

6 Phase Fully Actuated (US 421-NC 55 Dunn Closed Loop System)

NOTES

1. REFER TO "ROADWAY STANDARD DRAWINGS NCDOT" DATED JANUARY 2006, "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" DATED JANUARY 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. THE ORDER OF PHASE 3 AND PHASE 4 MAY BE REVERSED.
5. SET ALL DETECTOR UNITS TO PRESENCE MODE.
6. LOCATE NEW CABINET SO AS NOT TO OBSTRUCT SIGHT DISTANCE OF VEHICLES TURNING RIGHT ON RED.
7. MAXIMUM TIMES SHOWN IN TIMING CHART ARE FOR FREE-RUN OPERATION ONLY. COORDINATED SIGNAL SYSTEM TIMING VALUES SUPERSEDE THESE VALUES.
8. INSTALL SPREAD SPECTRUM WIRELESS RADIO AT THIS INTERSECTION AND THE INTERSECTION OF US 421 AND NORTHBOUND I-95 RAMP TO OBTAIN A COORDINATED SIGNAL SYSTEM.
9. CLOSED LOOP SYSTEM DATA: CONTROLLER ASSET 1310.

2070L LOOP & DETECTOR INSTALLATION												
INDUCTIVE LOOPS				DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6x40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
2A / S30	6x6	300	5	Y	2	Y	Y	-	-	-	-	Y
3A	6x40	0	2-4-2	Y	3	Y	Y	-	-	3	-	Y
3B	6x40	0	2-4-2	Y	3	Y	Y	-	-	-	-	Y
4A	6x40	0	2-4-2	Y	4	Y	Y	-	-	3	-	Y
5A	6x40	0	2-4-2	Y	5	Y	Y	-	-	15	-	Y
5B	6x40	0	2-4-2	Y	5	Y	Y	-	-	15	-	Y
6A / S31	6x6	300	5	Y	6	Y	Y	-	-	-	-	Y
6B	6x6	300	5	Y	6	Y	Y	-	-	-	-	Y

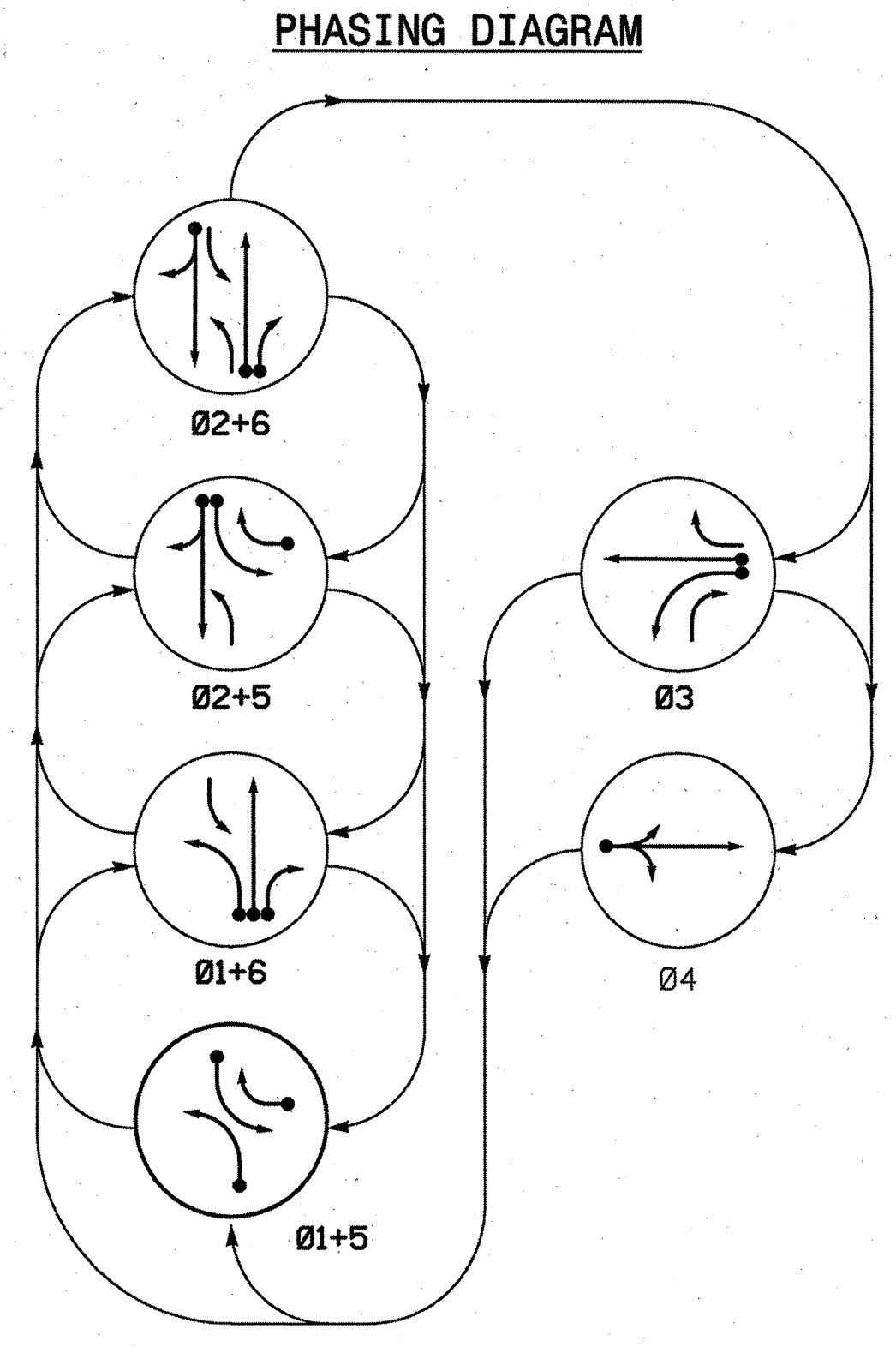
SIGNAL FACE	PHASE						
	Ø1+5	Ø2+5	Ø2+6	Ø3	Ø4	Ø1+6	F
11	-	-	F	F	F	F	F
21,22	R	R	G	G	R	R	Y
31	R	R	R	R	G	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G	R
42	R	R	R	R	R	G	R
51	-	F	-	F	-	-	-
61	R	G	R	G	R	R	Y
62	R	G	R	G	R	R	Y

STANDARD SIGNAL FACE CLEARANCES FOR 4 SECTION LEFT TURN SIGNAL

TO

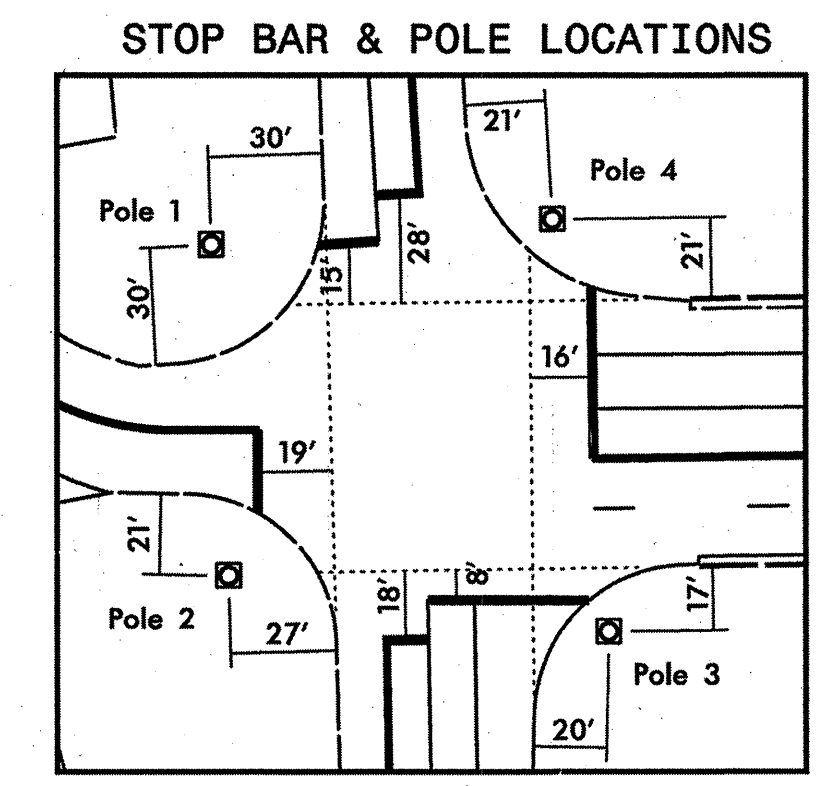
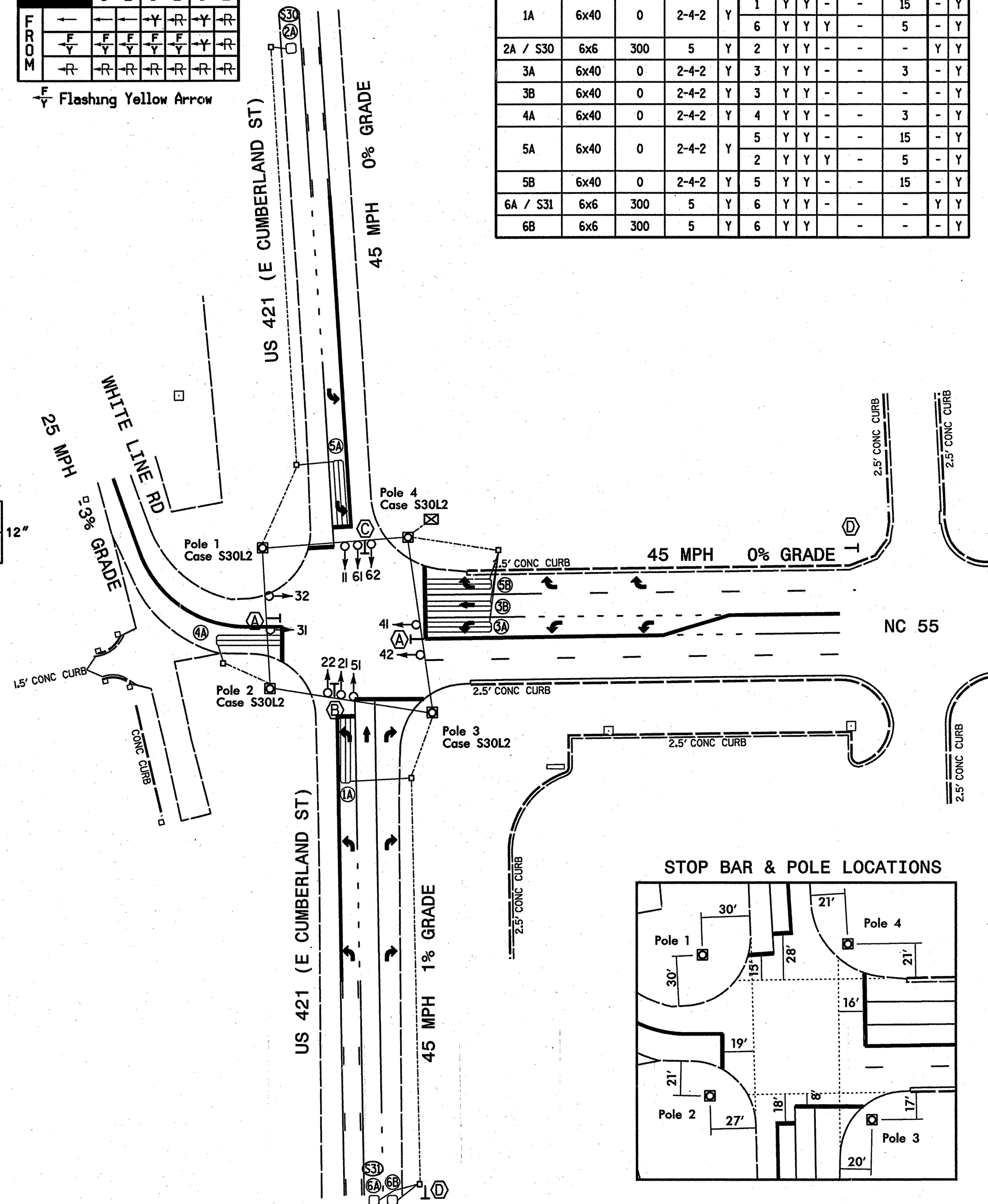
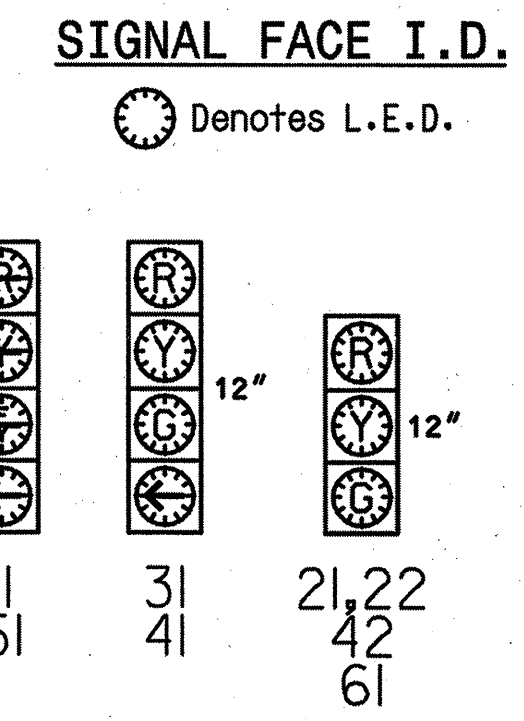
1	2	1	2	1	2
---	---	---	---	---	---

F Flashing Yellow Arrow



PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

NEW INSTALLATION		EXISTING	
○	Traffic Signal Head	●	N/A
○	Modified Signal Head	○	N/A
○	Sign	○	N/A
○	Pedestrian Signal Head With Push Button & Sign	○	N/A
□	Metal Strain Pole	□	N/A
□	Inductive Loop Detector	□	N/A
□	Controller & Cabinet	□	N/A
□	Junction Box	□	N/A
□	2-in Underground Conduit	□	N/A
N/A	Right of Way with Marker	△	N/A
→	Directional Arrow	→	N/A
→	Pavement Marking Arrow	→	N/A
Ⓐ	"E CUMBERLAND ST" SIGN	Ⓐ	N/A
Ⓑ	WHITE LINE RD → NC 55	Ⓑ	N/A
Ⓒ	← WHITE LINE RD NC 55	Ⓒ	N/A
Ⓓ	Right Lane Must Turn Right Sign (R3-7R) 30x30	Ⓓ	N/A

2070L TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1*	7	12	7	7	7	12
Extension 1*	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1*	20	90	20	20	20	90
Yellow Clearance	3.0	4.5	3.5	3.3	3.0	4.5
Red Clearance	2.1	1.3	1.9	2.1	2.1	1.3
Walk 1*	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation*	-	1.5	-	-	-	1.5
Max Variable Initial*	-	34	-	-	-	34
Time Before Reduction*	-	15	-	-	-	15
Time To Reduction*	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	LOCK	-	-	-	LOCK
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

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NEW INSTALLATION

Prepared in the Offices of:

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Traffic Engineering and Safety Section
750 N. Greenfield Parkway
Gastonia, NC 28052

US 421 (E CUMBERLAND ST) AT NC 55

DIVISION 06 HARNETT COUNTY DUNN

PLAN DATE: November 2009 REVIEWED BY: T. GRAVES

PREPARED BY: A. ARCHER REVIEWED BY:

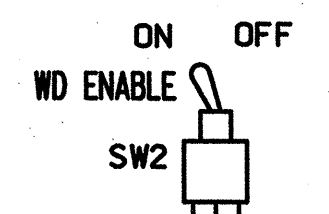
REVISIONS INIT. DATE

SCALE 0 50'

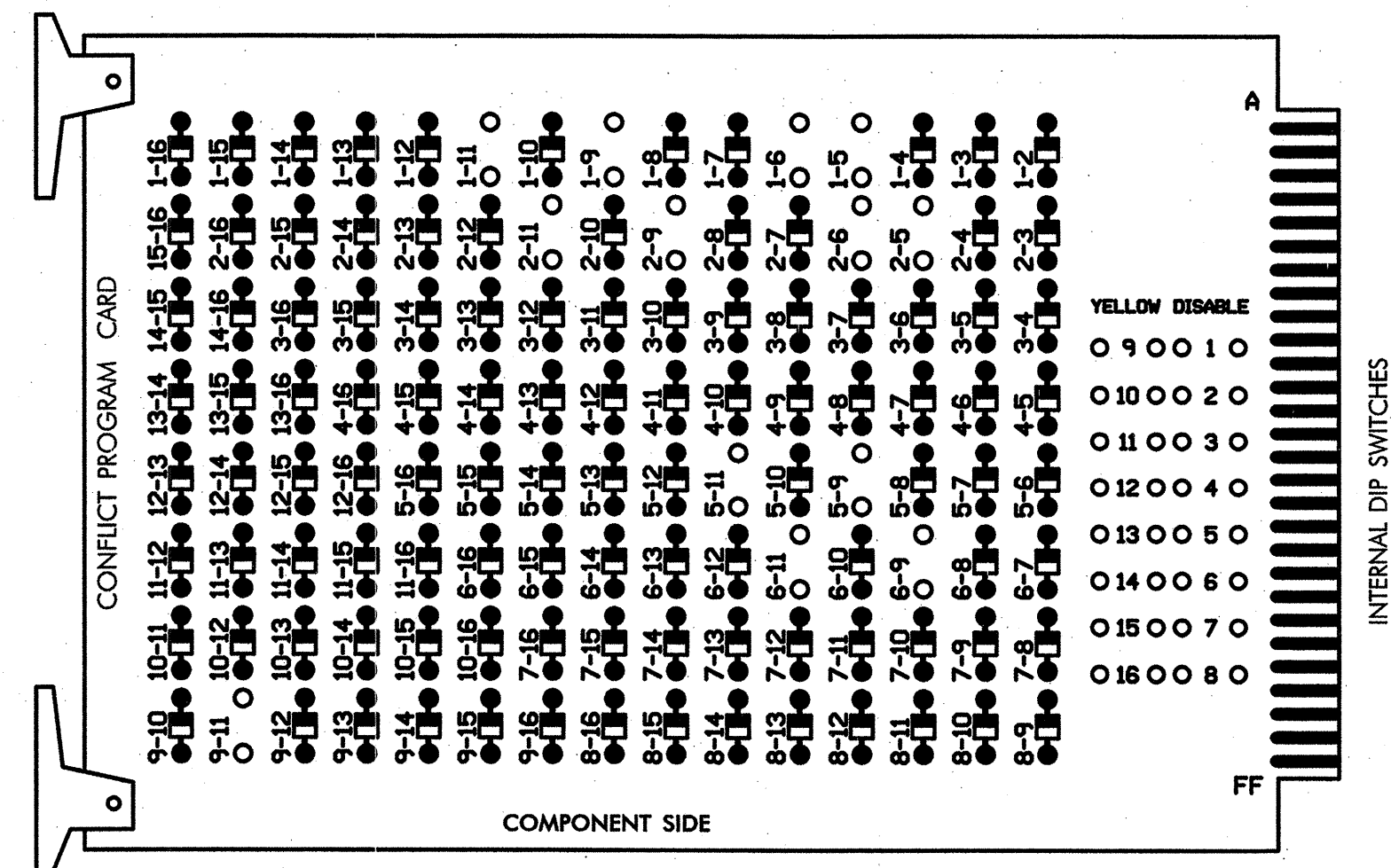
SEAL
NORTH CAROLINA
Professional Engineer
21080
11-9-09
T. GRAVES
SIGNATURE DATE
SIG. INVENTORY NO. 06-1310

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



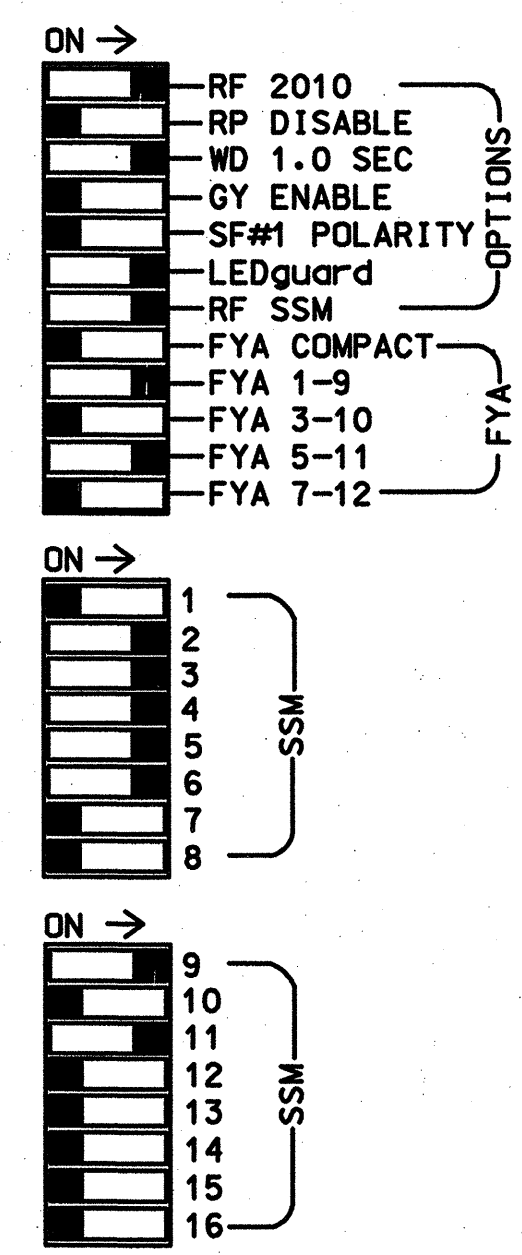
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 5-9, 5-11, 6-9, 6-11, and 9-11.



