

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

LEE COUNTY

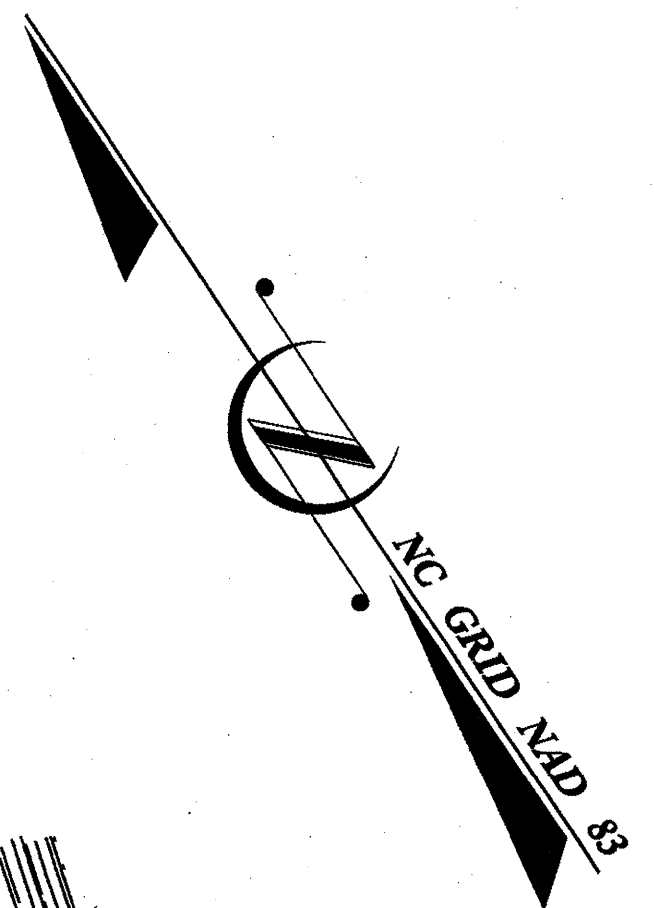
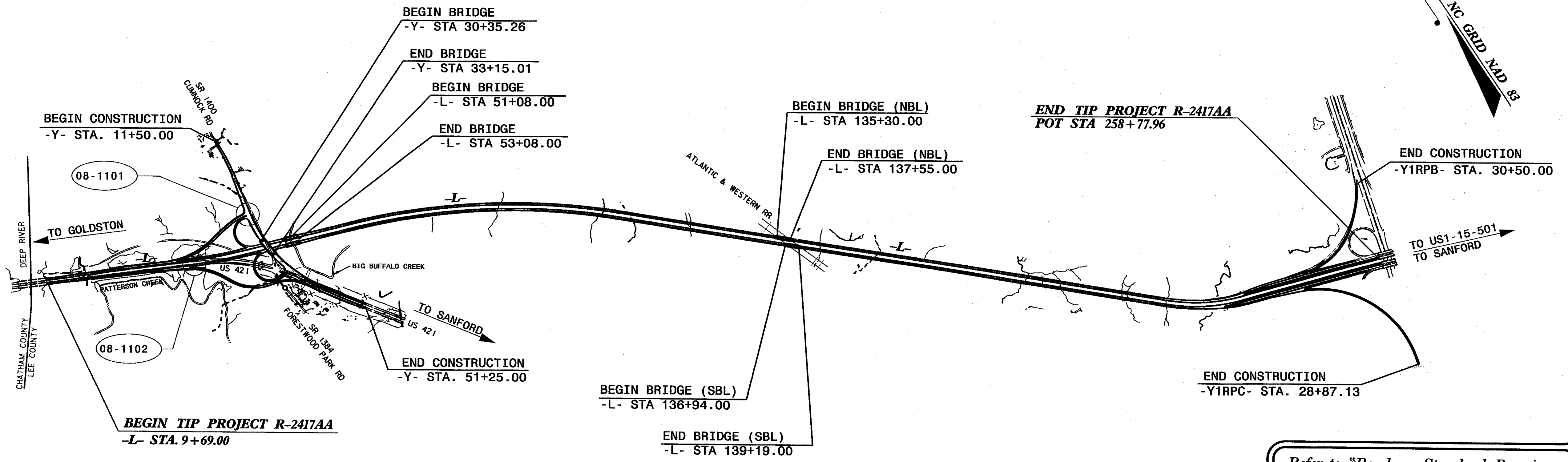
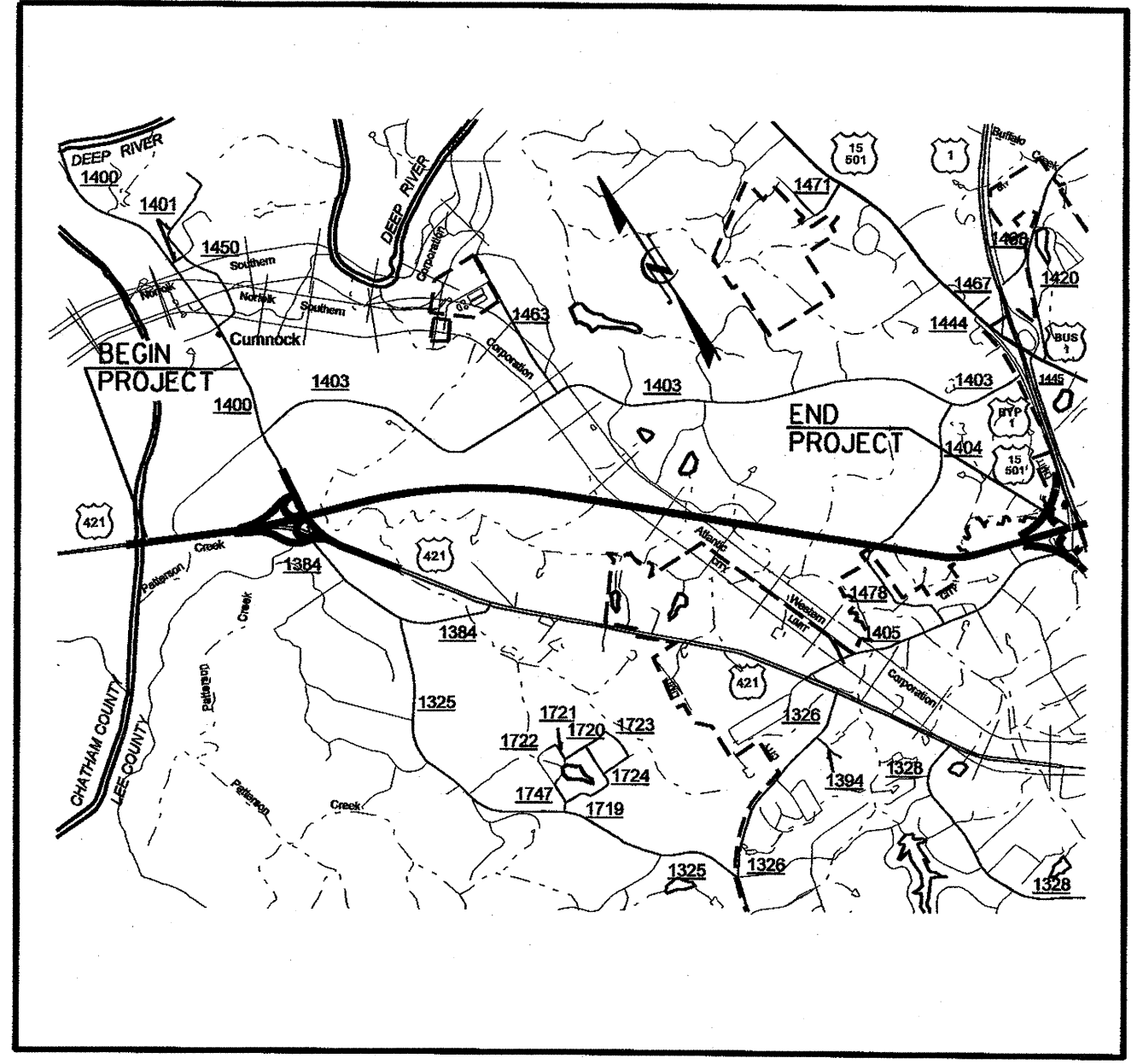
**LOCATION: US 421 (Sanford Bypass) From West Of
SR 1400 (Cumnock Road) To West Of US 1-15-501**

TYPE OF WORK: TRAFFIC SIGNALS

Project: R-2417AA

WBS: 34431.1.1

Vicinity



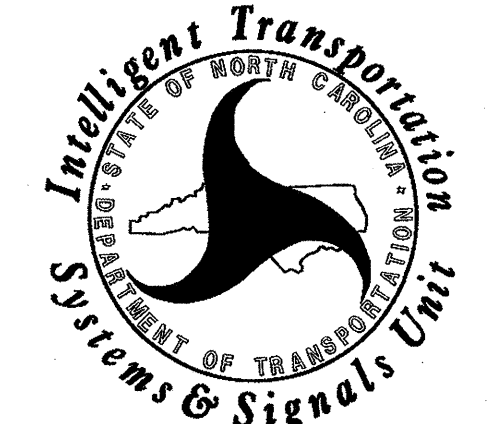
Refer to "Roadway Standard Drawings NCDOT" dated Jul, 2006 and "Standard Specifications for Roads and Structures" dated Jul, 2006.

Sheet #	Reference #	Index of Plans	Location/Description
Sig. 1		Title Sheet	
Sig. 2-5	08-1101	SR 1400 (Cumnock Road) at US 421 NB Ramps	
Sig. 6-9	08-1102	US 421 (Sanford Bypass) at SR 1400 (Cumnock Rd.) Ramp	
Sig. 10-15	N/A	Standard Drawings For Metal Poles	
Sig. 16-18	N/A	Inductive Detection Loops Details	

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:
R. J. Ziemba, PE - Central Region Signals Project Engineer
G. C. Brown, PE - Signal Equipment Design Engineer

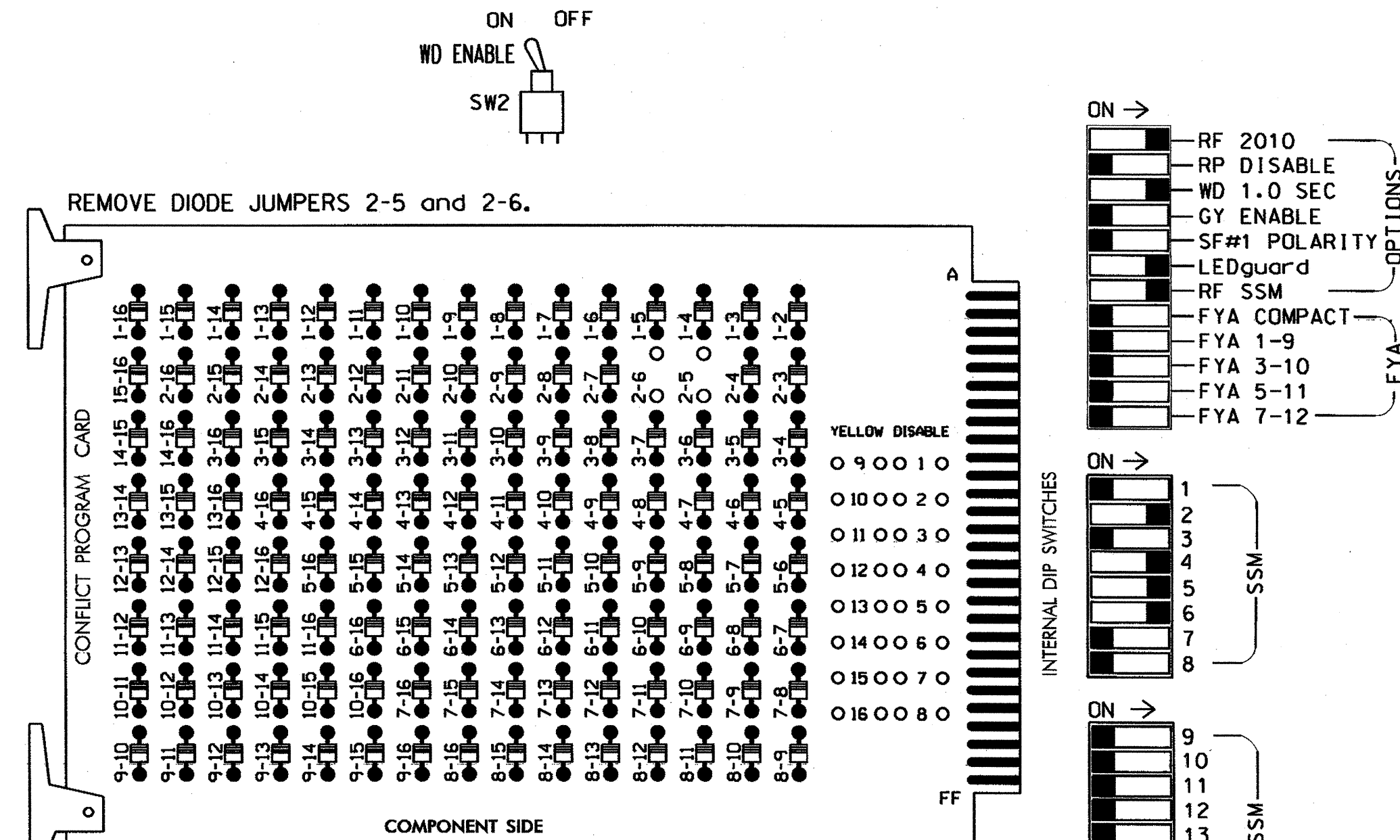
Prepared in the Office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION



S:\SFP-2010\810\Sig. 1\Signals Workgroups\TIP Projects\R-2417AA\Signals\Design\Titlesheet.R-2417AA-1.titlesheet:2009.dgn

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,7,8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S5,S6,
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

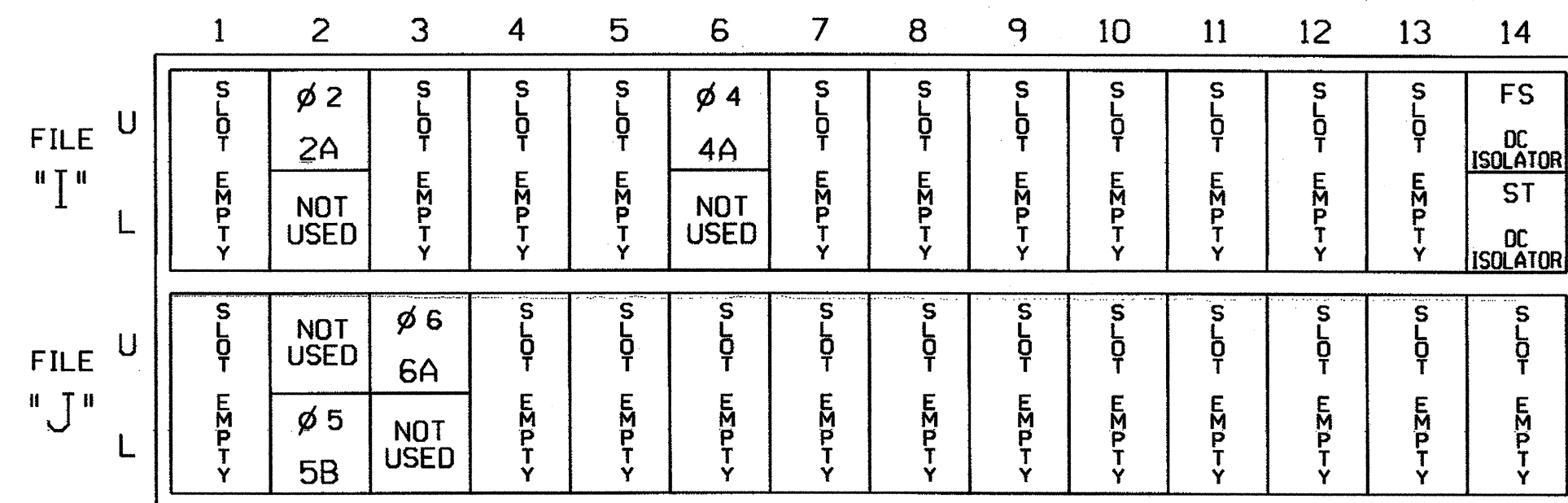
SIGNAL HEAD HOOK-UP CHART

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	51	61,62	NU	NU	NU	NU
RED		128			101			134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW								131				
YELLOW ARROW								132				
GREEN ARROW								133				
Hand icon												
Person icon												

NU = Not Used

INPUT FILE POSITION LAYOUT

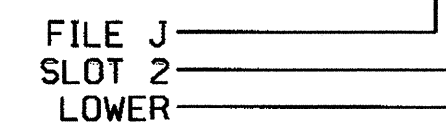
(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

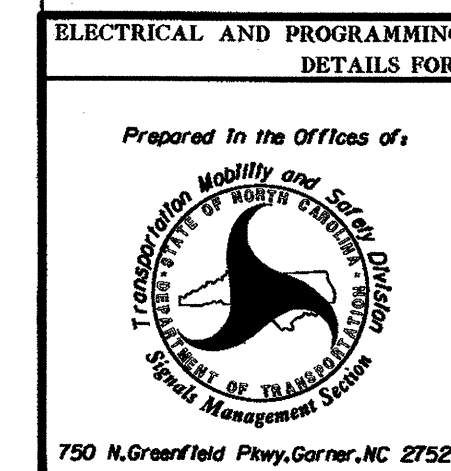
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			5
5B	TB3-7,8	J2L	44	6	16	5	Y	Y			
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 08-1101T
 DESIGNED: July 2010
 SEALED: 9-1-10
 REVISED: N/A

New Installation - Temporary Design



ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1400 (Cumnock Road) at US 421 Ramps

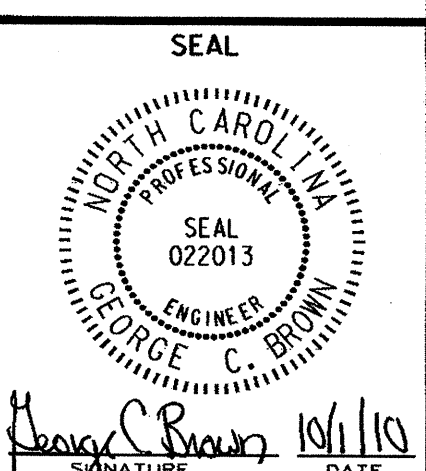
Division 08 Lee County Sanford

PLAN DATE: 8-18-10 REVIEWED BY: D.T. Joyce

PREPARED BY: D.H. Spaulding REVIEWED BY:

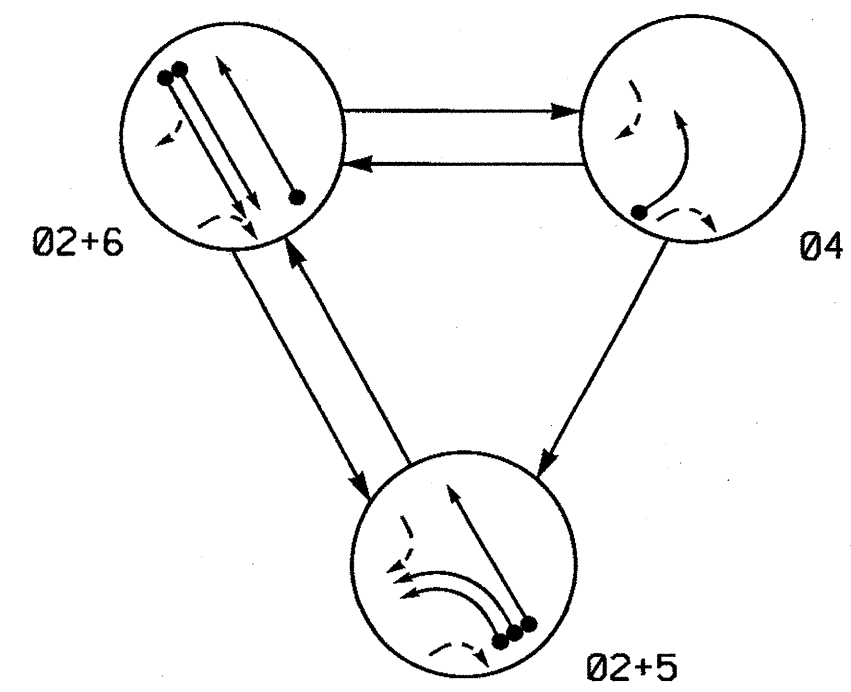
REVISIONS INIT. DATE

SIGNATURE DATE



SIG. INVENTORY NO. 08-1101T

PHASING DIAGRAM



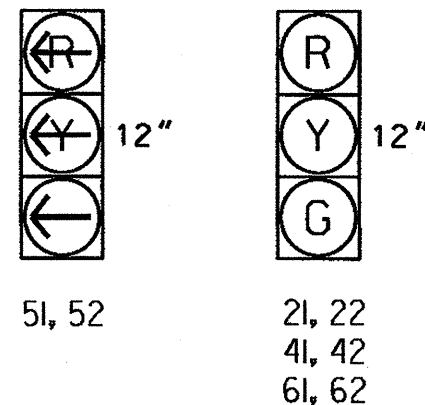
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE			
	02+5	02+6	04	F.L. EXTENSION
2L, 22	G	G	R	Y
4L, 42	R	R	G	R
5L, 52	-	-	-	-
6L, 62	R	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP	INDUCTIVE LOOPS				DETECTOR PROGRAMMING						
	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X6	420	6	-	2	Y	Y	-	-	-	-
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	Y
5B	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-
6A	6X6	420	6	Y	6	Y	Y	-	-	-	-

