

Project: U-4428

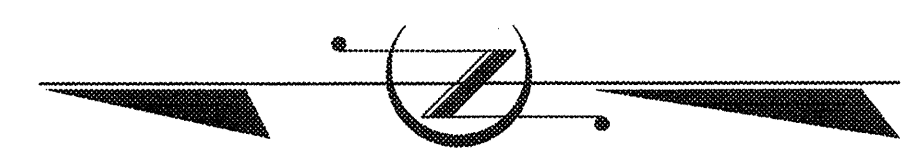
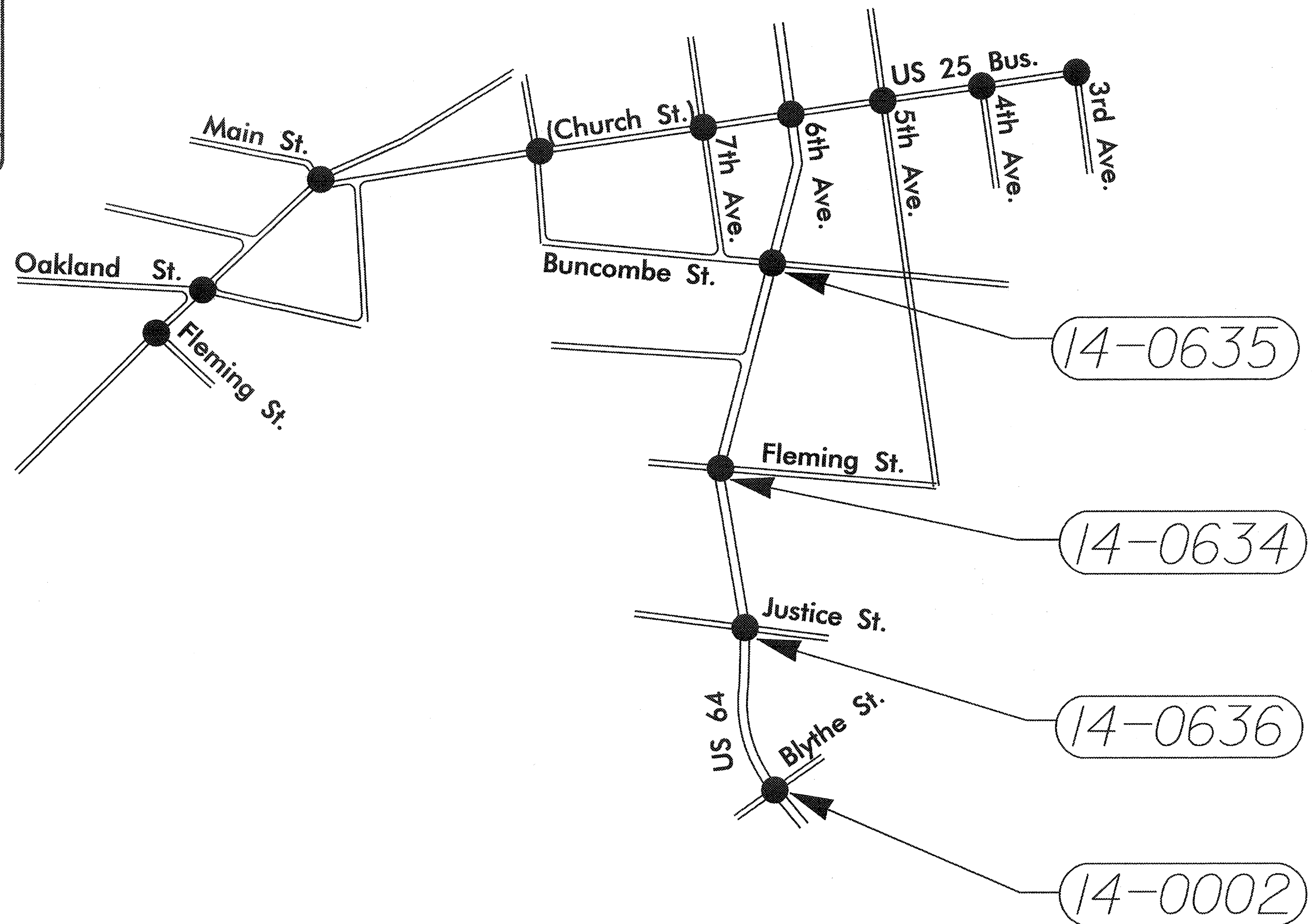
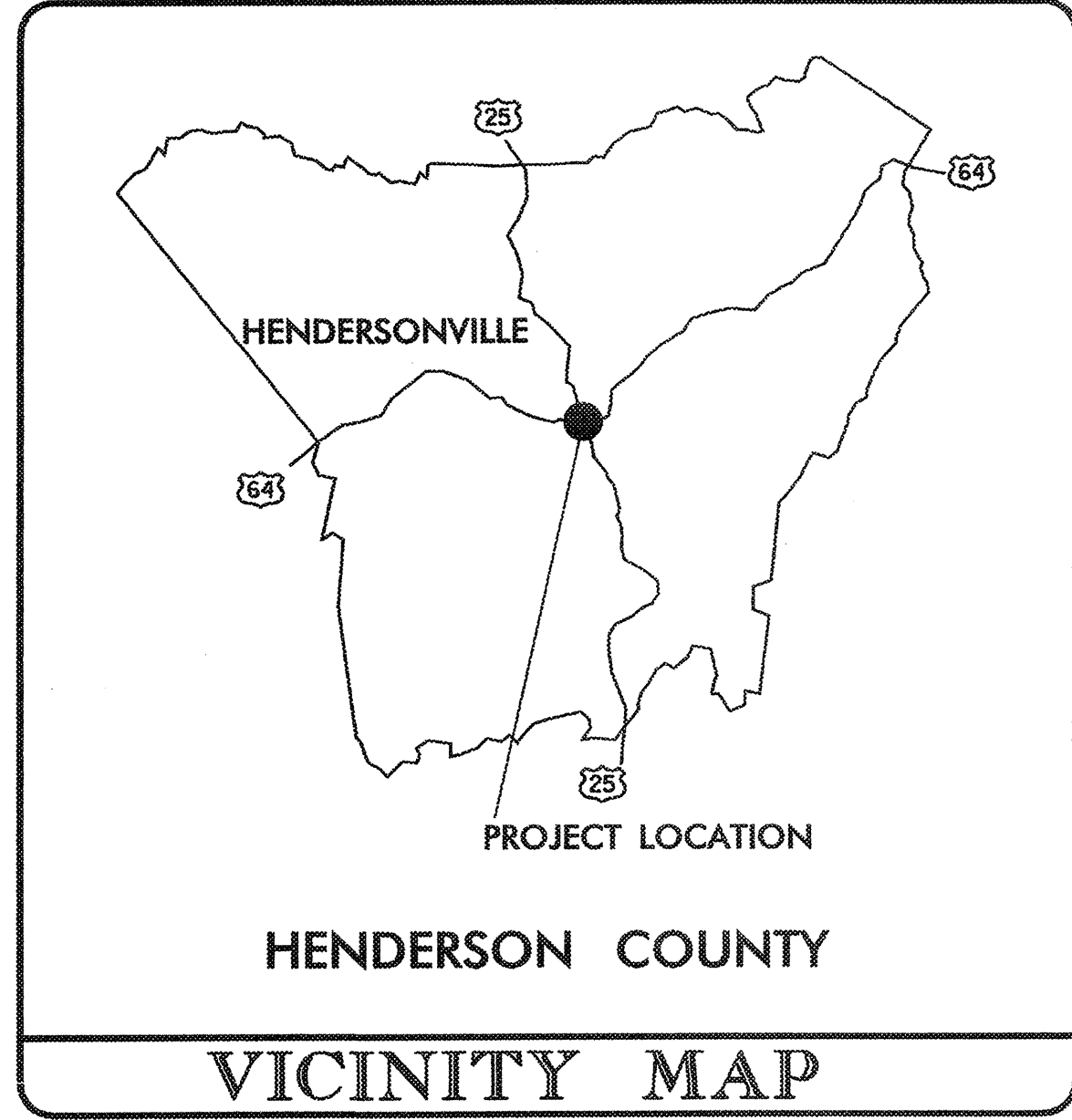
Project No.	Sheet No.
U-4428	Sig. 1

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# HENDERSON COUNTY

LOCATION: HENDERSONVILLE - US 64 FROM  
US 25 TO SR 1180 (BLYTHE STREET)

TYPE OF WORK: TRAFFIC SIGNALS &  
COMMUNICATIONS CABLE ROUTING PLANS



LOCATION MAP  
(NOT TO SCALE)

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

Sheet #	Reference #	Location/Description
Sig. 1		Title Sheet
Sig. 2-5	14-0002	US 64 (Brevard Road) at SR 1180 (Blythe Street)
Sig. 6-11	14-0636	US 64 (6th Avenue) at Justice Street
Sig. 12-17	14-0634	US 64 (6th Avenue) at Fleming Street
Sig. 18-23	14-0635	US 64 (6th Avenue) at Buncombe Street
Sig. 24-26	N/A	Standard Drawings for Metal Poles
Sig. 27-31	N/A	Wireless Communication Plans
Sig. 32-34	N/A	Inductive Detection Loops Details

**INTELLIGENT TRANSPORTATION AND SIGNALS UNIT**

Contacts:

T. J. Williams, PE - Signals and Geometrics Contracts Engineer  
G. C. Brown, PE - Signal Equipment Design Engineer  
G. G. Murr, Jr., PE - Intelligent Transportation Systems Engineer

Prepared In the Office of:  
DIVISION OF HIGHWAYS  
TRAFFIC ENGINEERING AND SAFETY SYSTEMS  
BRANCH

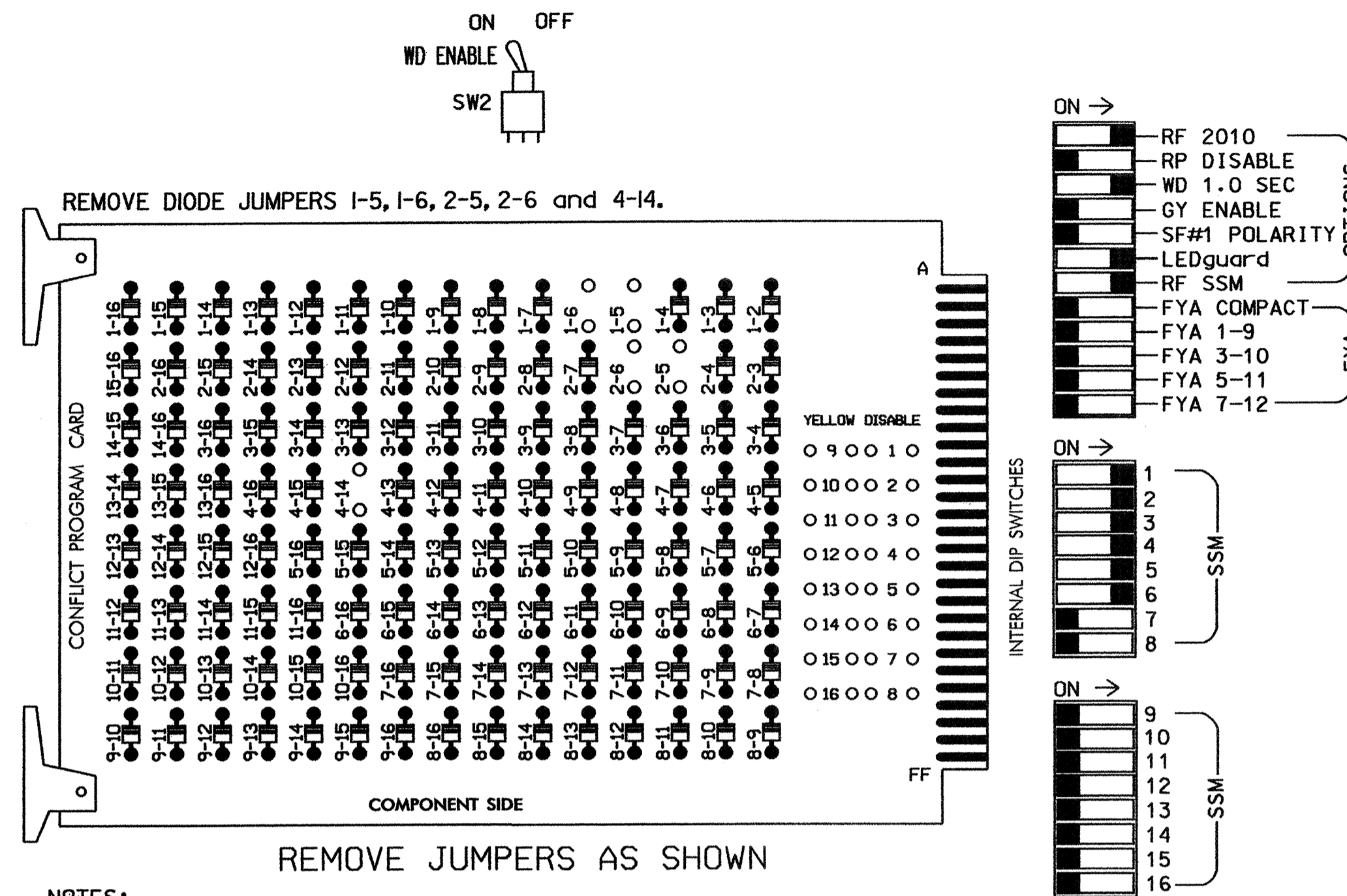
750 N. Greenfield Parkway, Garner, NC 27529

4-MAY-2008 12:22  
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### EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



**NOTES:**

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

### NOTES

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

### EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L  
 CABINET.....CONTRACTOR SUPPLIED 332  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S1,S2,S3,S4,S4P,S5,S6  
 PHASES USED.....1,2,3,4,4 PED,5,6  
 OVERLAPS.....NONE

### SIGNAL HEAD HOOK-UP CHART

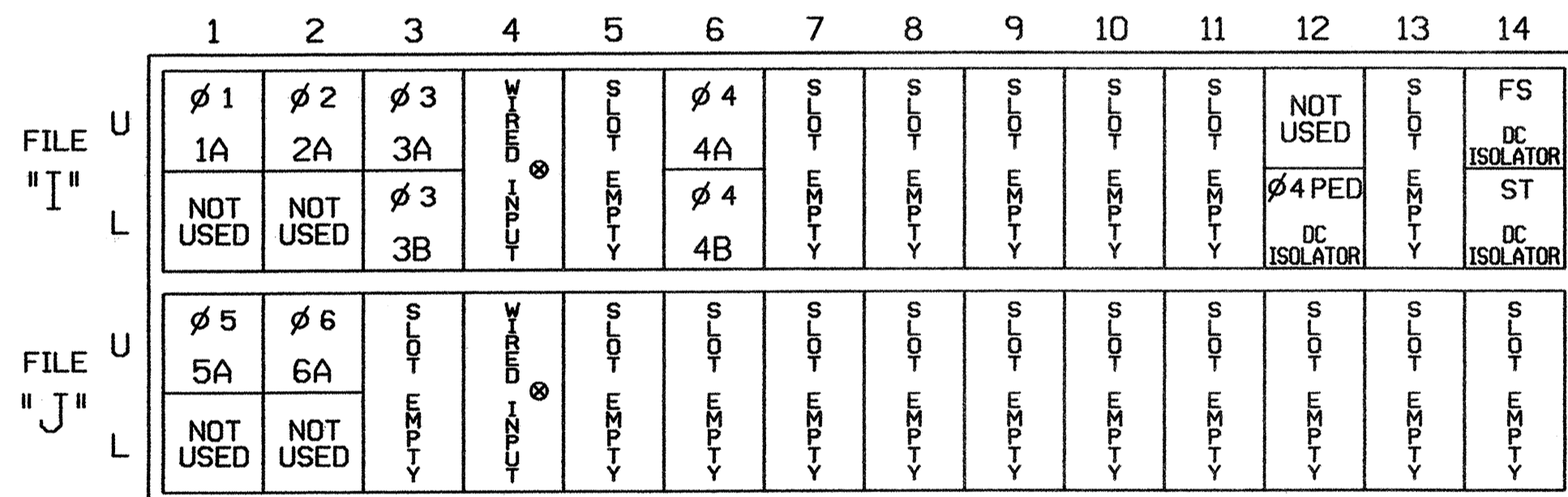
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	61	21,22	NU	31 32	41 42	P41, P42	21	61,62	NU	NU	NU	NU
RED	*	128		116 116	101 101		*	134				
YELLOW		129		117 117	102 102			135				
GREEN		130		118 118	103 103			136				
RED ARROW												
YELLOW ARROW	126							132				
GREEN ARROW	127			118	103		133					
Hand icon							104					
Walker icon							106					

NU = Not Used

\* Denotes install load resistor. See load resistor installation detail this sheet.

### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

### INPUT FILE CONNECTION & PROGRAMMING CHART

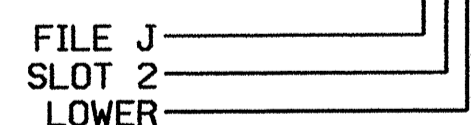
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A <sup>1</sup>	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
3A	TB2-9,10	I3U	63	25	32	3	Y	Y			3
3B	TB2-11,12	I3L	76	38	42	3	Y	Y			10
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
5A <sup>2</sup>	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					

NOTE:  
 INSTALL DC ISOLATORS IN INPUT FILE SLOT I12.

<sup>1</sup>Add jumper from I1W to J4W, on rear of input file.

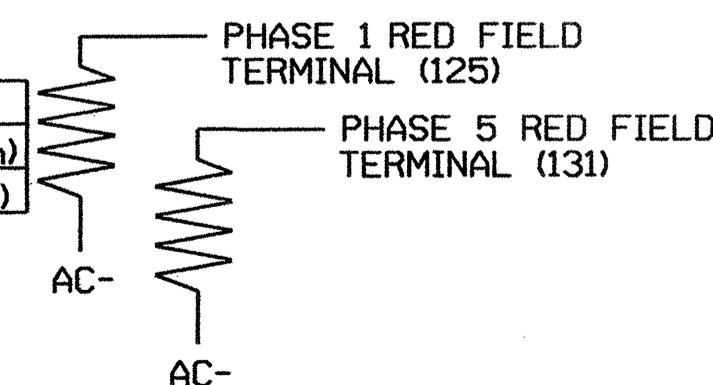
<sup>2</sup>Add jumper from J1W to I4W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



### LOAD RESISTOR INSTALLATION DETAIL

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



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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0002T  
 DESIGNED: April 2008  
 SEALED: 05/01/08  
 REVISED: N/A

### 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.

### DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

- From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Functions 1 and 2.
- From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

DYNAMIC/BACKUP CONTROL FUNCTION #01  
 OVERLAPS:;ABCDEFGHIJKLMNP  
 IF OVERLAPS ARE ACTIVE ;  
 OR PHASES:;12345678910111213141516  
 IF PHASES ARE ON: X  
 OMIT PHASES : X  
 CALL PHASES : X

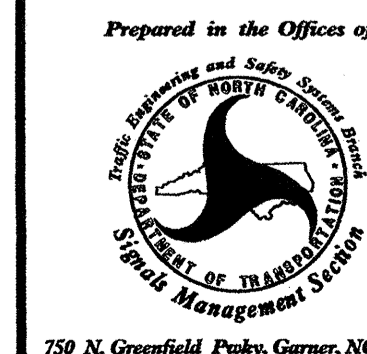
PRESS 'NEXT'

DYNAMIC/BACKUP CONTROL FUNCTION #02  
 OVERLAPS:;ABCDEFGHIJKLMNP  
 IF OVERLAPS ARE ACTIVE ;  
 OR PHASES:;12345678910111213141516  
 IF PHASES ARE ON: X  
 OMIT PHASES : X  
 CALL PHASES : X

BACKUP PROTECTION PROGRAMMING COMPLETE

Signal Upgrade - Temporary Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:

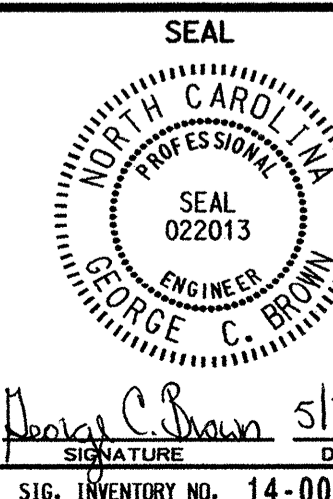


US 64 (Brevard Road)  
 at  
 SR 1180 (Blythe Street)

Division 14 Henderson County Hendersonville

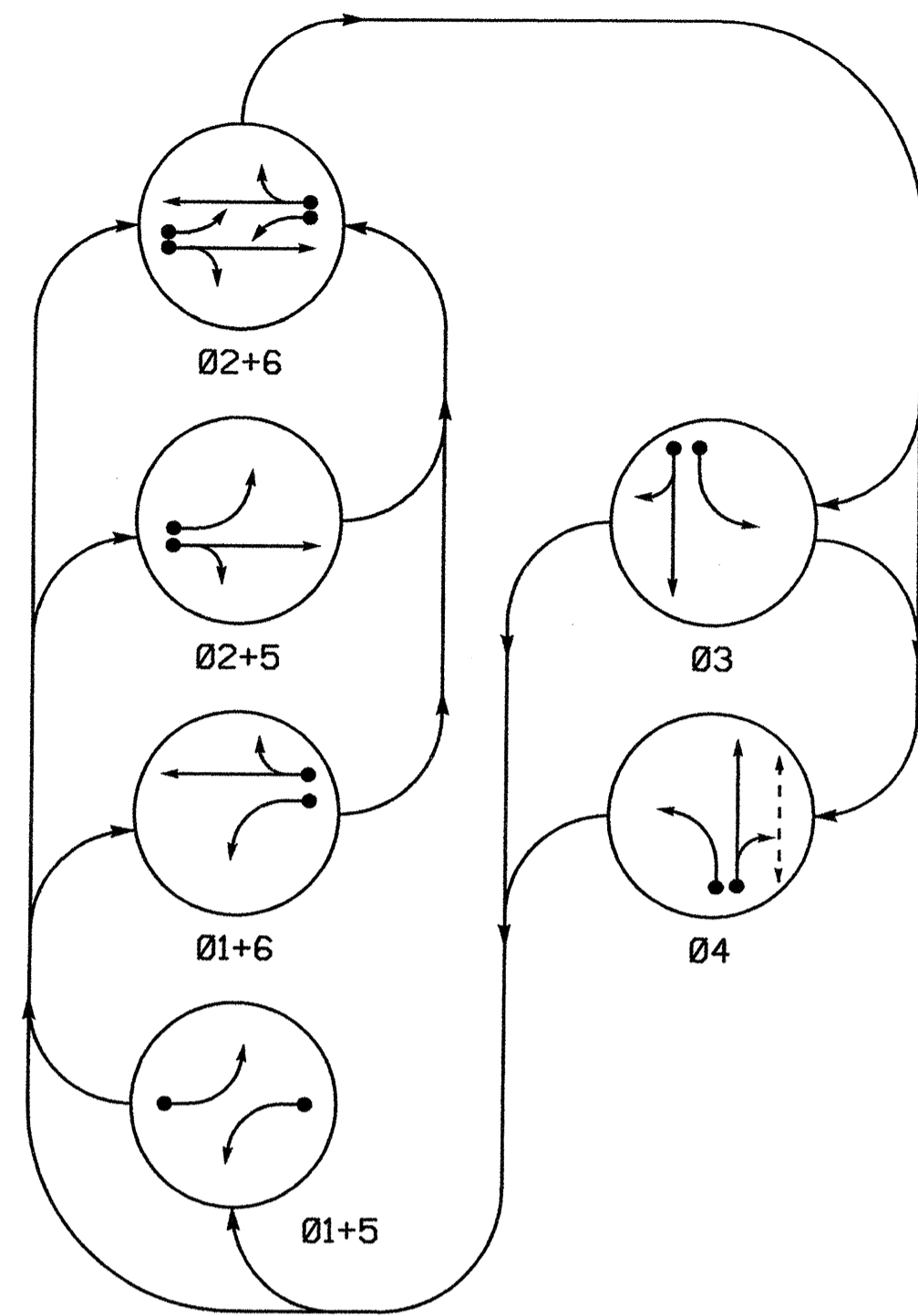
PREPARED BY: C. Strickland REVIEWED BY: T. Boyd

REVISIONS INIT. DATE



SIG. INVENTORY NO. 14-0002T

PHASING DIAGRAM

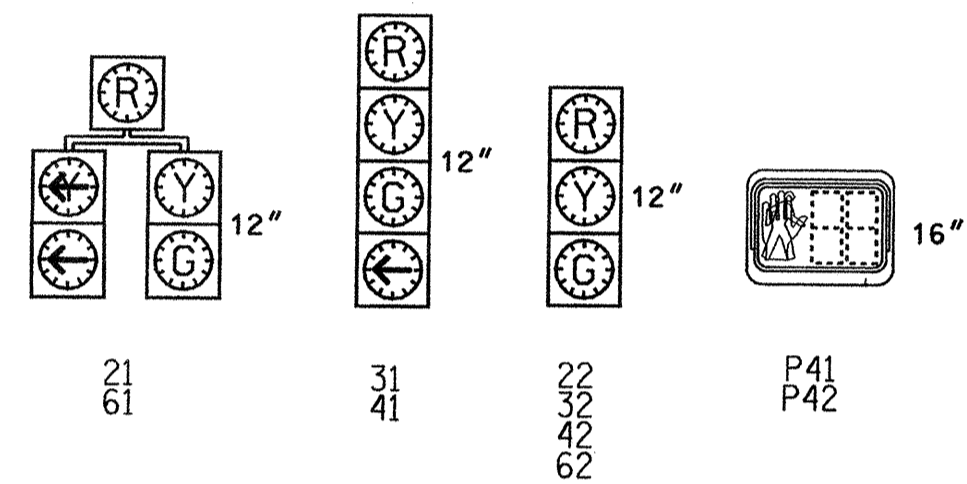


SIGNAL FACE	PHASE						FLIGHT HEADS
	01+5	01+6	02+5	02+6	03	04	
21	R	R	G	R	R	Y	
22	R	R	G	R	R	Y	
31	R	R	R	R	G	R	
32	R	R	R	R	G	R	
41	R	R	R	R	G	R	
42	R	R	R	R	G	R	
61	R	G	R	G	R	Y	
62	R	G	R	G	R	Y	
P41, P42	DW	DW	DW	DW	W	DRK	

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

SIGNAL FACE I.D.

Denotes L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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

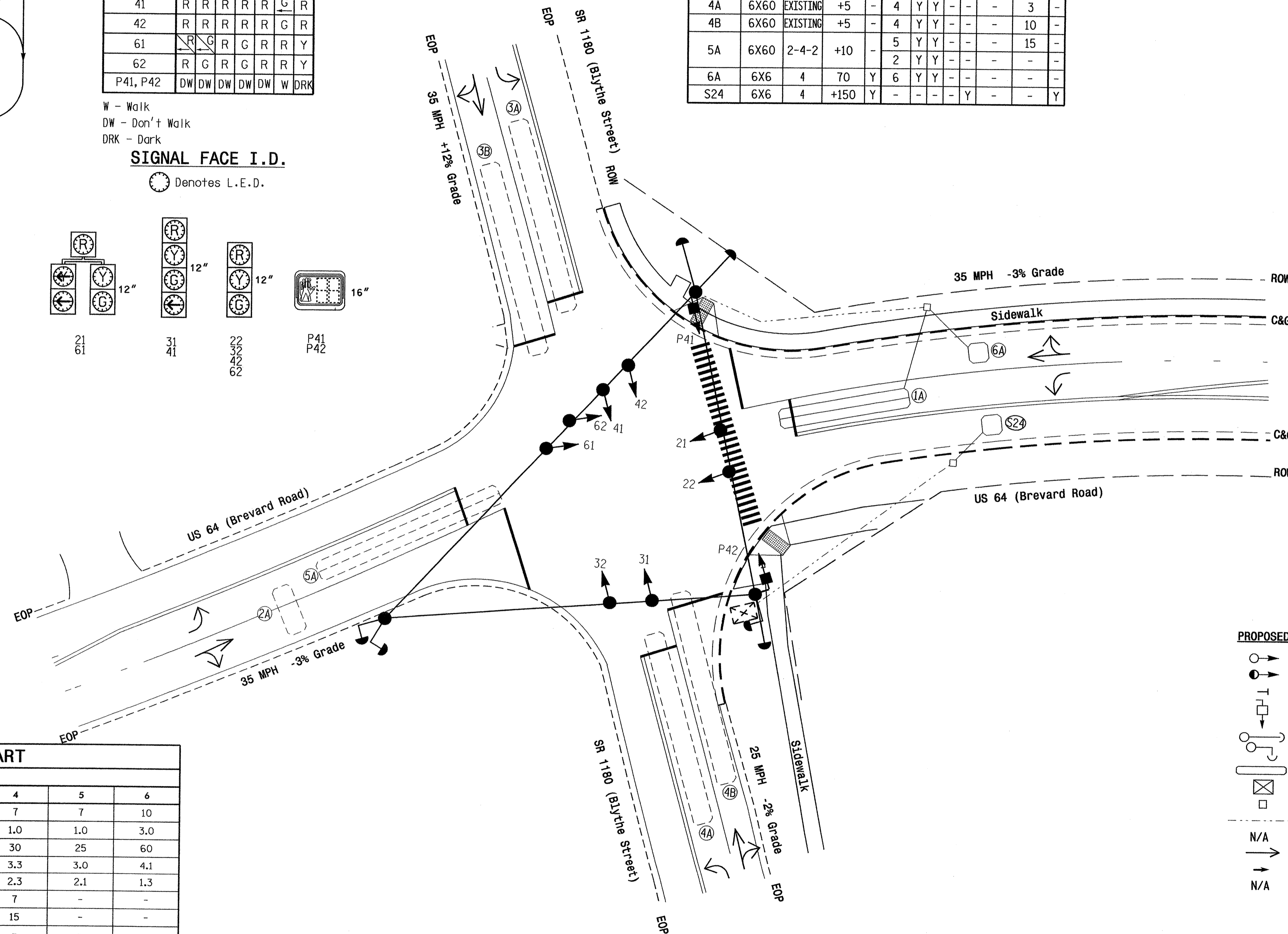
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	DETECTOR PROGRAMMING						
					PHASE	CALLING	EXTENSION	FULL TIME DELAY SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	6X40	2-4-2	+5	Y	1	Y	Y	-	-	15	-
2A	6X15	EXISTING	70	-	2	Y	Y	-	-	-	-
3A	6X60	EXISTING	+5	-	3	Y	Y	-	-	3	-
3B	6X60	EXISTING	+5	-	3	Y	Y	-	-	10	-
4A	6X60	EXISTING	+5	-	4	Y	Y	-	-	3	-
4B	6X60	EXISTING	+5	-	4	Y	Y	-	-	10	-
5A	6X60	2-4-2	+10	-	5	Y	Y	-	-	15	-
6A	6X6	4	70	Y	6	Y	Y	-	-	-	-
S24	6X6	4	+150	Y	-	-	-	Y	-	-	-

6 Phase Fully Actuated (US 64 Closed Loop System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Omit phase 5 during phase 6 on.
5. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4 (see Electrical Details).
6. The order of phase 3 and phase 4 may be reversed.
7. Set all detector units to presence mode.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Closed loop system data: Controller Asset # 0002.



FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	10	7	7	7	10
Extension 1 *	1.0	3.0	2.0	1.0	1.0	3.0
Max Green 1 *	25	60	30	30	25	60
Yellow Clearance	3.0	4.1	3.3	3.3	3.0	4.1
Red Clearance	2.4	1.4	2.1	2.3	2.1	1.3
Walk 1 *	-	-	-	7	-	-
Don't Walk 1	-	-	-	15	-	-
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	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

Signal Upgrade - Final

**US 64 (Brevard Road)  
at  
SR 1180 (Blythe Street)**

SEAL  
NORTH CAROLINA  
PROFESSIONAL ENGINEER  
T. WILLIAMS  
24393

Division 14 Henderson County Hendersonville  
PLAN DATE: April 2008 REVIEWED BY: T.J. Williams

PREPARED BY: TS Thigpen REVIEWED BY:

SCALE  
0 20  
1"=20'

REVISIONS

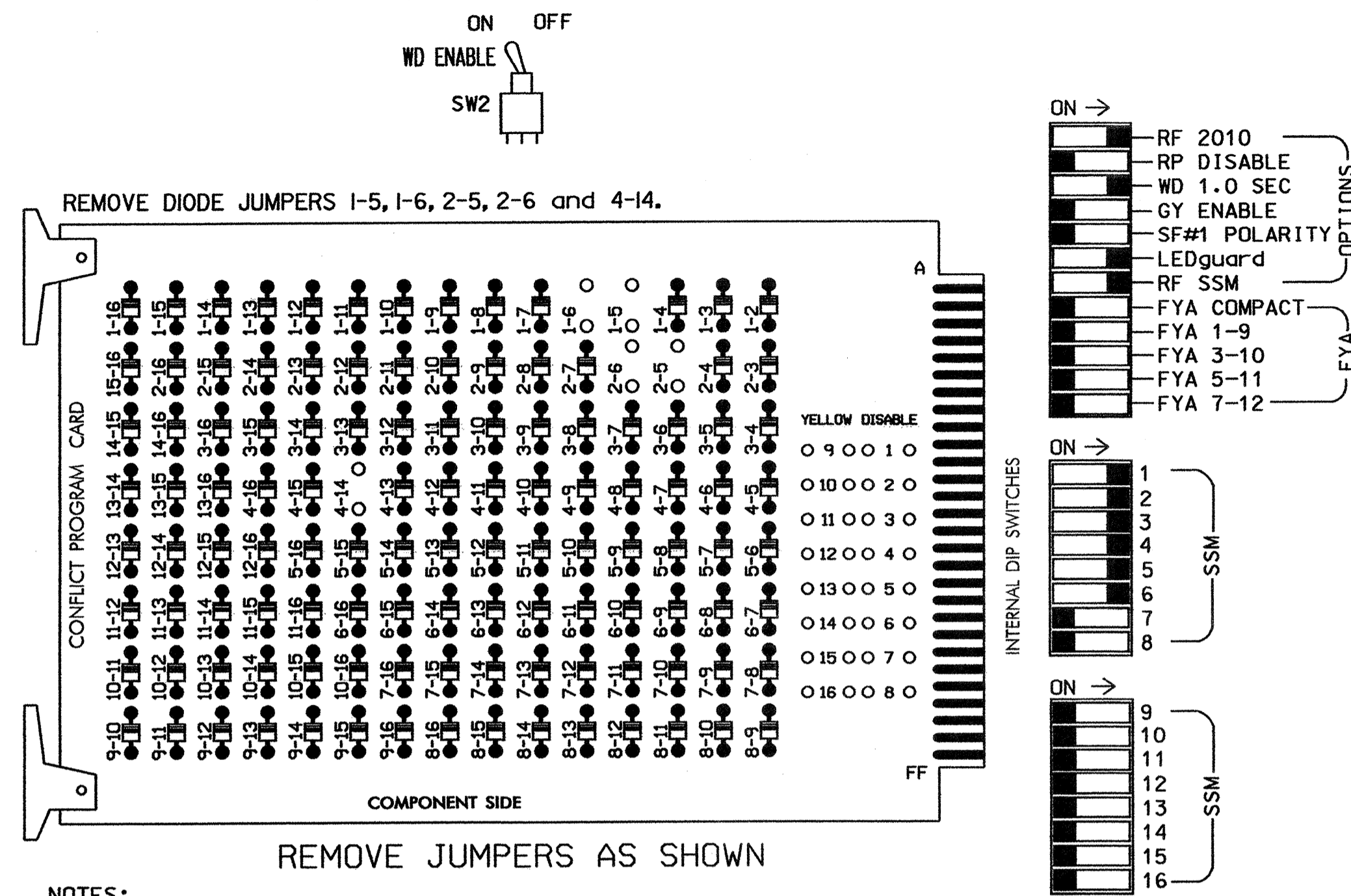
NO.	DATE	INIT.	DATE

SIGNATURE: *T. Williams* 5/1/08  
DATE: 5/1/08  
SIG. INVENTORY NO. 14-0002

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### EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



**NOTES:**

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

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 7,8,9, 10,11,12,13,14,15 & 16 to load switch ACT per the cabinet manufacturer's instructions.
- Program phases 2 and 6, on the controller unit, for Start Up In Green.
- Enable Simultaneous Gap-Out, on the controller unit, for all phases.
- Program phase 4 for 'STARTUP PED CALL'.
- The cabinet and controller are part of the US 64 Closed Loop System.

### EQUIPMENT INFORMATION

CONTROLLER.....EXISTING 2070L  
 CABINET.....EXISTING 332  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S1,S2,S3,S4,S4P,S5,S6  
 PHASES USED.....1,2,3,4,4 PED,5,6  
 OVERLAPS.....NONE

### 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.	61	21,22	NU	31	32	41	42	P41, P42	21	61,62	NU	NU
RED	*	128		116	116	101	101		*	134		
YELLOW		129		117	117	102	102			135		
GREEN		130		118	118	103	103			136		
RED ARROW												
YELLOW ARROW	126									132		
GREEN ARROW	127			118		103				133		
Hand icon										104		
Person icon										106		

NU = Not Used

\* 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	NOT USED	NOT USED	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
L	NOT USED	NOT USED	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

### 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 <sup>1</sup>	TB2-1,2	I1U	56	18	1	1	Y	Y			15
2A	TB2-5,6	I2U	48	10	26	6	Y	Y			
3A	TB2-9,10	I3U	63	25	32	3	Y	Y			3
3B	TB2-11,12	I3L	76	38	42	3	Y	Y			10
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
5A <sup>2</sup>	TB3-1,2	J1U	55	17	5	5	Y	Y			15
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
*S24	TB6-9,10	I9U	60	22	11	SYS					
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31		PED 4	4 PED				

**NOTE:**

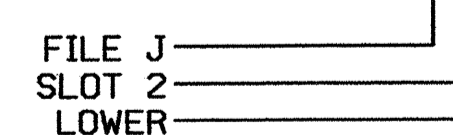
INSTALL DC ISOLATORS IN INPUT FILE SLOT 112.

<sup>1</sup>Add jumper from I1W to J4W, on rear of input file.

<sup>2</sup>Add jumper from J1W to I4W, on rear of input file.

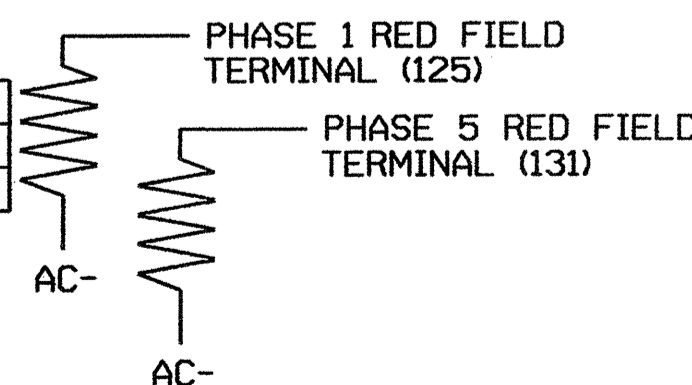
\* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



### LOAD RESISTOR INSTALLATION DETAIL

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



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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0002  
 DESIGNED: April 2008  
 SEALED: 05/01/08  
 REVISED: N/A

### 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.

### DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

- From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Functions 1 and 2.
- From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

DYNAMIC/BACKUP CONTROL FUNCTION #01  
 OVERLAPS: ABCDEFGHIJKLMNP  
 IF OVERLAPS ARE ACTIVE: |  
 OR PHASES: 12345678910111213141516  
 IF PHASES ARE ON: X  
 OMIT PHASES: | X  
 CALL PHASES: | X

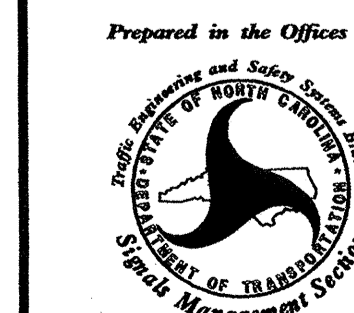
PRESS 'NEXT'

DYNAMIC/BACKUP CONTROL FUNCTION #02  
 OVERLAPS: ABCDEFGHIJKLMNP  
 IF OVERLAPS ARE ACTIVE: |  
 OR PHASES: 12345678910111213141516  
 IF PHASES ARE ON: X  
 OMIT PHASES: | X  
 CALL PHASES: | X

BACKUP PROTECTION PROGRAMMING COMPLETE

Signal Upgrade - Final

ELECTRICAL AND PROGRAMMING DETAILS FOR:

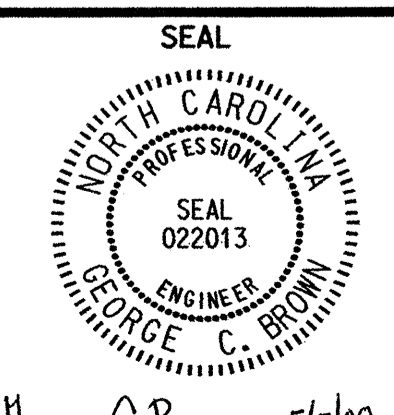


150 N. Greenfield Parkway, Garner, NC 27529

US 64 (Brevard Road) at SR 1180 (Blythe Street)

Division 14 Henderson County Hendersonville  
 PLAN DATE: April 2008 REVIEWED BY: T. Jacek  
 PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

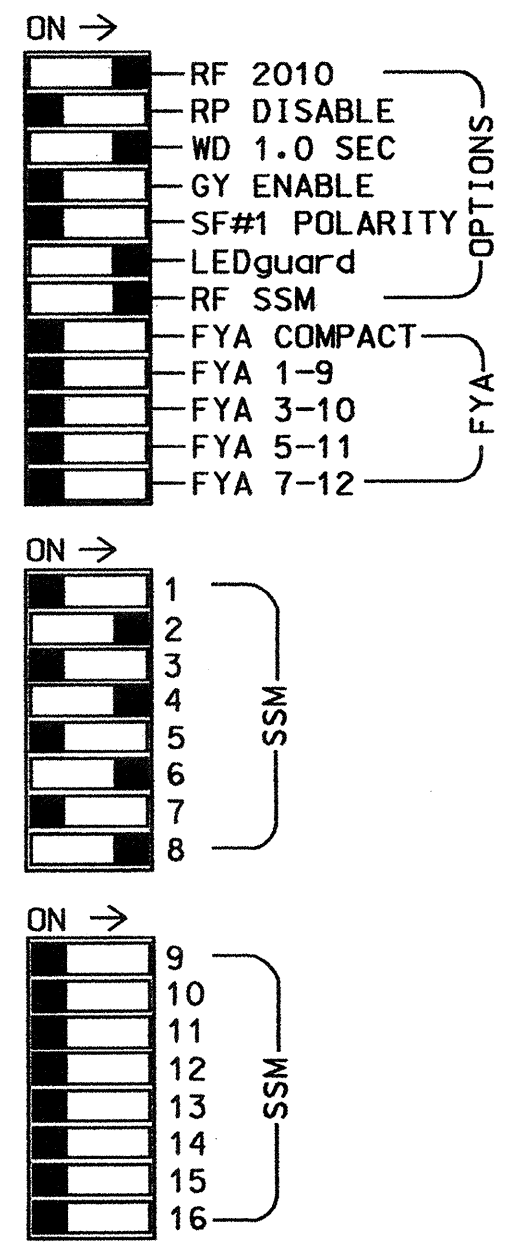
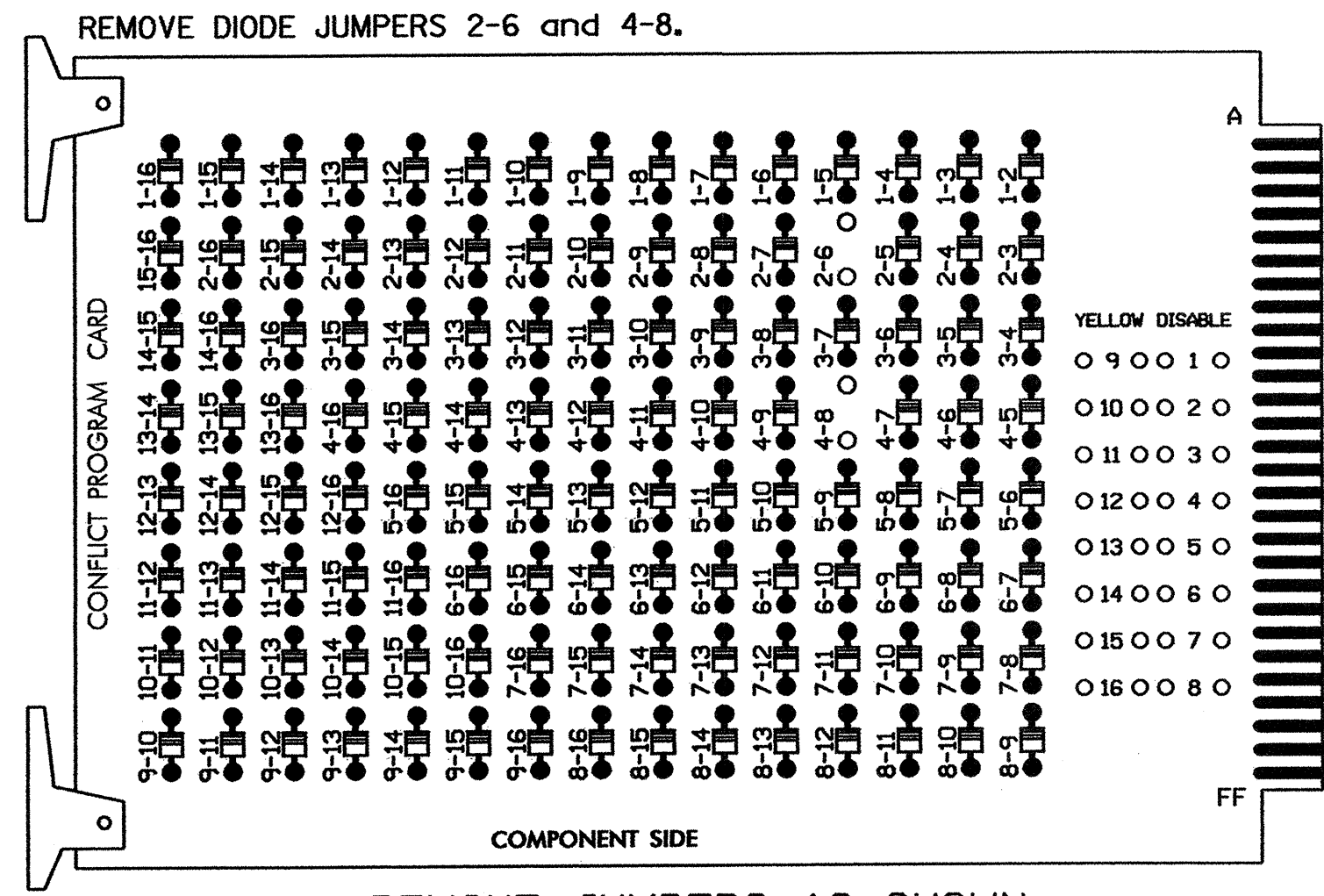
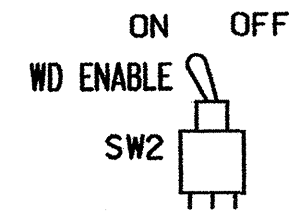


SIGNATURE: George C. Brown 5/1/08  
 DATE: 5/1/08  
 SIG. INVENTORY NO. 14-0002



**EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL**

(remove jumpers and set switches as shown)



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

**NOTES**

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

**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	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = Not Used

**EQUIPMENT INFORMATION**

CONTROLLER.....CONTRACTOR SUPPLIED 2070L  
 CABINET.....CONTRACTOR SUPPLIED 332  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S2,S2P,S4,S4P,S6,S6P,S8,S8P  
 PHASES USED.....2,2 PED,4,4 PED,6,6 PED,8,8 PED  
 OVERLAPS.....NONE

**INPUT FILE POSITION LAYOUT**

(front view)

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

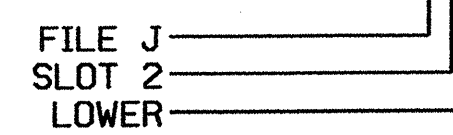
EX. : 1A, 2A, ETC. = LOOP NO.'S

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
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			5

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0636T  
 DESIGNED: April 2008  
 SEALED: 05/01/08  
 REVISED: N/A

**Signal Upgrade - Temporary Design**

Prepared in the Offices of:  
  
 750 N. Greenfield Pkwy, Garner, NC 27529

Division 14 Henderson County Hendersonville

PLAN DATE: May 2008 REVIEWED BY: T. J. J.

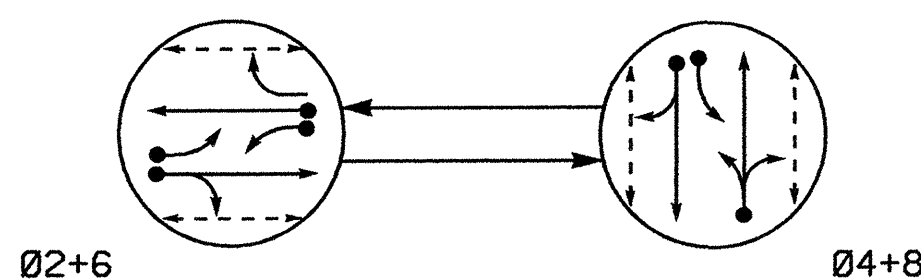
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL  
 NORTH CAROLINA  
 PROFESSIONAL ENGINEER  
 SEAL 022013  
 GEORGE C. BROWN  
 Signature: George C. Brown 5/6/08  
 DATE: 5/6/08  
 SIG. INVENTORY NO. 14-0636T

06-MAY-2008 07:37 s:\m\15\signal\enw\kgrcupsws1\g\manestr\ckland\40636t-sm.ele.xxx.dgn

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

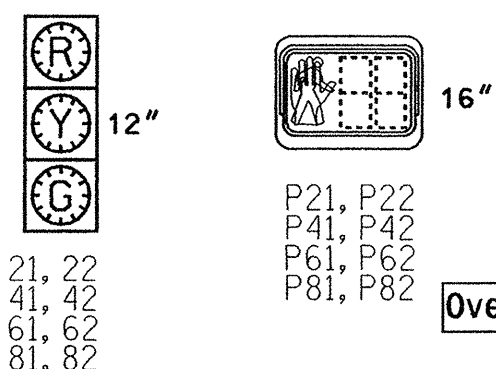
- ← ● → DETECTED MOVEMENT
- ← ○ → UNDETECTED MOVEMENT (OVERLAP)
- ← - - - → UNSIGNALIZED MOVEMENT
- ← - - - P → PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE		
	02+6	04+8	04+8
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK
P61, P62	W	DW	DRK
P81, P82	DW	W	DRK

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

SIGNAL FACE I.D.

○ Denotes L.E.D.  
 \* See Note #8



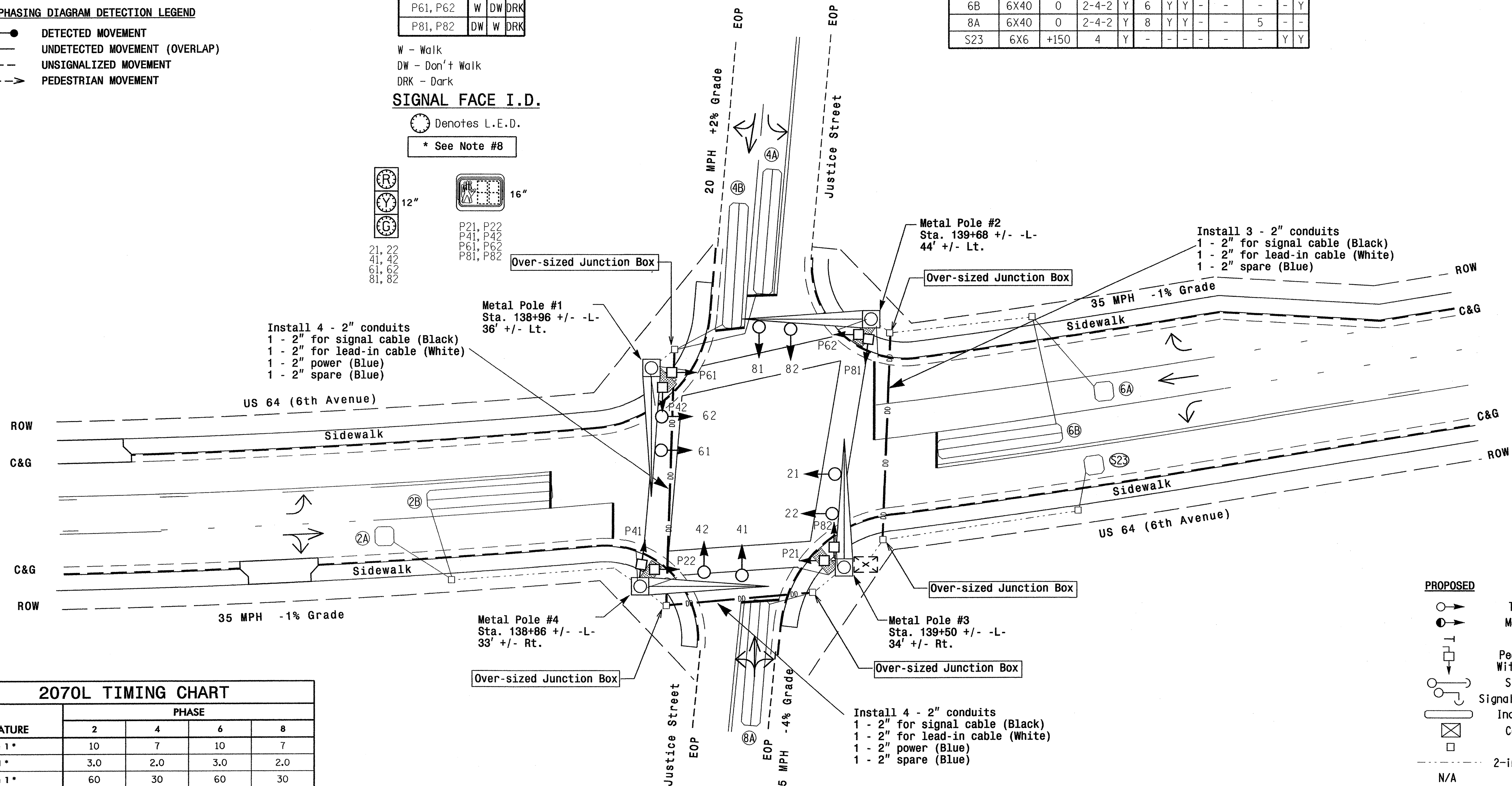
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING								
				NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X6	70	4	Y	2	Y	Y	-	-	-	-	Y
2B	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	3	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	10	-	Y
6A	6X6	70	4	Y	6	Y	Y	-	-	-	-	Y
6B	6X40	0	2-4-2	Y	6	Y	Y	-	-	-	-	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	5	-	Y
S23	6X6	+150	4	Y	-	-	-	-	-	-	-	Y

2 Phase Fully Actuated (US 64 Closed Loop System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset # 0636.
8. All signal heads shall be Hunter Green in color.
9. All metal poles and mastarms shall be Hunter Green in color.



2070L TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	10	7	10	7
Extension 1 *	3.0	2.0	3.0	2.0
Max Green 1 *	60	30	60	30
Yellow Clearance	3.9	3.0	3.9	4.1
Red Clearance	2.0	2.4	1.5	1.5
Walk 1 *	7	7	7	7
Don't Walk 1	8	10	10	11
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON

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

LEGEND

- |  |                                   |  |                                   |
|--|-----------------------------------|--|-----------------------------------|
|  | PROPOSED Traffic Signal Head      |  | EXISTING Traffic Signal Head      |
|  | PROPOSED Modified Signal Head     |  | EXISTING Modified Signal Head     |
|  | PROPOSED Pedestrian Signal Head   |  | EXISTING Pedestrian Signal Head   |
|  | PROPOSED Signal Pole with Guy     |  | EXISTING Signal Pole with Guy     |
|  | PROPOSED Inductive Loop Detector  |  | EXISTING Inductive Loop Detector  |
|  | PROPOSED Controller & Cabinet     |  | EXISTING Controller & Cabinet     |
|  | PROPOSED Junction Box             |  | EXISTING Junction Box             |
|  | PROPOSED 2-in Underground Conduit |  | EXISTING 2-in Underground Conduit |
|  | PROPOSED Right of Way             |  | EXISTING Right of Way             |
|  | PROPOSED Directional Arrow        |  | EXISTING Directional Arrow        |
|  | PROPOSED Pavement Marking Arrow   |  | EXISTING Pavement Marking Arrow   |
|  | PROPOSED Wheelchair Ramp          |  | EXISTING Wheelchair Ramp          |
|  | PROPOSED Directional Drill        |  | EXISTING Directional Drill        |
|  | PROPOSED Metal Pole with Mastarm  |  | EXISTING Metal Pole with Mastarm  |

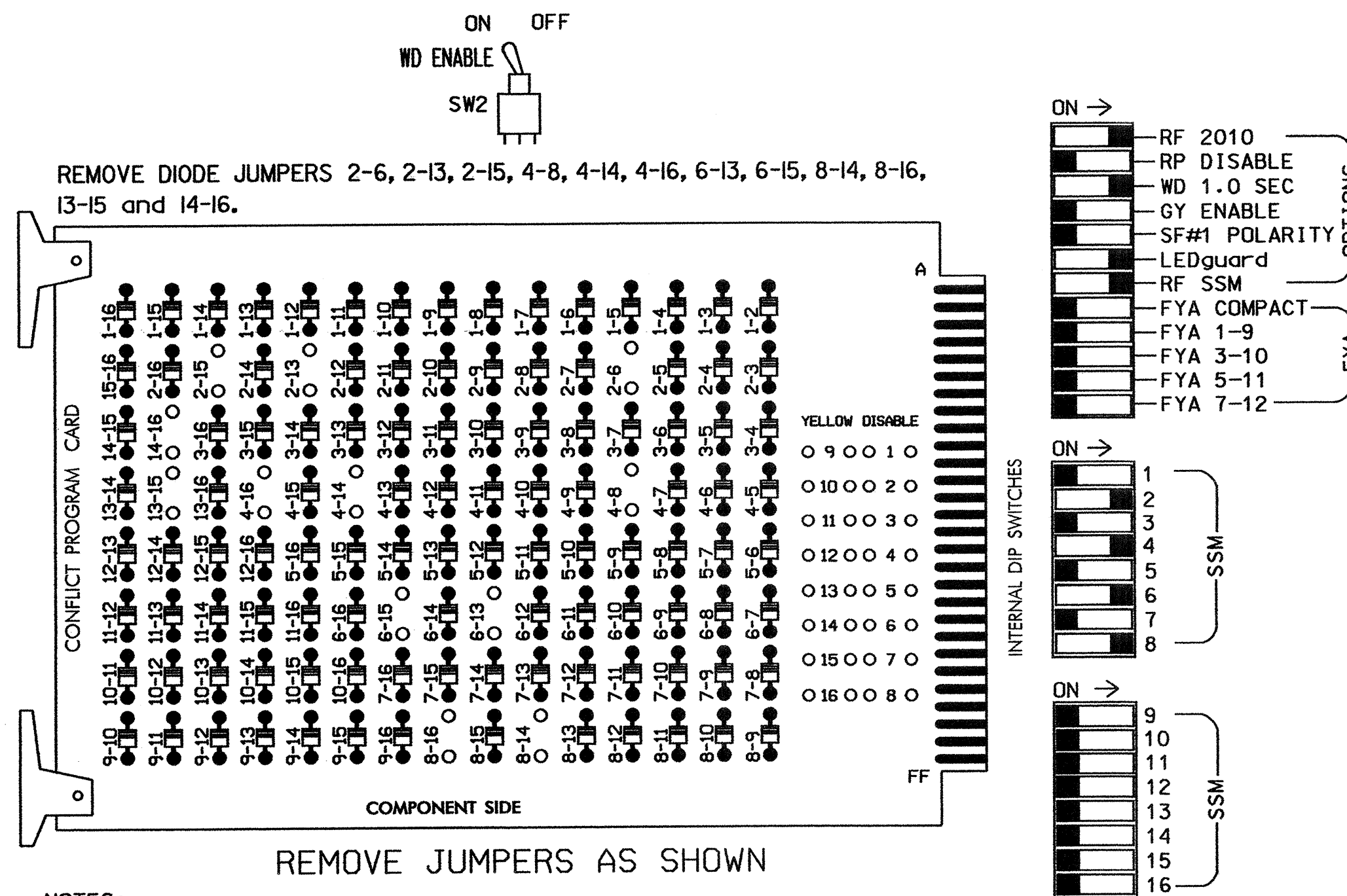
Signal Upgrade - Final

	<p>US 64 (6th Avenue) at Justice Street</p>		<p>SEAL</p>
	<p>Division 14 Henderson County Hendersonville</p> <p>PREPARED BY: TS Thigpen</p>	<p>REVIEWED BY: TJ Williams</p> <p>DATE: April 2008</p>	
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>		<p>SCALE 1"=20'</p>	



**EDI MODEL 2010ECL-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.
- Make sure jumpers SEL2-SEL5 are present on the monitor board.

