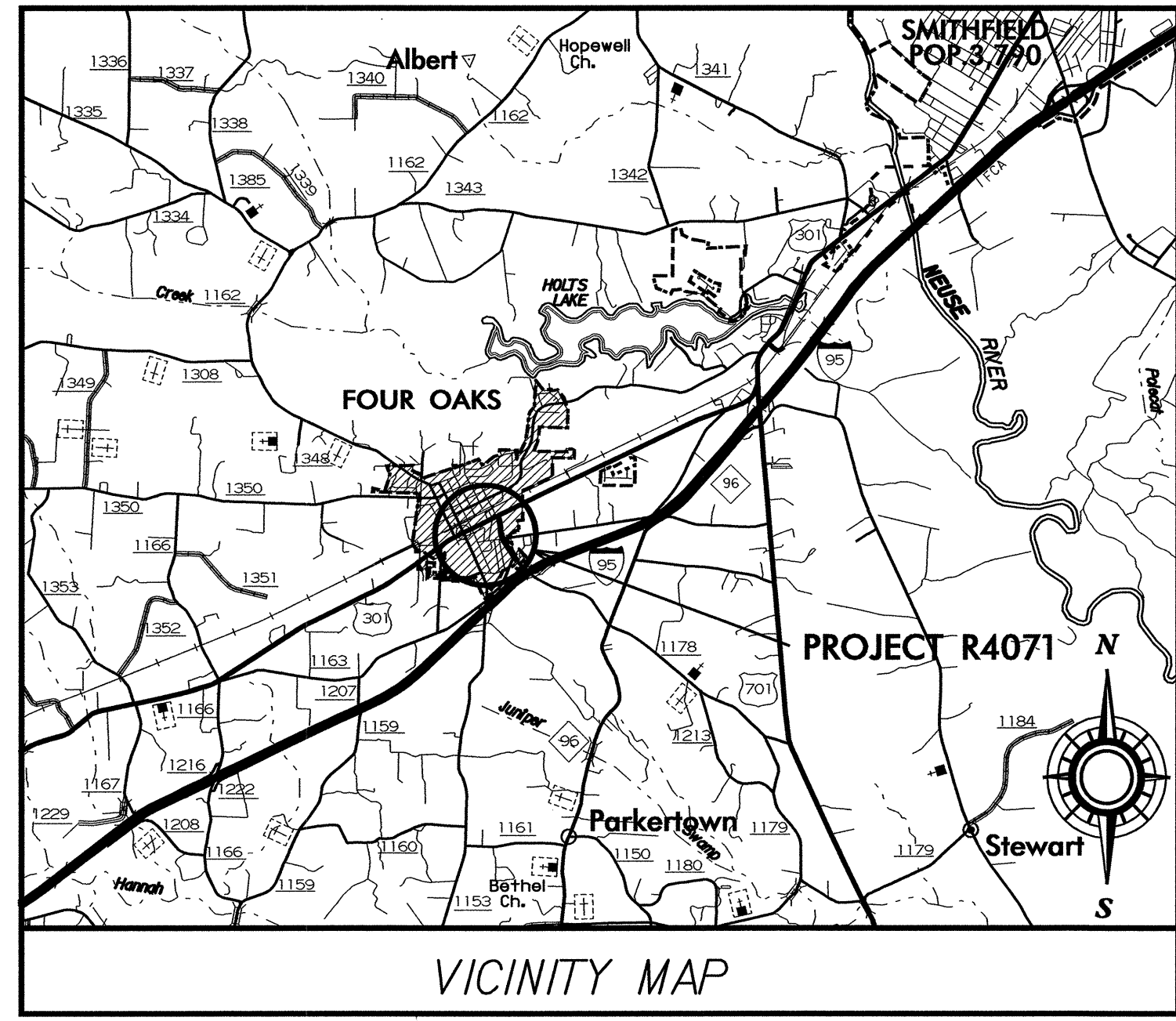


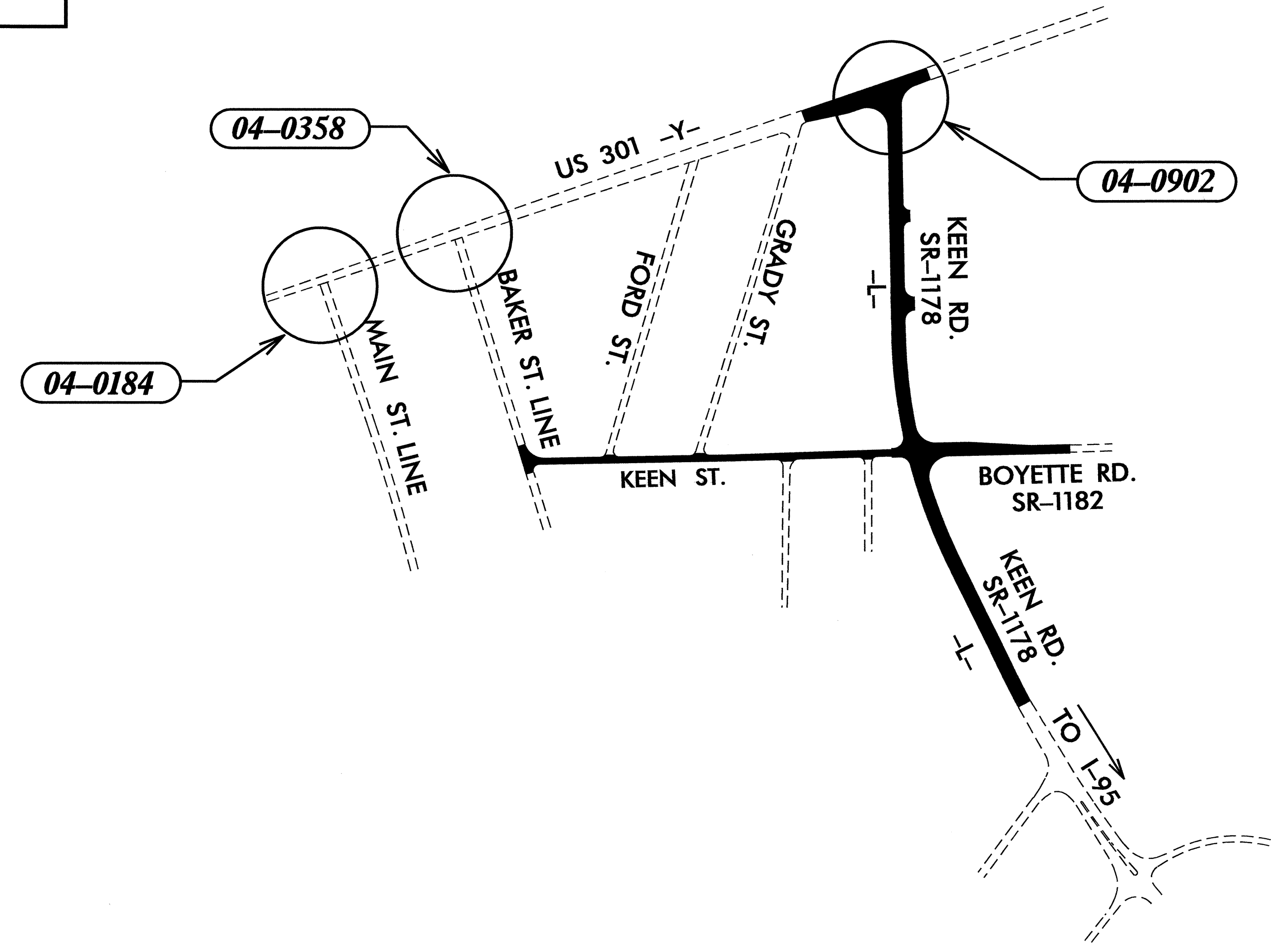
CONTRACT: TIP PROJECT: R-4071



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
JOHNSTON COUNTY

LOCATION: SR 1178 (KEEN ROAD) FROM US-301 TO 164' NORTH WEST OF SR 1164 (ALLENDALE ROAD).

TYPE OF WORK: GRADING, DRAINAGE, PAVING, CURB & GUTTER AND TRAFFIC SIGNAL.



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	N/A	Title Sheet	
Sig. 2-3	04-0184	US 301 (Wellons Avenue) at Main Street	
Sig. 4-5	04-0358	US 301 (Wellons Avenue) at Baker Street	
Sig. 6-11	04-0902	US 301 (E. Wellons Avenue) at SR 1178 (Keen Road)	
Sig. 12-14	N/A	Wireless Radio Antenna Typical Details	
Sig. 15-19	N/A	Standard Drawings for Metal Poles	

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

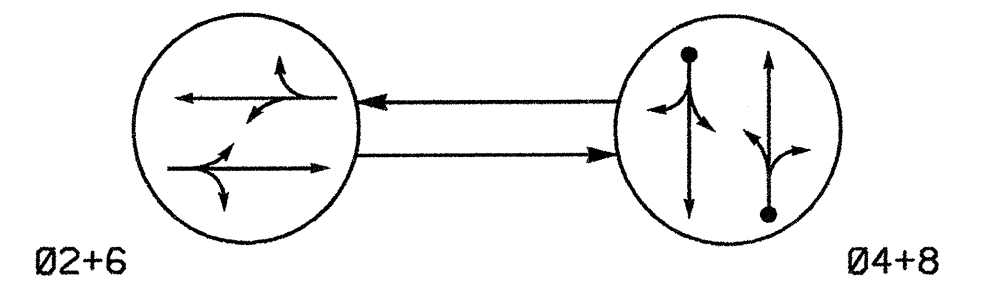
Contacts:

D. Y. Ishak - Signals and Geometrics Contracts Engineer
G. C. Brown, PE - Signal Equipment Design Engineer
G. G. Murr, Jr., PE - Traffic Management Systems Engineer

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

122 N. McDowell St., Raleigh, NC 27603

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

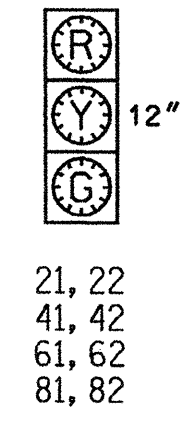
- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←- - UNSIGNALIZED MOVEMENT
- ←- - - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

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

SIGNAL FACE I.D.

⊙ Denotes L.E.D.



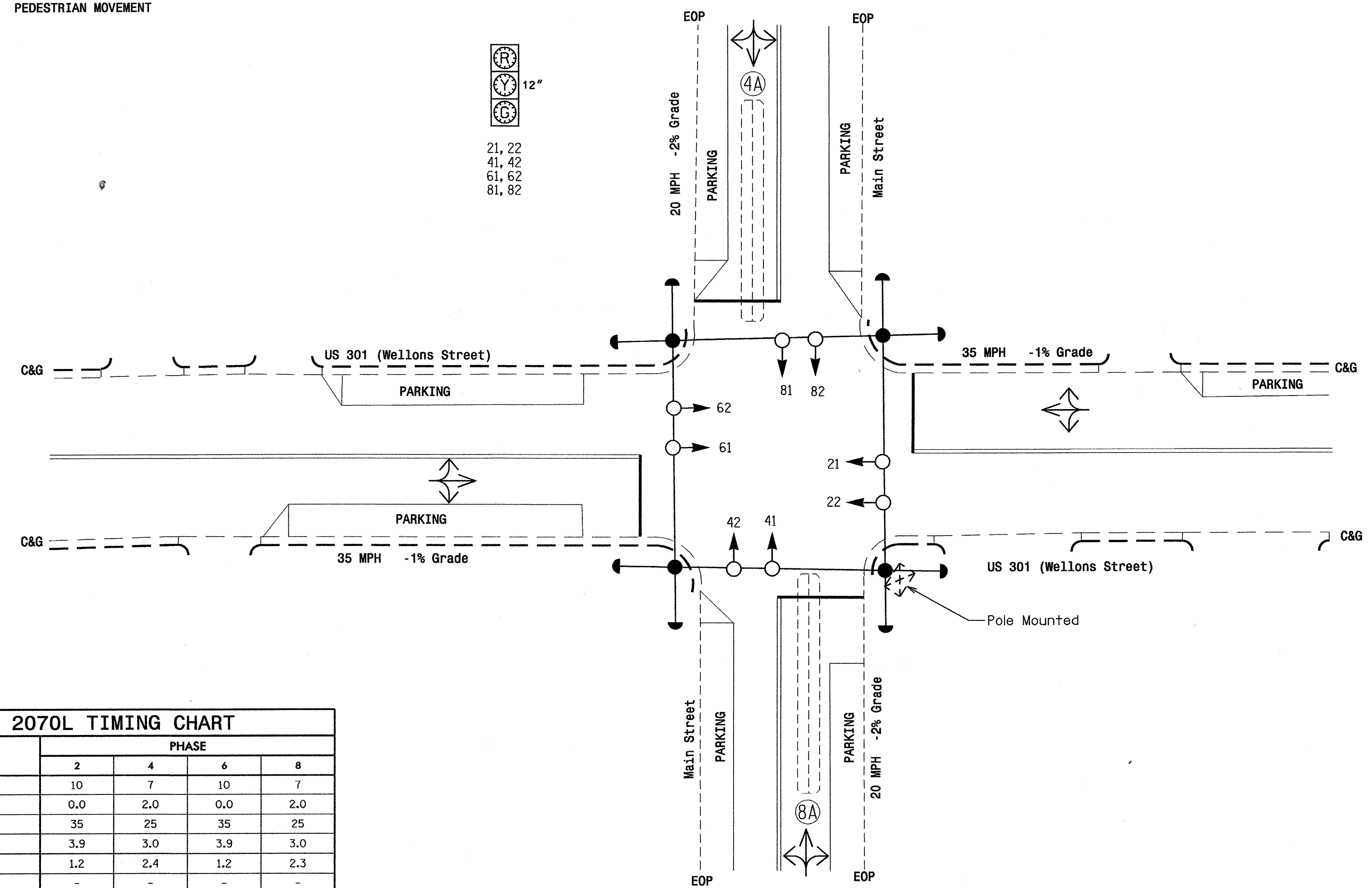
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING								
				NEW LOOP	PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD	
4A	6X60	+5	2-4-2	-	4	Y	Y	-	-	5	-	-
8A	6X60	+5	2-4-2	-	8	Y	Y	-	-	5	-	-

2 Phase Semi-Actuated (US 301 Closed Loop System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 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 #0184.



2070L TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	10	7	10	7
Extension 1 *	0.0	2.0	0.0	2.0
Max Green 1 *	35	25	35	25
Yellow Clearance	3.9	3.0	3.9	3.0
Red Clearance	1.2	2.4	1.2	2.3
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MAX RECALL	-	MAX RECALL	-
Vehicle Call Memory	N/A	-	N/A	-
Dual Entry	-	ON	-	ON
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.

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

Signal Upgrade

Prepared in the Offices of:

122 N. McDowell St., Raleigh, NC 27603

US 301 (Wellons Street) at Main Street

Division 04 Johnston County Four Oaks

PLAN DATE: February 2007 REVIEWED BY: DY Ishak

PREPARED BY: TS Thigpen REVIEWED BY:

REVISIONS

SCALE: 1" = 20'

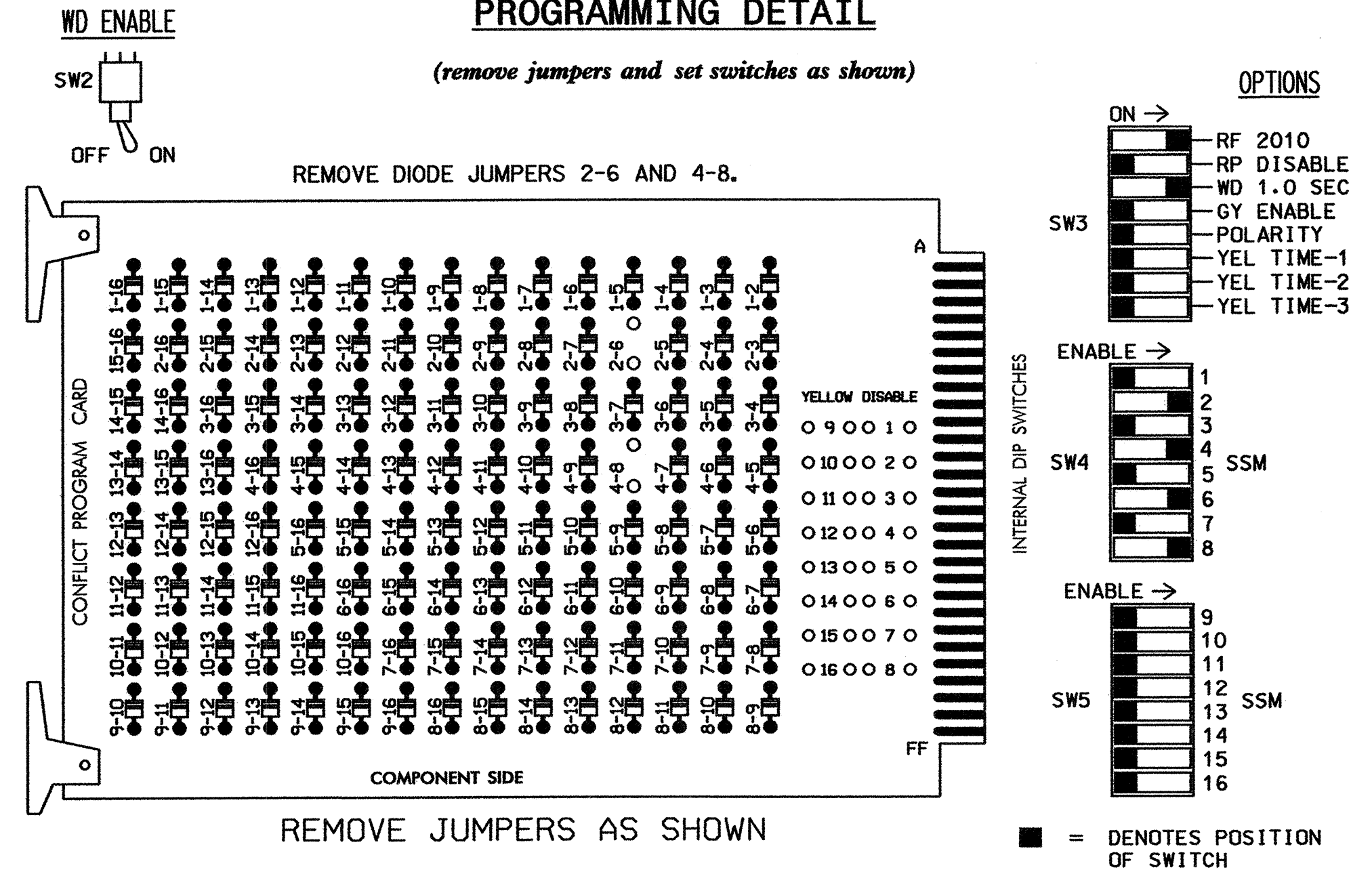
SIGNATURE: [Signature] DATE: 15 March 2007

SIG. INVENTORY NO. 04-0184

12-MAR-2007 09:05 s:\1115\sig\1115\work\gr\cousert\p\proj\ctsr-4071\new\roadway\roadway\04-0184_s\sig_sen_2007\mdd.dgn thigpen

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



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 SEL1-SEL5 are present on the monitor board.

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. To prevent red failures on unused monitor channels, see Red Monitor Board Programming Detail this sheet.
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 4 and 8, on the controller, for Dual Entry.
6. The Cabinet and Controller are part of US 301 Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....EAGLE TYPE 2070L
 CABINET.....McCain/CONTROL TECHNOLOGIES (DWG. NO. 9500-336-NCDOT)
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S6,S8
 PHASES USED.....2,4,6,8
 OVERLAPS.....NONE

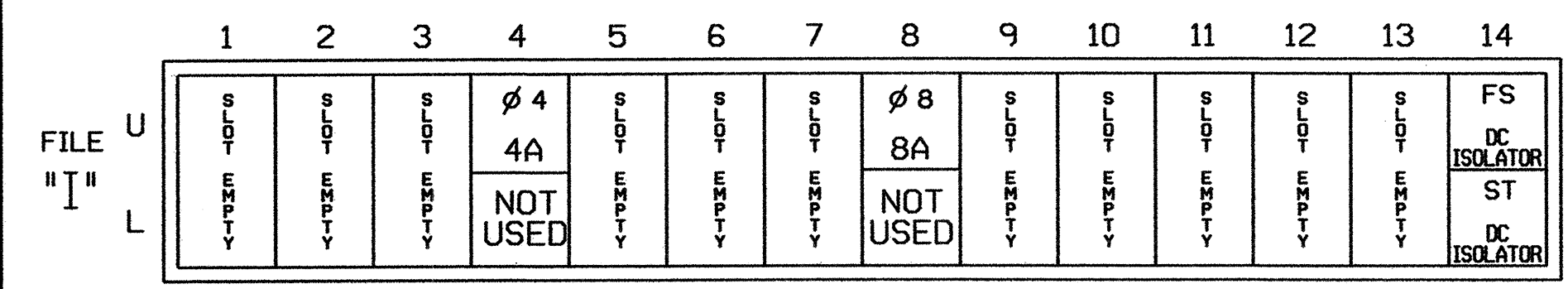
SIGNAL HEAD HOOK-UP CHART

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

NU = NOT USED

INPUT FILE POSITION LAYOUT

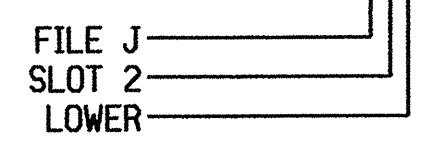
(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

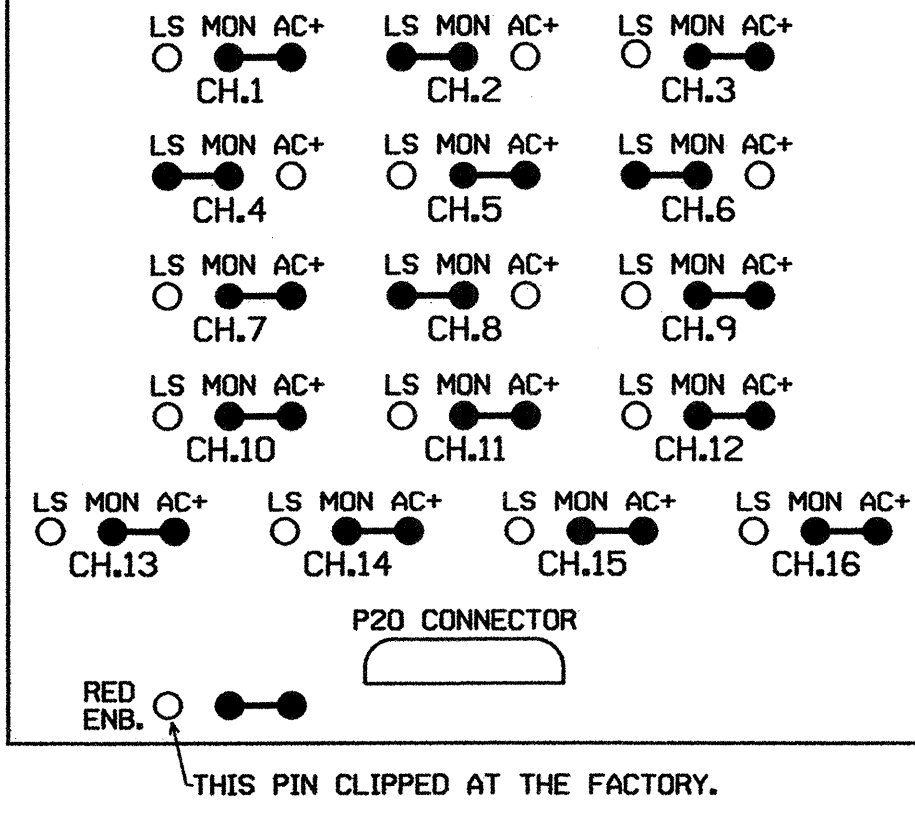
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
4A	TB21-7,8	I4U	41	3	4	4	Y	Y			5
8A	TB22-1,2	I8U	42	4	8	8	Y	Y			5

INPUT FILE POSITION LEGEND: J2L



RED MONITOR BOARD PROGRAMMING

(position jumpers as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-0184
 DESIGNED: February 2007
 SEALED: 3/15/17
 REVISED: N/A

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR: US 301 (Wellons Street) at Main Street

Division 4 Johnston County Four Oaks

PLAN DATE: FEBRUARY 2007 REVIEWED BY: T. Jape

PREPARED BY: A. MASTIEWICZ REVIEWED BY:

REVISIONS: INIT. DATE

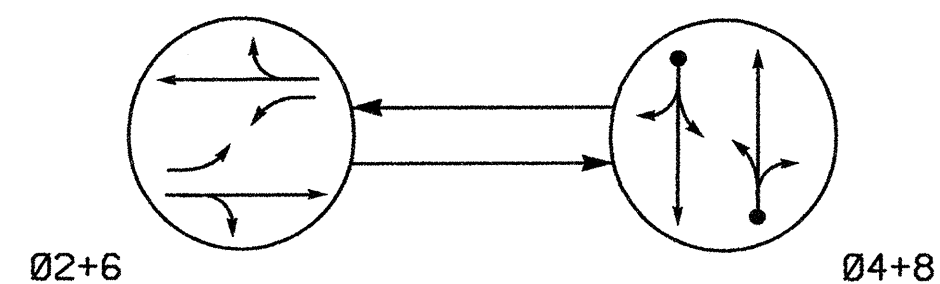
Signature: George C. Brown 3/28/07

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

122 N. McDowell St., Raleigh, NC 27603

SIG. INVENTORY NO. 04-0184

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

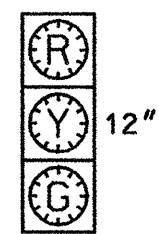
- ← DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ← UNSIGNALIZED MOVEMENT
- ← PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	Ø2+6	Ø4+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

○ Denotes L.E.D.



