

CONTRACT: TIP PROJECT: U-4009

09/08/99

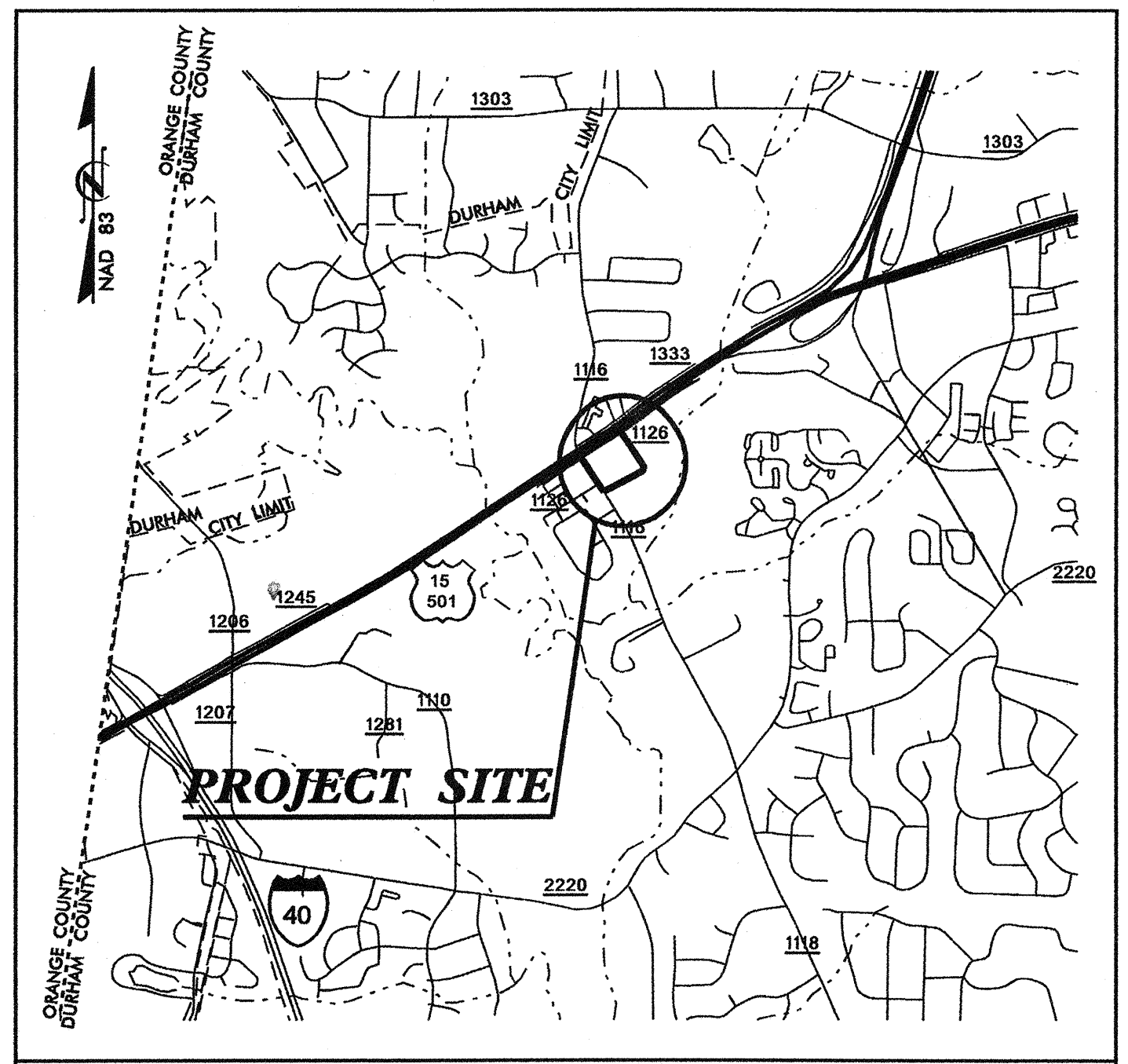
Project No.	Sheet No.
U-4009	SIG. 1

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**DURHAM COUNTY**

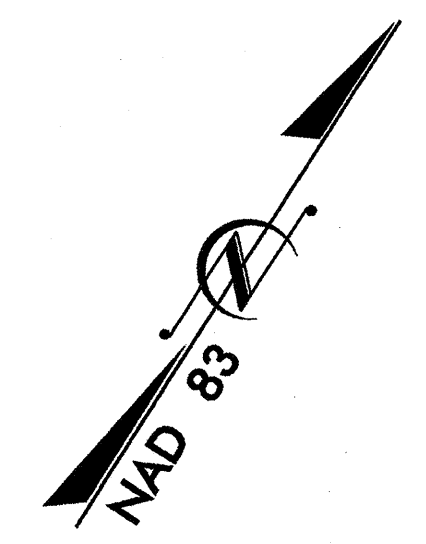
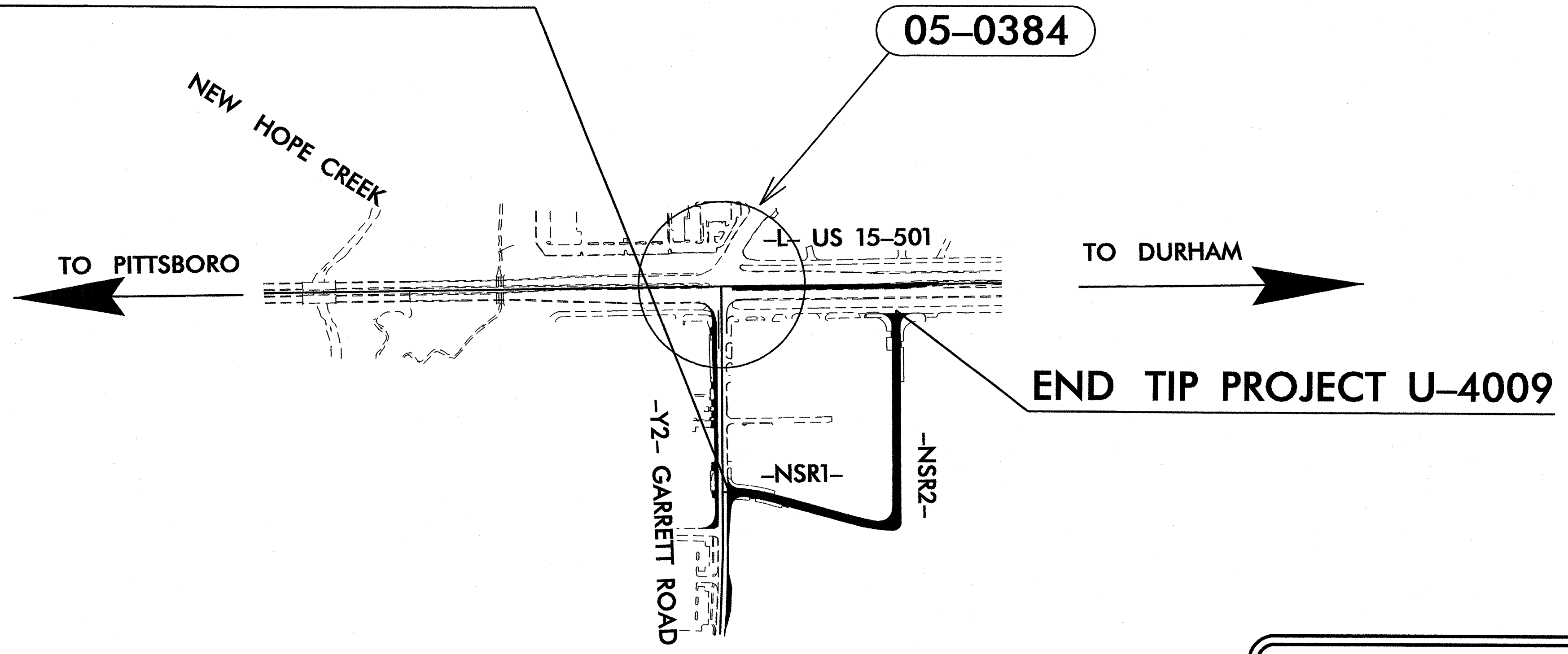
LOCATION: SR 1126 (SERVICE ROAD) AT US 15/501 AND GARRETT ROAD

TYPE OF WORK: SIGNALS (MOD)



VICINITY MAP

BEGIN TIP PROJECT U-4009



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF DURHAM.

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	N/A	Title Sheet	US 15-501 (Chapel Hill Blvd) @ SR 1116 (Garrett Road)
Sig. 2-7	05-0384	Standard Drawings for Metal Poles	
Sig. 8-13	N/A		

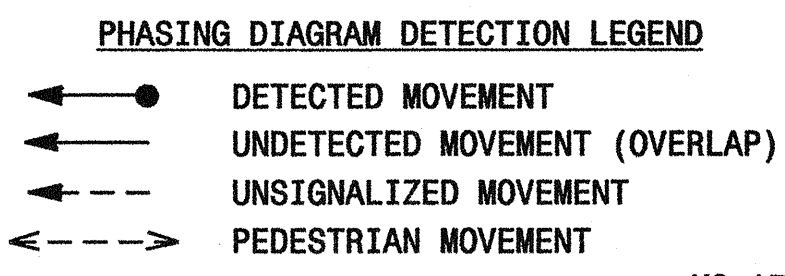
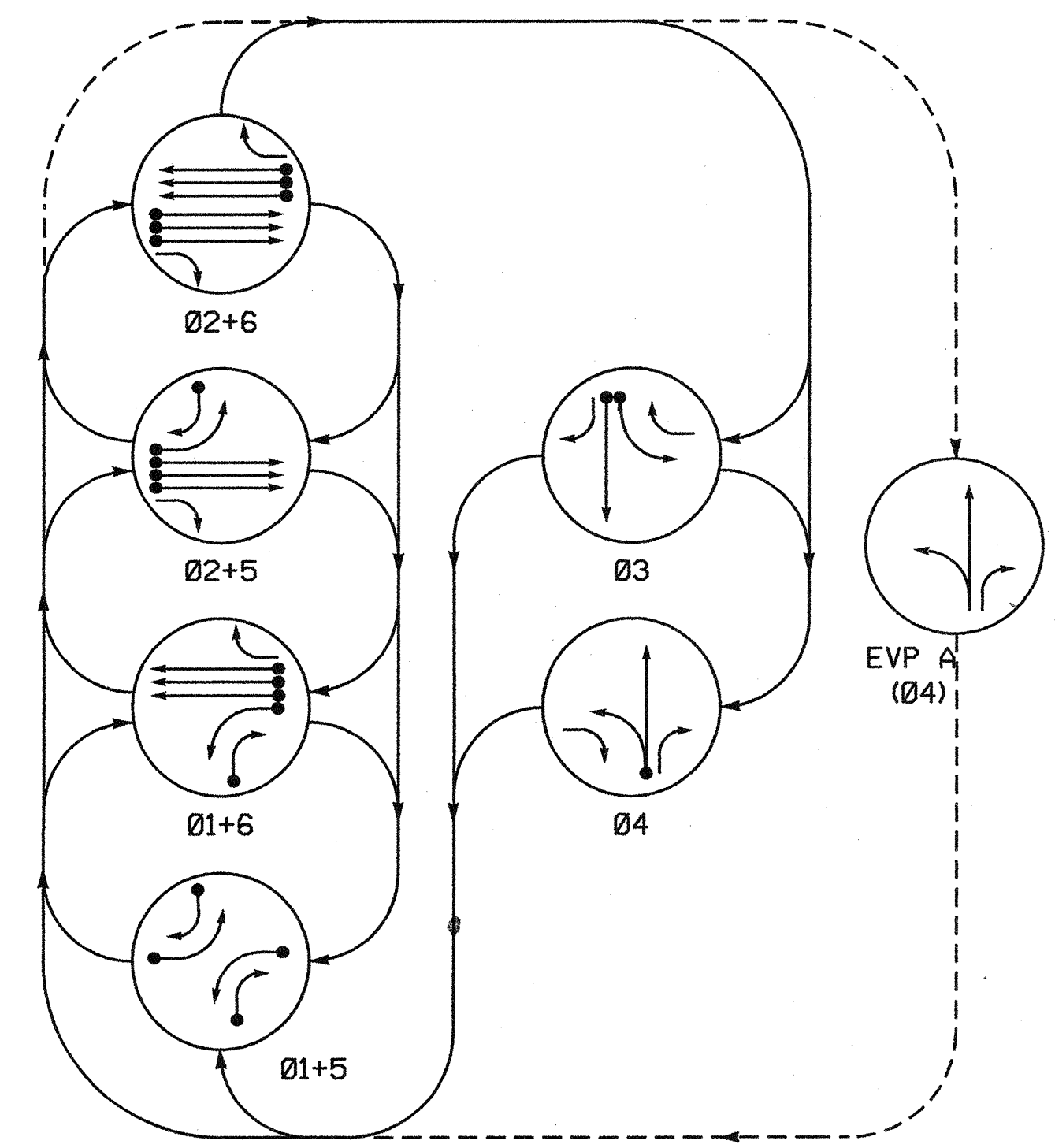
**TRAFFIC MANAGEMENT AND SIGNAL SYSTEMS UNIT**  
 Contacts:  
 D. Y. Ishak - Signals and Geometrics Contracts Engineer  
 G. C. Brown, PE - Signal Equipment Design Engineer  
 G. G. Murr, Jr., PE - Traffic Management Systems Engineer

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

122 N. McDowell St., Raleigh, NC 27603



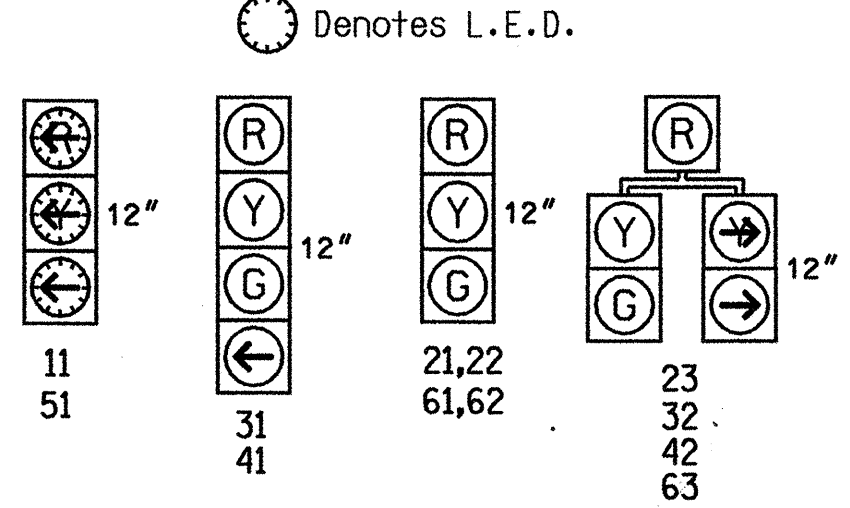
**PHASING DIAGRAM**



**TABLE OF OPERATION**

SIGNAL FACE	PHASE							
	01+5	02+5	02+6	03	04	EVP A	01+6	01+5
11	---	---	---	---	---	---	---	---
21, 22	R	R	G	G	R	R	R	Y
23	R	R	G	G	R	R	R	Y
31	R	R	R	R	G	R	R	R
32	R	R	R	R	G	R	R	R
41	R	R	R	R	R	G	R	R
42	R	R	R	R	R	G	R	R
51	---	---	---	---	---	---	---	---
61, 62	R	G	R	G	R	R	R	Y
63	R	G	R	G	R	R	R	Y

**SIGNAL FACE I.D.**



**LOOP & DETECTOR UNIT INSTALLATION CHART**  
170 CONTROLLER AND CABINET

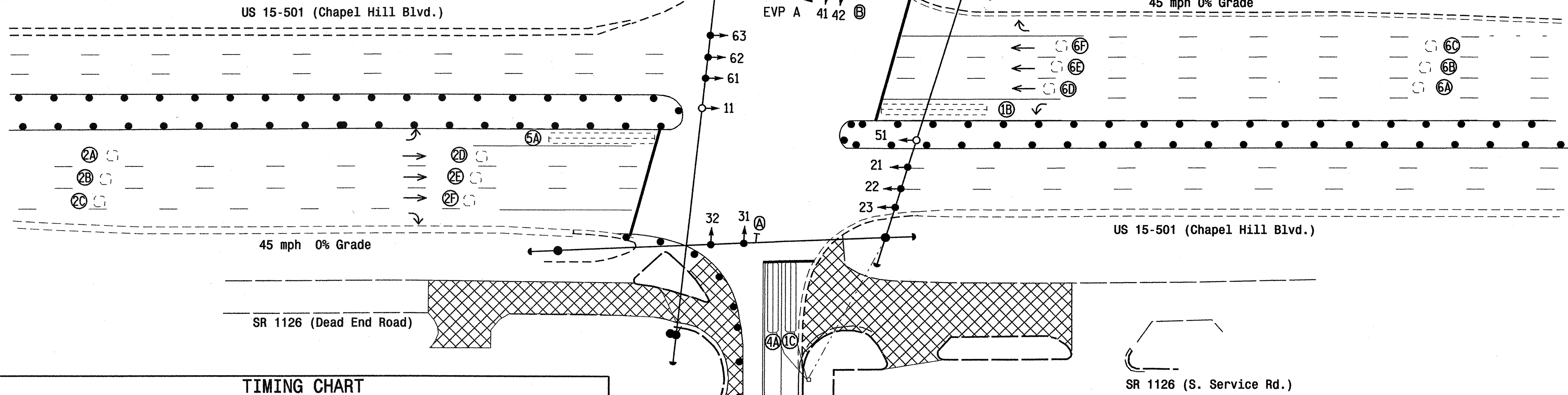
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	TIMING		ATTRIBUTES								STATUS			
						DELAY	CARRY (STRETCH)	1	2	3	4	5	6	7	8	NEW	EXISTING		
																		FULL TIME DELAY	PEDESTRIAN CALL
1B	6X60	2-4-2	0	X	1	- SEC.	- SEC.											X	
1C	6X40	2-4-2	0	X	1	15 SEC.	- SEC.											X	
2A,2B,2C	6X6	6	300	X	2	- SEC.	1.8 SEC.											X	
2D,2E,2F	6X6	6	90	X	2	- SEC.	- SEC.											X	
3A	6X60	2-4-2	0	X	3	3 SEC.	- SEC.											X	
3B	6X60	2-4-2	0	X	3	- SEC.	- SEC.											X	
4A	6X40	2-4-2	0	X	4	3 SEC.	- SEC.											X	
5A	6X60	2-4-2	0	X	5	- SEC.	- SEC.											X	
5B	6X60	2-4-2	0	X	5	15 SEC.	- SEC.											X	
6A,6B,6C	6X6	6	300	X	6	- SEC.	1.8 SEC.											X	
6D,6E,6F	6X6	6	90	X	6	- SEC.	- SEC.											X	
A*	EV Preemptor A			X	EVPA	- SEC.	- SEC.												

