

Project: U-2550B

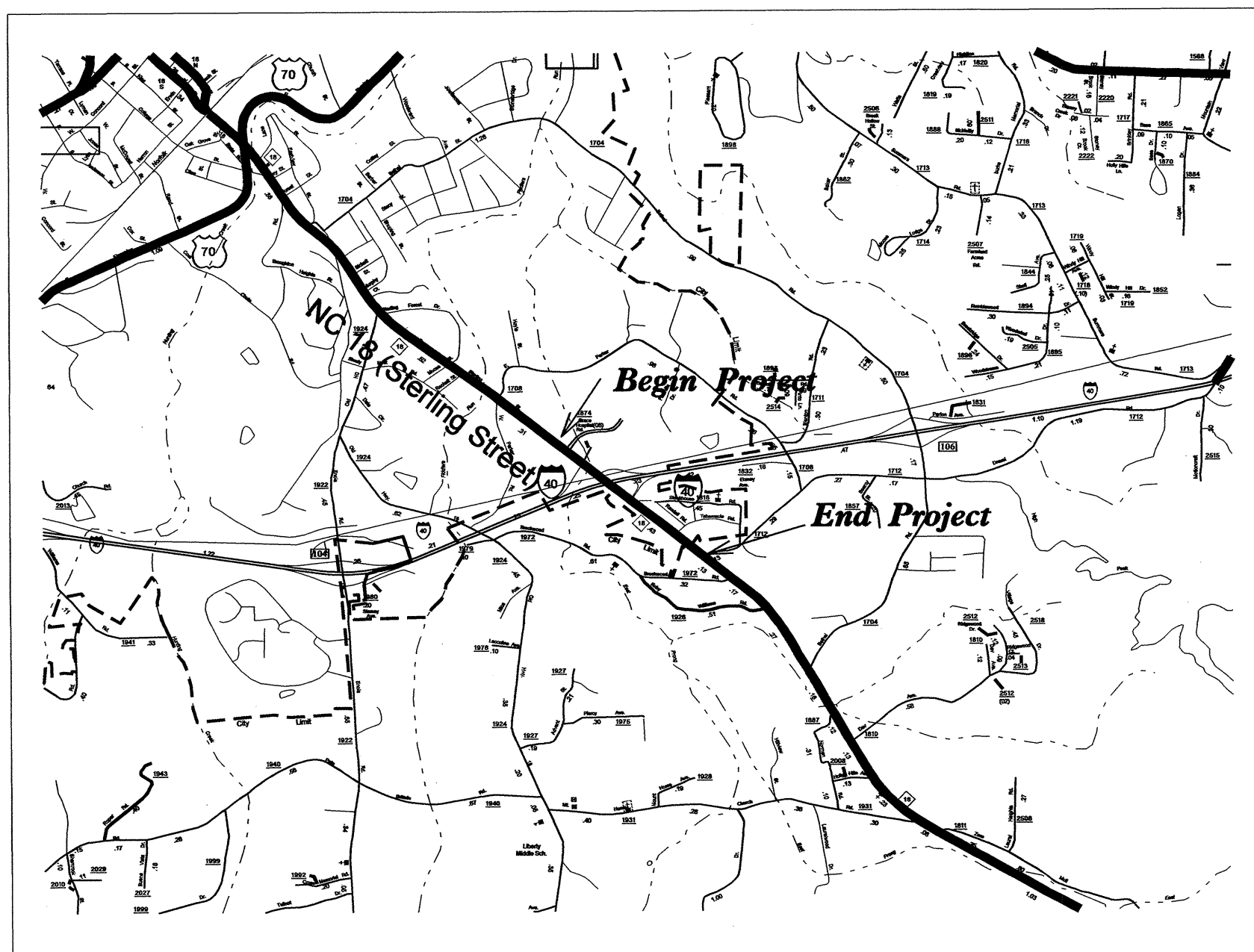
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

Project No. U-2550B	Sheet No. Sig. 1
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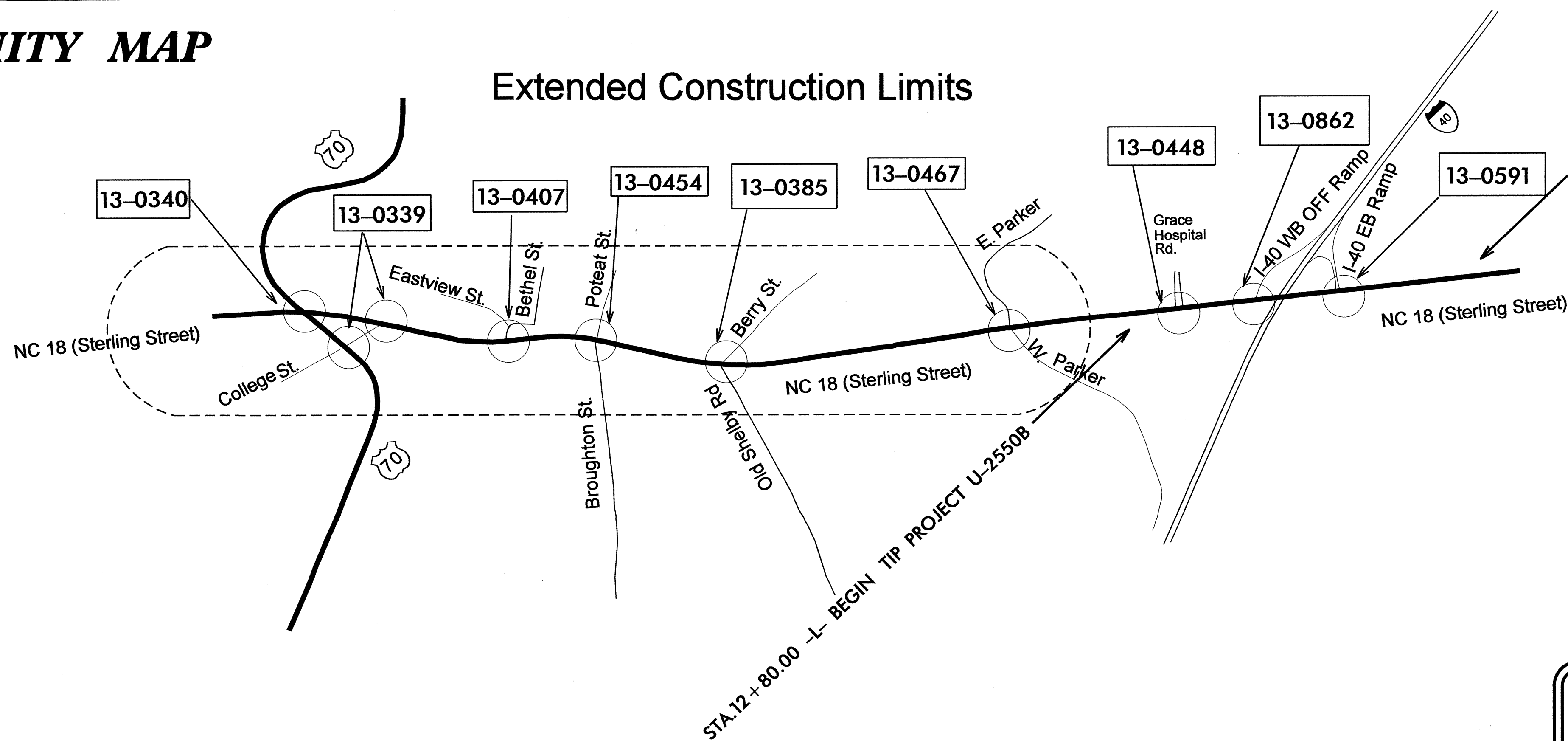
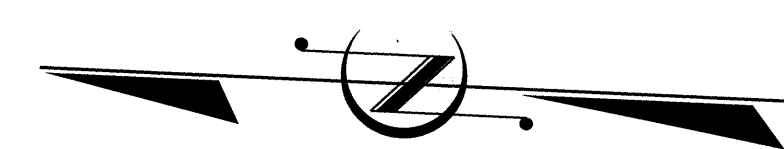
BURKE COUNTY

LOCATION: MORGANTON - NC 18 (STERLING STREET)
From US 70 TO I-40 INTERCHANGE

TYPE OF WORK: TRAFFIC SIGNALS



VICINITY MAP



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

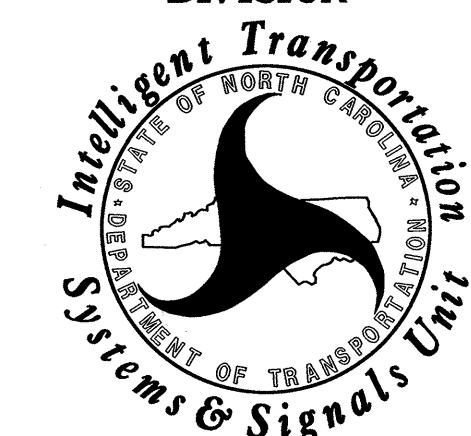
Sheet #	Reference #	Index of Plans Location/Description
Sig. 1		Title Sheet
Sig. 2-19	13-0591	NC 18 (Sterling Street) at I-40 EB Ramp
Sig. 20-21	13-0862	NC 18 (Sterling Street) at I-40 WB Off Ramp
Sig. 22-26	13-0448	NC 18 (Sterling Street) at Grace Hospital Road
Sig. 27-28	13-0467	NC 18 (Sterling Street) at SR 1708 (Parker Street)
Sig. 29-30	13-0385	NC 18 (Sterling Street) at Old NC 18 / Berry Street
Sig. 31-32	13-0454	NC 18 (Sterling Street) at Broughton Street/Potteat Street
Sig. 33-35	13-0407	NC 18 (Sterling Street) at SR 1704 (Bethel Street)
Sig. 36-37	13-0339	NC 18 (Sterling Street) at College Street & US 70 (Fleming Drive) @ College Street
Sig. 38-39	13-0340	US 70 Bypass (Fleming Drive) at NC 18 (Sterling Street)
Sig. 40-50	N/A	Metal Pole Standard Sheets
Sig. 51-53	N/A	Inductive Loop Detail Sheets
Sig. 54-58	N/A	Wireless Radio Communication Plan

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

Zachary M. Little, PE - Western Region Signals Project Engineer
George C. Brown, PE - Signal Equipment Design Engineer
Gregory A. Fuller, PE - Intelligent Transportation Systems Engineer

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



PHASING DIAGRAM

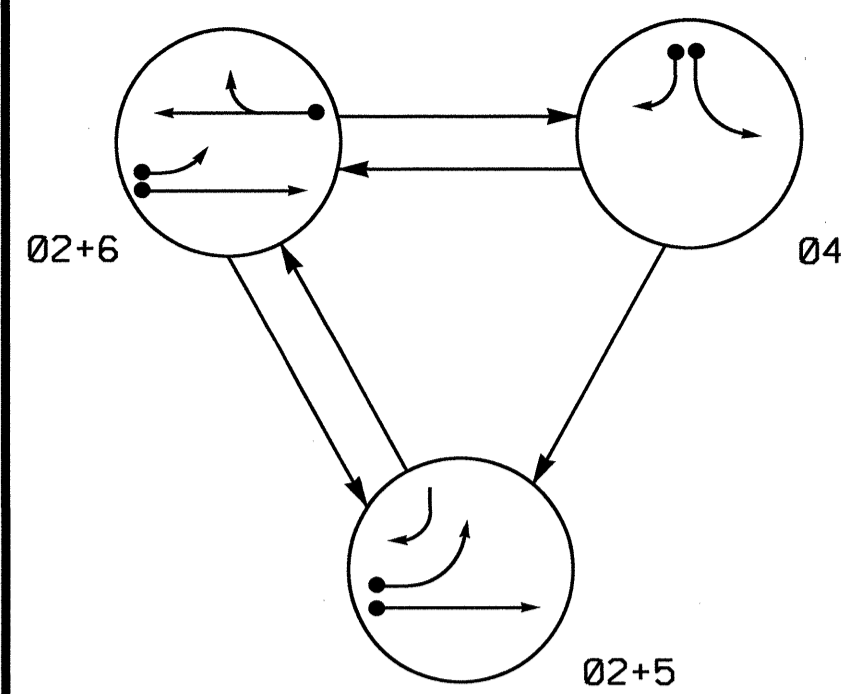


TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02+5	02+6	04	FLASH
21,22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51	F	F	F	F
61,62	R	G	R	Y

F = Flashing Yellow Arrow

STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL

FROM	TO					
	←	→	↔	↔	↔	↔
←	1	2	1	2	1	2
→	2	1	2	1	2	1
↔	1	2	1	2	1	2
↔	2	1	2	1	2	1

F = Flashing Yellow Arrow

OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

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	*	300	*	Y	2	Y	Y	-	-	-	-	*
4A	*	0	*	Y	4	Y	Y	-	-	5	-	*
5A	*	50	*	Y	5	Y	Y	-	-	10	-	*
6A	*	300	*	Y	6	Y	Y	-	-	-	-	*

* Microwave Detection Zone

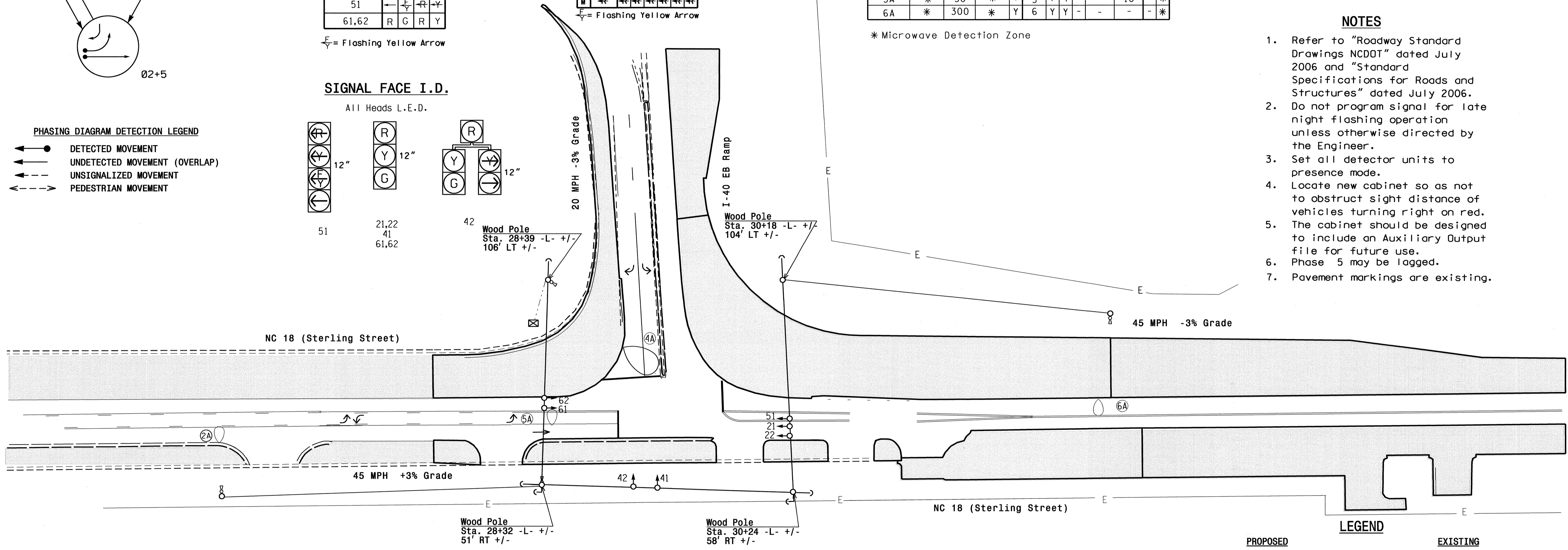
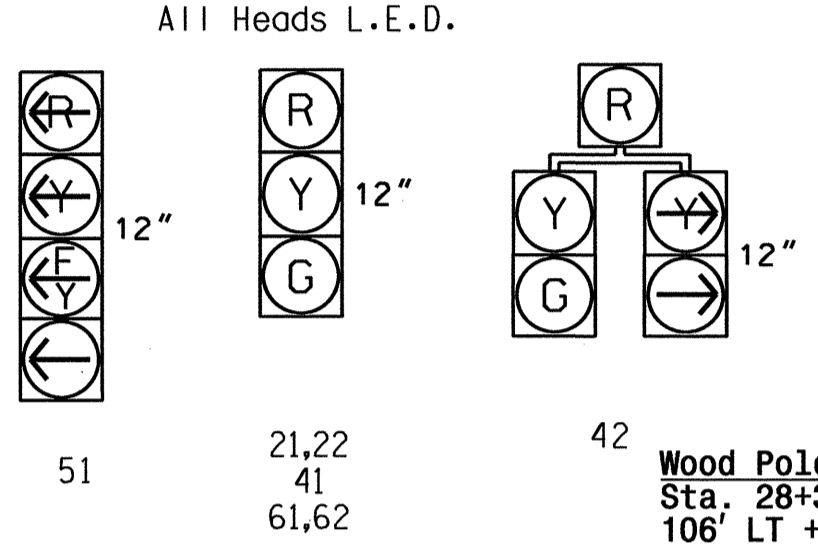
3 Phase Fully Actuated Isolated

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. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. The cabinet should be designed to include an Auxiliary Output file for future use.
6. Phase 5 may be lagged.
7. Pavement markings are existing.

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

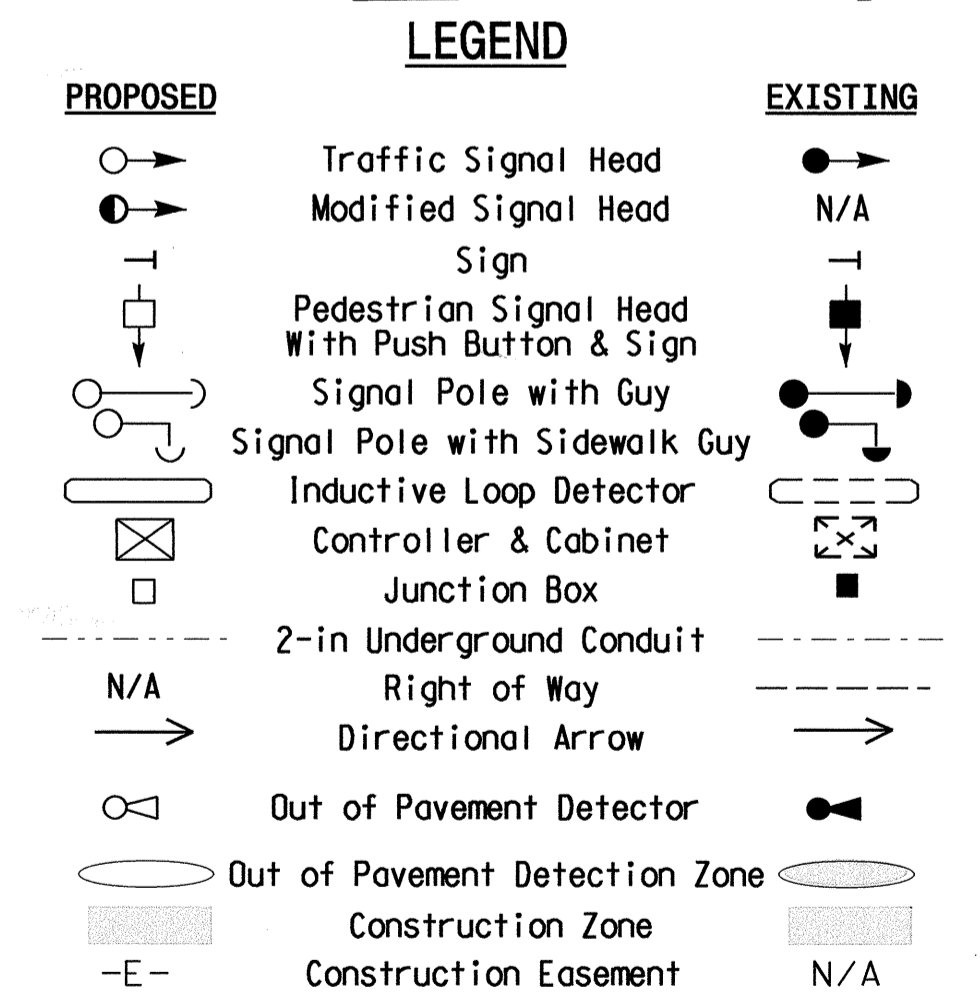
SIGNAL FACE I.D.



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 *	90	30	20	90
Yellow Clearance	4.3	3.0	3.0	4.8
Red Clearance	1.0	2.1	1.6	1.2
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	2.5	-	-	2.5
Max Variable Initial *	34	-	-	34
Time Before Reduction *	30	-	-	30
Time To Reduce *	15	-	-	15
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.



Temporary Signal 1 - (TCP Phase 2)

Prepared In the Offices of:

NC 18 (Sterling Street) at I-40 EB Ramp

Division 13 Burke County Morganton
 PLAN DATE: January 2011 REVIEWED BY:
 PREPARED BY: Jerry Yaravitz REVIEWED BY:
 REVISIONS: _____ INIT. DATE

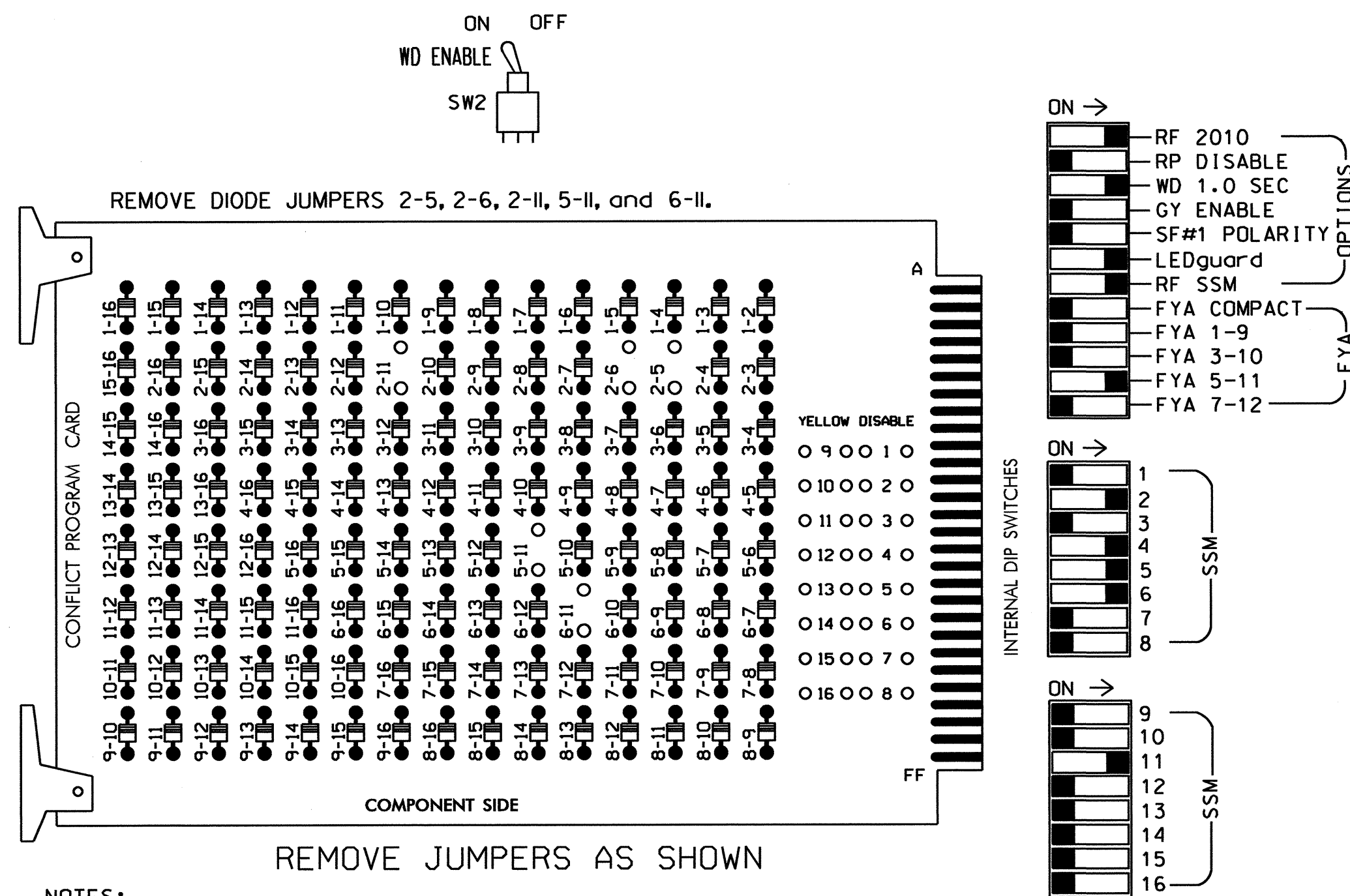
SCALE: 1"=40'

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 30530
 ZACHARY M. LITTLE
 SIGNATURE: _____ DATE: _____
 SIG. INVENTORY NO. 13-0591T1

28-FEB-2011 10:35 R:\RTOFFICE\Signal\Signal\13-0591\13-0591T1.Lsq_dsn_2010mddr.dgn

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

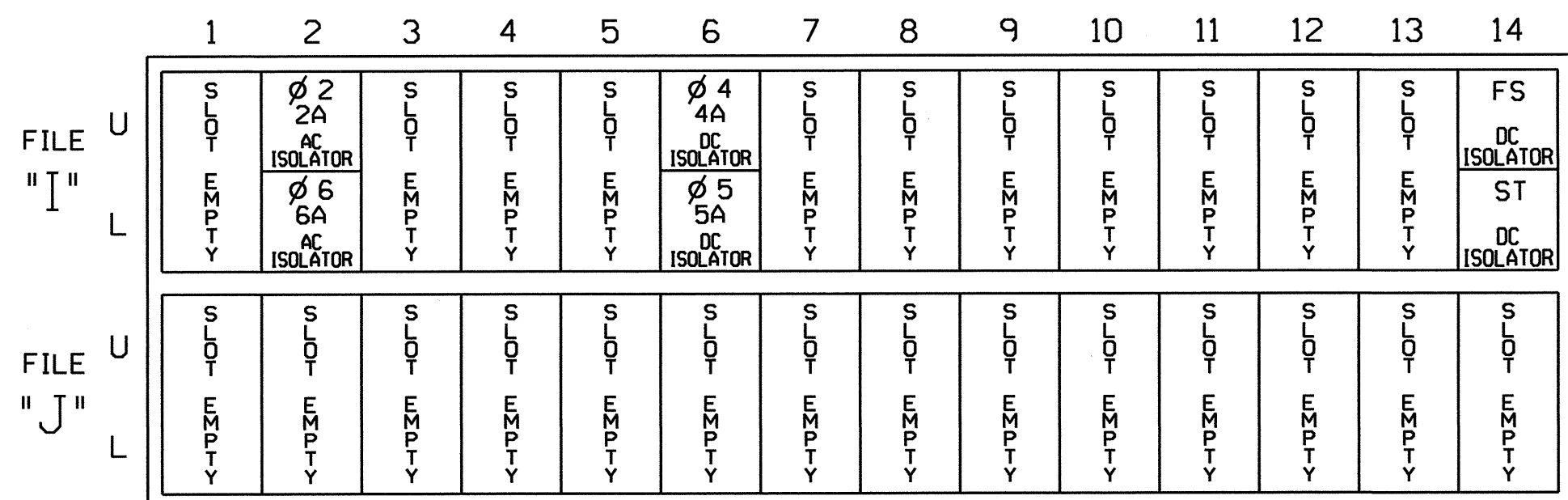


NOTES:

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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

Note: Install a model 252 AC isolator in slot 12, and a model 242 DC isolator in slot 16 for use with microwave detectors. See the Microwave Detector Wiring Details on sheet 3.

IMPORTANT: For proper operation of the microwave detector, remove surge protection from TB2-5 and TB2-6, and from TB2-7 and TB2-8. A DIRECT SHORT WILL OCCUR IF THIS IS NOT DONE. Tie TB2-6 and TB2-8 to AC neutral.

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 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	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	21,22	NU	NU	41,42	NU	42	51*	61,62	NU	NU	NU	NU	NU	NU	51*	NU	NU
RED		128			101		*		134									
YELLOW		129			102				135									
GREEN		130			103				136									
RED ARROW																		A114
YELLOW ARROW							132											A115
FLASHING YELLOW ARROW																		A116
GREEN ARROW							133	133										

NU = Not Used

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

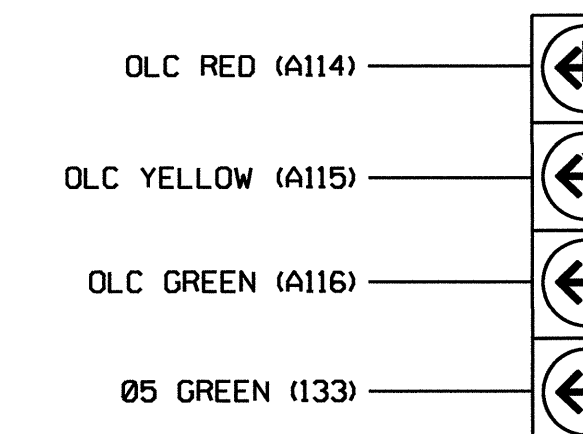
* See pictorial of head wiring in detail below.

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,S4,S5,S6,S12
 PHASES USED.....2,4,5,6
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)



51

NOTE

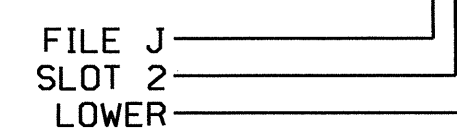
The sequence display for signal head 51 requires special logic programming. See sheet 2 of 3 for programming instructions.

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			
** 4A	TB4-9,10	I6U	41	3	4	4	Y	Y			5
** 5A	TB4-11,12	I6L	45	7	14	5	Y	Y			10
* 6A	TB2-7,8	I2L	43	5	12	6	Y	Y			

- * Microwave pulse detector - see wiring detail on sheet 3.
- ** Microwave presence detector - see wiring detail on sheet 3.

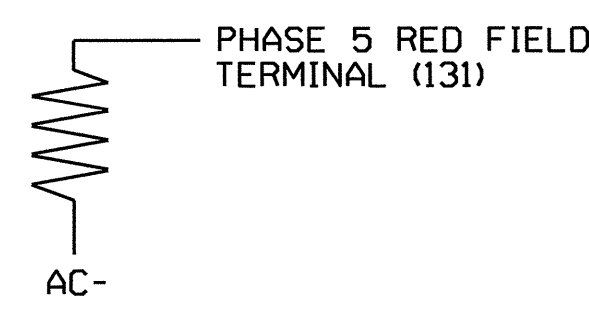
INPUT FILE POSITION LEGEND: J2L



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)



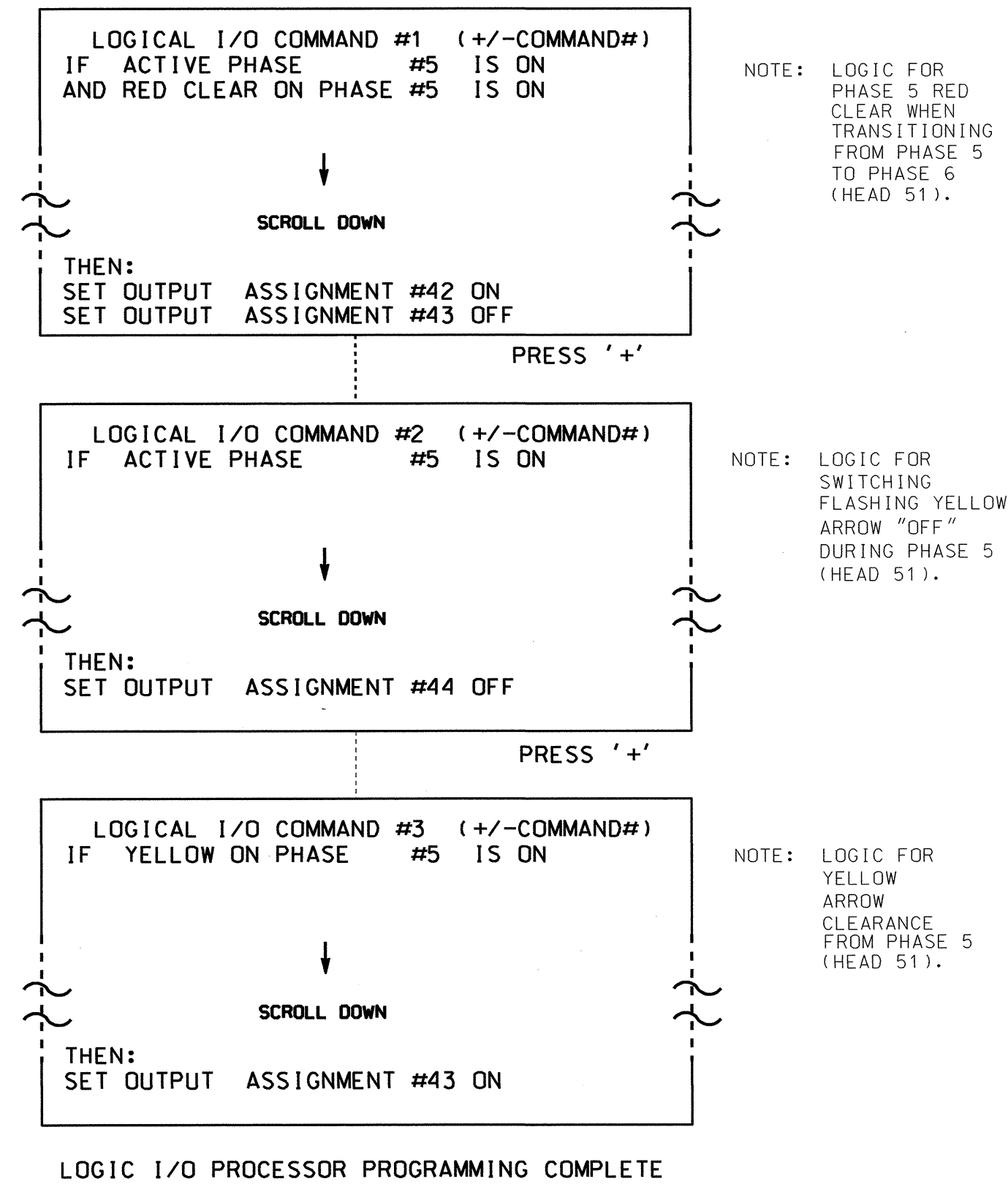
Temporary Signal 1 (TCP Phase 2) - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of: TRANSPORTATION MOBILITY AND SAFETY SOLUTIONS, INC. 750 N. Greenfield Pkwy, Corner, NC 27529	NC 18 (Sterling Street) at I-40 EB Ramp		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN
	Division 13 PLAN DATE: February 2011 PREPARED BY: S. Armstrong	Burke County Morganston REVIEWED BY: T. J. J. REVIEWED BY:	

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

(program controller as shown below)

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



LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE	
OUTPUT 42 =	Overlap C Red
OUTPUT 43 =	Overlap C Yellow
OUTPUT 44 =	Overlap C Green

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

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0591T1
DESIGNED: January 2011
SEALED: 3/1/11
REVISED: N/A

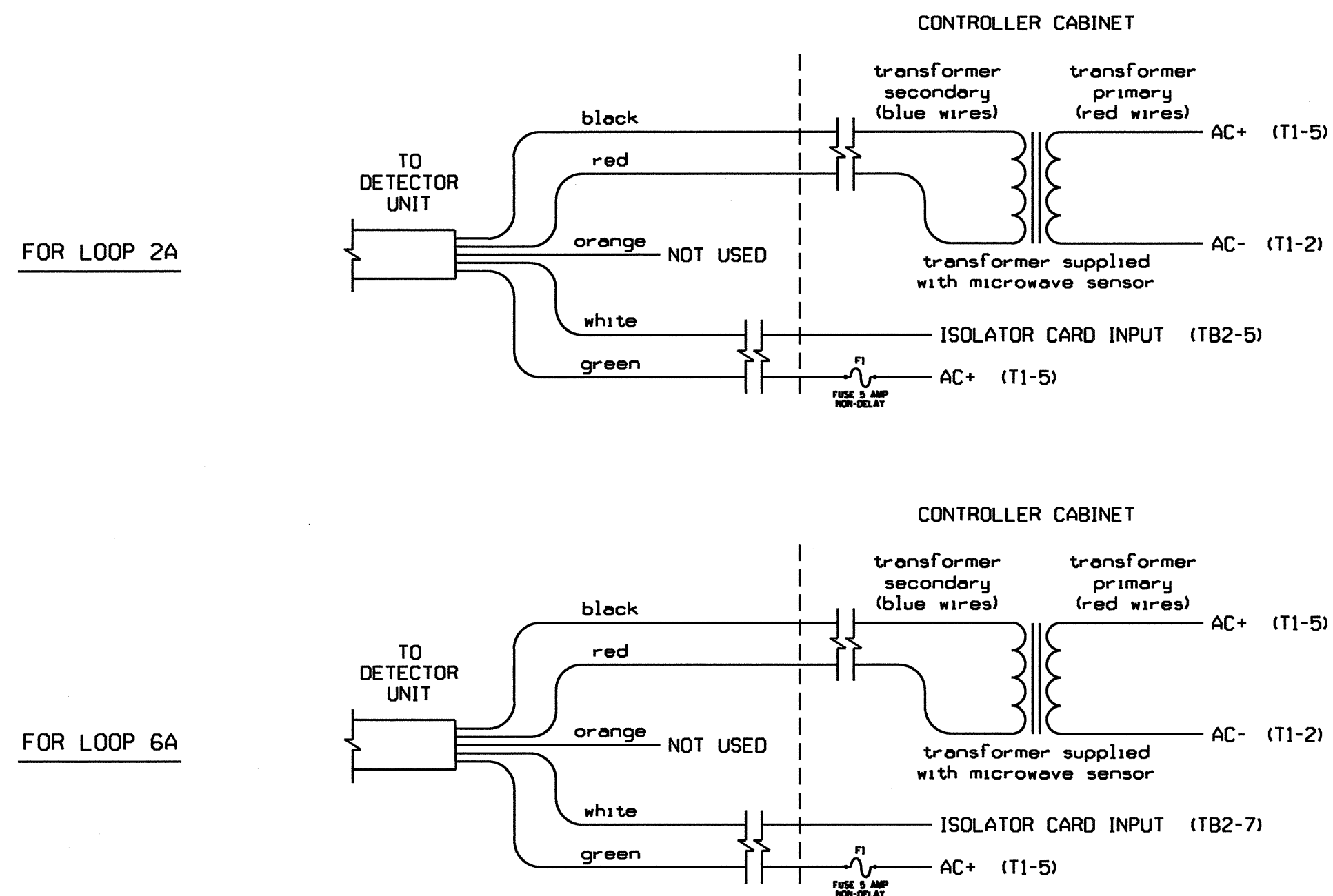
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scrmstronq

Temporary Signal 1 (TCP Phase 2) - Sheet 2 of 3

	NC 18 (Sterling Street) at I-40 EB Ramp		
	Division 13 Burke County Morganton	PLAN DATE: February 2011 REVIEWED BY: <i>T. J. M.</i>	
PREPARED BY: S. Armstrong		REVIEWED BY:	
REVISIONS	INIT.	DATE	
		<i>George C. Brown</i>	3/1/11
		SIGNATURE	DATE
SIG. INVENTORY NO. 13-0591T1			

MICROWAVE DETECTOR WIRING DETAIL FOR LOOPS 2A AND 6A

(wire as shown)



TC26B WIRE LIST

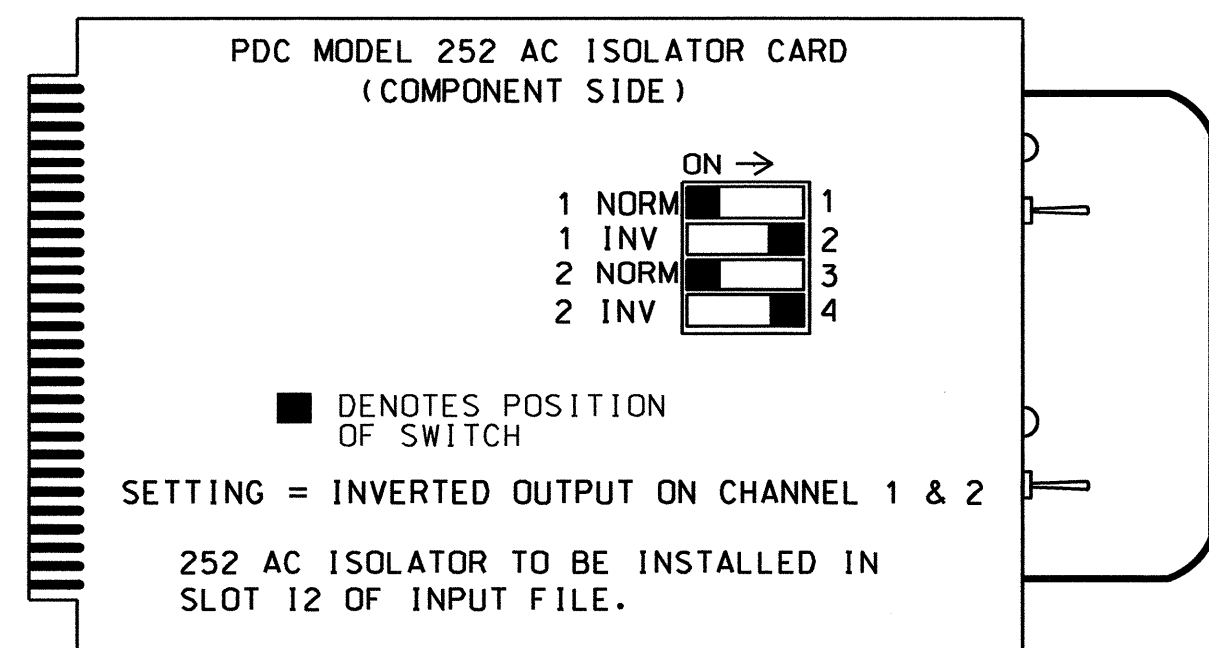
COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

NOTES:

- Sensors are Microwave Sensors, Inc. Model TC-26B microwave motion detectors mounted on poles as indicated on the Signal Design Plans.
- Configure AC isolator cards to place call upon removal of AC+ from the input.
- Important: For proper operation of the microwave detector, remove surge protection from TB2-5 and TB2-6, and from TB2-7 and TB2-8. Tie TB2-6 and TB2-8 to AC neutral.

MICROWAVE DETECTOR AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



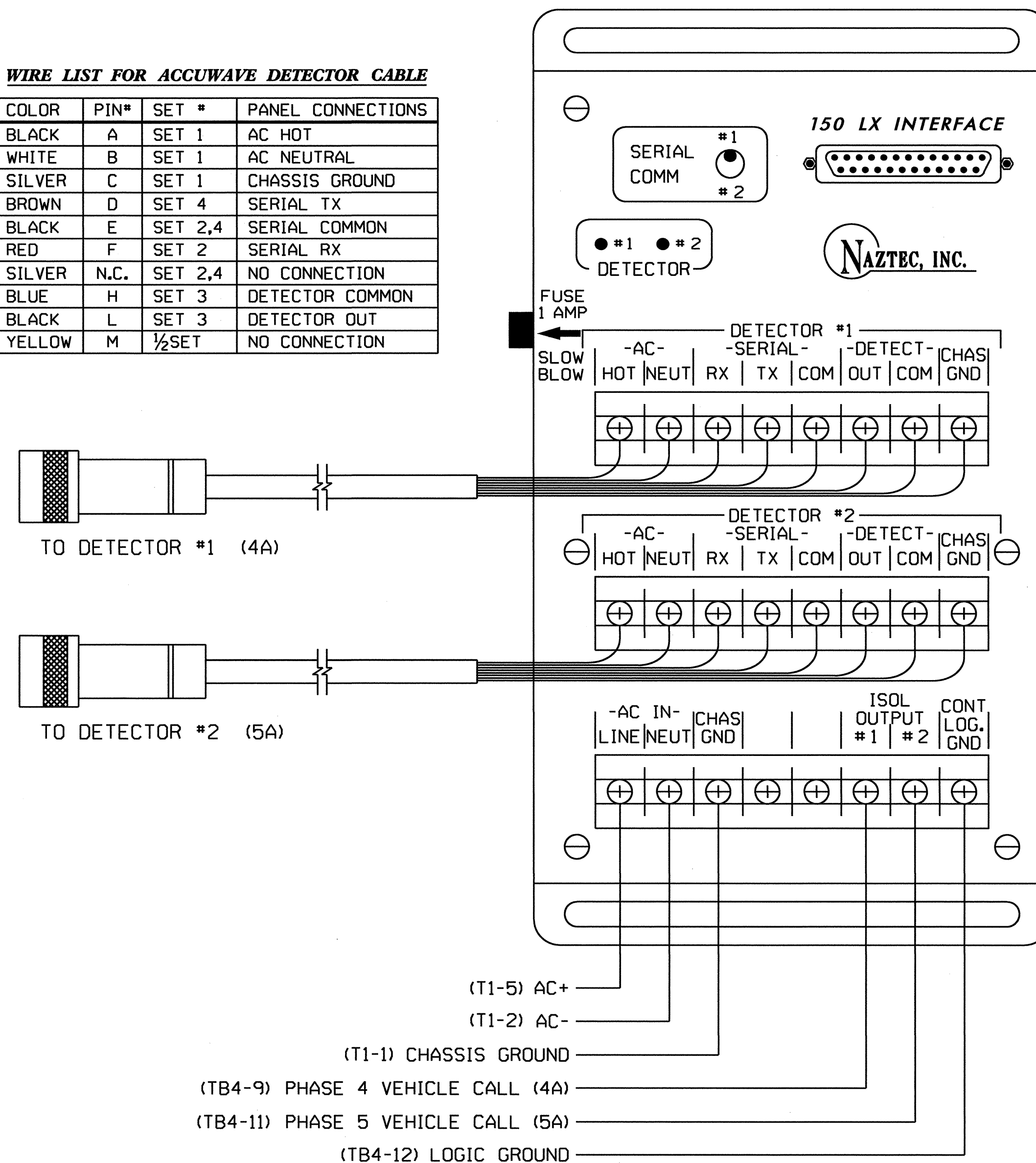
NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

ACCUWAVE DETECTOR PANEL WIRING DETAIL FOR LOOPS 4A & 5A

(wire as shown)

WIRE LIST FOR ACCUWAVE DETECTOR CABLE

COLOR	PIN#	SET #	PANEL CONNECTIONS
BLACK	A	SET 1	AC HOT
WHITE	B	SET 1	AC NEUTRAL
SILVER	C	SET 1	CHASSIS GROUND
BROWN	D	SET 4	SERIAL TX
BLACK	E	SET 2,4	SERIAL COMMON
RED	F	SET 2	SERIAL RX
SILVER	N.C.	SET 2,4	NO CONNECTION
BLUE	H	SET 3	DETECTOR COMMON
BLACK	L	SET 3	DETECTOR OUT
YELLOW	M	1/2 SET	NO CONNECTION



NOTES:

- Detectors are Accuwave Model 150LX presence detectors.
- Information in the detector cable wire list chart is for cable purchased from Naztec and may vary if purchased from another source.

Temporary Signal 1 (TCP Phase 2) - Sheet 3 of 3

<p>Prepared In the Offices of:</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>NC 18 (Sterling Street) at I-40 EB Ramp</p>		<p>SEAL</p>
	<p>Division 13</p> <p>PLANNING DATE: February 2011</p> <p>PREPARED BY: S. Armstrong</p>	<p>Burke County</p> <p>REVIEWED BY: T. J. [Signature]</p> <p>REVIEWED BY:</p>	

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0591T1
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

PHASING DIAGRAM

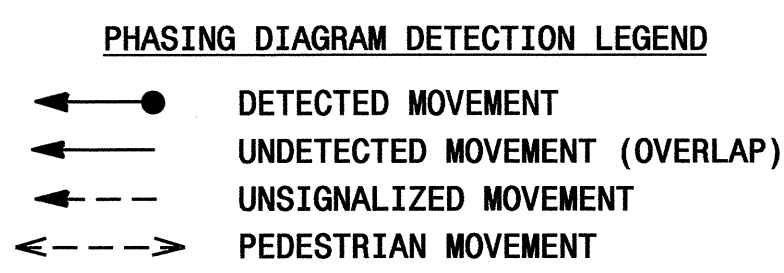
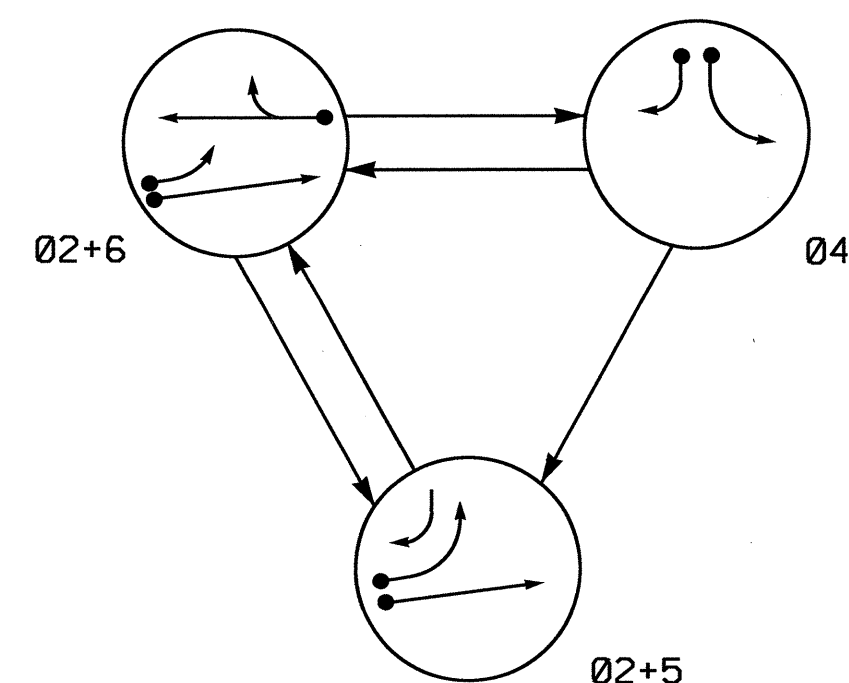


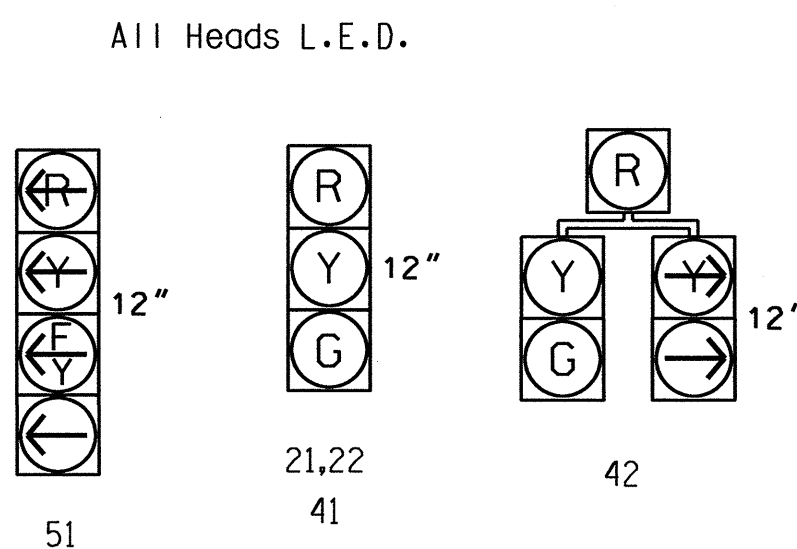
TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02+5	02+6	04	FLASH
21,22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51	←	←	←	←
61,62	R	G	R	Y

STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL

FROM	TO			
	1	2	1	2
←	←	←	←	←
→	→	→	→	→
↔	↔	↔	↔	↔
↔	↔	↔	↔	↔

SIGNAL FACE I.D.



OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

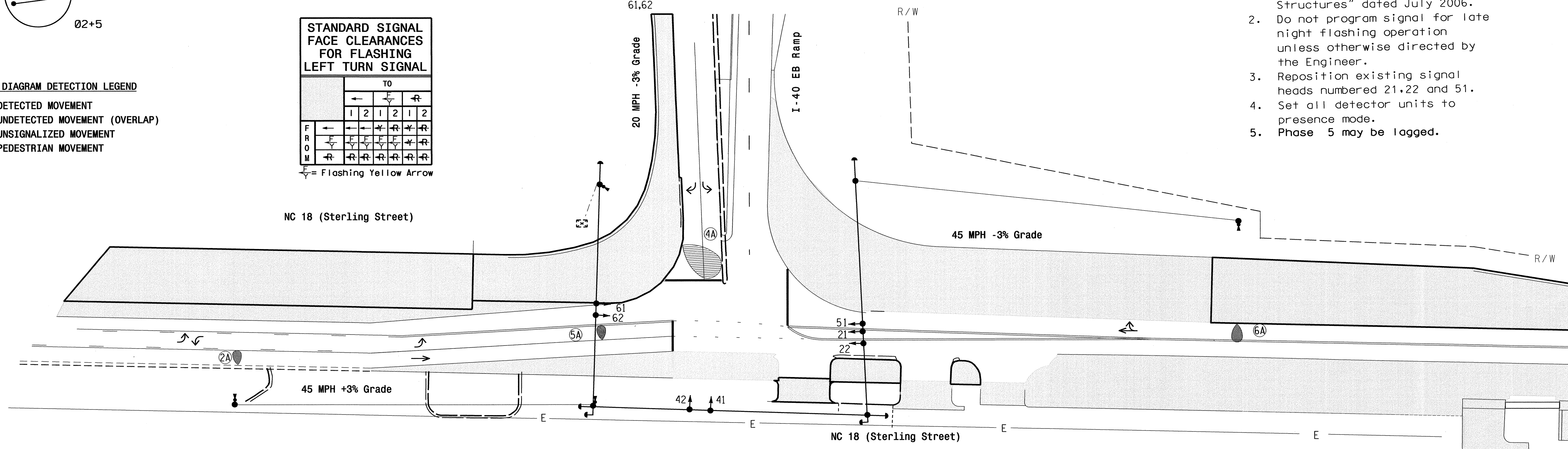
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING						
					PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	*	300	*	-	2	Y	Y	-	-	-	-
4A	*	0	*	-	4	Y	Y	-	-	5	-
5A	*	50	*	-	5	Y	Y	-	-	10	-
6A	*	300	*	-	6	Y	Y	-	-	-	-

* Microwave Detection Zone

3 Phase Fully Actuated Isolated

NOTES

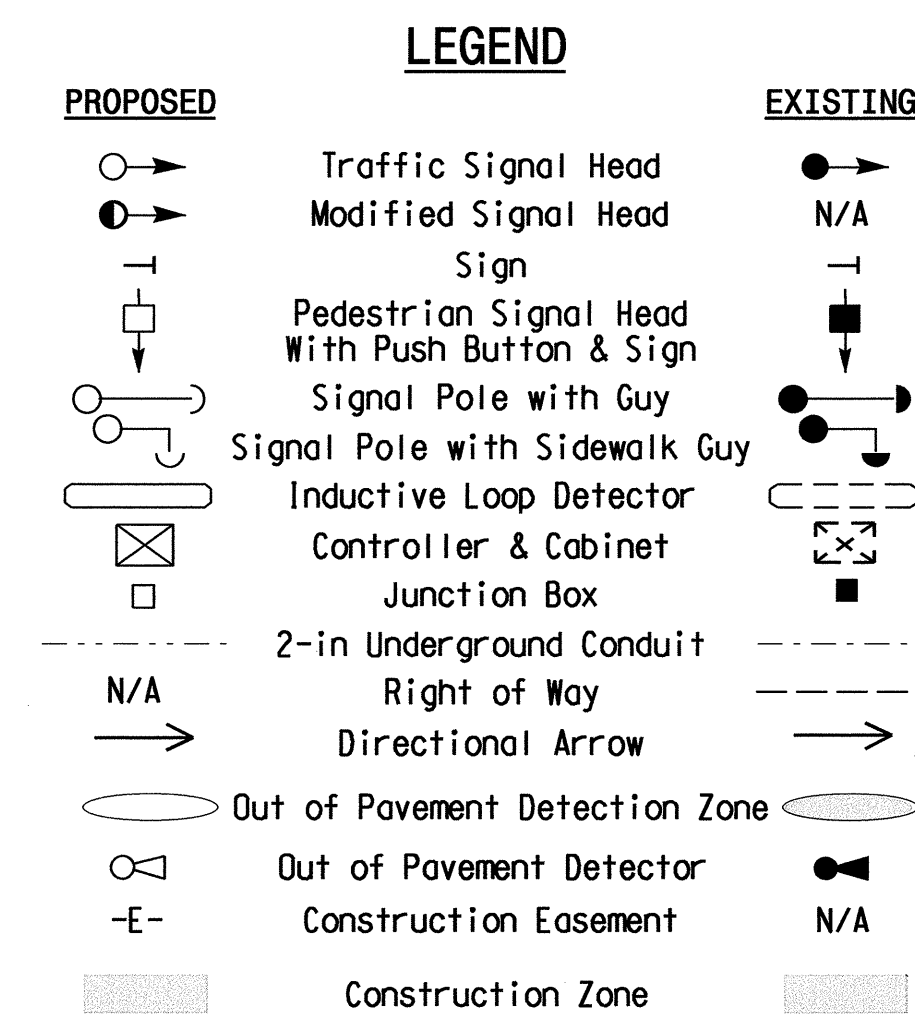
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 21,22 and 51.
- Set all detector units to presence mode.
- Phase 5 may be lagged.



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 *	90	30	20	90
Yellow Clearance	4.3	3.0	3.0	4.8
Red Clearance	1.1	2.4	2.1	1.2
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	2.5	-	-	2.5
Max Variable Initial *	34	-	-	34
Time Before Reduction *	30	-	-	30
Time To Reduce *	15	-	-	15
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.



Temporary Signal 2 (TCP Phase 4)

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
Signal Design Section

NC 18 (Sterling Street) at I-40 EB Ramp

Division 13 Burke County Morganton

PLAN DATE: January 2011 REVIEWED BY: [Signature]

PREPARED BY: Jerry Yaravitz REVIEWED BY: [Signature]

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 1"=40'

SIGNATURE: [Signature] DATE: 3/1/11

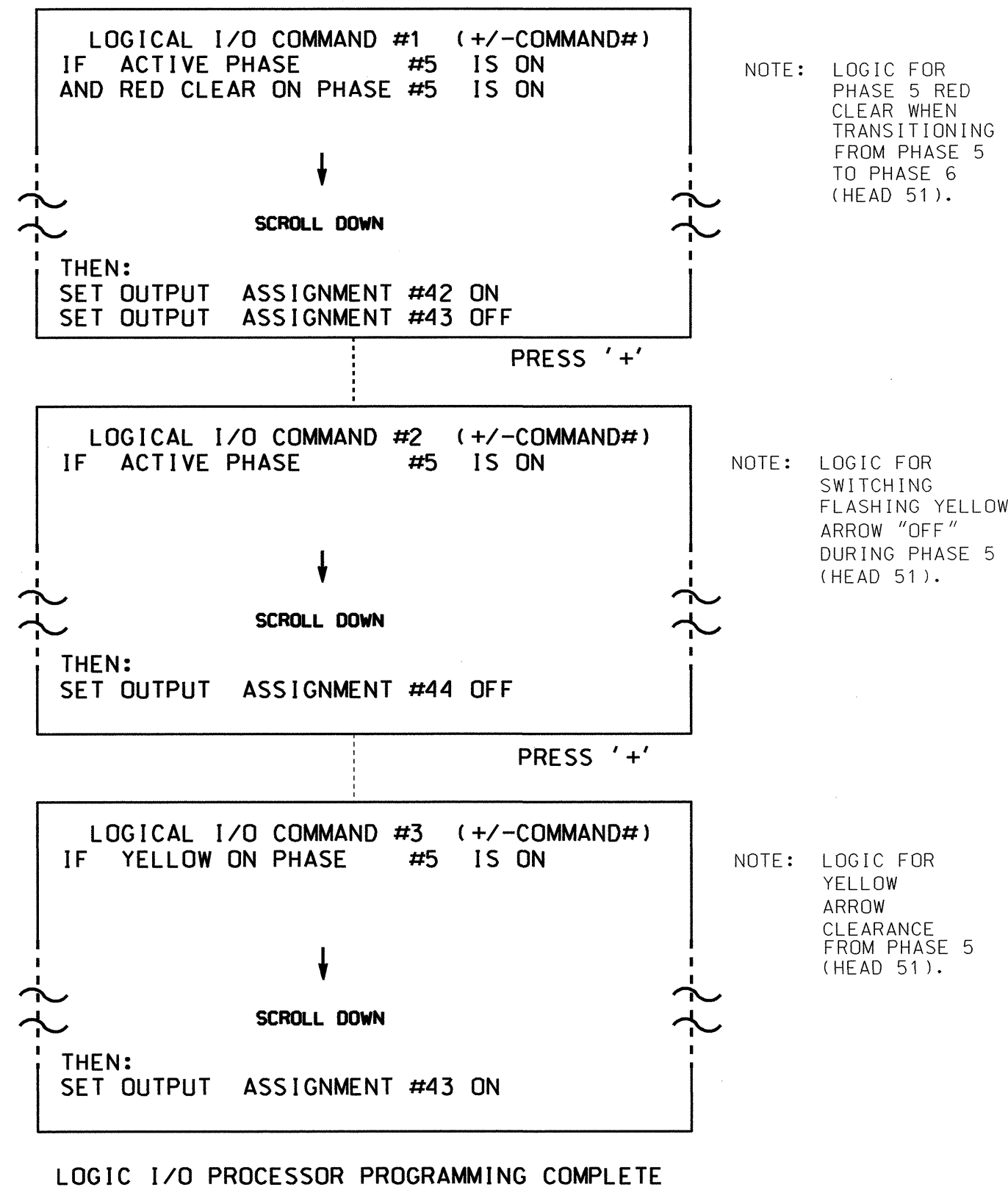
SIG. INVENTORY NO. 13-0591T2

28-FEB-2011 09:55 R:\IT\Traffic\Signal\13-0591\13-0591T2.sfg.dwg, 2010mdd.dgn jyaravitz

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

(program controller as shown below)

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



OUTPUT REFERENCE SCHEDULE	
OUTPUT 42 =	Overlap C Red
OUTPUT 43 =	Overlap C Yellow
OUTPUT 44 =	Overlap C Green

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 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: 13-0591T2
DESIGNED: January 2011
SEALED: 3/1/11
REVISED: N/A

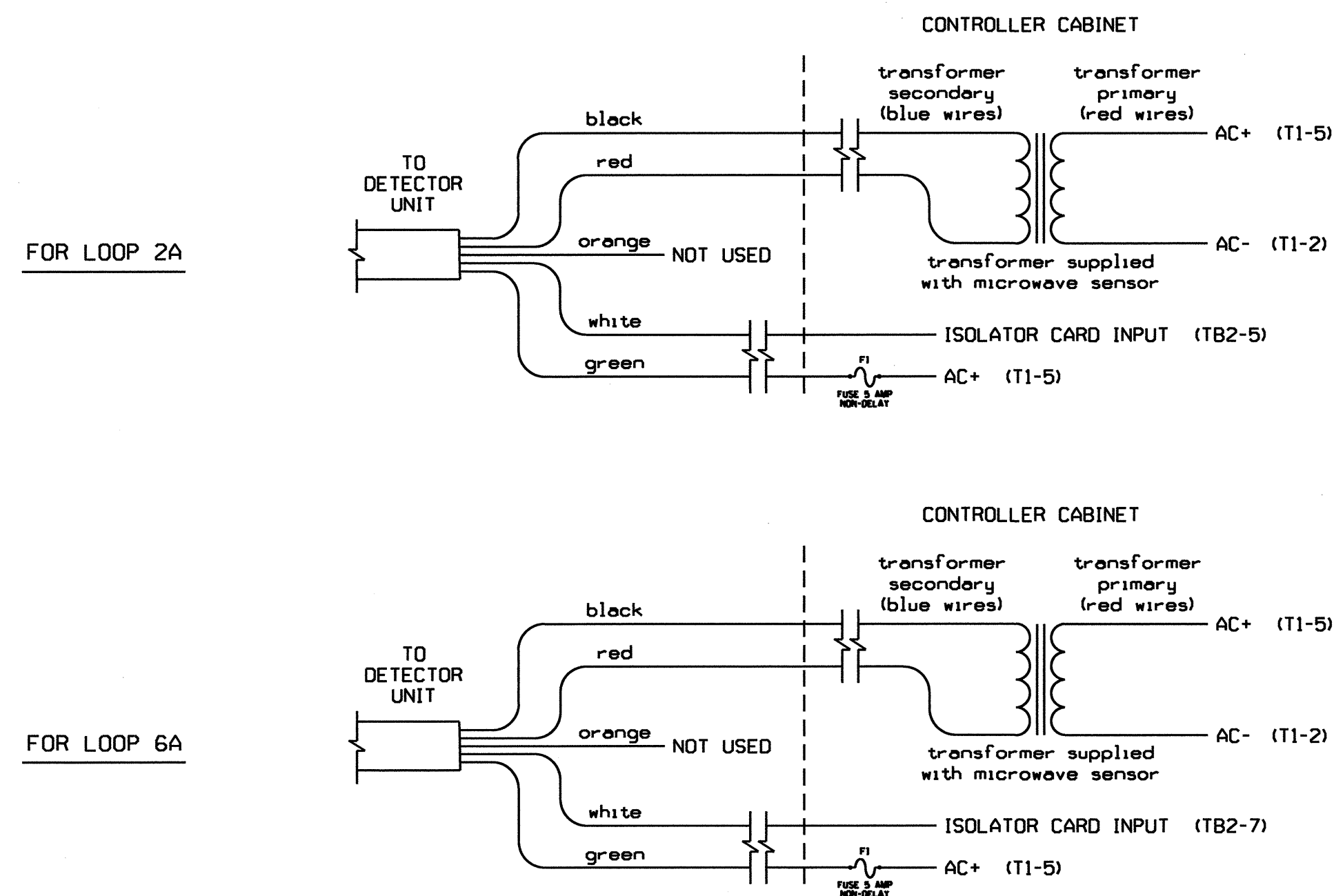
02-MAR-2011 10:05
S:\IT\SIGNALS\113-SIGNALS\work\cupas45\g_ham\armstrong\130591T2.sm.ele.xxx.dgn
armstrong

Temporary Signal 2 (TCP Phase 4) - Sheet 2 of 3

	ELECTRICAL AND PROGRAMMING DETAILS FOR:		NC 18 (Sterling Street) at I-40 EB Ramp		
	Prepared In the Offices of:	Division 13	Burke County	Morganton	
	PLAN DATE: February 2011	PREPARED BY: S. Armstrong	REVIEWED BY: T. J. J...	REVIEWED BY:	
	REVISIONS	INIT.	DATE		
					SIGNATURE: <i>George C. Brown</i> 3/4/11 DATE: 3/4/11 SIG. INVENTORY NO. 13-0591T2

MICROWAVE DETECTOR WIRING DETAIL FOR LOOPS 2A AND 6A

(wire as shown)



TC26B WIRE LIST

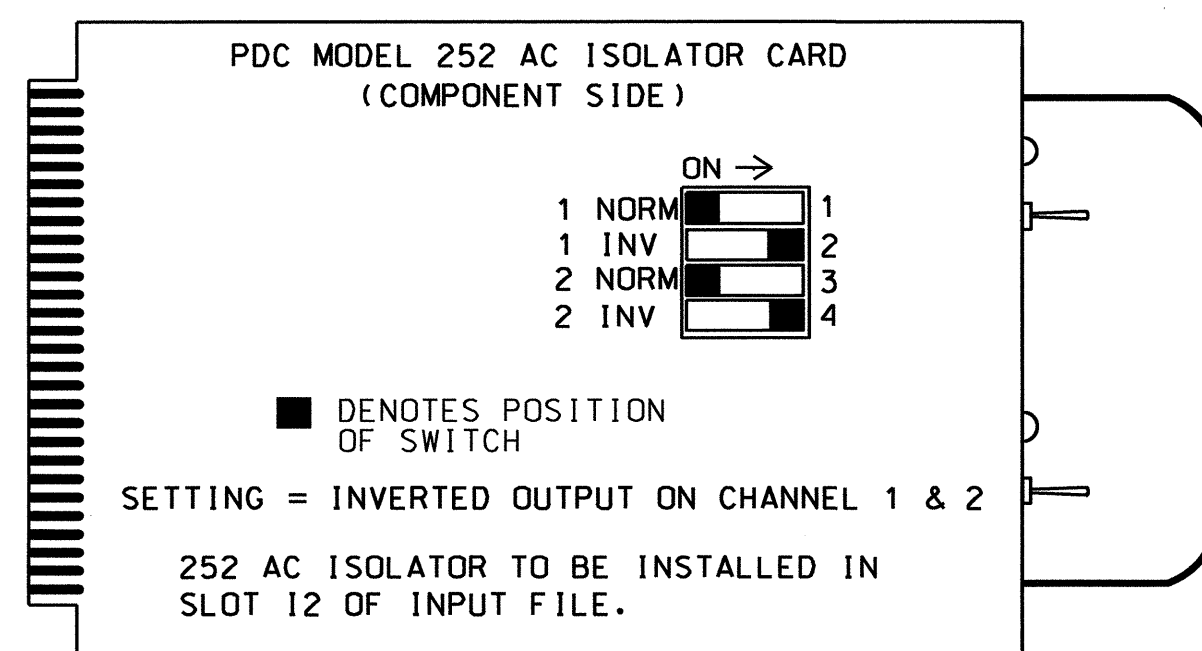
COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

NOTES:

- Sensors are Microwave Sensors, Inc. Model TC-26B microwave motion detectors mounted on poles as indicated on the Signal Design Plans.
- Configure AC isolator cards to place call upon removal of AC+ from the input.
- Important: For proper operation of the microwave detector, make sure surge protection has been removed from TB2-5 and TB2-6, and from TB2-7 and TB2-8. Make sure TB2-6 and TB2-8 are tied to AC neutral.