**NOTES**

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5, 7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 2 and 6, on the controller unit, for Start Up In Green.
- Enable Simultaneous Gap-Out, on the controller unit, for all phases.
- Program phases 4 and 8, on the controller unit, for Dual Entry.
- Program phases 2, 4, 6 and 8 for 'STARTUP PED CALL'.
- The cabinet and controller are part of the US 64 Closed Loop System.

**SIGNAL HEAD HOOK-UP CHART**

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	P21, P22	NU	41,42	P41, P42	NU	61,62	P61, P62	NU	81,82	P81, P82
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
			113			104		119				110
			115			106		121				112

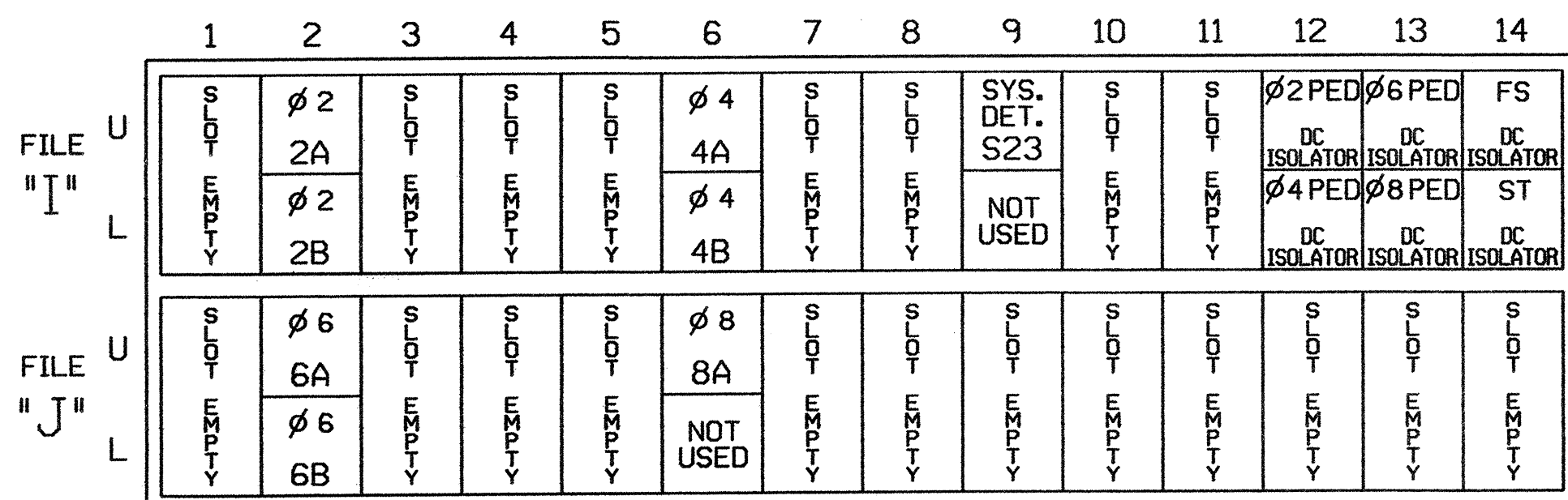
NU = Not Used

**EQUIPMENT INFORMATION**

CONTROLLER.....EXISTING 2070L  
 CABINET.....EXISTING 332  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S2,S2P,S4,S4P,S6,S6P,S8,S8P  
 PHASES USED.....2,2 PED,4,4 PED,6,6 PED,8,8 PED  
 OVERLAPS.....NONE

**INPUT FILE POSITION LAYOUT**

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

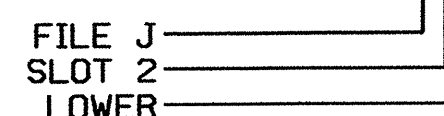
**INPUT FILE CONNECTION & PROGRAMMING CHART**

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
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			3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			5
*S23	TB6-9,10	I9U	60	22	11	SYS					
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

NOTE:  
 INSTALL DC ISOLATORS  
 IN INPUT FILE SLOTS  
 I12 AND I13.

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

INPUT FILE POSITION LEGEND: J2L



**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.

THIS ELECTRICAL DETAIL IS FOR  
 THE SIGNAL DESIGN: 14-0636  
 DESIGNED: April 2008  
 SEALED: 05/01/08  
 REVISED: N/A

Signal Upgrade - Final

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:  
  
 750 N. Greenfield Pkwy, Garner, NC 27529

**US 64 (6th Avenue) at Justice Street**

Division 14 Henderson County Hendersonville

PLAN DATE: May 2008 REVIEWED BY: T. J. J.

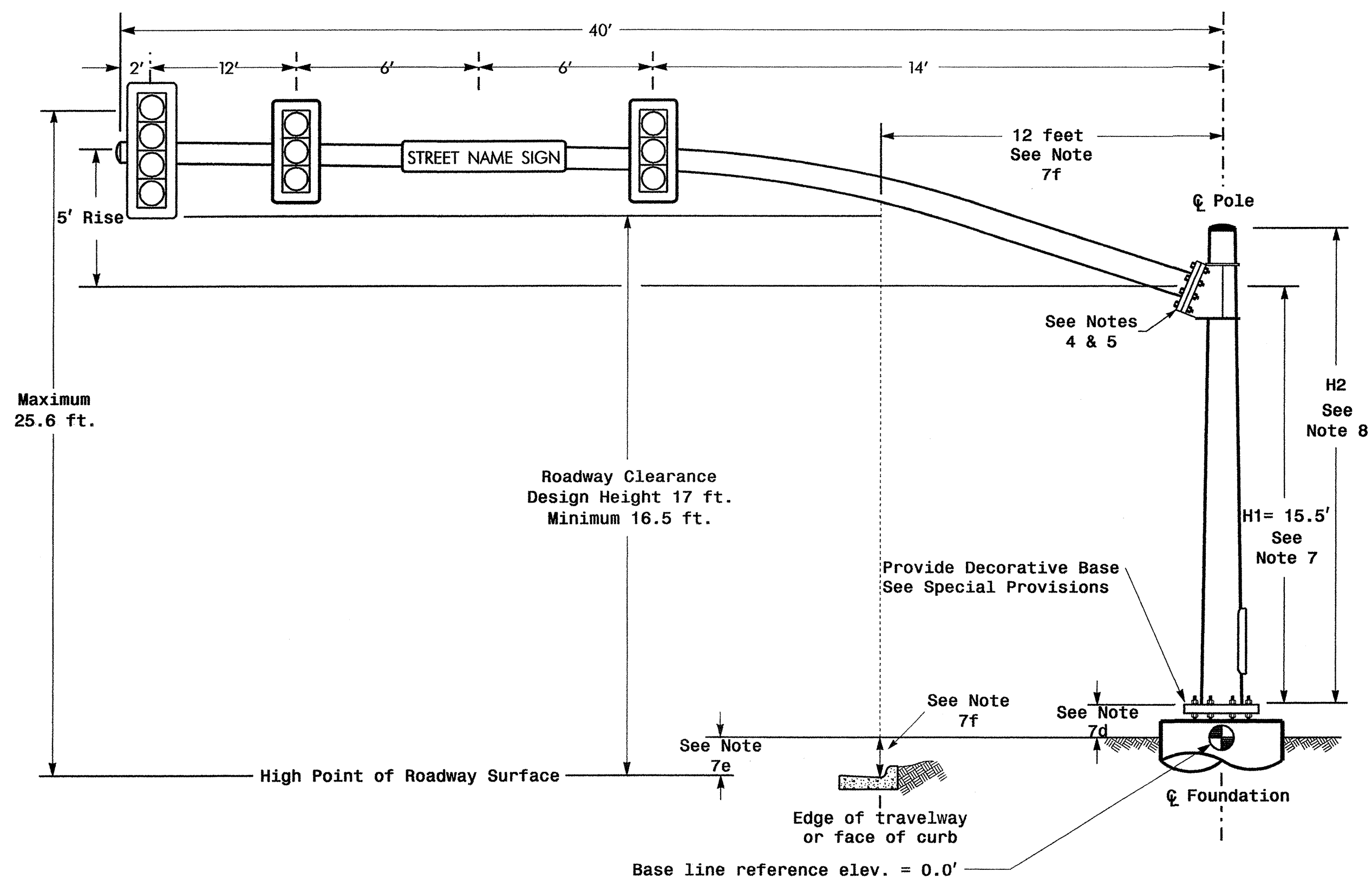
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

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

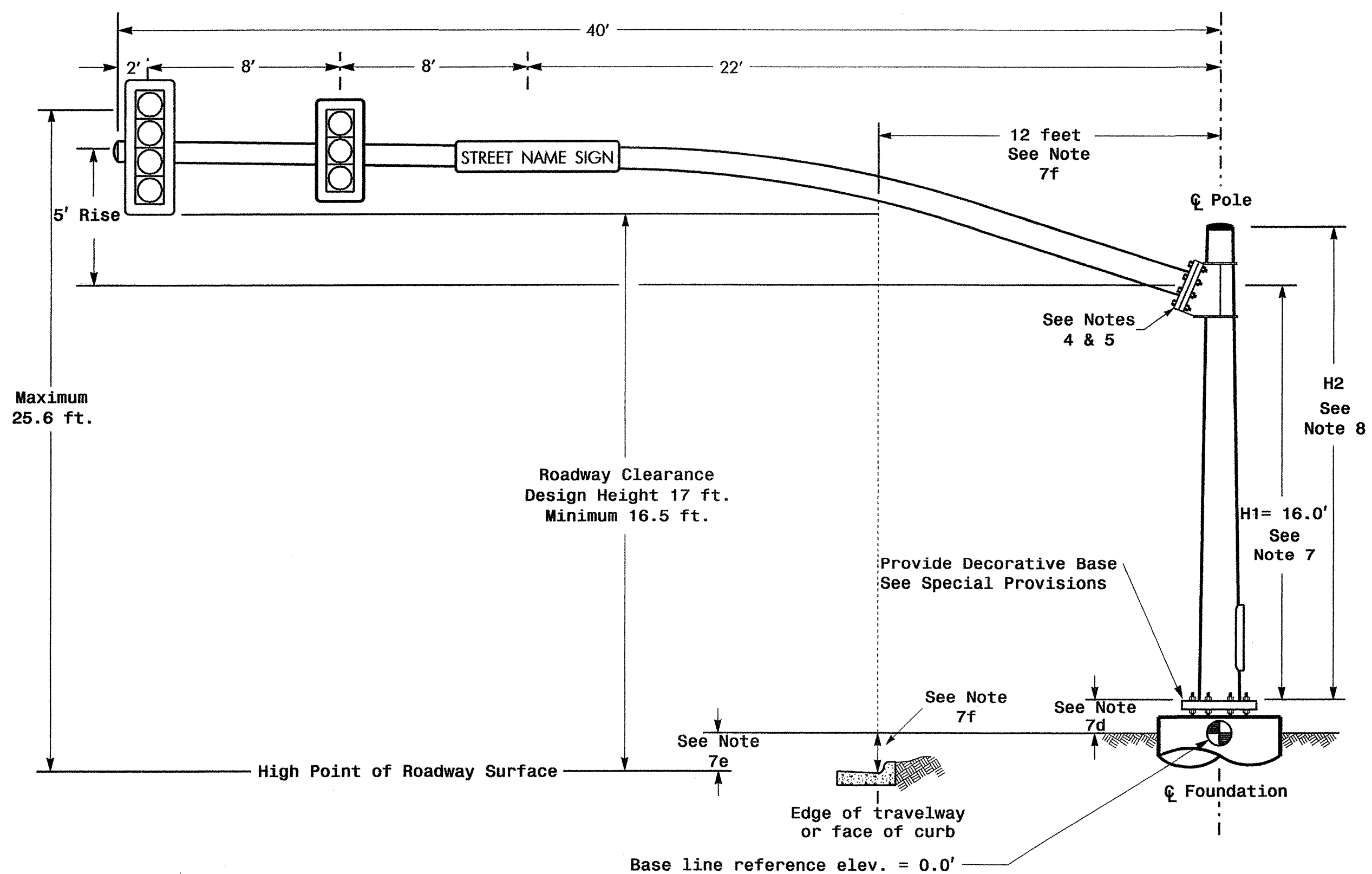
SIG. INVENTORY NO. 14-0636

**Design Loading for METAL POLE NO. 1**



**ELEVATION VIEW**

**Design Loading for METAL POLE NO. 2**

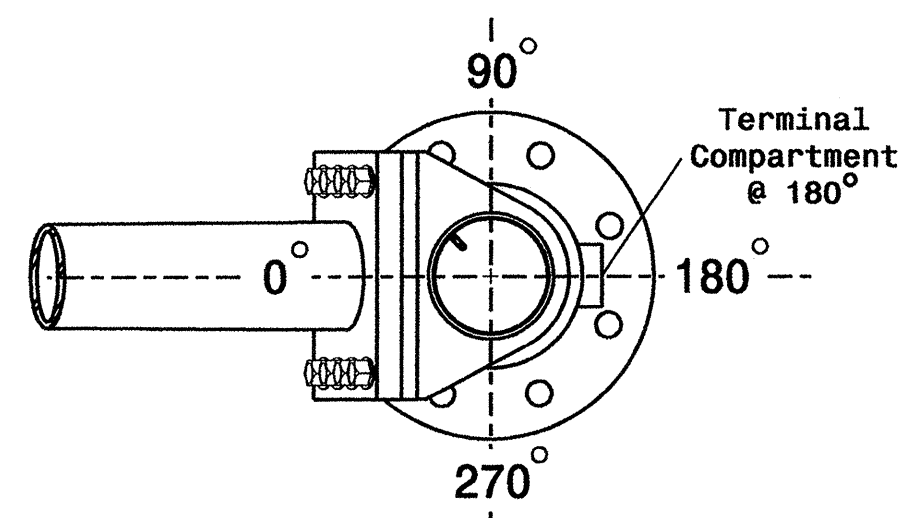


**Elevation View**

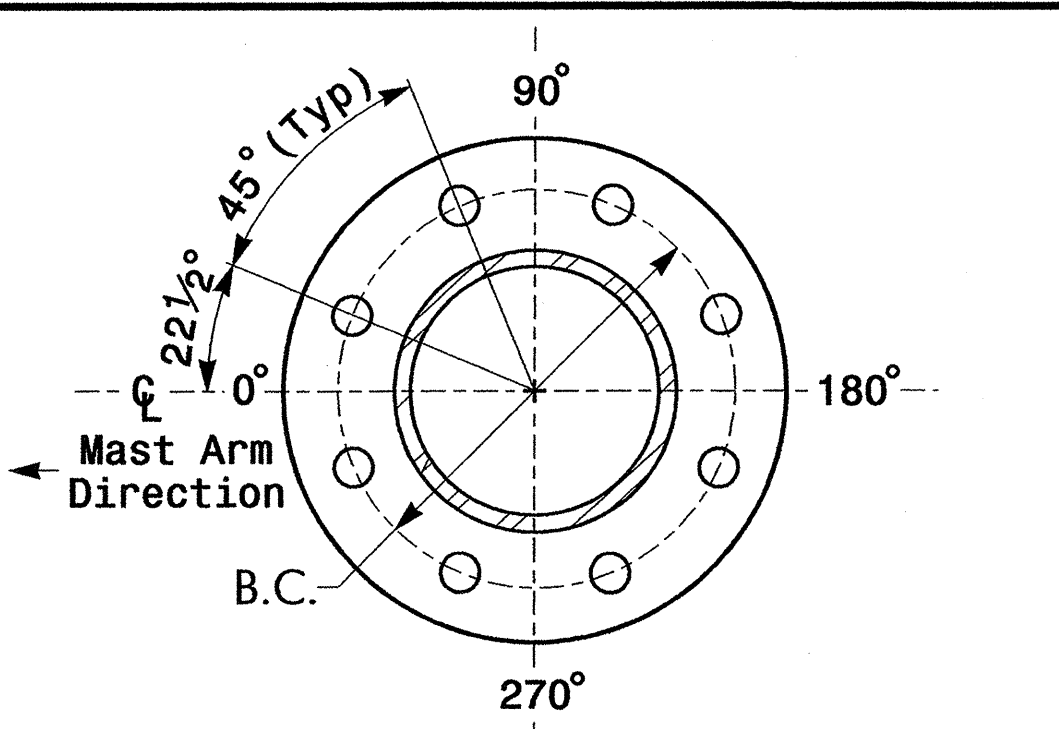
**SPECIAL NOTE**  
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

**Elevation Data for Mast Arm Attachment (H1)**

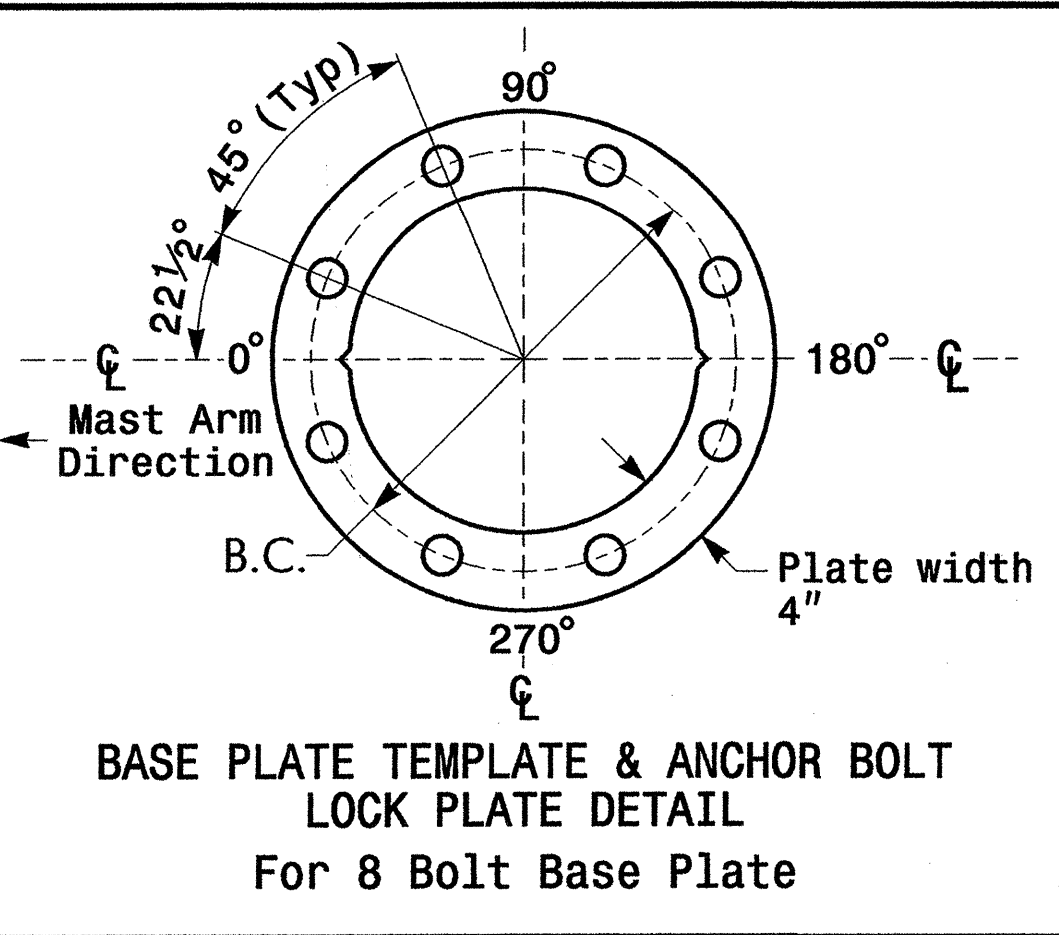
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at $\odot$ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.5 ft.	+2.0 ft.
Elevation difference at Edge of travelway or face of curb	+0.8 ft.	+1.0 ft.



**POLE RADIAL ORIENTATION**



**8 BOLT BASE PLATE DETAIL**  
See Note 6



**BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL**  
For 8 Bolt Base Plate

**METAL POLE No. 1 and 2**

PROJECT REFERENCE NO.	SHEET NO.
U-4428	Sig. 10

**MAST ARM LOADING SCHEDULE**

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

**NOTES**

**Design Reference Material**

- Design the traffic signal structure and foundation in accordance with:
  - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
  - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
  - The 2006 NCDOT Roadway Standard Drawings.
  - The traffic signal project plans and special provisions.

**Design Requirements**

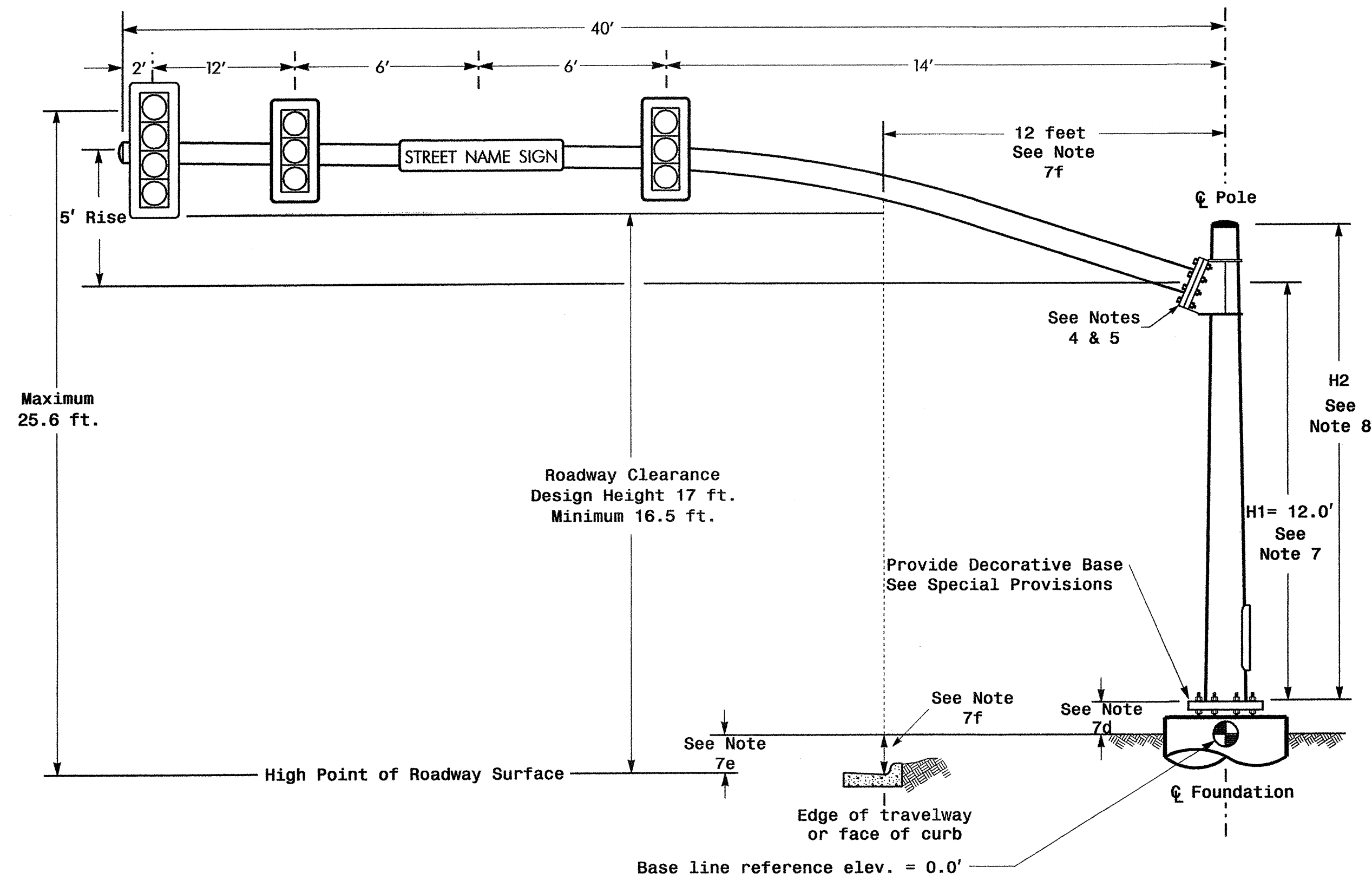
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- Design pole and pole arm connections comparable to Valmont Pole Drawing #6147 dated 11/15/07 prepared by Atlantic Technical Sales and installed under project U-4427.
- The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
  - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is .75 feet above the ground elevation.
  - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
  - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

	US 64 (6th Avenue) at Justice Street		SEAL 
	Division 14 Henderson County Hendersonville PLAN DATE: May 2008 PREPARED BY: TS Thigpen	REVIEWED BY: TJ Williams REVIEWED BY:	
SCALE: N/A 	REVISIONS:	INIT.:	DATE:
SIG. INVENTORY NO. 14-0636			

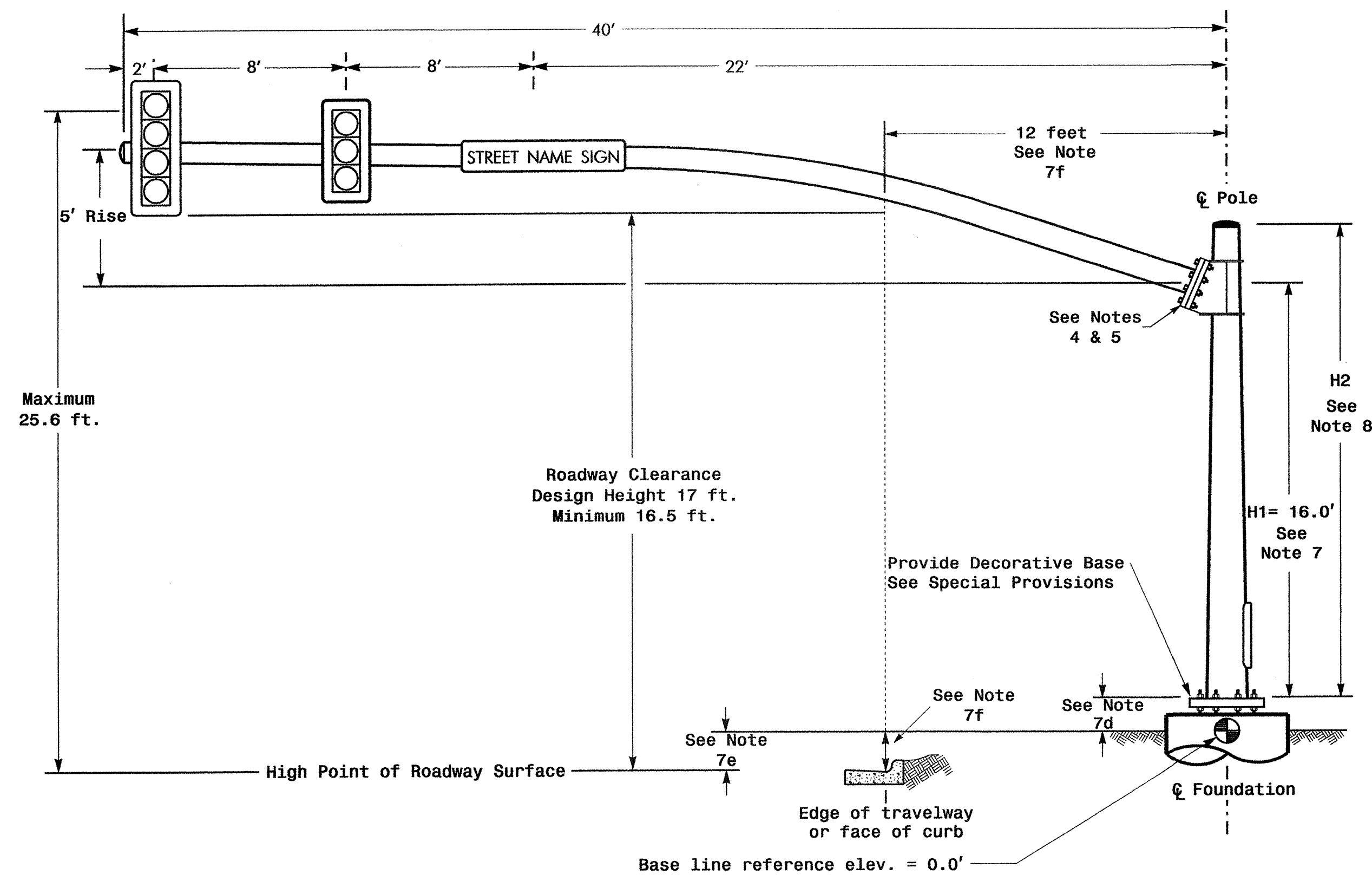
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 T:\thigpen

