

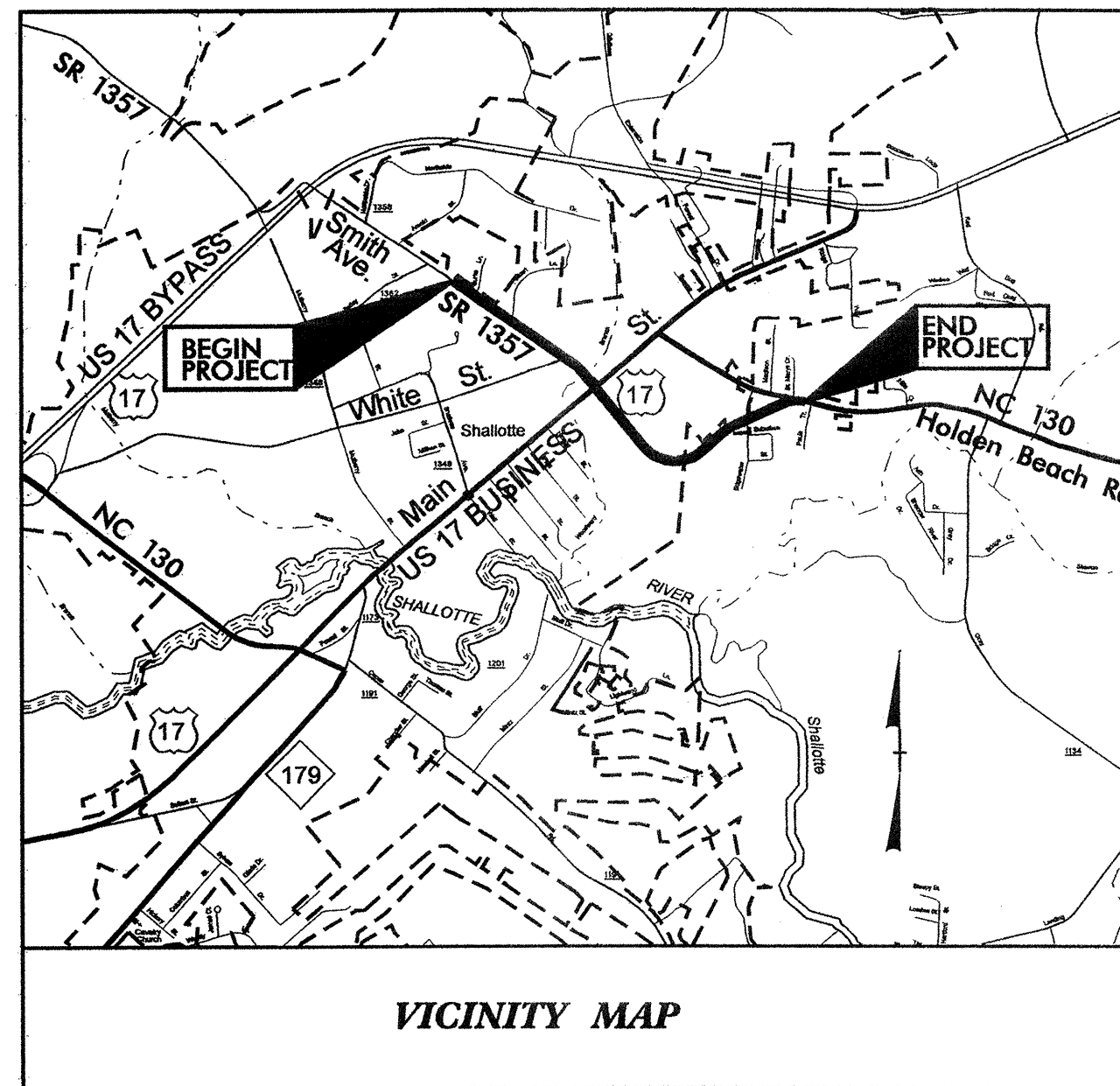


STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

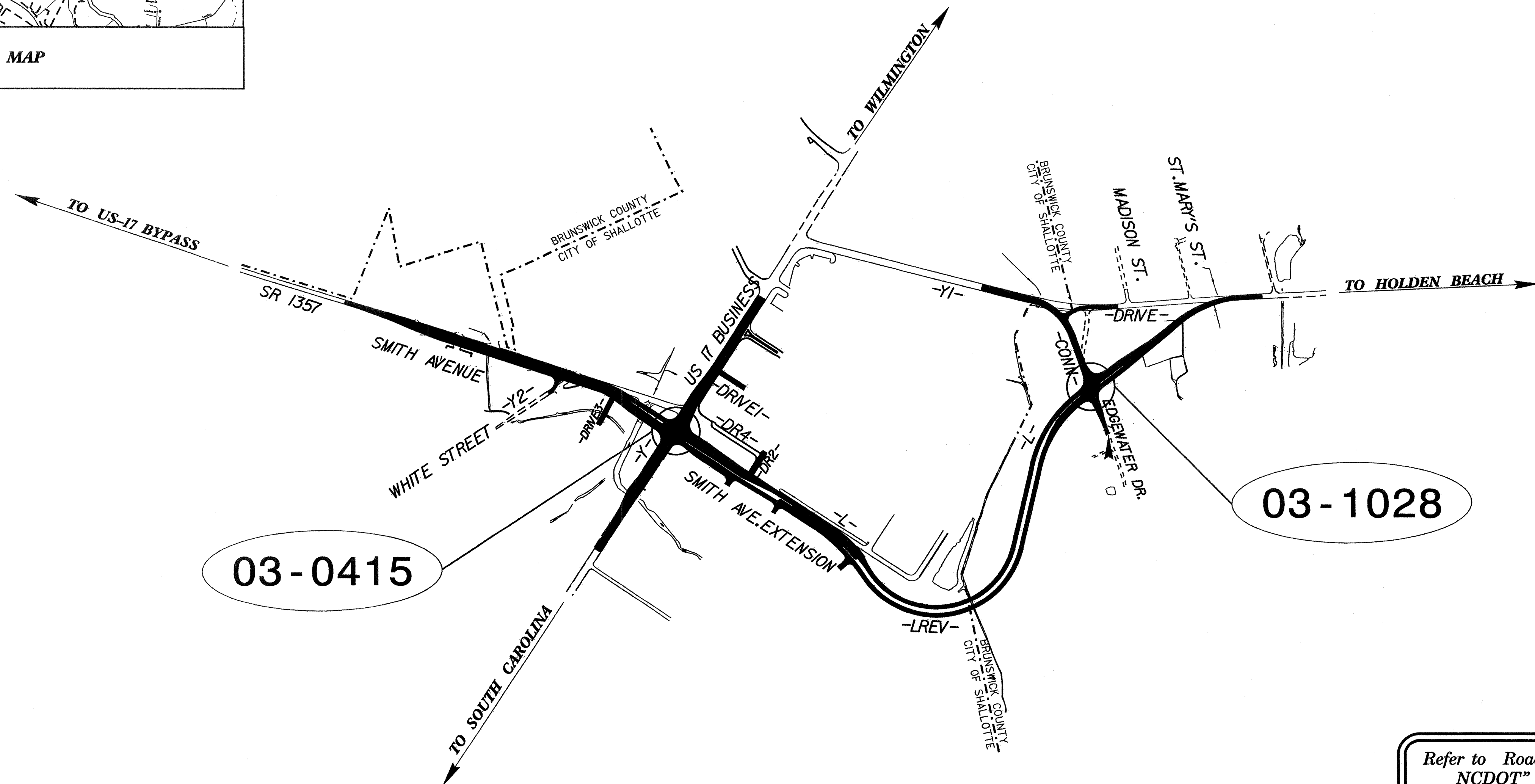
**BRUNSWICK COUNTY**

**LOCATION: EXTENSION OF SR 1357 FROM WEST OF  
US 17 BUSINESS TO NC 130 IN SHALLOTTE**

**TYPE OF WORK: TRAFFIC SIGNALS.**



**TIP: U-3462**



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

**Index of Plans**

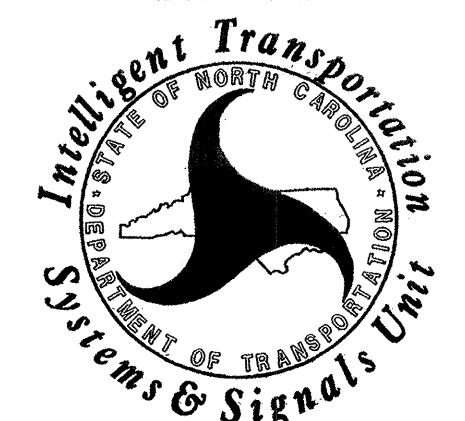
Sheet #	Reference #	Location/Description
Sig. 1		Title Sheet
Sig. 2-8	03-0415	US 17 - NC 130 (Main Street) at SR 1357 (Smith Ave.)/Home Depot Entrance
Sig. 9-12	03-1028	SR 1537 (Smith Road Ext.) at Edgewater Drive/Conn.
Sig. 13-17	N/A	Standard Drawings for Metal Poles
Sig. 18-27	N/A	Communications Cable and Conduit Routing Plans
Sig. 28-30	N/A	Inductive Detection Loops Details

**INTELLIGENT TRANSPORTATION AND SIGNALS UNIT**

Contacts:

**Timothy J. Williams, PE - Signals & Geometrics Contracts Engineer**  
**George C. Brown., PE - Signal Equipment Design Engineer**  
**G. G. Murr, Jr., PE - ITS Engineer**

Prepared In the Office of:  
DIVISION OF HIGHWAYS  
TRAFFIC ENGINEERING AND SAFETY SYSTEMS  
BRANCH



750 N. Greenfield Parkway, Garner, NC 27529

PHASING DIAGRAM

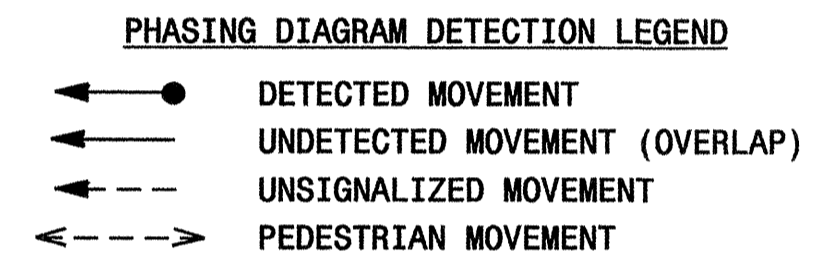
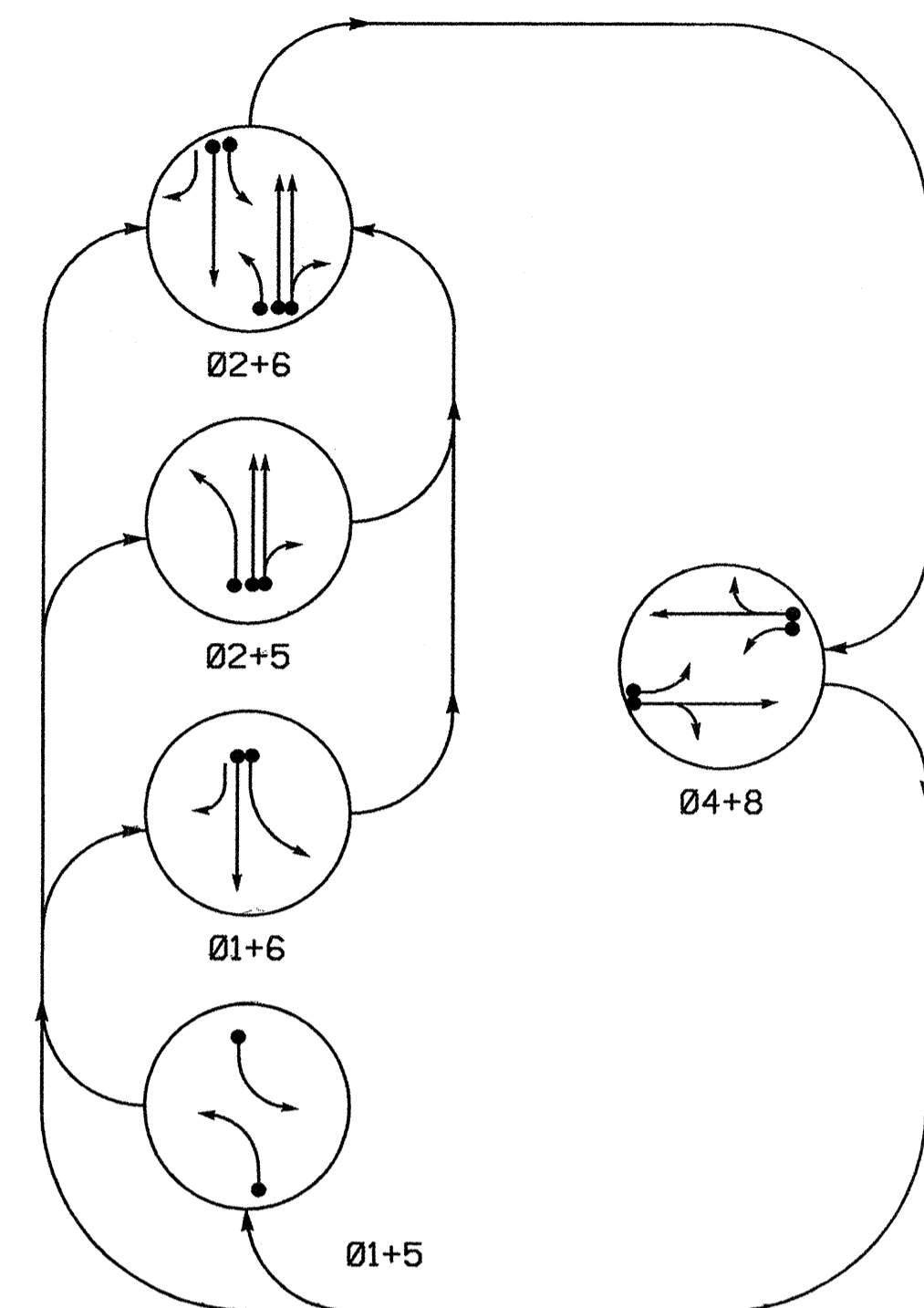
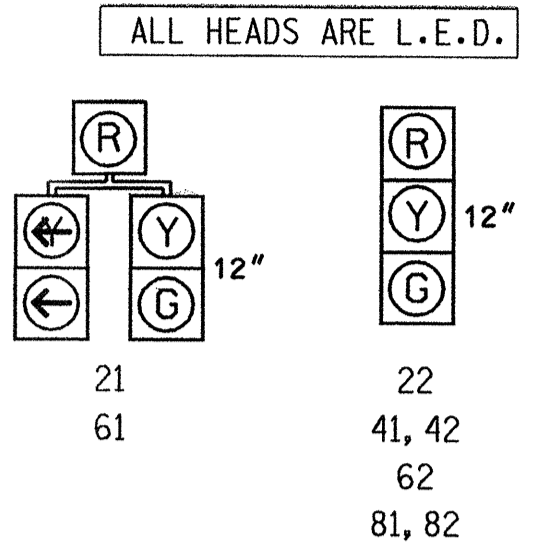


TABLE OF OPERATION

SIGNAL FACE	PHASE					
	01+5	01+6	02+5	02+6	04+8	F.I.C.S.I.H.
21	R	R	G	G	R	Y
22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
61	R	R	G	G	R	Y
62	R	R	G	G	R	Y
81, 82	R	R	R	R	G	R

SIGNAL FACE I.D.



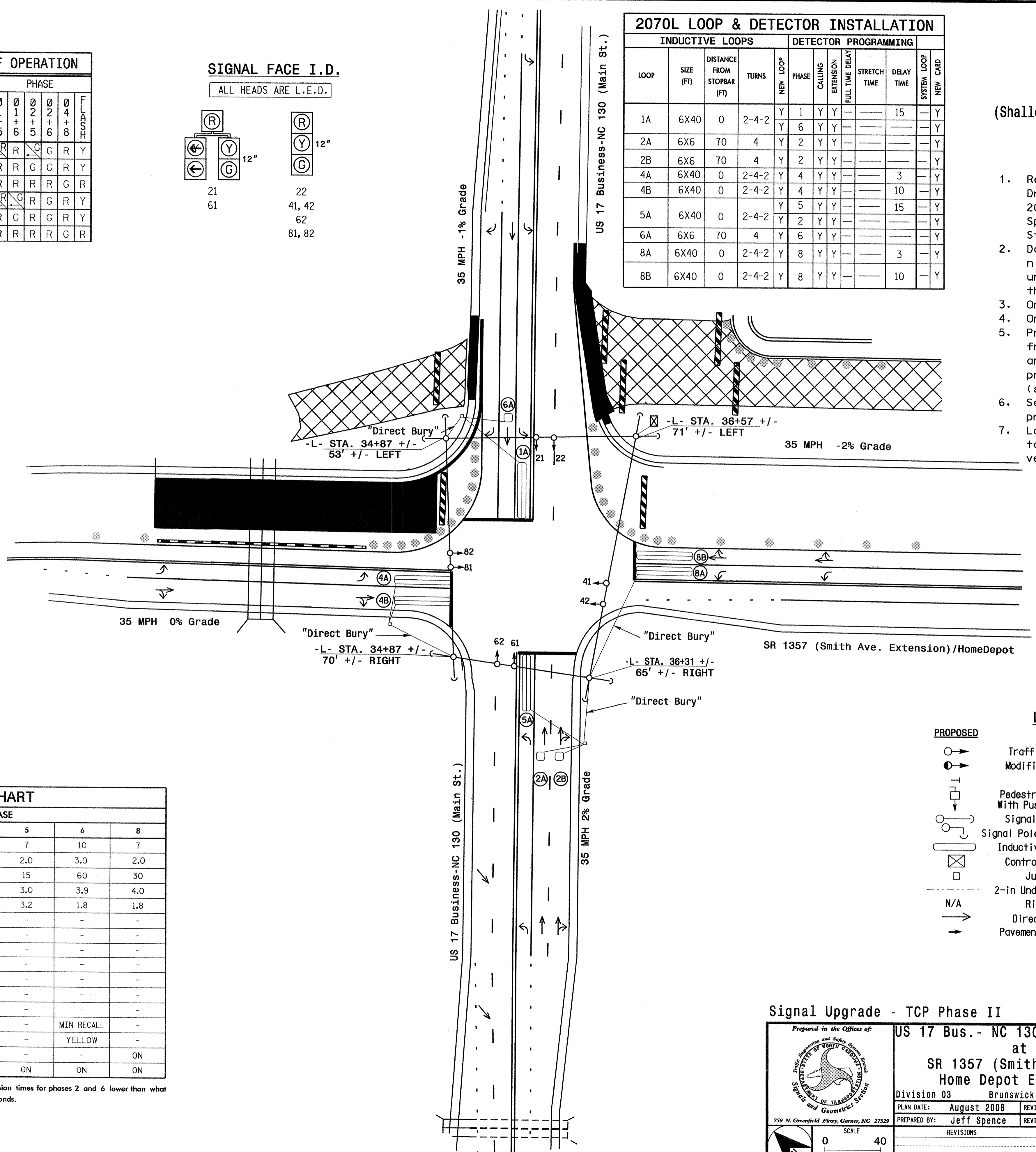
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING							
				NEW LOOP	PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	Y	1	Y	Y	---	15	---	Y
2A	6X6	70	4	Y	6	Y	Y	---	---	---	Y
2B	6X6	70	4	Y	2	Y	Y	---	---	---	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	---	3	---	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	---	10	---	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	---	15	---	Y
6A	6X6	70	4	Y	6	Y	Y	---	---	---	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	---	3	---	Y
8B	6X40	0	2-4-2	Y	8	Y	Y	---	10	---	Y

5 Phase Fully Actuated (Shallotte Closed Loop System)

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.
- Omit phase 1 during phase 2 on.
- Omit phase 5 during phase 6 on.
- Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (see Electrical Details).
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.

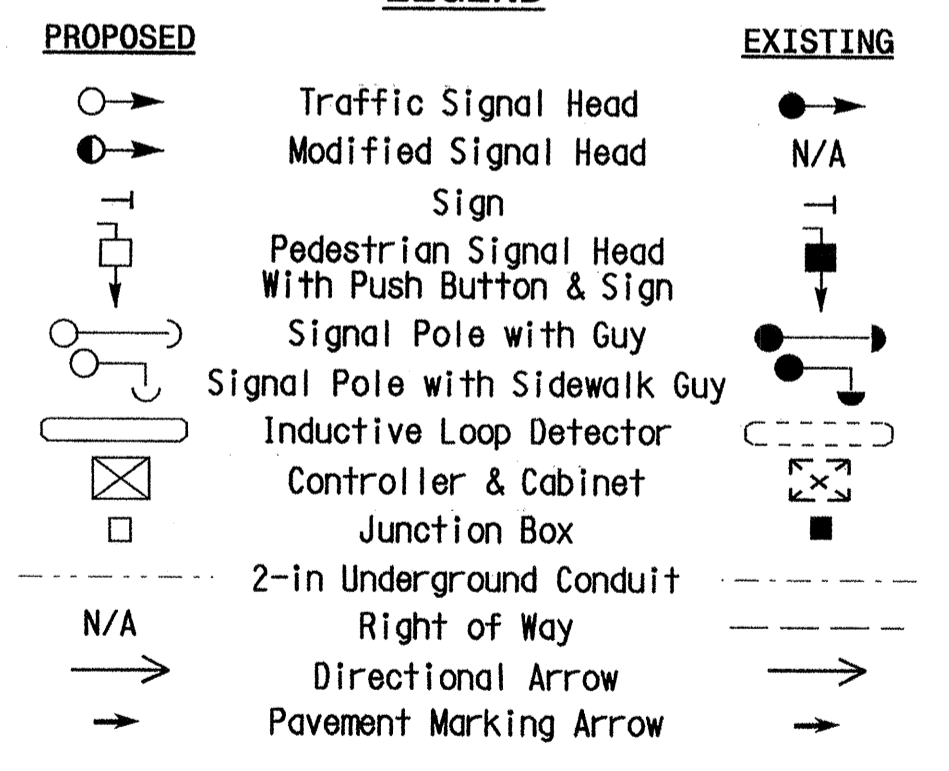


2070L TIMING CHART

FEATURE	PHASE						
	1	2	4	5	6	8	
Min Green 1 *	7	10	7	7	10	7	
Extension 1 *	2.0	3.0	2.0	2.0	3.0	2.0	
Max Green 1 *	15	60	30	15	60	30	
Yellow Clearance	3.0	3.7	3.8	3.0	3.9	4.0	
Red Clearance	2.3	2.5	1.8	3.2	1.8	1.8	
Walk 1 *	-	-	-	-	-	-	
Don't Walk 1	-	-	-	-	-	-	
Seconds Per Actuation *	-	-	-	-	-	-	
Max Variable Initial *	-	-	-	-	-	-	
Time Before Reduction *	-	-	-	-	-	-	
Time To Reduce *	-	-	-	-	-	-	
Minimum Gap	-	-	-	-	-	-	
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-	
Vehicle Call Memory	-	YELLOW	-	-	YELLOW	-	
Dual Entry	-	-	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.

LEGEND



Signal Upgrade - TCP Phase II

Prepared in the Office of: US 17 Bus. - NC 130 (Main Street) at SR 1357 (Smith Avenue) / Home Depot Entrance

Division 03 Brunswick Co. Shallotte

PLAN DATE: August 2008 REVIEWED BY: I. O. Umozurike

PREPARED BY: Jeff Spence REVIEWED BY:

SCALE: 1" = 40'

750 N. Greenfield Place, Garner, NC 27529

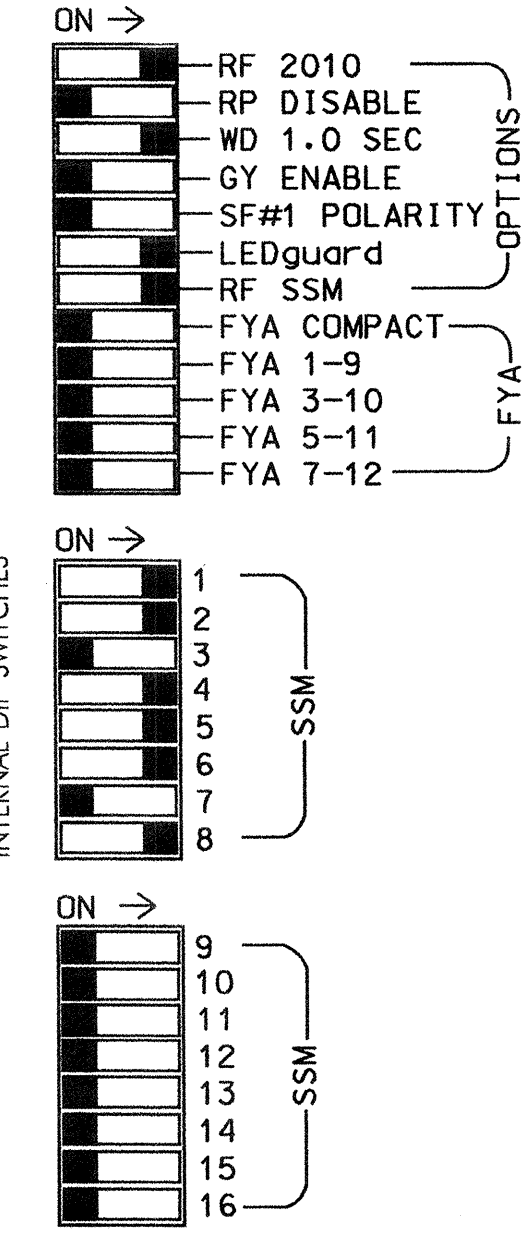
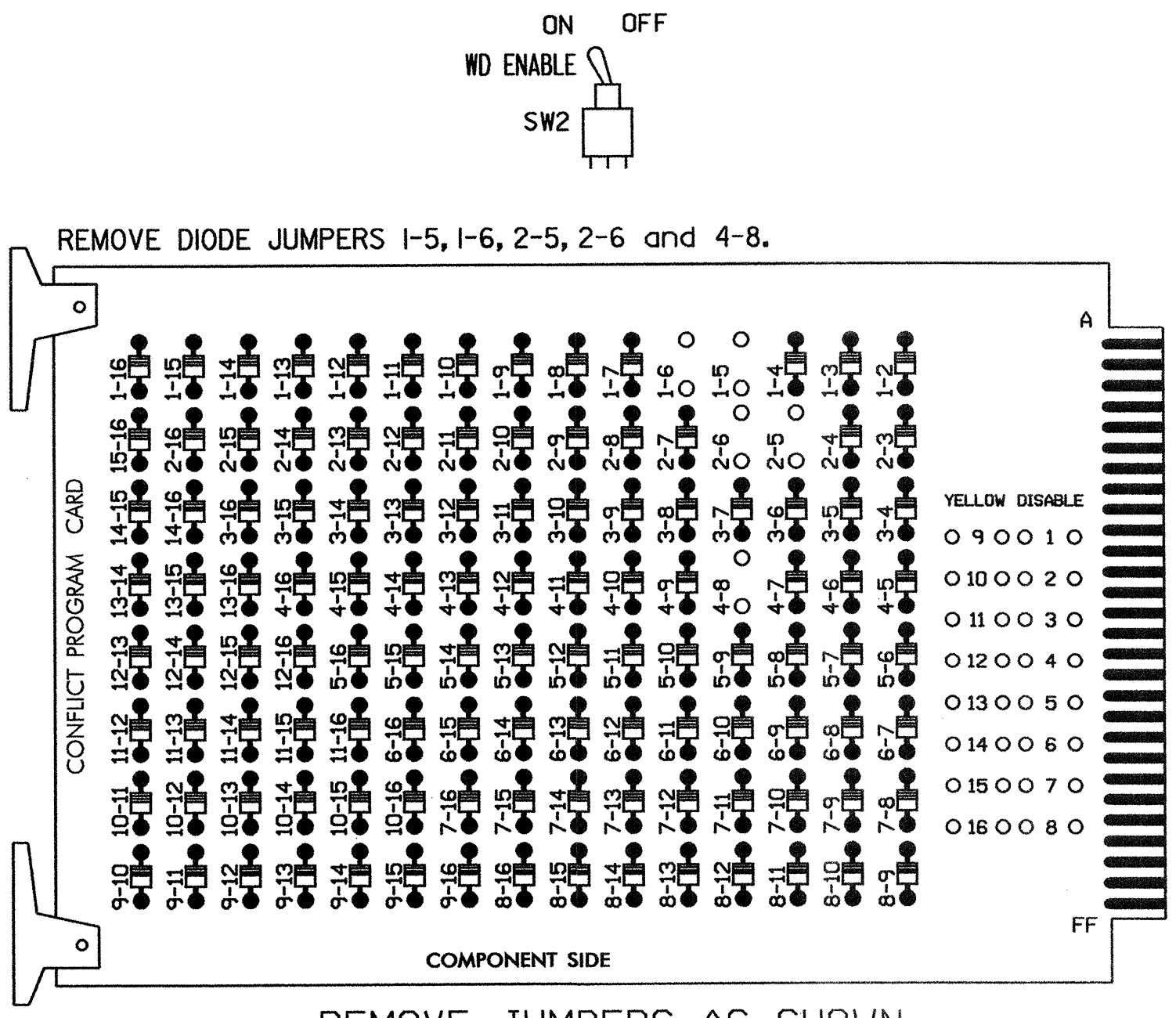
SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393 I. O. Umozurike

SIG. INVENTORY NO. 03-0415 T

11:45:00 08/15/13 2:11:11 030101 08maragr-cps+11p r/cj/ectstbu-3462as igm/s igm/s igm/s 0415-emp-s10-gm-2008mdd.dgn

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

(remove jumpers and set switches as shown)



**NOTES:**

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

■ = DENOTES POSITION OF SWITCH

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 3,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 2 and 6, on the controller unit, for Start Up In Green.
- Enable Simultaneous Gap-Out, on the controller unit, for all phases.
- Program phases 4 and 8, on the controller unit, for Dual Entry.
- The cabinet and controller are part of the Shallotte Closed Loop System.

### EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L  
 CABINET.....CONTRACTOR SUPPLIED 332 /W/ AUX  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE  
 LOAD SWITCHES USED.....S1,S2,S4,S5,S6,S8  
 PHASES USED.....1,2,4,5,6,8  
 OVERLAPS.....NONE

### 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	DLC	OLD	SPARE
SIGNAL HEAD NO.	61	21,22	NU	NU	41,42	NU	21	61,62	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED	*	128			101		*	134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW																		
YELLOW ARROW	126						132											
GREEN ARROW	127						133											

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

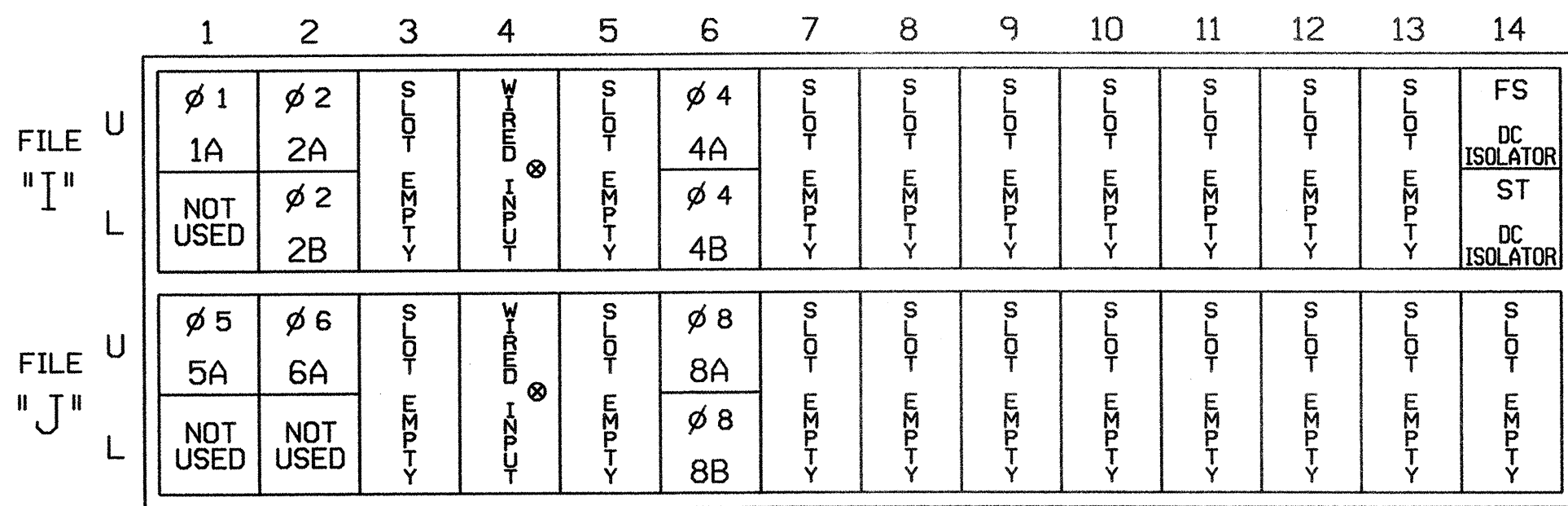
### DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

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

### INPUT FILE POSITION LAYOUT

(front view)



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

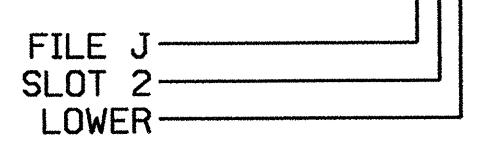
⊗ Wired Input - Do not populate slot with detector card

### INPUT FILE CONNECTION & PROGRAMMING CHART

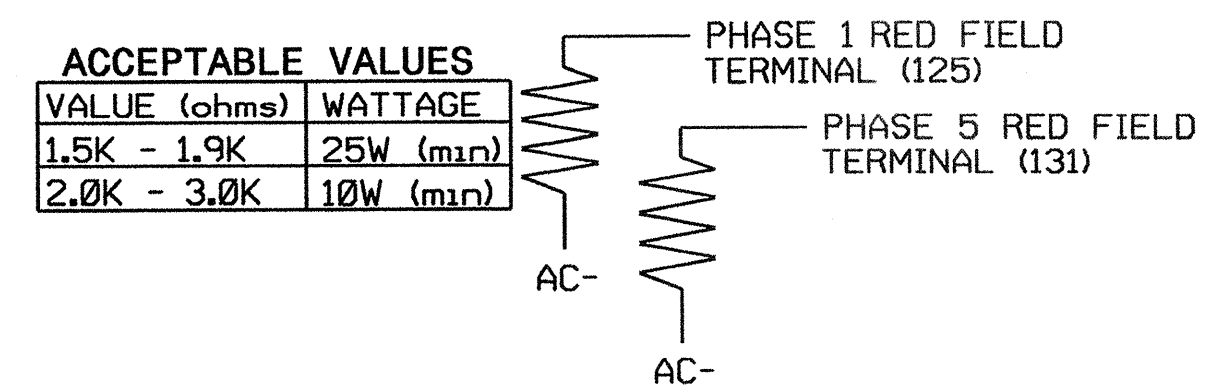
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A <sup>1</sup>	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
	2A	TB2-5,6	I2U	39	1	2	Y	Y			
	2B	TB2-7,8	I2L	43	5	12	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
	4B	TB4-11,12	I6L	45	7	14	4	Y	Y		10
	5A <sup>2</sup>	TB3-1,2	J1U	55	17	5	5	Y	Y		15
		-	I4U	47	9	22	2	Y	Y		
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			10

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

### INPUT FILE POSITION LEGEND: J2L



### LOAD RESISTOR INSTALLATION DETAIL



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

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

PRESS 'NEXT'

---

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

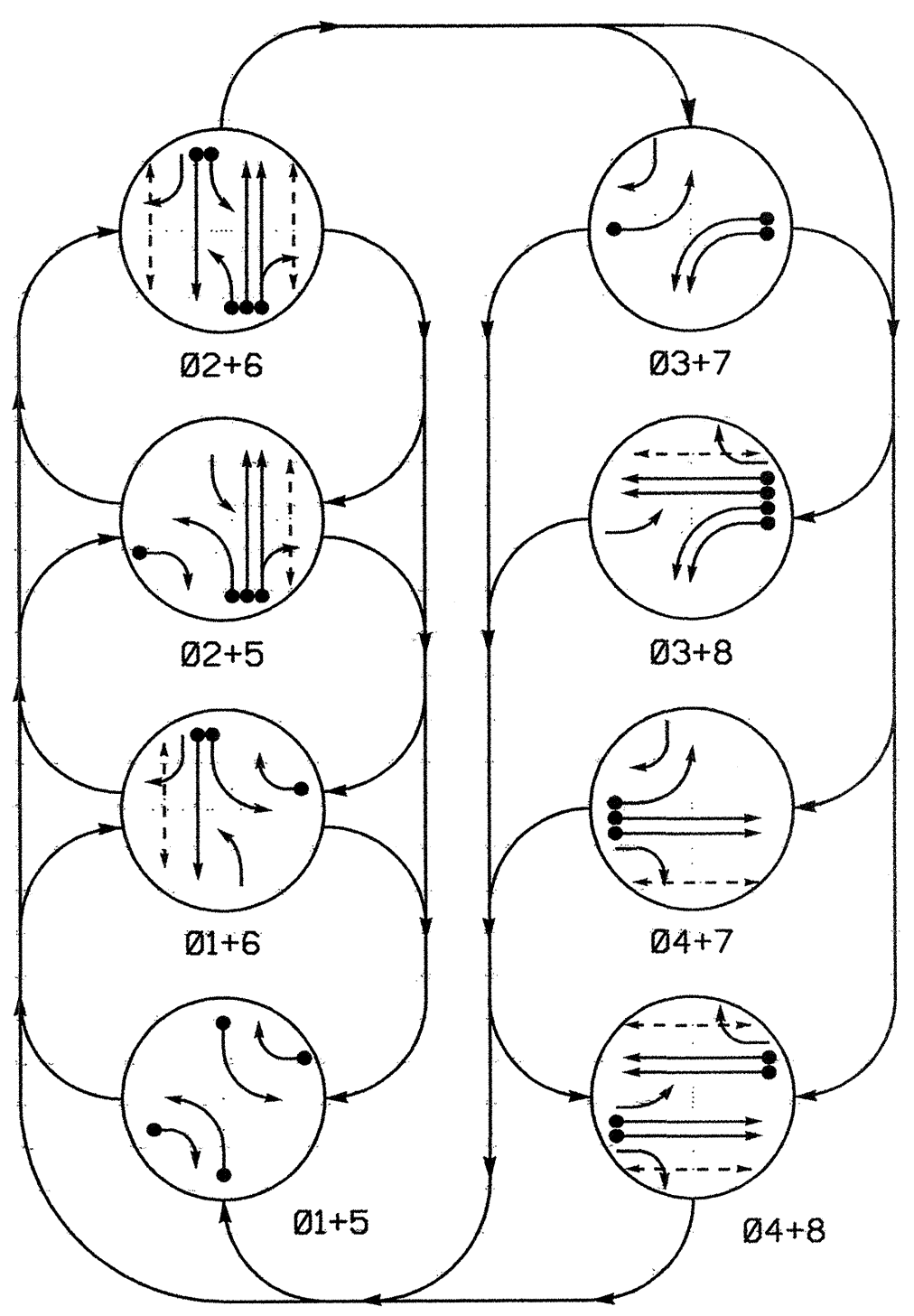
BACKUP PROTECTION PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0415 T  
 DESIGNED: August 2008  
 SEALED: 09/12/08  
 REVISED: N/A

Signal Upgrade - TCP Phase II

ELECTRICAL AND PROGRAMMING DETAILS FOR:		US 17 Bus. - NC 130(Main Street)	
Prepared in the Offices of:		at	
		SR 1357 (Smith Avenue)/ Home Depot Entrance	
Division 3	Brunswick County	Shallotte	
PLAN DATE: September 2008	REVIEWED BY: T. J. J.		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS	INIT.	DATE	
		Signature: Date: _____ Inventory No. 03-0415 T	

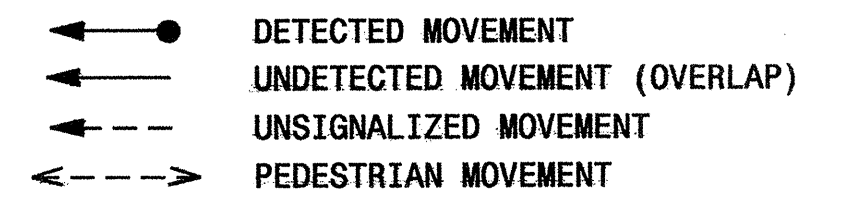
**PHASING DIAGRAM**



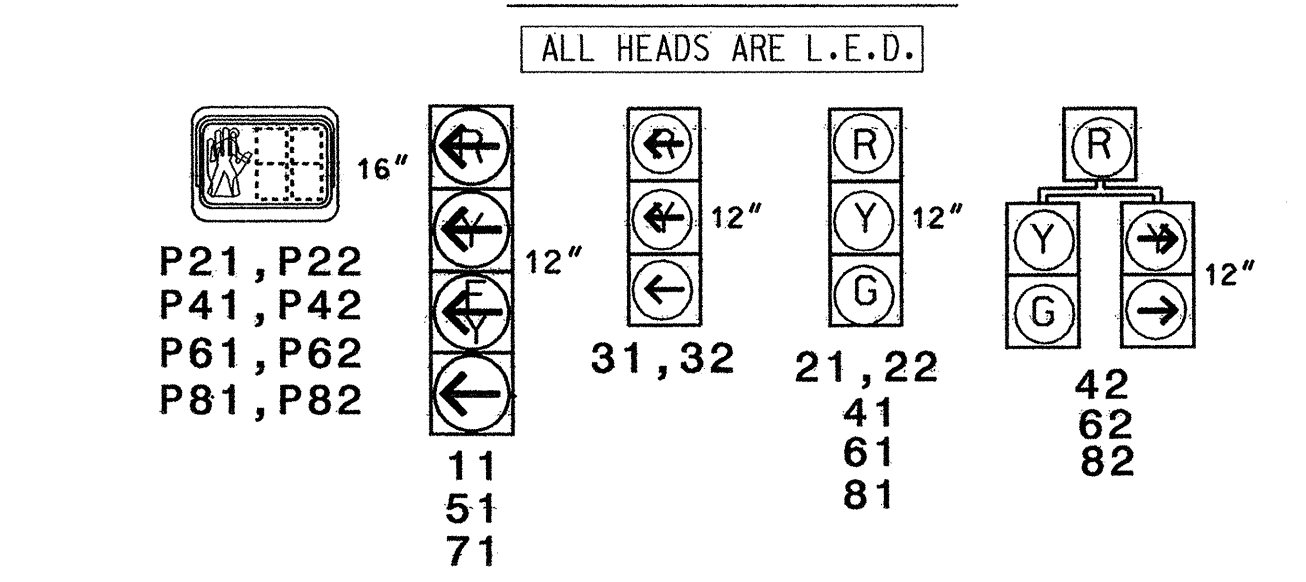
SIGNAL FACE	PHASE							
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8
11								
21, 22	R	R	G	G	R	R	R	Y
31, 32	R	R	R	R				
41	R	R	R	R	R	G	G	R
42	R	R	R	R	R	G	G	R
51								
61	R	G	R	G	R	R	R	Y
62	R	G	R	G	R	R	R	Y
71	R	R	R	R				
81	R	R	R	R	R	G	G	R
82	R	R	R	R	R	G	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	W	DW	W	DRK

