

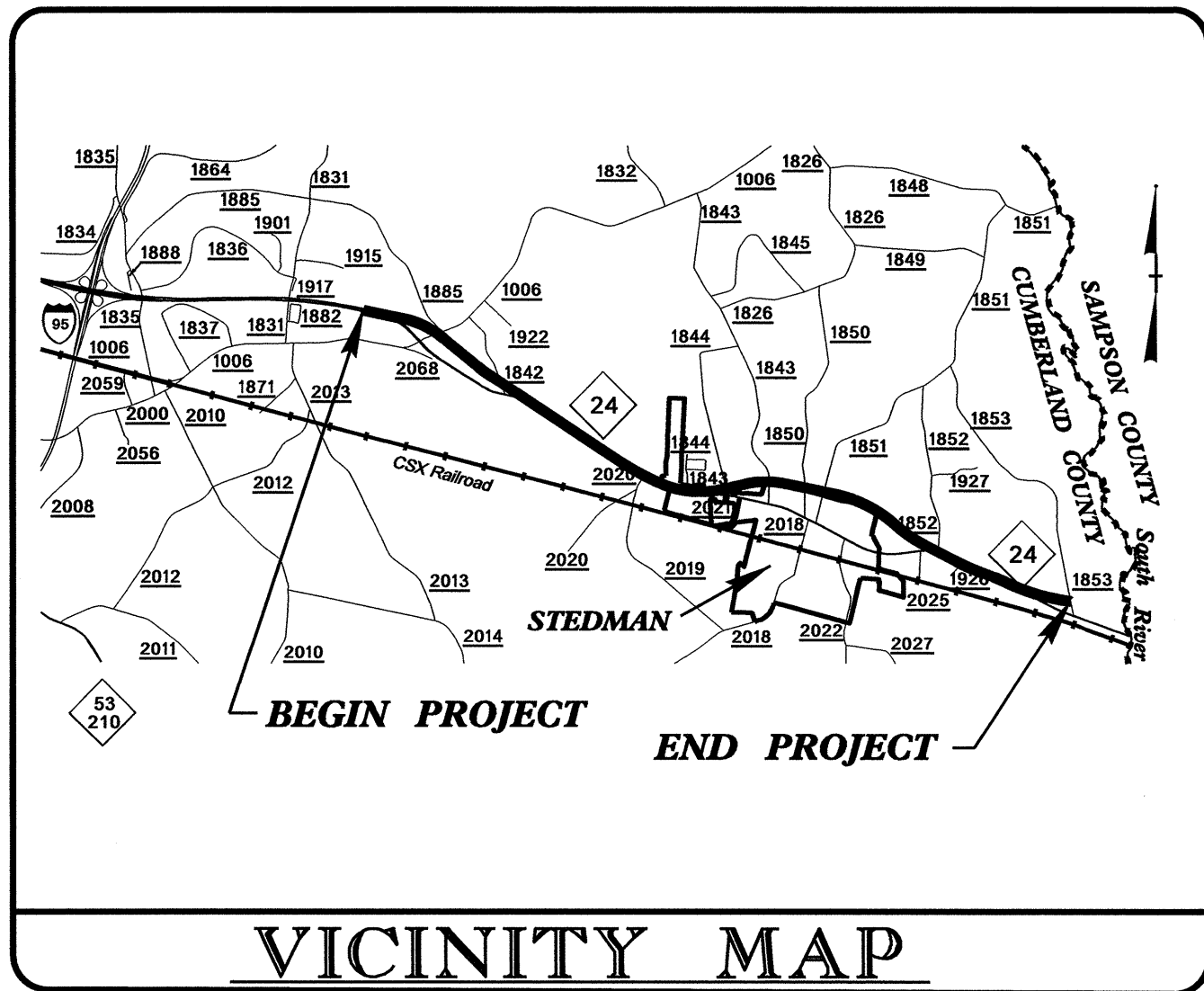
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CUMBERLAND COUNTY

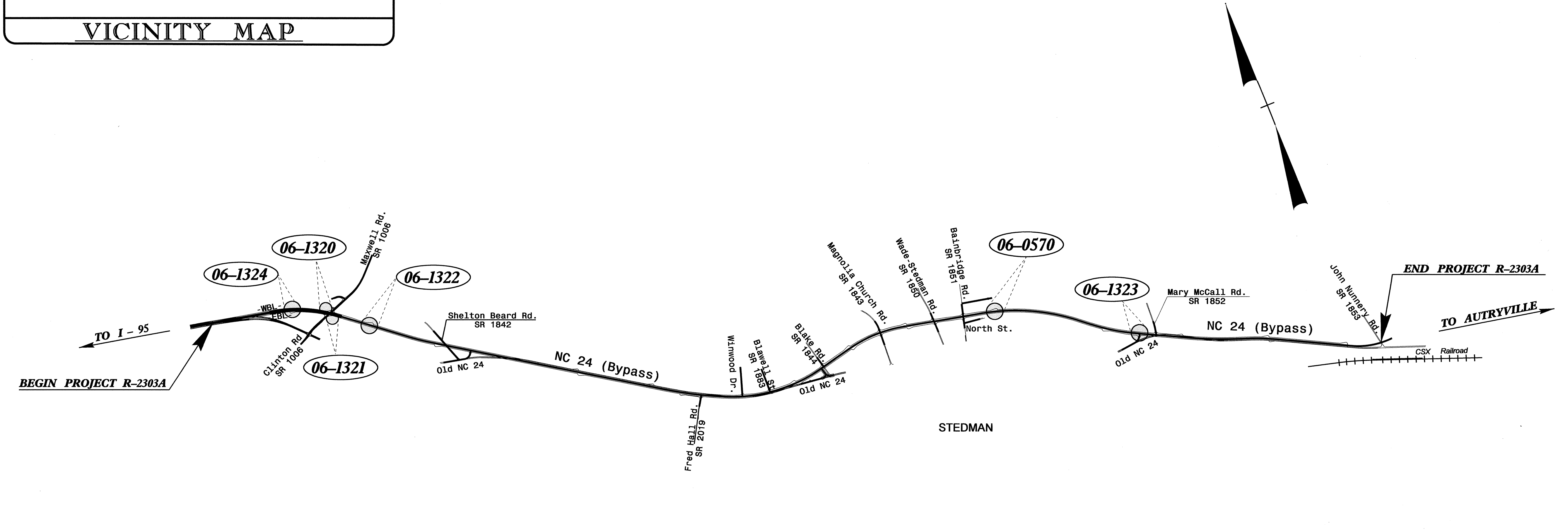
LOCATION: NC 24 from West of SR 1006 (Maxwell Road/Clinton Rd) to SR 1853 (John Nunnery Road)

TYPE OF WORK: Grading, Drainage, Paving & Signals

Project: R-2303A



VICINITY MAP



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

Index of Plans		
Sheet #	Reference #	Location/Description
Sig. 1	n/a	Title Sheet
Sig. 2-3	06-1324	NC 24 (Bypass) EB at U-Turn West of SR 1006 (Maxwell Rd)
Sig. 4-5	06-1320	NC 24 (Bypass) WB at SR 1006 (Maxwell Rd)/NC 24 EB Left
Sig. 6-8	06-1321	NC 24 (Bypass) EB at SR 1006 (Clinton Rd)/NC 24 WB Left
Sig. 9-10	06-1322	NC 24 (Bypass) EB at U-Turn East of SR 1006 (Clinton Rd)
Sig. 11-12	06-0570	NC 24 (Bypass) EB at U-Turn East of SR 1851 (Brainbridge Rd)
Sig. 13-15	06-1323	NC 24 (Bypass) EB at Old NC 24
Sig. 16-19	n/a	Cable Routing
Sig. 20-25	n/a	Metal Pole Standards

Transportation Mobility and Safety Division

Contacts:

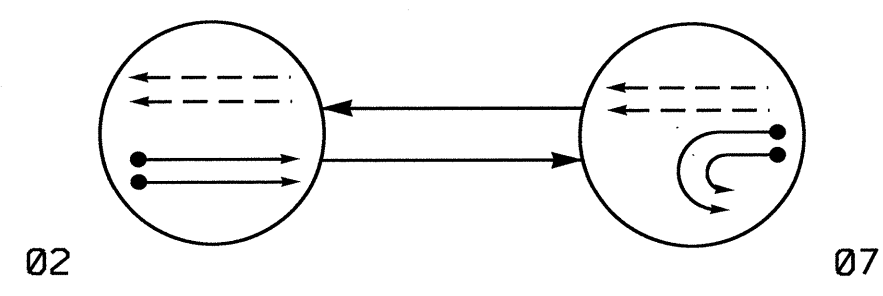
Pamela Alexander, PE - Eastern Region Signals Engineer
George C. Brown, PE - Signal Equipment Design Engineer
Greg Fuller, PE - State ITS and Signals Engineer

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

750 N. Greenfield Parkway, Garner, NC 27529

R:\JUL-2012_09-05... R-2303A.dgn

PHASING DIAGRAM

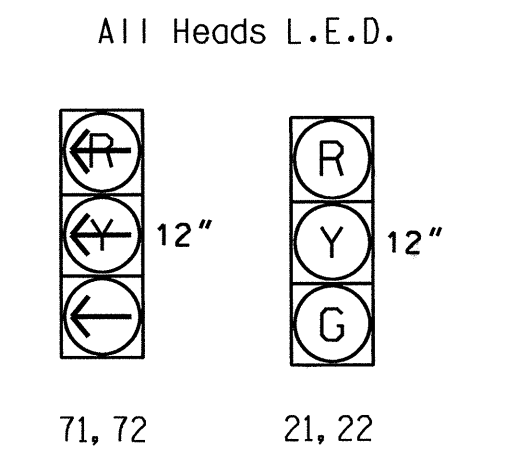


PHASING DIAGRAM DETECTION LEGEND
 ←● UNDETECTED MOVEMENT (OVERLAP)
 ← UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 ← - - - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	07	FLASH
21,22	G	R	Y
71,72	R	Y	R

SIGNAL FACE I.D.



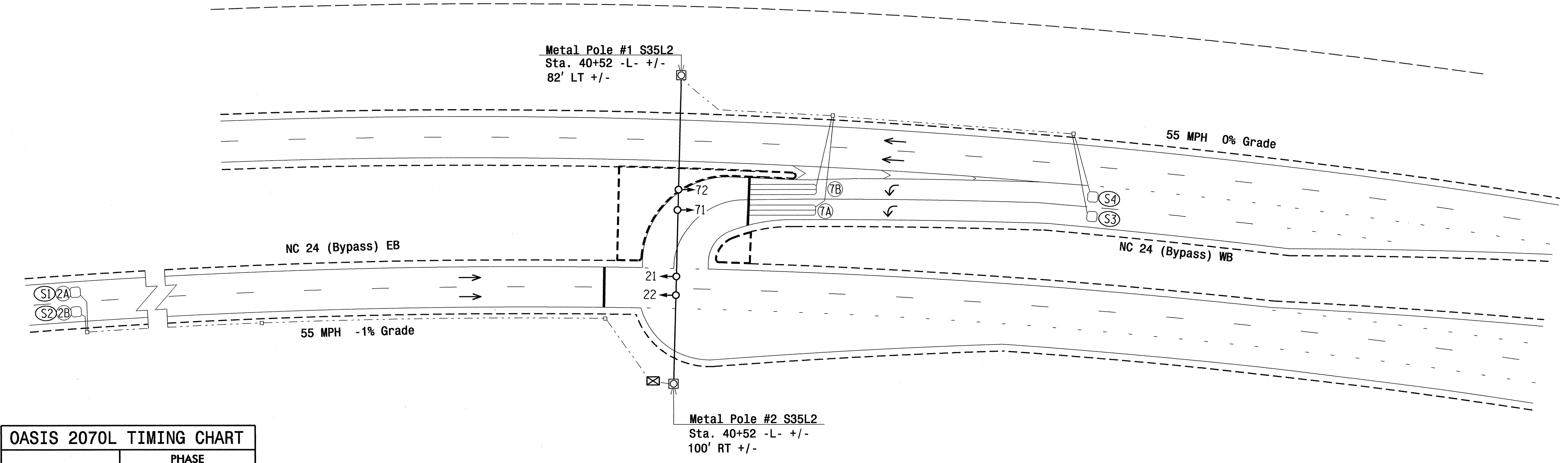
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

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/S1	6X6	420	5	Y	2	Y	Y	-	-	-	Y	Y
2B/S2	6X6	420	5	Y	2	Y	Y	-	-	-	Y	Y
7A	6X40	0	2-4-2	Y	7	Y	Y	-	-	-	-	Y
7B	6X40	0	2-4-2	Y	7	Y	Y	-	-	-	-	Y
S3	6X6	200	5	Y	-	-	-	-	-	-	Y	Y
S4	6X6	200	5	Y	-	-	-	-	-	-	Y	Y

2 Phase Fully Actuated NC 24 Bypass (Fayetteville) 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.
- 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.
- Closed loop system data: Controller Asset #1324.



OASIS 2070L TIMING CHART

FEATURE	PHASE	
	2	7
Min Green 1 *	14	7
Extension 1 *	6.0	2.0
Max Green 1 *	90	30
Yellow Clearance	5.3	3.0
Red Clearance	1.0	3.4
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	1.5	-
Max Variable Initial *	46	-
Time Before Reduction *	15	-
Time To Reduce *	30	-
Minimum Gap	3.4	-
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 phase 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	● → N/A
● → Modified Signal Head	■ → N/A
□ → Sign	□ → N/A
□ → Pedestrian Signal Head With Push Button & Sign	□ → N/A
○ → Signal Pole with Guy	● → N/A
○ → Signal Pole with Sidewalk Guy	● → N/A
⊗ → Metal Strain Pole	⊗ → N/A
⊗ → Inductive Loop Detector	⊗ → N/A
⊗ → Controller & Cabinet	⊗ → N/A
□ → Junction Box	□ → N/A
- - - → 2-in Underground Conduit	- - - → N/A
- - - → Direct Drill	- - - → N/A
N/A → Right of Way	- - - → N/A
→ → Directional Arrow	→ → N/A

New Installation

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

NC 24 (Bypass) EB at U-Turn West of SR 1006 (Maxwell Rd)

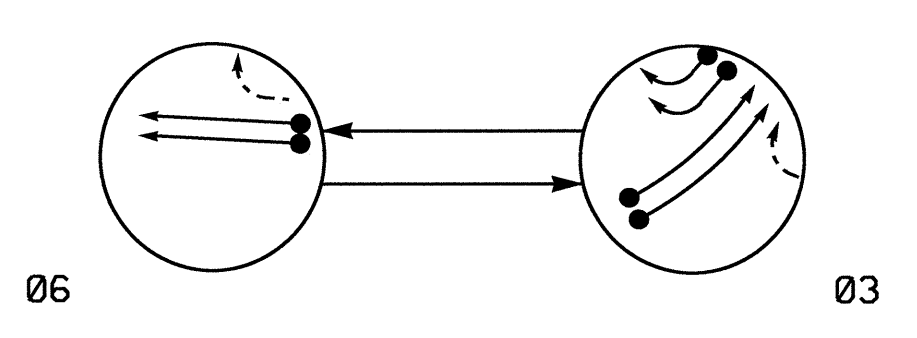
Division 6 Cumberland County E of Fayetteville
 PLAN DATE: April 2012 REVIEWED BY: PL Alexander, PE
 PREPARED BY: EM Minshew REVIEWED BY:

SCALE: 1" = 40'

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 SIG. INVENTORY NO. 06-1324

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 emminshew

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

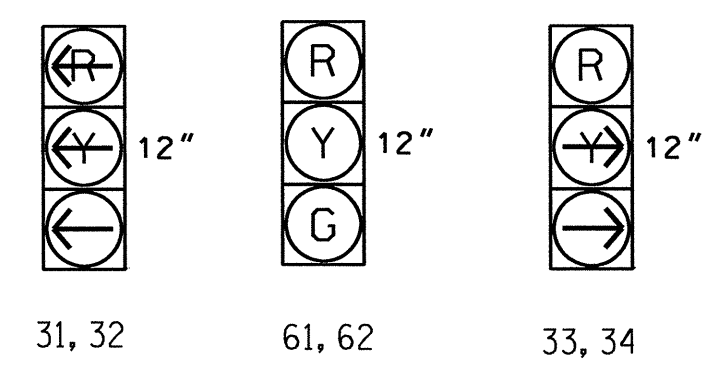
- ◄●◄ DETECTED MOVEMENT
- ◄◄◄ UNDETECTED MOVEMENT (OVERLAP)
- ◄-◄ UNSIGNALIZED MOVEMENT
- ◄-◄-◄ PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	06	03	L
31,32	R	R	R
33,34	R	R	R
61,62	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



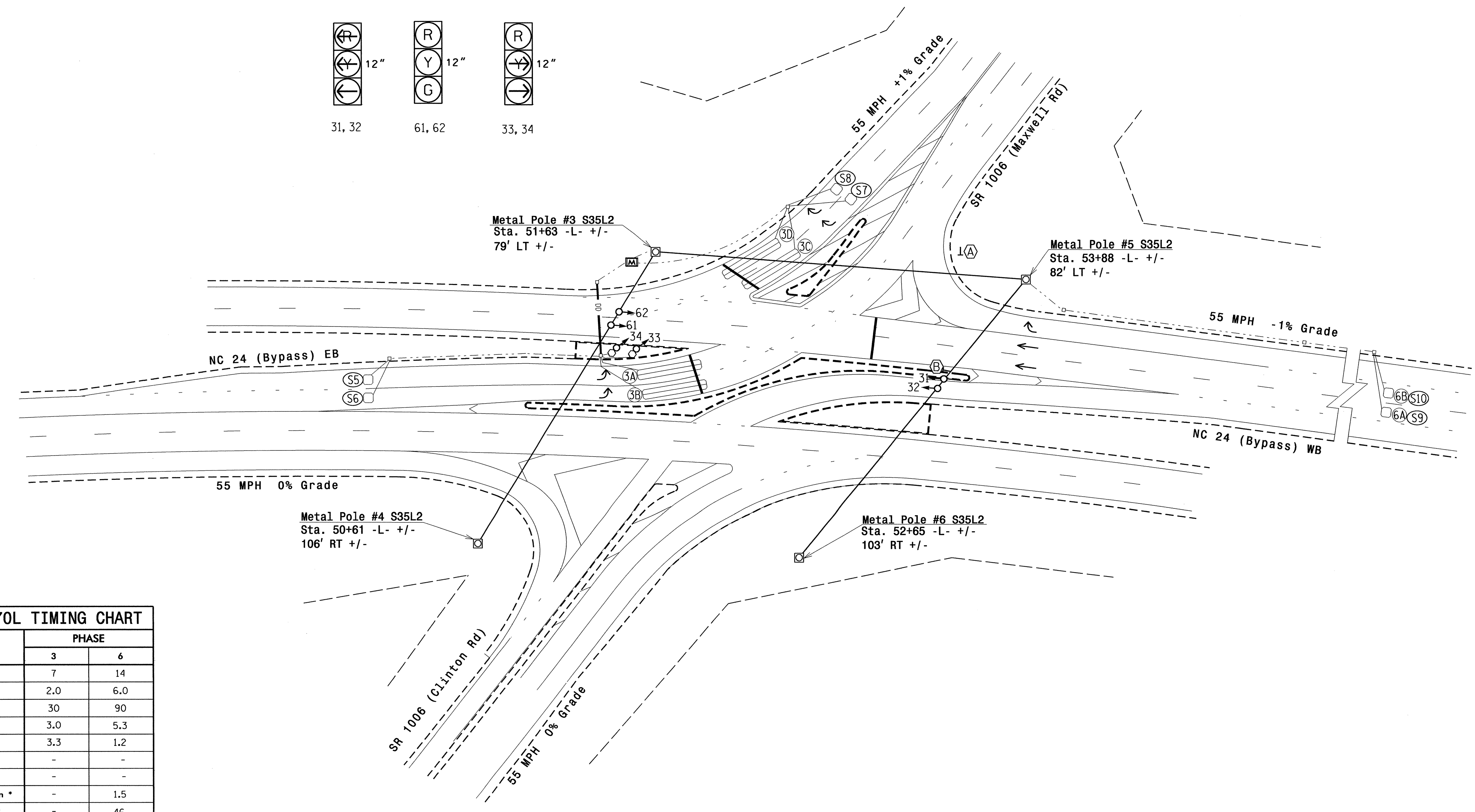
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
3A	6X40	+5	2-4-2	Y	3	Y	Y	-	-	-	-	Y
3B	6X40	+5	2-4-2	Y	3	Y	Y	-	-	-	-	Y
3C	6X40	+5	2-4-2	Y	3	Y	Y	-	-	15	-	Y
3D	6X40	+5	2-4-2	Y	3	Y	Y	-	-	15	-	Y
6A/S9	6X6	420	6	Y	6	Y	Y	-	-	-	-	Y
6B/S10	6X6	420	6	Y	6	Y	Y	-	-	-	-	Y
S5	6X6	200	3	Y	-	-	-	-	-	-	-	Y
S6	6X6	200	3	Y	-	-	-	-	-	-	-	Y
S7	6X6	75	3	Y	-	-	-	-	-	-	-	Y
S8	6X6	75	3	Y	-	-	-	-	-	-	-	Y

2 Phase Fully Actuated NC 24 Bypass (Fayetteville) CLS

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. 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. The cabinet should be designed to include an Auxiliary Output file for future use.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset #1320. Master Asset #10629.



