

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

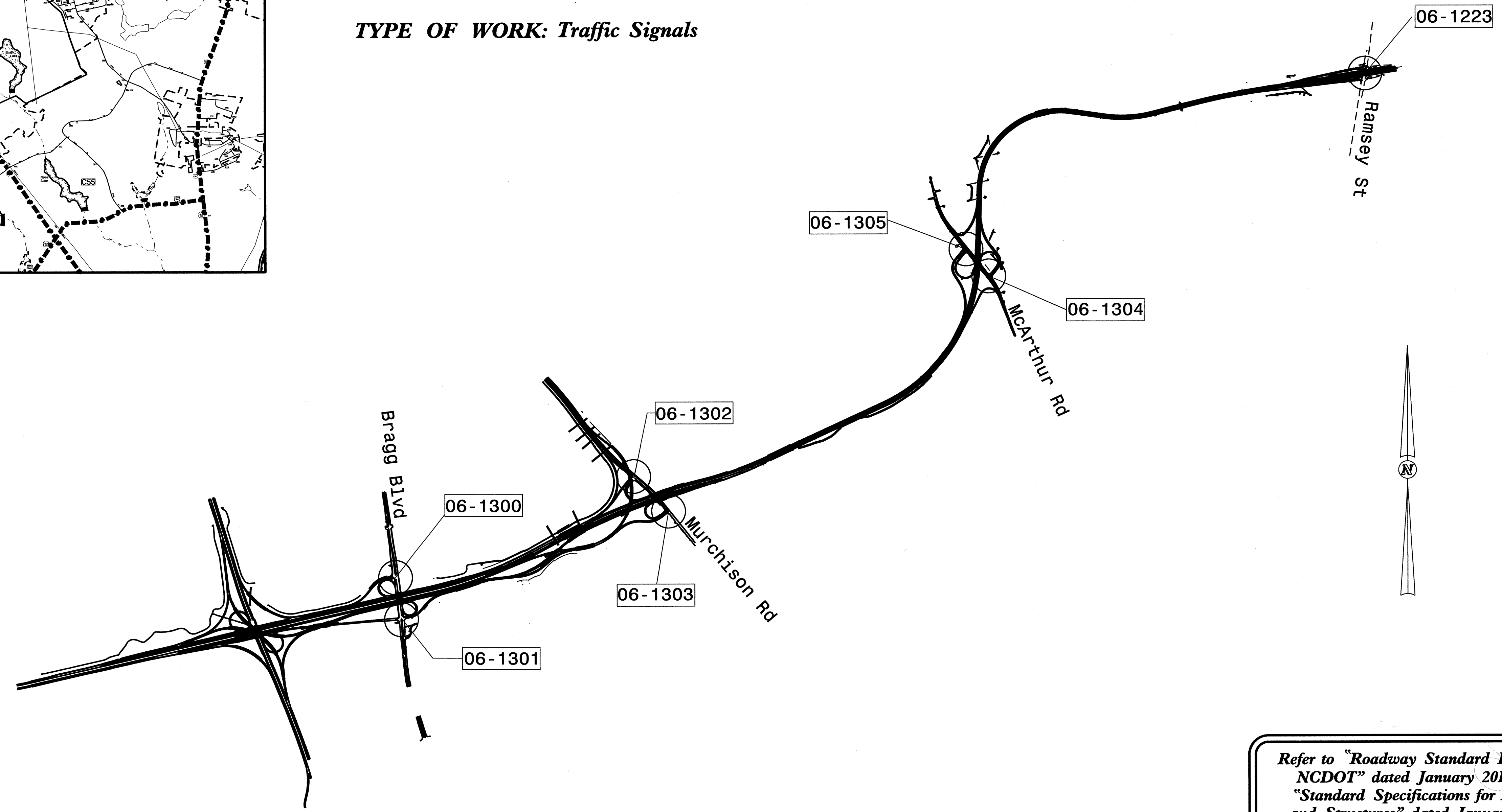
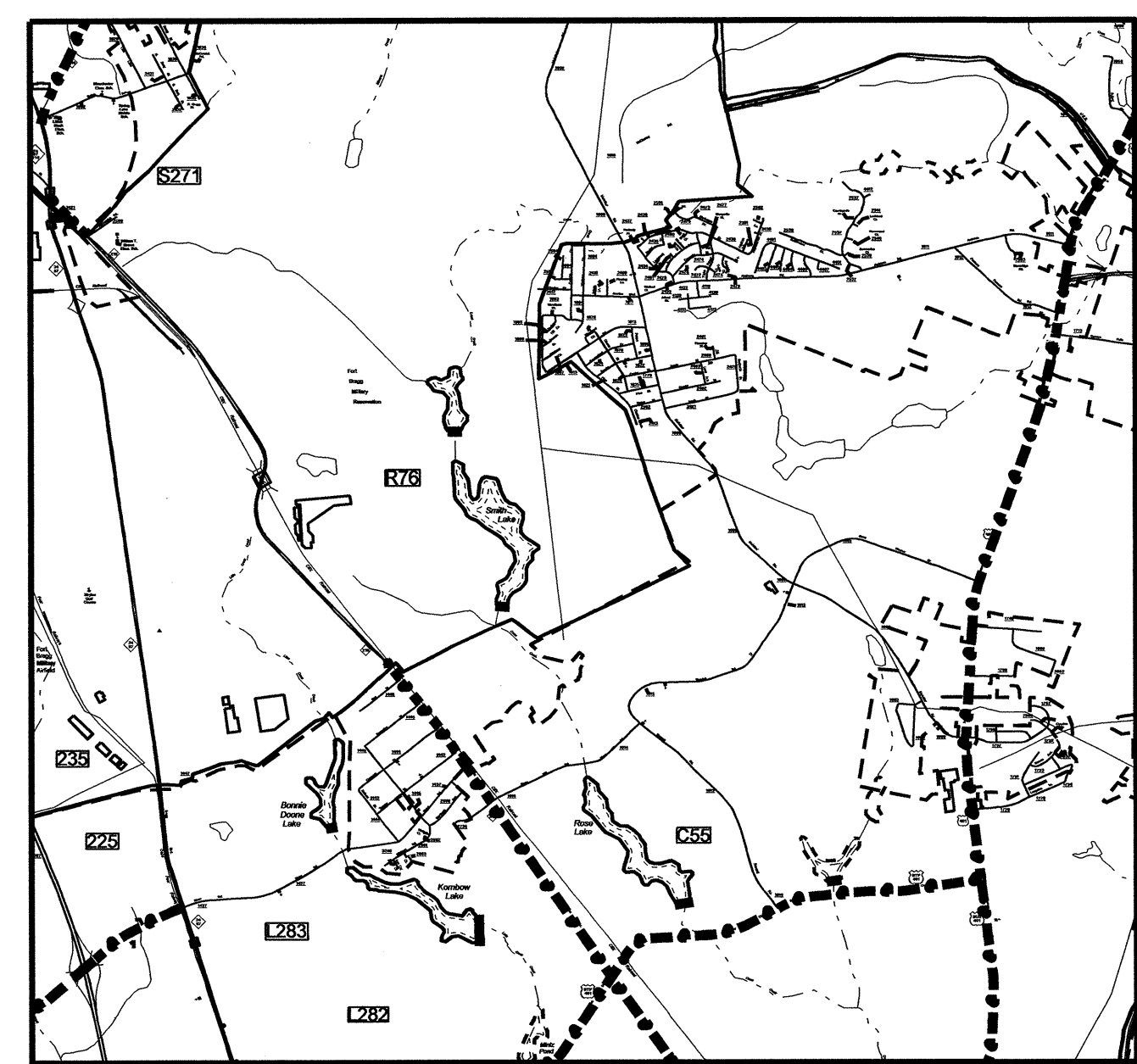
Cumberland County

LOCATION: Fayetteville Outer Loop from
Bragg Blvd to Ramsey St.

TYPE OF WORK: Traffic Signals

Project: X-0002CC

Vicinity



Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.

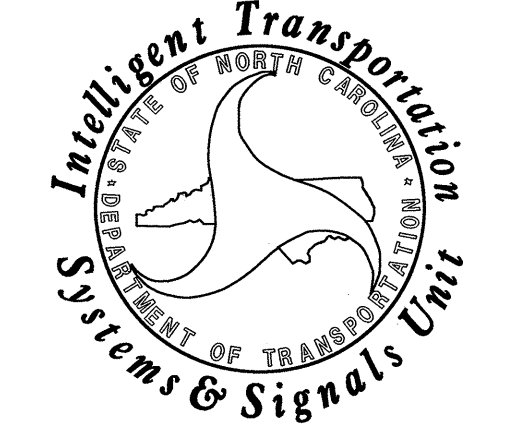
Sheet #	Reference #	Location/Description
Sig. 1		Title Sheet
Sig. 2-3	06-1223	US 401 (Ramsey Street) at I-295 Ramps
Sig. 4-5	06-1304	SR 1600 (McArthur Road) at I-295 EB Ramp /Loop B
Sig. 6-7	06-1305	SR 1600 (McArthur Road) at I-295 WB Ramp /Loop D
Sig. 8-9	06-1302	NC 87 - 210 (Murchison Road) at I-295 WB Ramp /Loop B
Sig. 10-12	06-1303	NC 87 - 210 (Murchison Road) at I-295 EB Ramp /Loop C
Sig. 13-14	06-1300	NC 24 (Bragg Blvd) at I-295 (Fayetteville Outer Loop) Ramp B
Sig. 15-16	06-1301	NC 24 (Bragg Blvd) at I-295 (Fayetteville Outer Loop) Ramp C/Loop D
Sig. 17	N/A	Communications Plans
Sig. 18-23	N/A	Metal Pole Standards
Sig.		
Sig.		
Sig.		
Sig.		

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

- Jason Galloway, PE - Region Signals Engineer
- George Brown, PE - Signal Equipment Design Engineer
- Greg Fuller, PE - Intelligent Transportation Systems Engineer

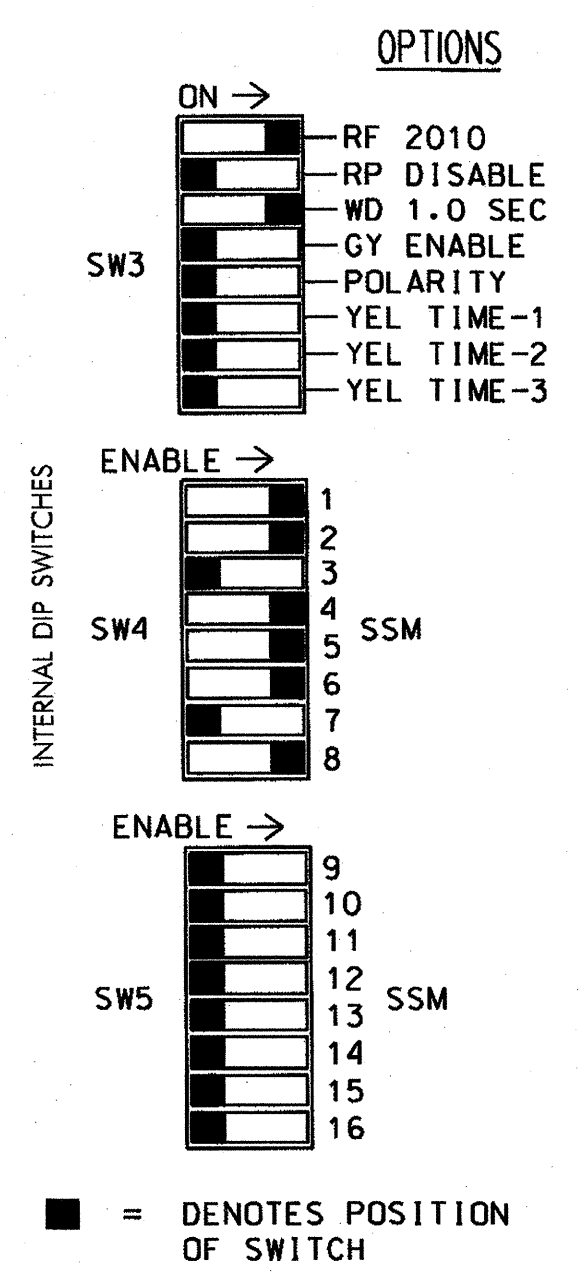
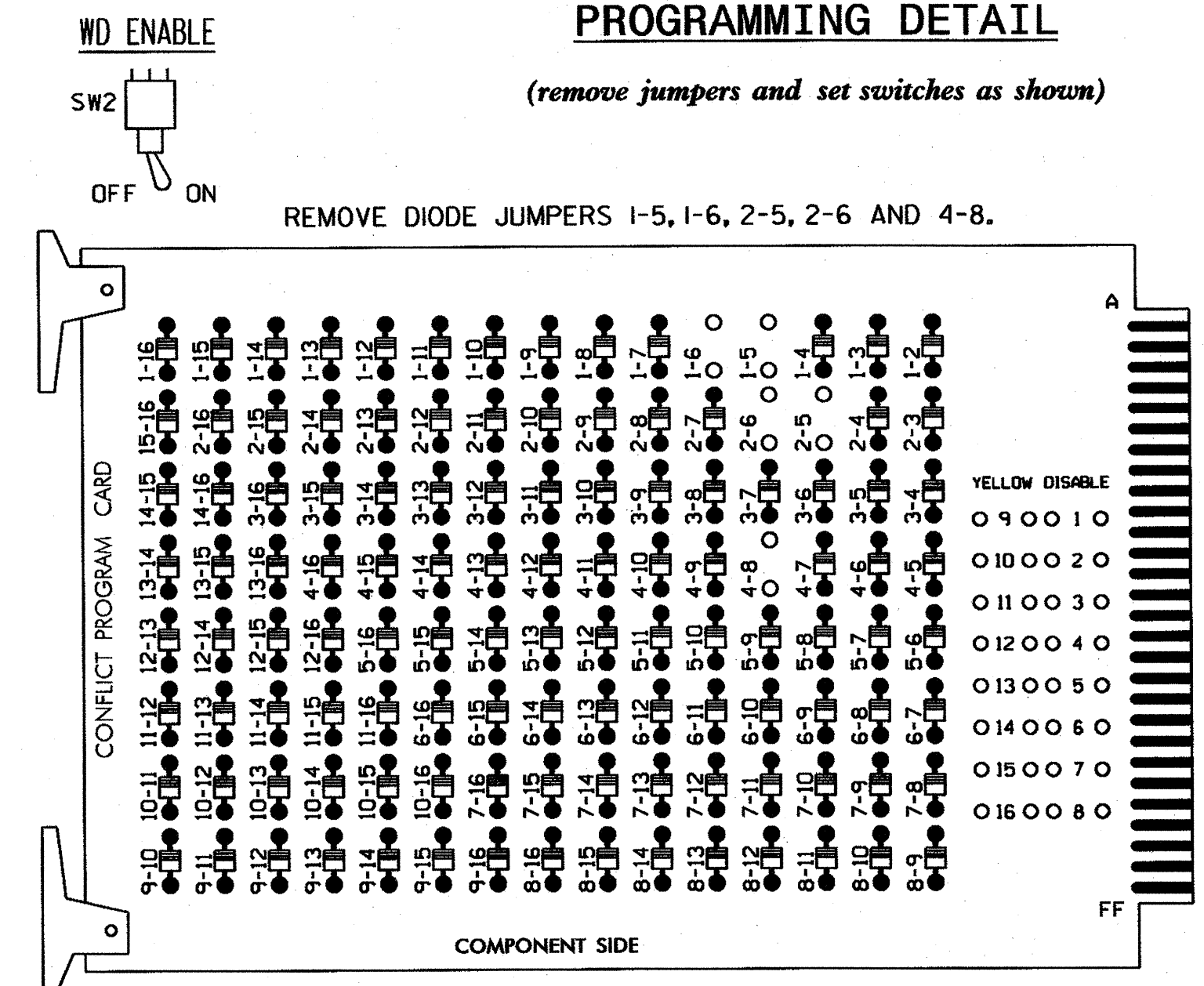
Prepared In the Office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION



07-NOV-2013 12:15 P:\TIP-Projects-X\0002CC\Traffic\Signals\Design\TitleSheet\X0002CC.sig-tsh.dgn

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



- 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.
 - Make sure switches YEL TIME-1, YEL TIME-2, and YEL TIME-3 are in the OFF position.

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 3,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 4 and 8 for Dual Entry.
- 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.
- The cabinet and controller are part of the Fayetteville City Signal System.