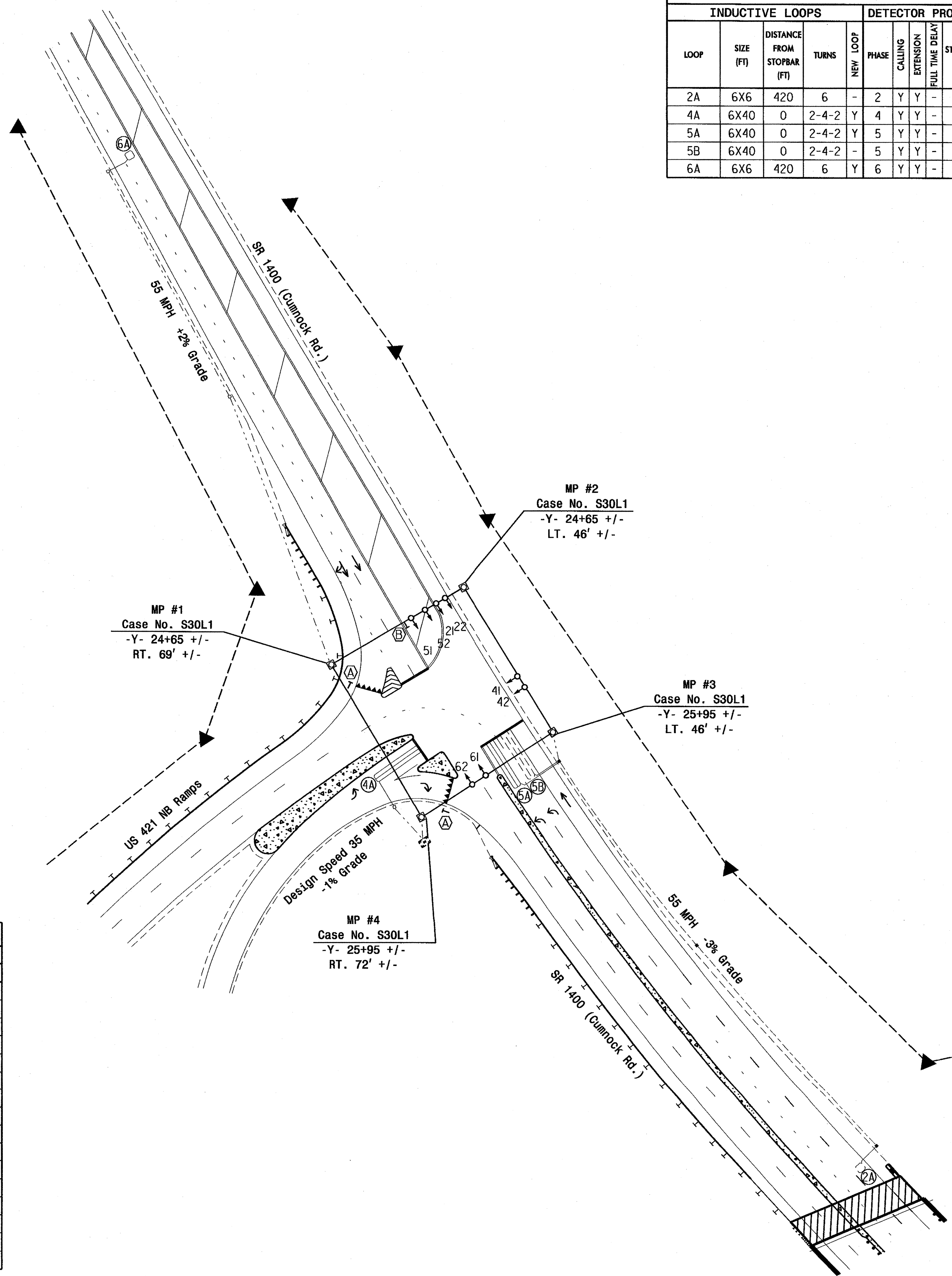
3 Phase Fully Actuated (Isolated)

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. Phase 5 may be lagged.
4. Set all detectors units to presence mode.

FEATURE	PHASE			
	2	4	5	6
Min Green 1*	14	7	7	14
Extension 1*	6.0	2.0	2.0	6.0
Max Green 1*	90	20	20	90
Yellow Clearance	5.5	3.0	3.0	5.0
Red Clearance	1.0	3.1	3.1	1.0
Walk 1*	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation*	2.5	-	-	2.5
Max Variable Initial*	46	-	-	46
Time Before Reduction*	15	-	-	15
Time To Reduce*	30	-	-	30
Minimum Gap	3.4	-	-	3.4
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.



PROPOSED	EXISTING
	N/A
N/A	
N/A	

Prepared in the Offices of:

750 N. Greenleaf Pkwy, Garner, NC 27529

SR 1400 (Cumcock Road) at US 421 NB Ramps

Division 8 Lee County Sanford

PLAN DATE: July 2010 REVIEWED BY:

PREPARED BY: Sterling REVIEWED BY:

REVISIONS

NO.	DESCRIPTION	INIT.	DATE

SEAL

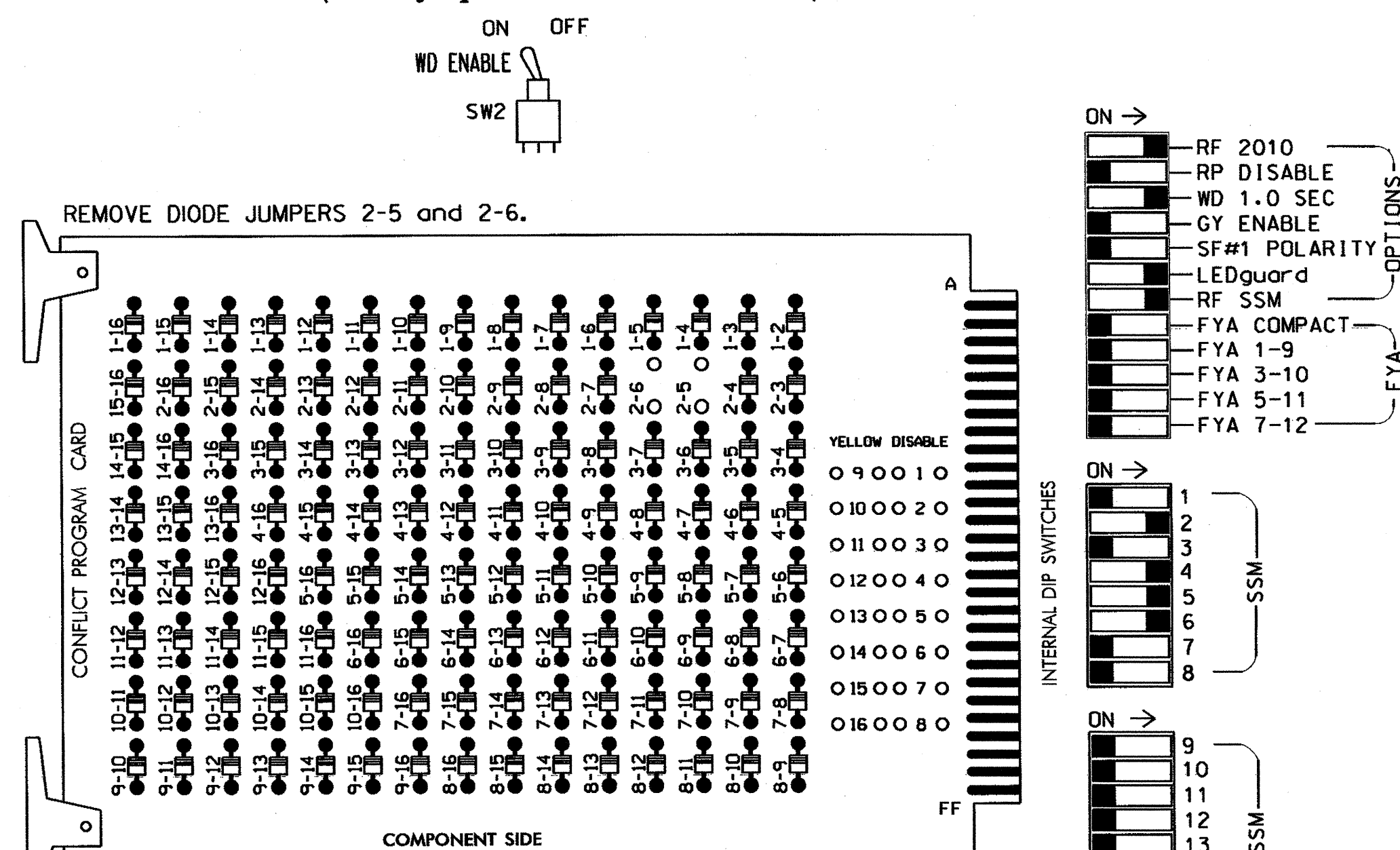
ROBERT J. ZIEBACH

DATE

SIG. INVENTORY NO. 08-1101

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

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 1,3,7,8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Start Up In Green.
6. Program phases 2 and 6 for Yellow Flash.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S5,S6.
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

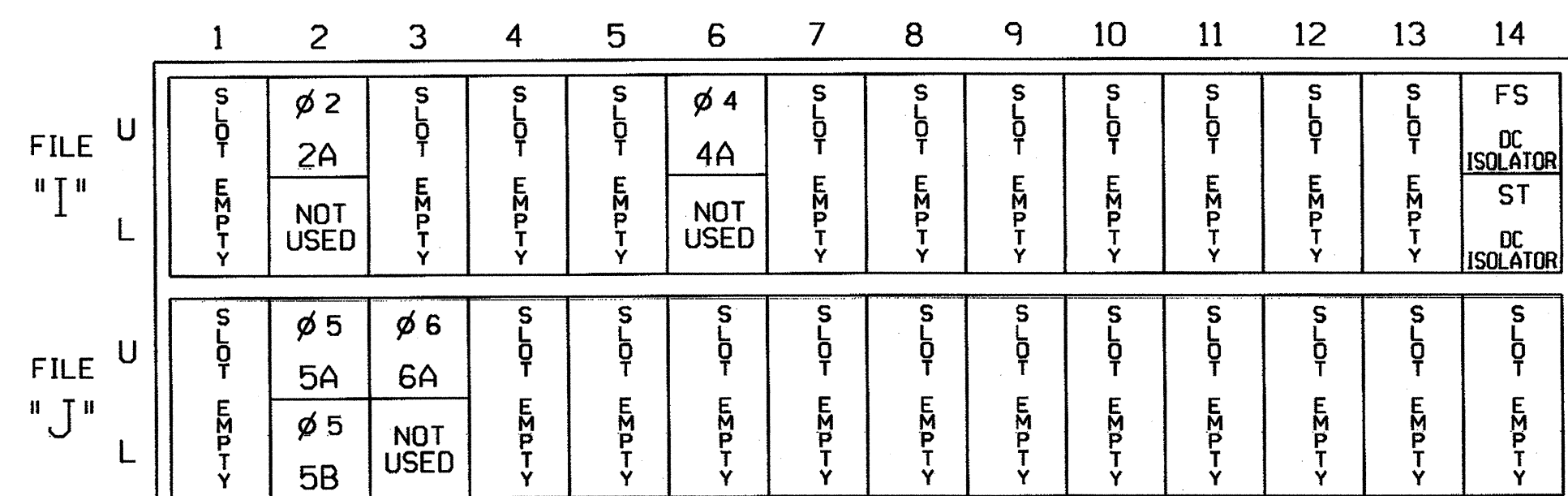
SIGNAL HEAD HOOK-UP CHART

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	51,52	61,62	NU	NU	NU	NU
RED		128			101			134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW								131				
YELLOW ARROW								132				
GREEN ARROW								133				

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



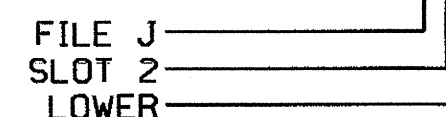
EX. : 1A, 2A, ETC. = LOOP NO.'S

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	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
5A	TB3-5,6	J2U	40	2	6	5	Y	Y			
5B	TB3-7,8	J2L	44	6	16	5	Y	Y			
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 08-1101
 DESIGNED: July 2010
 SEALED: 9-1-10
 REVISED: N/A

Signal Upgrade - Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1400 (Cumnock Road)
 at
 US 421 NB Ramps

Division 08 Lee County Sanford

PLAN DATE: 8-18-10 REVIEWED BY: D.T. Joyce

PREPARED BY: D.H. Spaulding REVIEWED BY:

REVISIONS INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 022013
 GEORGE C. BROWN

SIG. INVENTORY NO. 08-1101

PHASING DIAGRAM

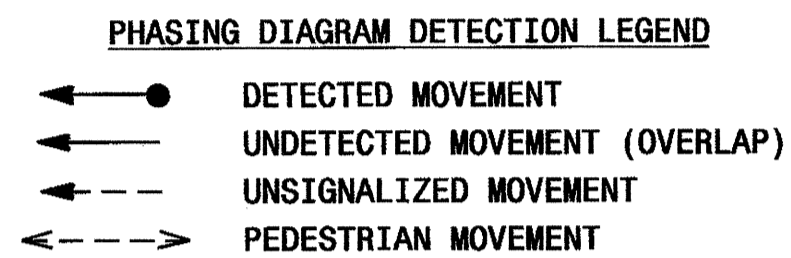
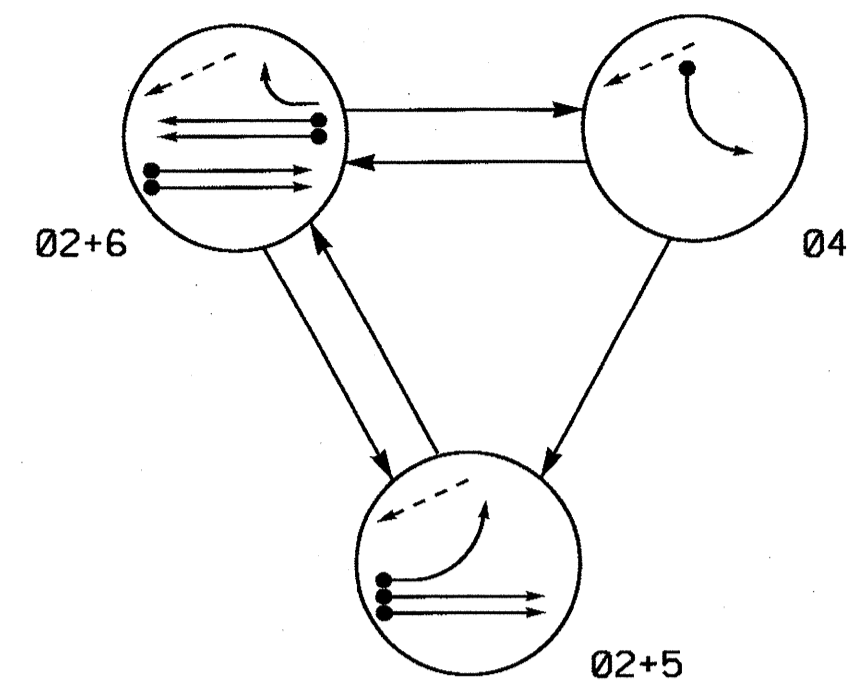
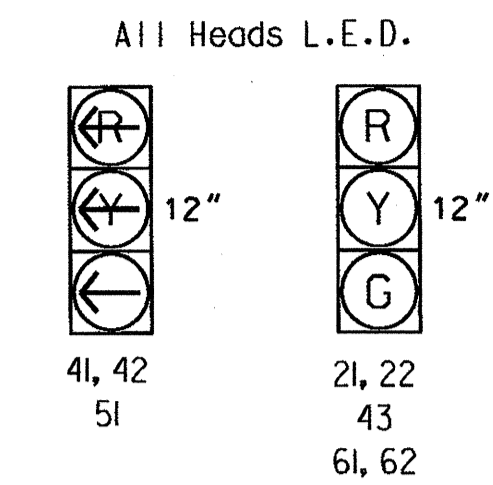


TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02+5	02+6	04	FLASH
2, 22	G	G	R	Y
4, 42	R	R	G	R
43	R	R	G	R
51	---	---	---	---
6, 62	R	G	R	Y

SIGNAL FACE I.D.



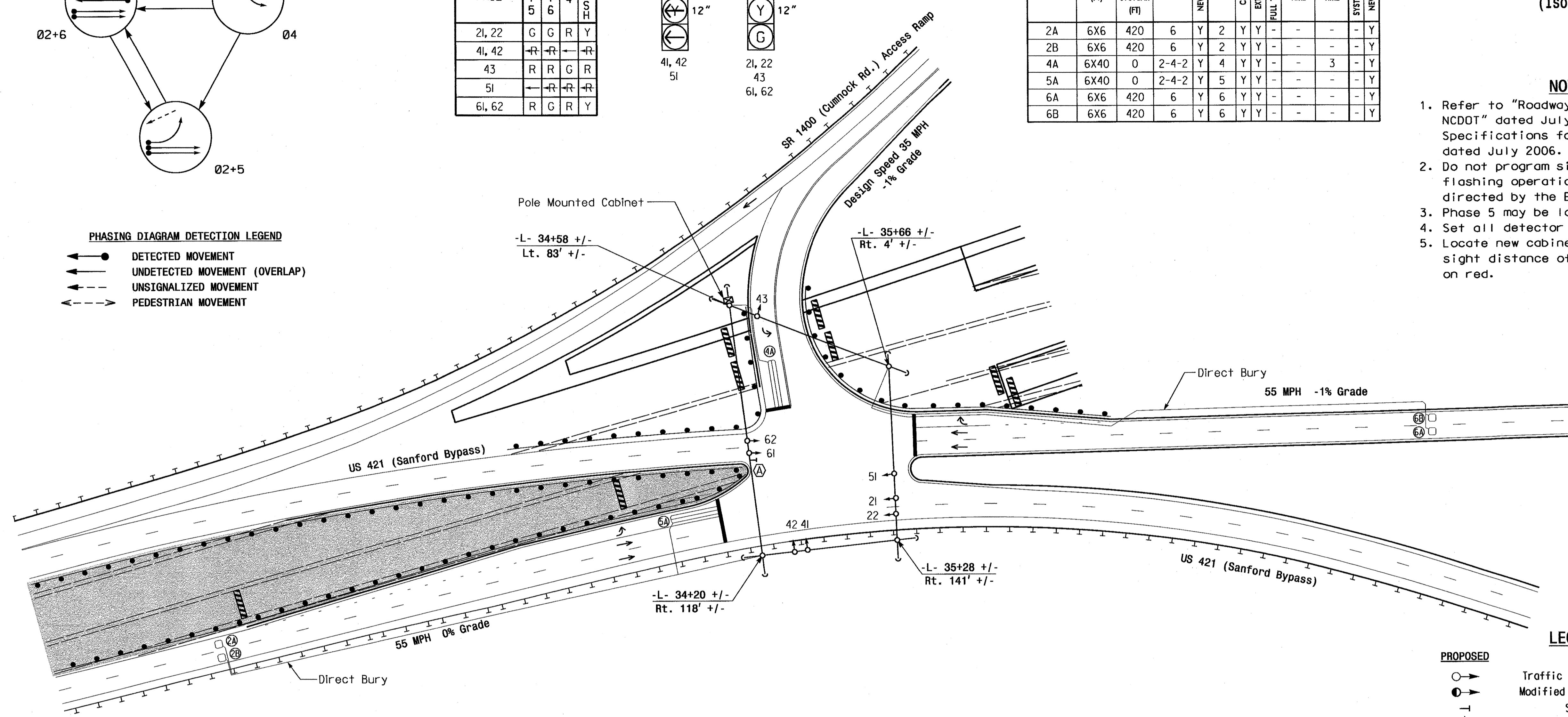
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY			
2A	6X6	420	6	Y	2	Y	Y	-	-	-	Y
2B	6X6	420	6	Y	2	Y	Y	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	3	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	Y
6A	6X6	420	6	Y	6	Y	Y	-	-	-	Y
6B	6X6	420	6	Y	6	Y	Y	-	-	-	Y

3 Phase Fully Actuated (Isolated)

NOTES

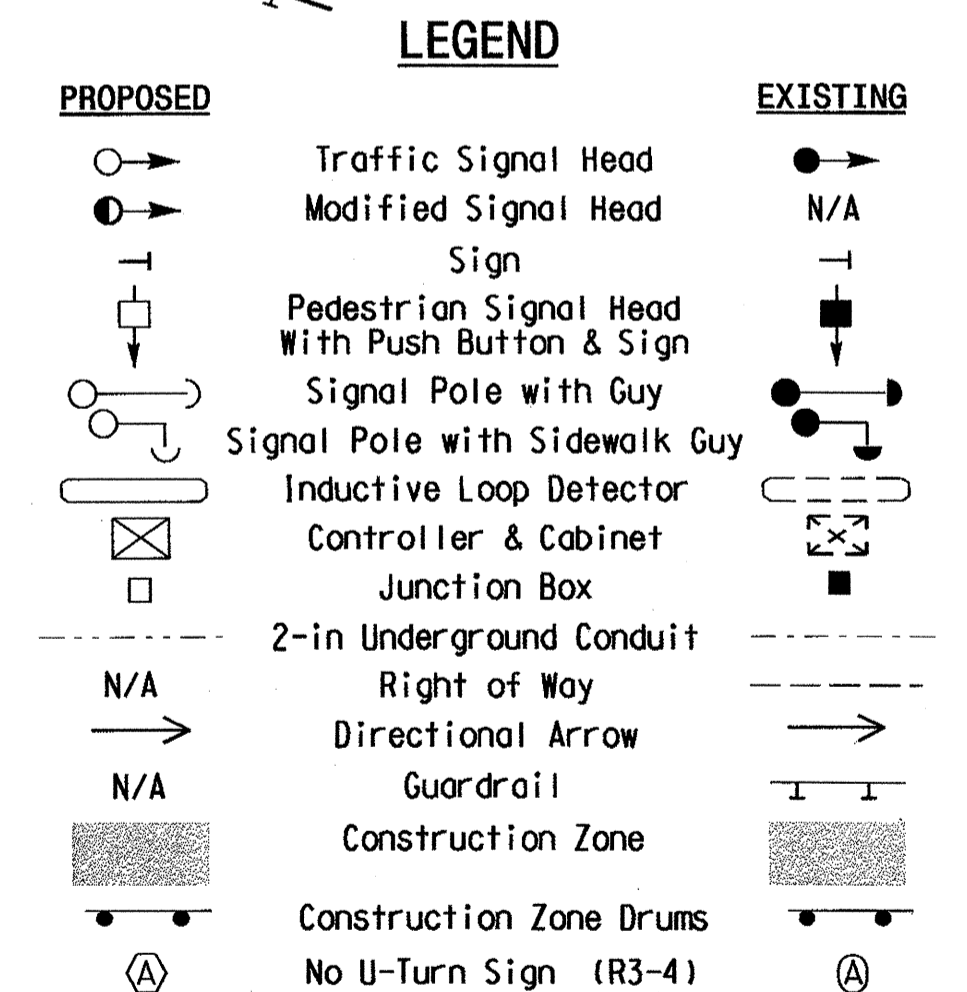
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.



