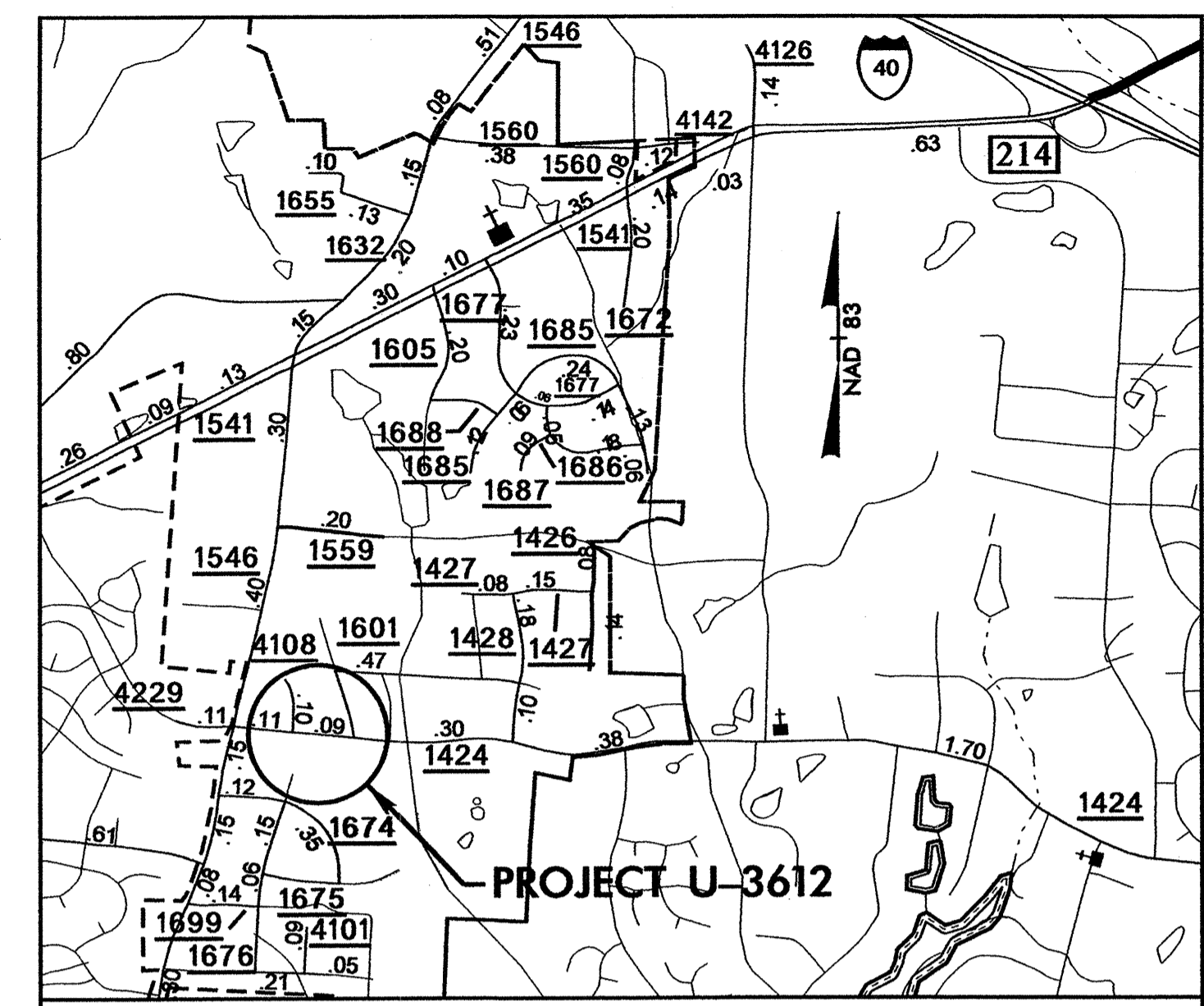


STATE	PROJECT NO.	SHEET NO.
N.C.	U-3612	Sig.1

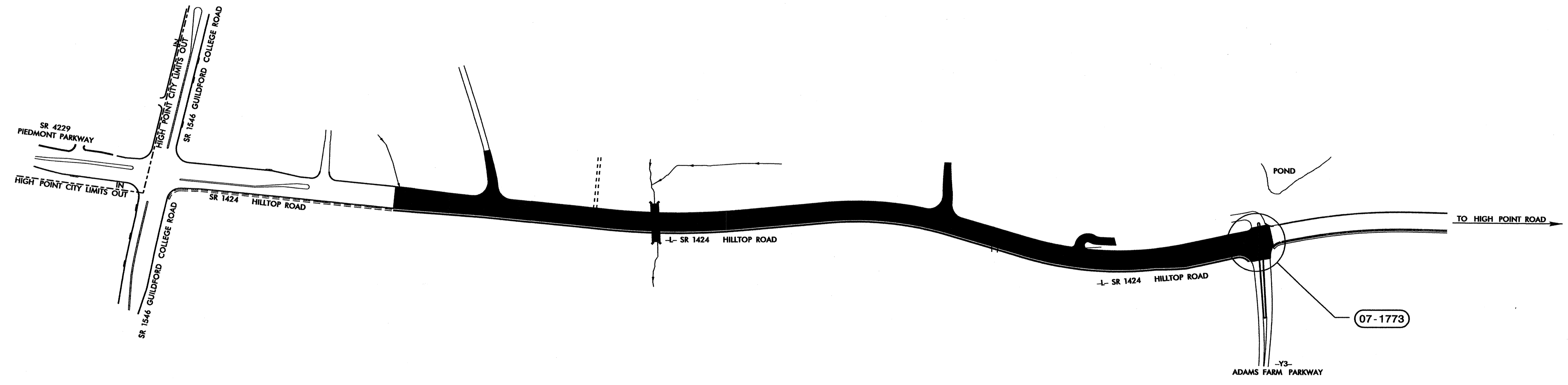
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**GUILFORD COUNTY**

**LOCATION: GREENSBORO - SR 1424 (HILLTOP ROAD) FROM EAST OF SR 1546 (GUILFORD COLLEGE ROAD) AT CHELSEA ACRES COURT TO ADAMS FARM PARKWAY**  
**TYPE OF WORK: TRAFFIC SIGNALS**



**VICINITY MAP**



**PROJECT: U-3612**

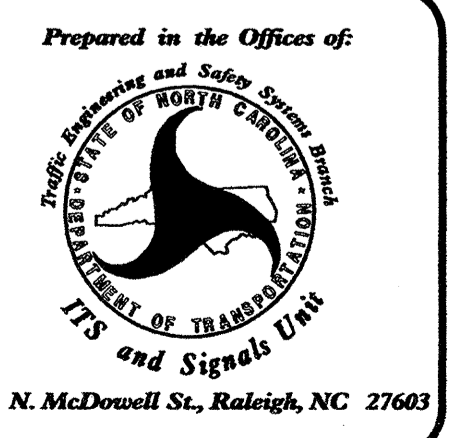
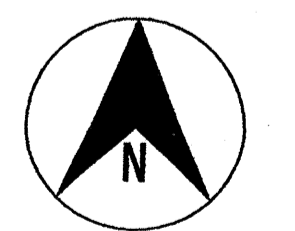
**INDEX OF PLANS**

SHEET NUMBER	SIGNAL INVENTORY NUMBER	LOCATION /DESCRIPTION
SIG. 1	---	Title Sheet
SIG. 2-4	07-1773	SR 1424 (Hilltop Road) at Adams Farm Parkway
SIG. 5-10	---	Standard Metal Pole Drawings

**LEGEND**

##-#### SIGNAL INVENTORY NUMBER  
INTELLIGENT TRANSPORTATION SYSTEMS AND SIGNALS UNIT

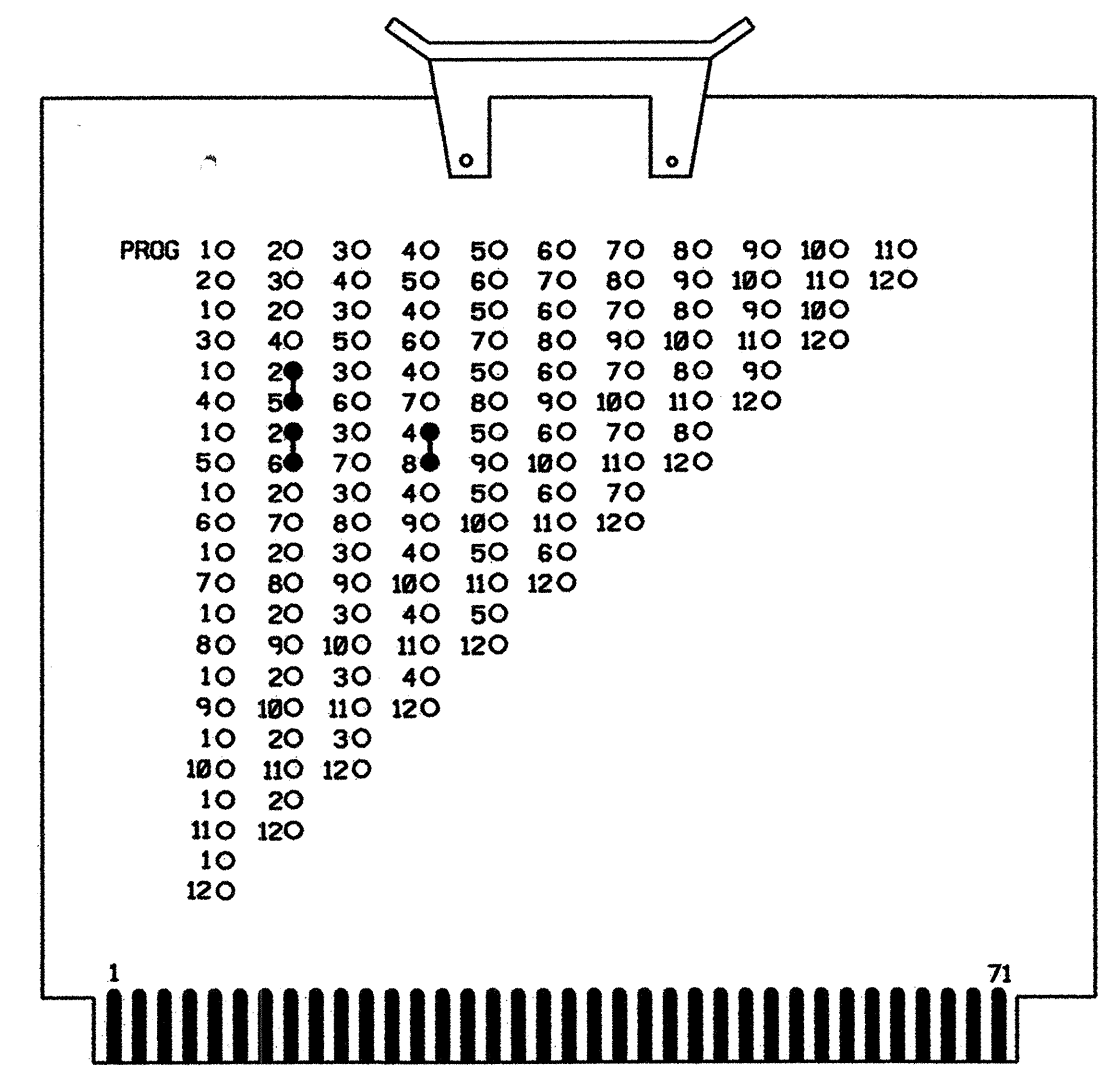
TIMOTHY J. WILLIAMS, PE - S & G CONTRACTS AND PEF SUPPORT ENGINEER  
GEORGE C. BROWN, PE - SIGNAL EQUIPMENT DESIGN ENGINEER







