

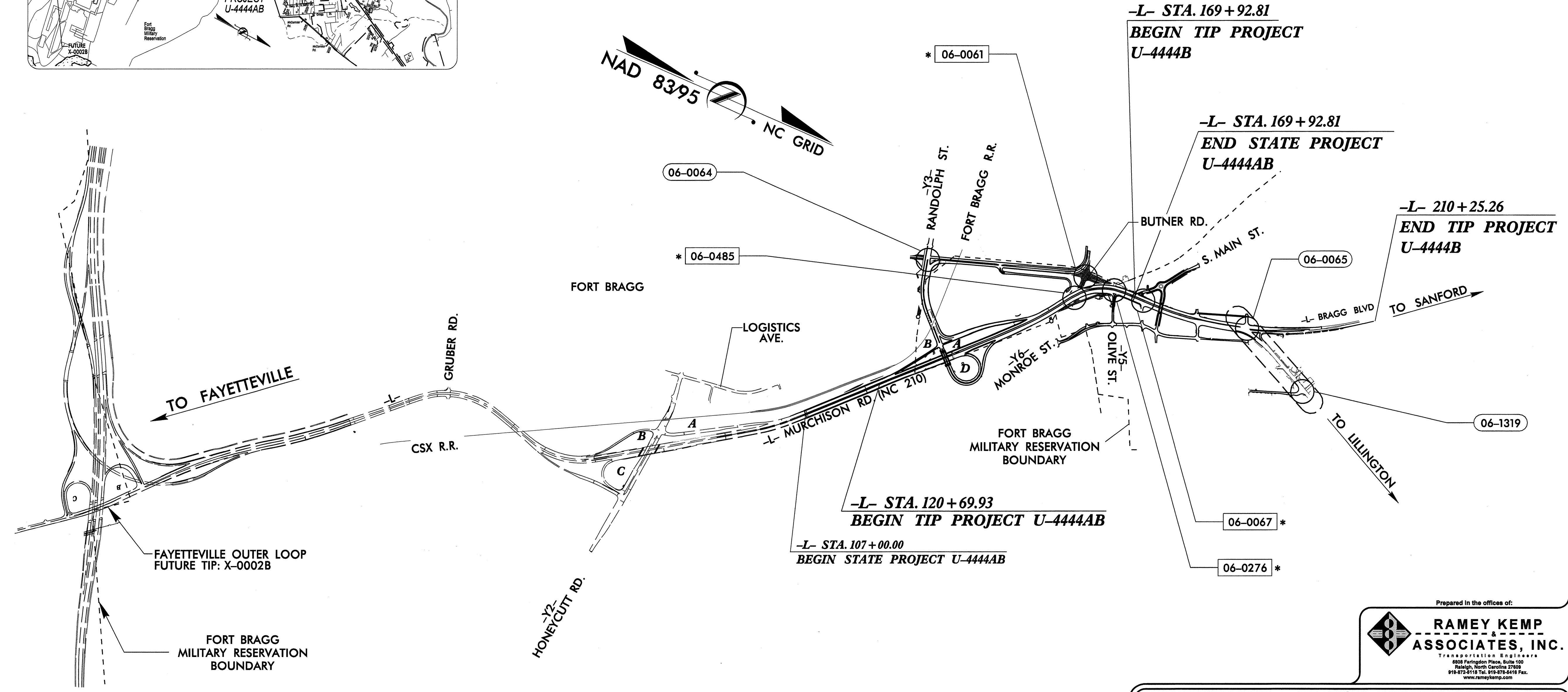
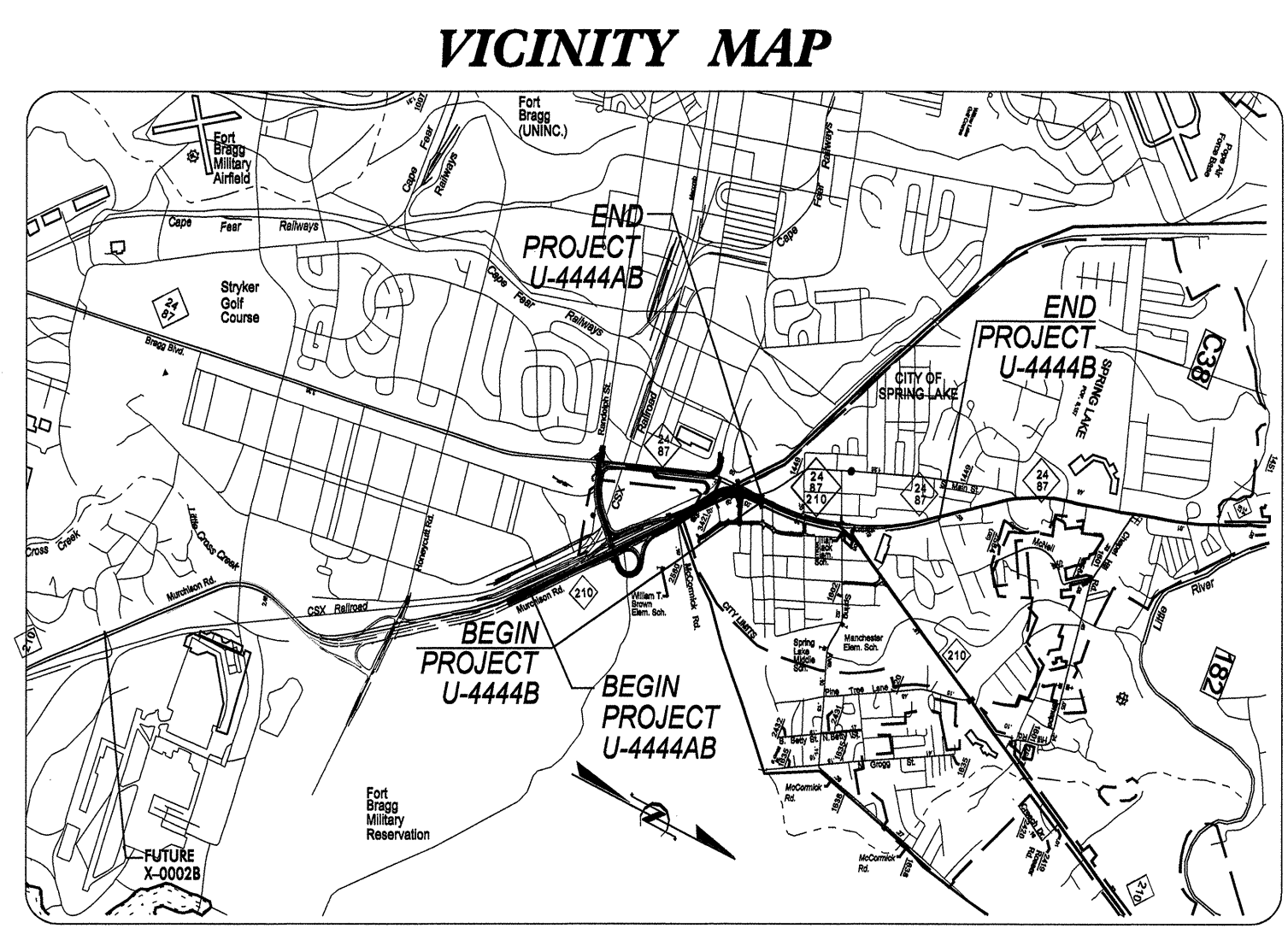
TIP PROJECT: U-4444AB & B

WBS 36492.1.2

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CUMBERLAND COUNTY

LOCATION: NC 210 (MURCHISON ROAD) FROM NORTH OF HONEYCUTT ROAD TO NORTH OF NC 210 (LILLINGTON ROAD)
TYPE OF WORK: Traffic Signal and Communication Design



PLANS PREPARED BY:

W. Jason Hamilton, P.E., PTOE - Project Manager

Nicholas E. Burns, E.I. - Project Engineer

INDEX OF PLANS		
Sheet Number	SIN	Location/Description
Sig. 1	-	Title Sheet
Sig. 2-8	06-0064	NC 2487 (Bragg Boulevard) at Randolph Street
Sig. 9-12	06-0061	NC 2487 (Bragg Boulevard) at Butner Road
Sig. 13-14	06-0276	NC 2487 (Bragg Boulevard) at NC 210 (Murchison Road)
Sig. 15-17	06-0067	NC 2487/210 (Bragg Boulevard) at SR 1449 (South Main Street)/Wilson Avenue
Sig. 17-24	06-0065	NC 2487/210 (Bragg Boulevard) at NC 210 / Spring Avenue
Sig. 25-27	06-1319	NC 210 (Lillington Road) at North Fifth Street
Sig. 28-35	-	Metal Pole Standard Details
Sig. 36-38	-	System Communication Plans
Sig. 39	-	CCTV Camera Installation Detail

Prepared in the offices of:

RAMEY KEMP ASSOCIATES, INC.
 Transportation Engineers
 8008 Farrington Place, Suite 100
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 919-872-2119 Tel. 919-872-2416 Fax
 www.rameykemp.com

LEGEND

SIGNAL INVENTORY NUMBER
 [Symbol] CLOSED LOOP SYSTEM [Symbol] * SIGNAL REMOVAL

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:
Jason P. Galloway, P.E. - Eastern Region Signals Project Engineer
George C. Brown, P.E. - Signal Equipment Design Engineer
I. Neil Avery - Signal Communications Project Engineer

PHASING DIAGRAM

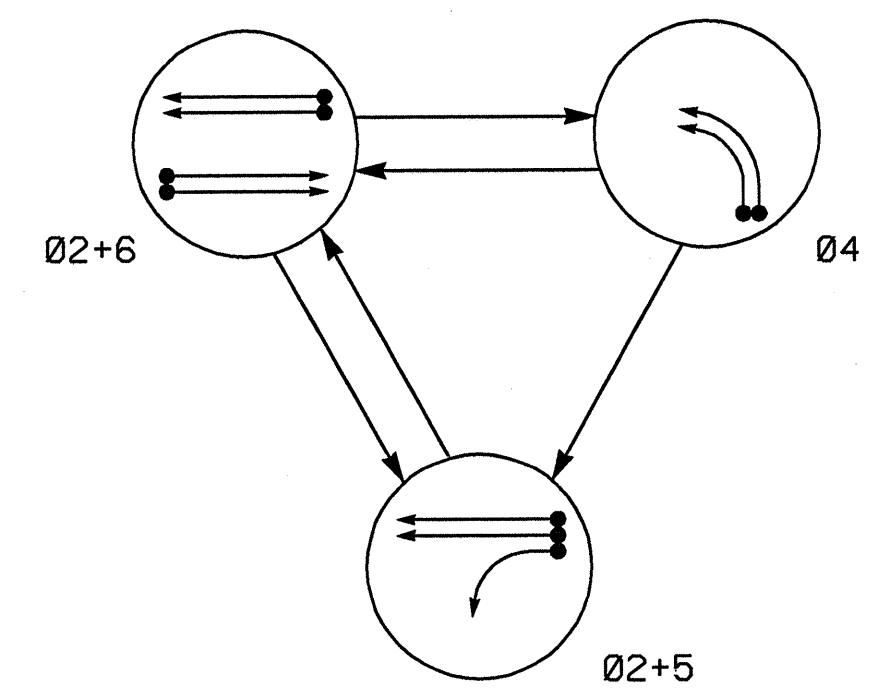
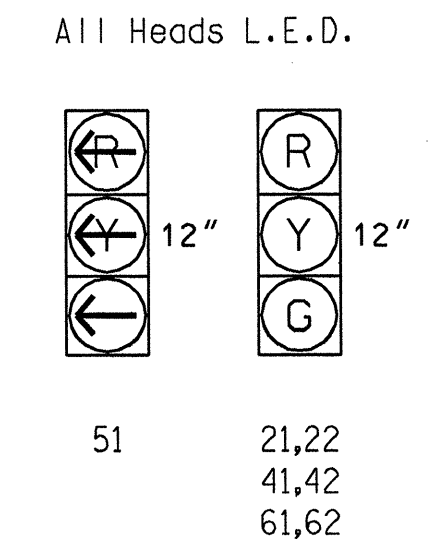


TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø 2+5	Ø 2+6	Ø 4	F L S D
21,22	G	G	R	Y
41,42	R	R	G	R
51	←	←	←	←
61,62	R	G	R	Y

SIGNAL FACE I.D.



OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X6	355	5	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	355	5	Y	2	Y	Y	-	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	-	Y
6A	6X6	355	5	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	355	5	Y	6	Y	Y	-	-	-	-	Y

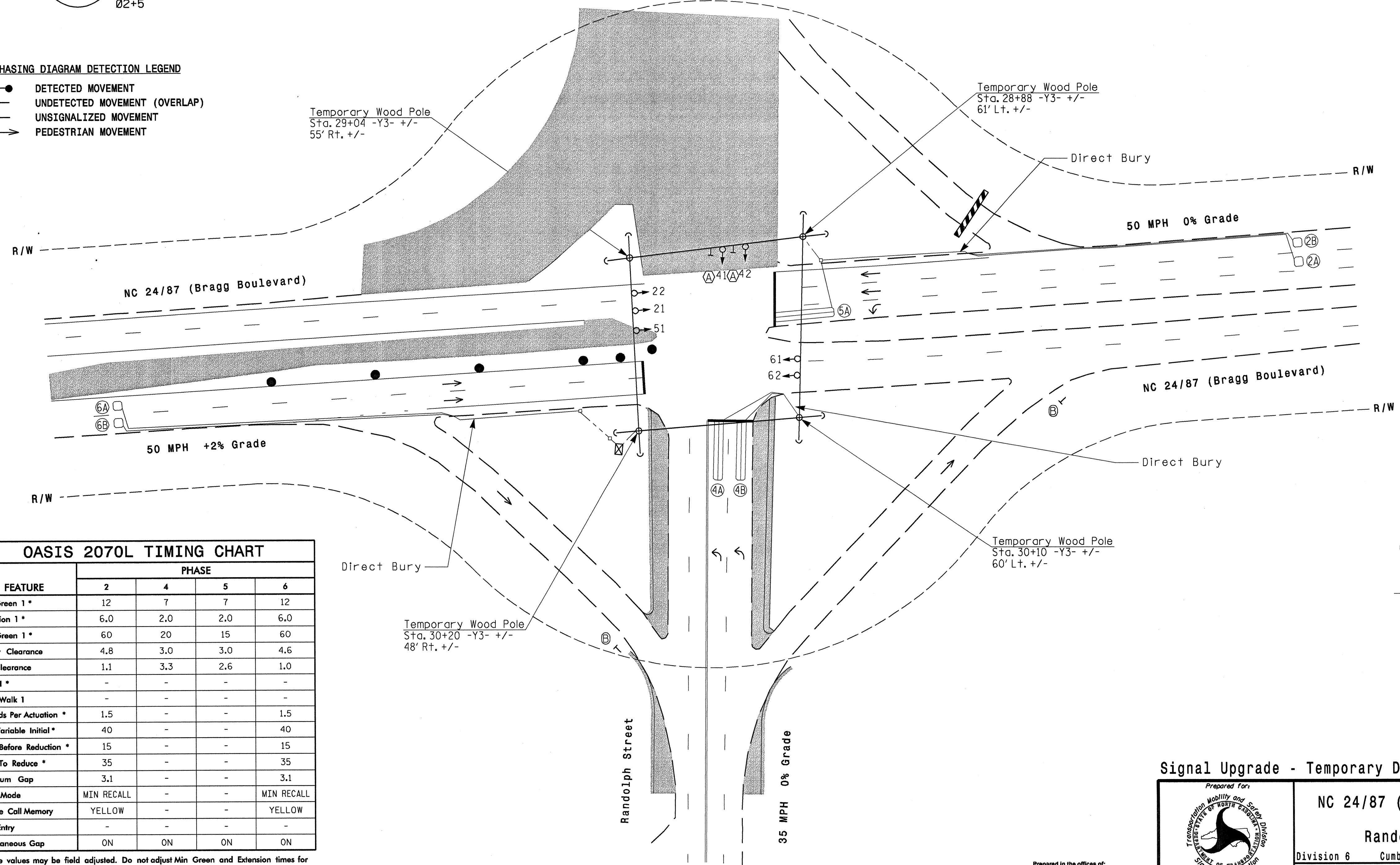
3 Phase Fully Actuated Isolated

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 5 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.

PHASING DIAGRAM DETECTION LEGEND

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



OASIS 2070L TIMING CHART

FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	12	7	7	12
Extension 1 *	6.0	2.0	2.0	6.0
Max Green 1 *	60	20	15	60
Yellow Clearance	4.8	3.0	3.0	4.6
Red Clearance	1.1	3.3	2.6	1.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	-	1.5
Max Variable Initial *	40	-	-	40
Time Before Reduction *	15	-	-	15
Time To Reduce *	35	-	-	35
Minimum Gap	3.1	-	-	3.1
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

LEGEND

PROPOSED	EXISTING
○ → Traffic Signal Head	● → Traffic Signal Head
◐ → Modified Signal Head Sign	N/A
◑ → 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
□ → Inductive Loop Detector	□ → Inductive Loop Detector
□ → Controller & Cabinet	□ → Controller & Cabinet
□ → Junction Box	□ → Junction Box
--- 2-in Underground Conduit	--- 2-in Underground Conduit
N/A Right of Way	--- Right of Way
→ Directional Arrow	→ Directional Arrow
--- Directional Drill	N/A
N/A Construction Barrels	● Construction Barrels
N/A Construction Barricades	▬ Construction Barricades
Construction Zone	Construction Zone
(A) Left Arrow "ONLY" Sign (R3-5L)	(A) Left Arrow "ONLY" Sign (R3-5L)
(B) "YIELD" Sign (R1-2)	(B) "YIELD" Sign (R1-2)

Signal Upgrade - Temporary Design 1 (TMP Phase I)

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 919-872-5115 Tel. 919-872-5416 Fax.
 www.rameykemp.com

Prepared For:

 750 N. Greenfield Pkwy, Garner, NC 27529

NC 24/87 (Bragg Boulevard) at Randolph Street
 Division 6 Cumberland County Spring Lake
 PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
 PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)
 REVISIONS: INIT. DATE

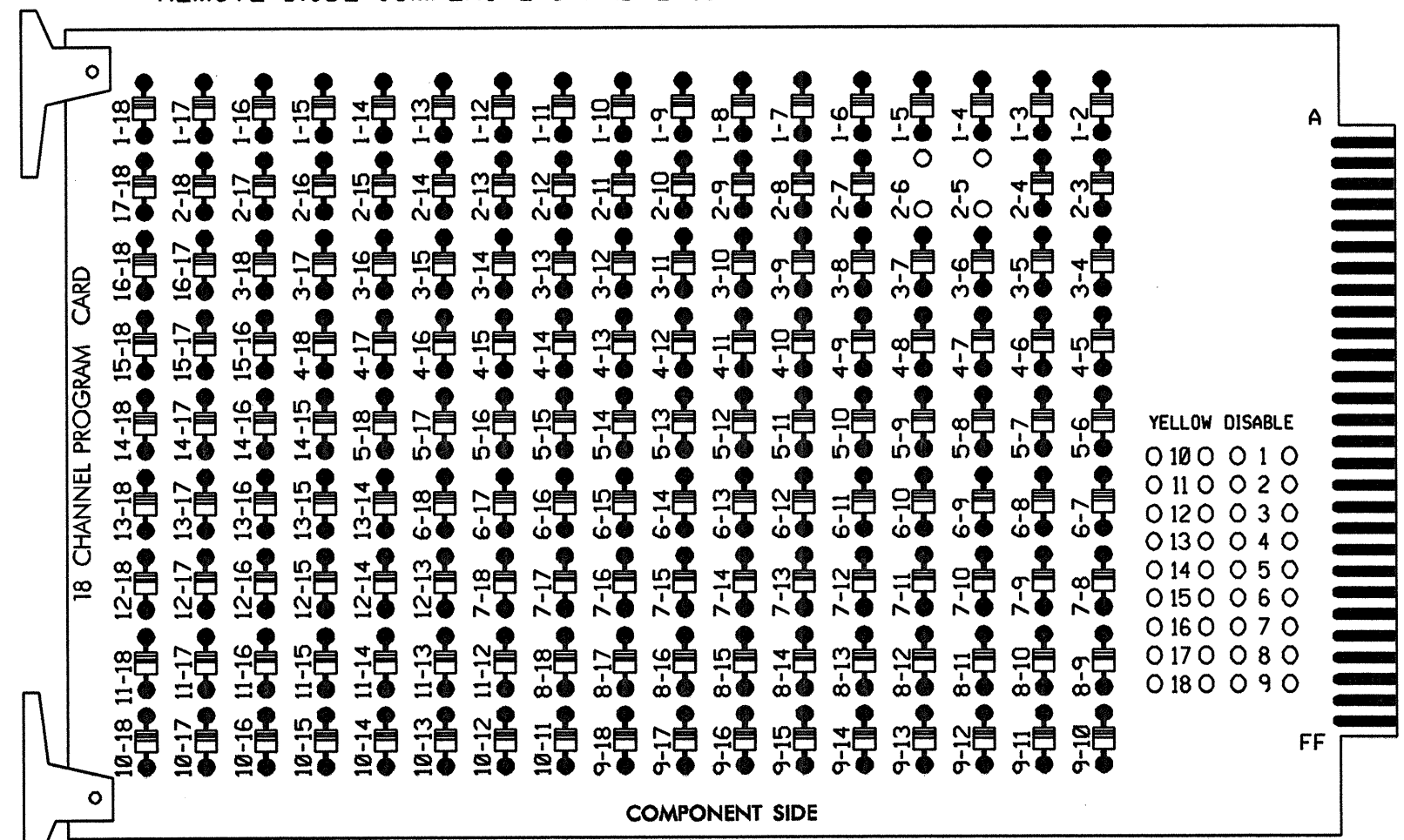
SEAL

 WILLIAM J. HAMILTON
 ENGINEER
 DATE: 6/19/12
 SIG. INVENTORY NO. 06-00641

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

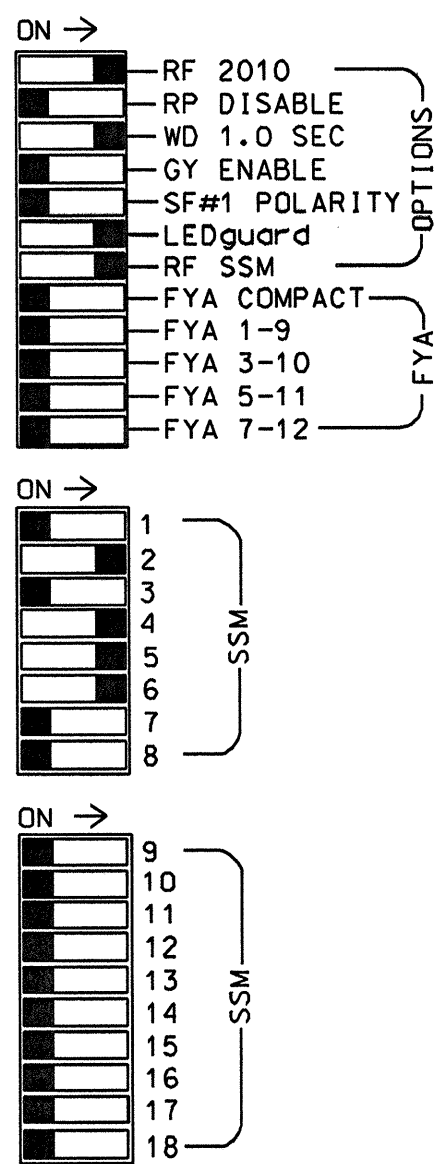
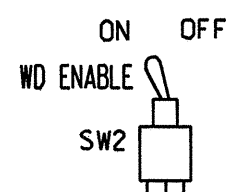
REMOVE DIODE JUMPERS 2-5 AND 2-6.



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. part 1 of 2070 controller. Ensure conflict monitor communicates with 2070.



■ = DENOTES POSITION OF SWITCH

NOTES

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

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,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

INPUT FILE POSITION LAYOUT

(front view)

FILE U	1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	S	2A	S	S	S	4A	S	S	S	S	S	S	S	FS
L	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	DC ISOLATOR
FILE U	5A	6A	S	S	S	S	S	S	S	S	S	S	S	S
"J"	NOT USED	6B	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	DC ISOLATOR
L	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M	←-T-03M

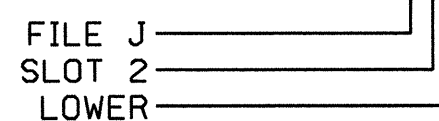
EX.: 1A, 2A, ETC. = LOOP NO.'S

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			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



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	DLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	51	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134										
YELLOW		129			102			135										
GREEN		130			103			136										
RED ARROW								131										
YELLOW ARROW								132										
FLASHING YELLOW ARROW																		
GREEN ARROW								133										

NU = Not Used

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-0064T1
 DESIGNED: Jun 2012
 SEALED: 06-29-2012
 REVISED:

Signal Upgrade - Temporary Design 1 (TMP Phase I)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 24/87 (Bragg Boulevard) at Randolph Street

Division 6 Cumberland County Spring Lake

PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton

PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

REVISIONS: INIT. DATE

SIGNATURE: DATE: 6/25/12

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER WILLIAM J. HAMILTON SEAL 32396

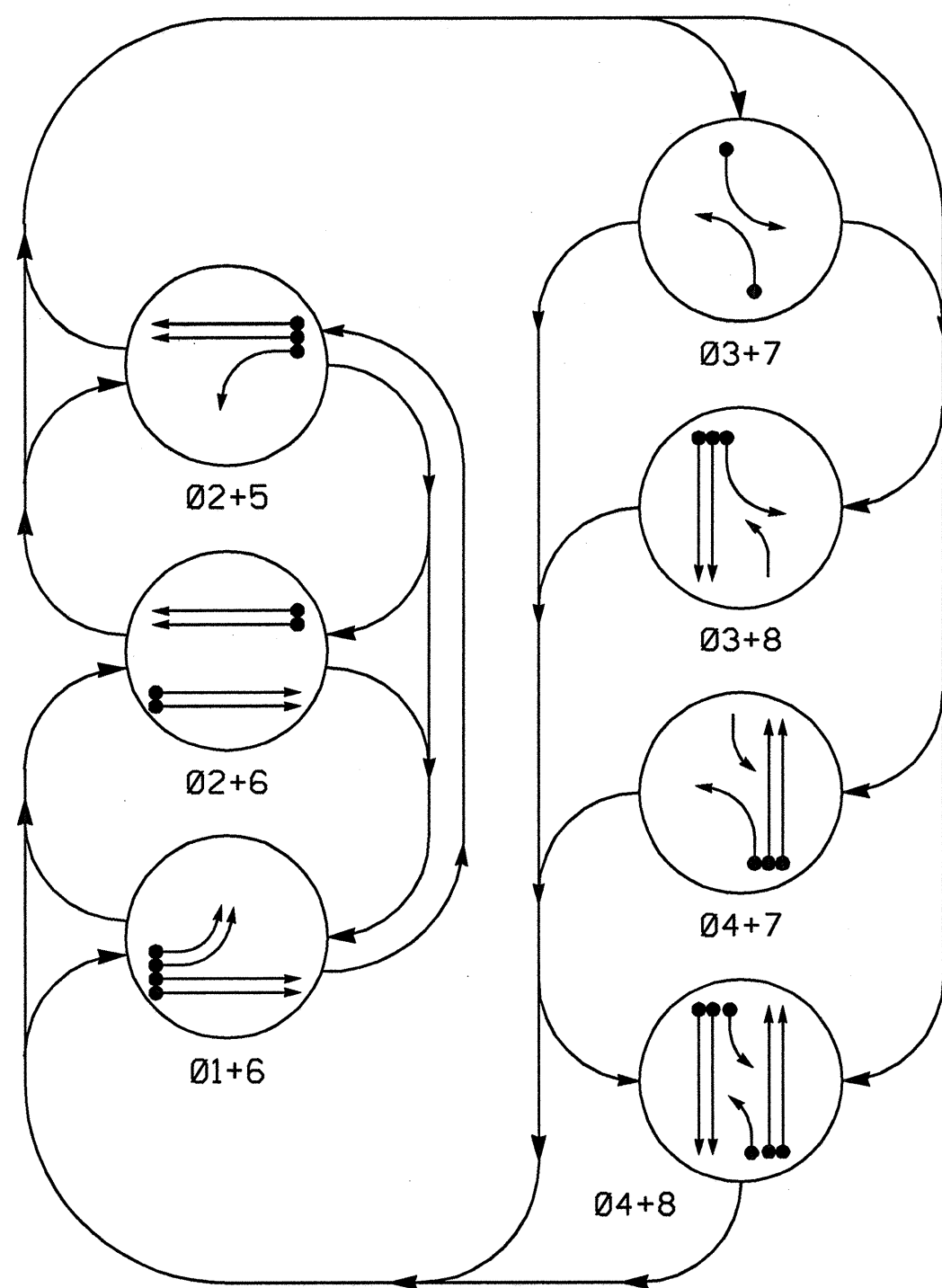
750 N. Greenfield Pkwy, Garner, NC 27529

Prepared in the offices of:

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 www.rameykemp.com, NC License No. C-0810

SIG. INVENTORY NO. 06-0064T1

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

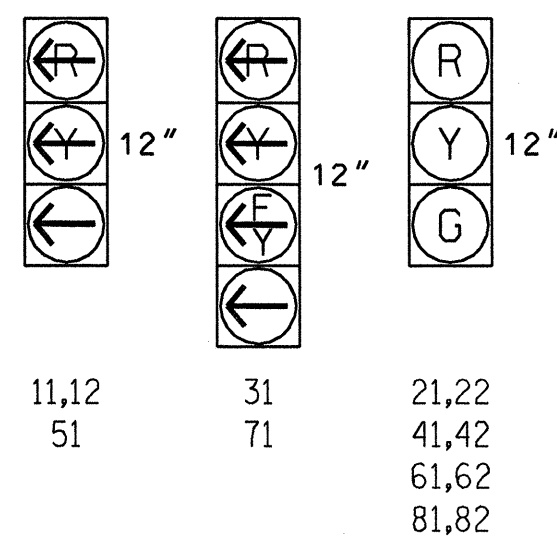
- ← ● → DETECTED MOVEMENT
- ← ○ → UNDETECTED MOVEMENT (OVERLAP)
- ← ○ → UNSIGNALIZED MOVEMENT
- ← ○ → PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE							
	Ø 1+6	Ø 2+5	Ø 2+6	Ø 3+7	Ø 3+8	Ø 4+7	Ø 4+8	PEDESTRIAN
11,12	←	←	←	←	←	←	←	←
21,22	R	G	G	R	R	R	R	Y
31	←	←	←	←	←	←	←	←
41,42	R	R	R	R	R	G	G	R
51	←	←	←	←	←	←	←	←
61,62	G	R	G	R	R	R	R	Y
71	←	←	←	←	←	←	←	←
81,82	R	R	R	R	G	R	G	R

F = Flashing Yellow Arrow

SIGNAL FACE I.D.

All Heads L.E.D.



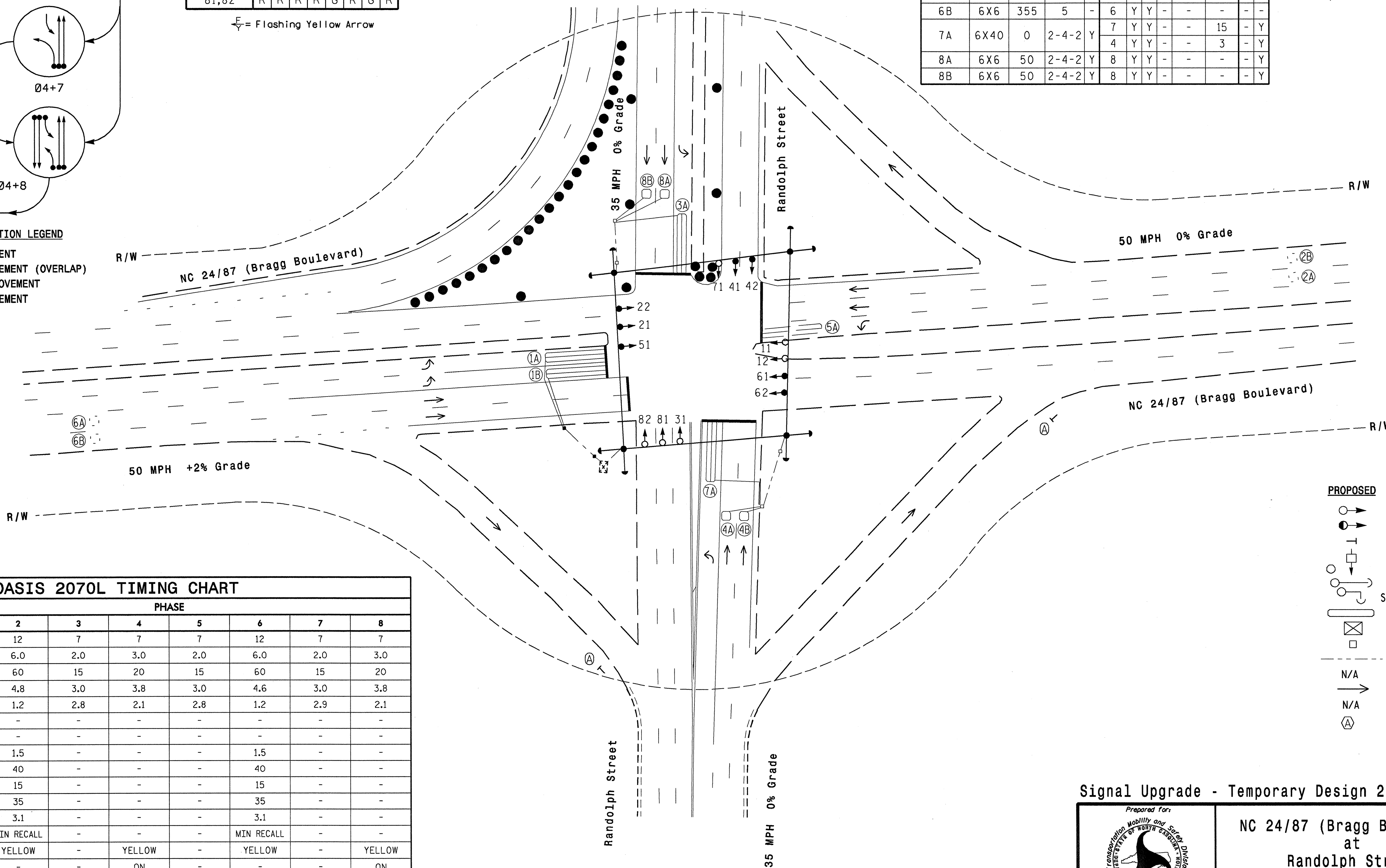
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

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
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	-	-	Y
1B	6X40	0	2-4-2	Y	1	Y	Y	-	-	-	-	Y
2A	6X6	355	5	-	2	Y	Y	-	-	-	-	-
2B	6X6	355	5	-	2	Y	Y	-	-	-	-	-
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	15	-	Y
4A	6X6	60	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	6X6	60	2-4-2	Y	4	Y	Y	-	-	-	-	Y
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
6A	6X6	355	5	-	6	Y	Y	-	-	-	-	-
6B	6X6	355	5	-	6	Y	Y	-	-	-	-	-
7A	6X40	0	2-4-2	Y	7	Y	Y	-	-	15	-	Y
8A	6X6	50	2-4-2	Y	8	Y	Y	-	-	-	-	Y
8B	6X6	50	2-4-2	Y	8	Y	Y	-	-	-	-	Y

7 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. Phase 1 and/or phase 5 may be lagged.
5. Phase 3 and/or phase 7 may be lagged.
6. Reposition existing signal heads numbered 41 and 42.



OASIS 2070L TIMING CHART

FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Min Green 1 *	7	12	7	7	7	12	7	7
Extension 1 *	2.0	6.0	2.0	3.0	2.0	6.0	2.0	3.0
Max Green 1 *	15	60	15	20	15	60	15	20
Yellow Clearance	3.0	4.8	3.0	3.8	3.0	4.6	3.0	3.8
Red Clearance	3.3	1.2	2.8	2.1	2.8	1.2	2.9	2.1
Walk 1 *	-	-	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-	-	-
Seconds Per Actuation *	-	1.5	-	-	-	1.5	-	-
Max Variable Initial *	-	40	-	-	-	40	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	35	-	-	-	35	-	-
Minimum Gap	-	3.1	-	-	-	3.1	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Vehicle Call Memory	-	YELLOW	-	YELLOW	-	YELLOW	-	YELLOW
Dual Entry	-	-	-	ON	-	-	-	ON
Simultaneous Gap	ON	ON	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 | ● → Traffic Signal Head |
| ○ → Modified Signal Head | N/A |
| □ → Sign | □ → Sign |
| ○ → Pedestrian Signal Head With Push Button & Sign | ○ → Pedestrian Signal Head |
| □ → Signal Pole with Guy | □ → Signal Pole with Guy |
| □ → Signal Pole with Sidewalk 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 |
| N/A → Right of Way | --- → Right of Way |
| → → Directional Arrow | → → Directional Arrow |
| N/A → Construction Barrels | ● → Construction Barrels |
| ⊙ → "YIELD" Sign (R1-2) | ⊙ → "YIELD" Sign (R1-2) |

Signal Upgrade - Temporary Design 2 (TMP Phase II and III)

Prepared in the offices of:
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 Professional Engineers
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 919-272-5118 FAX 919-272-5418 Fax
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Prepared for:

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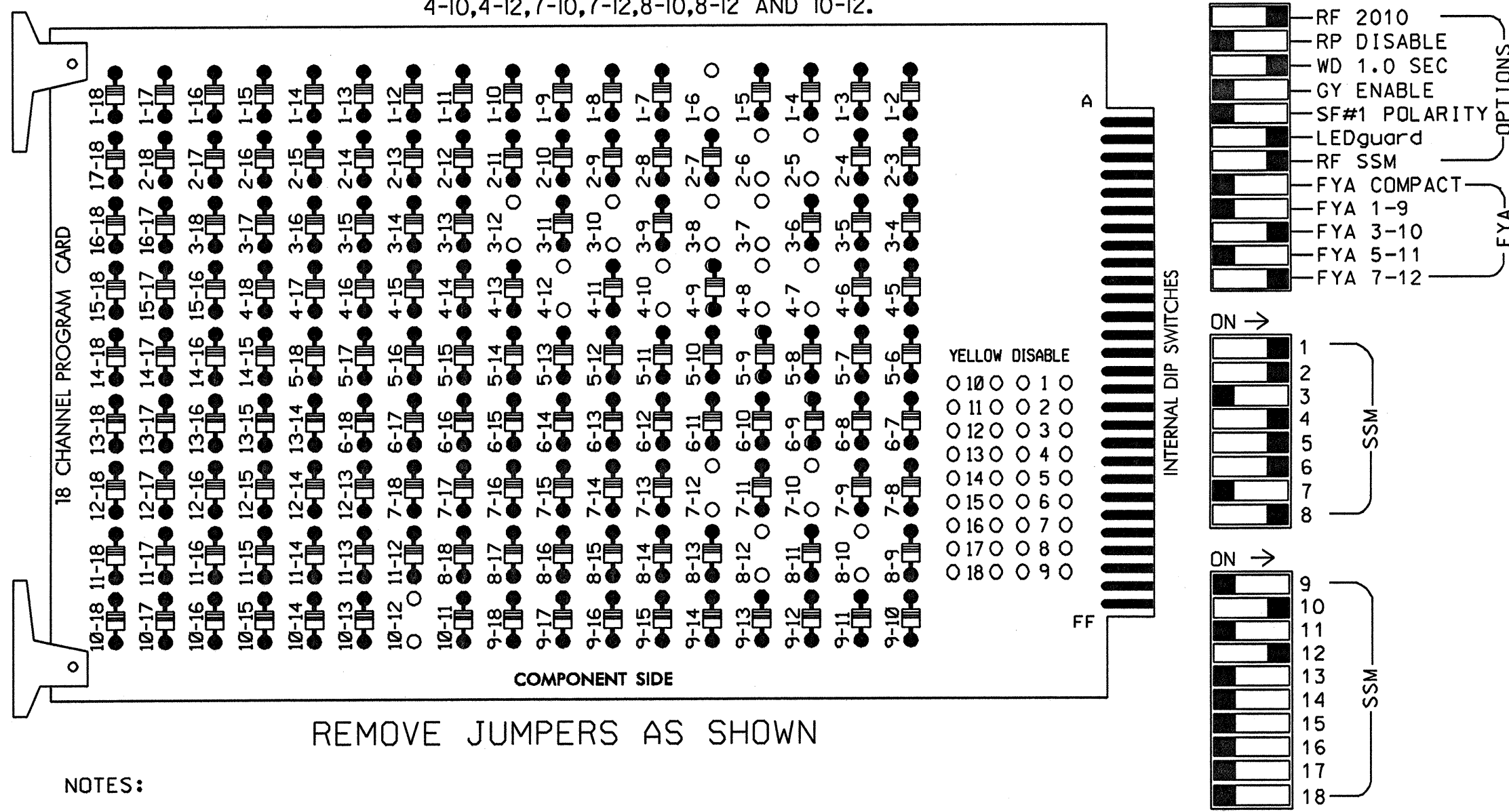
NC 24/87 (Bragg Boulevard) at Randolph Street
 Division 6 Cumberland County Spring Lake
 PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
 PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)
 REVISIONS: _____ INIT. DATE: _____

SEAL

 WILLIAM J. HAMILTON
 ENGINEER
 DATE: 6/29/12
 SIG. INVENTORY NO. 06-0064T2

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

REMOVE DIODE JUMPERS 1-6,2-5,2-6,3-7,3-8,3-10,3-12,4-7,4-8,
4-10,4-12,7-10,7-12,8-10,8-12 AND 10-12.