21, 22
41, 42
61, 62
81, 82

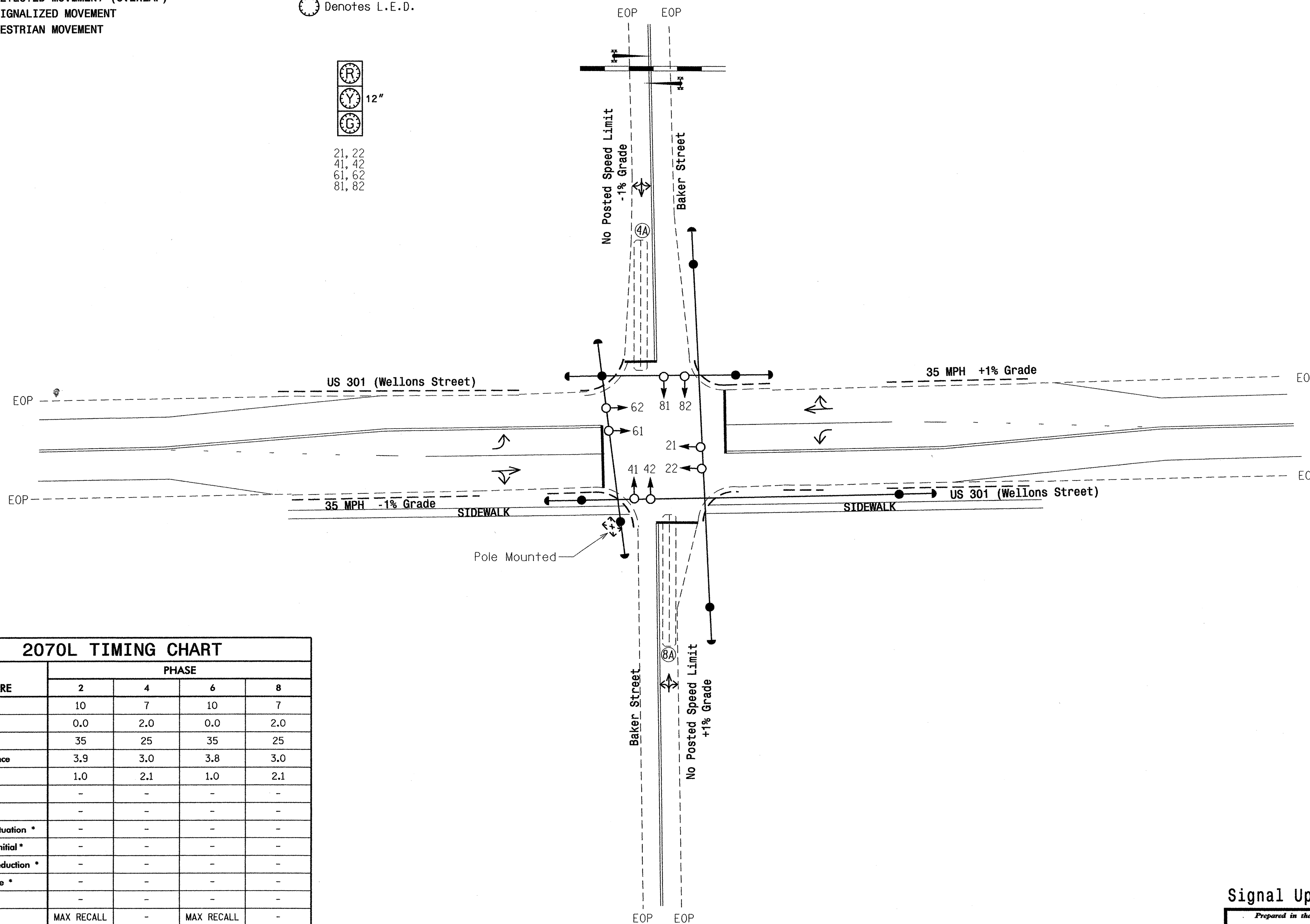
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING								
				PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD	
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	5	-	-
8A	6X40	0	2-4-2	-	8	Y	Y	-	-	5	-	-

**2 Phase
Semi-Actuated
(US 301 Closed Loop System)**

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 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 #0358.



2070L TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	10	7	10	7
Extension 1 *	0.0	2.0	0.0	2.0
Max Green 1 *	35	25	35	25
Yellow Clearance	3.9	3.0	3.8	3.0
Red Clearance	1.0	2.1	1.0	2.1
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MAX RECALL	-	MAX RECALL	-
Vehicle Call Memory	N/A	-	N/A	-
Dual Entry	-	ON	-	ON
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

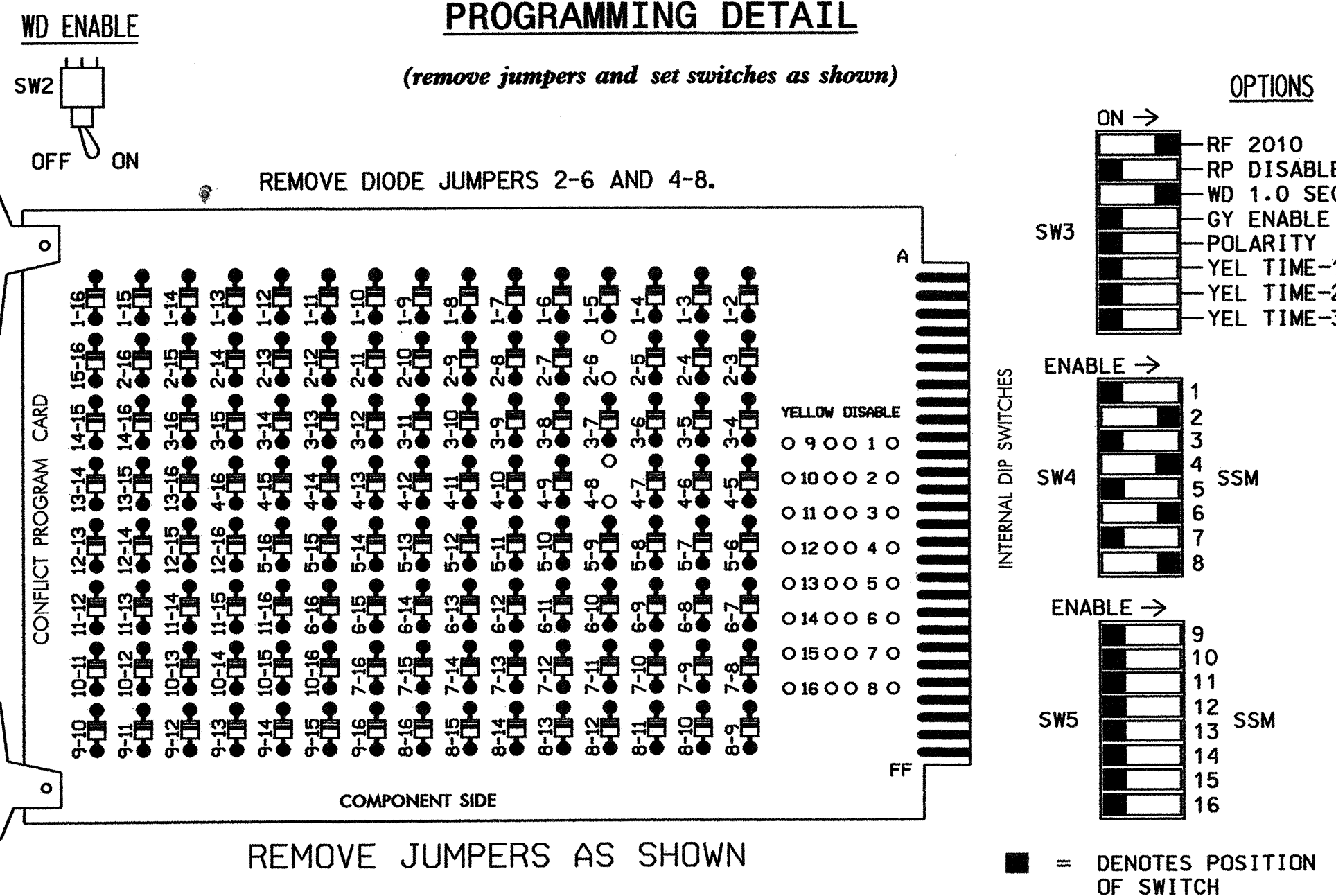
PROPOSED		EXISTING
○ →	Traffic Signal Head	● →
● →	Modified Signal Head	N/A
○ →	Sign	○ →
○ →	Pedestrian Signal Head With Push Button & Sign	○ →
○ →	Signal Pole with Guy	○ →
○ →	Signal Pole with Sidewalk Guy	○ →
□	Inductive Loop Detector	□
□	Controller & Cabinet	□
□	Junction Box	□
---	2-in Underground Conduit	---
N/A	Right of Way	---
→	Directional Arrow	→
→	Pavement Marking Arrow	→
N/A	Railroad Gate and Flasher	→
N/A	Railroad Tracks	—+—

Signal Upgrade

<p>122 N. McDowell St., Raleigh, NC 27603</p>	<p>US 301 (Wellons Street) at Baker Street</p>		<p>SEAL</p>			
	<p>Division 4 Johnston County Four Oaks</p> <p>PLAN DATE: February 2007 REVIEWED BY: DY Ishak</p> <p>PREPARED BY: TS Thigpen REVIEWED BY:</p>	<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		INIT.	DATE	
INIT.	DATE					
<p>SIGNATURE DATE</p>			<p>SIG. INVENTORY NO. 04-0358</p>			

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



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 SEL1-SEL5 are present on the monitor board.

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. To prevent red failures on unused monitor channels, see Red Monitor Board Programming Detail this sheet.
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 4 and 8, on the controller, for Dual Entry.
6. The Cabinet and Controller are part of US 301 Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....EAGLE TYPE 2070L
 CABINET.....McCain/CONTROL TECHNOLOGIES (DWG. NO. 9500-336-NCDOT)
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S6,S8
 PHASES USED.....2,4,6,8
 OVERLAPS.....NONE

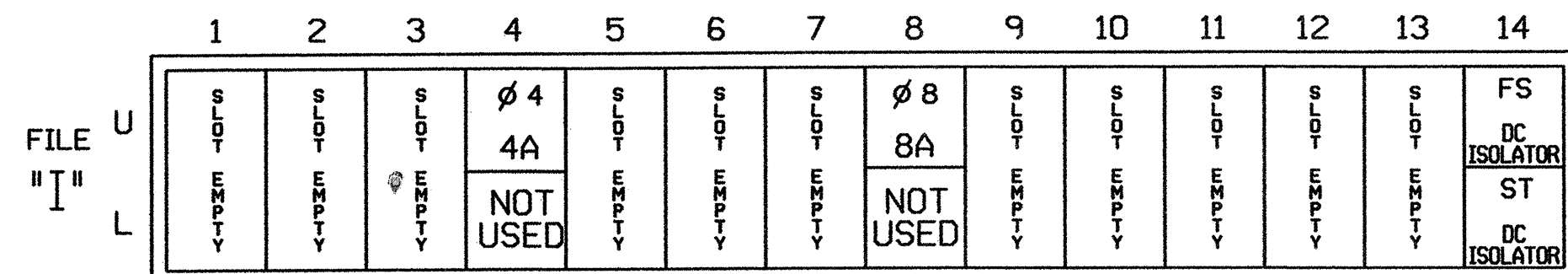
SIGNAL HEAD HOOK-UP CHART

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

NU = NOT USED

INPUT FILE POSITION LAYOUT

(front view)



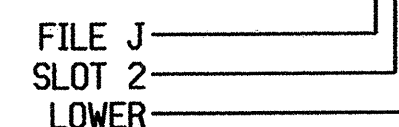
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

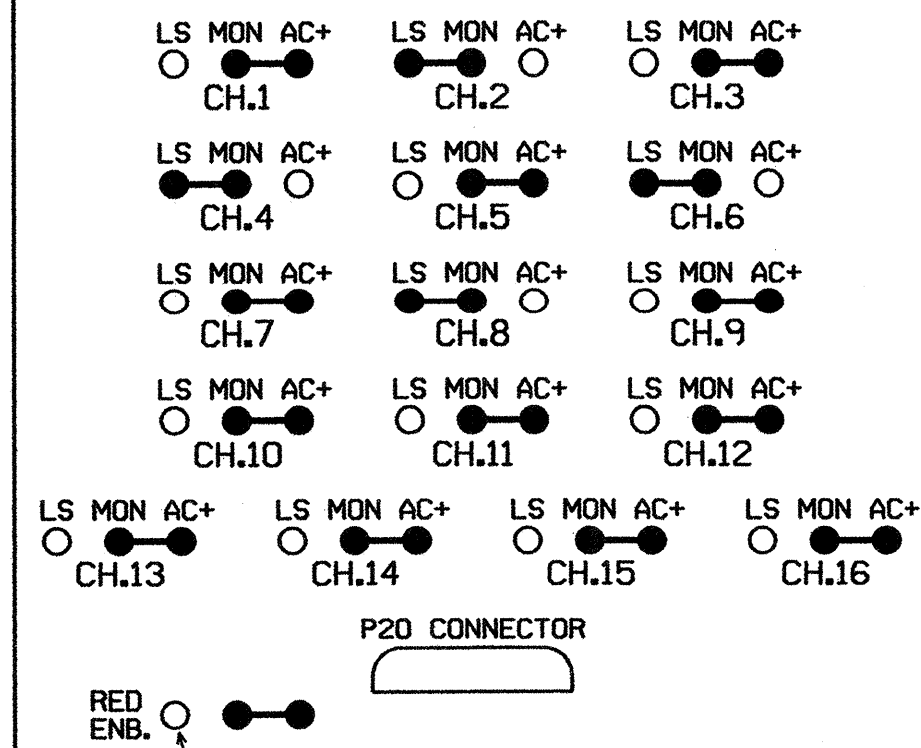
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
4A	TB21-7,8	I4U	41	3	4	4	Y	Y			5
8A	TB22-1,2	I8U	42	4	8	8	Y	Y			5

INPUT FILE POSITION LEGEND: J2L



RED MONITOR BOARD PROGRAMMING

(position jumpers as shown below)



THIS PIN CLIPPED AT THE FACTORY.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-0358
 DESIGNED: February 2007
 SEALED: 3/15/07
 REVISED: N/A

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 301 (Wellons Street) at Baker Street

Division 4 Johnston County Four Oaks

PLAN DATE: FEBRUARY 2007 REVIEWED BY: T. J. J. J.

PREPARED BY: A. MASIEWICZ REVIEWED BY:

REVISIONS INIT. DATE

Signature: George C. Brown 3/29/07

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

122 N. McDowell St., Raleigh, NC 27603

SIG. INVENTORY NO. 04-0358

PHASING DIAGRAM

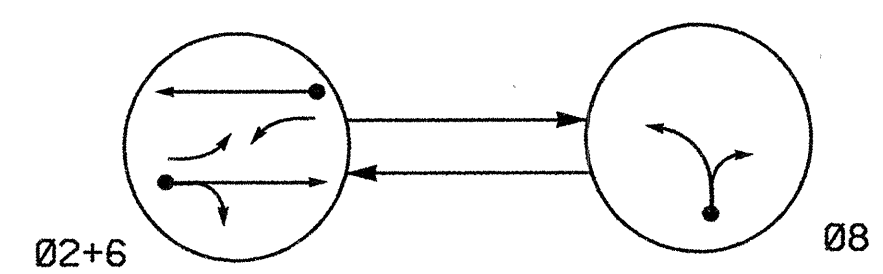


TABLE OF OPERATION

SIGNAL FACE	PHASE		
	Ø 2+6	Ø 8	FLASH
21, 22	G	R	Y
61, 62	G	R	Y
81, 82	R	G	R

2070L LOOP & DETECTOR INSTALLATION

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

2 Phase Fully Actuated (Isolated)

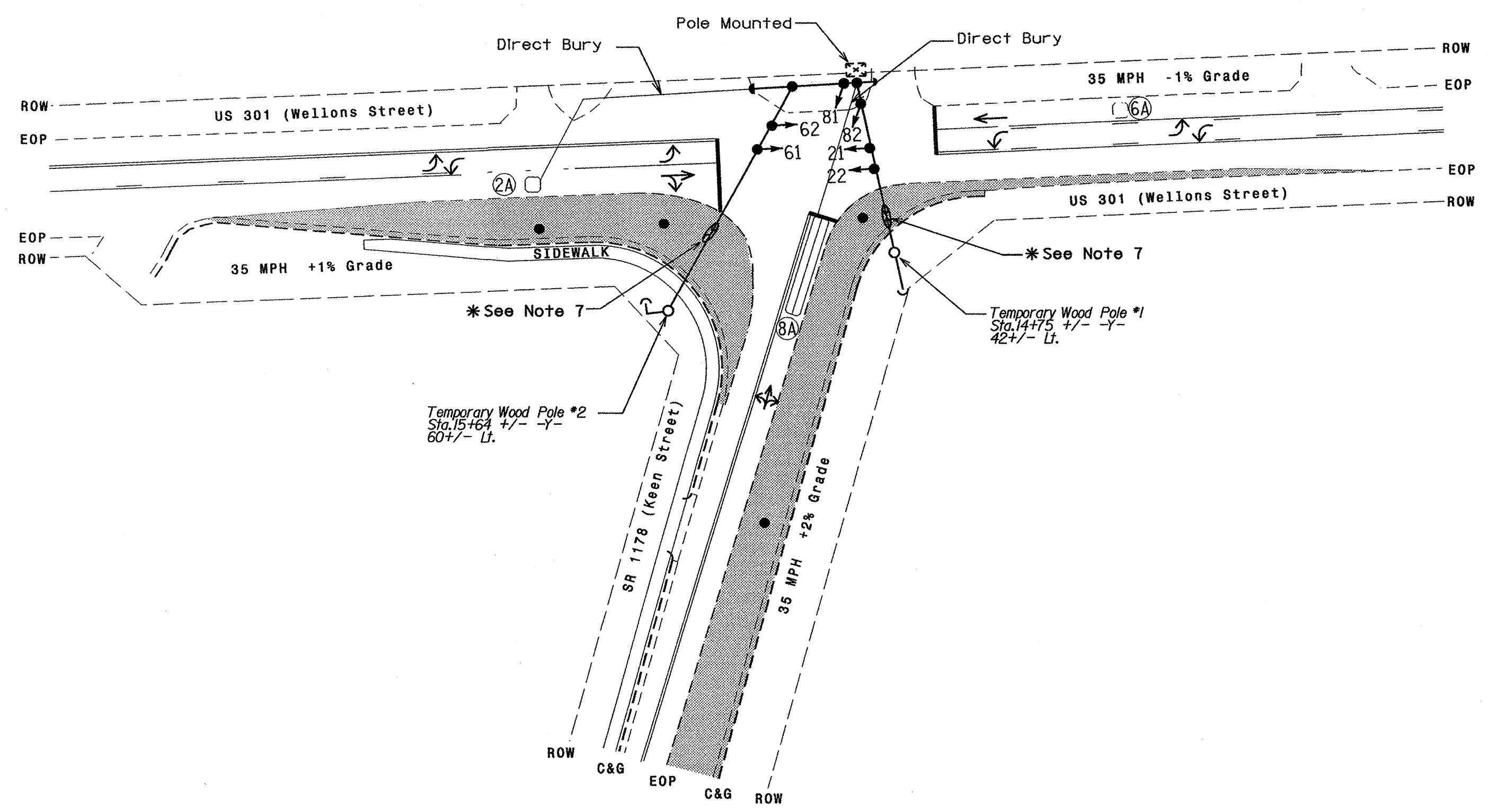
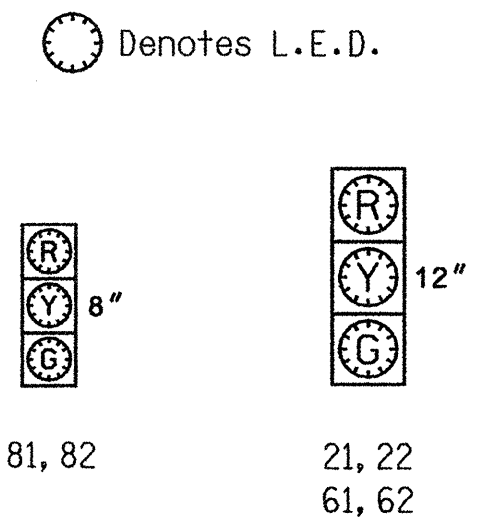
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered 21, 22, 61, 62 and 82.
4. Set all detector units to presence mode.
5. Pavement markings are existing.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Expand existing spanwire to new DOT pole using a strandlink device compatible with existing spanwire.

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.



FEATURE	PHASE		
	2	6	8
Min Green 1 *	10	10	7
Extension 1 *	2.0	2.0	2.0
Max Green 1 *	40	40	20
Yellow Clearance	3.8	3.9	3.0
Red Clearance	1.1	1.5	1.8
Walk 1 *	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation *	-	-	-
Max Variable Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Recall Mode	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	YELLOW	YELLOW	-
Dual Entry	-	-	-
Simultaneous Gap	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.

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

Temporary Signal

Prepared in the Office of:

 NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 SIGNAL AND GEOMETRICS SECTION
 122 N. McDowell St., Raleigh, NC 27603

**US 301 (Wellons Street)
at
SR 1178 (Keen Road)**

Division 4 Johnston County Four Oaks
 PLAN DATE: February 2007 REVIEWED BY: DY Ishak
 PREPARED BY: TS Thigpen REVIEWED BY:

SEAL

 NORTH CAROLINA
 PROFESSIONAL ENGINEER
 EDWARD E. MULINAX
 15 March 2007

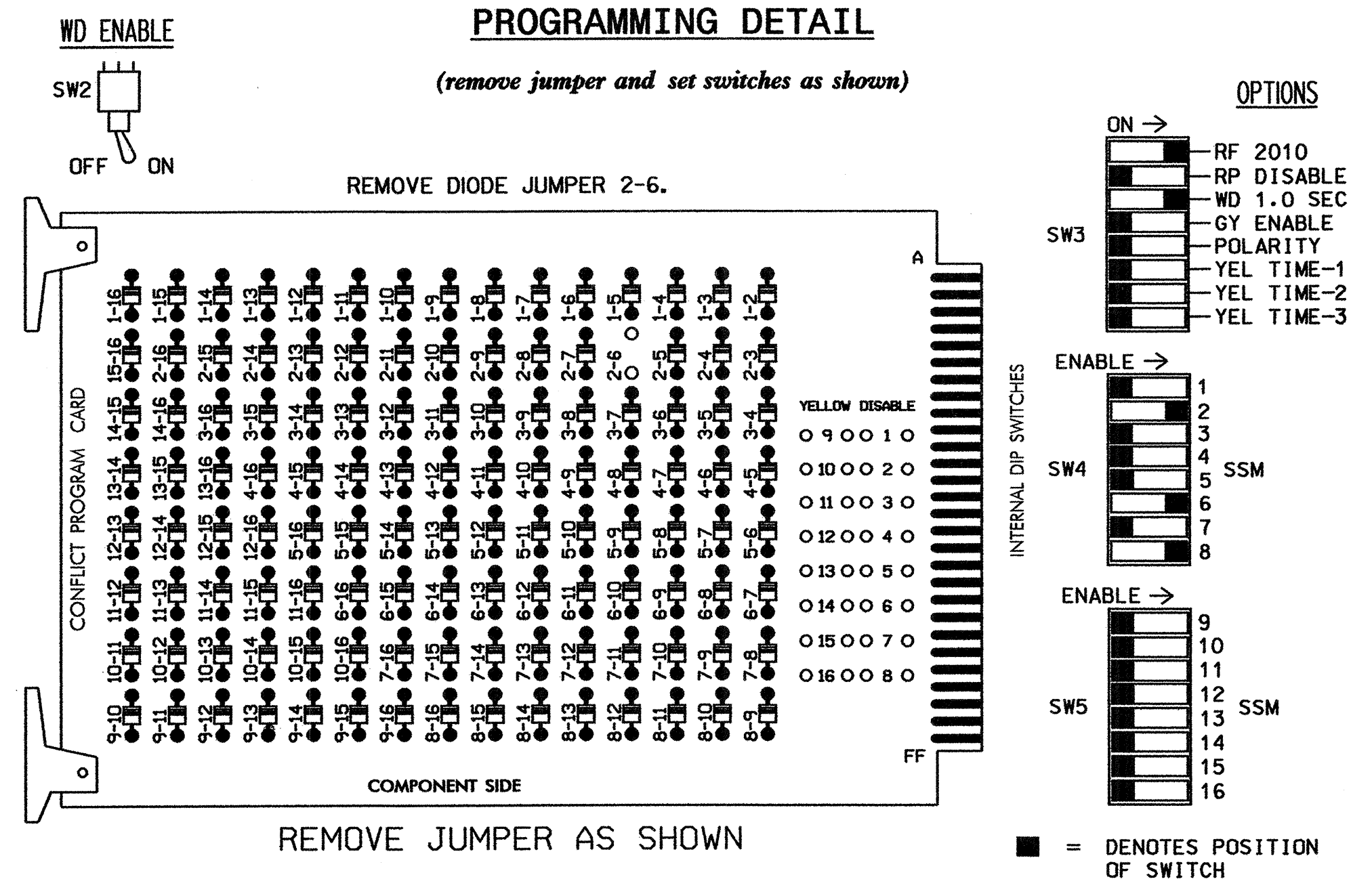
REVISIONS	INIT.	DATE

SIGNATURE DATE
 SIG. INVENTORY NO. 04-0902T

15-MAR-2007 13:34 C:\p04\emerge\cupss#1\p\project\em-4071\new\odoway\04-0902_sig.dgn-2007mads.dgn

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



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 SEL1-SEL5 are present on the monitor board.

