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STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

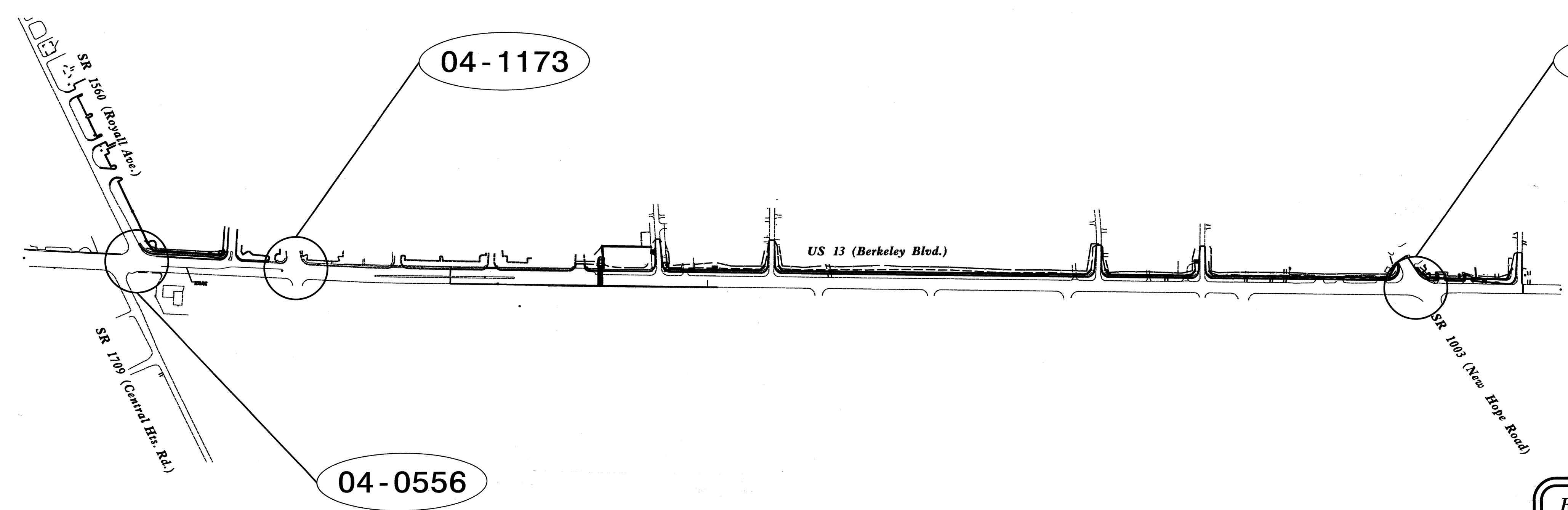
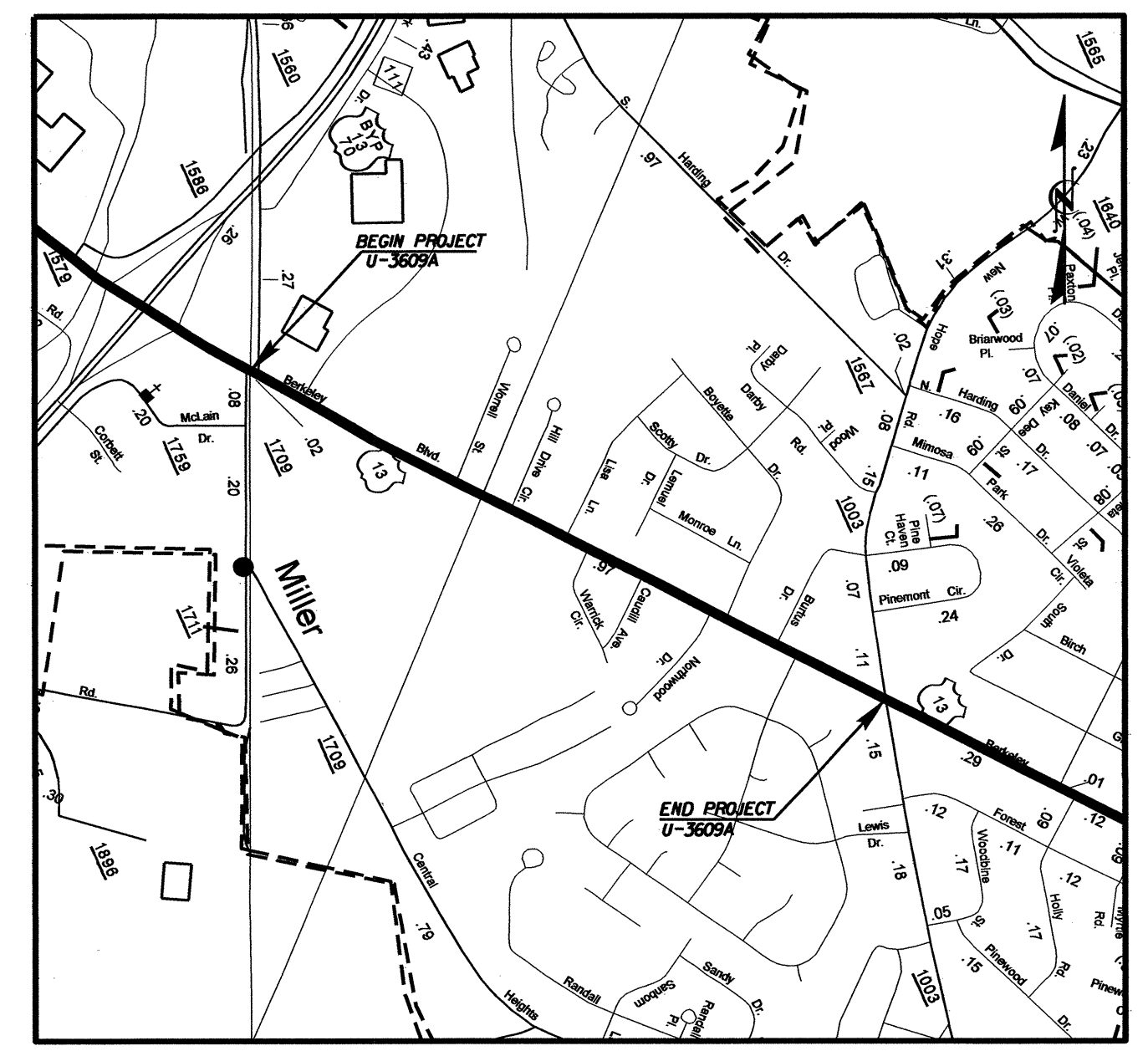
WAYNE COUNTY

**LOCATION: ROYALL AVENUE TO SOUTH DRIVE
GOLDSBORO, NC**

TYPE OF WORK: TRAFFIC SIGNAL

Project: BERKELEY BOULEVARD WIDENING

Vicinity



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		Title Sheet
Sig. 2-4	04-0556	US 13 (Berkeley Blvd.) at SR 1560 (Royall Ave.) & SR 1709 (Central Hts. Rd.)
Sig. 5-7	04-1173	US 13 (Berkeley Boulevard) at Lowe's Drive/Goldsboro Crossing Drive
Sig. 8-11	04-0367	US 13 (Berkeley Boulevard) at SR 1003 (New Hope Road)
Sig. 12-17	N/A	Metal Strain Poles Typicals

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT
Contacts:

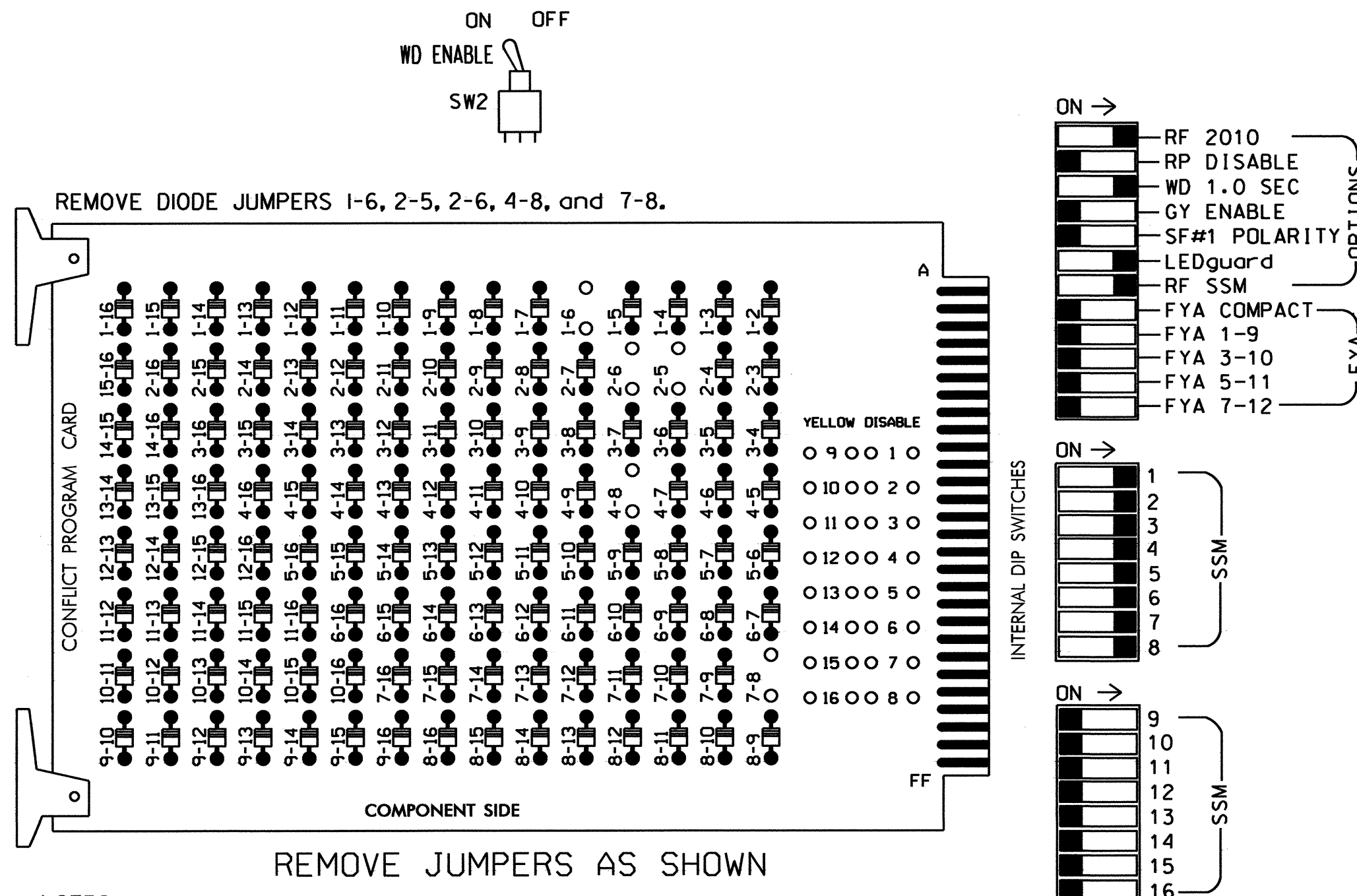
Pamela L. Alexander, PE - Eastern Region Signals Engineer
John T. Rowe Jr., PE - Signal Equipment Design Engineer

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

03-MAY-2012 10:20 AM S:\IT&S\NTS\Signal Design Section\Eastern Region\Div-04\U-3609A\Signals\Design\Titlesheet\U3609A_rdy_tsh.dgn

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS 3.02.77
OR LATEST APPROVED VERSION
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8
PHASES USED.....1,2,3,4,5,6,*7
OVERLAP E.....4+7
OVERLAP P.....1+2+3+4+5+6
*USED ONLY DURING PREEMPTION

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	OLE	8 PED
SIGNAL HEAD NO.	11	21,22	NU	31, 32,33	41, 42,43	NU	51	61,62	NU	31,41	62	NU
RED		128		116	101			134		*	*	
YELLOW		129		117	102			135				
GREEN		130		118	103			136				
RED ARROW	125							131				
YELLOW ARROW	126							132		123	108	
GREEN ARROW	127							133		124	109	

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.

PREEMPT ONLY PHASE OMIT NOTE

(program controller as shown below)

From Main Menu press '2' (Phase Control). Then '1' (Phase Control Functions). Program Phase 7 for 'Omit Phase' and Phases 1, 2, 3, 4, 5 and 6 for 'Startup Calls'. This is to prevent Phase 7 from being served when not in Preempt.

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	φ 1 1A	φ 2 2A,2B	S	S	S	φ 4 4A	φ 3 3A	S	S	S	S	S	S	FS
L	NOT USED	NOT USED	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	DC ISOLATOR
U	φ 5 5A	φ 6 6A,6B	S	S	S	S	S	S	S	S	S	S	S	PRE1
L	NOT USED	NOT USED	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	AC ISOLATOR

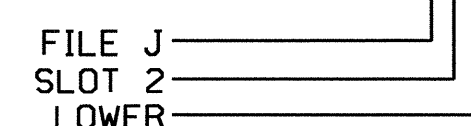
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME
PRE1 = RR PREEMPT

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	TB2-1,2	I1U	56	18	1	1	Y	Y			3
2A,2B	TB2-5,6	I2U	39	1	2	2	Y	Y			
3A	TB6-1,2	I7U	65	27	34	3	Y	Y			3
3B	TB6-3,4	I7L	78	40	44	3	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
6A,6B	TB3-5,6	J2U	40	2	6	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



OVERLAP 'P' 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 (0-25.5 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)...8
```

PRESS '-' FIVE TIMES

```
PAGE 1: VEHICLE OVERLAP 'P' SETTINGS
PHASE:      :12345678910111213141516
VEH OVL PARENTS:  xxxxxx
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR:  - RED - YELLOW - GREEN
FLASH COLORS:   - RED - YELLOW - GREEN