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash and overlap 2 as Wag overlaps.

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,S4,S5,S7,S8,S10,S11,AUX S2,AUX S5
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP "A".....NONE
OVERLAP "B".....3+4
OVERLAP "C".....NONE
OVERLAP "D".....7+8

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.	11,12	21,22	NU	31	41,42	NU	51	61,62	NU	71	81,82	NU	NU	31	NU	NU	71	NU
RED		128			101			134			107							
YELLOW		129		*	102			135		*	108							
GREEN		130			103			136			109							
RED ARROW	125							131						A124				A101
YELLOW ARROW	126							132						A125				A102
FLASHING YELLOW ARROW														A126				A103
GREEN ARROW	127			118				133			124							

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

INPUT FILE POSITION LAYOUT
(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
L	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A
U	∅ 1	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
L	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B

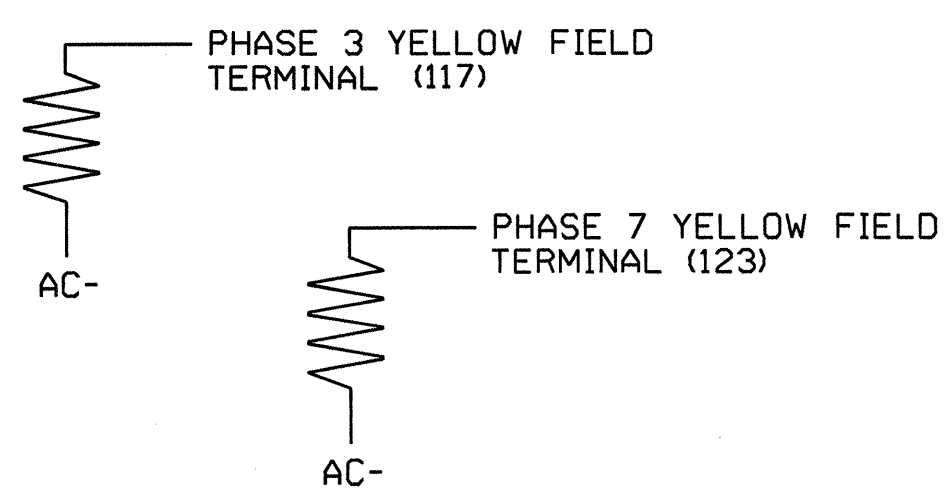
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

**LOAD RESISTOR
INSTALLATION DETAIL**

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



PHASE SEQUENCE PROGRAMMING DETAIL
(program controller as shown below)

FROM OASIS LOCAL CONTROLLER MAIN MENU
SELECT: 4 PHASE SEQUENCE

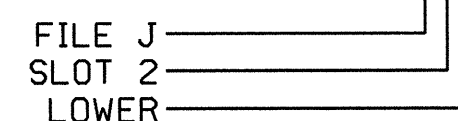
PHASE SEQUENCE: PAGE 1	NEXT: PAGES
RNG:LEAD	BARRIER 1 X-LAG:LEAD BARRIER 2 X-LAG
1 : 1	2 0 0 0 1 3 4 0 0 0
2 : 0	6 0 5 7 8 0 0 0 0
3 : 0	0 0 0 0 0 0 0 0 0
4 : 0	0 0 0 0 0 0 0 0 0

INPUT FILE CONNECTION & PROGRAMMING CHART

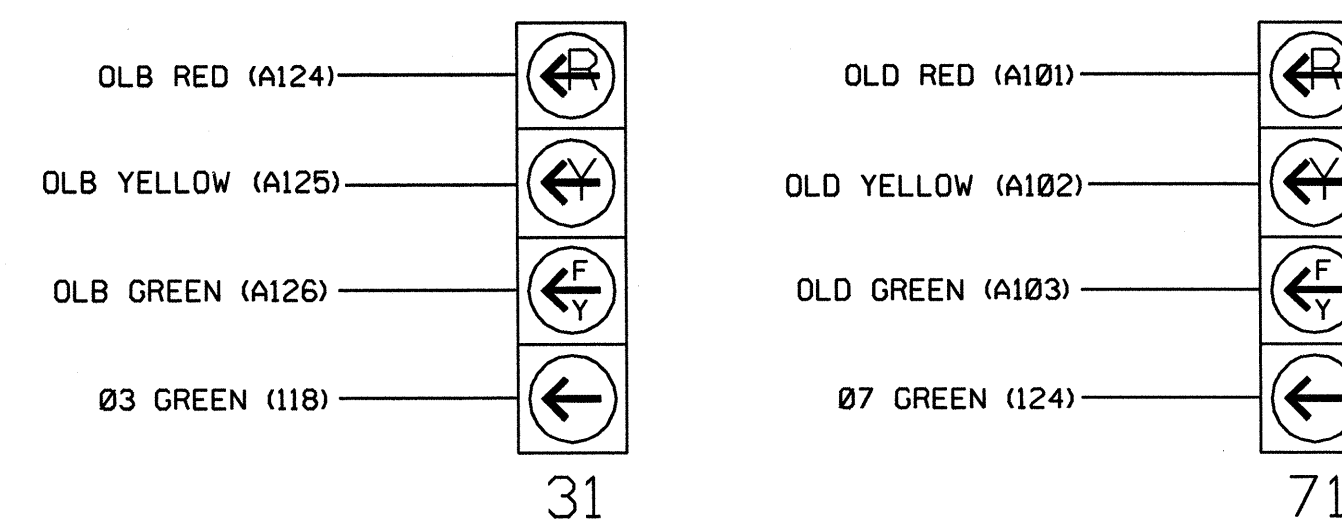
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
1B	TB2-3,4	I1L	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A ¹	TB4-5,6	I5U	58	20	3	3	Y	Y			15
	-	J8U	50	12	28	8	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
7A ²	TB5-5,6	J5U	57	19	7	7	Y	Y			15
	-	I8U	49	11	24	4	Y	Y			3
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			

- Add jumper from I5-W to J8-W, on rear of input file.
- Add jumper from J5-W to I8-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL
(wire signal heads as shown)



NOTE

- The sequence display for these signal heads require special logic programming. See sheet 2 of 2 for programming instructions.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 06-0064T2
DESIGNED: Jun 2012
SEALED: 06-29-2012
REVISED:

Electrical Detail
Sheet 1 of 2

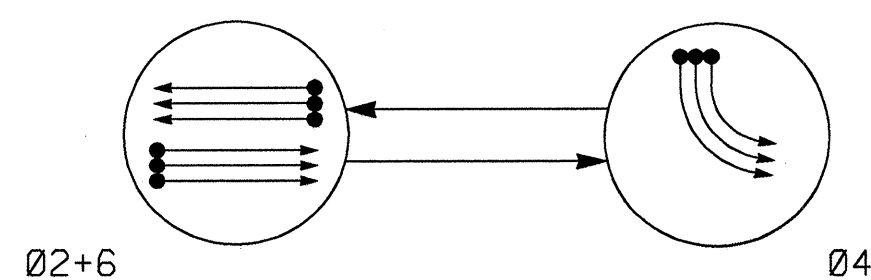
Signal Upgrade - Temporary Design 2 (TMP Phase II and III)

	ELECTRICAL AND PROGRAMMING DETAILS FOR:		NC 24/87 (Bragg Boulevard) at Randolph Street		
	Division 6 Cumberland County Spring Lake		PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton		
PREPARED BY: NE Burns		RKA PROJ. NO: 11172 (040)		REVISIONS:	
750 N. Grantfield Pkwy, Garner, NC 27529		Prepared in the offices of:		SIGNATURE: DATE:	

RAMEY KEMP ASSOCIATES, INC.
Transportation Engineers
8800 Farrington Place, Suite 100
Raleigh, North Carolina 27609
919-872-5410 Fax: 919-872-5411 Fax
www.rameykemp.com

SIG. INVENTORY NO. 06-0064T2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

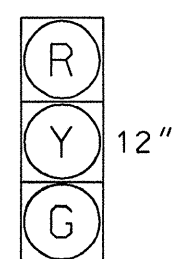
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.



21,22
41,42
61,62

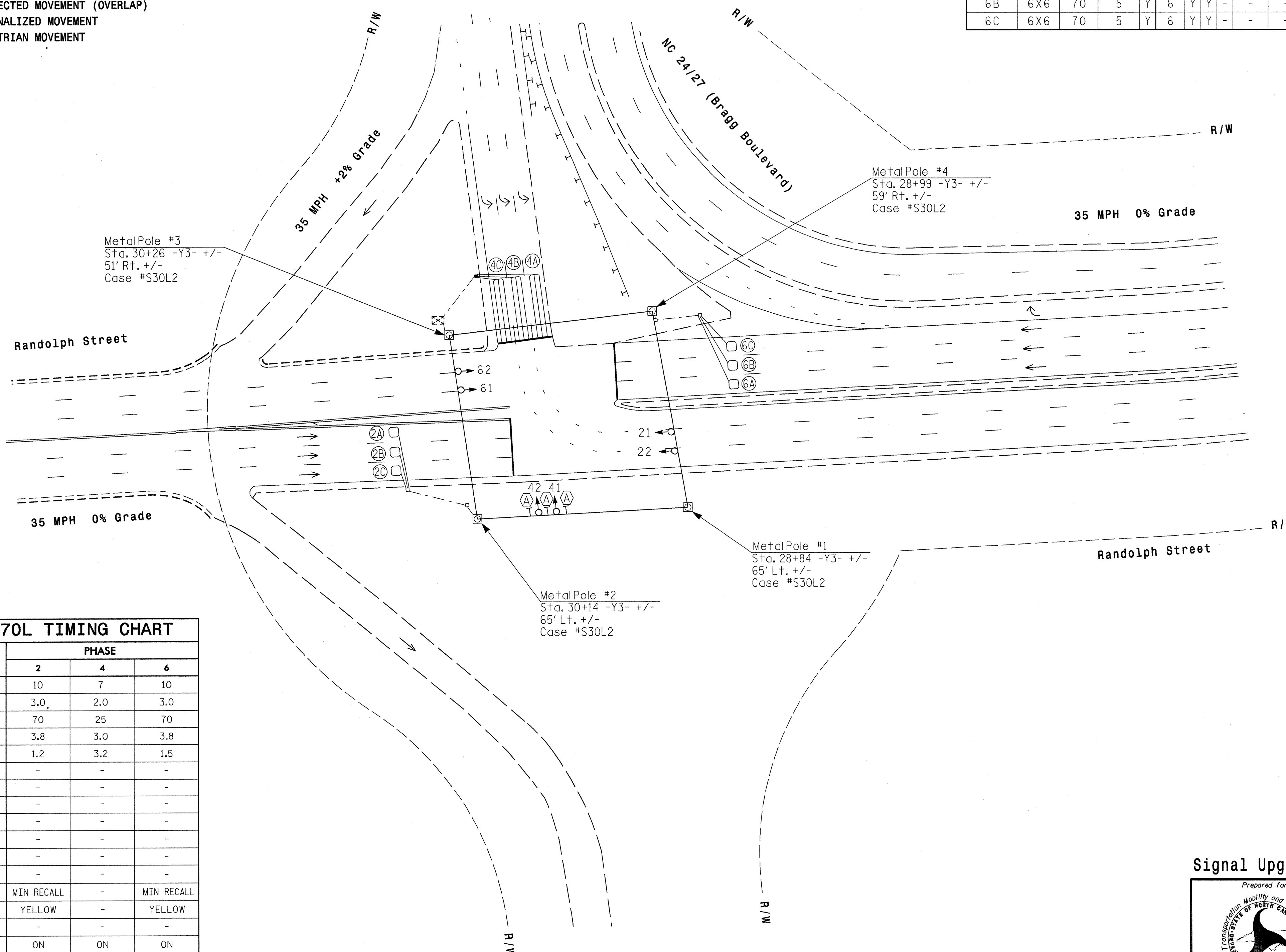
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME		
2A	6X6	70	5	Y	2	Y	Y	-	-	-	-
2B	6X6	70	5	Y	2	Y	Y	-	-	-	-
2C	6X6	70	5	Y	2	Y	Y	-	-	-	-
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-
4C	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-
6A	6X6	70	5	Y	6	Y	Y	-	-	-	-
6B	6X6	70	5	Y	6	Y	Y	-	-	-	-
6C	6X6	70	5	Y	6	Y	Y	-	-	-	-

2 Phase Fully Actuated Isolated

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.



OASIS 2070L TIMING CHART

FEATURE	PHASE		
	2	4	6
Min Green 1 *	10	7	10
Extension 1 *	3.0	2.0	3.0
Max Green 1 *	70	25	70
Yellow Clearance	3.8	3.0	3.8
Red Clearance	1.2	3.2	1.5
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	-	-	-
Simultaneous Gap	ON	ON	ON

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

LEGEND

PROPOSED	EXISTING

Signal Upgrade - (Phase IV & Final Design)

Prepared in the offices of:

RAMEY KEMP ASSOCIATES, INC.

8008 Farington Place, Suite 100
Raleigh, North Carolina 27608
919-872-5115 FAX 919-872-5418 Fax
www.rameykemp.com

Seal of the State of North Carolina
Professional Engineer
WILLIAM J. HAMILTON
32396

Division 6 Cumberland County Spring Lake

PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton

PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

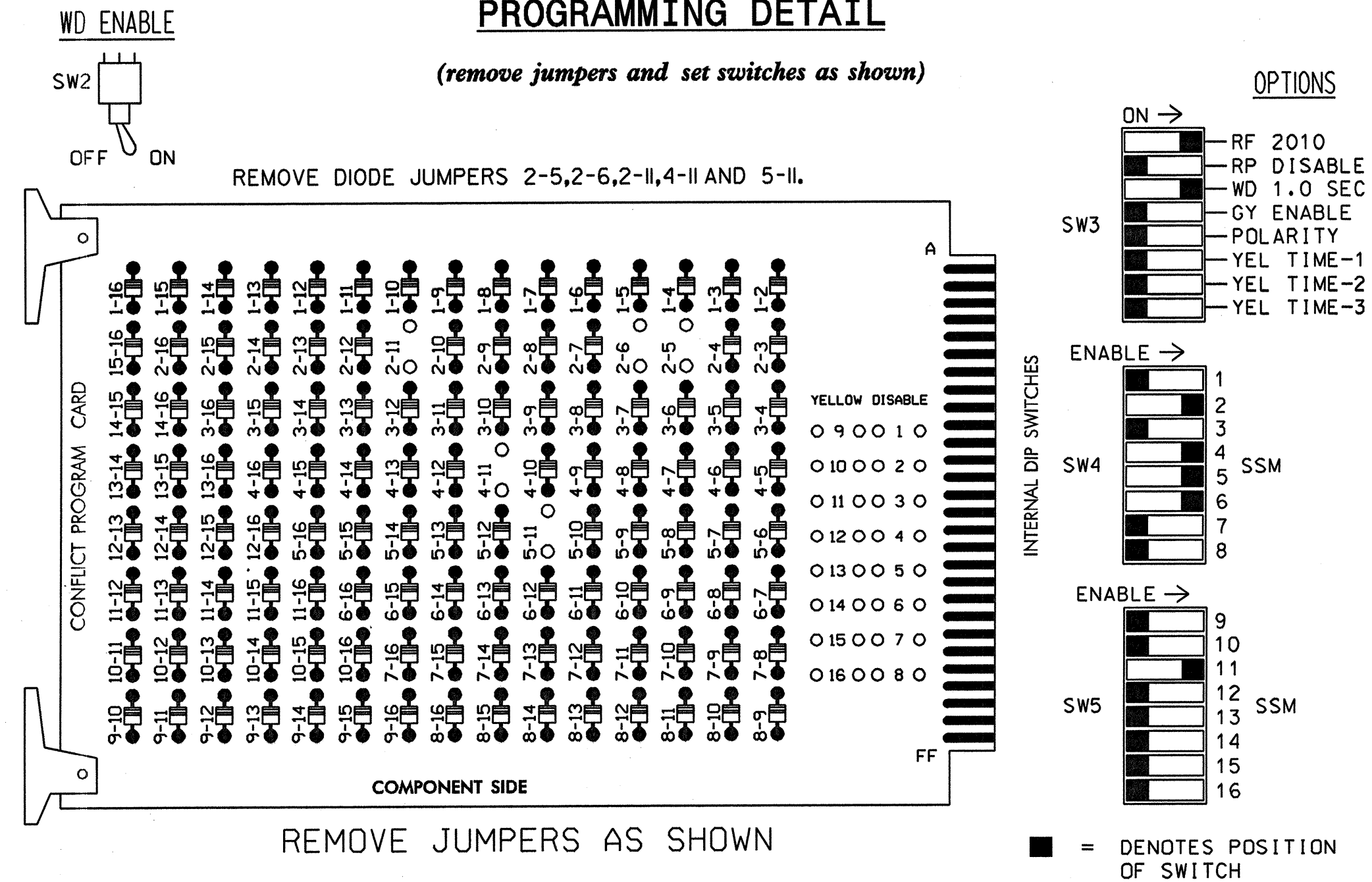
REVISIONS: _____ INIT. DATE: _____

SCALE: 1"=40'

SIG. INVENTORY NO. 06-0064

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



NOTES

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	**OLC	DLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	51,52	61,62	NU	NU	NU	NU	NU	NU	NU	43,44	NU	NU
RED		128						134								A114		
YELLOW		129						135										
GREEN		130						136										
RED ARROW					101		131											
YELLOW ARROW					102		132									A115		
GREEN ARROW					103		133									A116		
Hand icon																		
Person icon																		

NU = Not Used
** Re-wire DLC to flash on Flasher Unit #2, Circuit #2.

EQUIPMENT INFORMATION

CONTROLLER.....SAFETRAN TYPE 2070
CABINETSAFETRAN 332
SOFTWAREECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S4,S5,S6,S12
PHASES USED.....2,4,5,6
OVERLAP A:.....NOT USED
OVERLAP B:.....NOT USED
OVERLAP C:.....4+5
OVERLAP D:.....NOT USED

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)
FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).
PRESS '+' TWICE

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

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-0061T1
DESIGNED: Jun 2012
SEALED: 06-29-2012
REVISED:

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A,2B,2C	TB2-5,6	I2U	39	1	2	2	Y	Y		1.9	
2D,2E,2F	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB5-5,6	J5U	19	7	4	4	Y	Y			
4B	TB5-7,8	J5L	19	7	4	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-3,4	J1L	55	17	5	5	Y	Y			
5C	TB4-9,10	I6U	41	3	4	5	Y	Y			
5D	TB4-11,12	I6L	45	7	14	5	Y	Y			10
5E	TB6-1,2	I7U	65	27	34	5	Y	Y			15
6A,6B	TB3-5,6	J2U	40	2	6	6	Y	Y		1.6	
6C,6D	TB3-7,8	J2L	44	6	16	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

Signal Upgrade - Temporary Design 1 (TMP Phase II)

Prepared in the offices of:
RAMEY KEMP ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel. 919-878-5416 Fax.
www.rameykemp.com, NC License No. C-0910

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 24/87 (Bragg Boulevard) at Butner Road

Division 6 Cumberland County Spring Lake

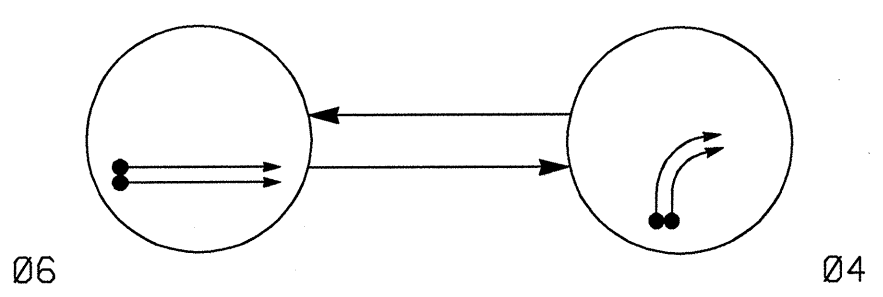
PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

REVISIONS	INIT.	DATE

750 N. Grandfield Hwy, Garner, NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
WILLIAM J. HAMILTON
32396
6/29/12
SIG. INVENTORY NO. 06-0061T1

PHASING DIAGRAM

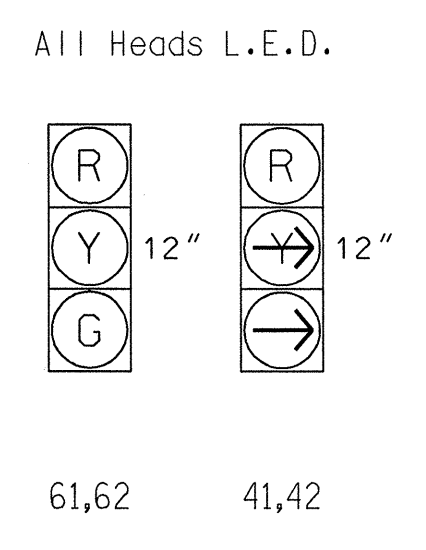


PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE		
	Ø 4	Ø 6	FLASH
41,42	→	R	R
61,62	R	G	Y

SIGNAL FACE I.D.

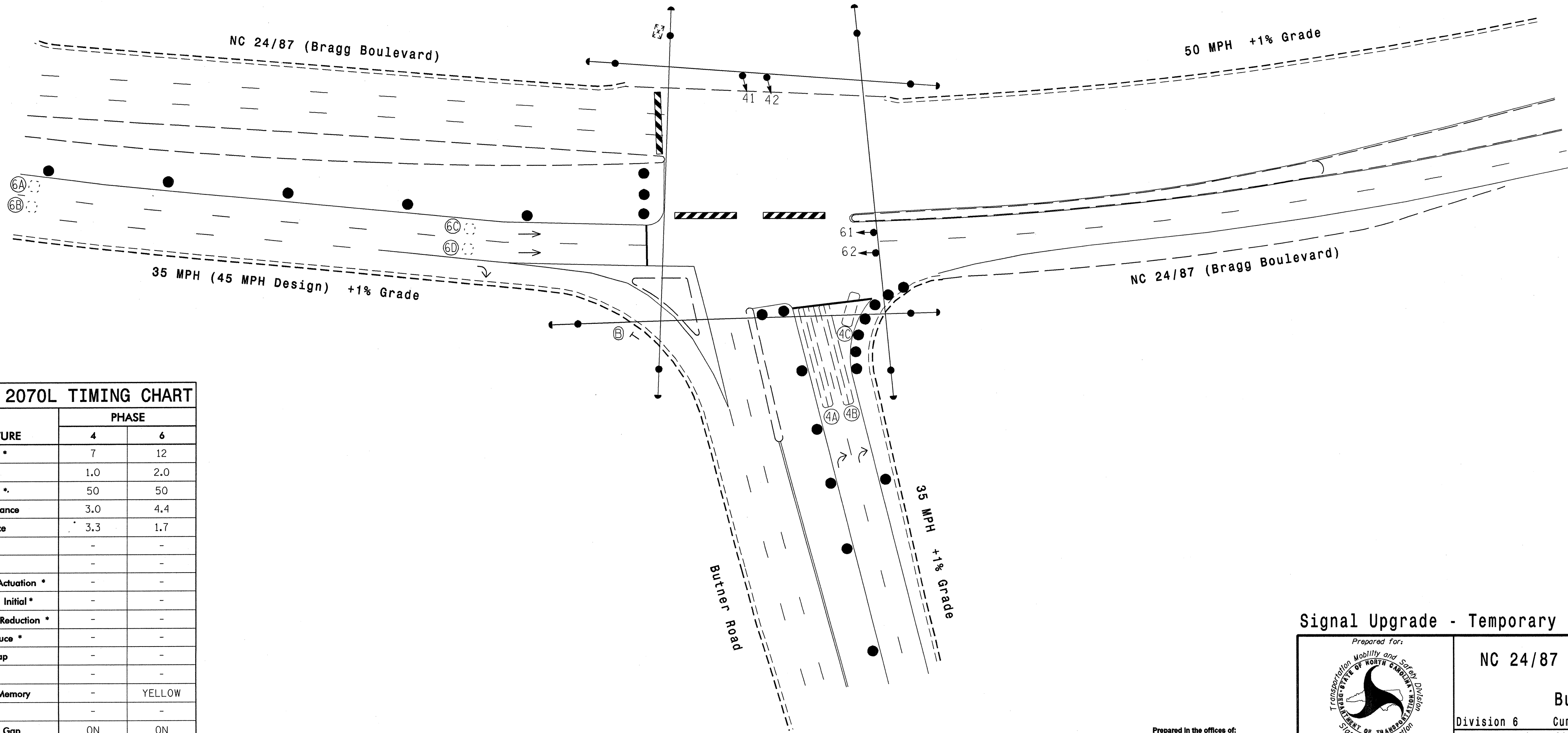


OASIS 2070L LOOP & DETECTOR INSTALLATION CHART												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
4A	6X60	+5	2-4-2	-	4	Y	Y	-	-	-	-	-
4B	6X60	+5	2-4-2	-	4	Y	Y	-	-	10	-	-
4C	6X20	+5	4	-	4	Y	Y	-	-	15	-	-
6A,6B	6X6	300	EXIST	-	6	Y	Y	-	1.6	-	-	-
6C,6D	6X6	90	EXIST	-	6	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.



FEATURE	PHASE	
	4	6
Min Green 1 *	7	12
Extension 1 *	1.0	2.0
Max Green 1 *	50	50
Yellow Clearance	3.0	4.4
Red Clearance	3.3	1.7
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	-	-
Max Variable Initial *	-	-
Time Before Reduction *	-	-
Time To Reduce *	-	-
Minimum Gap	-	-
Recall Mode	-	-
Vehicle Call Memory	-	YELLOW
Dual Entry	-	-
Simultaneous Gap	ON	ON

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

PROPOSED	EXISTING
○→ Traffic Signal Head	●→ Traffic Signal Head
●→ Modified Signal Head	N/A
□ Pedestrian Signal Head With Push Button & Sign	□ Pedestrian Signal Head
□ Signal Pole with Guy	□ Signal Pole with Guy
□ Signal Pole with Sidewalk 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
N/A Right of Way	N/A Right of Way
N/A Directional Arrow	N/A Directional Arrow
N/A Construction Barrels	N/A Construction Barrels
N/A Construction Barricades	N/A Construction Barricades
Ⓐ "U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ "U-TURN YIELD TO RIGHT TURN" Sign (R10-16)
Ⓑ "YIELD" Sign (R1-2)	Ⓑ "YIELD" Sign (R1-2)

Signal Upgrade - Temporary Design 2 (TMP Phase III)

Prepared in the offices of:

RAMEY KEMP ASSOCIATES, INC.
 Transportation Engineers
 8808 Farrington Place, Suite 100
 Raleigh, North Carolina 27609
 919-872-5115 Tel, 919-878-5418 Fax
 www.rameykemp.com

Prepared For:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 24/87 (Bragg Boulevard) at Butner Road

Division 6 Cumberland County Spring Lake

PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
 PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

REVISIONS	INIT.	DATE

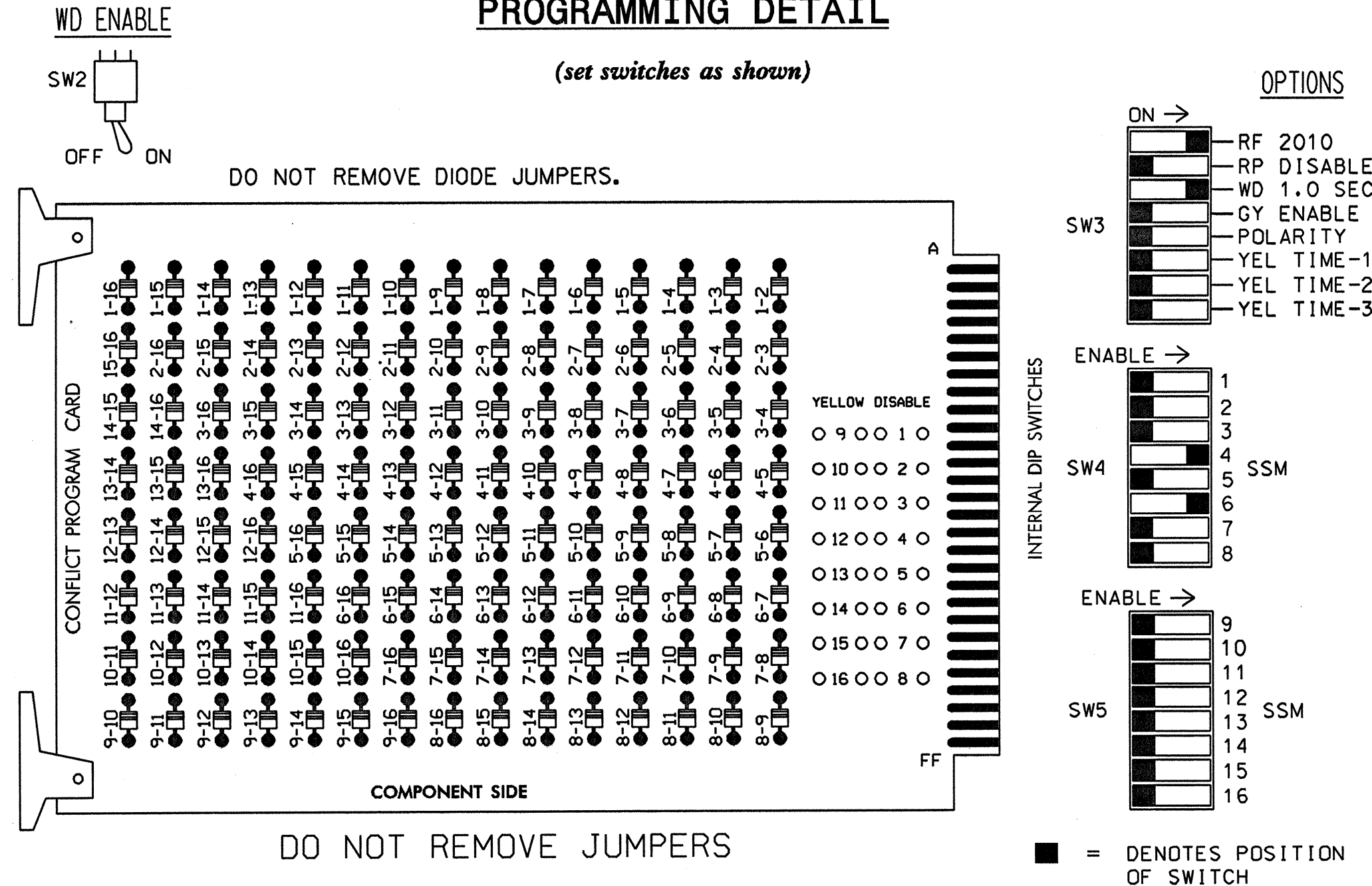
SEAL

WILLIAM J. HAMILTON
 ENGINEER

SIGNATURE DATE

SIG. INVENTORY NO. 06-0061T2

EDI MODEL 2010ECL CONFLICT MONITOR PROGRAMMING DETAIL



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

NOTES

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
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	NU	41,42	NU	NU	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED					101			134										
YELLOW								135										
GREEN								136										
RED ARROW																		
YELLOW ARROW					102													
GREEN ARROW					103													
Hand icon																		
Person icon																		

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....SAFETRAN TYPE 2070
 CABINETSAFETRAN 332
 SOFTWAREECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
 LOAD SWITCHES USED.....S4,S6
 PHASES USED.....4,6
 OVERLAP A:.....NOT USED
 OVERLAP B:.....NOT USED
 OVERLAP C:.....NOT USED
 OVERLAP D:.....NOT USED

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4
L	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4
U	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6
L	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6

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
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			15
6A,6B	TB3-5,6	J2U	40	2	6	6	Y	Y		1.6	
6C,6D	TB3-7,8	J2L	44	6	16	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L
 FILE J
 SLOT 2
 LOWER

REMOVE OVERLAP PROGRAMMING!!

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)
 FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).
 PRESS '+' TWICE

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

OVERLAP PROGRAMMING COMPLETE

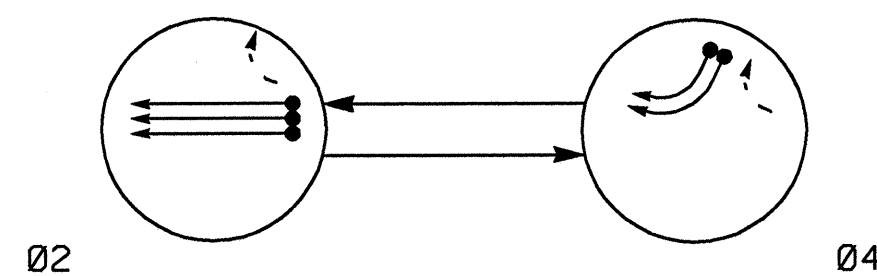
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-0061T2
 DESIGNED: Jun 2012
 SEALED: 06-29-2012
 REVISED:

Signal Upgrade - Temporary Design 2 (TMP Phase III)

Prepared in the offices of:
RAMEY KEMP ASSOCIATES, INC.
 Transportation Engineers
 5808 Farington Place, Suite 100
 Raleigh, North Carolina 27609
 919-872-5115 Tel. 919-878-5416 Fax.
 www.rameykemp.com, NC License No. C-0810

ELECTRICAL AND PROGRAMMING DETAILS FOR:
NC 24/87 (Bragg Boulevard) at Butner Road
 Division 6 Cumberland County Spring Lake
 PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
 PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)
 REVISIONS: IMIT. DATE
 750 N. Greenfield Pkwy, Garner, NC 27529
 SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 WILLIAM J. HAMILTON
 DATE: 6/29/12
 SIG. INVENTORY NO: 06-0061T2

PHASING DIAGRAM



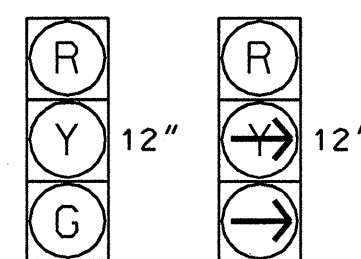
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE		
	Ø 2	Ø 4	LOCAL
21,22,23	G	R	Y
41,42	R	→	R

SIGNAL FACE I.D.

All Heads L.E.D.



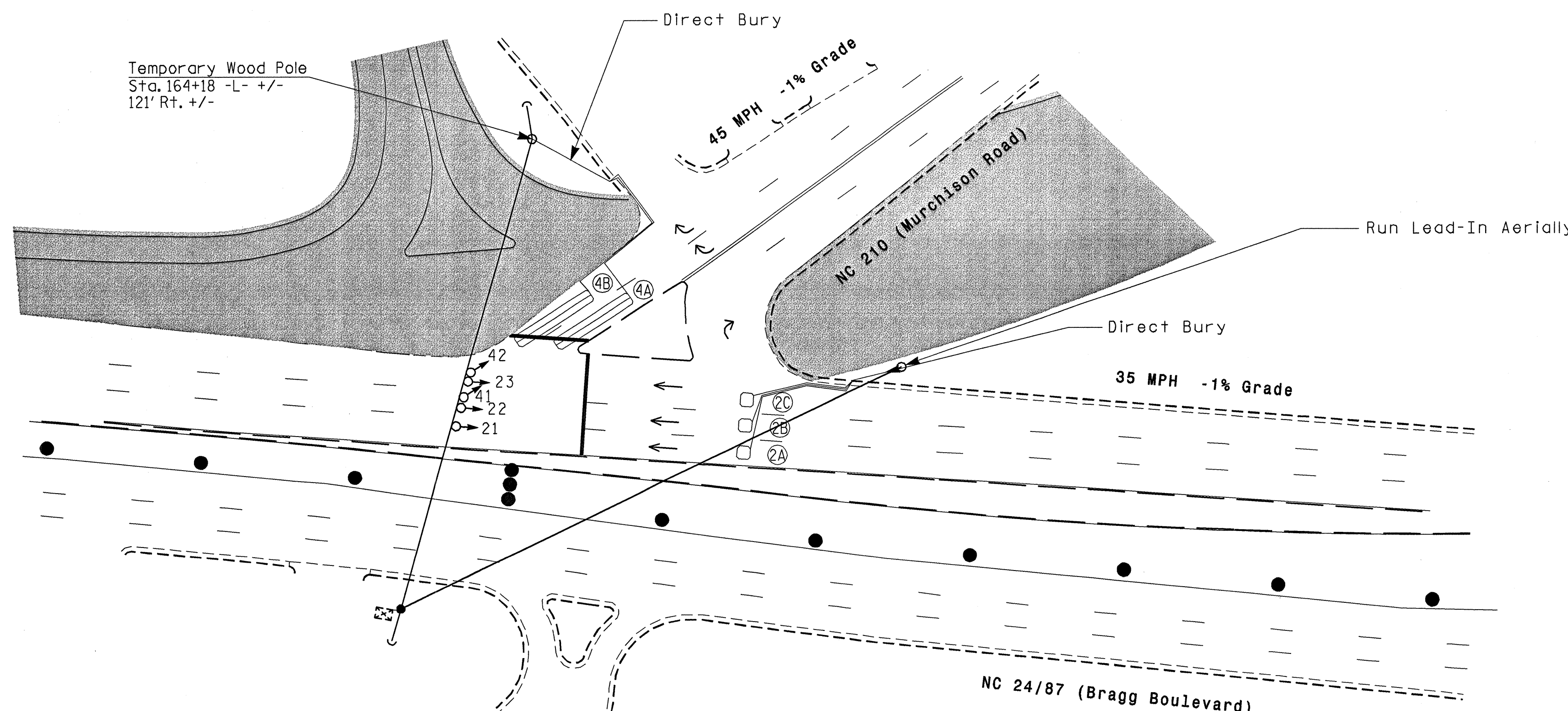
21,22,23 41,42

LOOP	INDUCTIVE LOOPS			DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD	
	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME			DELAY TIME
2A,2B,2C	6X6	70	5	Y	2	Y	Y	-	-	-	-
4A	6X40	+5	2-4-2	Y	4	Y	Y	-	-	15	-
4B	6X40	+5	2-4-2	Y	4	Y	Y	-	-	15	-

2 Phase Fully Actuated Isolated

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.