**Design Loading for METAL POLE NO. 3**



**ELEVATION VIEW**

**Design Loading for METAL POLE NO. 4**



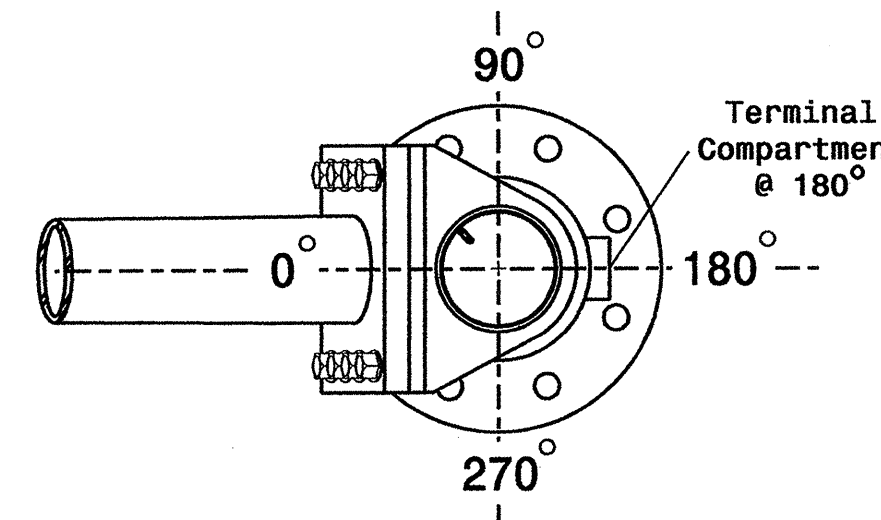
**Elevation View**

**SPECIAL NOTE**

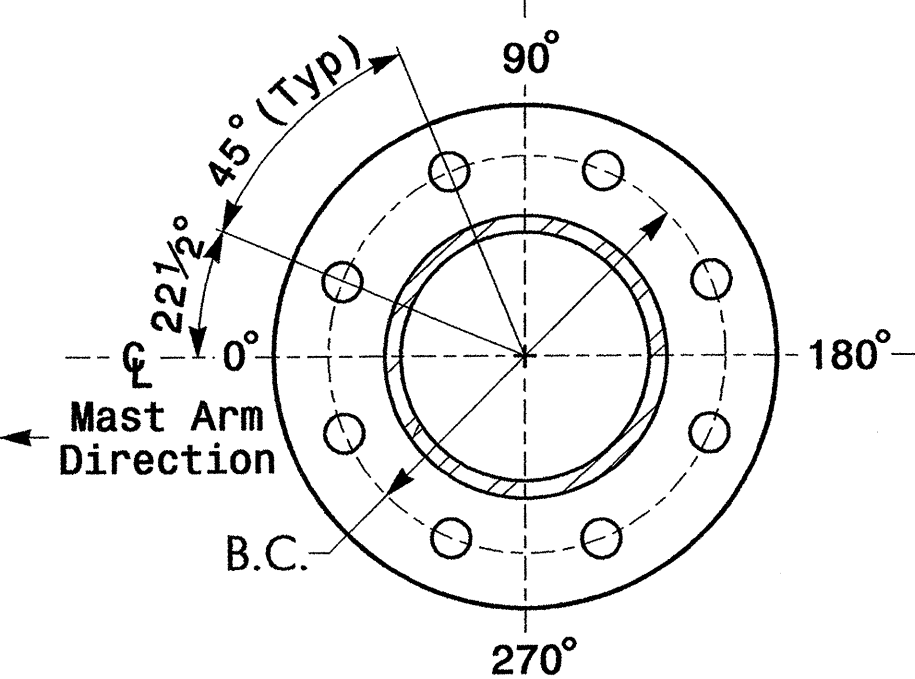
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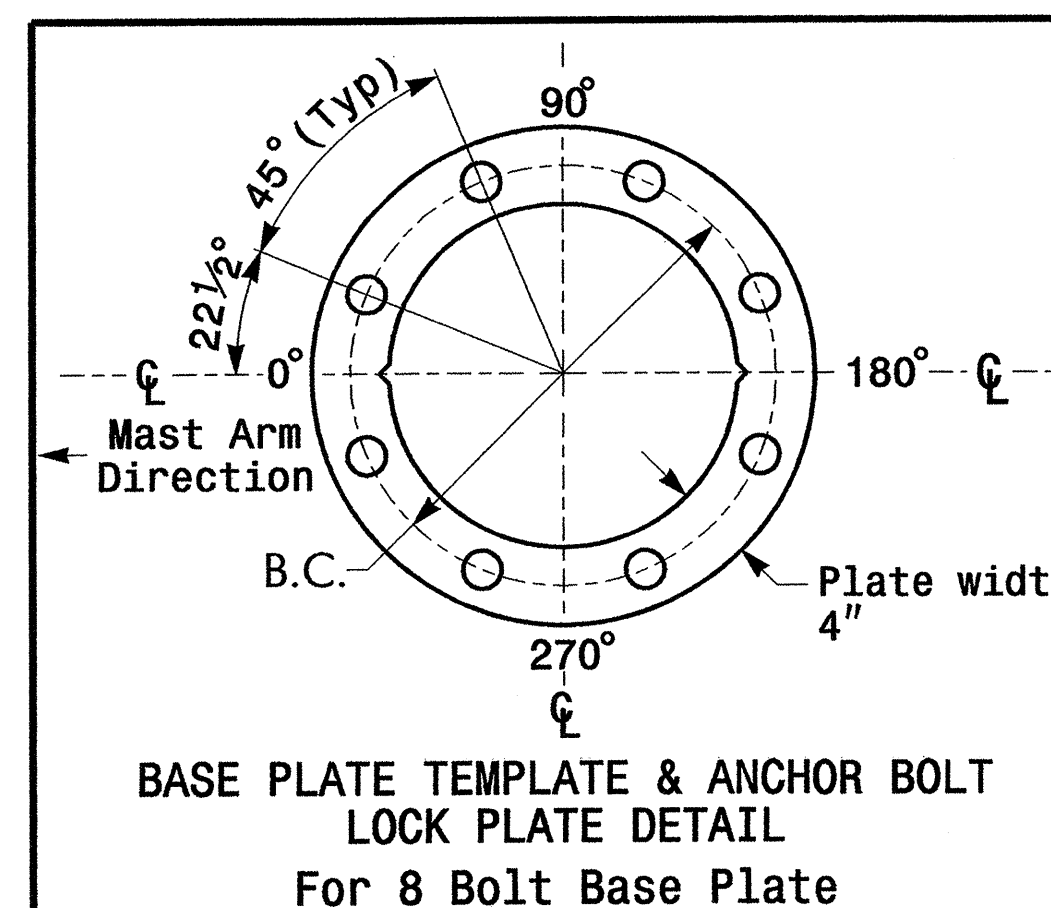
Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-2.0 ft.	+2.0 ft.
Elevation difference at Edge of travelway or face of curb	-1.8 ft.	+1.0 ft.



**POLE RADIAL ORIENTATION**



**8 BOLT BASE PLATE DETAIL**  
See Note 6



**BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL**  
For 8 Bolt Base Plate

**MAST ARM LOADING SCHEDULE**

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
[Symbol]	SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC	11.5 S.F.	25.5" W X 66.0" L	74 LBS
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**NOTES**

**Design Reference Material**

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- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
  - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is .75 feet above the ground elevation.
  - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
  - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
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  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
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- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

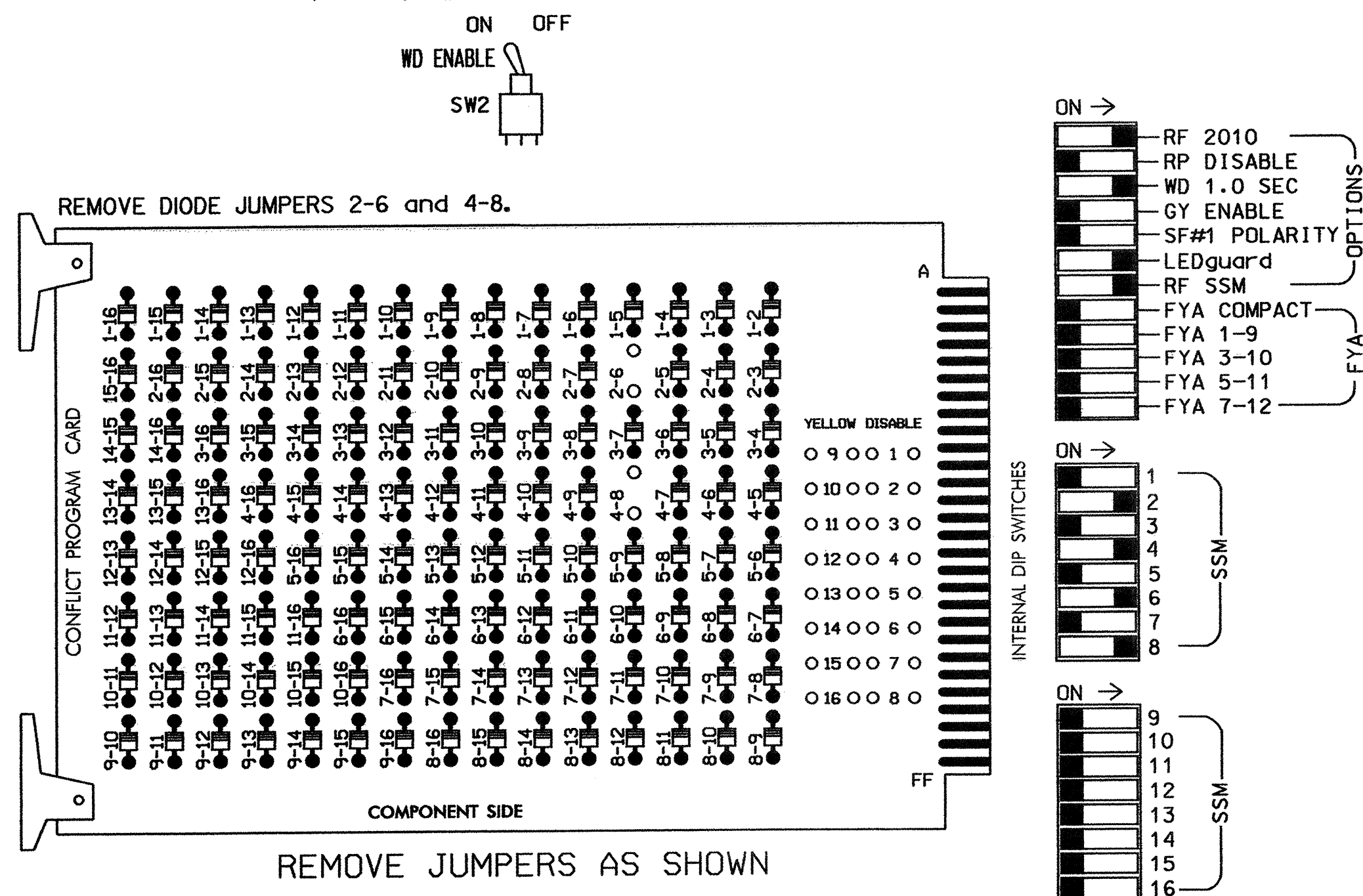
**NCDOT Wind Zone 4 (90 mph)**

	US 64 (6th Avenue) at Justice Street		
	Division 14 Henderson County Hendersonville PLAN DATE: May 2008 PREPARED BY: TS Thigpen	REVIEWED BY: TJ Williams REVIEWED BY:	
SCALE 0 N/A N/A	REVISIONS	INIT. DATE	SIGNATURE DATE



**EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL**

(remove jumpers and set switches as shown)



**NOTES:**

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

■ = 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. 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 1,3,5,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Dual Entry.

**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	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

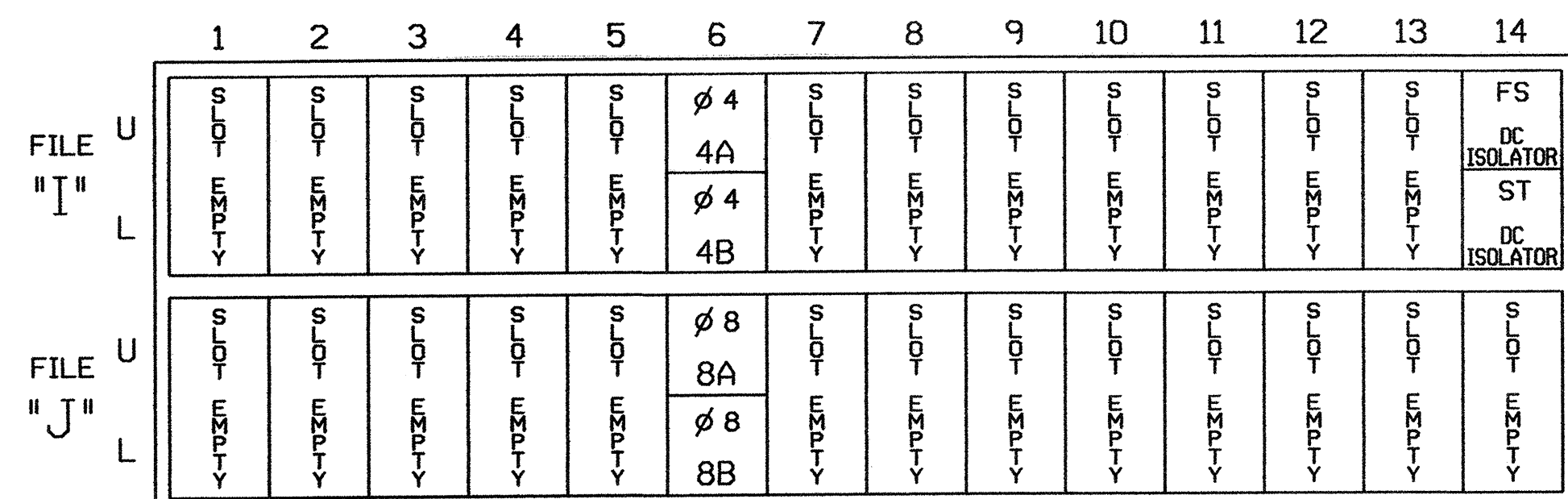
NU = Not Used

**EQUIPMENT INFORMATION**

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

**INPUT FILE POSITION LAYOUT**

(front view)



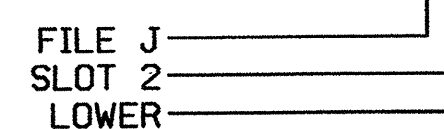
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE  
 ST = STOP TIME

**INPUT FILE CONNECTION & PROGRAMMING CHART**

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			10

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0634T  
 DESIGNED: April 2008  
 SEALED: 05/01/08  
 REVISED: N/A

Signal Upgrade - Temporary Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:  
 Public, Planning and Safety Services  
 TRANSPORTATION AND TRAFFIC MANAGEMENT SECTION  
 750 N. Greenfield Parkway, Garner, NC 27529

**US 64 (6th Avenue) at Fleming Street**

Division 14 Henderson County Hendersonville

PLAN DATE: May 2008 REVIEWED BY: T. J. [Signature]

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013

GEORGE C. BROWN

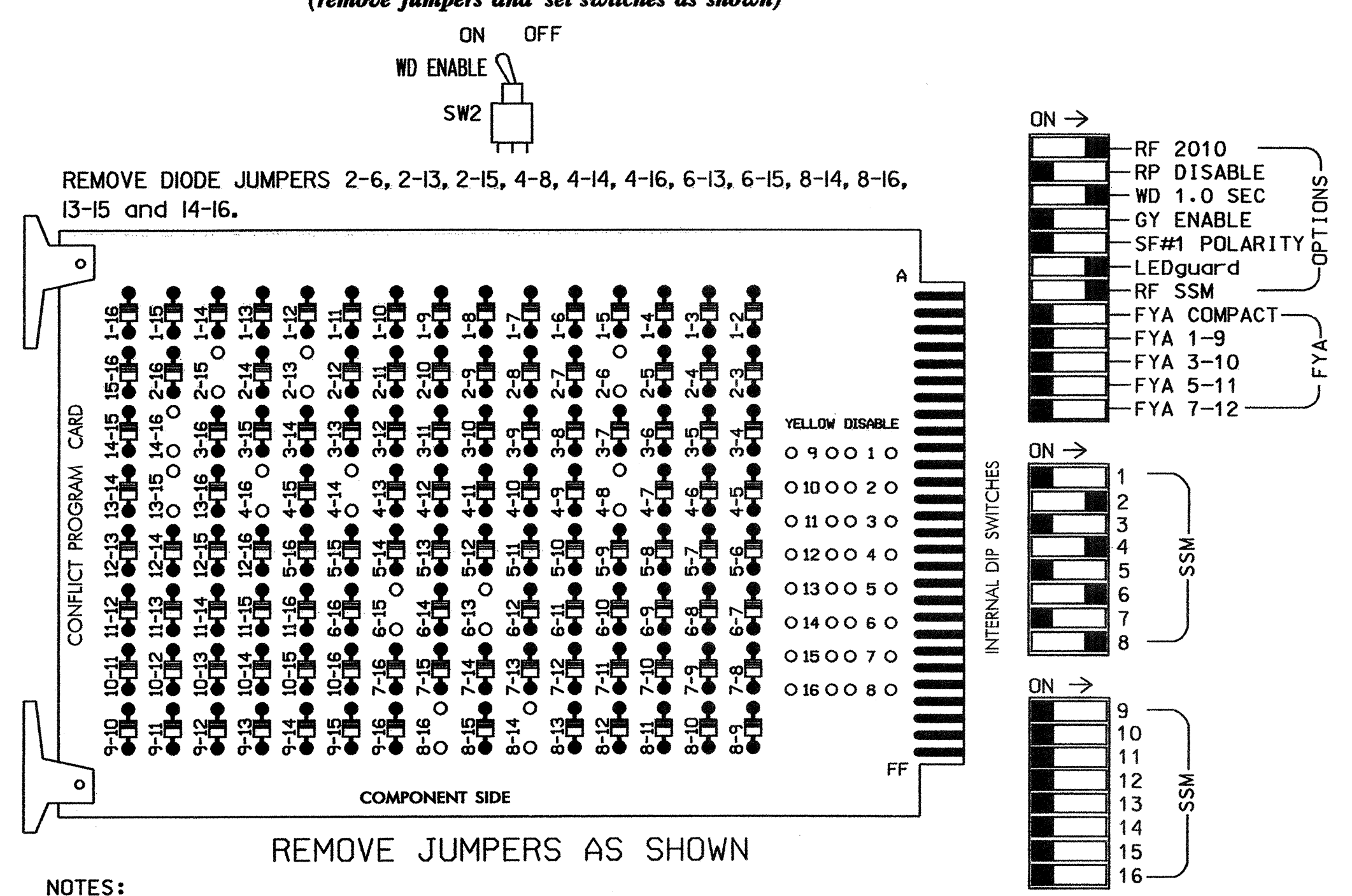
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SIG. INVENTORY NO. 14-0634T

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**EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL**  
(remove jumpers and set switches as shown)



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

- NOTES**
- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
  - Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5, 7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
  - Program phases 2 and 6, on the controller unit, for Start Up In Green.
  - Enable Simultaneous Gap-Out, on the controller unit, for all phases.
  - Program phases 4 and 8, on the controller unit, for Dual Entry.
  - Program phases 2, 4, 6 and 8 for 'STARTUP PED CALL'.
  - The cabinet and controller are part of the US 64 Closed Loop System.

**EQUIPMENT INFORMATION**

CONTROLLER.....EXISTING 2070L  
 CABINET.....EXISTING 332  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S2,S2P,S4,S4P,S6,S6P,S8,S8P  
 PHASES USED.....2,2 PED,4,4 PED,6,6 PED,8,8 PED  
 OVERLAPS.....NONE

**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	P21, P22	NU	41,42	P41, P42	NU	61,62	P61, P62	NU	81,82	P81, P82
RED		128			101			134				107
YELLOW		129			102			135				108
GREEN		130			103			136				109
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
Hand			113			104			119			110
Walker			115			106			121			112

NU = Not Used

**INPUT FILE POSITION LAYOUT (front view)**

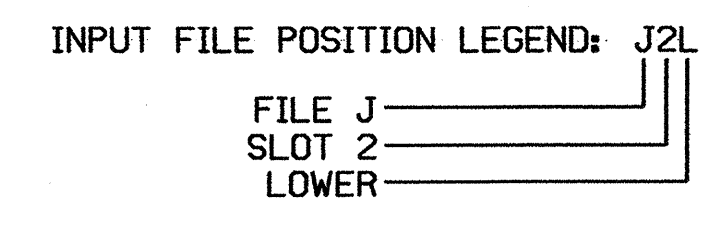
FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 2	∅ 2A	∅ 2	∅ 2	∅ 2	∅ 4	∅ 2	∅ 2	∅ 2	∅ 2	∅ 2	∅ 2 PED	∅ 6 PED	FS
L	∅ 2	∅ 2B	∅ 2	∅ 2	∅ 2	∅ 4A	∅ 2	∅ 2	∅ 2	∅ 2	∅ 2	DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
U	∅ 6	∅ 6A	∅ 6	∅ 6	∅ 6	∅ 8	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6
L	∅ 6	∅ 6B	∅ 6	∅ 6	∅ 6	∅ 8A	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 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
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		3	
4B	TB4-11,12	I6L	45	7	14	4	Y	Y		10	
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y		3	
8B	TB5-11,12	J6L	46	8	18	8	Y	Y		10	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0634  
 DESIGNED: April 2008  
 SEALED: 05/01/08  
 REVISED: N/A

**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.

Signal Upgrade - Final

Prepared in the Offices of:  
  
 750 N. Greenfield Parkway, Garner, NC 27529

**US 64 (6th Avenue) at Fleming Street**

Division 14 Henderson County Hendersonville  
 PLAN DATE: May 2008 REVIEWED BY: T. Joyce  
 PREPARED BY: C. Strickland REVIEWED BY: T. Joyce

REVISIONS: \_\_\_\_\_ INIT. DATE: \_\_\_\_\_

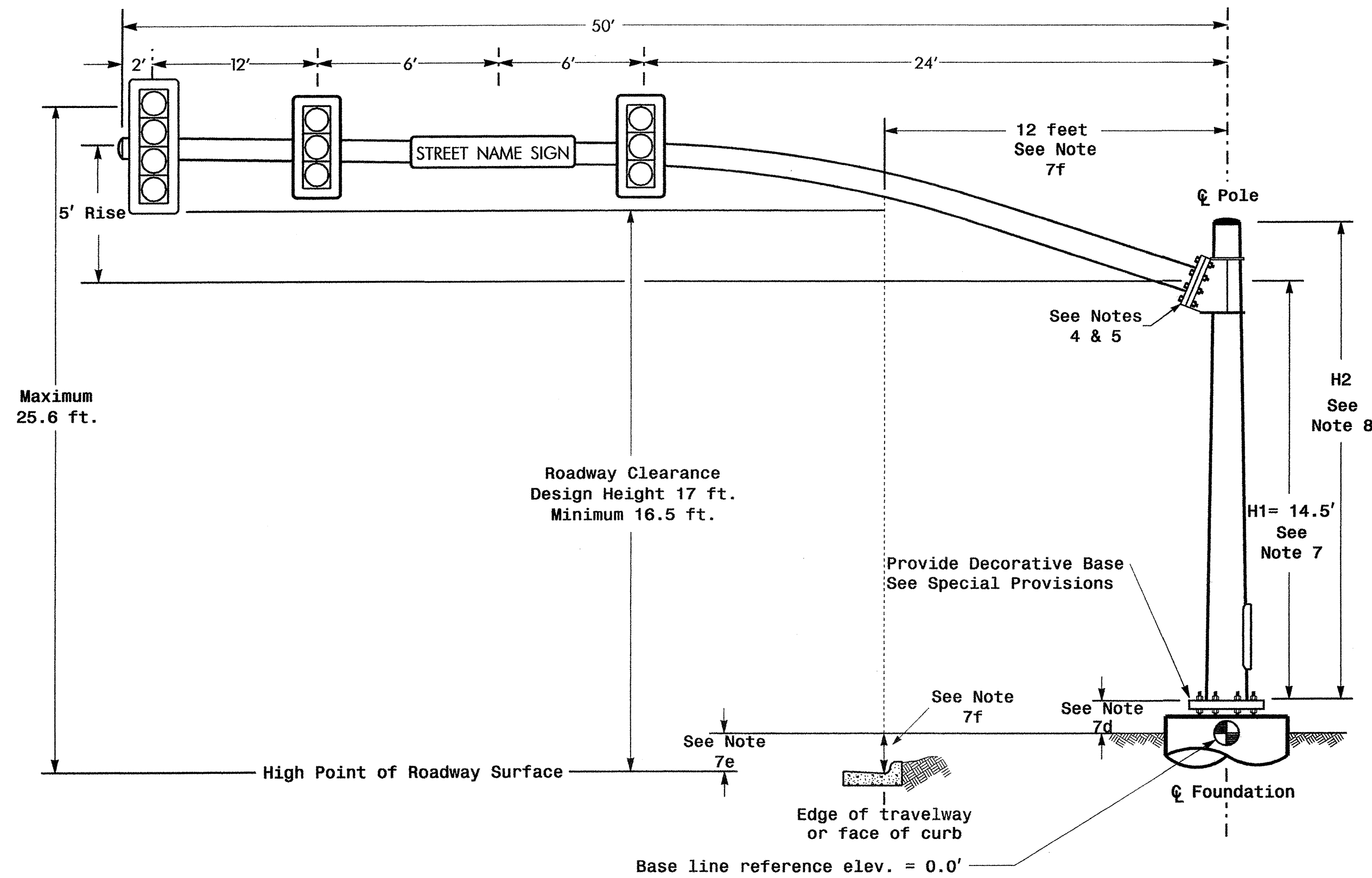
SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 GEORGE C. BROWN  
 SIGNATURE: \_\_\_\_\_ DATE: 5/1/08  
 SIG. INVENTORY NO. 14-0634

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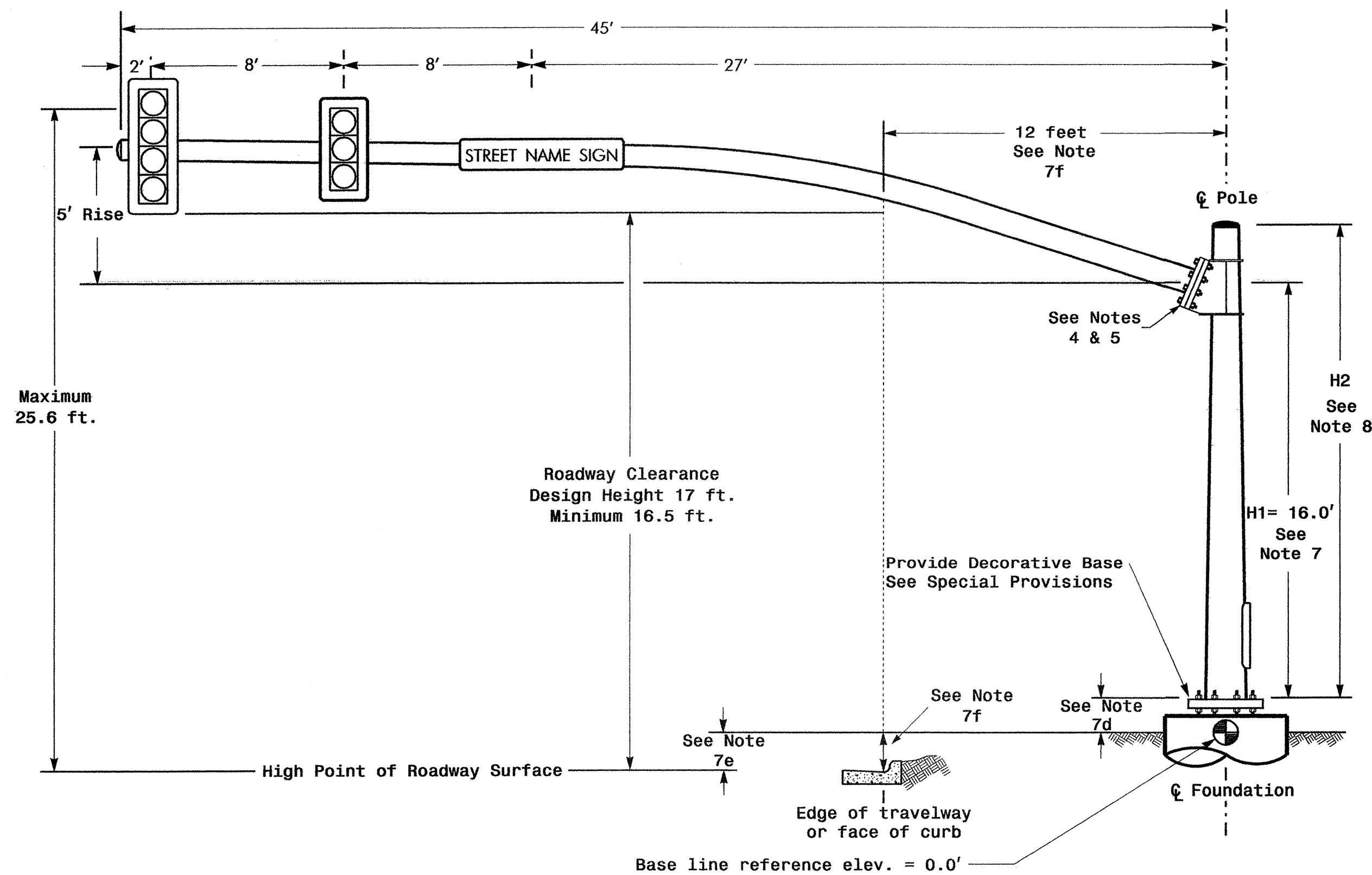