\* Optical Detection Unit

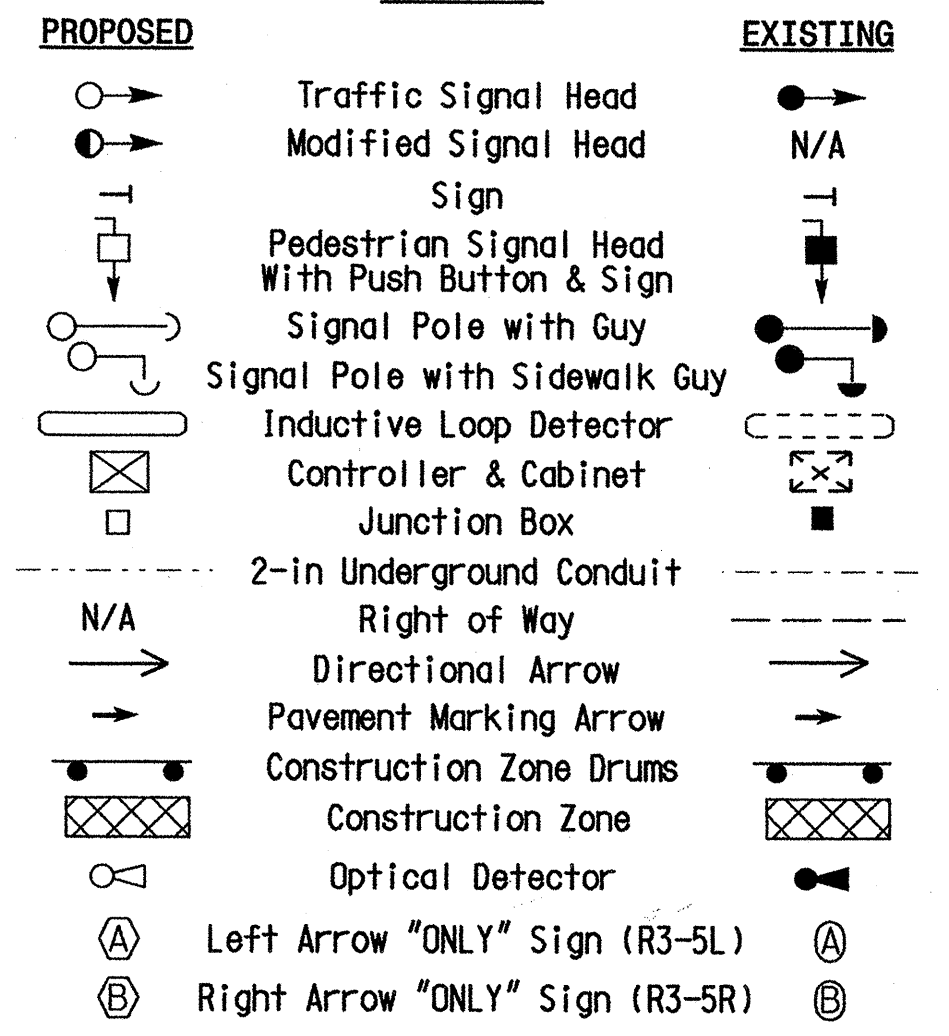
**6-Phase Fully Actuated w/ Emergency Vehicle Preemption (Durham Signal System)**

**NOTES**

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
3. Do not program signal for late night flashing operation unless otherwise directed by the engineer.
4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
5. During coordination, phase 1 or phase 5 may be lagged.
6. During coordination, the order of phase 3 and phase 4 may be reversed.
7. Set all detector units to presence mode.
8. Set phase bank 3 maximum limit to 250 seconds for phases used.



**LEGEND**



**TIMING CHART**  
170 CONTROLLER

PHASE	01	02	03	04	05	06	OL 1
MINIMUM INITIAL	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	0 SEC.
VEHICLE EXTENSION	1.0 SEC.	2.0 SEC.	1.0 SEC.	2.0 SEC.	1.0 SEC.	2.0 SEC.	N/A
YELLOW CHANGE INT.	3.0 SEC.	4.5 SEC.	4.1 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.	4.0 SEC.
RED CLEARANCE	3.4 SEC.	1.6 SEC.	2.6 SEC.	2.2 SEC.	3.6 SEC.	1.6 SEC.	2.0 SEC.
MAXIMUM LIMIT	25 SEC.	65 SEC.	30 SEC.	30 SEC.	25 SEC.	65 SEC.	N/A
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	N/A
VEHICLE CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK	N/A
DOUBLE ENTRY	OFF	OFF	OFF	OFF	OFF	OFF	N/A
WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAXIMUM INITIAL	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAXIMUM GAP	1.0 SEC.	2.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	2.0 SEC.	- SEC.
REDUCE 0.1 SEC EVERY	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	1.0 SEC.	2.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	2.0 SEC.	- SEC.

**E.V. Preemption Timing Chart**

EV PREEMPTOR	EVP A
FUNCTION	SECONDS
DELAY BEFORE PREEMPT	0
PED. CLEAR BEFORE PREEMPT	-
MIN. GREEN BEFORE PREEMPT	1.0
CLEARANCE TIME	1.0
PREEMPT EXTEND (TIMING ON OPTICAL DETECTION UNIT)	2.0

This plan shall supercede the plan signed and sealed on 2/19/04.

**Signal Upgrade**

**Temporary Signal**

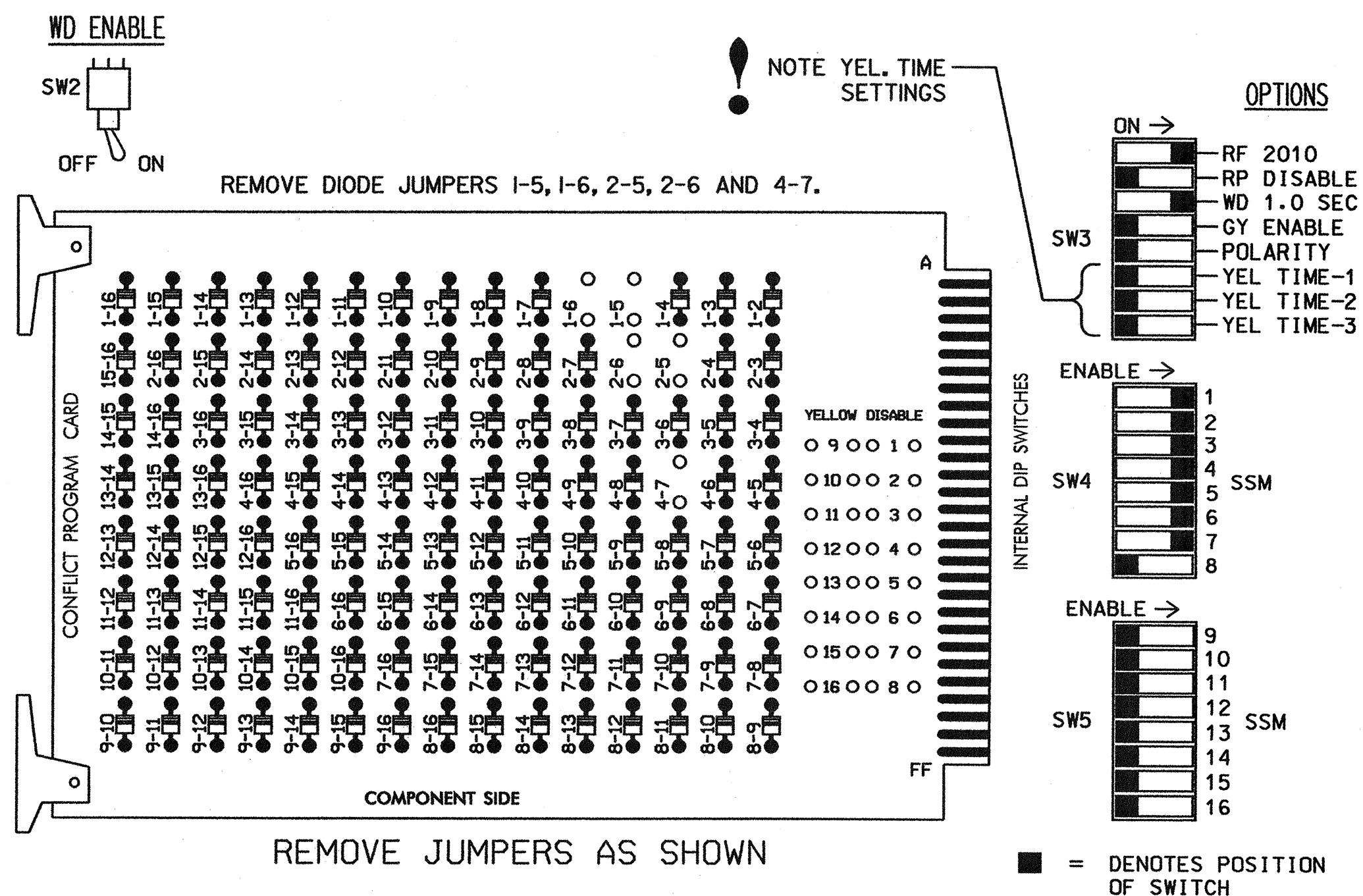
Prepared in the Offices of:  
  
 US 15-501 (Chapel Hill Blvd.) at SR 1116 (Garrett Road)  
 Division 5 Durham County Durham  
 PLAN DATE: January 2007 REVIEWED BY: DY Ishak  
 PREPARED BY: TS Thigpen REVIEWED BY:  
 SCALE: 1"=40'  
 REVISIONS: INIT. DATE  
 SIGNATURE: DATE  
 SIG. INVENTORY NO. 05-0384 T

23-JAN-2007 08:24  
 S:\GIS\Signal\050384\2007\mdd.s1g  
 TS Thigpen



## EDI MODEL 2010ECL 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 SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.
- ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION.

### OVERLAP PROGRAMMING NOTES

- TO ASSURE THAT LOADSWITCH S7 IS ASSIGNED AS OVERLAP 1, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+0=7
- TO SET THE PARENT PHASE FOR OVERLAP 1 (VEH. SET 1) AS PHASE 4, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+1=Ø4
- TO SET THE PARENT PHASE FOR OVERLAP 1 (VEH. SET 2) AS NONE, NO PROGRAMMING IS REQUIRED.
- PROGRAM TIMING FOR OVERLAP 1 AS FOLLOWS:  
 GREEN CLEAR - E/29+1+D=0.0 (SEC.)  
 YELLOW CHANGE INTERVAL - E/29+1+E=4.0 (SEC.)  
 RED CLEARANCE - E/29+1+F=2.0 (SEC.)

### NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN OUTPUT FILE. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS 8, 9, 10, 11, 12, 13, 14, 15 & 16, TIE UNUSED LOAD SWITCH RED OUTPUTS TO LOAD SWITCH AC+ PER CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM THE CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM ALL TIMING INFORMATION INTO PHASE BANKS 1, 2, AND 3 UNLESS OTHERWISE SPECIFIED.
- SET PHASE BANK 3 MAX. LIMIT TO 250 SEC. FOR PHASES USED.
- SET ALL DETECTOR CARD UNITS TO 'PRESENCE' MODE.
- THE CONTROLLER AND CABINET ARE TO BE PROGRAMMED AND WIRED TO BE A PART OF THE CITY OF DURHAM'S COMPUTERIZED SIGNAL SYSTEM. THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER INTER-CONNECTION OF THIS SIGNAL WITHIN THE SYSTEM.

-- NOTE --  
ADD NEW LOAD SWITCH 'S7'. ALL OTHERS ARE EXISTING. FIELD CONNECTIONS MUST BE MADE AS SHOWN IN CHART BELOW.

FIELD CONNECTION 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	* OL1	8	8 PED	
SIGNAL HEAD NO.	11	42	21,22,23	31	32	63	41	42	NU	32	51	61,62,63	23
GREEN		130		118	118		103	103				136	
YELLOW		129		117	117		102	102				135	
RED		128		116	116		101	101				134	*
RED ARROW	125											131	
YELLOW ARROW	126	126				117				132	132		123
GREEN ARROW	127	127		118	118	103				133	133		124

NU = NOT USED

- \* INSTALL LOAD RESISTOR ON LOAD SWITCH 'S7' RED FIELD TERMINAL. REFER TO LOAD RESISTOR INSTALLATION DETAIL THIS SHEET.
- \*\* SEE 'OVERLAP PROGRAMMING NOTES' THIS SHEET.

