

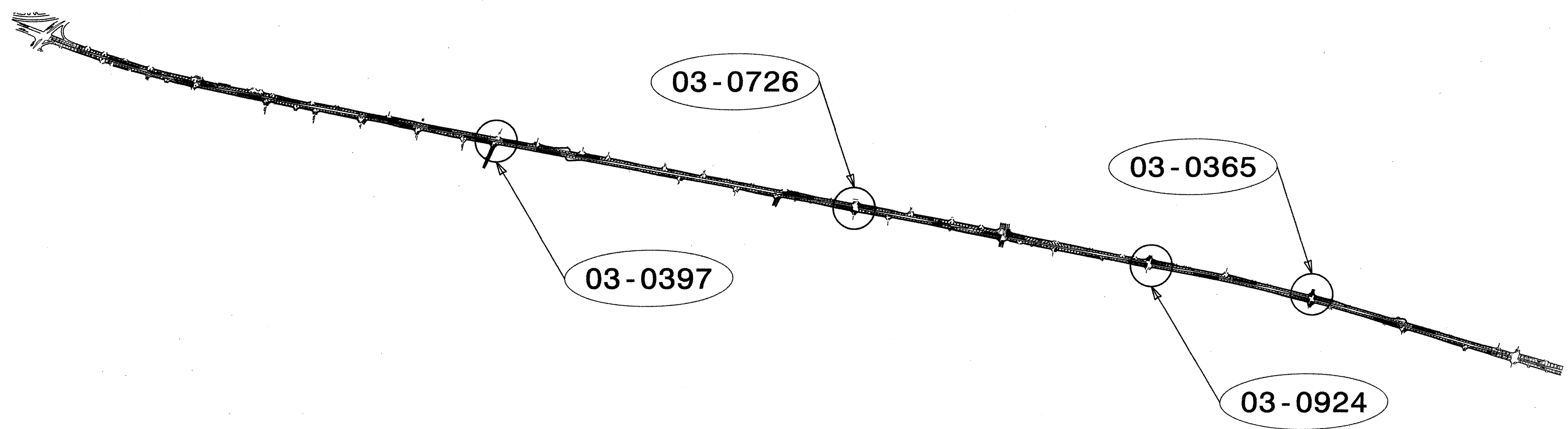
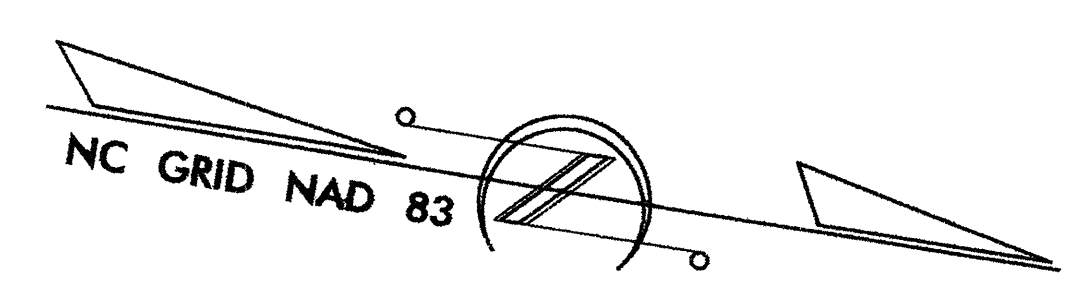
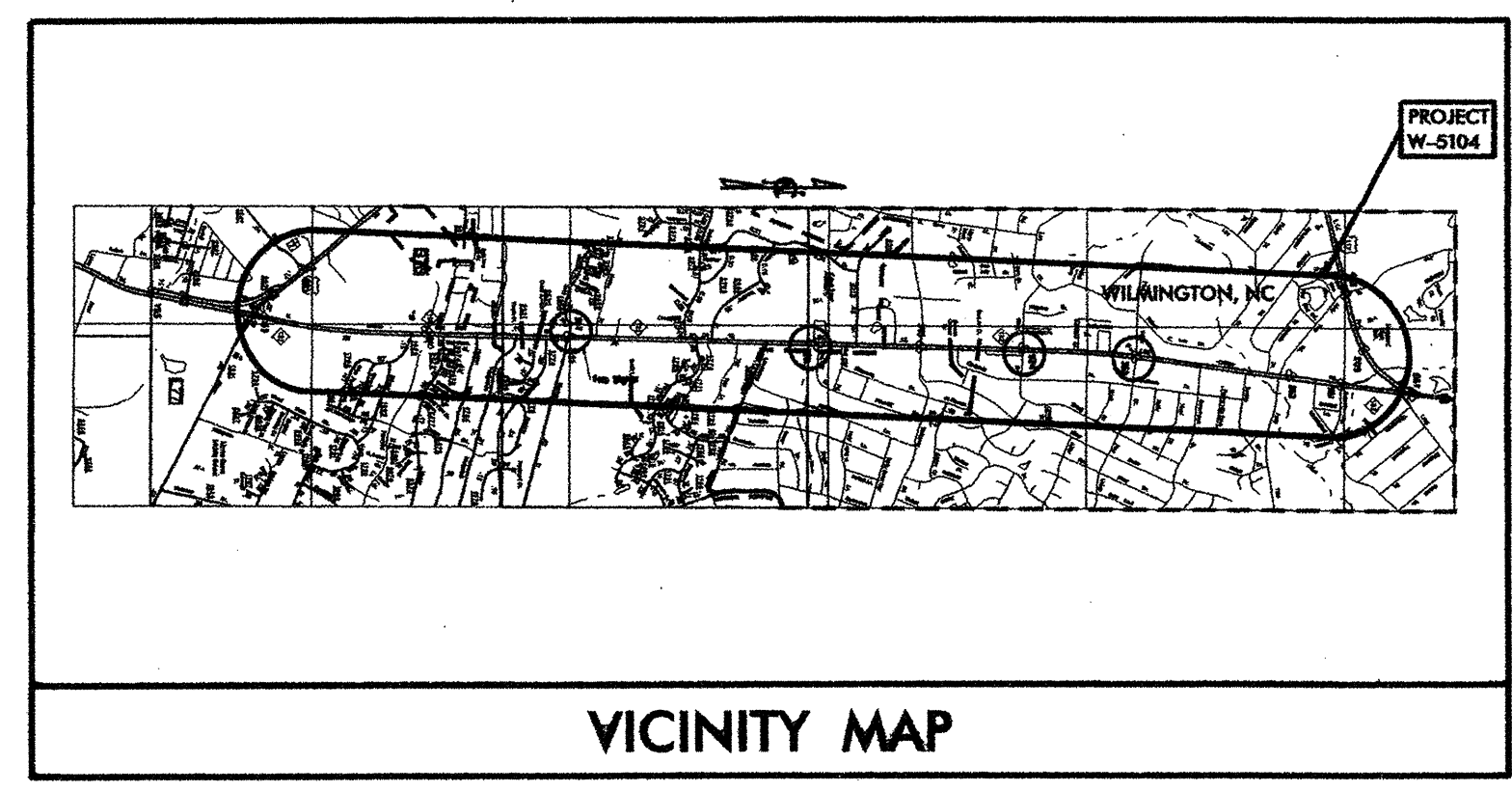
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# NEW HANOVER COUNTY

LOCATION: NC 132 (COLLEGE ROAD) FROM US 117 (SHIPYARD BOULEVARD)  
TO US 421 (CAROLINA BEACH ROAD)

TYPE OF WORK: SIGNALS

TIP PROJECT: W-5104



Refer to Roadway Standard Drawings  
NCDOT dated Jul, 2006 and  
"Standard Specifications for Roads  
and Structures" dated Jul, 2006.

Sheet #	Reference #	Location/Description
Sig. 1		Title Sheet
Sig. 2-5	03-0397	NC 132 (S. College Road) at SR 1565 (Mohican Trail)
Sig. 6-8	03-0726	NC 132 (S. College Road) at Pinecliff Drive and Entrance to Cape Fear Academy
Sig. 9-11	03-0924	NC 132 (S. College Road) at Bragg Drive
Sig. 12-15	03-0365	NC 132 (S. College Road) at Pine Valley Drive
Sig. 16-19	N/A	Wireless communication and conduit routing plans
Sig. 20-24	N/A	Metal Strain Poles Typicals
Sig. 25-27	N/A	Inductive Detection Loops Details

**INTELLIGENT TRANSPORTATION AND SIGNALS UNIT**

Contacts:

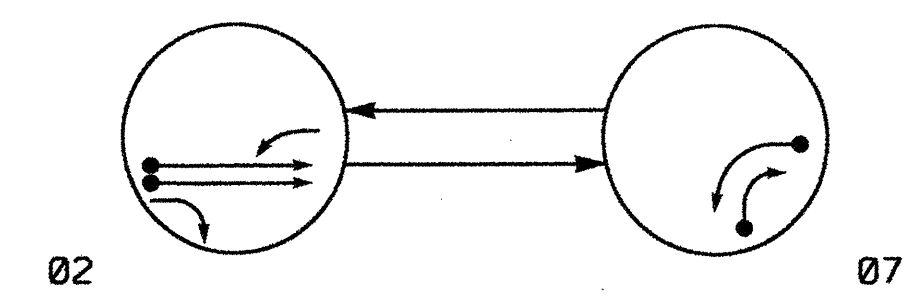
Pamela L. Alexander, PE - Eastern Region Signals Engineer  
John T Rowe Jr., PE - Signal Equipment Design Engineer  
Greg Fuller, PE - State ITS and Signals Engineer

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

750 N. Greenfield Parkway, Garner, NC 27529

3-F:\48-200-1055-SIGNALS\Signal Design\Eastern Region\Div-03\W-5104\Roadway file\W-5104\_title sheet.dgn

**PHASING DIAGRAM**



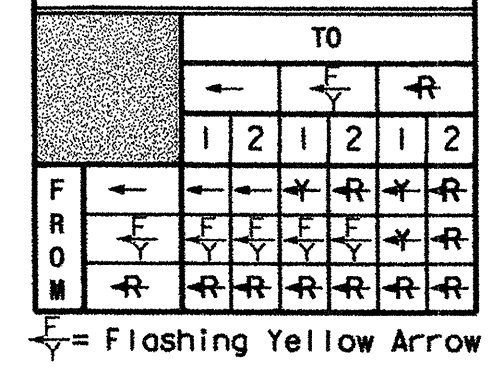
**PHASING DIAGRAM DETECTION LEGEND**

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

**TABLE OF OPERATION**

SIGNAL FACE	PHASE		
	02	07	FLASH
21, 22	G	R	Y
71	Y	Y	Y
72, 73	R	R	Y

**STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL**



**OASIS 2070L LOOP & DETECTOR INSTALLATION CHART**

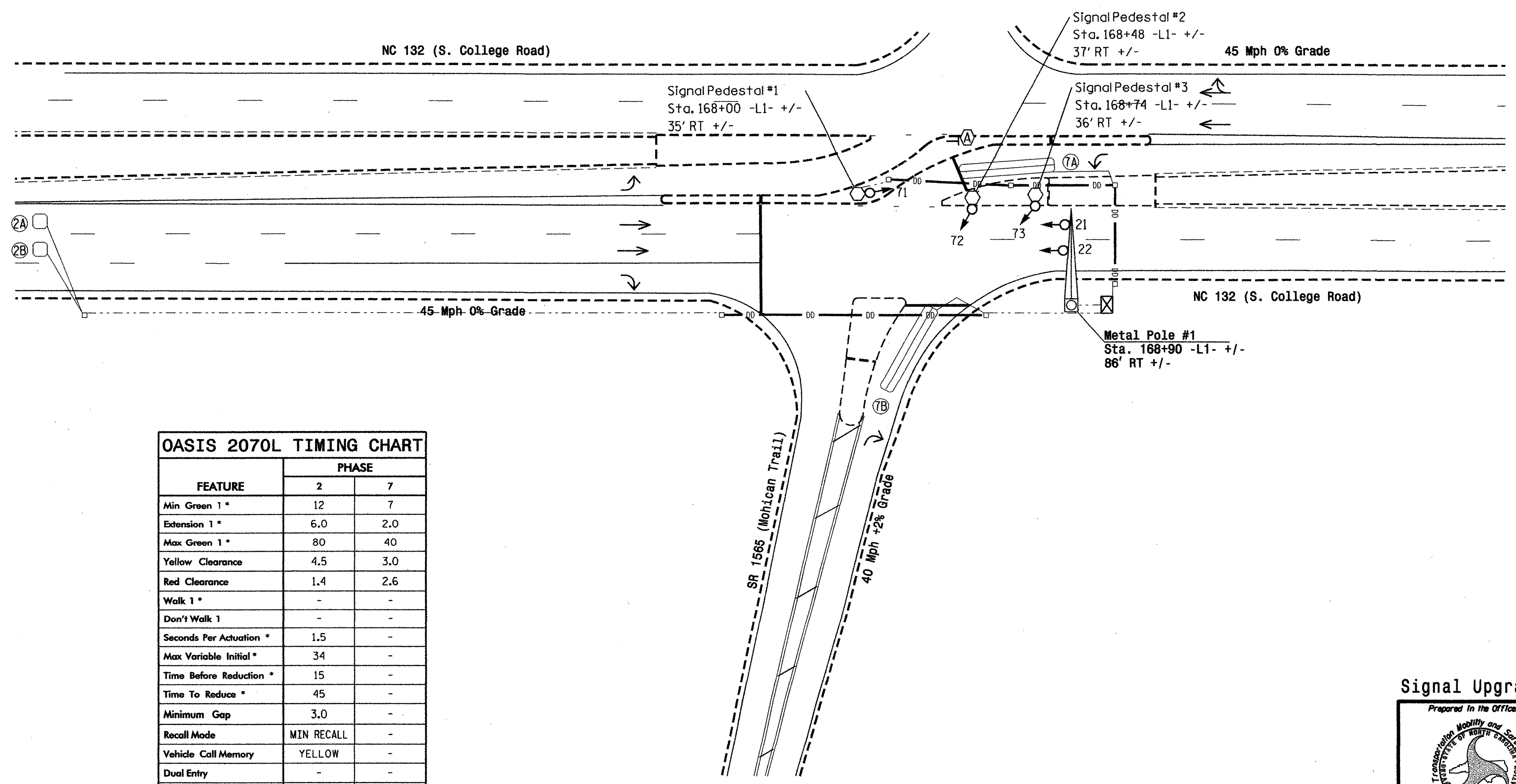
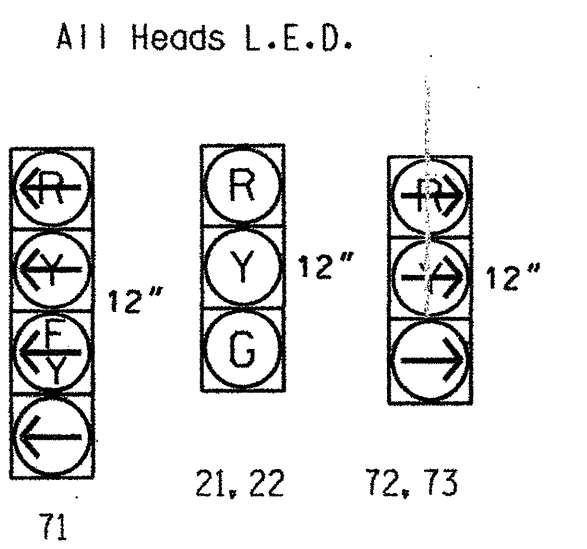
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING								
				PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP			
2A	6X6	300	4	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	300	4	Y	2	Y	Y	-	-	-	-	Y
7A	6X40	0	2-4-2	Y	7	Y	Y	-	-	15	-	Y
7B	6X40	0	2-4-2	Y	7	Y	Y	-	-	15	-	Y

**2 Phase Fully Actuated Wilmington Signal System**

**NOTES**

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. Closed loop system data: Controller Asset #0397.

**SIGNAL FACE I.D.**



**OASIS 2070L TIMING CHART**

FEATURE	PHASE	
	2	7
Min Green 1*	12	7
Extension 1*	6.0	2.0
Max Green 1*	80	40
Yellow Clearance	4.5	3.0
Red Clearance	1.4	2.6
Walk 1*	-	-
Don't Walk 1	-	-
Seconds Per Actuation*	1.5	-
Max Variable Initial*	34	-
Time Before Reduction*	15	-
Time To Reduce*	45	-
Minimum Gap	3.0	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

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

**LEGEND**

PROPOSED	EXISTING
○→ Traffic Signal Head	○→ Traffic Signal Head
●→ Modified Signal Head	N/A
↑ Sign	↑ Sign
⊕ Pedestrian Signal Head With Push Button & Sign	⊕ Pedestrian Signal Head With Push Button & Sign
⊙ Signal Pole with Guy	⊙ Signal Pole with Guy
⊙ Signal Pole with Sidewalk Guy	⊙ Signal Pole with Sidewalk Guy
⊠ Inductive Loop Detector	⊠ Inductive Loop Detector
⊠ Controller & Cabinet	⊠ Controller & Cabinet
⊠ Junction Box	⊠ Junction Box
- - - 2-in Underground Conduit	- - - 2-in Underground Conduit
N/A Right of Way	N/A Right of Way
→ Directional Arrow	→ Directional Arrow
⊙ Metal Pole with Mastarm	⊙ Metal Pole with Mastarm
- - - Directional Drill	- - - Directional Drill
⊙ "STOP HERE ON RED" Sign (R10-6)	⊙ "STOP HERE ON RED" Sign (R10-6)

**Signal Upgrade**

Prepared In the Offices of:

**NC 132 (S. College Road) at SR 1565 (Mohican Trail)**

Division 3 New Hanover County Wilmington

PLAN DATE: July 2010 REVIEWED BY:

PREPARED BY: I. O. Umzurike REVIEWED BY:

REVISIONS: \_\_\_\_\_ INIT.: \_\_\_\_\_ DATE: \_\_\_\_\_

SCALE: 0 30 1"=30'

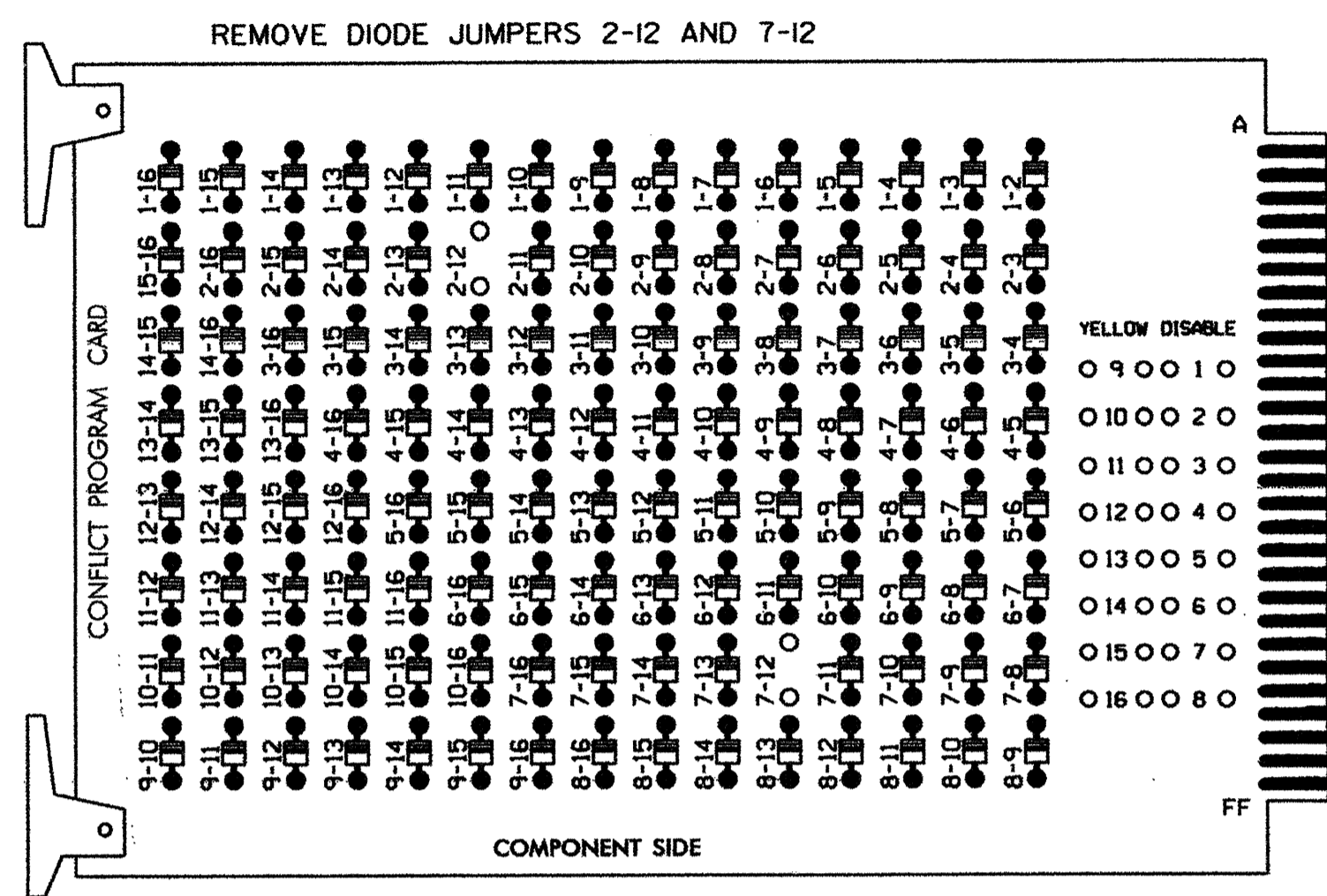
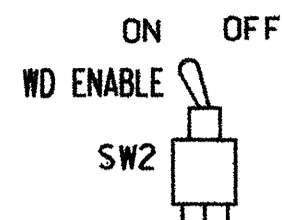
SIGNATURE: I. O. Umzurike DATE: 8/10/10

SIG. INVENTORY NO. 03-0397

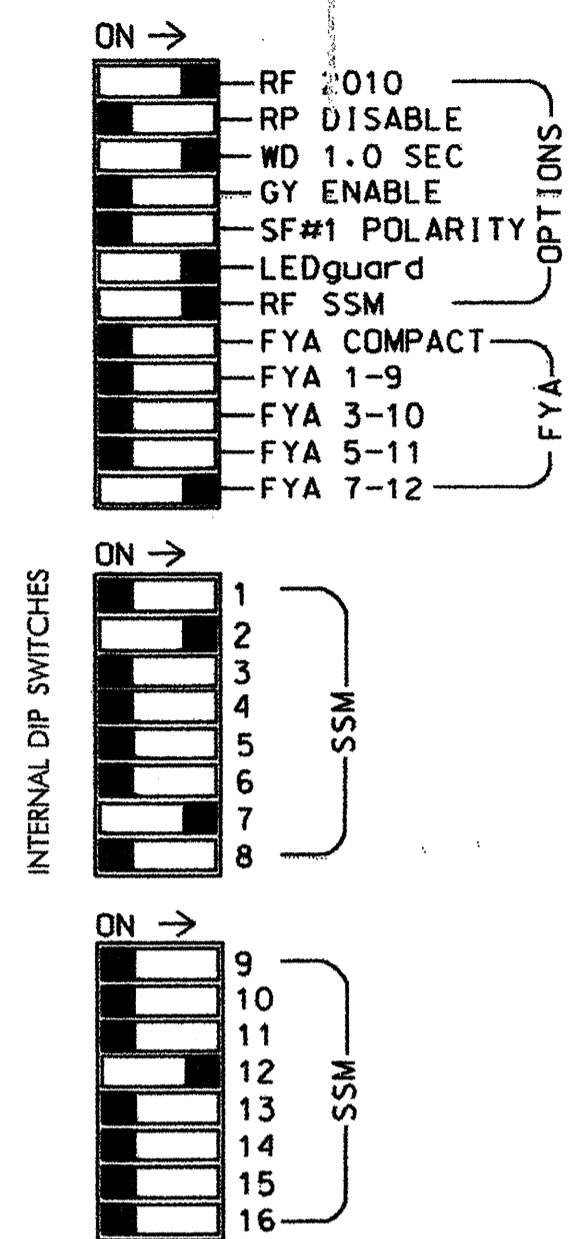
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**EDI MODEL 2010ECL-NC CONFLICT MONITOR  
PROGRAMMING DETAIL**

(remove jumpers and set switches as shown)



REMOVE JUMPERS 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.
- Make sure jumpers SEL2-SEL5 are present on the monitor board.

**INPUT FILE POSITION LAYOUT**

(front view)

FILE "I" U	1	2	3	4	5	6	7	8	9	10	11	12	13	14
L	S	∅ 2	S	S	S	S	S	S	S	S	S	S	S	FS
	←-1-103M	2A	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	DC ISOLATOR
		∅ 2												ST
		2B												DC ISOLATOR
FILE "J" U	1	2	3	4	5	6	7	8	9	10	11	12	13	14
L	S	S	S	S	∅ 7	S	S	S	S	S	S	S	S	S
	←-1-103M	←-1-103M	←-1-103M	←-1-103M	7A	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M	←-1-103M
					∅ 7									
					7B									

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

FS = FLASH SENSE  
ST = STOP TIME

**NOTES**

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,4,5,6,8,9,10,11,13,14,15 & 16 to load switch AC+ per cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phase 2 for Variable Initial and Gap Reduction.
- Program phase 2 for Start-Up in Green.
- Set all detector card channels to 'PRESENCE' mode.
- Program phase 2 for Yellow Flash.
- The cabinet and controller are part of the Wilmington Signal System. Controller Asset: #0397

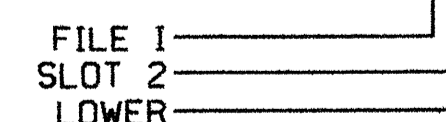
**EQUIPMENT INFORMATION**

CONTROLLER.....CONTRACTOR SUPPLIED 2070L  
CABINET.....CONTRACTOR SUPPLIED 332A W/AUX  
SOFTWARE.....ECONOLITE OASIS  
CABINET MOUNT.....BASE  
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)  
LOAD SWITCHES USED.....S2,S7,S13  
PHASES USED.....2,7  
OVERLAP 'A'.....NOT USED  
OVERLAP 'B'.....NOT USED  
OVERLAP 'C'.....NOT USED  
OVERLAP 'D'.....2+7

**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			
7A	TB5-5,6	J5U	57	19	7	7	Y	Y			15
7B	TB5-7,8	J5L	57	19	7	7	Y	Y			15

INPUT FILE POSITION LEGEND: I2L



**SIGNAL HEAD HOOK-UP CHART**

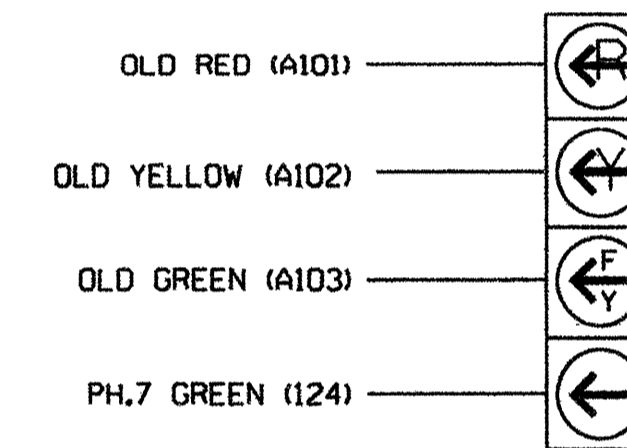
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71*	72,73	NU	NU	NU	NU	NU	71*	NU	
RED		128																	
YELLOW		129																	
GREEN		130																	
RED ARROW										122								A101	
YELLOW ARROW										123									A102
FLASHING YELLOW ARROW																			A103
GREEN ARROW										124	124								

NU = Not Used

\* See 4-Sect. FYA-PPLT Signal Wiring Detail below.

**4-SECTION FYA-PPLT SIGNAL WIRING DETAIL**

(wire signal head as shown)



71

**NOTE:**

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0397  
DESIGNED: JULY 2010  
SEALED: 8/10/10  
REVISED: N/A

SEE SHEET 2 FOR FYA-PPLT SIGNAL SEQUENCE PROGRAMMING AND OVERLAP PROGRAMMING

Electrical Detail - Sheet 1 of 2

	Electrical and Programming Details For: <b>NC 132 (S. College Road) at SR 1565 (Mohican Trail)</b>		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER 008453 JOHN T. ROWE, JR. 8-17-10
	Division 03 New Hanover County Wilmington PLAN DATE: August 2010 REVIEWED BY: [Signature] PREPARED BY: F.E. Russ REVIEWED BY: [Signature]	REVISIONS: [Table] INIT. DATE: [Table]	

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

LOGICAL I/O COMMAND #1 (+/-COMMAND#)  
IF ACTIVE PHASE #7 IS ON  
AND RED CLEAR ON PHASE #7 IS ON

↓  
SCROLL DOWN

THEN:  
SET OUTPUT ASSIGNMENT #39 ON  
SET OUTPUT ASSIGNMENT #40 OFF

NOTE: LOGIC FOR PHASE 7 RED CLEAR WHEN TRANSITIONING FROM PHASE 7 TO PHASE 2 (HEAD 71)

PRESS '+'

LOGICAL I/O COMMAND #2 (+/-COMMAND#)  
IF ACTIVE PHASE #7 IS ON

↓  
SCROLL DOWN

THEN:  
SET OUTPUT ASSIGNMENT #4 OFF

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 7 (HEAD 71)

PRESS '+'

LOGICAL I/O COMMAND #3 (+/-COMMAND#)  
IF YELLOW ON PHASE #7 IS ON

↓  
SCROLL DOWN

THEN:  
SET OUTPUT ASSIGNMENT #40 ON

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 7 (HEAD 71)

END OF PROGRAMMING

**OUTPUT REFERENCE SCHEDULE**

OUTPUT 39 = Overlap D Red  
OUTPUT 40 = Overlap D Yellow  
OUTPUT 41 = Overlap D Green

### OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS). PRESS '+' UNTIL OVERLAP 'D' IS REACHED.

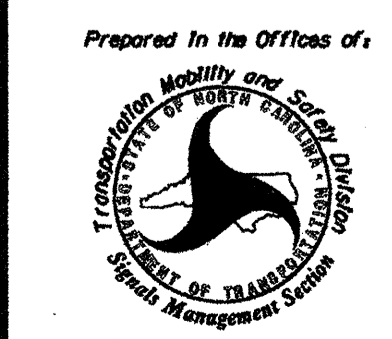
PAGE 1: VEHICLE OVERLAP 'D' SETTINGS  
PHASE: 12345678910111213141516  
VEH OVL PARENTS: X X  
VEH OVL NOT VEH:  
VEH OVL NOT PED:  
VEH OVL GRN EXT:  
STARTUP COLOR: \_ RED \_ YELLOW \_ GREEN  
FLASH COLORS: \_ RED \_ YELLOW X GREEN  
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)  
FLASH YELLOW IN CONTROLLER FLASH?...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: 03-0397  
DESIGNED: JULY 2010  
SEALED: 8/10/10  
REVISED: N/A

Electrical Detail - Sheet 2 of 2

 <p>Prepared In the Offices of: TRANSPORTATION MOBILITY AND SAFETY SOLUTIONS, INC. 750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>NC 132 (S. College Road) at SR 1565 (Mohican Trail)</p>		<p>SEAL NORTH CAROLINA PROFESSIONAL ENGINEER JOHN T. ROWE, JR. 008453</p>			
	<p>Division 03 New Hanover County Wilmington</p> <p>PLAN DATE: August 2010 REVIEWED BY: JTR</p> <p>PREPARED BY: F.E. RUSS REVIEWED BY:</p>	<p>REVISIONS</p> <table border="1"> <tr> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> </tr> </table>		INIT.	DATE	
INIT.	DATE					