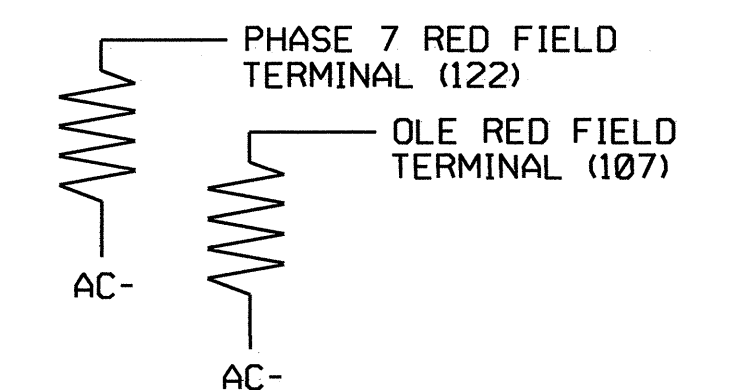
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-25.5 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
```

OVERLAP PROGRAMMING COMPLETE

The utilization of overlap P ensures consistent clearance timing during transition to preemption

LOAD RESISTOR INSTALLATION DETAIL

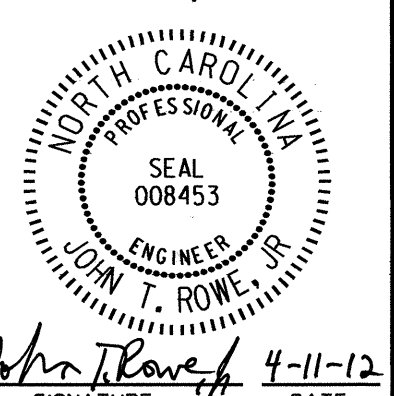
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-0556
DESIGNED: March 2012
SEALED: 4/11/12
REVISED: N/A

REVISION SEAL



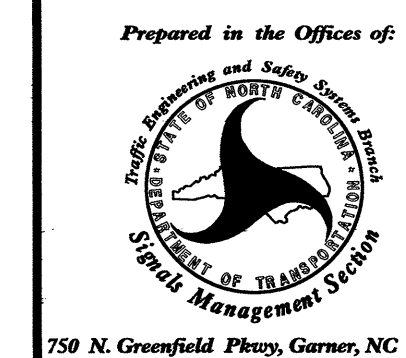
SIGNATURE DATE

Signal Upgrade - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 13 (Berkeley Blvd.)

at
SR 1560 (Royall Ave.) &
SR 1709 (Central Hts. Rd.)



Division 4 Wayne County Goldsboro
PLAN DATE: January 2009 REVIEWED BY: T. JOYCE
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS
Added right turn overlap head 62 and created... JTK 4-11-12
overlap Et revised input file. (WSA)

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 2/17/09. This document is only certified as to the revisions.

SIGNATURE DATE
SIG. INVENTORY NO. 04-0556

RAILROAD PREEMPTION PROGRAMMING DETAIL

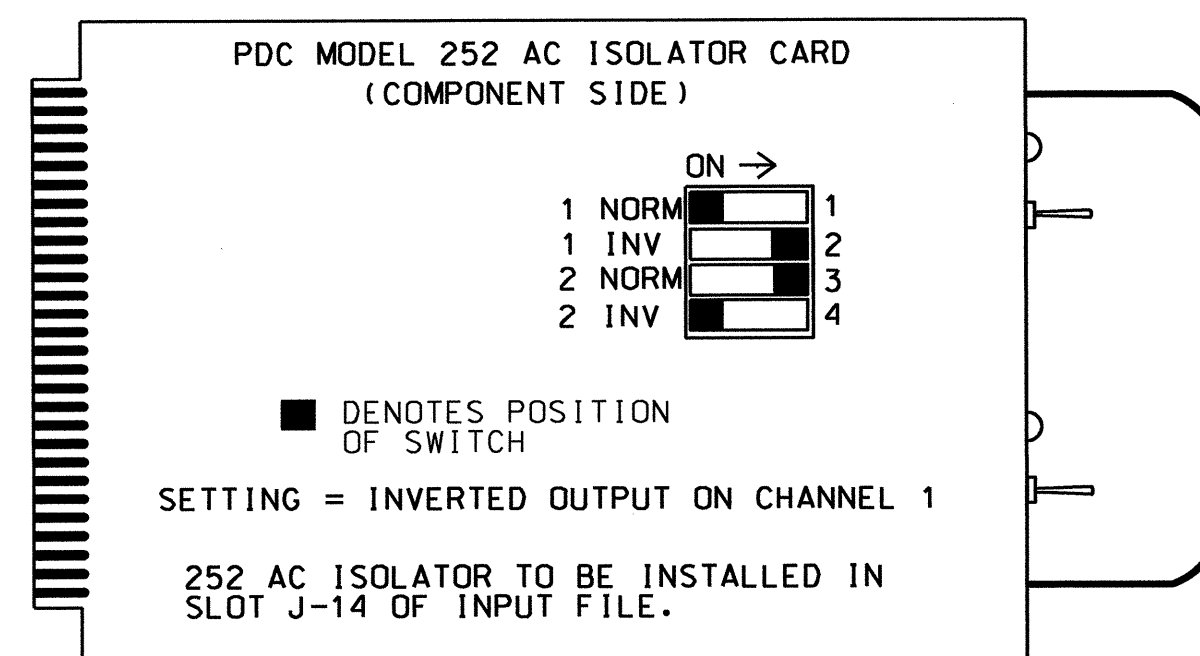
(program controller as shown below)

From Main Menu press 'A' (Preemption), then '1' (Standard Preemptions).

PREEMPTION #1	SETTINGS (NEXT:1-10)
INTERVAL/TIMING	CLEAR/DWELL PHASES
GRN YEL RED	12345678910111213141516
1 0 0.0 0.0	
2 255 0.0 0.0	X
3 0 0.0 0.0	
4 0 0.0 0.0	
5 1 0.0 0.0	X X
EXIT CALLS	
OPTIONS	
PRIORITY (Y/N TO SELECT)	.....HIGH
DELAY TIMER (0-255 SEC)	.....0
MIN GREEN BEFORE PRE (0= DEFAULT)	...1
PED CLEAR BEFORE PRE (0= DEFAULT)	...0
YELLOW CLEAR BEFORE PRE (0= DEFAULT)	...0.0
RED CLEAR BEFORE PRE (0= DEFAULT)	...0.0
DWELL MIN TIMER (0-255 SEC)	.....7
DWELL MAX TIMER (0=OFF,1-255MIN)	....0
DWELL HOLD-OVER TIMER (0-255)	.....0
LATCH CALL?	.....N
LINK TO NEXT PREEMPT?	.....N
ENABLE BACKUP PROTECTION?	.....N
HOLD CLEAR 1 PHASES DURING DELAY?	...N
FAST GREEN FLASH DWELL PHASES?	.....N
PED CLEARANCE THROUGH YELLOW?	.....N
INHIBIT OVERLAP GREEN EXTENSION?	...N
SERVICE DURING SOFTWARE FLASH?	.....N
REST IN RED DURING DWELL INTERVAL?	..N
FLASH DWELL INTERVAL?	.....N
ALLOW PEDS IN DWELL INTERVAL?	.....N
RE-TIME DWELL INTERVAL?	.....N
OVERLAPS:	ABCDEFGHIJKLMN
DWELL INT FLASH YELLOW	
OMIT OVERLAPS:	X

PREEMPT 1 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

PHASE SEQUENCE PROGRAMMING DETAIL

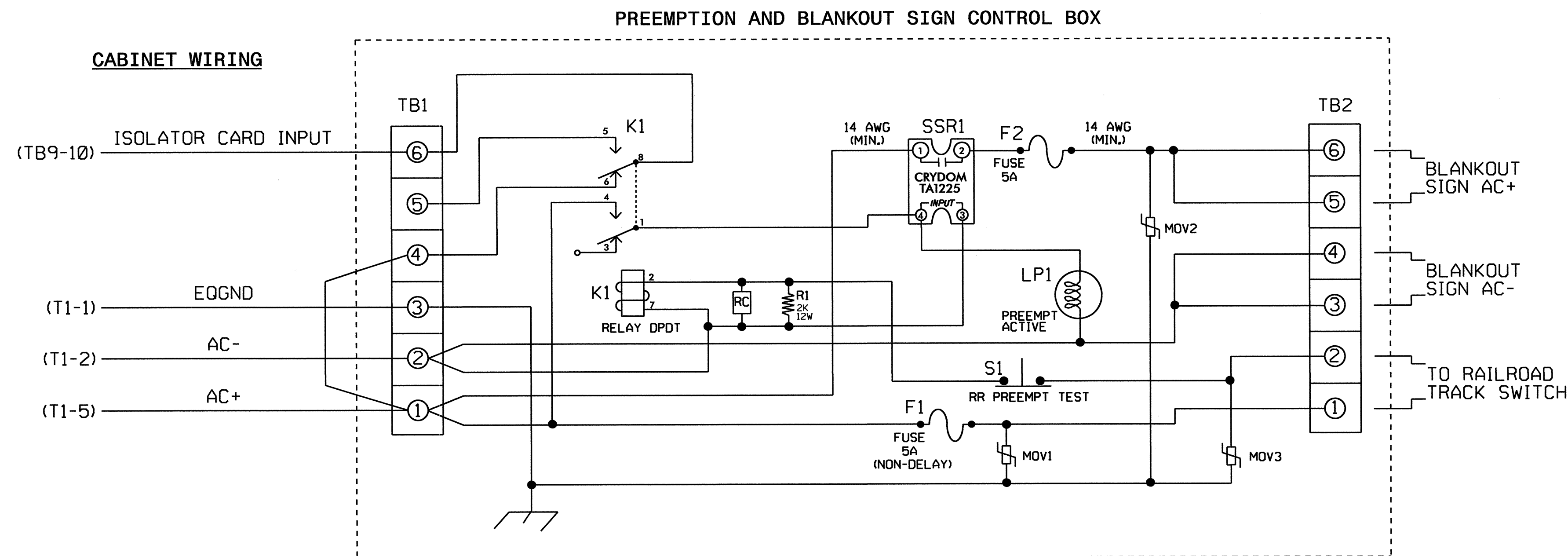
(program controller as shown below)

FROM OASIS LOCAL CONTROLLER MAIN MENU
SELECT: 4 PHASE SEQUENCE

PHASE SEQUENCE:	PAGE 1	NEXT:	PAGES)			
RNG:LEAD	BARRIER 1	X-LAG:LEAD	BARRIER 2	X-LAG:LEAD	BARRIER 3	X-LAG
1 :1	2 0	0 :3	4 0	0 :7	0 0	0 0
2 :0	6 0	5 :0	0 0	0 :0	0 0	0 0
3 :0	0 0	0 :0	0 0	0 :0	0 0	0 0
4 :0	0 0	0 :0	0 0	0 :0	0 0	0 0

RAILROAD PREEMPTION WIRING DETAIL

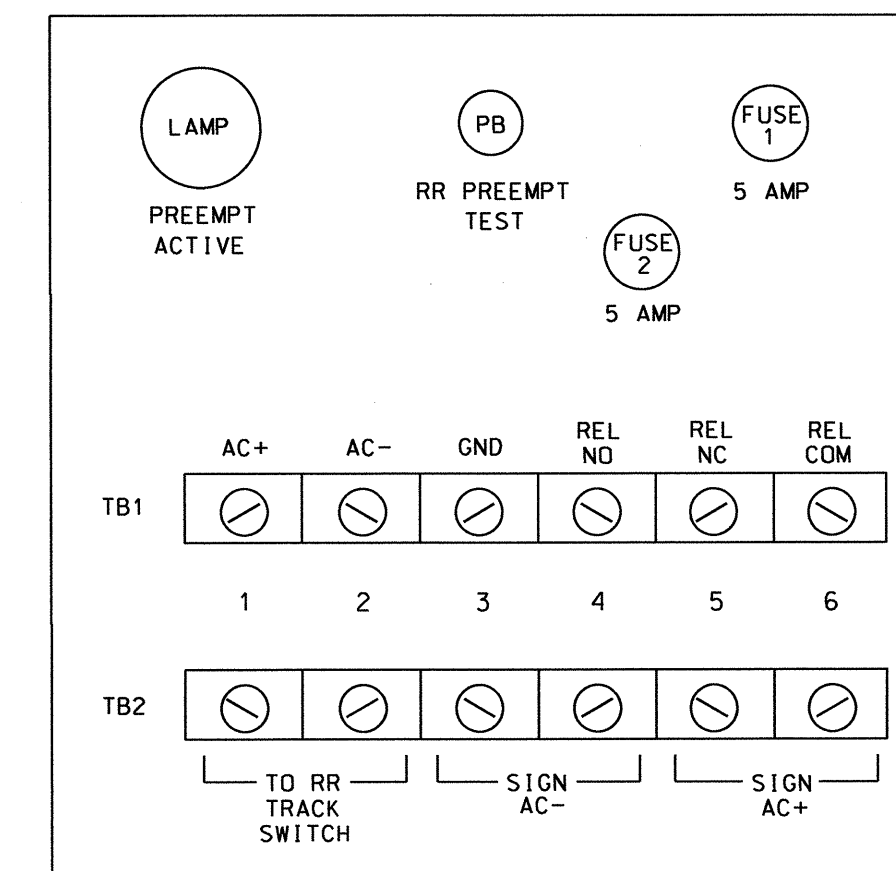
(wire as shown below)



NOTES

- Relay K1 is shown in the energized (Preempt not active) normal operation state.
- Relay K1 is a DPDT with 120VAC coil. Potter & Brumfield KRP11AG with octal base or approved equivalent.
- Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output. Crydom TA1225 or approved equivalent.
- AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