OASIS 2070L TIMING CHART

FEATURE	PHASE	
	2	4
Min Green 1 *	12	7
Extension 1 *	3.0	2.0
Max Green 1 *	50	20
Yellow Clearance	3.9	3.0
Red Clearance	1.2	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	-
Vehicle Call Memory	-	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

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

LEGEND

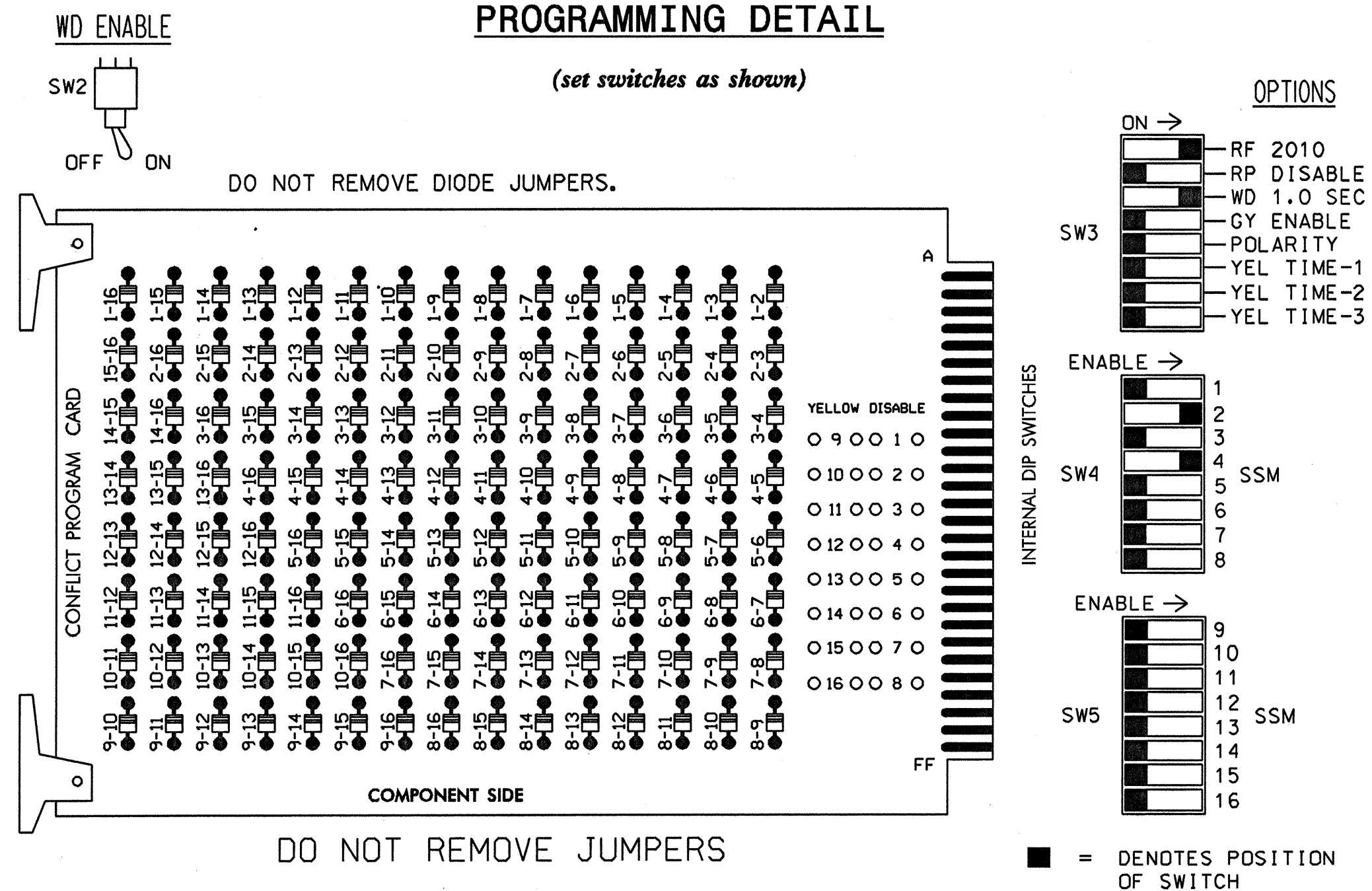
- | PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → Traffic Signal Head |
| ● → Modified Signal Head | N/A |
| ⊥ Sign | ⊥ Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Pedestrian Signal Head With Push Button & Sign |
| ○ Signal Pole with Guy | ○ Signal Pole with Guy |
|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

Signal Upgrade - Temporary Design (TMP Phase II)

<p>Prepared in the offices of: RAMEY KEMP & ASSOCIATES, INC. TRANSPORTATION ENGINEERS 8000 Furlong Place, Suite 100 Raleigh, North Carolina 27609 919-872-6110 Tel. 919-878-6118 Fax. www.rameykemp.com</p>	<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>NC 24/87 (Bragg Boulevard) at NC 210 (Murchison Road)</p>	<p>SEAL NORTH CAROLINA PROFESSIONAL ENGINEER WILLIAM A. HAMILTON 32396</p>						
	<p>Division 6 Cumberland County Spring Lake</p> <p>PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)</p>	<p>REVISIONS</p> <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DATE	DESCRIPTION				<p>SCALE: 1" = 40'</p>
NO.	DATE	DESCRIPTION							

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



NOTES:

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

NOTES

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22, 23	NU	NU	41,42	NU	NU	NU	NU	NU	NU	NU
RED		128			101							
YELLOW		129										
GREEN		130										
RED ARROW												
YELLOW ARROW					102							
GREEN ARROW					103							
Hand icon												
Person icon												

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....SAFETRAN 2070L
 CABINET.....SAFETRAN 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4
 PHASES USED.....2,4
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

FILE U	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	FS	∅ 2 2A, 2C	FS	FS	FS	∅ 4 4A	FS	FS	FS	FS	FS	FS	FS	FS
L	FS	NOT USED	FS	FS	FS	∅ 4 4B	FS	FS	FS	FS	FS	FS	FS	FS
U	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
L	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS

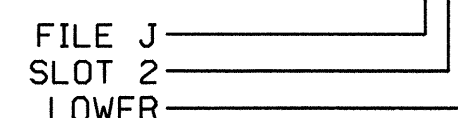
EX.: 1A, 2A, ETC. = LOOP NO.'S

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,2B,2C	TB2-5,6	12U	39	1	2	2	Y	Y			
4A	TB4-9,10	16U	41	3	4	4	Y	Y			15
4B	TB4-11,12	16L	45	7	14	4	Y	Y			15

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-0276T
 DESIGNED: Jun 2012
 SEALED: 06-29-2012
 REVISED:

Signal Upgrade - Temporary Design (TMP Phase II)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 24/87 (Bragg Boulevard) at NC 210 (Murchison Road)

Division 6 Cumberland County Spring Lake

PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton

PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

REVISIONS: INIT. DATE

Signature: *WJ Hamilton* DATE: _____

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 32396 WILLIAM J. HAMILTON

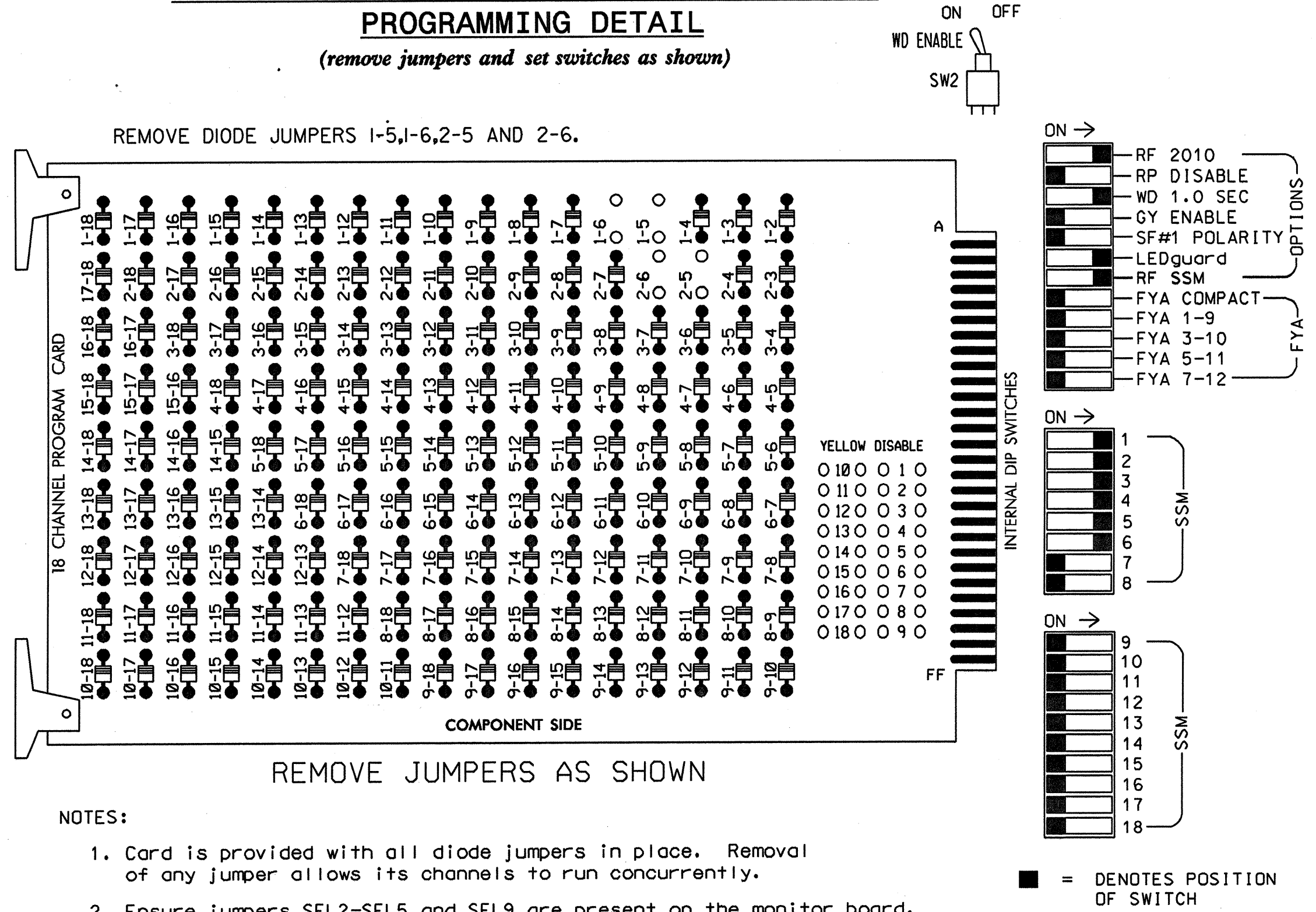
750 N. Greenfield Pkwy, Garner, NC 27529

Prepared in the offices of:

RAMEY KEMP ASSOCIATES, INC.
 Transportation Engineers
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 919-872-5115 Tel. 919-878-5416 Fax.
 www.rameykemp.com, NC License No. C-0910

SIG. INVENTORY NO. 06-0276T

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 phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.

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	31	32	41,42	43	NU	43	51	61,62	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							132	132			
GREEN ARROW	127			118	103			133	133			
Hand icon												
Person icon												

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

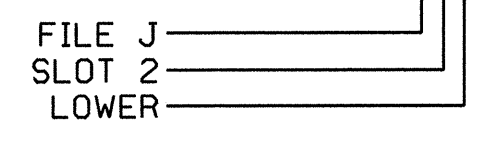
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A,2B,2C	TB2-5,6	I2U	39	1	2	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
6A,6B,6C	TB3-9,10	J3U	64	26	36	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-0067T
DESIGNED: Jun 2012
SEALED: 06-29-2012
REVISED:

Signal Upgrade - Temporary Design 1 (TMP Phase II)

Prepared in the offices of:

RAMEY KEMP ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel. 919-875-5416 Fax.
www.rameykemp.com, NC License No. C-0910

ELECTRICAL AND PROGRAMMING DETAILS FOR: NC 24/87/210 (Bragg Boulevard) at SR 1449 (South Main Street)/Wilson Avenue
Division 6 Cumberland County Spring Lake

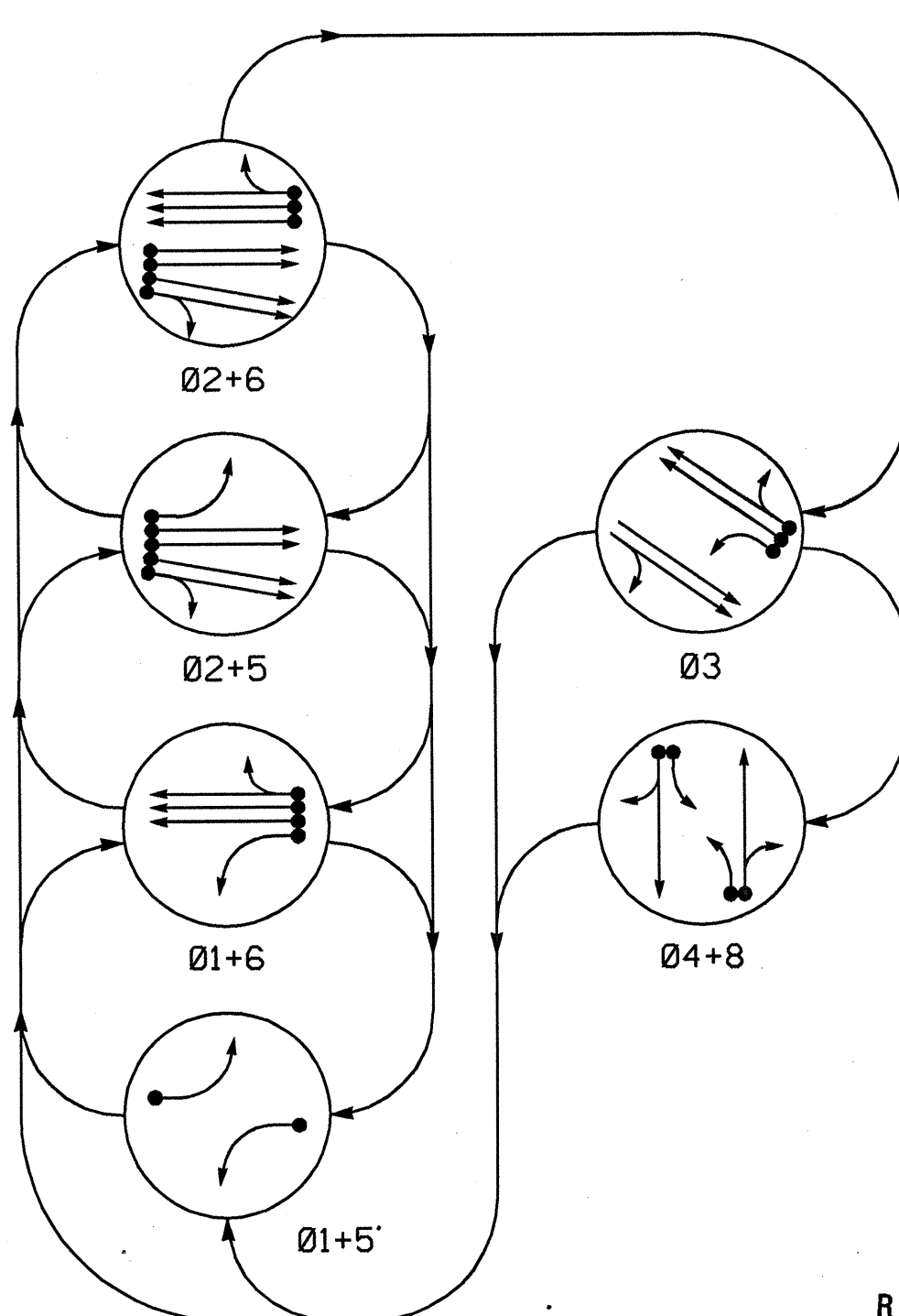
PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

REVISIONS: INIT. DATE

750 N. Grantfield Pkwy, Garner, NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
WILLIAM J. HAMILTON
SEAL 32396
DATE: 6/29/12
SIG. INVENTORY NO. 06-0067T

PHASING DIAGRAM

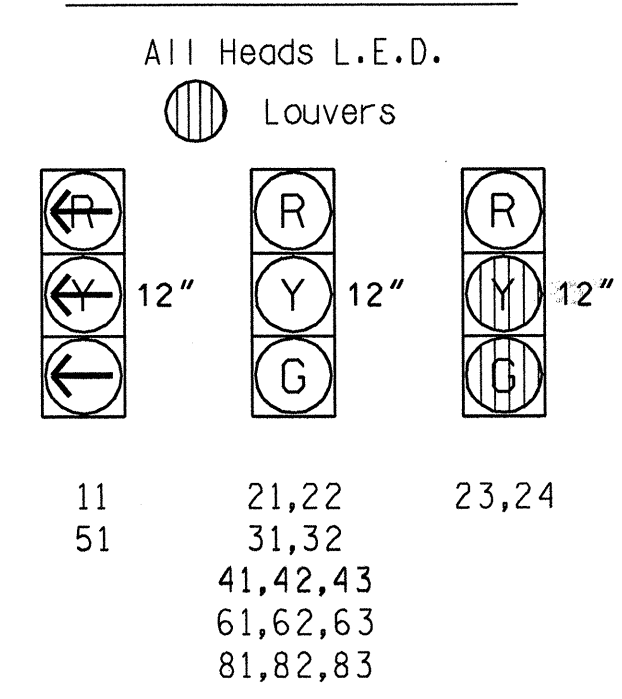


PHASING DIAGRAM DETECTION LEGEND
 ← ● DETECTED MOVEMENT
 ← ○ UNDETECTED MOVEMENT (OVERLAP)
 ← — UNSIGNALIZED MOVEMENT
 ← — PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE						
	01+5	01+6	02+5	02+6	03	04+8	TRUCK
11	←	←	←	←	←	←	←
21,22	R	R	G	G	R	R	Y
23,24	R	R	G	G	R	R	Y
31,32	R	R	R	R	G	R	Y
41,42,43	R	R	R	R	R	G	R
51	←	←	←	←	←	←	←
61,62,63	R	G	R	G	R	R	Y
81,82,83	R	R	R	R	R	G	R

SIGNAL FACE I.D.

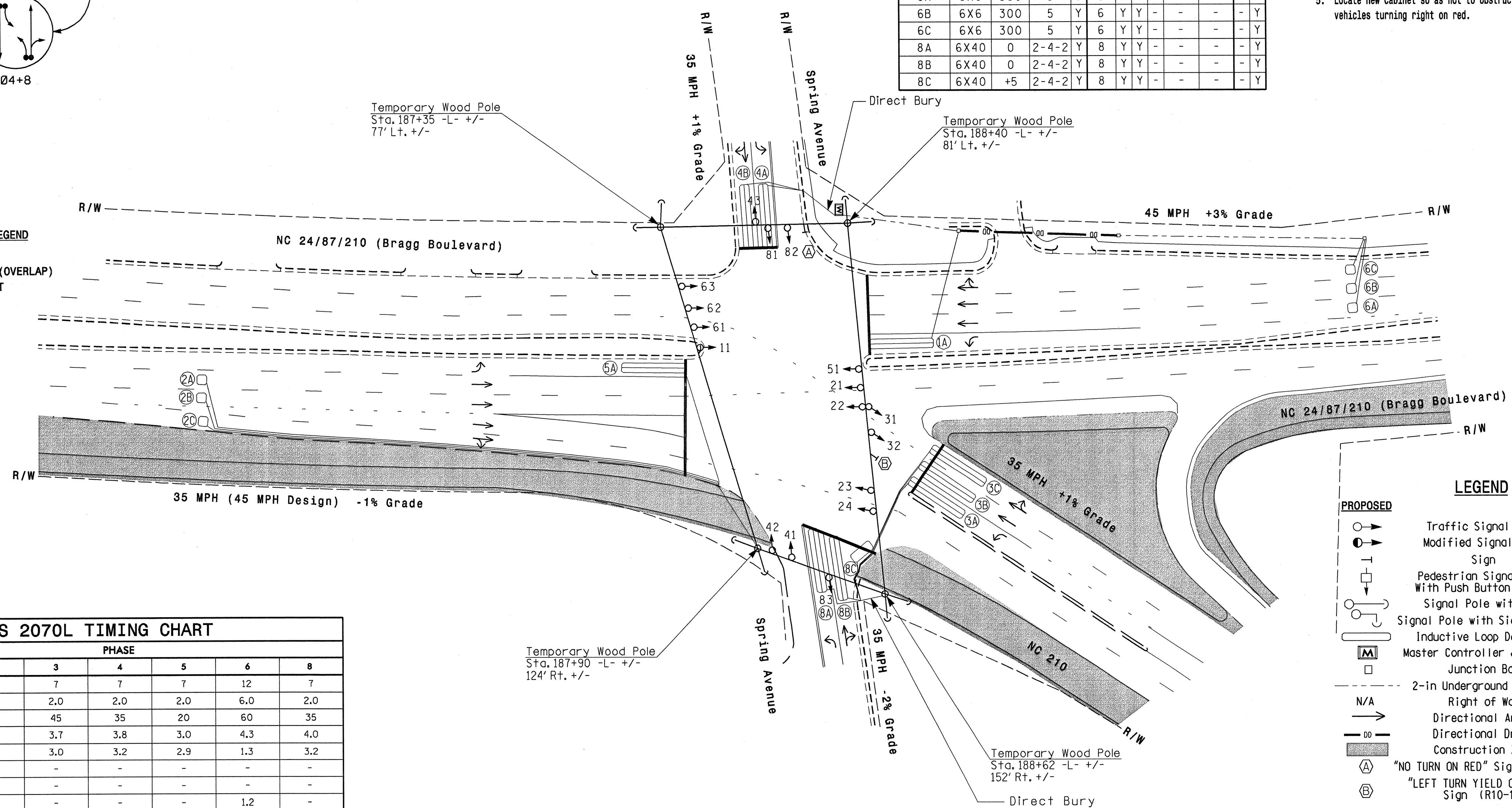


OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY				
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	-	-	Y
2A	6X6	300	5	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	300	5	Y	2	Y	Y	-	-	-	-	Y
2C	6X6	300	5	Y	2	Y	Y	-	-	-	-	Y
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	-	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	-	Y
6A	6X6	300	5	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	300	5	Y	6	Y	Y	-	-	-	-	Y
6C	6X6	300	5	Y	6	Y	Y	-	-	-	-	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-	Y
8B	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-	Y
8C	6X40	+5	2-4-2	Y	8	Y	Y	-	-	-	-	Y

6 Phase Fully Actuated Isolated
NOTES

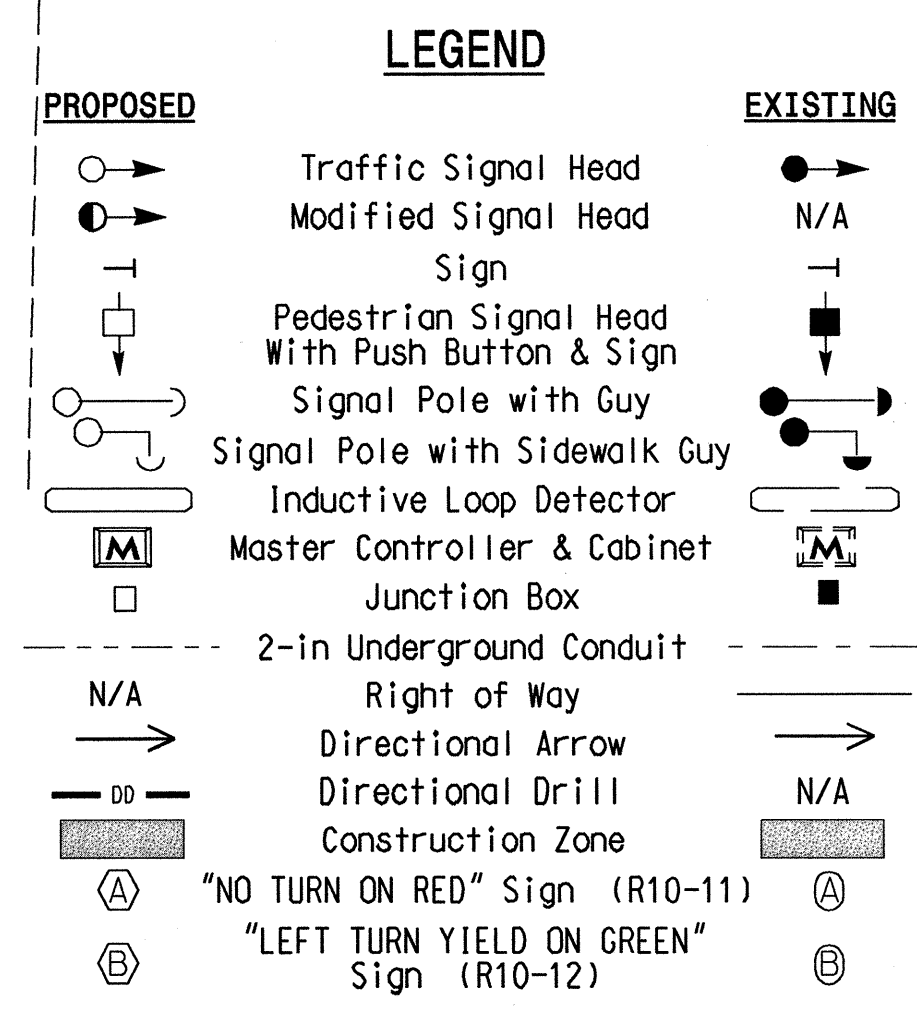
- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.



OASIS 2070L TIMING CHART

FEATURE	PHASE						
	1	2	3	4	5	6	8
Min Green 1*	7	12	7	7	7	12	7
Extension 1*	2.0	6.0	2.0	2.0	2.0	6.0	2.0
Max Green 1*	30	60	45	35	20	60	35
Yellow Clearance	3.0	4.6	3.7	3.8	3.0	4.3	4.0
Red Clearance	3.6	1.7	3.0	3.2	2.9	1.3	3.2
Walk 1*	-	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-	-
Seconds Per Actuation*	-	1.2	-	-	-	1.2	-
Max Variable Initial*	-	34	-	-	-	34	-
Time Before Reduction*	-	15	-	-	-	15	-
Time To Reduce*	-	35	-	-	-	35	-
Minimum Gap	-	3.0	-	-	-	3.0	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-
Dual Entry	-	-	-	ON	-	-	ON
Simultaneous Gap	ON	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.



Signal Upgrade - Temporary Design 1 (TMP Phase II)

Prepared in the office of:

RAMEY KEMP ASSOCIATES, INC.
 Transportation Engineers
 5508 Paffington Place, Suite 100
 Raleigh, North Carolina 27608
 919-872-8110 Tel. 919-872-8118 Fax.
 www.rameykemp.com

Division 6 Cumberland County Spring Lake
 PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
 PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

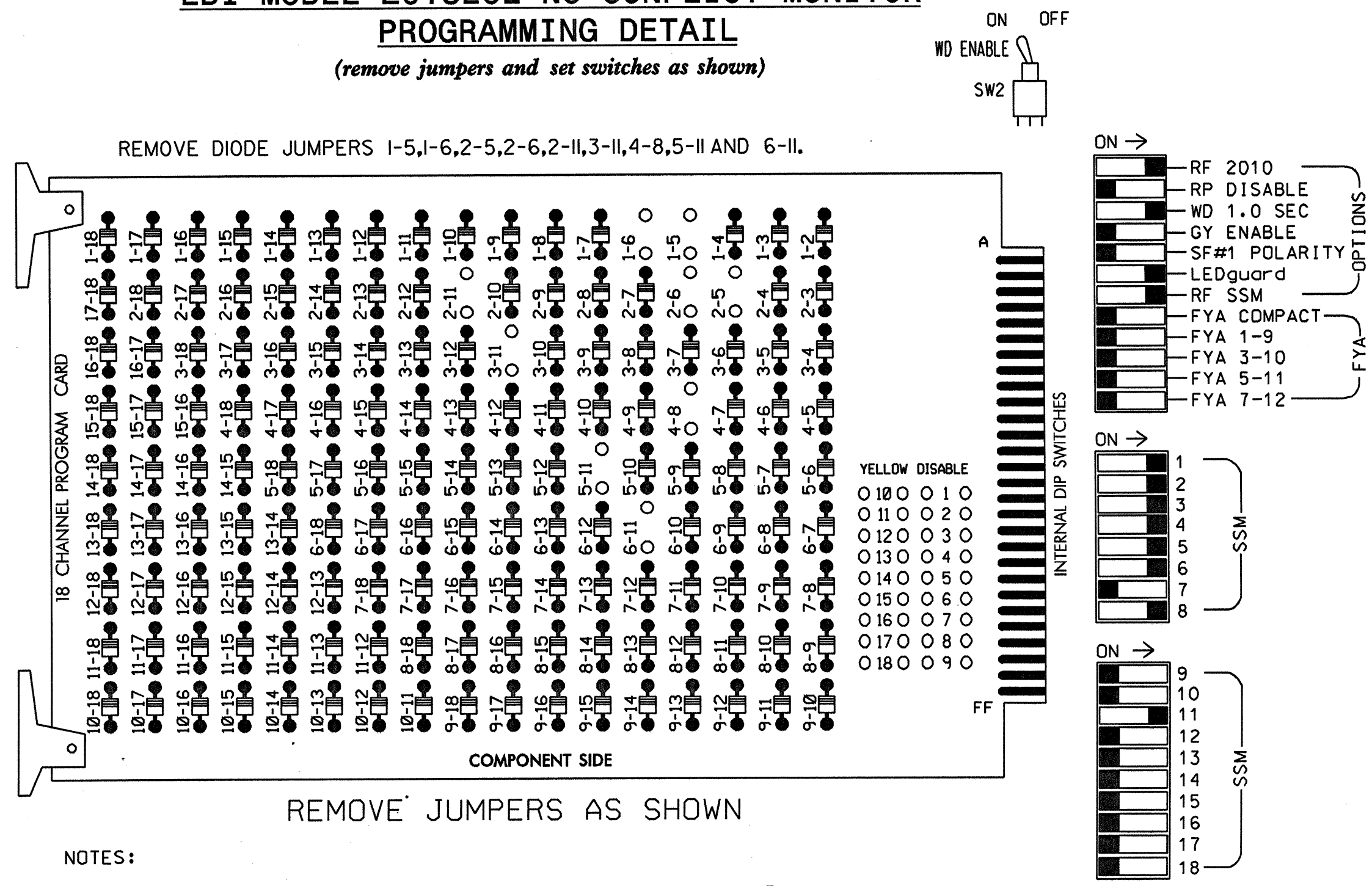
SCALE: 1"=40'

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER WILLIAM HAMILTON

SIG. INVENTORY NO. 06-0065T1

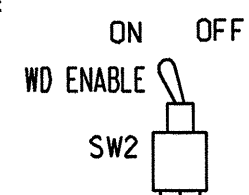
EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(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 Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 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.	11	21,22	NU	31,32	41,42, 43	NU	51	61,62, 63	NU	NU	81,82, 83	NU	NU	NU	NU	23,24	NU	NU
RED		128		116	101			134			107					A114		
YELLOW		129		117	102			135			108					A115		
GREEN		130		118	103			136			109					A116		
RED ARROW	125							131										
YELLOW ARROW	126							132										
GREEN ARROW	127							133										

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE DASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S11,AUX S4
 PHASES USED.....1,2,3,4,5,6,8
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....2+3
 OVERLAP "D".....NOT USED

INPUT FILE POSITION LAYOUT

(front view)

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

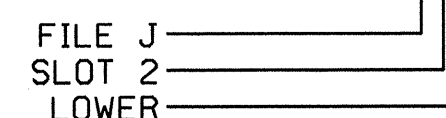
EX.: 1A, 2A, ETC. = LOOP NO.'S

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			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
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			
4A	TB6-5,6	I8U	49	11	24	4	Y	Y			
4B	TB6-7,8	I8L	49	11	24	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
6C	TB3-9,10	J3U	64	26	36	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
8C	TB7-1,2	J7U	66	28	38	8	Y	Y			

INPUT FILE POSITION LEGEND: J2L



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	0	0	0	0	0
2	5	6	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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

PRESS '+' TWICE

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE: |12345678910111213141516
 VEH OVL PARENTS: | XX
 VEH OVL NOT VEH: |
 VEH OVL NOT PED: |
 VEH OVL GRN EXT: |
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW - GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC)...0.0
 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

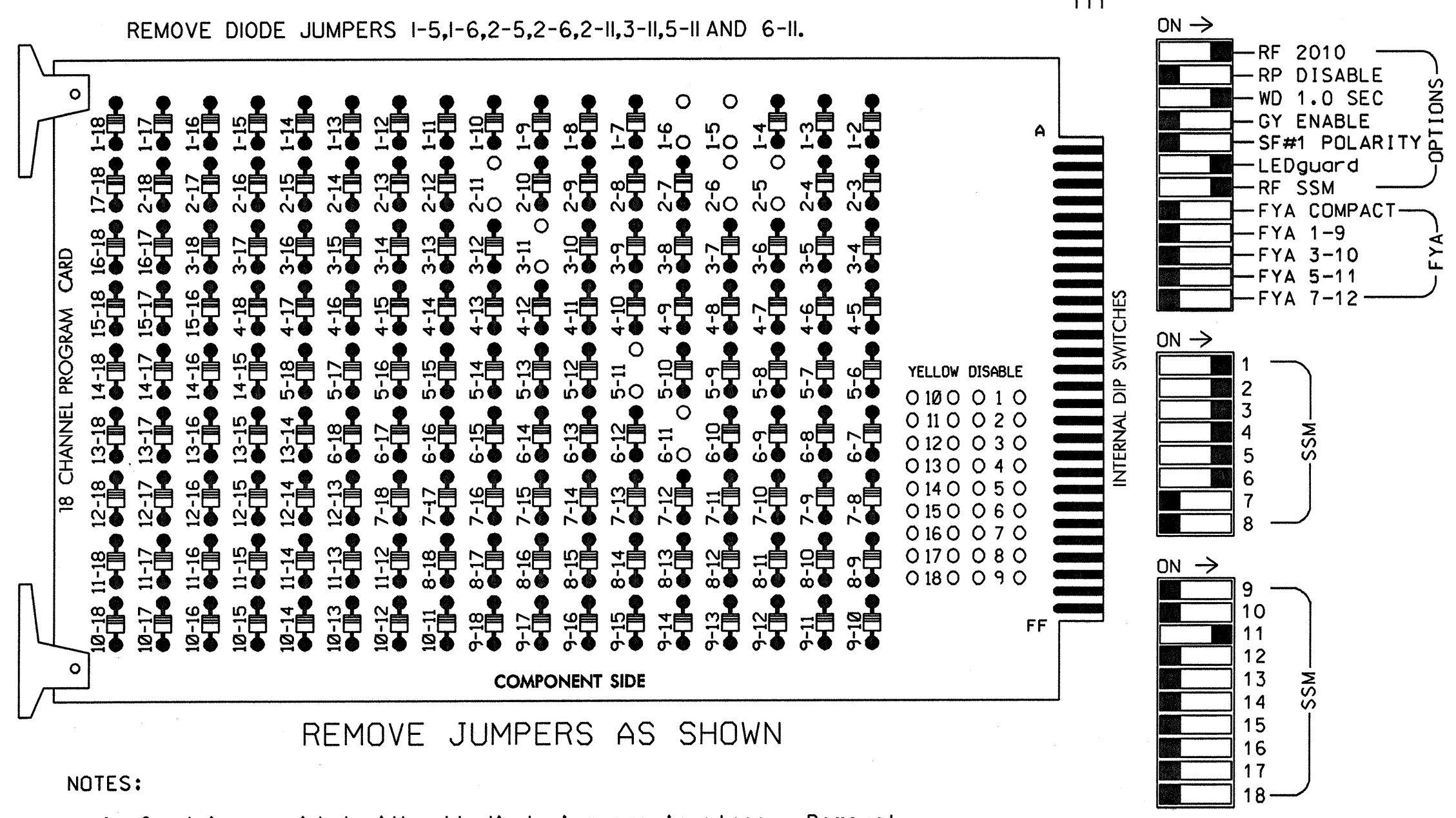
THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 06-0065T1
 DESIGNED: Jun 2012
 SEALED: 06-29-2012
 REVISED:

Signal Upgrade - Temporary Design 1 (TMP Phase II)

	ELECTRICAL AND PROGRAMMING DETAILS FOR:		NC 24/87/210 (Bragg Boulevard) at NC 210/Spring Avenue	
	Prepared in the offices of: RAMEY KEMP ASSOCIATES, INC. Transportation Engineers 8808 Faringdon Place, Suite 100 Raleigh, North Carolina 27609 919-872-5115 Tel. 919-878-5416 Fax. www.rameykemp.com, NC License No. C-0910		Division 6 Cumberland County Spring Lake PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)	
750 Greenfield Parkway, Garner, NC 27529		REVISIONS:		INIT. DATE:
SIG. INVENTORY NO. 06-0065T1		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.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.
- Program Phase Sequence for standard dual ring operation.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE DASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,AUX S4
 PHASES USED.....1,2,3,4,5,6
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....2+3
 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
CH1 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, 23	NU	31,32	33,34	41	42,43	NU	51	61,62, 63	NU	NU	NU	NU	NU	24,25	NU	NU
RED		128		116	101	101		134										
YELLOW		129		117	102	102		135										
GREEN		130		118	103	103		136										
RED ARROW	125			116				131								A114		
YELLOW ARROW	126			117				132								A115		
GREEN ARROW	127			118	103			133								A116		