**SPECIAL NOTE**

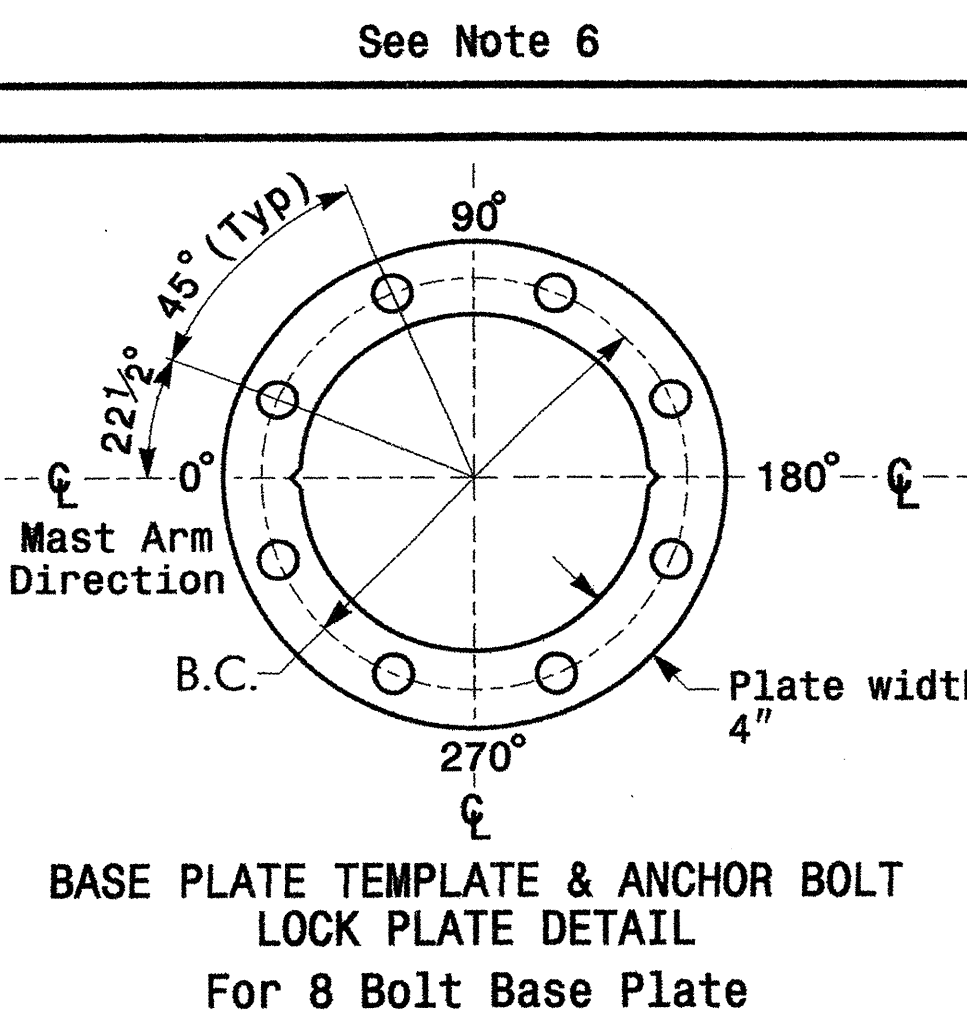
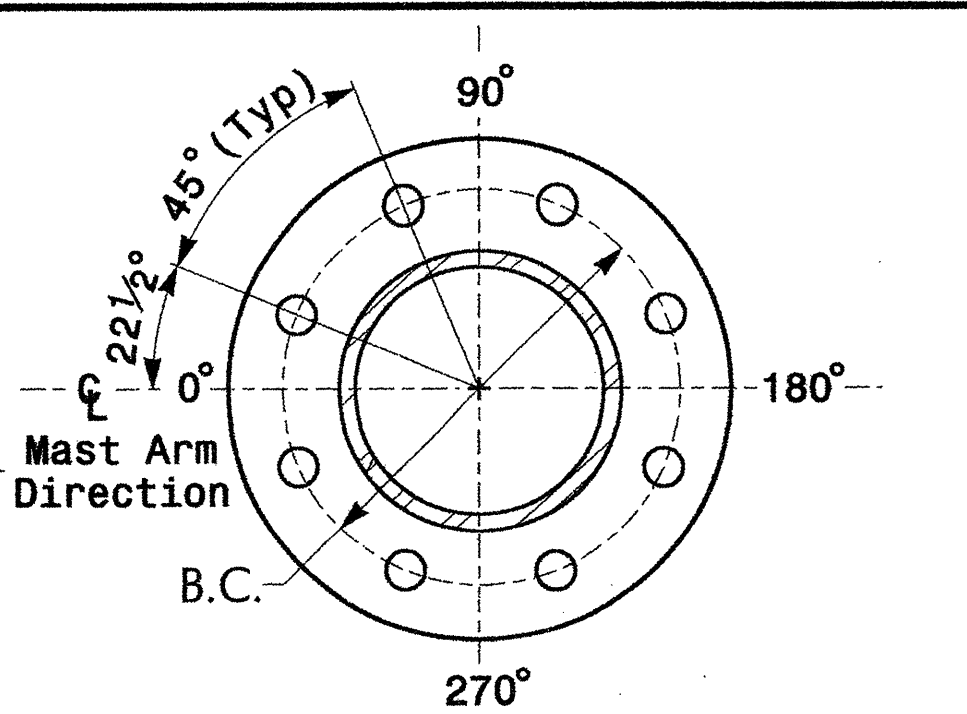
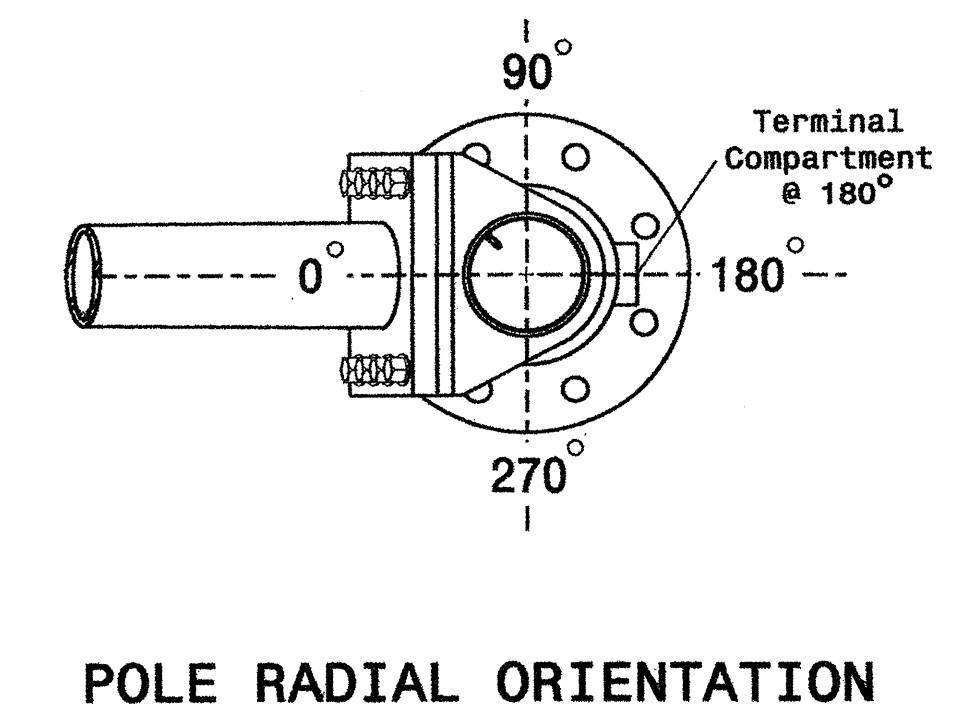
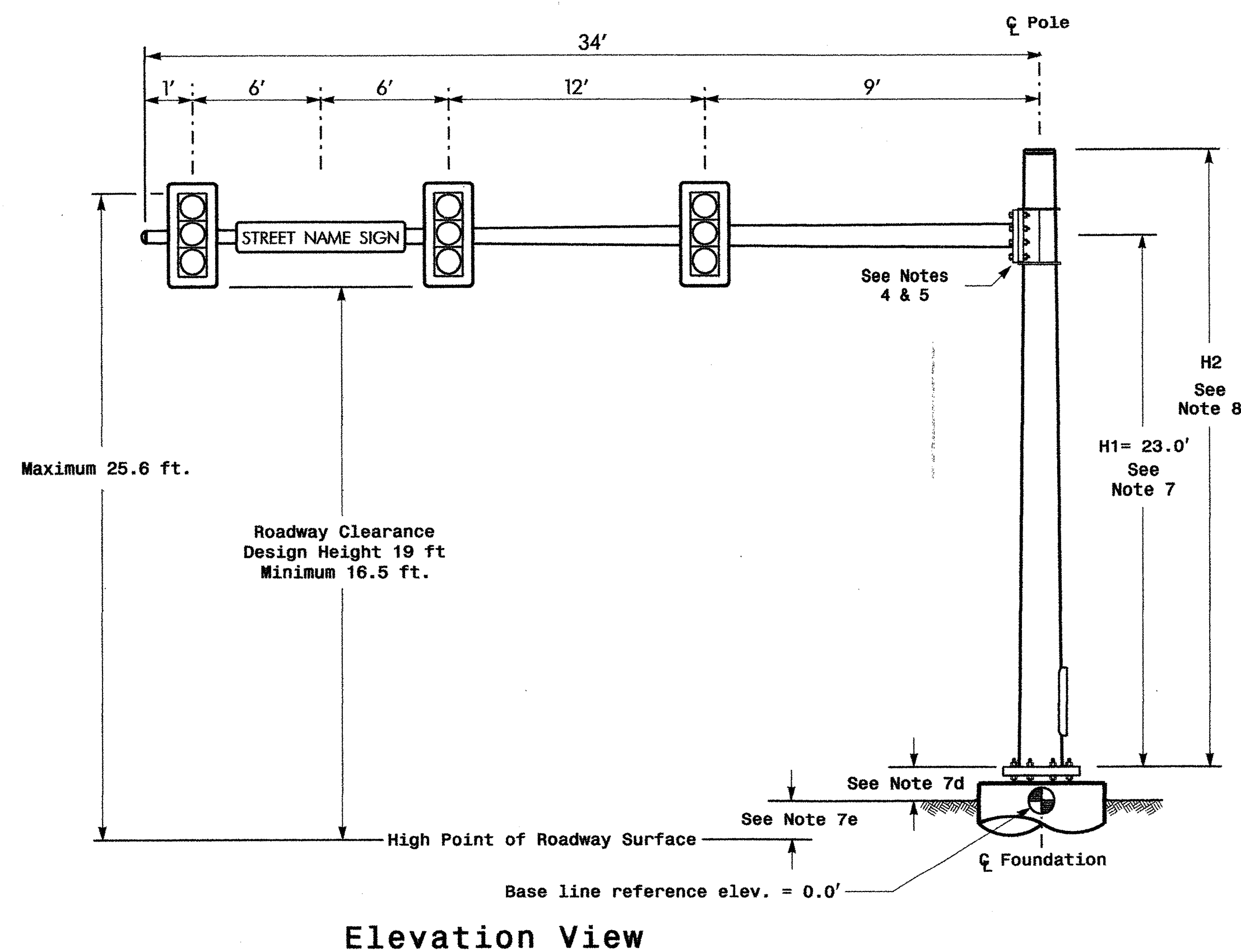
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

**Elevation Data for Mast Arm Attachment (H1)**

Elevation Differences for:	Pole 1
Baseline reference point at $\phi$ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+2.6 ft.
Elevation difference at Edge of travelway or face of curb	N/A

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
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

**Design Loading for METAL POLE NO. 1**



**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 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
    - The 2006 NCDOT Roadway Standard Drawings.
- 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.
  - The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
  - 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:
    - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
    - 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.
  - 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 & Geometrics 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 2 (130 mph)

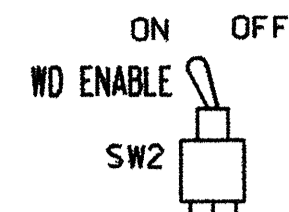
	Prepared in the Office of: <b>NC 132 (S. College Road)</b> at <b>SR 1565 (Mohican Trail)</b>		SEAL 
	Division 3 New Hanover County PLAN DATE: July 2010 PREPARED BY: I. O. Umozurike	Wilmington REVIEWED BY: REVIEWED BY:	
REVISIONS INIT. DATE		SIGNATURE:  DATE: 8/5/10 SIG. INVENTORY NO. 03-0397	

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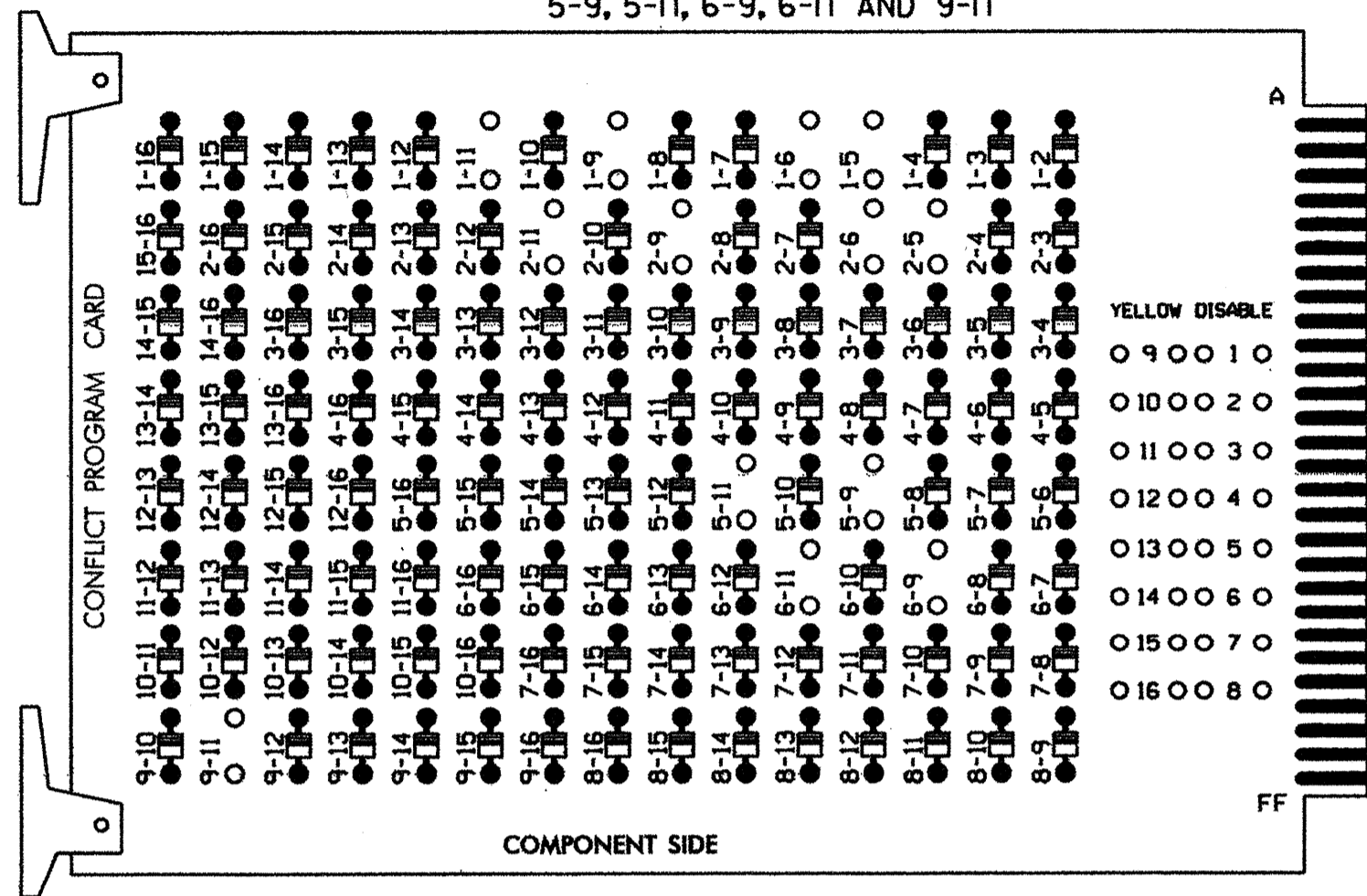


**EDI MODEL 2010ECL-NC CONFLICT MONITOR  
PROGRAMMING DETAIL**

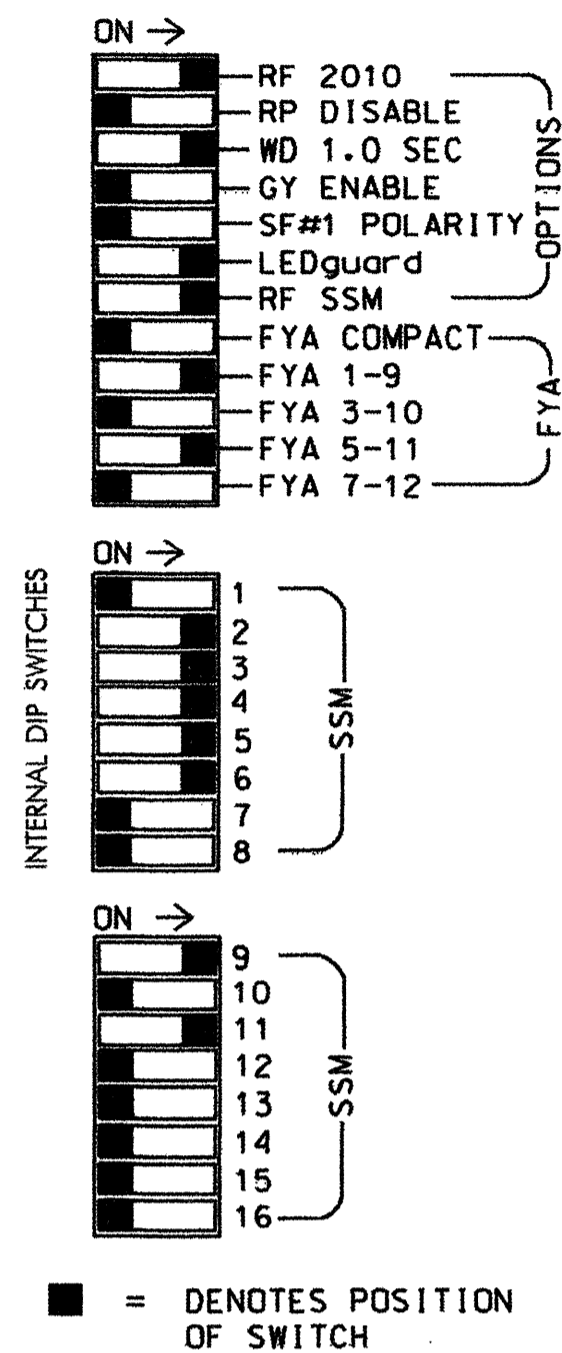
(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 5-9, 5-11, 6-9, 6-11 AND 9-11



REMOVE JUMPERS AS SHOWN



**NOTES:**

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

**INPUT FILE POSITION LAYOUT**

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	∅ 1 1A	∅ 2 2A	∅ 3 3A	∅ 4 4A	∅ 5 5A	∅ 6 6A	∅ 7 7A	∅ 8 8A	∅ 9 9A	∅ 10 10A	∅ 11 11A	∅ 12 12A	∅ 13 13A	∅ 14 14A
FILE "J"	NOT USED	∅ 2 2B	∅ 3 3B	∅ 4 4B	∅ 5 5B	∅ 6 6B	∅ 7 7B	∅ 8 8B	∅ 9 9B	∅ 10 10B	∅ 11 11B	∅ 12 12B	∅ 13 13B	∅ 14 14B

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

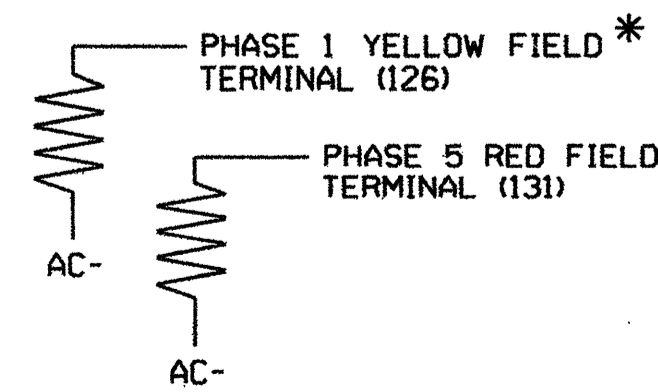
FS = FLASH SENSE  
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

**LOAD RESISTOR INSTALLATION DETAIL**

(install resistors as shown below)

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



\* REMOVE EXISTING LOAD RESISTOR FROM PHASE 1 RED FIELD TERMINAL

**NOTES**

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,7,8,10,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start-Up in Green.
- Set all detector card channels to 'PRESENCE' mode.
- Program phases 2 and 6 for Yellow Flash, and Overlap 1 as a Wag Overlap.
- The cabinet and controller are part of the Wilmington Signal System. Controller Asset: #0726

**EQUIPMENT INFORMATION**

CONTROLLER.....EXISTING TYPE 2070L  
CABINET.....EXISTING MODEL 332A W/AUX  
SOFTWARE.....ECONOLITE OASIS  
CABINET MOUNT.....BASE  
OUTPUT FILE POSITIONS...18 (12-STD,6-AUX)  
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S9,S12  
PHASES USED.....1,2,3,4,5,6  
OVERLAP 'A'.....1+2  
OVERLAP 'B'.....NOT USED  
OVERLAP 'C'.....5+6  
OVERLAP 'D'.....NOT USED

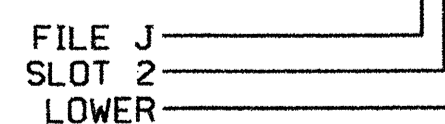
**INPUT FILE CONNECTION & PROGRAMMING CHART**

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 <sup>1</sup>	TB2-1,2	I1U	56	18	1	1	Y	Y			15
2A	TB2-5,6	J4U	48	10	2	2	Y	Y			3
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			5
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A <sup>2</sup>	TB3-1,2	J1U	95	17	5	5	Y	Y			15
5B	TB3-9,10	J3U	64	26	36	5	Y	Y	Y		3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			15
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			

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

<sup>2</sup>Add jumper from J1-W to I4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



**SIGNAL HEAD HOOK-UP CHART**

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	9	10	11	12	13	14
SIGNAL HEAD NO.	11*	21,22	NU	22	31	32	41	42	62	NU	42	51*	61,62	NU	NU	NU	NU	NU
RED		128		116	116	101	101			*		134						
YELLOW	*	129		117	117	102	102					135						
GREEN		130		118	118	103	103					136						
RED ARROW															A121		A114	
YELLOW ARROW				117				102	132						A122		A115	
FLASHING YELLOW ARROW															A123		A116	
GREEN ARROW	127			118	118	103	103	103	133	133								

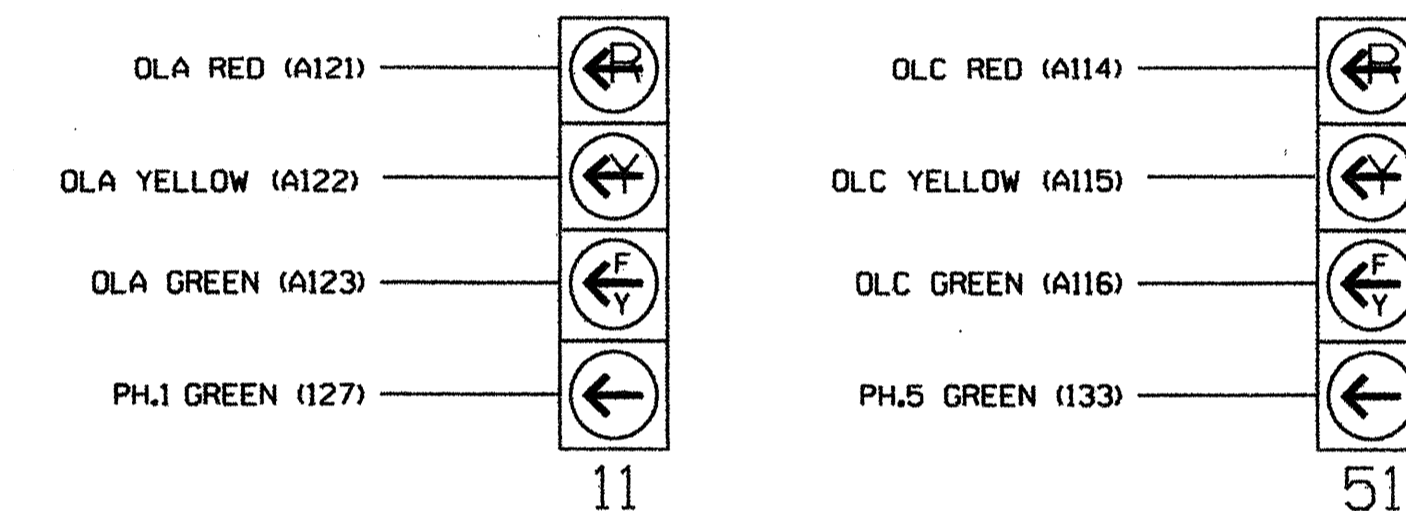
NU = Not Used

\* Denotes install load resistor. See Load Resistor Installation Detail this sheet.

\* See 4-Sect. FYA-PPLT Signal Wiring Detail below.

**4-SECTION FYA-PPLT SIGNAL WIRING DETAIL**

(wire signal heads as shown)



NOTE:

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

**BACKUP PROTECTION DISABLE NOTE**

From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll down to 'Backup Protect' and DISABLE programming for phases 2 and 6.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0726  
DESIGNED: JULY 2010  
SEALED: 8/10/10  
REVISED: N/A

SEE SHEET 2 FOR FYA-PPLT SIGNAL SEQUENCE PROGRAMMING AND OVERLAP PROGRAMMING

Electrical Detail - Sheet 1 of 2

Electrical and Programming Details For:

NC 132 (S. College Road) at Pinecliff Drive and Entrance to Cape Fear Academy

Division 03 New Hanover County Wilmington

PLAN DATE: August 2010 REVIEWED BY: [Signature]

PREPARED BY: F.E. RUSS REVIEWED BY: [Signature]

REVISIONS: [Table with columns for REVISIONS, INIT., DATE]

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE, INC.

Signature: John T. Rowe, 8-16-10

SIG. INVENTORY NO. 03-0726

### 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 & 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

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

PRESS '+'

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

↓  
SCROLL DOWN

THEN:  
SET OUTPUT ASSIGNMENT #52 OFF

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

PRESS '+'

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

↓  
SCROLL DOWN

THEN:  
SET OUTPUT ASSIGNMENT #51 ON

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

PRESS '+'

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

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

PRESS '+'

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

↓  
SCROLL DOWN

THEN:  
SET OUTPUT ASSIGNMENT #44 OFF

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

PRESS '+'

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

↓  
SCROLL DOWN

THEN:  
SET OUTPUT ASSIGNMENT #43 ON

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

END OF PROGRAMMING

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  
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)  
FLASH YELLOW IN CONTROLLER FLASH?...Y  
GREEN EXTENSION (0-255 SEC)...0.0  
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0  
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0  
OUTPUT AS PHASE # (0=NONE, 1-16)...0

← NOTICE GREEN FLASH

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  
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)  
FLASH YELLOW IN CONTROLLER FLASH?...Y  
GREEN EXTENSION (0-255 SEC)...0.0  
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0  
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0  
OUTPUT AS PHASE # (0=NONE, 1-16)...0

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0726  
DESIGNED: JULY 2010  
SEALED: 8/10/10  
REVISED: N/A

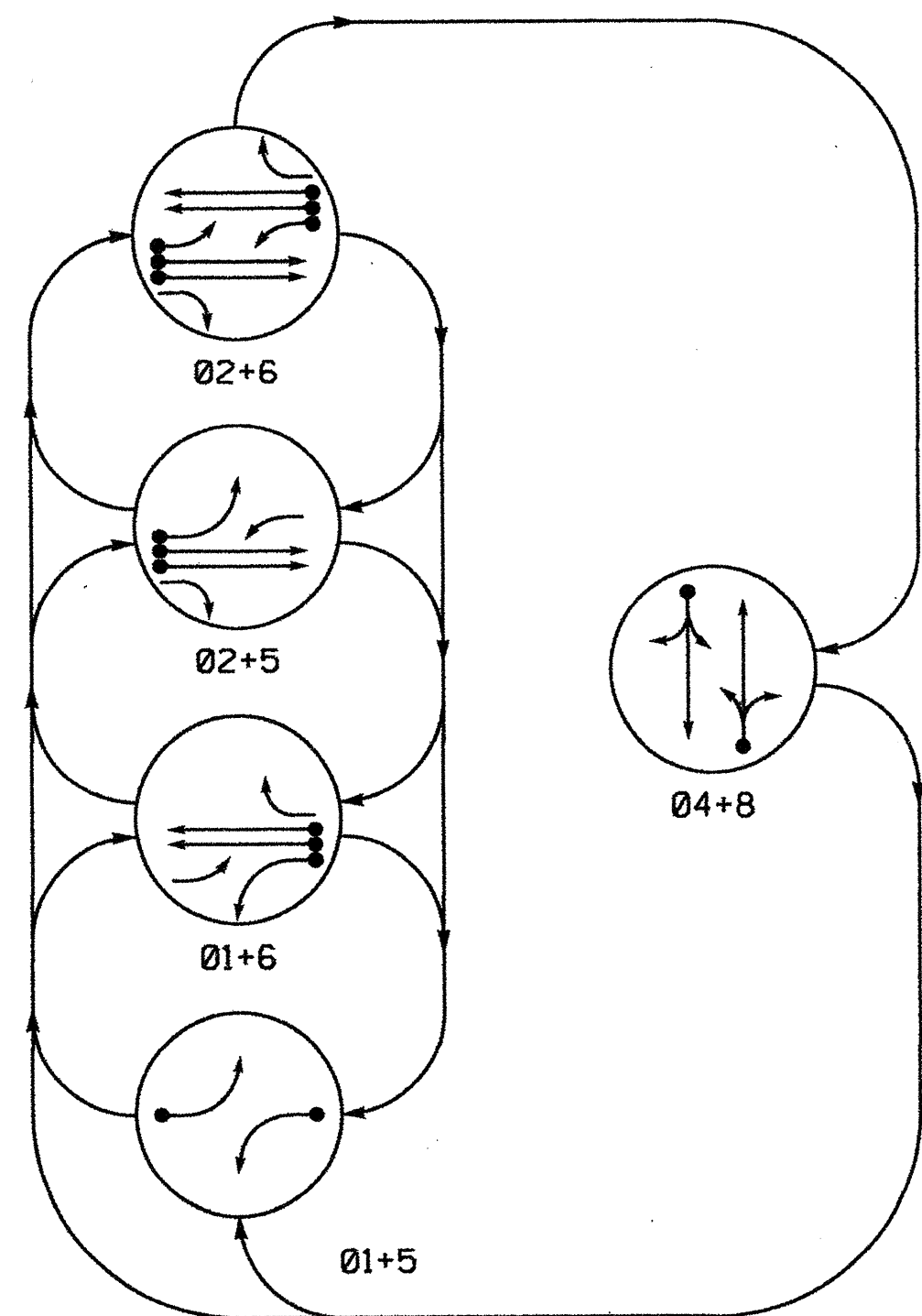
Electrical Detail - Sheet 2 of 2

	<p>NC 132 (S. College Road) at Pinecliff Drive and Entrance to Cape Fear Academy</p>					
	<p>Division 03 New Hanover County Wilmington</p> <p>PLAN DATE: August 2010 REVIEWED BY: <i>MR</i></p> <p>PREPARED BY: F.E. Russ REVIEWED BY:</p>	<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		INIT.	DATE	
INIT.	DATE					

15-AUG-2010 11:04  
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 487188



**PHASING DIAGRAM**



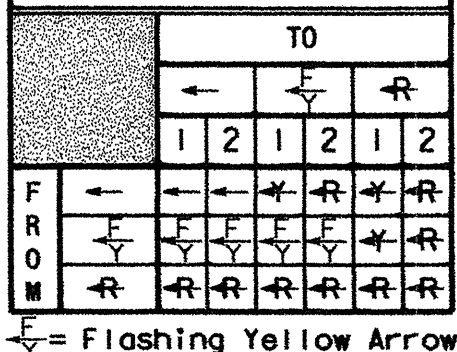
**PHASING DIAGRAM DETECTION LEGEND**

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

**TABLE OF OPERATION**

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

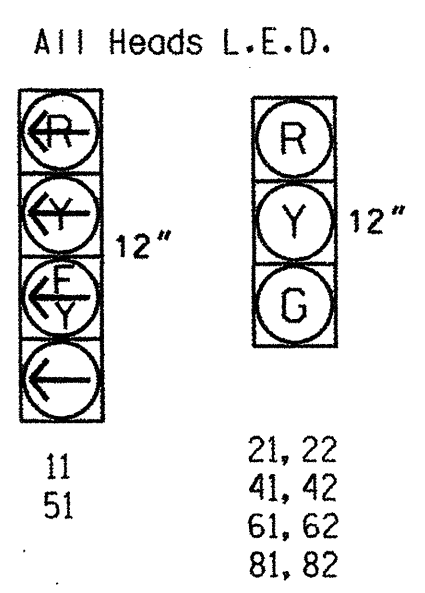
**STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL**



**OASIS 2070L LOOP & DETECTOR INSTALLATION CHART**

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Y	Y	-	-	15	-	-
2A	6X6	300	4	-	2	Y	Y	-	-	-	-	-
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	5	-	-
4B	6X15	0	2-4-2	Y	4	Y	Y	-	-	15	-	-
5A	6X60	0	2-4-2	-	5	Y	Y	-	-	-	-	-
6A	6X6	300	4	-	6	Y	Y	-	-	-	-	-
6B	6X6	300	4	-	6	Y	Y	-	-	-	-	-
8A	6X60	+5	2-4-2	-	8	Y	Y	-	-	5	-	-
8B	6X15	+5	2-4-2	-	8	Y	Y	-	-	15	-	-

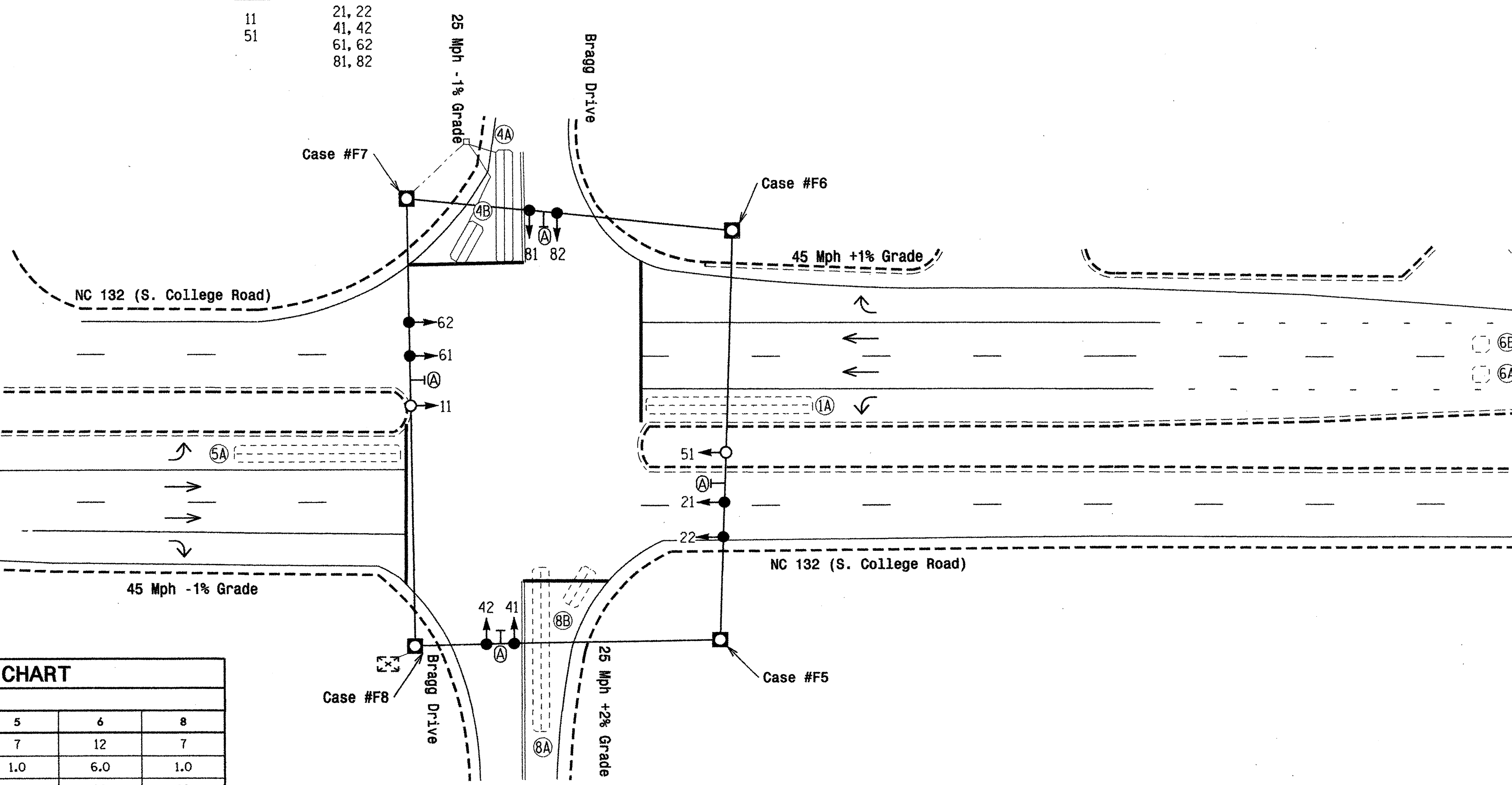
**SIGNAL FACE I.D.**



**5 Phase Fully Actuated Wilmington Signal System**

**NOTES**

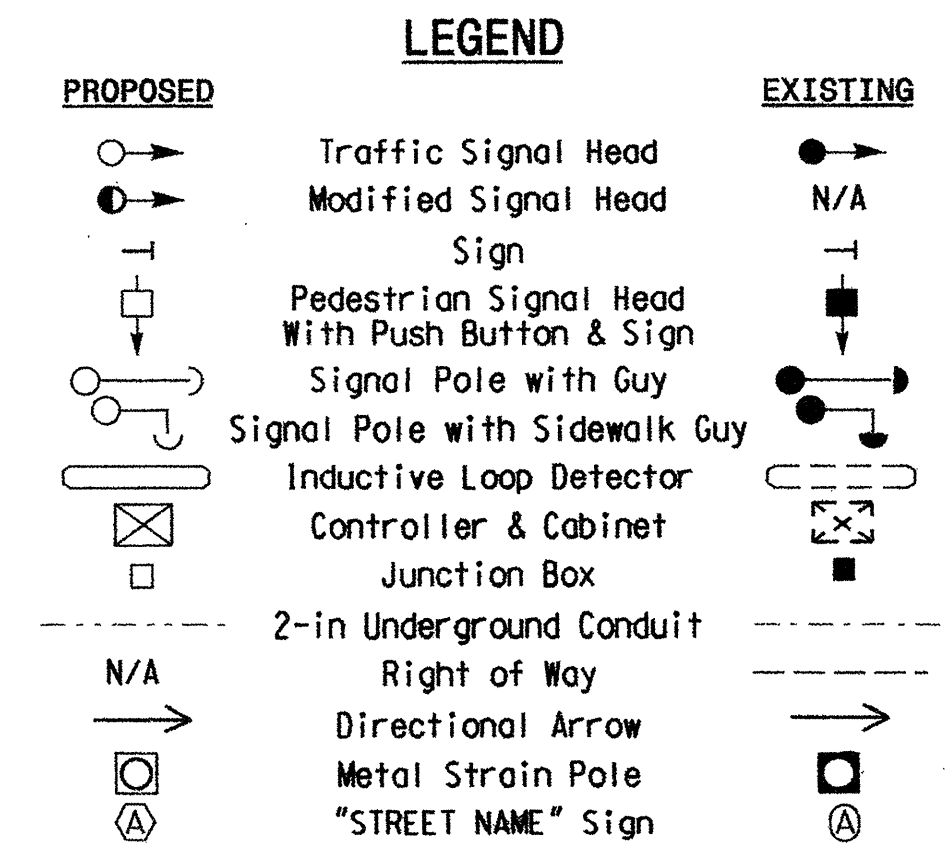
1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. Signal system data: Controller Asset #0924.