- Resistor is valued at 2K ohm, 12 watt. Clarostat part no. VPR10F-2K or approved equivalent.
- RC network is valued at .1 microfarad, 100 ohm.
- If replacement movs are needed, GE part no. V150LA20A may be used.
- Preemption and Blankout Sign Control Box is a Control Technologies part no. 2299-101 or approved equivalent.
- IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW



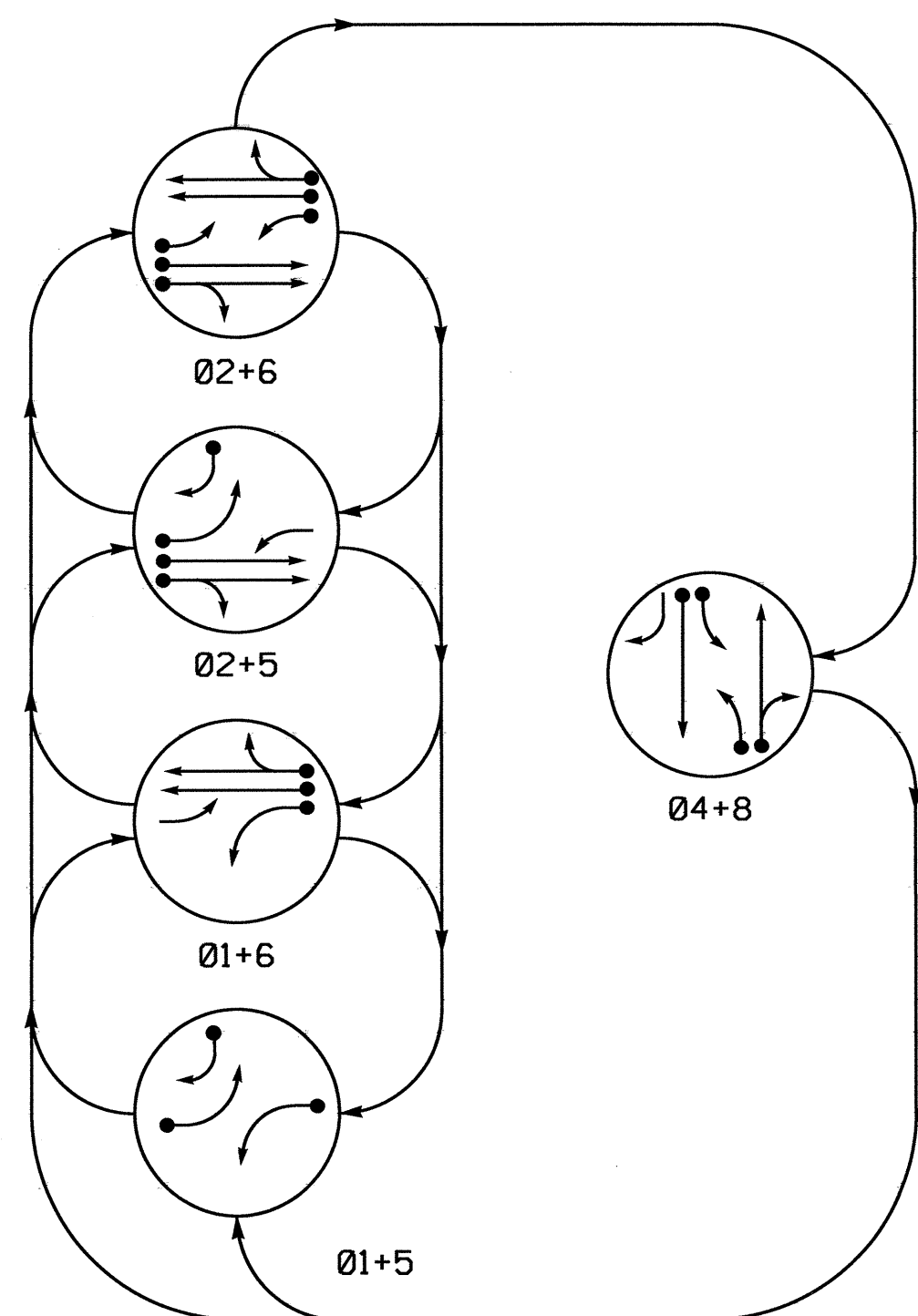
Signal Upgrade - Sheet 2 of 2

	US 13 (Berkeley Blvd.) at SR 1560 (Royall Ave.) & SR 1709 (Central Hts. Rd.)		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, M022013, on 2/11/09. This document is only certified as to the revisions.	
	Division 4 PLAN DATE: January 2009 PREPARED BY: C. Strickland	Wayne County REVIEWED BY: T. Joyce		Goldsboro DATE: 4-11-12
	REVISIONS Added right turn over lap head 62 and created over lap. E: changed loops and revised input file. (WSA)			INIT. DATE JTK 4-11-12
	750 N. Greenfield Pkwy, Garner, NC 27529			SIGNATURE DATE T. Joyce 4-11-12

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-0556
DESIGNED: March 2012
SEALED: 4/11/12
REVISED: N/A

REVISION SEAL

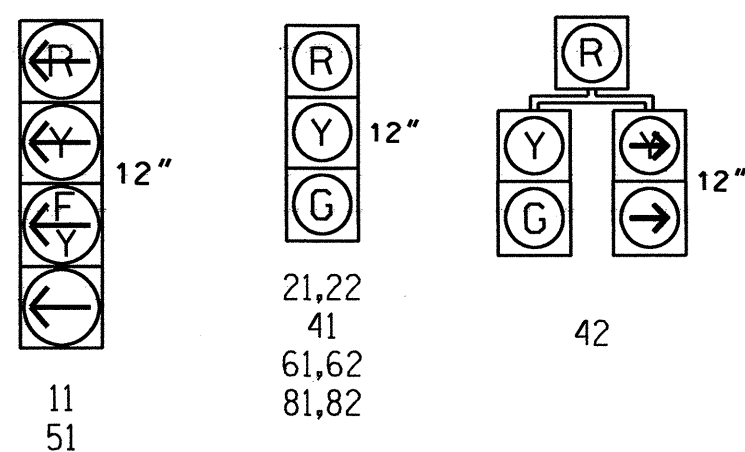
PHASING DIAGRAM



SIGNAL FACE	PHASE					
	01+5	02+5	02+6	04+8	F	FL
11	←	←	←	←	←	←
21,22	R	R	G	G	R	Y
41	R	R	R	R	G	R
42	R	R	R	R	G	R
51	←	←	←	←	←	←
61,62	R	G	R	G	R	Y
81,82	R	R	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	+5	2-4-2	-	1	Y	Y	-	-	15	-	-
2A	6X6	90	4	-	2	Y	Y	-	-	-	-	-
2B	6X6	90	4	-	2	Y	Y	-	-	-	-	-
4A	6X40	+5	2-4-2	-	4	Y	Y	-	-	3	-	-
4B	6X40	+5	2-4-2	-	4	Y	Y	-	-	-	-	-
5A	6X40	+5	2-4-2	-	5	Y	Y	-	-	15	-	-
5B	6X40	+5	2-4-2	-	5	Y	Y	-	-	15	-	-
6A	6X6	90	4	-	6	Y	Y	-	-	-	-	-
6B	6X6	90	4	-	6	Y	Y	-	-	-	-	-
8A	6X60	+15	2-4-2	-	8	Y	Y	-	-	3	-	-
8B	6X60	+5	2-4-2	-	8	Y	Y	-	-	10	-	-
S01	6X6	300	4	-	-	-	-	-	-	-	Y	-
S02	6X6	300	4	-	-	-	-	-	-	-	Y	-

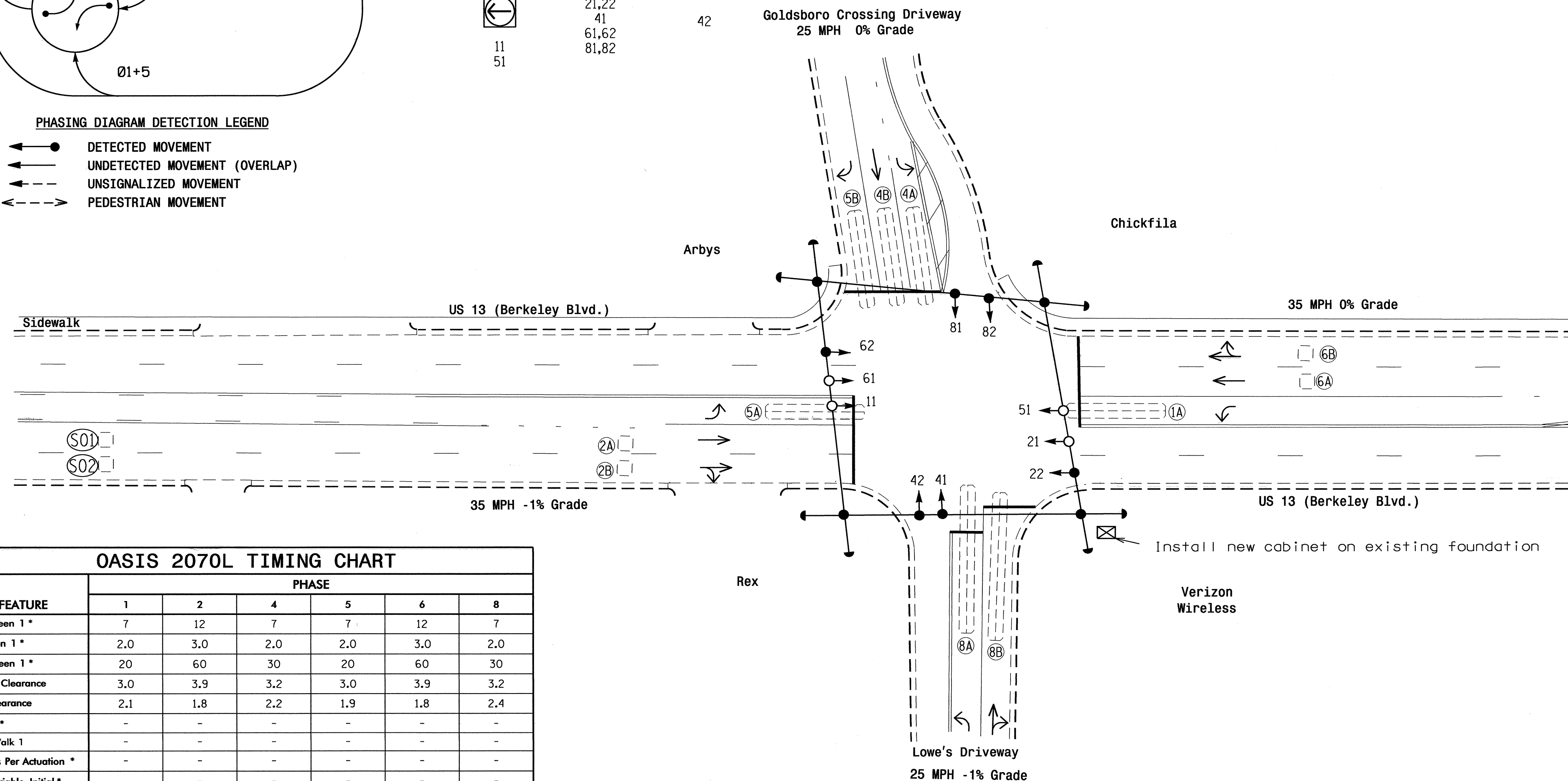
5 Phase Fully Actuated Goldsboro City System

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.
- Disable Backup Protect for phase 2+6.
- Reposition existing signal heads numbered 22 and 62.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Controller Asset # 1173.

PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←- UN SIGNALIZED MOVEMENT
- ←- PEDESTRIAN MOVEMENT



OASIS 2070L TIMING CHART

FEATURE	PHASE					
	1	2	4	5	6	8
Min Green 1*	7	12	7	7	12	7
Extension 1*	2.0	3.0	2.0	2.0	3.0	2.0
Max Green 1*	20	60	30	20	60	30
Yellow Clearance	3.0	3.9	3.2	3.0	3.9	3.2
Red Clearance	2.1	1.8	2.2	1.9	1.8	2.4
Walk 1*	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation*	-	-	-	-	-	-
Max Variable Initial*	-	-	-	-	-	-
Time Before Reduction*	-	-	-	-	-	-
Time To Reduce*	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	-	-	YELLOW	-
Dual Entry	-	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

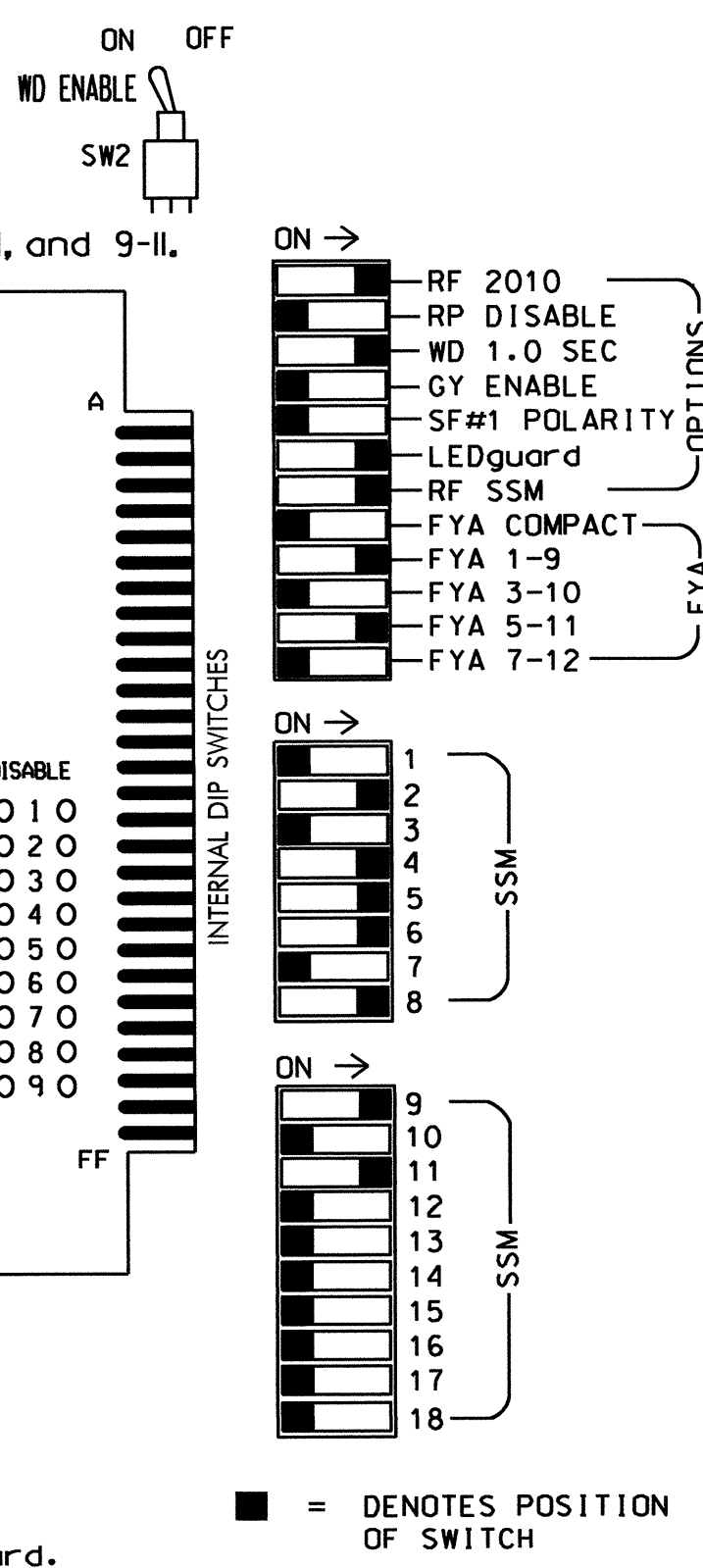
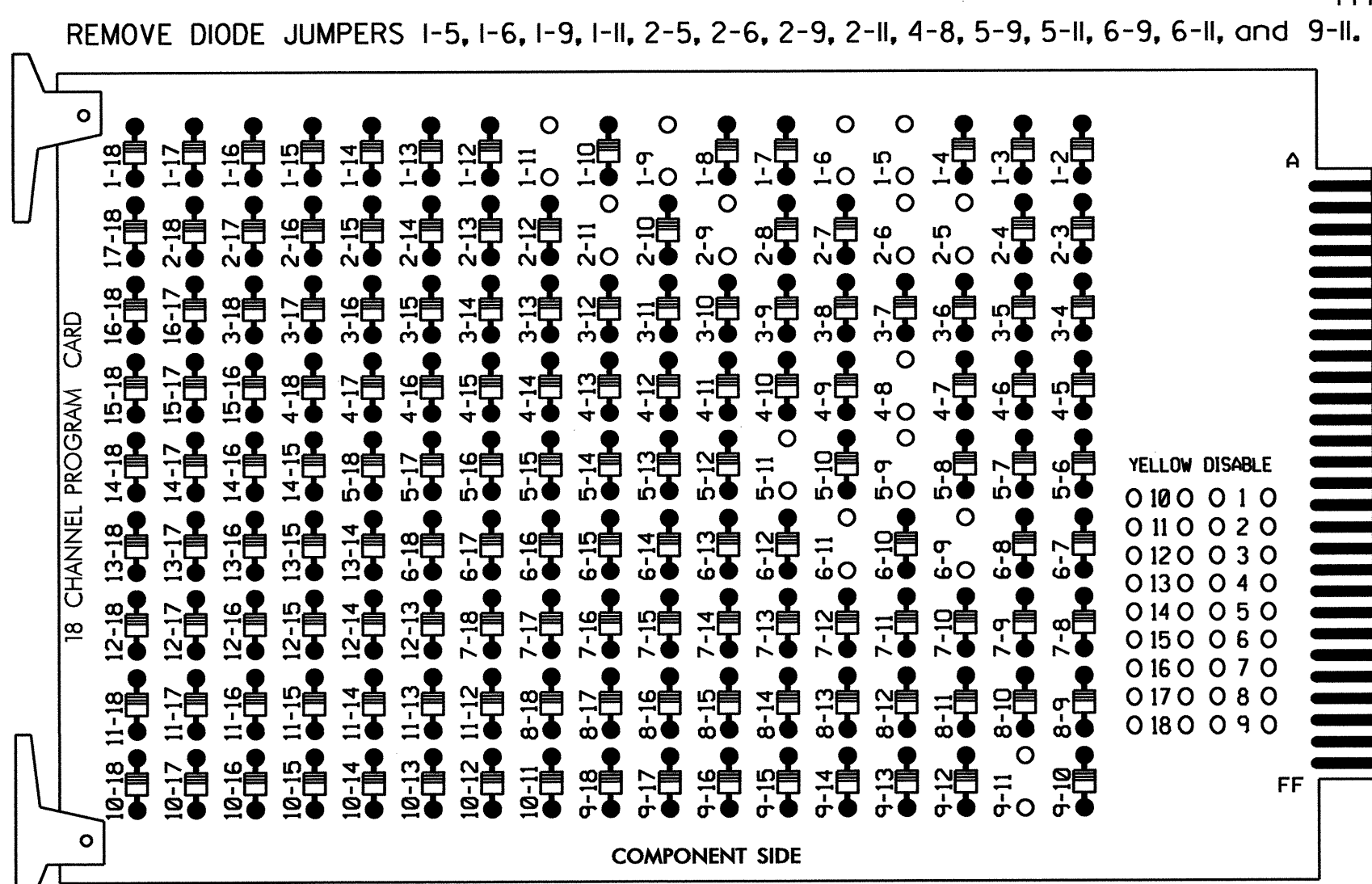
LEGEND

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

Signal Upgrade - Final

	<p>US 13 (Berkeley Boulevard) at Lowe's Drive / Goldsboro Crossing Drive</p>		<p>SEAL</p>							
	<p>Division 4 Wayne County Goldsboro</p> <p>PLAN DATE: February 2012 REVIEWED BY:</p> <p>PREPARED BY: Jeff Spence REVIEWED BY:</p>	<p>REVISIONS</p> <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		NO.	DATE	INIT.	DATE			