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.	11,12	21,22	NU	NU	41,42, 43,44	NU	51,52	61,62	NU	NU	81,82, 83,84	NU
RED		128						134				
YELLOW		129						135				
GREEN		130						136				
RED ARROW	125				101		131					107
YELLOW ARROW	126				102		132					108
GREEN ARROW	127				103		133					109

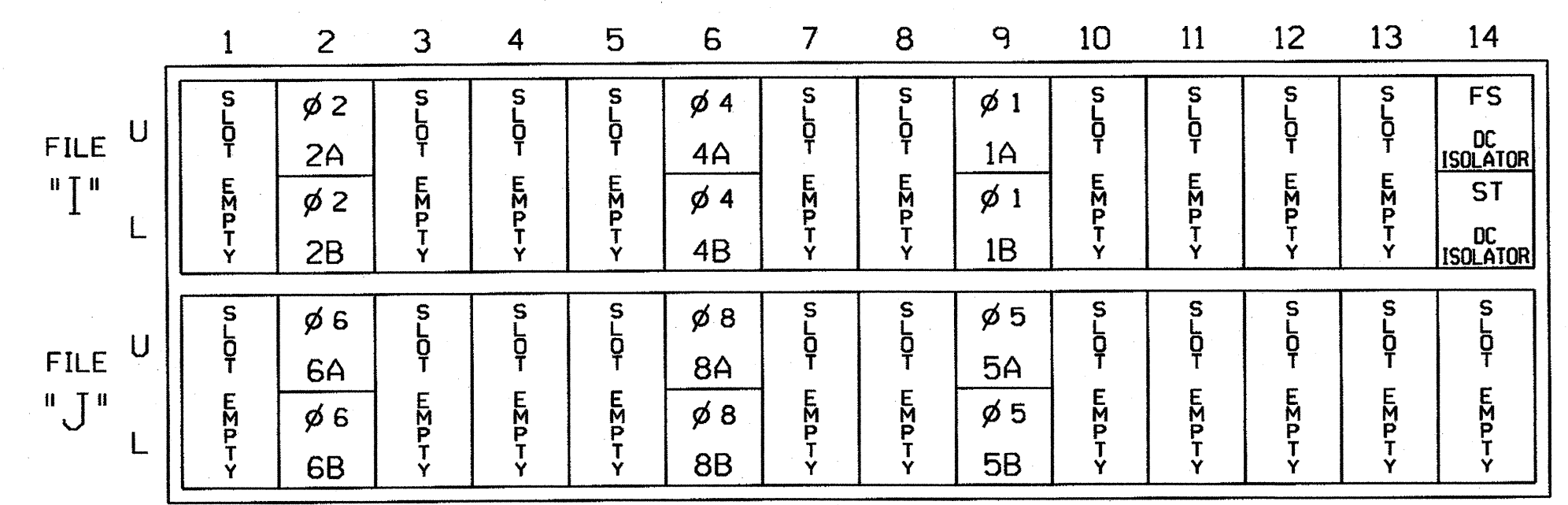
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S4,S5,S6,S8
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

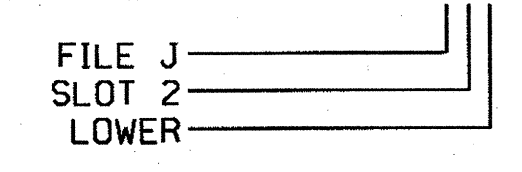


EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

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
1A	TB6-9,10	I9U	60	22	11	1	Y	Y			
1B	TB6-11,12	I9L	62	24	13	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	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			
5A	TB7-9,10	J9U	59	21	15	5	Y	Y			
5B	TB7-11,12	J9L	61	23	17	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1223
 DESIGNED: May 2013
 SEALED: 8/1/13
 REVISED: N/A

Electrical Detail

Electrical and Programming Details For:

US 401 (Ramsey Street) at I-295 Ramps

Division 6 Cumberland County Fayetteville

PLAN DATE: August 2013 REVIEWED BY: *T. Strickland*

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

750 N. Greenfield Pkwy, Garner, NC 27529

Seal of George C. Brown, Professional Engineer, License No. 022013

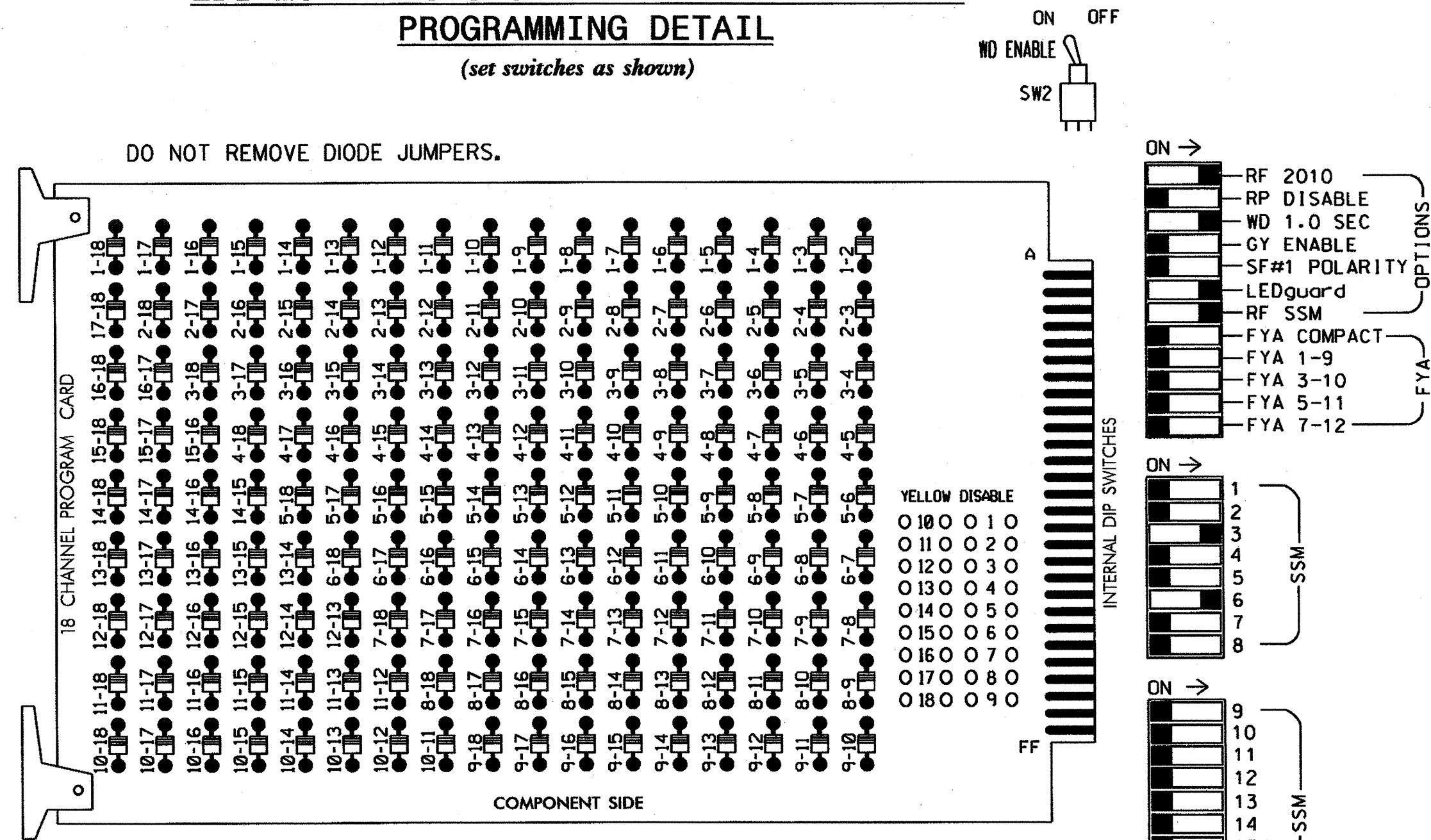
Signature: *George C. Brown* 8/21/13

Sig. Inventory No. 06-1223

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EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL

(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 phase 6 for Variable Initial and Gap Reduction.
4. Program phase 6 for Start Up In Green.
5. Program phase 6 for Yellow Flash.
6. The cabinet and controller are part of the SR 1600 (McArthur Road) Closed Loop System.

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	NU	NU	31,32	33,34	NU	NU	NU	61,62	NU	NU	NU
RED					116				134			
YELLOW									135			
GREEN									136			
RED ARROW				116								
YELLOW ARROW				117	117							
GREEN ARROW				118	118							

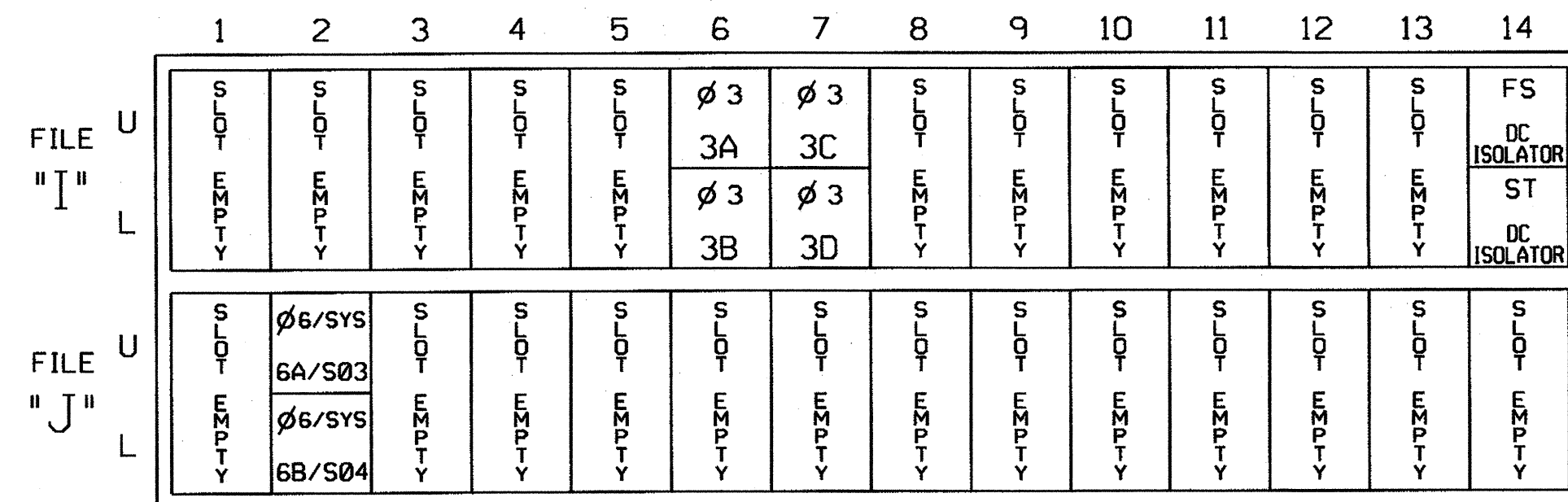
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



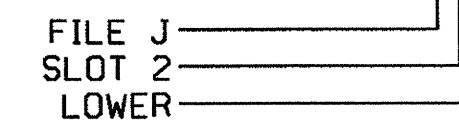
EX. : 1A, 2A, ETC. = LOOP NO.'S

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
3A	TB4-9,10	16U	41	3	4	3	Y	Y			
3B	TB4-11,12	16L	45	7	14	3	Y	Y			
3C	TB6-1,2	17U	65	27	34	3	Y	Y			10
3D	TB6-3,4	17L	78	40	44	3	Y	Y			10
6A/S03	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S04	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			

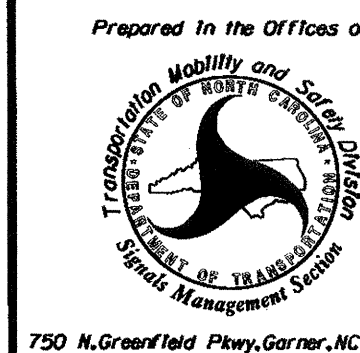
INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 06-1304
 DESIGNED: May 2013
 SEALED: 8/15/13
 REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:



SR 1600 (McArthur Road)
 at
 I-295 EB Ramp/Loop B

Division 6 Cumberland County Fayetteville

PLAN DATE: August 2013 REVIEWED BY: T. J. J. J.

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER

SEAL 022013

ENGINEER

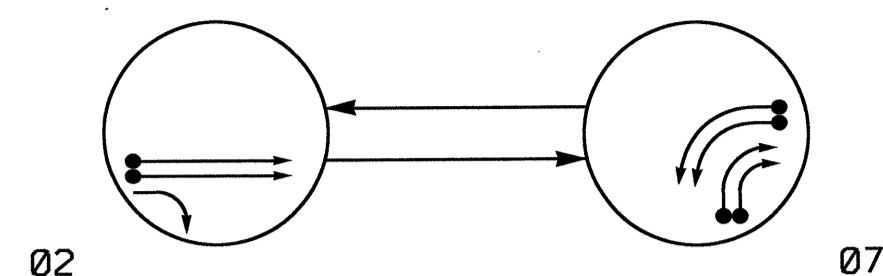
GEORGE C. BROWN

Signature: George C. Brown 8/24/13

DATE

SIG. INVENTORY NO. 06-1304

PHASING DIAGRAM



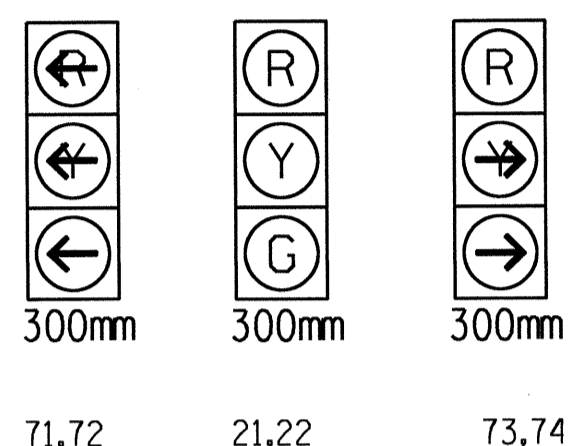
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	07	FLIGHT
21,22	G	R	Y
71,72	R	R	R
73,74	R	R	R

SIGNAL FACE I.D.



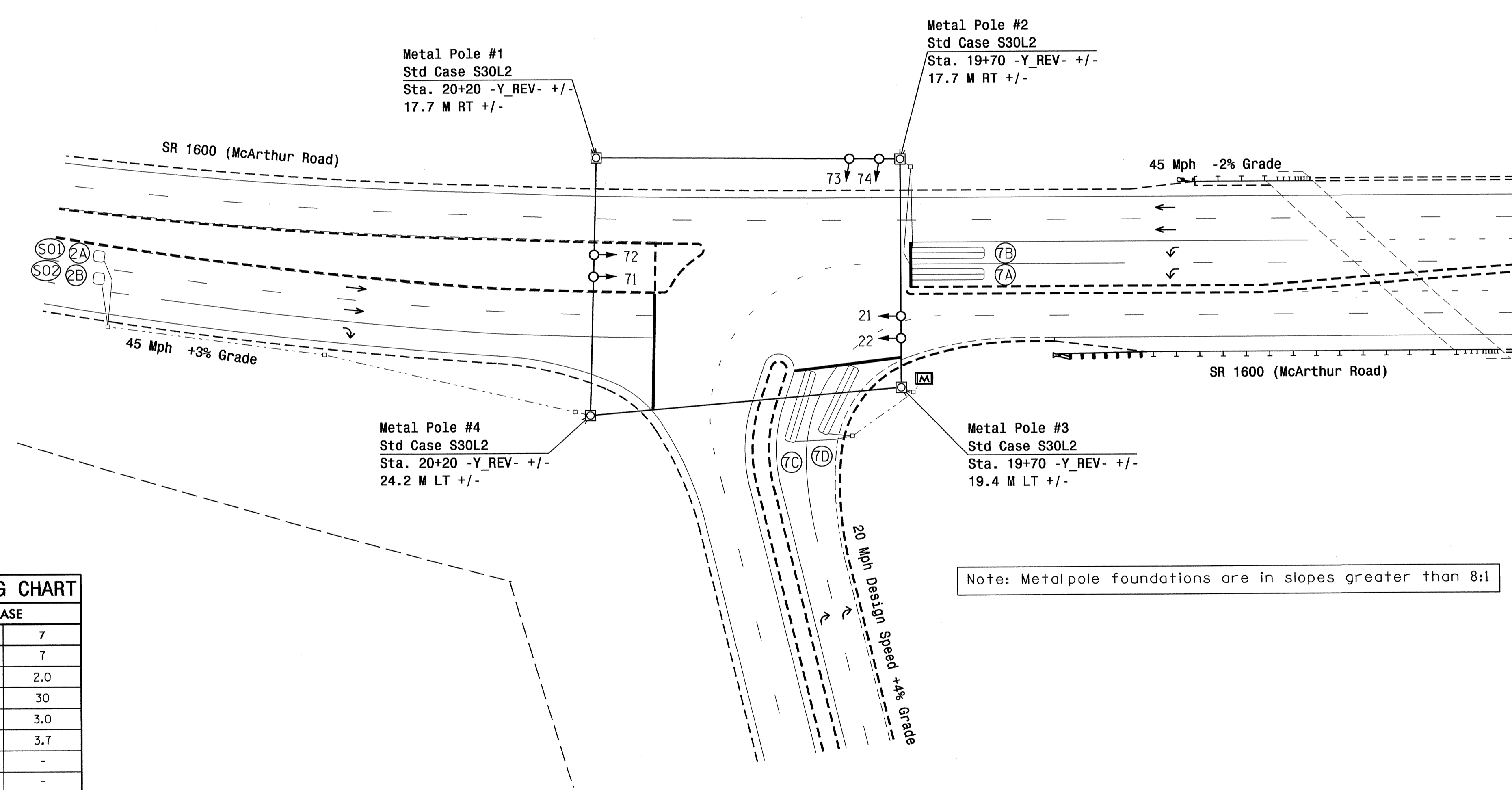
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME			DELAY TIME
2A/S01	1.8X1.8	90	4	Y	2	Y	Y	-	-	-	Y	Y
2B/S02	1.8X1.8	90	4	Y	2	Y	Y	-	-	-	Y	Y
7A	1.8X12	0	2-4-2	Y	7	Y	Y	-	-	-	-	Y
7B	1.8X12	0	2-4-2	Y	7	Y	Y	-	-	-	-	Y
7C	1.8X12	0	2-4-2	Y	7	Y	Y	-	-	10	-	Y
7D	1.8X12	0	2-4-2	Y	7	Y	Y	-	-	10	-	Y

2 Phase Fully Actuated SR 1600 (McArthur Road) CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #1305.



OASIS 2070L TIMING CHART

FEATURE	PHASE	
	2	7
Min Green 1 *	12	7
Extension 1 *	6.0	2.0
Max Green 1 *	90	30
Yellow Clearance	4.3	3.0
Red Clearance	2.1	3.7
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	1.5	-
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 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

- | | | | |
|--|--|--|--|
| | PROPOSED Traffic Signal Head | | EXISTING Traffic Signal Head |
| | PROPOSED Modified Signal Head | | EXISTING Modified Signal Head |
| | PROPOSED Pedestrian Signal Head | | EXISTING Pedestrian Signal Head |
| | PROPOSED Signal Pole with Guy | | EXISTING Signal Pole with Guy |
| | PROPOSED Signal Pole with Sidewalk Guy | | EXISTING Signal Pole with Sidewalk Guy |
| | PROPOSED Inductive Loop Detector | | EXISTING Inductive Loop Detector |
| | PROPOSED Controller & Cabinet | | EXISTING Controller & Cabinet |
| | PROPOSED Junction Box | | EXISTING Junction Box |
| | PROPOSED 50mm Underground Conduit | | EXISTING 50mm Underground Conduit |
| | PROPOSED Right of Way with Marker | | EXISTING Right of Way with Marker |
| | PROPOSED Directional Arrow | | EXISTING Directional Arrow |