### EQUIPMENT INFORMATION

- \* CONTROLLER.....CONTRACTOR SUPPLIED 170E
- \* CABINET .....CONTRACTOR SUPPLIED 332
- SOFTWARE .....BI TRANS 233NC2
- CABINET MOUNT.....BASE
- OUTPUT FILE POSITIONS...12
- LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7
- PHASES USED.....1,2,3,4,5,6
- OVERLAPS.....OL1=Ø4

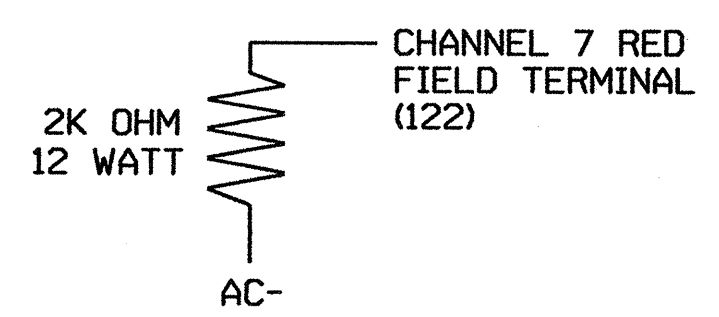
THIS ELECTRICAL DETAIL IS FOR THE  
TEMPORARY SIGNAL DESIGN: 05-0384T  
DESIGNED: JANUARY 2007  
SEALED: 1 FEBRUARY 07  
REVISED: N/A

**TYPE 170 CONTROLLER @ 332 CABINET**

THIS DETAIL SUPERSEDES DETAIL DATED  
FEBRUARY 2004 AND SEALED 2/23/04

EXISTING TO REMAIN IN USE\*

### LOAD RESISTOR INSTALLATION DETAIL



NOTE: THE PURPOSE OF THIS RESISTOR IS TO LOAD THE CHANNEL RED MONITOR INPUT IN ORDER FOR THE SIGNAL SEQUENCE MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON CHANNELS THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

SEE SHEET 2 FOR INPUT FILE LAYOUT DETAIL AND PROGRAMMING CHART, AND FOR EMERGENCY VEHICLE PREEMPTION PROGRAMMING NOTES

### TEMPORARY SIGNAL

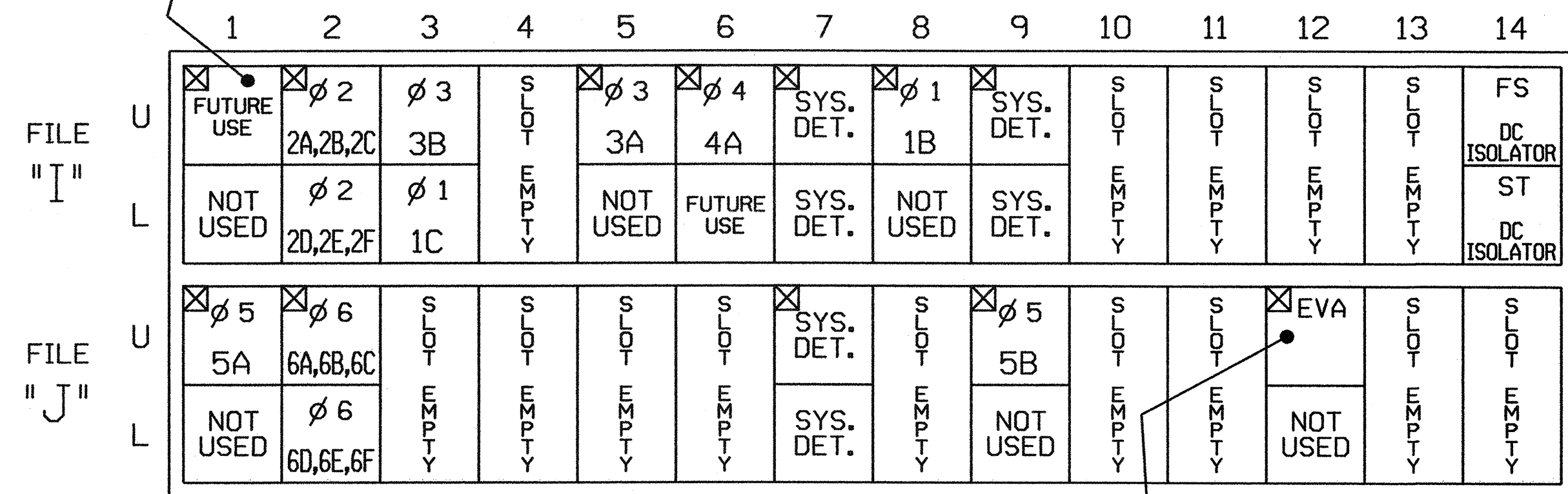
## ELECTRICAL DETAIL - SHEET 1 of 2

 Prepared in the Offices of: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Signal Management Section 122 N. McDowell St., Raleigh, NC 27603	DETAILS FOR: <b>US 15-501 (CHAPEL HILL BLVD.) at SR 1116 (GARRETT ROAD)</b>	SEAL 
	DIVISION 05    DURHAM COUNTY    DURHAM PLAN DATE: JANUARY 2007    REVIEWED BY: <i>AWA</i> PREPARED BY: F.E. RUSS    REVIEWED BY:	
REVISIONS    INIT.    DATE		

DISCONNECT LOOP 'A' WIRES AT INPUT PANEL TERMINAL BLOCK DURING TEMPORARY SIGNAL; COIL AND TAPE.

**INPUT FILE POSITION LAYOUT**

(FRONT VIEW)



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

☒ = EXISTING; RE-USE AS INDICATED. (SEE INPUT FILE CONNECTION & PROGRAMMING CHART BELOW)

FS = FLASH SENSE  
ST = STOP TIME  
EV = EMERG. VEH. PREEMPT

OPTICAL DETECTOR INTERFACE CARD

**INPUT FILE CONNECTION & PROGRAMMING CHART**

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
FUTURE	---	I1U	1	56		--
2A,2B,2C	TB2-5,6	I2U	2	39	5 7	2
2D,2E,2F	TB2-7,8	I2L	3	43	5 7	2
3B	TB2-9,10	I3U	4	63	5 7	3
1C	TB2-11,12	I3L	5	76	5 7	1
3A	TB4-5,6	I5U	6	58	5 7	3
4A	TB4-9,10	I6U	7	41	5 7	4
FUTURE	---	I6L	8	45		--
SYSTEM	EXISTING	I7U	---	X	---	SYS.
SYSTEM	EXISTING	I7L	---	X	---	SYS.
1B	TB6-5,6	I8U	9	49	5 7	1
SYSTEM	EXISTING	I9U	---	X	---	SYS.
SYSTEM	EXISTING	I9L	---	X	---	SYS.
5A	TB3-1,2	J1U	10	55	5 7	5
6A,6B,6C	TB3-5,6	J2U	11	40	5 7	6
6D,6E,6F	TB3-7,8	J2L	12	44	5 7	6
SYSTEM	EXISTING	J7U	---	X	---	SYS.
SYSTEM	EXISTING	J7L	---	X	---	SYS.
5B	TB7-9,10	J9U	13	59	5 7	5

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

PIN NO.: X = EXISTING PIN ASSIGNMENT TO REMAIN

**HEAD 23 ARROWS (OL1) OPERATION DURING PREEMPTION**

IN ORDER FOR E.V. PREEMPTION TO OPERATE AS PHASE 4 WITHOUT SIGNAL HEAD 23 RIGHT-TURN ARROWS (OVERLAP 'OLI'), THE FOLLOWING PROGRAMMING MUST BE IN PLACE:

ASSIGN O/L VEH. SET 2 INPUT AT E/126+D+C= 200  
ASSIGN E.V. PREEMPT OUTPUT AT E/127+D+8= 200

200 = ASSIGNABLE PSEUDO-PIN (SOFTWARE)

**EMERGENCY VEHICLE PREEMPTION PROGRAMMING**

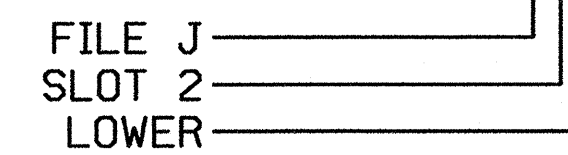
E. V. PREEMPT	OPTICAL DETECTOR	TERMINAL	INPUT PIN	CLEARANCE PHASES LOCATION	DELAY TIME LOCATION	CLEAR TIME LOCATION
EVP	A	TB9-4,6	E/126+F+1=71	E/125+E+A= 04	F/1+E+2=0 (SEC.)	F/1+E+3=1 (SEC.)

- PROGRAM PREEMPT MINIMUM GREEN AT: F/1+0+8= 1 (SEC.)
- PROGRAM EXTEND TIME ON OPTICAL DETECTOR UNIT FOR 2.0 SEC.

THIS ELECTRICAL DETAIL IS FOR THE TEMPORARY SIGNAL DESIGN: 05-0384T  
DESIGNED: JANUARY 2007  
SEALED: 1 FEBRUARY 07  
REVISED: N/A

TYPE 170 CONTROLLER & 332 CABINET

INPUT FILE POSITION LEGEND: J2L



DETECTOR ATTRIBUTES LEGEND:

- 1-FULL TIME DELAY
- 2-PED CALL
- 3-RESERVED
- 4-COUNTING
- 5-EXTENSION
- 6-TYPE 3
- 7-CALLING
- 8-ALTERNATE

THIS DETAIL SUPERSEDES DETAIL DATED FEBRUARY 2004 AND SEALED 2/23/04

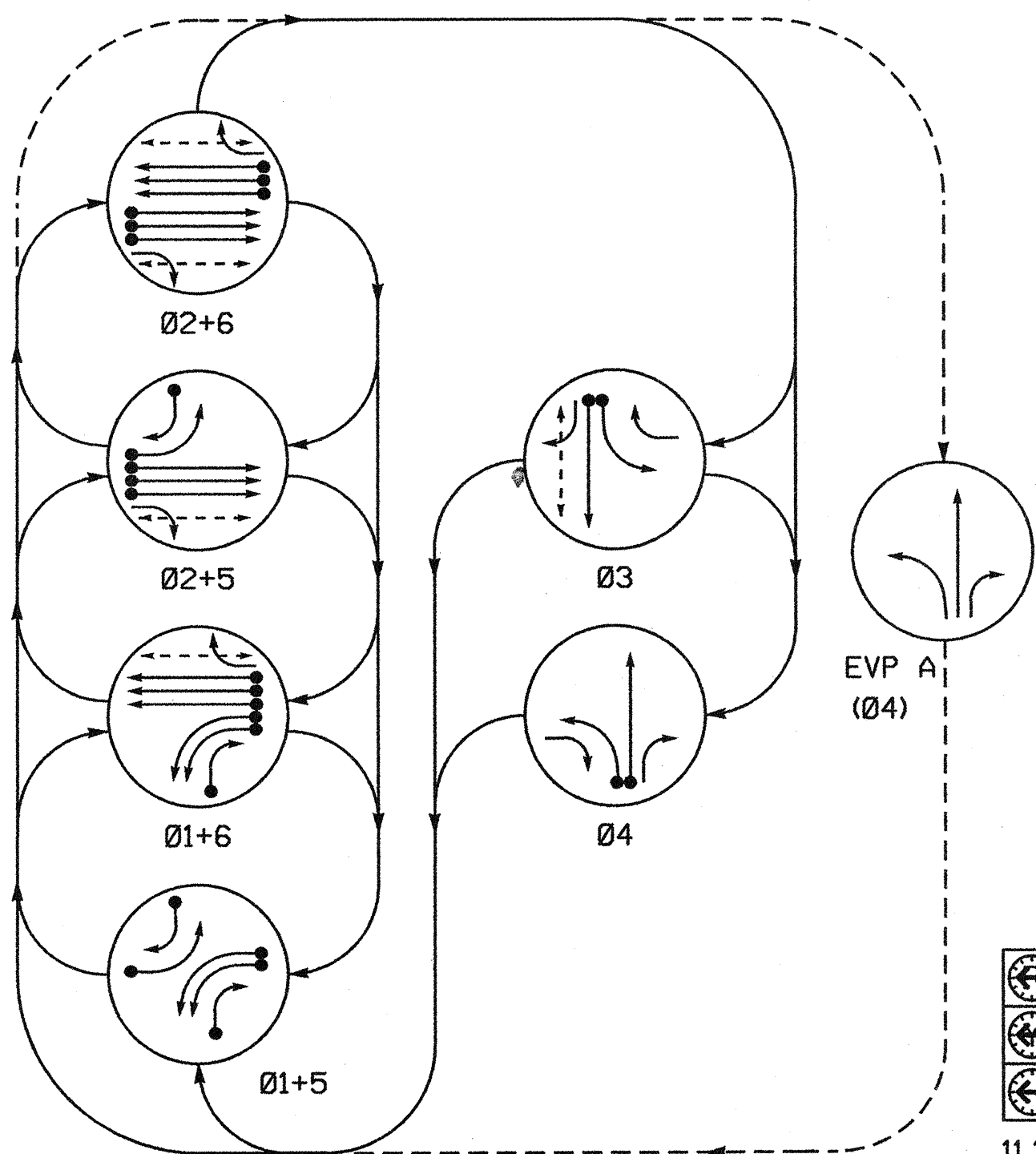
TEMPORARY SIGNAL

**ELECTRICAL DETAIL - SHEET 2 of 2**

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Offices of:  122 N. McDowell St., Raleigh, NC 27603	US 15-501 (CHAPEL HILL BLVD.) at SR 1116 (GARRETT ROAD)		SEAL 
	DIVISION 05 PLAN DATE: JANUARY 2007 PREPARED BY: F.E. RUSS	DURHAM COUNTY REVIEWED BY: <i>[Signature]</i> REVIEWED BY:	DURHAM REVISIONS INIT. DATE



PHASING DIAGRAM



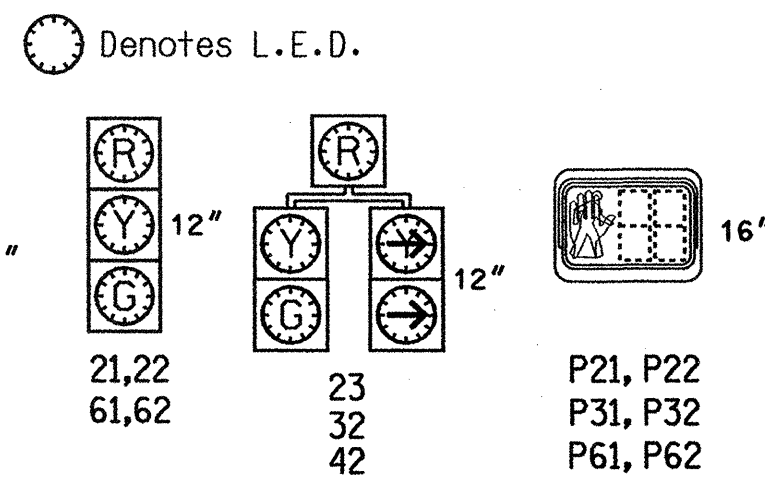
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE										
	01+5	01+6	02+5	02+6	03	04	EVP A	FLASH	FLUSH	FLUSH	FLUSH
11, 12	---	---	---	---	---	---	---	---	---	---	---
21, 22	R	R	G	G	R	R	R	R	R	R	R
23	R	R	G	G	R	R	R	R	R	R	Y
31	R	R	R	R	G	R	R	R	R	R	R
32	R	R	R	R	G	R	R	R	R	R	R
41	R	R	R	R	R	G	G	R	R	R	R
42	R	R	R	R	R	G	G	R	R	R	R
51	---	---	---	---	---	---	---	---	---	---	---
61, 62	R	G	R	G	R	R	R	R	R	R	Y
63	R	G	R	G	R	R	R	R	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DW	DRK	DRK	DRK	DRK
P31, P32	DW	DW	DW	DW	W	DW	DW	DRK	DRK	DRK	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DRK	DRK	DRK	DRK

SIGNAL FACE I.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	TIMING		DETECTOR PROGRAMMING																
							DELAY	CARRY (STRETCH)	1	2	3	4	5	6	7	8	STATUS								
1A	6X40	2-4-2	0	X		1	- SEC.	- SEC.																	
1B	6X40	2-4-2	0	X		1	- SEC.	- SEC.																	
1C	6X40	2-4-2	0	X		1	15 SEC.	- SEC.																	
2A,2B,2C	6X6	6	300	X		2	- SEC.	1.8 SEC.																	
2D,2E,2F	6X6	6	90	X		2	- SEC.	- SEC.																	
3A	6X60	2-4-2	0	X		3	3 SEC.	- SEC.																	
3B	6X60	2-4-2	0	X		3	- SEC.	- SEC.																	
4A	6X40	2-4-2	0	X		4	- SEC.	- SEC.																	
4B	6X40	2-4-2	0	X		4	- SEC.	- SEC.																	
5A	6X40	2-4-2	0	X		5	- SEC.	- SEC.																	
5B	6X60	2-4-2	0	X		5	15 SEC.	- SEC.																	
6A,6B,6C	6X6	6	300	X		6	- SEC.	1.8 SEC.																	
6D,6E,6F	6X6	6	90	X		6	- SEC.	- SEC.																	
P21,P22	N/A	N/A	N/A	X		2	- SEC.	- SEC.			X														
P31,P32	N/A	N/A	N/A	X		3	- SEC.	- SEC.			X														
P61,P62	N/A	N/A	N/A	X		6	- SEC.	- SEC.			X														
S1	6X6	5	+200	X		-	- SEC.	- SEC.														X	X		
S2	6X6	5	+200	X		-	- SEC.	- SEC.														X	X		
S3	6X6	5	+200	X		-	- SEC.	- SEC.														X	X		
S4	6X6	4	+200	X		-	- SEC.	- SEC.														X	X		
S5	6X6	4	+200	X		-	- SEC.	- SEC.														X	X		
S6	6X6	4	+200	X		-	- SEC.	- SEC.														X	X		
S7	6X6	4	+200	X		-	- SEC.	- SEC.														X	X		
S8	6X6	4	+200	X		-	- SEC.	- SEC.														X	X		
A*	EV Preemptor A			X		EVPA	- SEC.	- SEC.														X	X		

6-Phase Fully Actuated w/ Emergency Vehicle Preemption (Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
3. Do not program signal for late night flashing operation unless otherwise directed by the engineer.
4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
5. During coordination, phase 1 or phase 5 may be lagged.
6. During coordination, the order of phase 3 and phase 4 may be reversed.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Set all detector units to presence mode.
9. Set phase bank 3 maximum limit to 250 seconds for phases used.
10. Relocate existing optical detector to new span as shown.