LEGEND

PROPOSED	EXISTING
○	●
◄●◄	◄●◄
◄◄◄	◄◄◄
◄-◄	◄-◄
◄-◄-◄	◄-◄-◄
◄-◄-◄-◄	◄-◄-◄-◄
□	□
◻	◻
—	—
→	→
Ⓐ	Ⓐ
Ⓑ	Ⓑ

OASIS 2070L TIMING CHART

FEATURE	PHASE	
	3	6
Min Green 1*	7	14
Extension 1*	2.0	6.0
Max Green 1*	30	90
Yellow Clearance	3.0	5.3
Red Clearance	3.3	1.2
Walk 1*	-	-
Don't Walk 1	-	-
Seconds Per Actuation*	-	1.5
Max Variable Initial*	-	46
Time Before Reduction*	-	15
Time To Reduce*	-	30
Minimum Gap	-	3.4
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 phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

New Installation

Prepared in the Offices of:

EMMINSHAW

Transportation Mobility and Safety Division
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 Signal Design Section

NC 24 (Bypass) WB at SR 1006 (Maxwell Rd)/NC 24 EB Left

Division 6 Cumberland County E of Fayetteville

PLAN DATE: April 2012 REVIEWED BY: PL Alexander, PE

PREPARED BY: EM Minshew REVIEWED BY:

750 N. Greenfield Phwy, Garner, NC 27529

SCALE: 1"=40'

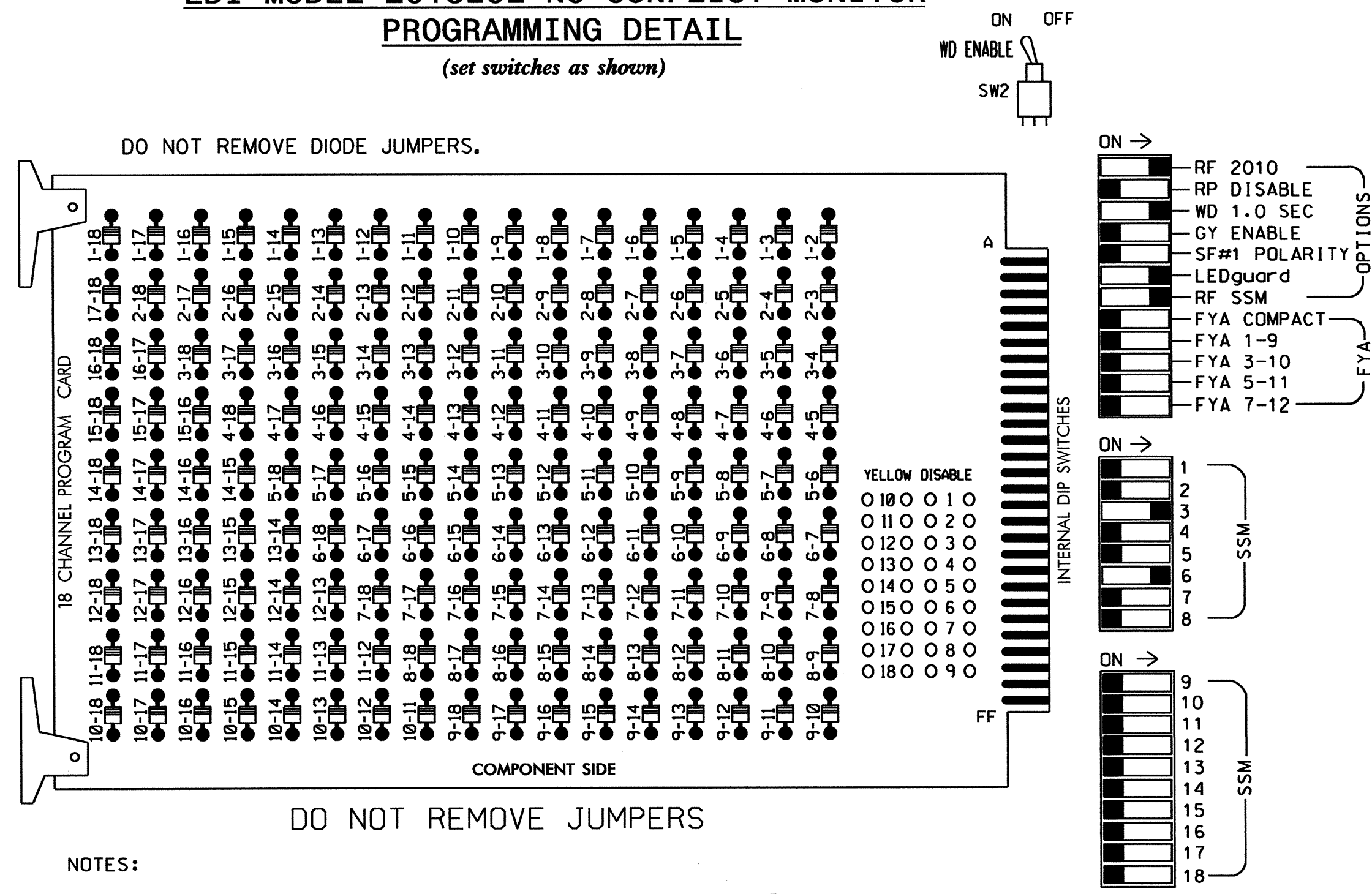
REVISIONS: INIT. DATE

SIGNATURE: DATE

SIG. INVENTORY NO. 06-1320

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 emminshaw

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 NC 24 Bypass (Fayetteville Closed Loop System).

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.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

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

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	S	S	S	S	S	∅ 3	∅ 3	S	SYS. DET. S5	S	S	S	S	FS
I	-	-	-	-	-	3A	3C	-	-	-	-	-	-	DC ISOLATOR
L	-	-	-	-	-	∅ 3	∅ 3	-	SYS. DET. S6	-	-	-	-	ST
U	S	∅ 6/SYS	S	S	S	S	S	S	SYS. DET. S7	S	S	S	S	S
J	-	6A/S9	-	-	-	-	-	-	-	-	-	-	-	-
L	-	∅ 6/SYS	-	-	-	-	-	-	SYS. DET. S8	-	-	-	-	-
	-	6B/S10	-	-	-	-	-	-	-	-	-	-	-	-

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

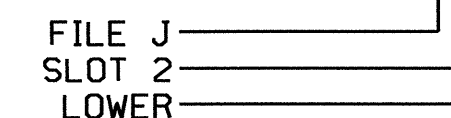
FS = FLASH SENSE
 ST = STOP TIME

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	I6U	41	3	4	3	Y	Y			
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			
3C	TB6-1,2	I7U	65	27	34	3	Y	Y			15
3D	TB6-3,4	I7L	78	40	44	3	Y	Y			15
6A/S9	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S10	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			
* S5	TB6-9,10	I9U	60	22	11	SYS					
* S6	TB6-11,12	I9L	62	24	13	SYS					
* S7	TB7-9,10	J9U	59	21	15	SYS					
* S8	TB7-11,12	J9L	61	23	17	SYS					

* System Detector only. Remove the vehicle phase assigned to this detector in the default programming.

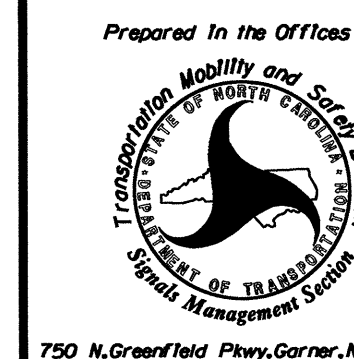
INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1320
 DESIGNED: April 2012
 SEALED: 06/04/12
 REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:



Prepared in the Offices of:
 Transportation Mobility and Safety Solutions
 STATE OF NORTH CAROLINA
 Signal Management Division
 750 N. Greenfield Pkwy, Garner, NC 27529

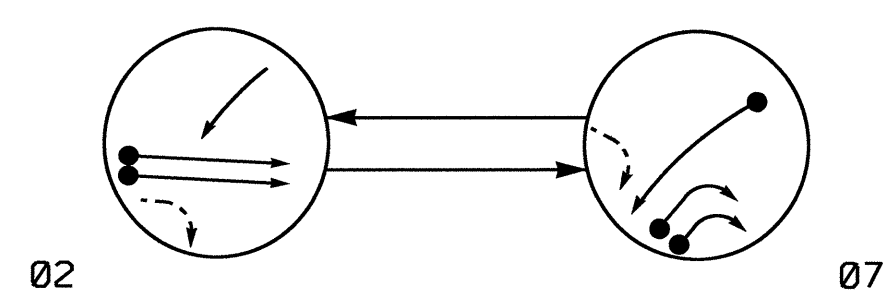
NC 24 (Bypass) WB at SR 1006 (Maxwell Rd)/NC 24 EB Left
 Division 6 Cumberland County E of Fayetteville

PLAN DATE: May 2012 REVIEWED BY: T. J. J. J.
 PREPARED BY: C. Strickland REVIEWED BY: T. J. J. J.

REVISIONS	INIT.	DATE

SEAL
 STATE OF NORTH CAROLINA
 PROFESSIONAL ENGINEER
 SEAL 022013
 GEORGE C. BROWN
 SIGNATURE DATE 6/7/12
 SIG. INVENTORY NO. 06-1320

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

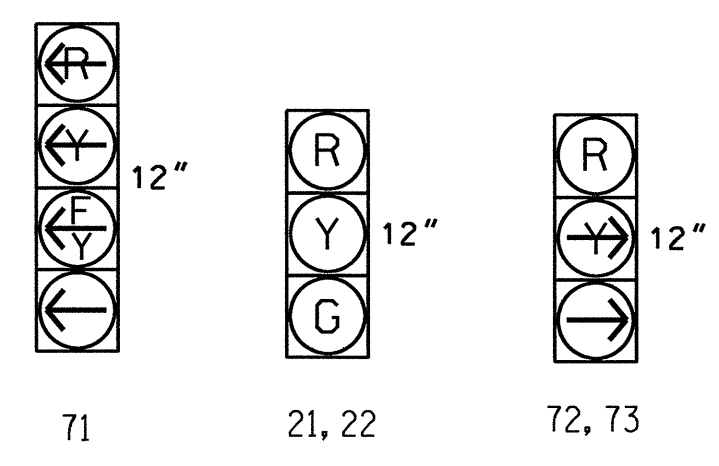
- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ←--- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+7	07	F L E O D B
21, 22	G	R	Y
71	F	←	←
72, 73	R	→	→

SIGNAL FACE I.D.

All Heads L.E.D.



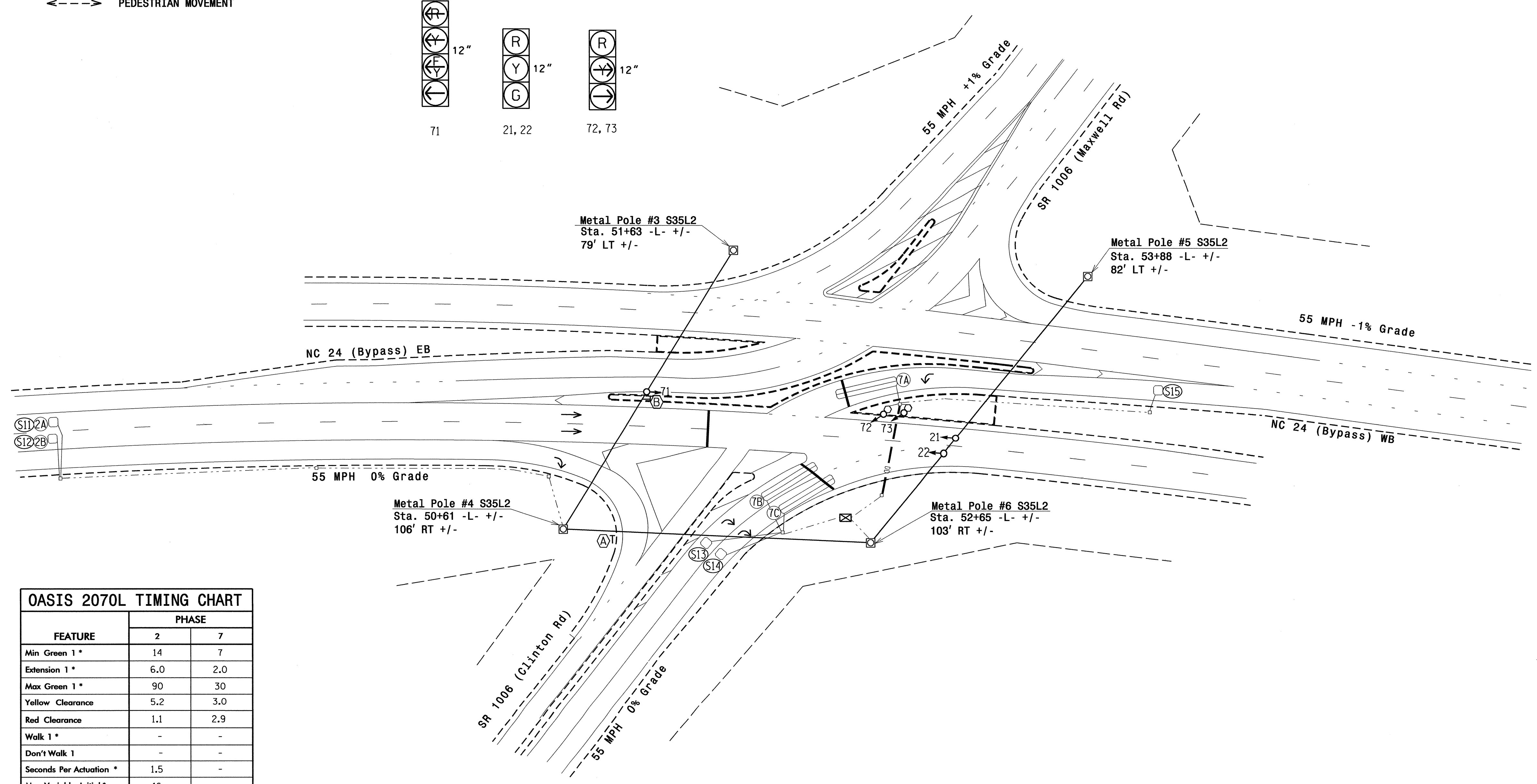
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A/S11	6X6	420	6	Y	2	Y	Y	-	-	-	Y	Y
2B/S12	6X6	420	6	Y	2	Y	Y	-	-	-	Y	Y
7A	6X40	+5	2-4-2	7	Y	Y	-	-	15	-	Y	Y
7B	6X40	+5	2-4-2	7	Y	Y	-	-	15	-	Y	Y
7C	6X40	+5	2-4-2	7	Y	Y	-	-	15	-	Y	Y
S13	6X6	75	3	Y	7	-	-	-	-	-	Y	Y
S14	6X6	75	3	Y	7	-	-	-	-	-	Y	Y
S15	6X6	200	4	Y	7	-	-	-	-	-	Y	Y

2 Phase Fully Actuated NC 24 Byp. (Fayetteville) 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.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #1321.



OASIS 2070L TIMING CHART

FEATURE	PHASE	
	2	7
Min Green 1 *	14	7
Extension 1 *	6.0	2.0
Max Green 1 *	90	30
Yellow Clearance	5.2	3.0
Red Clearance	1.1	2.9
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	1.5	-
Max Variable Initial *	46	-
Time Before Reduction *	15	-
Time To Reduce *	30	-
Minimum Gap	3.4	-
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 phase 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	● → N/A
○ → Modified Signal Head	○ → N/A
○ → Sign	○ → N/A
○ → Pedestrian Signal Head With Push Button & Sign	○ → N/A
○ → Signal Pole with Guy	○ → N/A
○ → Signal Pole with Sidewalk Guy	○ → N/A
□ → Metal Strain Pole	□ → N/A
□ → Inductive Loop Detector	□ → N/A
□ → Controller & Cabinet	□ → N/A
□ → Junction Box	□ → N/A
□ → 2-in Underground Conduit	□ → N/A
--- Direct Drill	--- N/A
N/A Right of Way	N/A
→ Directional Arrow	→
(A) "YIELD" Sign (R1-2)	(A)
(B) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	(B)

New Installation

Prepared in the Offices of:

EM MINSHAW

750 N. Greenfield Pkwy, Garner, NC 27529

NC 24 (Bypass) EB at SR 1006 (Clinton Rd)/NC 24 WB Left

Division 6 Cumberland County E of Fayetteville

PLAN DATE: April 2012 REVIEWED BY: PL Alexander, PE

PREPARED BY: EM Minshew REVIEWED BY:

REVISIONS: _____

SCALE: 1" = 40'