REMOVE JUMPERS AS SHOWN

NOTES:

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



■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,7,8,10,12,13,14,15 & 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 2 and 6, on controller unit, for variable initial and gap reduction.
- The cabinet and controller are part of the US 421 - NC 55 Dunn Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

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

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

EQUIPMENT INFORMATION

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

INPUT FILE POSITION LAYOUT

(from view)

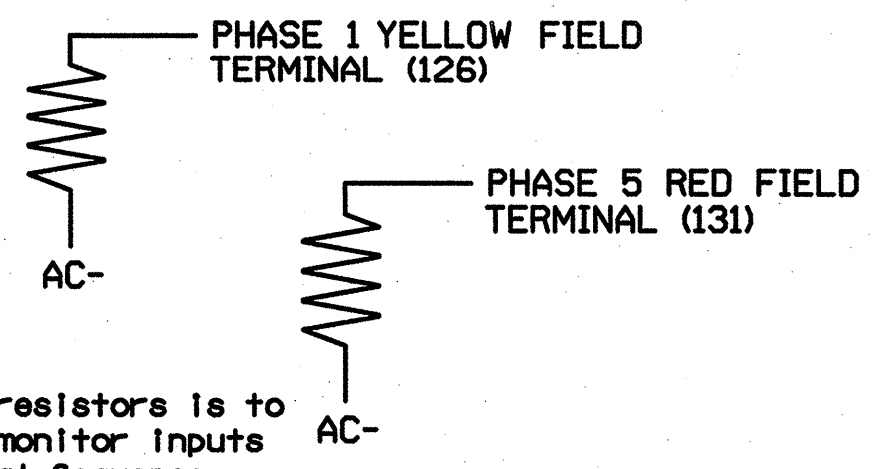
FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	φ 1	φ 2/SYS	φ 3	φ 3	φ 4	φ 5	φ 5	φ 6/SYS	φ 6	φ 7	φ 7	φ 8	φ 8	φ 9
L	1A	2A/S30	3A	3B	4A	5A	5B	6A/S31	6B	7A	7B	8A	8B	9A
	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED

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

FS = FLASH SENSE
 ST = STOP TIME

LOAD RESISTOR INSTALLATION DETAIL

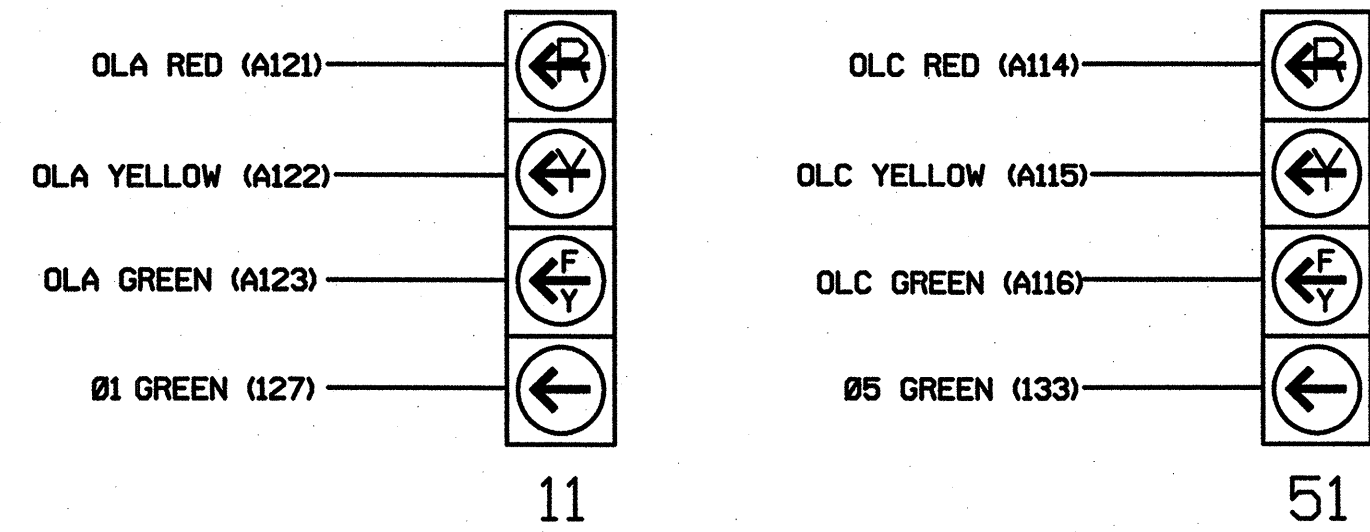
ACCEPTABLE VALUES	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



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.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

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

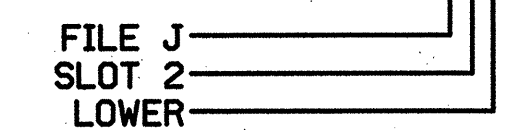
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1310
 DESIGNED: NOV. 2009
 SEALED: 11/4/2009
 REVISED:

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		5
2A, S30	TB2-5,6	I2U	39	1	2	2/SYSTEM	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
3B	TB4-9,10	I6U	41	3	4	3	Y	Y			
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
5A ²	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y	Y		5
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
6A, S31	TB3-9,10	J3U	64	26	36	6/SYSTEM	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			

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

INPUT FILE POSITION LEGEND: J2L



NEW INSTALLATION SHEET 1 OF 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

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US 421 (E CUMBERLAND ST) AT NC 55

DIVISION 06 HARNETT COUNTY DUNN

PLAN DATE: November 2009 REVIEWED BY: J. WATTERS

PREPARED BY: A. ARCHER REVIEWED BY:

REVISIONS

INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL
 JOHN L. WATTERS
 PROFESSIONAL ENGINEER
 STATE OF NORTH CAROLINA
 15491

SEAL NOT VALID UNLESS SIGNED AND DATED

SIGNATURE DATE

SIG. INVENTORY NO. 06-1310

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

(program controller as shown below)

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

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

↓
SCROLL DOWN

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

PRESS '+'

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

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

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #52 OFF

PRESS '+'

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

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

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #51 ON

PRESS '+'

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

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

↓
SCROLL DOWN

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

PRESS '+'

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

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

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #44 OFF

PRESS '+'

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

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

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #43 ON

PRESS '+'

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

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

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

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN

← NOTICE GREEN FLASH

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

PRESS '+' TWICE

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN

← NOTICE GREEN FLASH

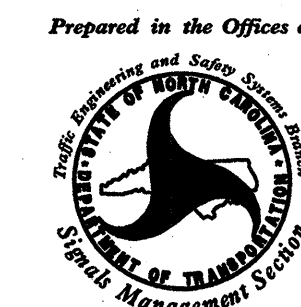
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0.0

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1310
DESIGNED: NOV. 2009
SEALED: 11/4/2009
REVISED:

NEW INSTALLATION SHEET 2 OF 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



US 421 (E CUMBERLAND ST)
AT NC 55

DIVISION 08 HARNETT COUNTY DUNN

PLAN DATE: November 2009 REVIEWED BY: J. WATTERS

PREPARED BY: A. ARCHER REVIEWED BY:

REVISIONS	INIT.	DATE

SIGNATURE DATE

SIG. INVENTORY NO. 06-1310

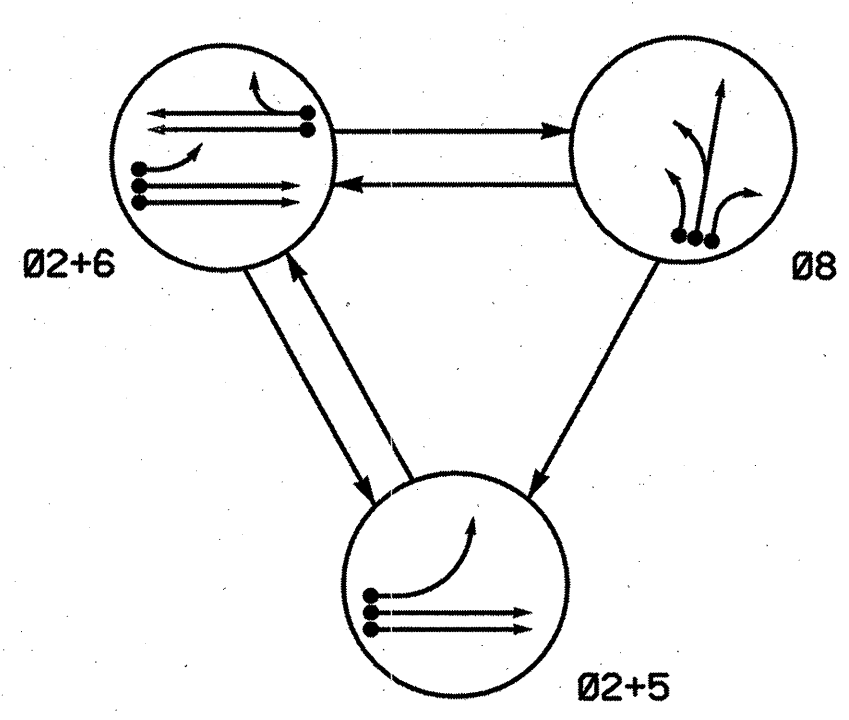
ARCADIS
G & M of North Carolina, Inc.
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750 N. Greenfield Pkwy, Garner, NC 27529

*****SYTIME*****
*****PRINTING*****
*****DATE*****

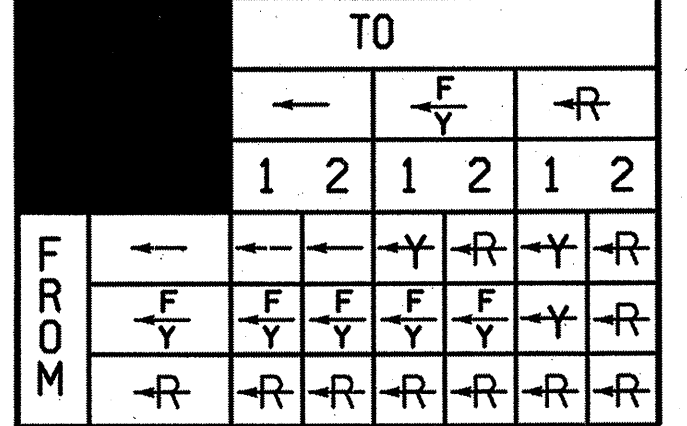
3 Phase Fully Actuated (US 421-NC 55 Dunn Closed Loop System)

PHASING DIAGRAM



SIGNAL FACE	PHASE			
	Ø2+5	Ø2+6	Ø8	F L C R
21, 22	G	G	R	Y
51	-	F	R	R
61, 62	R	G	R	Y
81, 82, 83	R	R	G	R

STANDARD SIGNAL FACE CLEARANCES FOR 4 SECTION LEFT TURN SIGNAL



F Flashing Yellow Arrow

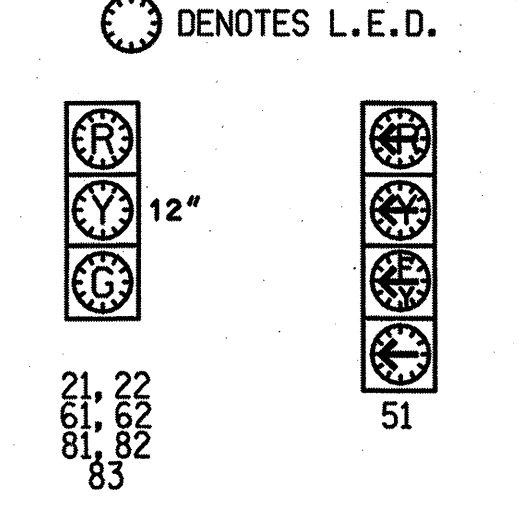
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	DETECTOR PROGRAMMING								
				NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	LOOP SYSTEM	NEW CARD
2A, 2B	6x6	5	130	-	2	Y	Y	-	-	-	-	-
5A	6x60	2-4-2	+5	-	5	Y	Y	-	-	15	-	-
6A/S28	6x6	5	420	-	6	Y	Y	-	2.7	-	Y	-
6B/S29	6x6	5	420	-	6	Y	Y	-	2.7	-	Y	-
6C, 6D	6x6	3	110	-	6	Y	Y	-	-	-	-	-
8A	6x40	2-4-2	+5	-	8	Y	Y	-	-	-	-	-
8B	6x40	2-4-2	+5	-	8	Y	Y	-	-	-	-	-
8C	6x40	2-4-2	+5	-	8	Y	Y	-	-	15	-	-

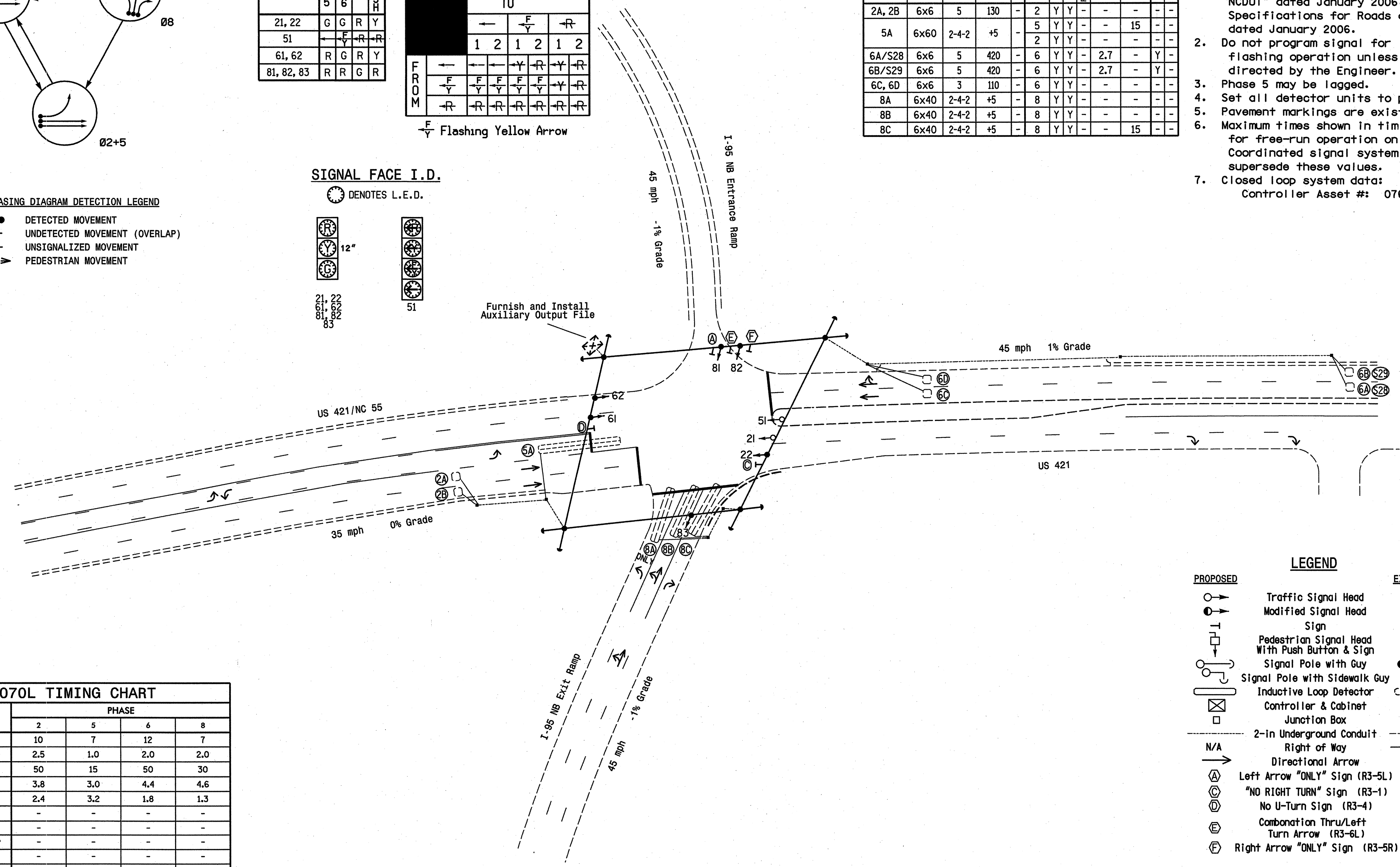
- NOTES
- Refer to "Roadway Standard Drawings NCDOT" dated January 2006, "Standard Specifications for Roads and Structures" dated January 2006.
 - Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
 - Phase 5 may be lagged.
 - Set all detector units to presence mode.
 - Pavement markings are existing.
 - Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
 - Closed loop system data: Controller Asset #: 0766.

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

SIGNAL FACE I.D.



Furnish and Install Auxiliary Output File



FEATURE	PHASE			
	2	5	6	8
Min Green 1 *	10	7	12	7
Extension 1 *	2.5	1.0	2.0	2.0
Max Green 1 *	50	15	50	30
Yellow Clearance	3.8	3.0	4.4	4.6
Red Clearance	2.4	3.2	1.8	1.3
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduction *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

- LEGEND
- | | | | |
|--|---|--|---|
| | PROPOSED Traffic Signal Head | | EXISTING Traffic Signal Head |
| | PROPOSED Modified Signal Head | | EXISTING N/A |
| | PROPOSED Pedestrian Signal Head | | EXISTING With Push Button & Sign |
| | PROPOSED Signal Pole with Guy | | EXISTING Signal Pole with Sidewalk Guy |
| | PROPOSED Inductive Loop Detector | | EXISTING Inductive Loop Detector |
| | PROPOSED Controller & Cabinet | | EXISTING Junction Box |
| | PROPOSED 2-in Underground Conduit | | EXISTING 2-in Underground Conduit |
| | PROPOSED Right of Way | | EXISTING Right of Way |
| | PROPOSED Directional Arrow | | EXISTING Directional Arrow |
| | PROPOSED Left Arrow "ONLY" Sign (R3-5L) | | EXISTING Left Arrow "ONLY" Sign (R3-5L) |
| | PROPOSED "NO RIGHT TURN" Sign (R3-1) | | EXISTING "NO RIGHT TURN" Sign (R3-1) |
| | PROPOSED No U-Turn Sign (R3-4) | | EXISTING No U-Turn Sign (R3-4) |
| | PROPOSED Combination Thru/Left Turn Arrow (R3-6L) | | EXISTING Combination Thru/Left Turn Arrow (R3-6L) |
| | PROPOSED Right Arrow "ONLY" Sign (R3-5R) | | EXISTING Right Arrow "ONLY" Sign (R3-5R) |

Signal Upgrade

Prepared in the Offices of:

US 421/NC 55 at I-95 NB Ramps

Division 6 Harnett County Dunn

PLAN DATE: March 20, 2009 REVIEWED BY: T. Graves

PREPARED BY: A. Archer REVIEWED BY:

REVISIONS: INIT. DATE

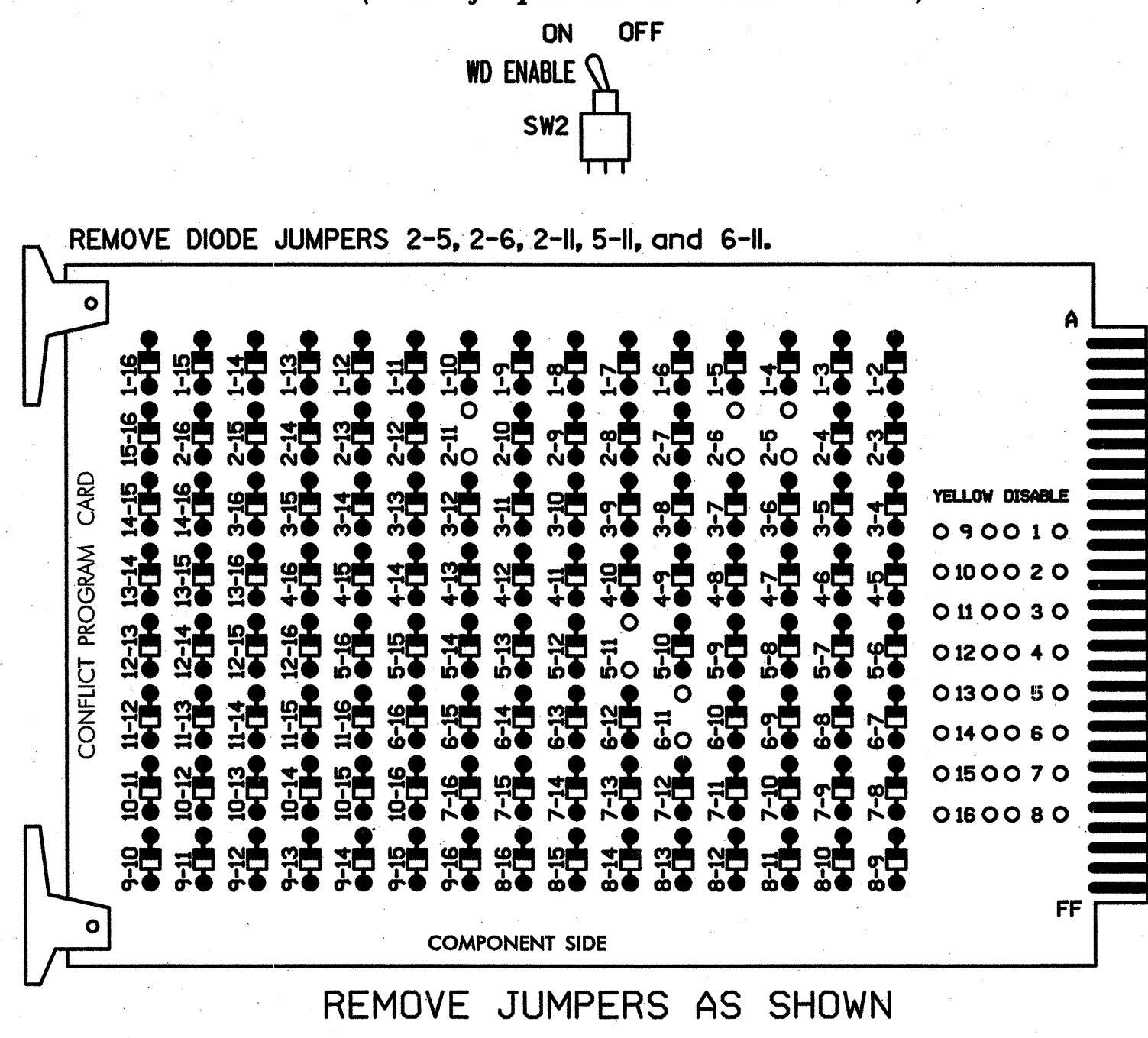
SCALE: 1" = 40'

ARCADIS 6 & H of North Carolina, Inc. 801 Corporate Center Drive, Suite 300 Raleigh, NC 27607-5075 Tel: 919/854-1282 Fax: 919/854-5448

SIG. INVENTORY NO. 06-0766

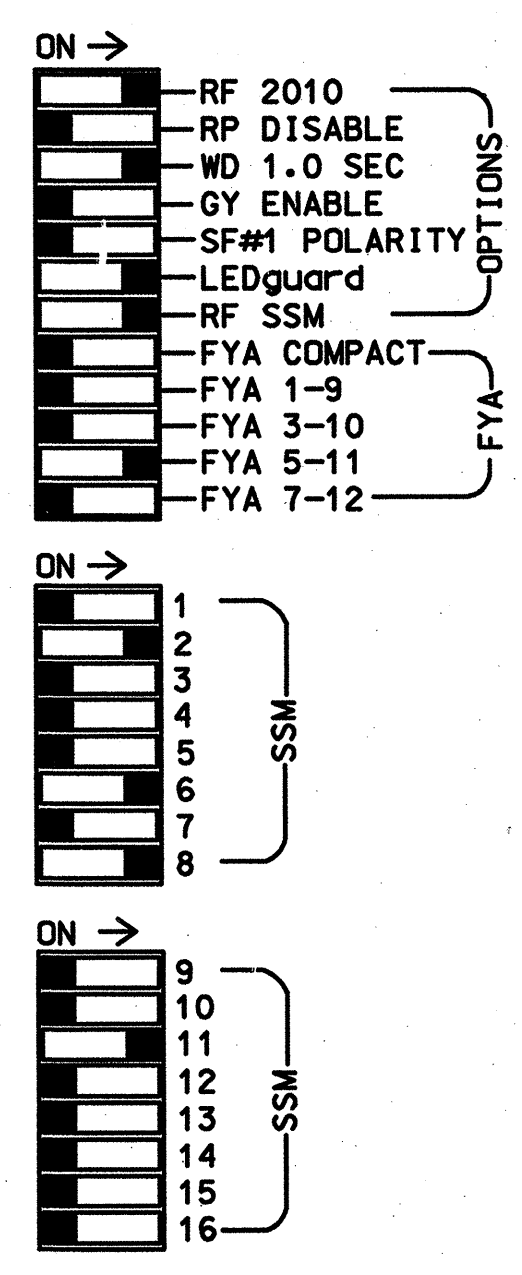
EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(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 signalheads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,4, 5,7,9,10,12,13,14,15 & 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.
- Remove the existing conflict monitor. Install new EDI Model 2010ECL-NC Conflict monitor and aux file.
- The cabinet and controller are part of the Dunn Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	51*	61,62	NU	NU	81,82, 83	NU	NU	NU	NU	51*	NU	NU
RED		128						134			107							
YELLOW		129					*	135			108							
GREEN		130						136			109							
RED ARROW																		A114
YELLOW ARROW																		A115
FLASHING YELLOW ARROW																		A116
GREEN ARROW								133										