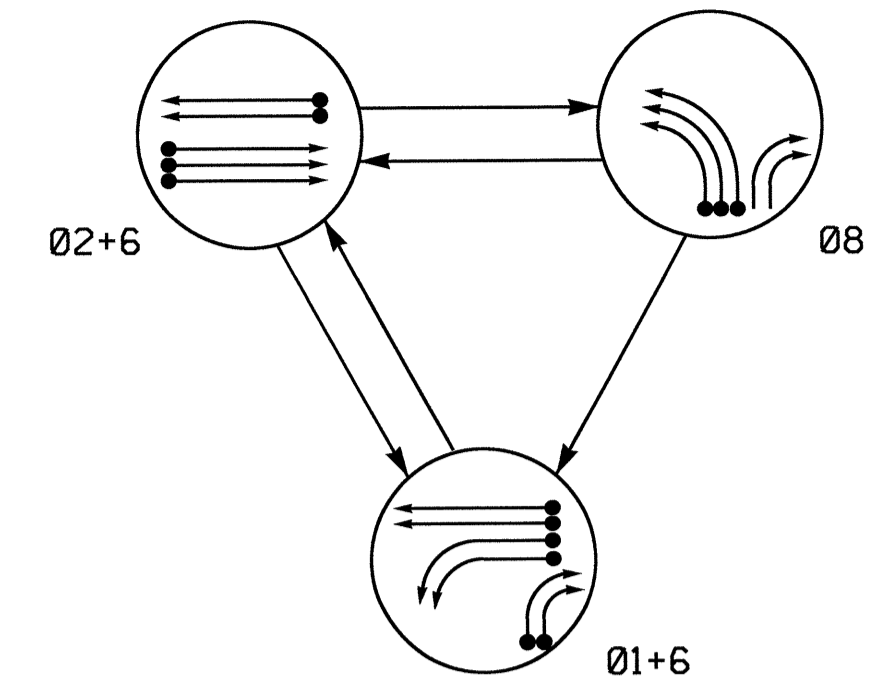
Note: Metalpole foundations are in slopes greater than 8:1

New Installation

	SR 1600 (McArthur Road)		
	At I-295 WB Ramp/Loop D		
	Division 6 Cumberland County Fayetteville	PLA	PLA
PLAN DATE: May 2013	REVIEWED BY: PLA	PREPARED BY: JPG	REVIEWED BY: PLA
750 N. Greenfield Pkwy, Garner, NC 27529	SCALE: 1:500	REVISIONS:	INIT. DATE
SIG. INVENTORY NO. 06-1305			

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PHASING DIAGRAM



SIGNAL FACE	PHASE			
	Ø 1 + 6	Ø 2 + 6	Ø 8	FLASH
11,12	←	→	→	→
13,14	→	→	→	→
21,22,23	R	G	R	Y
61,62	G	G	R	Y
81,82,83	→	→	→	→

LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME		
1A	1.8x12	0	2-4-2	-	1	Y	Y	-	-	-	-
1B	1.8x12	0	2-4-2	-	1	Y	Y	-	-	-	-
1C	1.8x12	0	2-4-2	Y	1	Y	Y	-	-	10	-
1D	1.8x12	0	2-4-2	Y	1	Y	Y	-	-	10	-
2A/S2A	1.8x1.8	90	5	-	2	Y	Y	-	-	-	Y
2B/S2B	1.8x1.8	90	5	-	2	Y	Y	-	-	-	Y
2C/S2C	1.8x1.8	90	5	-	2	Y	Y	-	-	-	Y
6A/S6A	1.8x1.8	90	6	-	6	Y	Y	-	-	-	Y
6B/S6B	1.8x1.8	90	6	-	6	Y	Y	-	-	-	Y
8A	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	-	Y
8B	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	-	Y
8C	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	-	Y

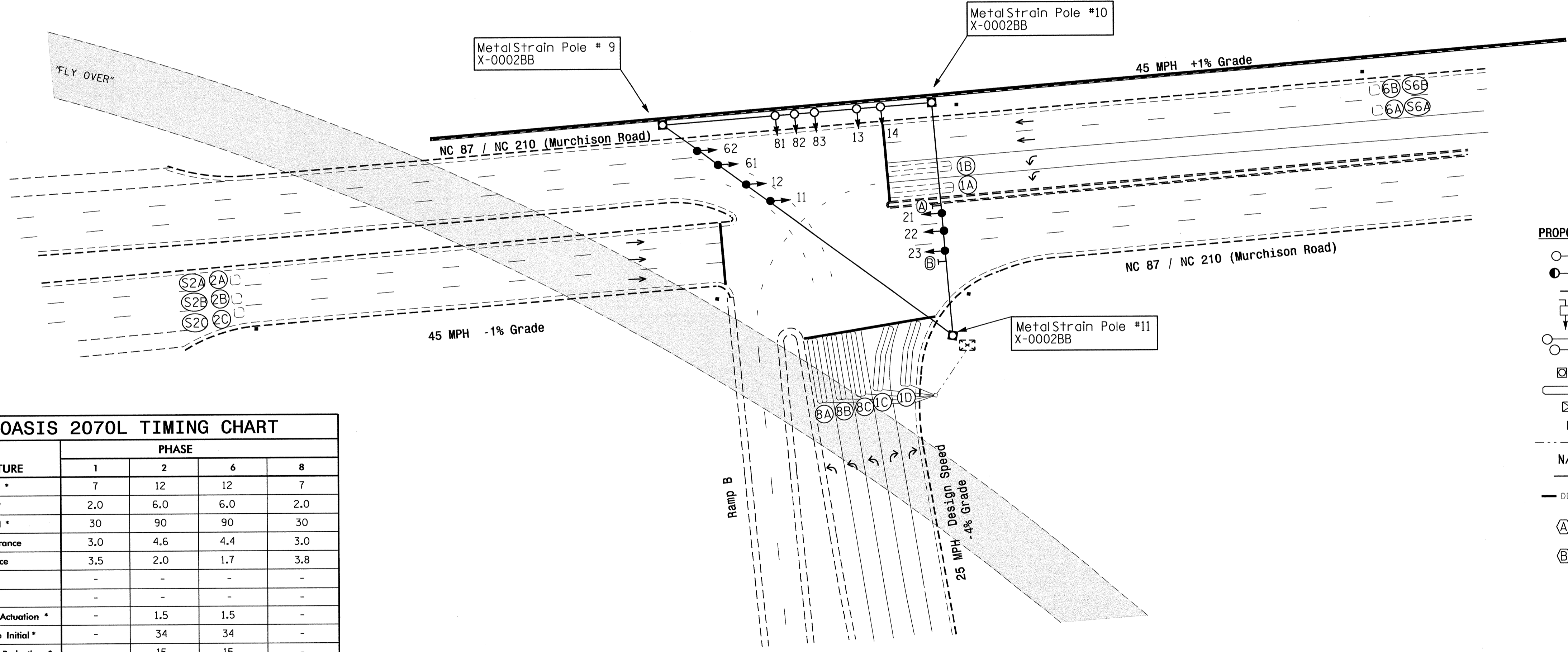
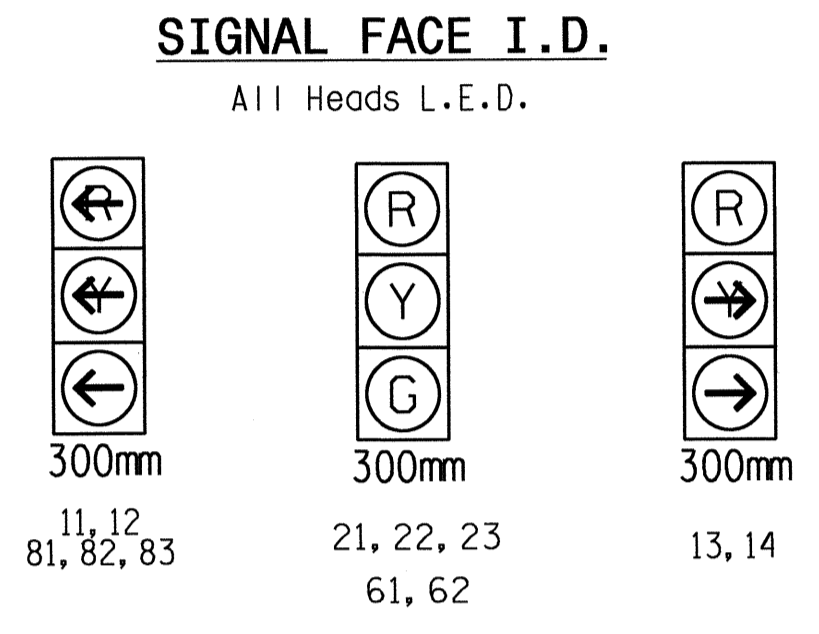
3 Phase Fully Actuated Fayetteville Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

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



FEATURE	PHASE			
	1	2	6	8
Min Green 1 *	7	12	12	7
Extension 1 *	2.0	6.0	6.0	2.0
Max Green 1 *	30	90	90	30
Yellow Clearance	3.0	4.6	4.4	3.0
Red Clearance	3.5	2.0	1.7	3.8
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	1.5	1.5	-
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	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	● → N/A
○ → Modified Signal Head Sign	N/A
○ → Pedestrian Signal Head With Push Button & Sign	N/A
○ → Signal Pole with Guy	○ → Metal Strain Pole
○ → Signal Pole with Sidewalk Guy	○ → Metal Strain Pole
○ → Inductive Loop Detector	○ → Junction Box
○ → Controller & Cabinet	○ → 50mm Underground Conduit
○ → Junction Box	○ → Right of Way
○ → 50mm Underground Conduit	○ → Directional Arrow
N/A	○ → Directional Drill (2.50MM Polyethylene Conduit)
→	○ → Through Arrow "ONLY" Sign (R3-5A)
→	○ → No Right Turn Sign (R3-1)

Signal Upgrade

Prepared in the Offices of:
Transportation Mobility and Safety Division
Department of Transportation
Signal Design Section
750 N. Greenfield Pkwy, Garner, NC 27529

NC 87-210 (Murchison Road) at I-295 WB Ramp/Loop B

Division 6 Cumberland County Fayetteville

PLAN DATE: May 2013 REVIEWED BY: PLA

PREPARED BY: JPG REVIEWED BY:

SEAL
MICHAEL P. GALLOWAY
REGISTERED PROFESSIONAL ENGINEER
NO. 29904
DATE: 8/15/2013

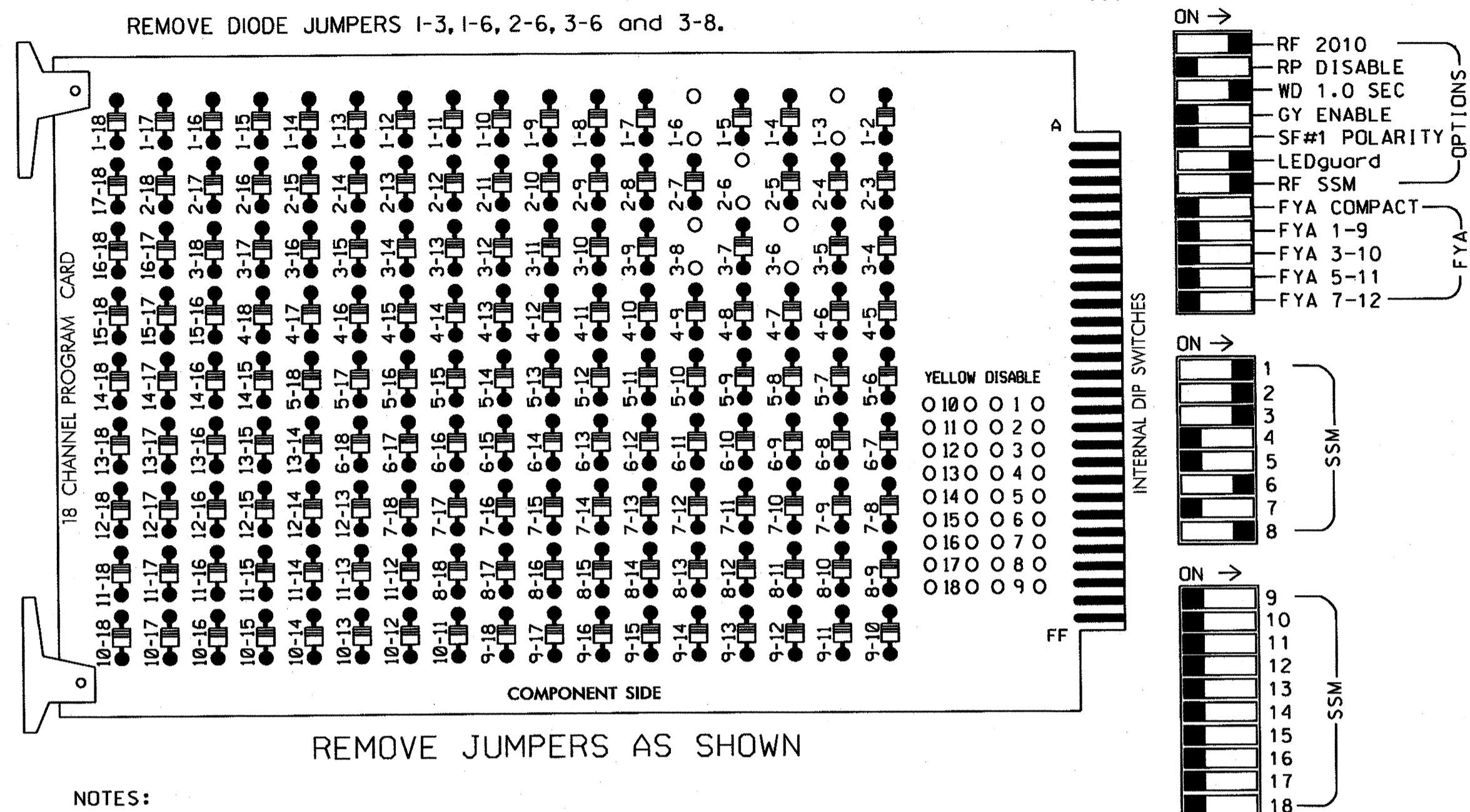
SCALE: 1:500

SIGNATURE: DATE: 8/15/2013

INVENTORY NO. 06-1302

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

■ = DENOTES POSITION OF SWITCH

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 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.
- 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,S4,S8,S11
 PHASES USED.....1,2,6,8
 OVERLAP E.....1+8

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	OLE	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11,12	21, 22,23	NU	13,14	NU	NU	NU	61,62	NU	NU	81, 82,83	NU
RED		128		116				134				
YELLOW		129						135				
GREEN		130						136				
RED ARROW	125										107	
YELLOW ARROW	126			117							108	
GREEN ARROW	127			118							109	

NU = Not Used

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' FOUR TIMES

```

PAGE 1: VEHICLE OVERLAP 'E' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: :X X
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW - GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0=255 SEC)...0
YELLOW CLEAR (0=PARENT.3-25.5 SEC)...0.0
RED CLEAR (0=PARENT.0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...3
    
```

OVERLAP PROGRAMMING COMPLETE

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	S Ø2/SYS 2A/S2A	S Ø2/SYS 2C/S2C	S Ø2/SYS NOT USED	S Ø2/SYS 2B/S2B	S Ø2/SYS NOT USED	S Ø2/SYS NOT USED	S Ø2/SYS NOT USED	S Ø2/SYS NOT USED	S Ø2/SYS NOT USED	S Ø2/SYS NOT USED	S Ø2/SYS NOT USED	S Ø2/SYS NOT USED	S Ø2/SYS NOT USED	S Ø2/SYS NOT USED
FILE "J"	S Ø6/SYS 6A/S6A	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED	S Ø6/SYS NOT USED

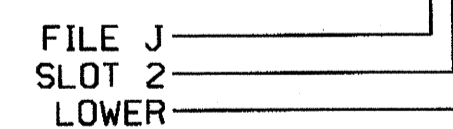
EX.: 1A, 2A, ETC. = LOOP NO.'S

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			
1C	TB7-9,10	J9U	59	21	15	1	Y	Y			10
1D	TB7-11,12	J9L	61	23	17	1	Y	Y			10
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			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
8C	TB7-1,2	J7U	66	28	38	8	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1302
 DESIGNED: May 2013
 SEALED: 8/15/13
 REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR: **NC 87-210 (Murchison Road) at I-295 WB Ramp/Loop B**

Division 6 Cumberland County Fayetteville

PLAN DATE: August 2013 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: _____ INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

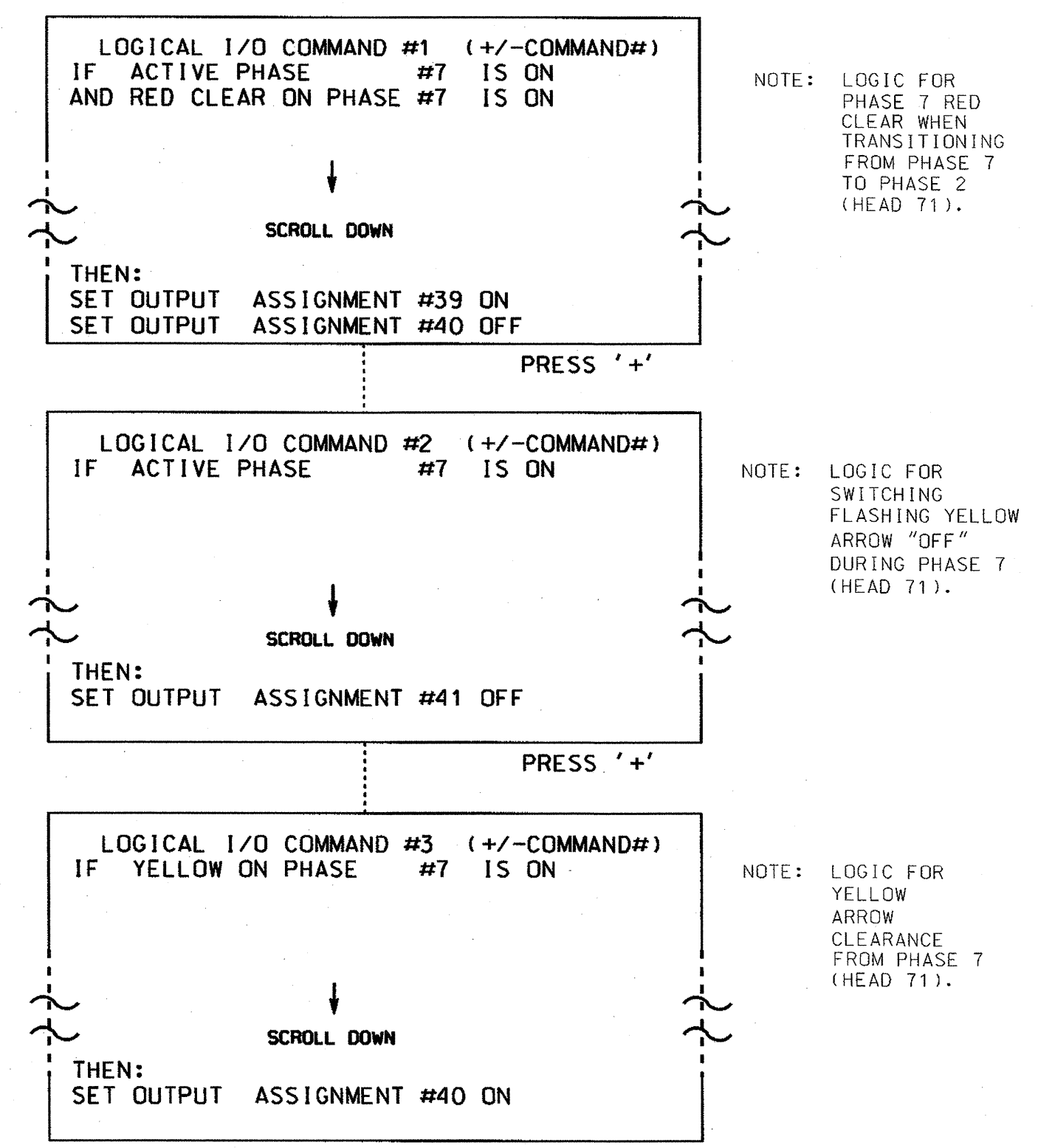
SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

