



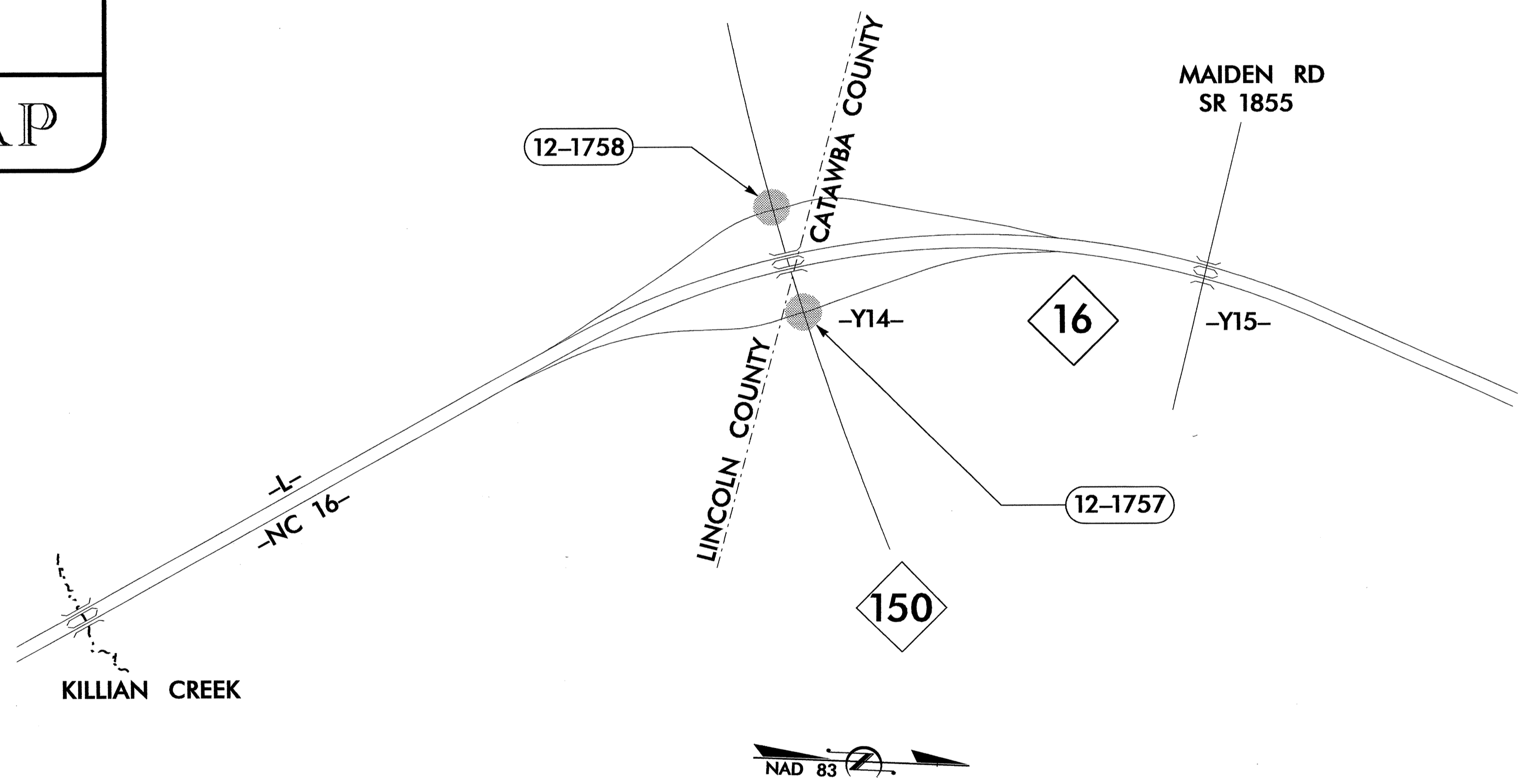
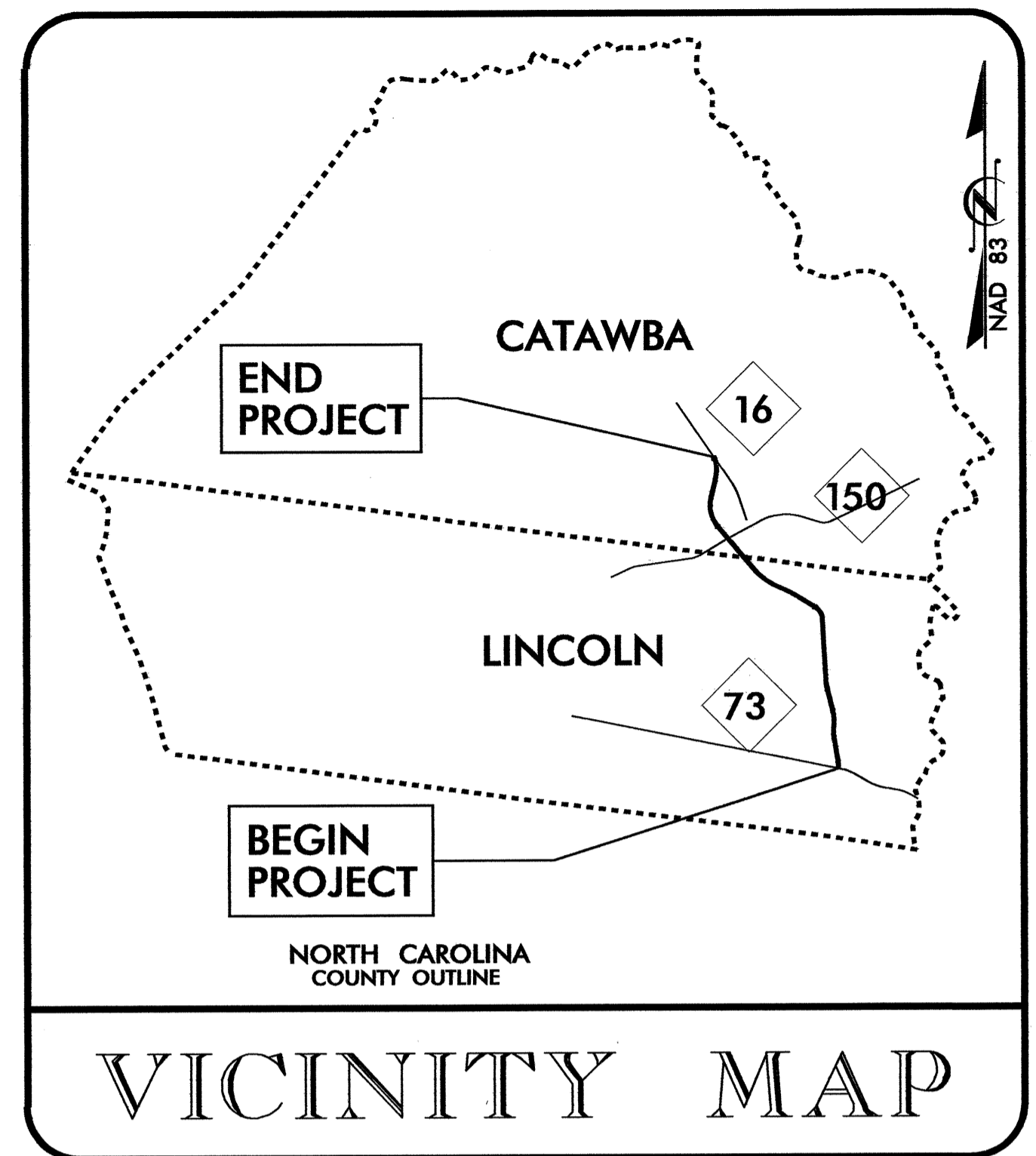
TIP: R-2206BA & CA

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

LINCOLN COUNTY

LOCATION: NC 150 AT NC 16 NORTHBOUND AND SOUTHBOUND RAMPS

TYPE OF WORK: TRAFFIC SIGNALS & COMMUNICATIONS CABLE ROUTING PLANS



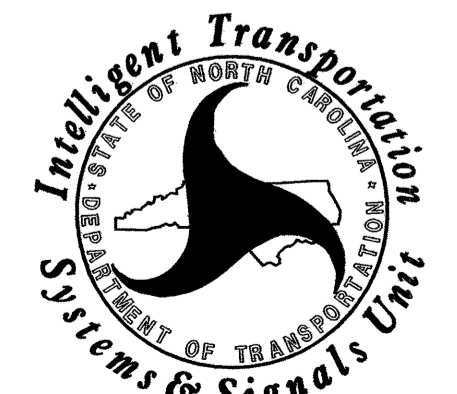
Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.

Sheet #	Reference #	Index of Plans Location/Description
Sig. 1		Title Sheet
Sig. 2-3	12-1757	NC 150 at NC 16 Northbound Ramp
Sig. 4-5	12-1758	NC 150 at NC 16 Southbound Ramp
Sig. 6-11	N/A	Standard Drawings for Metal Poles
Sig. 12-14	N/A	Communications Cable Routing Details
Sig. 15-17	N/A	Inductive Detection Loop Details

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:
Timothy J. Williams, PE - S&G Contracts Engineer
George C. Brown, PE - Signal Equipment Design Engineer
G. G. Murr, Jr., PE - Intelligent Transportation Systems Engineer

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

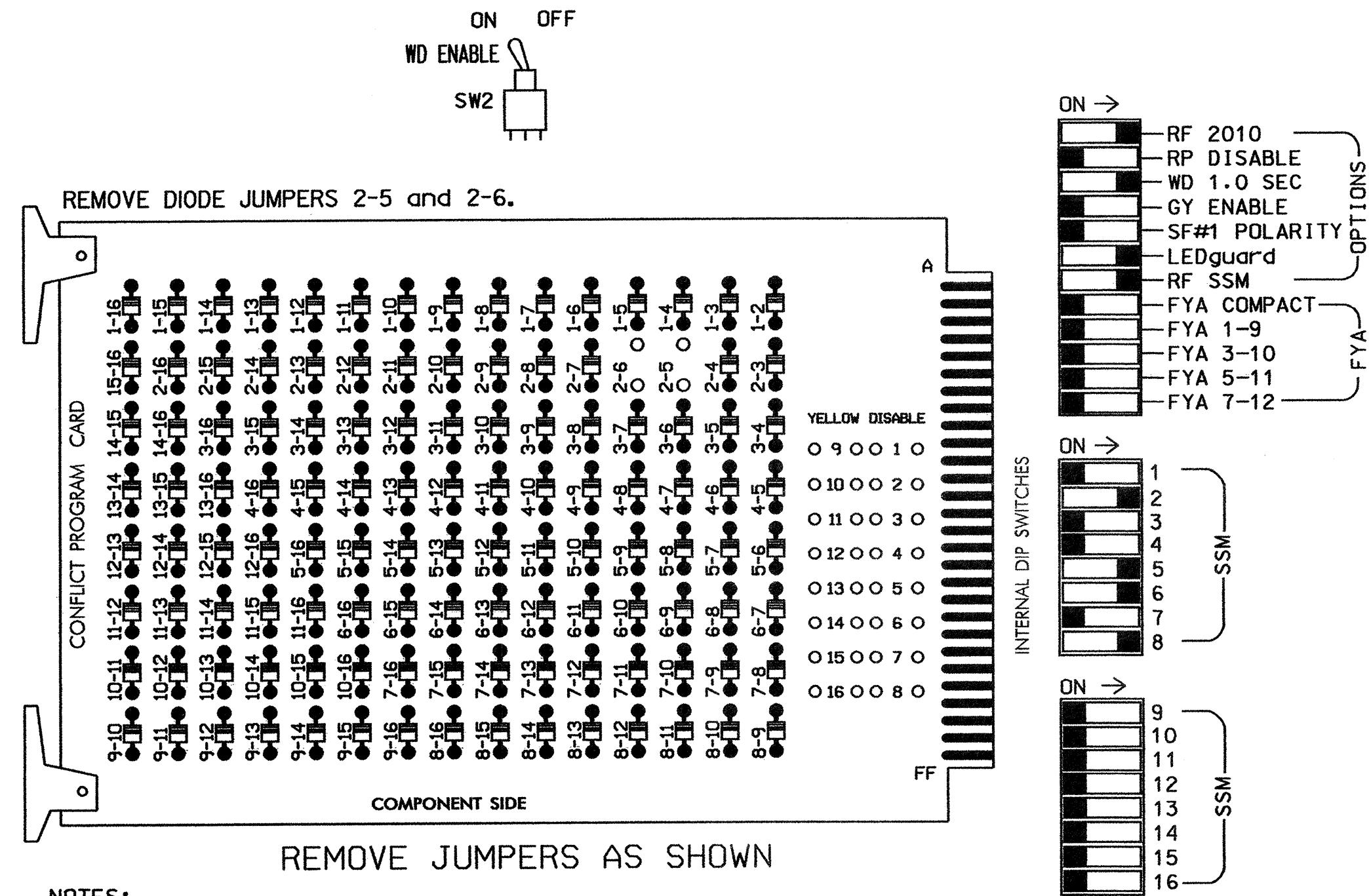


750 N. Greenfield Parkway, Garner, NC 27529

07-MAY-2008 08:56:00
 C:\Users\jwilliams\workgroups\tip_projects\R-2206BA\SIGNALS\Design\Titlesheet\Titlesheet.rvt-2206ba.tsh.dgn

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. 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, 7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.
6. The cabinet and controller are part of the NC 150 / NC 16 Closed Loop System.

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	NU	NU	21	61,62	NU	NU	81,82	NU
RED		128					*	134			107	
YELLOW		129						135			108	
GREEN		130						136			109	
RED ARROW												
YELLOW ARROW							132					
GREEN ARROW							133					

NU = Not Used

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S5,S6,S8
 PHASES USED.....2,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS	∅2/SYS
L	2A/S3	NOT USED												FS
														DC ISOLATOR
														ST
														DC ISOLATOR
U	∅5	∅6/SYS	∅5	∅5	∅8	∅5	∅5	∅5	∅5	∅5	∅5	∅5	∅5	∅5
L	5A	6A/S4			8A									
	∅2	NOT USED			∅8									
	5A				8B									

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

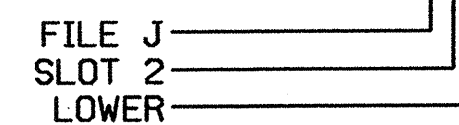
FS = FLASH SENSE
 ST = STOP TIME

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/S3	TB2-5,6	J2U	39	1	2	2/SYS	Y	Y			
5A ¹	TB3-5,6	J2U	40	2	6	5	Y	Y			15
	TB3-7,8	J2L	44	6	16	2	Y	Y	Y		3
6A/S4	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			10

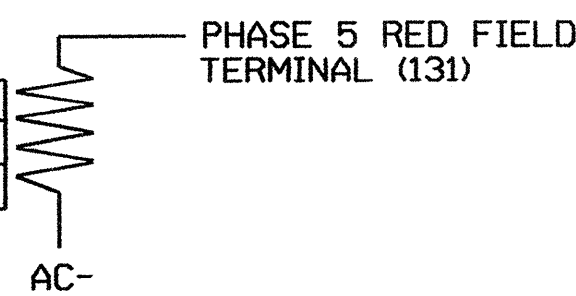
¹Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

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

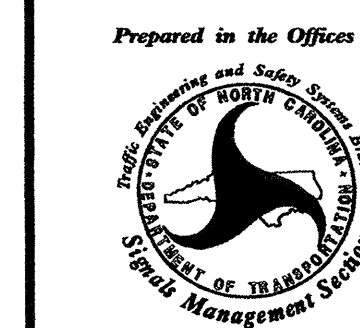


NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1757
 DESIGNED: April 2008
 SEALED: 04/15/08
 REVISED: N/A