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

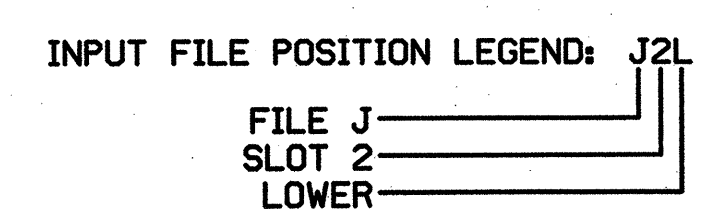
EQUIPMENT INFORMATION

CONTROLLER.....EAGLE 2070L
 CABINET.....EAGLE 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18(12-STD,6AUX)
 LOAD SWITCHES USED.....S2,S5,S6,S8,S12
 PHASES USED.....2,5,6,8
 OVERLAP "A":.....NOT USED
 OVERLAP "B":.....NOT USED
 OVERLAP "C":.....5+6
 OVERLAP "D":.....NOT USED

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A,2B	TB2-5,6	I2U	39	1	2	2	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			15
		I4U	47	9	22	2	Y	Y			
6A,S28	TB3-9,10	J3U	64	26	36	6/SYSTEM	Y	Y		2.7	
6B,S29	TB3-11,12	J3L	77	39	46	6/SYSTEM	Y	Y		2.7	
8A	TB5-1,2	J4U	48	10	26	6	Y	Y			
8B	TB5-9,10	J6U	42	4	8	8	Y	Y			
8C	TB5-11,12	J6L	46	8	18	8	Y	Y			
8C	TB7-1,2	J7U	66	28	38	8	Y	Y			15

1 Add jumpers from J1-W to I4-W, on rear of Input file.



INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 2	2A,2B	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
L	NOT USED													
U	∅ 5	∅ 6/SYS	∅ 6	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8
L	NOT USED	6A/S28	6C,6D	8A	8C	8B	NOT USED							
		6B/S29	NOT USED											

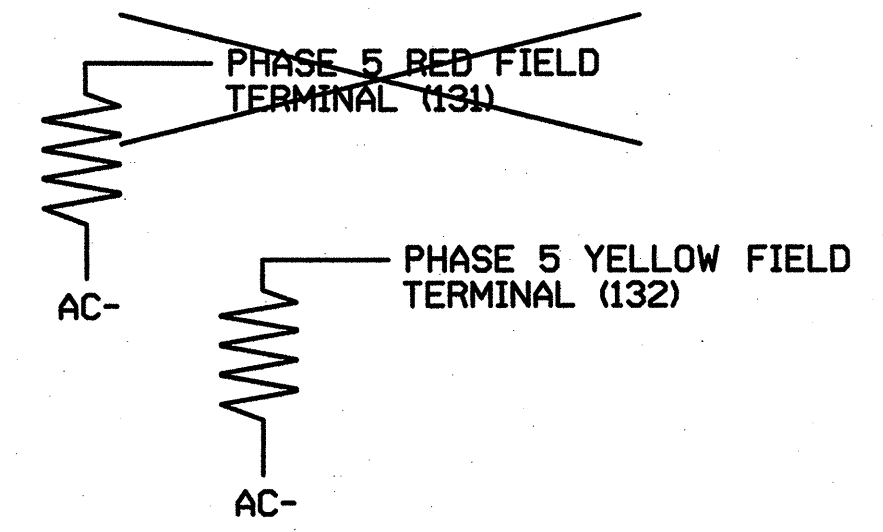
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

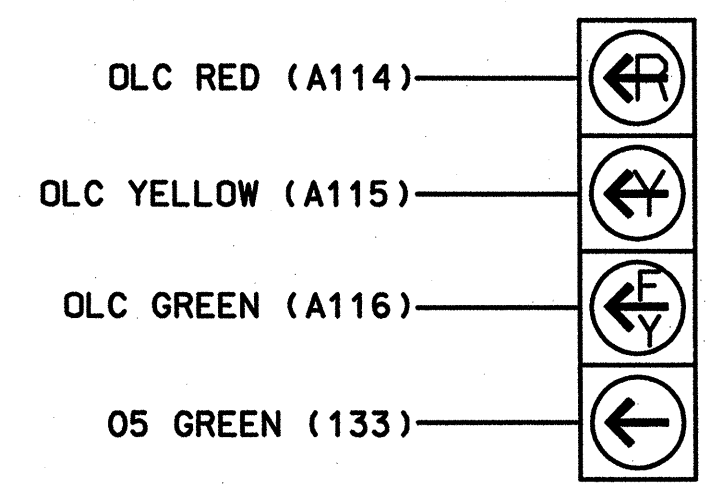
LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



4 SECTION FYA PPLT SIGNAL WIRING DETAIL



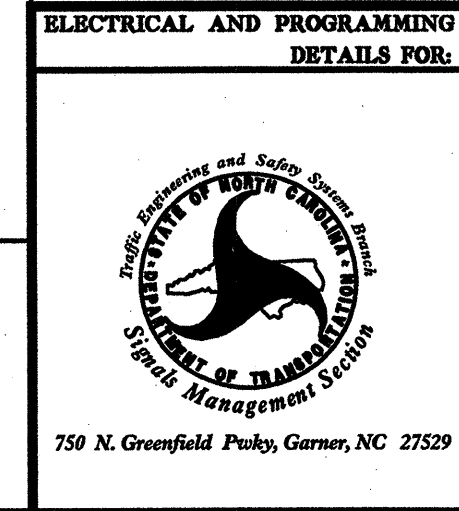
51

NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-0766
 DESIGNED: NOV. 2009
 SEALED: 11/4/2009
 REVISED: _____

Signal Upgrade Sheet 1 of 2



US 421/NC 55 at I-95 NB Ramps	
Division 6	Harnett County
PLANNED BY: November 2009	REVIEWED BY: J. Watters
PREPARED BY: A. Archer	REVIEWED BY:
REVISIONS	INIT. DATE

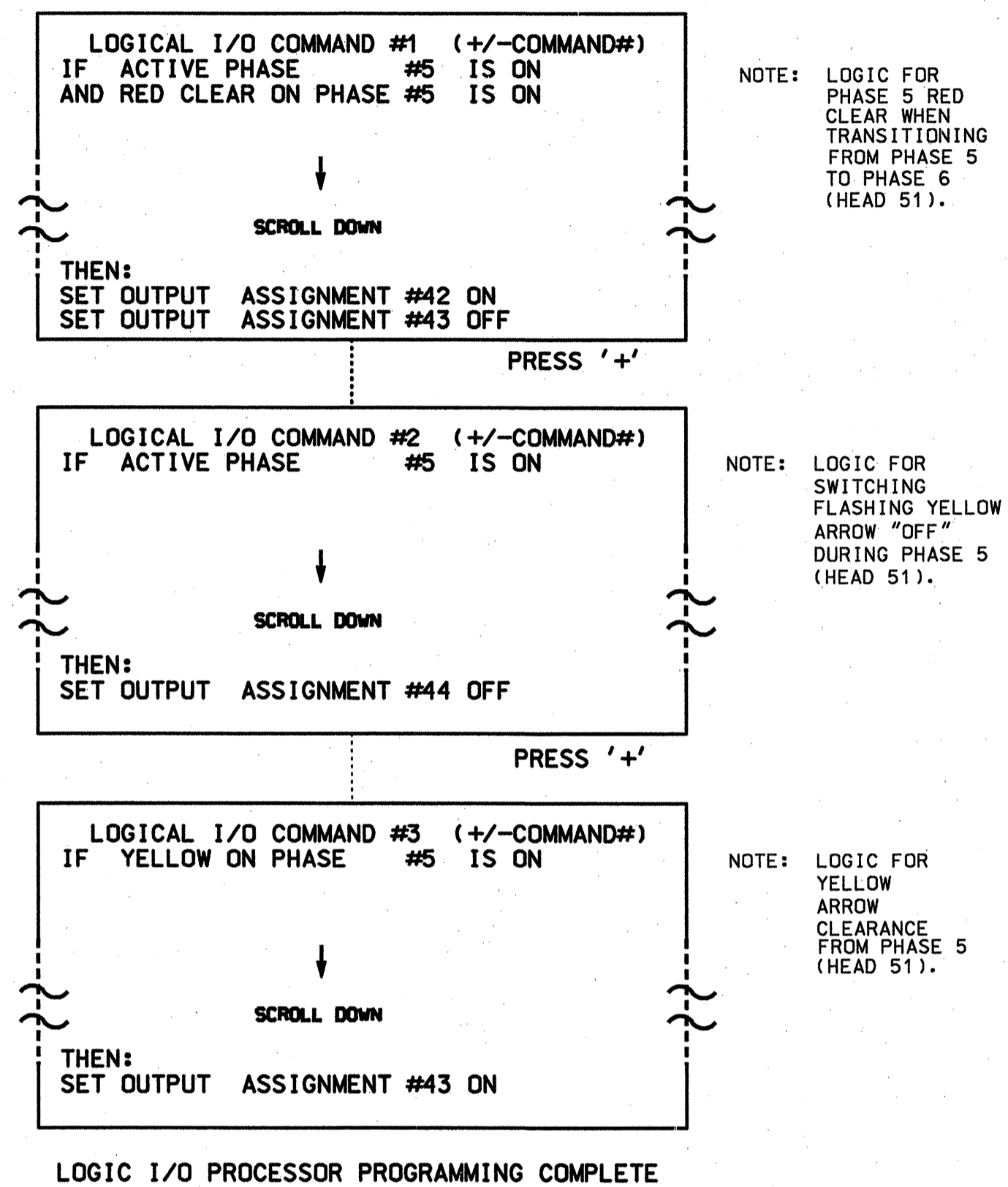
SEALED
 JOHN WATTERS
 PROFESSIONAL ENGINEER
 STATE OF NORTH CAROLINA
 LICENSE NO. 15491
 SIGNATURE DATE
 SIG. INVENTORY NO. 06-0766

750 N. Greenfield Pkwy, Garner, NC 27529

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

(program controller as shown below)

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



OUTPUT REFERENCE SCHEDULE
OUTPUT 42 = Overlap C Red OUTPUT 43 = Overlap C Yellow OUTPUT 44 = Overlap C Green

OVERLAP PROGRAMMING DETAIL
(program controller as shown below)

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

PRESS '+' TWICE TO SELECT OVERLAP 'C'

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


← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 06-0766
 DESIGNED: NOV. 2009
 SEALED: 11/4/2009
 REVISED: _____

Signal Upgrade Sheet 2 of 2

ELECTRICAL AND PROGRAMMING
 DETAILS FOR:



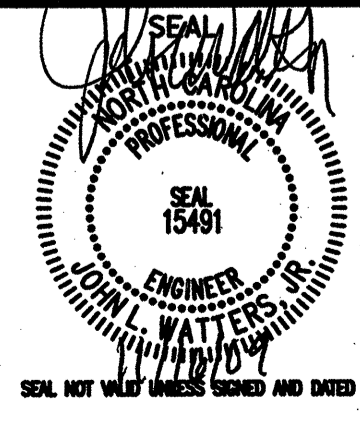
801 Corporate Center Drive, Suite 300
 Raleigh, NC 27607-5C73
 Tel: 919/854-1282 Fax: 919/854-5448

**US 421/NC 55
 at
 I-95 NB Ramps**

Division 8 Harnett County Dunn

PLAN DATE: November 2009 REVIEWED BY: J. Watters
 PREPARED BY: A. Archer REVIEWED BY:

REVISIONS	INIT.	DATE



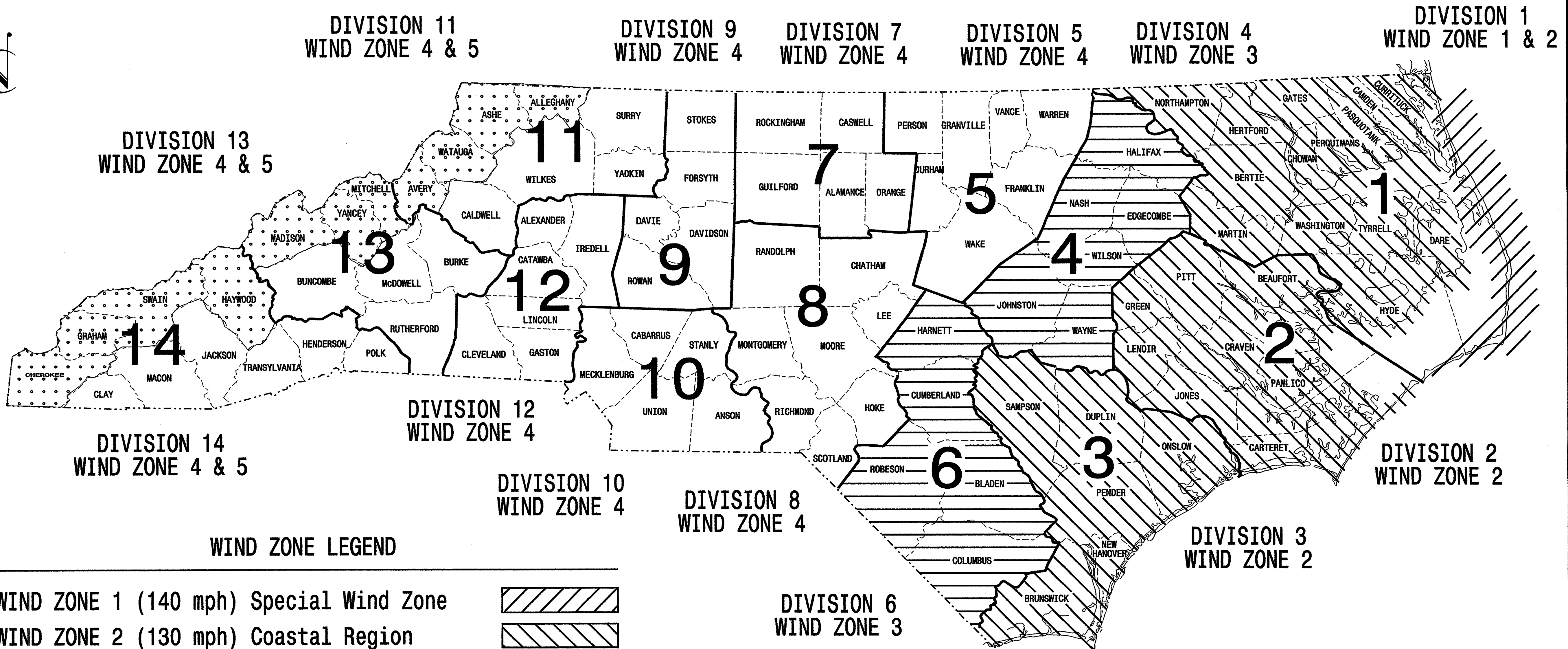
SEAL
 STATE OF NORTH CAROLINA
 PROFESSIONAL ENGINEER
 J. WATTERS
 NO. 15481

SIGNATURE DATE
 SIG. INVENTORY NO. 06-0766

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	I-5010	Sig. 7
F.A. PROJ. NO.	M 1	
PROJECT ID. NO.		

STANDARD DRAWINGS FOR METAL POLES



WIND ZONE LEGEND

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

<http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html>

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

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

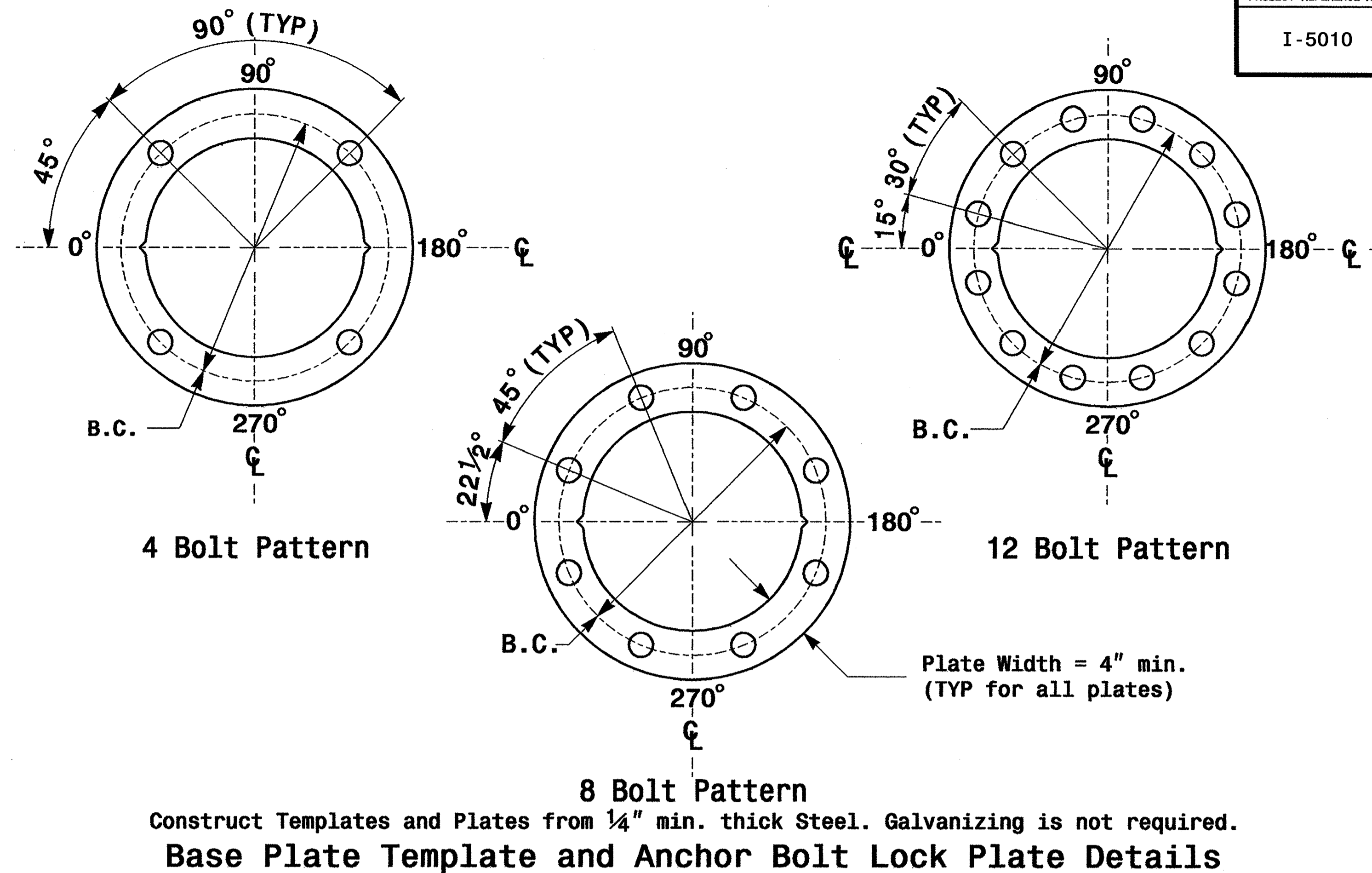
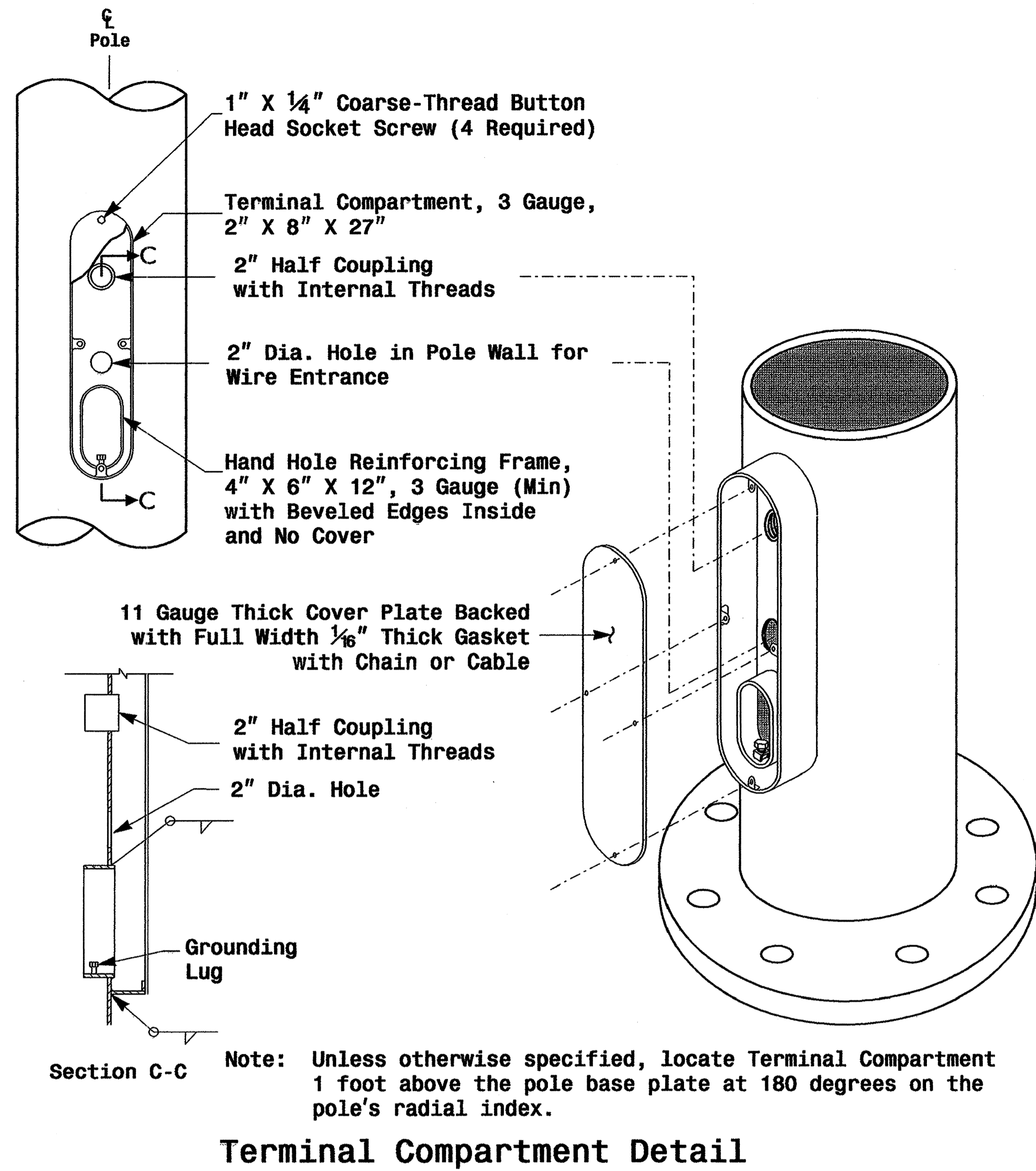
INDEX OF PLANS	
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