OASIS 2070L TIMING CHART

FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	14	7	7	14
Extension 1 *	6.0	2.0	2.0	6.0
Max Green 1 *	90	25	20	90
Yellow Clearance	5.2	3.0	3.0	5.3
Red Clearance	1.3	3.1	3.4	1.5
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	-	1.5
Max Variable Initial *	46	-	-	46
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.4	-	-	3.4
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.



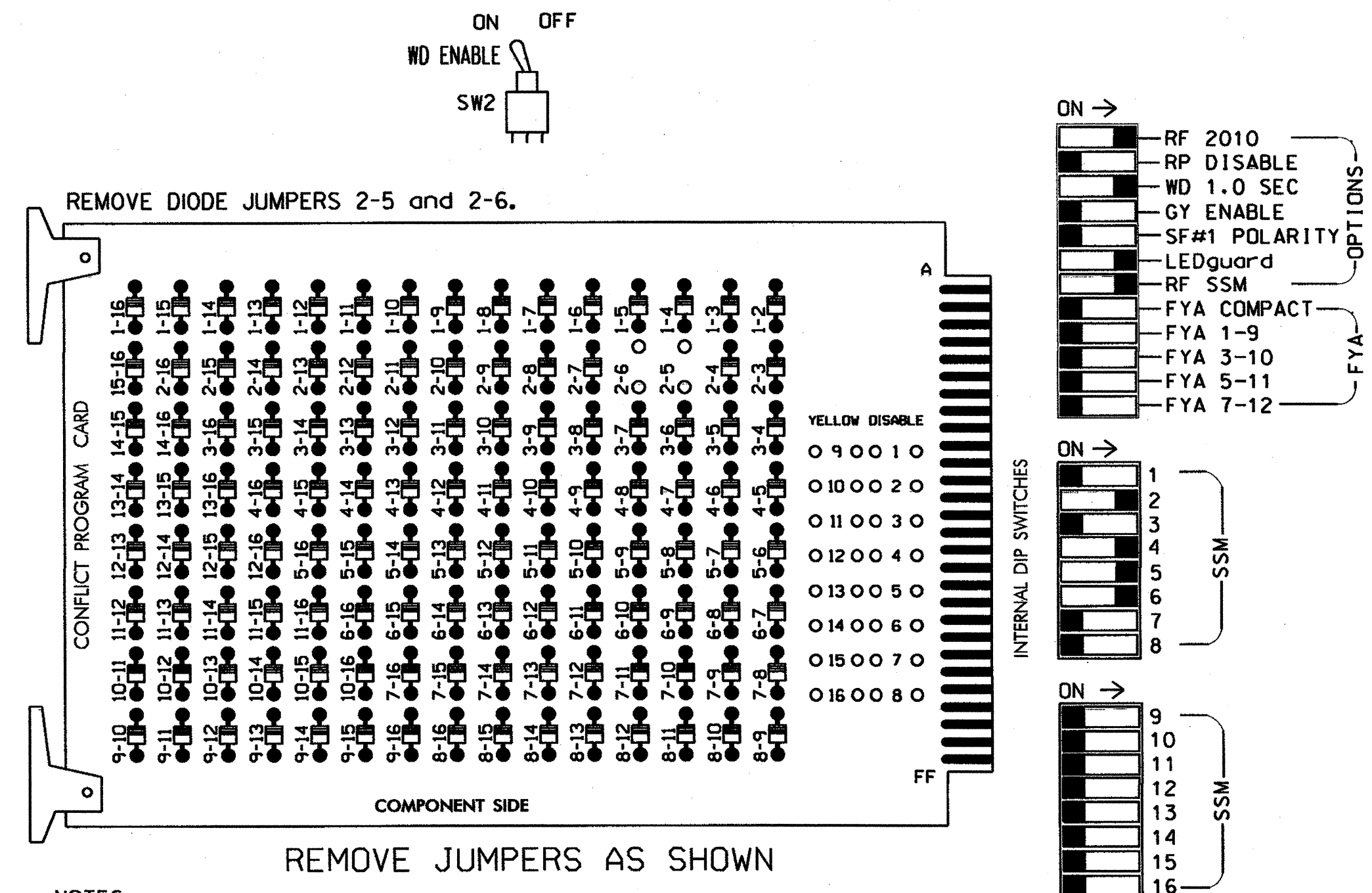
Temporary Signal - Design 1 (Construction Phase II)

	US 421 (Sanford Bypass) at SR 1400 (Cummock Rd) Ramp		
	Division 8 Lee County Sanford		
PREPARED BY: Sterling	REVISIONS:	REVIEWED BY:	DATE:
SCALE: 1" = 50'	REVISIONS:	INIT.:	DATE:
SIGNATURE:			DATE:
SIG. INVENTORY NO. 08-110211			

30-SEP-2010 17:59
 C:\Users\jts\Documents\Signal\2417AA\Sigs\08-110211\0211.dgn
 2417AA\Sigs\08-110211\0211.dgn

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,7,8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 336
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S5,S6.
 PHASES USED.....2,4,5,6
 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	43	NU	51	61,62	NU	NU	NU
RED		128			101			134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW					101			131				
YELLOW ARROW					102			132				
GREEN ARROW					103			133				

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

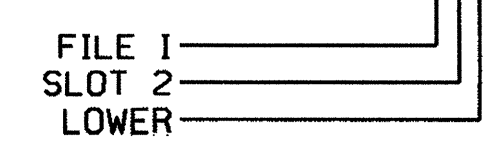
EX.: 1A, 2A, ETC. = LOOP NO.'S

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			
2B	TB23-3,4	I2L	43	5	12	2	Y	Y			
4A	TB21-7,8	I4U	41	3	4	4	Y	Y			3
5A	TB21-9,10	I5U	55	17	5	5	Y	Y			
6A	TB21-11,12	I6U	40	2	6	6	Y	Y			
6B	TB23-11,12	I6L	44	6	16	6	Y	Y			

INPUT FILE POSITION LEGEND: I2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 08-1102T1
 DESIGNED: July 2010
 SEALED: 9-1-10
 REVISED: N/A

Temporary Signal - Design 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 421 (Sanford Bypass.) at SR 1400 (Cumnock Rd.) Ramp

Division 08 Lee County Sanford

PLAN DATE: 8-19-10 REVIEWED BY: D.T. Joyce

PREPARED BY: D.H. Spaulding REVIEWED BY:

REVISIONS

INIT. DATE

750 N.Greenfield Phary,Garner,NC 27529

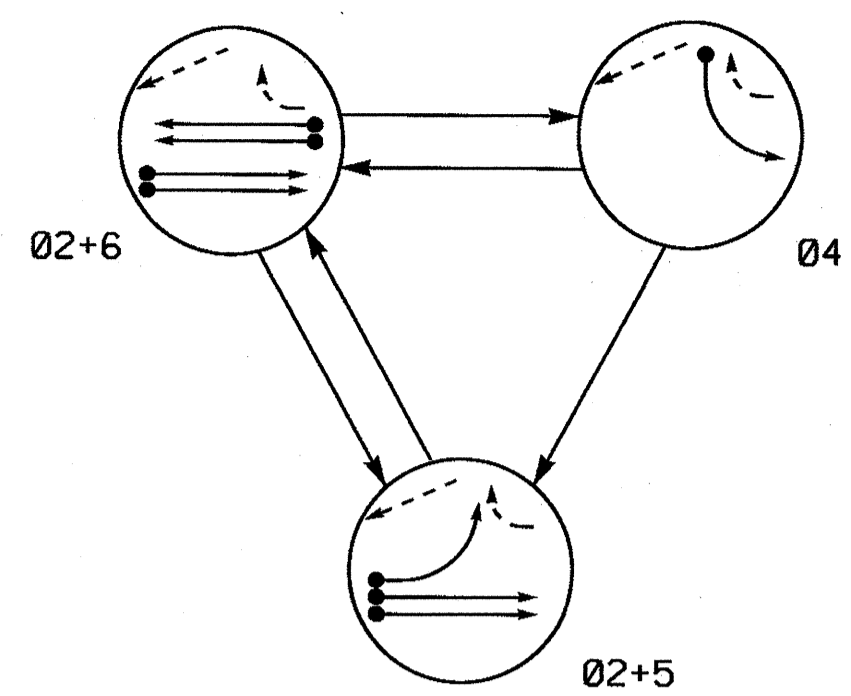
SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

Signature:

SIG. INVENTORY NO. 08-1102T1

01-001-2010 08:43 S:\TSS\UHTS 5\proj\smr\krc\groups\g1\man\spaulding\in-progress\081102-sm-1e-2010.dwg dgs

PHASING DIAGRAM



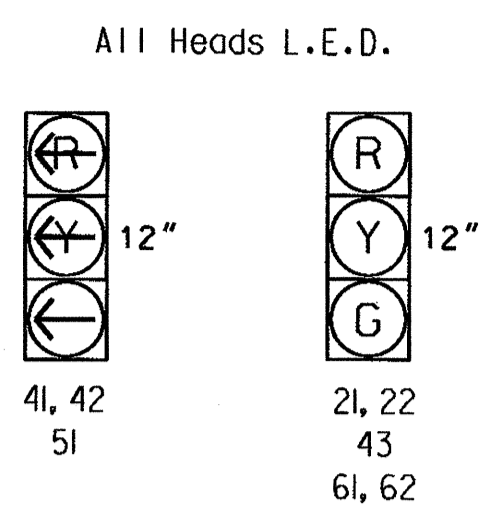
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE			
	0 2 + 5	0 2 + 6	0 4	F L C H
21, 22	G	G	-R	Y
41, 42	-R	-R	-	-R
43	R	R	G	R
51	-	-R	-R	-R
61, 62	R	G	R	Y

SIGNAL FACE I.D.



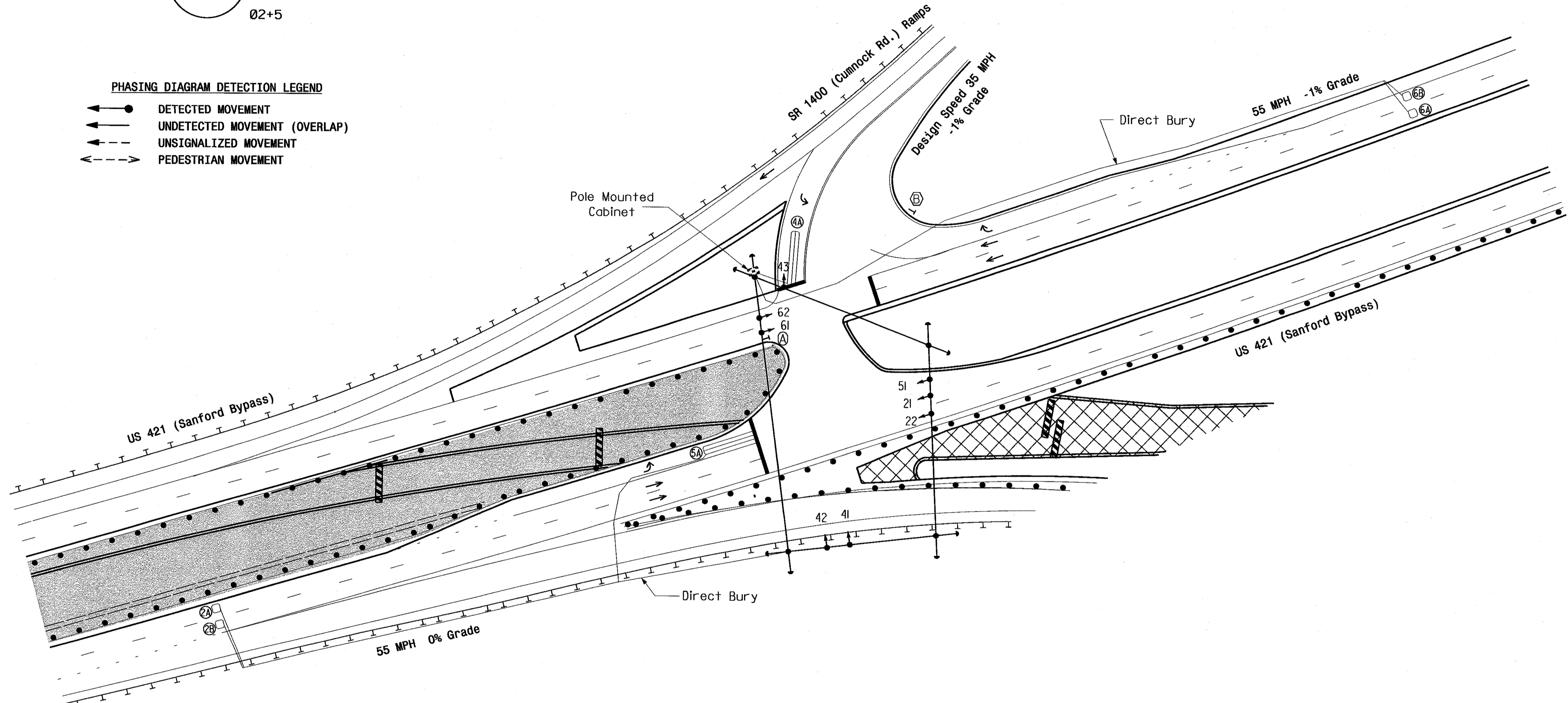
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY		
2A	6X6	420	6	Y	2	Y	Y	-	-	-
2B	6X6	420	6	Y	2	Y	Y	-	-	-
4A	6X40	0	2-4-2	Y	4	Y	Y	-	3	-
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-
6A	6X6	420	6	Y	6	Y	Y	-	-	-
6B	6X6	420	6	Y	6	Y	Y	-	-	-

3 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. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Reposition existing signal heads as shown.



OASIS 2070L TIMING CHART

FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	14	7	7	14
Extension 1 *	6.0	2.0	2.0	6.0
Max Green 1 *	90	25	20	90
Yellow Clearance	5.2	3.0	3.0	5.3
Red Clearance	1.2	3.4	3.9	1.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	-	1.5
Max Variable Initial *	46	-	-	46
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.4	-	-	3.4
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

LEGEND

PROPOSED	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	□ → N/A
N/A → Right of Way	N/A → N/A
N/A → Directional Arrow	N/A → N/A
N/A → Guardrail	N/A → N/A
N/A → Construction Zone	N/A → N/A
N/A → Construction Zone Drums	N/A → N/A
ⓐ → No U-Turn Sign (R3-4)	ⓐ → N/A
ⓑ → "YIELD" Sign (R1-2)	ⓑ → N/A

Temporary Signal - Design 2 (Construction Phase III)

US 421 (Sanford Bypass) at SR 1400 (Cumnock Rd.) Ramp

Division 8 Lee County Sanford

PLAN DATE: July 2010 PREPARED BY: Sterling REVIEWED BY:

REVISIONS

NO.	DESCRIPTION	INIT.	DATE

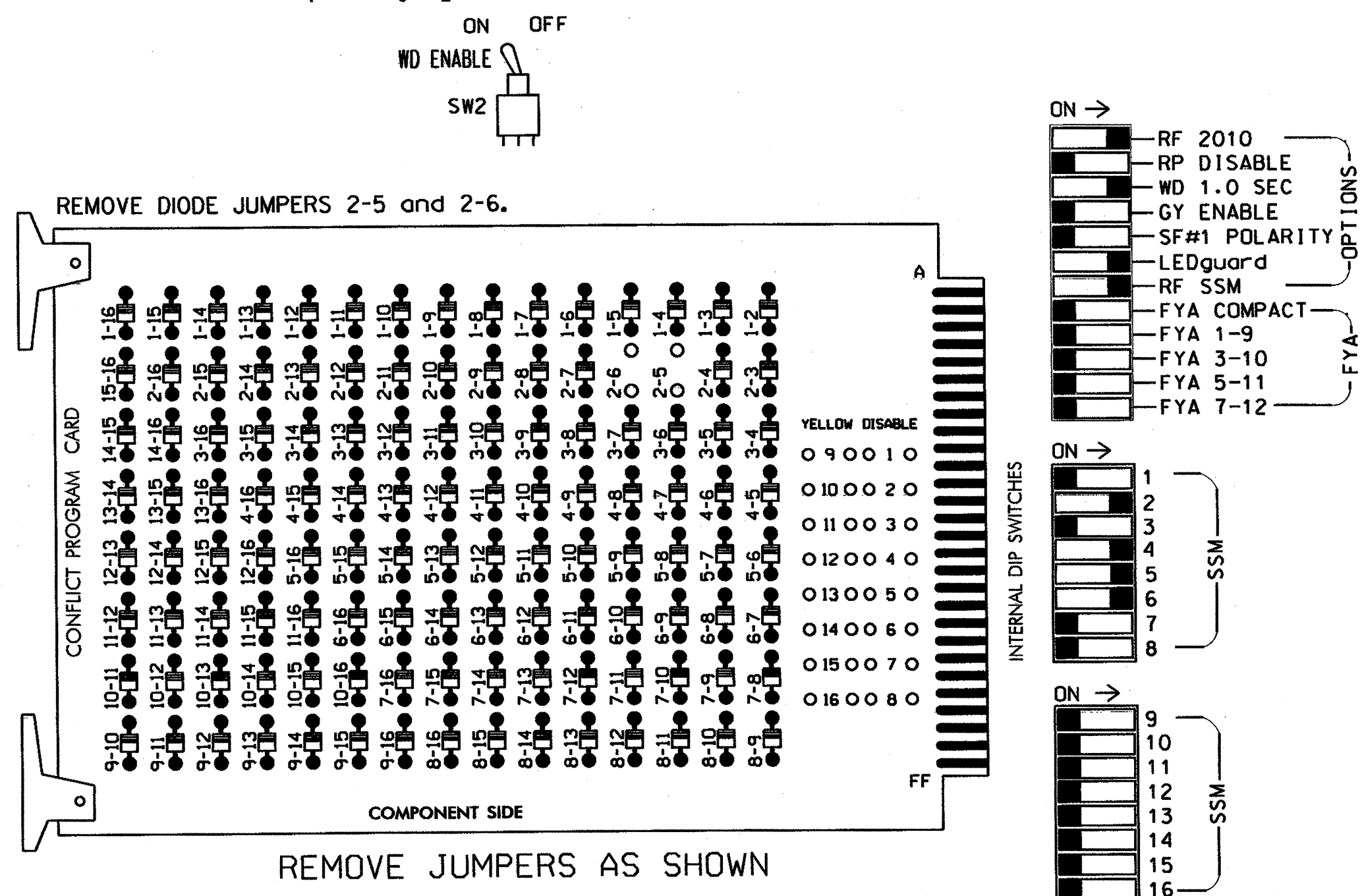
SEAL
ROBERT J. ZIEMER
ENGINEER
No. 026486
DATE: 9/1/10

SIG. INVENTORY NO. 08-110272

30-SEP-2010 18:00
 S:\T\AS\175 S:\T\AS\175\Sig\2417AA\Sig\08-110272.dgn
 Project: 2417AA\Sig\08-110272.dgn
 User: jz
 2417AA\Sig\08-110272.dgn

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,7,8,9, 10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Start Up In Green.
6. Program phases 2 and 6 for Yellow Flash.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 336
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S5,S6,
 PHASES USED.....2,4,5,6
 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	43	NU	51	61,62	NU	NU	NU
RED		128			101			134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW					101			131				
YELLOW ARROW					102			132				
GREEN ARROW					103			133				
Hand icon												
Person icon												