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	∅ 2	∅ 2	∅ 5	∅ 5	∅ 5	∅ 4	∅ 5	∅ 5	∅ 5	∅ 5	∅ 5	FS
I	1A	2A	2C	2E	5A	5B	5C	4A	5D	5E	5F	5G	5H	DC ISOLATOR
L	NOT USED	∅ 2	∅ 2	NOT USED	∅ 3	∅ 3	∅ 3	∅ 4	∅ 5	∅ 5	∅ 5	∅ 5	∅ 5	ST
U		2B	2D		∅ 3	∅ 3	∅ 3	∅ 4	∅ 5	∅ 5	∅ 5	∅ 5	∅ 5	DC ISOLATOR
L		∅ 6	∅ 6	NOT USED	∅ 3	NOT USED	∅ 3	∅ 4	∅ 5	∅ 5	∅ 5	∅ 5	∅ 5	
		6A	6C		∅ 3	∅ 3	∅ 3	∅ 4	∅ 5	∅ 5	∅ 5	∅ 5	∅ 5	
		∅ 6	NOT USED		∅ 3	NOT USED	∅ 3	∅ 4	∅ 5	∅ 5	∅ 5	∅ 5	∅ 5	
		6B			∅ 3	∅ 3	∅ 3	∅ 4	∅ 5	∅ 5	∅ 5	∅ 5	∅ 5	

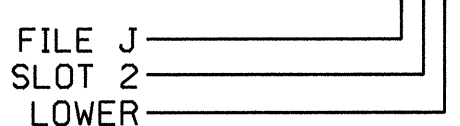
EX.: 1A, 2A, ETC. = LOOP NO.'S

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			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
2D	TB2-11,12	I3L	76	38	42	2	Y	Y			
2E	TB4-1,2	I4U	47	9	22	2	Y	Y			
3A	TB5-9,10	J6U	42	4	8	3	Y	Y			
3B	TB5-11,12	J6L	46	8	18	3	Y	Y			
3C	TB7-1,2	J7U	66	28	38	3	Y	Y			
4A	TB6-5,6	I8U	49	11	24	4	Y	Y			
4B	TB6-7,8	I8L	49	11	24	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
6C	TB3-9,10	J3U	64	26	36	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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

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

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-0065T2
 DESIGNED: Jun 2012
 SEALED: 06-29-2012
 REVISED:

Signal Upgrade - Temporary Design 2 (TMP Phase III)

ELECTRICAL AND PROGRAMMING DETAILS FOR: **NC 24/87/210 (Bragg Boulevard) at NC 210/Spring Avenue**

Division 6 Cumberland County Spring Lake

PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton

PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

REVISIONS: INIT. DATE

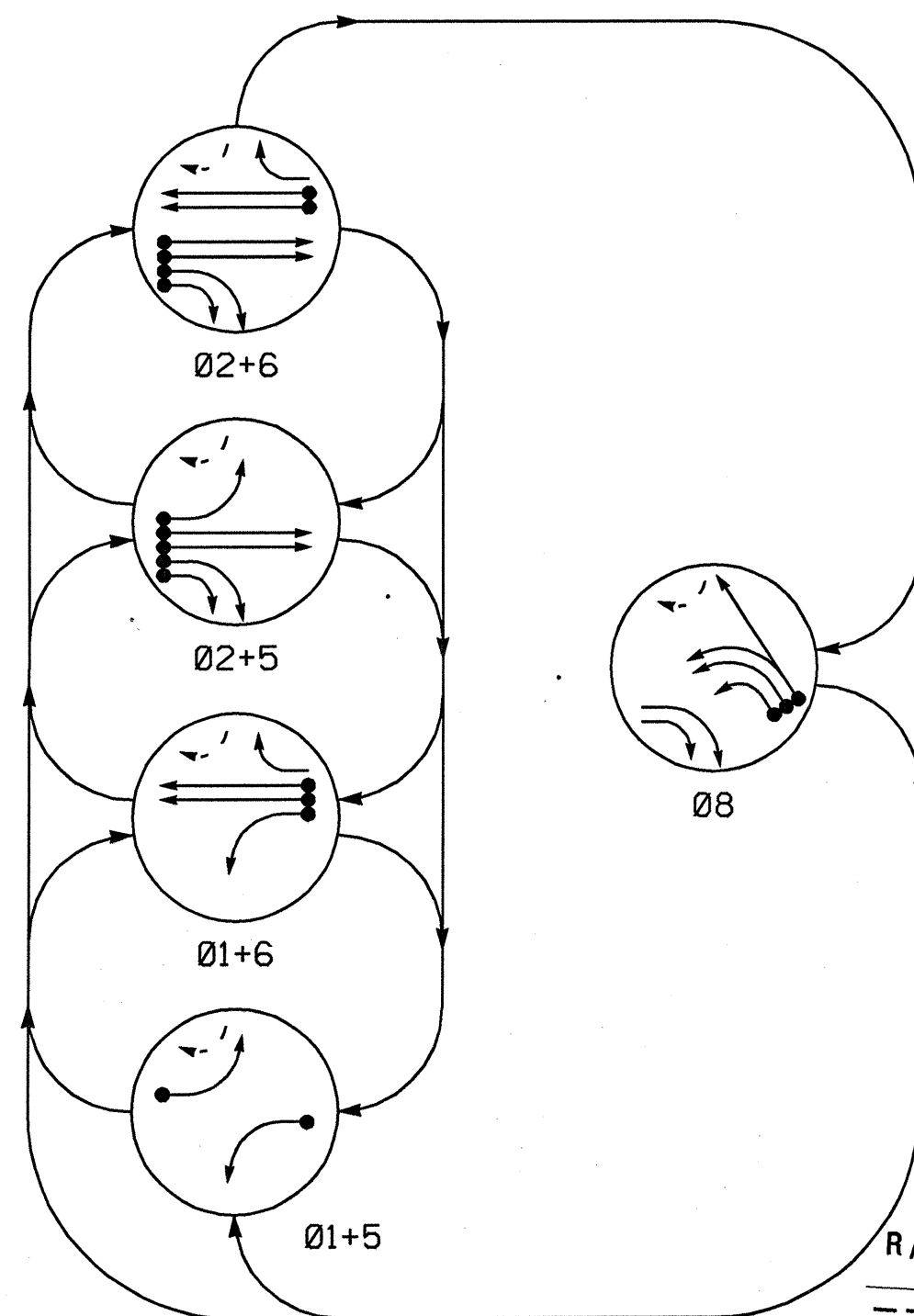
Prepared in the offices of: **RAMEY KEMP ASSOCIATES, INC.** Transportation Engineers
 5808 Faringdon Place, Suite 100
 Raleigh, North Carolina 27609
 919-872-5115 Tel. 919-878-5415 Fax.
 www.rameykemp.com, NC License No. C-0910

750 Greenfield Parkway, Garner, NC 27529

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 32396

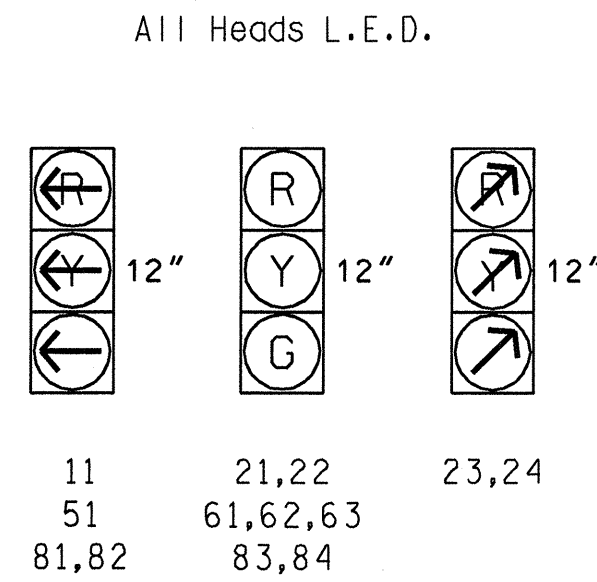
SIG. INVENTORY NO. 06-0065T2

PHASING DIAGRAM



SIGNAL FACE	PHASE				
	Ø 1+5	Ø 1+6	Ø 2+5	Ø 2+6	Ø 8
11	←	←	→	→	↔
21,22	R	R	G	G	R
23,24	↗	↗	↘	↘	↔
51	←	←	→	→	↔
61,62,63	R	G	R	G	R
81,82	↗	↗	↘	↘	↔
83,84	R	R	R	R	G

SIGNAL FACE I.D.



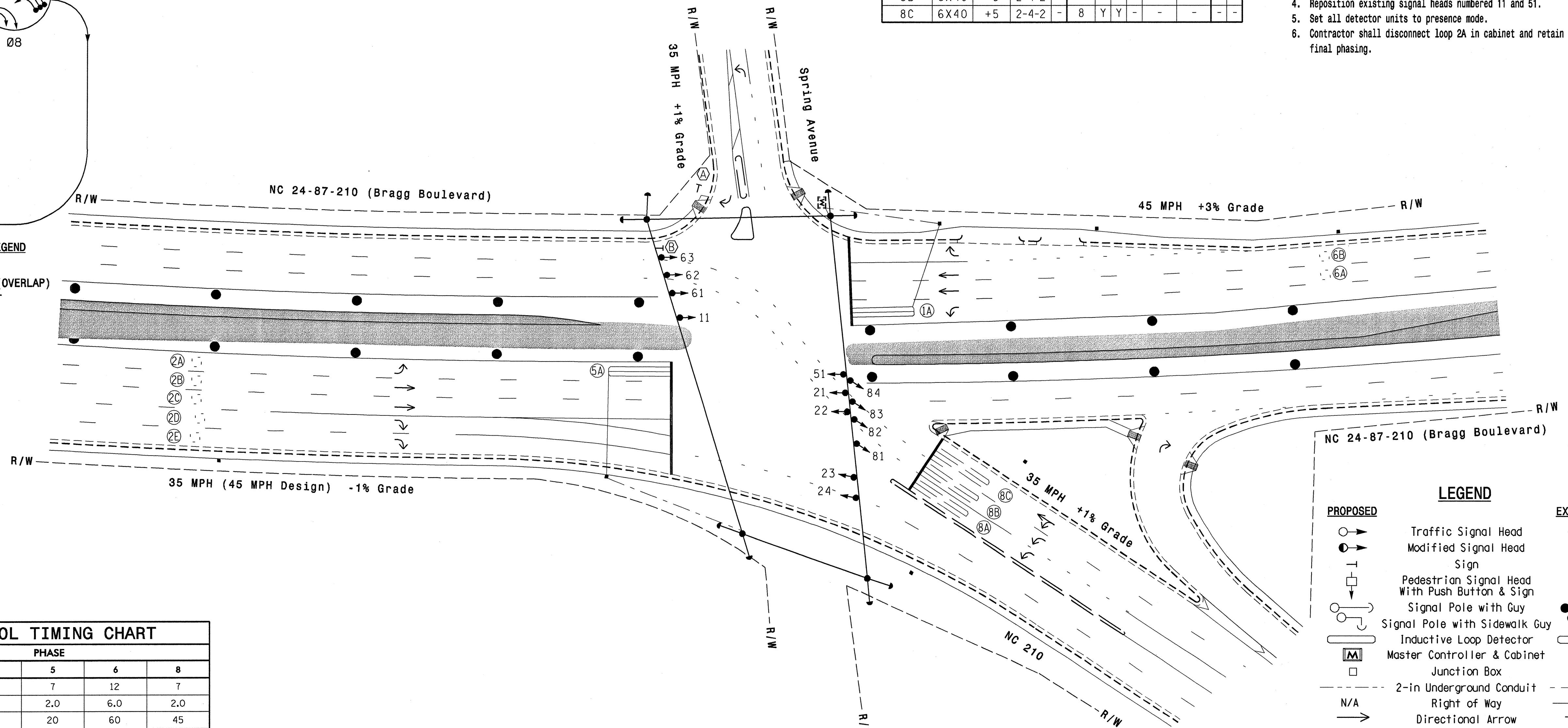
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	-	-	-
2B	6X6	300	5	-	2	Y	Y	-	-	-	-	-
2C	6X6	300	5	-	2	Y	Y	-	-	-	-	-
2D	6X6	300	5	-	2	Y	Y	-	-	-	-	-
2E	6X6	300	5	-	2	Y	Y	-	-	-	-	-
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	-	-
6A	6X6	300	5	-	6	Y	Y	-	-	-	-	-
6B	6X6	300	5	-	6	Y	Y	-	-	-	-	-
8A	6X40	+5	2-4-2	-	8	Y	Y	-	-	-	-	-
8B	6X40	+5	2-4-2	-	8	Y	Y	-	-	-	-	-
8C	6X40	+5	2-4-2	-	8	Y	Y	-	-	-	-	-

5 Phase Fully Actuated Isolated
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.
- Reposition existing signal heads numbered 11 and 51.
- Set all detector units to presence mode.
- Contractor shall disconnect loop 2A in cabinet and retain for final phasing.

PHASING DIAGRAM DETECTION LEGEND

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



OASIS 2070L TIMING CHART					
FEATURE	PHASE				
	1	2	5	6	8
Min Green 1 *	7	12	7	12	7
Extension 1 *	2.0	6.0	2.0	6.0	2.0
Max Green 1 *	30	60	20	60	45
Yellow Clearance	3.0	4.6	3.0	4.3	3.8
Red Clearance	3.4	2.6	3.3	1.6	3.6
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	1.5	-	1.5	-
Max Variable Initial *	-	34	-	34	-
Time Before Reduction *	-	15	-	15	-
Time To Reduce *	-	40	-	40	-
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

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

PROPOSED		EXISTING	
○ →	Traffic Signal Head	● →	N/A
○ →	Modified Signal Head	○ →	N/A
○ →	Sign	○ →	N/A
○ →	Pedestrian Signal Head With Push Button & Sign	○ →	N/A
○ →	Signal Pole with Guy	○ →	N/A
○ →	Signal Pole with Sidewalk Guy	○ →	N/A
○ →	Inductive Loop Detector	○ →	N/A
○ →	Master Controller & Cabinet	○ →	N/A
○ →	Junction Box	○ →	N/A
○ →	2-in Underground Conduit	○ →	N/A
○ →	Right of Way	○ →	N/A
○ →	Directional Arrow	○ →	N/A
○ →	Construction Barrels	○ →	N/A
○ →	Construction Zone	○ →	N/A
○ →	"YIELD" Sign (R1-2)	○ →	N/A
○ →	Right Arrow "ONLY" Sign (R3-5R)	○ →	N/A
○ →	Wheelchair Ramp	○ →	N/A

Signal Upgrade - Temporary Design 3 (TMP Phase IV-Step 2)

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
608 Partington Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel. 919-872-6418 Fax.
www.rameykemp.com

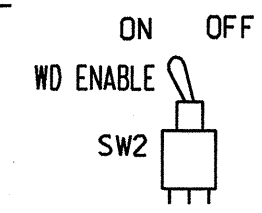
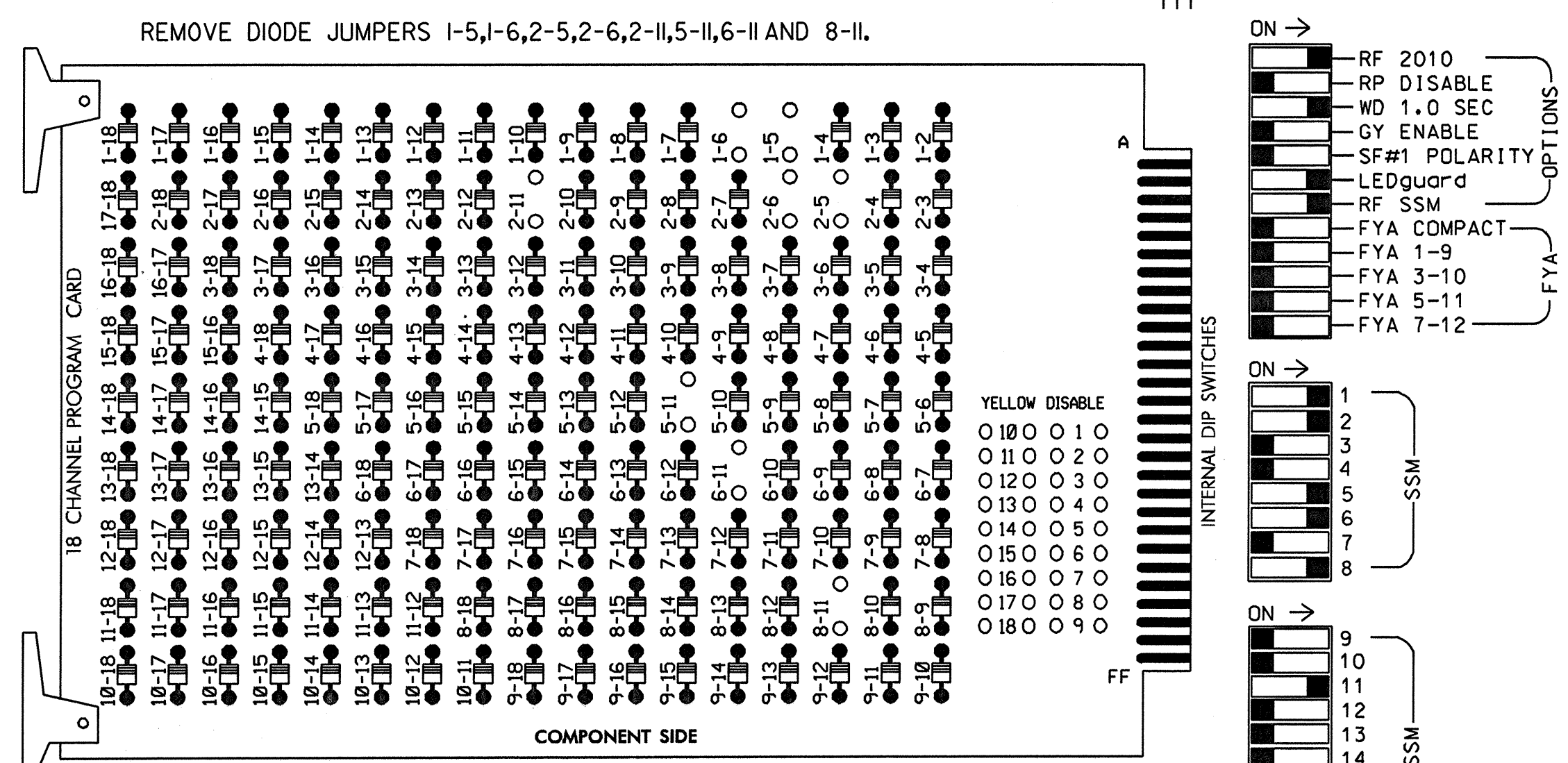
Prepared For:
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section

NC 24/87/210 (Bragg Boulevard) at NC 210/Spring Avenue
Division 6 Cumberland County Spring Lake
PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
WILLIAM A. HAMILTON
32396
DATE: 6/29/12
SIGNATURE: [Signature]
SIC - INVENTORY NO. 06-0065T3

SCALE 40'
1" = 40'

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



NOTES:

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

NOTES

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

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	
CHU 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	NU	NU	51	61,62,63	NU	NU	81,82	83,84	NU	NU	NU	23,24	NU	NU	
RED		128						134			107								
YELLOW		129						135			108								
GREEN		130						136			109								
RED ARROW	125							131			107							A114	
YELLOW ARROW	126							132			108								A115
GREEN ARROW	127							133			109								A116

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.....S1,S2,S7,S8,S11,AUX S4
 PHASES USED.....1,2,5,6,8
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....2+8
 OVERLAP "D".....NOT USED

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1 1A	NOT USED	∅ 2 2C	∅ 2 2E	∅ 5 5A	∅ 6 6B	∅ 8 8A	∅ 8 8C	∅ 8 8B	∅ 8 8B	∅ 8 8B	∅ 8 8B	∅ 8 8B	∅ 8 8B
L	NOT USED	∅ 2 2B	∅ 2 2D	NOT USED	∅ 5 5A	∅ 6 6A	∅ 8 8A	∅ 8 8C	∅ 8 8B	∅ 8 8B	∅ 8 8B	∅ 8 8B	∅ 8 8B	∅ 8 8B

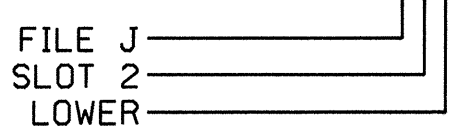
EX.: 1A, 2A, ETC. = LOOP NO.'S

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			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
2D	TB2-11,12	I3L	76	38	42	2	Y	Y			
2E	TB4-1,2	I4U	47	9	22	2	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-7,8	J2L	44	6	16	6	Y	Y			
6B	TB3-9,10	J3U	64	26	36	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
8C	TB7-1,2	J7U	66	28	38	8	Y	Y			

INPUT FILE POSITION LEGEND: J2L



OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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

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

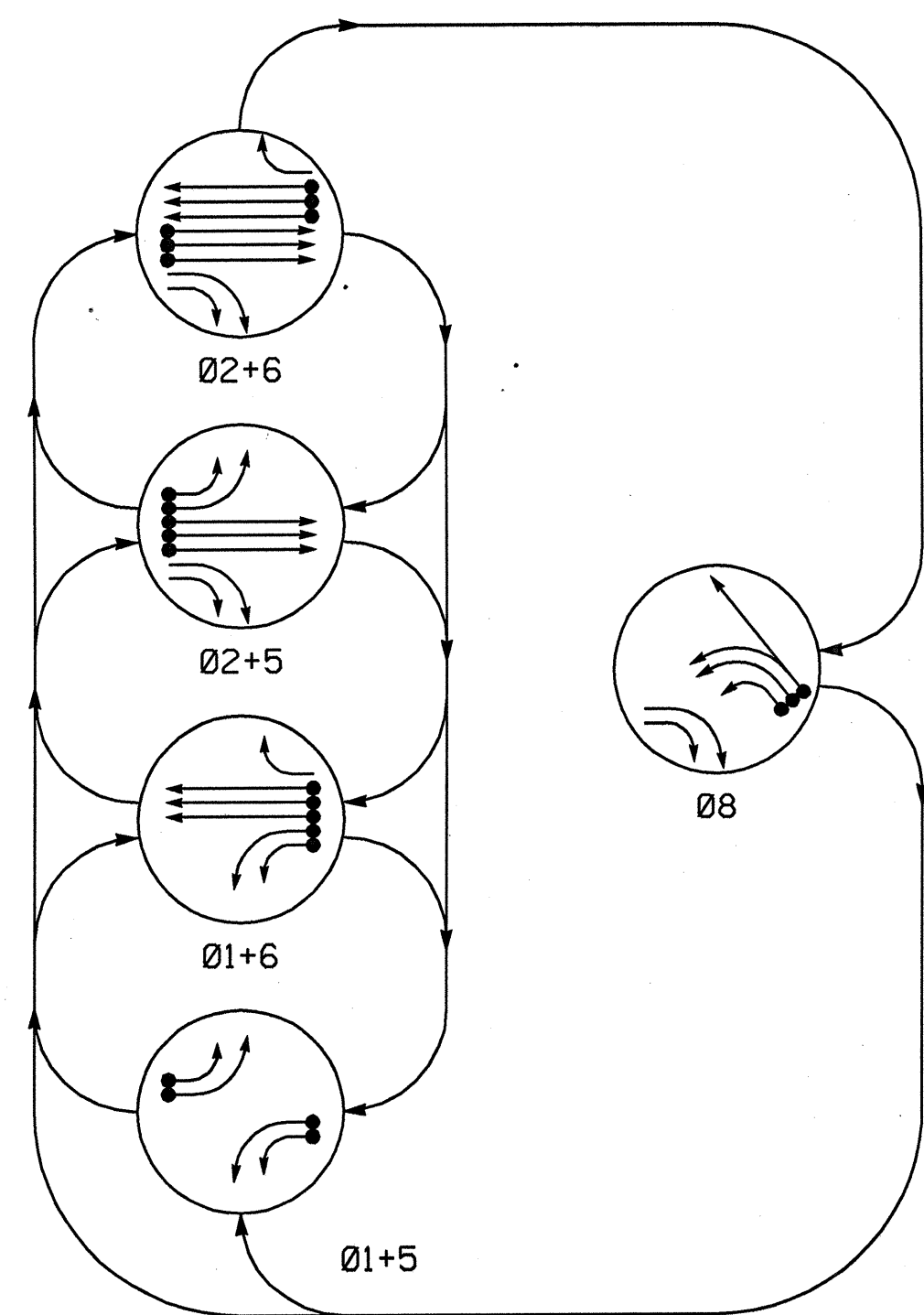
OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-0065T3
 DESIGNED: Jun 2012
 SEALED: 06-29-2012
 REVISED:

Signal Upgrade - Temporary Design 3 (TMP Phase IV-Step 2)

	ELECTRICAL AND PROGRAMMING DETAILS FOR: NC 24/87/210 (Bragg Boulevard) at NC 210/Spring Avenue
	Division 6 Cumberland County Spring Lake PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton PREPARED BY: NE Burns RKA PROJ. NO.: 11172 (040)
Prepared in the offices of: RAMEY KEMP ASSOCIATES, INC. Transportation Engineers 6808 Faringdon Place, Suite 100 Raleigh, North Carolina 27609 919-872-5115 Tel. 919-872-5416 Fax. www.rameykemp.com, NC License No. C-0910	750 Greenfield Parkway, Garner, NC 27529

PHASING DIAGRAM



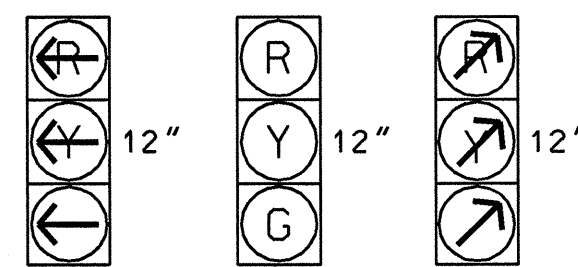
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE				
	01+5	01+6	02+5	02+6	08
11,12	←	←	←	←	←
21,22,23	R	R	G	G	R
24,25	↗	↗	↗	↗	↗
51,52	←	←	←	←	←
61,62,63	R	G	R	G	R
81,82	←	←	←	←	←
83,84	R	R	R	R	G

SIGNAL FACE I.D.

All Heads L.E.D.



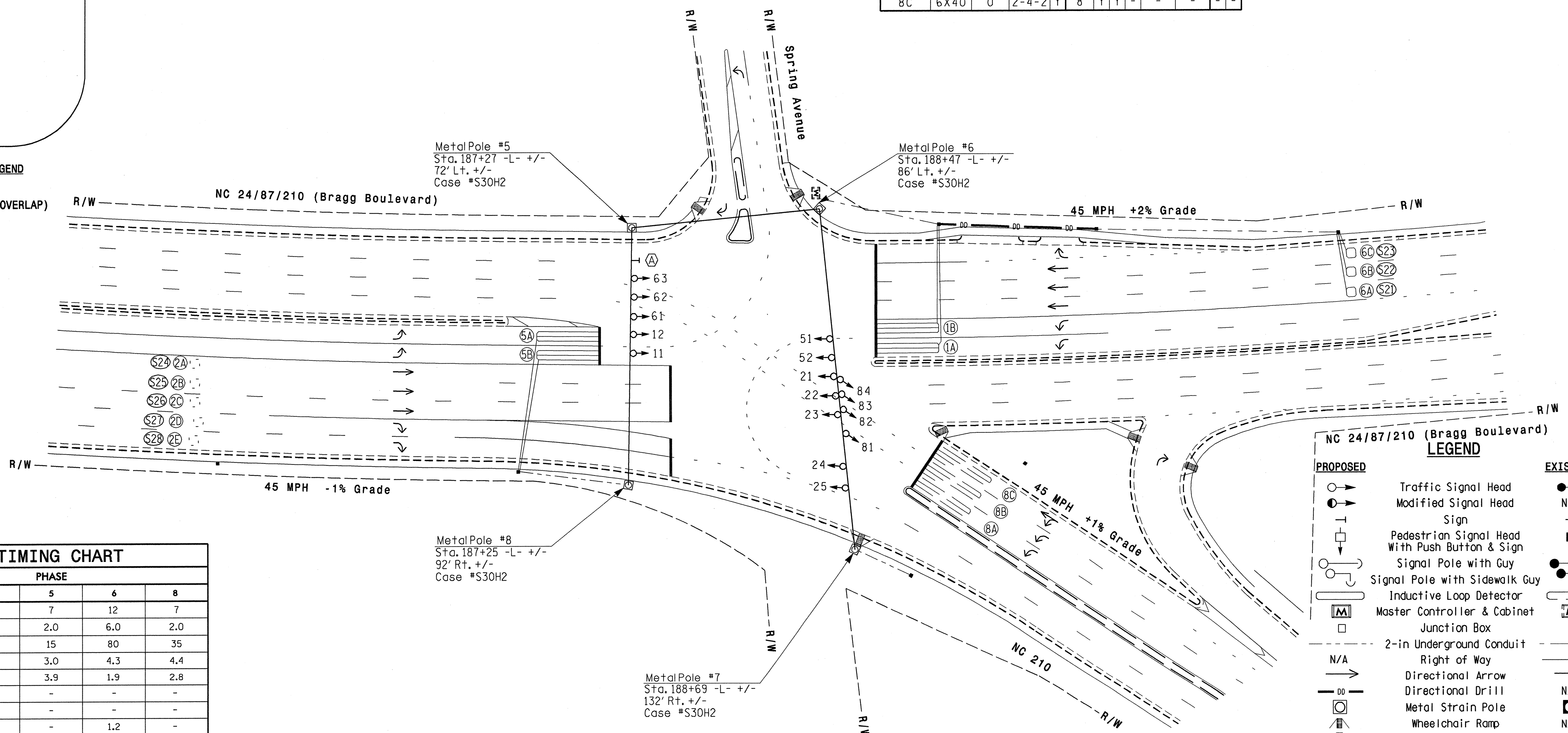
11,12 21,22,23
51,52 61,62,63 24,25
81,82 83,84

OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING			STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION				
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	-	-
1B	6X40	0	2-4-2	Y	1	Y	Y	-	-	-	-
2A/S24	6X6	300	5	-	2	Y	Y	-	-	-	Y
2B/S25	6X6	300	5	-	2	Y	Y	-	-	-	Y
2C/S26	6X6	300	5	-	2	Y	Y	-	-	-	Y
2D/S27	6X6	300	5	-	2	Y	Y	-	-	-	Y
2E/S28	6X6	300	5	-	2	Y	Y	-	-	-	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	-
5B	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	-
6A/S21	6X6	300	5	Y	6	Y	Y	-	-	-	Y
6B/S22	6X6	300	5	Y	6	Y	Y	-	-	-	Y
6C/S23	6X6	300	5	Y	6	Y	Y	-	-	-	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-
8B	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-
8C	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-

5 Phase Fully Actuated NC 24/87 (Bragg Boulevard) 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.
- Phase 1 and/or 5 may be lagged.
- 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.
- Closed loop system data: Master Asset #10627, Controller Asset #0065.



FEATURE	PHASE				
	1	2	5	6	8
Min Green 1*	7	12	7	12	7
Extension 1*	2.0	6.0	2.0	6.0	2.0
Max Green 1*	15	80	15	80	35
Yellow Clearance	3.0	4.6	3.0	4.3	4.4
Red Clearance	3.3	2.5	3.9	1.9	2.8
Walk 1*	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation*	-	1.2	-	1.2	-
Max Variable Initial*	-	34	-	34	-
Time Before Reduction*	-	15	-	15	-
Time To Reduce*	-	45	-	45	-
Minimum Gap	-	3.0	-	3.0	-
Recall Mode	-	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	-	YELLOW	-
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON

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

PROPOSED		EXISTING
○	Traffic Signal Head	●
○	Modified Signal Head	N/A
○	Sign	○
○	Pedestrian Signal Head With Push Button & Sign	○
○	Signal Pole with Guy	○
○	Signal Pole with Sidewalk Guy	○
○	Inductive Loop Detector	○
○	Master Controller & Cabinet	○
○	Junction Box	○
○	2-in Underground Conduit	○
○	Right of Way	○
○	Directional Arrow	○
○	Directional Drill	N/A
○	Metal Strain Pole	○
○	Wheelchair Ramp	N/A
○	Right Arrow "ONLY" Sign (R3-5R)	○

Signal Upgrade - Final Design

Prepared for: **TRANSPORTATION MOBILITY AND SAFETY DIVISION**

NC 24/87/210 (Bragg Boulevard) at NC 210/Spring Avenue

Division 6 Cumberland County Spring Lake

PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton

PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

REVISIONS: _____ INIT. DATE

SCALE: 1" = 40'

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 32396 WILLIAM J. HAMILTON

SIG. INVENTORY NO. 06-0065

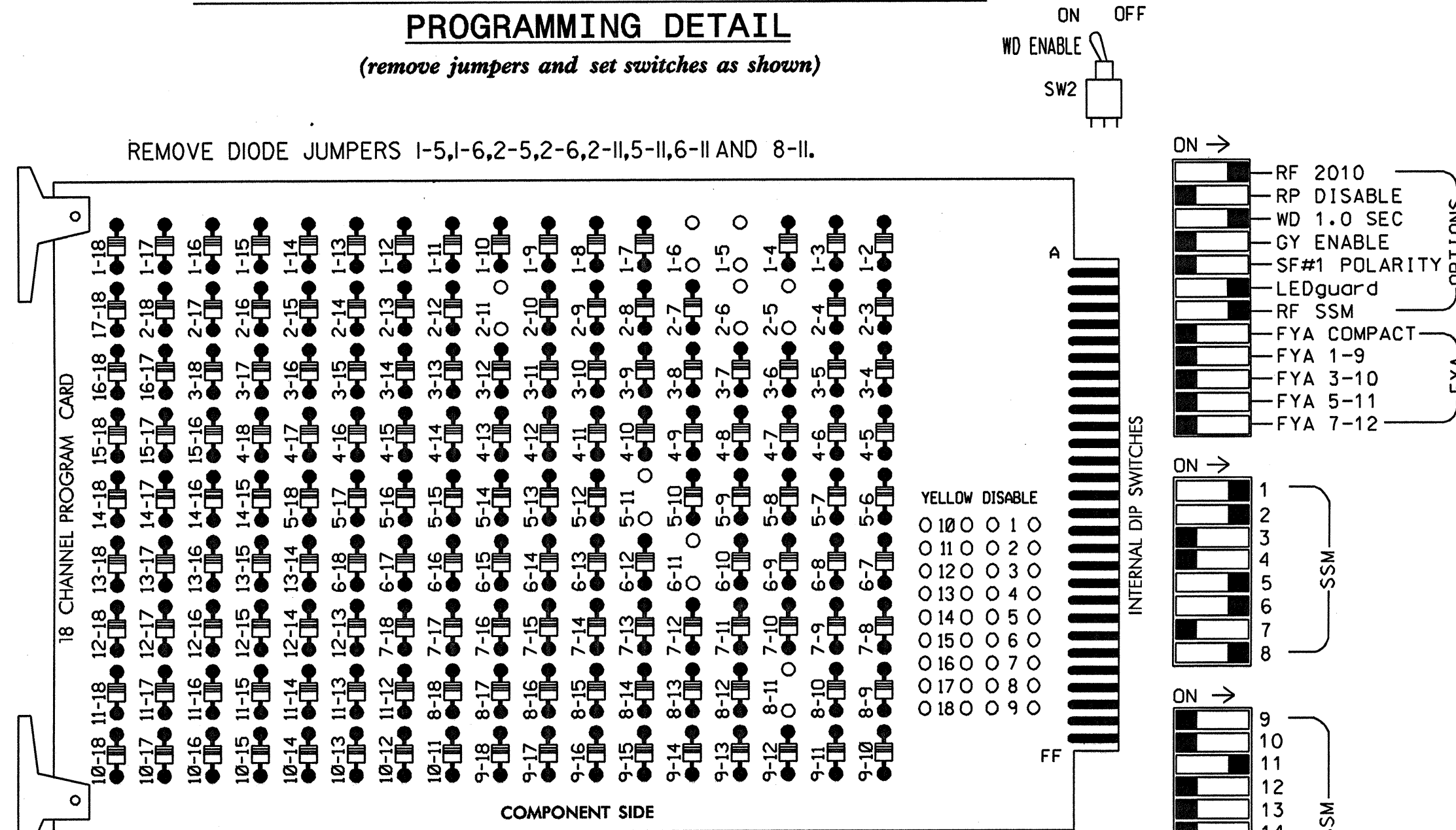
Prepared in the office of:

RAMEY KEMP ASSOCIATES, INC.

Transportation Engineers

6808 Ferguson Place, Suite 100 Raleigh, North Carolina 27609 919-872-5110 Tel. 919-872-5414 Fax. www.rameykemp.com

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



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the NC 24/87 (Bragg Boulevard) CLS.