**OASIS 2070L TIMING CHART**

FEATURE	PHASE					
	1	2	4	5	6	8
Min Green 1 *	7	12	7	7	12	7
Extension 1 *	1.0	6.0	1.0	1.0	6.0	1.0
Max Green 1 *	15	80	20	15	80	20
Yellow Clearance	3.0	4.6	3.2	3.0	4.6	3.1
Red Clearance	2.8	1.4	3.0	2.9	1.4	3.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	1.5	-	-	1.5	-
Max Variable Initial *	-	34	-	-	34	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	45	-	-	45	-
Minimum Gap	-	3.0	-	-	3.0	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	-	-	YELLOW	-
Dual Entry	-	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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



**Signal Upgrade**

Prepared in the Offices of:

**NC 132 (S. College Road) at Bragg Drive**

Division 3 New Hanover County Wilmington

PLAN DATE: July 2010 REVIEWED BY: [Signature]

PREPARED BY: I. O. Umzurike REVIEWED BY: [Signature]

SCALE: 1"=30'

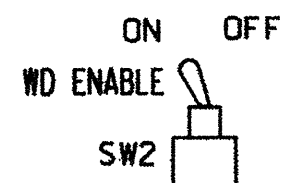
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SIG. INVENTORY NO. 03-0924

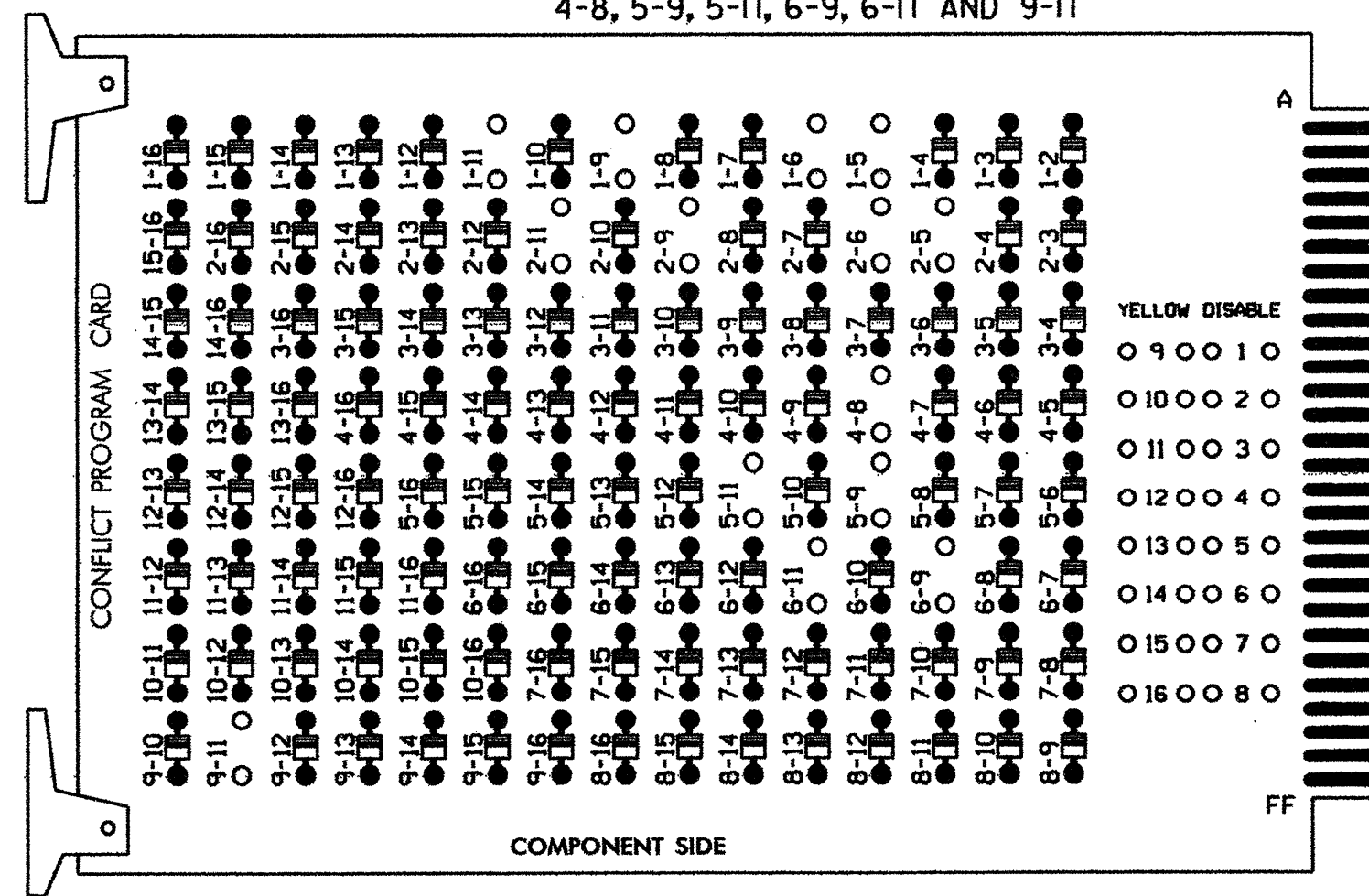
20-AUG-2010 12:26 S:\MITS\SIG\15\Sig\04\W5104\W5104.dgn f:\mcs\0924\03-0924.dgn\_2010mids.dgn

**EDI MODEL 2010ECL-NC CONFLICT MONITOR  
PROGRAMMING DETAIL**

(remove jumpers and set switches as shown)



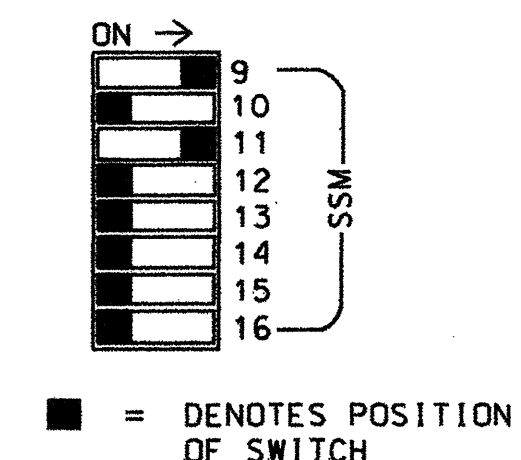
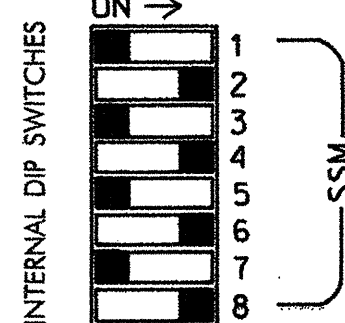
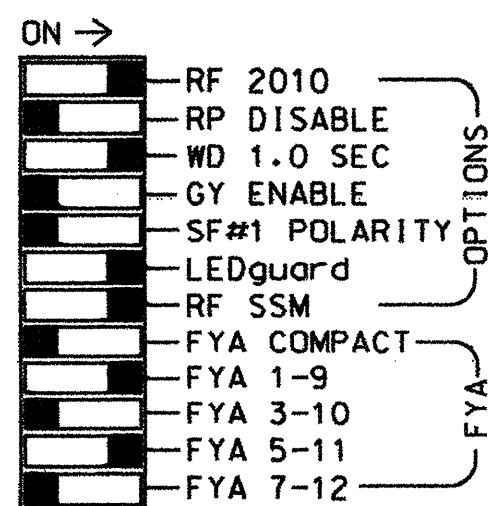
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 4-8, 5-9, 5-11, 6-9, 6-11 AND 9-11



REMOVE JUMPERS AS SHOWN

**NOTES:**

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



■ = DENOTES POSITION OF SWITCH

**INPUT FILE POSITION LAYOUT**

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	∅ 1 1A	∅ 2 2A	∅ 3 3A	∅ 4 4A	∅ 5 5A	∅ 6 6A	∅ 7 7A	∅ 8 8A	∅ 9 9A	∅ 10 10A	∅ 11 11A	∅ 12 12A	∅ 13 13A	∅ 14 14A
FILE "J"	∅ 1 1A	∅ 2 2A	∅ 3 3A	∅ 4 4A	∅ 5 5A	∅ 6 6A	∅ 7 7A	∅ 8 8A	∅ 9 9A	∅ 10 10A	∅ 11 11A	∅ 12 12A	∅ 13 13A	∅ 14 14A

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

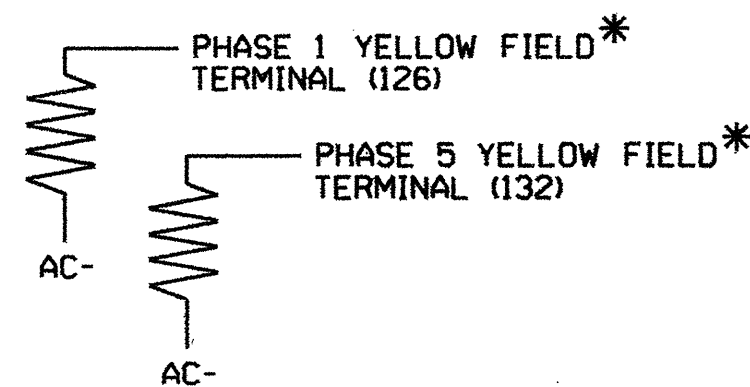
FS = FLASH SENSE  
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

**LOAD RESISTOR INSTALLATION DETAIL**

(install resistors as shown below)

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



\* REMOVE EXISTING LOAD RESISTORS FROM PHASES 1 AND 5 RED FIELD TERMINALS

**NOTES**

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5,7,10,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start-Up in Green.
- Set all detector card channels to 'PRESENCE' mode.
- Program phases 2 and 6 for Yellow Flash, and Overlap 1 as a Wag Overlap.
- The cabinet and controller are part of the Wilmington Signal System. Controller Asset: #0924

**EQUIPMENT INFORMATION**

CONTROLLER.....EXISTING TYPE 2070L  
CABINET.....EXISTING MODEL 332A W/AUX SOFTWARE.....ECONOLITE OASIS  
CABINET MOUNT.....BASE  
OUTPUT FILE POSITIONS...18 (12-STD,6-AUX)  
LOAD SWITCHES USED.....S1,S2,S4,S5,S6,S8,S9,S12  
PHASES USED.....1,2,4,5,6,8  
OVERLAP 'A'.....1+2  
OVERLAP 'B'.....NOT USED  
OVERLAP 'C'.....5+6  
OVERLAP 'D'.....NOT USED

**INPUT FILE CONNECTION & PROGRAMMING CHART**

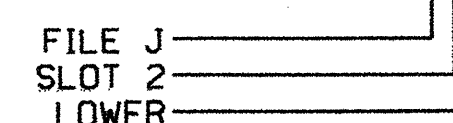
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A <sup>1</sup>	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
	2A	TB2-5,6	I2U	39	1	2	Y	Y			
	2B	TB2-7,8	I2L	43	5	12	2	Y	Y		
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			5
	4B	TB4-11,12	I6L	45	7	14	4	Y	Y		15
	5A <sup>2</sup>	TB3-1,2	J1U	55	17	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y	Y		3
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		5
	8B	TB5-11,12	J6L	46	8	18	8	Y	Y		15

<sup>1</sup>Add jumper from I1-W to J4-W. on rear of input file\*

<sup>2</sup>Add jumper from J1-W to I4-W. on rear of input file\*

\* REMOVE EXISTING JUMPERS ON TERMINAL BLOCKS TB2 AND TB3

INPUT FILE POSITION LEGEND: J2L



**SIGNAL HEAD HOOK-UP CHART**

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	9	OLA	DLB	SPARE	DLA	DLB	SPARE
SIGNAL HEAD NO.	11*	21,22	NU	NU	41,42	NU	51*	61,62	NU	NU	81,82	NU	11*	NU	NU	51*	NU	NU	
RED		128			101			134			107								
YELLOW	*	129			102		*	135			108								
GREEN		130			103			136			109								
RED ARROW														A121				A114	
YELLOW ARROW														A122				A115	
FLASHING YELLOW ARROW														A123				A116	
GREEN ARROW	127							133											

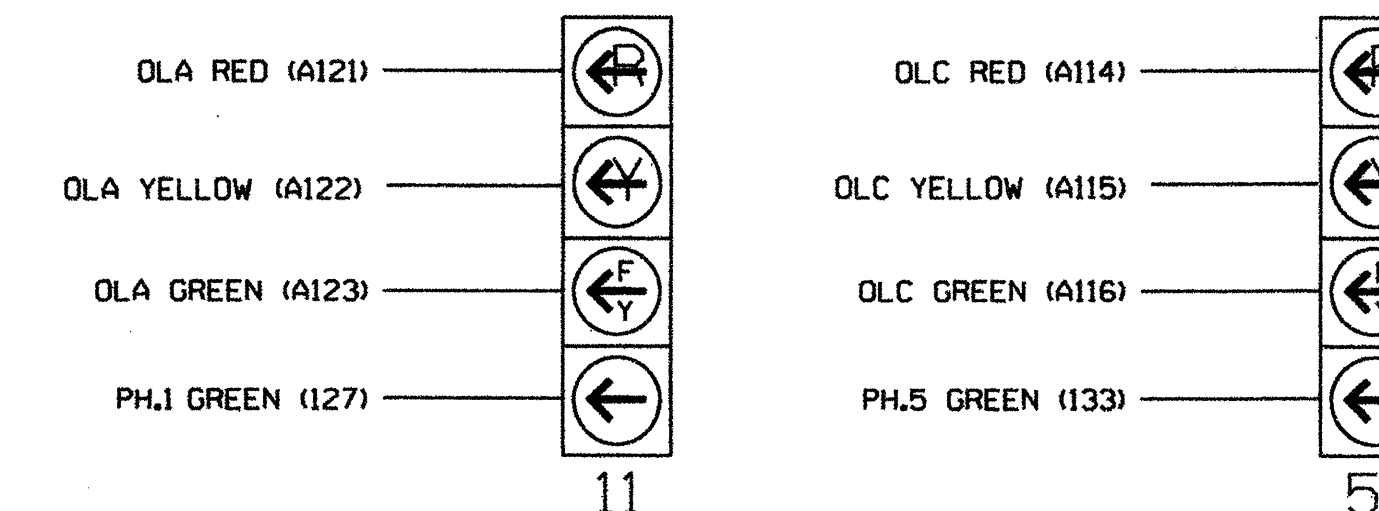
NU = Not Used

\* Denotes install load resistor. See Load Resistor Installation Detail this sheet.

\* See 4-Sept. FYA-PPLT Signal Wiring Detail below.

**4-SECTION FYA-PPLT SIGNAL WIRING DETAIL**

(wire signal heads as shown)



NOTE:

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

**BACKUP PROTECTION DISABLE NOTE**

From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll down to 'Backup Protect' and DISABLE programming for phases 2 and 6.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0924  
DESIGNED: JULY 2010  
SEALED: 8/10/10  
REVISED: N/A

SEE SHEET 2 FOR FYA-PPLT SIGNAL SEQUENCE PROGRAMMING AND OVERLAP PROGRAMMING

Electrical Detail - Sheet 1 of 2

	NC 132 (S. College Road) at Bragg Drive	
	Division 03 PLAN DATE: August 2010 PREPARED BY: F.E. RUSS	New Hanover County REVIEWED BY: JTR REVISIONS:
750 N. Grantfield Pkwy, Garner, NC 27529		SIG. INVENTORY NO. 03-0924

### 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 & 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

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

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

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

↓  
SCROLL DOWN

THEN:  
SET OUTPUT ASSIGNMENT #51 ON

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

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

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

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

↓  
SCROLL DOWN

THEN:  
SET OUTPUT ASSIGNMENT #44 OFF

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

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

END OF PROGRAMMING

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  
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)...0.0

← NOTICE GREEN FLASH

PRESS '+' TWICE

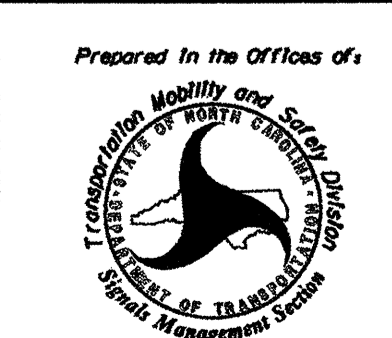
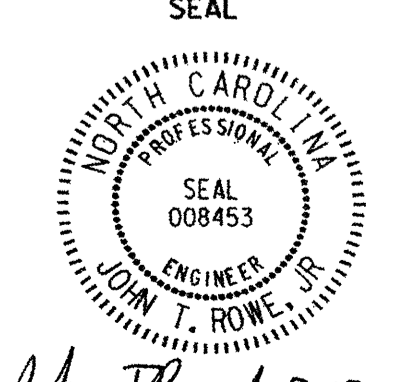
PAGE 1: VEHICLE OVERLAP 'C' SETTINGS  
PHASE: :12345678910111213141516  
VEH OVL PARENTS: :XX  
VEH OVL NOT VEH: :  
VEH OVL NOT PED: :  
VEH OVL GRN EXT: :  
STARTUP COLOR: - RED - YELLOW - GREEN  
FLASH COLORS: - RED - YELLOW X GREEN  
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)  
FLASH YELLOW IN CONTROLLER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

← NOTICE GREEN FLASH

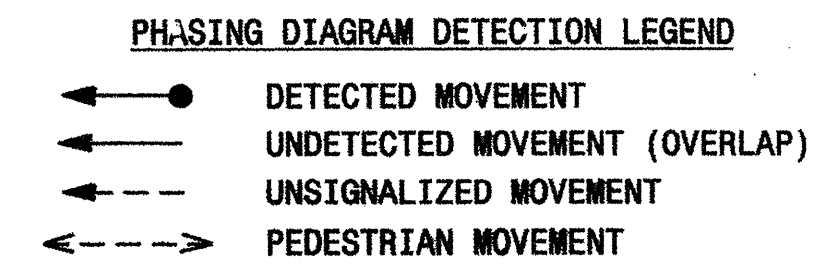
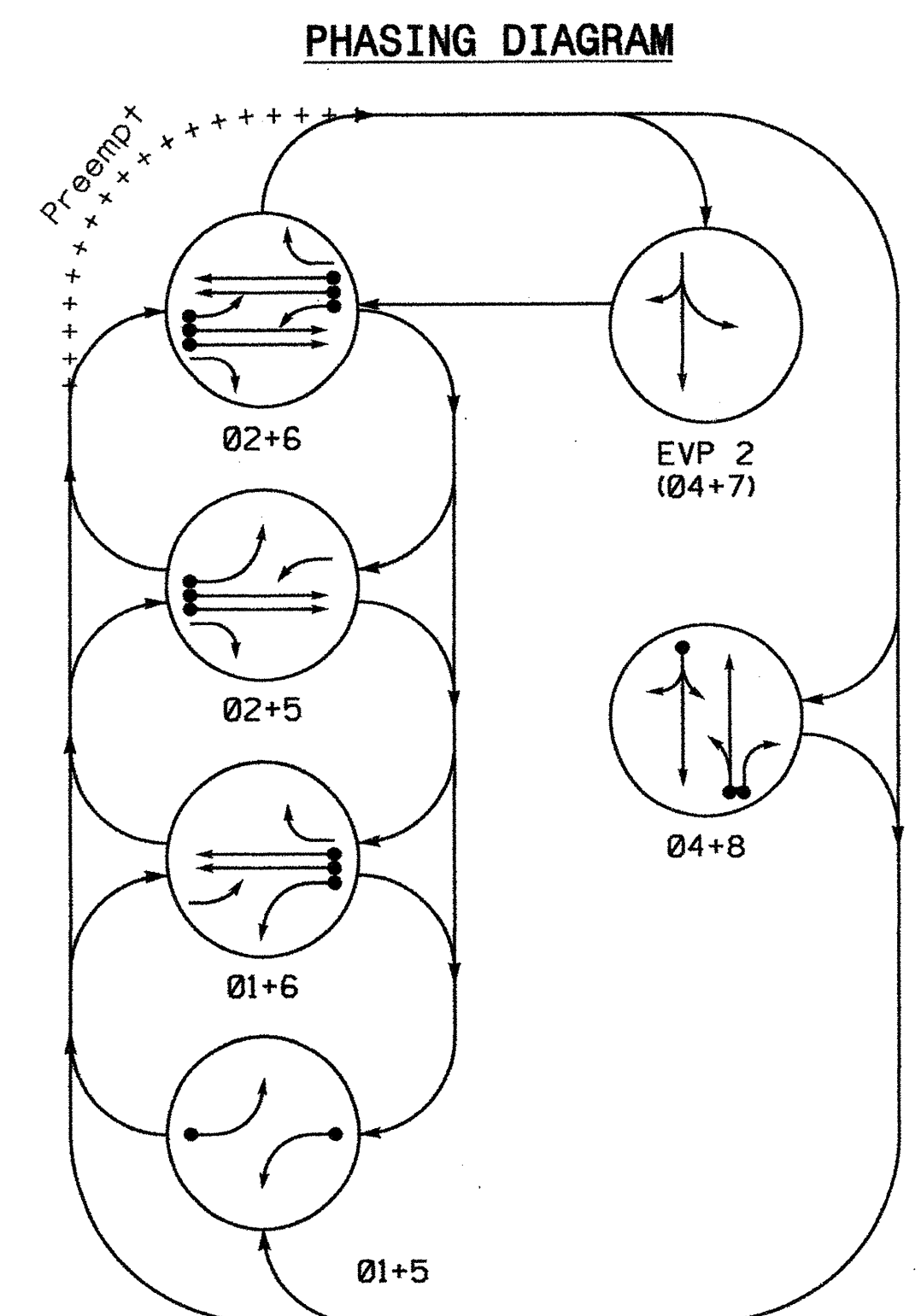
OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 03-0924  
DESIGNED: JULY 2010  
SEALED: 8/10/10  
REVISED: N/A

Electrical Detail - Sheet 2 of 2

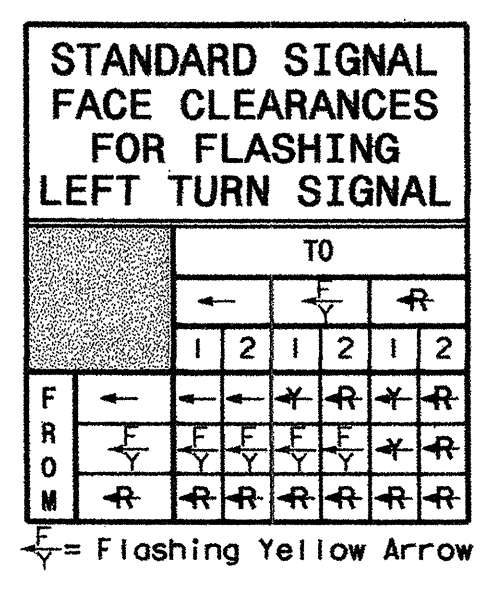
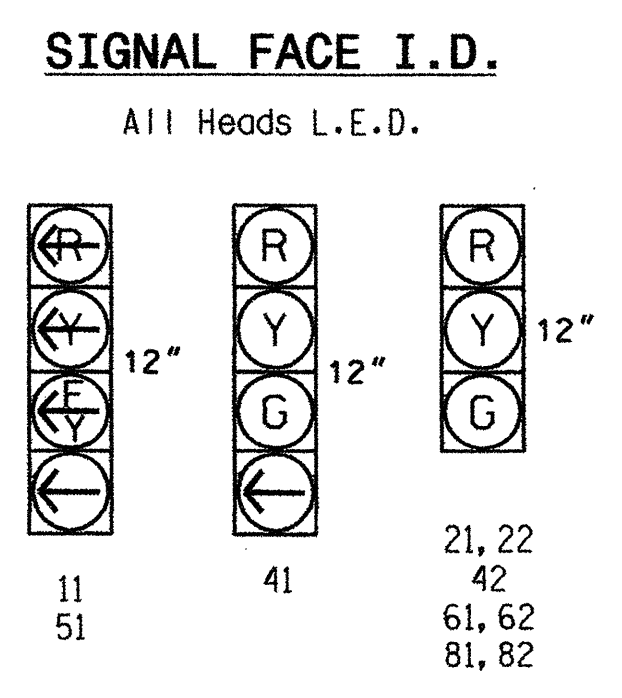
	<b>NC 132 (S. College Road) at Bragg Drive</b>		
	Division 03 PLAN DATE: August 2010 PREPARED BY: F.E. RUSS	New Hanover County REVIEWED BY: <i>JTR</i> REVIEWED BY:	
750 N. Greenfield Pkwy, Corner, NC 27529		REVISIONS INIT. DATE	SIG. INVENTORY NO. 03-0924

5 Phase Fully Actuated w/ EVP Wilmington Signal System



**TABLE OF OPERATION**

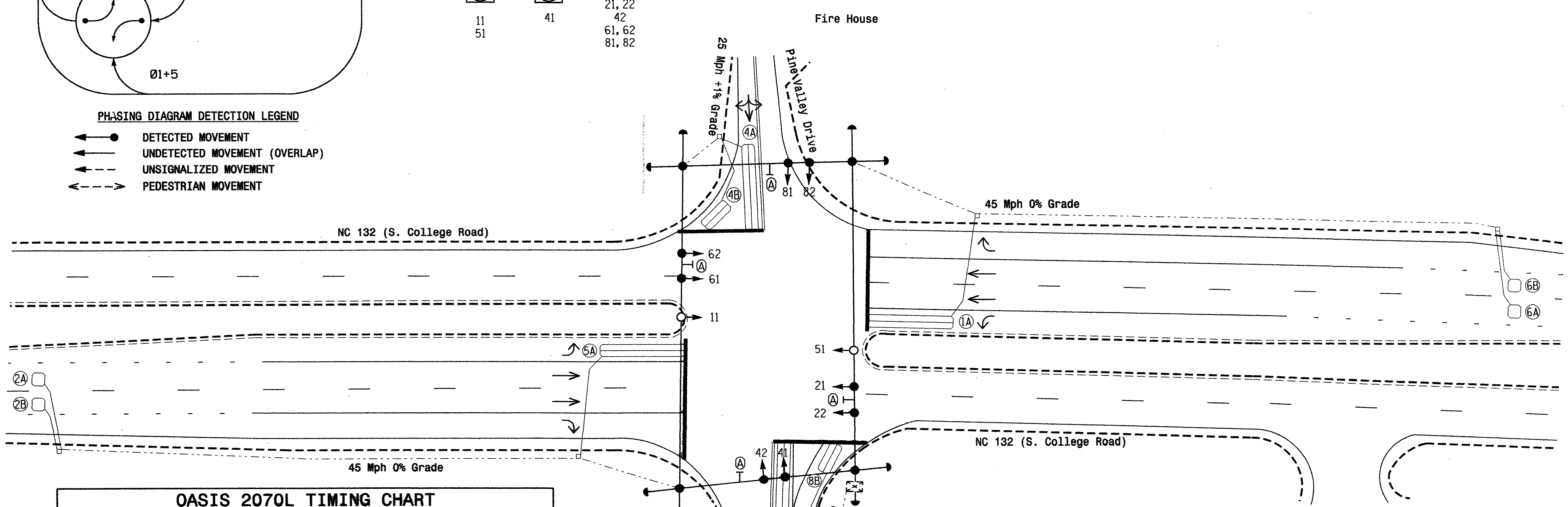
SIGNAL FACE	PHASE					
	01+5	01+6	02+5	02+6	04+8	EVP 2
11	←	←	←	←	←	←
21, 22	R	R	G	G	R	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
51	←	←	←	←	←	←
61, 62	R	G	R	G	R	R
81, 82	R	R	R	R	G	R



**OASIS 2070L LOOP & DETECTOR INSTALLATION**

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY		
1A	6X40	0	2-4-2	Y	1	Y	Y	-	15	-
2A	6X6	300	4	Y	2	Y	Y	-	3	-
2B	6X6	300	4	Y	2	Y	Y	-	-	-
4A	6X40	0	2-4-2	Y	4	Y	Y	-	5	-
4B	6X15	0	2-4-2	Y	4	Y	Y	-	15	-
5A	6X40	0	2-4-2	Y	5	Y	Y	-	15	-
6A	6X6	300	4	Y	6	Y	Y	-	-	-
6B	6X6	300	4	Y	6	Y	Y	-	-	-
8A	6X40	0	2-4-2	Y	8	Y	Y	-	5	-
8B	6X15	0	2-4-2	Y	8	Y	Y	-	15	-

- NOTES**
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
  - Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
  - Phase 1 and/or phase 5 may be lagged.
  - Set all detector units to presence mode.
  - Emergency vehicle preemption switch located in Fire Station.
  - The Division Traffic Engineer will determine the Delay Time and Preempt Dwell Min Time for the emergency vehicle preemption timing.
  - Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
  - Closed loop system data: Controller Asset # 0365.



**OASIS 2070L TIMING CHART**

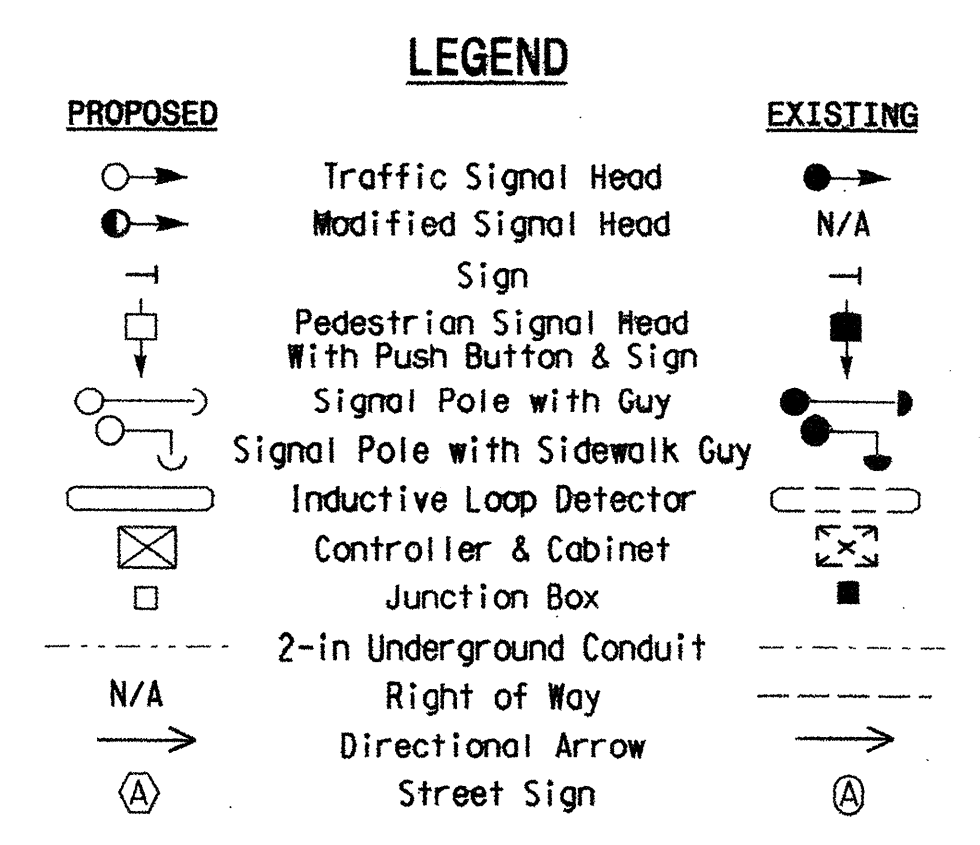
FEATURE	PHASE					
	1	2	4	5	6	8
Min Green 1*	7	12	7	7	12	7
Extension 1*	1.0	6.0	2.0	1.0	6.0	2.0
Max Green 1*	15	90	15	15	90	15
Yellow Clearance	3.0	4.5	3.1	3.0	4.5	3.1
Red Clearance	2.6	1.3	3.0	2.6	1.3	2.8
Walk 1*	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation*	-	1.5	-	1.5	-	-
Max Variable Initial*	-	34	-	34	-	-
Time Before Reduction*	-	15	-	15	-	-
Time To Reduce*	-	45	-	45	-	-
Minimum Gap	-	3.0	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	MIN RECALL	-	-
Vehicle Call Memory	-	YELLOW	-	YELLOW	-	-
Dual Entry	-	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON

\* 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.

**2070 EV PREEMPTION**

FUNCTION	PRE 2
Interval 1 - Dwell Green	255
Interval 1 - Dwell Yellow	0.0*
Interval 1 - Dwell Red	0.0*
Interval 5 - Exit Green	1
Interval 5 - Yellow	0.0
Interval 5 - Red	0.0
Priority	Medium
Delay Time	**
Min Green Before Pre	1
Ped Clear Before Pre	0
Yellow Clear Before Pre	0.0*
Red Clear Before Pre	0.0*
Dwell Min Time	**
Enable Backup Protection	Y
Ped Clear Through Yellow	N
Preempt Extend	-
Omit Overlaps	-

\* Time defaults to time used for phase during normal operation  
\*\* See Note 6.