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

FILE "I" L	1	2	3	4	5	6	7	8	9	10	11	12	13	14
S	∅ 2	∅ 2	∅ 4	∅ 5	∅ 6	S	S	S	S	S	S	S	S	FS
DC ISOLATOR			NOT USED	NOT USED	∅ 6									ST
DC ISOLATOR					6B									

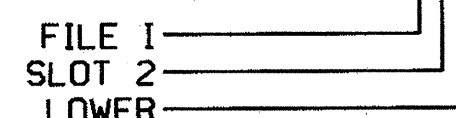
EX. : 1A, 2A, ETC. = LOOP NO.'S

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			
2B	TB23-3,4	I2L	43	5	12	2	Y	Y			
4A	TB21-7,8	I4U	41	3	4	4	Y	Y			3
5A	TB21-9,10	I5U	55	17	5	5	Y	Y			
6A	TB21-11,12	I6U	40	2	6	6	Y	Y			
6B	TB23-11,12	I6L	44	6	16	6	Y	Y			

INPUT FILE POSITION LEGEND: I2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 08-1102T2
 DESIGNED: July 2010
 SEALED: 9-1-10
 REVISED: N/A

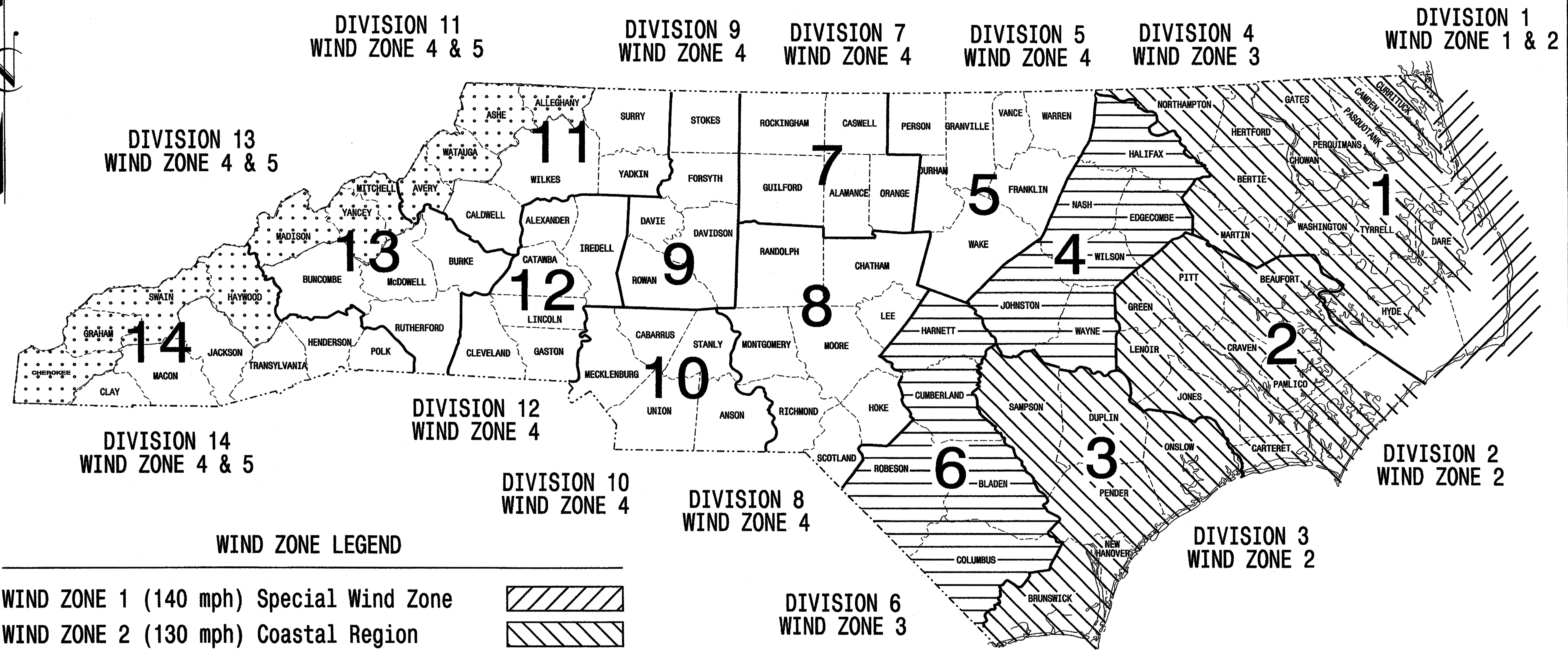
Temporary Signal - Design 2

Prepared in the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	ELECTRICAL AND PROGRAMMING DETAILS FOR: US 421 (Sanford Bypass) at SR 1400 (Cumnock Rd.) Ramp		SEAL SEAL 022013 ENGINEER GEORGE C. BROWN
	Division 08 PLAN DATE: 8-19-10 PREPARED BY: D.H. Spaulding	Lee County Sanford REVIEWED BY: D.T. Joyce REVIEWED BY:	

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	R-2417AA	Sig. 10
F.A. PROJ. NO.	M 1	
PROJECT ID. NO.		

STANDARD DRAWINGS FOR METAL POLES



WIND ZONE LEGEND

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

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

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

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

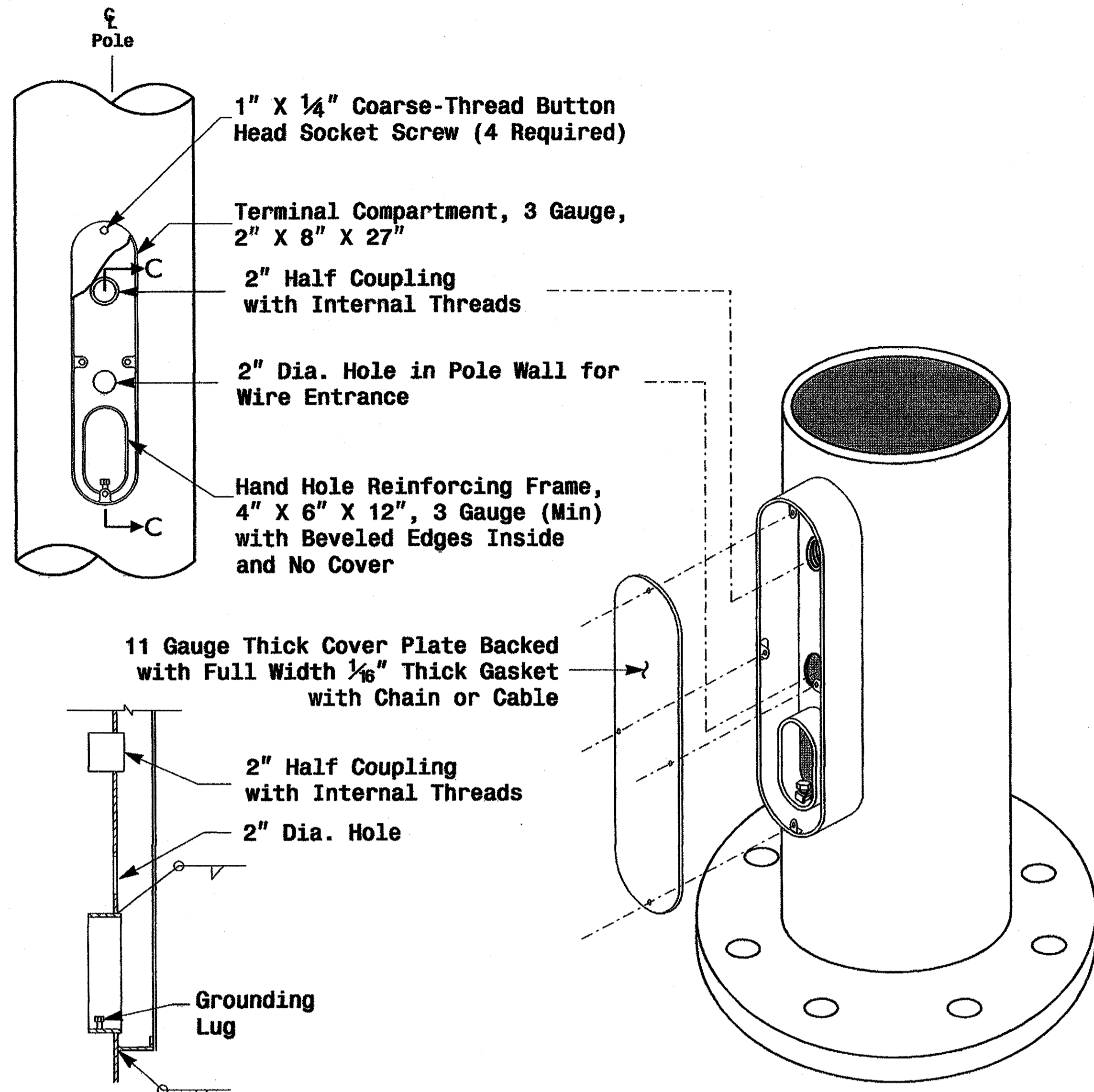
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

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

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

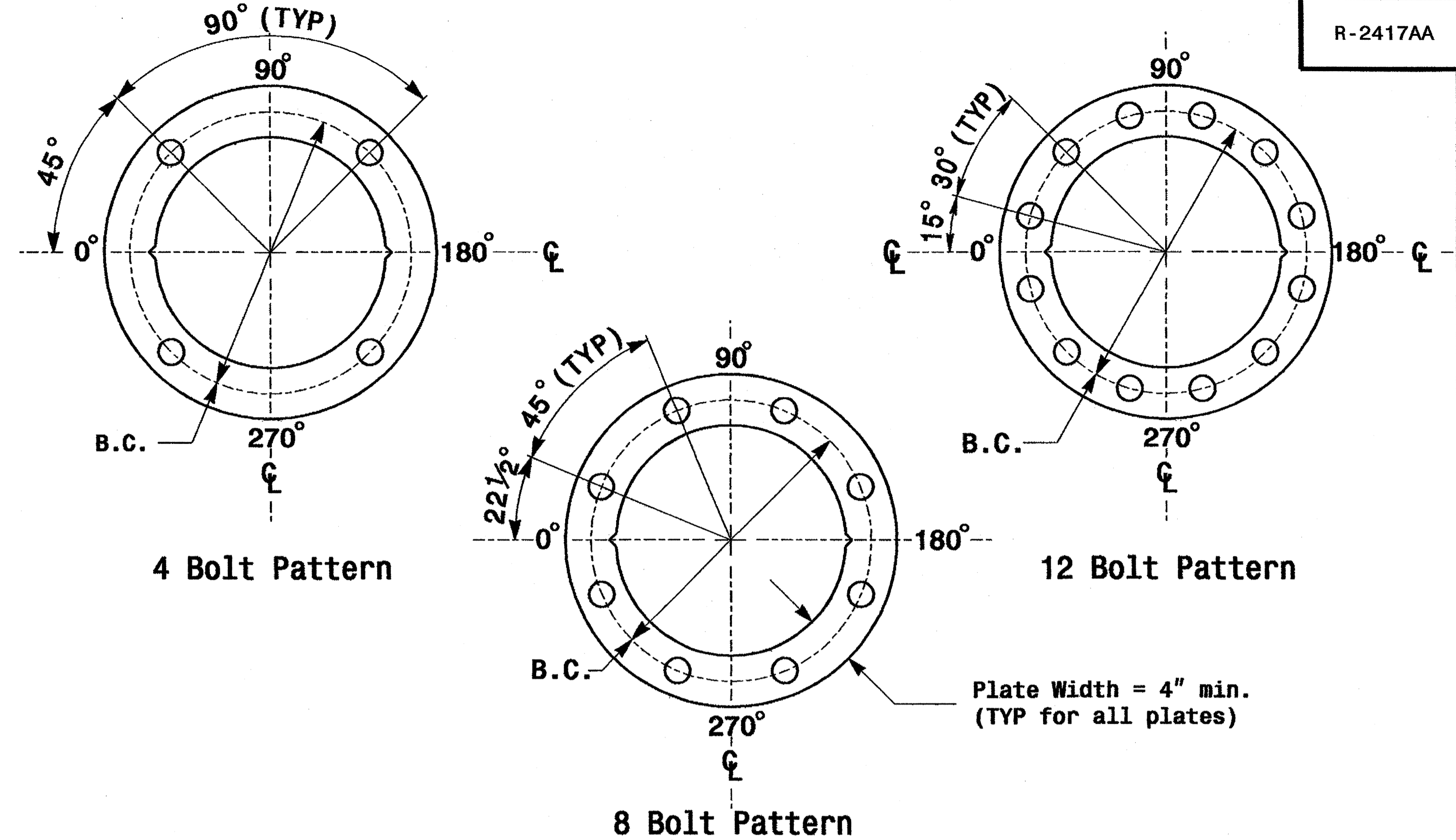
SEAL

D. C. Sarkar 7.21.2009
 SIGNATURE DATE



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

Terminal Compartment Detail



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

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

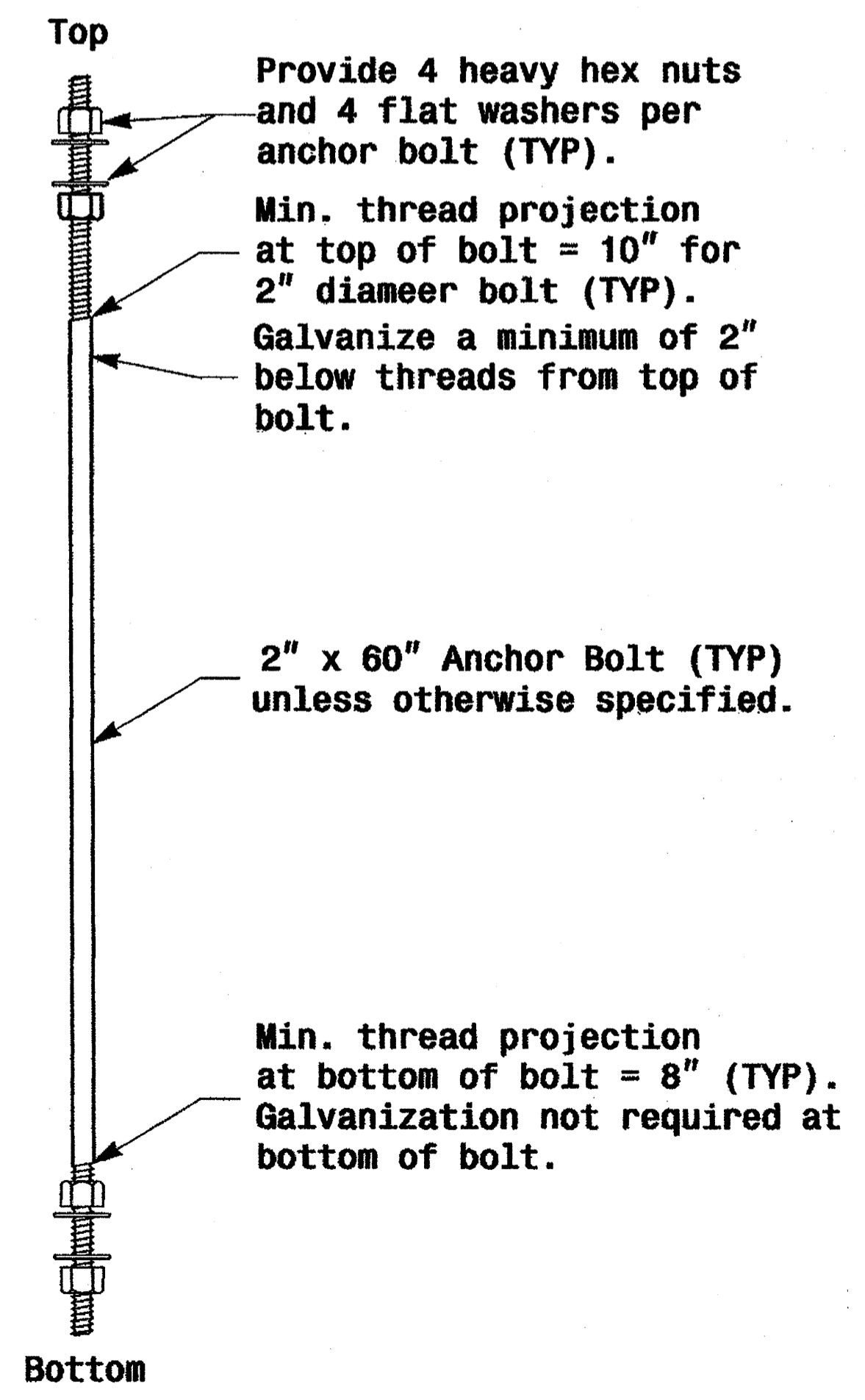
MFG _____	MFG. DATE: MM/YY _____
SECTION D/T/L/Y _____	
NCDOT STANDARD _____	

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

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

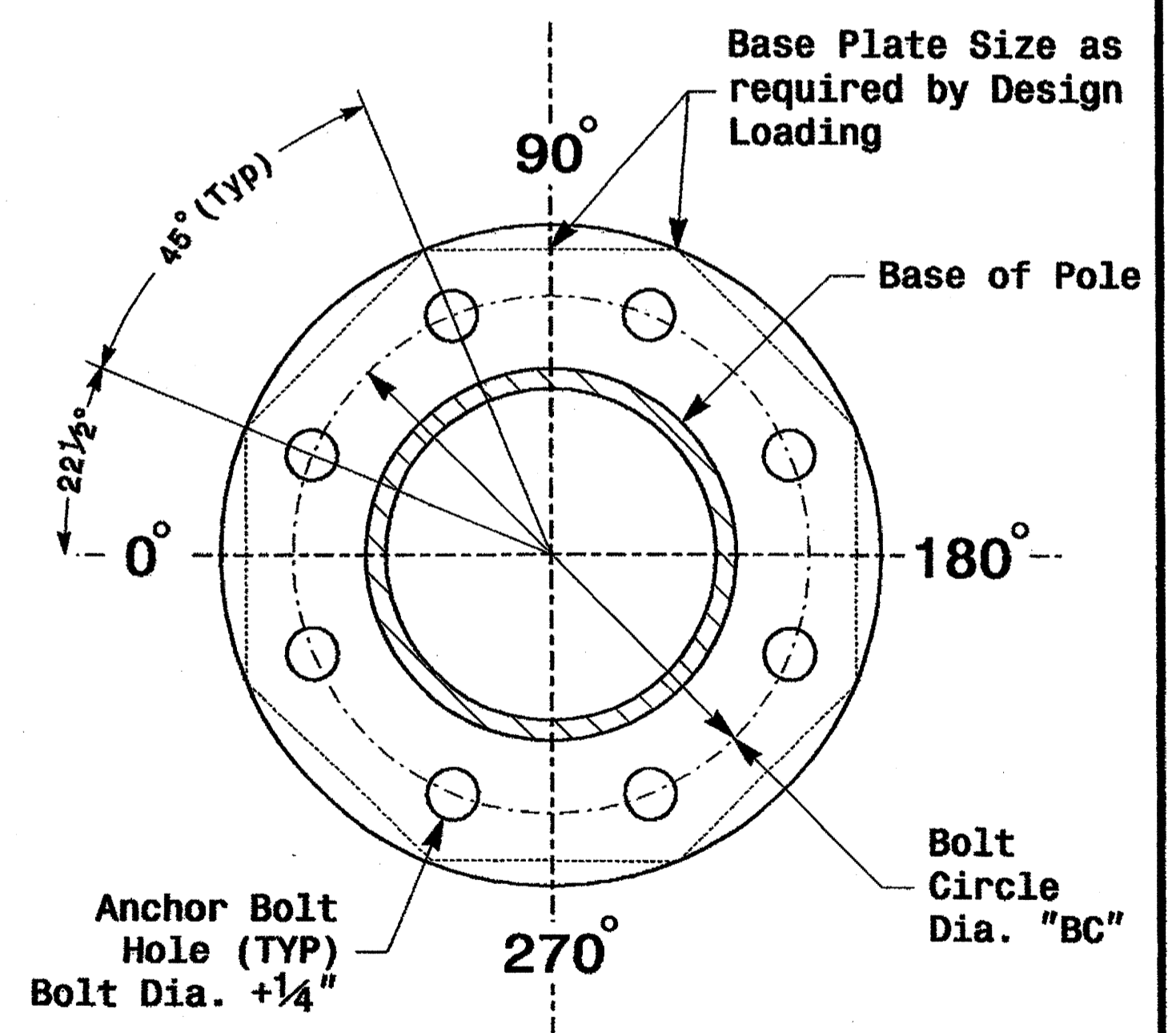
- Notes:
- 1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
 - 2) A.B. = Anchor Bolt
 - 3) B.C. = Bolt Circle of Anchor Bolts
 - 4) If Custom Design, use "NCDOT STANDARD" line for plan pole I.D.
 - 5) See drawing M4 for mounting positions of I.D. tags.

