

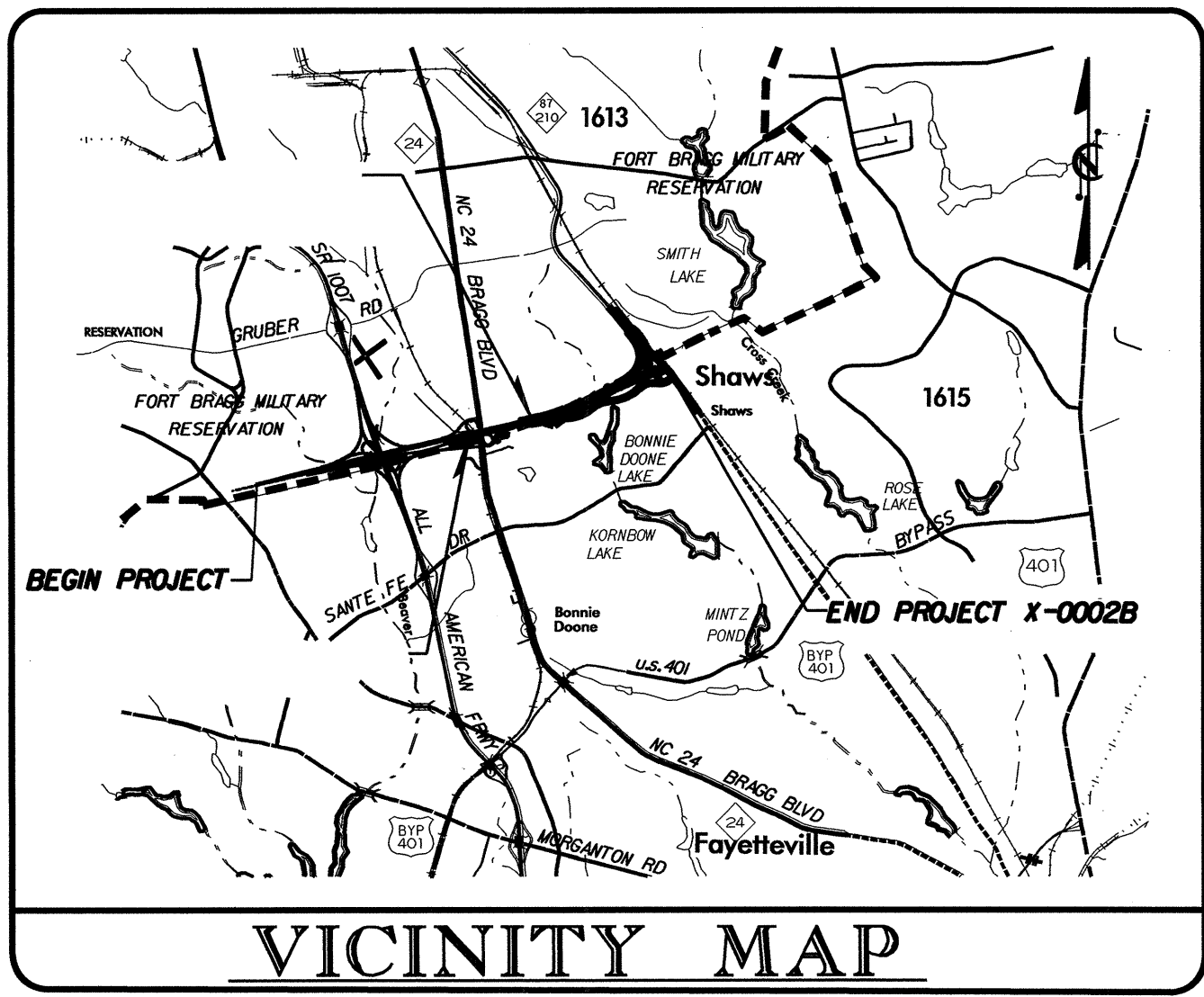
TIP PROJECT: X-0002BB

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

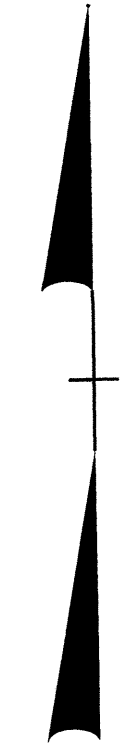
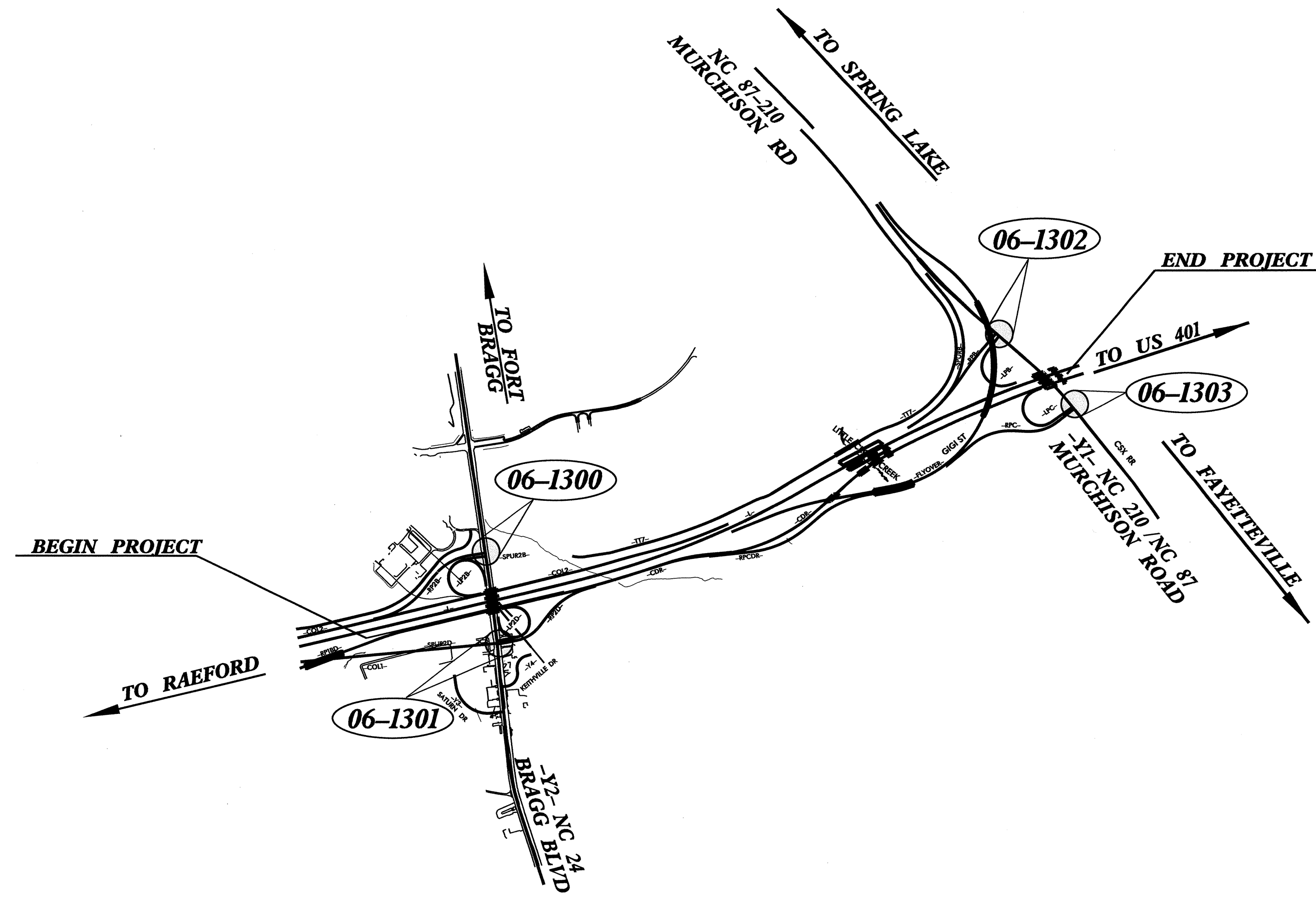
CUMBERLAND COUNTY

**LOCATION: FAYETTEVILLE OUTER LOOP FROM
WEST OF NC 24 TO 1.74 km EAST
OF NC 87 / NC 210 (MURCHISON RD.)**

TYPE OF WORK: TRAFFIC SIGNALS



VICINITY MAP



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

Index of Plans		
Sheet #	Reference #	Location/Description
Sig. 1	n/a	Title Sheet
Sig. 2-3	06-1300	NC 24 (Bragg Boulevard) at I-295 (Fayetteville Outer Loop) Ramp "B"
Sig. 4-5	06-1301	NC 24 (Bragg Boulevard) at I-295 (Fayetteville Outer Loop) Ramp "C"/Loop "D"
Sig. 6-7	06-1302	NC 87/210 (Murchison Rd) at I-295 (Fayetteville Outer Loop) Ramp "B"/Loop "B"
Sig. 8-9	06-1303	NC 87/210 (Murchison Rd) at I-295 (Fayetteville Outer Loop) Off Ramp/On Loop "C"
Sig. 10-14	n/a	Cable Routing
Sig. 15-20	n/a	Metal Pole Standards
Sig. 21-23	n/a	Loop Typicals

Transportation Mobility and Safety Division

Contacts:

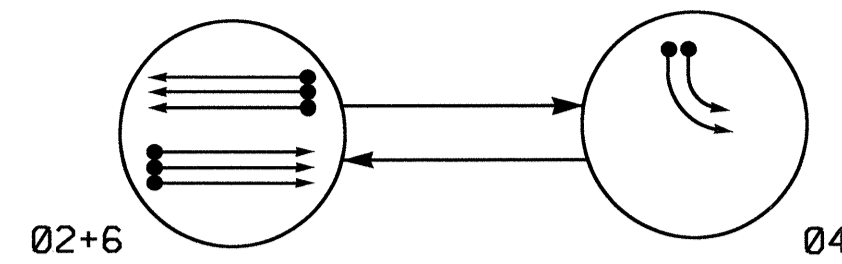
Jason Galloway, PE - Eastern Region Signals Project Engineer
George Brown, PE - Signal Equipment Engineer
Gregg Fuller, PE - State ITS and Signals Engineer

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

750 N. Greenfield Parkway, Garner, NC 27529

19-JUN-2012 08:42
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PHASING DIAGRAM

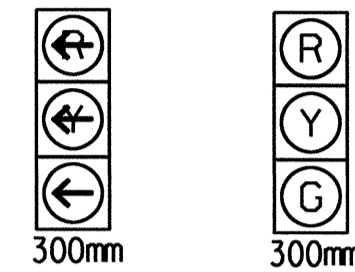


PHASING DIAGRAM DETECTION LEGEND
 ● DETECTED MOVEMENT
 ○ UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 - - - PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE		
	02+6	04	FLASH
21,22,23	G	R	Y
41,42	R	-	R
61,62,63	G	R	Y

SIGNAL FACE I.D.D.

All Heads L.E.D.



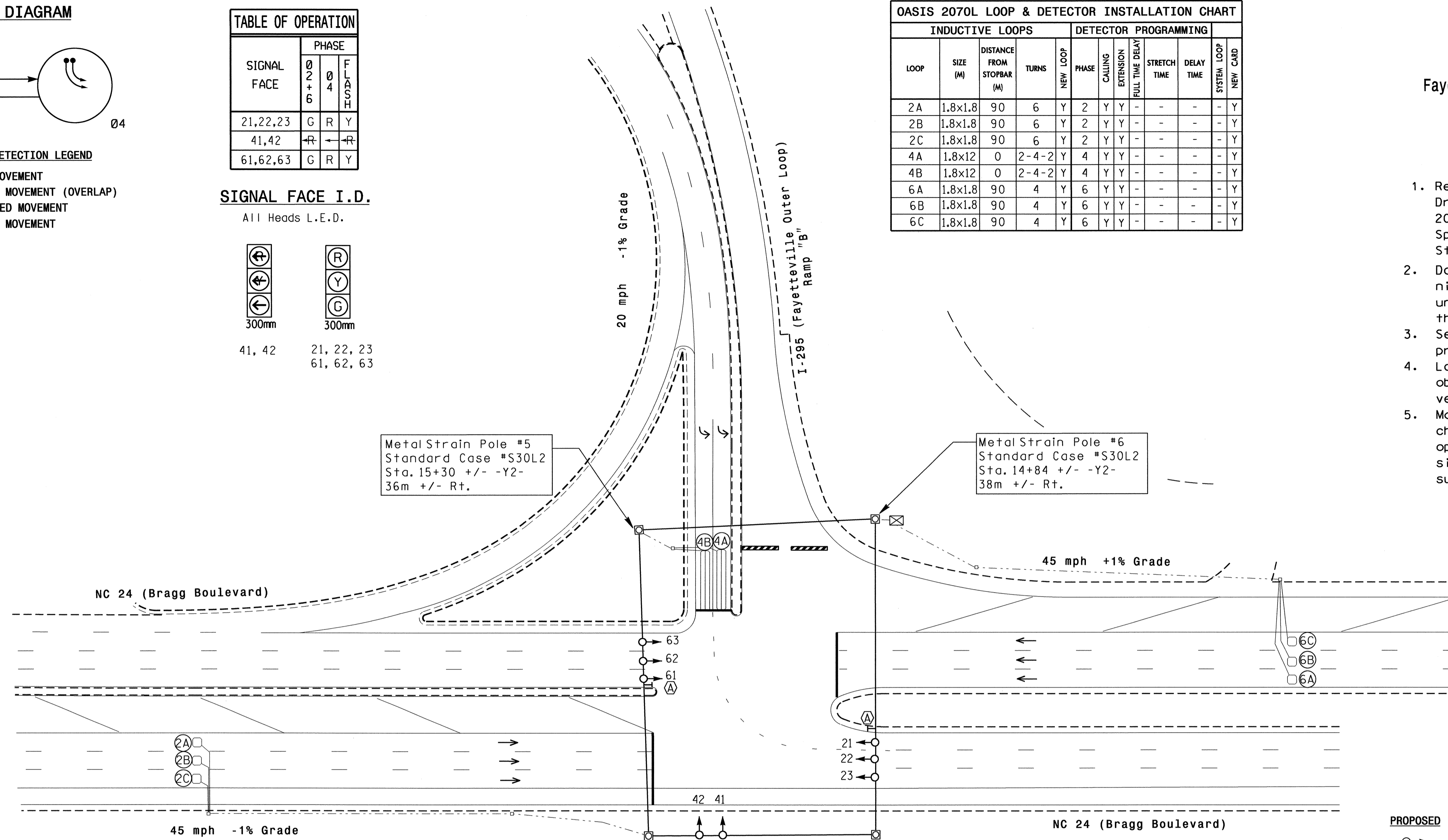
41, 42 21, 22, 23
61, 62, 63

INDUCTIVE LOOPS				DETECTOR PROGRAMMING								
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	1.8x1.8	90	6	Y	2	Y	Y	-	-	-	-	Y
2B	1.8x1.8	90	6	Y	2	Y	Y	-	-	-	-	Y
2C	1.8x1.8	90	6	Y	2	Y	Y	-	-	-	-	Y
4A	1.8x1.2	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	1.8x1.2	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
6A	1.8x1.8	90	4	Y	6	Y	Y	-	-	-	-	Y
6B	1.8x1.8	90	4	Y	6	Y	Y	-	-	-	-	Y
6C	1.8x1.8	90	4	Y	6	Y	Y	-	-	-	-	Y

2 Phase Fully Actuated Fayetteville Signal System

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. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



FEATURE	PHASE		
	2	4	6
Min Green 1*	12	7	12
Extension 1*	6.0	2.0	6.0
Max Green 1*	90	30	90
Yellow Clearance	4.6	3.0	4.4
Red Clearance	1.8	3.7	1.5
Walk 1*	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation*	1.0	-	1.0
Max Variable Initial*	34	-	34
Time Before Reduction*	15	-	15
Time To Reduce*	45	-	45
Minimum Gap	3.0	-	3.0
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	Modified Signal Head
⊥	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
⊠	Metal Strain Pole	⊠	Metal Strain Pole
⊠	Inductive Loop Detector	⊠	Inductive Loop Detector
⊠	Controller & Cabinet	⊠	Controller & Cabinet
⊠	Junction Box	⊠	Junction Box
- - -	50mm Underground Conduit	- - -	50mm Underground Conduit
N/A	Right of Way	- - -	Right of Way
→	Directional Arrow	→	Directional Arrow
⊠	No U-Turn Sign (R3-4)	⊠	No U-Turn Sign (R3-4)

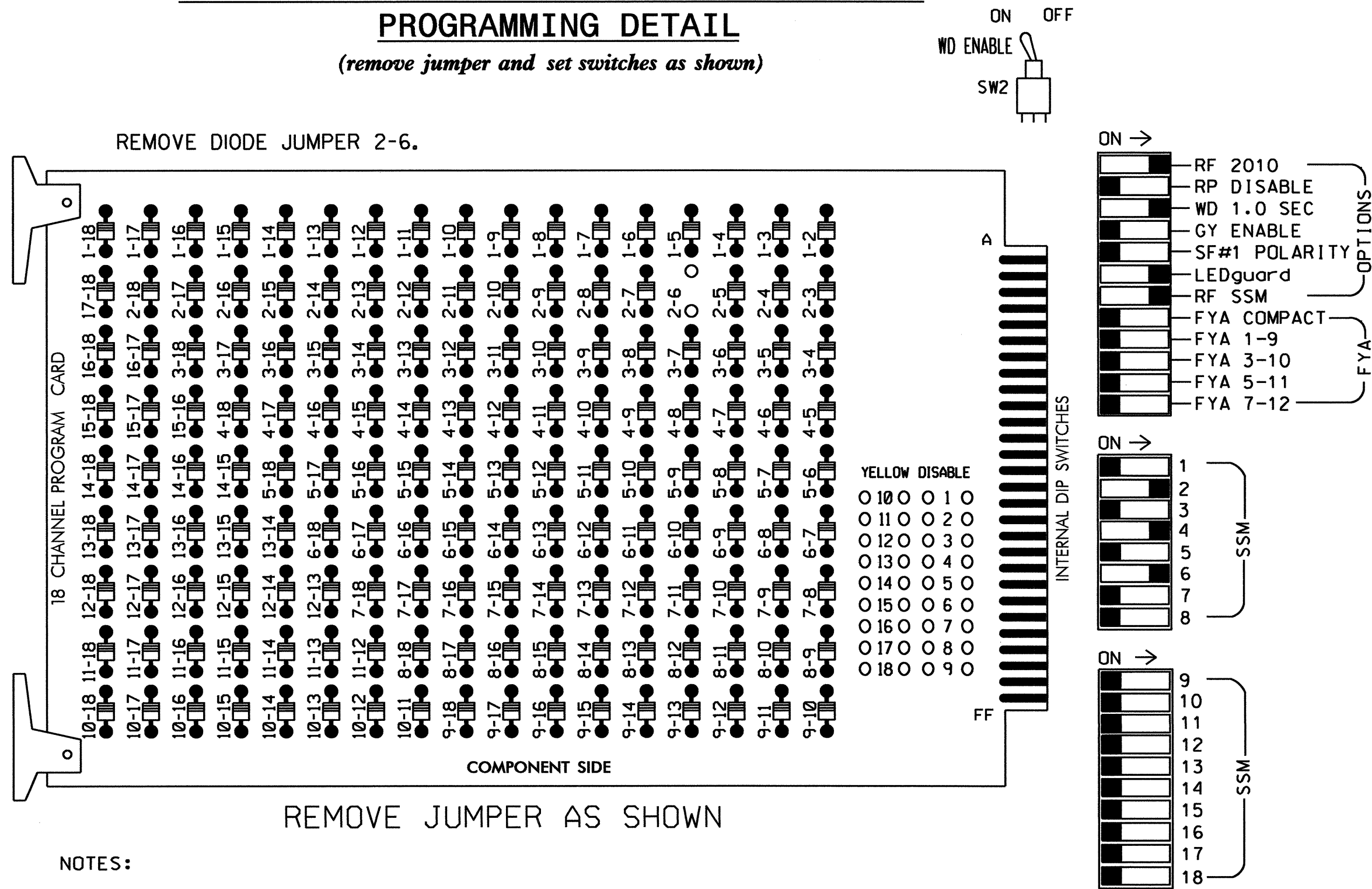
New Installation

	NC 24 (Bragg Boulevard) at I-295 (Fayetteville Outer Loop) Ramp "B"		
	Division 06 Cumberland County Fayetteville		
PLAN DATE: May 2012 PREPARED BY: EM Minshew SCALE: 1:500	REVIEWED BY: JP Galloway, PE DATE: 5/17/12		SIG. INVENTORY NO. 06-1300

EDI MODEL 2018ECL-NC CONFLICT MONITOR

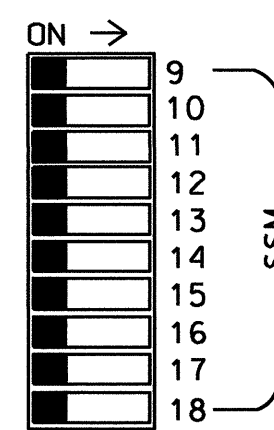
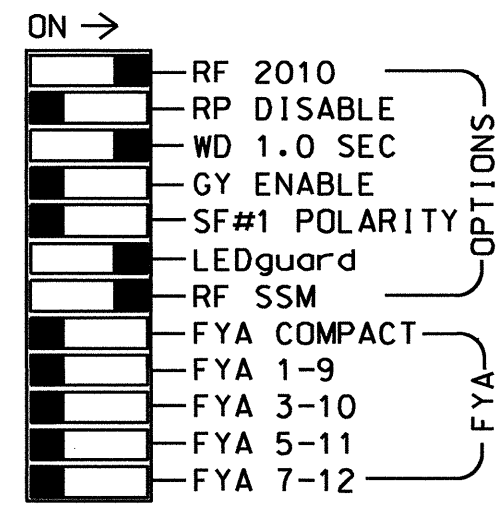
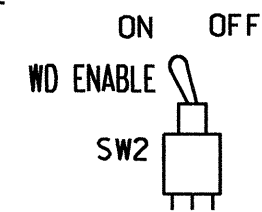
PROGRAMMING DETAIL

(remove jumper 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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.



■ = 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. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Fayetteville Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S5,S8
 PHASES USED.....2,4,6
 OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21, 22,23	NU	NU	41,42	NU	NU	61, 62,63	NU	NU	NU	NU
RED		128						134				
YELLOW		129						135				
GREEN		130						136				
RED ARROW						101						
YELLOW ARROW						102						
GREEN ARROW						103						

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	S	∅ 2	∅ 2	S	S	∅ 4	S	S	S	S	S	S	S	FS
"I" L	∅ 2	2A	2C	∅ 2	∅ 2	4A	∅ 2	∅ 2	∅ 2	∅ 2	∅ 2	∅ 2	∅ 2	DC ISOLATOR
FILE "J" U	S	∅ 6	∅ 6	S	S	∅ 6	S	S	S	S	S	S	S	ST
"J" L	∅ 6	6A	6C	∅ 6	∅ 6	6B	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	DC ISOLATOR

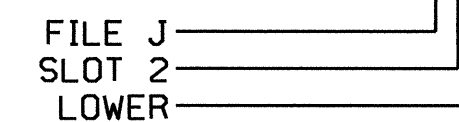
EX. : 1A, 2A, ETC. = LOOP NO.'S

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	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
6C	TB3-9,10	J3U	64	26	36	6	Y	Y			

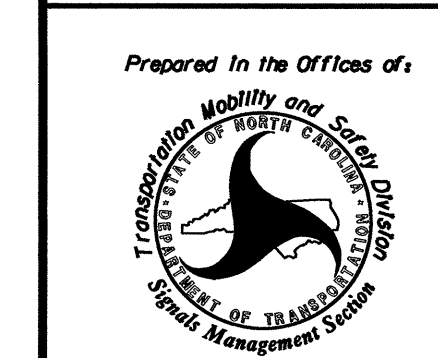
INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1300
 DESIGNED: May 2012
 SEALED: 05/17/12
 REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:



Prepared In the Offices of:
 Transportation Mobility and Safety
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 Signal Management Section
 750 N. Greenfield Pkwy, Garner, NC 27529

NC 24 (Bragg Boulevard) at I-295 (Fayetteville Outer Loop) Ramp "B"

Division 6 Cumberland County Fayetteville

PLAN DATE: May 2012 REVIEWED BY: T. Lynn

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

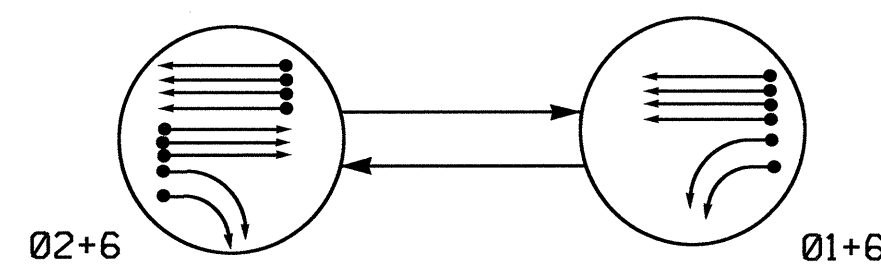
SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 022013
 GEORGE C. BROWN

Signature: *George C. Brown* 5/18/12
 DATE

SIG. INVENTORY NO. 06-1300

PHASING DIAGRAM



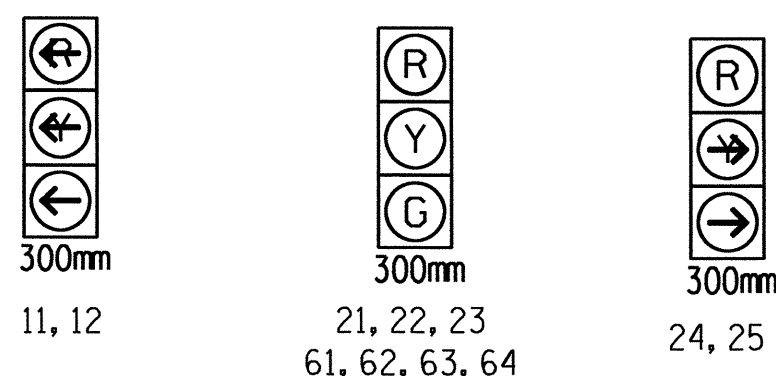
PHASING DIAGRAM DETECTION LEGEND
 ← ● DETECTED MOVEMENT
 ← UNDETECTED MOVEMENT (OVERLAP)
 ← - - - UNSIGNALIZED MOVEMENT
 ← - - - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE	
	02+6	01+6
11,12	R	R
21,22,23	G	R
24,25	R	Y
61,62,63,64	G	Y

SIGNAL FACE I.D.