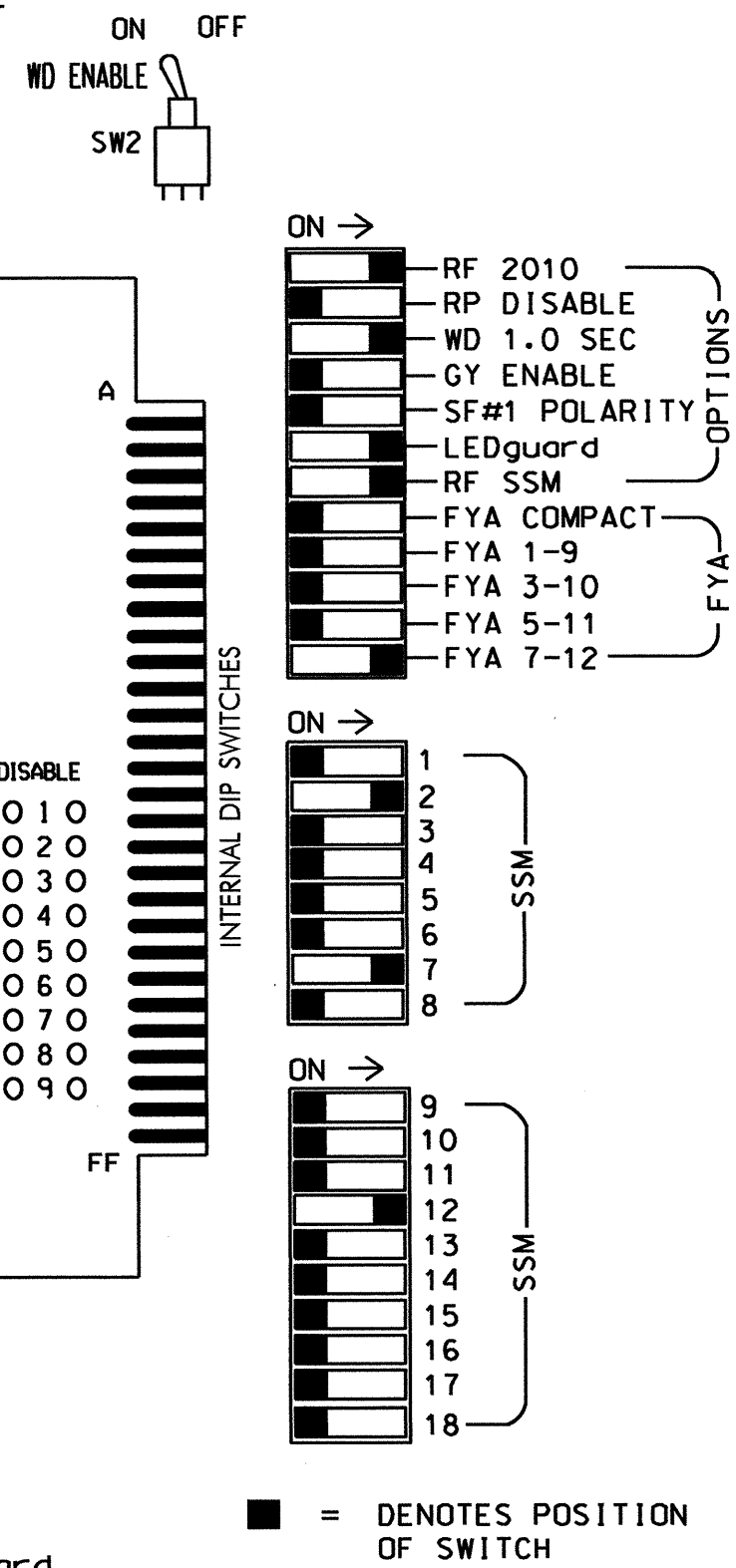
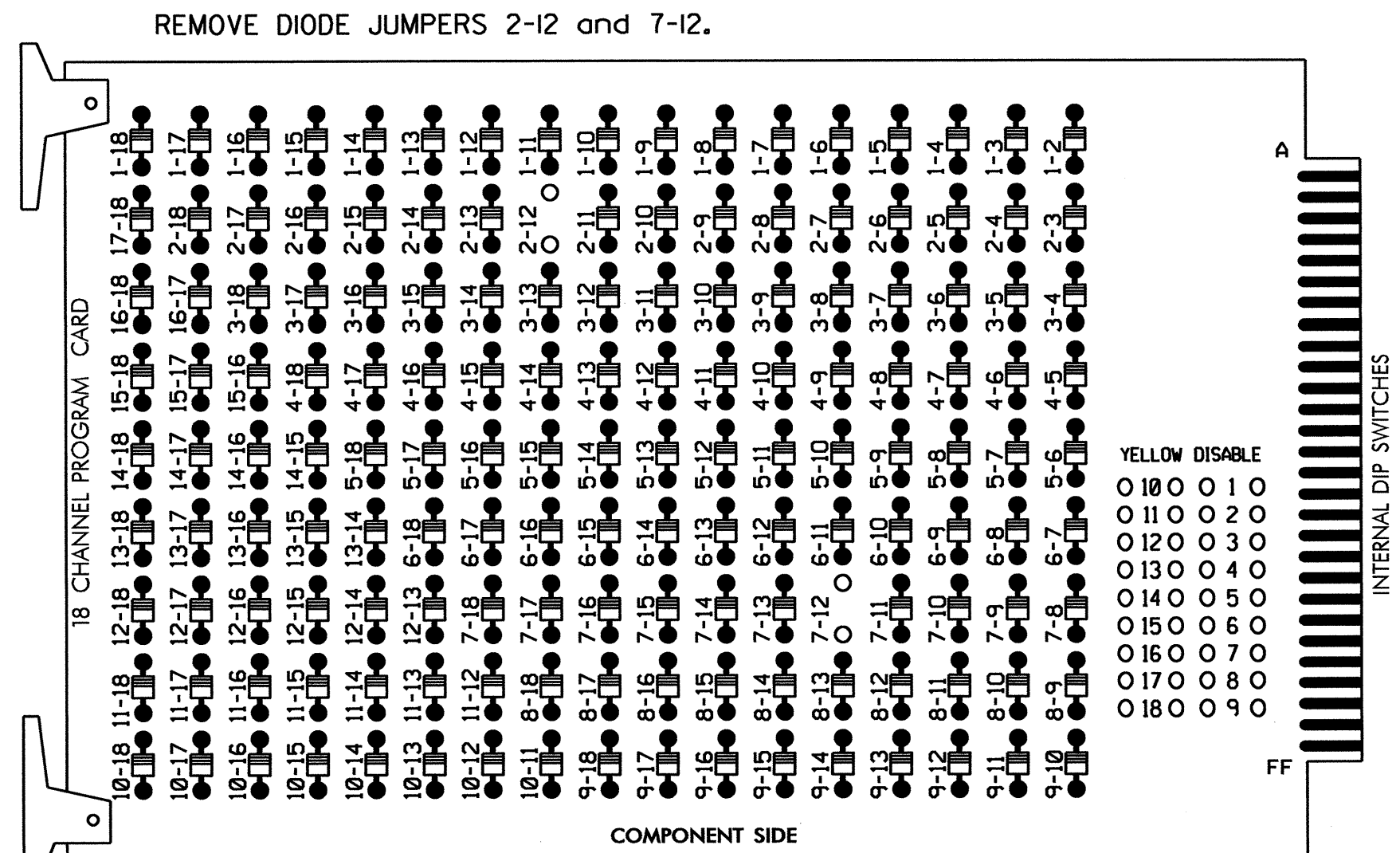
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SIG. INVENTORY NO. 06-1321

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EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and 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 NC 24 Byp. (Fayetteville) Closed Loop System.

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,S10,AUX S5
 PHASES USED.....2,7
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....2+7

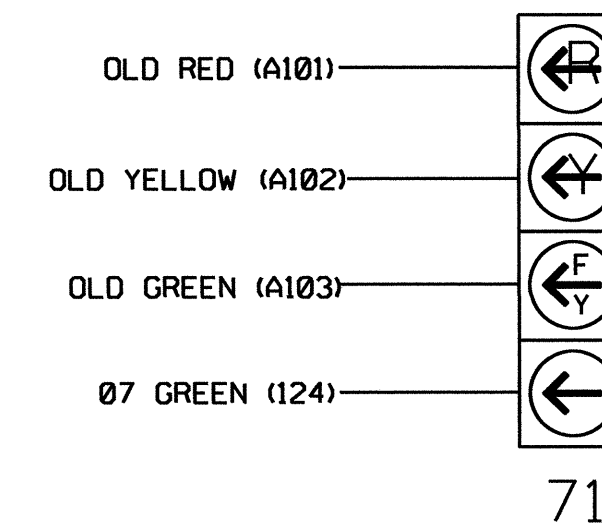
SIGNAL HEAD HOOK-UP CHART

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
CNU 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	71*	72,73	NU	NU	NU	NU	NU	71*	NU
RED		128									122							
YELLOW		129																
GREEN		130																
RED ARROW																		A101
YELLOW ARROW											123							A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW										124	124							

NU = Not Used
 * See pictorial of head wiring in detail below.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)



NOTE

1. The sequence display for this signal requires special logic programming. See sheet 2 of 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)

FILE	U	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
"I"	U	S	∅ 2/SYS	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	SYS. DET. S13	∅ S	∅ S	∅ S	∅ S	FS	
		L	2A/S11	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	NOT USED	∅ S	∅ S	∅ S	∅ S	DC ISOLATOR
		L	2B/S12	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	DC ISOLATOR
"J"	U	S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	SYS. DET. S14	∅ S	∅ S	∅ S	∅ S	∅ S	
		L	7A	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	
		L	7B	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	
			NOT USED	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	SYS. DET. S15	∅ S	∅ S	∅ S	∅ S	∅ S	
			7C	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	

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

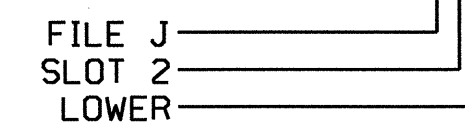
FS = FLASH SENSE
 ST = STOP TIME

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/S11	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S12	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
7A	TB5-5,6	J5U	57	19	7	7	Y	Y			15
7B	TB5-9,10	J6U	42	4	8	7	Y	Y			15
7C	TB5-11,12	J6L	46	8	18	7	Y	Y			15
* S13	TB6-9,10	I9U	60	22	11	SYS					
* S14	TB7-9,10	J9U	59	21	15	SYS					
* S15	TB7-11,12	J9L	61	23	17	SYS					

* System Detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 24 (Bypass) EB at SR 1006 (Clinton Rd)/NC 24 WB Left

Division 6 Cumberland County E of Fayetteville

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

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: INIT. DATE

SEAL

STATE OF NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013

ENGINEER GEORGE C. BROWN

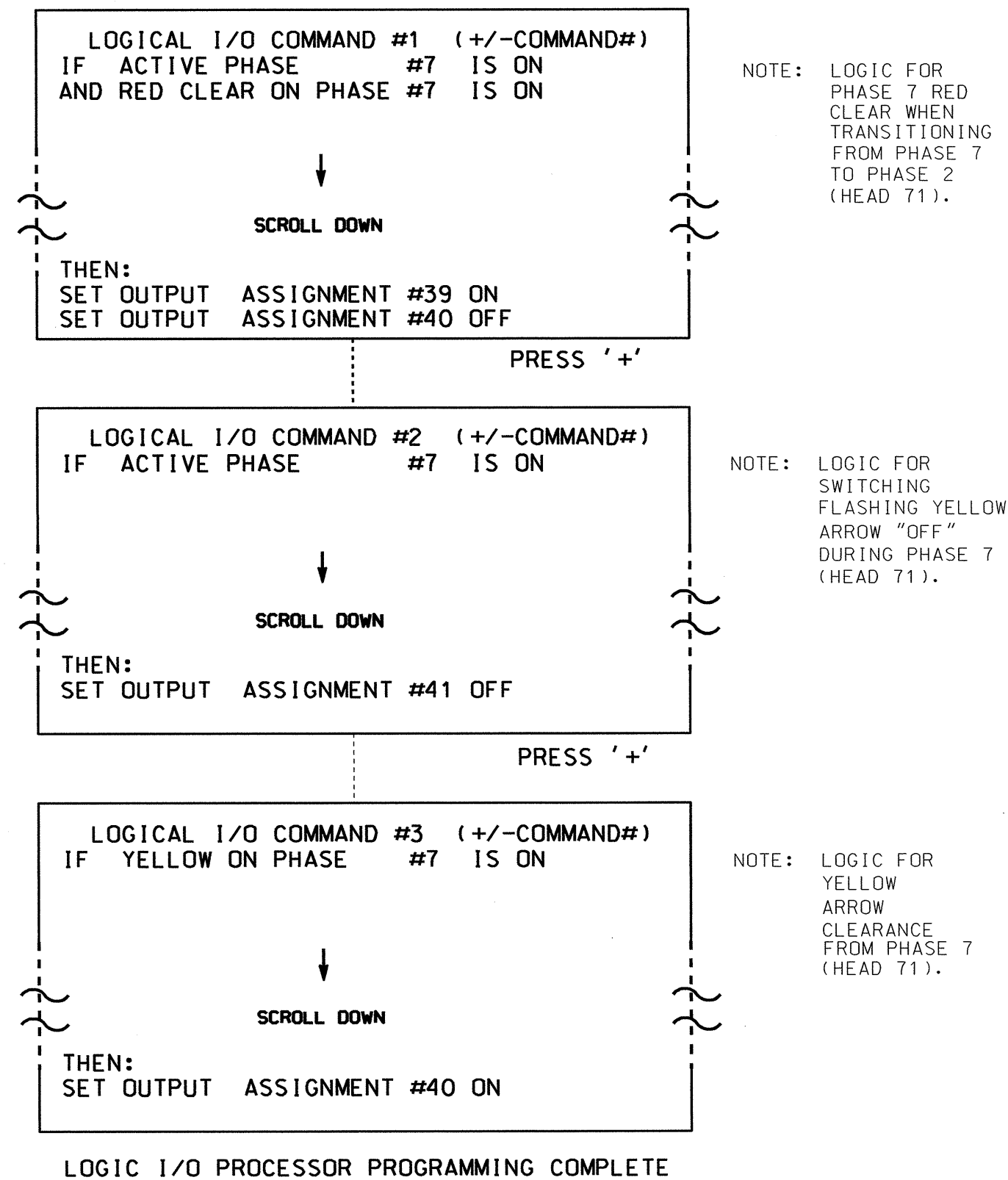
Signature: George C. Brown 6/7/12 DATE: 6/7/12

SIG. INVENTORY NO. 06-1321

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).



OUTPUT REFERENCE SCHEDULE

USE TO INTERPRET LOGIC PROCESSOR

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
YELLOW CLEAR (0=PARENT.3-25.5 SEC)...0
RED CLEAR (0=PARENT.0.1-25.5 SEC)...0
OUTPUT AS PHASE # (0=NONE, 1-16)...0

← NOTICE GREEN FLASH

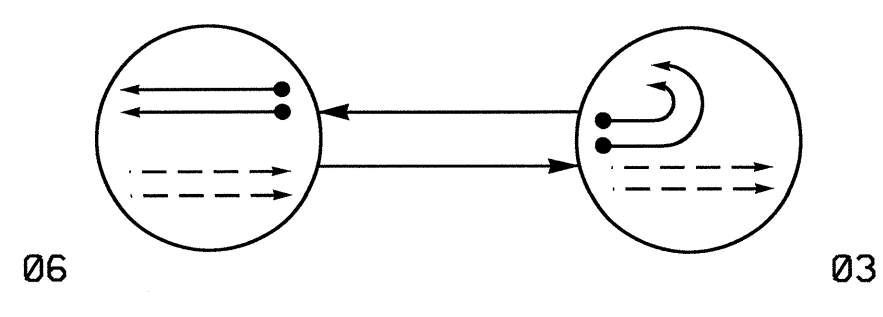
OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 06-1321
DESIGNED: April 2012
SEALED: 06/04/12
REVISED: N/A

Electrical Detail - Sheet 2 of 2

	NC 24 (Bypass) EB at SR 1006 (Clinton Rd)/NC 24 WB Left		
	Division 6 Cumberland County E of Fayetteville		
PLAN DATE: May 2012	REVIEWED BY: <i>[Signature]</i>		SIGNATURE: <i>[Signature]</i> DATE: 6/7/12
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS	INIT.	DATE	SIG. INVENTORY NO. 06-1321

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

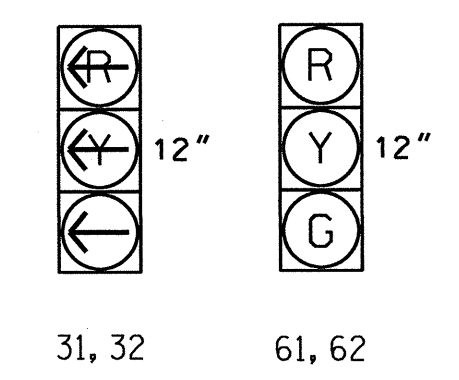
- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ←--- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	06	03	FLASH
31,32	R	R	R
61,62	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



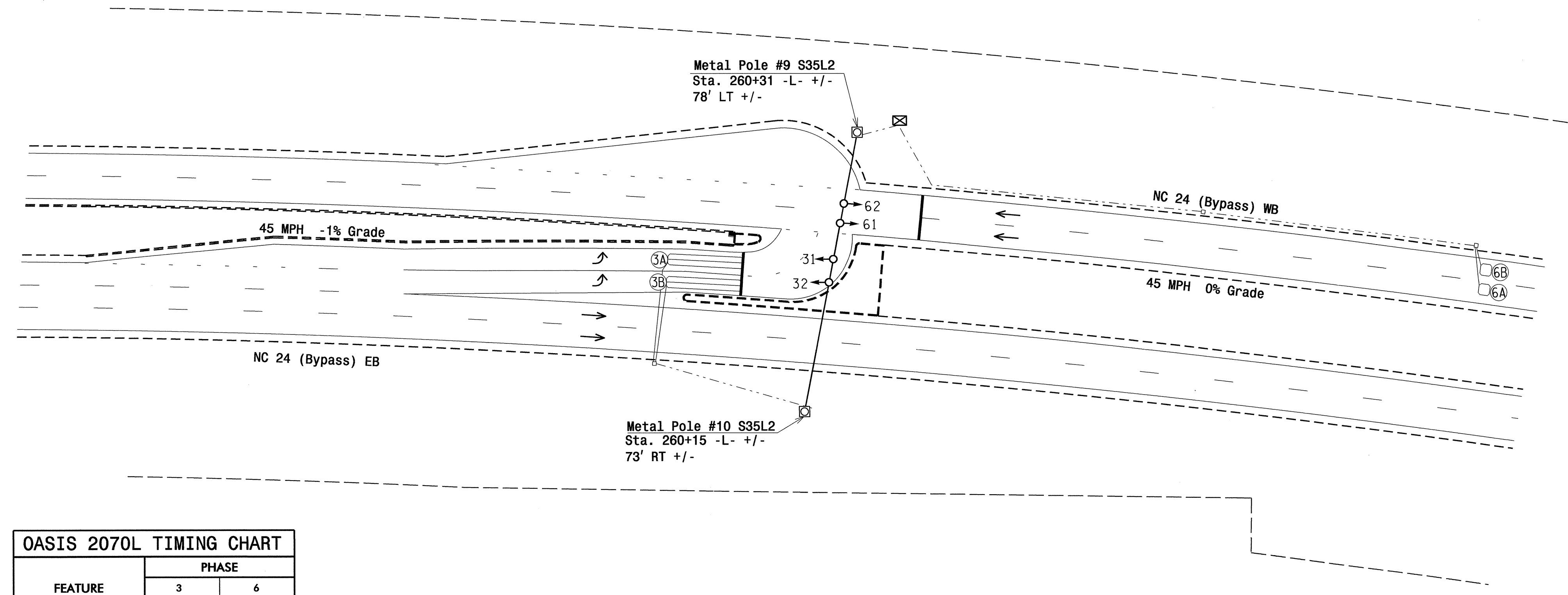
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	PULL TIME DELAY	STRETCH TIME			DELAY TIME
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	-	-	Y
3B	6X40	0	2-4-2	Y	3	Y	Y	-	-	-	-	Y
6A	6X6	300	4	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	300	4	Y	6	Y	Y	-	-	-	-	Y

2 Phase Fully Actuated Isolated

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. 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. The cabinet should be designed to include an Auxiliary Output file for future use.



OASIS 2070L TIMING CHART

FEATURE	PHASE	
	3	6
Min Green 1 *	7	12
Extension 1 *	2.0	6.0
Max Green 1 *	30	90
Yellow Clearance	3.0	4.5
Red Clearance	3.1	1.2
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	-	1.5
Max Variable Initial *	-	34
Time Before Reduction *	-	15
Time To Reduce *	-	30
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 phase 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 | ●→ Traffic Signal Head |
| ●→ Modified Signal Head | N/A |
| ⊥ Sign | ⊥ Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Pedestrian Signal Head With Push Button & Sign |
| ○ Signal Pole with Guy | ● Signal Pole with Guy |
| ⊥ Signal Pole with Sidewalk Guy | ⊥ Signal Pole with Sidewalk Guy |
| ⊠ Metal Strain Pole | ⊠ Metal Strain Pole |
| ⊠ Inductive Loop Detector | ⊠ Inductive Loop Detector |
| ⊠ Controller & Cabinet Junction Box | ⊠ Controller & Cabinet Junction Box |
| ⊠ 2-in Underground Conduit | ⊠ 2-in Underground Conduit |
| — Direct Drill | N/A |
| N/A Right of Way | --- Right of Way |
| → Directional Arrow | → Directional Arrow |

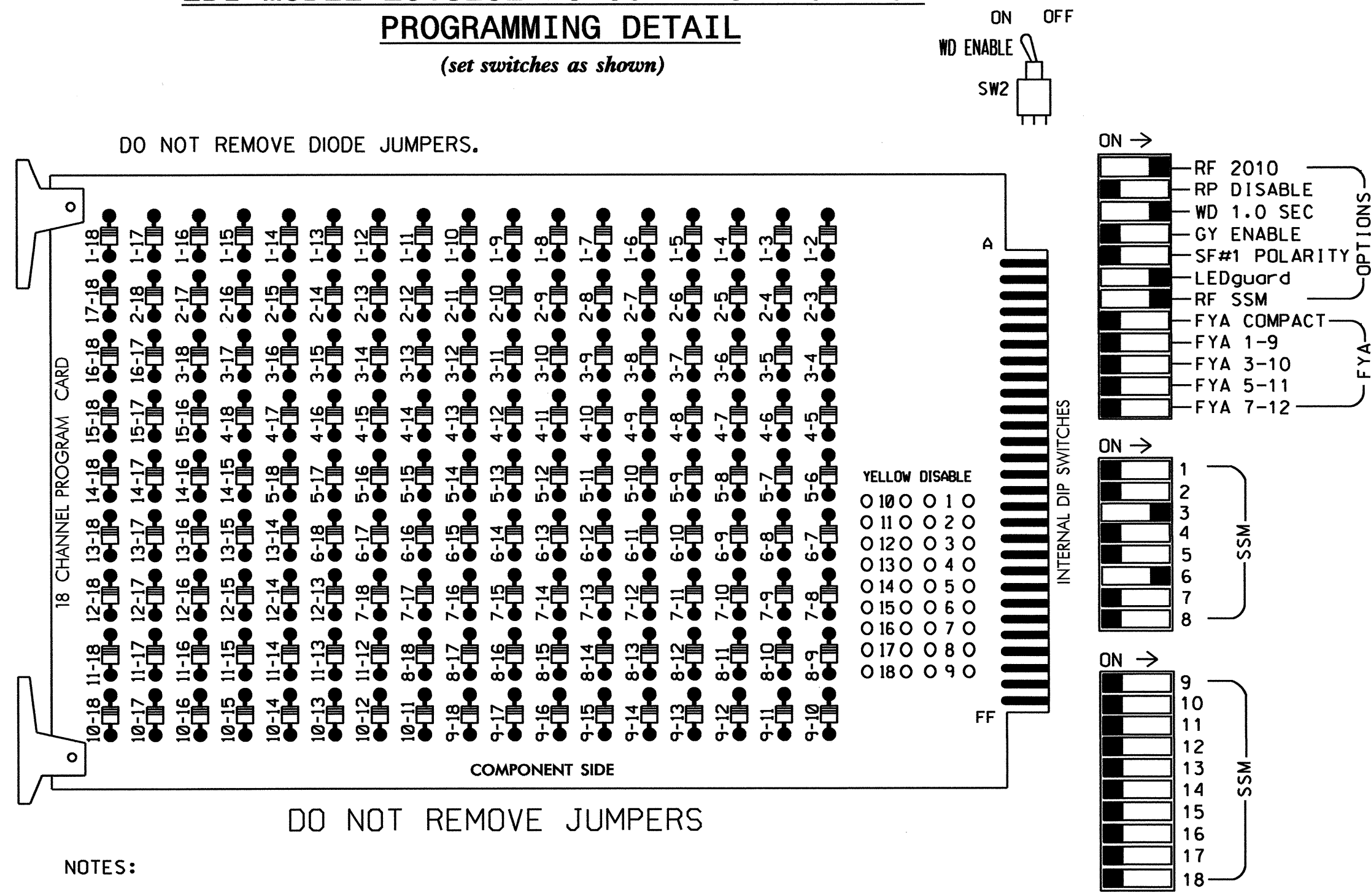
New Installation

Prepared in the Offices of:

NC 24 (Bypass) EB at U-Turn East of SR 1851 (Brainbridge Rd)
 Division 6 Cumberland County E of Fayetteville
 PLAN DATE: April 2012 REVIEWED BY: PL Alexander, PE
 PREPARED BY: EM Minshew REVIEWED BY:
 SCALE: 1" = 40'
 REVISIONS: _____ INIT. DATE
 SIGNATURE: _____ DATE: 6/4/12
 SIG. INVENTORY NO. 06-0570

01-JUN-2012 13:40
 R:\Traffic\ok51\p01\sig060570\sig060570.s1\p01\Des\lgn\sig060570.s1.dgn, 2012.mdd, dgn
 emminshew

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.