Identification Tag Details



Anchor Bolt Detail

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

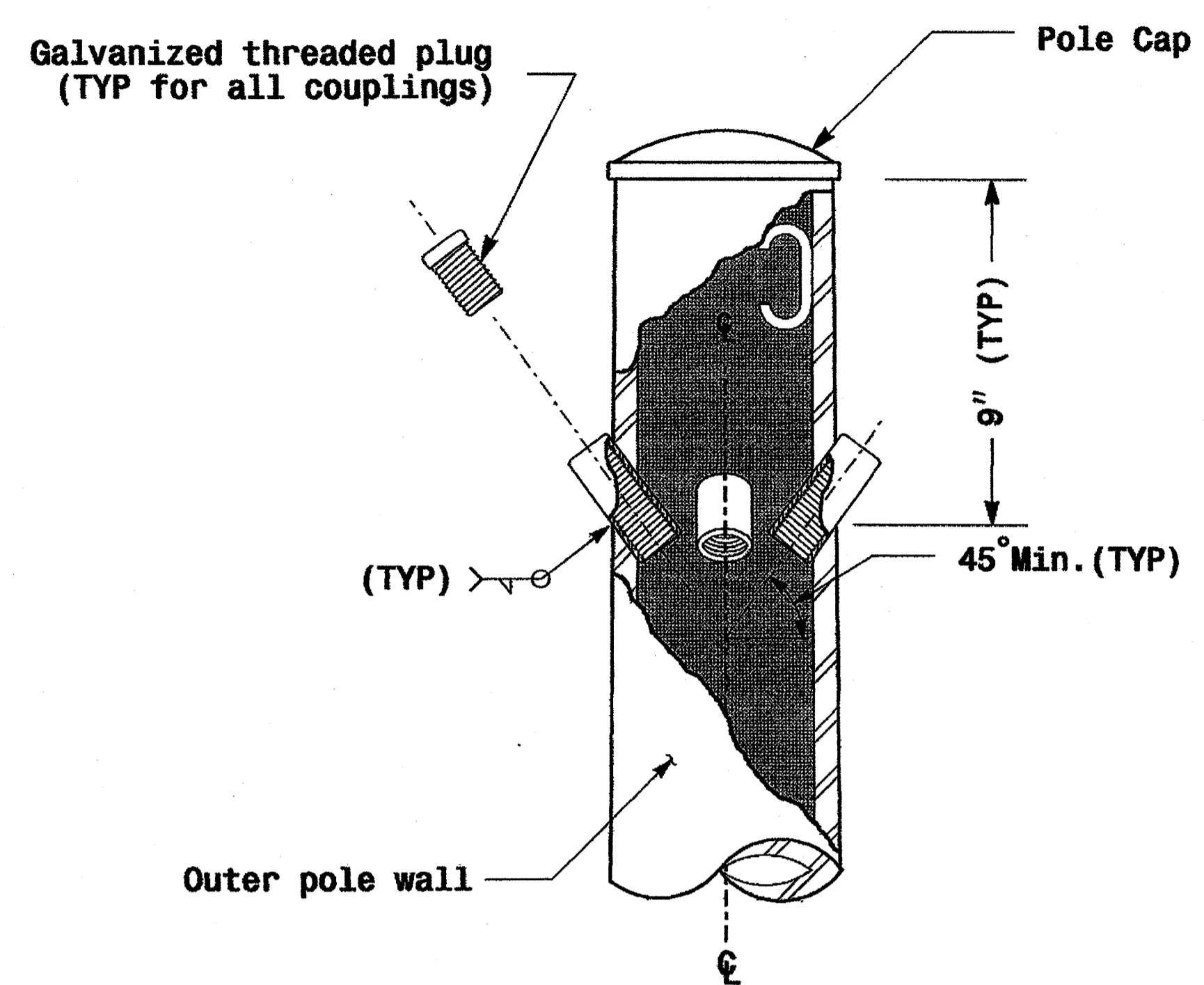


8 Bolt Base Plate Detail

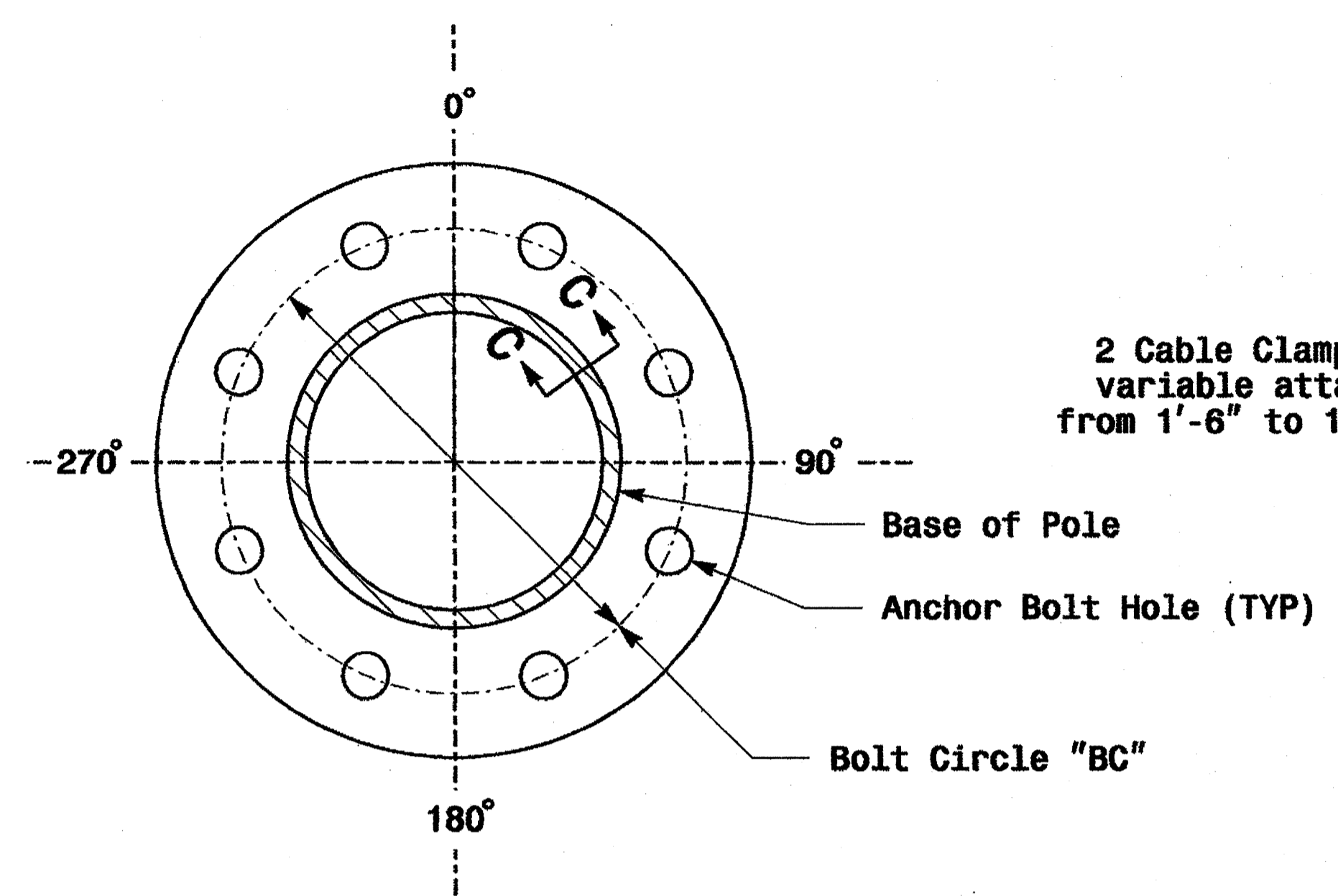
	Typical Fabrication Details Common To All Metal Poles		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander REVISIONS: _____ SCALE: NONE	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito INIT. DATE: _____	

Fabrication Details - All Poles

01-SEP-2005 18:22: D:\2404_Metro Pole Standard.dwg:004 ad thru m5.dgn

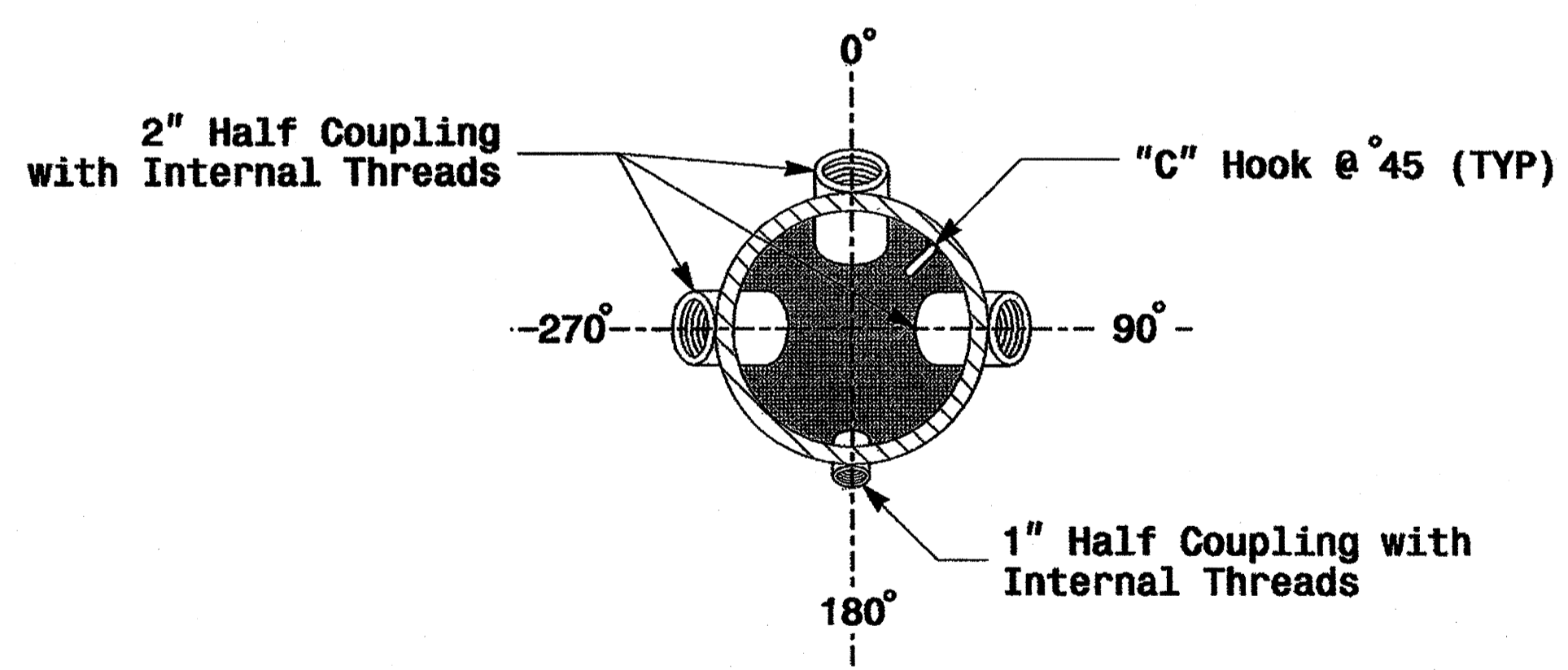
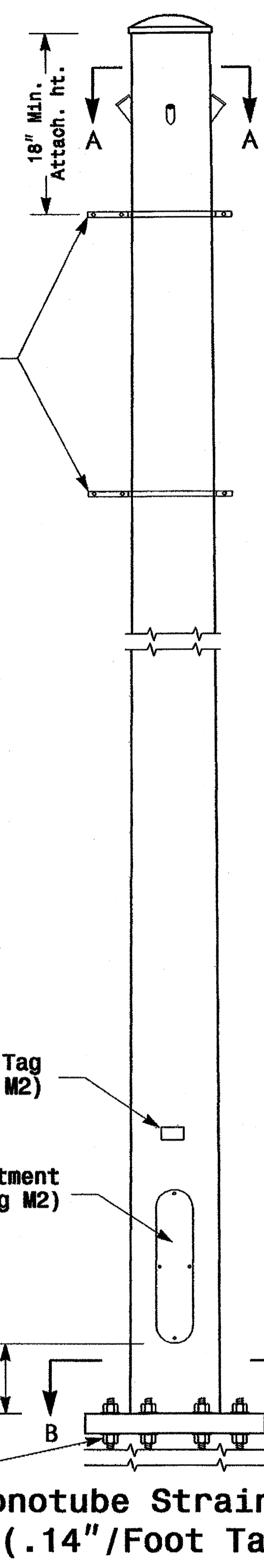


Cable Entrances at Top of Pole

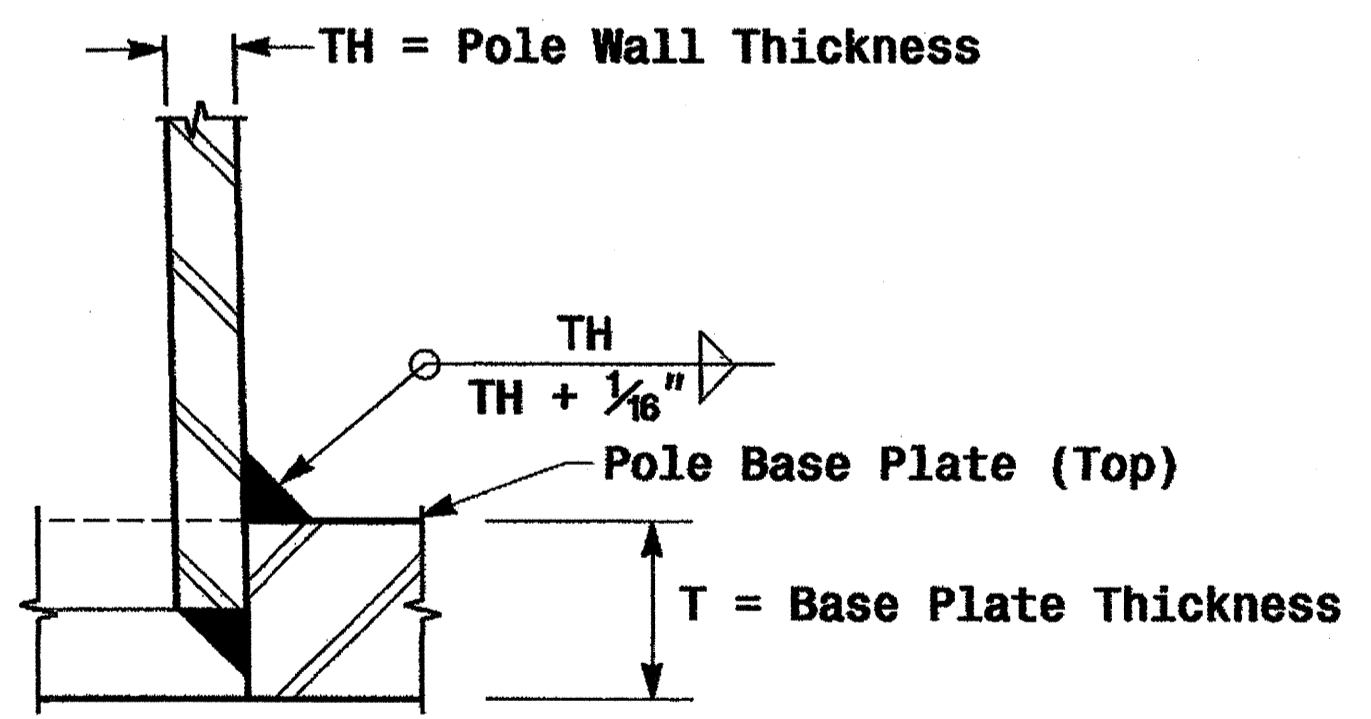


Section B-B
(See drawing M2)
Pole Base Plate

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



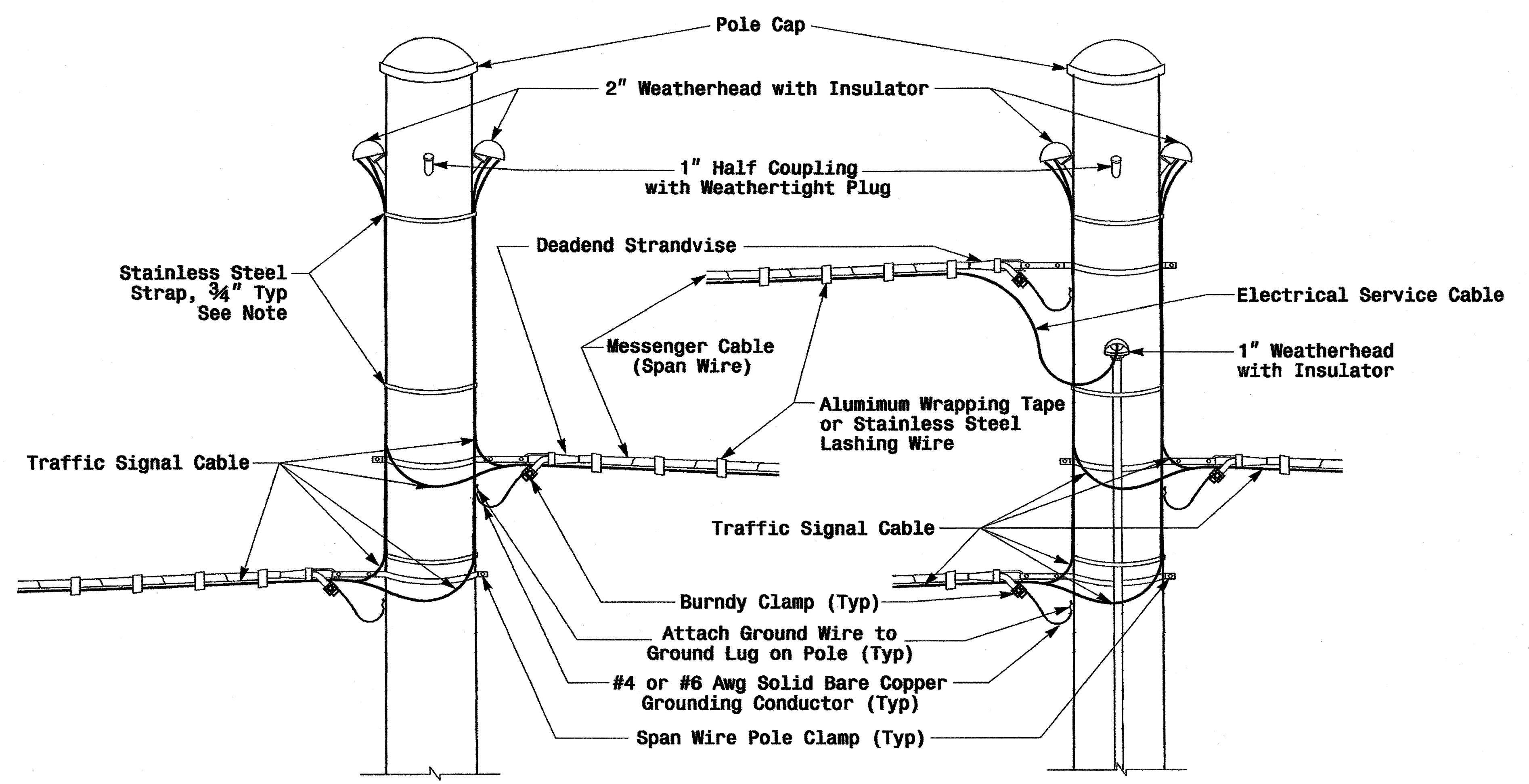
Section A-A
Radial Orientation for Factory Installed Accessories at Top of Pole



Section C-C
Socket Connection Weld Detail

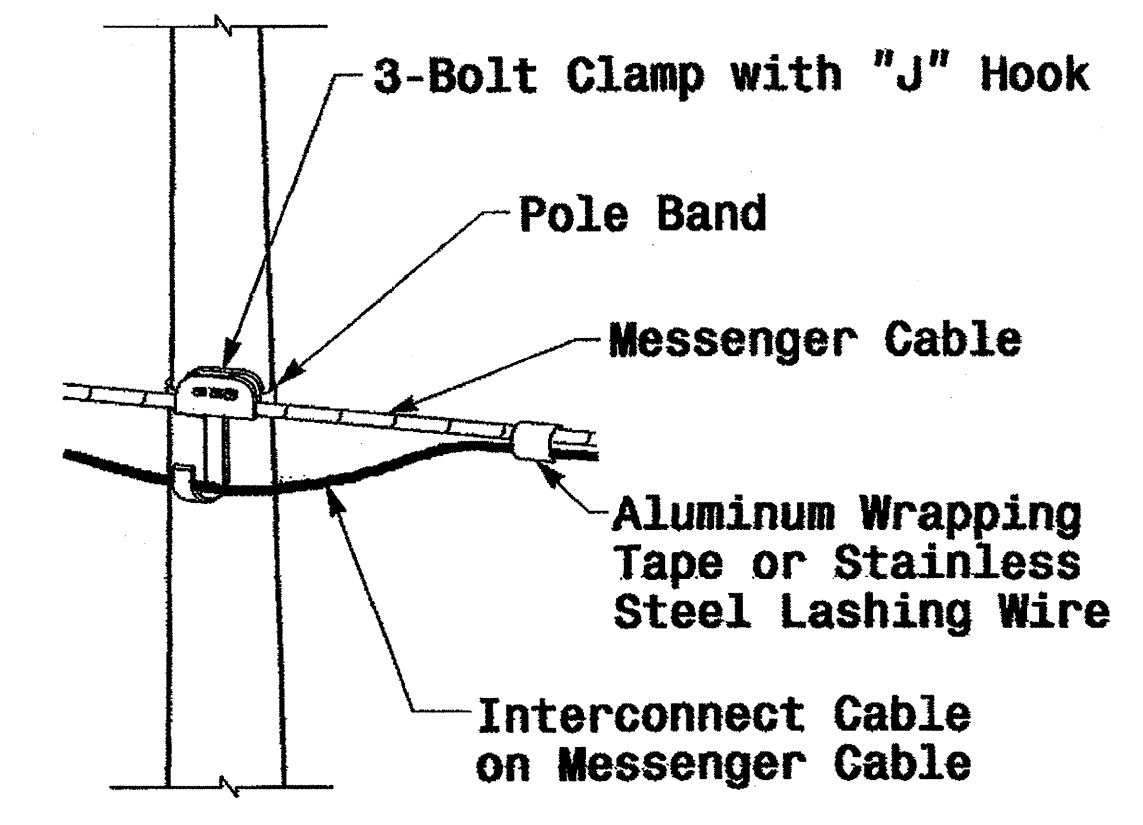
	<p>Typical Fabrication Details For Strain Poles</p>	
	<p>PLAN DATE: May 2005</p>	<p>REVIEWED BY: C.F. Andrews</p>
<p>PREPARED BY: P.L. Alexander</p>	<p>REVIEWED BY: A.M. Esposito</p>	<p>SCALE: 0 NA NONE</p>
<p>REVISIONS</p>	<p>INIT. DATE</p>	<p>SIGNATURE: P. L. Alexander 9.2.2005</p>
<p>SIG. INVENTORY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