**Signal Upgrade**

Prepared in the Offices of:  
  
**NC 132 (S. College Road.) at Pine Valley Drive**

Division 3 New Hanover County Wilmington  
 PREPARED BY: I. O. Umzurike REVIEWED BY:  
 PLAN DATE: July 2010  
 PREPARED BY: I. O. Umzurike REVIEWED BY:  
 SCALE: 1"=30'  
 REVISIONS: INIT. DATE

SIG. INVENTORY NO. 03-0365

31-AUG-2010 12:54 S:\TSS\0115 Signal\Signal Design Section\Eastern Region\11-03-03-0365-sig.dgn - 2010mdd.dgn



**EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL**

(program controller as shown below)

From Main Menu press 'A' (Preemption), then '1' (Standard Preemptions). Press 'Next' to advance to Preempt 2:

PRE2:

PREEMPTION #2	SETTINGS (NEXT:1-10)
INTERVAL/TIMING	CLEAR/DWELL PHASES
GRN YEL RED	12345678910111213141516
1 255 0.0*0.0*	X X
2 0 0.0 0.0	
3 0 0.0 0.0	
4 0 0.0 0.0	
5 1 0.0 0.0	X X
EXIT CALLS	
PRIORITY (Y/N TO SELECT)	MED
DELAY TIMER (0-255 SEC)	* * *
MIN GREEN BEFORE PRE (0= DEFAULT)	...1
PED CLEAR BEFORE PRE (0= DEFAULT)	...0
YELLOW CLEAR BEFORE PRE (0= DEFAULT)	...0
RED CLEAR BEFORE PRE (0= DEFAULT)	...0
DWELL MIN TIMER (0-255 SEC)	* * *
DWELL MAX TIMER (0=OFF,1-255MIN)	...0
DWELL HOLD-OVER TIMER (0-255)	...0
LATCH CALL?	...Y
LINK TO NEXT PREEMPT?	...N
ENABLE BACKUP PROTECTION?	...Y
HOLD CLEAR 1 PHASES DURING DELAY?	...N
FAST GREEN FLASH DWELL PHASES?	...N
PED CLEARANCE THROUGH YELLOW?	...N
INHIBIT OVERLAP GREEN EXTENSION?	...N
SERVICE DURING SOFTWARE FLASH?	...N
REST IN RED DURING DWELL INTERVAL?	...N
FLASH DWELL INTERVAL?	...N
ALLOW PEDS IN DWELL INTERVAL?	...N
RE-TIME DWELL INTERVAL?	...Y
OVERLAPS:	ABCDEFGHIJKLMN
DWELL INT FLASH YELLOW	
OMIT OVERLAPS:	

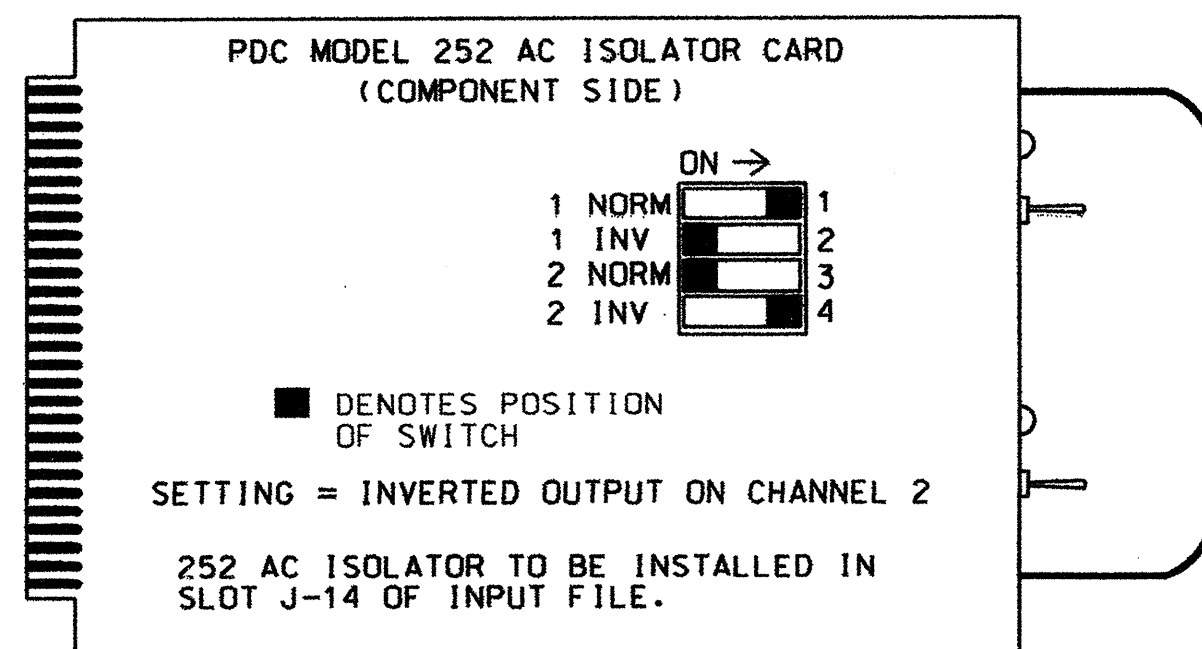
PROGRAMMING COMPLETE

\* TIME DEFAULTS TO TIME USED FOR PHASE DURING NORMAL OPERATION.

\*\* TO BE DETERMINED IN FIELD BY DIVISION TRAFFIC ENGINEER.

**PREEMPT 2 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL**

(set DIP switches as shown below)



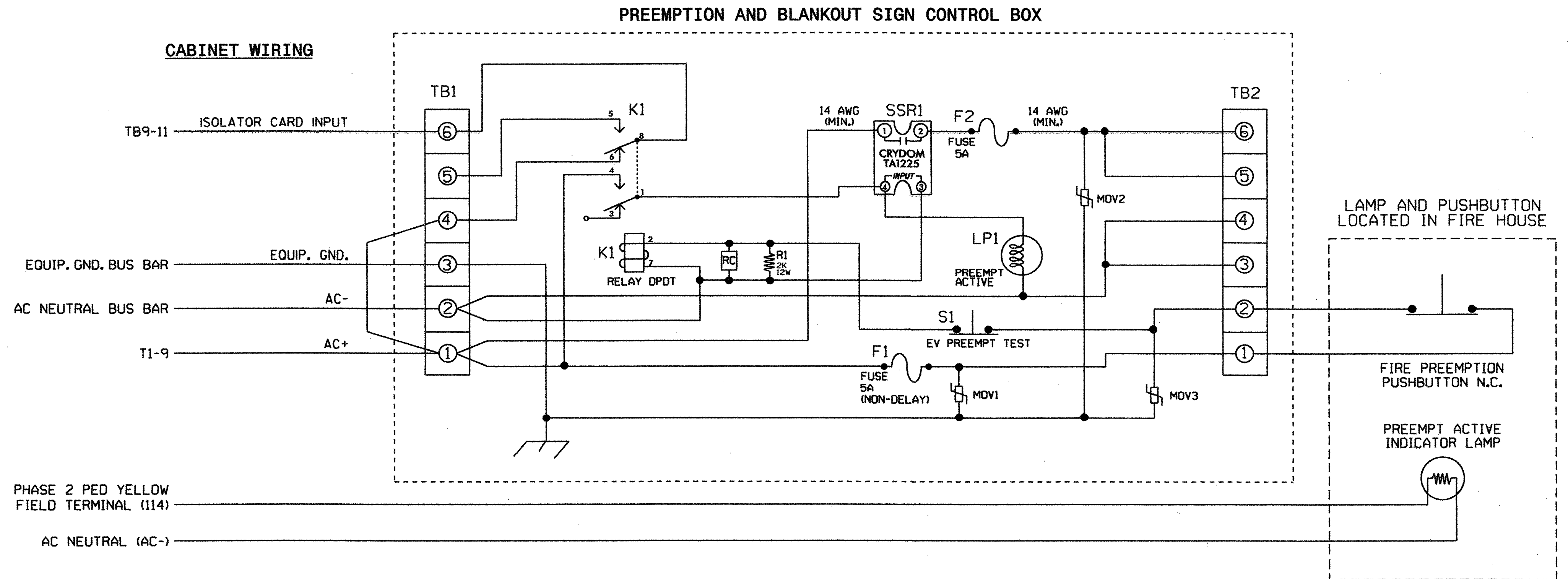
NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO BE EQUAL TO THAT SHOWN ABOVE.

**PREEMPT ONLY PHASE OMIT & STARTUP CALLS**

From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll down on this screen to 'Omit Phase' and toggle phase 7 'ON'. Scroll down to 'Startup Calls' and select phases '1,2,4,5,6 and 8'. This programming is to prevent phase 7 from being served when not in Preemption.

**EMERGENCY VEHICLE PREEMPTION WIRING DETAIL**

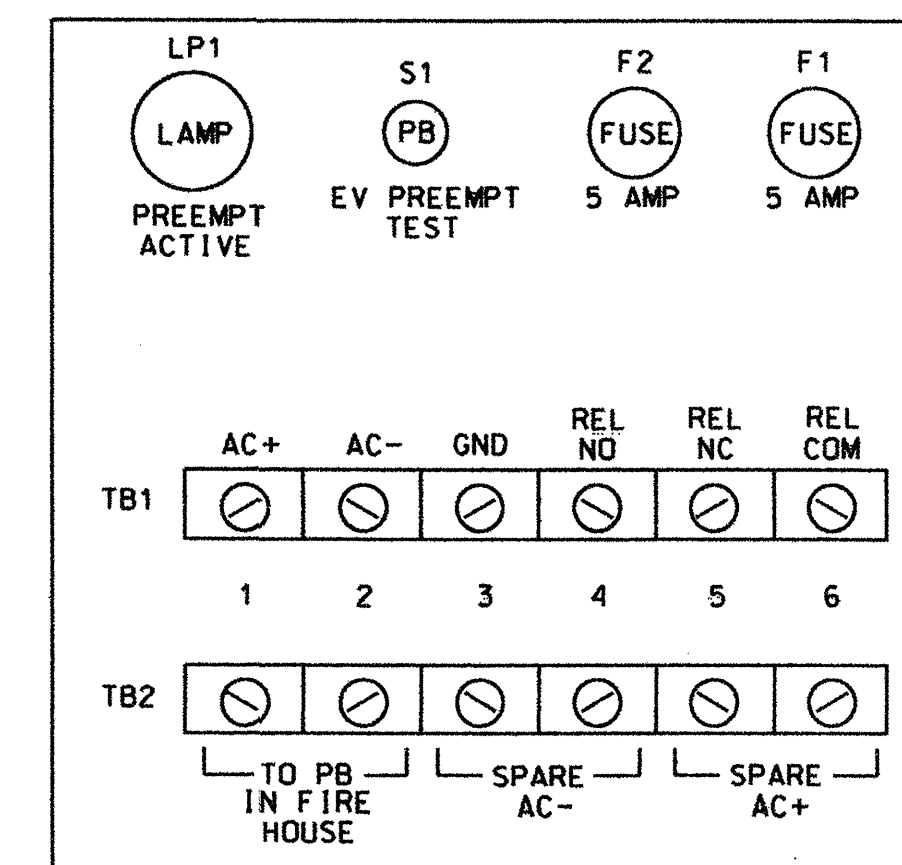
(wire as shown below)



**NOTES**

- Relay K1 is shown in the energized (Preempt not active) normal operation state.
- Relay K1 is a Potter & Brumfield KRP11AG DPDT Relay with 120VAC coil and octal base.
- Relay SSR1 is a Crydom TA1225 SPST (normally open) Solid State Relay with AC input and AC (25 Amp) output. (DOT# 625028740)
- AC Isolator Card activates preemption upon removal of AC+ from the input. To accomplish this, set invert dip switch on AC Isolator Card. (See Preempt AC Isolator Output Programming Detail this sheet).
- Resistor is valued at 2K ohm, 12 watt. Clarostat part no. VPR10F-2K. (DOT# 625011550)
- RC network is valued at 0.1 microfarad, 100 ohm.
- If replacement movs are needed, GE part no. V150LA20A (DOT# 106023975) may be used.
- Preemption and Blankout Sign Control Box is a Control Technologies Part No. 2299-101. (DOT# 619033450)
- IMPORTANT!! Terminal TB9-12 (on input panel) must be connected to AC neutral (jumper may have to be added).

**FRONT VIEW**



SEE SHEET 3 FOR FYA-PPLT SIGNAL SEQUENCE & EVPE PILOT LAMP CONTROL LOGICAL I/O PROCESSOR PROGRAMMING

Electrical Detail - Sheet 2 of 3

Prepared in the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	NC 132 (S. College Road) at Pine Valley Drive		SEAL JOHN T. ROWE, P.E. DATE: 8-17-10
	Division 03 New Hanover County Wilmington PLAN DATE: August 2010 REVIEWED BY: QJP PREPARED BY: F.E. RUSS REVIEWED BY:	REVISIONS INIT. DATE	

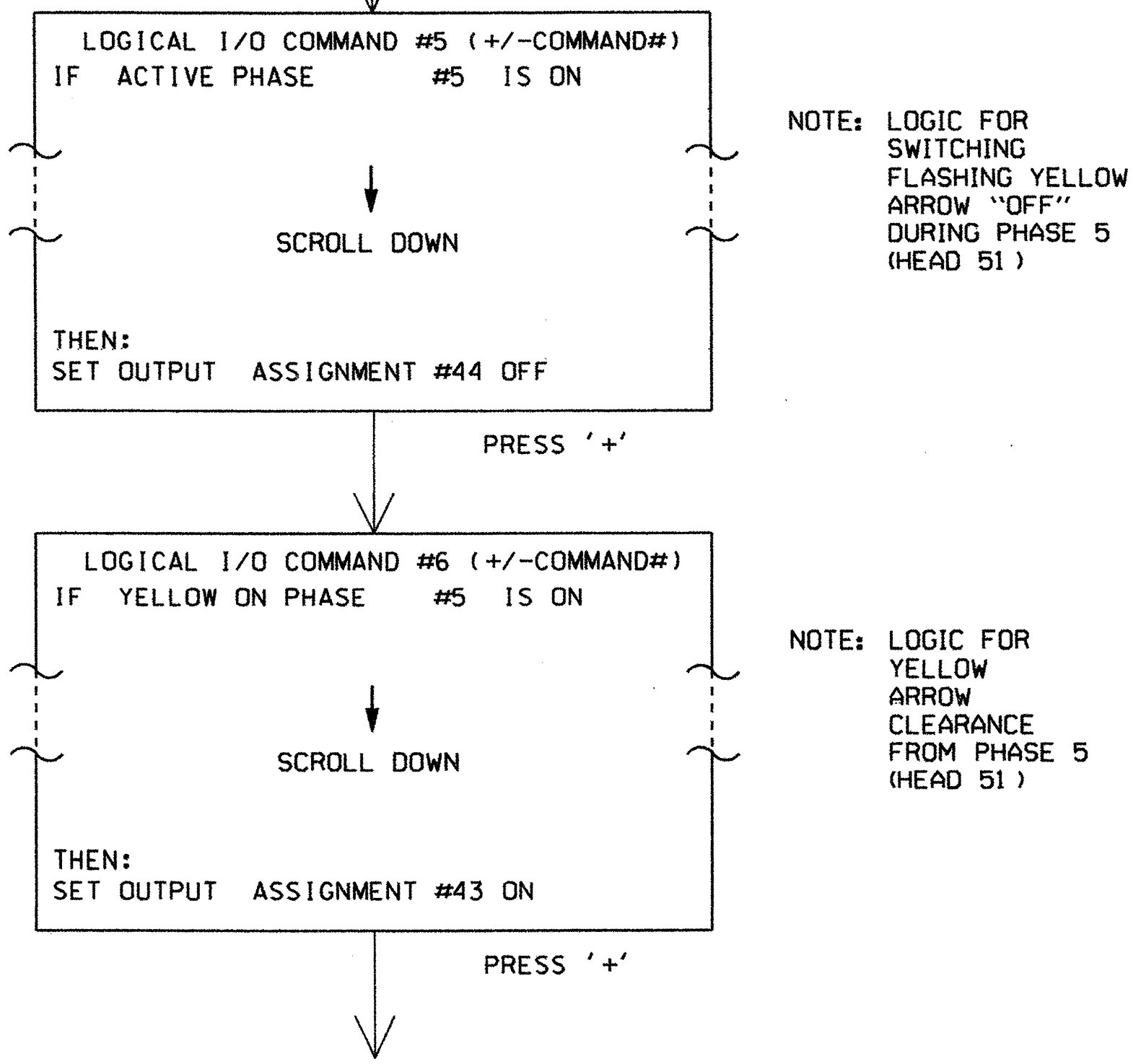
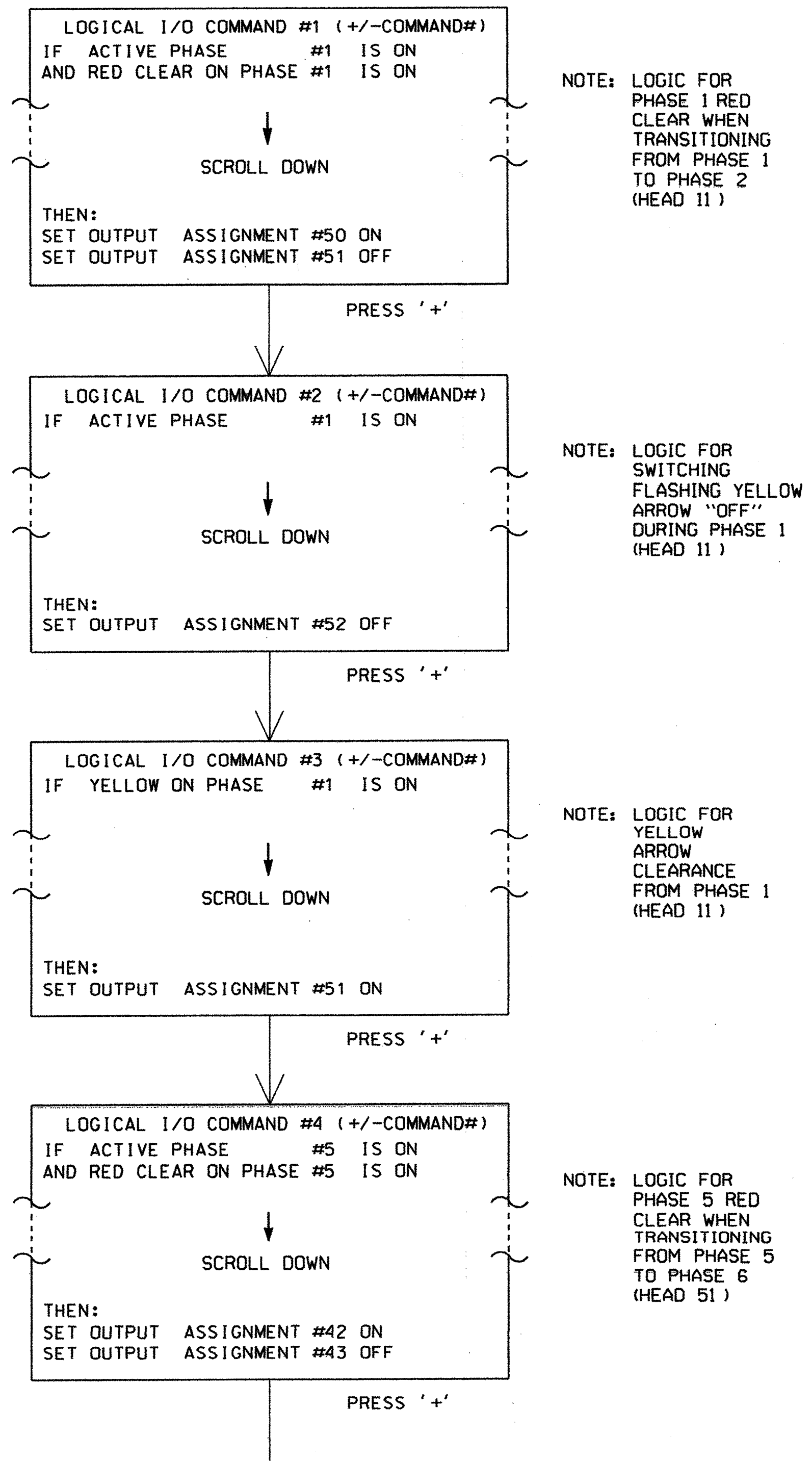
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0365  
 DESIGNED: JULY 2010  
 SEALED: 8/10/10  
 REVISED: N/A

**LOGICAL I/O PROCESSOR PROGRAMMING FOR SPECIAL FYA-PPLT SIGNAL SEQUENCE & PILOT LAMP CONTROL**

(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: 1.2.3.4.5.6.7 AND 8.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

**STEP 1: FYA-PPLT SIGNAL SEQUENCE**



**STEP 2: PILOT LAMP CONTROL**

NOTICE 'OR' CONDITION

**INPUT/OUTPUT REFERENCE SCHEDULE**

- INPUT 14 = Preempt 2 Input
- OUTPUT 33 = Phase 2 Ped Yellow
- OUTPUT 42 = Overlap C Red
- OUTPUT 43 = Overlap C Yellow
- OUTPUT 44 = Overlap C Green
- OUTPUT 50 = Overlap A Red
- OUTPUT 51 = Overlap A Yellow
- OUTPUT 52 = Overlap A Green

**OVERLAP PROGRAMMING DETAIL**

(program controller as shown below)

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

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

← NOTICE GREEN FLASH

PRESS '+' TWICE

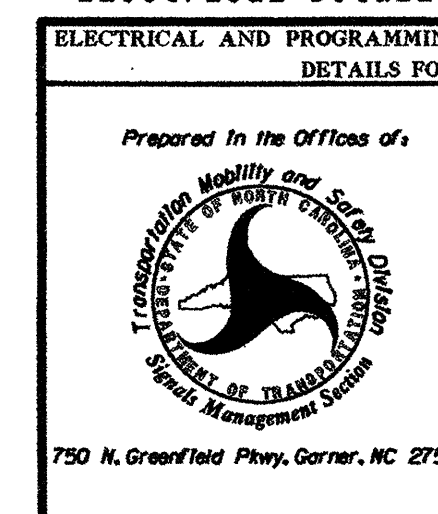
PAGE 1: VEHICLE OVERLAP 'C' SETTINGS  
 PHASE: 12345678910111213141516  
 VEH OVL PARENTS: XX  
 VEH OVL NOT VEH:  
 VEH OVL NOT PED:  
 VEH OVL GRN EXT:  
 STARTUP COLOR: - RED - YELLOW - GREEN  
 FLASH COLORS: - RED - YELLOW X GREEN  
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)  
 FLASH YELLOW IN CONTROLLER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

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0365  
 DESIGNED: JULY 2010  
 SEALED: 8/10/10  
 REVISED: N/A

Electrical Detail - Sheet 3 of 3



NC 132 (S. College Road) at Pine Valley Drive	
Division 03	New Hanover County Wilmington
PLAN DATE: August 2010	REVIEWED BY: JTR
PREPARED BY: F.E. RUSS	REVIEWED BY:
REVISIONS	INIT. DATE

SEAL  
 JOHN T. ROWE, JR.  
 PROFESSIONAL ENGINEER  
 STATE OF NORTH CAROLINA  
 LICENSE NO. 008453  
 SIGNATURE: [Handwritten Signature]  
 DATE: 8-17-10  
 SIG. INVENTORY NO. 03-0365

11-AUG-2010 14:38 S:\MTCASU\MTS Signal\sewr\krc\cupas\lg NamR\Russ\2010\wgs\030365\_sml.e...e...20100826.dgn

- 1 INSTALL REA, PE - 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 2 INSTALL REA, PE - 38, (FIGURE 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 3 INSTALL REA, PE - 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 4 INSTALL SMFO CABLE
- 5 INSTALL MMFO CABLE
- 6 INSTALL FIBER OPTIC DROP CABLE
- 7 INSTALL TRACER WIRE
- 8 TRENCH
- 9 INSTALL PVC CONDUIT
- 10 INSTALL RIGID, GALVANIZED STEEL CONDUIT
- 11 INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
- 12 INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
- 13 INSTALL OUTER-DUCT POLYETHYLENE CONDUIT
- 14 INSTALL POLYETHYLENE CONDUIT
- 15 DIRECTIONAL DRILL CONDUIT
- 16 BORE AND JACK CONDUIT
- 17 INSTALL CABLE(S) IN EXISTING CONDUIT
- 18 INSTALL CABLE(S) IN NEW CONDUIT
- 19 INSTALL CABLE(S) IN EXISTING RISER
- 20 INSTALL CABLE(S) IN NEW RISER
- 21 INSTALL CABLE(S) IN EXISTING CONDUIT STUB-OUTS
- 22 INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 23 INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 24 INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
- 25 INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
- 26 TERMINATE COMMUNICATIONS CABLE ON EXISTING TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
- 27 INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
- 28 INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPlice CABLE IN CABINET
- 29 INSTALL UNDERGROUND SPlice ENCLOSURE
- 30 INSTALL AERIAL SPlice ENCLOSURE
- 31 INSTALL POLE MOUNTED SPlice CABINET
- 32 INSTALL BASE MOUNTED SPlice CABINET
- 33 REMOVE EXISTING SPlice CABINET

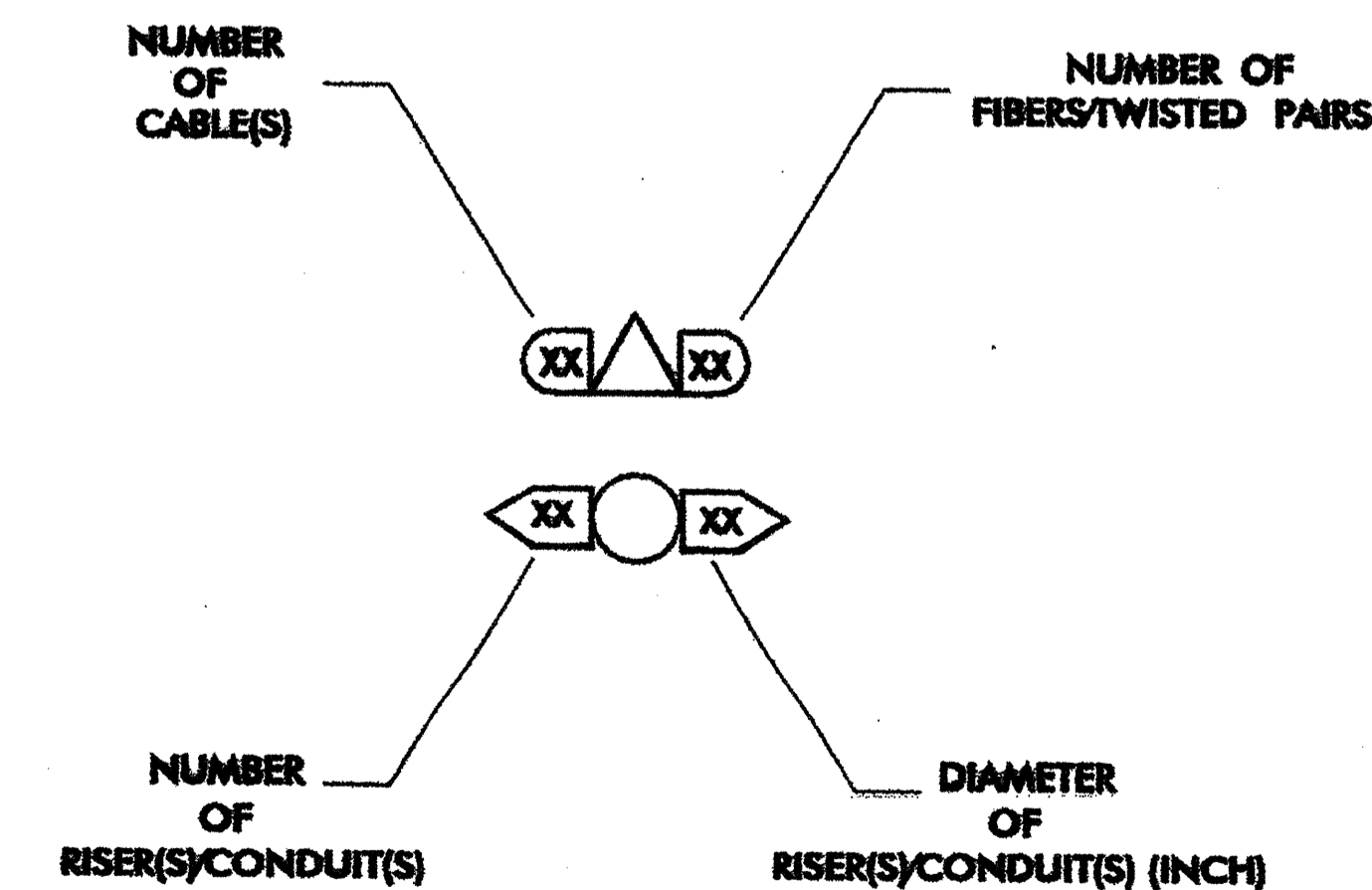
- 34 INSTALL CABINET FOUNDATION
- 35 REMOVE EXISTING CABINET FOUNDATION
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40 INSTALL OVERSIZED JUNCTION BOX
- 41 REMOVE EXISTING JUNCTION BOX
- 42 INSTALL WOOD POLE
- 43 REMOVE EXISTING WOOD POLE
- 44 INSTALL AERIAL GUY ASSEMBLY
- 45 INSTALL STANDARD GUY ASSEMBLY
- 46 INSTALL SIDEWALK GUY ASSEMBLY
- 47 INSTALL MESSENGER CABLE
- 48 REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
- 49 REMOVE EXISTING MESSENGER CABLE
- 50 INSTALL TELEPHONE SERVICE
- 51 INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
- 52 INSTALL DELINEATOR MARKER
- 53 STORE 20 FEET OF COMMUNICATIONS CABLE
- 54 LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
- 55 LASH CABLE(S) TO EXISTING MESSENGER CABLE
- 56 LASH CABLE(S) TO NEW MESSENGER CABLE
- 57 MODIFY EXISTING ELECTRICAL SERVICE
- 58 INSTALL NEW ELECTRICAL SERVICE

**LEGEND**

- FO NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST PR NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXI EXISTING COMMUNICATIONS CABLE
- REM EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD NEW DIRECTIONAL DRILLED CONDUIT
- B&J NEW BORED AND JACKED CONDUIT
- NEW JUNCTION BOX
- EXISTING JUNCTION BOX
- NEW WOOD POLE
- EXISTING WOOD POLE
- AERIAL SPlice ENCLOSURE
- NEW METAL POLE
- EXISTING METAL POLE
- NEW CCTV ASSEMBLY
- NEW STANDARD GUY ASSEMBLY
- NEW SIDEWALK GUY ASSEMBLY
- NEW CABLE STORAGE RACKS (SNOW SHOES)
- EXISTING CONTROLLER AND CABINET
- EXISTING SPlice CABINET
- NEW SPlice CABINET
- SIGNAL POLE
- XX-XXXX SIGNAL INVENTORY NUMBER

**CONSTRUCTION NOTE SYMBOLOGY KEY**

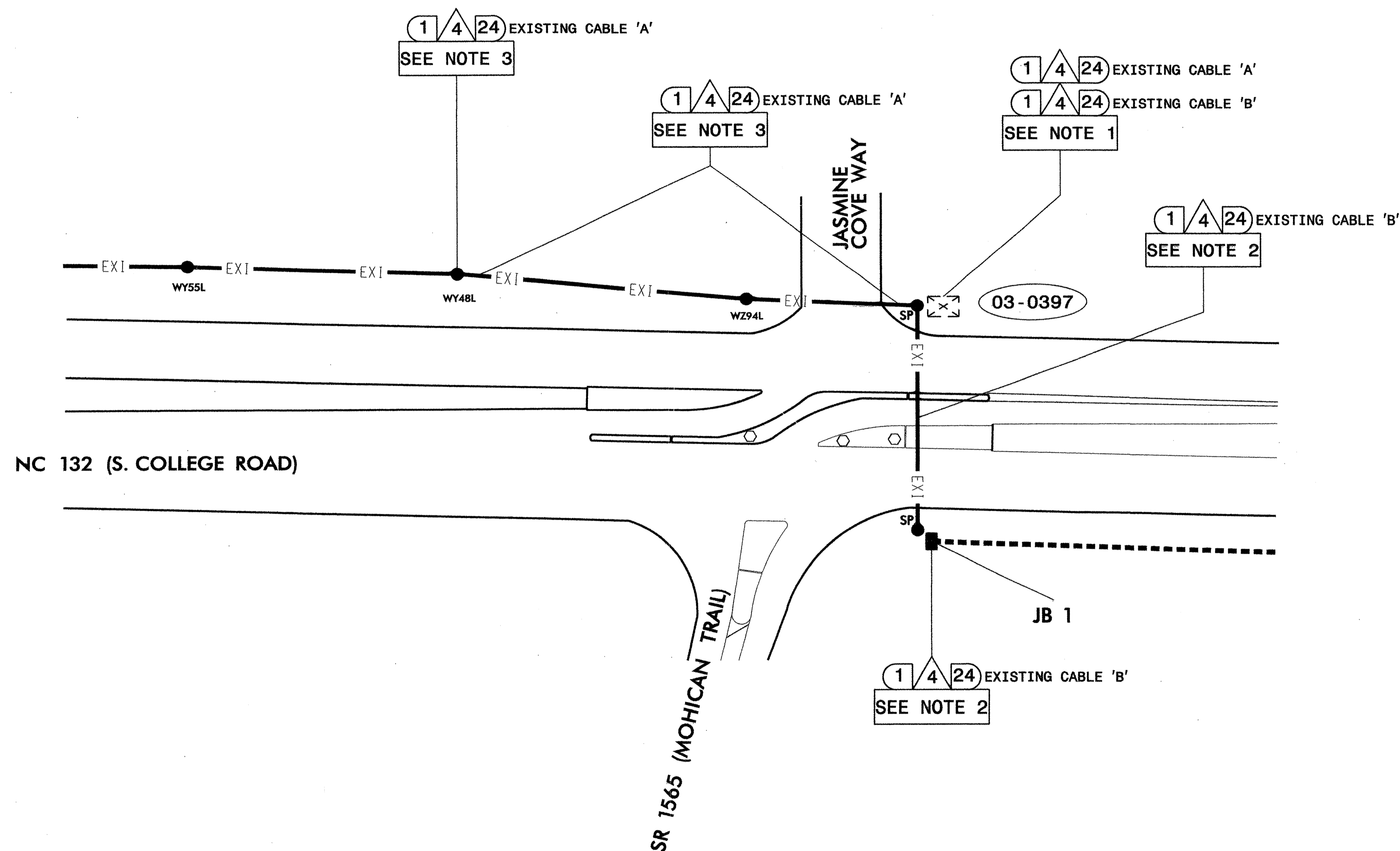
- XX INDICATES NUMBER OF CABLES, LOOPS, ETC.
- XX INDICATES NUMBER OF FIBERS PER CABLE, TWISTED PAIRS PER CABLE, ETC.
- XX INDICATES NUMBER OF RISER(S)/CONDUIT(S)
- XX INDICATES DIAMETER OF RISER(S)/CONDUIT(S) (INCH)



	<b>CONSTRUCTION NOTES</b>		
	PLAN DATE: _____ PREPARED BY: _____ SCALE: _____	REVIEWED BY: _____ REVIEWED BY: <b>G. A. FULLER</b> REVISIONS: _____ DATE: _____	



# EXISTING CONFIGURATION



**NOTES:**

1. REMOVE EXISTING 24 FIBER CABLES FROM SIGNAL CABINET TO ALLOW FOR FUTURE RELOCATION TO NEW CABINET. CAP AND SEAL ALL FIBERS USING SILICONE HEAT SHRINK OR AN APPROVED EQUIVALENT TO PREVENT WATER PENETRATION.
2. BACKPULL CABLE SEGMENT 'B' TO EXISTING JUNCTION BOX (JB 1) AND STORE FOR FUTURE INSTALLATION IN NEW SIGNAL CABINET.
3. BACKPULL CABLE SEGMENT 'A' TO POLE WY48L AND STORE FOR FUTURE INSTALLATION INTO NEW AERIAL SPLICE ENCLOSURE.