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

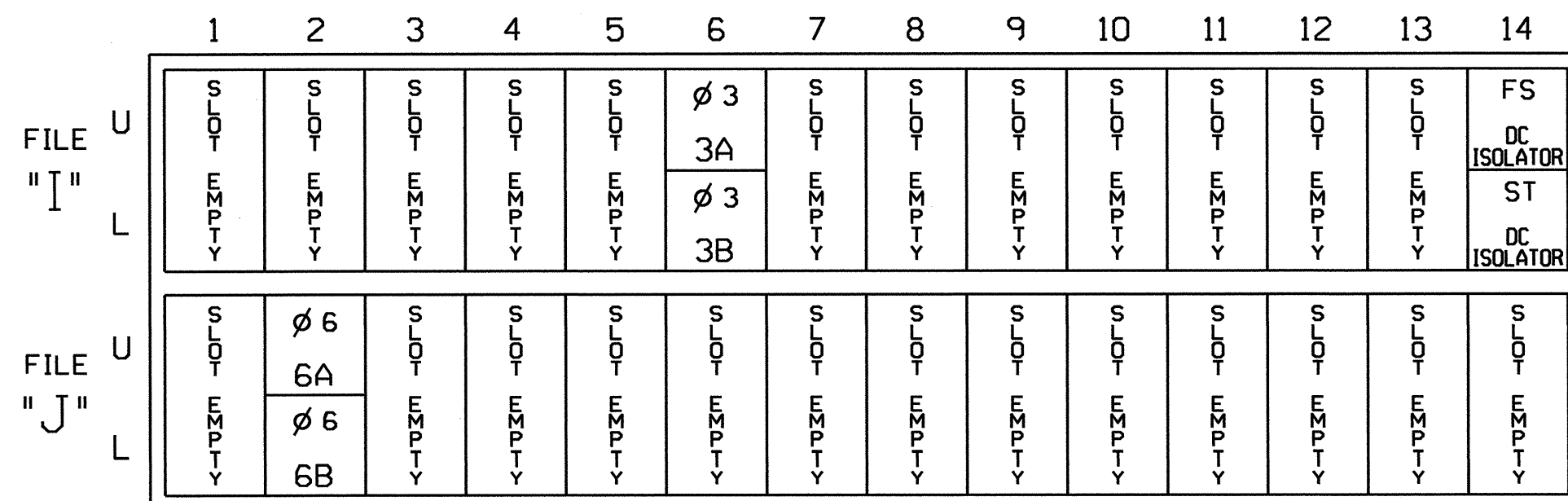
NU = Not Used

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.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



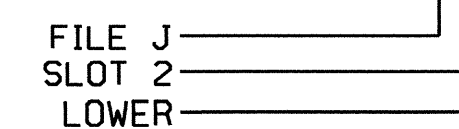
EX.: 1A, 2A, ETC. = LOOP NO.'S

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	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			

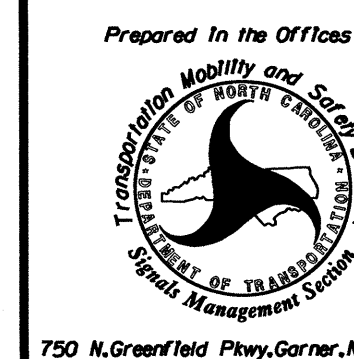
INPUT FILE POSITION LEGEND: J2L



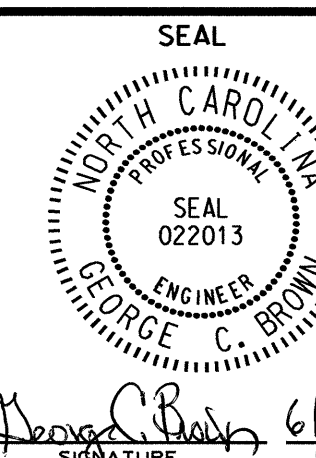
THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 06-0570
 DESIGNED: April 2012
 SEALED: 06/04/12
 REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:



Prepared in the Office of:
NC 24 (Bypass) EB
 at
U-Turn East of SR 1851 (Brainbridge Rd)
 Division 6 Cumberland County E of Fayetteville
 PLAN DATE: May 2012 REVIEWED BY: T. J. J. J.
 PREPARED BY: C. Strickland REVIEWED BY:
 REVISIONS INIT. DATE

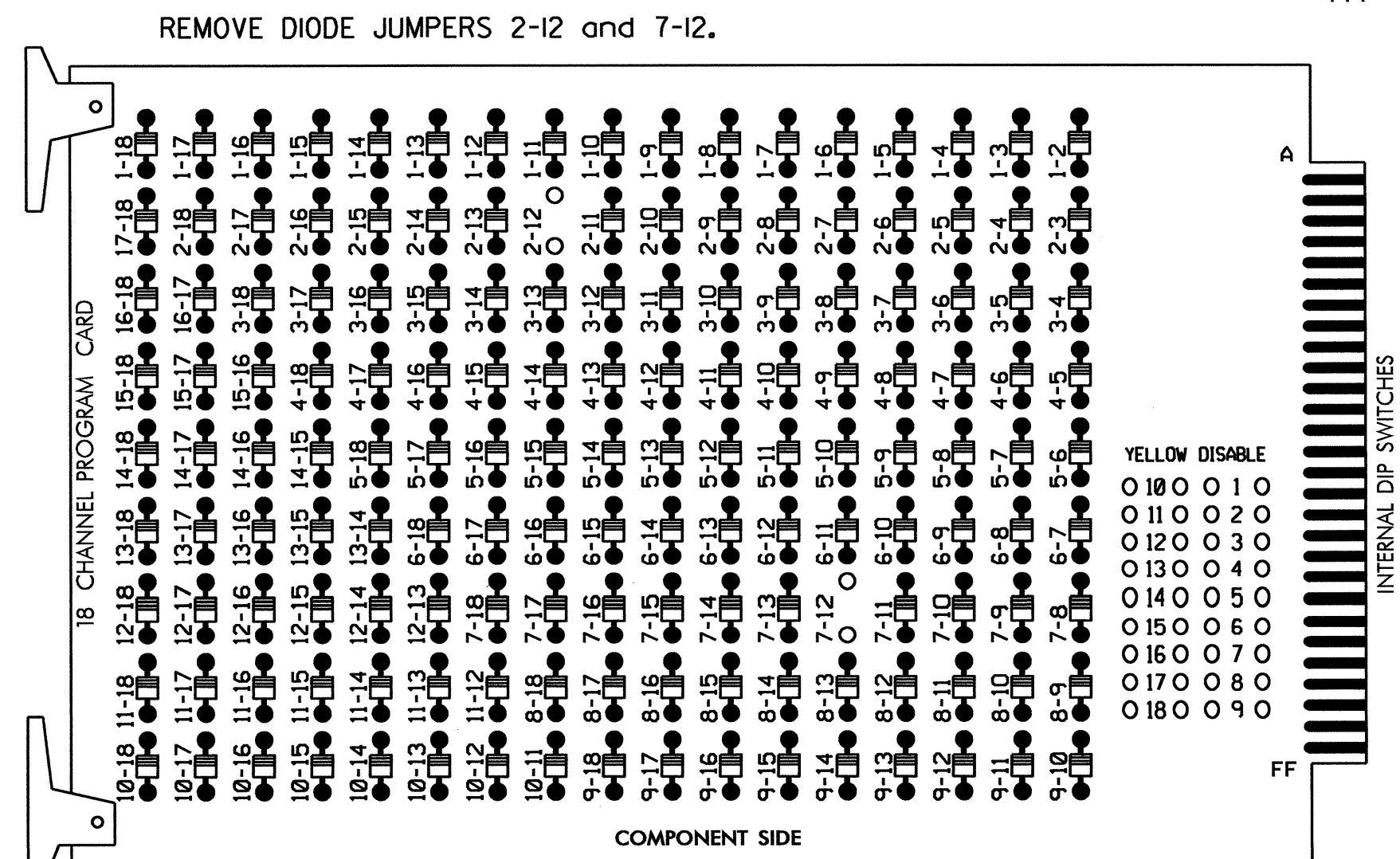


Signature: *George C. Brown* DATE: 6/7/12

SIG. INVENTORY NO. 06-0570

EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL

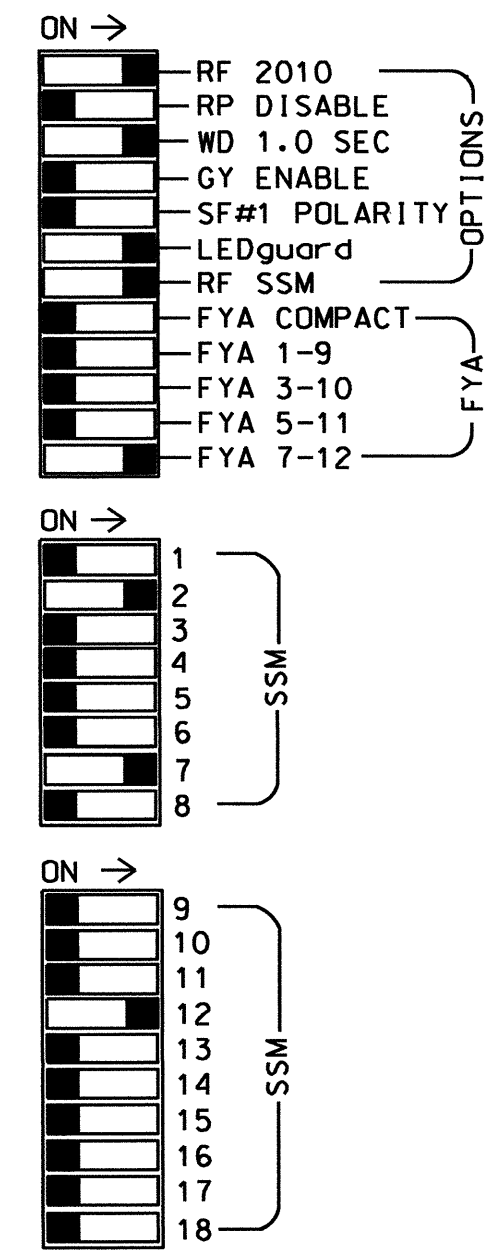
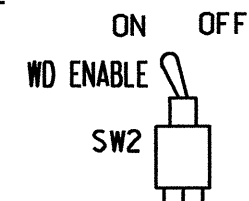
(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. 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 phase 2 for Variable Initial and Gap Reduction.
4. Program phase 2 for Start Up In Green.
5. Program phase 2 for Yellow Flash.

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,S10,AUX S5
 PHASES USED.....2,7
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....2+7

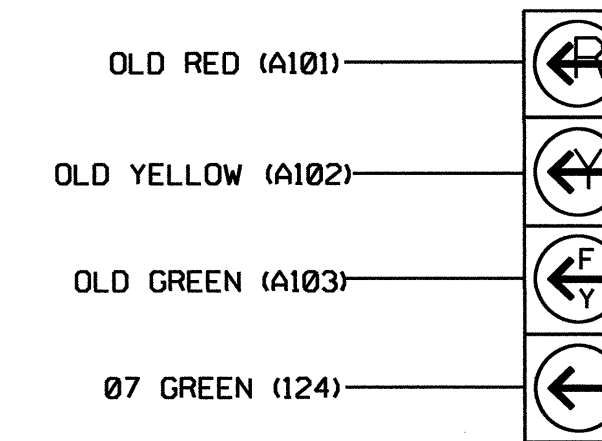
SIGNAL HEAD HOOK-UP CHART

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	71*	72,73	NU	NU	NU	NU	NU	71*	NU	
RED		128										122							
YELLOW		129																	
GREEN		130																	
RED ARROW																		A101	
YELLOW ARROW											123								A102
FLASHING YELLOW ARROW																			A103
GREEN ARROW										124	124								

NU = Not Used
 * See pictorial of head wiring in detail below.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)



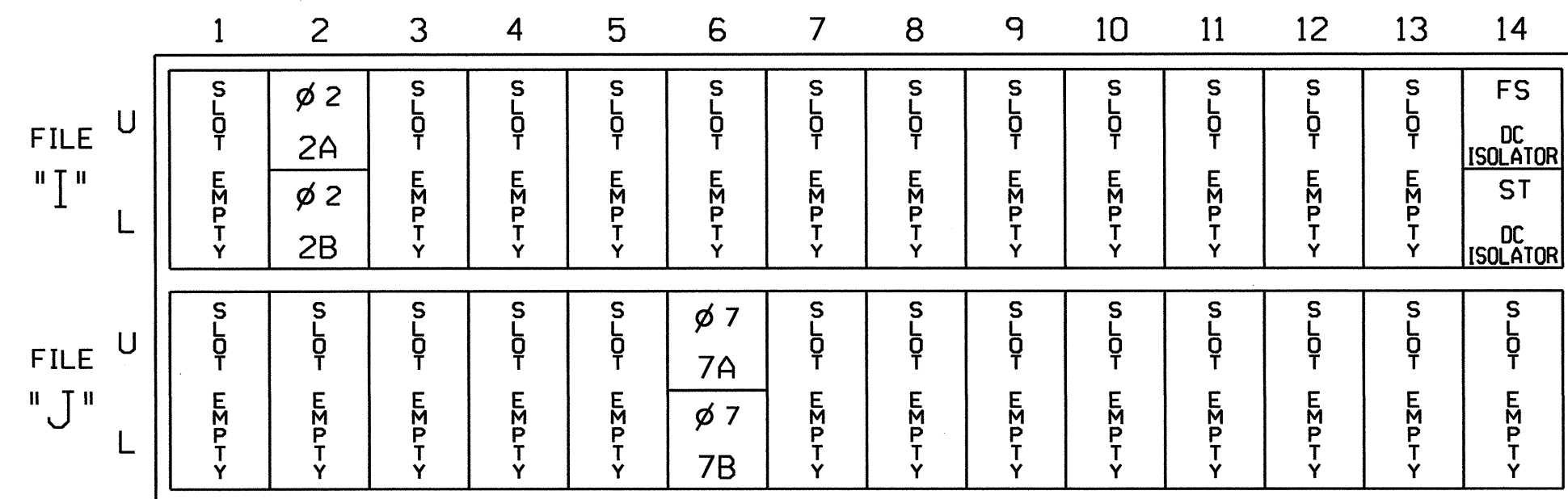
71

NOTE

1. The sequence display for this signal requires special logic programming. See sheet 2 of 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)



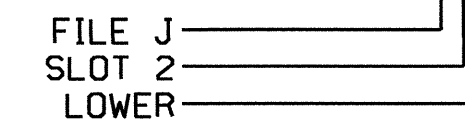
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

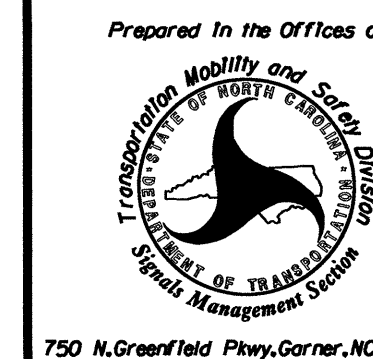
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
7A	TB5-9,10	J6U	42	4	8	7	Y	Y			15
7B	TB5-11,12	J6L	46	8	18	7	Y	Y			15

INPUT FILE POSITION LEGEND: J2L



Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



Prepared in the Offices of:

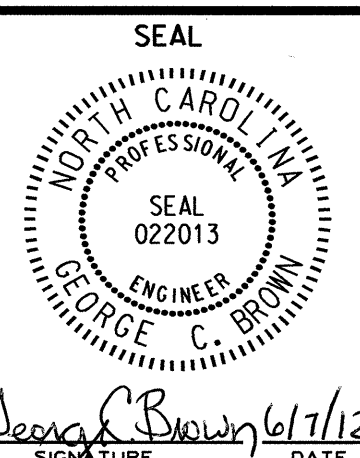
NC 24 (Bypass) EB at Old NC 24

Division 6 Cumberland County E of Stedman

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

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

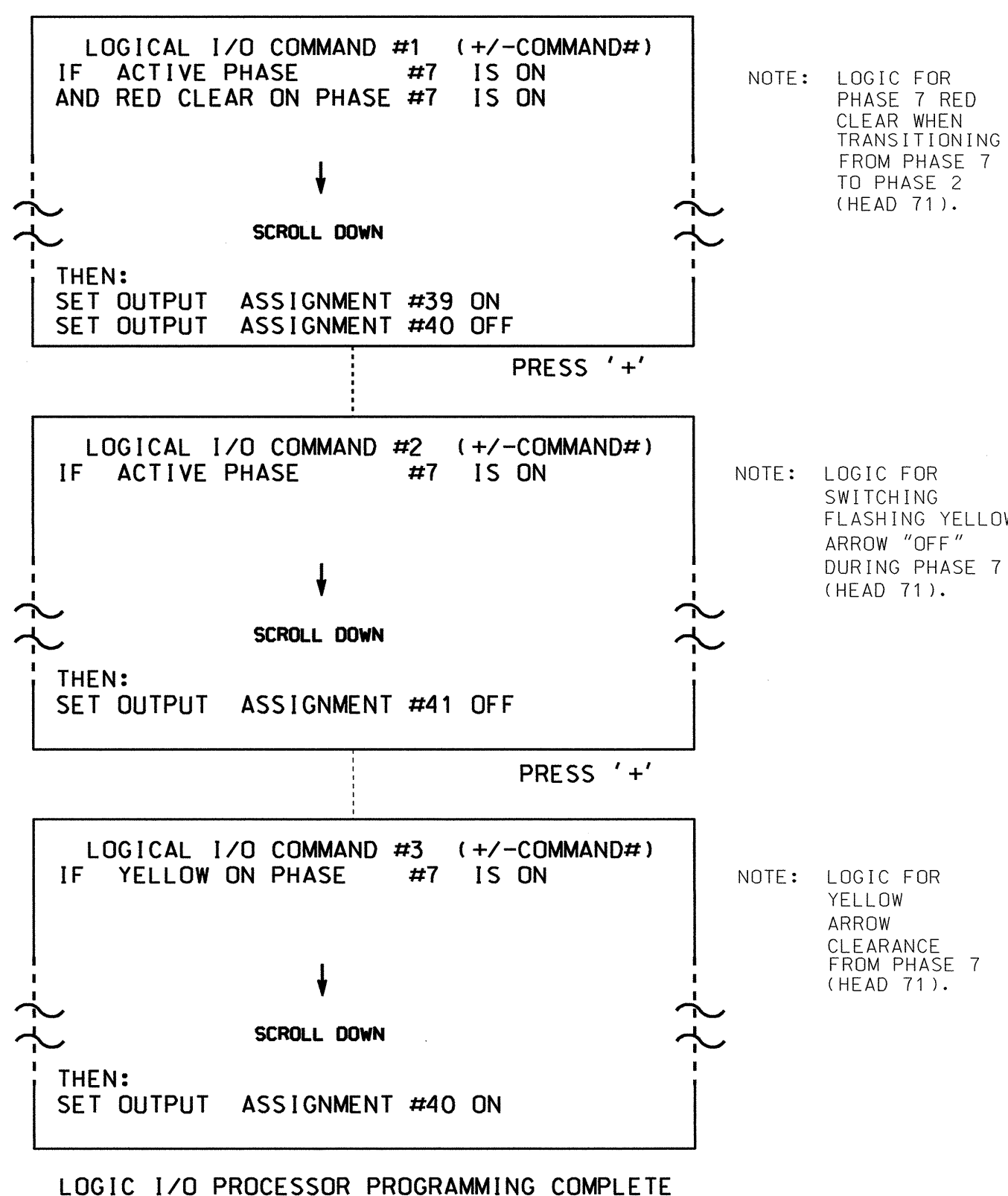


SIG. INVENTORY NO. 06-1323

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

(program controller as shown below)