01-SEP-2005 14:07 \\p1\work\groups\2004\metal pole standard\2004.m3.dgn pol alexander

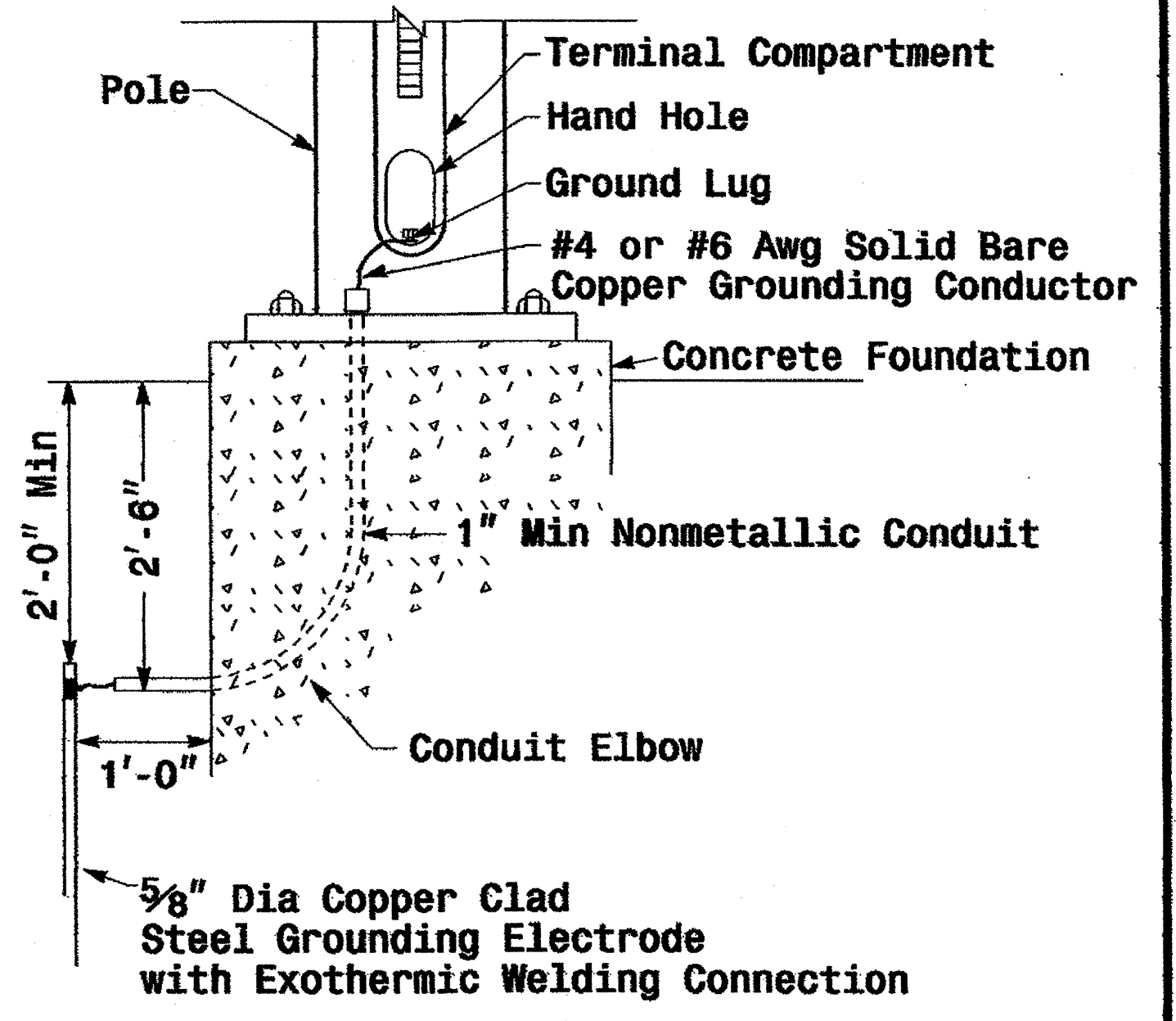


Note: Strap all signal cables to the side of the pole with 3/4\" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36\"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole



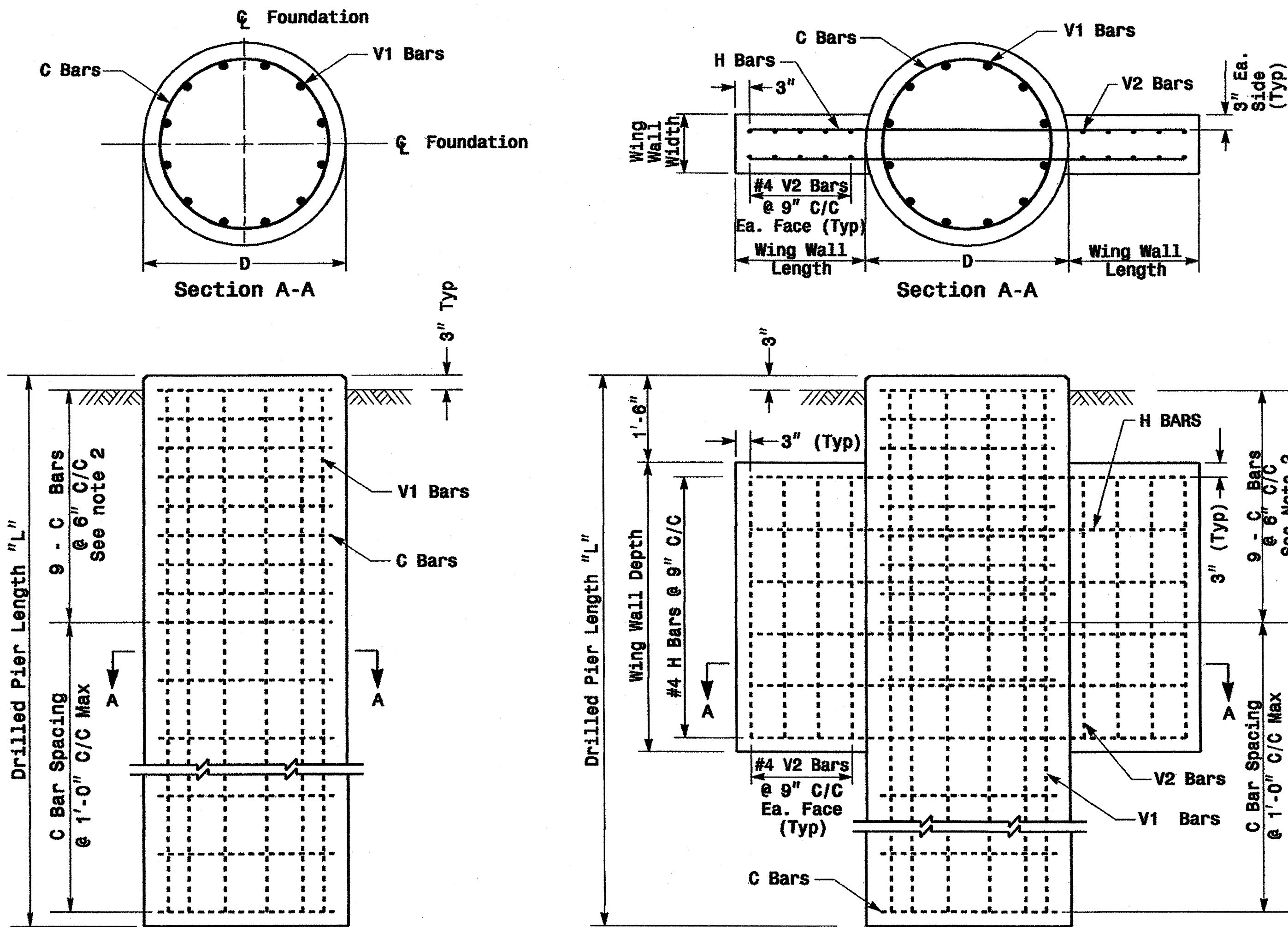
Metal Pole Grounding Detail

Construction Details - Strain Poles

01-SEP-2005 16:33 w:\p001\es-un1\work\gr-cups\2004 metal pole standard\2004 m6.dgn pol1ecorndr

	Construction Details Strain Poles		
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: D.C. SARKAR	
SCALE 0 NA NONE	REVISIONS _____ _____	INIT. DATE _____ _____	SIGNATURE DATE 9-1-05 SIG. INVENTORY NO.

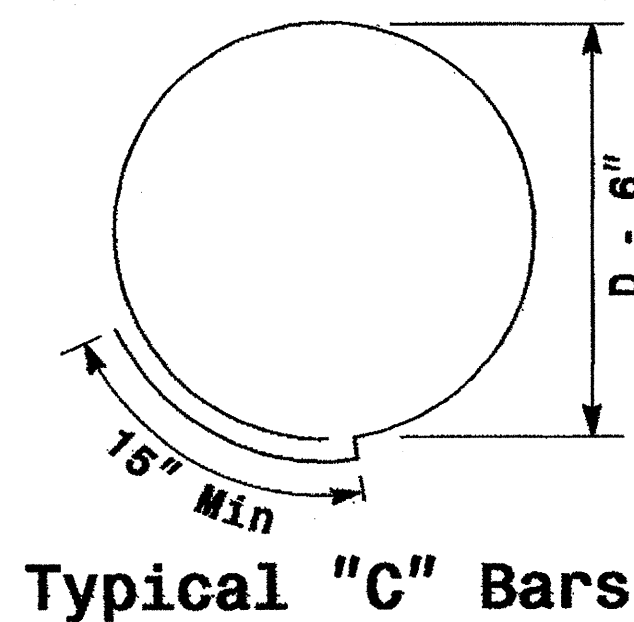
Reinforcing Steel Bars



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

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

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



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

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

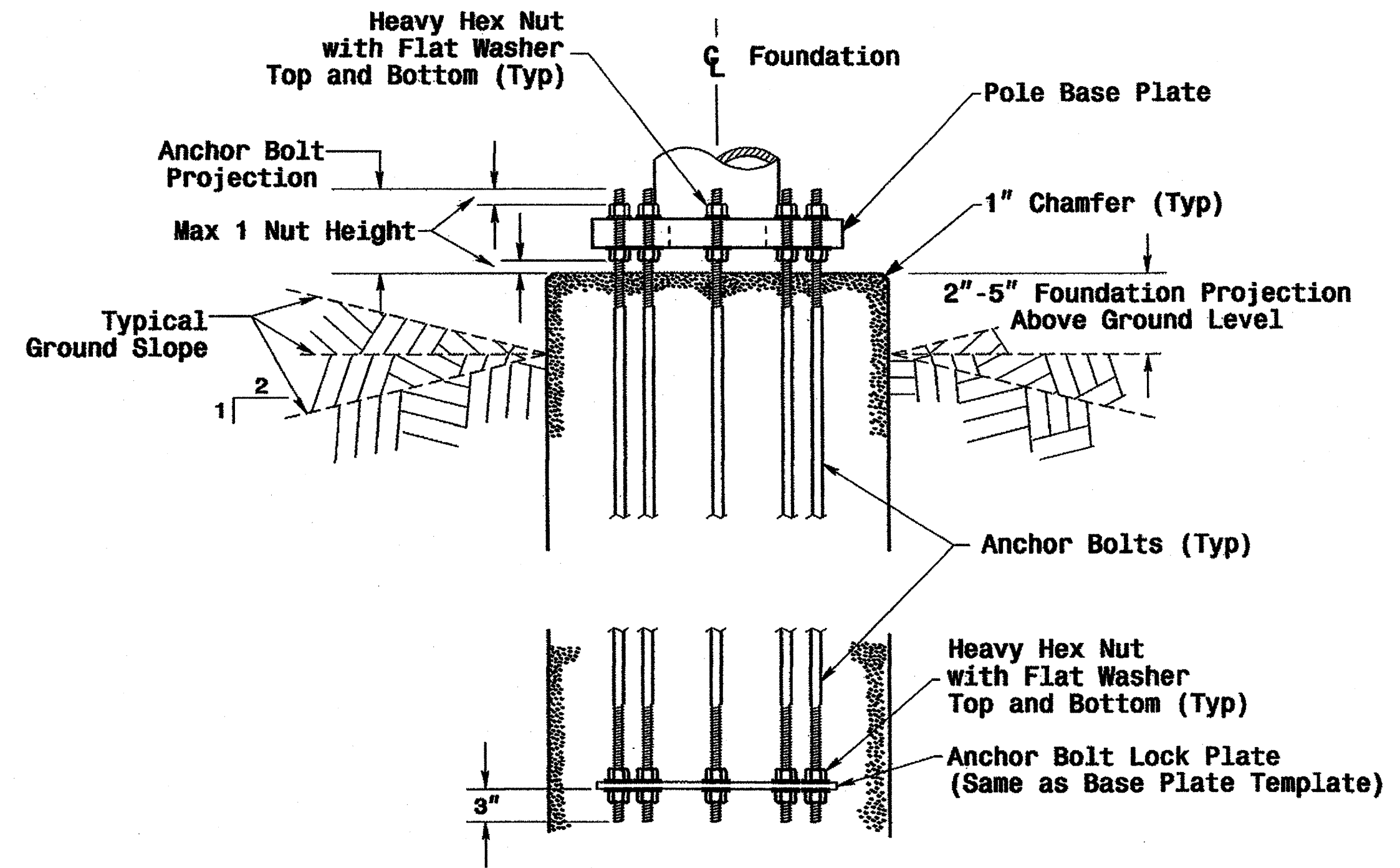
WING WALL DETAILS

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

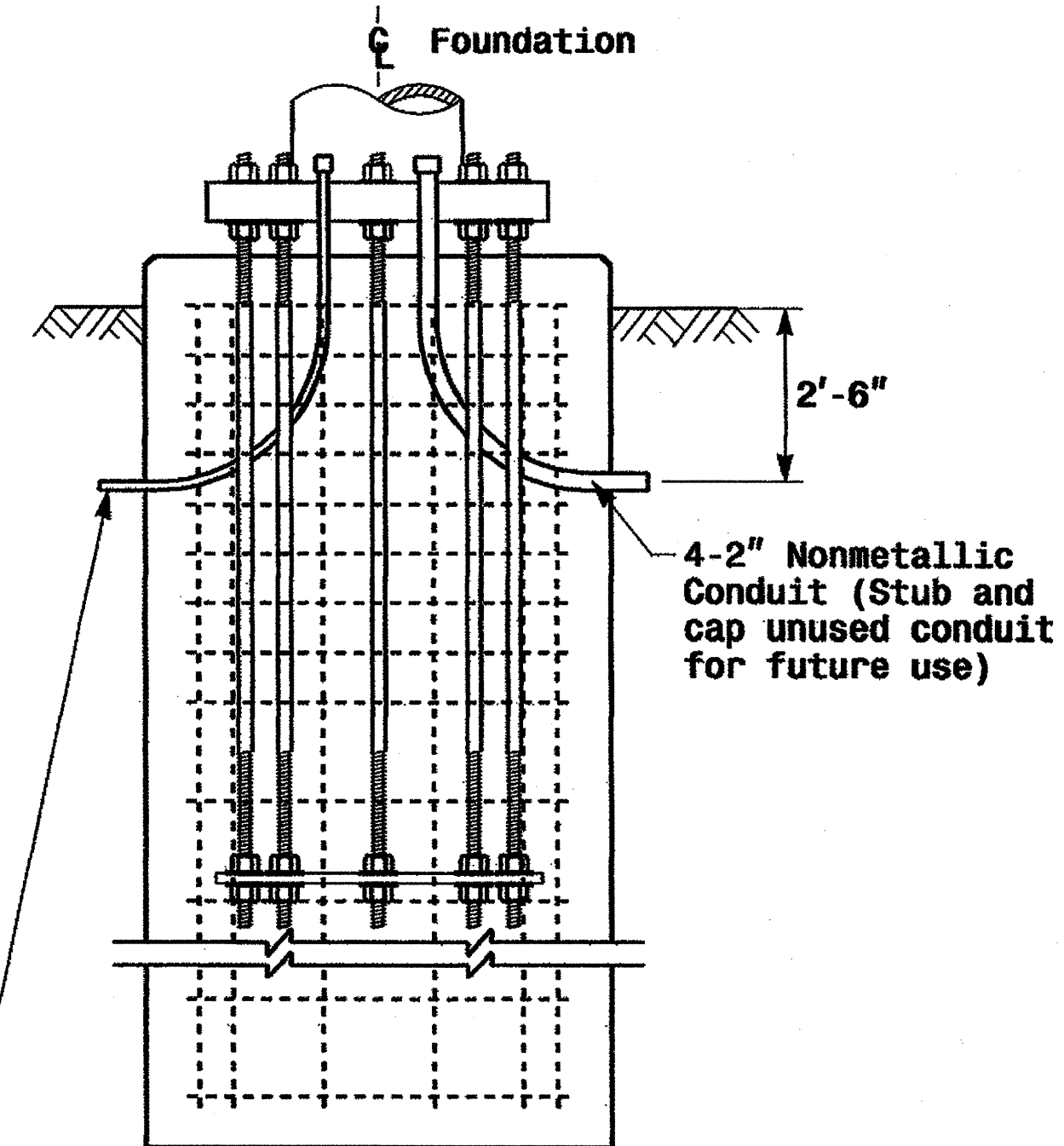
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



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.)

Construction Details - Foundations

01-SEP-2005 11:48 w:\projects\2004\mtr\1\mtr\kpr\cupse2004.mtr\1\pols standard\da2004.mtr.dgn pol alexander

Construction Details Foundations

SCALE: 0 NA NONE

SEAL

DATE: May 2005

REVIEWED BY: P.L. ALEXANDER

PREPARED BY: C.F. ANDREWS

REVIEWED BY: A.M. ESPOSITO

DATE: 9.2.2005

SIG. INVENTORY NO.

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

Concrete Volume (cubic yards) = .356 X L

Fabrication Design Notes:

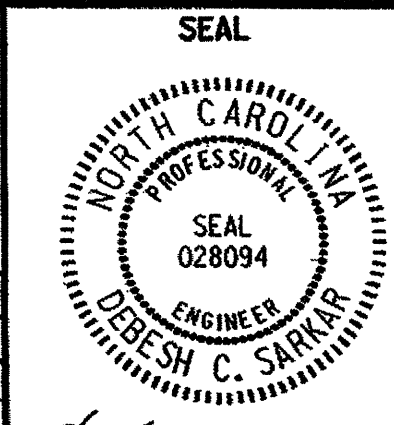
1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.
2. Base plate thickness (T) is 2.0 inches.

Foundation Selection:

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

Standard Strain Poles

02-SEP-2005 12:42 W:\000\ee-un1\workgroups\2004 metal pole standard\2004 me std strain pole.dgn polecander

	Standard Strain Poles and Standard Foundations		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER DEBESH C. SARKAR 028094
	PLAN DATE: May 2005	REVIEWED BY: C.F. Andrews	
SCALE: 0 NA None		REVISIONS:	INIT. DATE:
		SIGNATURE: <i>D. Sarkar</i>	DATE: 9.2.2005

STATE OF NORTH CAROLINA
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RALEIGH, N.C.

