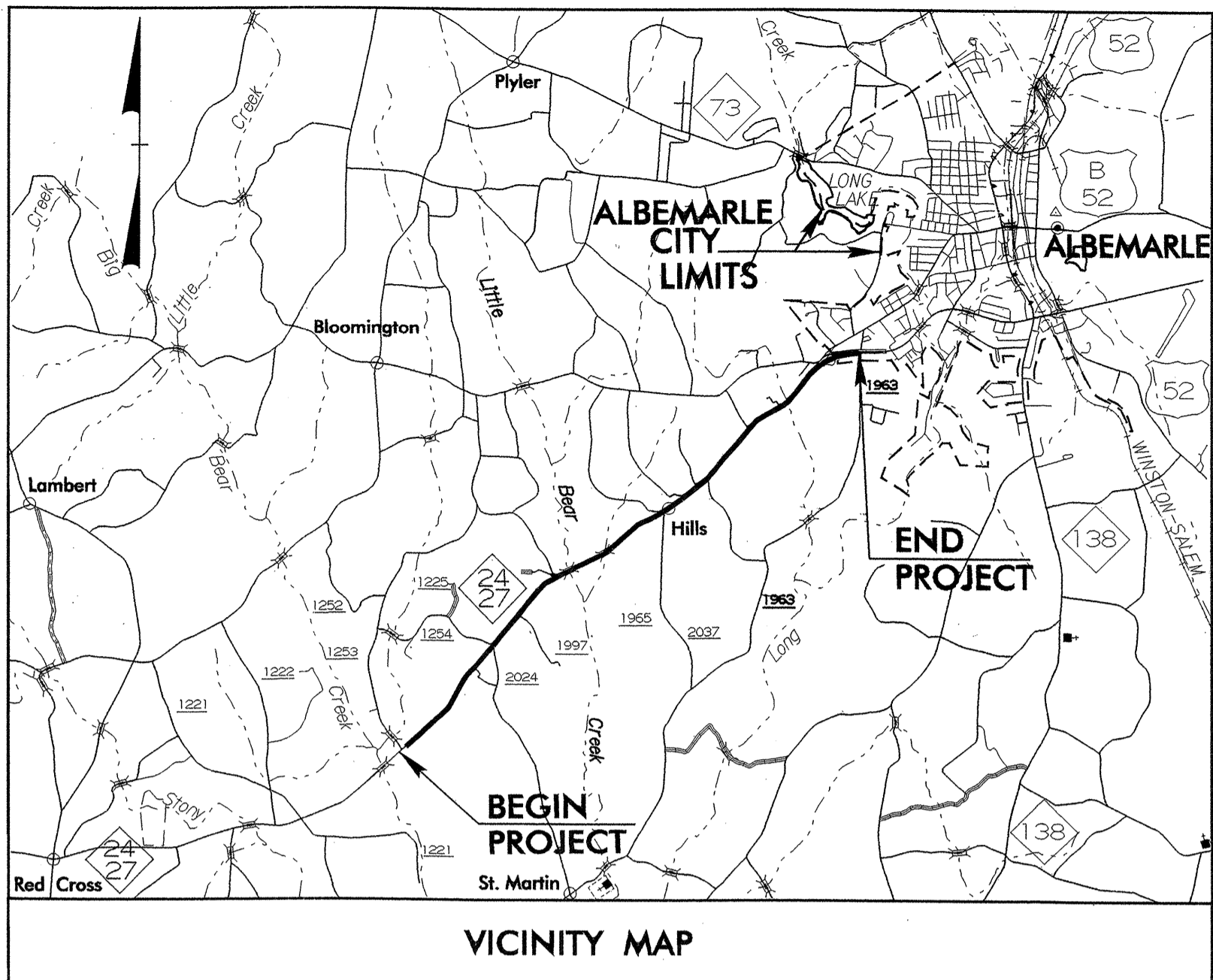


CONTRACT: C201065  
 R-0967 CC

9/09/99

See Sheet 1-A For Index of Sheets



STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS

# STANLY COUNTY

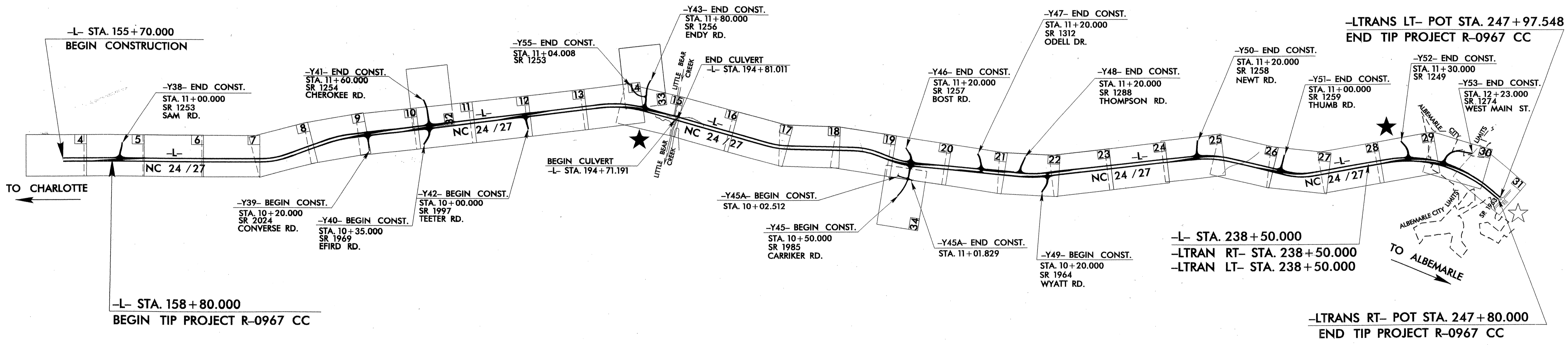
**LOCATION: NC 24/27 FROM EAST OF BIG BEAR CREEK  
 TO SR 1963 (SAINT MARTIN RD.) IN ALBEMARLE**

**TYPE OF WORK: GRADING, DRAINAGE, CULVERT EXTENSIONS,  
 PAVING AND SIGNALS.**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-0967 CC	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34355.1.1		PE	
34355.2.5		RW, UTL	
34355.3.12		CONST.	

ALL DIMENSIONS IN  
 THESE PLANS ARE IN METERS

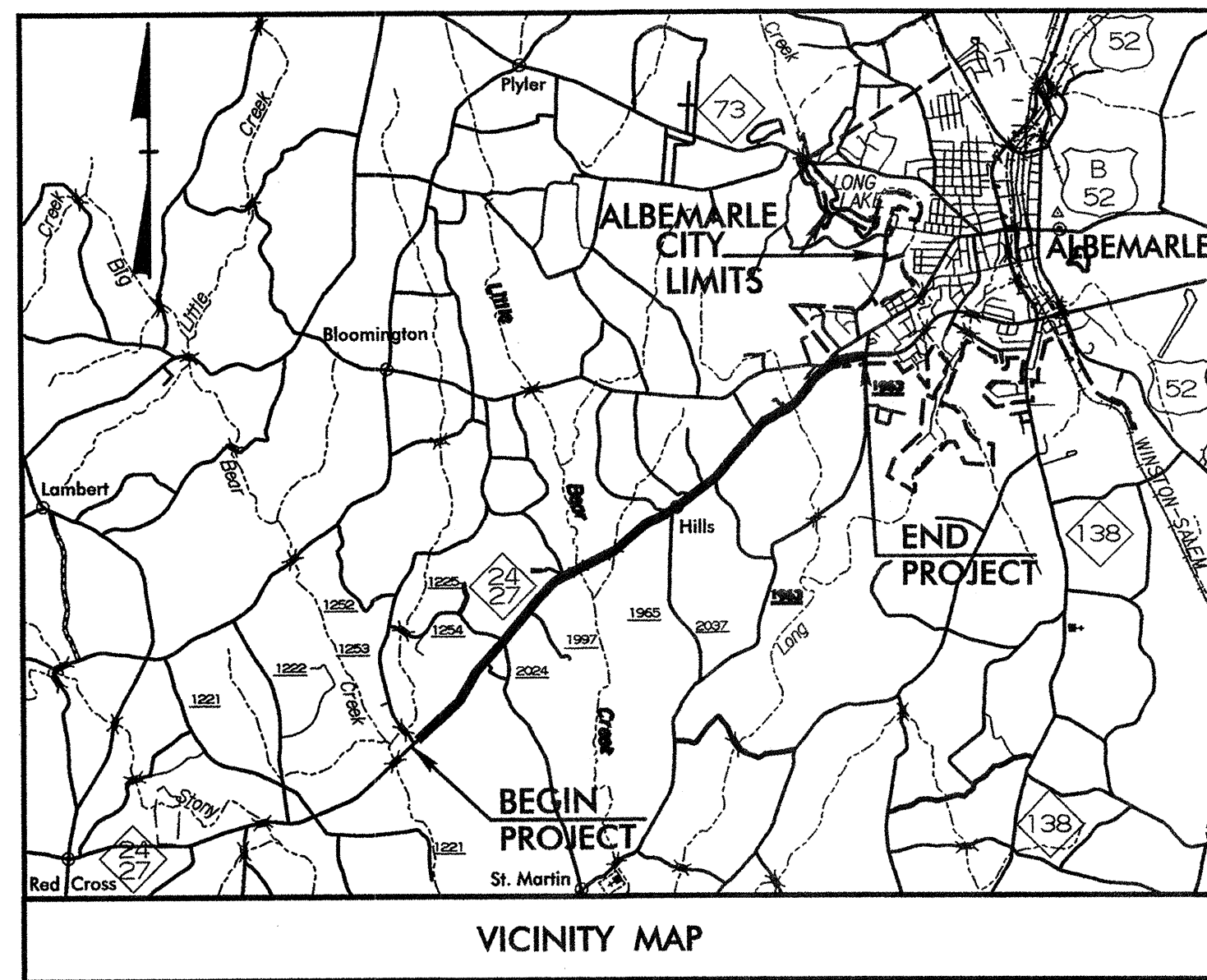
Part 2 of 2



★ NEW SIGNAL  
 ☆ EXIST. SIGNAL UPGRADED

01-MAR-2005 07:53  
 R:\Projects\10-067\c201065\at RD206395

R-0967 CC

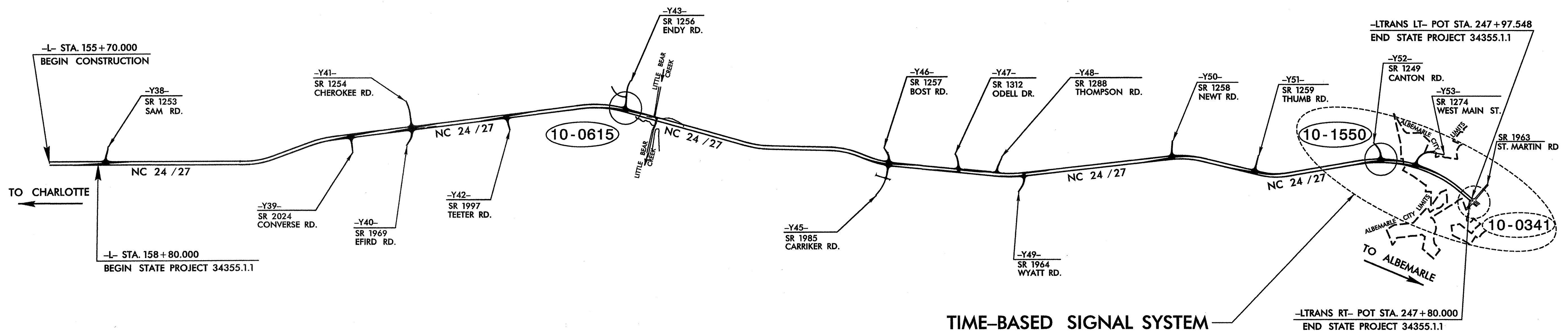


STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**STANLY COUNTY**

**LOCATION: NC 24 /27 FROM EAST OF BIG BEAR CREEK  
TO SR 1963 (SAINT MARTIN ROAD)  
IN ALBEMARLE**

**TYPE OF WORK: TRAFFIC SIGNALS**



**PLANS PREPARED BY**

**ARCADIS G&M**  
of North Carolina, Inc.

**TYSON A. GRAVES, P.E.**  
**KENNETH E. MILAM, P.E.**  
**XUEJUN FAN, P.E.**

**INDEX OF PLANS**

SHEET NUMBER	SIGNAL INVENTORY NUMBER	LOCATION /DESCRIPTION
SIG. 1	---	TITLE SHEET
SIG. 2	10-0615	NC 24 /27 AT SR 1256 (ENDY ROAD)
SIG. 7	10-1550	NC 24 /27 AT SR 1249 (CANTON ROAD)
SIG. 11	10-0341	NC 24 /27 AT SR 1963 (ST. MARTIN ROAD)
SIG. 17	NA	METAL POLE TYPICALS
SIG. 21	NA	2070L CABINET TYPICALS

**LEGEND**

- XX-XXXX SIGNAL INVENTORY NUMBER
- EXISTING SIGNAL
- NEW SIGNAL

**NCDOT CONTACTS**

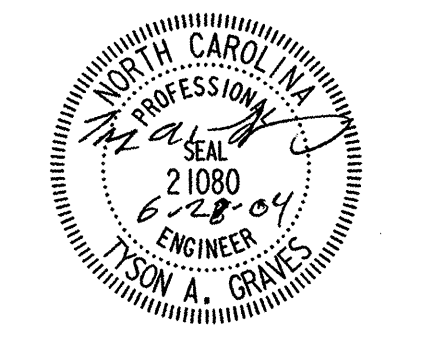
**D.Y. ISHAK - SIGNALS AND GEOMETRICS CONTRACTS ENGINEER**

**G.C. BROWN, P.E. - SIGNAL EQUIPMENT DESIGN ENGINEER**



ALL DIMENSIONS IN THESE PLANS ARE IN METERS UNLESS OTHERWISE NOTED

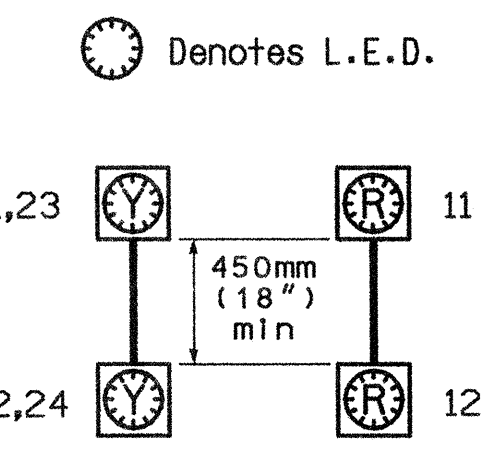
**SEAL**



SEAL NOT VALID UNLESS SIGNED AND DATED

SIGNAL FACE	INTERVAL	
	1	2
11	ON	OFF
12	OFF	ON
21,23	ON	OFF
22,24	OFF	ON

**SIGNAL FACE I.D.**

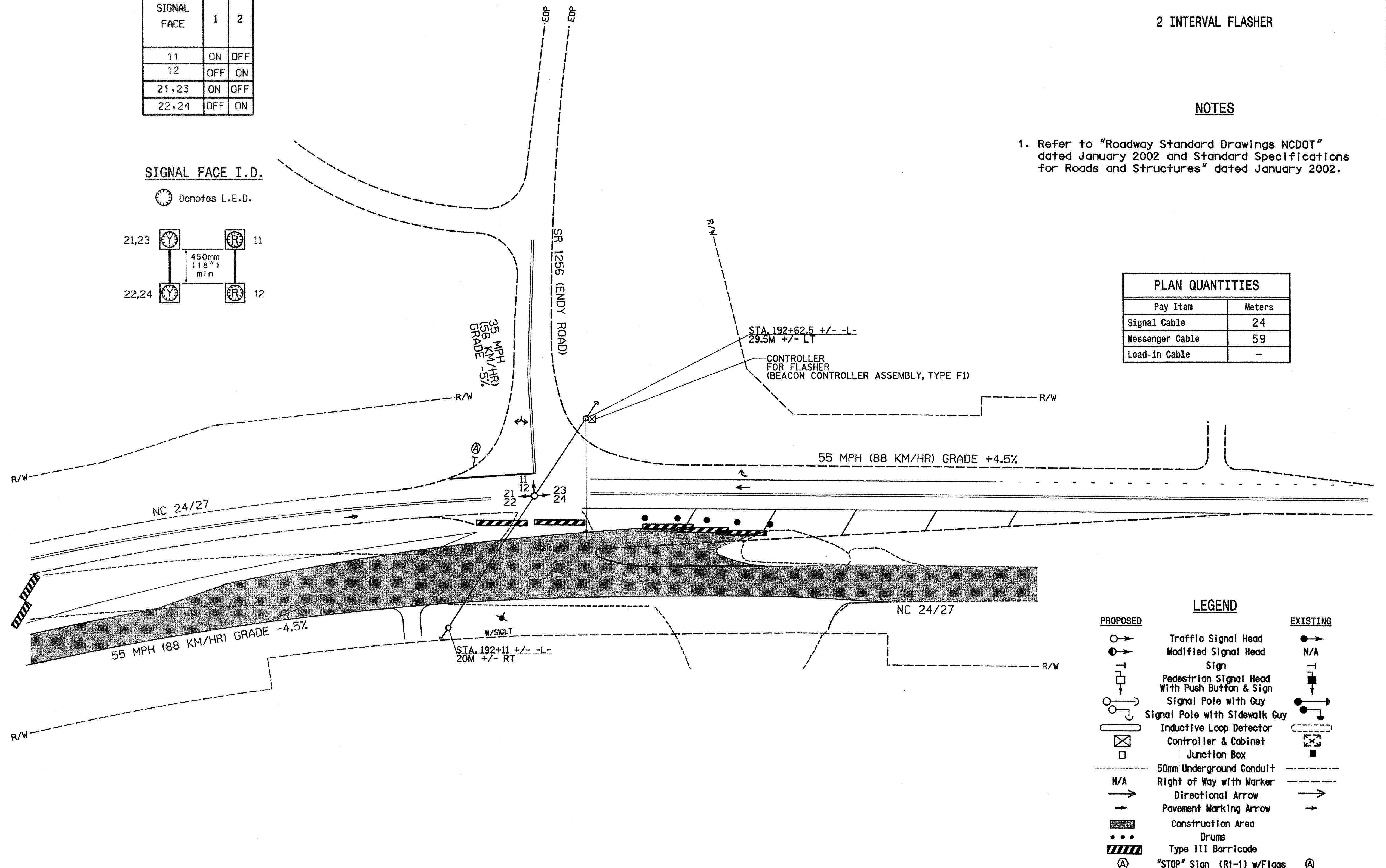


**2 INTERVAL FLASHER**

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and Standard Specifications for Roads and Structures" dated January 2002.