New Installation

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

NC 150 at NC 16 Northbound Ramps

Division 12 Lincoln County near Chronicle

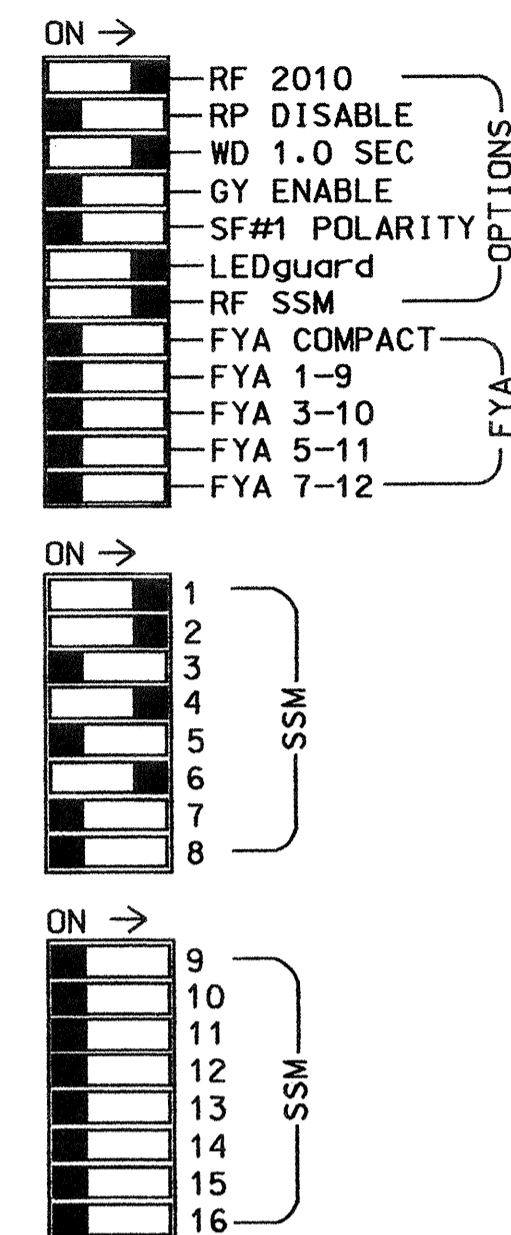
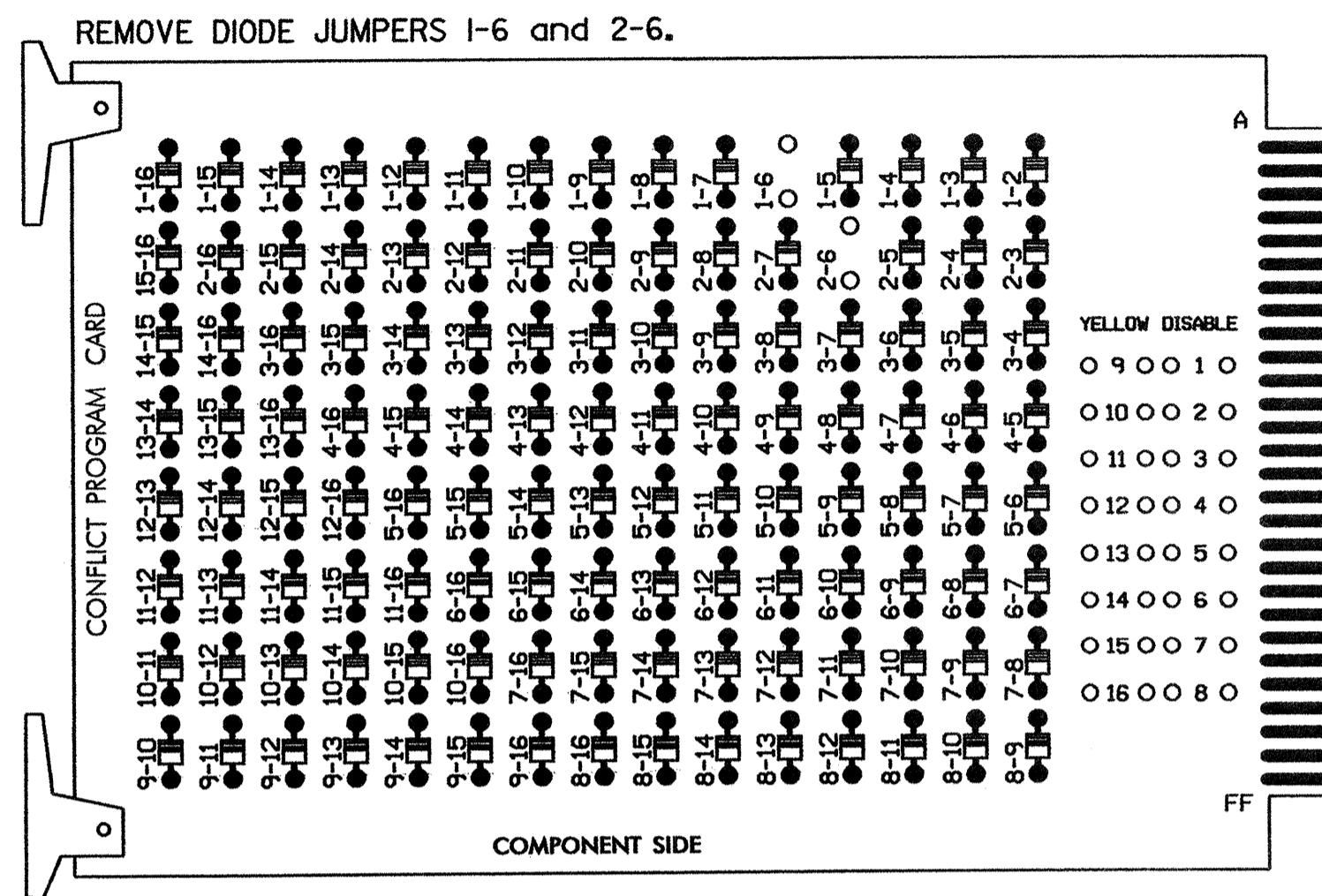
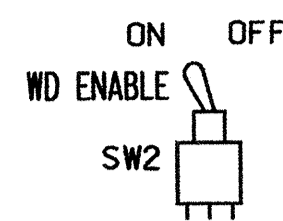
PLAN DATE: April 2008 REVIEWED BY: T. Sygel
 PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS INIT. DATE

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 022013
 GEORGE C. BROWN
 SIGNATURE: [Signature] DATE: 4/15/08
 SIG. INVENTORY NO. 12-1757

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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 3,5,7, 8,9,10,11,12,13,14,15 & 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 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.
- The cabinet and controller are part of the NC 150 / NC 16 Closed Loop System.

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.	61	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU
RED	*	128			101			134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW												
YELLOW ARROW	126											
GREEN ARROW	127											

NU = Not Used

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S4,S6
 PHASES USED.....1,2,4,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1 1A	∅ 2/SYS 2A/S1				∅ 4 4A								FS DC ISOLATOR
L	∅ 6 1A	NOT USED				∅ 4 4B								ST DC ISOLATOR
U	∅ 6/SYS 6A/S2													
L	NOT USED													

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

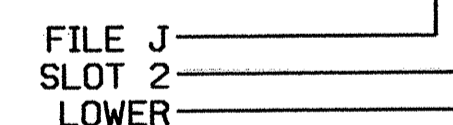
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-5,6	I2U	39	1	2	1	Y	Y			15
	TB2-7,8	I2L	43	5	12	6	Y	Y	Y		3
2A/S1	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
6A/S2	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			

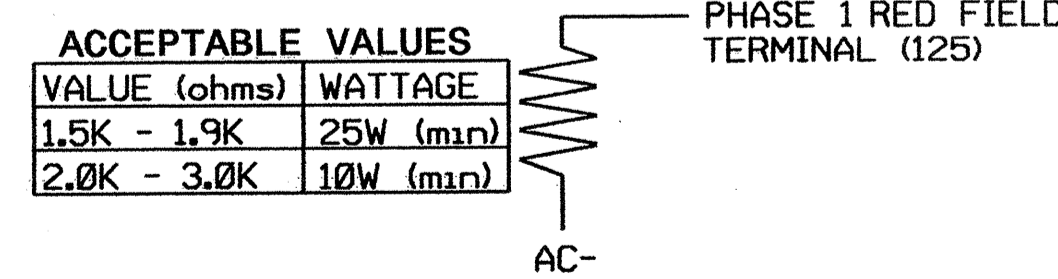
¹Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1758
 DESIGNED: April 2008
 SEALED: 04/15/08
 REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

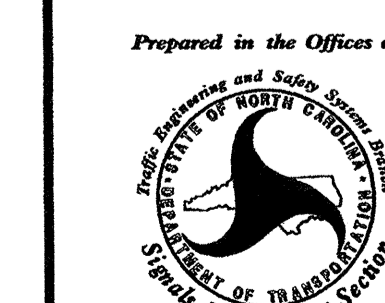


ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)

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.

New Installation

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

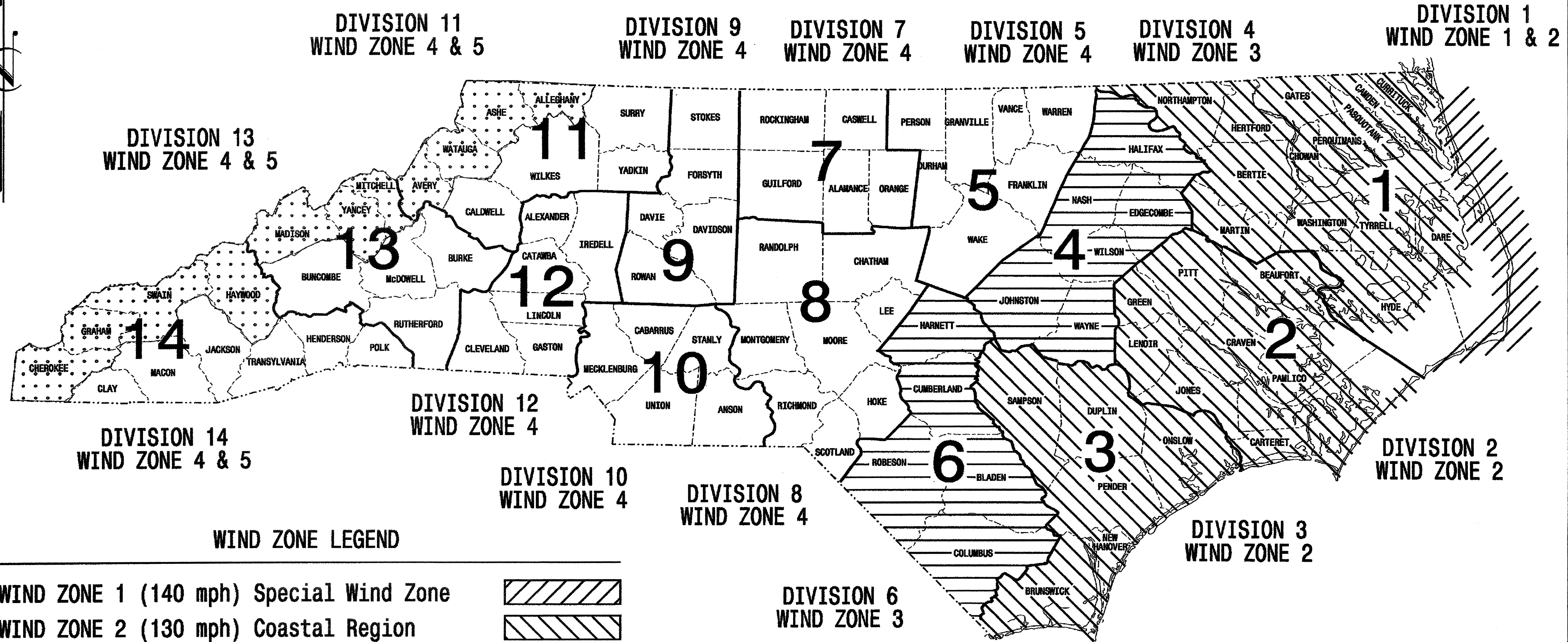
NC 150 at NC 16 Southbound Ramps	
Division 12	Lincoln County near Chronicle
PLAN DATE: April 2008	REVIEWED BY: T. J. J...
PREPARED BY: C. Strickland	REVIEWED BY:
REVISIONS	INIT. DATE

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 022013
 GEORGE C. BROWN
 SIGNATURE: George C. Brown 4/18/08
 DATE: 4/18/08
 SIG. INVENTORY NO. 12-1758

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	R-2206BA&CA	Sig. 6
F.A. PROJ. NO.	M 1	
PROJECT ID. NO.		

STANDARD DRAWINGS FOR METAL POLES

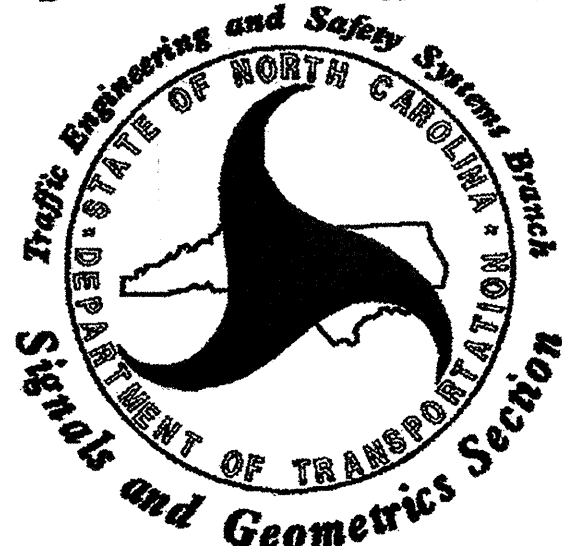


WIND ZONE LEGEND

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

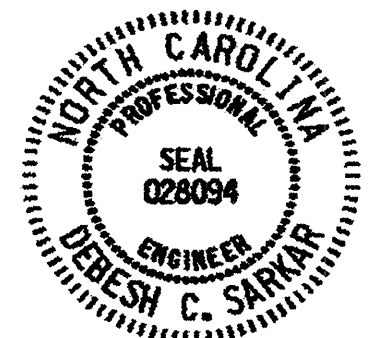
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

NCDOT CONTACTS:

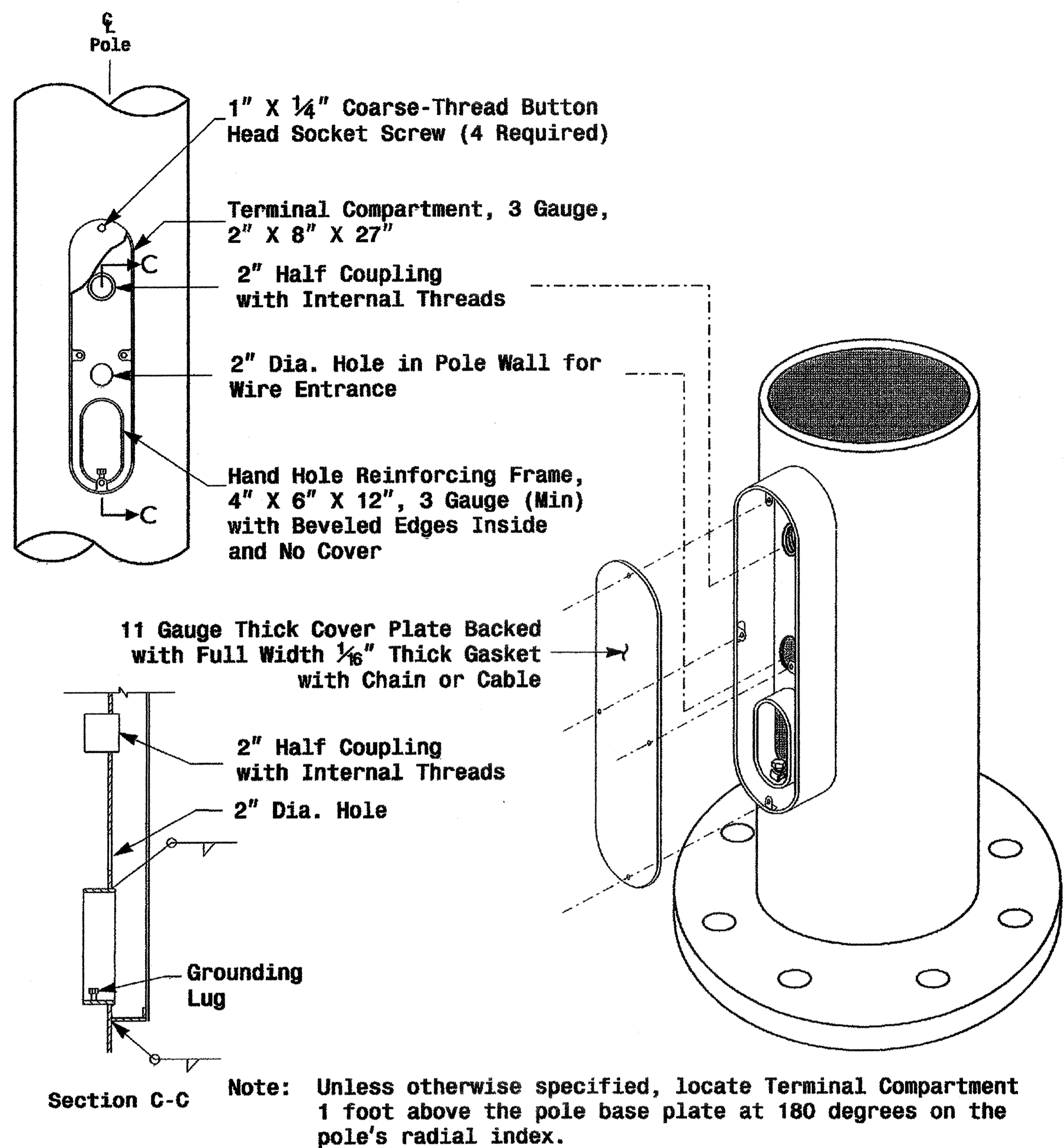
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

- 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
- G. F. Andrews, Jr. - Signals and Geometrics Project Engineer