Denotes L.E.D.



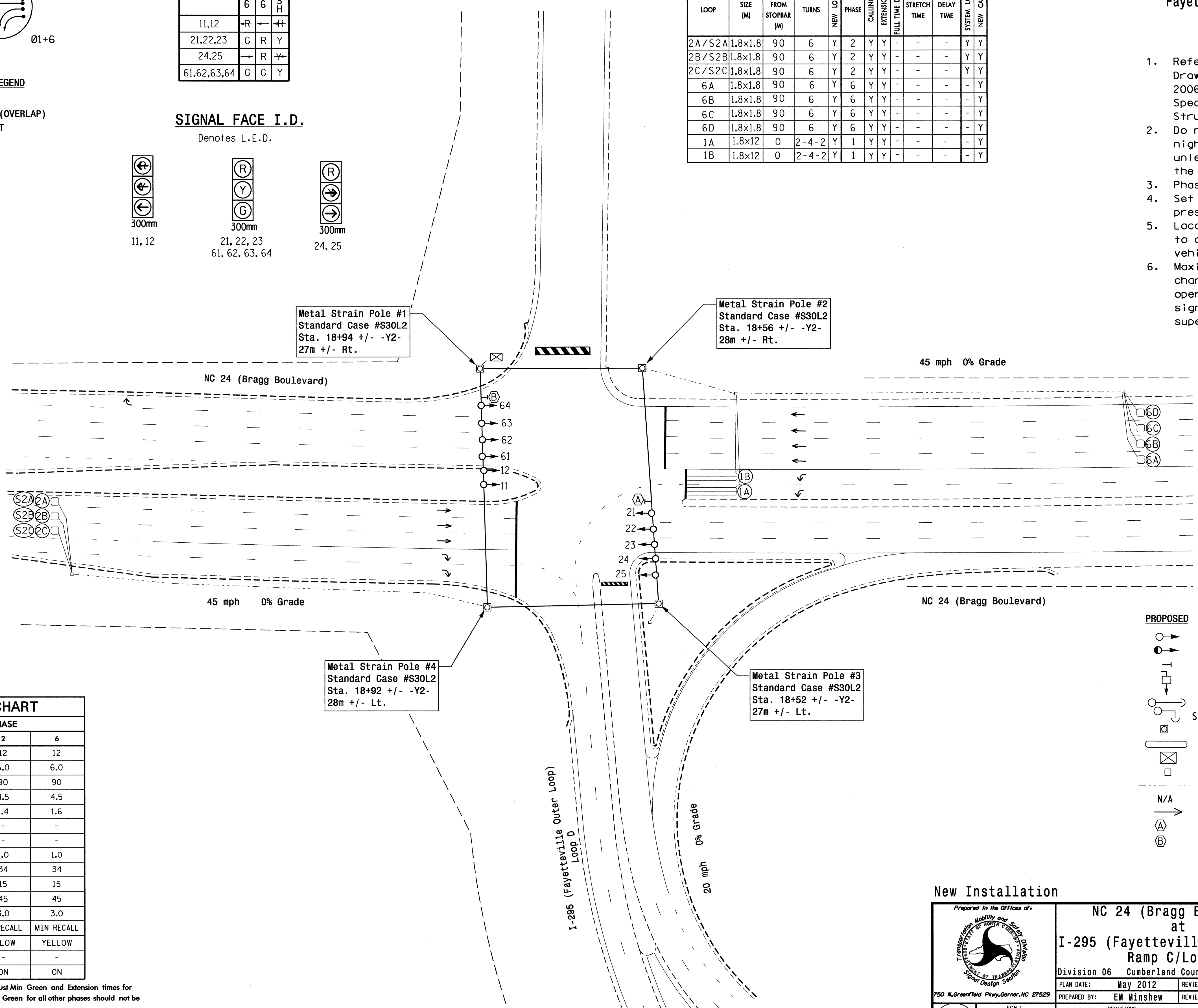
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS				DETECTOR PROGRAMMING								
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A/S2A	1.8x1.8	90	6	Y	2	Y	Y	-	-	-	Y	Y
2B/S2B	1.8x1.8	90	6	Y	2	Y	Y	-	-	-	Y	Y
2C/S2C	1.8x1.8	90	6	Y	2	Y	Y	-	-	-	Y	Y
6A	1.8x1.8	90	6	Y	6	Y	Y	-	-	-	Y	Y
6B	1.8x1.8	90	6	Y	6	Y	Y	-	-	-	Y	Y
6C	1.8x1.8	90	6	Y	6	Y	Y	-	-	-	Y	Y
6D	1.8x1.8	90	6	Y	6	Y	Y	-	-	-	Y	Y
1A	1.8x12	0	2-4-2	Y	1	Y	Y	-	-	-	Y	Y
1B	1.8x12	0	2-4-2	Y	1	Y	Y	-	-	-	Y	Y

2 Phase Fully Actuated Fayetteville Signal System

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 1 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



2070L TIMING CHART

FEATURE	PHASE		
	1	2	6
Min Green 1 *	7	12	12
Extension 1 *	2.0	6.0	6.0
Max Green 1 *	20	90	90
Yellow Clearance	3.0	4.5	4.5
Red Clearance	3.6	1.4	1.6
Walk 1 *	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation *	-	1.0	1.0
Max Variable Initial *	-	34	34
Time Before Reduction *	-	15	15
Time To Reduce *	-	45	45
Minimum Gap	-	3.0	3.0
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.

LEGEND

PROPOSED		EXISTING
○	Traffic Signal Head	●
○ →	Modified Signal Head	N/A
┬	Pedestrian Signal Head With Push Button & Sign	┬
┬	Signal Pole with Guy	┬
┬	Signal Pole with Sidewalk Guy	┬
⊗	Metal Strain Pole	⊗
⊗	Inductive Loop Detector	⊗
⊗	Controller & Cabinet	⊗
⊗	Junction Box	⊗
- - -	50mm Underground Conduit	- - -
N/A	Right of Way	- - -
→	Directional Arrow	→
(A)	No Left Turn Sign (R3-2)	(A)
(B)	No Right Turn Sign (R3-1)	(B)

18-JUN-2012 12:09 I:\Users\jgalloway\Signal\Projects\06-1301\06-1301_Sig.dgn 20120517.dgn

New Installation

Prepared in the Offices of:
 Transportation Mobility and Safety Division
 NORTH CAROLINA PROFESSIONAL ENGINEERING BOARD
 J. SCOTT R. GALLOWAY
 ENGINEER
 SEAL 29904

NC 24 (Bragg Boulevard) at I-295 (Fayetteville Outer Loop) Ramp C/Loop D
 Division 06 Cumberland County Fayetteville
 PLAN DATE: May 2012 REVIEWED BY: JP Galloway, PE
 PREPARED BY: EM Minshew REVIEWED BY:

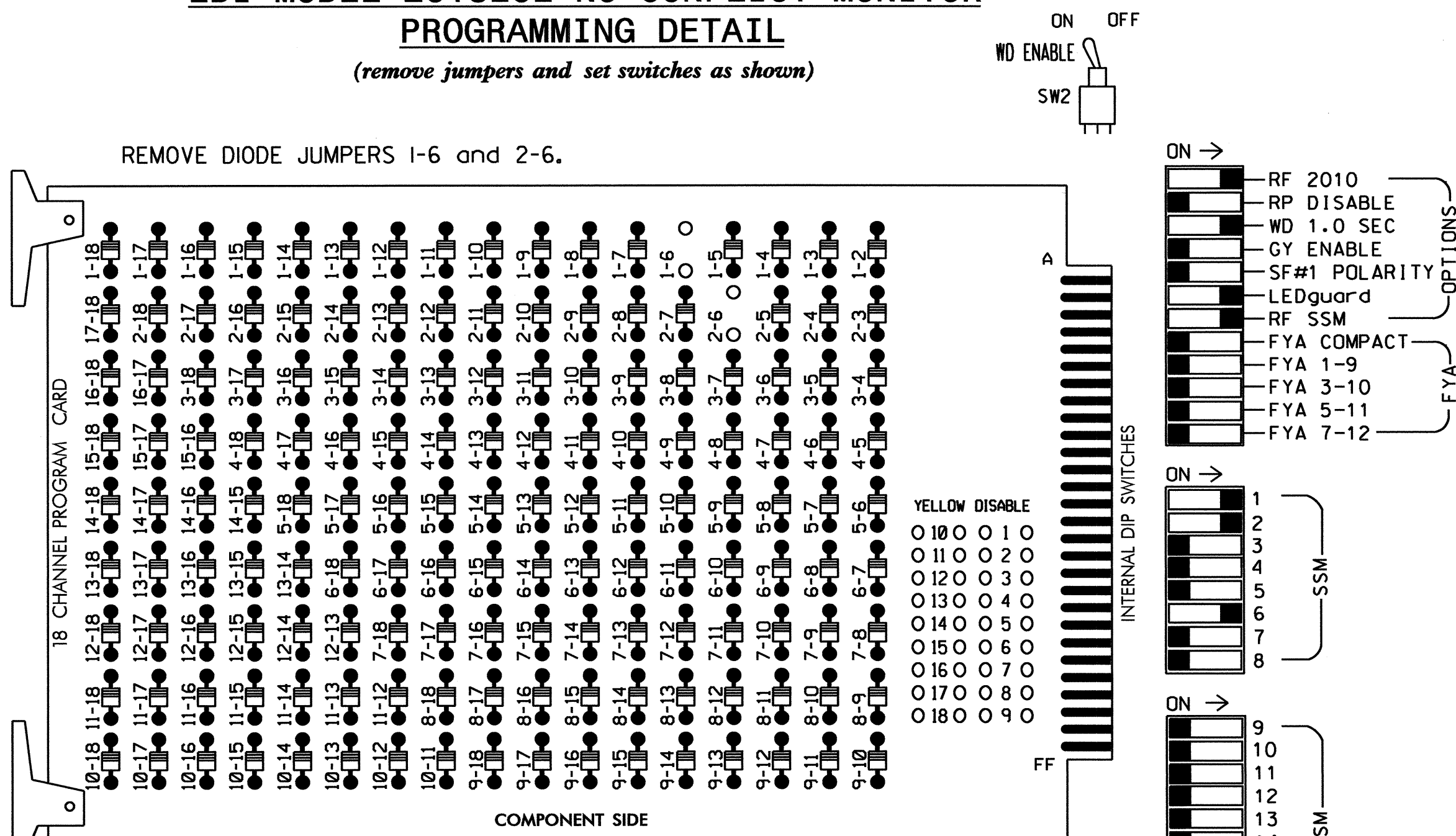
750 N. Greenfield Pkwy, Garner, NC 27529
 SCALE 5 0 10
 1:500

REVISIONS _____ INIT. _____ DATE _____

SIG. INVENTORY NO. 06-1301 DATE 5/17/12

**EDI MODEL 2018ECL-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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

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. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Fayetteville Signal System.

EQUIPMENT INFORMATION

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11,12	21, 22,23	24,25	NU	NU	NU	NU	NU	61,62, 63,64	NU	NU	NU
RED		128	128						134			
YELLOW		129							135			
GREEN		130							136			
RED ARROW	125											
YELLOW ARROW	126	129										
GREEN ARROW	127	130										

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	S	∅ 2/SYS	∅ 2/SYS	S	S	S	S	S	∅ 1	S	S	S	S	FS
I	2A/S2A	2C/S2C							1A					DC ISOLATOR
L	∅ 2/SYS	NOT USED							∅ 1					ST
U	S	∅ 6	∅ 6	S	S	S	S	S	S	S	S	S	S	S
I	6A	6C												DC ISOLATOR
L	∅ 6	∅ 6												
U	S	∅ 6	∅ 6	S	S	S	S	S	S	S	S	S	S	S
I	6B	6D												DC ISOLATOR
L														

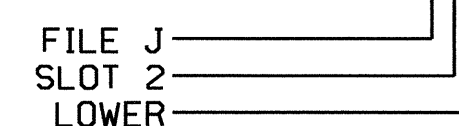
EX. : 1A, 2A, ETC. = LOOP NO.'S

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/S2A	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S2B	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
2C/S2C	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
6C	TB3-9,10	J3U	64	26	36	6	Y	Y			
6D	TB3-11,12	J3L	77	39	46	6	Y	Y			
1A	TB6-9,10	I9U	60	22	11	1	Y	Y			
1B	TB6-11,12	I9L	62	24	13	1	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1301
DESIGNED: May 2012
SEALED: 05/17/12
REVISED: N/A

Electrical Design

Electrical AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

NC 24 (Bragg Boulevard) at I-295 (Fayetteville Outer Loop) Ramp C/Loop D

Division 6 Cumberland County Fayetteville

PLAN DATE: May 2012 REVIEWED BY: T. J. J...

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: INIT. DATE

Signature: [Signature] DATE: 5/18/12

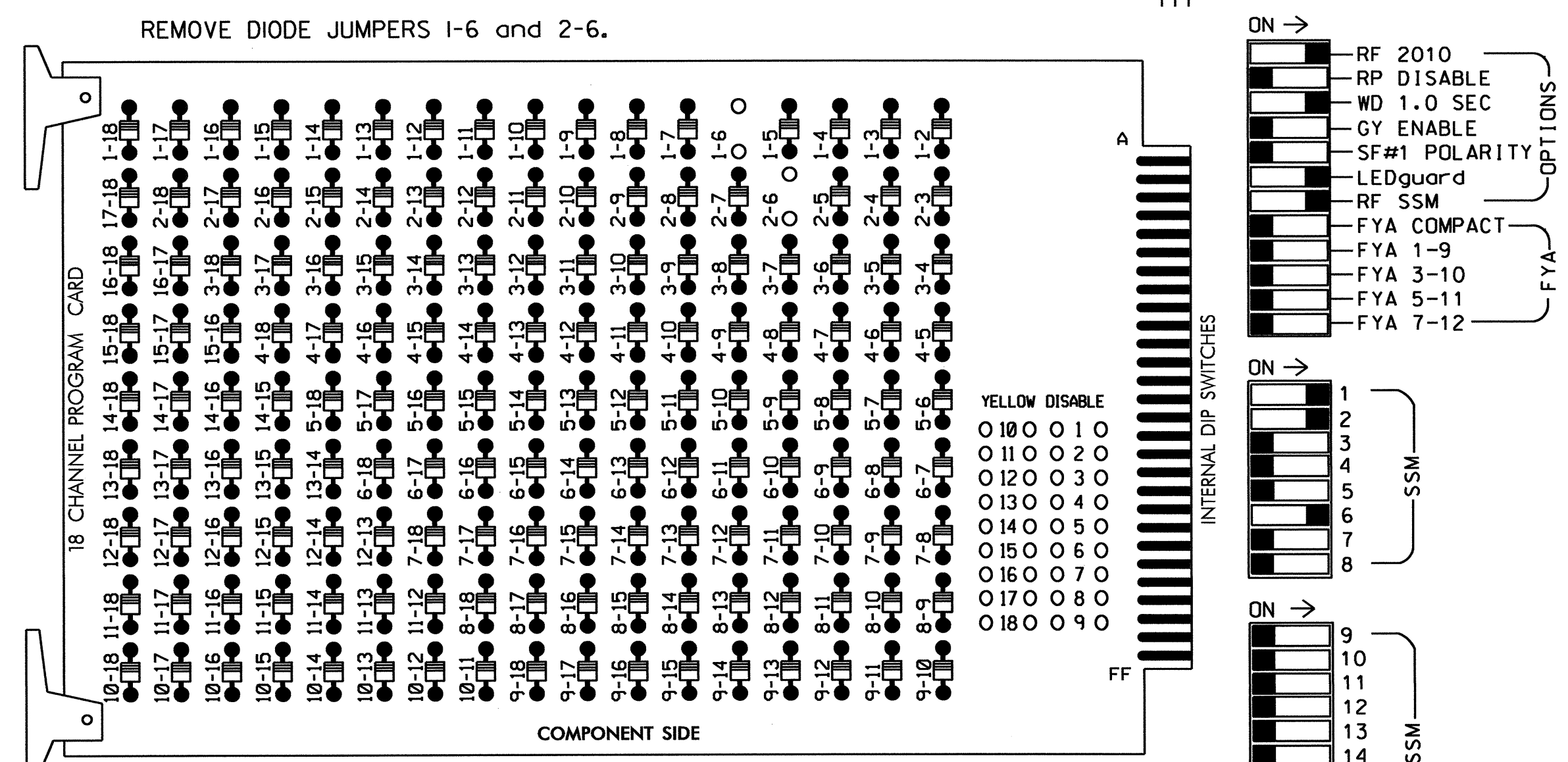
SIG. INVENTORY NO. 06-1301

18-MAY-2012 08:11:17
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EDI MODEL 2018ECL-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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

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. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Fayetteville Signal System.

EQUIPMENT INFORMATION

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11,12	21, 22,23	NU	NU	NU	NU	NU	61,62	NU	NU	NU	NU
RED		128						134				
YELLOW		129						135				
GREEN		130						136				
RED ARROW	125											
YELLOW ARROW	126											
GREEN ARROW	127											

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	S	∅ 2/SYS	∅ 2/SYS	S	S	S	S	S	∅ 1	S	S	S	S	FS
"I" L	2A/S2A	2C/S2C							1A					DC ISOLATOR
FILE "J" U	S	∅ 6/SYS	S	S	S	S	S	S	S	S	S	S	S	S
"J" L	6A/S6A	NOT USED							1B					DC ISOLATOR
	S	∅ 6/SYS	S	S	S	S	S	S	S	S	S	S	S	S
	6B/S6B													

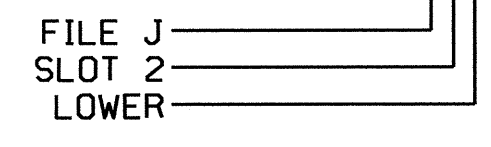
EX.: 1A, 2A, ETC. = LOOP NO.'S

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	TB6-9,10	I9U	60	22	11	1	Y	Y			
1B	TB6-11,12	I9L	62	24	13	1	Y	Y			
2A/S2A	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S2B	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
2C/S2C	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
6A/S6A	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S6B	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1302
 DESIGNED: May 2012
 SEALED: 05/17/12
 REVISED: N/A

Electrical Detail

Electrical and Programming Details For: **NC 87/NC 210 (Murchison Road) at I-295 (Fayetteville Outer Loop) Ramp "B"/Loop "B"**

Division 6 Cumberland County in Fayetteville

Prepared In the Offices of: **TRANSITION MOBILITY AND SAFETY SOLUTIONS**
 750 N. Greenfield Pkwy, Garner, NC 27529

Prepared By: **C. Strickland** Reviewed By: **T. J. [Signature]**

Plan Date: **May 2012**

REVISIONS: _____ INIT. DATE

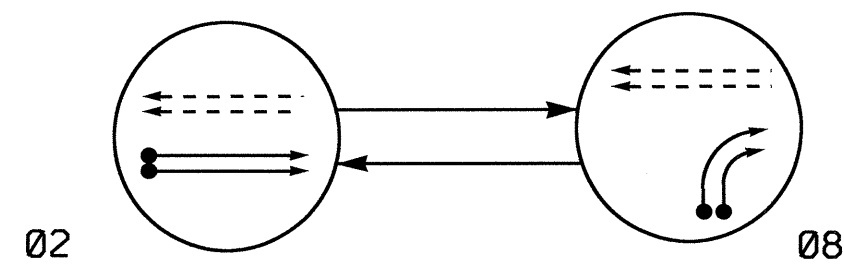
Signature: **George C. Brown** Date: **5/18/12**

Professional Engineer Seal: **GEORGE C. BROWN**, License No. **022013**

Sig. Inventory No. **06-1302**

18-MAY-2012 08:25 S:\Projects\2012\I-295\Signal\swk\cgr\cup\sig\Mon\5\Fr\ch\cand\061302_sml_e1e.xxx.dgn

PHASING DIAGRAM

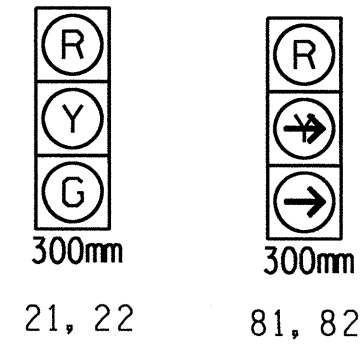


- PHASING DIAGRAM DETECTION LEGEND
- DETECTED MOVEMENT
 - UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 - - - PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE		
	02	08	LEFT
21,22	G	R	Y
81,82	R		R

SIGNAL FACE I.D.

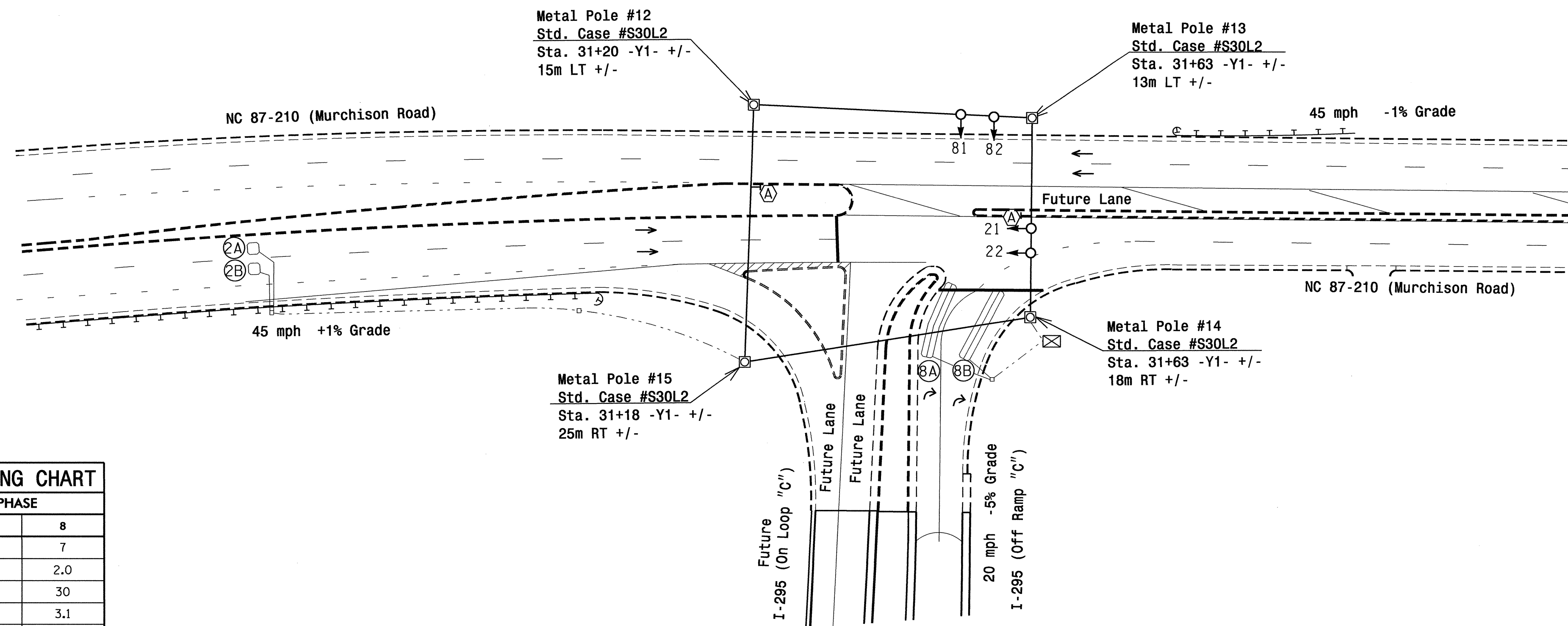
All Heads L.E.D.



LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	STRETCH TIME DELAY	STRETCH TIME			DELAY TIME
2A	1.8x1.8	90	5	Y	2	Y	Y	-	-	-	-	Y
2B	1.8x1.8	90	5	Y	2	Y	Y	-	-	-	-	Y
8A	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	15	-	Y
8B	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	15	-	Y

2 Phase Fully Actuated Fayetteville Signal 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.
- The cabinet should be designed to include an Auxiliary Output file for future use.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



FEATURE	PHASE	
	2	8
Min Green 1 *	12	7
Extension 1 *	6.0	2.0
Max Green 1 *	90	30
Yellow Clearance	4.4	3.1
Red Clearance	1.1	1.2
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	1.0	-
Max Variable Initial *	34	-
Time Before Reduction *	15	-
Time To Reduce *	45	-
Minimum Gap	3.0	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

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

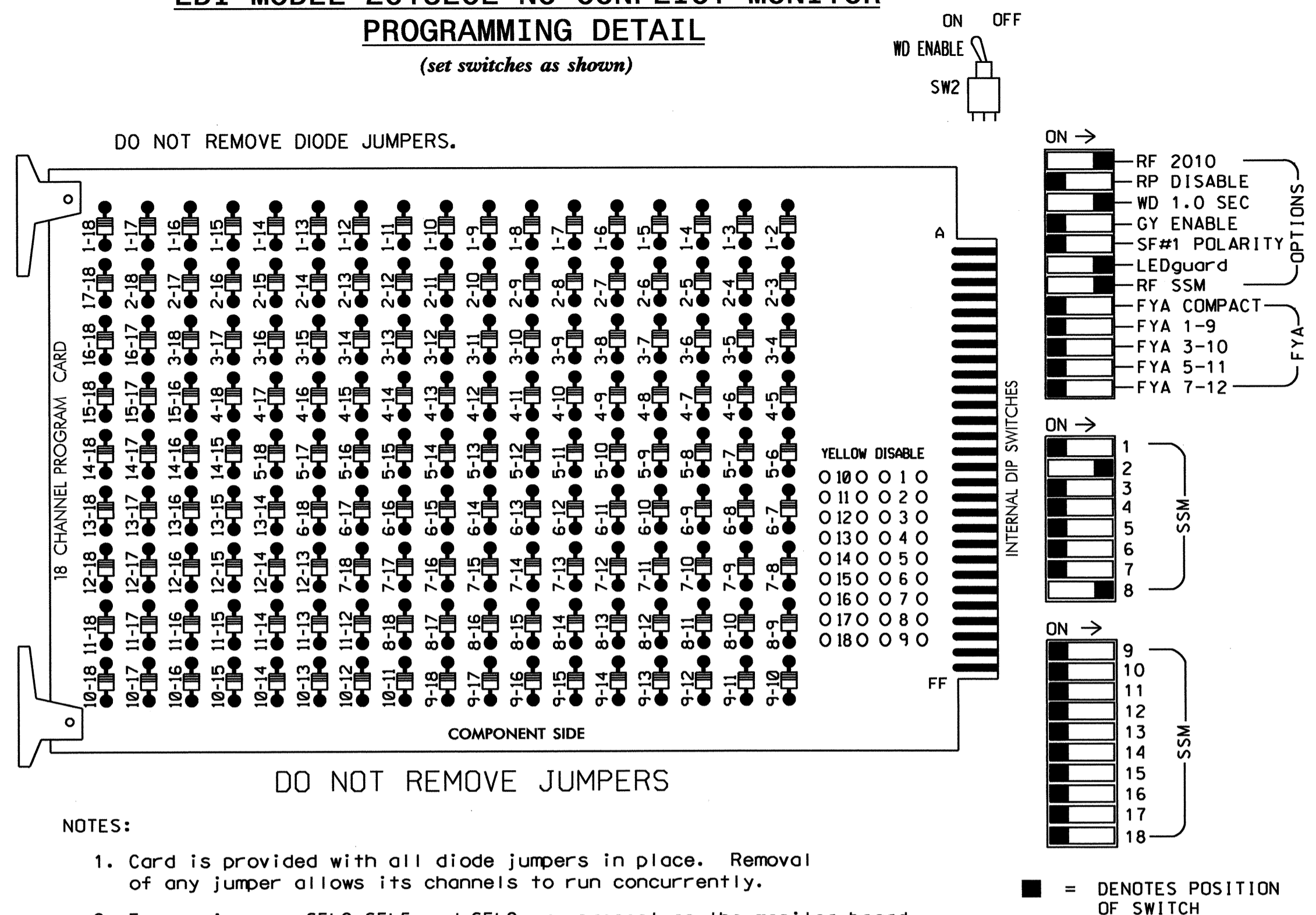
- LEGEND
- | PROPOSED | EXISTING |
|----------|-------------------------------------|
| | Traffic Signal Head |
| | Modified Signal Head |
| | Sign |
| | Pedestrian Signal Head |
| | Signal Pole with Push Button & Sign |
| | Signal Pole with Guy |
| | Signal Pole with Sidewalk Guy |
| | Metal Strain Pole |
| | Inductive Loop Detector |
| | Controller & Cabinet |
| | Junction Box |
| | 50mm Underground Conduit |
| | Guard Rail |
| | Right of Way |
| | Directional Arrow |
| | No Left Turn Sign (R3-2) |

New Installation

<p>Prepared in the Offices of:</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>NC 87-210 (Murchison Road) at I-295 Off Ramp/On Loop "C"</p>			
	<p>Division 06 Cumberland County Fayetteville</p>			
	<p>PLAN DATE: May 2012</p>	<p>REVIEWED BY: JP Galloway, PE</p>		<p>SEAL</p>
	<p>PREPARED BY: EM Minshew</p>	<p>REVIEWED BY:</p>		<p>DATE</p>
	<p>SCALE 1:500</p>	<p>REVISIONS</p>		<p>INIT. DATE</p>

18-JUN-2012 12:26
 R:\TFC\Offices\Signal\signal\isigal\isigal\06-1303\06-1303-01\signal.dwg 20120517.dgn
 jpa:tkay

**EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL**
(set switches as shown)



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.
- Enable Simultaneous Gap-Out for all phases.
- Program phase 2 for Variable Initial and Gap Reduction.
- Program phase 2 for Start Up In Green.
- Program phase 2 for Yellow Flash.
- The cabinet and controller are part of the Fayetteville Signal System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED		128										107						
YELLOW		129																
GREEN		130																
RED ARROW																		
YELLOW ARROW												108						
GREEN ARROW												109						

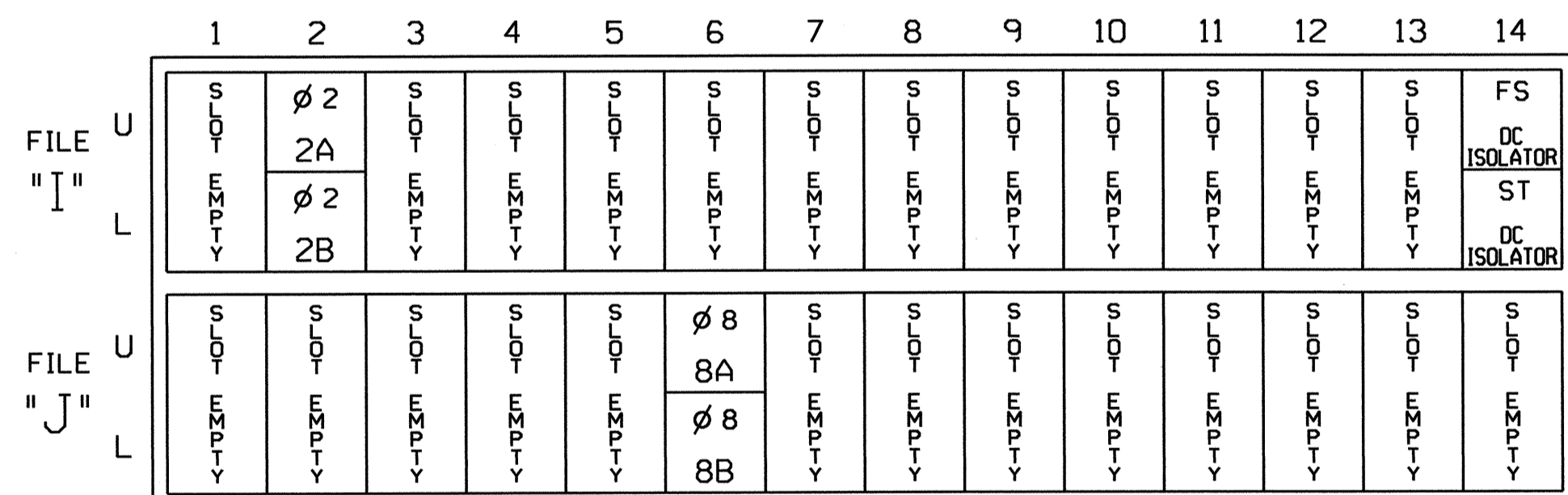
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S11
 PHASES USED.....2,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

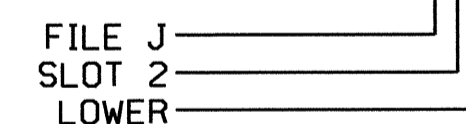
(front view)



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			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			15
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			15

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 06-1303
 DESIGNED: May 2012
 SEALED: 05/17/12
 REVISED: N/A

Electrical Detail

Electrical AND PROGRAMMING DETAILS FOR: **NC 87-210 (Murchison Road) at I-295 Off Ramp/On Loop "C"**

Prepared In the Offices of: **TRANSPORTATION MOBILITY AND SAFETY CONSULTANTS, INC.**

Division 6 Cumberland County Fayetteville

PLAN DATE: **May 2012** REVIEWED BY: **T. Ugan**

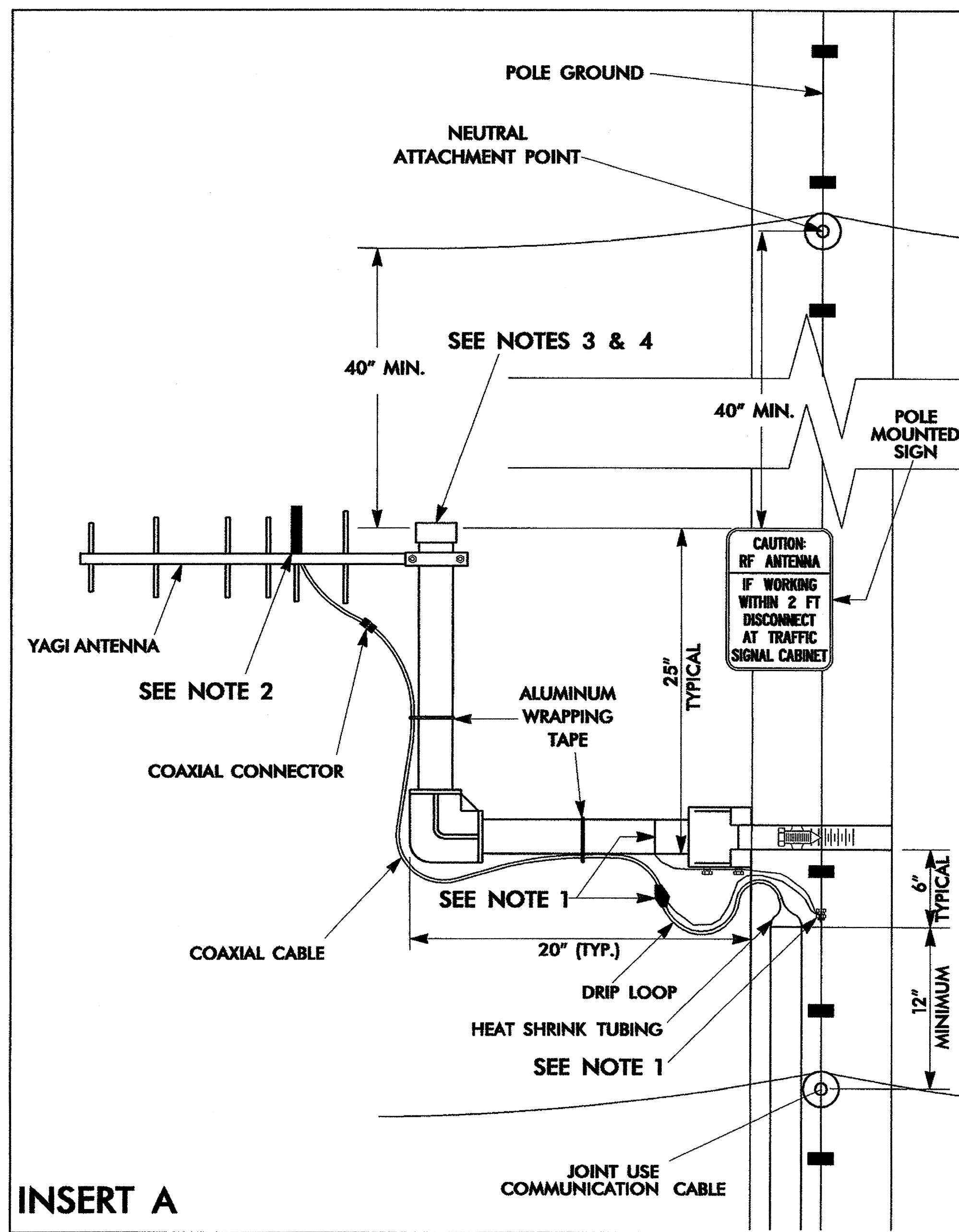
PREPARED BY: **C. Strickland** REVIEWED BY:

REVISIONS: _____ INIT. _____ DATE _____

SEAL: **GEORGE C. BROWN**, PROFESSIONAL ENGINEER, No. 022013

SIGNATURE: **George C. Brown** DATE: _____

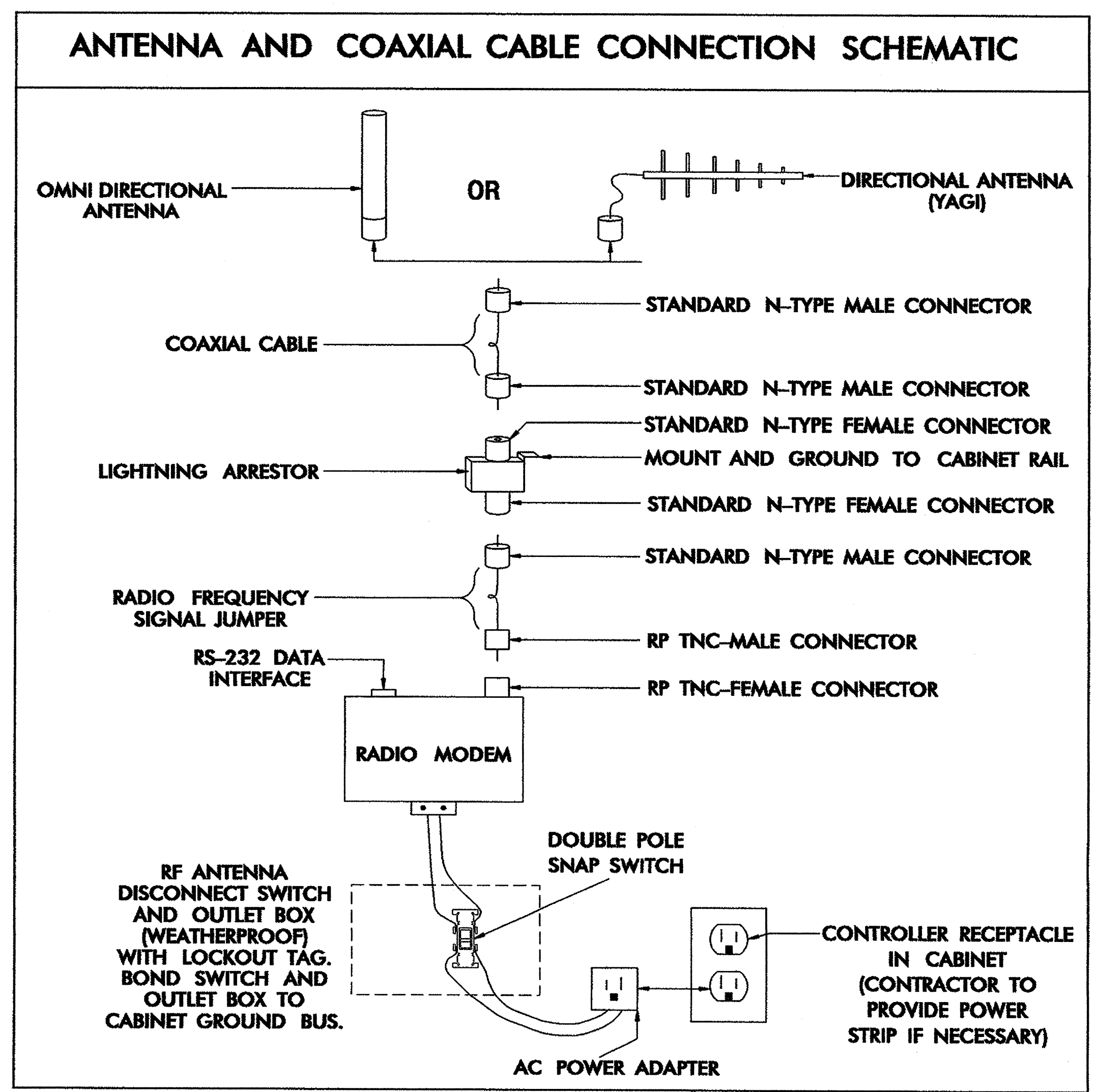
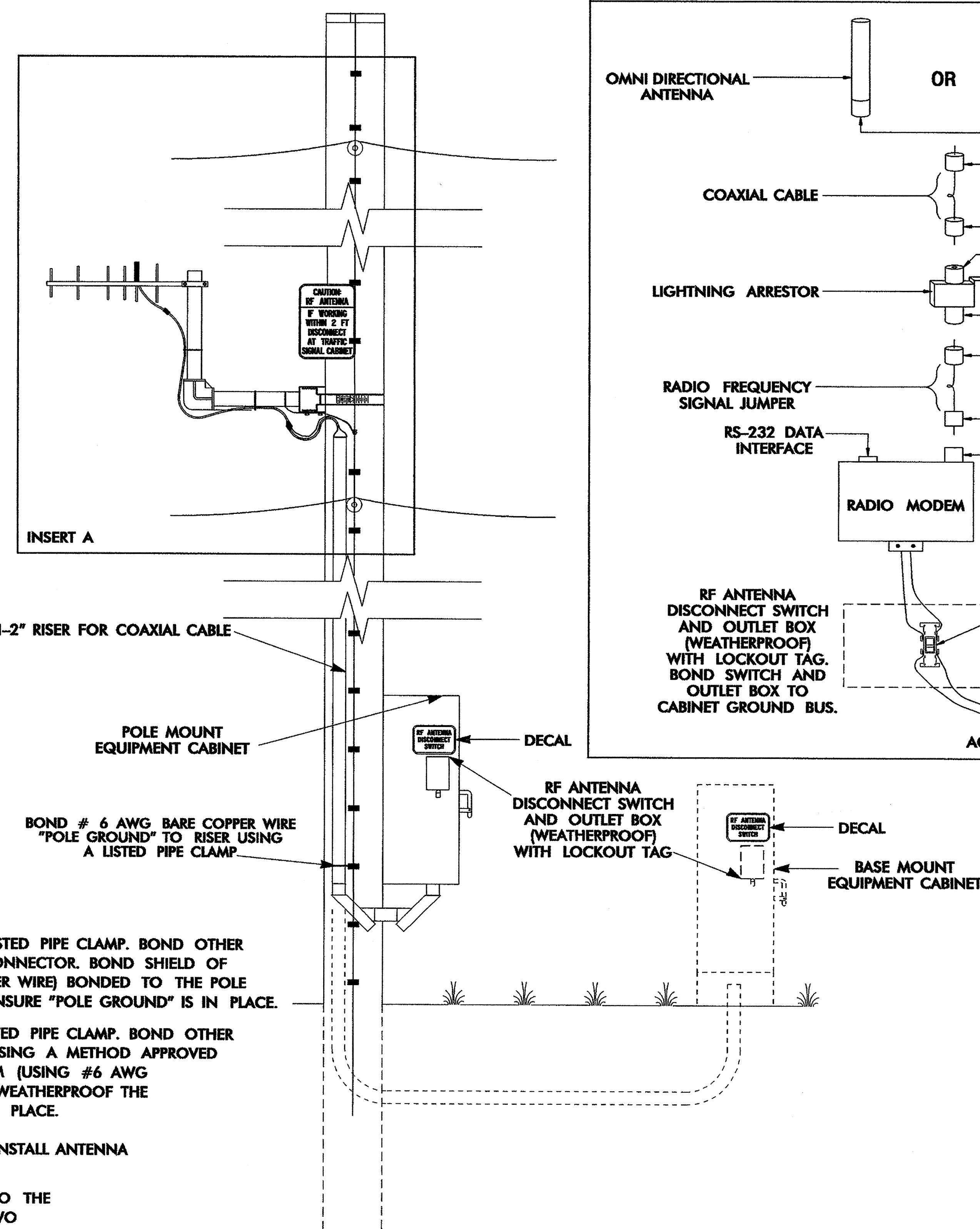
SIG. INVENTORY NO. 06-1303



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

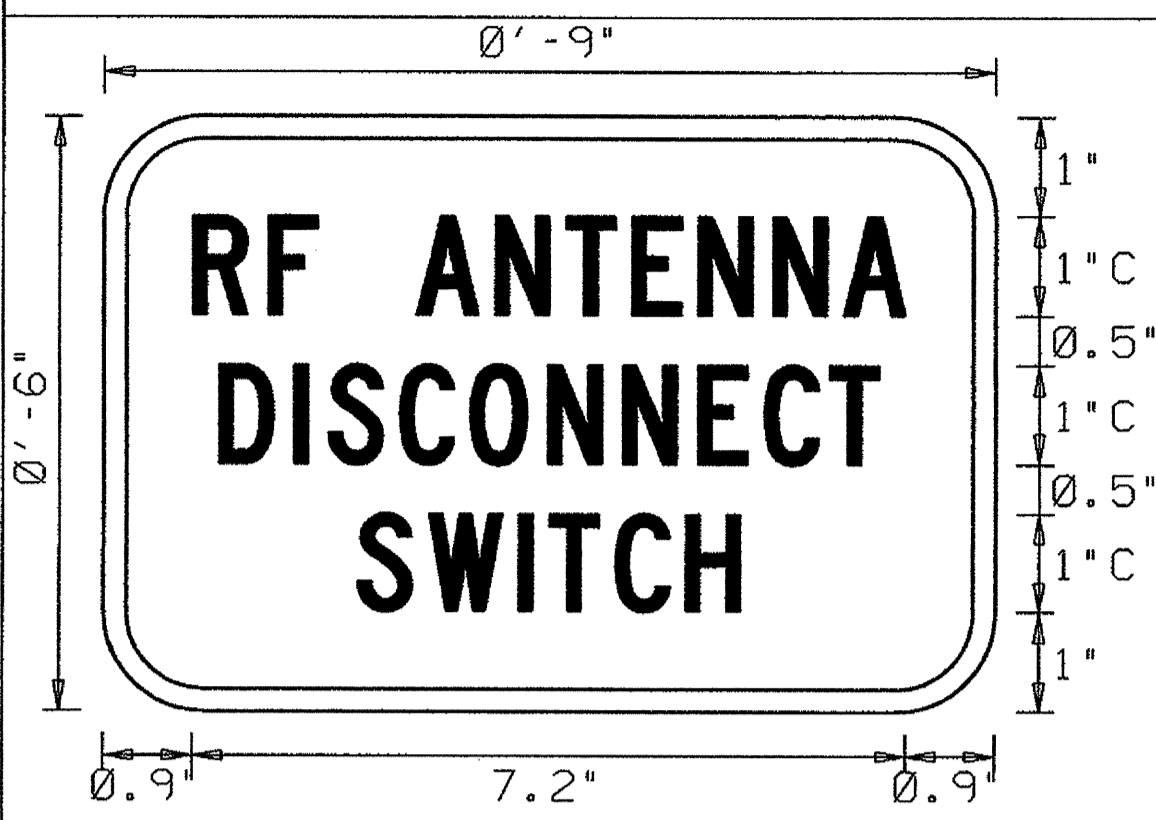
DECAL

POLE MOUNTED SIGN

PROJECT REFERENCE NO. X-0002BB SHEET NO. SIG. 11

SIGN NUMBER: SPO5224
 TYPE: DECAL
 QUANTITY:
 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:
 LENGTH:
 BACKG COLOR: Yellow
 COPY COLOR: Black
 SYMBOL X Y WID HT

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

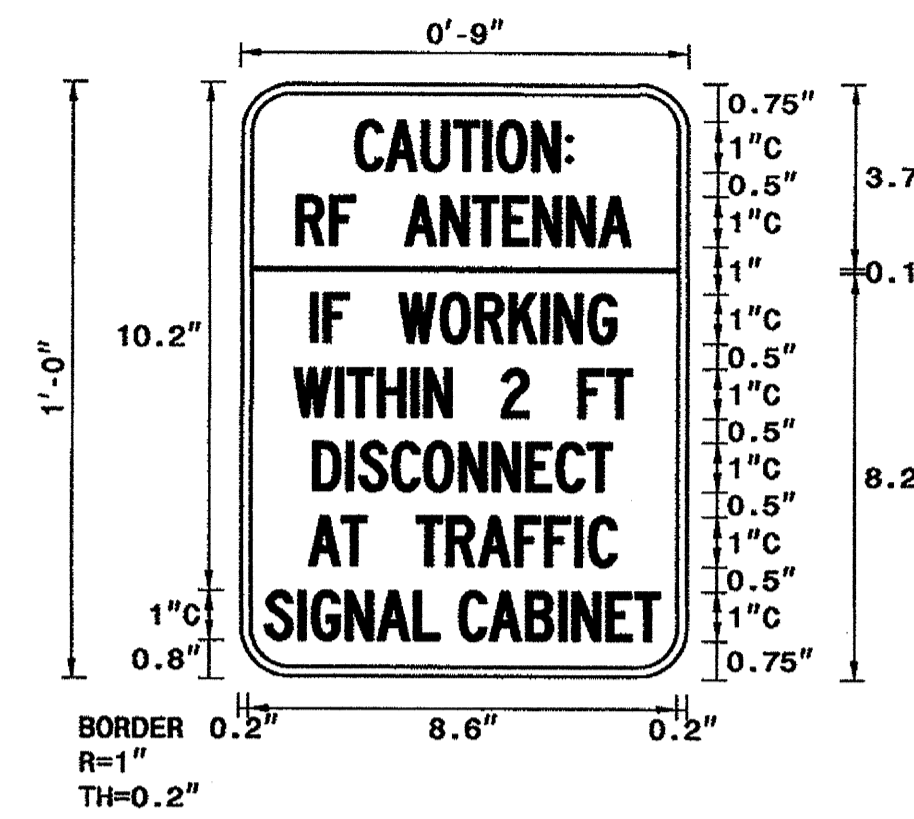


NOTE:
 THIS SIGN SHALL BE PRODUCED AS A DECAL

- USE NOTES: 2, 4
- Legend and border shall be direct applied Type III reflective sheeting.
 - Legend and border shall be direct applied non-reflective sheeting.
 - Shields shall be Type III reflective sheeting on 0.032" (0.8mm) aluminum and demountable.
 - Background shall be Type III reflective sheeting.
 - Background shall be Type I reflective sheeting.
 - Center arrow(s) vertically on sign.
 - Bottom panel shall be yellow Type III sheeting. Legend shall be direct applied black non-reflective sheeting. Yellow panel is:

SIGN NUMBER: SPO5223
 TYPE: D
 QUANTITY:
 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:
 LENGTH:
 BACKG COLOR: Yellow
 COPY COLOR: Black
 SYMBOL X Y WID HT

DESIGN BY: M. TRACEY DATE: Oct 25, 2007 CHECKED BY: SUSAN KUNZ
 PROJECT ID: DIV: INTELLIGENT TRANSPORTATION SYSTEMS



- USE NOTES: 2, 4
- Legend and border shall be direct applied Type III reflective sheeting.
 - Legend and border shall be direct applied non-reflective sheeting.
 - Shields shall be Type III reflective sheeting on 0.032" (0.8mm) aluminum and demountable.
 - Background shall be Type III reflective sheeting.
 - Background shall be Type I reflective sheeting.
 - Center arrow(s) vertically on sign.
 - 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

	R	F	A	N	T	E	N	N	A		Series/Size Text Length	
0.9	0.8	0.5	1	0.8	0.7	0.7	0.8	0.7	0.6	0.9	C1 7.2	
1.2	0.8	0.3	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.5	1.2	C1 6.7
2.6	0.7	0.9	0.3	0.7	0.7	0.5	2.6					C1 3.9

Spacing Factor is 1 unless specified otherwise

LETTER POSITIONS

Letter spacings are to start of next letter

	C	A	U	T	I	O	N	:				Series/Size Text Length				
2.3	0.6	0.7	0.6	0.6	0.3	0.7	0.7	0.1	2.3			C 4.4				
1.2	0.7	0.5	1	0.7	0.6	0.6	0.6	0.7	0.6	0.6	1.2	C 6.7				
1.4	0.3	0.5	1	0.8	0.7	0.7	0.6	0.3	0.7	0.5	1.4	C 6.1				
1.1	0.8	0.2	0.6	0.7	0.3	0.5	1	0.5	1	0.6	0.5	1.1	C 6.8			
1.5	0.7	0.3	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.5	1.5	C 6				
1.4	0.7	0.5	1	0.6	0.6	0.7	0.6	0.6	0.3	0.5	1.4	C 6.2				
0.5	0.7	0.3	0.7	0.6	0.7	0.5	0.4	0.6	0.7	0.7	0.3	0.7	0.6	0.5	0.5	C 7.9

Spacing Factor is 1 unless specified otherwise

NORTH CAROLINA D.O.T. SIGN DETAIL

Prepared in the Offices of:

 750 N. Greenfield Blvd., Garner, NC 27529

WIRELESS RADIO ANTENNA TYPICAL DETAILS

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

SCALE: 0

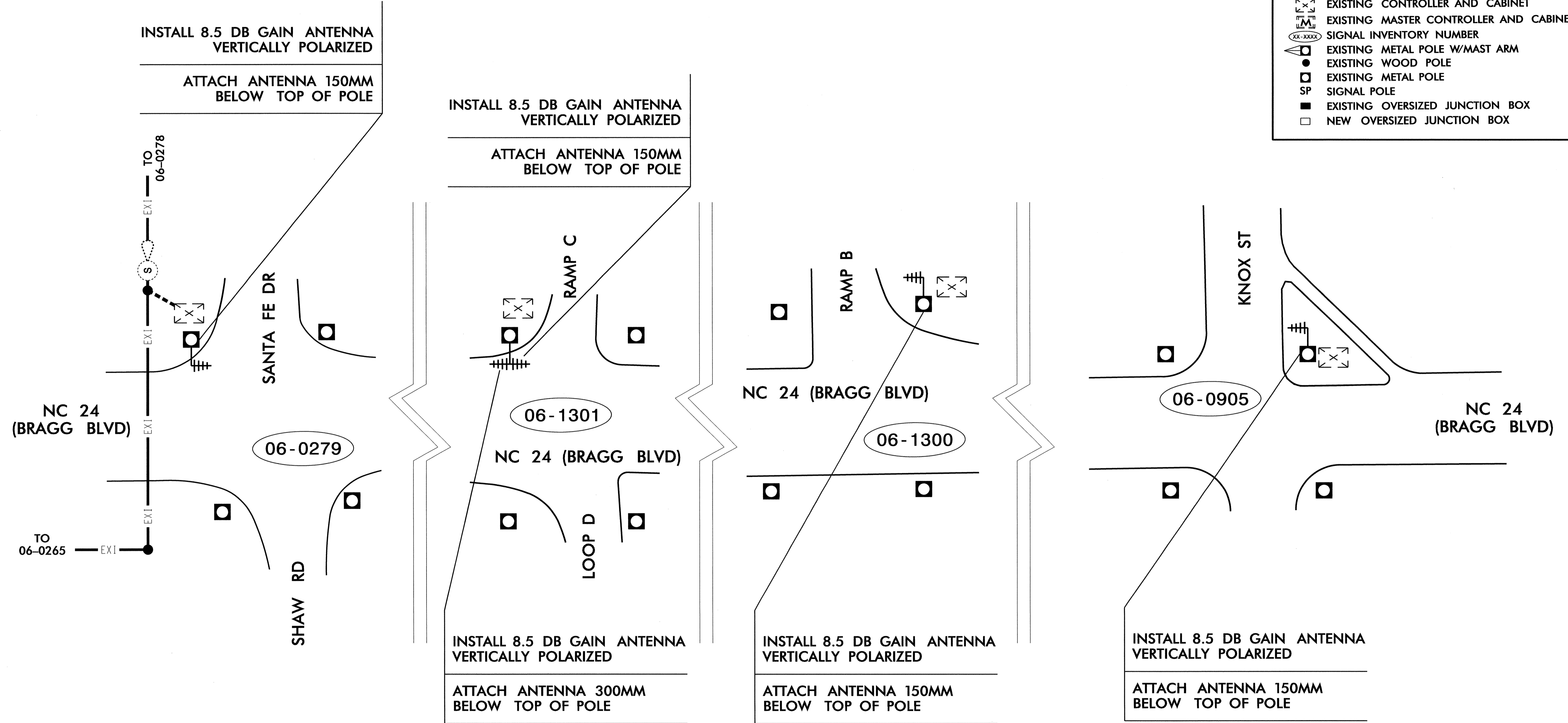
SEAL: PROFESSIONAL ENGINEER SEAL 023919 GREGORY A. FULLER

SIGNATURE: Gregory A. Fuller 9/2/05 DATE: 9/2/05

CADD Filename:

LEGEND

+++	YAGI ANTENNA (DOUBLE) FOR REPEATOR OPERATION
++	YAGI ANTENNA (SINGLE)
⊙	OMNI ANTENNA
⊠	EXISTING CONTROLLER AND CABINET
⊡	EXISTING MASTER CONTROLLER AND CABINET
⊞	SIGNAL INVENTORY NUMBER
⊠	EXISTING METAL POLE W/MAST ARM
●	EXISTING WOOD POLE
□	EXISTING METAL POLE
SP	SIGNAL POLE
■	EXISTING OVERSIZED JUNCTION BOX
□	NEW OVERSIZED JUNCTION BOX



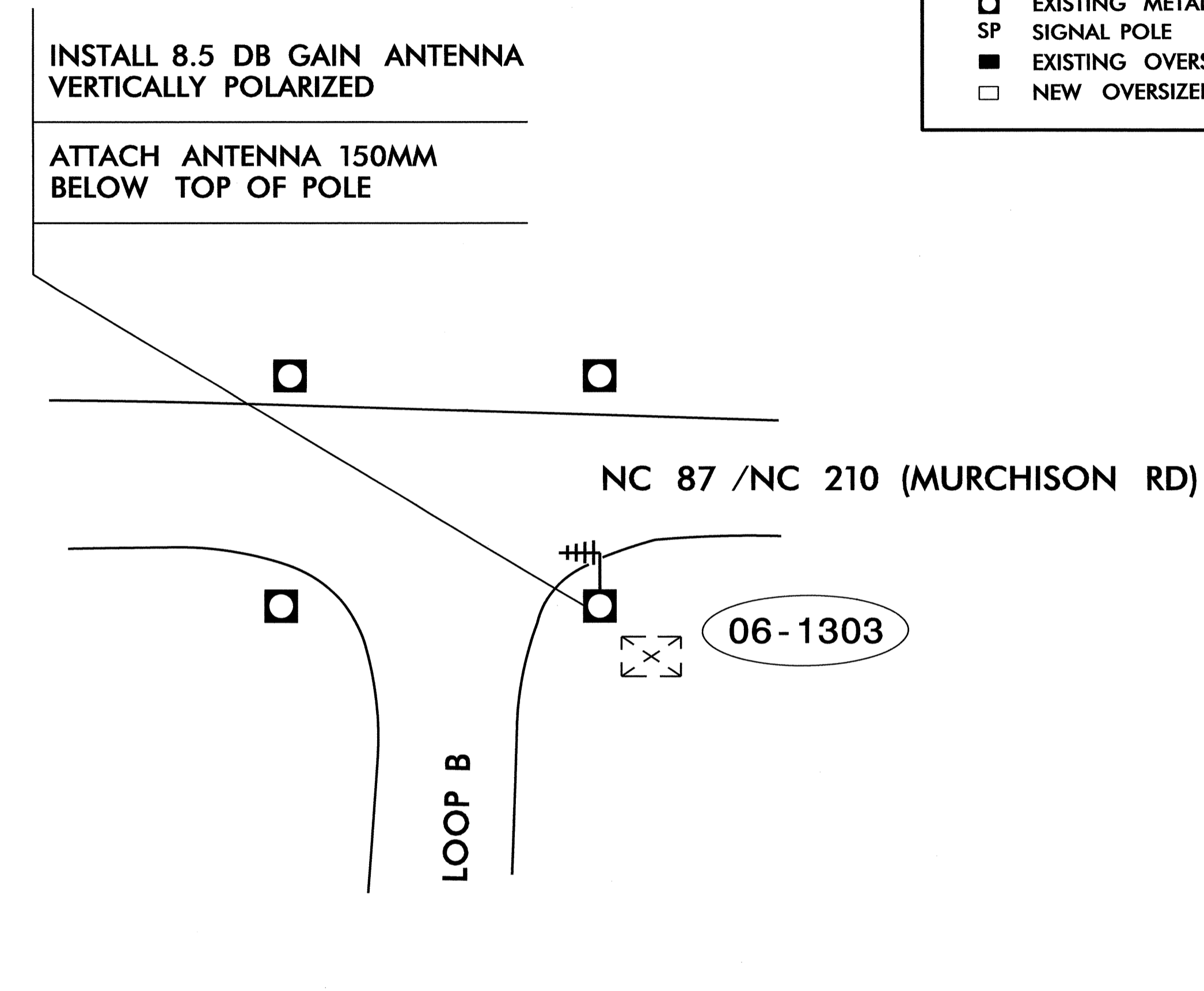
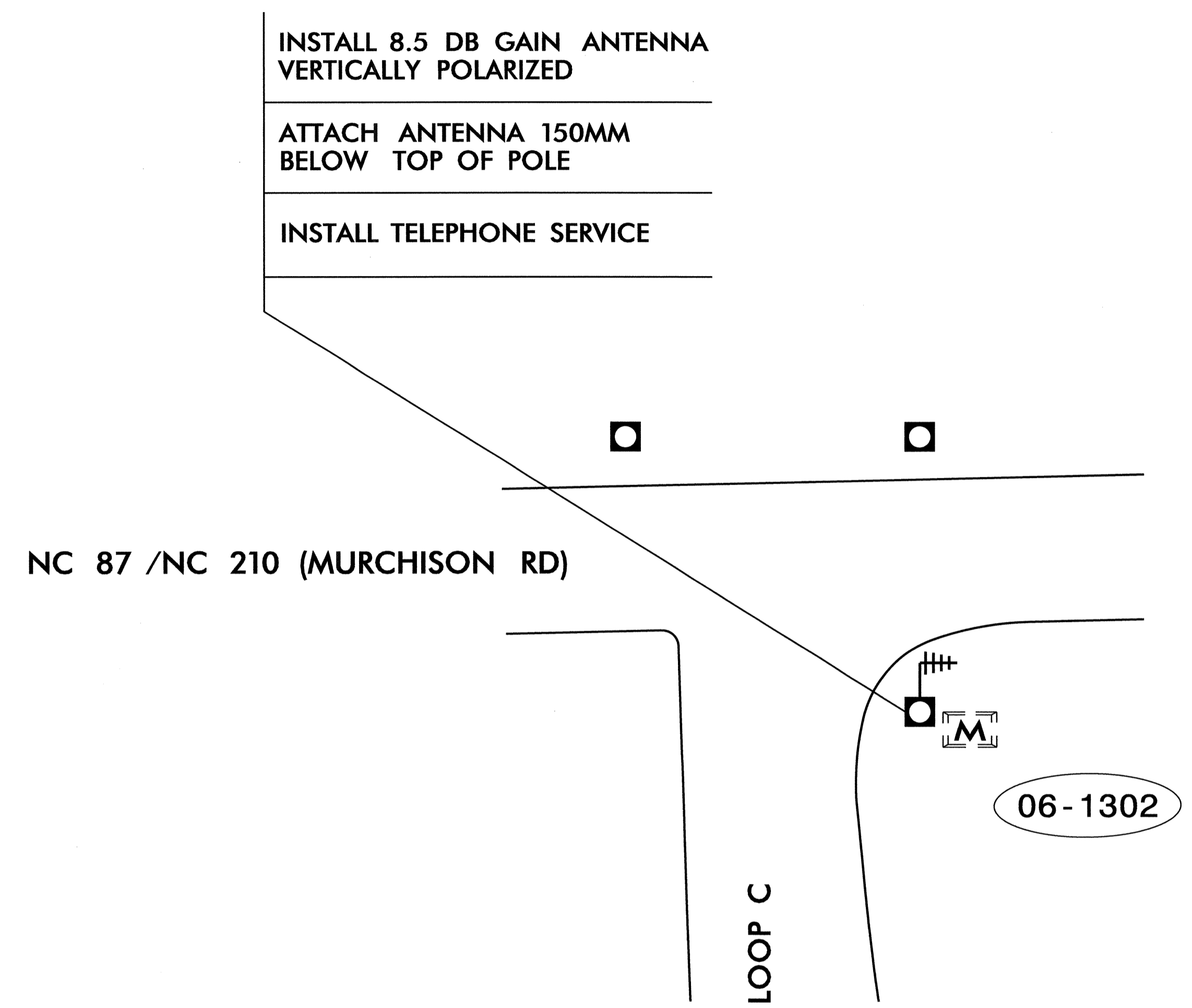
NOTES:

- INSTALL COAXIAL CABLE
 - ON WOOD POLES, REQUIRING A NEW RIGID GALVANIZED STEEL RISER, INSTALL A 50MM RISER WITH WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - ON METAL POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL 13MM HOLE WITH GROMMET THROUGH BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL CABLE TO THE ANTENNA.
 - ON METAL STRAIN POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - BETWEEN THE POINT OF EXITING THE METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 19MM STAINLESS STEEL STRAPS EVERY 300MM.
- IF AN EXISTING 50MM SPARE RIGID GALVANIZED STEEL RISER IS AVAILABLE, INSTALL THE COAXIAL CABLE IN THE SPARE RISER.
- INSTALL WIRELESS ANTENNA ON POLE WITH RF WARNING SIGN. (NOTE: RF WARNING SIGN NOT REQUIRED WHEN ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
- MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER THE NATIONAL ELECTRICAL SAFETY CODE.
- INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET. (NOTE: RF ANTENNA DISCONNECT SWITCH AND DECAL ARE NOT REQUIRED WHEN THE ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
- REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS."

	Prepared in the Offices of: TRANSPORTATION MOBILITY AND SAFETY DIVISION NORTH CAROLINA DEPARTMENT OF TRANSPORTATION		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER GREGORY A FULLER 023919
	WIRELESS COMMUNICATION PLANS ALONG NC 24 (BRAGG BOULEVARD)		
DIVISION 06 CUMBERLAND CO. FAYETTEVILLE		PLAN DATE: JUNE 2012 REVIEWED BY: I.N. AVERY	
PREPARED BY: S.C. WARDLE		REVIEWED BY: G.A. FULLER	
SCALE: 0		REVISIONS: INIT. DATE	
750 N. Greenfield Pkwy., Garner, NC 27529		Signature: <i>G.A. Fuller</i> DATE: 6/19/12	

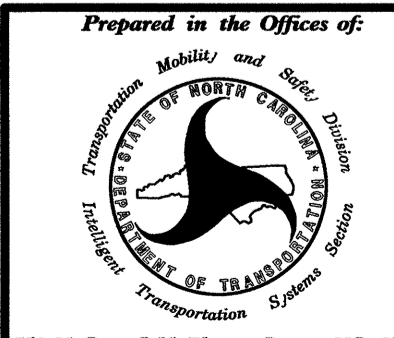
LEGEND

- ⦶⦶⦶ YAGI ANTENNA (DOUBLE) FOR REPEATOR OPERATION
- ⦶ YAGI ANTENNA (SINGLE)
- ⦶ OMNI ANTENNA
- ⦶ X EXISTING CONTROLLER AND CABINET
- ⦶ M EXISTING MASTER CONTROLLER AND CABINET
- ⦶ XX-XXXX SIGNAL INVENTORY NUMBER
- ⦶ EXISTING METAL POLE W/MAST ARM
- EXISTING WOOD POLE
- EXISTING METAL POLE
- SP SIGNAL POLE
- EXISTING OVERSIZED JUNCTION BOX
- NEW OVERSIZED JUNCTION BOX



NOTES:

1. INSTALL COAXIAL CABLE
 - A. ON WOOD POLES, REQUIRING A NEW RIGID GALVANIZED STEEL RISER, INSTALL A 50MM RISER WITH WEATHERHEAD AND 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 13MM 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 OUT THE WEATHERHEAD 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 19MM STAINLESS STEEL STRAPS EVERY 300MM.
2. IF AN EXISTING 50MM SPARE RIGID GALVANIZED STEEL RISER IS AVAILABLE, INSTALL THE COAXIAL CABLE IN THE SPARE RISER.
3. INSTALL WIRELESS ANTENNA ON POLE WITH RF WARNING SIGN. (NOTE: RF WARNING SIGN NOT REQUIRED WHEN ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
4. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER THE NATIONAL ELECTRICAL SAFETY CODE.
5. INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET. (NOTE: RF ANTENNA DISCONNECT SWITCH AND DECAL ARE NOT REQUIRED WHEN THE ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS."

Prepared in the Offices of:

 750 N. Greenfield Pkwy., Garner, NC 27529

WIRELESS COMMUNICATION PLANS
ALONG NC 24 (BRAGG BOULEVARD)

DIVISION 06 CUMBERLAND CO. FAYETTEVILLE

PLAN DATE: JUNE 2012 REVIEWED BY: I.N. AVERY

PREPARED BY: S.C. WARDLE REVIEWED BY: G.A. FULLER

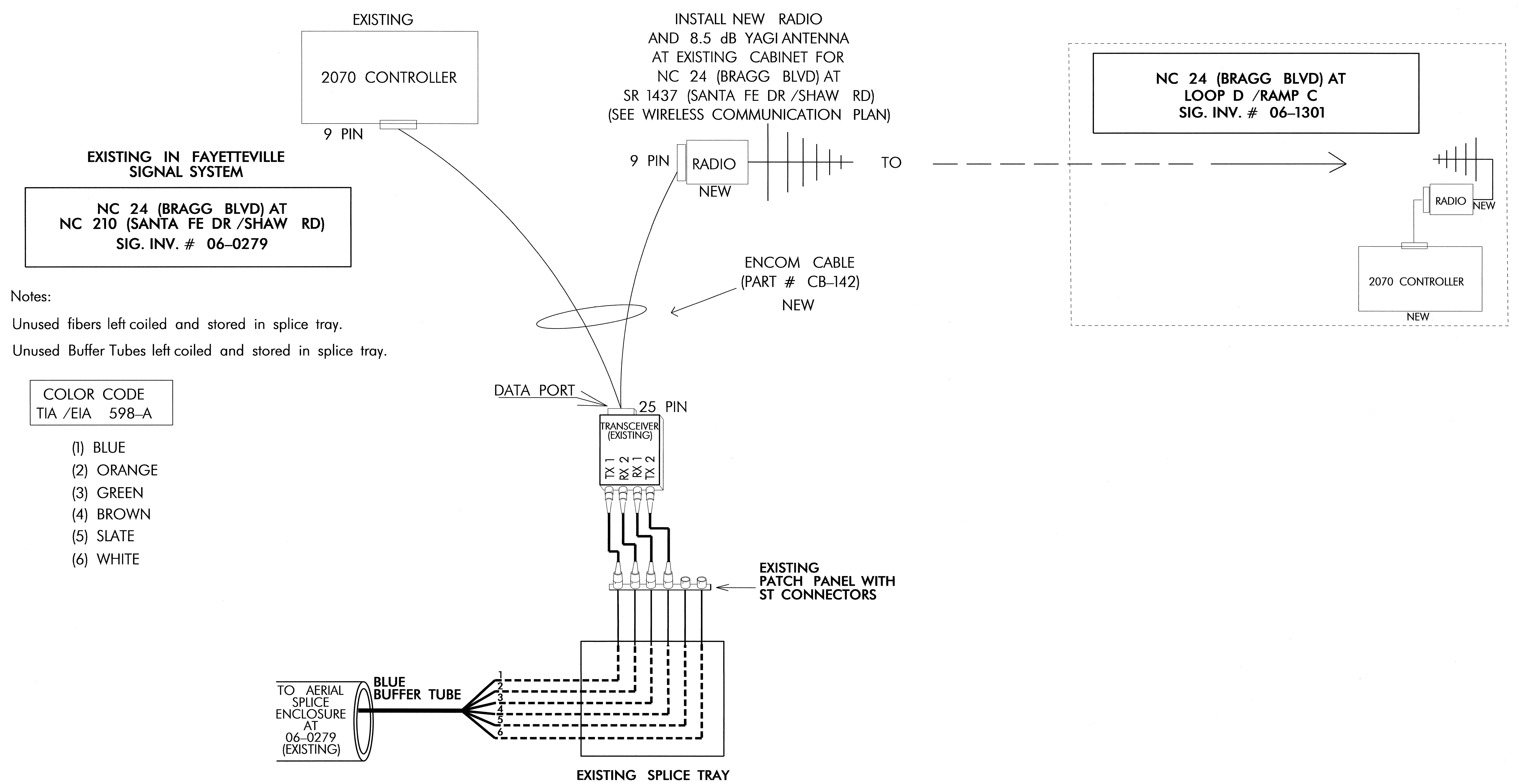
REVISIONS: _____ INIT. DATE

SCALE: 0 _____

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 023919
 GREGORY A. FULLER
 ENGINEER

Gregory A. Fuller
 SIGNATURE DATE

CADD Filename:



Notes:
 Unused fibers left coiled and stored in splice tray.
 Unused Buffer Tubes left coiled and stored in splice tray.

- COLOR CODE
TIA /EIA 598-A
- (1) BLUE
 - (2) ORANGE
 - (3) GREEN
 - (4) BROWN
 - (5) SLATE
 - (6) WHITE

NOTES:
 1. FIBER CONNECTIONS SHOWN FOR INFORMATIONAL PURPOSES ONLY. DO NOT DISTURB EXISTING FIBER CONFIGURATION.