LEGEND

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

TIMING CHART							
170 CONTROLLER							
PHASE	01	02	03	04	05	06	DL 1
MINIMUM INITIAL	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	0 SEC.
VEHICLE EXTENSION	2.0 SEC.	2.0 SEC.	1.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	N/A
YELLOW CHANGE INT.	3.0 SEC.	4.5 SEC.	4.1 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.	4.0 SEC.
RED CLEARANCE	3.7 SEC.	1.9 SEC.	2.9 SEC.	2.3 SEC.	3.9 SEC.	2.2 SEC.	2.0 SEC.
MAXIMUM LIMIT	25 SEC.	65 SEC.	30 SEC.	30 SEC.	25 SEC.	65 SEC.	N/A
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	N/A
VEHICLE CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK	N/A
DOUBLE ENTRY	OFF	OFF	OFF	OFF	OFF	OFF	N/A
WALK	- SEC.	7 SEC.	7 SEC.	- SEC.	- SEC.	7 SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	21 SEC.	29 SEC.	- SEC.	- SEC.	28 SEC.	- SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAXIMUM INITIAL	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAXIMUM GAP	1.0 SEC.	2.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	2.0 SEC.	- SEC.
REDUCE 0.1 SEC EVERY	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	1.0 SEC.	2.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	2.0 SEC.	- SEC.

E.V. Preemption Timing Chart	
EV PREEMPTOR	EVP A
FUNCTION	SECONDS
DELAY BEFORE PREEMPT	0
PED. CLEAR BEFORE PREEMPT	9
MIN. GREEN BEFORE PREEMPT	1.0
CLEARANCE TIME	1.0
PREEMPT EXTEND	2.0
(TIMING ON OPTICAL DETECTION UNIT)	

This plan shall supercede the plan signed and sealed on 2/19/04.

Signal Upgrade Final Design

US 15-501 (Chapel Hill Blvd.) at SR 1116 (Garrett Road)

Division 5 Durham County Durham

PLAN DATE: January 2007 REVIEWED BY: DY Ishak

PREPARED BY: TS Thigpen REVIEWED BY:

REVISIONS

SCALE 0 40 1"=40'

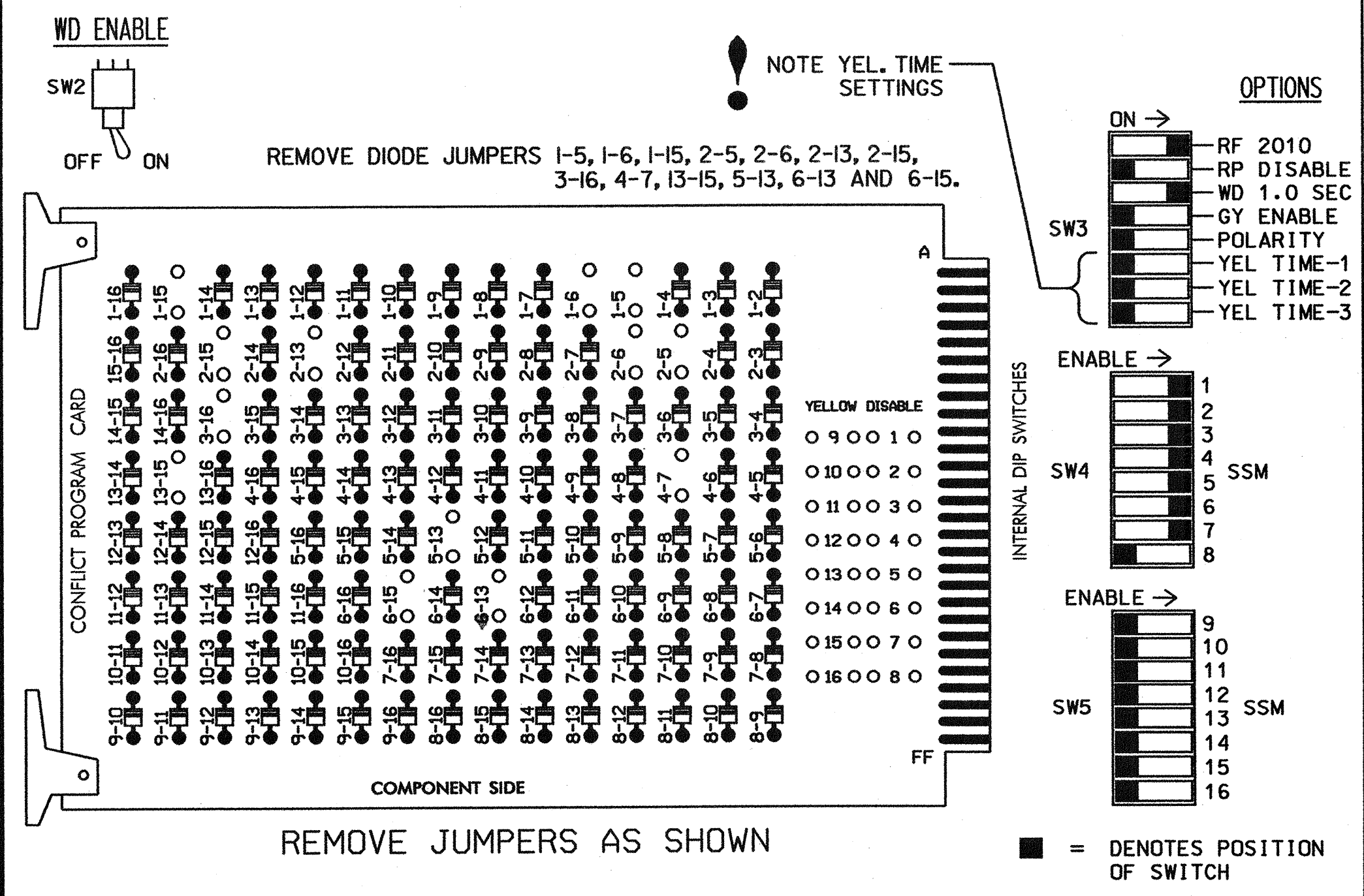
SIGNATURE: TS THIGPEN DATE: FEBRUARY 07

SIG. INVENTORY NO. 05-0384



### EDI MODEL 2010ECL 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 SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.
  - ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION.

### NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN OUTPUT FILE. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS 8, 9, 10, 11, 12, 13, 14, 15 & 16, TIE UNUSED LOAD SWITCH RED OUTPUTS TO LOAD SWITCH AC+ PER CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM THE CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM ALL TIMING INFORMATION INTO PHASE BANKS 1, 2, AND 3 UNLESS OTHERWISE SPECIFIED.
- SET PHASE BANK 3 MAX. LIMIT TO 250 SEC. FOR PHASES USED.
- SET ALL DETECTOR CARD UNITS TO 'PRESENCE' MODE.
- THE CONTROLLER AND CABINET ARE TO BE PROGRAMMED AND WIRED TO BE A PART OF THE CITY OF DURHAM'S COMPUTERIZED SIGNAL SYSTEM. THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER INTER-CONNECTION OF THIS SIGNAL WITHIN THE SYSTEM.

-- NOTE --

ADD NEW LOAD SWITCHES 'S2P, S6P, S8P'. ALL OTHERS ARE EXISTING. FIELD CONNECTIONS MUST BE MADE AS SHOWN IN CHART BELOW.

### FIELD CONNECTION 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	** OL1	8	*** 3 PED						
SIGNAL HEAD NO.	11, 12	42	21, 22, 23	P21, P22	31	32	63	41	42	NU	32	51	61, 62, 63	P61, P62	23	NU	P31, P32	
GREEN			130	118	118		103	103					136					
YELLOW			129	117	117		102	102					135					
RED			128	116	116		101	101					134	*				
RED ARROW	125												131					
YELLOW ARROW	126	126				117					132	132			123			
GREEN ARROW	127	127				118	118	103			133	133			124			
Hand														113			119	110
Person														115			121	112

NU = NOT USED

\* INSTALL LOAD RESISTOR ON LOAD SWITCH 'S7' RED FIELD TERMINAL. SEE LOAD RESISTOR INSTALLATION DETAIL THIS SHEET.

\*\* SEE 'OVERLAP PROGRAMMING NOTES' THIS SHEET.

\*\*\* SEE 'PEDESTRIAN PHASE PROGRAMMING' THIS SHEET, AND 'INPUT FILE CONNECTION & PROGRAMMING CHART' ON SHEET 2 OF 2.

★ SEE 'COUNTDOWN PEDESTRIAN SIGNAL OPERATION' NOTE THIS SHEET.

### 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.

### OVERLAP PROGRAMMING NOTES

TO ASSURE THAT LOADSWITCH S7 IS ASSIGNED AS OVERLAP 1, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+0=7

TO SET THE PARENT PHASE FOR OVERLAP 1 (VEH. SET 1) AS PHASE 4, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+1=ϕ4

TO SET THE PARENT PHASE FOR OVERLAP 1 (VEH. SET 2) AS NONE, NO PROGRAMMING IS REQUIRED.

PROGRAM TIMING FOR OVERLAP 1 AS FOLLOWS:  
 GREEN CLEAR - E/29+1+D=0.0 (SEC.)  
 YELLOW CHANGE INTERVAL - E/29+1+E=4.0 (SEC.)  
 RED CLEARANCE - E/29+1+F=2.0 (SEC.)

### EQUIPMENT INFORMATION

\* CONTROLLER.....CONTRACTOR SUPPLIED 170E  
 \* CABINET .....CONTRACTOR SUPPLIED 332  
 SOFTWARE .....BI TRANS 233NC2  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S5,S6,S6P,S7,S8P  
 PHASES USED.....1,2,2PED,3,3PED,4,5,6,6PED  
 OVERLAPS.....OL1=ϕ4

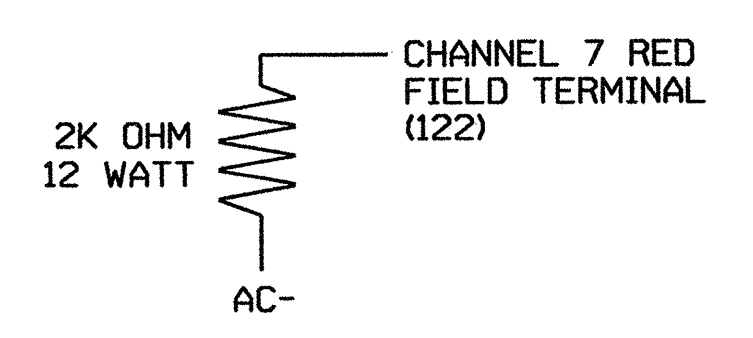
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0384  
 DESIGNED: JANUARY 2007  
 SEALED: 1 FEBRUARY 07  
 REVISED: N/A

TYPE 170 CONTROLLER & 332 CABINET

THIS DETAIL SUPERSEDES DETAIL DATED FEBRUARY 2004 AND SEALED 2/23/04

EXISTING TO REMAIN IN USE\*

### LOAD RESISTOR INSTALLATION DETAIL



NOTE: THE PURPOSE OF THIS RESISTOR IS TO LOAD THE CHANNEL RED MONITOR INPUT IN ORDER FOR THE SIGNAL SEQUENCE MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON CHANNELS THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

### PEDESTRIAN PHASE PROGRAMMING

PROGRAM PEDESTRIAN 2P OUTPUT AT KEYPAD INPUT E/I25+F+5=ϕ2  
 PROGRAM PEDESTRIAN 6P OUTPUT AT KEYPAD INPUT E/I25+F+6=ϕ6  
 PROGRAM PEDESTRIAN 8P OUTPUT AT KEYPAD INPUT E/I25+F+8=ϕ3 <--- NOTICE !

SEE SHEET 2 FOR INPUT FILE LAYOUT DETAIL AND PROGRAMMING CHART, AND FOR EMERGENCY VEHICLE PREEMPTION PROGRAMMING NOTES

FINAL DESIGN

### ELECTRICAL DETAIL - SHEET 1 of 2

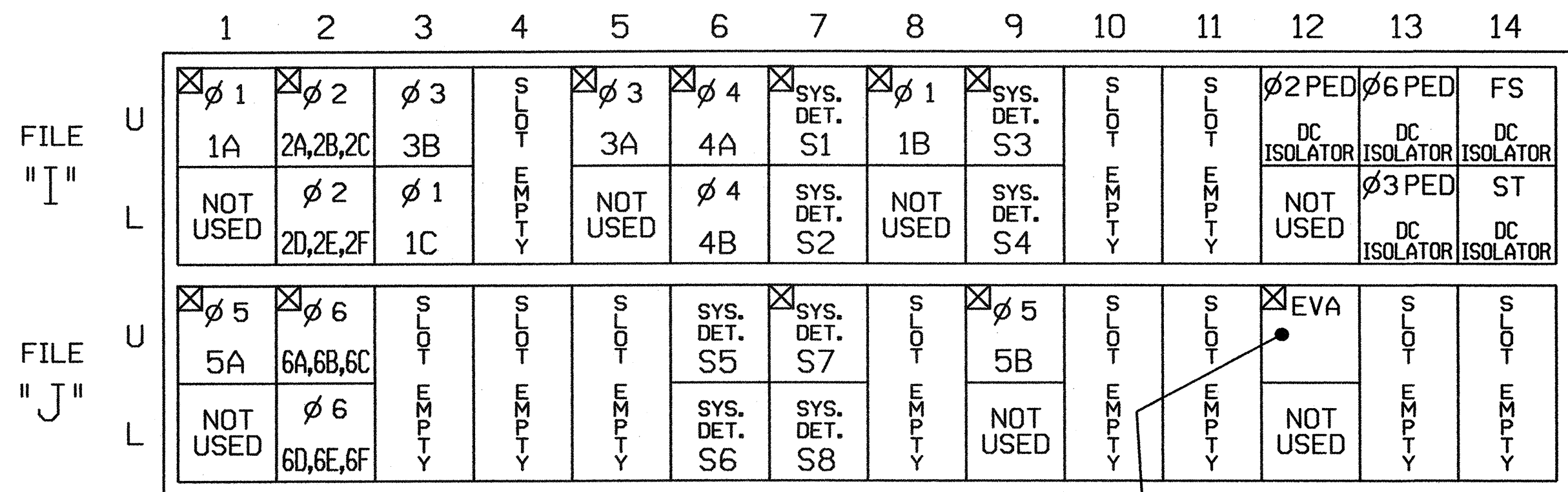
ELECTRICAL AND PROGRAMMING DETAILS FOR:  Prepared in the Offices of:  122 N. McDowell St., Raleigh, NC 27603	US 15-501 (CHAPEL HILL BLVD.) at SR 1116 (GARRETT ROAD)		SEAL  JOHN T. ROWE, JR. ENGINEER
	DIVISION 05 PLAN DATE: JANUARY 2007 PREPARED BY: F.E. RUSS	DURHAM COUNTY DURHAM REVIEWED BY: JWR REVIEWED BY:	

DATE: 2-9-07  
 SIGNATURE: John T. Rowe  
 DATE: 2-9-07  
 Sig. Inventory No. 05-0384



### INPUT FILE POSITION LAYOUT

(FRONT VIEW)



EX.: 1A, 2A, ETC. = LOOP NO.'S  
 ☒ = EXISTING; RE-USE AS INDICATED. (SEE INPUT FILE CONNECTION & PROGRAMMING CHART BELOW)

FS = FLASH SENSE  
 ST = STOP TIME  
 EV = EMERG. VEH. PREEMPT

OPTICAL DETECTOR INTERFACE CARD

### INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
1A	TB2-1,2	I1U	1	56	5 7	1
2A,2B,2C	TB2-5,6	I2U	2	39	5 7	2
2D,2E,2F	TB2-7,8	I2L	3	43	5 7	2
3B	TB2-9,10	I3U	4	63	5 7	3
1C	TB2-11,12	I3L	5	76	5 7	1
3A	TB4-5,6	I5U	6	58	5 7	3
4A	TB4-9,10	I6U	7	41	5 7	4
4B	TB4-11,12	I6L	8	45	5 7	4
1B	TB6-5,6	I8U	9	49	5 7	1
5A	TB3-1,2	J1U	10	55	5 7	5
6A,6B,6C	TB3-5,6	J2U	11	40	5 7	6
6D,6E,6F	TB3-7,8	J2L	12	44	5 7	6
5B	TB7-9,10	J9U	13	59	5 7	5
PED PUSH BUTTONS						
P21, P22	TB8-4,6	I12U	14	67	2	2PED
P61, P62	TB8-7,9	I13U	15	68	2	6PED
P31, P32	TB8-8,9	I13L	16	70	2	3PED
SYSTEM LOOPS						
S1	TB6-1,2	I7U	---	65	---	SYS1 *
S2	TB6-3,4	I7L	---	78	---	SYS2 *
S3	TB6-9,10	I9U	---	60	---	SYS3 *
S4	TB6-11,12	I9L	---	62	---	SYS4 *
S5	TB5-9,10	J6U	---	42	---	SYS5 *
S6	TB5-11,12	J6L	---	46	---	SYS6 *
S7	TB7-1,2	J7U	---	66	---	SYS7 *
S8	TB7-3,4	J7L	---	79	---	SYS8 *

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

INPUT FILE POSITION LEGEND: J2L

FILE J \_\_\_\_\_  
 SLOT 2 \_\_\_\_\_  
 LOWER \_\_\_\_\_

DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY  
 2-PED CALL  
 3-RESERVED  
 4-COUNTING  
 5-EXTENSION  
 6-TYPE 3  
 7-CALLING  
 8-ALTERNATE

### HEAD 23 ARROWS (OL1) OPERATION DURING PREEMPTION

IN ORDER FOR E.V. PREEMPTION TO OPERATE AS PHASE 4 WITHOUT SIGNAL HEAD 23 RIGHT-TURN ARROWS (OVERLAP 'OLI'), THE FOLLOWING PROGRAMMING MUST BE IN PLACE:

ASSIGN O/L VEH. SET 2 INPUT AT E/126+D+C= 200  
 ASSIGN E.V. PREEMPT OUTPUT AT E/127+D+B= 200

200 = ASSIGNABLE PSEUDO-PIN (SOFTWARE)

### EMERGENCY VEHICLE PREEMPTION PROGRAMMING

E. V. PREEMPT	OPTICAL DETECTOR	TERMINAL	INPUT PIN	CLEARANCE PHASES LOCATION	DELAY TIME LOCATION	CLEAR TIME LOCATION
EVP	A	TB9-4,6	E/126+F+1=71	E/125+E+A= ∅ 4	F/1+E+2=0 (SEC.)	F/1+E+3=1 (SEC.)