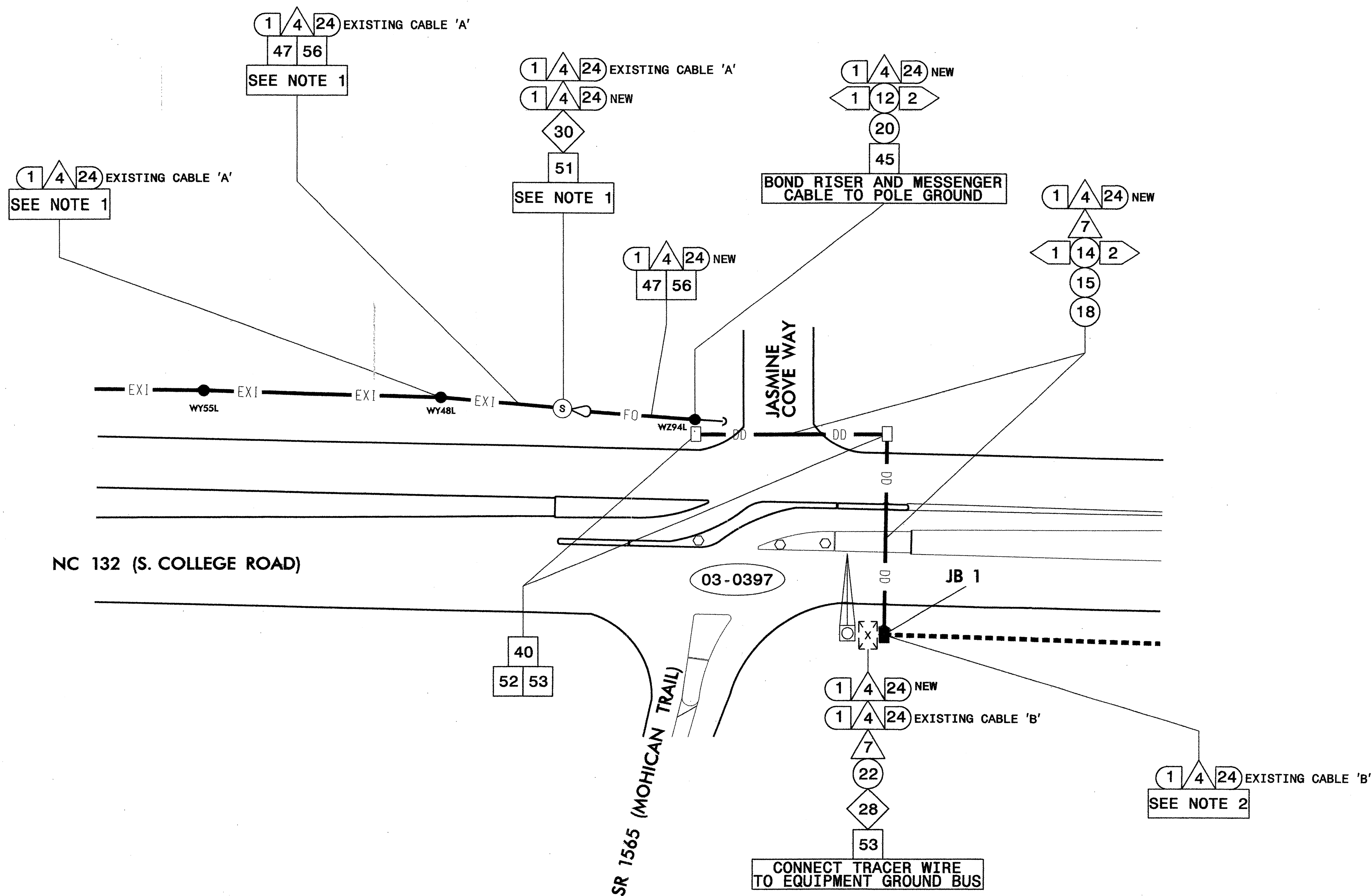
\* CONTRACTOR TO CONTACT DENYS VIELKANOWITZ, CITY OF WILMINGTON SIGNAL SYSTEM MANAGEMENT ENGINEER (910-341-4676), PRIOR TO BEGINNING WORK ON SYSTEM SPLICING. PROVIDE 5 DAYS ADVANCE NOTICE PRIOR TO BEGINNING WORK.

\* RECORD AND PROVIDE TO THE ENGINEER DOCUMENTATION OF EXISTING SPLICES IN THE EXISTING SIGNAL CABINET (SIN #03-0397) PRIOR TO REMOVAL OF ANY SPLICES.

\* FOR INSTALLATION OF NEW INTERCONNECT CENTER, COMPARE SPLICE CONFIGURATION DATA RECORDED PREVIOUSLY TO THE SPLICE PLANS. IF THERE ARE VARIATIONS, SPLICE BACK ACCORDING TO EXISTING FIELD DATA TAKEN PRIOR TO REMOVAL.

	<b>COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS</b>		
	DIVISION 03 NEW HANOVER CO. WILMINGTON		
PLAN DATE: AUGUST 2010	REVIEWED BY: I.N. AVERY	PREPARED BY: S.C. WARDLE REVIEWED BY: G.A. FULLER	
SCALE: 0	REVISIONS	INIT.	DATE
SIGNATURE: <i>Gregory A. Fuller</i>		DATE: 8/21/10	

# PROPOSED CONFIGURATION



**NOTES:**

1. LOCATE CABLE SEGMENT 'A' PREVIOUSLY STORED ON POLE WY48L. INSTALL EXISTING CABLE SEGMENT 'A' INTO NEW AERIAL SPLICE ENCLOSURE ALONG WITH NEW 24 FIBER CABLE. RUN NEW 24 FIBER CABLE TO NEW SIGNAL CABINET AS SHOWN.
2. LOCATE CABLE SEGMENT 'B' PREVIOUSLY STORED IN JUNCTION BOX (JB 1) AND INSTALL IN NEW SIGNAL CABINET.

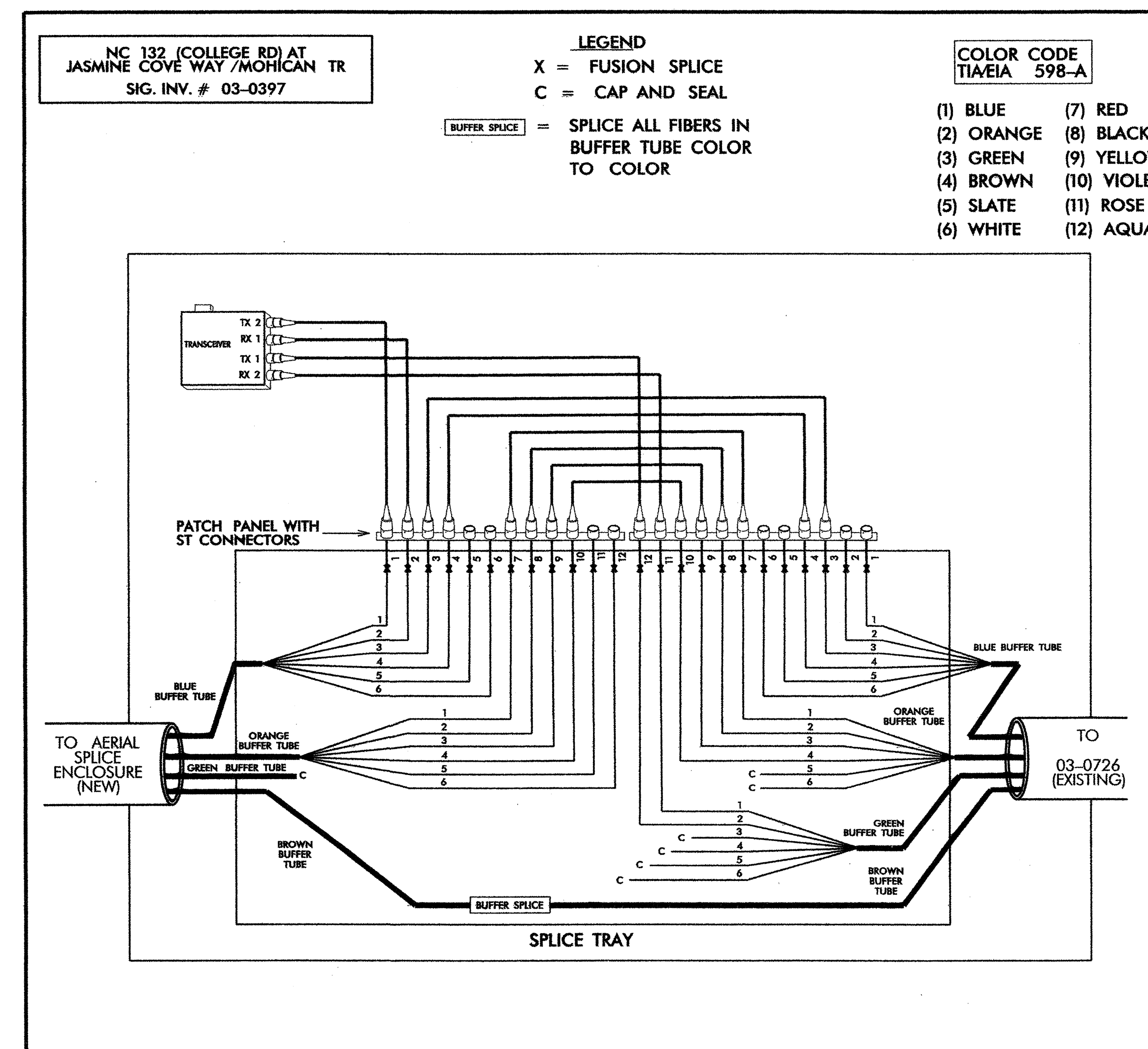
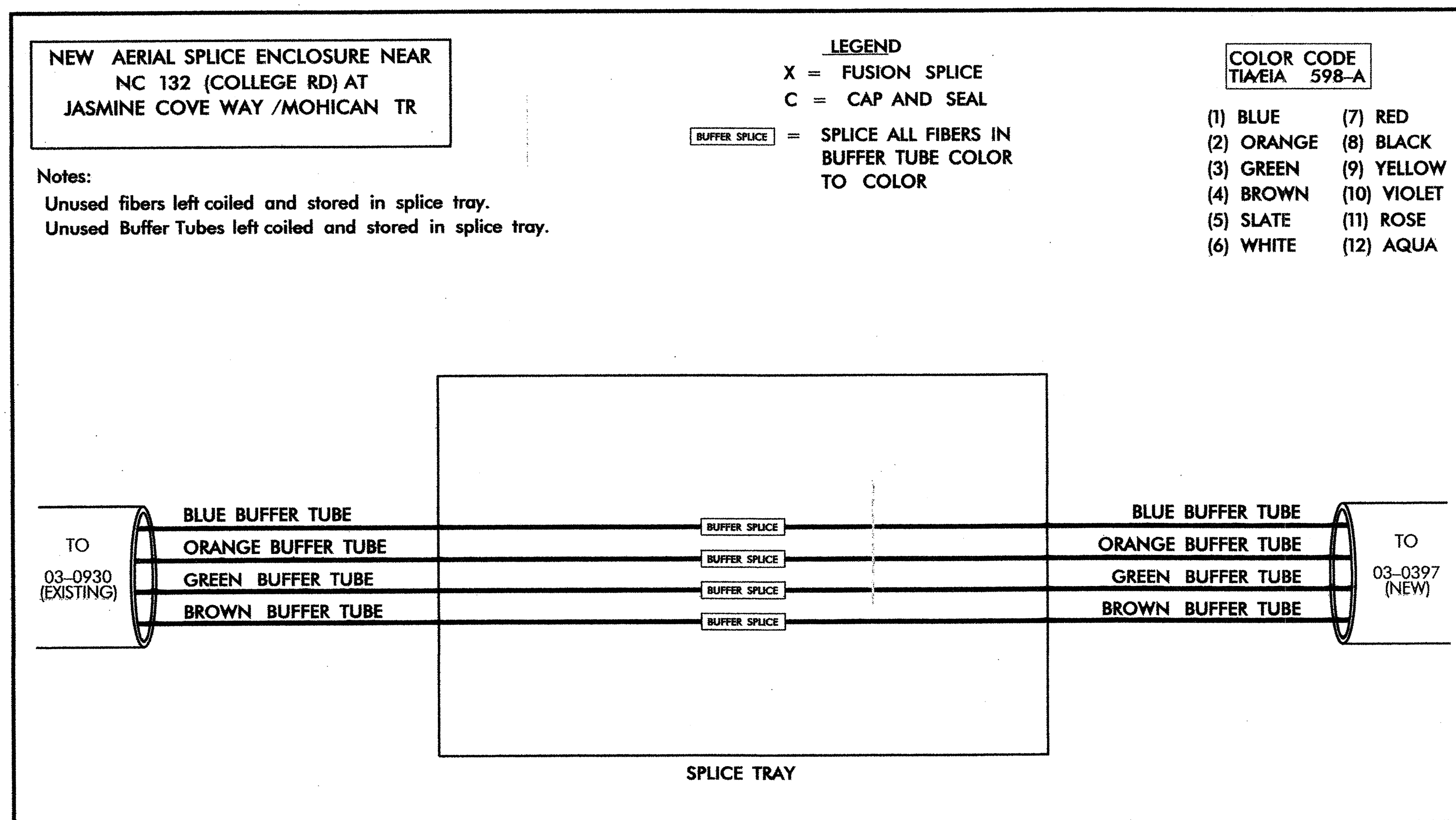
\* CONTRACTOR TO CONTACT DENYS VIELKANOWITZ, CITY OF WILMINGTON SIGNAL SYSTEM MANAGEMENT ENGINEER (910-341-4676), PRIOR TO BEGINNING WORK ON SYSTEM SPLICING. PROVIDE 5 DAYS ADVANCE NOTICE PRIOR TO BEGINNING WORK.

\* RECORD AND PROVIDE TO THE ENGINEER DOCUMENTATION OF EXISTING SPLICES IN THE EXISTING SIGNAL CABINET (SIN #03-0397) PRIOR TO REMOVAL OF ANY SPLICES.

\* FOR INSTALLATION OF NEW INTERCONNECT CENTER, COMPARE SPLICE CONFIGURATION DATA RECORDED PREVIOUSLY TO THE SPLICE PLANS. IF THERE ARE VARIATIONS, SPLICE BACK ACCORDING TO EXISTING FIELD DATA TAKEN PRIOR TO REMOVAL.

	<b>COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS</b>									
	DIVISION 03 NEW HANOVER CO. WILMINGTON PLAN DATE: AUGUST 2010 REVIEWED BY: I.N. AVERY PREPARED BY: S.C. WARDLE REVIEWED BY: G.A. FULLER									
	SCALE 	REVISIONS <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DATE	INIT.	DATE				
NO.	DATE	INIT.	DATE							
SIGNATURE: <i>Gregory A. Fuller</i> DATE: <i>08/10/10</i>		SEAL: <i>Gregory A. Fuller</i>								

# FIBER OPTIC CABLE



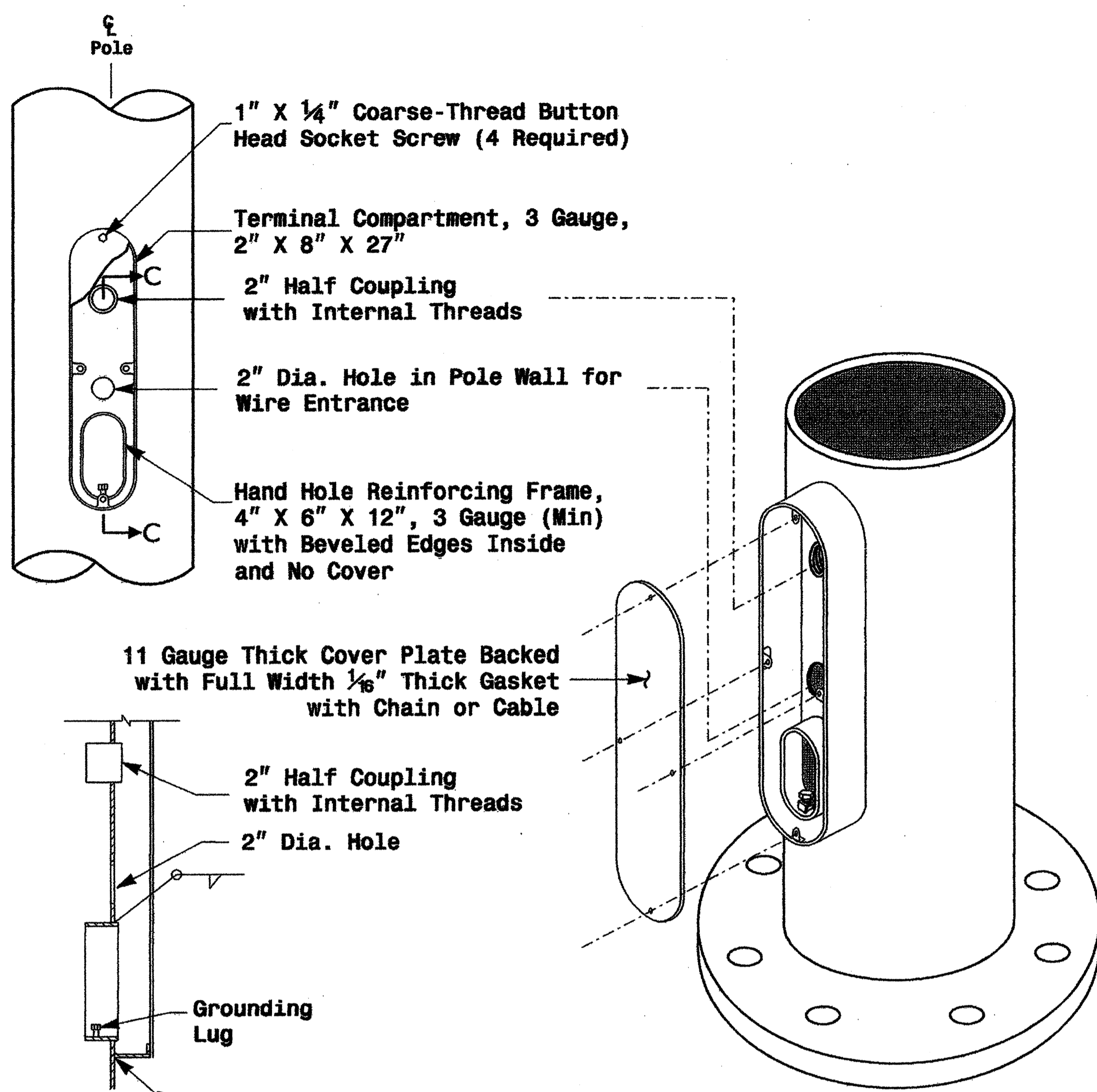
**NOTES:**

1. REUSE EXISTING TRANSCEIVER AND INSTALL WITH NEW INTERCONNECT CENTER.
2. CONTRACTOR TO CONTACT DENYS VIELKANOWITZ, CITY OF WILMINGTON SIGNAL SYSTEM MANAGEMENT ENGINEER (910-341-4676), PRIOR TO BEGINNING WORK ON SYSTEM SPLICING. PROVIDE 5 DAYS ADVANCE NOTICE PRIOR TO BEGINNING WORK.
3. CONTRACTOR TO RECORD EXISTING SPLICING PRIOR TO REMOVAL OF ANY SPLICES. RESPLICE ACCORDING TO EXISTING SPLICES.

TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS

## PROPOSED CONFIGURATION

	<b>SPLICE PLAN</b>		
	DIVISION 03 NEW HANOVER CO. WILMINGTON PLAN DATE: AUGUST 2010 REVIEWED BY: I.N. AVERY PREPARED BY: S.C. WARDLE REVIEWED BY: G.A. FULLER		
SCALE 0	REVISIONS	INIT. DATE	SIGNATURE <i>G.A. Fuller</i> DATE 08/21/10 CADD Filename:



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

**Terminal Compartment Detail**

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 _____	

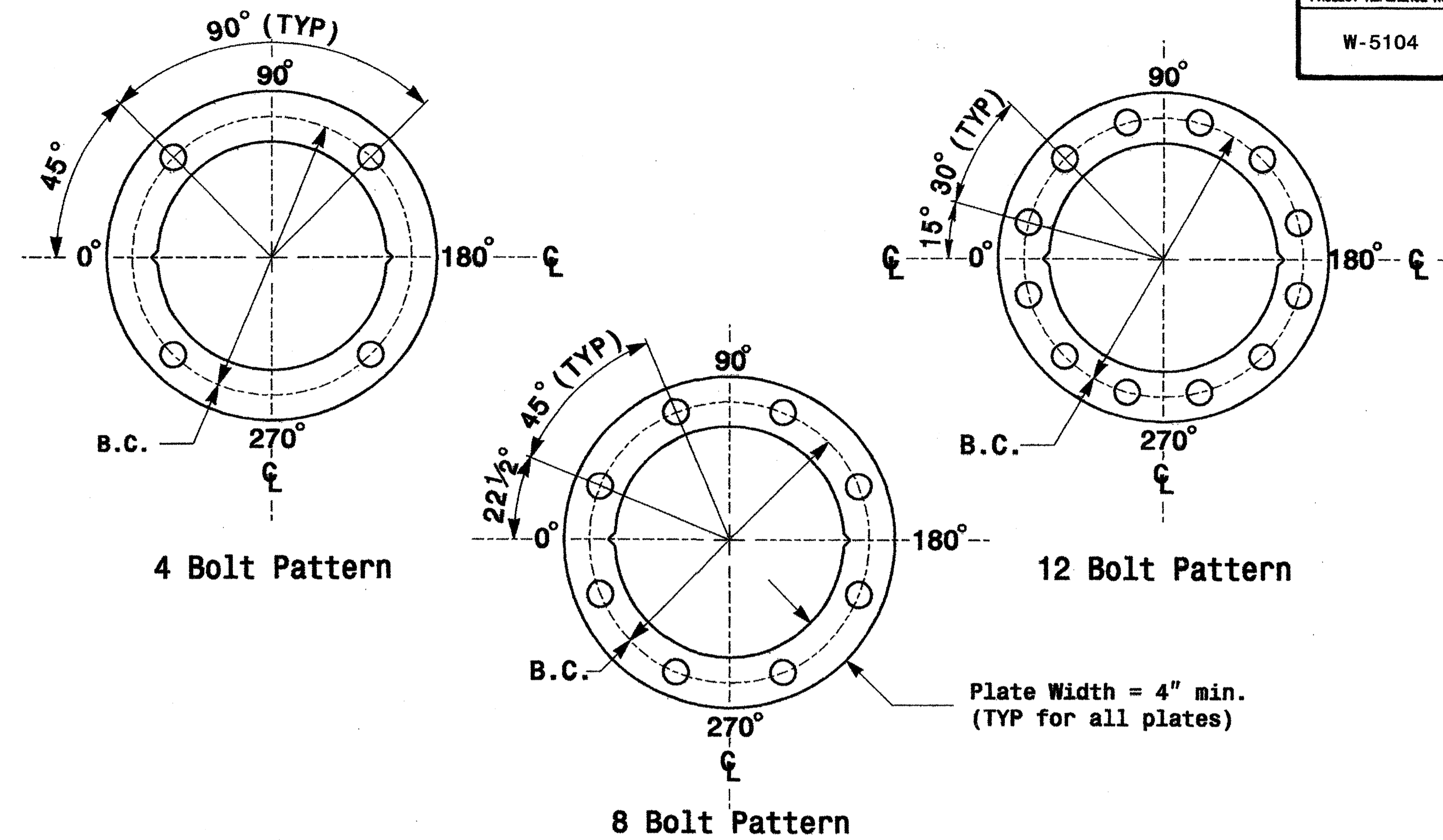
Shaft I.D. Tag  
(Provide on Strain Poles and Mast Arm Poles)

- 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.

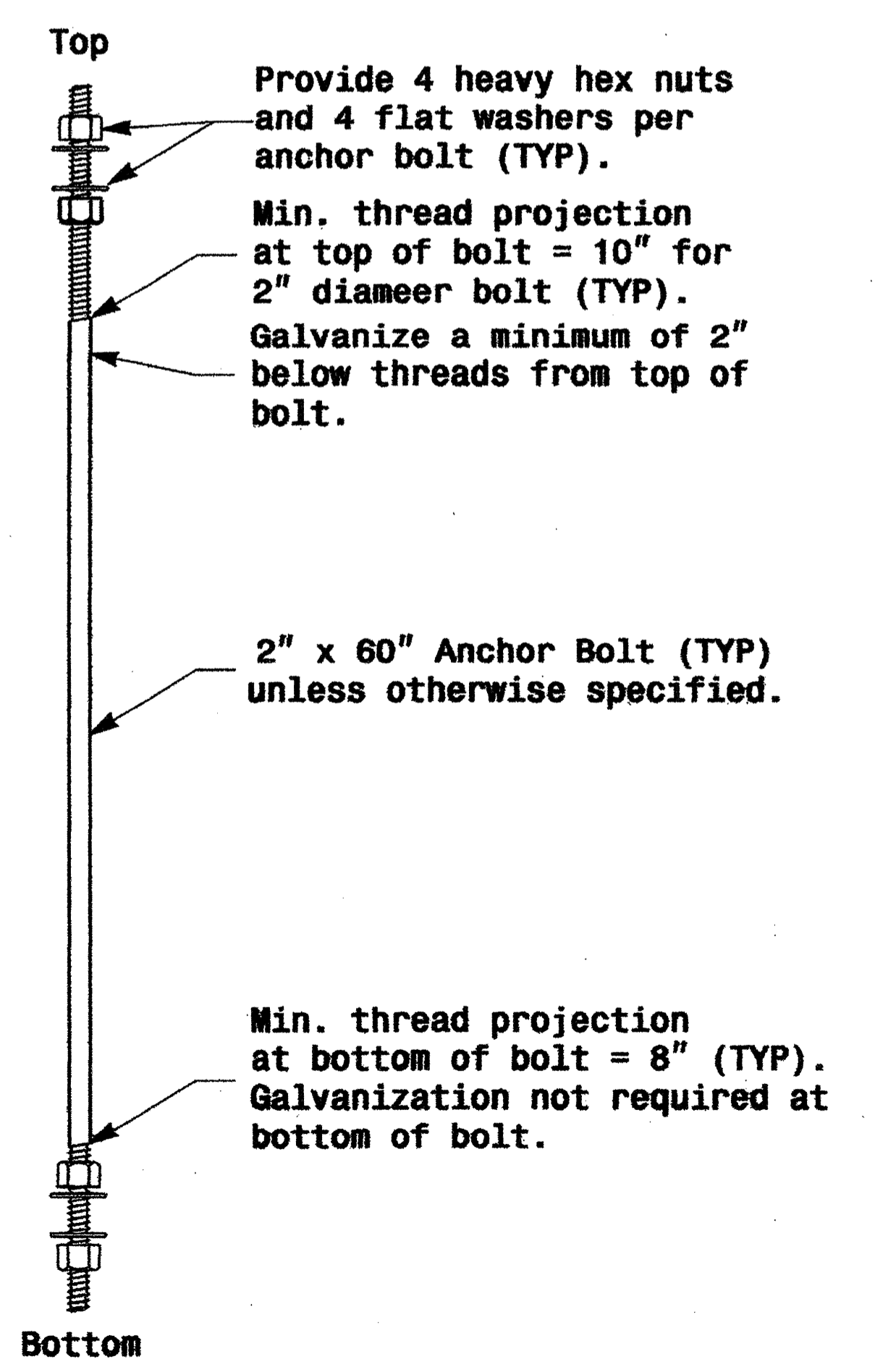
**Identification Tag Details**

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

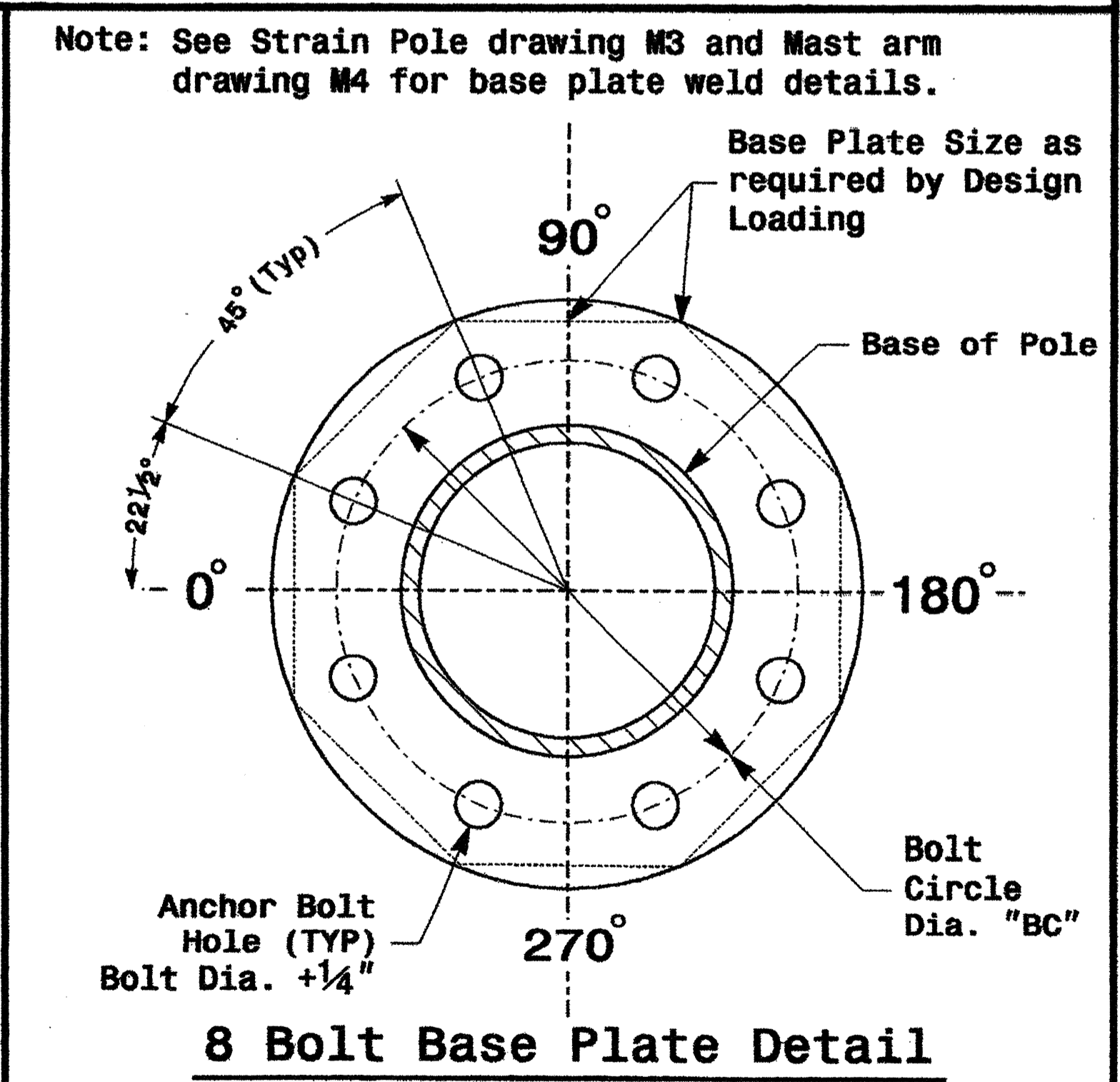
Arm I.D. Tag  
(Provide on each section of a multi-section mast arm)



Construct Templates and Plates from 1/4" min. thick Steel. Galvanizing is not required.  
**Base Plate Template and Anchor Bolt Lock Plate Details**



**Anchor Bolt Detail**



	<b>Typical Fabrication Details Common To All Metal Poles</b>		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	

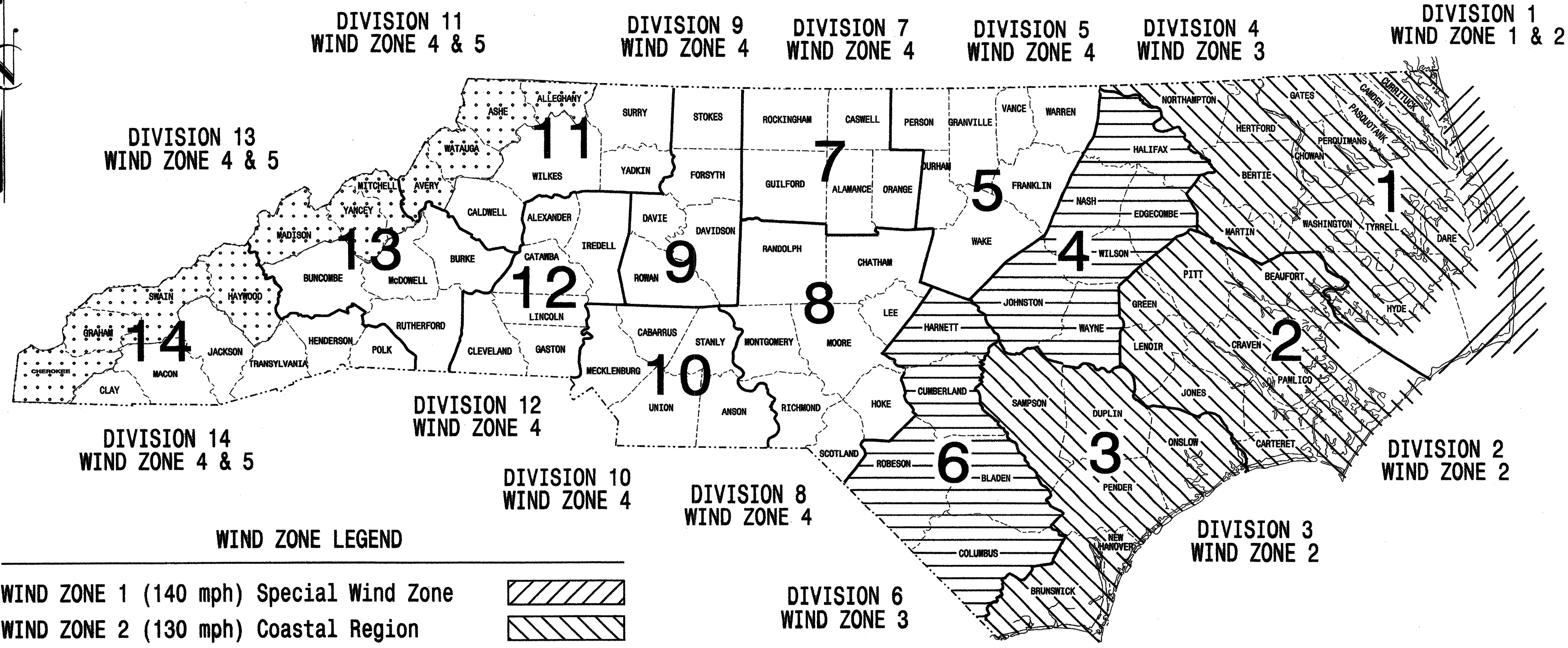
**Fabrication Details - All Poles**

01-SEP-2005 16:22 D:\2004 Metal Pole Standards\dwg004.m2 thru m6.dgn

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	W-5104	Sig.21
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/ITSS/ws/mpoles/poles.html>