SEAL

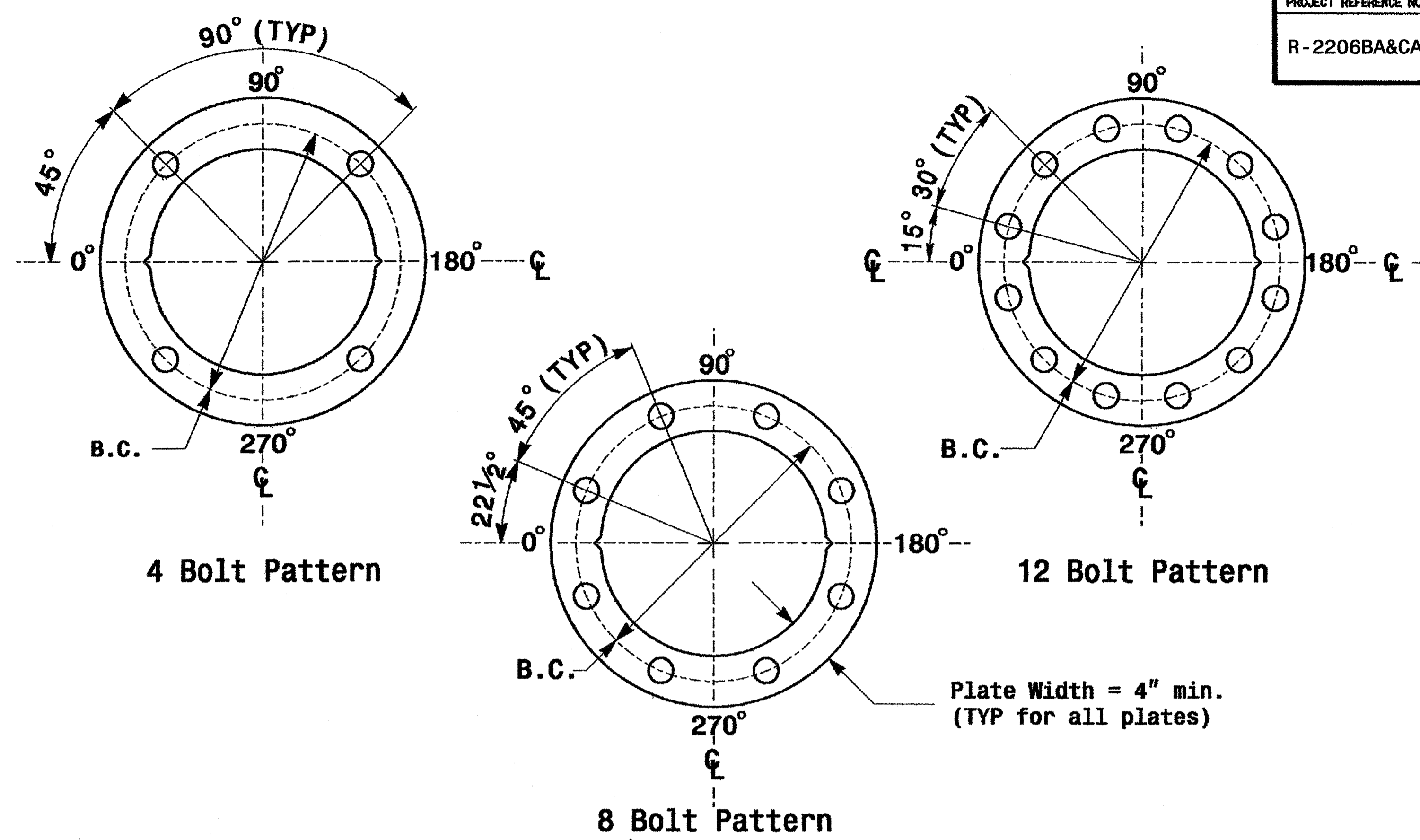


D. Sarkar 9.2.2005
SIGNATURE DATE

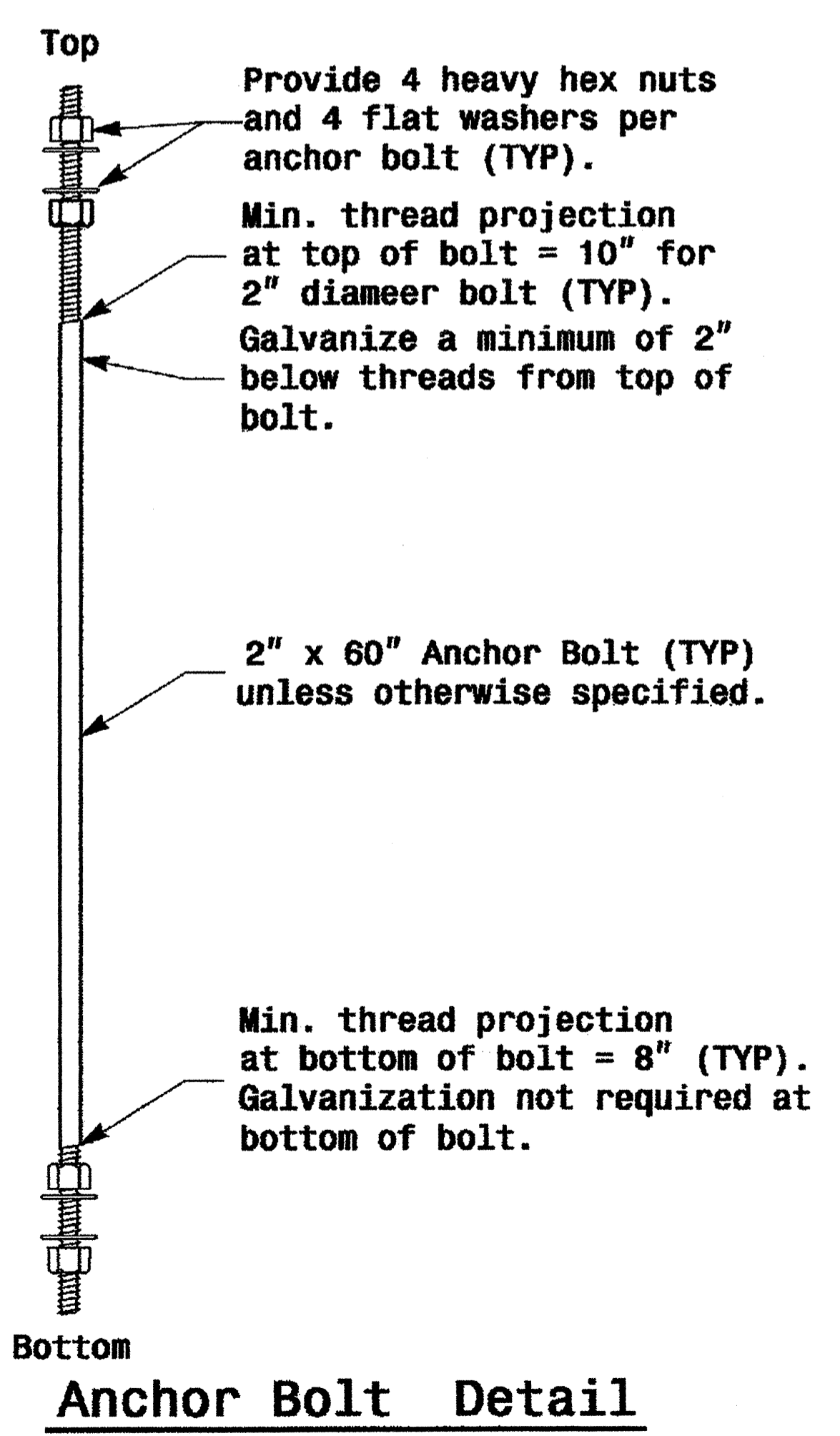


Note: Unless otherwise specified, locate Terminal Compartment 1 foot above the pole base plate at 180 degrees on the pole's radial index.

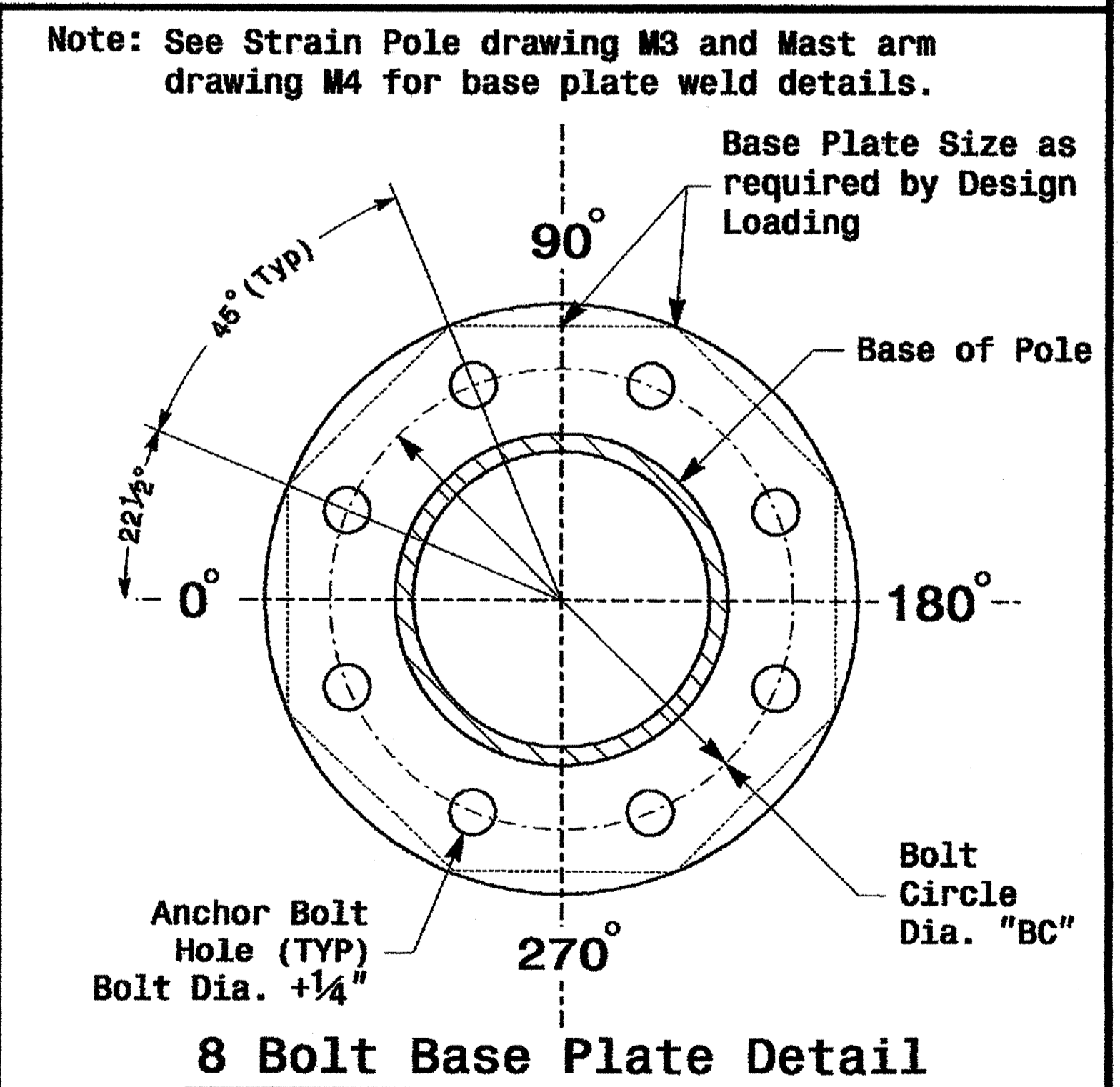
Terminal Compartment Detail



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



Anchor Bolt Detail



8 Bolt Base Plate Detail

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

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

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

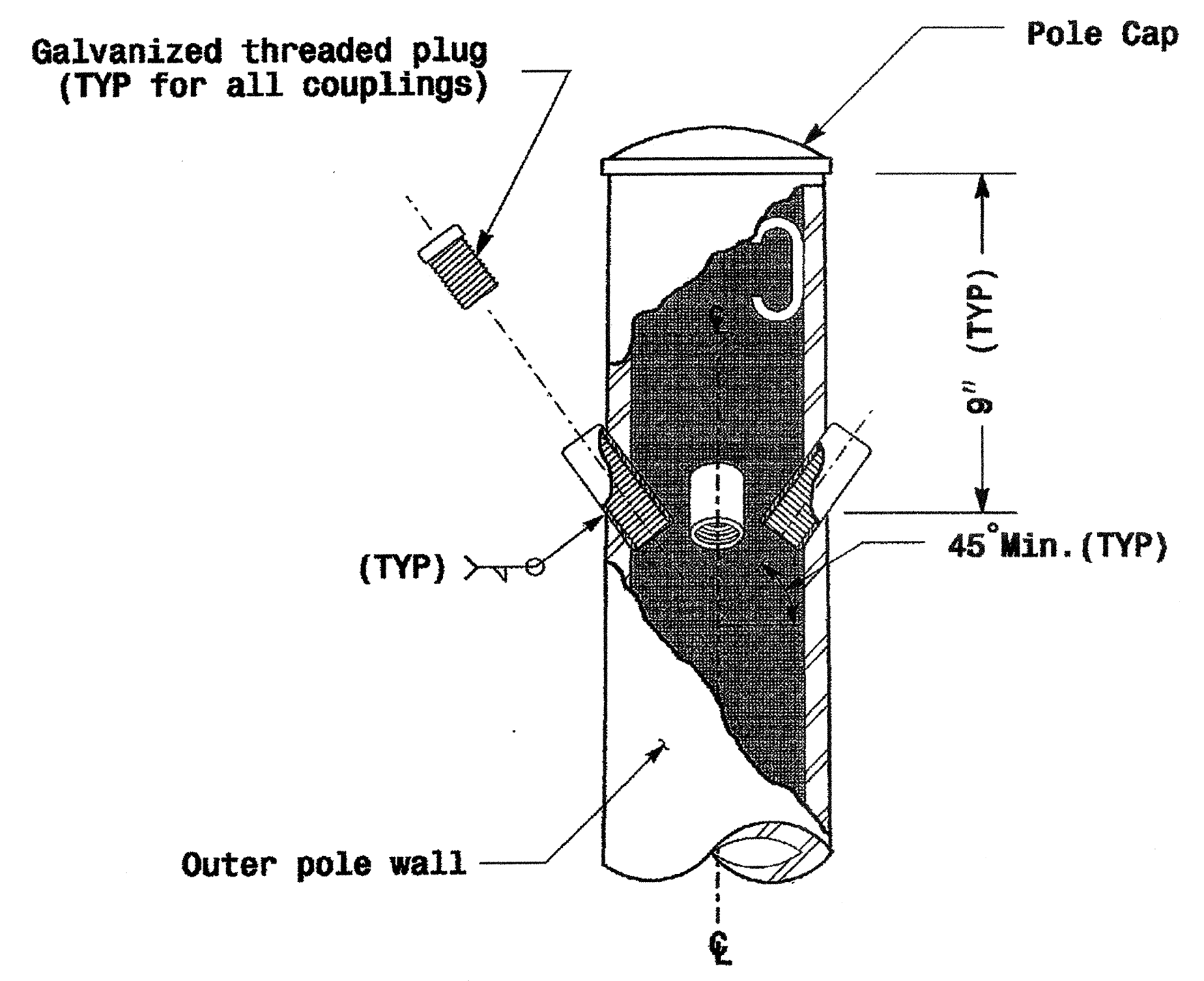
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REVISIONS: _____ INIT. DATE

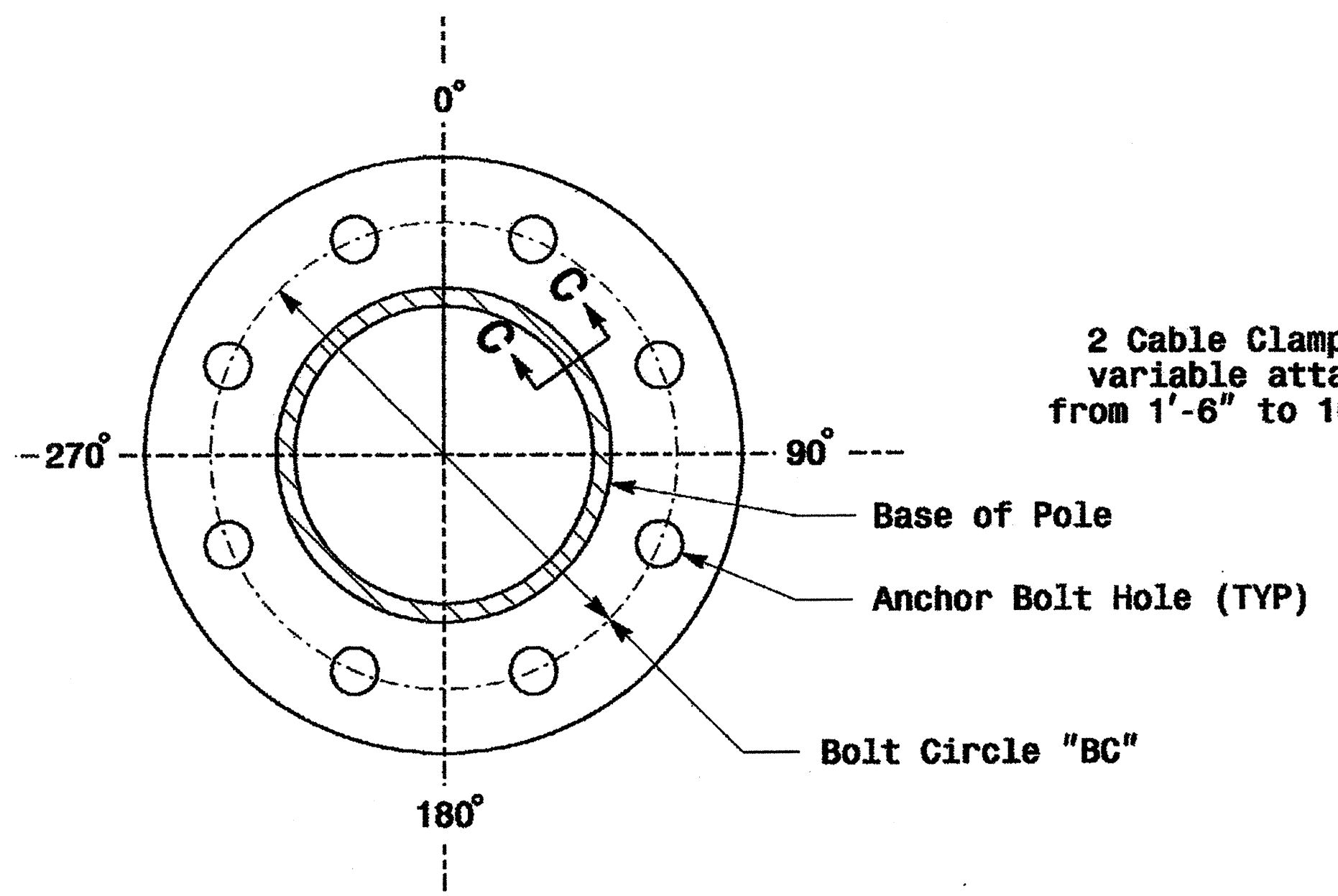
Signature: *A. Sankar* 9.2.2005
DATE: _____
SIG. INVENTORY NO. _____