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 1,3,4,5,7,9,10,11,12,13,14,15 & 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.

EQUIPMENT INFORMATION

CONTROLLER.....EXISTING 2070L
 CABINET.....EXISTING 336
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S6,S8
 PHASES USED.....2,6,8
 OVERLAPS.....NONE

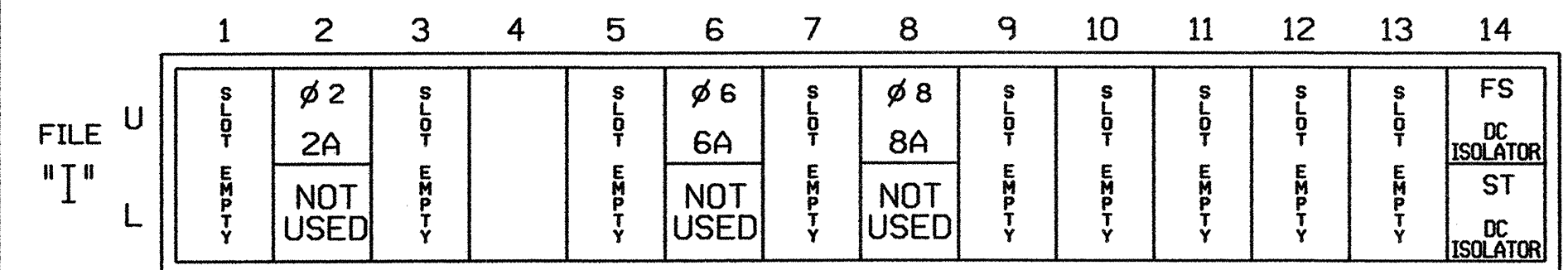
SIGNAL HEAD HOOK-UP CHART

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

NU = NOT USED

INPUT FILE POSITION LAYOUT

(front view)



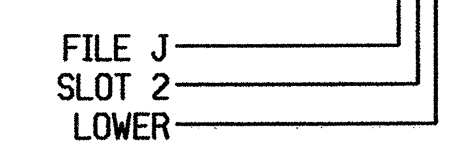
EX. : 1A, 2A, ETC. = LOOP NO.'S

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	TB21-3,4	I2U	39	1	2	2	Y	Y			
6A	TB21-11,12	I6U	40	2	6	6	Y	Y			
8A	TB22-1,2	I8U	42	4	8	8	Y	Y			5

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-0902T
 DESIGNED: February 2007
 SEALED: 3/15/07
 REVISED: N/A

Temporary Signal

Electrical and Programming Details For:
 Prepared in the Office of:

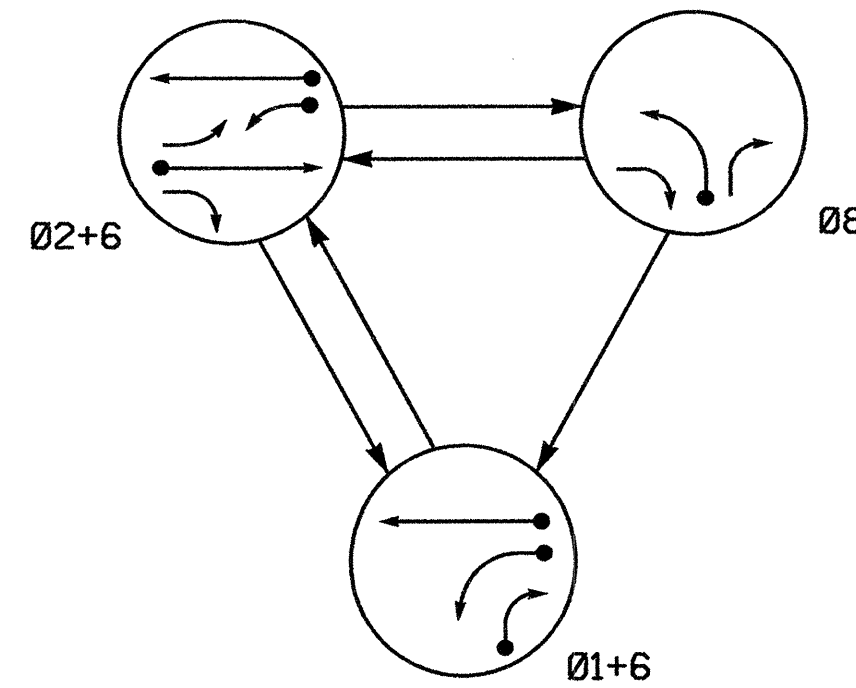
 122 N. McDowell St., Raleigh, NC 27603

US 301 (Wellons Street)
 at
 SR 1178 (Keen Road)

Division 4	Johnston County	Four Oaks
PLAN DATE: FEBRUARY 2007	REVIEWED BY: T. J. [Signature]	
PREPARED BY: A. MASTIEWICZ	REVIEWED BY:	
REVISIONS	INIT.	DATE

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 022013
 GEORGE C. BROWN
 [Signature]
 DATE 3/15/07
 SIG. INVENTORY NO. 04-0902T

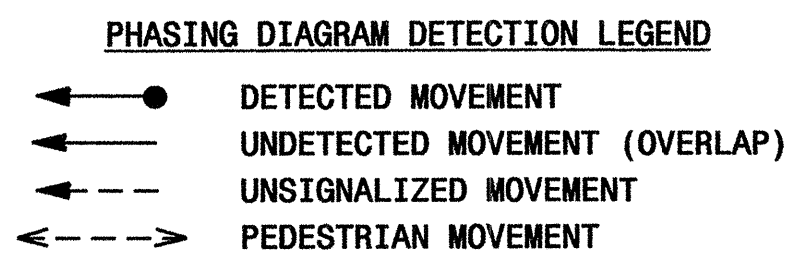
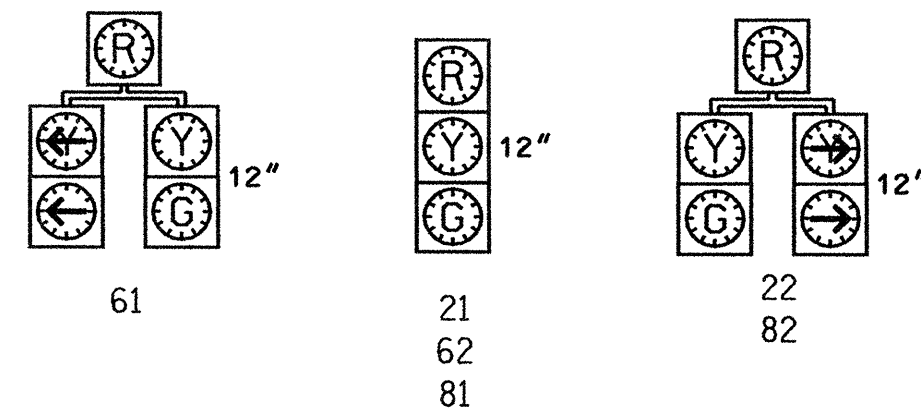
PHASING DIAGRAM



SIGNAL FACE	PHASE			
	Ø 1 + 6	Ø 2 + 6	Ø 8	F L EOP
21	R	G	R	Y
22	R	G	R	Y
61	G	R	Y	
62	G	G	R	Y
81	R	R	G	R
82	R	R	G	R

SIGNAL FACE I.D.

⊙ Denotes L.E.D.



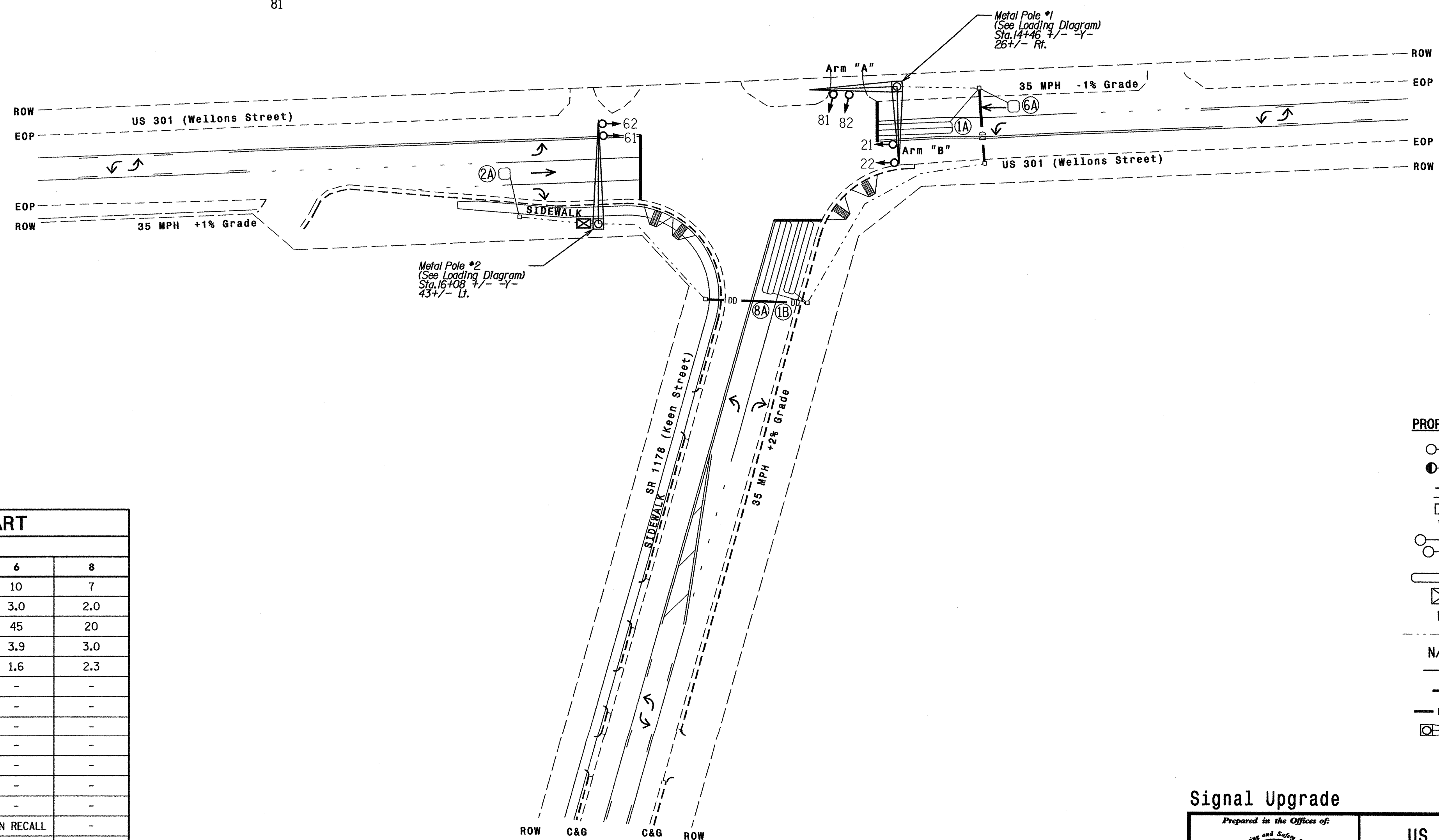
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					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
1B	6x40	0	2-4-2	Y	6	Y	Y	-	-	-	-	Y
2A	6x6	70	4	Y	2	Y	Y	-	-	-	-	Y
6A	6x6	70	4	Y	6	Y	Y	-	-	-	-	Y
8A	6x40	0	2-4-2	Y	8	Y	Y	-	-	3	-	Y

3 Phase Fully Actuated (US 301 Closed Loop System)

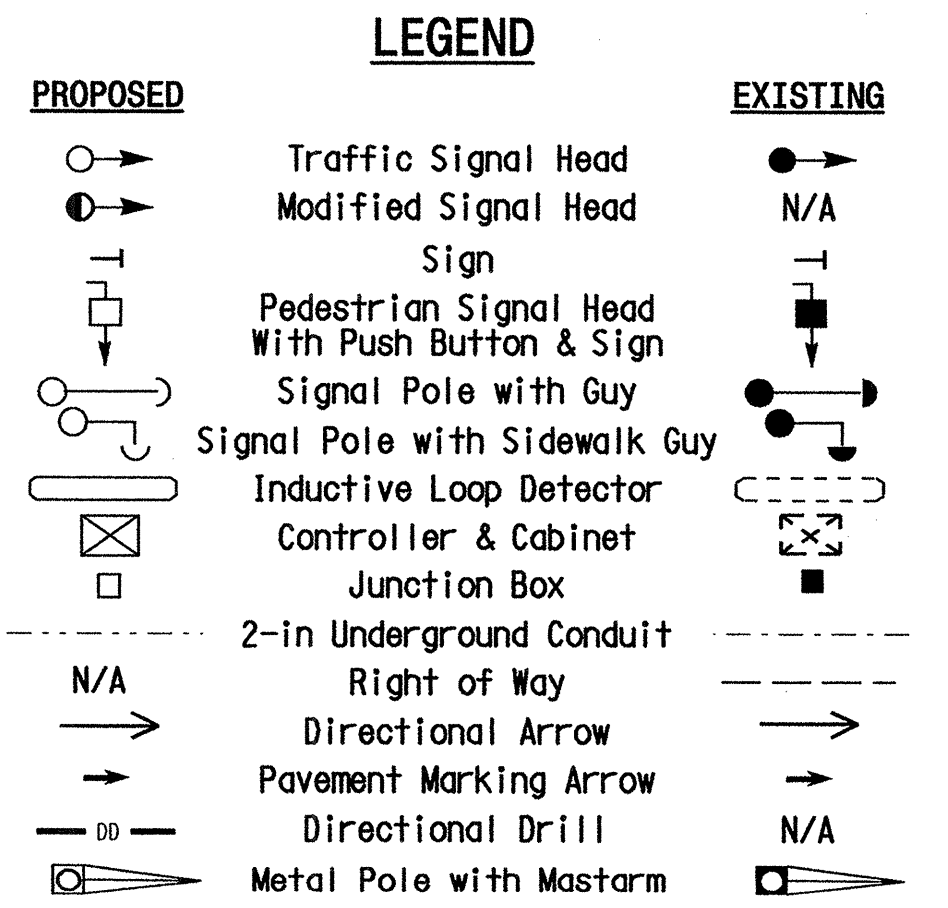
NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- 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 # 0902.



FEATURE	PHASE			
	1	2	6	8
Min Green 1 *	7	10	10	7
Extension 1 *	2.0	3.0	3.0	2.0
Max Green 1 *	15	45	45	20
Yellow Clearance	3.0	3.8	3.9	3.0
Red Clearance	2.3	2.0	1.6	2.3
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	YELLOW	-
Dual Entry	-	-	-	-
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.



Signal Upgrade

Prepared in the Offices of:

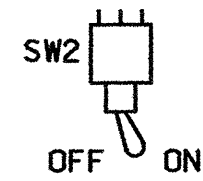
US 301 (Wellons Street) at SR 1178 (Keen Road)
 Division 4 Johnston County Four Oaks
 PLAN DATE: February 2007 REVIEWED BY: DY Ishak
 PREPARED BY: TS Thigpen REVIEWED BY:
 REVISIONS: _____ INIT. DATE
 SCALE: 1" = 40'
 SIGNATURE: _____ DATE: 3/15/07
 SIG. INVENTORY NO. 04-0902

01-MAY-2007 10:23
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 TJS

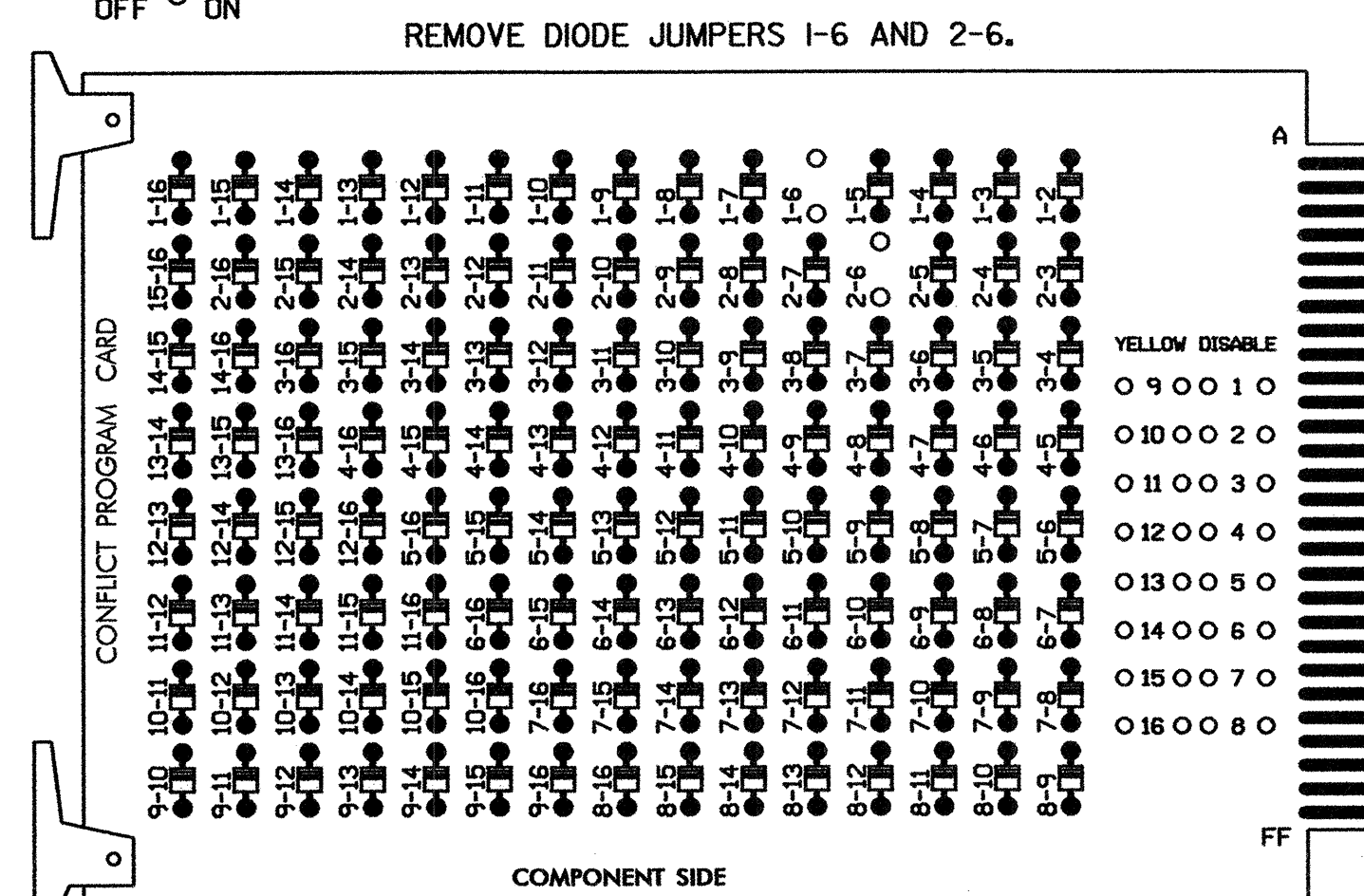
EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

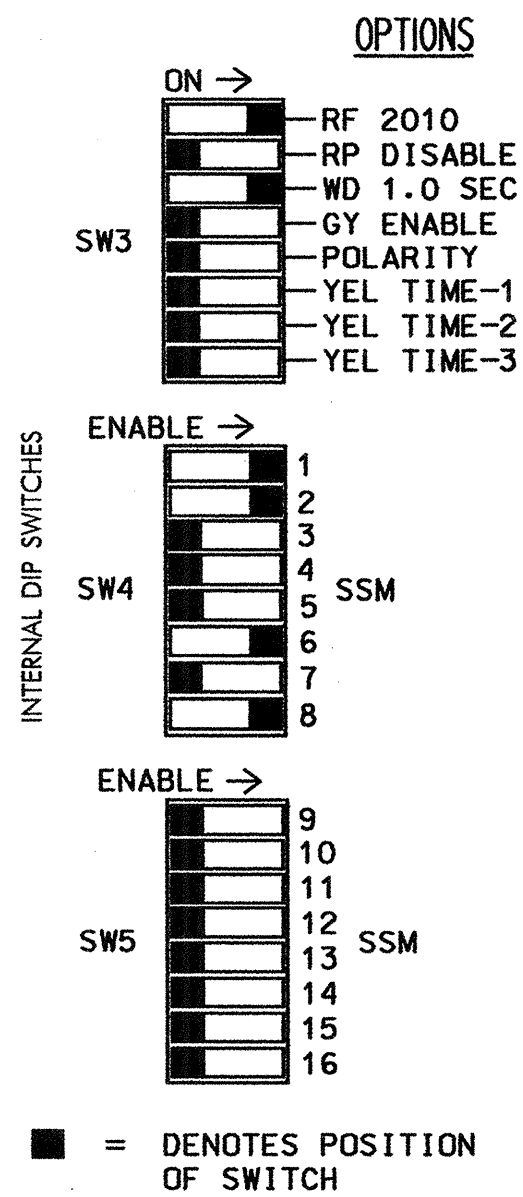
WD ENABLE



(remove jumpers and set switches as shown)



REMOVE JUMPERS 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 SEL1-SEL5 are present on the monitor board.