PLAN QUANTITIES	
Pay Item	Meters
Signal Cable	24
Messenger Cable	59
Lead-in Cable	-



LEGEND	
PROPOSED	EXISTING
	Traffic Signal Head
	Modified Signal Head
	Sign
	Pedestrian Signal Head
	Signal Pole with Guy
	Inductive Loop Detector
	Controller & Cabinet
	Junction Box
	50mm Underground Conduit
	Right of Way with Marker
	Directional Arrow
	Pavement Marking Arrow
	Construction Area
	Drums
	Type III Barricade
	"STOP" Sign (R1-1) w/Flags

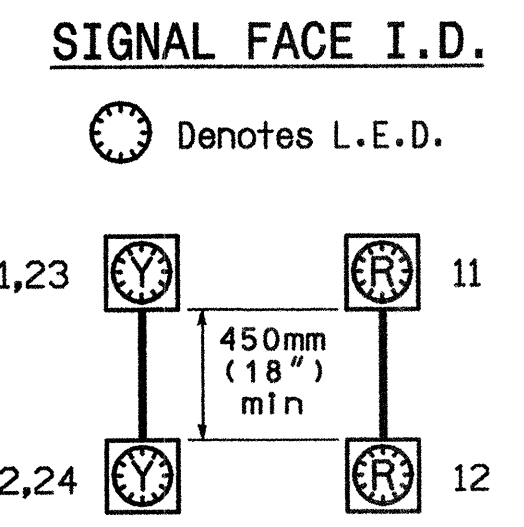
SIGNAL UPGRADE - TEMPORARY 1 SEE TCP PHASE II

	<b>NC 24/27</b> <b>AT</b> <b>SR 1256 (ENDY ROAD)</b>	
	DIVISION 10 STANLY COUNTY ALBEMARLE	
PLAN DATE: OCT 2004 PREPARED BY: X. FAN	REVIEWED BY: REVIEWED BY:	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER JASON A. GRAVES License No. 21080
SCALE 1:500	REVISIONS INIT. DATE	SIGNATURE DATE

**ARCADIS**  
 G & M of North Carolina, Inc.  
 WWW.ARCADIS-US.COM  
 801 Corporate Center Drive, Suite 300  
 Raleigh, NC 27607-5073  
 Tel: 919/854-1282 Fax: 919/854-5448

\*\*\*\*\*SYTIME\*\*\*\*\*  
 \*\*\*\*\*DIGIT\*\*\*\*\*  
 \*\*\*\*\*SERIAL\*\*\*\*\*

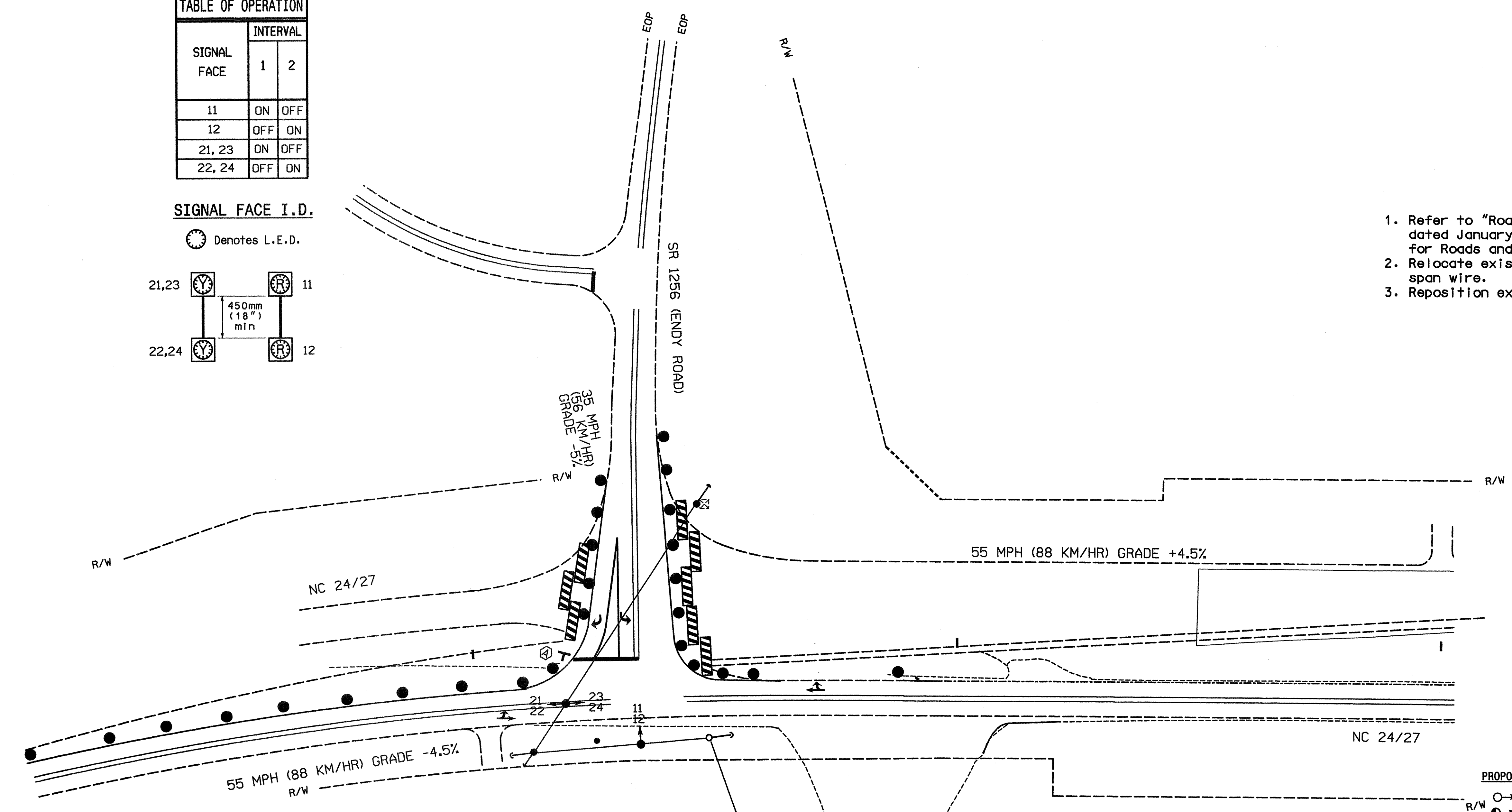
SIGNAL FACE	INTERVAL	
	1	2
11	ON	OFF
12	OFF	ON
21, 23	ON	OFF
22, 24	OFF	ON



2 INTERVAL FLASHER

**NOTES**

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and Standard Specifications for Roads and Structures" dated January 2002.
2. Relocate existing signal heads 11, 12, onto new span wire.
3. Reposition existing signal heads 21, 22, 23, & 24.



STA 192+48 +/- -L-  
18.5M +/- -RT

Pay Item	Meters
Signal Cable	84
Messenger Cable	36
Lead-in Cable	-

PROPOSED	EXISTING
	N/A
N/A	

TEMPORARY SIGNAL FLASHER (2) SEE TCP PHASE III

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Tel: 919/854-1282 Fax: 919/854-5448

Prepared in the Offices of:

**NC 24/27 AT SR 1256 (ENDY ROAD)**

DIVISION 10 STANLY COUNTY ALBEMARLE

PLAN DATE: OCT 2004 REVIEWED BY:  
 PREPARED BY: K MILAM REVIEWED BY:

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

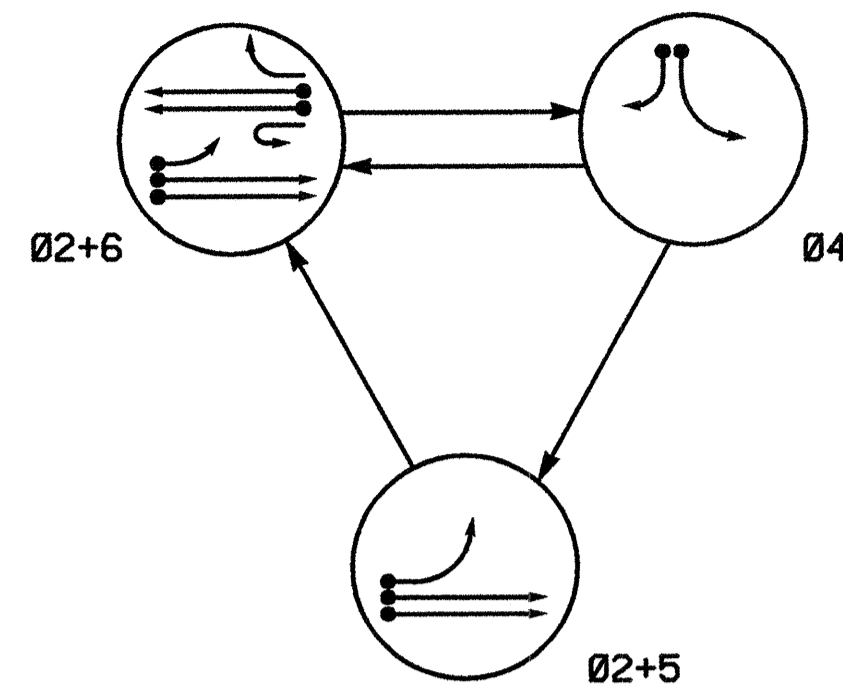
SCALE: 1:500

SEAL: \_\_\_\_\_  
 SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

SIG. INVENTORY NO. 10-06152REV

\*\*\*\*\*SYSTEMS\*\*\*\*\*  
 \*\*\*\*\*SERIALS\*\*\*\*\*  
 \*\*\*\*\*SERIALS\*\*\*\*\*

PHASING DIAGRAM



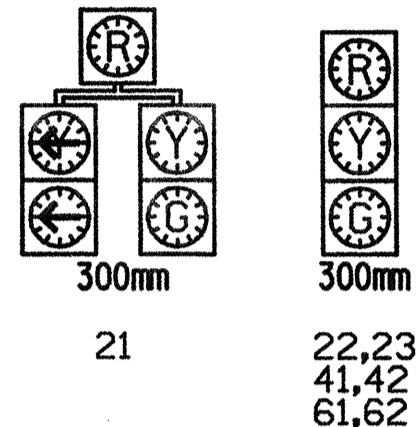
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE			
	Ø 2+5	Ø 2+6	Ø 4	FLASH
21	G	R	Y	
22,23	G	G	R	Y
41,42	R	R	G	R
61,62	R	G	R	Y

SIGNAL FACE I.D.

○ Denotes L.E.D.

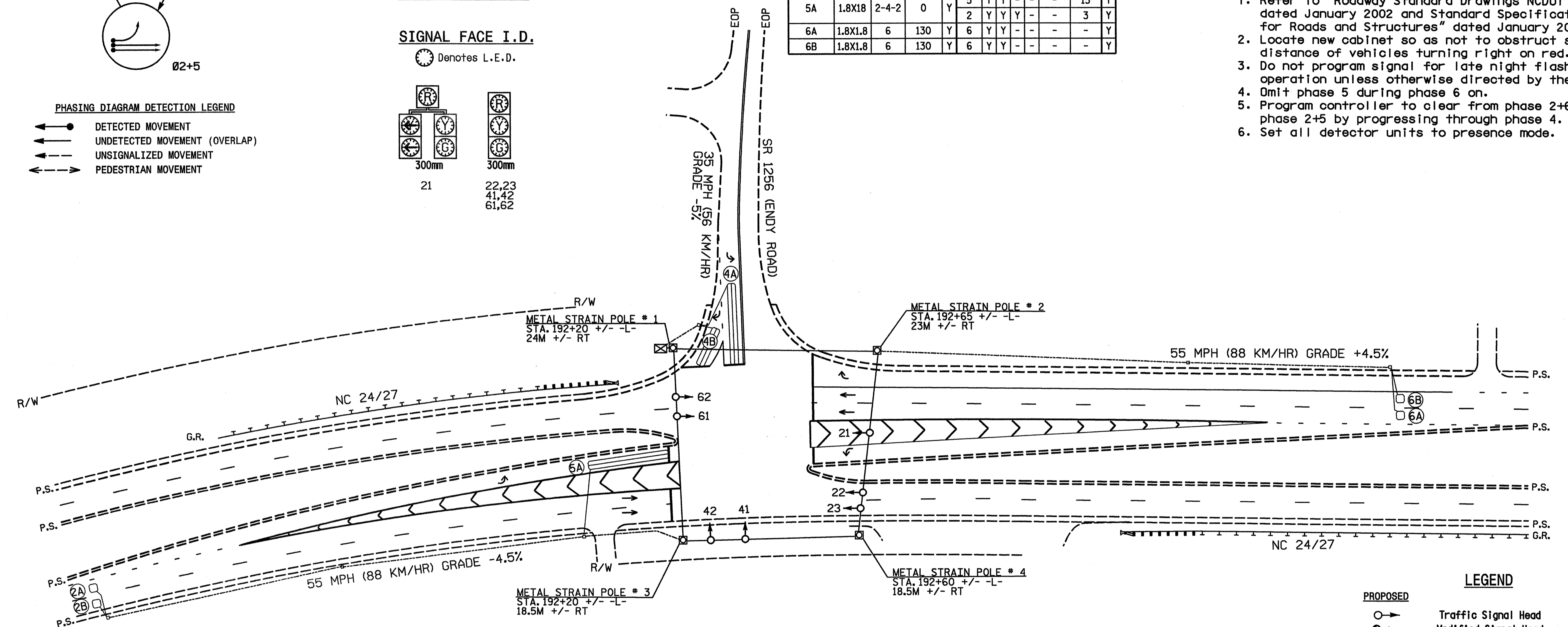


2070L LOOP & DETECTOR INSTALLATION												
INDUCTIVE LOOPS				DETECTOR PROGRAMMING								
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
2A	1.8X1.8	5	130	Y	2	Y	Y	-	-	-	-	Y
2B	1.8X1.8	5	130	Y	2	Y	Y	-	-	-	-	Y
4A	1.8X1.8	2-4-2	0	Y	4	Y	Y	-	-	-	3	Y
4B	1.8X9	2-4-2	0	Y	4	Y	Y	-	-	-	15	Y
5A	1.8X1.8	2-4-2	0	Y	5	Y	Y	-	-	-	15	Y
6A	1.8X1.8	6	130	Y	6	Y	Y	-	-	-	3	Y
6B	1.8X1.8	6	130	Y	6	Y	Y	-	-	-	-	Y