MICROWAVE DETECTOR AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



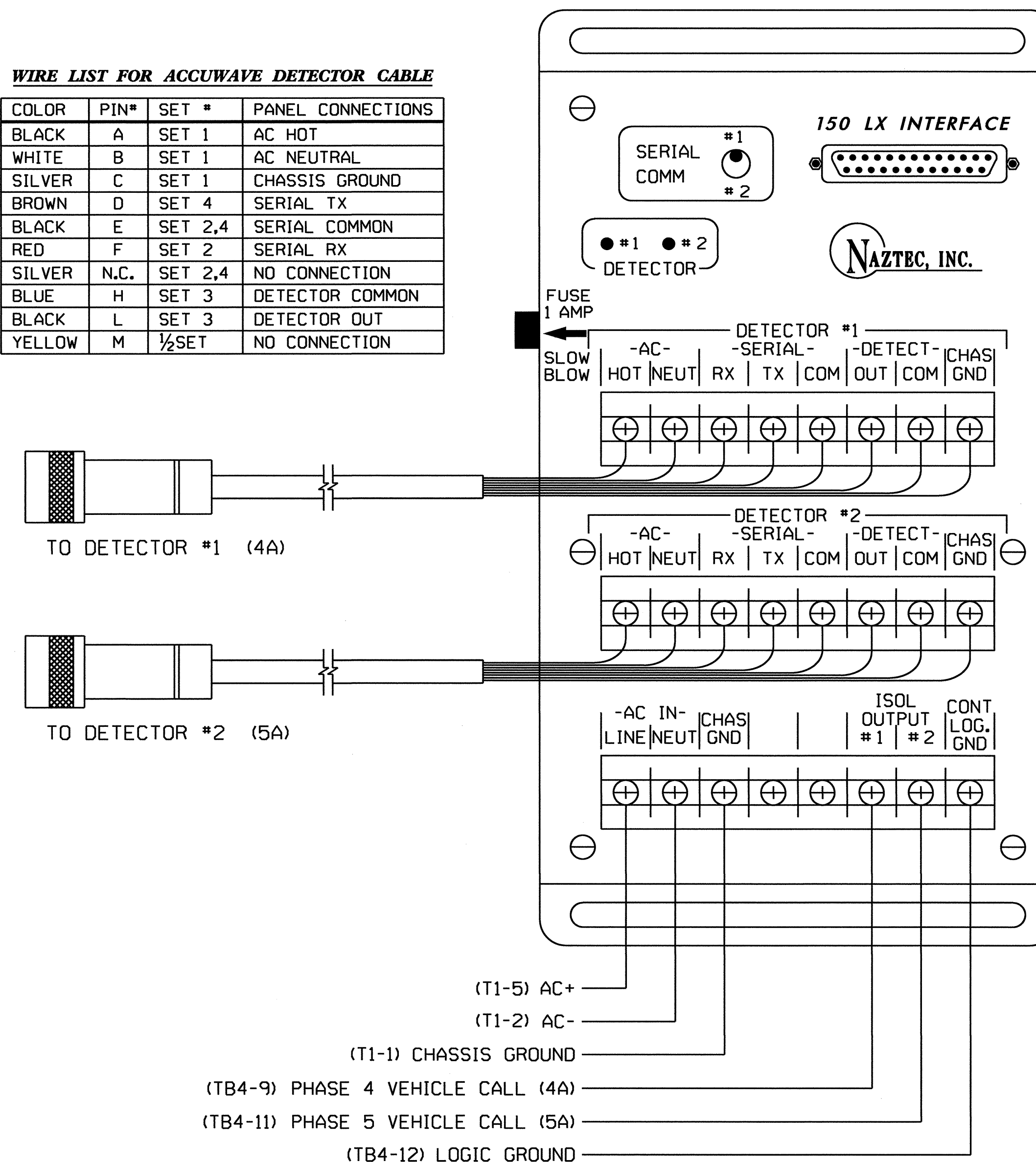
NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

ACCUWAVE DETECTOR PANEL WIRING DETAIL FOR LOOPS 4A & 5A

(wire as shown)

WIRE LIST FOR ACCUWAVE DETECTOR CABLE

COLOR	PIN#	SET #	PANEL CONNECTIONS
BLACK	A	SET 1	AC HOT
WHITE	B	SET 1	AC NEUTRAL
SILVER	C	SET 1	CHASSIS GROUND
BROWN	D	SET 4	SERIAL TX
BLACK	E	SET 2,4	SERIAL COMMON
RED	F	SET 2	SERIAL RX
SILVER	N.C.	SET 2,4	NO CONNECTION
BLUE	H	SET 3	DETECTOR COMMON
BLACK	L	SET 3	DETECTOR OUT
YELLOW	M	1/2 SET	NO CONNECTION



NOTES:

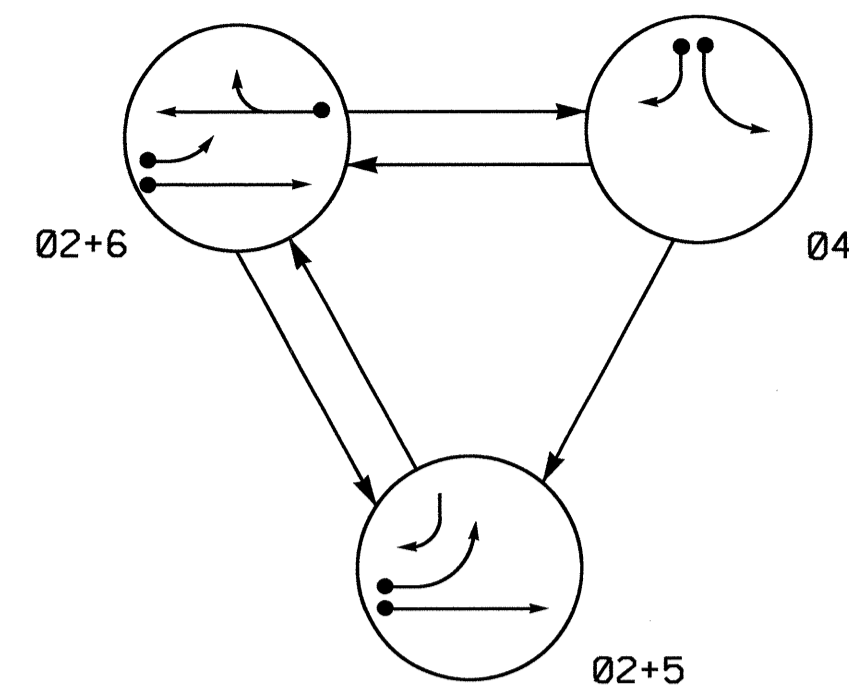
- Detectors are Accuwave Model 150LX presence detectors.
- Information in the detector cable wire list chart is for cable purchased from Naztec and may vary if purchased from another source.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0591T2
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

Temporary Signal 2 (TCP Phase 4) - Sheet 3 of 3

	ELECTRICAL AND PROGRAMMING DETAILS FOR:		NC 18 (Sterling Street) at I-40 EB Ramp		SEAL STATE OF TENNESSEE PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN SIGNATURE DATE
	Division 13 PLAN DATE: February 2011 PREPARED BY: S. Armstrong	Burke County REVIEWED BY: [Signature] REVIEWED BY:	MORGANTON	REVISIONS INIT. DATE	

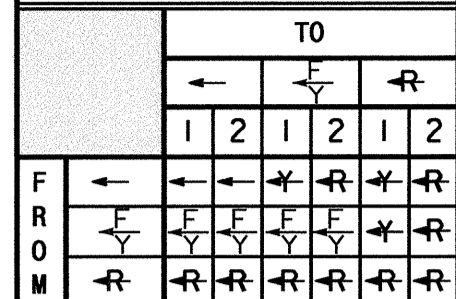
PHASING DIAGRAM



SIGNAL FACE	PHASE			
	0 2 + 5	0 2 + 6	0 4	F LASHING YELLOW
21,22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51	F	F	R	Y
61,62	R	G	R	Y

F = Flashing Yellow Arrow

STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL



F = Flashing Yellow Arrow

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING							
				NEW LOOP	PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	*	300	*	-	2	Y	Y	-	-	-	-
4A	*	0	*	-	4	Y	Y	-	-	5	-
5A	*	50	*	-	5	Y	Y	-	-	10	-
6A	*	300	*	-	6	Y	Y	-	-	-	-

* Microwave Detection Zone

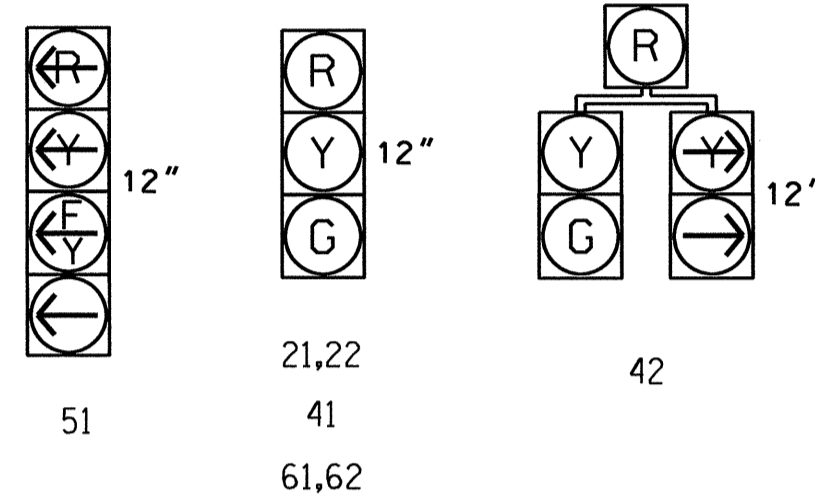
3 Phase Fully Actuated Isolated

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. Reposition existing signal heads numbered 41 and 42.
4. Set all detector units to presence mode.
5. Phase 5 may be lagged.

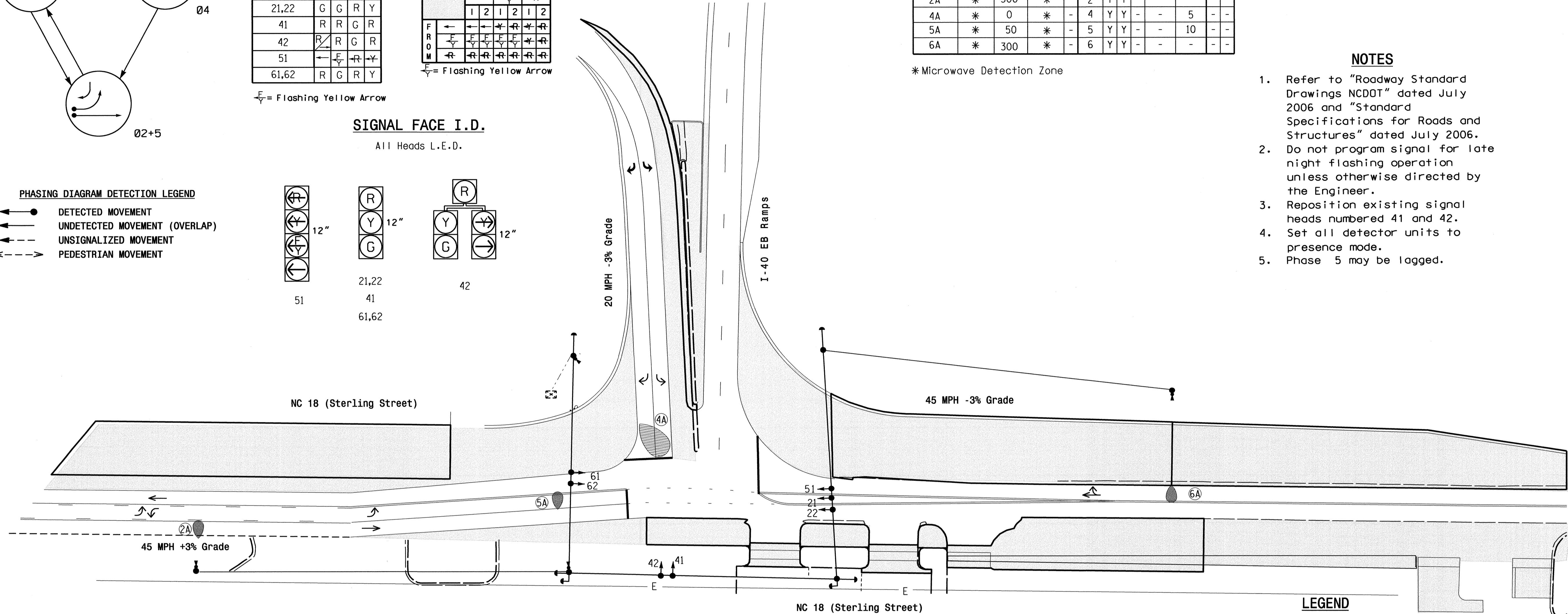
SIGNAL FACE I.D.

All Heads L.E.D.



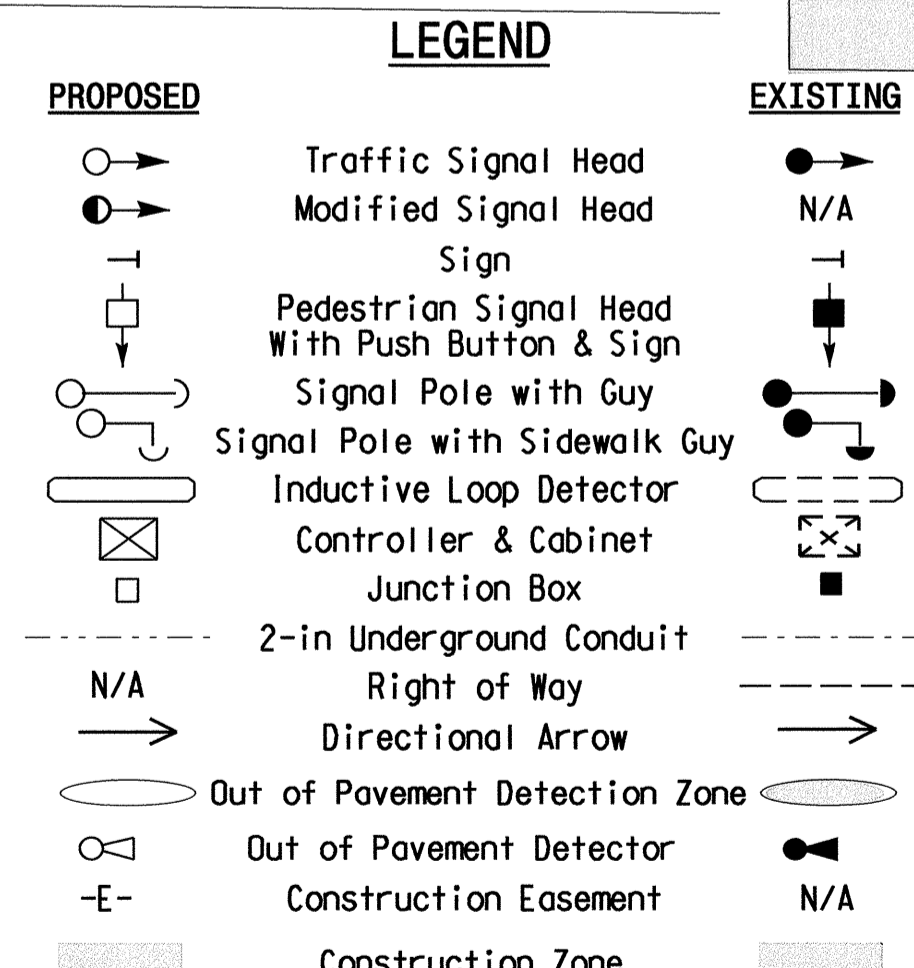
PHASING DIAGRAM DETECTION LEGEND

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



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 *	90	30	20	90
Yellow Clearance	4.3	3.0	3.0	4.8
Red Clearance	1.3	2.6	2.4	1.3
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	2.5	-	-	2.5
Max Variable Initial *	34	-	-	34
Time Before Reduction *	30	-	-	30
Time To Reduce *	15	-	-	15
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.



Temporary Signal 3 (TCP Phase 4)

750 N. Greenfield Pkwy, Garner, NC 27529

**NC 18 (Sterling Street)
at
I-40 EB Ramp**

Division 13 - Burke County - Morganton

PLAN DATE: January 2011 REVIEWED BY: [Signature]

PREPARED BY: Jerry Yaravitz REVIEWED BY: [Signature]

SCALE: 1" = 40'

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER

SEAL 30530

ZACHARY W. LITTLE

DATE: 3/1/11

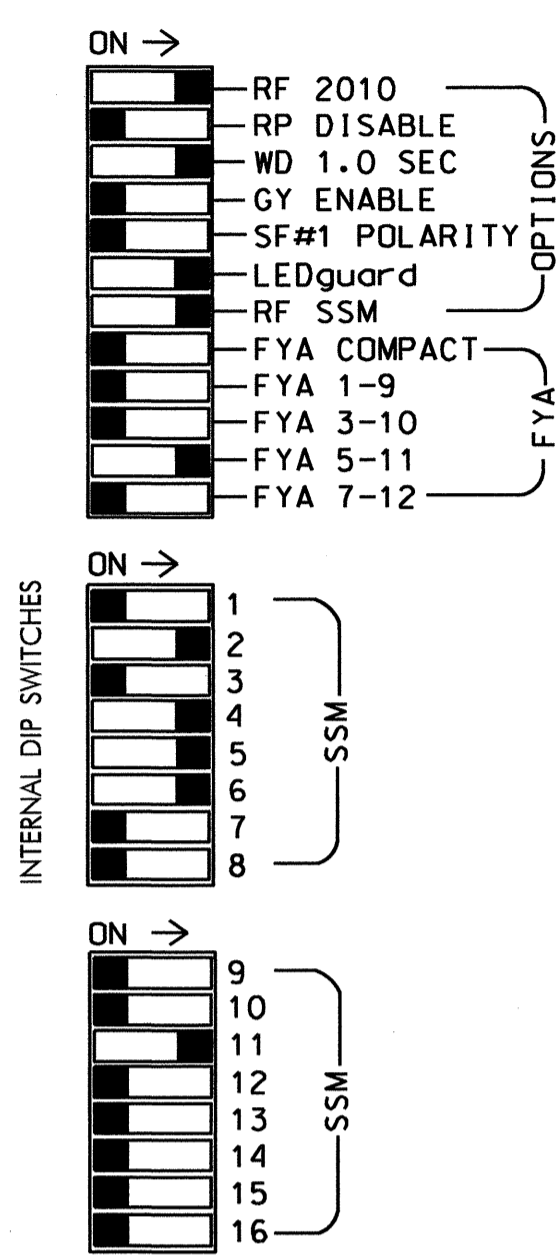
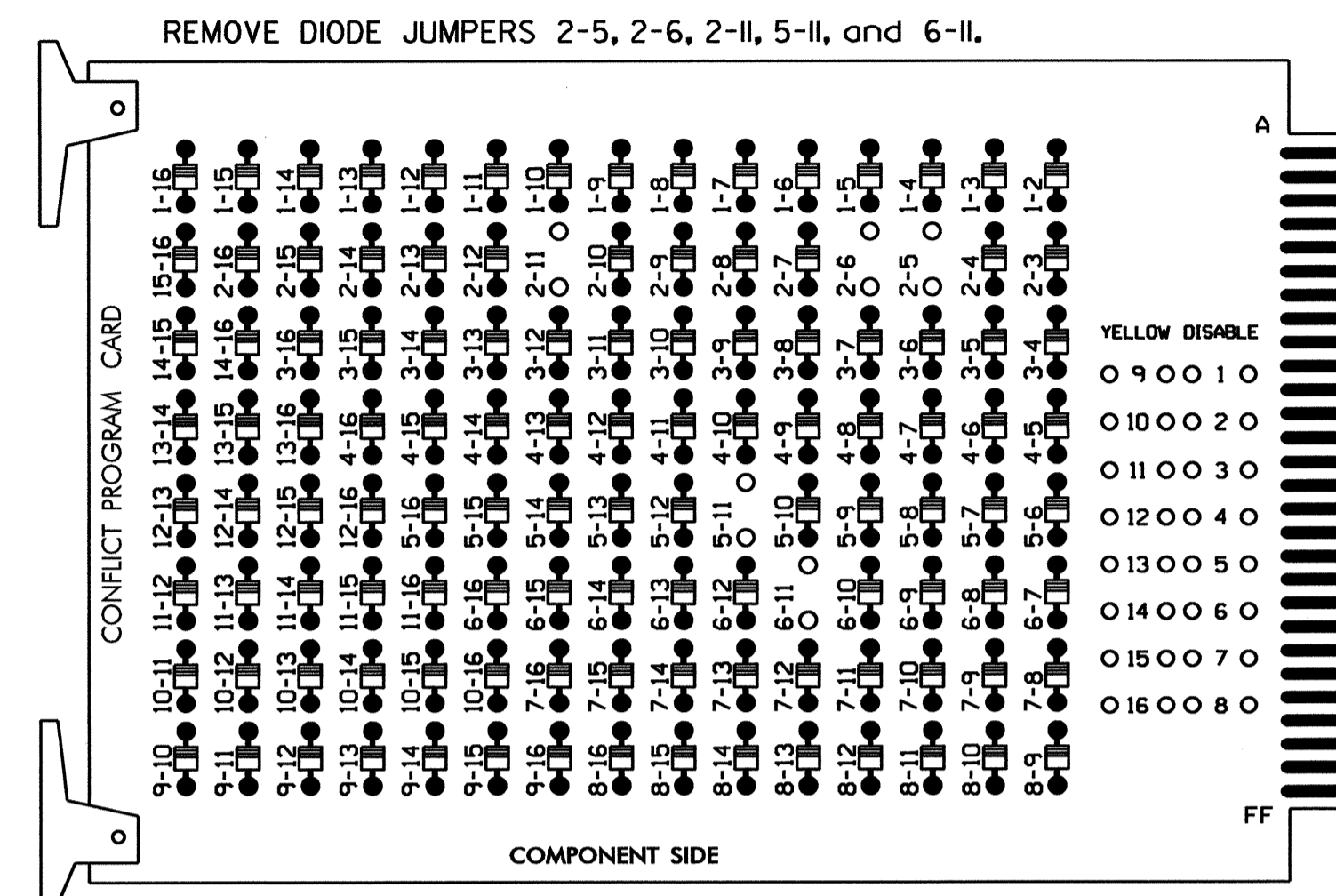
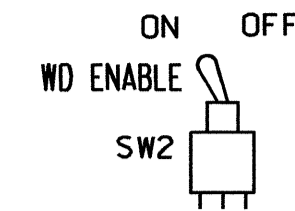
SIGNATURE: [Signature]

INVENTORY NO. 13-059173

03-MAR-2011 10:31:35 R:\projects\13-059173\sig_cen_2010madd.dgn jyaravitz

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

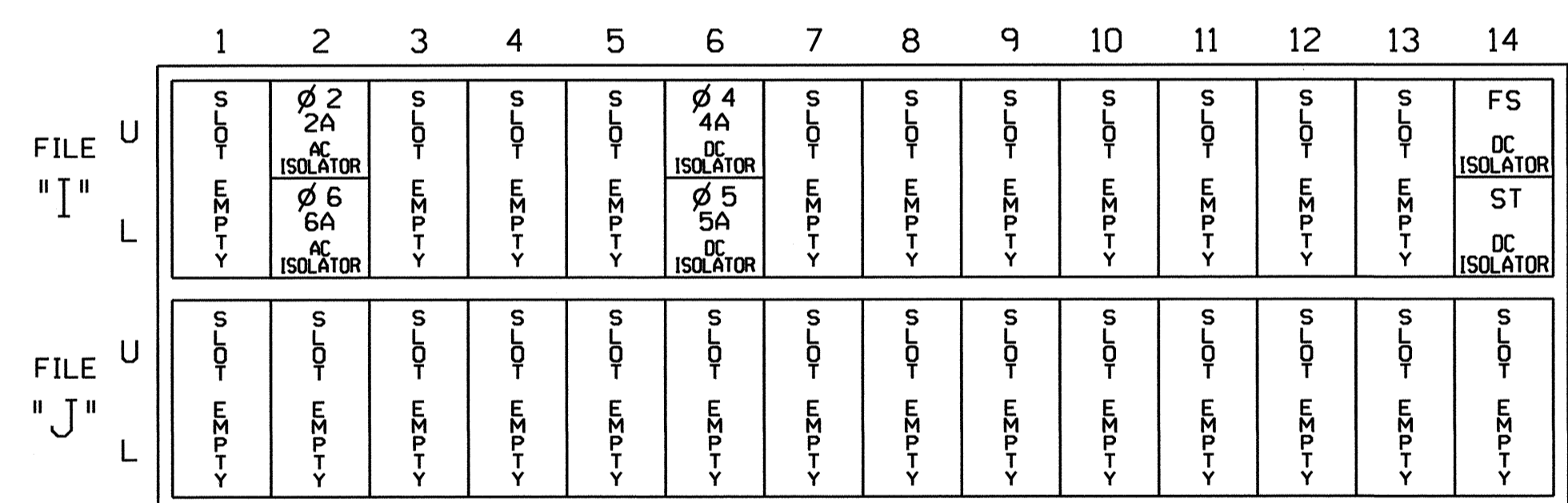
(remove jumpers and set switches as shown)



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.

INPUT FILE POSITION LAYOUT
(front view)



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

Note: Install a model 252 AC isolator in slot 12, and a model 242 DC isolator in slot 16 for use with microwave detectors. See the Microwave Detector Wiring Details on sheet 3.

IMPORTANT: For proper operation of the microwave detector, make sure surge protection has been removed from TB2-5 and TB2-6, and from TB2-7 and TB2-8. A DIRECT SHORT WILL OCCUR IF THIS HAS NOT BEEN DONE. Make sure TB2-6 and TB2-8 are tied to AC neutral.

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 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

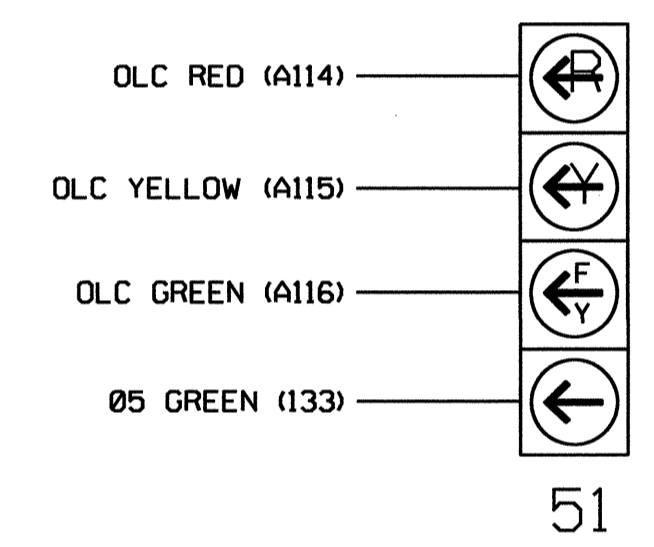
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	9	10	11	12	13	14
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	42	51*	61,62	NU	NU	NU	NU	NU	NU	NU	51*	NU
RED		128			101		*	134										
YELLOW		129			102			135										
GREEN		130			103			136										
RED ARROW																		A114
YELLOW ARROW							132											A115
FLASHING YELLOW ARROW																		A116
GREEN ARROW							133	133										

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

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,S4,S5,S6,S12
PHASES USED.....2,4,5,6
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....5+6
OVERLAP "D".....NOT USED

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



NOTE

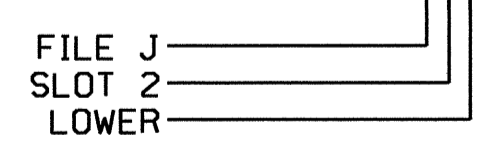
The sequence display for signal head 51 requires special logic programming. See sheet 2 of 3 for programming instructions.

INPUT FILE CONNECTION & PROGRAMMING CHART

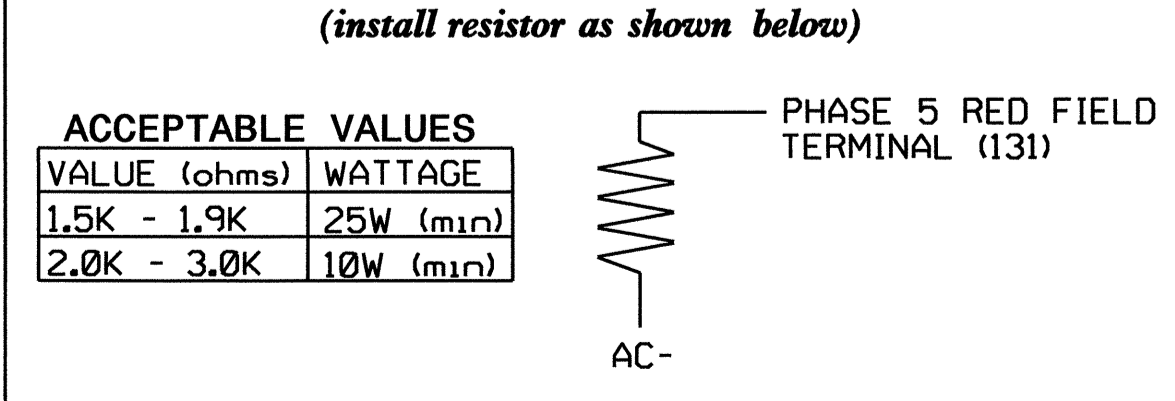
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
* 2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
** 4A	TB4-9,10	I6U	41	3	4	4	Y	Y			5
** 5A	TB4-11,12	I6L	45	7	14	5	Y	Y			10
* 6A	TB2-7,8	I2L	43	5	12	6	Y	Y			

- * Microwave pulse detector - see wiring detail on sheet 3.
- ** Microwave presence detector - see wiring detail on sheet 3.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL
(install resistor as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0591T3
DESIGNED: January 2011
SEALED: 3/1/11
REVISED: N/A

Temporary Signal 3 (TCP Phase 4) - Sheet 1 of 3

Electrical and Programming Details For: **NC 18 (Sterling Street) at I-40 EB Ramp**

Division 13 Burke County Morganton

Prepared By: **S. Armstrong** Reviewed By: **T. Joyce**

PLAN DATE: February 2011

750 N. Greenfield Hwy, Garner, NC 27529

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER 022013 GEORGE C. BROWN

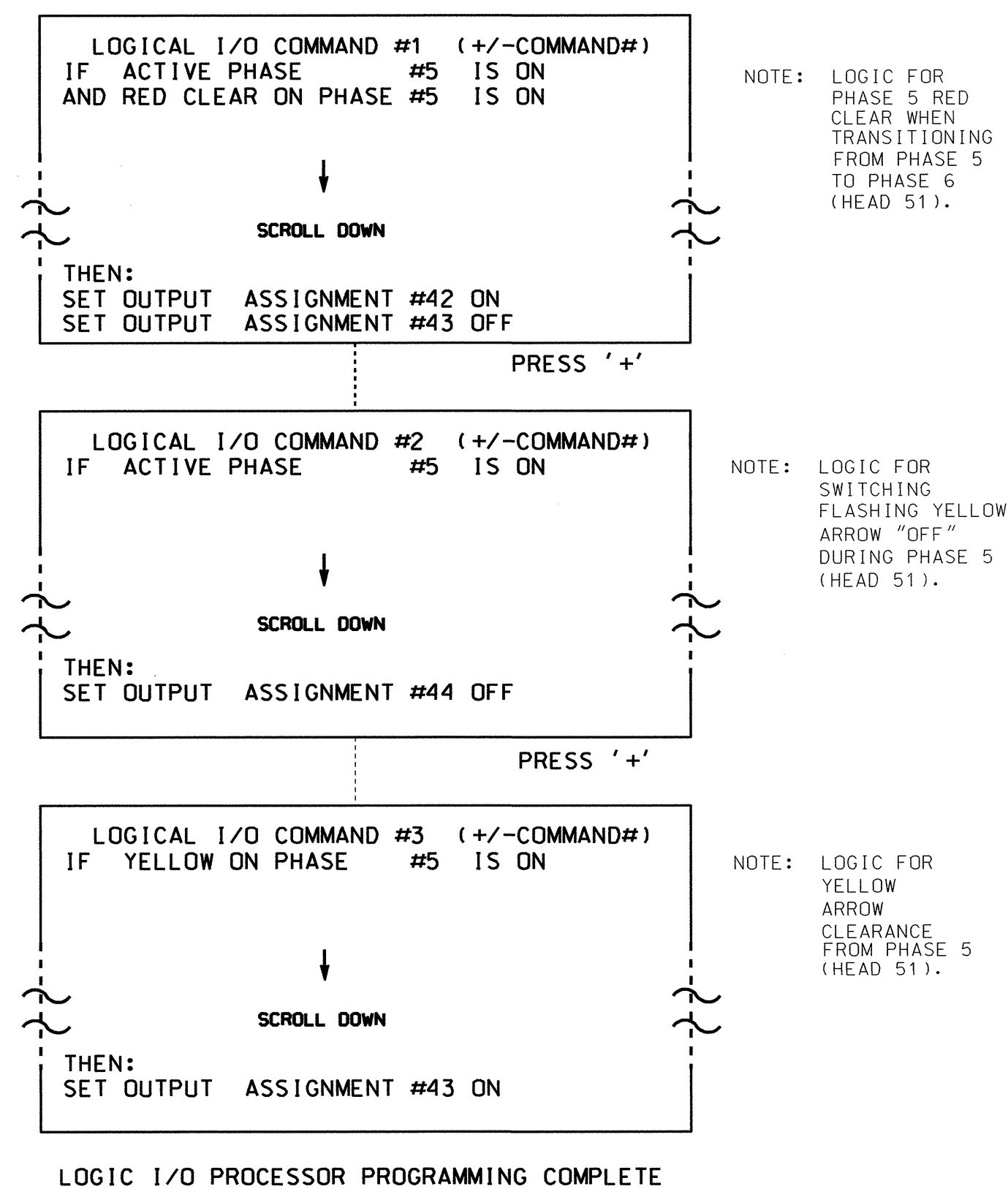
SIG. INVENTORY NO. 13-0591T3

02-MAR-2011 12:15 S:\IT\SAS\MTS Signal\workgroups\sig Mon\armstrong\130591T3_sig.ele.xxx.dgn

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

OUTPUT 42 = Overlap C Red
 OUTPUT 43 = Overlap C Yellow
 OUTPUT 44 = Overlap C Green

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

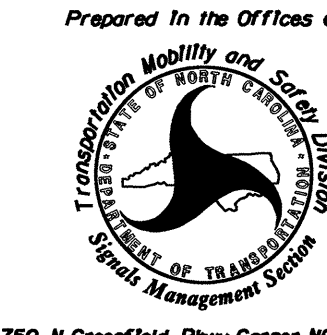
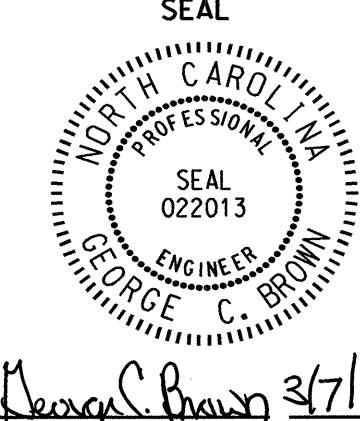
← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 13-0591T3
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

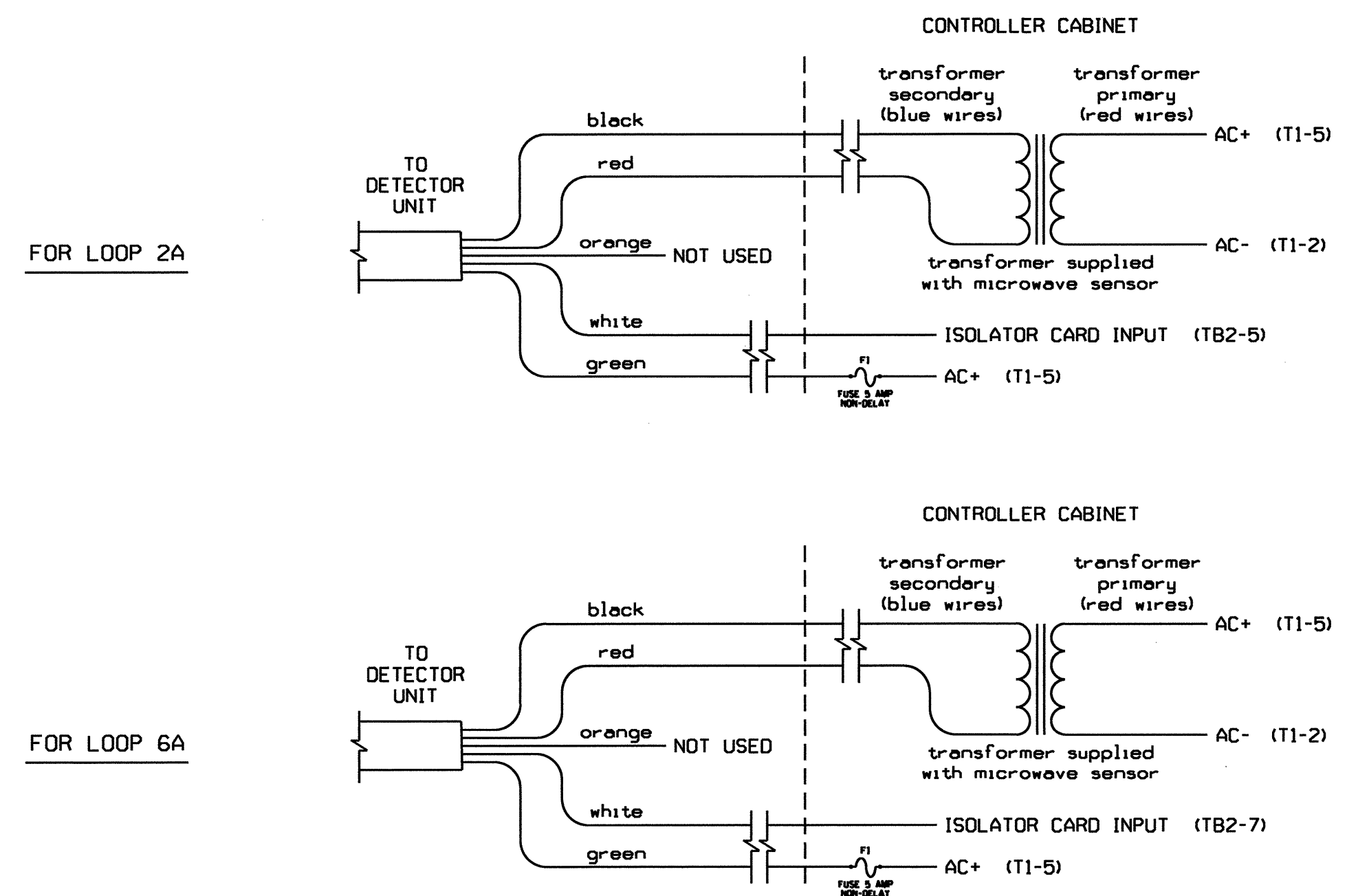
02-MAR-2011 12:16 S:\113545\113545\Sigs\Sig\13-0591T3.dgn

Temporary Signal 3 (TCP Phase 4) - Sheet 2 of 3

	<p>NC 18 (Sterling Street) at I-40 EB Ramp</p> <p>Division 13 Burke County Morganton</p> <p>PLAN DATE: February 2011 REVIEWED BY: <i>T. J. J.</i></p> <p>PREPARED BY: S. Armstrong REVIEWED BY:</p>							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		REVISIONS	INIT.	DATE				<p><i>George C. Brown</i> 3/7/11 SIGNATURE DATE</p>
REVISIONS	INIT.	DATE						
<p style="text-align: center;">750 N. Greenfield Pkwy, Garner, NC 27529</p>		<p>SIG. INVENTORY NO. 13-0591T3</p>						

MICROWAVE DETECTOR WIRING DETAIL FOR LOOPS 2A AND 6A

(wire as shown)



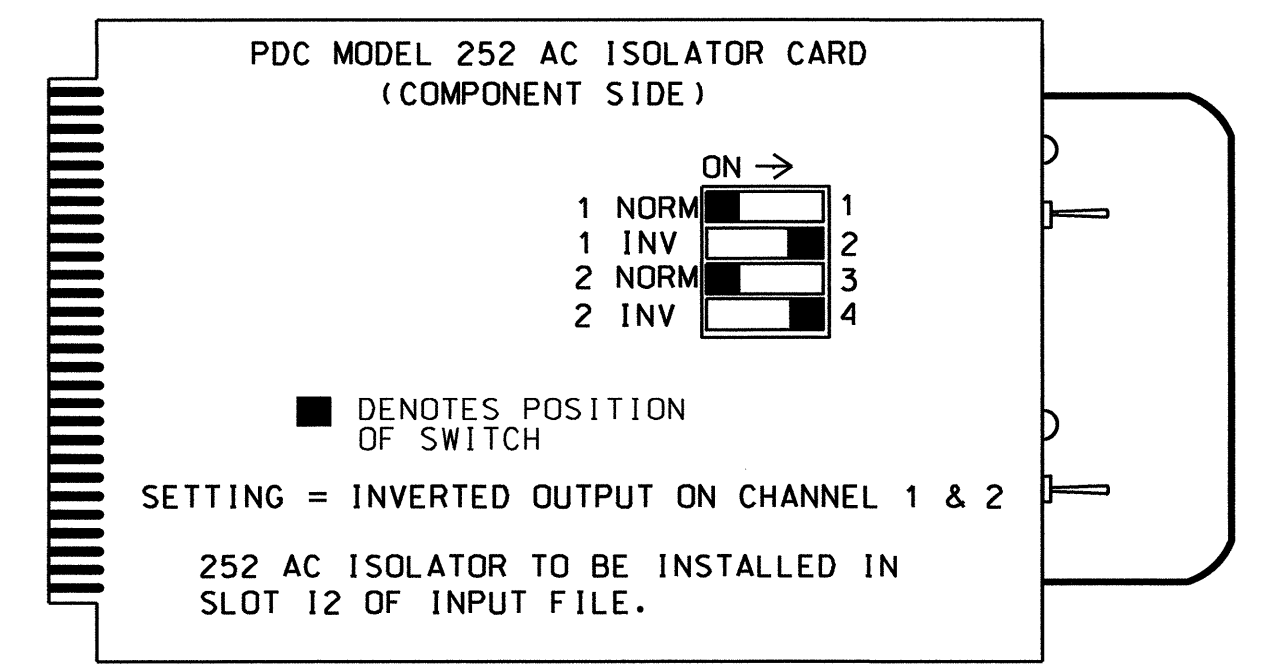
TC26B WIRE LIST

COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

- NOTES:**
- Sensors are Microwave Sensors, Inc. Model TC-26B microwave motion detectors mounted on poles as indicated on the Signal Design Plans.
 - Configure AC isolator cards to place call upon removal of AC+ from the input.
 - Important: For proper operation of the microwave detector, make sure surge protection has been removed from TB2-5 and TB2-6, and from TB2-7 and TB2-8. Make sure TB2-6 and TB2-8 are tied to AC neutral.

MICROWAVE DETECTOR AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



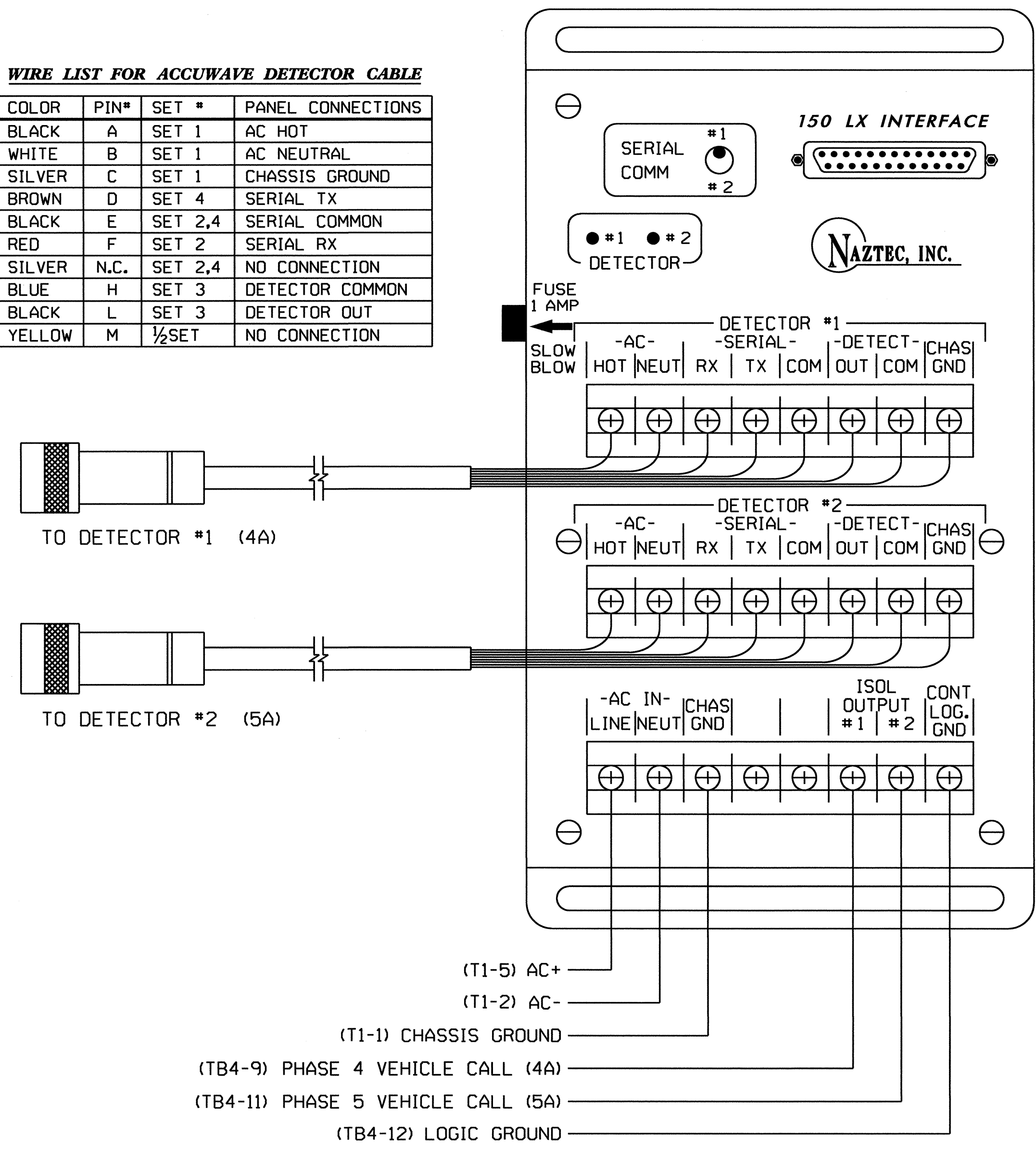
NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

ACCUWAVE DETECTOR PANEL WIRING DETAIL FOR LOOPS 4A & 5A

(wire as shown)

WIRE LIST FOR ACCUWAVE DETECTOR CABLE

COLOR	PIN#	SET #	PANEL CONNECTIONS
BLACK	A	SET 1	AC HOT
WHITE	B	SET 1	AC NEUTRAL
SILVER	C	SET 1	CHASSIS GROUND
BROWN	D	SET 4	SERIAL TX
BLACK	E	SET 2,4	SERIAL COMMON
RED	F	SET 2	SERIAL RX
SILVER	N.C.	SET 2,4	NO CONNECTION
BLUE	H	SET 3	DETECTOR COMMON
BLACK	L	SET 3	DETECTOR OUT
YELLOW	M	1/2 SET	NO CONNECTION



- NOTES:**
- Detectors are Accuwave Model 150LX presence detectors.
 - Information in the detector cable wire list chart is for cable purchased from Naztec and may vary if purchased from another source.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0591T3
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

Temporary Signal 3 (TCP Phase 4) - Sheet 3 of 3

	<p>NC 18 (Sterling Street) at I-40 EB Ramp</p>			
	<p>Division 13</p>	<p>Burke County</p>		<p>Morganton</p>
	<p>PLAN DATE: February 2011</p>	<p>REVIEWED BY: T. J. J.</p>		<p>PREPARED BY: S. Armstrong</p>
	<p>REVISIONS</p>	<p>INIT.</p>		<p>DATE</p>

750 N. Greenfield Pkwy, Garner, NC 27529

SIG. INVENTORY NO. 13-0591T3

03-NR-2011-0917
 S:\13ASU\13-0591T3-01\13-0591T3-sm.ele.xxx.dgn
 M:\armstrong\130591T3-sm.ele.xxx.dgn
 armstrong

PHASING DIAGRAM

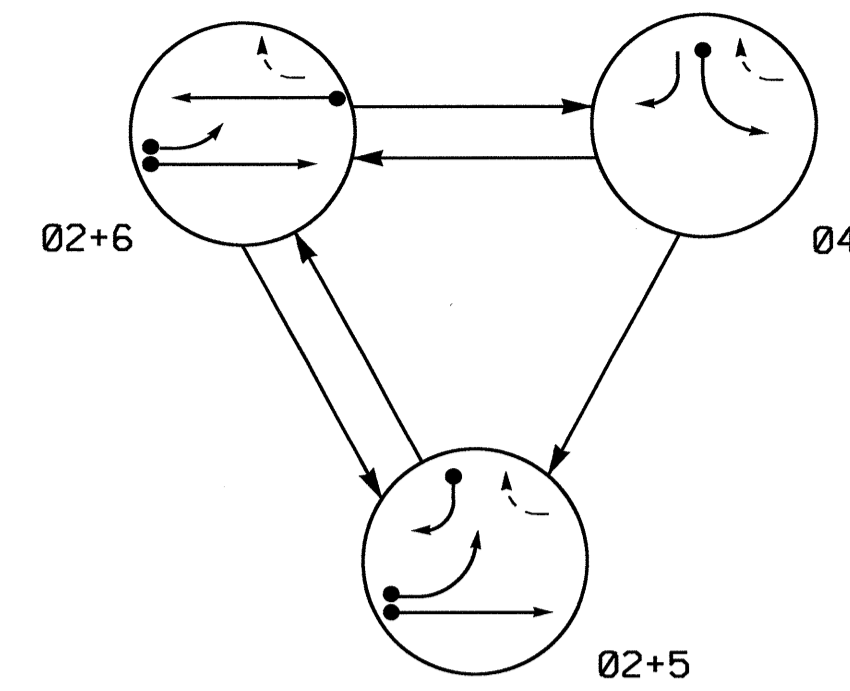


TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02+5	02+6	04	FLASHING
21,22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51	F	F	F	F
61,62	R	G	R	Y

STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL

	TO			
	1	2	1	2
FROM 1	←	←	←	←
FROM 2	←	←	←	←
FROM 1	←	←	←	←
FROM 2	←	←	←	←

F = Flashing Yellow Arrow

OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING							
				NEW LOOP	PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	*	300	*	-	2	Y	Y	-	-	-	-
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	15	-	Y
5B	6X40	0	2-4-2	Y	5	Y	Y	-	15	-	Y
6A	6X6	300	4	Y	6	Y	Y	-	-	-	Y

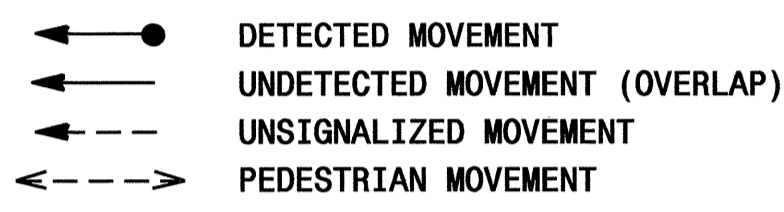
* Microwave Detection Zone

3 Phase Fully Actuated Isolated

NOTES

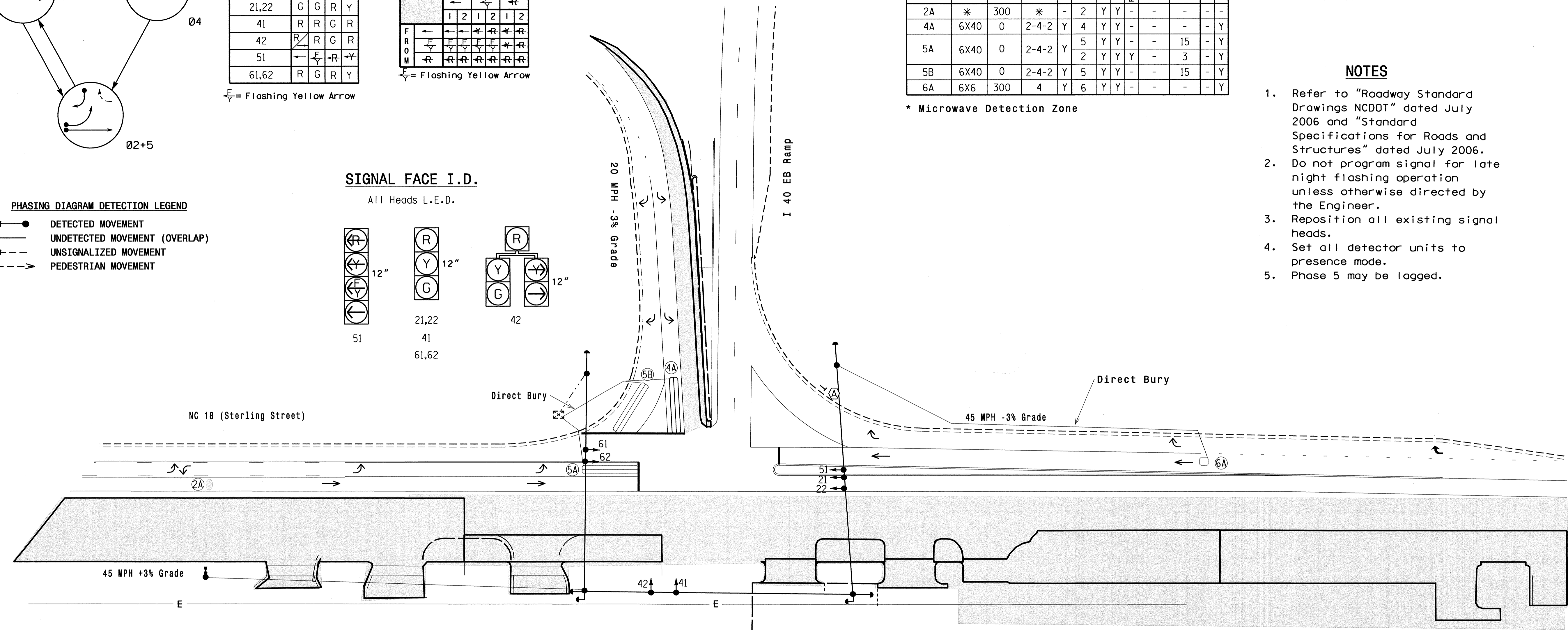
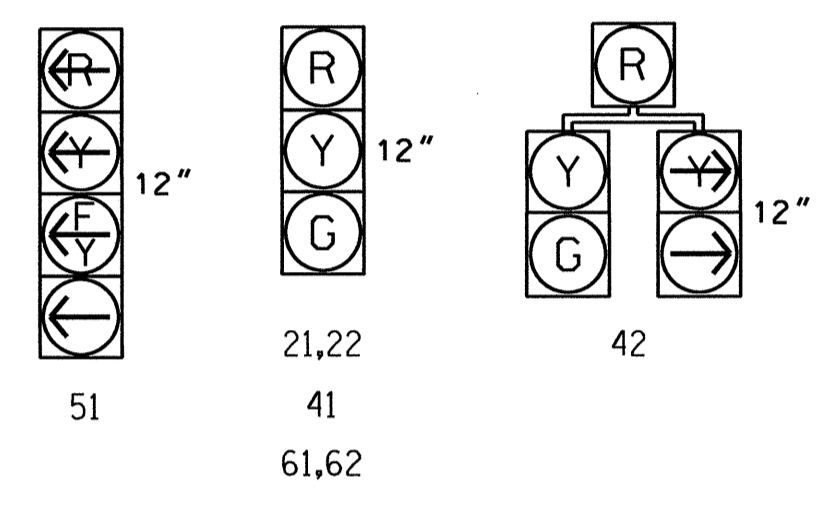
1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition all existing signal heads.
4. Set all detector units to presence mode.
5. Phase 5 may be lagged.

PHASING DIAGRAM DETECTION LEGEND



SIGNAL FACE I.D.

All Heads L.E.D.

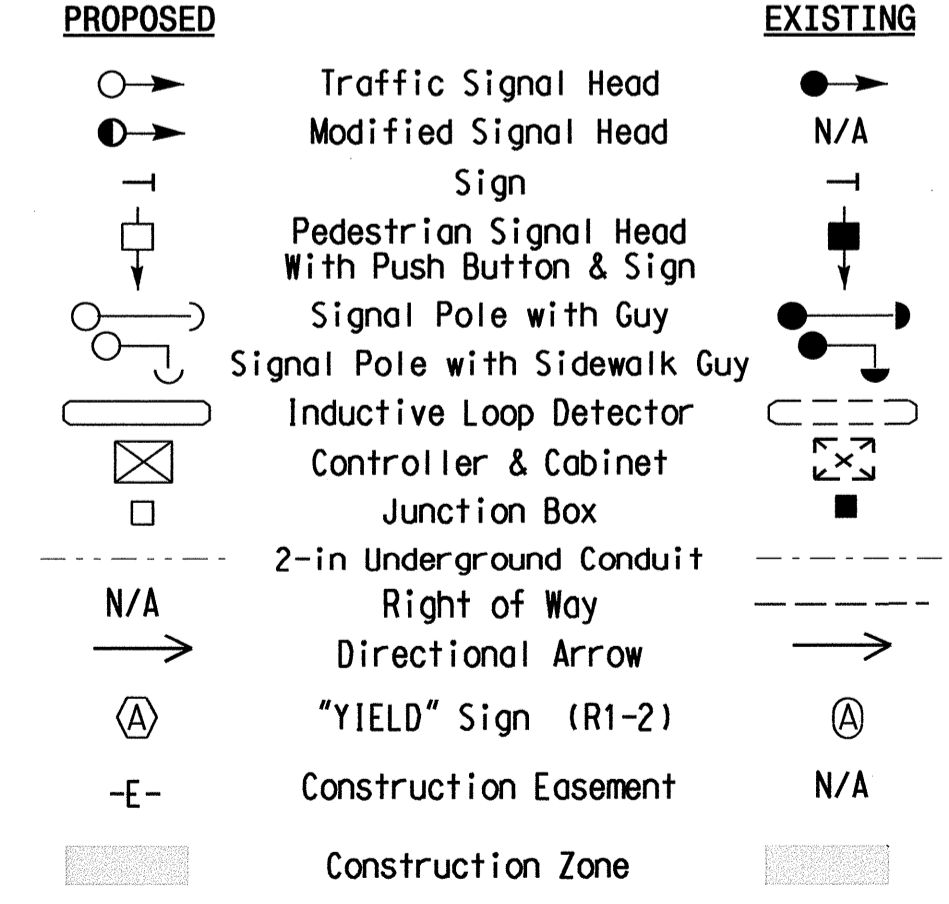


OASIS 2070L TIMING CHART

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 *	90	30	20	90
Yellow Clearance	4.3	3.0	3.0	4.8
Red Clearance	1.3	2.6	2.6	1.6
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	2.5	-	-	2.5
Max Variable Initial *	34	-	-	34
Time Before Reduction *	30	-	-	30
Time To Reduce *	15	-	-	15
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.

LEGEND



Temporary Signal 4 (TCP Phase 5)

Prepared In the Offices of:

JERRY YARAVITZ
Professional Engineer
License No. 30530

NC 18 (Sterling Street)
at
I-40 EB Ramp

Division 13 Burke County Morganton
PLANNED BY: Jerry Yaravitz REVIEWED BY:
PREPARED BY: Jerry Yaravitz REVIEWED BY:

REVISIONS: INIT. DATE

3/1/11
DATE

SIG. INVENTORY NO. 13-0591T4

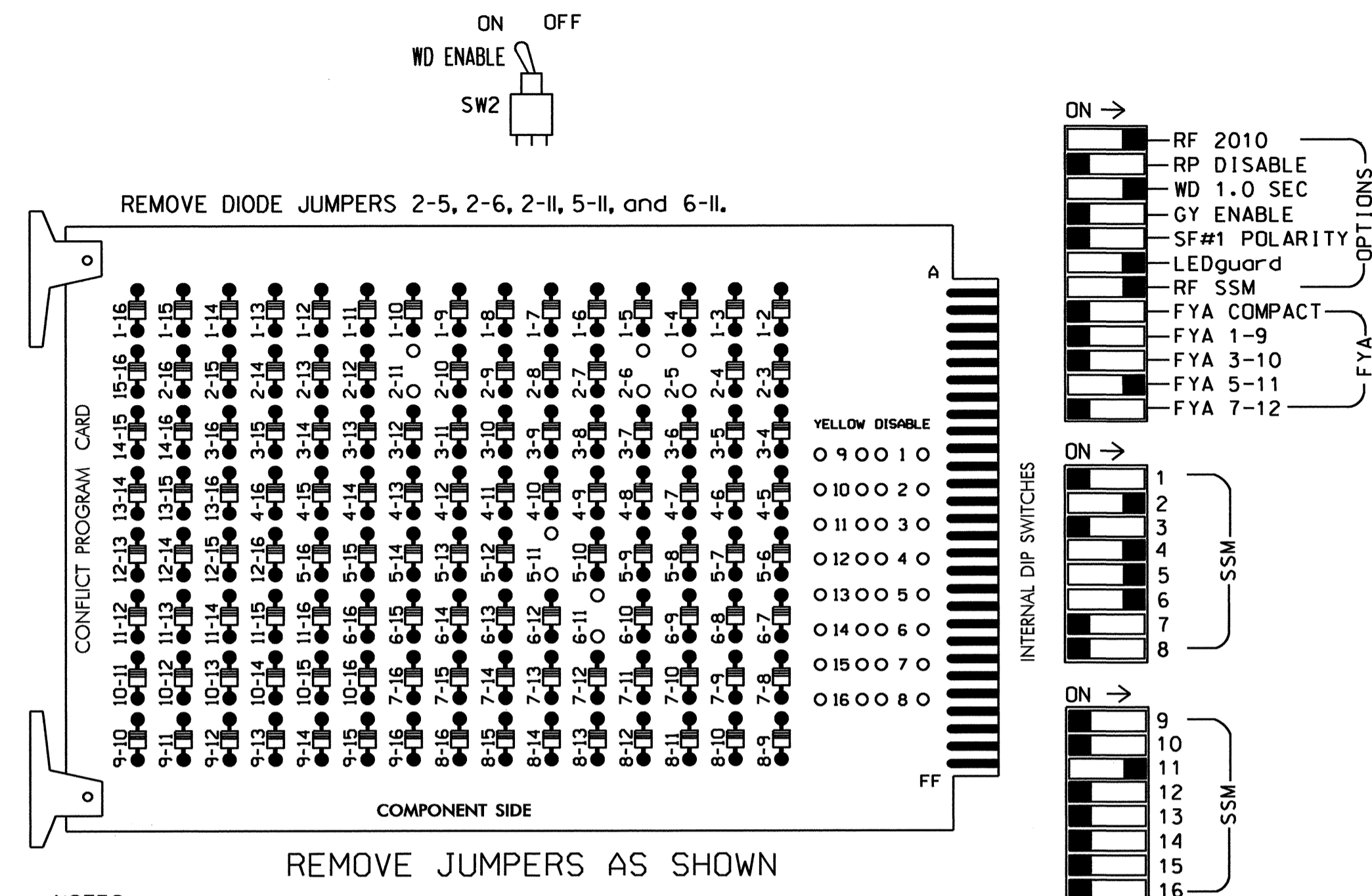
JERRY YARAVITZ
Professional Engineer
License No. 30530

750 N. Greerfield Pkwy, Garner, NC 27529

SCALE: 0 40
1"=40'

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

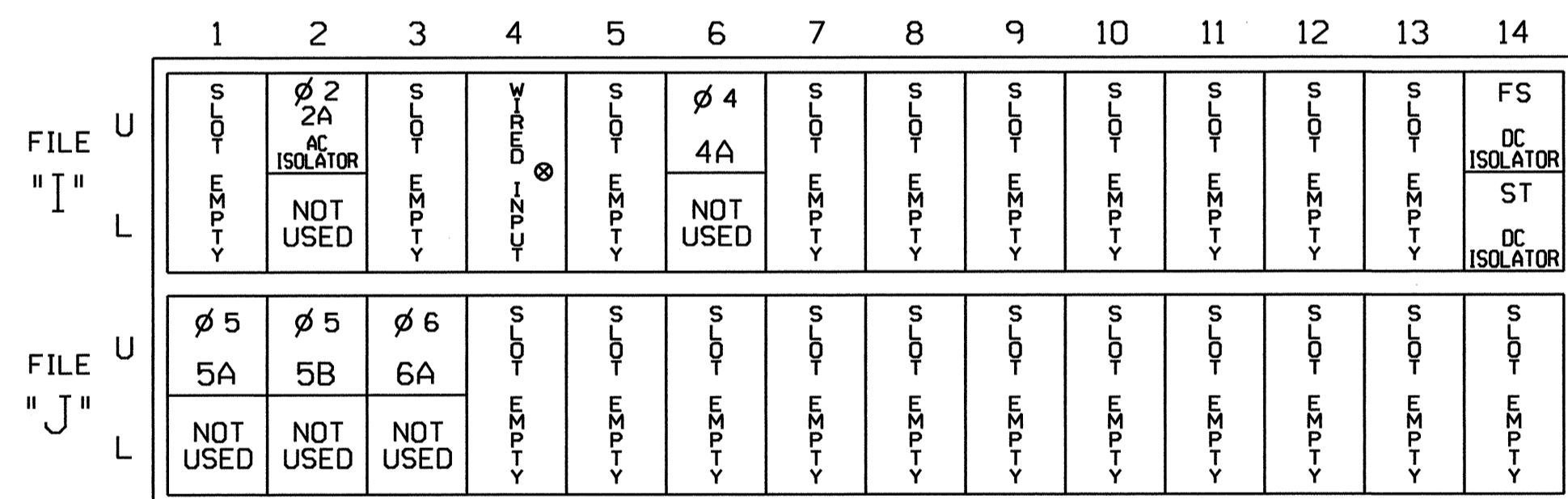


NOTES:

- 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.

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

Note: model 252 AC isolator should be installed in slot 12 for use with microwave detectors. See the Microwave Detector Wiring Detail on sheet 3.

IMPORTANT: For proper operation of the microwave detector, make sure surge protection has been removed from TB2-5 and TB2-6. A DIRECT SHORT WILL OCCUR IF THIS HAS NOT BEEN DONE. Make sure TB2-6 is tied to AC neutral. Also, be sure to replace surge protection between TB2-7 and TB2-8 if it is not presently installed, and make sure TB2-8 is not jumpered to AC neutral.

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 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	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	9	10	11	12	13	14
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	42	51	61,62	NU	NU	NU	NU	NU	NU	51	NU	NU
RED		128			101		*		134									
YELLOW		129			102				135									
GREEN		130			103				136									
RED ARROW																	A114	
YELLOW ARROW							132										A115	
FLASHING YELLOW ARROW																	A116	
GREEN ARROW							133	133										

NU = Not Used

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

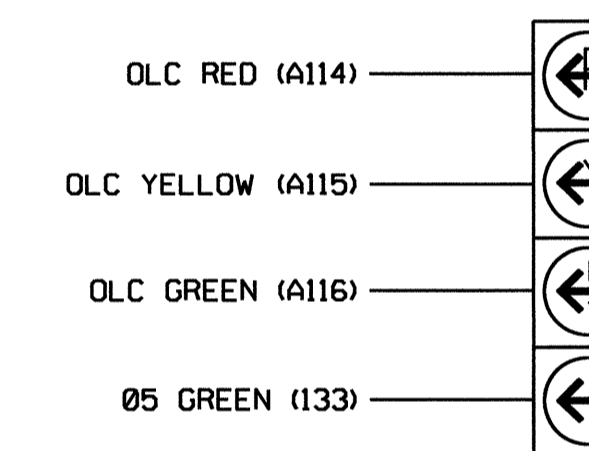
★ See pictorial of head wiring in detail below.

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,S4,S5,S6,S12
 PHASES USED.....2,4,5,6
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)



51

NOTE

The sequence display for signal head 51 requires special logic programming. See sheet 2 of 3 for programming instructions.

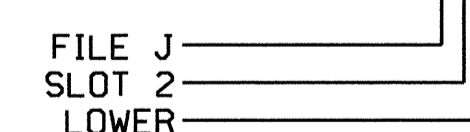
INPUT FILE CONNECTION & PROGRAMMING CHART

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			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
5A ¹	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y	Y		3
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			

¹Add jumper from J1-W to I4-W, on rear of input file.

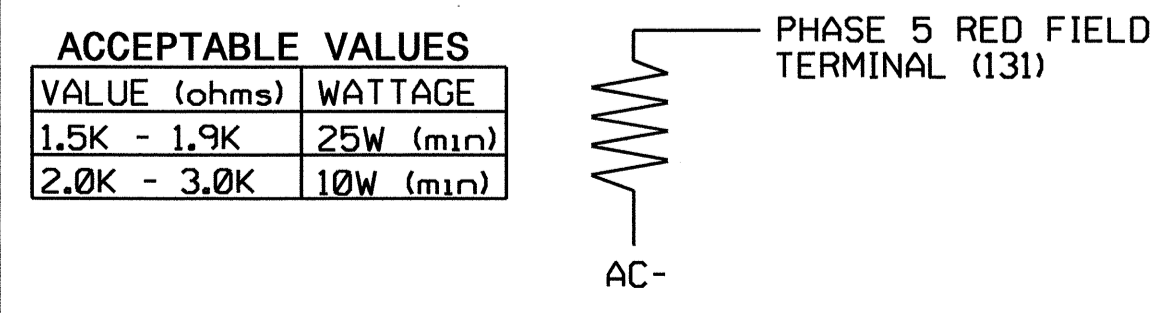
* Microwave pulse detector - see wiring detail on sheet 3.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



Temporary Signal 4 (TCP Phase 5) - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 18 (Sterling Street) at I-40 EB Ramp

Division 13 Burke County Morganton

PLAN DATE: February 2011 REVIEWED BY: T. J. J. J.