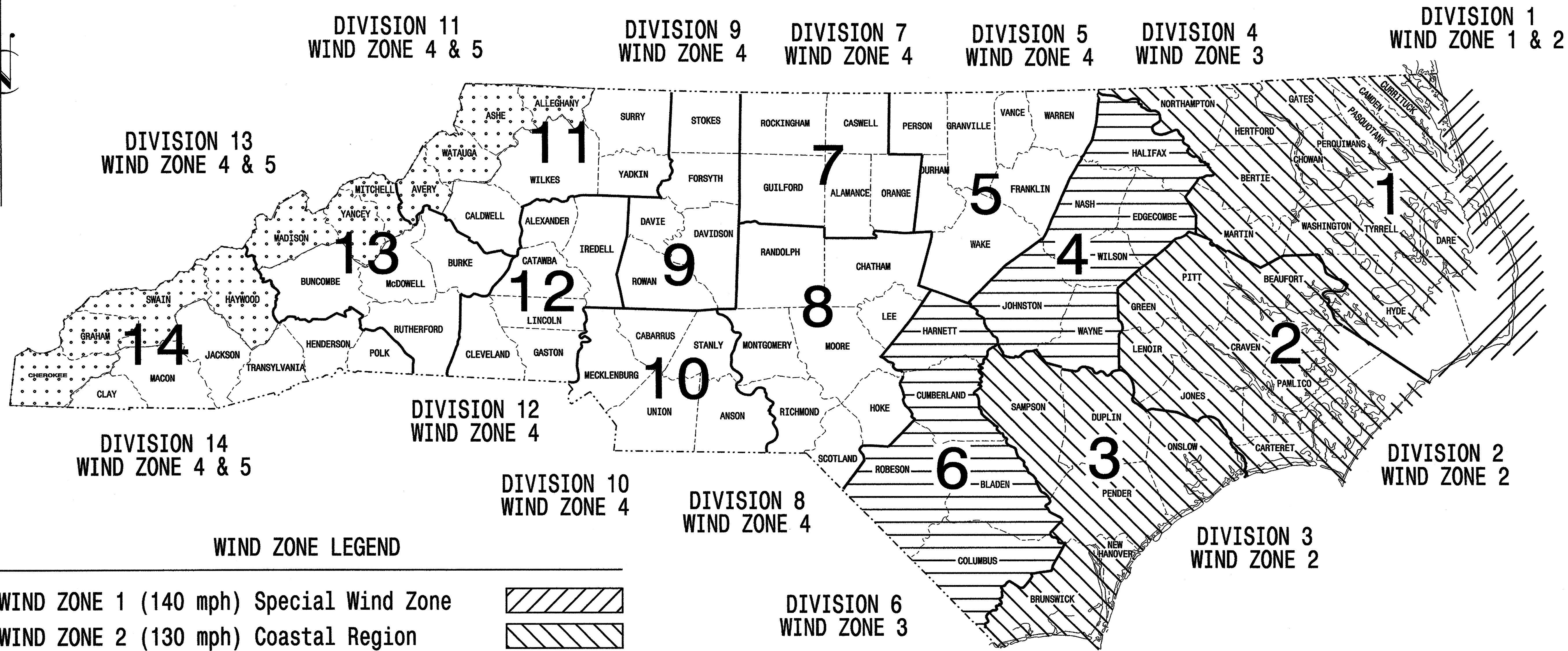
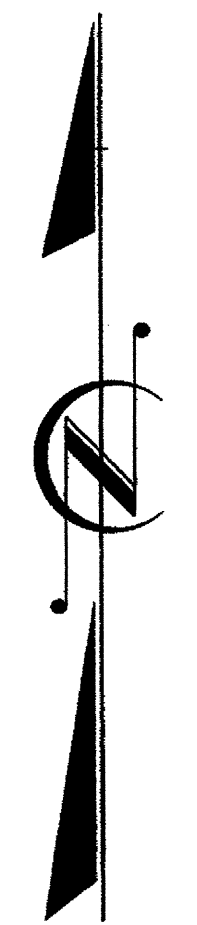
TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS

	SPLICE PLAN ALONG NC 24 (BRAGG BOULEVARD)		SEAL NORTH CAROLINA PROFESSIONAL SEAL 023919 G. A. FULLER ENGINEER
	DIVISION 06 CUMBERLAND CO. FAYETTEVILLE	PLAN DATE: JUNE 2012	
PREPARED BY: S. C. WARDLE	REVISIONS	REVIEWED BY: G. A. FULLER	INIT. DATE
SCALE 0	REVISIONS	INIT. DATE	SIGNATURE DATE G. A. Fuller 6/19/12

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	X-0002BB	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/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

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

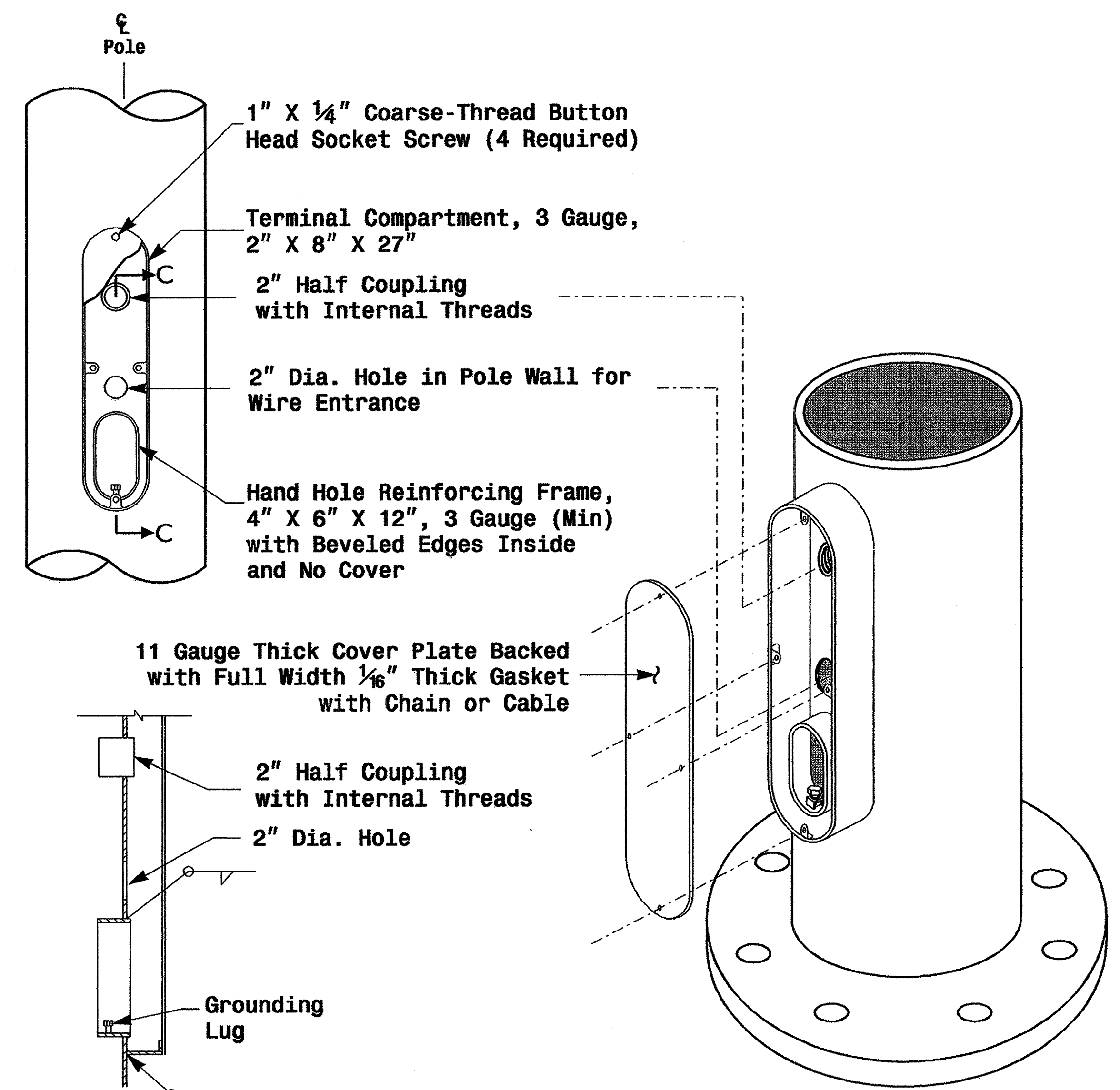
NCDOT CONTACTS:

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

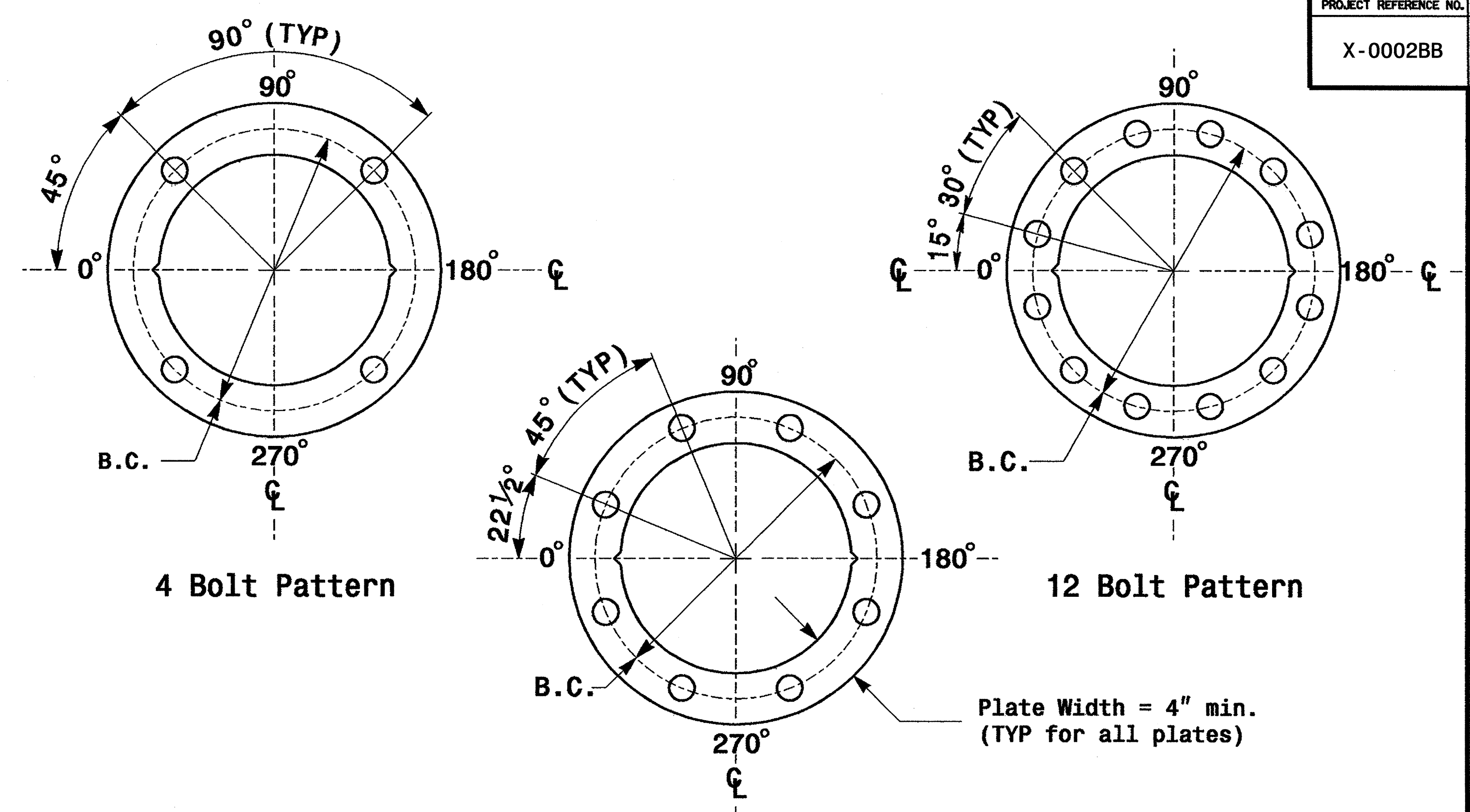
SEAL

D. Sarkar 7.21.2009
 SIGNATURE DATE



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

Terminal Compartment Detail



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 _____	

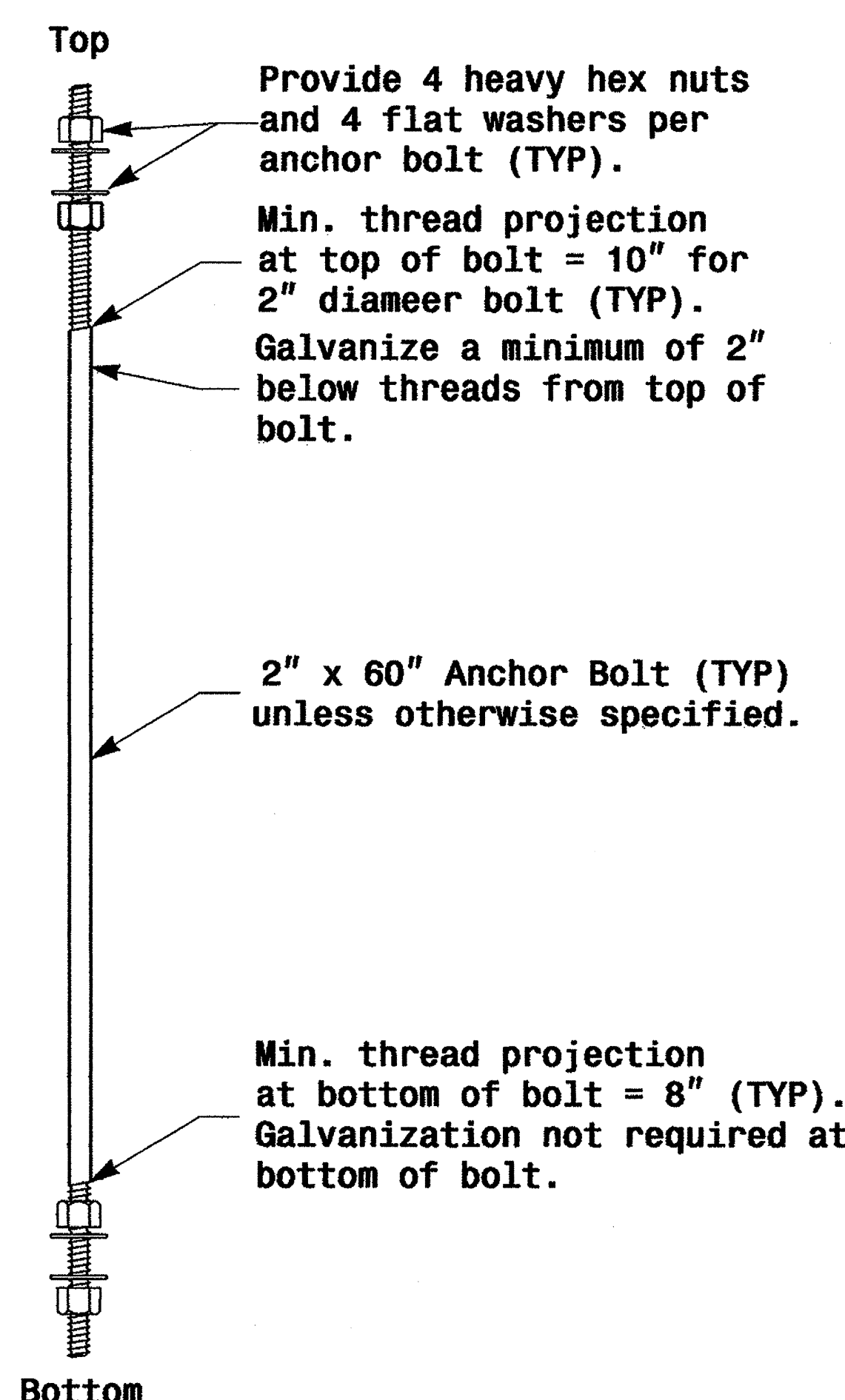
MFG _____	MFG. DATE: MM/YY _____
SECTION D/T/L/Y _____	
NCDOT STANDARD _____	

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)

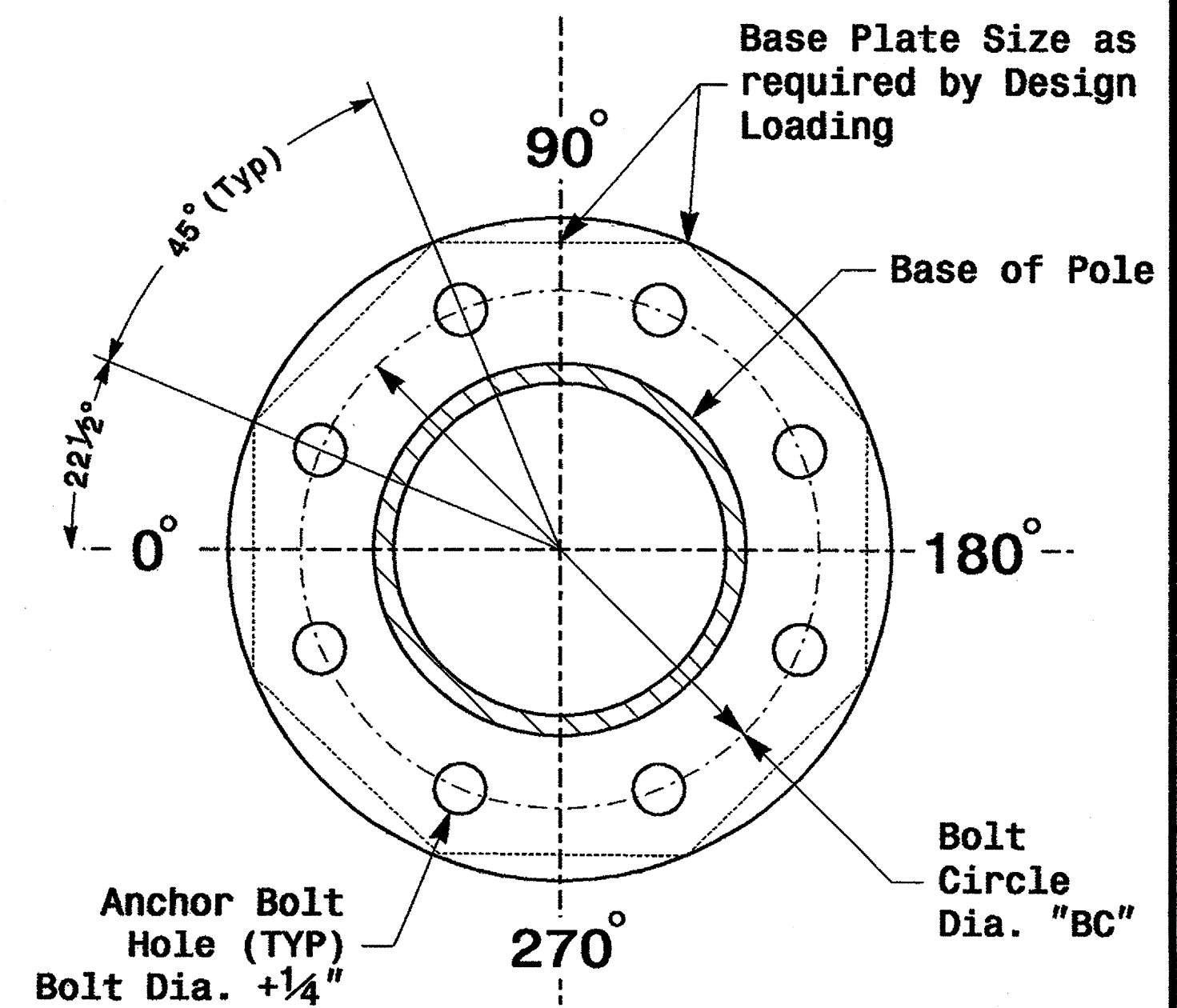
- Notes:
- 1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
 - 2) A.B. = Anchor Bolt
 - 3) B.C. = Bolt Circle of Anchor Bolts
 - 4) If Custom Design, use "NCDOT STANDARD" line for plan pole I.D.
 - 5) See drawing M4 for mounting positions of I.D. tags.

Identification Tag Details



Anchor Bolt Detail

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

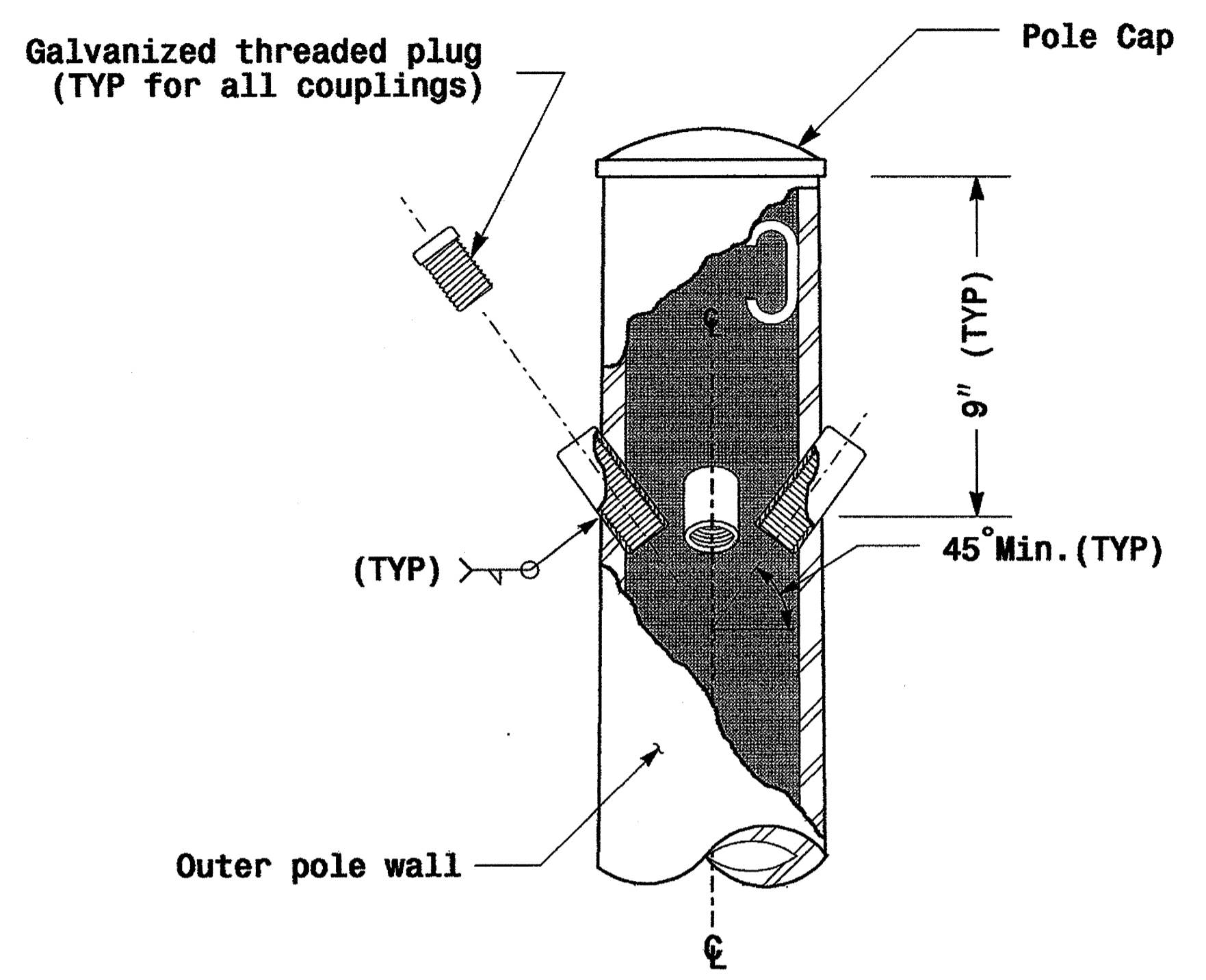


8 Bolt Base Plate Detail

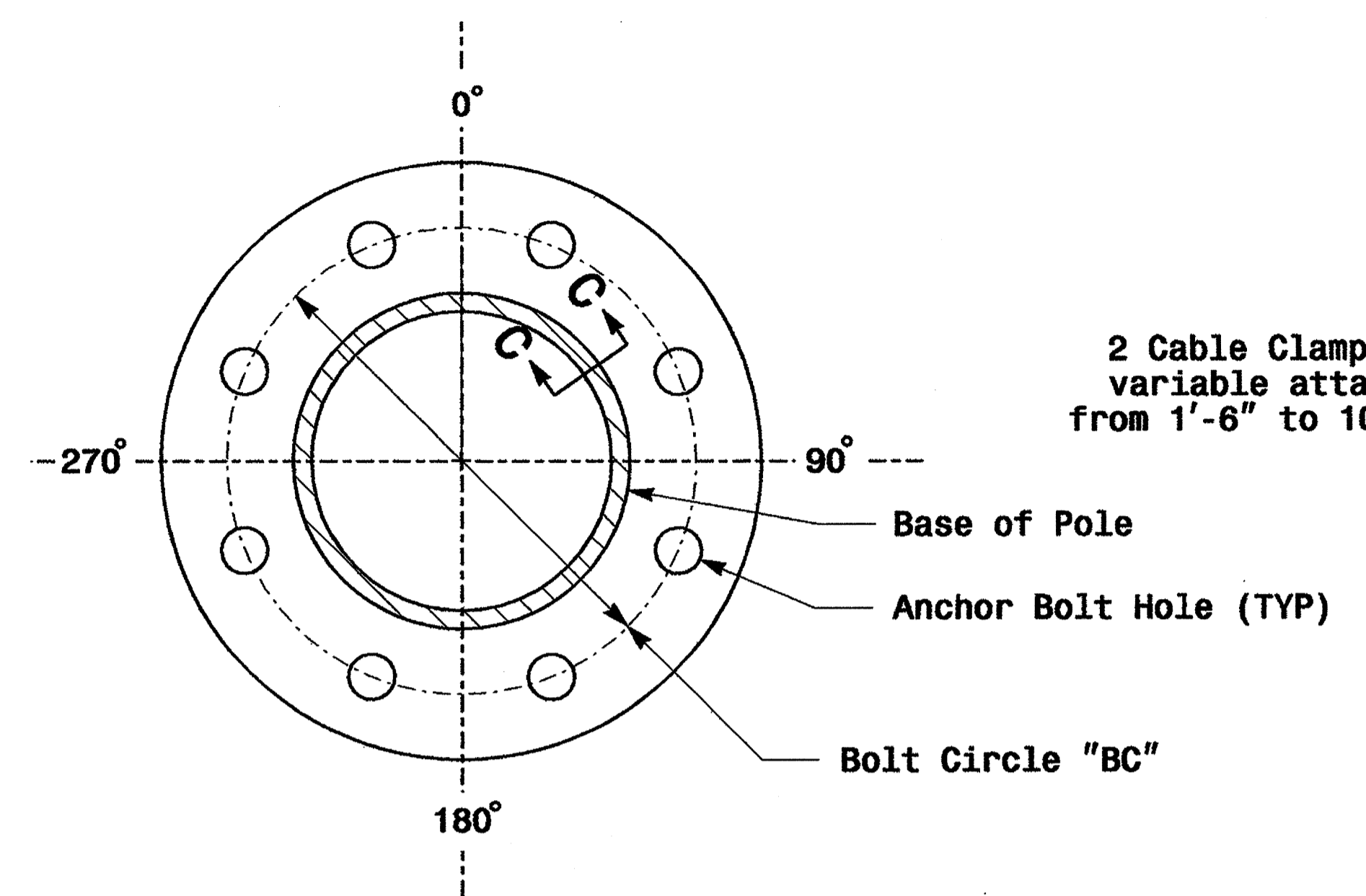
	Typical Fabrication Details Common To All Metal Poles		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander SCALE: NONE	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito REVISIONS: _____ INIT. DATE: _____	