3 PHASE FULLY ACTUATED (ISOLATED)

NOTES

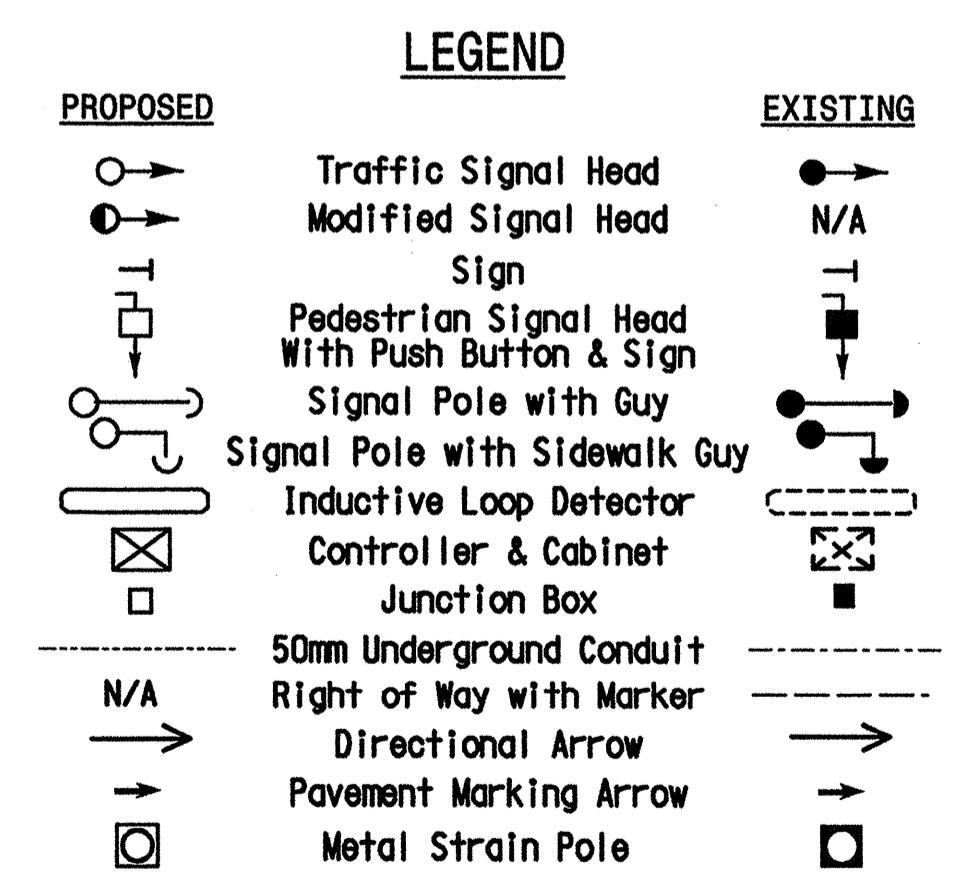
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and Standard Specifications for Roads and Structures" dated January 2002.
2. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
3. Do not program signal for late night flashing operation unless otherwise directed by the engineer.
4. Omit phase 5 during phase 6 on.
5. Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4.
6. Set all detector units to presence mode.



FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	14	7	7	14
Extension 1 *	6.0	1.0	1.0	6.0
Max Green 1 *	100	25	20	100
Yellow Clearance	5.8	4.0	4.0	5.8
Red Clearance	1.5	3.0	2.5	1.5
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	-	1.5
Max Variable Initial *	47	-	-	47
Time Before Reduction *	15	-	-	15
Time To Reduce *	45	-	-	45
Minimum Gap	3.4	-	-	3.4
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.

PLAN QUANTITIES	
Pay Item	Meters
Signal Cable	205
Messenger Cable	170
Lead-in Cable	880



NEW INSTALLATION

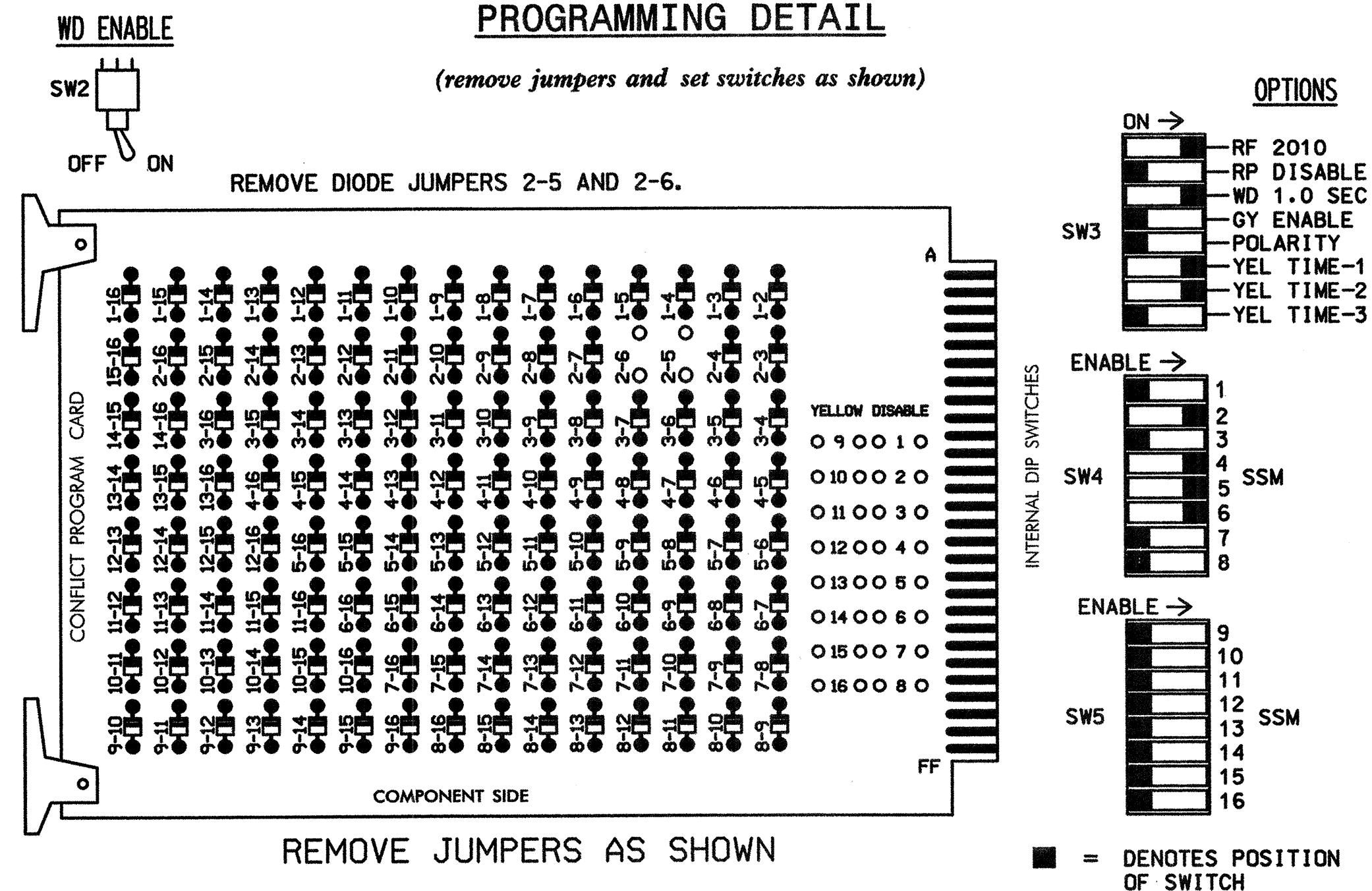
Prepared in the Offices of:  
  
 NC 24/27 AT SR 1256 (ENDY ROAD)  
 DIVISION 10 STANLY COUNTY ALBEMARLE  
 PLAN DATE: OCT 2004 REVIEWED BY:  
 PREPARED BY: X. FAN REVIEWED BY:  
 SCALE: 1:500  
 REVISIONS: INIT. DATE  
 SIGNATURE: DATE  
 SEAL INVENTORY NO. 10-0615

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 Raleigh, NC 27607-5073  
 Tel: 919/854-1282 Fax: 919/854-5448

\*\*\*\*\*SYSTEMTIME\*\*\*\*\*  
 \*\*\*\*\*USER\*\*\*\*\*

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



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.

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, 10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VARIABLE INITIAL AND GAP REDUCTION.

EQUIPMENT INFORMATION

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

FIELD CONNECTION HOOK-UP CHART

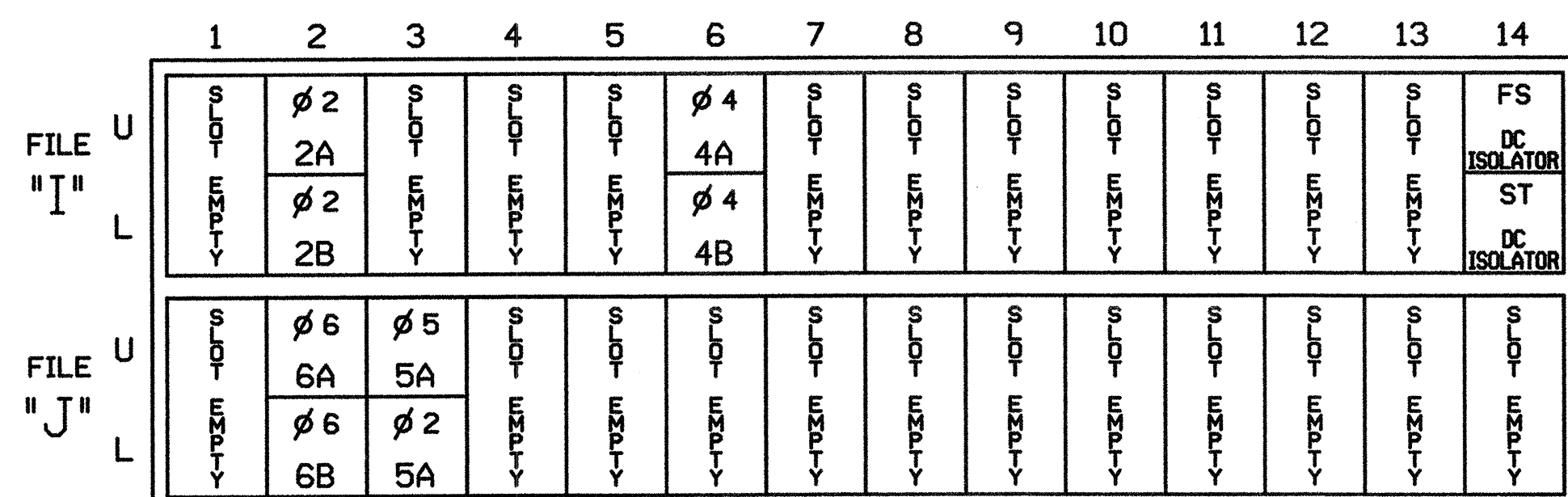
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22, 23	NU	NU	41,42	NU	21	61,62	NU	NU	NU	NU
GREEN		130			103			136				
YELLOW		129			102			135				
RED		128			101		*	134				
RED ARROW												
YELLOW ARROW							132					
GREEN ARROW							133					

NU = NOT USED

\* DENOTES INSTALL LOAD RESISTOR. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

INPUT FILE POSITION LAYOUT

(front view)



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

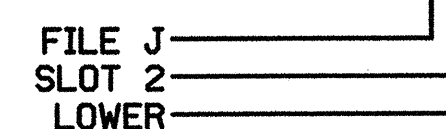
FS = FLASH SENSE  
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

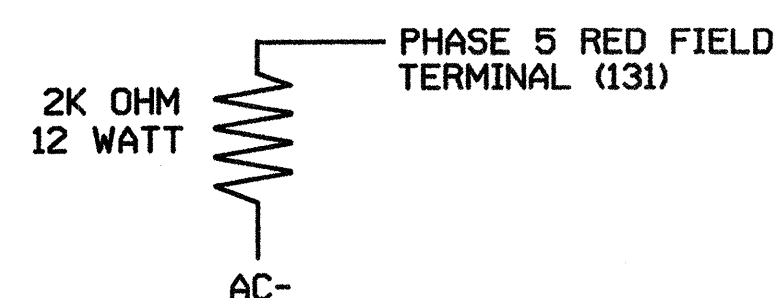
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
5A <sup>1</sup>	TB3-9,10	J3U	64	26	36	5	Y	Y			15
	TB3-11,12	J3L	77	39	46	2	Y	Y	Y		3

<sup>1</sup> INSTALL JUMPER FROM TB3-9 TO TB3-11 AND FROM TB3-10 TO TB3-12.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL



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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0615  
 DESIGNED: OCT 2004  
 SEALED: JAN 04, 2005  
 REVISED:

**ARCADIS**  
 G & M of North Carolina, Inc.  
 WWW.ARCADIS-US.COM  
 801 Corporate Center Drive, Suite 300  
 Raleigh, NC 27607-5073  
 Tel: 919/854-1282 Fax: 919/854-5448

BACK-UP PROTECTION PROGRAMMING DETAIL

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE DYNAMIC/BACKUP CONTROL FUNCTION 1.
- FROM PHASE CONTROL FUNCTIONS MENU PRESS '2' (DYNAMIC/BACKUP CONTROL FUNCTIONS).

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

BACKUP PROTECTION PROGRAMMING COMPLETE

NEW INSTALLATION

ELECTRICAL AND PROGRAMMING DETAILS FOR:

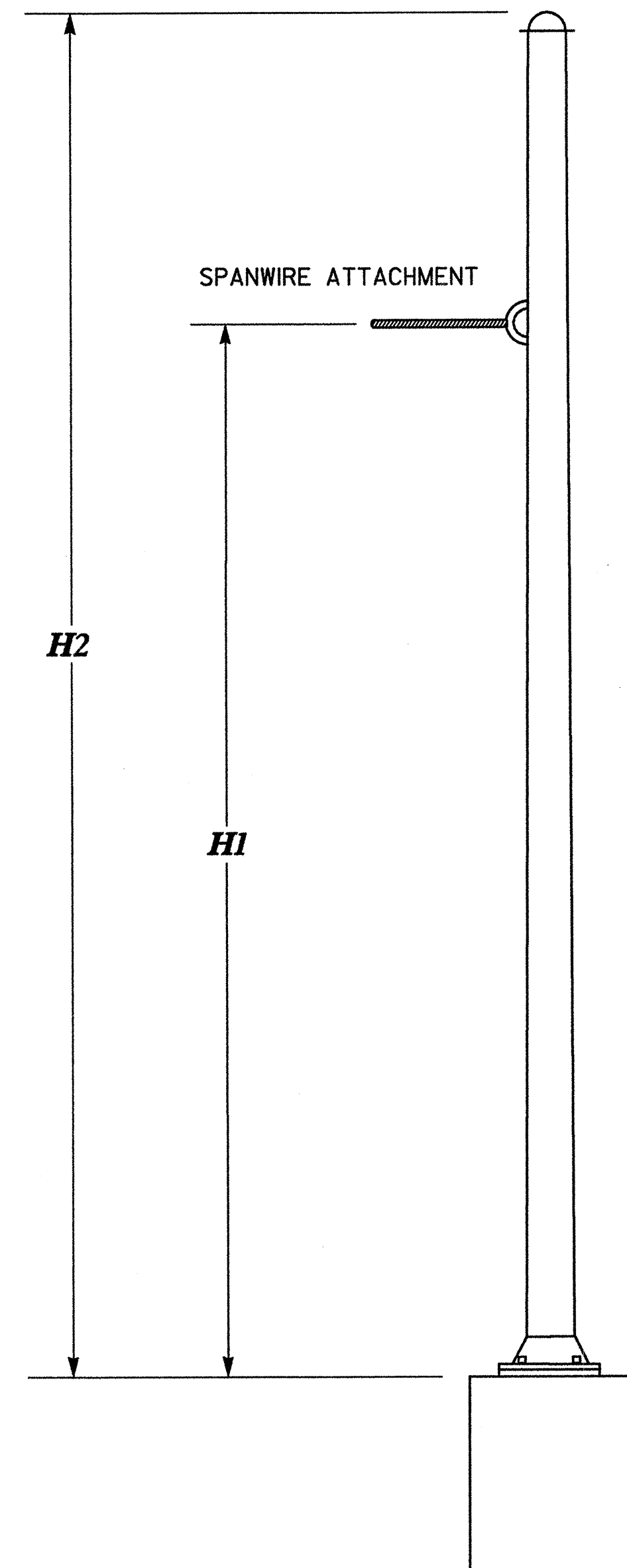
NC 24/27  
 AT  
 SR 1256 (ENDY ROAD)