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

**PHASING DIAGRAM DETECTION LEGEND**



**SIGNAL FACE I.D.**



**STANDARD SIGNAL FACE CLEARANCES FOR 4 SECTION LEFT TURN SIGNAL**

TO	TO			
	1	2	1	2
1				
2				
1				
2				

FL = FLASHING YELLOW ARROW

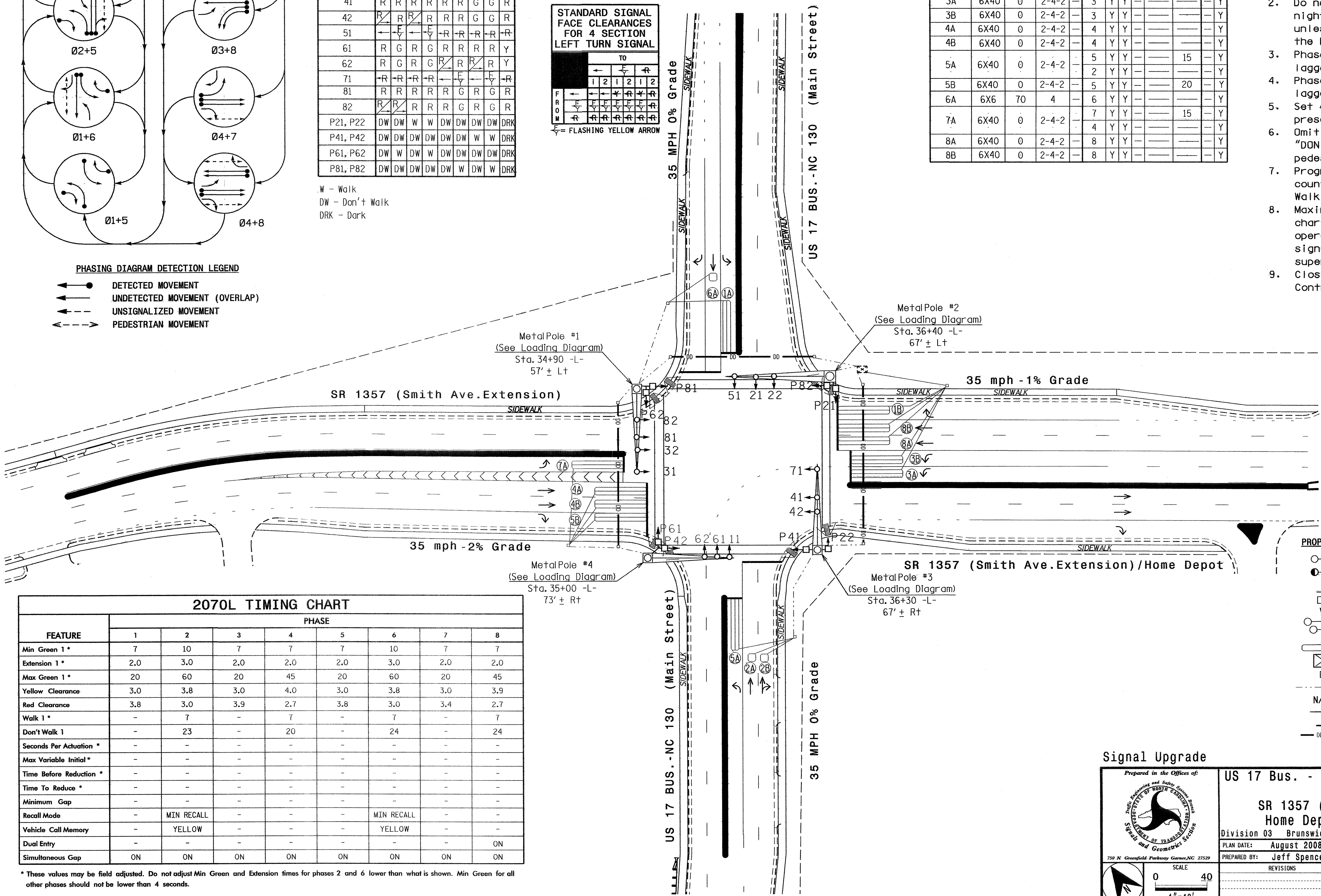
**2070L LOOP & DETECTOR INSTALLATION**

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING							
				PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	1	Y	Y			15		Y
1B	6X40	0	2-4-2	6	Y	Y					Y
2A	6X6	70	4	2	Y	Y					Y
2B	6X6	70	4	2	Y	Y					Y
3A	6X40	0	2-4-2	3	Y	Y					Y
3B	6X40	0	2-4-2	3	Y	Y					Y
4A	6X40	0	2-4-2	4	Y	Y					Y
4B	6X40	0	2-4-2	4	Y	Y					Y
5A	6X40	0	2-4-2	5	Y	Y			15		Y
5B	6X40	0	2-4-2	5	Y	Y			20		Y
6A	6X6	70	4	6	Y	Y					Y
7A	6X40	0	2-4-2	7	Y	Y			15		Y
8A	6X40	0	2-4-2	8	Y	Y					Y
8B	6X40	0	2-4-2	8	Y	Y					Y

**8 Phase Fully Actuated (Shalotte Closed Loop System)**

**NOTES**

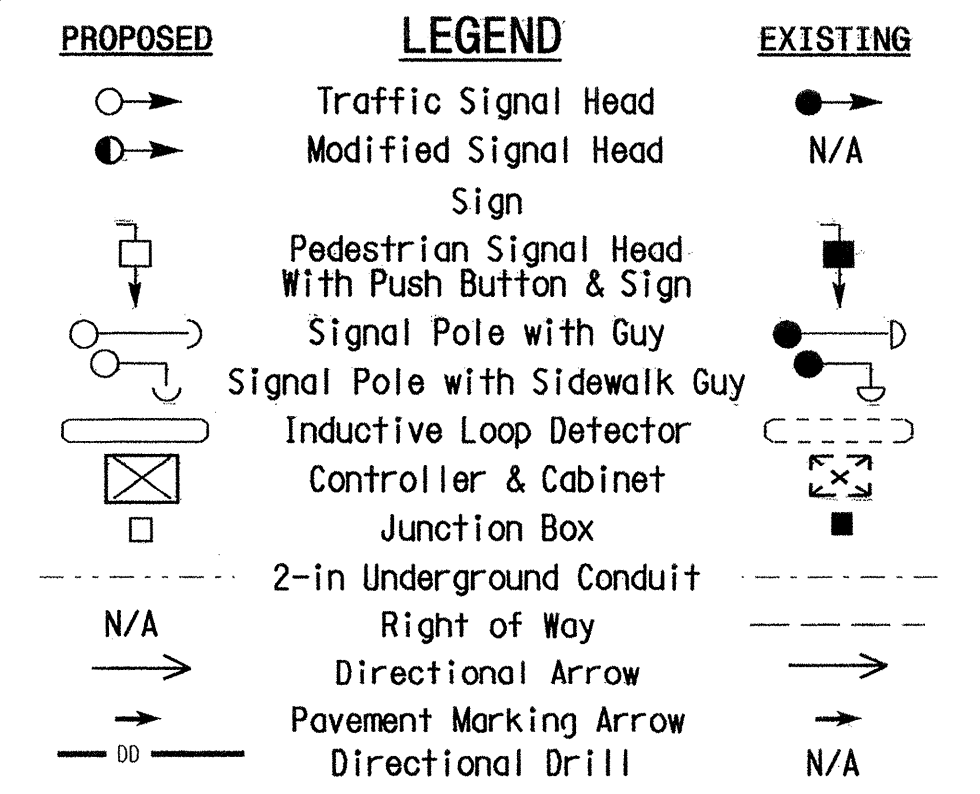
1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 or phase 5 may be lagged.
4. Phase 3 or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset #0415.



**2070L TIMING CHART**

FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Min Green 1*	7	10	7	7	7	10	7	7
Extension 1*	2.0	3.0	2.0	2.0	2.0	3.0	2.0	2.0
Max Green 1*	20	60	20	45	20	60	20	45
Yellow Clearance	3.0	3.8	3.0	4.0	3.0	3.8	3.0	3.9
Red Clearance	3.8	3.0	3.9	2.7	3.8	3.0	3.4	2.7
Walk 1*	-	7	-	7	-	7	-	7
Don't Walk 1	-	23	-	20	-	24	-	24
Seconds Per Actuation*	-	-	-	-	-	-	-	-
Max Variable Initial*	-	-	-	-	-	-	-	-
Time Before Reduction*	-	-	-	-	-	-	-	-
Time To Reduce*	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-	-
Dual Entry	-	-	-	-	-	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON	ON

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



**Signal Upgrade**

Prepared in the Offices of:  
 THE ENGINEERING AND SAFETY SERVICES DIVISION  
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 STATE OF NORTH CAROLINA  
 750 N. Greenfield Parkway, Cary, NC 27529

**US 17 Bus. - NC 130 (Main St.)**  
 at  
**SR 1357 (Smith Ave.)/ Home Depot Entrance**

Division 03 Brunswick County Shalotte  
 PREPARED BY: Jeff Spence REVIEWED BY: I. O. Umozurike  
 PLAN DATE: August 2008 REVIEWED DATE: 9/12/08

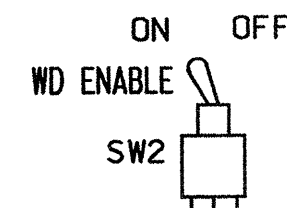
REVISIONS: INIT. DATE

SCALE: 1" = 40'

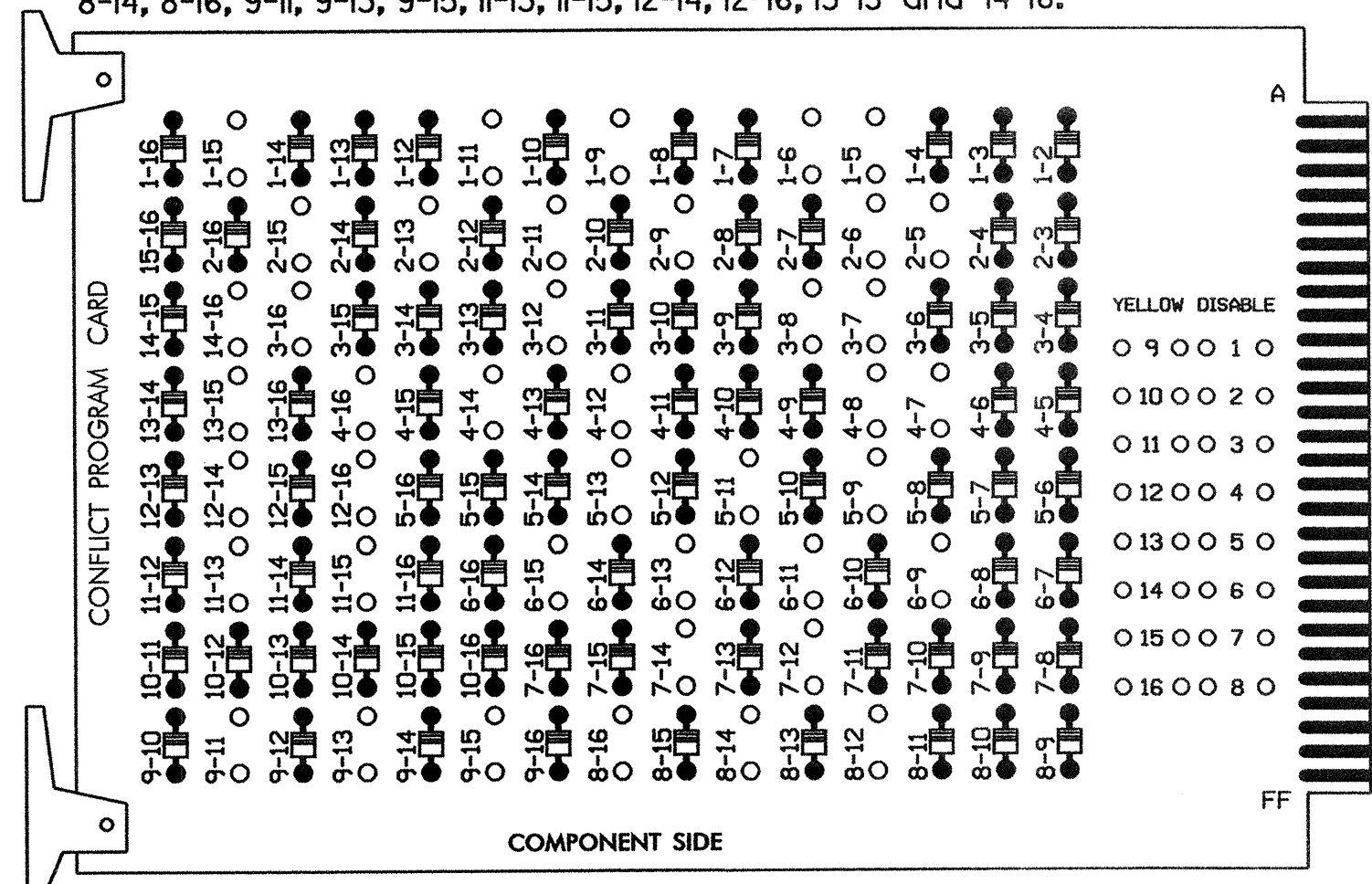
SIG. INVENTORY NO. 03-0415

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

(remove jumpers and set switches as shown)



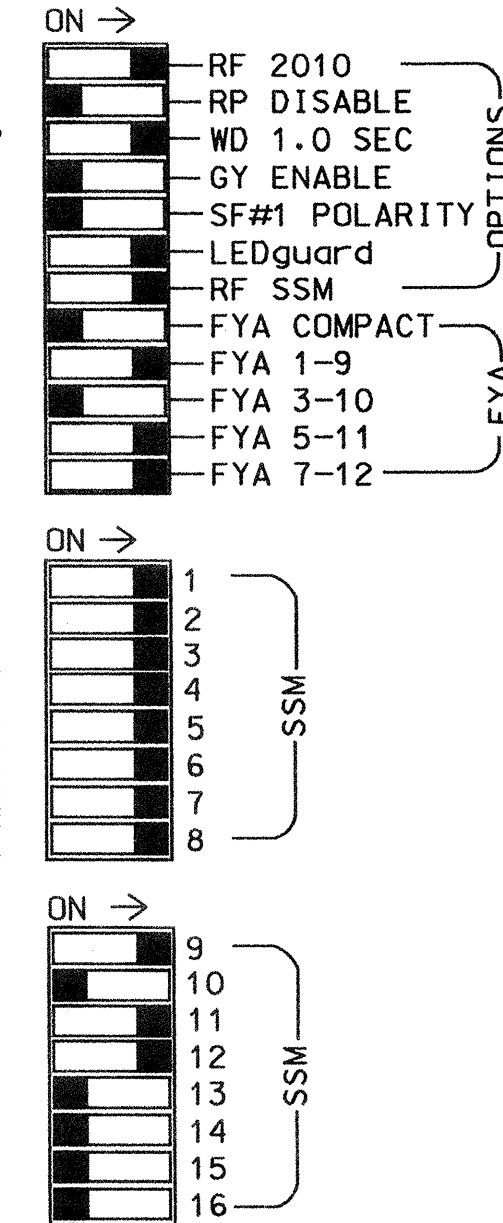
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-7, 3-8, 3-12, 3-16, 4-7, 4-8, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 7-12, 7-14, 8-12, 8-14, 8-16, 9-11, 9-13, 9-15, 11-13, 11-15, 12-14, 12-16, 13-15 and 14-16.



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)

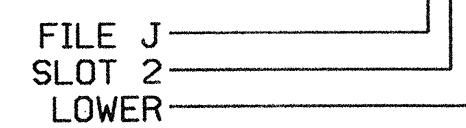
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
FILE "I"	∅ 1 1A	∅ 2 2A	∅ 1 1B	∅ 3 3A	∅ 4 4A	∅ 5 5A	∅ 6 6A	∅ 7 7A	∅ 8 8A	∅ 9 9A	∅ 10 10A	∅ 11 11A	∅ 12 12A	∅ 13 13A	∅ 14 14A
FILE "J"	NOT USED	∅ 2 2B	NOT USED	∅ 3 3B	∅ 4 4B	∅ 5 5B	∅ 6 6B	∅ 7 7B	∅ 8 8B	∅ 9 9B	∅ 10 10B	∅ 11 11B	∅ 12 12B	∅ 13 13B	∅ 14 14B

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

FS = FLASH SENSE  
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

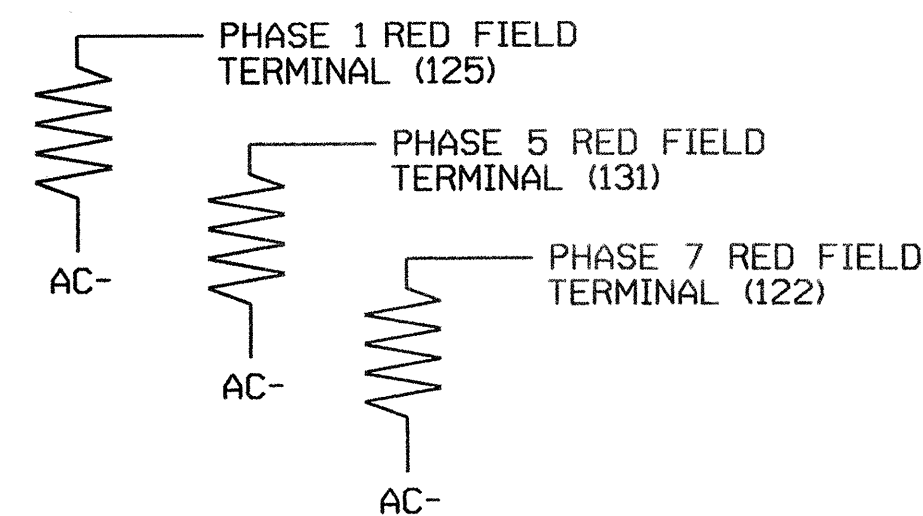
INPUT FILE POSITION LEGEND: J2L



**LOAD RESISTOR INSTALLATION DETAIL**

(install resistors as shown below)

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



**NOTES**

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 10,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 2 and 6, on the controller unit, for Start Up In Green.
- Enable Simultaneous Gap-Out, on the controller unit, for all phases.
- Program phase 8, on the controller unit, for Dual Entry.
- Program phases 2, 4, 6 and 8 for 'STARTUP PED CALL'.
- The cabinet and controller are part of the Shallotte Closed Loop System.

**EQUIPMENT INFORMATION**

CONTROLLER.....CONTRACTOR SUPPLIED 2070L  
 CABINET.....CONTRACTOR SUPPLIED 332 /W/ AUX  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE  
 LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S4P,S5,S6,S6P,S7,S8,  
 S8P,S9,S12,S13.  
 PHASES USED.....1,2,2 PED,3,4,4 PED,5,6,6 PED,7,8,8 PED  
 OVERLAP "A".....1+2  
 OVERLAP "B".....NOT USED  
 OVERLAP "C".....5+6  
 OVERLAP "D".....7+8

**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			
1B	TB2-9,10	I3U	63	25	32	1	Y	Y			20
	2A	TB2-5,6	I2U	39	1	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
	3A	TB4-5,6	I5U	58	20	3	Y	Y			
3B	TB4-7,8	I5L	58	20	3	Y	Y				
	4A	TB4-9,10	I6U	41	3	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
	5A <sup>2</sup>	TB3-1,2	J1U	55	17	5	Y	Y			15
5B	-	I4U	47	9	22	2	Y	Y			
	6A	TB3-7,8	J2L	44	6	16	5	Y	Y		20
6B	TB3-5,6	J2U	40	2	6	6	Y	Y			
	7A <sup>3</sup>	TB5-5,6	J5U	57	19	7	Y	Y			15
7B	-	I8U	49	11	24	4	Y	Y			
	8A	TB5-9,10	J6U	42	4	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
	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				
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 112 AND 113.

- Add jumper from I1-W to J4-W, on rear of input file.
- Add jumper from J1-W to I4-W, on rear of input file.
- Add jumper from J5-W to I8-W, on rear of input file.

**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.

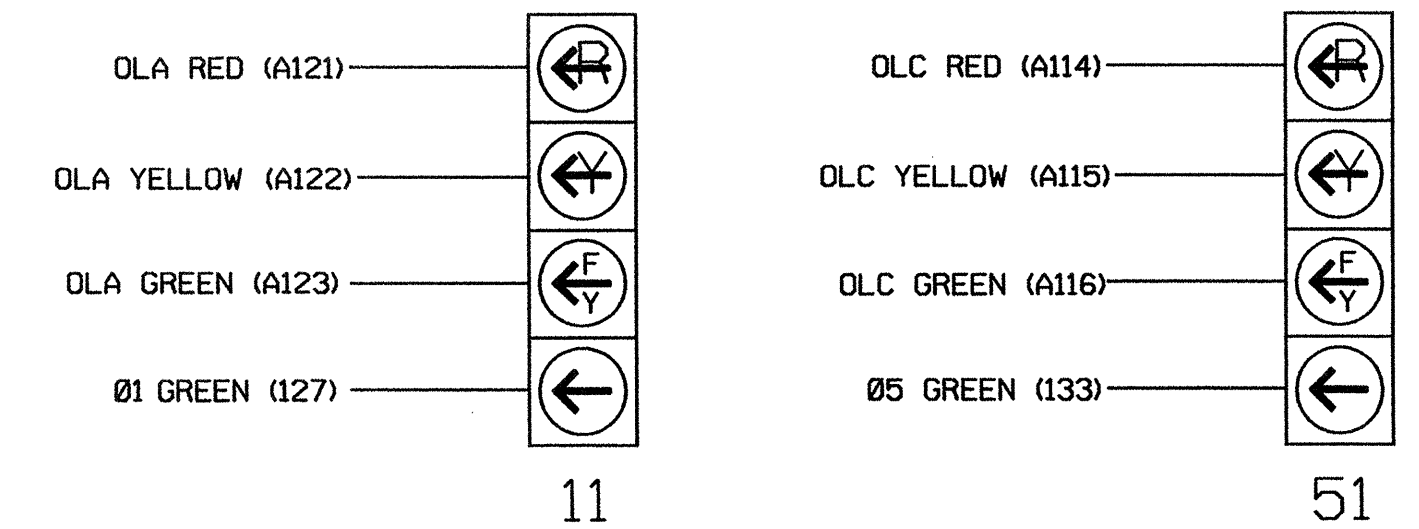
**SIGNAL HEAD HOOK-UP CHART**

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.	11*	82	21,22	P21, P22	31,32	41,42	P41, P42	42	51*	61,62	P61, P62	62	71*	81,82	P81, P82	11*	NU	NU	51*	71*	NU	
RED	*	128			101		*	134		*	107											
YELLOW		129			102			135			108											
GREEN		130			103			136			109											
RED ARROW					116											A121			A114	A101		
YELLOW ARROW		126			117			132			123					A122			A115	A102		
FLASHING YELLOW ARROW																A123			A116	A103		
GREEN ARROW	127	127			118			133	133		124	124										
⚠					113			104			119											
🚶																						

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

**4 SECTION FYA PPLT SIGNAL WIRING DETAIL**

(wire signal heads as shown)



**NOTE**

- The sequence display for these signals require special logic programming. See sheet 2 of 2 for programming instructions.

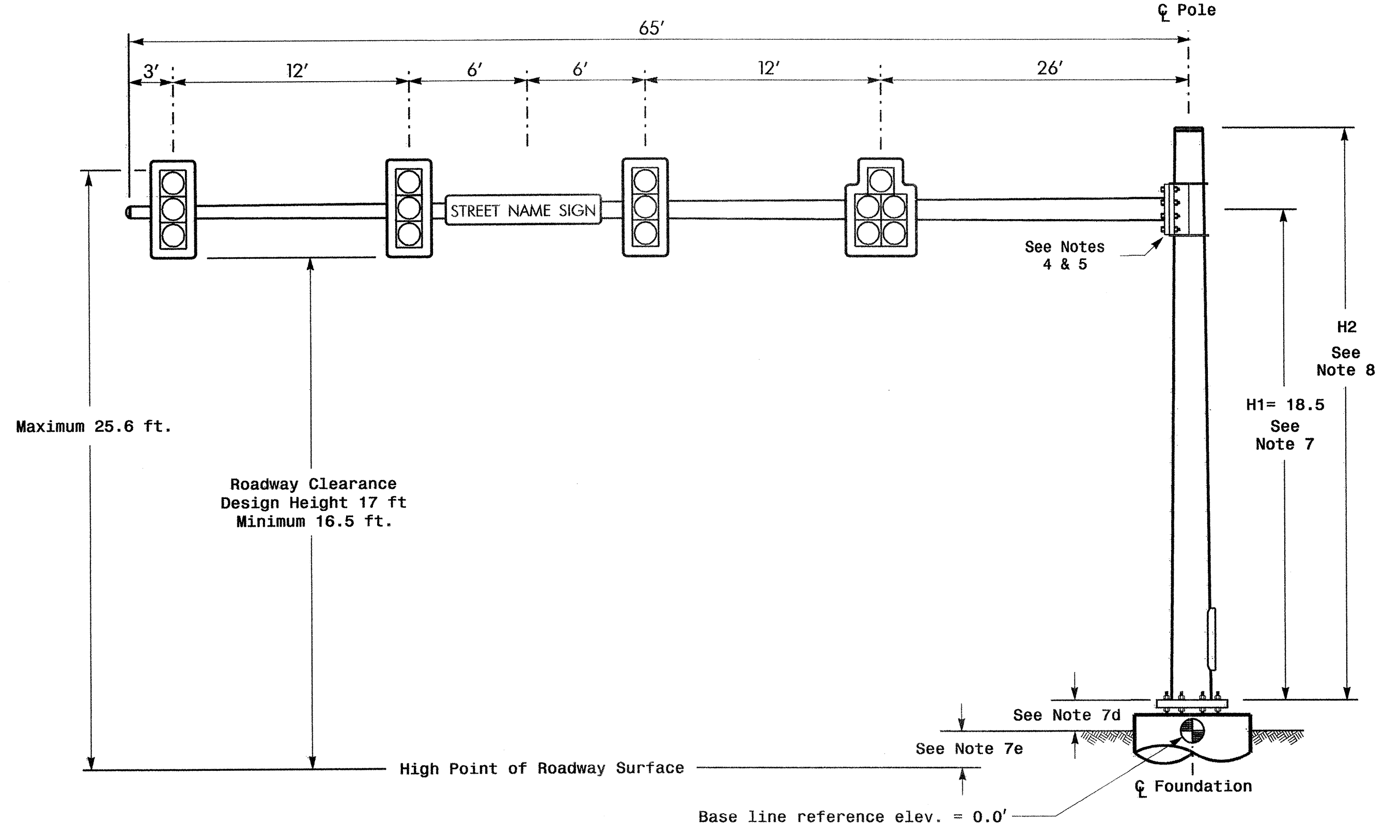
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0415  
 DESIGNED: August 2008  
 SEALED: 09/12/08  
 REVISED: N/A

ELECTRICAL DETAIL SHEET 1 OF 2

Prepared in the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	ELECTRICAL AND PROGRAMMING DETAILS FOR:	US 17 Bus. - NC 130 (Main St.) at SR 1357 (Smith Ave.) Home Depot Entrance	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN
	Division 3 PLAN DATE: August 2008 PREPARED BY: C. Strickland	Brunswick County REVIEWED BY: T. J. J... REVIEWED BY:	Shallotte REVISIONS INIT. DATE



Design Loading for METAL POLE NO. 1



Elevation View

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

Elevation Data for Mast Arm Attachment (H1)		
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	0.0 ft.	-0.5 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

MAST ARM LOADING SCHEDULE				
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	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

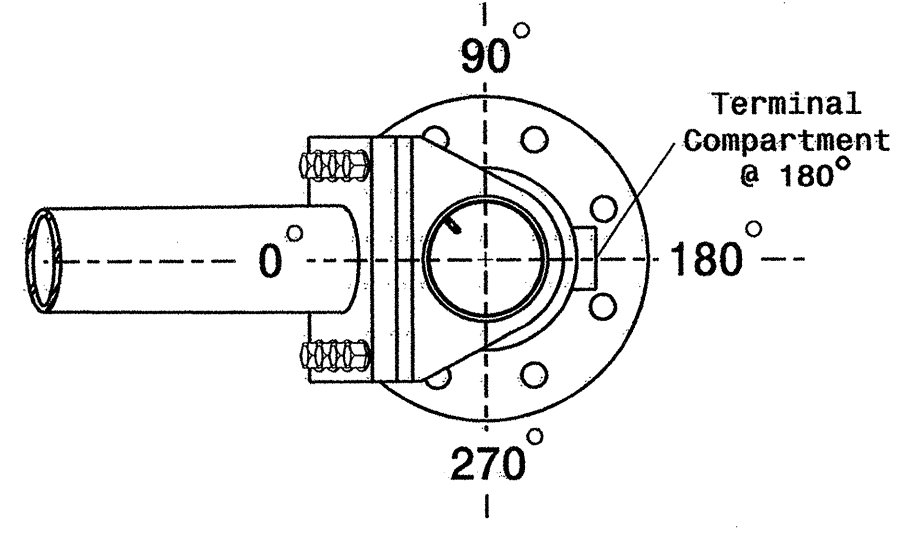
NOTES

Design Reference Material

1. 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.
  - The traffic signal project plans and special provisions.

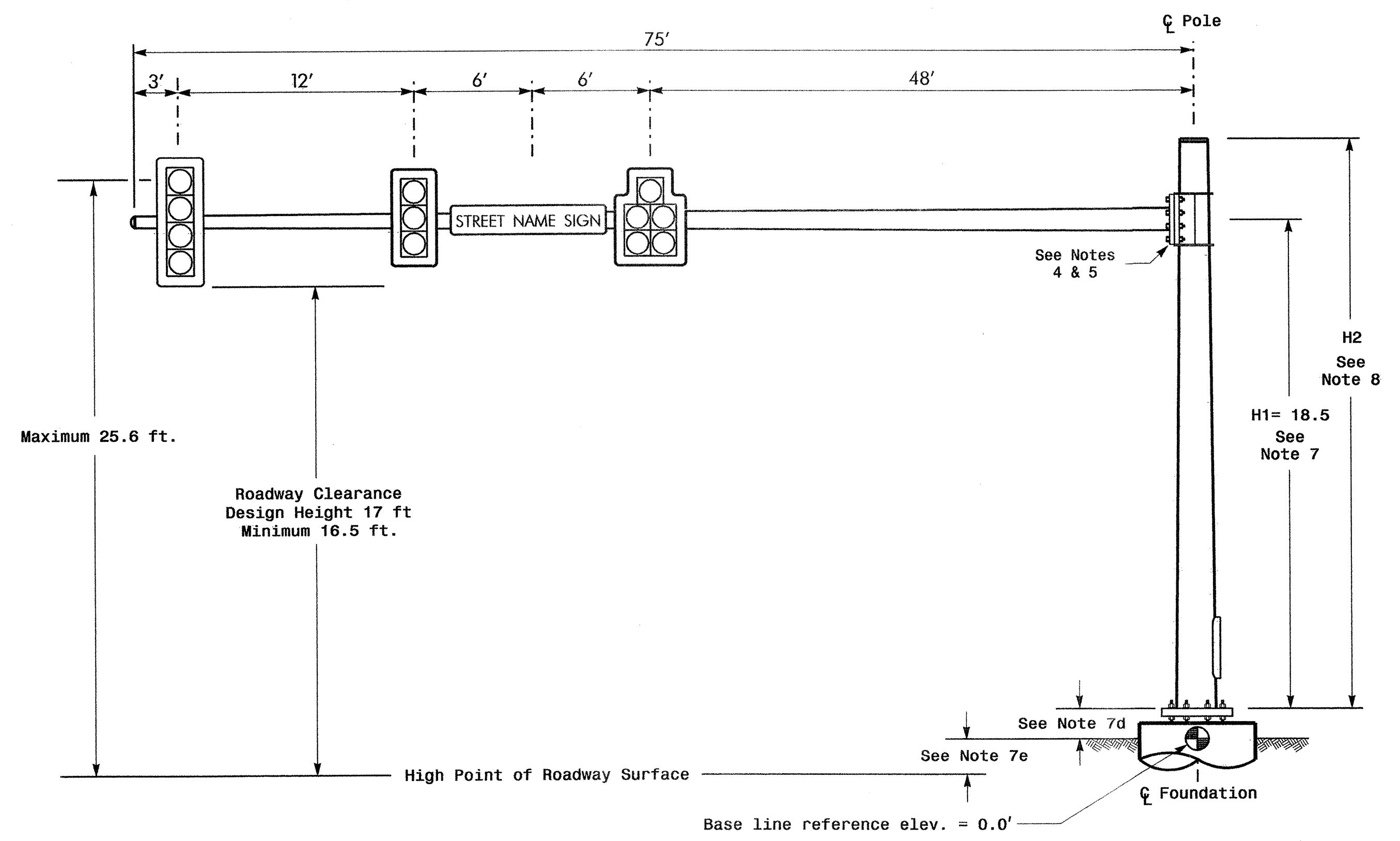
Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
  - a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
  - b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
  - c. The roadway clearance height for design is as shown in the elevation views.
  - d. The top of the pole base plate is .75 feet above the ground elevation.
  - e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

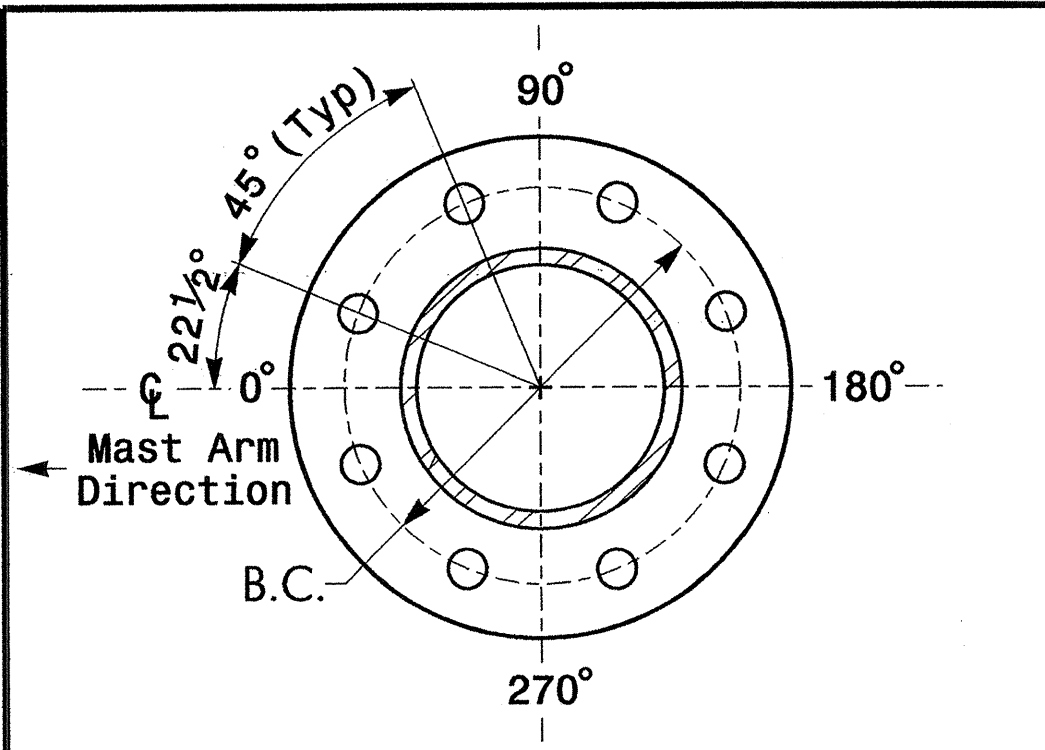


POLE RADIAL ORIENTATION

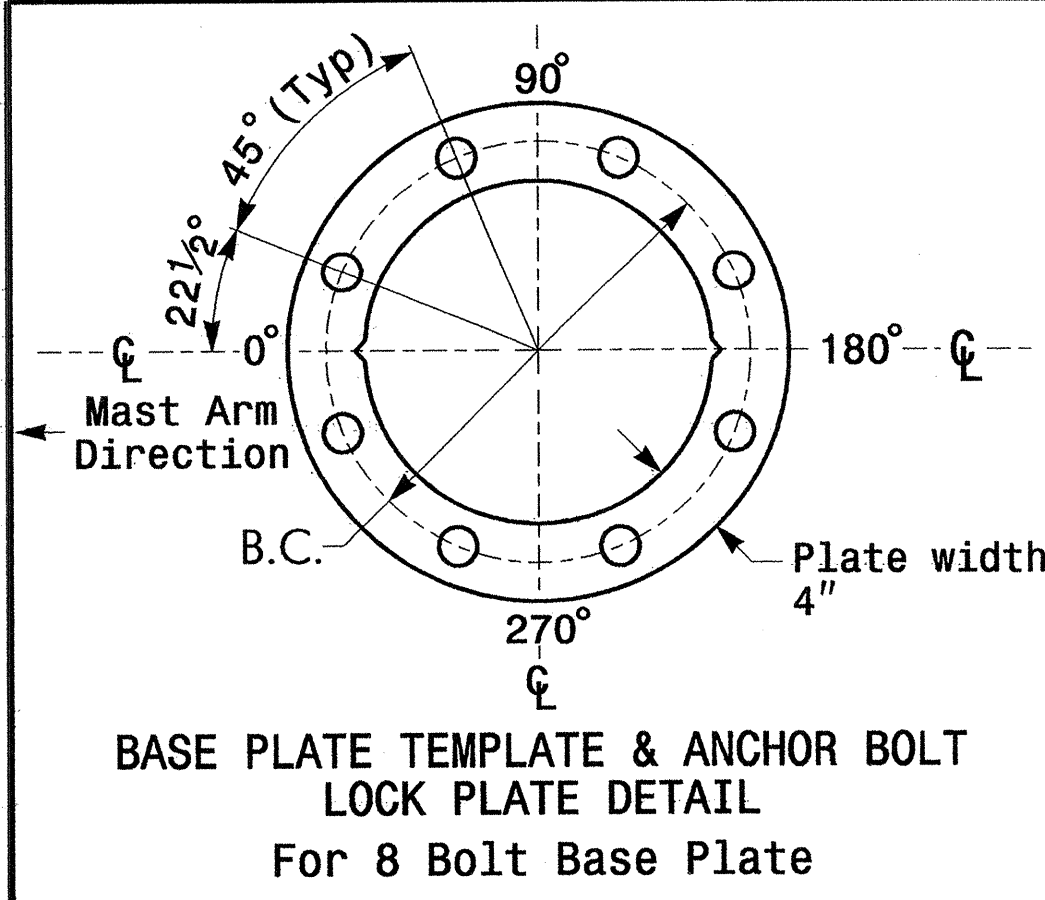
Design Loading for METAL POLE NO. 2



Elevation View



8 BOLT BASE PLATE DETAIL  
See Note 6



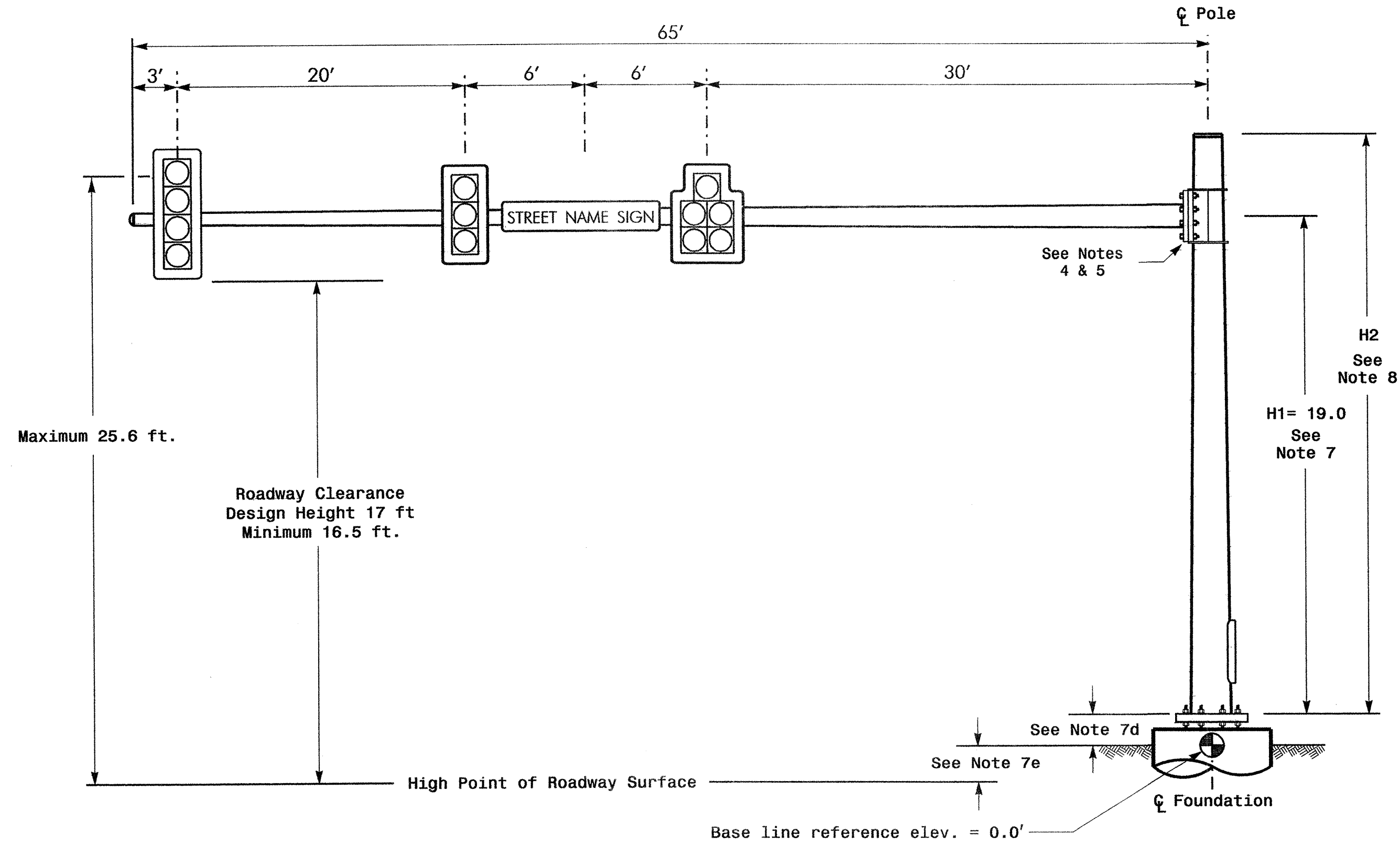
BASE PLATE TEMPLATE & ANCHOR BOLT  
LOCK PLATE DETAIL  
For 8 Bolt Base Plate

NCDOT Wind Zone 2 (130 mph)