- PROGRAM PREEMPT MINIMUM GREEN AT: F/1+O+8= 1 (SEC.)
- PROGRAM PED. CLEAR BEFORE PREEMPT AS SHOWN BELOW.
- FOR PREEMPTION IMMEDIATE RESPONSE, DISABLE MIN. WALK AT: E/125+F+F=3
- PROGRAM EXTEND TIME ON OPTICAL DETECTOR UNIT FOR 2.0 SEC.

### PEDESTRIAN CLEAR BEFORE PREEMPT TIMING

PROGRAM PED. PHASE 2 MIN. CLEAR BEFORE PREEMPT AT F/1+2+B= 9 (SEC.)  
 PROGRAM PED. PHASE 3 MIN. CLEAR BEFORE PREEMPT AT F/1+3+B= 9 (SEC.)  
 PROGRAM PED. PHASE 6 MIN. CLEAR BEFORE PREEMPT AT F/1+6+B= 9 (SEC.)

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0384  
 DESIGNED: JANUARY 2007  
 SEALED: 1 FEBRUARY 07  
 REVISED: N/A

TYPE 170 CONTROLLER & 332 CABINET

### \* SYSTEM DETECTOR PROGRAMMING NOTES

IN ORDER FOR SYSTEM LOOPS TO OPERATE PROPERLY, THEIR PIN ASSIGNMENTS WILL HAVE TO BE RE-ASSIGNED ON I70E CONTROLLER AS DESCRIBED BELOW.

- A. IN ORDER TO ASSURE THAT THESE PINS ARE CLEARED FROM THEIR DEFAULT FUNCTION, PROGRAM AS FOLLOWS:
- |                      |                      |
|----------------------|----------------------|
| PIN 65 - E/126+4+6=0 | PIN 42 - E/126+0+3=0 |
| PIN 78 - E/126+4+E=0 | PIN 46 - E/126+0+7=0 |
| PIN 60 - E/126+4+1=0 | PIN 66 - E/126+4+7=0 |
| PIN 62 - E/126+4+3=0 | PIN 79 - E/126+4+F=0 |
- B. AFTER FOLLOWING STEP 'A' ABOVE, PROGRAM PINS FOR SYSTEM DETECTORS AS FOLLOWS:
- |                     |                     |
|---------------------|---------------------|
| SYS1 - E/126+B+1=65 | SYS5 - E/126+B+5=42 |
| SYS2 - E/126+B+2=78 | SYS6 - E/126+B+6=46 |
| SYS3 - E/126+B+3=60 | SYS7 - E/126+B+7=66 |
| SYS4 - E/126+B+4=62 | SYS8 - E/126+B+8=79 |

THIS DETAIL SUPERSEDES DETAIL DATED FEBRUARY 2004 AND SEALED 3/2/04

FINAL DESIGN

**ELECTRICAL DETAIL - SHEET 2 of 2**

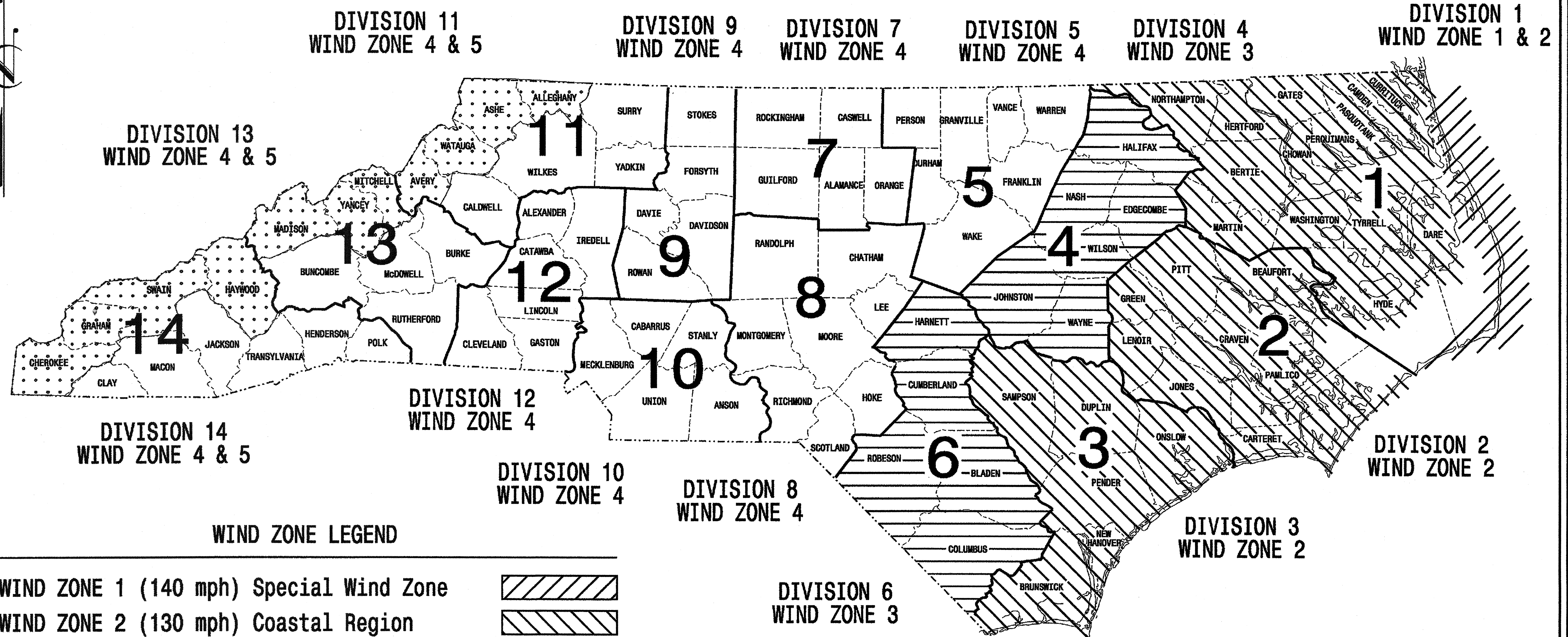
	US 15-501 (CHAPEL HILL BLVD.) at SR 1116 (GARRETT ROAD)		SEAL 
	DIVISION 05 DURHAM COUNTY DURHAM PLAN DATE: JANUARY 2007 PREPARED BY: F.E. RUSS	REVIEWED BY: JAW REVIEWED BY:	
REVISIONS:			SIG. INVENTORY NO. 05-0384



# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	U-4009	Sig. 8
F. A. PROJ. NO.		M 1
PROJECT ID. NO.		

## STANDARD DRAWINGS FOR METAL POLES



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

Prepared in the Offices of:

Traffic Engineering and Safety Systems Branch  
DEPARTMENT OF TRANSPORTATION  
STATE OF NORTH CAROLINA

Signals and Geometrics Section

122 N. McDowell St., Raleigh, NC 27603

Designed in conformance with the  
2002 Interim to the  
4th Edition 2001

### AASHTO

Standard Specifications for  
Structural Supports for  
Highway Signs, Luminaires,  
and Traffic Signals

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

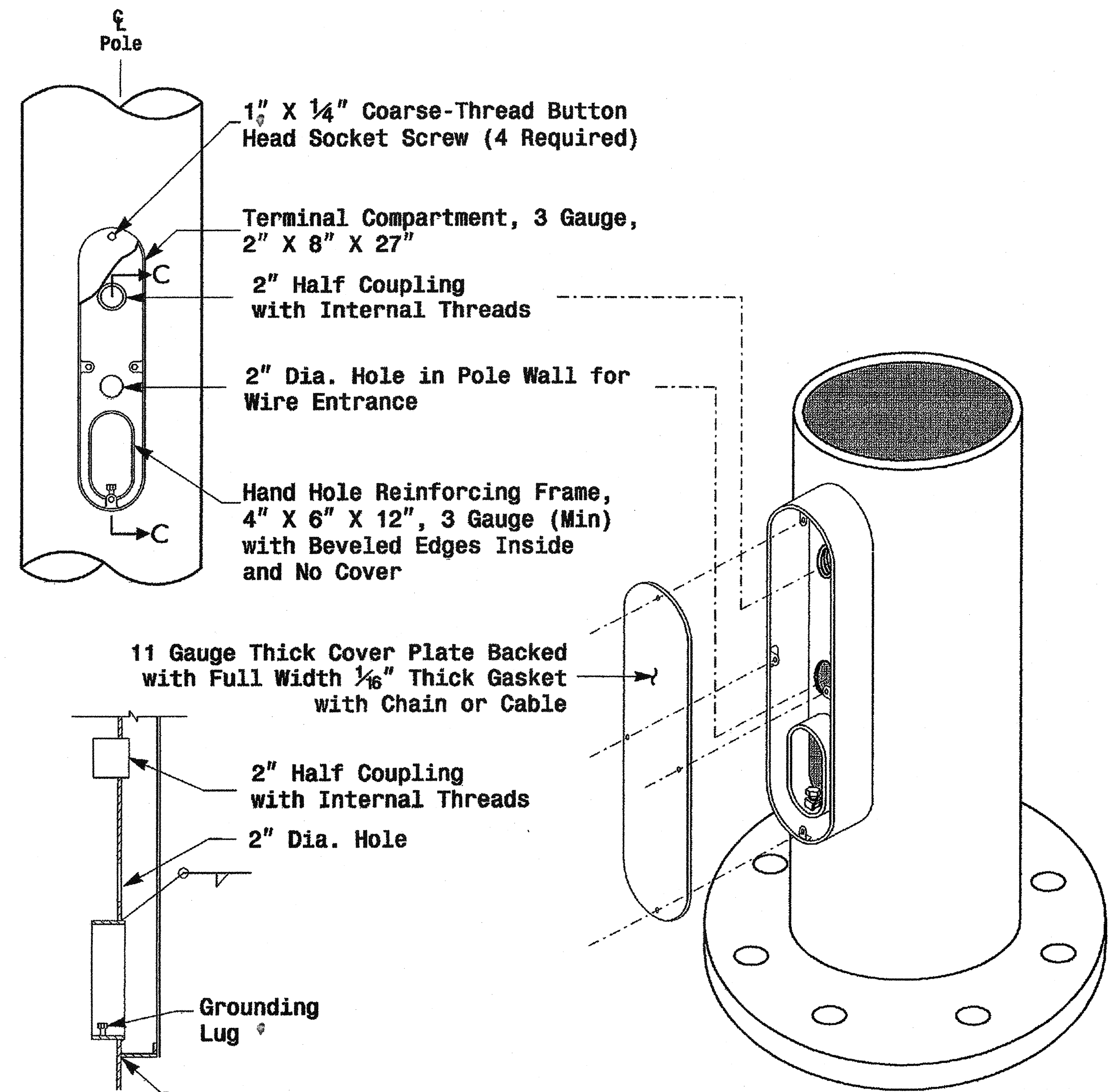
**NCDOT CONTACTS:**  
**TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH**

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

SEAL

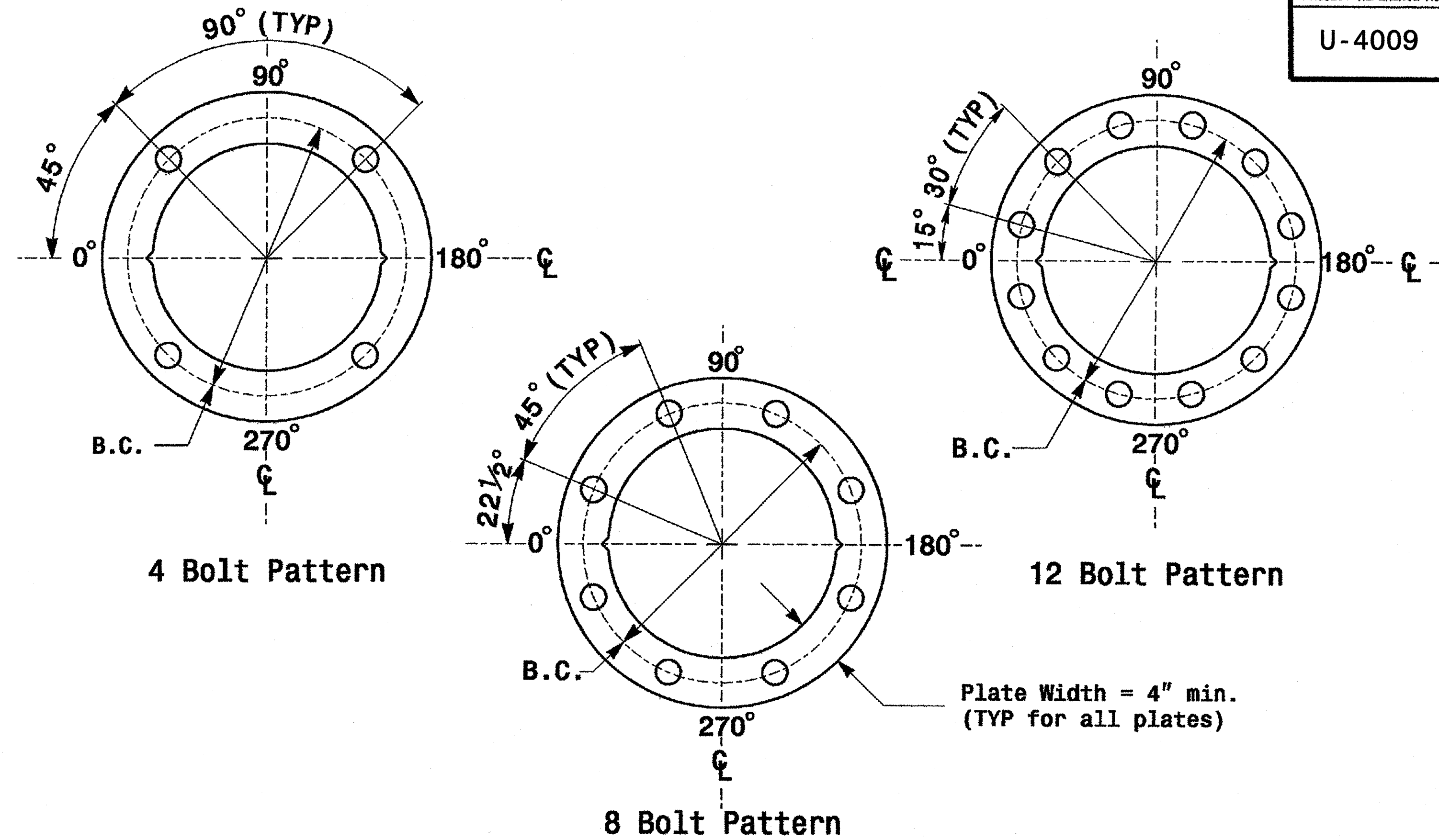
Dibesh C. Sarkar  
9.2.2005  
SIGNATURE DATE