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS

INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER

SEAL 022013

GEORGE C. BROWN

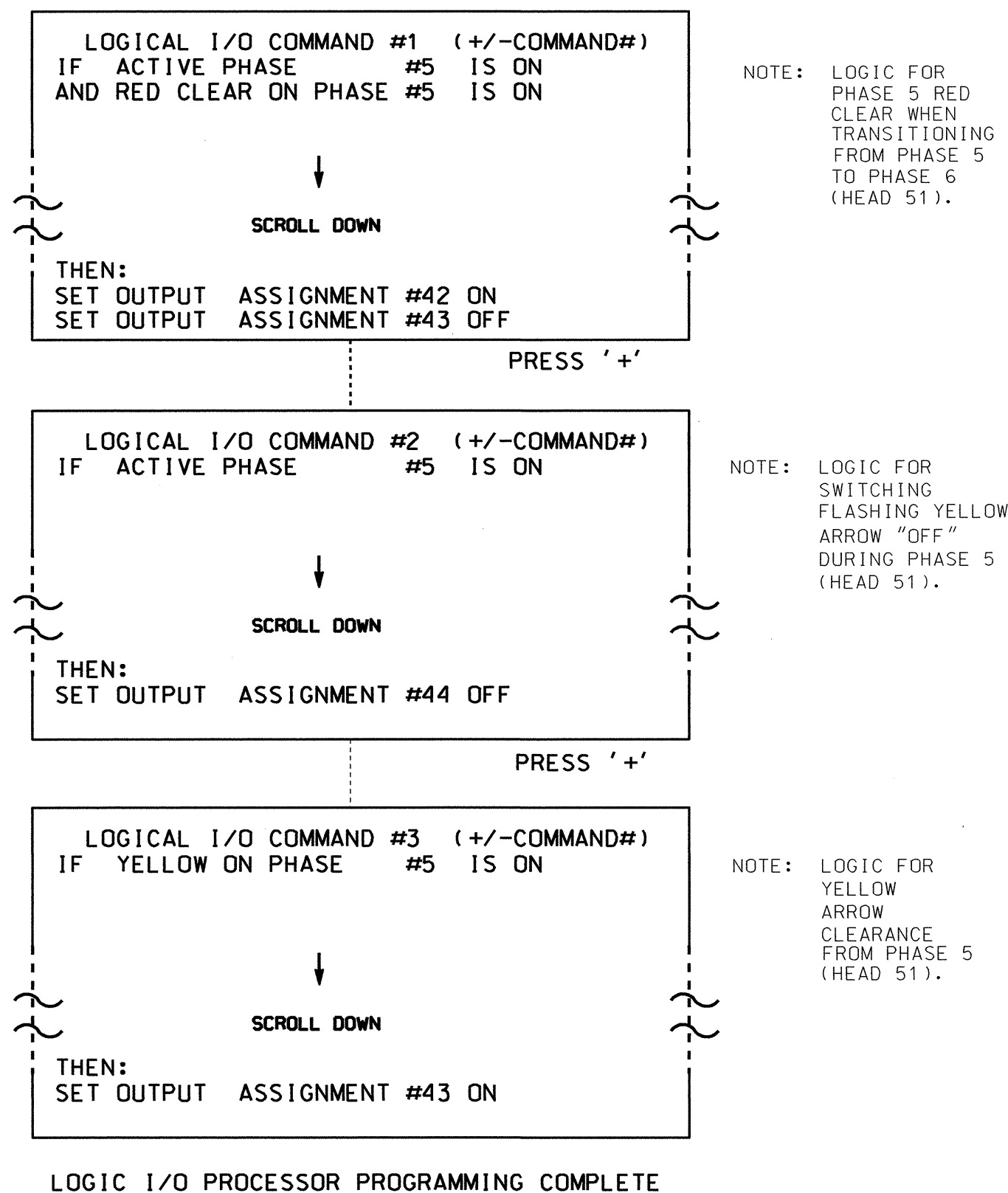
3/1/11

SIG. INVENTORY NO. 13-0591T4

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

(program controller as shown below)

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



OUTPUT REFERENCE SCHEDULE	
OUTPUT 42 =	Overlap C Red
OUTPUT 43 =	Overlap C Yellow
OUTPUT 44 =	Overlap C Green

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

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0591T4
DESIGNED: January 2011
SEALED: 3/1/11
REVISED: N/A

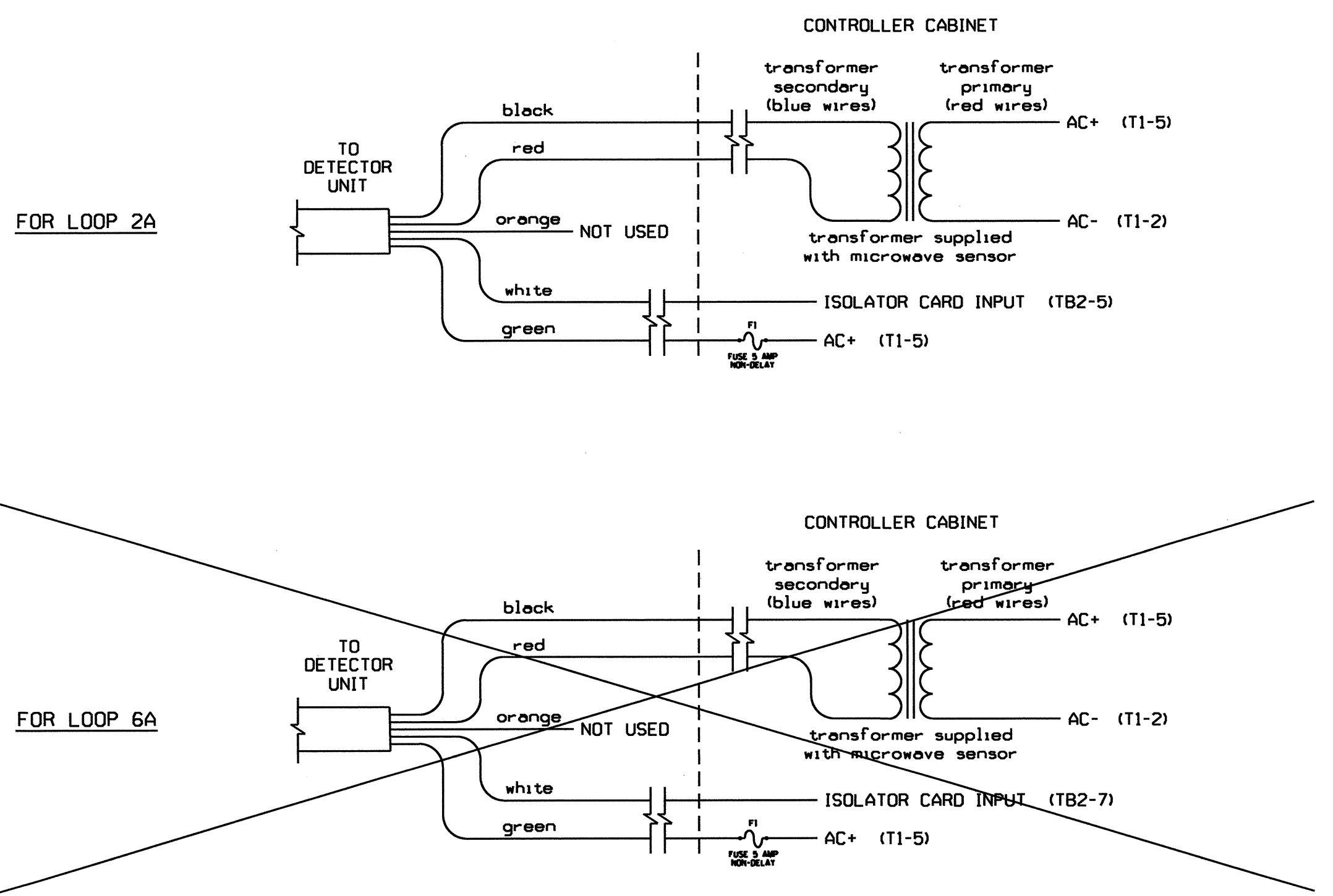
03-MAR-2011 13:08 S:\MITSUBISHI\SIGNALS\WORKGROUPS\Sig_Monitors\strong\130591T4_sml.ele.xxx.dgn sarmstrong

Temporary Signal 4 (TCP Phase 5) - Sheet 2 of 3

	NC 18 (Sterling Street) at I-40 EB Ramp		SEAL NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN	
	Division 13 PLAN DATE: February 2011 PREPARED BY: S. Armstrong	Burke County MORGANTON REVIEWED BY: T. J. J.	REVIEWED BY:	REVISIONS INIT. DATE
	750 N. Greenfield Pkwy., Garner, NC 27529	SIGNATURE 	DATE 3/1/11	DATE
	SIG. INVENTORY NO. 13-0591T4			DATE

MICROWAVE DETECTOR WIRING DETAIL FOR LOOP 2A AND 6A

(wire as shown)



! IMPORTANT! Remove this detector and disconnect all of its wiring to the cabinet.

TC26B WIRE LIST

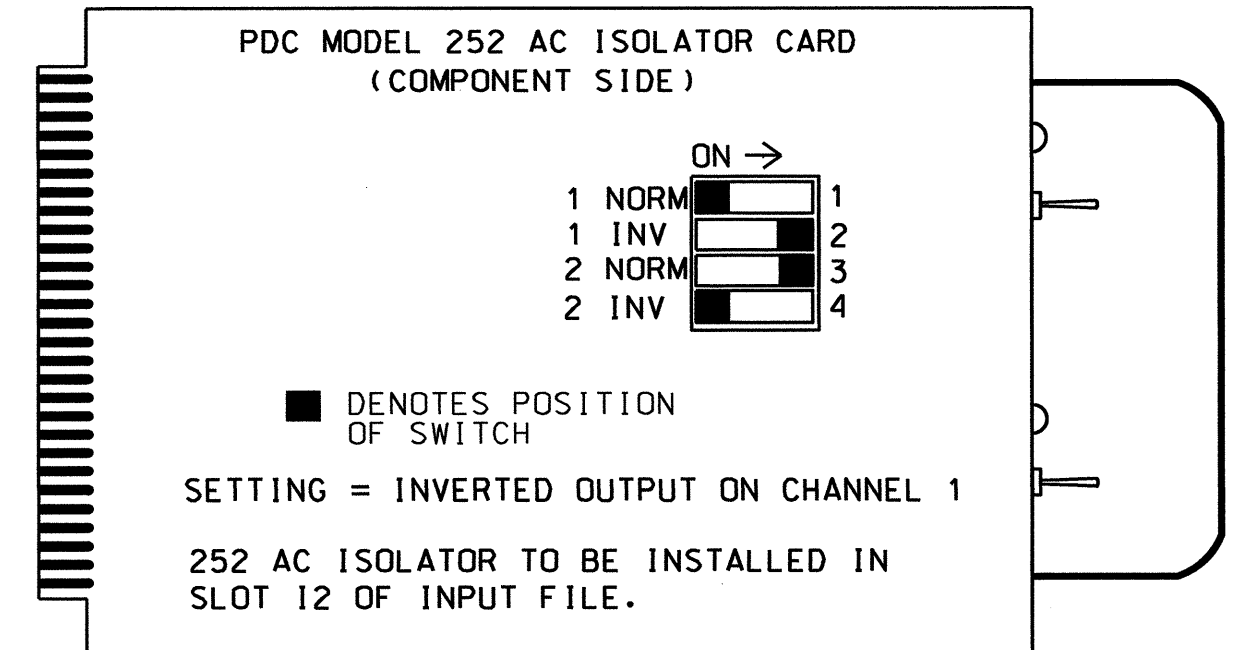
COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

NOTES:

- Sensors are Microwave Sensors, Inc. Model TC-26B microwave motion detectors mounted on poles as indicated on the Signal Design Plans.
- Configure AC isolator cards to place call upon removal of AC+ from the input.
- Important: For proper operation of the microwave detector, make sure surge protection has been removed from TB2-5 and TB2-6. A DIRECT SHORT WILL OCCUR IF THIS HAS NOT BEEN DONE. Make sure TB2-6 is tied to AC neutral. Also, be sure to replace surge protection between TB2-7 and TB2-8 if it is not presently installed, and make sure TB2-8 is not jumpered to AC neutral.

MICROWAVE DETECTOR AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



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

! IMPORTANT! make sure the channel 2 output on the AC isolator card is set to NORM as shown in the output programming detail above.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0591T4
DESIGNED: January 2011
SEALED: 3/1/11
REVISED: N/A

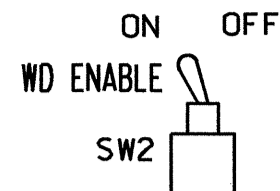
Temporary Signal 4 (TCP Phase 5) - Sheet 3 of 3

	NC 18 (Sterling Street) at I-40 EB Ramp		SEAL NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
	Division 13 Burke County Morganton		
	PLAN DATE: February 2011	REVIEWED BY: T. J. [Signature]	
	PREPARED BY: S. Armstrong	REVIEWED BY:	
REVISIONS	INIT.	DATE	[Signature] 3/1/11 DATE
ELECTRICAL AND PROGRAMMING DETAILS FOR:			SIG. INVENTORY NO. 13-0591T4

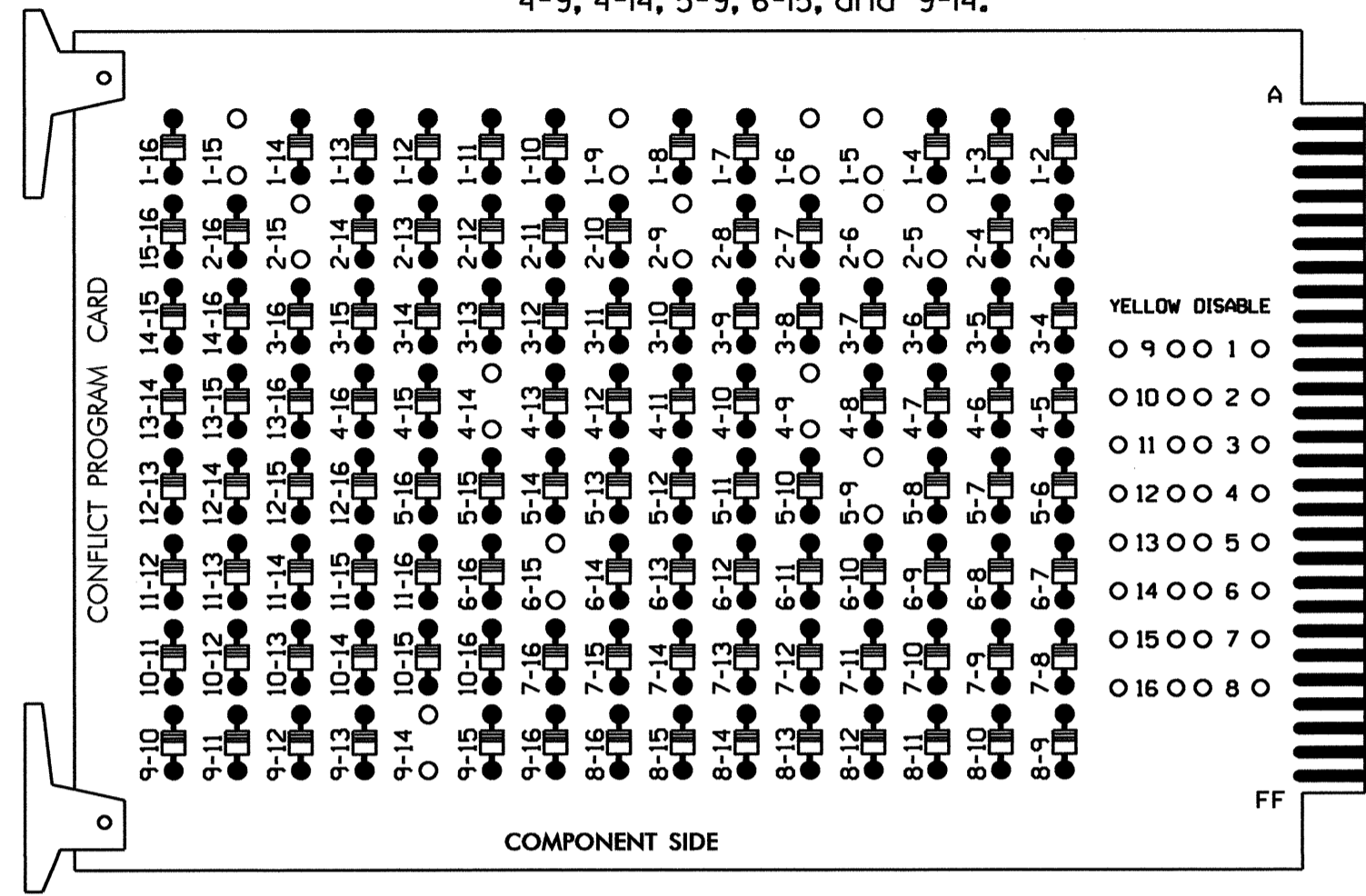
02-MAR-2011 13:09 C:\projects\13-0591T4\Sig\13-0591T4_Sig\13-0591T4_Sig.dgn

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



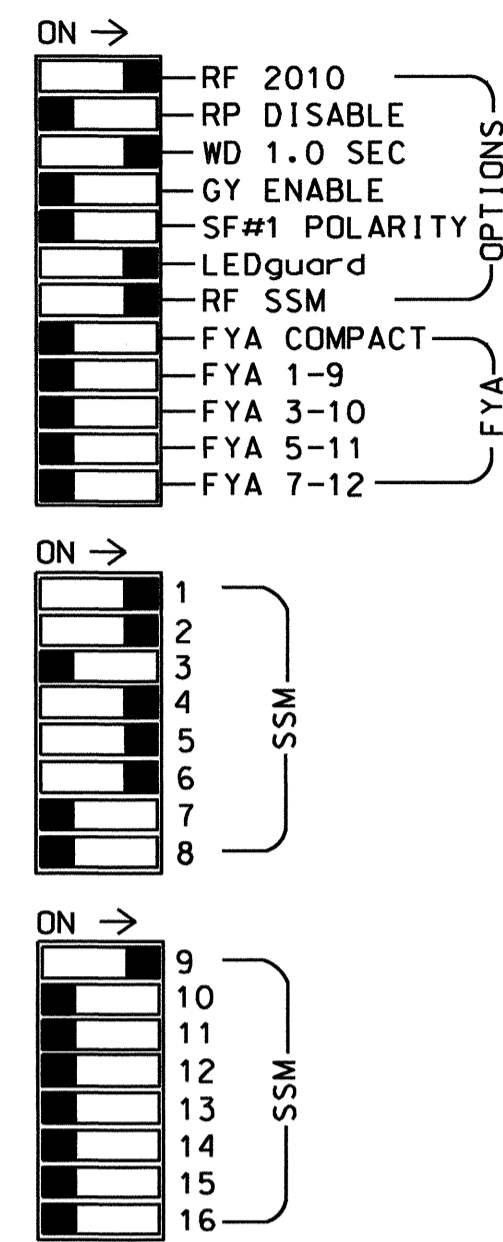
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-15, 2-5, 2-6, 2-9, 2-15, 4-9, 4-14, 5-9, 6-15, and 9-14.



CONFIGURE CARD EXACTLY 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.



■ = 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.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 3,7, 8,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 4 and 6 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the NC 18 (Sterling Street) Closed Loop System.

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.	11	21,22	NU	NU	41,42	P41, P42	51,52	61,62	P61,P62 P63,P64	NU	NU	NU	43	NU	NU	NU	NU	NU
RED		128						134					A121					
YELLOW		129						135										
GREEN		130						136										
RED ARROW	125				101		131											
YELLOW ARROW	126				102		132						A122					
GREEN ARROW	127				103		133						A123					
Hand icon						104			119									
Person icon						106			121									

NU = Not Used

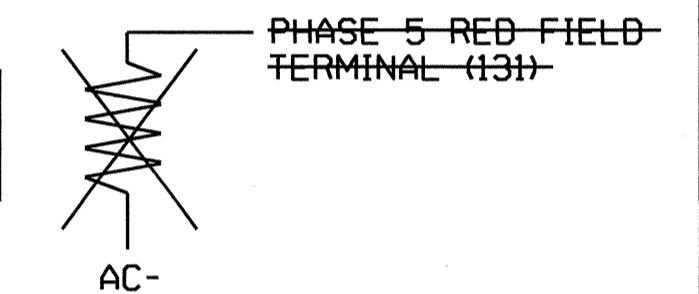
EQUIPMENT INFORMATION

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,S4,S4P,S5,S6,S6P,S9
 PHASES USED.....1,2,4,4 PED,5,6,6 PED
 OVERLAP "A".....4+5

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)



IMPORTANT! Remove load resistor from Phase 5 RED Field Terminal (131), if present.

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	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
L	1A	2A/S31	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
U	∅ 5	∅ 5	∅ 6/SYS	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17
L	5A	5B	6A/S33	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17
U	∅ 5	∅ 5	∅ 6/SYS	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17
L	5C	6B/S34	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17	∅ 18

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

FS = FLASH SENSE
 ST = STOP TIME

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.

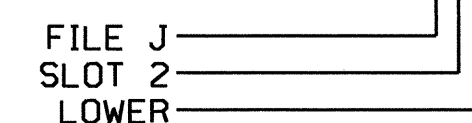
INPUT FILE CONNECTION & PROGRAMMING CHART

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/S31	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S32	TB2-7,8	I2L	43	5	12	2/SYS	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			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			
5C	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A/S33	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
6B/S34	TB3-11,12	J3L	77	39	46	6/SYS	Y	Y			
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62 P63,P64	TB8-7,9	I13U	68	30	PED 6	6 PED					

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

IMPORTANT! Remove jumper from J1-W to I4-W, or rear of input file, if present.

INPUT FILE POSITION LEGEND: J2L



OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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

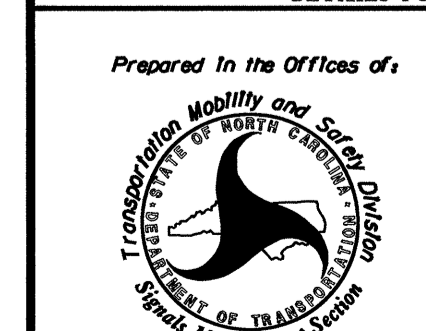
PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE: 12345678910111213141516
 VEH OVL PARENTS: XX
 VEH OVL NOT VEH:
 VEH OVL NOT PED:
 VEH OVL GRN EXT:
 STARTUP COLOR: _ RED _ YELLOW _ GREEN
 FLASH COLORS: _ RED _ YELLOW _ GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...N
 GREEN 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: 13-0591
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

New Installation - Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:



NC 18 (Sterling Street) at I-40 EB Ramp

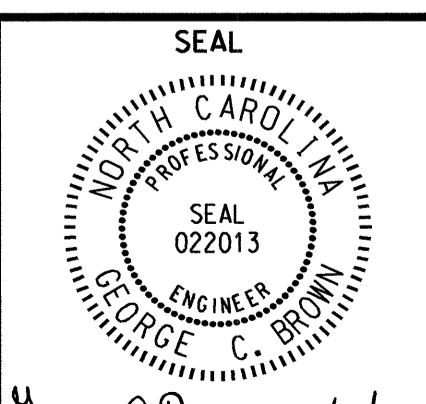
Division 13 Burke County Morganton

PLAN DATE: February 2011 REVIEWED BY: T. Jaffe

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS INIT. DATE

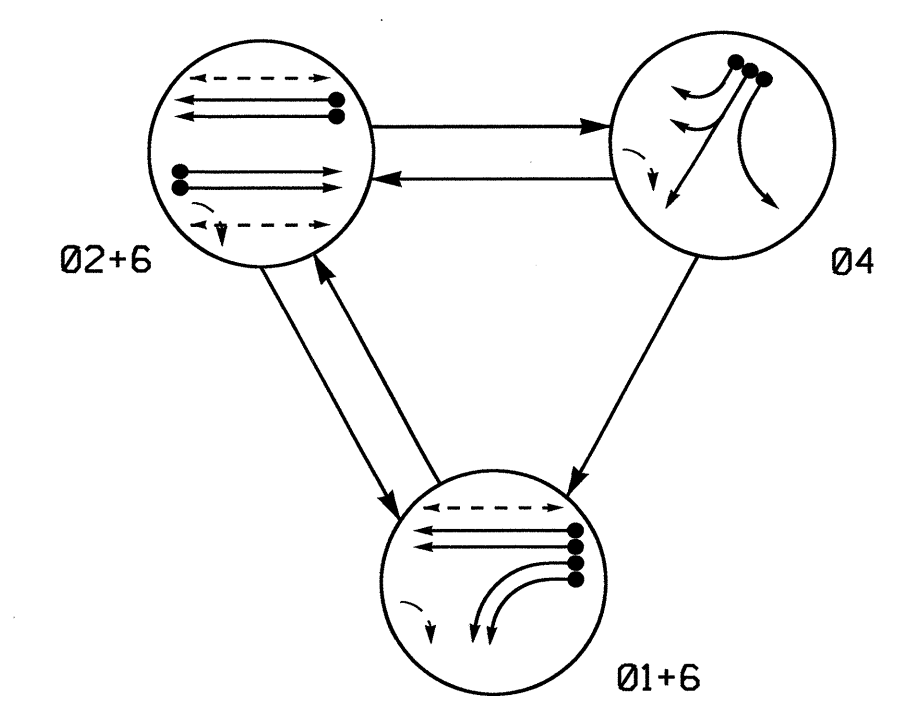
Signature: George C. Brown 3/7/11



SIG. INVENTORY NO. 13-0591

3 Phase Fully Actuated NC 18 (Sterling Street) CLS

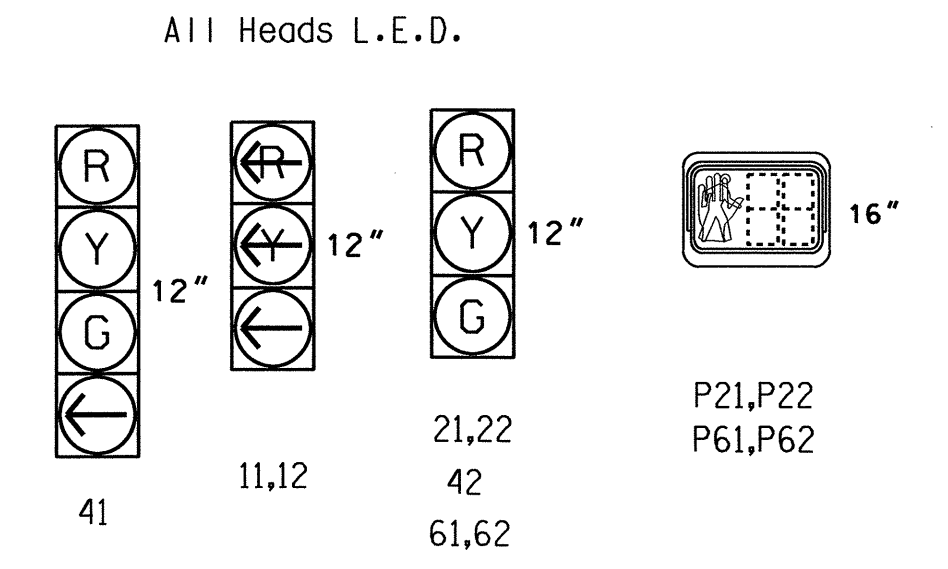
PHASING DIAGRAM



SIGNAL FACE	PHASE			
	01+6	02+6	04	FLASH
11,12	←	←R	←R	←R
21,22	R	G	R	Y
41	R	R	G	R
42	R	G	G	R
61,62	G	G	R	Y
P21,P22	DW	W	DW	DRK
P61,P62	W	W	DW	DRK

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

SIGNAL FACE I.D.



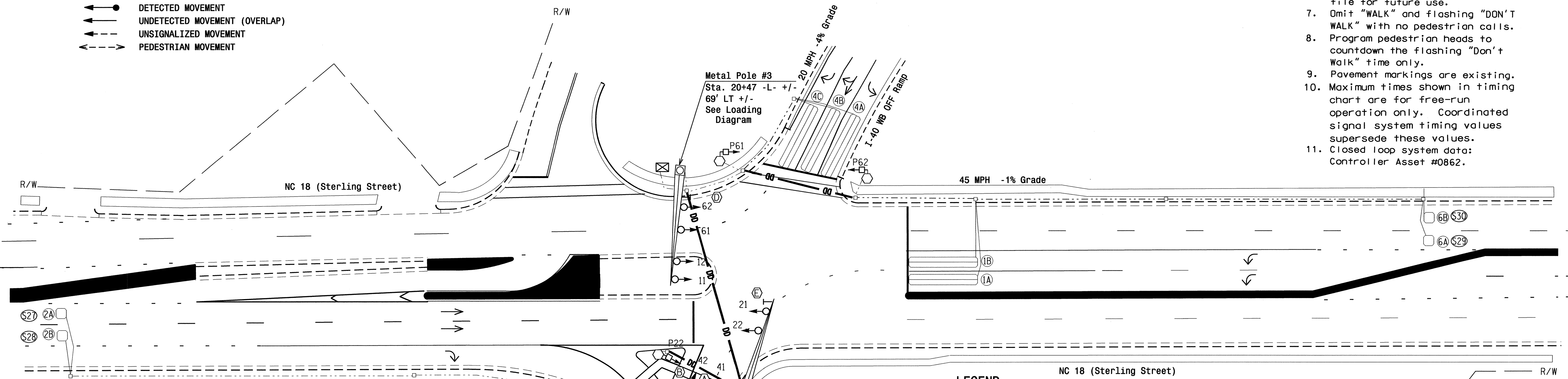
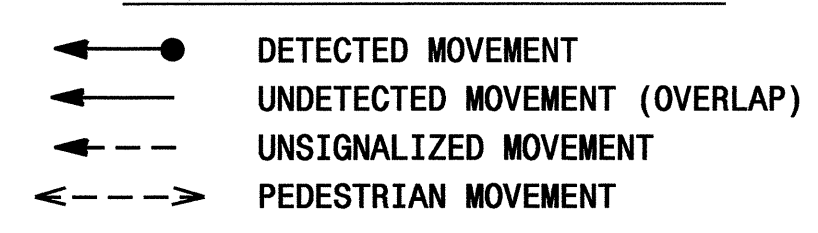
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY		
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	Y
1B	6X40	0	2-4-2	Y	1	Y	Y	-	-	Y
2A/S27	6X6	300	5	Y	2	Y	Y	-	-	Y
2B/S28	6X6	300	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
4C	6X40	0	2-4-2	Y	4	Y	Y	-	15	Y
6A/S29	6X6	300	5	Y	6	Y	Y	-	-	Y
6B/S30	6X6	300	5	Y	6	Y	Y	-	-	Y

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- 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.
- The cabinet should be designed to include an Auxiliary Output file for future use.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Pavement markings are existing.
- 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 #0862.

PHASING DIAGRAM DETECTION LEGEND



FEATURE	PHASE			
	1	2	4	6
Min Green 1*	7	12	7	12
Extension 1*	2.0	6.0	2.0	6.0
Max Green 1*	20	90	30	90
Yellow Clearance	3.0	4.4	3.0	4.6
Red Clearance	4.2	1.0	3.9	1.6
Red Revert	2.0	2.0	2.0	2.0
Walk 1*	-	7	-	7
Don't Walk 1	-	20	-	10
Seconds Per Actuation*	-	1.5	-	1.5
Max Variable Initial*	-	34	-	34
Time Before Reduction*	-	30	-	30
Time To Reduce*	-	15	-	15
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
	N/A
N/A	Right of Way
	N/A

New Installation - Final Design

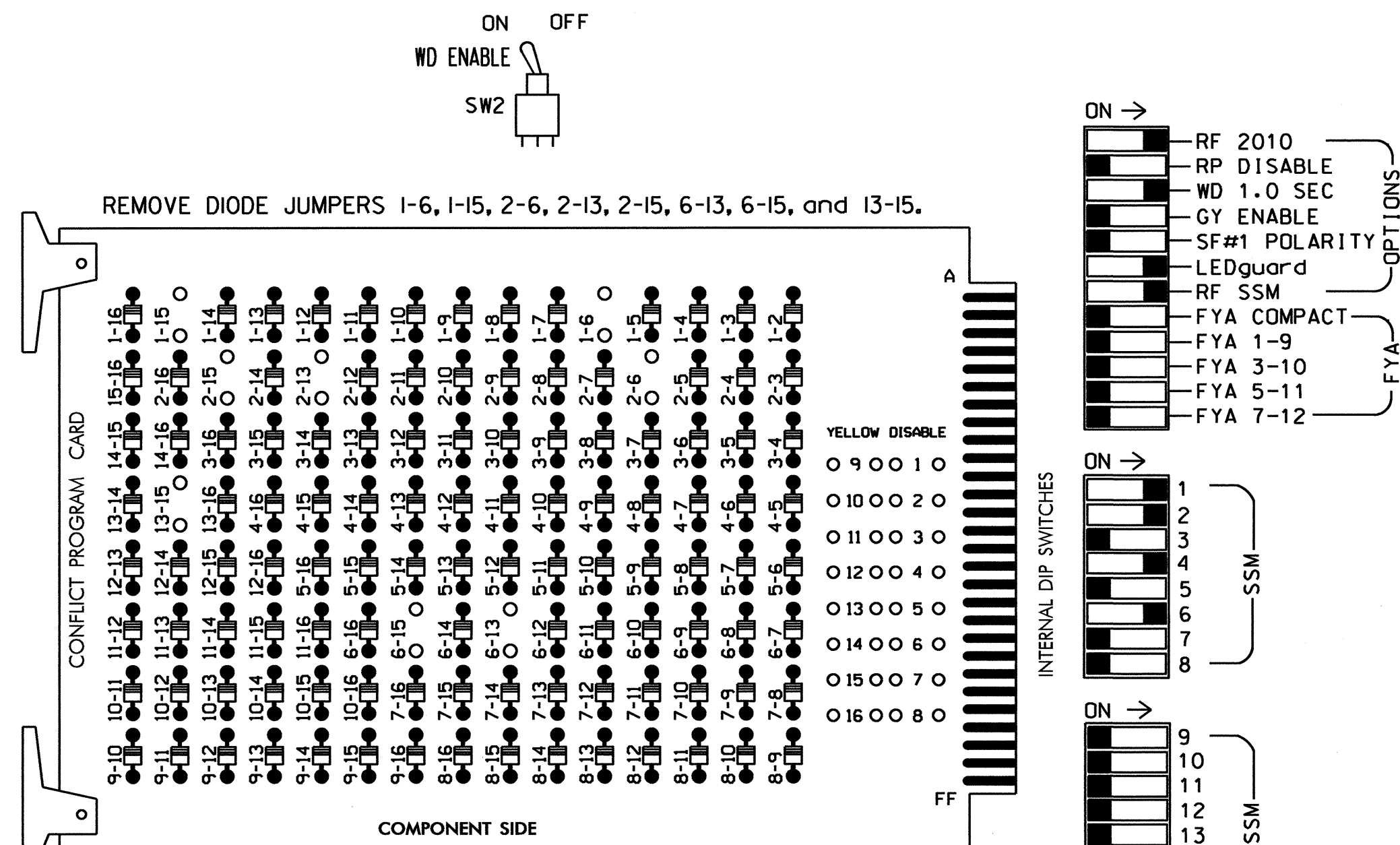
Prepared in the Offices of

NC 18 (Sterling Street) at I-40 WB Off Ramp
 Division 13 Burke County Morganton
 PLAN DATE: January 2011 REVIEWED BY:
 PREPARED BY: Jerry Yaravitz REVIEWED BY:
 SCALE: 1"=30'
 REVISIONS: _____
 INIT. DATE: _____
 SIGNATURE: _____ DATE: 3/1/11
 SIG. INVENTORY NO. 13-0862

08-FEB-2011 09:04
 P:\Projects\Signal\Signal\gms\Signal\3-0862\13-0862.dwg
 JYaravitz

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.

■ = 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.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 3,5,7,8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the NC 18 (Sterling Street) Closed Loop System.

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	9	10	11	12	13	14
SIGNAL HEAD NO.	11,12	21,22	P21, P22	NU	41	42	NU	61,62	P61, P62	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101	101			134									
YELLOW		129			102	102			135									
GREEN		130			103	103			136									
RED ARROW	125																	
YELLOW ARROW	126																	
GREEN ARROW	127				103													
Hand				113						119								
Person				115								121						

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET332
 SOFTWAREECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
 LOAD SWITCHES USED.....S1,S2,S2P,S4,S6,S6P
 PHASES USED.....1,2,2 PED,4,6,6 PED
 OVERLAPS.....NONE

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.

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	S	∅ 1	∅2/SYS	S	S	∅ 4	∅ 4	S	S	S	S	∅2 PED	∅6 PED	FS
I	T	1A	2A/S27	T	T	4A	4C	T	T	T	T	DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
L	Y	∅ 1	∅2/SYS	Y	Y	4B	NOT USED	Y	Y	Y	Y	NOT USED	NOT USED	ST
U	S	∅6/SYS	S	S	S	S	S	S	S	S	S	S	S	S
J	T	6A/S29	T	T	T	T	T	T	T	T	T	T	T	T
L	Y	∅6/SYS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Y	6B/S30	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

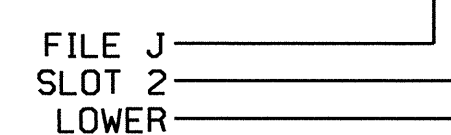
FS = FLASH SENSE
 ST = STOP TIME

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	TB2-5,6	I2U	39	1	2	1	Y	Y			
1B	TB2-7,8	I2L	43	5	12	1	Y	Y			
2A/S27	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
2B/S28	TB2-11,12	I3L	76	38	42	2/SYS	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			5
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			15
6A/S29	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S30	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29		PED 2	2 PED				
P61,P62	TB8-7,9	I13U	68	30		PED 6	6 PED				

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

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0862
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

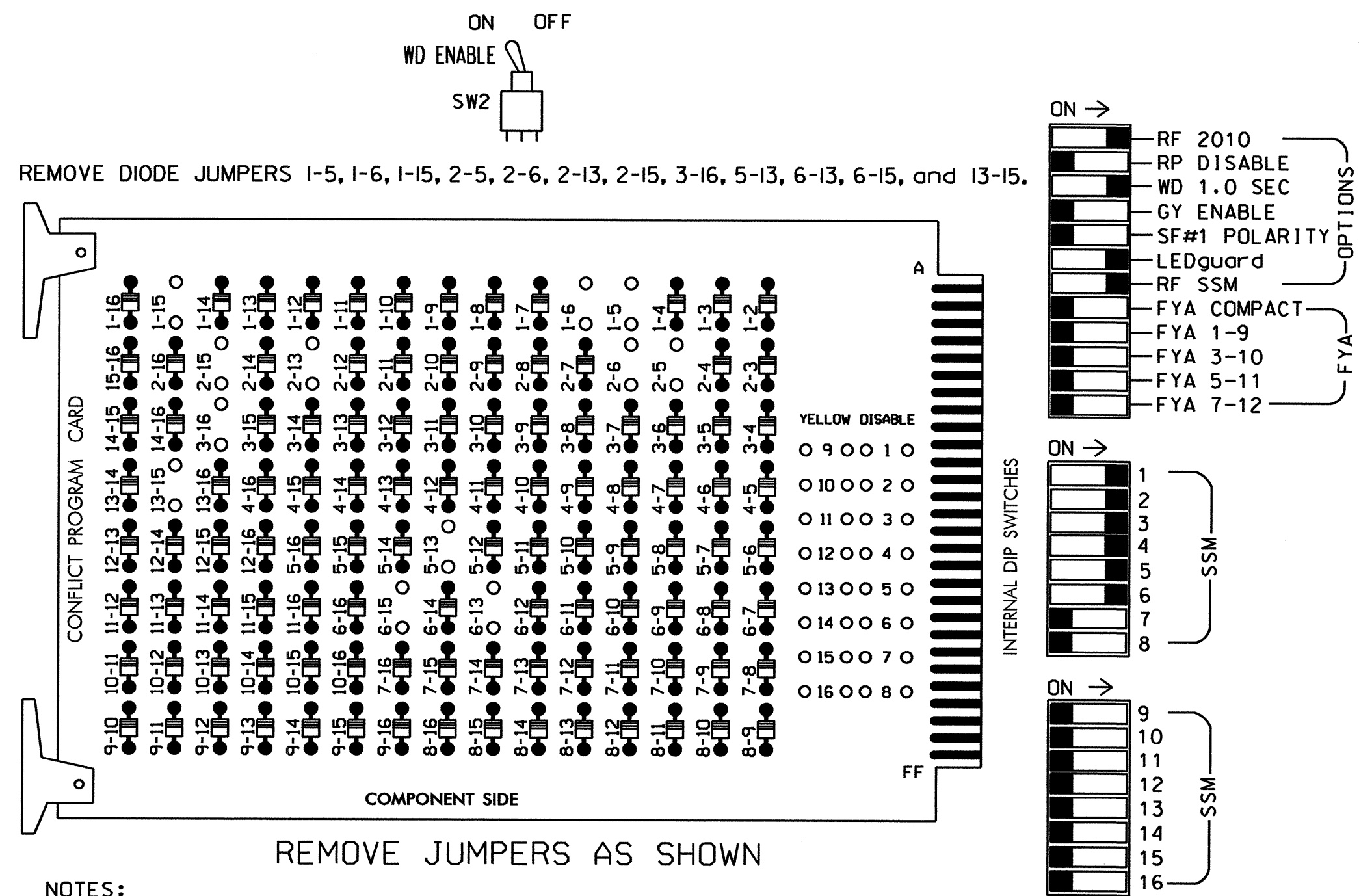
02-MAR-2011 13:40 S:\ITSAS\UNIT5\SIGNALS\workgroups\sig_mon\armstrong\30862_enr.ele...xxx.dgn armstrong

New Installation - Final Design

	NC 18 (Sterling Street) at I-40 WB Off Ramp		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN
	Division 13 PLAN DATE: February 2011 PREPARED BY: S. Armstrong	Burke County Morganton REVIEWED BY: T. Jaxk REVIEWED BY:	

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- REMOVE DIODE JUMPERS 1-5, 1-6, 1-15, 2-5, 2-6, 2-13, 2-15, 3-16, 5-13, 6-13, 6-15, and 13-15.
- 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 7,8, 9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phase 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2, 3, and 6 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 W/ AUX FILE
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
 LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S5,S6,S6P,S8P
 PHASES USED.....1,2,2 PED,3,3 PED,4,5,6,6 PED
 OVERLAPS.....NONE

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	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	62	41	42,43	NU	51	61,62	P61, P62	NU	NU	P31, P32	NU	NU	NU
RED		128		116	116		101	101			134							
YELLOW		129		117	117		102	102			135							
GREEN		130		118	118		103	103			136							
RED ARROW	125									131								
YELLOW ARROW	126				117					132								
GREEN ARROW	127			118	118	103				133								
Hand icon			113								119		110					
Person icon			115								121		112					

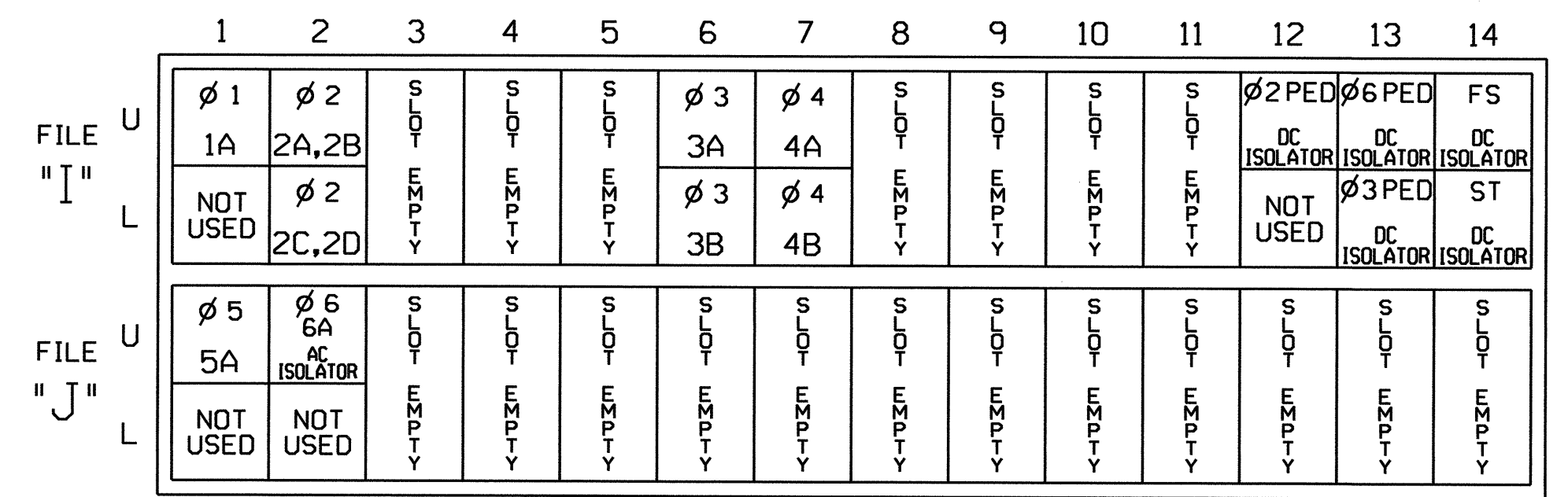
NU = Not Used

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.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

Note: Install model 252 AC isolator in slot J2 for use with microwave detector. See microwave detector wiring on sheet 2.

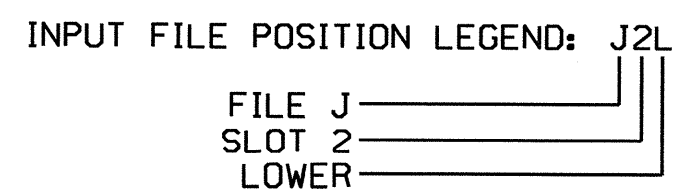
IMPORTANT: For proper operation of the microwave detector, remove surge protection from TB3-5 and TB3-6. A DIRECT SHORT WILL OCCUR IF THIS IS NOT DONE. Tie TB3-6 to AC neutral.

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			3
2A,2B	TB2-5,6	I2U	39	1	2	2	Y	Y		1.6	
2C,2D	TB2-7,8	I2L	43	5	12	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			10
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			10
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
*6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P31,P32	TB8-8,9	I13L	70	32	PED 8	3 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					

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

* Microwave detector - see wiring detail on sheet 2.



PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
- ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
- SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING
- ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
- BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
- SELECT '1' (OUTPUT ASSIGNMENTS)
- ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
- REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
- CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
- MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

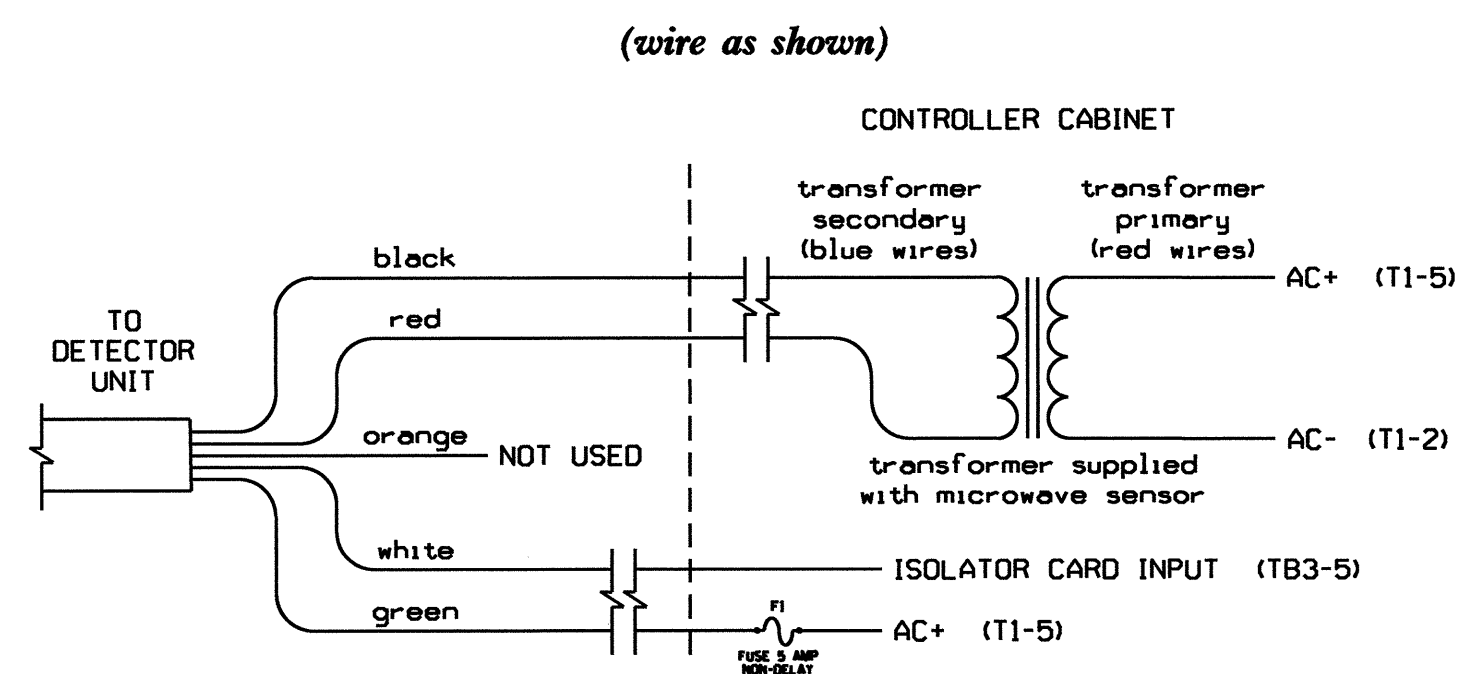
PROGRAMMING COMPLETE

Temporary Signal 1 (TCP Phase 1) - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: 	NC 18 (Sterling Street) at SR 1874 (Grace Hospital Road)		SEAL
	Division 13 PLAN DATE: February 2011 PREPARED BY: S. Armstrong	Burke County MORGANTON REVIEWED BY: T. Jya REVIEWED BY:	
750 N. Greenfield Phry, Garner, NC 27529			SIGNATURE: <i>George C. Brown</i> 3/4/11 DATE:

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0448T1
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

MICROWAVE DETECTOR WIRING DETAIL



TC26B WIRE LIST

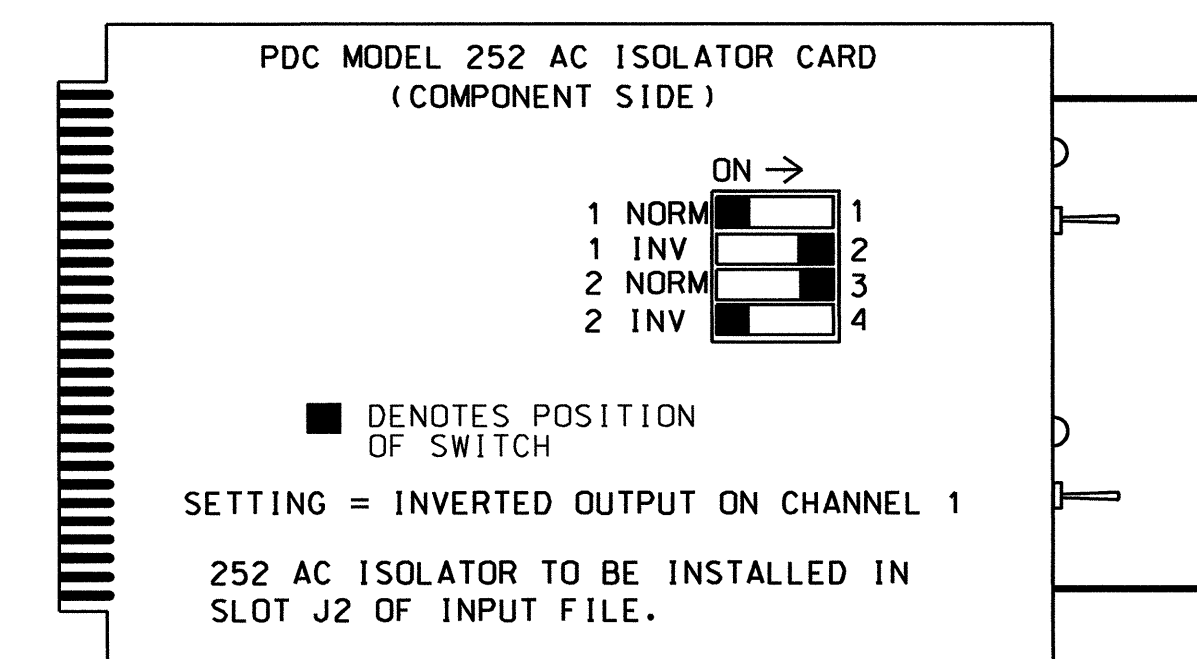
COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

NOTES:

1. Sensor is a Microwave Sensors, Inc. Model TC-26B microwave motion detector mounted on poles as indicated on the Signal Design Plans.
2. Configure AC isolator card to place call upon removal of AC+ from the input.
3. Important: For proper operation of the microwave detector, remove surge protection from TB3-5 and TB3-6. Tie TB3-6 to AC neutral.

MICROWAVE DETECTOR AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



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

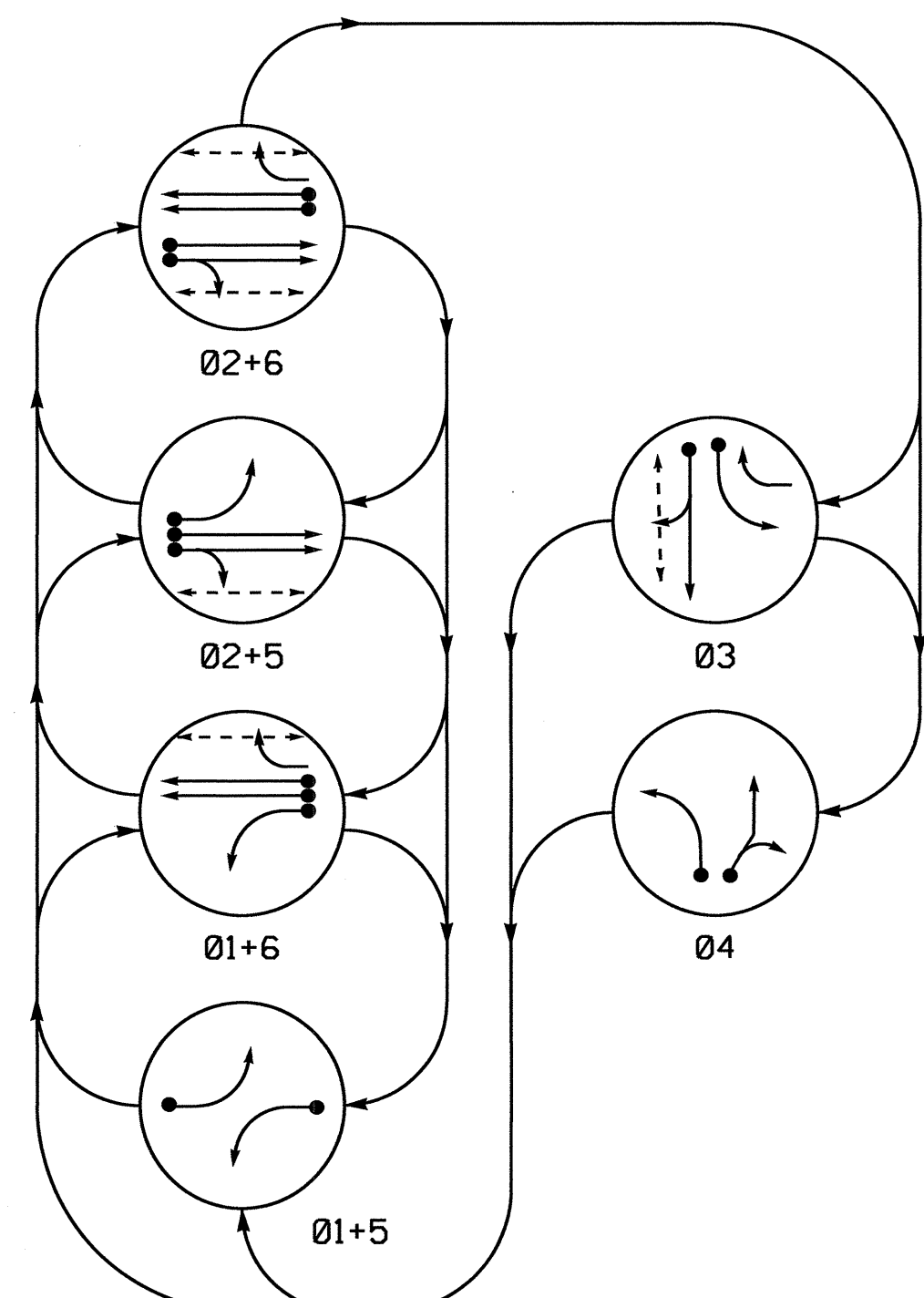
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0448T1
DESIGNED: January 2011
SEALED: 3/1/11
REVISED: N/A

02-MAR-2011 13:49 SS:ITSS\JUN13 5:10pm I:\work\groups\sig_mon\armstrong\130448T1_sml_elec.dwg sarmstrong

Temporary Signal 1 (TCP Phase 1) - Sheet 2 of 2

	NC 18 (Sterling Street) at SR 1874 (Grace Hospital Road)		
	Division 13 Burke County Morganton		
	PLAN DATE: February 2011	REVIEWED BY: <i>T. J. J.</i>	
	PREPARED BY: S. Armstrong	REVIEWED BY:	
REVISIONS	INIT.	DATE	SIGNATURE: <i>George C. Brown</i> DATE: 3/4/11
750 N. Greenfield Hwy, Garner, NC 27529			SIG. INVENTORY NO. 13-0448T1

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

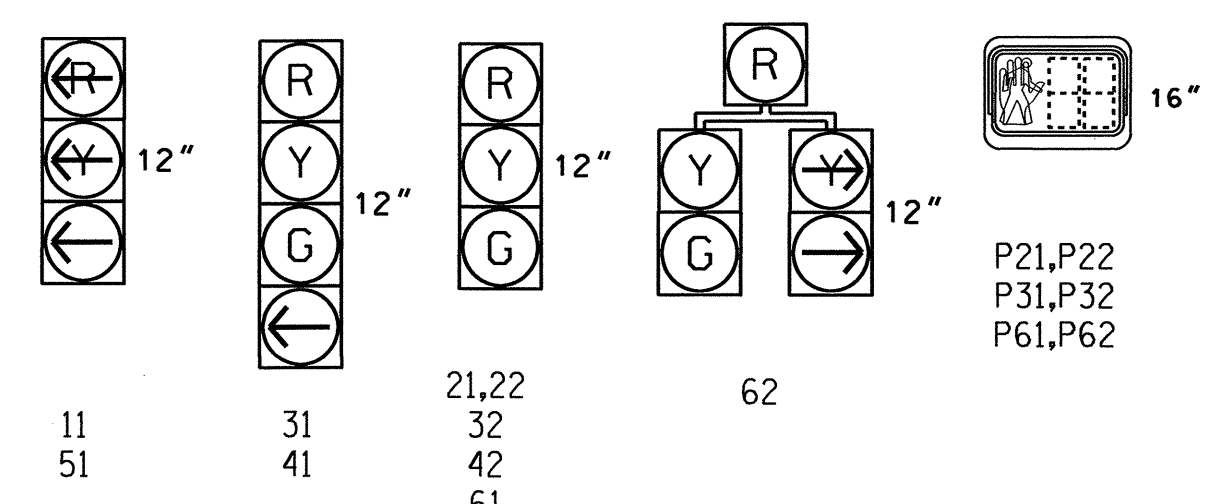
TABLE OF OPERATION

SIGNAL FACE	PHASE						L	R
	01+5	01+6	02+5	02+6	03	04		
11	←	←	←	←	←	←	←	
21,22	R	R	G	G	R	R	Y	
31	R	R	R	R	G	R	R	
32	R	R	R	R	G	R	R	
41	R	R	R	R	R	G	R	
42	←	←	←	←	R	G	R	
51	←	←	←	←	←	←	←	
61	R	G	R	G	R	R	Y	
62	R	G	R	G	R	R	Y	
P21,P22	DW	DW	W	W	DW	DW	DRK	
P31,P32	DW	DW	DW	DW	W	DW	DRK	
P61,P62	DW	W	DW	W	DW	DW	DRK	

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

SIGNAL FACE I.D.

All Heads L.E.D.



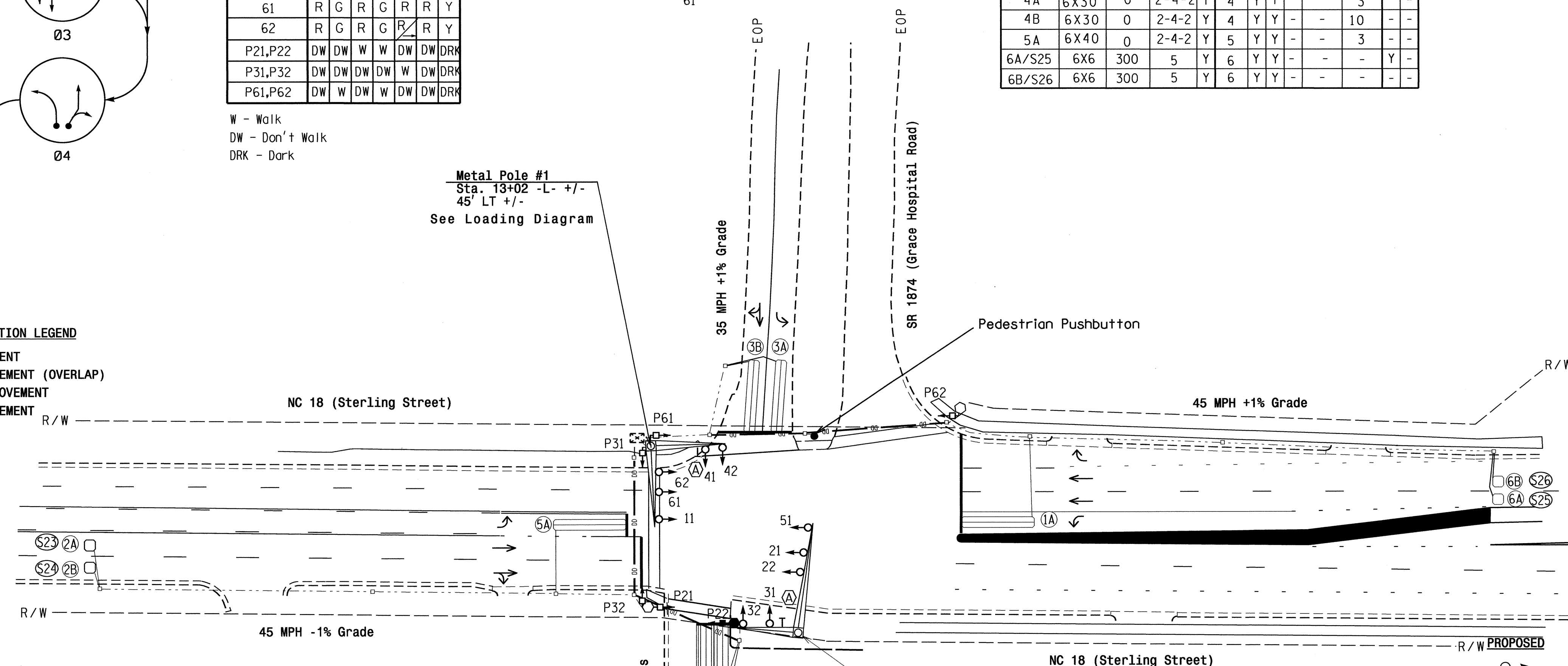
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

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	-	-	-	-	-
2A/S23	6X6	300	5	Y	2	Y	Y	-	-	-	-	-
2B/S24	6X6	300	5	Y	2	Y	Y	-	-	-	-	-
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	-	-	-
3B	6X40	0	2-4-2	Y	3	Y	Y	-	-	10	-	-
4A	6X30	0	2-4-2	Y	4	Y	Y	-	-	3	-	-
4B	6X30	0	2-4-2	Y	4	Y	Y	-	-	10	-	-
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	3	-	-
6A/S25	6X6	300	5	Y	6	Y	Y	-	-	-	Y	-
6B/S26	6X6	300	5	Y	6	Y	Y	-	-	-	-	-

6 Phase Fully Actuated NC 18 (Sterling Street) CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- 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 #0448.



LEGEND

- | | | | |
|-----|--|-----|----------|
| ○→ | Traffic Signal Head | ●→ | EXISTING |
| ○→ | 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 | ⊗ | |
| □ | Controller & Cabinet | □ | |
| □ | Junction Box | □ | |
| --- | 2-in Underground Conduit | --- | |
| N/A | Right of Way | --- | |
| → | Directional Arrow | → | |
| --- | Directional Drill | N/A | |
| ⊗ | Left Arrow "ONLY" Sign (R3-5L) | ⊗ | |

OASIS 2070L TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1*	7	12	7	7	7	12
Extension 1	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1*	20	90	20	20	20	90
Yellow Clearance	3.0	4.6	3.8	3.0	3.0	4.4
Red Clearance	4.2	1.3	1.9	3.7	3.5	2.3
Walk 1*	-	7	7	-	-	7
Don't Walk 1	-	29	15	-	-	6
Seconds Per Actuation*	-	1.5	-	-	-	1.5
Max Variable Initial*	-	34	-	-	-	34
Time Before Reduction*	-	30	-	-	-	30
Time To Reduce*	-	15	-	-	-	15
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

Signal Upgrade - Final Design

NC 18 (Sterling Street) at SR 1874 (Grace Hospital Road)

Division 13 Burke County Morganton

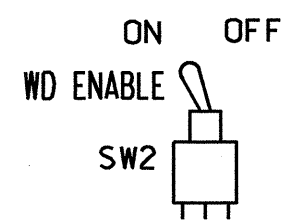
PLAN DATE: January 2011 REVIEWED BY: Jerry Yaravitz

PREPARED BY: Jerry Yaravitz

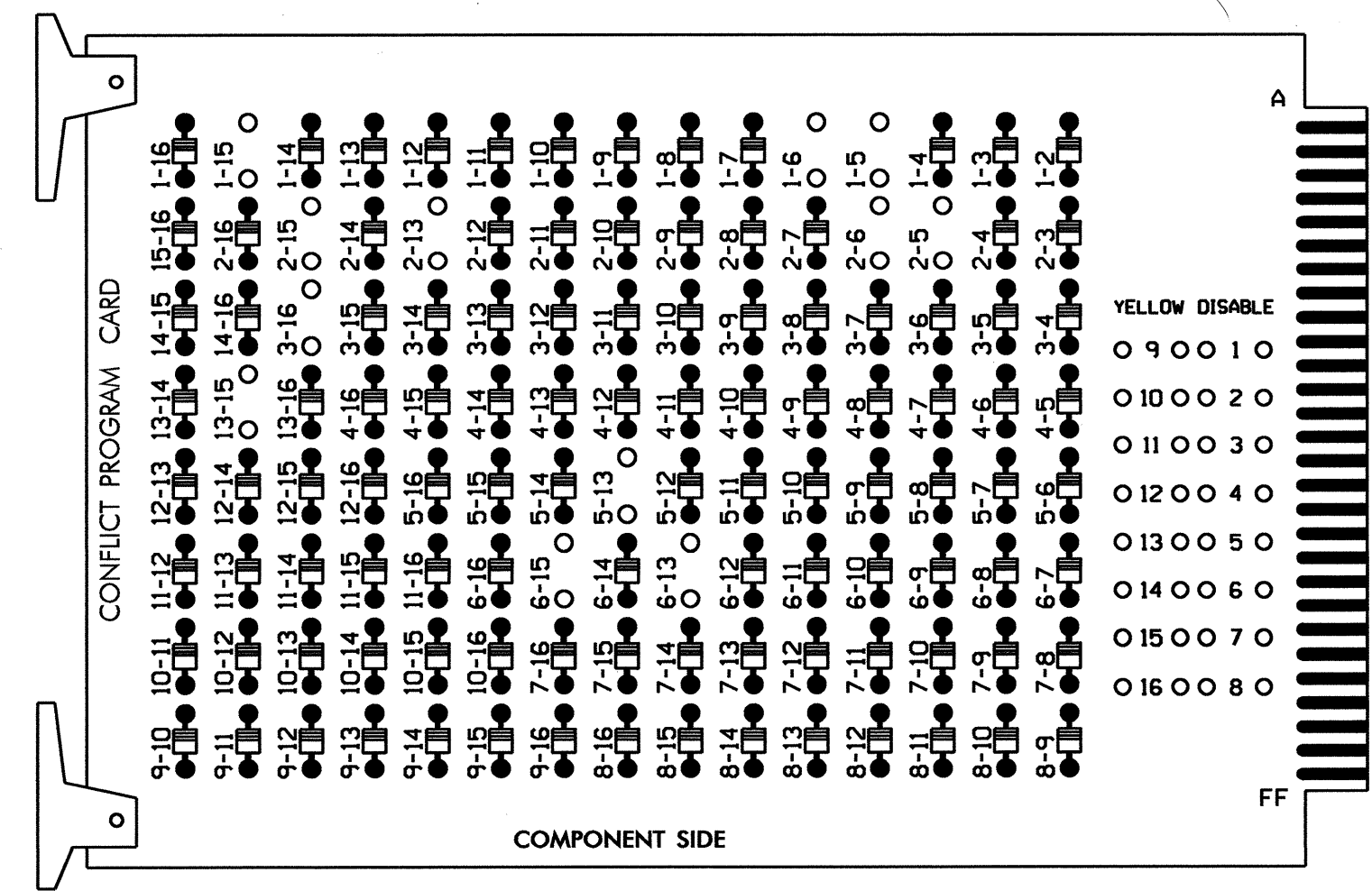
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EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



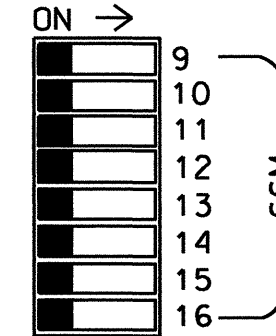
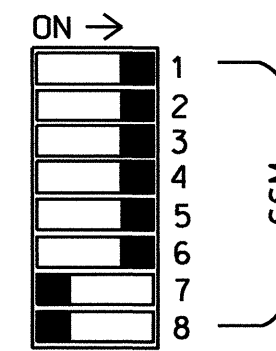
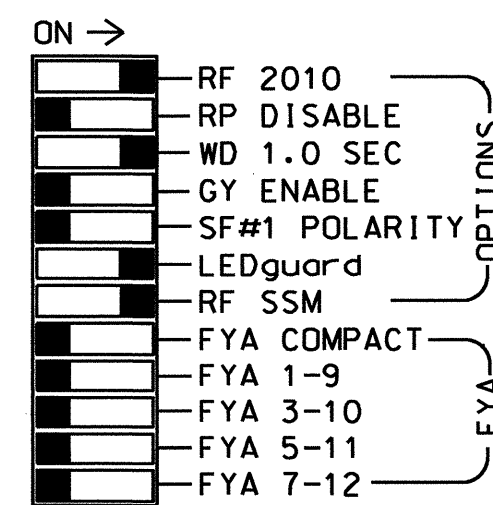
REMOVE DIODE JUMPERS 1-5, 1-6, 1-15, 2-5, 2-6, 2-13, 2-15, 3-16, 5-13, 6-13, 6-15, and 13-15.