1. 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.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



OUTPUT REFERENCE SCHEDULE	
USE TO INTERPRET LOGIC PROCESSOR	
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
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
    
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE


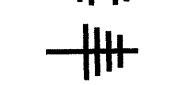



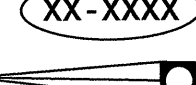









THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 06-1323
DESIGNED: April 2012
SEALED: 06/04/12
REVISED: N/A

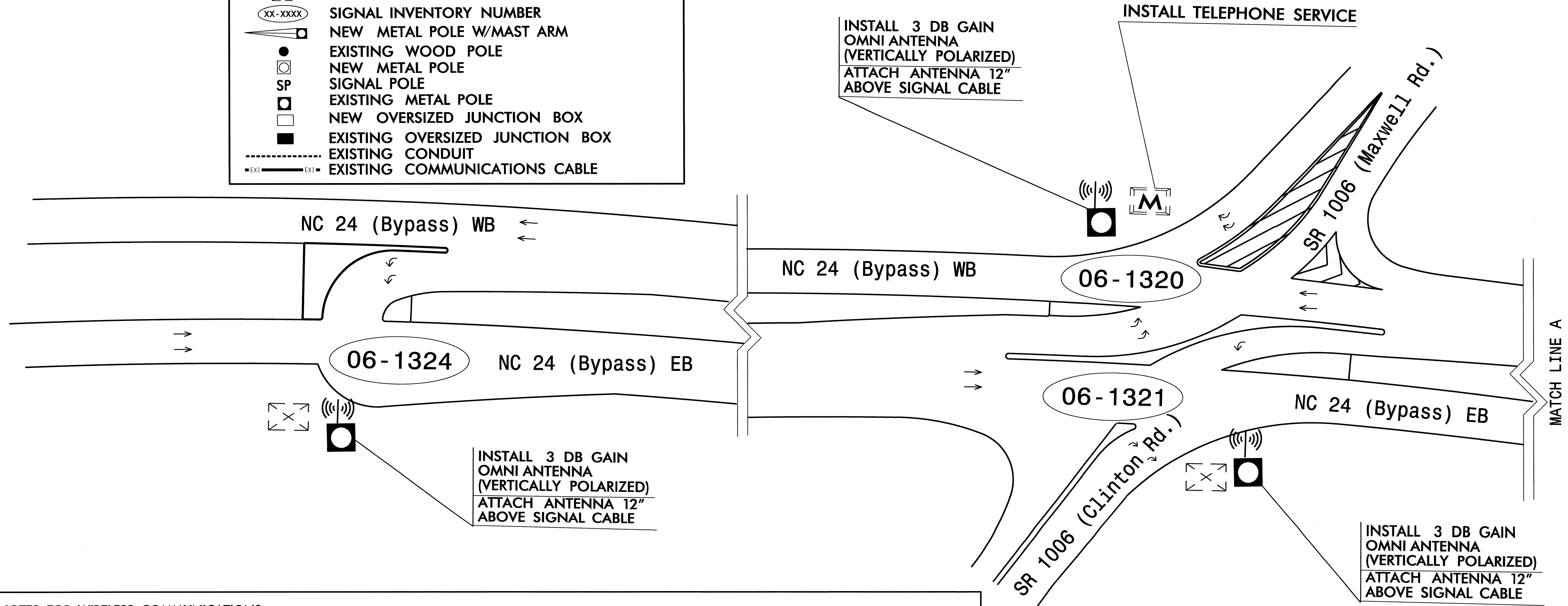
Electrical Detail - Sheet 2 of 2

	NC 24 (Bypass) EB at Old NC 24		
	Division 6 PLAN DATE: May 2012 PREPARED BY: C. Strickland	Cumberland County REVIEWED BY: <i>T. J. M.</i> REVIEWED BY:	E of Stedman DATE:
REVISIONS		INIT.	DATE
SIG. INVENTORY NO. 06-1323			

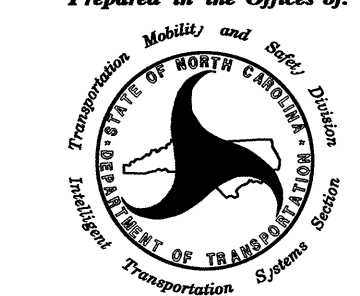


04-JUL-2012 15:56
 C:\TSS\ASSETS\Sigs\101\work\p06s51g\Main51r1\ok\lnd#061323.sm.e.le.xxx.dgn
 ceshr\ok\lnd

LEGEND

-  YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
-  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
-  SIGNAL POLE
-  EXISTING METAL POLE
-  NEW OVERSIZED JUNCTION BOX
-  EXISTING OVERSIZED JUNCTION BOX
-  EXISTING CONDUIT
-  EXISTING COMMUNICATIONS CABLE

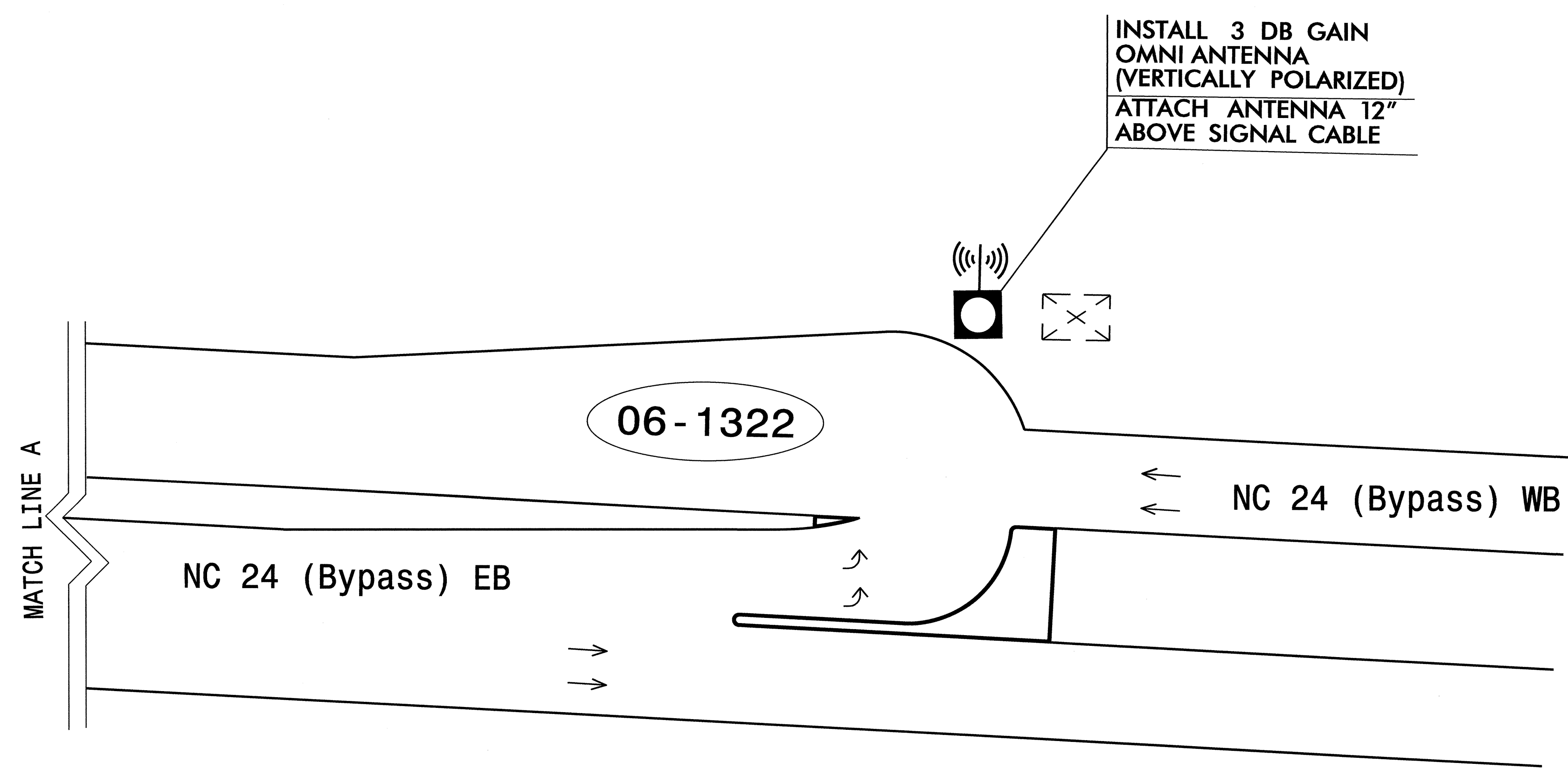


- NOTES FOR WIRELESS COMMUNICATIONS:**
1. INSTALL COAXIAL CABLE:
 - A. ON WOOD POLES, REQUIRING A NEW RIGID GALVANIZED STEEL RISER, INSTALL A 2" RISER WITH WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - B. ON METAL POLES WITH MAST ARMS, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST 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."

<p><small>Prepared in the Offices of:</small></p>  <p><small>250 N. Greenfield Pkwy., Garner, NC 27529</small></p>	<p>WIRELESS COMMUNICATIONS PLAN SUPER STREET NC 24 BYPASS</p> <p>DIVISION 06 CUMBERLAND CO. E. of FAYETTEVILLE</p> <p>PLAN DATE: JUNE 2012 REVIEWED BY: I. N. AVERY</p> <p>PREPARED BY: P. C. LOUDER REVIEWED BY: G. A. FULLER, PE</p>	<p>SEAL</p>  <p>SEAL 023919</p> <p>ENGINEER</p> <p>GREGORY A. FULLER</p>									
 <p>SCALE</p> <p>0</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	REVISIONS	INIT.	DATE							<p><i>Gregory A. Fuller</i> 6-18-12</p> <p>SIGNATURE DATE</p> <p>CADD File name:</p>
REVISIONS	INIT.	DATE									

LEGEND

	YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
	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
	SIGNAL POLE
	EXISTING METAL POLE
	NEW OVERSIZED JUNCTION BOX
	EXISTING OVERSIZED JUNCTION BOX
	EXISTING CONDUIT
	EXISTING COMMUNICATIONS CABLE



NOTES FOR WIRELESS COMMUNICATIONS:

- INSTALL COAXIAL CABLE:
 - ON WOOD POLES, REQUIRING A NEW RIGID GALVANIZED STEEL RISER, INSTALL A 2" RISER WITH WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - 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.
 - 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 RISER, METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
- IF AN EXISTING 2" 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."

	WIRELESS COMMUNICATIONS PLAN SUPER STREET NC 24 BYPASS		SEAL
	DIVISION 06 CUMBERLAND CO., E. of FAYETTEVILLE		
PLAN DATE: JUNE 2012	REVIEWED BY: I. N. AVERY		PREPARED BY: P. C. LOUDER REVIEWED BY: G.A. FULLER, PE
SCALE: 0	REVISIONS	INIT. DATE	
CADD File name:			DATE: 6/18/12

DECAL

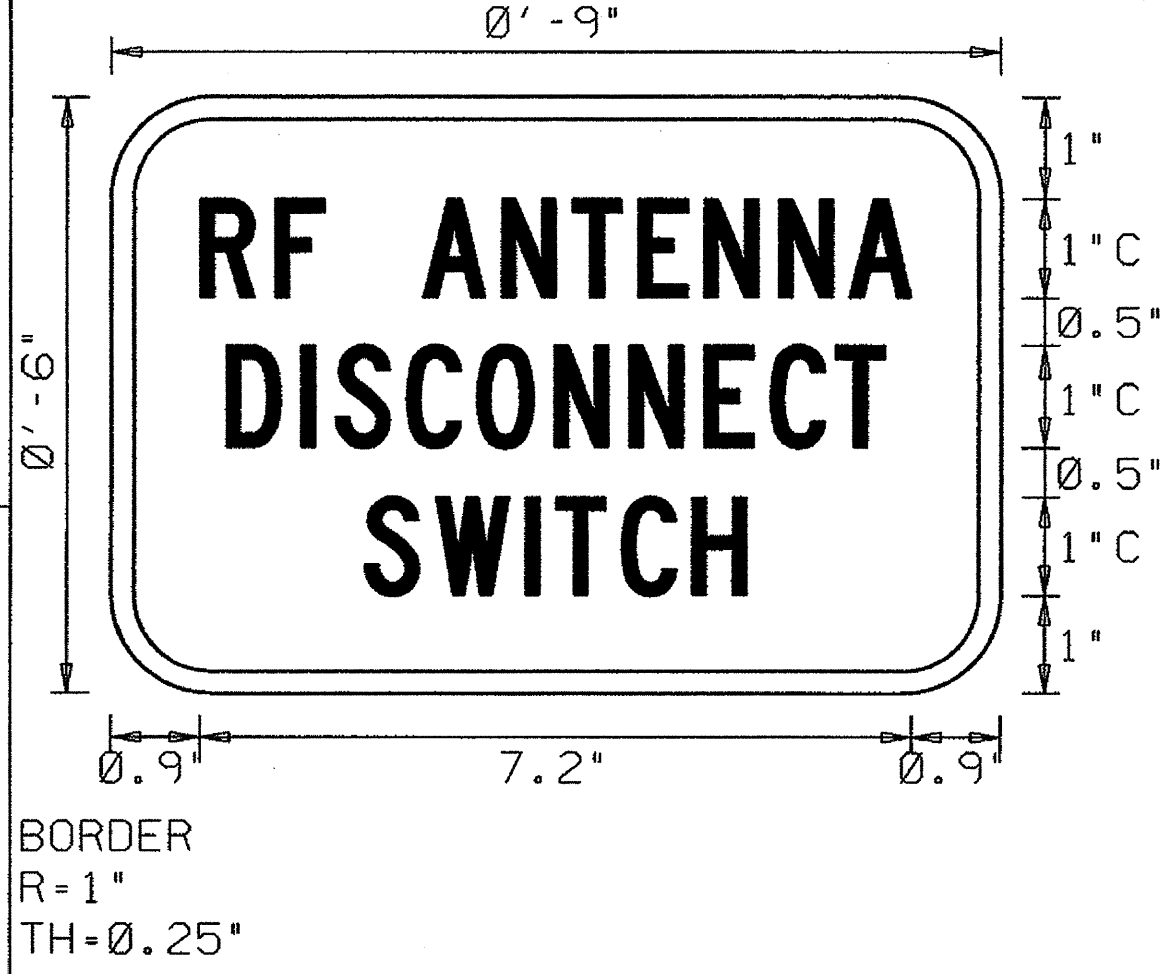
POLE MOUNTED SIGN

PROJECT REFERENCE NO. SHEET NO.
SIG. 18

SIGN NUMBER: SP05224
TYPE: DECAL
QUANTITY:
SIGN WIDTH: 0'-9"
HEIGHT: 0'-6"
TOTAL AREA: 0.4 Sq.Ft.
BORDER TYPE: FLUSH
RECESS: 0"
WIDTH: 0.25"
RADIUS: 1"
NO. Z BARS:
LENGTH:

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:

LETTER POSITIONS

Letter spacings are to start of next letter

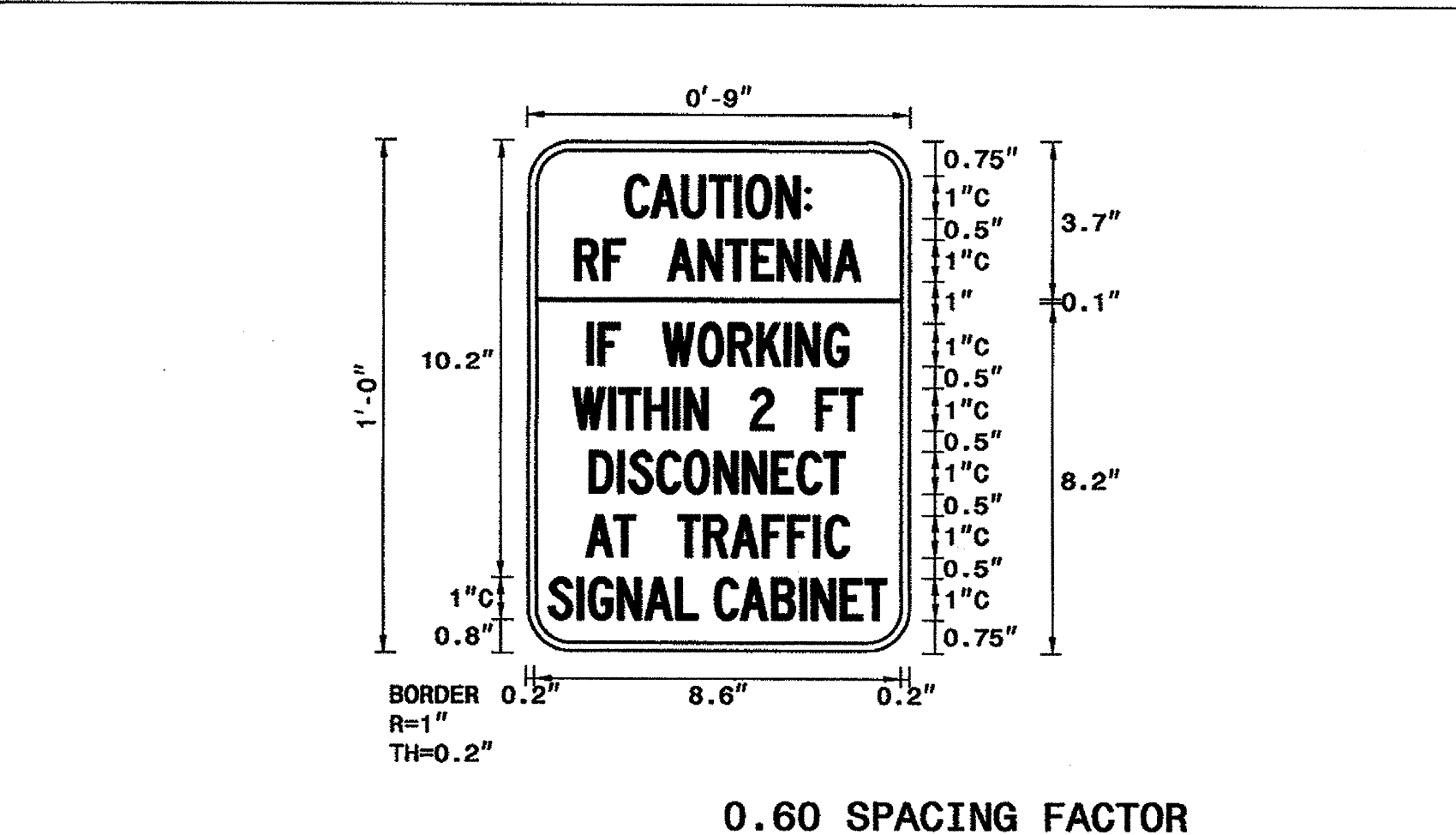
Letter	R	F	A	N	T	E	N	N	A	Series/Size Text Length			
RF ANTENNA	0.9	0.8	0.5	1	0.8	0.7	0.7	0.7	0.8	0.7	0.6	0.9	C1
DISCONNECT	1.2	0.8	0.3	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.5	1.2	C1
SWITCH	2.6	0.7	0.9	0.3	0.7	0.7	0.5	2.6					C1
													3.9