SIG. INVENTORY NO. 06-1302

**LOGICAL I/O PROCESSOR PROGRAMMING DETAIL
TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE**

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS), SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2 AND 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE	
OUTPUT 39	= Overlap D Red
OUTPUT 40	= Overlap D Yellow
OUTPUT 41	= Overlap D Green

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' THREE TIMES

```

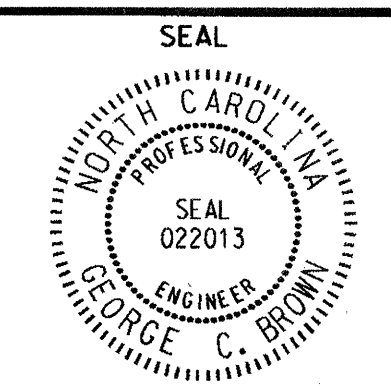
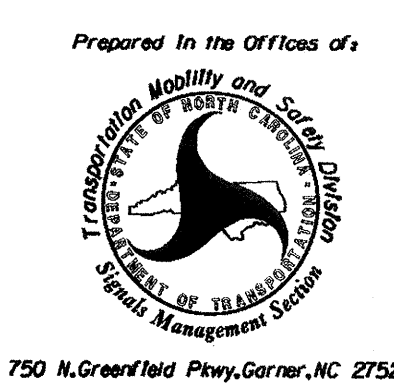
PAGE 1: VEHICLE OVERLAP 'D' SETTINGS
PHASE:      12345678910111213141516
VEH OVL PARENTS: X X
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0.0
  
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 06-1303
 DESIGNED: May 2013
 SEALED: 8/15/13
 REVISED: N/A

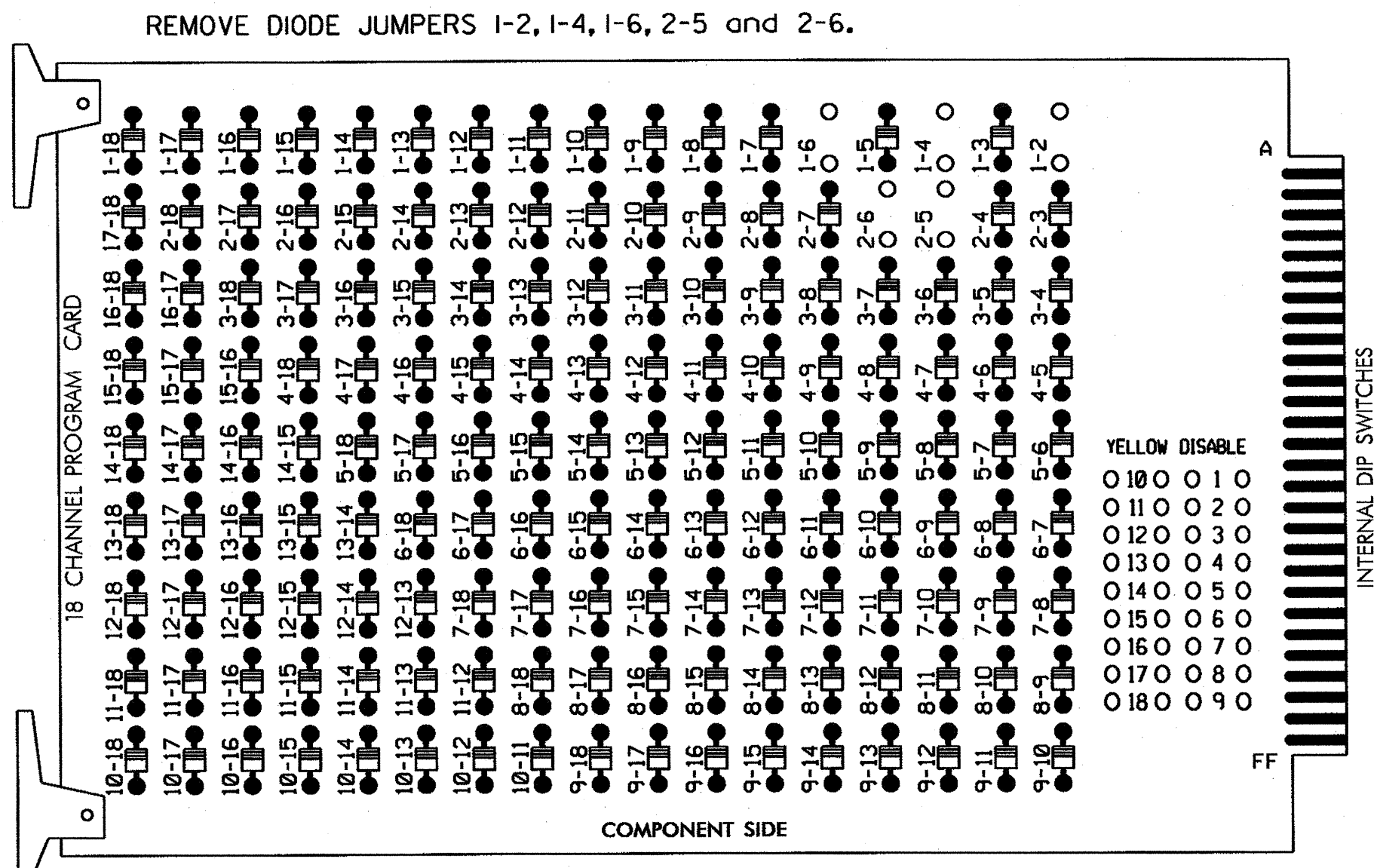
Electrical Detail - Sheet 2 of 2

	NC 87-210 (Murchison Road) at I-295 EB Ramp/Loop C	
	Division 6 PLAN DATE: August 2013 PREPARED BY: C. Strickland	Cumberland County REVIEWED BY: T. J. J... REVIEWED BY:
	REVISIONS INIT. DATE	SIGNATURE: <i>George C. Brown</i> DATE: 8/21/13

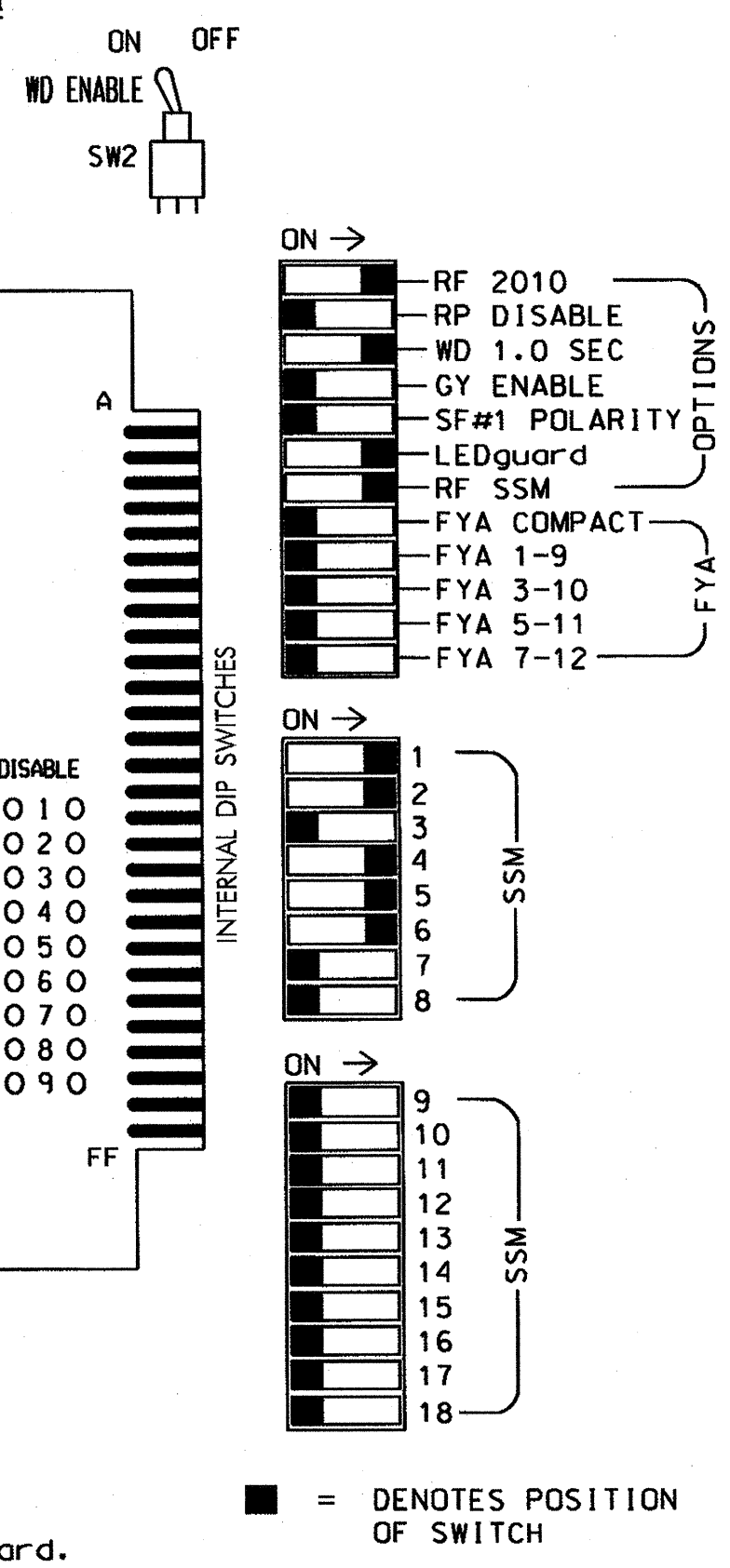
SIG. INVENTORY NO. 06-1303

20-AUG-2013 08:37
 C:\Users\strickland\Documents\Sig_Management_Systems\1303_Sig_Management_Systems.dgn

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



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 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, and overlap 1 as Wag overlaps.
- 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,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAP A.....4+6

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	OLA	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	64,65	21,22 23,24	NU	NU	41,42	NU	51,52	61, 62,63	NU	NU	NU	NU
RED	125	128						134				
YELLOW		129						135				
GREEN		130						136				
RED ARROW					101		131					
YELLOW ARROW	126				102		132					
GREEN ARROW	127				103		133					

NU = Not Used

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

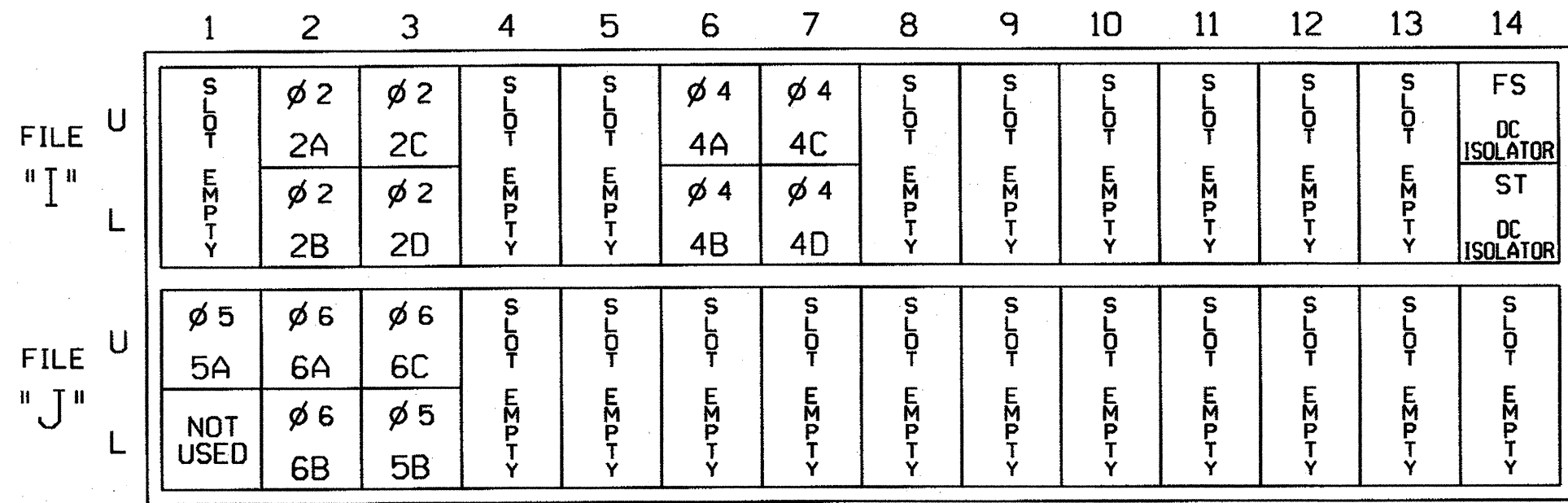
FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE: :12345678910111213141516
 VEH OVL PARENTS: : X X
 VEH OVL NOT VEH: :
 VEH OVL NOT PED: :
 VEH OVL GRN EXT: :
 STARTUP COLOR: _ RED _ YELLOW _ GREEN
 FLASH COLORS: _ RED _ YELLOW _ GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC)...0