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.



■ = 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.
- 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.
- 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, 3, and 6 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the NC 18 (Sterling Street) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 W/ AUX FILE
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
 LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S5,S6,S6P,S8P
 PHASES USED.....1,2,2 PED,3,3 PED,4,5,6,6 PED
 OVERLAPS.....NONE

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	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	62	41	42	NU	51	61,62	P61, P62	NU	NU	P31, P32	NU	NU	NU
RED		128		116	116		101	101				134						
YELLOW		129		117	117		102	102				135						
GREEN		130		118	118		103	103				136						
RED ARROW	125											131						
YELLOW ARROW	126					117						132						
GREEN ARROW	127			118	118	103						133						
Hand icon				113								119						110
Person icon				115								121						112

NU = Not Used

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.

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	S	S	S	∅ 3	∅ 4	S	S	S	S	∅ 2 PED	∅ 6 PED	FS
L	1A	2A/S23	-	-	-	3A	4A	-	-	-	-	DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
U	NOT USED	∅ 2/SYS	S	S	S	∅ 3	∅ 4	S	S	S	S	NOT USED	∅ 3 PED	ST
L		2B/S24	-	-	-	3B	4B	-	-	-	-	DC ISOLATOR	DC ISOLATOR	
U	∅ 5	∅ 6/SYS	S	S	S	S	S	S	S	S	S	S	S	S
L	5A	6A/S25	-	-	-	-	-	-	-	-	-	-	-	-
U	NOT USED	∅ 6/SYS	S	S	S	S	S	S	S	S	S	S	S	S
L		6B/S26	-	-	-	-	-	-	-	-	-	-	-	-

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

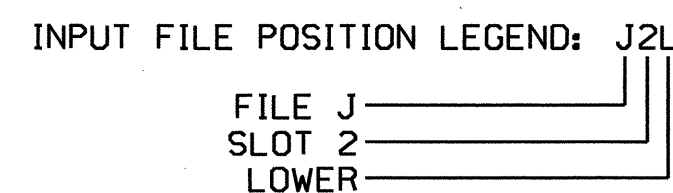
FS = FLASH SENSE
 ST = STOP TIME

IMPORTANT: Make sure a surge protector is installed between TB3-5 and TB3-6. Also, remove the jumper connecting TB3-6 to AC neutral, if present.

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/S23	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S24	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			10
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			10
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
6A/S25	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S26	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29		PED 2	2 PED				
P31,P32	TB8-8,9	I13L	70	32		PED 8	3 PED				
P61,P62	TB8-7,9	I13U	68	30		PED 6	6 PED				

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



PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
- ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
- SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' **REGARDLESS OF DEFAULT PROGRAMMING**
- ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
- BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
- SELECT '1' (OUTPUT ASSIGNMENTS)
- ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
- REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
- CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
- MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

Signal Upgrade - Final Design

Electrical and Programming Details for: **NC 18 (Sterling Street) at SR 1874 (Grace Hospital Road)**

Prepared in the Offices of: **TRANSPOREX MOBILITY AND SIGNAL SYSTEMS**

750 N. Greenfield Pkwy, Garner, NC 27529

Division 13 Burke County Morganton

PLANNED BY: February 2011 REVIEWED BY: S. Armstrong

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS: INIT. DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER 022013 GEORGE C. BRUNN

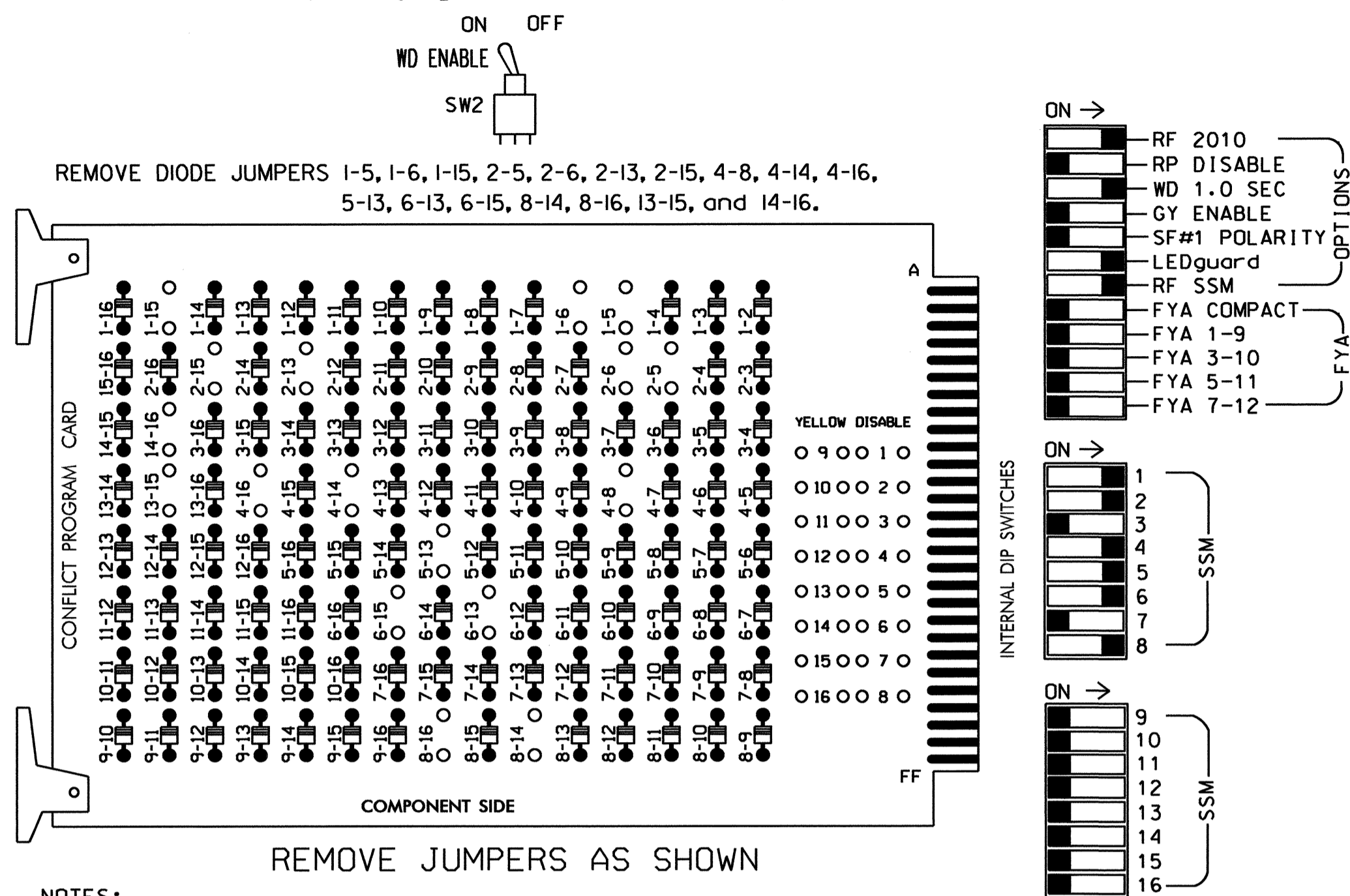
SIGNATURE: *George C. Brunn* DATE: 3/1/11

SIG. INVENTORY NO. 13-0448

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0448
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

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 3,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6, for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2, 4, 6 and 8 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the NC 18 (Sterling Street) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S2P,S4,S4P,S5,S6,S6P,S8,S8P
 PHASES USED.....1,2,2 PED,4,4 PED,5,6,6 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.	11	21,22	P21, P22	NU	41,42	P41, P42	51	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	125						131					
YELLOW ARROW	126						132					
GREEN ARROW	127						133					
↓			113			104			119			110
↓			115			106			121			112

NU = 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"	U	∅ 1 1A	∅ 2/SYS 2A/S19	∅ 3 -∅ 3	∅ 4 4A	∅ 5 -∅ 5	∅ 6 -∅ 6	∅ 7 -∅ 7	∅ 8 -∅ 8	∅ 9 -∅ 9	∅ 10 -∅ 10	∅ 11 -∅ 11	∅ 12 PED DC ISOLATOR	∅ 13 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	∅ 2/SYS 2B/S20	∅ 3 -∅ 3	NOT USED	∅ 5 -∅ 5	∅ 6 -∅ 6	∅ 7 -∅ 7	∅ 8 -∅ 8	∅ 9 -∅ 9	∅ 10 -∅ 10	∅ 11 -∅ 11	∅ 12 PED DC ISOLATOR	∅ 13 PED DC ISOLATOR	ST DC ISOLATOR
"J"	U	∅ 5 5A	∅ 6/SYS 6A/S21	∅ 7 -∅ 7	∅ 8 8A	∅ 9 -∅ 9	∅ 10 -∅ 10	∅ 11 -∅ 11	∅ 12 -∅ 12	∅ 13 -∅ 13	∅ 14 -∅ 14	∅ 15 -∅ 15	∅ 16 -∅ 16	∅ 17 -∅ 17	∅ 18 -∅ 18
	L	NOT USED	∅ 6/SYS 6B/S22	∅ 7 -∅ 7	∅ 8 8B	∅ 9 -∅ 9	∅ 10 -∅ 10	∅ 11 -∅ 11	∅ 12 -∅ 12	∅ 13 -∅ 13	∅ 14 -∅ 14	∅ 15 -∅ 15	∅ 16 -∅ 16	∅ 17 -∅ 17	∅ 18 -∅ 18

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

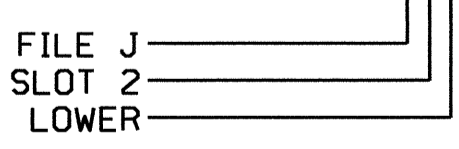
FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			3
2A/S19	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S20	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			10
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
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			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			10
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			15
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.

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: 13-0467
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 18 (Sterling Street) at SR 1708 (Parker Road)

Division 13 Burke County Morganton

PLAN DATE: February 2011 REVIEWED BY: T. J. J.

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS	INIT.	DATE

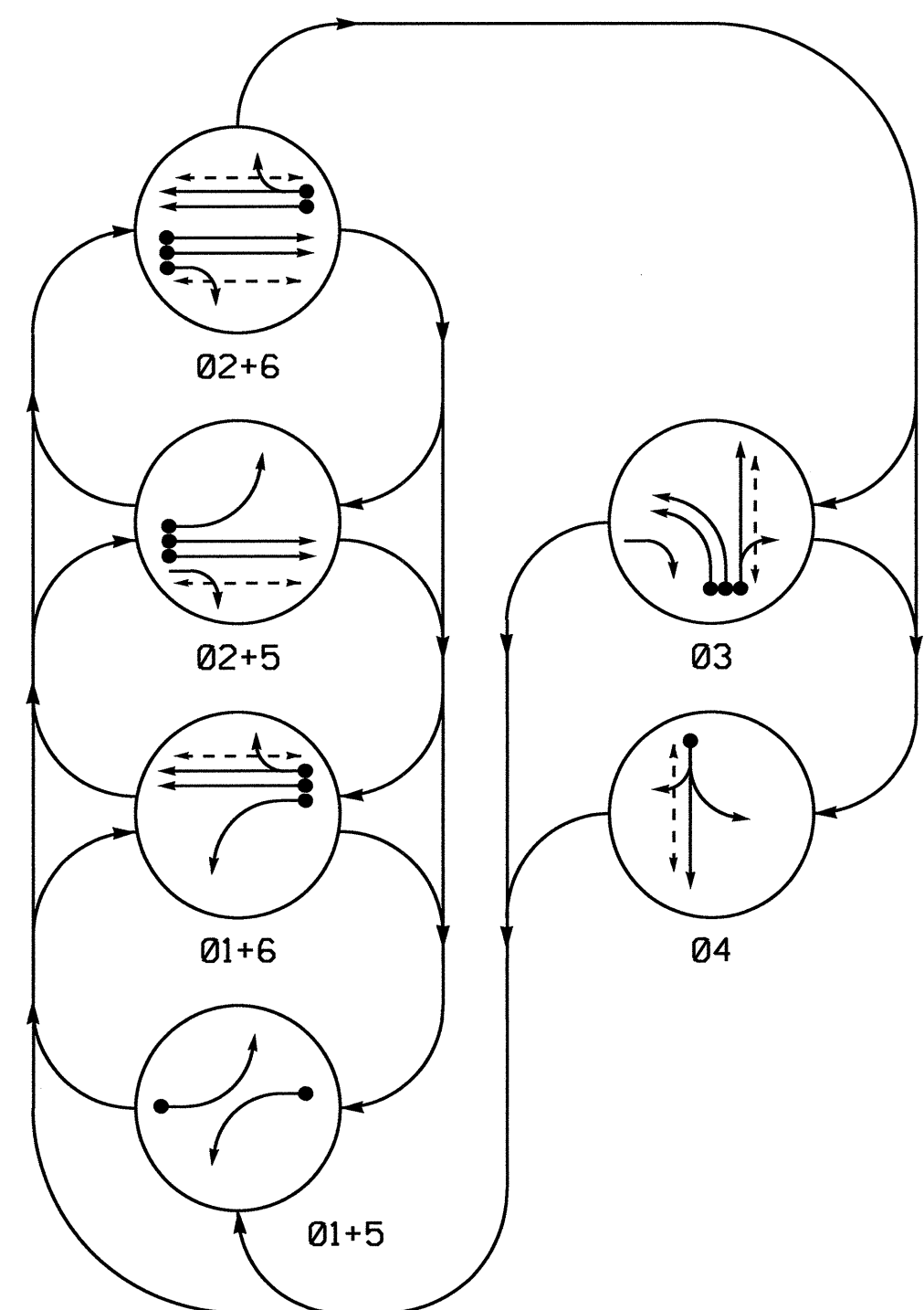
SEAL

George C. Brown 3/3/11

SIG. INVENTORY NO. 13-0467

02-MAR-2011 14:51 S:\TITSAS\UNITS 51\ppl\sw\workgroups\sig Mon\armstrong\130467_sm.ele.xxx.dgn

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

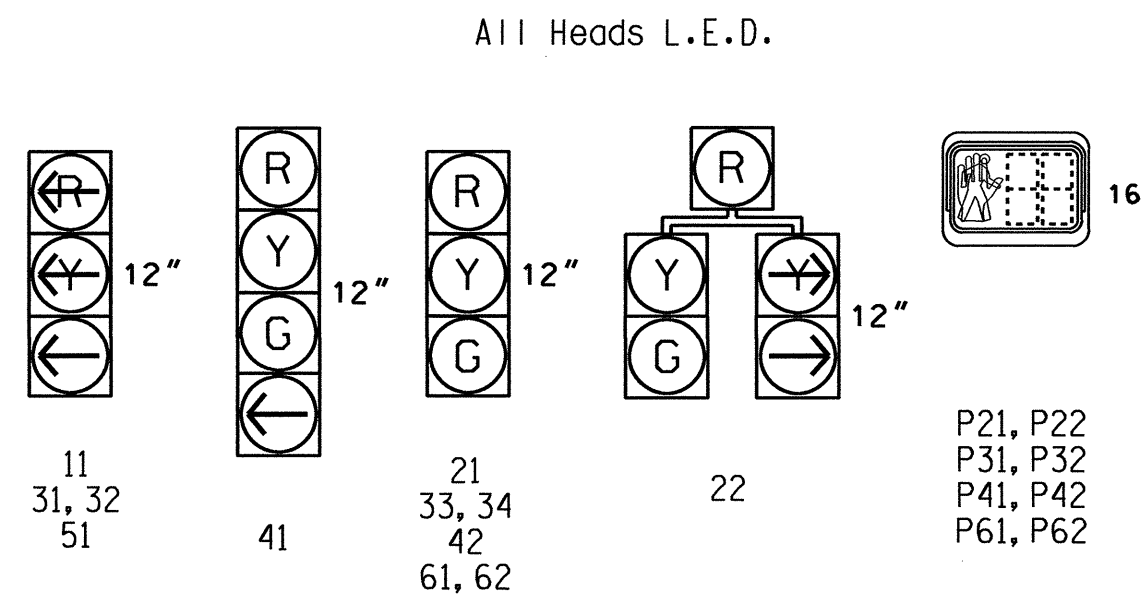
- ← ● DETECTED MOVEMENT
- ← ○ UNDETECTED MOVEMENT (OVERLAP)
- ← ○ UNSIGNALIZED MOVEMENT
- ← ○ PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE					
	01+5	02+5	02+6	03	04	FLASH
11	—	—	—	—	—	—
21	R	R	G	G	R	Y
22	R	R	G	G	R	Y
31, 32	—	—	—	—	—	—
33, 34	R	R	R	R	G	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
51	—	—	—	—	—	—
61, 62	R	G	R	G	R	Y
P21, P22	DW	DW	W	W	DW	DRK
P31, P32	DW	DW	DW	DW	W	DRK
P41, P42	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DRK

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

SIGNAL FACE I.D.



OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

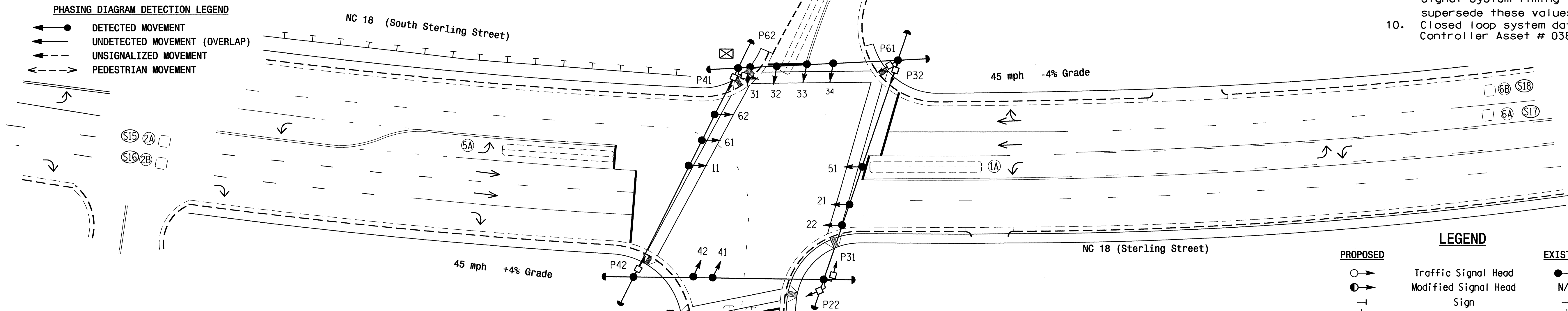
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X60	0	EXIST	-	1	Y	Y	-	-	3	-	Y
2A/S15*	6X6	250	EXIST	-	2	Y	Y	-	-	-	-	Y
2B/S16*	6X6	250	EXIST	-	2	Y	Y	-	-	-	-	Y
3A	6X60	+5	EXIST	-	3	Y	Y	-	-	3	-	Y
3B	6X60	+5	EXIST	-	3	Y	Y	-	-	-	-	Y
3C	6X60	0	EXIST	-	3	Y	Y	-	-	10	-	Y
4A	6X60	+5	EXIST	-	4	Y	Y	-	-	10	-	Y
5A	6X60	0	EXIST	-	5	Y	Y	-	-	3	-	Y
6A/S17*	6X6	300	EXIST	-	6	Y	Y	-	-	-	-	Y
6B/S18*	6X6	300	EXIST	-	6	Y	Y	-	-	-	-	Y

* Re-wire loops and place on separate channels

6 Phase Fully Actuated NC 18 (Sterling Street) CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- 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.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Pavement markings are existing.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset # 0385.



OASIS 2070L TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1*	7	12	7	7	7	12
Extension 1	1.0	6.0	1.0	1.0	1.0	6.0
Max Green 1*	15	90	30	30	15	90
Yellow Clearance	3.0	4.2	4.0	3.3	3.0	4.9
Red Clearance	3.5	1.7	2.6	2.7	3.4	1.3
Walk 1*	-	7	7	7	-	7
Don't Walk 1	-	10	20	25	-	13
Seconds Per Actuation*	-	1.5	-	-	-	1.5
Max Variable Initial*	-	29	-	-	-	34
Time Before Reduction*	-	15	-	-	-	15
Time To Reduce*	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

LEGEND

- | PROPOSED | 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 | --- 2-in Underground Conduit |
| N/A → Right of Way | → Right of Way |
| → Directional Arrow | → Directional Arrow |
| → Pavement Marking Arrow | → Pavement Marking Arrow |
| N/A → Guardrail | → Guardrail |
| ○ → Pedestrian Signal Pedestal | ○ → Pedestrian Signal Pedestal |
| N/A → Wheelchair Ramp | → Wheelchair Ramp |

Signal Upgrade

Prepared in the Offices of:

NC 18 (South Sterling Street) at Berry Road/Old NC 18

Division 13 Burke County Morganton

PLAN DATE: January 2011 REVIEWED BY:

PREPARED BY: Jerry Yaravitz REVIEWED BY:

REVISIONS INIT. DATE

SCALE: 1"=30'

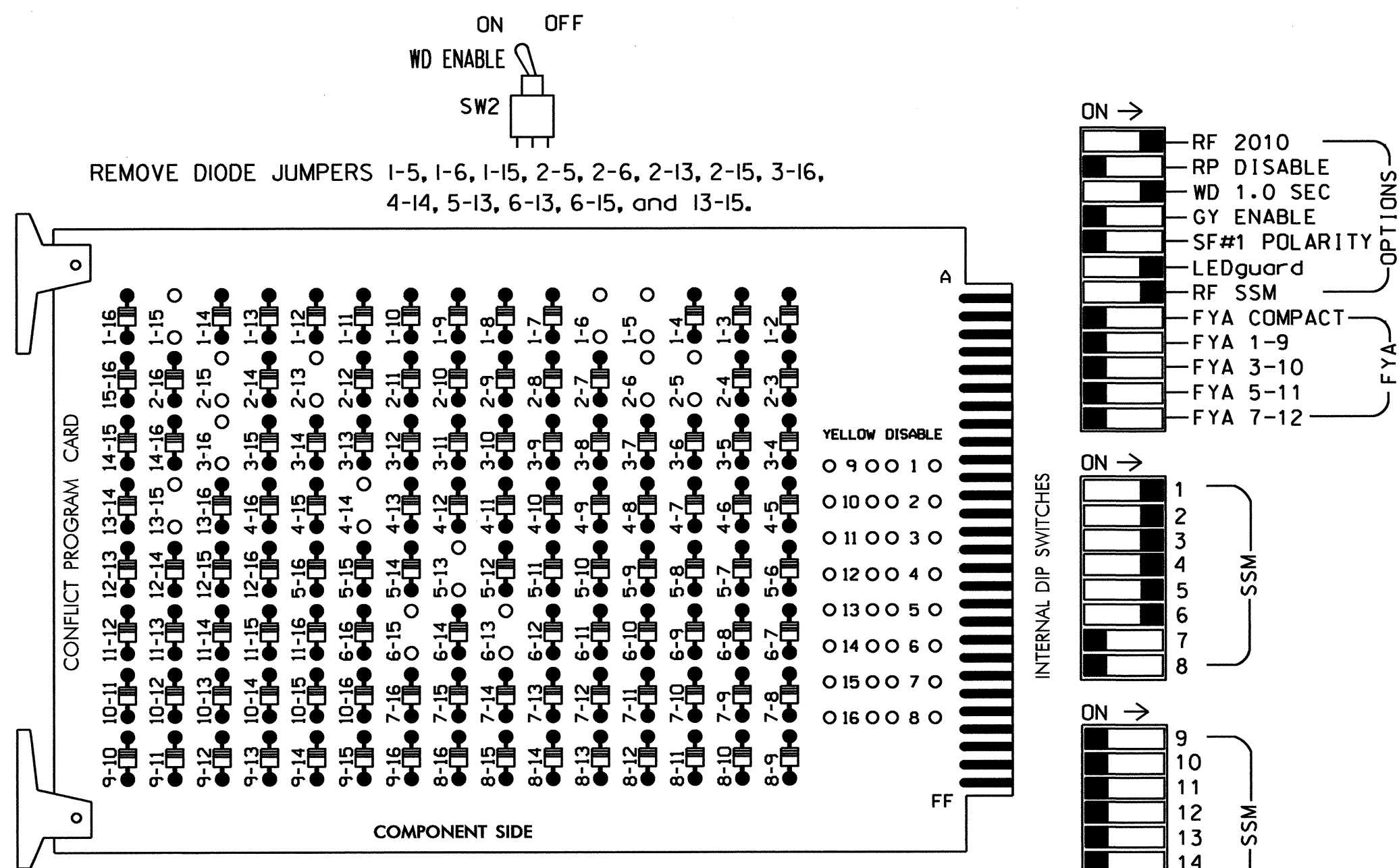
SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 30530

SIG. INVENTORY NO. 13-0385

02-MAR-2011 14:31
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 jy2\dwg\13

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.
- 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, 3, 4, and 6 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the NC 18 (Sterling Street) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S4P,S5,S6,S6P,S8P
 PHASES USED.....1,2,2 PED,3,3 PED,4,4 PED,5,6,6 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	3 PED
SIGNAL HEAD NO.	11	21,22	P21, P22	22	31,32	33,34	41	42	P41, P42	51	61,62	P61, P62
RED		128			116	101	101			134		
YELLOW		129			117	102	102			135		
GREEN		130			118	103	103			136		
RED ARROW	125			116					131			
YELLOW ARROW	126			117	117				132			
GREEN ARROW	127			118	118		103		133			
			113					104		119		110
			115					106		121		112

NU = Not Used

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.

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1A	Ø1	Ø2/SYS	Ø3	Ø4	Ø5	Ø6/SYS	Ø7	Ø8	Ø9	Ø10	Ø11	Ø12	Ø13	Ø14
NOT USED	2A/S15	2B/S16	3A	3B	4A	5A	6A/S17	6B/S18	7A	8A	9A	10A	11A	12A

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

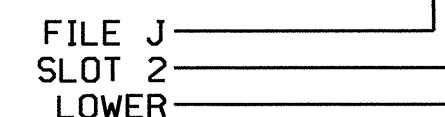
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			3
2A/S15	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S16	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			
3C	TB6-1,2	I7U	65	27	34	3	Y	Y			10
4A	TB6-3,4	I7L	78	40	44	4	Y	Y			10
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
6A/S17	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S18	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P31,P32	TB8-8,9	I13L	70	32	PED 8	3 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					

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

INPUT FILE POSITION LEGEND: J2L



PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
- ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
- SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' **REGARDLESS OF DEFAULT PROGRAMMING**
- ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
- BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
- SELECT '1' (OUTPUT ASSIGNMENTS)
- ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
- REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
- CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
- MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR: **NC 18 (South Sterling Street) at Berry Road/Old NC 18**

Prepared In the Offices of: **TRANSPORTATION MOBILITY AND SAFETY DESIGN**

Division 13 Burke County Morganton

PLAN DATE: February 2011 REVIEWED BY: T. J. J. J.

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

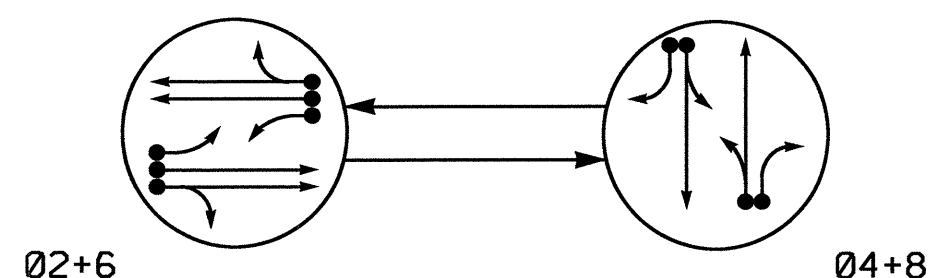
SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

SIGNATURE DATE: *George C. Brown* 3/4/11

SIG. INVENTORY NO. 13-0385

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0385
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

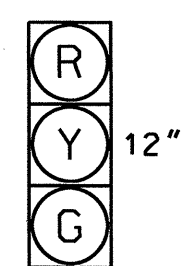
- ←●→ DETECTED MOVEMENT
- ←○→ UNDETECTED MOVEMENT (OVERLAP)
- ←---→ UNSIGNALIZED MOVEMENT
- ←- - -> PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21,22	G	R	Y
41,42	R	G	R
61,62	G	R	Y
81,82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



21,22
41,42
61,62
81,82

OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

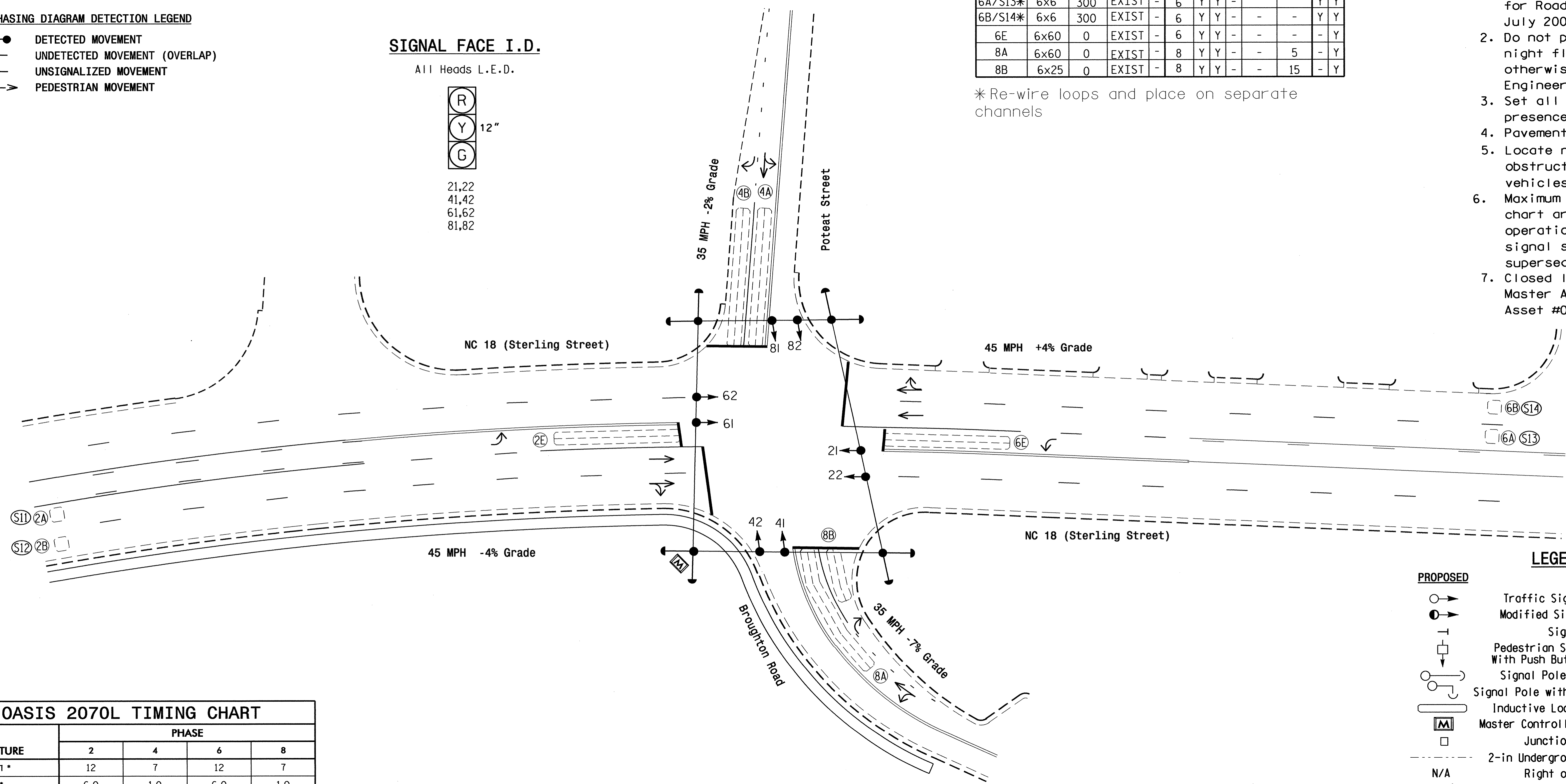
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING								
				NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A/S11*	6x6	300	EXIST	-	2	Y	Y	-	-	-	Y	Y
2B/S12*	6x6	300	EXIST	-	2	Y	Y	-	-	-	Y	Y
2E	6x60	0	EXIST	-	2	Y	Y	-	-	-	-	Y
4A	6x60	0	EXIST	-	4	Y	Y	-	-	3	-	Y
4B	6x60	0	EXIST	-	4	Y	Y	-	-	15	-	Y
6A/S13*	6x6	300	EXIST	-	6	Y	Y	-	-	-	Y	Y
6B/S14*	6x6	300	EXIST	-	6	Y	Y	-	-	-	Y	Y
6E	6x60	0	EXIST	-	6	Y	Y	-	-	-	-	Y
8A	6x60	0	EXIST	-	8	Y	Y	-	-	5	-	Y
8B	6x25	0	EXIST	-	8	Y	Y	-	-	15	-	Y

* Re-wire loops and place on separate channels

2 Phase Fully Actuated NC 18 (Sterling Street) CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Pavement markings are existing.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Master Asset #11317. Controller Asset #0454.



OASIS 2070L TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	12	7	12	7
Extension 1 *	6.0	1.0	6.0	1.0
Max Green 1 *	50	20	50	20
Yellow Clearance	4.9	4.0	4.2	4.4
Red Clearance	1.0	1.5	1.0	1.7
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 *	30	-	30	-
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

* 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
□ → 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
□ → Master Controller & Cabinet	□ → Master 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

Signal Upgrade

NC 18 (Sterling Street) at Broughton Road/Poteat Street

Division 13 Burke County Morganton

PLAN DATE: January 2011 REVIEWED BY: [Signature]

PREPARED BY: Jerry Yaravitz REVIEWED BY: [Signature]

REVISIONS: [Table with columns for REVISIONS, INIT., DATE]

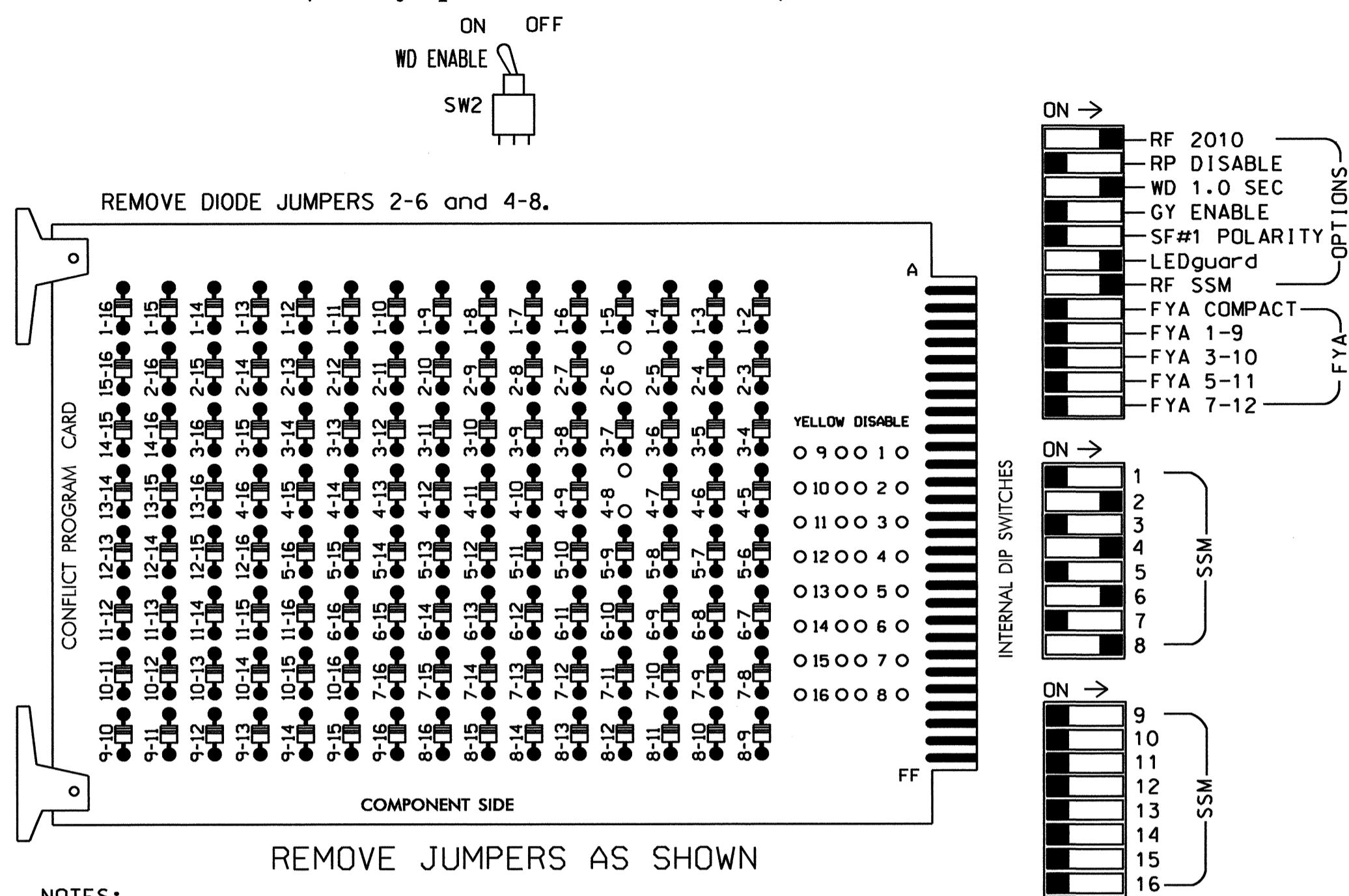
SEAL

3/1/11

SIG. INVENTORY NO. 13-0454

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.

■ = 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.
- 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 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6, for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the NC 18 (Sterling Street) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....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

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												
Hand icon												
Person icon												

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	∅2/SYS	NOT USED	∅2	∅4	∅4	∅4	∅4	∅4	∅4	∅4	∅4	∅4	∅4	FS
L	2A/S11	∅2	2E	4A	4B	4C	4D	4E	4F	4G	4H	4I	4J	DC ISOLATOR
U	∅6/SYS	NOT USED	∅6	∅8	∅8	∅8	∅8	∅8	∅8	∅8	∅8	∅8	∅8	ST
L	6A/S13	∅6	6E	8A	8B	8C	8D	8E	8F	8G	8H	8I	8J	DC ISOLATOR
U	∅6/SYS	∅6	∅6	∅8	∅8	∅8	∅8	∅8	∅8	∅8	∅8	∅8	∅8	FS
L	6B/S14	6E	6E	8B	8C	8D	8E	8F	8G	8H	8I	8J	8K	ST

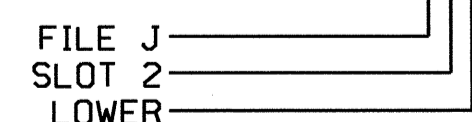
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A/S11	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S12	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
2E	TB2-11,12	I3L	76	38	42	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			15
6A/S13	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S14	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			
6E	TB3-11,12	J3L	77	39	46	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			5
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			15

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0454
DESIGNED: January 2011
SEALED: 3/1/11
REVISED: N/A

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 18 (Sterling Street) at Broughton Road/Potat Street

Division 13 Burke County Morganton

PLAN DATE: February 2011 REVIEWED BY: T. J. J.

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS INIT. DATE

SEAL

STATE OF NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013

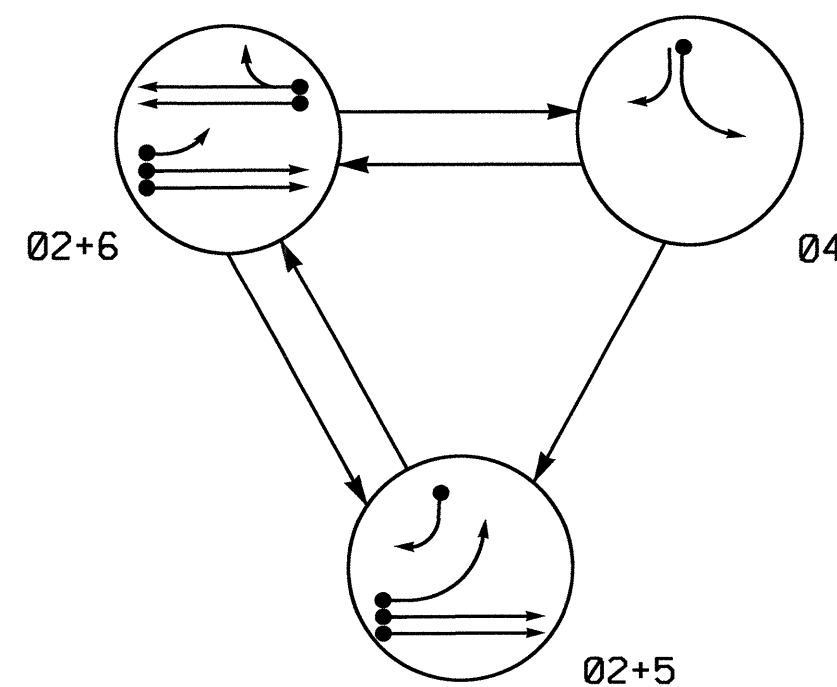
GEORGE C. BROWN

Signature: George C. Brown 3/3/11

SIG. INVENTORY NO. 13-0454

02-MAR-2011 15:32
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scmstron

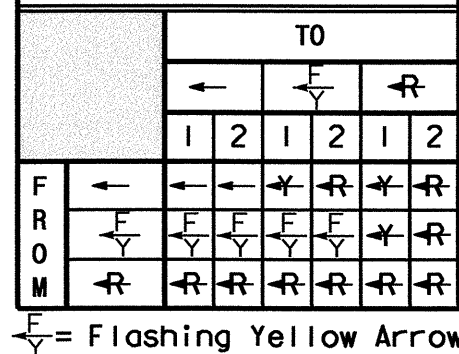
PHASING DIAGRAM



SIGNAL FACE	PHASE			
	02+5	02+6	04	F L S H
21,22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51	F	F	R	Y
61,62	R	G	R	Y

F = Flashing Yellow Arrow

STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL



F = Flashing Yellow Arrow

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	300	5	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	300	5	Y	2	Y	Y	-	-	-	-	Y
4A	6X60	0	EXIST	-	4	Y	Y	-	-	3	-	Y
5A	6X60	0	EXIST	-	5	Y	Y	-	-	15	-	Y
5B	6X60	0	EXIST	-	5	Y	Y	-	-	15	-	Y
6A	6X6	300	5	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	300	5	Y	6	Y	Y	-	-	-	-	Y

3 Phase Fully Actuated NC 18 (Sterling Street) CLS

NOTES

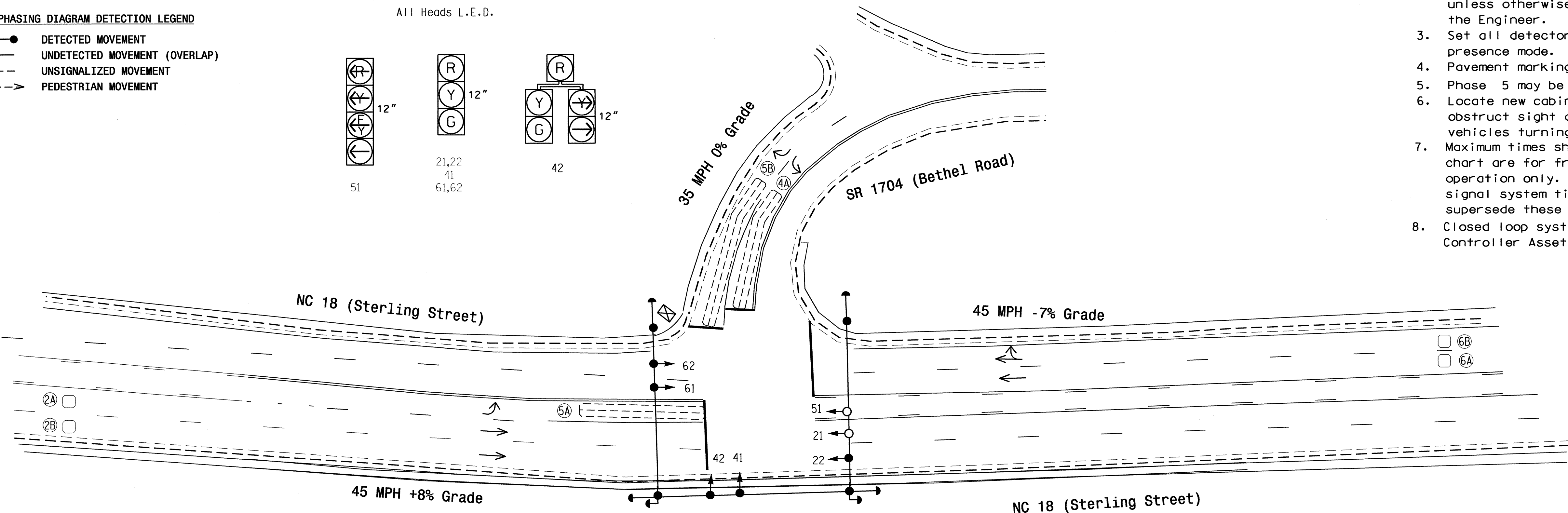
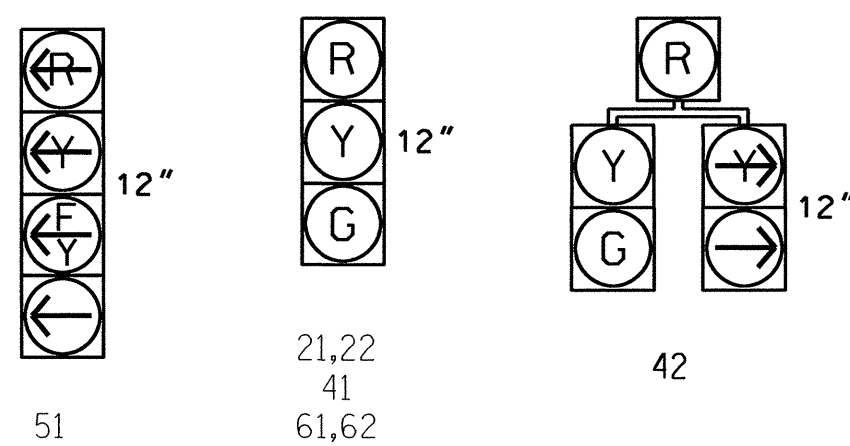
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Pavement markings are existing.
- Phase 5 may be lagged.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0407.

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070L TIMING CHART				
FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	12	7	7	12
Extension 1 *	6.0	1.0	1.0	6.0
Max Green 1 *	90	20	20	90
Yellow Clearance	3.9	3.0	3.0	5.2
Red Clearance	1.0	2.3	1.6	1.0
Red Revert	2.0	2.0	2.0	2.0
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 *	30	-	-	30
Minimum Gap	3.0	-	-	3.0
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

* 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

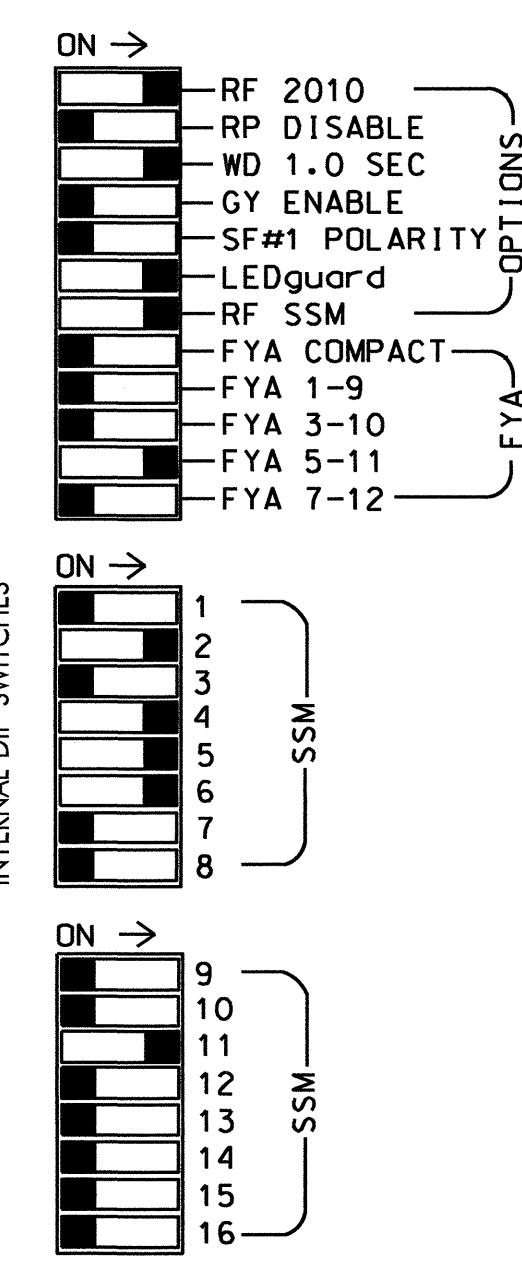
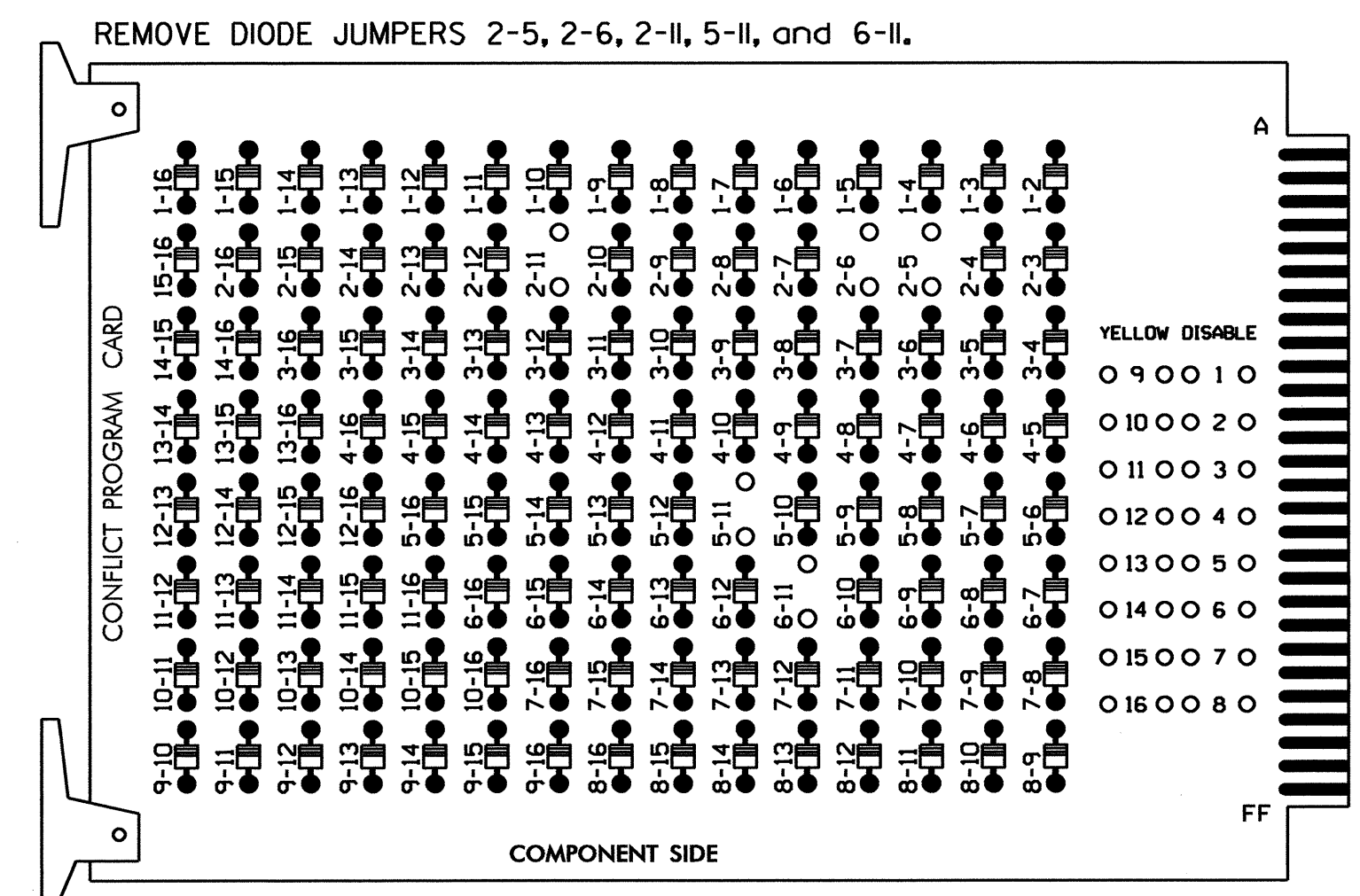
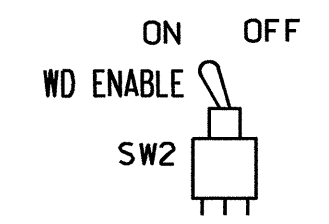
- | PROPOSED | EXISTING |
|--|---------------------|
| ○ → Traffic Signal Head | ● → N/A |
| ○ → Modified Signal Head | ○ → N/A |
| ○ → Sign | ○ → N/A |
| □ → Pedestrian Signal Head With Push Button & Sign | □ → N/A |
| ○ → Signal Pole with Guy | ○ → N/A |
| ○ → Signal Pole with Sidewalk Guy | ○ → N/A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

Signal Upgrade

	NC 18 (Sterling Street) at SR 1704 (Bethel Road)		
	Division 13 Burke County Morganton PLAN DATE: January 2011 PREPARED BY: Jerry Varavitz	REVIEWED BY: REVIEWED BY:	
SCALE: 1"=30' REVISIONS:	INIT. DATE:	SIG. INVENTORY NO. 13-0407	

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 5-11, and 6-11.
- 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, 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 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 18 (Sterling Street) Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

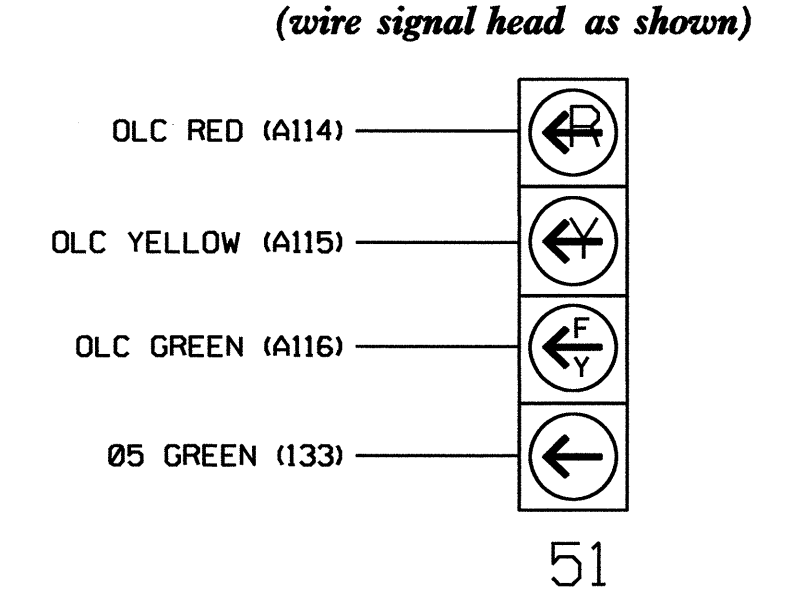
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	42	51*	61,62	NU	NU	NU	NU	NU	NU	51*	NU	NU
RED		128			101		*		134									
YELLOW		129			102				135									
GREEN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

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

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,S4,S5,S6,S12
 PHASES USED.....2,4,5,6
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

4 SECTION FYA PPLT SIGNAL WIRING DETAIL



NOTE
 The sequence display for signal head 51 requires special logic programming. See sheet 2 of 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)

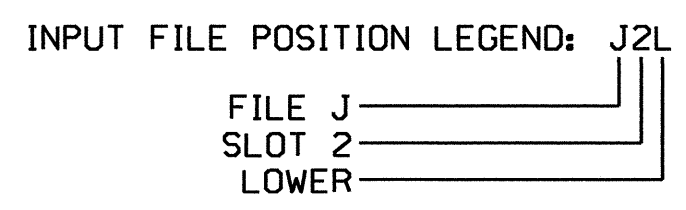
FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 2	∅ 2	∅ 2	∅ 2	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4
L	2A	2B	2C	2D	4A	4B	4C	4D	4E	4F	4G	4H	4I	4J
U	∅ 5	∅ 5	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6
L	5A	5B	6A	6B	6C	6D	6E	6F	6G	6H	6I	6J	6K	6L

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

INPUT FILE CONNECTION & PROGRAMMING CHART

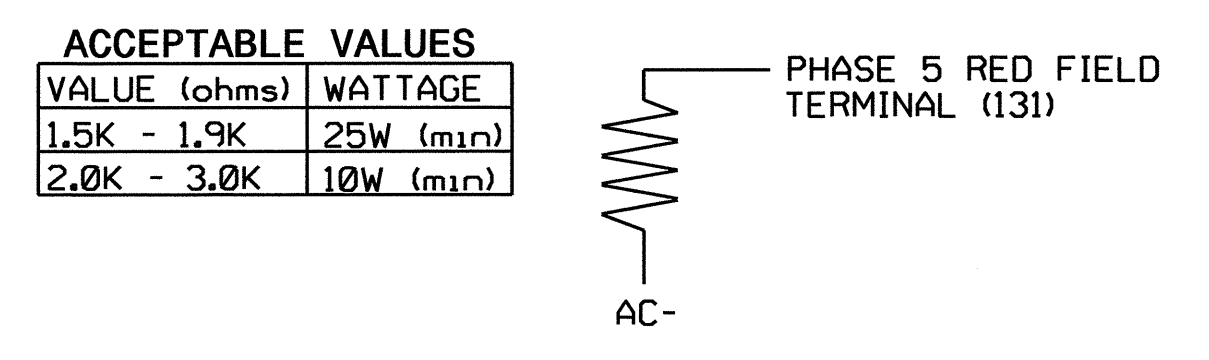
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
5A ¹	TB3-1,2	J1U	55	17	5	5	Y	Y			15
		I4U	47	9	22	2	Y	Y	Y		3
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			

¹Add jumper from J1-W to I4-W, on rear of input file.



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



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

Signal Upgrade - Sheet 1 of 2

Electrical and Programming Details For:

NC 18 (Sterling Street) at SR 1704 (Bethel Road)

Division 13 Burke County Morganton

Prepared By: S. Armstrong
 Reviewed By: T. J. J. J.