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 3,4,5,7,9, 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. The Cabinet And Controller Are Part Of US 301 Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S6,S8
 PHASES USED.....1,2,6,8
 OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

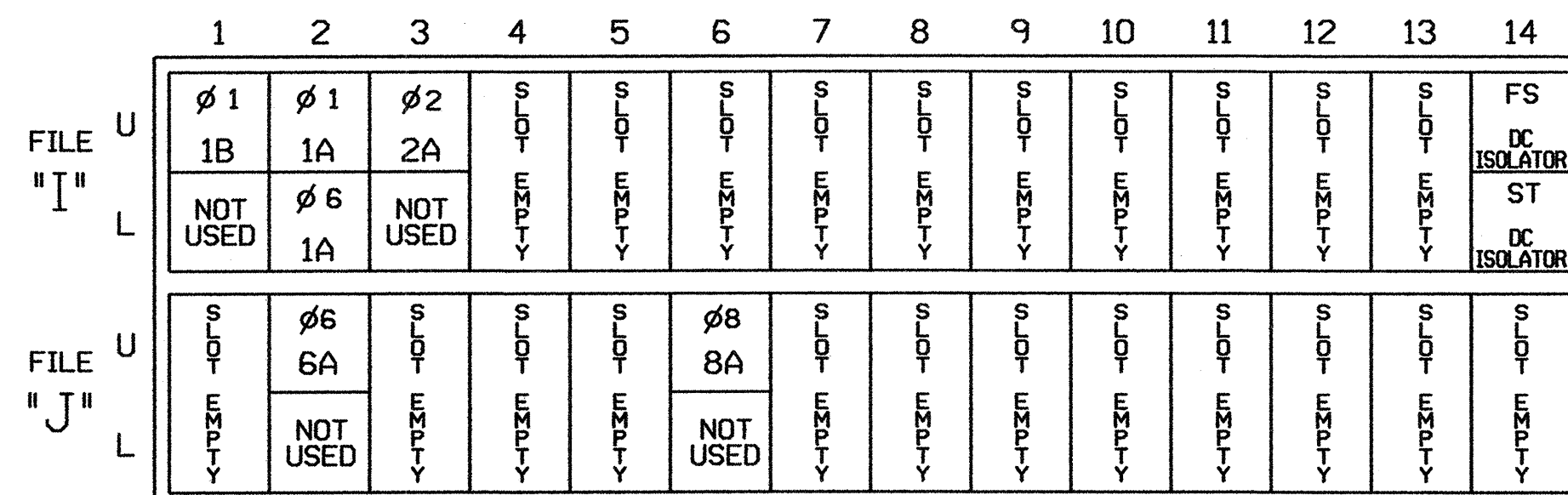
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	61,82	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	81,82	22
RED	*	128						134			107	
YELLOW		129						135			108	
GREEN		130						136			109	
RED ARROW												
YELLOW ARROW	126										108	
GREEN ARROW	127										109	

NU = NOT USED

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

INPUT FILE POSITION LAYOUT

(from view)



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

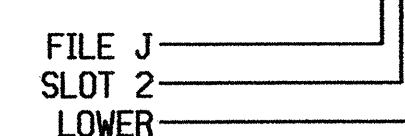
FS = FLASH SENSE
 ST = STOP TIME

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			
1B	TB2-1,2	I1U	56	18	1	1	Y	Y			15
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3

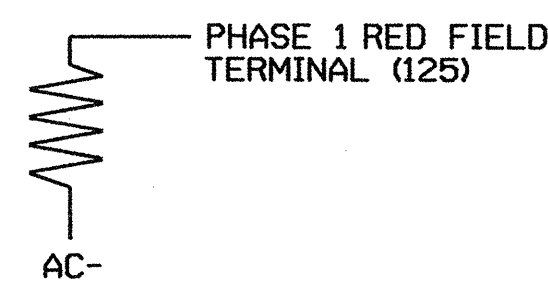
¹Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

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



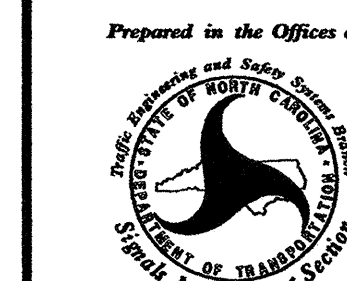
NOTE: The purpose of these resistors is to load the channel red monitor inputs in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-0902
 DESIGNED: February 2007
 SEALED: 3/15/07
 REVISED: N/A

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 301 (Wellons Street)
 at
 SR 1178 (Keen Road)

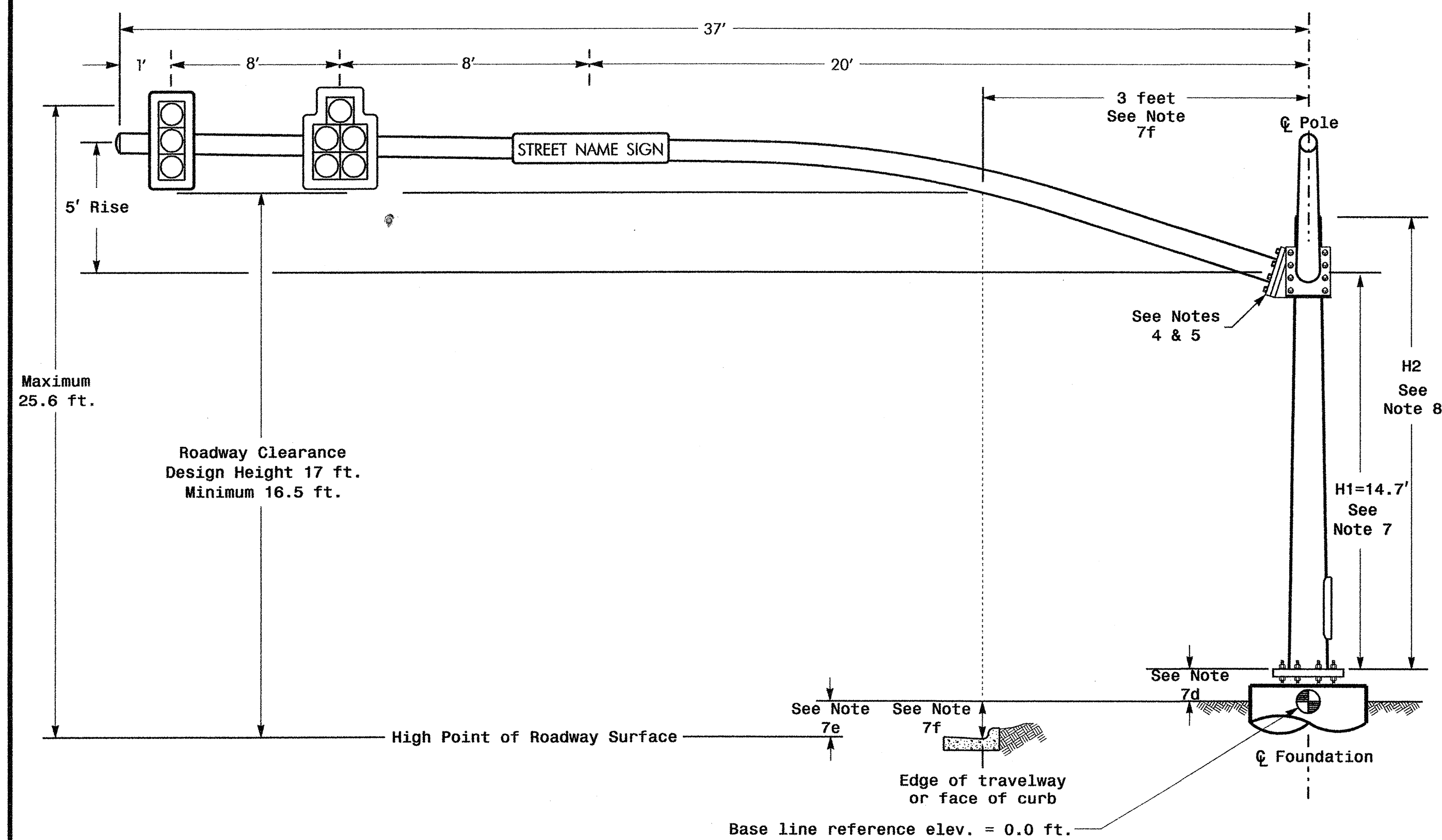


Division 4 Johnston County Four Oaks
 PLAN DATE: FEBRUARY 2007 REVIEWED BY: T. Jaffe
 PREPARED BY: A. MASTIEWICZ REVIEWED BY:

122 N. McDowell St., Raleigh, NC 27603

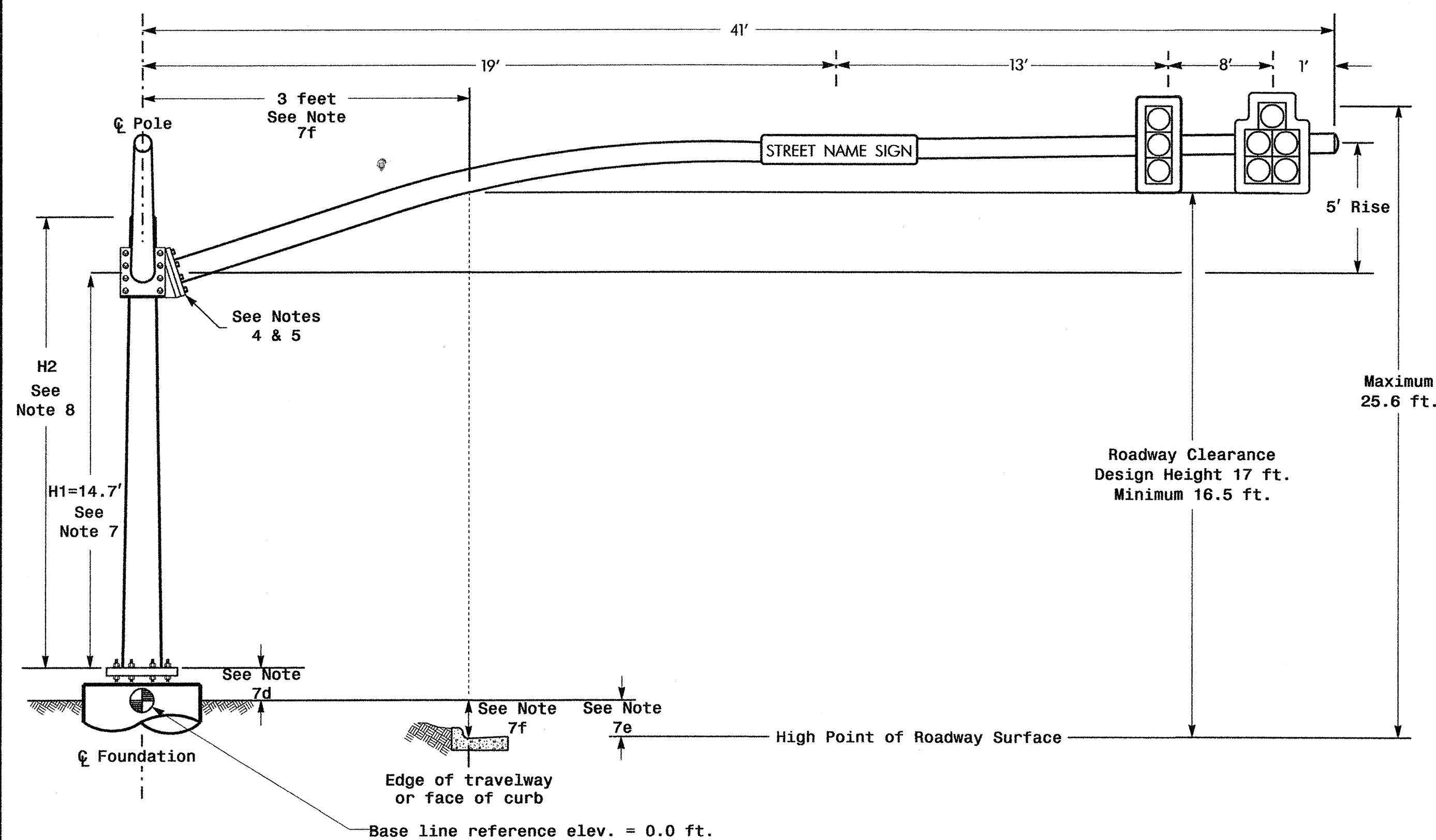
REVISIONS INIT. DATE
 SIGNATURE DATE
 SIG. INVENTORY NO. 04-0902

Design Loading for METAL POLE NO. 1, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 1, MAST ARM B



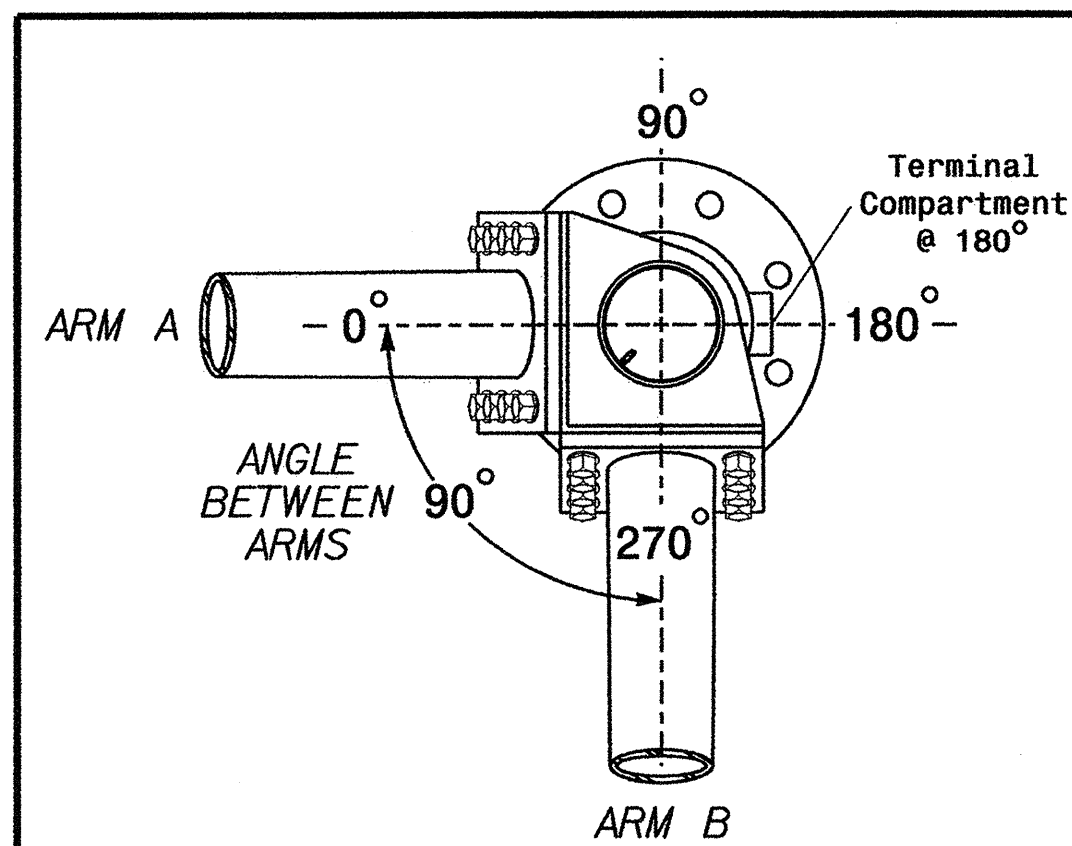
Elevation View @ 0°

SPECIAL NOTE

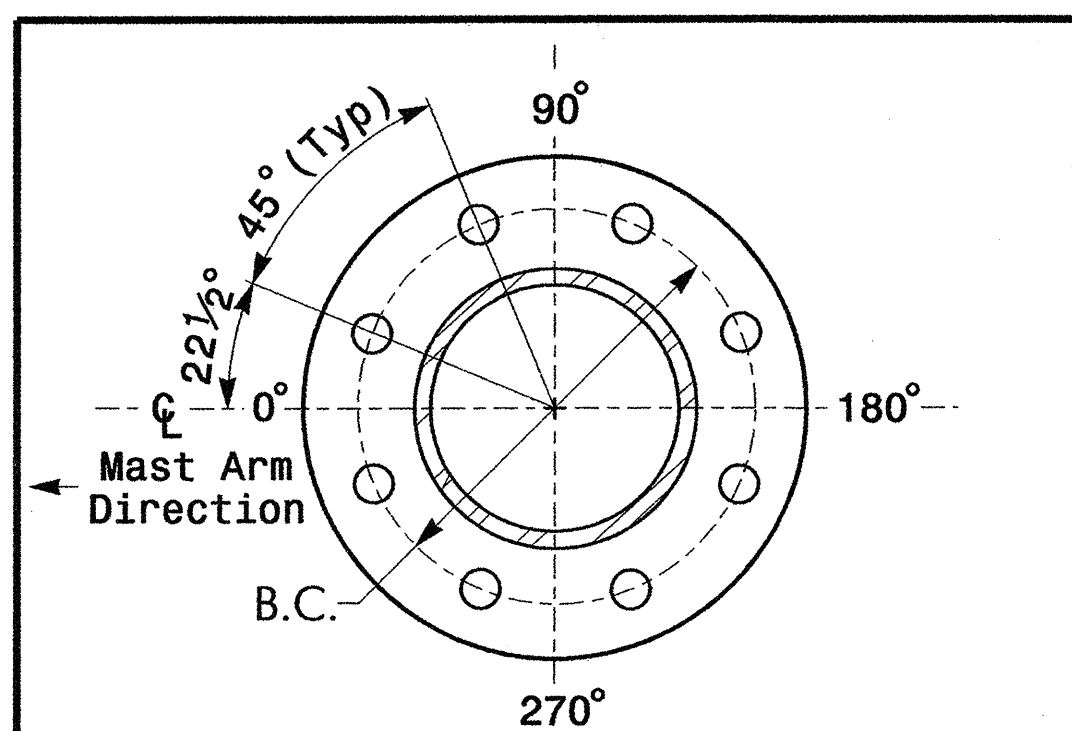
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.1ft.	+1.1ft.
Elevation difference at Edge of travelway or face of curb	-.48 ft.	-.48 ft.

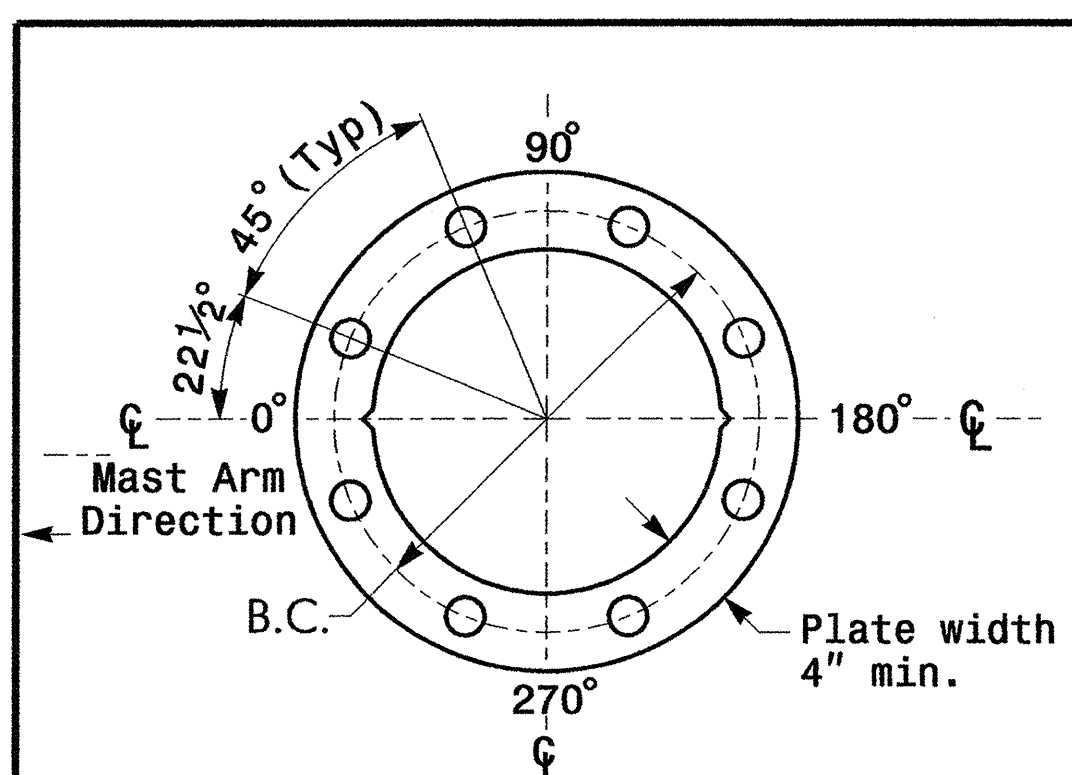


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
[Symbol]	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
[Symbol]	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
[Symbol]	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/itss/ws/mpoles/poles.html>

Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- 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 requires staggering the connections. Use elevation data for each arm to determine appropriate connection points.
- The arm-to-pole attachment 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 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - 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.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- The pole manufacturer will determine the total height (H2) of the 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.

NCDOT Wind Zone 3 (110mph)

	Prepared in the Offices of: US 301 (Wellons Street) at SR 1178 (Keen Road)		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER DAVID E. MULLINAX 23 March 2007
	Division 04 Johnston County Four Oaks PLAN DATE: March 2007 PREPARED BY: TS Thigpen	REVIEWED BY: DY Ishak REVIEWED BY:	
SCALE: 0 N/A N/A			SIGNATURE DATE SIG. INVENTORY NO. 04-0902

23-MAR-2007 07:37
 S:\175 51\proj\sig\wv\krc\cupproj\refsig\wv\4071\new\cody\40902.sig.mp1_2007.madd.dgn
 TTH:qbn

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.

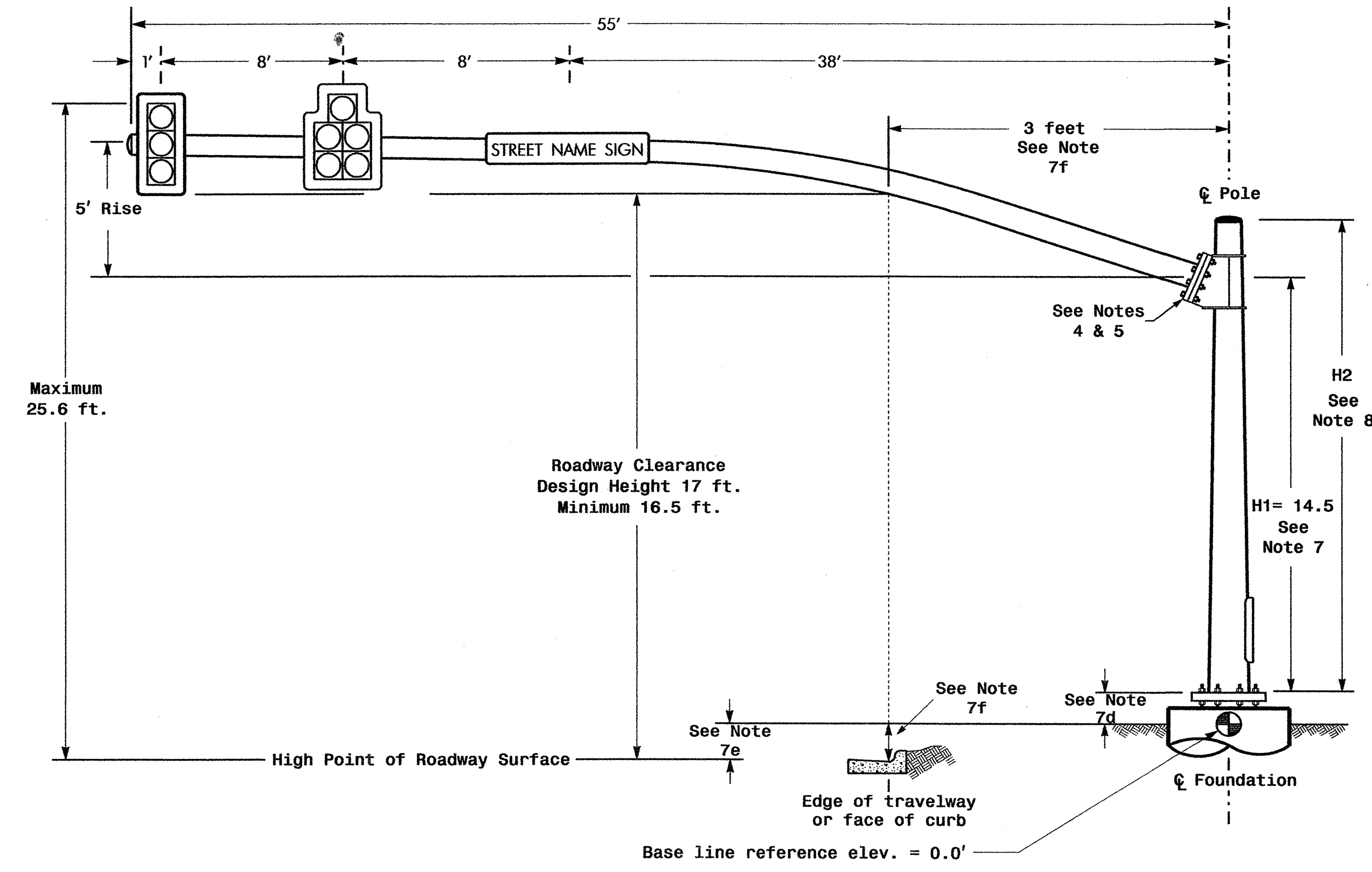
Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 2
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+0.9 ft.
Elevation difference at Edge of travelway or face of curb	-.71 ft.