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,S7,S8,S11,AUX S4
 PHASES USED.....1,2,5,6,8
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....2+8
 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	
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.	11,12	21,22, 23	NU	NU	NU	NU	51,52	61,62, 63	NU	NU	81,82	83,84	NU	NU	NU	24,25	NU	NU	
RED	128							134				107							
YELLOW		129							135			108							
GREEN			130							136		109							
RED ARROW	125							131				107						A114	
YELLOW ARROW	126							132				108							A115
GREEN ARROW	127							133				109							A116

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/SYS	∅ 2/SYS	∅ 2/SYS	S	S	S	S	S	S	S	S	S	FS
I	1A	2A/S24	2C/S26	2E/S28	∅ 1	∅ 2/SYS	∅ 2/SYS	NOT USED	∅ 1	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	DC ISOLATOR
L	1B	2B/S25	2D/S27											ST
U	∅ 5	∅ 6/SYS	∅ 6/SYS	S	S	∅ 8	∅ 8	S	S	S	S	S	S	S
J	5A	6A/S21	6C/S23			8A	8C							
L	∅ 5	∅ 6/SYS	NOT USED			∅ 8	NOT USED							
	5B	6B/S22				8B								

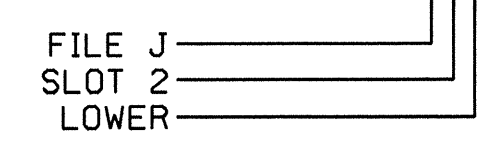
EX. : 1A, 2A, ETC. = LOOP NO.'S

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			
1B	TB2-3,4	I1L	56	18	1	1	Y	Y			
2A/S24	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S25	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
2C/S26	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
2D/S27	TB2-11,12	I3L	76	38	42	2/SYS	Y	Y			
2E/S28	TB4-1,2	I4U	47	9	22	2/SYS	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-3,4	J1L	55	17	5	5	Y	Y			
6A/S21	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S22	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			
6C/S23	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
8C	TB7-1,2	J7U	66	28	38	8	Y	Y			

INPUT FILE POSITION LEGEND: J2L



OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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

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

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-0065
 DESIGNED: Jun 2012
 SEALED: 06-29-2012
 REVISED:

Signal Upgrade - Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR: NC 24/87/210 (Bragg Boulevard) at NC 210/Spring Avenue

Division 6 Cumberland County Spring Lake

PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton

PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

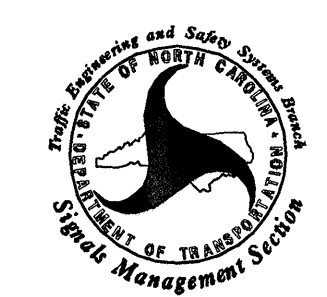
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Signature: [Signature] DATE: 6/29/12

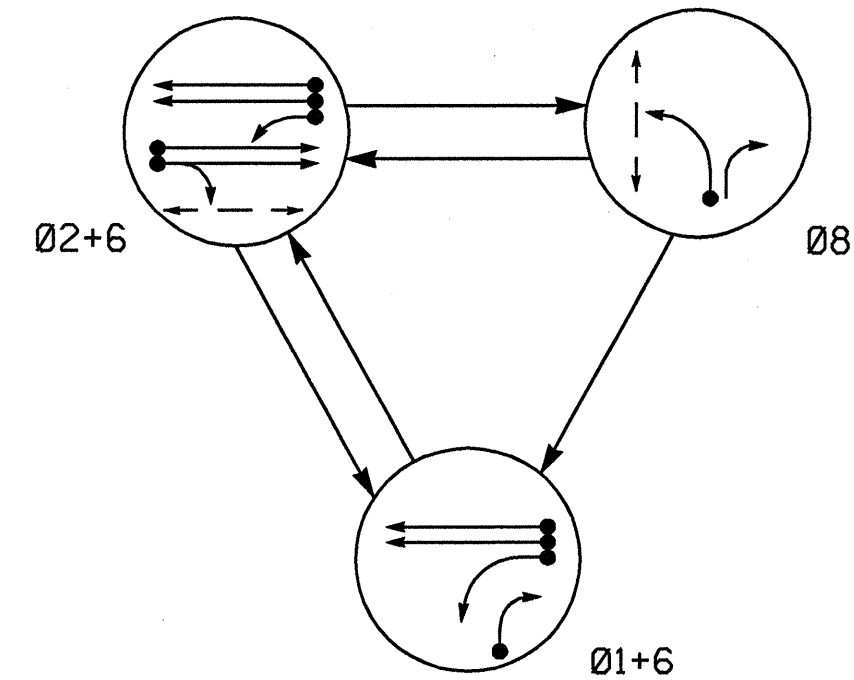
Seal: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 32396 WILLIAM AL HAMILTON

SIG. INVENTORY NO. 06-0065

Prepared in the offices of:
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 Transportation Engineers
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 919-872-5115 Tel. 919-872-5416 Fax.
 www.rameykemp.com, NC License No. C-0910



PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

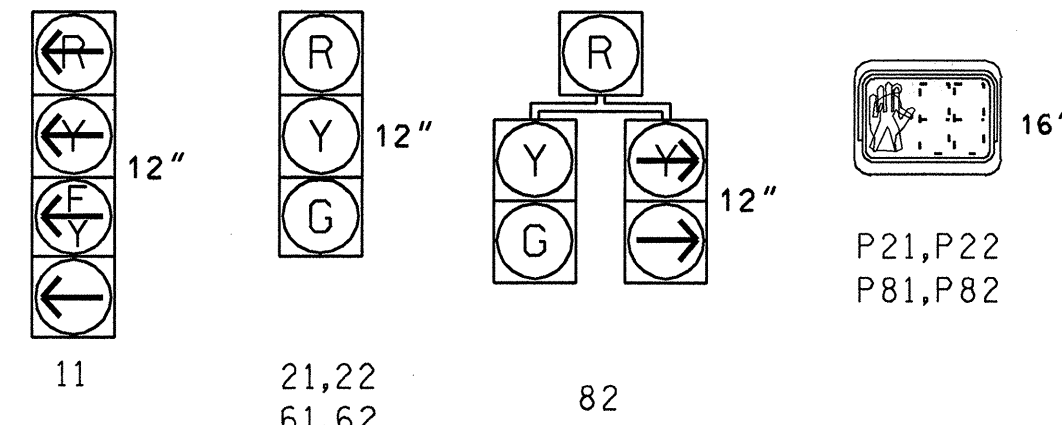
SIGNAL FACE	PHASE			
	Ø1+6	Ø2+6	Ø8	FLASH
11	←	←	←	←
21,22	R	G	R	Y
61,62	G	G	R	Y
81	R	R	G	R
82	R	R	G	R
P21,P22	DW	W	DW	DRK
P81,P82	DW	DW	W	DRK

W - Walk
DW - Don't Walk
DRK - Dark

⚡ = Flashing Yellow Arrow

SIGNAL FACE I.D.

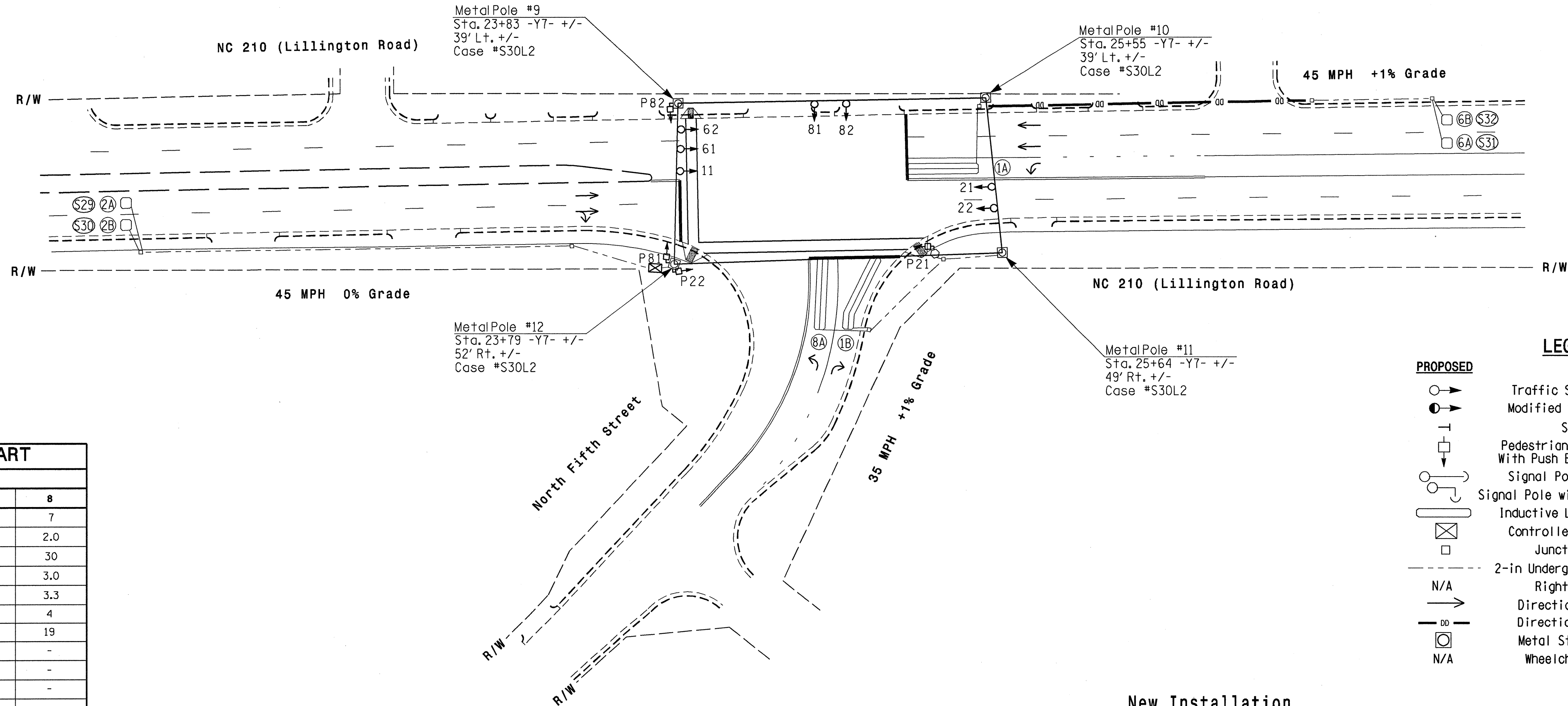
All Heads L.E.D.



LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	STRETCH TIME			DELAY TIME
1A	6X40	0	2-4-2	Y	1	Y	Y	-	15	-	Y
1B	6X40	0	5	Y	1	Y	Y	-	10	-	Y
2A/S29	6X6	300	5	Y	2	Y	Y	-	-	-	Y
2B/S30	6X6	300	5	Y	2	Y	Y	-	-	-	Y
6A/S31	6X6	300	5	Y	6	Y	Y	-	-	-	Y
6B/S32	6X6	300	5	Y	6	Y	Y	-	-	-	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	Y

3 Phase Fully Actuated NC 24/87 (Bragg Boulevard) 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.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- 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 #1319.



FEATURE	PHASE			
	1	2	6	8
Min Green 1*	7	12	12	7
Extension 1*	2.0	6.0	6.0	2.0
Max Green 1*	15	60	60	30
Yellow Clearance	3.0	4.5	4.5	3.0
Red Clearance	2.6	1.9	1.9	3.3
Walk 1*	-	7	-	4
Don't Walk 1	-	30	-	19
Seconds Per Actuation*	-	1.5	1.5	-
Max Variable Initial*	-	34	34	-
Time Before Reduction*	-	15	15	-
Time To Reduce*	-	40	40	-
Minimum Gap	-	3.0	3.0	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

PROPOSED		EXISTING	
○	Traffic Signal Head	●	N/A
◐	Modified Signal Head	◐	N/A
◑	Sign	◑	N/A
◒	Pedestrian Signal Head With Push Button & Sign	◒	N/A
◓	Signal Pole with Guy	◓	N/A
◔	Signal Pole with Sidewalk Guy	◔	N/A
◕	Inductive Loop Detector	◕	N/A
◖	Controller & Cabinet	◖	N/A
◗	Junction Box	◗	N/A
◘	2-in Underground Conduit	◘	N/A
→	Right of Way	→	N/A
→	Directional Arrow	→	N/A
→	Directional Drill	→	N/A
○	Metal Strain Pole	○	N/A
○	Wheelchair Ramp	○	N/A

New Installation

Prepared for: **North Carolina Department of Transportation**

NC 210 (Lillington Road) at North Fifth Street

Division 6 Cumberland County Spring Lake

PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton

PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

REVISIONS: _____

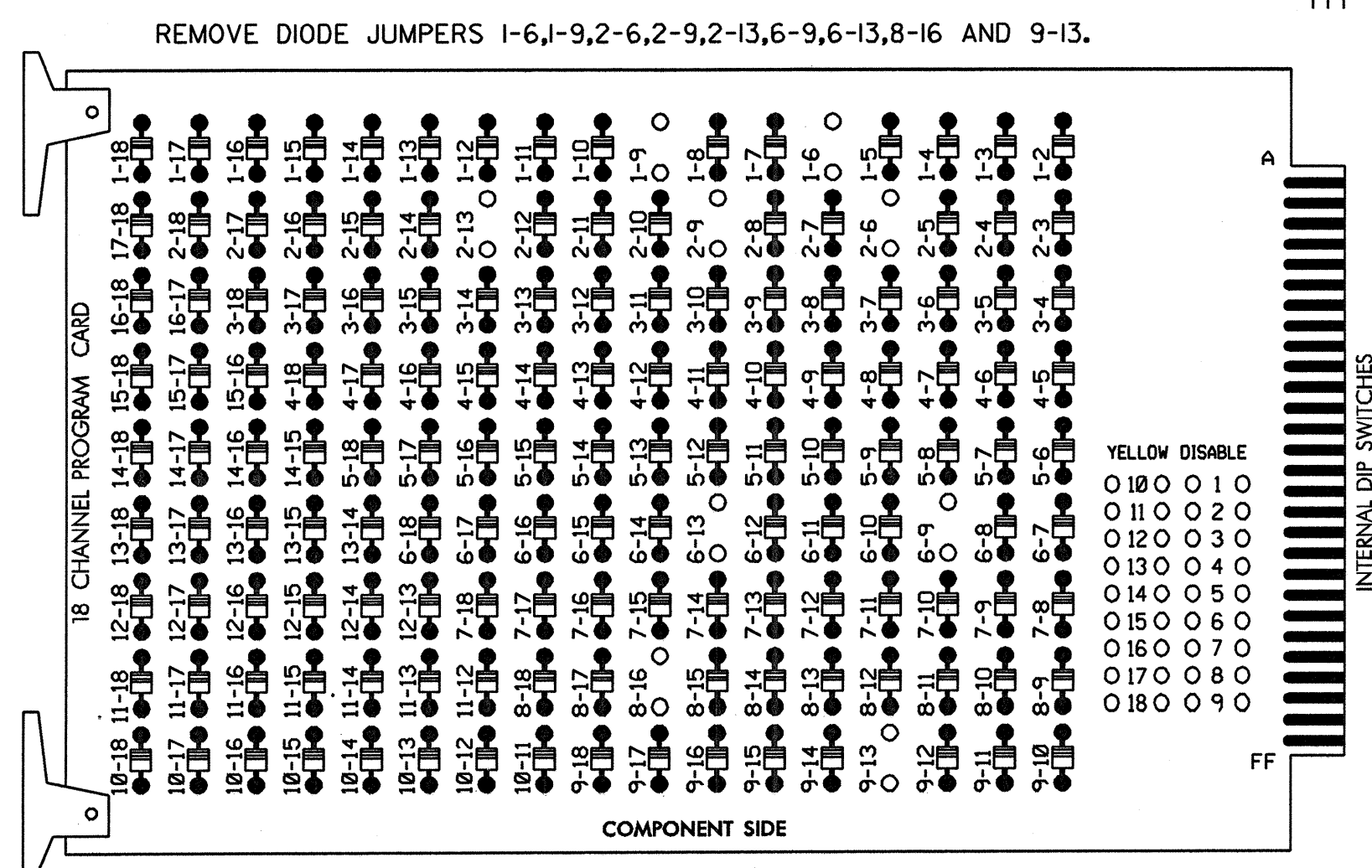
SCALE: 1" = 40'

RAMEY KEMP ASSOCIATES, INC.
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SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 32396
WILLIAM J. HAMILTON
W. J. Hamilton
SIG. INVENTORY NO. 06-1319

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 8 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the NC 24/87 (Bragg Boulevard) CLS.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONDLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S3,S8,S11,S12,AUX S1
 PHASES USED.....1,2,2PED,6,8,8PED
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 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*	82	21,22	P21, P22	NU	NU	NU	61,62	NU	NU	81,82	P81, P82	11*	NU	NU	NU	NU	NU
RED	*	128						134			107							
YELLOW		129						135			108							
GREEN		130						136			109							
RED ARROW													A121					
YELLOW ARROW		126												A122				
FLASHING YELLOW ARROW														A123				
GREEN ARROW	127	127																
Hand icon				113									110					
Person icon				115									112					

NU = Not Used

* Denotes see pictorial of head wiring in detail below.
 * Denotes install load resistor. See load resistor installation detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1 1A	∅ 1 1B	∅ 2/SYS 2A/S29	S TORS	S TORS	S TORS	S TORS	S TORS	S TORS	S TORS	S TORS	∅ 2 PED DC ISOLATOR	NOT USED	FS DC ISOLATOR
L	NOT USED	NOT USED	∅ 2/SYS 2B/S30	Y TORS	Y TORS	Y TORS	Y TORS	Y TORS	Y TORS	Y TORS	Y TORS	NOT USED	∅ 8 PED DC ISOLATOR	ST DC ISOLATOR
U	S TORS	∅ 6/SYS 6A/S31	S TORS	S TORS	S TORS	∅ 8 8A	S TORS	S TORS	S TORS	S TORS	S TORS	S TORS	S TORS	S TORS
L	Y TORS	∅ 6/SYS 6B/S32	Y TORS	Y TORS	Y TORS	NOT USED	Y TORS	Y TORS	Y TORS	Y TORS	Y TORS	Y TORS	Y TORS	Y TORS

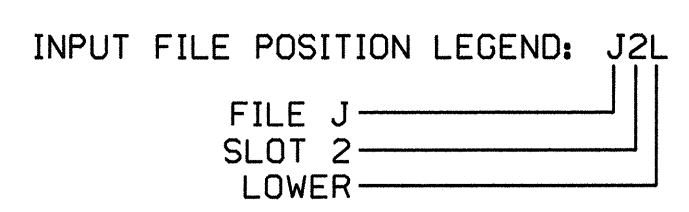
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 ⊗ Wired Input - Do not populate slot with detector card

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	TB2-1,2	I1U	56	18	1	1	Y	Y			15
		J4U	48	10	26	6	Y	Y	Y		3
1B	TB2-5,6	I2U	39	1	2	1	Y	Y			10
	2A/S29	TB2-9,10	I3U	63	25	2/SYS	Y	Y			
	2B/S30	TB2-11,12	I3L	76	38	2/SYS	Y	Y			
	6A/S31	TB3-5,6	J2U	40	2	6/SYS	Y	Y			
	6B/S32	TB3-7,8	J2L	44	6	6/SYS	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOTS 112 AND 113.

1 Add jumper from 11-W to J4-W, on rear of input file.



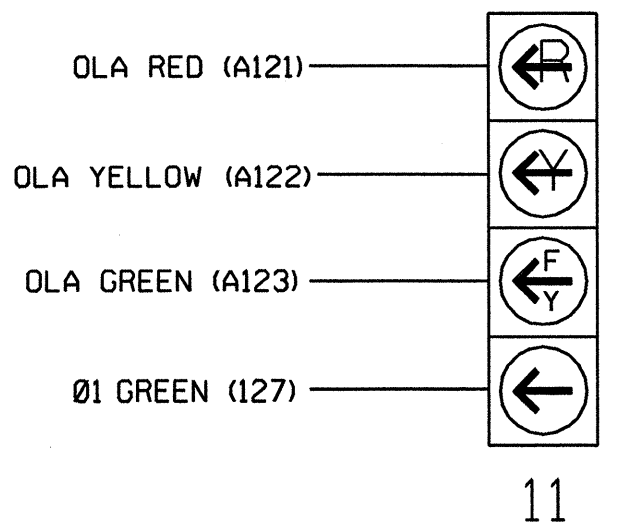
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 06-1319
 DESIGNED: Jun 2012
 SEALED: 06-29-2012
 REVISED:

Prepared in the offices of:

RAMEY KEMP ASSOCIATES, INC.
 Transportation Engineers
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 919-872-5115 Tel. 919-878-5416 Fax.
 www.rameykemp.com, NC License No. C-0910

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



NOTE

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

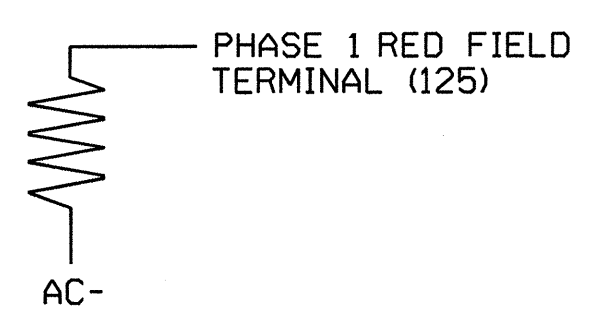
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

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



Electrical Detail Sheet 1 of 2

NEW INSTALLATION

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 210 (Lillington Road) at North Fifth Street

Division 6 Cumberland County Spring Lake

PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
 PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

REVISIONS	INIT.	DATE

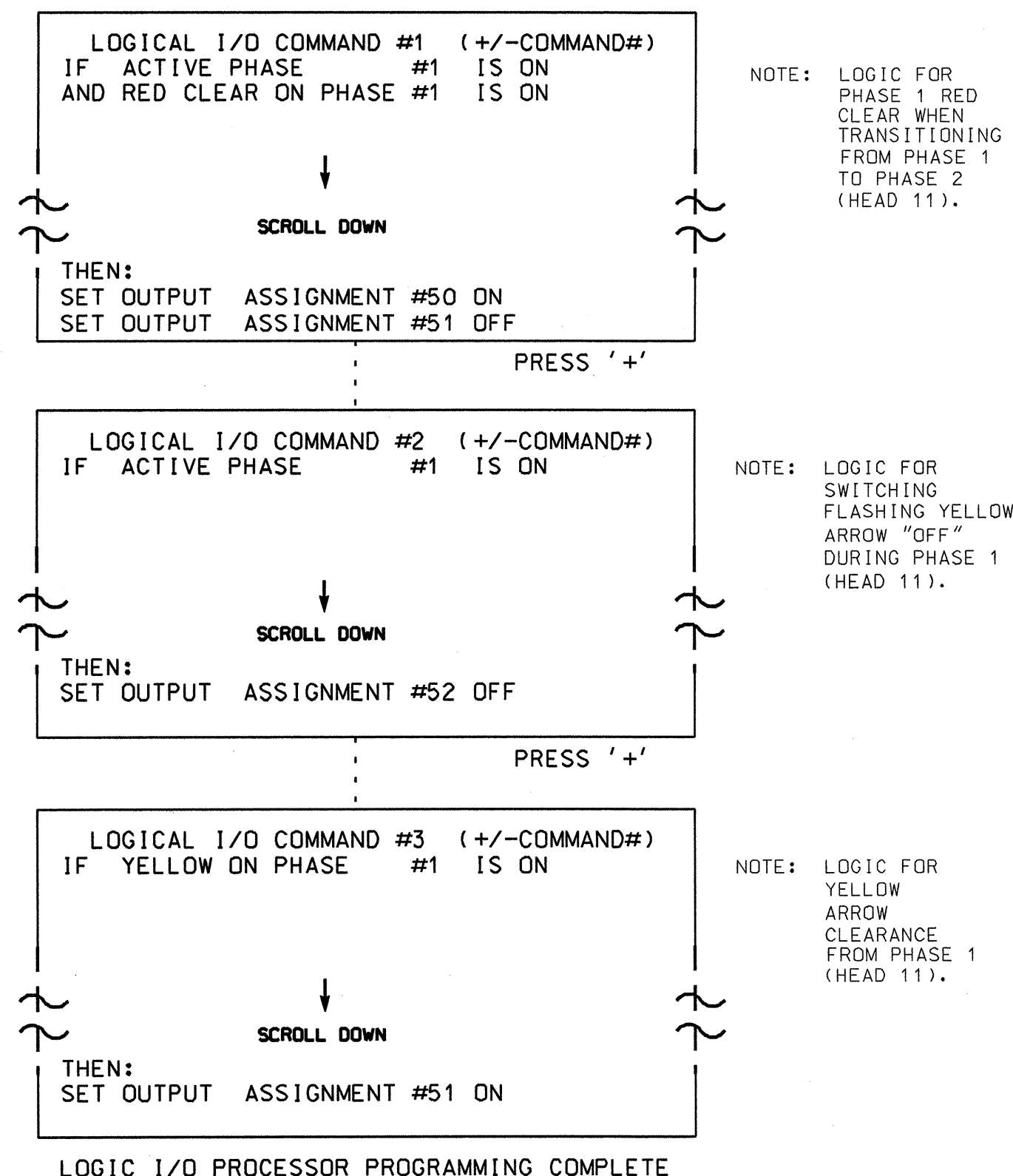
SEAL

SIGNATURE: *William J. Hamilton* DATE: _____
 SIG. INVENTORY NO. 06-1319

**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 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
 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: 06-1319
 DESIGNED: Jun 2012
 SEALED: 06-29-2012
 REVISED:

Electrical Detail
 Sheet 2 of 2

Prepared in the offices of:

RAMEY KEMP ASSOCIATES, INC.
 Transportation Engineers
 6808 Faringdon Place, Suite 100
 Raleigh, North Carolina 27609
 919-872-5115 Tel. 919-878-5416 Fax.
 www.rameykemp.com, NC License No. C-0910 750 Greenfield Parkway, Garner, NC 27529

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 32396
 WILLIAM J. HAMILTON

Division 6 Cumberland County Spring Lake
 PLAN DATE: June 2012 REVIEWED BY: WJ Hamilton
 PREPARED BY: NE Burns RKA PROJ. NO: 11172 (040)

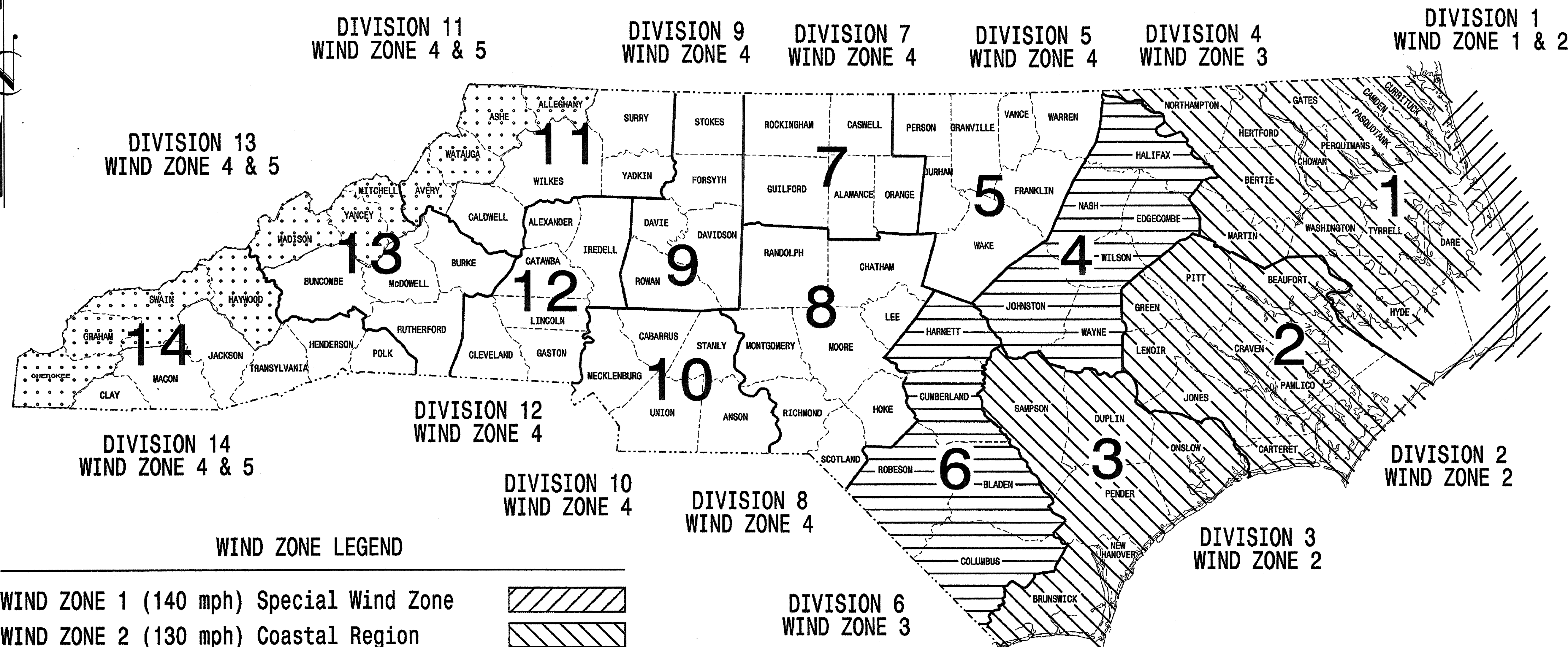
REVISIONS	INIT.	DATE

SIG. INVENTORY NO. 06-1319

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	U-4444AB/B	sig. 28
F. A. PROJ. NO.	M 1	
PROJECT ID. NO.		

STANDARD DRAWINGS FOR METAL POLES



<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

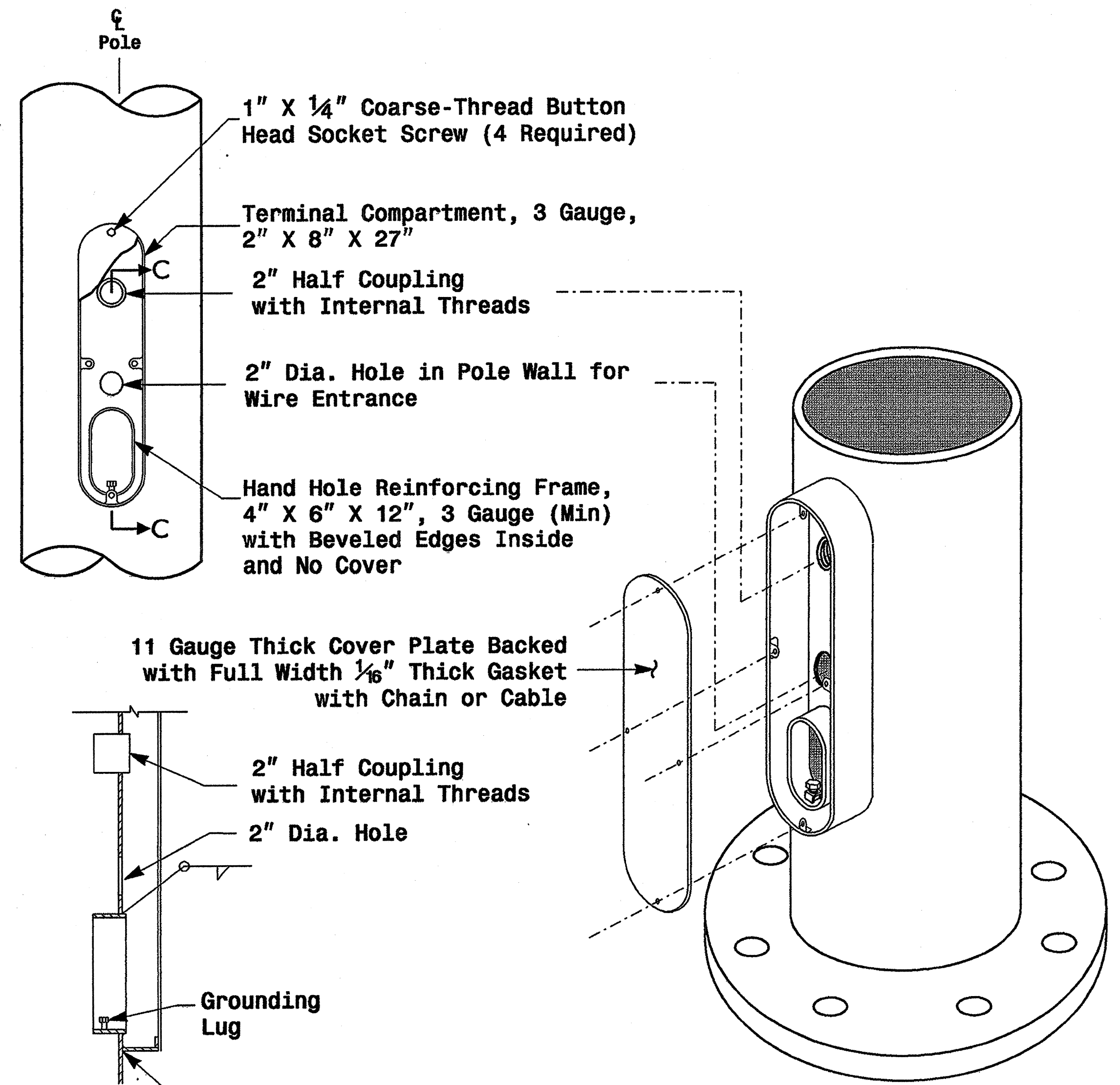
INDEX OF PLANS	
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

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

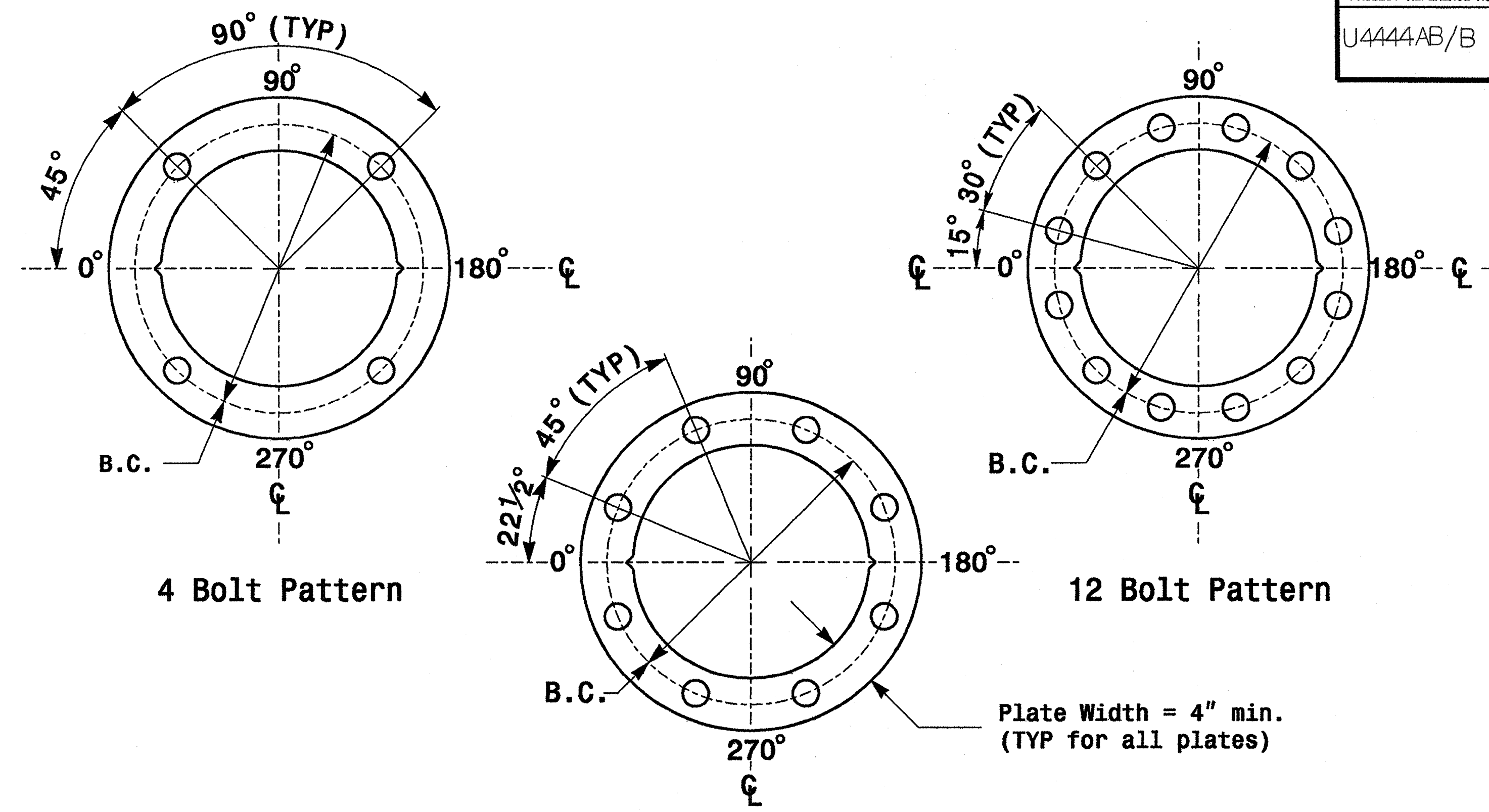
SEAL

SIGNATURE: *D. Sarkar* DATE: 7.21.2009



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

Terminal Compartment Detail



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

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

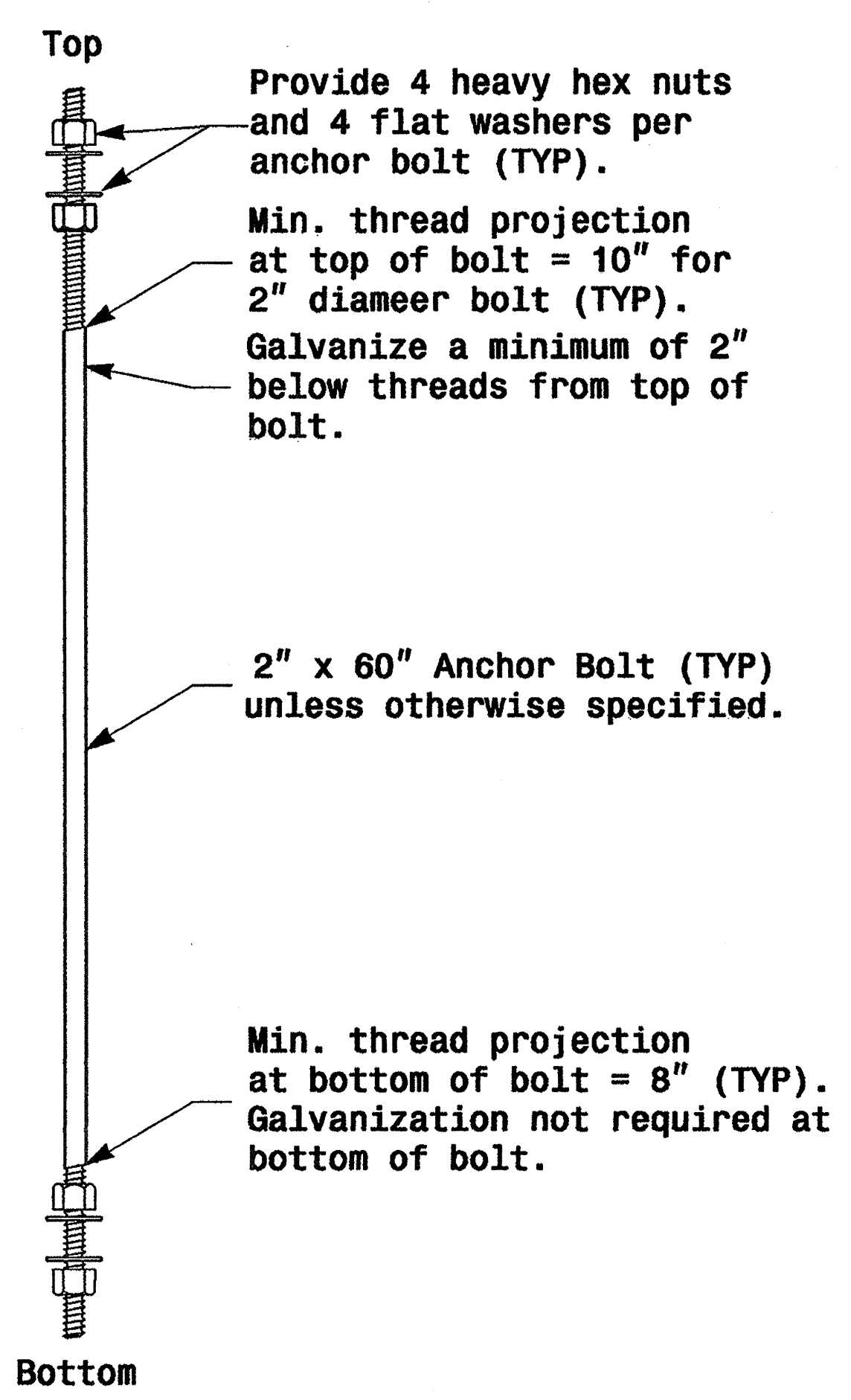
MFG _____	MFG. DATE: MM/YY _____
SHAFT D/T/L/Y _____	_____
ARM-A D/T/L/Y _____	_____
ARM-B D/T/L/Y _____	_____
A.B. DIA./B.C./L/Y _____	_____
NCDOT STANDARD _____	_____

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 _____	_____

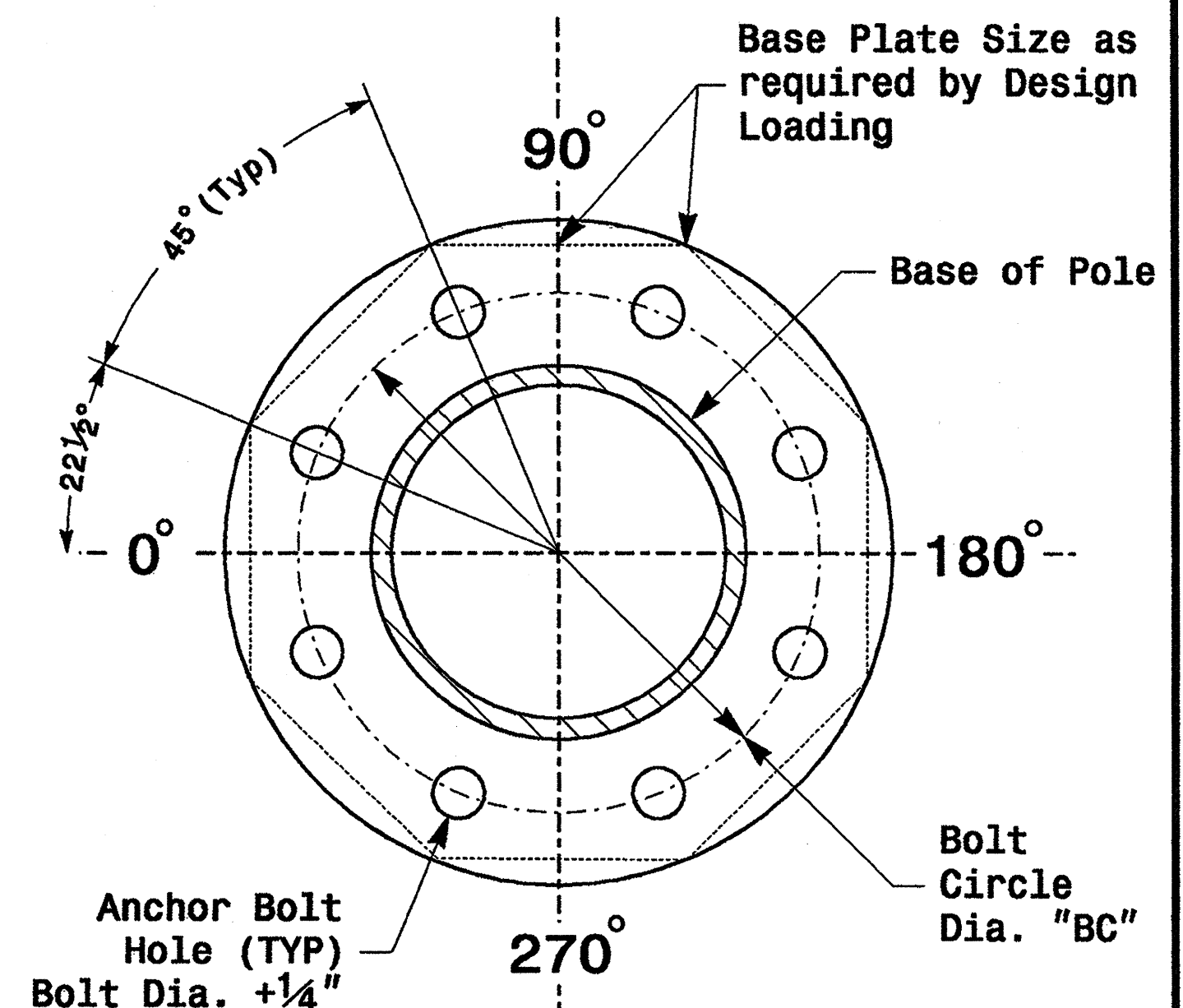
- Notes:
- 1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
 - 2) A.B. = Anchor Bolt
 - 3) B.C. = Bolt Circle of Anchor Bolts
 - 4) If Custom Design, use "NCDOT STANDARD" line for plan pole I.D.
 - 5) See drawing M4 for mounting positions of I.D. tags.