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

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

SEAL

SIGNATURE 7.21.2009
 DATE



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

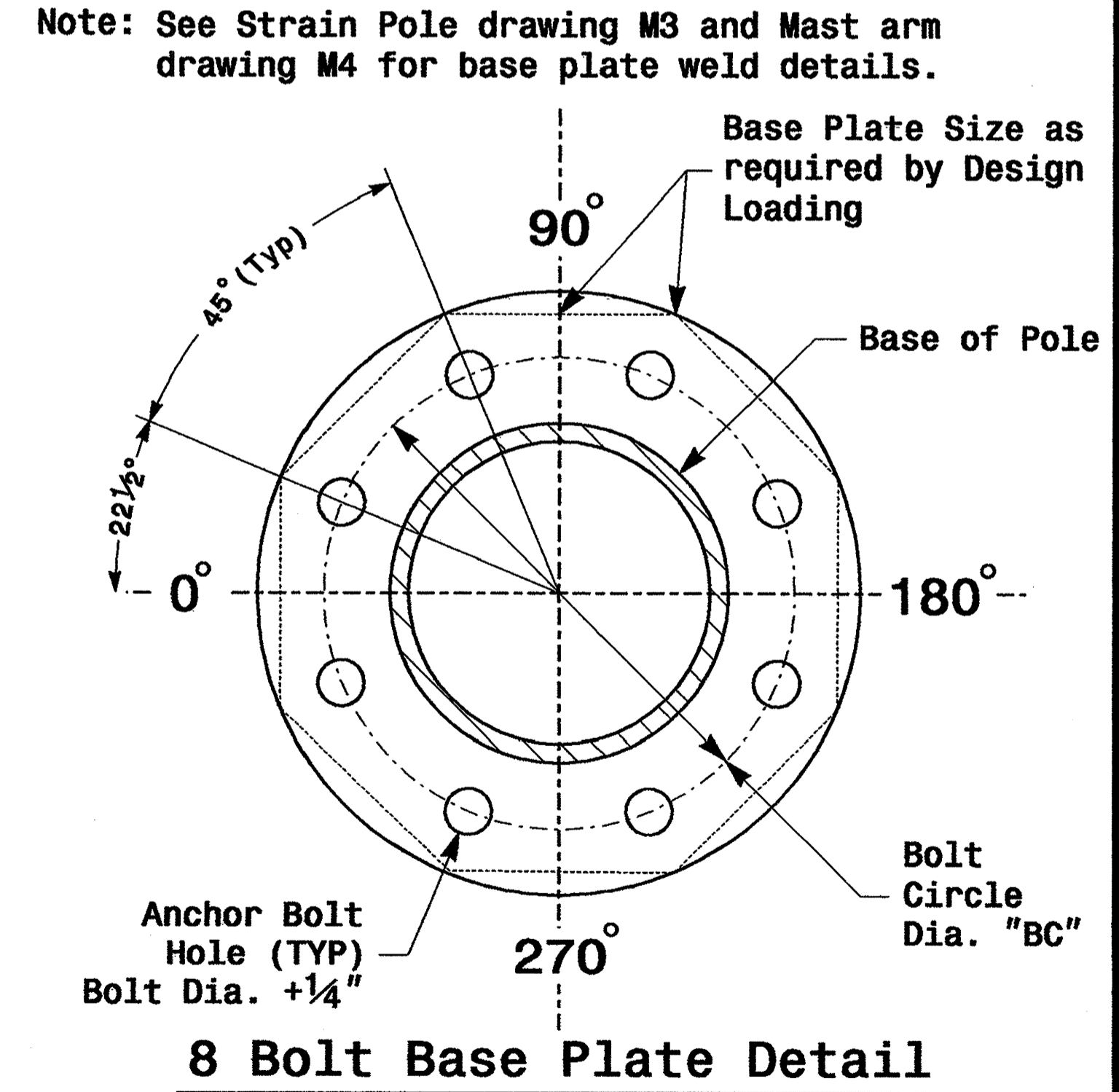
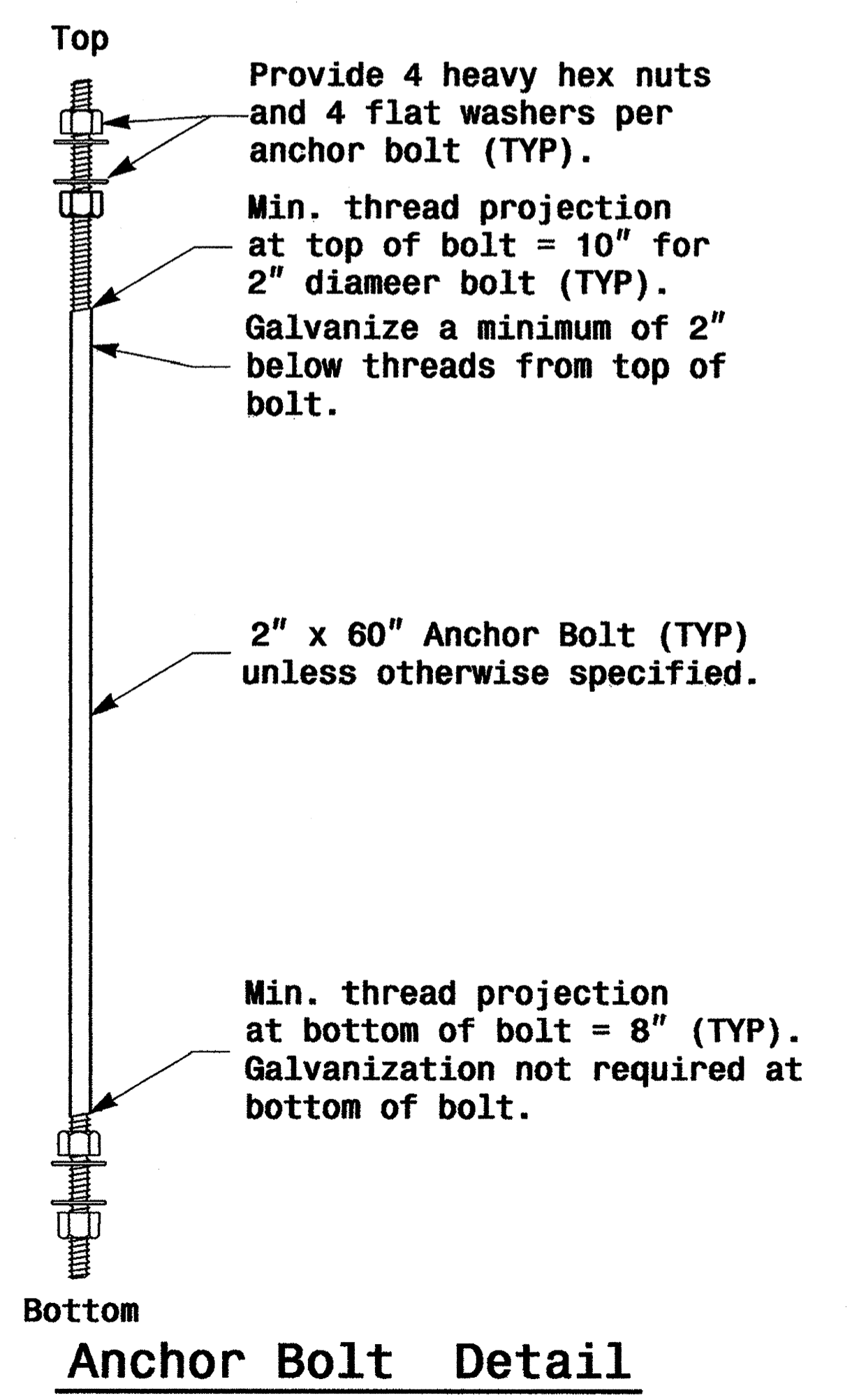
MFG	MFG. DATE: MM/YY
SHAFT D/T/L/Y
ARM-A D/T/L/Y
ARM-B D/T/L/Y
A.B. DIA./B.C./L/Y
NCDOT STANDARD

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

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

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

Identification Tag Details



Prepared in the Office of:

Typical Fabrication Details Common To All Metal Poles

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

SCALE: 0 NA NONE

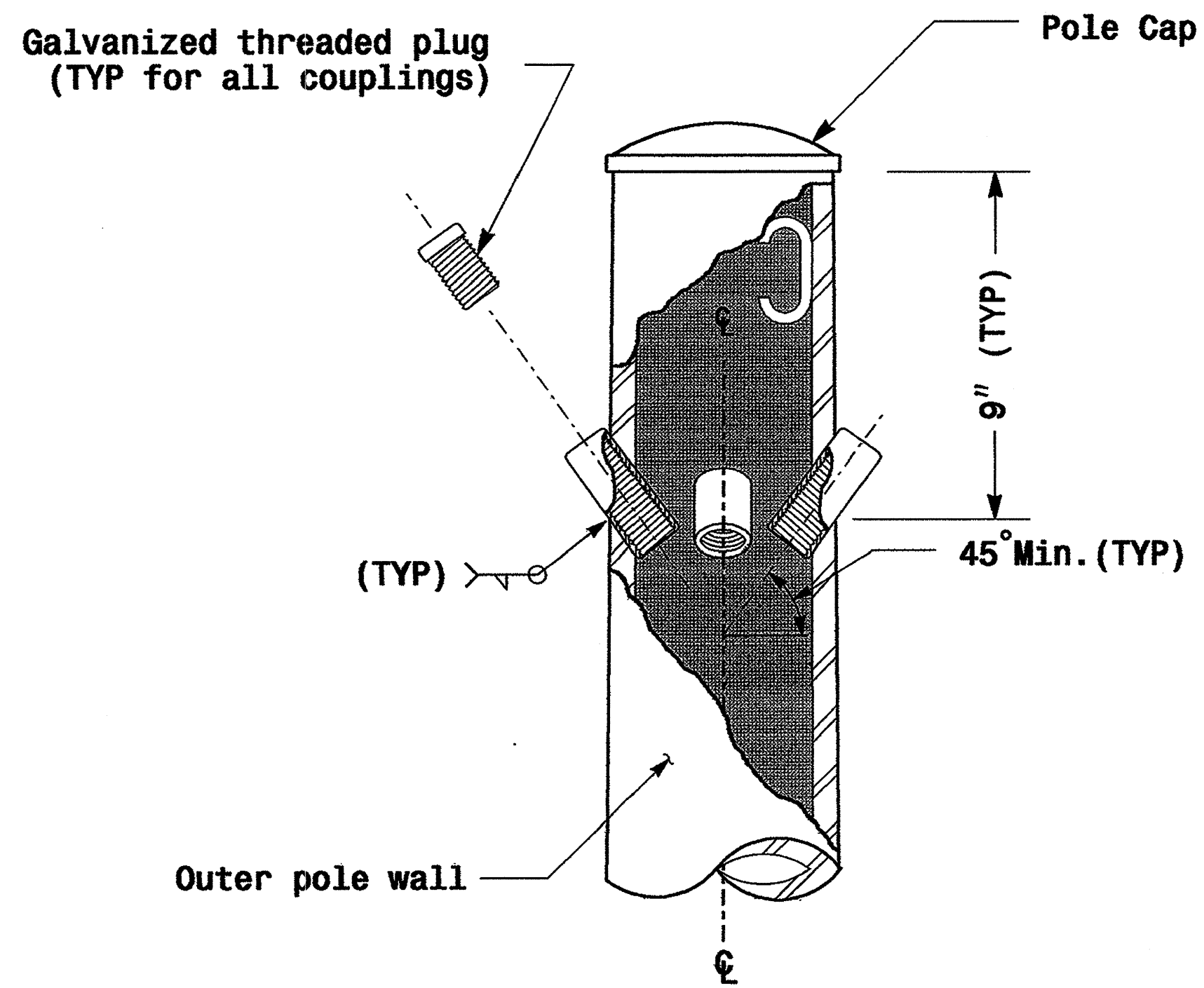
REVISIONS: INIT. DATE

Signature: *D. Sankar* 9.2.2005
 SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094
 SIGNATURE: D. Sankar DATE: 9.2.2005
 SIG. INVENTORY NO.

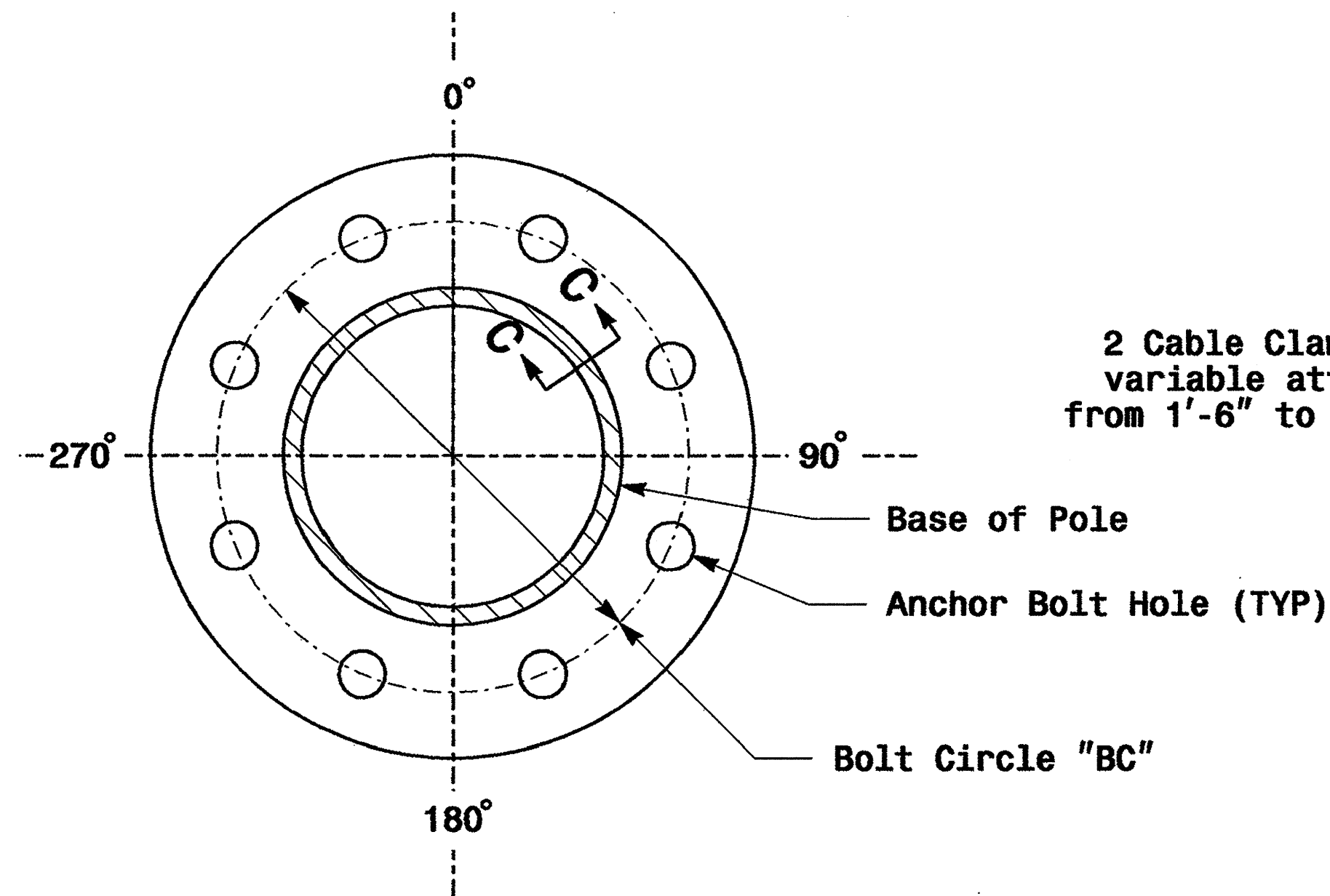
Fabrication Details - All Poles

01-565-2005-1822 01-565-2005-1822 Pole Standards.dwg004 re thru mfg.dgn

Fabrication Details - Strain Poles

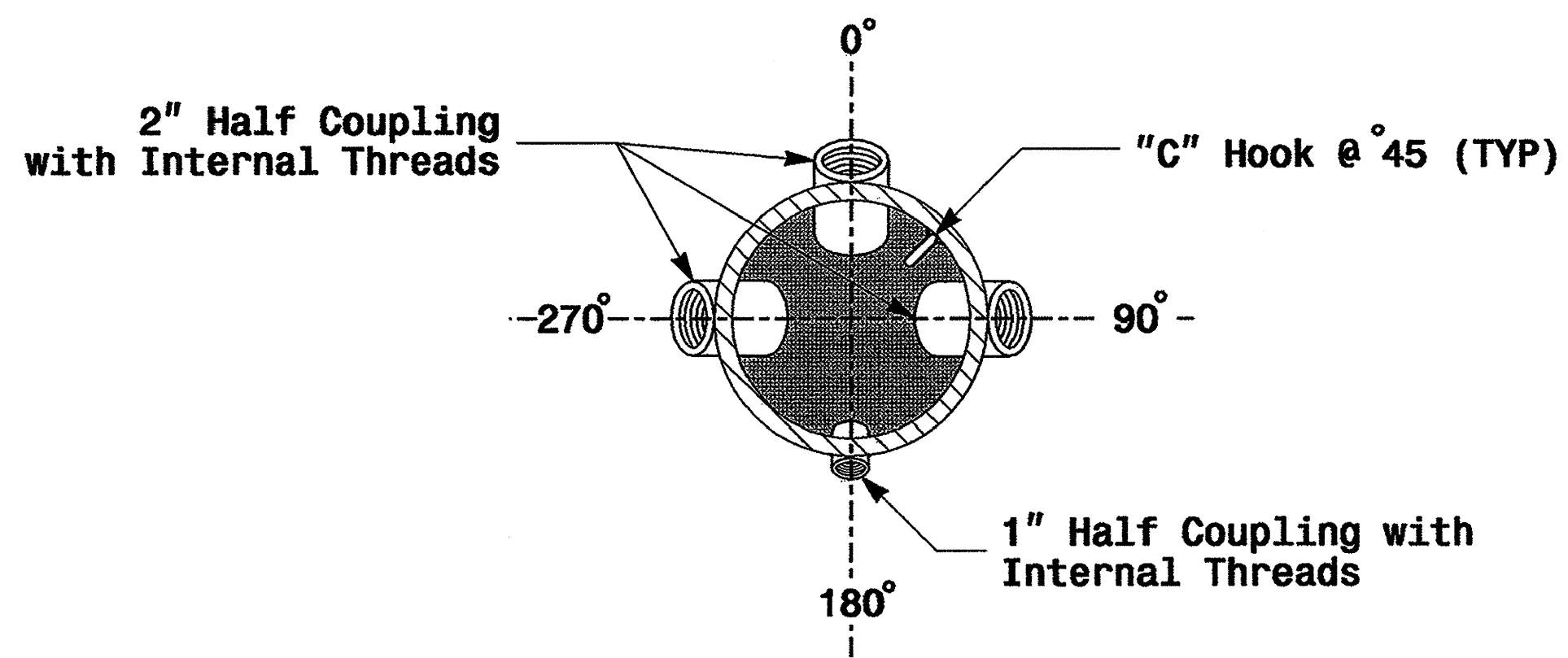
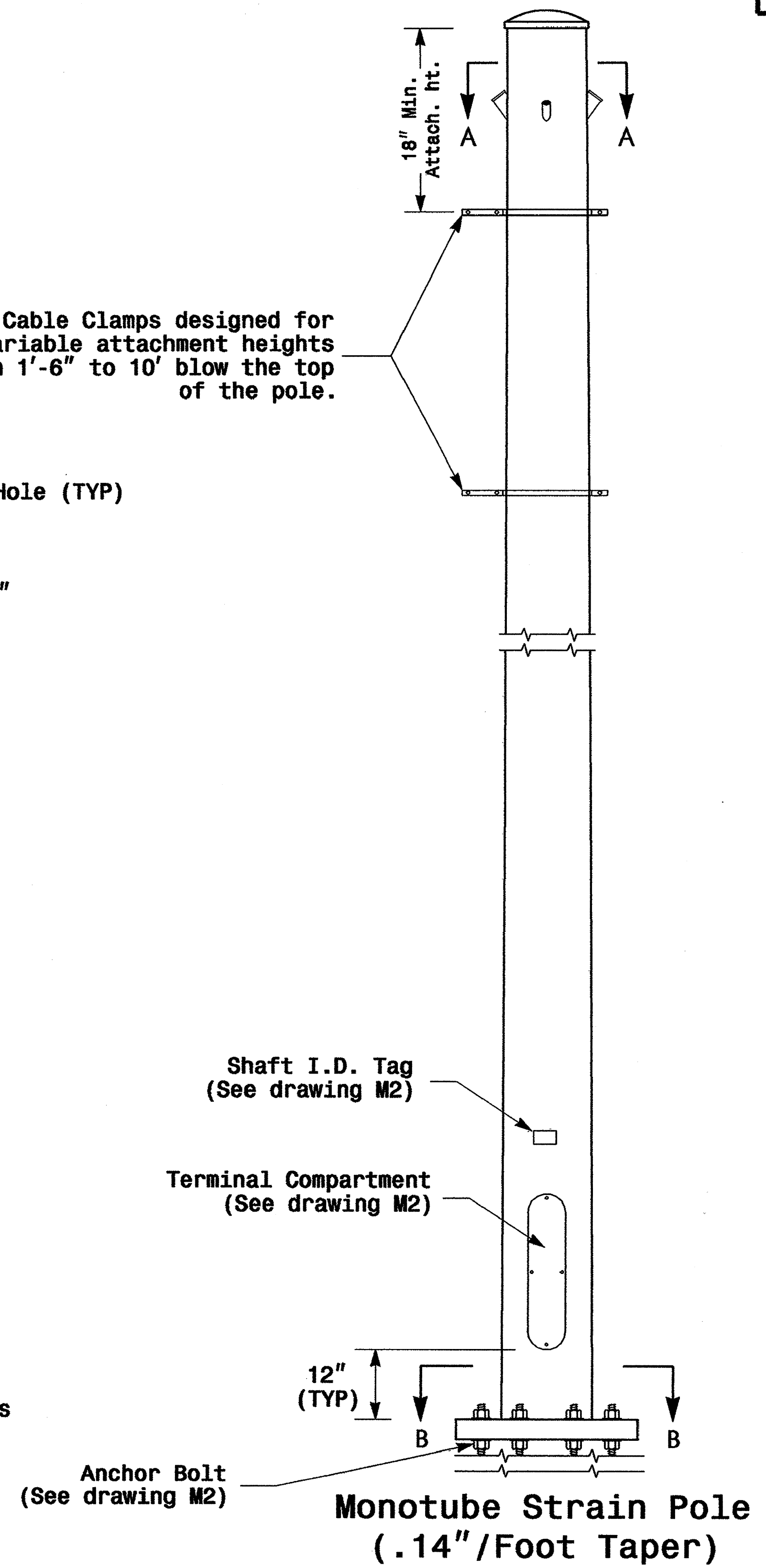