**NEMA\* CONFLICT MONITOR  
PROGRAMMING CARD**  
(install jumpers as shown below)



\* NOTE: MONITOR SHALL BE PROGRAMMED FOR FULL SIGNAL SEQUENCE MONITORING. (NEMA+)

**NOTES**

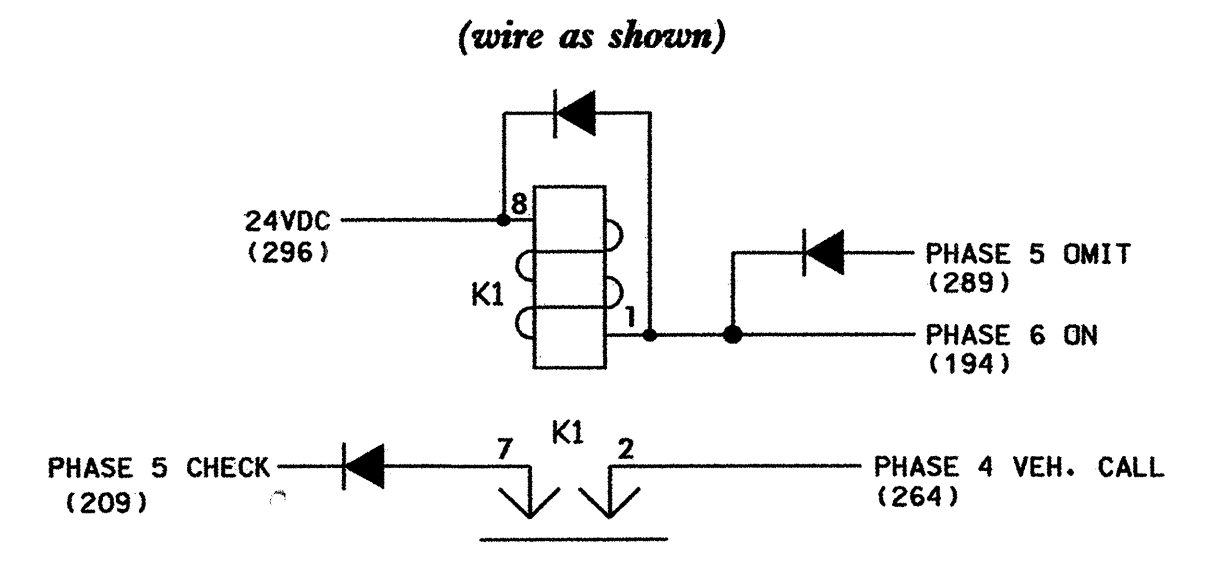
1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED PHASES AND OVERLAPS TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 1,3,7,9,10,11 AND 12 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE CONFLICT MONITOR. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. WIRE DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. SET ALL DETECTOR UNIT CHANNELS TO "PRESENCE" MODE.
8. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
9. THE CABINET AND CONTROLLER ARE A PART OF THE GREENSBORO CITY SIGNAL SYSTEM.

**FIELD CONNECTION HOOK-UP CHART**

PHASE	1	2	3	4	5	6	7	8	OLA	OLB	OLC	OLD	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	41,42	21,42	61,62 63**	NU	81,82	NU	NU	NU	NU	NU	P41, P42	NU	NU
RED		4		10	*	16		22								
YELLOW		5		11		17		23								
GREEN		6		12		18		24								
RED ARROW																
YELLOW ARROW					14											
GREEN ARROW					15											
														604		
														606		

NU = NOT USED  
\* DENOTES INSTALL LOAD RESISTOR. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.  
\*\* DENOTES HEAD 63 ADDED ON FINAL DESIGN.

**BACK-UP PROTECTION WIRING DETAIL**

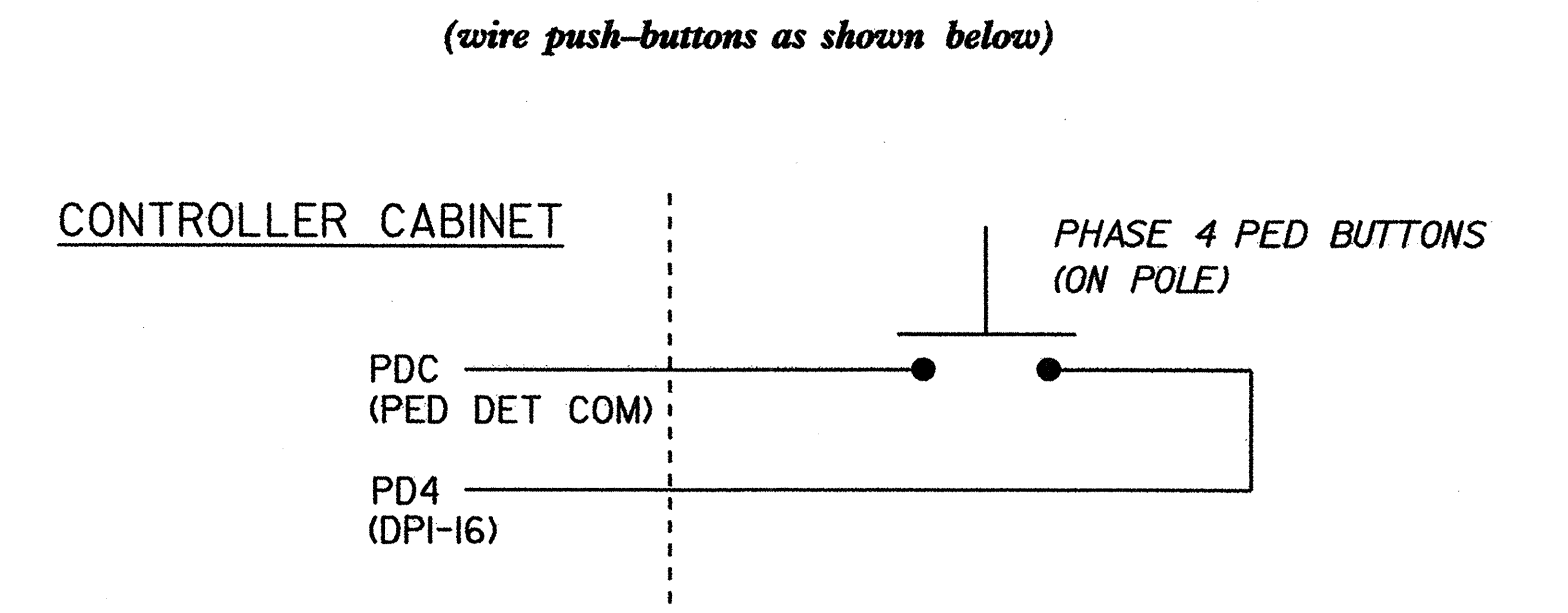


- NOTES**
1. RELAY 'K1' IS A SPST WITH A 24VDC COIL. (P&B\* KRP3DH SHOWN, APPROVED EQUIVALENT MAY BE USED)
  2. ALL DIODES ARE VALUED AT 600V PIV, 1 AMP MINIMUM. (RECOMMENDED PART NO. IN4005)
  3. WHEN TRAFFIC CONDITIONS REQUIRE THE CONTROLLER TO TO BACK-UP FROM PHASE 2+6 TO PHASE 5, THIS RELAY LOGIC CIRCUIT WILL FORCE THE CONTROLLER TO CYCLE THROUGH PHASE 4. THE CONTROLLER IS NOT ALLOWED TO BACK UP DIRECTLY TO PHASE 5 FROM PHASE 2+6.

**COUNTDOWN PEDESTRIAN SIGNAL OPERATION**

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

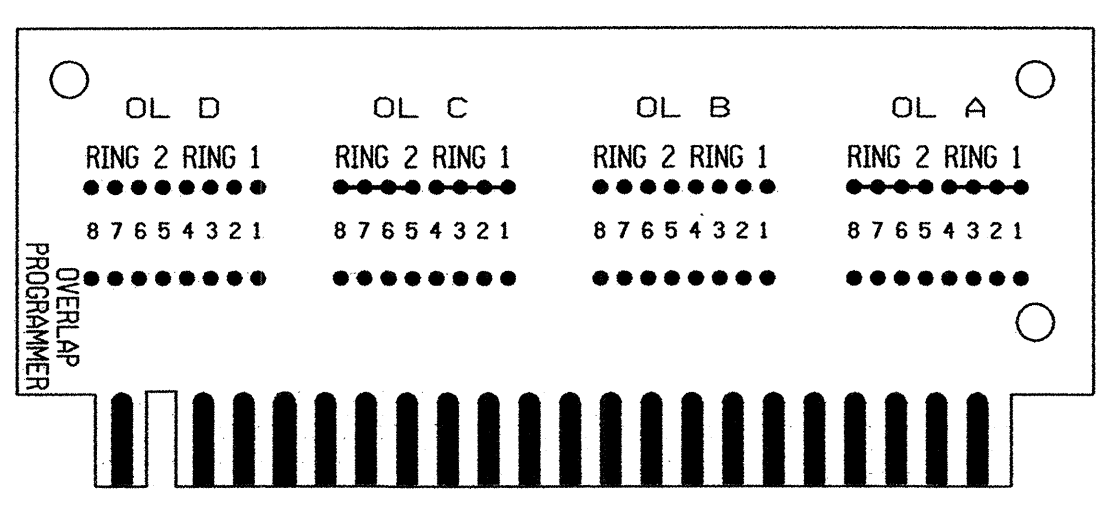
**PEDESTRIAN PUSH-BUTTON WIRING DETAIL**