Spacing Factor is 1 unless specified otherwise

SIGN NUMBER: SP05223
TYPE: D
QUANTITY:
SIGN WIDTH: 0'-9"
HEIGHT: 1'-0"
TOTAL AREA: 0.8 Sq.Ft.
BORDER TYPE: FLUSH
RECESS: 0"
WIDTH: 0.2"
RADIUS: 1"
NO. Z BARS:
LENGTH:

SYMBOL	X	Y	WID	HT
BAR	0.2	8.2	8.6	1.0

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:

LETTER POSITIONS

Letter spacings are to start of next letter

Letter	C	A	U	T	I	O	:	Series/Size Text Length									
CAUTION:	2.3	0.6	0.7	0.6	0.6	0.3	0.7	0.7	0.1	2.3	C						
RF ANTENNA	1.2	0.7	0.5	1	0.7	0.6	0.6	0.7	0.6	0.6	1.2	C					
IF WORKING	1.4	0.3	0.5	1	0.8	0.7	0.7	0.6	0.3	0.7	0.5	1.4	C				
WITHIN 2 FT	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			
DISCONNECT	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				
AT TRAFFIC	1.4	0.7	0.5	1	0.6	0.6	0.7	0.6	0.6	0.3	0.5	1.4	C				
SIGNAL CABINET	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

Spacing Factor is 1 unless specified otherwise

Prepared in the Offices of:

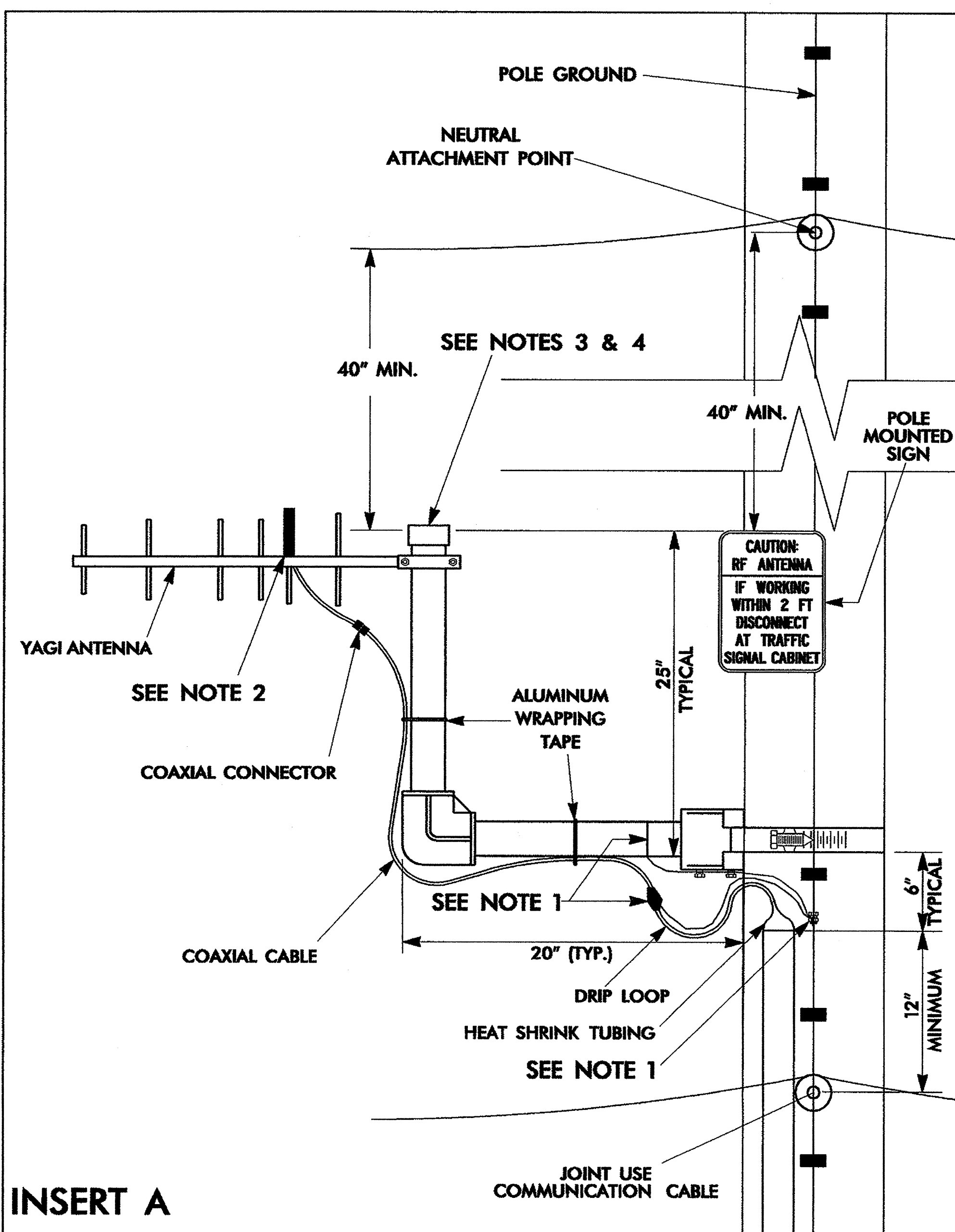
WIRELESS RADIO ANTENNA TYPICAL DETAILS

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

REVISIONS: _____ INIT. DATE: _____

Signature: *Gregory A. Fuller* 9/2/05
DATE: 9/2/05

CADD Filename: _____

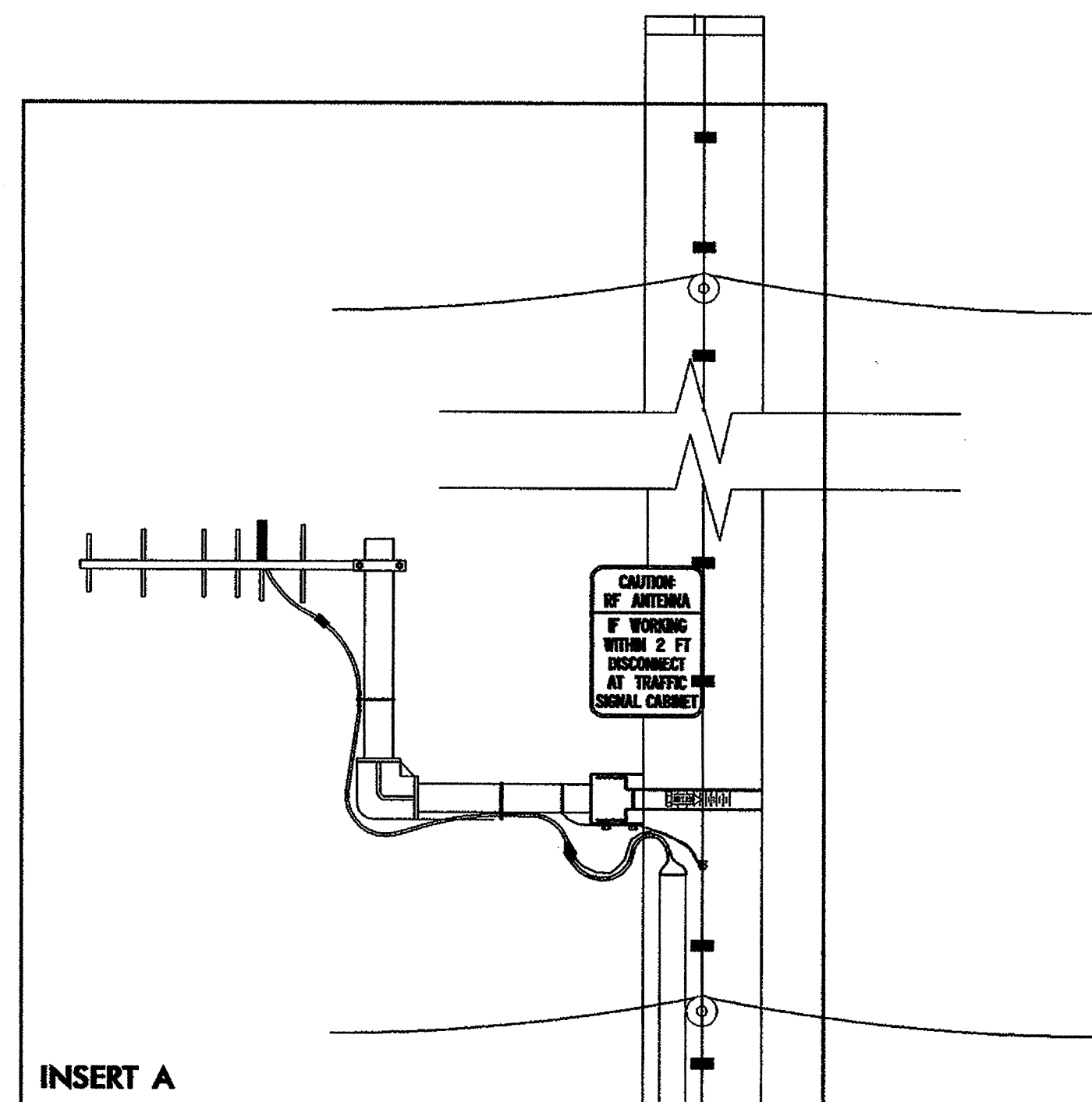


INSERT A

NOTES

- 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.
- YAGI ANTENNA SHOWN IN VERTICAL POLARIZATION POSITION FOR CLARIFICATION. TYPICALLY INSTALL ANTENNA IN HORIZONTAL POLARIZATION POSITION.
- 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)
 - ROTATE THE VERTICAL SUPPORT ARM 90 DEGREES SUCH THAT THE ANTENNA IS AT THE SAME HEIGHT AS THE HORIZONTAL SUPPORT ARM.
 - ELIMINATE THE VERTICAL SUPPORT ARM AND MOUNT THE ANTENNA TO THE HORIZONTAL SUPPORT ARM.
 - ANTENNA, ANTENNA SUPPORT ARM, AND SIGN TO MAINTAIN A 40" SEPARATION FROM NEUTRAL /POWER AND 12" FROM OTHER UTILITIES.
- INSTALL AN END CAP TO SEAL THE EXPOSED END OF THE MOUNTING PIPE.



1-2" RISER FOR COAXIAL CABLE

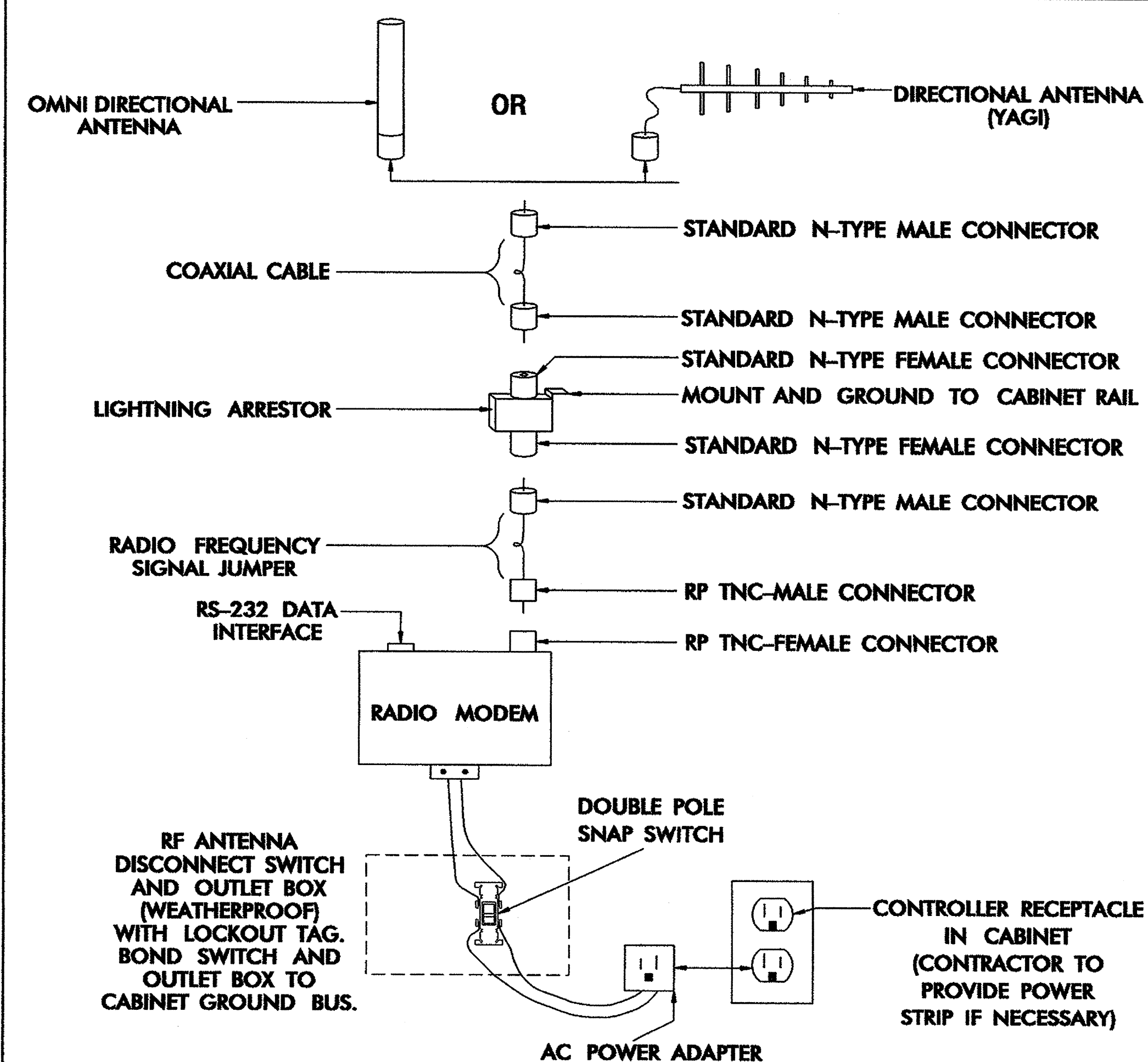
POLE MOUNT EQUIPMENT CABINET

BOND # 6 AWG BARE COPPER WIRE "POLE GROUND" TO RISER USING A LISTED PIPE CLAMP

RF ANTENNA DISCONNECT SWITCH AND OUTLET BOX (WEATHERPROOF) WITH LOCKOUT TAG

BASE MOUNT EQUIPMENT CABINET

ANTENNA AND COAXIAL CABLE CONNECTION SCHEMATIC

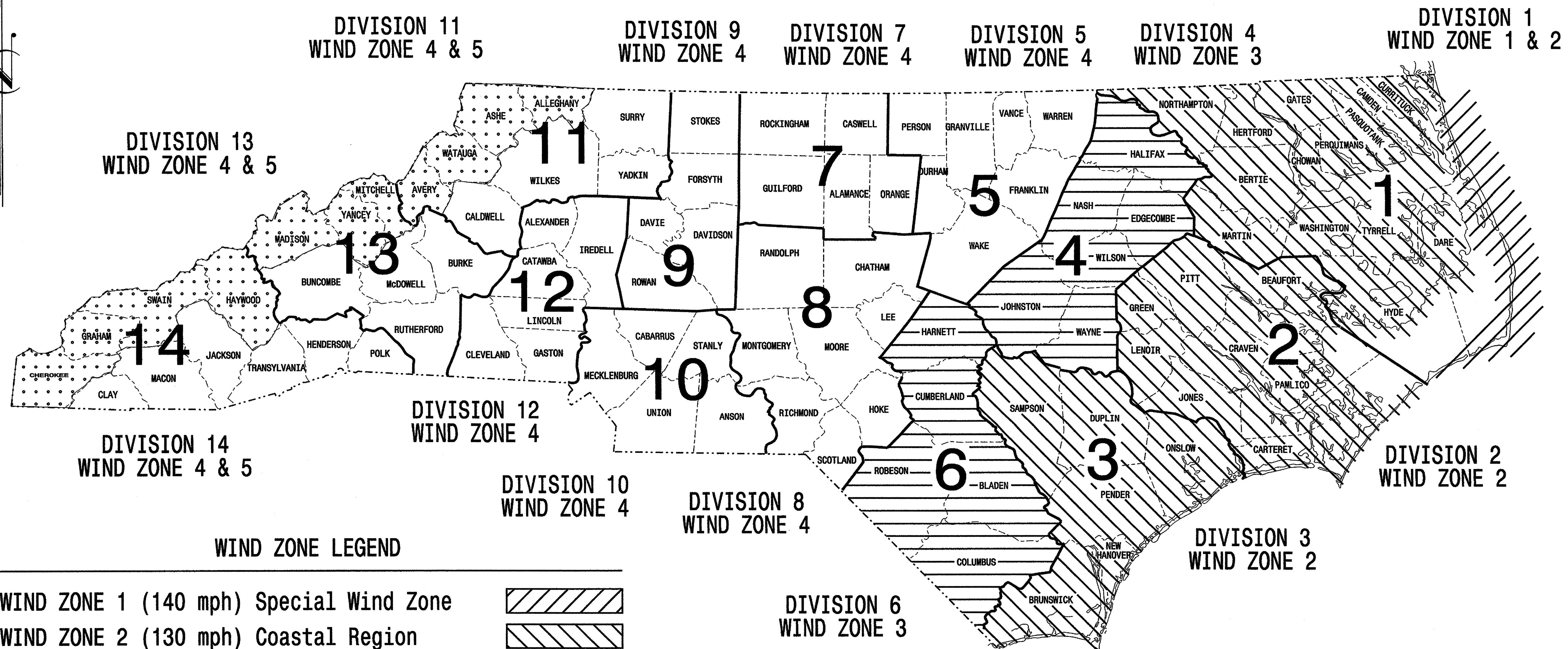


	WIRELESS RADIO ANTENNA TYPICAL DETAILS		SEAL GREGORY A. FULLER ENGINEER STATE OF NORTH CAROLINA LICENSE NO. 023919
	PLAN DATE: JULY 2005 PREPARED BY: A. CREECH SCALE: 0	REVIEWED BY: I. N. AVERY REVIEWED BY: A. T. FAULKNER DATE: 9/12/05	

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	R-2303A	Sig.20
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