NO.	DATE	INIT.	DATE							

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.
 - Program phases 4 and 8 for Dual Entry.
 - Enable Simultaneous Gap-Out for all phases.
 - 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 Goldsboro City System.

EQUIPMENT INFORMATION

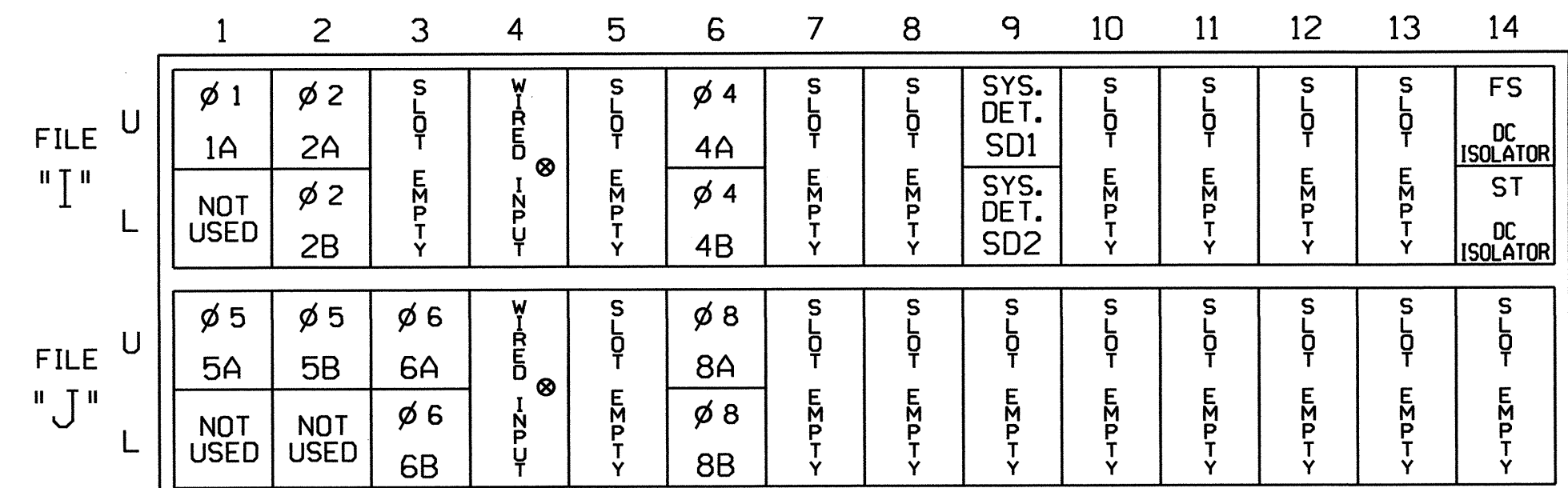
CONTROLLER.....2070L
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S11,AUX S1,AUX S4
 PHASES USED.....1,2,4,5,6,8
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

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.	11	21,22	NU	NU	41,42	NU	42	51	61,62	NU	NU	81,82	NU	11	NU	51	NU	NU
RED	128				101		*		134			107						
YELLOW	*	129			102				135			108						
GREEN		130			103				136			109						
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW	127						133	133										

NU = Not Used
 * Denotes install load resistor. See load resistor installation detail this sheet.
 * See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT
 (front view)

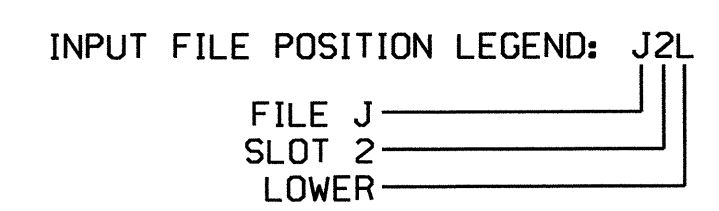


EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 * Wired Input - Do not populate slot with detector card

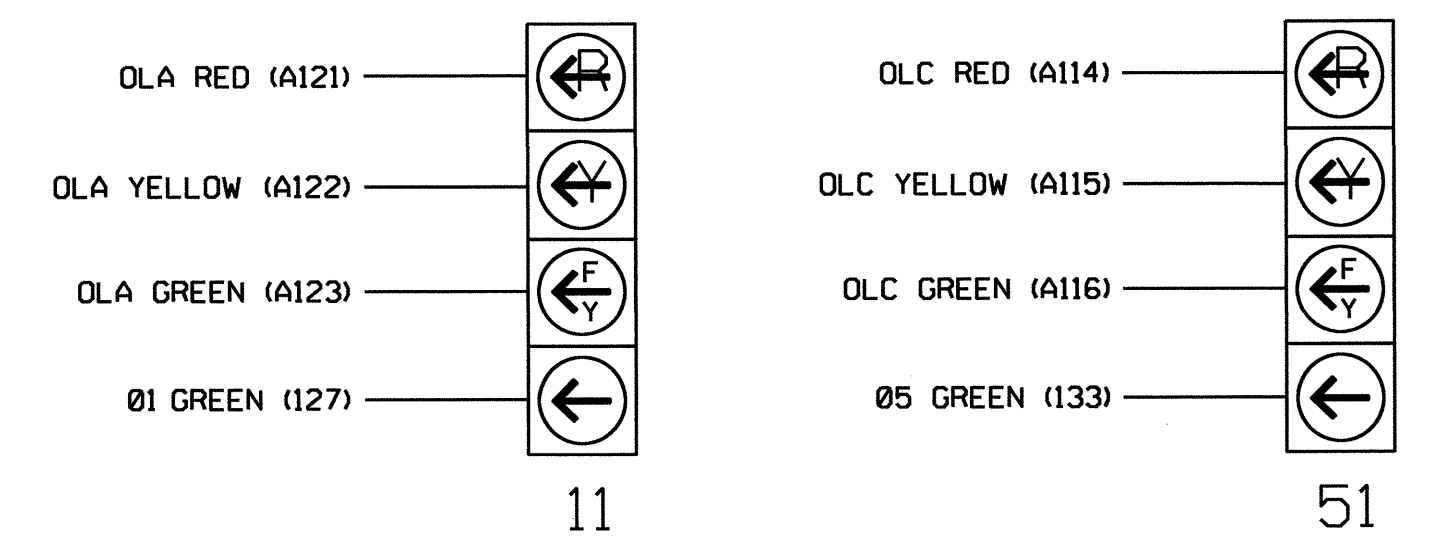
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	J1U	56	18	1	1	Y	Y			15
2A	TB2-5,6	J2U	39	1	2	2	Y	Y			
2B	TB2-7,8	J2L	43	5	12	2	Y	Y			
4A	TB4-9,10	J6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	J6L	45	7	14	4	Y	Y			
5A ²	TB3-1,2	J1U	55	17	5	5	Y	Y			15
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			10
* SD1	TB6-9,10	J9U	60	22	11	SYS					
* SD2	TB6-11,12	J9L	62	24	13	SYS					

- ¹Add jumper from J1-W to J4-W, on rear of input file.
²Add jumper from J1-W to J4-W, on rear of input file.
 * System detector only. Remove the vehicle phase assigned to this detector in the default programming.



4 SECTION FYA PPLT SIGNAL WIRING DETAIL
 (wire signal heads as shown)



NOTE
 The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

BACKUP PROTECTION NOTE
 (program controller as shown below)

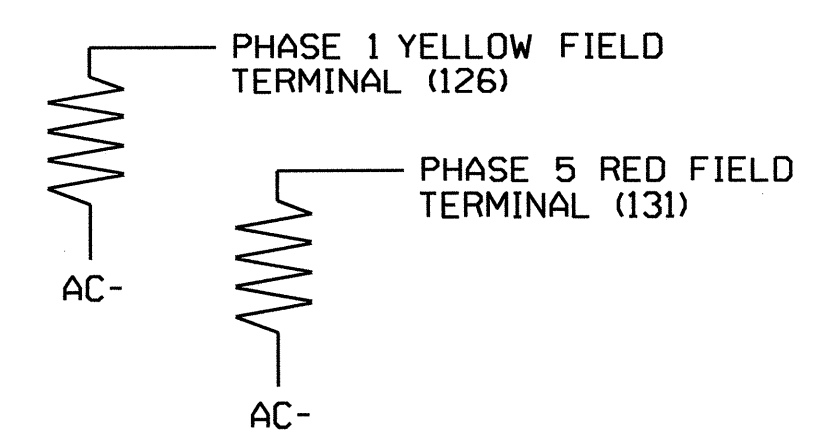
From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Program phase 2 and 6 for 'Backup Protect'. Make sure the Red Revert times shown on the Signal Design Plans are programmed in the 'Phase Timing' menu.

DELETE

LOAD RESISTOR INSTALLATION DETAIL
 (install resistors as shown below)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1173
 DESIGNED: February 2012
 SEALED: 4/10/12
 REVISED: N/A

Signal Upgrade (Final) - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	US 13 (Berkeley Boulevard) at Lowe's Drive/ Goldsboro Crossing Drive		SEAL SEAL JOHN T. ROWE, P.E. ENGINEER DATE: 4-10-12
	Division 4 PLAN DATE: April 2012 PREPARED BY: S. Armstrong	Wayne County Goldsboro REVIEWED BY: JKR REVIEWED BY:	

SIG. INVENTORY NO. 04-1173

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, 3, 4, 5 AND 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF

PRESS '+'

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #52 OFF

PRESS '+'

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 1 (HEAD 11).

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #51 ON

PRESS '+'