Fabrication Details - All Poles

01-SEP-2005 18:22 01-SEP-2005 18:22 01-SEP-2005 18:22 01-SEP-2005 18:22 01-SEP-2005 18:22

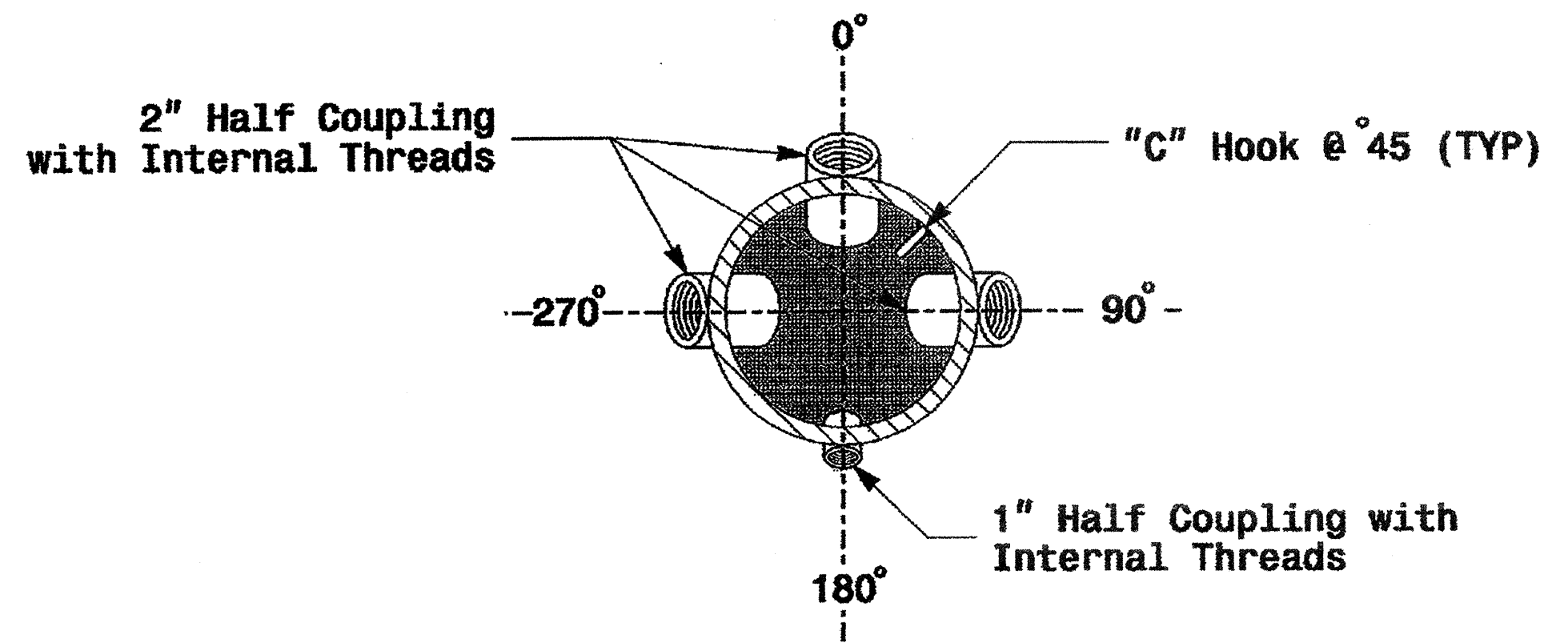


Cable Entrances at Top of Pole

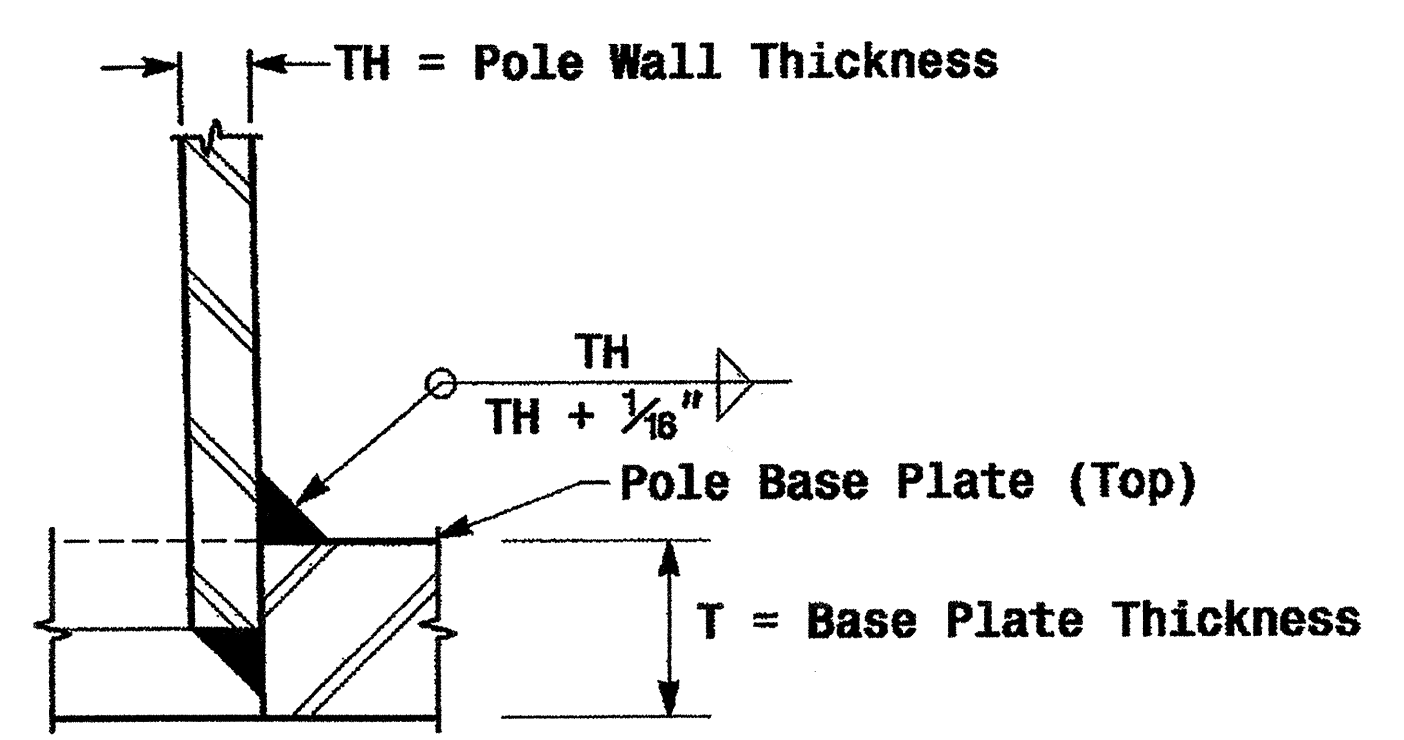


Section B-B
(See drawing M2)
Pole Base Plate

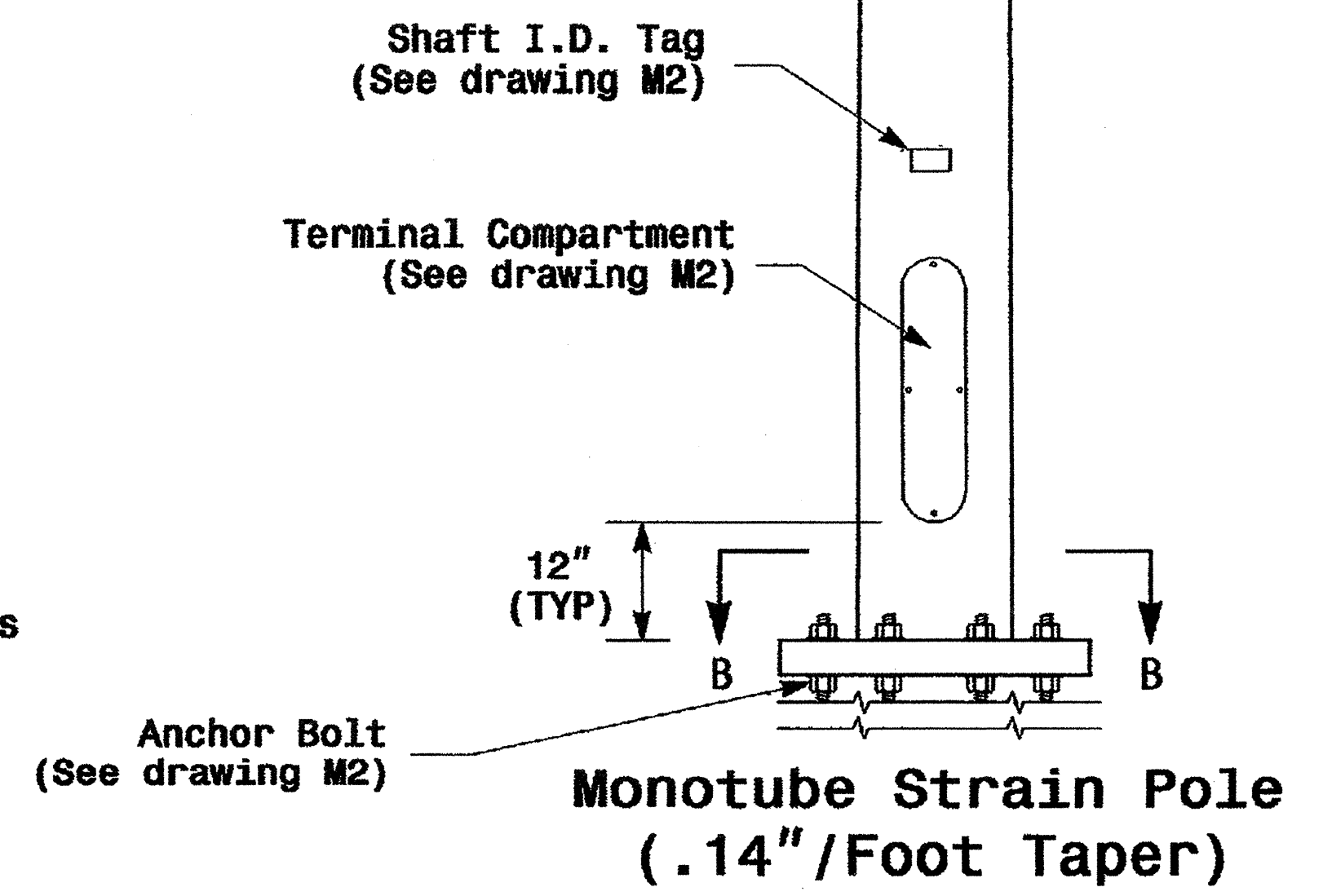
2 Cable Clamps designed for variable attachment heights from 1'-6" to 10' blow the top of the pole.



Radial Orientation for Factory Installed Accessories at Top of Pole



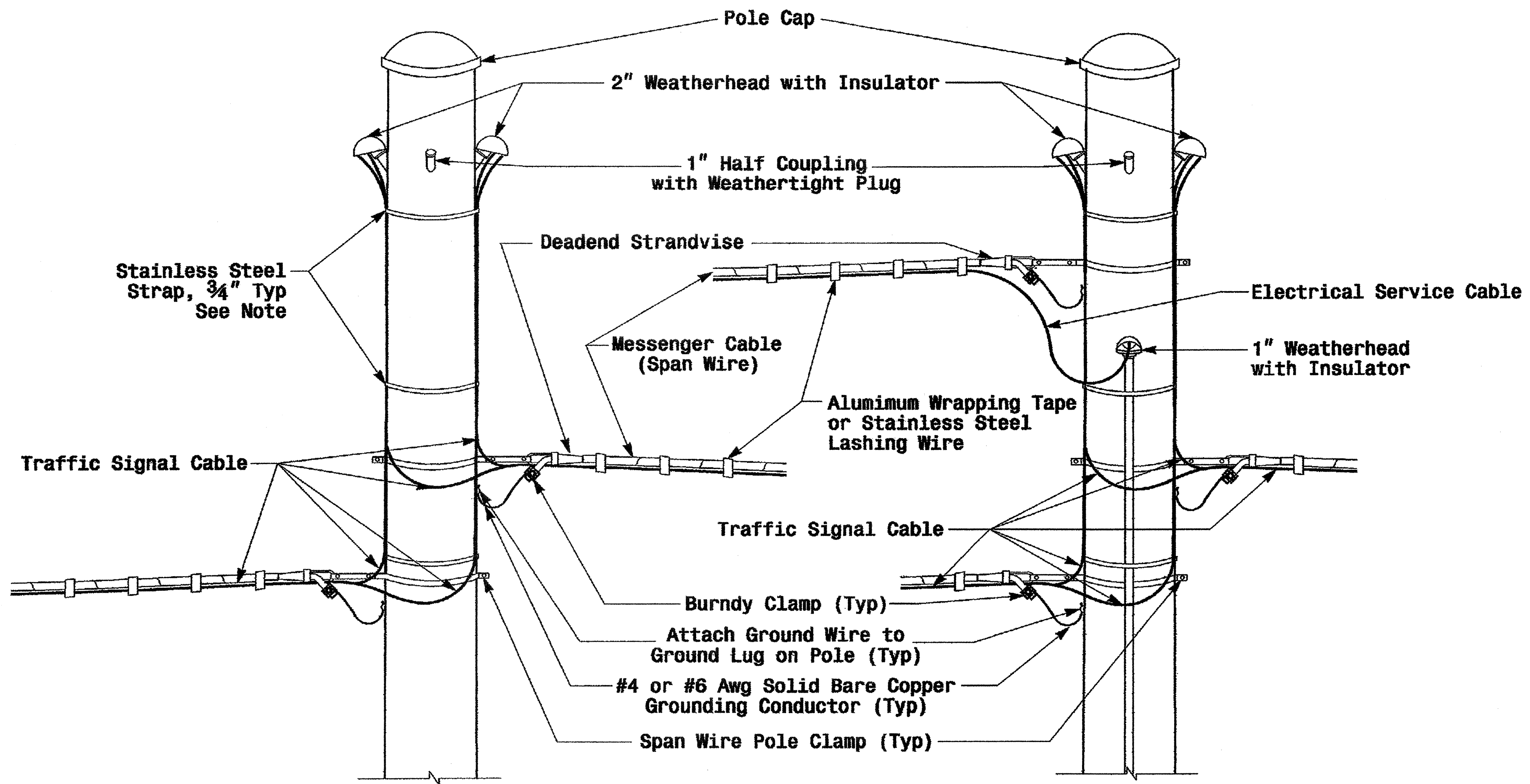
Socket Connection Weld Detail



Fabrication Details - Strain Poles

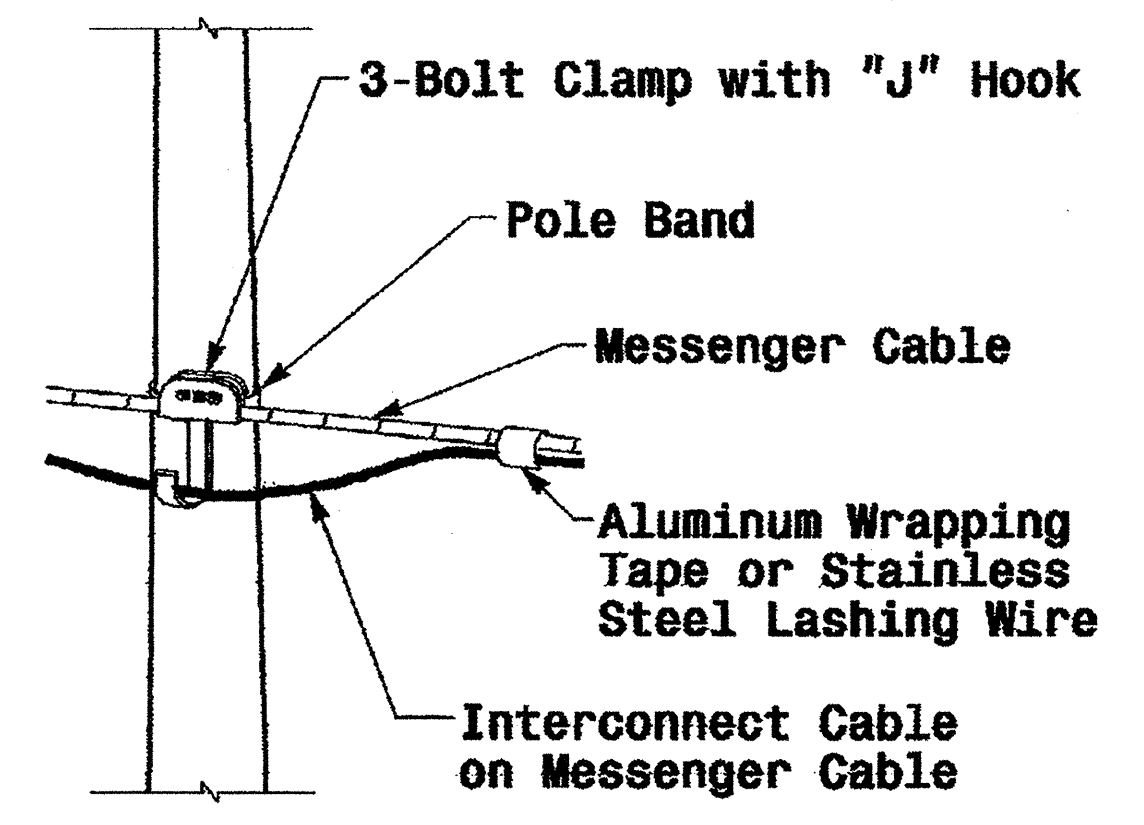
01-SEP-2005 14:07
vs:rsd\p\lax-ant\mch\p\coups\2004 mch.dgn
p.l.alexander

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

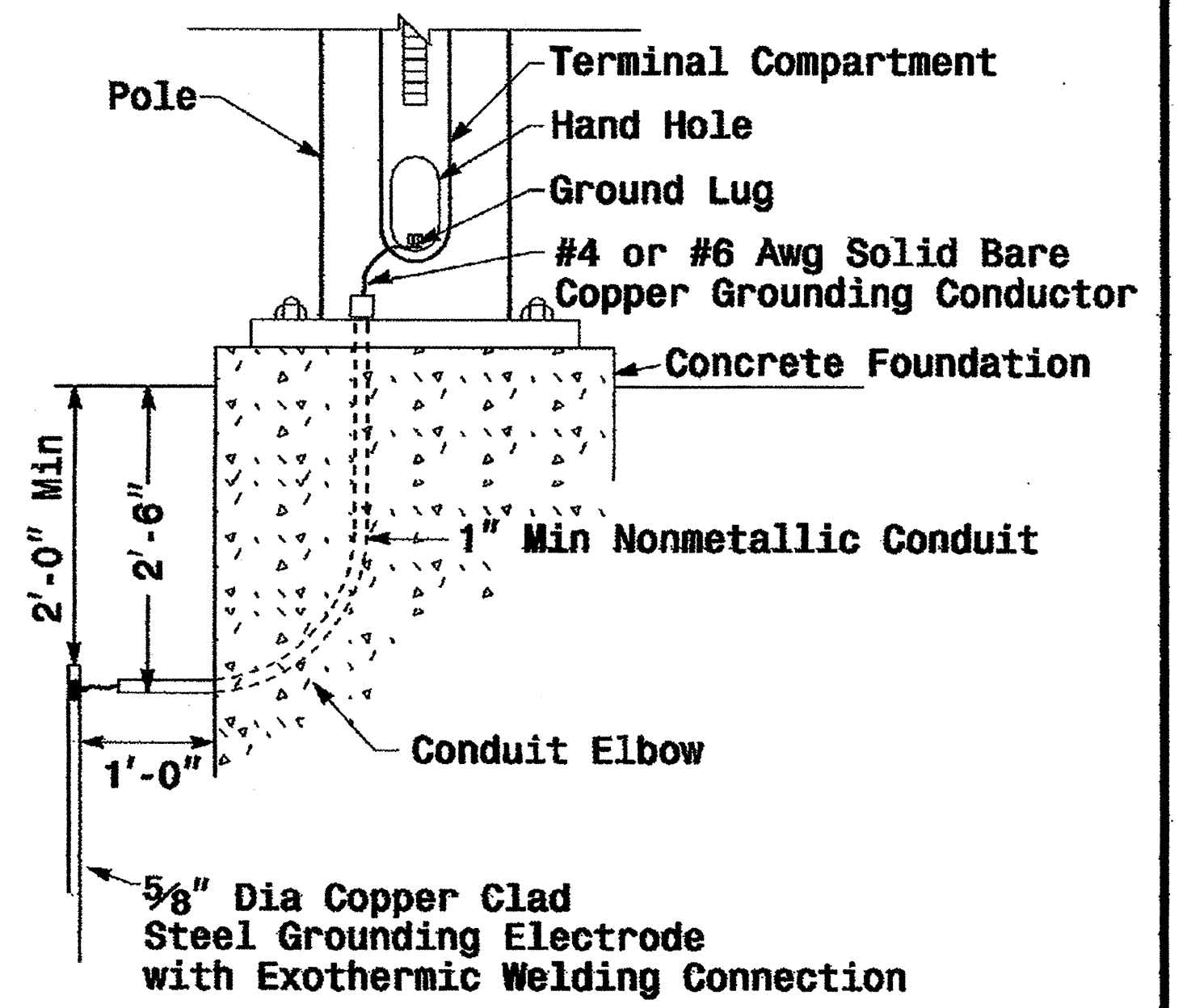


Note: Strap all signal cables to the side of the pole with 3/4\" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36\"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole



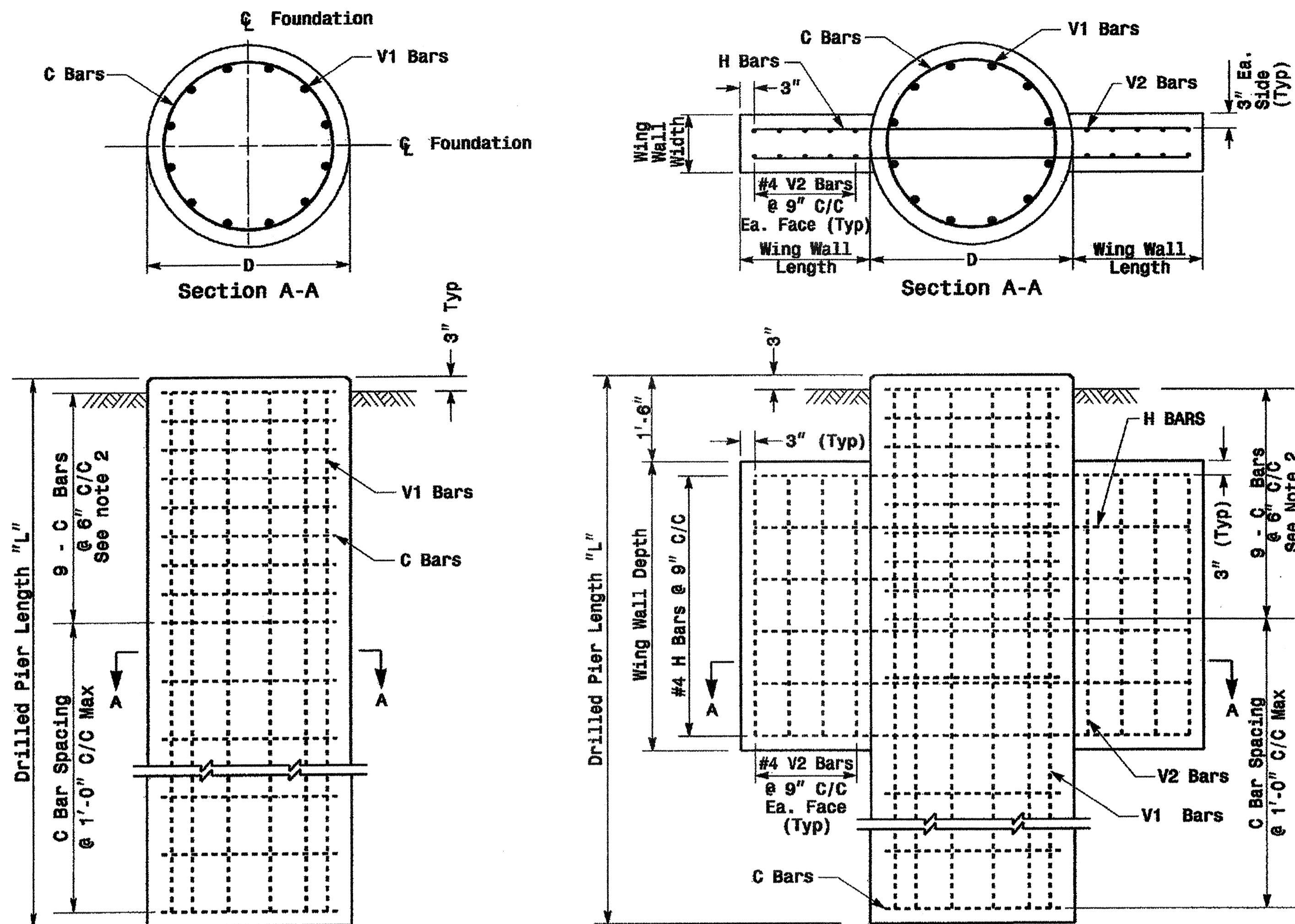
Metal Pole Grounding Detail

Construction Details - Strain Poles

01-SEP-2005 14:33
c:\work\am1\mch-krc\pca\2206\metc1 pole strndr\ca\004.m6.dgn
ca alexander

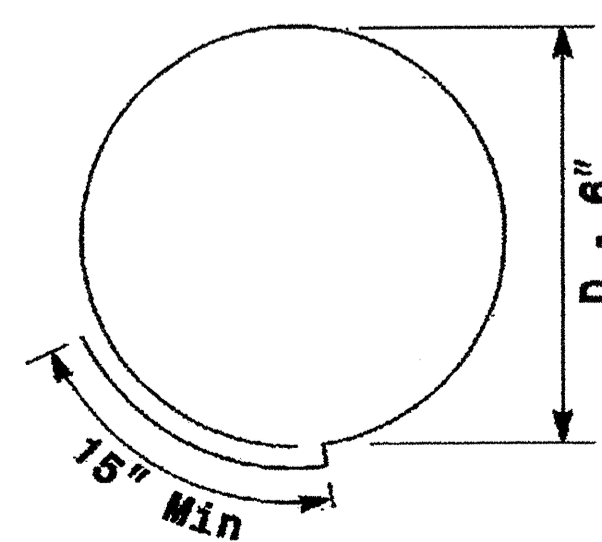
	Construction Details Strain Poles		SEAL
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS SCALE: 0 NA NONE	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: D.C. SARKAR REVISIONS:	DATE:

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



Typical "C" Bars

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"

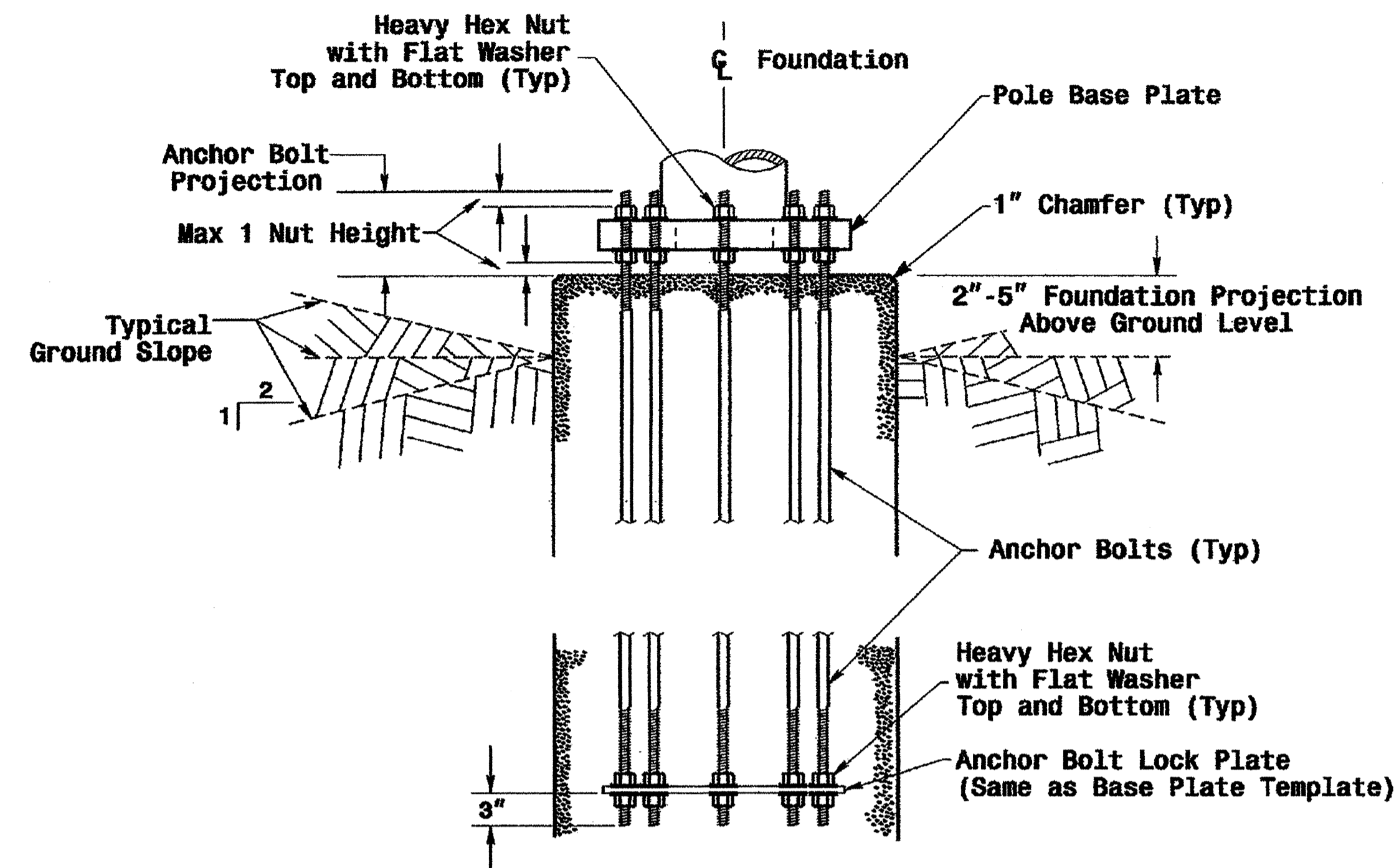
* See Note No. 1
** See Note No. 3

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

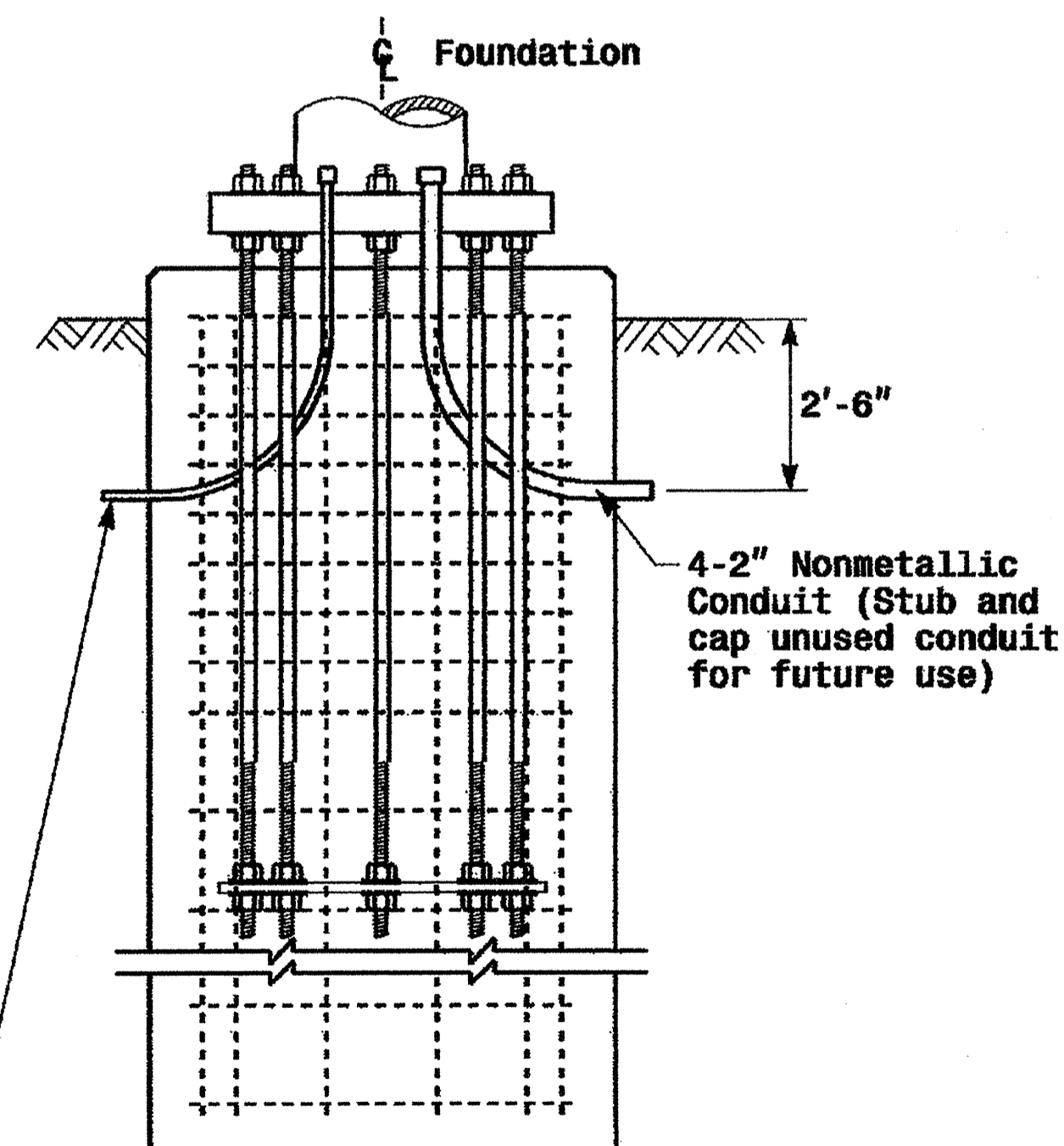
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



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

Notes

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

PROJECT REFERENCE NO. R-2206BA&CA
SHEET NO. Sig. 10 M 7

Construction Details - Foundations

	Construction Details Foundations		
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: A.N. ESPOSITO	
SCALE: 0 NA NONE		SIGNATURE: D. Sarkar 9.2.2005 DATE:	

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

Concrete Volume (cubic yards) = .356 X L

Fabrication Design Notes:


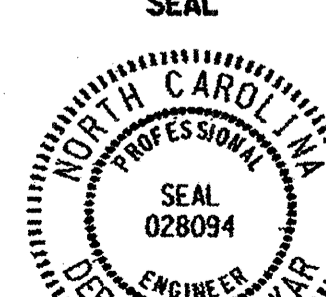
1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.
2. Base plate thickness (T) is 2.0 inches.

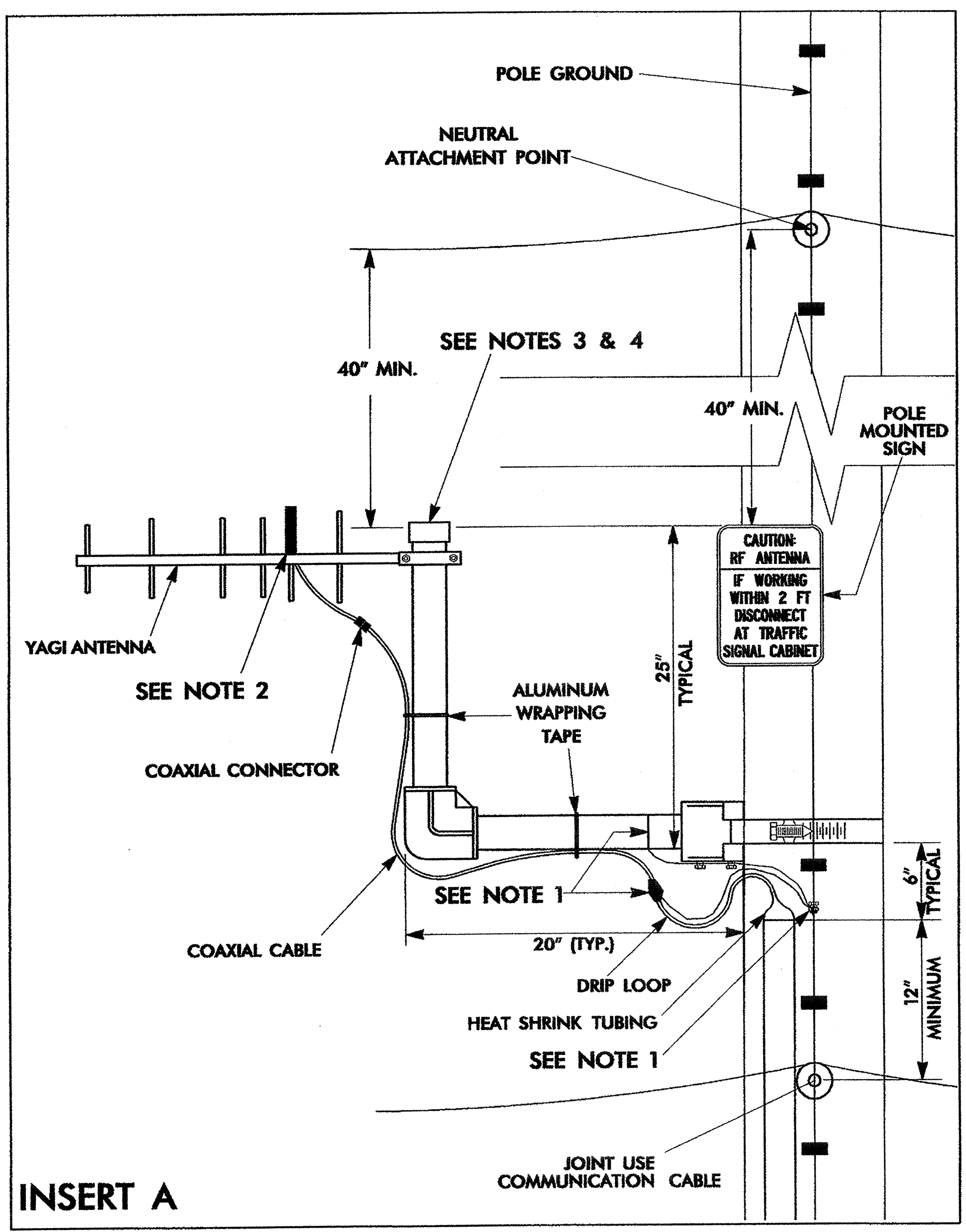
Foundation Selection:

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

Standard Strain Poles

02-SEP-2005 12:42 \\fs-0205-11\work\groups\2004 metal pole standards\2004 mg strn strain pole.dgn palexander

	Standard Strain Poles and Standard Foundations		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: G.F. Andrews REVIEWED BY: A.M. Esposito	
SCALE: None	SIGNATURE: <i>D. Sarkar</i> 9.2.2005		DATE