Prepared in the Office of:  

 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 Signal Management Section

DIVISION 10 STANLY COUNTY ALBEMARLE  
 PLAN DATE: OCT 2004 REVIEWED BY: A. ANCHORS  
 PREPARED BY: A. ANCHORS REVIEWED BY:  
 REVISIONS INIT. DATE  
 SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 15061  
 1-1-05  
 A. ANCHORS  
 SEAL NOT VALID UNLESS SIGNED AND DATED  
 SIGNATURE DATE  
 SIG. INVENTORY NO. 10-0615

\*\*\*\*\*SYTIME\*\*\*\*\*  
 \*\*\*\*\*USER\*\*\*\*\*  
 \*\*\*\*\*USER\*\*\*\*\*



STRAIN POLE ELEVATION

**ATTACHMENT HEIGHT**

POLE NUMBER	SPAN		ATTACHMENT HEIGHT (H1) (feet /m)	POLE HEIGHT (H2) (feet /m)
	FROM POLE	TO POLE		
1	1	2	30.92/9.42	30.8/9.4
	1	3	30.92/9.42	
2	2	1	29.27/8.92	30.9/9.4
	2	4	29.27/8.92	
3	3	1	34.22/10.43	35.8/11
	3	4	34.22/10.43	
4	4	2	34.37/10.48	35.9/11
	4	3	34.37/10.48	

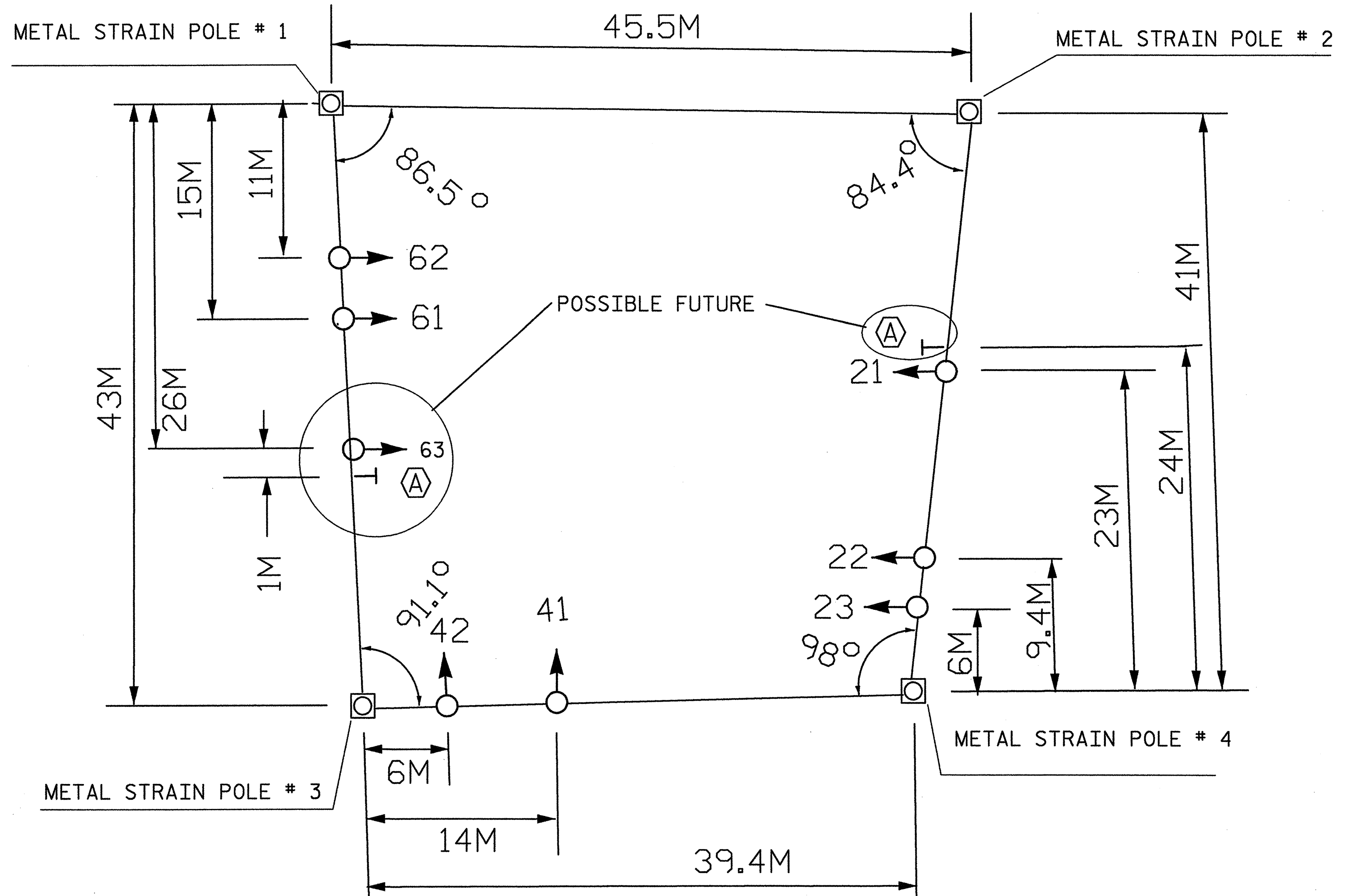
( ASSUMED CLEARANCE 17.7/5.18M, SAG OF 4%)

**LOADING SCHEDULE**

I. D. No.	DESCRIPTION	AREA (m <sup>2</sup> )	SIZE (mm)	WEIGHT (kg)
22,23 41,42 61,62	SIGNAL HEAD 300mm-3 SECTION-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	0.9	650 W X 1340 L	25.4
21 (63)	SIGNAL HEAD 300mm-5 SECTION-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	1.5	1070 W X 1430 L	40.4
(A)	SIGN WITH HANGER	0.5	610 W X 770 L	5.0

**NOTES**

- NO LESS THAN 5.2M(17 FT) OR NO MORE THAN 5.8M(19 FT) CLEARANCE SHALL BE MAINTAINED FROM BOTTOM OF THE LOWEST SIGNAL OR SIGN TO THE HIGHEST POINT ON THE ROADWAY.
- DESIGNS TO BE IN ACCORDANCE TO THE NCDOT STANDARD SPECIFICATIONS, AND STANDARD DRAWINGS (SEC. 1098-15, 1740 & 1742)



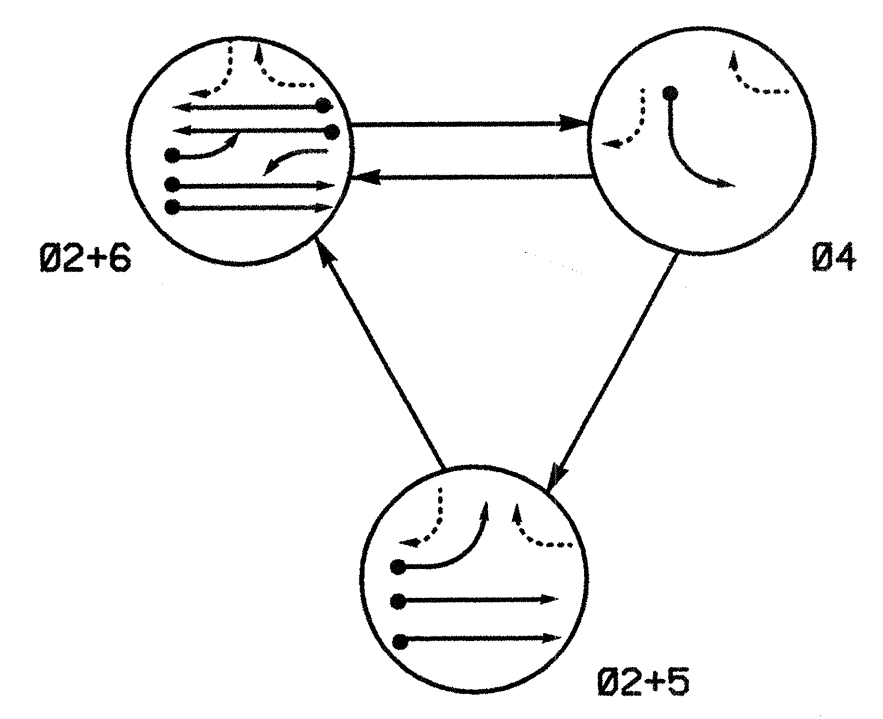
STRAIN-POLE AND SPANWIRE PLAN

FOR DESIGN OF METAL STRAIN POLES 1 THRU 4 AND FOUNDATIONS



<b>METAL STRAIN POLE DETAILS</b> NC 24/27 @ SR 1256 (ENDY RD)		
DIVISION 10	STANLY COUNTY	
REVISIONS		INIT. DATE
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING BRANCH		PREPARED BY: K MILAM REVIEWED BY: S/G NO. 10-0615

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	DETECTOR PROGRAMMING						
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	NEW CARD
2A	1.8X1.8	5	130	Y	2	Y	Y	-	-	-	Y
2B	1.8X1.8	5	130	Y	2	Y	Y	-	-	-	Y
4A	1.8X1.8	2-4-2	0	Y	4	Y	Y	-	-	-	Y
5A	1.8X1.8	2-4-2	0	Y	5	Y	Y	-	-	15	Y
6A	1.8X1.8	5	130	Y	6	Y	Y	-	-	-	Y
6B	1.8X1.8	5	130	Y	6	Y	Y	-	-	-	Y

3 PHASE ACTUATED PROT/PERMISSIVE TIME BASED SYSTEM

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Set all detector units to presence mode.
- Omit phase 5 during phase 6 on.
- Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4.
- Install GPS unit for time synchronization.

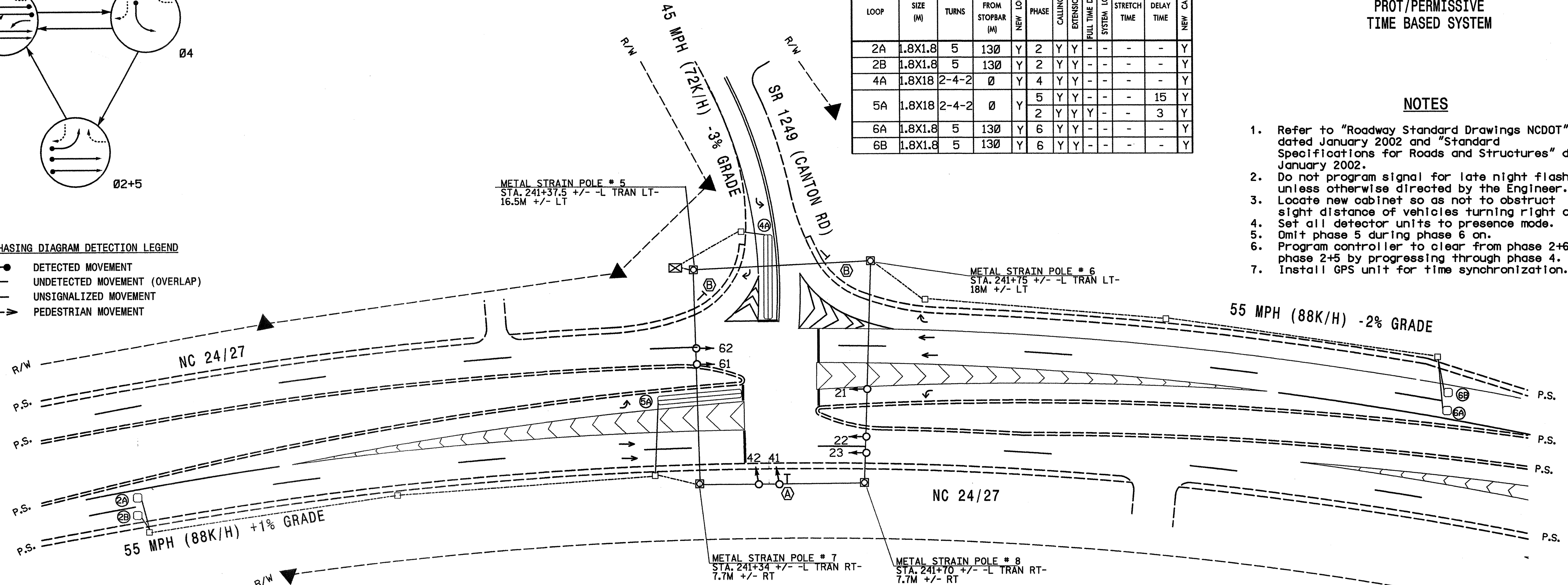


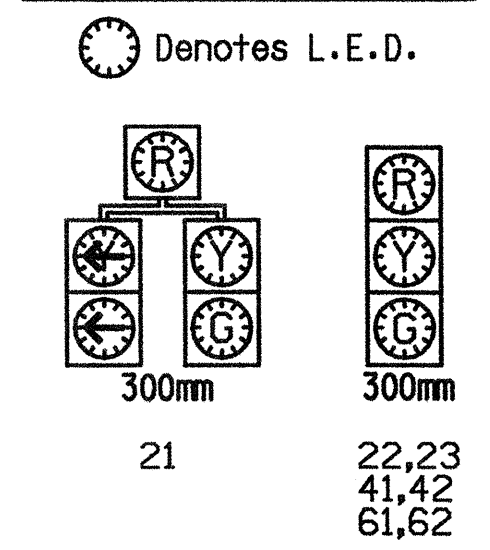
TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02+5	02+6	04	PEDESTRIAN
21	G	R	Y	
22,23	G	G	R	Y
41,42	R	R	G	R
61,62	R	G	R	Y

2070L TIMING CHART

FEATURE	PHASE			
	2	4	5	6
Min Green 1*	14	7	7	14
Extension 1*	6.0	1.0	1.0	6.0
Max Green 1*	100	25	20	100
Yellow Clearance	5.4	4.0	4.0	5.4
Red Clearance	1.0	2.5	1.5	1.0
Walk 1*	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation*	1.5	-	-	1.5
Max Variable Initial*	47	-	-	47
Time Before Reduction*	15	-	-	15
Time To Reduce*	45	-	-	45
Minimum Gap	3.4	-	-	3.4
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

SIGNAL FACE I.D.