750 N. Greenfield Pkwy, Garner, NC 27529

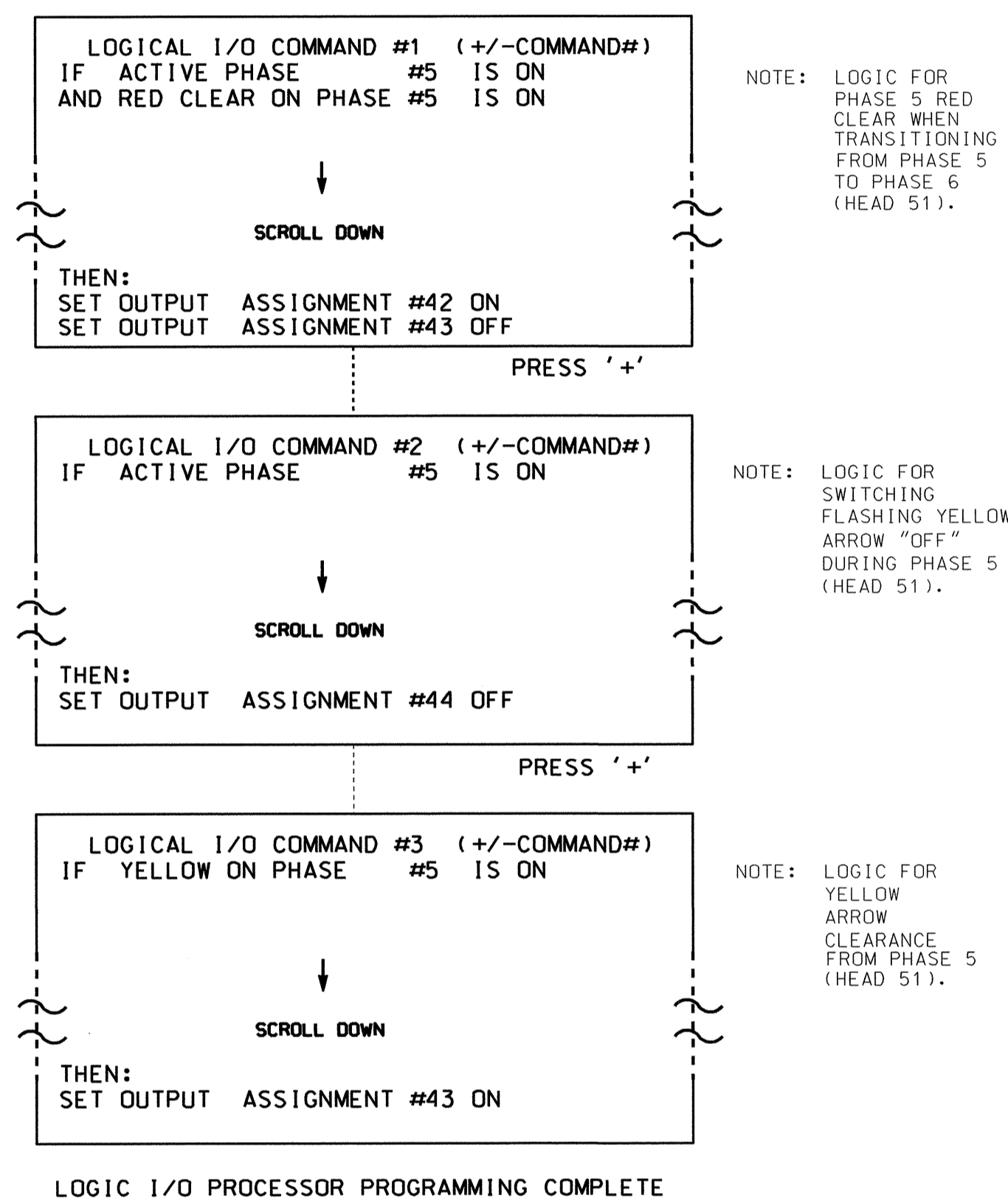
Seal of George C. Brown, Professional Engineer, License No. 022013

Sig. Inventory No. 13-0407

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

(program controller as shown below)

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



OUTPUT REFERENCE SCHEDULE

OUTPUT 42 = Overlap C Red
OUTPUT 43 = Overlap C Yellow
OUTPUT 44 = Overlap C Green

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 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
    