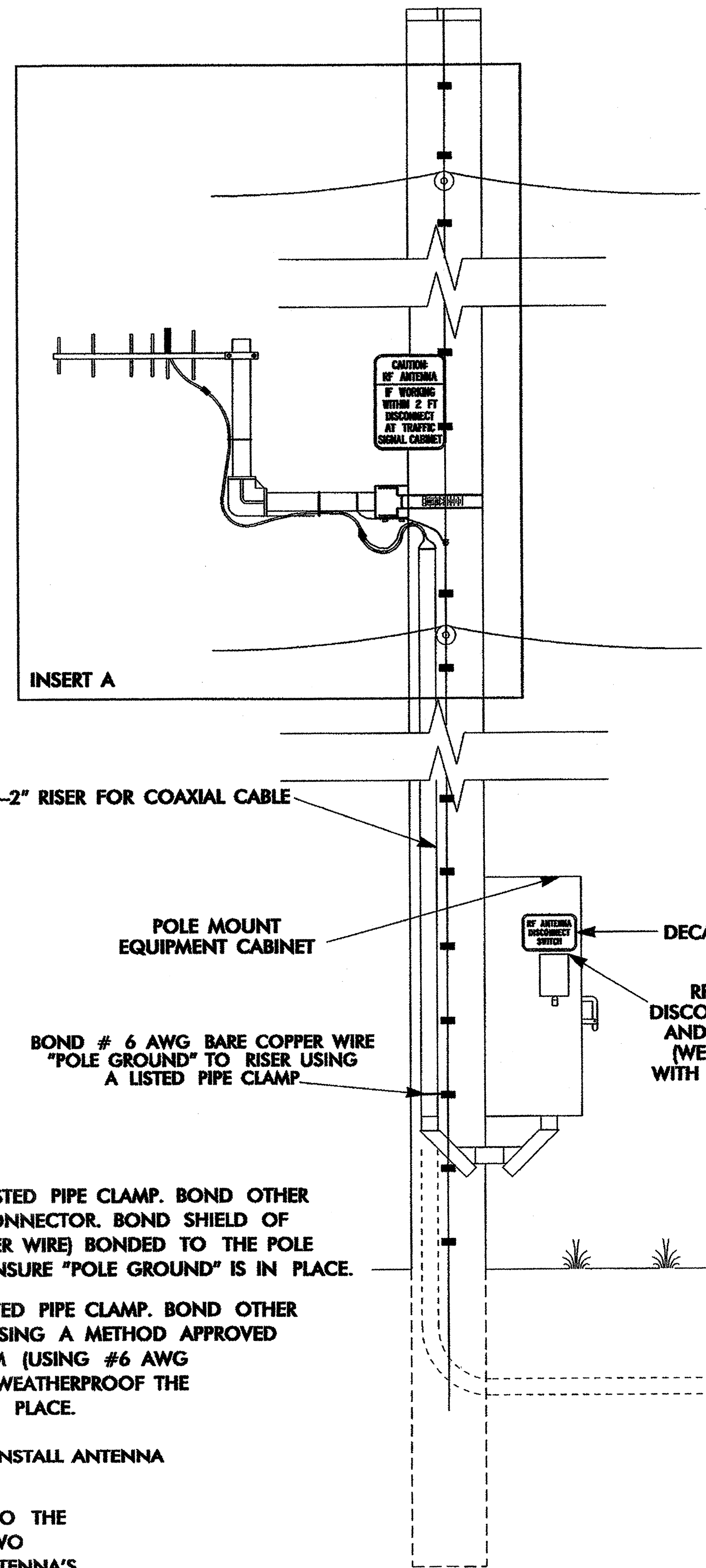


INSERT A

NOTES

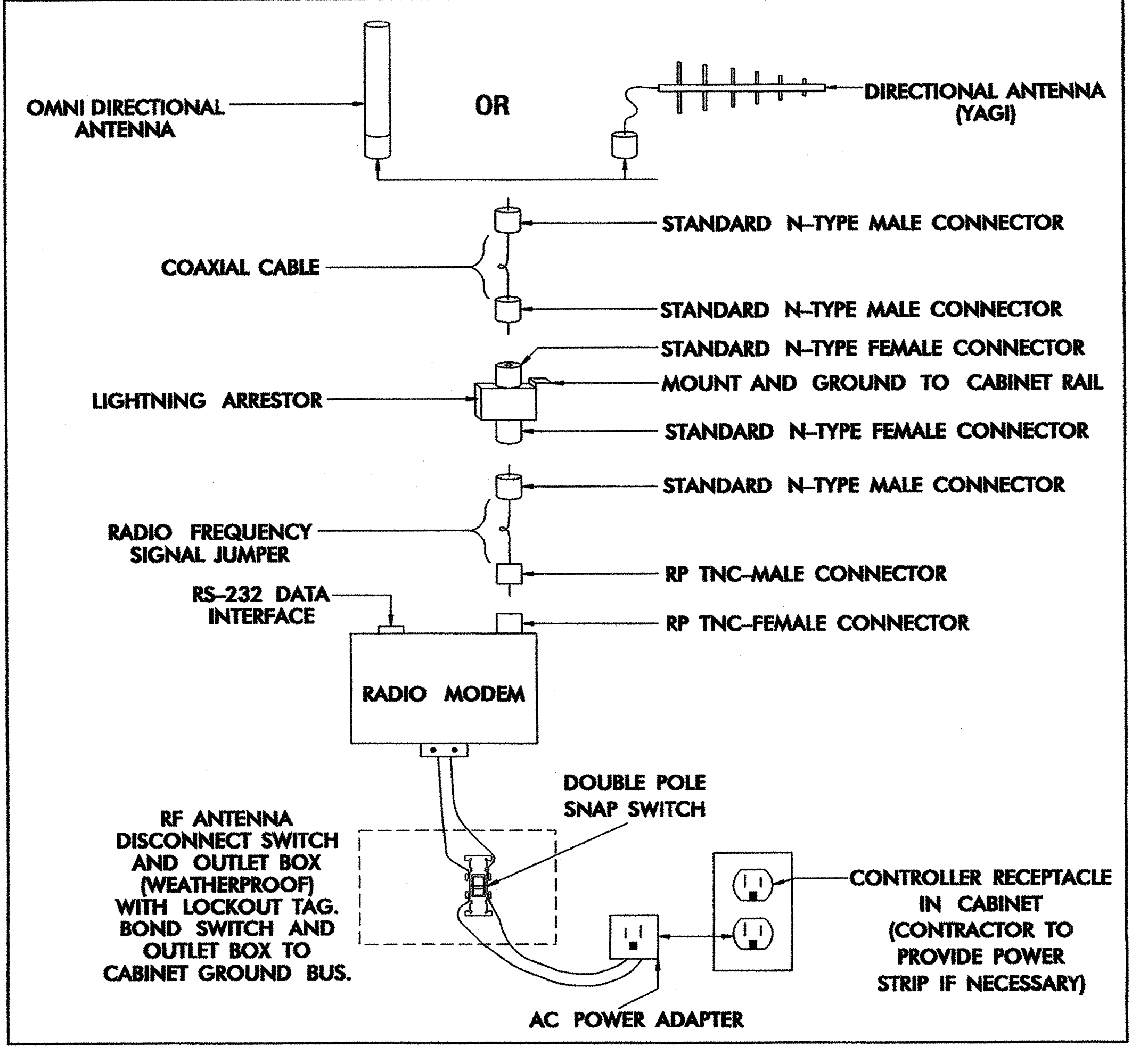
- WOOD POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE GROUND USING A SPLIT BOLT CONNECTOR. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED COPPER WIRE) BONDED TO 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.



INSERT A

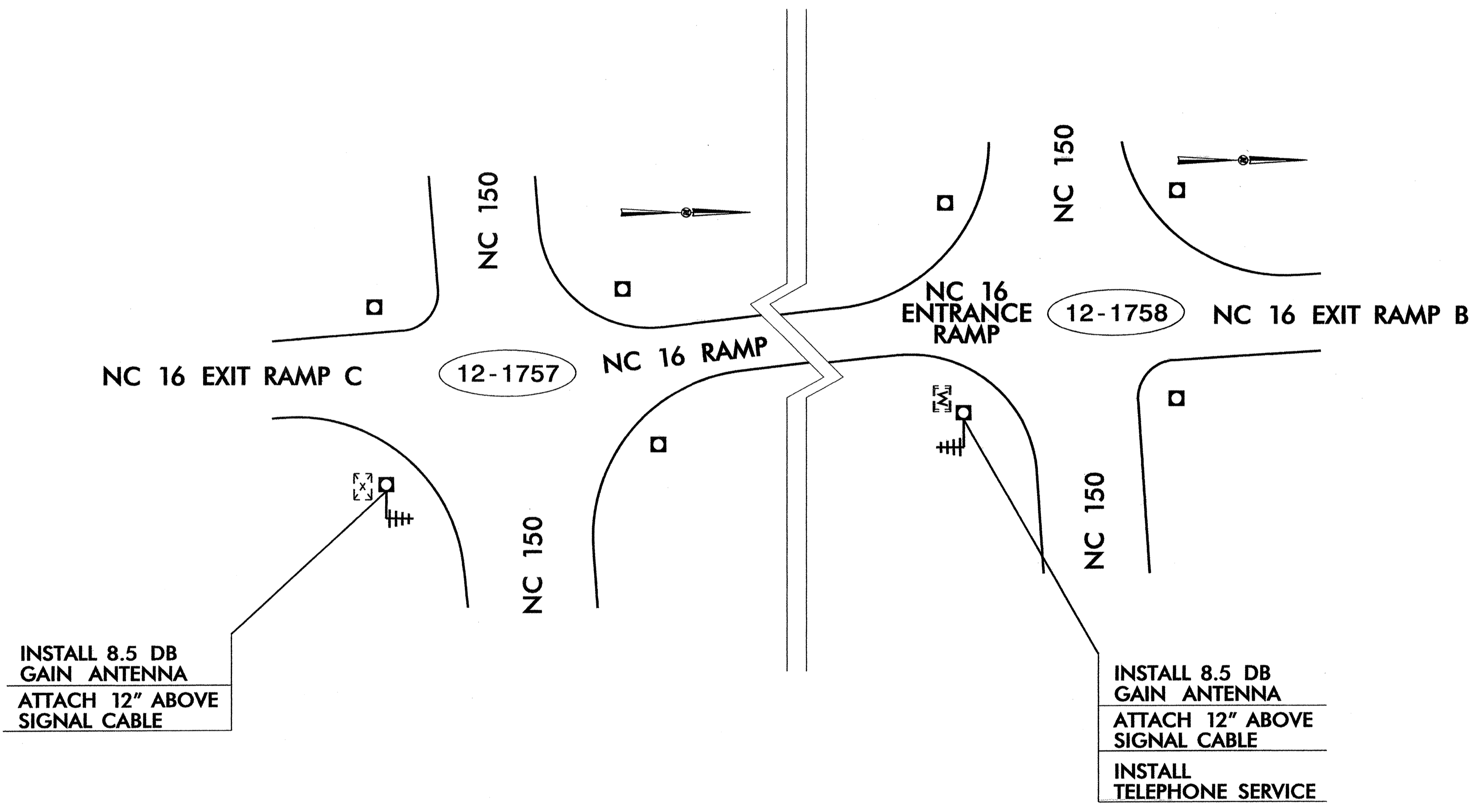
ANTENNA AND COAXIAL CABLE CONNECTION SCHEMATIC



	WIRELESS RADIO ANTENNA TYPICAL DETAILS	
	PLAN DATE: JULY 2005 PREPARED BY: A. CREECH	REVIEWED BY: I. N. AVERY REVIEWED BY: A. T. FAULKNER
SCALE: 0	REVISIONS: UPDATE GROUNDING - COAXIAL CABLE SHIELD	SIGNATURE: <i>Gregory A. Fulek</i> DATE: 9/12/05

LEGEND

- ⚡⚡⚡ YAGI ANTENNA (DOUBLE) FOR REPEATOR OPERATION
- ⚡⚡ YAGI ANTENNA (SINGLE)
- ⊙ OMNI ANTENNA
- ⊠ EXISTING CONTROLLER AND CABINET
- ⊠ EXISTING MASTER CONTROLLER AND CABINET
- ⊠ XX-XXXX 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 CABLES. RESEAL WITH HEAT SHRINK TUBING.
3. INSTALL WIRELESS ANTENNA ON POLE WITH RF WARNING SIGN AND AIM TOWARDS MASTER.
4. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER THE 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."

 <small>Prepared in the Offices of: Traffic Engineering and Safety Services DIVISION OF TRANSPORTATION 750 N. Greenfield Pkwy., Garner, NC 27529</small>	WIRELESS COMMUNICATION PLANS ALONG NC 150		
	DIVISION 12 LINCOLN CO. NEAR CHRONICLE PLAN DATE: APRIL 2008 REVIEWED BY: I. N. AVERY PREPARED BY: S. C. WARDLE REVIEWED BY: G. G. MURR, JR.	REVISIONS INIT. DATE	SIGNATURE DATE <small>CADD File name:</small>

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DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

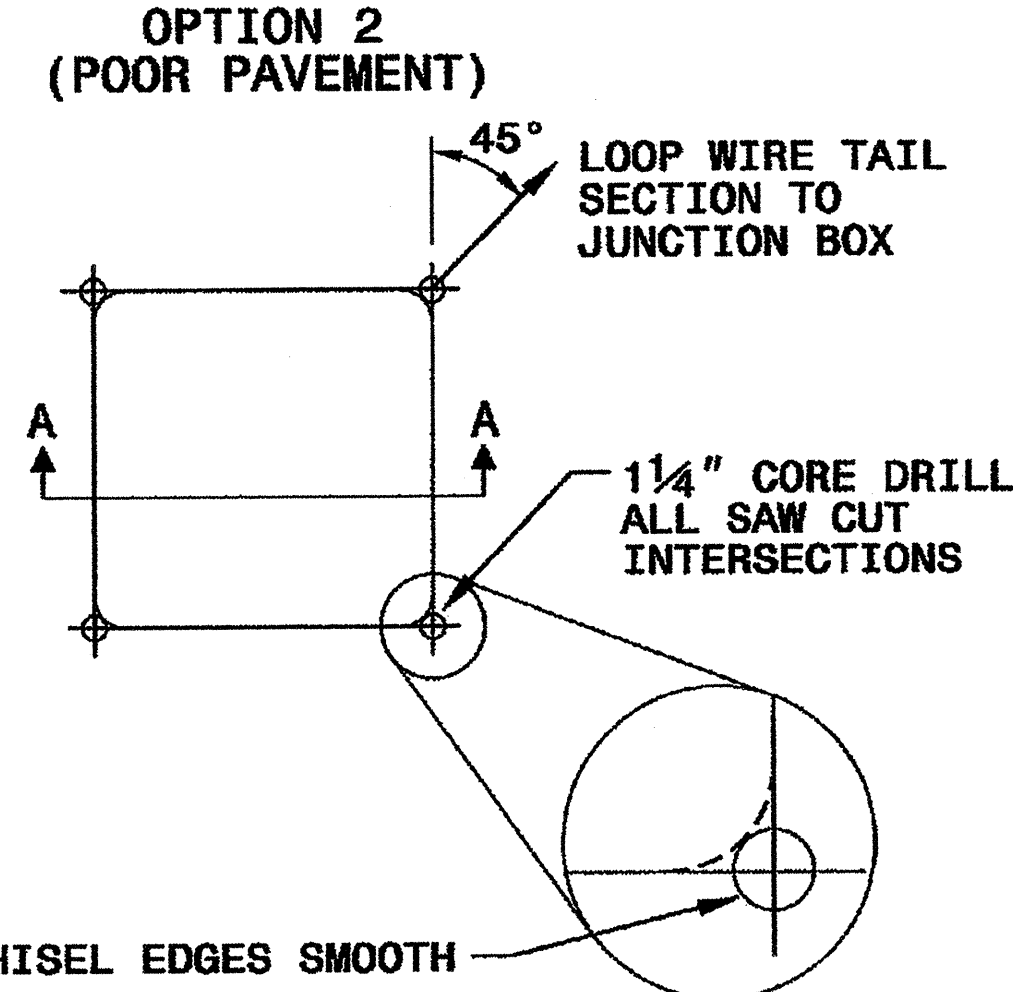
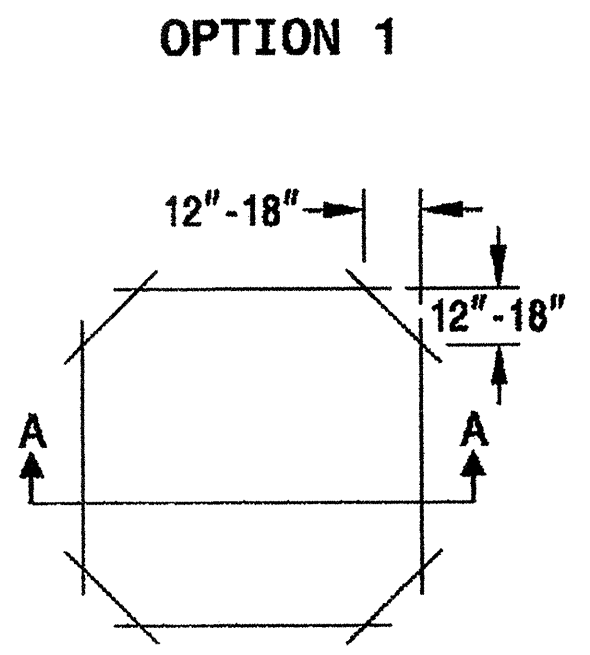
5-07