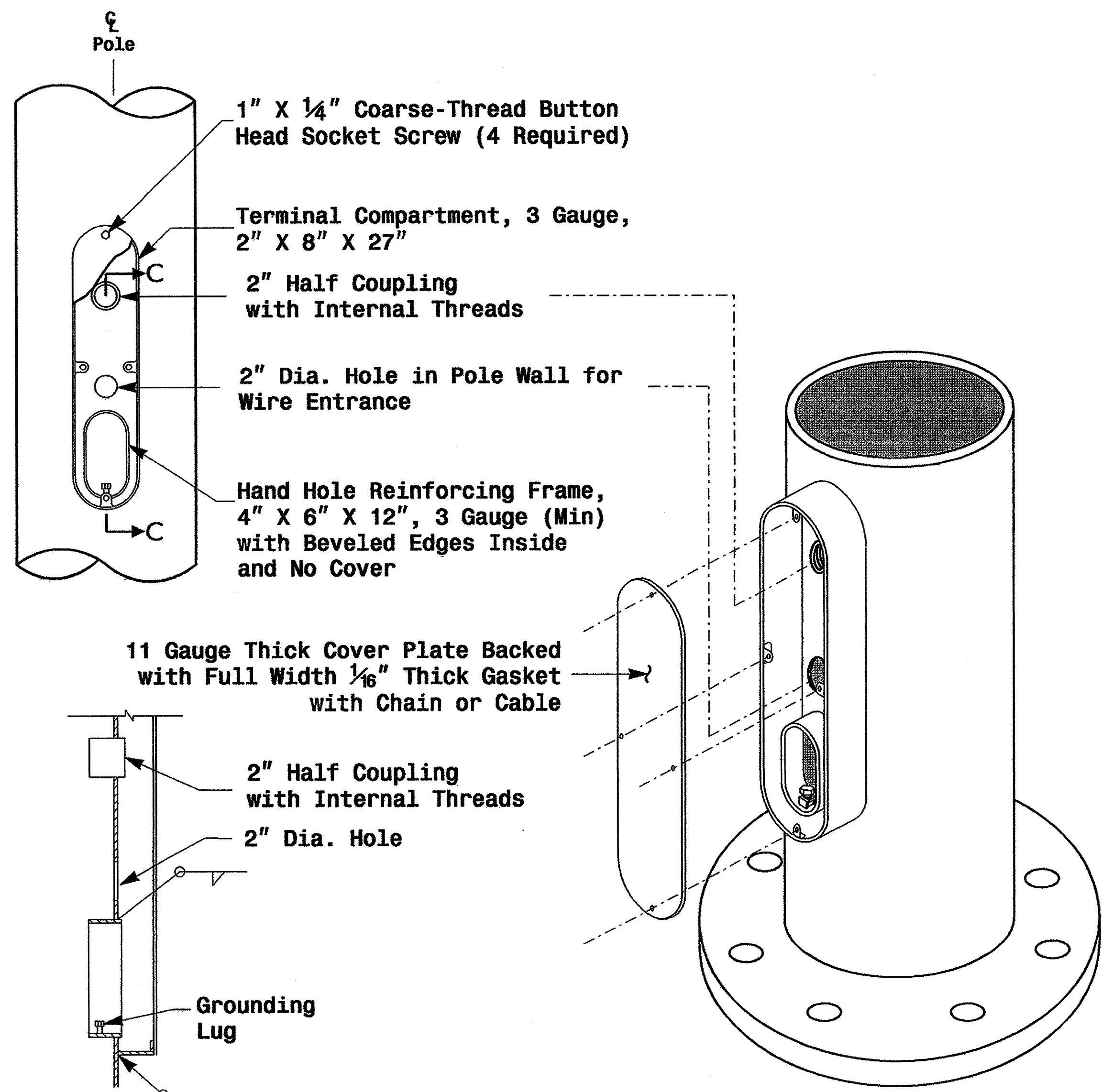
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

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

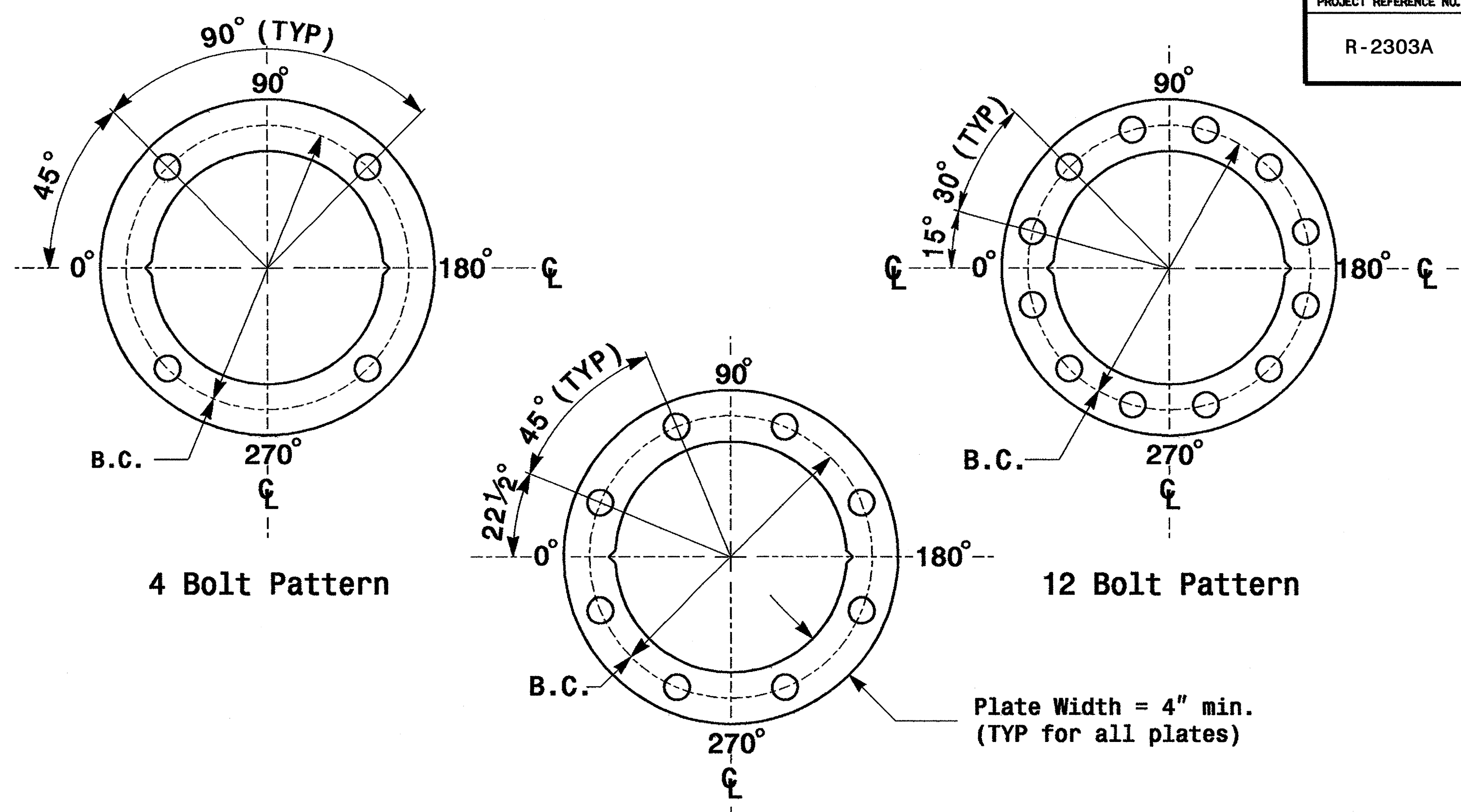
SEAL

D. Sarkar 7.26.2009
 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



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

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

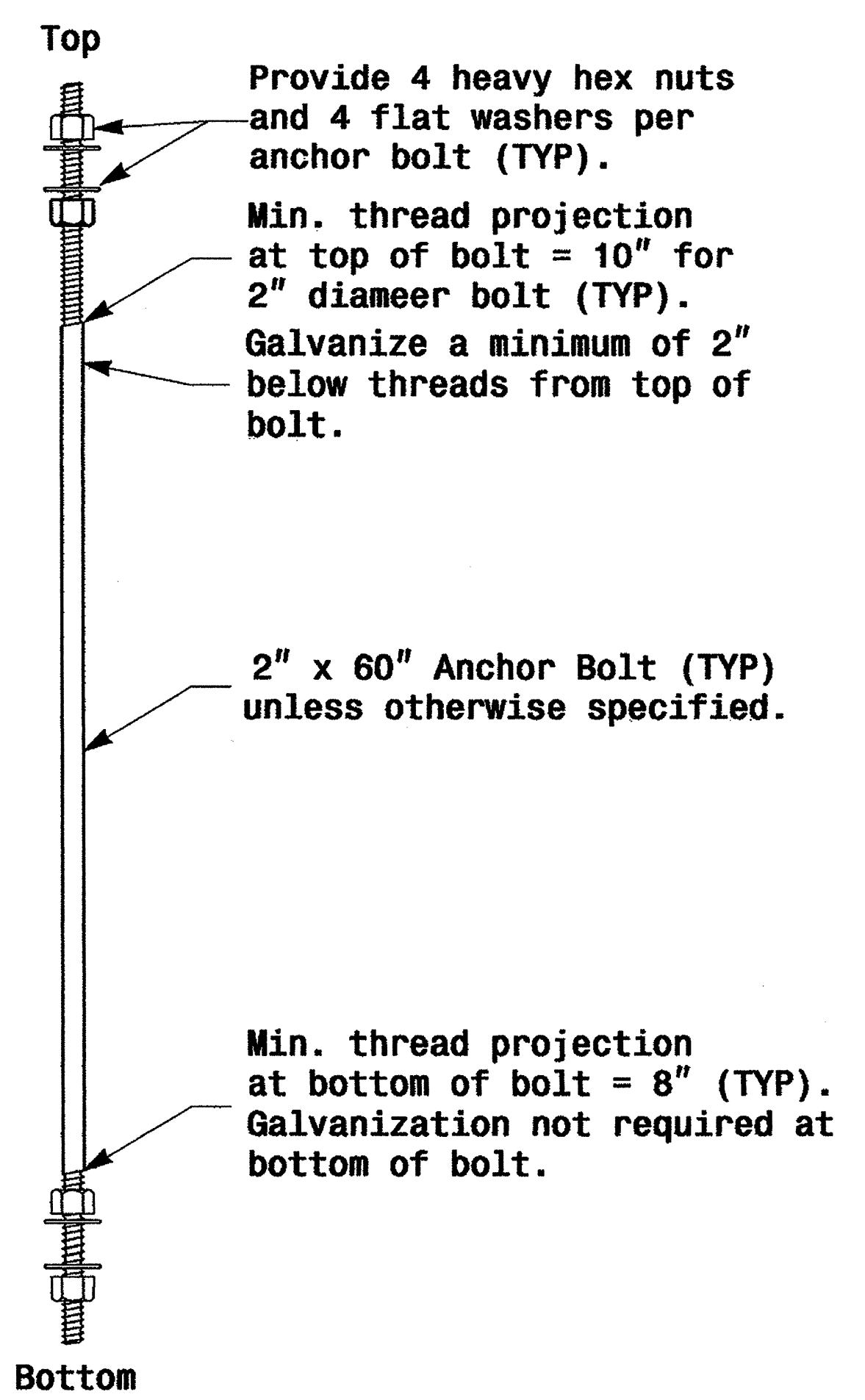
Shaft I.D. Tag
(Provide on Strain Poles and Mast Arm Poles)

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

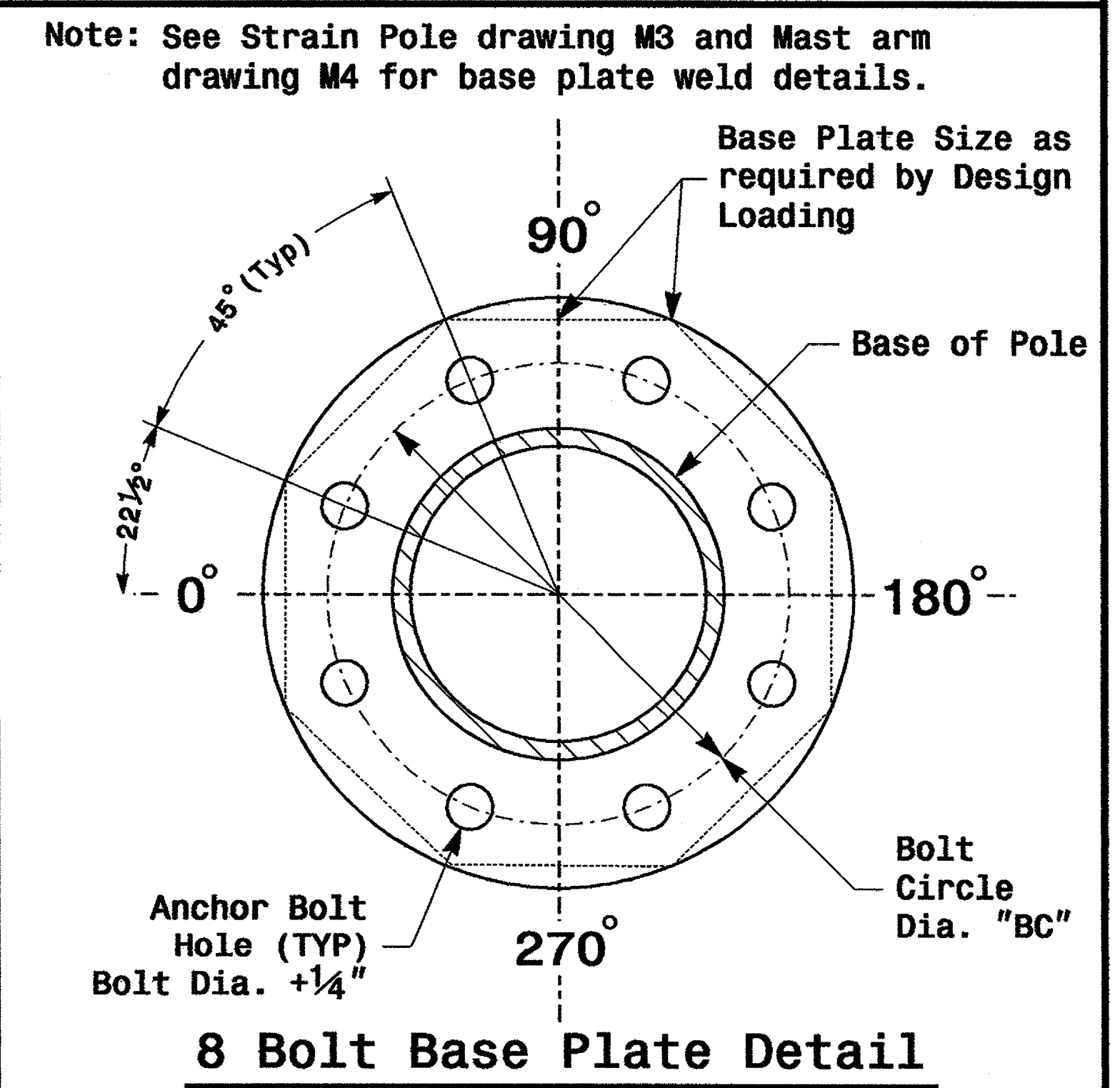
Arm I.D. Tag
(Provide on each section of a multi-section mast arm)

- 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



Anchor Bolt Detail

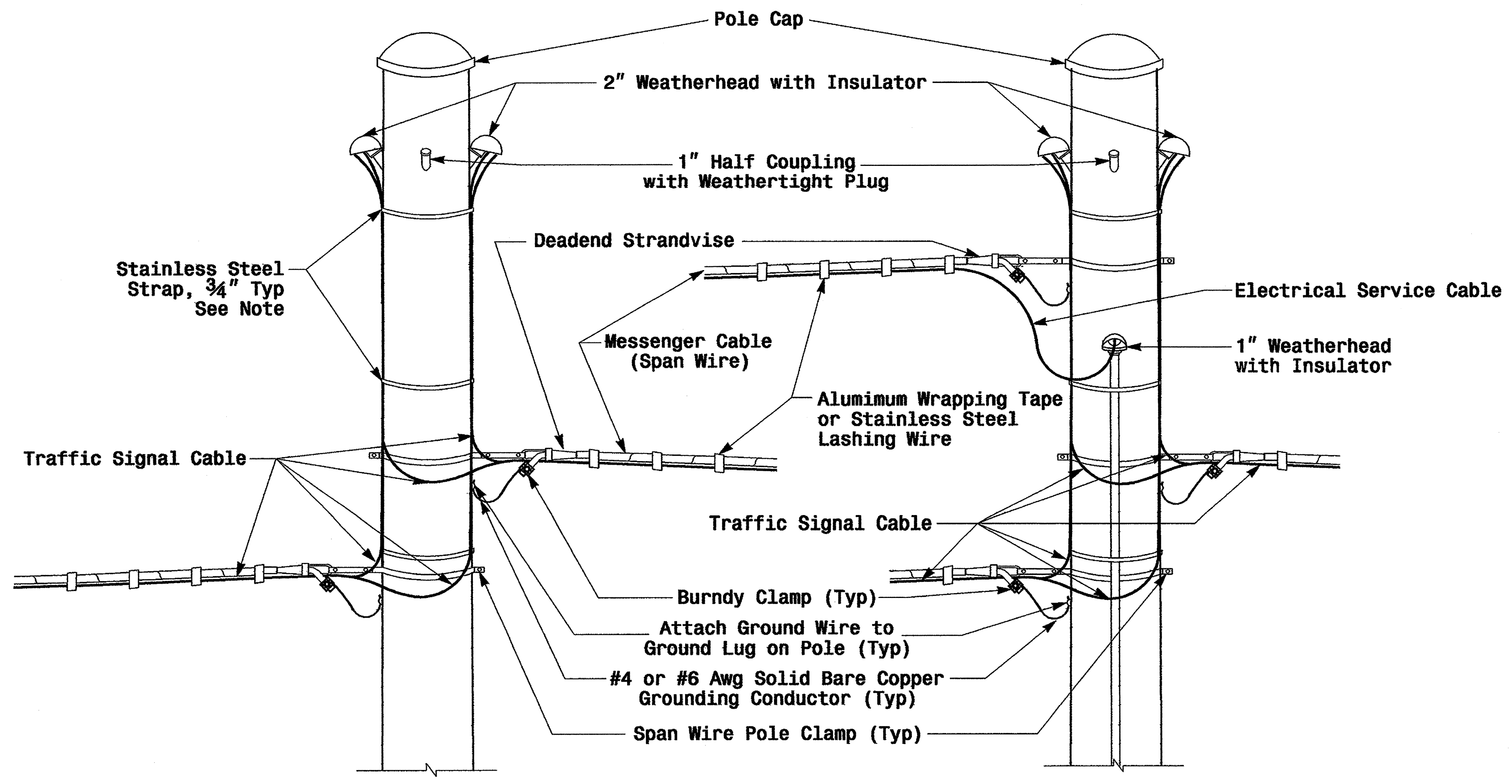


8 Bolt Base Plate Detail

	Typical Fabrication Details Common To All Metal Poles	
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito
SCALE: 0 NA NONE	REVISIONS: _____ INTI: _____ DATE: _____	SIGNATURE: <i>D. Sankar</i> 9.2.2005 DATE: _____ SIG. INVENTORY NO. _____