**EQUIPMENT INFORMATION**

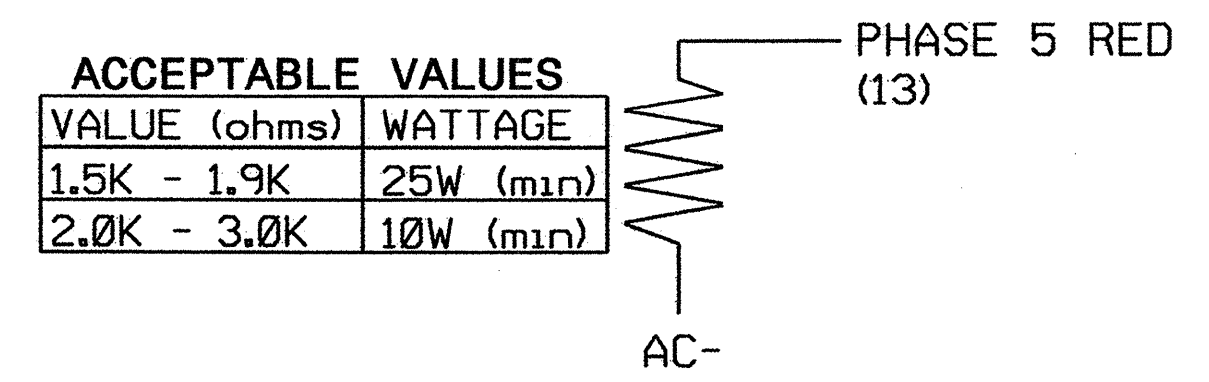
- CONTROLLER.....PEEK 3000
- CABINET.....PEEK CWD-1063
- CABINET MOUNT.....BASE
- LOADBAY POSITIONS.....16
- LOAD SWITCHES USED.....2,4,5,6,8,14
- PHASES USED.....2,4,5,6,8,4 PED
- OVERLAP A.....NOT USED
- OVERLAP B.....NOT USED
- OVERLAP C.....NOT USED
- OVERLAP D.....NOT USED

**NEMA OVERLAP CARD**



OVERLAP CARD SHALL BE COMPLETELY BLANK (NO OVERLAPS)

**LOAD RESISTOR INSTALLATION DETAIL**



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 PHASES THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1773 T AND 07-1773  
DESIGNED: April 2006  
SEALED: 05-05-06  
REVISED: N/A

Signal Upgrade - Temporary Design & Final Design

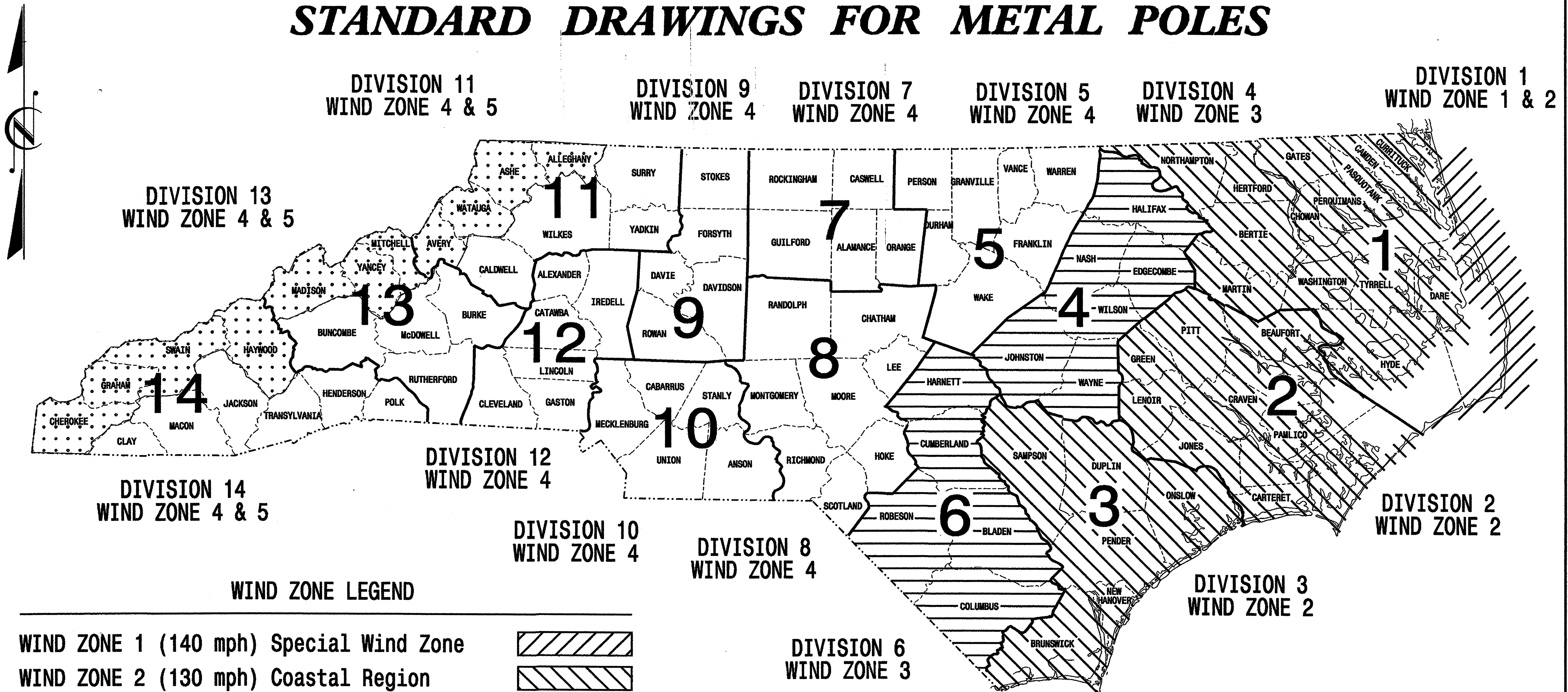
	<b>SR 1424 (Hilltop Road) at Adams Farm Parkway</b>		
	Division 7 PLAN DATE: May 2006 PREPARED BY: James Peterson	Guilford County REVIEWED BY: JWH REVIEWED BY:	
REVISIONS			INIT. DATE
122 N. McDowell St., Raleigh, NC 27603			SIGNATURE: <i>James C. Brown</i> 5/8/06 DATE:

SIG. INVENTORY NO. 07-1773

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	U-3612	Sig.5
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

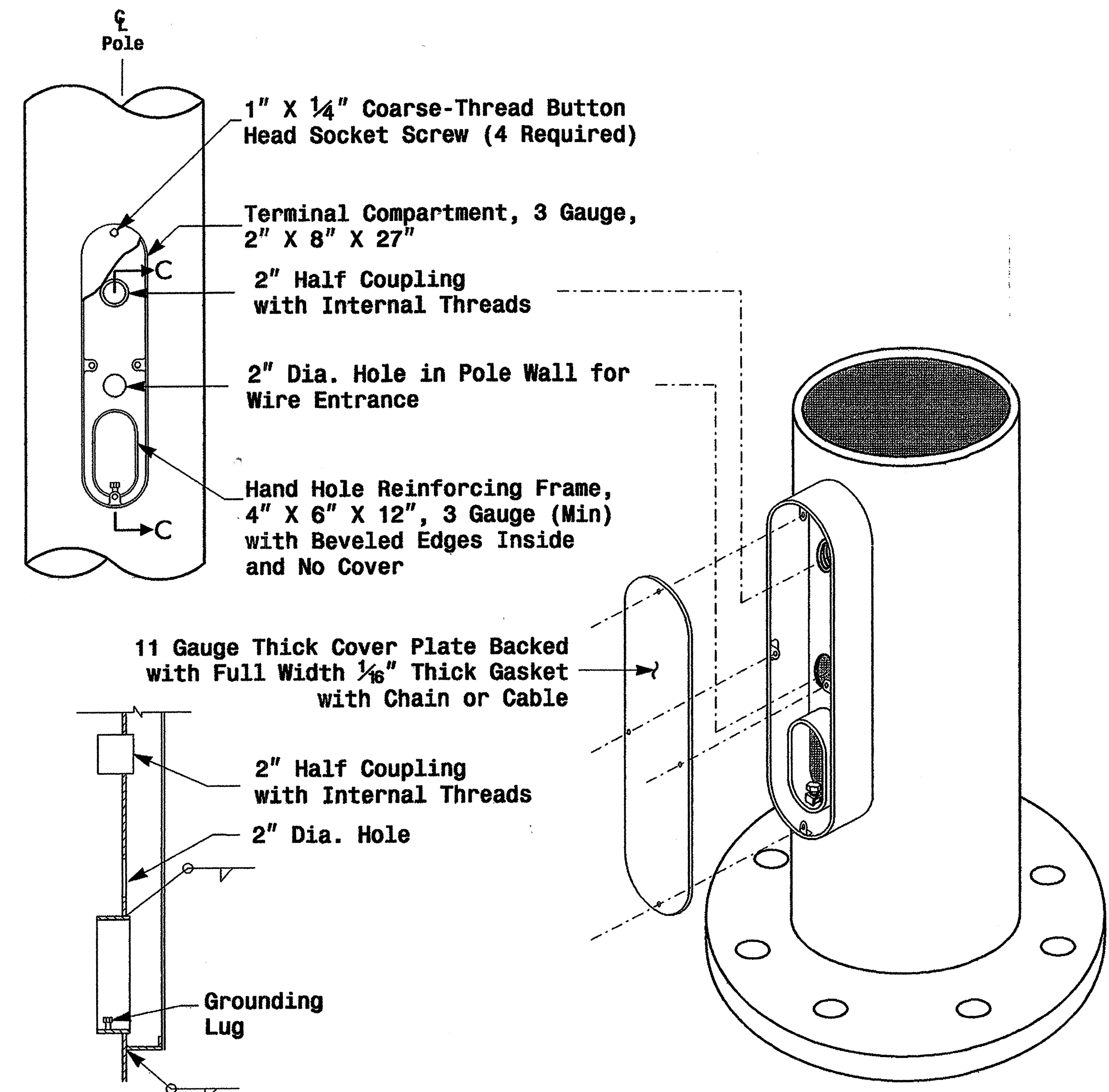
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