```


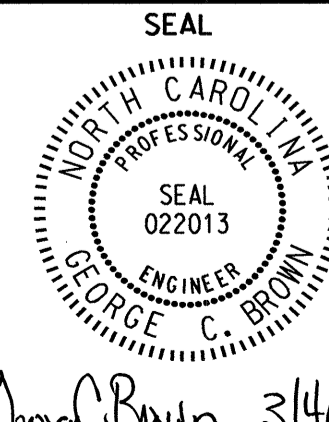
← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

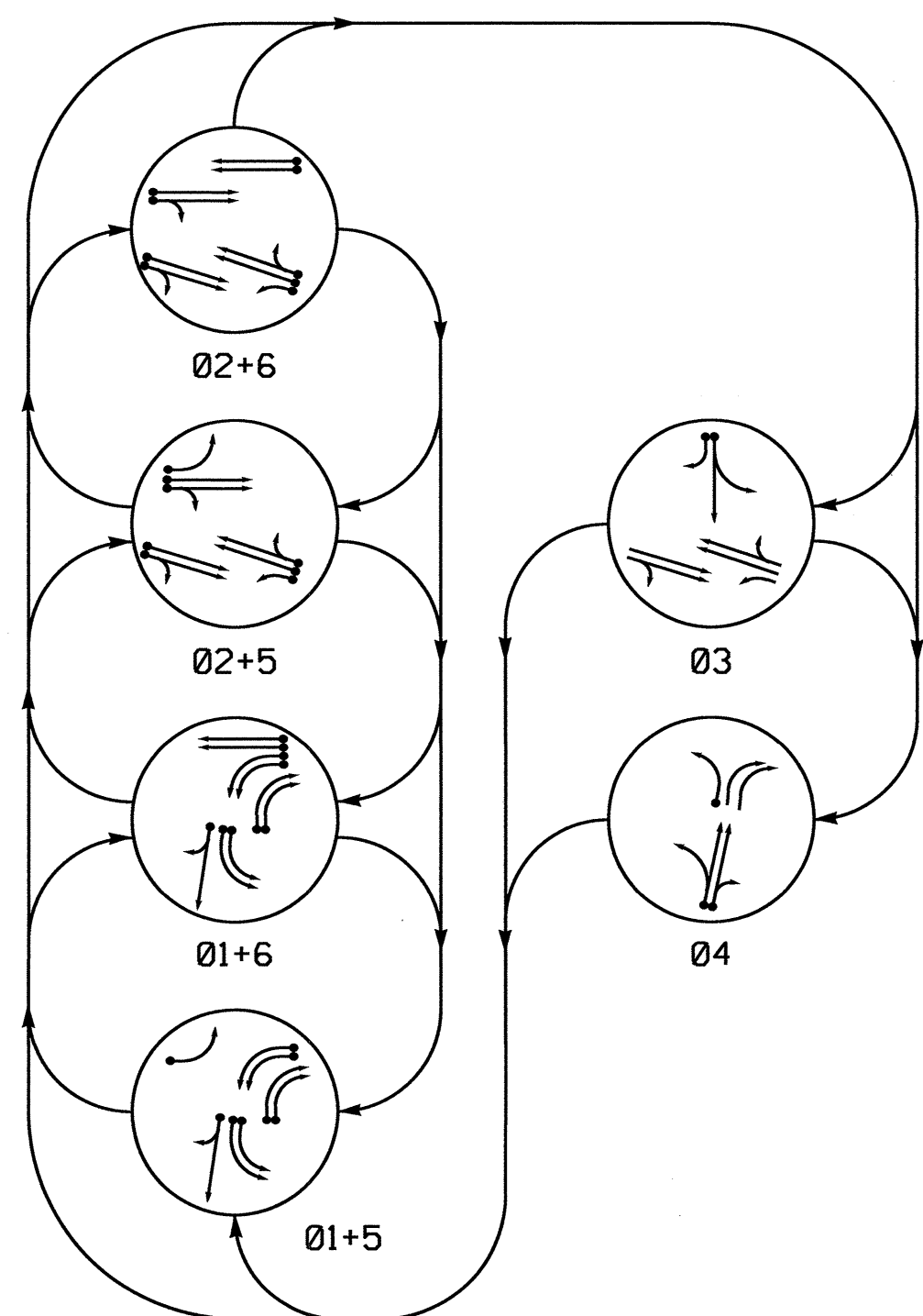
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0407
DESIGNED: January 2011
SEALED: 3/1/11
REVISED: N/A

03-MAR-2011 15:44 SS:TESAS\MTS\Sig\plm\wcr\groups\Sig\Mon\mstronq\30407_en.ele.xxx.dgn

Signal Upgrade - Sheet 2 of 2

	<p>NC 18 (Sterling Street) at SR 1704 (Bethel Road)</p>	
<p>Division 13 Burke County Morganton</p>		
<p>PLAN DATE: February 2011 REVIEWED BY: <i>T. J. [Signature]</i></p>		
<p>PREPARED BY: S. Armstrong REVIEWED BY:</p>		
REVISIONS	INIT.	DATE
<p><i>George C. Brown</i> 3/4/11</p>		DATE
SIGNATURE		DATE
SIG. INVENTORY NO. 13-0407		

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

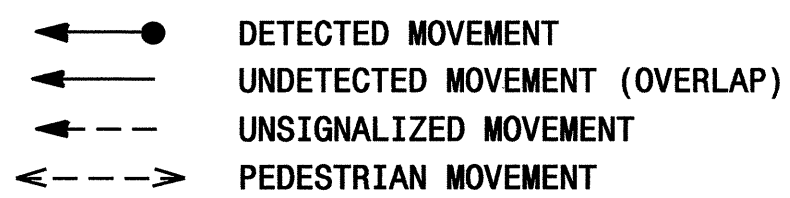
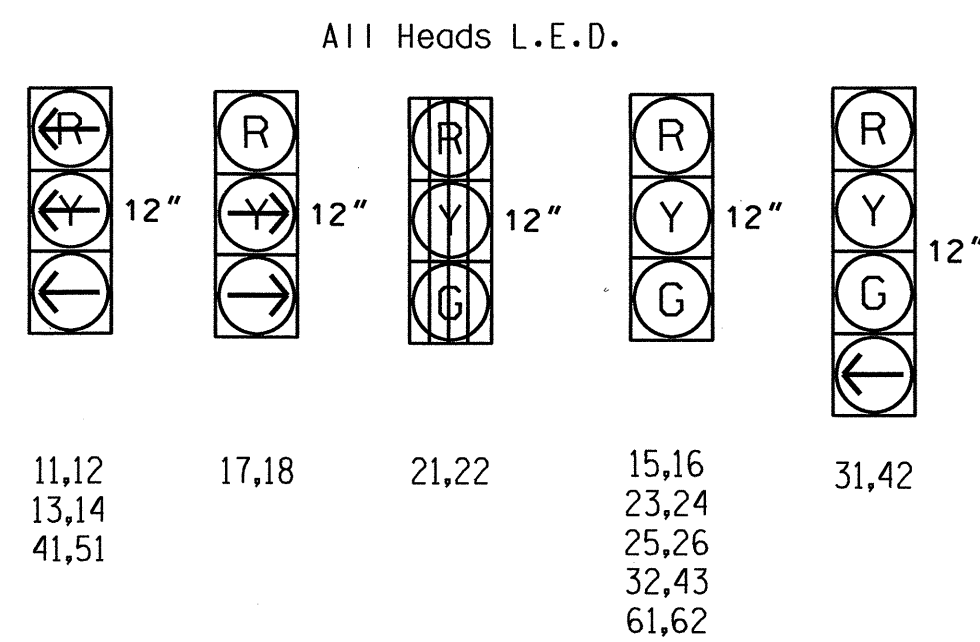


TABLE OF OPERATION

SIGNAL FACE	PHASE					
	01+5	01+6	02+5	02+6	03	04
11,12	←	←	→	→	→	→
13,14	←	←	→	→	→	→
15,16	G	G	R	R	R	R
17,18	←	←	→	→	→	→
21,22	R	R	G	G	R	Y
23,24	R	R	G	G	R	Y
25,26	R	R	G	G	R	Y
31	R	R	R	R	G	R
32	R	R	R	R	G	R
41	←	←	←	←	←	←
42	R	R	R	R	R	G
43	R	R	R	R	R	G
51	←	←	←	←	←	←
61,62	R	G	R	G	R	Y

SIGNAL FACE I.D.



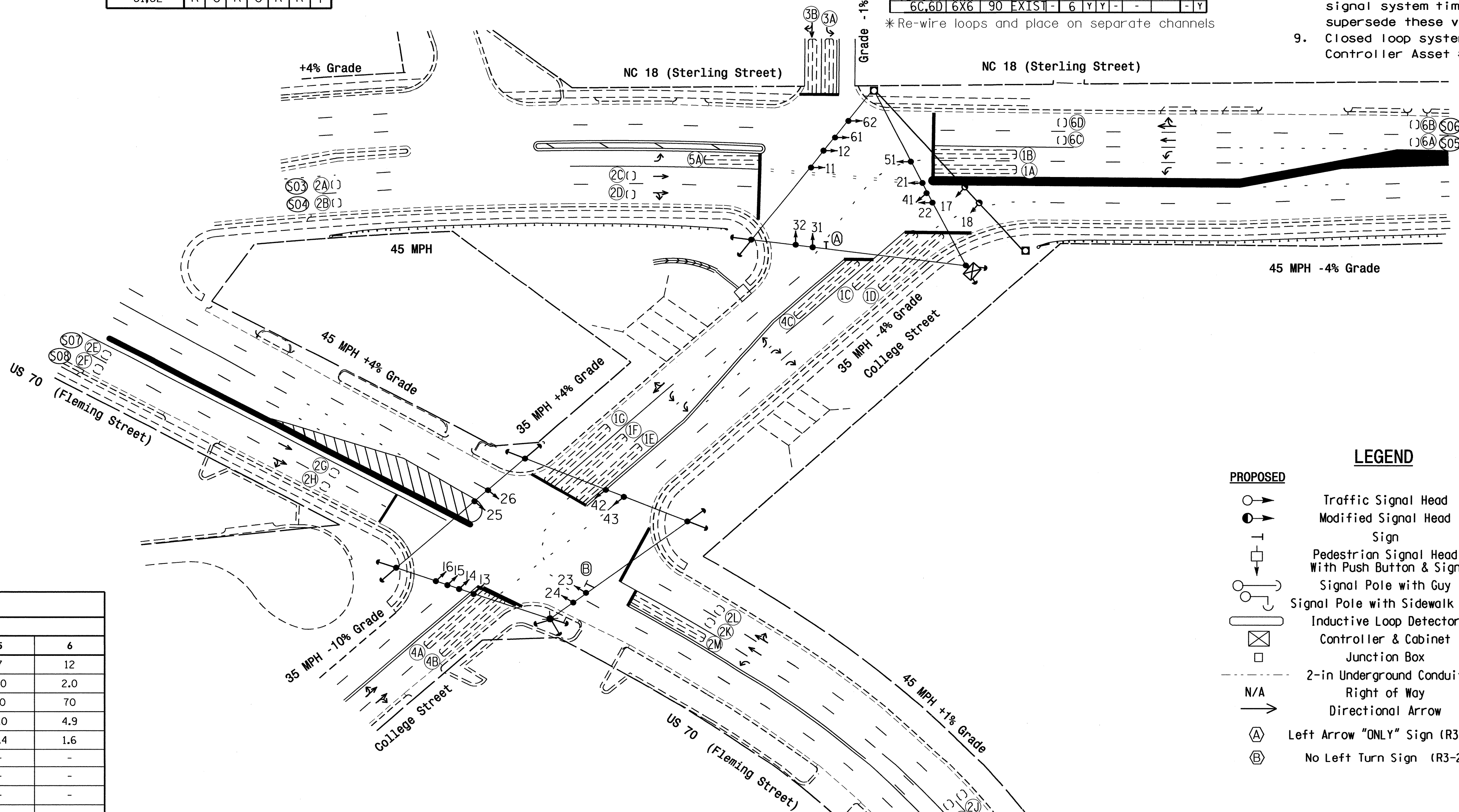
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	INDUCTIVE LOOPS	DETECTOR PROGRAMMING						
				PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	
1A	6X60	0	EXIST	-	1	Y	-	-	-	Y
1B	6X60	0	EXIST	-	1	Y	-	-	-	Y
1C	6X60	0	EXIST	-	1	Y	-	-	15	-
1D	6X60	0	EXIST	-	1	Y	-	-	15	-
1E	6X60	0	EXIST	-	1	Y	-	-	-	Y
1F	6X60	0	EXIST	-	1	Y	-	-	-	Y
1G	6X60	0	EXIST	-	1	Y	-	-	10	-
2A/S3*	6X6	300	EXIST	-	2	Y	-	1.6	-	Y
2B/S4*	6X6	300	EXIST	-	2	Y	-	1.6	-	Y
2C,2D	6X6	90	EXIST	-	2	Y	-	-	-	Y
2E/S7*	6X6	300	EXIST	-	2	Y	-	1.6	-	Y
2F/S8*	6X6	300	EXIST	-	2	Y	-	1.6	-	Y
2G,2H	6X6	90	EXIST	-	2	Y	-	-	-	Y
2I/S9*	6X6	300	EXIST	-	2	Y	-	1.6	-	Y
2J/S10*	6X6	300	EXIST	-	2	Y	-	1.6	-	Y
2K,2L	6X6	90	EXIST	-	2	Y	-	-	-	Y
2M	6X60	0	EXIST	-	2	Y	-	-	3	-
3A	6X40	0	EXIST	-	3	Y	-	-	3	-
3B	6X40	0	EXIST	-	3	Y	-	-	10	-
4A	6X60	0	EXIST	-	4	Y	-	-	3	-
4B	6X60	0	EXIST	-	4	Y	-	-	10	-
4C	6X60	0	EXIST	-	4	Y	-	-	-	Y
5A	6X40	0	EXIST	-	5	Y	-	-	3	-
6A/S5*	6X6	300	EXIST	-	6	Y	-	1.6	-	Y
6B/S6*	6X6	300	EXIST	-	6	Y	-	1.6	-	Y
6C,6D	6X6	90	EXIST	-	6	Y	-	-	-	Y

* Re-wire loops and place on separate channels

6 Phase Fully Actuated NC 18 (Sterling Street) CLS

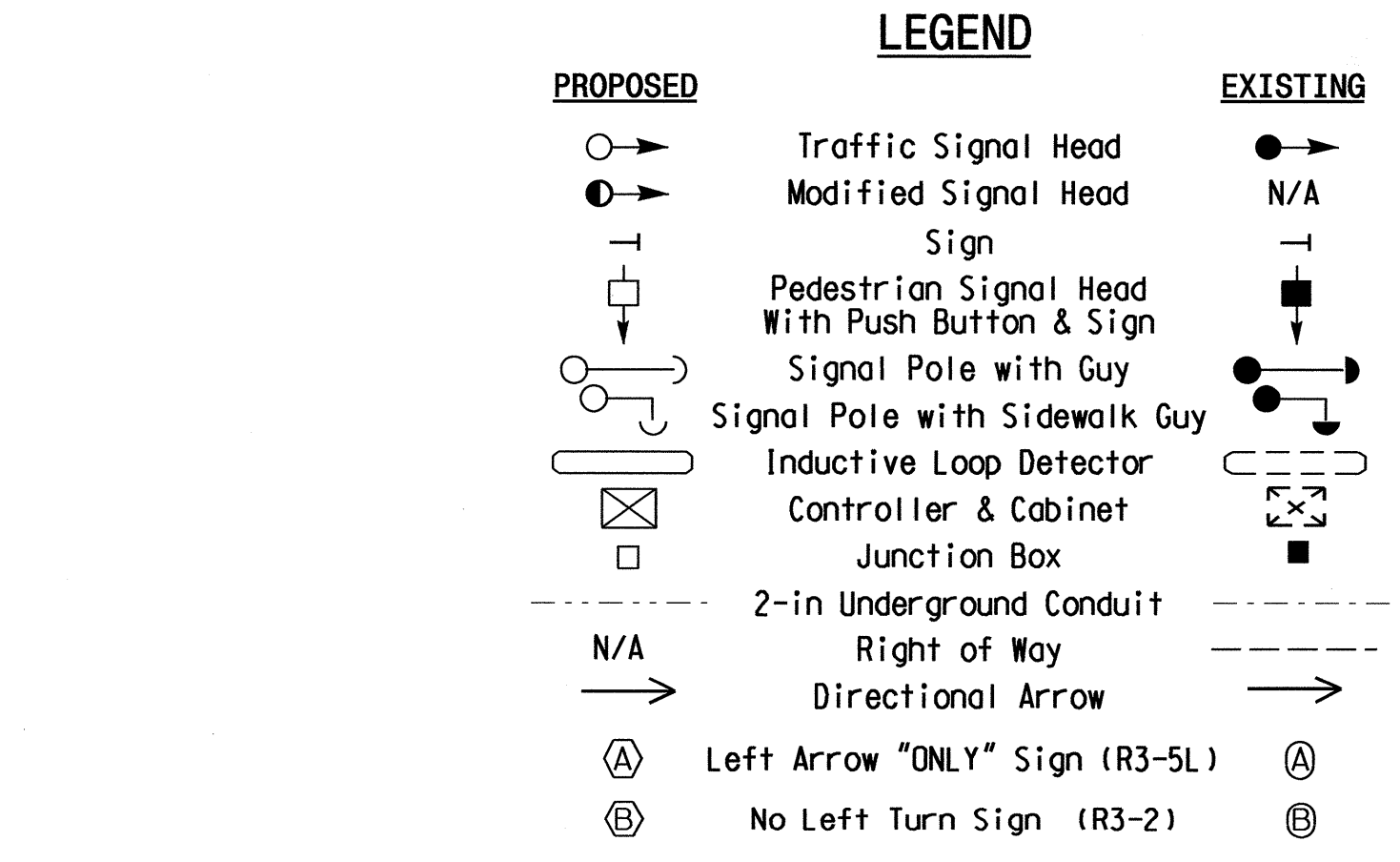
- NOTES
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
 - Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
 - Phase 1 and/or phase 5 may be lagged.
 - The order of phase 3 and phase 4 may be reversed.
 - Set all detector units to presence mode.
 - Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red. Pavement markings are existing.
 - 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 #0339.



OASIS 2070L TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	1.0	2.0	1.0	1.0	1.0	2.0
Max Green 1 *	30	70	15	15	30	70
Yellow Clearance	3.6	4.2	3.0	4.8	3.0	4.9
Red Clearance	3.2	2.0	3.3	3.2	2.4	1.6
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	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

Prepared In the Offices of

 750 N. Greenfield Pkwy, Garner, NC 27529

NC 18 (Sterling Street) and US 70 (Fleming Street) at College Street

Division 13 Burke County Worganton
 PREPARED BY: Jerry Yaravitz REVIEWED BY: [Signature]
 SCALE: 1" = 50'

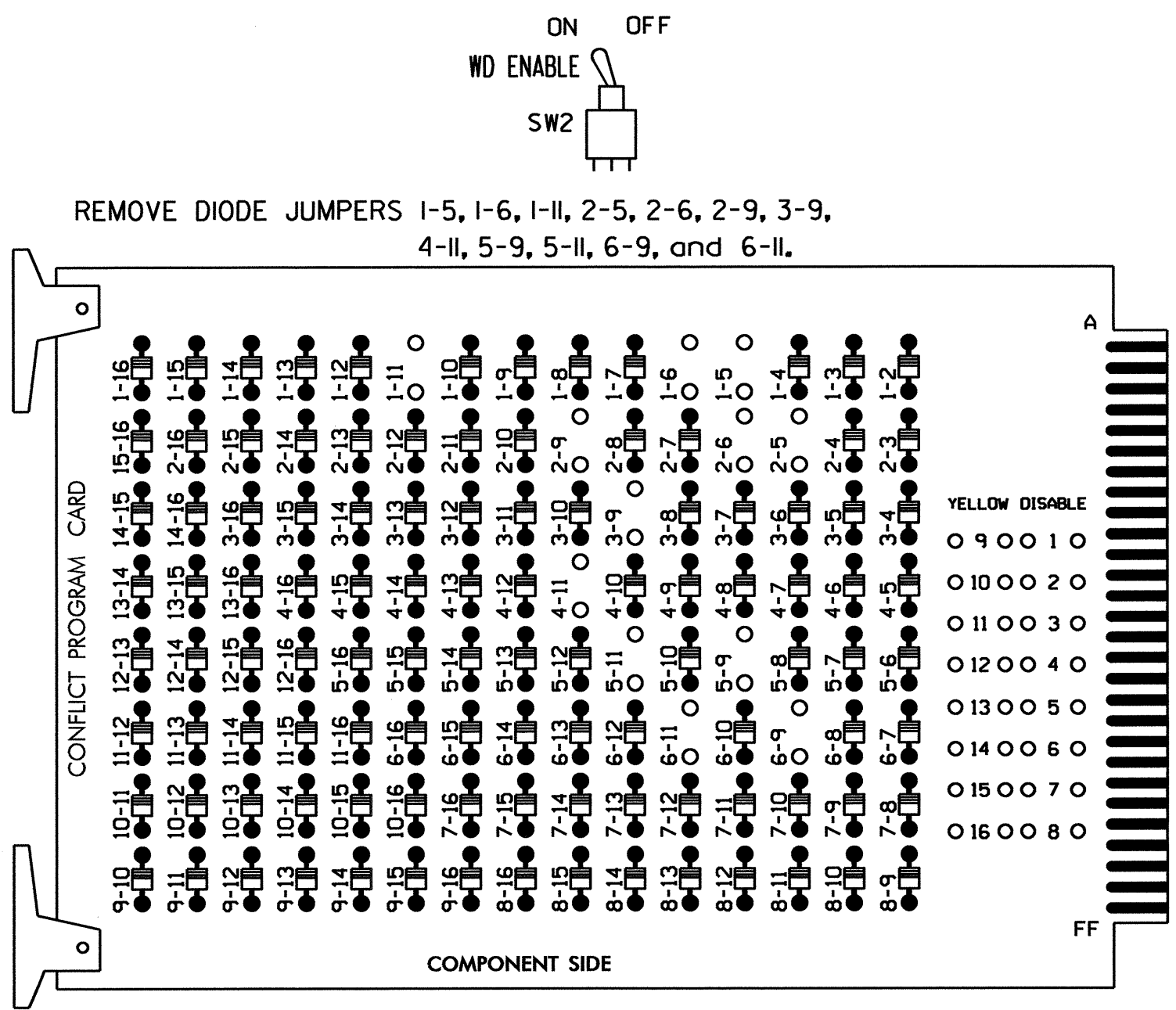
SEAL
 NORTH CAROLINA
 PROFESSIONAL ENGINEER
 JERRY YARAVITZ
 30530
 3/1/11

Sig. Inventory No. 13-0339

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 13-0339

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

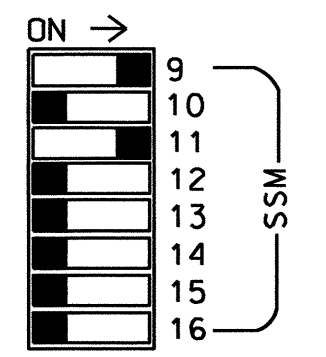
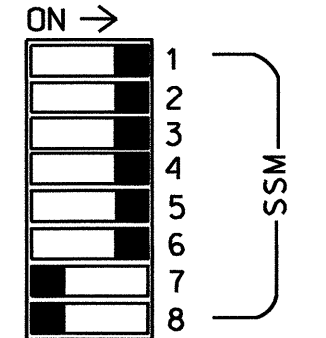
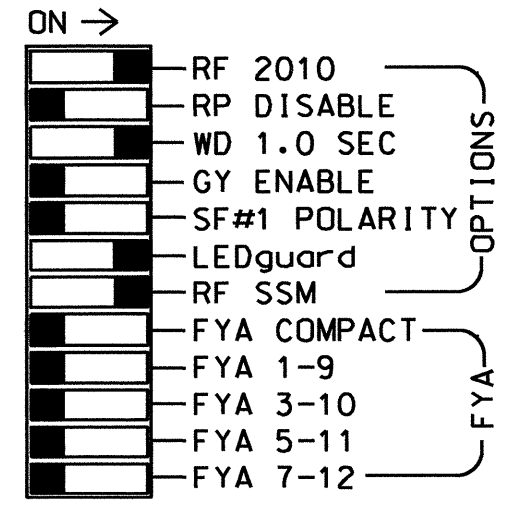
(remove jumpers and set switches as shown)



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.



■ = 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.
- 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, 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.
- The cabinet and controller are part of the NC 18 (Sterling Street) Closed Loop System.

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.	11,12 13,14	15,16	21,22	NU	31	32	41	42	43	NU	51	61,62	NU	NU	NU	23,24 25,26	NU	17,18	NU	NU
RED	125	128		116	116		101	101				134				A121		A114		
YELLOW	126	129		117	117		102	102				135				A122				
GREEN	127	130		118	118		103	103				136				A123				
RED ARROW	125						101					131								
YELLOW ARROW	126						102					132								A115
GREEN ARROW	127						103	103				133								A116

NU = Not Used
FLASH NOTE: rewire OLC to flash on Flasher Unit #2, Circuit #2.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET332
SOFTWAREECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S9,S12
PHASES USED.....1,2,3,4,5,6
OVERLAP A.....2+3
OVERLAP C:.....1+4

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 _ 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

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?...N
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

INPUT FILE POSITION LAYOUT

(front view)

FILE	U	1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	U	1A	2A/S3	2E/S7	2K,2L	3A	2I/S9	2C,2D	4C	1G	S	S	S	S	FS
	L	1B	2B/S4	2F/S8	NOT USED	NOT USED	2J/S10	2G,2H	NOT USED	3B	S	S	S	S	DC ISOLATOR ST
"J"	U	5A	6A/S5	1C	6C,6D	S	1E	4A	2M	S	S	S	S	S	S
	L	NOT USED	6B/S6	1D	NOT USED	1F	1	4B	NOT USED	S	S	S	S	S	S

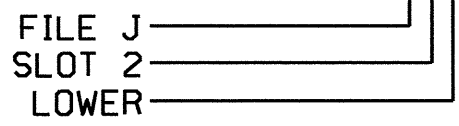
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
1B	TB2-3,4	I1L	56	18	1	1	Y	Y			
1C	TB3-9,10	J3U	64	26	36	1	Y	Y			15
1D	TB3-11,12	J3L	77	39	46	1	Y	Y			15
1E	TB5-9,10	J6U	42	4	8	1	Y	Y			
1F	TB5-11,12	J6L	46	8	18	1	Y	Y			
1G	TB6-9,10	I9U	60	22	11	1	Y	Y			10
2A/S3	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y		1.6	
2B/S4	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y		1.6	
2C,2D	TB6-1,2	I7U	65	27	34	2	Y	Y			
2E/S7	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y		1.6	
2F/S8	TB2-11,12	I3L	76	38	42	2/SYS	Y	Y		1.6	
2G,2H	TB6-3,4	I7L	78	40	44	2	Y	Y			
2I/S9	TB4-9,10	I6U	41	3	4	2/SYS	Y	Y		1.6	
2J/S10	TB4-11,12	I6L	45	7	14	2/SYS	Y	Y		1.6	
2K,2L	TB4-1,2	I4U	47	9	22	2	Y	Y			
2M	TB7-5,6	J8U	50	12	28	2	Y	Y			3
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
3B	TB6-11,12	I9L	62	24	13	3	Y	Y			10
4A	TB7-1,2	J7U	66	28	38	4	Y	Y			3
4B	TB7-3,4	J7L	79	41	48	4	Y	Y			10
4C	TB6-5,6	I8U	49	11	24	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
6A/S5	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y		1.6	
6B/S6	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y		1.6	
6C,6D	TB5-1,2	J4U	48	10	26	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0339
DESIGNED: January 2011
SEALED: 3/1/11
REVISED: N/A

Signal Upgrade

PREPARED IN THE OFFICES OF
TRANSPORTATION MOBILITY AND SAFETY DIVISION
DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 18 (Sterling Street) and US 70 (Fleming Street) at College Street

Division 13 Burke County Morganton

PLAN DATE: February 2011 REVIEWED BY: T. J. J.

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS	INIT.	DATE

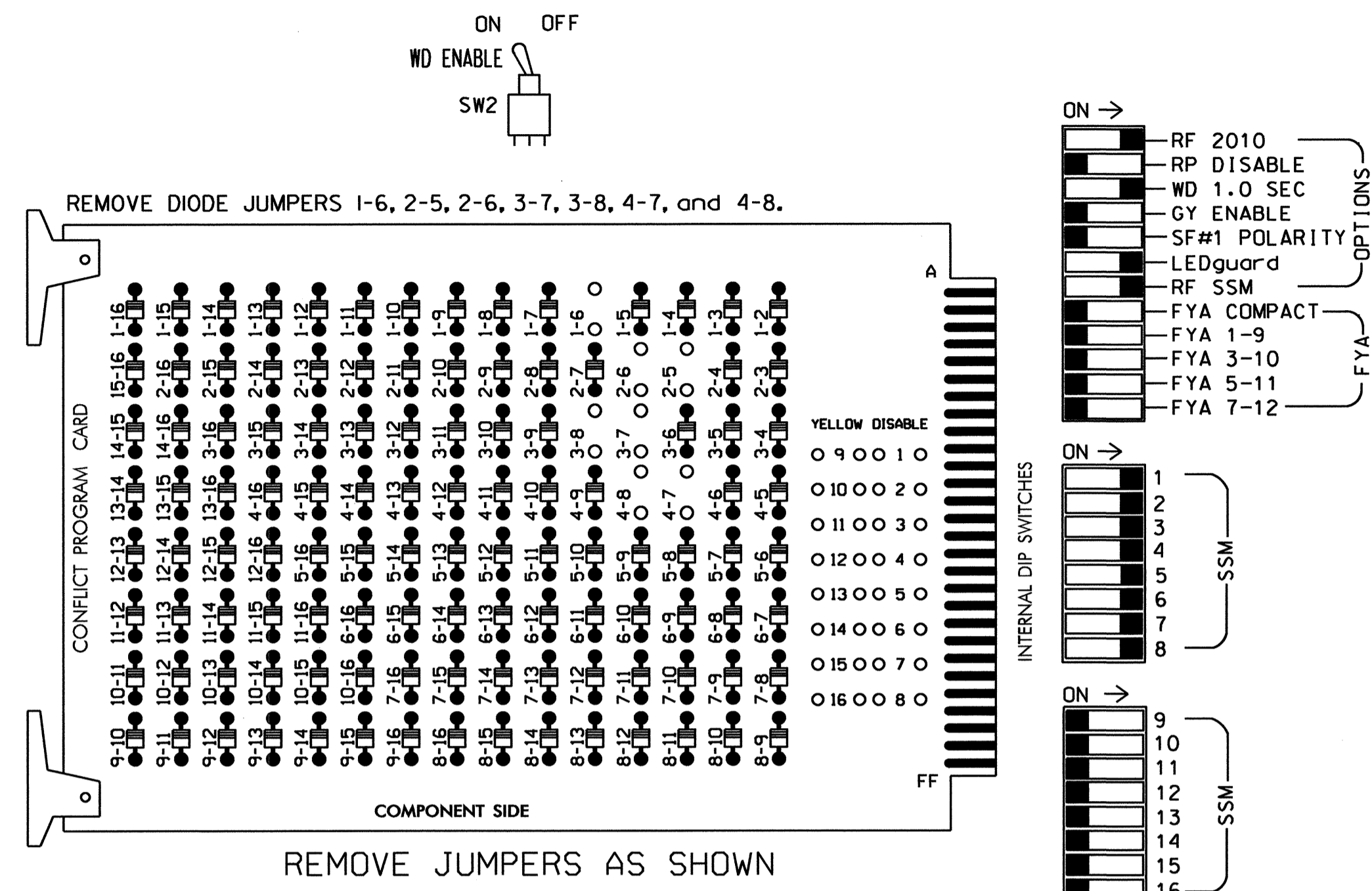
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 022013
GEORGE C. BRIMMON
ENGINEER

SIG. INVENTORY NO. 13-0339

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armstrong

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 9,10, 11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- 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.
- The cabinet and controller are part of the NC 18 (Sterling Street) 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.	11,12	82	21,22 23	NU	31	41,42 43	NU	42	51,52	61,62 63	NU	71	81,82 83	NU
RED			128			101				134			107	
YELLOW			129			102				135			108	
GREEN			130			103				136			109	
RED ARROW	125					116				131			122	
YELLOW ARROW	126	126				117			132	132			123	
GREEN ARROW	127	127				118			133	133			124	

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8
 PHASES USED.....1,2,3,4,5,6,7,8
 OVERLAPS.....NONE

PHASE SEQUENCE PROGRAMMING DETAIL

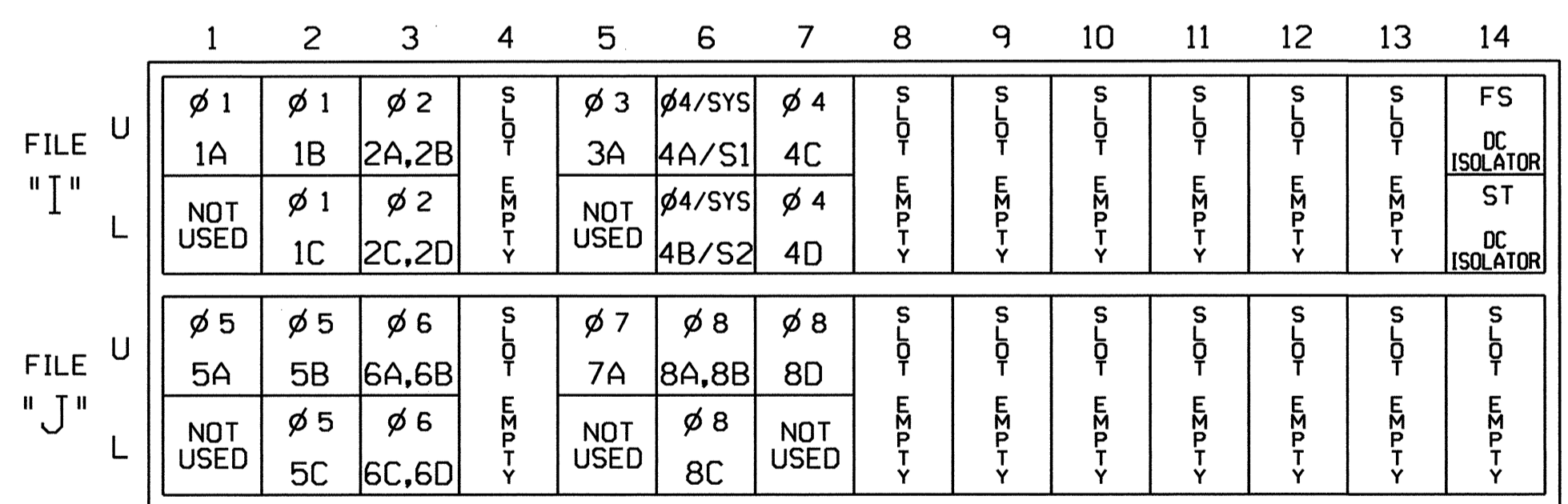
(program controller as shown below)

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	3	4	0	0
2	0	6	0	5	7	8	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0

INPUT FILE POSITION LAYOUT

(front view)

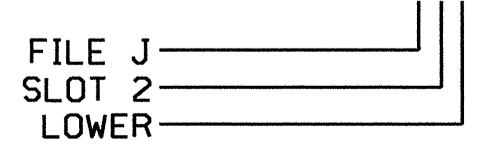


EX. : 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			3
1B	TB2-5,6	I2U	39	1	2	1	Y	Y			
1C	TB2-7,8	I2L	43	5	12	1	Y	Y			15
2A,2B	TB2-9,10	I3U	63	25	32	2	Y	Y		1.6	
2C,2D	TB2-11,12	I3L	76	38	42	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
4A/S1	TB4-9,10	I6U	41	3	4	4/SYS	Y	Y		3.1	
4B/S2	TB4-11,12	I6L	45	7	14	4/SYS	Y	Y		3.1	
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			
4D	TB6-3,4	I7L	78	40	44	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			
5C	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A,6B	TB3-9,10	J3U	64	26	36	6	Y	Y		1.6	
6C,6D	TB3-11,12	J3L	77	39	46	6	Y	Y			
7A	TB5-5,6	J5U	57	19	7	7	Y	Y			
8A,8B	TB5-9,10	J6U	42	4	8	8	Y	Y		3.1	
8C	TB5-11,12	J6L	46	8	18	8	Y	Y			
8D	TB7-1,2	J7U	66	28	38	8	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 13-0340
 DESIGNED: January 2011
 SEALED: 3/1/11
 REVISED: N/A

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR: **US 70 Bypass (Fleming Drive) at NC 18 (Sterling Street)**

Division 13 Burke County Morganton

PLANNED BY: February 2011 REVIEWED BY: T. J. [Signature]

PREPARED BY: S. Armstrong REVIEWED BY: [Signature]

REVISIONS: [Table with columns for Revisions, Init., and Date]

750 N. Greenfield Hwy, Garner, NC 27529

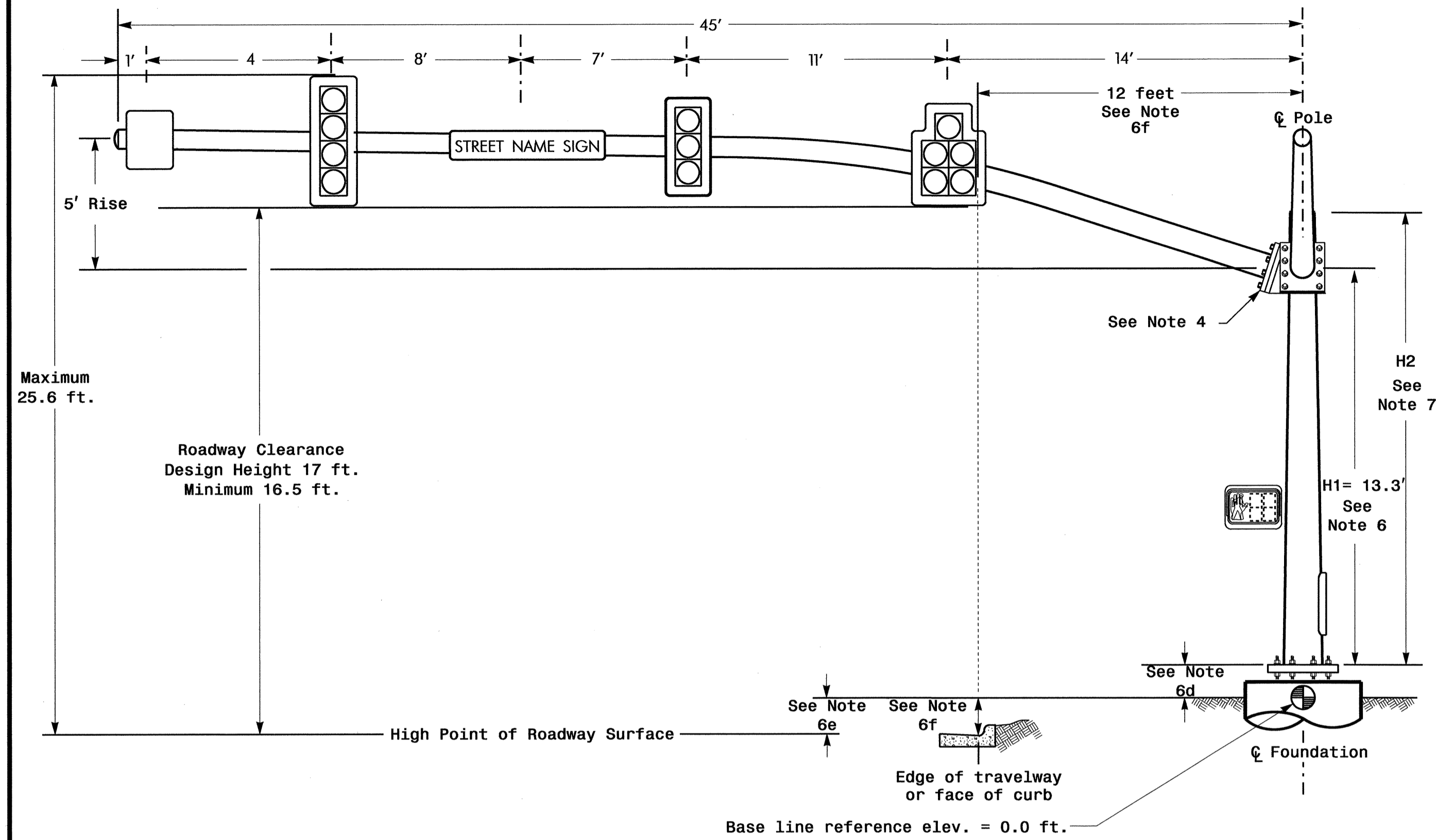
SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER GEORGE C. BROWN

SIGNATURE: [Signature] DATE: 3/11

SIG. INVENTORY NO. 13-0340

02-MAR-2011 15:58 S:\W\TSA\SUM\T5\S1\p\l\m\m\tr\trng\130340.sm.ele...xxx.dgn

Design Loading for METAL POLE NO. 1, MAST ARM A

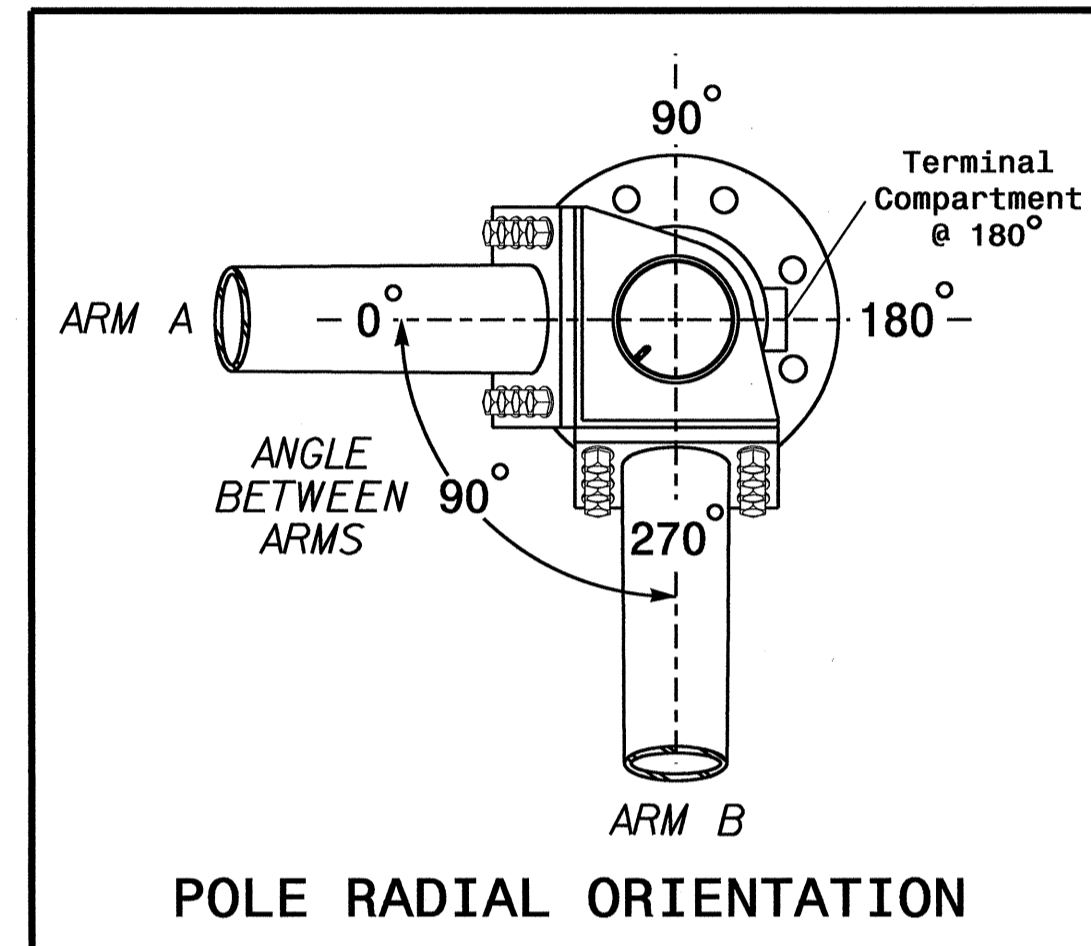


Elevation View @ 270°

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:	Arm "A"	Arm "B"
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.4 ft.	-1.0 ft.
Elevation difference at Edge of travelway or face of curb	-0.2 ft.	-1.0 ft.



POLE RADIAL ORIENTATION

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
[Signal Head Symbol]	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
[Signal Head Symbol]	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 Symbol]	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
[Sign Symbol]	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS
[Street Name Sign Symbol]	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

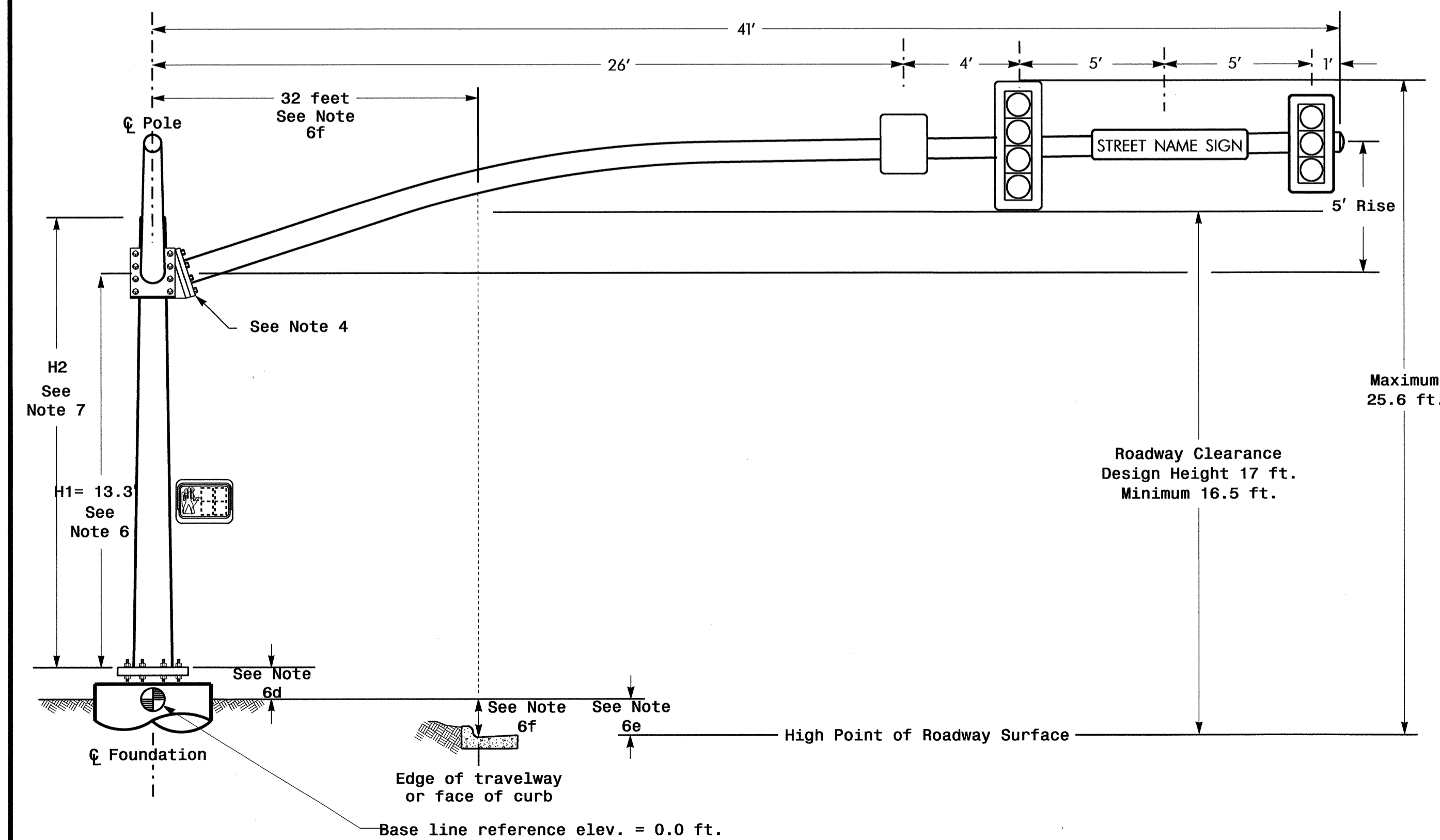
Design Reference Material

- 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.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html>

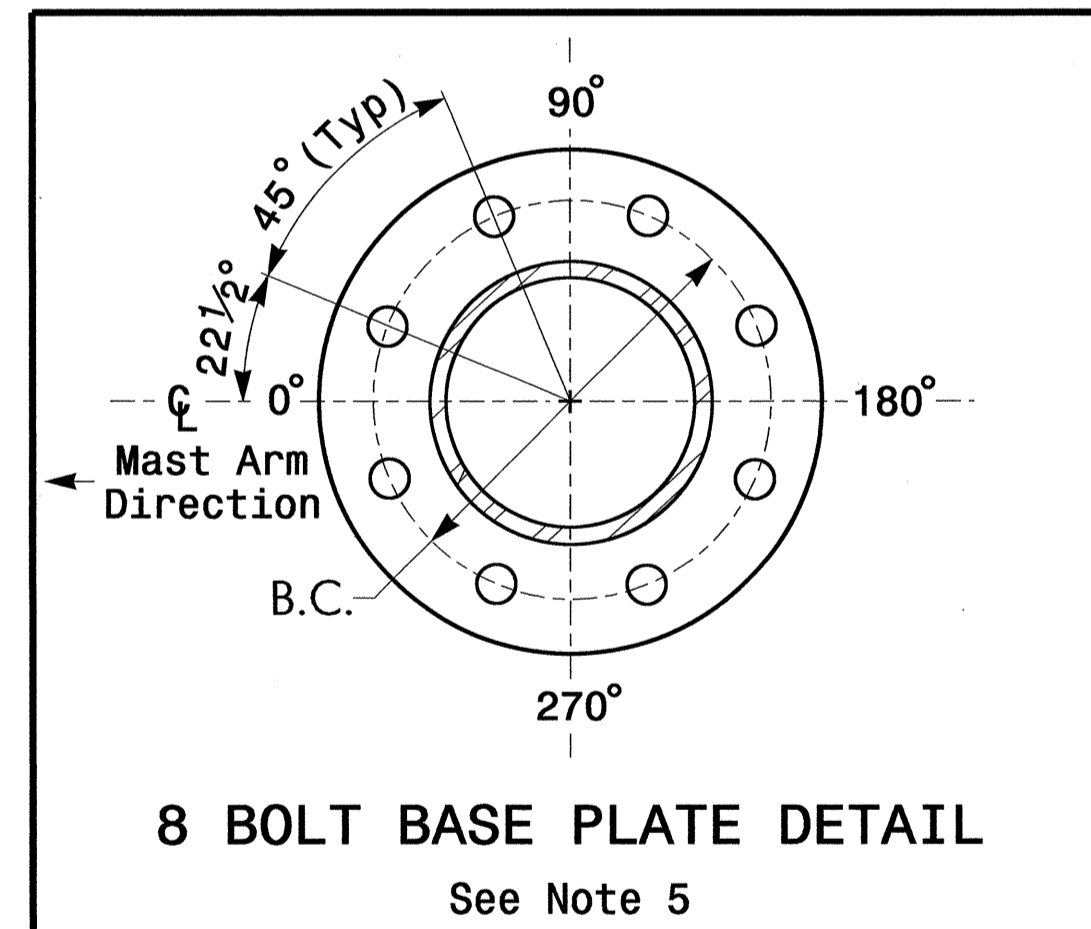
Design Requirements

- 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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate connection points.
- 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 the 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.

Design Loading for METAL POLE NO. 1, MAST ARM B

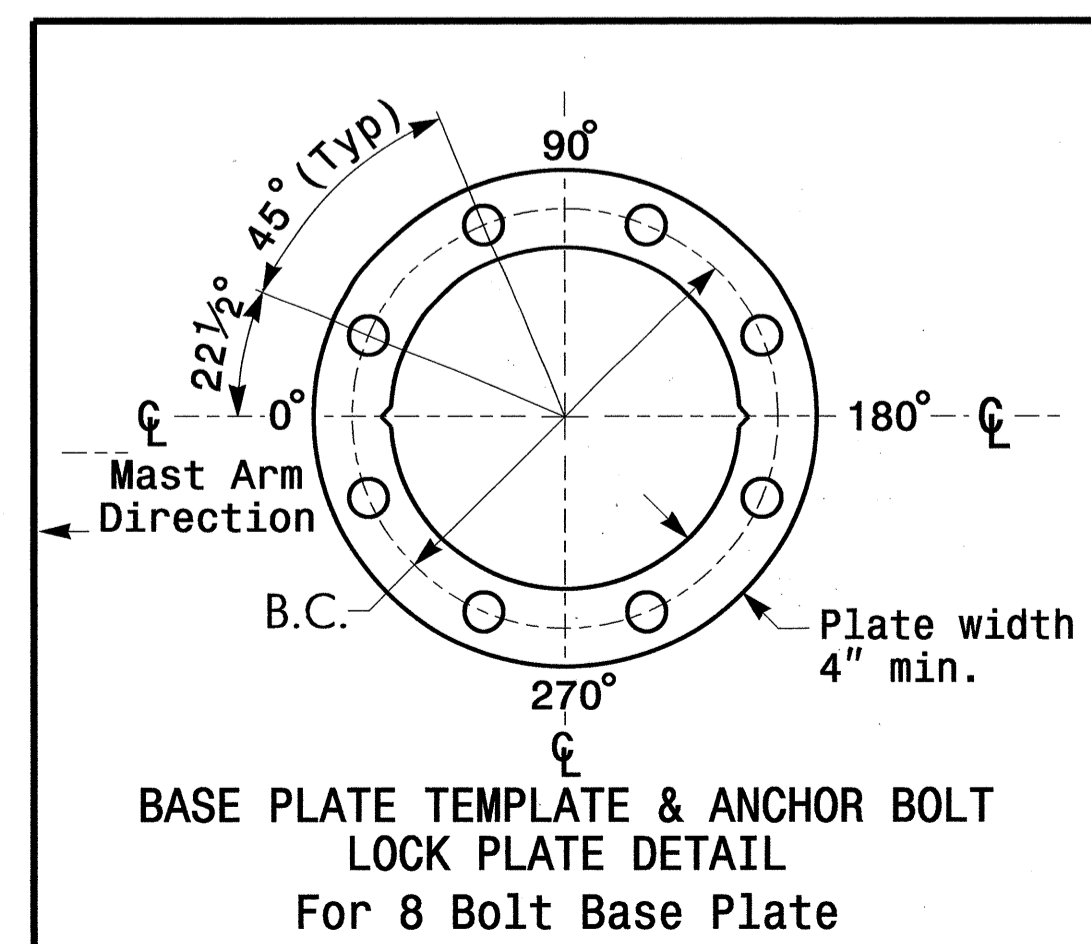


Elevation View @ 0°



8 BOLT BASE PLATE DETAIL

See Note 5

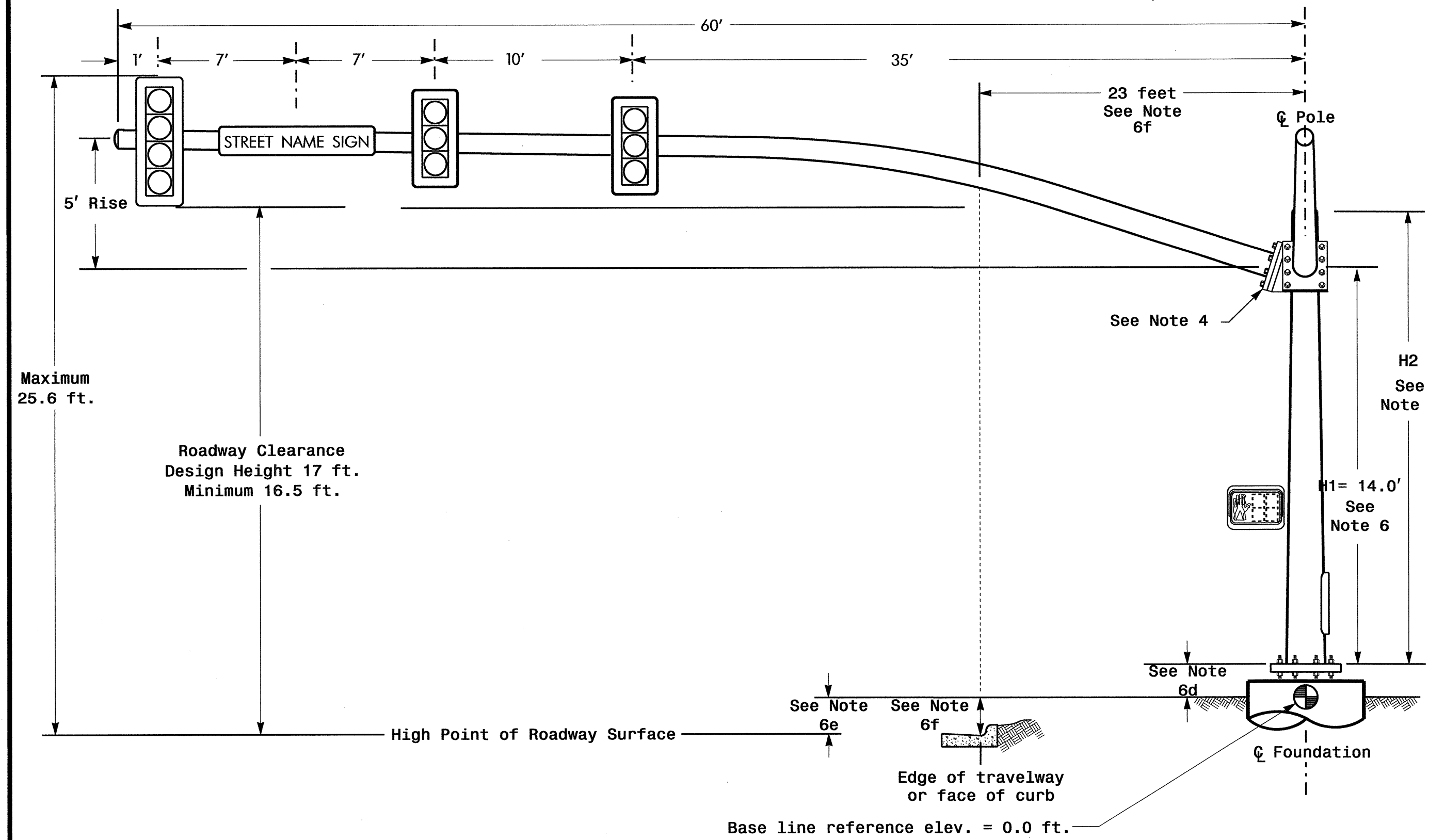


BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

NCDOT Wind Zone 4 (90 mph)

	Prepared in the Office of: NC 18 (Sterling Street) at Grace Hospital Entrance Road		SEAL
	Division 13 Burke County Morganton		
	PLAN DATE: February 2011	REVIEWED BY:	
	PREPARED BY: Jerry Yaravitz	REVIEWED BY:	
SCALE: N/A	REVISIONS:	INIT. DATE	DATE
0 N/A N/A	SIGNATURE:	DATE:	DATE:
Sig. Inventory No. 13-0448			3/1/11

Design Loading for METAL POLE NO. 2, MAST ARM A

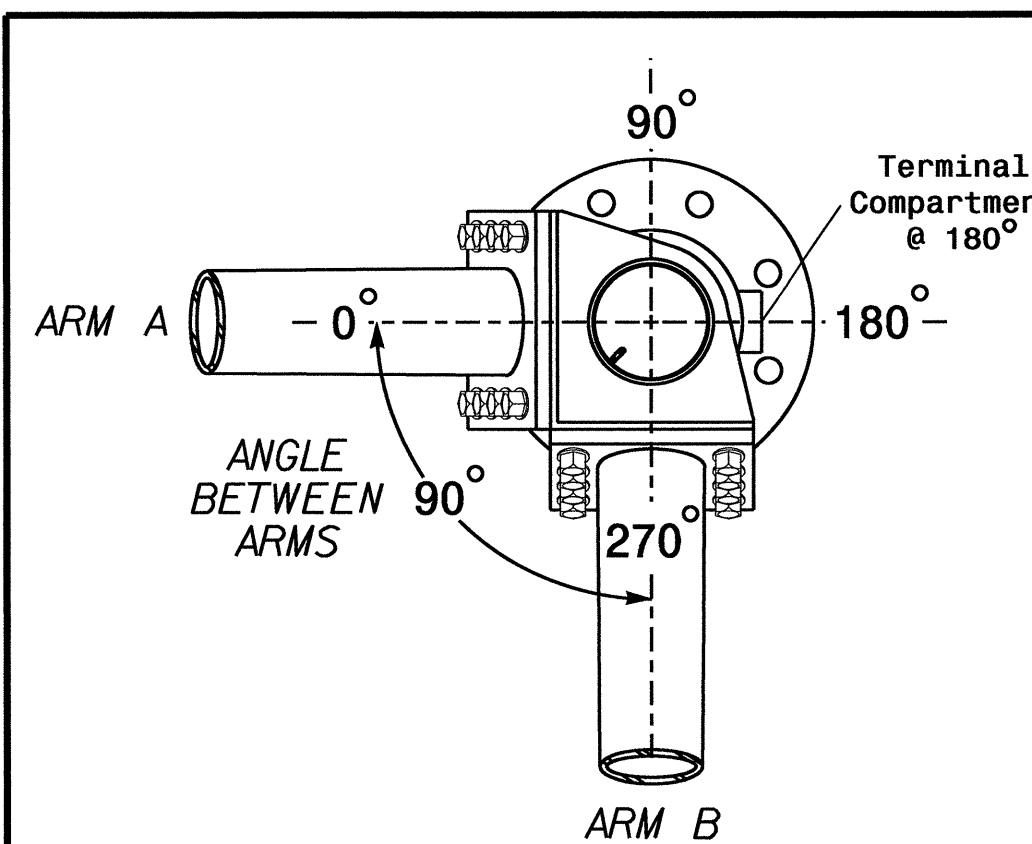