 YELLOW CLEAR (0=PARENT.3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT.0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)...1

OVERLAP PROGRAMMING COMPLETE

INPUT FILE POSITION LAYOUT

(front view)



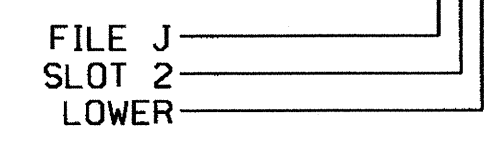
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

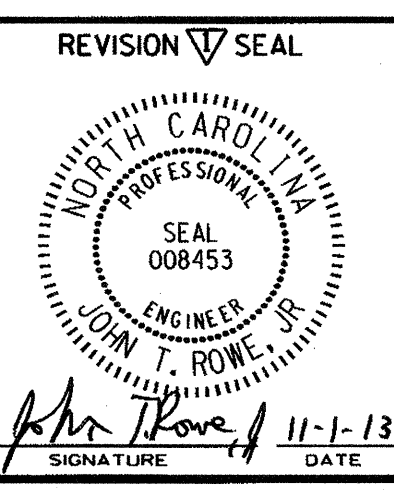
INPUT FILE CONNECTION & PROGRAMMING CHART

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			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
2D	TB2-11,12	I3L	76	38	42	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			
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			15
4D	TB6-3,4	I7L	78	40	44	4	Y	Y			15
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-11,12	J3L	77	39	46	5	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: October 2013
 SEALED: 10/30/13
 REVISED: N/A



Electrical Detail

Electrical and Programming Details For:

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

Division 6 Cumberland County Fayetteville

PLAN DATE: May 2012 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: Added signal heads and loops; revised monitor. (USA) INIT. DATE: TRK 11-1-13

750 N. Greenfield Pkwy, Garner, NC 27529

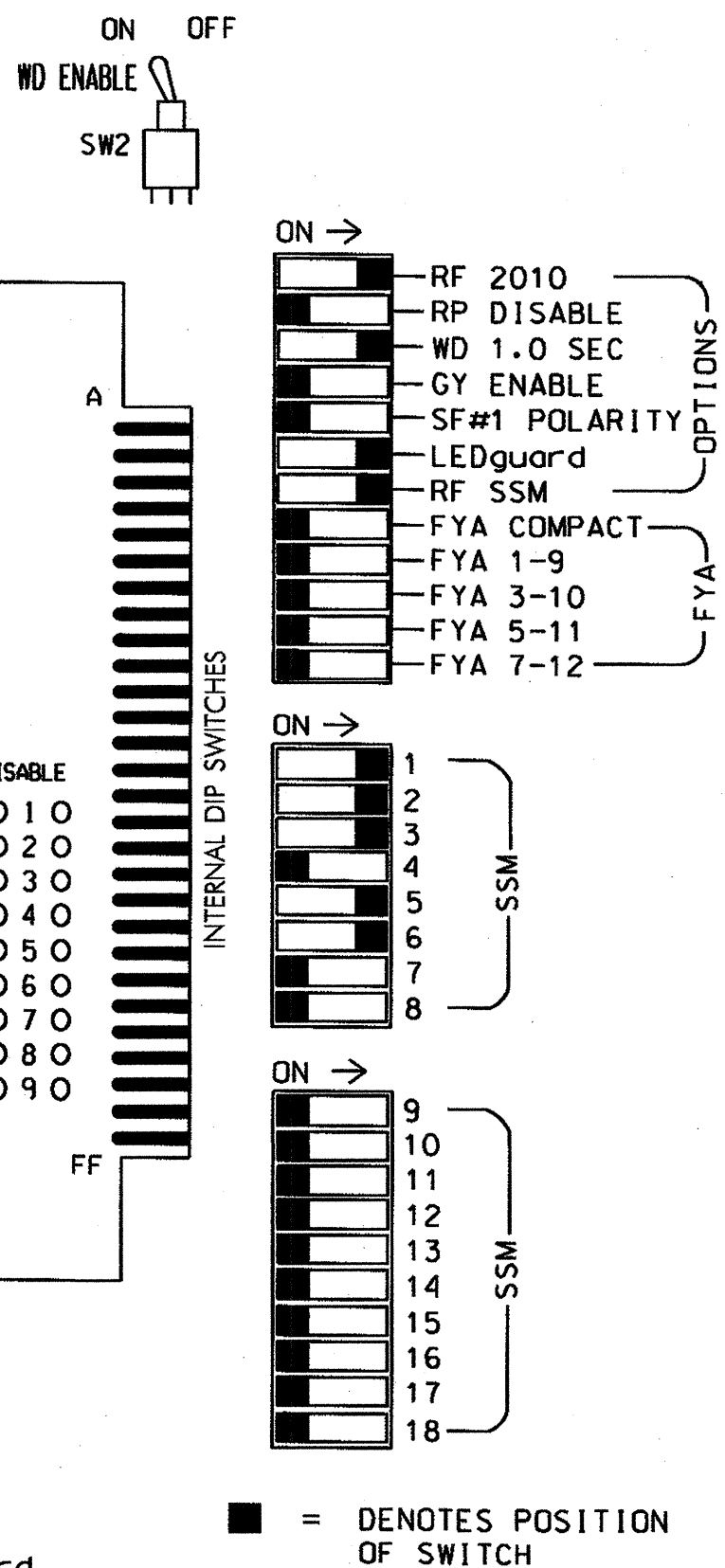
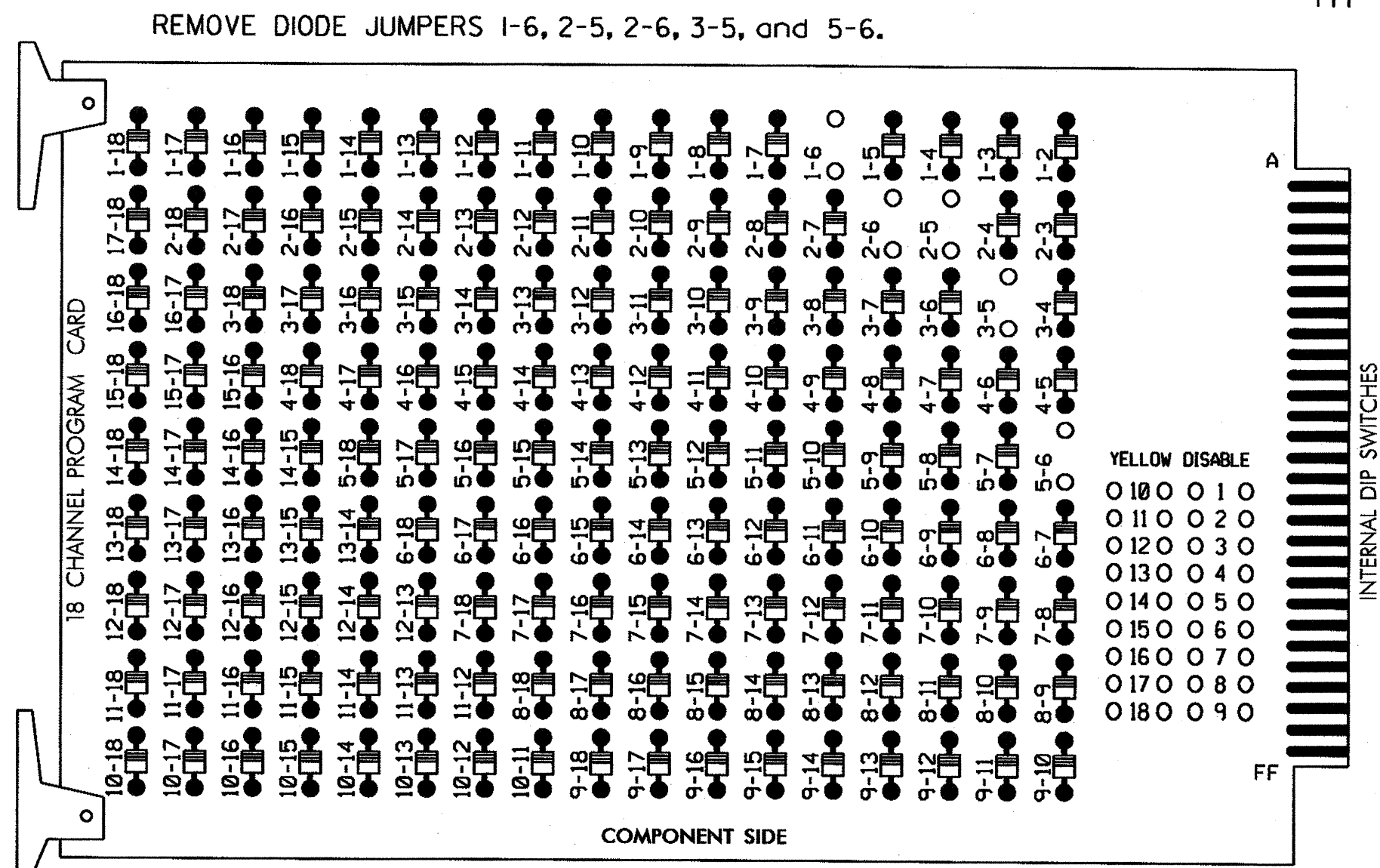
Not a certified document as to the Original Document but Only as to the Revisions - This document originally issued and sealed by George C. Brown, #022013, on 5/18/12. This document is only certified as to the revisions.

SIG. INVENTORY NO. 06-1300

01-100-2013_08-104
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 8/1/2013 10:58:10 AM

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,S4,S7,S8
 PHASES USED.....1,2,3,6
 OVERLAP C.....2+3

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	PED	3	4	PED	DLC	6	PED	7	8	PED
SIGNAL HEAD NO.	11,12	21, 22,23	NU	31,32	NU	NU	24,25	61,62, 63,64	NU	NU	NU	NU
RED		128						131 134				
YELLOW		129						135				
GREEN		130						136				
RED ARROW	125			116								
YELLOW ARROW	126			117			132					
GREEN ARROW	127			118			133					

NU = Not Used

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' TWICE

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE: :12345678910111213141516
 VEH OVL PARENTS: : XX
 VEH OVL NOT VEH: :
 VEH OVL NOT PED: :
 VEH OVL GRN EXT: :