Cable Entrances at Top of Pole

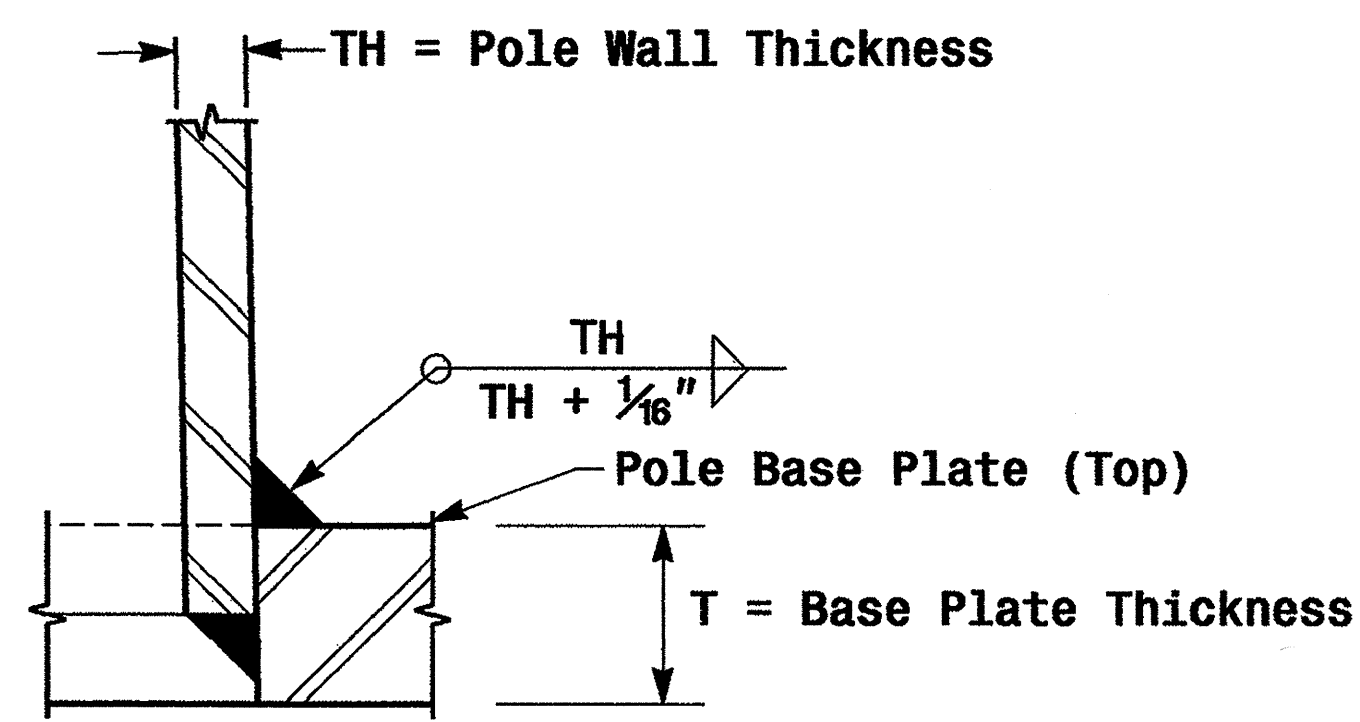


Section B-B
(See drawing M2)
Pole Base Plate

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



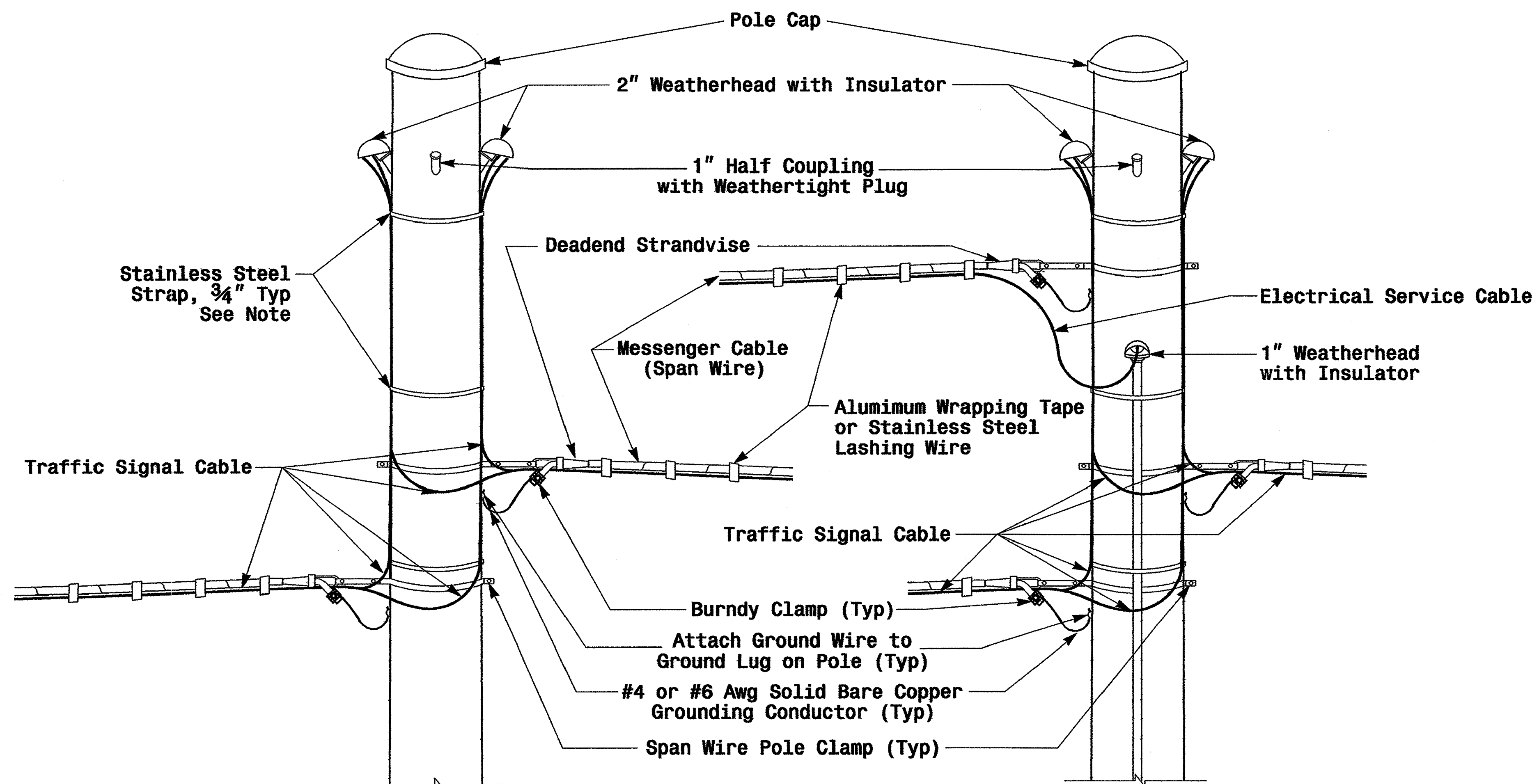
Section A-A
Radial Orientation for Factory Installed Accessories at Top of Pole



Section C-C
Socket Connection Weld Detail

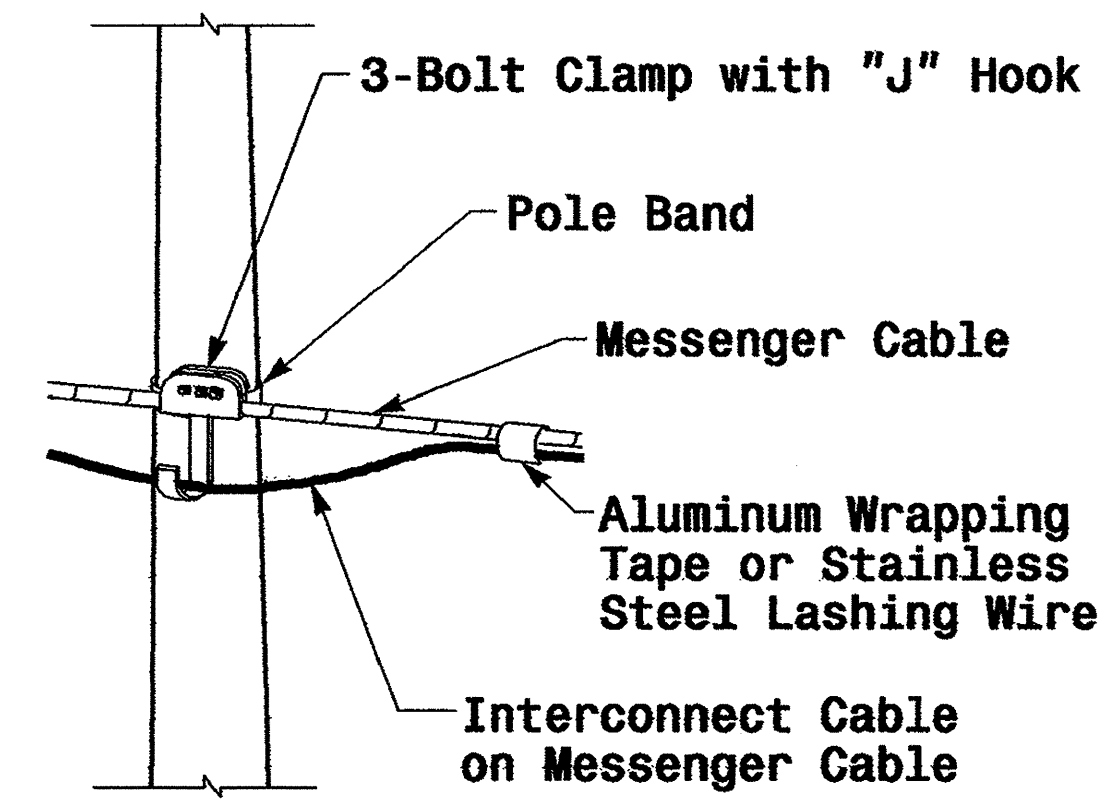
	<p>Typical Fabrication Details For Strain Poles</p>			
	<p>PLAN DATE: May 2005</p>	<p>REVIEWED BY: C.F. Andrews</p>		<p>SEAL</p>
	<p>PREPARED BY: P.L. Alexander</p>	<p>REVIEWED BY: A.M. Esposito</p>		<p>DATE: 9.2.2005</p>
<p>SCALE: NONE</p>	<p>REVISIONS</p>	<p>INIT.</p>	<p>DATE</p>	
<p>SIGNATURE: P. L. Alexander</p>	<p>SIGNATURE: A. M. Esposito</p>	<p>SIGNATURE: P. L. Alexander</p>	<p>SIGNATURE: A. M. Esposito</p>	
<p>SIG. INVENTORY NO.</p>	<p>SIG. INVENTORY NO.</p>	<p>SIG. INVENTORY NO.</p>	<p>SIG. INVENTORY NO.</p>	

Construction Details - Strain Poles

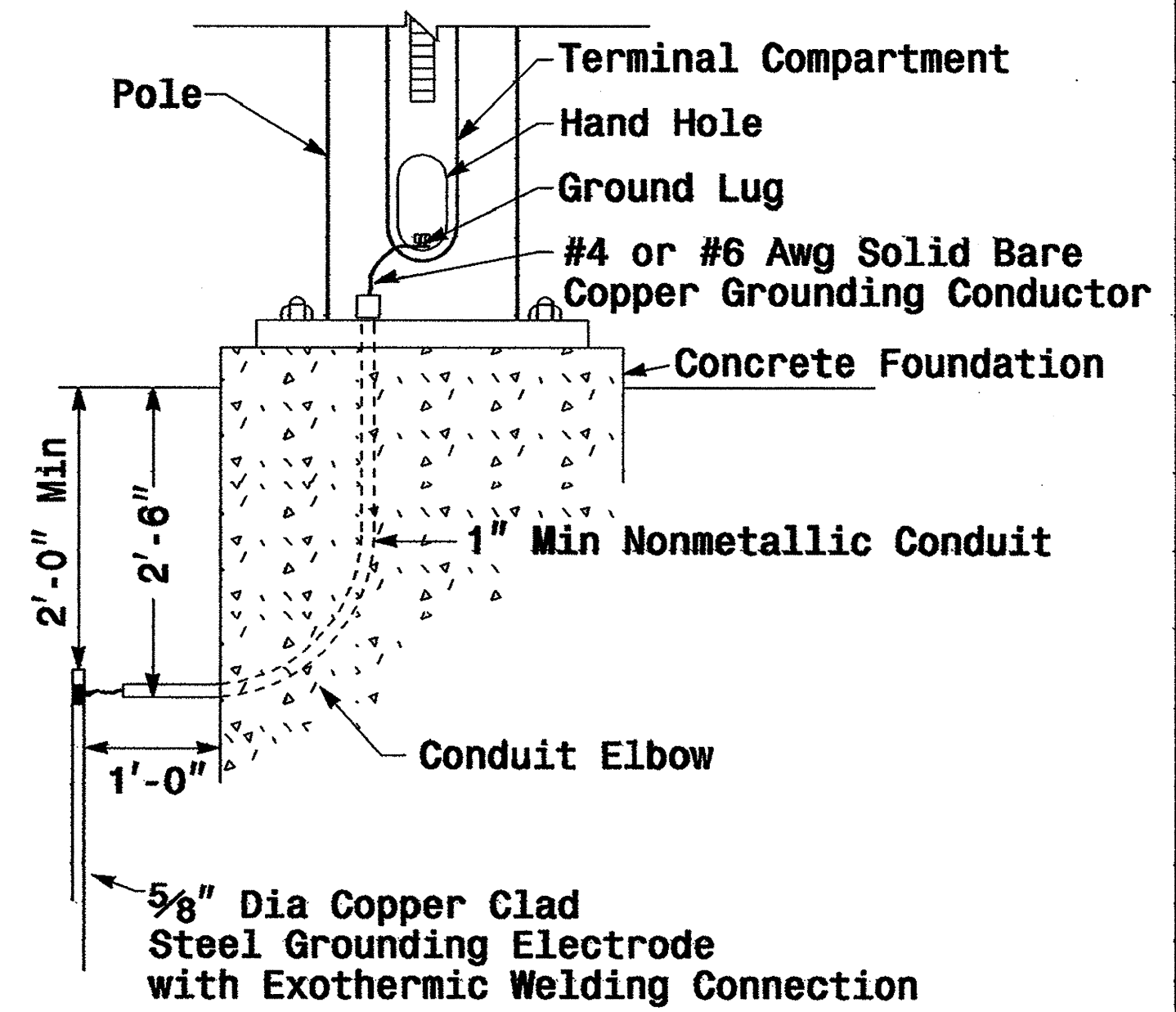


Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole

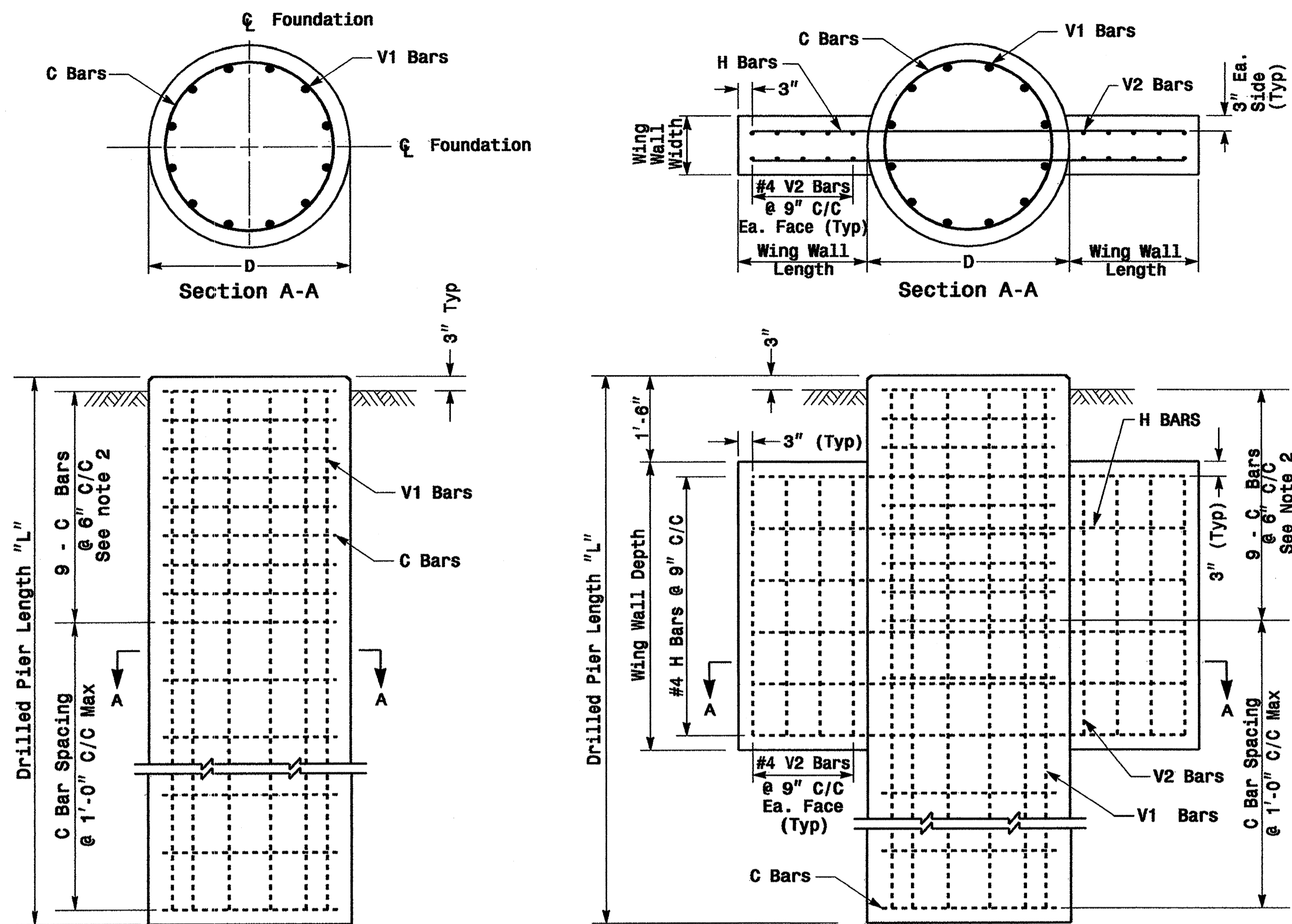


Metal Pole Grounding Detail

01-SEP-2005 16:33
w:\projects\104\104\work\groups\2004 metal pole standard\2004.mxd
20/04/04

	Construction Details Strain Poles		SEAL
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: D.C. SARKAR	REVISIONS INIT. DATE
SCALE: 0 NA NONE	222 N. McDowell St., Raleigh, NC 27603		

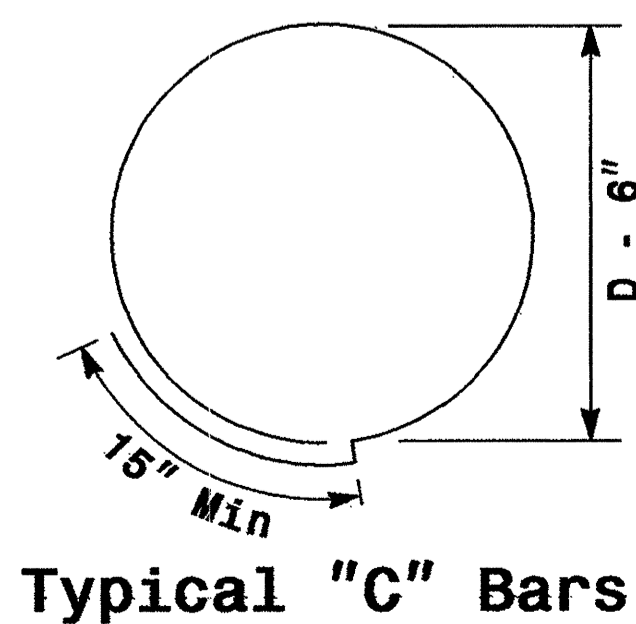
Reinforcing Steel Bars



REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER)

Shaft Dia. (in.)	Conc. Volume (cu. yds.)	Bar Name	No.	Size	Type	Length
42"	.356 x L	V1	9	#8	STR.	**
		C	*	#4	CIR.	10'-9"
48"	.465 x L	V1	12	#8	STR.	**
		C	*	#4	CIR.	12'-6"

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



REINFORCING STEEL TABLE FOR STANDARD 42" and 48" DRILL PIER SHAFT WITH TYPE 1 AND TYPE 2 WING WALLS

Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel					
		Bar Name	No.	Size	Type	Length	
TYPE 1	42"	V1	9	#8	STR.	**	
		V2	12	#4	STR.	2'-6"	
		H	8	#4	STR.	6'-0"	
		C	*	#4	CIR.	10'-9"	
TYPE 2	42"	V1	9	#8	STR.	**	
		V2	16	#4	STR.	4'-6"	
		H	12	#4	STR.	9'-0"	
TYPE 2	48"	C	*	#4	CIR.	10'-9"	
		V1	12	#8	STR.	**	
		V2	16	#4	STR.	4'-6"	
		H	12	#4	STR.	9'-6"	
		C	*	#4	CIR.	12'-6"	