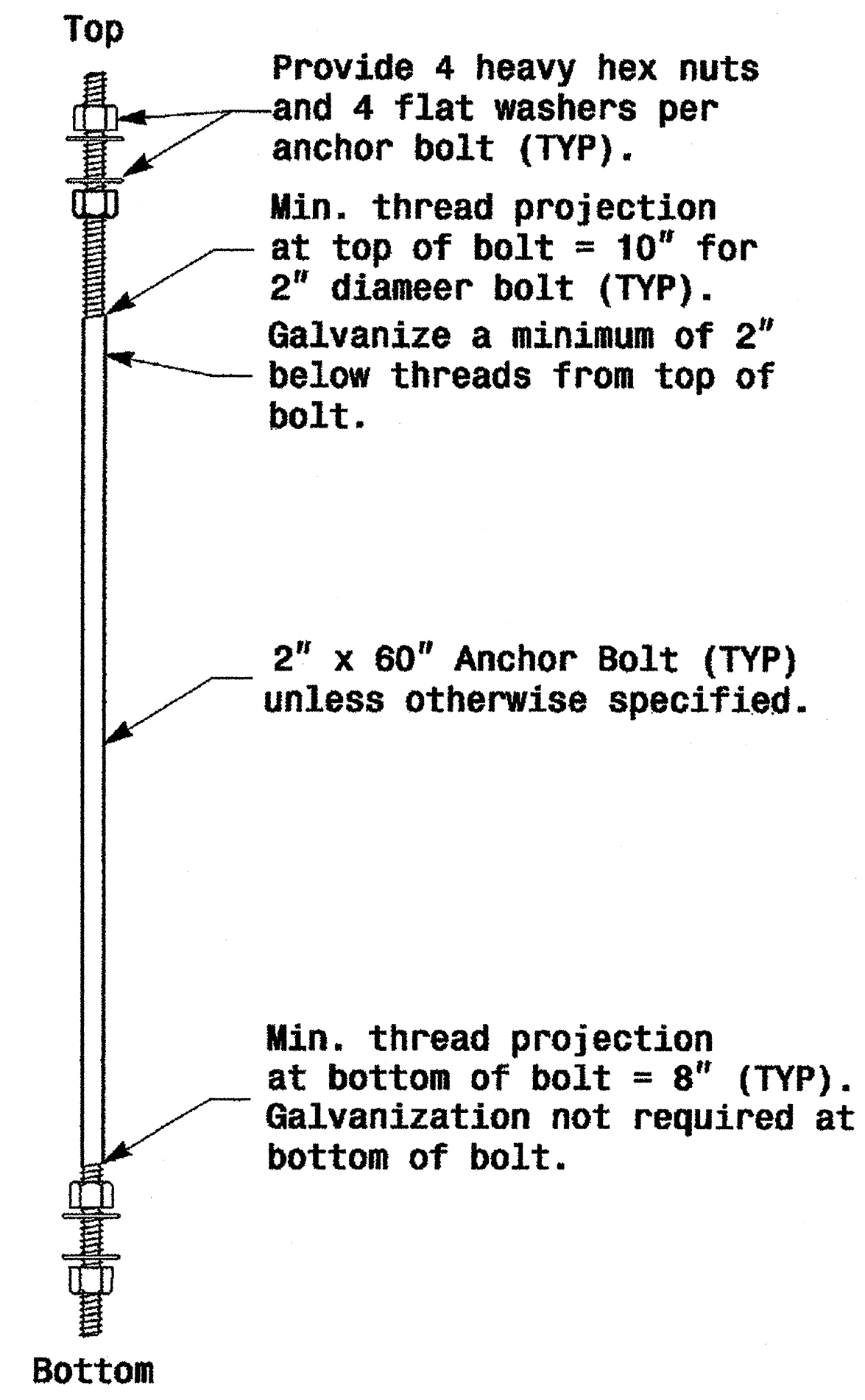


Section C-C Note: Unless otherwise specified, locate Terminal Compartment 1 foot above the pole base plate at 180 degrees on the pole's radial index.

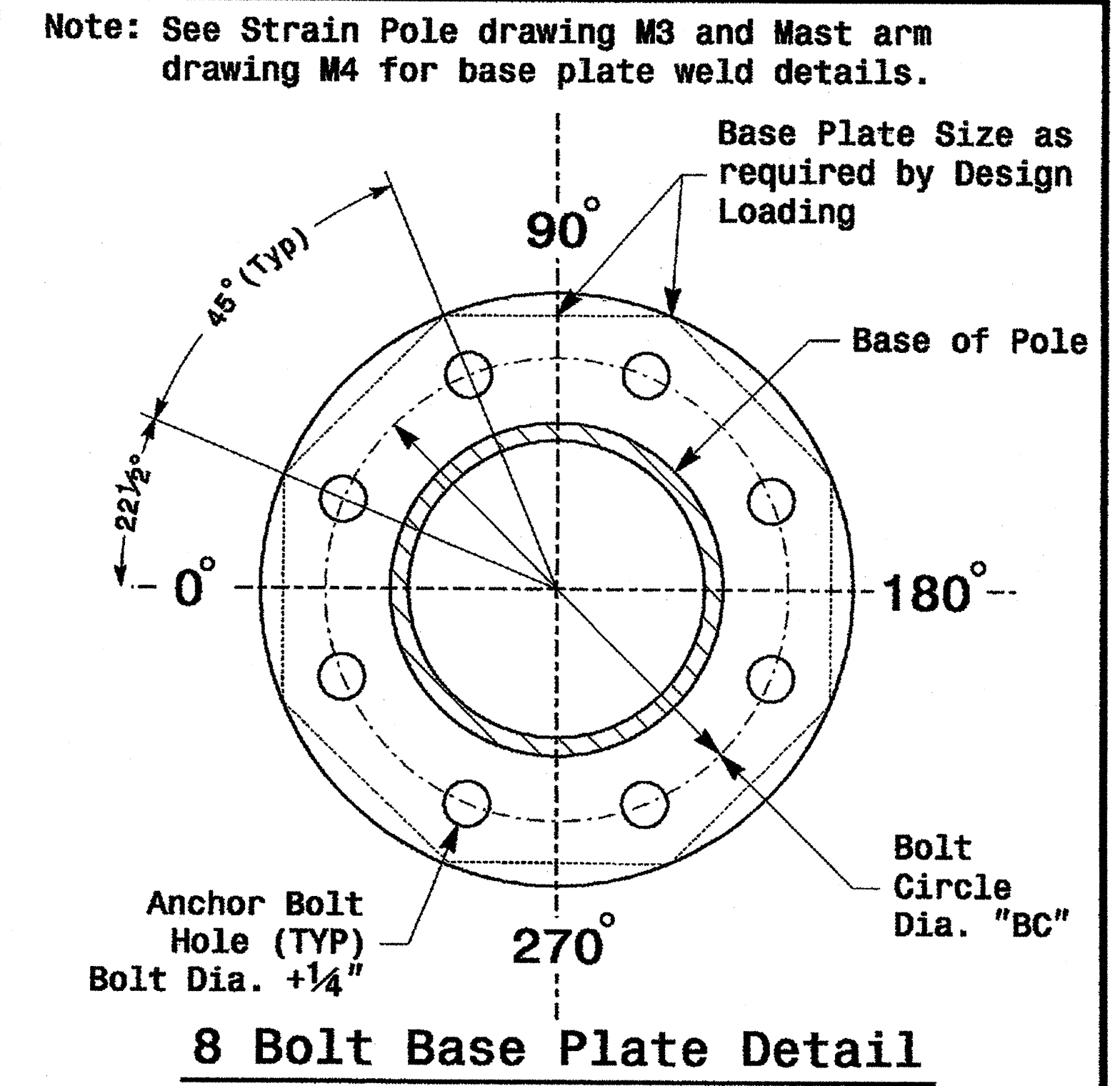
**Terminal Compartment Detail**



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



**Anchor Bolt Detail**



**8 Bolt Base Plate Detail**

Prepared in the Office of:

**Typical Fabrication Details Common To All Metal Poles**

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

222 N. McDowell St., Raleigh, NC 27603

SCALE: 0 NA NONE

REVISIONS: INIT. DATE

Signature: *P.L. Alexander* 9/2/2005  
 DATE: 9/2/2005  
 SIG. INVENTORY NO.

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

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

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

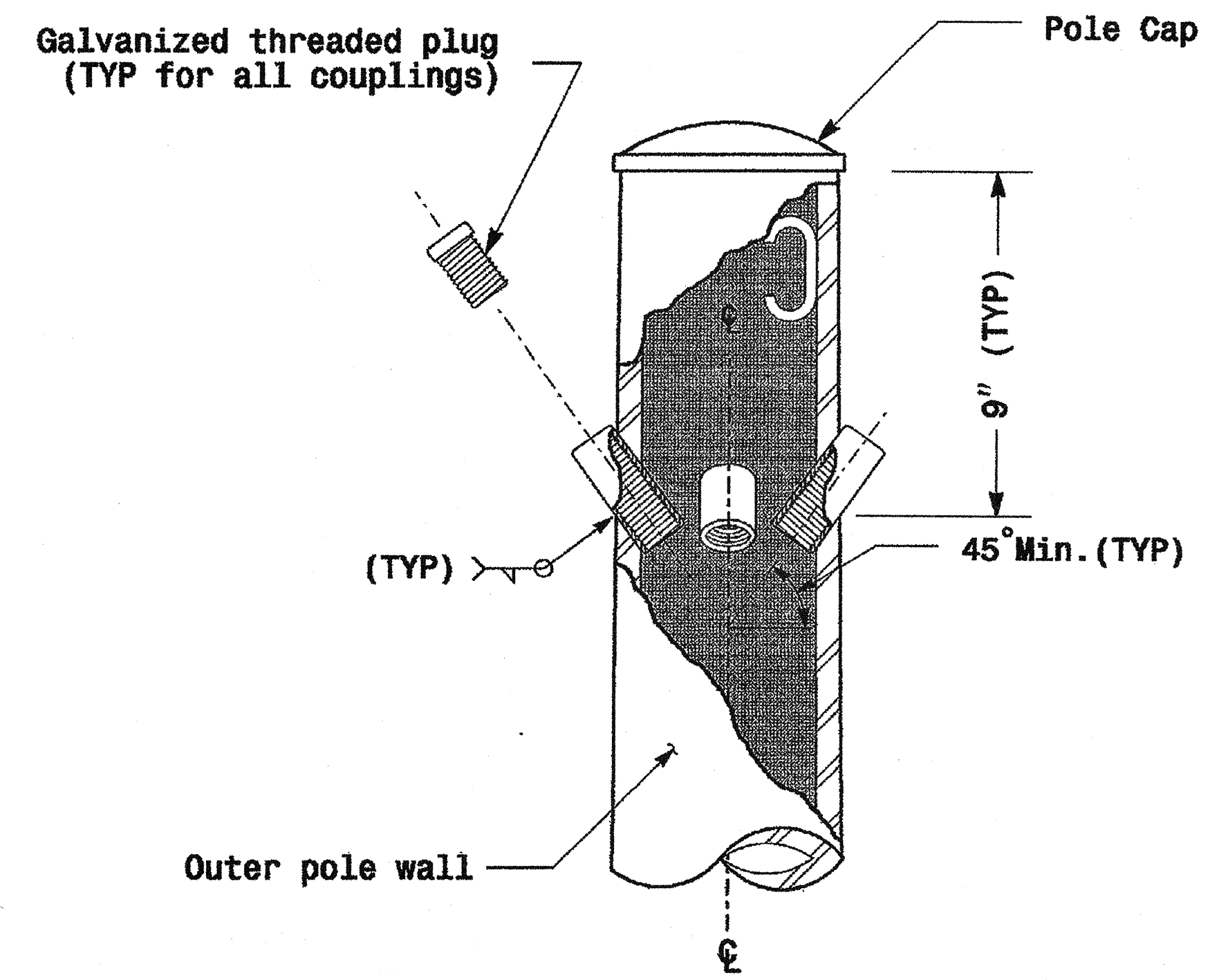
MFG \_\_\_\_\_ MFG. DATE: MM/YY \_\_\_\_\_  
 SECTION D/T/L/Y \_\_\_\_\_  
 NCDOT STANDARD \_\_\_\_\_