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW - GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC).....0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)....5

OVERLAP PROGRAMMING COMPLETE

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	2C/S2C	S	S	3A	S	S	1A	S	S	S	S	FS
L	2/SYS	NOT USED	S	S	3B	S	S	1B	S	S	S	S	S	DC ISOLATOR
U	S	6A	6C	S	S	S	S	S	S	S	S	S	S	DC ISOLATOR
L	S	6B	6D	S	S	S	S	S	S	S	S	S	S	DC ISOLATOR

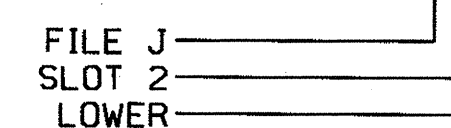
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

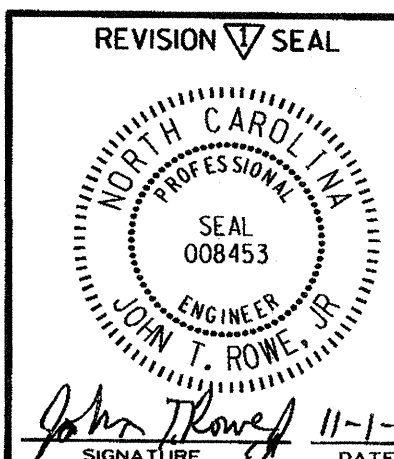
INPUT FILE CONNECTION & PROGRAMMING CHART

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
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			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			
3B	TB4-11,12	I6L	45	7	14	3	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			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1301
 DESIGNED: October 2013
 SEALED: 10/30/13
 REVISED: N/A



Electrical Design

Electrical AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

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. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: Added signal heads and loops revised monitor. (WSA) JTR 11-1-13

SIGNATURE DATE

SEAL

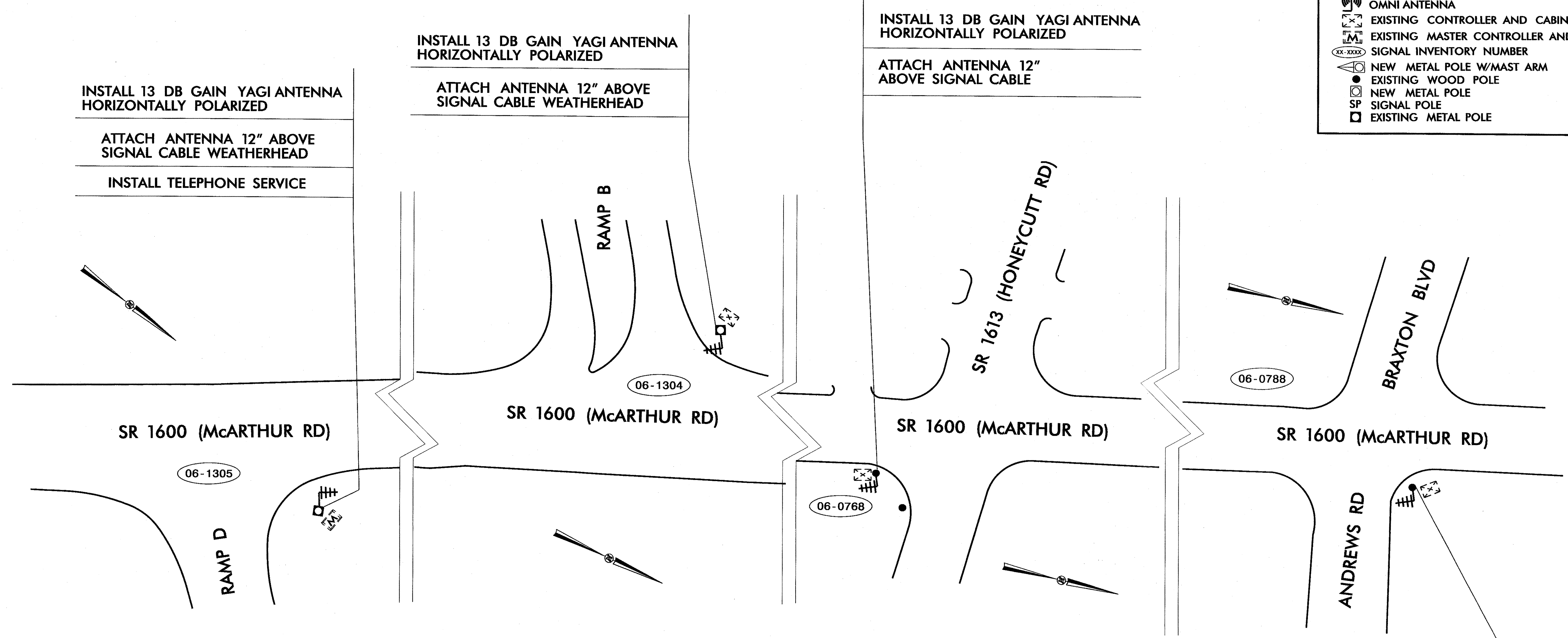
Not a certified document as to the Original Document but Only as to the Revisions - This document originally issued and sealed by George C. Brown, #022013, on 5/18/12. This document is only certified as to the revisions.

SIGNATURE DATE

SIG. INVENTORY NO. 06-1301

LEGEND

- HH HH YAGI ANTENNA (DOUBLE) FOR REPEATOR OPERATION
- HH YAGI ANTENNA (SINGLE)
- ⊙ OMNI ANTENNA
- ⊙ EXISTING CONTROLLER AND CABINET
- ⊙ EXISTING MASTER CONTROLLER AND CABINET
- ⊙ SIGNAL INVENTORY NUMBER
- ⊙ NEW METAL POLE W/MAST ARM
- ⊙ EXISTING WOOD POLE
- ⊙ NEW METAL POLE
- SP SIGNAL POLE
- ⊙ EXISTING METAL POLE



INSTALL 13 DB GAIN YAGI ANTENNA HORIZONTALLY POLARIZED

ATTACH ANTENNA 12" ABOVE SIGNAL CABLE WEATHERHEAD

INSTALL TELEPHONE SERVICE

INSTALL 13 DB GAIN YAGI ANTENNA HORIZONTALLY POLARIZED

ATTACH ANTENNA 12" ABOVE SIGNAL CABLE WEATHERHEAD

INSTALL 13 DB GAIN YAGI ANTENNA HORIZONTALLY POLARIZED

ATTACH ANTENNA 12" ABOVE SIGNAL CABLE

INSTALL 13 DB GAIN YAGI ANTENNA HORIZONTALLY POLARIZED

ATTACH ANTENNA 12" ABOVE SIGNAL CABLE

- NOTES FOR WIRELESS COMMUNICATIONS:**
1. INSTALL COAXIAL CABLE:
 - A. ON WOOD POLES, REQUIRING A NEW RIGID GALVANIZED STEEL RISER, INSTALL A 2" RISER WITH WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - B. ON METAL POLES WITH MAST ARMS, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL A 1/2" HOLE UP THROUGH THE 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 RISER, METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
 2. IF AN EXISTING 2" 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."

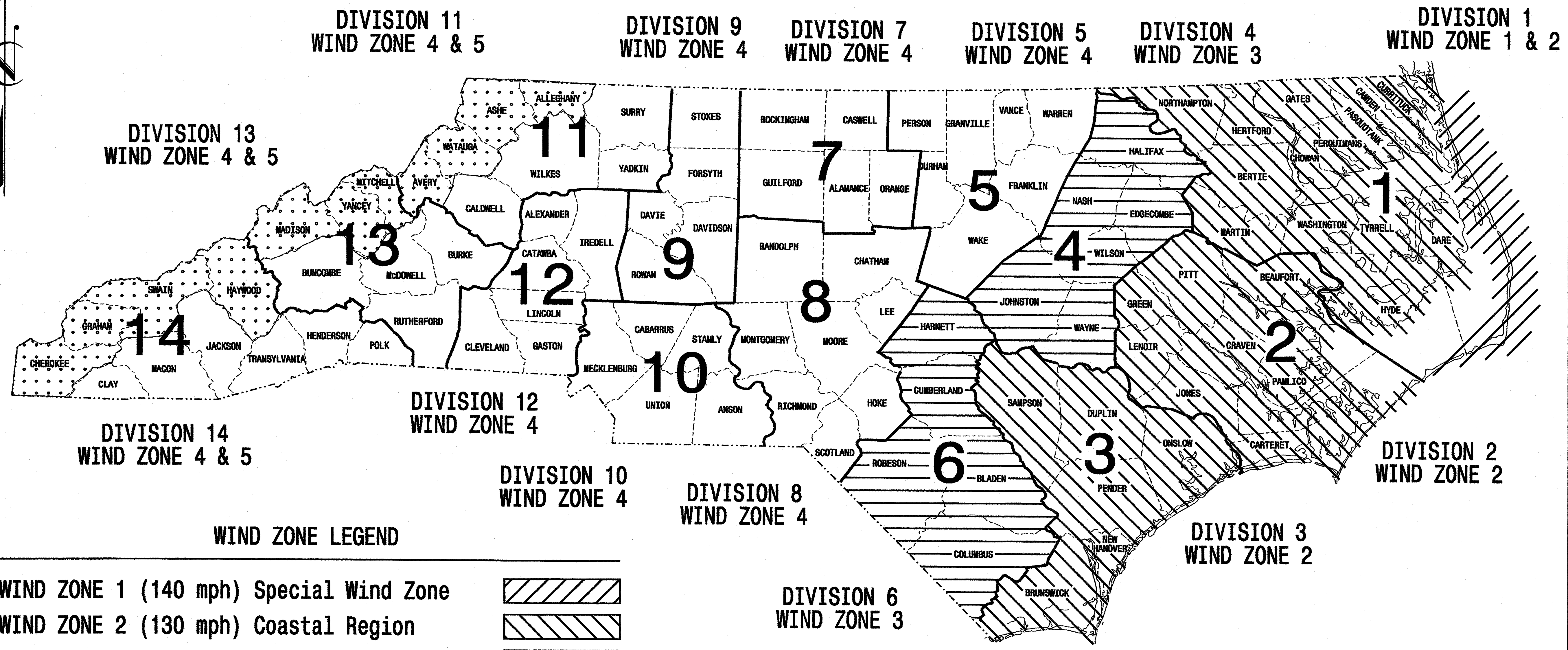
	WIRELESS COMMUNICATION PLANS ALONG SR 1600 (McARTHUR RD)		
	DIVISION 06 CUMBERLAND CO. FAYETTEVILLE PLAN DATE: JULY 2013 REVIEWED BY: I.N. AVERY PREPARED BY: B.A. STOUCHKO REVIEWED BY: G.A. FULLER		
SCALE 0	REVISIONS _____ _____	INIT. _____ _____	DATE _____ _____

Signature: *Gregory A. Fuller* DATE: 7/24/13
 CADD P11 and 6s

**STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS**

STATE	PROJECT NO.	SHEET NO.
N.C.	X-0002CC	Sig. 18
F. A. PROJ. NO.	M 1	
PROJECT ID. NO.		

STANDARD DRAWINGS FOR METAL POLES



WIND ZONE LEGEND

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

<http://www.ncdot.org/doh/preconstruct/traffic/tmsu/ws/default.htm>

Prepared in the Offices of:

122 N. McDowell St., Raleigh, NC 27603

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

INDEX OF PLANS

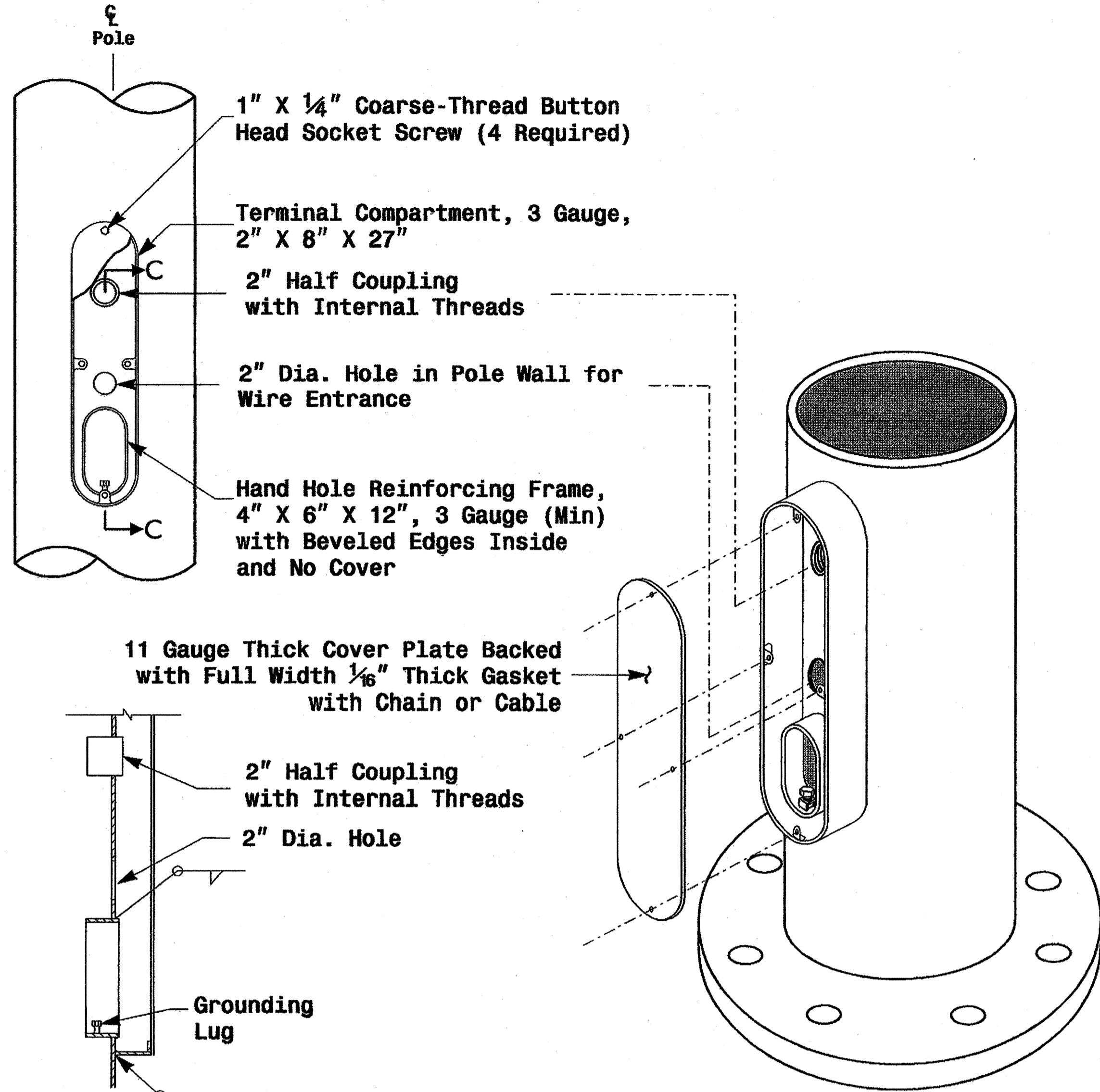
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

NCDOT CONTACTS:
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

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

SEAL

SIGNATURE *D. Sarkar* DATE 9.2.2005



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

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 _____

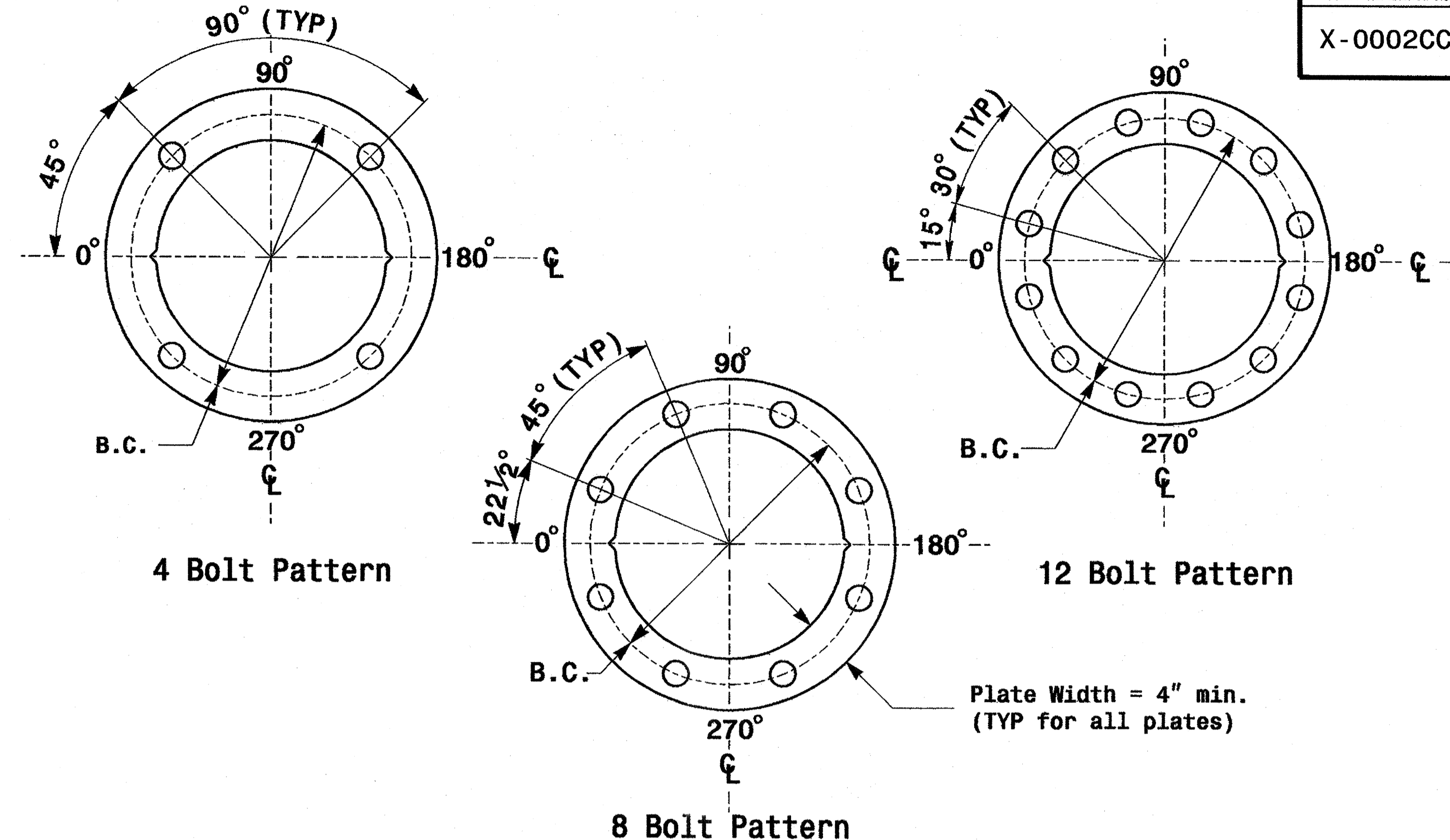
Shaft I.D. Tag
(Provide on Strain Poles and Mast Arm Poles)

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

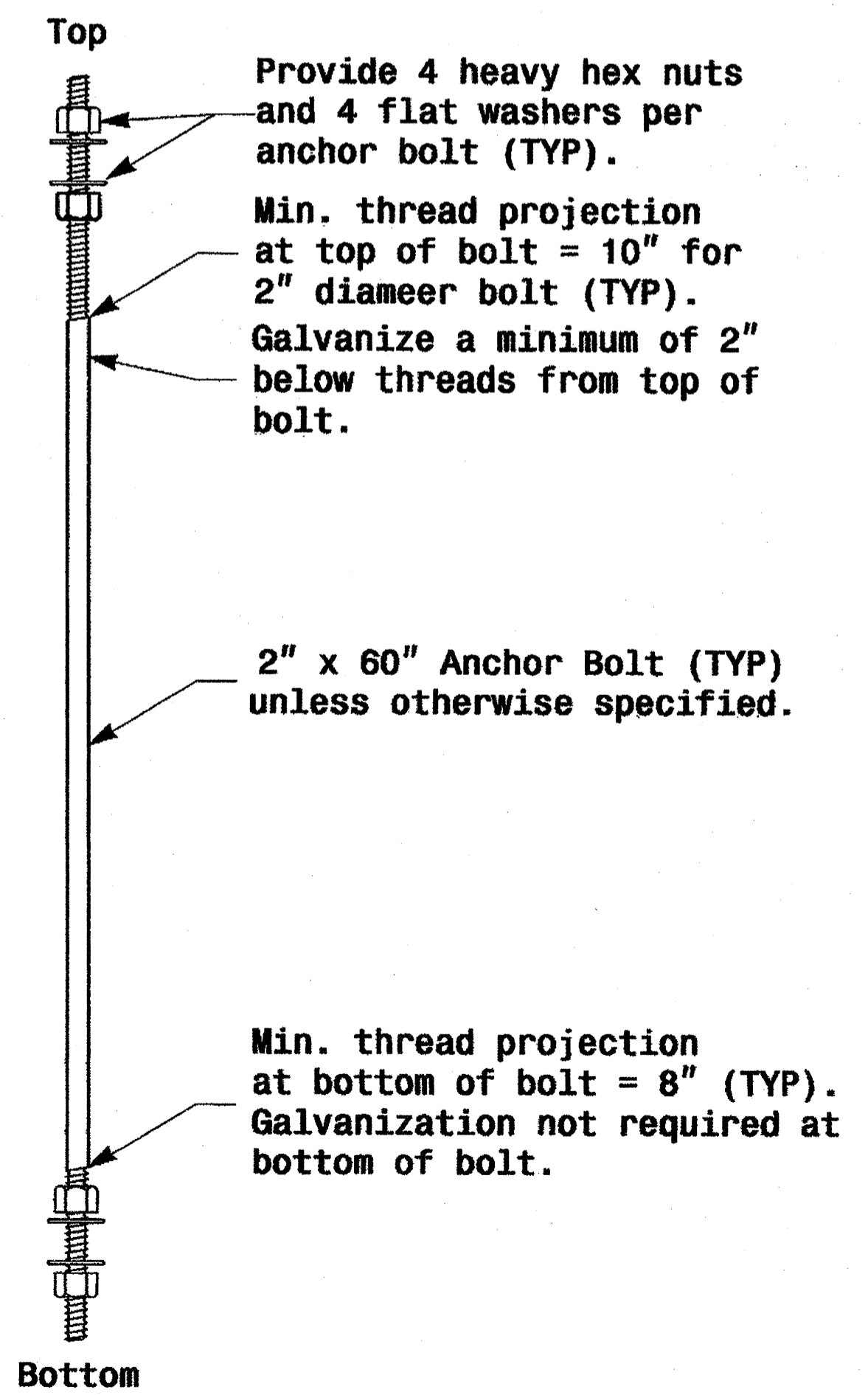
Arm I.D. Tag
(Provide on each section of a multi-section mast arm)

- 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.

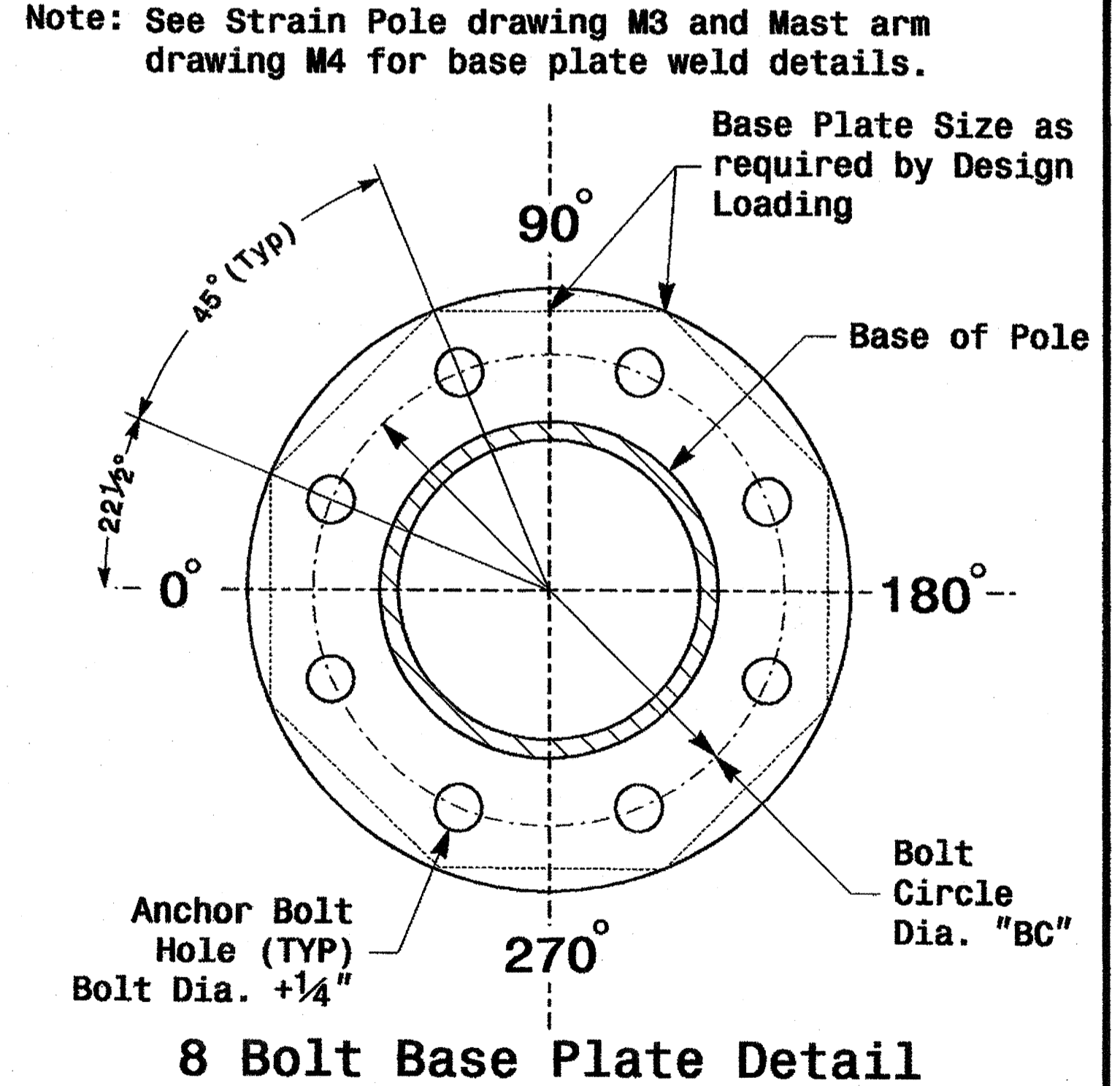
Identification Tag Details



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



Anchor Bolt Detail



Prepared in the Office of:

Typical Fabrication Details Common To All Metal Poles

PLAN DATE: May 2005 REVIEWED BY: C.F. Andrews
 PREPARED BY: P.L. Alexander REVIEWED BY: A.M. Esposito

222 N. McDowell St., Raleigh, NC 27603

SCALE: 0 NA NONE