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

LOGICAL I/O COMMAND #4 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON
AND RED CLEAR ON PHASE #5 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #42 ON
SET OUTPUT ASSIGNMENT #43 OFF

PRESS '+'

NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

LOGICAL I/O COMMAND #5 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #44 OFF

PRESS '+'

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 5 (HEAD 51).

LOGICAL I/O COMMAND #6 (+/-COMMAND#)
IF YELLOW ON PHASE #5 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #43 ON

PRESS '+'

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

OUTPUT 42 = Overlap C Red
OUTPUT 43 = Overlap C Yellow
OUTPUT 44 = Overlap C Green
OUTPUT 50 = Overlap A Red
OUTPUT 51 = Overlap A Yellow
OUTPUT 52 = Overlap A Green

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: |XX
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

← NOTICE GREEN FLASH

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 X GREEN

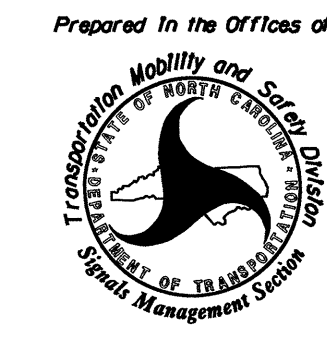
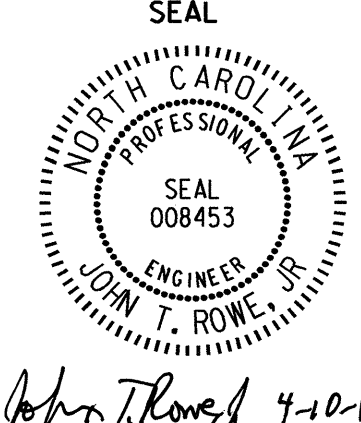
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1173
DESIGNED: February 2012
SEALED: 4/10/12
REVISED: N/A

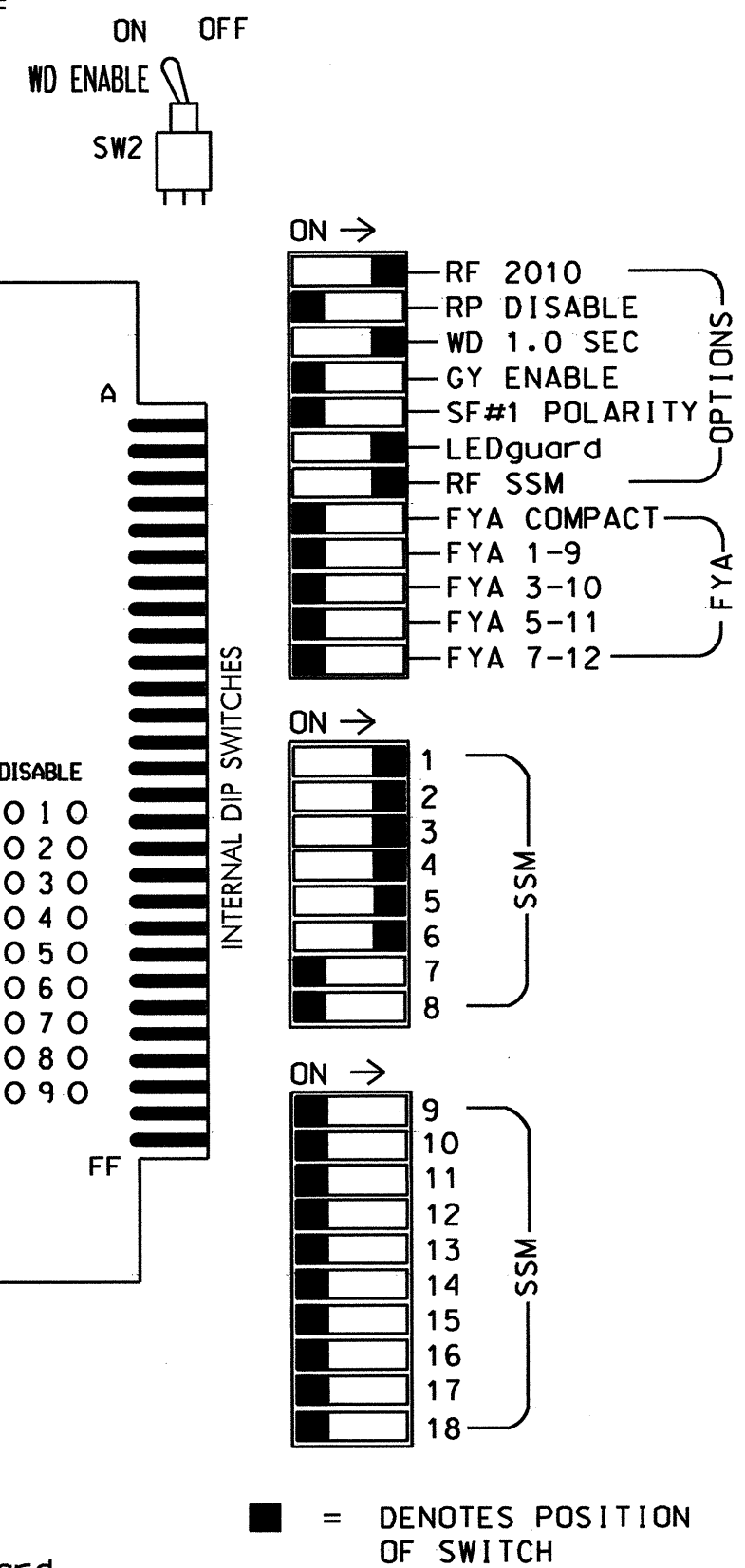
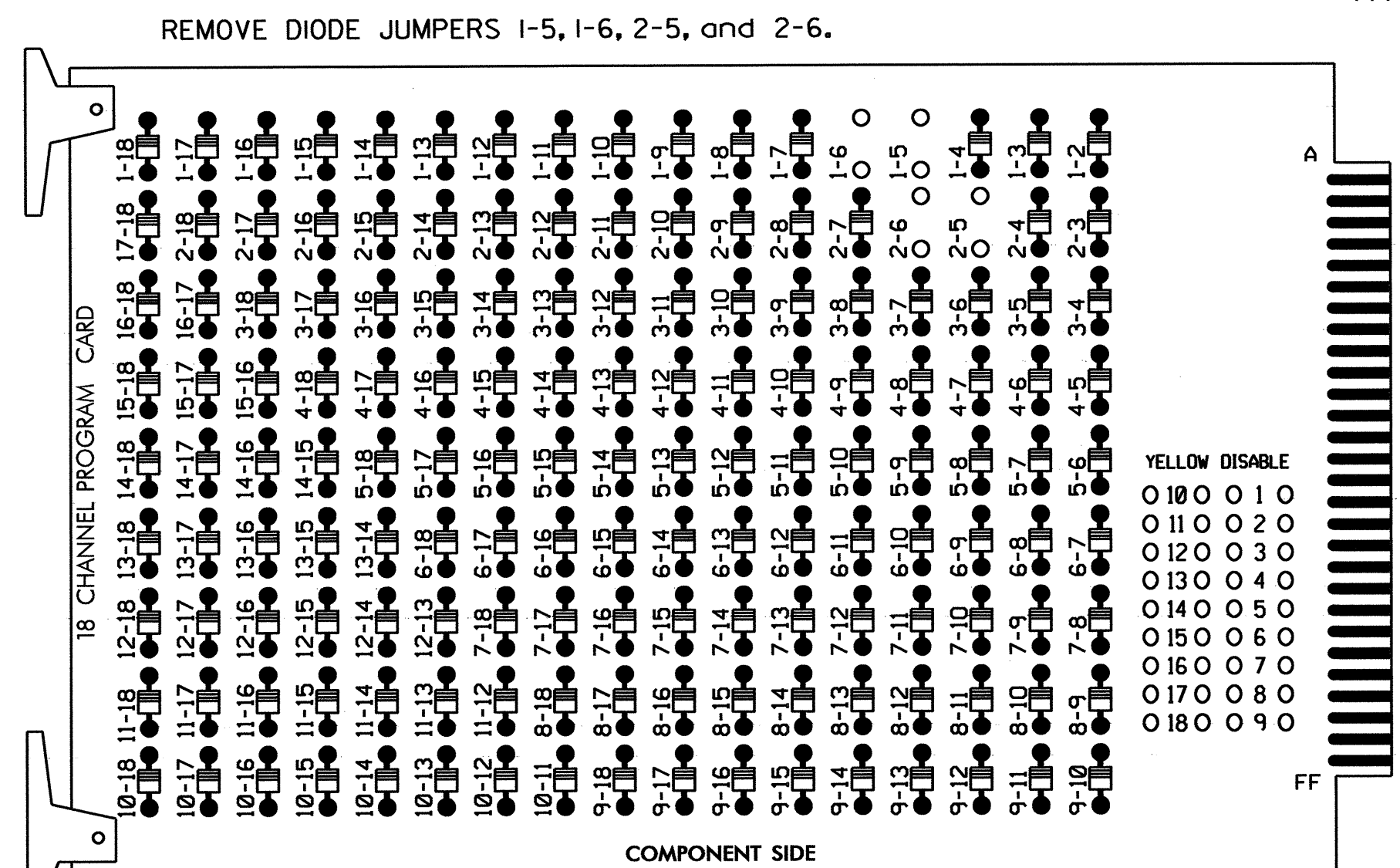
Signal Upgrade (Final) - Sheet 2 of 2

	<p>US 13 (Berkeley Boulevard) at Lowe's Drive/ Goldsboro Crossing Drive</p> <p>Division 4 Wayne County Goldsboro</p> <p>PLAN DATE: April 2012 REVIEWED BY: JRR</p> <p>PREPARED BY: S. Armstrong REVIEWED BY:</p>	<p>SEAL</p> 						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">REVISIONS</th> <th style="width: 25%;">INIT.</th> <th style="width: 25%;">DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			REVISIONS	INIT.	DATE			
REVISIONS	INIT.	DATE						
<p>750 N. Greenfield Pkwy, Corner, NC 27529</p>		<p>John T. Rowley 4-10-12</p> <p>SIGNATURE DATE</p> <p>SIG. INVENTORY NO. 04-1173</p>						

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 Goldsboro City System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8
 PHASES USED.....1,2,3,4,5,6
 OVERLAPS.....NONE

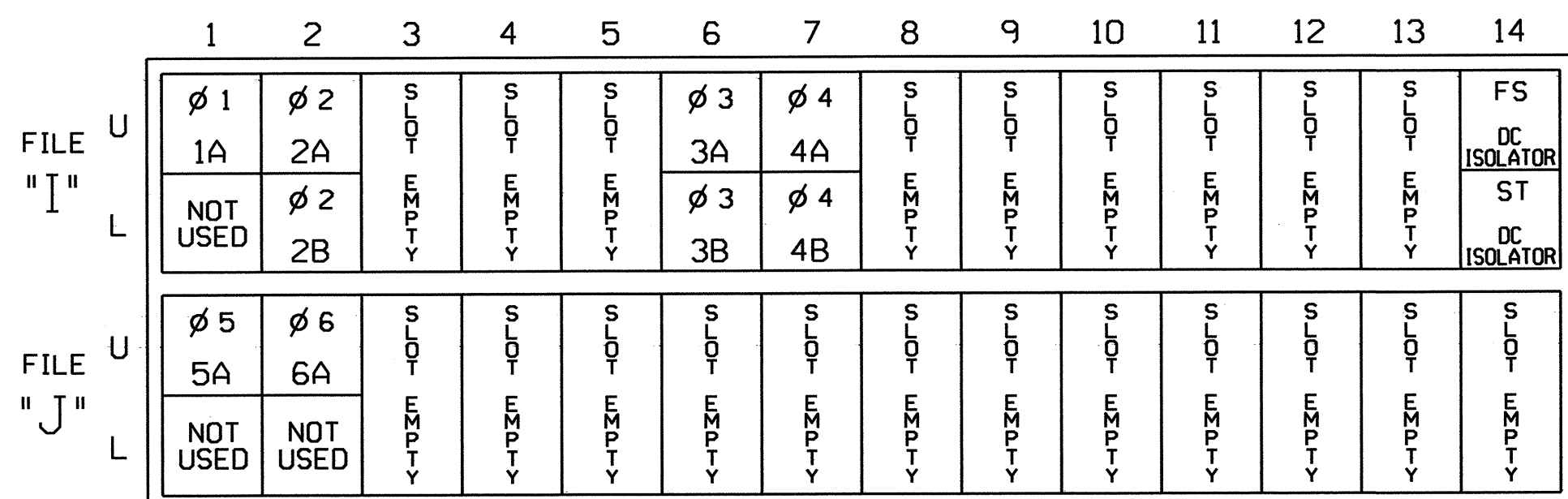
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12			
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16			
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED			
SIGNAL HEAD NO.	11	21,22	NU	22	31	32	41	42	NU	51	51,62	NU	NU	NU	NU
RED		128		116	116	101	101			134					
YELLOW		129		117	117	102	102			135					
GREEN		130		118	118	103	103			136					
RED ARROW	125									131					
YELLOW ARROW	126			117						132					
GREEN ARROW	127			118	118	103				133					
Hand icon															
Person icon															

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



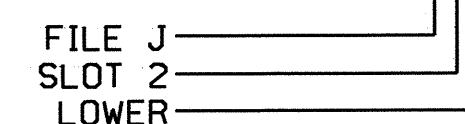
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			3
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			3
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			3
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-0367T
 DESIGNED: March 2012
 SEALED: 5/3/12
 REVISED: N/A

Signal Upgrade (Temporary Signal - Phase I)

ELECTRICAL AND PROGRAMMING DETAILS FOR: **US 13 (Berkeley Boulevard) at SR 1003 (New Hope Road)**