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ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

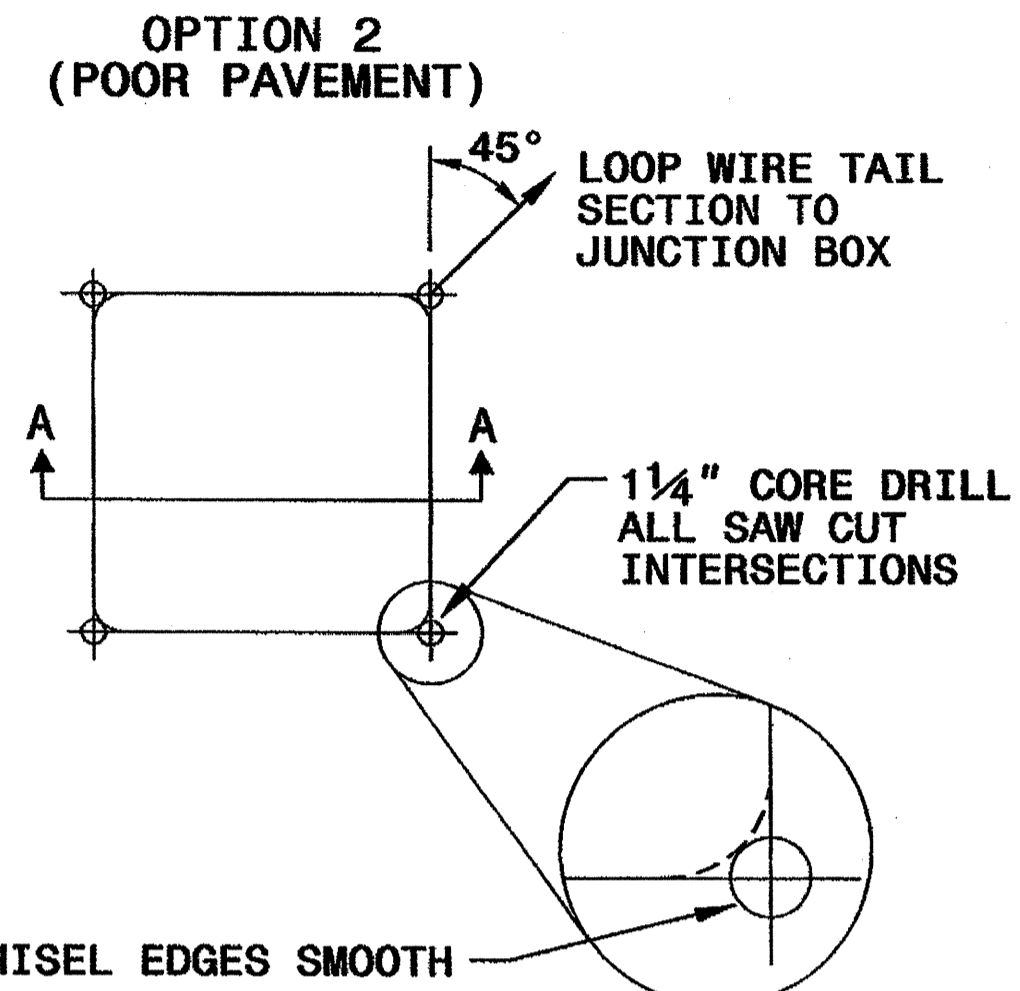
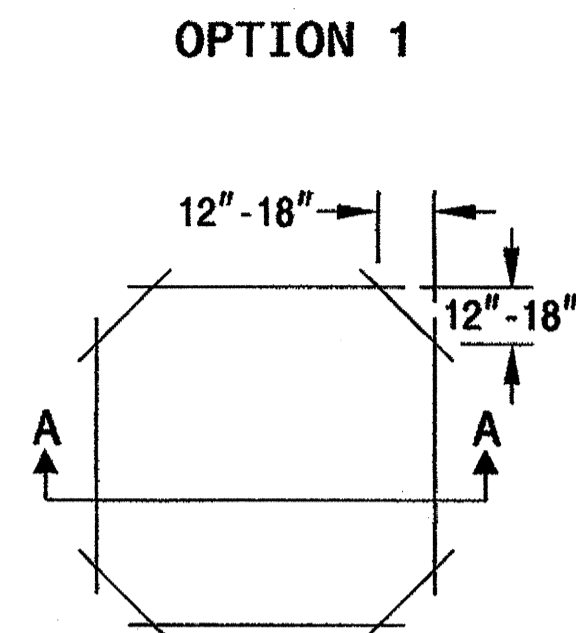
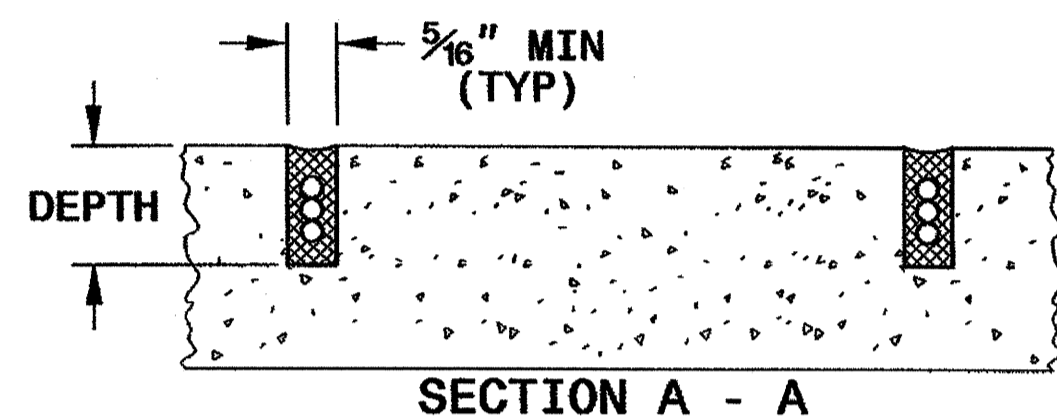
SHEET 1 OF 3
1725D01

CONVENTIONAL 4-SIDED LOOP

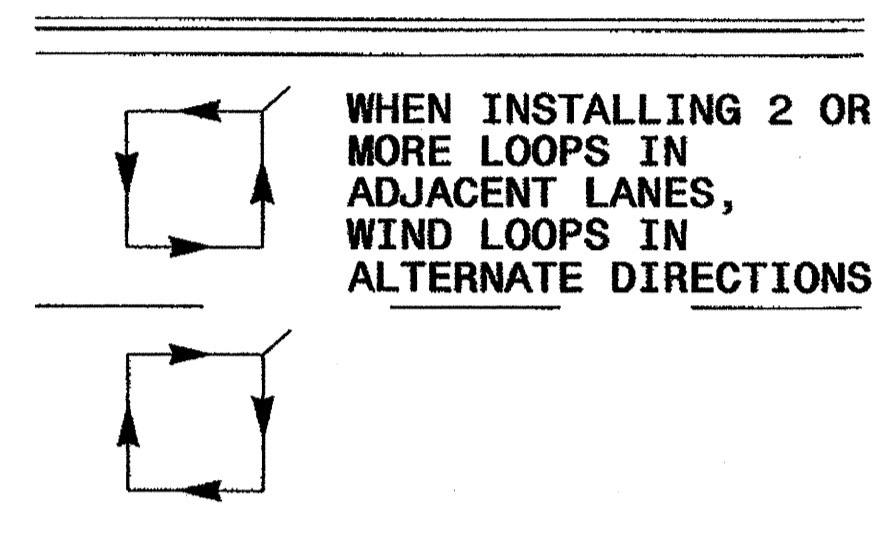
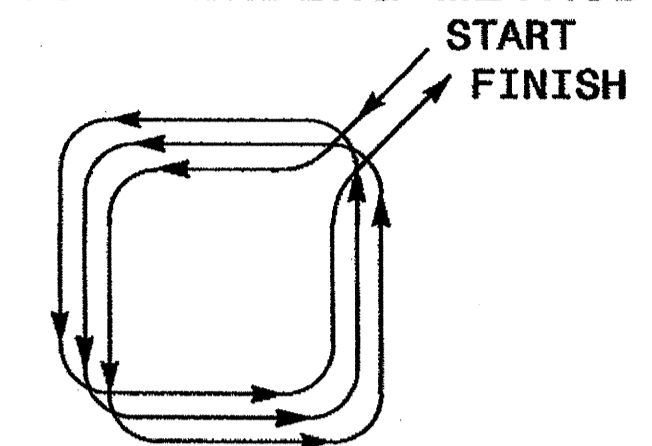
SAW CUT OPTIONS

SAW SLOT DEPTH CHART

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



LOOP WINDING METHOD



LOOP WIRE TWISTING METHOD

INCORRECT WAY TO TWIST WIRE



CORRECT WAY TO TWIST WIRE



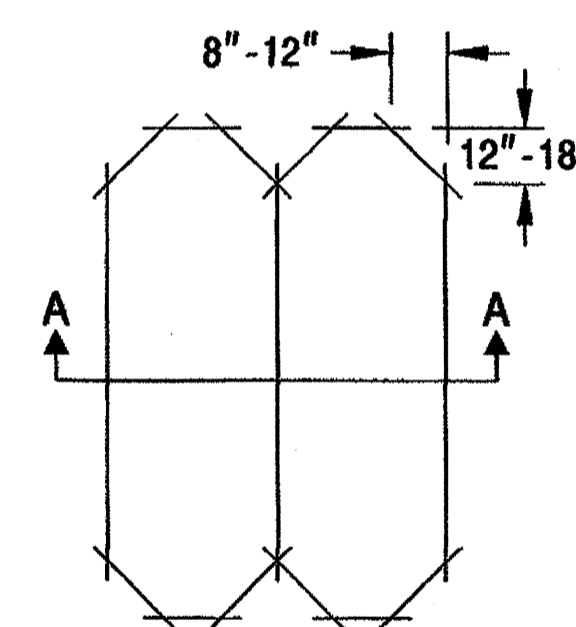
NOTES

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

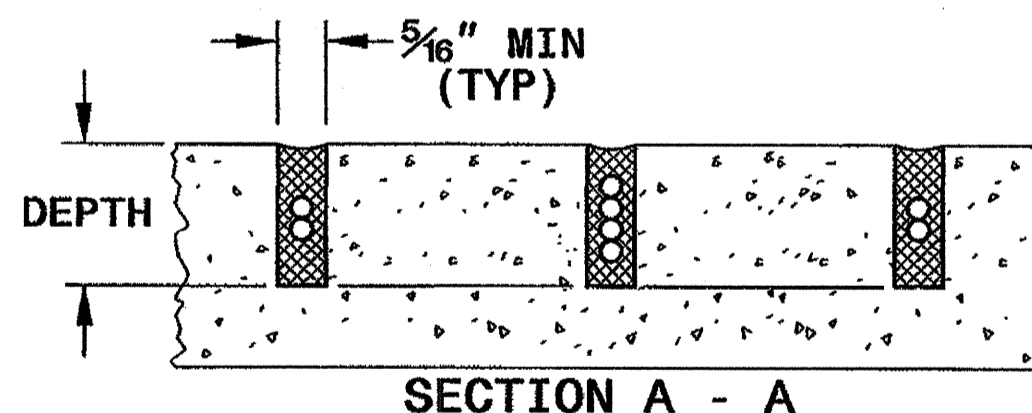
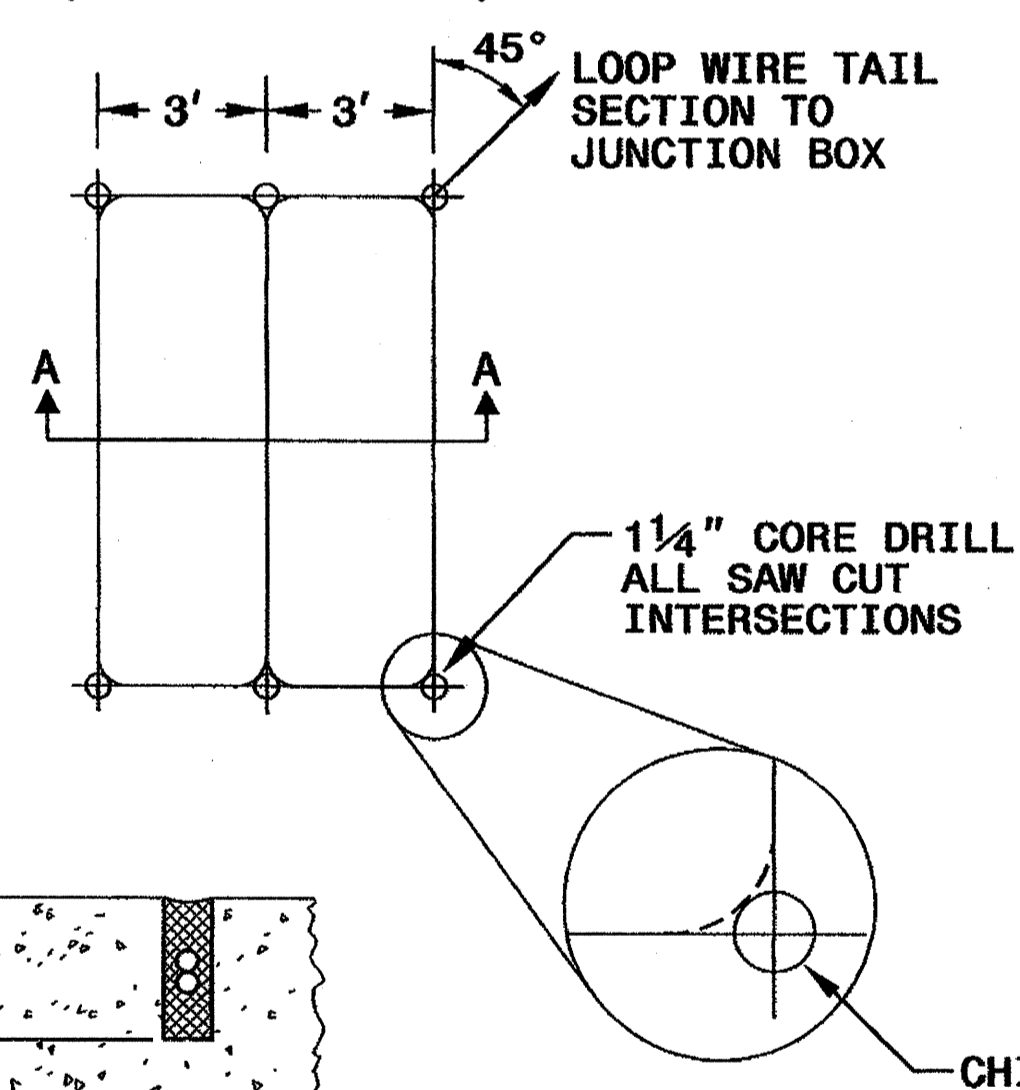
QUADRUPOLE LOOP

SAW CUT OPTIONS

OPTION 1

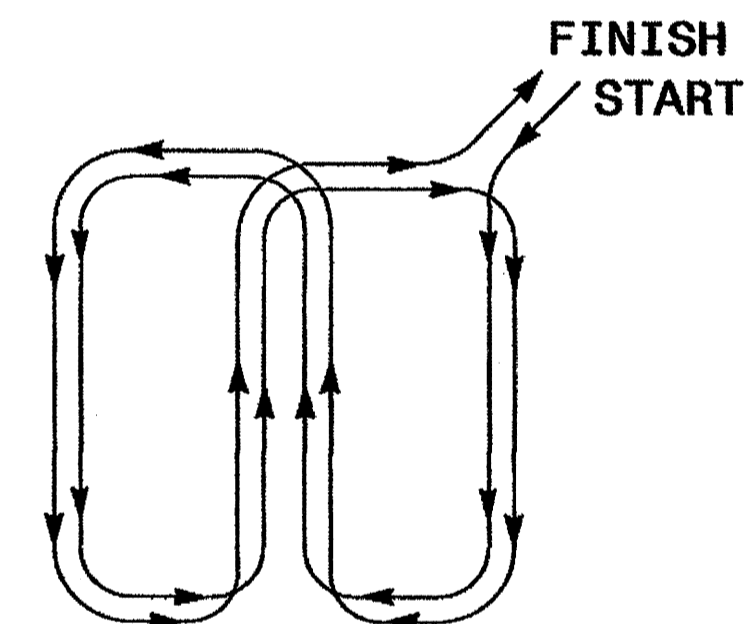


OPTION 2 (POOR PAVEMENT)



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

LOOP WINDING METHOD



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ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

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1725D01

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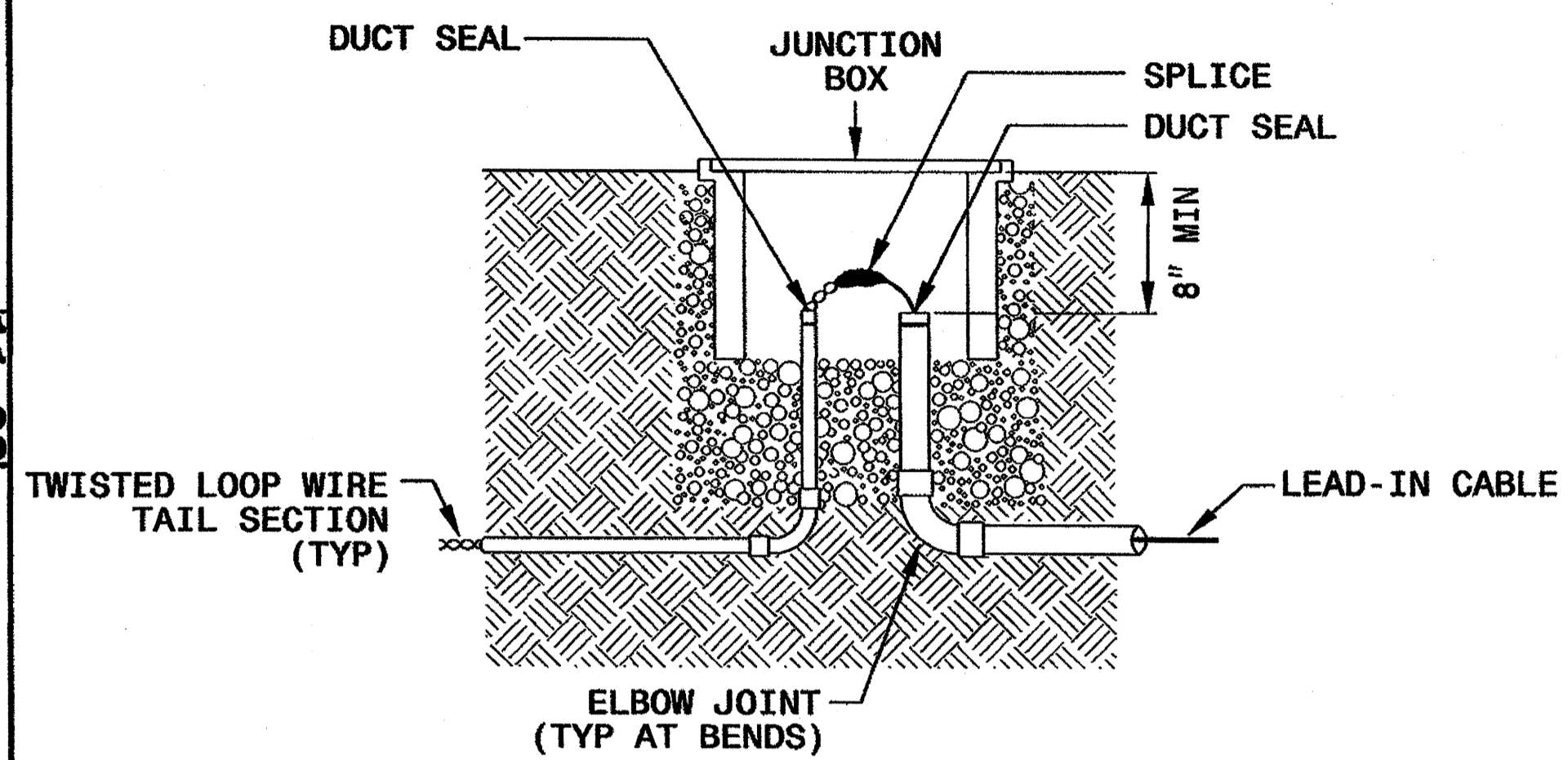
11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