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

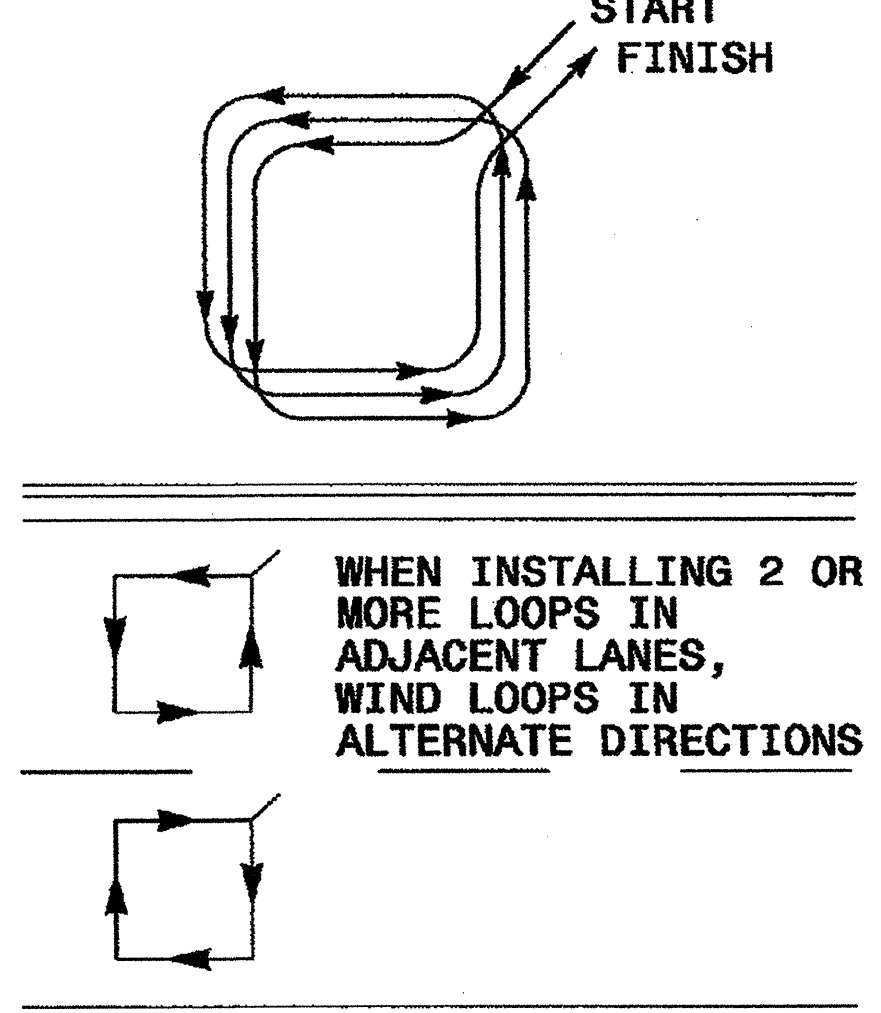
SHEET 1 OF 3
1725D01

CONVENTIONAL 4-SIDED LOOP

SAW CUT OPTIONS

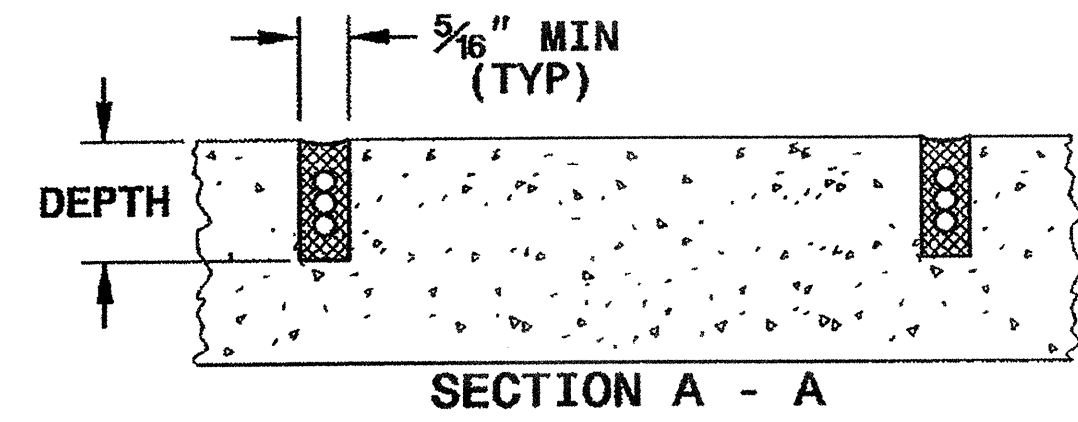


LOOP WINDING METHOD

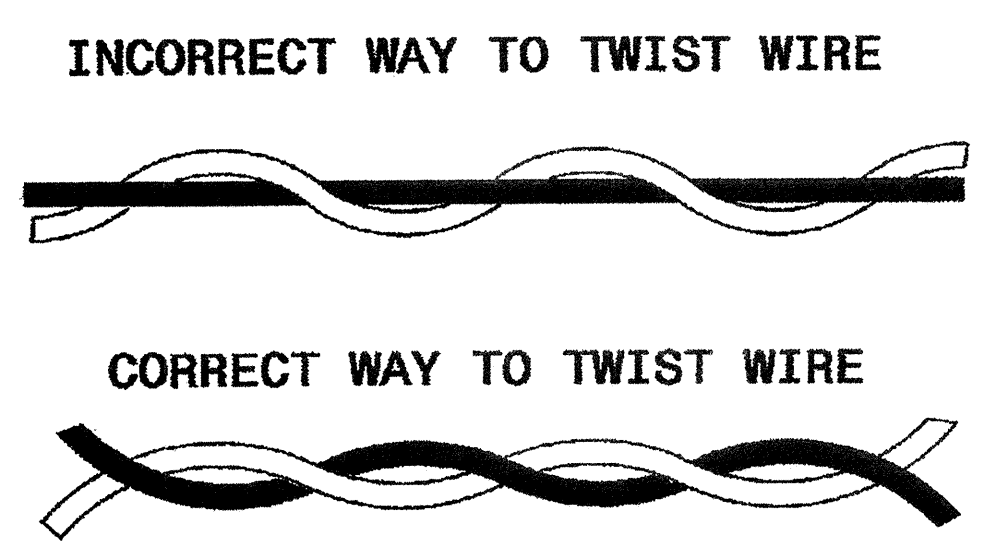


SAW SLOT DEPTH CHART

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



LOOP WIRE TWISTING METHOD

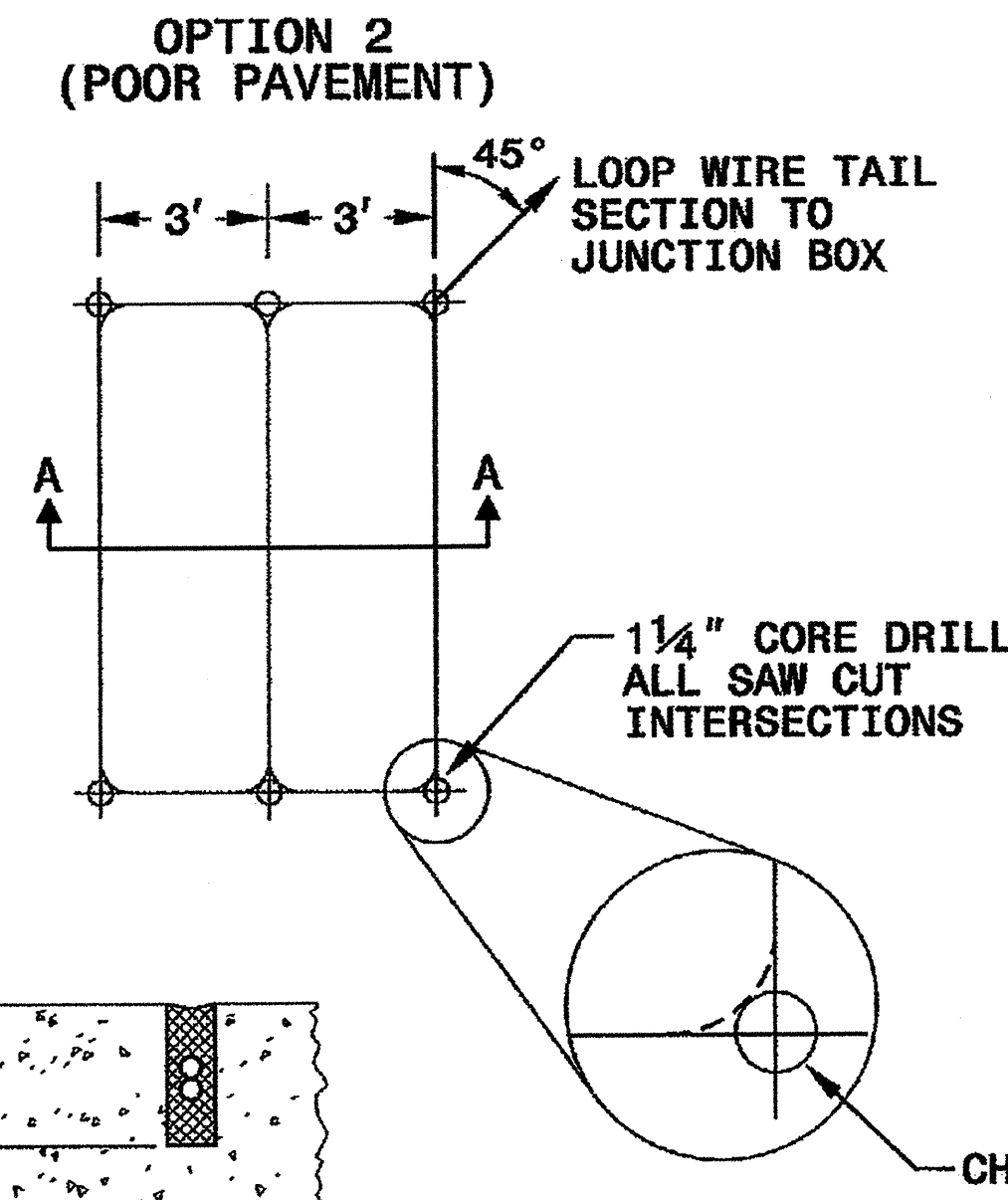
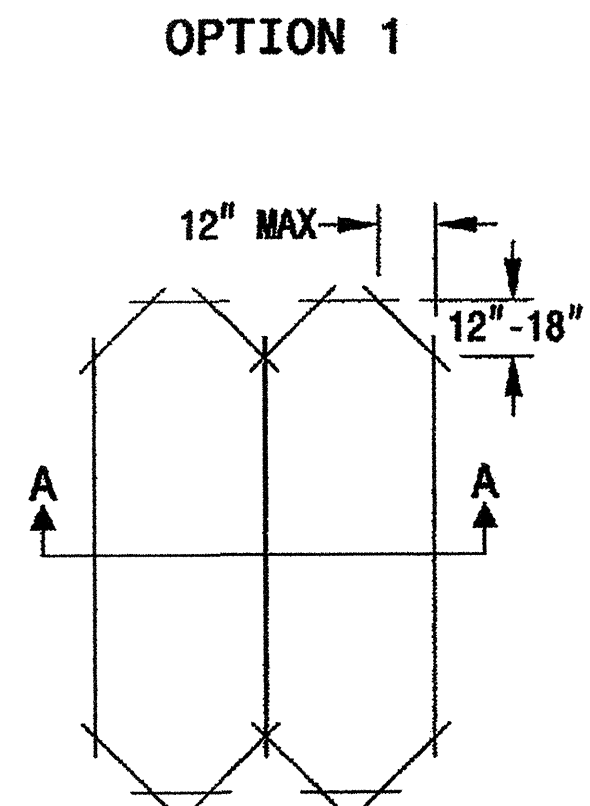


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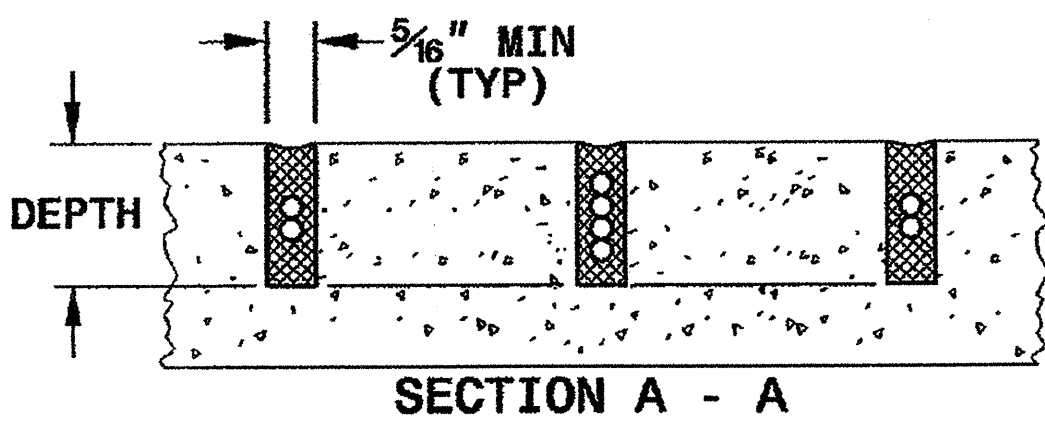
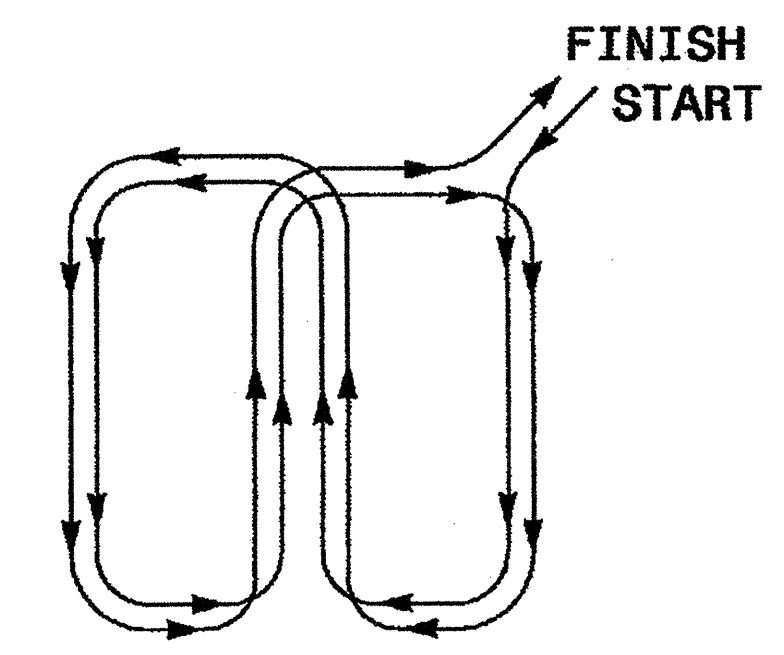
1. OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
2. MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
3. WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
4. LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

QUADRUPOLE LOOP

SAW CUT OPTIONS



LOOP WINDING METHOD



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

SHEET 1 OF 3
1725D01

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RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

See Plate for Title

Prepared in the Office of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

Milton J. Dean 9/5/07
SIGNATURE DATE

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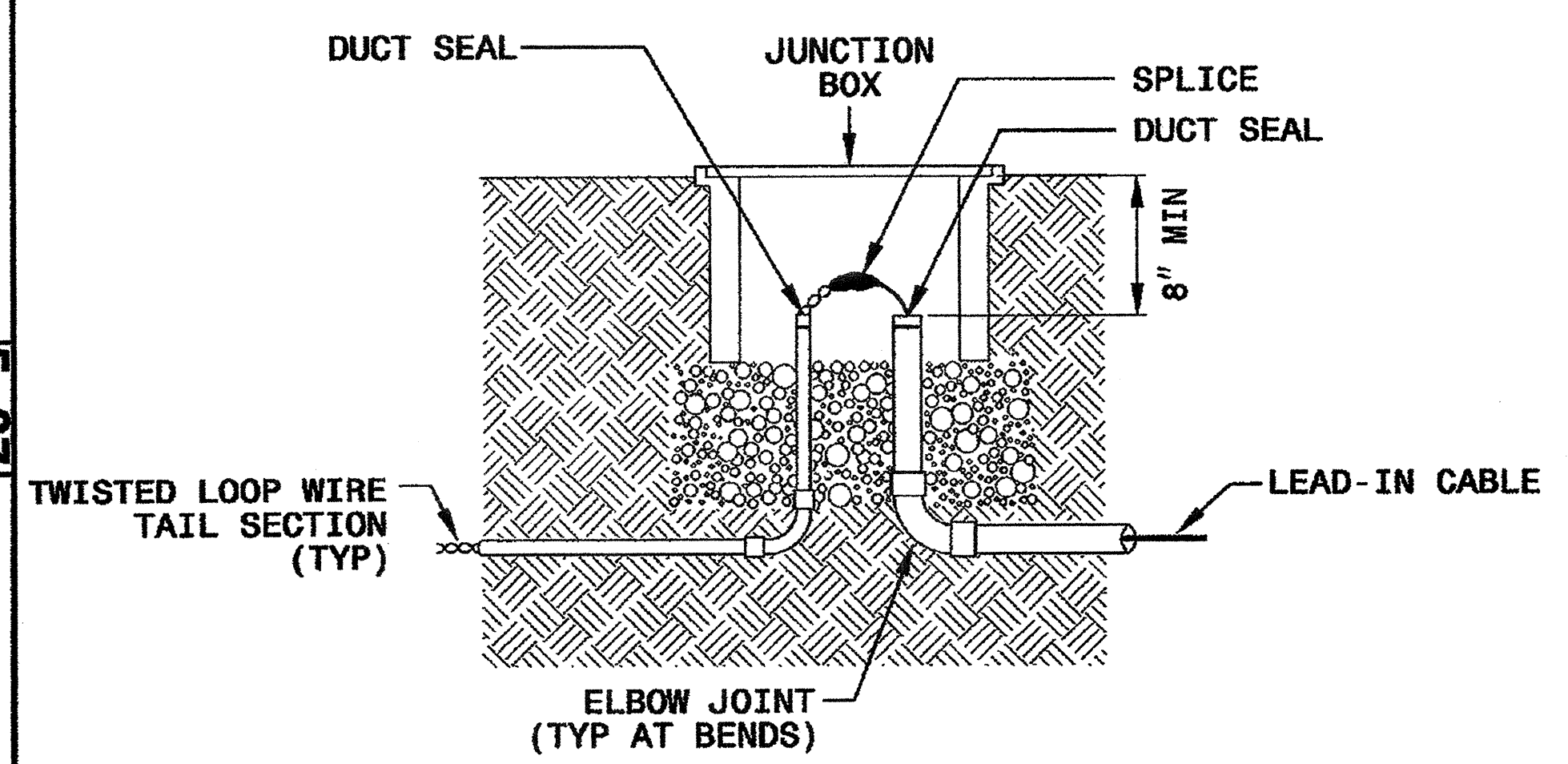
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