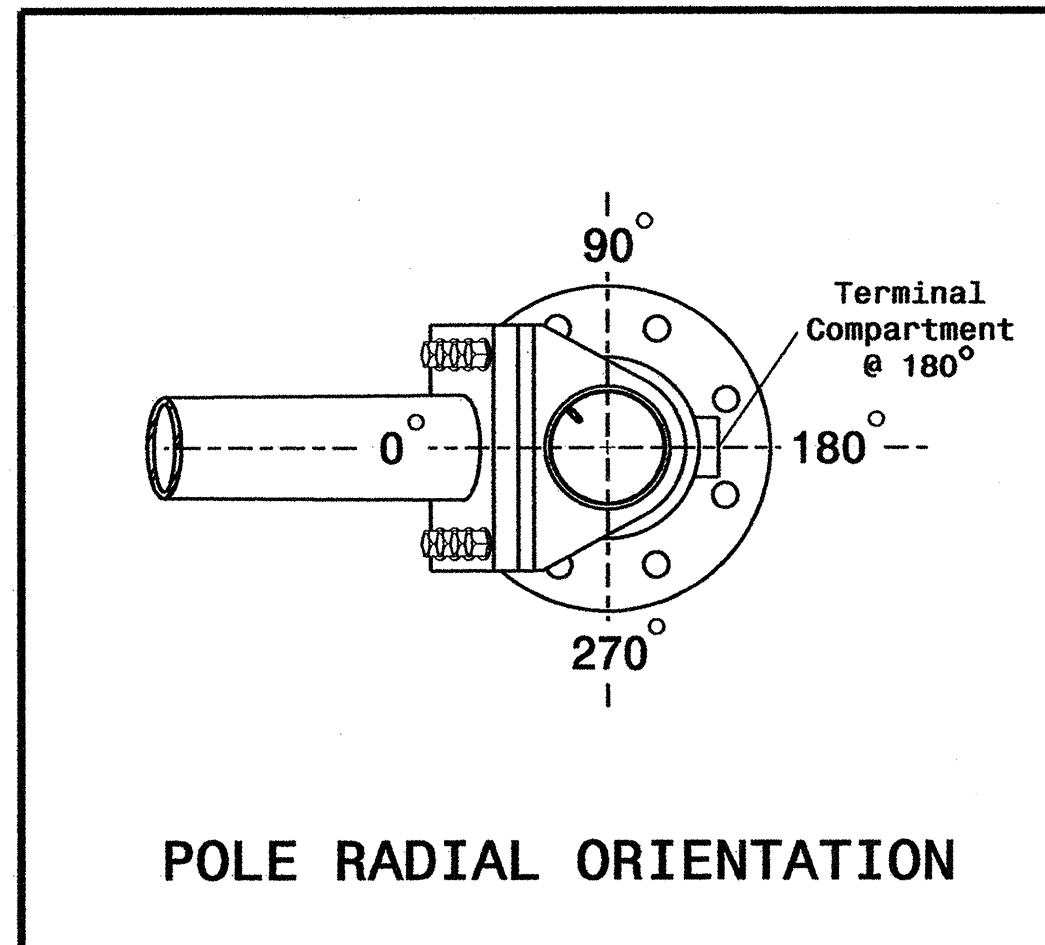
MAST ARM LOADING SCHEDULE

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"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

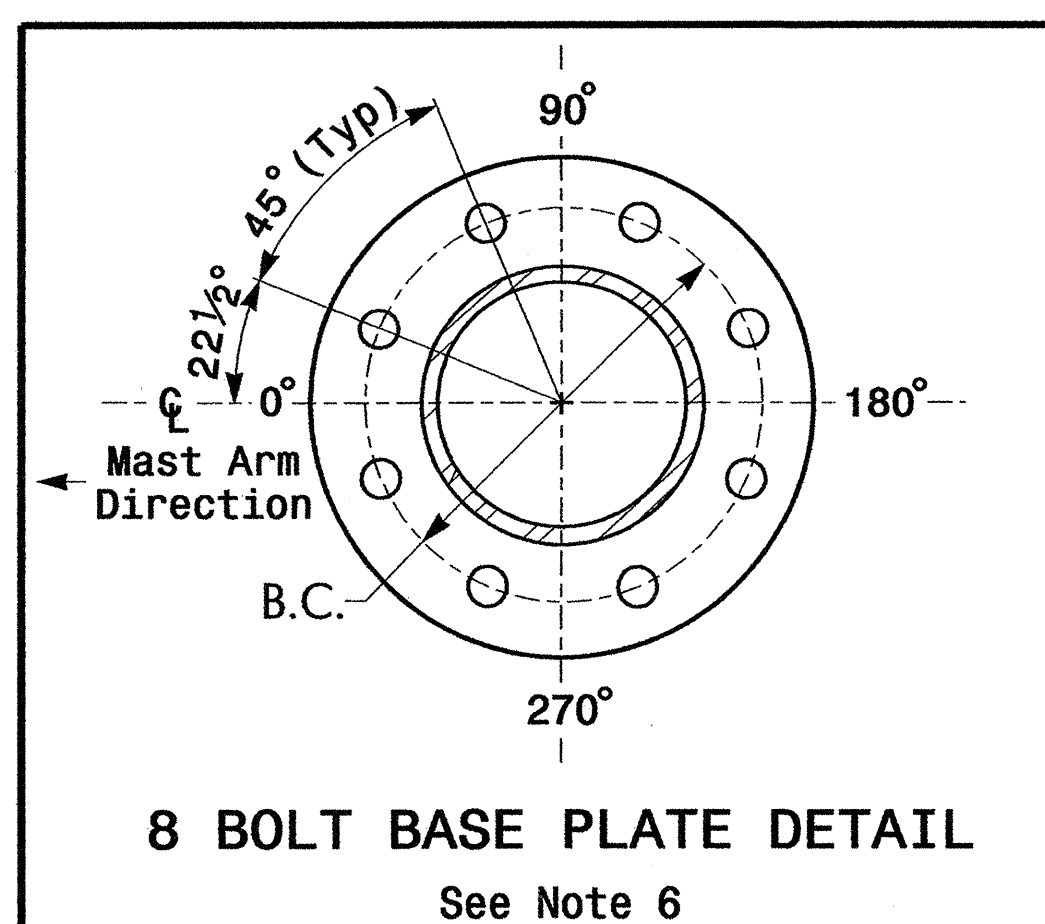
Design Loading for METAL POLE NO. 2



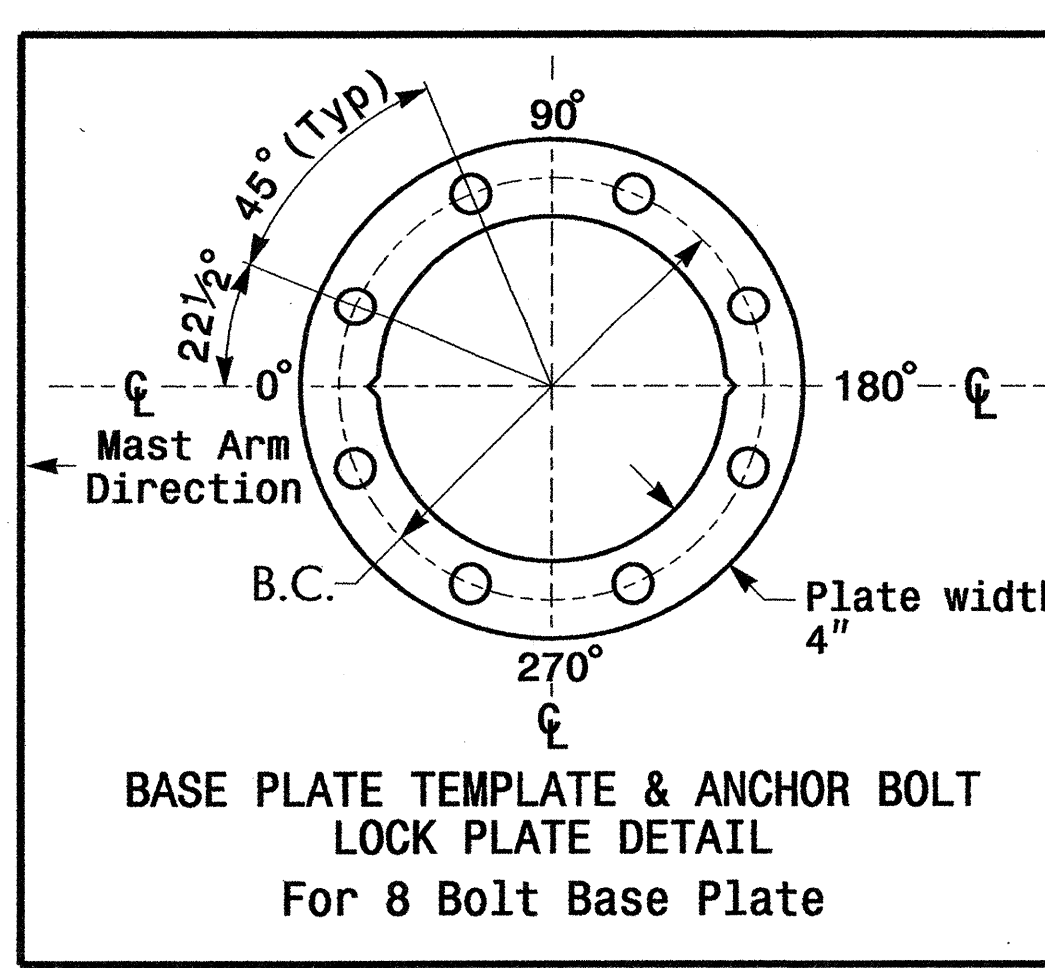
ELEVATION VIEW



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



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

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/itss/ws/mpoles/poles.html>

Design Requirements

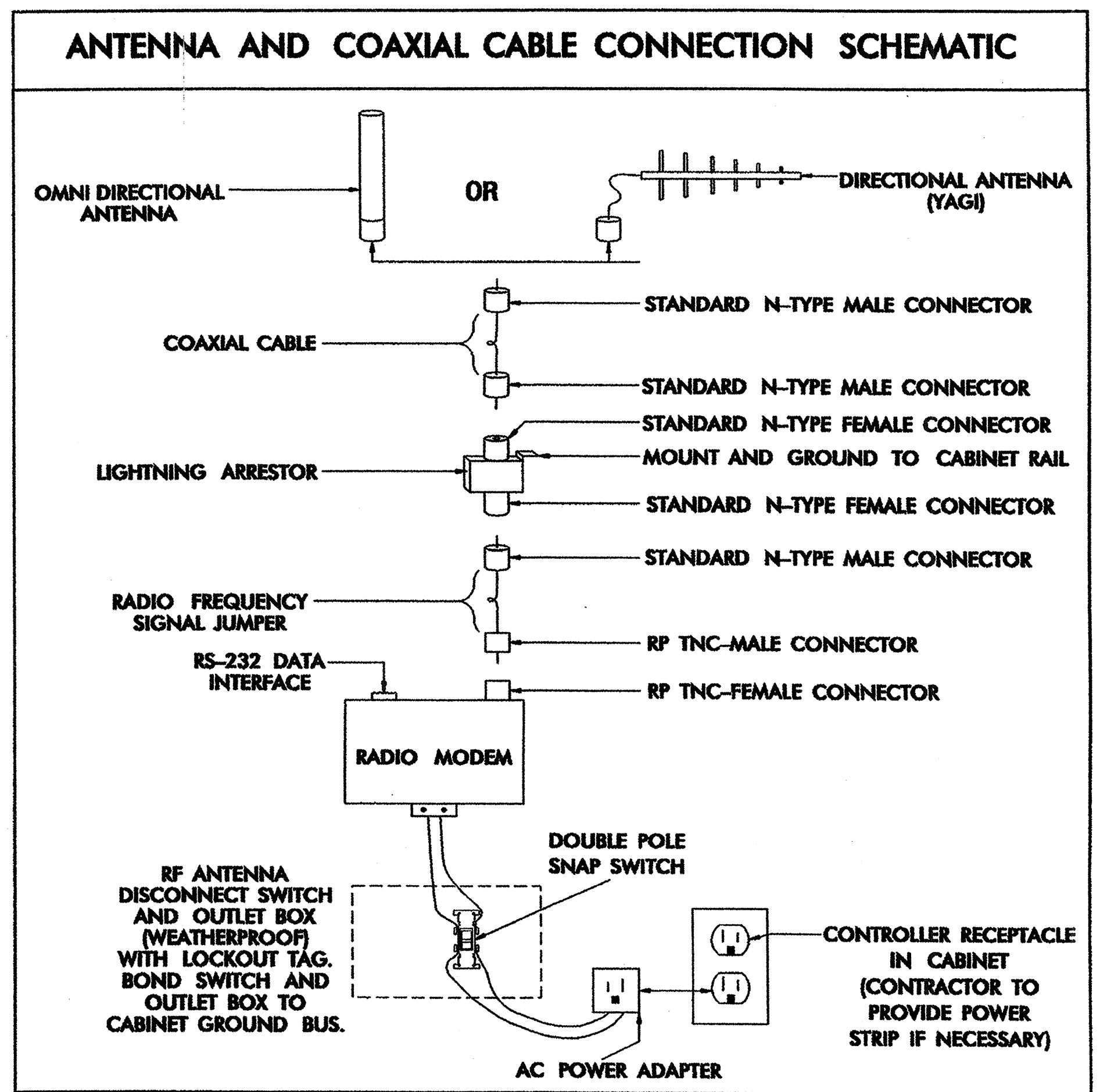
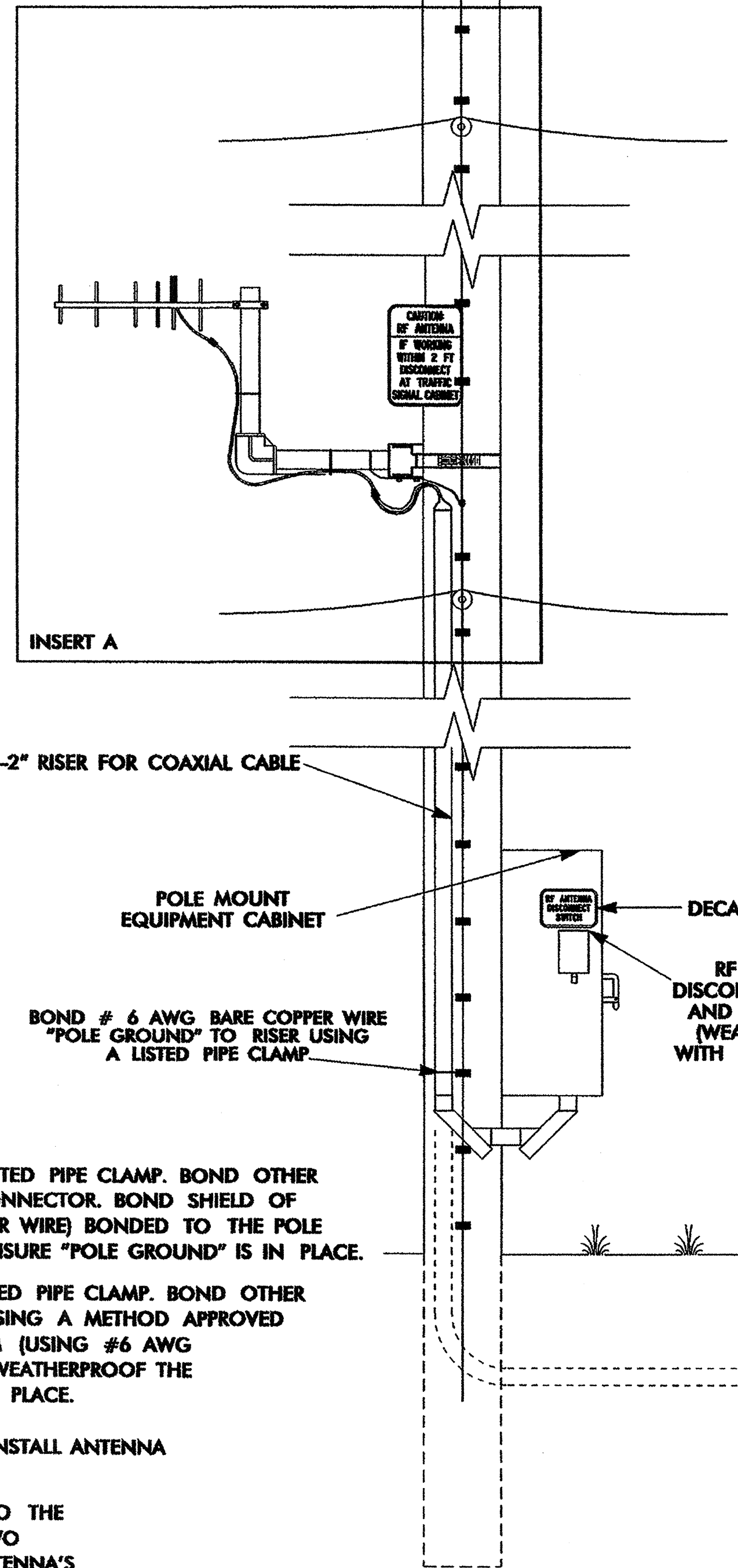
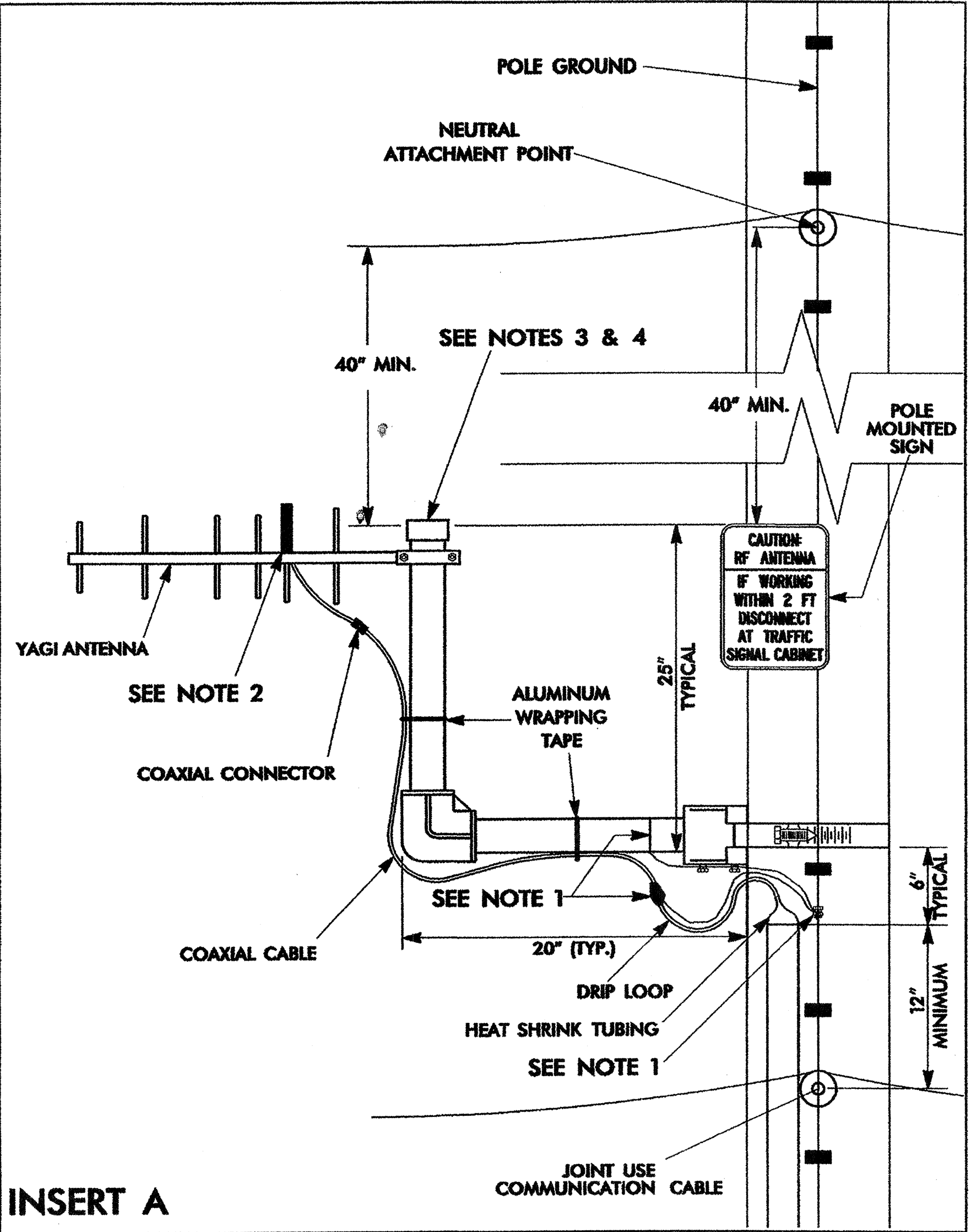
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- 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.
- The arm-to-pole attachment 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 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - 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.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- 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.

NCDOT Wind Zone 3 (110mph)

<p>222 N. McDowell St., Raleigh, NC 27603</p>	<p>US 301 (Wellons Street) at SR 1178 (Keen Road)</p>		<p>SEAL</p>
	<p>Division 4 Johnston County Four Oaks</p> <p>PLAN DATE: March 2007</p> <p>PREPARED BY: TS Thigpen</p>	<p>REVIEWED BY: DY Ishak</p> <p>REVIEWED BY:</p>	
<p>SCALE: 0 N/A</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>	<p>SIGNATURE DATE</p> <p>SIG. INVENTORY NO. 04-0902</p>

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 544 H:\IS & GIS\work\groups\1p project\lar-4071\enr\odoc\040902.sig.mp2.2007mod.dgn
 11/10/07

PROJECT REFERENCE NO. R-4071 SHEET NO. SIG 12



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	
	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	DATE: 9/12/05 SIGNATURE: <i>A. Creech</i> DATE: 9/12/05

DECAL

POLE MOUNTED SIGN

SIGN NUMBER: SP05224 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

QUANTITY:

SYMBOL	X	Y	WID	HT

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
 LENGTH:

NOTE: THIS SIGN SHALL BE PRODUCED AS A DECAL

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:

SIGN NUMBER: SP05223 BACKG COLOR: Yellow
 TYPE: D COPY COLOR: Black

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

QUANTITY:

SYMBOL	X	Y	WID	HT
BAR	0.2	8.2	8.6	1.0

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
 LENGTH:

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	Letter Spacing Data											
C1	0.9	0.9	0.5	1	0.8	0.7	0.7	0.7	0.8	0.7	0.6	0.9
C1	1.2	0.8	0.3	0.7	0.7	0.8	0.8	0.7	0.7	0.5	1.2	
C1	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	Letter Spacing Data												
C1	2.3	0.6	0.7	0.6	0.6	0.3	0.7	0.7	0.1	2.3			
C1	1.1	0.7	0.5	1	0.7	0.6	0.6	0.6	0.7	0.6	0.6	1.1	
C1	1.4	0.3	0.5	1	0.8	0.7	0.7	0.6	0.3	0.7	0.5	1.4	
C1	1.1	0.9	0.2	0.6	0.7	0.3	0.5	1	0.5	1	0.6	0.5	1.1
C1	1.5	0.7	0.3	0.6	0.6	0.7	0.7	0.7	0.8	0.6	0.5	1.5	
C1	1.4	0.7	0.5	1	0.6	0.6	0.7	0.6	0.6	0.3	0.6	1.4	
C1	0.6	0.7	0.3	0.7	0.8	0.7	0.5	5					
C1	4.5	0.6	0.7	0.7	0.3	0.7	0.6	0.5	0.5				

Spacing Factor is 1 unless specified otherwise

Prepared in the Office of:

122 N. McDowell St., Raleigh, NC 27603

SCALE: 0

WIRELESS RADIO ANTENNA TYPICAL DETAILS

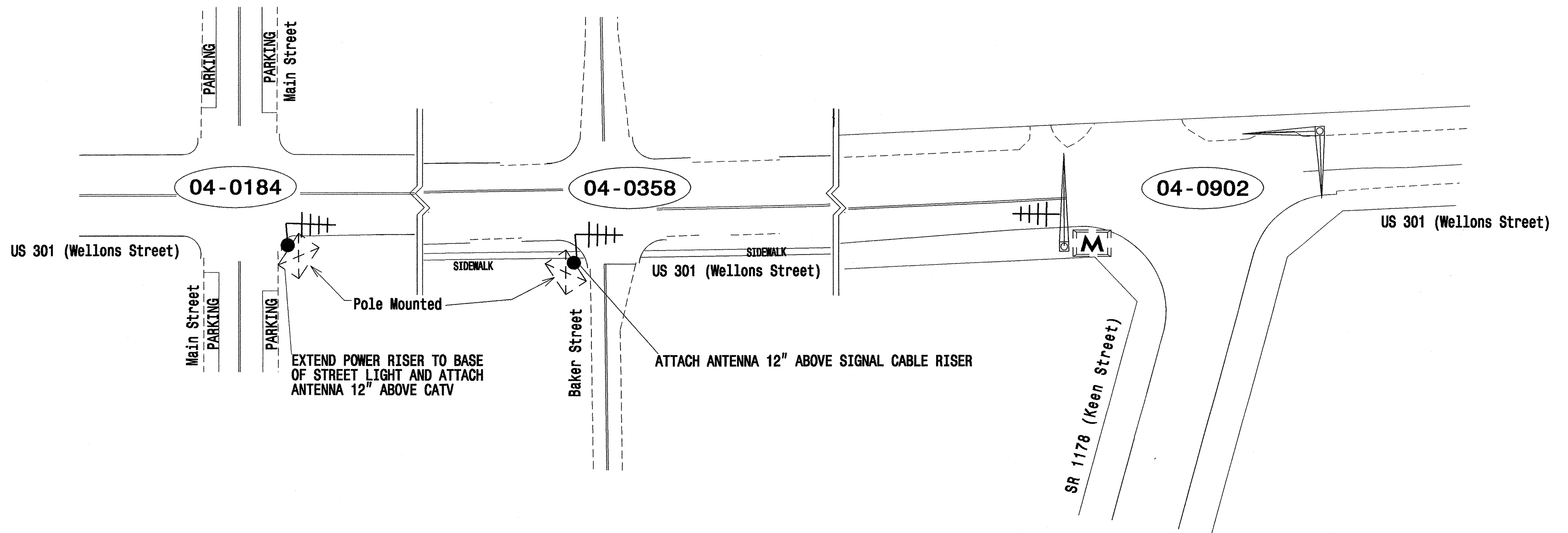
PLAN DATE: JULY 2005 REVIEWED BY: I. N. AVERY
 PREPARED BY: A. CREECH REVIEWED BY: A. T. FAULKNER