**NC DOT CONTACTS:**  
**TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH**

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

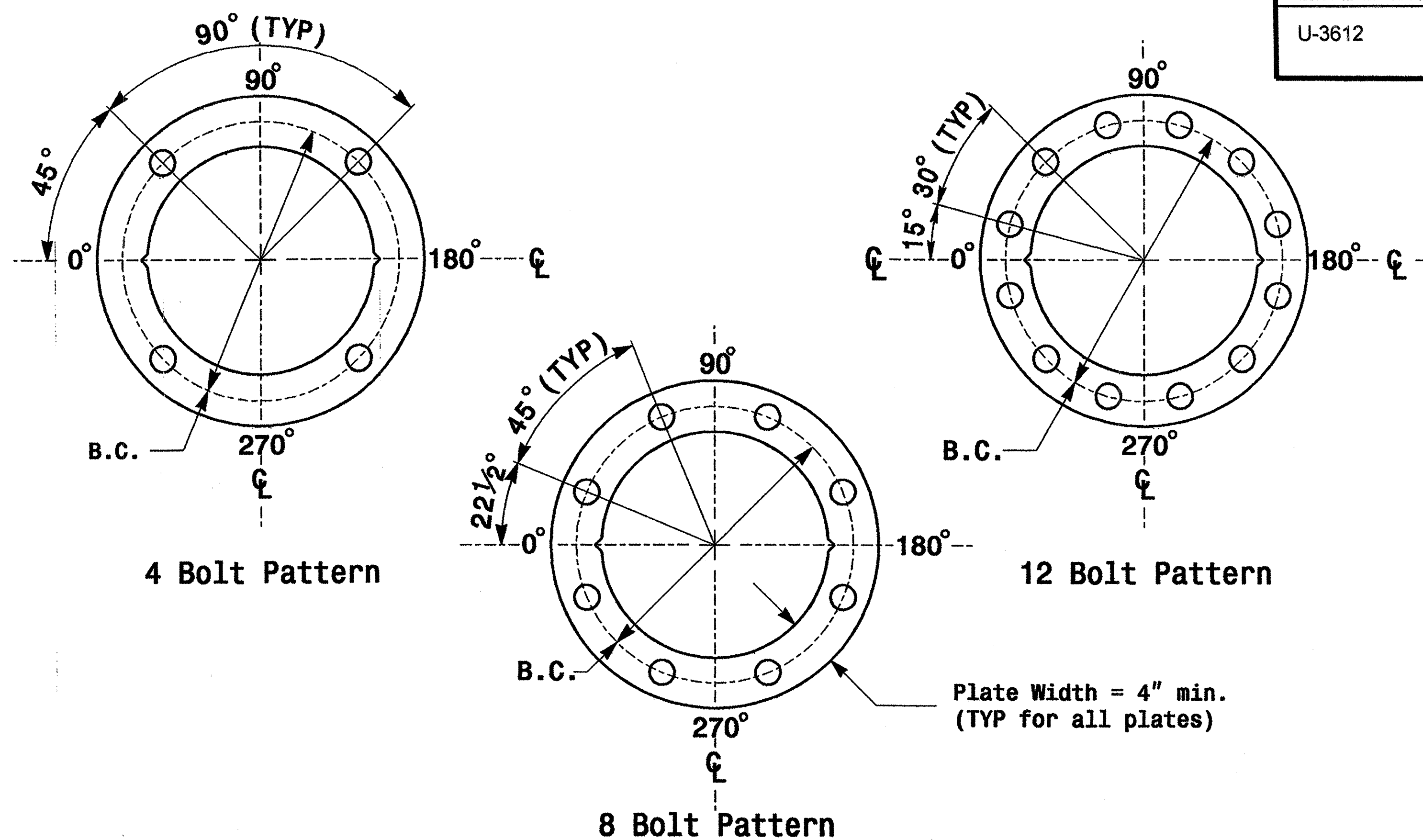
SEAL

D. Sarkar      9.2.2005  
 SIGNATURE      DATE



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

**Terminal Compartment Detail**



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

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

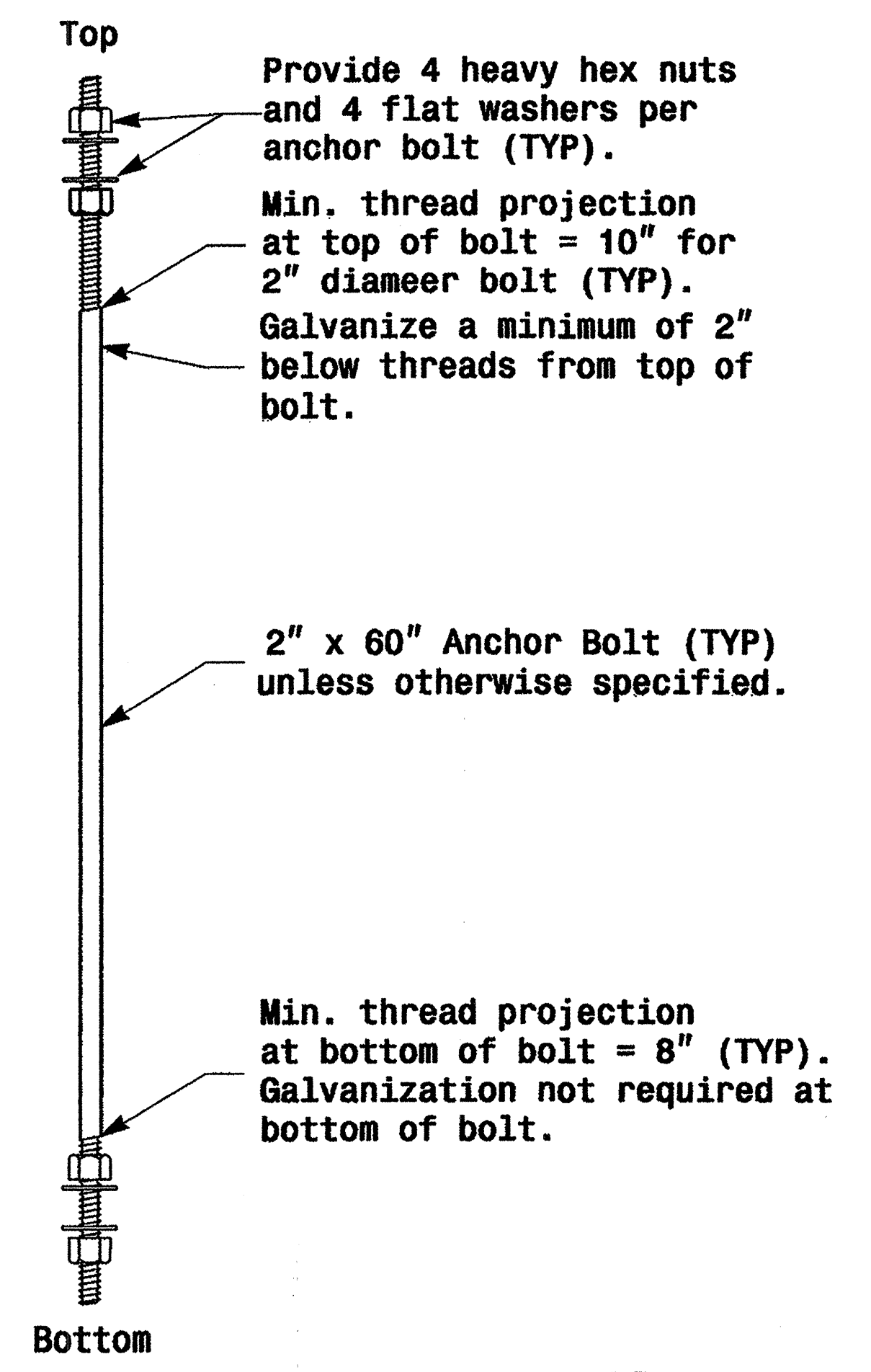
MFG _____	MFG. DATE: MM/YY _____
SECTION D/T/L/Y _____	
NCDOT STANDARD _____	

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

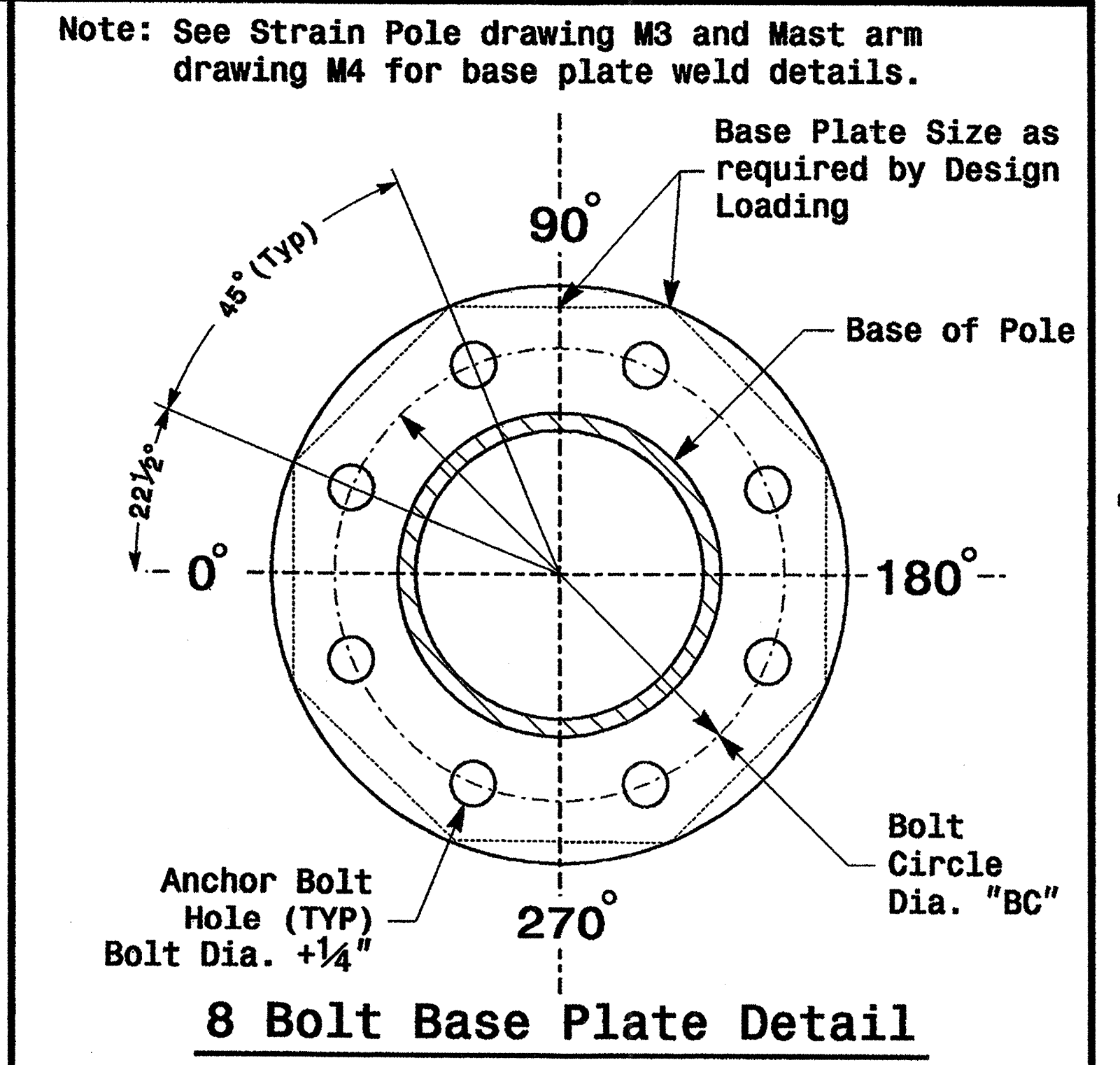
**Shaft I.D. Tag**  
 (Provide on Strain Poles and Mast Arm Poles)