 Prepared in the Offices of: US 17 Bus. - NC 130 (Main St.) at SR 1357 (Smith Ave.) Home Depot Entrance Division 03 Brunswick County Shallotte PLAN DATE: August 2008 PREPARED BY: I. O. Umozurike SCALE: N/A REVISIONS: N/A N/A	SEAL  REVIEWED BY: REVIEWED BY: INIT. DATE DATE 9/7/08 DATE 03-0415
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------

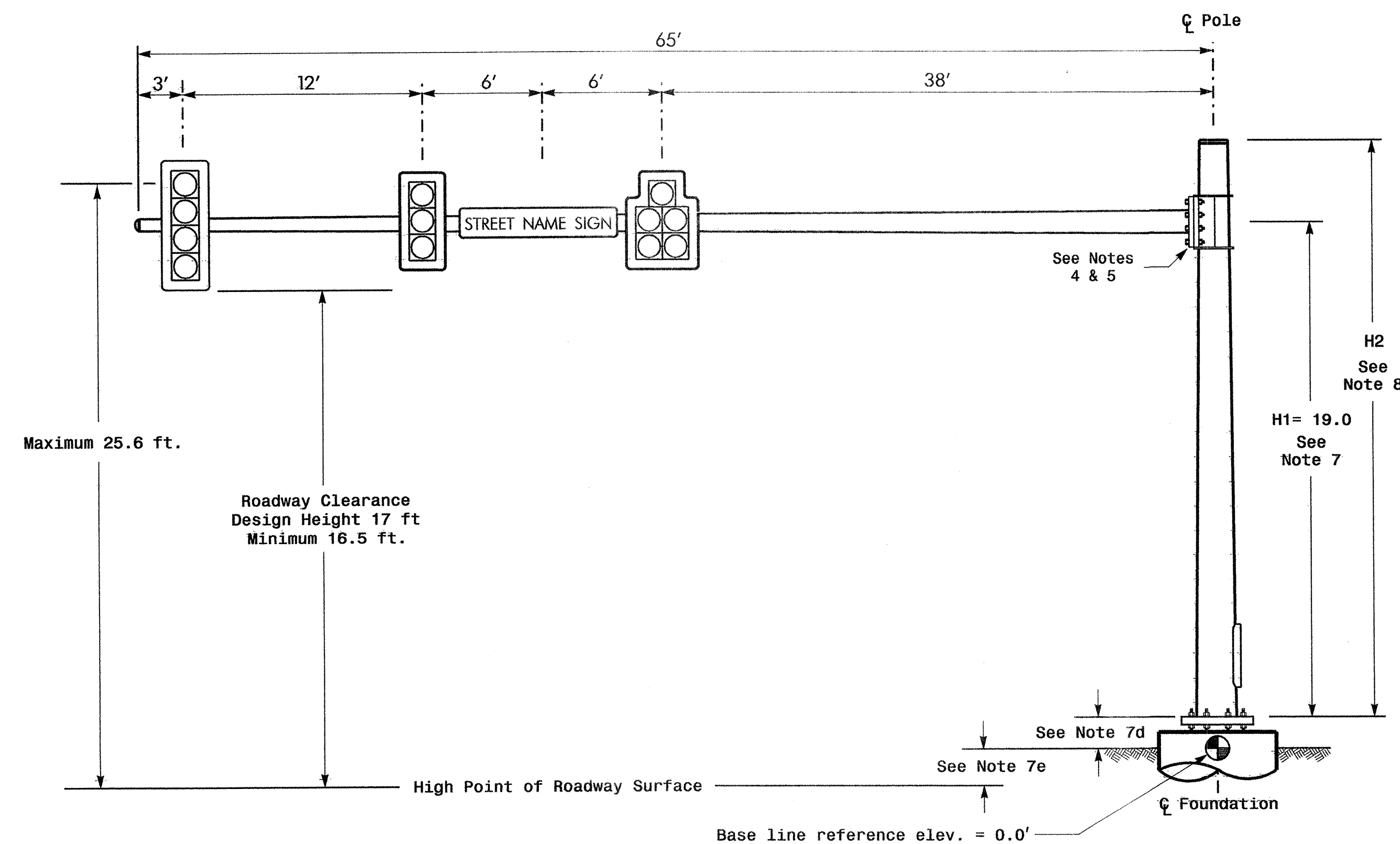
17-SEP-2008 07:43 s:\1715\_s\signal\wcr\pgo\subsh1\p\_projects\20-3462\gs\gn1\8601-1234\405-0415-mp\_s1\g\_usr\_2008mmcd.dgn

Design Loading for METAL POLE NO. 3



Elevation View

Design Loading for METAL POLE NO. 4



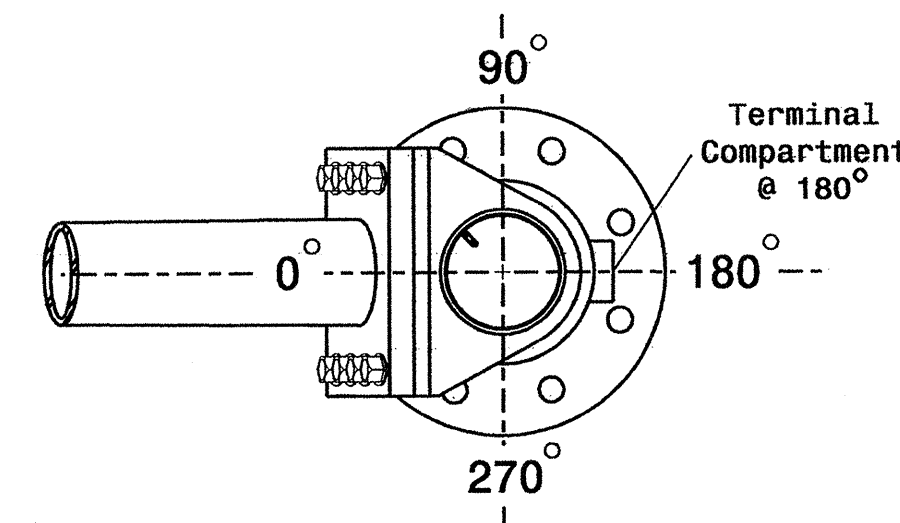
Elevation View

SPECIAL NOTE

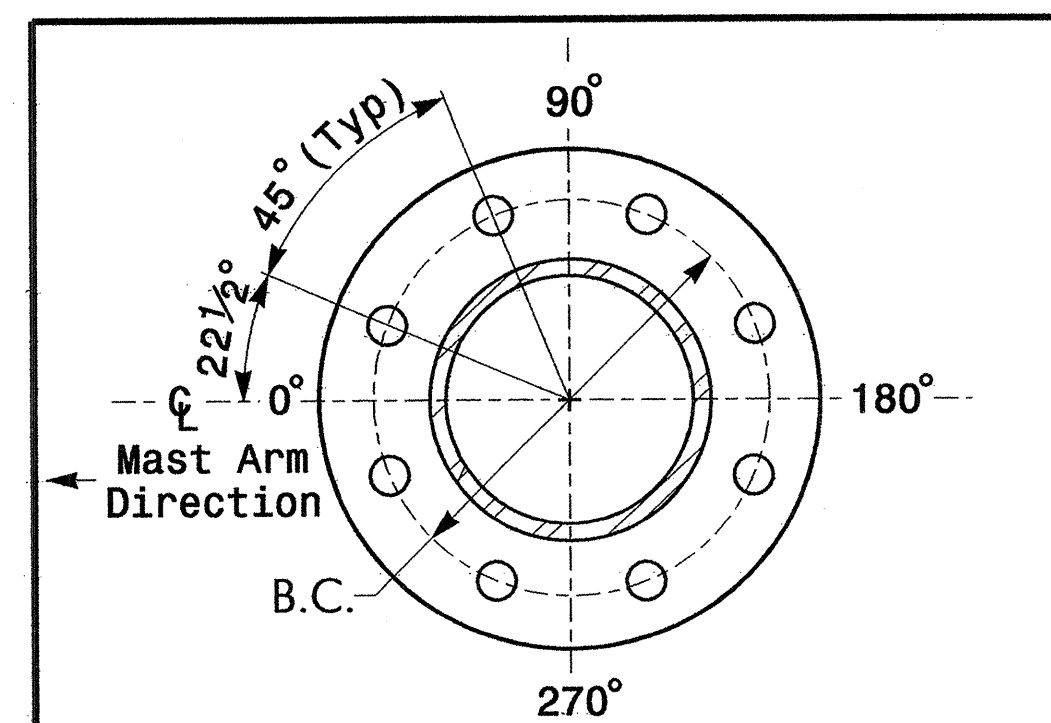
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at $\phi$ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	0.0 ft.	0.0 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

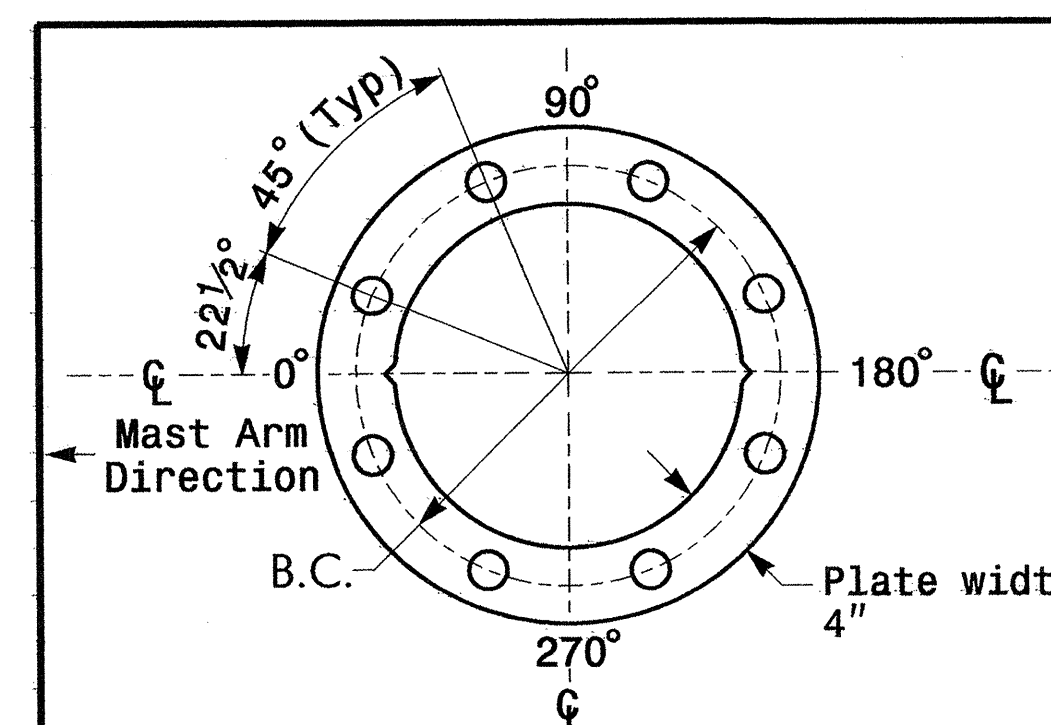


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	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

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.
  - The traffic signal project plans and special provisions.

Design Requirements

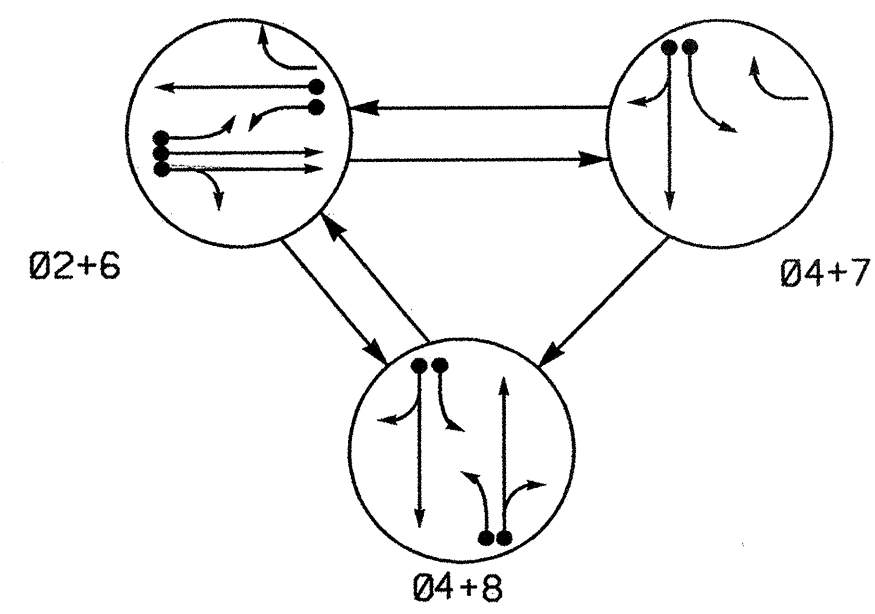
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the 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.
- 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 Offices of: US 17 Bus. - NC 130 (Main St.) at SR 1357 (Smith Ave.) Home Depot Entrance Division 03 Brunswick County Shalotte PLAN DATE: August 2008 PREPARED BY: I. O. Umozurike REVIEWED BY:	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER TIMOTHY WILLIAMS 24393 7.0 Williams 9/17/08 DATE
	SCALE 0 N/A N/A	



**PHASING DIAGRAM**



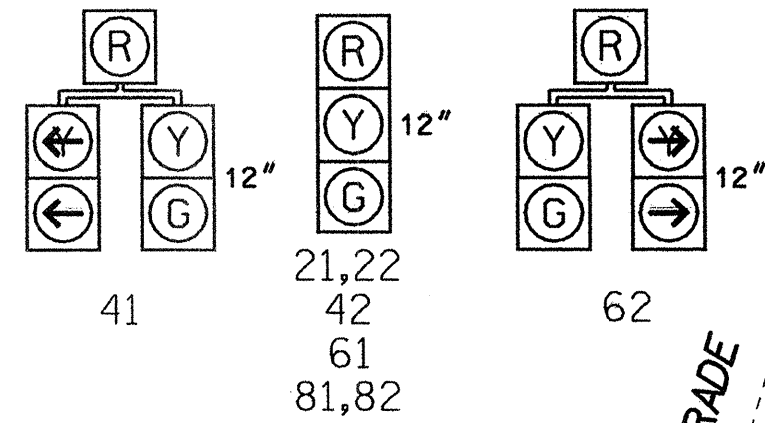
**PHASING DIAGRAM DETECTION LEGEND**

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

SIGNAL FACE	PHASE			F L S H
	02+6	04+7	04+8	
21,22	G	R	R	Y
41	R	G	G	R
42	R	G	G	R
61	G	R	R	Y
62	G	R	R	Y
81,82	R	R	G	R

**SIGNAL FACE I.D.**

ALL HEADS ARE L.E.D.



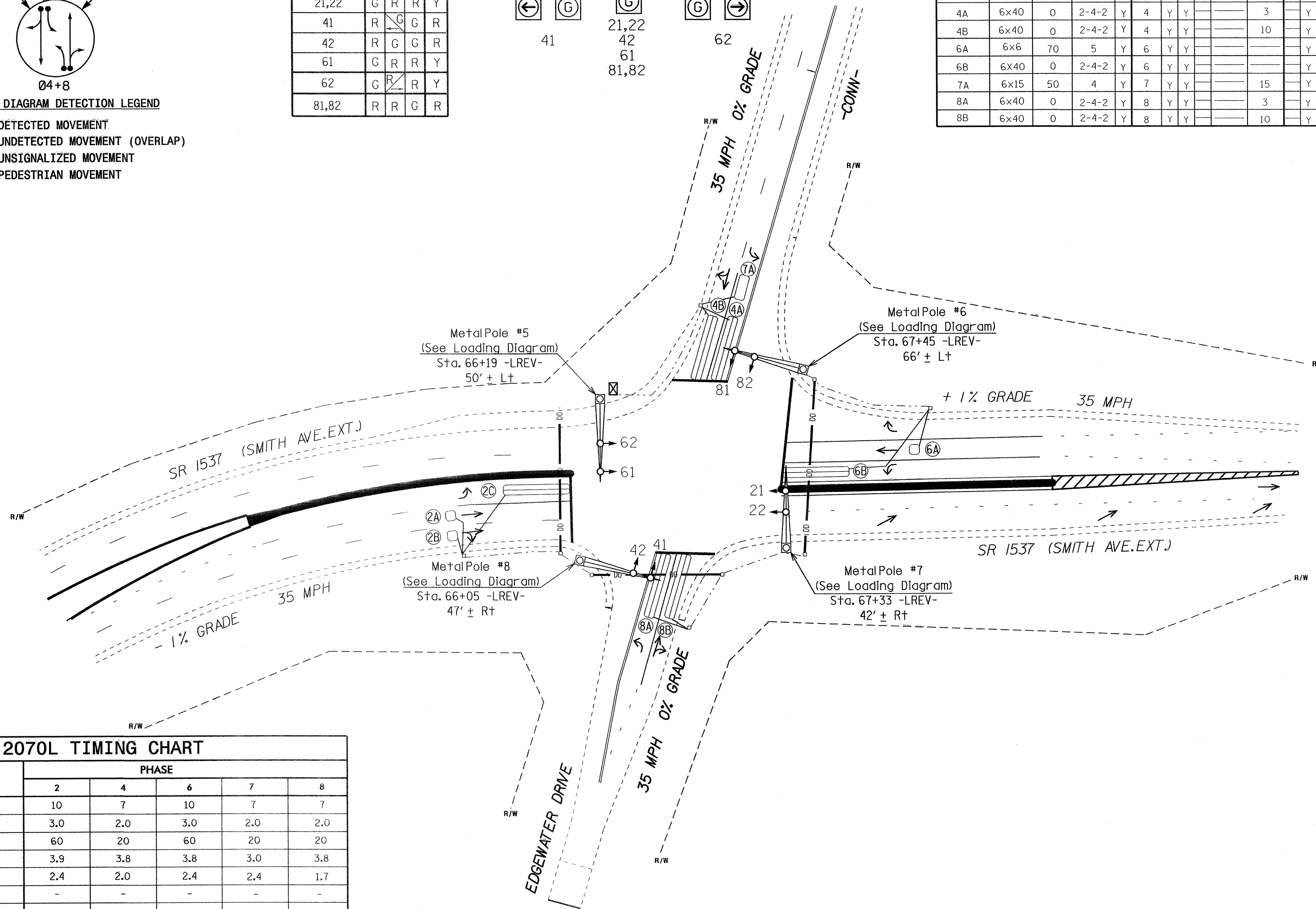
**2070L LOOP & DETECTOR INSTALLATION**

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME		
2A	6x6	70	5	Y	2	Y	Y				Y
2B	6x6	70	5	Y	2	Y	Y				Y
2C	6x40	0	2-4-2	Y	2	Y	Y				Y
4A	6x40	0	2-4-2	Y	4	Y	Y			3	Y
4B	6x40	0	2-4-2	Y	4	Y	Y			10	Y
6A	6x6	70	5	Y	6	Y	Y				Y
6B	6x40	0	2-4-2	Y	6	Y	Y				Y
7A	6x15	50	4	Y	7	Y	Y			15	Y
8A	6x40	0	2-4-2	Y	8	Y	Y			3	Y
8B	6x40	0	2-4-2	Y	8	Y	Y			10	Y

**3 Phase Fully Actuated (Shalotte Closed Loop 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. Omit phase 7 during phase 8 on.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset #1028.



**2070L TIMING CHART**

FEATURE	PHASE				
	2	4	6	7	8
Min Green 1 *	10	7	10	7	7
Extension 1 *	3.0	2.0	3.0	2.0	2.0
Max Green 1 *	60	20	60	20	20
Yellow Clearance	3.9	3.8	3.8	3.0	3.8
Red Clearance	2.4	2.0	2.4	2.4	1.7
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	MIN RECALL	-	MIN RECALL	-	-
Vehicle Call Memory	YELLOW	-	YELLOW	-	-
Dual Entry	-	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**

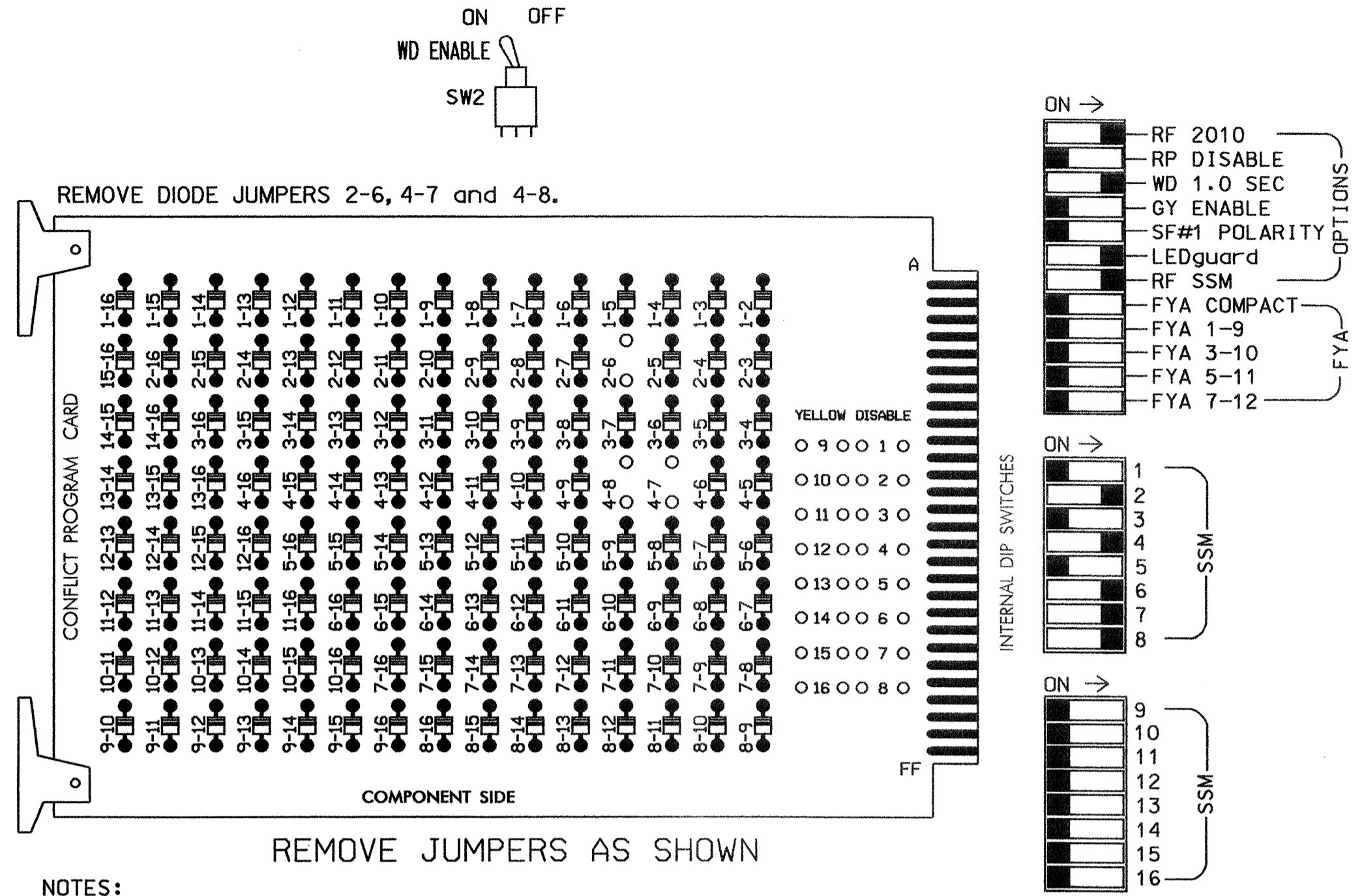
PROPOSED	EXISTING
○→ Traffic Signal Head	●→ N/A
●→ Modified Signal Head Sign	
⊞ Pedestrian Signal Head With Push Button & Sign	
○ Signal Pole with Guy	● Signal Pole with Sidewalk Guy
⊞ Inductive Loop Detector	⊞ Junction Box
⊞ Controller & Cabinet	⊞ Junction Box
⊞ 2-in Underground Conduit	
N/A Right of Way	- - - - -
→ Directional Arrow	→ Pavement Marking Arrow
DD-00-DD-00 Direct Drill	N/A
⊞ Metal Pole with Mastarm	⊞

**New Installation**

	<p><b>SR 1537 (Smith Road Ext.) at Edgewater Drive \ Conn.</b></p>		
	<p>Division 03 Brunswick County Shalotte</p>		
	<p>PLAN DATE: August 2008 REVIEWED BY: I.O. Uzozurike</p>		
<p>PREPARED BY: Jeff Spence</p>		<p>REVIEWED BY:</p>	
<p>REVISIONS</p>		<p>INIT. DATE</p>	
<p>SCALE 1" = 40'</p>		<p>SIGNATURE DATE 9/12/08</p>	
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>		<p>SIG. INVENTORY NO. 03-1028</p>	

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

(remove jumpers and set switches as shown)



**NOTES:**

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

**NOTES**

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5, 9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 2 and 6, on the controller unit, for Start Up In Green.
- Enable Simultaneous Gap-Out, on the controller unit, for all phases.
- Program phases 4 and 8, on the controller unit, for Dual Entry.
- The cabinet and controller are part of the Shallotte Closed Loop System.

**EQUIPMENT INFORMATION**

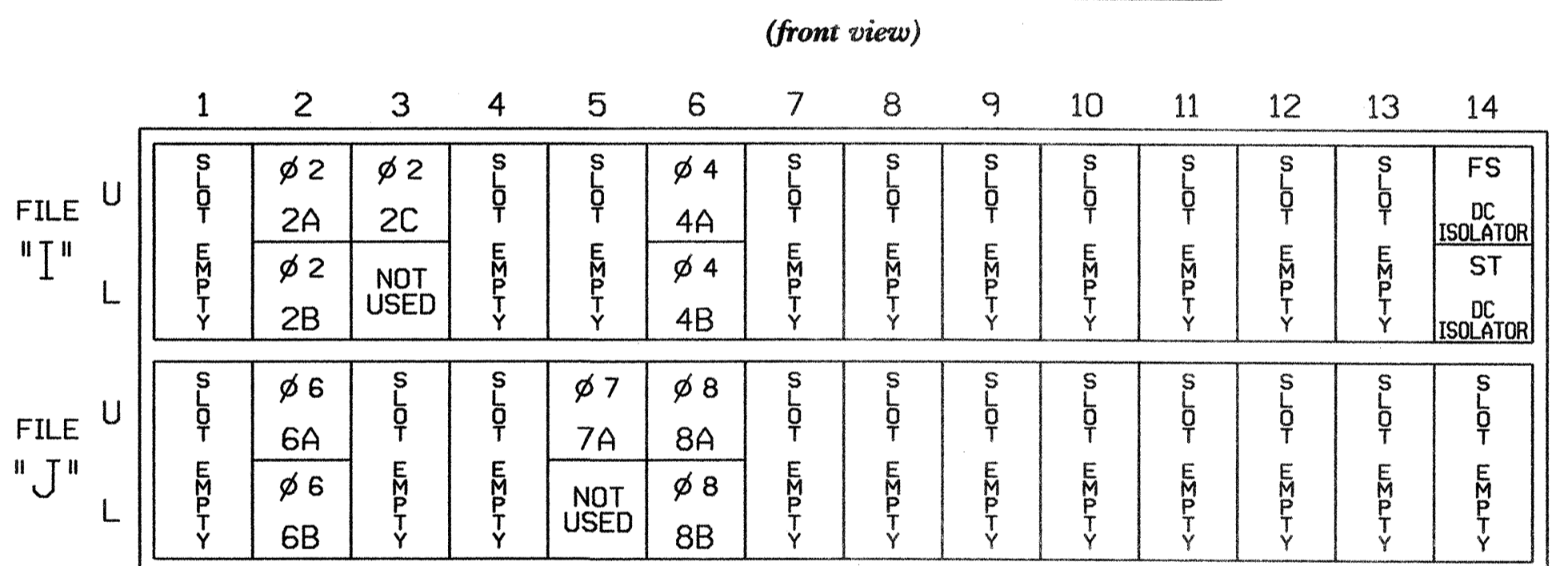
CONTROLLER.....CONTRACTOR SUPPLIED 2070L  
 CABINET.....CONTRACTOR SUPPLIED 332  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S2,S4,S6,S7,S8  
 PHASES USED.....2,4,6,7,8  
 OVERLAPS.....NONE

**SIGNAL HEAD HOOK-UP CHART**

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	41,62	81,82	NU
RED		128			101			134		*	107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW											123	
GREEN ARROW											124	

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

**INPUT FILE POSITION LAYOUT**



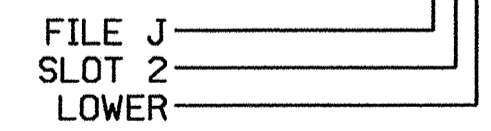
EX. : 1A, 2A, ETC. = LOOP NO.'S

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	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
7A	TB5-5,6	J5U	57	19	7	7	Y	Y			15
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			10

INPUT FILE POSITION LEGEND: J2L



**LOAD RESISTOR INSTALLATION DETAIL**

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

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

**DYNAMIC BACK-UP CONTROL PROGRAMMING**

(program controller as shown below)

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

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

BACKUP PROTECTION PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-1028  
 DESIGNED: August 2008  
 SEALED: 09/12/08  
 REVISED: N/A

New Installation

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:  

 Traffic Engineering and Signal Systems, Inc.  
 750 N. Greenfield Pkwy, Garner, NC 27529

SR 1537 (Smith Road Ext.) at Edgewater Drive Conn.

Division 3 Brunswick County Shallotte

PLAN DATE: September 2008 REVIEWED BY: T. C. Strickland

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: INIT. DATE

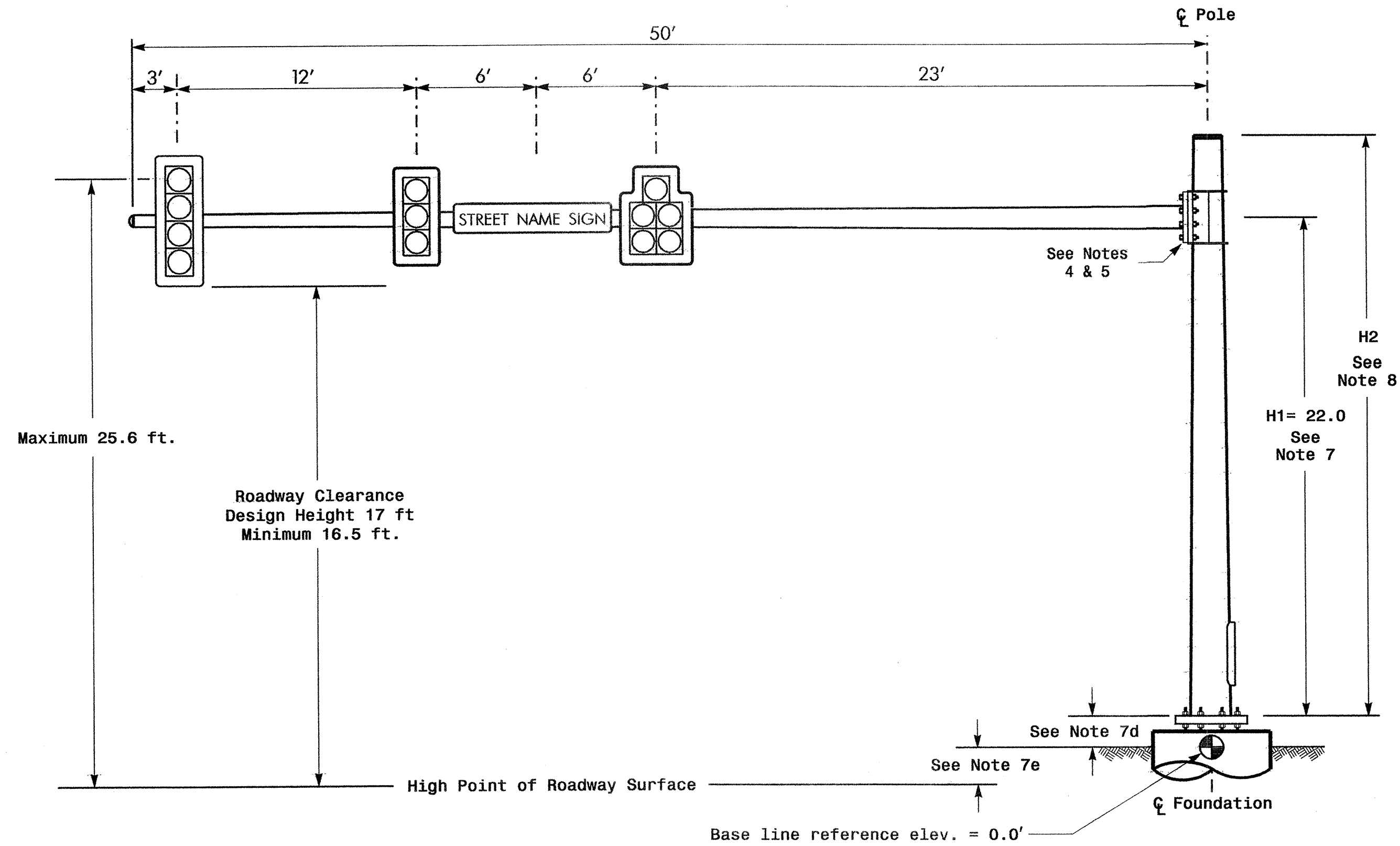
SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

SIGNATURE: DATE: 9/15/08

SIG. INVENTORY NO. 03-1028

15-SEP-2008 08:12  
 s:\1\15 51\proj\sewer\groups\sig\manstr\ckl\and\031028\_sml.e...xxx.dgn  
 c:\p1\ckl\and

**Design Loading for METAL POLE NO. 5**



Elevation View

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

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

Elevation Differences for:	Pole 5	Pole 6
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+3.0 ft.	+2.0 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

**MAST ARM LOADING SCHEDULE**

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	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

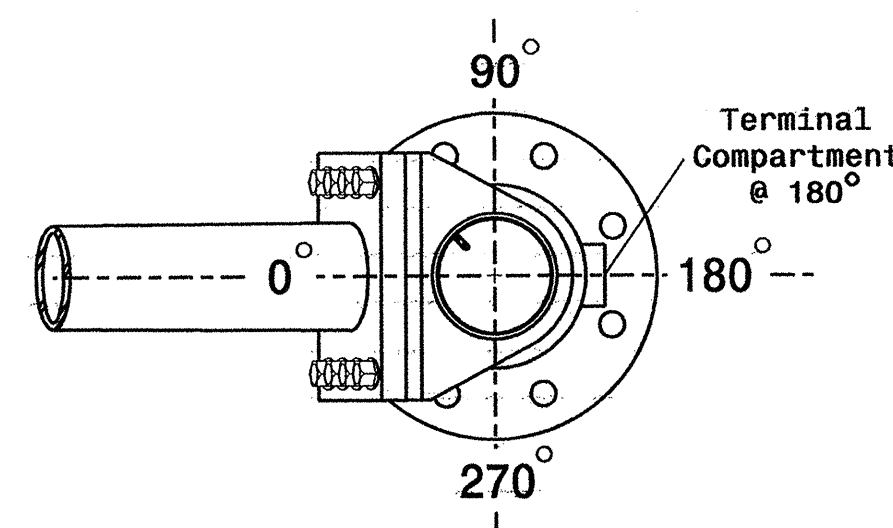
**NOTES**

**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.
  - The traffic signal project plans and special provisions.

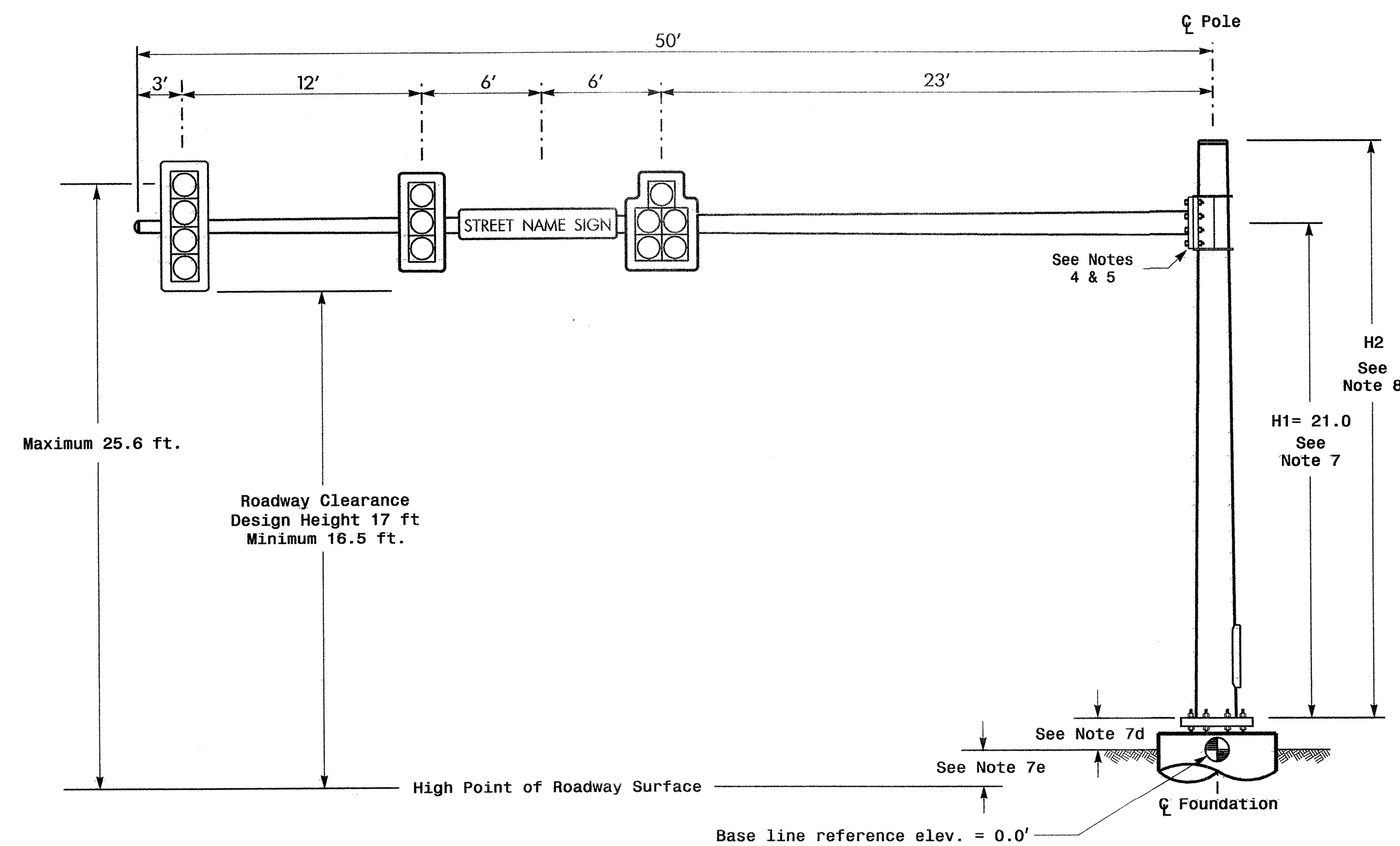
**Design Requirements**

- 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.
- 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.