REVISIONS: INIT. DATE

Signature: Gregory A. Fuller Date: 9/12/05

LEGEND

- +++ WIRELESS YAGI ANTENNA (DOUBLE) FOR REPEATOR OPERATION
- +++ WIRELESS YAGI ANTENNA (SINGLE)
- (()) WIRELESS OMNI ANTENNA
- [X] EXISTING CONTROLLER AND CABINET
- [M] 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:

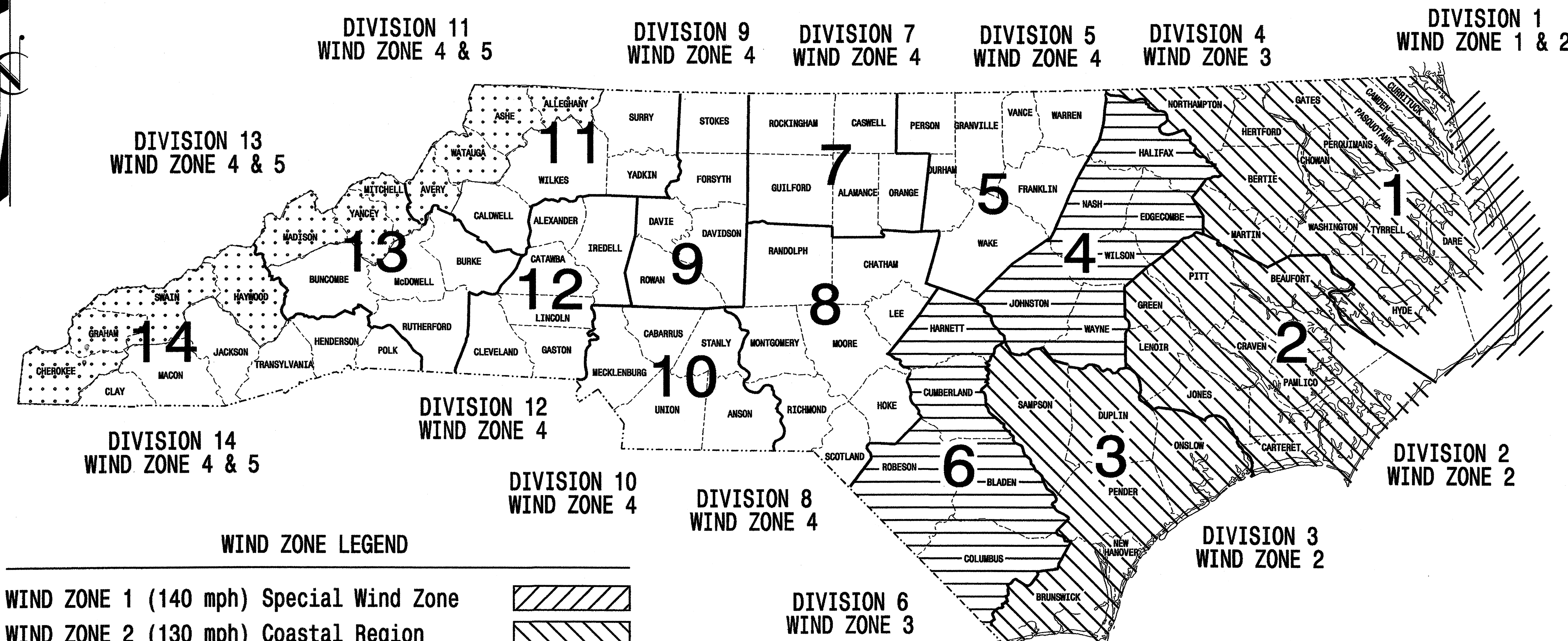
1. INSTALL COAXIAL CABLE
 - A. ON WOOD POLES, INSTALL A 2" RISER WITH HEAT SHRINK TUBING TO ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - B. ON METAL POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL HOLE WITH GROMMET THROUGH BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL 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 NESCA.
5. INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET.
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS".

<p>122 N. McDowell St., Raleigh, NC 27603</p>	WIRELESS COMMUNICATIONS PLAN		
	US 301 (WELLONS STREET)		
Prepared in the Office of: Statewide and Local Signal Systems Department of Transportation Traffic Management Systems	DIVISION 04 JOHNSTON COUNTY FOUR OAKS PLAN DATE: APRIL 2007 REVIEWED BY: I. N. AVERY PREPARED BY: P. C. LOUDER REVIEWED BY: G. G. MURR, JR., PE	REVISIONS INIT. DATE	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER G. G. MURR, JR. 14543 4-18-07
	SCALE 		CADD File Name:

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	R-4071	Sig. 15
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/tmsu/ws/default.htm>

Prepared in the Offices of:

Traffic Engineering and Safety Systems Branch
DEPARTMENT OF TRANSPORTATION
Signals and Geometrics Section

122 N. McDowell St., Raleigh, NC 27603

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

INDEX OF PLANS

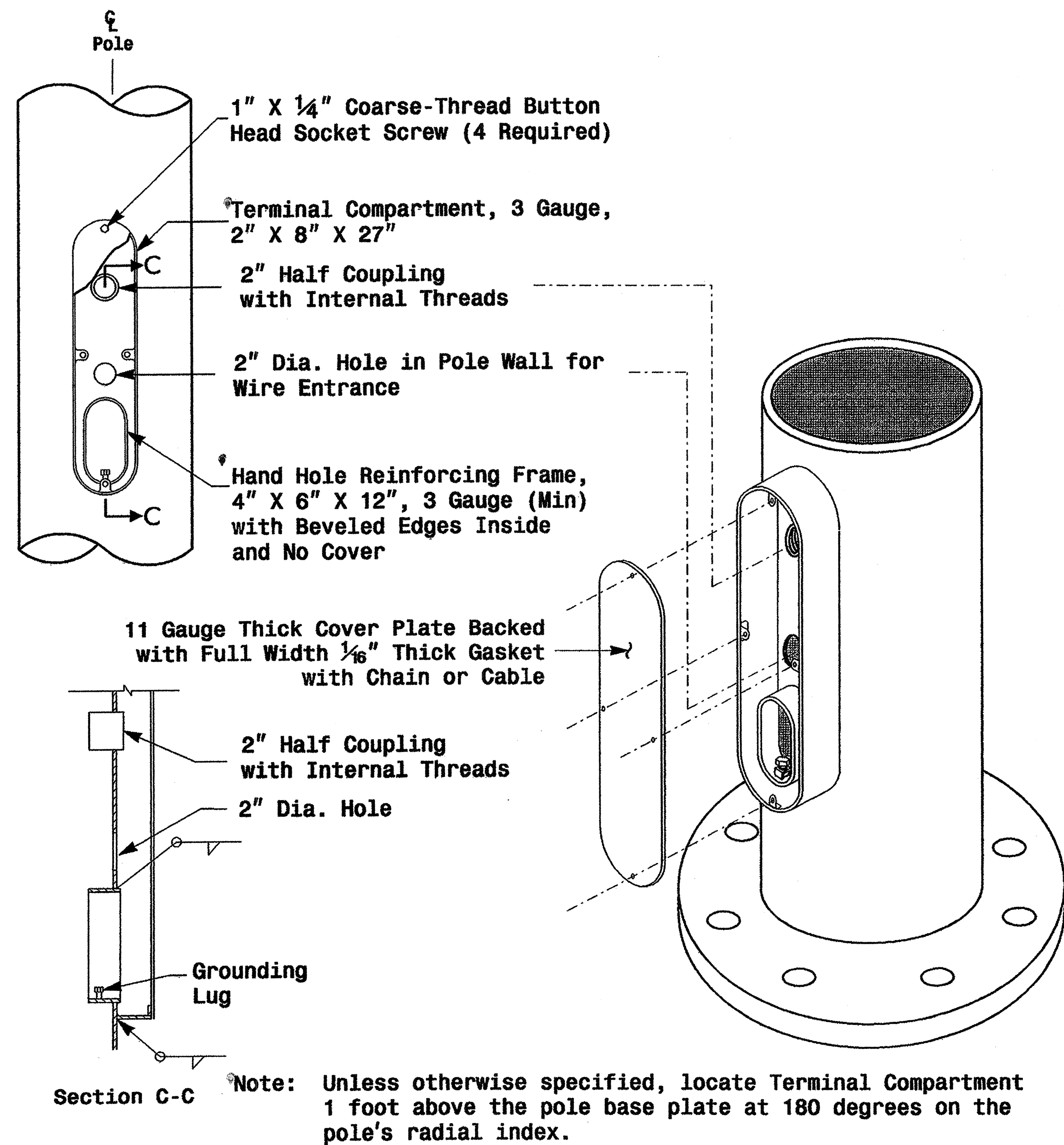
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

NCDOT CONTACTS:
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

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

SEAL

Debesh C. Sarkar
 SIGNATURE 9.2.2005
 DATE



Terminal Compartment Detail

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

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

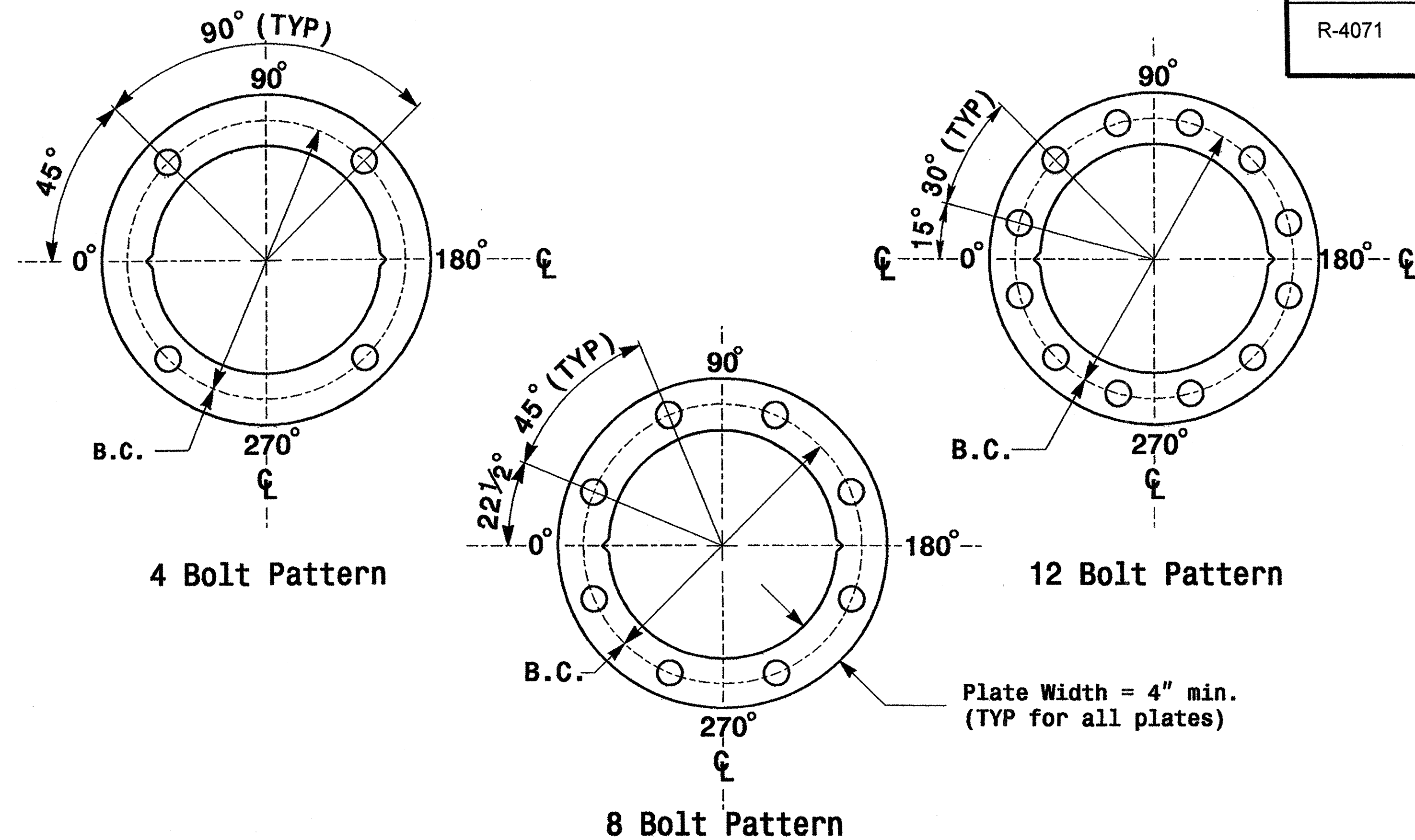
Notes:

- 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.

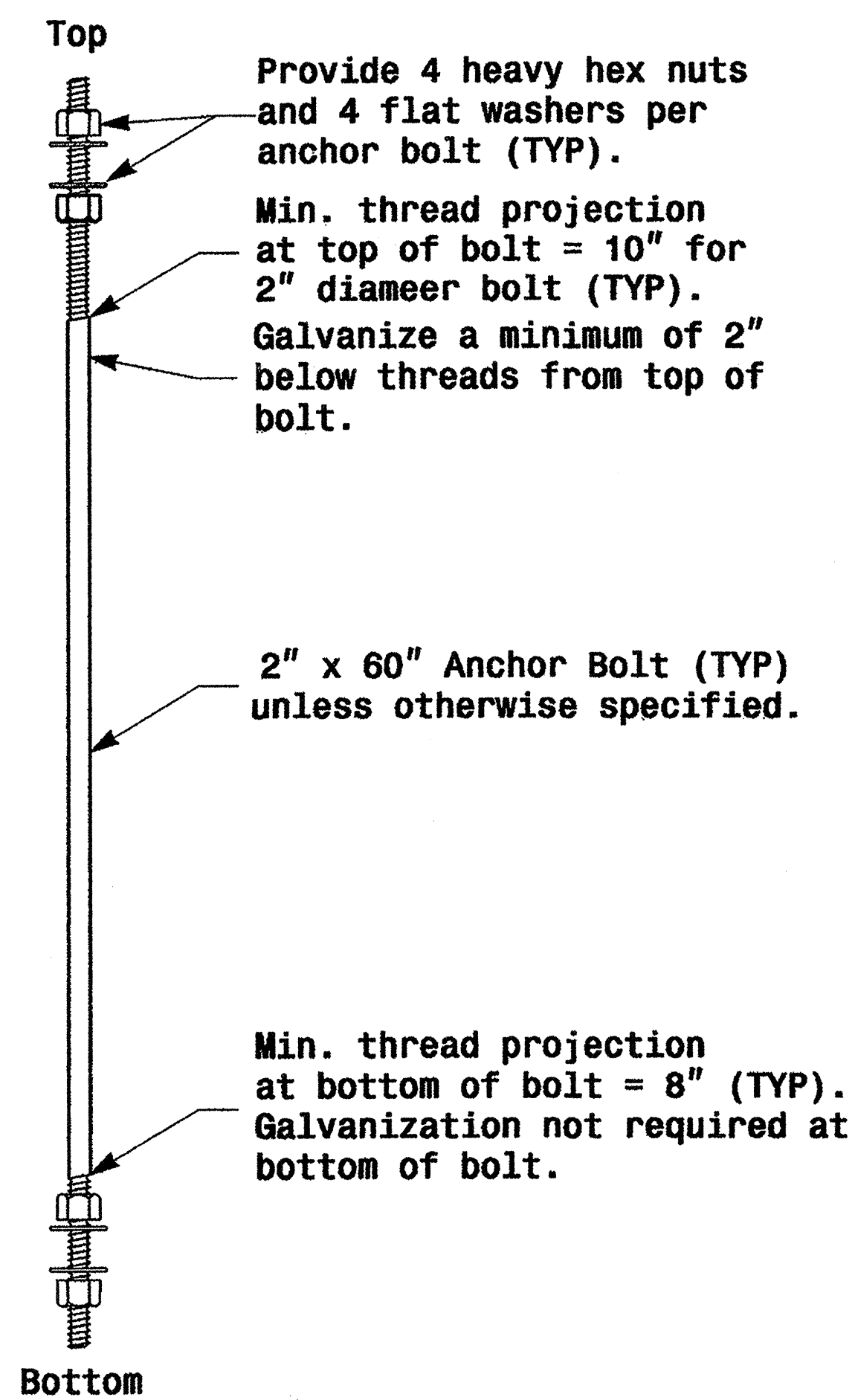
Identification Tag Details

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)

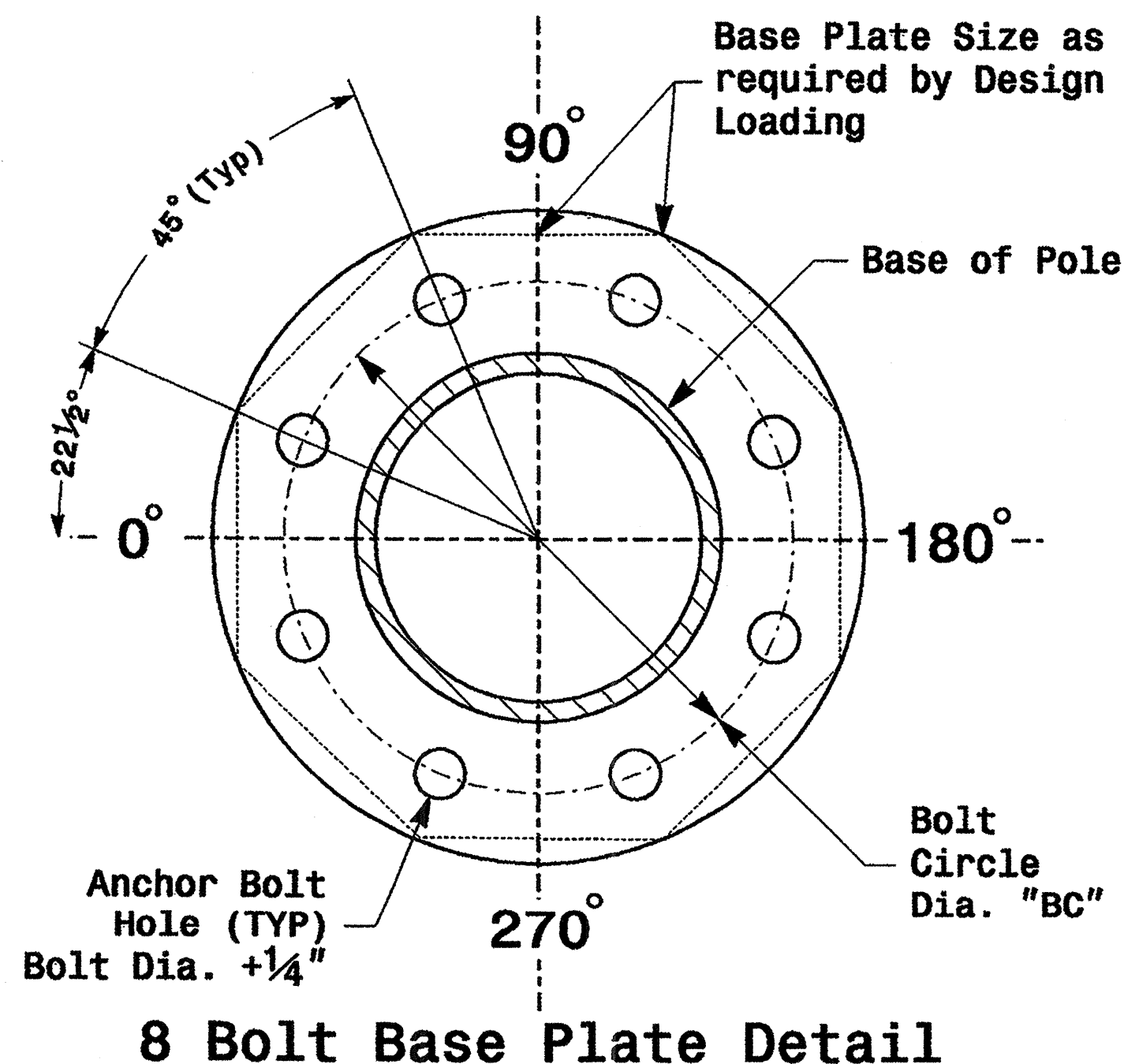


Base Plate Template and Anchor Bolt Lock Plate Details

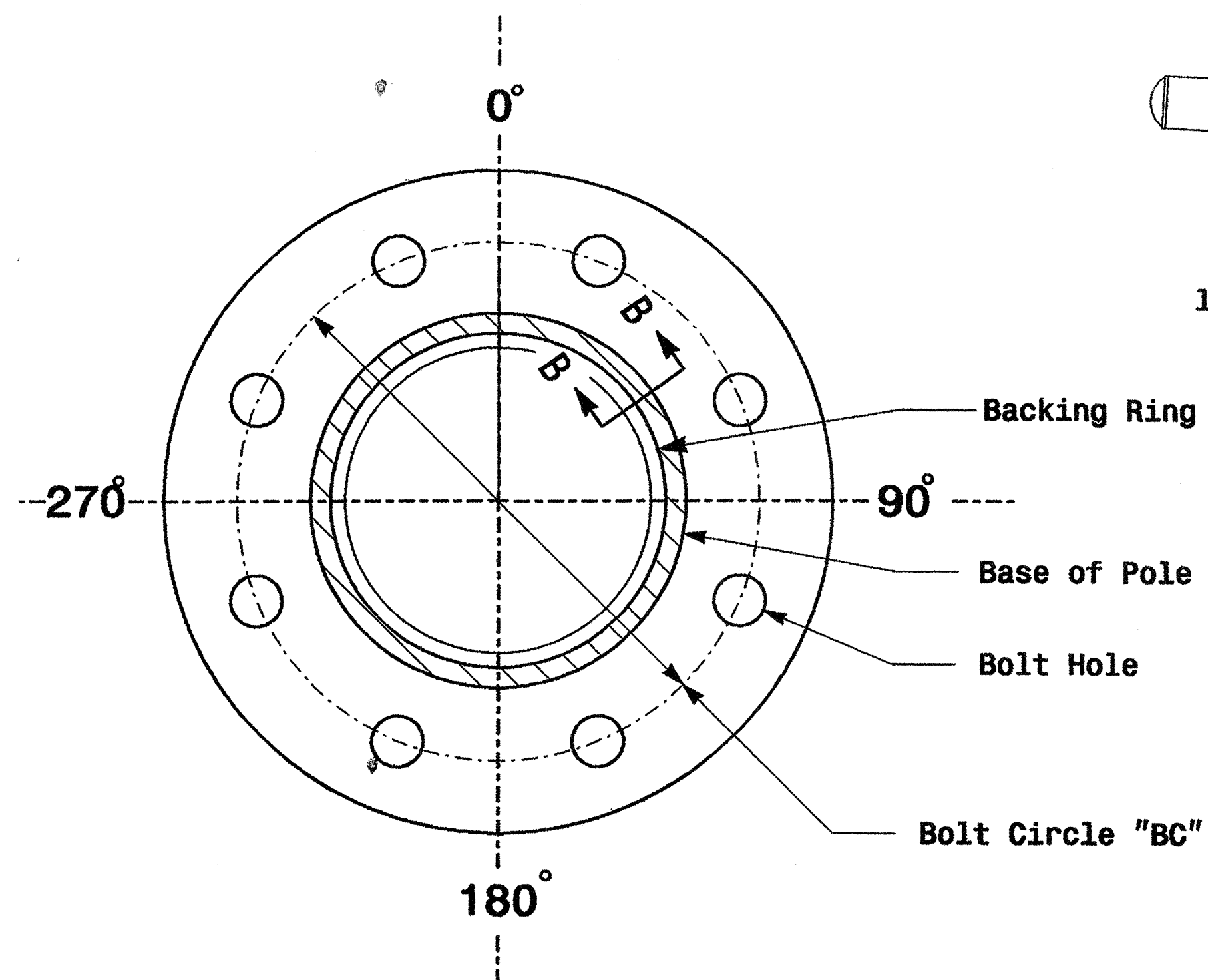


Anchor Bolt Detail

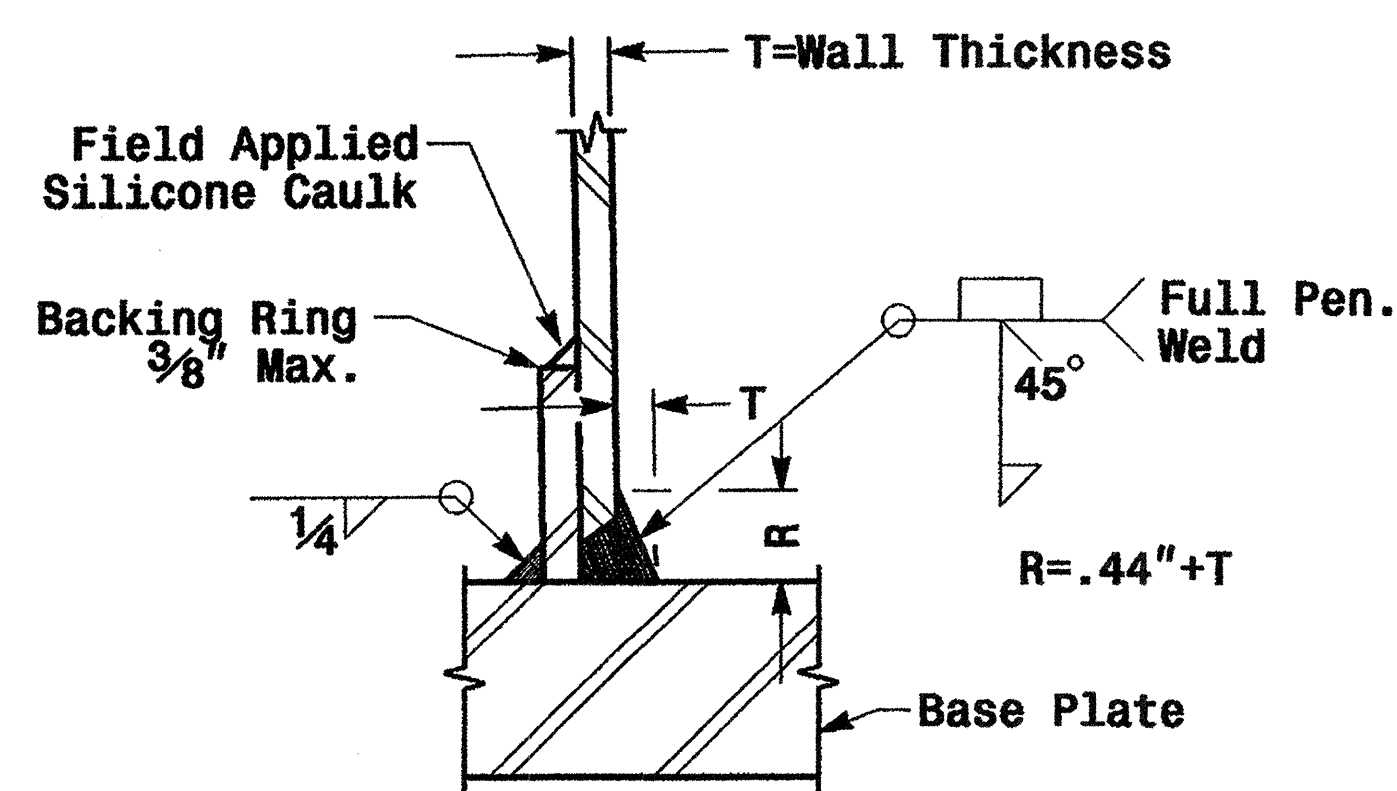
Note: See Strain Pole drawing M3 and Mast arm drawing M4 for base plate weld details.