01-SEP-2005 18:22 D:\2004 Metrol Pole Standard\ds04.m2 thru m5.dgn condrens

Fabrication Details - All Poles

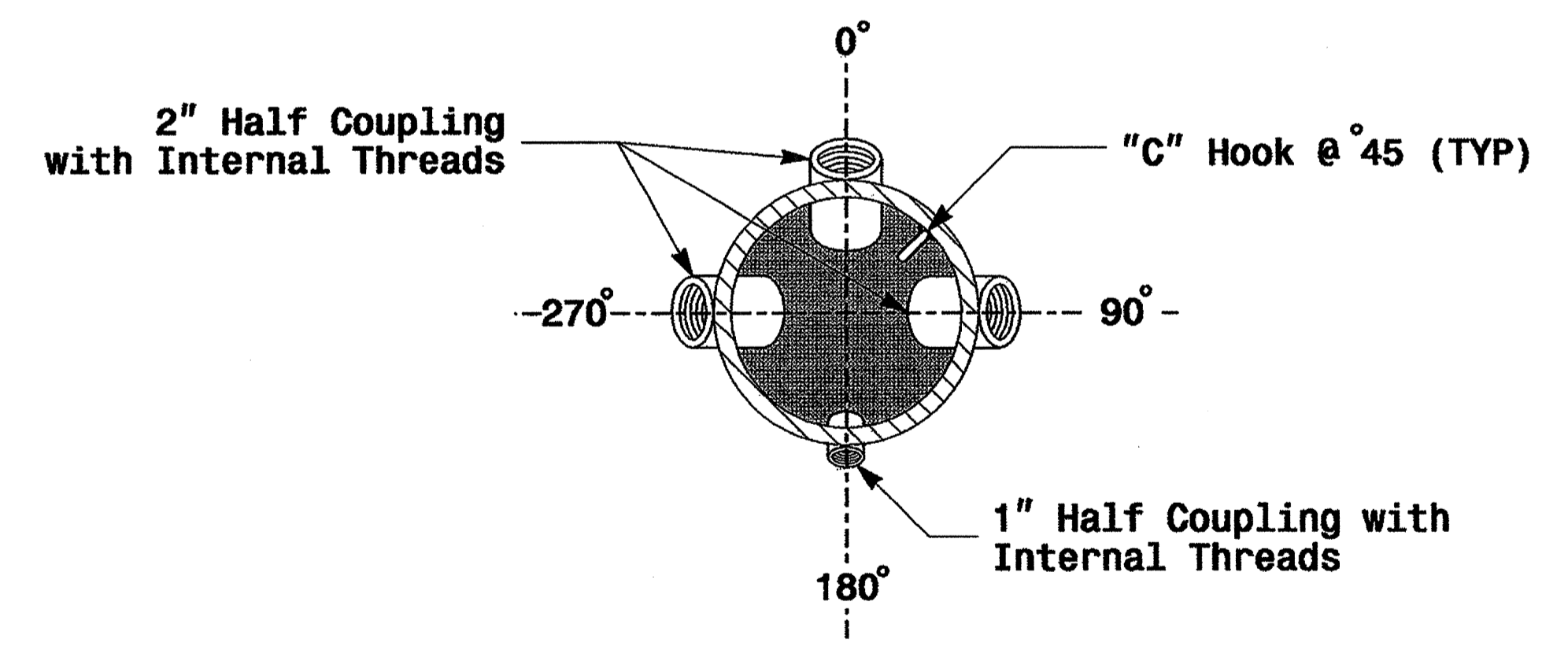
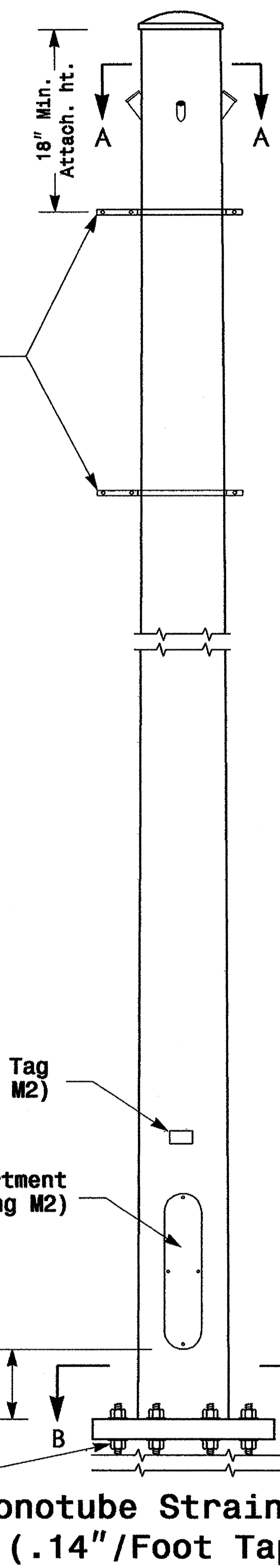


Cable Entrances at Top of Pole

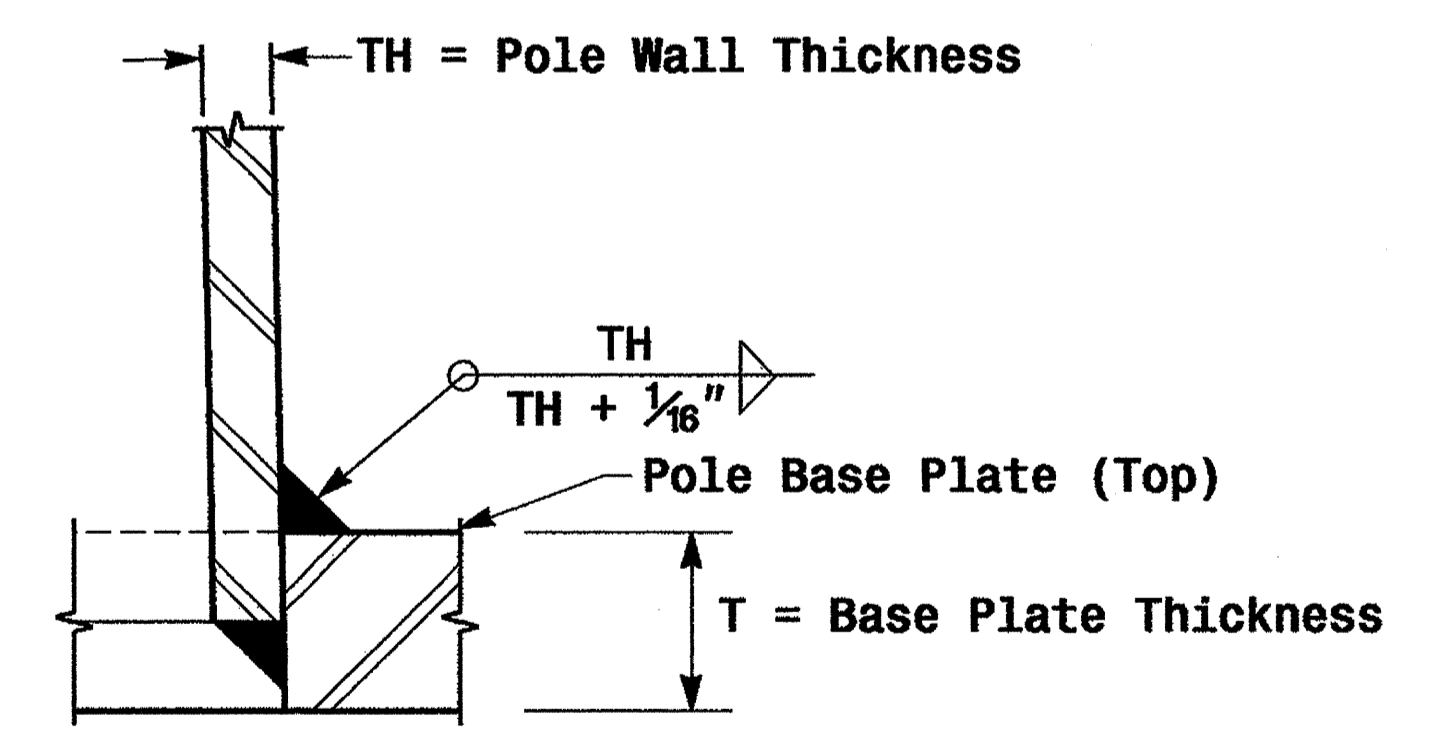


Section B-B
Pole Base Plate
(See drawing M2)

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



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

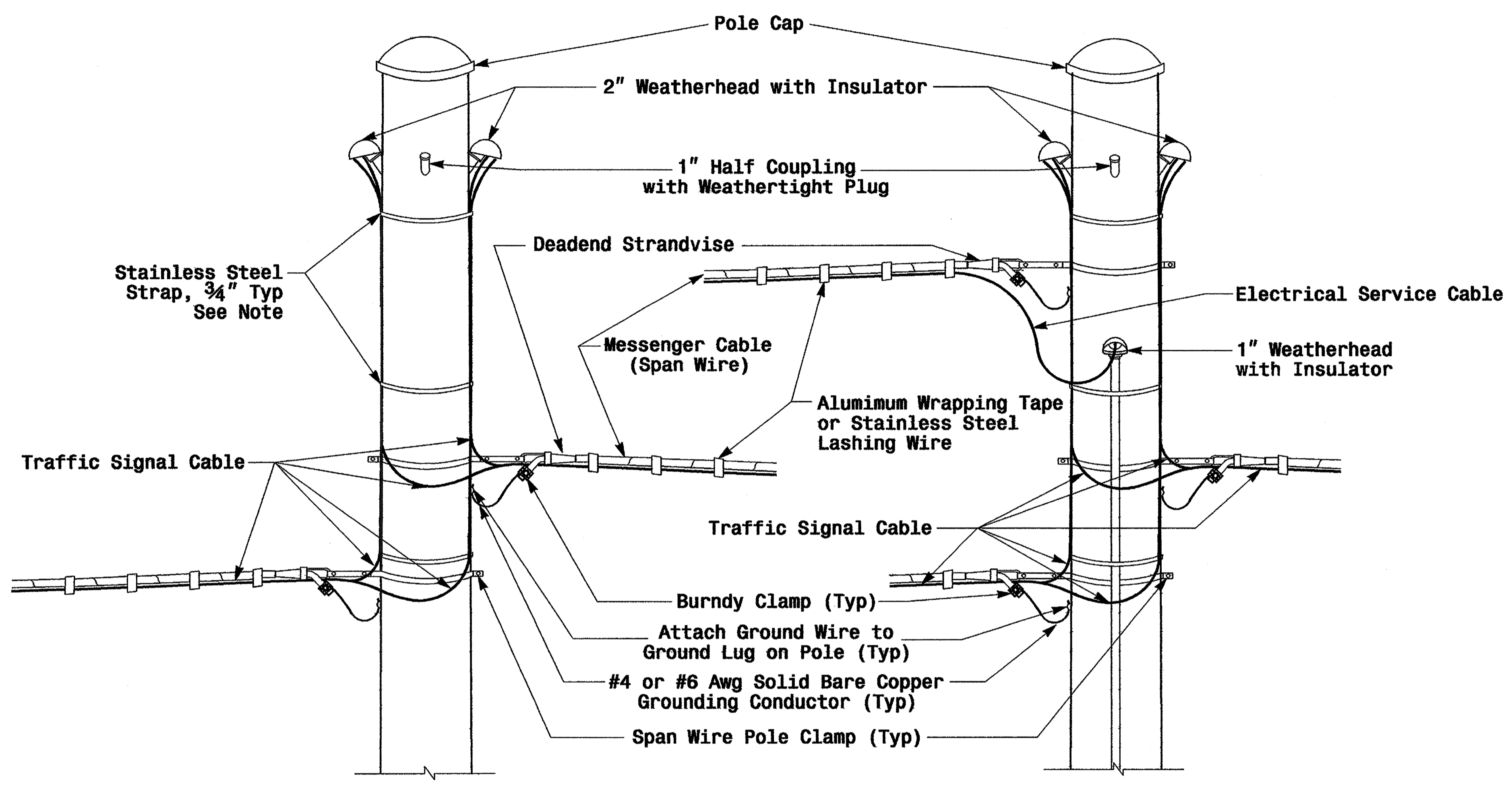


Section C-C
Socket Connection Weld Detail

Fabrication Details - Strain Poles

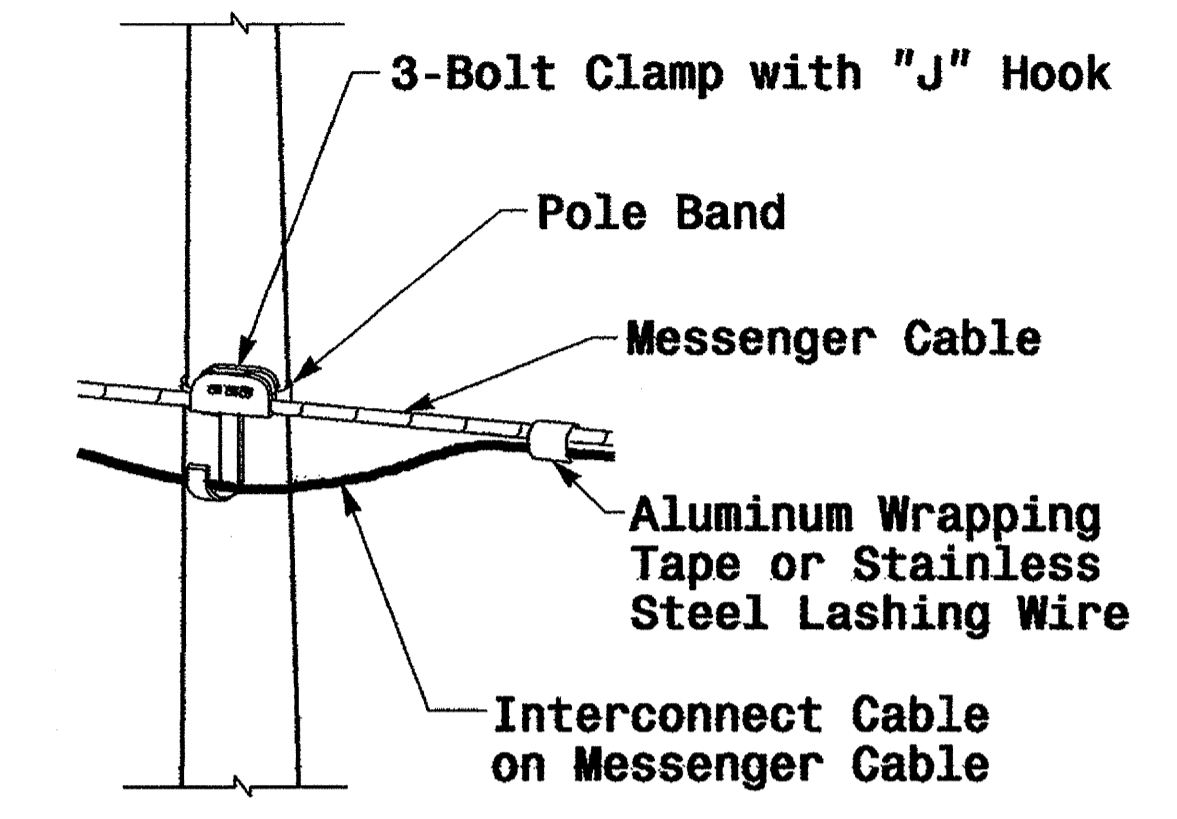
01-SEP-2005 14:07
w:\p\p\ee-unit\work\p\p\ee\2004\metal pole standard\ds2004.m3.dgn
p\alexander

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

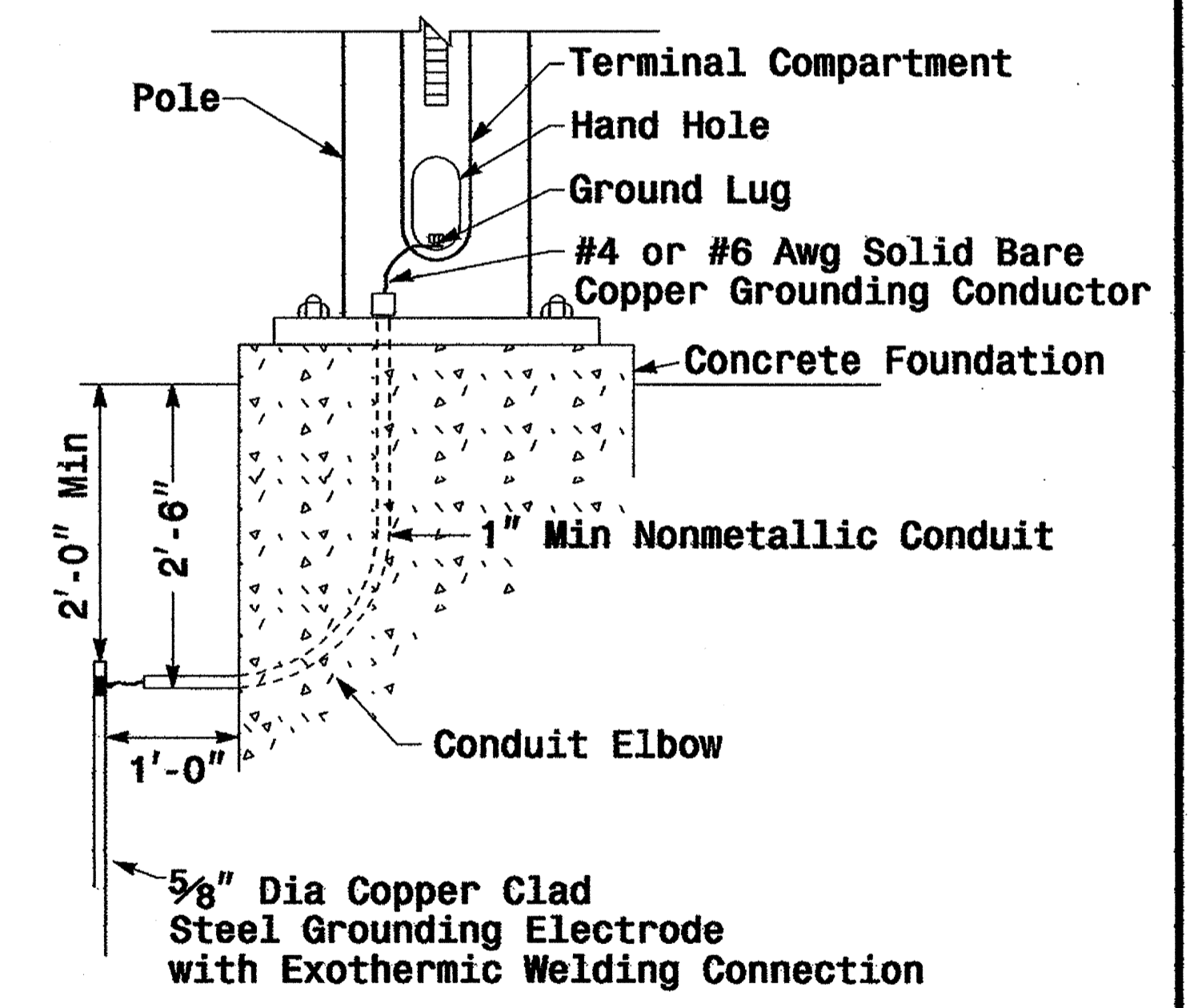


Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole



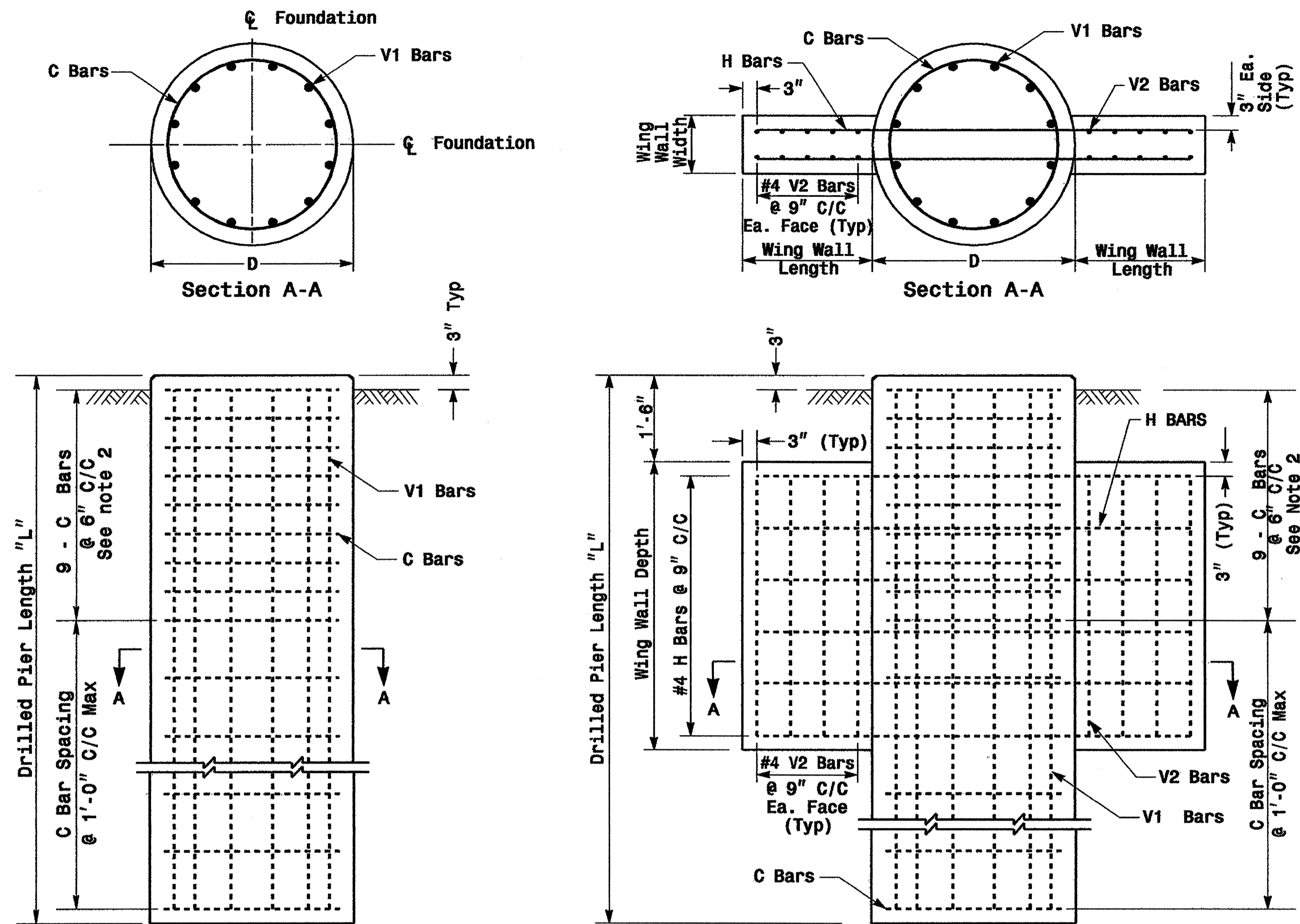
Metal Pole Grounding Detail

Construction Details - Strain Poles

01-SEP-2005 16:13 C:\pwork\ch1\mtr\kgcupae2004\mtr\pole_strainpole.dwg pd alexander

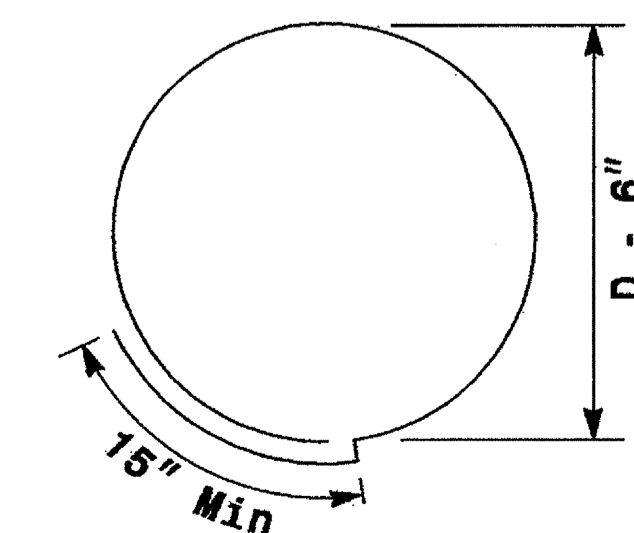
	Construction Details Strain Poles		
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: D.C. SARKAR	
REVISIONS:		INITIALS:	DATE:
SIGNATURE: <i>Milton I. Dean</i>		DATE: 9-1-05	SIG. INVENTORY NO.:

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



Typical "C" Bars

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

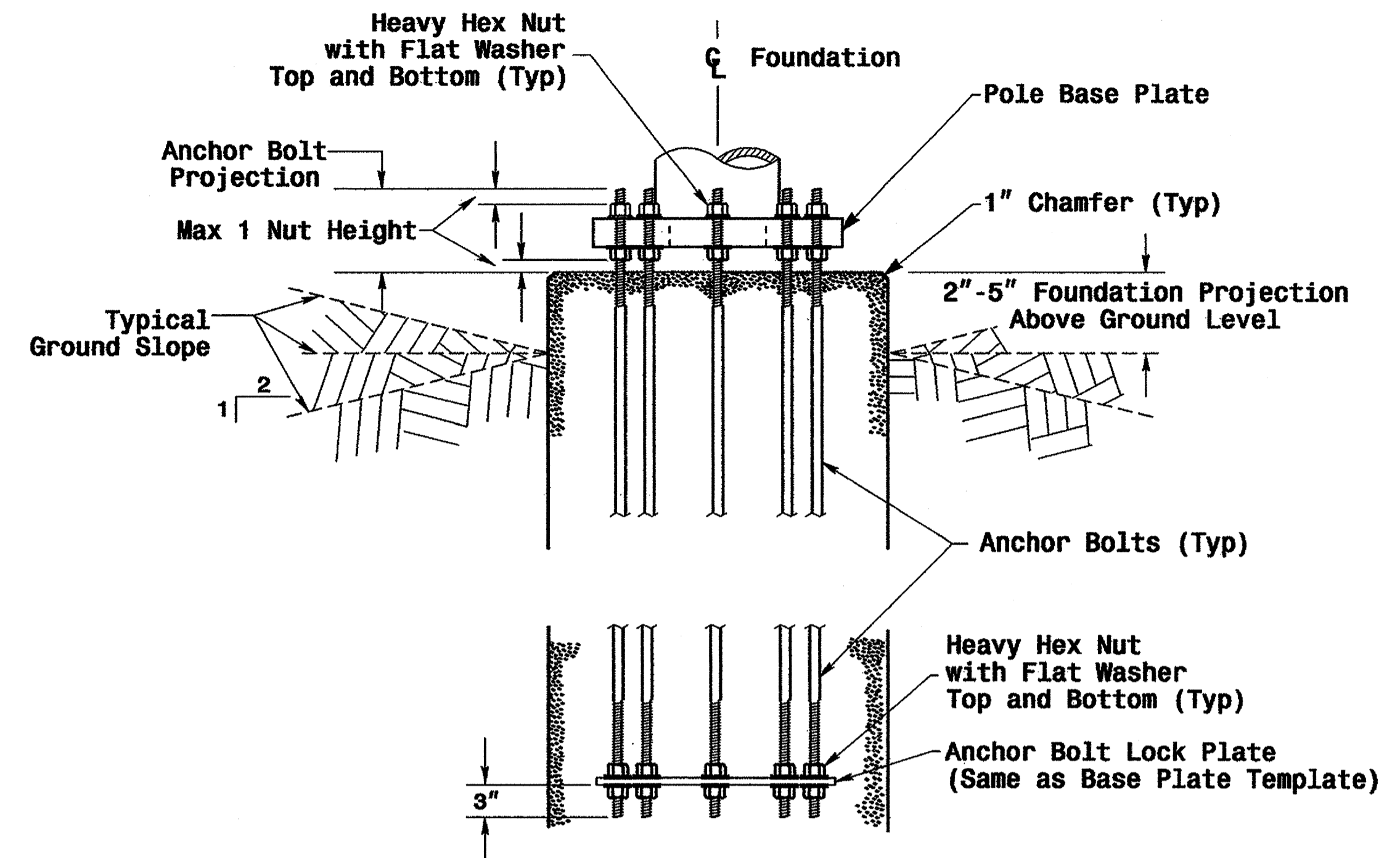
* See Note No. 1
** See Note No. 3

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

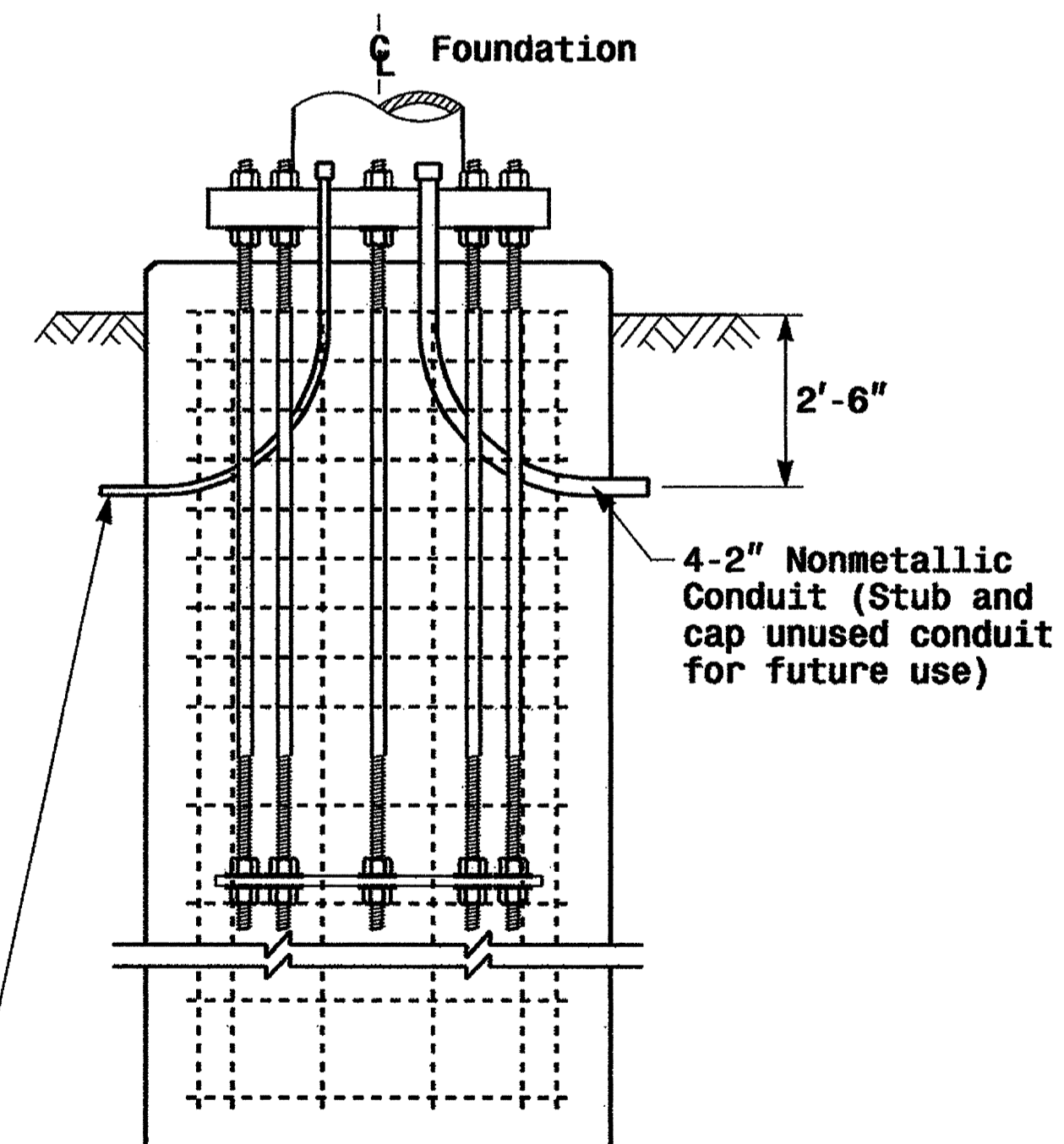
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



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. X-0002BB

SHEET NO. Sig. 19

M 7

Construction Details - Foundations

	Construction Details Foundations		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER DEBESH C. SARKAR 028094
	PREPARED BY: C.F. ANDREWS SCALE: NONE DATE:	REVIEWED BY: P.L. ALEXANDER DATE:	REVIEWED BY: A.W. ESPOSITO DATE:

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

Concrete Volume (cubic yards) = .356 X L

Fabrication Design Notes:

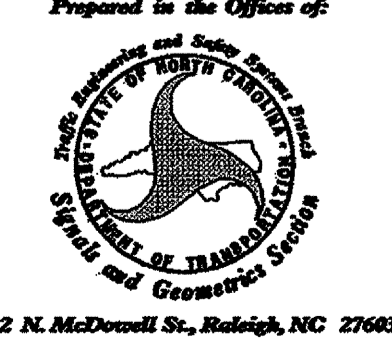
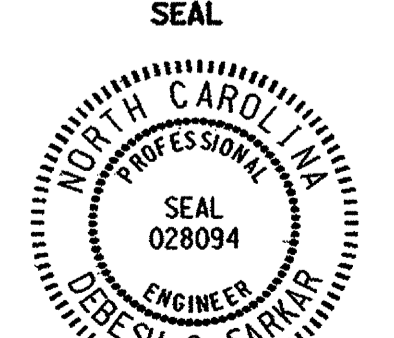
1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.
2. Base plate thickness (T) is 2.0 inches.

Foundation Selection:

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

Standard Strain Poles

02-SEP-2005 12:12
vr:\pools\std-strain-pole-std-strain-pole.dgn
not to be used

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

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

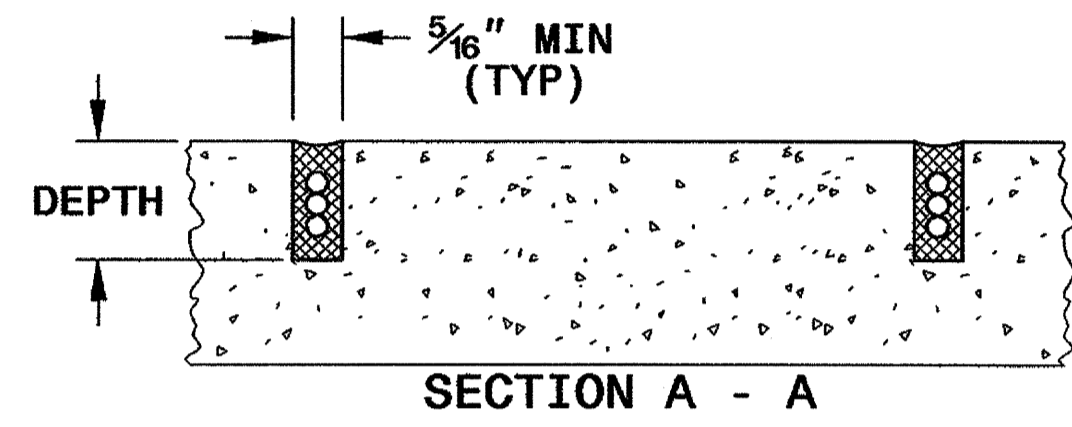
11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3
1725D01

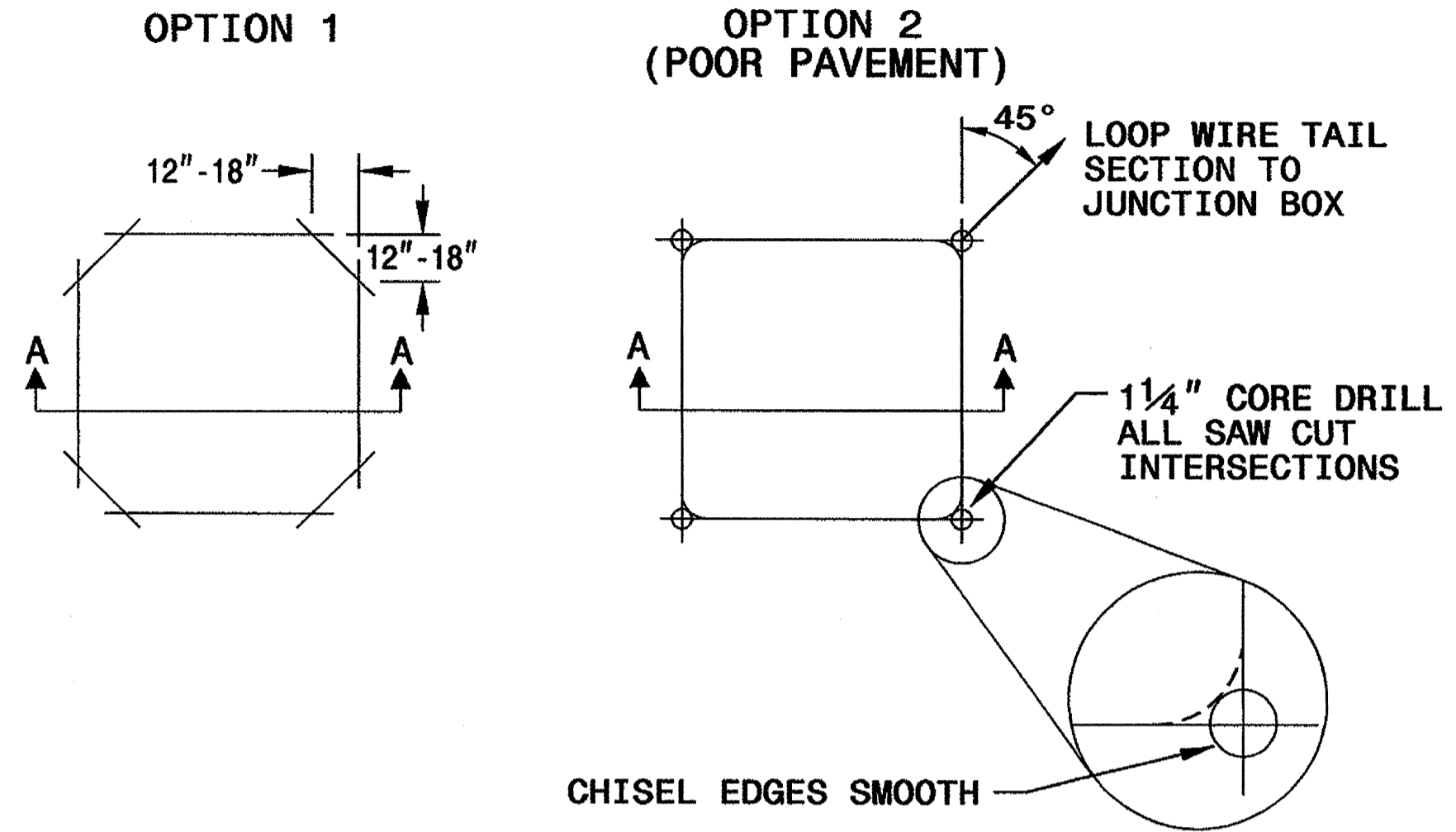
SAW SLOT DEPTH CHART

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

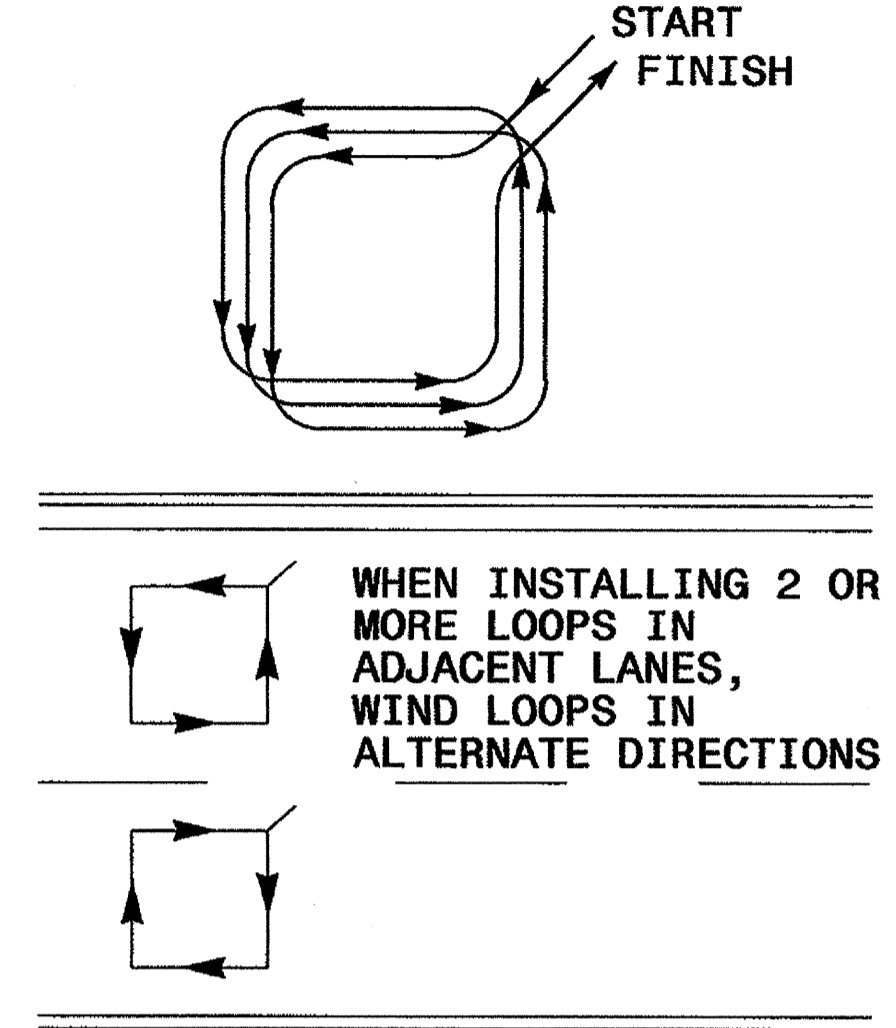


CONVENTIONAL 4-SIDED LOOP

SAW CUT OPTIONS

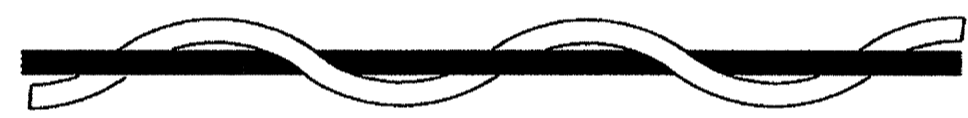


LOOP WINDING METHOD



LOOP WIRE TWISTING METHOD

INCORRECT WAY TO TWIST WIRE



CORRECT WAY TO TWIST WIRE

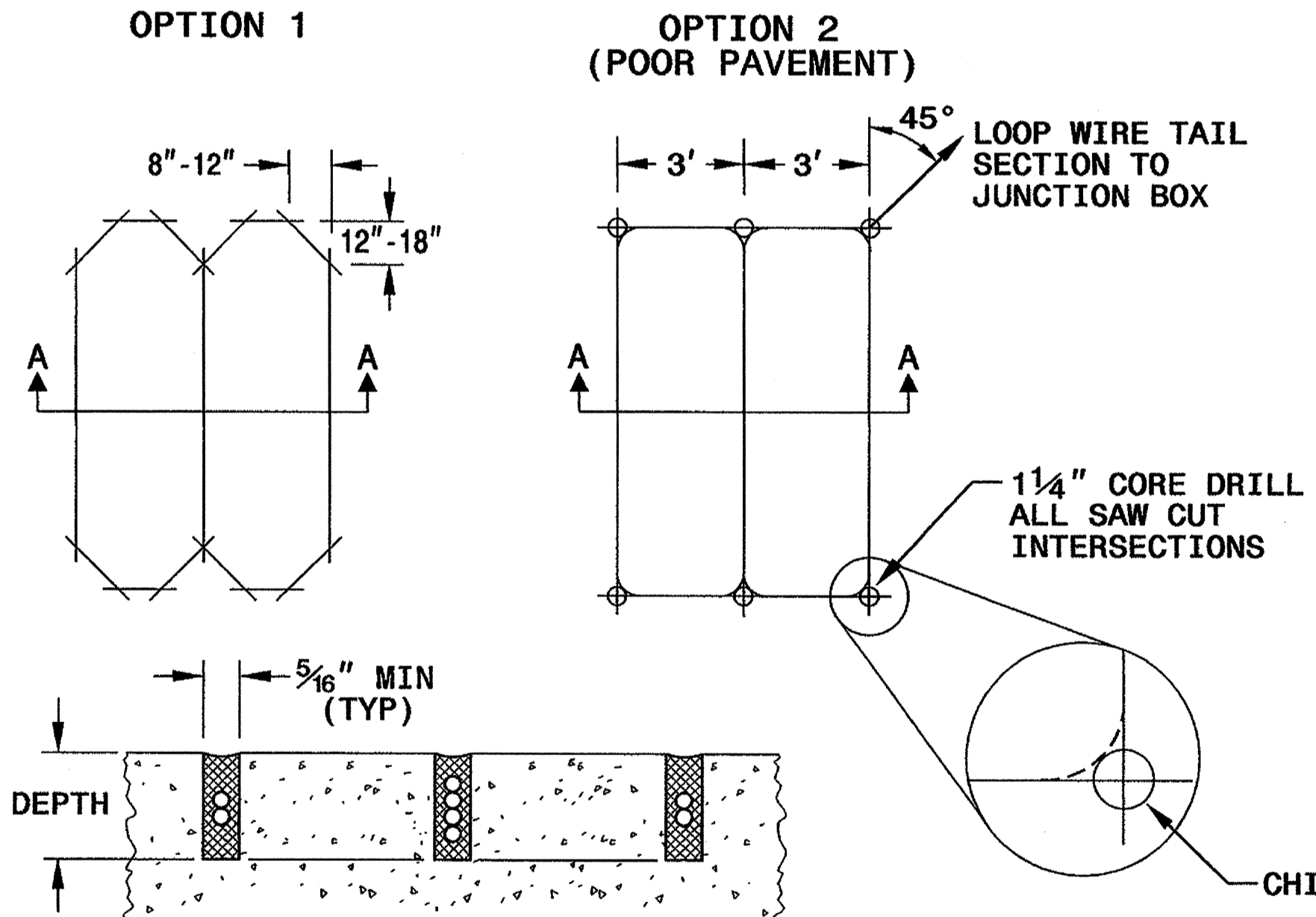


NOTES

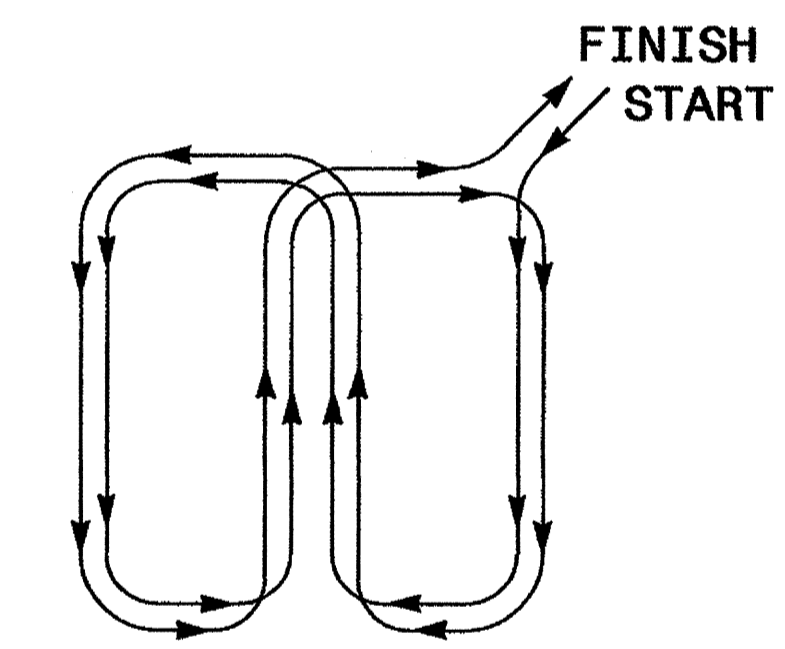
1. OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
2. MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
3. WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
4. LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

QUADRUPOLE LOOP

SAW CUT OPTIONS



LOOP WINDING METHOD



SECTION A - A
DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

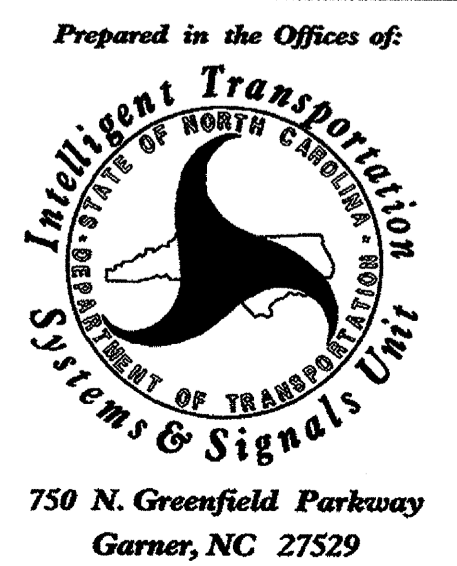
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3
1725D01

See Plate for Title



Signature: *Wilton Dean* 11/24/08
DATE

24-NOV-2008 09:28 d:\work_files\1725D01\1725D01.dgn

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

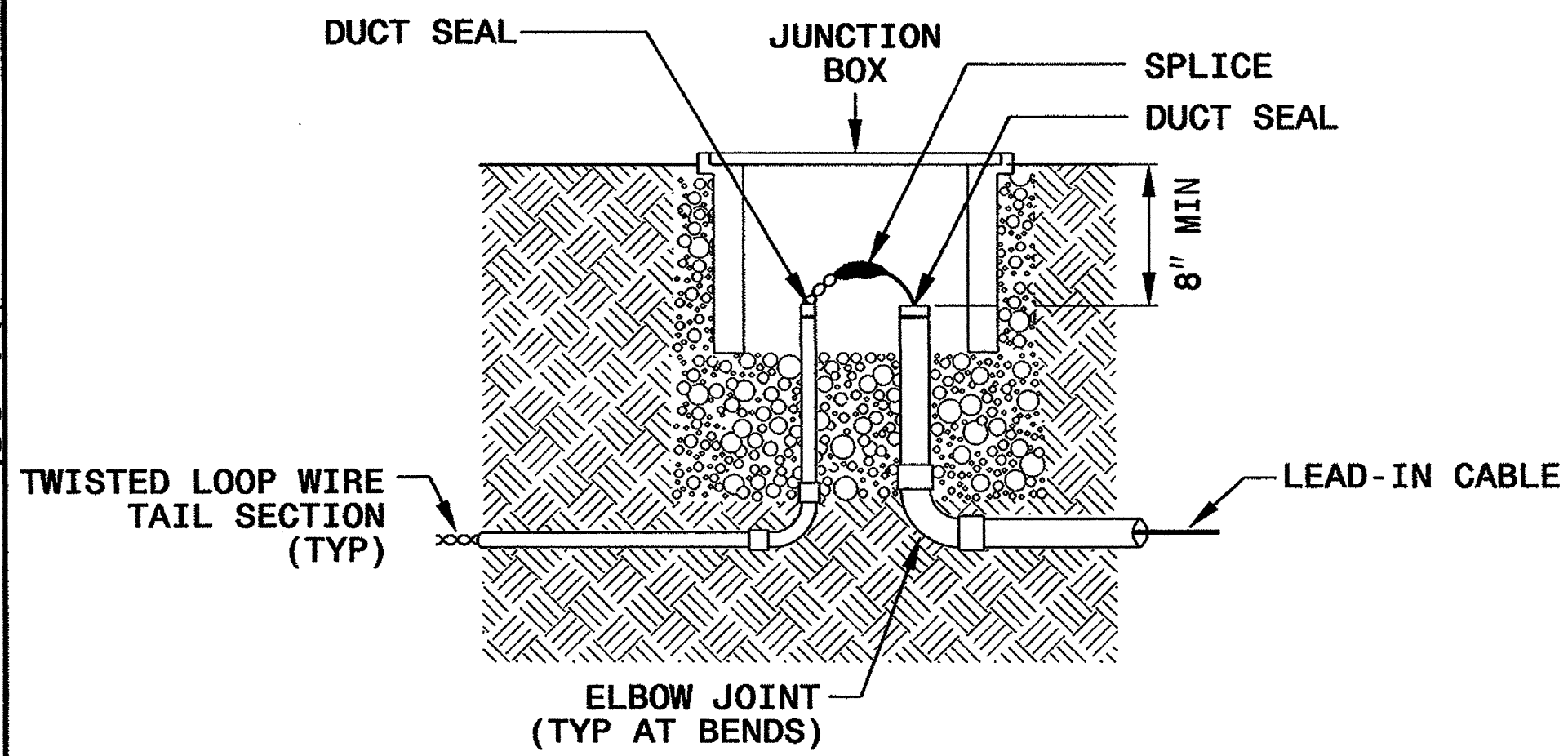
11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
 LOOP WIRE DETAILS