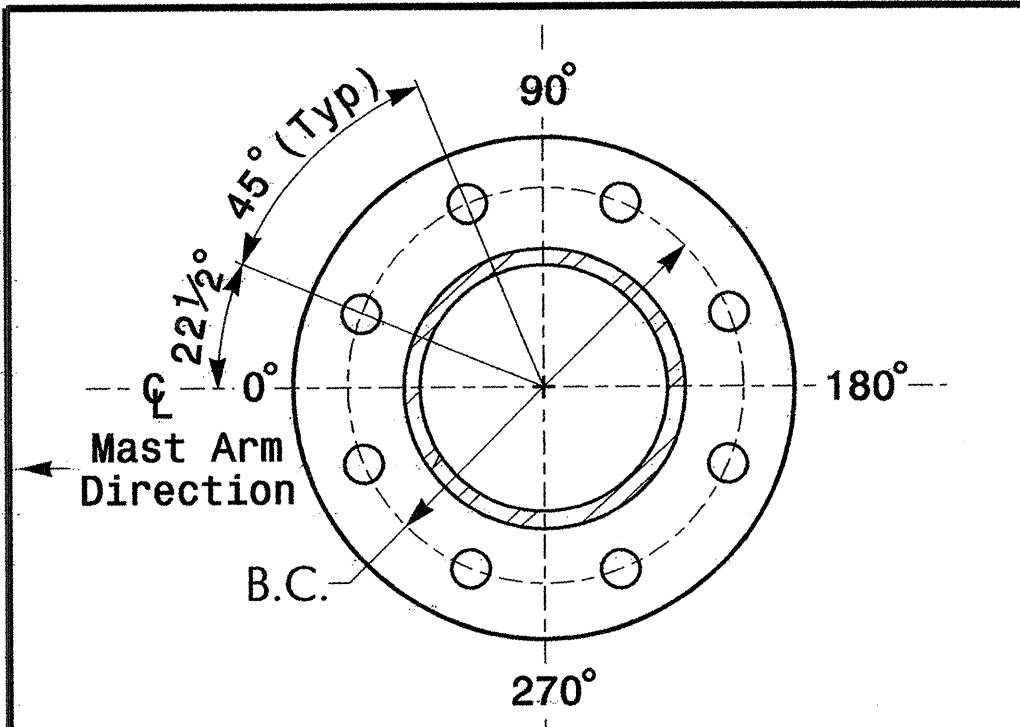


POLE RADIAL ORIENTATION

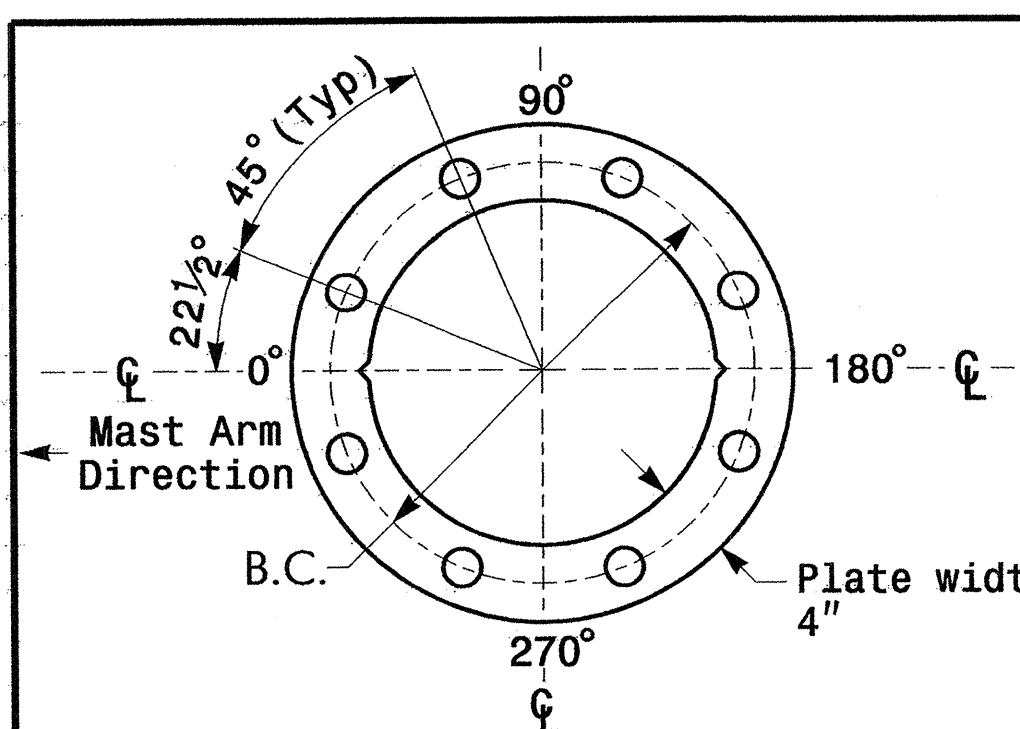
**Design Loading for METAL POLE NO. 6**



Elevation View



8 BOLT BASE PLATE DETAIL  
See Note 6



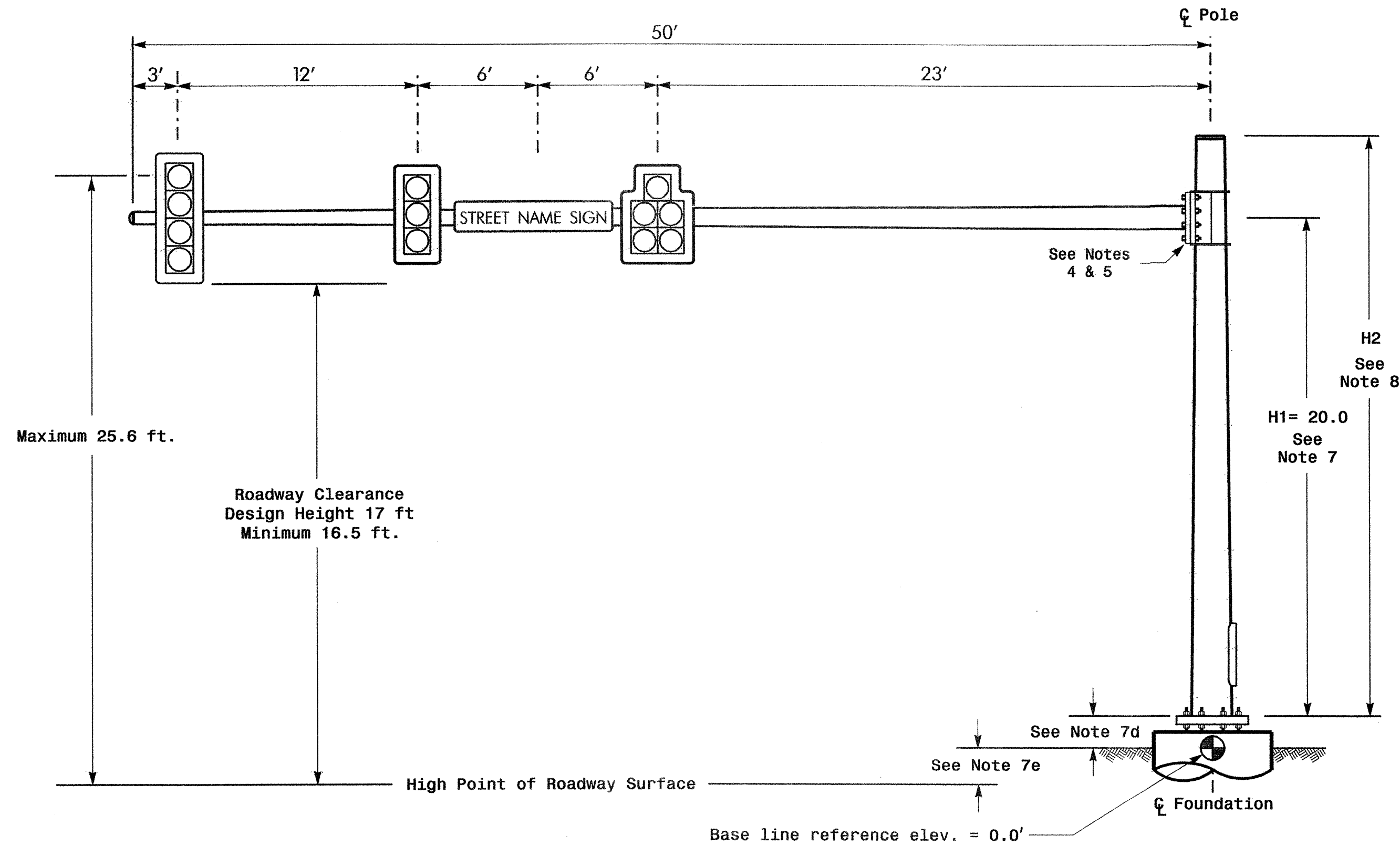
BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL  
For 8 Bolt Base Plate

NCDOT Wind Zone 2 (130 mph)

	SR 1537 (Smith Road Ext.) at Edgewater Drive/Conn.		
	Division 03 Brunswick County Shalotte	PREPARED BY: I. O. Umozurike REVIEWED BY:	
SCALE 0 N/A N/A	PLAN DATE: August 2008 REVISIONS:	REVIEWED BY:	INIT. DATE 9/17/08 DATE
PREPARED IN THE OFFICES OF:  759 N. Greenfield Pkwy, Garner, NC 27529			SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393 TIMOTHY A. WILLIAMS

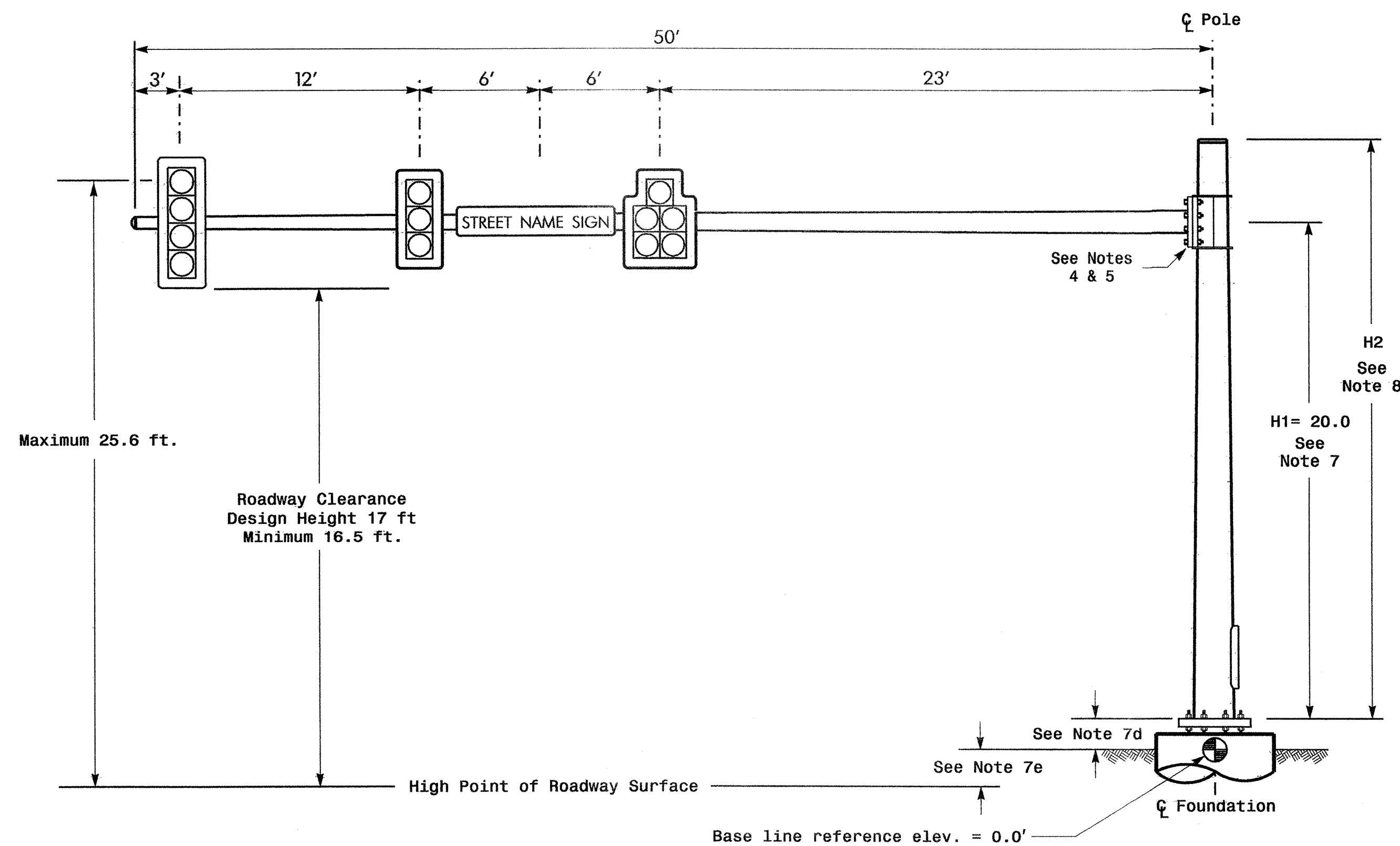
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Design Loading for METAL POLE NO. 7



Elevation View

Design Loading for METAL POLE NO. 8



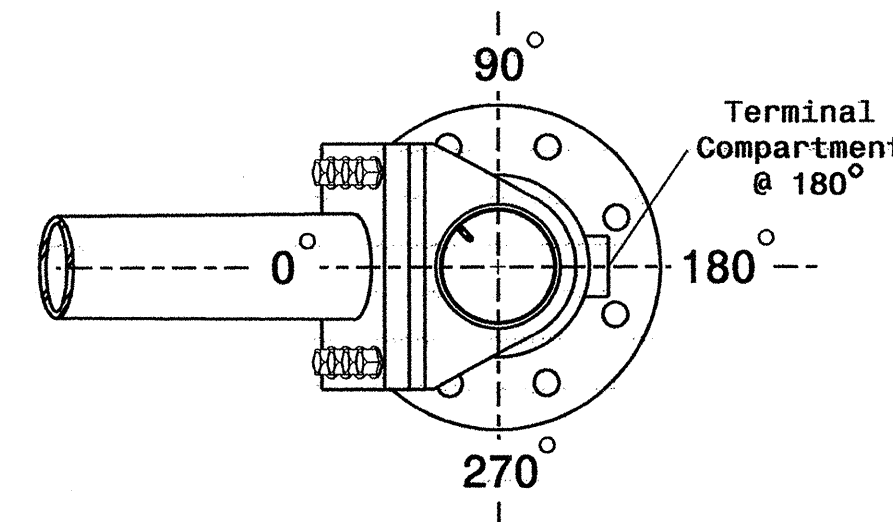
Elevation View

SPECIAL NOTE

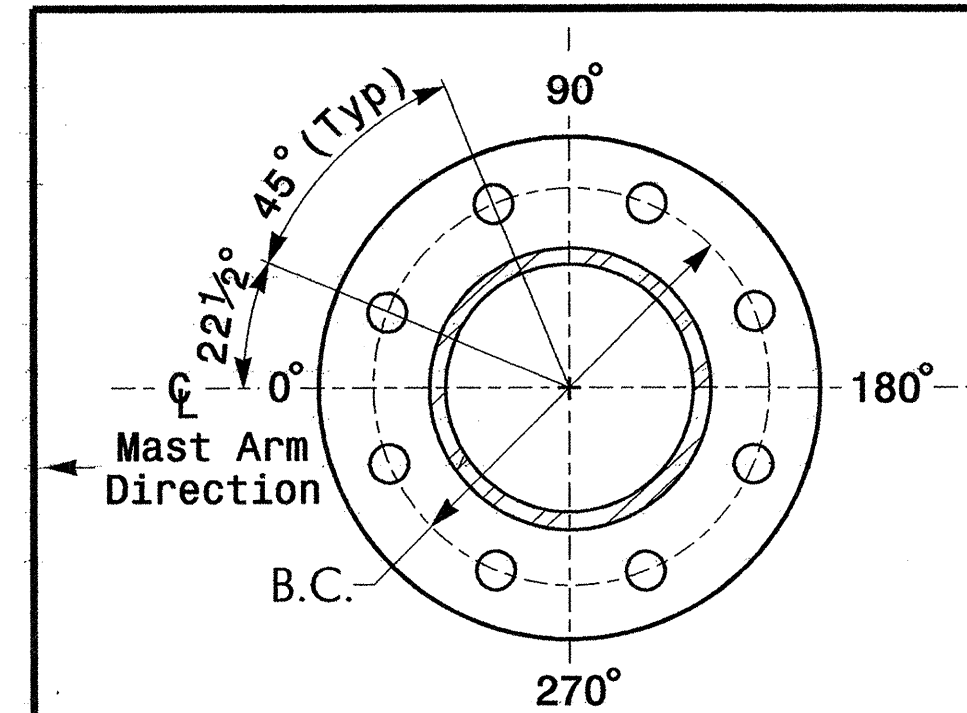
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

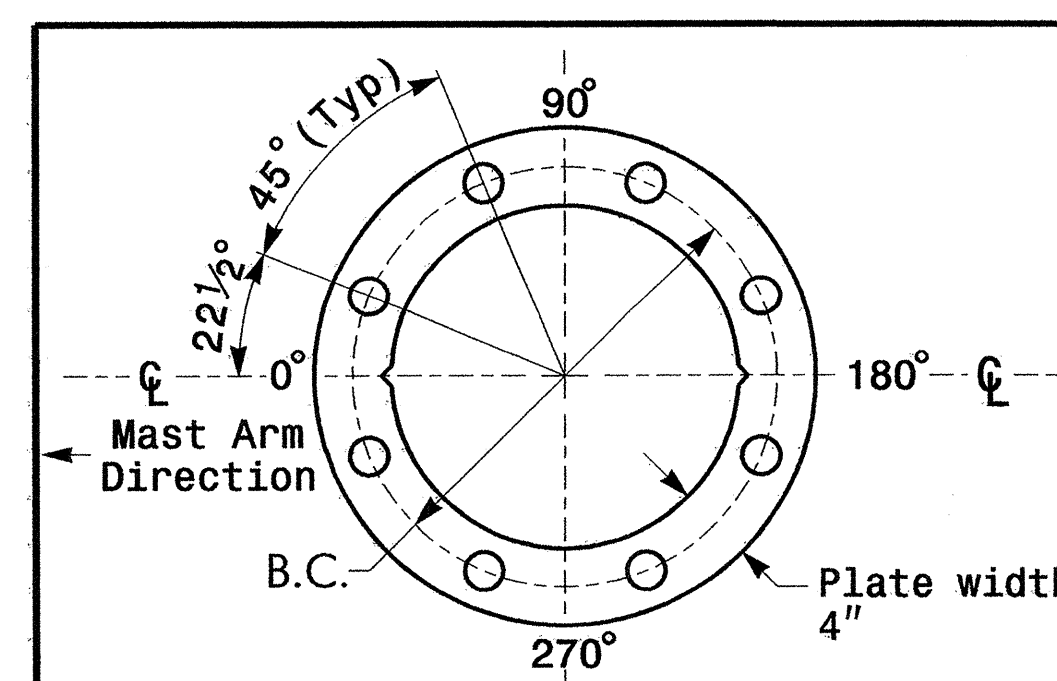
Elevation Differences for:	Pole 7	Pole 8
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.0 ft.	+1.0 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL  
See Note 6



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	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

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.
  - 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.
- 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.

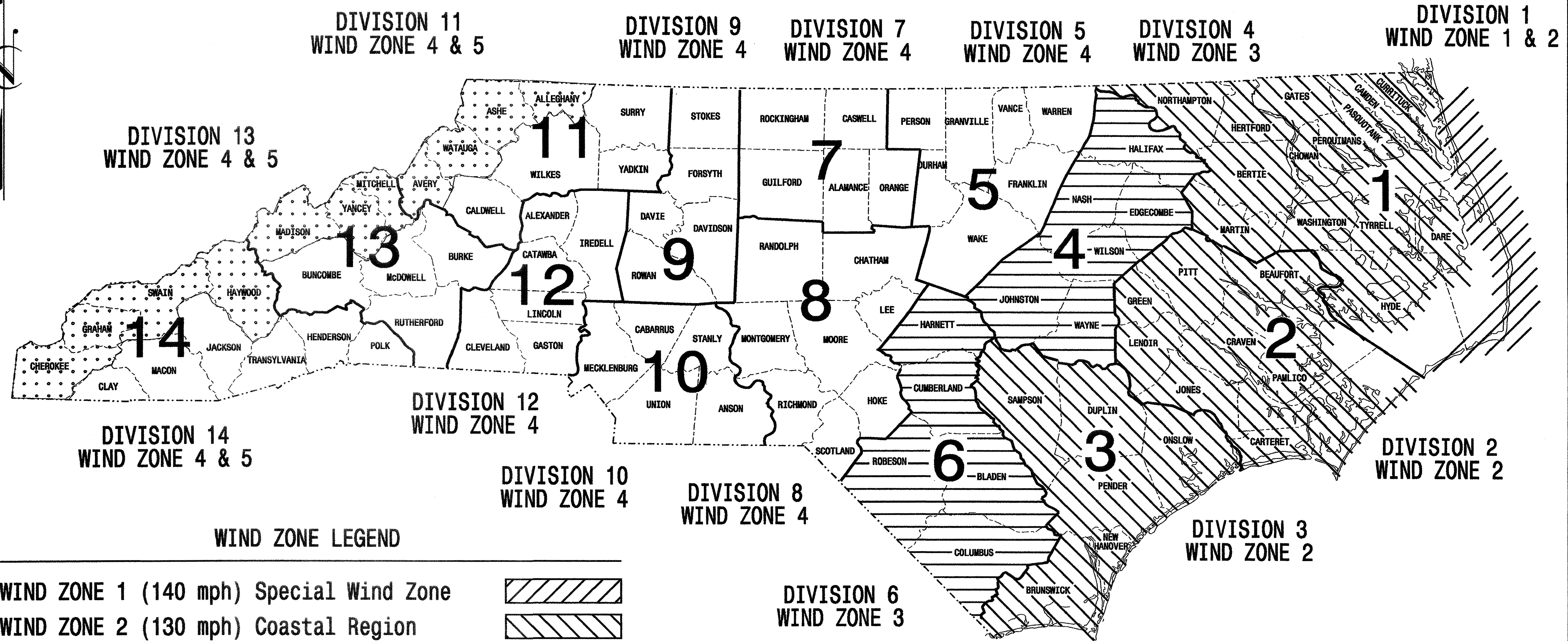
NCDOT Wind Zone 2 (130 mph)

<p>Prepared in the Offices of:</p> <p>759 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>SR 1537 (Smith Road Ext.) at Edgewater Drive/Conn.</p>	<p>SEAL</p> <p>SEAL 24393</p> <p>2008</p> <p>DATE</p>
	<p>Division 03 Brunswick County</p> <p>Shalotte</p> <p>PLAN DATE: August 2008</p> <p>REVIEWED BY:</p> <p>PREPARED BY: I. O. Umozurike</p> <p>REVIEWED BY:</p>	

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	U-3462	Sig.13
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:

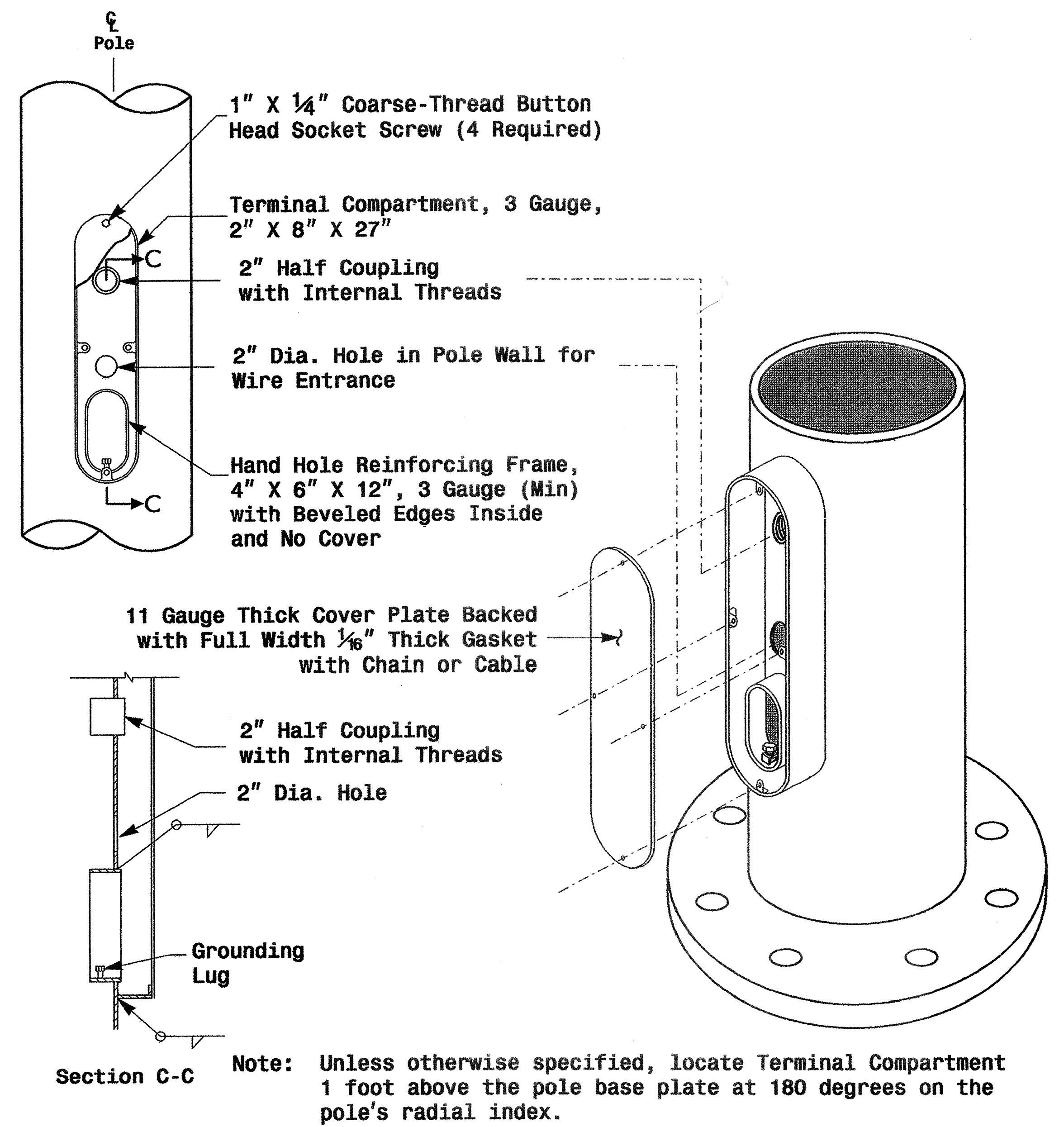
#### TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

- 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

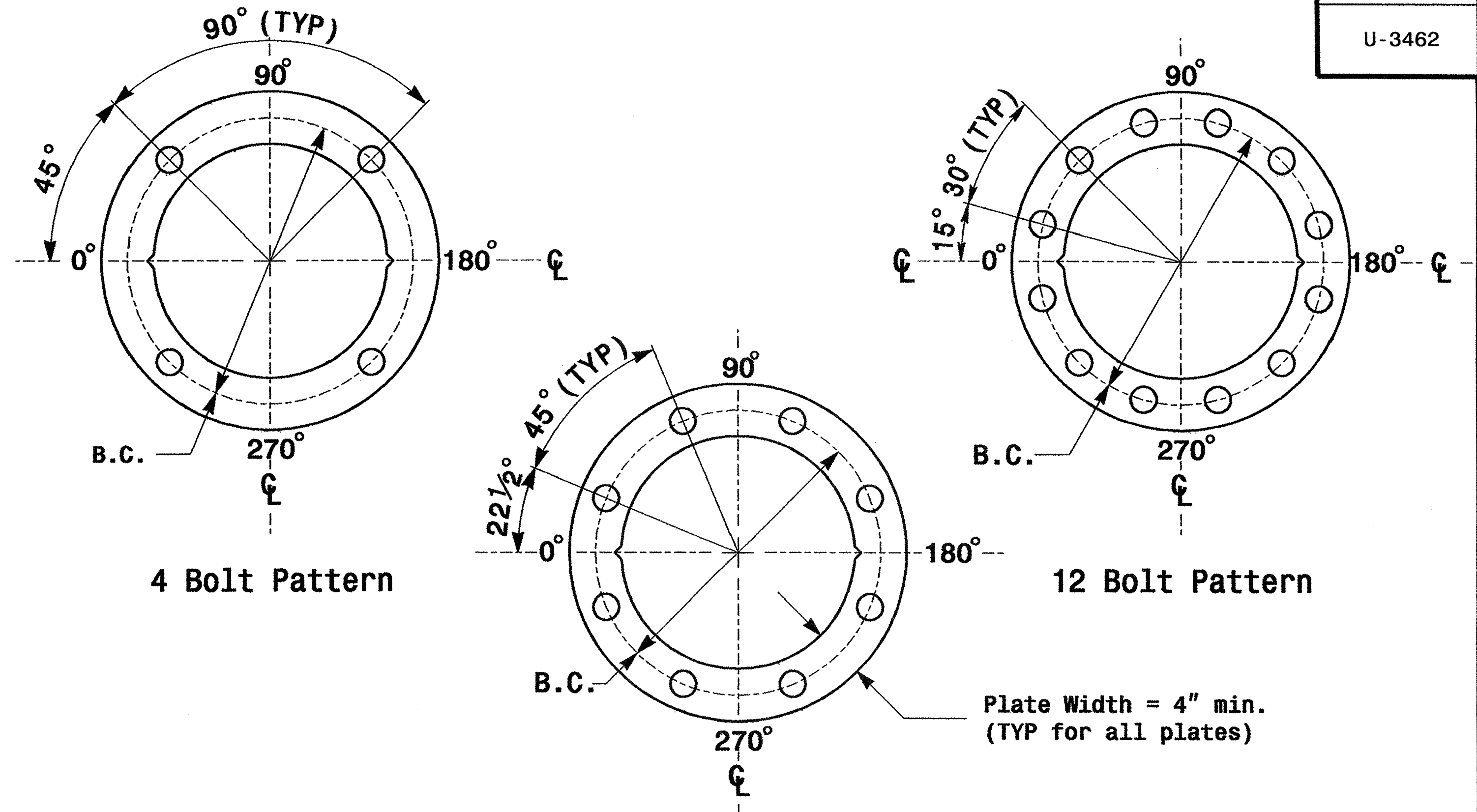
SEAL



*D. Sarkar* 9.2.2005  
SIGNATURE DATE



**Terminal Compartment Detail**



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

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 _____	

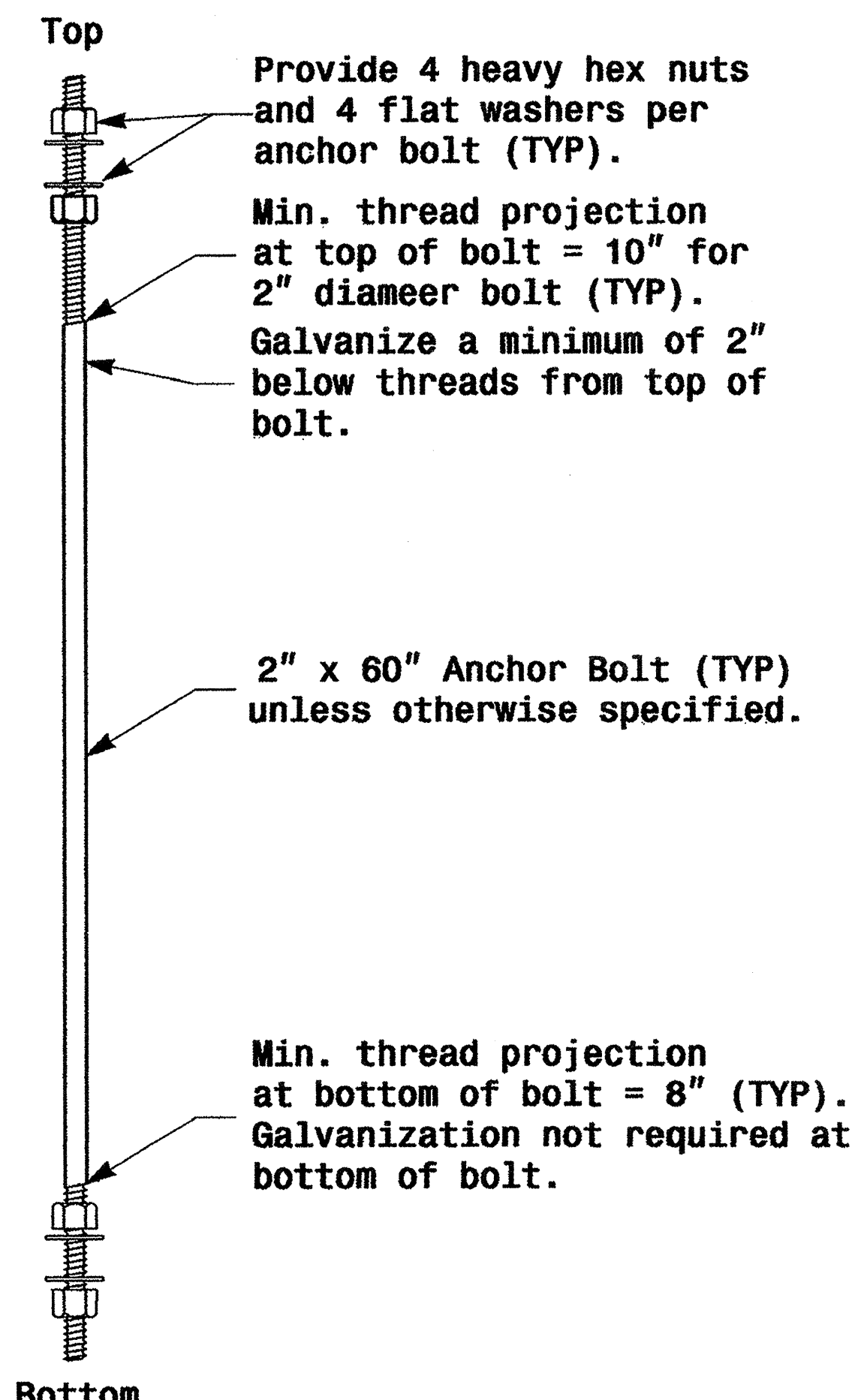
MFG _____	MFG. DATE: MM/YY _____
SECTION D/T/L/Y _____	
NCDOT STANDARD _____	

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

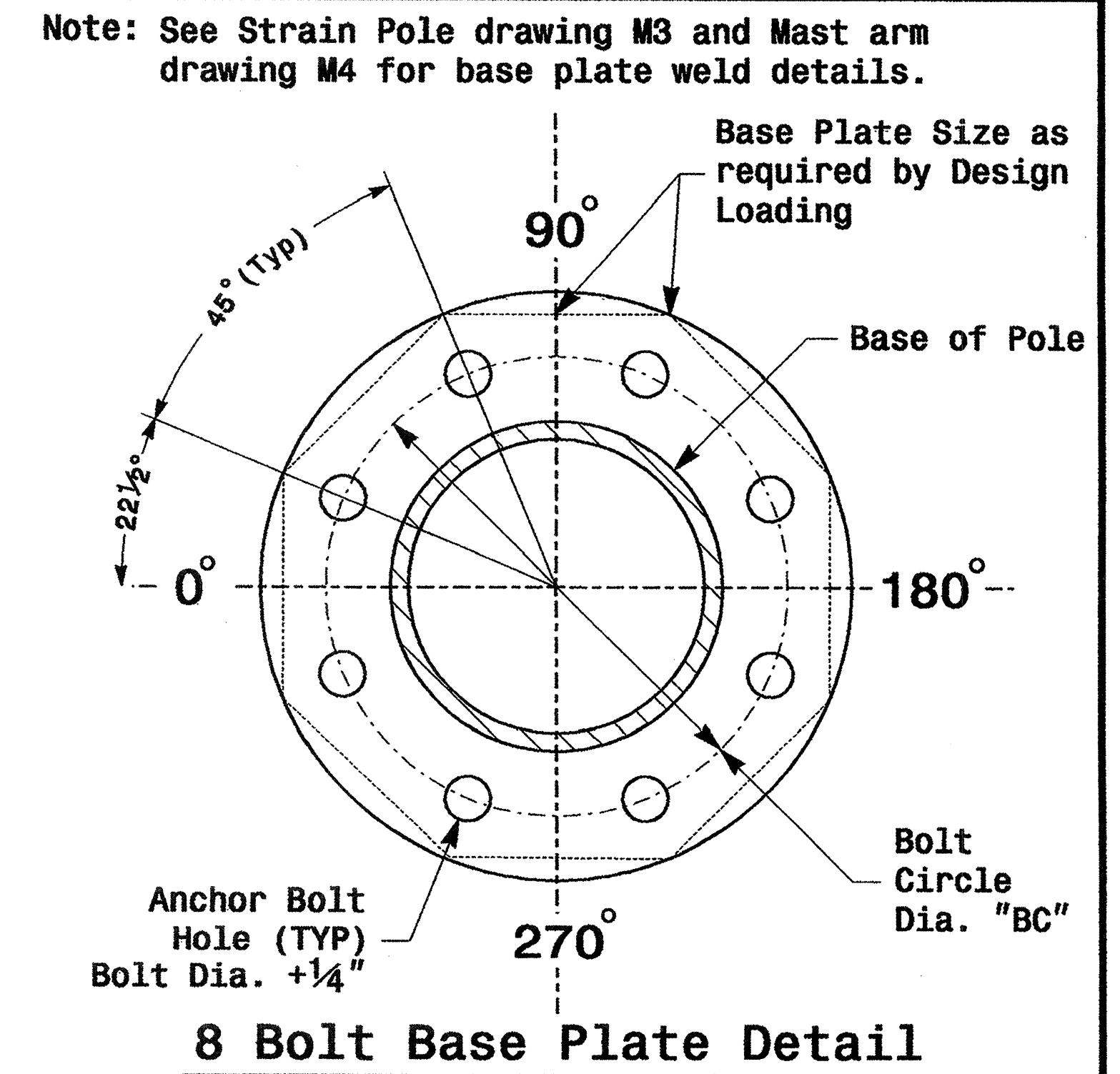
**Shaft I.D. Tag**  
(Provide on Strain Poles and Mast Arm Poles)

- 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**



**Anchor Bolt Detail**

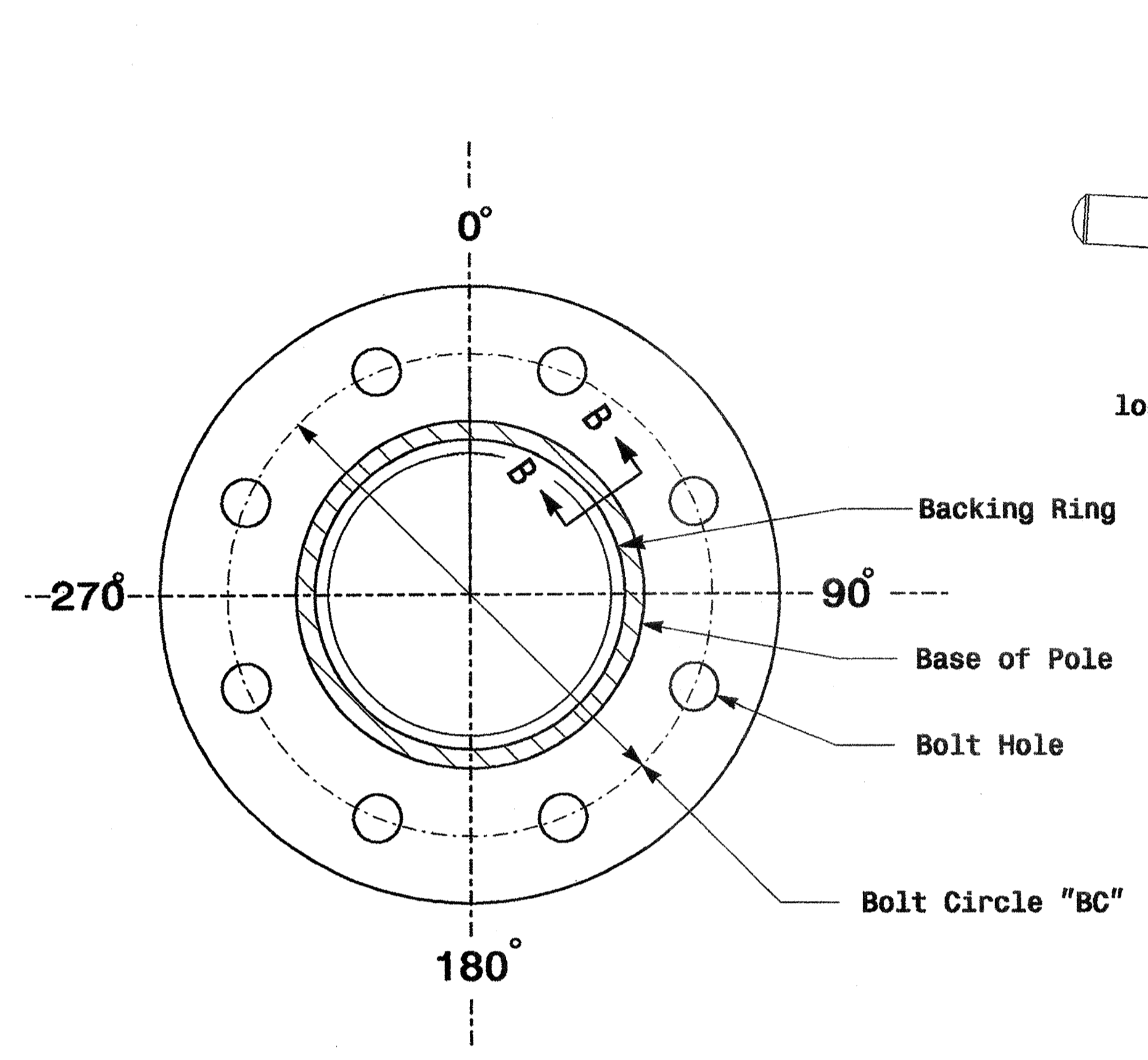


**8 Bolt Base Plate Detail**

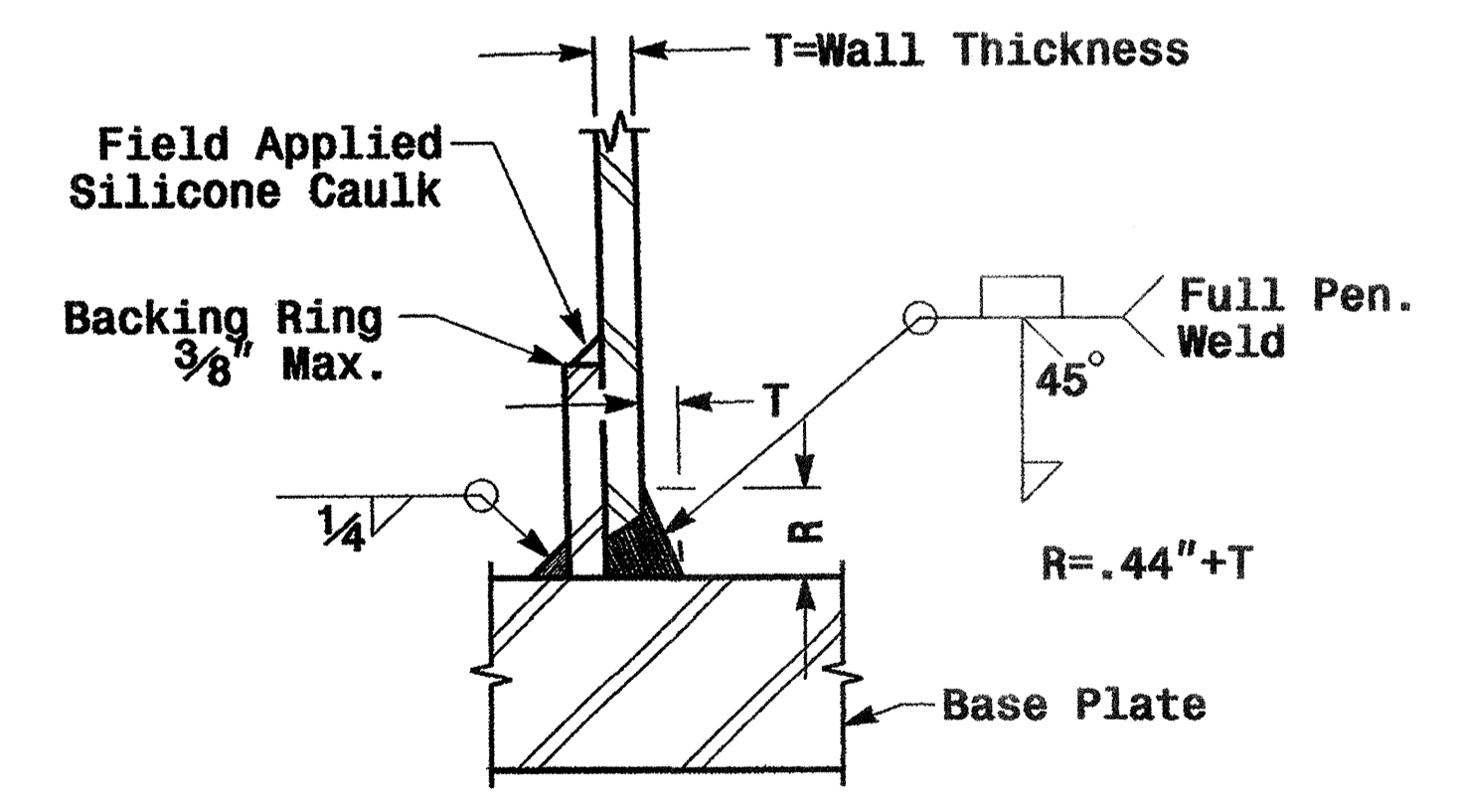
**Fabrication Details - All Poles**

01-SEP-2005 18:22 D:\2004\_Metro Pole Standards\004 m2 thru rd.dgn cad@dwg

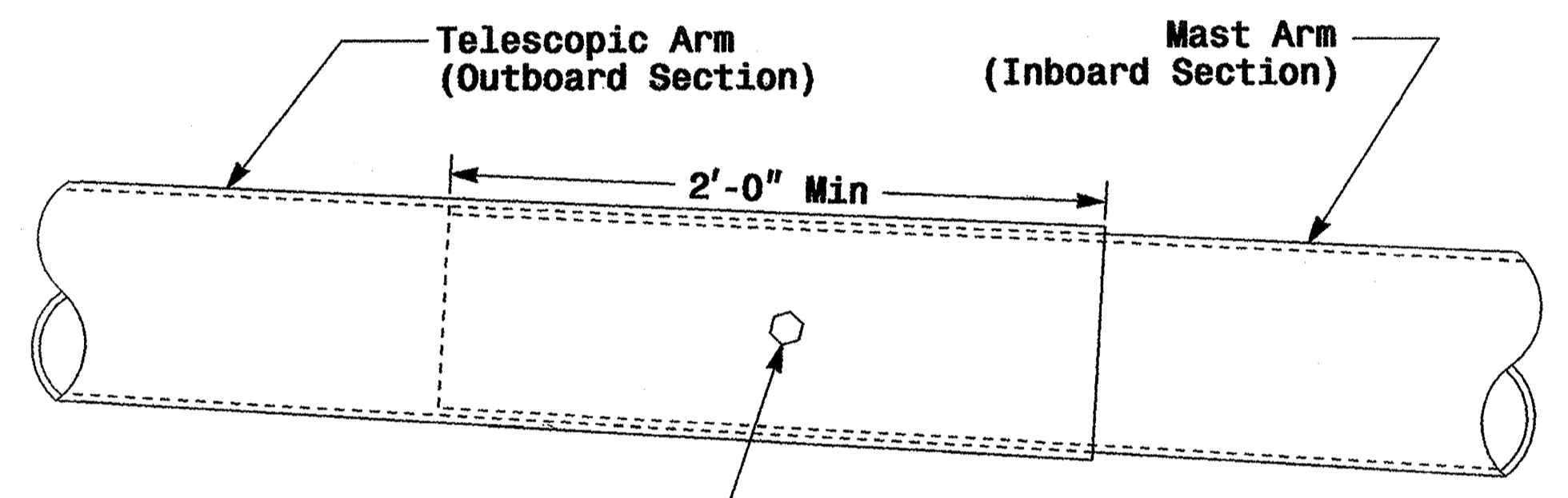
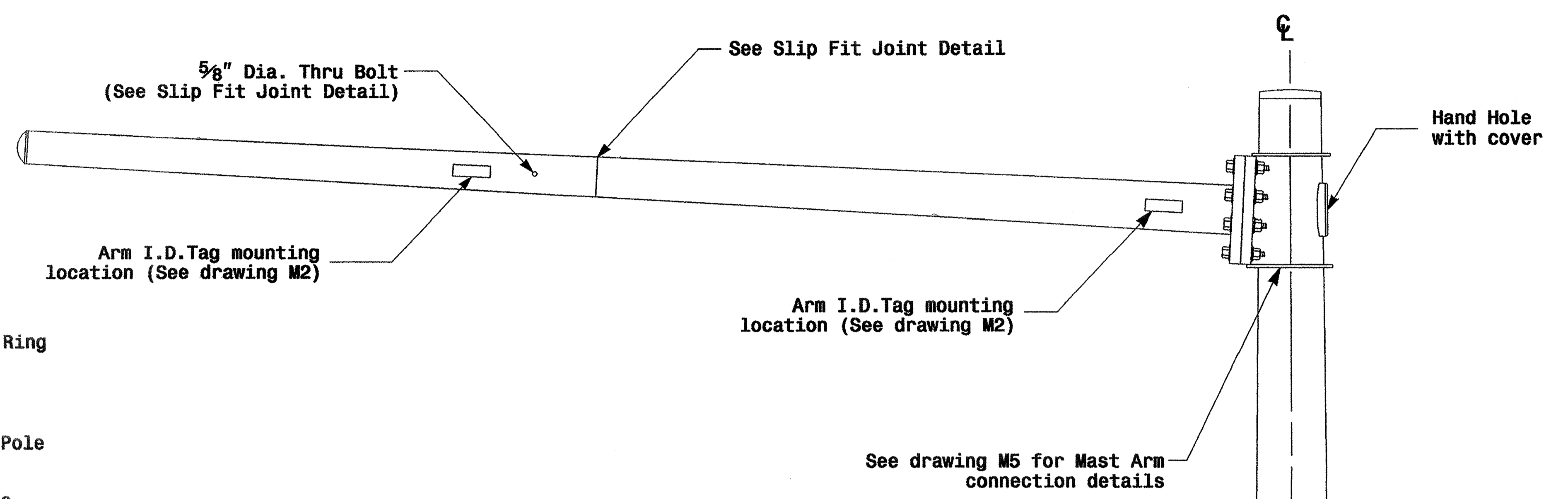
	<b>Typical Fabrication Details Common To All Metal Poles</b>		
	PLAN DATE: <b>May 2005</b>	REVIEWED BY: <b>C.F. Andrews</b>	
SCALE: 0 NA NONE	REVISIONS:	INIT.:	DATE:
Signature: <i>P.L. Alexander</i>			Date: <b>9.2.2005</b>