LEGEND

- | PROPOSED                                         | EXISTING                                         |
|--------------------------------------------------|--------------------------------------------------|
| ○→ Traffic Signal Head                           | ●→ N/A                                           |
| ○→ 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                 |
| ⊠ Metal Strain Pole                              | ⊠ Metal Strain Pole                              |
| ⊠ Controller & Cabinet Junction Box              | ⊠ Controller & Cabinet Junction Box              |
| --- 50mm Underground Conduit                     | --- 50mm Underground Conduit                     |
| N/A Right of Way with Marker                     | --- Right of Way with Marker                     |
| → Directional Arrow                              | → Directional Arrow                              |
| → Pavement Marking Arrow                         | → Pavement Marking Arrow                         |
| (A) Left Arrow "ONLY" Sign (R3-5L)               | (A) Left Arrow "ONLY" Sign (R3-5L)               |
| (B) "YIELD" Sign (R1-2)                          | (B) "YIELD" Sign (R1-2)                          |

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	215
Messenger Cable	165
Lead-in Cable	860

NEW INSTALLATION

Prepared in the Offices of:

NC 24/27 @ SR 1249 (CANTON RD)

DIV 10 STANLY COUNTY ALBEMARLE

PLAN DATE: MAY 2004 REVIEWED BY:

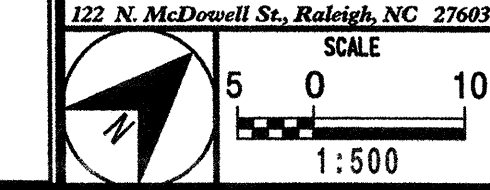
PREPARED BY: K MILAM REVIEWED BY:

REVISIONS INIT. DATE

SIGNATURE: [Signature] DATE: 6-28-04

SIG. INVENTORY NO. 10-1550

G & M of North Carolina, Inc.  
WWW.ARCADIS-US.COM  
801 Corporate Center Drive, Suite 300  
Raleigh, NC 27607-5073  
Tel: 919/854-1282 Fax: 919/854-5448



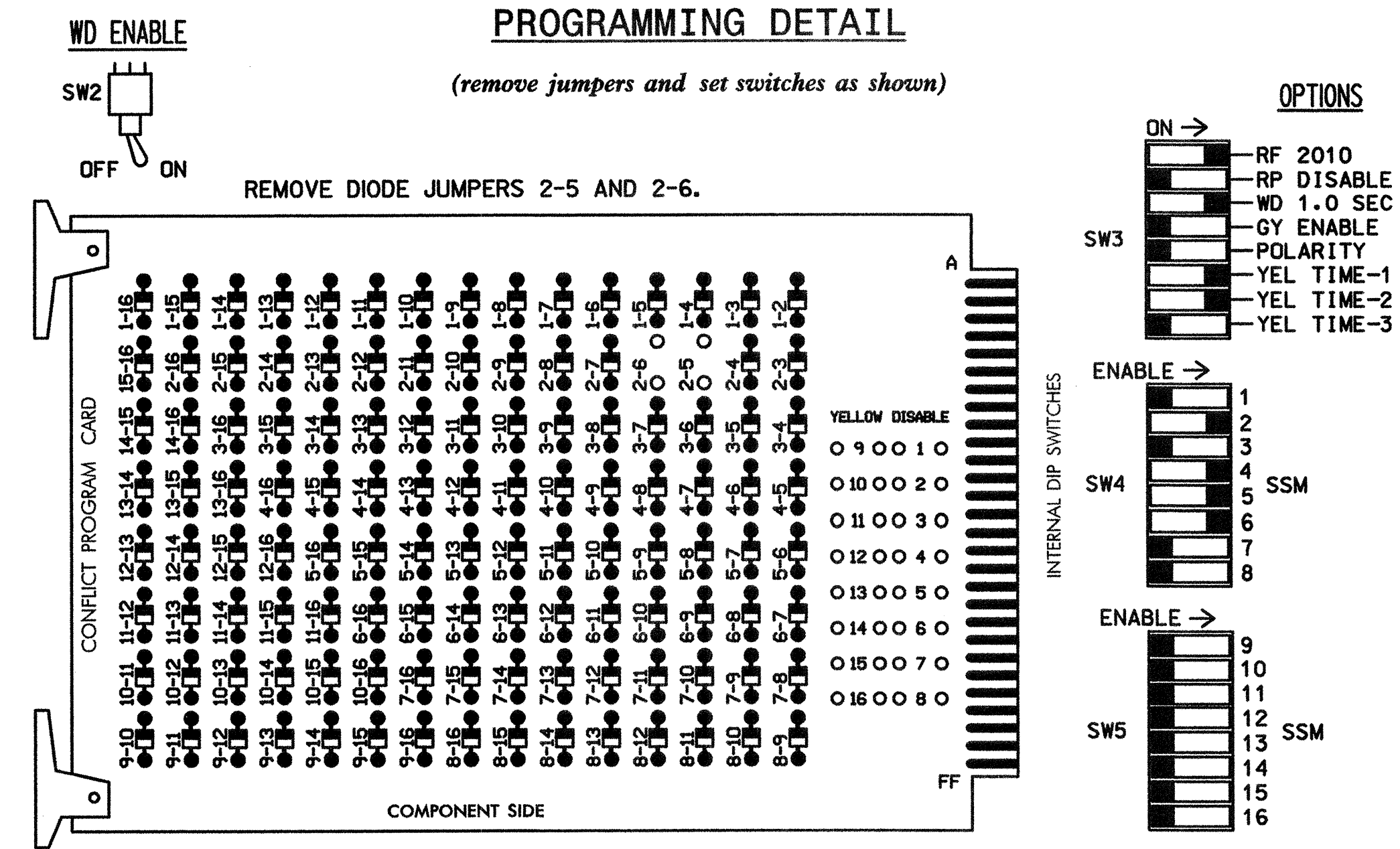
\*\*\*\*\*SYSTEM TIME\*\*\*\*\*  
\*\*\*\*\*USER NAME\*\*\*\*\*



EDI MODEL 2010ECL 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 SEL1-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, 10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VARIABLE INITIAL AND GAP REDUCTION.
- THE CABINET AND CONTROLLER ARE PART OF NC 24/27 TIME-BASED SYSTEM.

EQUIPMENT INFORMATION

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

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	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22, 23	NU	NU	41,42	NU	21	61,62	NU	NU	NU	NU
GREEN		130			103			136				
YELLOW		129			102			135				
RED		128			101		*	134				
RED ARROW												
YELLOW ARROW								132				
GREEN ARROW								133				
⚠												
✋												

NU = NOT USED  
 \* DENOTES INSTALL LOAD RESISTOR. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

INPUT FILE POSITION LAYOUT

(from view)

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

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

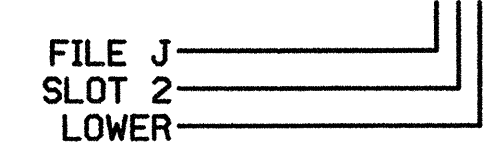
FS = FLASH SENSE  
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

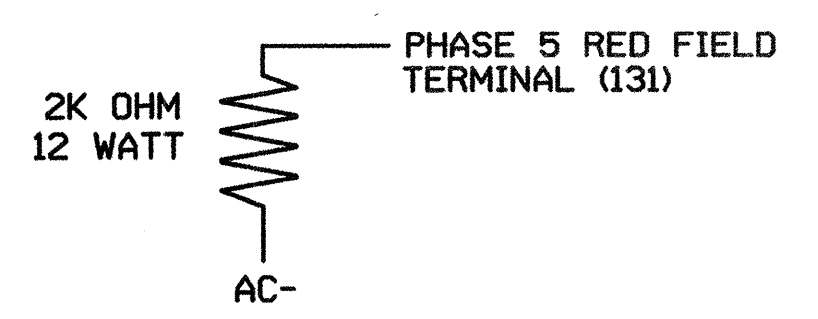
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
5A <sup>1</sup>	TB3-9,10	J3U	64	26	36	5	Y	Y			15
	TB3-11,12	J3L	77	39	46	2	Y	Y			3

<sup>1</sup> INSTALL JUMPER FROM TB3-9 TO TB3-11 AND FROM TB3-10 TO TB3-12.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL



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

BACK-UP PROTECTION PROGRAMMING DETAIL

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE DYNAMIC/BACKUP CONTROL FUNCTION 1.
- FROM PHASE CONTROL FUNCTIONS MENU PRESS '2' (DYNAMIC/BACKUP CONTROL FUNCTIONS).

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

BACKUP PROTECTION PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1551  
 DESIGNED: MAY 2004  
 SEALED: JUNE 28, 2004  
 REVISED:

**ARCADIS**  
 G & M of North Carolina, Inc.  
 WWW.ARCADIS-US.COM  
 801 Corporate Center Drive, Suite 300  
 Raleigh, NC 27607-5073  
 Tel: 919/854-1282 Fax: 919/854-5448

NEW INSTALLATION

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

SEAL

NC 24/27 AT SR 1249 (CANTON ROAD)

DIVISION 10 STANLY COUNTY ALBEMARLE

PLAN DATE: MAY 2004 REVIEWED BY: A. ANCHORS

PREPARED BY: A. ANCHORS REVIEWED BY:

REVISIONS INIT. DATE

SEAL

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 ENGINEER  
 ARTHUR L. ANCHORS  
 10-26-04  
 15061

SEAL NOT VALID UNLESS SIGNED AND DATED

SIGNATURE DATE

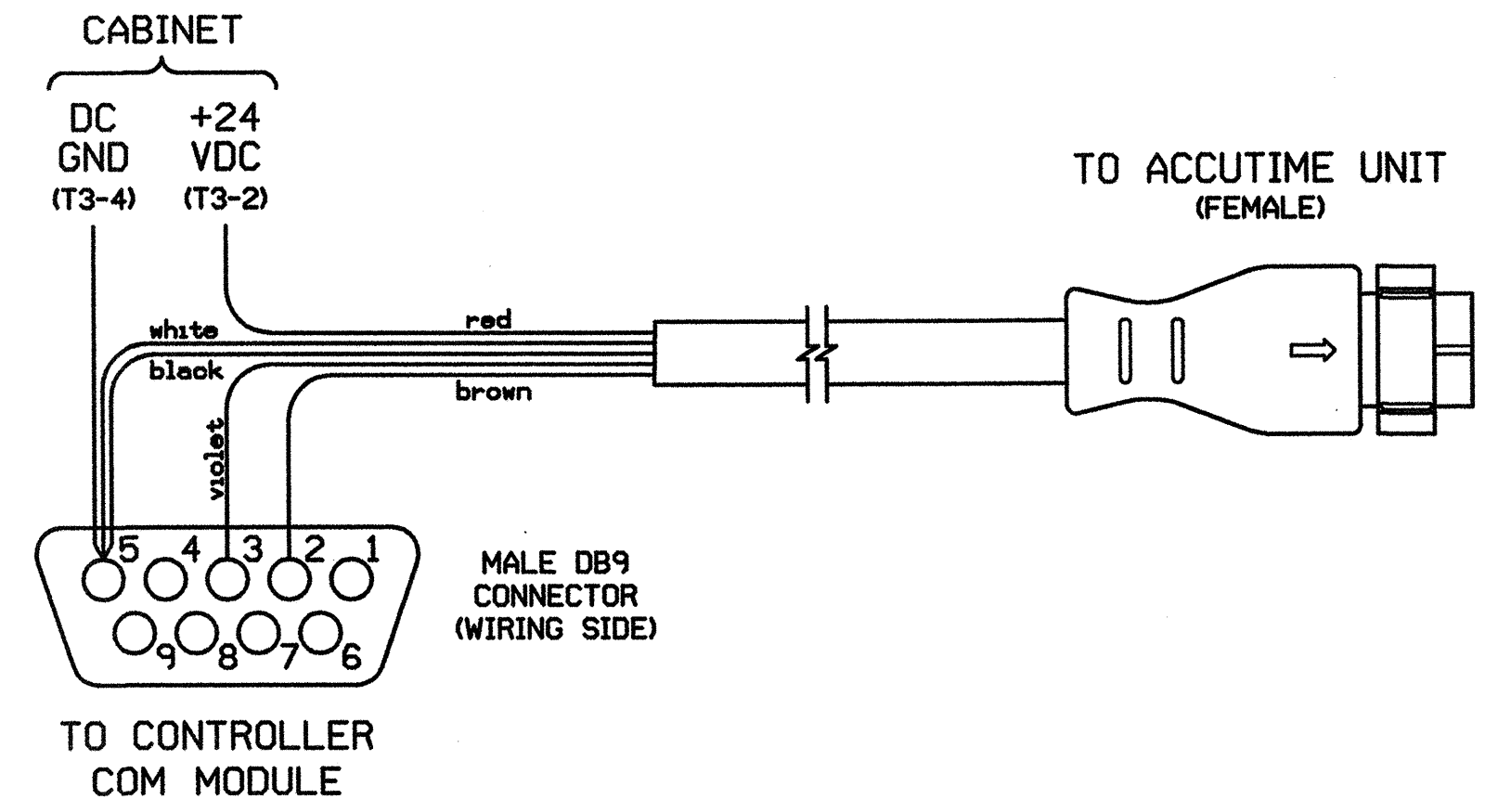
SIG. INVENTORY NO. 10-1550

\*\*\*\*\*SYSTEM TIME\*\*\*\*\*  
 \*\*\*\*\*USER NAME\*\*\*\*\*

10/25/2004 3:26:51 PM

**CONNECTOR WIRING DETAIL FOR ACCUTIME 2000  
WITH RS232 INTERFACE**

*(make connections as shown)*



SIGNAL DESCRIPTION	12 CONDUCTOR CABLE COLOR	ACCUTIME CØNNECTOR	DB9 TO CØNTROLLER	CABINET CØNNECTION
DC POWER	RED	PIN 1		T3-2
PORT B: RECEIVE	VIOLET	PIN 2	PIN 3	
PORT B: TRANSMIT	BROWN	PIN 4	PIN 2	
PORT A: RECEIVE	WHITE	PIN 6	PIN 5	
DC GROUND	BLACK	PIN 9	PIN 5	T3-4

NOTE: ALL OTHER WIRES IN THE ACCUTIME CABLE ARE UNUSED AND SHOULD BE TIED OFF.

THE COM PORT USED BY THE ACCUTIME UNIT NEEDS TO BE CONFIGURED IN THE OASIS SOFTWARE USING THE SETTING BELOW:

- \* TRIMBLE TSIP GPS PROTOCOL
- \* 9600 BAUD
- \* 8 DATA BITS
- \* 1 STOP BIT
- \* ODD PARITY

FOR EAGLE 2070 CONTROLLERS, THE CURRENT TIME AND DATE MUST BE SET IN THE OS-9 SHELL, NOT IN OASIS.

SHEET 2 OF 2

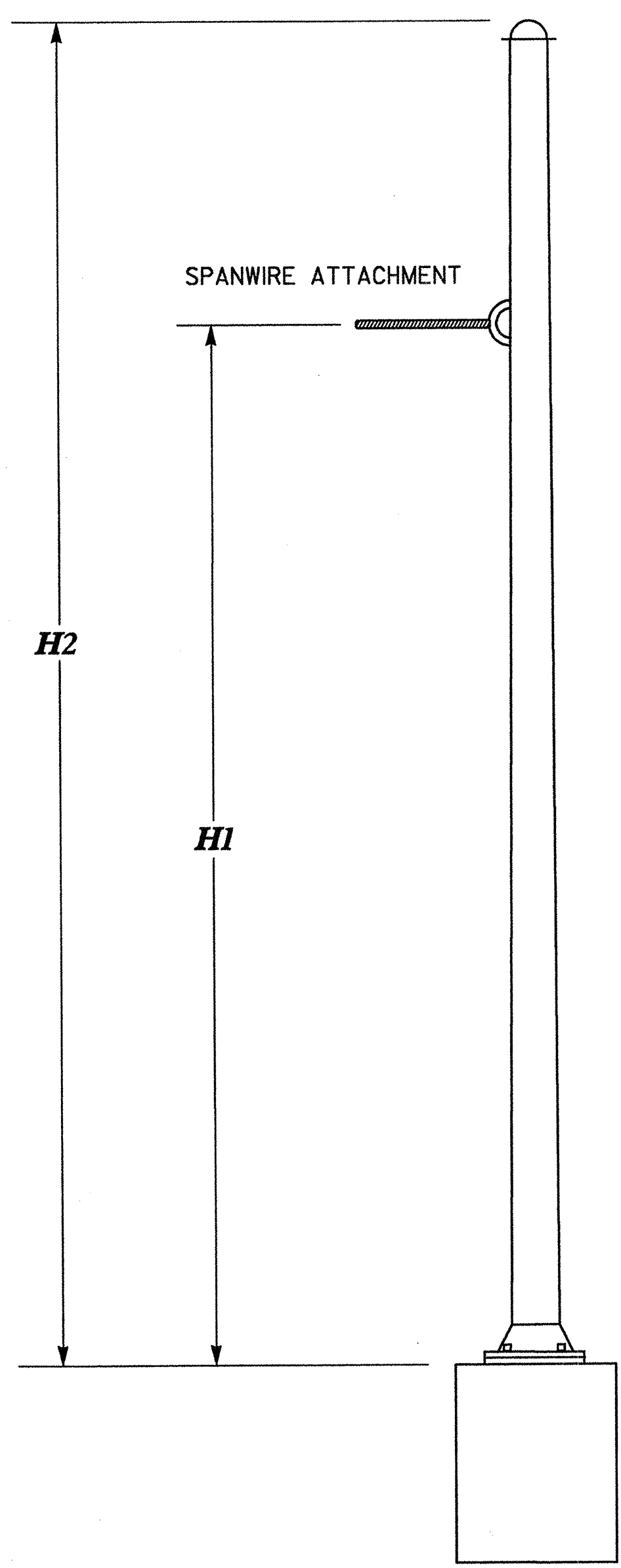
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1551  
DESIGNED: MAY 2004  
SEALED: JUNE 28, 2004  
REVISED:

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Raleigh, NC 27607-5073  
Tel: 919/854-1282 Fax: 919/854-5448

NEW INSTALLATION

ELECTRICAL AND PROGRAMMING DETAILS FOR: 	<b>NC 24/27 AT SR 1249 (CANTON ROAD)</b>		<b>SEAL</b> 
	DIVISION 10 STANLY COUNTY ALBEMARLE PLAN DATE: MAY 2004 REVIEWED BY: A. ANCHORS PREPARED BY: A. ANCHORS REVIEWED BY:	REVISIONS INIT. DATE	