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

Designed in conformance with the 2002 Interim to the 4th Edition 2001

**AASHTO**

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

**INDEX OF PLANS**

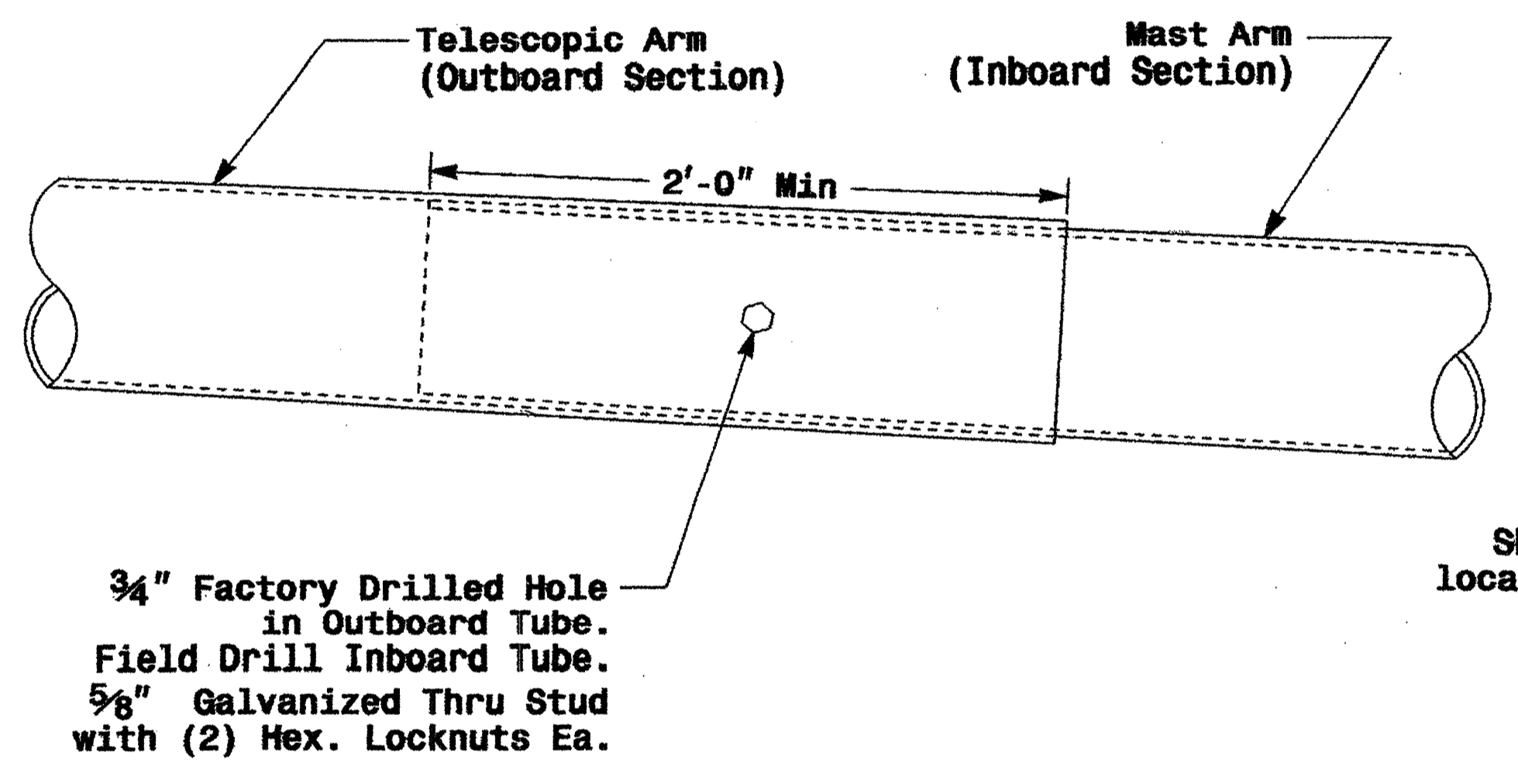
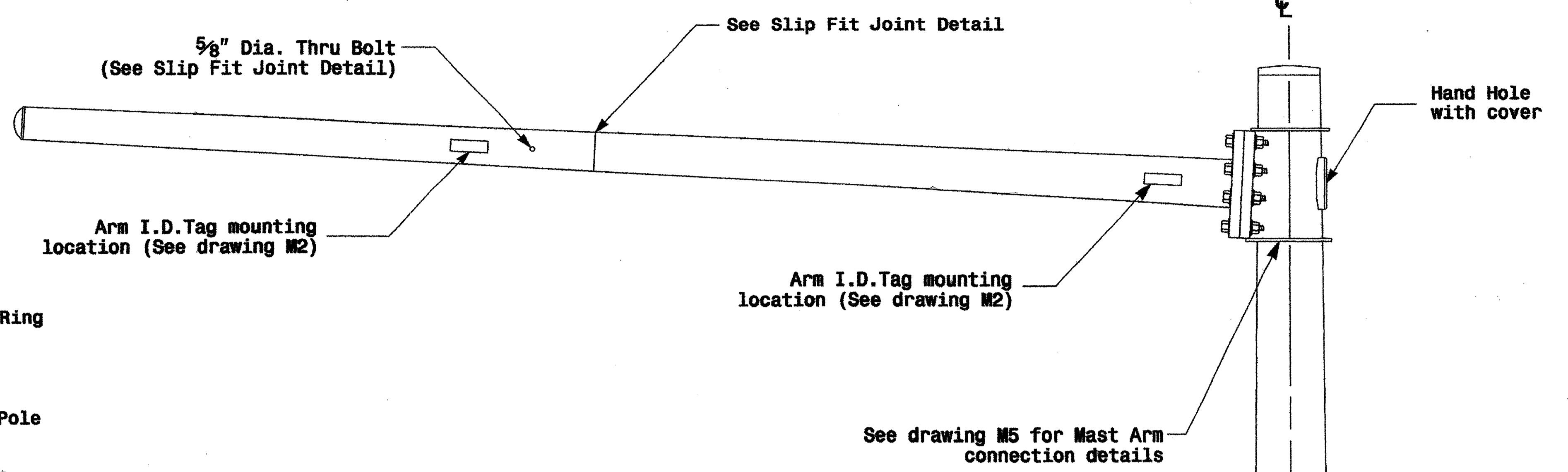
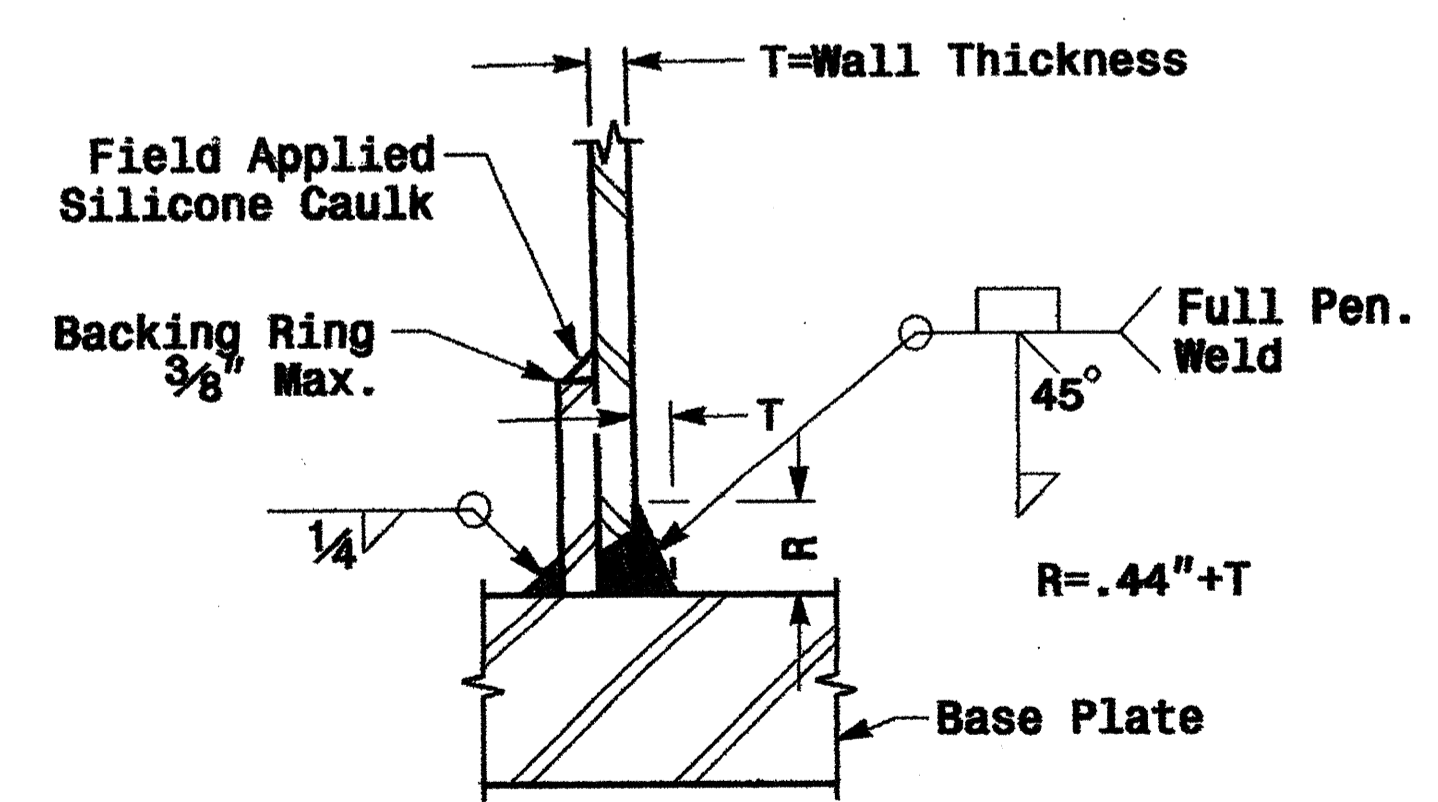
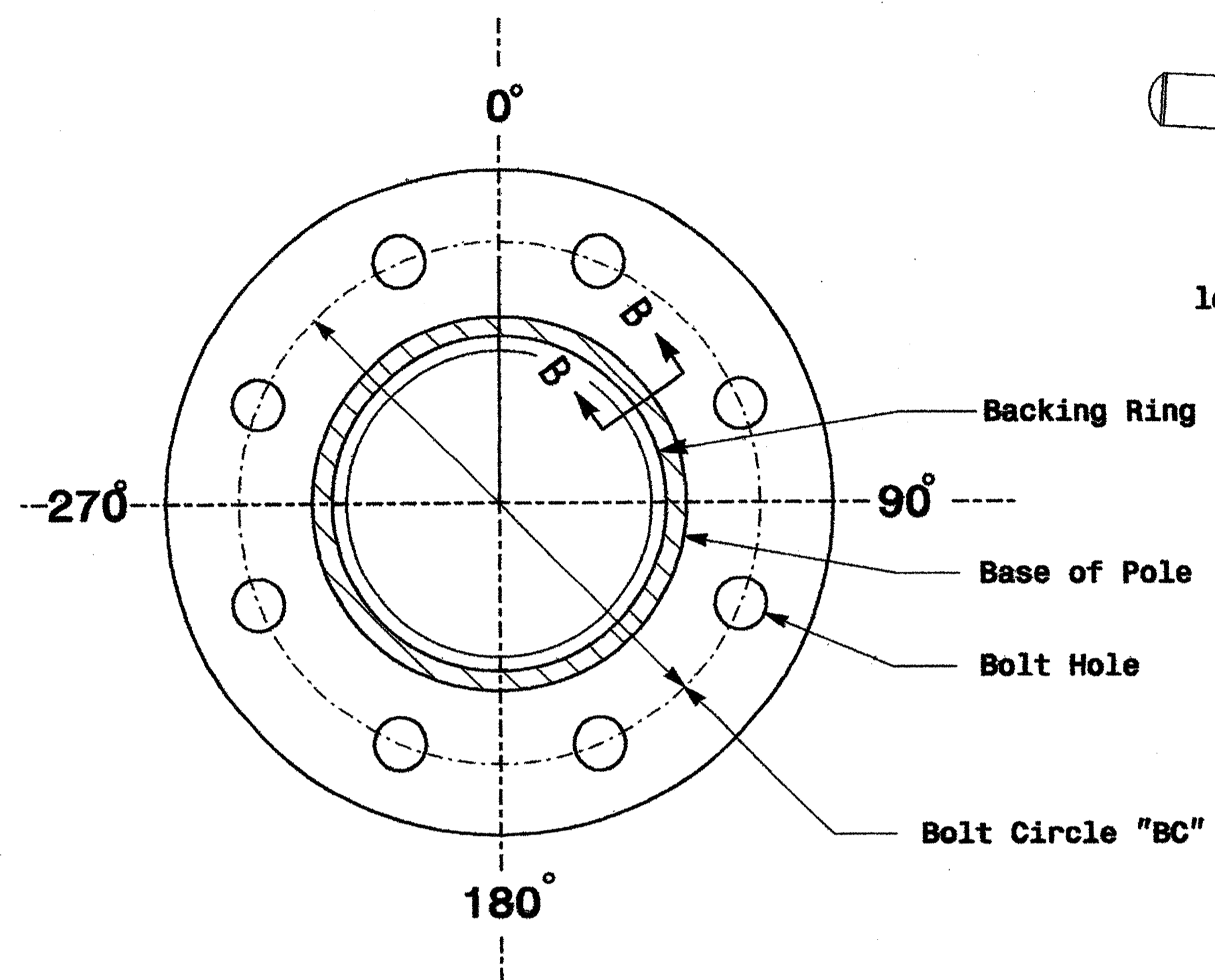
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

**NCDOT CONTACTS:**  
**MOBILITY AND SAFETY DIVISION - ITS and SIGNALS UNIT**

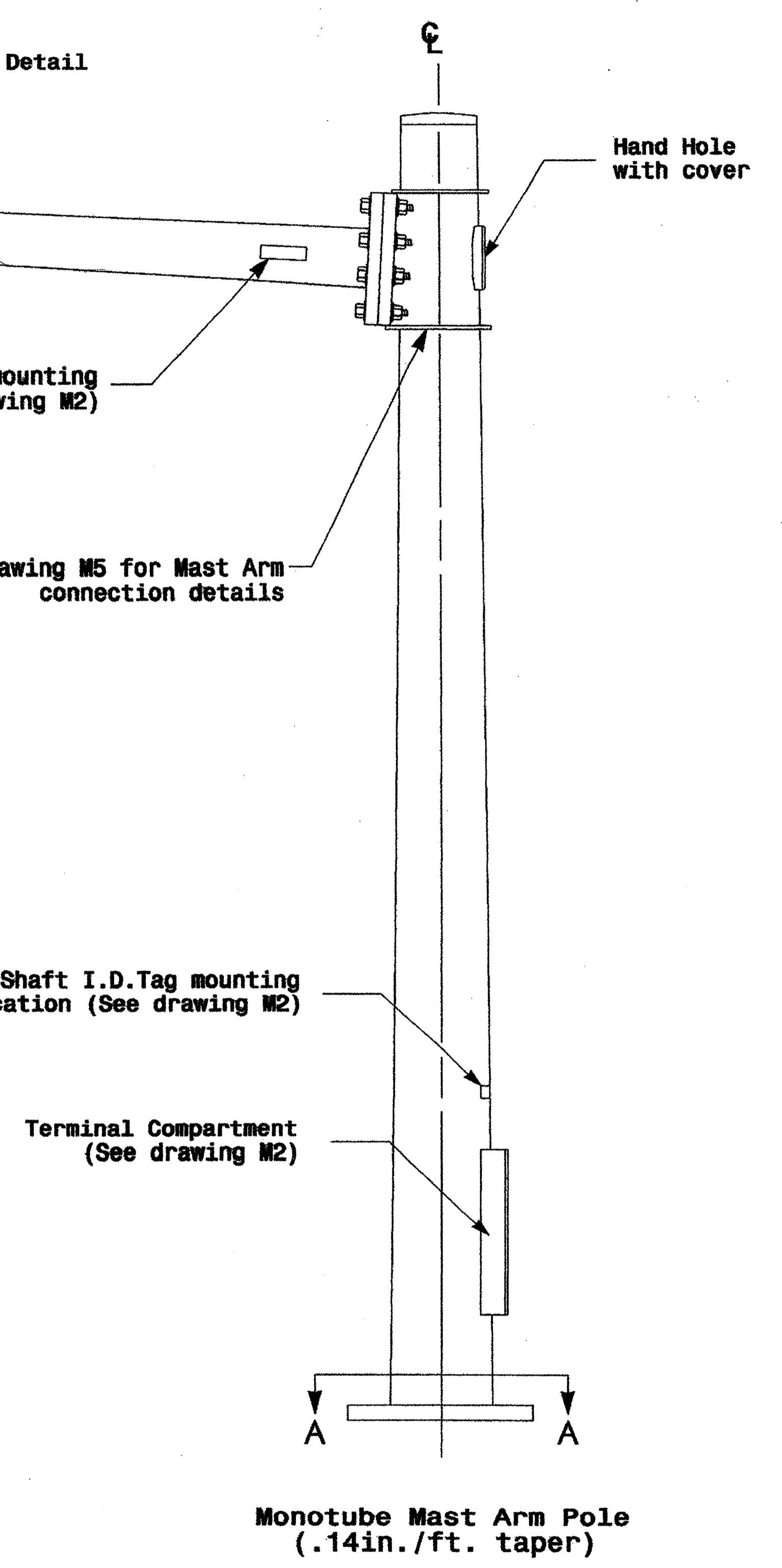
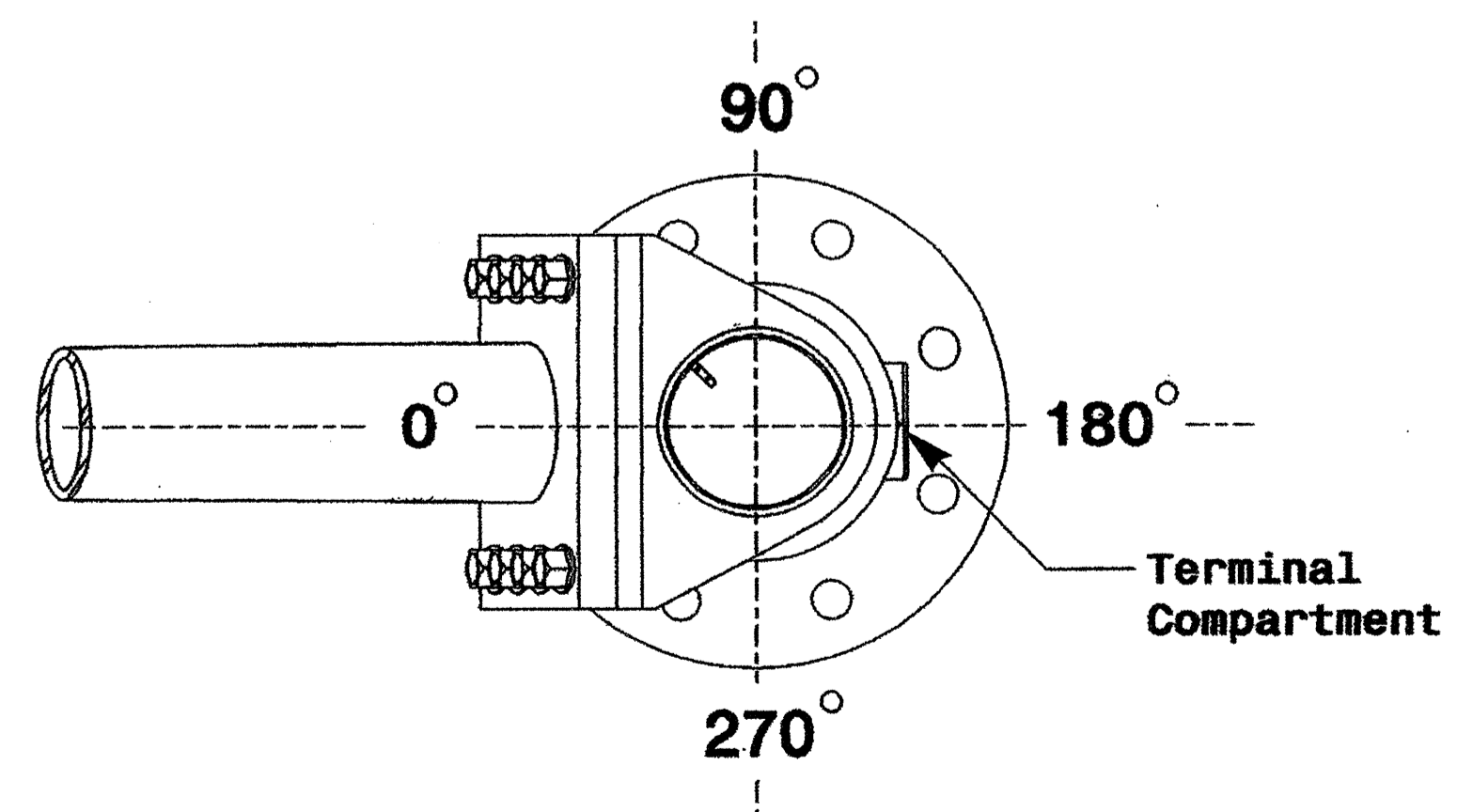
G. A. Fuller, P.E. - State ITS and Signals Engineer  
 G. G. Murr, Jr., P.E. - State Signals Engineer  
 D. C. Sarkar, P.E. - ITS and Signals Senior Structural Engineer  
 C. F. Andrews, Jr. - ITS and Signals Structural Project Engineer  
 M. Aslam - ITS and Signals Structural Project Engineer  
 N. Bitting, P.E. - ITS and Signals Structural Project Engineer

SEAL

D. Sarkar 7.21.2009  
 SIGNATURE DATE



**Slip Fit Joint Detail for Mast Arm**

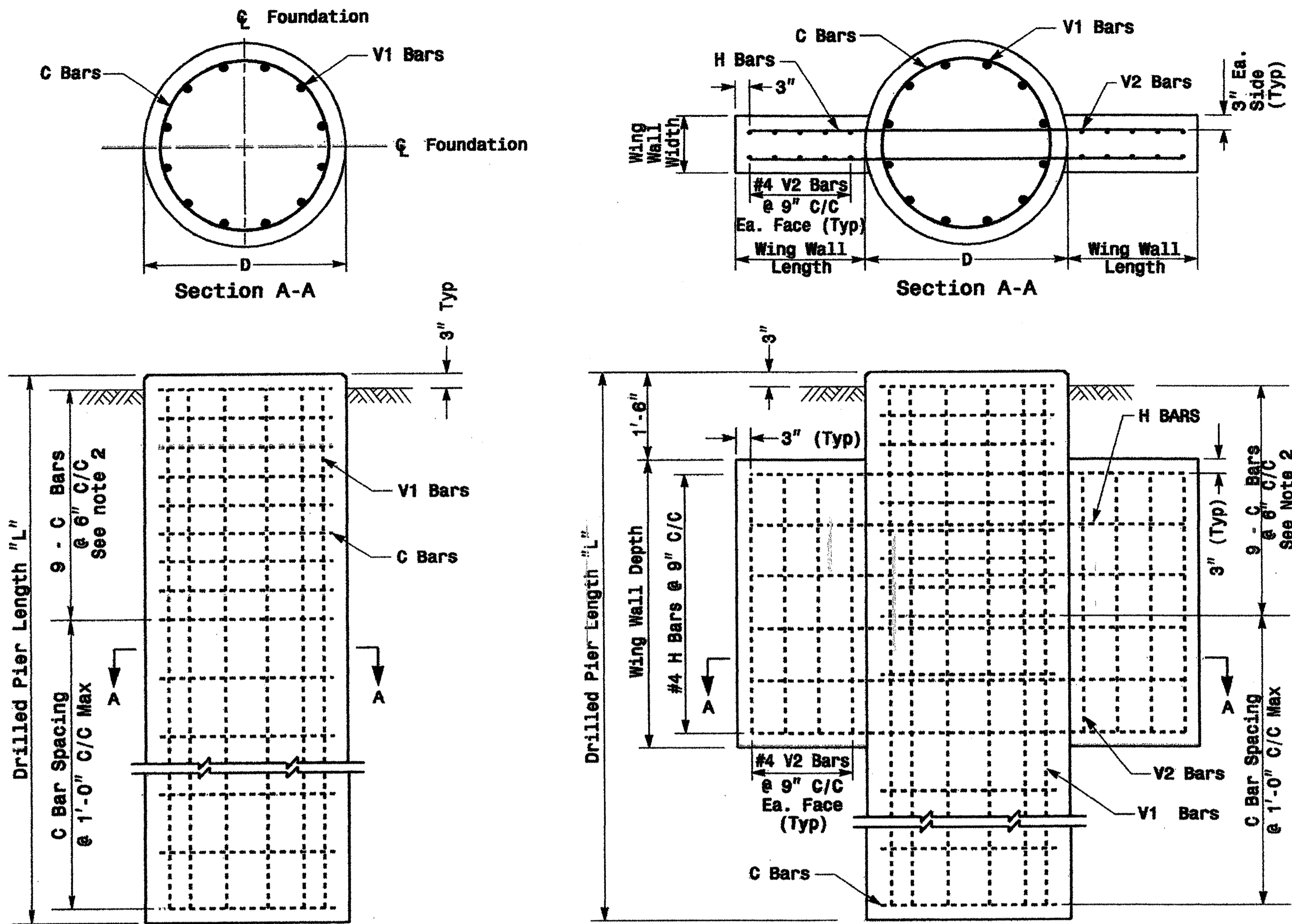


**Fabrication Details - Mast Arm Poles**

01-SEP-2005 14:08 v:\shop\pse-un\1\sec-kp\pse\2004\metol pole at\stdrds\2004 m4.dgn

	<b>Typical Fabrication Details for Mast Arm Poles</b>		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094 DINESH C. SRIVASTAVA
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	REVISIONS DATE INIT. DATE

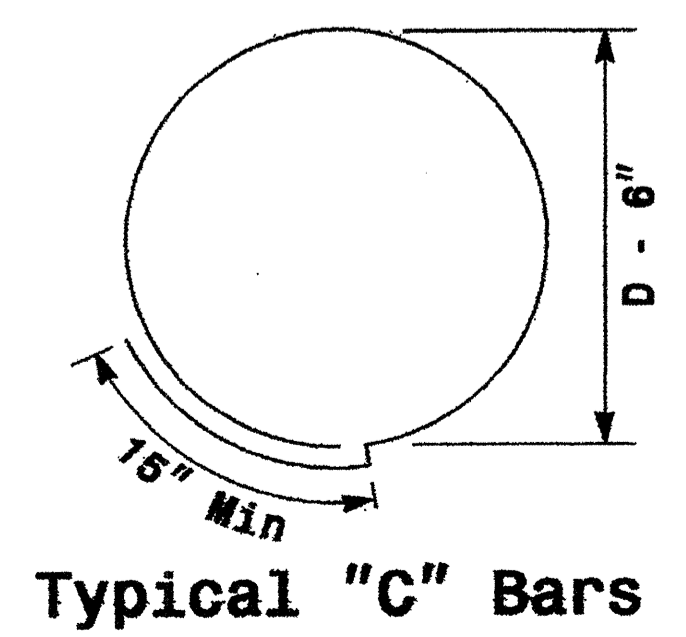
### Reinforcing Steel Bars



**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



**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

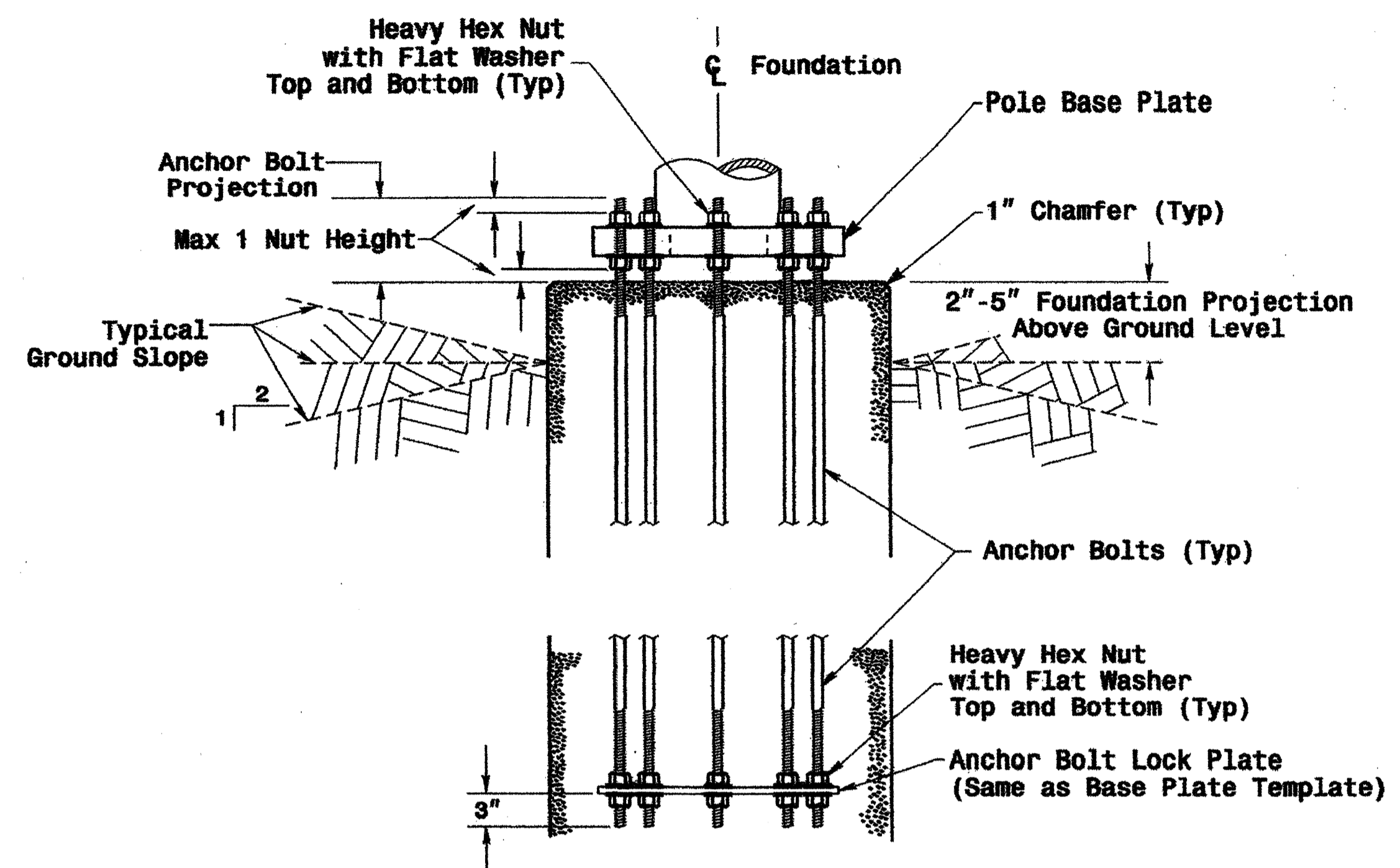
**WING WALL DETAILS**

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

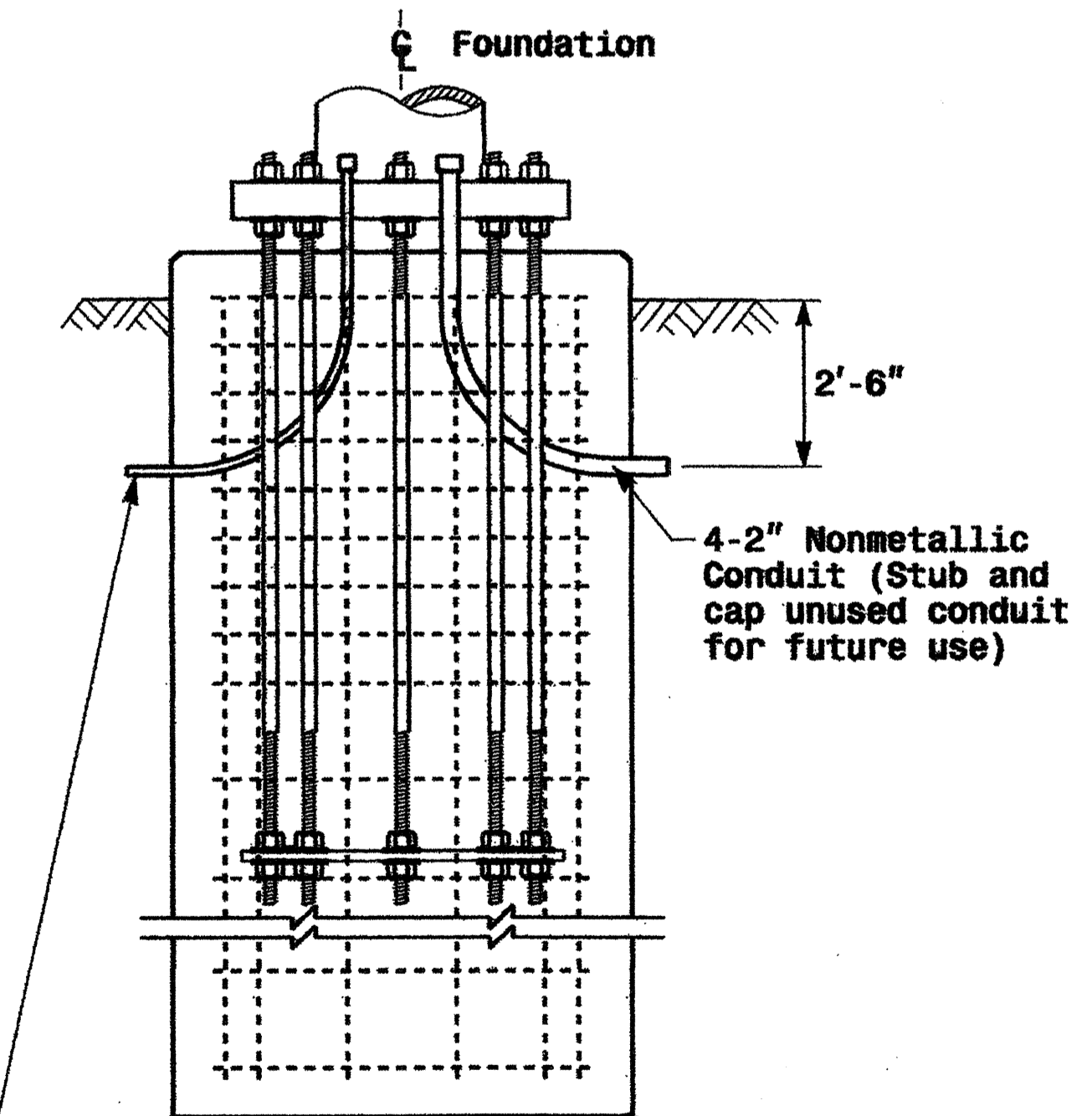
See Note No. 4

### 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 # 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 # 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.)