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

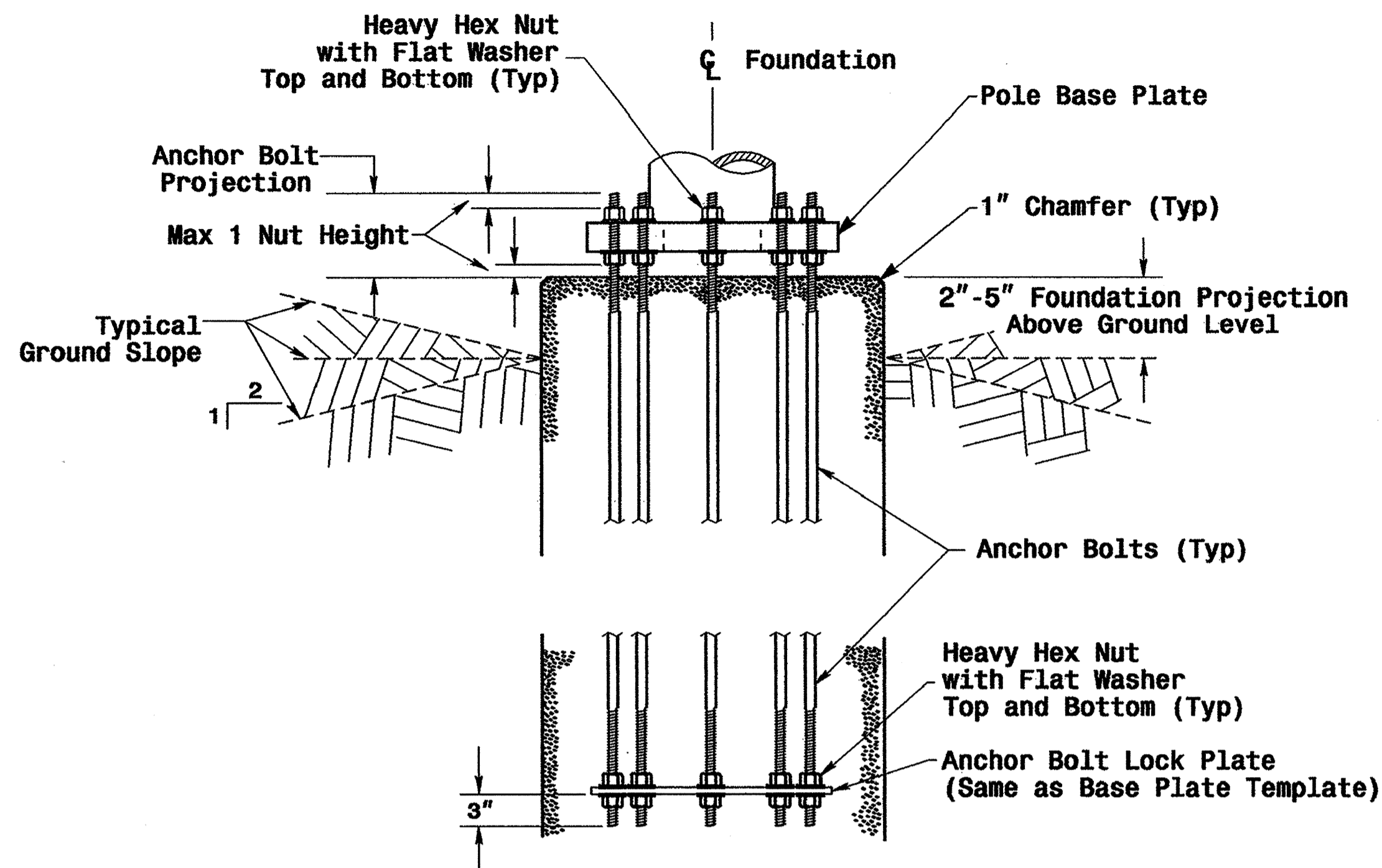
WING WALL DETAILS

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

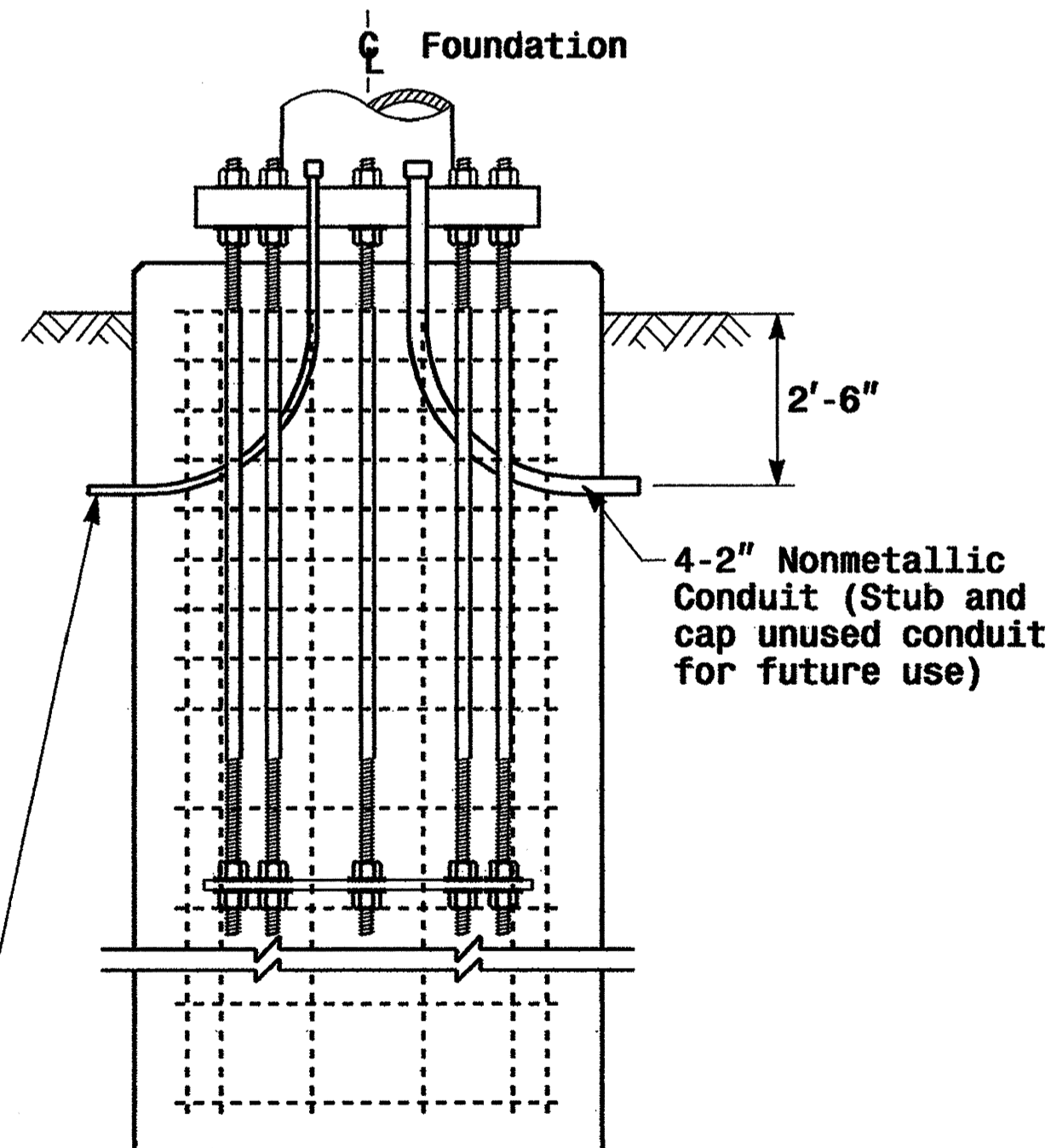
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



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.)

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

Prepared in the Office of:

Construction Details Foundations

FLM DATE: May 2005 REVIEWED BY: P.L. ALEXANDER
 PREPARED BY: C.F. ANDREWS REVIEWED BY: A.W. ESPOSITO

SCALE: 0 NA NONE

SIGNATURE: D. Sankar 9.2.2005
 DATE: 9.2.2005
 STG. INVENTORY NO.

Construction Details - Foundations

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

Concrete Volume (cubic yards) = .356 X L

Fabrication Design Notes:

1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.


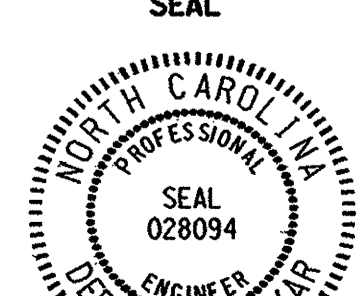
2. Base plate thickness (T) is 2.0 inches.

Foundation Selection:

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

Standard Strain Poles

05-SEP-2005 12:42 p:\se-unit\mcr\krc\pse2004 metal pole standard\004 m8 std strain pole.dgn

	Standard Strain Poles and Standard Foundations		
	PLAN DATE: May 2005	REVIEWED BY: C.F. Andrews	
SCALE: 0 NA None	REVISIONS:	INIT.	DATE
		SIGNATURE: <i>D. Sarker</i>	DATE: 9.2.2005

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

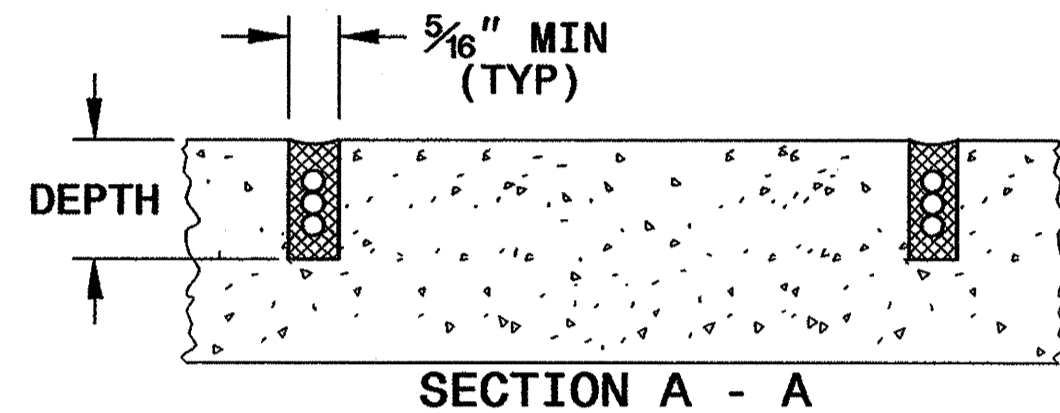
11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3
1725D01

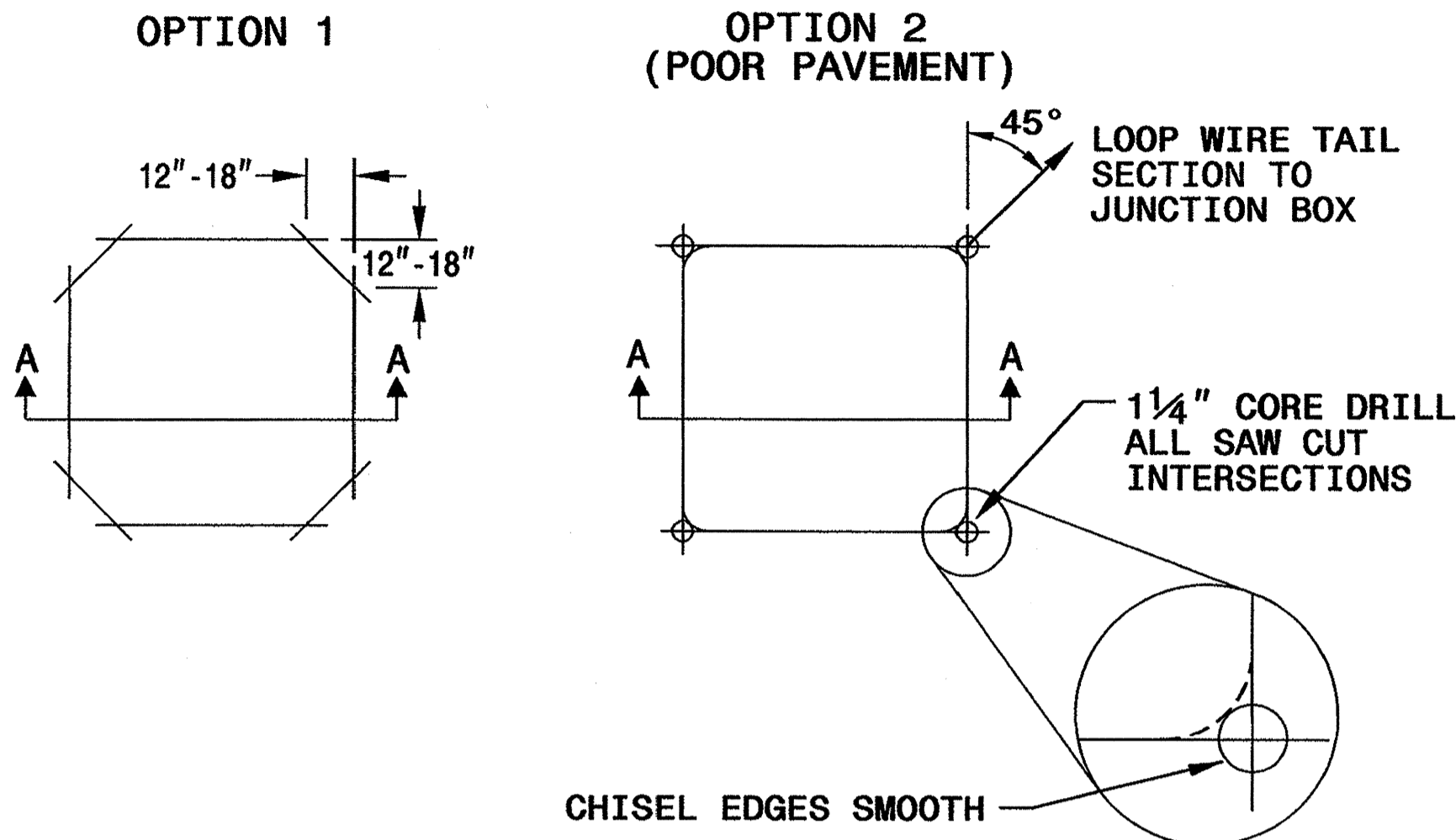
SAW SLOT DEPTH CHART

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

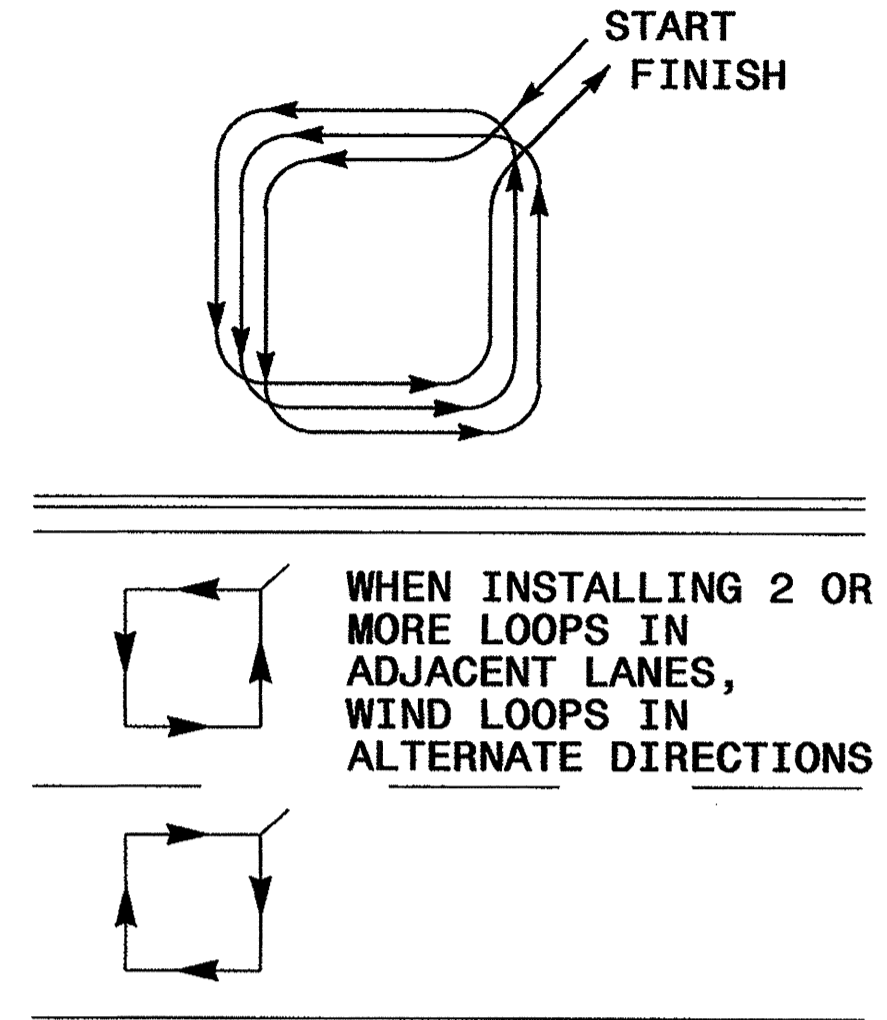


CONVENTIONAL 4-SIDED LOOP

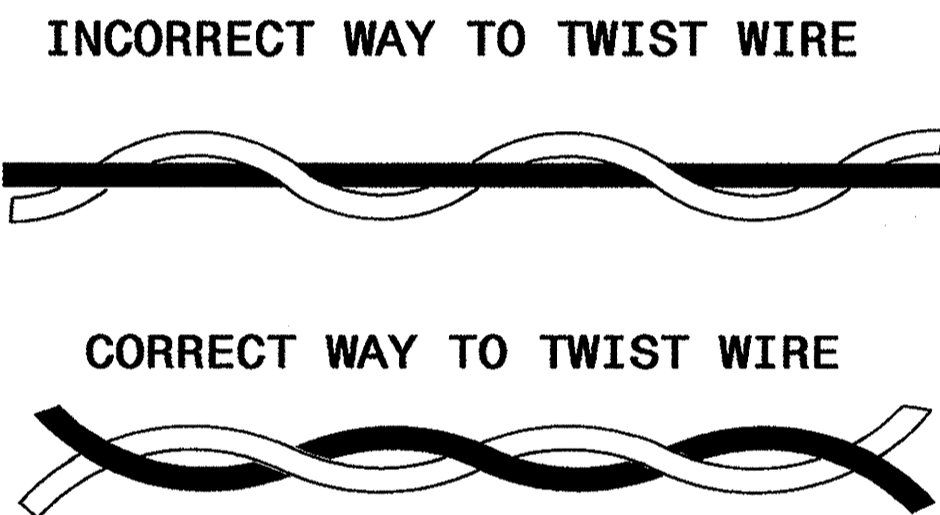
SAW CUT OPTIONS



LOOP WINDING METHOD



LOOP WIRE TWISTING METHOD

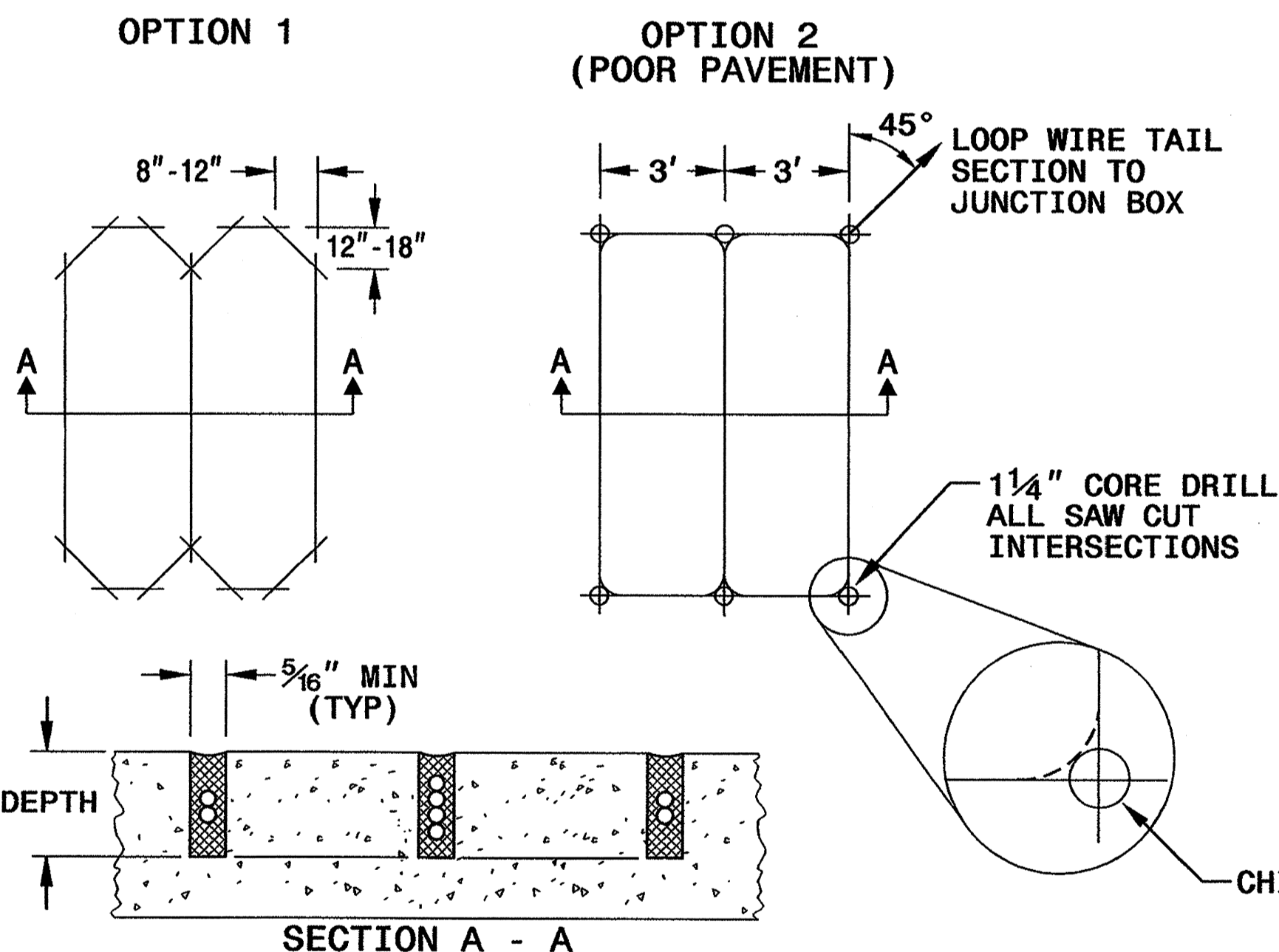


NOTES

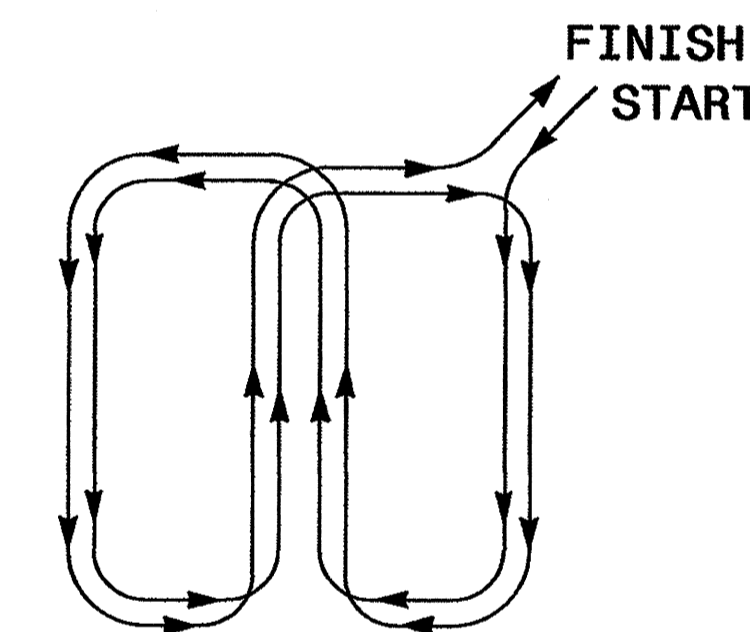
1. OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
2. MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
3. WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
4. LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