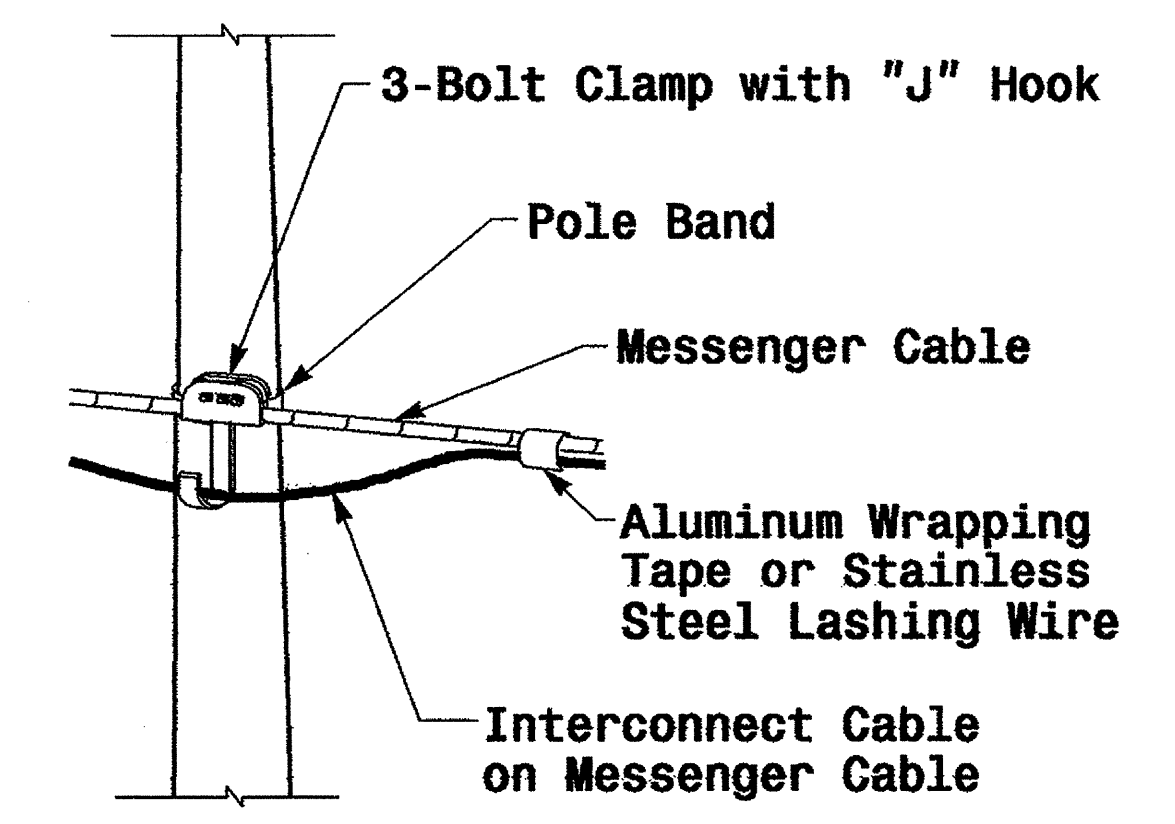
Fabrication Details - All Poles

01-SEP-2005 18:22 D:\2004 Metal Pole Standard.dwg me thru me.dgn

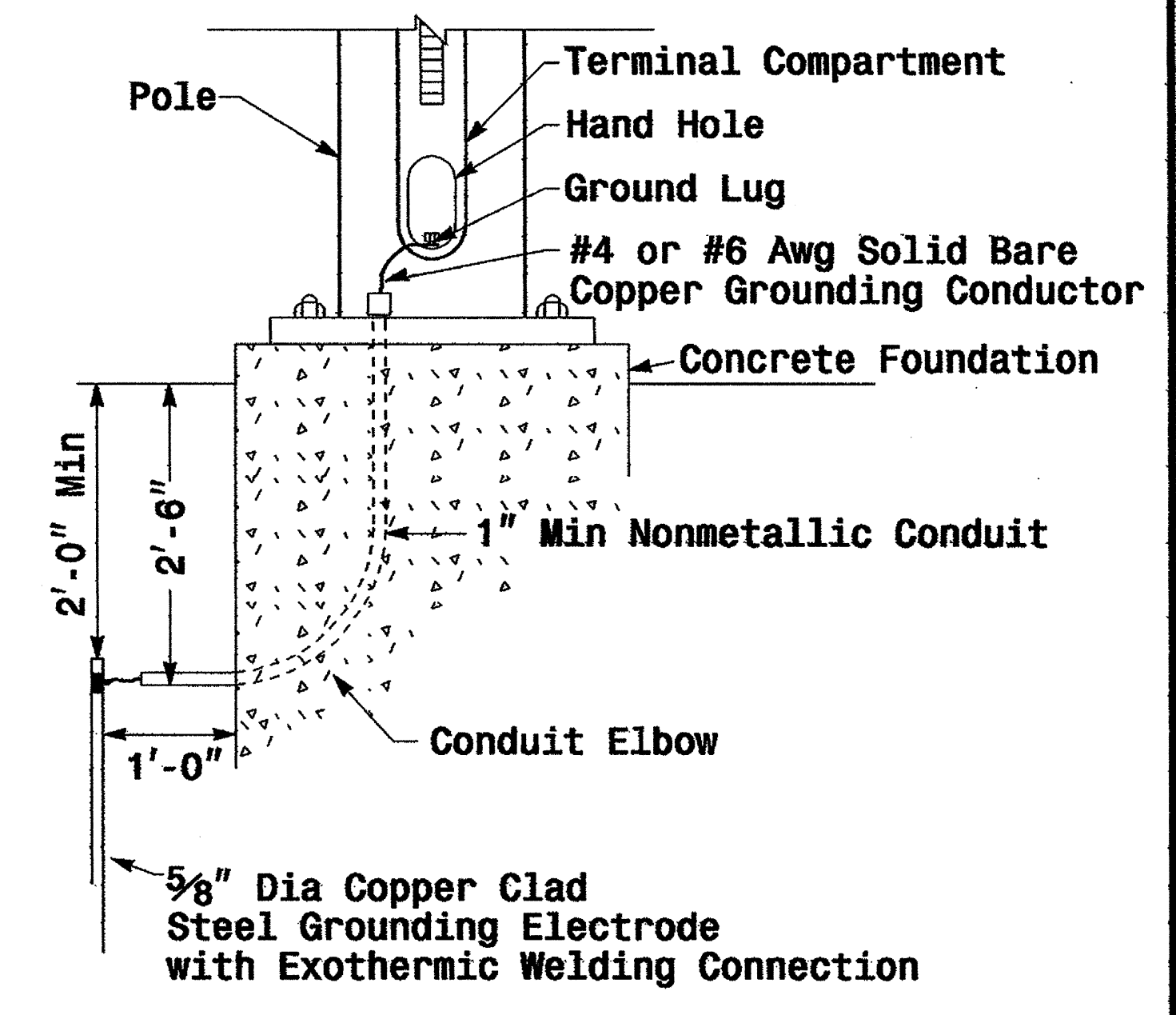


Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole



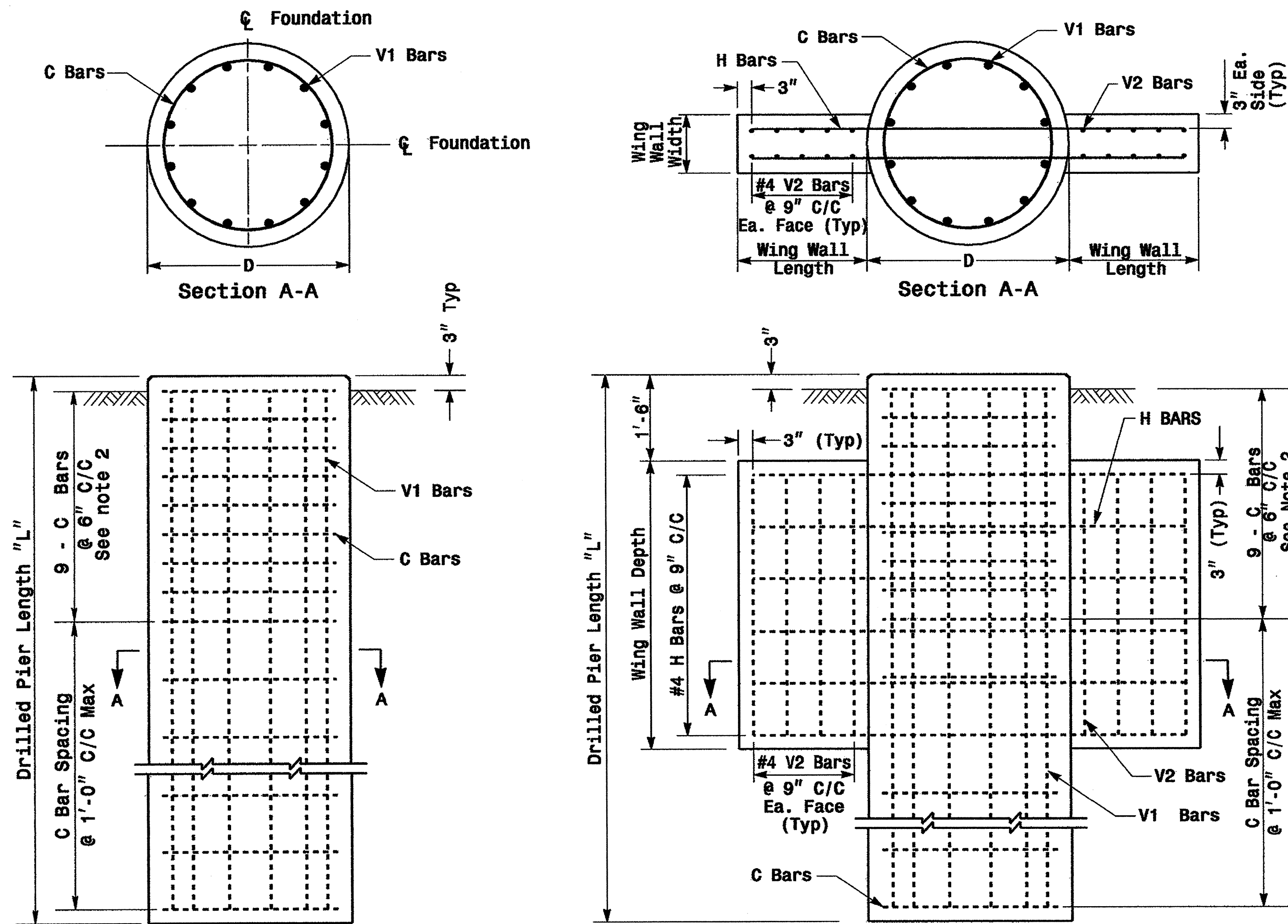
Metal Pole Grounding Detail

Construction Details - Strain Poles

01-SEP-2005 16:33 P:\95051\95051\work\95051\metal pole standard.dwg

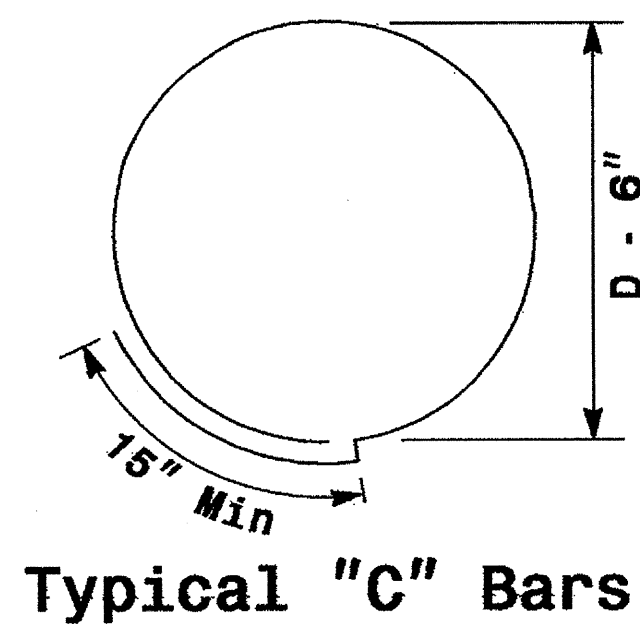
	Construction Details Strain Poles		
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: D.C. SARKAR	
SCALE: 0 NA NONE		SIGNATURE: <i>P.L. Alexander</i> 9-1-05 DATE SIG. INVENTORY NO.	

Reinforcing Steel Bars



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

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



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"	

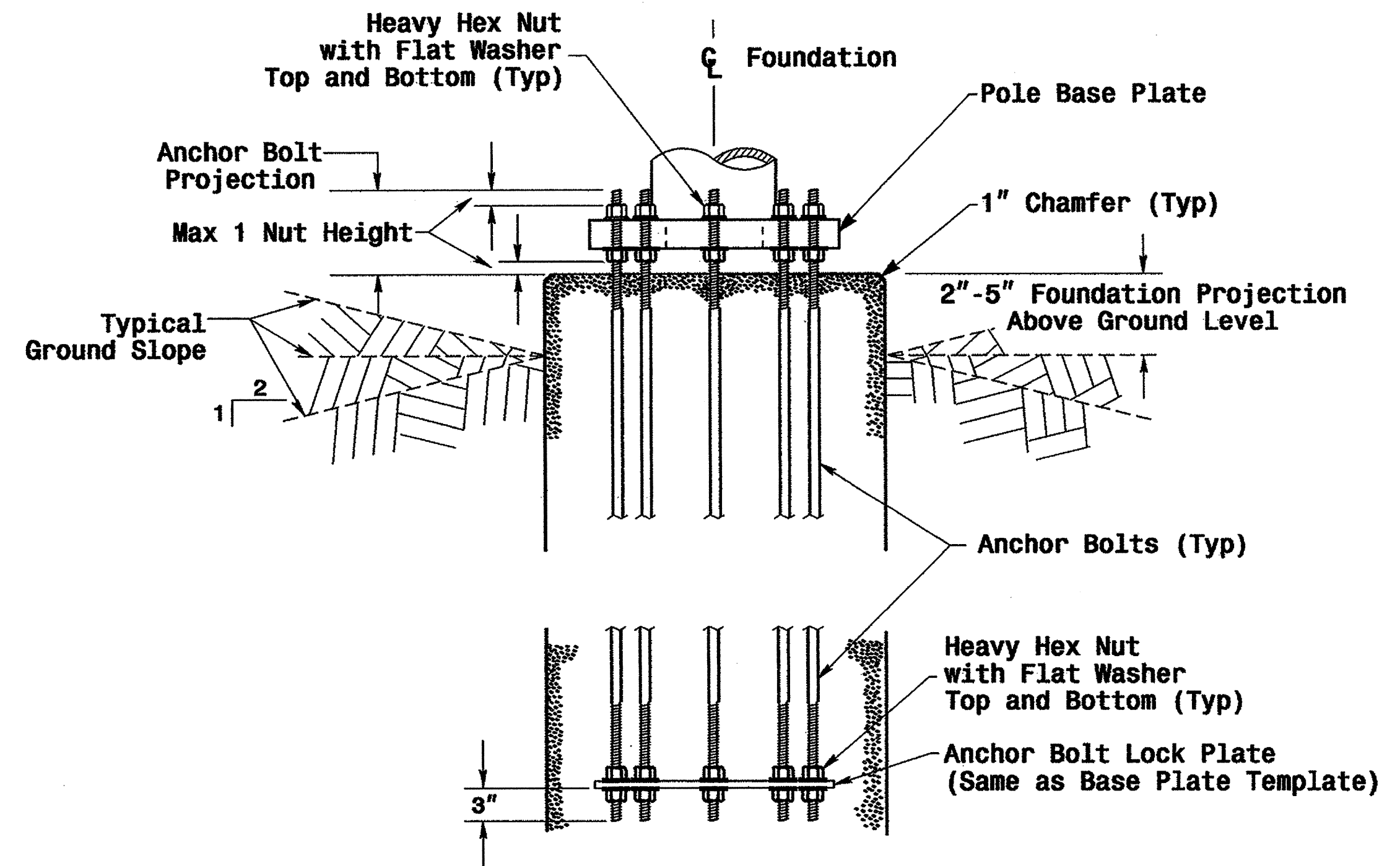
* See Note No. 1
** See Note No. 3

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

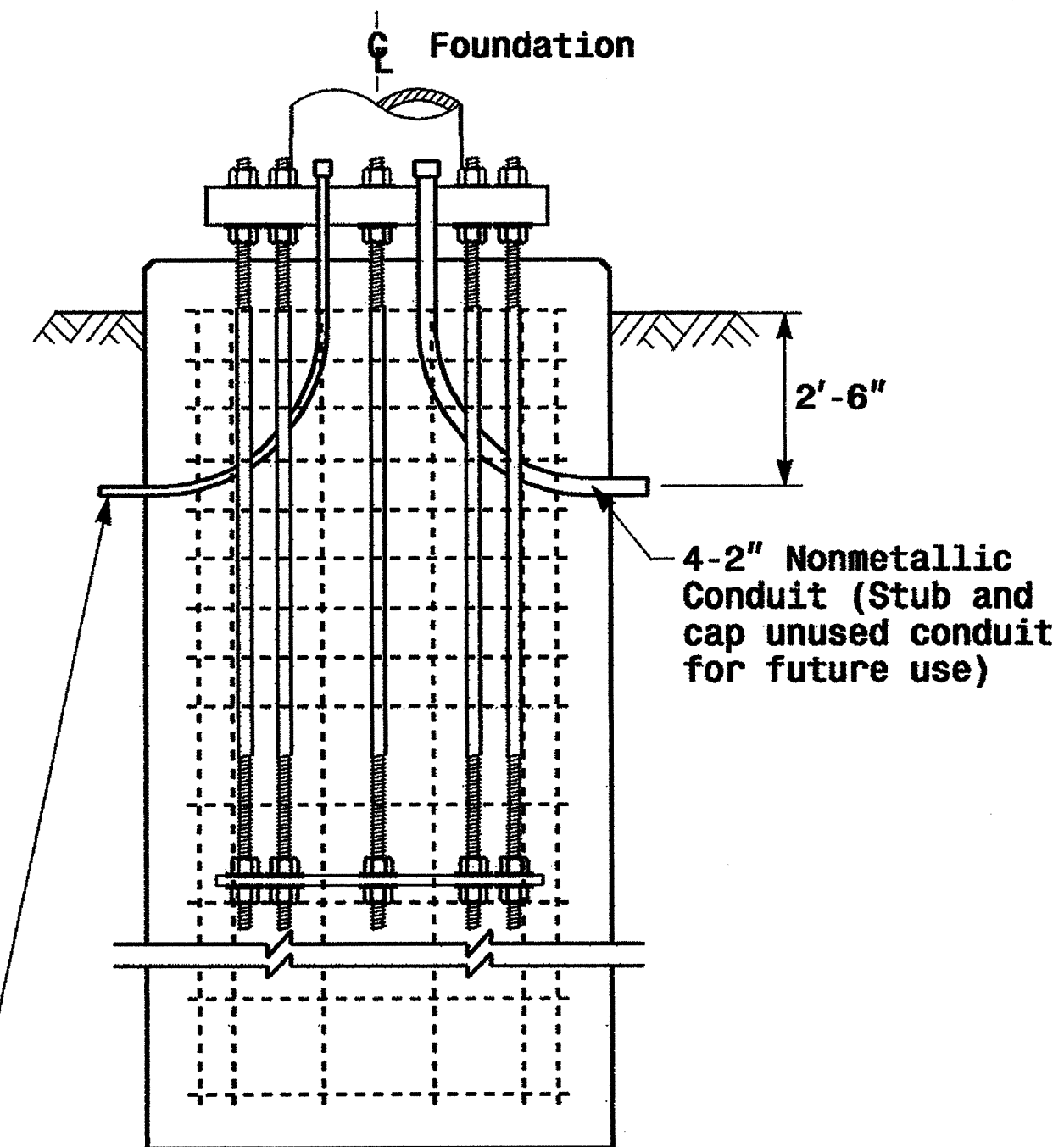
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



Notes

- The number of C-bars is based on foundation depth. For standard foundations, see sheet M 8.
- Circular tie reinforcing rings may be vertically adjusted by +/- 3" at a depth between 2'-0" and 3'-0" to facilitate the installation of electrical conduit entering in the cage.
- The length of V1-bars is based on foundation depth. For standard foundations, see sheet M 8.
- The quantities for steel and concrete shown in the Wing Wall Details Chart reflect the amount of material for 1 pair of wing walls (2 wing walls per drilled pier shaft.)

Construction Details - Foundations

01-SEP-2005 11:48 w:\p001\ees-un1\workgroups\2004 metal pole standard\2004.mt.dgn

	Construction Details Foundations		SEAL
	PREPARED BY: C.F. ANDREWS REVISIONS:	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: A.W. ESPOSITO	SCALE: 0 NA NONE DATE:
PREPARED IN THE OFFICE OF: 222 N. McDowell St., Raleigh, NC 27603			SIGNATURE: D. Sankar DATE: 9.2.2005 SIG. INVENTORY NO.

		STANDARD STRAIN POLES				STANDARD FOUNDATIONS 42" Diameter Drilled Pier Length (L) - Feet						
		Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Moment at the Pole Base (ft-kp)	Clay				Sand		
						Medium N-Value 4-8	Stiff N-Value 9-15	Very Stiff N-Value 16-30	Hard N-Value >30	Loose N-Value 4-10	Medium N-Value 11-30	Dense N-Value >30
WIND ZONE 1	LIGHT	S26L3	26	25	280	20.5	14.0	11.5	9.5	18.0	16.0	14.0
		S30L3	30	25	310	21.0	14.5	11.5	9.5	18.5	16.5	14.5
		S35L3	35	25	350	22.5	15.0	12.0	10.0	19.5	17.5	15.5
	HEAVY	S30H3	30	29	450	25.5	16.5	13.0	11.0	21.0	18.5	16.5
		S35H3	35	29	540	26.0	17.0	13.5	11.5	22.0	19.5	17.0
	WIND ZONE 2	LIGHT	S26L2	26	23	250	19.5	13.5	11.0	9.0	18.0	15.5
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:


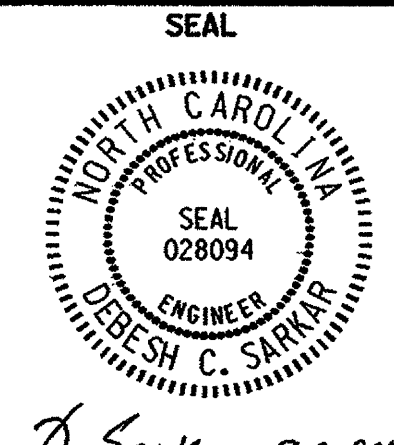
1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.
2. Base plate thickness (T) is 2.0 inches.

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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P.L.Alexander

 Prepared in the Office of: 222 N. McDowell St., Raleigh, NC 27603	Standard Strain Poles and Standard Foundations		SEAL  DEBESH C. SARKAR
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander SCALE: 0 NA None	REVIEWED BY: C.F. Andrews REVIEWED BY: A.W. Esposito	
		D. Sarkar 9.2.2005 SIGNATURE DATE	