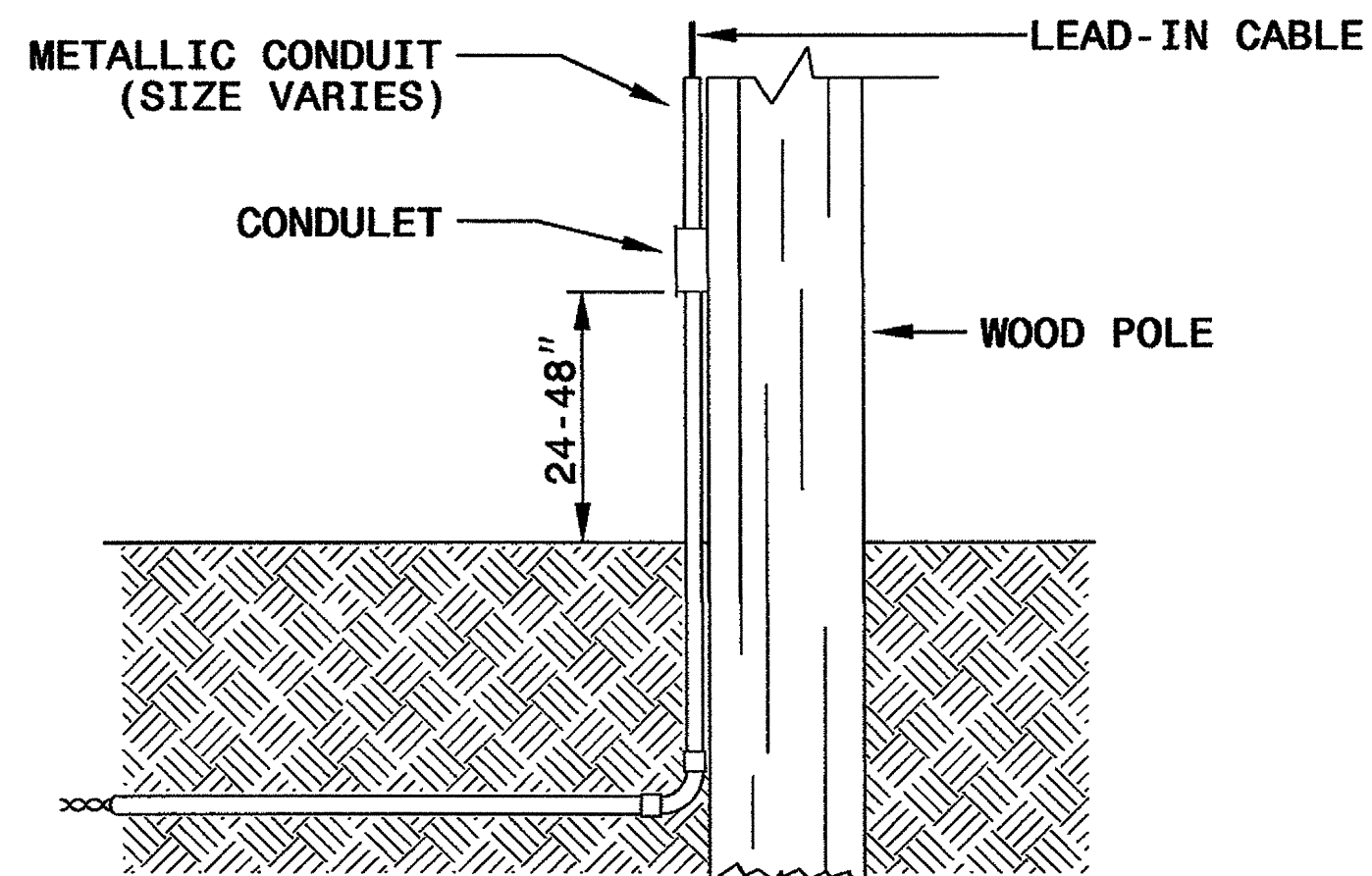
SHEET 2 OF 3
1725D01

LOOP WIRE SPLICE POINT DETAILS

LOOP WIRE AT JUNCTION BOX



LOOP WIRE AT POLE

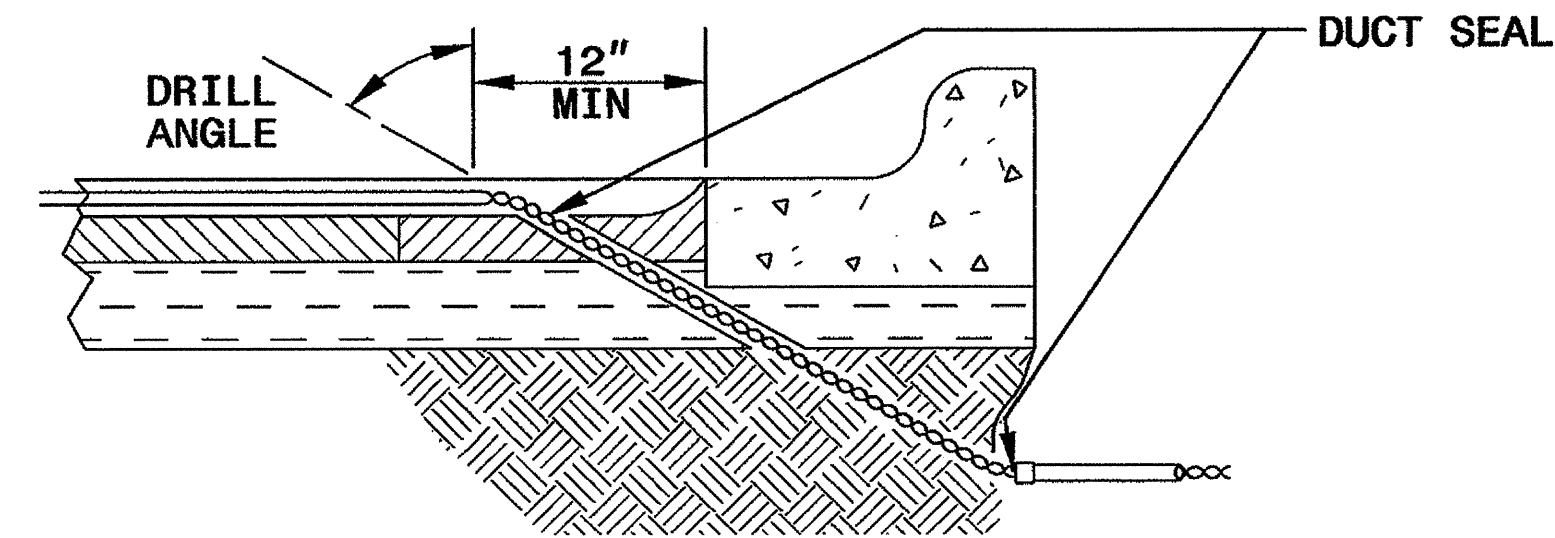


NOTE

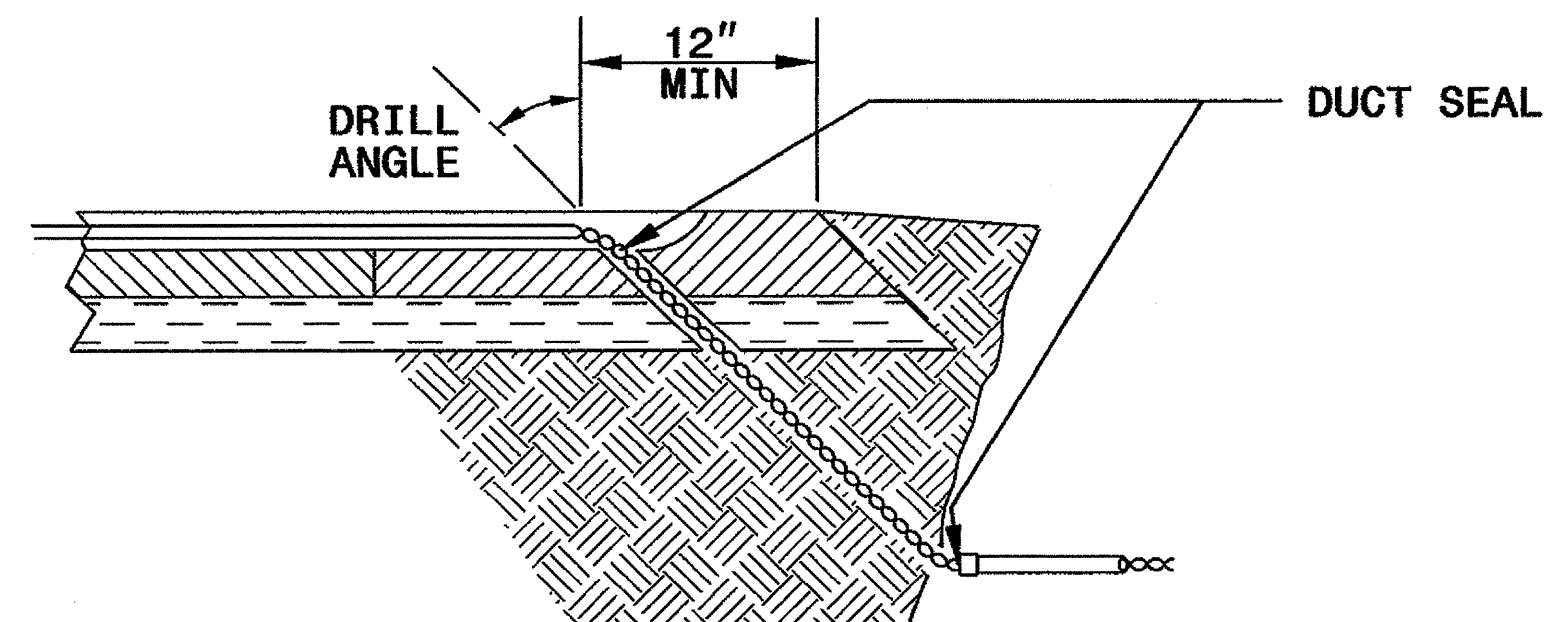
SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

LOOP WIRE PAVEMENT EDGE DETAILS

LOOP WIRE AT CURB & GUTTER SECTION



LOOP WIRE AT PAVEMENT SECTION



NOTES

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

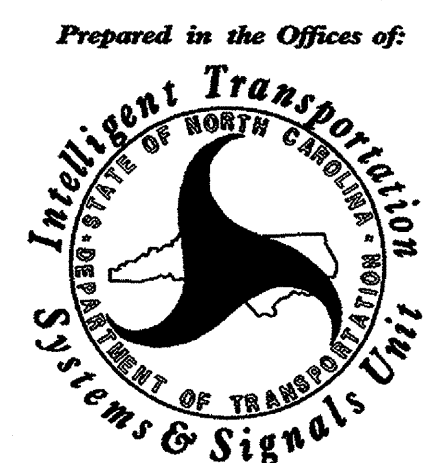
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 DIVISION OF HIGHWAYS
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11-08

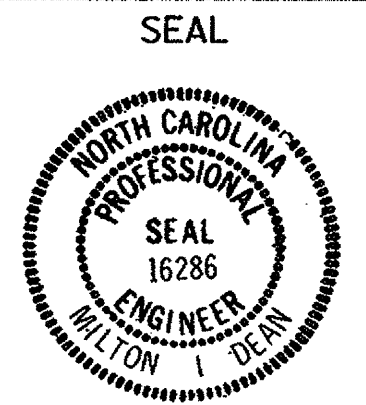
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
 LOOP WIRE DETAILS

SHEET 2 OF 3
1725D01

See Plate for Title



750 N. Greenfield Parkway
 Garner, NC 27529



Milton J. Dean 11/24/08
 SIGNATURE DATE

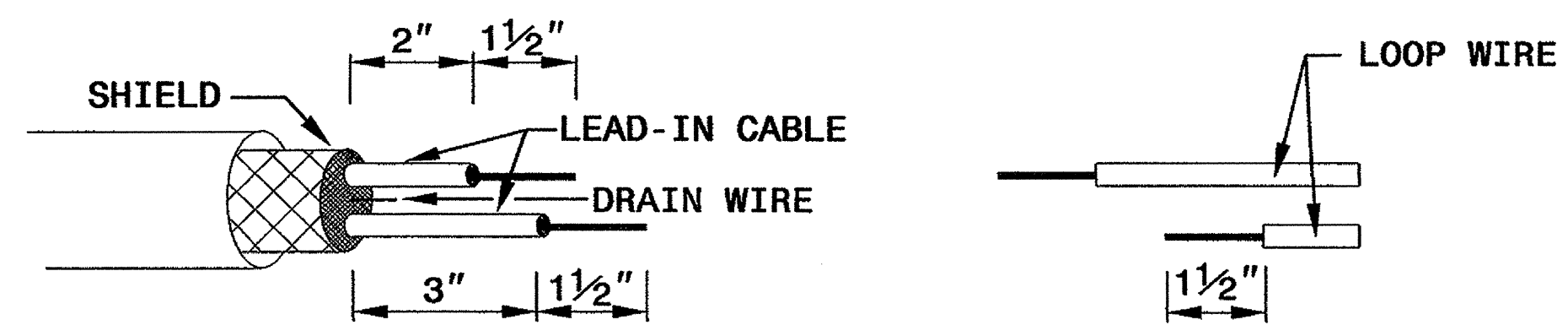
STATE OF NORTH CAROLINA
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11-08

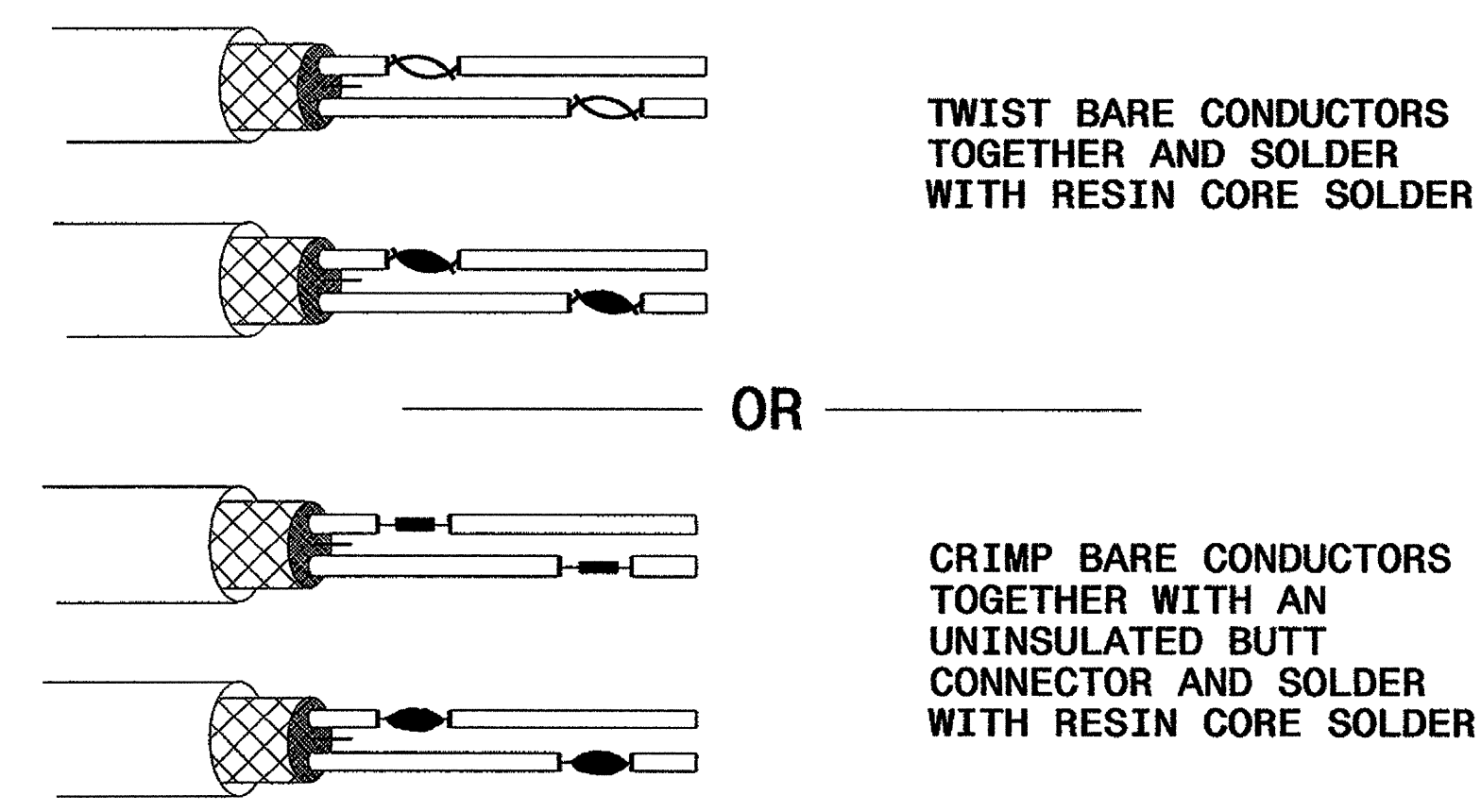
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
 SPLICING FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE

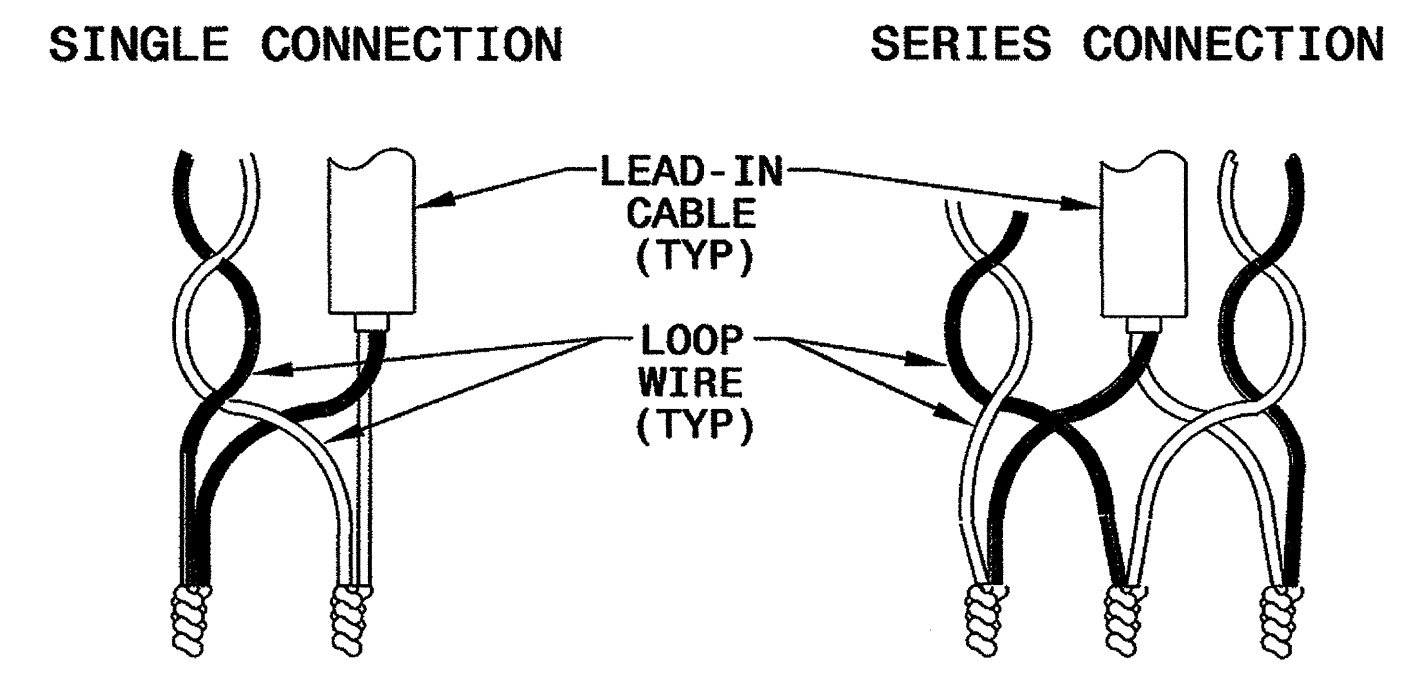


STEP 2. CONNECT AND SOLDER

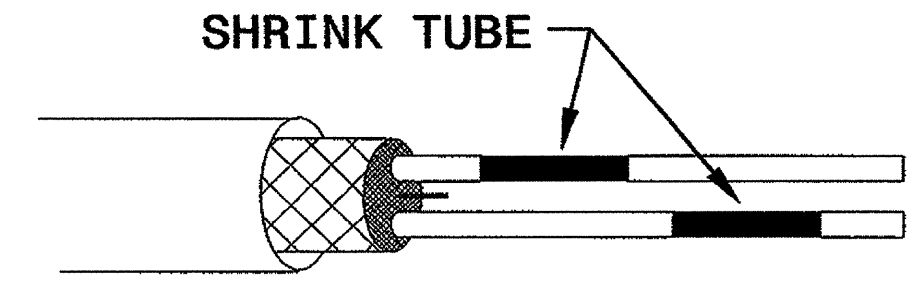


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

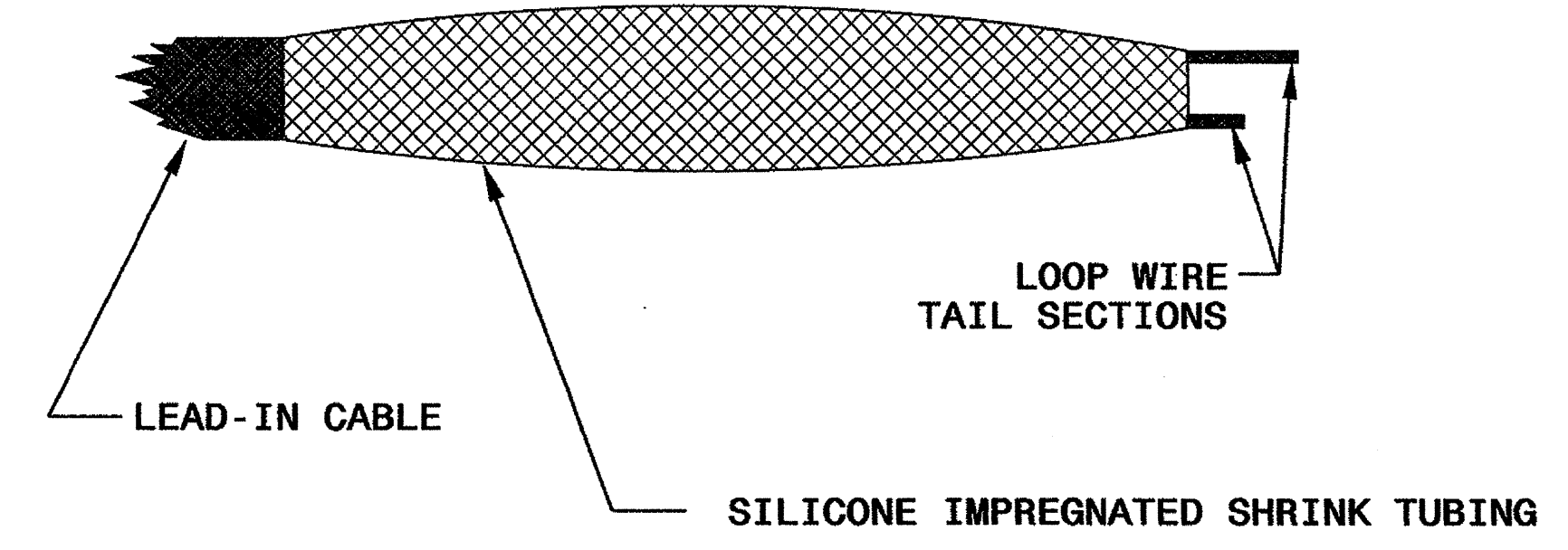
LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY PROTECT SPLICE



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

SHEET 3 OF 3
1725D01

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

Milton I. Dean 11/24/08
SIGNATURE DATE

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