QUADRUPOLE LOOP

SAW CUT OPTIONS



LOOP WINDING METHOD



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

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DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3
1725D01

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

SIGNATURE: *Nicholas J. Dean* DATE: 11/24/08

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

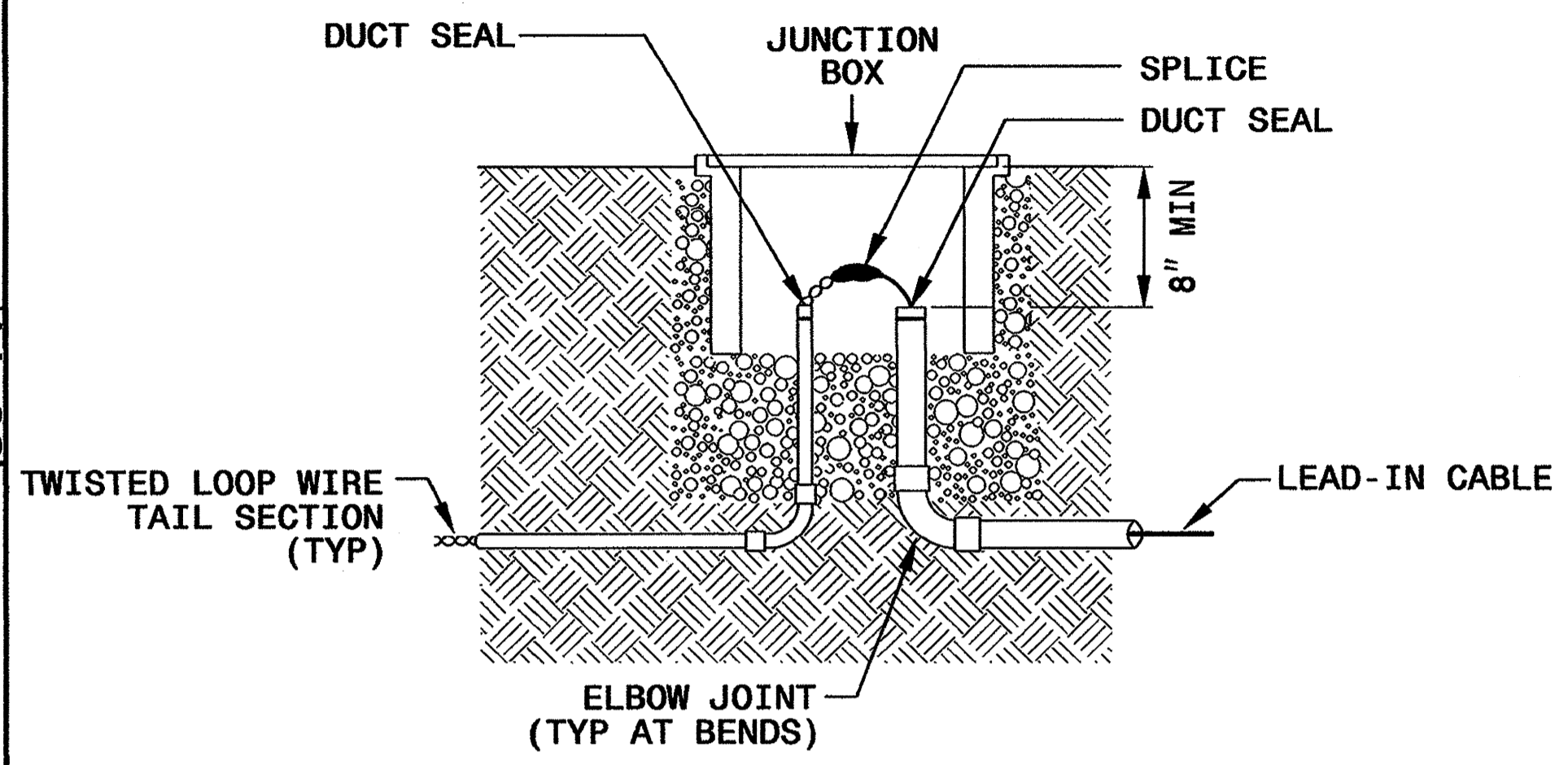
11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

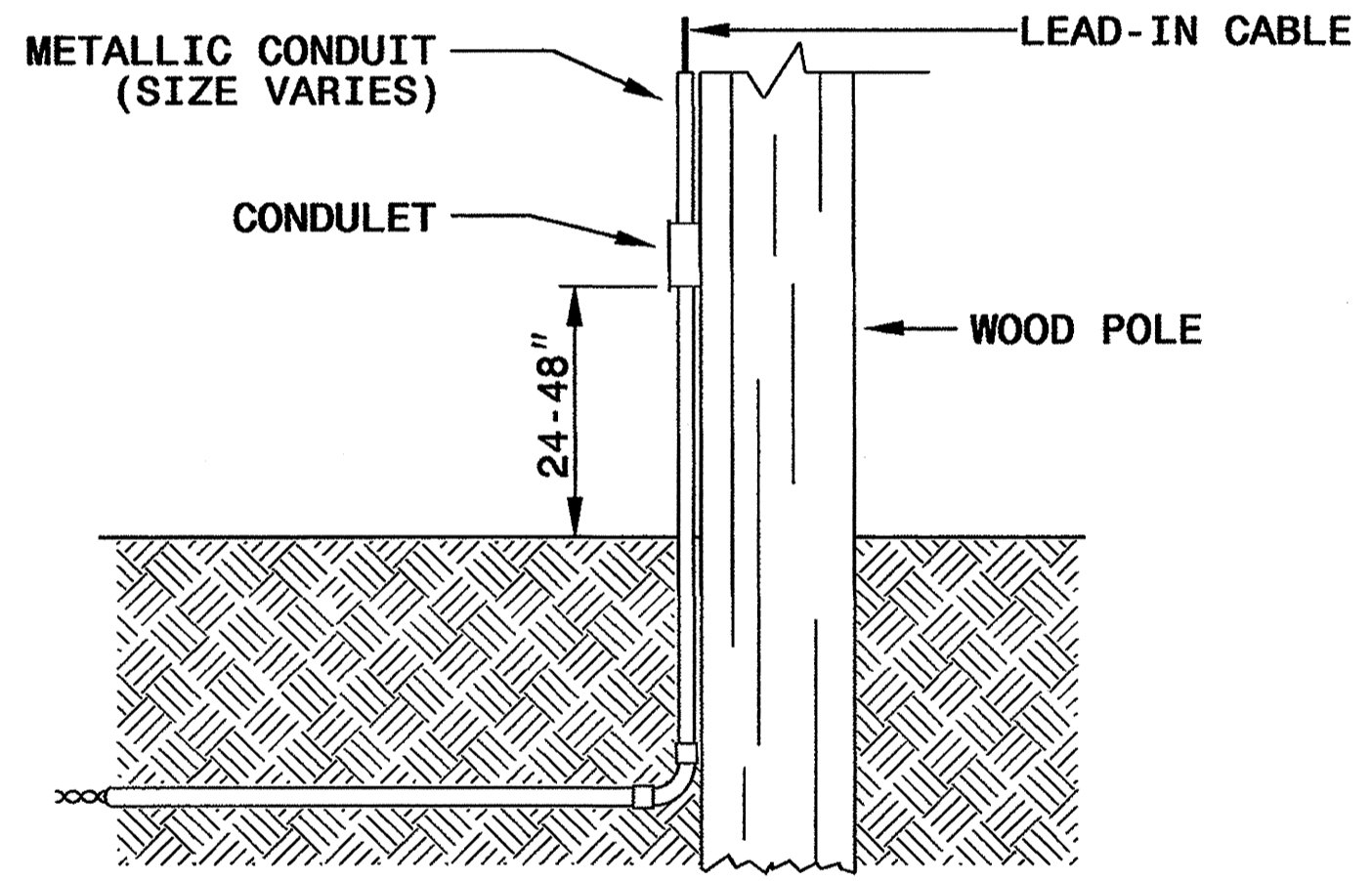
SHEET 2 OF 3
1725D01

LOOP WIRE SPLICE POINT DETAILS

LOOP WIRE AT JUNCTION BOX



LOOP WIRE AT POLE

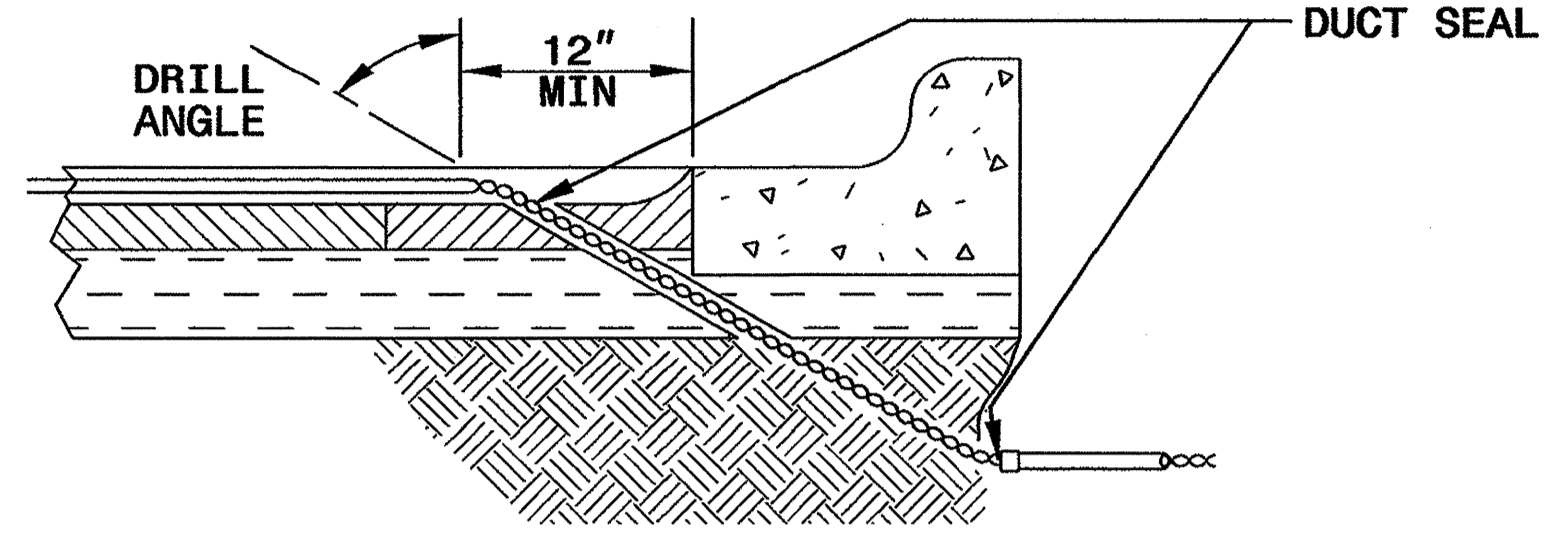


NOTE

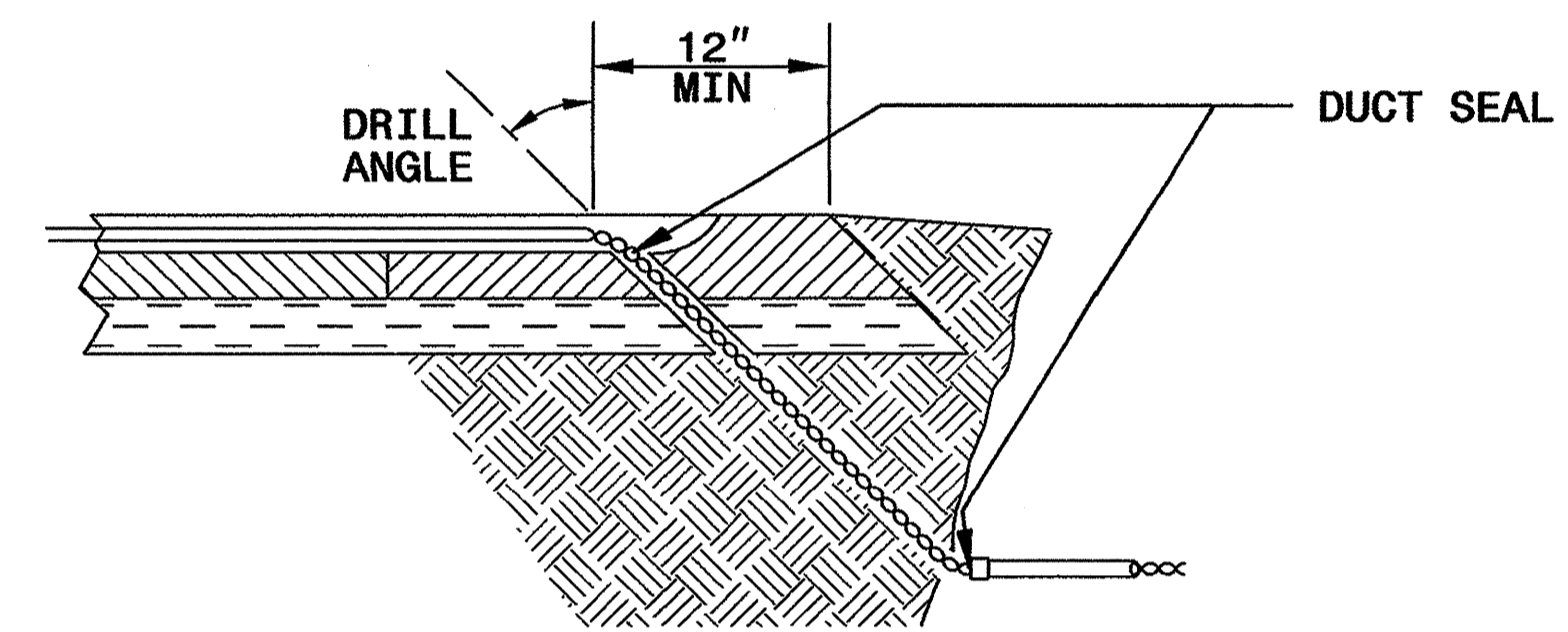
SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

LOOP WIRE PAVEMENT EDGE DETAILS

LOOP WIRE AT CURB & GUTTER SECTION



LOOP WIRE AT PAVEMENT SECTION



NOTES

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

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RALEIGH, N.C.

11-08

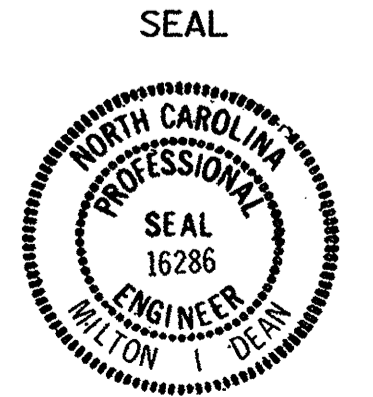
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

SHEET 2 OF 3
1725D01

See Plate for Title



750 N. Greenfield Parkway
Garner, NC 27529



Milton J. Dean 11/24/08
SIGNATURE DATE

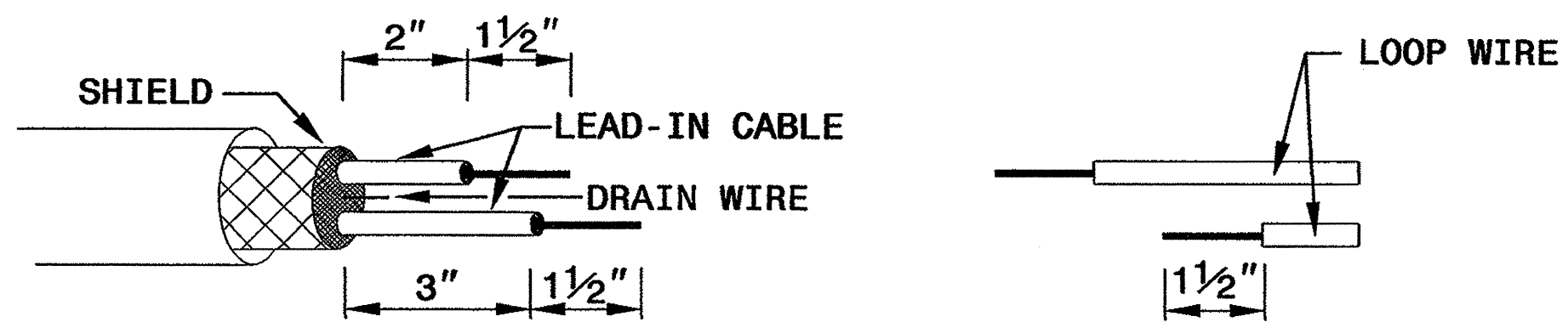
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

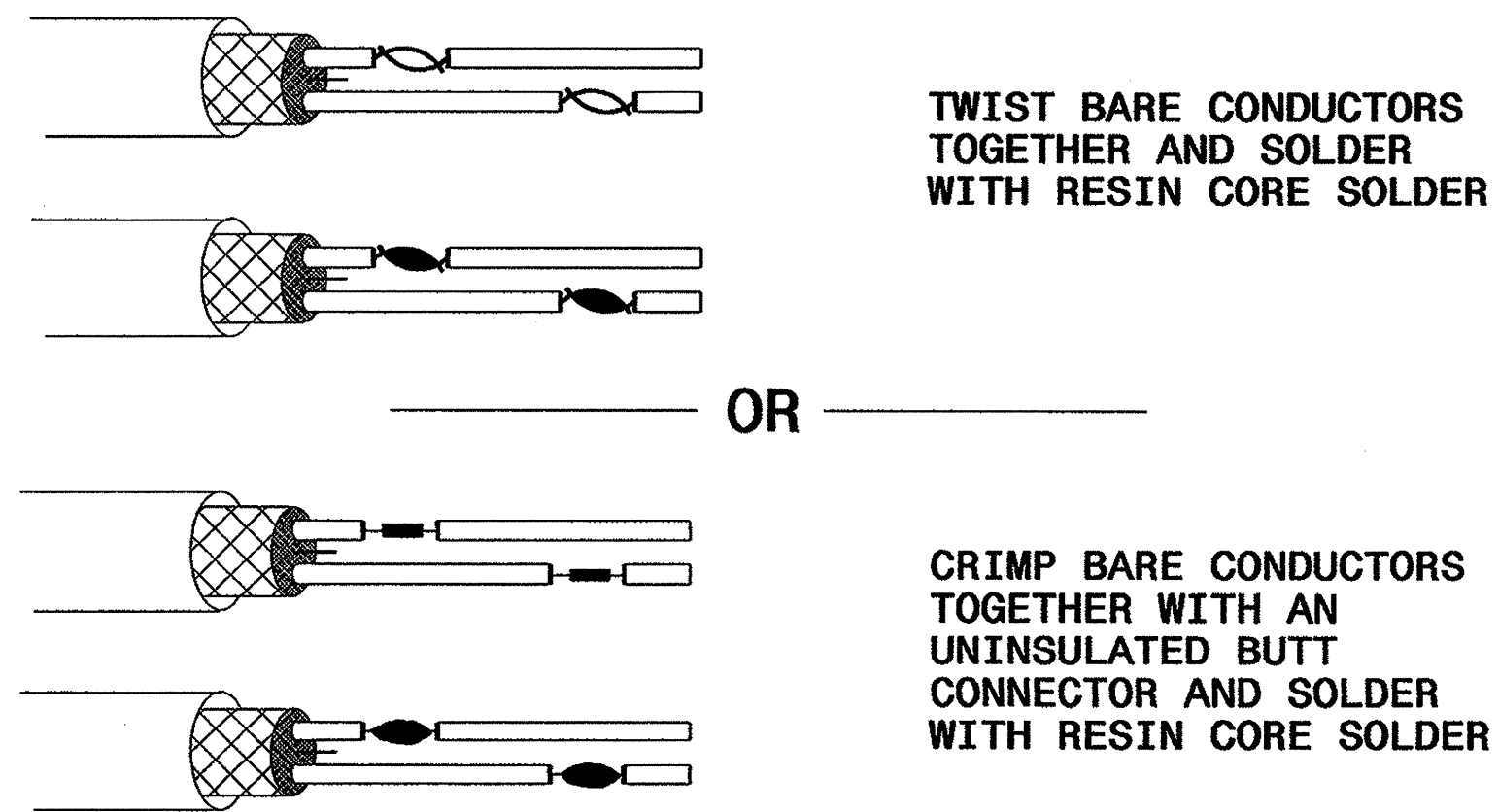
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE

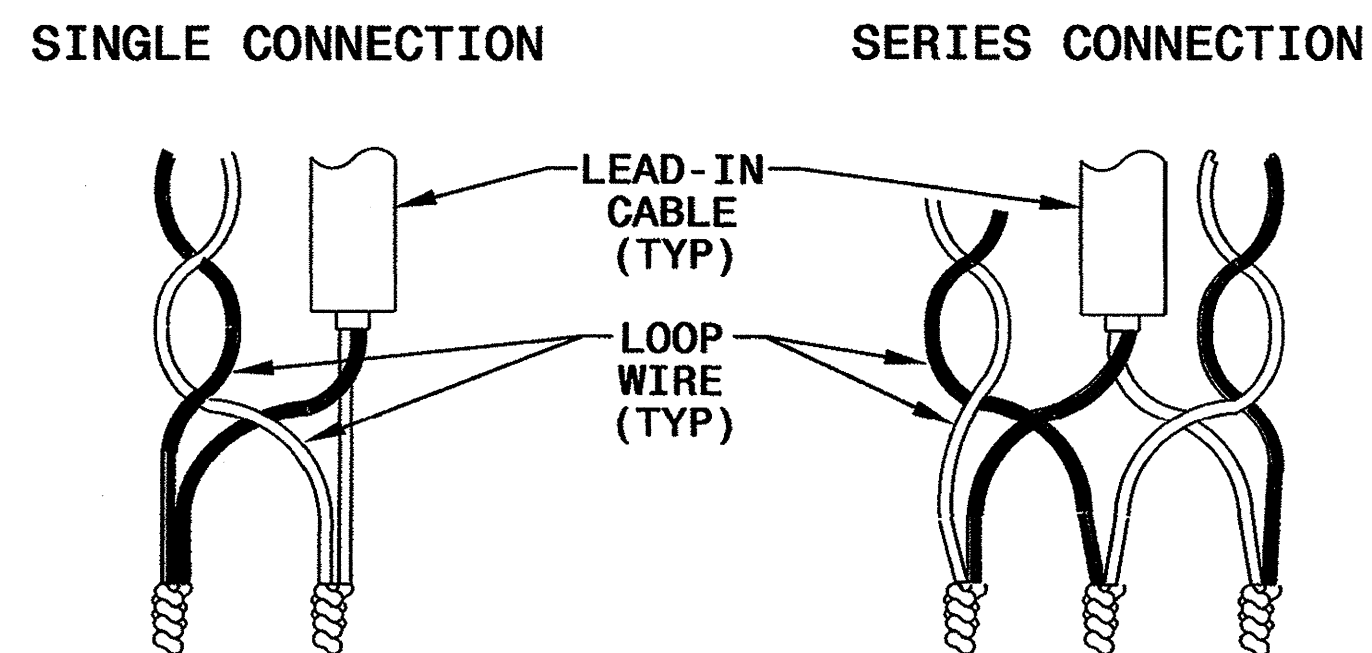


STEP 2. CONNECT AND SOLDER

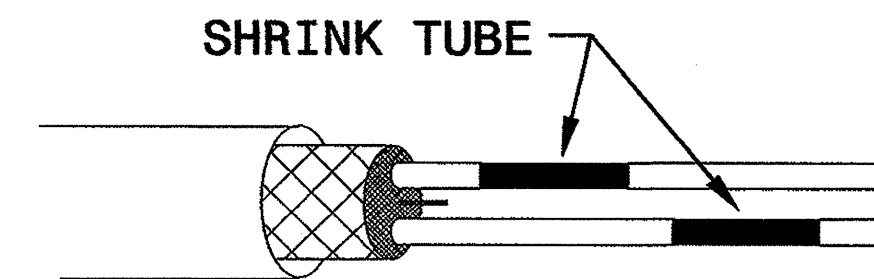


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

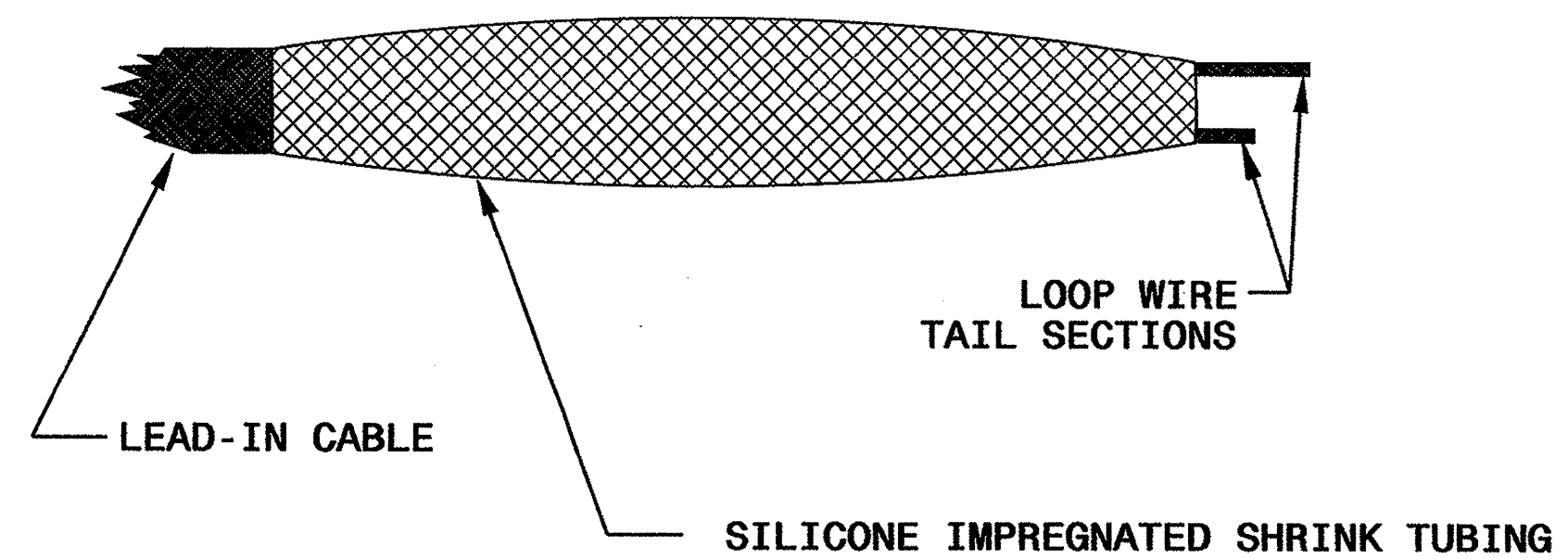
LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY PROTECT SPLICE



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RALEIGH, N.C.

11-08

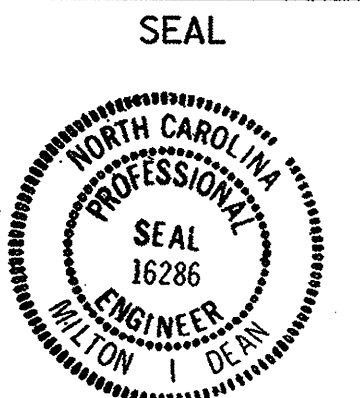
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

See Plate for Title



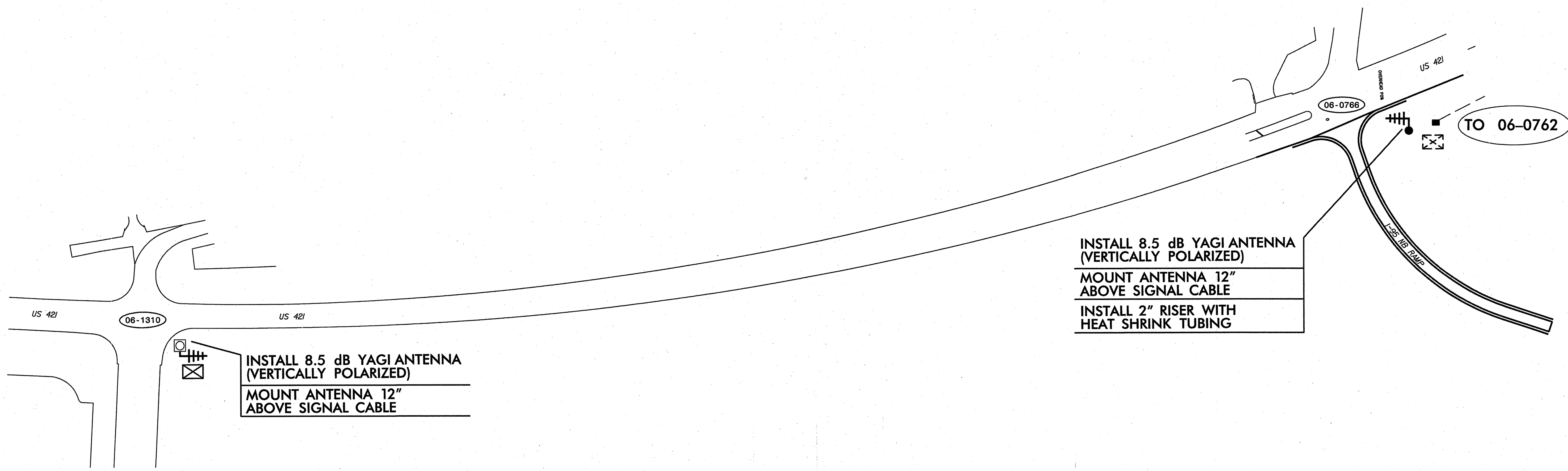
750 N. Greenfield Parkway
Garner, NC 27529



Milton I. Dean 11/24/08
SIGNATURE DATE

LEGEND

- ⚡ WIRELESS ANTENNA (SINGLE)
- ⊠ EXISTING CONTROLLER AND CABINET
- ⊠ PROPOSED CONTROLLER AND CABINET
- ⓧ (xx-xxxx) SIGNAL INVENTORY NUMBER
- EXISTING WOOD POLE
- ⊠ NEW METAL POLE

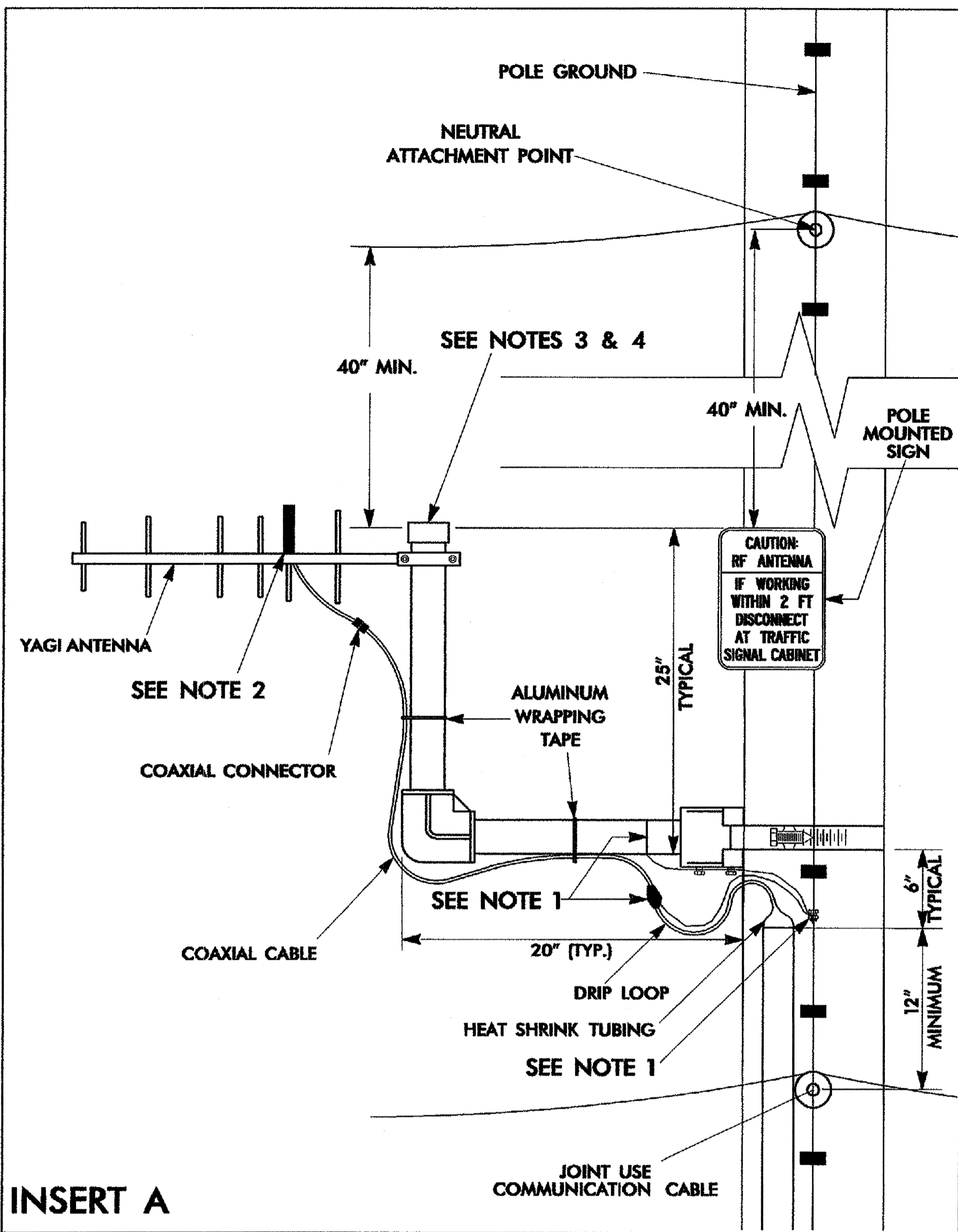


NOTES:

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 CABLES. RESEAL WITH HEAT SHRINK TUBING.
3. INSTALL WIRELESS ANTENNA ON POLE 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".



	US 421 (E CUMBERLAND ST) AT NC 55 WIRELESS COMMUNICATIONS PLANS	
	DIVISION 06 HARNETT COUNTY DUNN	
PLAN DATE: November 2009	REVIEWED BY: T. GRAVES	
PREPARED BY: A. ARCHER	REVIEWED BY:	
REVISIONS	INIT.	DATE
SCALE 1" = 100'	SIGNATURE _____ DATE _____	
SIG. INVENTORY NO. 06-1310		

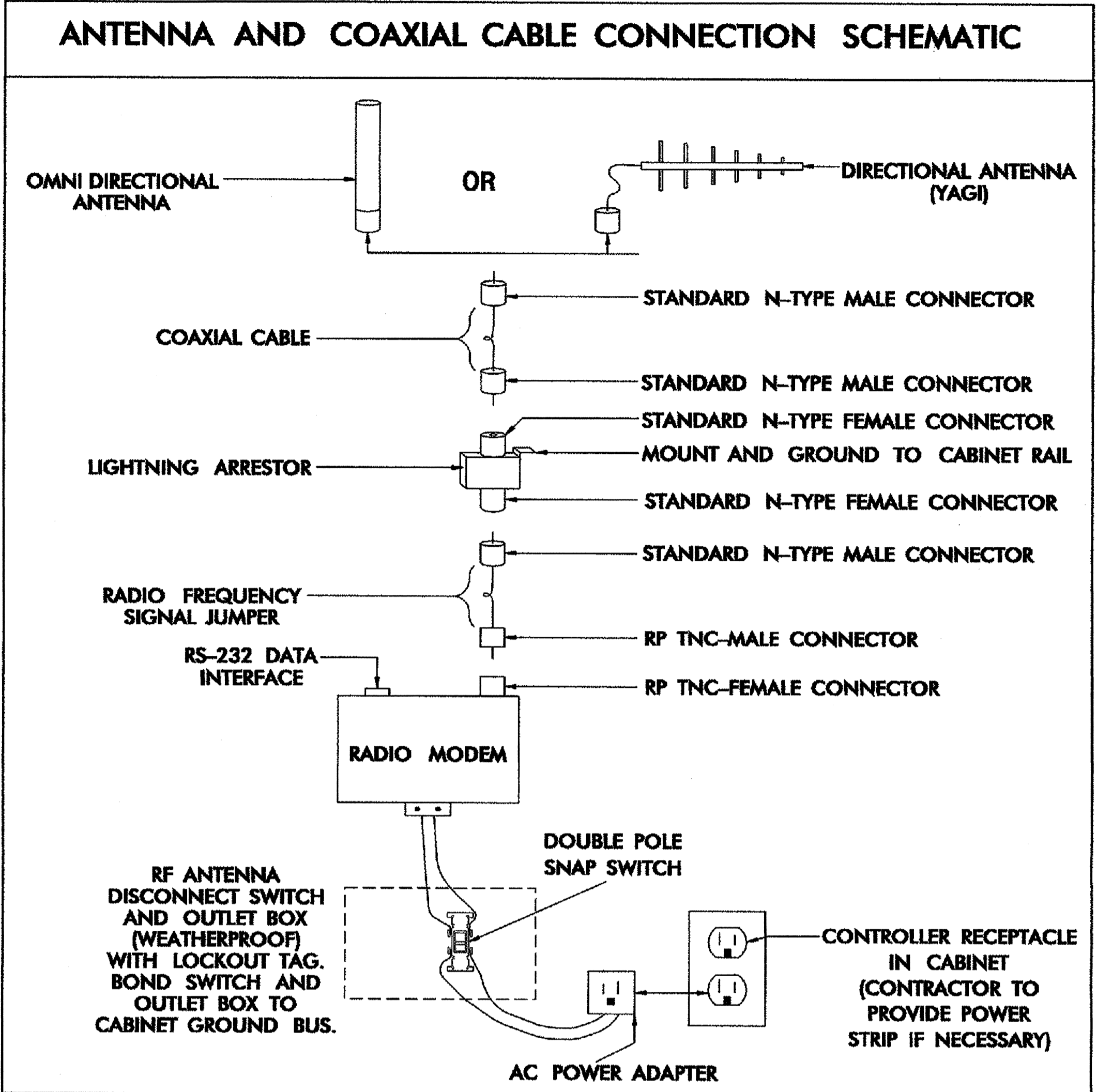
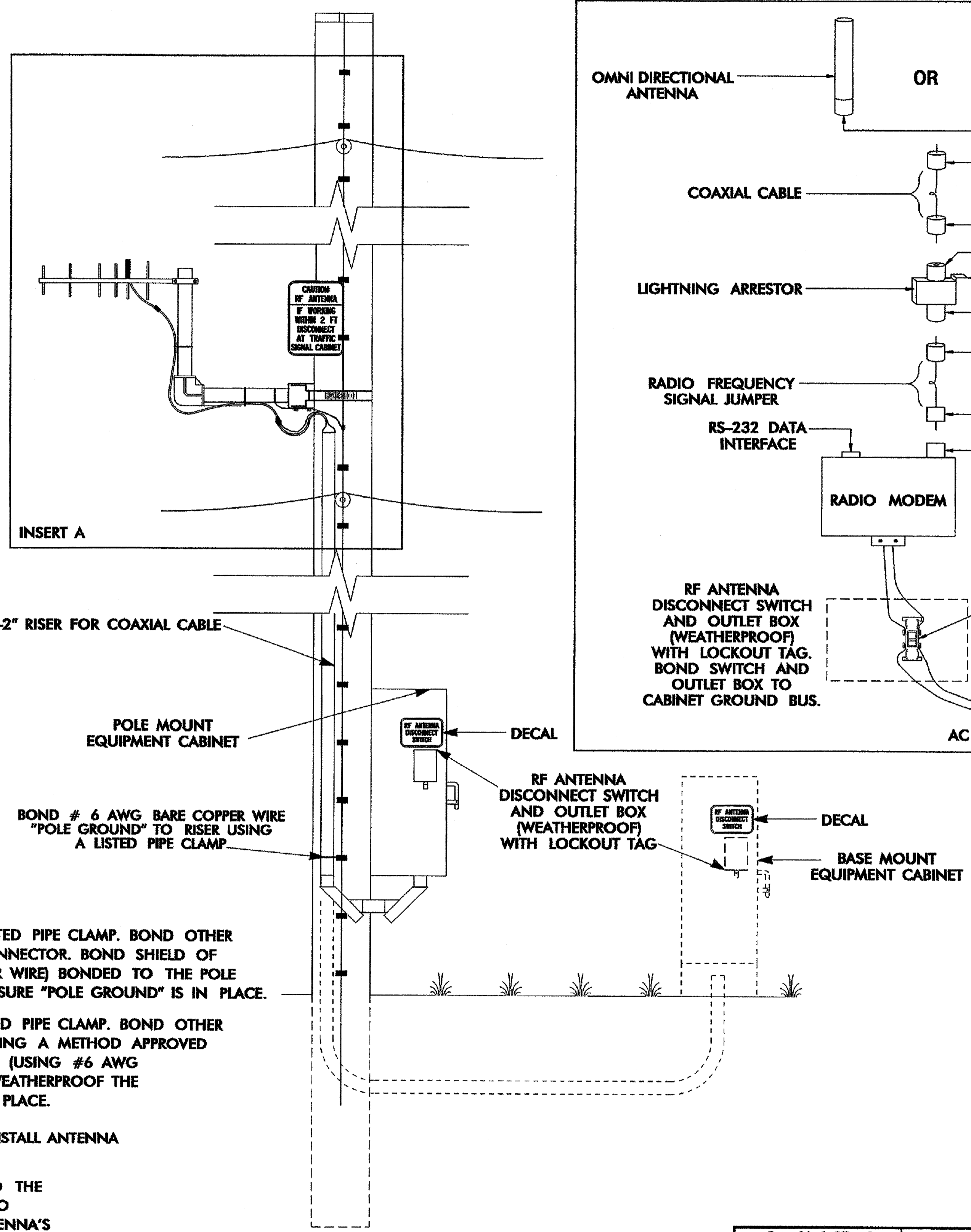


INSERT A

NOTES

1. 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.
2. YAGI ANTENNA SHOWN IN VERTICAL POLARIZATION POSITION FOR CLARIFICATION. TYPICALLY INSTALL ANTENNA IN HORIZONTAL POLARIZATION POSITION.
3. 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)
 - A) ROTATE THE VERTICAL SUPPORT ARM 90 DEGREES SUCH THAT THE ANTENNA IS AT THE SAME HEIGHT AS THE HORIZONTAL SUPPORT ARM.
 - B) ELIMINATE THE VERTICAL SUPPORT ARM AND MOUNT THE ANTENNA TO THE HORIZONTAL SUPPORT ARM.
 - C) ANTENNA, ANTENNA SUPPORT ARM, AND SIGN TO MAINTAIN A 40" SEPARATION FROM NEUTRAL /POWER AND 12" FROM OTHER UTILITIES.
4. INSTALL AN END CAP TO SEAL THE EXPOSED END OF THE MOUNTING PIPE.



	WIRELESS RADIO ANTENNA TYPICAL DETAILS		SEAL PROFESSIONAL ENGINEER GREGORY A. FAULKNER LICENSE NO. 023919 STATE OF NORTH CAROLINA
	PLAN DATE: JULY 2005 PREPARED BY: A. CREECH SCALE: 0	REVIEWED BY: I. N. AVERY REVIEWED BY: A. T. FAULKNER REVISIONS:	

DECAL

POLE MOUNTED SIGN

SIGN NUMBER: SPO5224 BACKG COLOR: Yellow
 TYPE: DECAL COPY COLOR: Black

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

SYMBOL	X	Y	WID	HT

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: MAT'L: 0.063" (1.6 mm) ALUMINUM

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:

NOTE: THIS SIGN SHALL BE PRODUCED AS A DECAL

SIGN NUMBER: SPO5223 BACKG COLOR: Yellow
 TYPE: D COPY COLOR: Black

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

SYMBOL	X	Y	WID	HT
BAR	0.2	8.2	8.6	1.0

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: MAT'L: 0.063" (1.6 mm) ALUMINUM

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:

0.60 SPACING FACTOR

LETTER POSITIONS

Letter spacings are to start of next letter

Series/Size	Text Length	R	F	A	N	T	E	N	N	A			
C1	7.2	0.9	0.8	0.5	1	0.8	0.7	0.7	0.7	0.8	0.7	0.6	0.9
C1	6.7	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	3.9	2.6	0.7	0.9	0.3	0.7	0.7	0.5	2.6				

Spacing Factor is 1 unless specified otherwise

LETTER POSITIONS

Letter spacings are to start of next letter

Series/Size	Text Length	C	A	U	T	I	O	N	:								
C	4.4	2.3	0.6	0.7	0.6	0.6	0.3	0.7	0.7	0.1	2.3						
C	6.7	1.2	0.7	0.5	1	0.7	0.6	0.6	0.7	0.6	0.6	1.2					
C	6.1	1.4	0.3	0.5	1	0.8	0.7	0.7	0.6	0.3	0.7	0.5	1.4				
C	6.8	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	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	6.2	1.4	0.7	0.5	1	0.6	0.6	0.7	0.6	0.6	0.3	0.5	1.4				
C	7.9	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

Spacing Factor is 1 unless specified otherwise

NORTH CAROLINA D.O.T. SIGN DETAIL

Prepared in the Offices of:

WIRELESS RADIO ANTENNA TYPICAL DETAILS

PLAN DATE: JULY 2005 REVIEWED BY: I. N. AVERY
 PREPARED BY: A. GREECH REVIEWED BY: A. T. FAULKNER

SCALE: 0

REVISIONS: INIT. DATE

Signature: *Gregory A. Fuller* 9/12/05 DATE

CADD File Name: