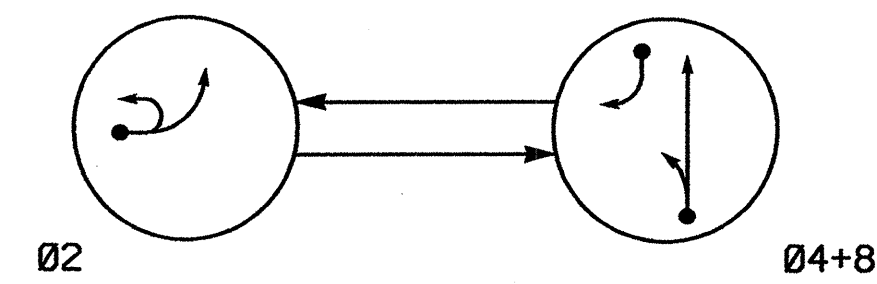


PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

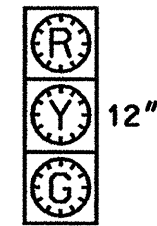
- ← ● DETECTED MOVEMENT
- ← ○ UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ← - - - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	04+8	FLASH
21,22	G	R	R
41,42,43	R	G	R
81,82,83	R	G	R

SIGNAL FACE I.D.

○ Denotes L.E.D.



* 21,22
41,42,43
81,82,83
* See Note 4

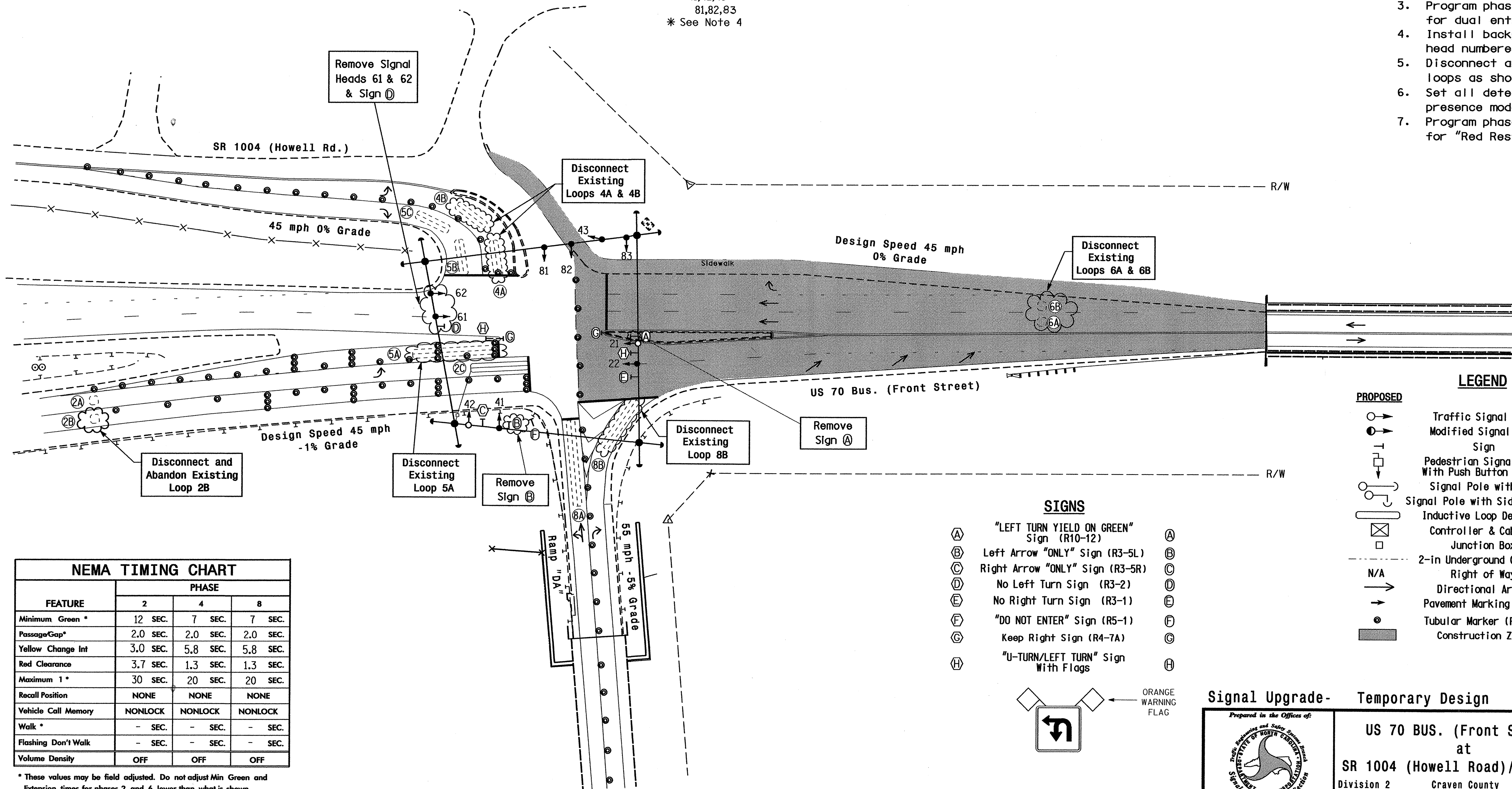
NEMA LOOP & DETECTOR UNIT INSTALLATION CHART
with TS-1 CABINET

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	DETECTOR UNITS				PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?			
					UNIT NO.	NEW EXISTING	CHANNEL	NEMA PHASE					
2A	6X6	Existing	300	- X	1	- X	1	2	EXTEND	3.1	2	NO	
2C	6X40	2-4-2	0	X -		X	-	2				ALL	NO
5B	6X25	Existing	0	- X		- X	1	4	DELAY	15		ALL	YES
5C	6X25	Existing	35	- X		- X	2	4	DELAY	10		ALL	YES
8A	6X60	Existing	0	- X	5	- X	1	8				ALL	NO

2-Phase Fully Actuated (Isolated)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Program phase 4 and phase 8 for dual entry.
- Install backplates for signal head numbered 21.
- Disconnect and Abandon existing loops as shown.
- Set all detector units to presence mode.
- Program phase 2 and phase 4+8 for "Red Rest".



NEMA TIMING CHART

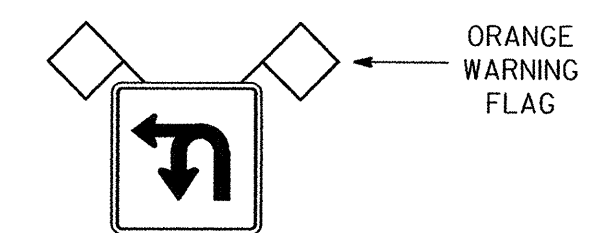
FEATURE	PHASE		
	2	4	8
Minimum Green *	12 SEC.	7 SEC.	7 SEC.
Passage Gap*	2.0 SEC.	2.0 SEC.	2.0 SEC.
Yellow Change Int	3.0 SEC.	5.8 SEC.	5.8 SEC.
Red Clearance	3.7 SEC.	1.3 SEC.	1.3 SEC.
Maximum I *	30 SEC.	20 SEC.	20 SEC.
Recall Position	NONE	NONE	NONE
Vehicle Call Memory	NONLOCK	NONLOCK	NONLOCK
Walk *	- SEC.	- SEC.	- SEC.
Flashing Don't Walk	- SEC.	- SEC.	- SEC.
Volume Density	OFF	OFF	OFF

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

LEGEND

PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
○ → Modified Signal Head	○ → N/A
○ → Sign	○ → N/A
○ → Pedestrian Signal Head With Push Button & Sign	○ → N/A
○ → Signal Pole with Guy	○ → N/A
○ → Signal Pole with Sidewalk Guy	○ → N/A
□ → Inductive Loop Detector	□ → N/A
□ → Controller & Cabinet	□ → N/A
□ → Junction Box	□ → N/A
--- 2-in Underground Conduit	--- 2-in Underground Conduit
- - - Right of Way	- - - Right of Way
→ Directional Arrow	→ Directional Arrow
→ Pavement Marking Arrow	→ Pavement Marking Arrow
● Tubular Marker (Fixed)	● Tubular Marker (Fixed)
Construction Zone	Construction Zone

- SIGNS**
- (A) "LEFT TURN YIELD ON GREEN" Sign (R10-12)
 - (B) Left Arrow "ONLY" Sign (R3-5L)
 - (C) Right Arrow "ONLY" Sign (R3-5R)
 - (D) No Left Turn Sign (R3-2)
 - (E) No Right Turn Sign (R3-1)
 - (F) "DO NOT ENTER" Sign (R5-1)
 - (G) Keep Right Sign (R4-7A)
 - (H) "U-TURN/LEFT TURN" Sign With Flags



Signal Upgrade - Temporary Design

Prepared in the Offices of:

 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 TRAFFIC ENGINEERING AND GEOMETRICS SECTION

122 N. McDowell St., Raleigh, NC 27603

US 70 BUS. (Front Street) at SR 1004 (Howell Road)/Ramp "DA"
 Division 2 Craven County New Bern

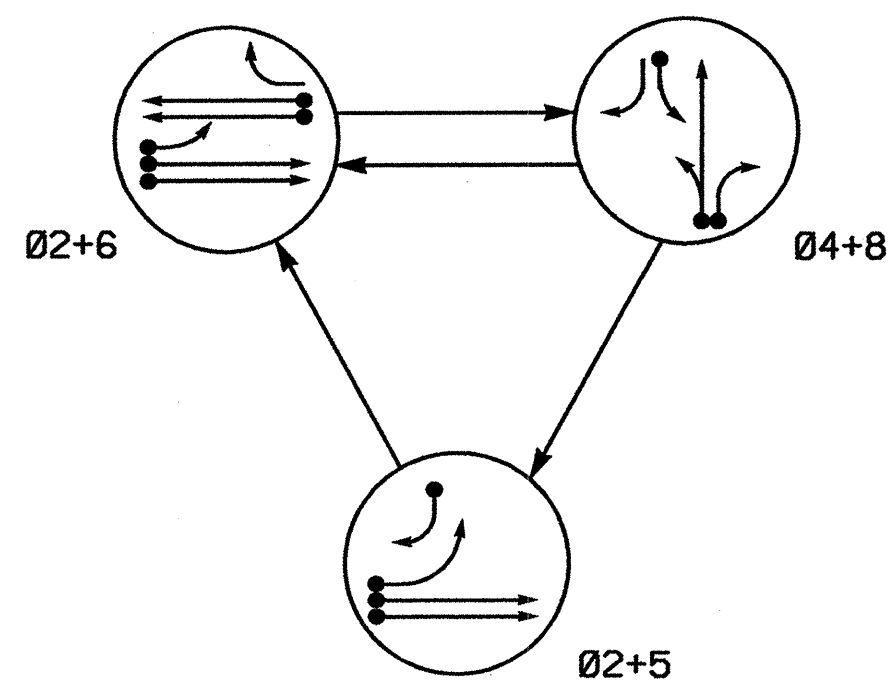
PLAN DATE: August 2006 REVIEWED BY: I. O. Umofurike
 PREPARED BY: Lufir REVIEWED BY:

SCALE: 0 40
1"=40'

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393
 THOMAS J. WILLIAMS
 SIGNATURE: [Signature] DATE: 9/25/06
 SIG. INVENTORY NO. 02-0309 T

25-SEP-2006 11:11:52 s:\p1\lufir\groups\lufir\project\sb-2532\sig\lufir\lufir\02-0309_41.g.dgn 2006/xx/xx/xx

PHASING DIAGRAM



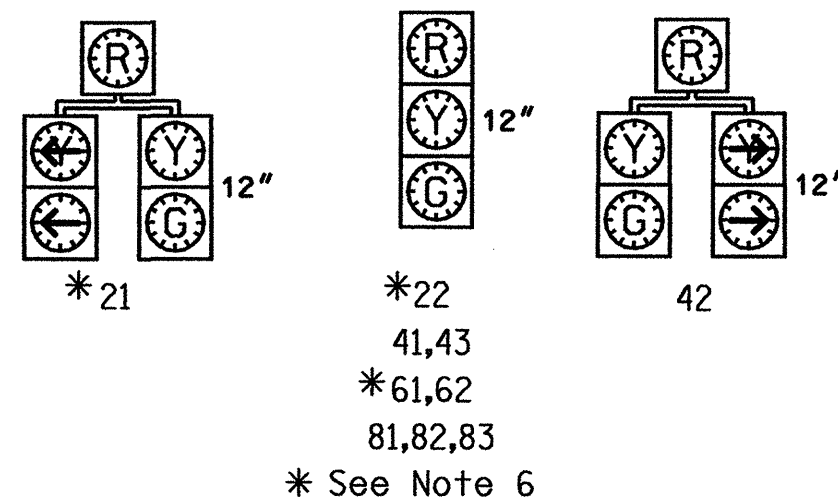
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE				
	02+5	02+6	04+8	FLASH	
21	G	R	Y		
22	G	R	Y		
41,43	R	R	G	R	
42	R	R	G	R	
61,62	R	G	R	Y	
81,82,83	R	R	G	R	

SIGNAL FACE I.D.

Denotes L.E.D.



NEMA LOOP & DETECTOR UNIT INSTALLATION CHART
with TS-1 CABINET

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	UNIT NO.	TIMING			PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
						FEATURE	TIME			
2A	6X6	6	420	X	1	1	2	SEC.	ALL	NO
2B	6X6	6	420	X	1	2	2	SEC.	ALL	NO
* 4A	6X25	Existing	0	-X	2	1	4	SEC.	ALL	NO
* 4B	6X25	Existing	35	-X	2	2	4	SEC.	ALL	NO
* 5A	6X60	Existing	0	-X	3	1	2	DELAY	3 SEC.	2 NO
5B	6X25	Existing	0	-X	6	1	5	DELAY	15 SEC.	ALL YES
5C	6X25	Existing	35	-X	6	2	5	DELAY	10 SEC.	ALL YES
6A	6X6	4	300	X	4	1	6	SEC.	ALL	NO
6B	6X6	4	300	X	4	2	6	SEC.	ALL	NO
8A	6X60	Existing	0	-X	5	1	8	SEC.	ALL	NO
* 8B	6X40	Existing	0	-X	5	2	8	DELAY	15 SEC.	ALL YES

* See Note 9.

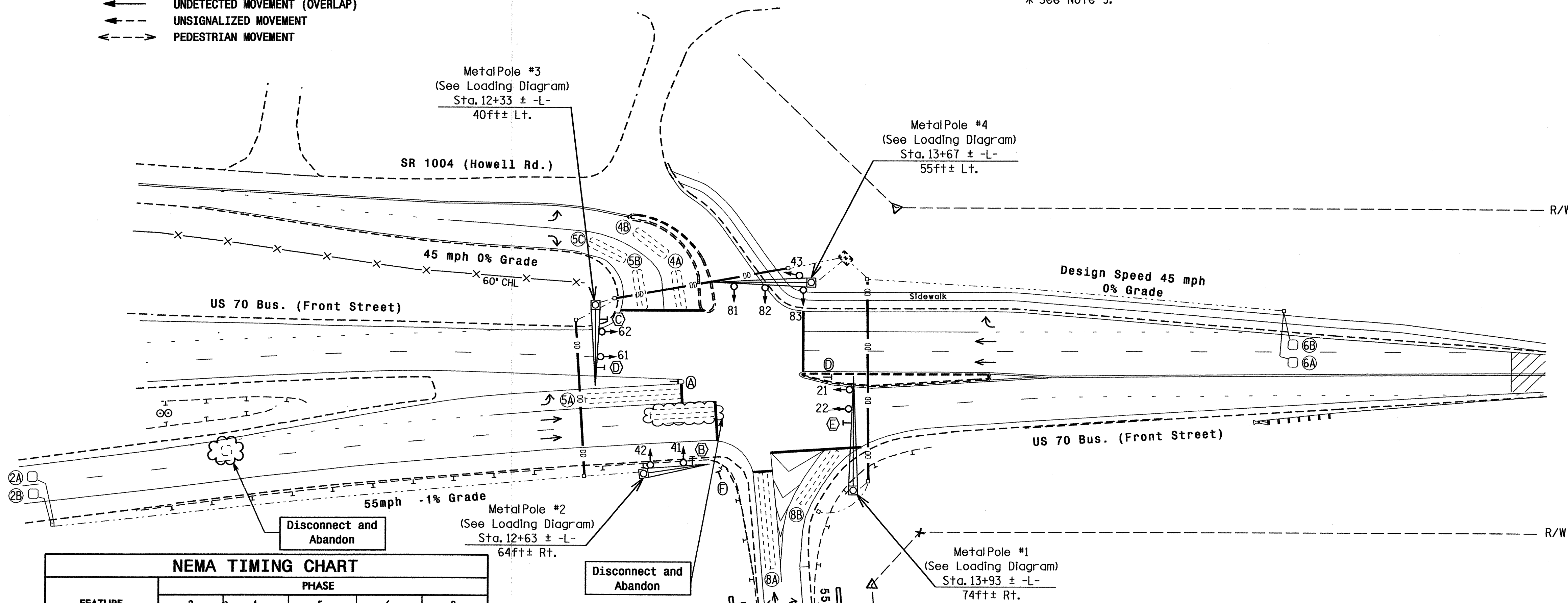
3-Phase Fully Actuated (Isolated)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Omit phase 5 during phase 6 on.
- Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4+8 (see Electrical Details).
- Program phase 4 and phase 8 for dual entry.
- Install backplates for signal heads numbered 21, 22, 61 and 62.
- Disconnect and abandon existing loops as shown.
- Set all detector units to presence mode.
- Reconnect Existing Loops as shown.

LEGEND

- | | | | |
|--|---|--|--|
| | PROPOSED Traffic Signal Head | | EXISTING Traffic Signal Head |
| | PROPOSED Modified Signal Head | | EXISTING Modified Signal Head |
| | PROPOSED Pedestrian Signal Head With Push Button & Sign | | EXISTING Pedestrian Signal Head |
| | PROPOSED Signal Pole with Guy | | EXISTING Signal Pole with Guy |
| | PROPOSED Signal Pole with Sidewalk Guy | | EXISTING Signal Pole with Sidewalk Guy |
| | PROPOSED Inductive Loop Detector | | EXISTING Inductive Loop Detector |
| | PROPOSED Controller & Cabinet | | EXISTING Controller & Cabinet |
| | PROPOSED Junction Box | | 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 Pavement Marking Arrow | | EXISTING Pavement Marking Arrow |
| | PROPOSED Directional Drill | | EXISTING Directional Drill |
| | PROPOSED Metal Pole with Mastarm | | EXISTING Metal Pole with Mastarm |
| | PROPOSED Keep Right Sign (R4-7A) | | EXISTING Keep Right Sign (R4-7A) |
| | PROPOSED Left Arrow "ONLY" Sign (R3-5L) | | EXISTING Left Arrow "ONLY" Sign (R3-5L) |
| | PROPOSED Right Arrow "ONLY" Sign (R3-5R) | | EXISTING Right Arrow "ONLY" Sign (R3-5R) |
| | PROPOSED No Left Turn Sign (R3-2) | | EXISTING No Left Turn Sign (R3-2) |
| | PROPOSED No Right Turn Sign (R3-1) | | EXISTING No Right Turn Sign (R3-1) |
| | PROPOSED "DO NOT ENTER" Sign (R5-1) | | EXISTING "DO NOT ENTER" Sign (R5-1) |



FEATURE	PHASE				
	2	4	5	6	8
Minimum Green *	14 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
PassageGap*	6.0 SEC.	2.0 SEC.	1.0 SEC.	6.0 SEC.	2.0 SEC.
Yellow Change Int	5.3 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.	5.8 SEC.
Red Clearance	1.1 SEC.	1.7 SEC.	2.3 SEC.	1.7 SEC.	1.3 SEC.
Maximum I *	90 SEC.	20 SEC.	15 SEC.	90 SEC.	20 SEC.
Recall Position	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
Vehicle Call Memory	LOCK	NONLOCK	NONLOCK	LOCK	NONLOCK
Walk *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
Flashing Don't Walk	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
Volume Density	ON	OFF	OFF	ON	OFF
Actuation B4 Add *	0 VEH	- VEH	- VEH	0 VEH	- VEH
Sec Per Actuation *	1.5 SEC.	-	- SEC.	1.5 SEC.	- SEC.
Maximum Initial *	46 SEC.	-	- SEC.	34 SEC.	- SEC.
Time B4 Reduction *	15 SEC.	-	- SEC.	15 SEC.	- SEC.
Time To Reduce *	30 SEC.	-	- SEC.	30 SEC.	- SEC.
Minimum Gap	3.4 SEC.	-	- SEC.	3.0 SEC.	- SEC.

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

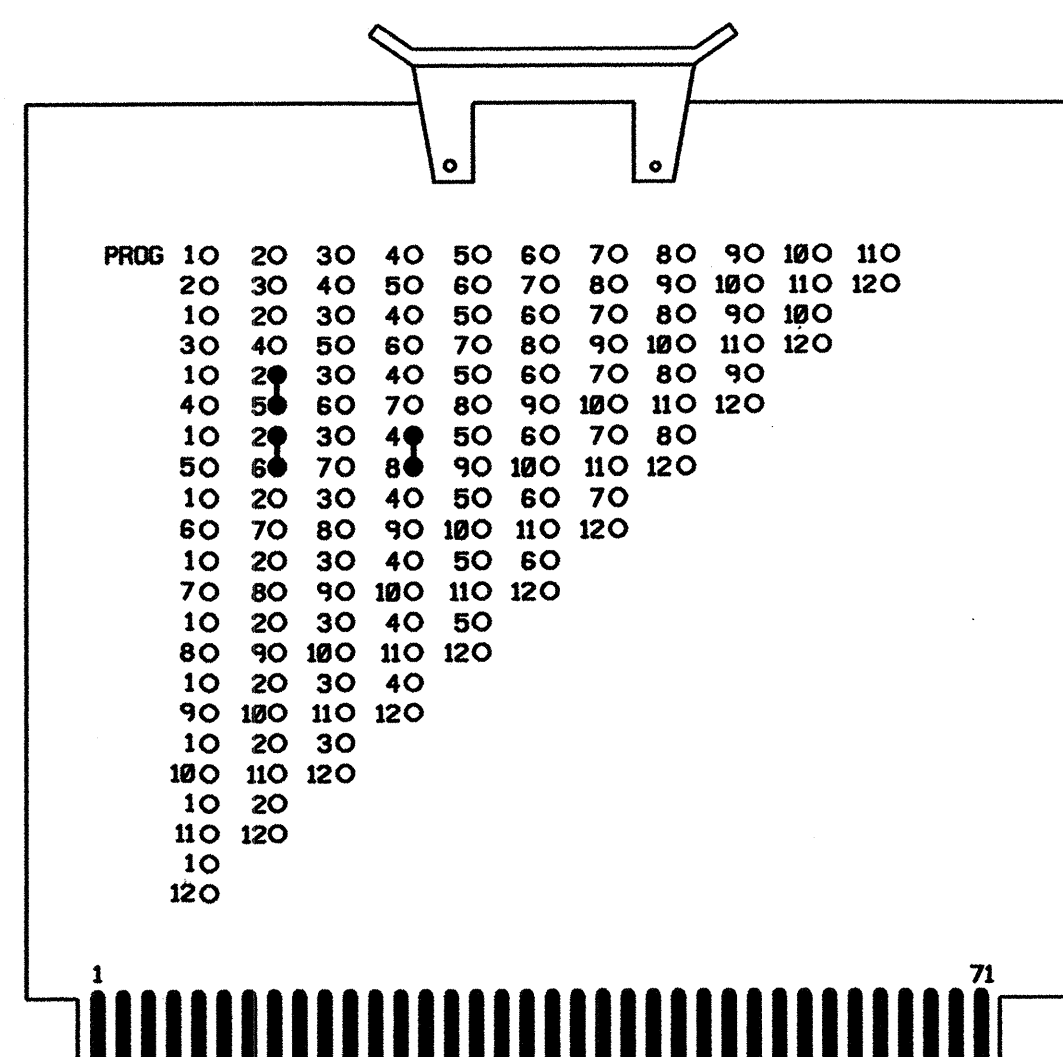
Signal Upgrade- Final

	US 70 BUS. (Front Street) at SR 1004 (Howell Road)/Ramp "DA"		
	Division 2 PLAN DATE: August 2006 PREPARED BY: Luhn	Craven County REVIEWED BY: I. O. Umzurike REVIEWED BY:	
SCALE: 1"=40' 		REVISIONS:	INIT. DATE:

09-OCT-2006 09:130
 s:\ts\signal\w\k\groups\ip\proj\cts\sb-2532\sig\lsmw02-0309-0309-sig_dsn_2006xxxx.dgn
 Luhn

NEMA* CONFLICT MONITOR PROGRAMMING CARD

(install jumpers as shown below)



* NOTE: PROGRAM MONITOR FOR FULL SIGNAL SEQUENCE MONITORING ON CHANNELS 2,4,5,6 AND 8. (NEMA+)

NOTES

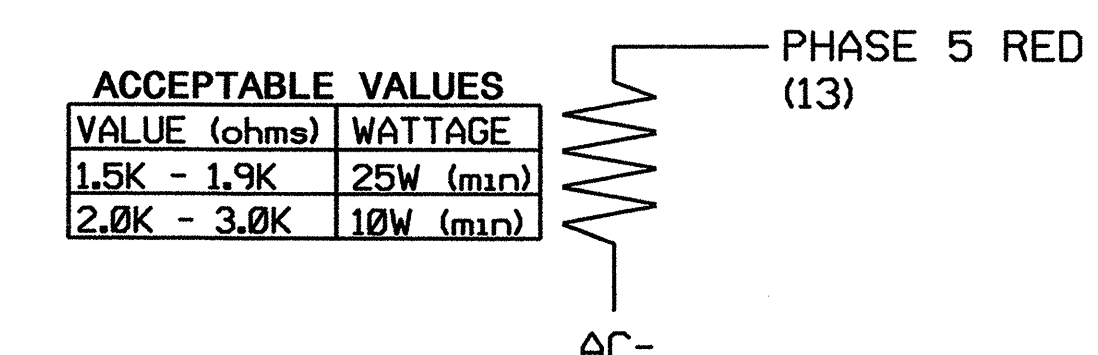
1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED PHASES AND OVERLAPS TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 1,3,7,9,10,11 AND 12 TO LOAD SWITCH AC+ BY INSERTING 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 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
9. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.

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, 42,43	21,42	61,62	NU	81, 82,83	NU	NU	NU	NU	NU	NU	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											

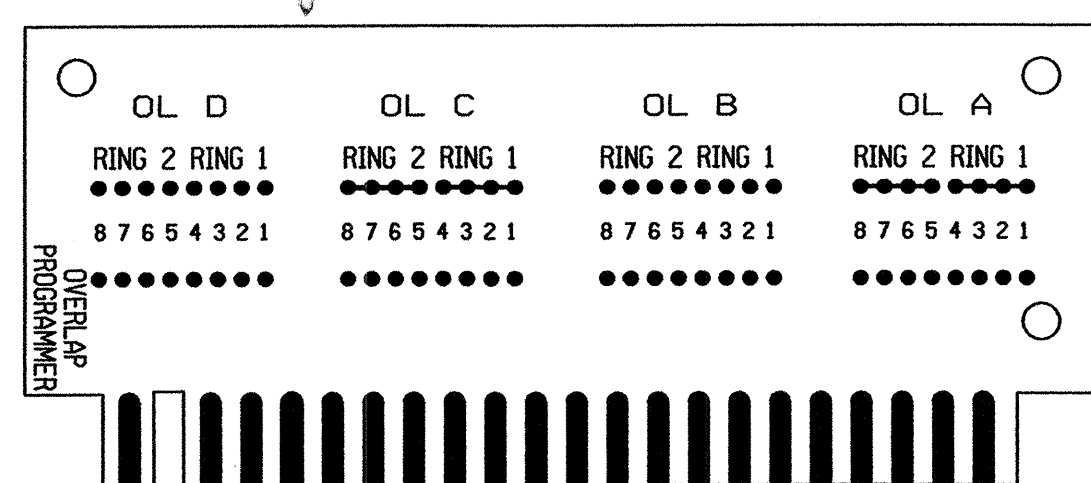
NU = NOT USED
* DENOTES INSTALL LOAD RESISTOR. SEE LOAD RESISTOR INSTALLATION DETAIL THIS SHEET.

LOAD RESISTOR INSTALLATION DETAIL



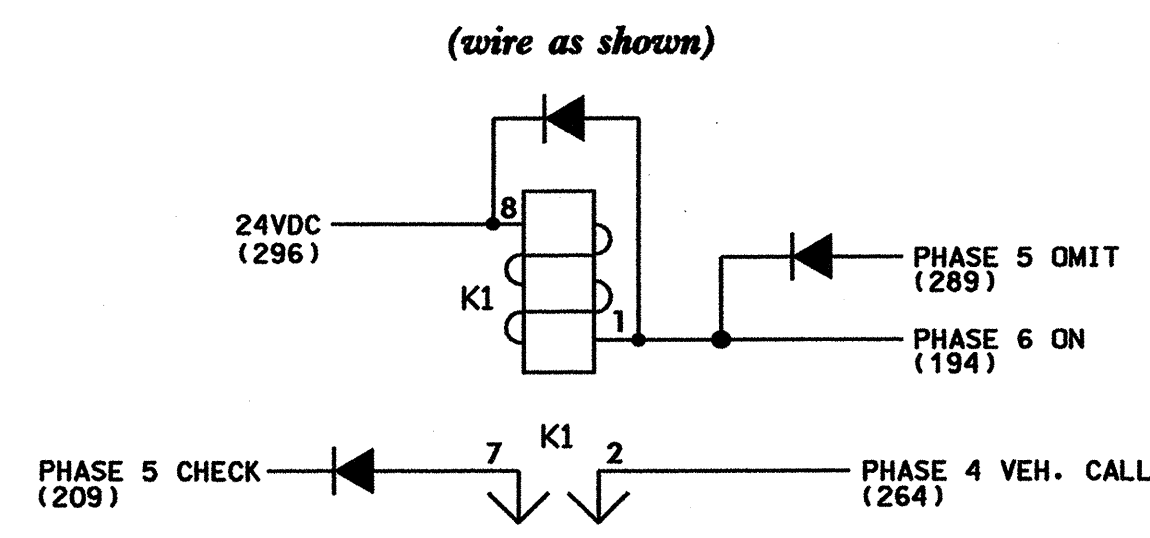
NOTE: THE PURPOSE OF THIS RESISTOR IS TO LOAD THE CHANNEL RED MONITOR INPUT IN ORDER FOR THE SIGNAL SEQUENCE MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON PHASES THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

NEMA OVERLAP CARD



OVERLAP CARD SHALL BE COMPLETELY BLANK (NO OVERLAPS)

BACK-UP PROTECTION WIRING DETAIL



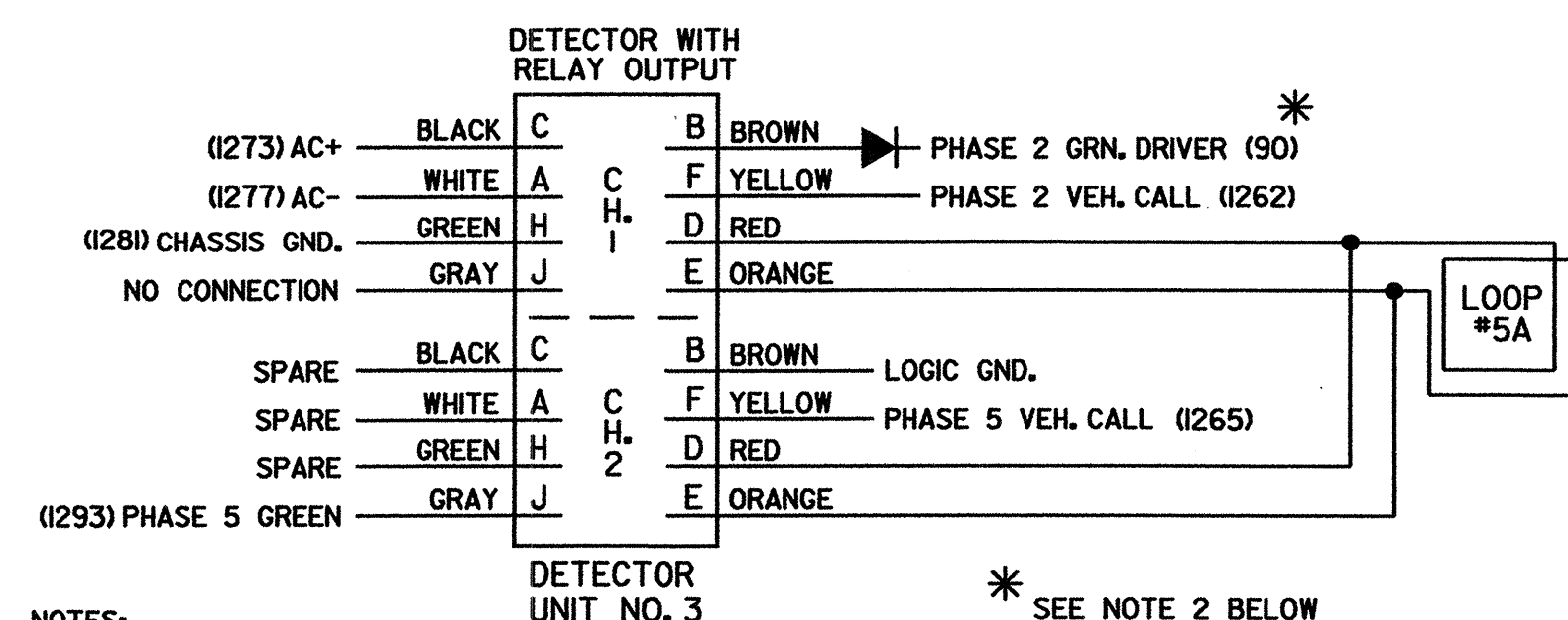
- NOTES
1. RELAY 'K1' IS A SPST WITH A 24VDC COIL. (P&B* KRP3DH SHOWN, APPROVED EQUIVALENT MAY BE USED)
 2. ALL DIODES ARE VALUED AT 600V PIV, 1 AMP MINIMUM. (RECOMMENDED PART NO. IN4005)
 3. WHEN TRAFFIC CONDITIONS REQUIRE THE CONTROLLER TO TO BACK-UP FROM PHASE 2+5 TO PHASE 2+6, THIS RELAY LOGIC CIRCUIT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

EQUIPMENT INFORMATION

CONTROLLER.....ECONOLITE ASC/2-2100
CABINET.....PEEK PER DWG. 0856085
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,4,5,6,8
PHASES USED.....2,4,5,6,8
OVERLAP A.....NOT USED
OVERLAP B.....NOT USED
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

SPECIAL DETECTOR WIRING DETAIL

(WIRE AS SHOWN)



- NOTES:
1. THE TIMING INHIBIT WIRE (WHT/RED) SHALL BE CONNECTED TO THE ASSOCIATED DELAY INHIBIT ON THE DETECTOR PANEL, WHEN ONLY DELAY OPERATION IS REQUIRED, UNLESS OTHERWISE SPECIFIED.
 2. TERMINAL DESIGNATIONS SHOWN ARE LOCATED ON THE DETECTOR PANEL, EXCEPT FOR PHASE GREEN DRIVER, WHICH IS LOCATED ON THE BACK PANEL.
 3. DIODE IS VALUED AT 600V PIV, 1AMP (MINIMUM). RECOMMENDED PART NO. IN4005.

TYPICAL CONNECTION CHART FOR DETECTORS

PIN FUNCTION	LOOP PANEL TERMINATION
AC+	AC+
AC-	AC-
CHASSIS GROUND	CHASSIS GROUND
LOOP INPUT	LOOP
LOOP INPUT	LOOP
RELAY NORMALLY OPEN	VEHICLE CALL INPUT
RELAY COMMON	LOGIC GROUND
TIMER INHIBIT	ASSOCIATED PHASE GREEN

NOTE: THE TIMER INHIBIT WIRE SHALL BE CONNECTED TO THE ASSOCIATED PHASE GREEN LOAD SWITCH OUTPUT WHEN ONLY DELAY OPERATION IS REQUIRED UNLESS OTHERWISE SPECIFIED BY THE LOOP AND DETECTOR UNIT INSTALLATION CHART.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0309
DESIGNED: August 2006
SEALED: 09-25-06
REVISED: N/A

Signal Upgrade - Final

Electrical and Programming Details For: US 70 BUS. (Front Street) at SR 1004 (Howell Road)/Ramp "DA"

Division 2 Craven County New Bern

PLAN DATE: October 2006 REVIEWED BY: JPA

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

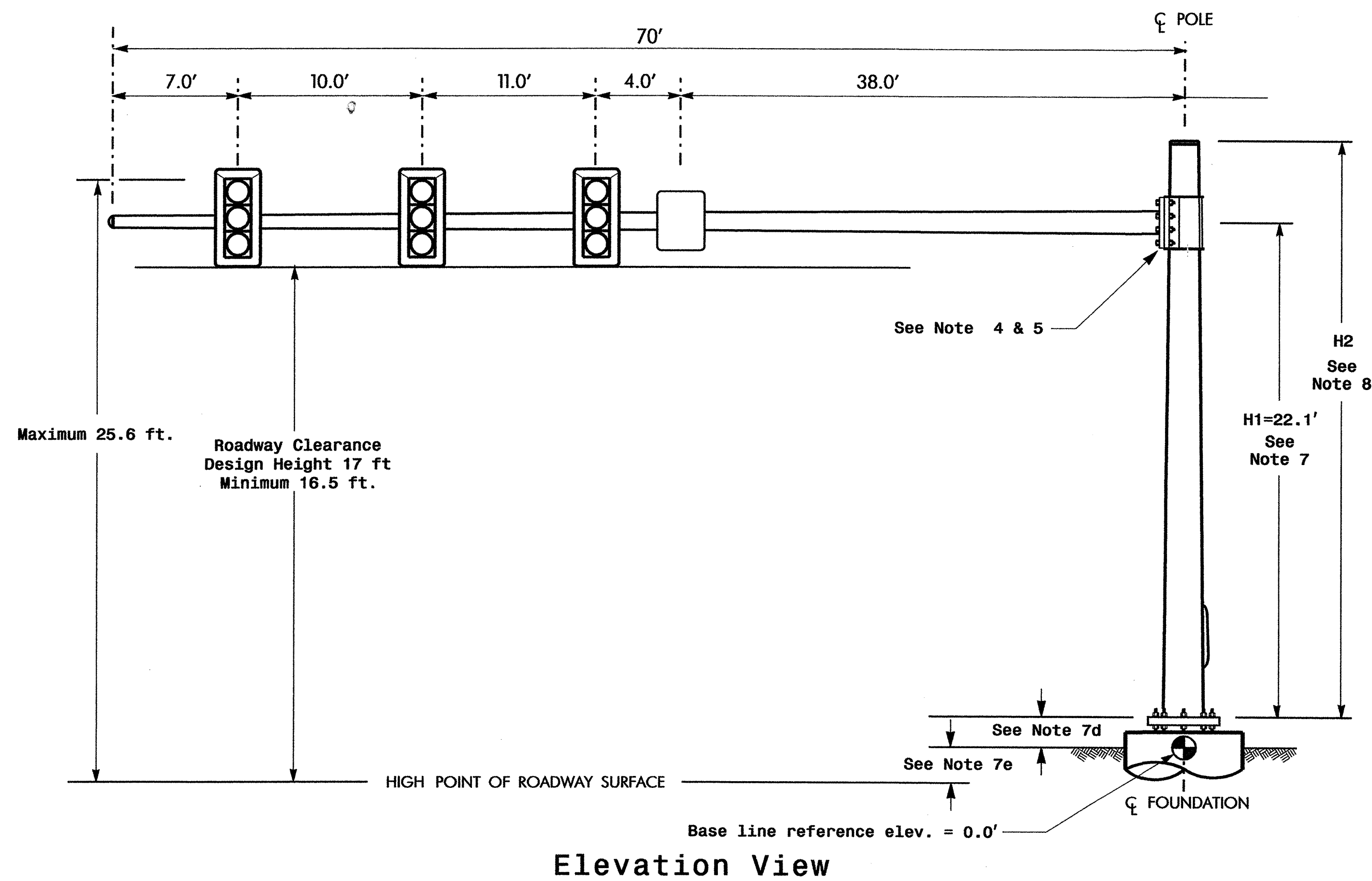
122 N. McDowell St., Raleigh, NC 27603

SEAL: JOHN T. ROWE, JR. ENGINEER

SIGNATURE: John Peterson DATE: 10-2-06

SIG. INVENTORY NO. 02-0309

Design Loading for METAL POLE NO. 1



SPECIAL NOTE

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

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+2.4 ft.	0.0 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS

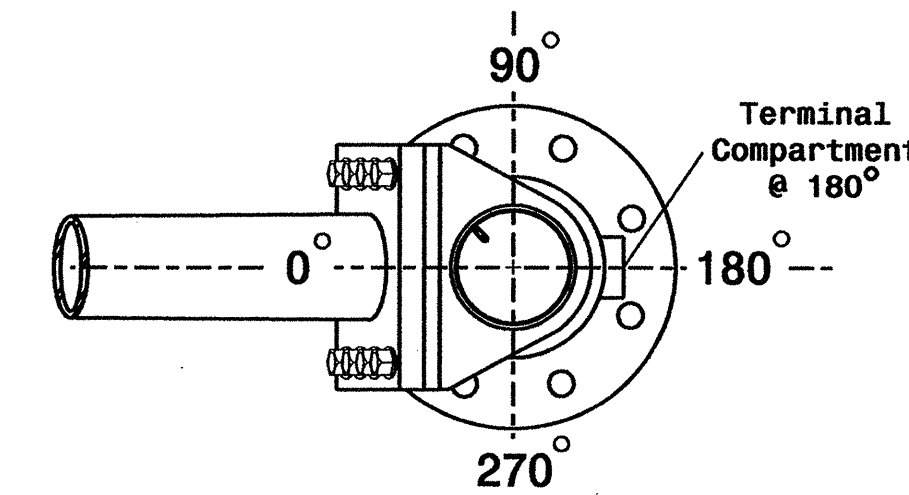
NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2002 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm>

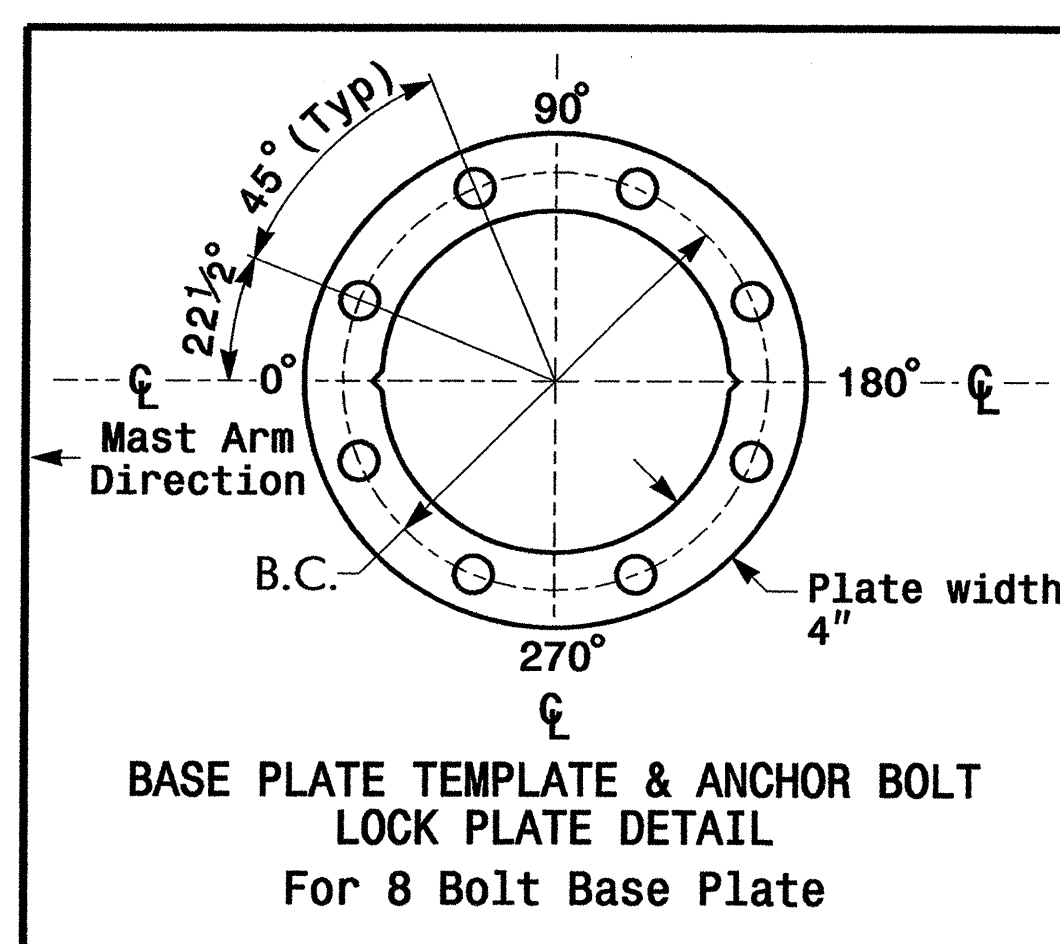
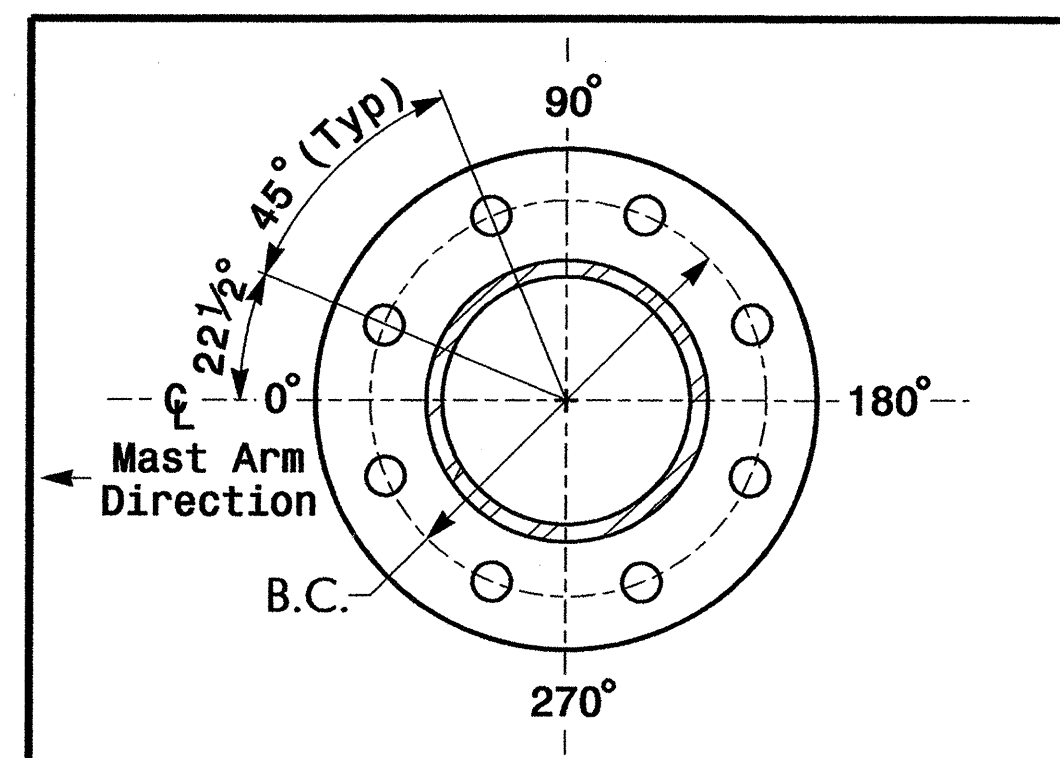
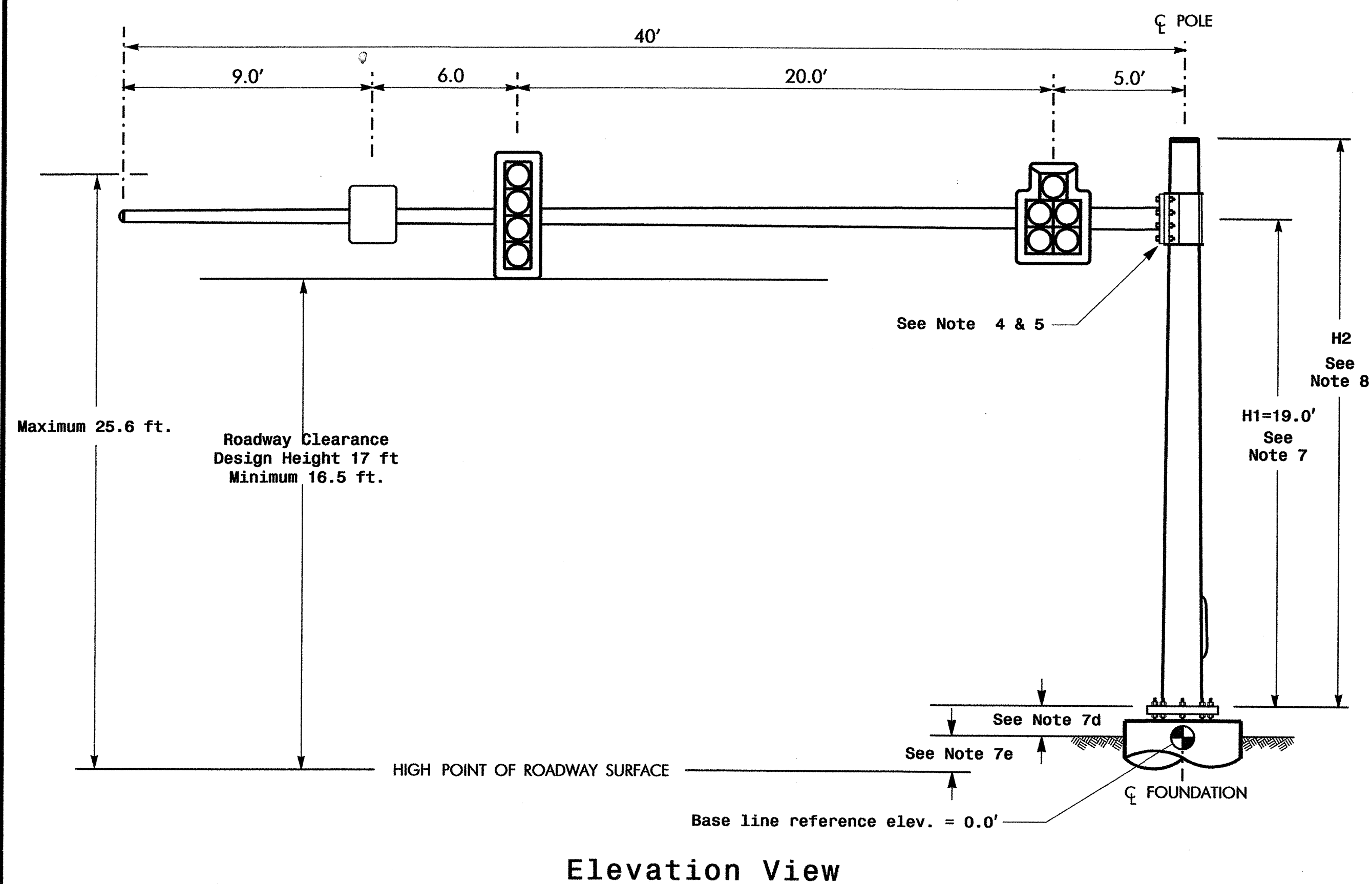
Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



POLE RADIAL ORIENTATION

Design Loading for METAL POLE NO. 2



NCDOT Wind Zone 2 (130 mph)

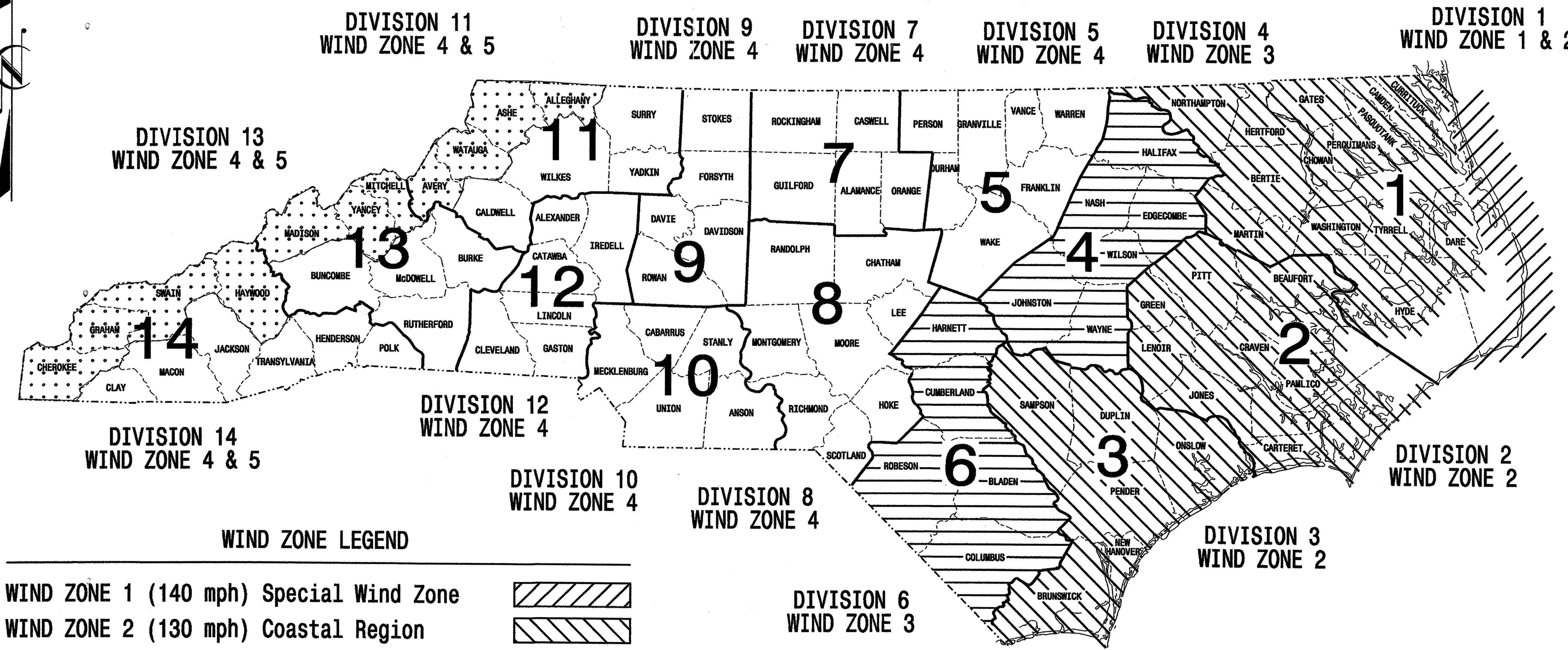
	Prepared in the Office of: US 70 BUS. (Front Street) at SR 1004 (Howell Road)/Ramp "DA"		SEAL
	Division 2 Craven County New Bern PLAN DATE: September 2006 PREPARED BY: Luhr SCALE: 0 N/A N/A	REVIEWED BY: I.O. Umzurike REVIEWED BY: Luhr DATE: 9/29/06	

28-SEP-2006 09:52
 s:\115 s\proj\swm\krc\sub\1p\proj\sect\2-2532\sig\p1\m1\k2_3\k4_2006\xxx.dgn
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STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	B-2532	Sig. 8
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

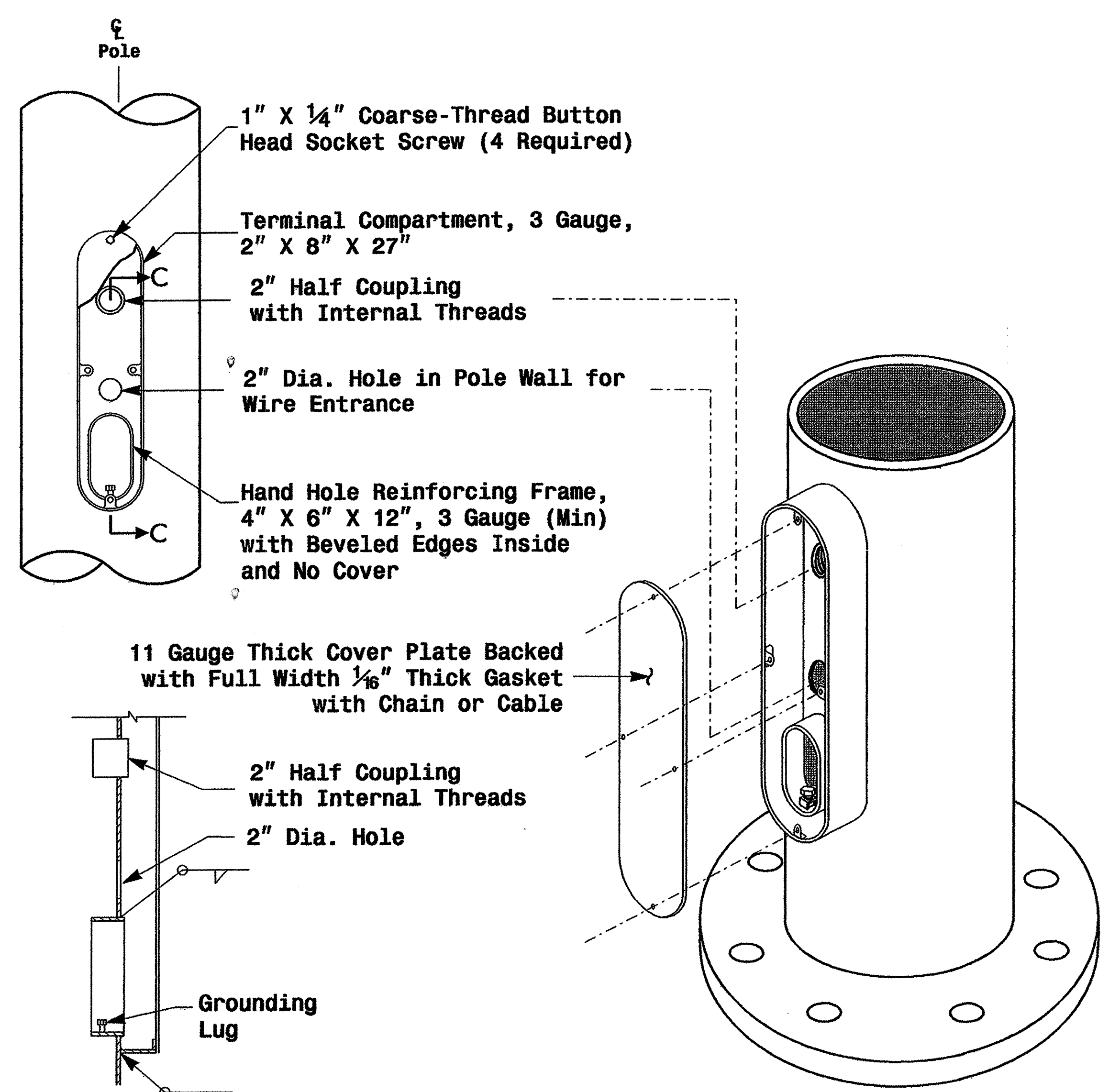
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

NCDOT CONTACTS:
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

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 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

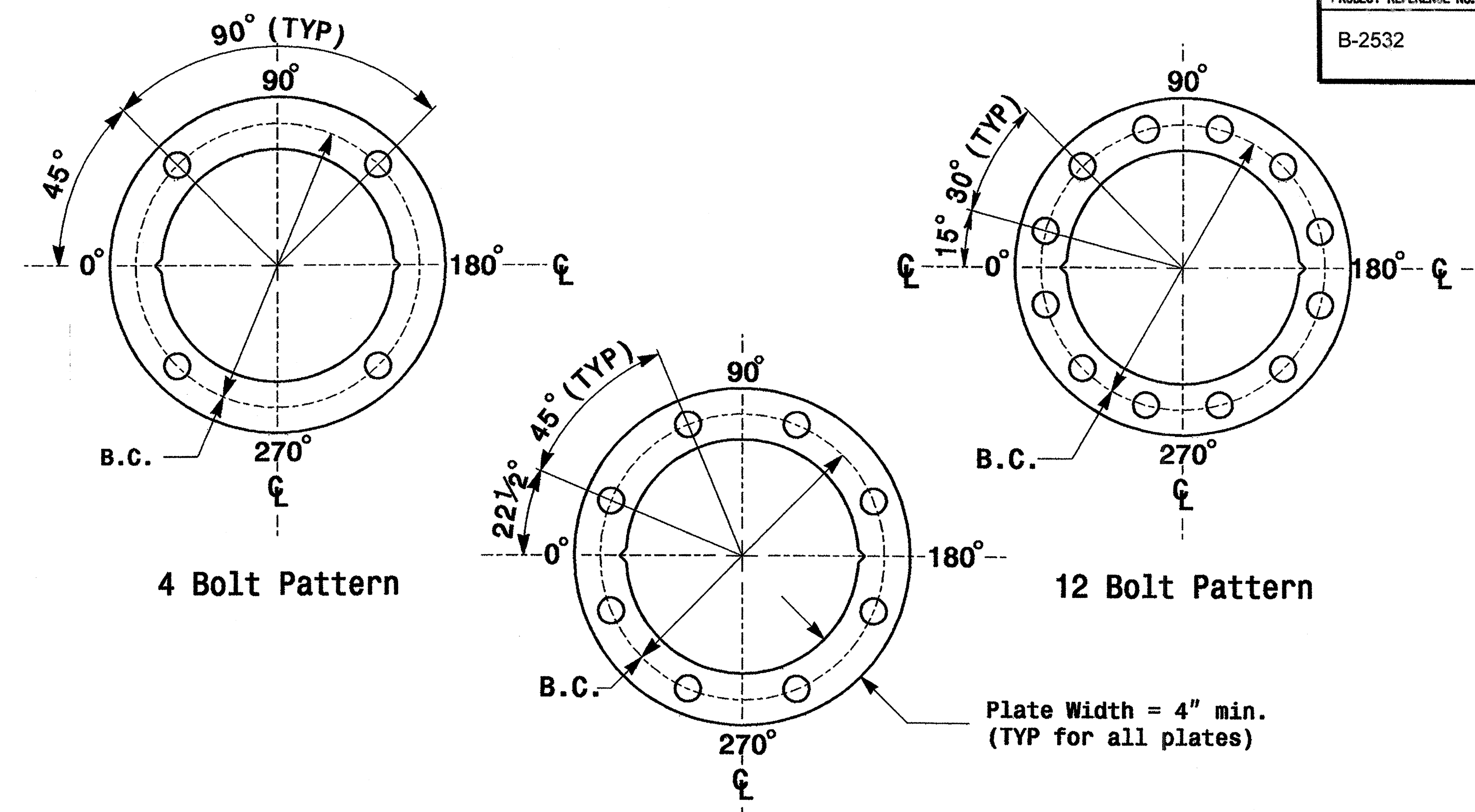
SEAL

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

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

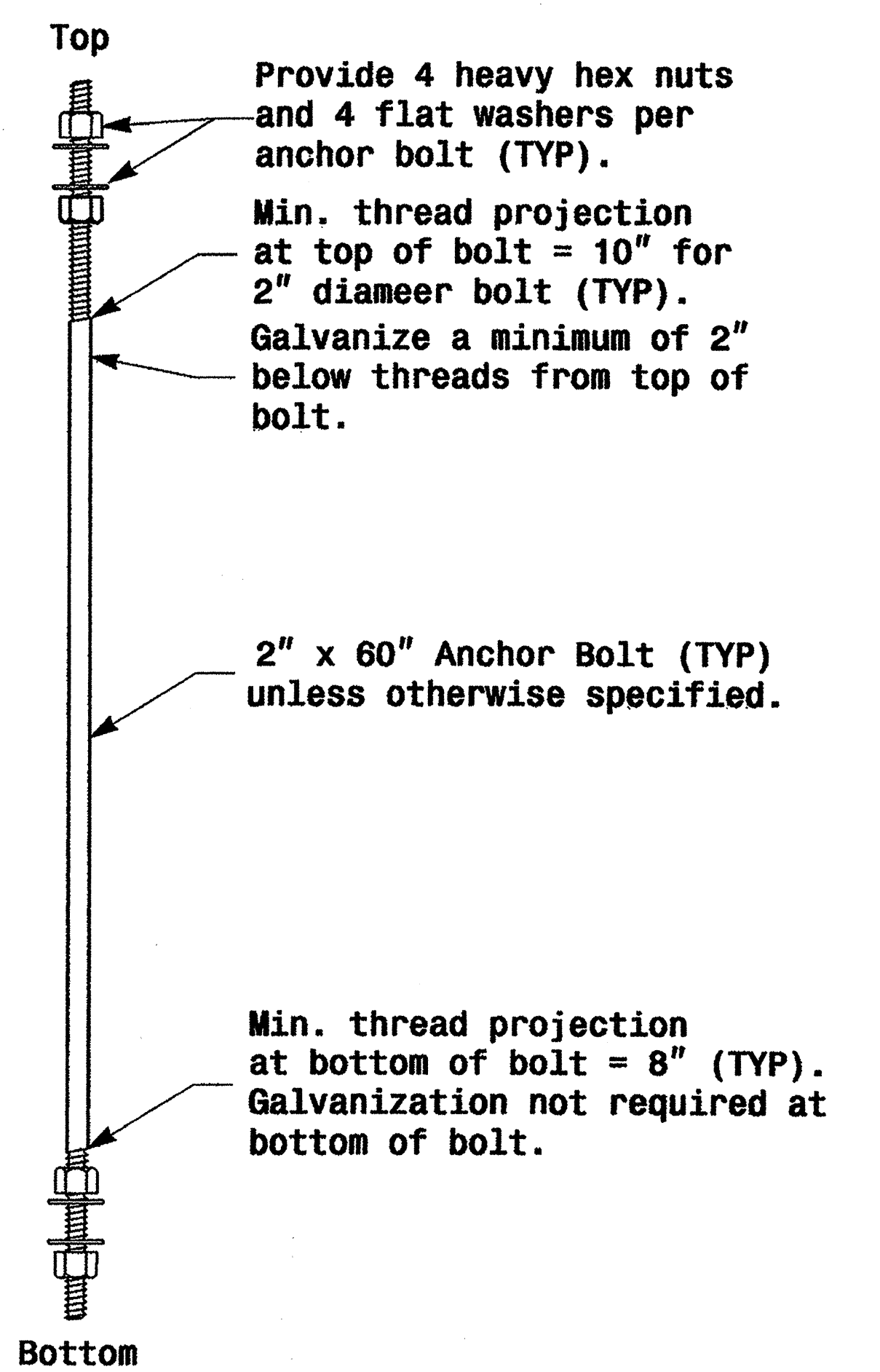
MFG	MFG. DATE: MM/YY
SHAFT D/T/L/Y	-----
ARM-A D/T/L/Y	-----
ARM-B D/T/L/Y	-----
A.B. DIA./B.C./L/Y	-----
NCDOT STANDARD	-----

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

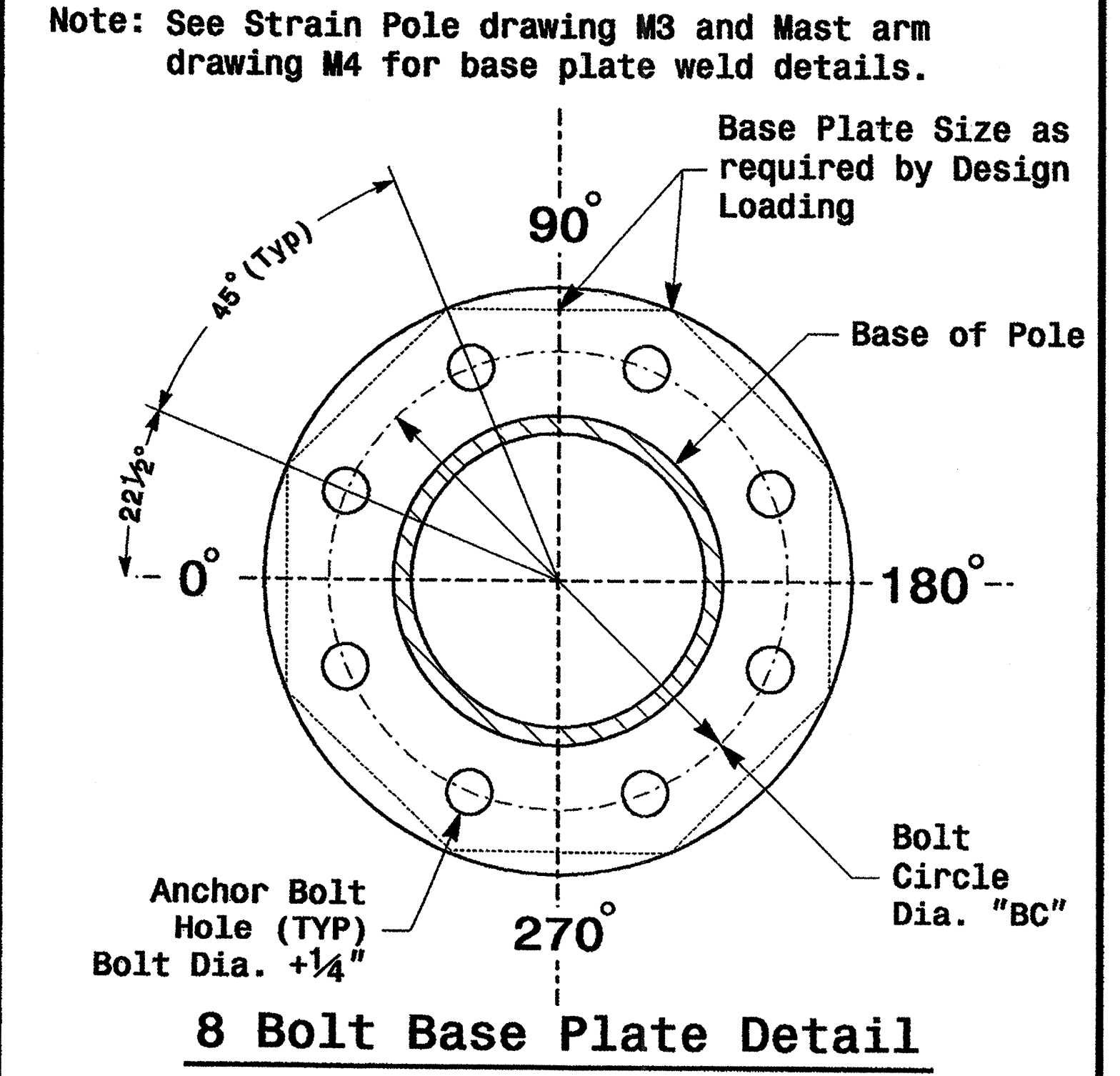
MFG	MFG. DATE: MM/YY
SECTION D/T/L/Y	-----
NCDOT STANDARD	-----

- 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



Anchor Bolt Detail



8 Bolt Base Plate 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

222 N. McDowell St., Raleigh, NC 27603

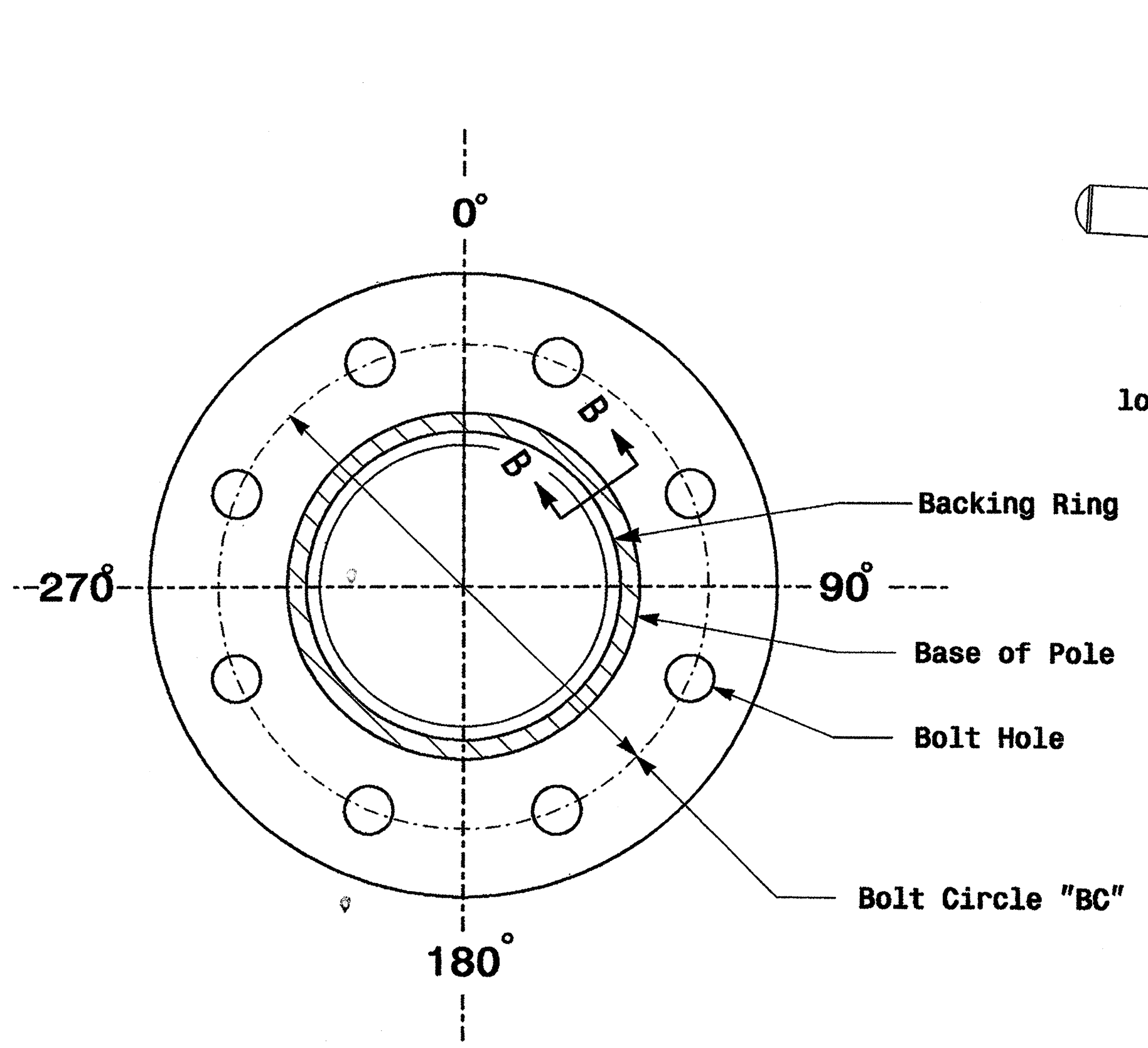
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Signature: *D. Sankar* 9/2/2005

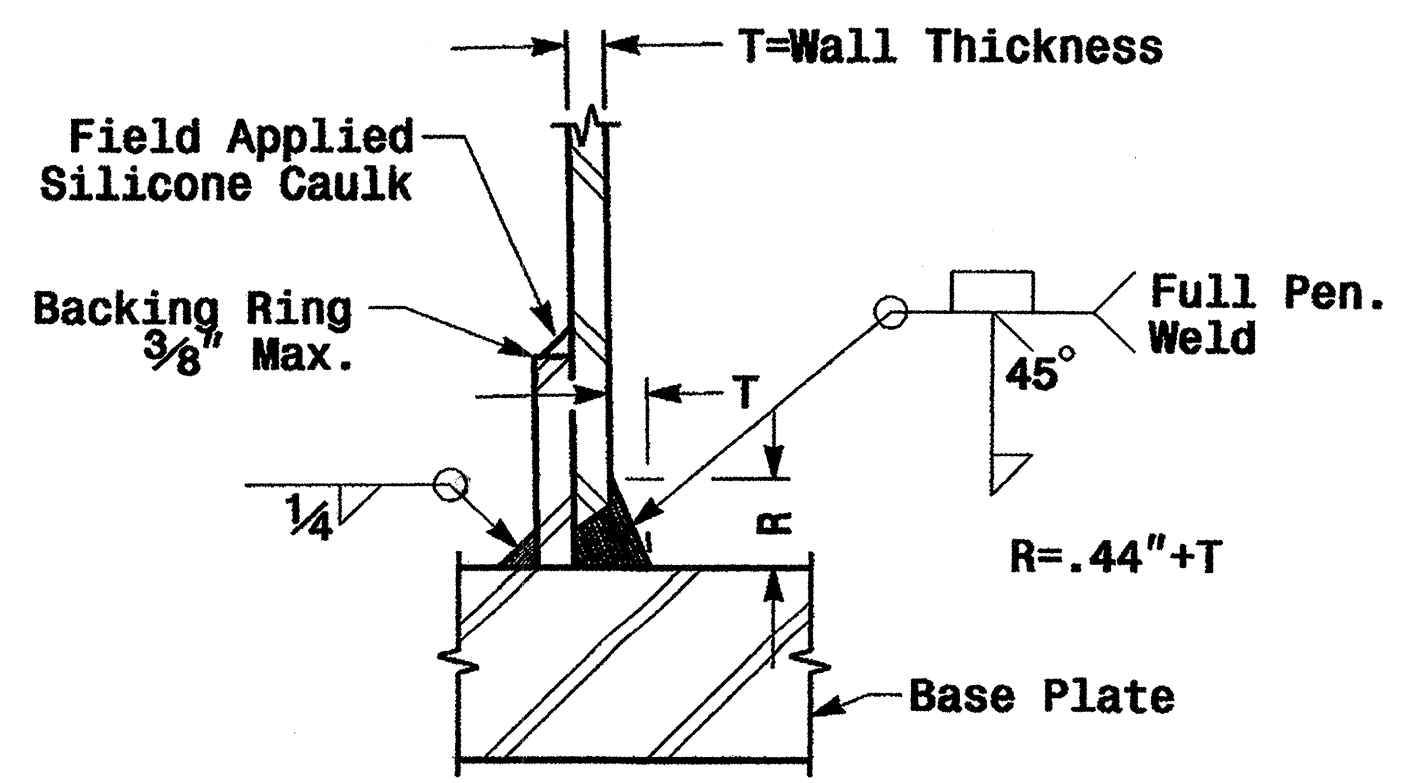
SIG. INVENTORY NO.

Fabrication Details - All Poles

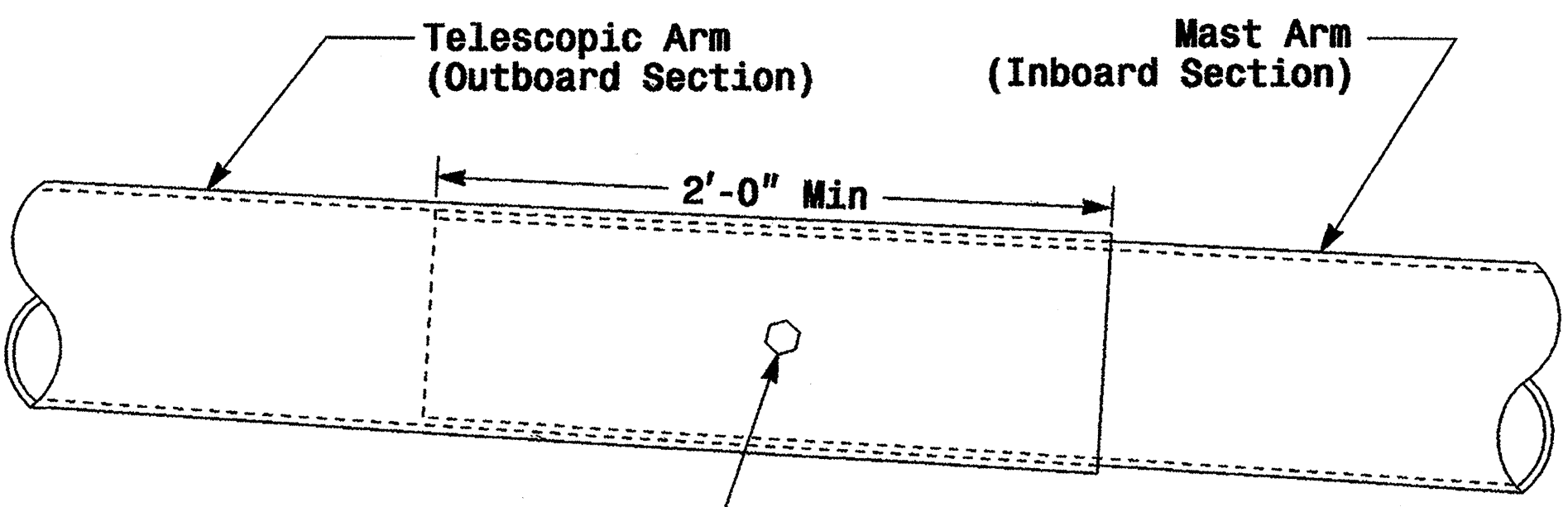
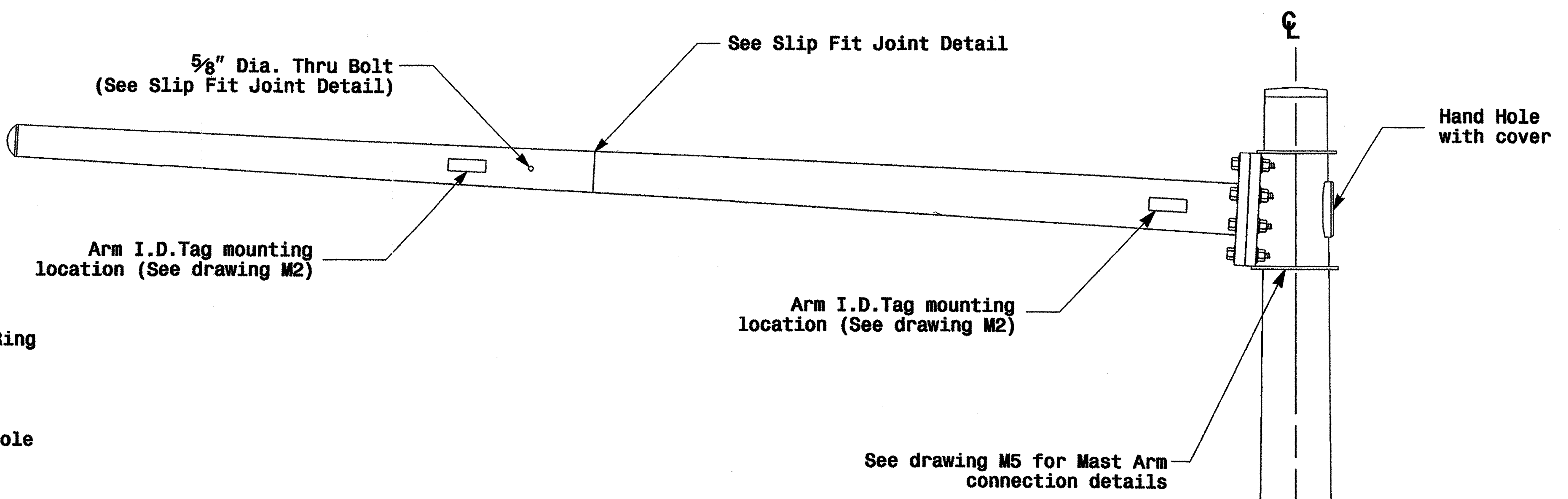
01-SEP-2005 18:22
Strain Pole Standard-082004.nc thru mfg.dgn
C.F. Andrews



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

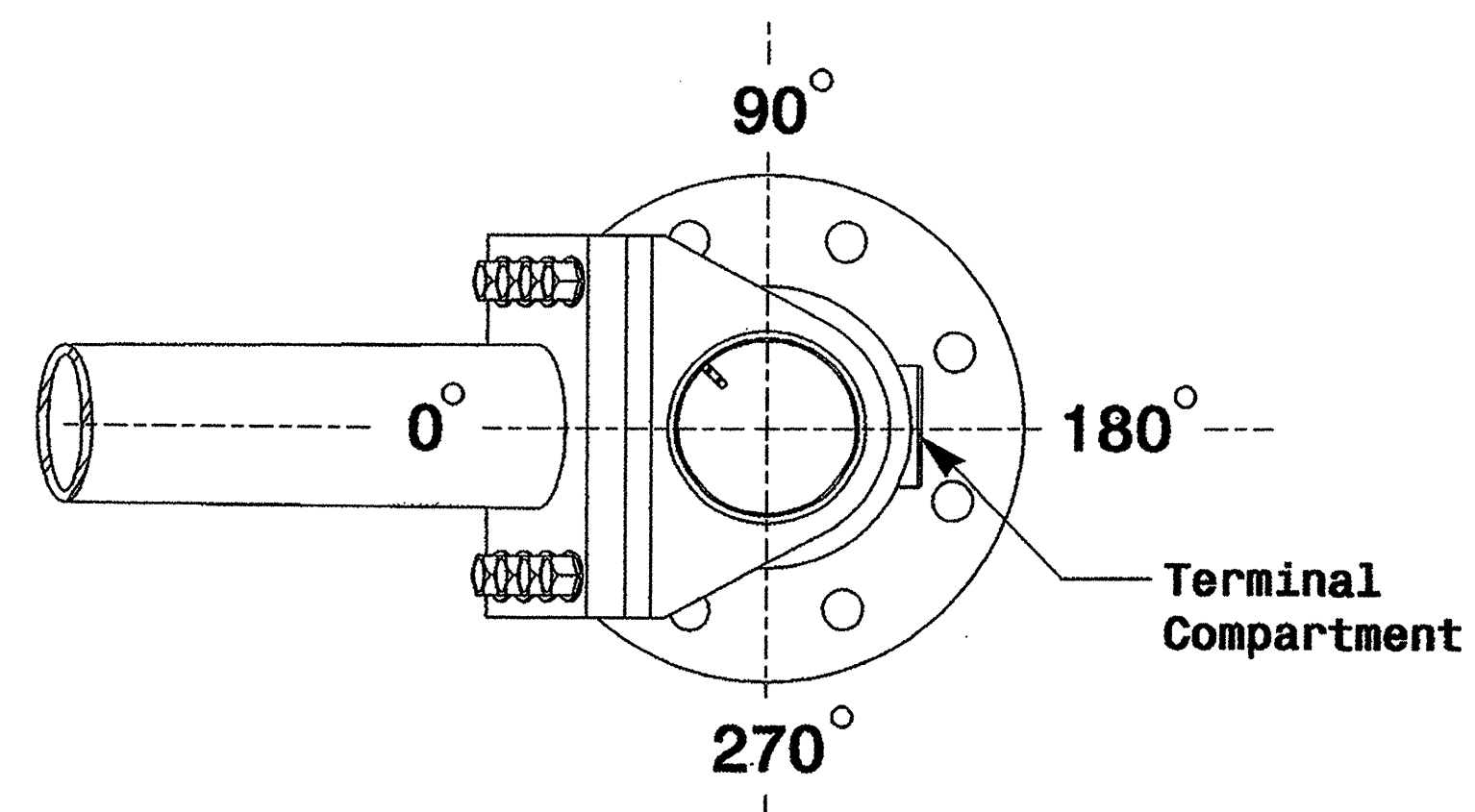


Section B-B
(Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail

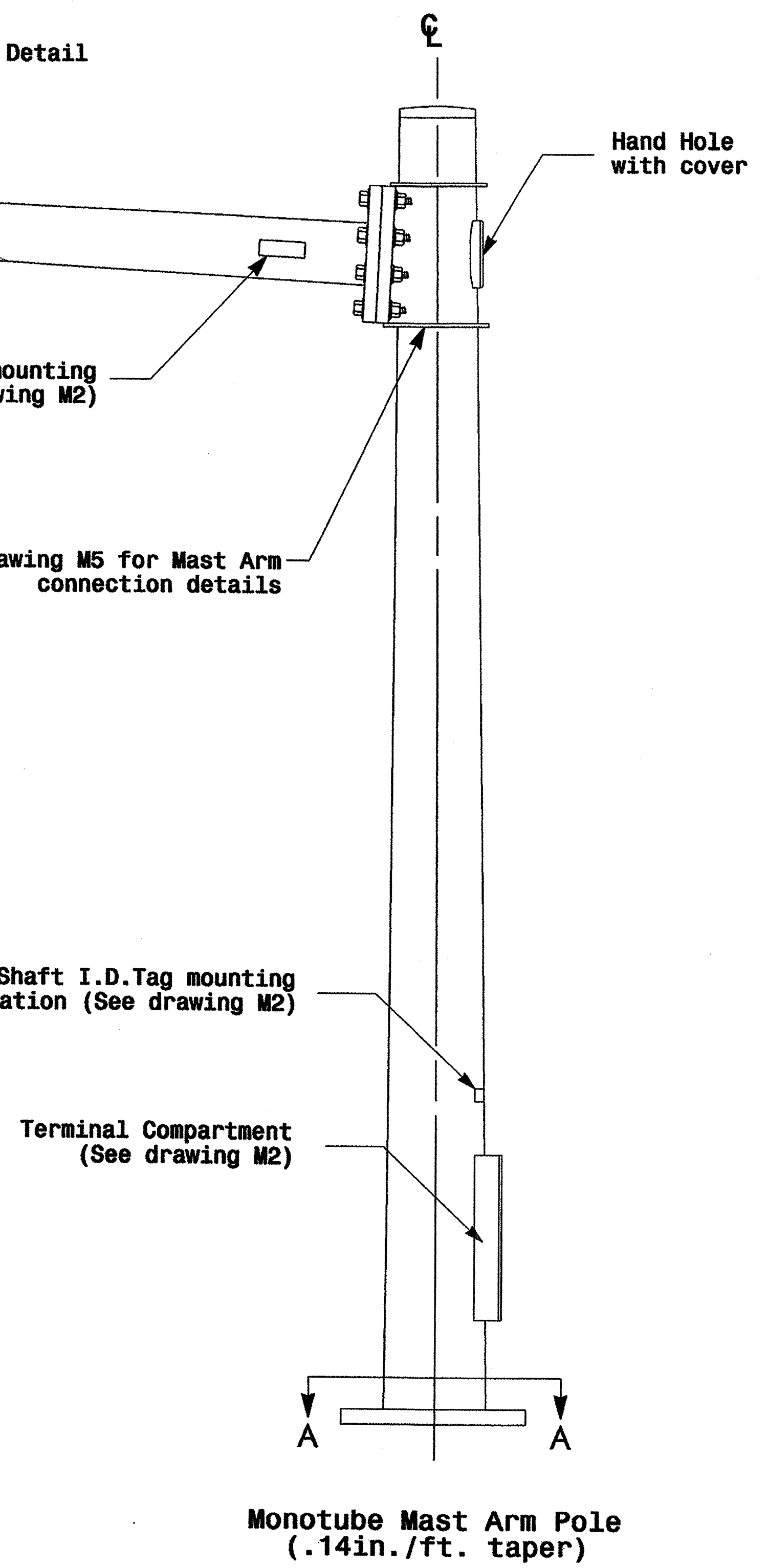


3/4" Factory Drilled Hole in Outboard Tube.
Field Drill Inboard Tube.
5/8" Galvanized Thru Stud with (2) Hex. Locknuts Ea.

Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation

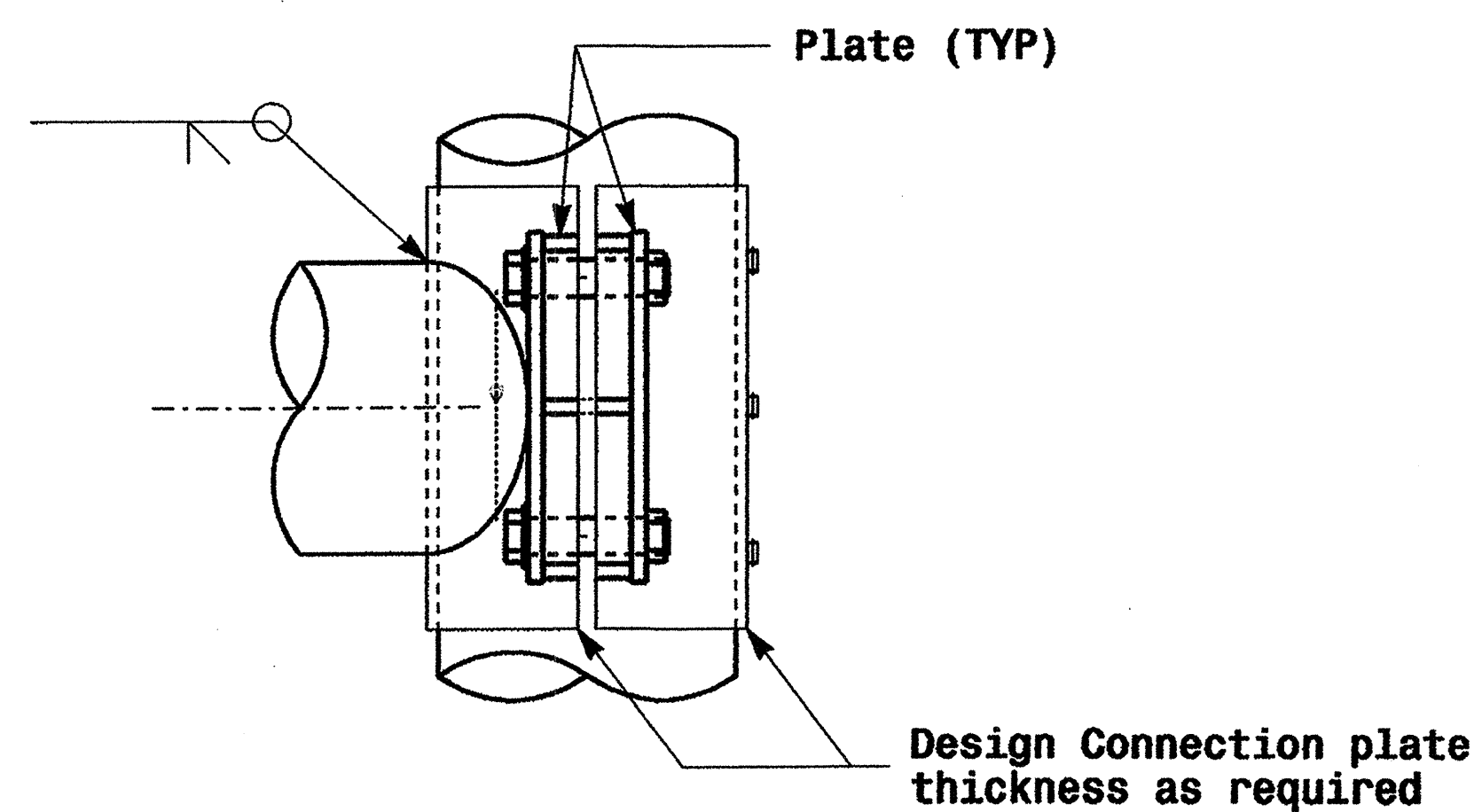


Fabrication Details - Mast Arm Poles

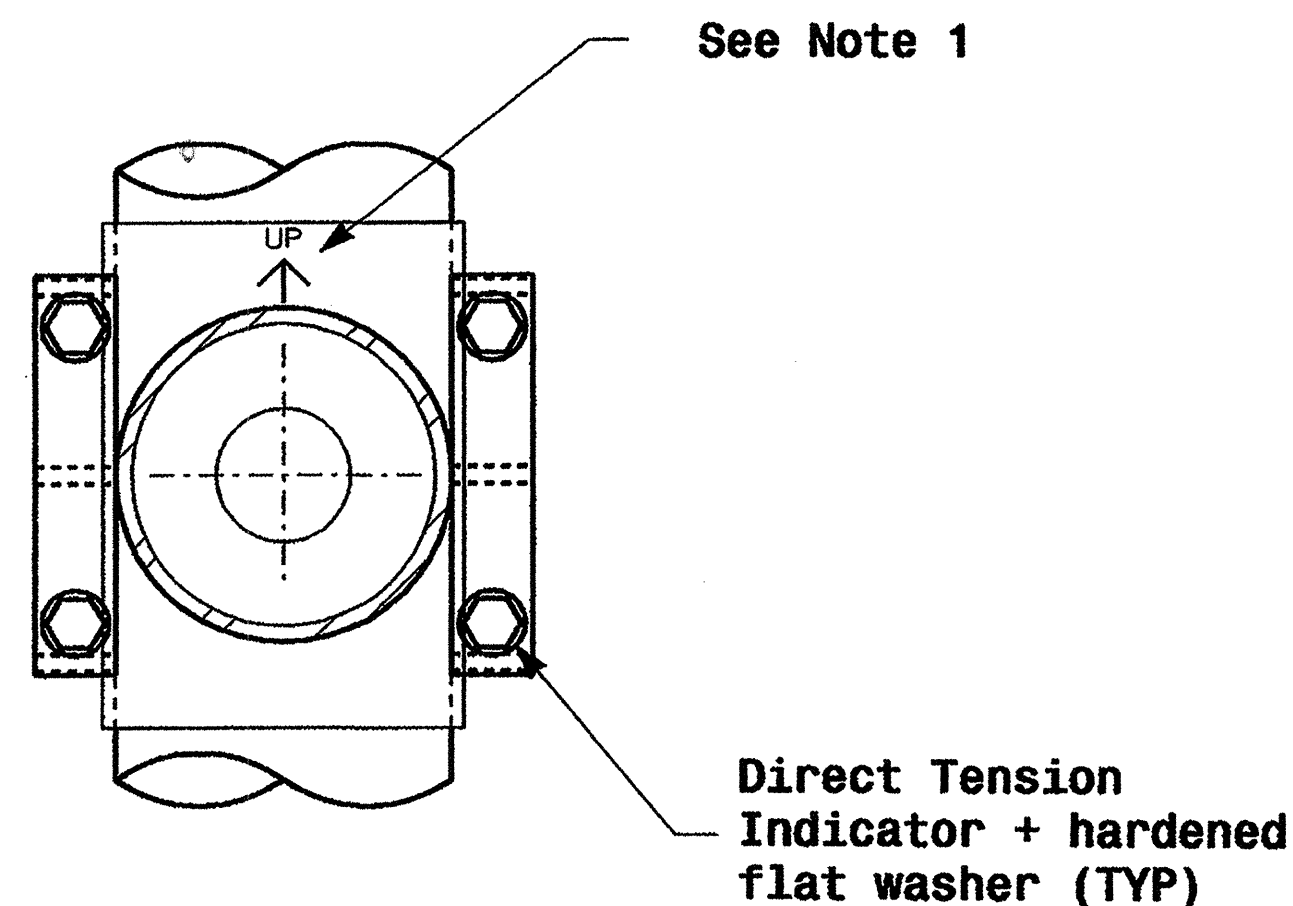
01-SEP-2005 14:08 C:\pwork\pwork\groups\2004 mast arm pole standard\2004 m4.dgn P.L. Alexander

	Typical Fabrication Details for Mast Arm Poles		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.W. Esposito	

Adjustable Clamp Type Bolted Mast Arm Connection

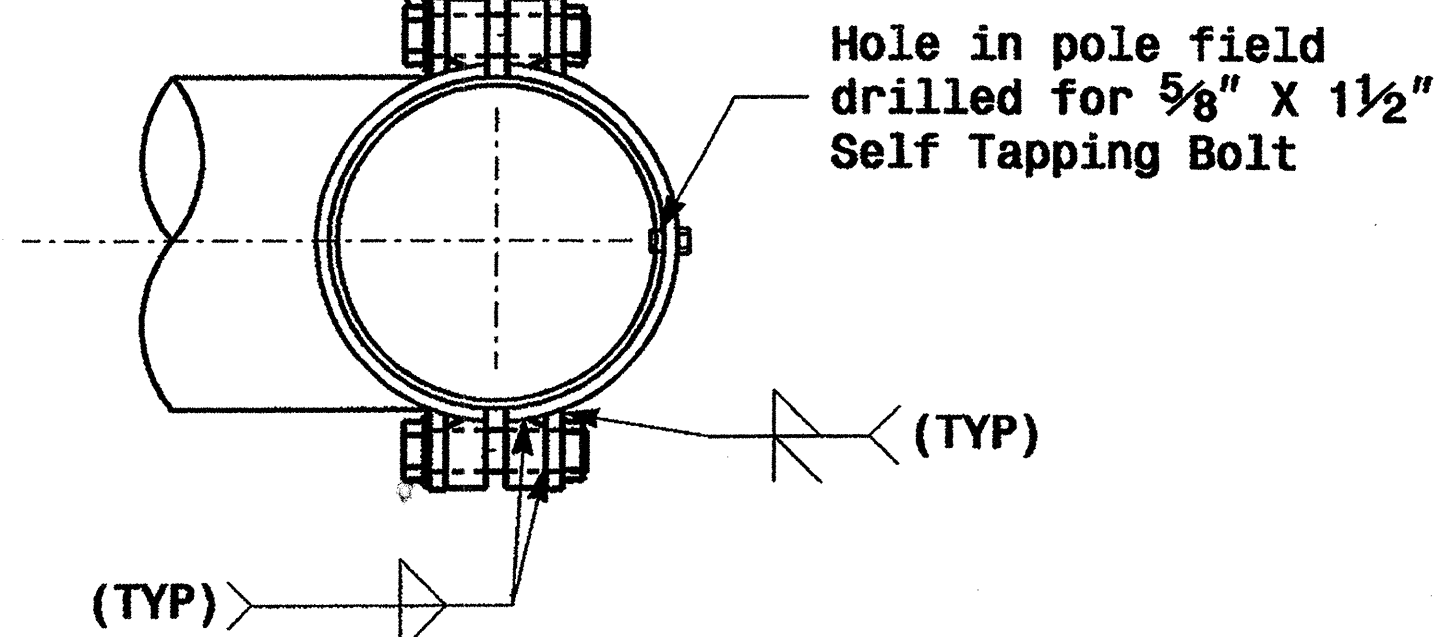


Side Elevation View



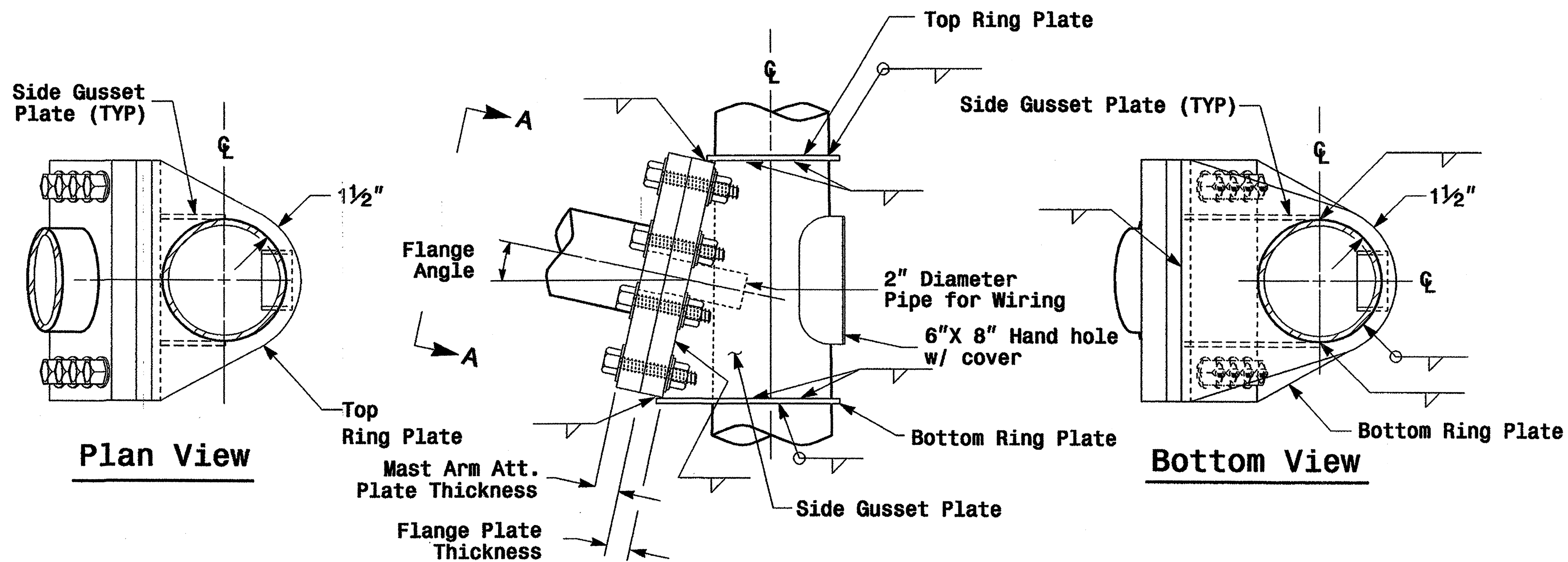
Front Elevation View

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

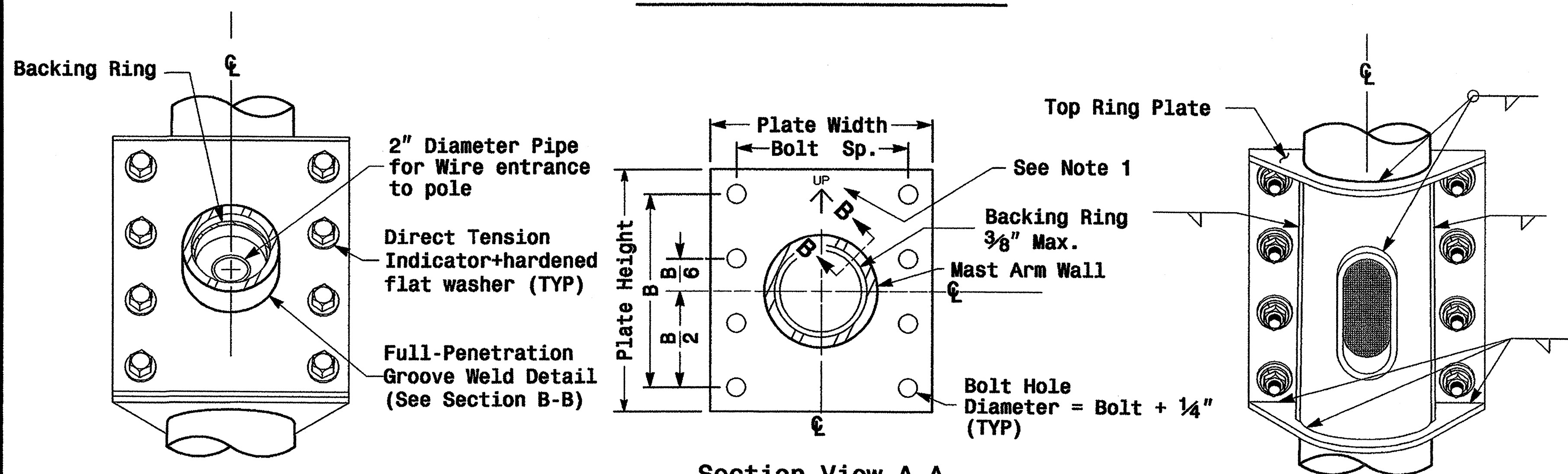


Plan View

Welded Ring Stiffened Mast Arm Connection



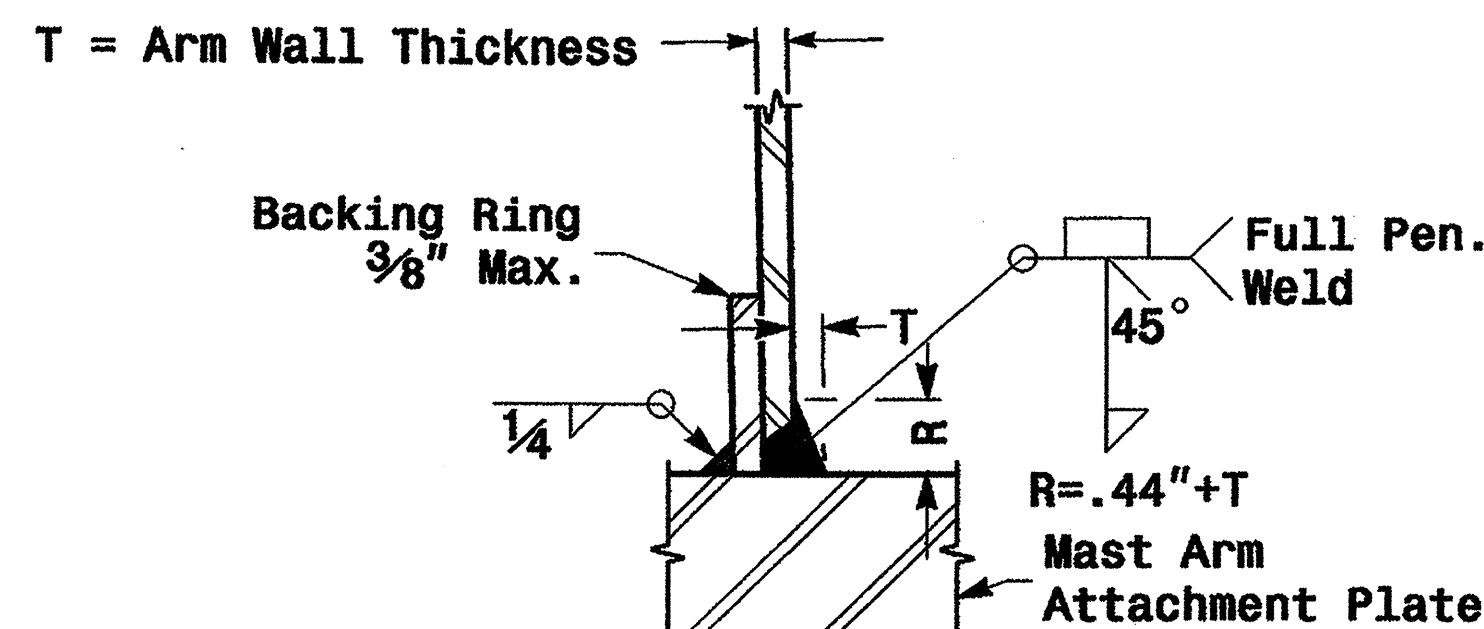
Side Elevation View



Front Elevation View

Mast Arm Attachment Plate

Back Elevation View



Section B-B Full-Penetration Groove Weld Detail

Notes:

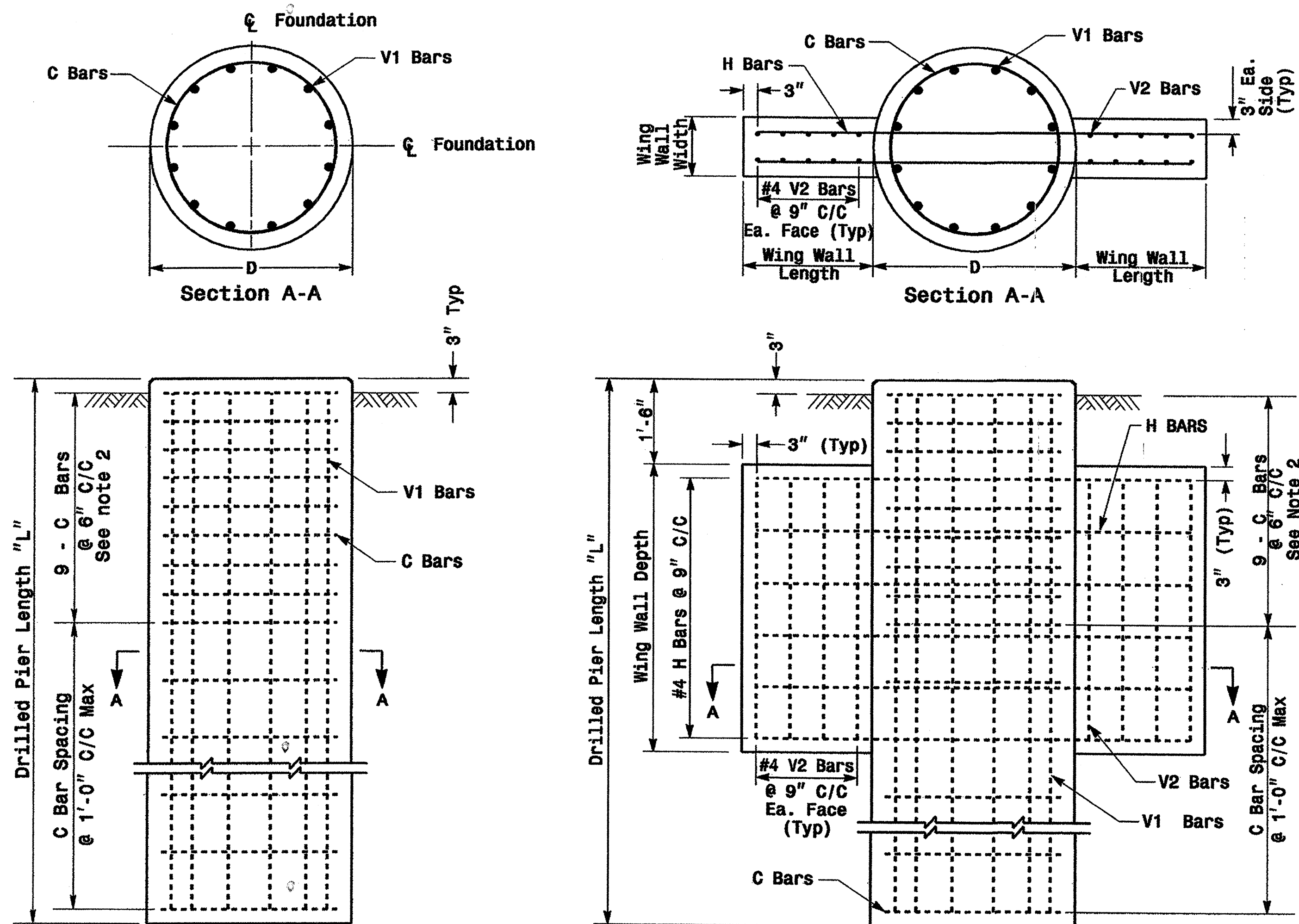
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Designer is responsible for providing appropriate drainage points.

01-SEP-2005 14:11
 v:\projects\magnagroup\04_mast pole standard\04_mf.dgn
 p:\alexander

Fabrication Details - Mast Arm Poles

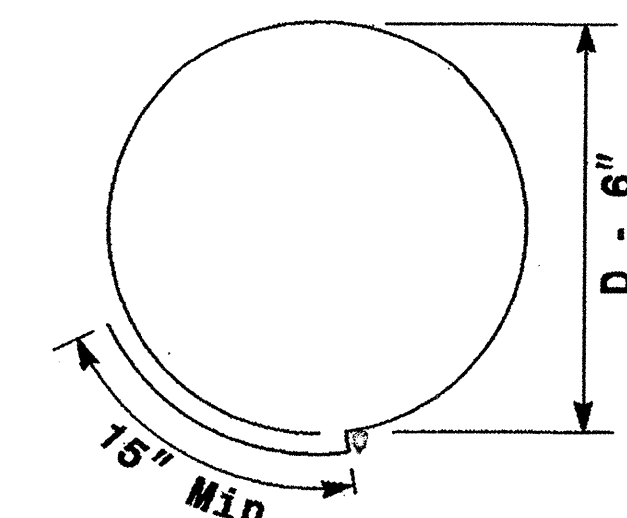
	Fabrication Details For Mast Arm Connection To Pole		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	

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



Typical "C" Bars

REINFORCING STEEL TABLE FOR STANDARD 42" and 48" DRILL PIER SHAFT WITH TYPE 1 AND TYPE 2 WING WALLS						
Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel				
		Bar Name	No.	Size	Type	Length
TYPE 1	42"	V1	9	#8	STR.	**
		V2	12	#4	STR.	2'-6"
		H	8	#4	STR.	6'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	42"	V1	9	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	48"	V1	12	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-6"
		C	*	#4	CIR.	12'-6"

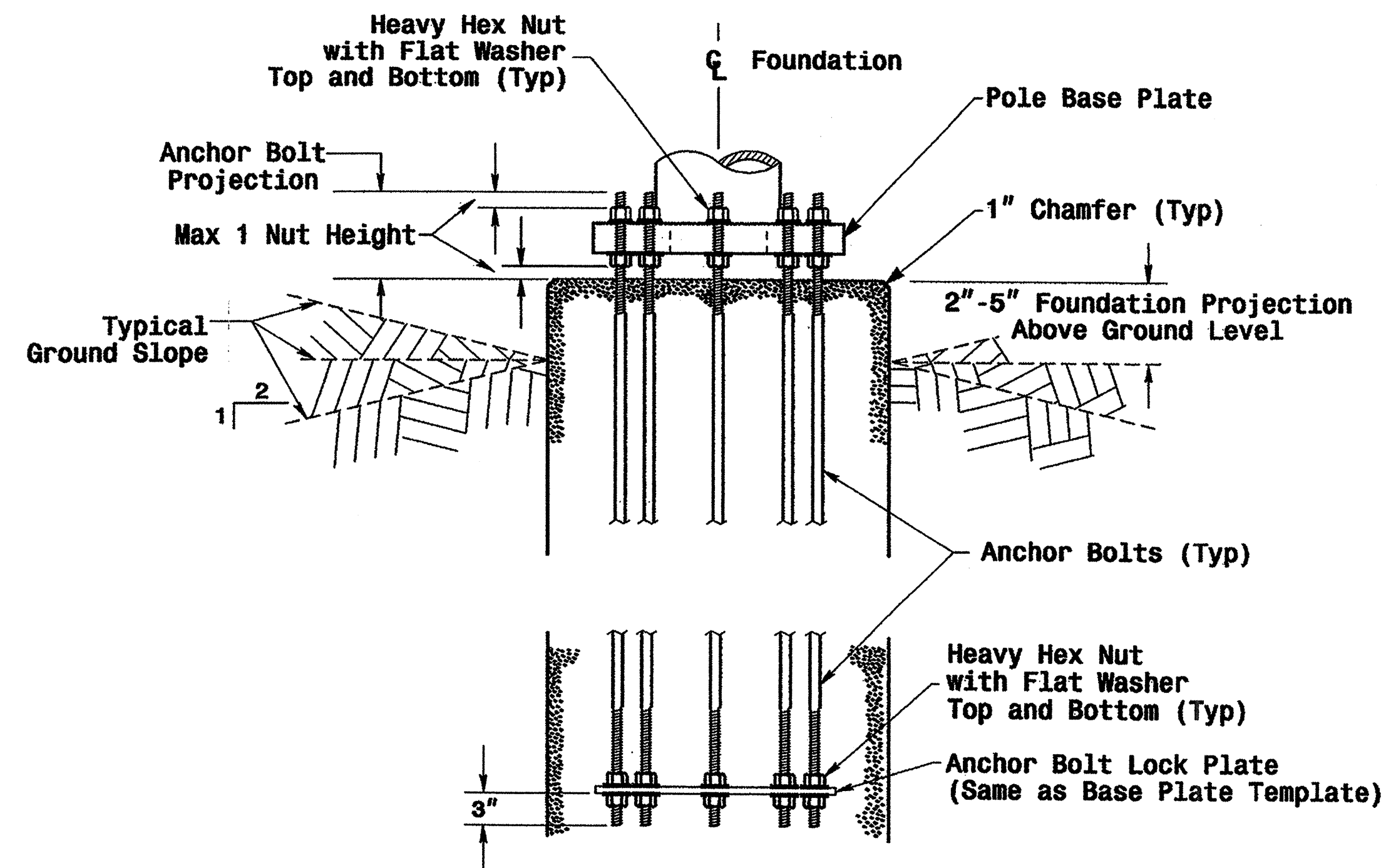
* See Note No. 1
** See Note No. 3

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

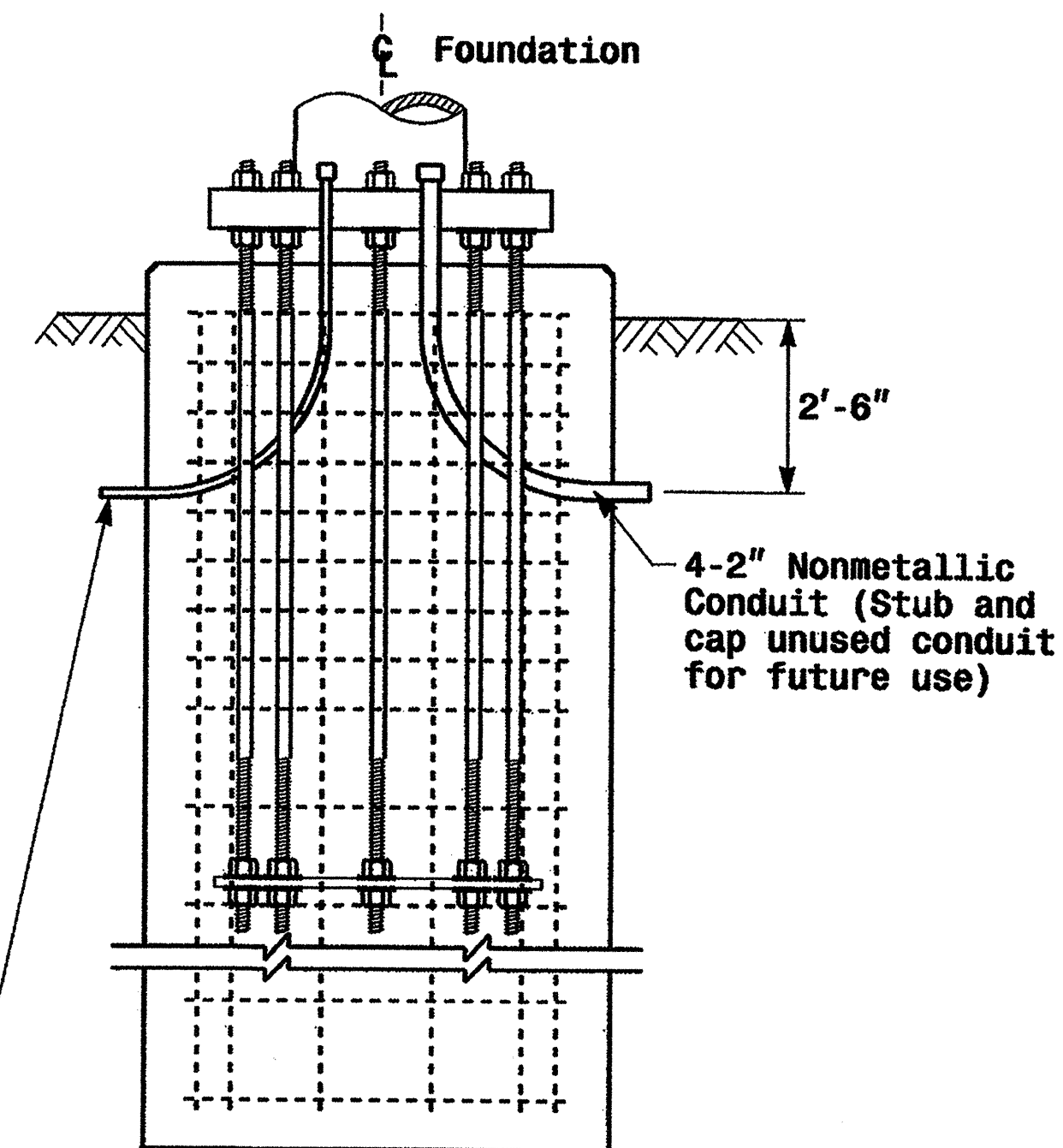
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



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. B-2532
SHEET NO. Sig. 12 M 7

Construction Details - Foundations

	Construction Details Foundations	
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS SCALE: 0 NA NONE	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: A.M. ESPOSITO REVISIONS: _____ INIT. DATE: _____