Design Loading for METAL POLE NO. 7



ELEVATION VIEW

Design Loading for METAL POLE NO. 8



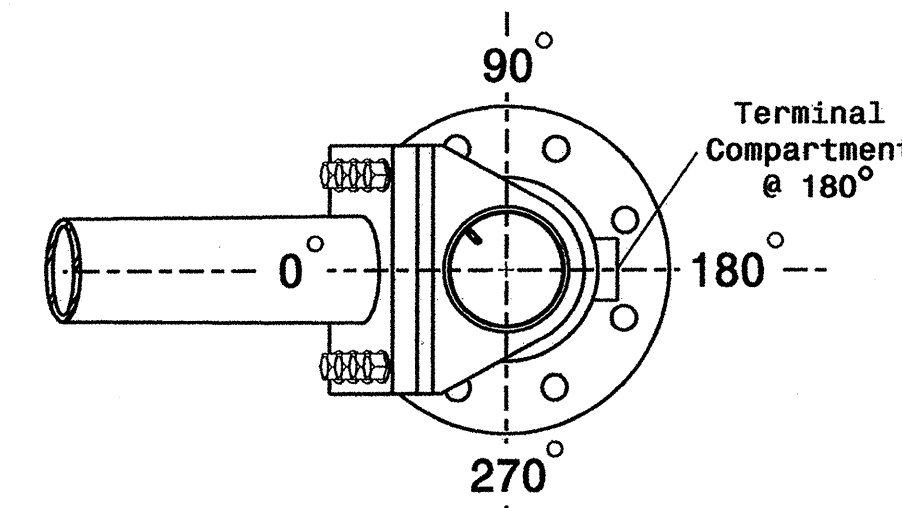
Elevation View

SPECIAL NOTE

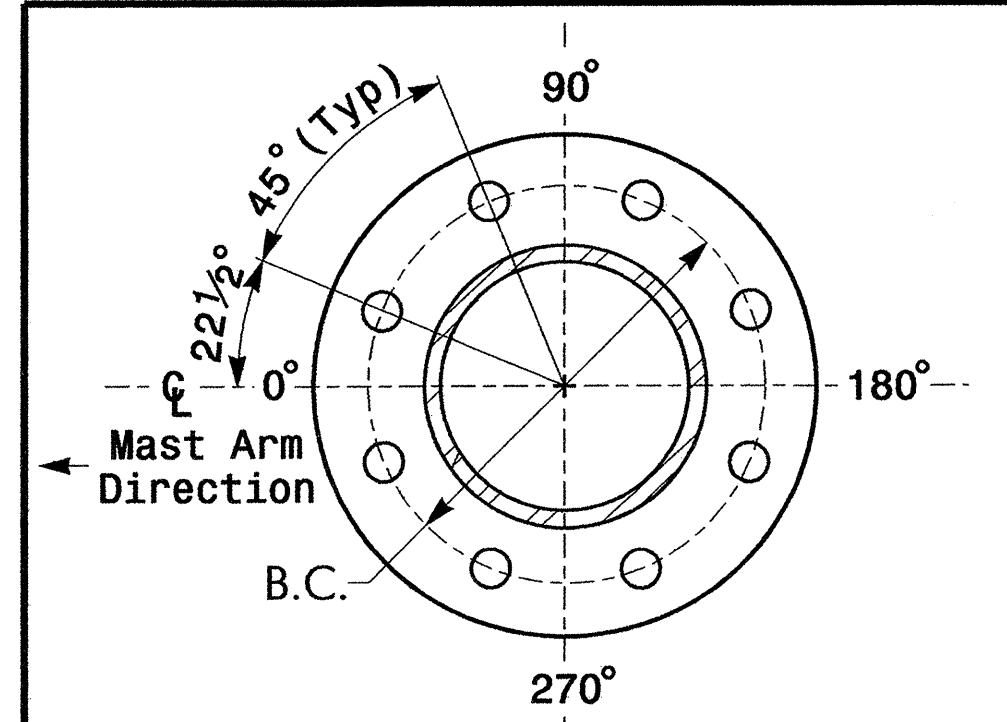
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

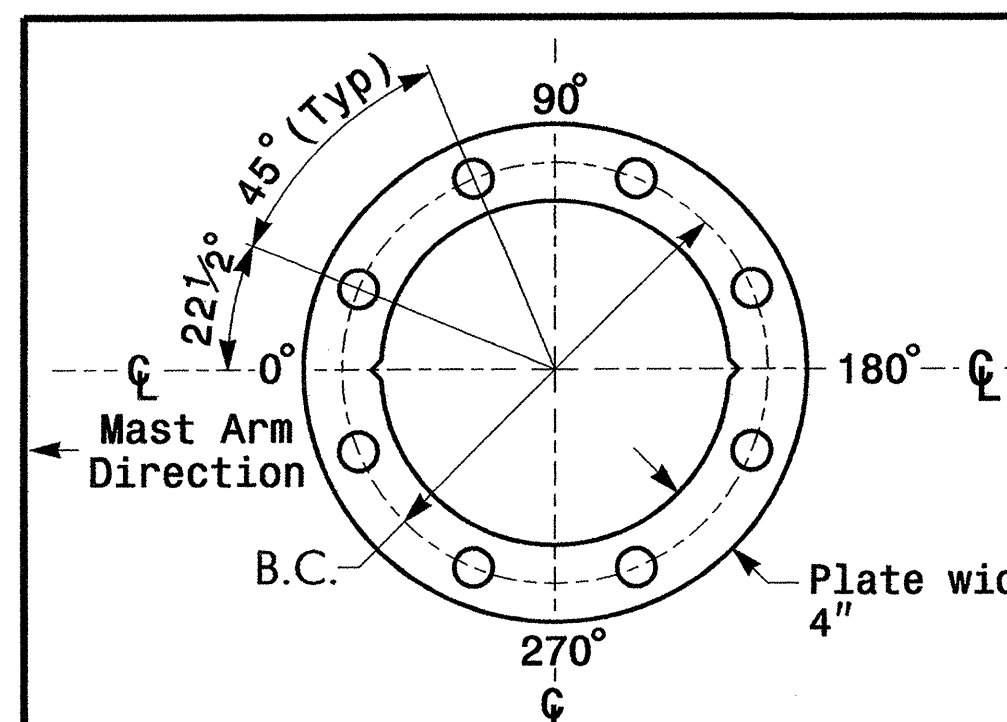
Elevation Differences for:	Pole 7	Pole 8
Baseline reference point at $\phi$ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.5 ft.	+2.0 ft.
Elevation difference at Edge of travelway or face of curb	+0.0 ft.	+1.0 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL  
See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT  
LOCK PLATE DETAIL  
For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
  - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
  - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
  - The 2006 NCDOT Roadway Standard Drawings.
  - The traffic signal project plans and special provisions.

Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- Design pole and pole arm connections comparable to Valmont Pole Drawing #6147 dated 11/15/07 prepared by Atlantic Technical Sales and installed under project U-4427.
- The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
  - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is .75 feet above the ground elevation.
  - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
  - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

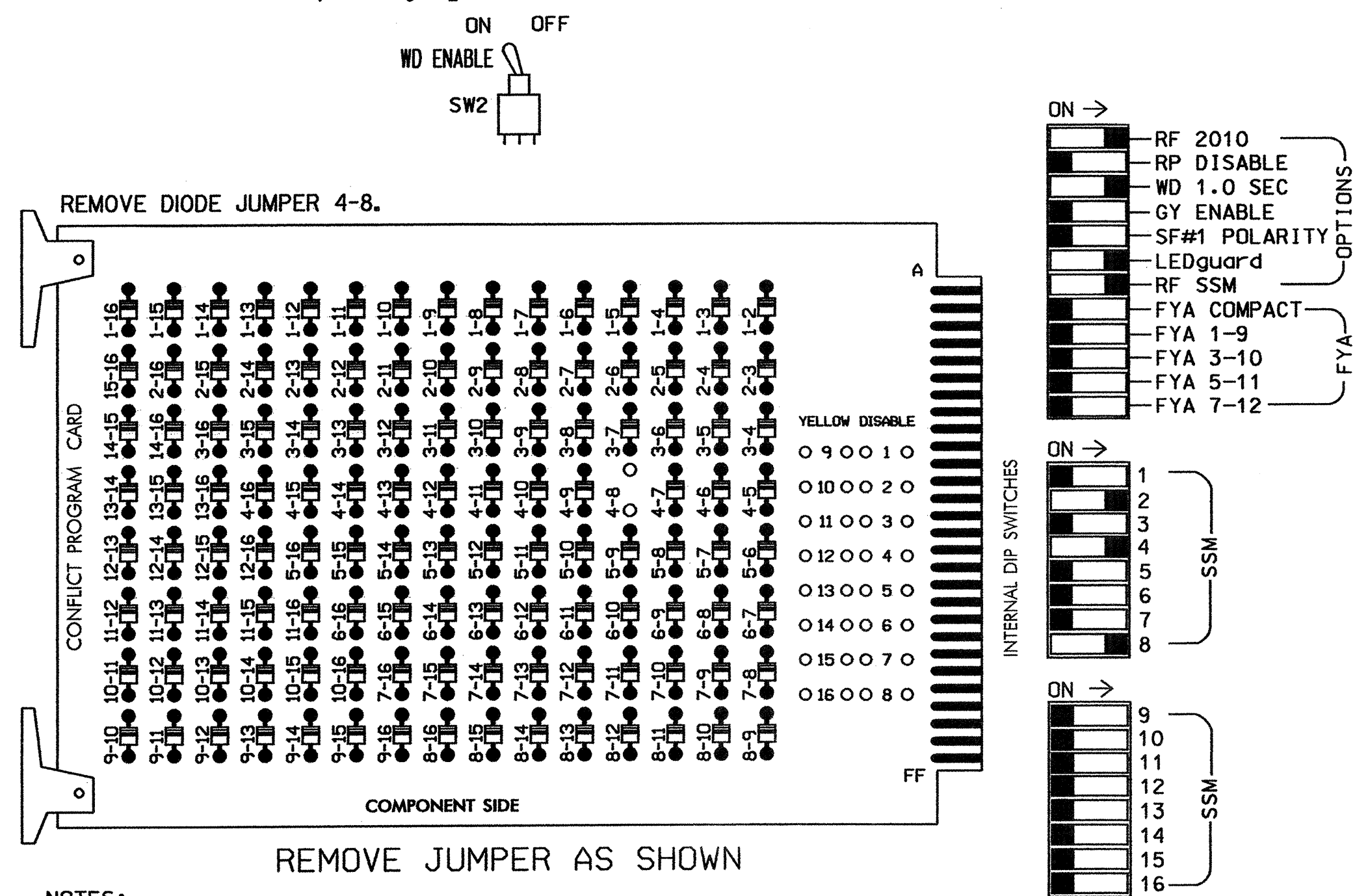
 Prepared in the Offices of: PUBLIC ENGINEERING AND SURVEYING UNIVERSITY OF NORTH CAROLINA STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Signals and Geometrics Section 750 N. Greenfield Plaza, Garner, NC 27829	US 64 (6th Avenue) at Fleming Street		SEAL  SEAL 24393 ENGINEER TIMOTHY W. WILLIAMS 7. Williams 5/14/08 SIGNATURE DATE
	Division 14 Henderson County Hendersonville PLAN DATE: May 2008 REVIEWED BY: TJ Williams PREPARED BY: TS Thigpen REVIEWED BY:	REVISIONS INIT. DATE	
SIG. INVENTORY NO. 14-0634			

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**EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL**

(remove jumper and set switches as shown)



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

**NOTES**

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

**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	42	NU	41,42	NU	NU	NU	NU	NU	81,82	NU
RED		128			101						107	
YELLOW		129			102						108	
GREEN		130			103						109	
RED ARROW												
YELLOW ARROW			129									
GREEN ARROW			130									

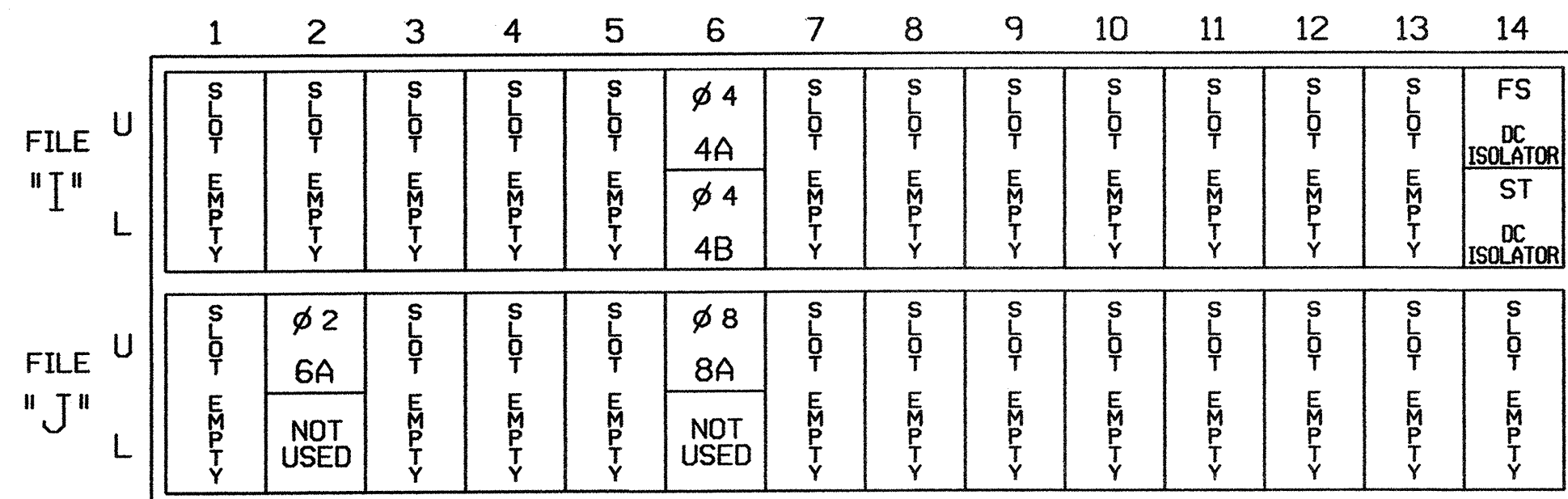
NU = Not Used

**EQUIPMENT INFORMATION**

CONTROLLER.....CONTRACTOR SUPPLIED 2070L  
 CABINET.....CONTRACTOR SUPPLIED 332  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S2,S4,S8  
 PHASES USED.....2,4,8  
 OVERLAPS.....NONE

**INPUT FILE POSITION LAYOUT**

(front view)

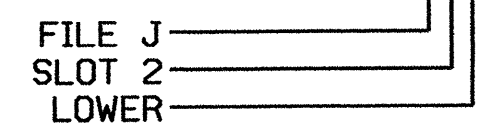


EX.: 1A, 2A, ETC. = LOOP NO.'S

**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			
6A	TB3-5,6	J2U	40	2	6	2	Y	Y			15
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			10

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0635T  
 DESIGNED: April 2008  
 SEALED: 05/01/08  
 REVISED: N/A

Signal Upgrade - Temporary Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:  
  
 750 N. Greenfield Parky, Garner, NC 27529

**US 64 (6th Avenue) at Buncombe Street**

Division 14 Henderson County Hendersonville

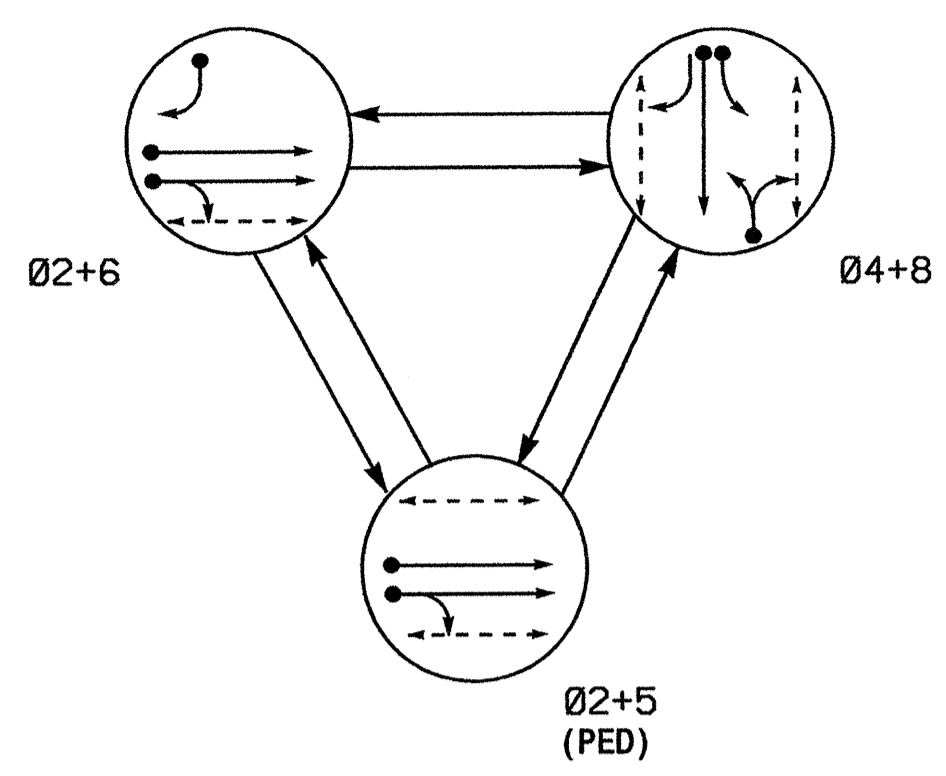
PLAN DATE: May 2008 REVIEWED BY: T. J. J. (Signature)  
 PREPARED BY: C. Strickland REVIEWED BY: (Signature)

REVISIONS	INIT.	DATE

SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 SEAL 022013  
 SIGNATURE: George C. Brown  
 DATE: 5/1/08  
 SIG. INVENTORY NO. 14-0635T

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**PHASING DIAGRAM**



**PHASING DIAGRAM DETECTION LEGEND**

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

**TABLE OF OPERATION**

SIGNAL FACE	PHASE			
	02+6	02+5 (PED)	04+8	FLASH
21, 22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
81, 82	R	R	G	R
P21, P22	W	W	DW	DRK
P41, P42	DW	DW	W	DRK
P51, P52	DW	W	DW	DRK
P81, P82	DW	DW	W	DRK

W - Walk  
 DW - Don't Walk  
 DRK - Dark  
**SIGNAL FACE I.D.**  
 ○ Denotes L.E.D.

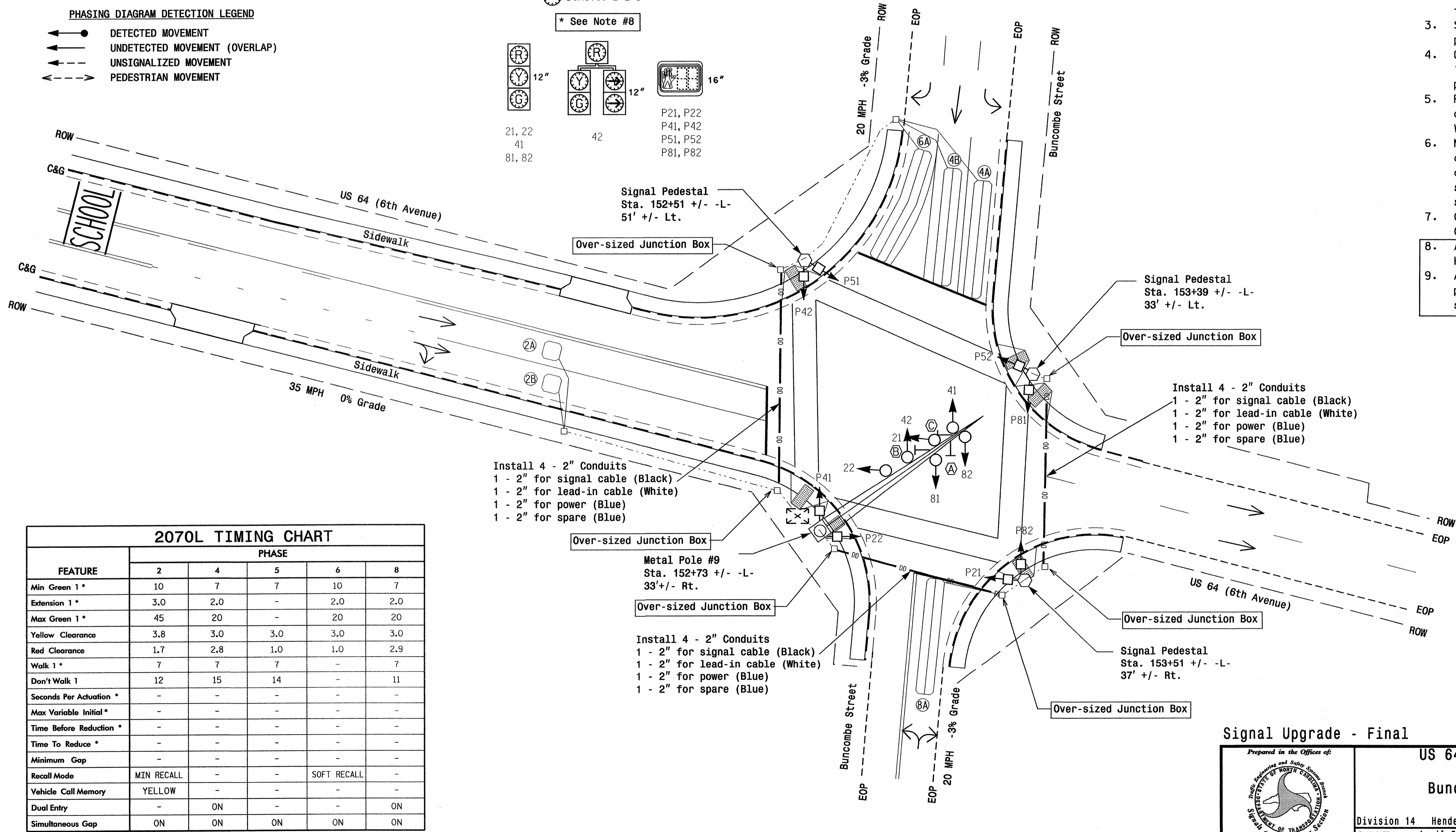
**2070L LOOP & DETECTOR INSTALLATION**

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING EXTENSION	STRETCH TIME	DELAY TIME		
2A	6X6	70	4	Y	2	Y	-	-	-	Y
2B	6X6	70	4	Y	2	Y	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	-	-	-	Y
4B	6X40	0	2-4-2	Y	4	Y	-	-	-	Y
6A	6X40	0	2-4-2	Y	6	Y	-	-	15	Y
8A	6X40	0	2-4-2	Y	8	Y	-	-	10	Y

**3 Phase Fully Actuated (US 64 Closed Loop System)**

**NOTES**

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset # 0635.
8. All signal heads shall be Hunter Green in color.
9. All metal poles, mastarms and pedestrian signal pedestals shall be Hunter Green in color.



**2070L TIMING CHART**

FEATURE	PHASE				
	2	4	5	6	8
Min Green 1 *	10	7	7	10	7
Extension 1 *	3.0	2.0	-	2.0	2.0
Max Green 1 *	45	20	-	20	20
Yellow Clearance	3.8	3.0	3.0	3.0	3.0
Red Clearance	1.7	2.8	1.0	1.0	2.9
Walk 1 *	7	7	7	-	7
Don't Walk 1	12	15	14	-	11
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	MIN RECALL	-	-	SOFT RECALL	-
Vehicle Call Memory	YELLOW	-	-	-	-
Dual Entry	-	ON	-	-	ON
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 be lower than 4 seconds.

**LEGEND**

- | PROPOSED   | EXISTING |
|--|----------|
| ○ → Traffic Signal Head                            | ● → N/A  |
| ○ → Modified Signal Head                           | ○ → N/A  |
| ○ → Sign   | ○ → N/A  |
| ○ → Pedestrian Signal Head With Push Button & Sign | ○ → N/A  |
| ○ → Signal Pole with Guy                           | ○ → N/A  |
| ○ → Signal Pole with Sidewalk Guy                  | ○ → N/A  |
| ○ → 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  |
| ○ → Pavement Marking Arrow                         | ○ → N/A  |
| ○ → Metal Pole with Mastarm                        | ○ → N/A  |
| ○ → Wheelchair Ramp                                | ○ → N/A  |
| ○ → Pedestrian Signal Pedestal                     | ○ → N/A  |
| ○ → Directional Drill                              | ○ → N/A  |
| ○ → Dual Turn Arrows Sign (R3-18)                  | ○ → N/A  |
| ○ → Through Arrow "ONLY" Sign (R3-6R)              | ○ → N/A  |
| ○ → No Left Turn Sign (R3-2)                       | ○ → N/A  |

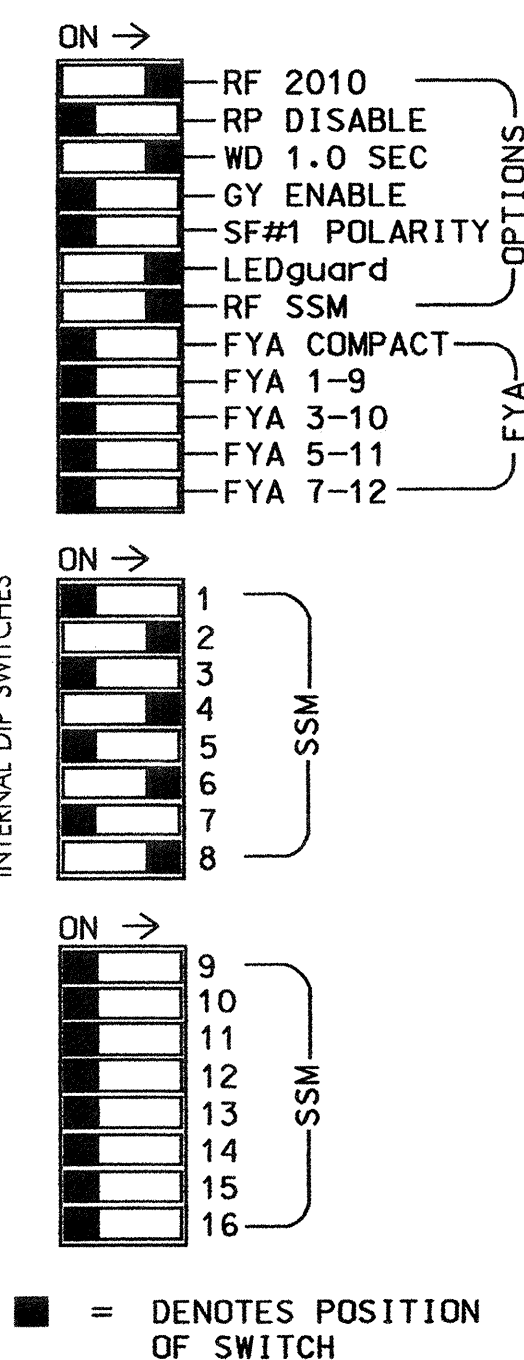
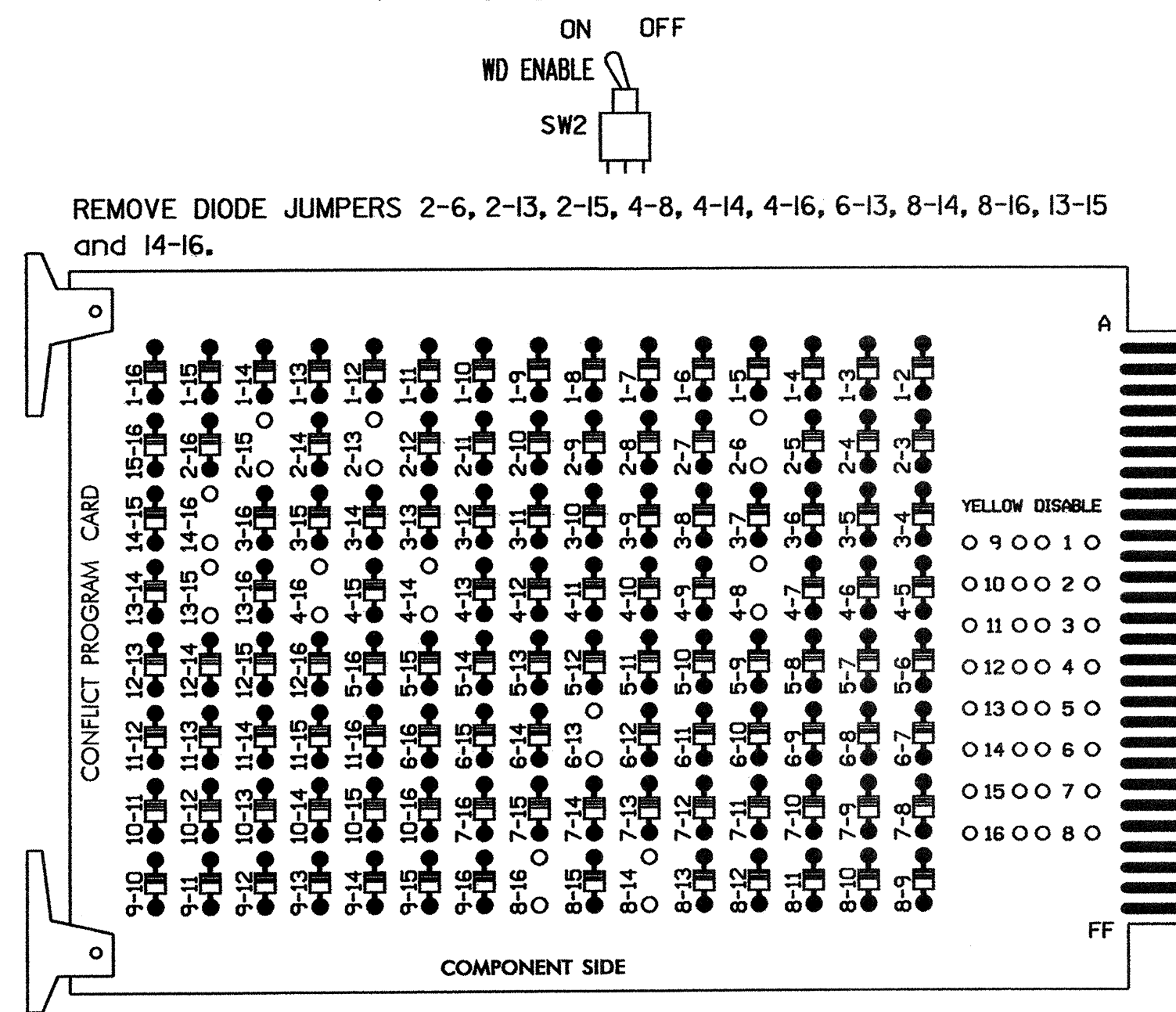
**Signal Upgrade - Final**

	<b>US 64 (6th Avenue) at Buncombe Street</b>		
	Division 14 Henderson County Hendersonville		
PLAN DATE: April 2008 PREPARED BY: TS Thigpen	REVIEWED BY: TJ Williams REVIEWED BY:	REVISIONS INIT. DATE	SIGNATURE: <i>T.J. Williams</i> 5/1/08 DATE:
SCALE: 1" = 20'		SIG. INVENTORY NO. 14-0635	

12-MAY-2008 13:33  
 s:\p\ts\signal\work\gr\oups\h1\p\projects\4428\signal\shades\gn\l\sm\4-0635\h1-1635.s\q.dgn\_2008mdd.dgn  
 th open

### EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5, 7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phase 2, on the controller unit, for Start Up In Green.
- Enable Simultaneous Gap-Out, on the controller unit, for all phases.
- Program phases 4 and 8, on the controller unit, for Dual Entry.
- Program phases 2, 4, 5 and 8 for 'STARTUP PED CALL'.
- The cabinet and controller are part of the US 64 Closed Loop System.

### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	P21, P22	NU	41,42	P41, P42	NC	42	P51, P52	NU	81,82	P81, P82
RED		128			101			*			107	
YELLOW		129			102						108	
GREEN		130			103						109	
RED ARROW												
YELLOW ARROW								135				
GREEN ARROW								136				
			113			104			119			110
			115			106			121			112

NU = Not Used  
 NC = No Connection, phase used for timing purposes only.  
 \* Denotes install load resistor. See load resistor installation detail this sheet.

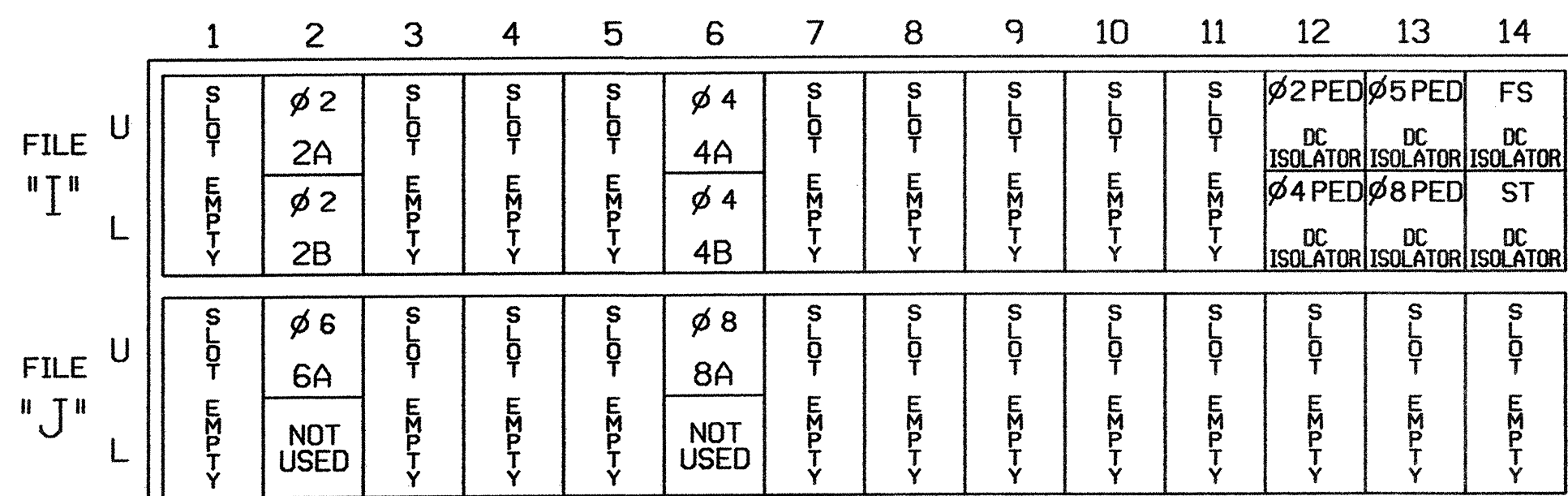
### EQUIPMENT INFORMATION

CONTROLLER.....EXISTING 2070L  
 CABINET.....EXISTING 332  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S2,S2P,S4,S4P,S6,S6P,S8,S8P  
 PHASES USED.....2,2 PED,4,4 PED,5\*,5 PED,6,8,8 PED  
 OVERLAPS.....NONE

\*Used only for timing of phase 5 PED

### INPUT FILE POSITION LAYOUT

(front view)



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

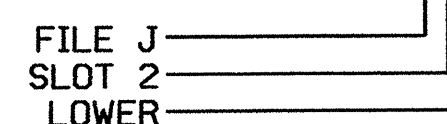
FS = FLASH SENSE  
 ST = STOP TIME

### INPUT FILE CONNECTION & PROGRAMMING CHART

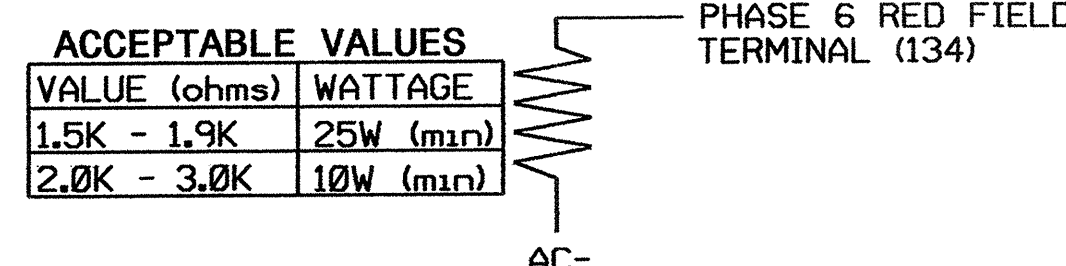
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			15
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			10
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P51,P52	TB8-7,9	I13U	68	30	PED 6	5 PED					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

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

INPUT FILE POSITION LEGEND: J2L



### LOAD RESISTOR INSTALLATION DETAIL



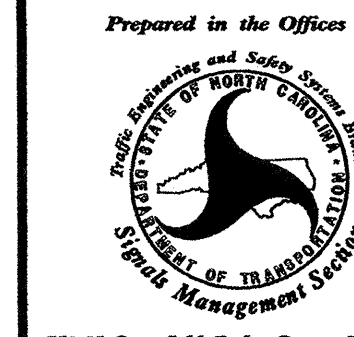
NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

### 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.

Signal Upgrade - Final - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



US 64 (6th Avenue) at Buncombe Street

Division 14 Henderson County Hendersonville

PLAN DATE: May 2008 REVIEWED BY: T. J. J.

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER

SEAL 022013

ENGINEER GEORGE C. BROWN

Signature: George C. Brown 5/1/08

SIG. INVENTORY NO. 14-0635

**OUTPUT ASSIGNMENT PROGRAMMING TO REASSIGN PED PHASE 6 TO PED PHASE 5**

(program controller as shown below)

①

FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS). PRESS '+' UNTIL OUTPUT # 25 (PIN 27) IS REACHED. OUTPUT # 25 = PHASE 6 DW

```
PAGE:1 C1 PIN:27 PEDESTRIAN PHASE
OUTPUT ASSIGNMENT #.....25
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH).....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

②

IT IS NECESSARY TO SCROLL DOWN AND ENTER A 'Y' FOR 'PEDESTRIAN PHASE' (EVEN THOUGH THIS IS THE DEFAULT SETTING). UPON ENTERING 'Y', THE SCREEN SHOWN BELOW WILL APPEAR:

```
PAGE:1 C1 PIN:27 PEDESTRIAN PHASE
SELECT PEDESTRIAN PHASE (1-16).....5
SELECT COLOR(0=DWALK,1=YEL,2=WALK)..0
```

CHANGE DATA TO THAT SHOWN ABOVE. PRESS 'ENT' AFTER INPUTTING DATA. THEN 'ESC'.

③

PRESS '+' TO ADVANCE TO OUTPUT #26. OUTPUT #26 = PHASE 6 W

```
PAGE:1 C1 PIN:28 PEDESTRIAN PHASE
OUTPUT ASSIGNMENT #.....26
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH).....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

④

IT IS NECESSARY TO SCROLL DOWN AND ENTER A 'Y' FOR 'PEDESTRIAN PHASE' (EVEN THOUGH THIS IS THE DEFAULT SETTING). UPON ENTERING 'Y', THE SCREEN SHOWN BELOW WILL APPEAR:

```
PAGE:1 C1 PIN:28 PEDESTRIAN PHASE
SELECT PEDESTRIAN PHASE (1-16).....5
SELECT COLOR(0=DWALK,1=YEL,2=WALK)..2
```

CHANGE DATA TO THAT SHOWN ABOVE. PRESS 'ENT' AFTER INPUTTING DATA. THEN 'ESC'.

PED PHASE 6 OUTPUT HAS NOW BEEN ASSIGNED TO PHASE 5

PROGRAMMING COMPLETE

TAKE EXTREME CARE THAT NO CHANGES ARE MADE TO 'C1 PIN:' FIELDS

**PEDESTRIAN DETECTOR ASSIGNMENT PROGRAMMING DETAIL**

(program controller as shown below)

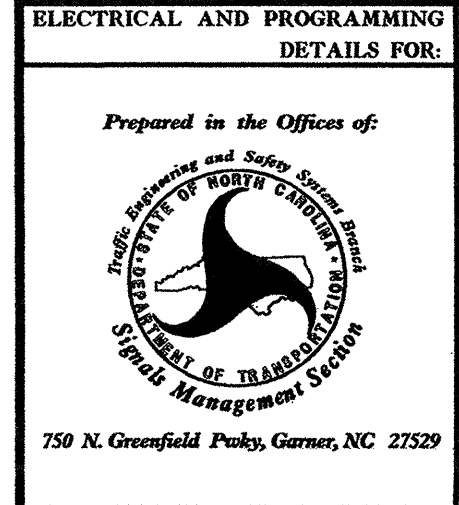
FROM MAIN MENU PRESS '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS). PRESS '+' UNTIL PED DETECTOR # 6 IS REACHED.

```
PED DETECTOR #6 SETTINGS (+/- DET)
PHASE# :12345678910111213141516
PHASES ASSIGNED : X
SETTING: (Y/N)
ENABLE DETECTOR.....Y
ENABLE LOGGING.....N
ENABLE DIAGNOSTICS.....N
RECALL IF FAILED.....N
MAX CALLS/MINUTE (0-255).....255
MAX CALLS/DIAG PERIOD (0-255).....0
MAX OCCUPANCY % (0-100%).....100
```

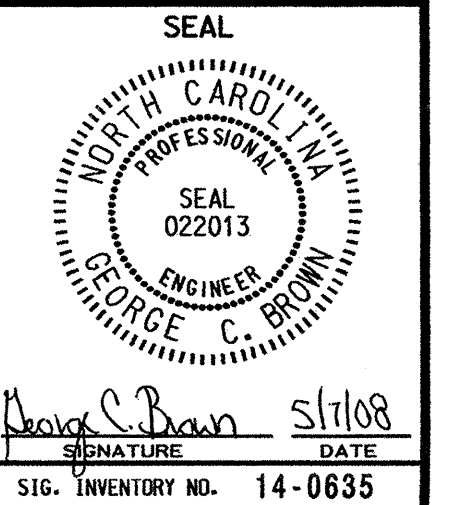
PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0635  
DESIGNED: April 2008  
SEALED: 05/01/08  
REVISED: N/A

Signal Upgrade - Final - Sheet 2 of 2

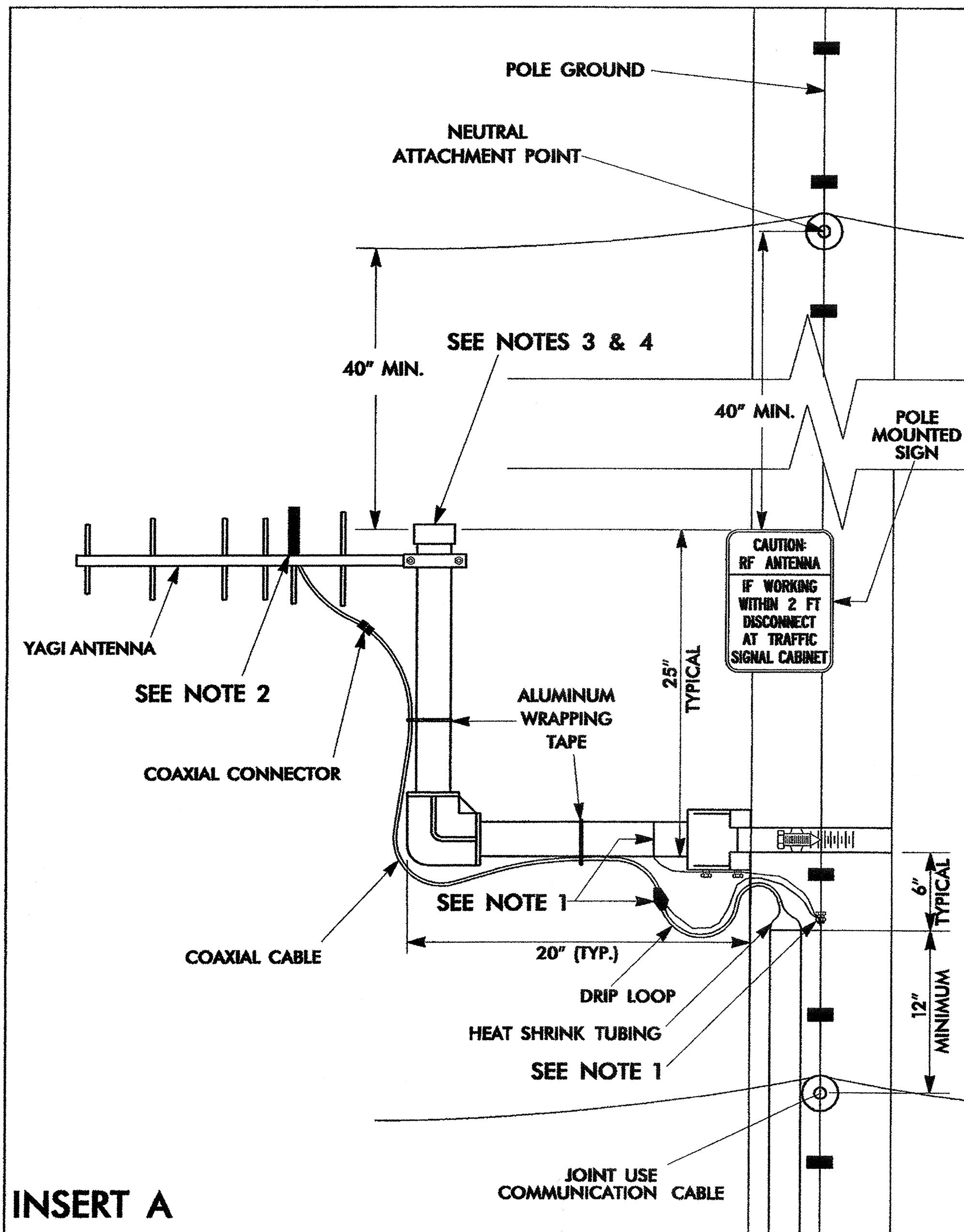


ELECTRICAL AND PROGRAMMING DETAILS FOR:		US 64 (6th Avenue) at Buncombe Street	
Division 14	Henderson County	Hendersonville	
PLAN DATE: May 2008	REVIEWED BY: T. Saffa		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS	INIT.	DATE	
		George C. Brown 5/1/08	
		SIGNATURE DATE	



SIG. INVENTORY NO. 14-0635

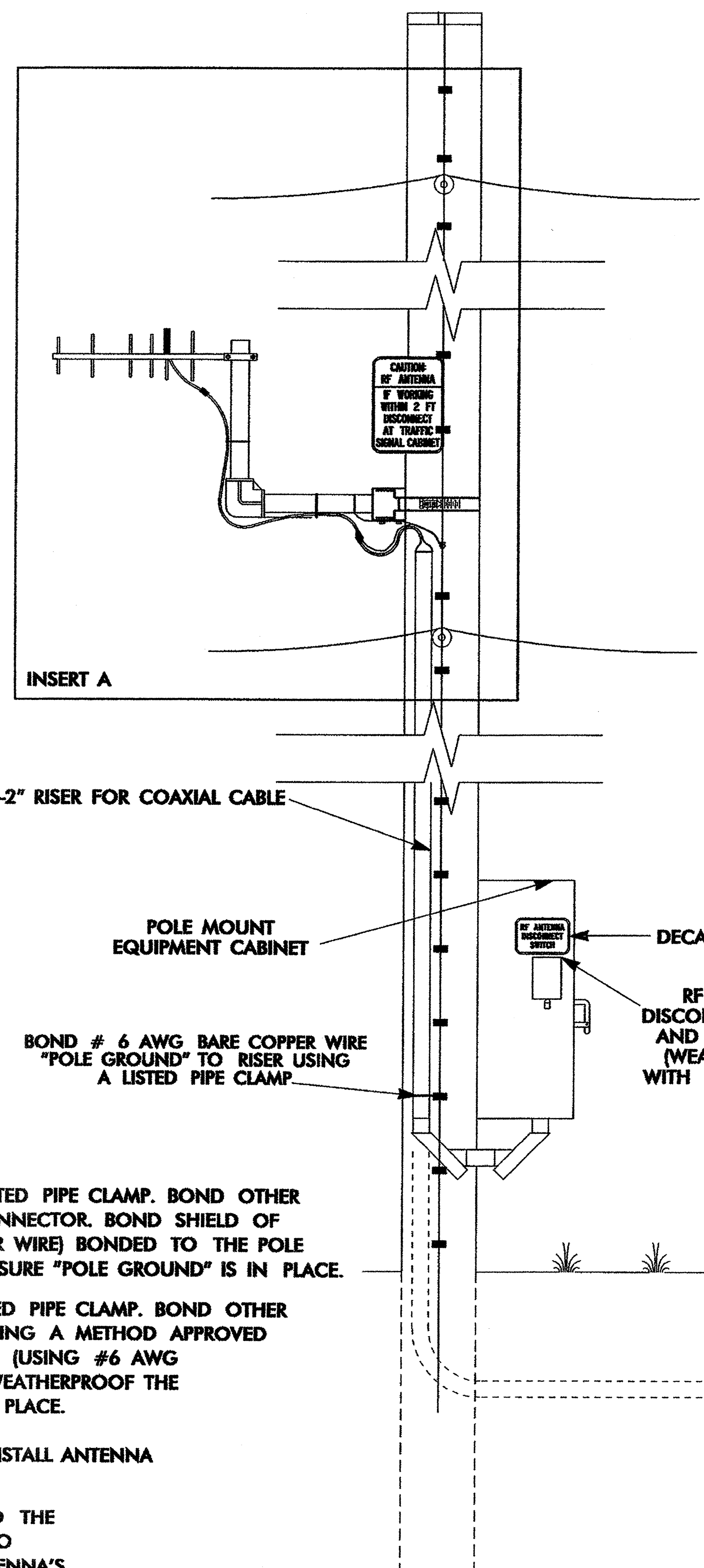




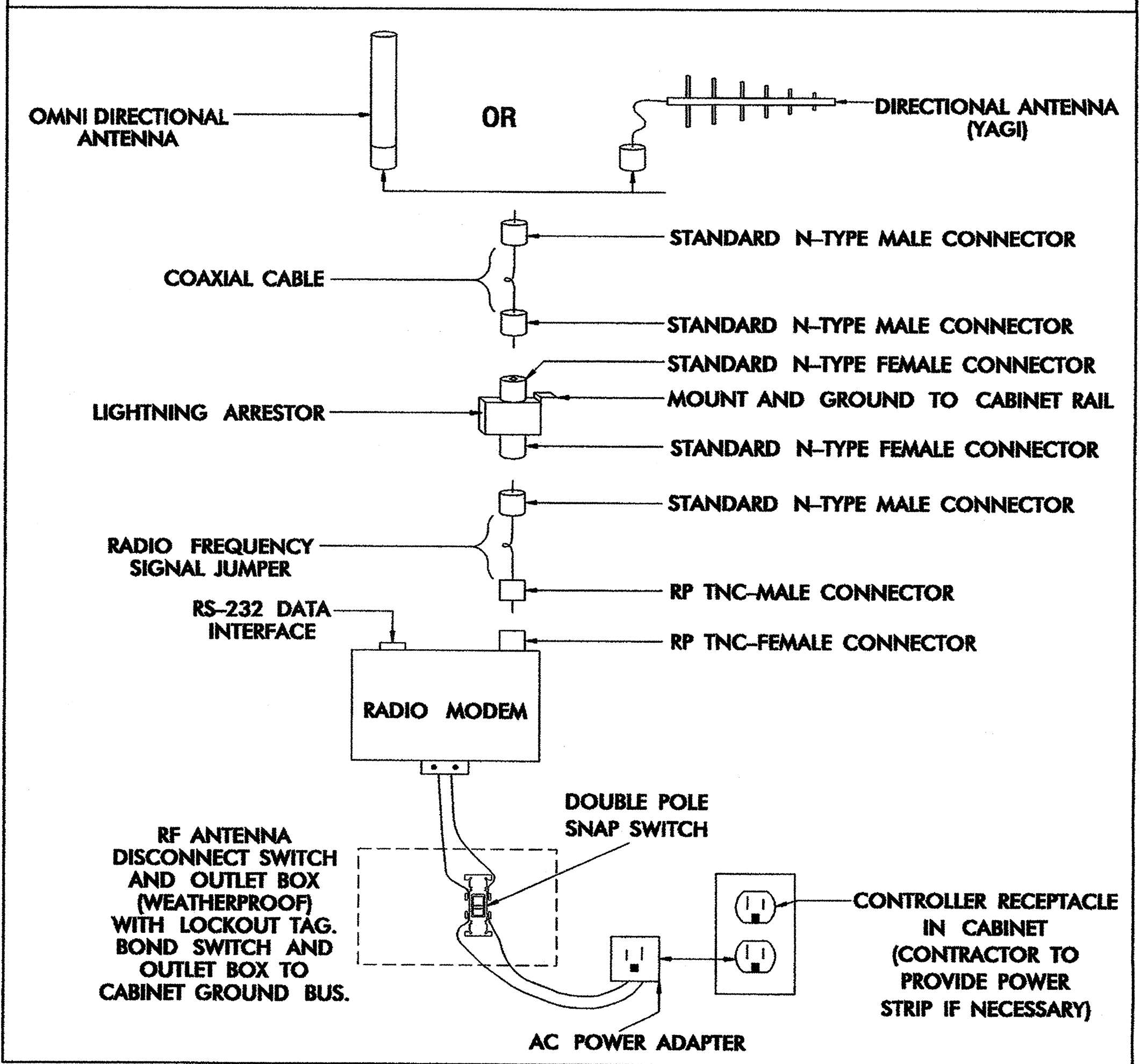
INSERT A

NOTES

1. WOOD POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE GROUND USING A SPLIT BOLT CONNECTOR. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED COPPER WIRE) BONDED TO THE POLE GROUND. WEATHERPROOF THE CONNECTION ONCE THE GROUNDING SYSTEM IS INSTALLED. ENSURE "POLE GROUND" IS IN PLACE.  
  
METAL POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE OR EXISTING SYSTEM GROUND USING A METHOD APPROVED BY THE ENGINEER. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED COPPER WIRE) BONDED TO THE POLE BY A METHOD APPROVED BY THE ENGINEER. WEATHERPROOF THE CONNECTION ONCE THE GROUNDING SYSTEM IS INSTALLED. ENSURE "SYSTEM GROUND" IS IN PLACE.
2. YAGI ANTENNA SHOWN IN VERTICAL POLARIZATION POSITION FOR CLARIFICATION. TYPICALLY INSTALL ANTENNA IN HORIZONTAL POLARIZATION POSITION.
3. TO CONSERVE VERTICAL SPACING ON THE POLE (JOINT-USE OR SIGNAL POLE) WITH REGARDS TO THE SURROUNDING UTILITIES, INSTALL THE ANTENNA MOUNTING HARDWARE USING ONE OF THE TWO METHODS LISTED BELOW: (ENSURE THAT THE MOUNTING METHOD DOES NOT DEGRADE THE ANTENNA'S SIGNAL INTEGRITY)
  - A) ROTATE THE VERTICAL SUPPORT ARM 90 DEGREES SUCH THAT THE ANTENNA IS AT THE SAME HEIGHT AS THE HORIZONTAL SUPPORT ARM.
  - B) ELIMINATE THE VERTICAL SUPPORT ARM AND MOUNT THE ANTENNA TO THE HORIZONTAL SUPPORT ARM.
  - C) ANTENNA, ANTENNA SUPPORT ARM, AND SIGN TO MAINTAIN A 40" SEPARATION FROM NEUTRAL /POWER AND 12" FROM OTHER UTILITIES.
4. INSTALL AN END CAP TO SEAL THE EXPOSED END OF THE MOUNTING PIPE.