	Typical Fabrication Details Common To All Metal Poles		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander REVISIONS: _____	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito INIT. DATE: _____	
SCALE: NA NONE	PROJECT REFERENCE NO. R-4071 SHEET NO. Sig. 16 M 2		SIG. INVENTORY NO.

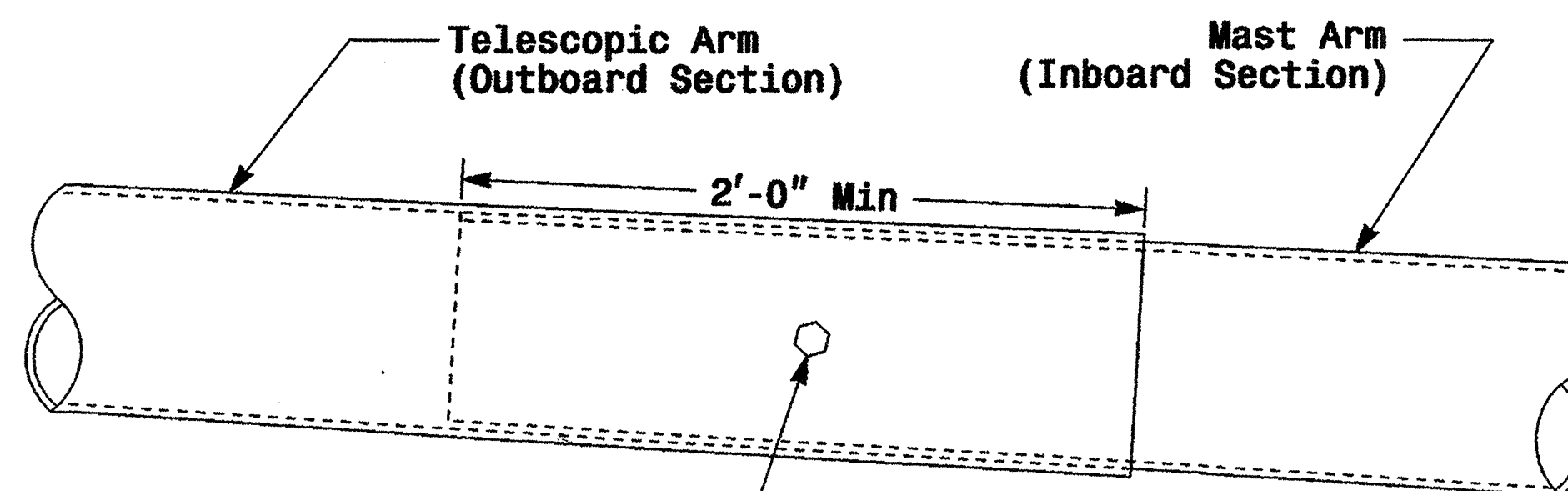
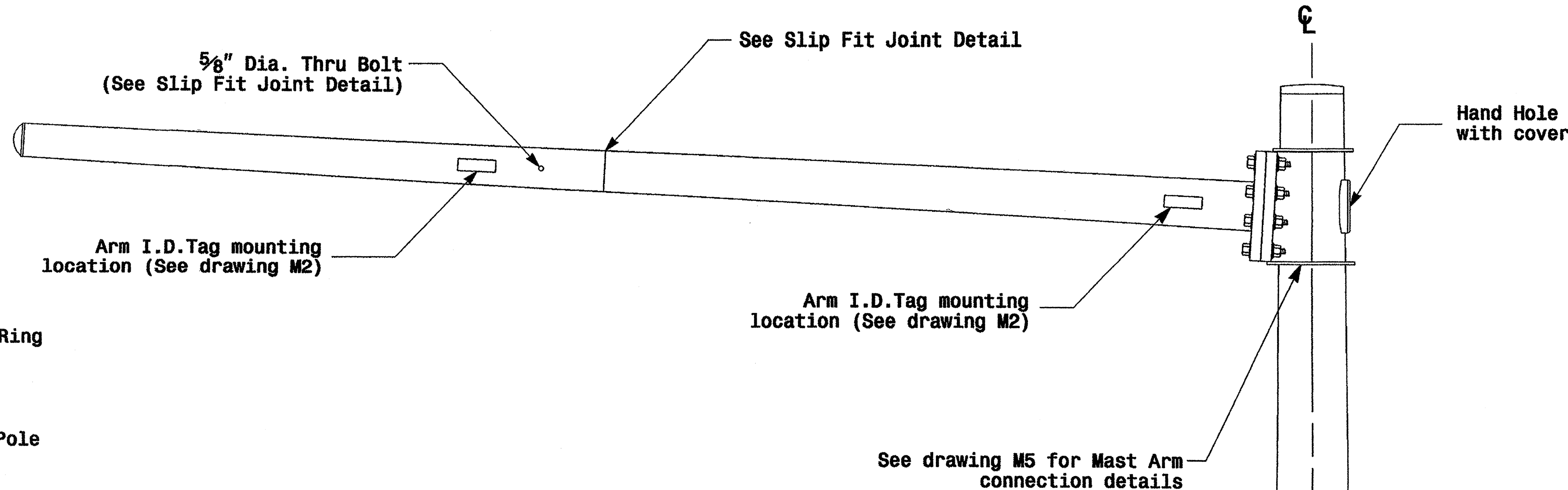


Section A-A
(See drawing M 2)
Pole Base Plate



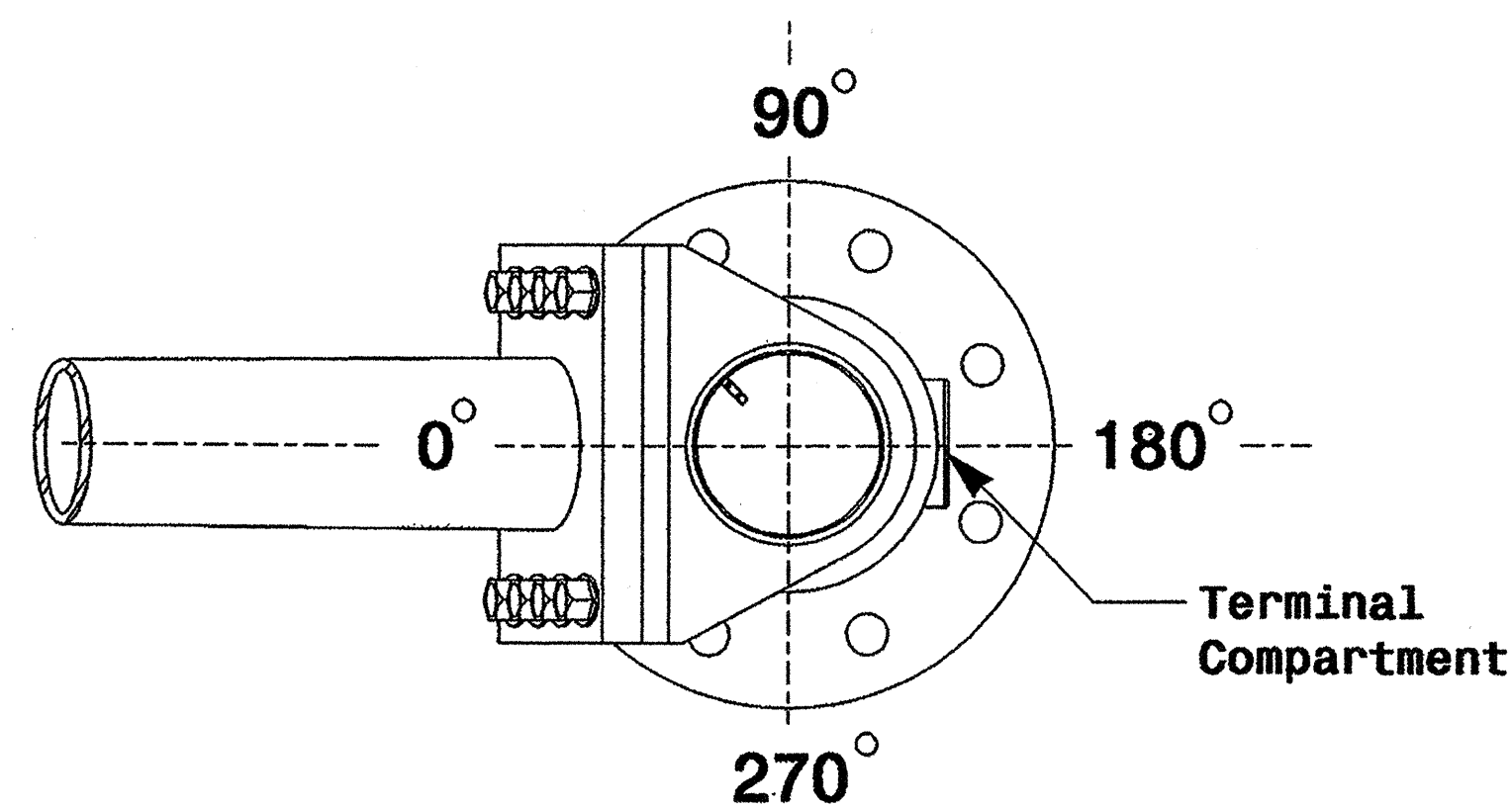
Section B-B
(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail

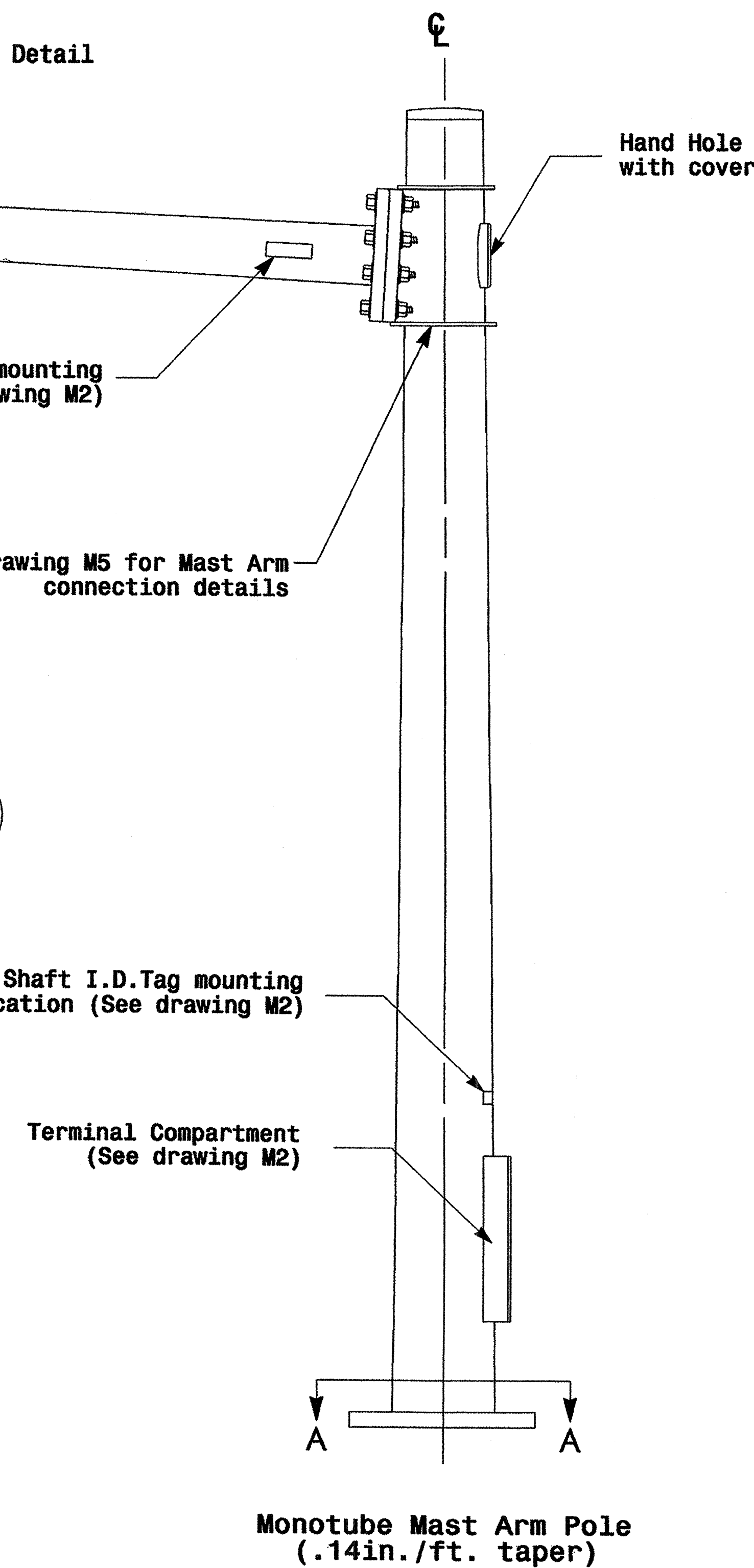


3/4" Factory Drilled Hole in Outboard Tube.
Field Drill Inboard Tube.
5/8" Galvanized Thru Stud with (2) Hex. Locknuts Ea.

Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



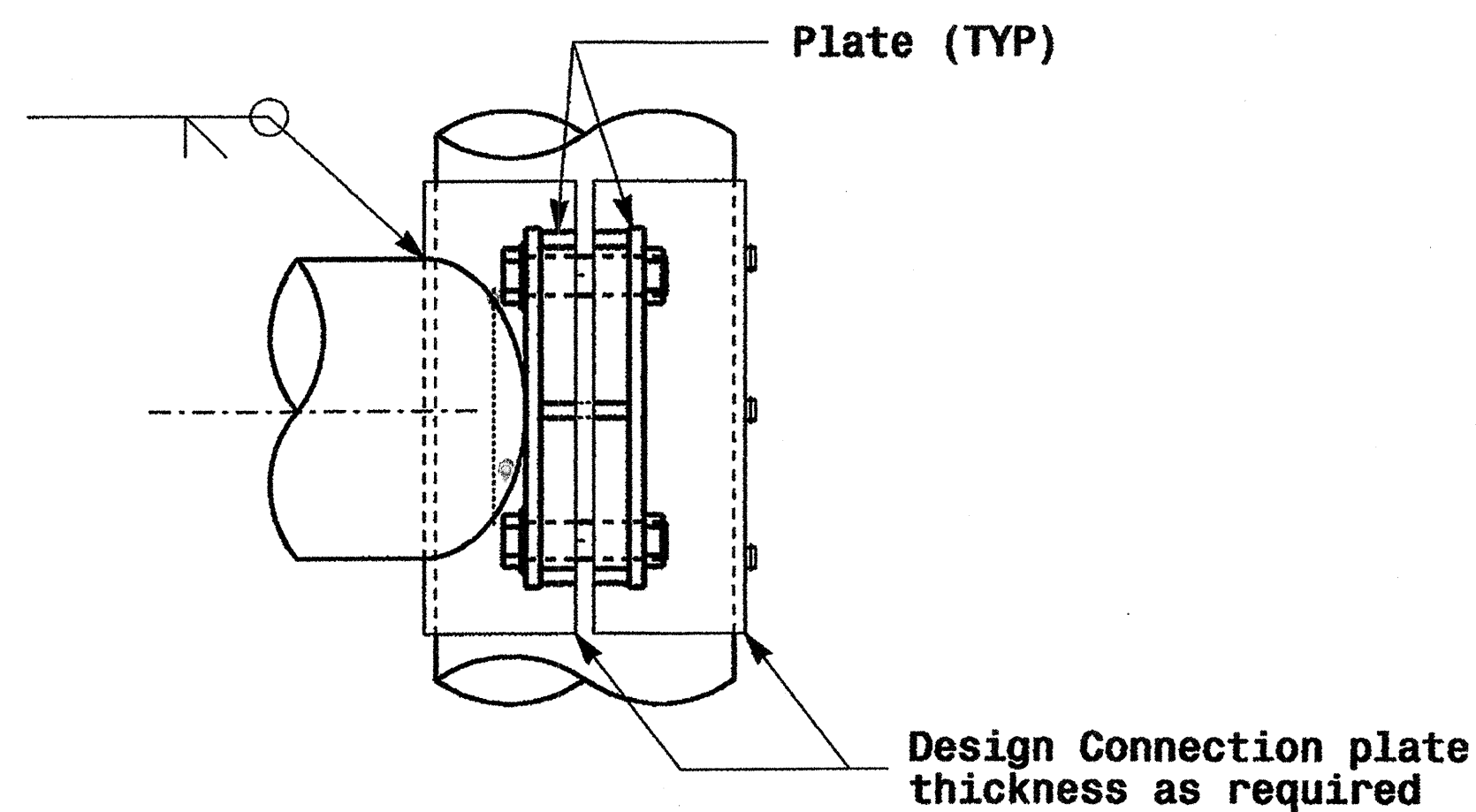
Monotube Mast Arm Pole
(.14in./ft. taper)

Fabrication Details - Mast Arm Poles

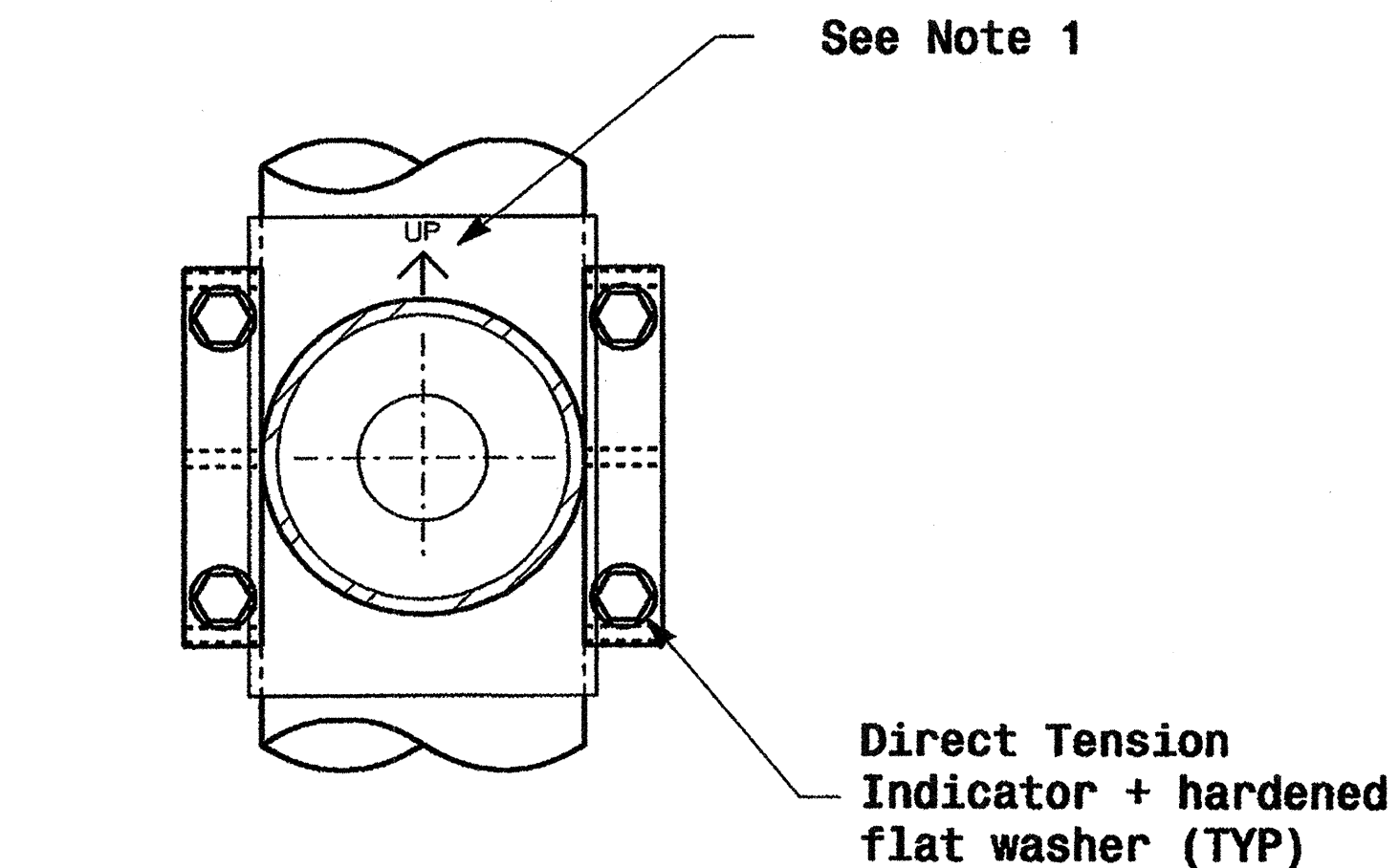
01-SEP-2005 14:08 ac:alexander:un11:hw:kg:cupae2004 metal pole strander:ds2004 m4.dgn