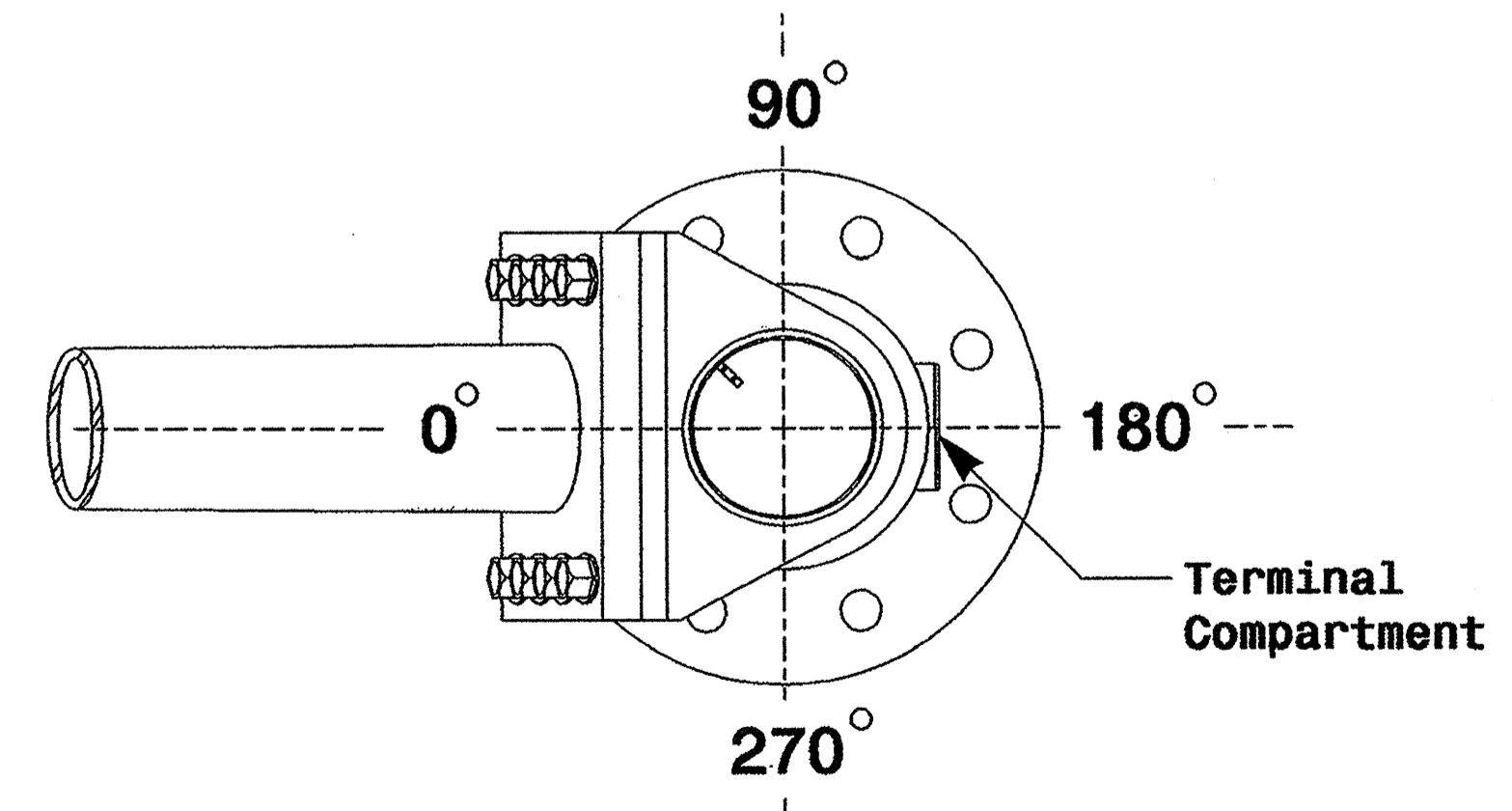
Section A-A  
(See drawing M 2)  
**Pole Base Plate**



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



**Slip Fit Joint Detail for Mast Arm**



**Mast Arm Radial Orientation**

See drawing M5 for Mast Arm connection details

Shaft I.D.Tag mounting location (See drawing M2)

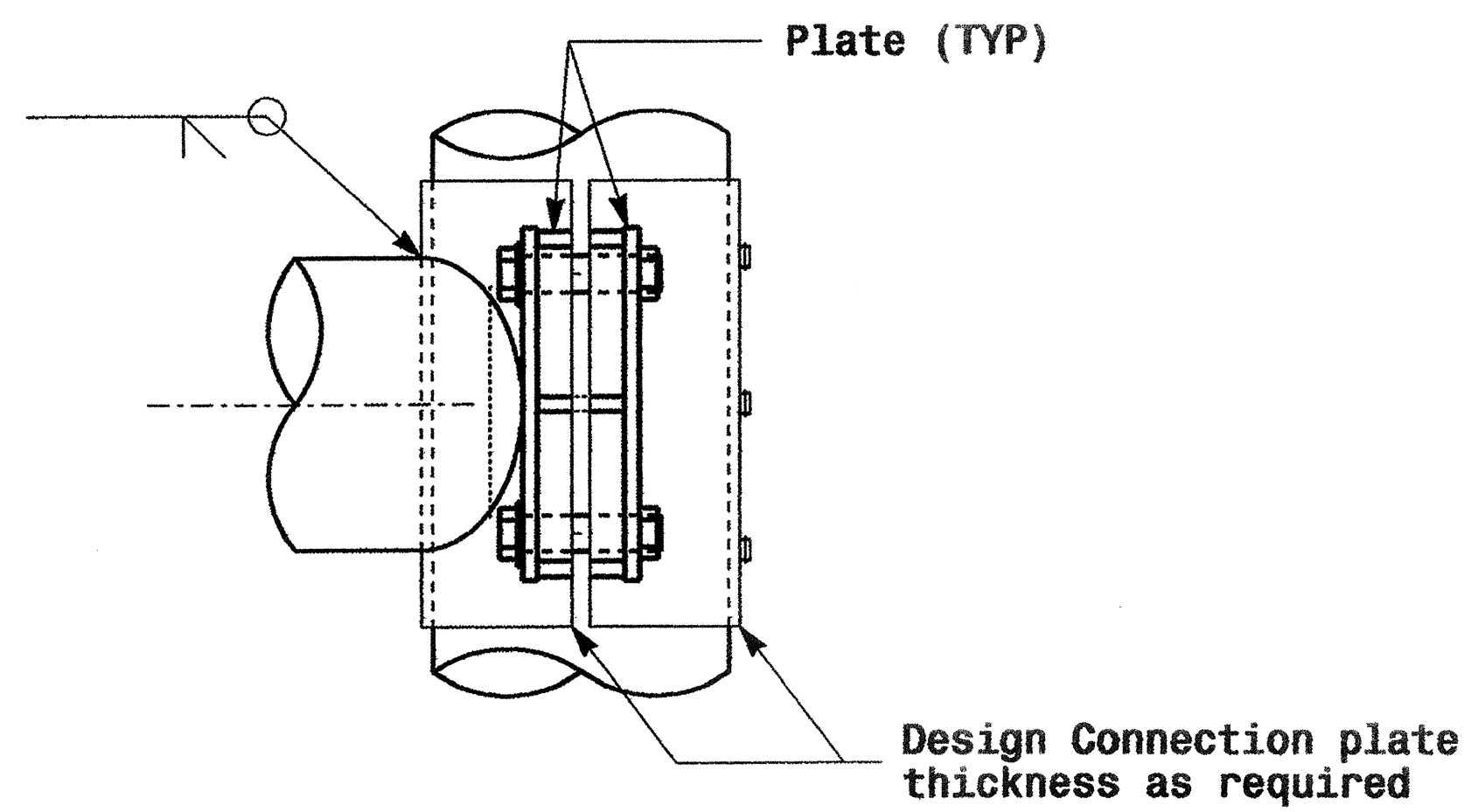
Terminal Compartment (See drawing M2)

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

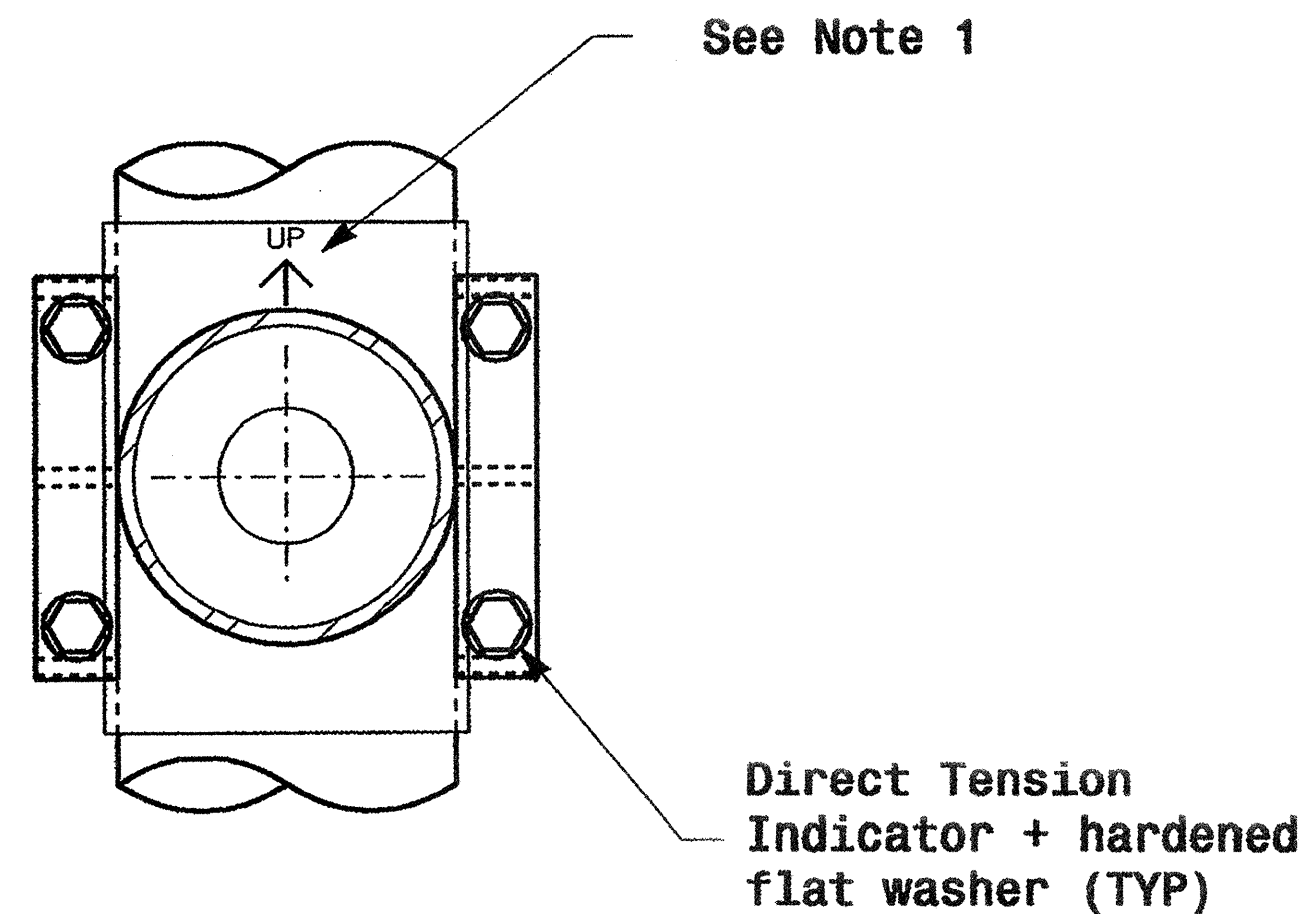
	<b>Typical Fabrication Details for Mast Arm Poles</b>		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	
SCALE: NONE 0 NA	REVISIONS INIT. DATE		SIGNATURE: D. Sacker DATE: 9.2.2005 SIG. INVENTORY NO.

01-SEP-2005 14:08 P:\Projects\2005\U-3462\pole\_etal\pole\_etal.dgn

# Adjustable Clamp Type Bolted Mast Arm Connection

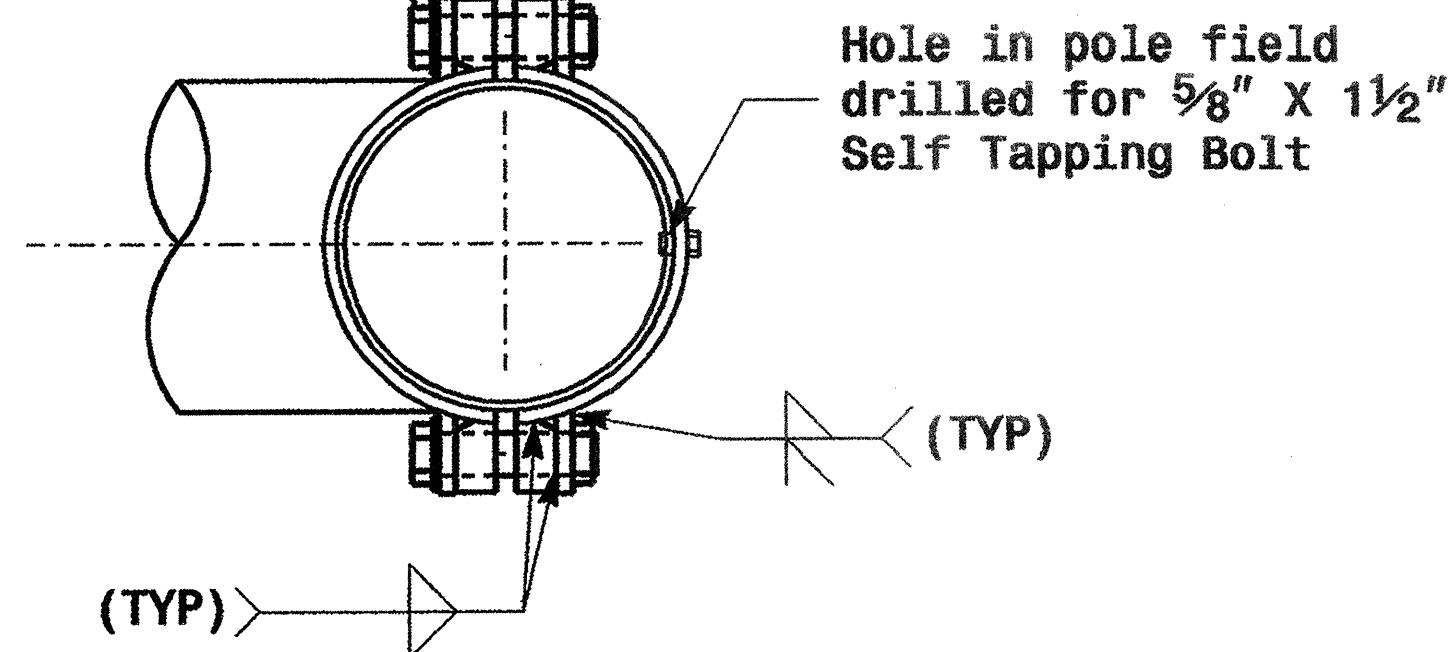


Side Elevation View



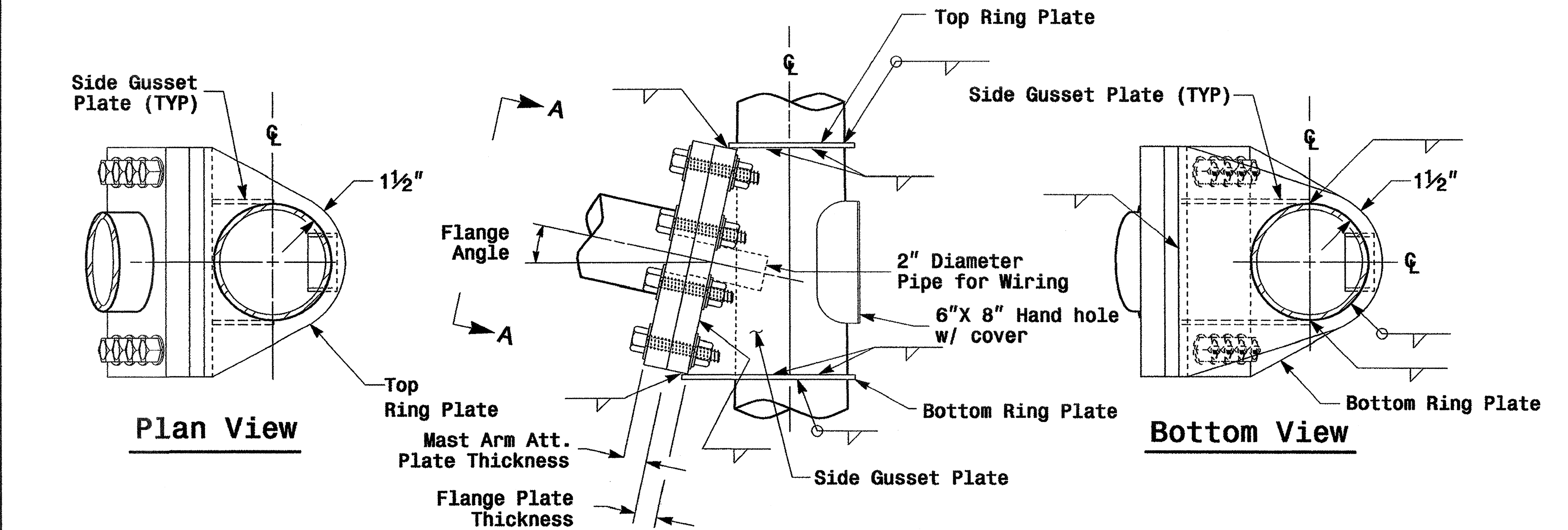
Front Elevation View

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



Plan View

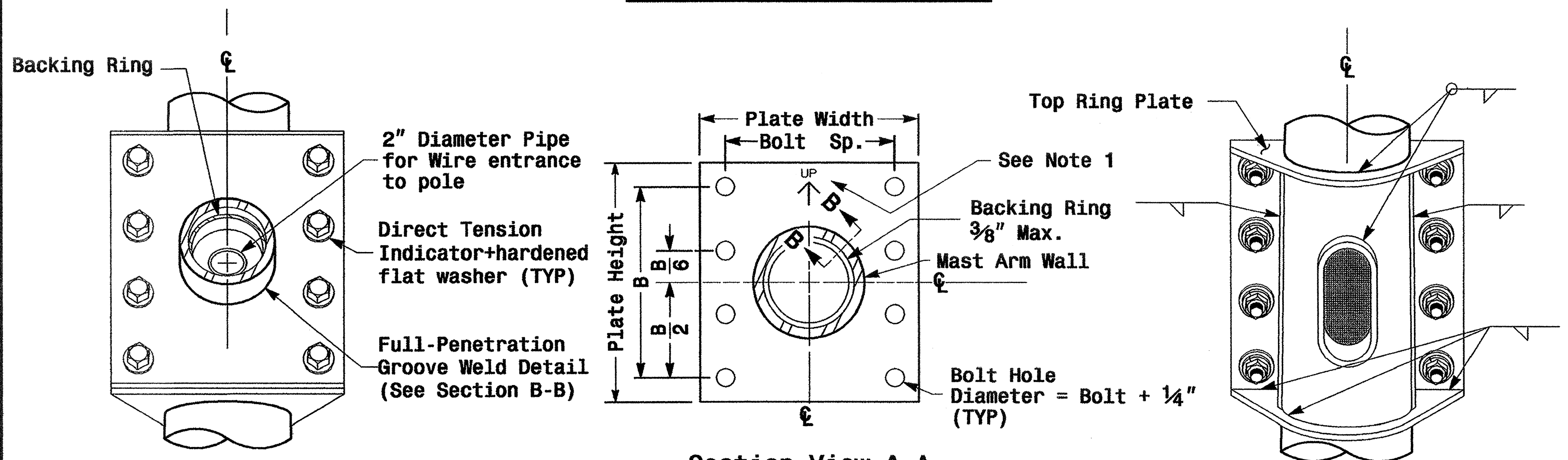
# Welded Ring Stiffened Mast Arm Connection



Plan View

Side Elevation View

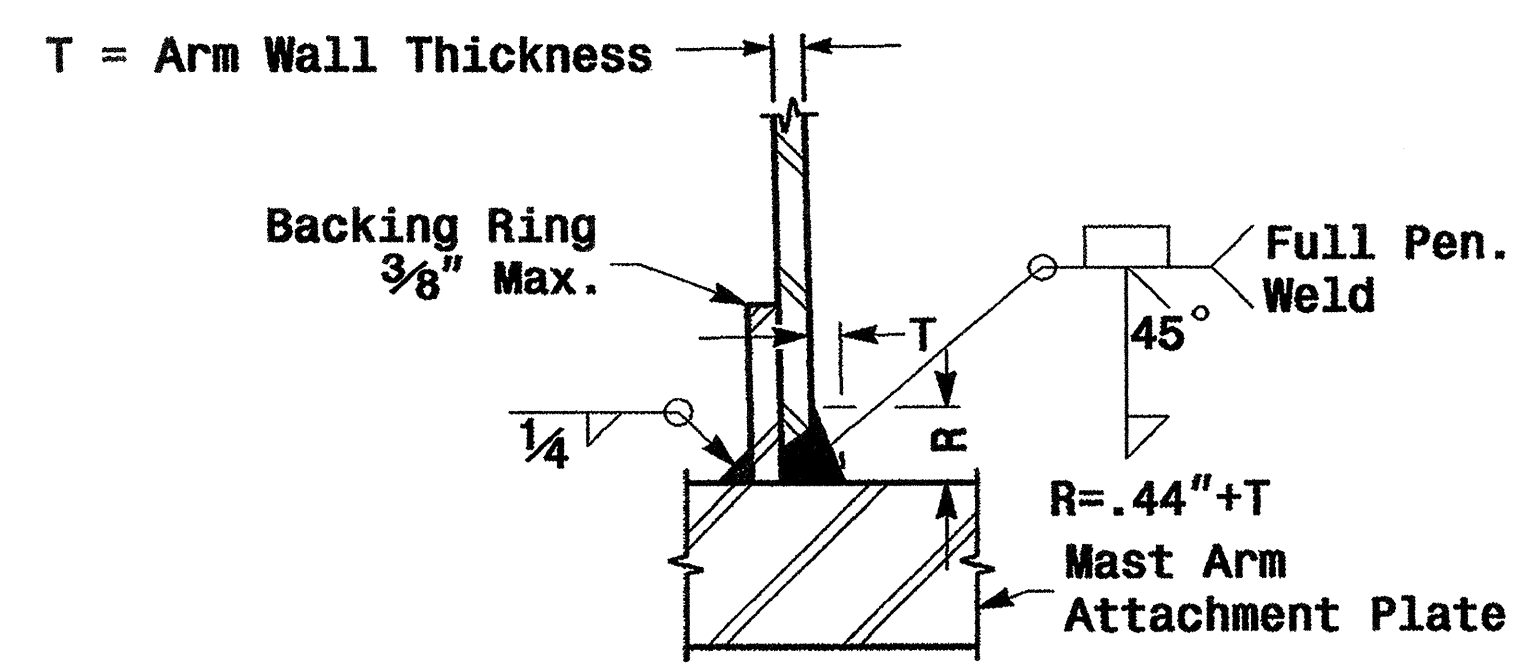
Bottom View



Front Elevation View

Mast Arm Attachment Plate

Back Elevation View

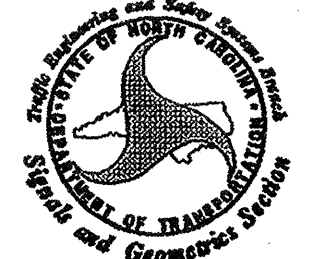
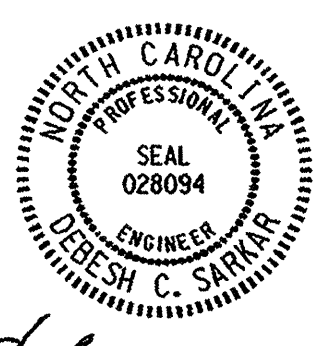


Section B-B Full-Penetration Groove Weld Detail

- 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.

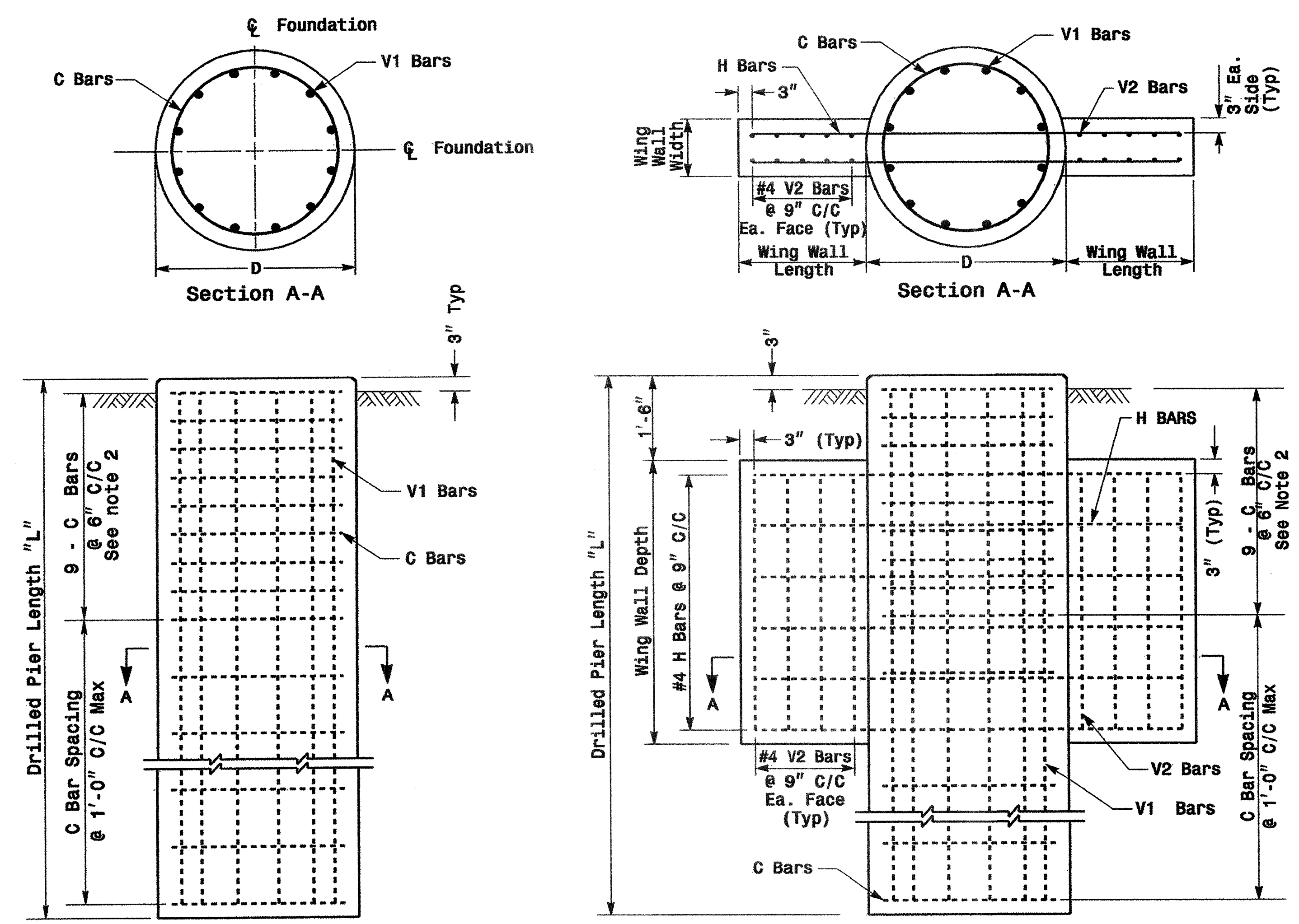
Fabrication Details - Mast Arm Poles

01-SEP-2005 14:11 v:\p0401\ref-un1\work\p0401\metal pole.stan\ar-052004.mf.dgn

<p>Prepared in the Office of:</p>  <p>222 N. McDowell St., Raleigh, NC 27603</p>		<p><b>Fabrication Details For Mast Arm Connection To Pole</b></p> <p>PLAN DATE: May 2005 REVIEWED BY: C.F. Andrews</p> <p>PREPARED BY: P.L. Alexander REVIEWED BY: A.M. Esposito</p>		<p>SEAL</p>  <p>DATE: 9.2.2005</p>													
<p>SCALE: NONE</p>		<p>REVISIONS:</p> <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				<p>INITIALS:</p> <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>INITIALS</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>		NO.	DATE	INITIALS			
NO.	DATE	DESCRIPTION															
NO.	DATE	INITIALS															
<p>SIGNATURE: D. Sarker</p>		<p>INVENTORY NO.:</p>															

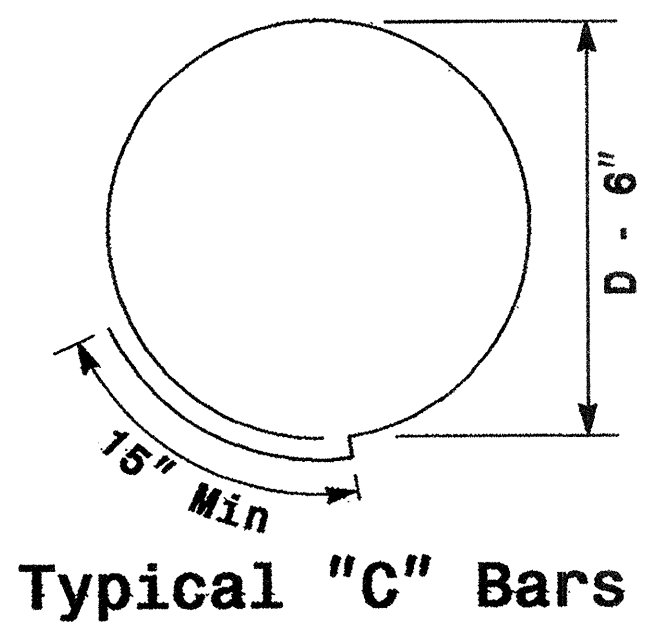


### Reinforcing Steel Bars



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



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"

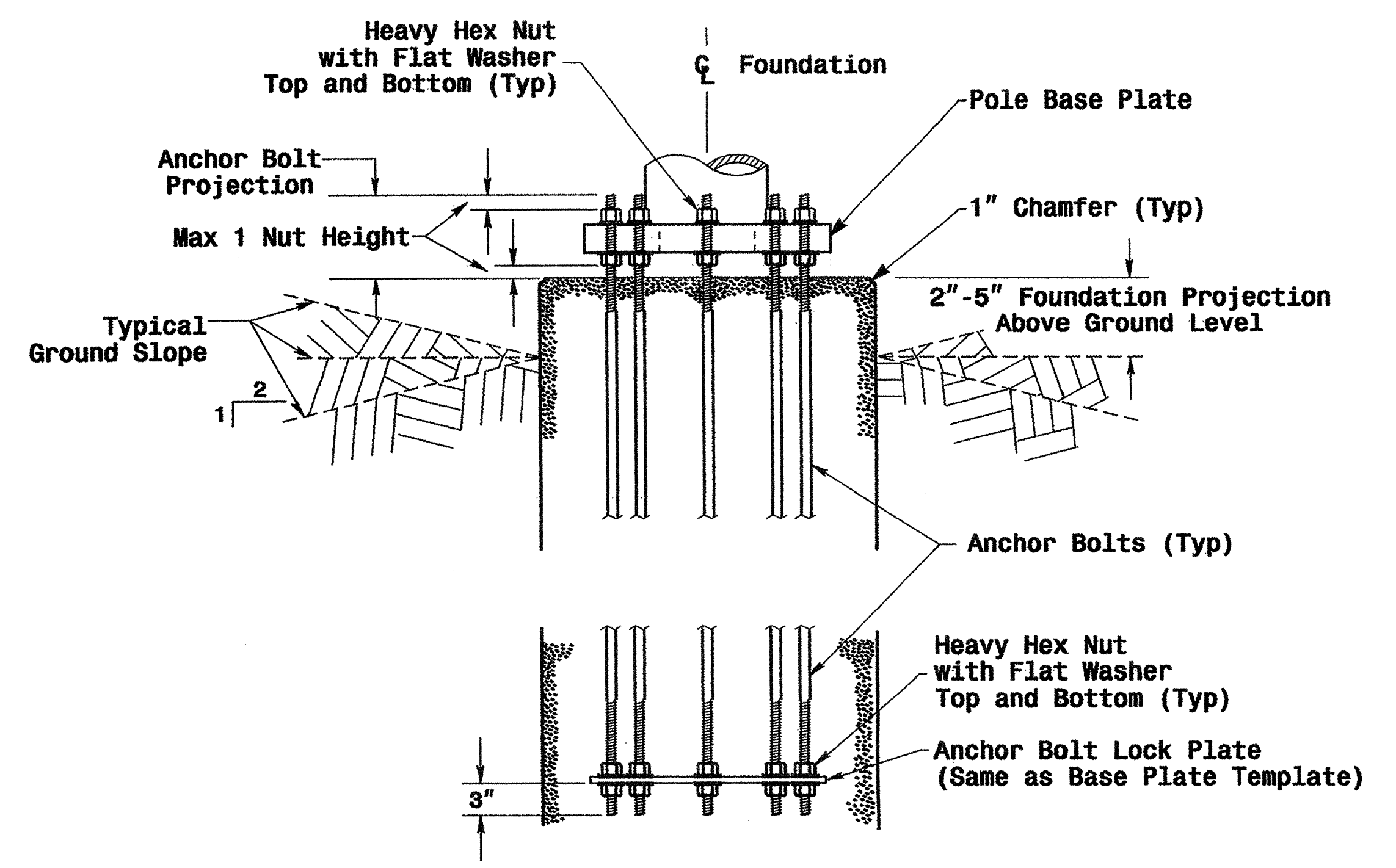
\* See Note No. 1  
\*\* See Note No. 3

Wing Wall 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

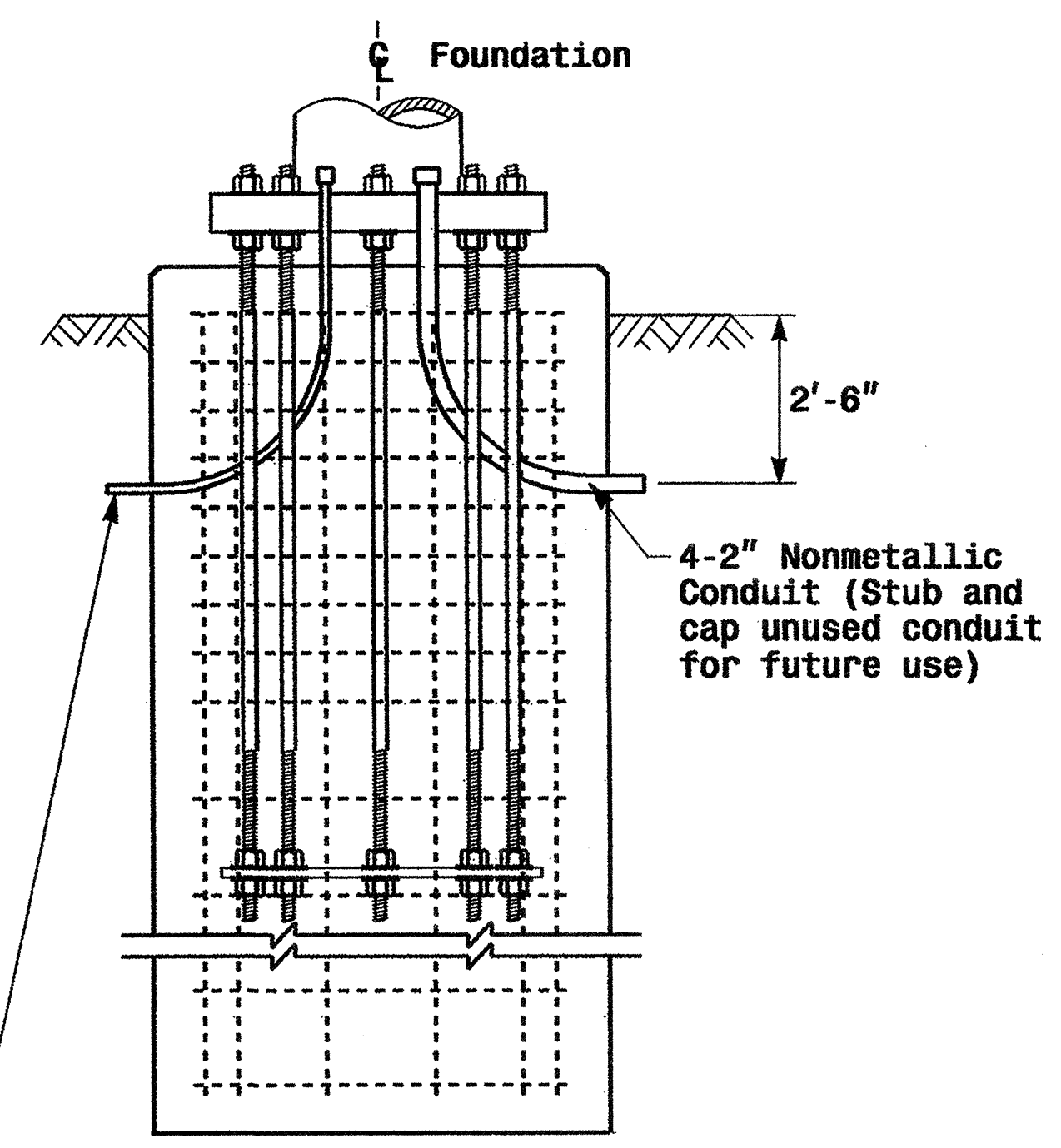
See Note No. 4

### Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



### Typical Foundation Conduit Details



### 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

01-SEP-2005 11:48 \\s\p\c\188-un\1\m\c\p\group\2004\_m\c\1\p\18 standard.dwg2004\_m\l.dgn

	<b>Construction Details Foundations</b>		
	PLAN DATE: <b>May 2005</b> PREPARED BY: <b>C.F. ANDREWS</b>	REVIEWED BY: <b>P.L. ALEXANDER</b> REVIEWED BY: <b>A.M. ESPOSITO</b>	
SCALE: <b>0 NA NONE</b>		SIG. INVENTORY NO. _____	