ANTENNA AND COAXIAL CABLE CONNECTION SCHEMATIC



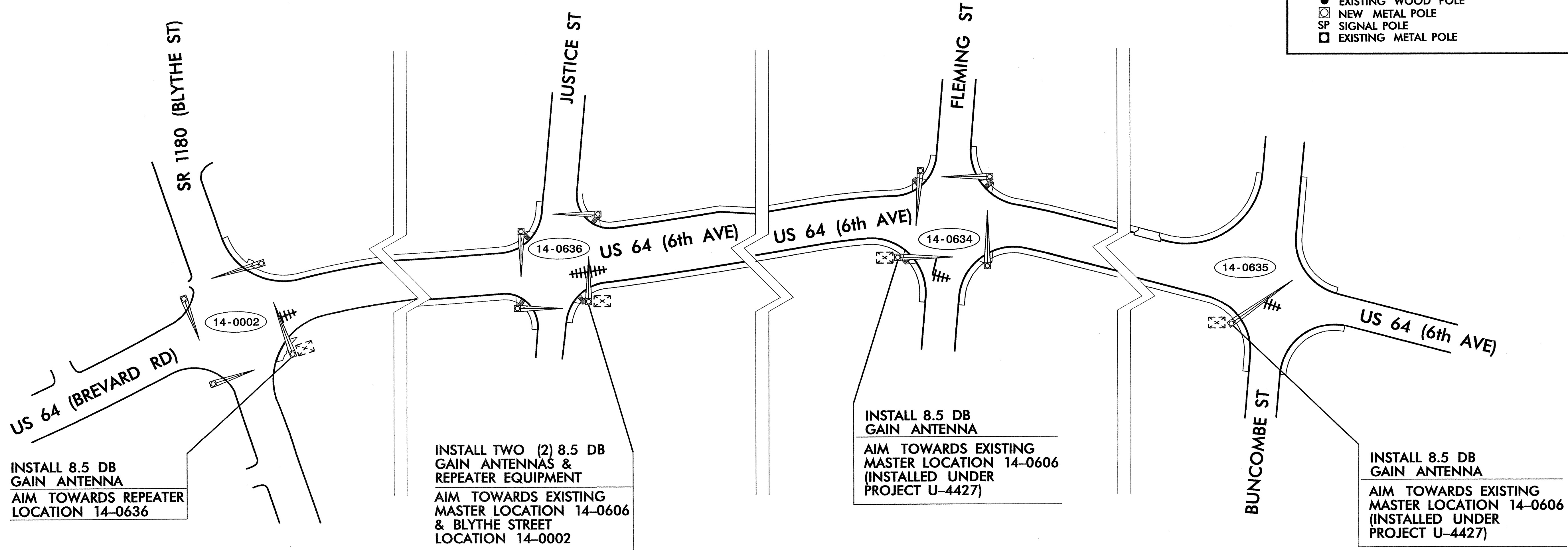
	<b>WIRELESS RADIO ANTENNA TYPICAL DETAILS</b>	
	PLAN DATE: JULY 2005	REVIEWED BY: I. N. AVERY
	PREPARED BY: A. GREECH	REVIEWED BY: A. T. FAULKNER
SCALE: 0 	REVISIONS: UPDATE GROUNDING - COAXIAL CABLE SHIELD DATE: 9/13/05 SIGNATURE: <i>Gregory A. Faulkner</i> DATE: 9/12/05	SEAL PROFESSIONAL ENGINEER GREGORY A. FAULKNER LICENSE NO. 023919 STATE OF NORTH CAROLINA





**LEGEND**

- +++ YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
- ++ YAGI ANTENNA (SINGLE)
- ⊕ OMNI ANTENNA
- ⊗ EXISTING CONTROLLER AND CABINET
- ⊗ EXISTING MASTER CONTROLLER AND CABINET
- ⊗ (xx-xxxx) SIGNAL INVENTORY NUMBER
- ⊗ NEW METAL POLE W/MAST ARM
- EXISTING WOOD POLE
- ⊗ NEW METAL POLE
- SP SIGNAL POLE
- ⊗ EXISTING METAL POLE



**NOTES:**

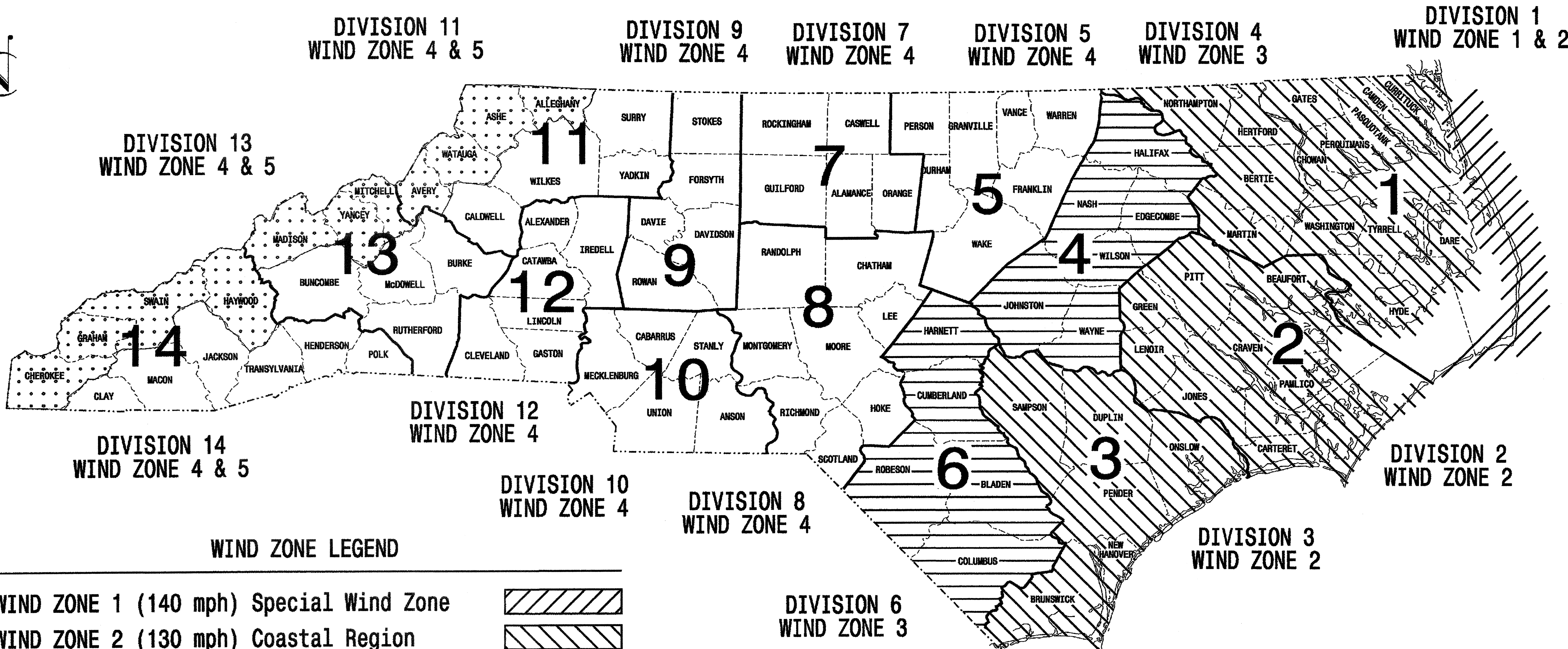
1. INSTALL COAXIAL CABLE
  - A. ON WOOD POLES, INSTALL A 2" RISER WITH HEAT SHRINK TUBING TO ROUTE THE COAXIAL CABLE TO THE ANTENNA.
  - B. ON METAL POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM;  
FIELD DRILL HOLE WITH GROMMET THROUGH BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL 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.
4. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER THE NESC.
5. INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET. (NOTE: RF ANTENNA DISCONNECT SWITCH NOT REQUIRED ON NCDOT-OWNED POLE.)
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS."

<p>Prepared in the Offices of: Traffic Engineering and Safety Services DEPARTMENT OF TRANSPORTATION</p>	<b>WIRELESS COMMUNICATION PLANS ALONG US 64</b>		
	DIVISION 14 HENDERSON CO. HENDERSONVILLE PLAN DATE: MAY 2008 REVIEWED BY: I. N. AVERY PREPARED BY: S. C. WARDLE REVIEWED BY: G. G. MURR, JR.		
	REVISIONS INIT. DATE	SIGNATURE DATE	SEAL 14543 G. G. MURR, JR. 5-6-08

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	U-4428	Sig. 27
F. A. PROJ. NO.	M 1	
PROJECT ID. NO.		

## STANDARD DRAWINGS FOR METAL POLES



### WIND ZONE LEGEND

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

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

Prepared in the Offices of:

122 N. McDowell St., Raleigh, NC 27603

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

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

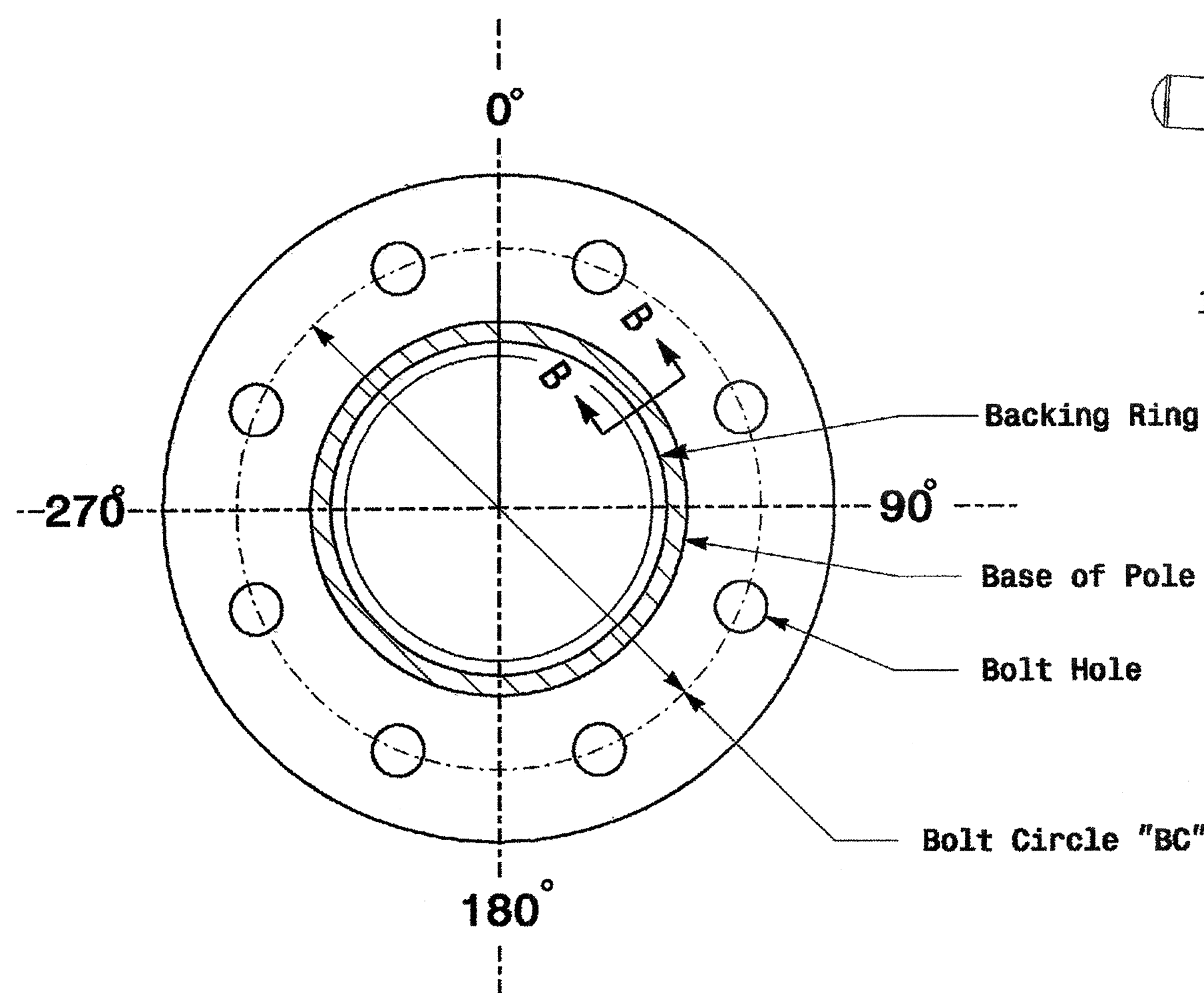
**NCDOT CONTACTS:**  
**TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH**

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

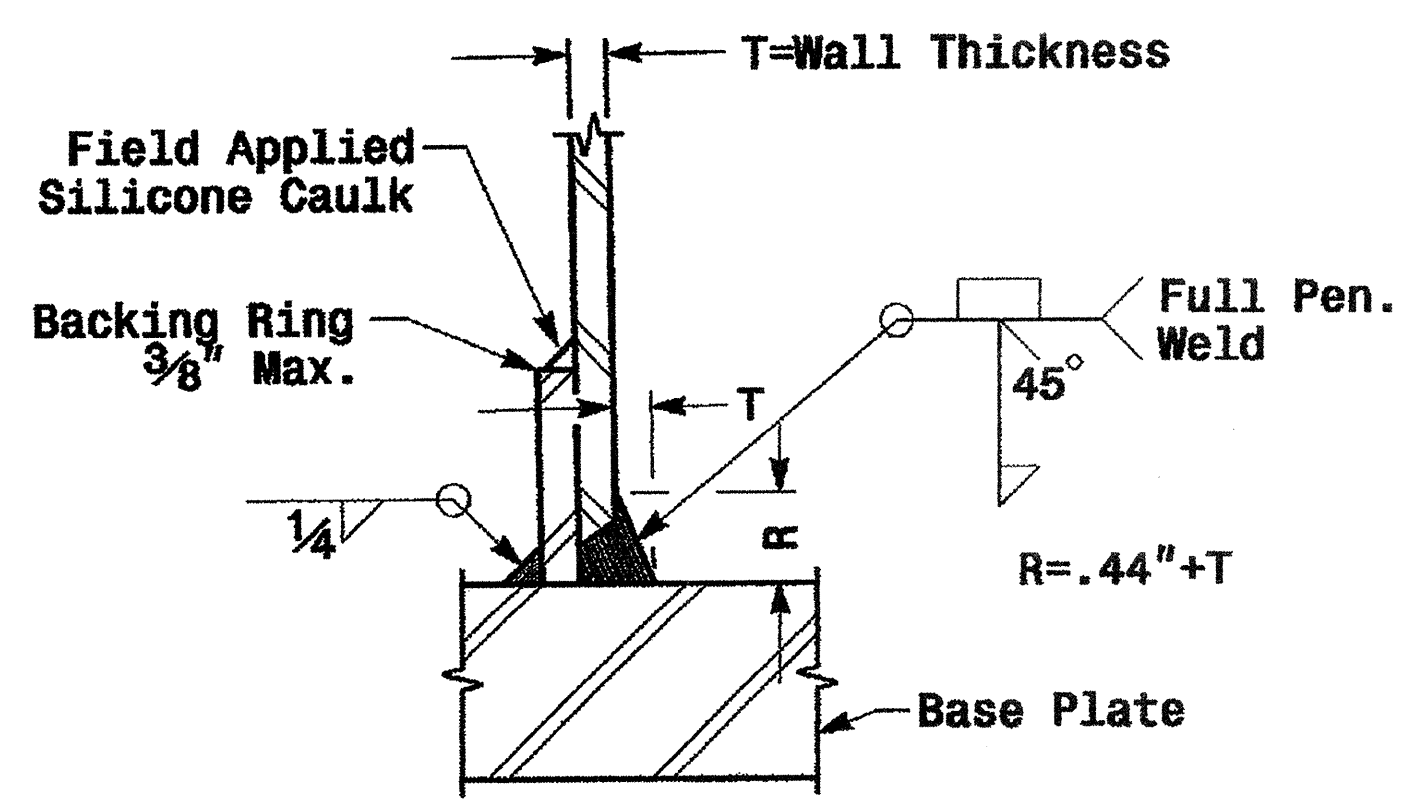
SEAL

D. Sarkar 9.2.2005  
SIGNATURE DATE

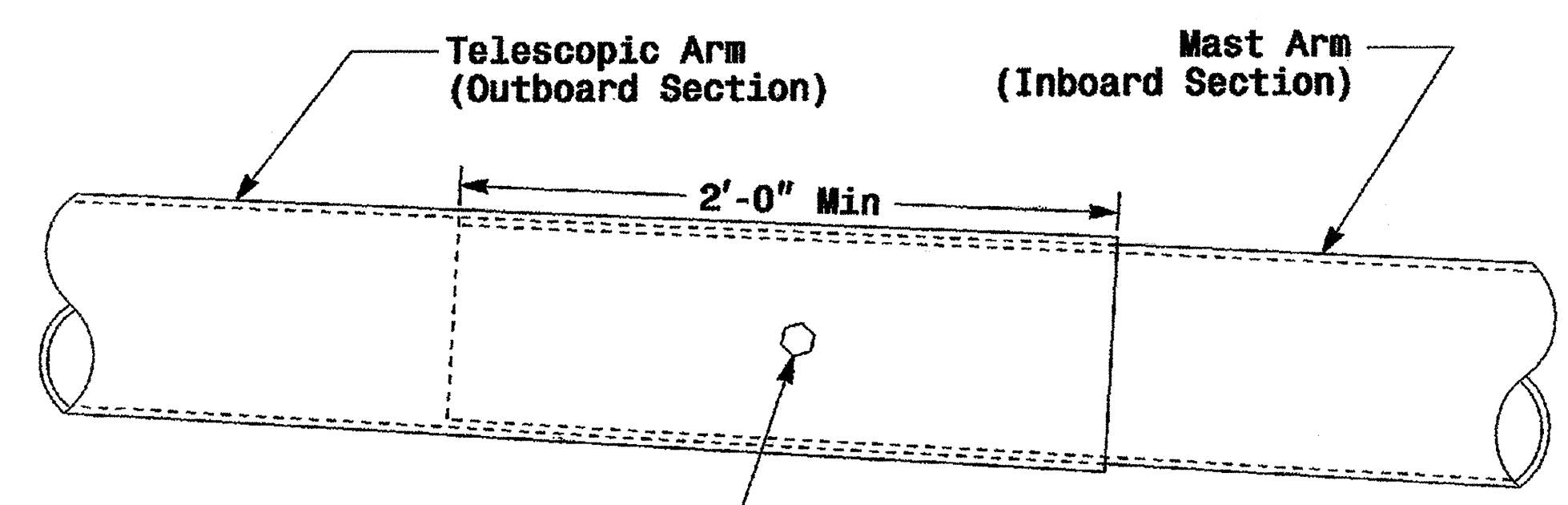
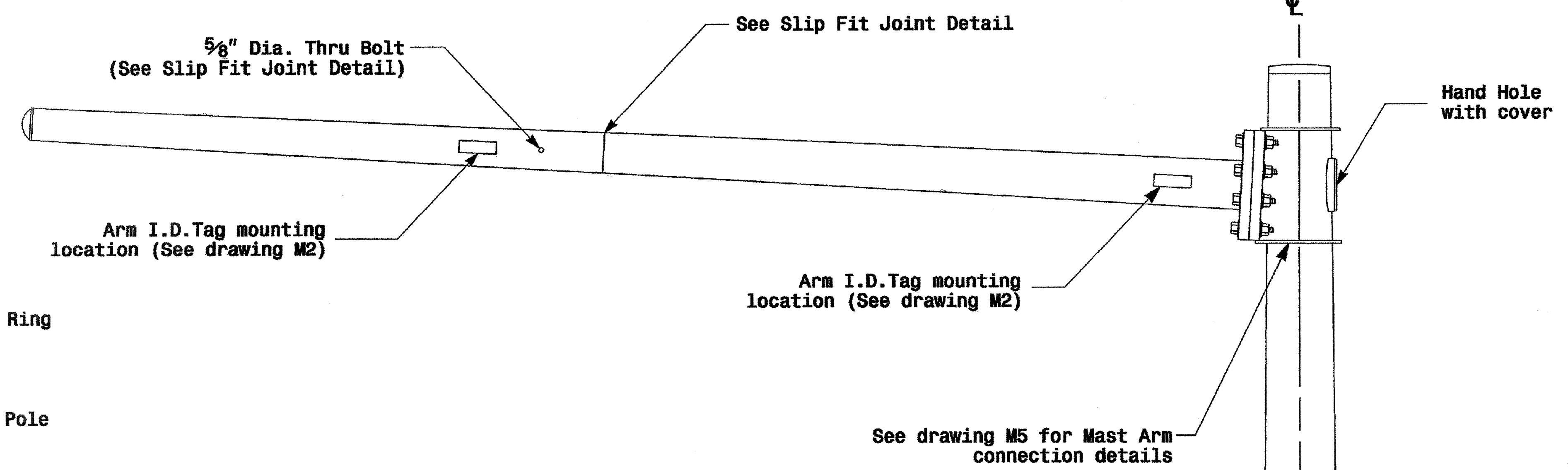




Section A-A  
(See drawing M 2)  
**Pole Base Plate**

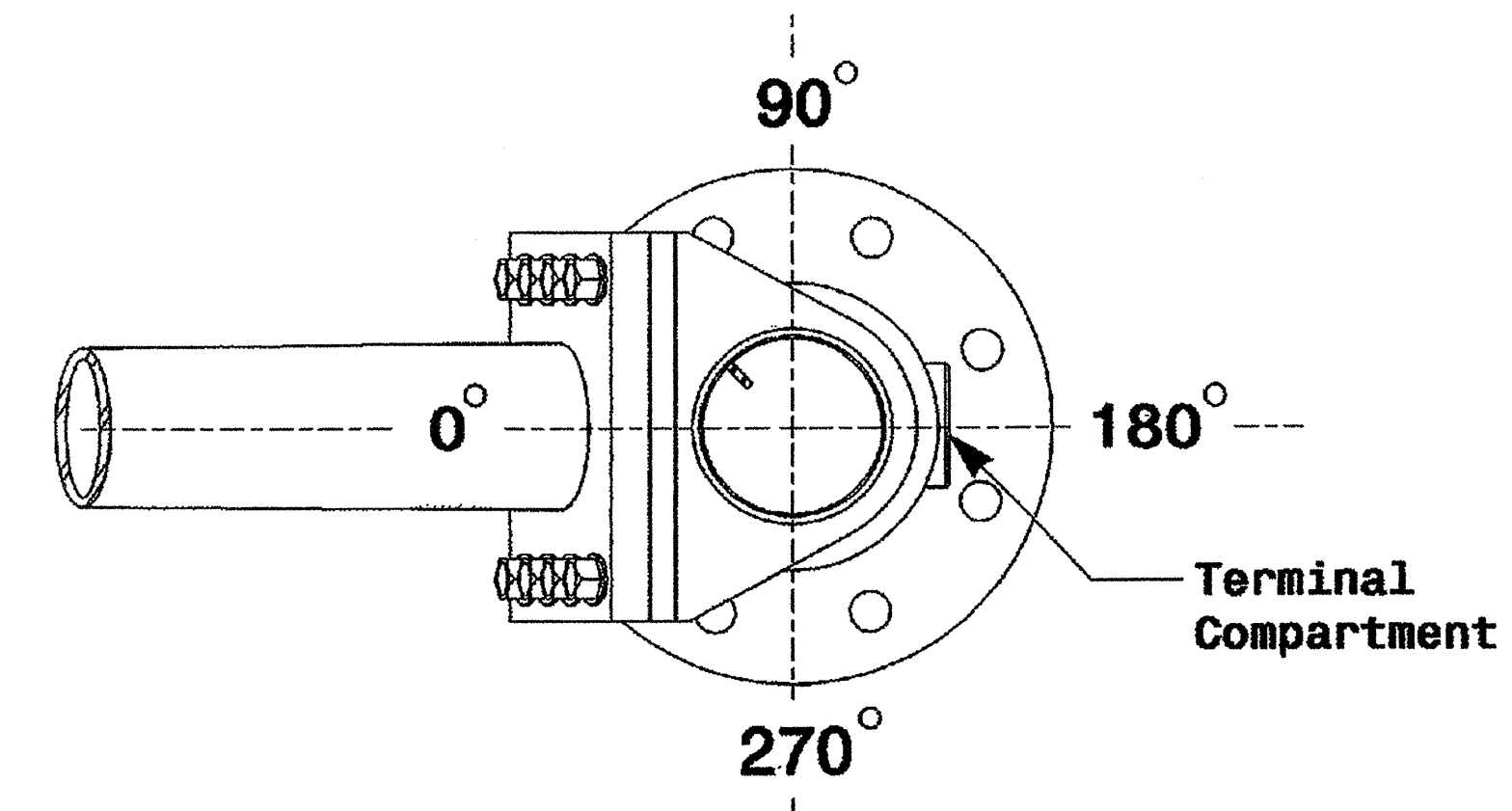


Section B-B  
(Pole Attachment to Base Plate)  
**Full-Penetration Groove Weld Detail**

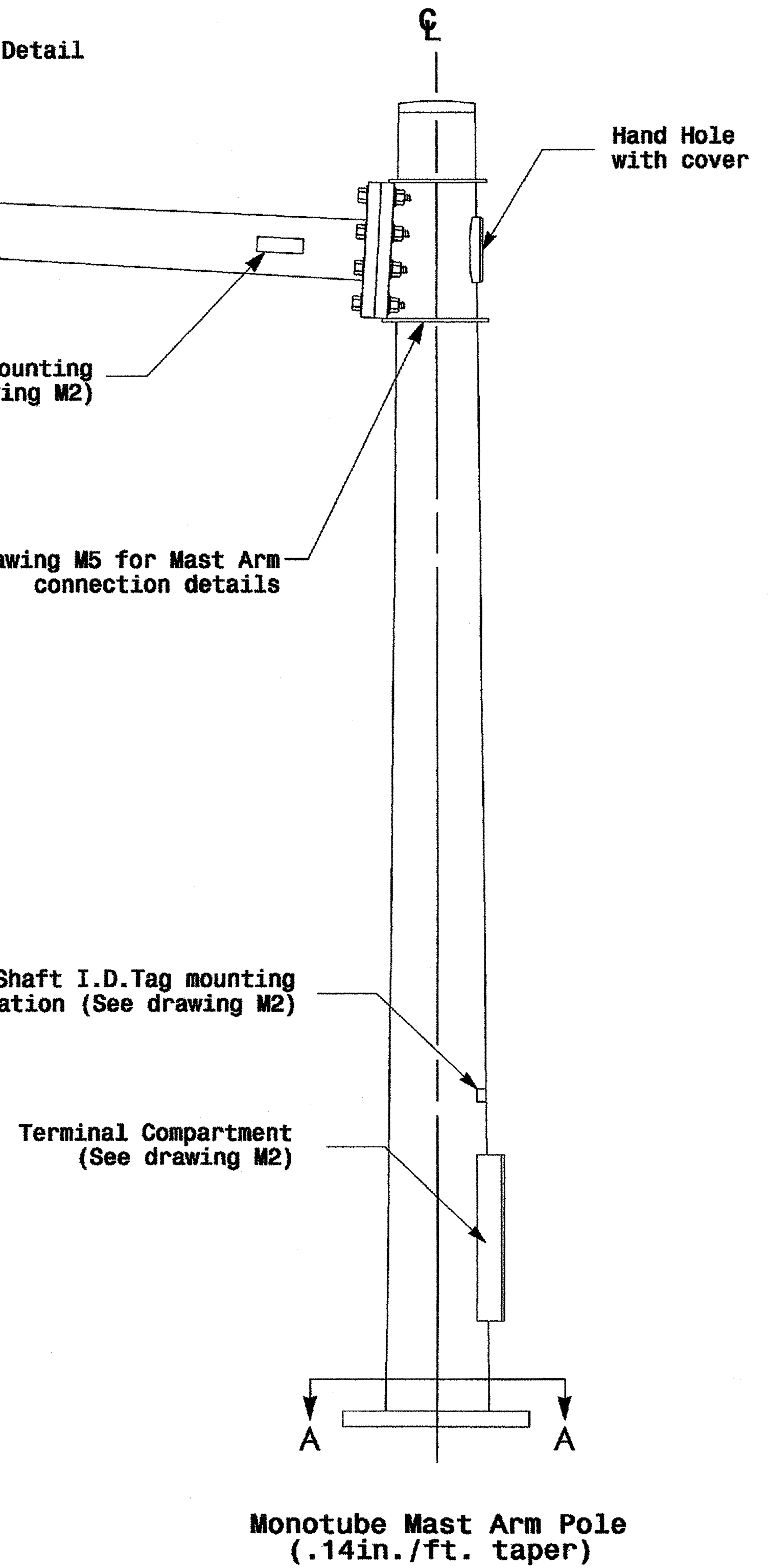


3/4" Factory Drilled Hole in Outboard Tube. Field Drill Inboard Tube. 5/8" Galvanized Thru Stud with (2) Hex. Locknuts Ea.