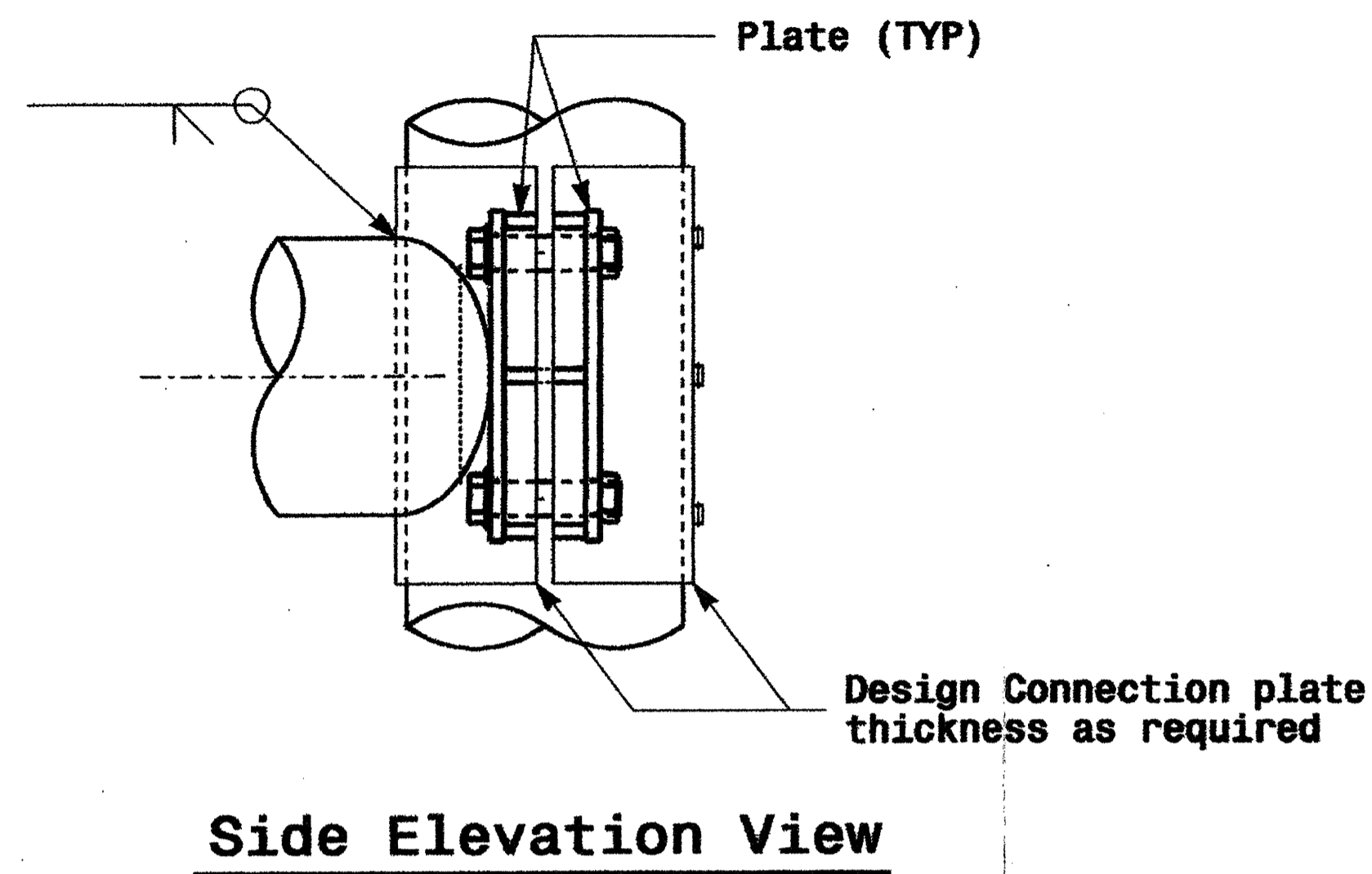
PROJECT REFERENCE NO. W-5104	SHEET NO. Sig. 23 M 7
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Construction Details - Foundations

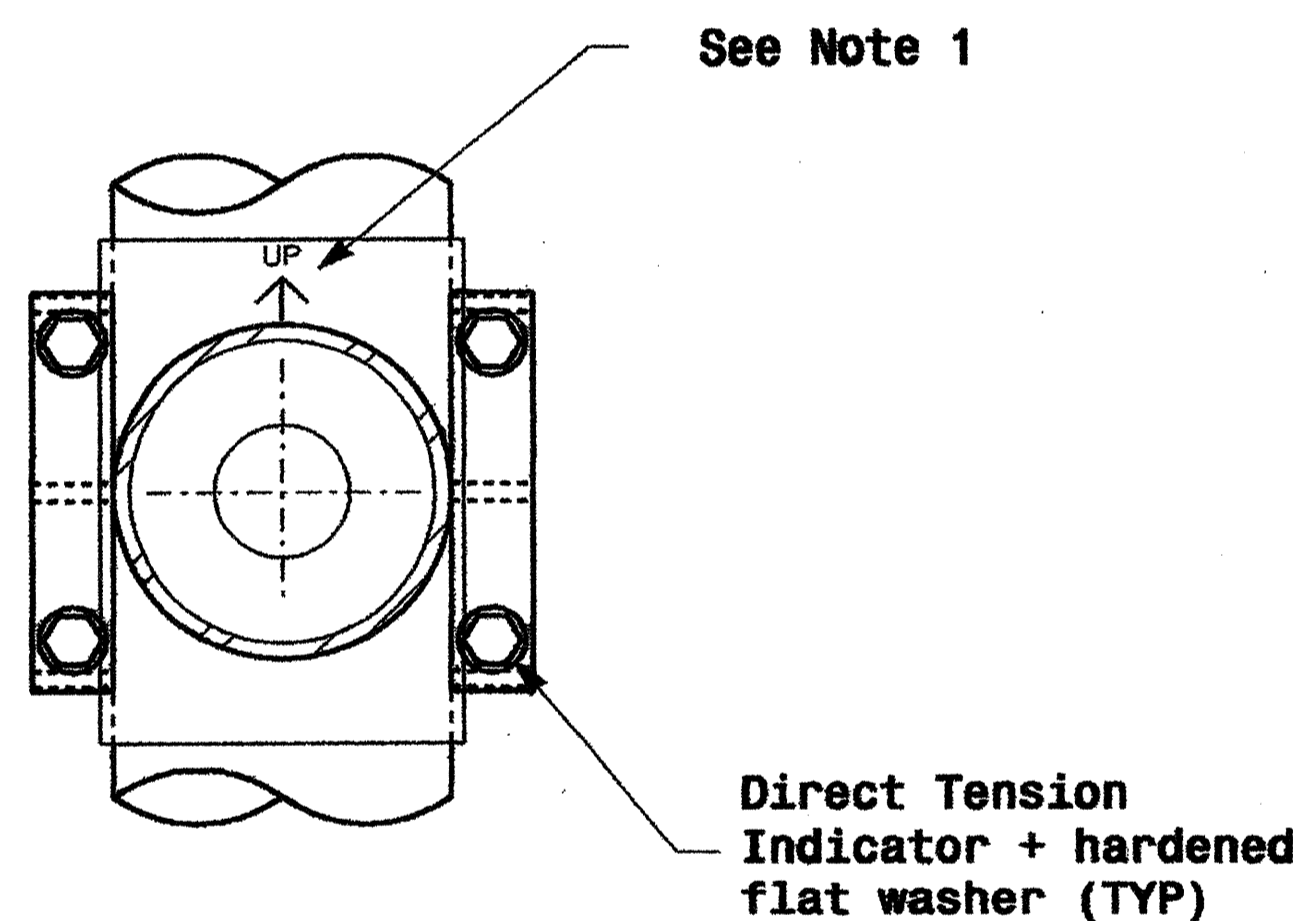
01-SEP-2005 11:48 AM W:\SAP\01-SEP-2005\11-48\p01\stdcrs\stdcrs.dwg

	<b>Construction Details Foundations</b>		SEAL
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: A.W. ESPOSITO	REVISIONS INIT. DATE

# Adjustable Clamp Type Bolted Mast Arm Connection

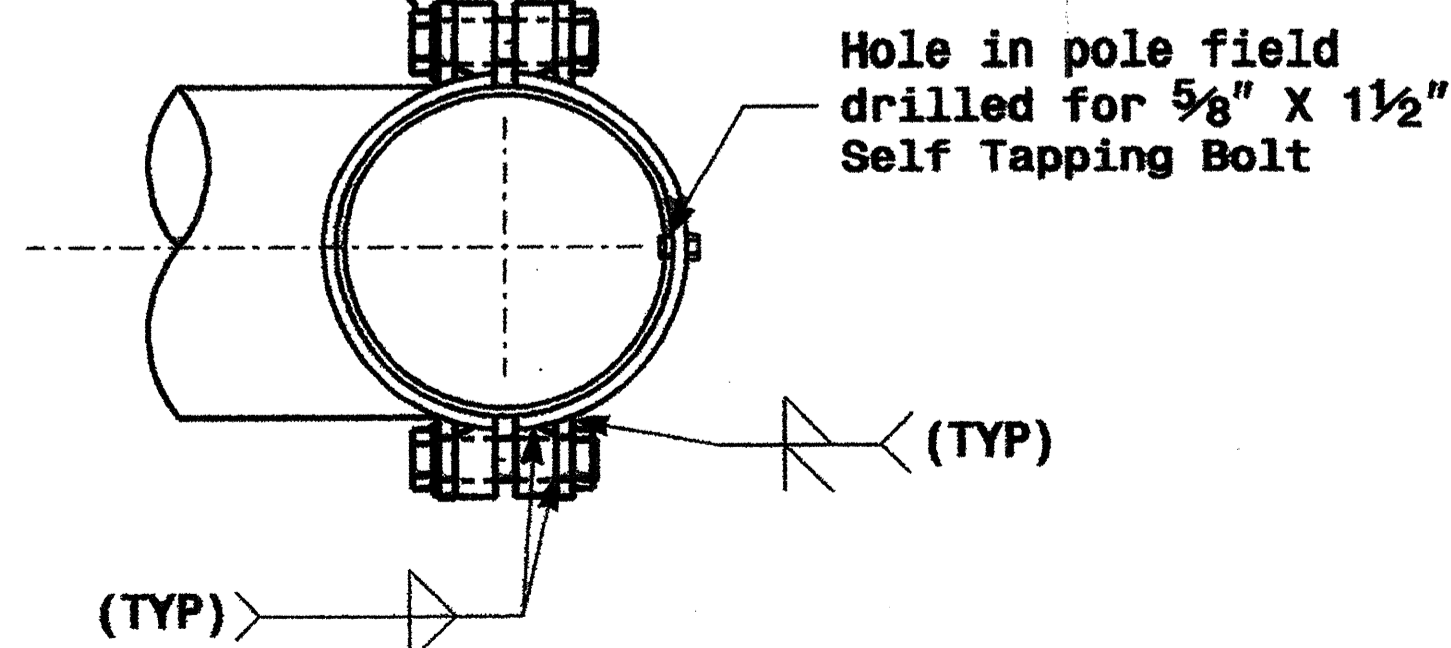


Side Elevation View



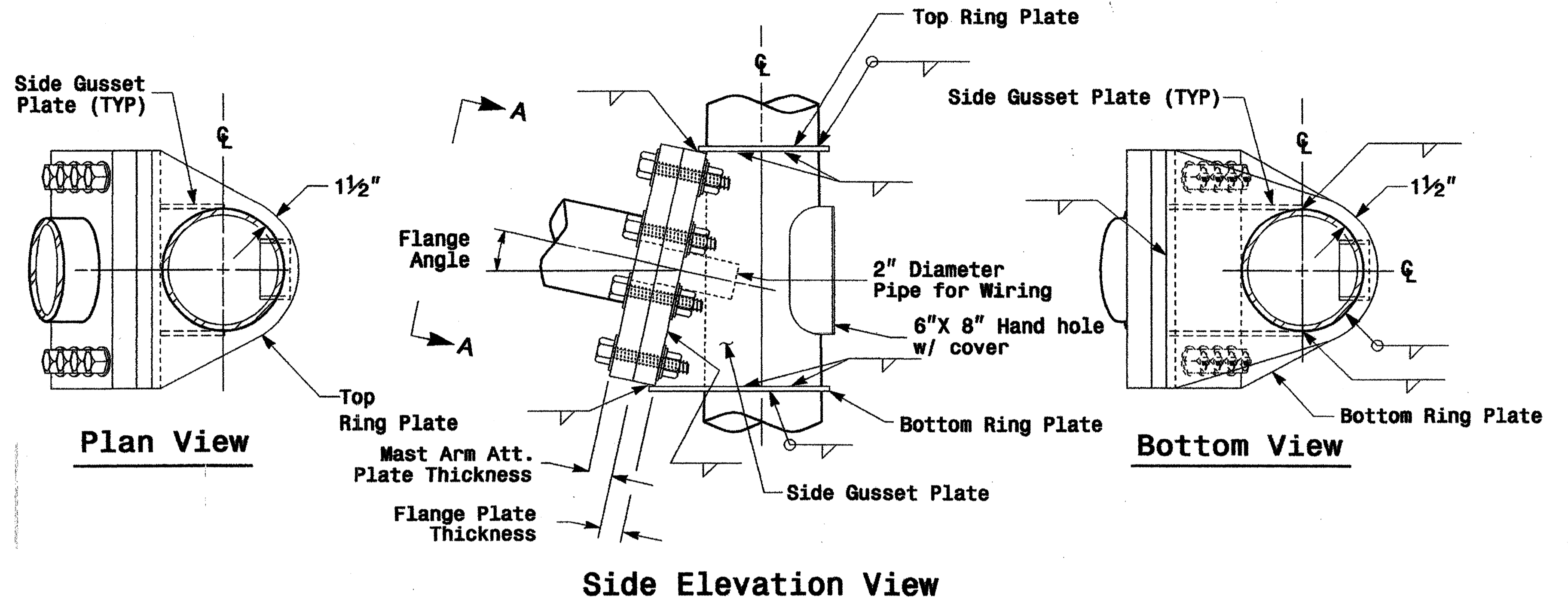
Front Elevation View

(4) - Size "E" Hex Head Bolts with (1) Hex Nuts & Washers

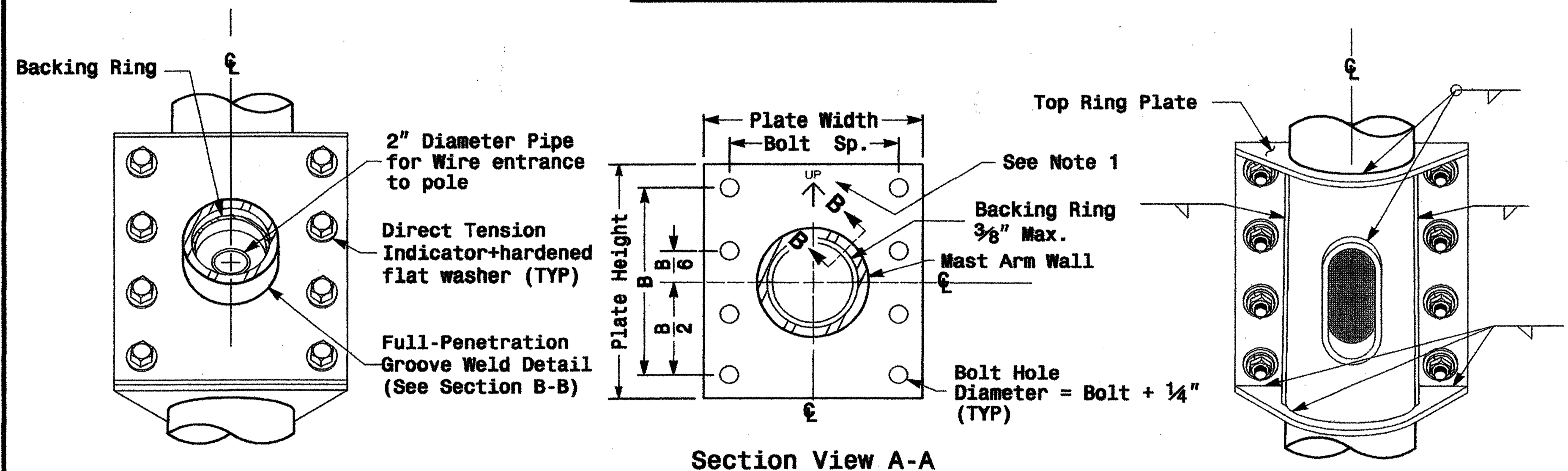


Plan View

# Welded Ring Stiffened Mast Arm Connection



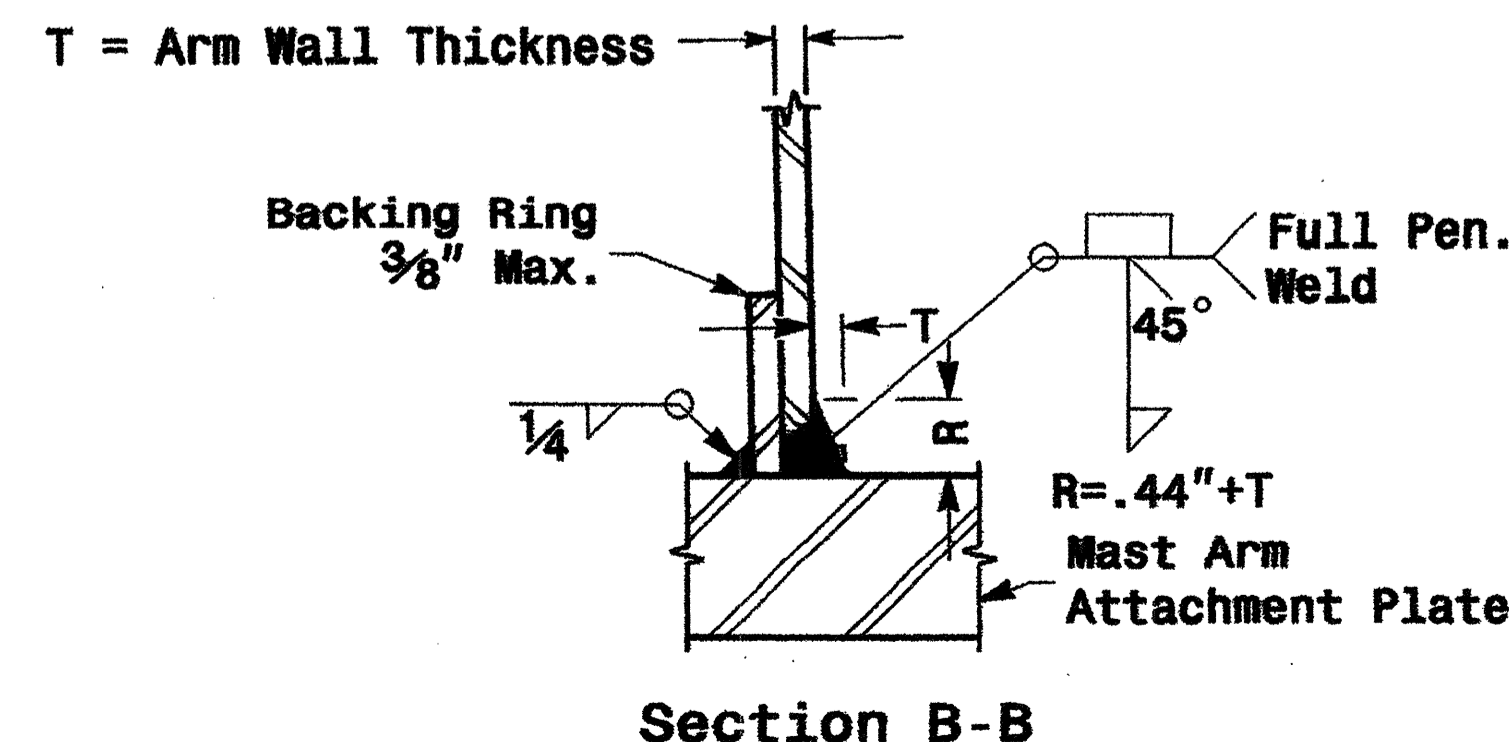
Side Elevation View



Front Elevation View

Section View A-A  
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.

PROJECT REFERENCE NO. W-5104	SHEET NO. Sig.24 M 5
---------------------------------	----------------------------

Fabrication Details - Mast Arm Poles

01-SEP-2005 14:11  
w:\poc\ee-un\l\work\groups\004\_mast\pole\_etc\mca\001\_05.dgn  
P:\Alexander

	Fabrication Details For Mast Arm Connection To Pole		SEAL 
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	
SCALE: NONE	REVISIONS:	INIT.:	DATE:
SIG. INVENTORY NO.			DATE:



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

11-08

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**

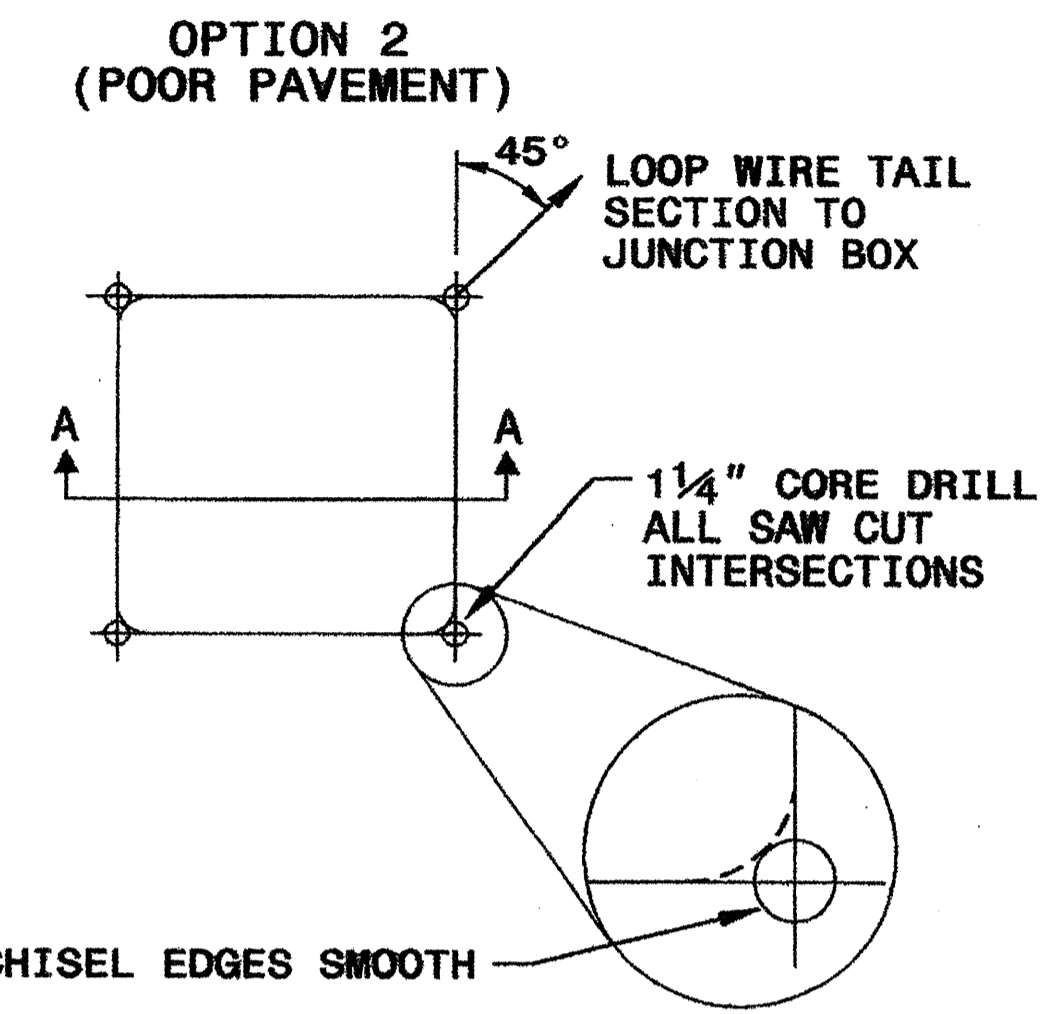
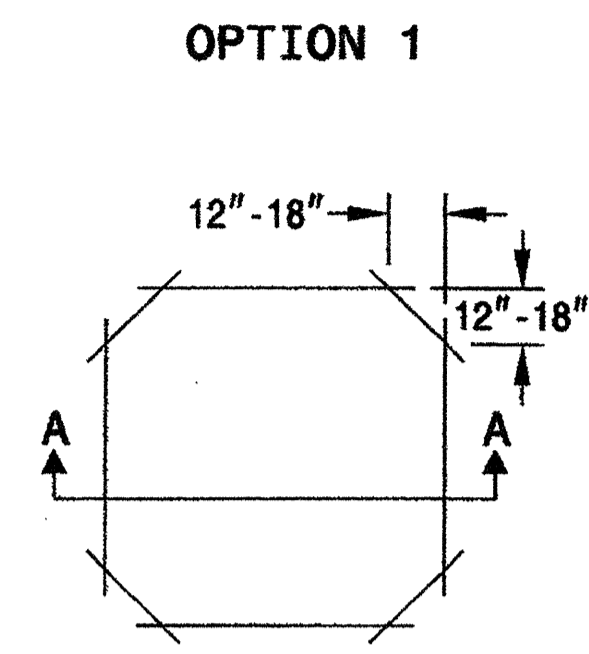
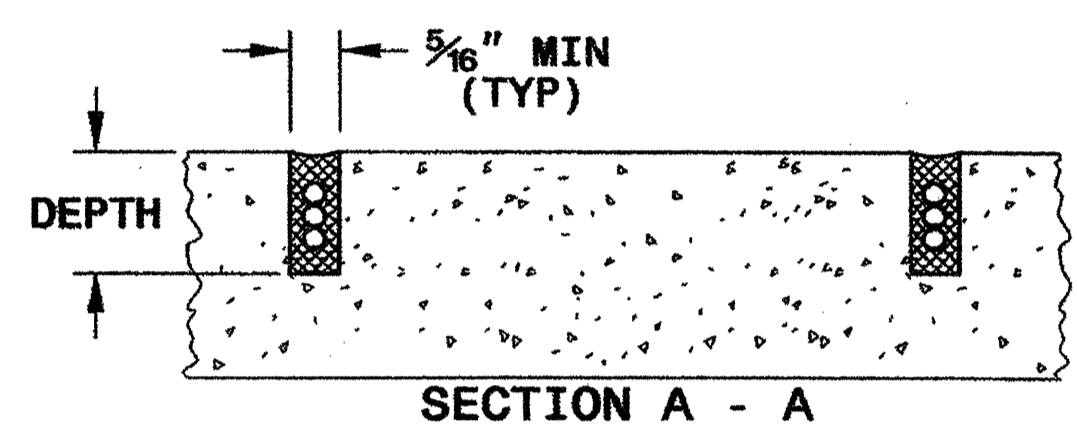
SHEET 1 OF 3  
**1725D01**

**CONVENTIONAL 4-SIDED LOOP**

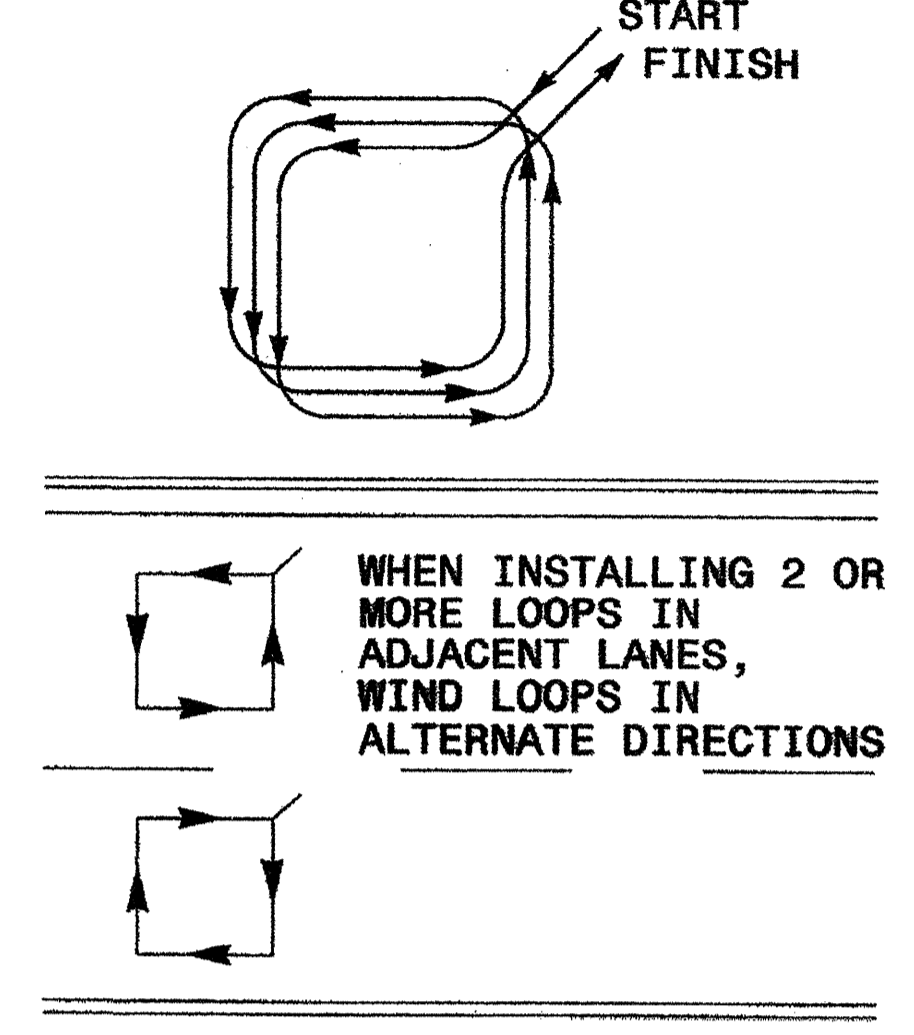
**SAW CUT OPTIONS**

**SAW SLOT DEPTH CHART**

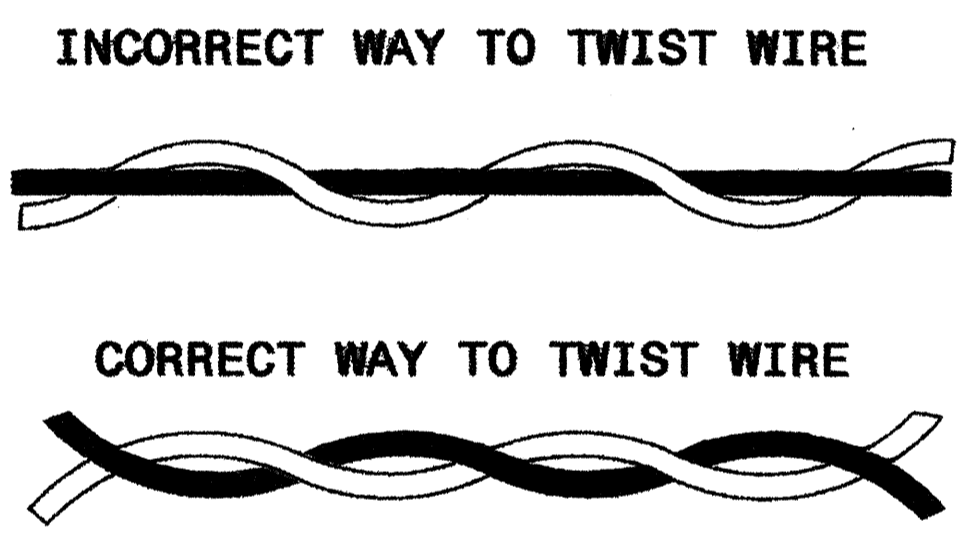
DEPTH (IN)	NO. OF WIRE TURNS				
	2	3	4	5	6
CONCRETE	2.0	2.0	2.5	2.5	3.0
ASPHALT	2.0	2.5	3.0	3.0	3.0