Elevation View @ 270°

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:	Arm "A"	Arm "B"
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.8 ft. +/- 0.0 ft.	
Elevation difference at Edge of travelway or face of curb	-3.2 ft. +/- 0.0 ft.	



POLE RADIAL ORIENTATION

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	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
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

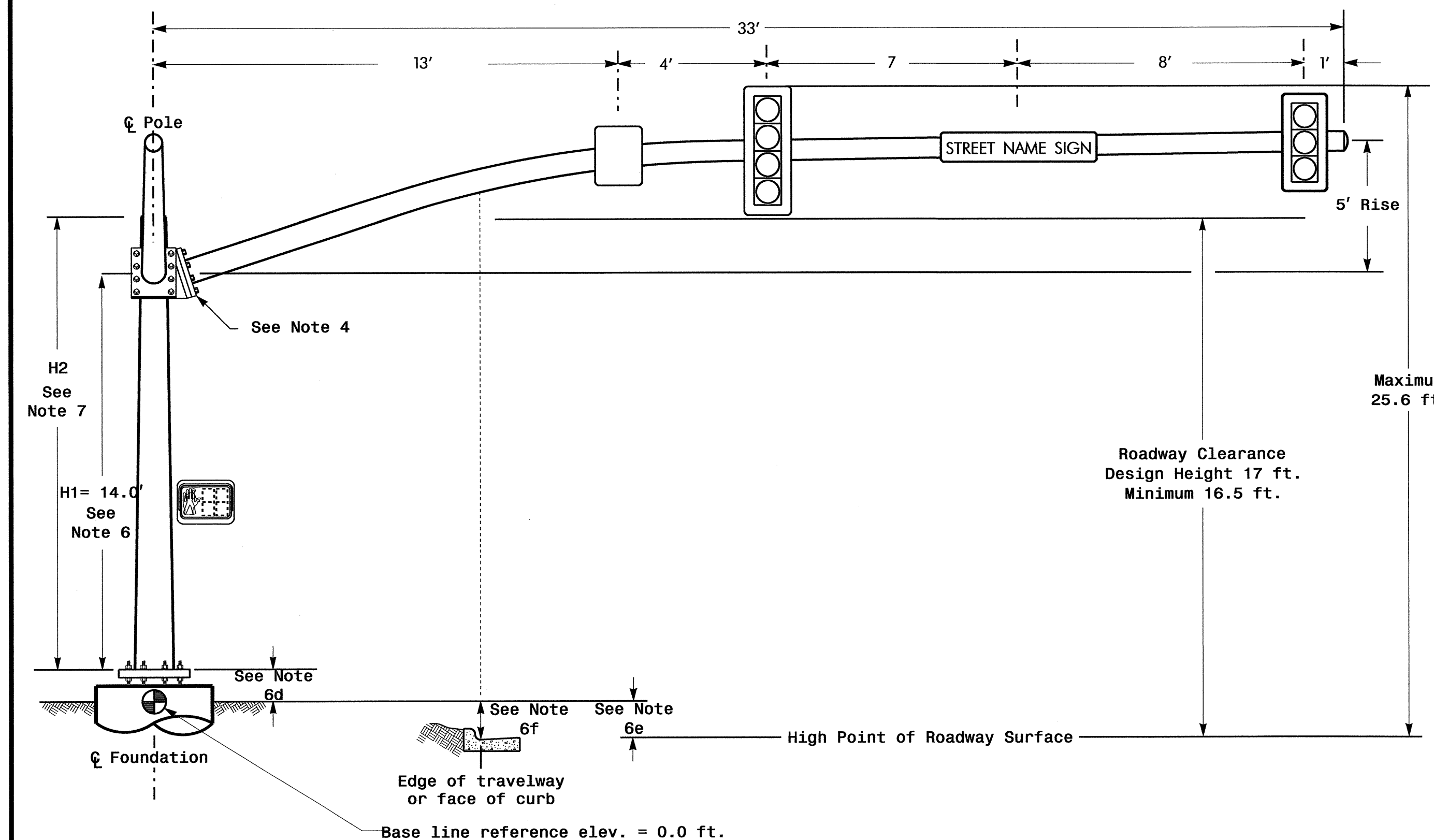
Design Reference Material

- 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.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html>

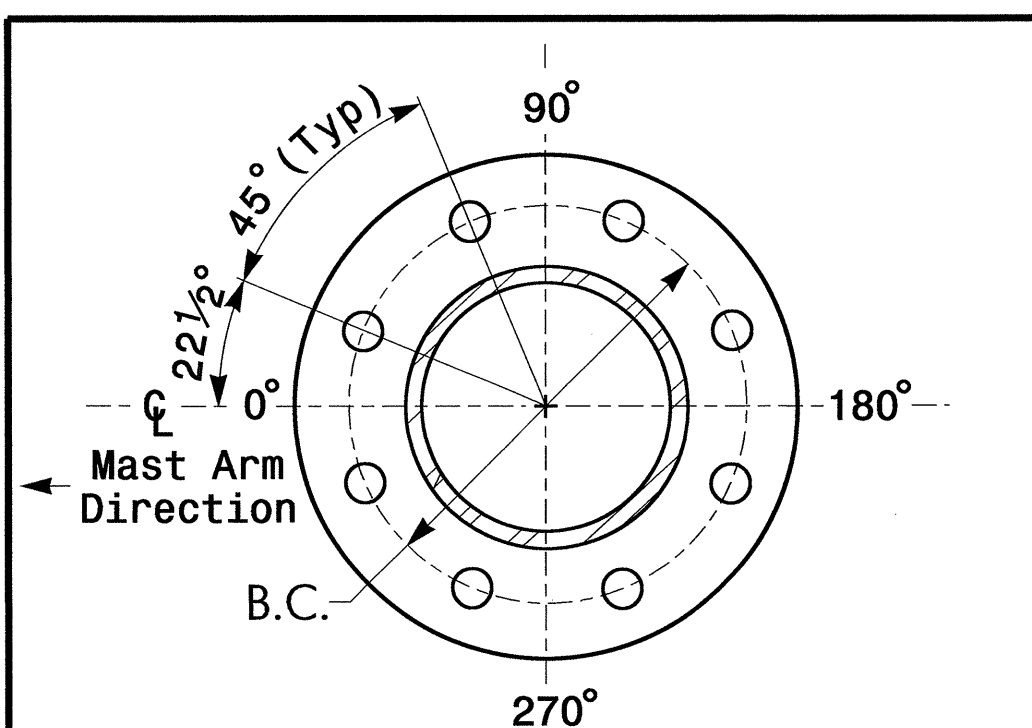
Design Requirements

- 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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate connection points.
- 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 the 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.

Design Loading for METAL POLE NO. 2, MAST ARM B

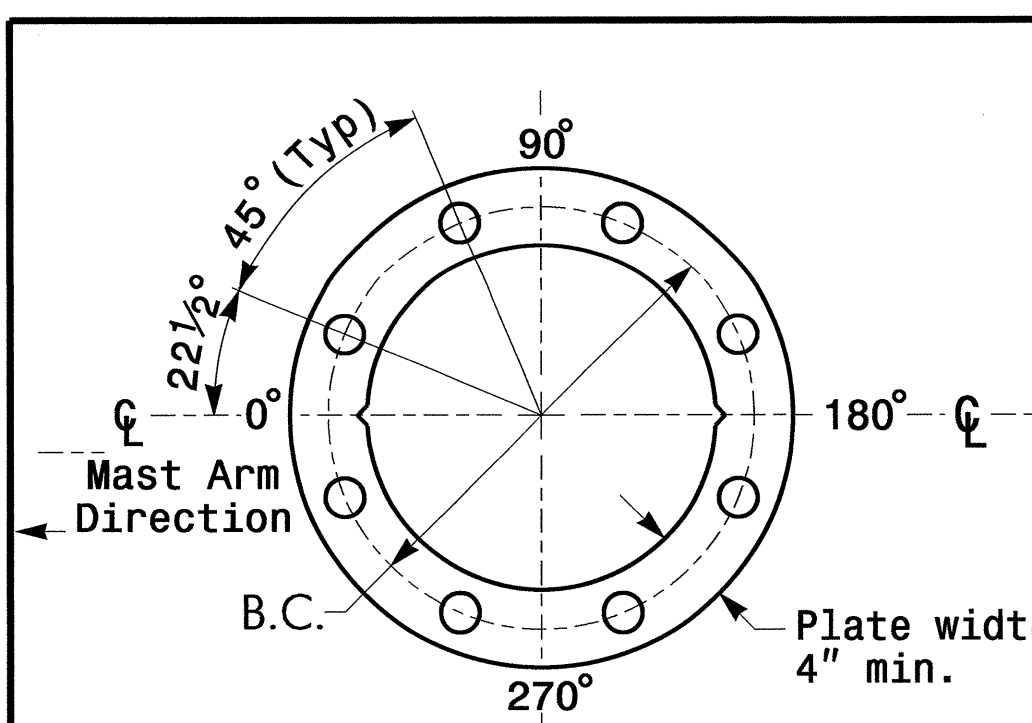


Elevation View @ 0°



8 BOLT BASE PLATE DETAIL

See Note 5



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

NCDOT Wind Zone 4 (90 mph)

 750 N. Greenfield Pkwy, Garner, NC 27529	NC 18 (Sterling Street) at Grace Hospital Entrance Road		SEAL JERRY YARAVITZ ENGINEER 30530
	Division 13 Burke County Morganton PREPARED BY: Jerry Yaravitz SCALE: 0 N/A N/A	REVIEWED BY: DATE: 3/1/11	

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.

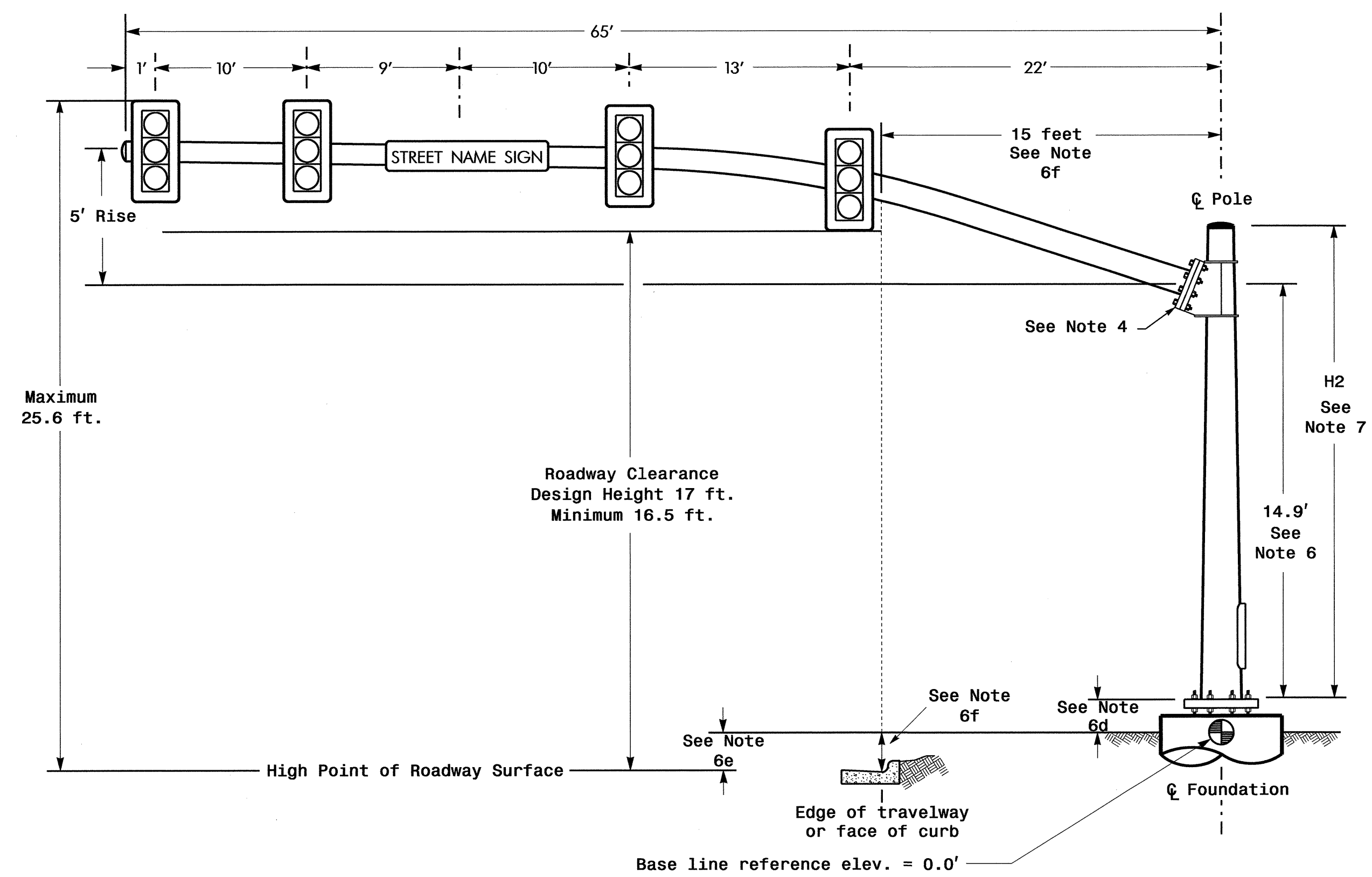
Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+0.9 ft.
Elevation difference at Edge of travelway or face of curb	+0.1 ft.

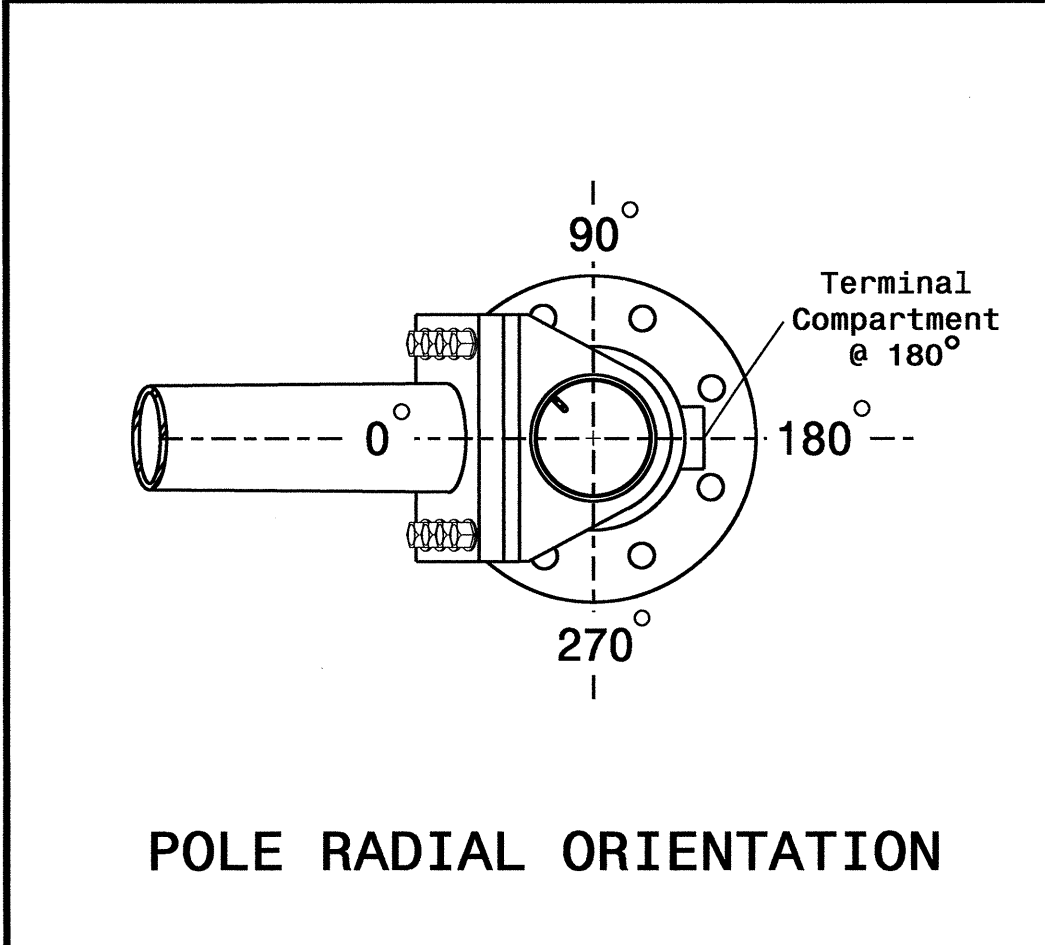
MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	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

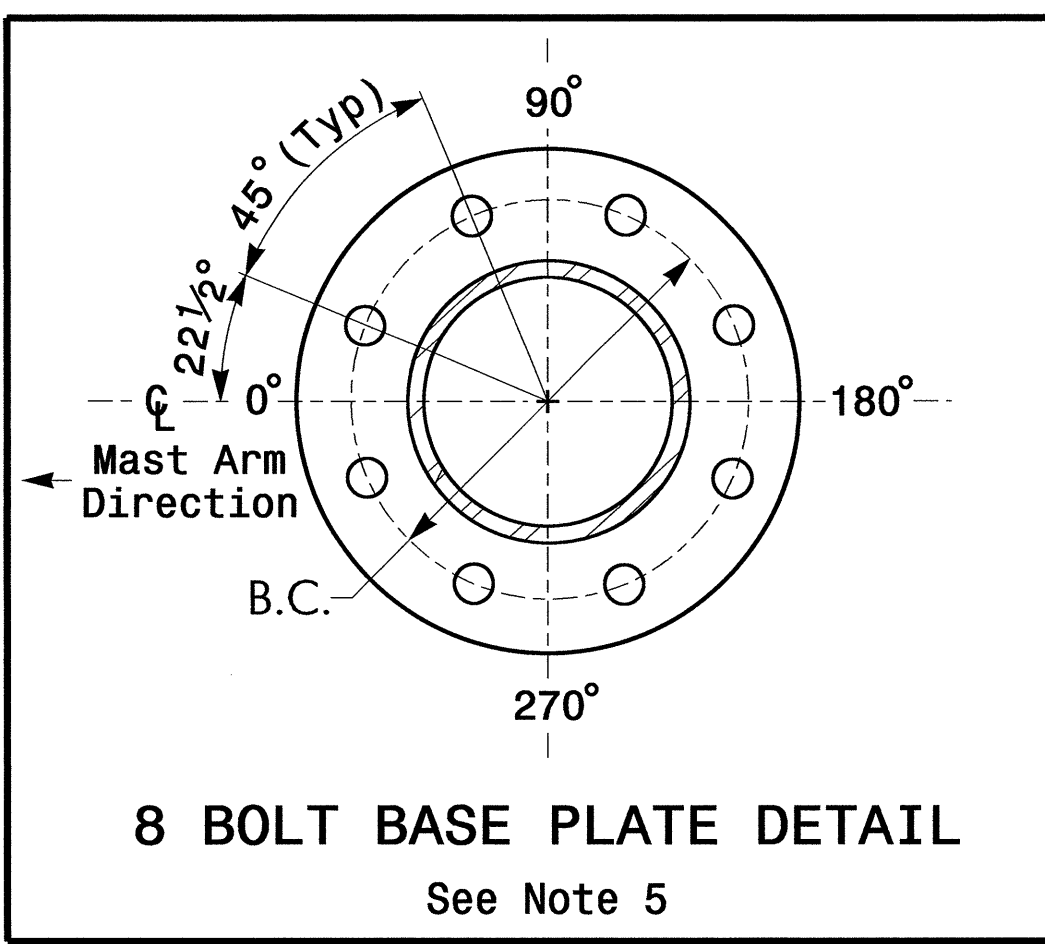
Design Loading for METAL POLE NO. 3



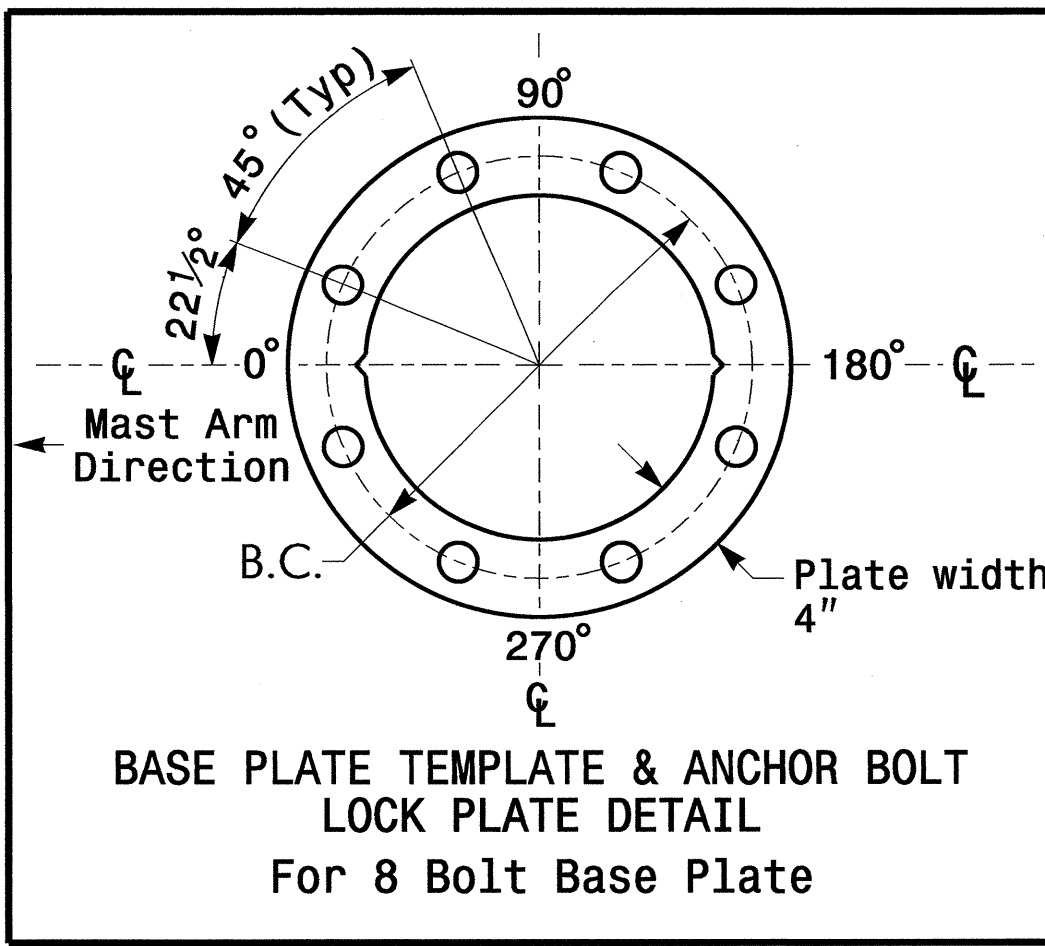
ELEVATION VIEW



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 5



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

NOTES

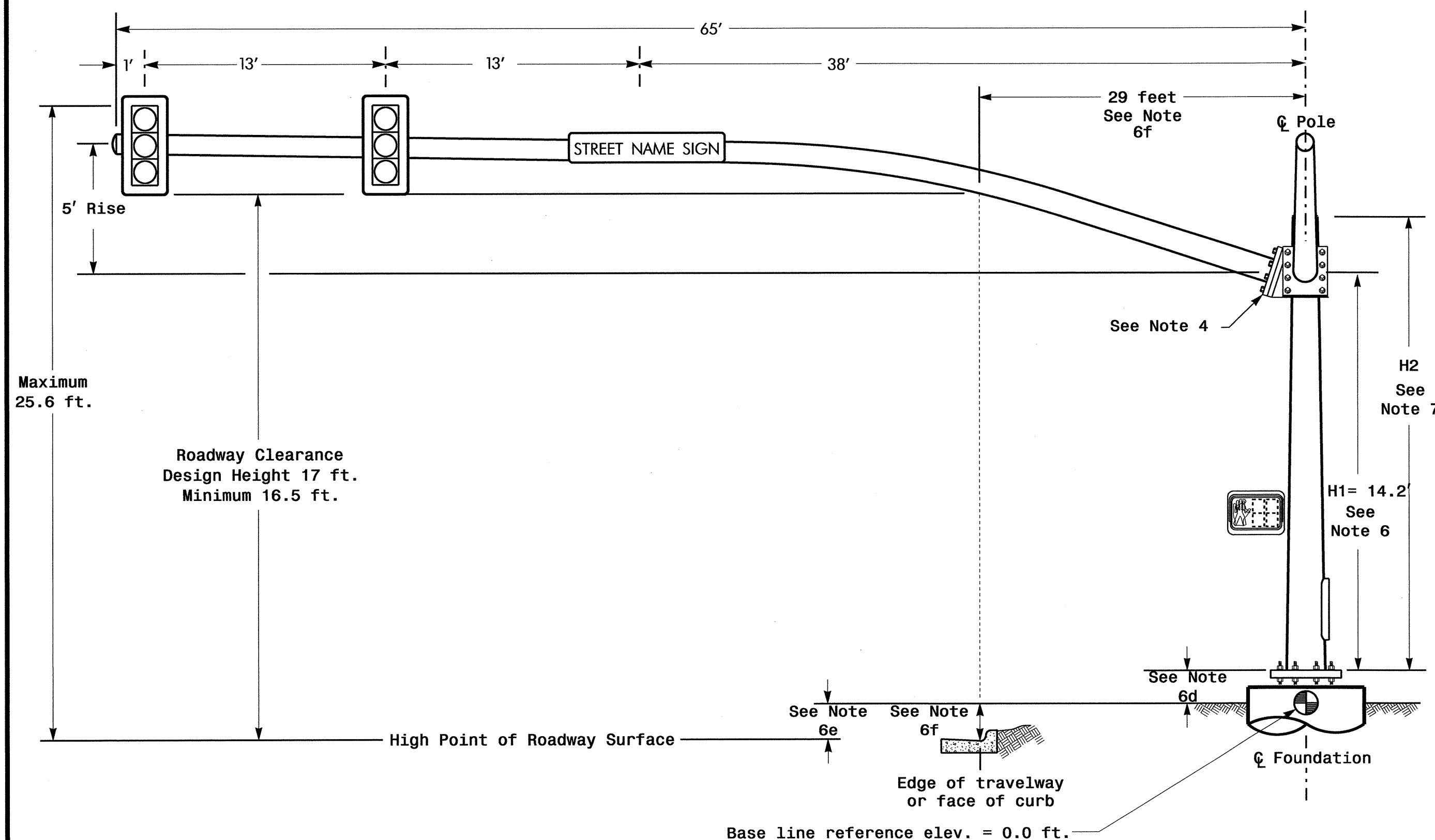
- Design Reference Material**
- The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these 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.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html>
- Design Requirements**
- Design the traffic signal structure and foundation in accordance with:
 - 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.
 - Design all signal supports using stress ratios that do not exceed 0.9.
 - A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
 - 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: Signals and Geometrics 759 N. Greenfield Pkwy, Garner, NC 27529	NC 18 (Sterling Street) at I-40 WB Off Ramp		SEAL ENGINEER JERRY VARAVITZ 30530
	Division 13 Burke County Morganton PLAN DATE: February 2011 PREPARED BY: Jerry Varavitz	REVIEWED BY: REVIEWED BY:	
REVISIONS		INIT. DATE	SIGNATURE DATE 3/1/11
SIG. INVENTORY NO. 13-0862			DATE

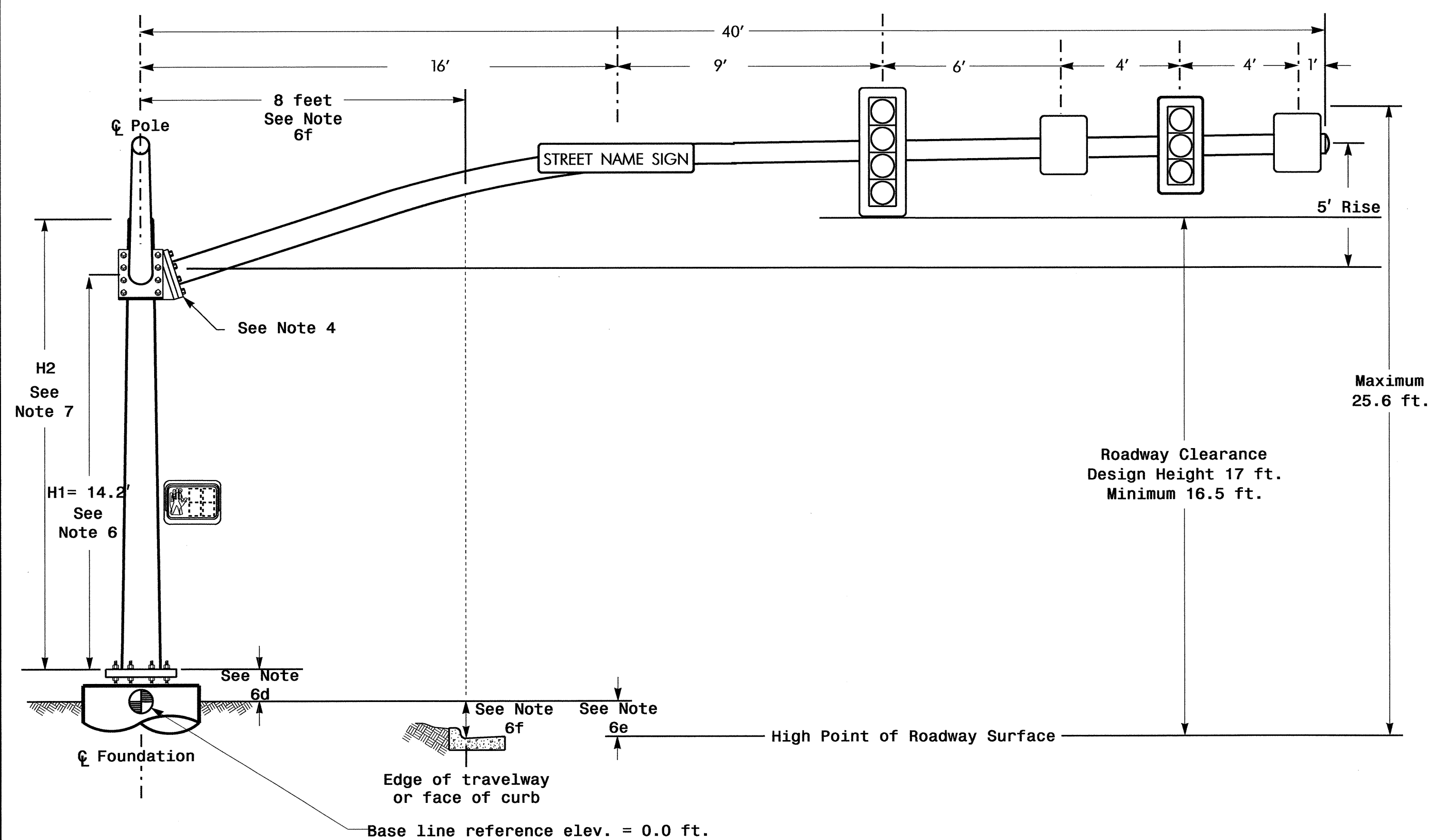
01-MAR-2011 08:02
 P:\11111111\11111111\11111111\11111111\11111111.dgn
 JYARAVITZ

Design Loading for METAL POLE NO. 4, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 4, MAST ARM B



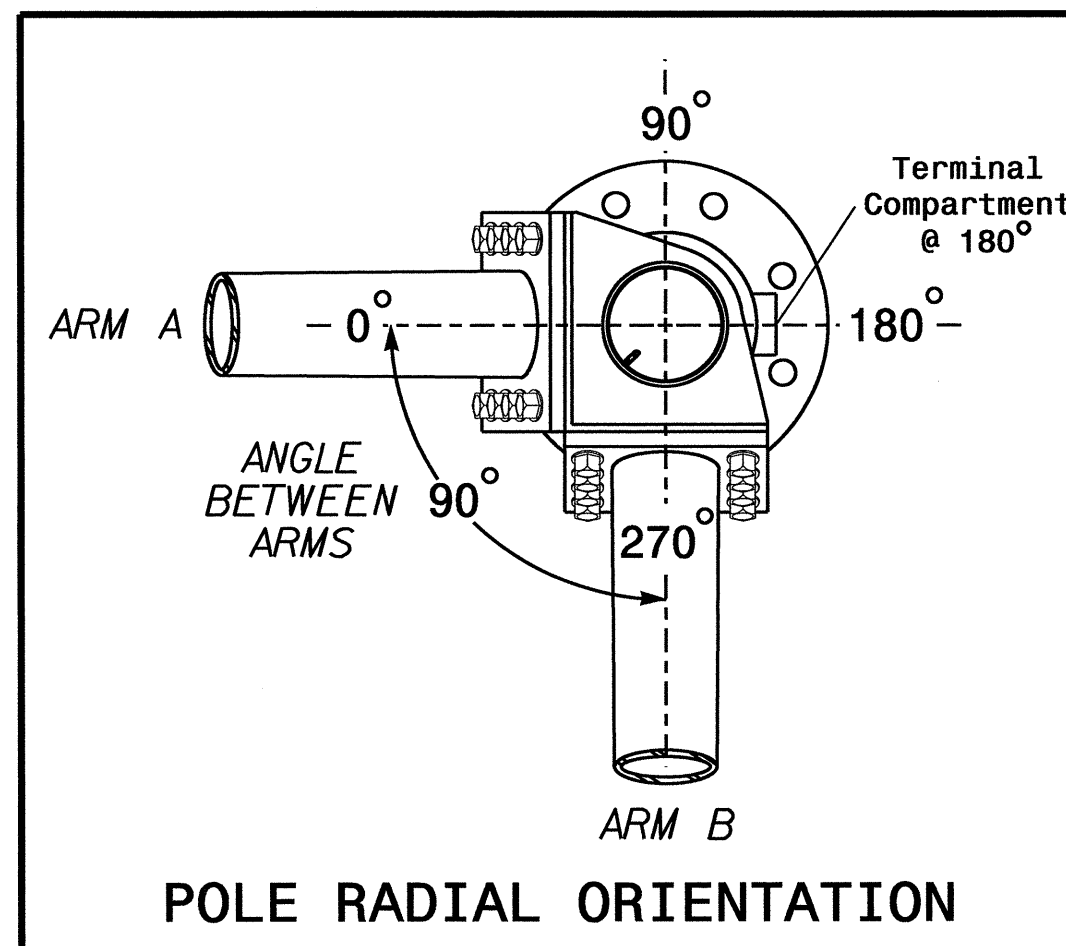
Elevation View @ 0°

SPECIAL NOTE

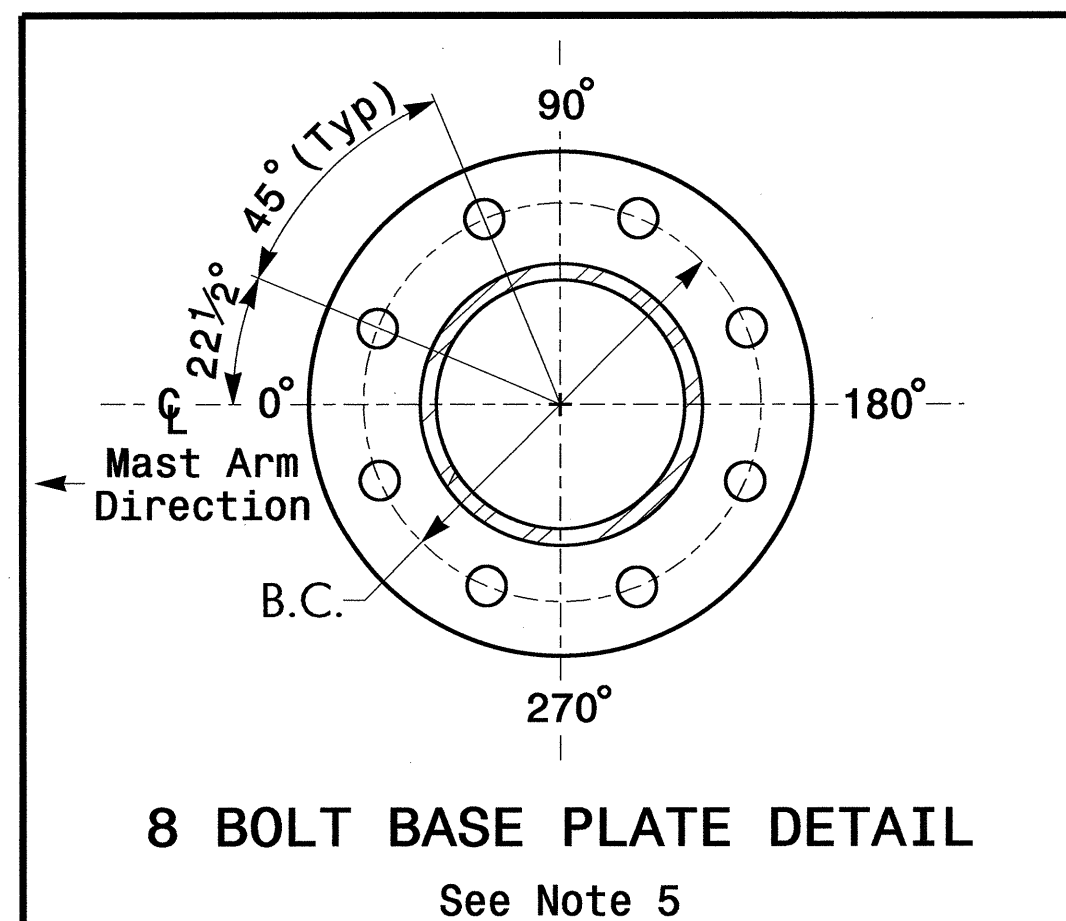
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

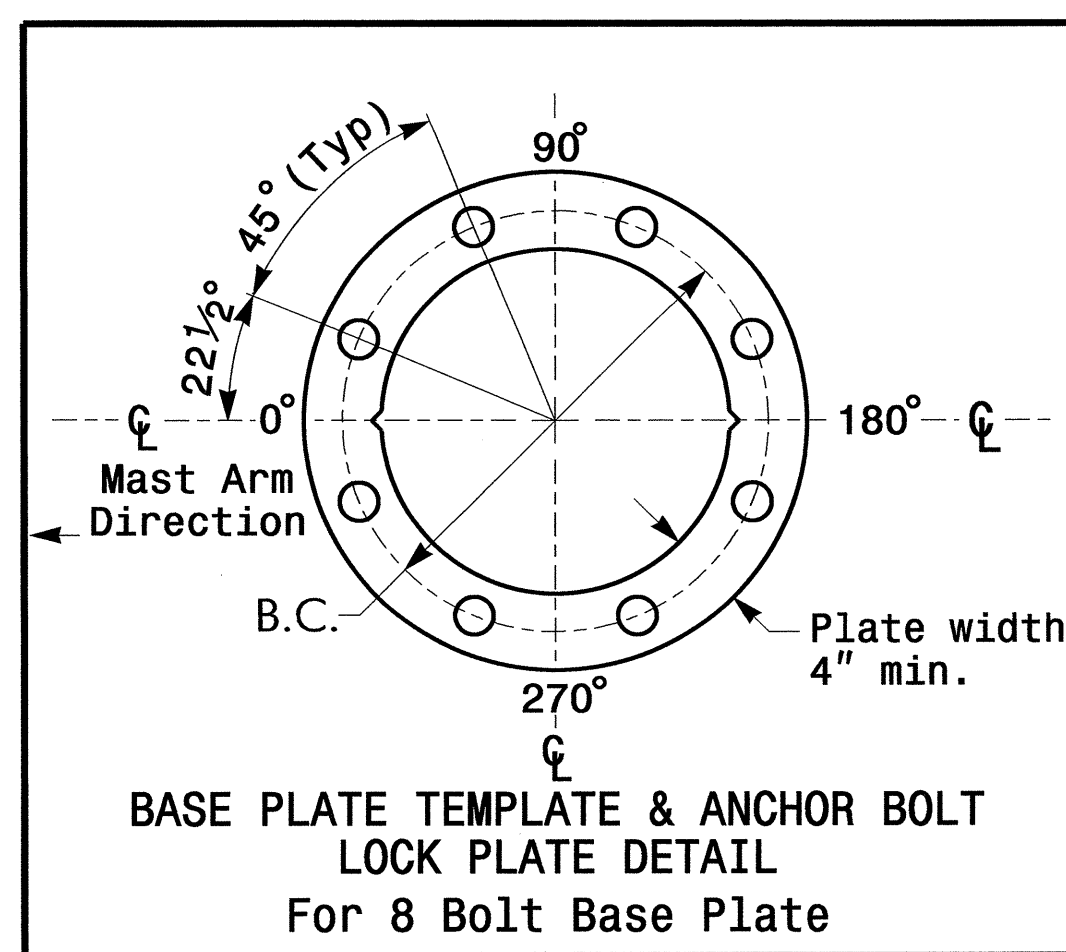
Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.2 ft.	-0.7 ft.
Elevation difference at Edge of travelway or face of curb	-0.7 ft.	-0.7 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



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
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 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.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html>

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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate connection points.
- 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 the 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)

	NC 18 (Sterling Street) at I-40 WB Off Ramp		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER ZACHARY M. ... DATE 3/1/11
	Division 13 Burke County Morganton PLAN DATE: February 2011 REVIEWED BY:	PREPARED BY: Jerry Yaravitz REVIEWED BY:	
SCALE 0 N/A N/A	REVISIONS	INIT. DATE	SIGNATURE DATE SIG. INVENTORY NO. 13-0862

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.

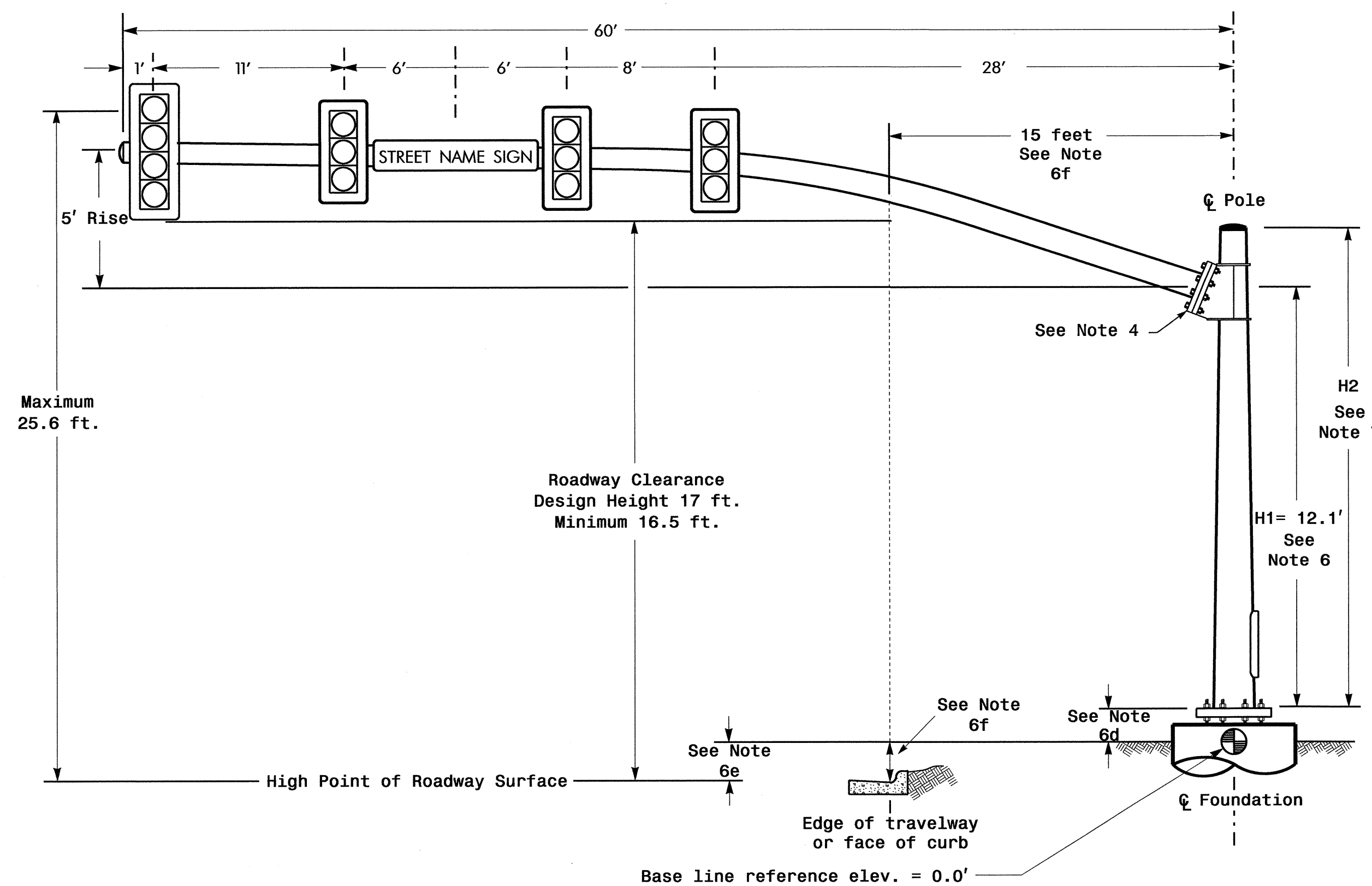
Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 5
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	-1.9 ft.
Elevation difference at Edge of travelway or face of curb	-3.0 ft.

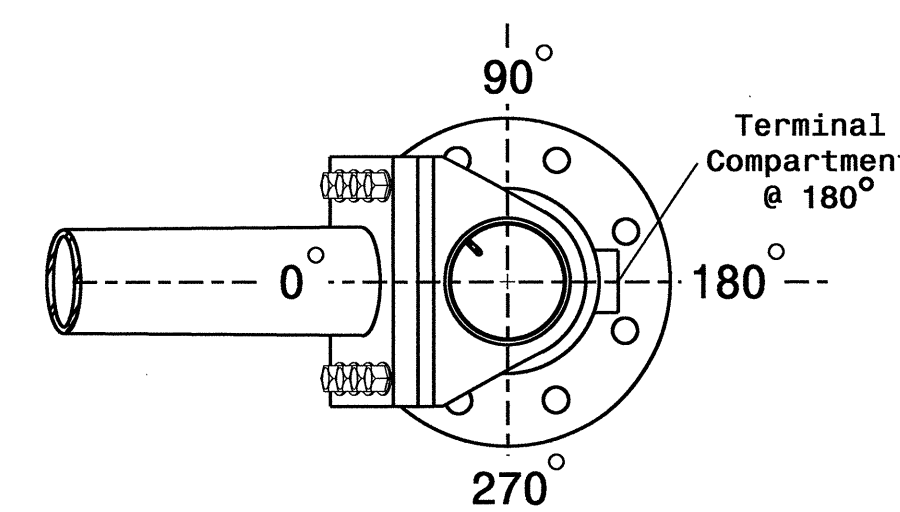
MAST ARM LOADING SCHEDULE

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

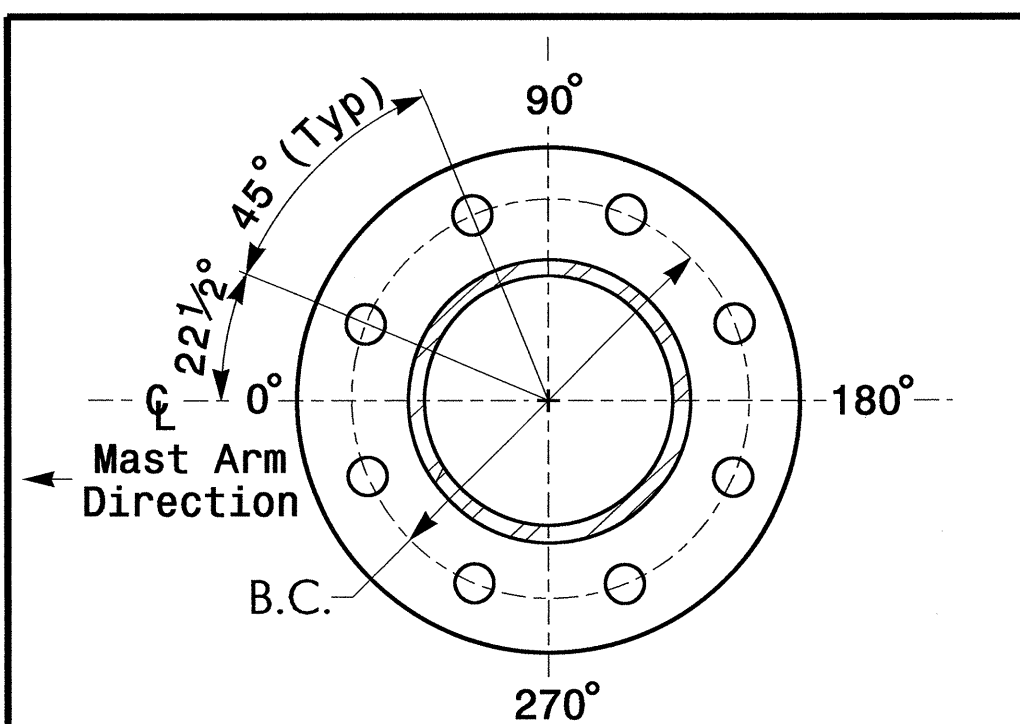
Design Loading for METAL POLE NO. 5



ELEVATION VIEW

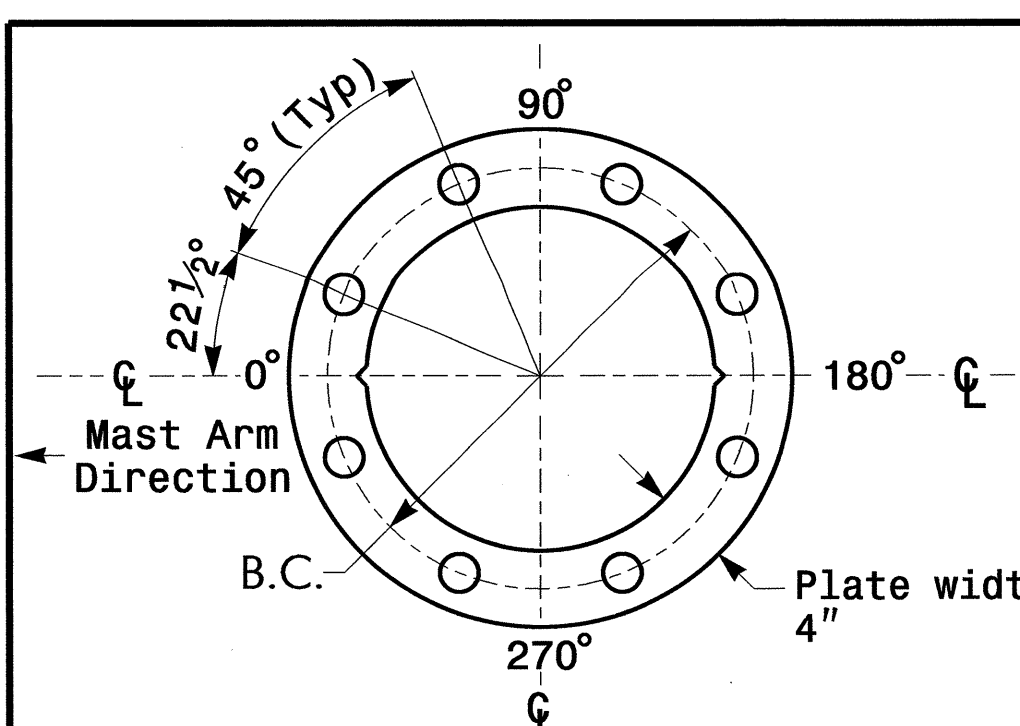


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



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

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.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html>

Design Requirements

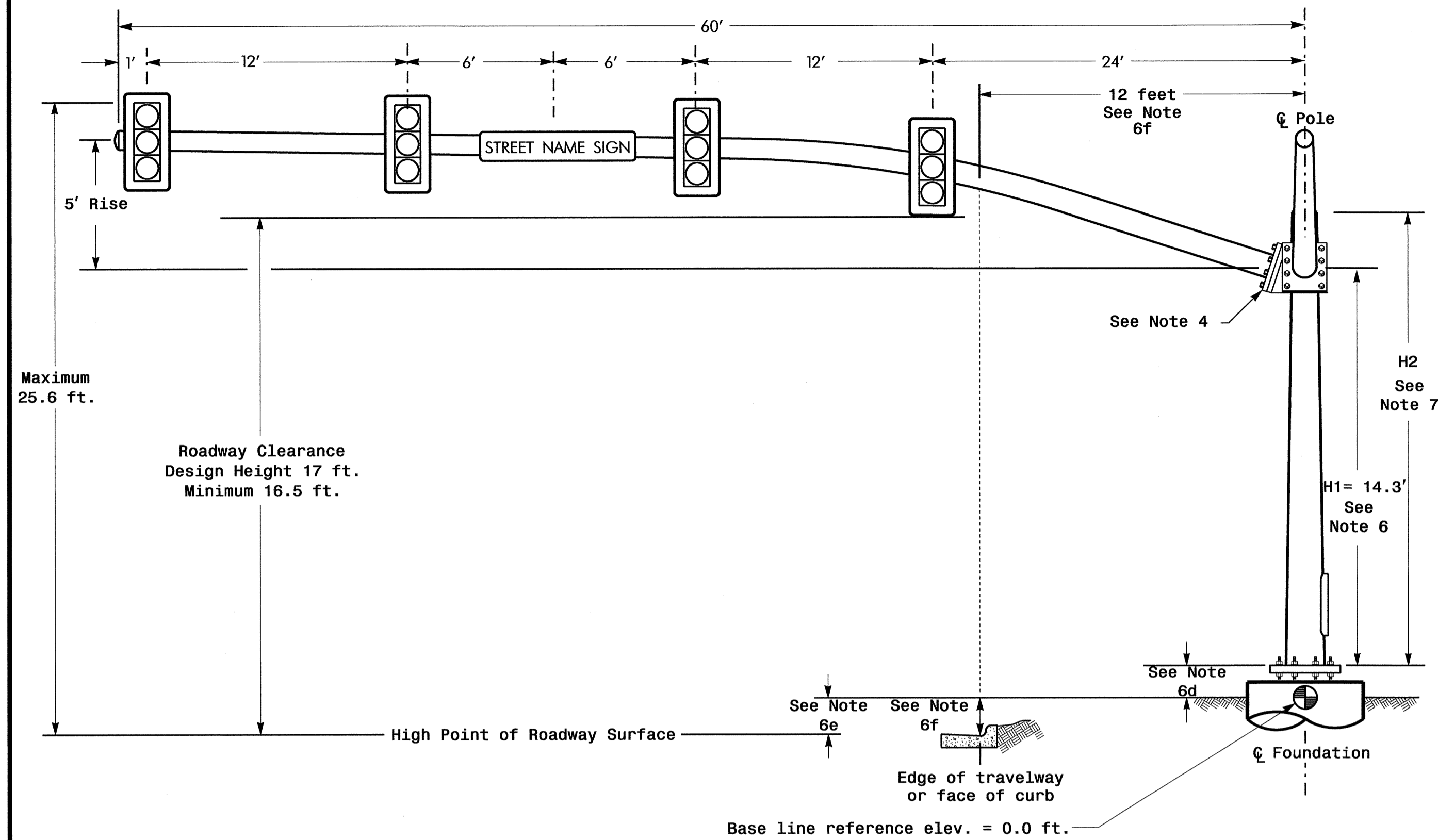
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- 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.

01-MAR-2011 08:35 O:\Projects\2011\11-0551\Design\Signal\13-0551\mchshn1.e.dgn

NCDOT Wind Zone 4 (90 mph)

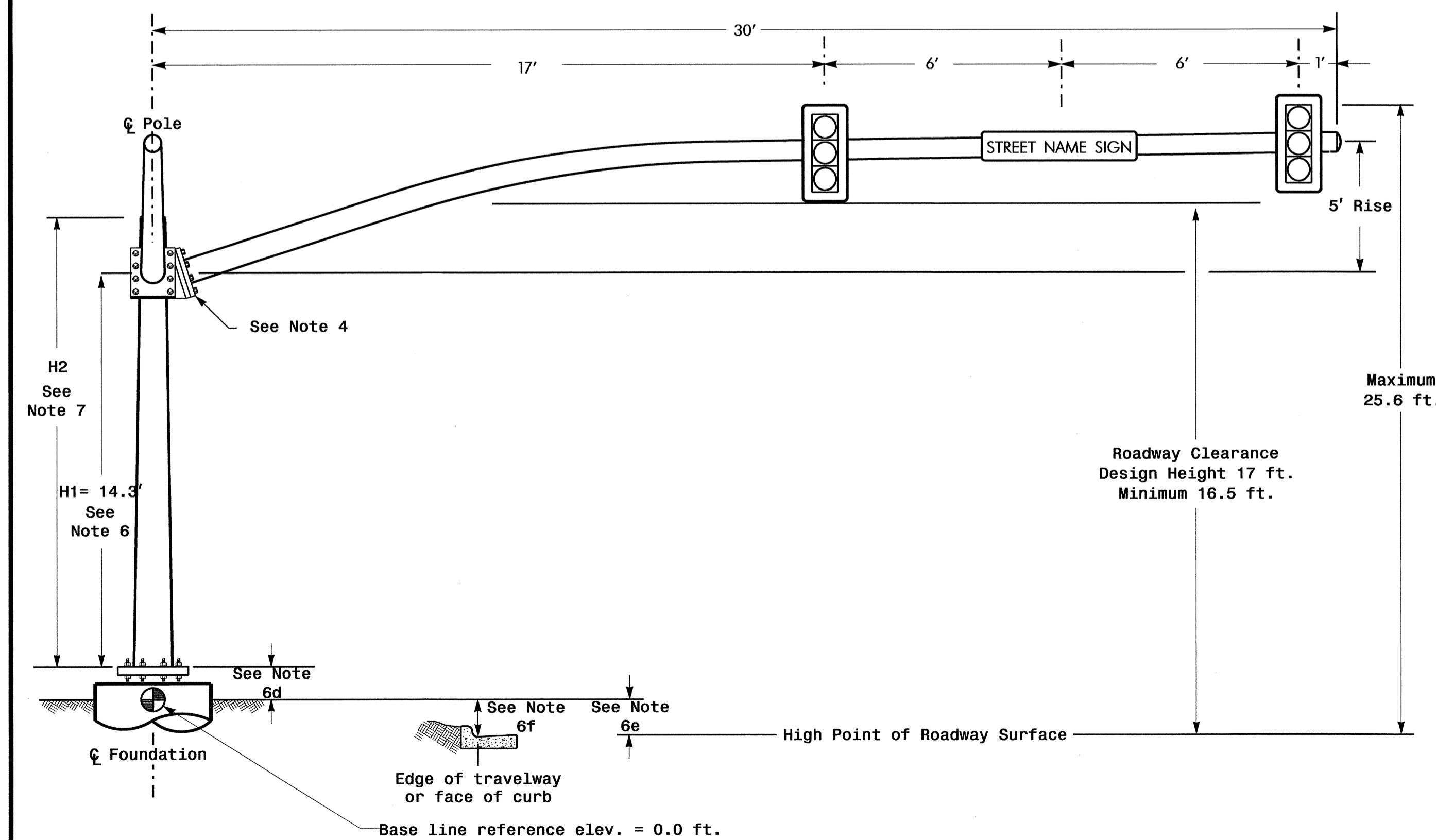
	Prepared In the Offices of: NC 18 (Sterling Street) at I-40 EB Ramp		SEAL
	Division 13 PLAN DATE: February 2011 PREPARED BY: Jerry Varavitz SCALE: 0 N/A N/A	Burke County REVIEWED BY: REVIEWED BY:	

Design Loading for METAL POLE NO. 6, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 6, MAST ARM B



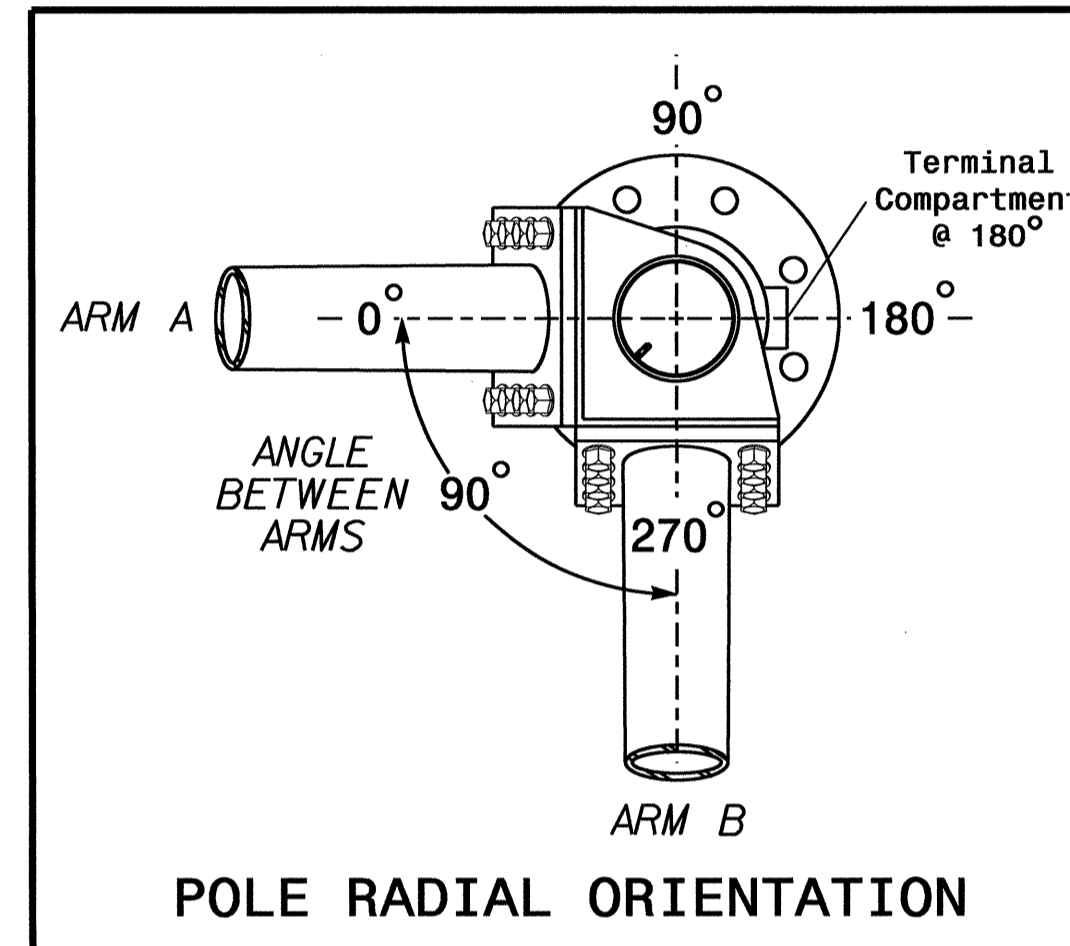
Elevation View @ 0°

SPECIAL NOTE

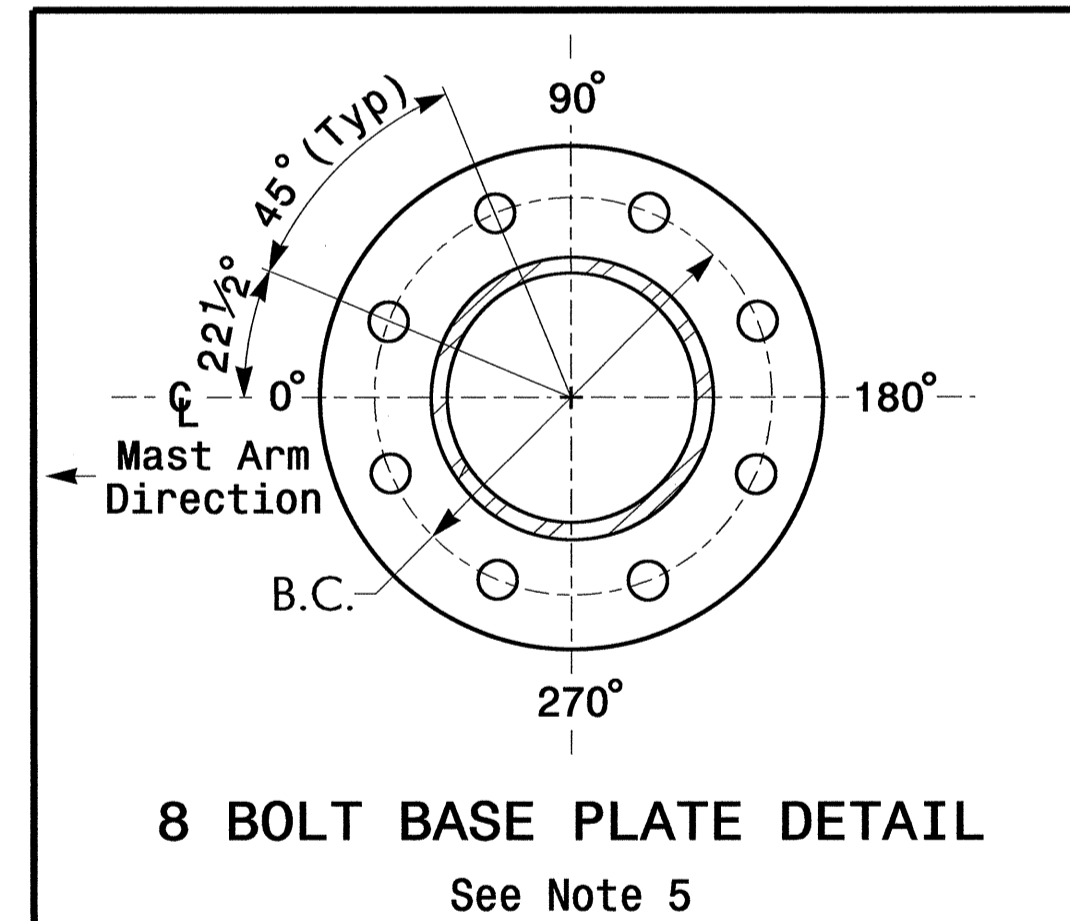
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:		Arm "A"	Arm "B"
Baseline reference point at Foundation @ ground level		0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface		+0.3 ft.	+/-0.0 ft.
Elevation difference at Edge of travelway or face of curb		-0.5 ft.	+/-0.0 ft.

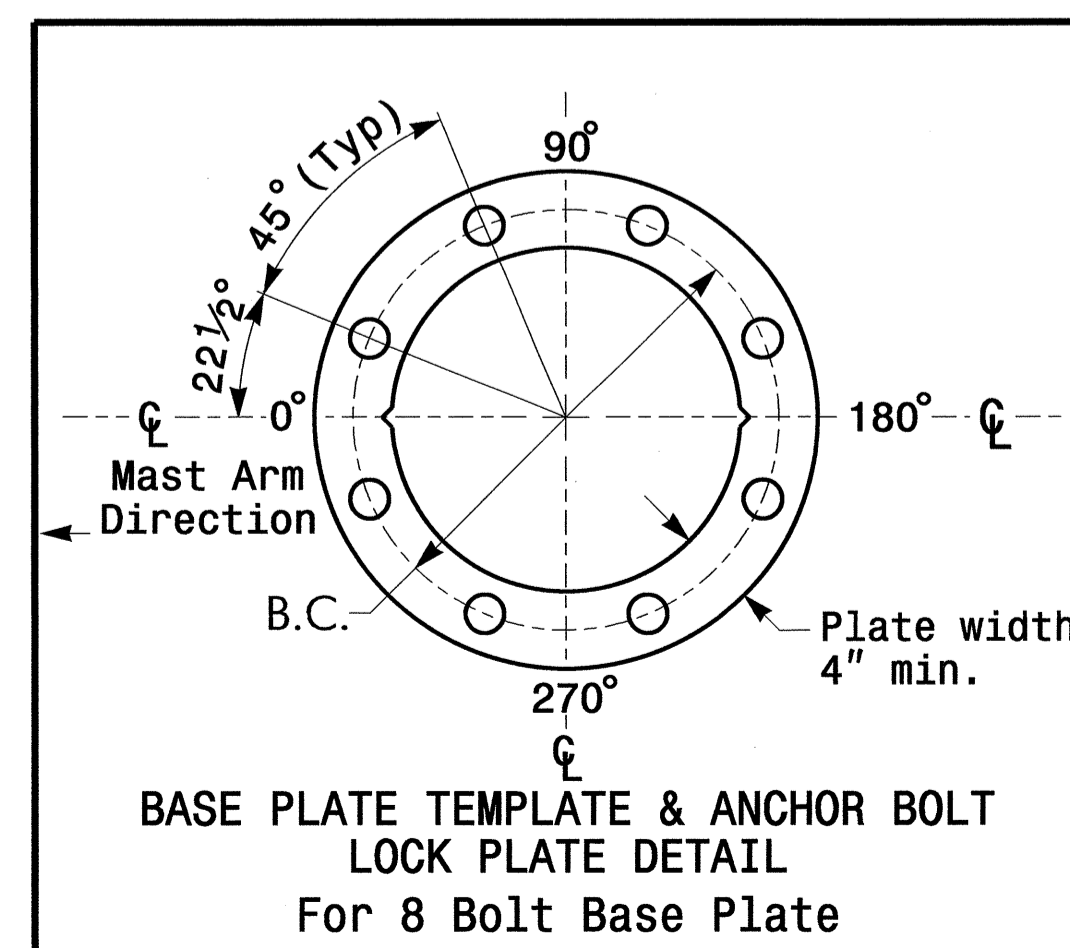


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



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"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	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
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 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.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html>

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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate connection points.
- 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 the 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.
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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.

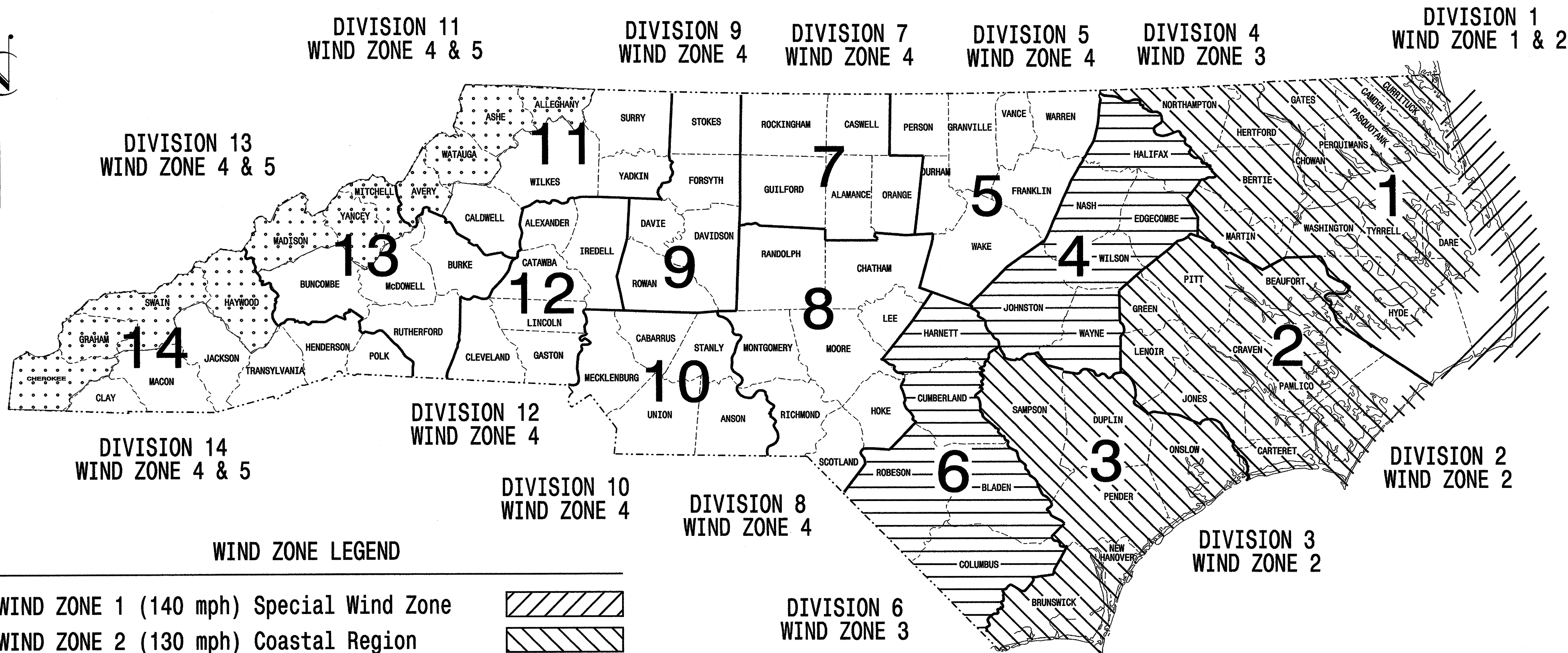
NCDOT Wind Zone 4 (90 mph)

	Prepared In the Offices of: NC 18 (Sterling Street) at I-40 EB Ramp		SEAL
	Division 13 PLAN DATE: February 2011 PREPARED BY: Jerry Yaravitz	Burke County REVIEWED BY: REVIEWED BY:	
SCALE: N/A 0 N/A N/A			SIGNATURE: [Signature] DATE: [Date]

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	U-2550B	Sig. 46
F.A. PROJ. NO.		M 1
PROJECT ID. NO.		

STANDARD DRAWINGS FOR METAL POLES



WIND ZONE LEGEND

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

<http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html>

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

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

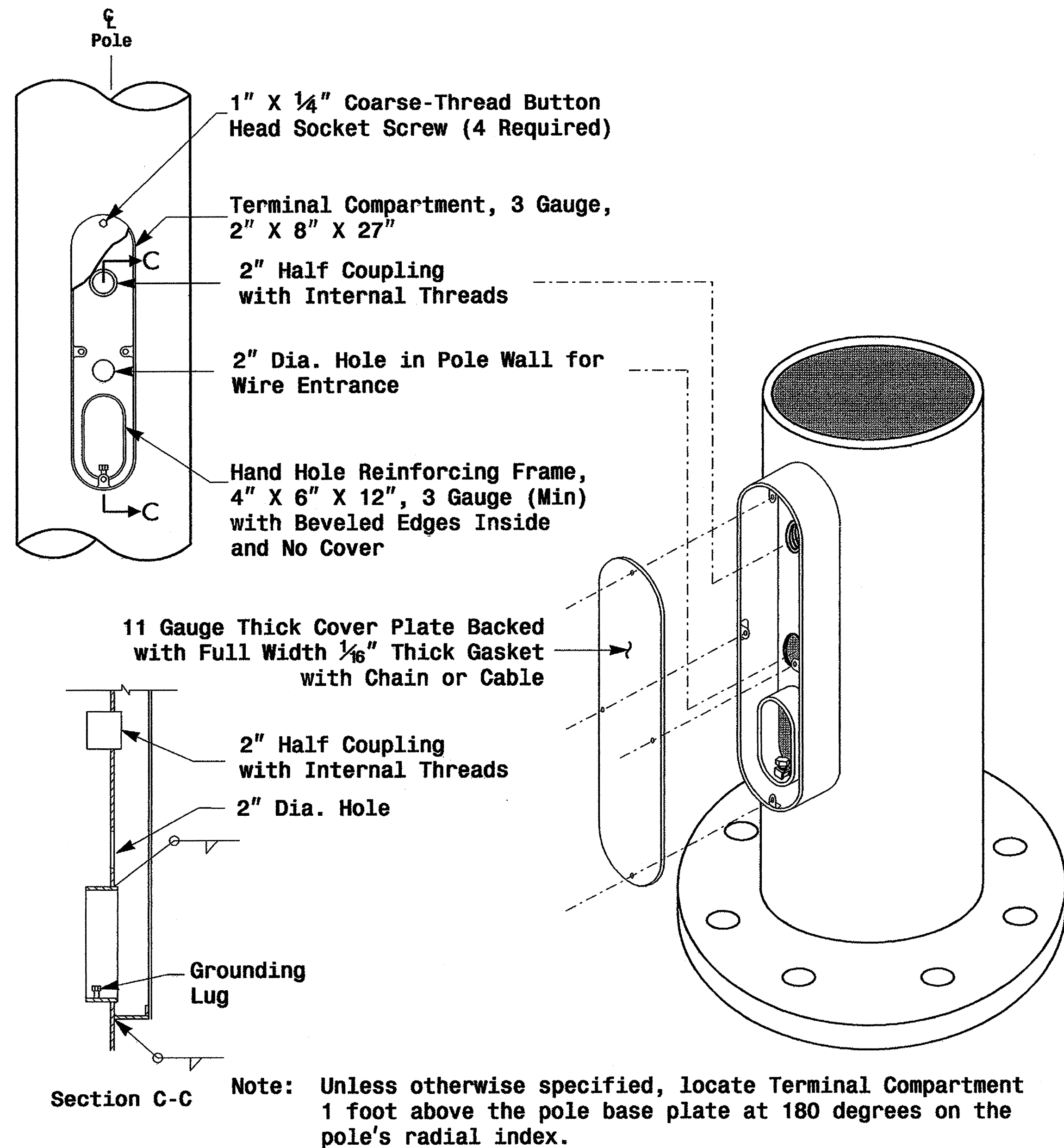
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

NCDOT CONTACTS:
MOBILITY AND SAFETY DIVISION - ITS and SIGNALS UNIT

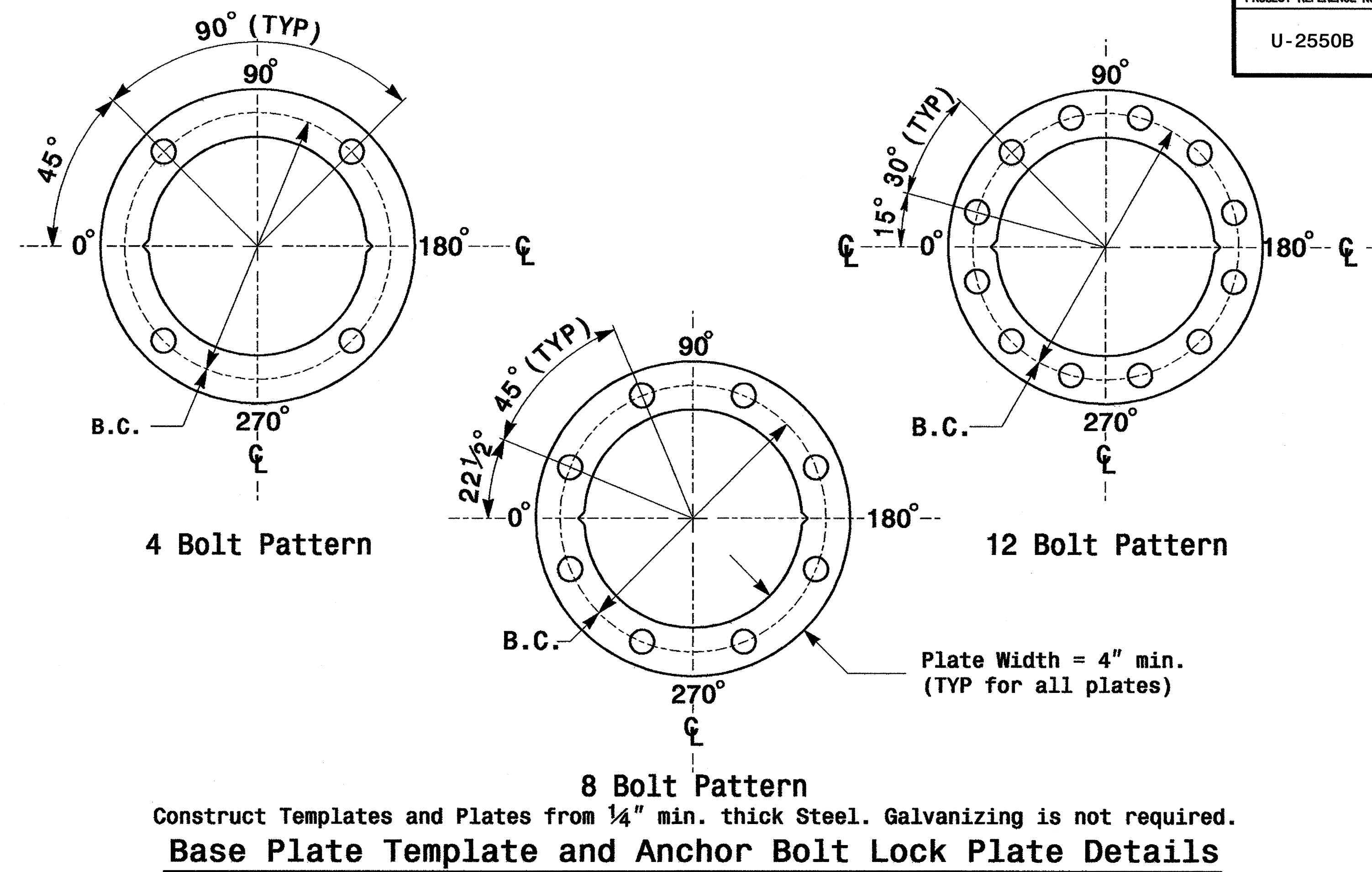
G. A. Fuller, P.E. - State ITS and Signals Engineer
 G. G. Murr, Jr., P.E. - State Signals Engineer
 D. C. Sarkar, P.E. - ITS and Signals Senior Structural Engineer
 C. F. Andrews, Jr. - ITS and Signals Structural Project Engineer
 M. Aslam - ITS and Signals Structural Project Engineer
 N. Bitting, P.E.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

SEAL

D. Sarkar 7.21.2009
SIGNATURE DATE



Terminal Compartment Detail



Base Plate Template and Anchor Bolt Lock Plate Details

MFG _____ MFG. DATE: MM/YY

SHAFT D/T/L/Y _____

ARM-A D/T/L/Y _____

ARM-B D/T/L/Y _____

A.B. DIA./B.C./L/Y _____

NCDOT STANDARD _____

MFG _____ MFG. DATE: MM/YY

SECTION D/T/L/Y _____

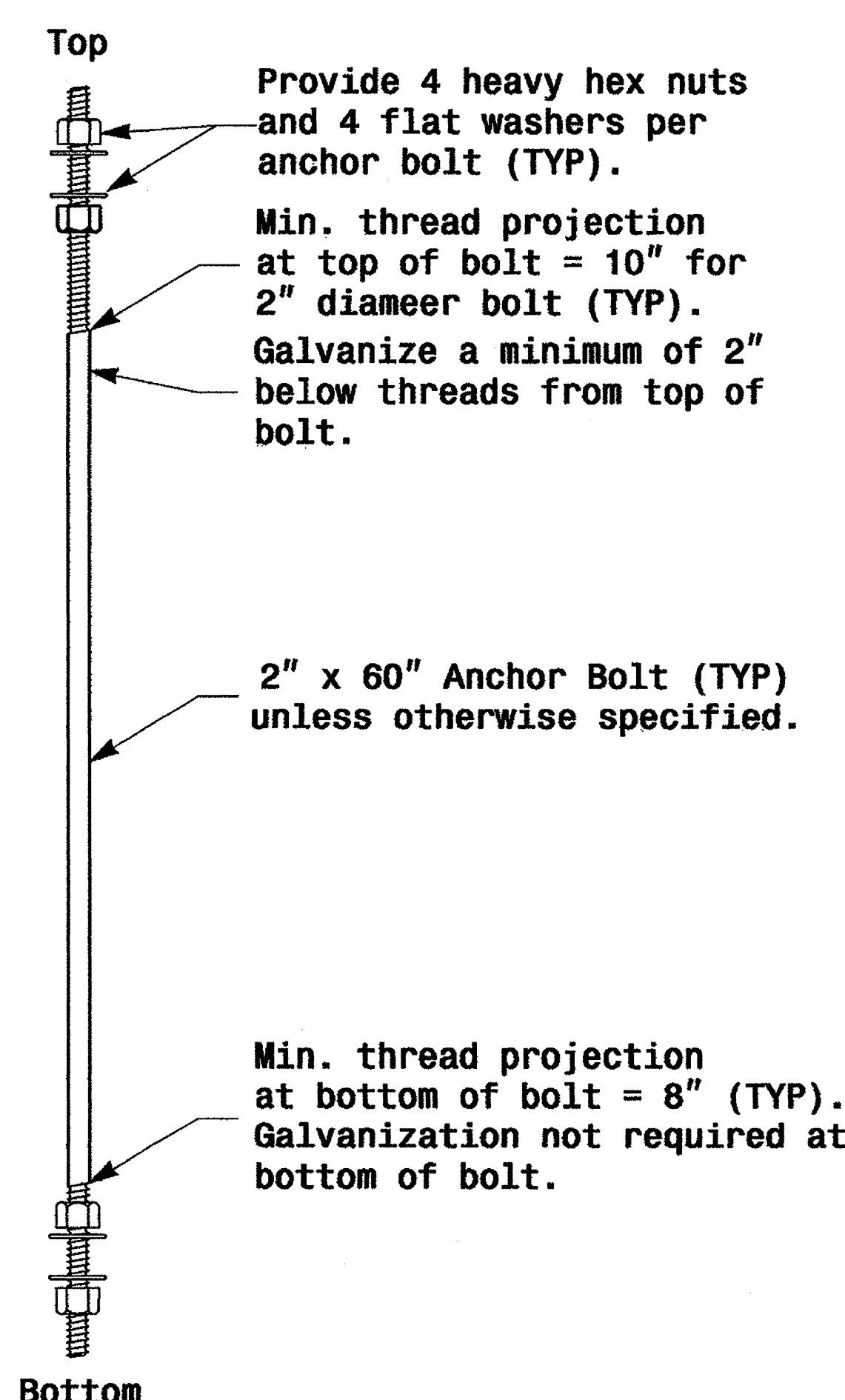
NCDOT STANDARD _____

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

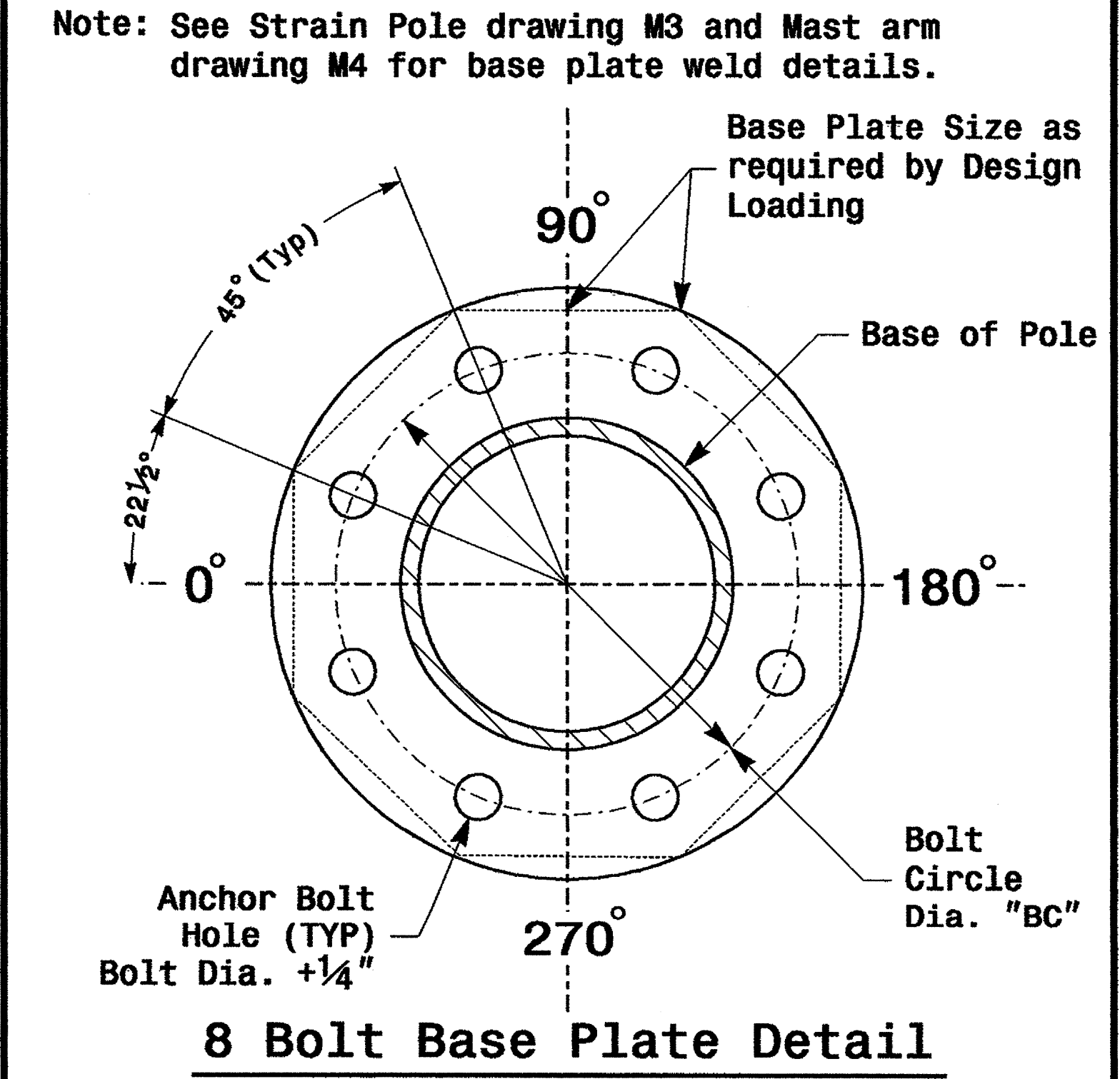
Shaft I.D. Tag
(Provide on Strain Poles and Mast Arm Poles)

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

Identification Tag Details



Anchor Bolt Detail



8 Bolt Base Plate Detail

Prepared in the Office of:

222 N. McDowell St., Raleigh, NC 27603

SCALE: 0 NA NONE

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

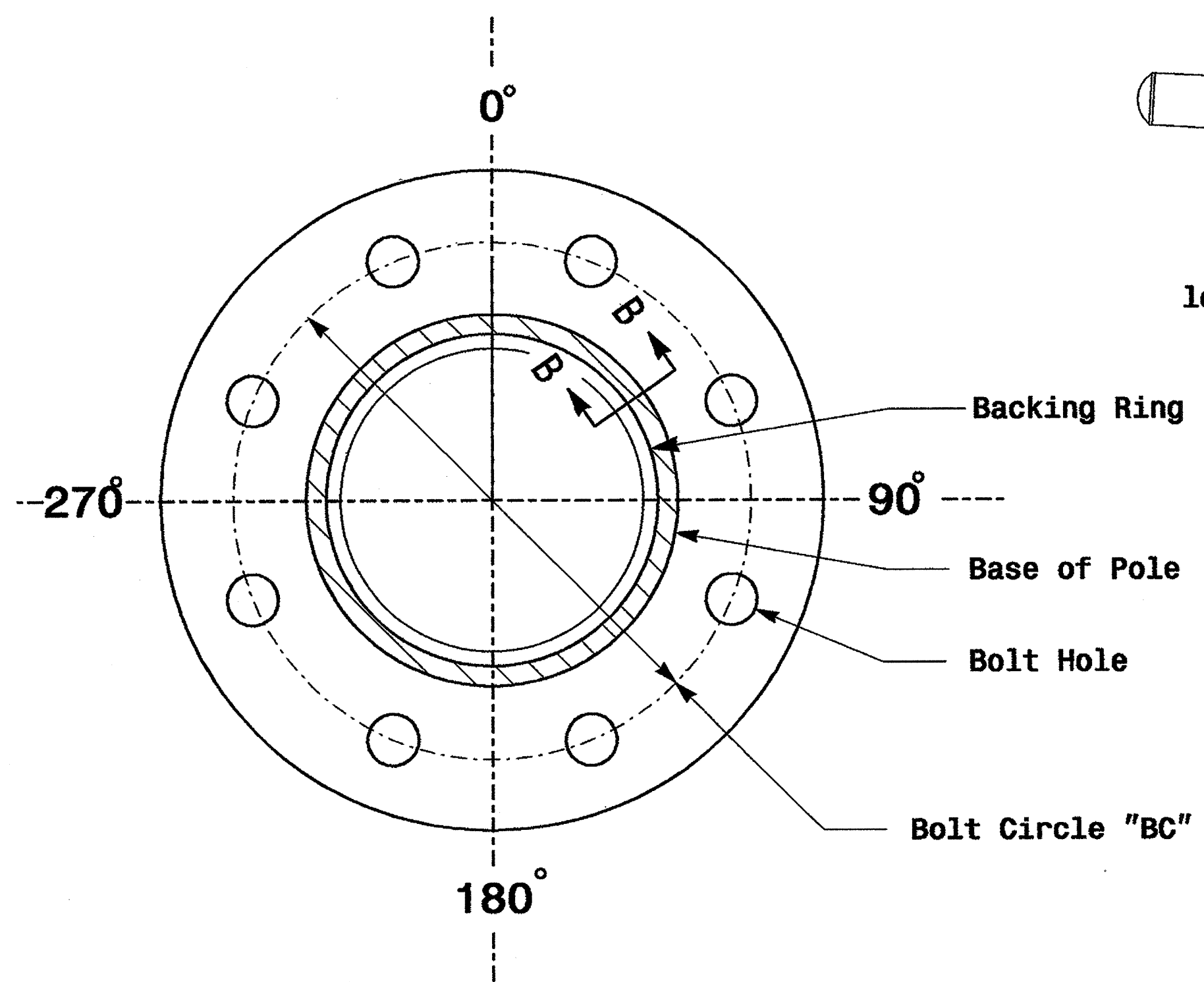
REVISIONS: _____ INIT. DATE

Signature: *D. Sankar* 9.2.2005

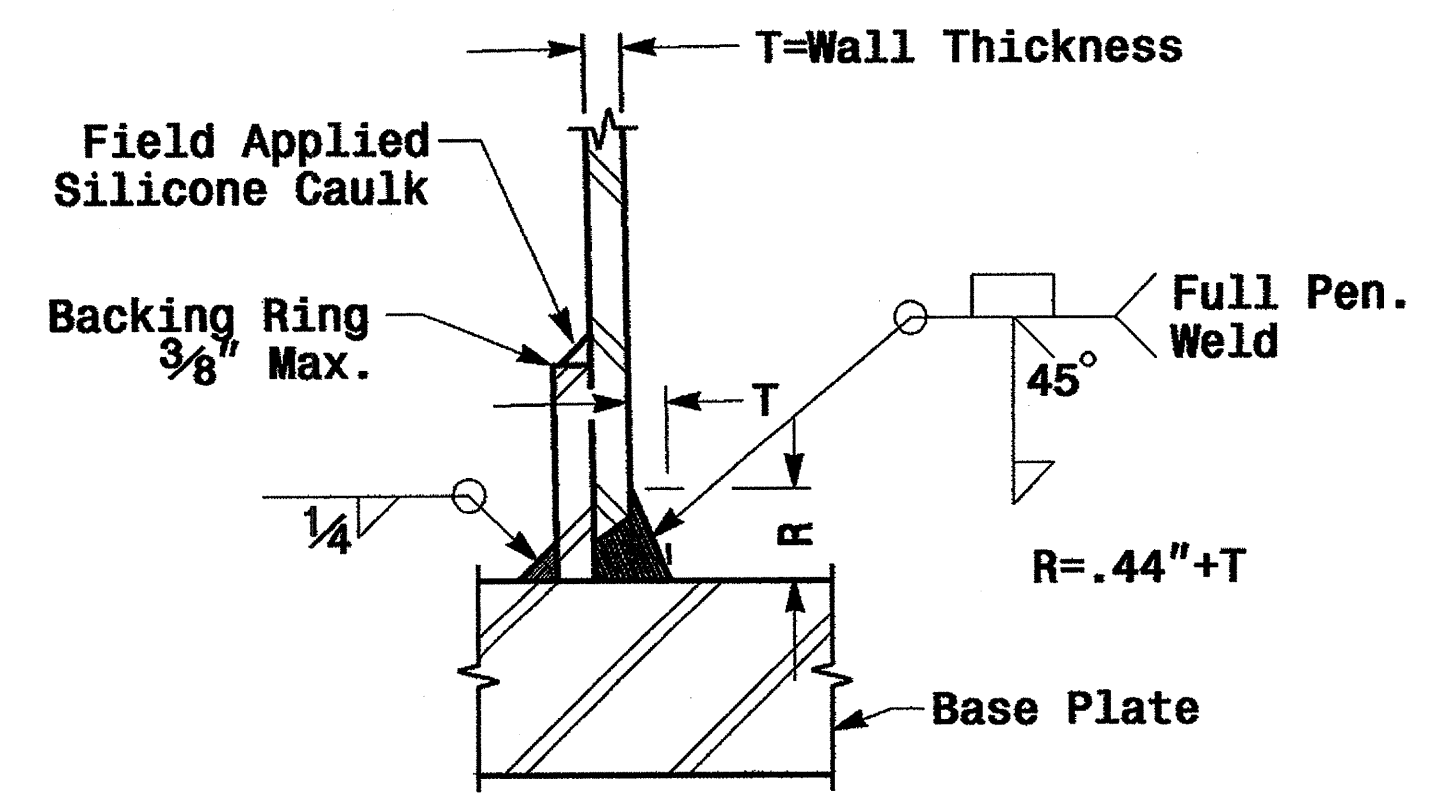
SIG. INVENTORY NO. _____

Fabrication Details - All Poles

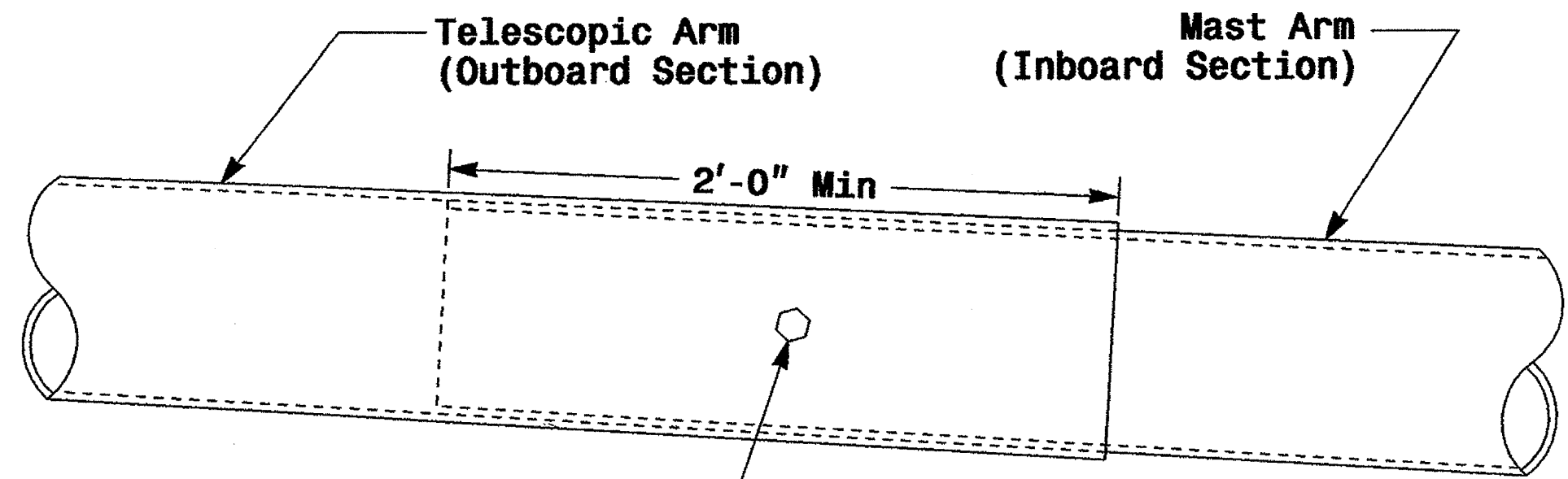
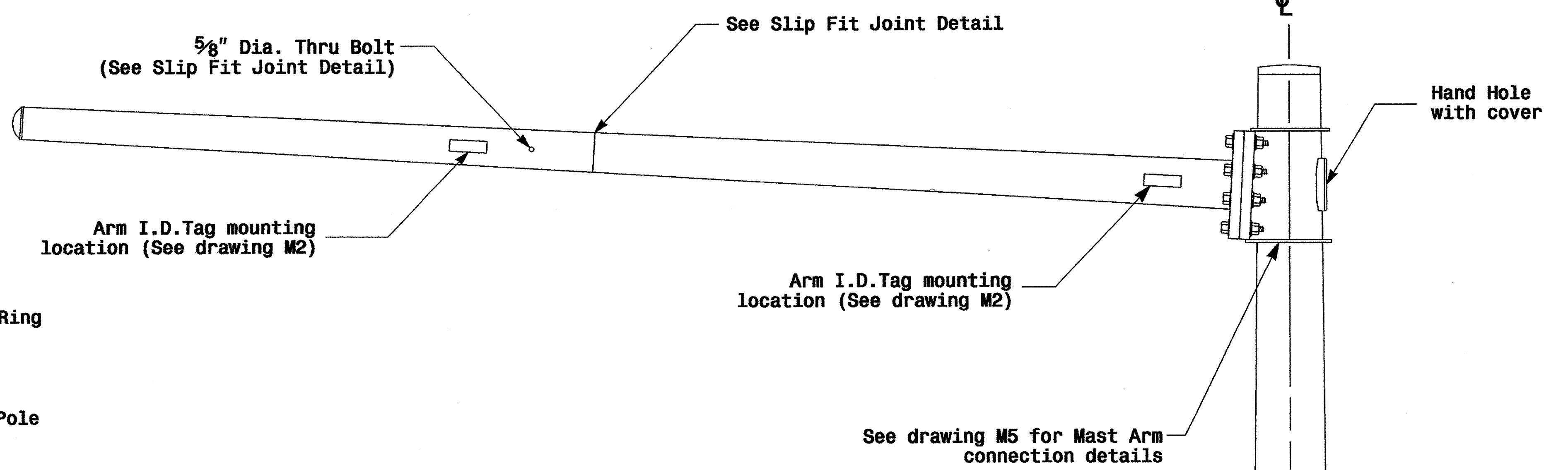
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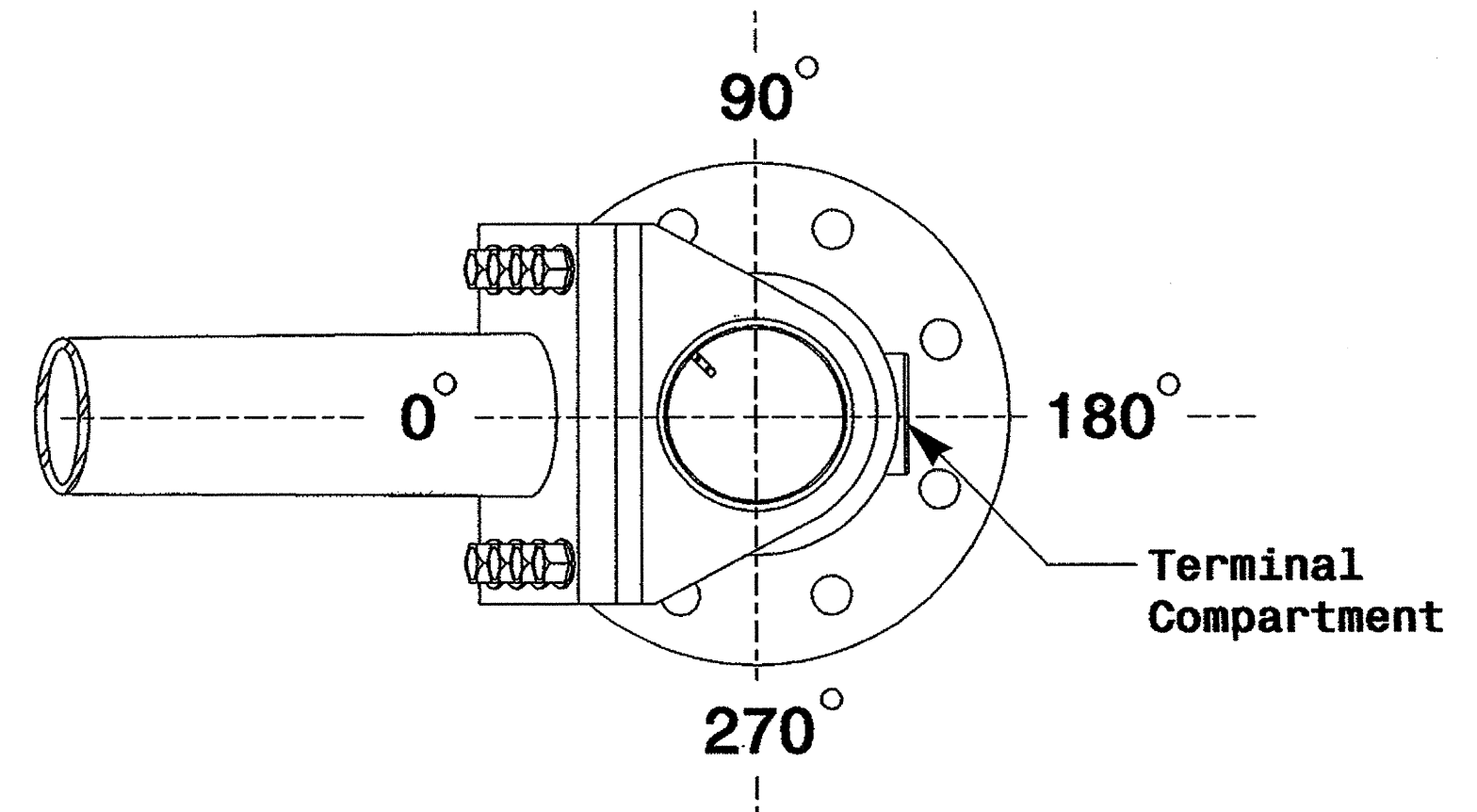
Section A-A
(See drawing M 2)
Pole Base Plate



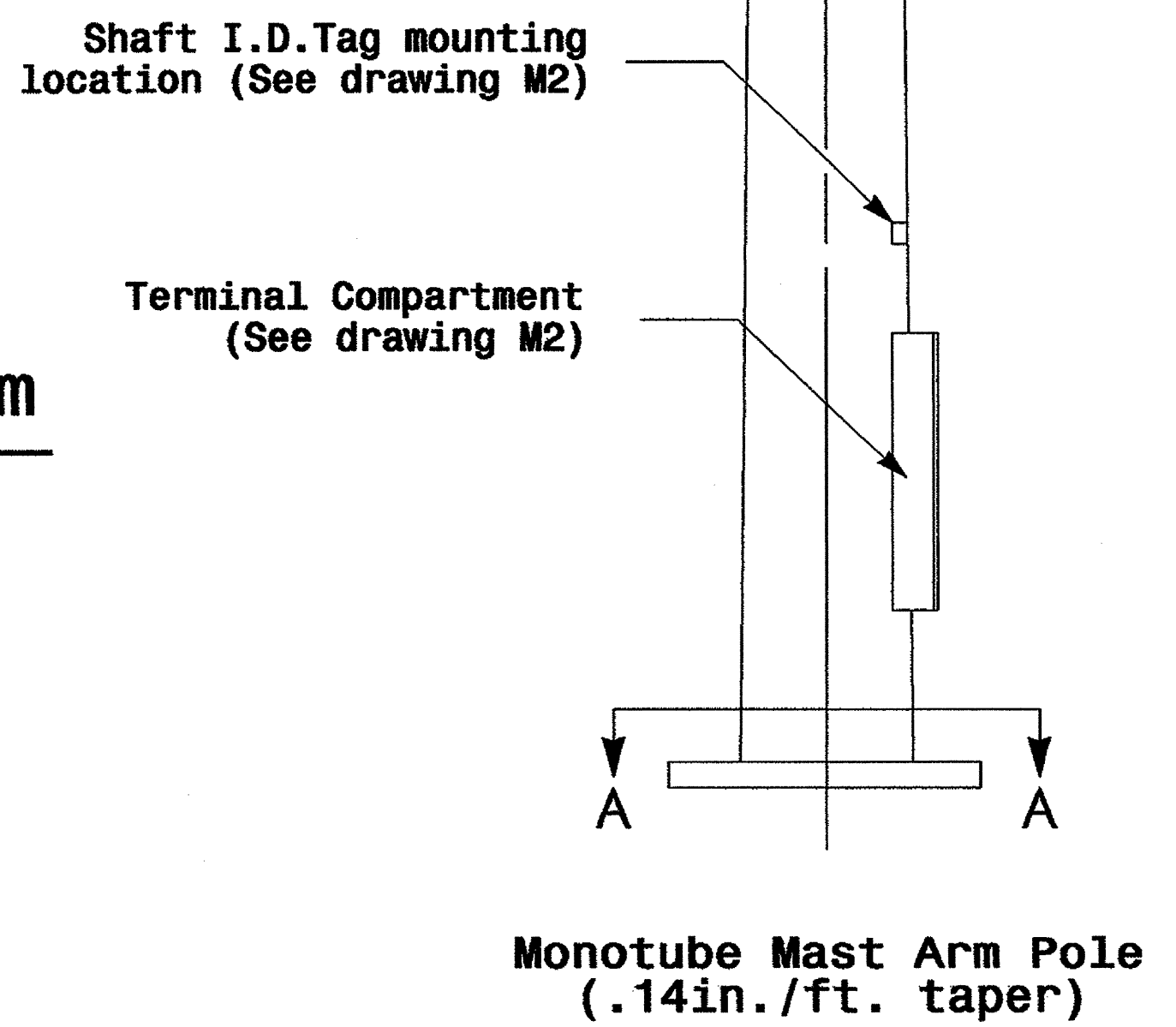
Section B-B
(Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



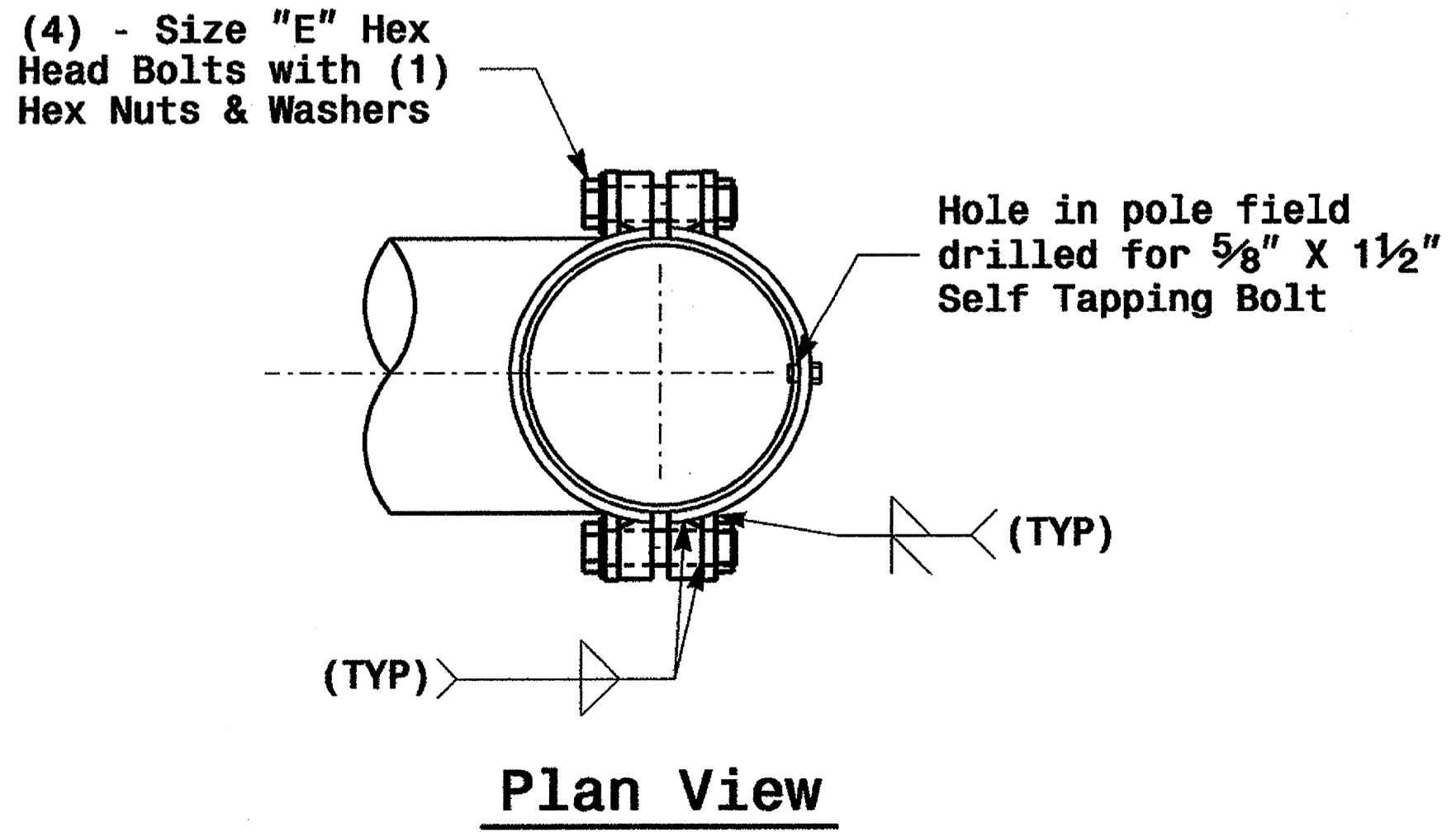
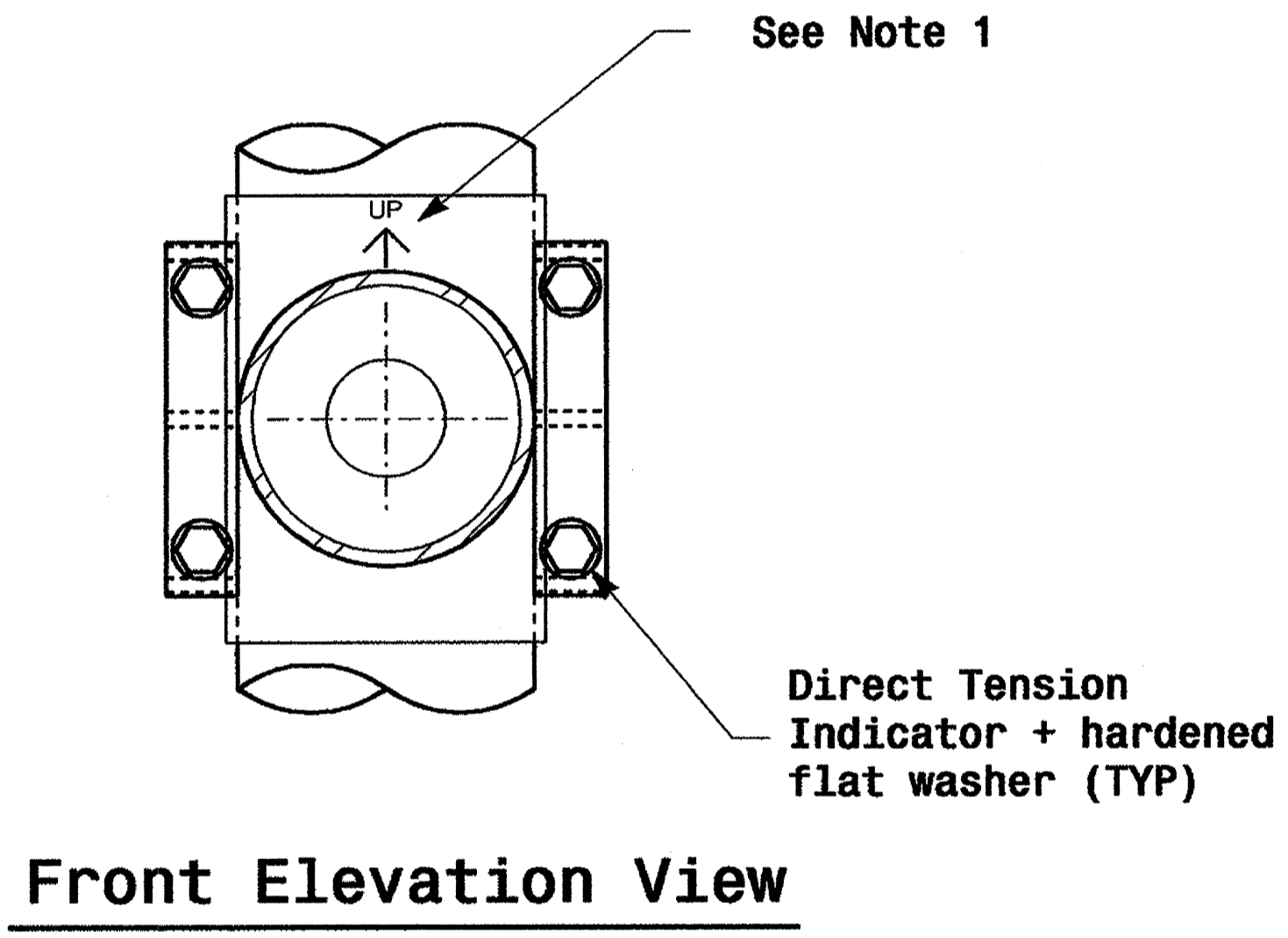
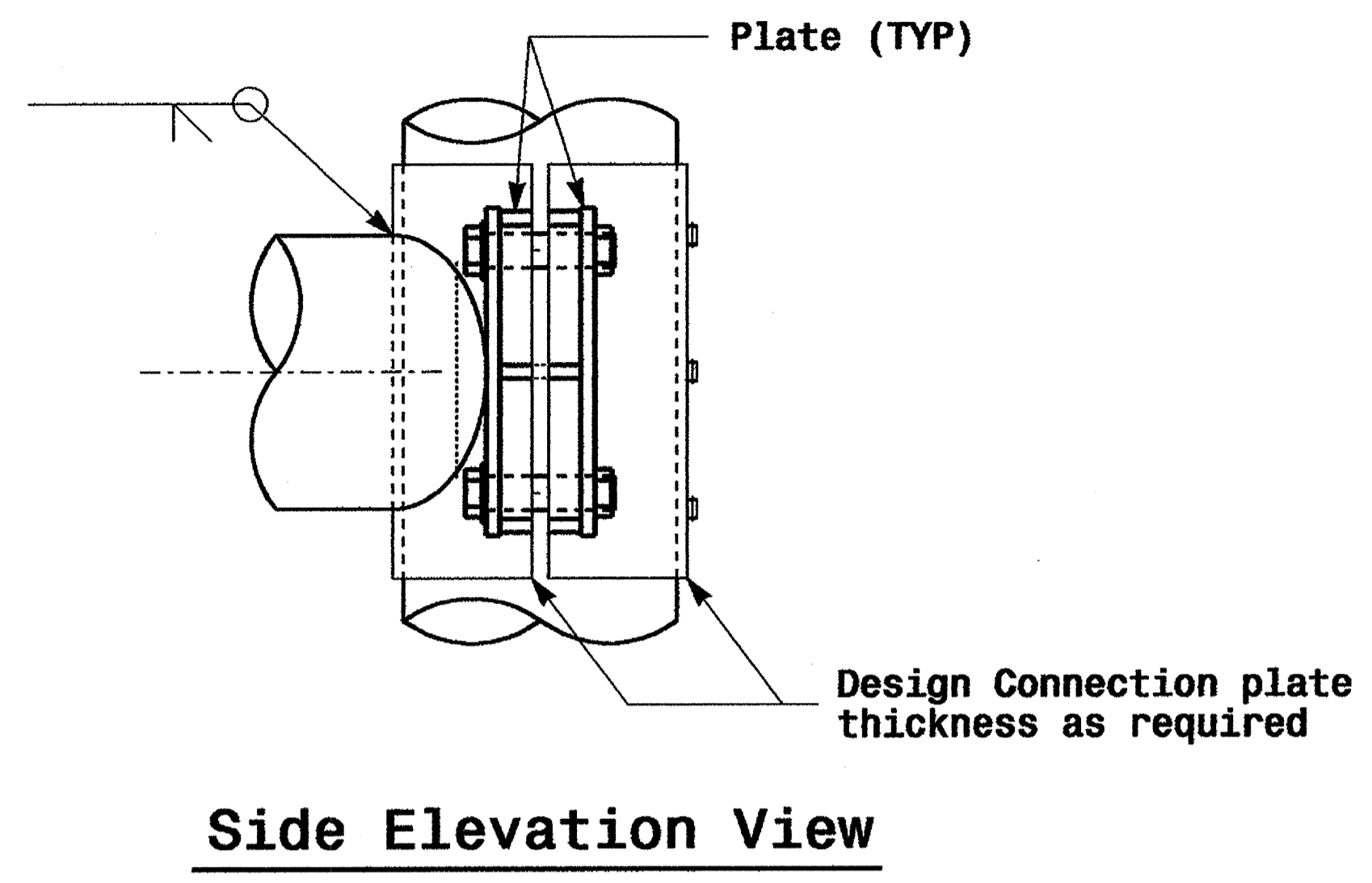
Mast Arm Radial Orientation



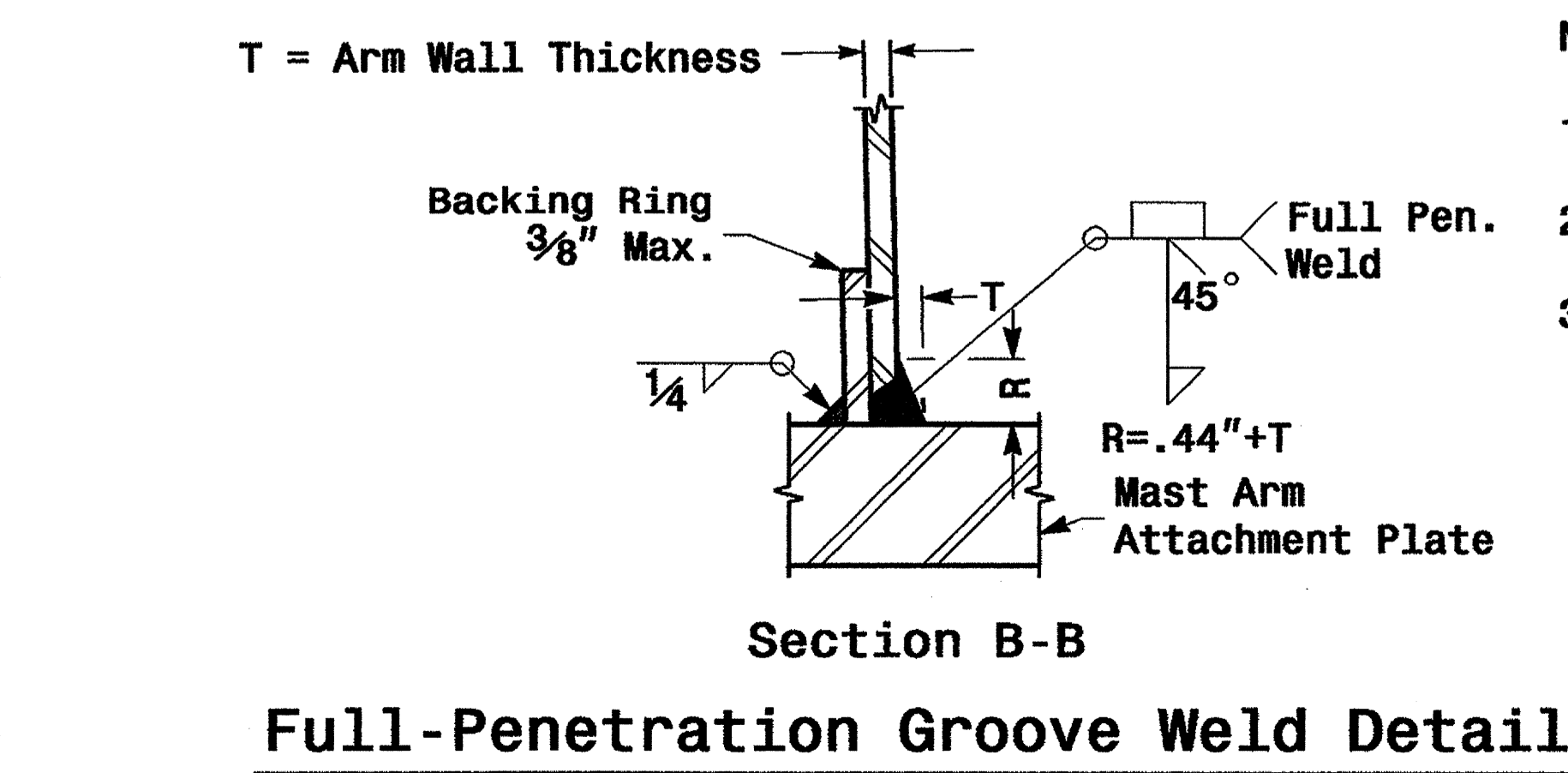
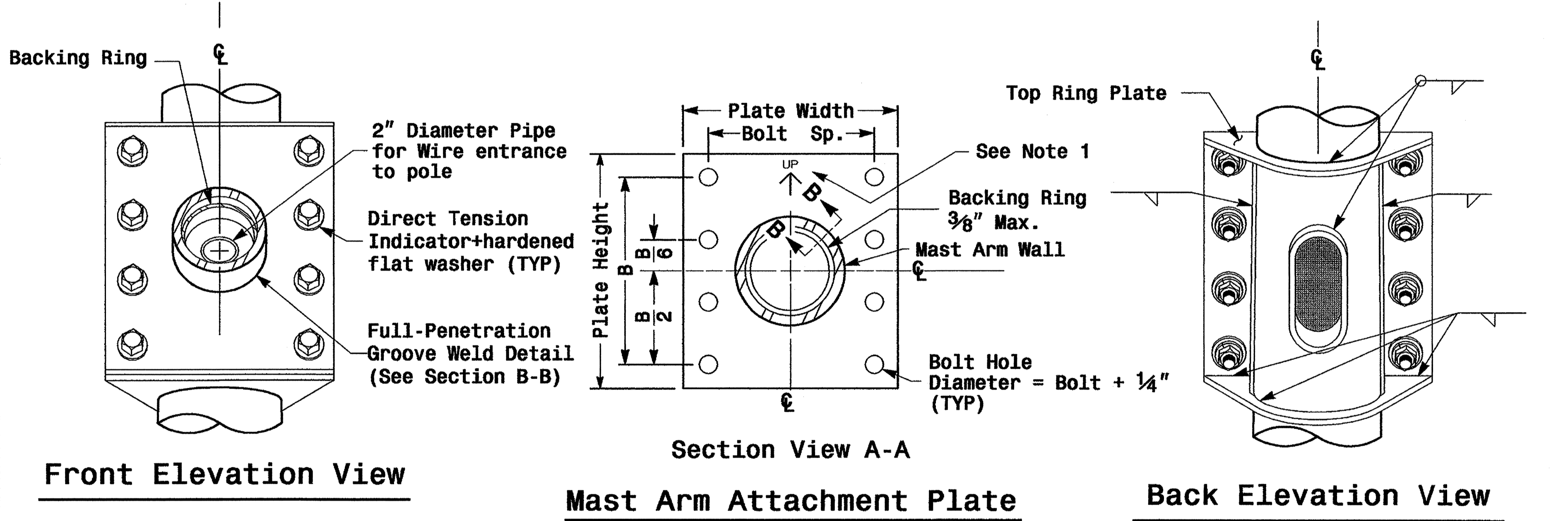
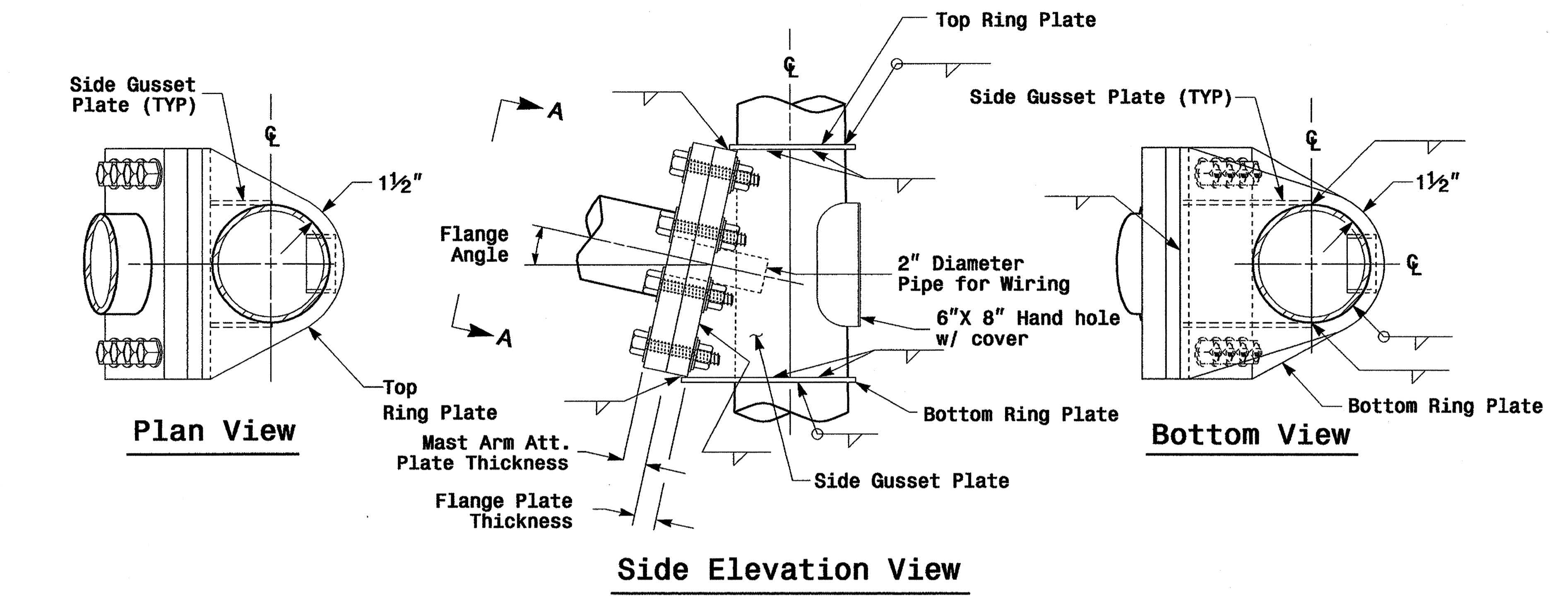
	Typical Fabrication Details for Mast Arm Poles		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander SCALE: NONE	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	

01-SEP-2005 14:08
w:\ee\p1\ee-un1\hewok\groups\2004 metal pole etf\etf\dwg\2004 m1.dgn
p.l.alexander

Adjustable Clamp Type Bolted Mast Arm Connection



Welded Ring Stiffened Mast Arm Connection



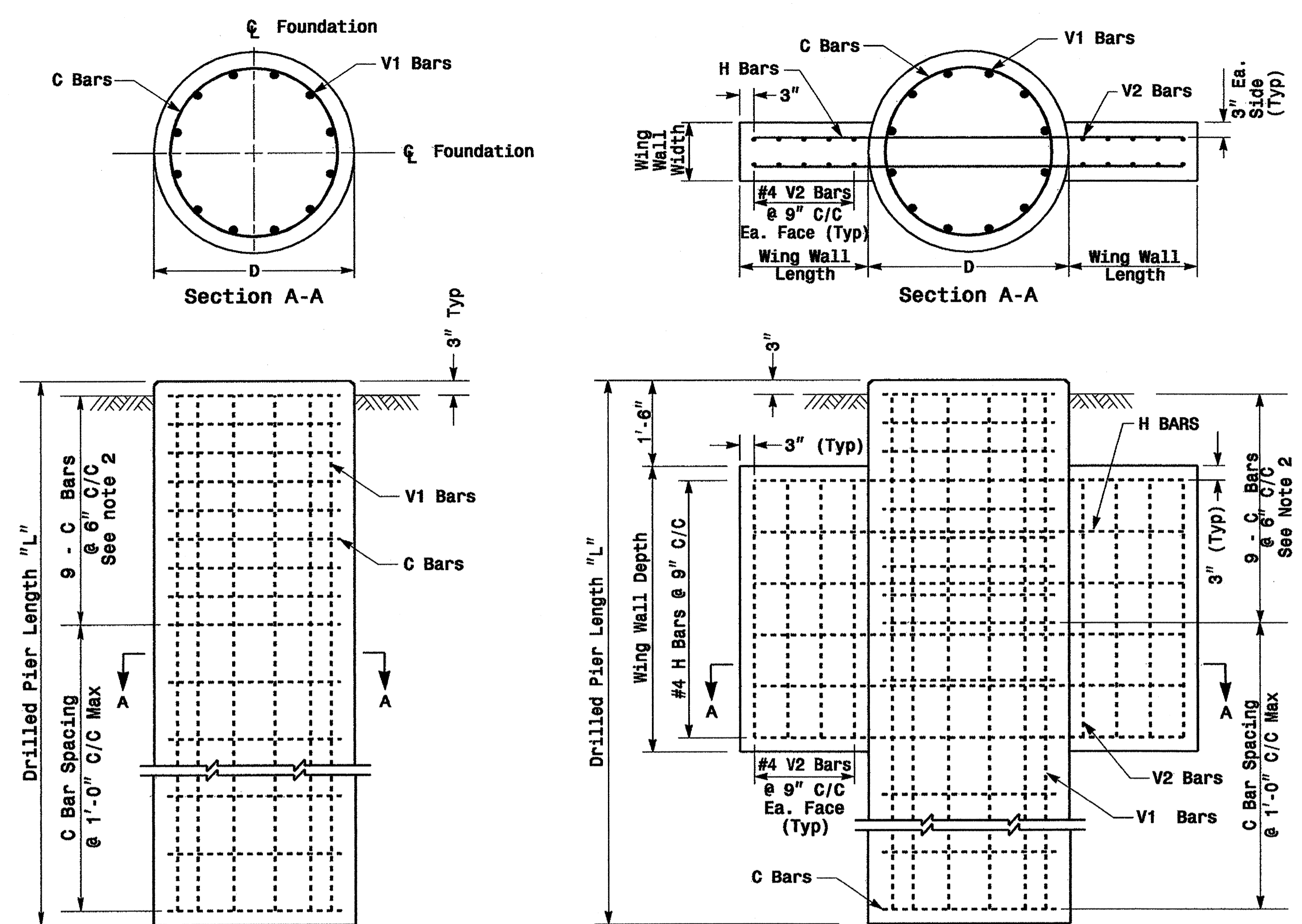
- Notes:
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
 2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
 3. Designer is responsible for providing appropriate drainage points.

Fabrication Details - Mast Arm Poles

01-SEP-2005 14:11 w:\poc\188-un1\workgroups\2004 metol pole etf\order\dwg004.m5.dgn

	Fabrication Details For Mast Arm Connection To Pole		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	
REVISIONS:		INIT. DATE	SIGNATURE: D. Sarker 9/2/2005 DATE:
SIG. INVENTORY NO.			SEAL

Reinforcing Steel Bars



REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER)

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

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

REINFORCING STEEL TABLE FOR STANDARD 42" and 48" DRILL PIER SHAFT WITH TYPE 1 AND TYPE 2 WING WALLS

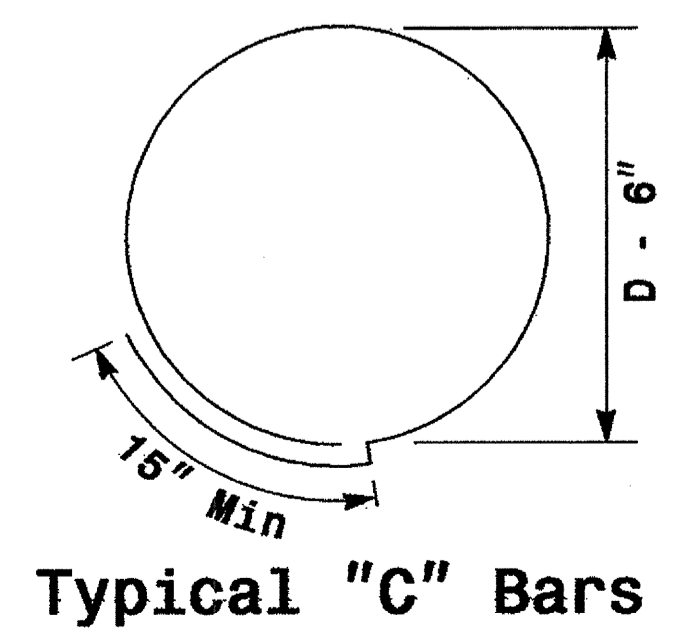
Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel				
		Bar Name	No.	Size	Type	Length
TYPE 1	42"	V1	9	#8	STR.	**
		V2	12	#4	STR.	2'-6"
		H	8	#4	STR.	6'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	42"	V1	9	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	48"	V1	12	#8	STR.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

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

WING WALL DETAILS

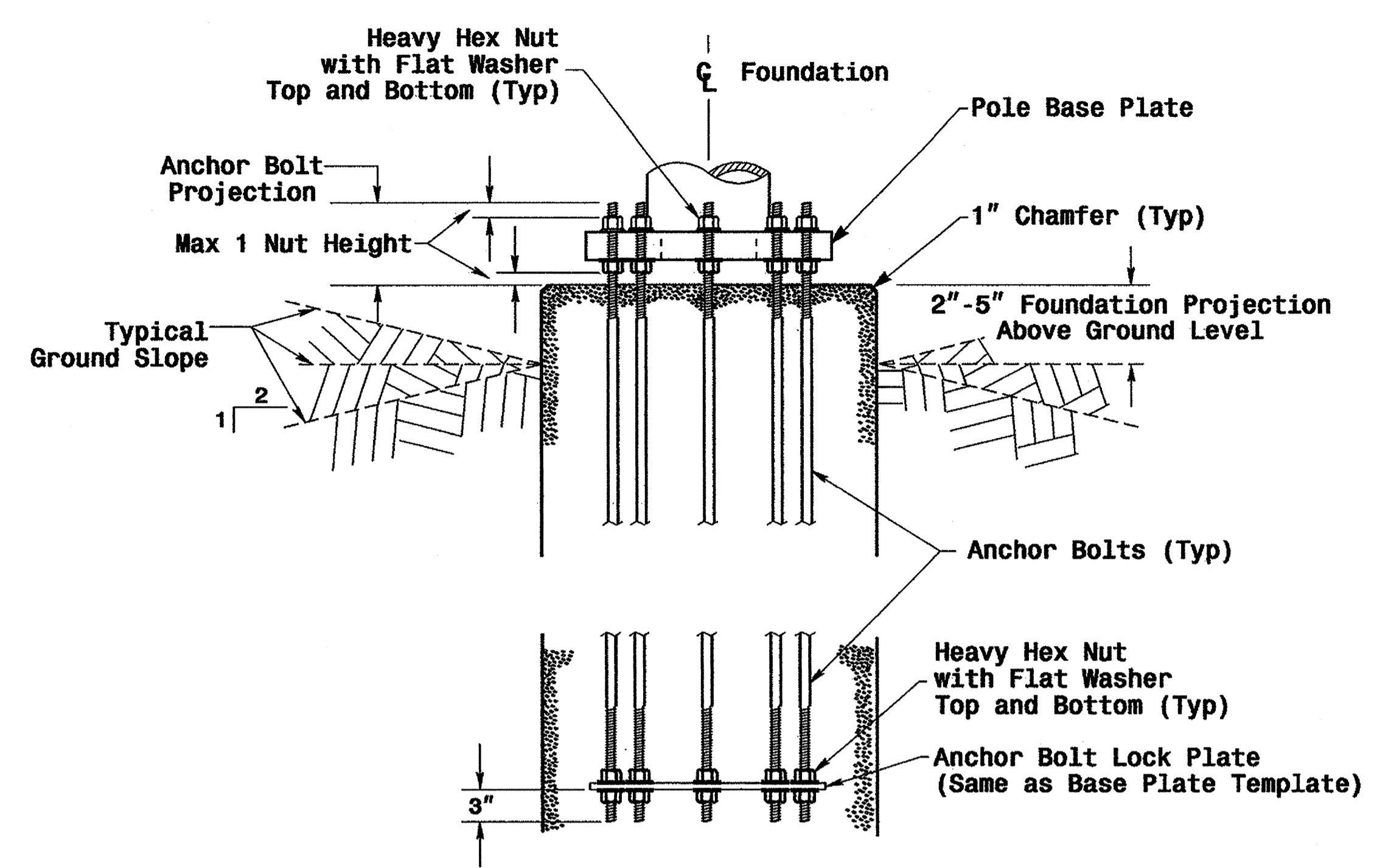
Wing Wall Type	Wing Wall Length (Ft.)	Wing Wall Width (Ft.)	Wing Wall Depth (Ft.)	Concrete Volume (Cu. Yds.)