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

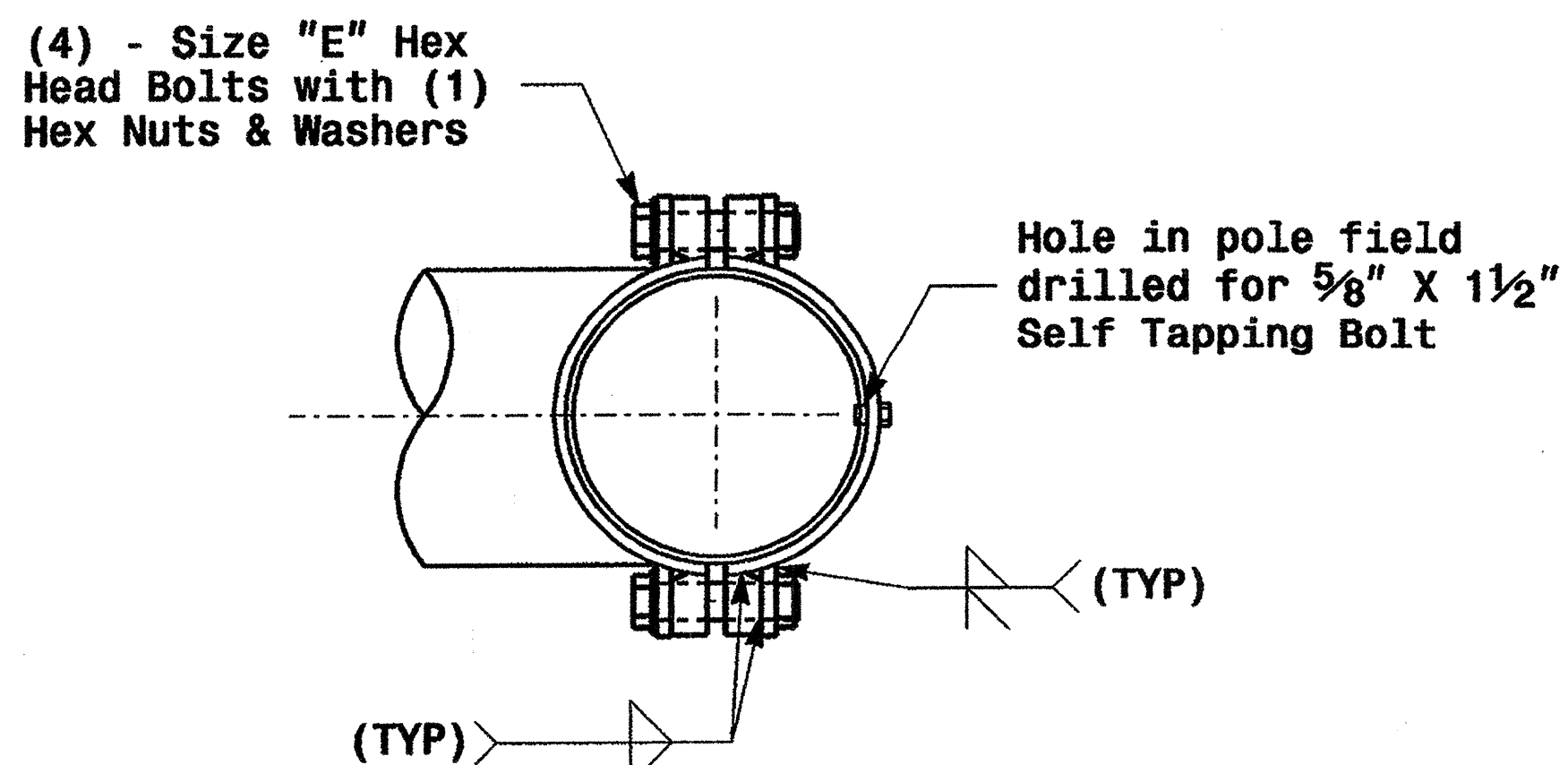
Adjustable Clamp Type Bolted Mast Arm Connection



Side Elevation View

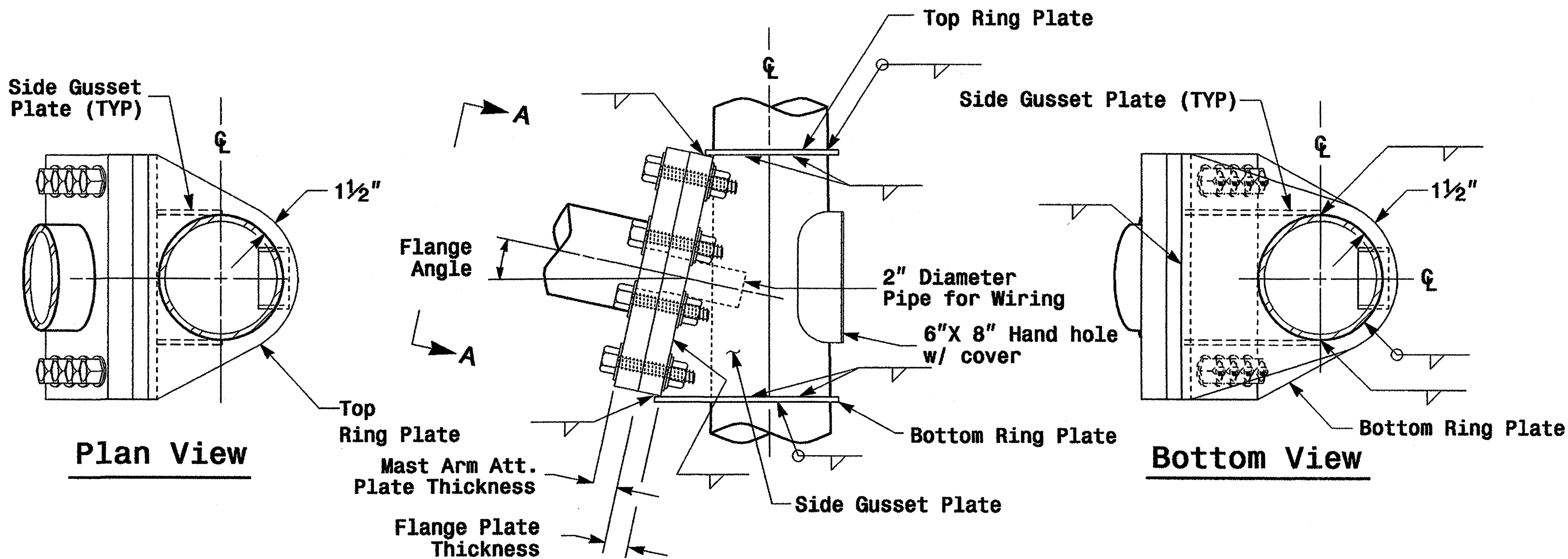


Front Elevation View



Plan View

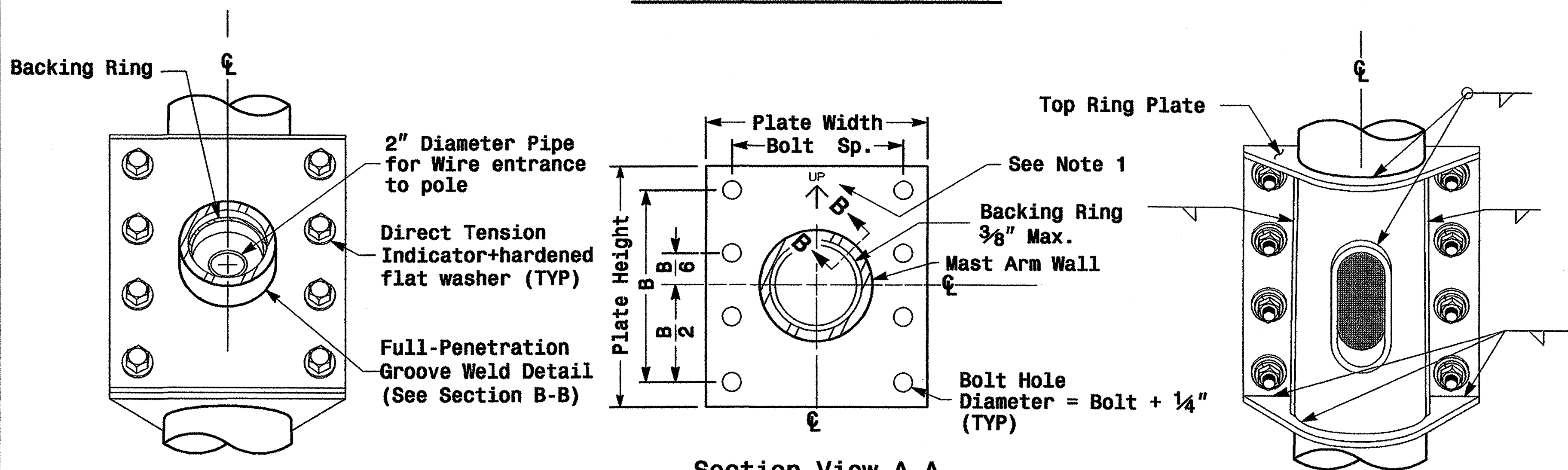
Welded Ring Stiffened Mast Arm Connection



Plan View

Side Elevation View

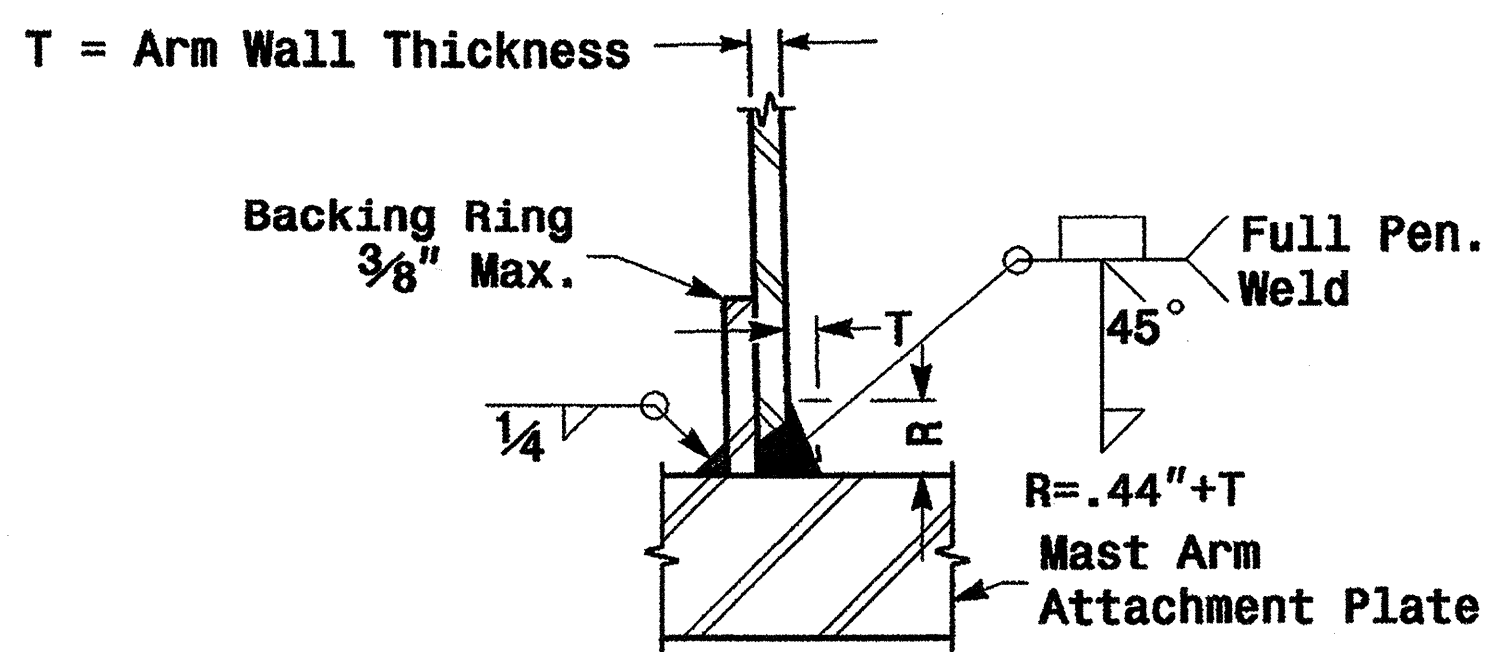
Bottom View



Front Elevation View

Section View A-A Mast Arm Attachment Plate

Back Elevation View



Section B-B Full-Penetration Groove Weld Detail

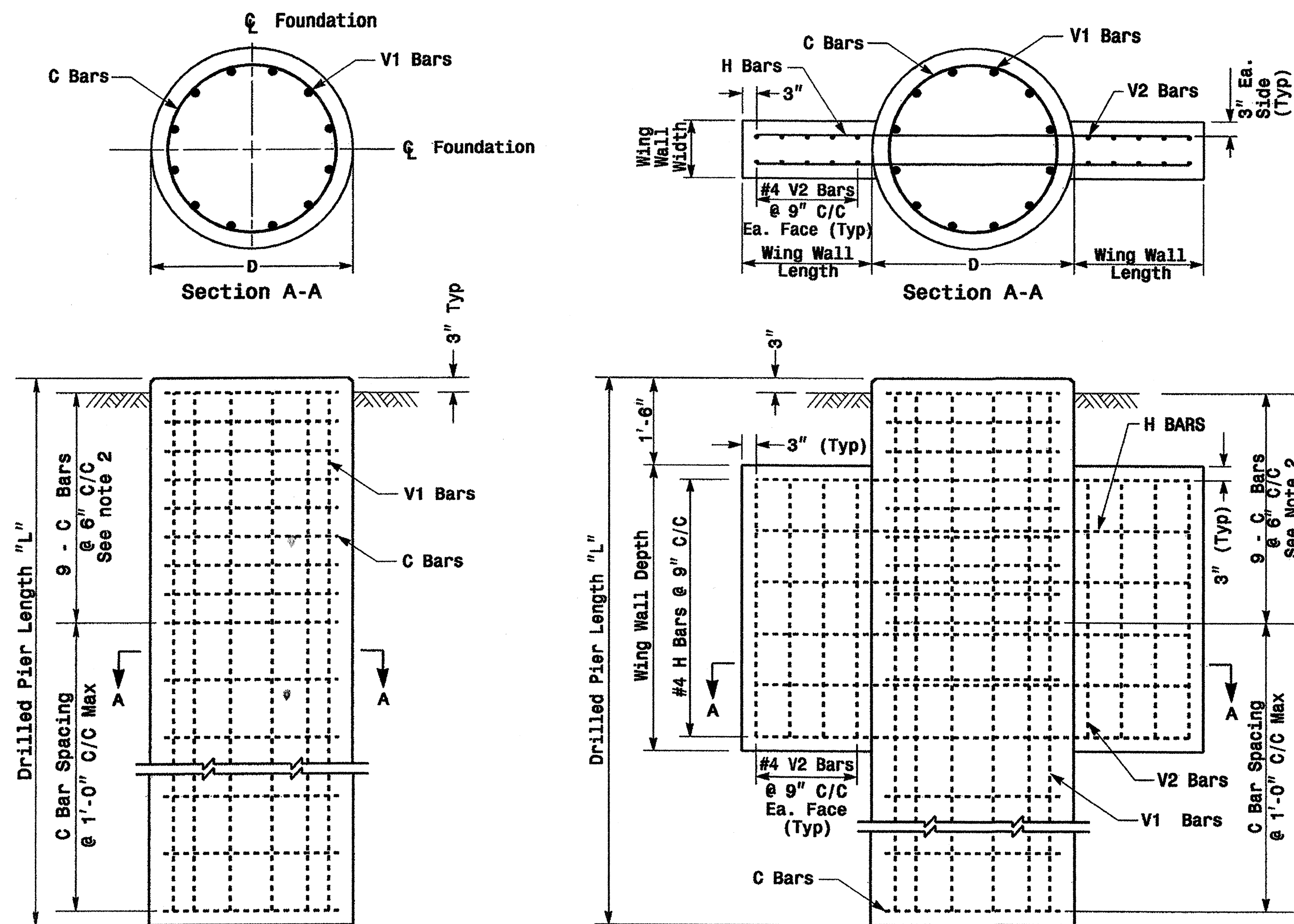
- Notes:
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
 2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
 3. Designer is responsible for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

01-SEP-2005 14:11 v:\pools\es-unif\workgroups\2004_mast\pole_standards\2004_m5.dgn pol_alexander

	Fabrication Details For Mast Arm Connection To Pole		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER JOSEPH C. SARKAR 026094 DATE: 9.2.2005
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	
222 N. McDowell St., Raleigh, NC 27603 SCALE: NONE		SIG. INVENTORY NO.	

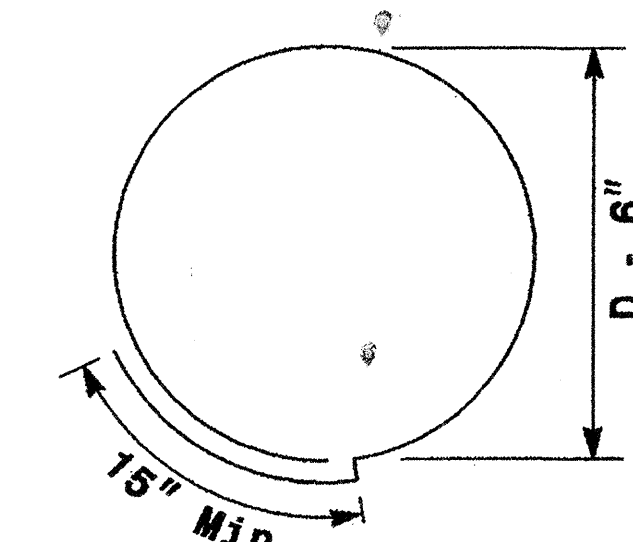
Fabrication Details - Mast Arm Poles

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"
TYPE 2	42"	C	*	#4	CIR.	10'-9"
		V1	9	#8	STR.	**
		V2	16	#4	STR.	4'-6"
TYPE 2	48"	H	12	#4	STR.	9'-0"
		C	*	#4	CIR.	10'-9"
		V1	12	#8	STR.	**
TYPE 2	48"	V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-6"
		C	*	#4	CIR.	12'-6"

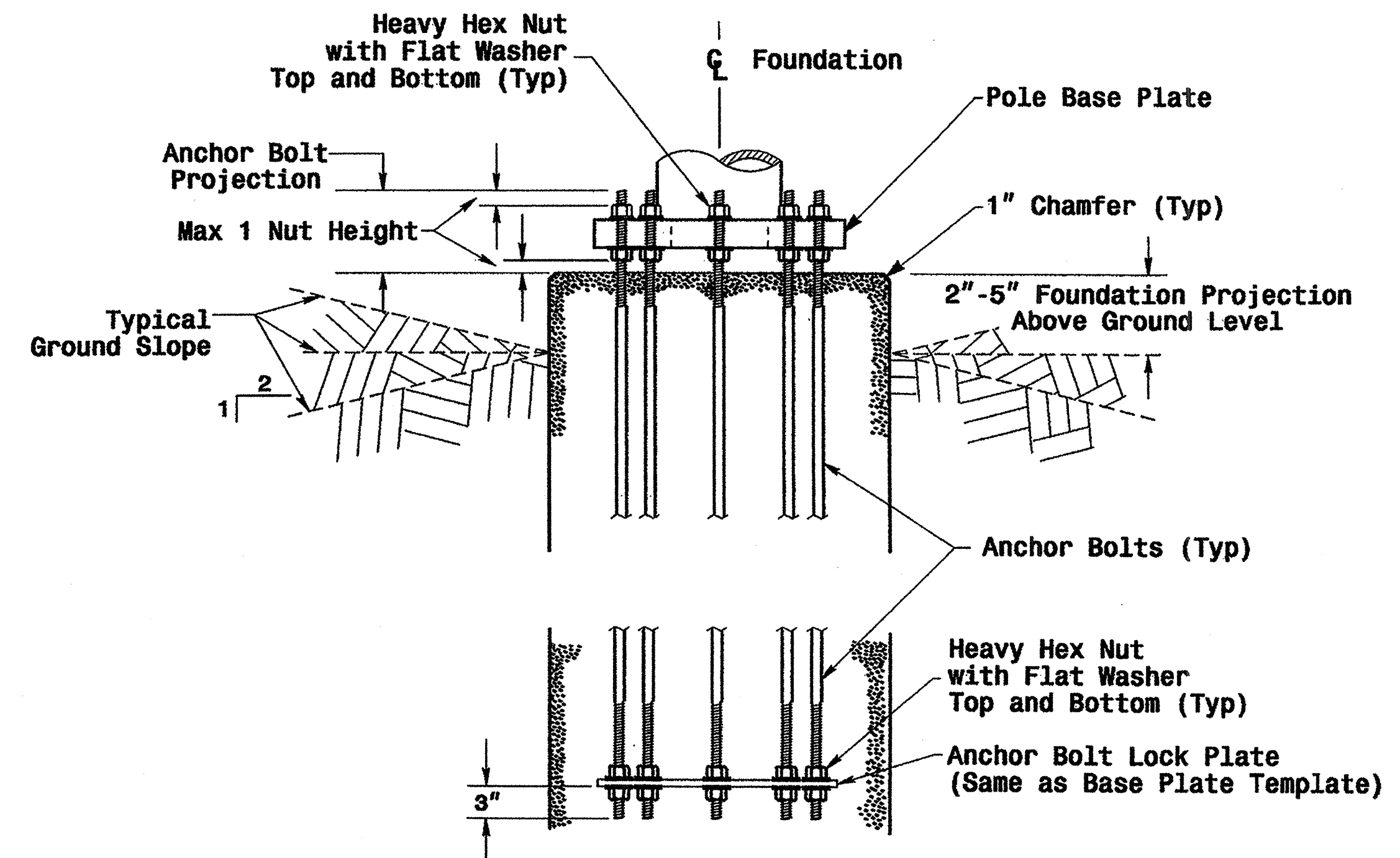
* See Note No. 1
** See Note No. 3

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

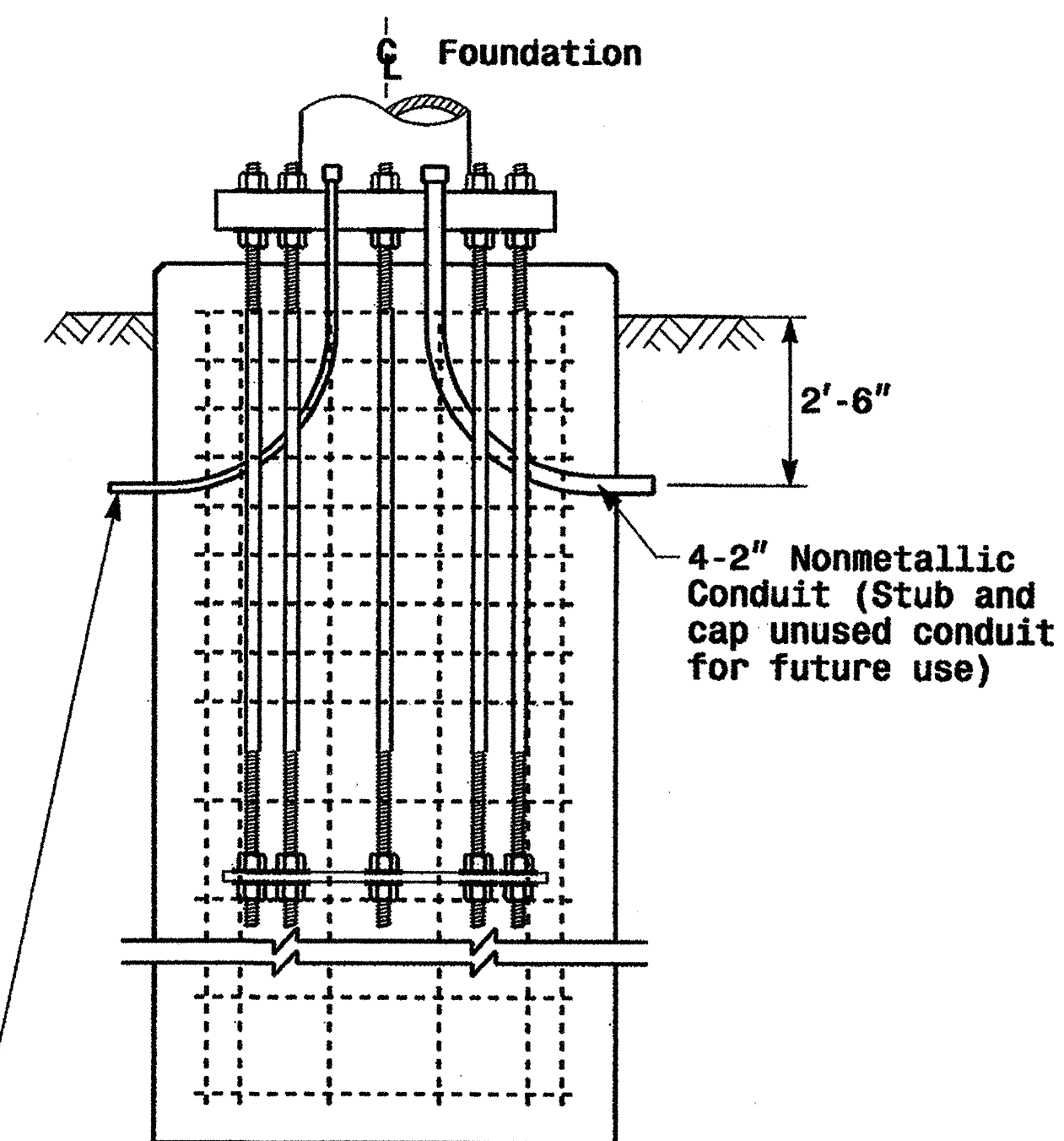
See Note No. 4

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. SHEET NO.

R-4071

Sig.19
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