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

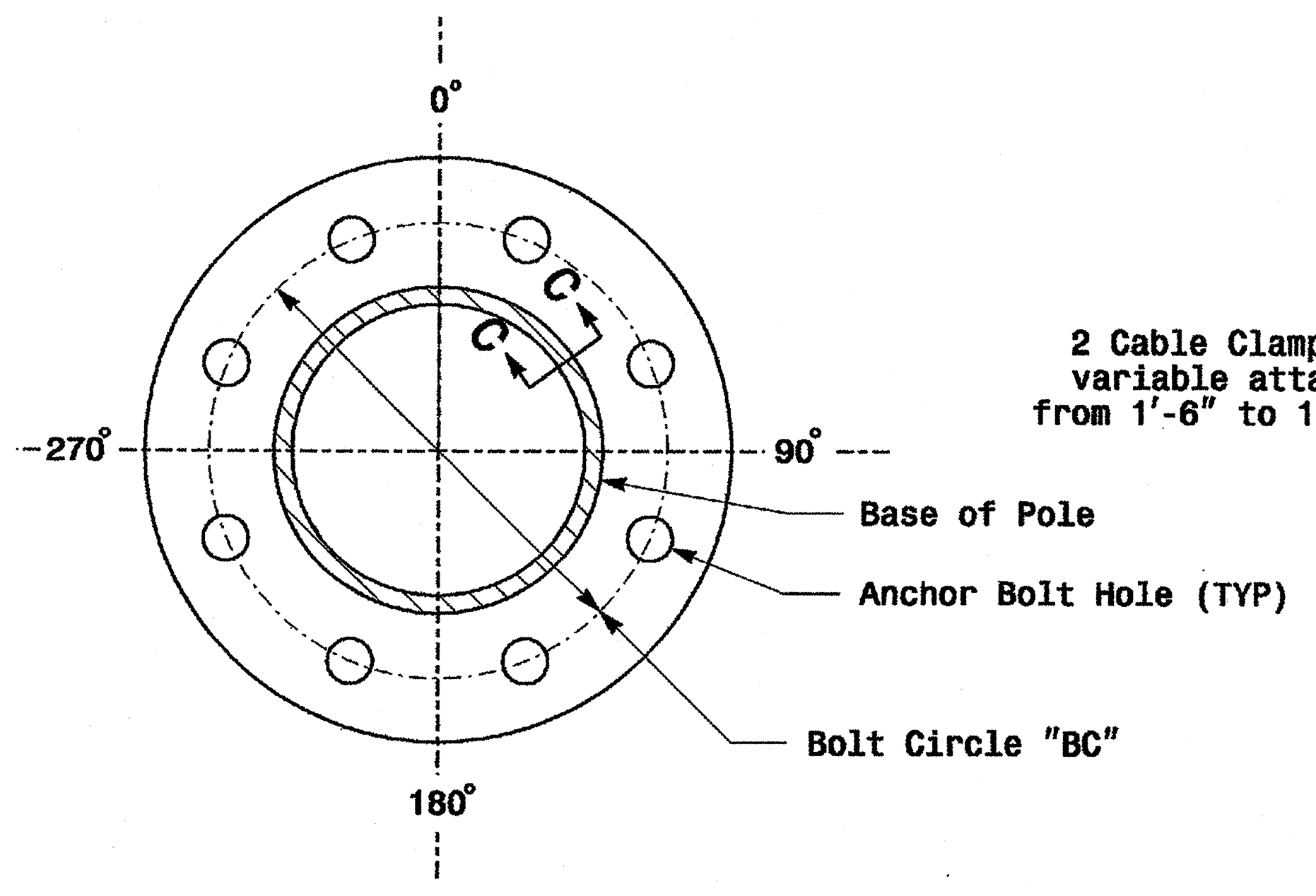
**Identification Tag Details**

**Fabrication Details - All Poles**

01-SEP-2005 18:22:01 SEP 2005 10:10:01 AM Standard.dwg 2004 me thru m5.dgn

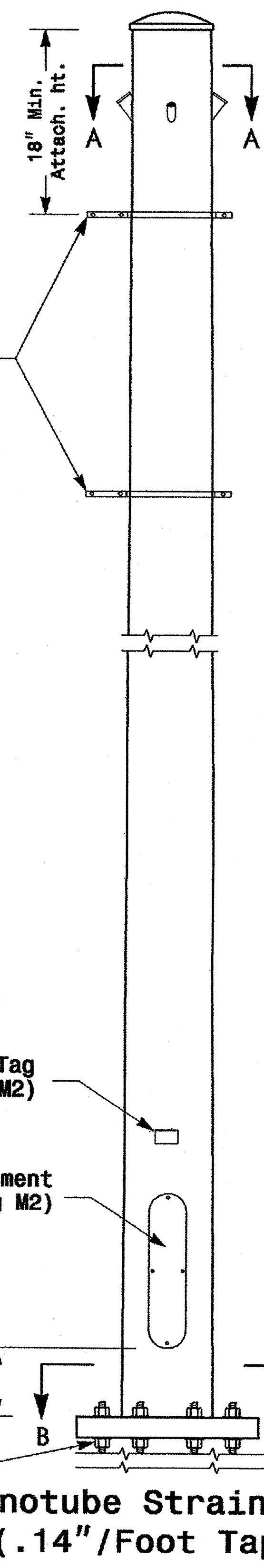


**Cable Entrances at Top of Pole**

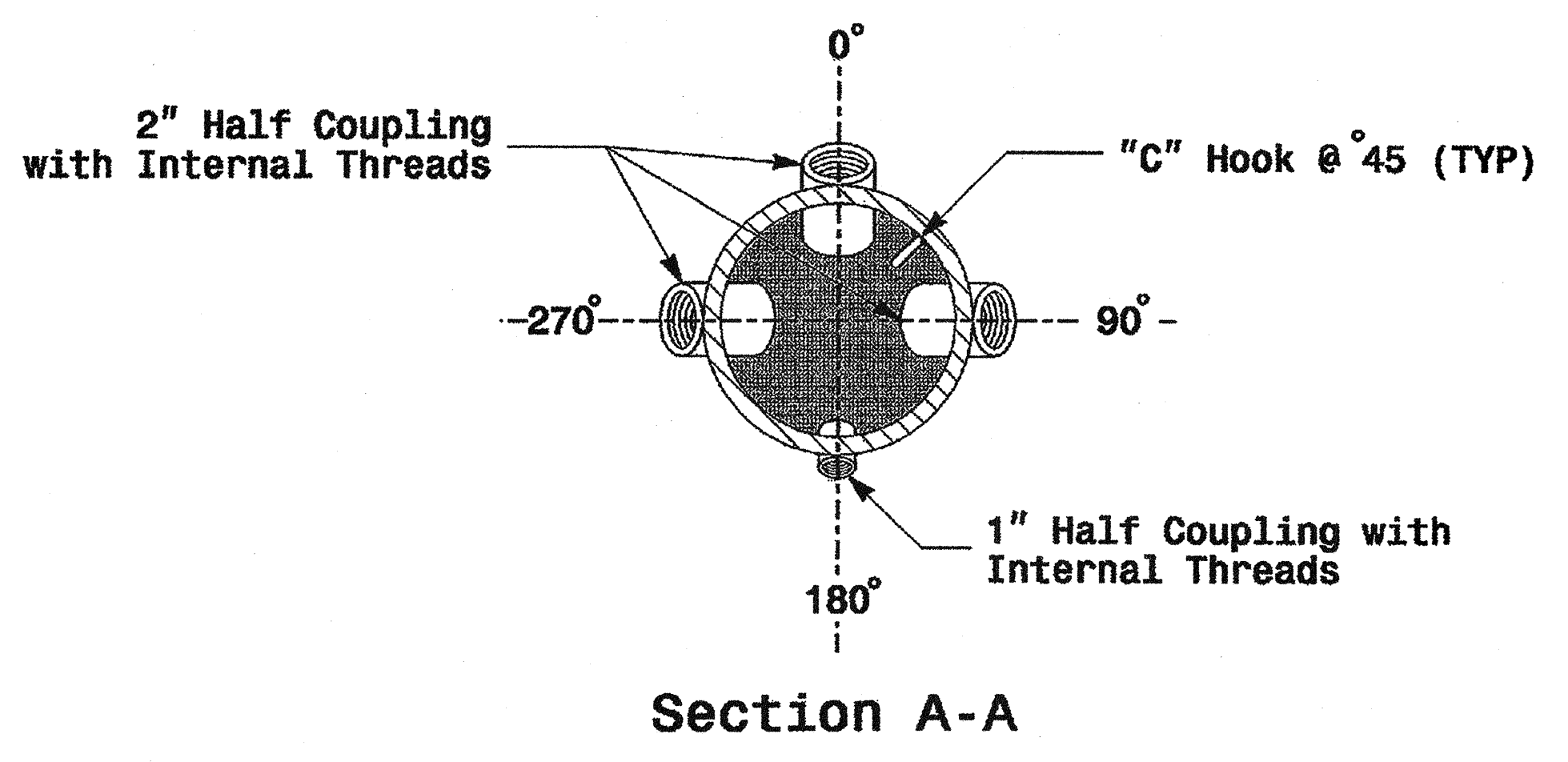


**Section B-B  
 (See drawing M2)  
 Pole Base Plate**

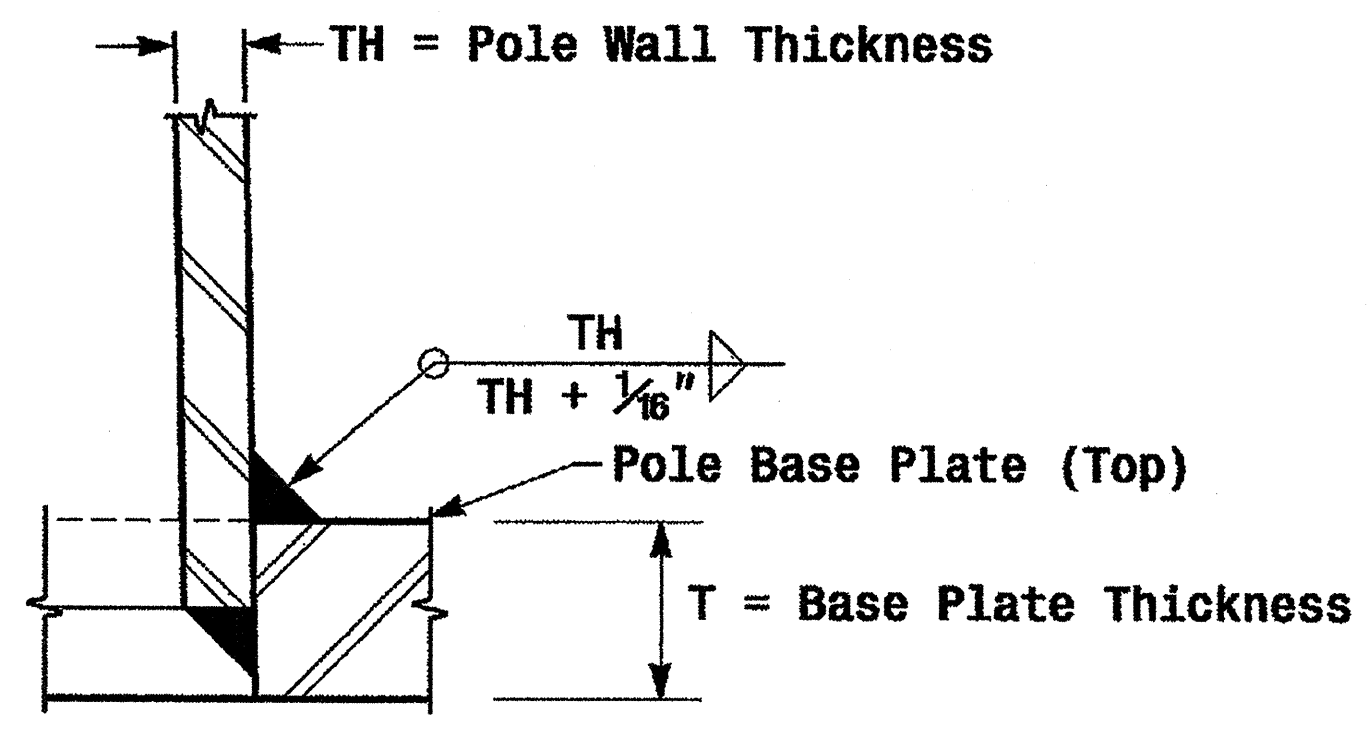
2 Cable Clamps designed for variable attachment heights from 1'-6" to 10' below the top of the pole.



**Monotube Strain Pole  
 (.14"/Foot Taper)**



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



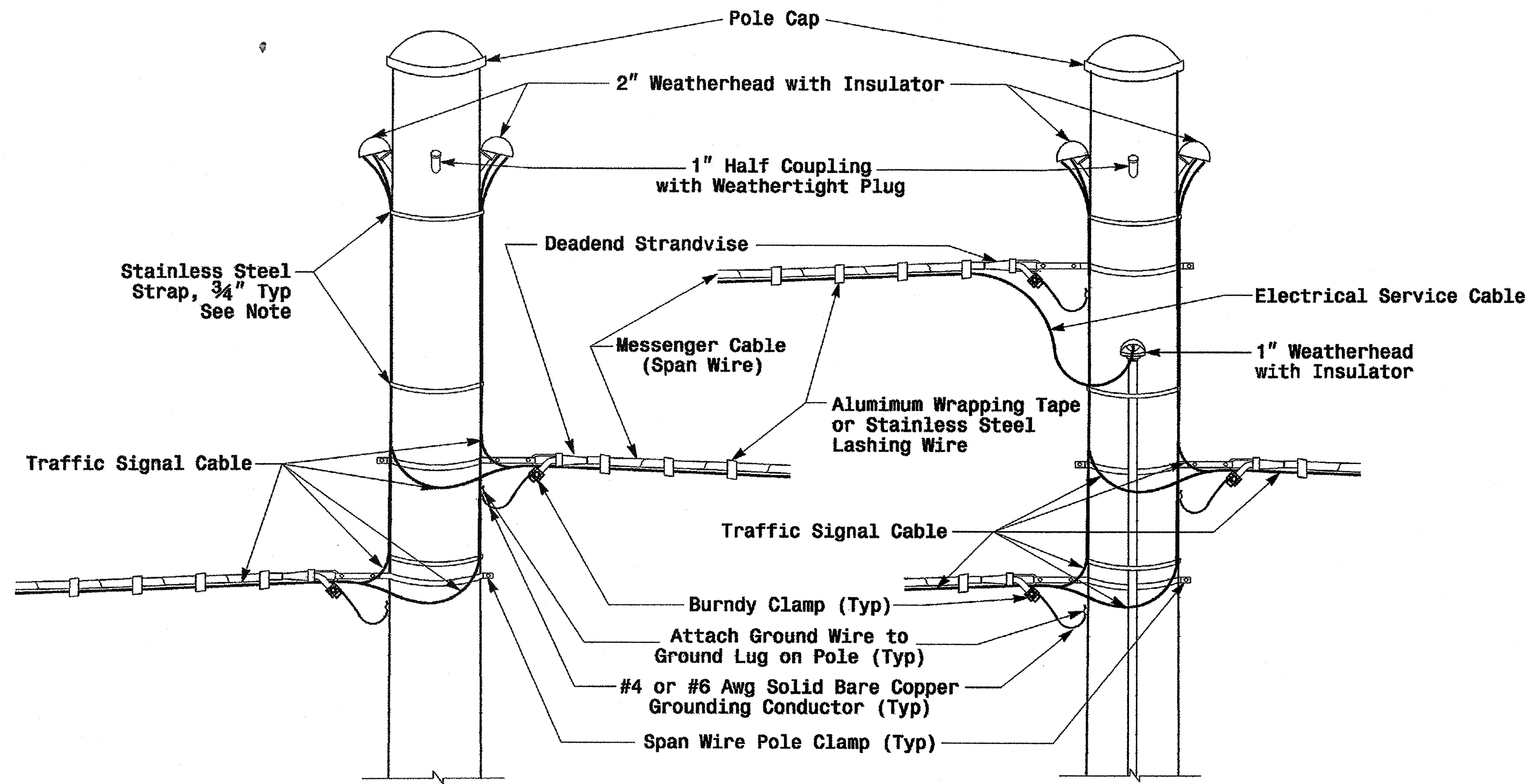
**Section C-C  
 Socket Connection Weld Detail**

**Fabrication Details - Strain Poles**

01-SEP-2005 14:07  
 w:\p\000\ees-un1\wcr\grcupse2004 metal pole standard\2004 ed.dgn  
 P.L. Alexander

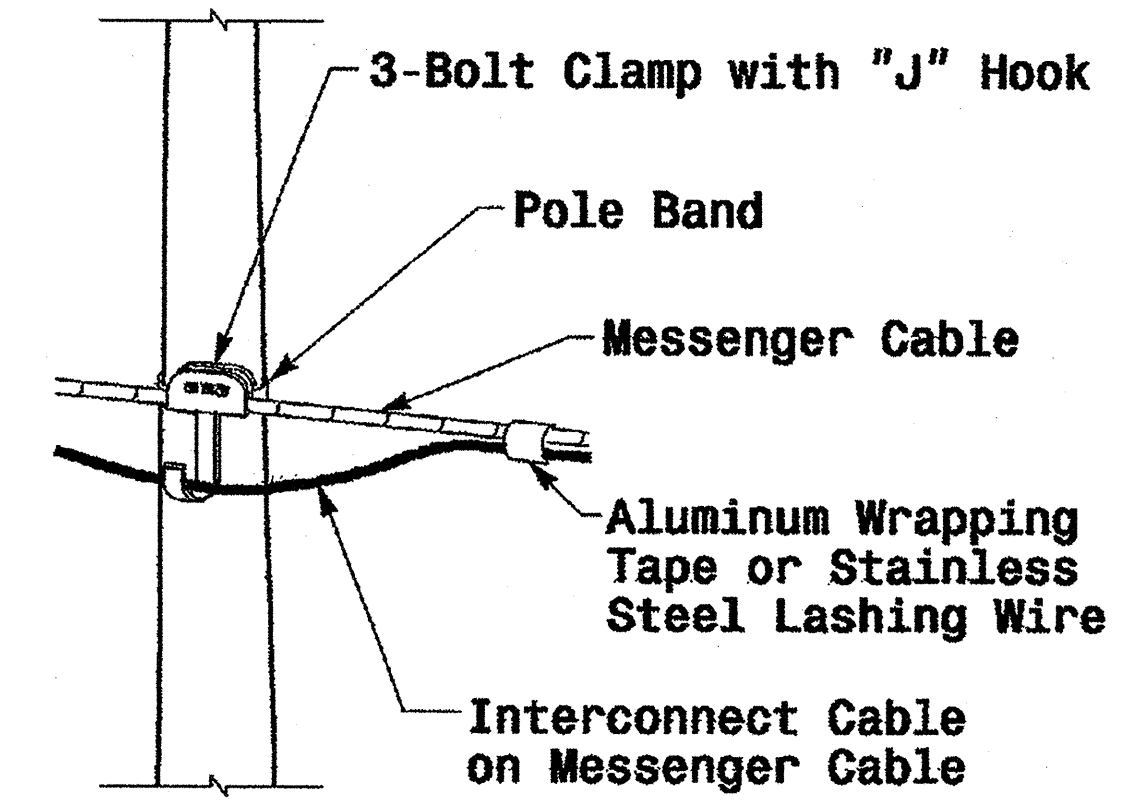
	<b>Typical Fabrication Details          For Strain Poles</b>		
	PLAN DATE: <b>May 2005</b> PREPARED BY: <b>P.L. Alexander</b>	REVIEWED BY: <b>C.F. Andrews</b> REVIEWED BY: <b>A.M. Esposito</b>	
REVISIONS: _____ INIT. DATE _____		SIGNATURE: <i>J. Sarker</i> DATE: <b>9.2.2005</b>	
SIG. INVENTORY NO. _____			