Prepared In the Offices of: **Transposition Mobility and Signal Design**

Division 4 Wayne County Goldsboro

PLAN DATE: **May 2012** REVIEWED BY: **JTK**

PREPARED BY: **S. Armstrong** REVIEWED BY:

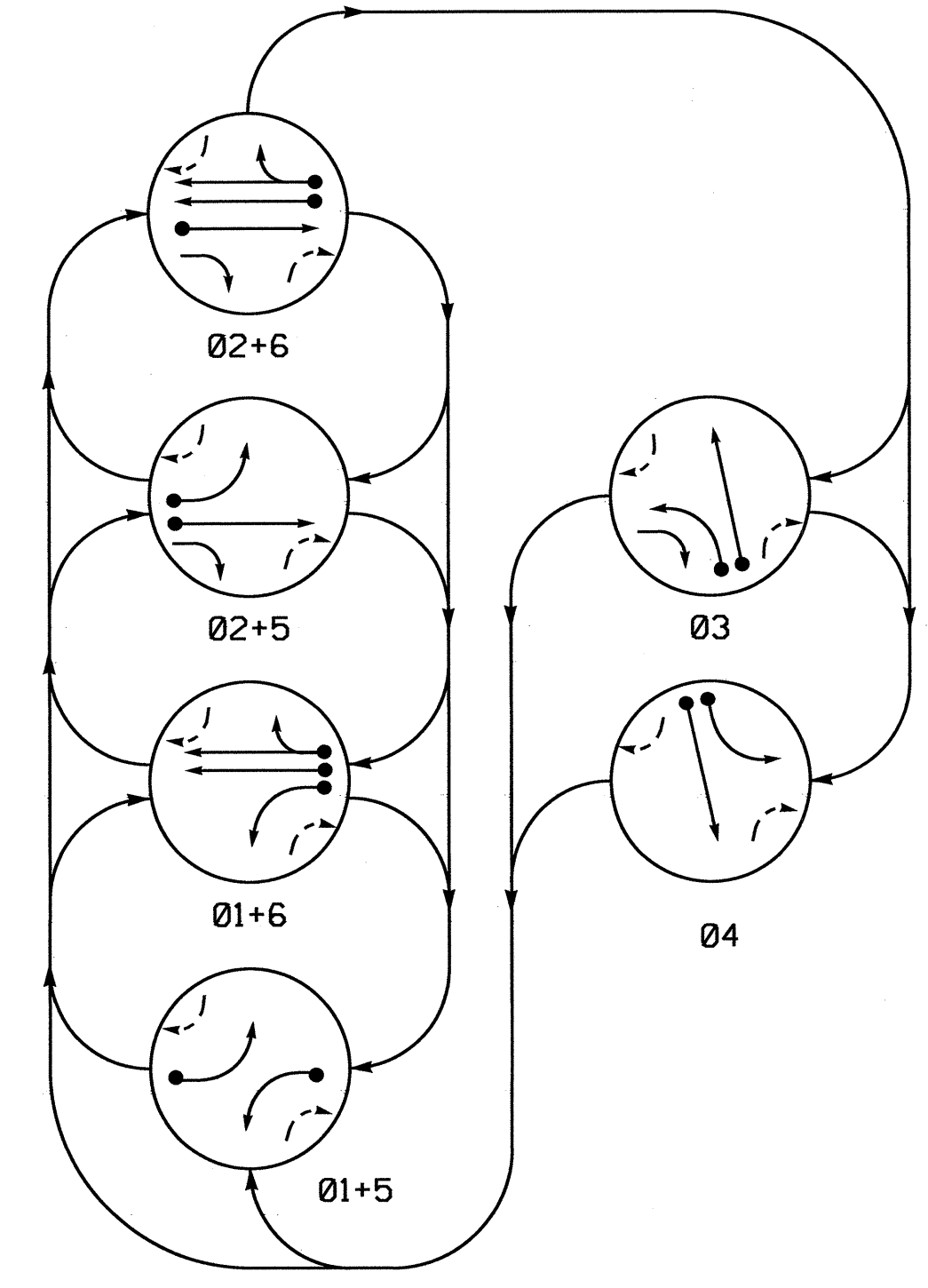
REVISIONS: INIT. DATE

Signature: *Mr. Row* 5-4-12

SIG. INVENTORY NO. 04-0367T

04-MAY-2012 08:55 S:\ITS\SIU\ITS_Signal\sewkr\groups\sig_mon\mstron\040367_sml.ele...xxx.dgn

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

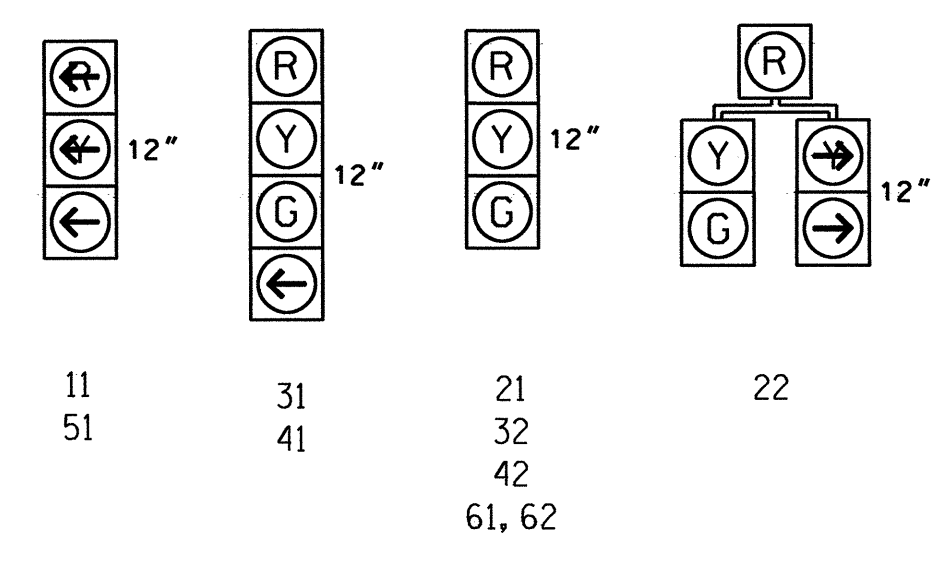


TABLE OF OPERATION

SIGNAL FACE	PHASE					
	01+5	02+5	03	04	FLASH	
11	---	R	R	R	R	R
21	R	R	G	G	R	Y
22	R	R	G	G	R	Y
31	R	R	R	R	G	R
32	R	R	R	R	G	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
51	---	R	R	R	R	R
61, 62	R	G	R	G	R	Y

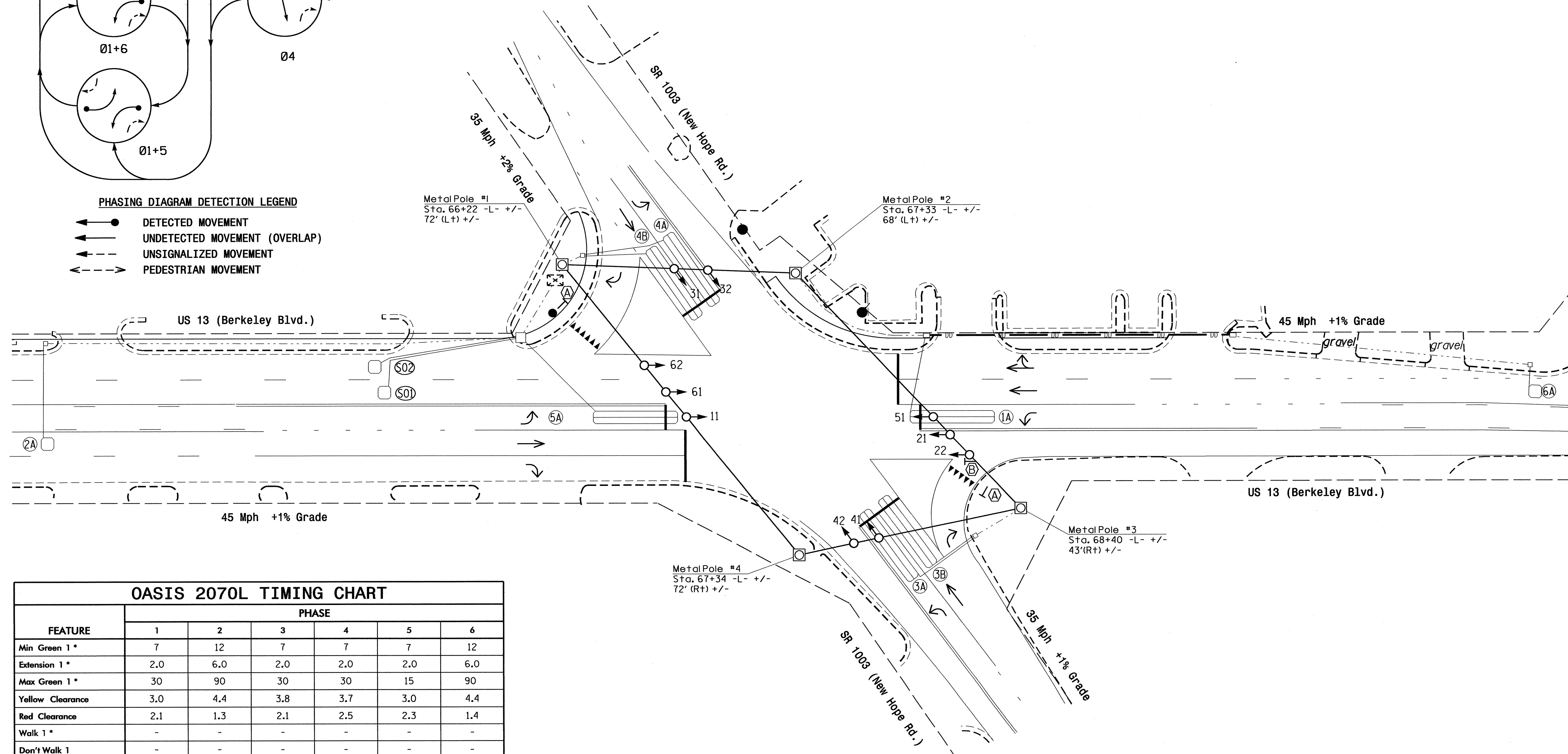
OASIS 2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD		
					PHASE	CALLING	EXTENSION	FULL TIME DELAY				
1A	6X40	+5	2-4-2	Y	1	Y	Y	-	-	3	-	Y
2A	6X6	300	4	Y	2	Y	Y	-	-	-	-	Y
3A	6X40	+5	2-4-2	Y	3	Y	Y	-	-	3	-	Y
3B	6X40	+5	2-4-2	Y	3	Y	Y	-	-	3	-	Y
4A	6X40	+5	2-4-2	Y	4	Y	Y	-	-	3	-	Y
4B	6X40	+5	2-4-2	Y	4	Y	Y	-	-	3	-	Y
5A	6X40	+5	2-4-2	Y	5	Y	Y	-	-	3	-	Y
6A	6X6	300	4	Y	6	Y	Y	-	-	-	-	Y
S01	6X6	+200	3	Y	-	-	-	-	-	-	-	Y
S02	6X6	+200	3	Y	-	-	-	-	-	-	-	Y

6 Phase Fully Actuated Goldsboro City System

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.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Controller Asset # 0367.



OASIS 2070L TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1*	7	12	7	7	7	12
Extension 1*	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1*	30	90	30	30	15	90
Yellow Clearance	3.0	4.4	3.8	3.7	3.0	4.4
Red Clearance	2.1	1.3	2.1	2.5	2.3	1.4
Walk 1*	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation*	-	2.5	-	-	-	2.5
Max Variable Initial*	-	34	-	-	-	34
Time Before Reduction*	-	15	-	-	-	15
Time To Reduce*	-	30	-	-	-	30
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	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 Oversized Junction Box		Existing Oversized Junction Box
	Proposed 2-in Underground Conduit		Existing 2-in Underground Conduit
	Proposed Right of Way		Existing Right of Way
	Proposed Directional Arrow		Existing Directional Arrow
	Proposed Directional Drill		Existing Directional Drill
	Proposed "YIELD" Sign (R1-2)		Existing "YIELD" Sign (R1-2)
	Proposed Right Arrow "ONLY" Sign (R3-5R)		Existing Right Arrow "ONLY" Sign (R3-5R)

Signal Upgrade - Final

Prepared in the Offices of:

750 N. Greenfield Phyllis Garner, NC 27529

US 13 (Berkeley Boulevard) at SR 1003 (New Hope Road)

Division 4 Wayne County Goldsboro

PLAN DATE: March 2012 REVIEWED BY: IOU

PREPARED BY: Jeff Spence REVIEWED BY:

SEAL

SEAL 23489

DATE

SCALE: 0 30 1"=30'

REVISIONS	INIT.	DATE

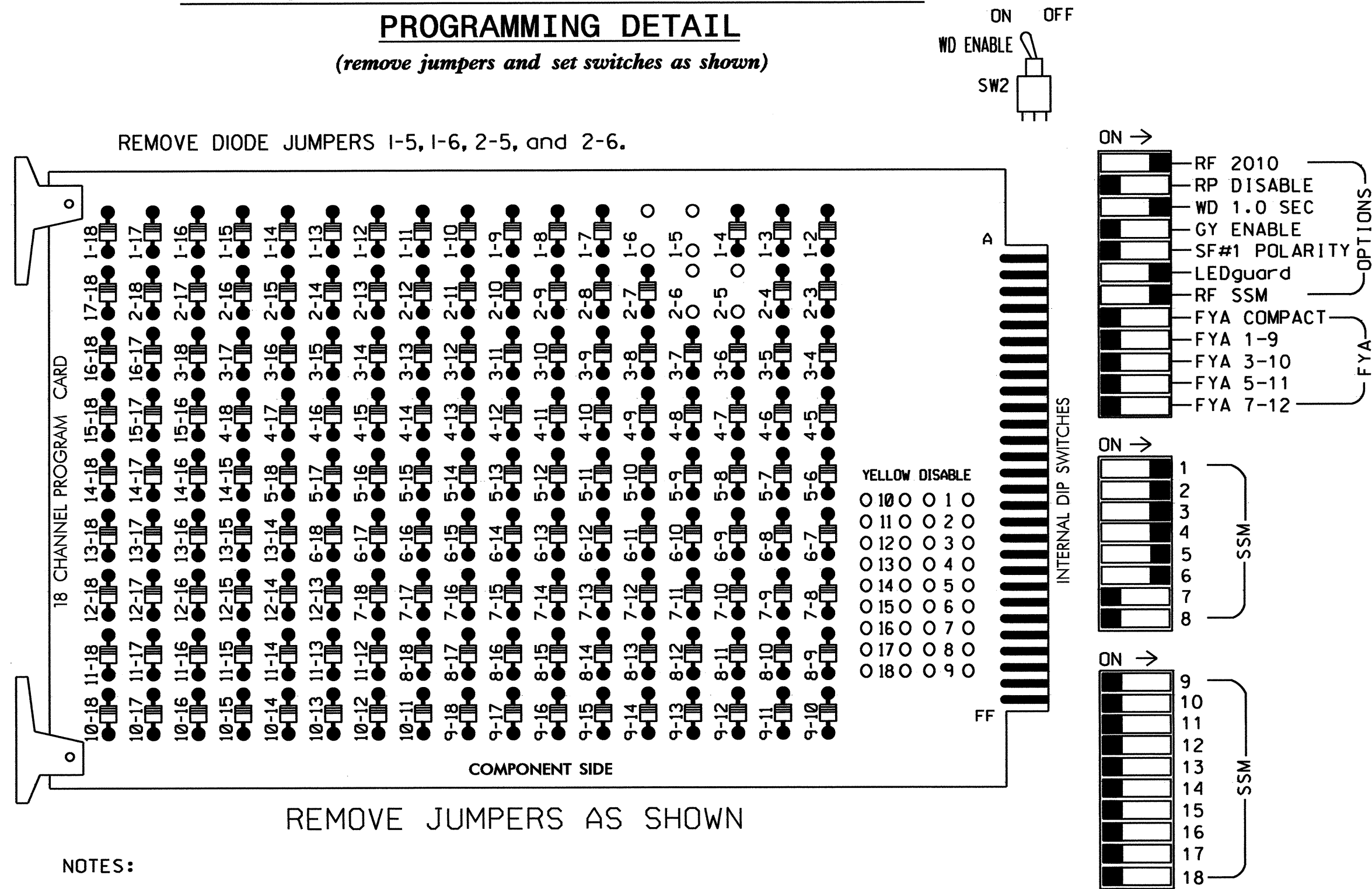
SIG. INVENTORY NO. 04-0367

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EDI MODEL 2018ECL-NC CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Goldsboro City System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8
 PHASES USED.....1,2,3,4,5,6
 OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12			
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16			
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED			