Identification Tag Details



Anchor Bolt Detail

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



8 Bolt Base Plate Detail

Prepared in the Office of:

Typical Fabrication Details
 Common To
 All Metal Poles

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

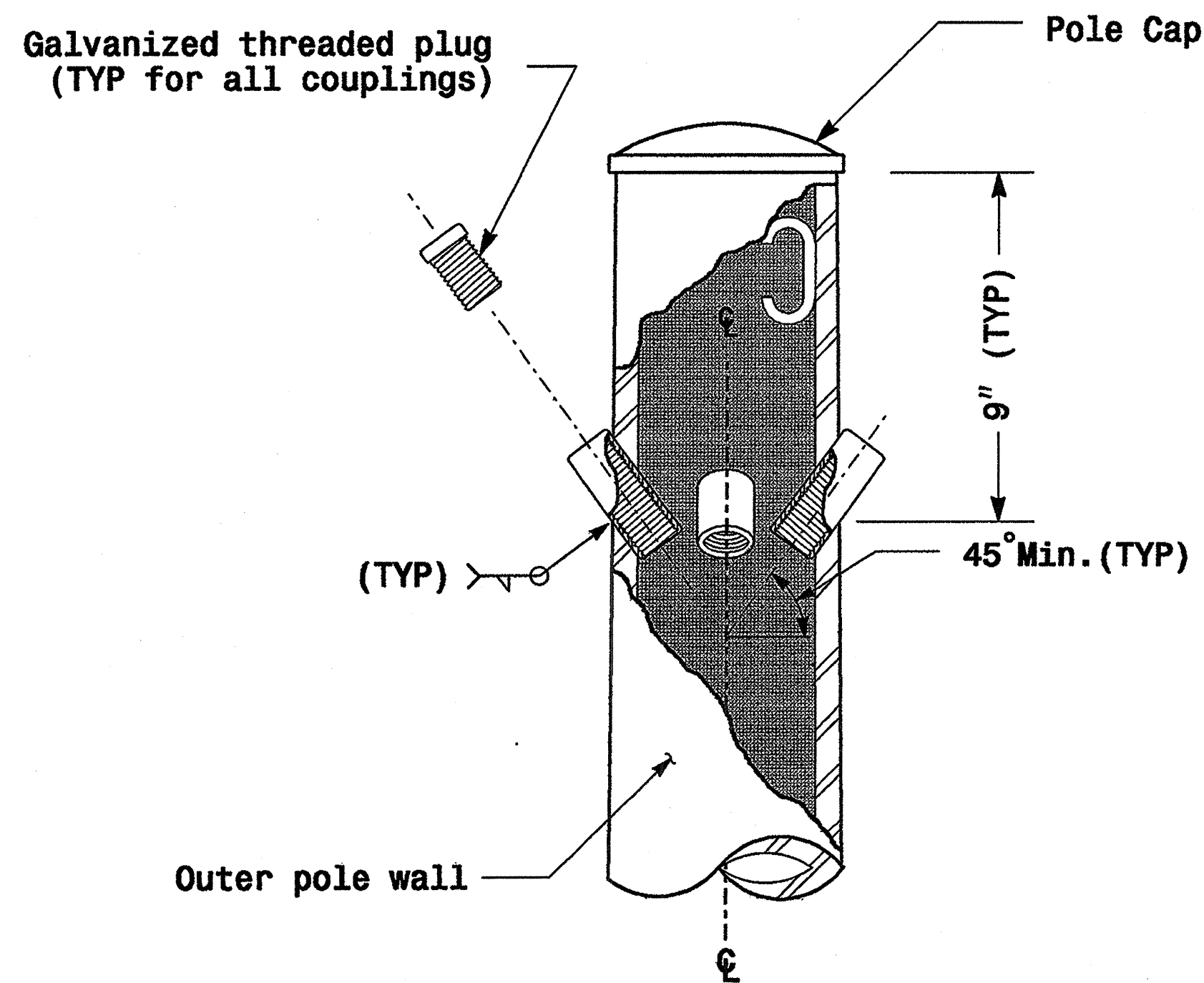
REVISIONS	INIT.	DATE

SCALE: 0 NA NONE

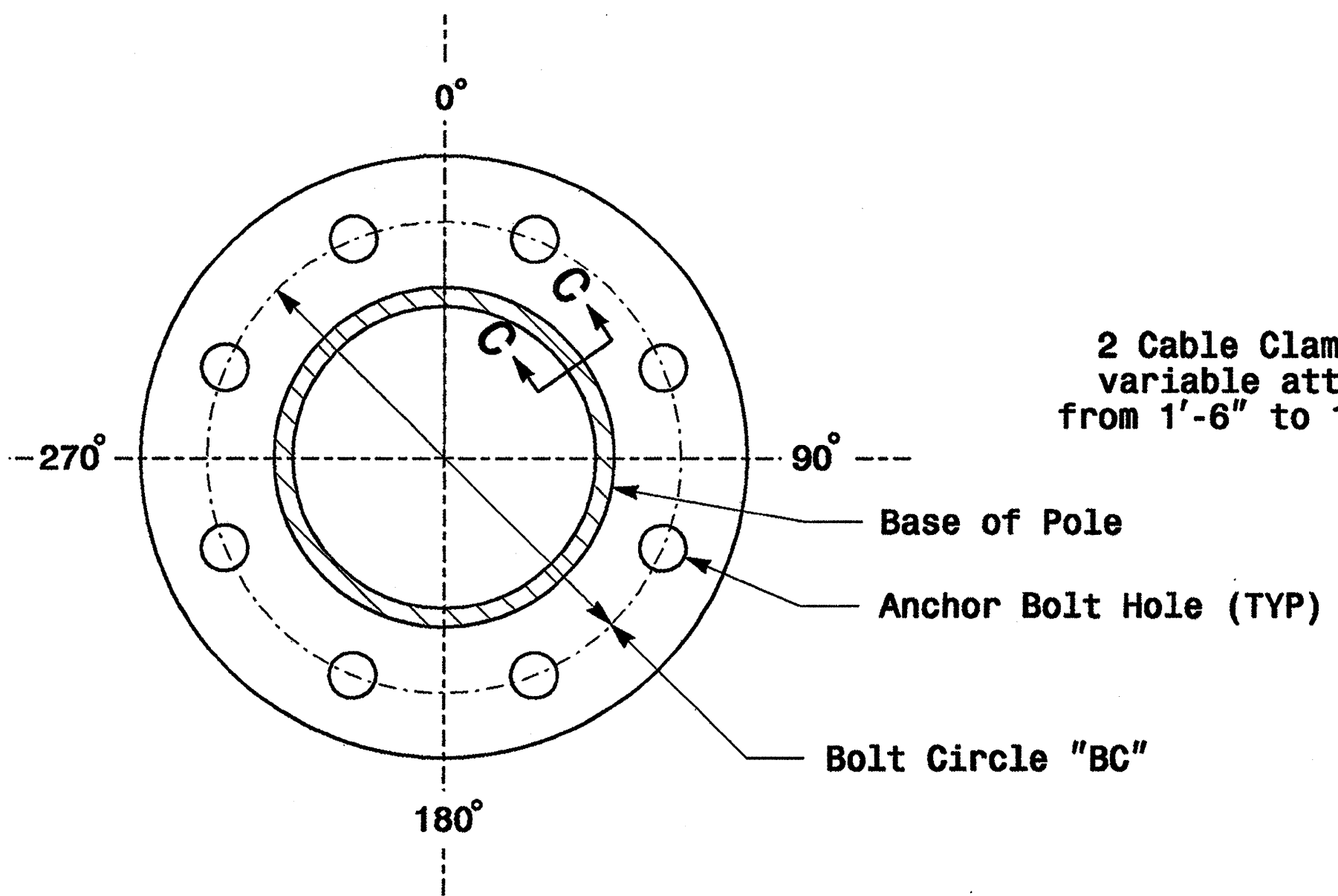
Signature: *D. Sarkar* 9.2.2005
 DATE: 9.2.2005
 SIG. INVENTORY NO.:

Fabrication Details - All Poles

01-SEP-2005 18:22 D:\42004 Metal Pole Standard\0400.mcd thru m5.dgn

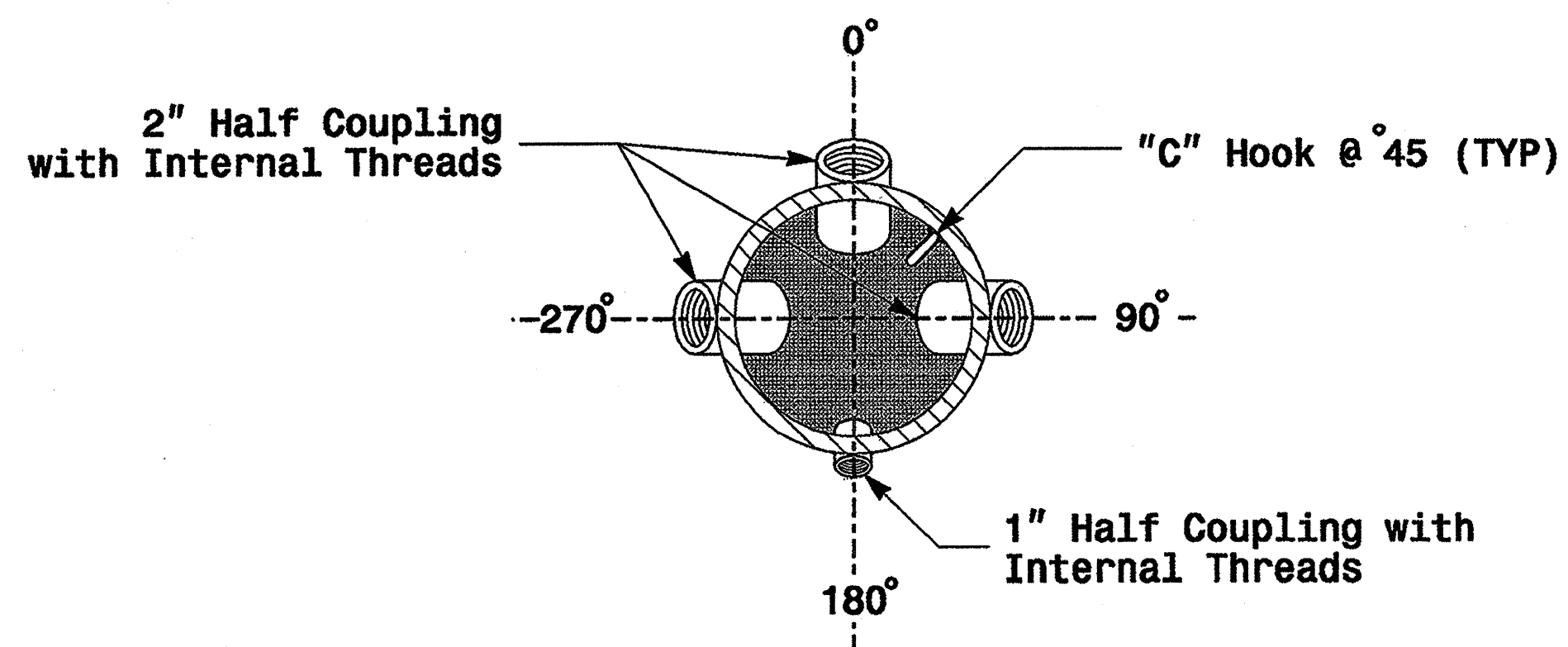
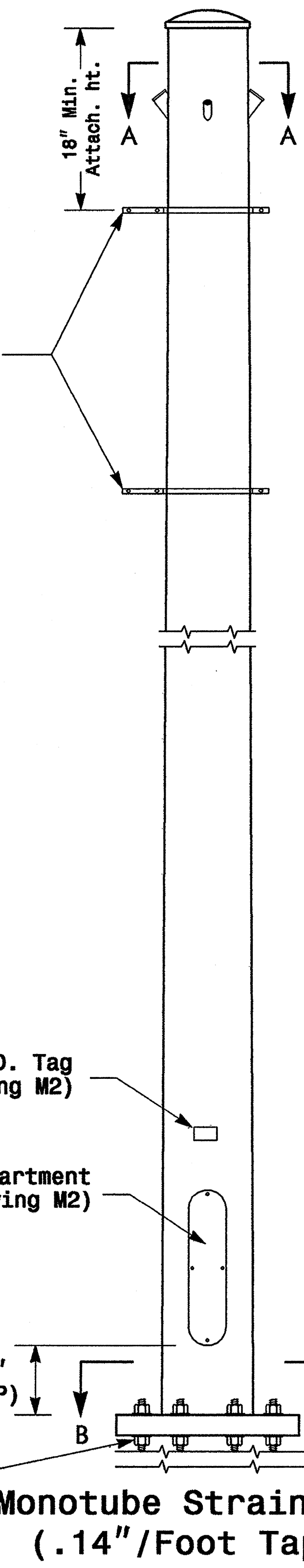


Cable Entrances at Top of Pole

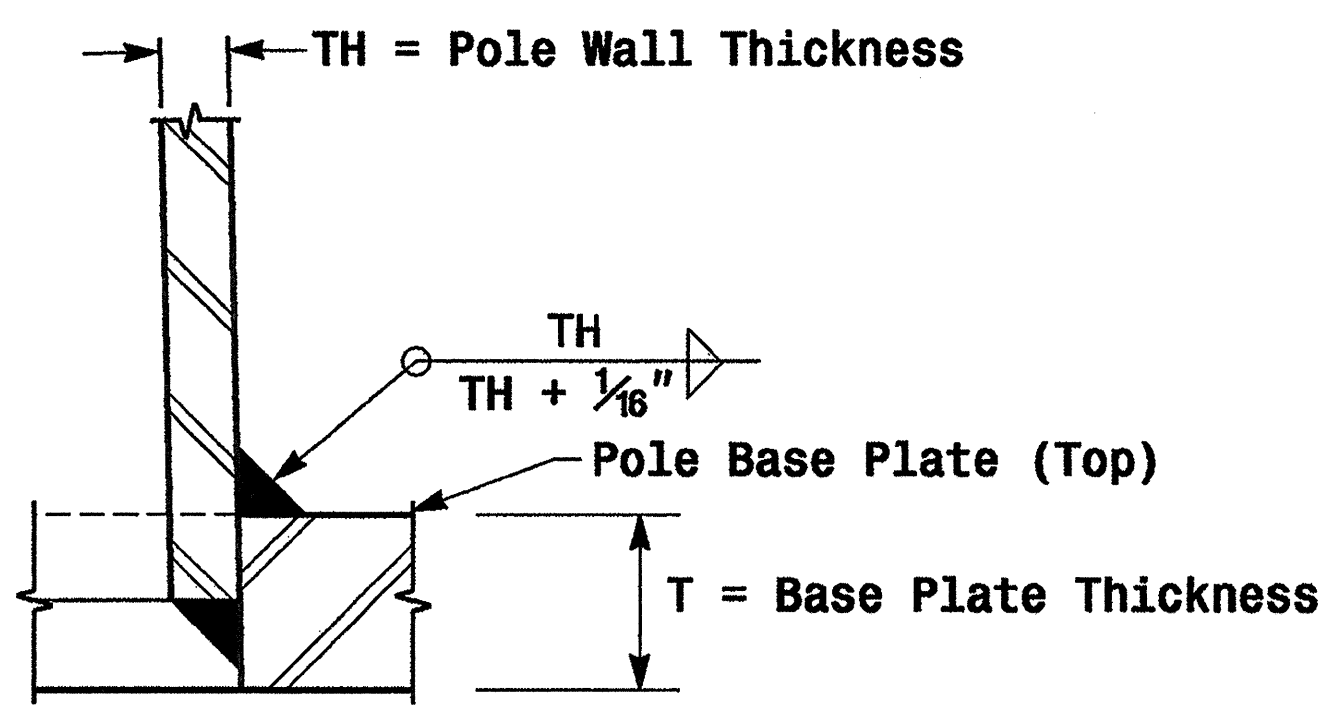


Section B-B
(See drawing M2)
Pole Base Plate

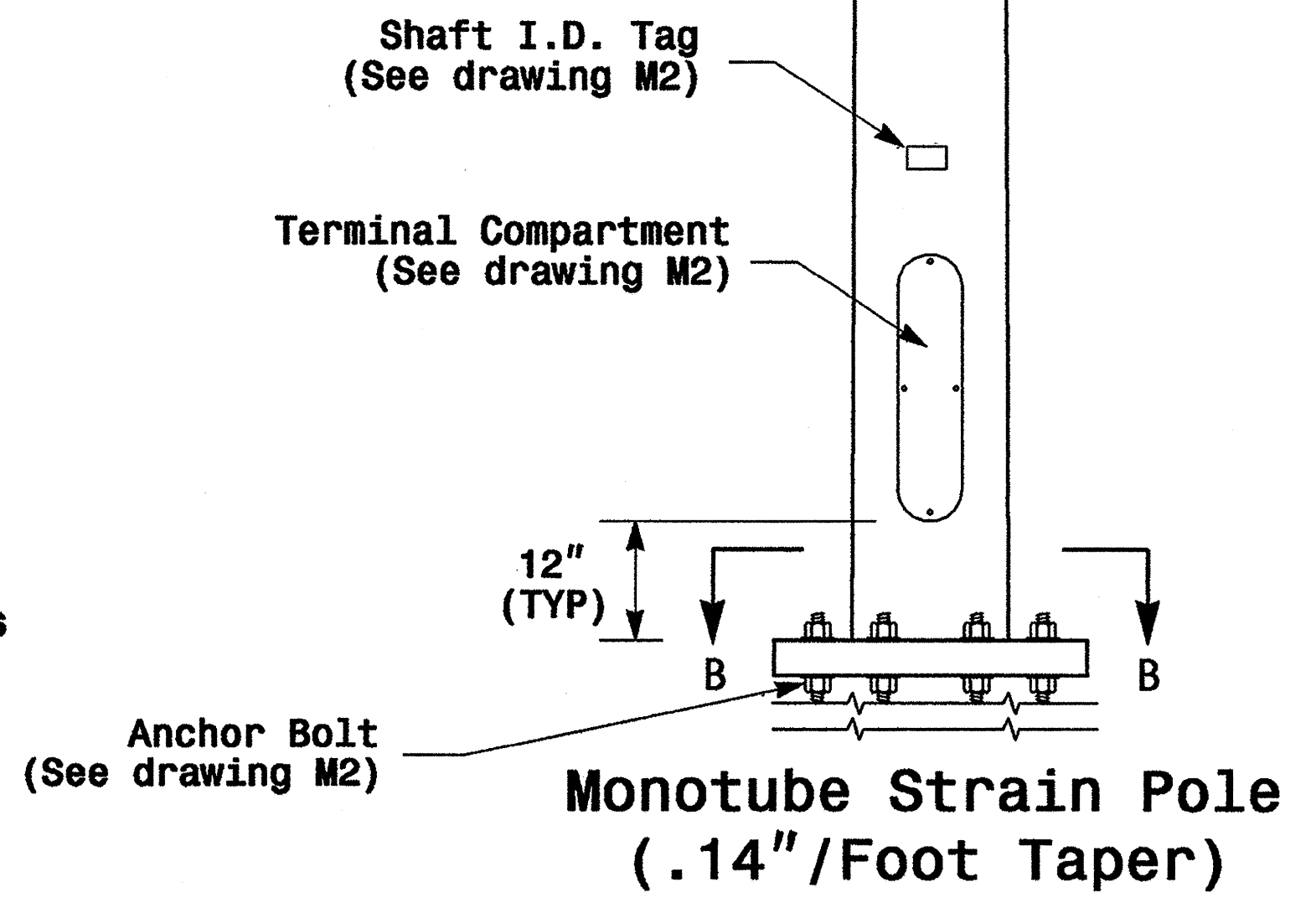
2 Cable Clamps designed for variable attachment heights from 1'-6" to 10' blow the top of the pole.



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

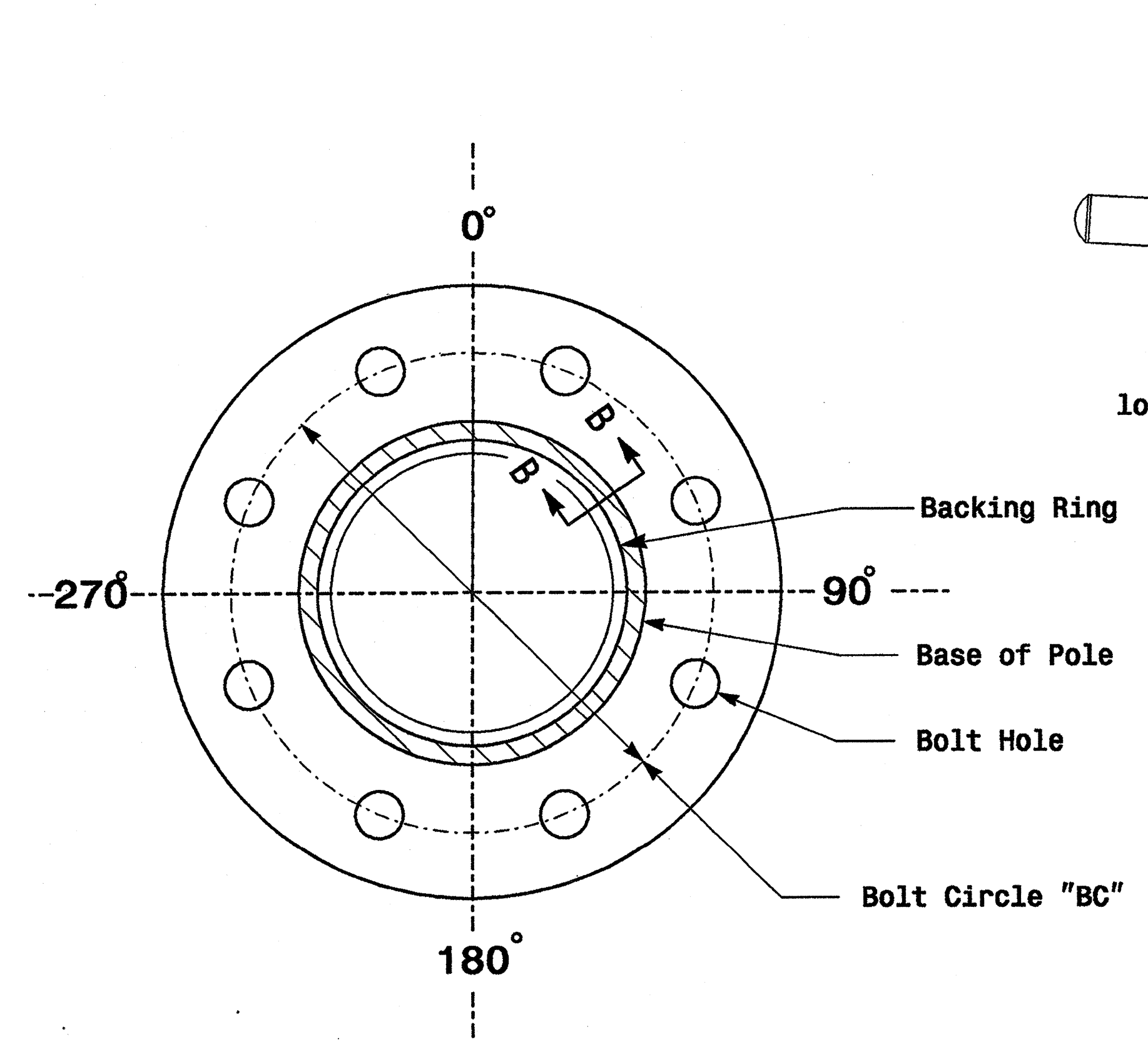


Section C-C
Socket Connection Weld Detail

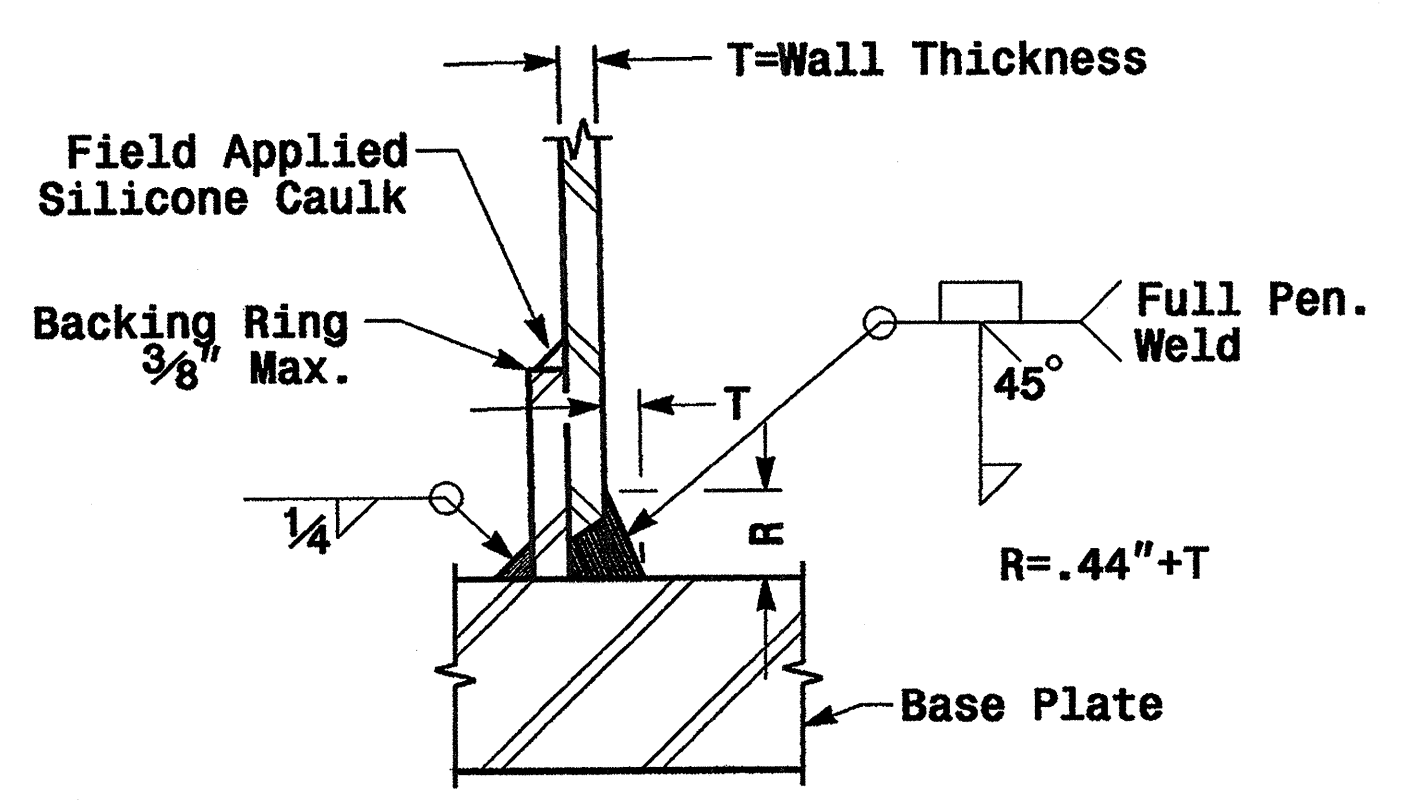


01-SEP-2005 14:07 v:\spec\iss-un\hvac\kg\couple2004 metal pole standard2004.mxd p.l.alexander

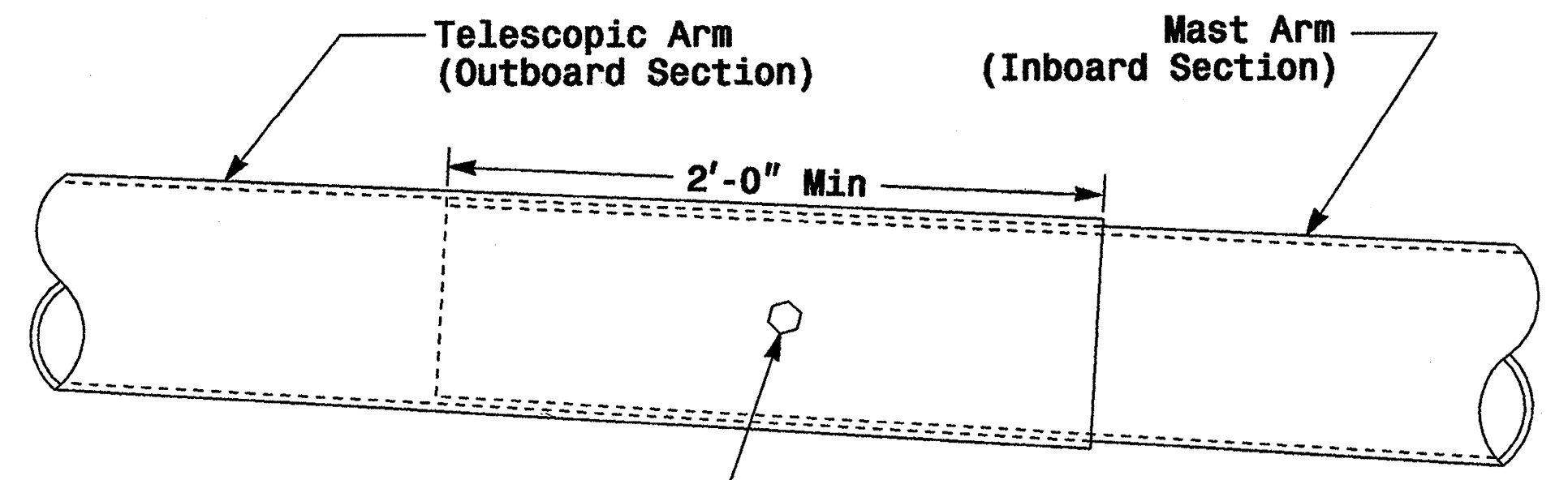
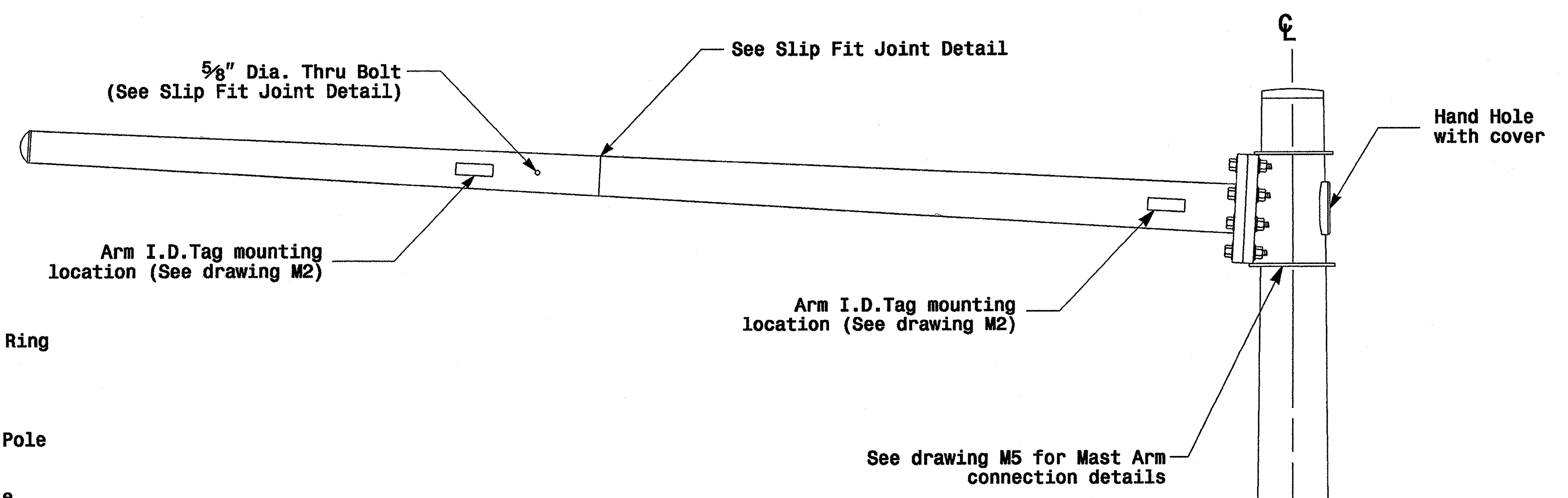
	Typical Fabrication Details For Strain Poles		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	
REVISIONS: _____ INIT. DATE _____		SIGNATURE: <i>P. L. Alexander</i> DATE: 9.2.2005	SEAL: _____ SIG. INVENTORY NO. _____



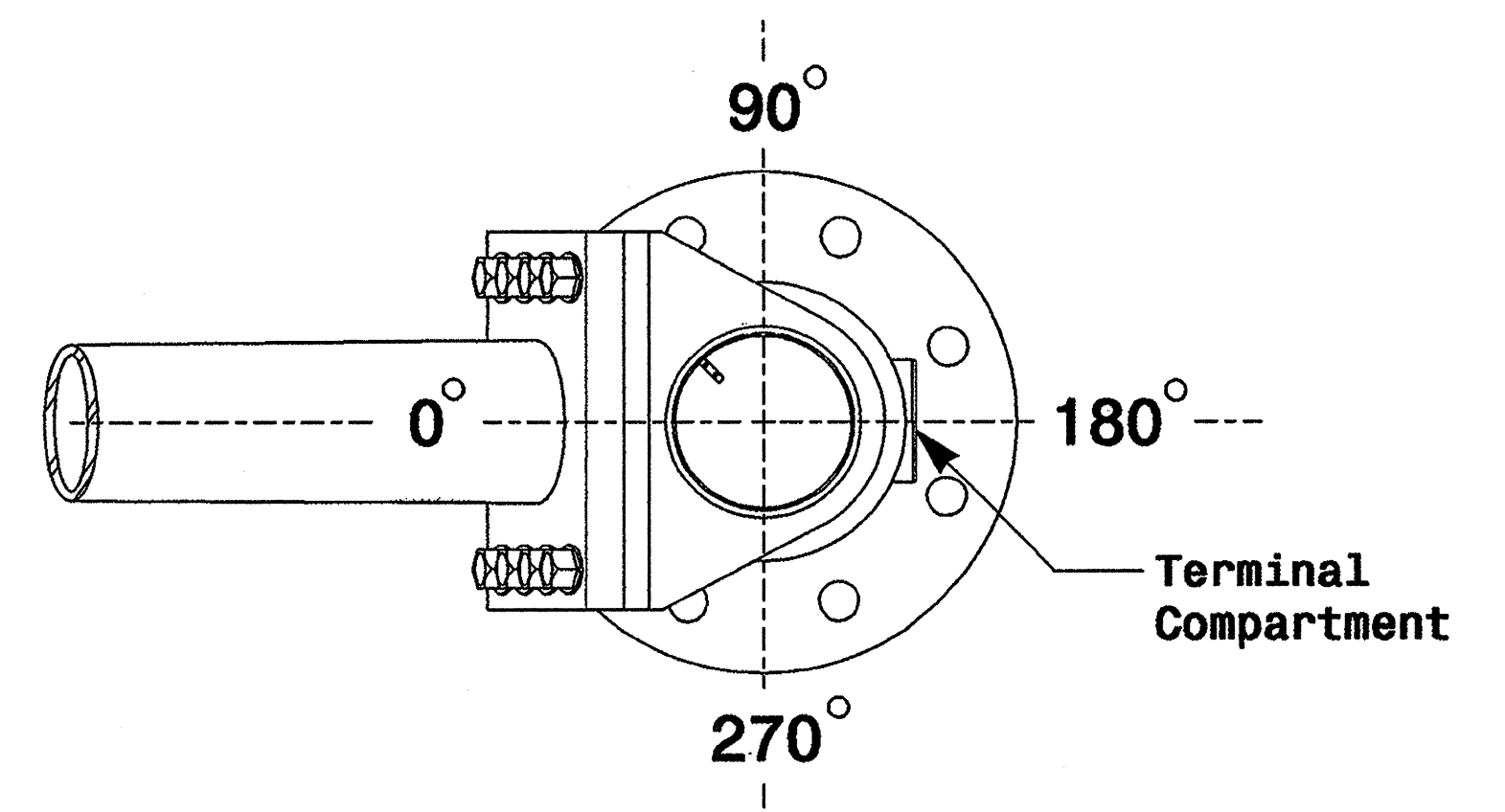
Section A-A
(See drawing M 2)
Pole Base Plate