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

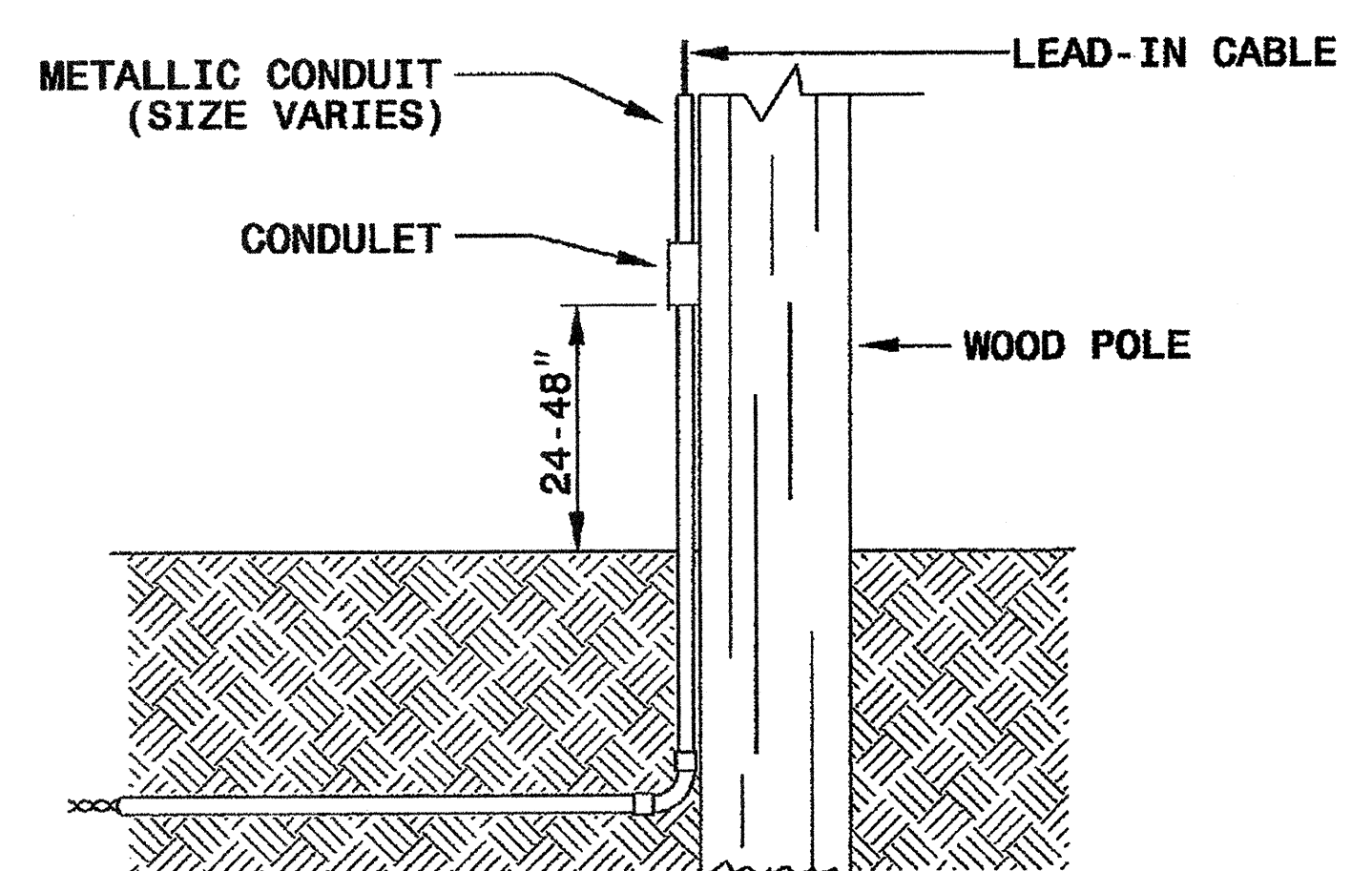
SHEET 2 OF 3
1725D01

LOOP WIRE SPLICE POINT DETAILS

LOOP WIRE AT JUNCTION BOX



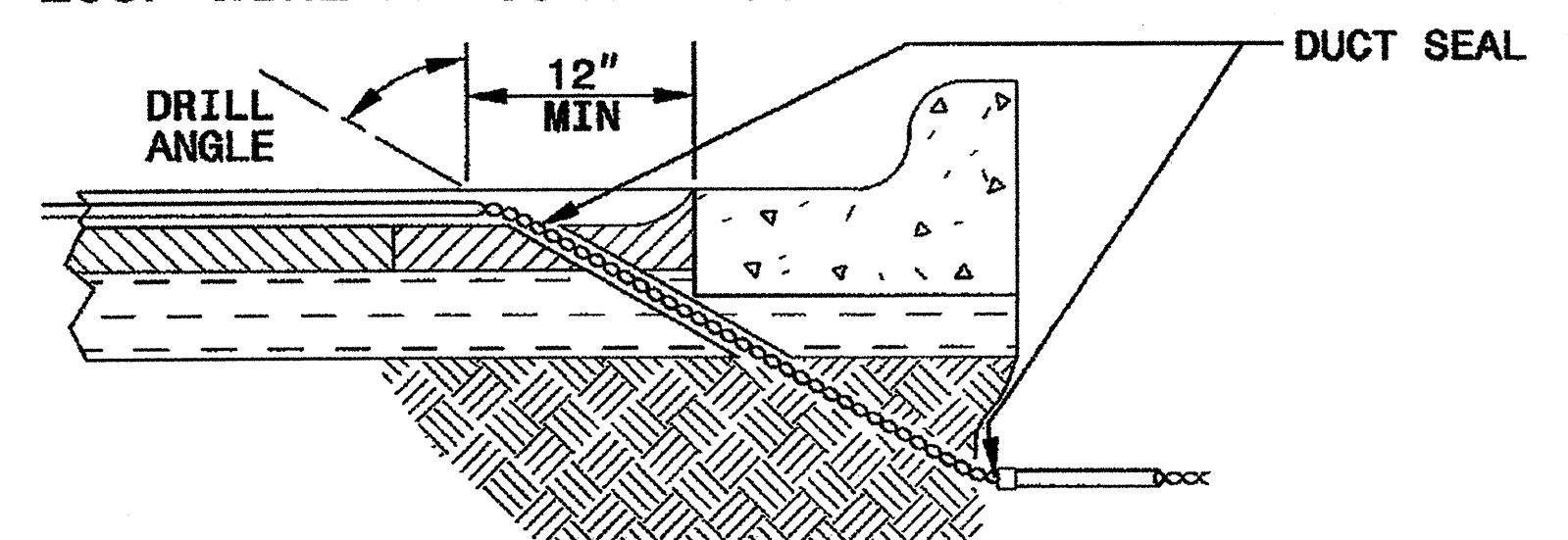
LOOP WIRE AT POLE



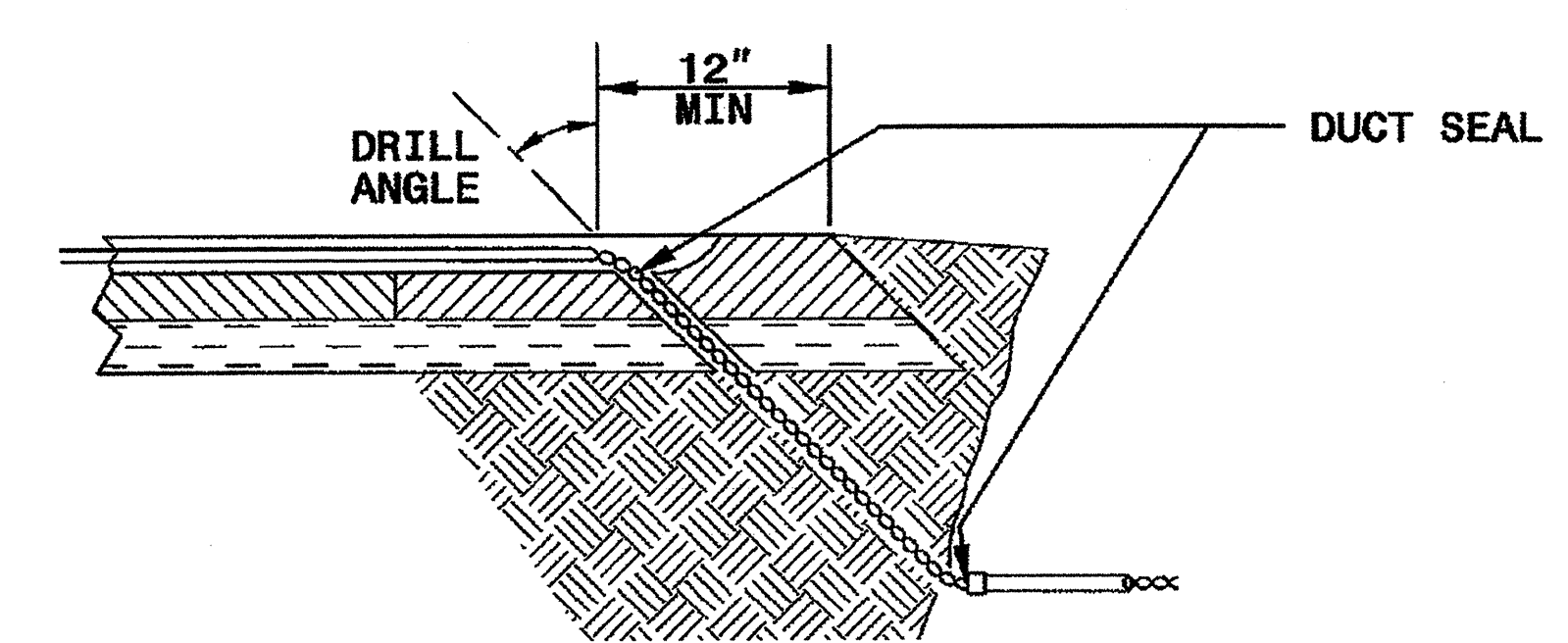
NOTE
SPlice ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE
IN JUNCTION BOXES OR APPROVED CONDULETS.

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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ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

SHEET 2 OF 3
1725D01

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Garner, NC 27529

SEAL

Milton I. Dean 9/5/07
SIGNATURE DATE

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zml1111

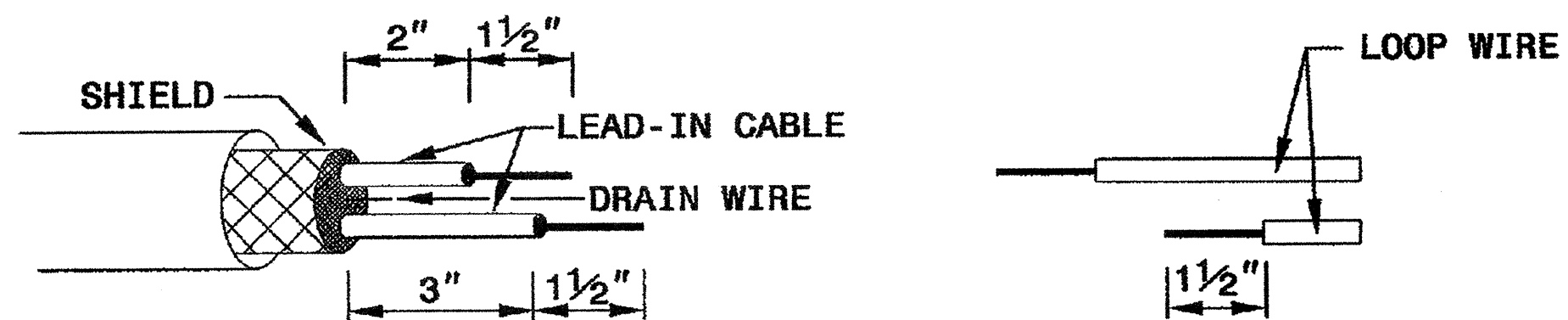
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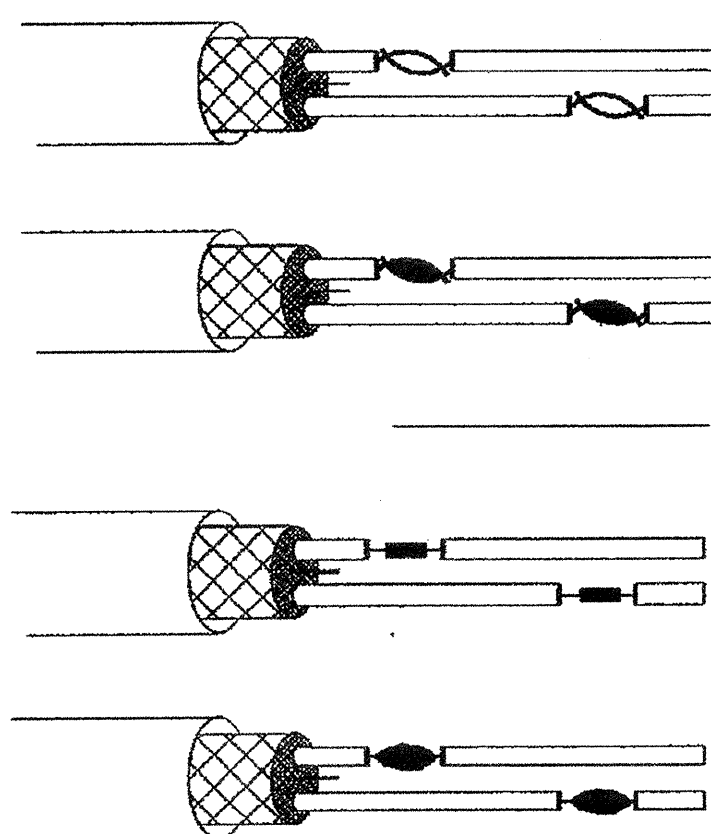
ENGLISH DETAIL DRAWING FOR
INDUCTION DETECTION LOOPS
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE



STEP 2. CONNECT AND SOLDER



TWIST BARE CONDUCTORS TOGETHER AND SOLDER WITH RESIN CORE SOLDER

OR

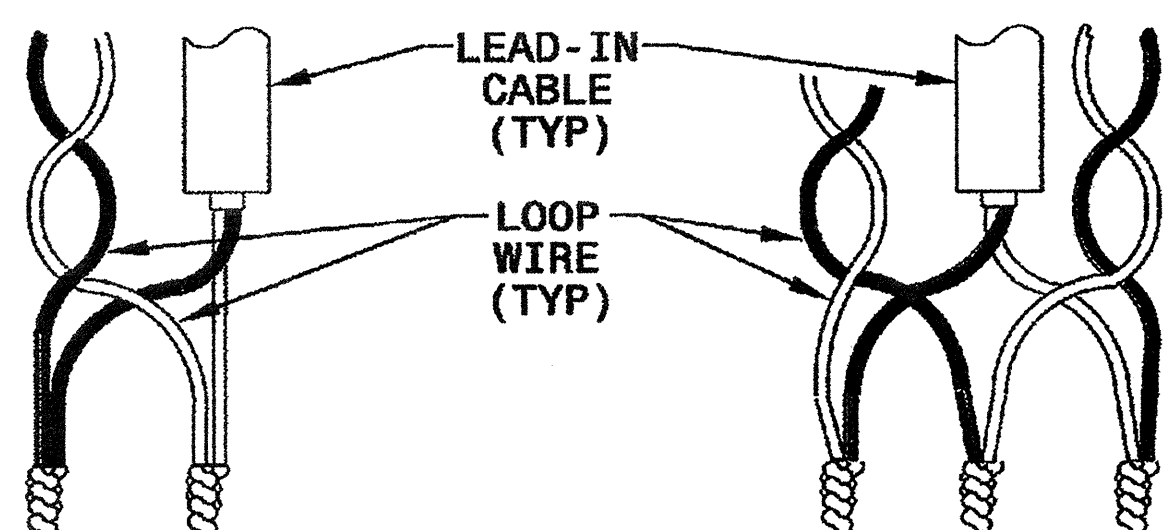
CRIMP BARE CONDUCTORS TOGETHER WITH AN UNINSULATED BUTT CONNECTOR AND SOLDER WITH RESIN CORE SOLDER

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

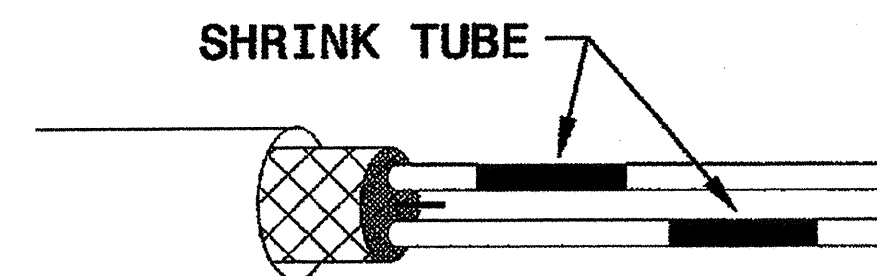
LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS

SINGLE CONNECTION

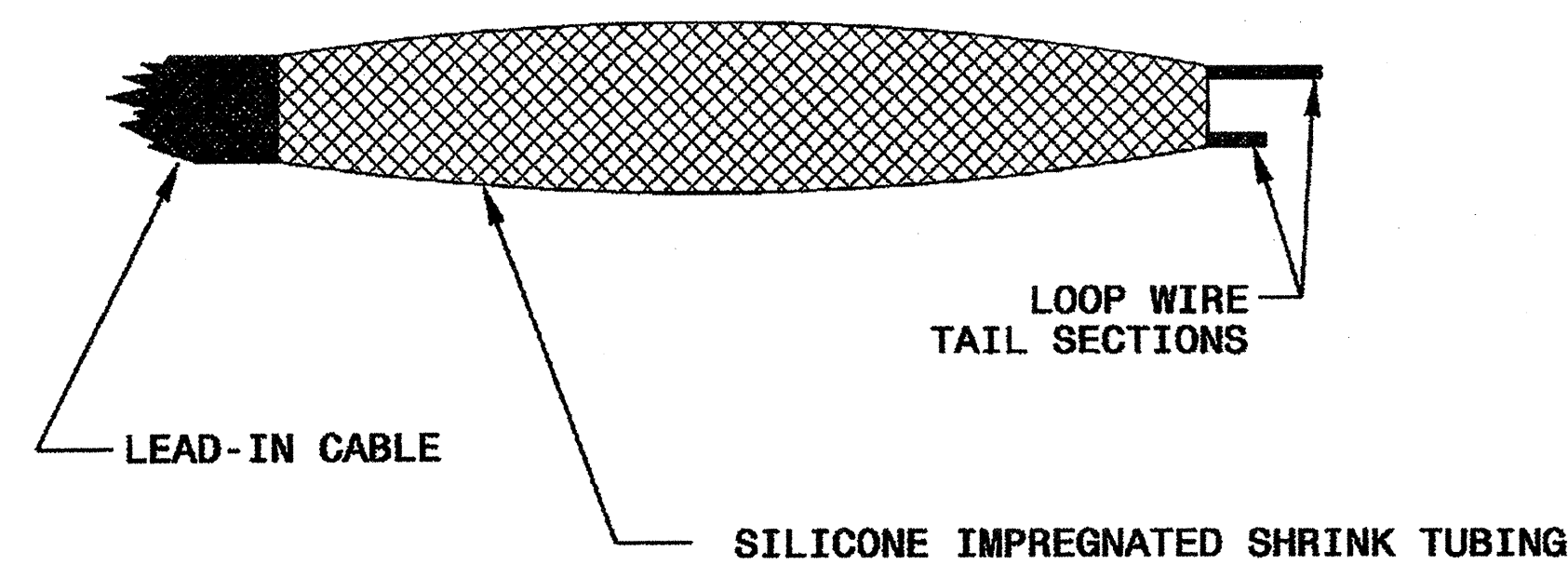
SERIES CONNECTION



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY PROTECT SPLICE



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

SHEET 3 OF 3
1725D01

See Plate for Title

Prepared in the Office of:
Intelligent Transportation Systems & Signals Unit
DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA
750 N. Greenfield Parkway
Garner, NC 27529

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
016286
ENGINEER
MILTON I. DEAN
Signature: Milton I. Dean
Date: 9/5/07