SIGNAL HEAD NO.	11	21,22	NU	22	31	32	41	42	NU	51	61,62	NU	NU	NU	NU
RED		128		116	116	101	101			134					
YELLOW		129		117	117	102	102			135					
GREEN		130		118	118	103	103			136					
RED ARROW	125									131					
YELLOW ARROW	126			117						132					
GREEN ARROW	127			118	118	103				133					

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	∅ 1	∅ 2	S	S	S	∅ 3	∅ 4	S	SYS. DET. S01	S	S	S	S	FS DC ISOLATOR
L	NOT USED	NOT USED	←-V-ZM	←-V-ZM	←-V-ZM	∅ 3	∅ 4	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	ST DC ISOLATOR
U	∅ 5	∅ 6	S	S	S	S	S	S	S	S	S	S	S	S
L	NOT USED	NOT USED	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM	←-V-ZM

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

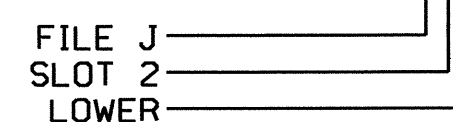
FS = FLASH SENSE
 ST = STOP TIME

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	TB2-1,2	I1U	56	18	1	1	Y	Y			3
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			3
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			3
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
*S01	TB6-9,10	I9U	60	22	11	SYS					
*S02	TB6-11,12	I9L	62	24	13	SYS					

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

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 4-11-12.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-0367
 DESIGNED: March 2012
 SEALED: 4/11/12
 REVISED: N/A

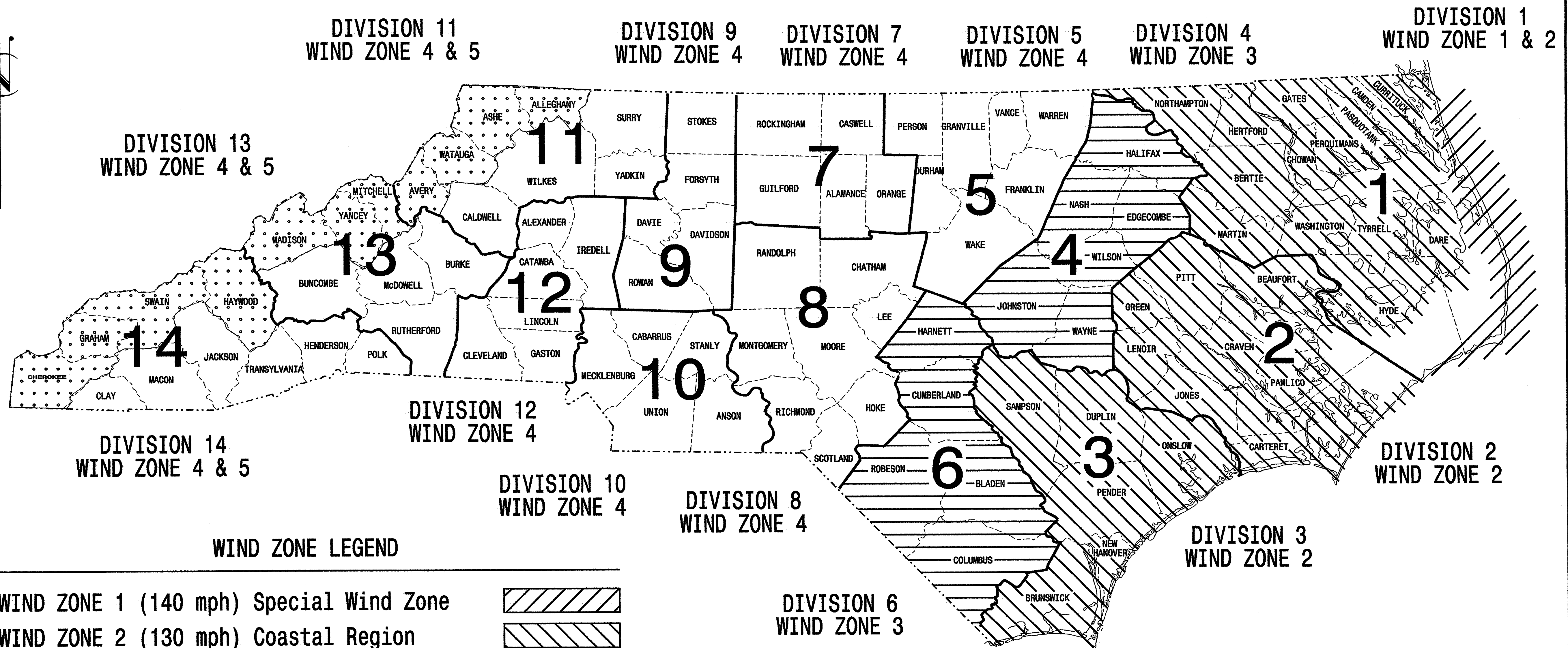
Signal Upgrade - Final

	ELECTRICAL AND PROGRAMMING DETAILS FOR:		US 13 (Berkeley Boulevard) at SR 1003 (New Hope Road)		
	Prepared In the Offices of:		Division 4 Wayne County Goldsboro		
PLAN DATE: May 2012		REVIEWED BY: JTR		PREPARED BY: S. Armstrong	
REVISIONS		INIT.		DATE	
750 N. Greenfield Pkwy, Garner, NC 27529		SIGNATURE: <i>John T. Rowley</i>		DATE: 5-4-12	
				SIG. INVENTORY NO. 04-0367	

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	U-3609A	Sig. 12
F.A. PROJ. NO.		M 1
PROJECT ID. NO.		

STANDARD DRAWINGS FOR METAL POLES

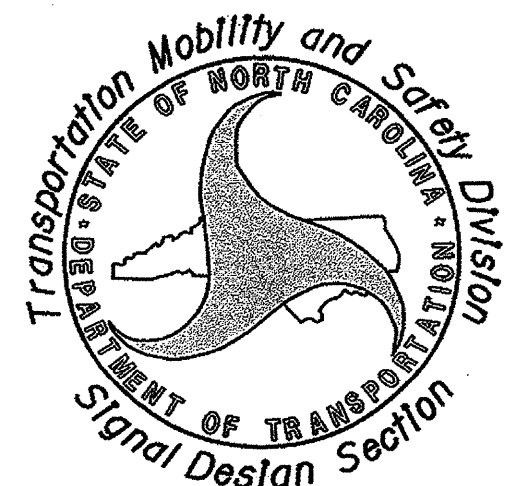


WIND ZONE LEGEND

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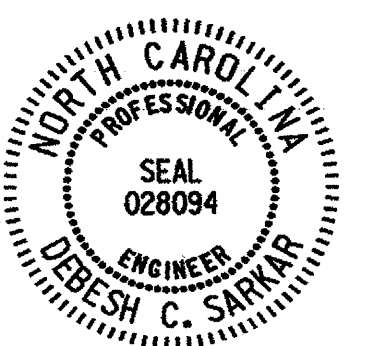
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

NCDOT CONTACTS:

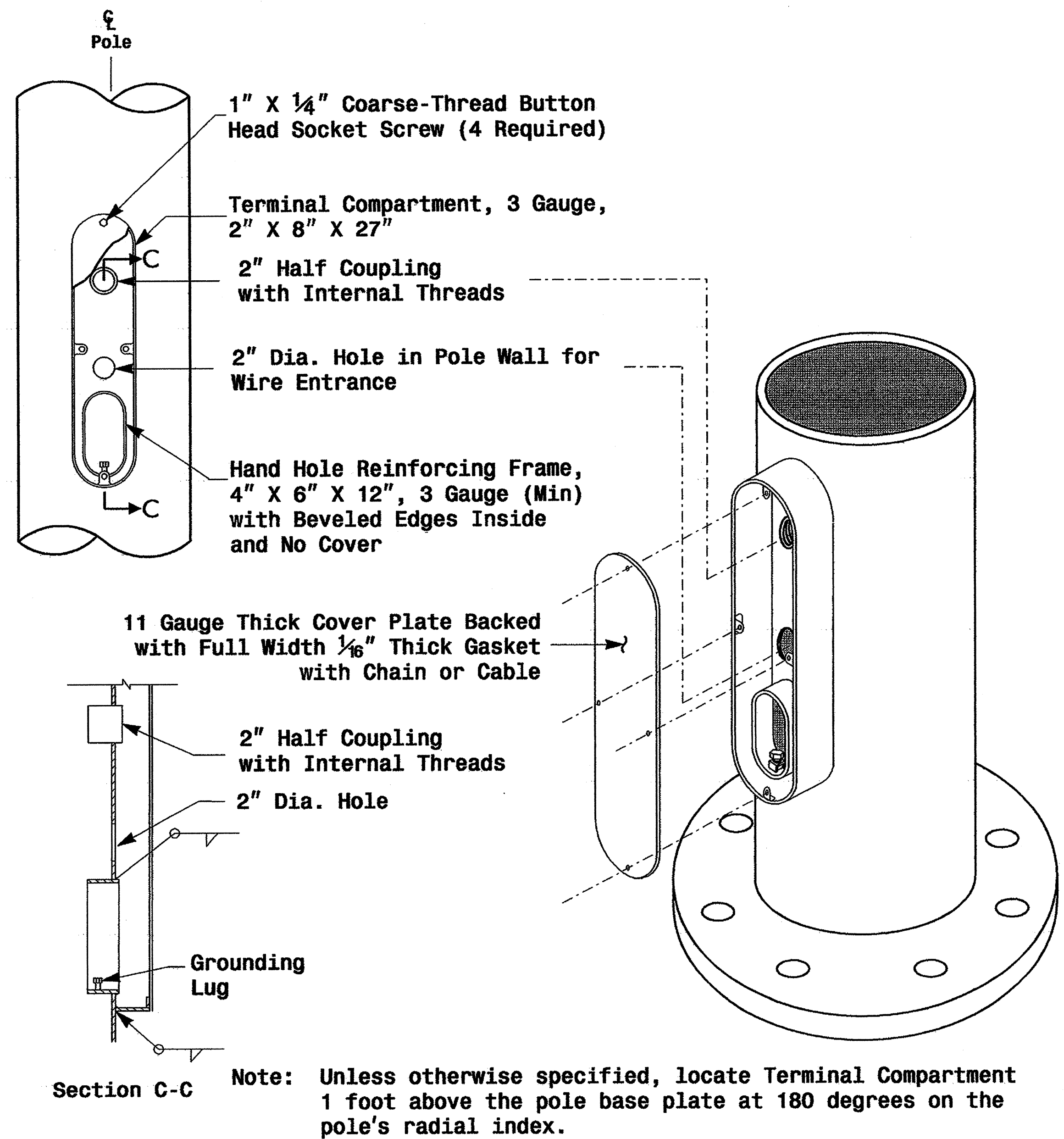
MOBILITY AND SAFETY DIVISION - ITS and SIGNALS UNIT

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

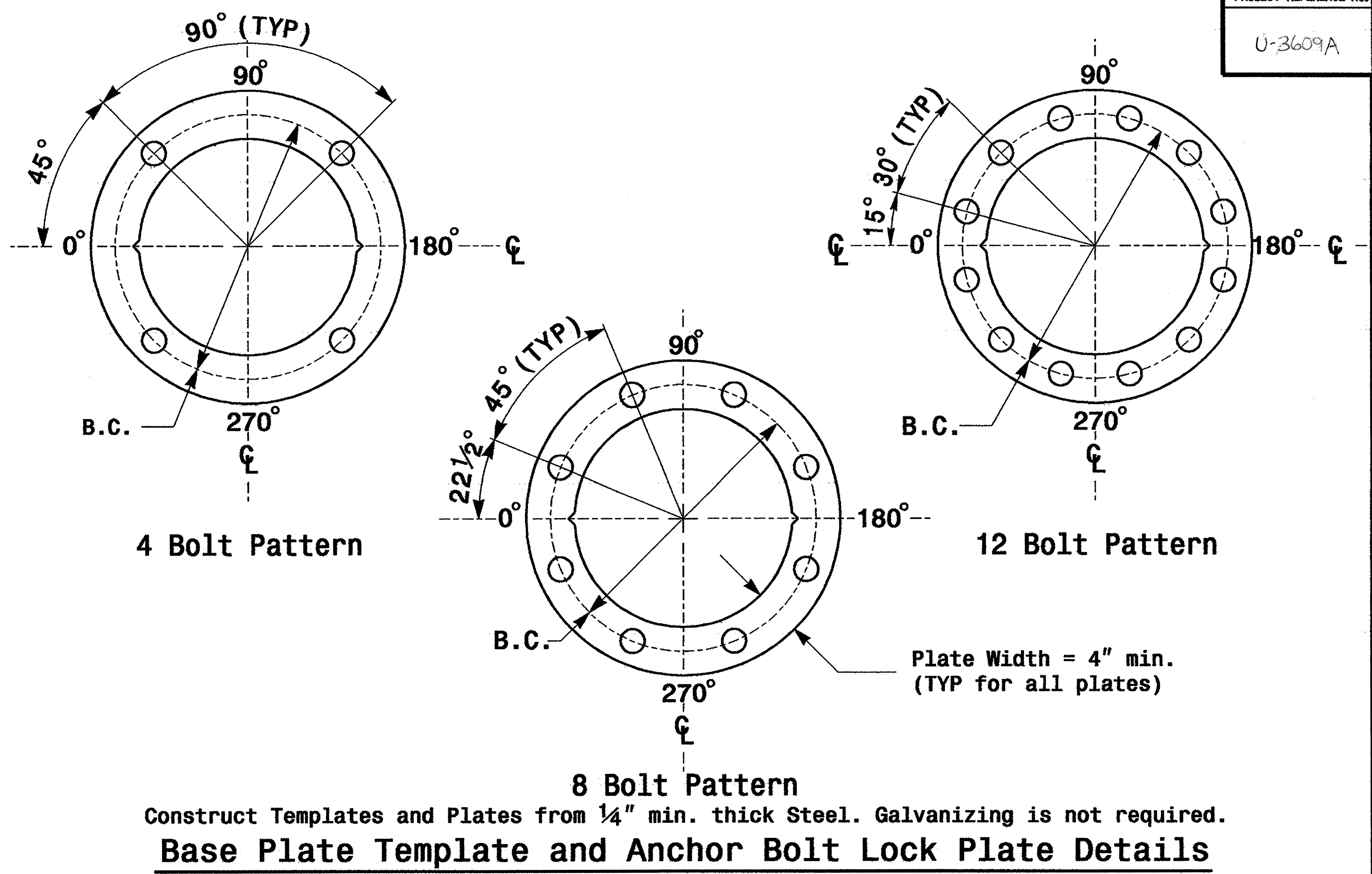
SEAL



D. Sarkar 7.21.2009
SIGNATURE DATE



Terminal Compartment Detail



Base Plate Template and Anchor Bolt Lock Plate Details

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

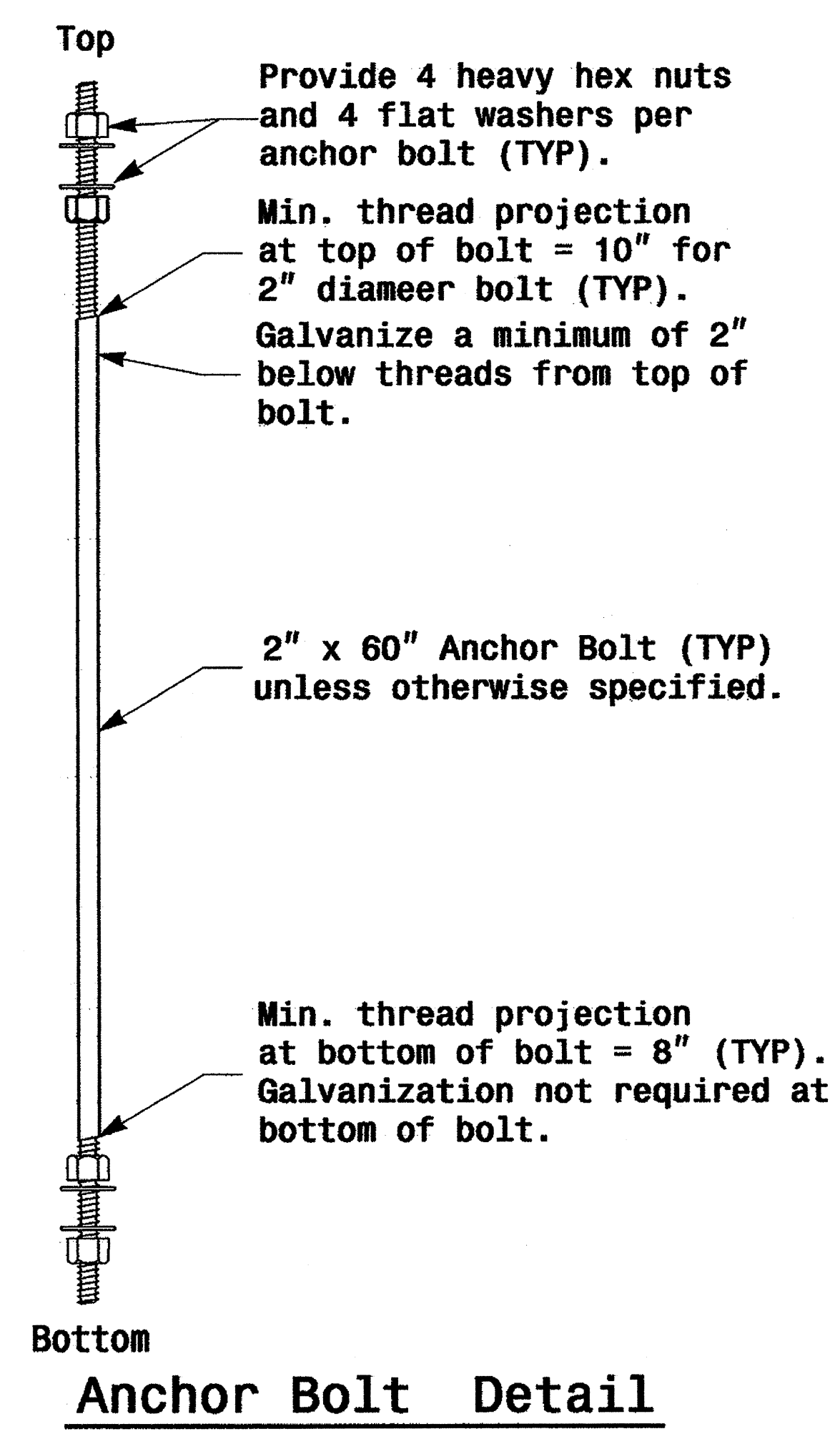
MFG _____ MFG. DATE: MM/YY _____
 SHAFT D/T/L/Y _____
 ARM-A D/T/L/Y _____
 ARM-B D/T/L/Y _____
 A.B. DIA./B.C./L/Y _____
 NCDOT STANDARD _____

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

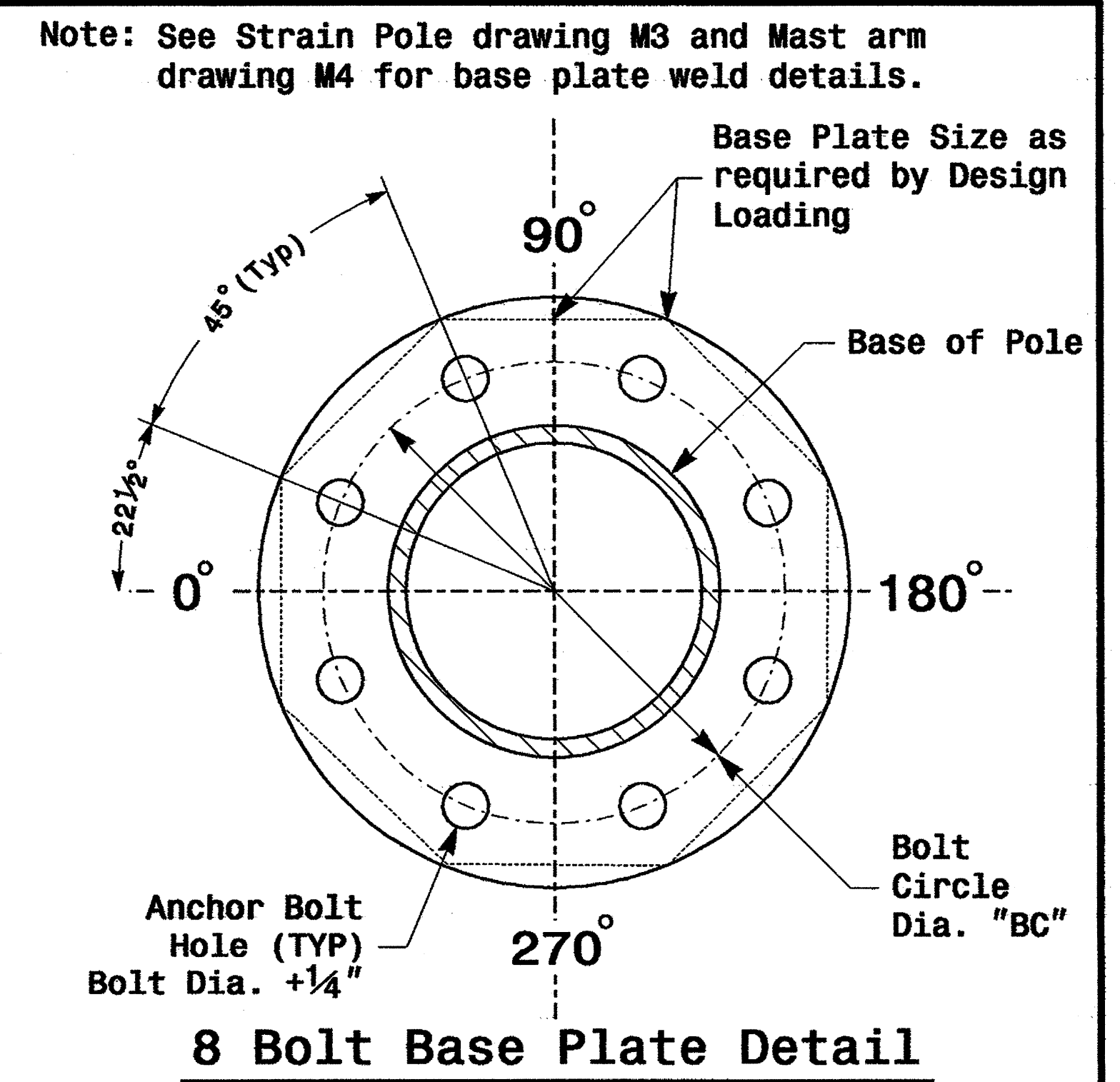
MFG _____ MFG. DATE: MM/YY _____
 SECTION D/T/L/Y _____
 NCDOT STANDARD _____

- 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



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.W. Esposito

222 N. McDowell St., Raleigh, NC 27603

SCALE: 0 NA NONE

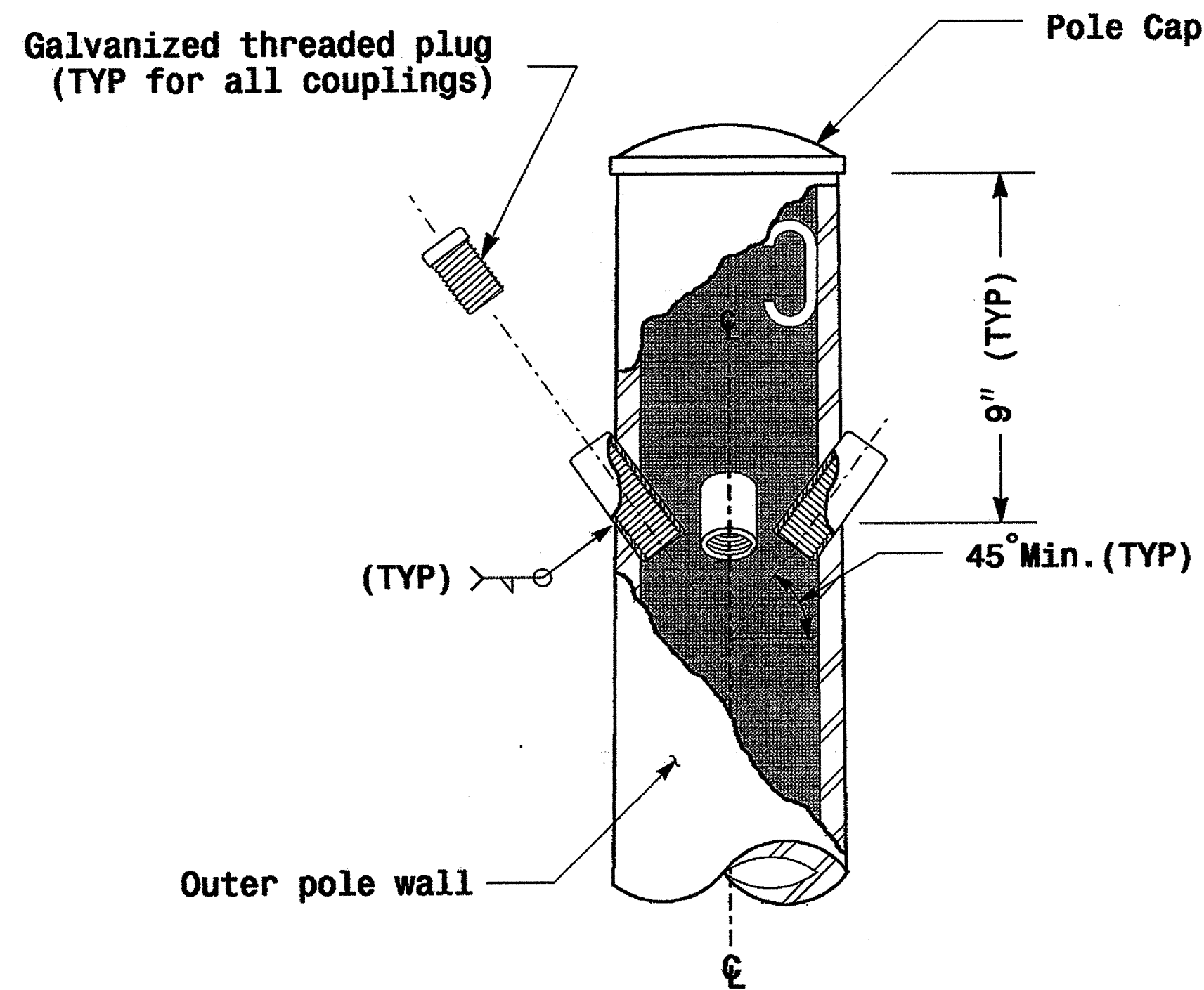
REVISIONS: INIT. DATE

SIGNATURE: D. Sarker 9.2.2005 DATE

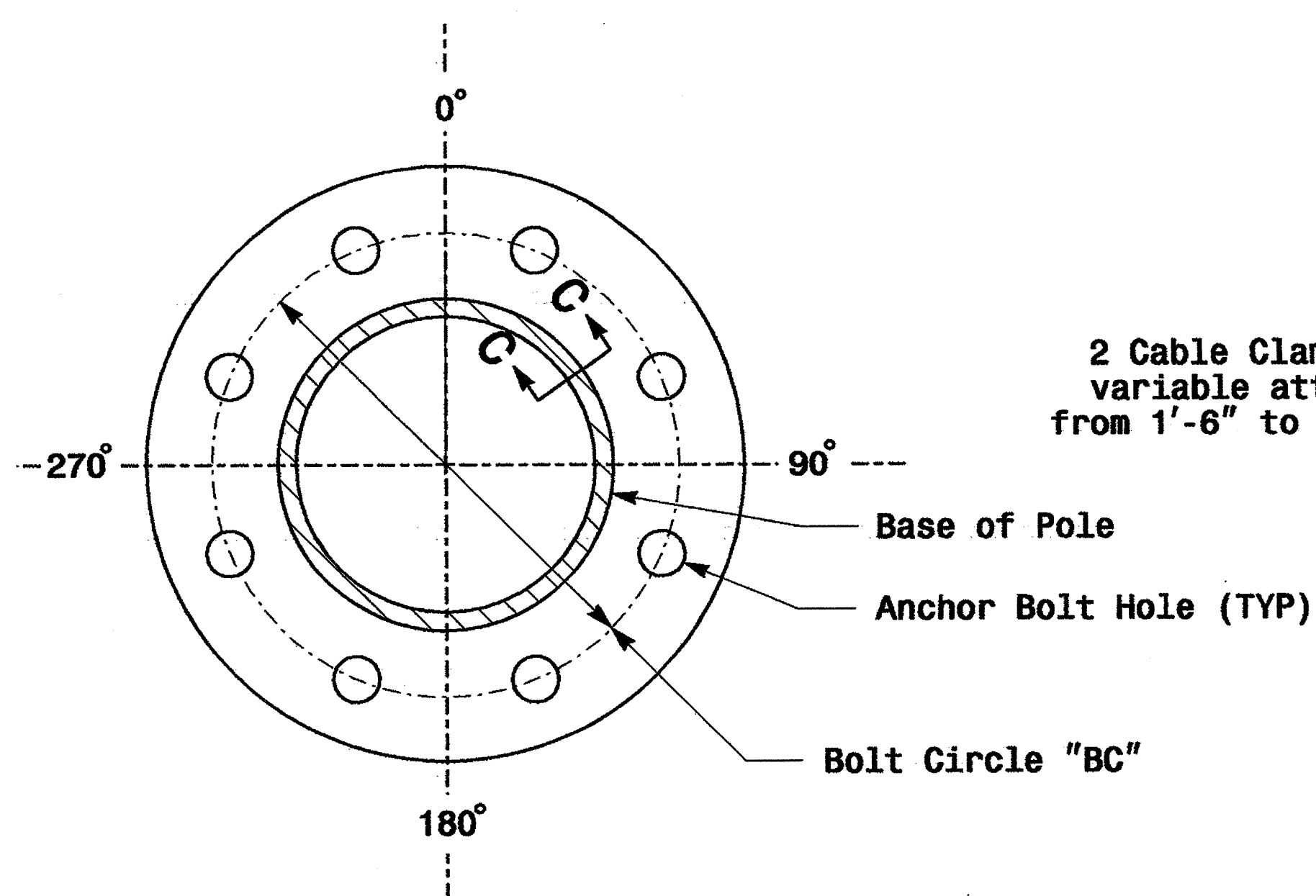