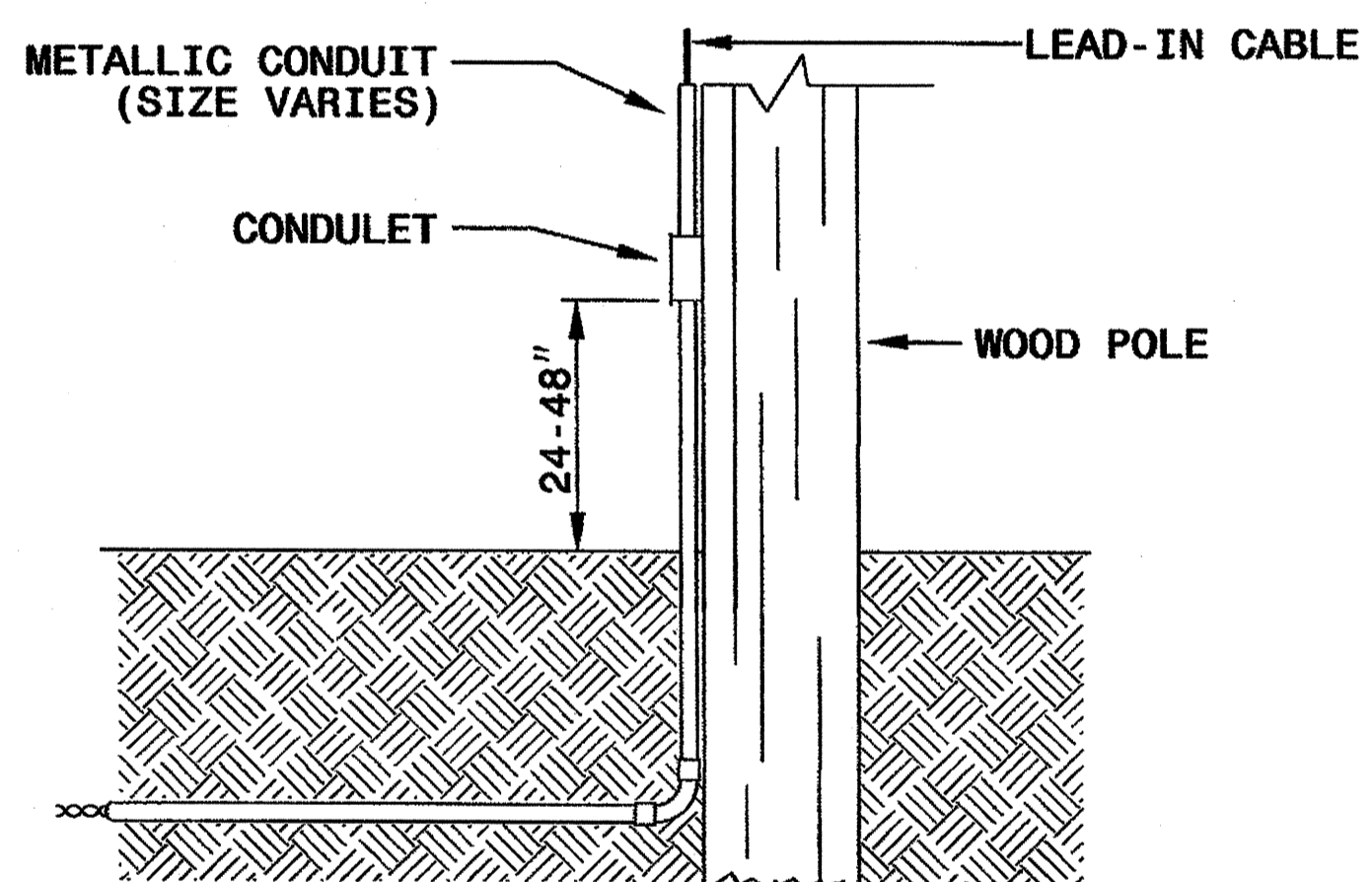
SHEET 2 OF 3
1725D01

LOOP WIRE SPLICE POINT DETAILS

LOOP WIRE AT JUNCTION BOX



LOOP WIRE AT POLE

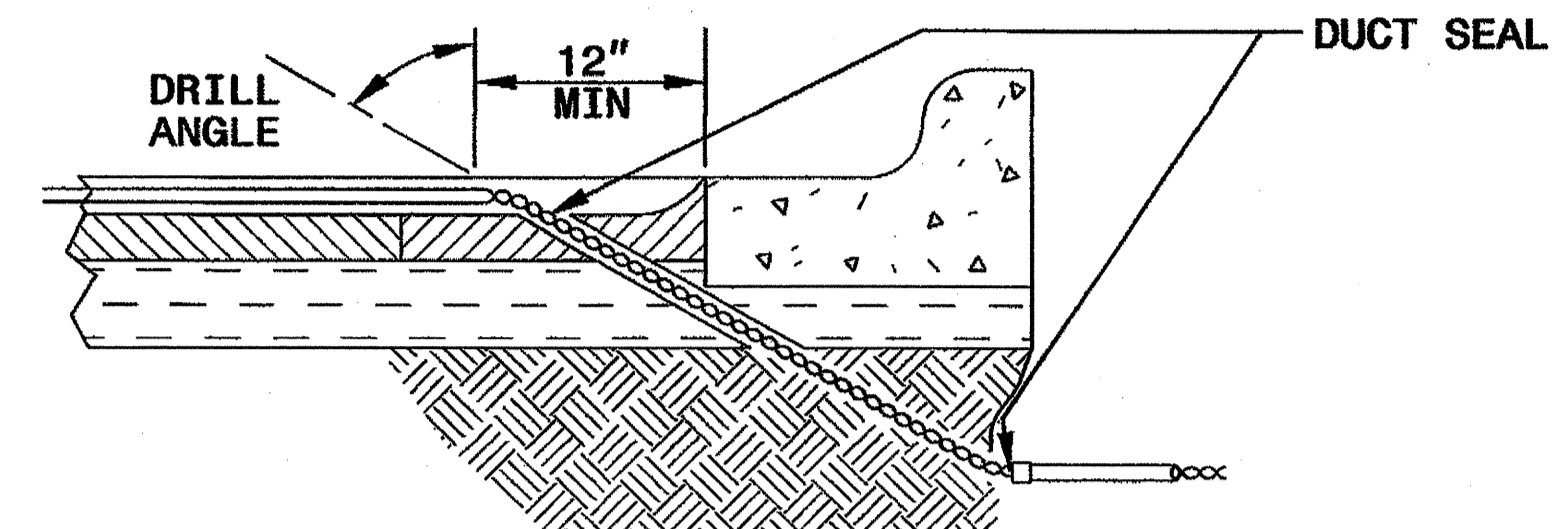


NOTE

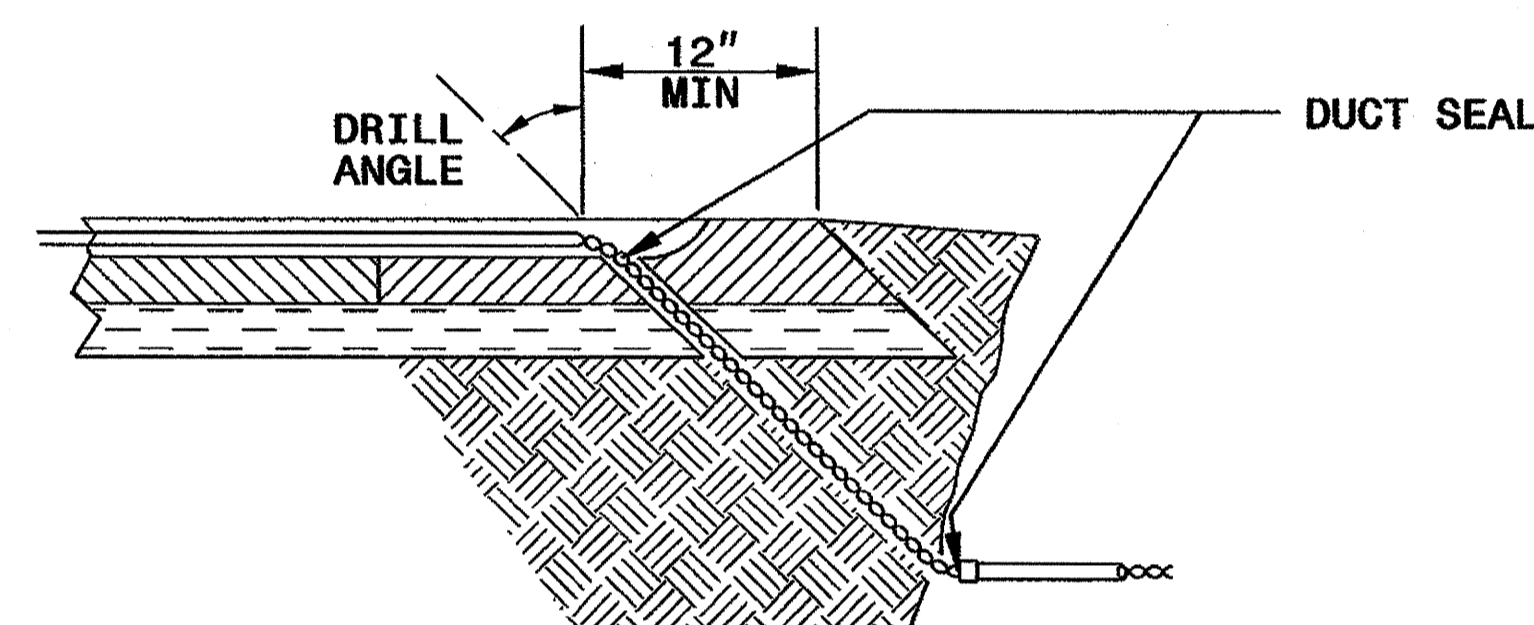
SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

LOOP WIRE PAVEMENT EDGE DETAILS

LOOP WIRE AT CURB & GUTTER SECTION



LOOP WIRE AT PAVEMENT SECTION



NOTES

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

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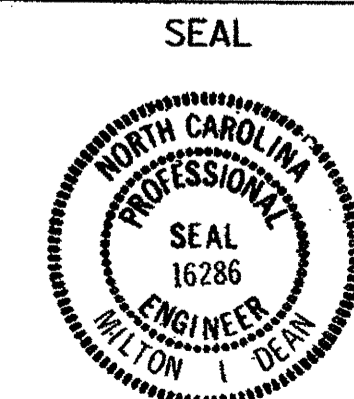
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

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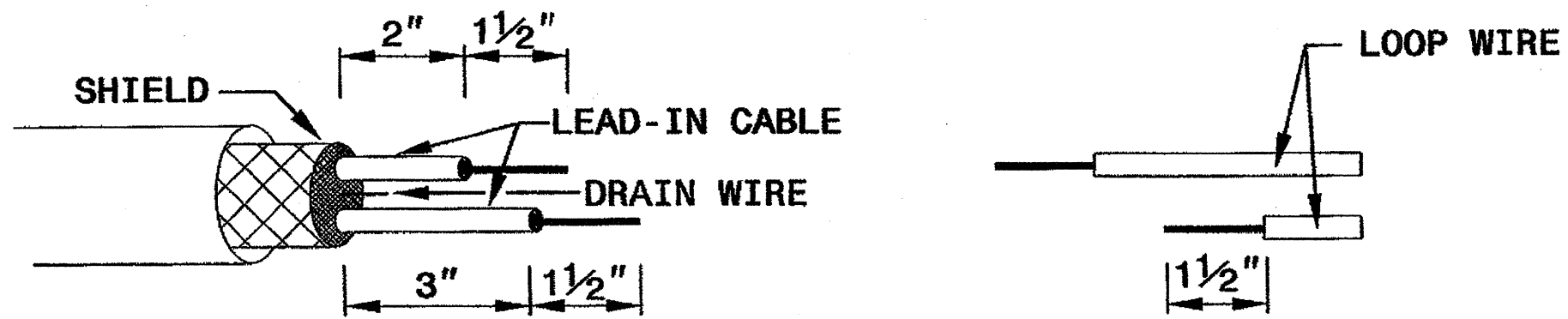
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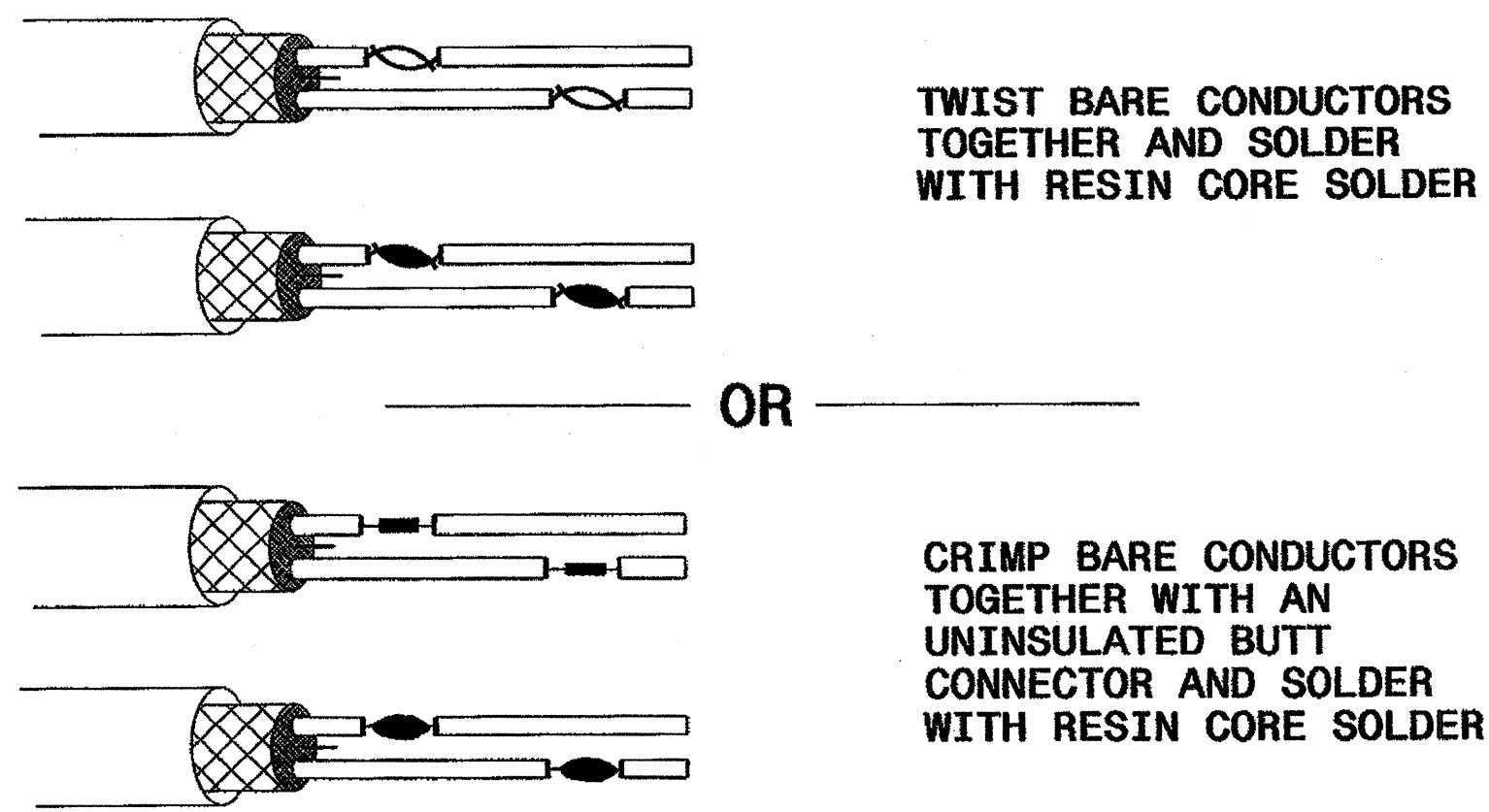
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
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STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE

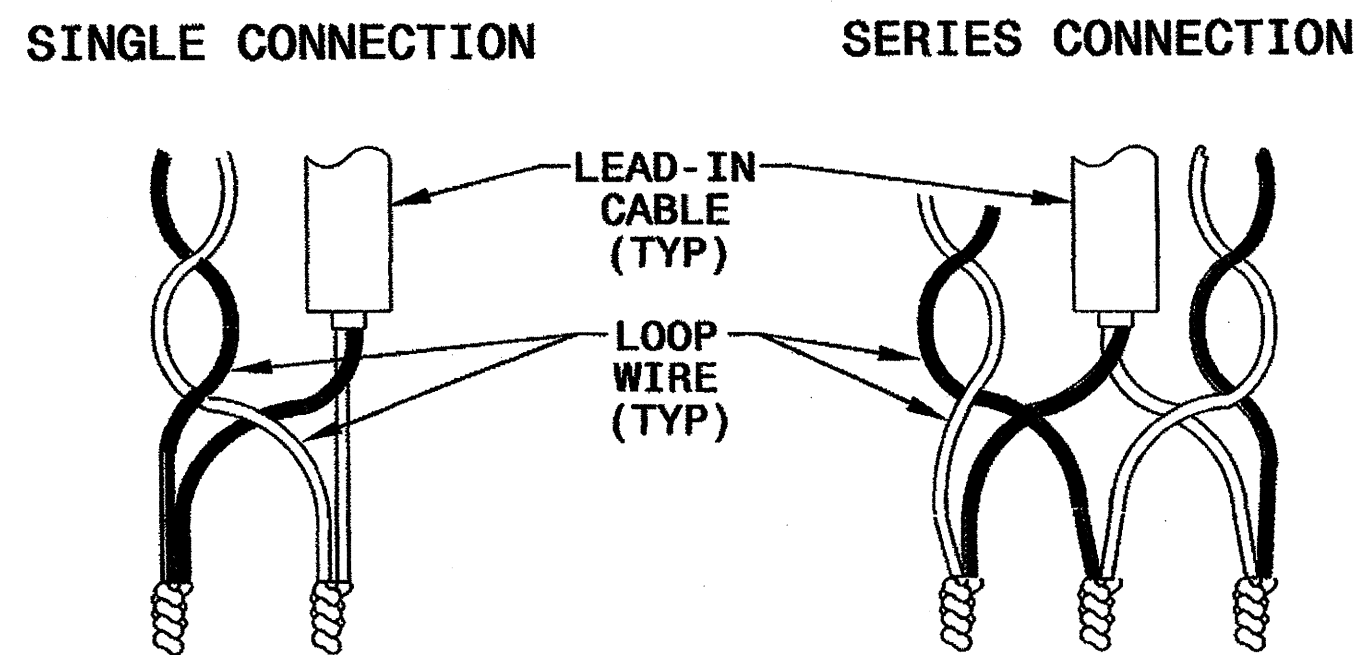


STEP 2. CONNECT AND SOLDER

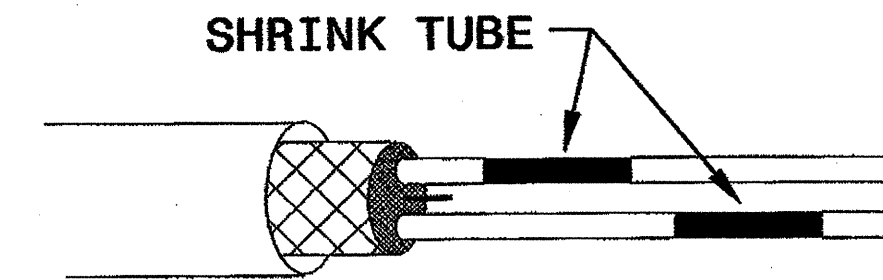


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

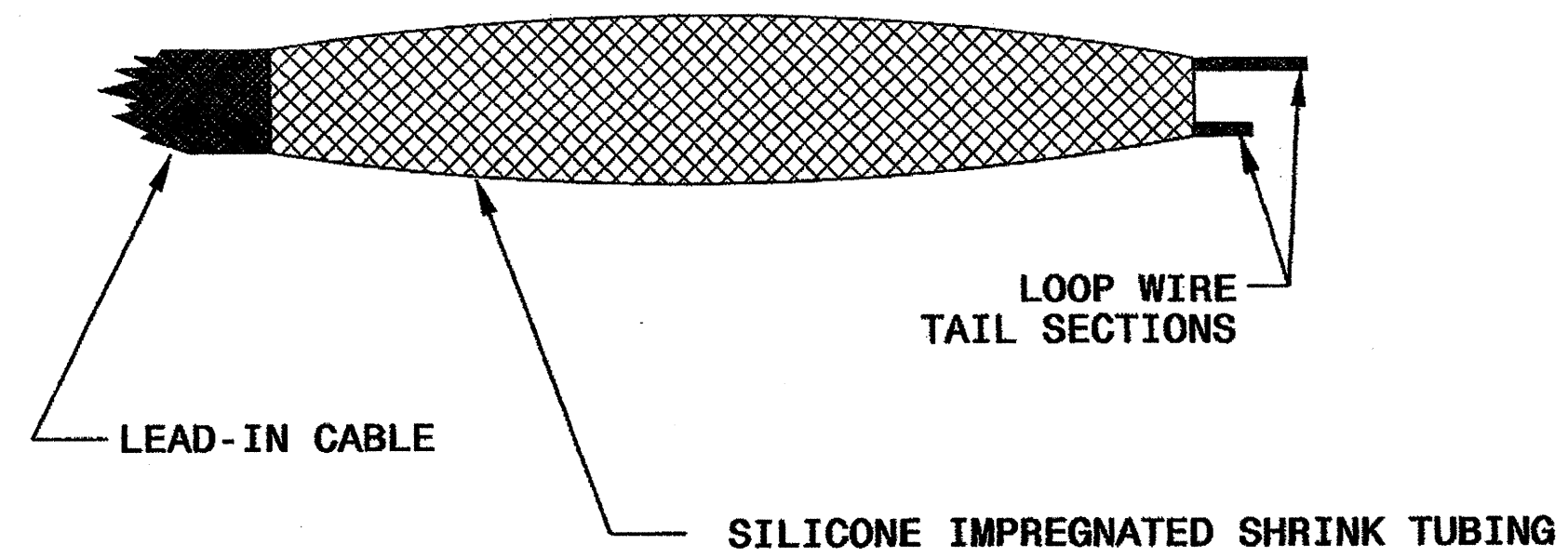
LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY PROTECT SPLICE



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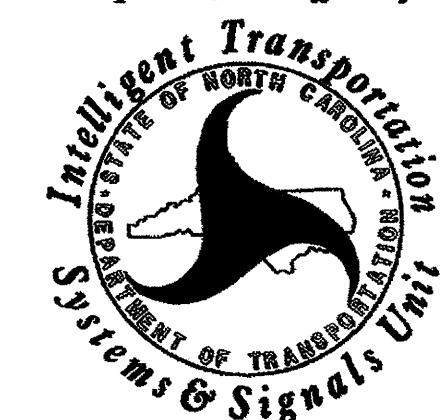
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SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

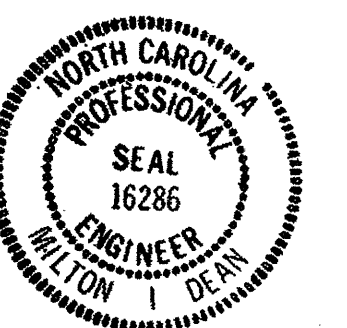
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