- 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

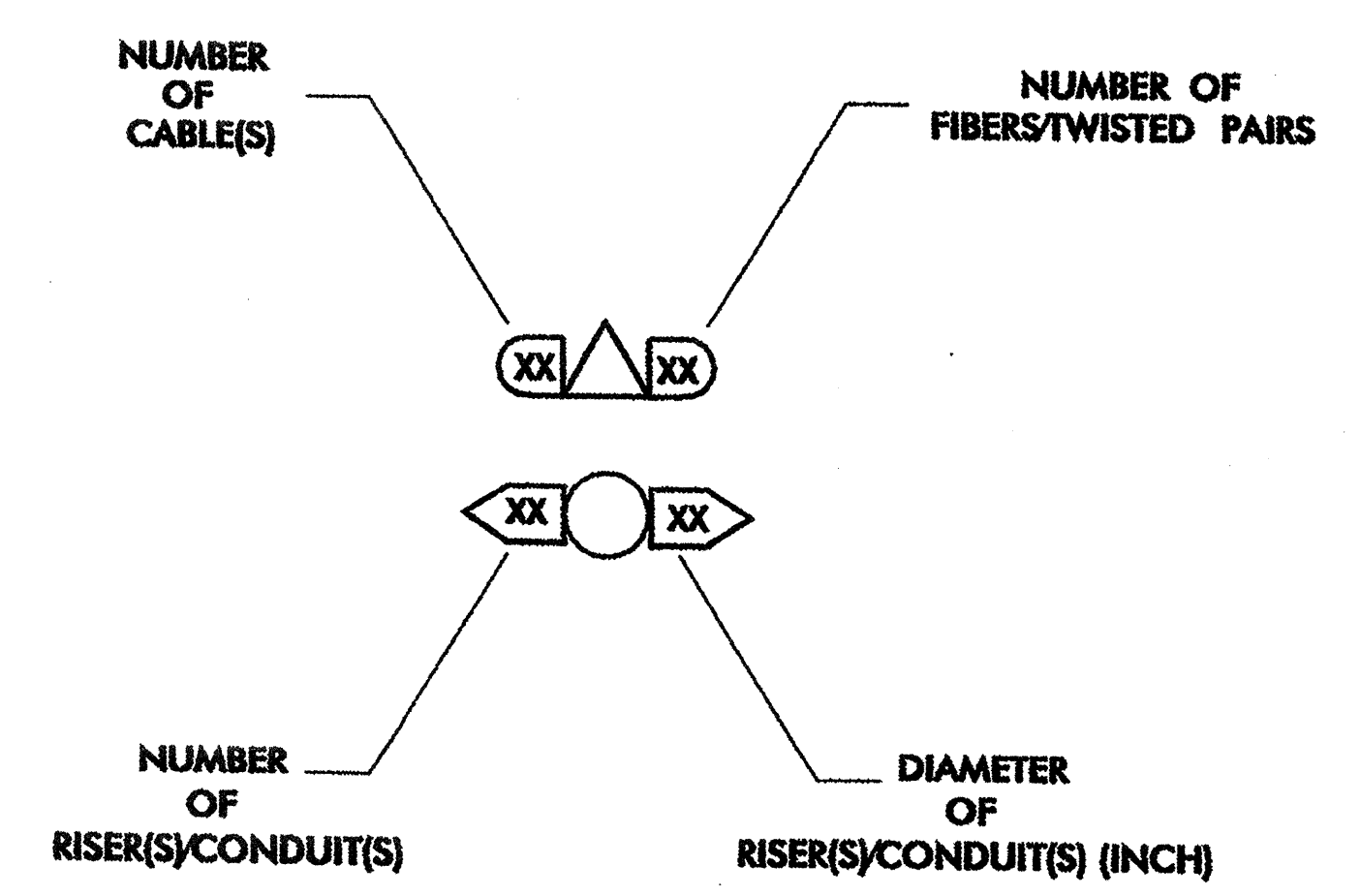
- 34 INSTALL CABINET FOUNDATION
- 35 REMOVE EXISTING CABINET FOUNDATION
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40 INSTALL OVERSIZED JUNCTION BOX
- 41 REMOVE EXISTING JUNCTION BOX
- 42 INSTALL 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**

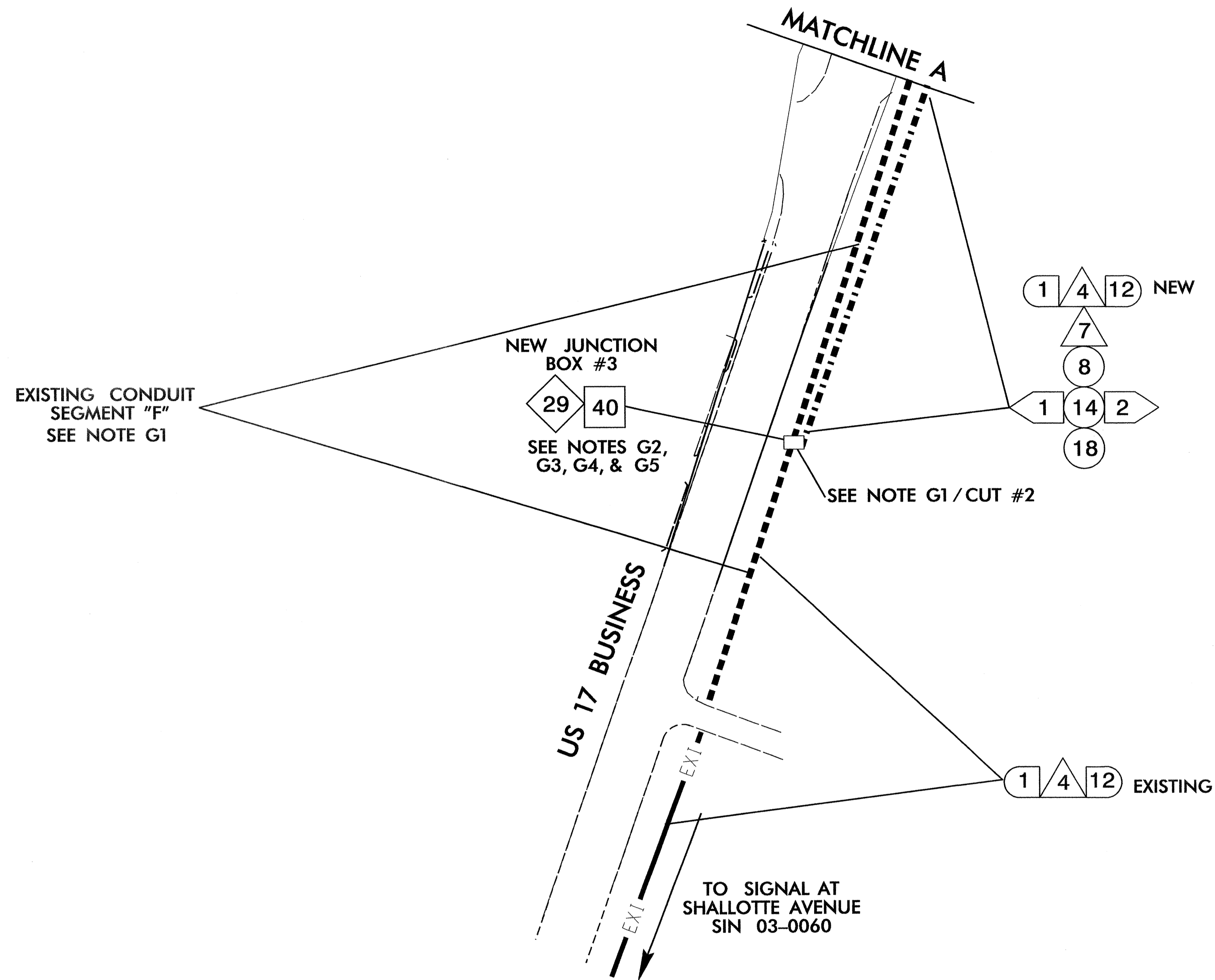
- FO NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST PR NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXI EXISTING COMMUNICATIONS CABLE
- REM EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD NEW DIRECTIONAL DRILLED CONDUIT
- B&J NEW BORED AND JACKED CONDUIT
- 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
- SP 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>		SEAL 
	PLAN DATE: _____ PREPARED BY: _____	REVIEWED BY: _____ REVIEWED BY: <b>G. A. FULLER</b>	
222 N. McDowell St., Raleigh, NC 27603 SCALE: _____ 			SIGNATURE: _____ DATE: 10/31/02 CADD F11800281



**GENERAL NOTES:**

**G1. EXISTING CONDUIT SEGMENT "F":**

LOCATE EXISTING CONDUIT SEGMENT "F" OUTSIDE OF PROJECT CONSTRUCTION BOUNDARY.  
 CUT #1 = LOCATE EXISTING JUNCTION BOX "#4" AND CUT FIBER OPTIC CABLE.  
 CUT #2 = LOCATE CONDUIT AND ONLY CUT CONDUIT. DO NOT CUT FIBER OPTIC CABLE.  
 BACKPULL EXISTING FIBER FROM EXISTING JUNCTION BOX "#4" TO CUT #2 AND INSTALL NEW JUNCTION BOX "#3".

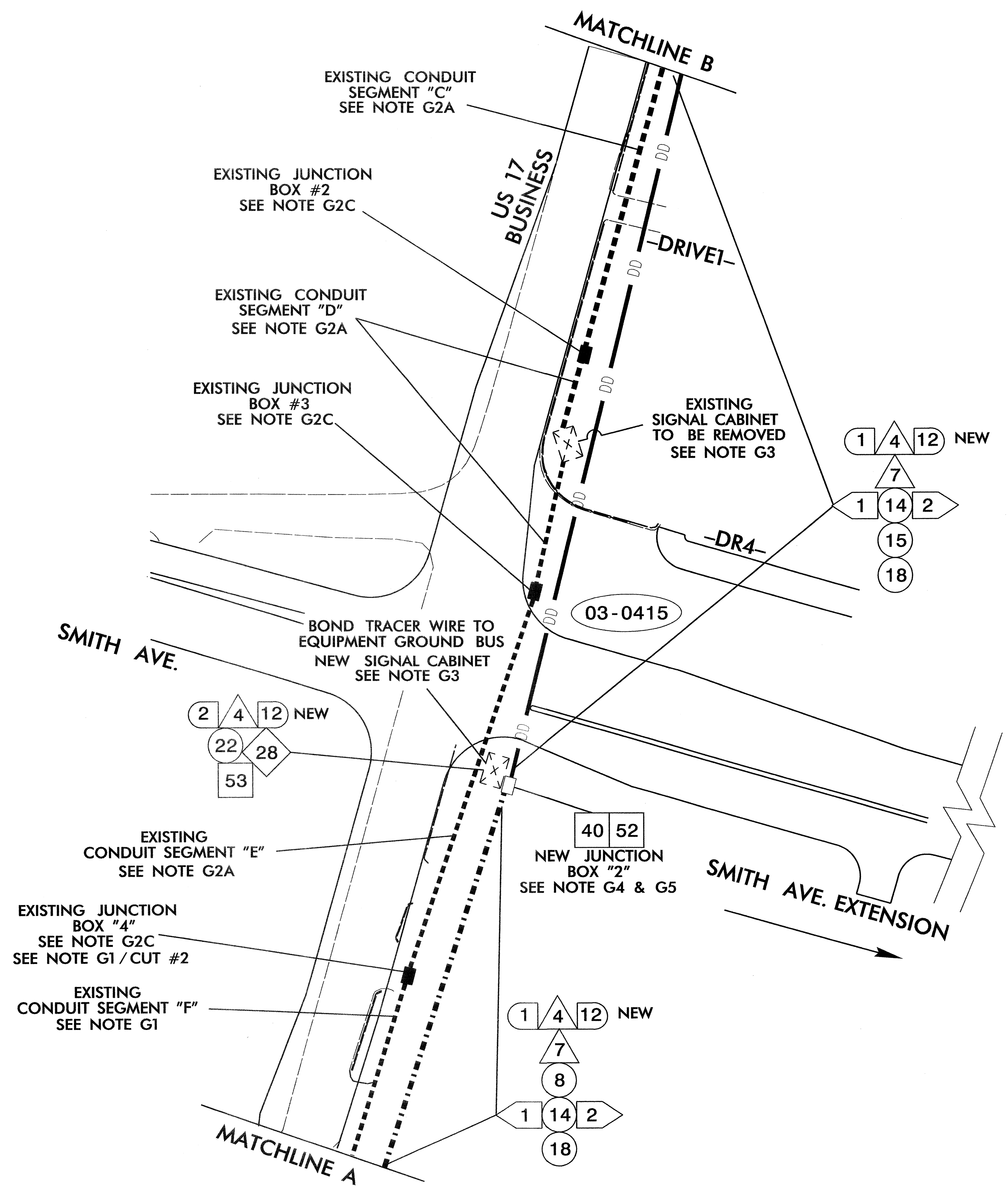
**G2. INSTALL NEW UNDERGROUND SPLICE ENCLOSURE IN NEW JUNCTION BOX "#3" AND FUSION SPLICE NEW 12-FIBER SMFO CABLE**

**G3. SEAL ALL CONDUIT ENTRANCES INTO JUNCTION BOXES WITH MECHANICAL SEALING DEVICES.**

**G4. STORE 60 FT. OF SPARE FIBER OPTIC CABLE.**

**G5. SPLICE TRACER WIRE.**

	<b>COMMUNICATIONS CABLE AND CONDUIT ROUTING ALONG US 17 BUSINESS</b>		
	DIVISION 03    BRUNSWICK CO.    SHALLOTTE PLAN DATE: SEPTEMBER 2008    REVIEWED BY: I. N. AVERY PREPARED BY: H. T. BERGGREN    REVIEWED BY: G. G. MURR, JR., PE		
REVISIONS _____ _____ _____		INIT.    DATE _____ _____ _____	SIGNATURE: <i>G. G. Murr, Jr.</i> DATE: 8-8-08 CADD Filename:



**GENERAL NOTES:**

**G1. EXISTING CONDUIT SEGMENT "F":**  
 LOCATE EXISTING CONDUIT SEGMENT "F" OUTSIDE OF PROJECT CONSTRUCTION BOUNDARY.  
 CUT #1 = LOCATE EXISTING JUNCTION BOX "#4" AND CUT FIBER OPTIC CABLE.  
 CUT #2 = LOCATE CONDUIT AND ONLY CUT CONDUIT. DO NOT CUT FIBER OPTIC CABLE.

BACKPULL EXISTING FIBER FROM EXISTING JUNCTION BOX "#4" TO CUT #2 AND INSTALL NEW JUNCTION BOX "#3".

**G2. ALL EXISTING CABLES LOCATED IN EXISTING CONDUIT SEGMENTS "A", "B", "C", "D", AND "E" ARE TO BE ABANDONED AS PART OF THE PROJECT.**

A) EXISTING CONDUIT SEGMENTS "B", "C", "D", AND "E" ARE TO BE ABANDONED IN PLACE.  
 B) DO NOT ABANDON EXISTING CONDUIT SEGMENT "A"; USE EXISTING CONDUIT FOR NEW FIBER RUN.  
 C) REMOVE "EXISTING JUNCTION BOXES "#1", "#2", "#3", AND "#4" AND BACKFILL WITH APPROVED SUBGRADE MATERIAL.

**G3. RECORD EXISTING SPLICES IN EXISTING SIGNAL CABINET TO BE REMOVED (SIN 03-0415) PRIOR TO DISCONNECTING FIBER OPTIC CABLE. TERMINATE NEW 12-FIBER CABLE IN NEW SIGNAL CABINET ACCORDING TO EXISTING / RECORDED SPLICING.**

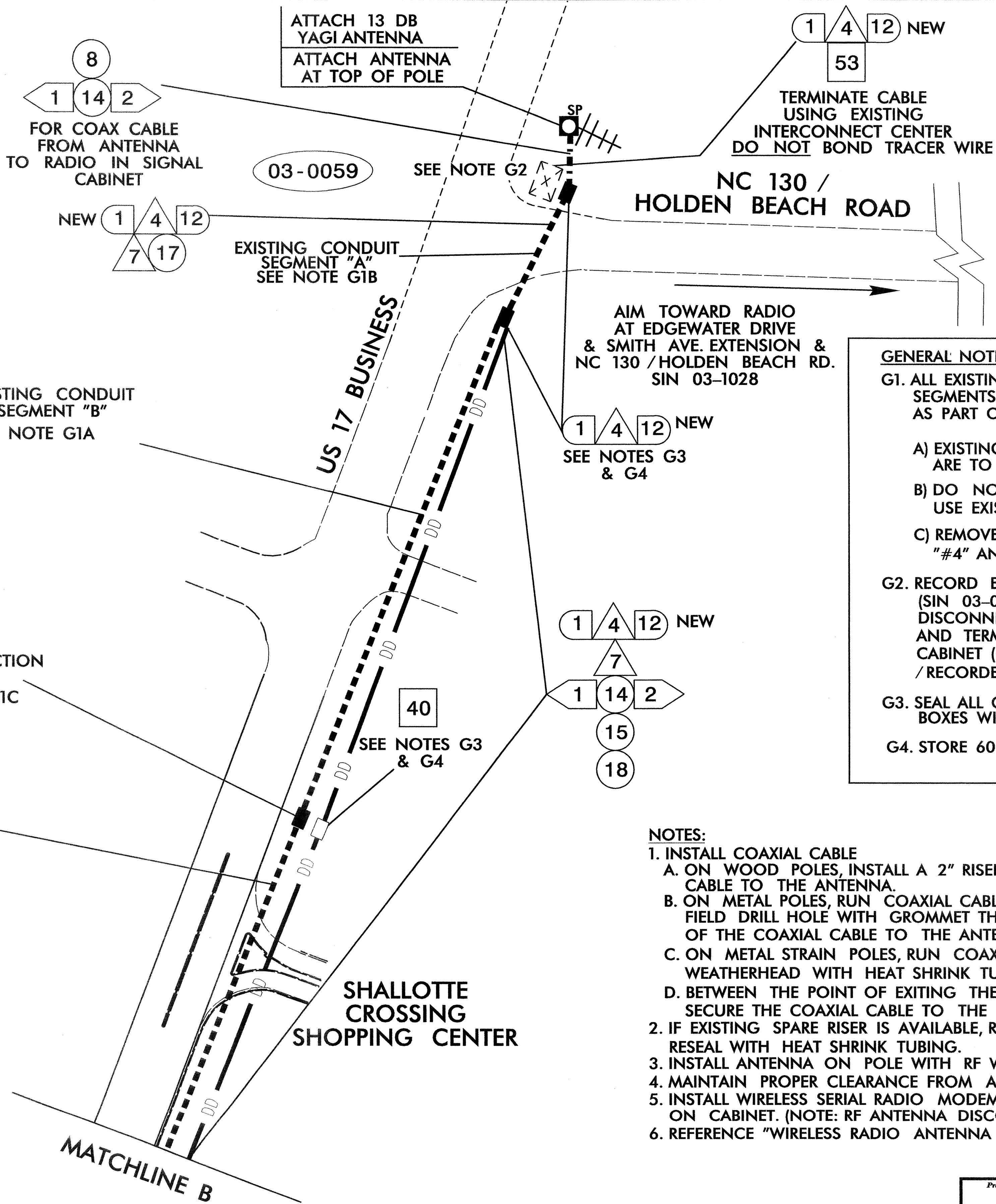
**G4. SEAL ALL CONDUIT ENTRANCES INTO NEW JUNCTION BOXES WITH MECHANICAL SEALING DEVICES.**

**G5. STORE 60 FT. OF SPARE FIBER OPTIC CABLE.**

	<b>WIRELESS PLAN AT US 17 BUS. AND NC 130 / HOLDEN BEACH RD. &amp; COMMUNICATIONS CABLE AND CONDUIT ROUTING ALONG US 17BUS.</b>	
	DIVISION 03 BRUNSWICK CO. SHALLOTTE	PLAN DATE: SEPTEMBER 2008
PREPARED BY: H.T. BERGGREN	REVISIONS	REVIEWED BY: G.G. MURR, JR., PE
SCALE: 0	INIT.	DATE
SIGNATURE: <i>[Signature]</i>	DATE: 9-8-08	

**LEGEND**

- ⚡⚡⚡ YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
- ⚡ YAGI ANTENNA (SINGLE)
- 📡 OMNI ANTENNA
- 📡 EXISTING CONTROLLER AND CABINET
- 📡 EXISTING MASTER CONTROLLER AND CABINET
- ⓧ-XXXX SIGNAL INVENTORY NUMBER
- 📡 NEW METAL POLE W/MAST ARM
- EXISTING WOOD POLE
- ◻ NEW METAL POLE
- SP SIGNAL POLE
- ◻ EXISTING METAL POLE



**GENERAL NOTES:**

G1. ALL EXISTING CABLES LOCATED IN EXISTING CONDUIT SEGMENTS "A", "B", "C", "D" AND "E" ARE TO BE ABANDONED AS PART OF THE PROJECT.

A) EXISTING CONDUIT SEGMENTS "B", "C", "D", AND "E" ARE TO BE ABANDONED IN PLACE.

B) DO NOT ABANDON EXISTING CONDUIT SEGMENT "A"; USE EXISTING CONDUIT FOR NEW FIBER RUN.

C) REMOVE "EXISTING JUNCTION BOXES "#1", "#2", "#3", AND "#4" AND BACKFILL WITH APPROVED SUBGRADE MATERIAL.

G2. RECORD EXISTING SPLICES IN EXISTING SIGNAL CABINET (SIN 03-0059) PRIOR TO DISCONNECTING FIBER OPTIC CABLE. DISCONNECT AND ABANDON EXISTING 12-FIBER CABLE AND TERMINATE NEW 12-FIBER CABLE IN EXISTING SIGNAL CABINET (03-0059). SPLICE ACCORDING TO EXISTING /RECORDED SPLICING.

G3. SEAL ALL CONDUIT ENTRANCES INTO NEW JUNCTION BOXES WITH MECHANICAL SEALING DEVICES.

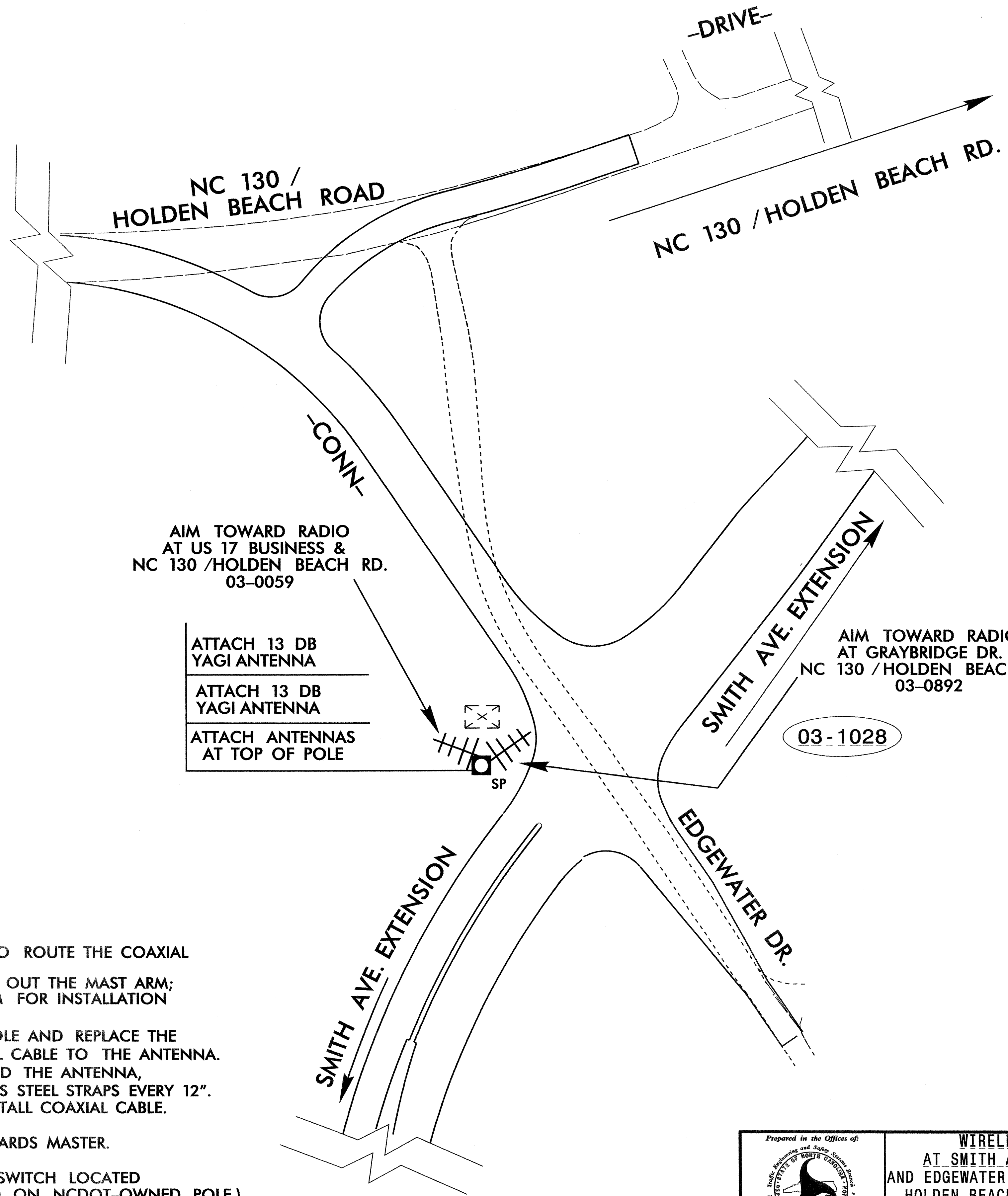
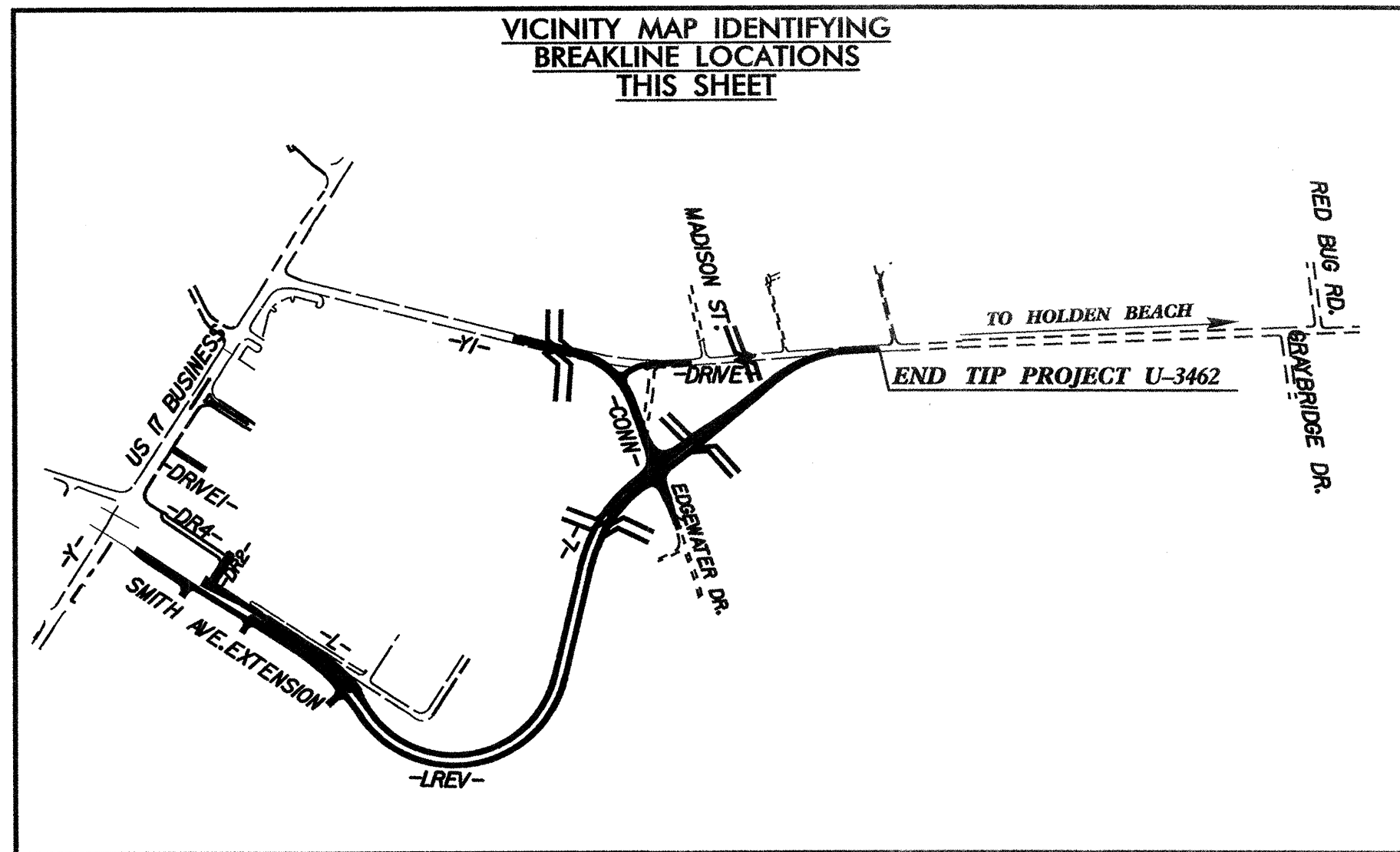
G4. STORE 60 FT. OF SPARE FIBER OPTIC CABLE.

**NOTES:**

1. INSTALL COAXIAL CABLE
  - A. ON WOOD POLES, INSTALL A 2" RISER WITH HEAT SHRINK TUBING TO ROUTE THE COAXIAL CABLE TO THE ANTENNA.
  - B. ON METAL POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL HOLE WITH GROMMET THROUGH BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL CABLE TO THE ANTENNA.
  - C. ON METAL STRAIN POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND REPLACE THE WEATHERHEAD WITH HEAT SHRINK TUBING AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
  - D. BETWEEN THE POINT OF EXITING THE METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
2. IF EXISTING SPARE RISER IS AVAILABLE, REMOVE WEATHERHEAD AND INSTALL COAXIAL CABLE. RESEAL WITH HEAT SHRINK TUBING.
3. INSTALL ANTENNA ON POLE WITH RF WARNING SIGN AND AIM TOWARDS MASTER.
4. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER NESC.
5. INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET. (NOTE: RF ANTENNA DISCONNECT SWITCH NOT REQUIRED ON NCDOT-OWNED POLE.)
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS".

	<b>COMMUNICATIONS CABLE AND CONDUIT ROUTING ALONG US 17 BUSINESS</b>		
	DIVISION 03 PLAN DATE: SEPTEMBER 2008 PREPARED BY: H.T. BERGGREN	BRUNSWICK CO. REVIEWED BY: I. N. AVERY REVIEWED BY: G.G. MURR, JR., PE	
SCALE: 0' = 1"		SIGNATURE: <i>[Signature]</i> DATE: 2/29/08	

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

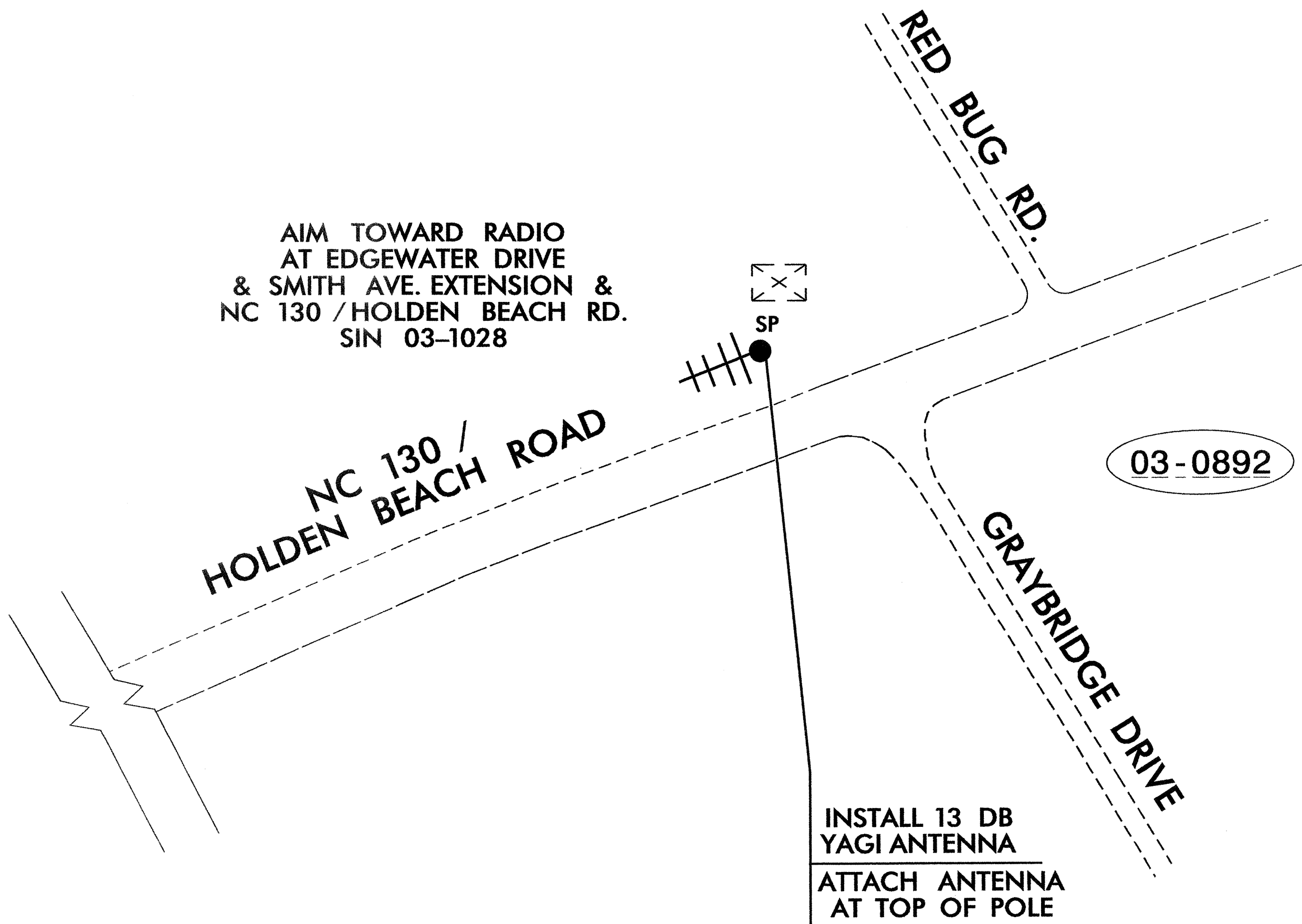


**NOTES:**

1. INSTALL COAXIAL CABLE
  - A. ON WOOD POLES, INSTALL A 2" RISER WITH HEAT SHRINK TUBING TO ROUTE THE COAXIAL CABLE TO THE ANTENNA.
  - B. ON METAL POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL HOLE WITH GROMMET THROUGH BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL CABLE TO THE ANTENNA.
  - C. ON METAL STRAIN POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND REPLACE THE WEATHERHEAD WITH HEAT SHRINK TUBING AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
  - D. BETWEEN THE POINT OF EXITING THE METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
2. IF EXISTING SPARE RISER IS AVAILABLE, REMOVE WEATHERHEAD AND INSTALL COAXIAL CABLE. RESEAL WITH HEAT SHRINK TUBING.
3. INSTALL ANTENNA ON POLE WITH RF WARNING SIGN AND AIM TOWARDS MASTER.
4. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER NESC.
5. INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET. (NOTE: RF ANTENNA DISCONNECT SWITCH NOT REQUIRED ON NCDOT-OWNED POLE.)
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS".

	<b>WIRELESS SYSTEM</b> <b>AT SMITH AVE. EXTENSION</b> <b>AND EDGEWATER DRIVE AND NC 130 /</b> <b>HOLDEN BEACH ROAD CONNECTOR</b>		
	PLAN DATE: SEPTEMBER 2008 PREPARED BY: H.T. BERGGREN	DIVISION 03 BRUNSWICK CO., SHALLOTTE REVIEWED BY: I. N. AVERY REVIEWED BY: G.G. MURR, JR., PE	

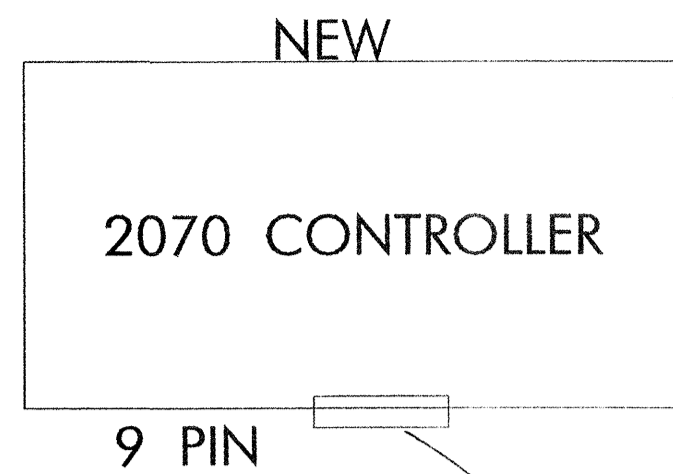
LEGEND	
⦚⦚⦚	YAGI ANTENNA (DOUBLE) FOR REPEATOR OPERATION
⦚⦚	YAGI ANTENNA (SINGLE)
⦚	OMNI ANTENNA
⦚	EXISTING CONTROLLER AND CABINET
⦚	EXISTING MASTER CONTROLLER AND CABINET
⦚	SIGNAL INVENTORY NUMBER
⦚	NEW METAL POLE W/MAST ARM
●	EXISTING WOOD POLE
⦚	NEW METAL POLE
SP	SIGNAL POLE
⦚	EXISTING METAL POLE



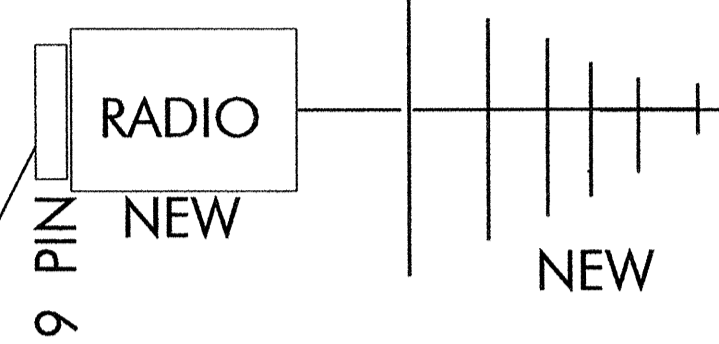
**NOTES:**

1. INSTALL COAXIAL CABLE
  - A. ON WOOD POLES, INSTALL A 2" RISER WITH HEAT SHRINK TUBING TO ROUTE THE COAXIAL CABLE TO THE ANTENNA.
  - B. ON METAL POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL HOLE WITH GROMMET THROUGH BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL CABLE TO THE ANTENNA.
  - C. ON METAL STRAIN POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND REPLACE THE WEATHERHEAD WITH HEAT SHRINK TUBING AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
  - D. BETWEEN THE POINT OF EXITING THE METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
2. IF EXISTING SPARE RISER IS AVAILABLE, REMOVE WEATHERHEAD AND INSTALL COAXIAL CABLE. RESEAL WITH HEAT SHRINK TUBING.
3. INSTALL ANTENNA ON POLE WITH RF WARNING SIGN AND AIM TOWARDS MASTER.
4. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER NESC.
5. INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET. (NOTE: RF ANTENNA DISCONNECT SWITCH NOT REQUIRED ON NCDOT-OWNED POLE.)
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS".