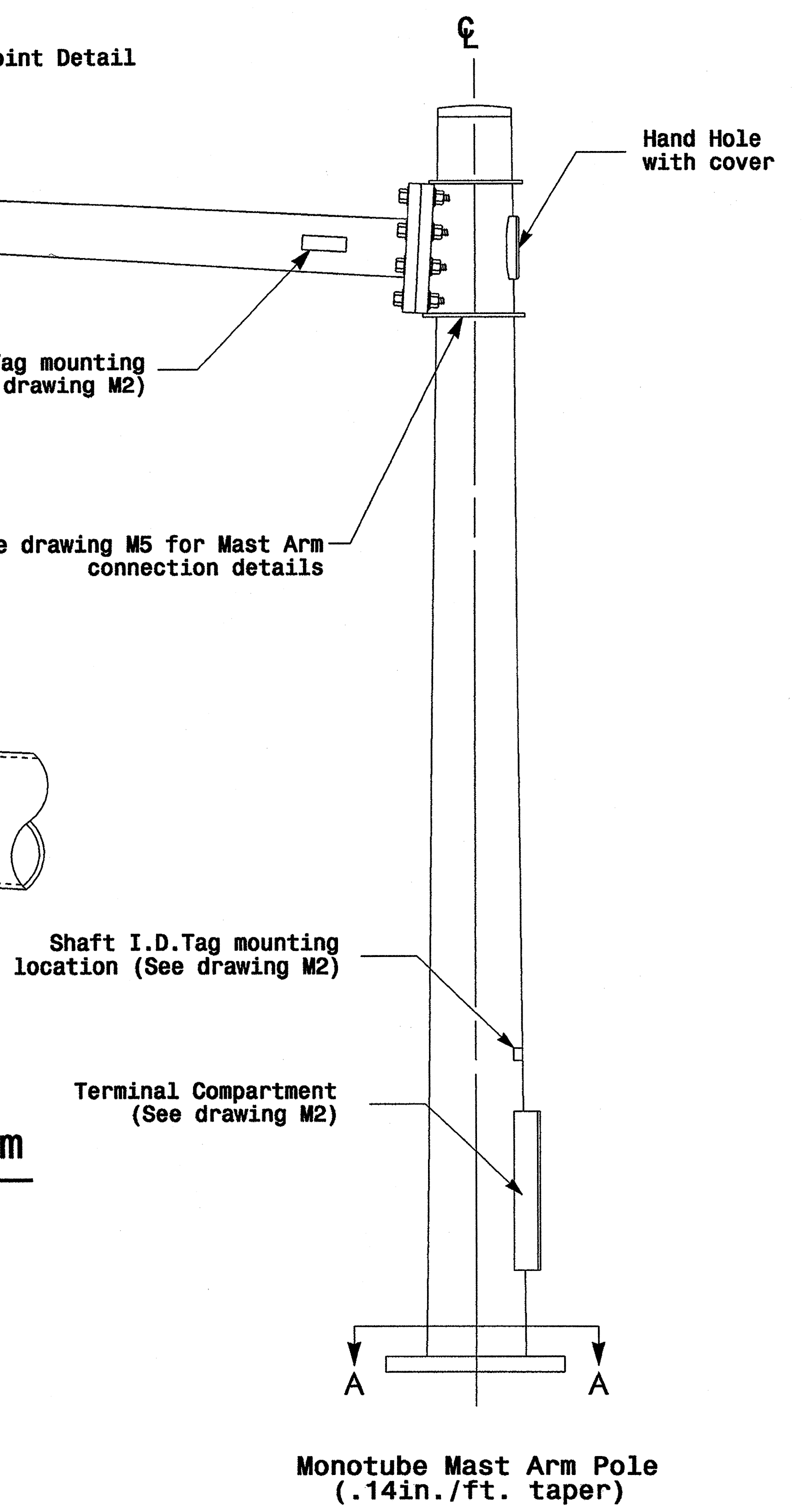
Section B-B
(Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail



3/4" Factory Drilled Hole in Outboard Tube.
Field Drill Inboard Tube.
5/8" Galvanized Thru Stud with (2) Hex. Locknuts Ea.
Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation

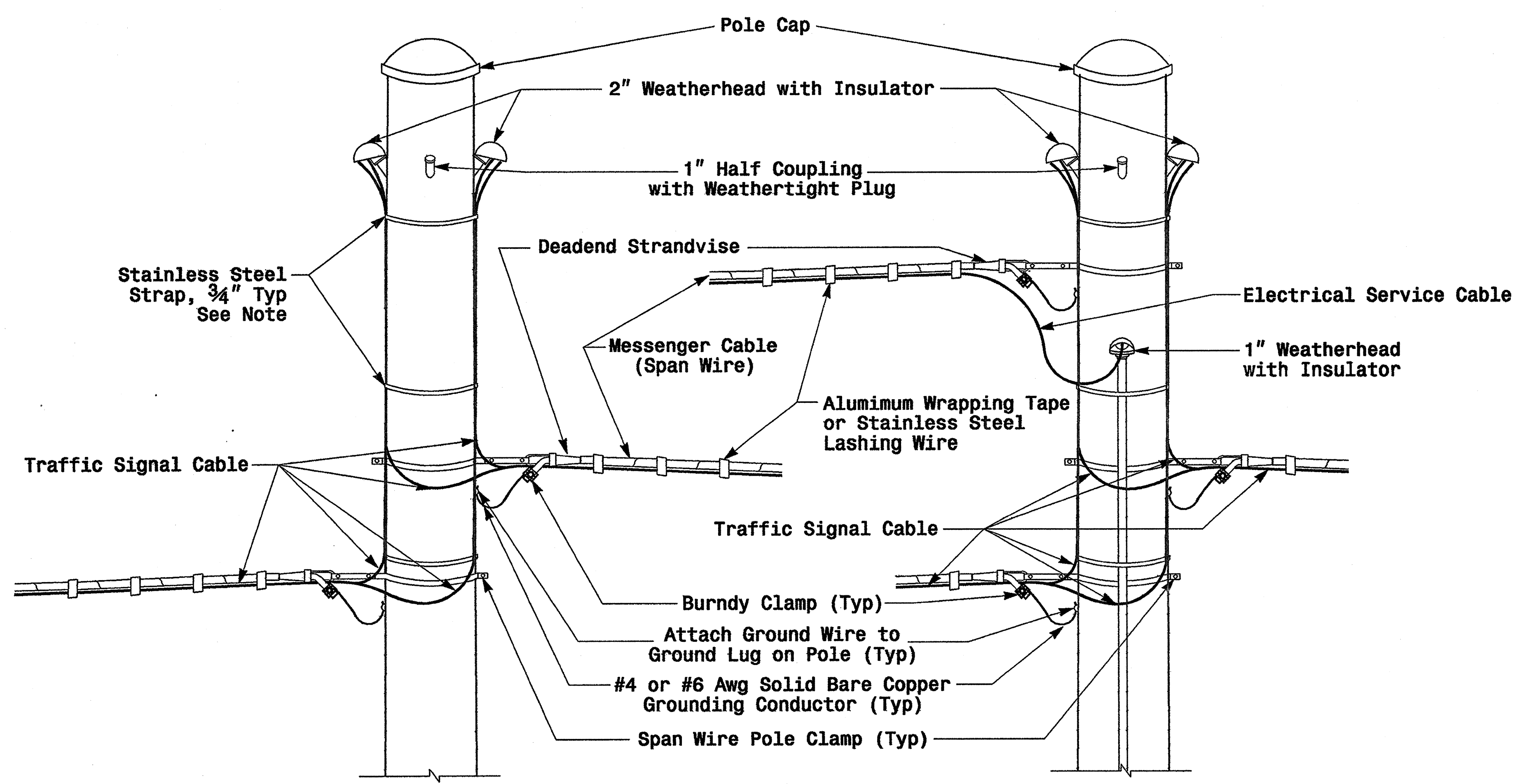


Monotube Mast Arm Pole
(.14in./ft. taper)

Fabrication Details - Mast Arm Poles

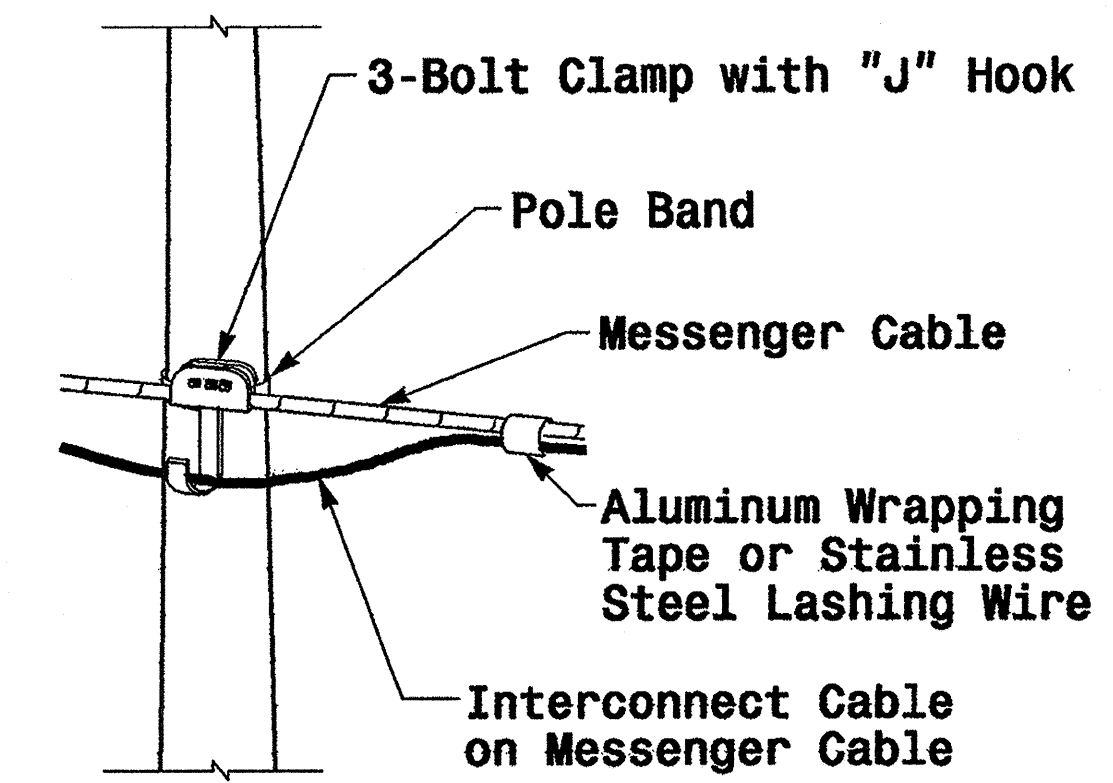
01-SEP-2005 14:08 w:\p001\es-un\m\kgr\groups2004\metal_pole_stand\stdr-dwg2004.mt.dgn

	Typical Fabrication Details for Mast Arm Poles			
	PLAN DATE: May 2005	REVIEWED BY: C.F. Andrews		9.2.2005 DATE
	PREPARED BY: P.L. Alexander	REVIEWED BY: A.M. Esposito		
SCALE: NONE	REVISIONS:	INIT.:	SIGNATURE: <i>P.L. Alexander</i>	

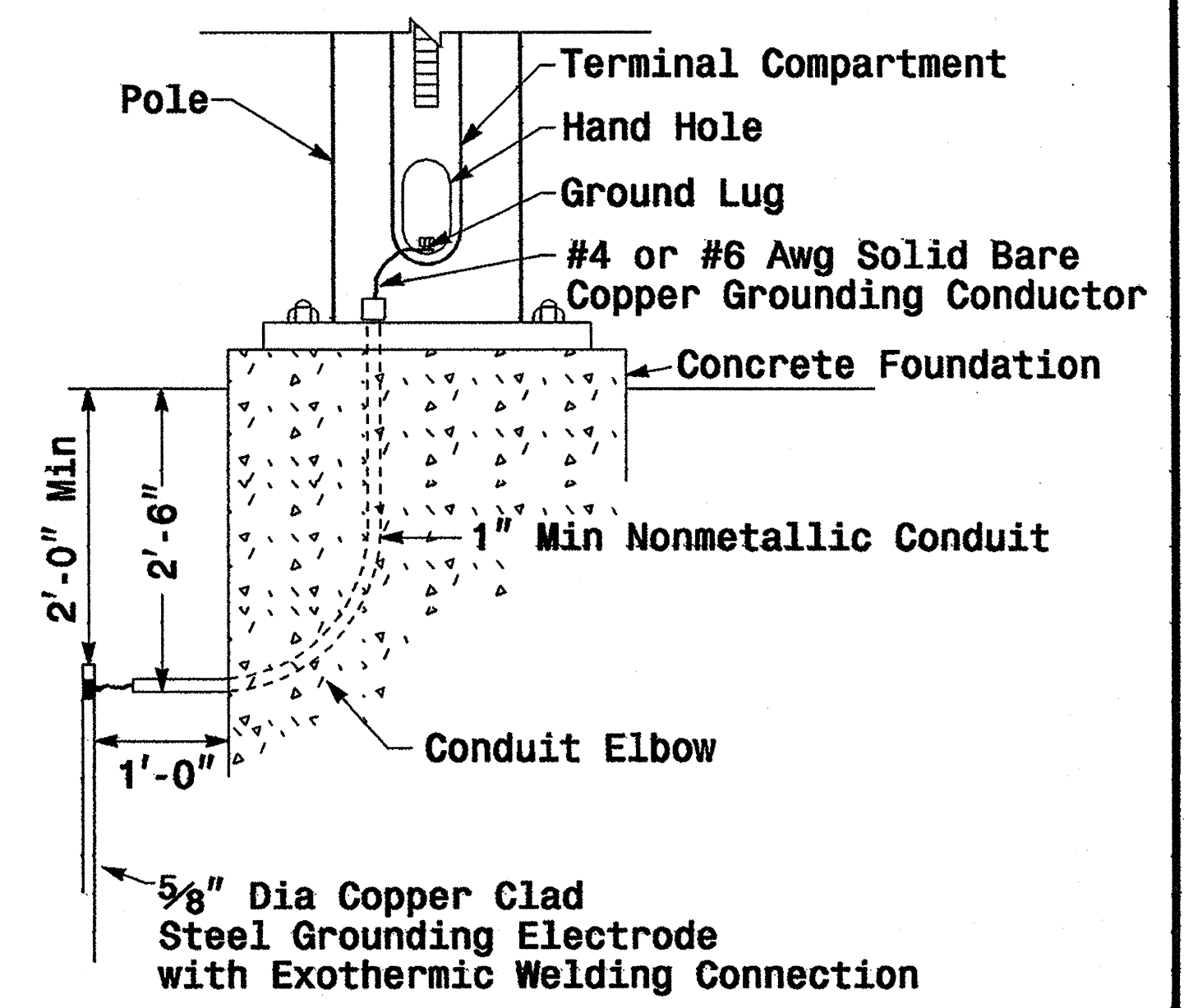


Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole



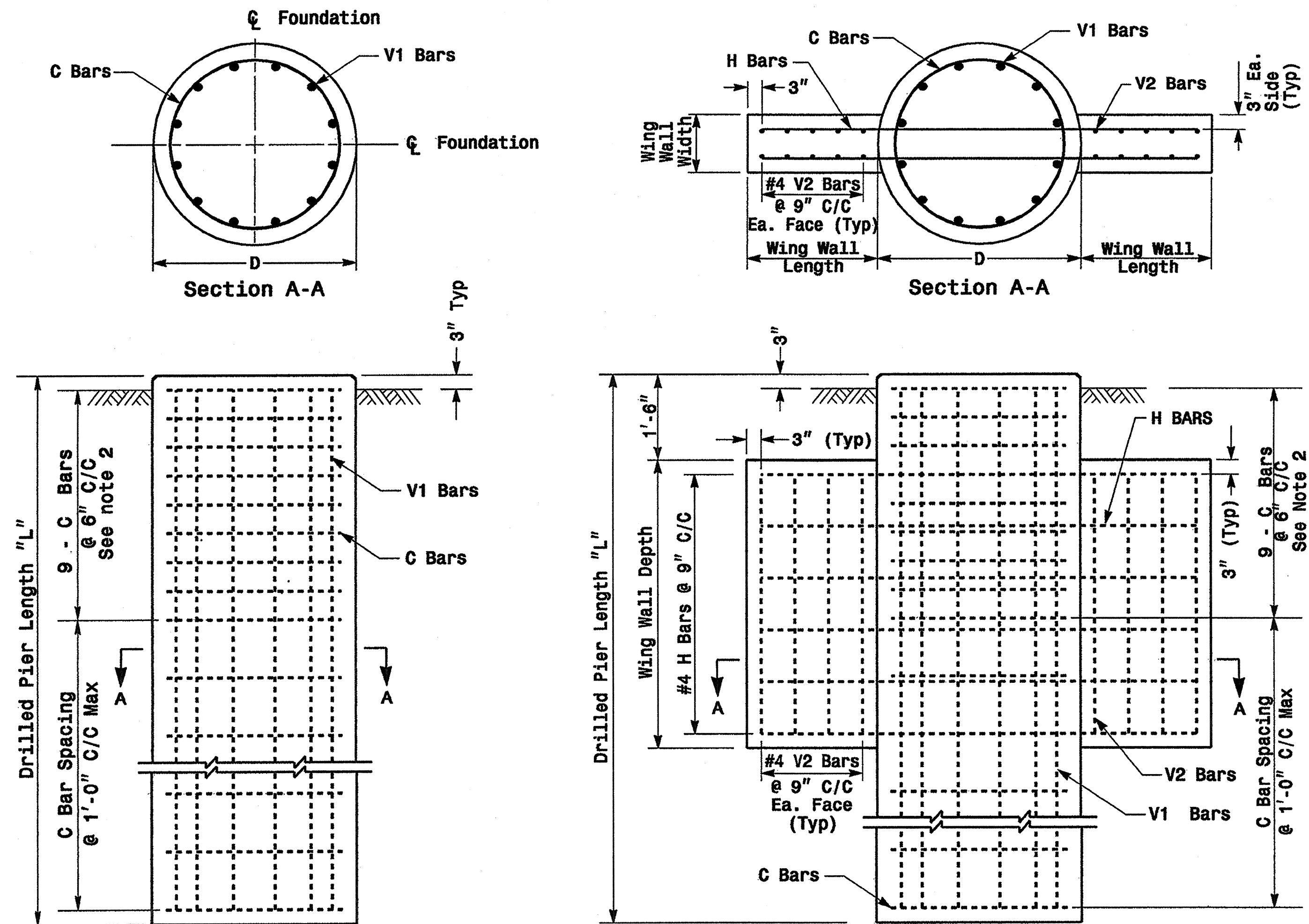
Metal Pole Grounding Detail

Construction Details - Strain Poles

01-SEP-2005 16:33 w:\p001\18-un\1\work\groups\2004 metal pole standards\2004 mb.dgn

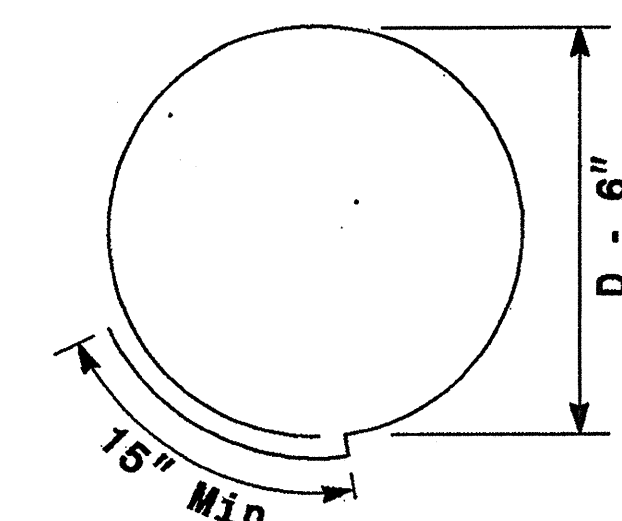
	Construction Details Strain Poles		
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: D.G. SARKAR	
SCALE: NA NONE	REVISIONS: _____ INIT. DATE	SIGNATURE: <i>Mito</i> DATE: 9-1-05	SIG. INVENTORY NO.

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



Typical "C" Bars

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"

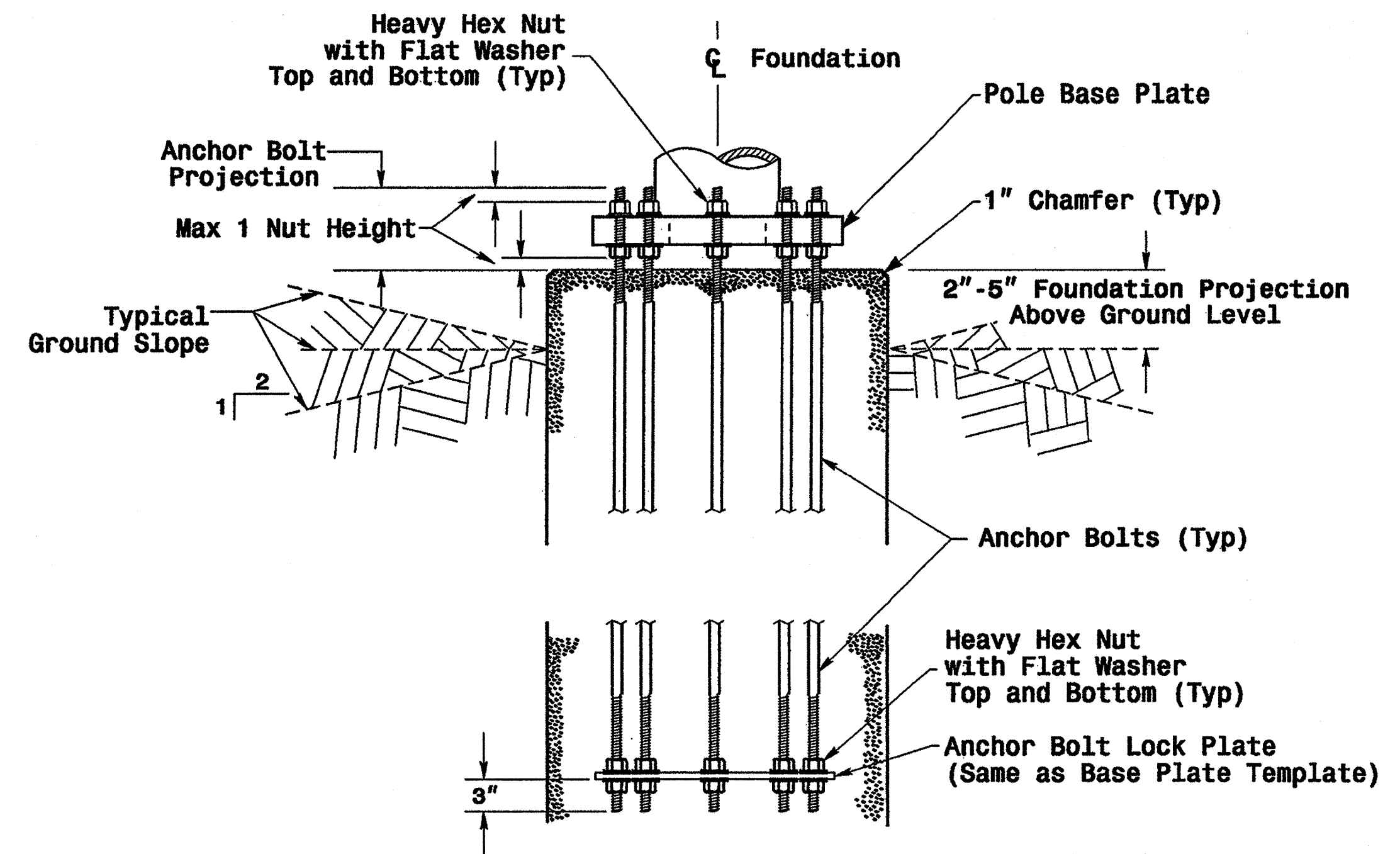
* See Note No. 1
** See Note No. 3

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

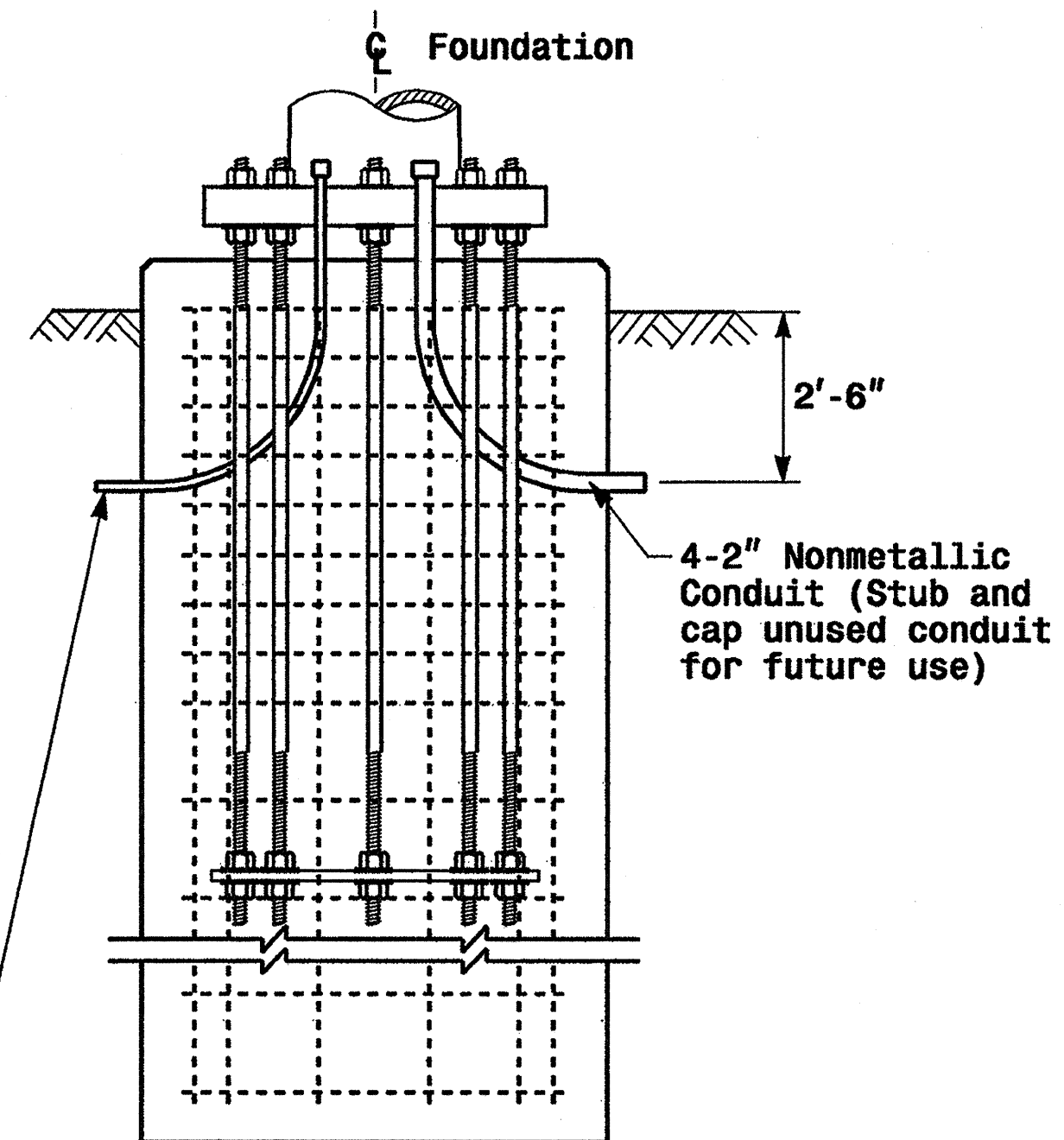
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



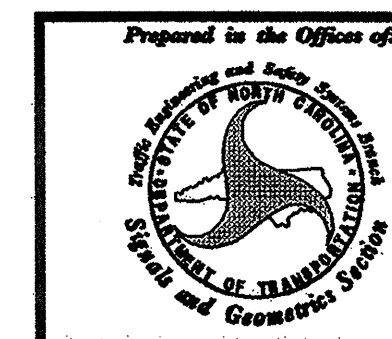
2-1" Nonmetallic Conduits for Electrical Service and Grounding Electrode Conductor

Notes

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

PROJECT REFERENCE NO. U4444AB/B
SHEET NO. Sig.34 M 7

Construction Details - Foundations



Construction Details Foundations

PLAN DATE: May 2005
REVIEWED BY: P.L. ALEXANDER
PREPARED BY: C.F. ANDREWS
REVIEWED BY: A.M. ESPOSITO

SCALE: NONE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
028094
P. L. Alexander
9.2.2005
DATE
SIG. INVENTORY NO.

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

Concrete Volume (cubic yards)=.356 X L

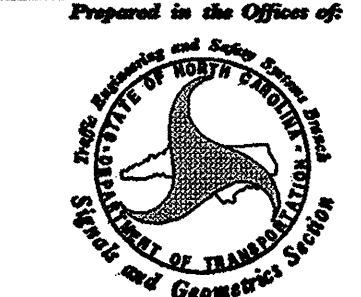
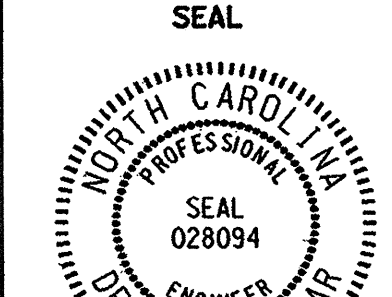
Fabrication Design Notes:

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


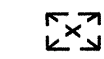

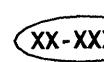


Foundation Selection:

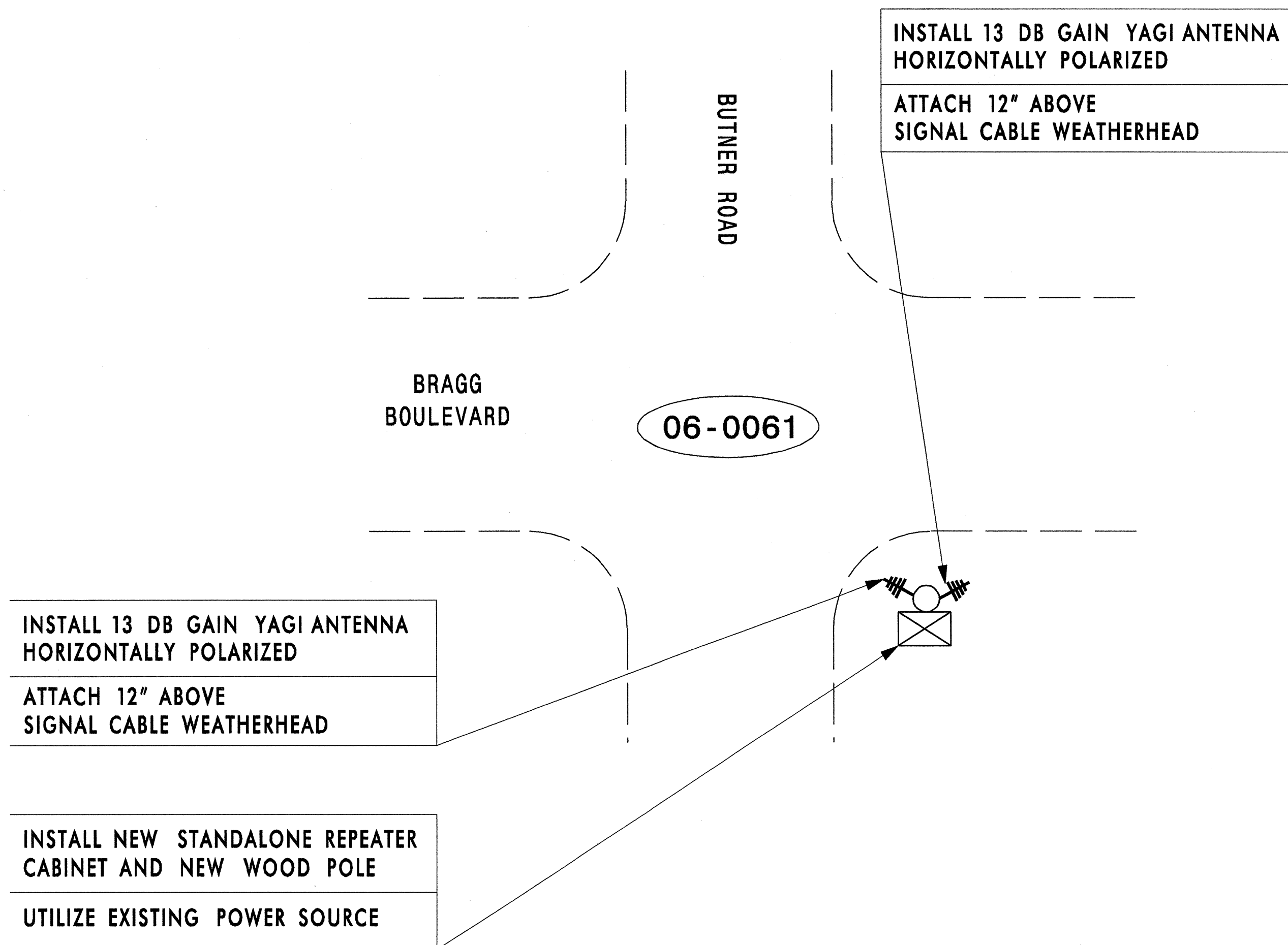
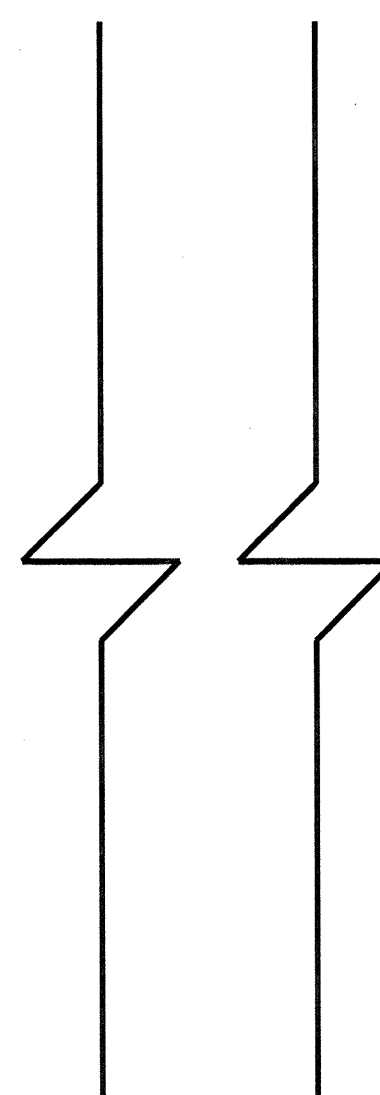
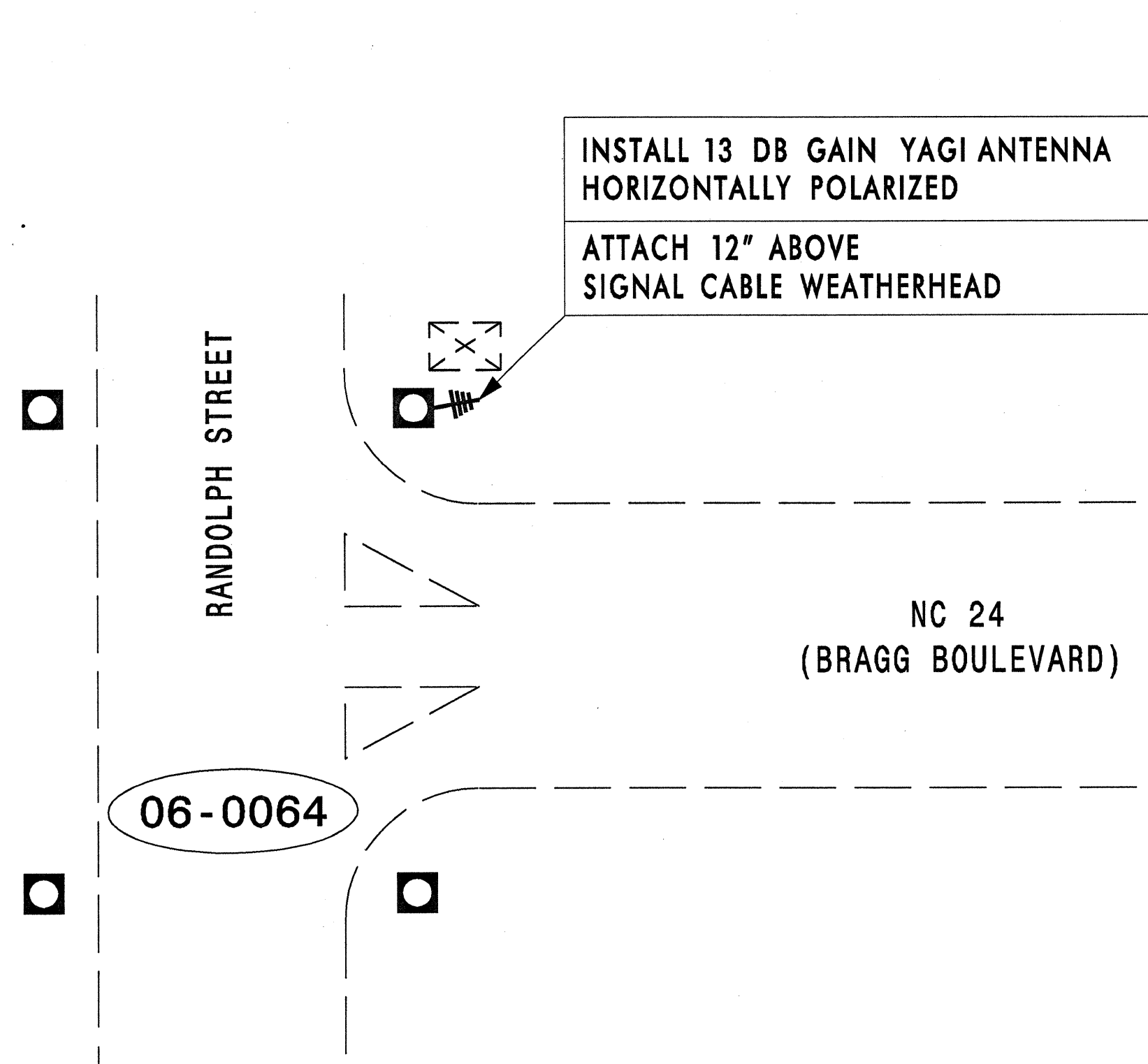
1. Perform a standard penetration test at each proposed foundation site to determine "N" value.
2. Select the appropriate wind zone from sheet M 1.
3. Select the soil type (Clay or Sand) that best describes the soil characteristics.
4. Get the appropriate pole case load number from the plans or from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

Standard Strain Poles

	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	
222 N. McDowell St., Raleigh, NC 27603		SIGNATURE: <i>D. SarKar</i>	DATE: 9.2.2005

LEGEND

-  YAGI ANTENNA (SINGLE)
-  EXISTING CONTROLLER AND CABINET
-  NEW STANDALONE REPEATER CABINET
-  SIGNAL INVENTORY NUMBER
-  EXISTING METAL POLE
-  NEW WOOD POLE

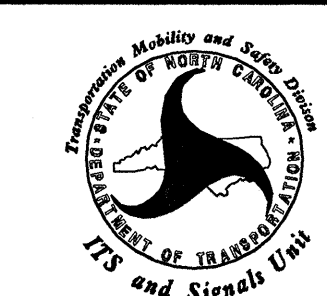


NOTES FOR WIRELESS COMMUNICATIONS:

1. INSTALL COAXIAL CABLE:
 - A. ON WOOD POLES, REQUIRING A NEW RISER, INSTALL A 2" RISER WITH WEATHERHEAD TO ROUTE THE COAXIAL CABLE TO THE ANTENNA. ON POLES WITH EXISTING RISERS WITH WEATHERHEADS REUSE THE RISER ASSEMBLY.
 - B. ON METAL POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL 1/2" HOLE WITH GROMMET THROUGH BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL CABLE TO THE ANTENNA.
 - C. ON METAL STRAIN POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND REPLACE THE WEATHERHEAD WITH HEAT SHRINK TUBING AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - D. BETWEEN THE POINT OF EXITING THE METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
2. IF EXISTING SPARE RISER IS AVAILABLE, REMOVE WEATHERHEAD AND INSTALL COAXIAL CABLES. RESEAL WITH HEAT SHRINK TUBING.
3. INSTALL WIRELESS ANTENNA ON POLE WITH RF WARNING SIGN AND AIM TOWARDS MASTER.
(NOTE: RF WARNING SIGN NOT REQUIRED WHEN ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
4. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER THE NATIONAL ELECTRICAL SAFETY CODE.
5. INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET.
(NOTE: RF ANTENNA DISCONNECT SWITCH AND DECAL ARE NOT REQUIRED WHEN THE ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS."