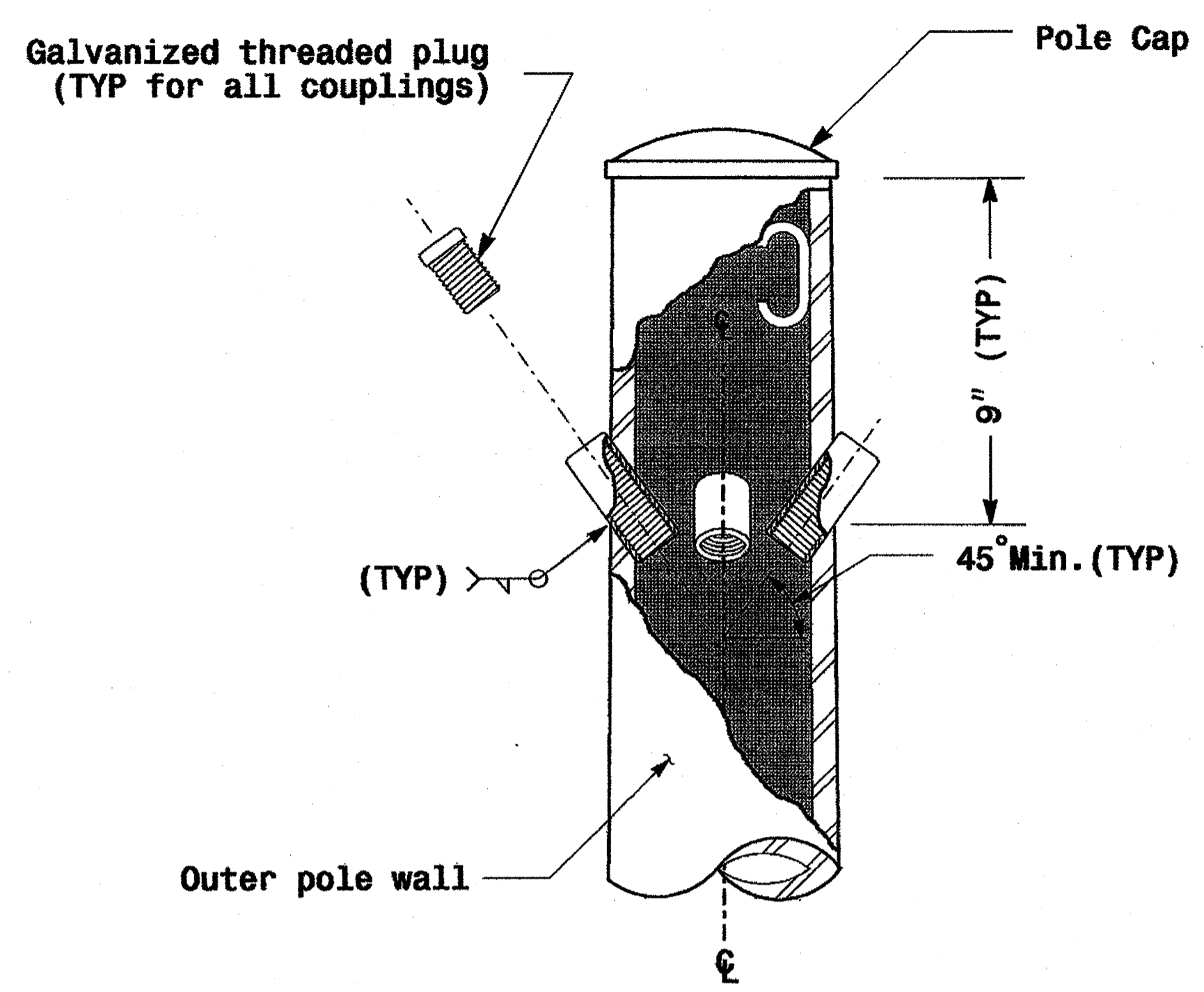
REVISIONS: _____ INIT. DATE

Signature: *D. Sankar* 9.2.2005
 SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094
 SIGNATURE DATE

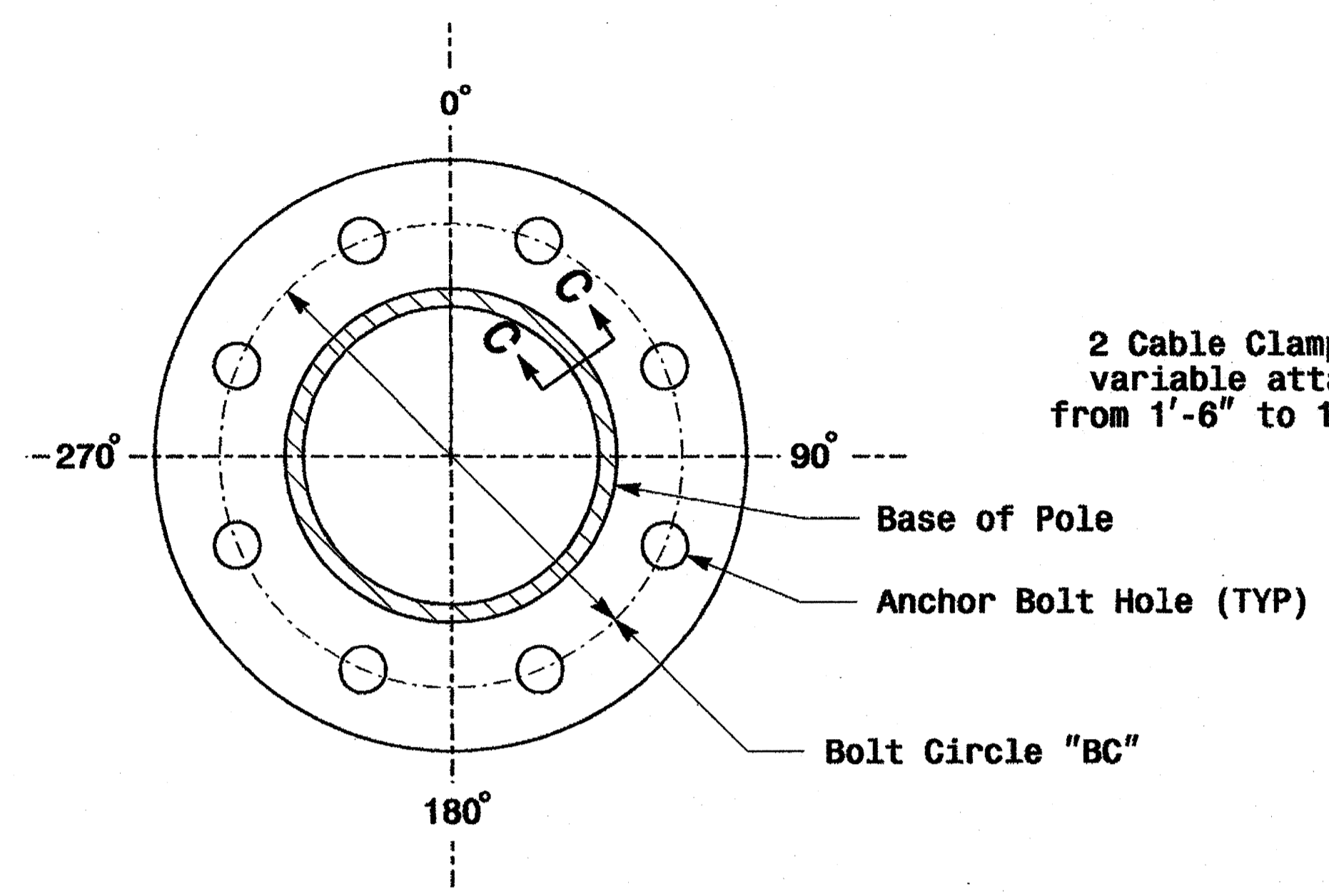
SIG. INVENTORY NO. _____

Fabrication Details - All Poles

01-SEP-2005 18:22 D:\2004\Metal Pole Standards\2004.m2 thru m6.dgn condense

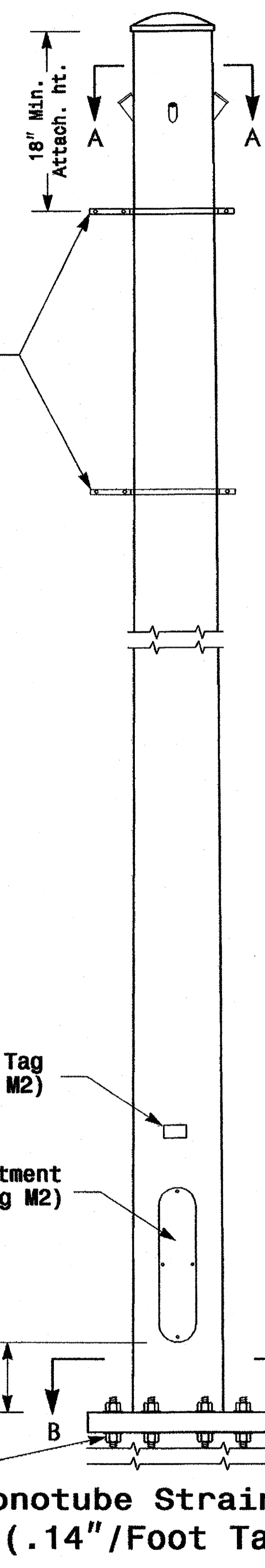


Cable Entrances at Top of Pole

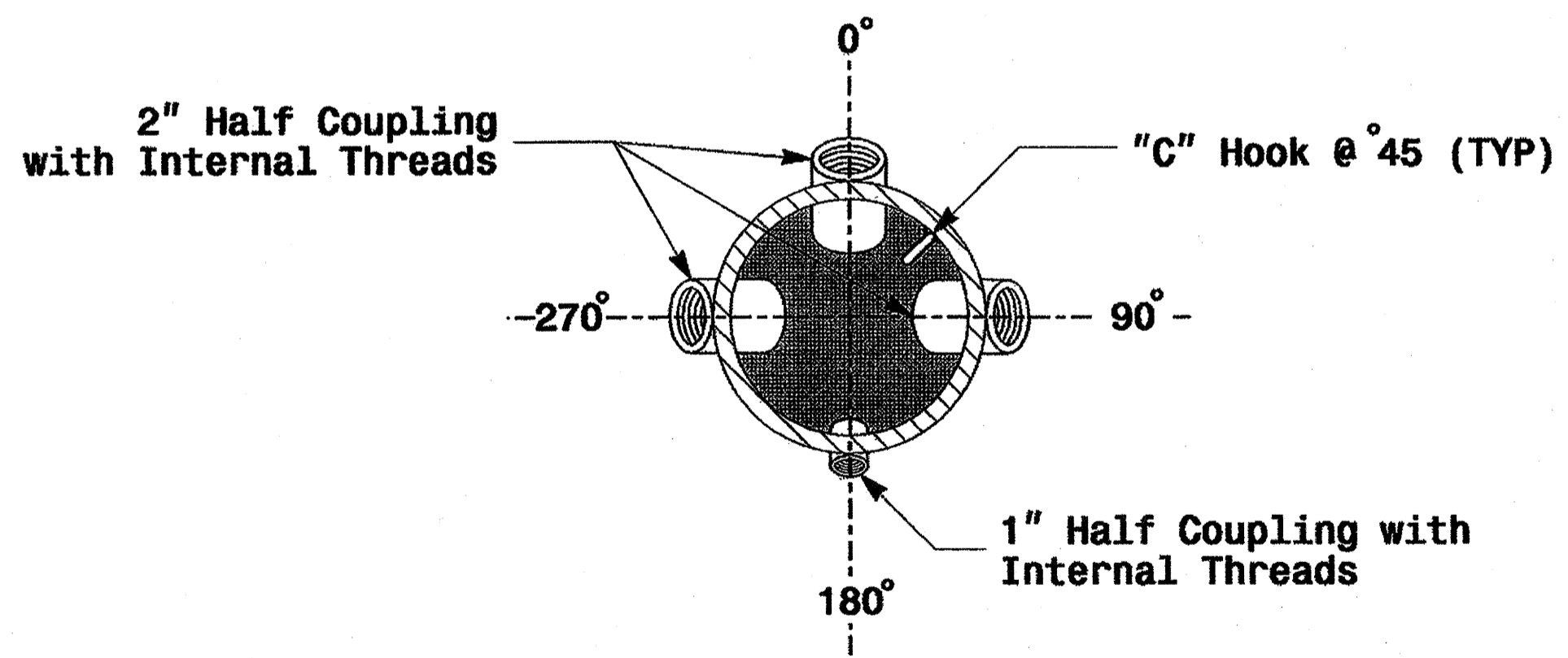


**Section B-B
(See drawing M2)
Pole Base Plate**

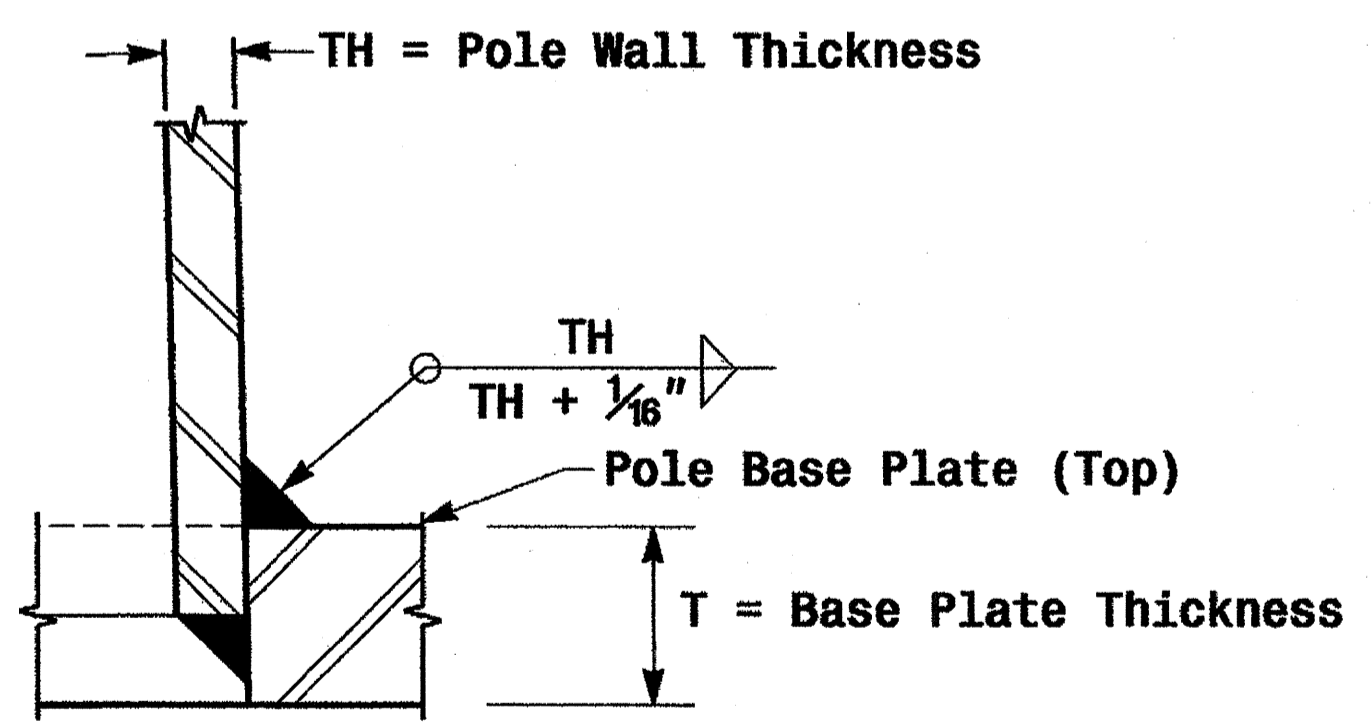
2 Cable Clamps designed for variable attachment heights from 1'-6" to 10' blow the top of the pole.



**Monotube Strain Pole
(.14"/Foot Taper)**



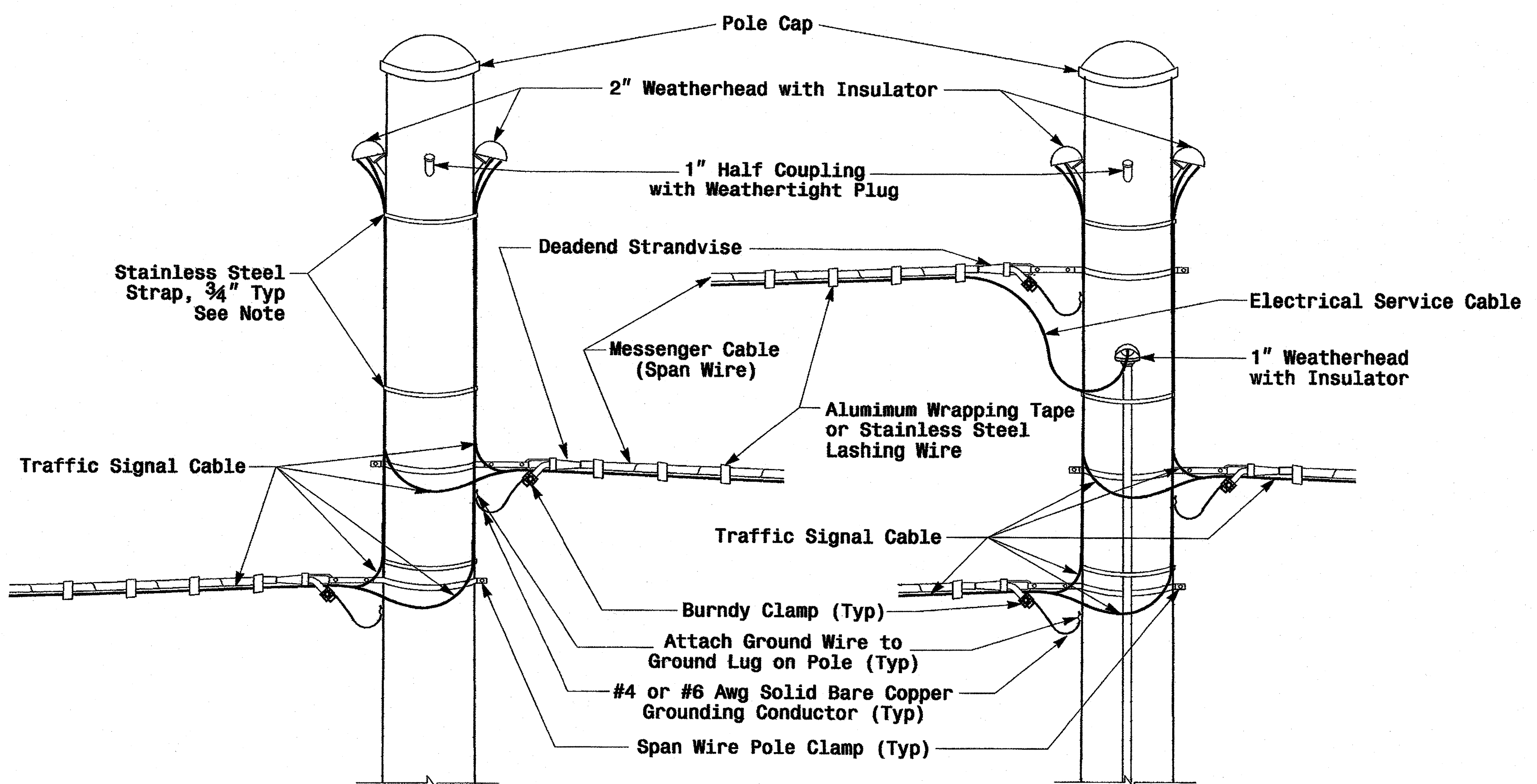
Radial Orientation for Factory Installed Accessories at Top of Pole



Socket Connection Weld Detail

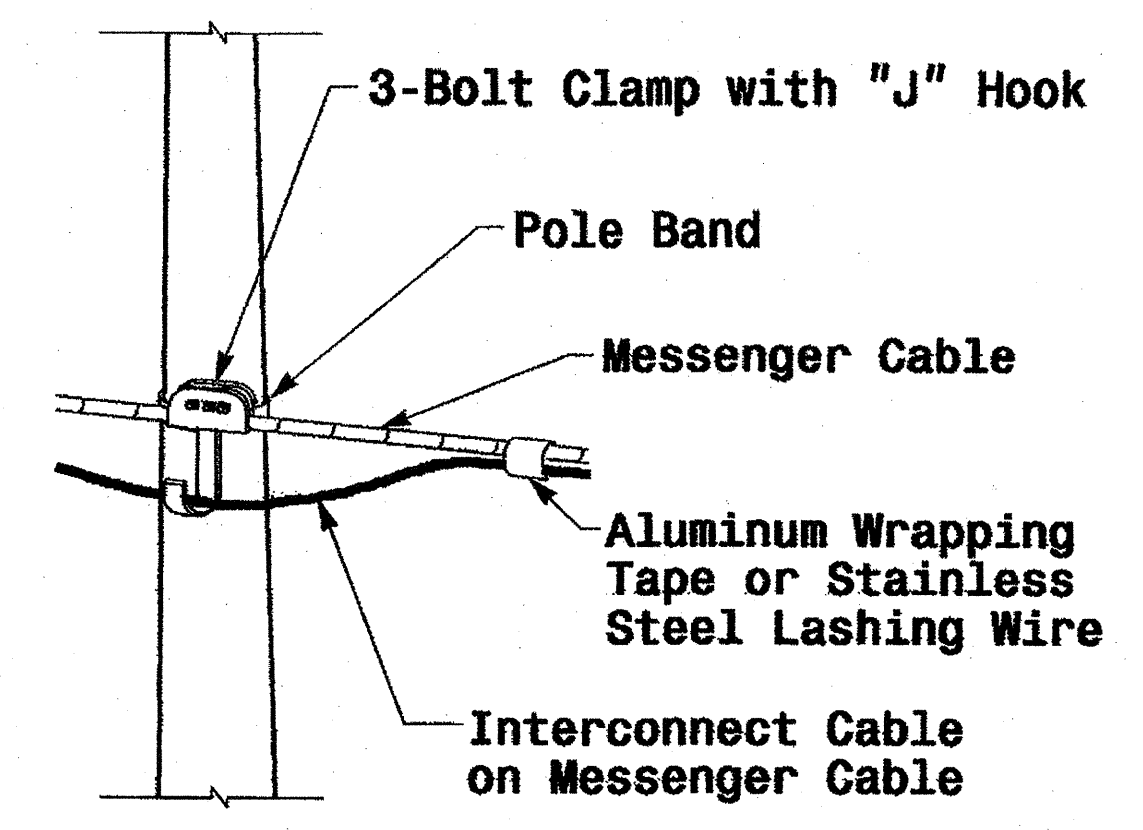
01-SEP-2005 14:07 v:\p000188-un11\work\groups\2004\metol pole standard\2004 m3.dgn pd alexander

	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: NA NONE	REVISIONS:	INIT. DATE	SIG. INVENTORY NO.

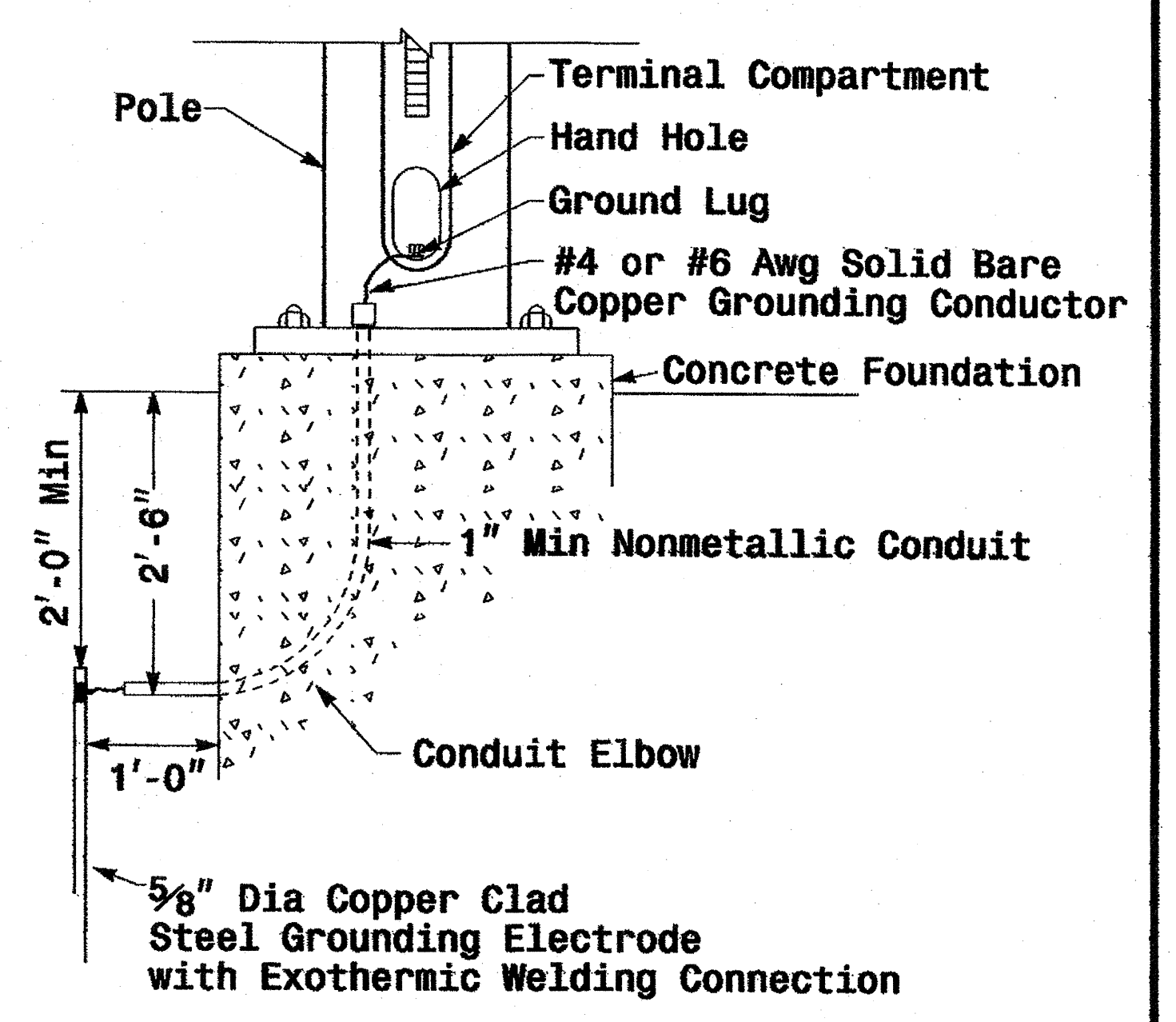


Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole

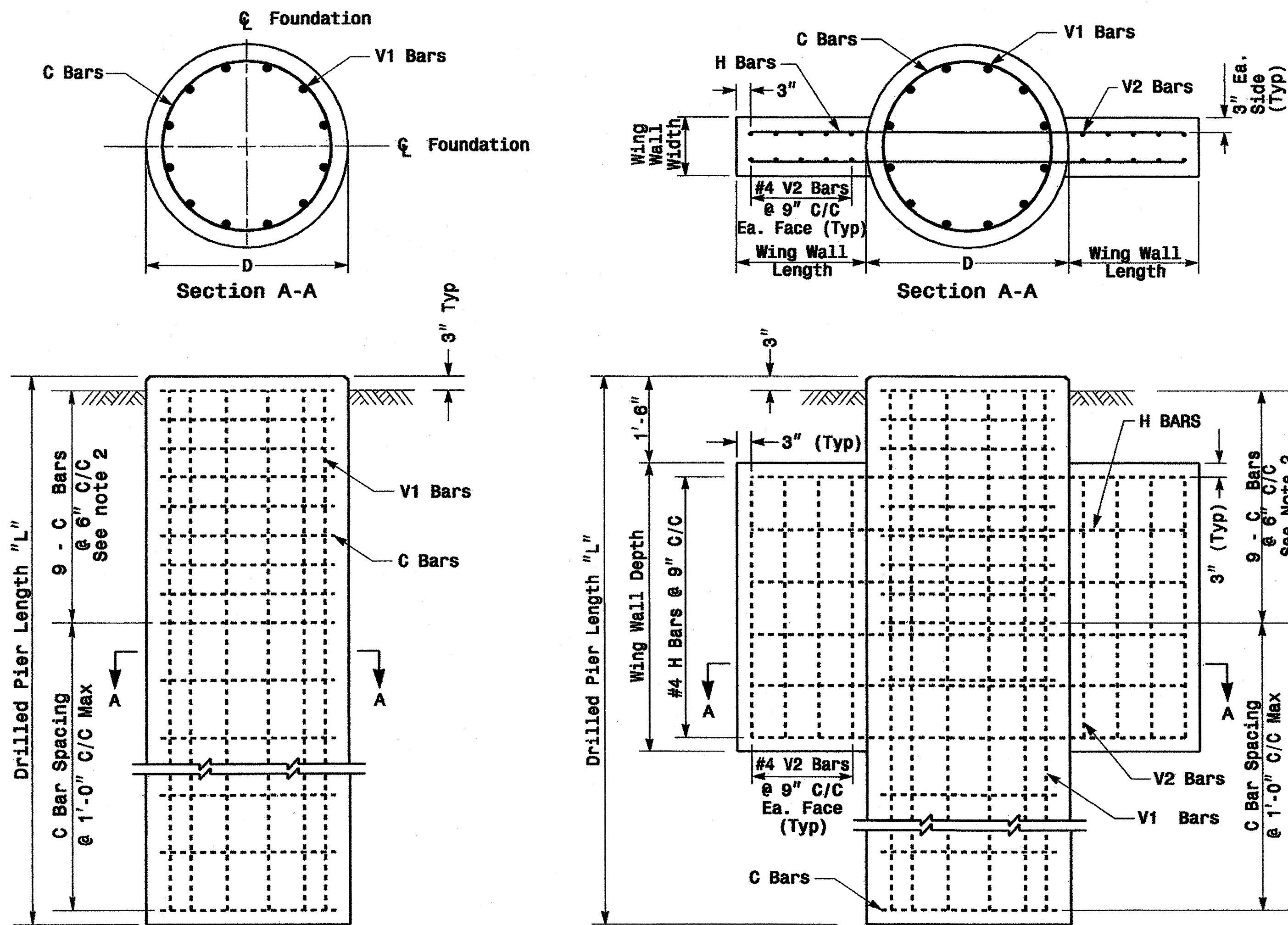


Metal Pole Grounding Detail

01-SEP-2005 16:13 v:\peoples-un11\work\groups\2004 metal pole stand\ds\004 inf.dgn pdl alexander

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

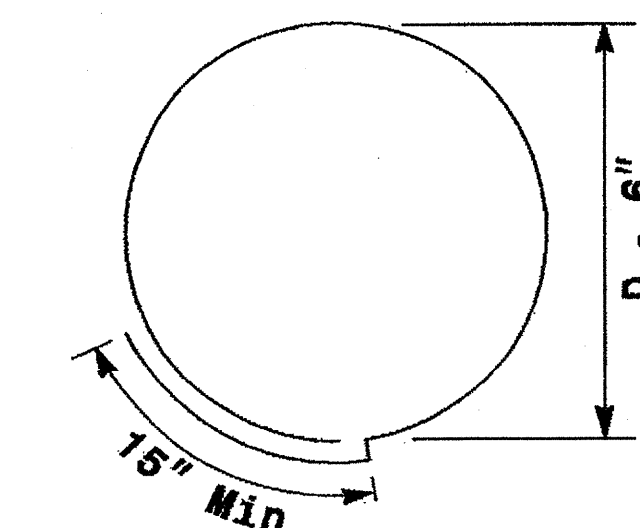
Reinforcing Steel Bars



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

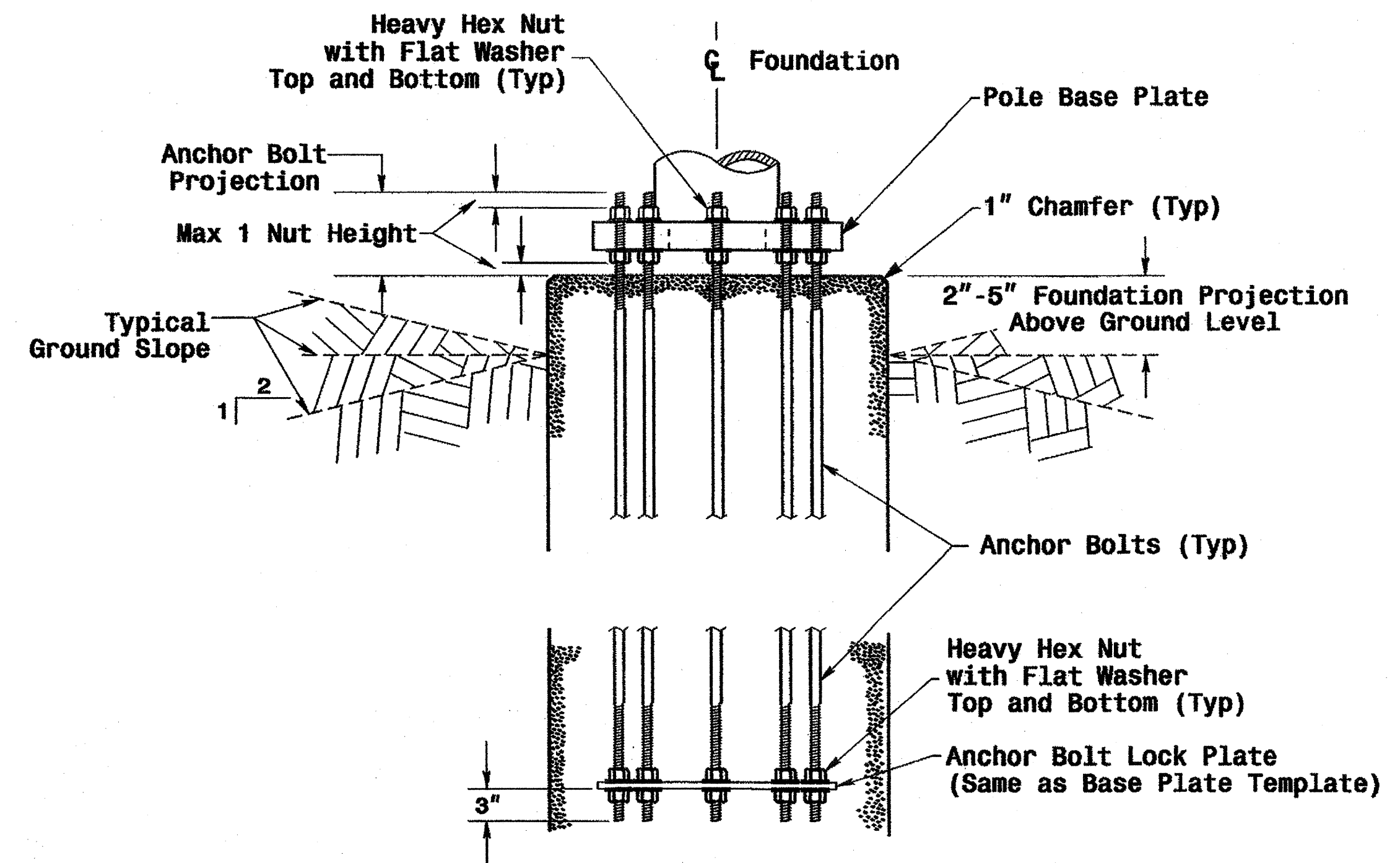
WING WALL DETAILS

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

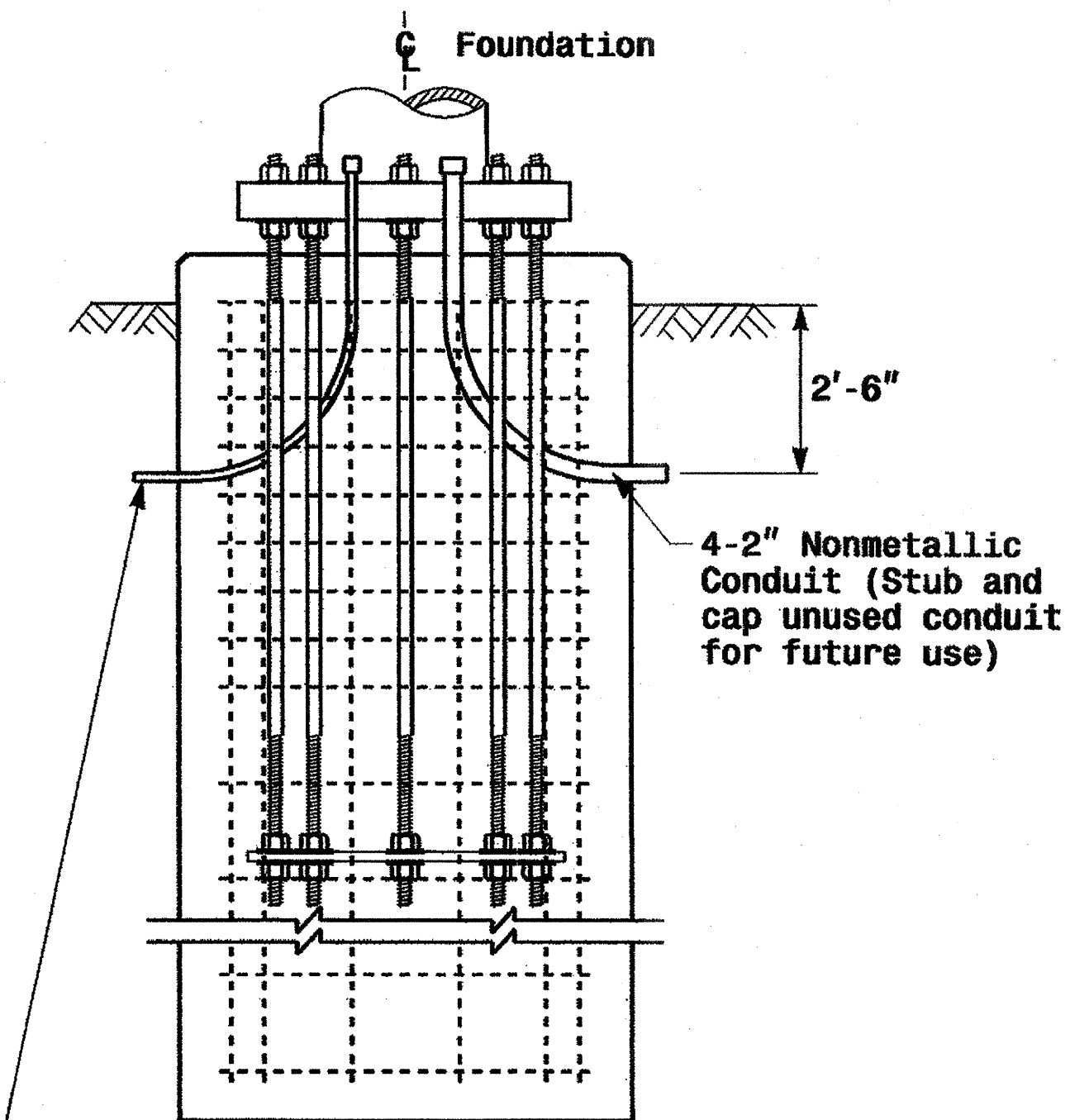
See Note No. 4

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.)

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

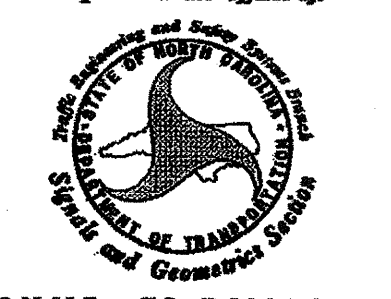
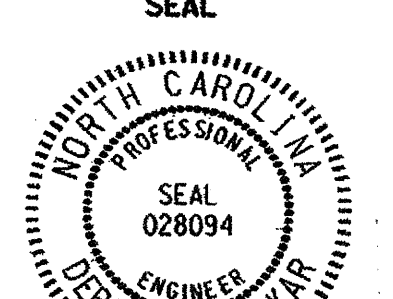
1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.
2. Base plate thickness (T) is 2.0 inches.

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

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	Standard Strain Poles and Standard Foundations		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander SCALE: None	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito REVISIONS:	
122 N. McDowell St., Raleigh, NC 27603		Signature: <i>D. SarKar</i>	DATE: 9.2.2005