TYPE 1	1'-6"	1'-0"	3'-0"	.4
TYPE 2	3'-0"	1'-0"	5'-0"	1.2

See Note No. 4

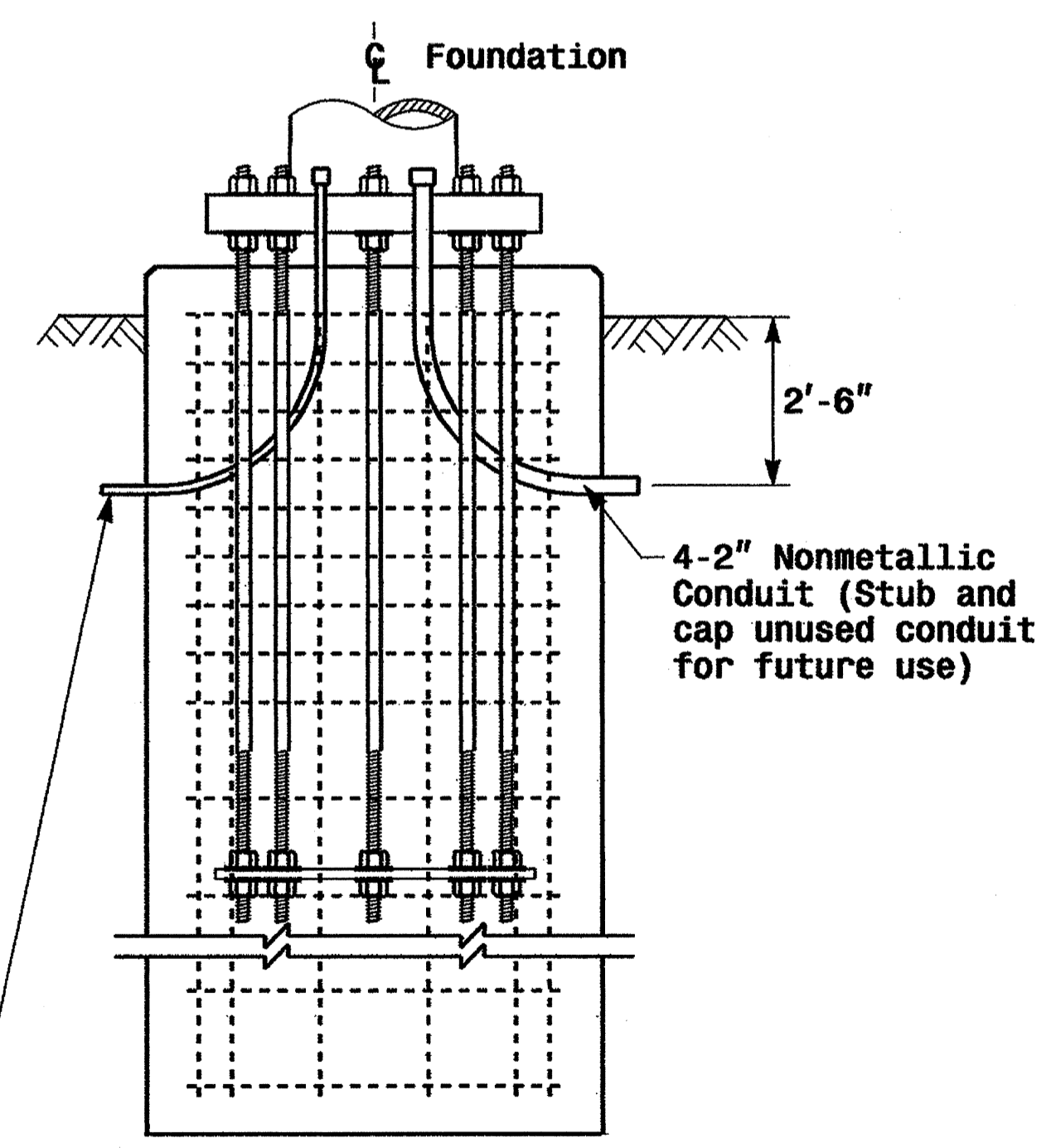


Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



Notes

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

Construction Details - Foundations

01-SEP-2005 11:45 v:\spec\es-un\theor\groups\2004\metal pole standards\2004 m.dgn

Prepared in the Office of:

Construction Details Foundations

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

SCALE: NONE

Signature: *P. L. Alexander* 9.2.2005
 DATE: 9.2.2005
 SIG. INVENTORY NO.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

INDUCTIVE DETECTION LOOPS
ENGLISH DETAIL DRAWING FOR

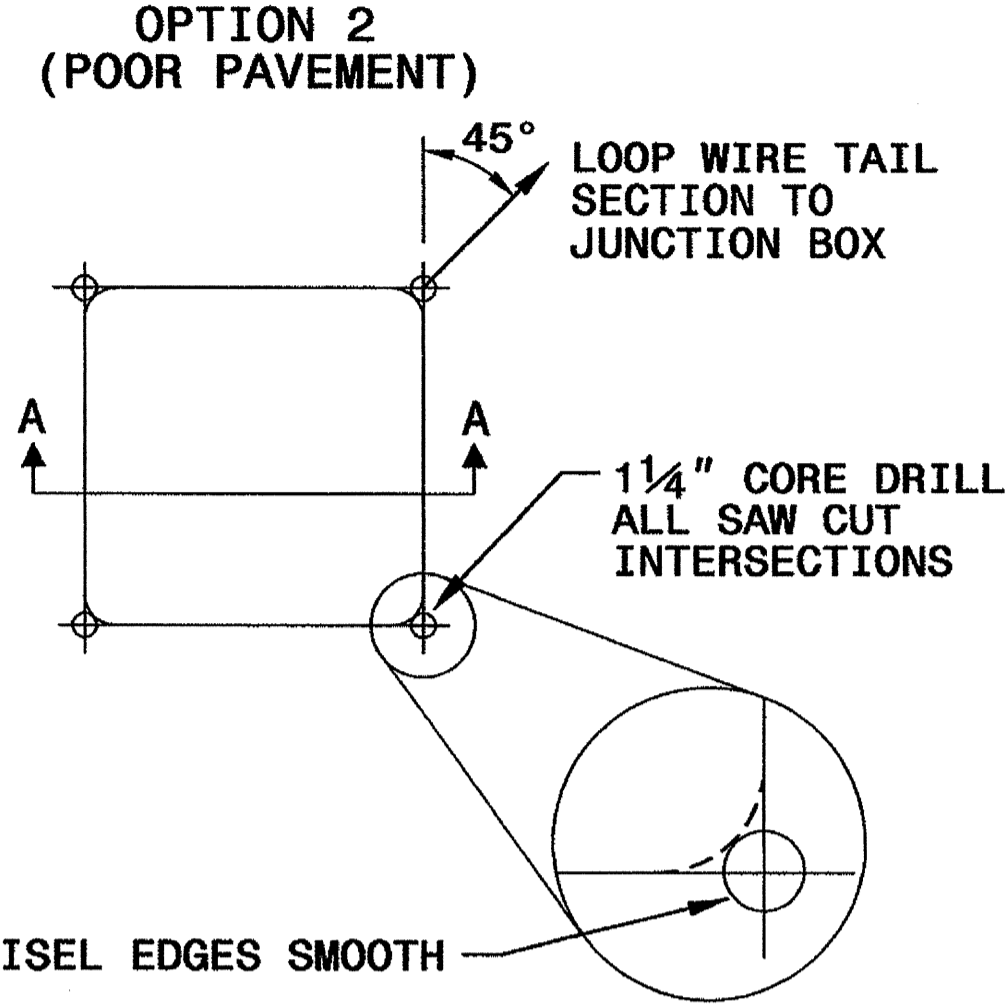
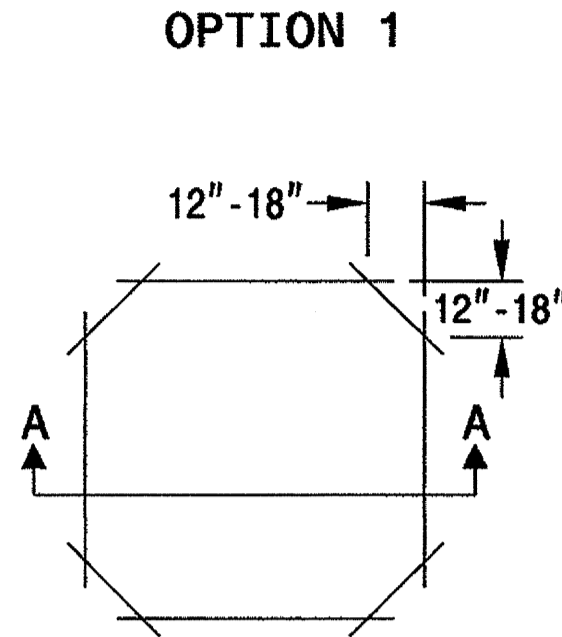
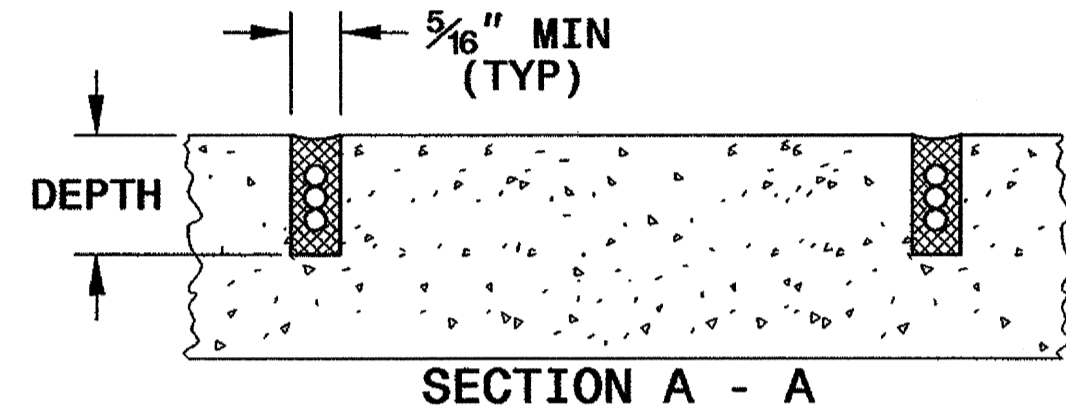
SHEET 1 OF 3
1725D01

CONVENTIONAL 4-SIDED LOOP

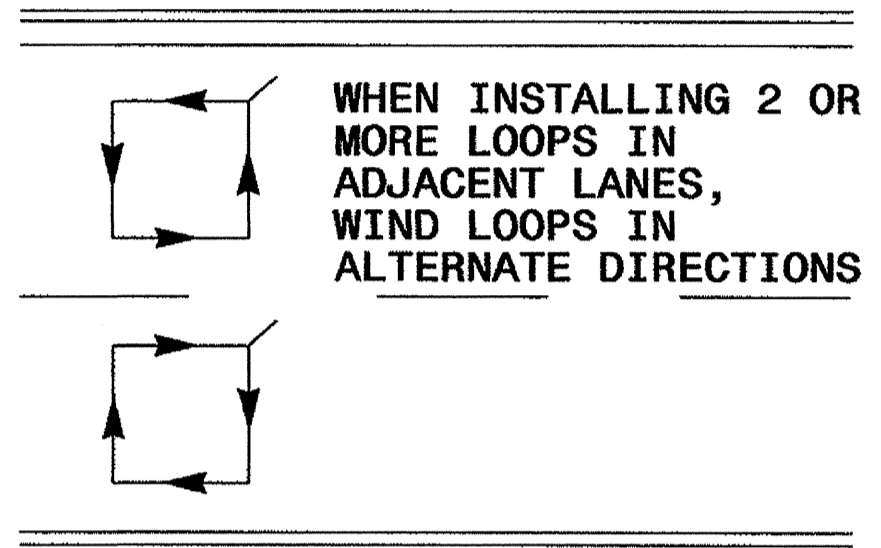
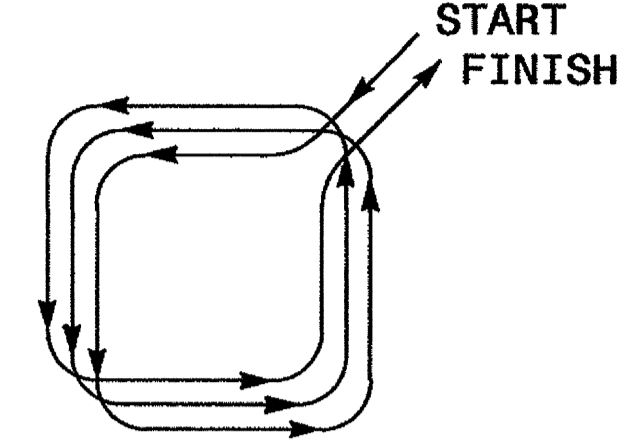
SAW CUT OPTIONS

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

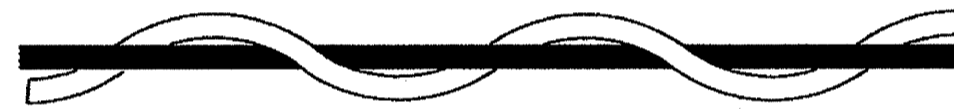


LOOP WINDING METHOD



LOOP WIRE TWISTING METHOD

INCORRECT WAY TO TWIST WIRE



CORRECT WAY TO TWIST WIRE

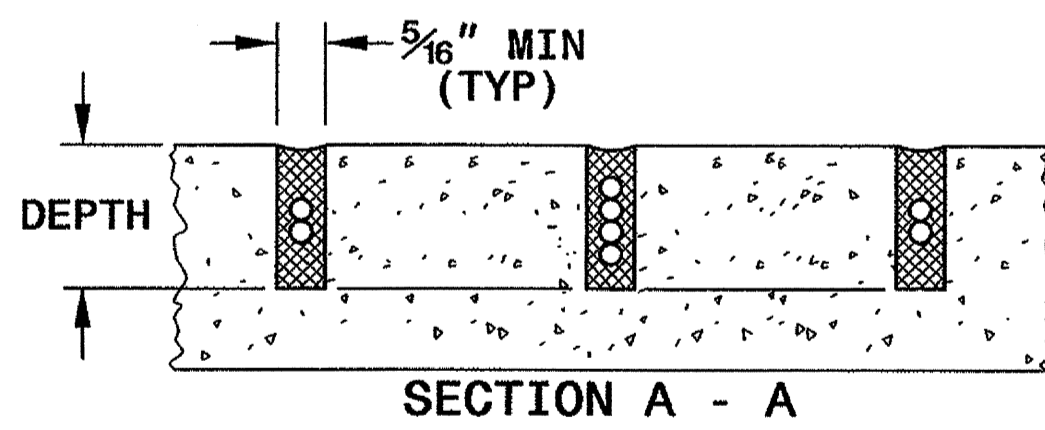
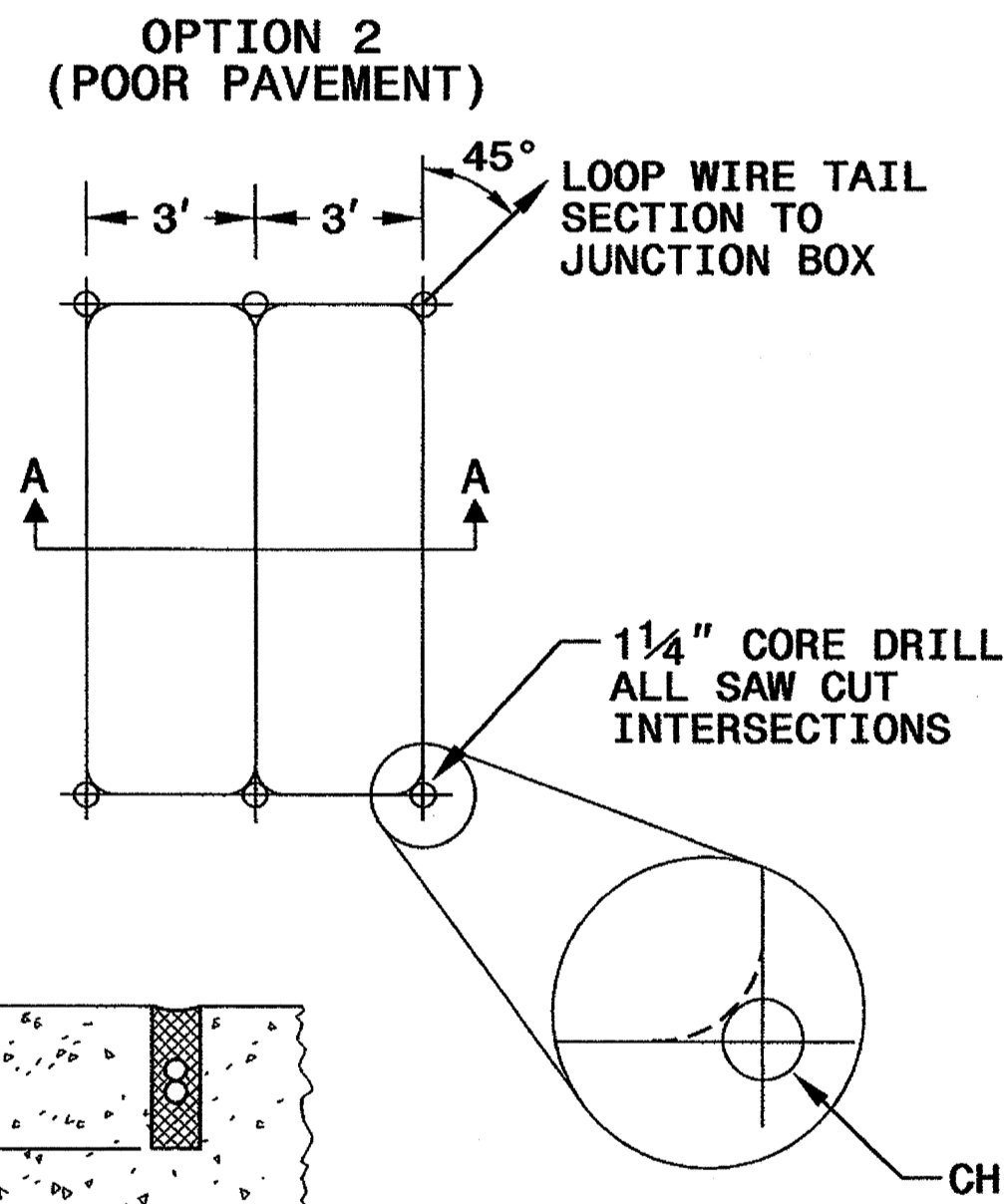
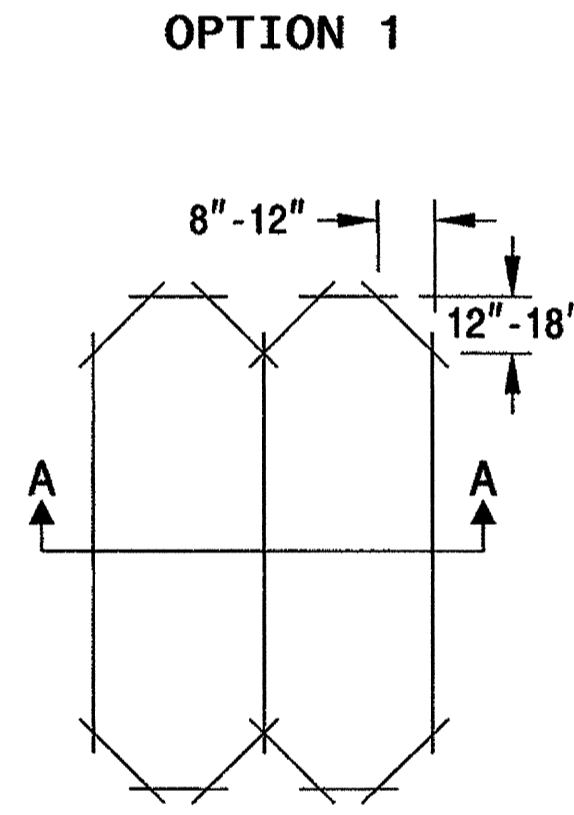


NOTES

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

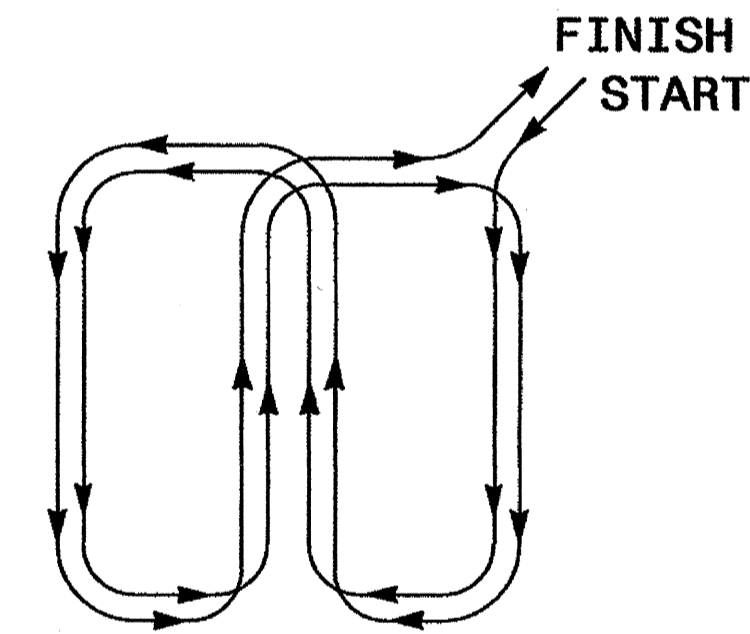
QUADRUPOLE LOOP

SAW CUT OPTIONS



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

LOOP WINDING METHOD



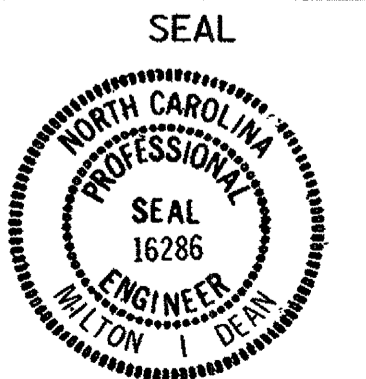
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

INDUCTIVE DETECTION LOOPS
ENGLISH DETAIL DRAWING FOR

SHEET 1 OF 3
1725D01

See Plate for Title



Milton Dean 1/24/08
SIGNATURE DATE

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

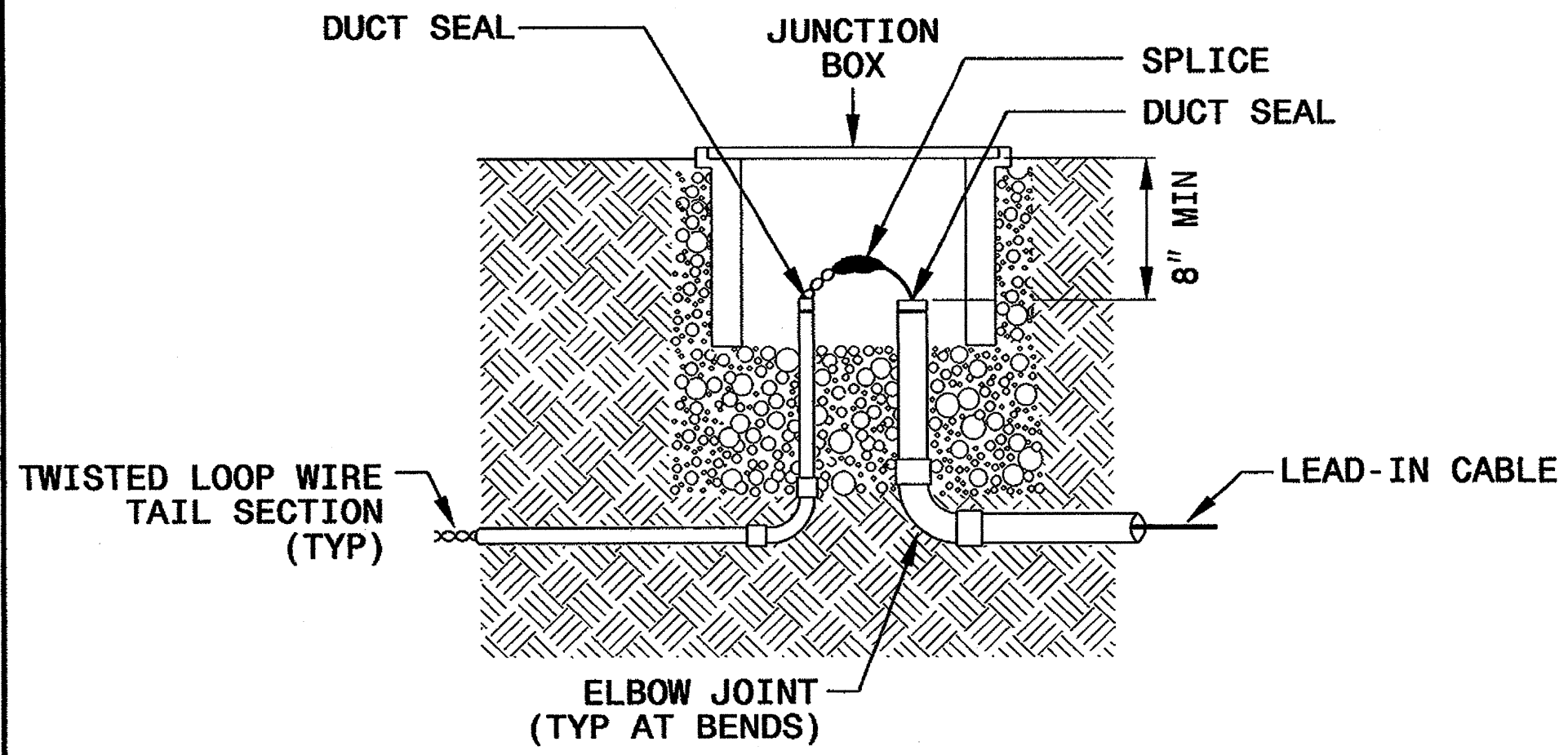
11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

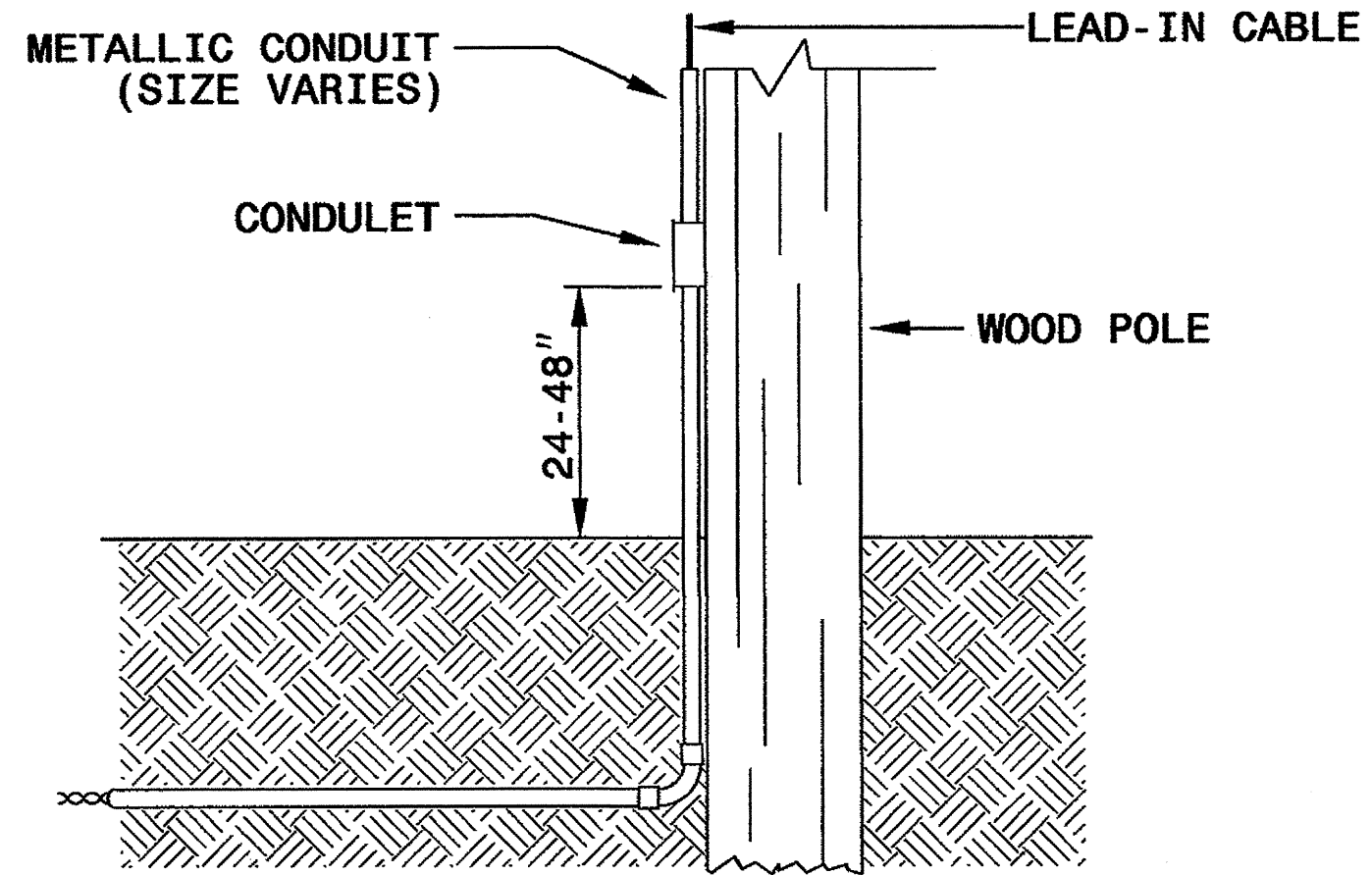
SHEET 2 OF 3
1725D01

LOOP WIRE SPLICE POINT DETAILS

LOOP WIRE AT JUNCTION BOX



LOOP WIRE AT POLE

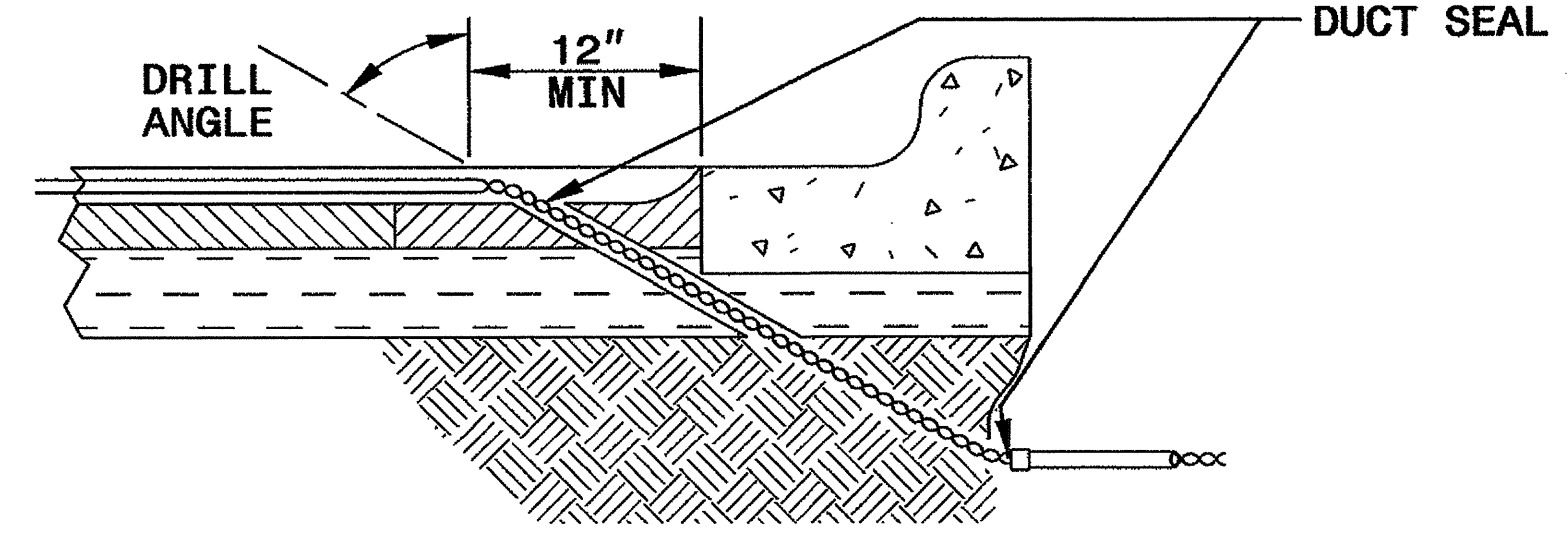


NOTE

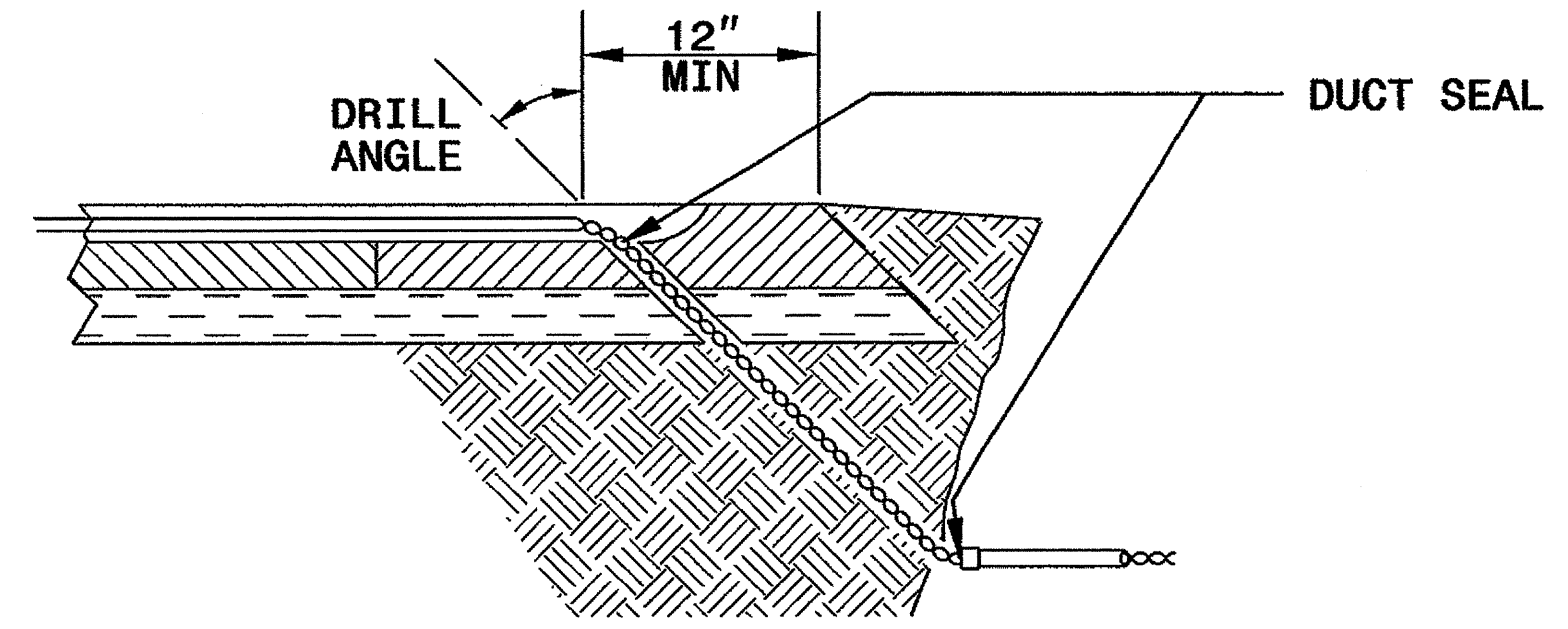
SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

LOOP WIRE PAVEMENT EDGE DETAILS

LOOP WIRE AT CURB & GUTTER SECTION



LOOP WIRE AT PAVEMENT SECTION



NOTES

1. DO NOT EXCAVATE UNDER CURB AND GUTTER SECTIONS FOR CONDUIT INSTALLATION.
2. TWIST LOOP WIRE TAIL SECTIONS FROM WHERE LOOP WIRE TAIL LEAVES SAW CUT TO JUNCTION BOX, INCLUDING THROUGH CONDUIT.
3. BEFORE SEALING LOOPS, INSTALL DUCT SEAL WHERE LOOP WIRE TAIL SECTION LEAVES SAW CUT IN PAVEMENT AND AT ENTRANCE OF CONDUIT TO JUNCTION BOX.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

SHEET 2 OF 3
1725D01

See Plate for Title

Prepared in the Offices of:
Intelligent Transportation Systems & Signals Unit
DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Parkway
Garner, NC 27529

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
16286
ENGINEER
MILTON DEAN
Milton A. Dean 11/24/08
SIGNATURE DATE

24-Nov-2008 09:29
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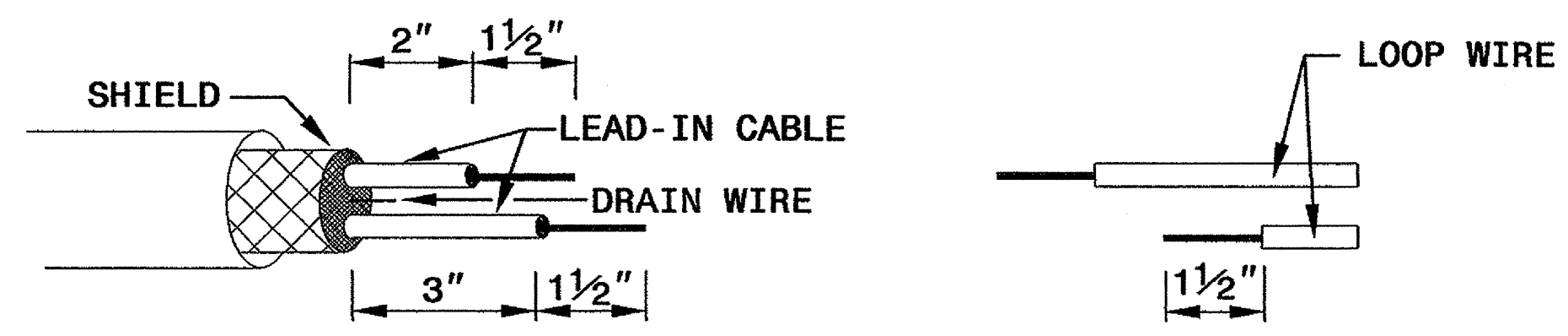
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

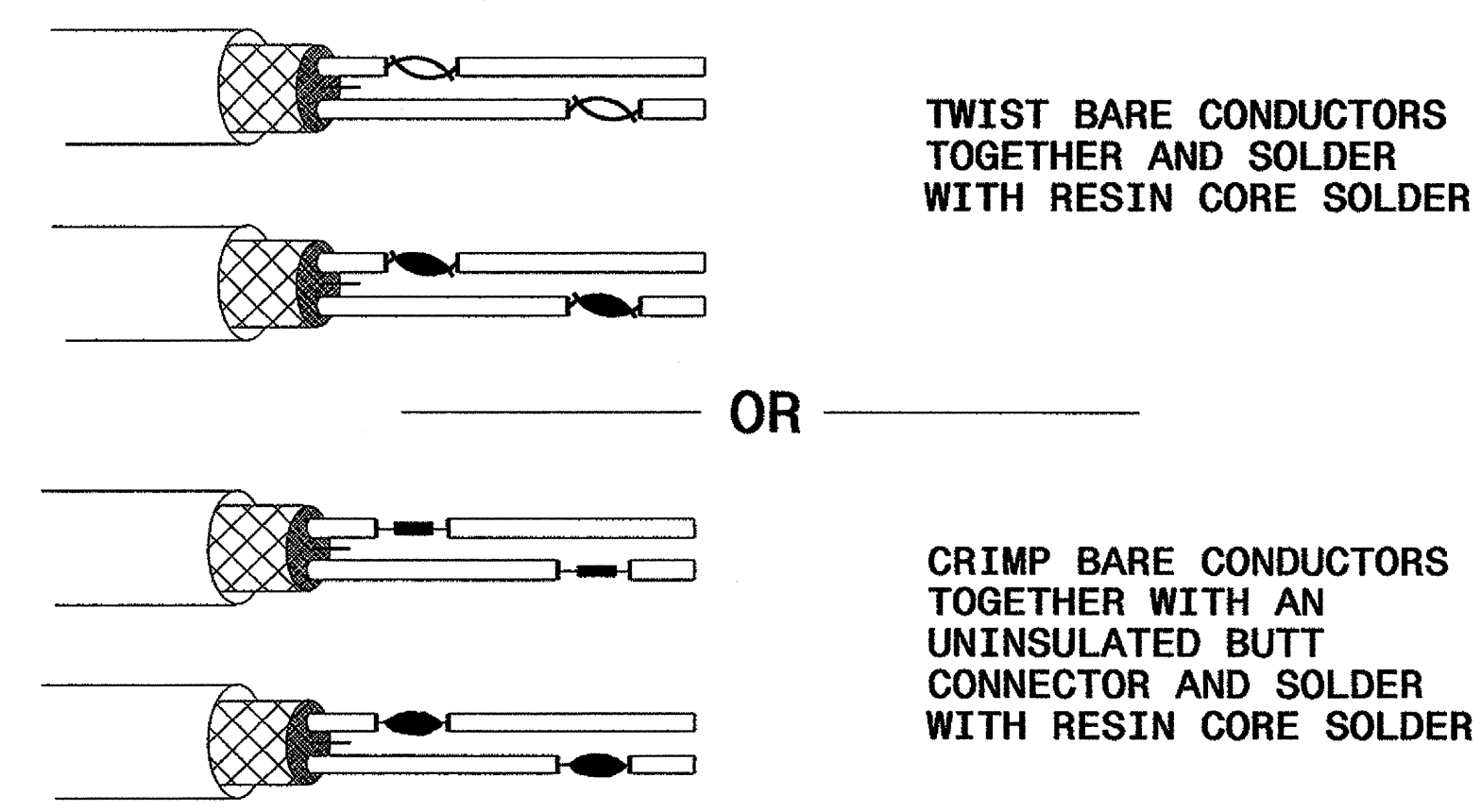
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
SPLICING FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE

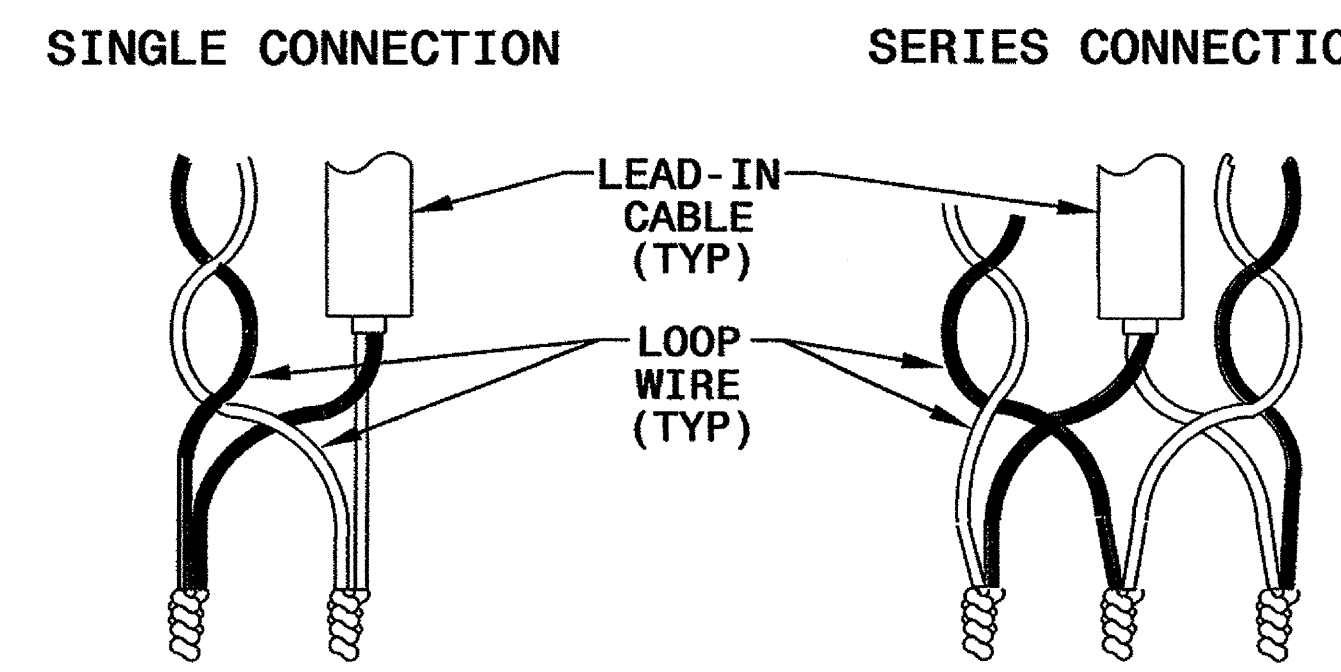


STEP 2. CONNECT AND SOLDER

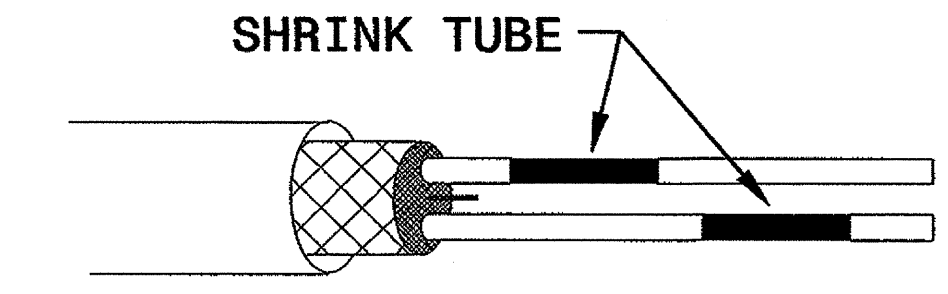


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

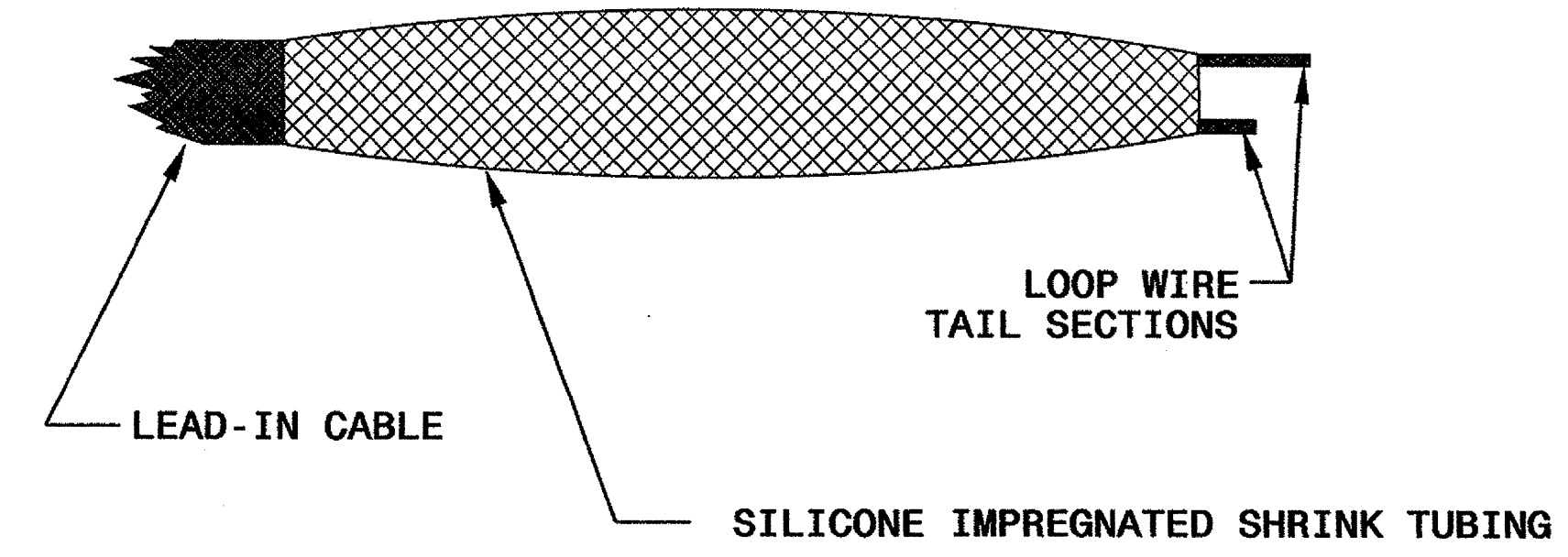
LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY PROTECT SPLICE



STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
SPLICING FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

Milton J. Dean 11/24/08
SIGNATURE DATE

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DECAL

POLE MOUNTED SIGN

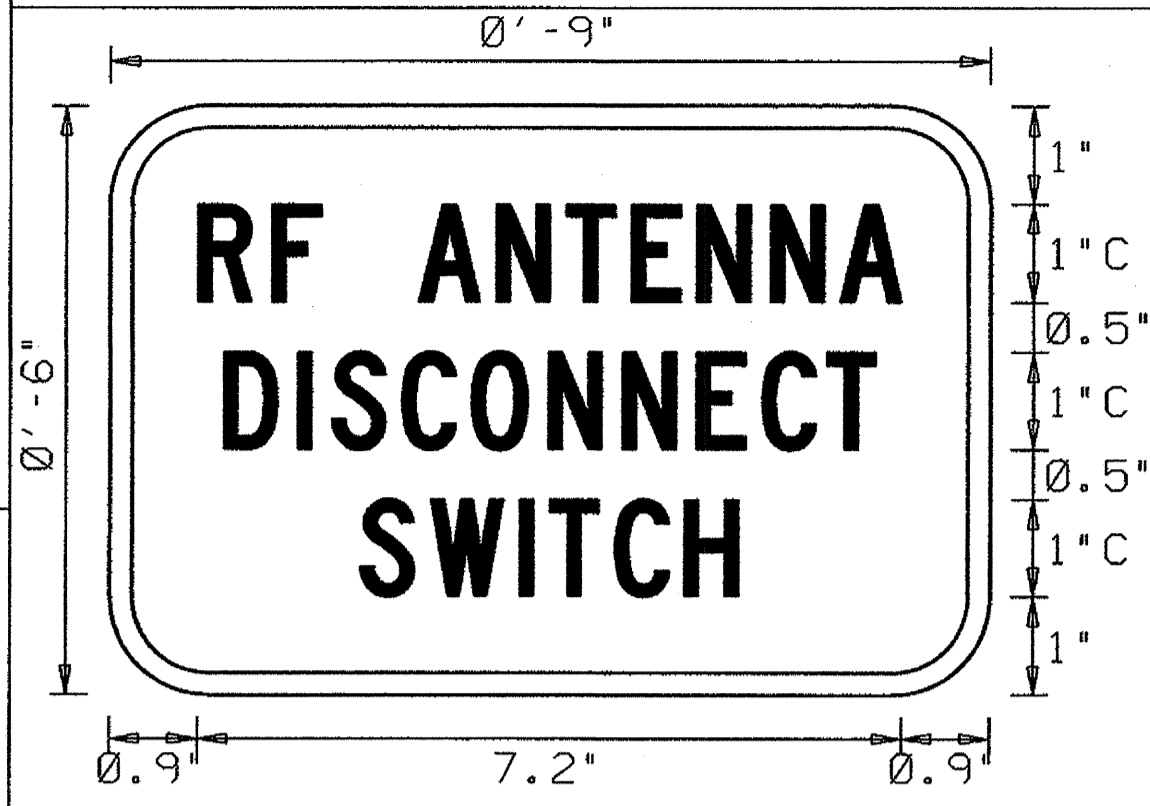
PROJECT REFERENCE NO. U-2550B SHEET NO. SIG. 54

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

SYMBOL	X	Y	WID	HT

MAT'L: 0.063" (1.6 mm) ALUMINUM

DESIGN BY: S PIOTROWSKI DATE: Jul 18, 2005 CHECKED BY: SUSAN B. KUNZ
 PROJECT ID: ID DIV: INTELLIGENT TRANSPORTATION SYSTEM



NOTE:
 THIS
 SIGN
 SHALL
 BE
 PRODUCED
 AS
 A
 DECAL

BORDER
 R=1"
 TH=0.25"

- USE NOTES: 2, 4
- Legend and border shall be direct applied Type III reflective sheeting.
 - Legend and border shall be direct applied non-reflective sheeting.
 - Shields shall be Type III reflective sheeting on 0.032" (0.8mm) aluminum and demountable.
 - Background shall be Type III reflective sheeting.
 - Background shall be Type I reflective sheeting.
 - Center arrow(s) vertically on sign.
 - Bottom panel shall be yellow Type III sheeting. Legend shall be direct applied black non-reflective sheeting. Yellow panel is:

LETTER POSITIONS

Letter spacings are to start of next letter													Series/Size
													Text Length
0.9	0.8	0.5	1	0.8	0.7	0.7	0.7	0.8	0.7	0.6	0.9		C1
													7.2
													C1
1.2	0.8	0.3	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.5	1.2		6.7
													C1
2.6	0.7	0.9	0.3	0.7	0.7	0.5	2.6						3.9

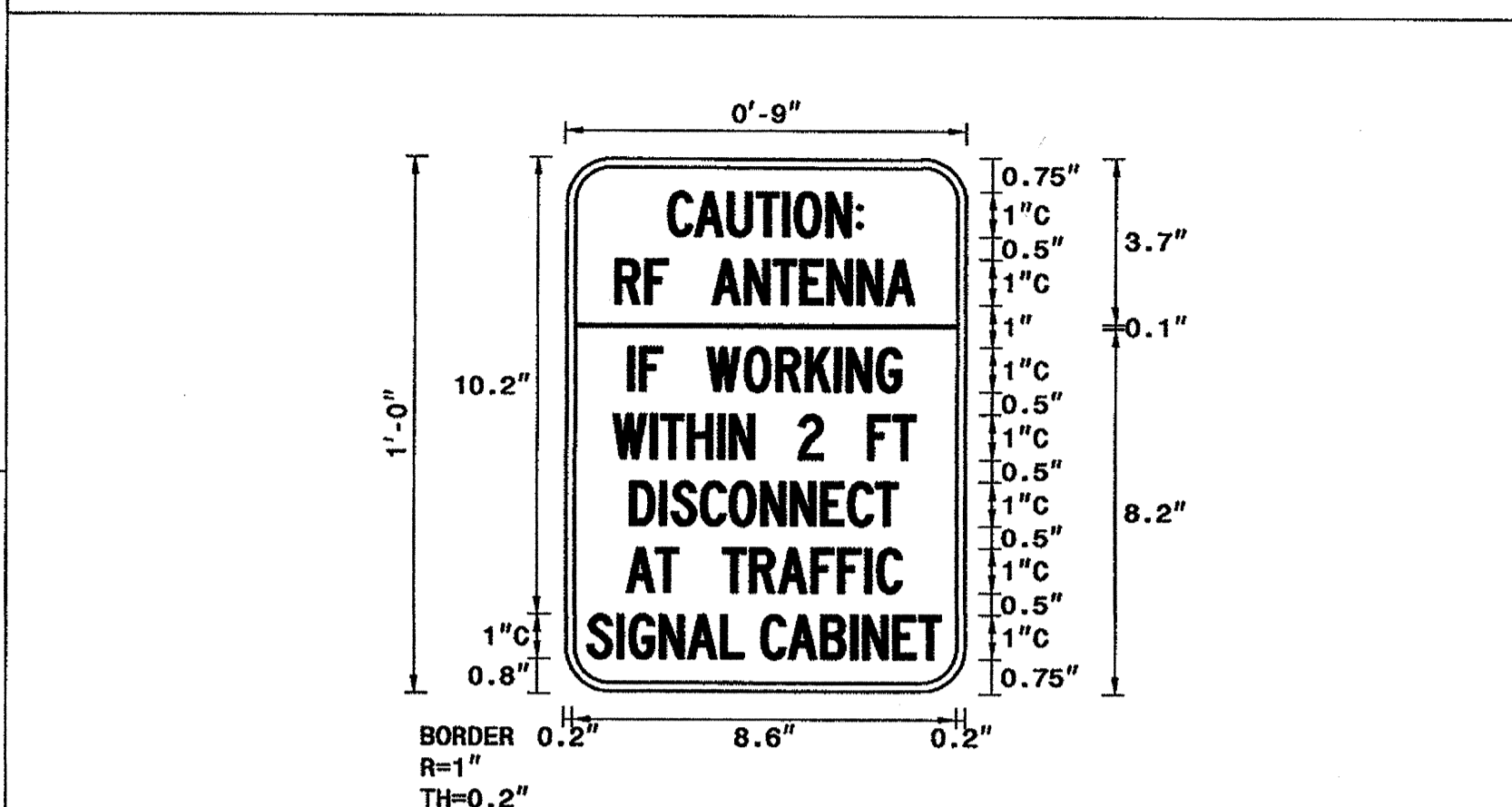
Spacing Factor is 1 unless specified otherwise

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

SYMBOL	X	Y	WID	HT
BAR	0.2	8.2	8.6	1.0

MAT'L: 0.063" (1.6 mm) ALUMINUM

DESIGN BY: M. TRACEY DATE: Oct 25, 2007 CHECKED BY: SUSAN KUNZ
 PROJECT ID: DIV: INTELLIGENT TRANSPORTATION SYSTEMS



BORDER
 R=1"
 TH=0.2"

- USE NOTES: 2, 4
- Legend and border shall be direct applied Type III reflective sheeting.
 - Legend and border shall be direct applied non-reflective sheeting.
 - Shields shall be Type III reflective sheeting on 0.032" (0.8mm) aluminum and demountable.
 - Background shall be Type III reflective sheeting.
 - Background shall be Type I reflective sheeting.
 - Center arrow(s) vertically on sign.
 - Bottom panel shall be yellow Type III sheeting. Legend shall be direct applied black non-reflective sheeting. Yellow panel is:

LETTER POSITIONS

Letter spacings are to start of next letter													Series/Size			
													Text Length			
2.3	0.6	0.7	0.6	0.6	0.3	0.7	0.7	0.1	2.3				C			
													4.4			
													C			
1.2	0.7	0.5	1	0.7	0.6	0.6	0.6	0.7	0.6	0.6	1.2		6.7			
													C			
1.4	0.3	0.5	1	0.8	0.7	0.7	0.6	0.3	0.7	0.5	1.4		6.1			
													C			
1.1	0.8	0.2	0.6	0.7	0.3	0.5	1	0.5	1	0.6	0.5	1.1	6.8			
													C			
1.5	0.7	0.3	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.5	1.5		6			
													C			
1.4	0.7	0.5	1	0.6	0.6	0.7	0.6	0.6	0.3	0.5	1.4		6.2			
													C			
0.5	0.7	0.3	0.7	0.6	0.7	0.5	0.4	0.6	0.7	0.7	0.3	0.7	0.6	0.5	0.5	7.9

Spacing Factor is 1 unless specified otherwise

NORTH CAROLINA D.O.T. SIGN DETAIL

750 N. Greenfield Hwy., Garner, NC 27529

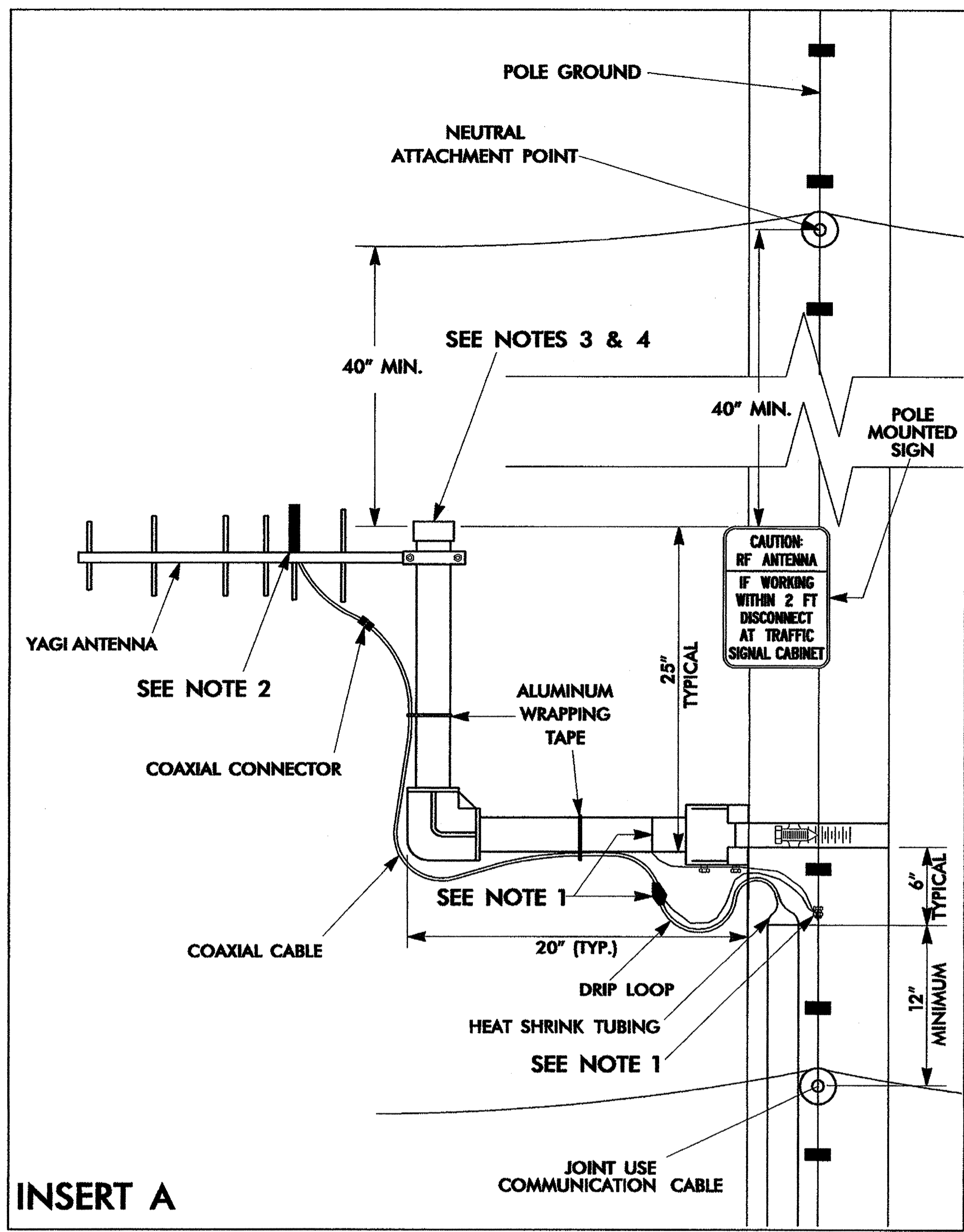
**WIRELESS
 RADIO ANTENNA
 TYPICAL DETAILS**

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

SCALE: 0

SEAL

DATE: 9/12/05

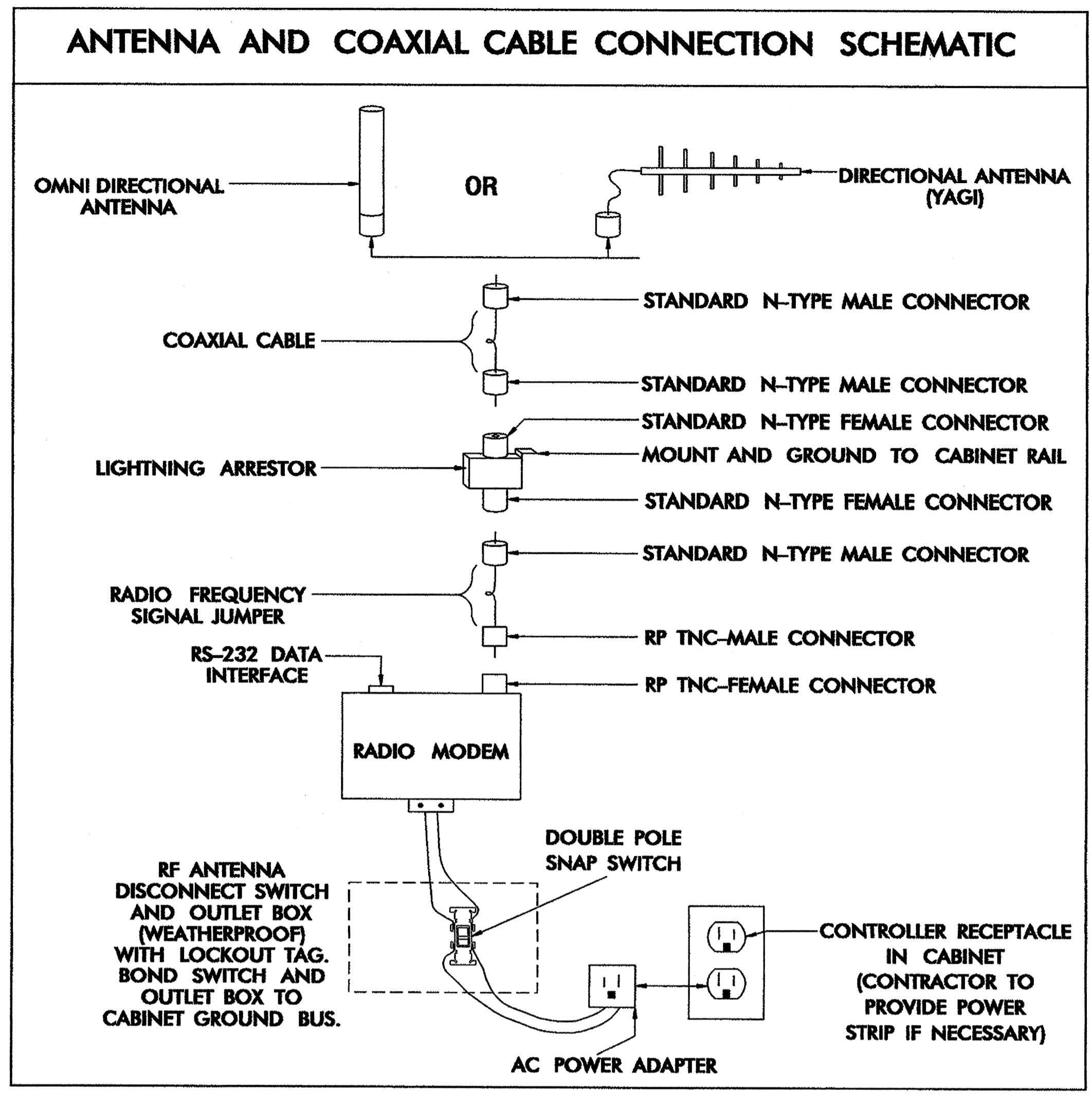
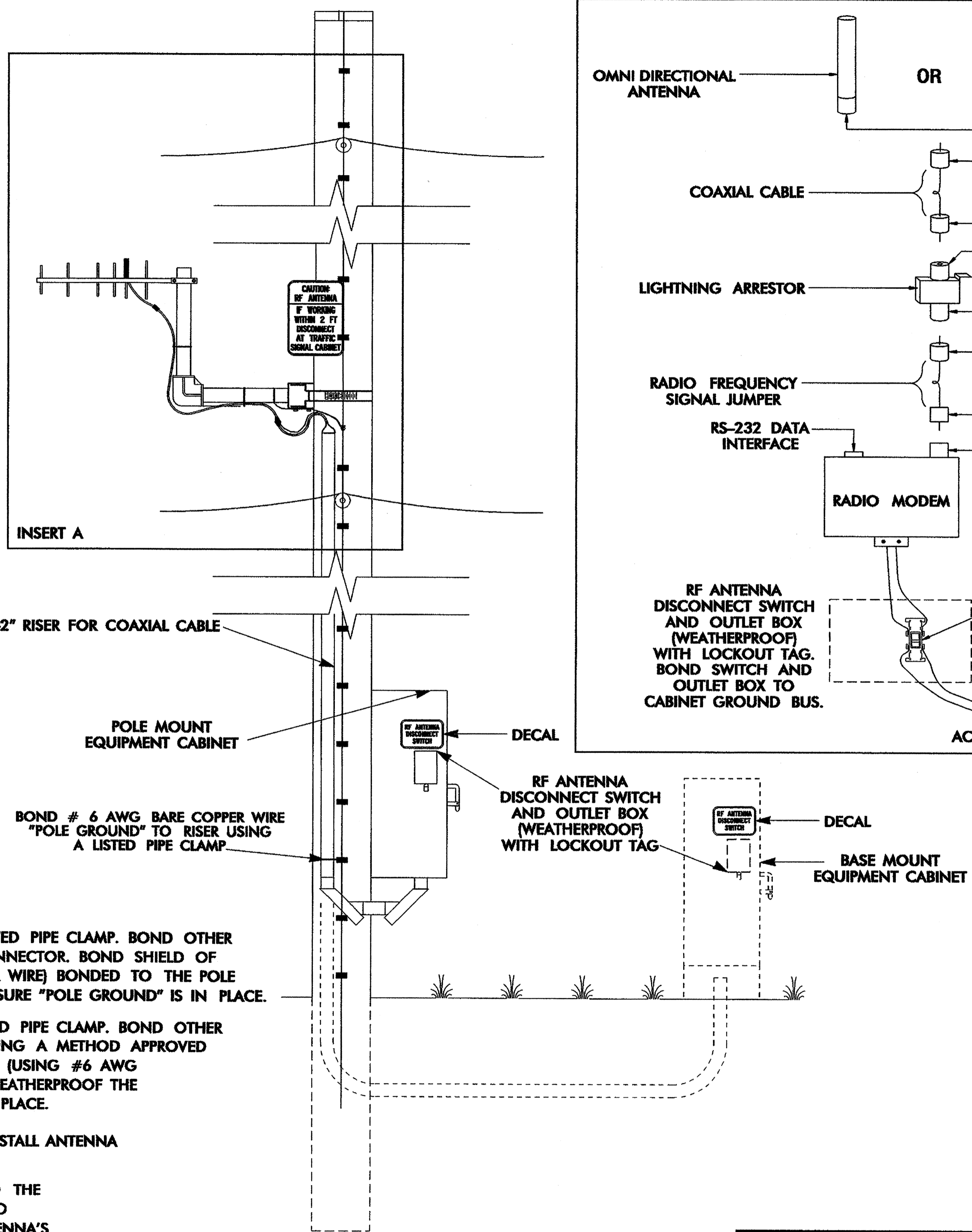


INSERT A

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.

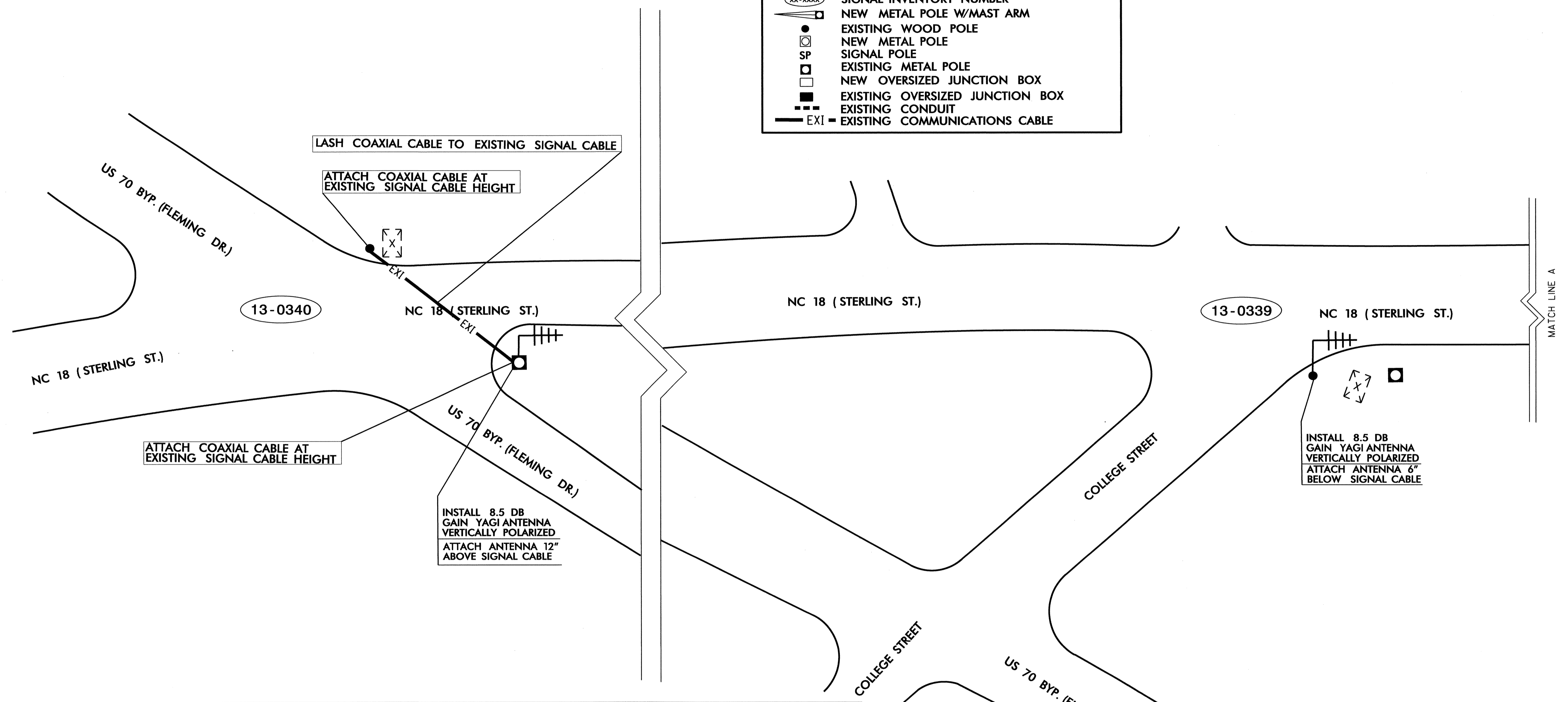
METAL POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE OR EXISTING SYSTEM GROUND USING A METHOD APPROVED BY THE ENGINEER. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED 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.



	WIRELESS RADIO ANTENNA TYPICAL DETAILS	
	PLAN DATE: JULY 2005 PREPARED BY: A. CREECH	REVIEWED BY: I. N. AVERY REVIEWED BY: A. T. FAULKNER
SCALE: 0	REVISIONS: UPDATE GROUNDING - COAXIAL CABLE SHIELD	DATE: 9/12/05 SIGNATURE: <i>[Signature]</i>

LEGEND

- YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
- YAGI ANTENNA (SINGLE)
- OMNI ANTENNA
- EXISTING CONTROLLER AND CABINET
- EXISTING MASTER CONTROLLER AND CABINET
- SIGNAL INVENTORY NUMBER
- NEW METAL POLE W/MAST ARM
- EXISTING WOOD POLE
- NEW METAL POLE
- SIGNAL POLE
- EXISTING METAL POLE
- NEW OVERSIZED JUNCTION BOX
- EXISTING OVERSIZED JUNCTION BOX
- EXISTING CONDUIT
- EXI - EXISTING COMMUNICATIONS CABLE

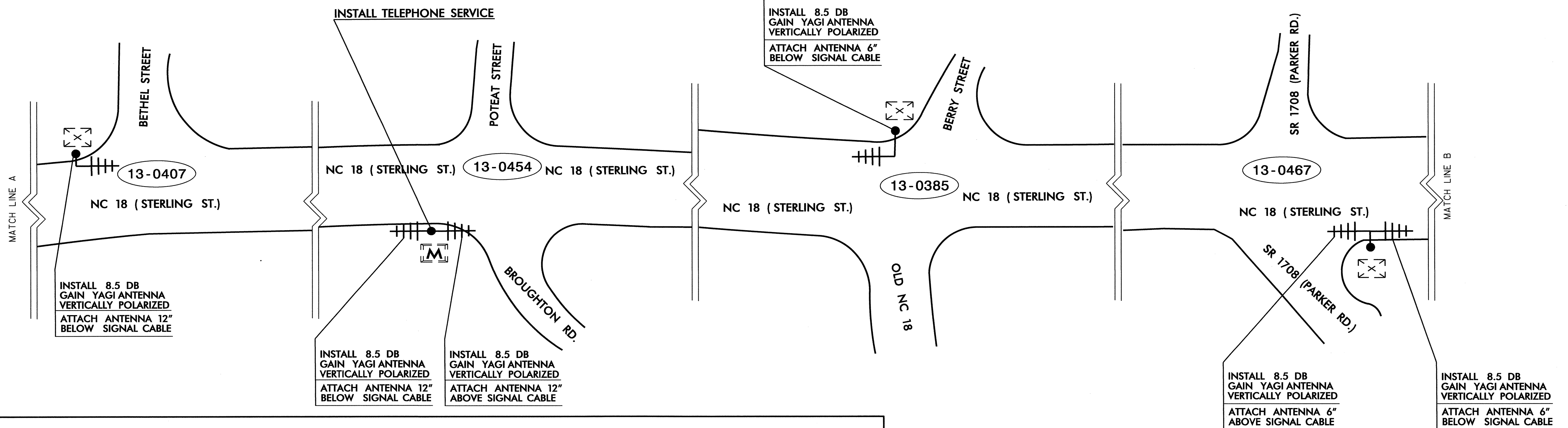


- NOTES FOR WIRELESS COMMUNICATIONS:**
1. INSTALL COAXIAL CABLE:
 - A. ON WOOD POLES, REQUIRING A NEW RISER, INSTALL A 2" RISER WITH WEATHERHEAD TO ROUTE THE COAXIAL CABLE TO THE ANTENNA. ON POLES WITH EXISTING RISERS WITH WEATHER HEADS REUSE THE RISER ASSEMBLY.
 - B. ON METAL POLES, RUN COAXIAL CABLE 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."

	WIRELESS COMMUNICATIONS PLAN		
	MORGANTON-NC 18 (STERLING ST.) FROM US 70 BYPASS (FLEMING DR.) TO I-40 EB RAMP		
<small>Prepared in the Offices of: North Carolina Department of Transportation 750 N. Greenfield Pkwy., Garner, NC 27529</small>	<small>DIVISION 13</small> <small>PLANNING, DESIGN, AND CONSTRUCTION</small>	<small>BURKE COUNTY</small> <small>MORGANTON</small>	<small>SEAL</small> <small>PROFESSIONAL ENGINEER</small> <small>GREGORY A. FULLER</small>
<small>SCALE</small> 	<small>PLAN DATE:</small> FEBRUARY 2011 <small>REVIEWED BY:</small> I. N. AVERY	<small>PREPARED BY:</small> P. C. LOUDER <small>REVIEWED BY:</small> G. A. FULLER, PE	<small>INIT.</small> <small>DATE</small> 2/10/11
<small>REVISIONS</small>		<small>INIT.</small> <small>DATE</small>	<small>SIGNATURE</small> <small>DATE</small>

LEGEND

- YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
- YAGI ANTENNA (SINGLE)
- OMNI ANTENNA
- EXISTING CONTROLLER AND CABINET
- EXISTING MASTER CONTROLLER AND CABINET
- SIGNAL INVENTORY NUMBER
- NEW METAL POLE W/MAST ARM
- EXISTING WOOD POLE
- NEW METAL POLE
- SIGNAL POLE
- EXISTING METAL POLE
- NEW OVERSIZED JUNCTION BOX
- EXISTING OVERSIZED JUNCTION BOX
- EXISTING CONDUIT
- EXISTING COMMUNICATIONS CABLE



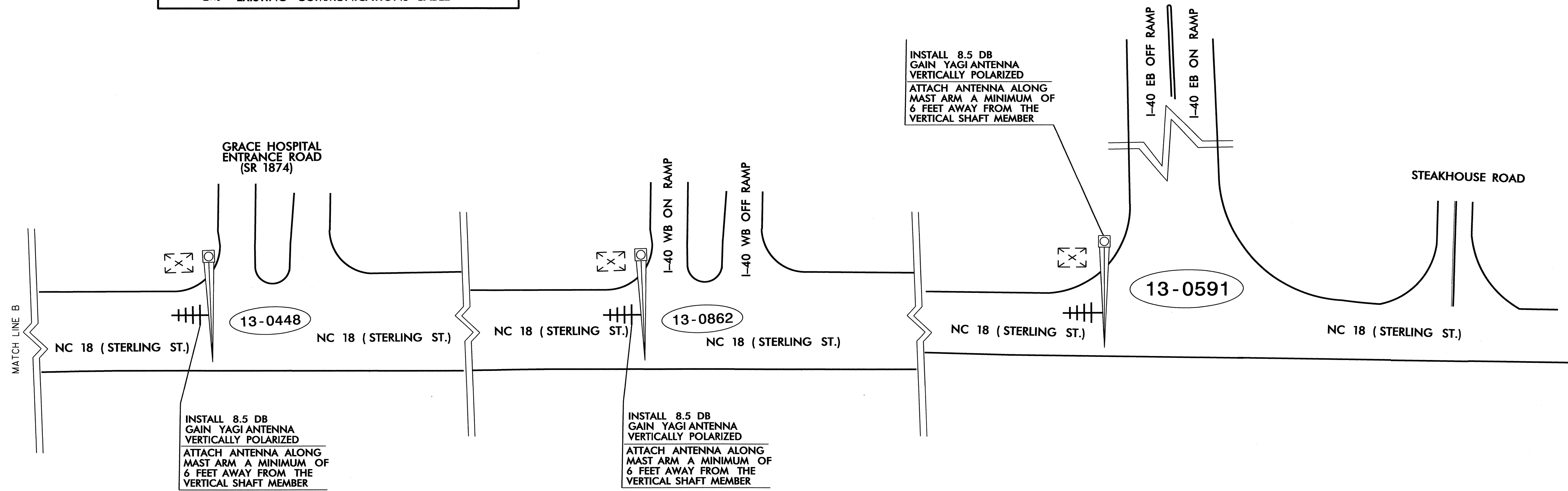
NOTES FOR WIRELESS COMMUNICATIONS:

1. INSTALL COAXIAL CABLE:
 - A. ON WOOD POLES, REQUIRING A NEW RISER, INSTALL A 2" RISER WITH WEATHERHEAD TO ROUTE THE COAXIAL CABLE TO THE ANTENNA. ON POLES WITH EXISTING RISERS WITH WEATHER HEADS 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."

	WIRELESS COMMUNICATIONS PLAN		
	MORGANTON-NC 18 (STERLING ST.) FROM US 70 BYPASS (FLEMING DR.) TO I-40 EB RAMP		
750 N. Greenfield Hwy., Garner, NC 27529	DIVISION 13	BURKE COUNTY	MORGANTON
SCALE: 0	PLAN DATE: FEBRUARY 2011	PREPARED BY: P. C. LOUDER	REVIEWED BY: I. N. AVERY
SCALE: 0	REVISIONS	INIT.	DATE
CADD 11/10/11			2/10/11

LEGEND

- YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
- YAGI ANTENNA (SINGLE)
- OMNI ANTENNA
- EXISTING CONTROLLER AND CABINET
- EXISTING MASTER CONTROLLER AND CABINET
- SIGNAL INVENTORY NUMBER
- NEW METAL POLE W/MAST ARM
- EXISTING WOOD POLE
- NEW METAL POLE
- SIGNAL POLE
- EXISTING METAL POLE
- NEW OVERSIZED JUNCTION BOX
- EXISTING OVERSIZED JUNCTION BOX
- EXISTING CONDUIT
- EXI - EXISTING COMMUNICATIONS CABLE



- 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 WEATHER HEADS 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.
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(NOTE: RF ANTENNA DISCONNECT SWITCH AND DECAL ARE NOT REQUIRED WHEN THE ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
 6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS."

	WIRELESS COMMUNICATION PLAN		
	MORGANTON-NC 18 (STERLING ST.) FORM US 70 BYPASS (FLEMING DR.) TO I-40 EB RAMP		
750 N. Greenfield Place, Garner, NC 27529	SCALE: 0	REVISIONS	INIT. DATE
PLAN DATE: FEBRUARY 2011 REVIEWED BY: I. N. AVERY PREPARED BY: P. C. LOUDER REVIEWED BY: G.A. FULLER, PE		DIVISION 13 BURKE COUNTY MORGANTON	
Prepared in the Offices of: 		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER GREGORY A. FULLER 023919	
Signature: <i>P. C. Louder</i> Date: 2/10/11 Signature: <i>G. A. Fuller</i> Date:		CADD File Name:	