	<b>WIRELESS SYSTEM AT HOLDEN BEACH RD. AND GRAYBRIDGE DR.</b>	
	DIVISION 03 BRUNSWICK CO. SHALLOTTE	
PLAN DATE: SEPTEMBER 2008 PREPARED BY: H.T. BERGGREN	REVIEWED BY: I. N. AVERY REVIEWED BY: G.G. MURR, JR., PE	SCALE: 0 
REVISIONS _____ _____	INIT. DATE _____ _____	SIGNATURE: <i>[Signature]</i> 9-8-08 DATE



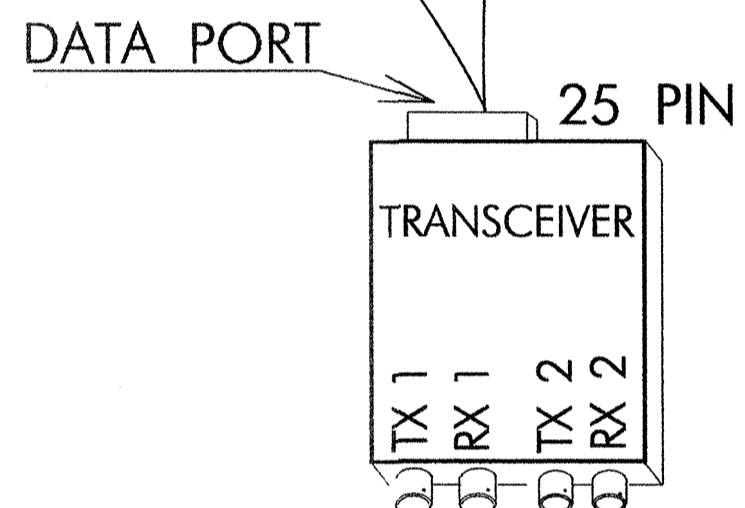
INSTALL NEW RADIO AND 13 dB YAGI ANTENNA AT EXISTING CABINET AT US 17 BUSINESS AND NC 130 / HOLDEN BEACH RD. (SEE WIRELESS PLAN)



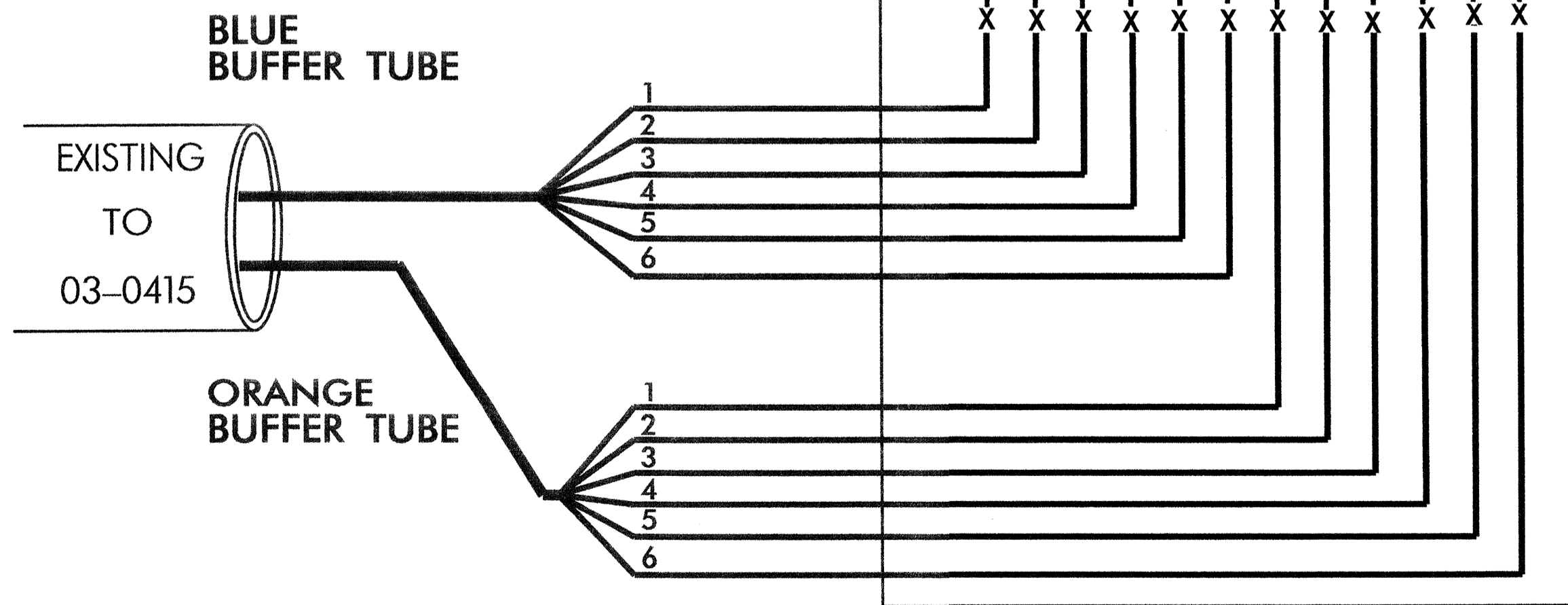
EXISTING IN SHALLOTTE CLS SYSTEM  
US 17 BUSINESS AT NC 130 / HOLDEN BEACH RD.  
SIG. INV. # 03-0059

ENCOM CABLE (PART # CB-142)

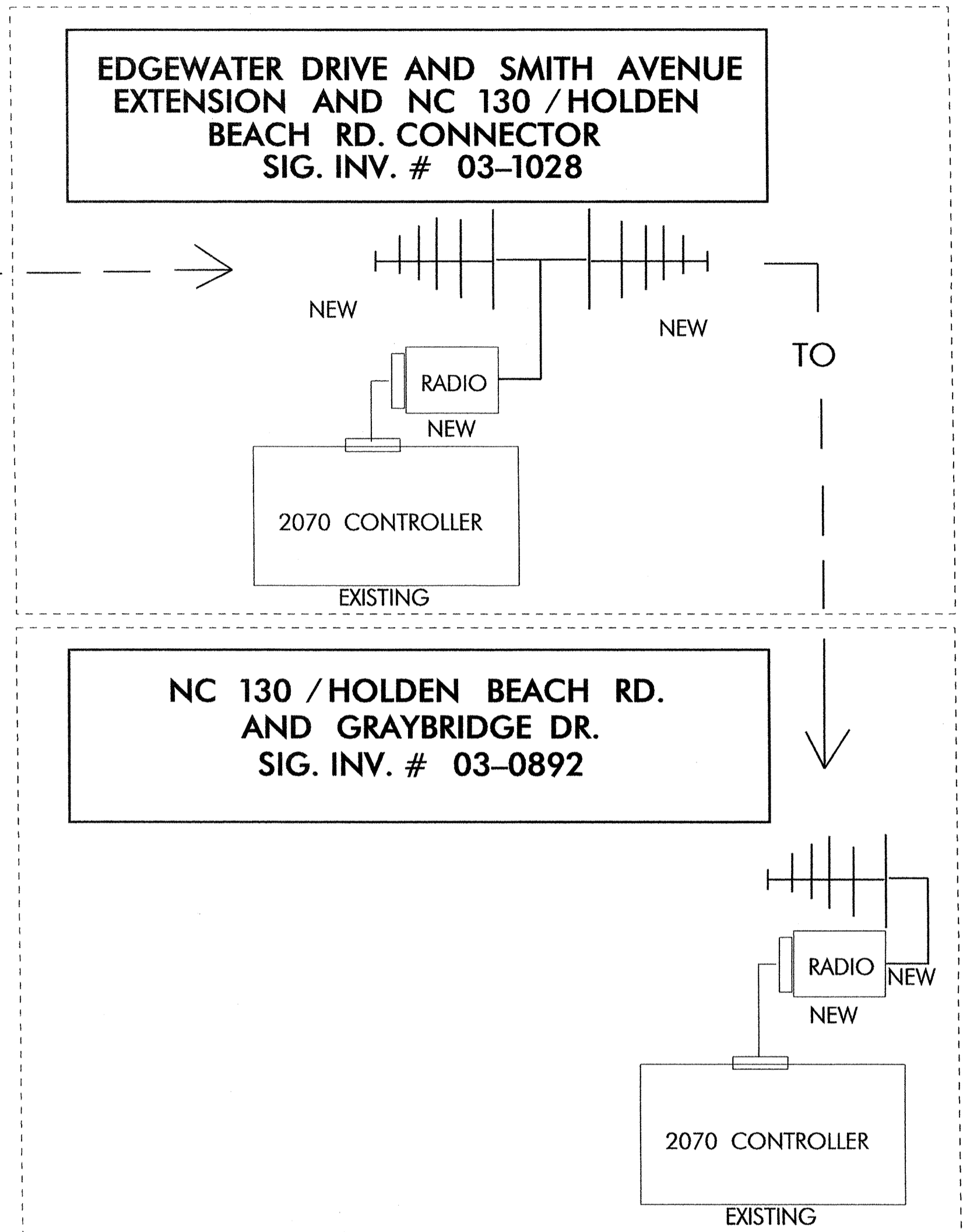
NEW



EXISTING PATCH PANEL WITH ST CONNECTORS



SEE NOTE 1



Notes:

Unused fibers left coiled and stored in splice tray.

Unused Buffer Tubes left coiled and stored in splice tray.

COLOR CODE  
TIA /EIA 598-A

- (1) BLUE
- (2) ORANGE
- (3) GREEN
- (4) BROWN
- (5) SLATE
- (6) WHITE

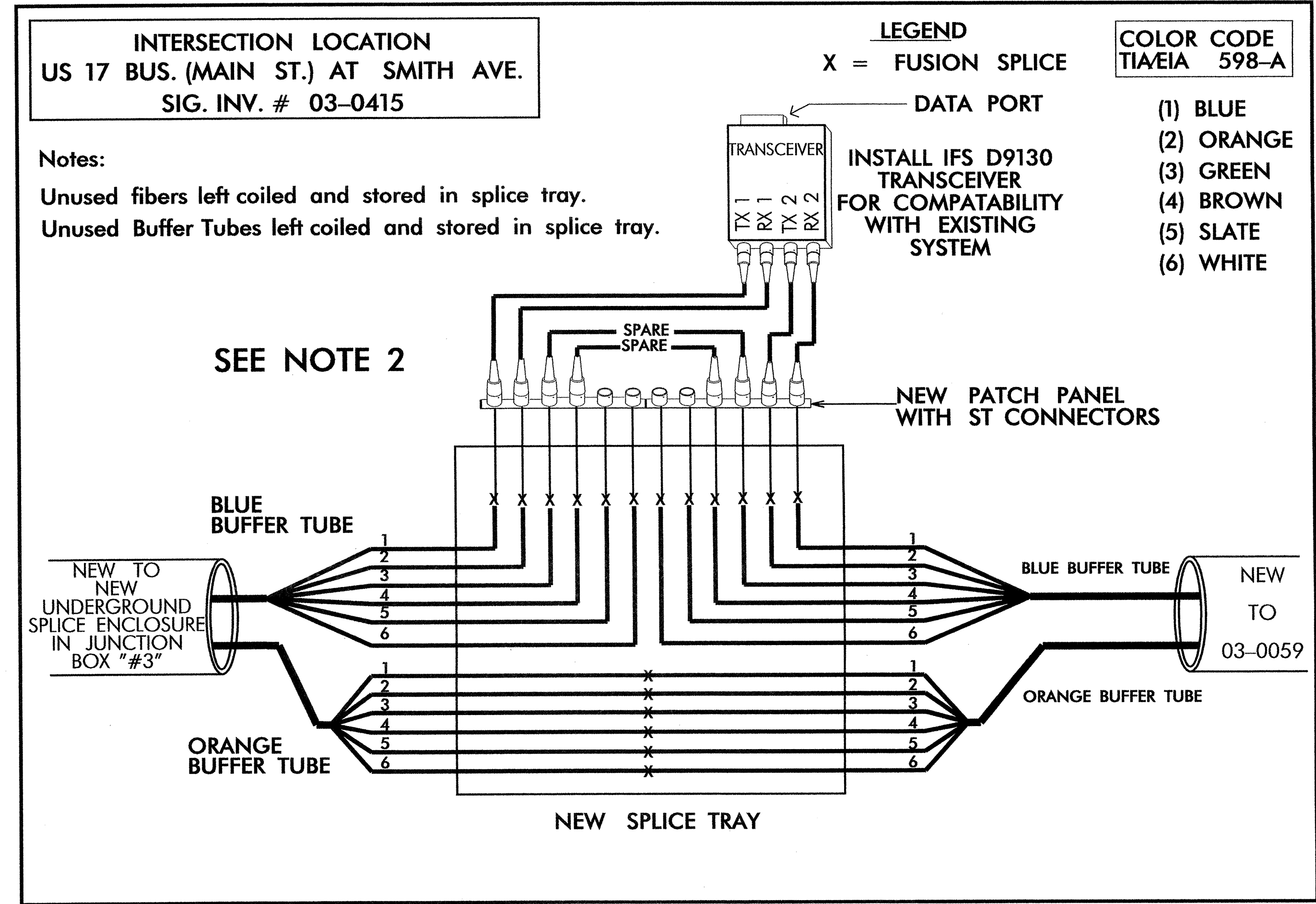
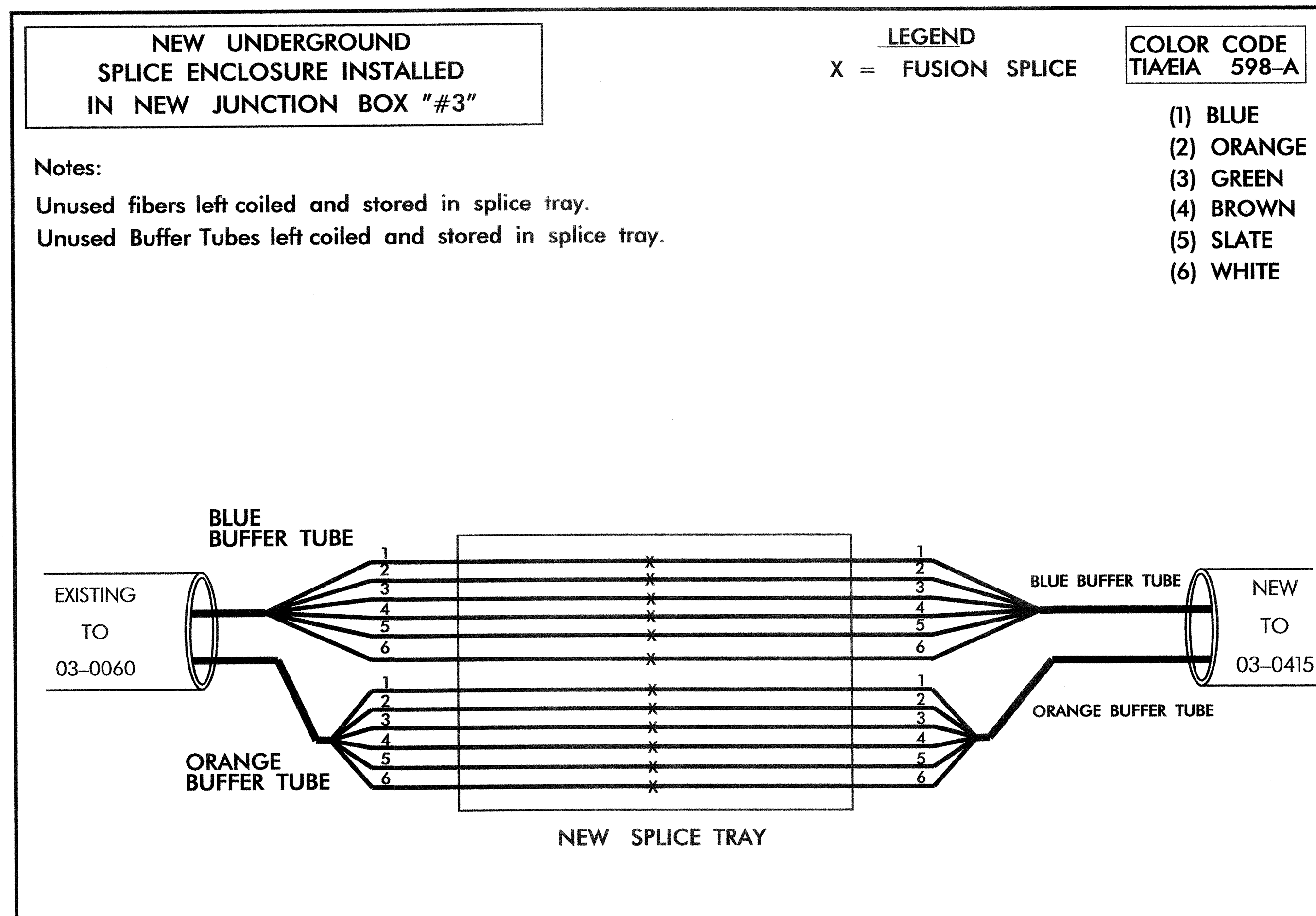
NOTE:

1. RECORD EXISTING SPLICES IN EXISTING SIGNAL CABINET (SIN 03-0059) PRIOR TO DISCONNECTING FIBER OPTIC CABLE. DISCONNECT AND ABANDON EXISTING 12-FIBER CABLE AND SPLICE IN NEW 12-FIBER CABLE IN EXISTING SIGNAL CABINET (03-0059). SPLICE ACCORDING TO EXISTING / RECORDED SPLICING.

	<b>WIRELESS COMMUNICATION PLANS</b> NC 130 / HOLDEN BEACH RD.		SEAL G. MURR, JR. PROFESSIONAL ENGINEER STATE OF NORTH CAROLINA LICENSE NO. 14543
	DIVISION 03 PLAN DATE: SEPTEMBER 2008 PREPARED BY: H. T. BERGGREN	BRUNSWICK REVIEWED BY: I. N. AVERY REVIEWED BY: G. G. MURR, JR., PE	



# FIBER OPTIC CABLE



**NOTES**

1. TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING /ENSURING THE PROPER TERMINATIONS.
2. RECORD EXISTING SPLICES IN EXISTING SIGNAL CABINET TO BE REMOVED (SIN 03-0415) PRIOR TO DISCONNECTING FIBER OPTIC CABLE. TERMINATE NEW 12-FIBER CABLE IN NEW SIGNAL CABINET (AT SIN 03-0415) ACCORDING TO EXISTING /RECORDED SPLICES.

<p style="font-size: small;">Prepared in the Offices of:</p> <p style="font-size: x-small;">122 N. McDowell St., Raleigh, NC 27603</p>	<p><b>SPLICE PLAN</b></p> <p>DIVISION 03 BRUNSWICK CO. SHALLOTTE</p> <p>PLAN DATE: SEPTEMBER 2008 REVIEWED BY: I. N. AVERY</p> <p>PREPARED BY: H.T. BERGGREN REVIEWED BY: G.G. MURR, JR., PE</p>	<p>SEAL</p>									
<p>SCALE</p> <p>0</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <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> </tbody> </table>	REVISIONS	INIT.	DATE							<p>SIGNATURE: <i>G.G. Murr, Jr.</i> DATE: 9-8-08</p> <p style="font-size: x-small;">CADD File Name:</p>
REVISIONS	INIT.	DATE									

# DECAL

# POLE MOUNTED SIGN

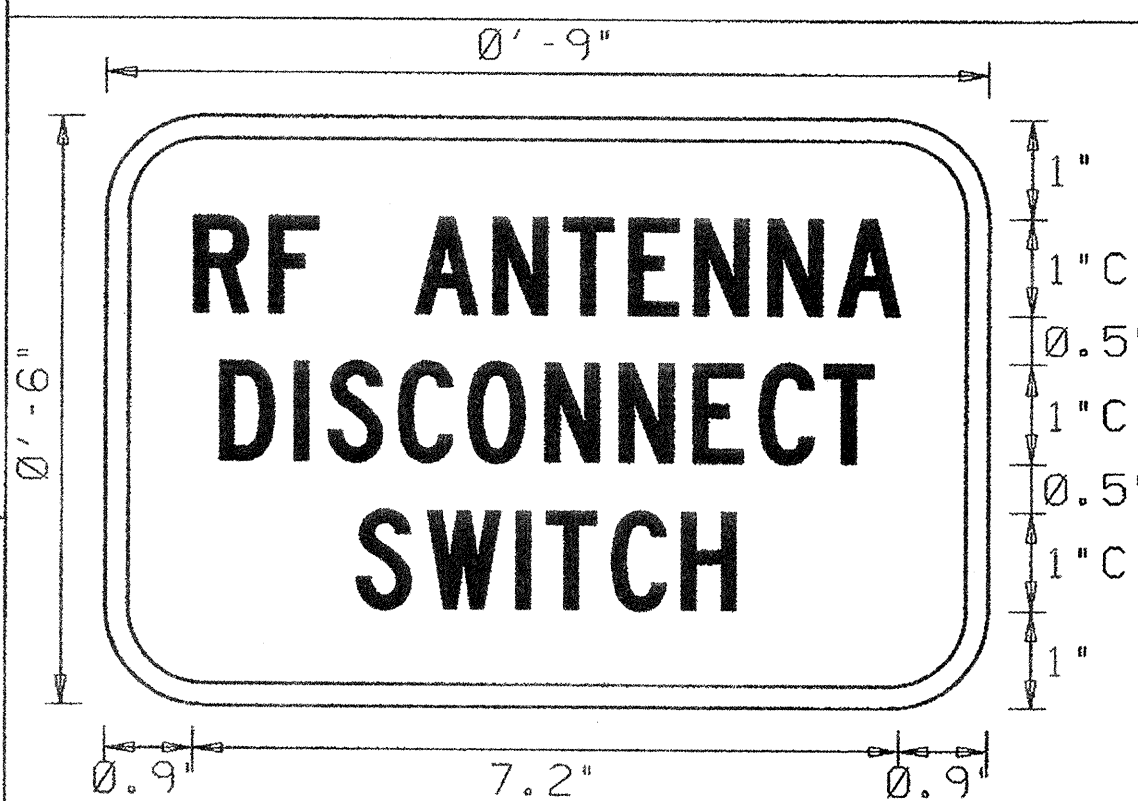
SIGN NUMBER: SPO5224  
 TYPE: DECAL  
 QUANTITY:  
 SIGN WIDTH: 0'-9"  
 HEIGHT: 0'-6"  
 TOTAL AREA: 0.4 Sq.Ft.  
 BORDER TYPE: FLUSH  
 RECESS: 0"  
 WIDTH: 0.25"  
 RADII: 1"  
 NO. Z BARS:  
 LENGTH:

BACKG COLOR: Yellow  
 COPY COLOR: Black

SYMBOL	X	Y	WID	HT

MAT'L: 0.063" (1.6 mm) ALUMINUM

DESIGN BY: S PIOTROWSKI DATE: Jul 18, 2005 CHECKED BY: SUSAN B. KUNZ  
 PROJECT ID: ID DIV: INTELLIGENT TRANSPORTATION SYSTEM



NOTE:  
 THIS  
 SIGN  
 SHALL  
 BE  
 PRODUCED  
 AS  
 A  
 DECAL

BORDER  
 R=1"  
 TH=0.25"

- USE NOTES: 2, 4
1. Legend and border shall be direct applied Type III reflective sheeting.
  2. Legend and border shall be direct applied non-reflective sheeting.
  3. Shields shall be Type III reflective sheeting on 0.032" (0.8mm) aluminum and demountable.
  4. Background shall be Type III reflective sheeting.
  5. Background shall be Type I reflective sheeting.
  6. Center arrow(s) vertically on sign.
  7. Bottom panel shall be yellow Type III sheeting. Legend shall be direct applied black non-reflective sheeting. Yellow panel is:

LETTER POSITIONS

Letter spacings are to start of next letter											Series/Size	
											Text Length	
0.9	0.8	0.5	1	0.8	0.7	0.7	0.7	0.8	0.7	0.6	0.9	C1
												7.2
1.2	0.8	0.3	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.5	1.2	C1
												6.7
2.6	0.7	0.9	0.3	0.7	0.7	0.5	2.6					C1
												3.9

Spacing Factor is 1 unless specified otherwise

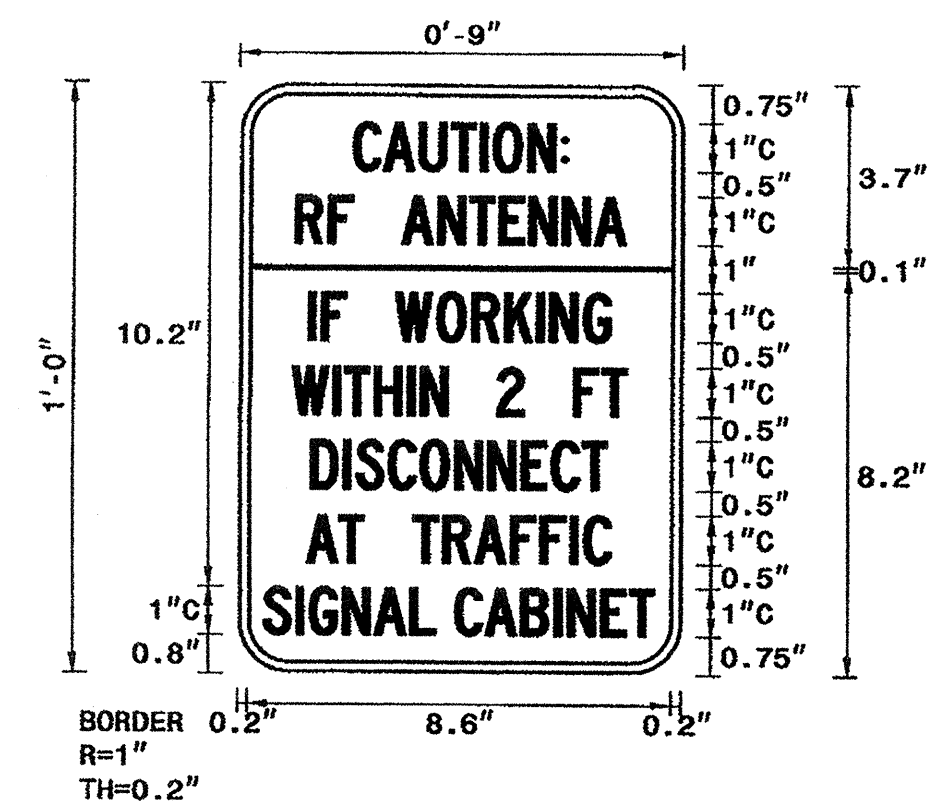
SIGN NUMBER: SPO5223  
 TYPE: D  
 QUANTITY:  
 SIGN WIDTH: 0'-9"  
 HEIGHT: 1'-0"  
 TOTAL AREA: 0.8 Sq.Ft.  
 BORDER TYPE: FLUSH  
 RECESS: 0"  
 WIDTH: 0.2"  
 RADII: 1"  
 NO. Z BARS:  
 LENGTH:

BACKG COLOR: Yellow  
 COPY COLOR: Black

SYMBOL	X	Y	WID	HT
BAR	0.2	8.2	8.6	1.0

MAT'L: 0.063" (1.6 mm) ALUMINUM

DESIGN BY: M. TRACEY DATE: Oct 25, 2007 CHECKED BY: SUSAN KUNZ  
 PROJECT ID: DIV: INTELLIGENT TRANSPORTATION SYSTEMS



0.60 SPACING FACTOR

- USE NOTES: 2, 4
1. Legend and border shall be direct applied Type III reflective sheeting.
  2. Legend and border shall be direct applied non-reflective sheeting.
  3. Shields shall be Type III reflective sheeting on 0.032" (0.8mm) aluminum and demountable.
  4. Background shall be Type III reflective sheeting.
  5. Background shall be Type I reflective sheeting.
  6. Center arrow(s) vertically on sign.
  7. Bottom panel shall be yellow Type III sheeting. Legend shall be direct applied black non-reflective sheeting. Yellow panel is:

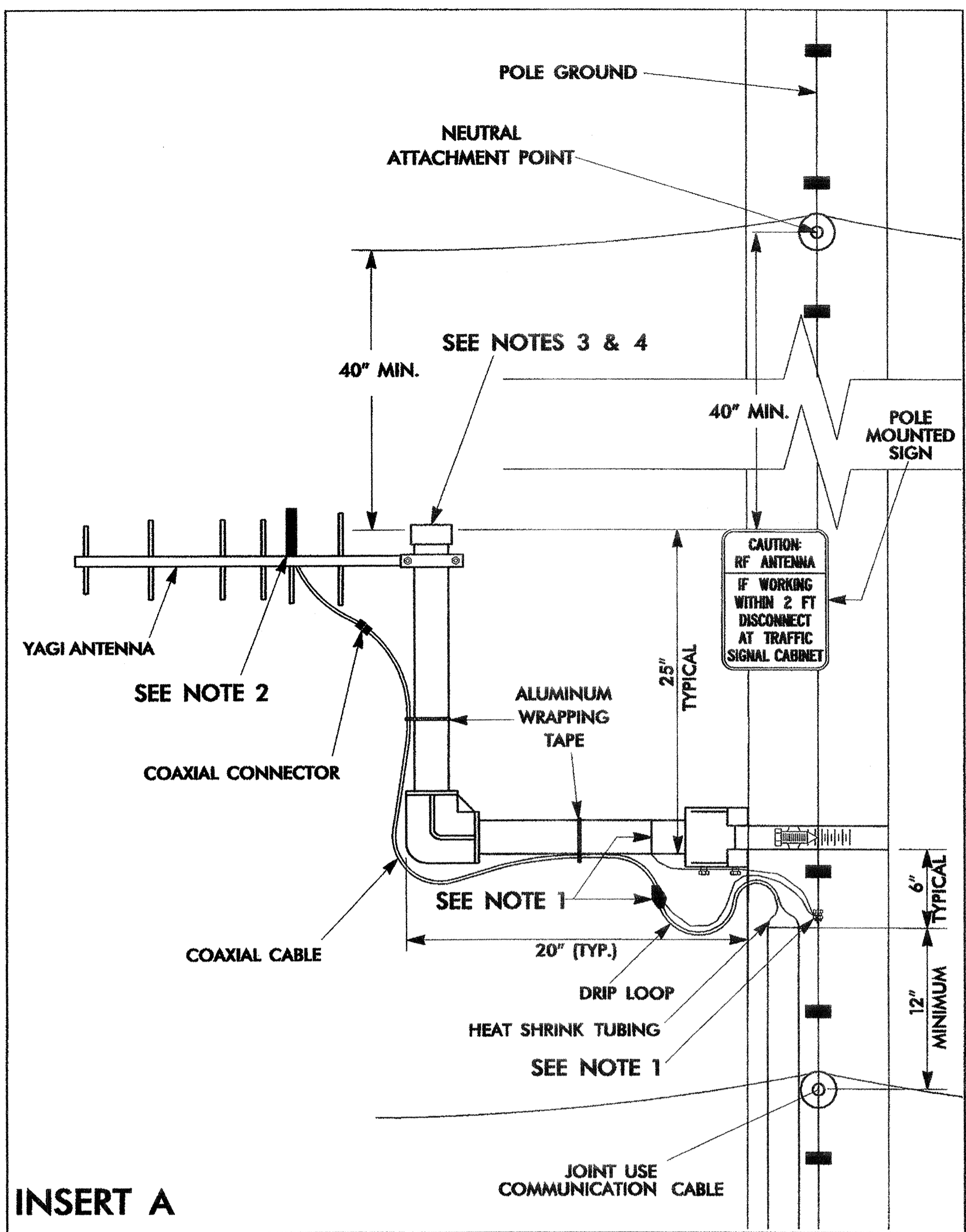
LETTER POSITIONS

Letter spacings are to start of next letter											Series/Size					
											Text Length					
2.3	0.6	0.7	0.6	0.6	0.3	0.7	0.7	0.1	2.3			C				
												4.4				
1.2	0.7	0.5	1	0.7	0.6	0.6	0.6	0.7	0.6	0.6	1.2	C				
												6.7				
1.4	0.3	0.5	1	0.8	0.7	0.7	0.6	0.3	0.7	0.5	1.4	C				
												6.1				
1.1	0.8	0.2	0.6	0.7	0.3	0.5	1	0.5	1	0.6	0.5	1.1	C			
													6.8			
1.5	0.7	0.3	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.5	1.5	C				
													6			
1.4	0.7	0.5	1	0.6	0.6	0.7	0.6	0.6	0.3	0.5	1.4	C				
													6.2			
0.5	0.7	0.3	0.7	0.6	0.7	0.5	0.4	0.6	0.7	0.7	0.3	0.7	0.6	0.5	0.5	C
																7.9

Spacing Factor is 1 unless specified otherwise

NORTH CAROLINA D.O.T. SIGN DETAIL

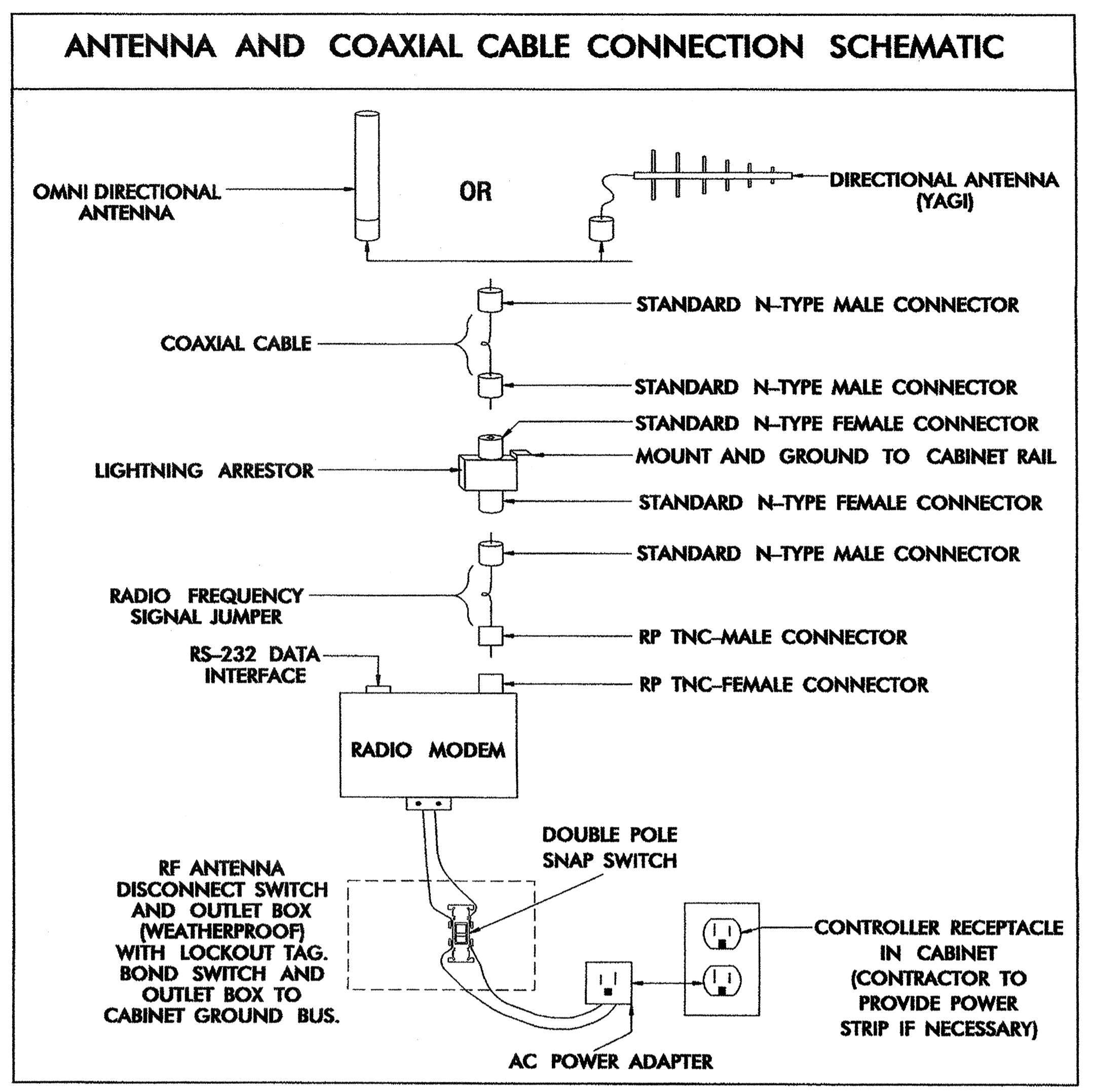
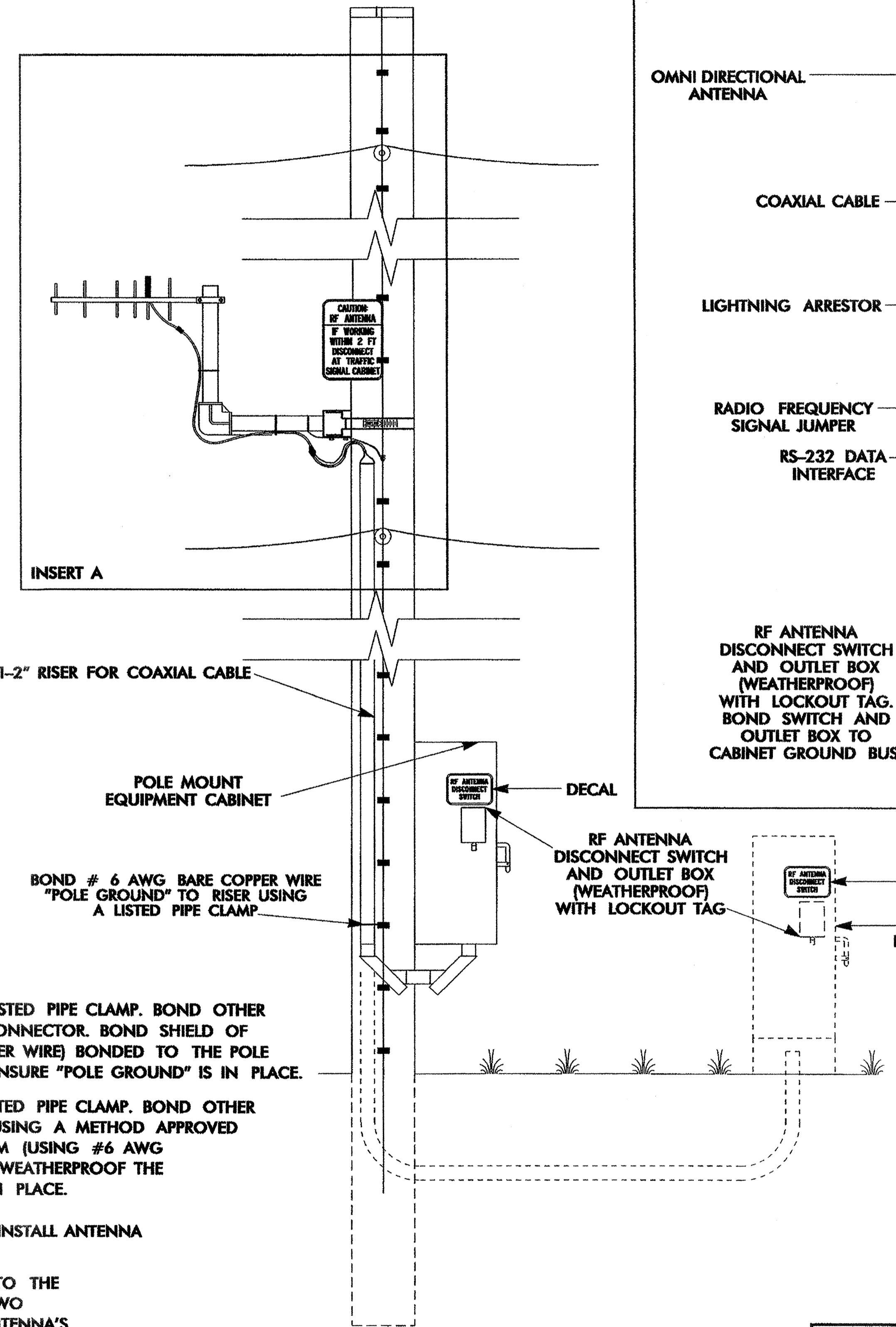
	<b>WIRELESS                  RADIO ANTENNA                  TYPICAL DETAILS</b>		SEAL 
	PLAN DATE: JULY 2005 PREPARED BY: A. CREECH	REVIEWED BY: I. N. AVERY REVIEWED BY: A. T. FAULKNER	
SCALE 	SIGNATURE: <i>Kregory A. Faulkner</i> 9/12/05 DATE		SEAL



INSERT A

NOTES

- WOOD POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE GROUND USING A SPLIT BOLT CONNECTOR. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED COPPER WIRE) BONDED TO THE POLE GROUND. WEATHERPROOF THE CONNECTION ONCE THE GROUNDING SYSTEM IS INSTALLED. ENSURE "POLE GROUND" IS IN PLACE.  
  
METAL POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE OR EXISTING SYSTEM GROUND USING A METHOD APPROVED BY THE ENGINEER. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED COPPER WIRE) BONDED TO THE POLE BY A METHOD APPROVED BY THE ENGINEER. WEATHERPROOF THE CONNECTION ONCE THE GROUNDING SYSTEM IS INSTALLED. ENSURE "SYSTEM GROUND" IS IN PLACE.
- YAGI ANTENNA SHOWN IN VERTICAL POLARIZATION POSITION FOR CLARIFICATION. TYPICALLY INSTALL ANTENNA IN HORIZONTAL POLARIZATION POSITION.
- TO CONSERVE VERTICAL SPACING ON THE POLE (JOINT-USE OR SIGNAL POLE) WITH REGARDS TO THE SURROUNDING UTILITIES, INSTALL THE ANTENNA MOUNTING HARDWARE USING ONE OF THE TWO METHODS LISTED BELOW: (ENSURE THAT THE MOUNTING METHOD DOES NOT DEGRADE THE ANTENNA'S SIGNAL INTEGRITY)
  - ROTATE THE VERTICAL SUPPORT ARM 90 DEGREES SUCH THAT THE ANTENNA IS AT THE SAME HEIGHT AS THE HORIZONTAL SUPPORT ARM.
  - ELIMINATE THE VERTICAL SUPPORT ARM AND MOUNT THE ANTENNA TO THE HORIZONTAL SUPPORT ARM.
  - ANTENNA, ANTENNA SUPPORT ARM, AND SIGN TO MAINTAIN A 40" SEPARATION FROM NEUTRAL /POWER AND 12" FROM OTHER UTILITIES.
- INSTALL AN END CAP TO SEAL THE EXPOSED END OF THE MOUNTING PIPE.



<p>Prepared in the Office of:</p> <p>122 N. McDowell St., Raleigh, NC 27603</p>	<p><b>WIRELESS RADIO ANTENNA TYPICAL DETAILS</b></p>		<p>SEAL</p>
	<p>PLAN DATE: JULY 2005</p> <p>PREPARED BY: A. CREECH</p>	<p>REVIEWED BY: I. N. AVERY</p> <p>REVIEWED BY: A. T. FAULKNER</p>	
<p>REVISIONS</p> <p>UPDATE GROUNDING - COAXIAL CABLE SHIELD</p>		<p>INITIALS: [Signature]</p> <p>DATE: 9/12/05</p>	<p>CADD File No:</p>

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DIVISION OF HIGHWAYS  
RALEIGH, N.C.