SIG. INVENTORY NO.

Fabrication Details - All Poles

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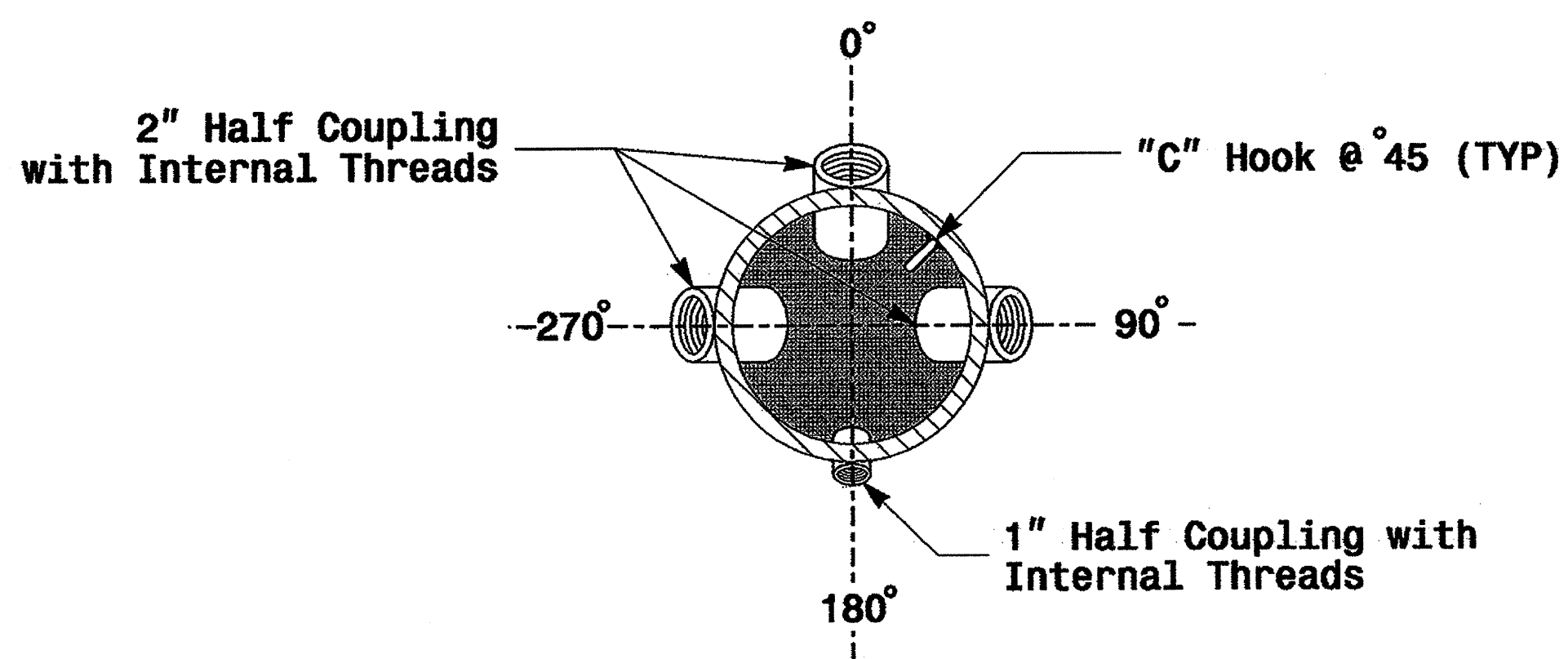
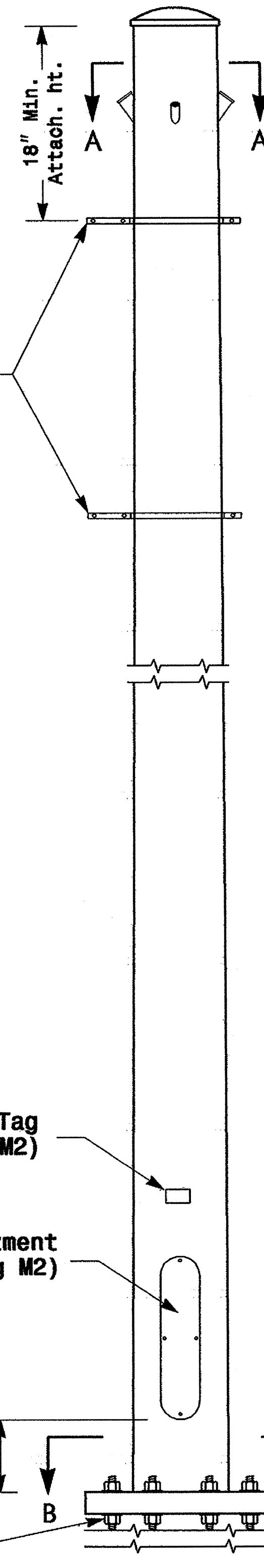


Cable Entrances at Top of Pole



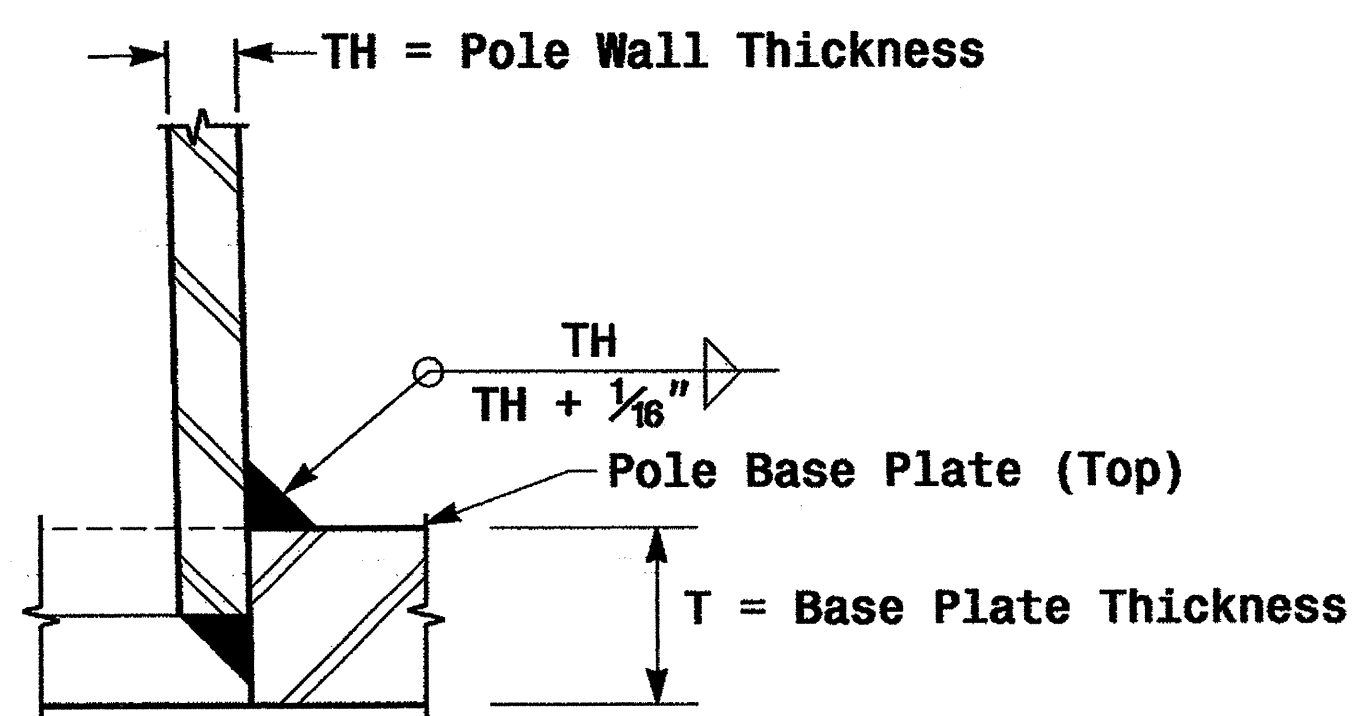
Section B-B
(See drawing M2)
Pole Base Plate

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



Section A-A

Radial Orientation for Factory Installed Accessories at Top of Pole



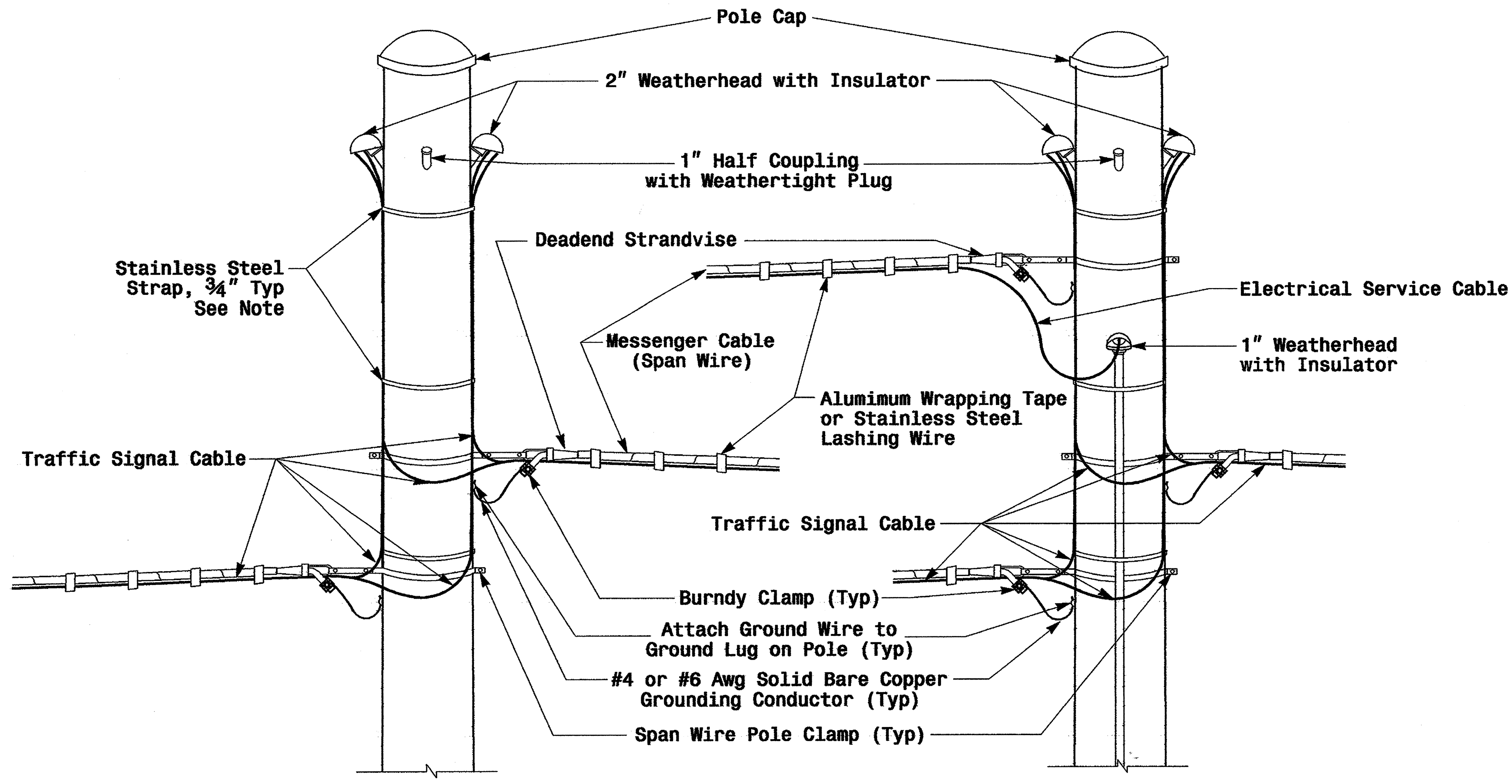
Section C-C

Socket Connection Weld Detail

<p>222 N. McDowell St., Raleigh, NC 27603</p>	<p>Typical Fabrication Details For Strain Poles</p>		<p>SEAL</p>
	<p>PLAN DATE: May 2005</p> <p>PREPARED BY: P.L. Alexander</p> <p>SCALE: 0 NA NONE</p>	<p>REVIEWED BY: C.F. Andrews</p> <p>REVIEWED BY: A.M. Esposito</p>		DATE: 9.2.2005 SIGNATURE: [Signature]
<p>REVISIONS</p>			<p>SIG. INVENTORY NO.</p>

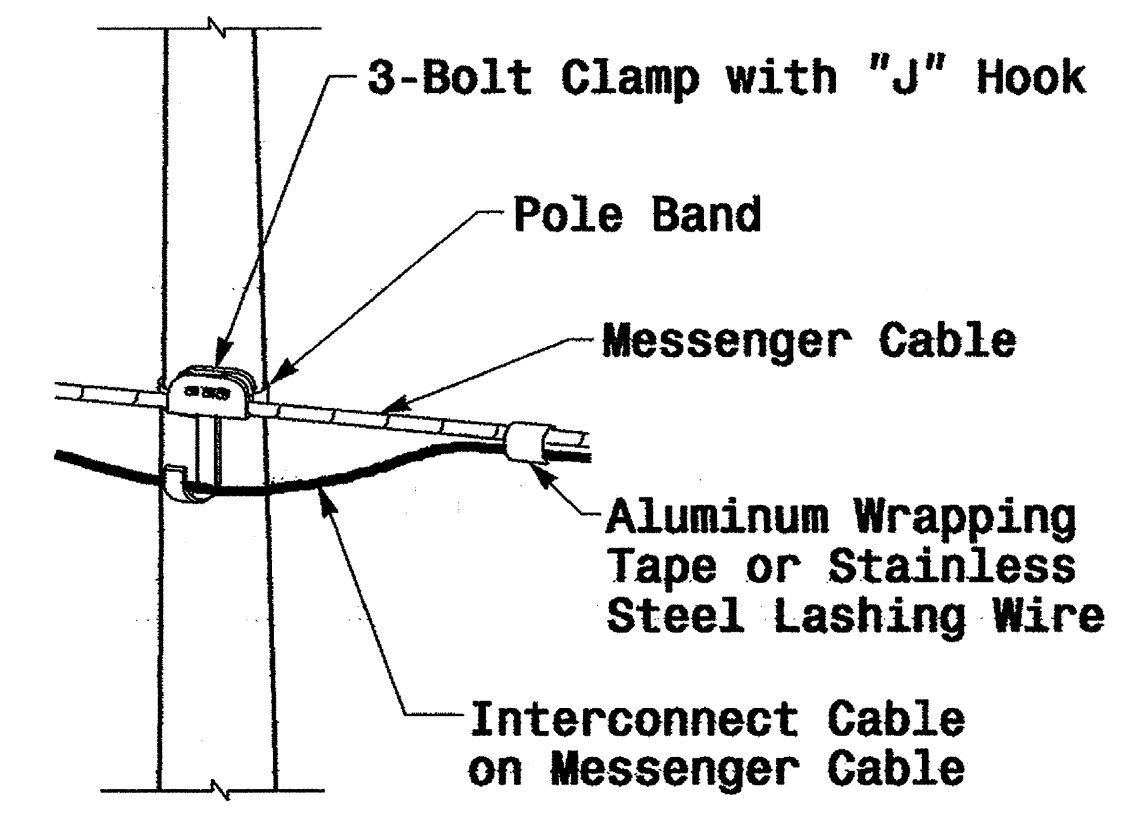
01-SEP-2005 14:07 C:\P\2005\14107\14107\mfg\pdr\cupse2004_mer1 pole strander.dwg alexander

Construction Details - Strain Poles

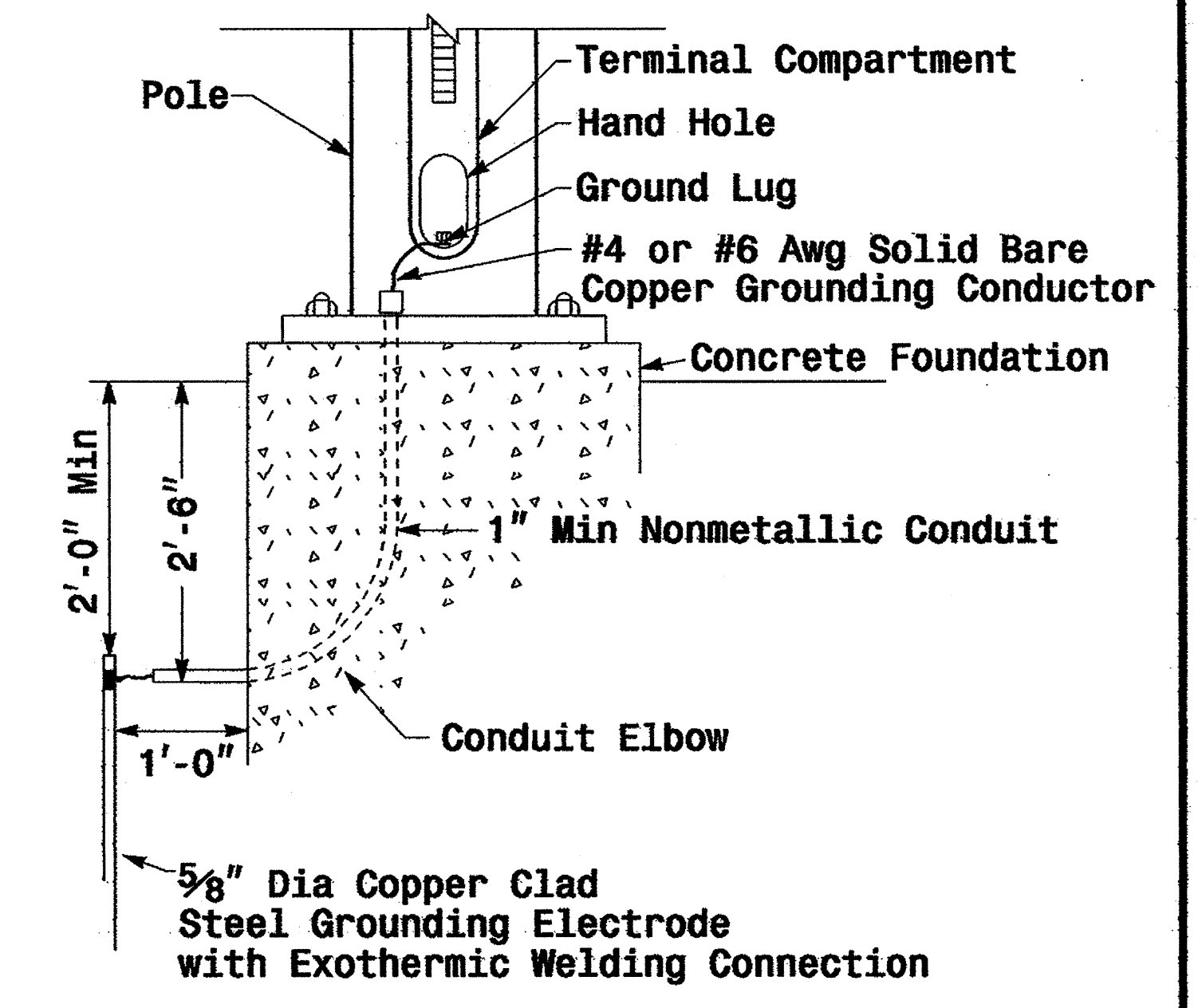


Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole

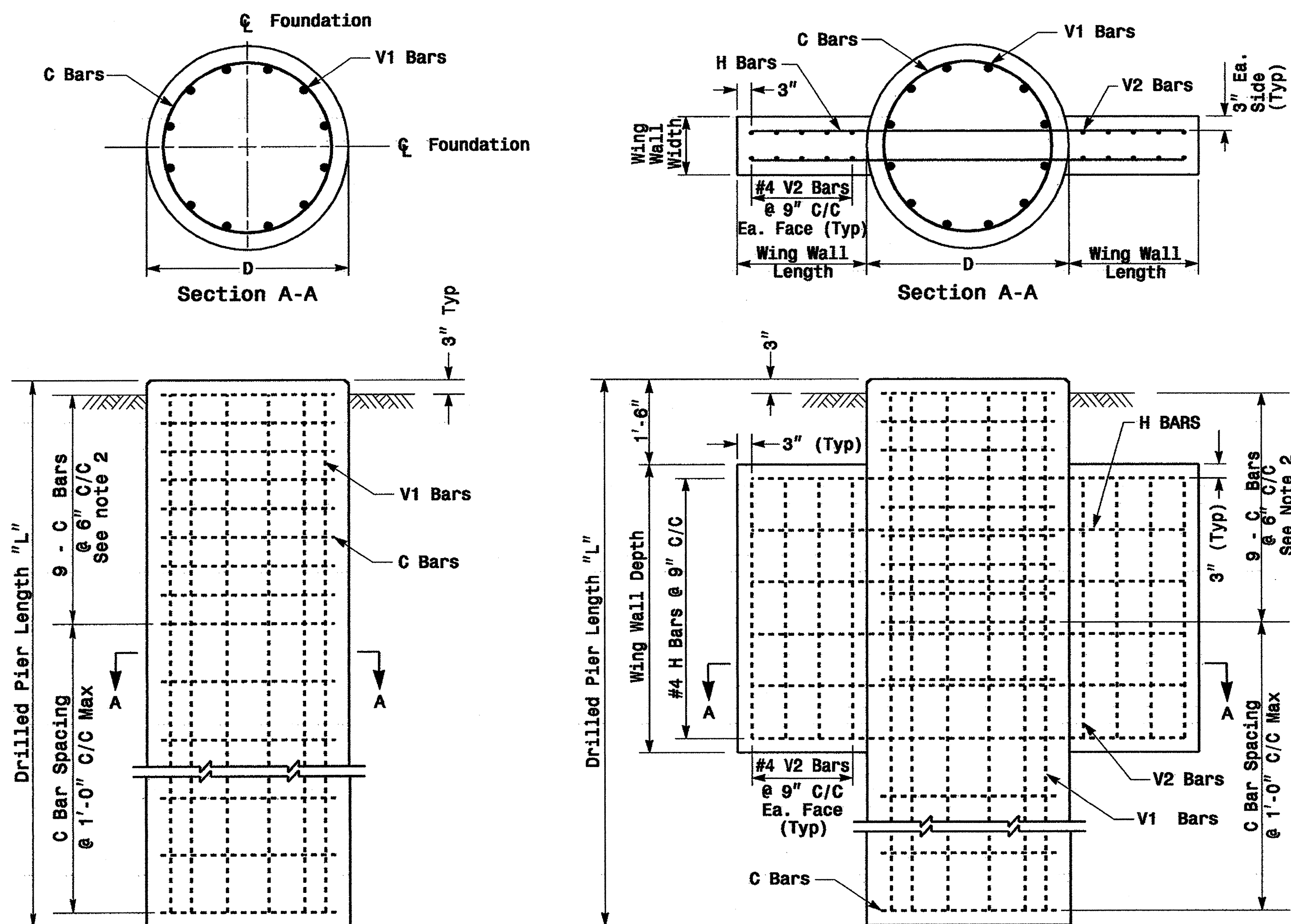


Metal Pole Grounding Detail

01-SEP-2005 16:33
w:\p\p\res-un\11\workgroups\2004 metal pole standards\2004 m6.dgn
palexander

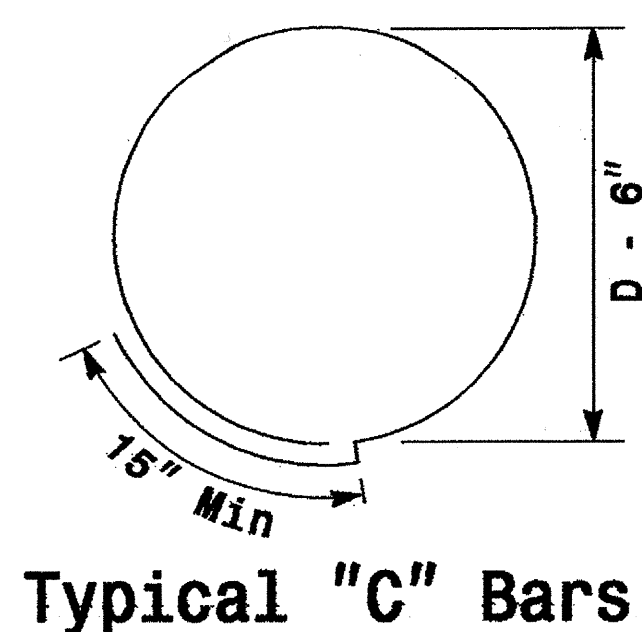
	Construction Details Strain Poles		
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: D.C. SARKAR		REVISIONS INIT. DATE
SCALE: 0 NA NONE		SIGNATURE: <i>P.L. Alexander</i> DATE: 9-1-05 SIG. INVENTORY NO.	

Reinforcing Steel Bars



REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER)						
Shaft Dia (in.)	Conc. Volume (cu. yds.)	Bar Name	No.	Size	Type	Length
42"	.356 x L	V1	9	#8	STR.	**
		C	*	#4	CIR.	10'-9"
48"	.465 x L	V1	12	#8	STR.	**
		C	*	#4	CIR.	12'-6"

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



Typical "C" Bars

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

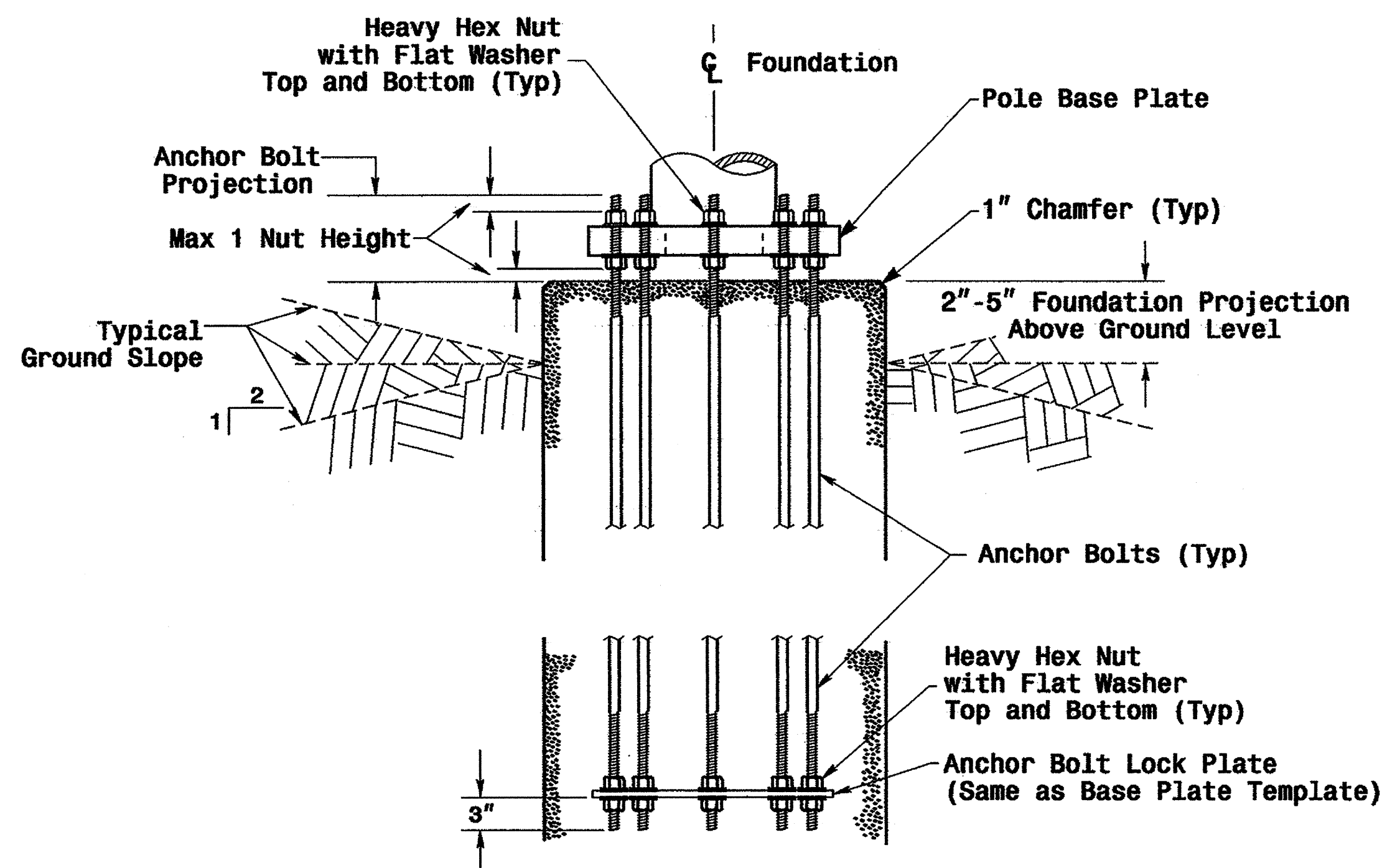
* See Note No. 1
** See Note No. 3

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

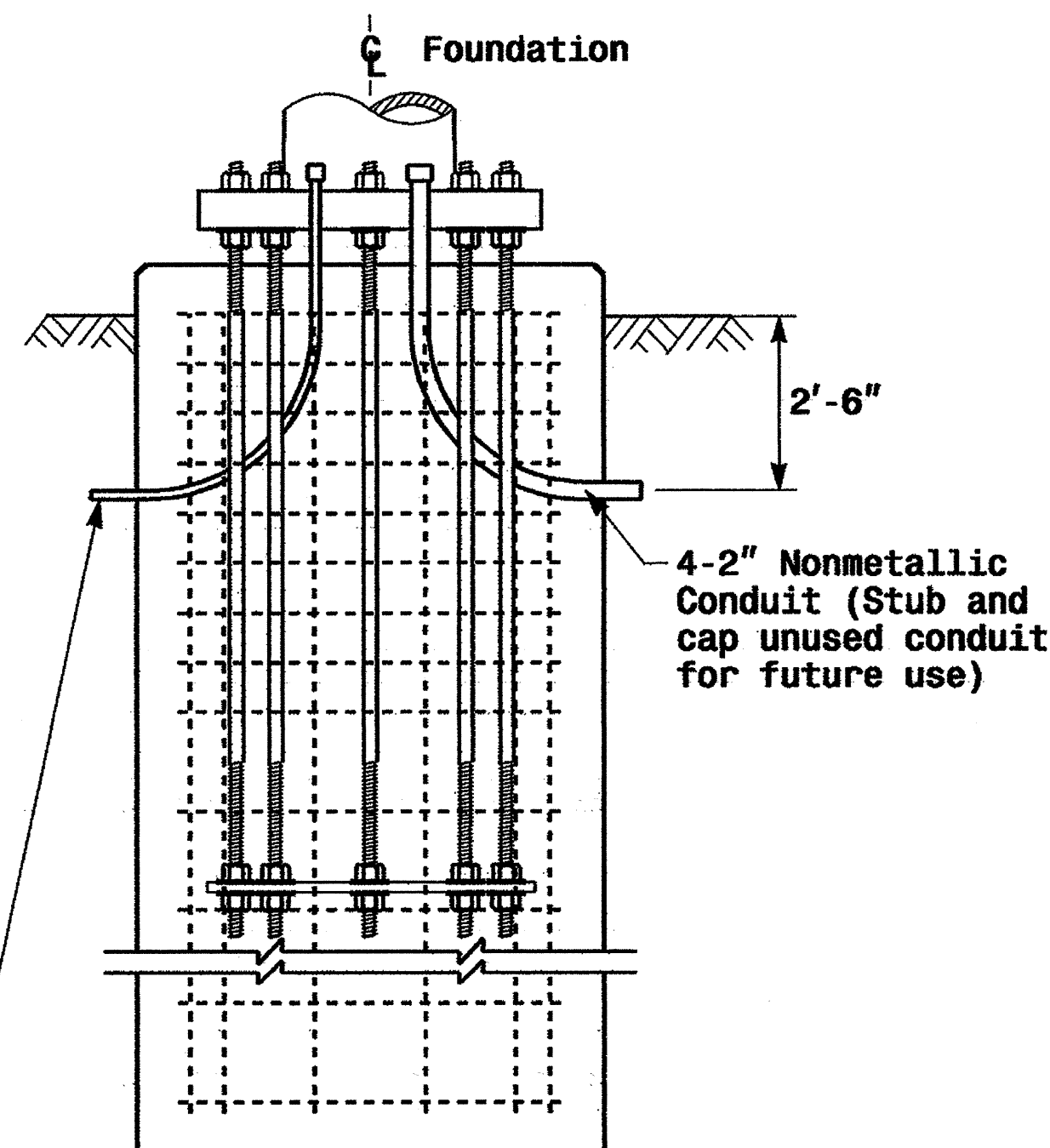
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



2-1" Nonmetallic Conduits for Electrical Service and Grounding Electrode Conductor

Notes

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

Construction Details - Foundations

	Construction Details Foundations		SEAL
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: A.M. ESPOSITO	REVISIONS INIT. DATE	SIGNATURE D. Sarker 9.2.2005 DATE SIG. INVENTORY NO.
SCALE: 0 NA NONE			

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

Concrete Volume (cubic yards) = .356 X L

Fabrication Design Notes:

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

Foundation Selection:

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

Standard Strain Poles

02-SEP-2005 12:42 vr:peop ee-unl1fwkrgroup#004 metol pole etfndar-ds204 mb etd strain pole.dgn

	Standard Strain Poles and Standard Foundations							
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito						
SCALE: None	REVISIONS: <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>							INIT. DATE D. Sarkar 9.2.2005 SIGNATURE DATE