**Slip Fit Joint Detail for Mast Arm**



**Mast Arm Radial Orientation**



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

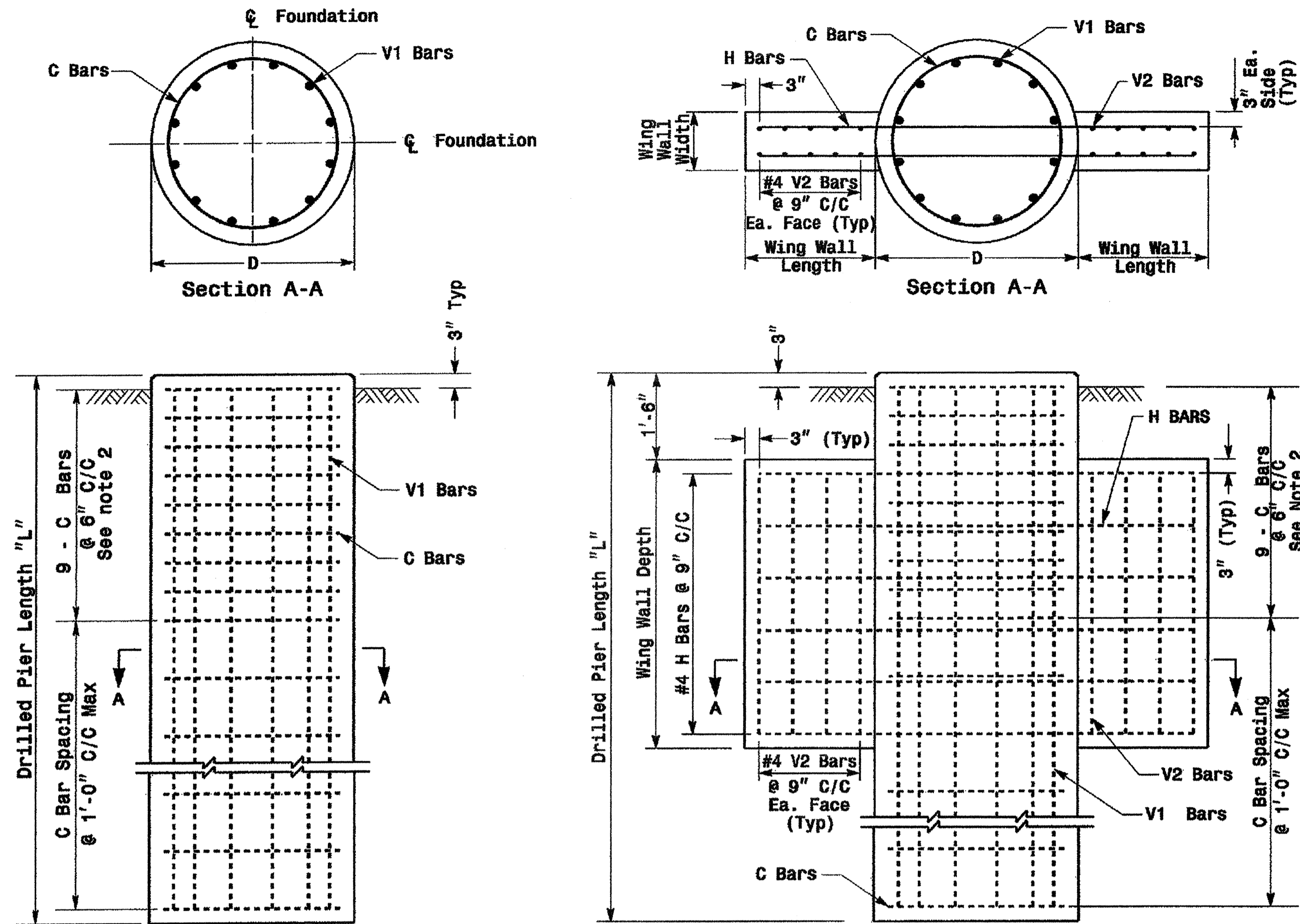
**Fabrication Details - Mast Arm Poles**

01-SEP-2005 14:08 m:\p\cd\res-unit\work\groups\2004 metal pole standard\2004 ml.dgn

	<b>Typical Fabrication Details for Mast Arm Poles</b>		
	PLAN DATE: <b>May 2005</b> PREPARED BY: <b>P.L. Alexander</b>	REVIEWED BY: <b>C.F. Andrews</b> REVIEWED BY: <b>A.M. Esposito</b>	
SCALE: <b>0 NA</b> NONE	SIGNATURE: <i>P.L. Alexander</i> <b>9.2.2005</b> DATE		SEAL STATE OF NORTH CAROLINA PROFESSIONAL ENGINEER <b>026094</b> <b>P. L. ALEXANDER</b>

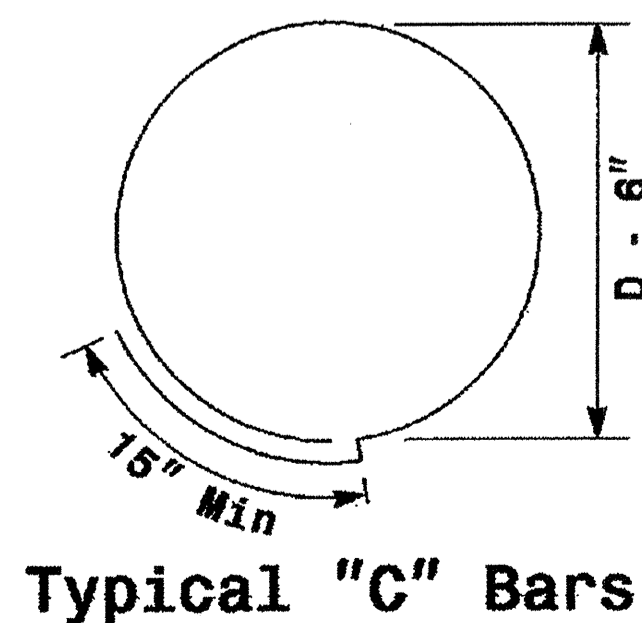


## Reinforcing Steel Bars



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

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



Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel				
		Bar Name	No.	Size	Type	Length
TYPE 1	42"	V1	9	#8	STR.	**
		V2	12	#4	STR.	2'-6"
		H	8	#4	STR.	6'-0"
TYPE 2	42"	C	*	#4	CIR.	10'-9"
		V1	9	#8	STR.	**
		V2	16	#4	STR.	4'-6"
TYPE 2	48"	H	12	#4	STR.	9'-0"
		C	*	#4	CIR.	10'-9"
		V1	12	#8	STR.	**
TYPE 2	48"	V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-6"
		C	*	#4	CIR.	12'-6"

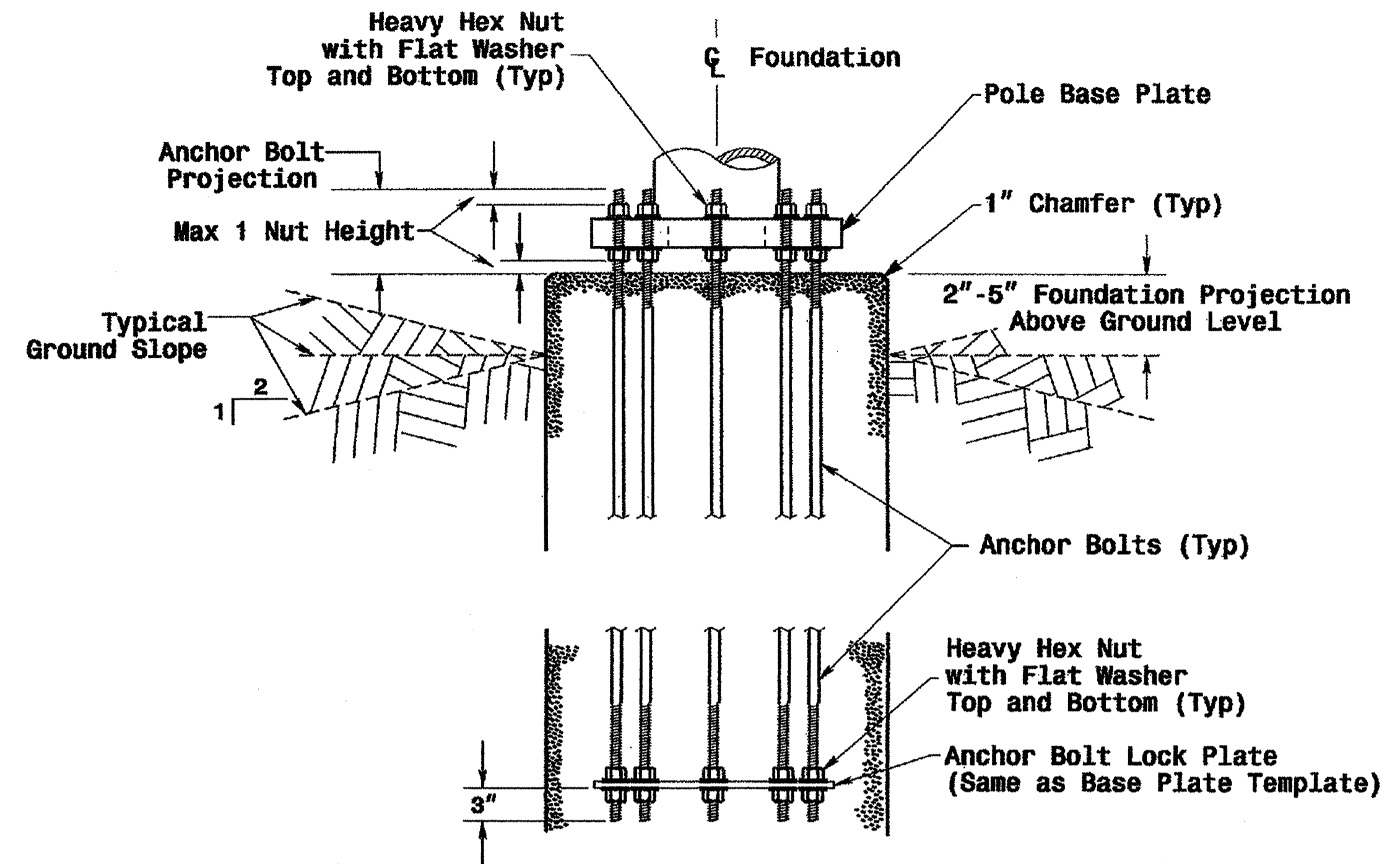
\* See Note No. 1  
 \*\* See Note No. 3

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

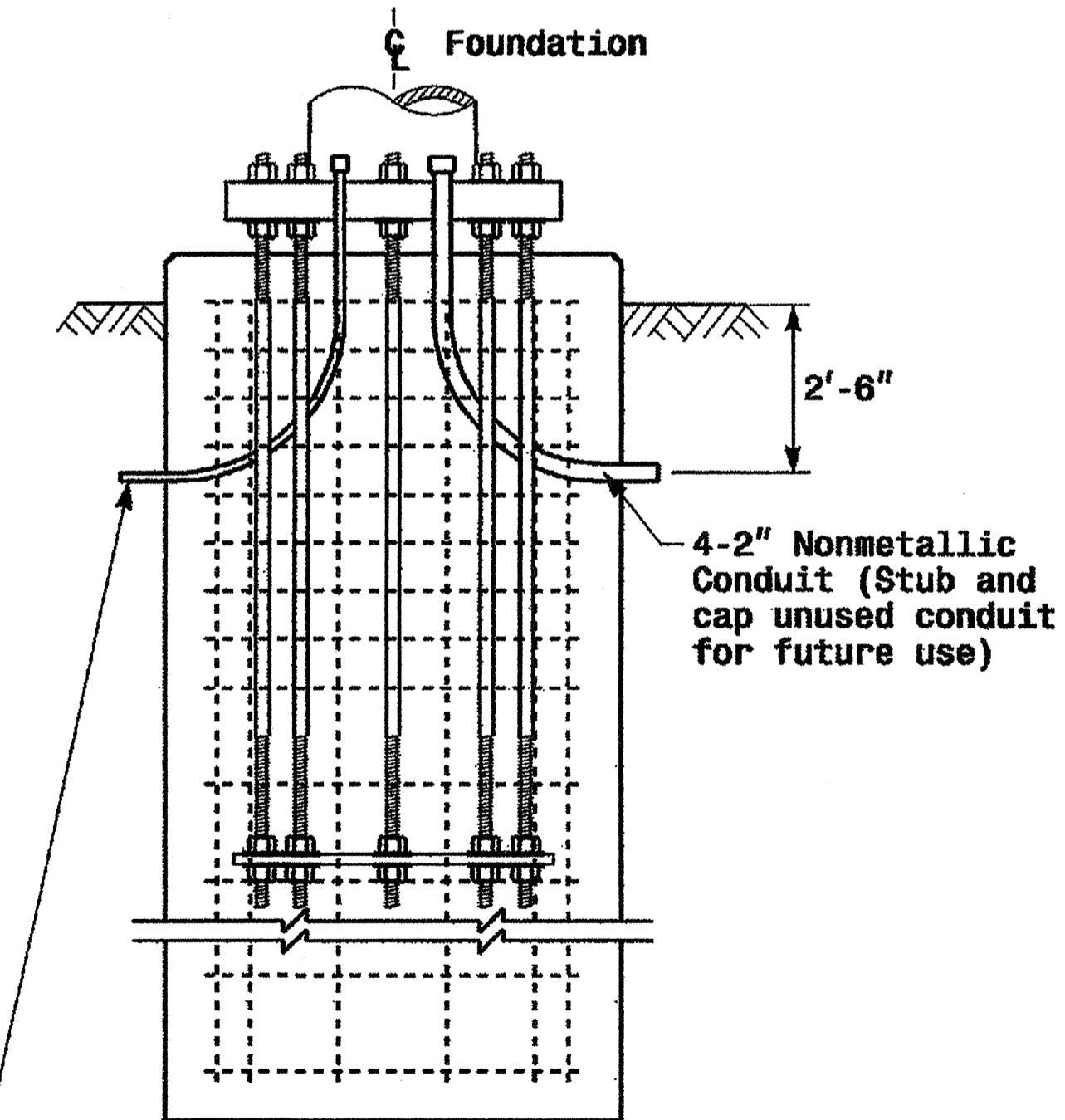
See Note No. 4

## Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



## Typical Foundation Conduit Details



## Notes

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

	<b>Construction Details Foundations</b>		
	PREPARED BY: G.F. ANDREWS REVISIONS: _____ SCALE: 0 NA NONE	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: A.W. ESPOSITO INIT. DATE	

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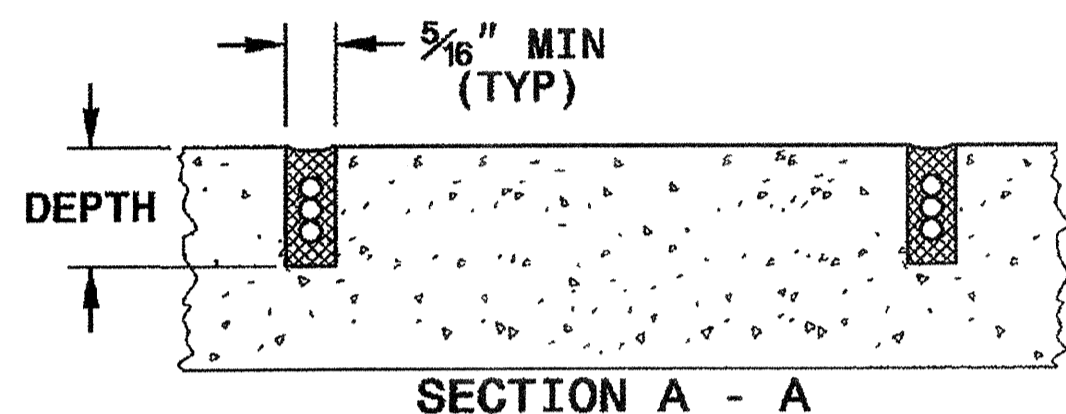
5-07

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**

SHEET 1 OF 3  
**1725D01**

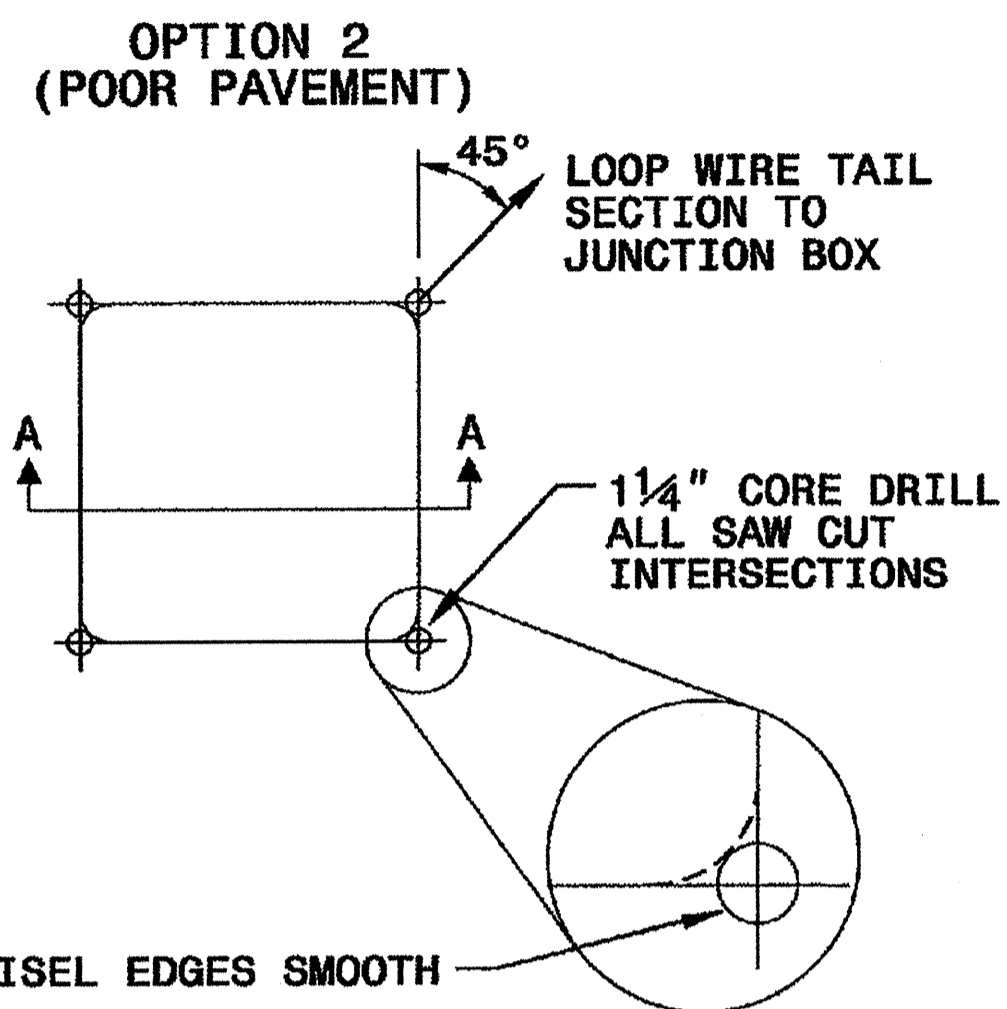
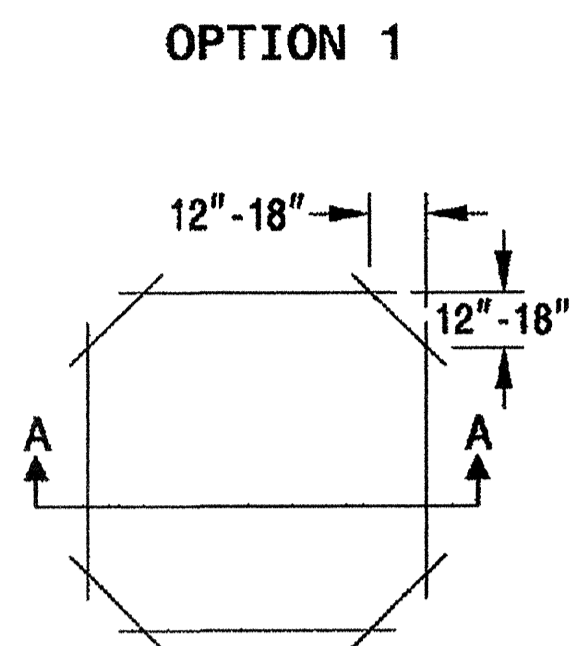
**SAW SLOT DEPTH CHART**

DEPTH (IN)	NO. OF WIRE TURNS				
	2	3	4	5	6
CONCRETE	2.0	2.0	2.5	2.5	3.0
ASPHALT	2.0	2.5	3.0	3.0	3.0

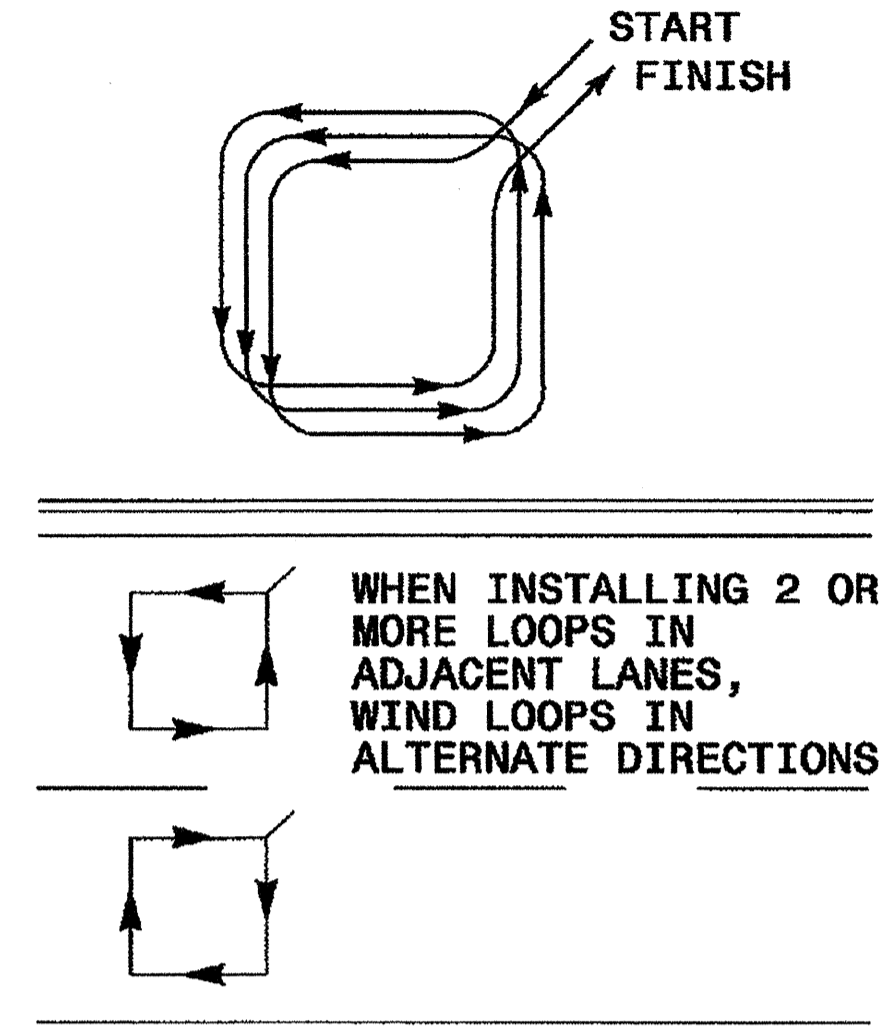


**CONVENTIONAL 4-SIDED LOOP**

**SAW CUT OPTIONS**



**LOOP WINDING METHOD**



**LOOP WIRE TWISTING METHOD**

INCORRECT WAY TO TWIST WIRE



CORRECT WAY TO TWIST WIRE

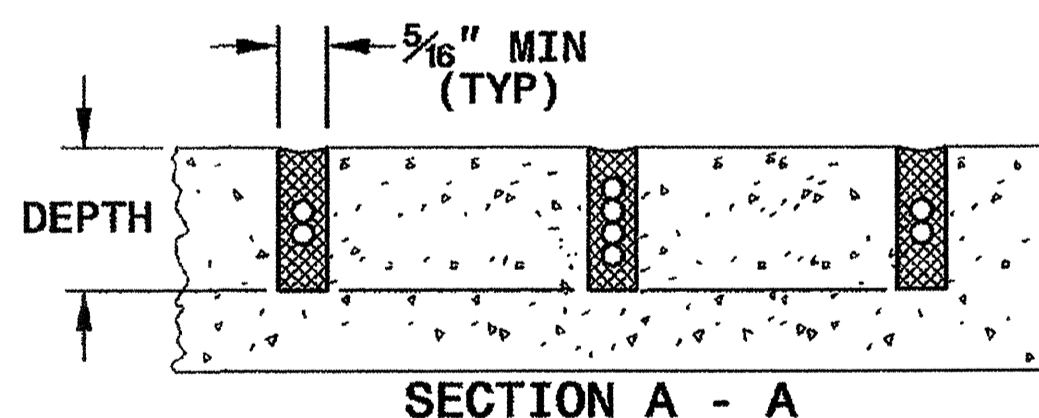
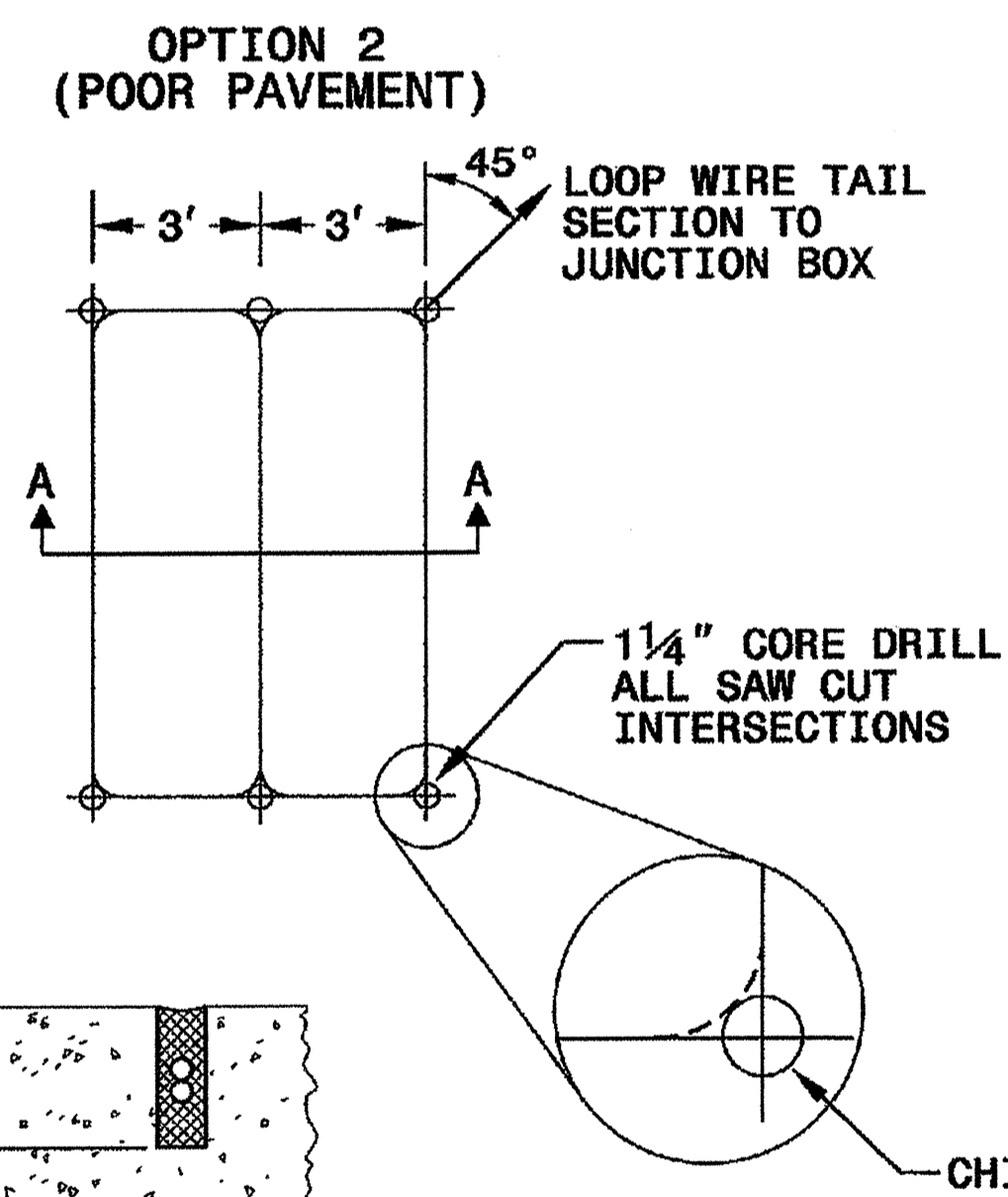
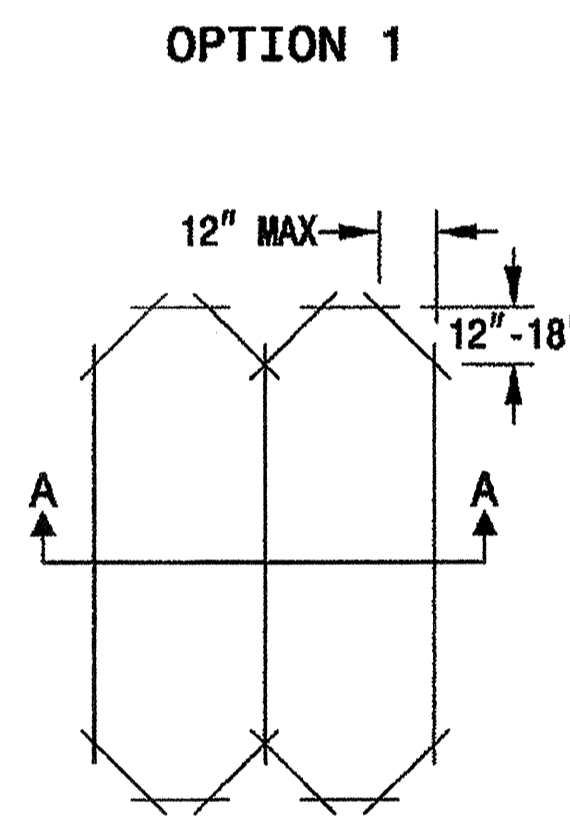


**NOTES**

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

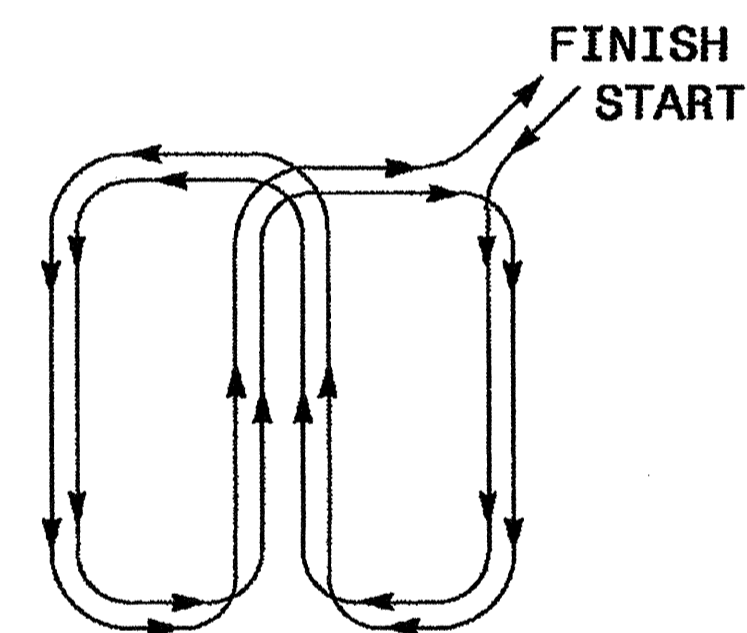
**QUADRUPOLE LOOP**

**SAW CUT OPTIONS**



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

**LOOP WINDING METHOD**



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ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**

SHEET 1 OF 3  
**1725D01**

See Plate for Title