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

**Identification Tag Details**



**Anchor Bolt Detail**



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

REVISIONS	INTY.	DATE

SCALE: NONE

SEAL

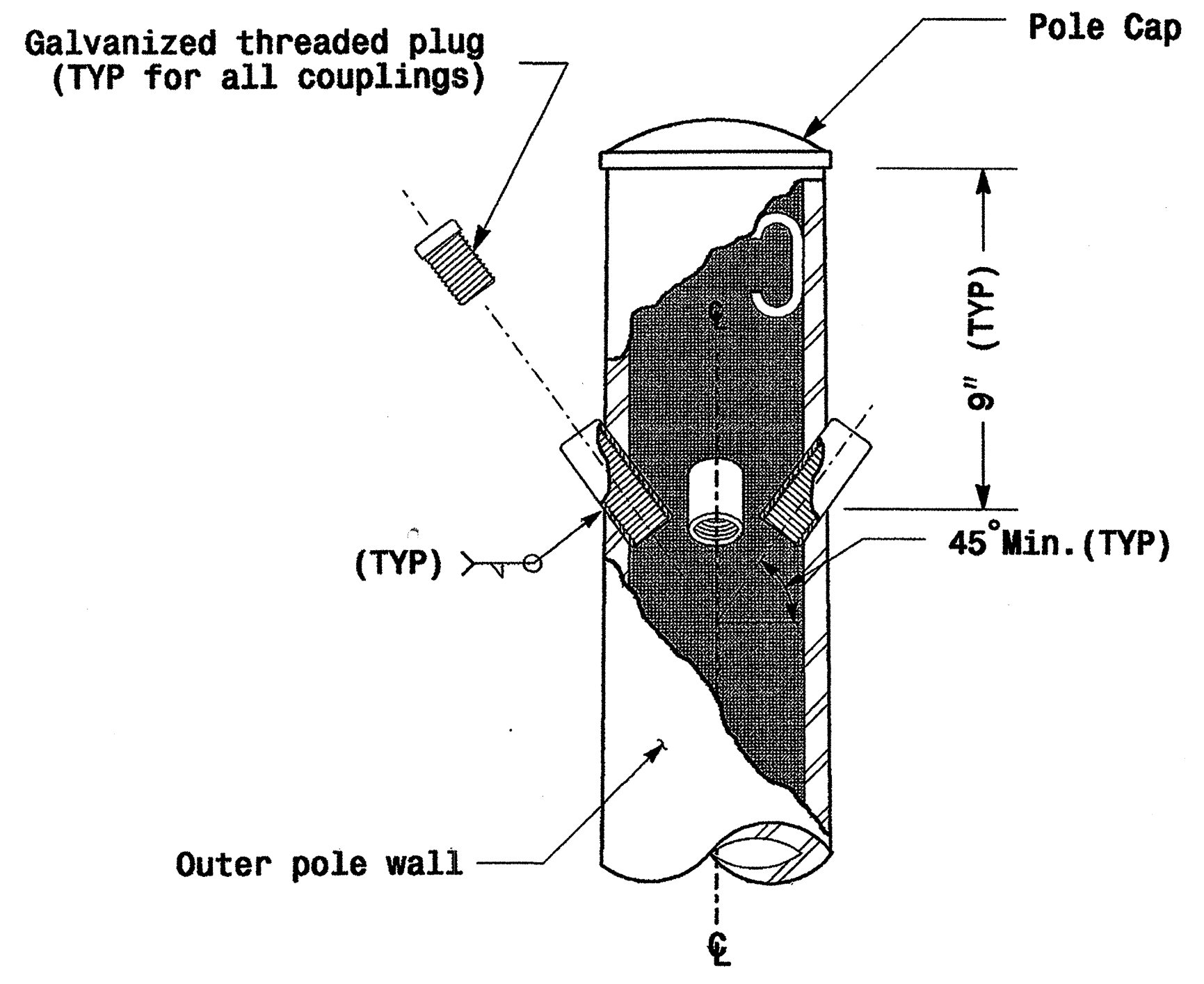
PROFESSIONAL SEAL  
 028094  
 DEREK C. SARKAR  
 ENGINEER

Signature: D. Sarkar 9.2.2005  
 DATE

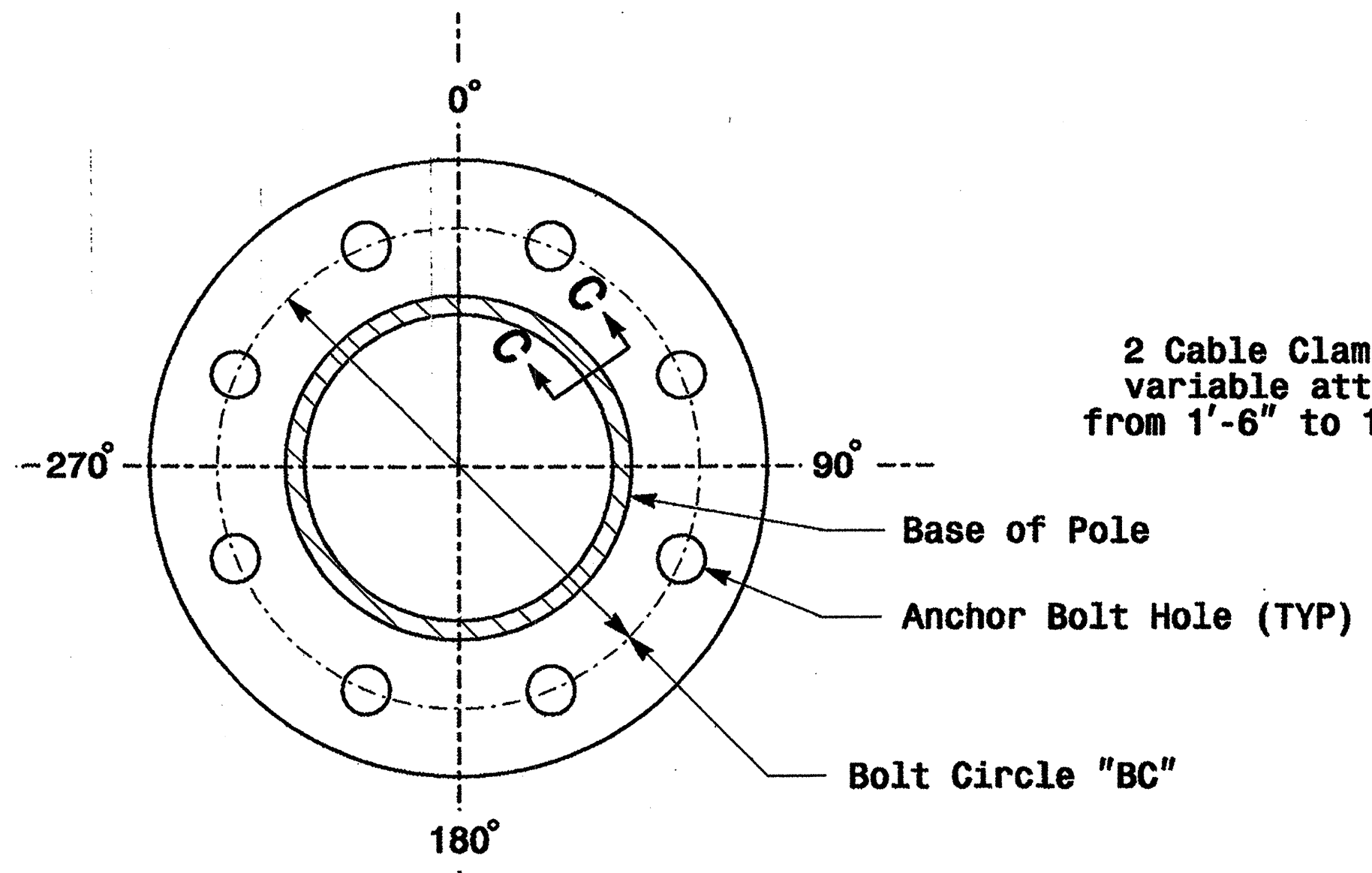
SIG. INVENTORY NO.