**LOOP WINDING METHOD**



**LOOP WIRE TWISTING METHOD**

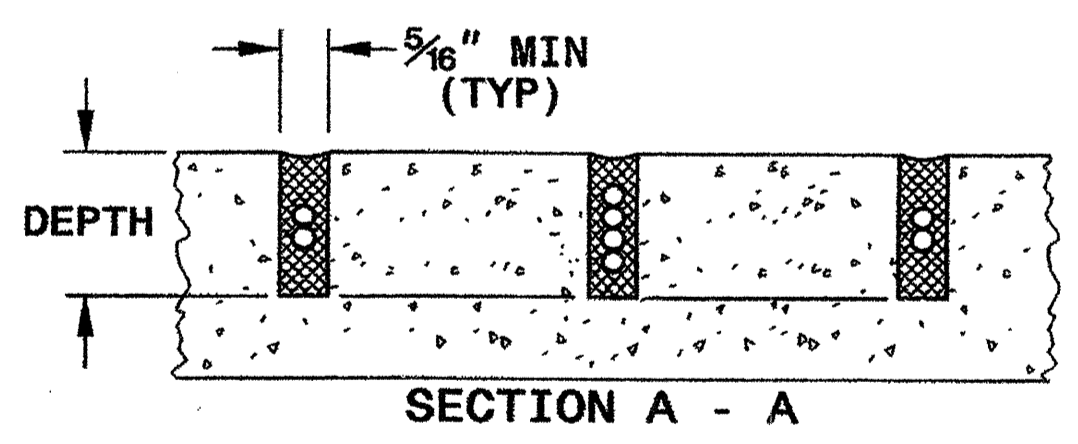
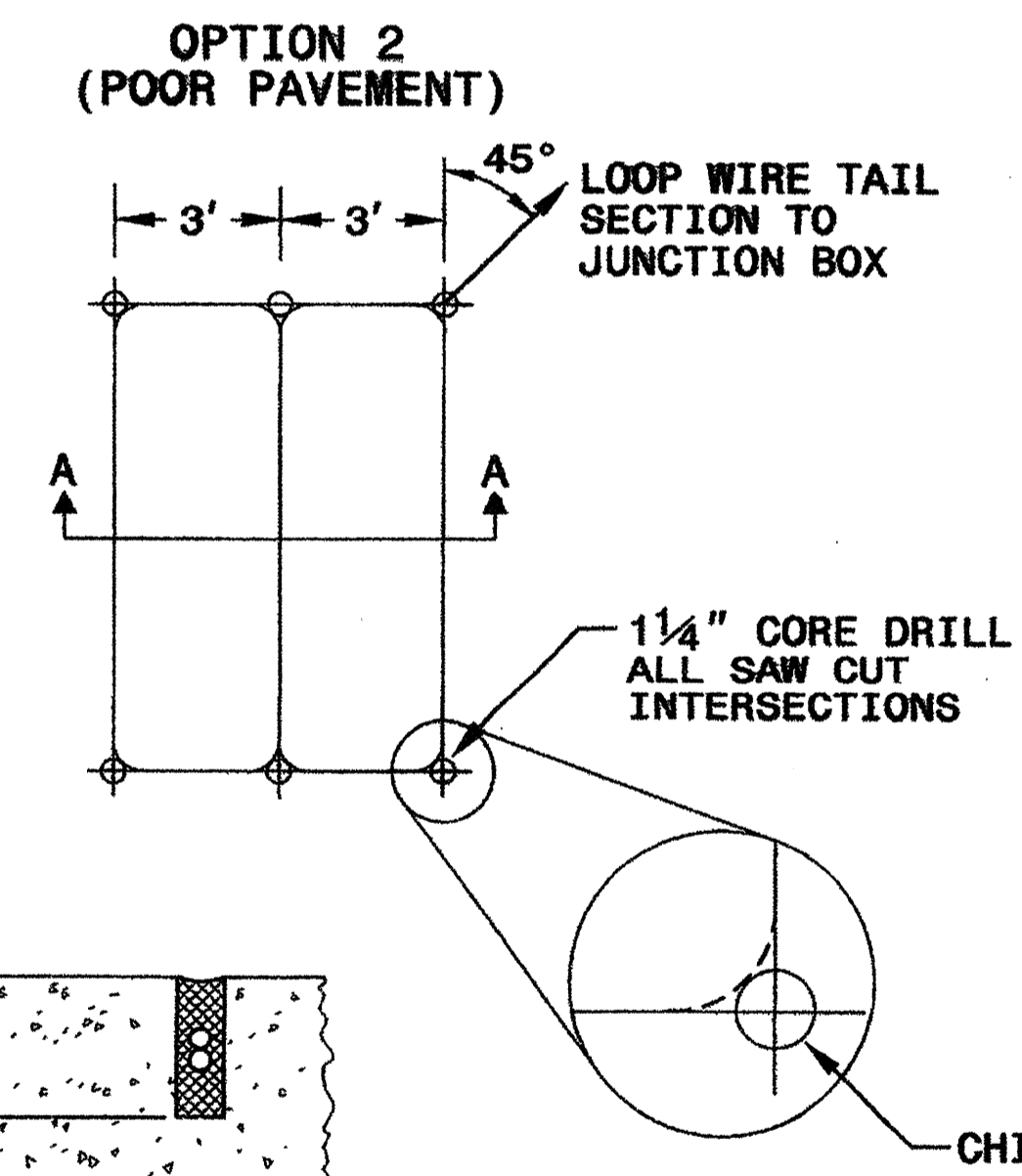
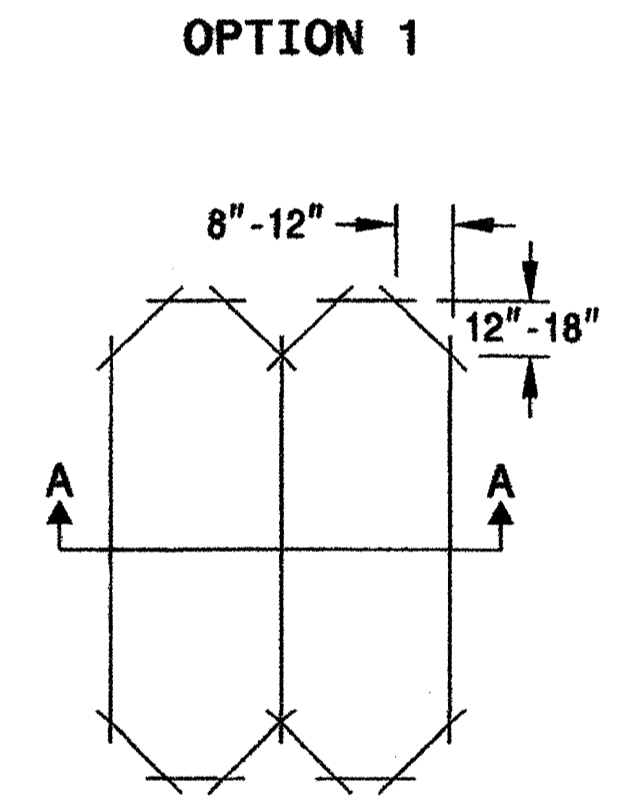


**NOTES**

1. OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
2. MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
3. WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
4. LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

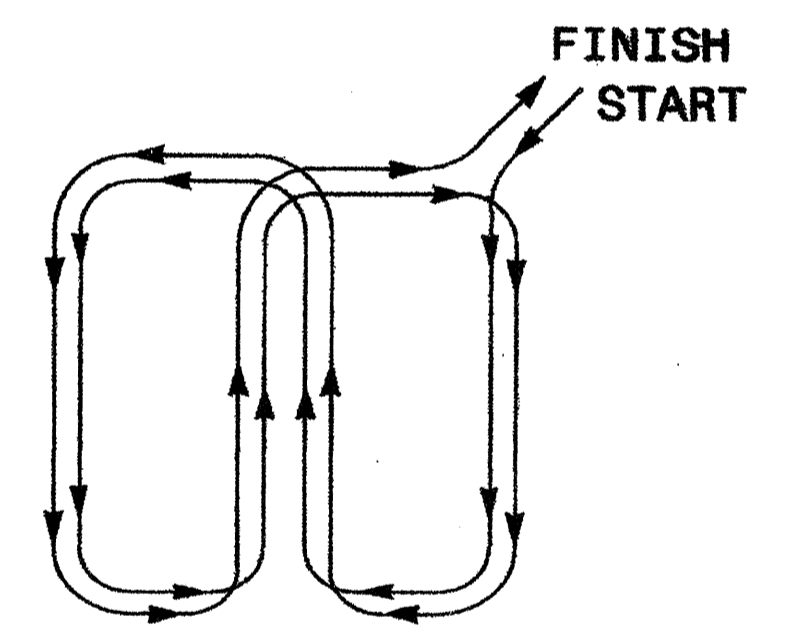
**QUADRUPOLE LOOP**

**SAW CUT OPTIONS**



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

**LOOP WINDING METHOD**



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

11-08

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**

SHEET 1 OF 3  
**1725D01**

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway  
Garner, NC 27529

SEAL

*Milton Dean* 11/24/08  
SIGNATURE DATE

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d:\work\files\1725D01.dwg  
Zml111e

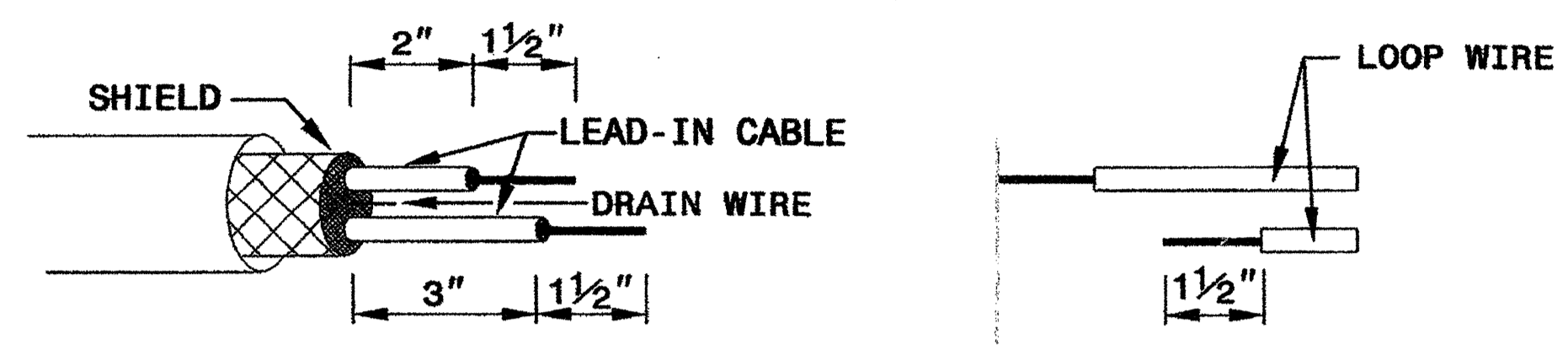
STATE OF NORTH CAROLINA  
 DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RALEIGH, N.C.

11-08

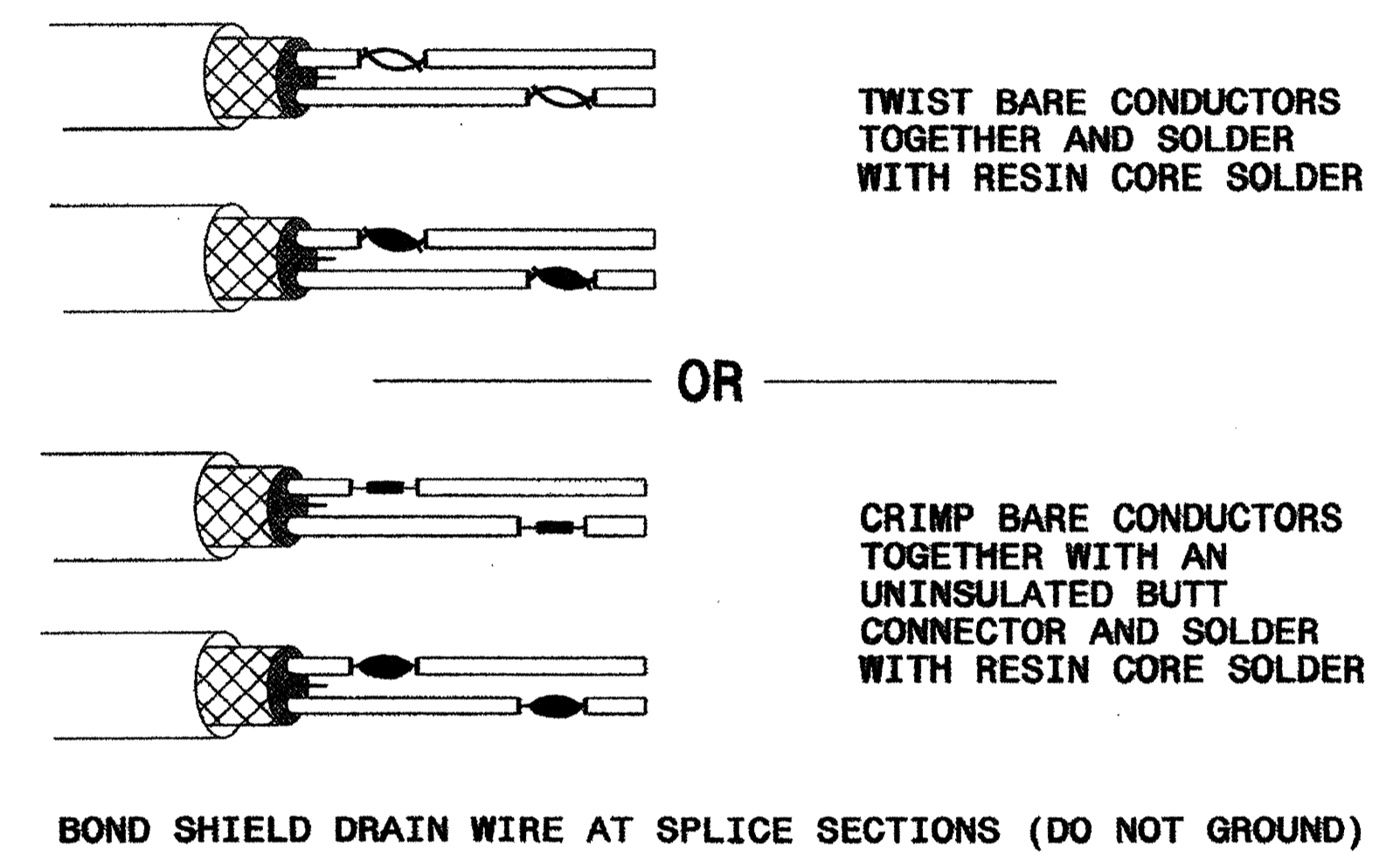
ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
 SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3  
1725D01

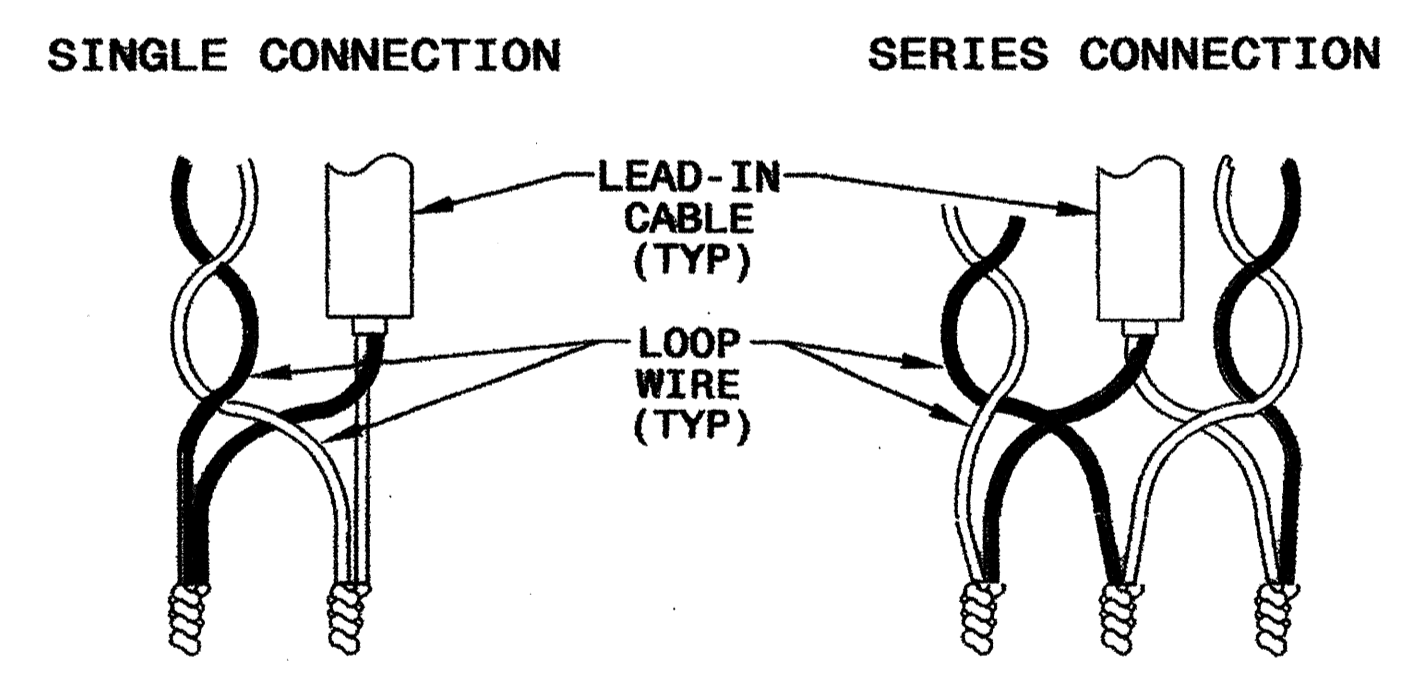
**STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE**



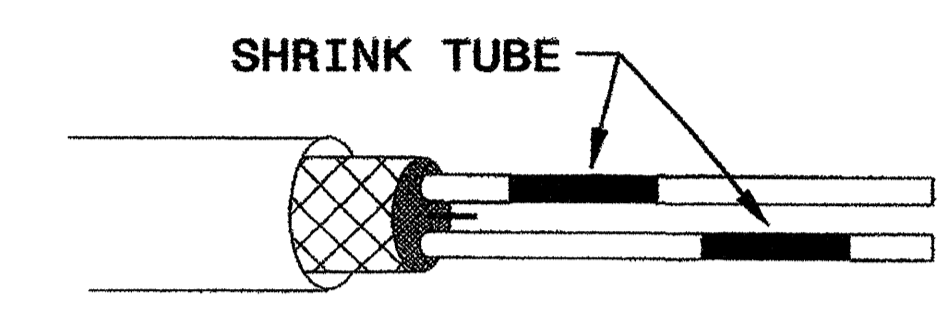
**STEP 2. CONNECT AND SOLDER**



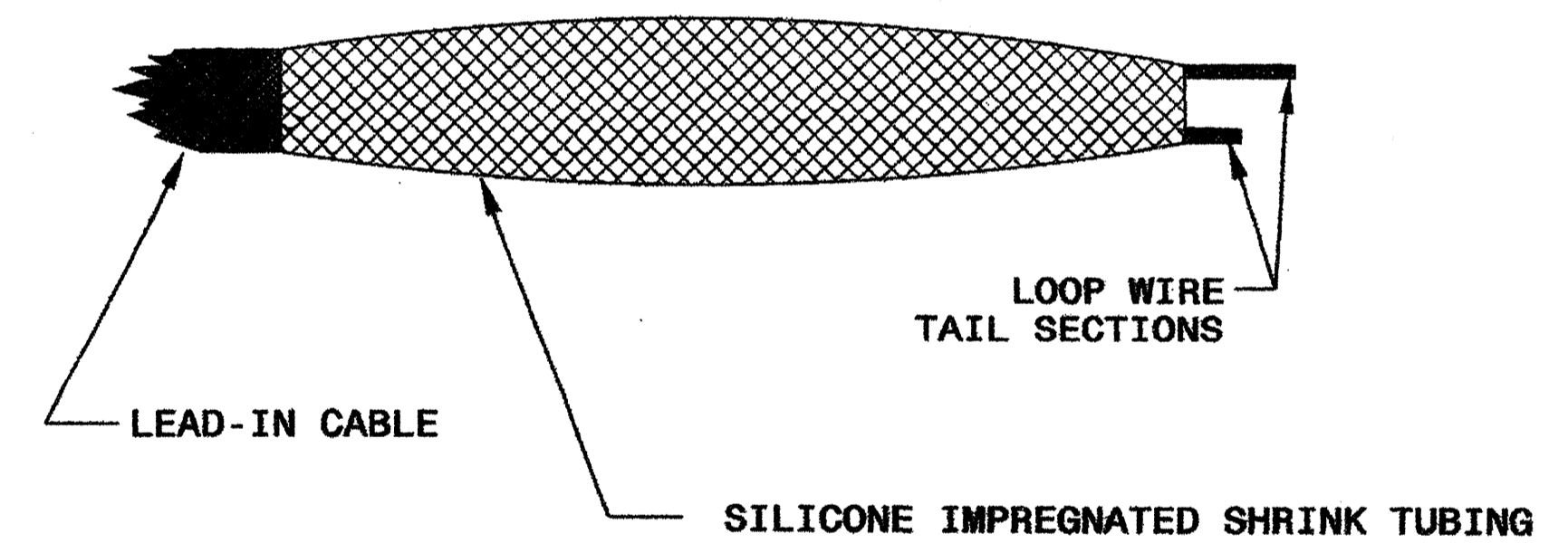
**LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS**



**STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY**



**STEP 4. ENVIRONMENTALLY PROTECT SPLICE**



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

11-08

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
 SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3  
1725D01

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway  
Garner, NC 27529

SEAL

Milton Dean 11/24/08  
SIGNATURE DATE

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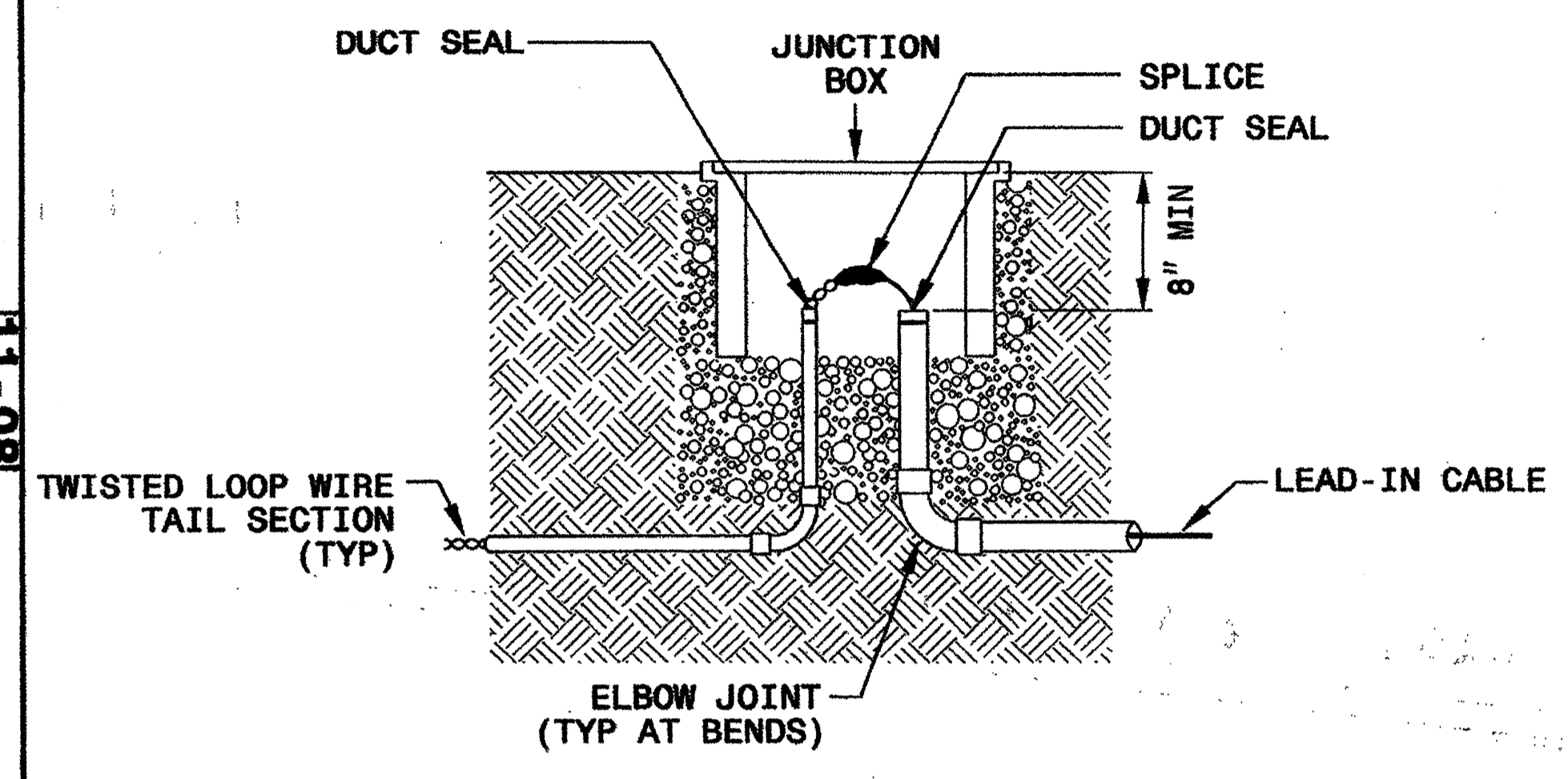
STATE OF NORTH CAROLINA  
 DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
 LOOP WIRE DETAILS

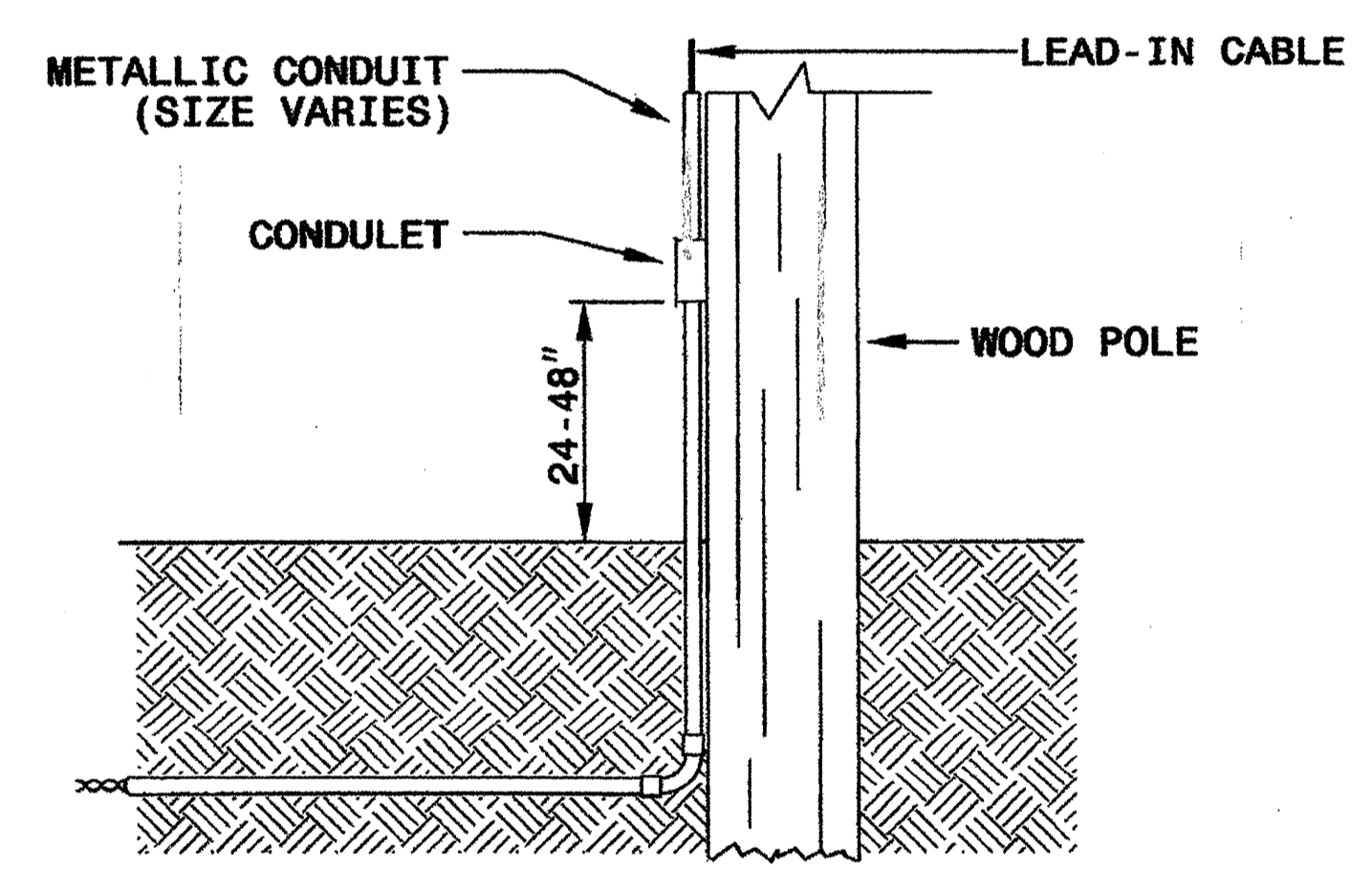
SHEET 2 OF 3  
**1725D01**

**LOOP WIRE SPLICE POINT DETAILS**

**LOOP WIRE AT JUNCTION BOX**



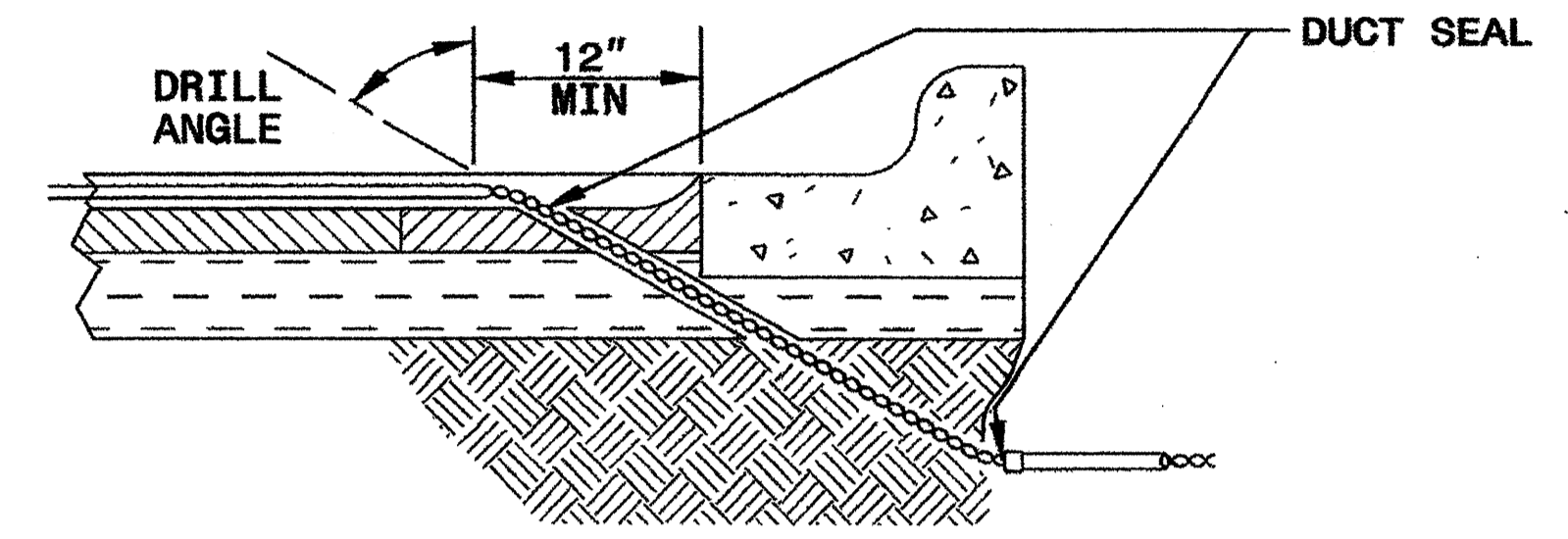
**LOOP WIRE AT POLE**



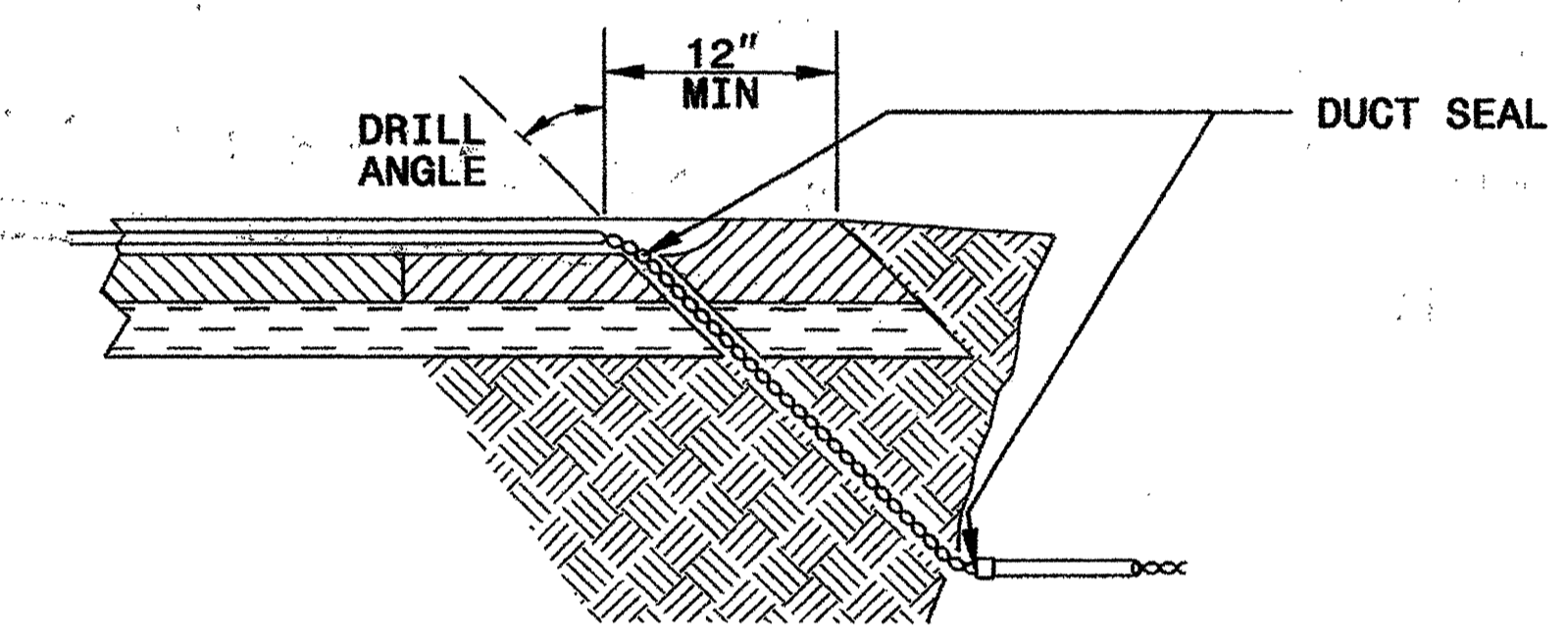
**NOTE**  
 SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

**LOOP WIRE PAVEMENT EDGE DETAILS**

**LOOP WIRE AT CURB & GUTTER SECTION**



**LOOP WIRE AT PAVEMENT SECTION**



**NOTES**

- DO NOT EXCAVATE UNDER CURB AND GUTTER SECTIONS FOR CONDUIT INSTALLATION.
- TWIST LOOP WIRE TAIL SECTIONS FROM WHERE LOOP WIRE TAIL LEAVES SAW CUT TO JUNCTION BOX, INCLUDING THROUGH CONDUIT.
- BEFORE SEALING LOOPS, INSTALL DUCT SEAL WHERE LOOP WIRE TAIL SECTION LEAVES SAW CUT IN PAVEMENT AND AT ENTRANCE OF CONDUIT TO JUNCTION BOX.

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 LOOP WIRE DETAILS

SHEET 2 OF 3  
**1725D01**

See Plate for Title

Prepared in the Office of:

750 N. Greenfield Parkway  
Garner, NC 27529

SEAL

Milton I. Dean 11/24/08  
SIGNATURE DATE