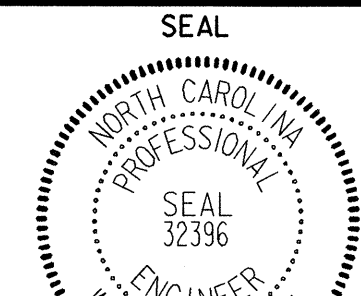
Prepared in the offices of:

RAMEY KEMP ASSOCIATES, INC.
 Transportation Engineers
 5000 Parkington Place, Suite 100
 Raleigh, North Carolina 27609
 919-872-0110 Tel. 919-872-0418 Fax
 www.rameykemp.com

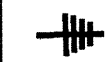
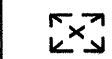

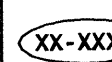







750 N. Greenfield Pkwy, Garner, NC 27529

Wireless Communication Plan	
NC 24/87 (Bragg Boulevard)	
Division 6	Cumberland County Spring Lake
PLAN DATE: June 2012	REVIEWED BY: WJ Hamilton
PREPARED BY: NE Burns	RKA PROJ. NO: 11172 (040)
REVISIONS	INIT. DATE

SEAL

 SIGNATURE: *WJ Hamilton* DATE: _____

LEGEND

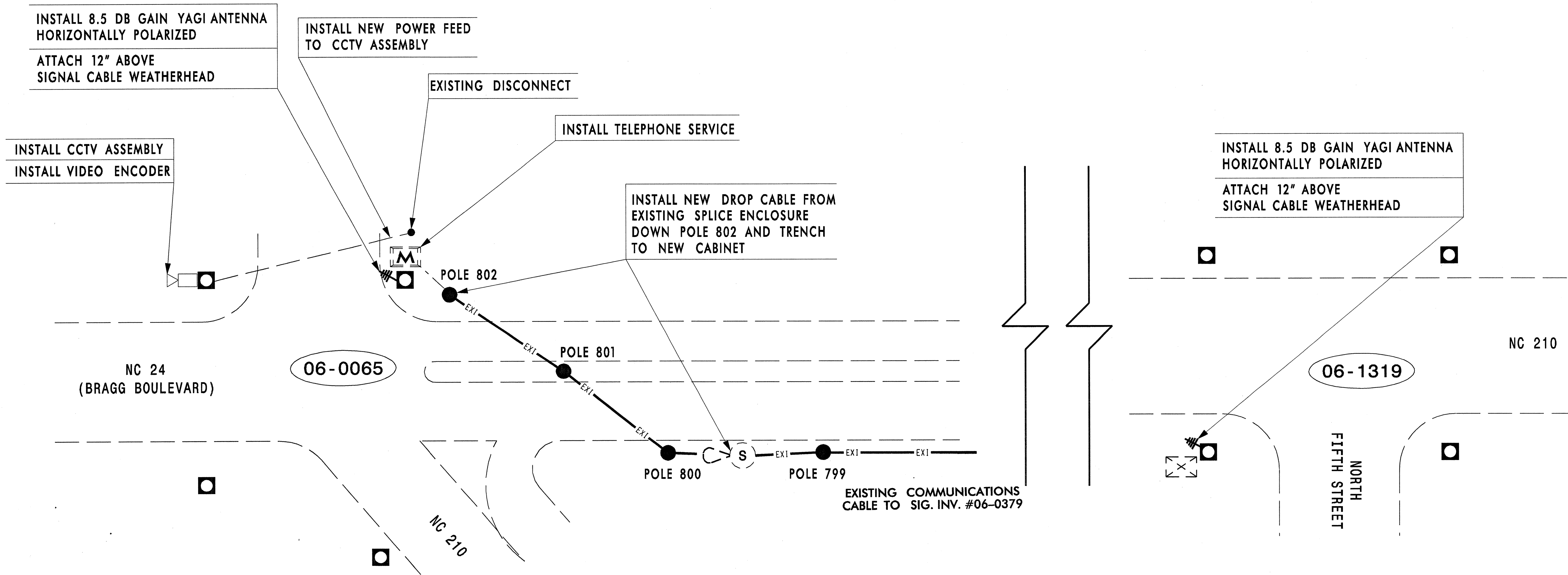
-  YAGI ANTENNA (SINGLE)
-  EXISTING CONTROLLER AND CABINET
-  EXISTING MASTER CONTROLLER AND CABINET
-  SIGNAL INVENTORY NUMBER
-  EXISTING METAL POLE
-  EXISTING WOOD POLE
-  NEW CCTV CAMERA
-  EXISTING SPLICE ENCLOSURE
-  EXISTING COMMUNICATIONS CABLE

NOTES:

EXISTING CCTV ASSEMBLY LOCATED AT THE BRAGG BOULEVARD AND MAIN STREET/WILSON AVENUE SHALL BE REMOVED AND ALL ASSOCIATED EQUIPMENT RETURNED TO THE NCDOT DIVISION OFFICE.

NEW CCTV ASSEMBLY AND ALL ASSOCIATED EQUIPMENT SHALL BE INSTALLED AT THE BRAGG BOULEVARD AND SPRING AVENUE [06-0065] INTERSECTION.

A DSL CONNECTION SHALL BE PROVIDED AND INSTALLED BY NCDOT TO PROVIDE COMMUNICATIONS TO THE NCDOT DIVISION OFFICE.



NOTES FOR WIRELESS COMMUNICATIONS:

1. INSTALL COAXIAL CABLE:
 - A. ON WOOD POLES, REQUIRING A NEW RISER, INSTALL A 2" RISER WITH WEATHERHEAD TO ROUTE THE COAXIAL CABLE TO THE ANTENNA. ON POLES WITH EXISTING RISERS WITH WEATHERHEADS REUSE THE RISER ASSEMBLY.
 - B. ON METAL POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL 1/2" HOLE WITH GROMMET THROUGH BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL CABLE TO THE ANTENNA.
 - C. ON METAL STRAIN POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND REPLACE THE WEATHERHEAD WITH HEAT SHRINK TUBING AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - D. BETWEEN THE POINT OF EXITING THE METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
2. IF EXISTING SPARE RISER IS AVAILABLE, REMOVE WEATHERHEAD AND INSTALL COAXIAL CABLES. RESEAL WITH HEAT SHRINK TUBING.
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(NOTE: RF WARNING SIGN NOT REQUIRED WHEN ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
4. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER THE NATIONAL ELECTRICAL SAFETY CODE.
5. INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET.
(NOTE: RF ANTENNA DISCONNECT SWITCH AND DECAL ARE NOT REQUIRED WHEN THE ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS."

Prepared in the offices of:

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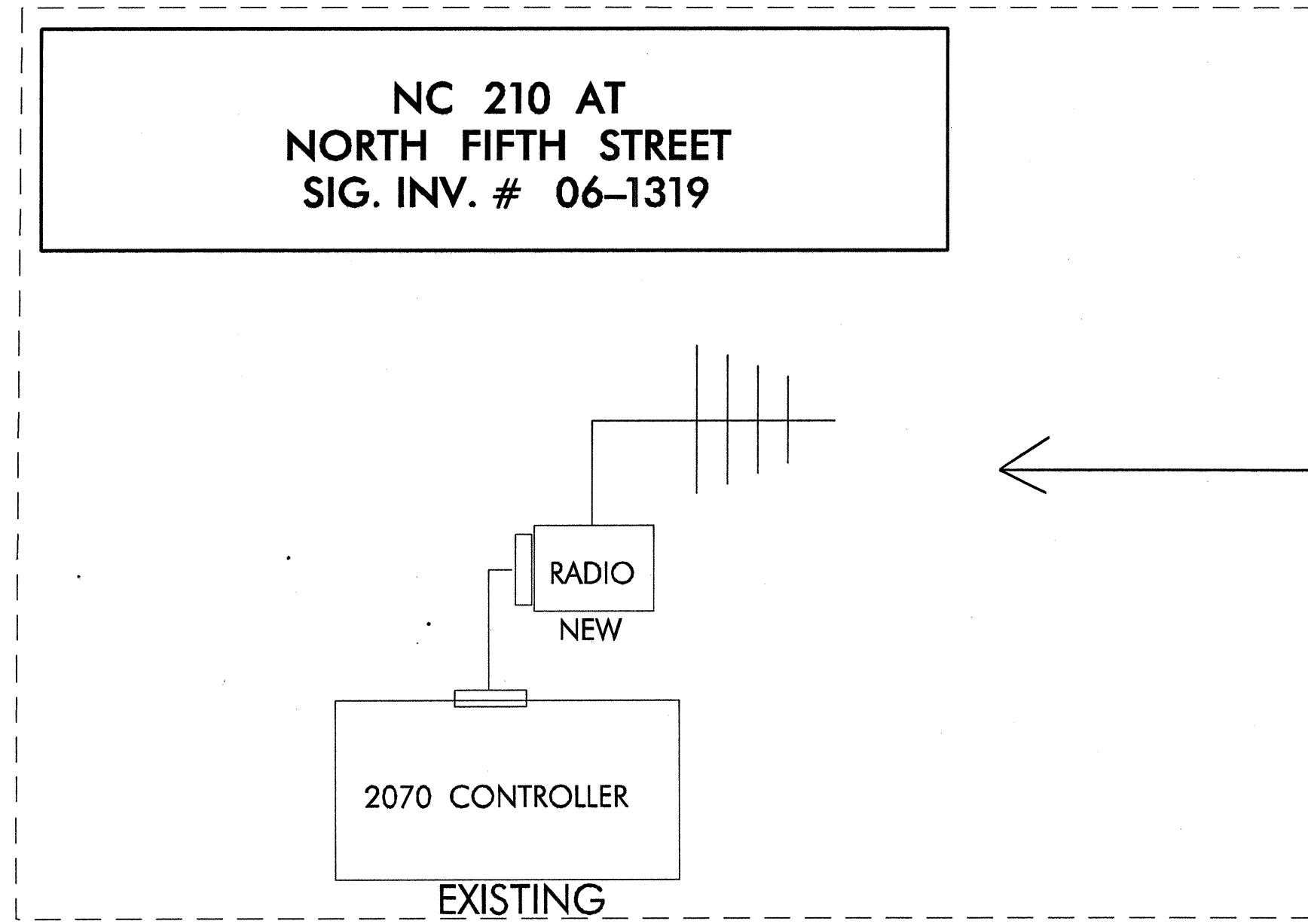
Wireless Communication Plan
NC 24/87 (Bragg Boulevard)

Division 6	Cumberland County	Spring Lake
PLAN DATE: June 2012	REVIEWED BY: WJ Hamilton	
PREPARED BY: NE Burns	RKA PROJ. NO: 11172 (040)	
REVISIONS	INIT.	DATE

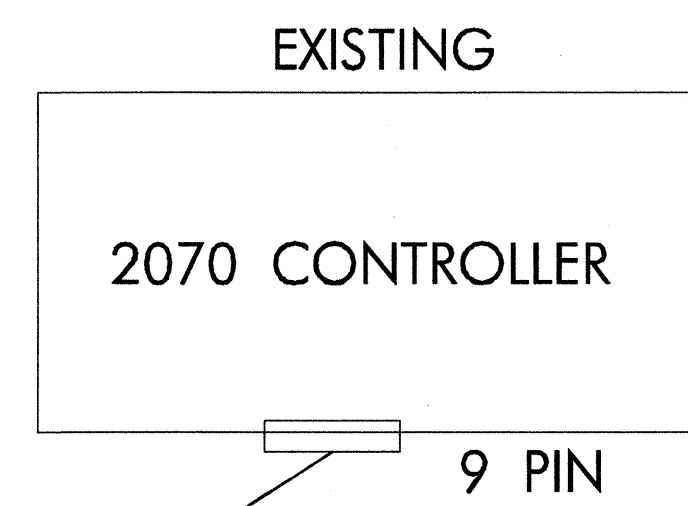
SEAL

WILLIAM J. HAMILTON
NORTH CAROLINA PROFESSIONAL ENGINEER
LICENSE NO. 32396

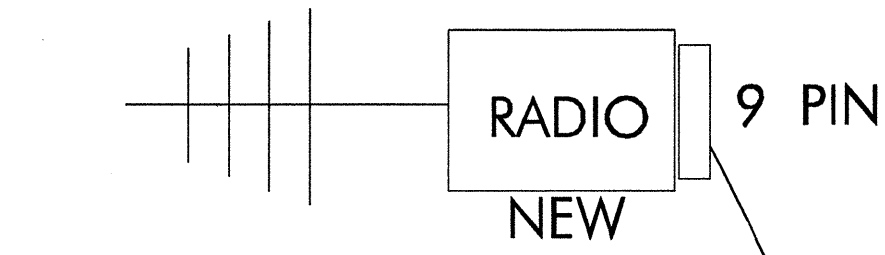
SIGNATURE: *William J. Hamilton* DATE: *6/29/12*



INSTALL NEW RADIO AND 8.5 dB GAIN YAGI ANTENNA FOR COMMUNICATION WITH NC 210 AT NORTH FIFTH STREET (SEE WIRELESS COMMUNICATION PLAN)



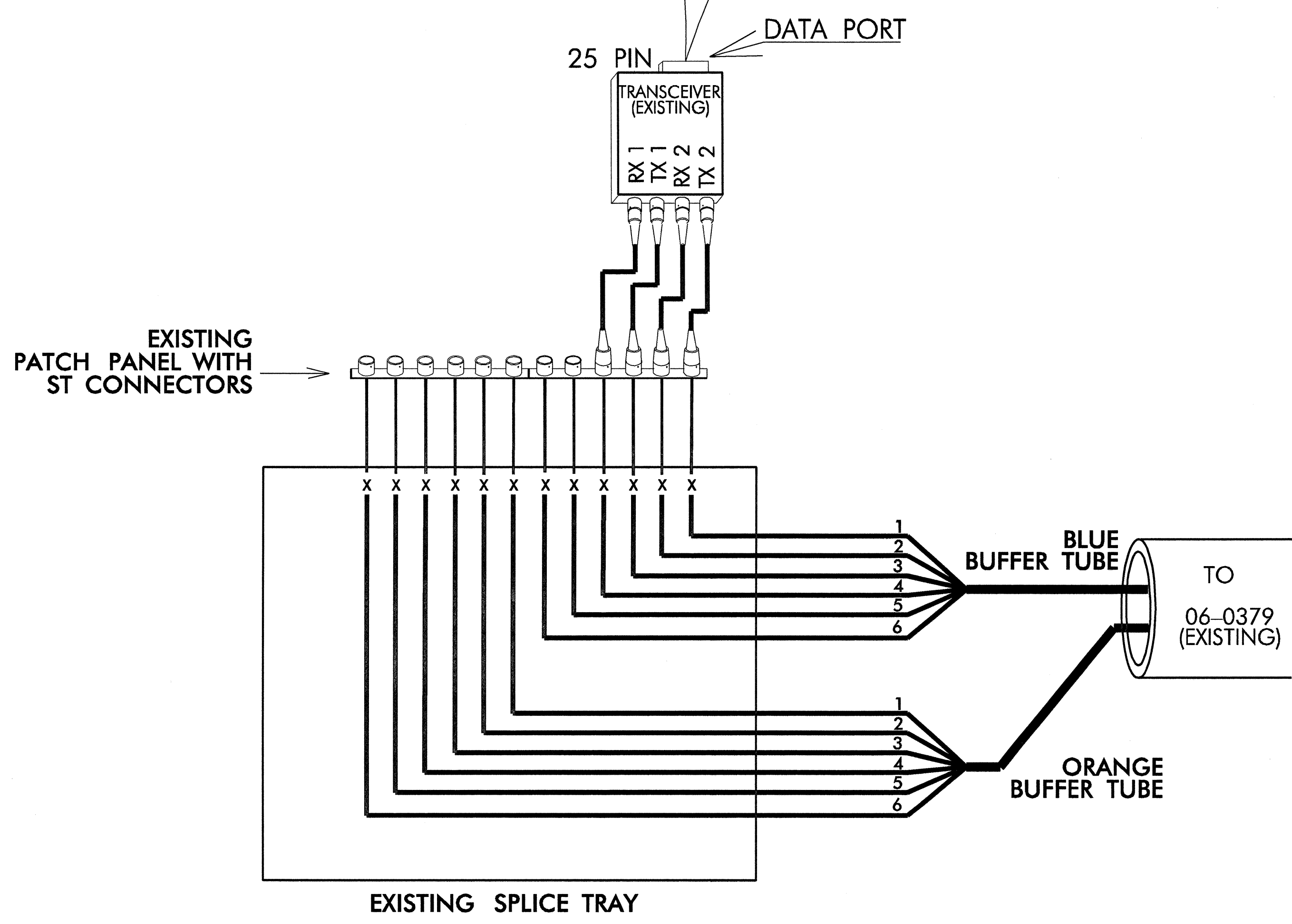
NC 24/87 (BRAGG BOULEVARD) AT NC 210/SPRING AVENUE
SIG. INV. # 06-0065



ENCOM CABLE (PART # CB-142) NEW

Notes:

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



COLOR CODE
TIA /EIA 598-A

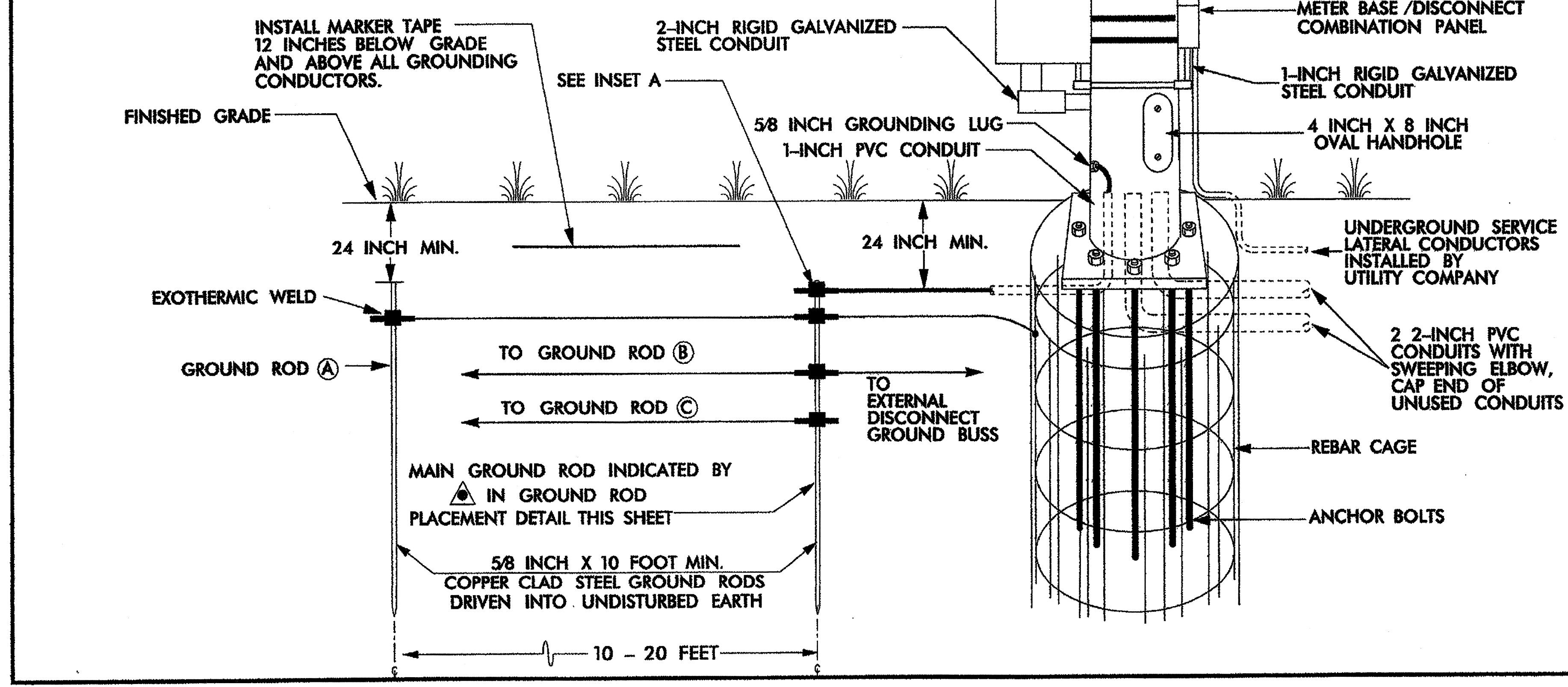
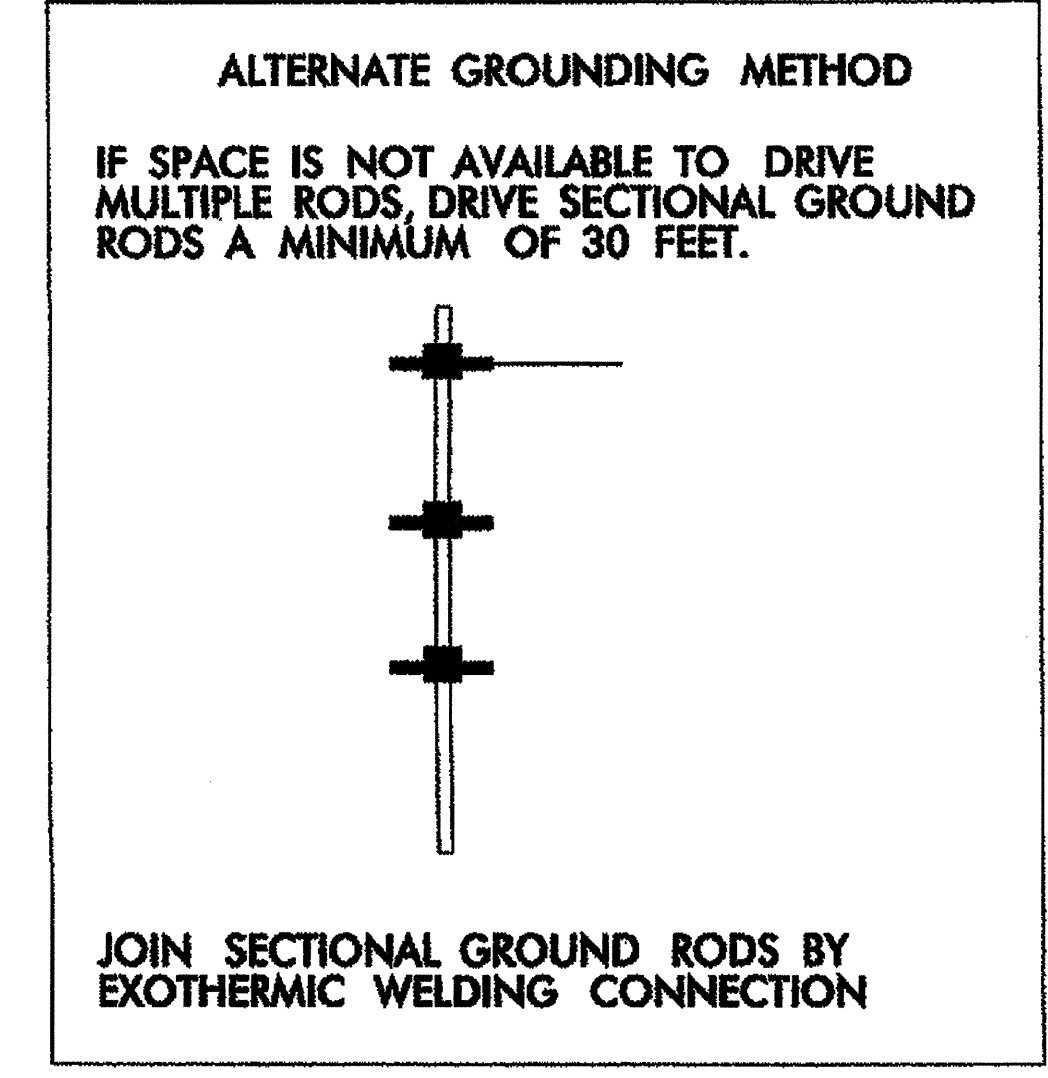
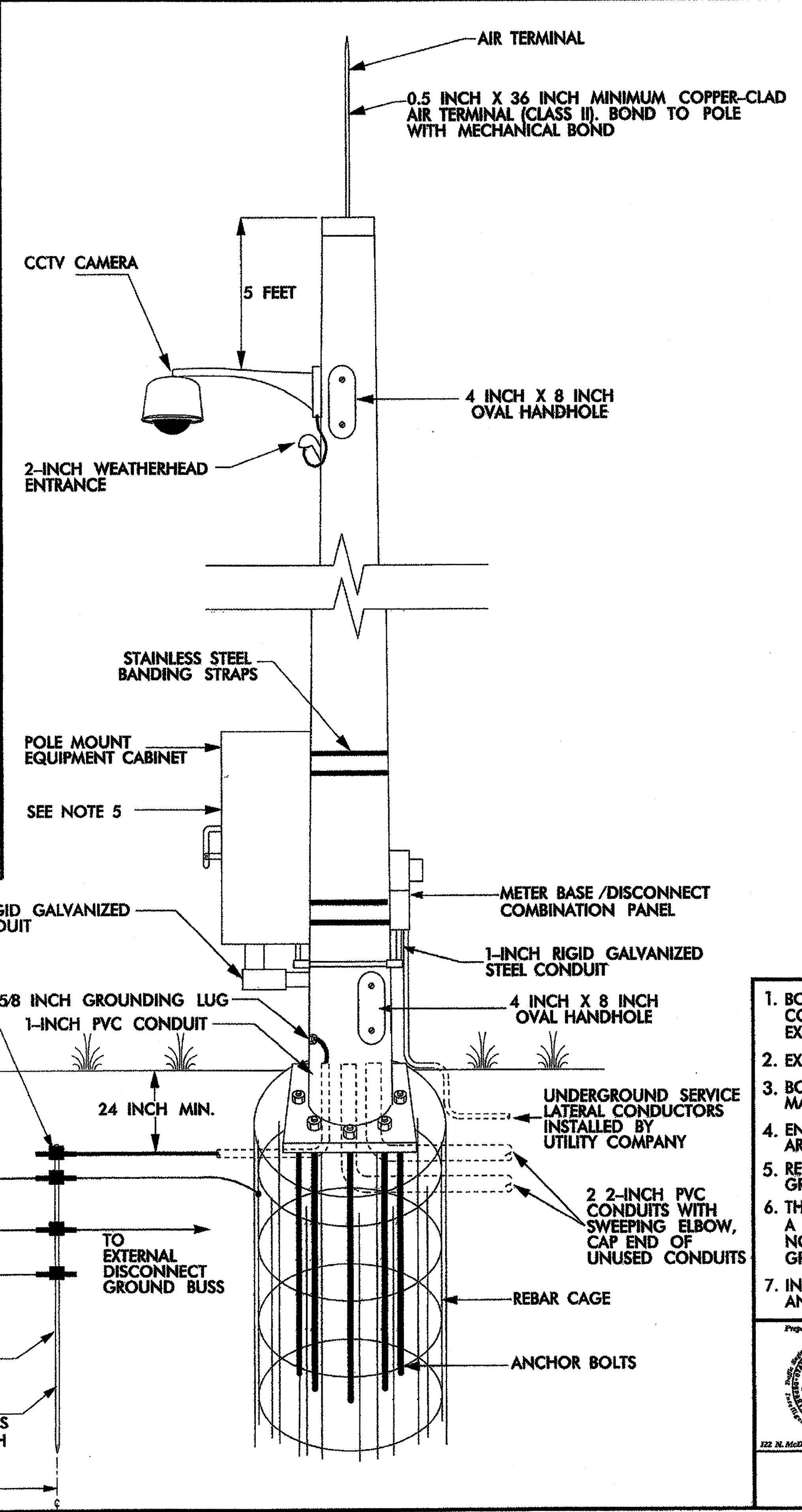
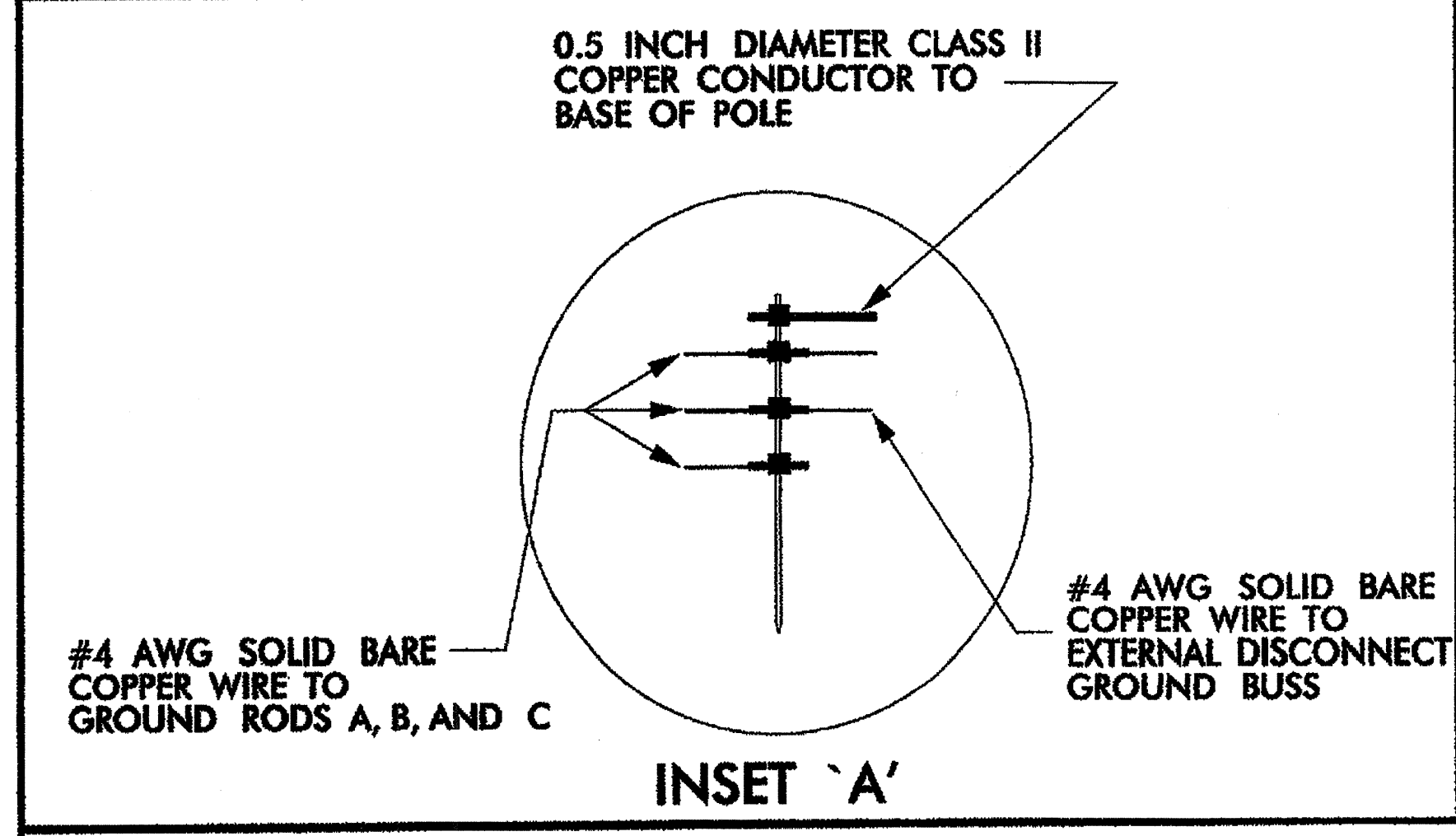
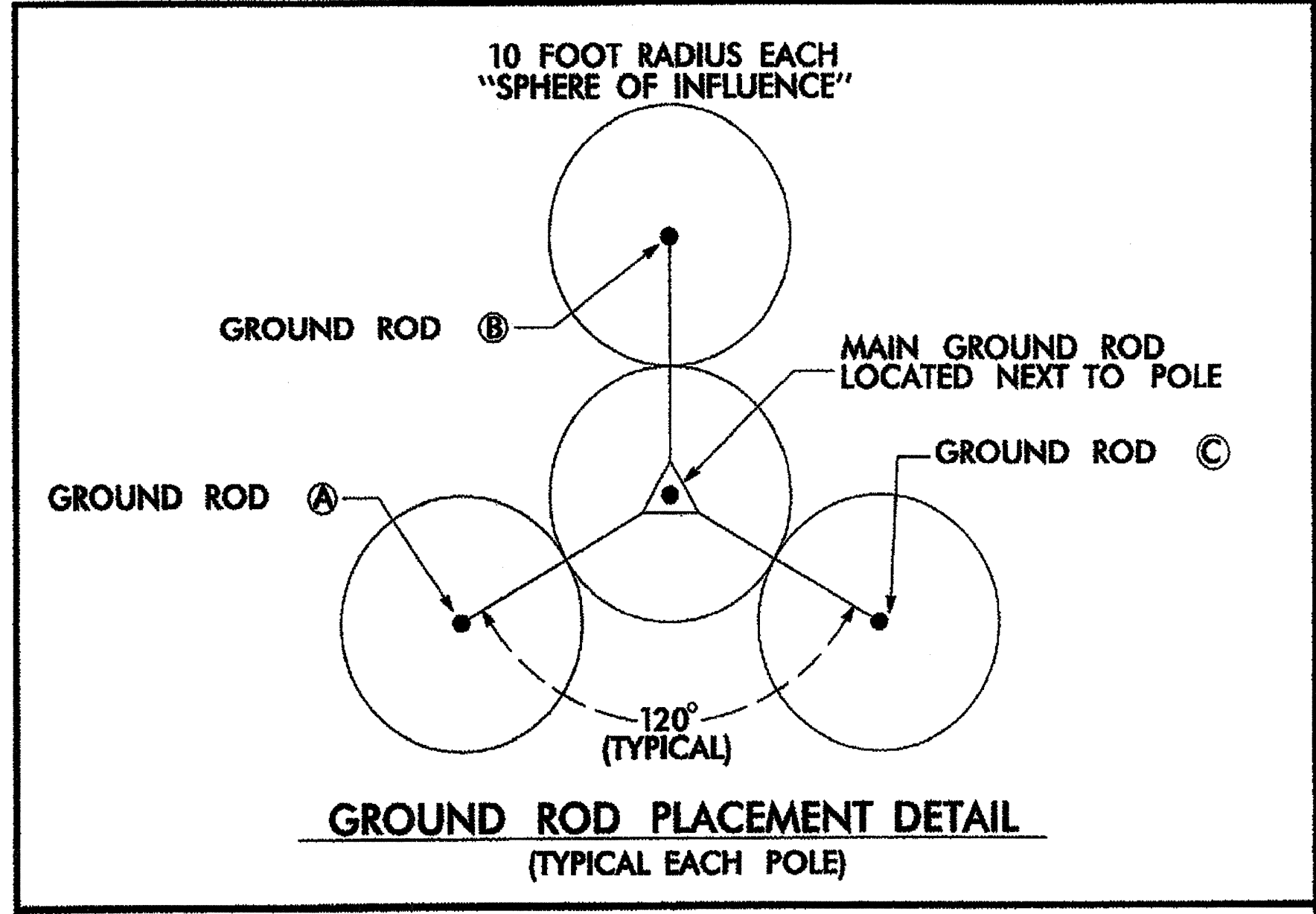
- (1) BLUE
- (2) ORANGE
- (3) GREEN
- (4) BROWN
- (5) SLATE
- (6) WHITE

LEGEND
X = FUSION SPLICE

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

Prepared in the offices of:
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Transportation Engineers
5808 Farrington Place, Suite 100
Raleigh, North Carolina 27609
919-872-8118 Tel. 919-878-6418 Fax
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	System Integration Plan NC 24/87 (Bragg Boulevard)		
	Division 6 Cumberland County Spring Lake	PLAN DATE: June 2012	
PREPARED BY: NE Burns	RKA PROJ. NO: 11172 (040)	REVISIONS	INIT. DATE
SCALE: 0 N/A	SIGNATURE: <i>WJ Hamilton</i>	DATE:	DATE:



- NOTES**
1. BOND 0.5 INCH DIAMETER, 28 STRAND (MINIMUM) CLASS II COPPER CONDUCTOR TO THE MAIN GROUND ROD BY AN EXOTHERMIC WELD METHOD.
 2. EXOTHERMICALLY WELD ALL CONNECTIONS TO GROUND RODS.
 3. BOND #4 AWG SOLID BARE COPPER WIRE TO REBAR CAGE AND THE MAIN GROUND ROD BY AN EXOTHERMIC WELD METHOD.
 4. ENSURE CAMERA HOUSING, CAMERA, AND PAN -TILT UNIT ARE BONDED TO POLE.
 5. REMOVE BONDING JUMPER BETWEEN EQUIPMENT CABINET GROUND BUSS AND NEUTRAL BUSS.
 6. THE CONTRACTOR MAY, UPON APPROVAL OF THE ENGINEER, INSTALL A 30-FOOT SECTIONAL GROUND ROD WHEN CONDITIONS WILL NOT ALLOW FOR THE INSTALLATION OF THE 3 - RADIAL GROUND RODS.
 7. INSTALL MARKER TAPE DIRECTLY ABOVE ALL GROUNDING ELECTRODES AND CONDUCTORS AT A DEPTH OF 12 INCHES.

Prepared in the Office of:

CCTV CAMERA INSTALLATION FOR METAL POLE WITH UNDERGROUND ELECTRICAL SERVICE TYPICAL DETAIL

PLAN DATE: JANUARY 2008 REVIEWED BY: T. G. PARKER

PREPARED BY: J. HOOKER REVIEWED BY: G. A. FULLER

SCALE: 0

REVISIONS: INIT. DATE

SIGNATURE: *G. A. Fuller* DATE: 2/1/08

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

322 N. McDowell St., Raleigh, NC 27603