01-SEP-2005 18:22 D:\2004\Markel Pole Stander-ds6204 m2 thru m5.dgn

**Fabrication Details - All Poles**

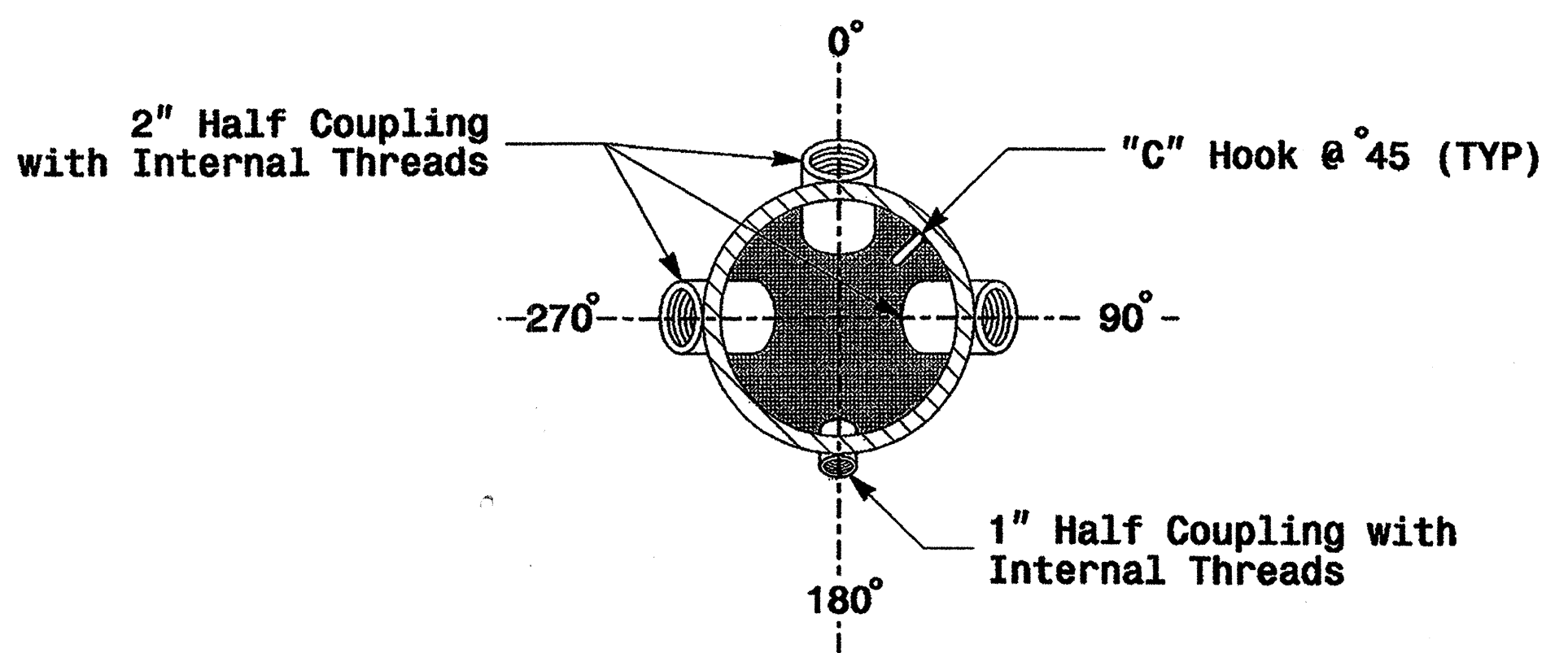
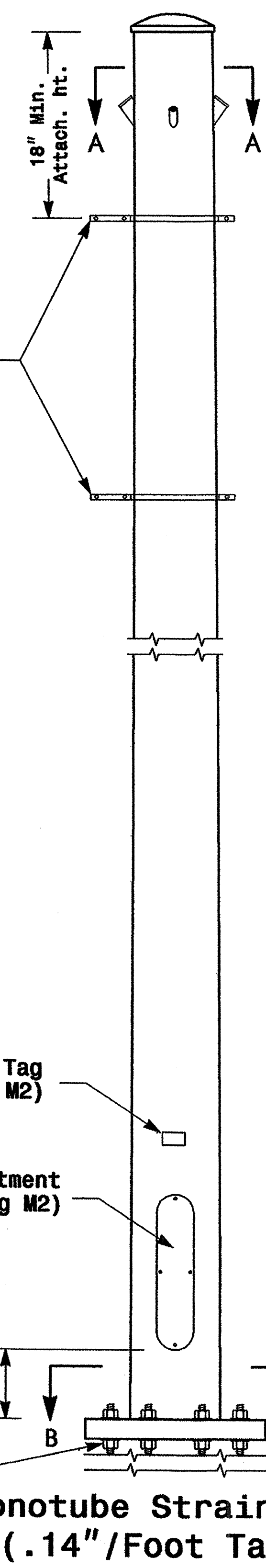