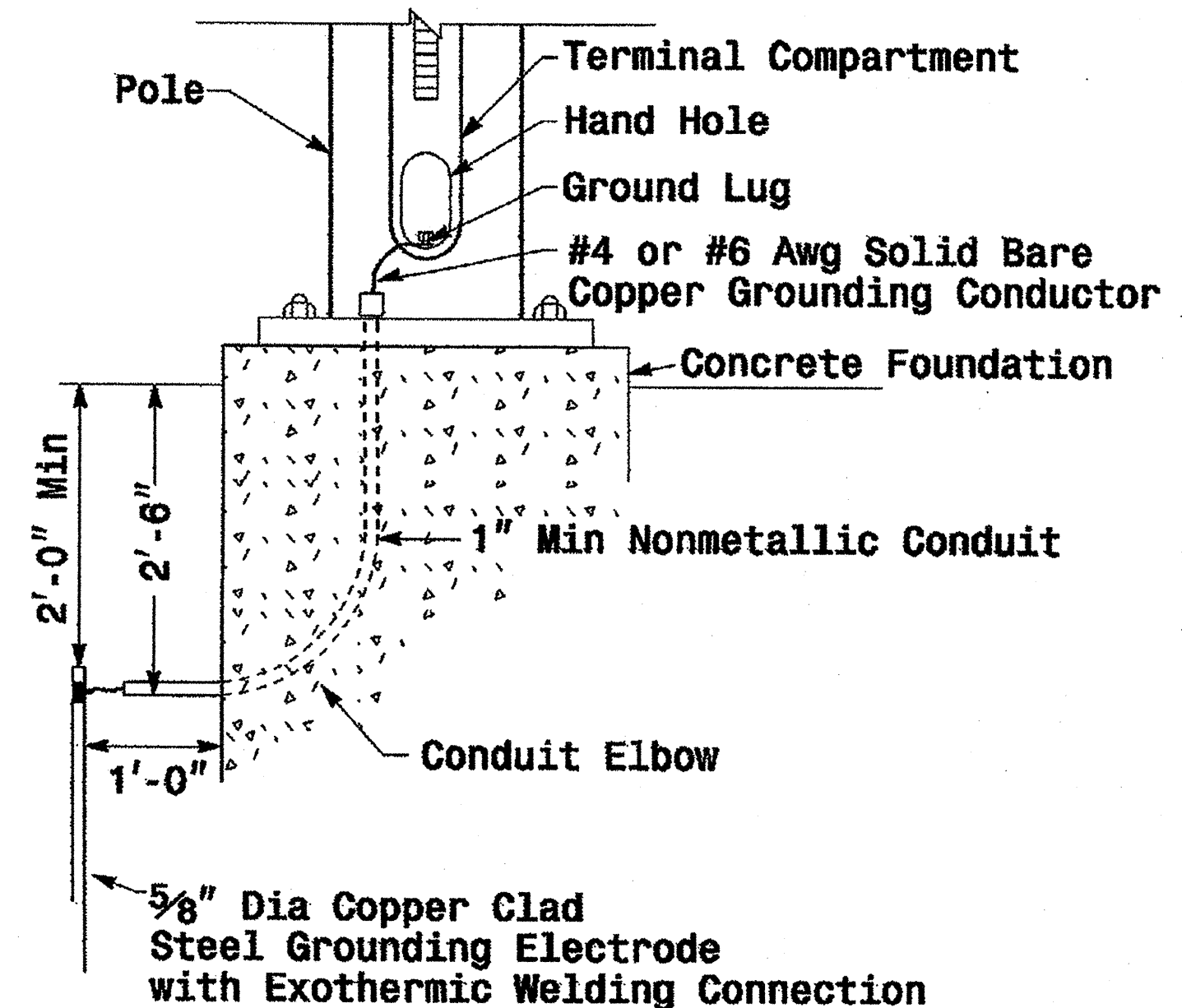


Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

**Strain Pole Attachments**



**Attachment of Cable to Intermediate Metal Pole**



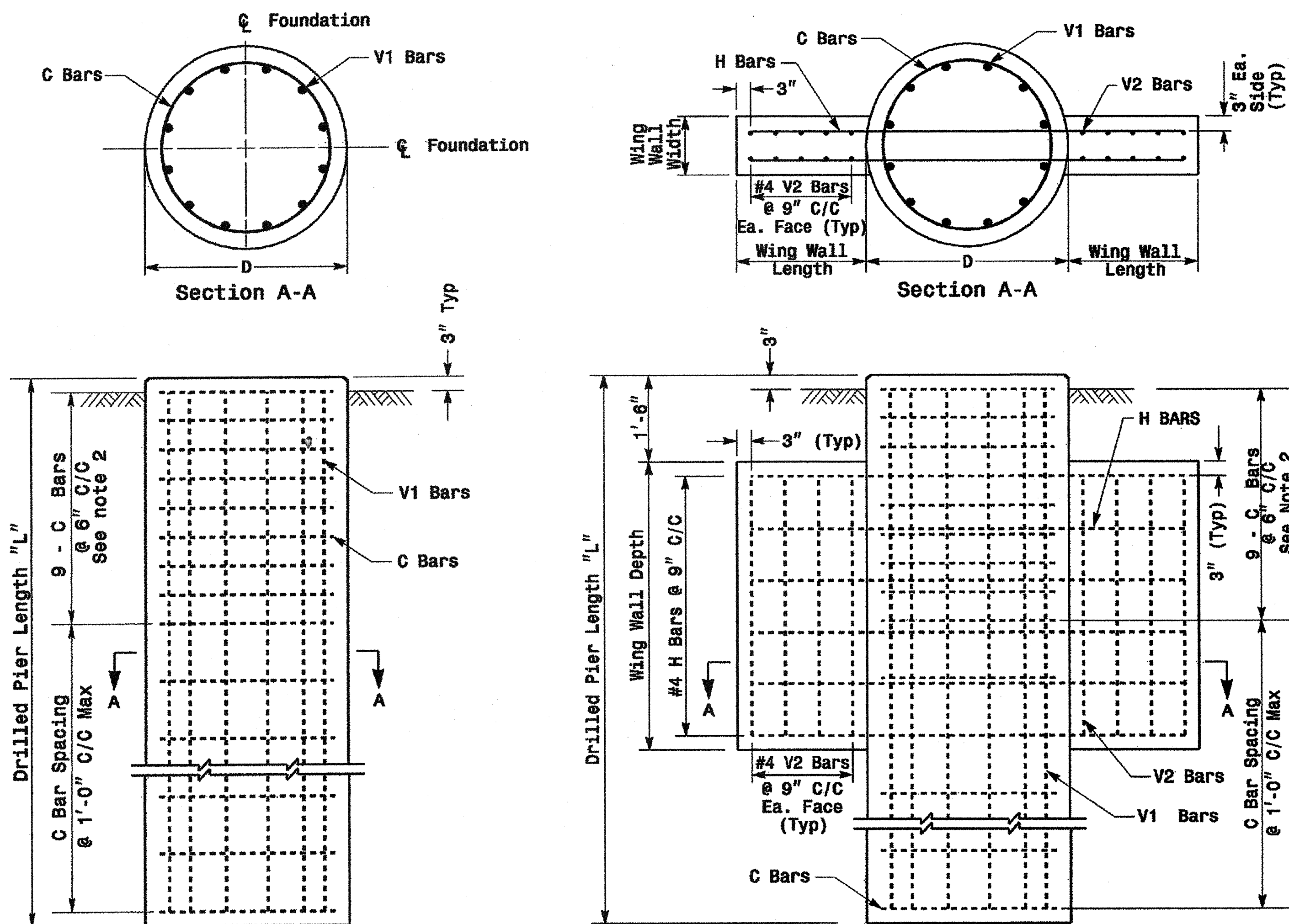
**Metal Pole Grounding Detail**

**Construction Details - Strain Poles**

01-SEP-2005 16:33 c:\win1\magnus\p04 metrol pole strander\d004 m6.dgn

	<b>Construction Details Strain Poles</b>		
	PLAN DATE: <b>May 2005</b> PREPARED BY: <b>C.F. ANDREWS</b>	REVIEWED BY: <b>P.L. ALEXANDER</b> REVIEWED BY: <b>D.C. SARKAR</b>	
SCALE: <b>NA</b> NONE		SIG. INVENTORY NO.	

## Reinforcing Steel Bars



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

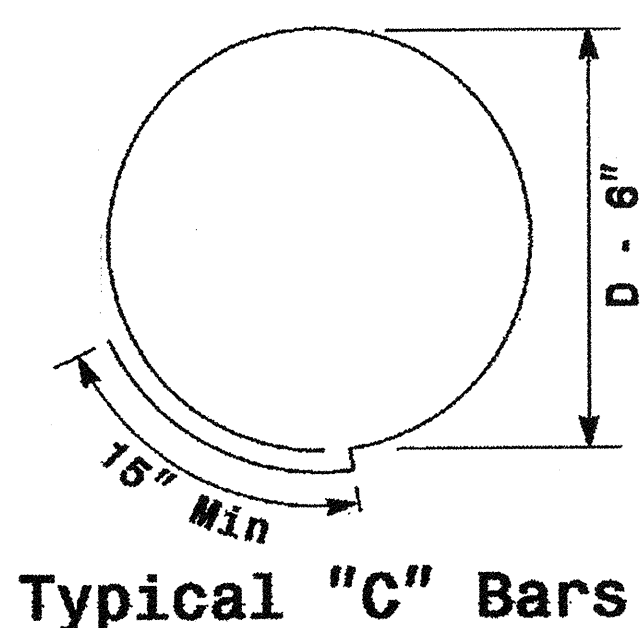
\* See Note No. 1  
 \*\* See Note No. 3

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

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

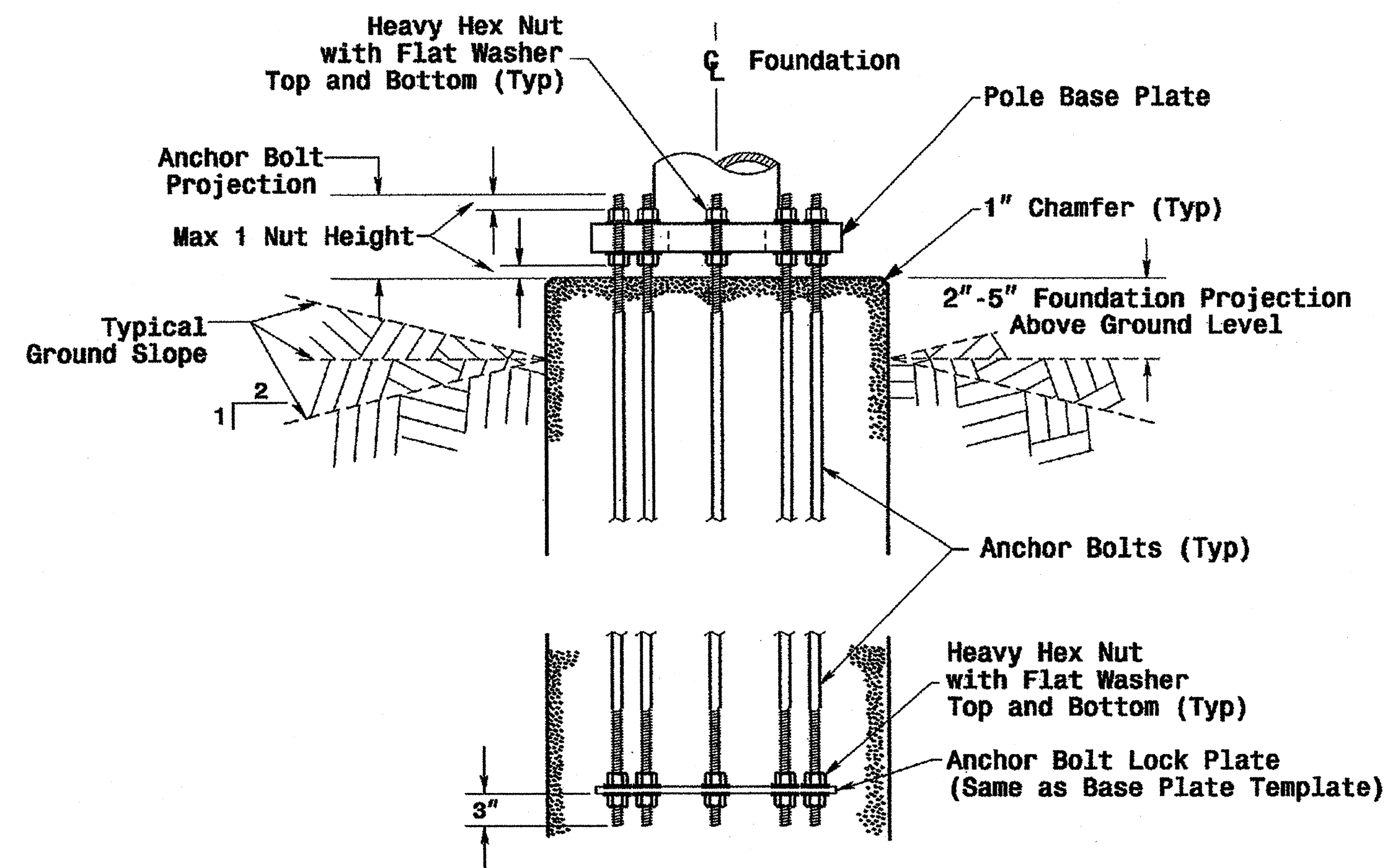
Wing Wall Type	Wing Wall Length (Ft.)	Wing Wall Width (Ft.)	Wing Wall Depth (Ft.)	Concrete Volume (Cu. Yds.)
TYPE 1	1'-6"	1'-0"	3'-0"	.4
TYPE 2	3'-0"	1'-0"	5'-0"	1.2

See Note No. 4

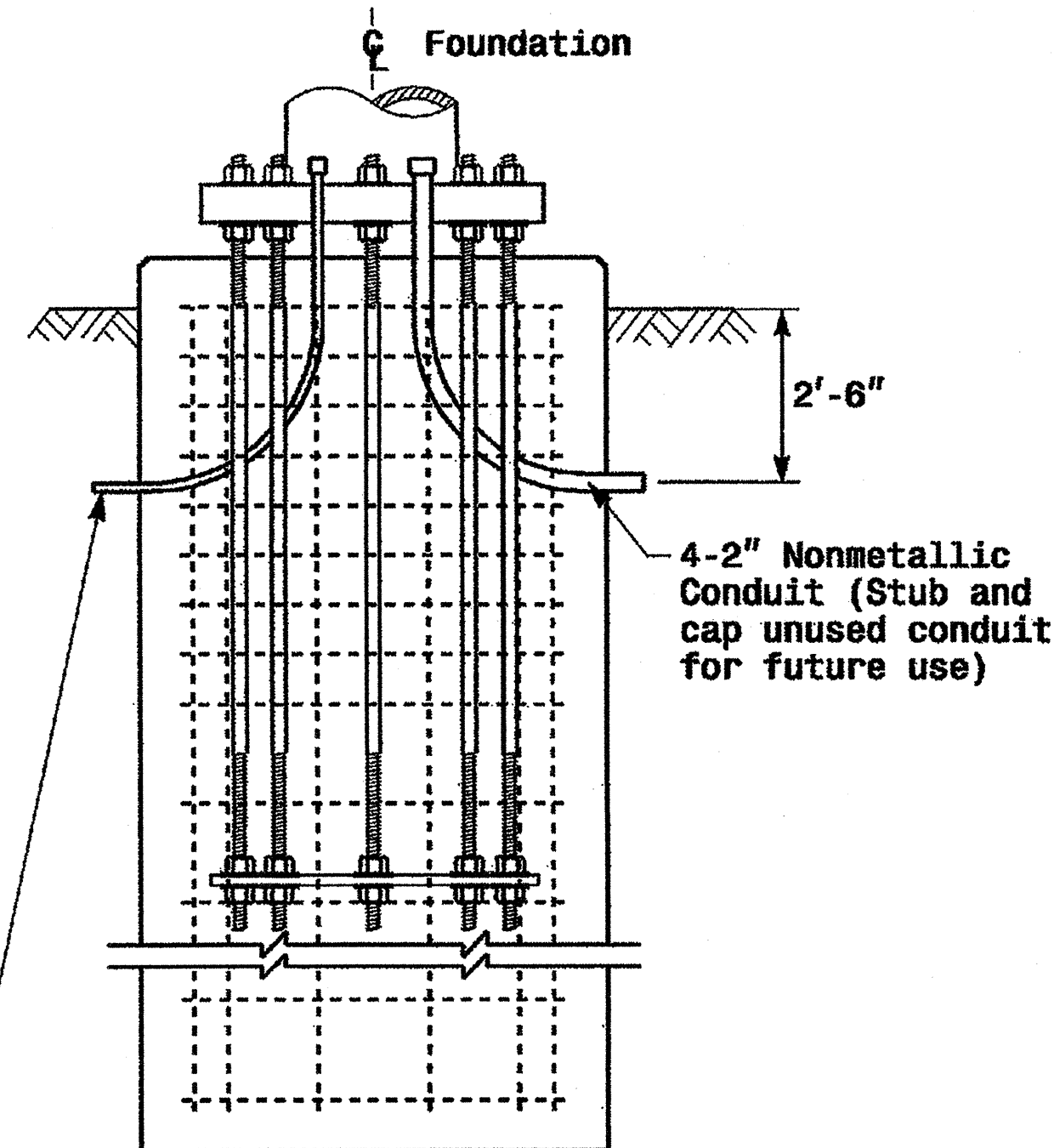


## Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



## Typical Foundation Conduit Details



## Notes

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

	<b>Construction Details Foundations</b>		
	PLAN DATE: May 2005 PREPARED BY: G.F. ANDREWS SCALE: 0 NA NONE	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: A.W. ESPOSITO REVISIONS: _____ INIT. DATE	