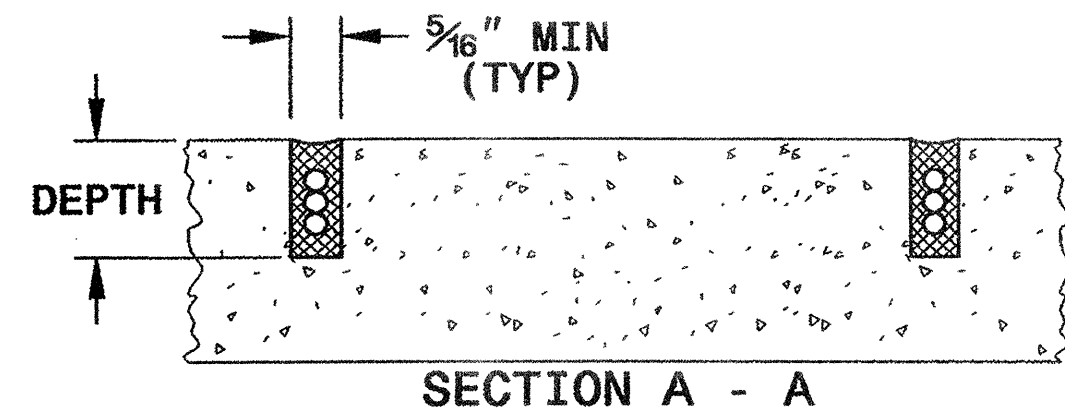
5-07

ENGLISH DETAIL DRAWING FOR  
INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3  
**1725D01**

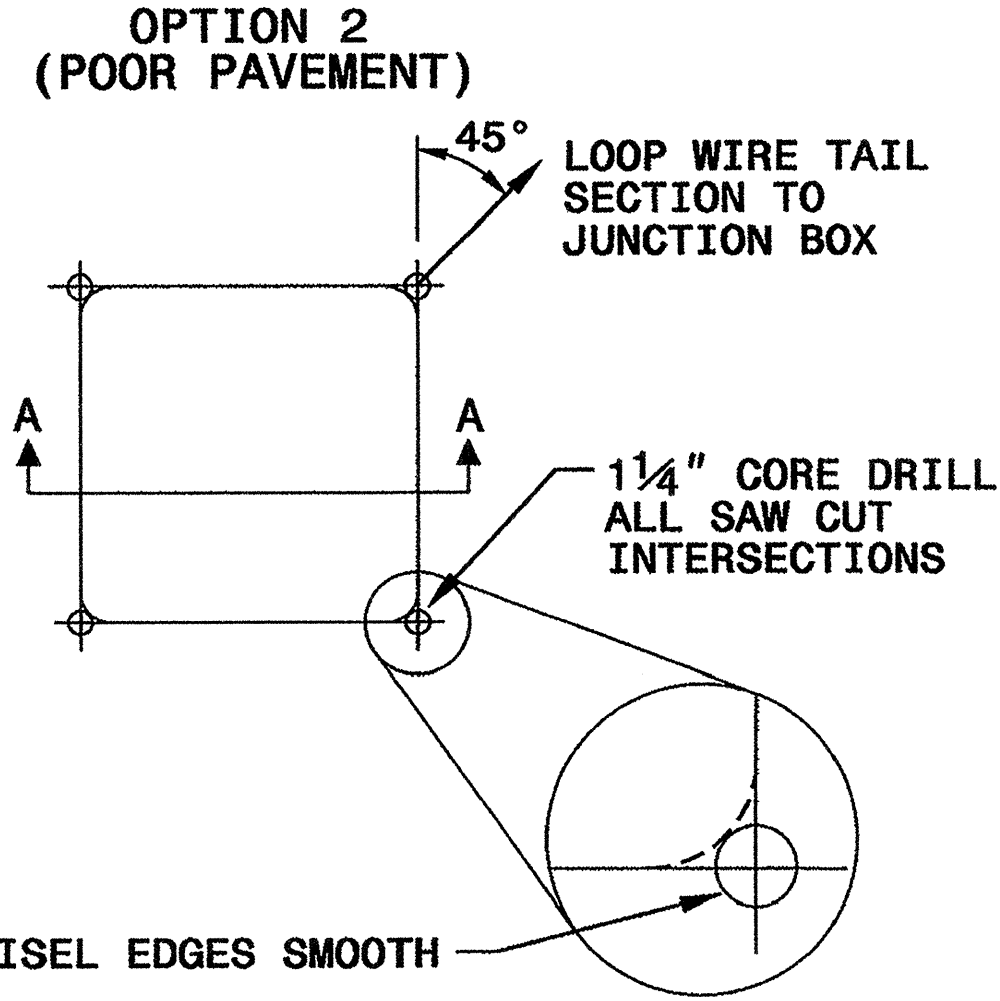
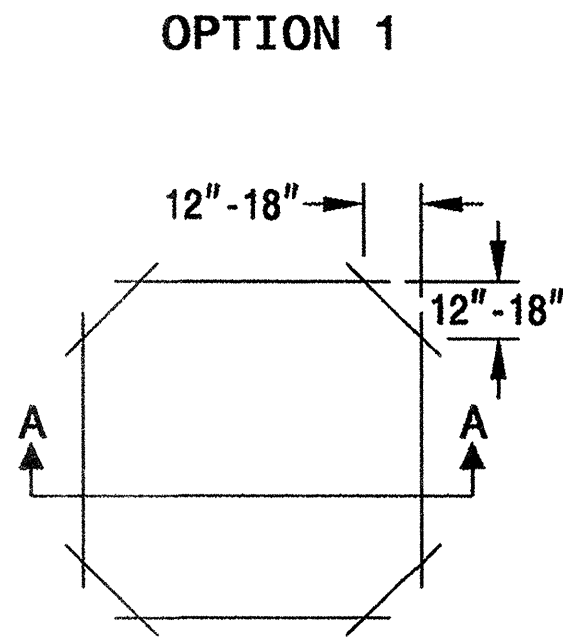
**SAW SLOT DEPTH CHART**

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

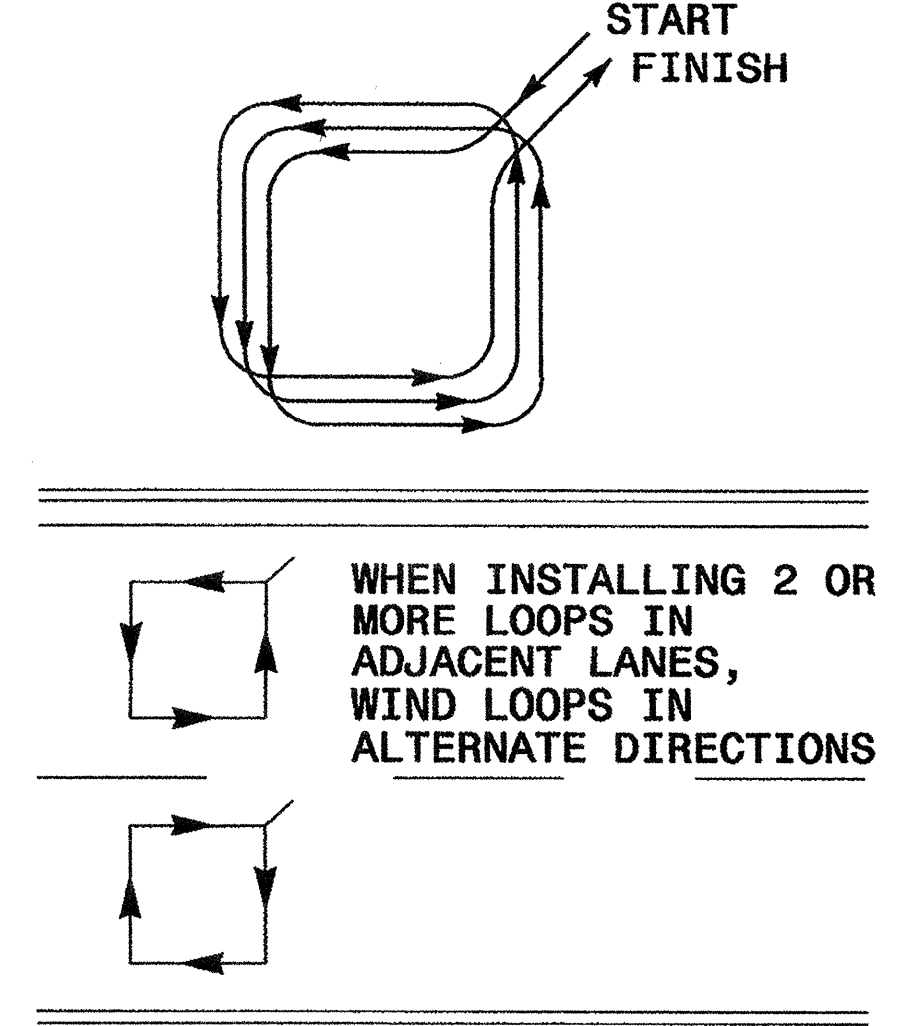


**CONVENTIONAL 4-SIDED LOOP**

**SAW CUT OPTIONS**



**LOOP WINDING METHOD**



**LOOP WIRE TWISTING METHOD**

INCORRECT WAY TO TWIST WIRE



CORRECT WAY TO TWIST WIRE

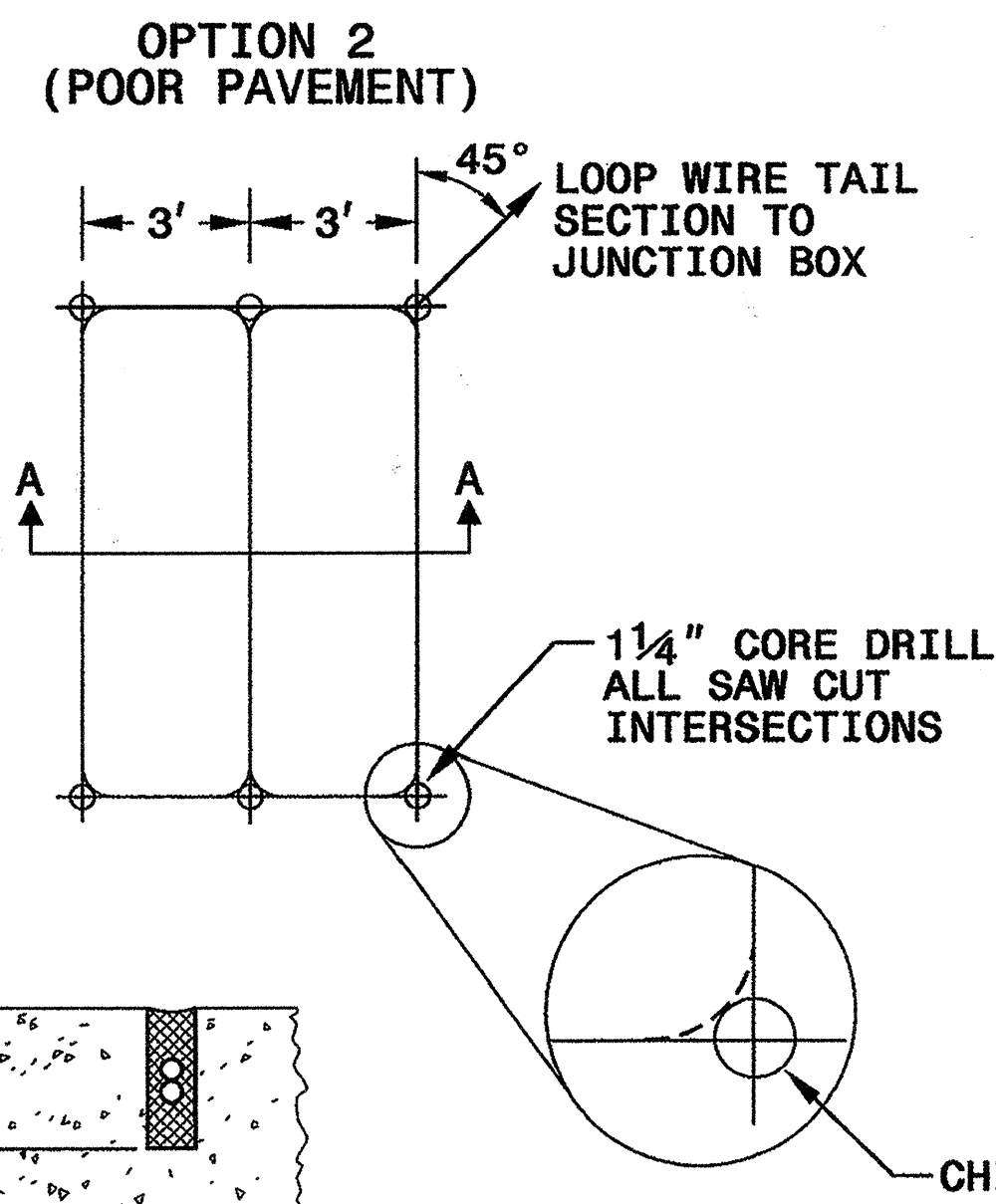
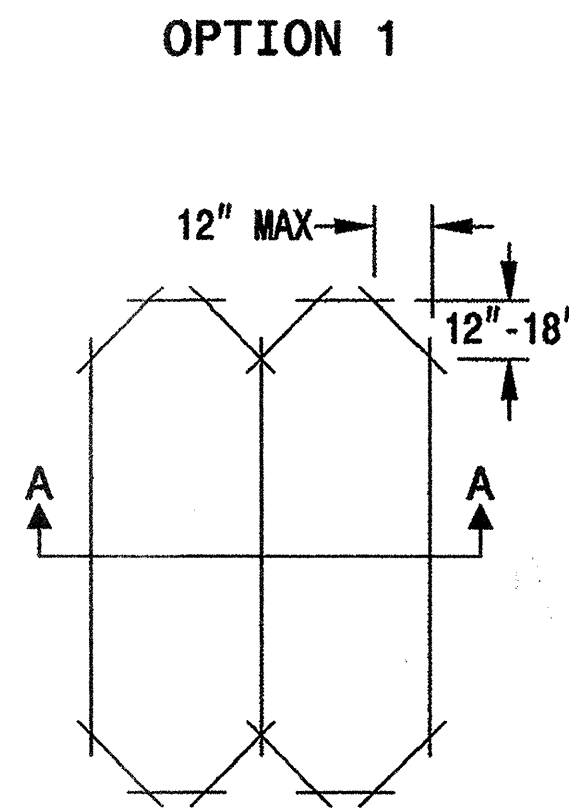


**NOTES**

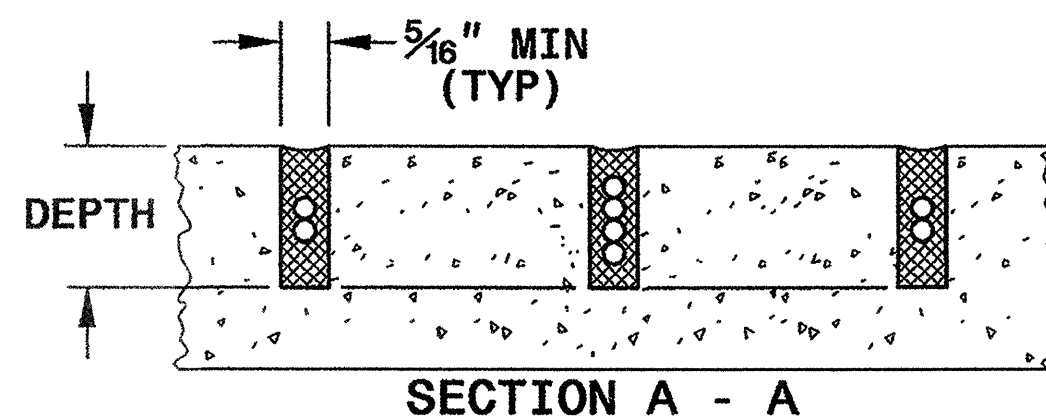
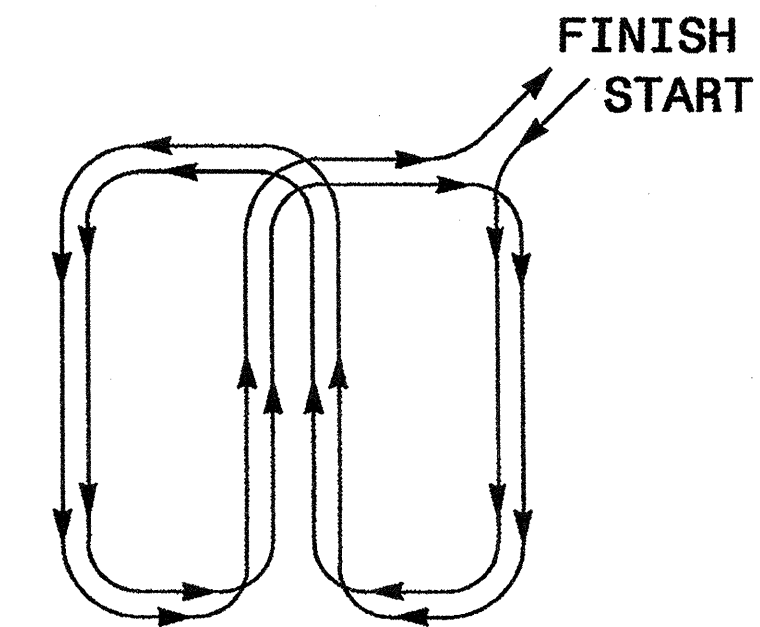
1. OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
2. MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
3. WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
4. LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

**QUADRUPOLE LOOP**

**SAW CUT OPTIONS**



**LOOP WINDING METHOD**



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

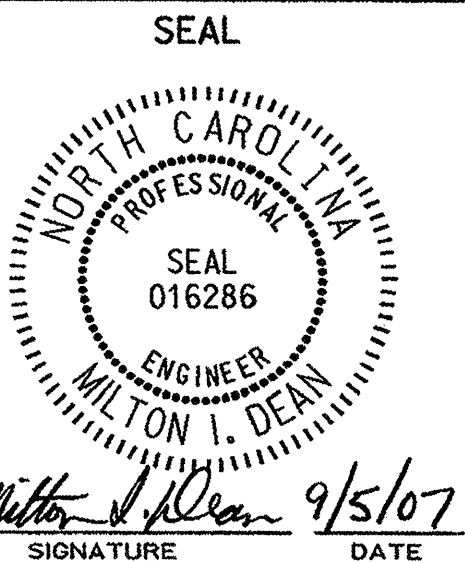
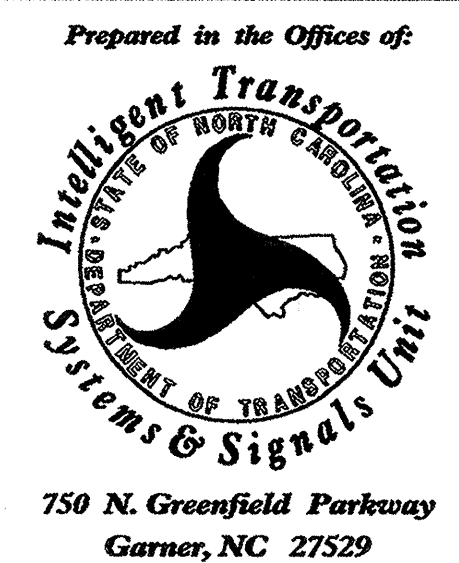
STATE OF NORTH CAROLINA  
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DIVISION OF HIGHWAYS  
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5-07

ENGLISH DETAIL DRAWING FOR  
INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3  
**1725D01**

See Plate for Title



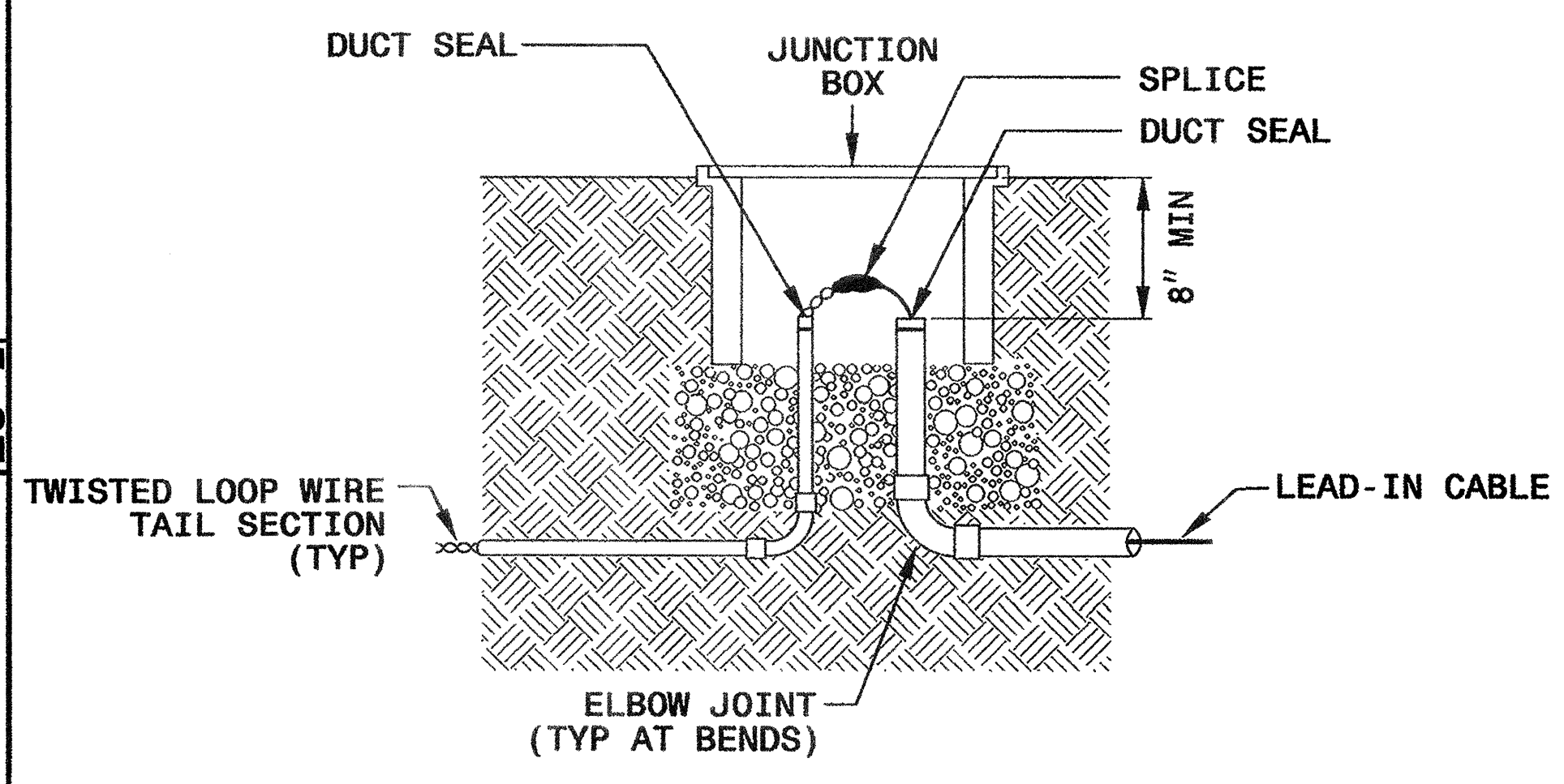
STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

5-07  
ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
LOOP WIRE DETAILS

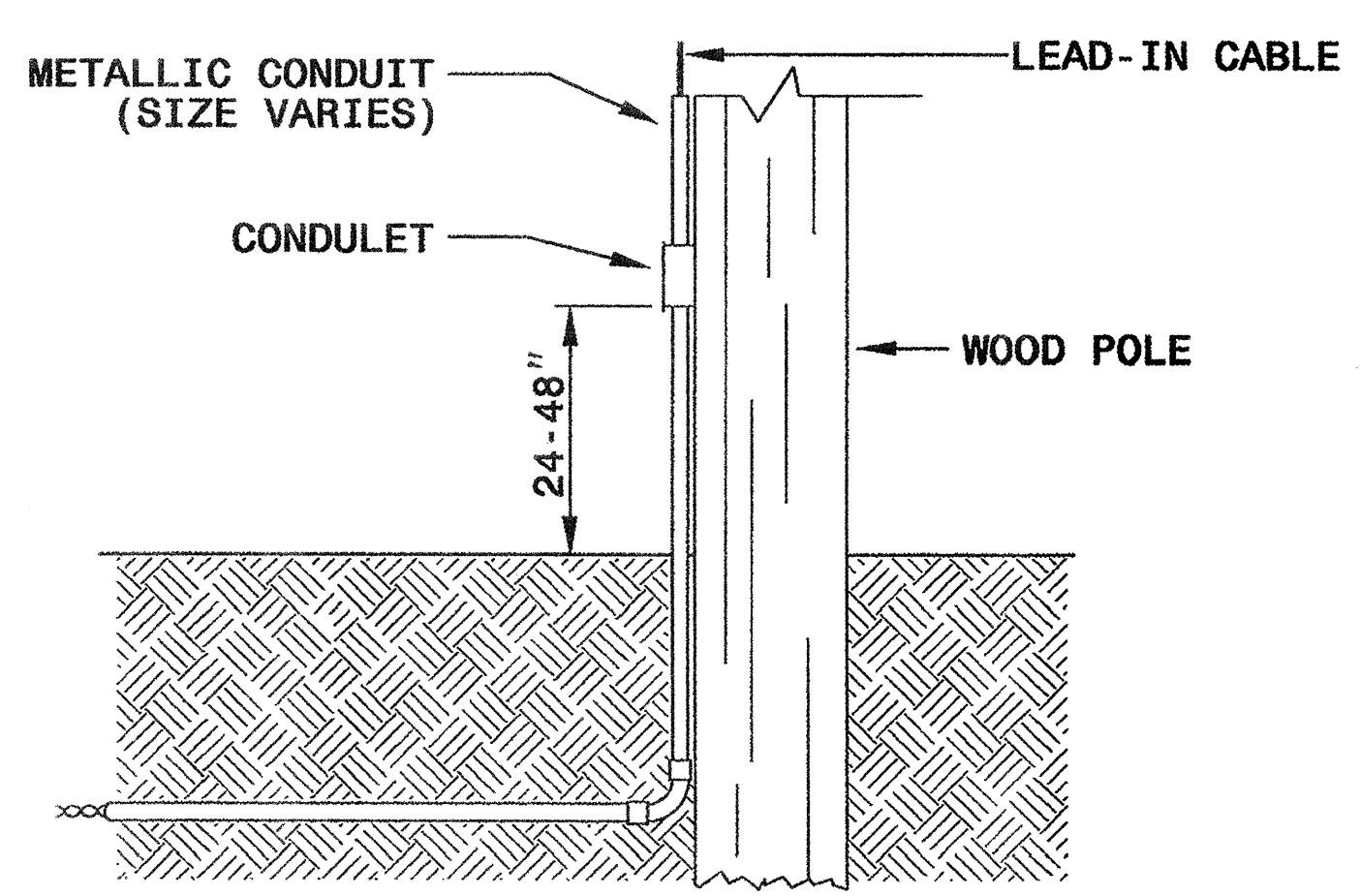
SHEET 2 OF 3  
**1725D01**

**LOOP WIRE SPLICE POINT DETAILS**

**LOOP WIRE AT JUNCTION BOX**



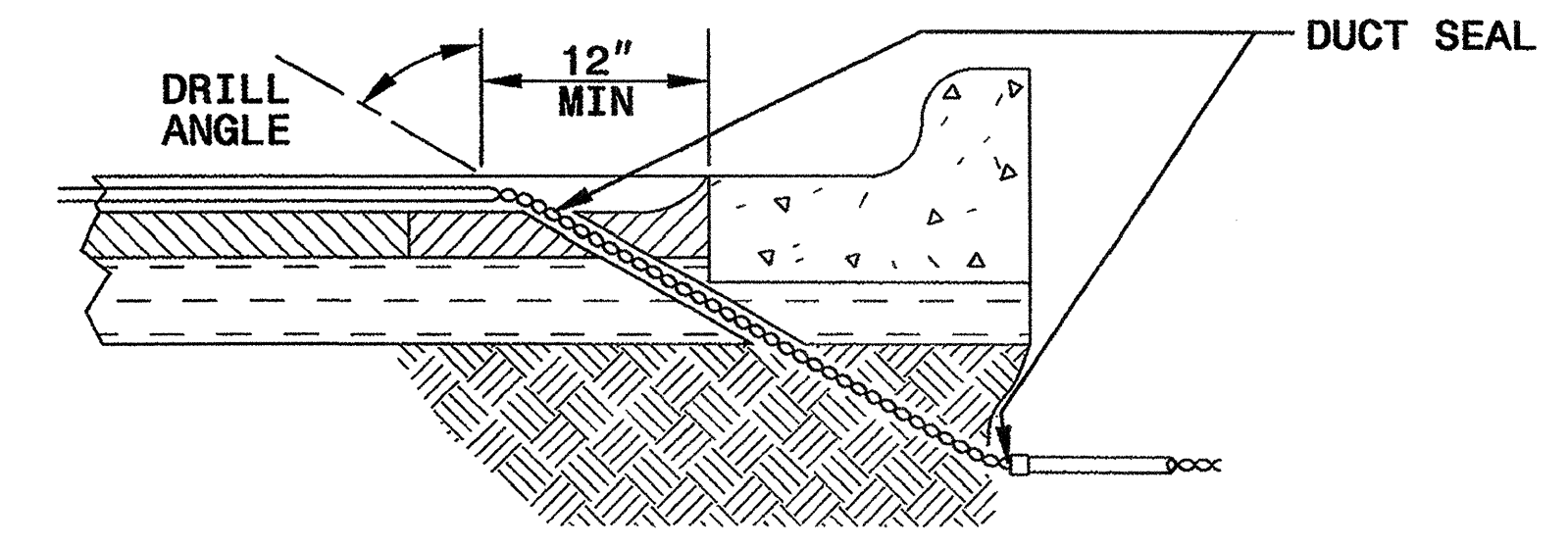
**LOOP WIRE AT POLE**



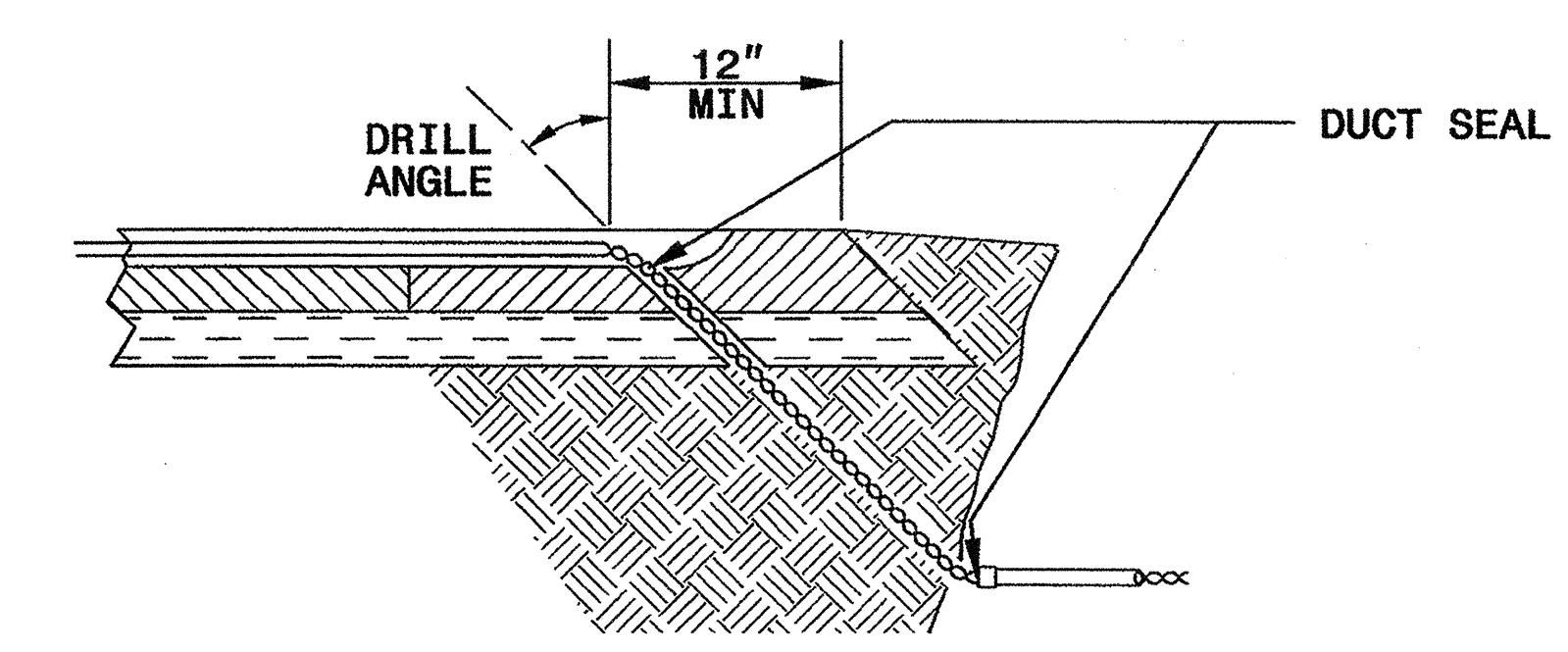
**NOTE**  
SPlice ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE  
IN JUNCTION BOXES OR APPROVED CONDULETS.

**LOOP WIRE PAVEMENT EDGE DETAILS**

**LOOP WIRE AT CURB & GUTTER SECTION**



**LOOP WIRE AT PAVEMENT SECTION**



**NOTES**

1. DO NOT EXCAVATE UNDER CURB AND GUTTER SECTIONS FOR CONDUIT INSTALLATION.
2. TWIST LOOP WIRE TAIL SECTIONS FROM WHERE LOOP WIRE TAIL LEAVES SAW CUT TO JUNCTION BOX, INCLUDING THROUGH CONDUIT.
3. 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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5-07  
ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
LOOP WIRE DETAILS

SHEET 2 OF 3  
**1725D01**

See Plate for Title

<p>Prepared in the Offices of:</p> <p>750 N. Greenfield Parkway Garner, NC 27529</p>	<p>SEAL</p> <p><i>Milton I. Dean</i> 9/5/07 SIGNATURE DATE</p>
------------------------------------------------------------------------------------------	--------------------------------------------------------------------

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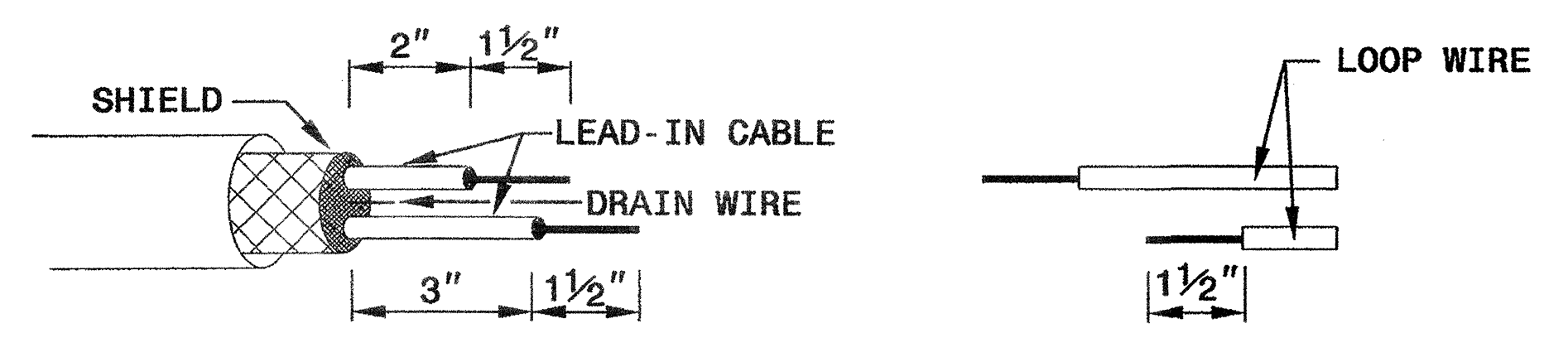
STATE OF  
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DIVISION OF HIGHWAYS  
RALEIGH, N.C.

5-07

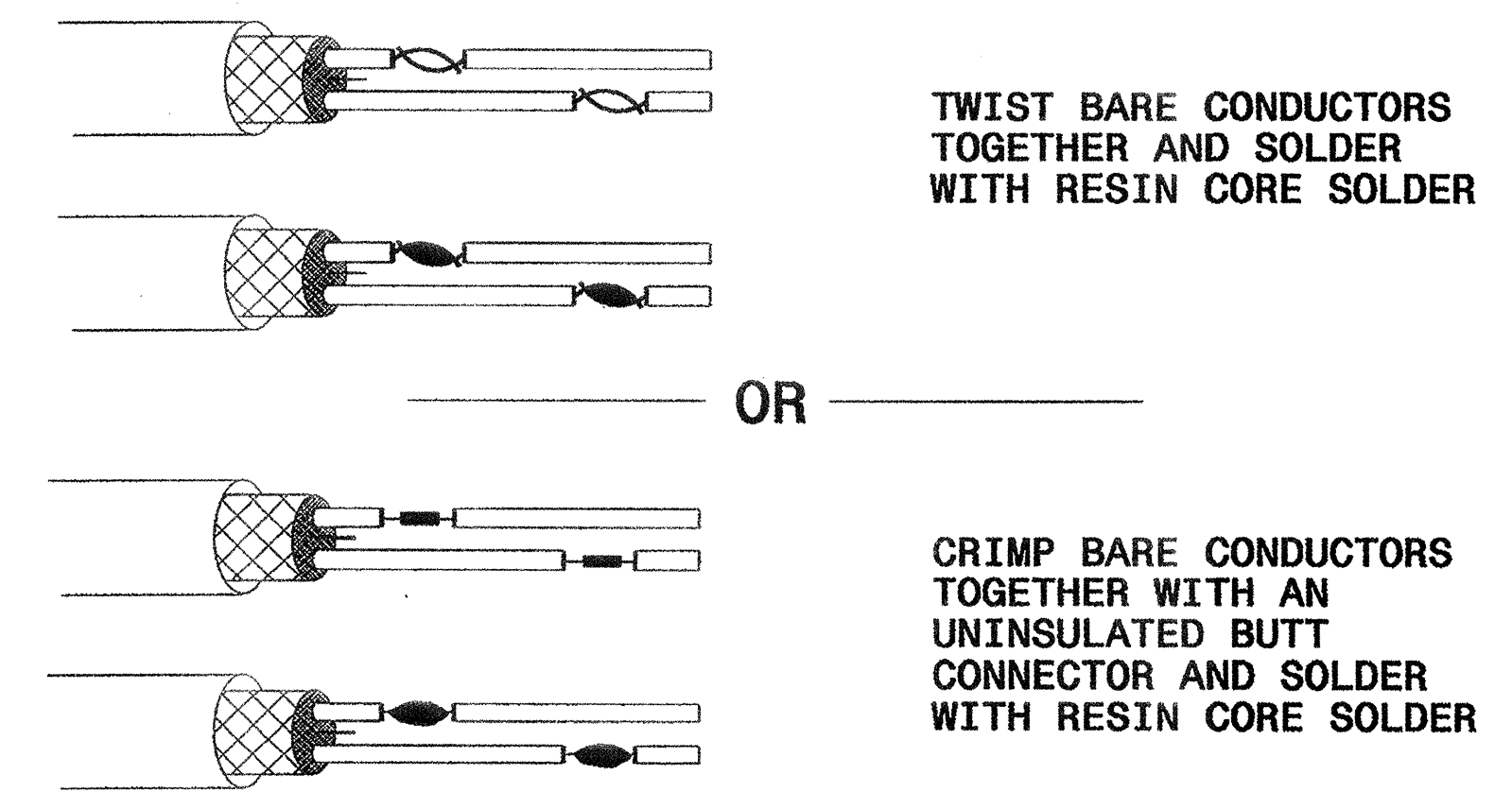
ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3  
**1725D01**

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

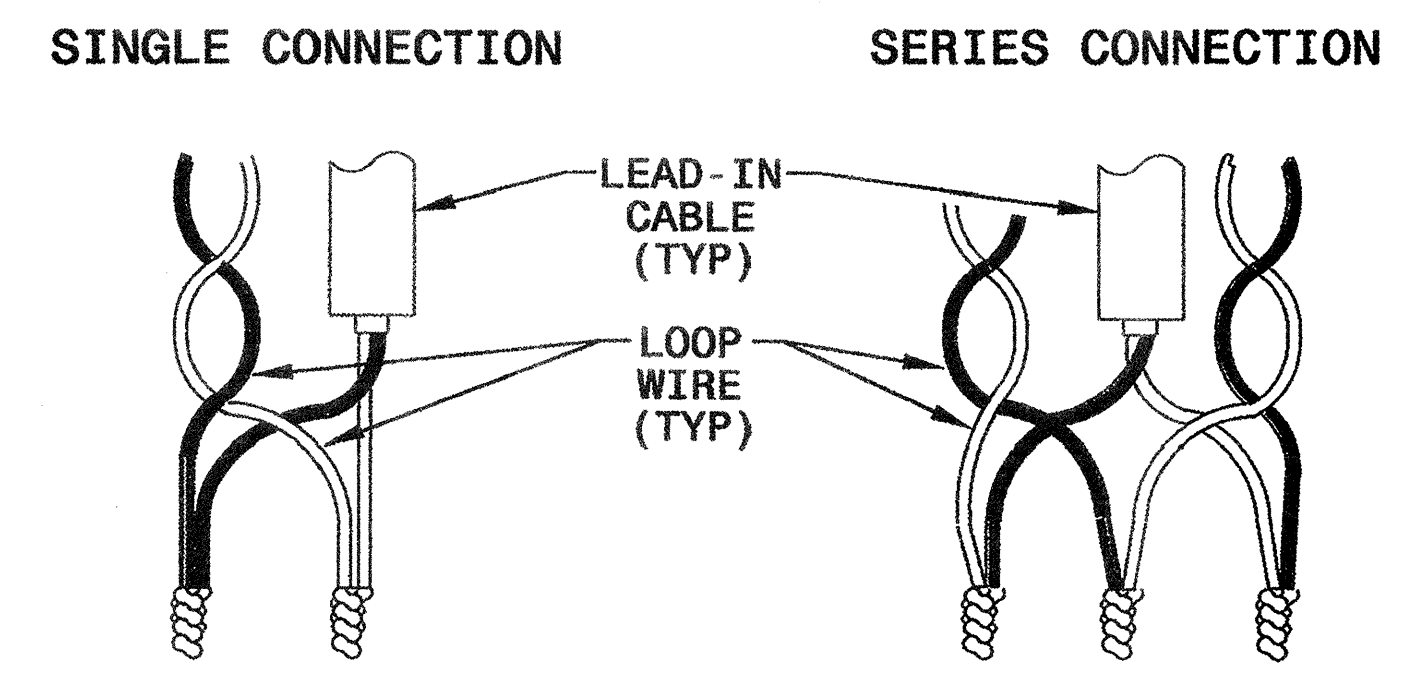


**STEP 2. CONNECT AND SOLDER**

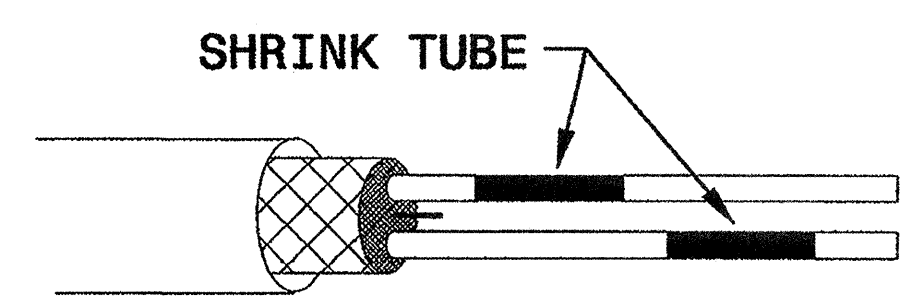


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

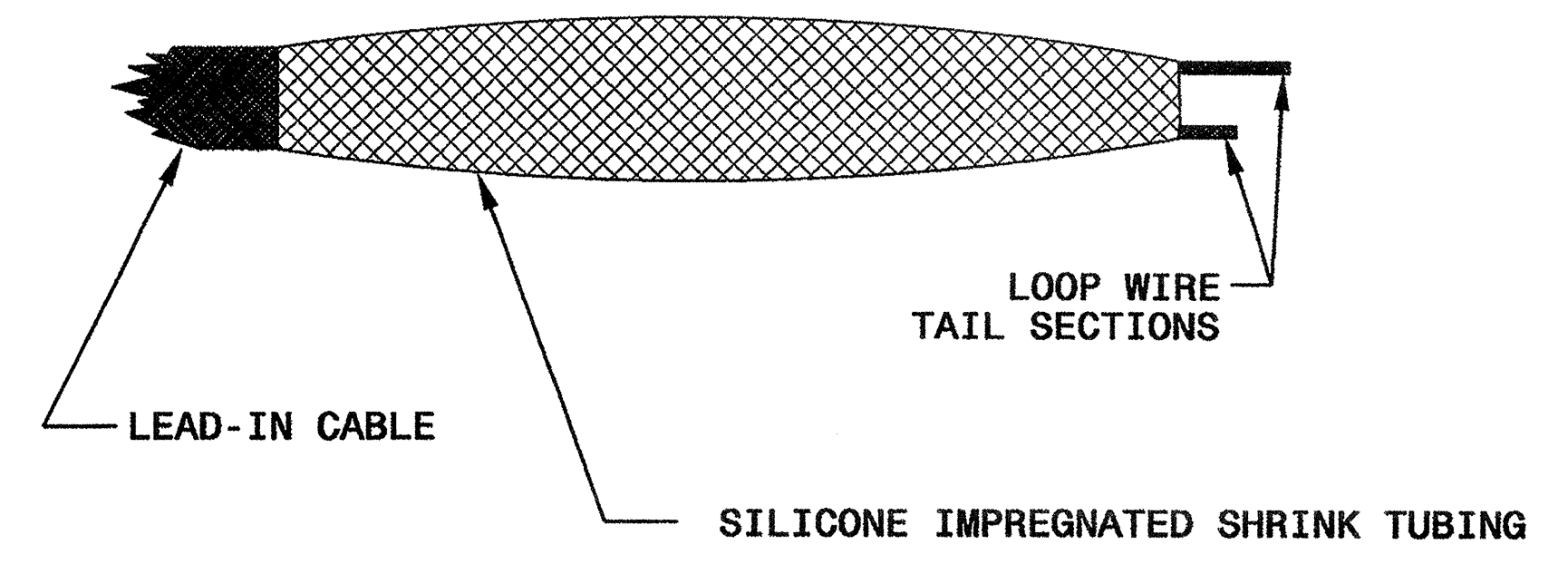
**LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS**



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



**STEP 4. ENVIRONMENTALLY PROTECT SPLICE**



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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

SEAL  
016286  
ENGINEER  
MILTON I. DEAN

*Milton I. Dean* 9/5/07  
SIGNATURE DATE

05-SEP-2007 14:01  
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