**Cable Entrances at Top of Pole**

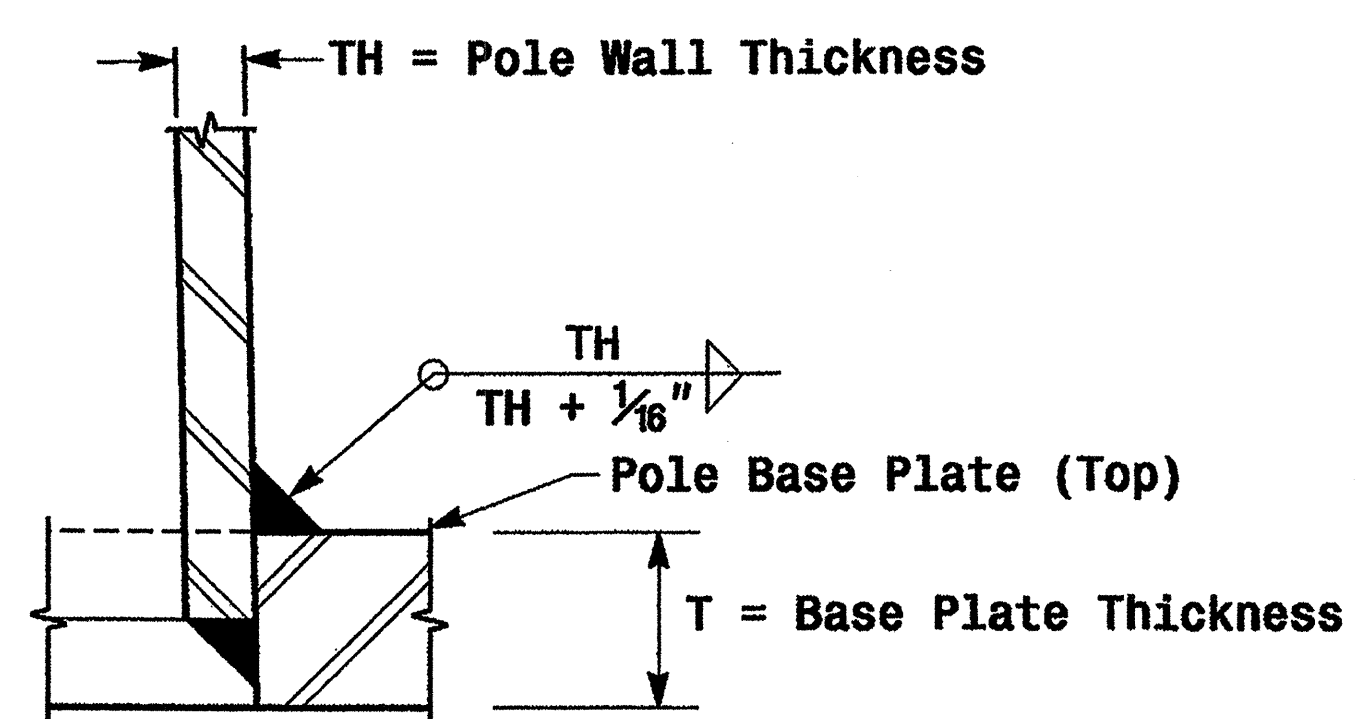


**Section B-B  
Pole Base Plate**  
(See drawing M2)

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**

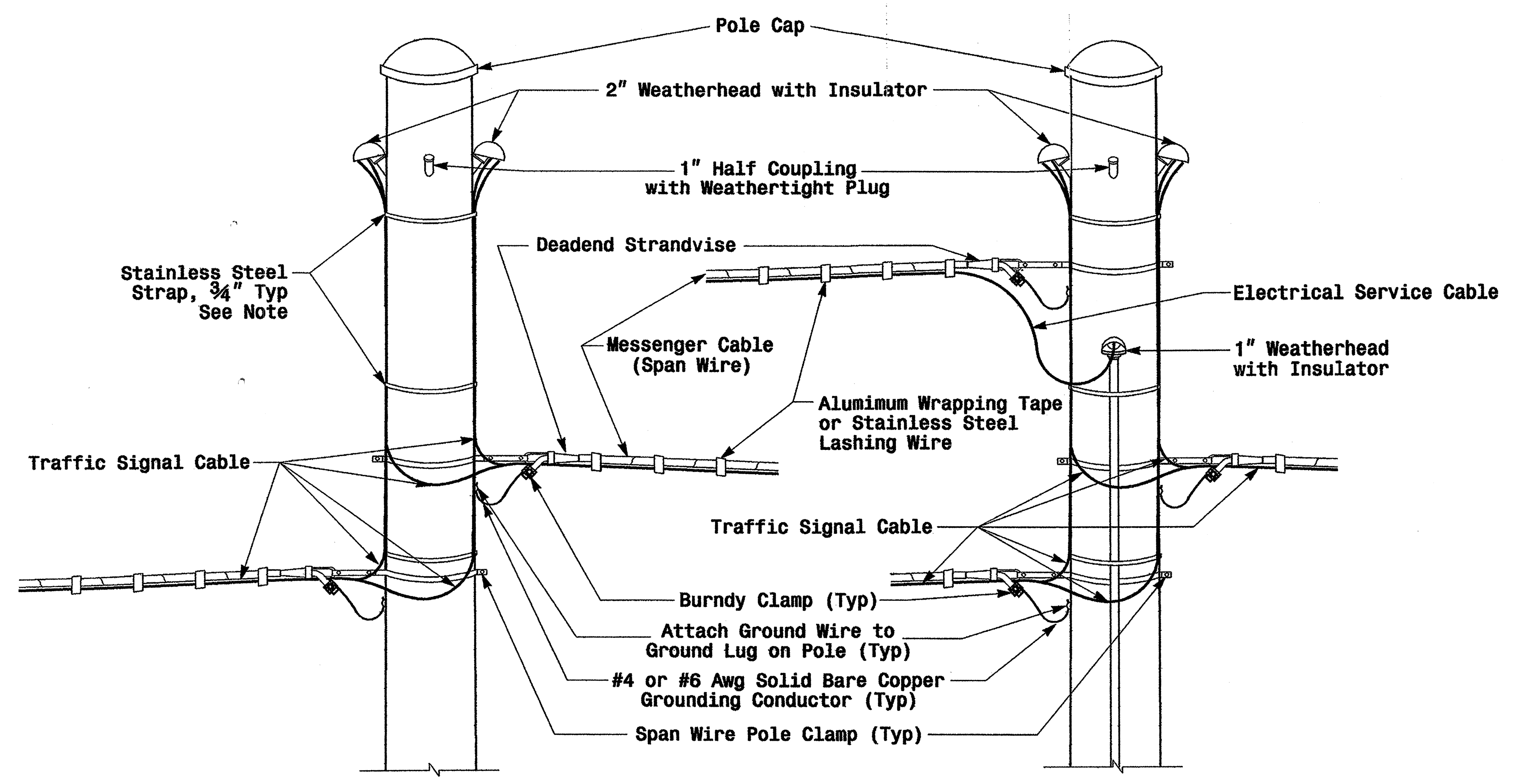


**Section C-C**  
**Socket Connection Weld Detail**

**Fabrication Details - Strain Poles**

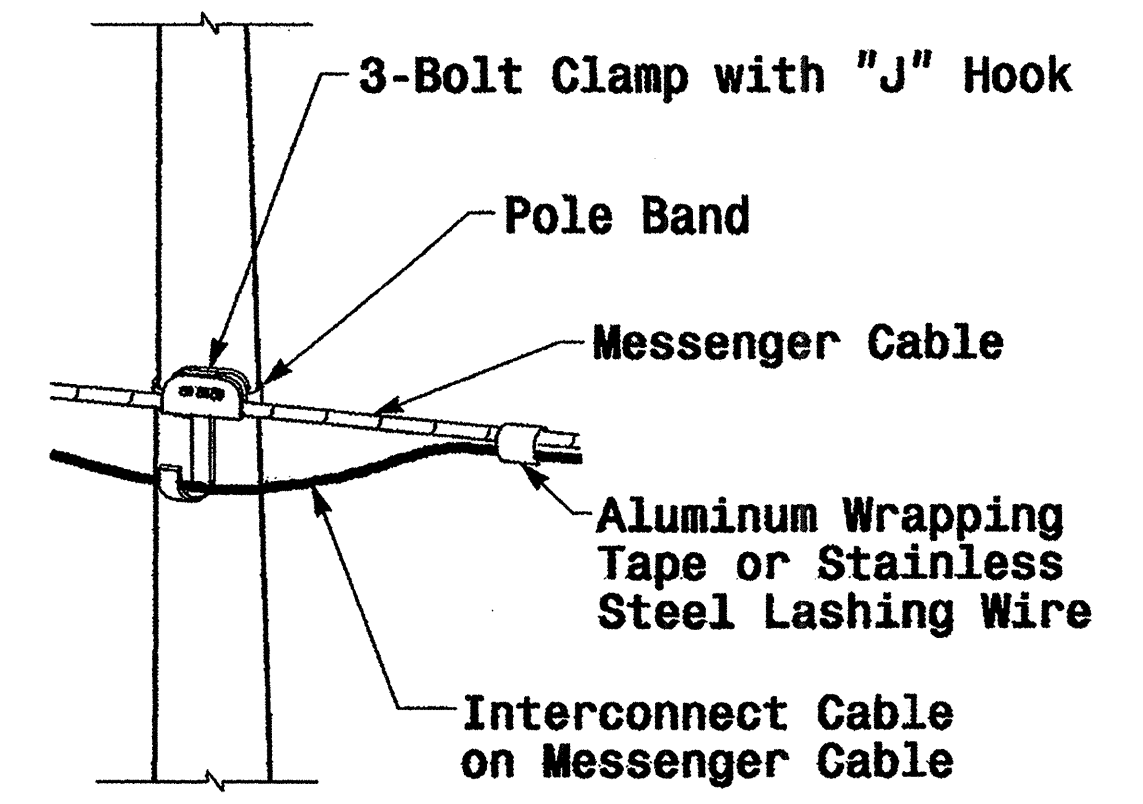
01-SEP-2005 14:07  
w:\pico\es-un1\pico\groups\2004 metal pole standard\2004 m3.dgn  
D:\sarker

	<b>Typical Fabrication Details For Strain Poles</b>		
	PLAN DATE: <b>May 2005</b> PREPARED BY: <b>P.L. Alexander</b>	REVIEWED BY: <b>G.F. Andrews</b> REVIEWED BY: <b>A.M. Esposito</b>	
SCALE: <b>0 NA</b> NONE	SIGNATURE: <i>P.L. Alexander</i> <b>9.2.2005</b> DATE		SIG. INVENTORY NO.

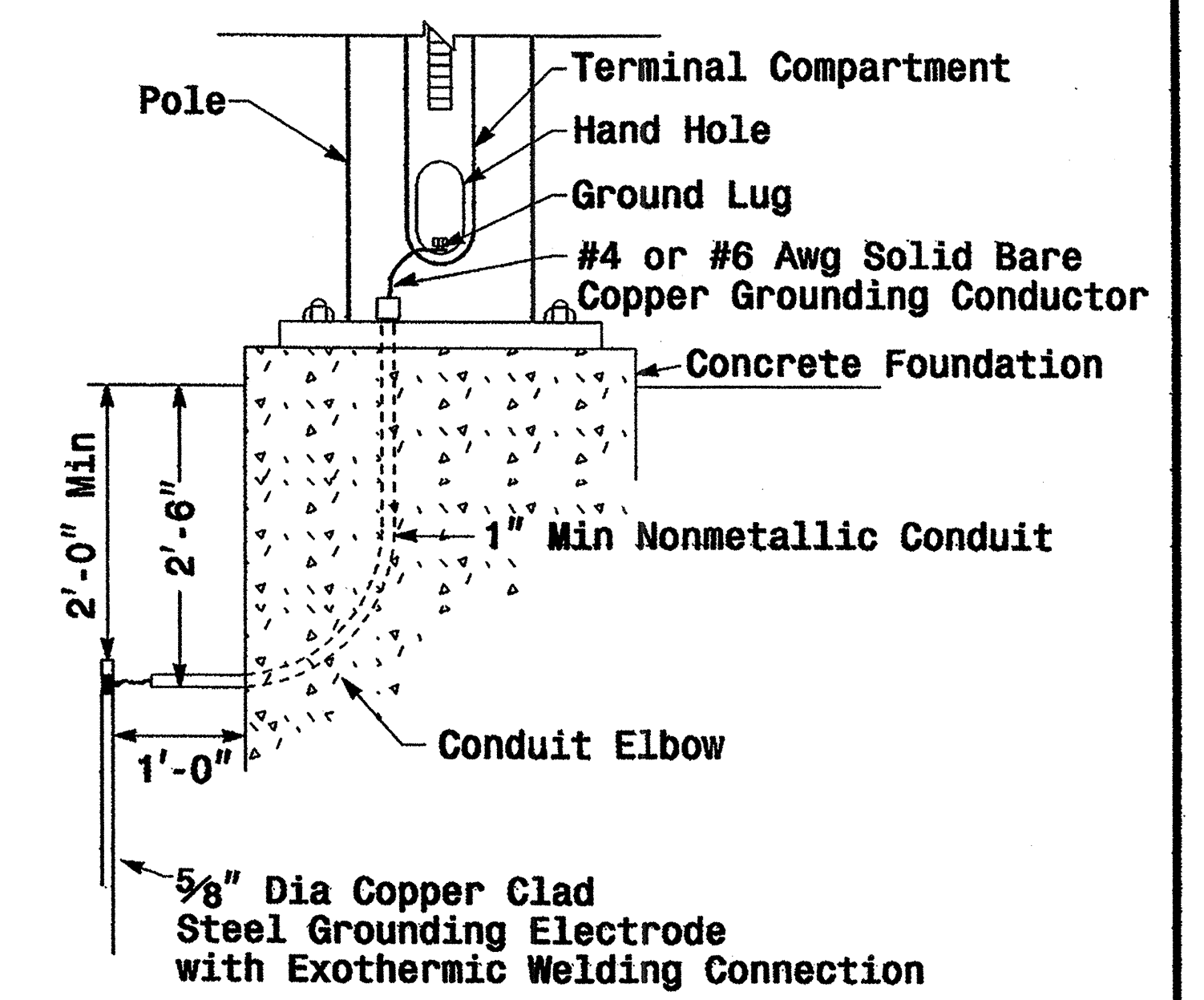


Note: Strap all signal cables to the side of the pole with 3/4\"/>

**Strain Pole Attachments**



**Attachment of Cable to Intermediate Metal Pole**



**Metal Pole Grounding Detail**

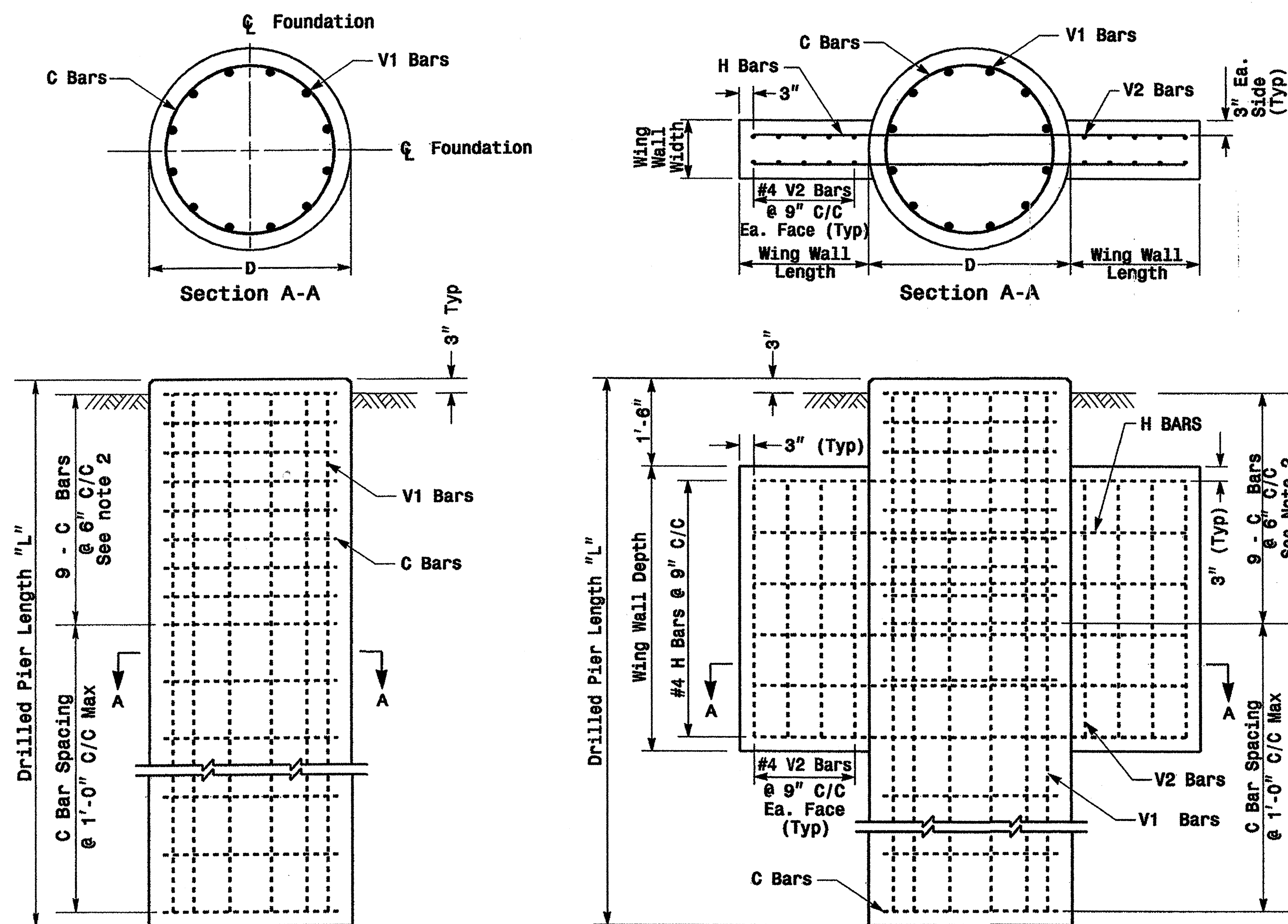
**Construction Details - Strain Poles**

01-SEP-2005 16:33 w:\peopl\es-un\hwork\groups\2004 metal pole standard\sig804.m6.dgn p:\alexander

	<b>Construction Details Strain Poles</b>		
	PLAN DATE: <b>May 2005</b> PREPARED BY: <b>C.F. ANDREWS</b>	REVIEWED BY: <b>P.L. ALEXANDER</b> REVIEWED BY: <b>D.C. SARKAR</b>	
SCALE: 0 NA NONE	SIGNATURE: <i>Milton I. Dean</i> DATE: <b>9-1-05</b>		SIG. INVENTORY NO.

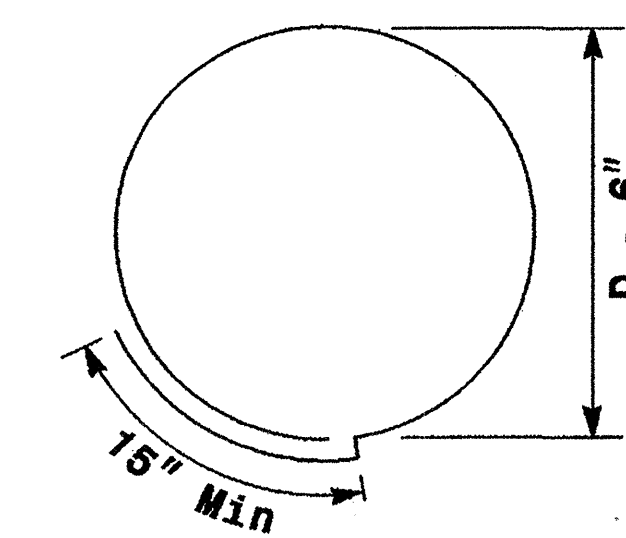


## Reinforcing Steel Bars



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"

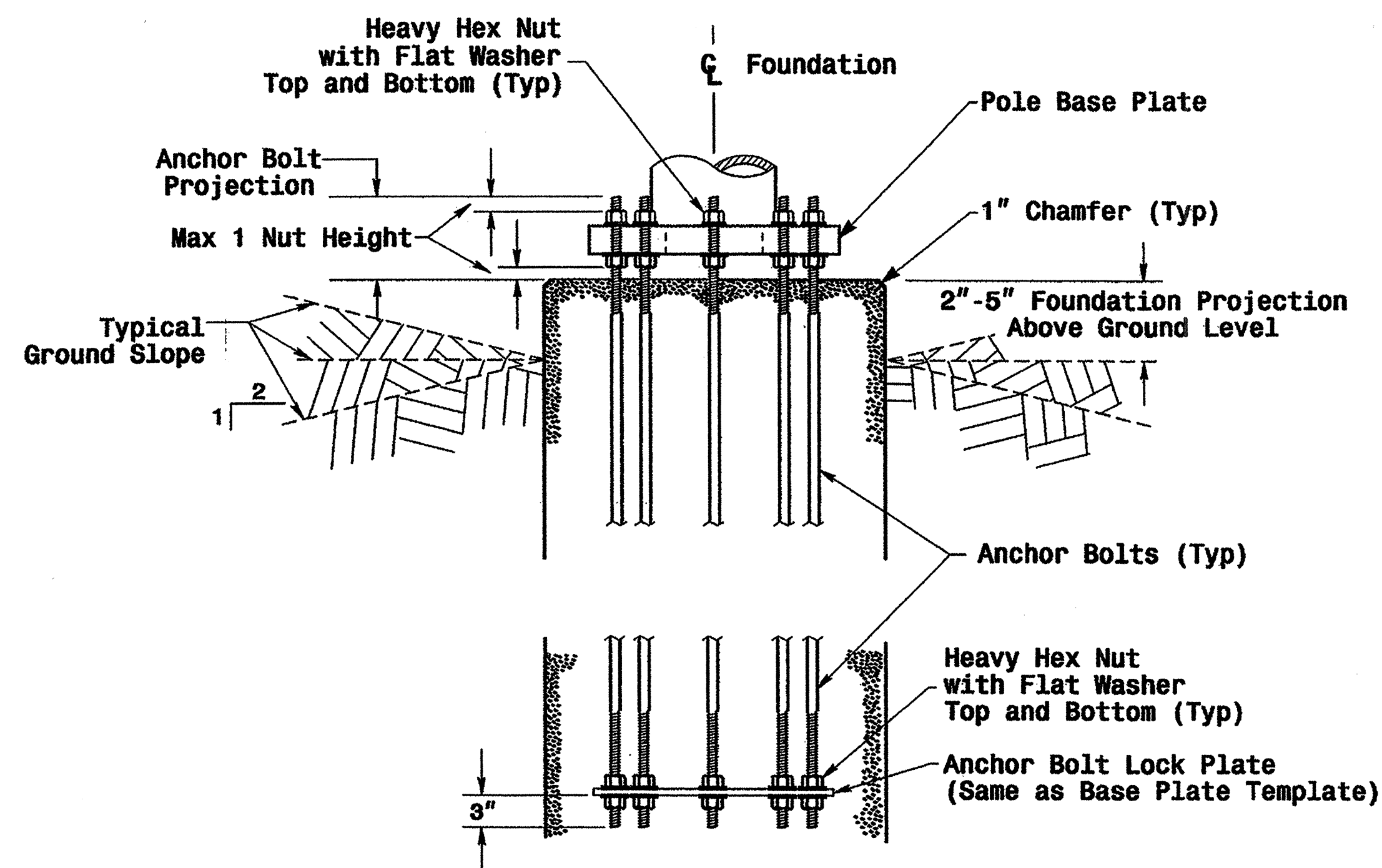
\* See Note No. 1  
\*\* See Note No. 3

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

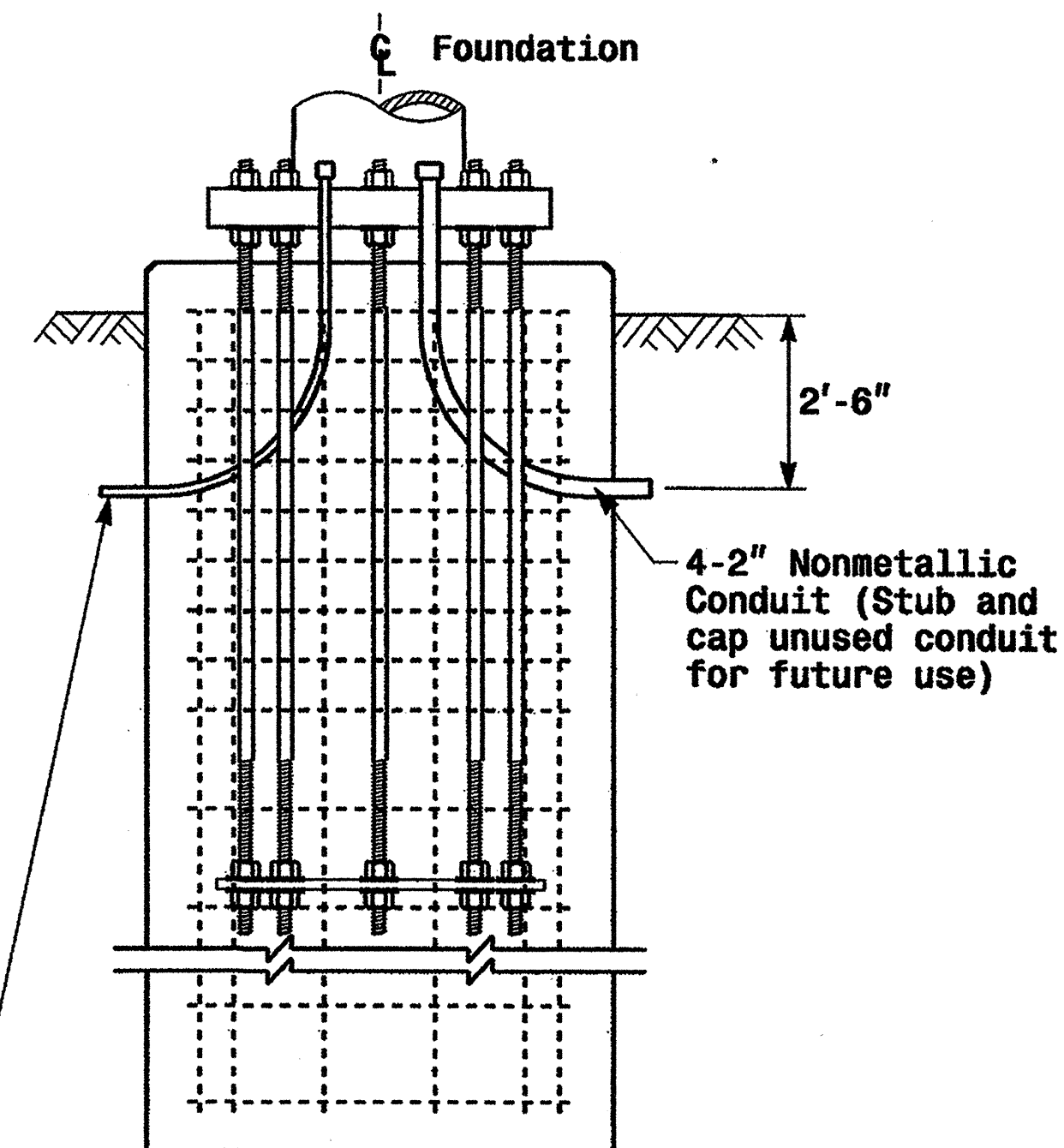
See Note No. 4

## Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



## Typical Foundation Conduit Details



## 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.)

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

		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:**

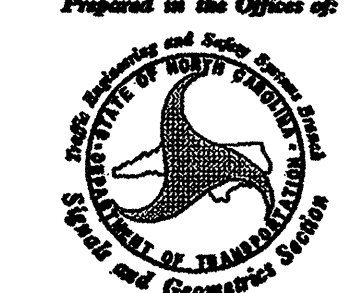
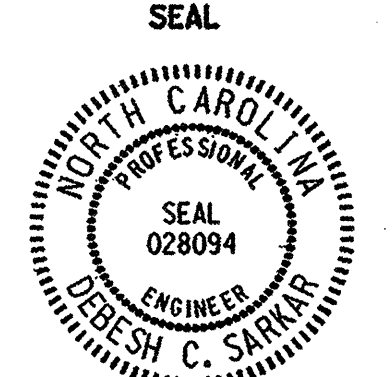
1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.
2. Base plate thickness (T) is 2.0 inches.

**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  
w:\pdp\lee-unit1\working\pdp\std strain pole.dgn  
pdx\chd

	Standard Strain Poles and Standard Foundations		
	PLAN DATE: <b>May 2005</b> PREPARED BY: <b>P.L. Alexander</b>	REVIEWED BY: <b>C.F. Andrews</b> REVIEWED BY: <b>A.M. Esposito</b>	
SCALE: 0 NA None		SIGNATURE: <i>D. Sarkar</i> 9.2.2005 DATE	