\*\*\*\*\*SYSTEM\*\*\*\*\*  
\*\*\*\*\*USER\*\*\*\*\*

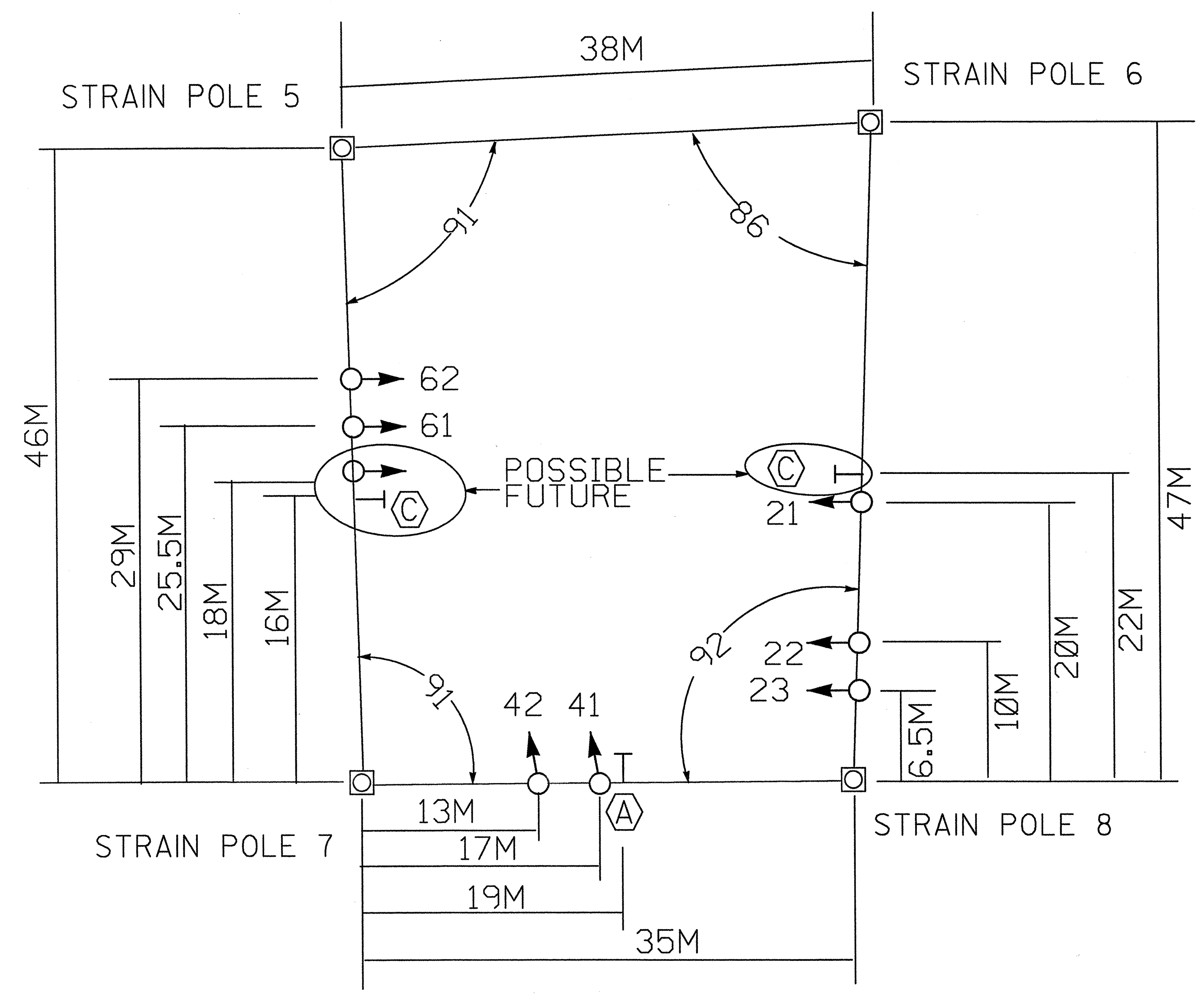


STRAIN POLE ELEVATION

POLE NUMBER	SPAN		ATTACHMENT HEIGHT (H1) (feet/m)	POLE HEIGHT (H2) (feet/m)
	FROM POLE	TO POLE		
5	5	6	28.55/8.70	30.6/9.4
	5	7	29.05/8.86	
6	6	5	28.81/8.78	30.8/9.4
	6	8	29.31/8.94	
7	7	5	36.69/11.19	38.2/11.7
	7	8	36.19/11.03	
8	8	6	36.49/11.13	38/11.6
	8	7	35.99/10.97	

(metal strainpole loads)

LOADING SCHEDULE				
I. D. No.	DESCRIPTION	AREA (m <sup>2</sup> )	SIZE (mm)	WEIGHT (kg)
22,23 41,42 61,62	SIGNAL HEAD 300mm-3 SECTION-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	0.9	650 W X 1340 L	25.4
	SIGNAL HEAD 300mm-4 SECTION (T-TYPE)-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	1.5	1070 W X 1430 L	33.1
	SIGNAL HEAD 300mm-4 SECTION (VERTICAL)-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	1.1	650 W X 1680 L	31.3
21 FUT	SIGNAL HEAD 300mm-5 SECTION-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	1.5	1070 W X 1430 L	40.4
C	SIGN WITH HANGER	0.5	610 W X 770 L	5.0
A	SIGN WITH HANGER	0.7	770 W X 920 L	6.3



STRAIN-POLE AND SPANWIRE PLAN

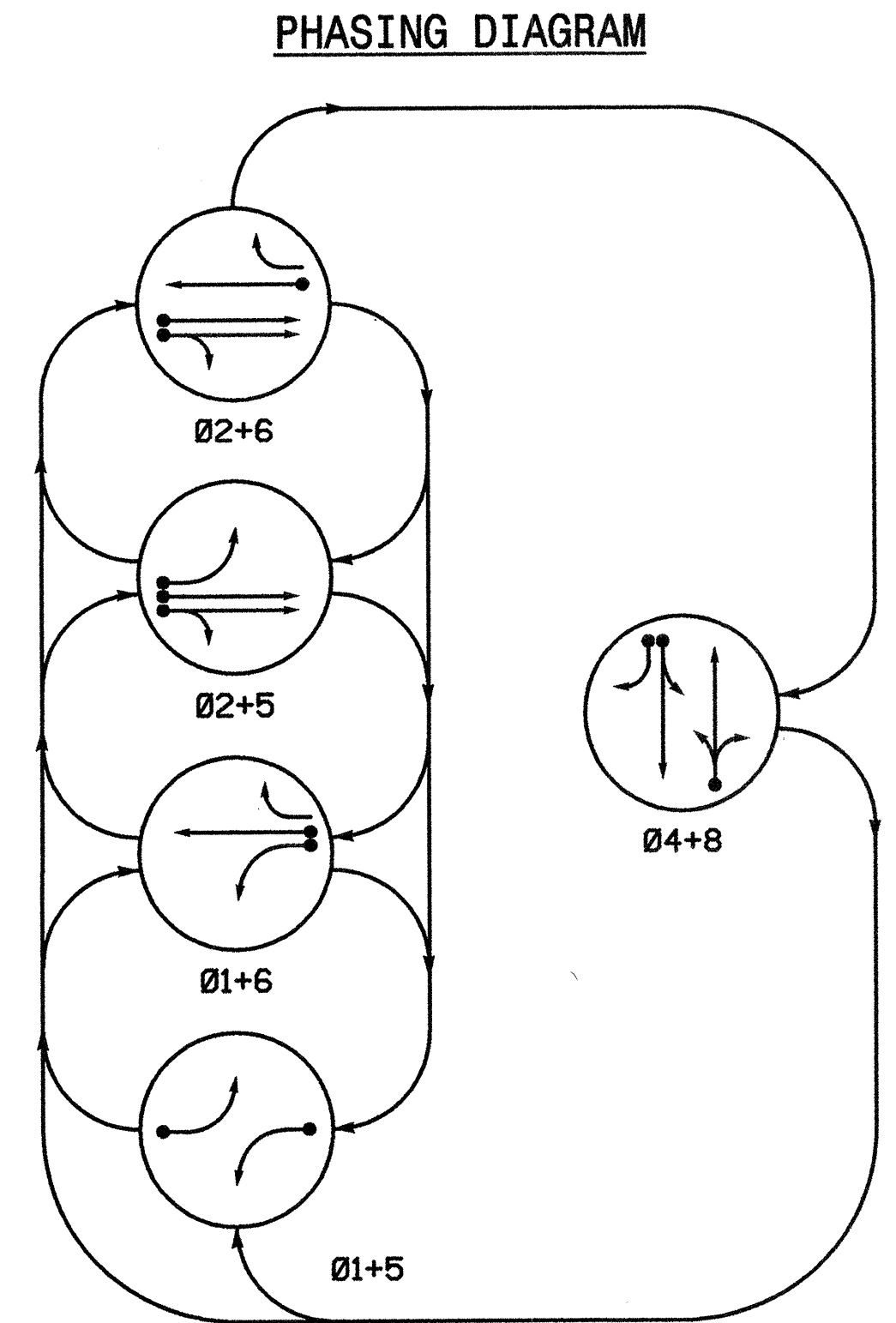
FOR DESIGN OF METAL STRAIN POLES 5 THRU 8 AND FOUNDATIONS

NOTES

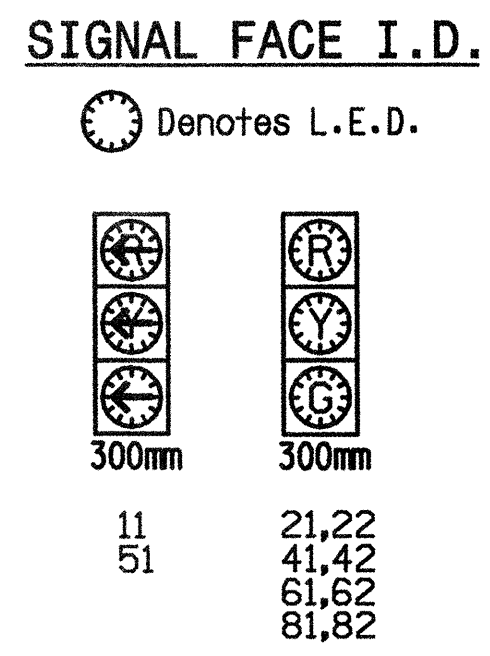
- NO LESS THAN 5.2M(17 FT) OR NO MORE THAN 5.8M(19 FT) CLEARANCE SHALL BE MAINTAINED FROM BOTTOM OF THE LOWEST SIGNAL OR SIGN TO THE HIGHEST POINT ON THE ROADWAY.
- DESIGNS TO BE IN ACCORDANCE TO THE NCDOT STANDARD SPECIFICATIONS, AND STANDARD DRAWINGS (SEC. 1098-15, 1740 & 1742)

**ARCADIS**  
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801 Corporate Center Drive, Suite 300  
Raleigh, NC 27607-5073  
Tel: 919/854-1282 Fax: 919/854-5448

<p>METAL STRAIN POLE DETAILS NC 24/27 @ SR 1249 (CANTON RD)</p>		<p>SEAL NORTH CAROLINA PROFESSIONAL ENGINEER LAWSON A. CRUMBLE SEAL 21080</p>
<p>DIVISION 10 STANLY COUNTY ALBEMARLE</p>		
REVISIONS	INT.	DATE
<p>SCALE: NONE DATE: MAY 2004</p>		<p>PREPARED BY: K MILAM REVIEWED BY: S/G INV. NO. 10-1550</p>
<p>N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING BRANCH</p>		<p>DATE: 6-29-04</p>



SIGNAL FACE	PHASE					
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLIGHT
11			R	R	R	R
21,22	R	R	G	G	R	Y
41	R	R	R	R	G	R
42	R	R	R	R	G	R
51		R		R	R	R
61,62	R	G	R	G	R	Y
81,82	R	R	R	R	G	R



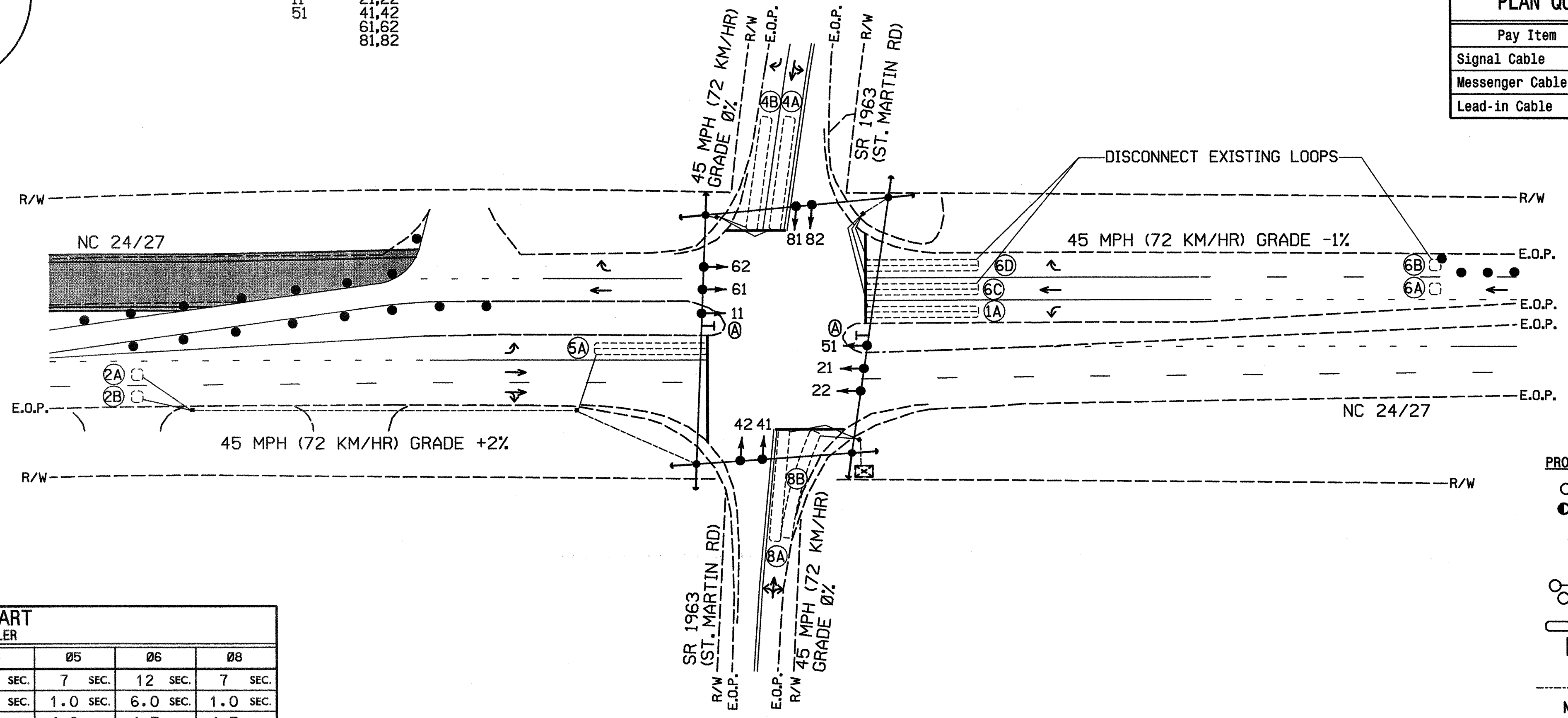
LOOP NO.	SIZE (m)	TURNS	DIST. FROM STOPBAR (m)	INDUCTIVE LOOPS		DETECTOR UNITS					
				NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIME	PLACE CALL DURING PHASE
1A	1.8X18	2-4-2	0	X	1	X	-	-	SEC.	ALL	NO
2A	1.8X18	5	90	X	2	X	-	-	SEC.	ALL	NO
2B	1.8X18	5	90	X	2	X	-	-	SEC.	ALL	NO
4A	1.8X18	2	0	X	4	X	DELAY	3 SEC.	ALL	YES	
4B	1.8X18	2	0	X	4	X	DELAY	15 SEC.	ALL	YES	
5A	1.8X18	2-4-2	0	X	5	X	-	-	SEC.	ALL	NO
6A	1.8X18	5	90	X	6	X	-	-	SEC.	ALL	NO
8A	1.8X18	2	0	X	8	X	DELAY	5 SEC.	ALL	YES	
8B	1.8X18	2	0	X	8	X	DELAY	15 SEC.	ALL	YES	

5 PHASE FULLY ACTUATED (ISOLATED)

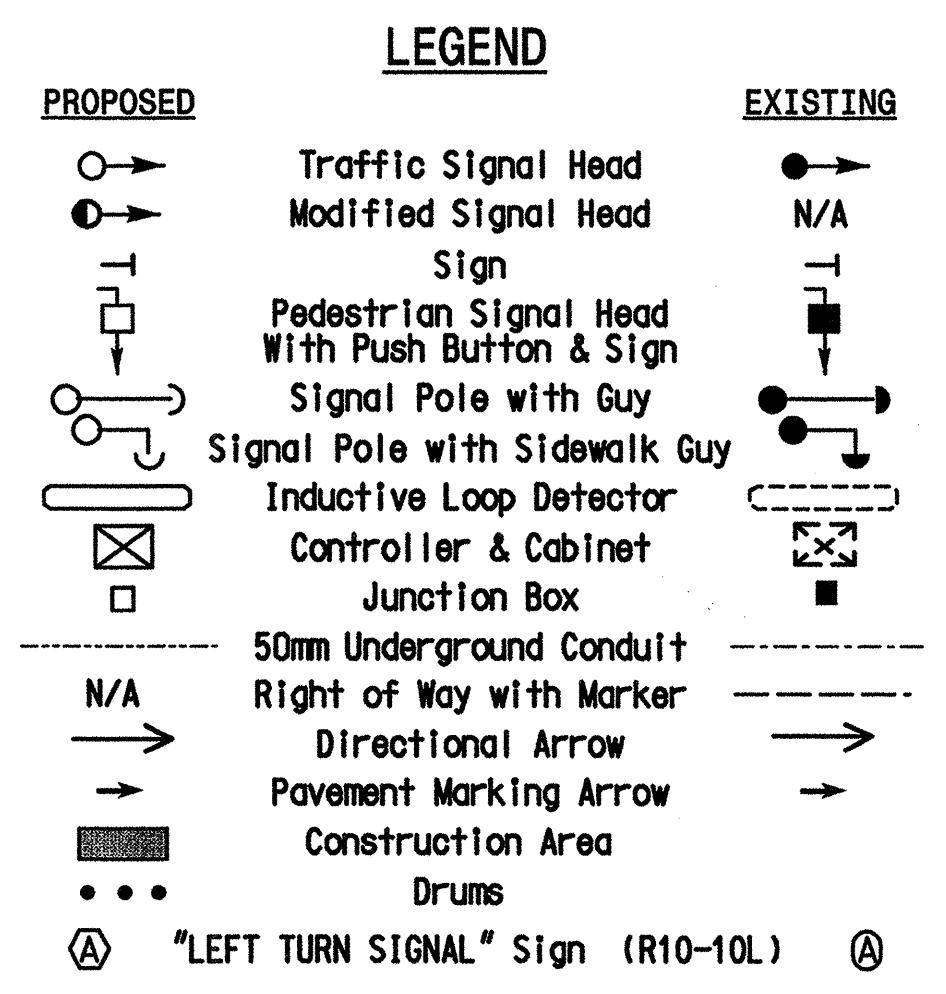
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and Standard Specifications for Roads and Structures" dated January 2002.
2. Pavement markings are existing.
3. Abandon existing loops 6B, 6C and 6D.
4. Do not program signal for late night flashing operation unless otherwise directed by the engineer.
5. Program phase 4 and phase 8 for dual entry.
6. Set all detector units to presence mode.

Pay Item	Meters
Signal Cable	0
Messenger Cable	0
Lead-in Cable	0



PHASE	Ø1	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM GREEN	7 SEC.	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
PASSAGE GAP	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	4.0 SEC.	4.7 SEC.	4.7 SEC.	4.0 SEC.	4.7 SEC.	4.7 SEC.
RED CLEARANCE	2.5 SEC.	1.5 SEC.	1.5 SEC.	2.0 SEC.	1.5 SEC.	1.5 SEC.
MAX. I	20 SEC.	100 SEC.	25 SEC.	20 SEC.	100 SEC.	25 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	LOCK	NONLOCK
WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD	- VEH.	0 VEH.	- VEH.	- VEH.	0 VEH.	- VEH.
SEC. PER ACTUATION	- SEC.	2.5 SEC.	- SEC.	- SEC.	2.5 SEC.	- SEC.
MAX. INITIAL	- SEC.	34 SEC.	- SEC.	- SEC.	34 SEC.	- SEC.
TIME B4 REDUCTION	- SEC.	15 SEC.	- SEC.	- SEC.	15 SEC.	- SEC.
TIME TO REDUCE	- SEC.	45 SEC.	- SEC.	- SEC.	45 SEC.	- SEC.
MINIMUM GAP	- SEC.	3.0 SEC.	- SEC.	- SEC.	3.0 SEC.	- SEC.



SIGNAL UPGRADE - TEMPORARY

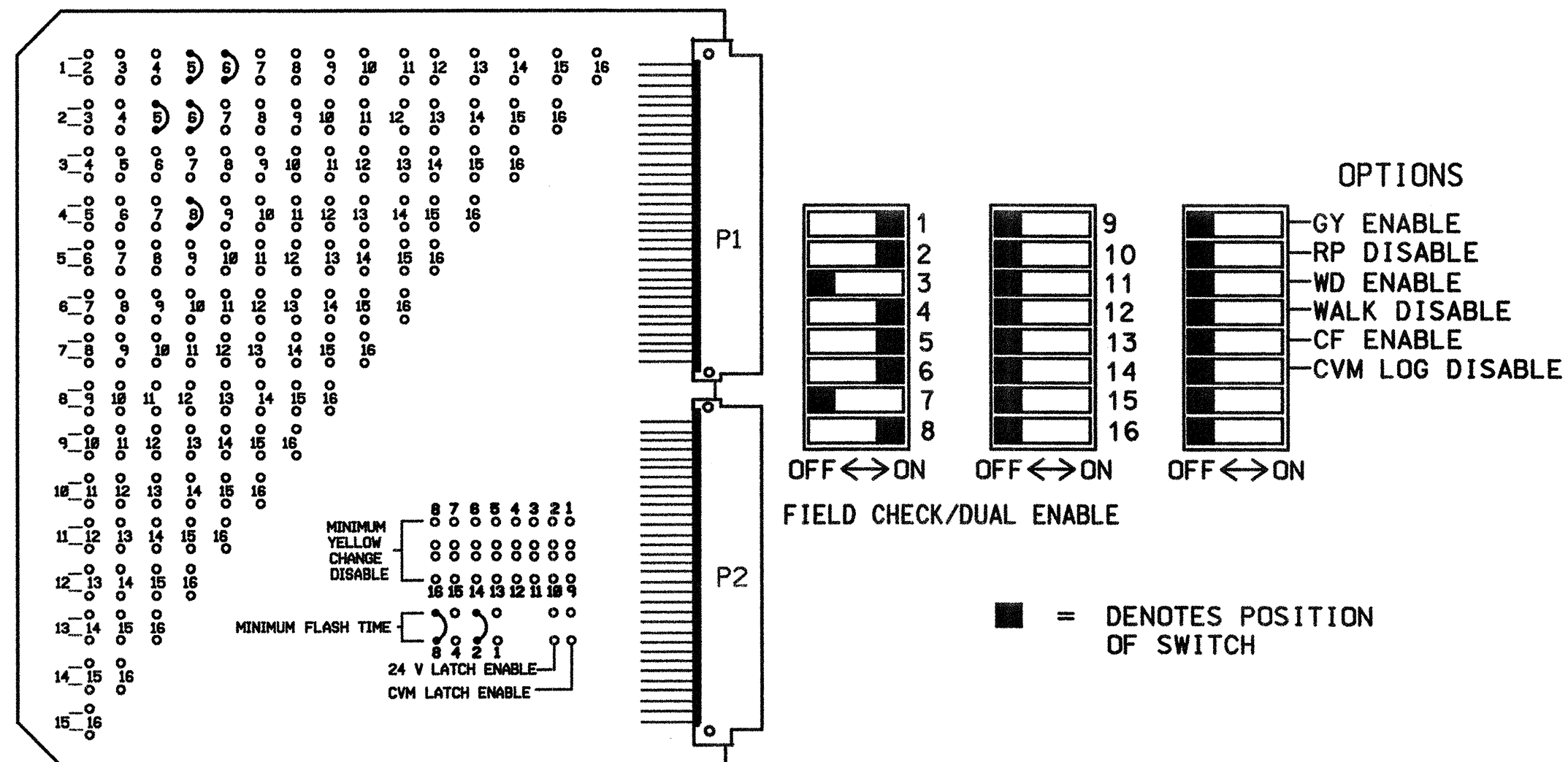
Prepared in the Offices of:  
  
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 Tel: 919/854-1282 Fax: 919/854-5448

NC 24/27 AT SR 1963 (ST. MARTIN ROAD)  
 DIVISION 10 STANLY COUNTY ALBEMARLE  
 PLAN DATE: MAY 2004 REVIEWED BY:  
 PREPARED BY: X. FAN REVIEWED BY:  
 REVISIONS INIT. DATE  
 SCALE 1:500  
 SIGNATURE: X. FAN DATE: 1-4-05  
 SIG. INVENTORY NO. 10-03411

\*\*\*\*\*SYTIME\*\*\*\*\*  
 \*\*\*\*\*DOCS\*\*\*\*\*  
 \*\*\*\*\*SENAME\*\*\*\*\*

**EDI MODEL MMU-16E  
MALFUNCTION MANAGEMENT UNIT  
PROGRAMMING DETAIL**

(program card and set switches as shown below)



MMU PROGRAMMING CARD

**NOTES**

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 3,7,9,10,11, & 12 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
- PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
- PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
- SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
- PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
- PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.

**FIELD CONNECTION HOOK-UP CHART**

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	11	21,22	NU	41,42	51	61,62	NU	81,82	NU	NU	NU	NU
GREEN		2G		4G		6G		8G				
YELLOW		2Y		4Y		6Y		8Y				
RED		2R		4R		6R		8R				
RED ARROW	1R				5R							
YELLOW ARROW	1Y				5Y							
GREEN ARROW	1G				5G							

NU = NOT USED

**DETECTOR RACK SET-UP DETAIL**

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1	CH1	CH1	CH1	S L O T	CH1	S L O T	S L O T	S L O T	S L O T	S L O T
	L3 ø2	L1 ø1	L7 ø6	L5 ø4		L9 ø8					
	CH2 L4 ø4	CH2 L2 ø2	CH2 L8 ø8	CH2 L6 ø5	E M P T Y	NOT USED	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A, L1B
2A	L2A, L2B
2B	L3A, L3B
4A	L4A, L4B
4B	L5A, L5B
5A	L6A, L6B
6A	L7A, L7B
8A	L8A, L8B
8B	L9A, L9B
---	L10A, L10B
---	L11A, L11B
---	L12A, L12B
---	L13A, L13B
---	L14A, L14B
---	L15A, L15B
---	L16A, L16B

**NOTE**  
BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME (SEC)
1	ø1	---	---
2	ø2	---	---
3	ø2	---	---
4	ø4	DELAY	3
5	ø4	DELAY	15
6	ø5	---	---
7	ø6	---	---
8	ø8	DELAY	5
9	ø8	DELAY	15
10	---	---	---
11	---	---	---
12	---	---	---
13	---	---	---
14	---	---	---
15	---	---	---
16	---	---	---

**EQUIPMENT INFORMATION**

CONTROLLER.....ECONOLITE ASC/2-2100  
 CABINET .....ECONOLITE 5300-444BR **TS2-1**  
 CABINET MOUNT.....BASE  
 LOADBAY POSITIONS.....12  
 LOAD SWITCHES USED.....1, 2, 4, 5, 6, 8  
 PHASES USED.....1, 2, 4, 5, 6, 8  
 OL/A.....NOT USED  
 OL/B.....NOT USED  
 OL/C.....NOT USED  
 OL/D.....NOT USED

**LOAD SWITCH ASSIGNMENT DETAIL**

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0341T  
 DESIGNED: MAY 2004  
 SEALED: JAN 04, 2005  
 REVISED:

TS-2 TYPE 1 CABINET

**SIGNAL UPGRADE - TEMPORARY**

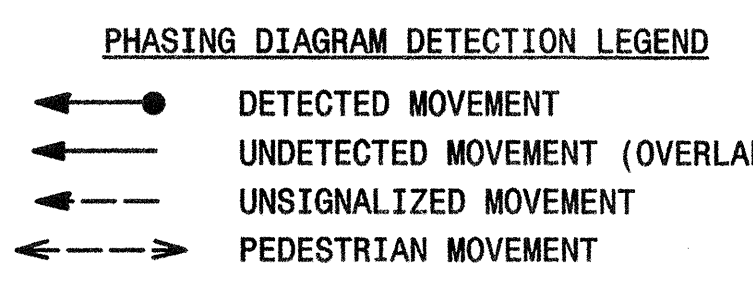
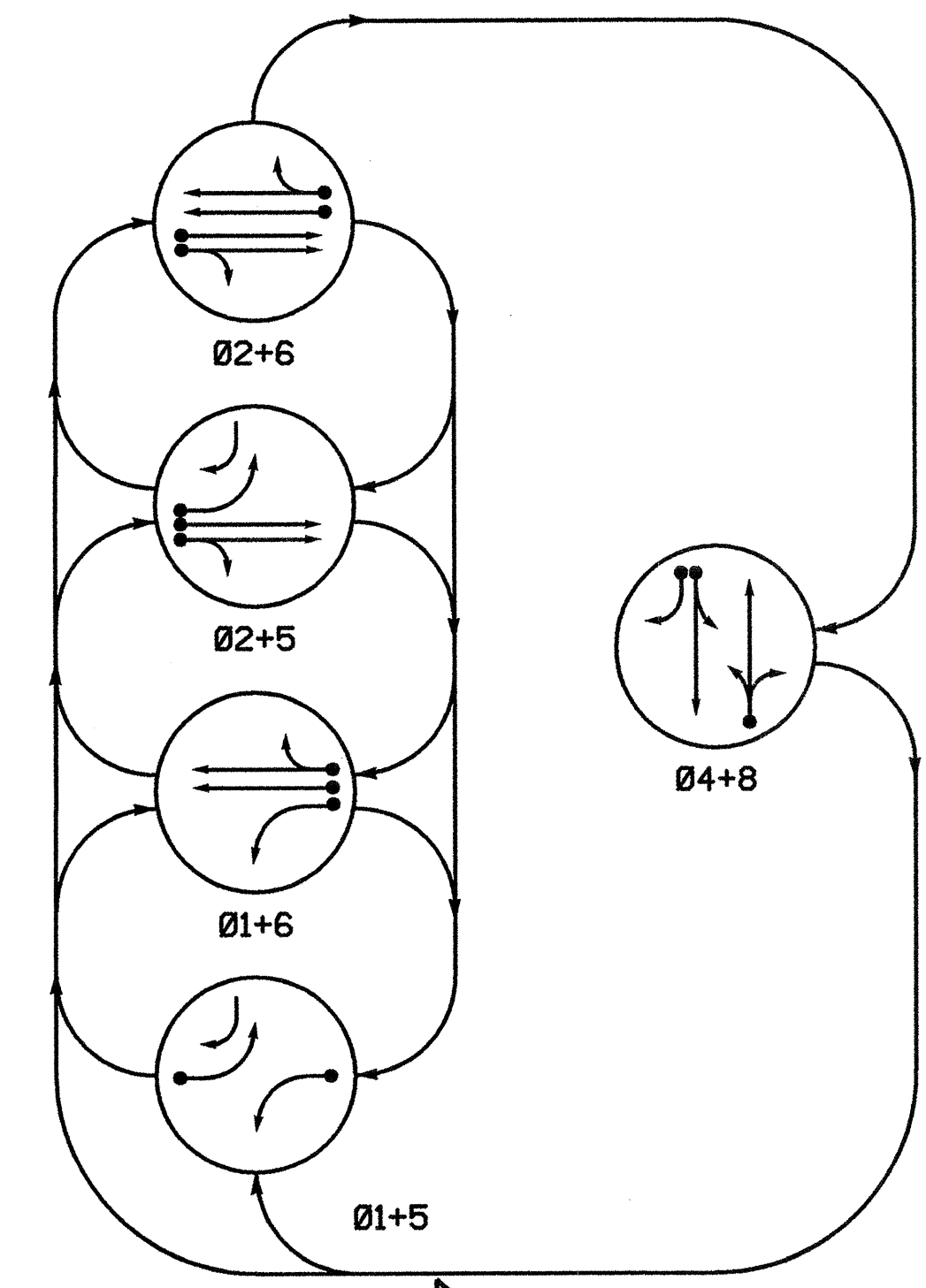
Prepared in the Offices of:  
  
 122 N. McDowell St., Raleigh, NC 27603

NC 24 / 27  
 AT  
 SR 1963 (ST. MARTIN ROAD)

DIVISION 10 STANLY COUNTY ALBEMARLE  
 PLAN DATE: MAY 2004 REVIEWED BY: A. ANCHORS  
 PREPARED BY: A. ANCHORS REVIEWED BY:  
 REVISIONS: INIT. DATE

SEAL  
  
 SEAL NUMBER 15061  
 DATE 1-2-05  
 SIGNATURE: Stanley L. Anchors  
 DATE: 1-2-05  
 SIG. INVENTORY NO. 10-0341T

PHASING DIAGRAM



SIGNAL FACE I.D.

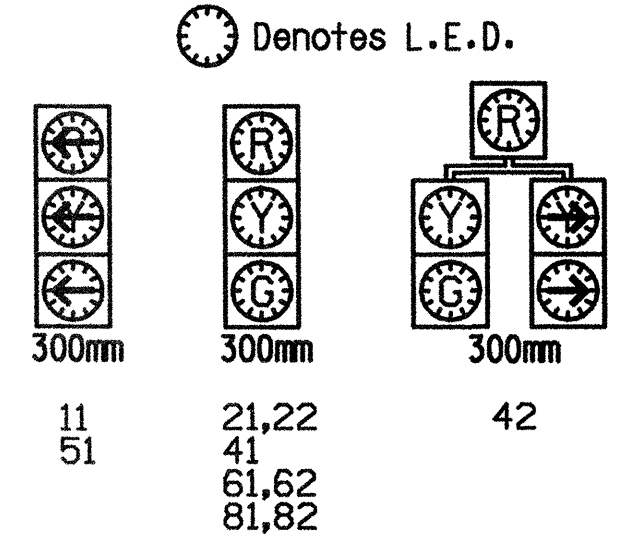


TABLE OF OPERATION

SIGNAL FACE	PHASE					
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	Ø1+5+6
11	—	—	—	—	—	—
21,22	R	R	G	G	R	Y
41	R	R	R	R	G	R
42	—	—	—	—	—	—
51	—	—	—	—	—	—
61,62	R	G	R	G	R	Y
81,82	R	R	R	R	G	R

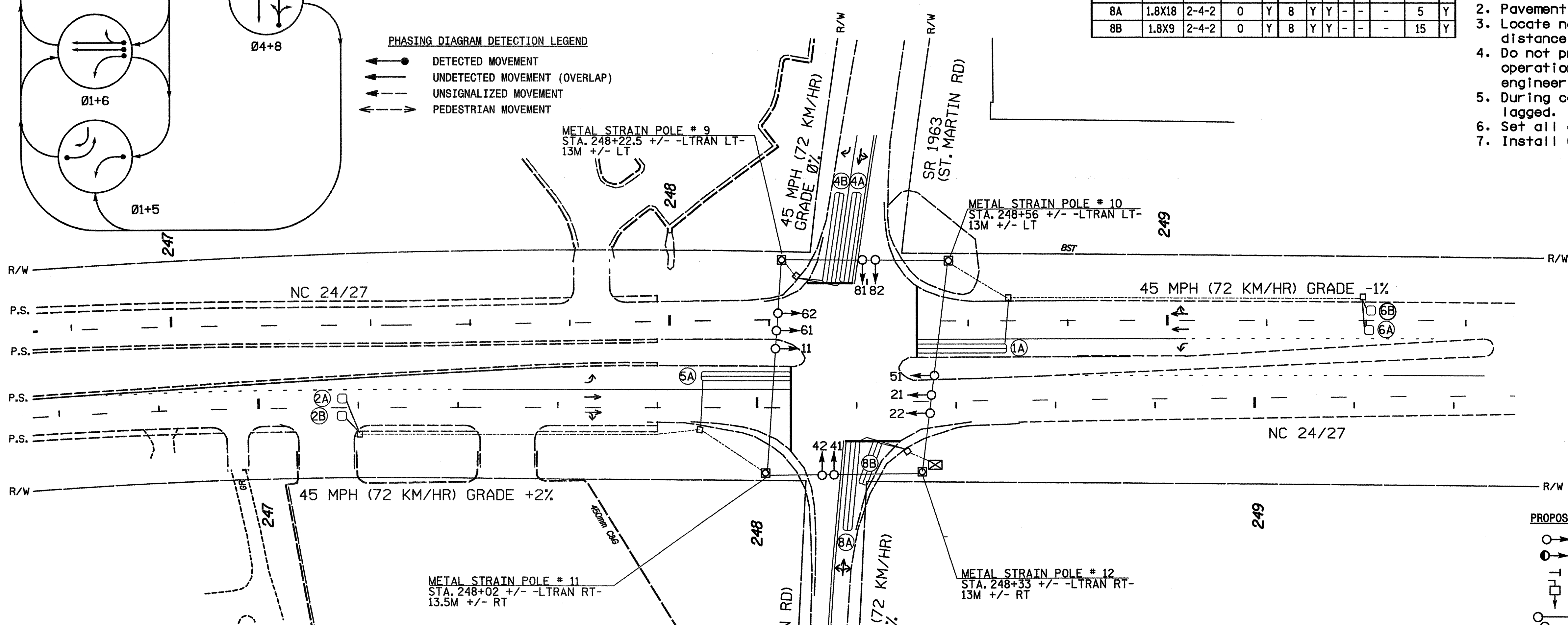
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	1.8X18	2-4-2	0	Y	1	Y	Y	—	—	—	—	Y
2A	1.8X1.8	5	90	Y	2	Y	Y	—	—	—	—	Y
2B	1.8X1.8	5	90	Y	2	Y	Y	—	—	—	—	Y
4A	1.8X18	2-4-2	0	Y	4	Y	Y	—	—	—	3	Y
4B	1.8X18	2-4-2	0	Y	4	Y	Y	—	—	—	15	Y
5A	1.8X18	2-4-2	0	Y	5	Y	Y	—	—	—	—	Y
6A	1.8X1.8	5	90	Y	6	Y	Y	—	—	—	—	Y
6B	1.8X1.8	5	90	Y	6	Y	Y	—	—	—	—	Y
8A	1.8X18	2-4-2	0	Y	8	Y	Y	—	—	—	5	Y
8B	1.8X9	2-4-2	0	Y	8	Y	Y	—	—	—	15	Y

5 PHASE FULLY ACTUATED (TIME-BASED SYSTEM)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and Standard Specifications for Roads and Structures" dated January 2002.
2. Pavement markings are existing.
3. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
4. Do not program signal for late night flashing operation unless otherwise directed by the engineer.
5. During coordination, phase 1 or phase 5 may be lagged.
6. Set all detector units to presence mode.
7. Install GPS Unit for time synchronization.

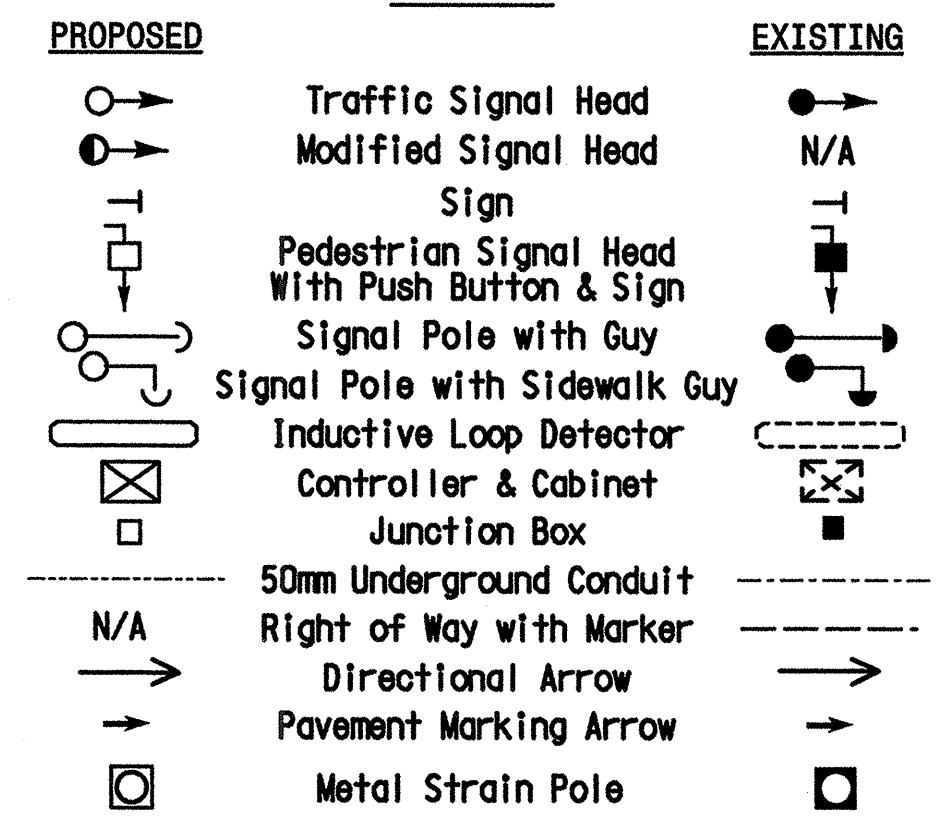


2070L TIMING CHART

FEATURE	PHASE					
	1	2	4	5	6	8
Min Green 1*	7	12	7	7	12	7
Extension 1*	1.0	6.0	1.0	1.0	6.0	1.0
Max Green 1*	20	100	25	20	100	25
Yellow Clearance	4.0	4.7	4.7	4.0	4.7	4.7
Red Clearance	2.5	1.5	1.5	2.0	1.5	1.5
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*	—	45	—	—	45	—
Minimum Gap	—	3	—	—	3	—
Recall Mode	—	MIN RECALL	—	—	MIN RECALL	—
Vehicle Call Memory	—	YELLOW	—	—	YELLOW	—
Dual Entry	—	—	ON	—	—	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

LEGEND



PLAN QUANTITIES

Pay Item	Meters
Signal Cable	230
Messenger Cable	150
Lead-in Cable	970

SIGNAL UPGRADE - FINAL

NC 24/27 AT SR 1963 (ST. MARTIN ROAD)

DIV 10 STANLY COUNTY ALBEMARLE

PLAN DATE: MAY 2004 REVIEWED BY:

PREPARED BY: K MILAM REVIEWED BY:

REVISIONS

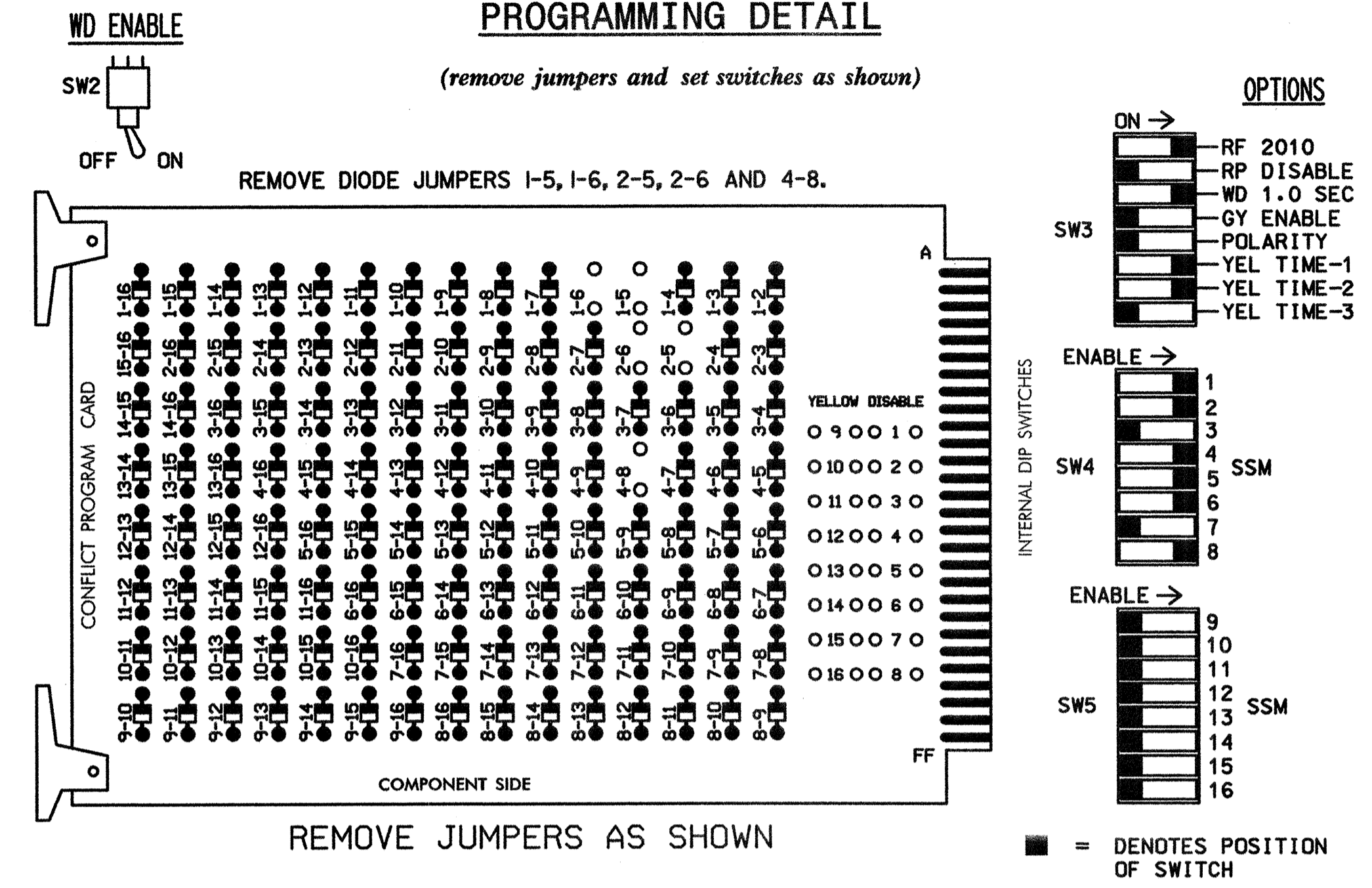
INIT.	DATE

SIG. INVENTORY NO. 10-0341

\*\*\*\*\*SYSTIME\*\*\*\*\*  
\*\*\*\*\*R0000\*\*\*\*\*  
\*\*\*\*\*SERIAL\*\*\*\*\*

**EDI MODEL 2010ECL CONFLICT MONITOR**

**PROGRAMMING DETAIL**



**NOTES**

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. THE INSTALLER SHALL VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 3,7,9,10, 11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
- PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VARIABLE INITIAL AND GAP REDUCTION.
- THE CABINET AND CONTROLLER ARE PART OF NC 24/27 TIME-BASED SYSTEM.

**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	7	8	8 PED	
SIGNAL HEAD NO.	11	21,22	NU	NU	41,42	NU	51	42	61,62	NU	NU	81,82	NU
GREEN		130			103				136			109	
YELLOW		129			102				135			108	
RED		128			101				134			107	
RED ARROW	125						131						
YELLOW ARROW	126						132	132					
GREEN ARROW	127						133	133					

NU = NOT USED

**EQUIPMENT INFORMATION**

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

**INPUT FILE POSITION LAYOUT**

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	FS
L	1A	2A	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	DC ISOLATOR
L	NOT USED	2B	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	ST
L	∅ 1	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	DC ISOLATOR
U	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17	∅ 18
L	5A	6A	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17	∅ 18
L	NOT USED	6B	∅ 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

**INPUT FILE CONNECTION & PROGRAMMING CHART**

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	48	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			5
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			15

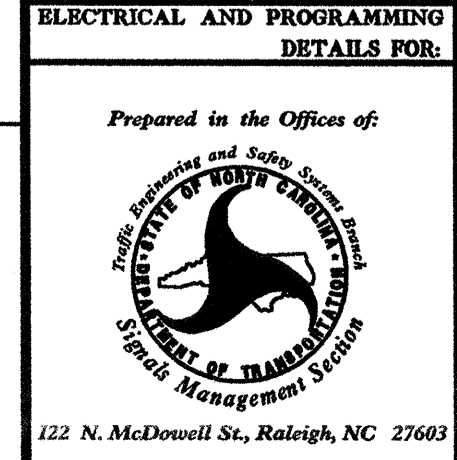
INPUT FILE POSITION LEGEND: J2L



SHEET 1 OF 2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0341  
 DESIGNED: MAY 2004  
 SEALED: JUNE 28, 2004  
 REVISED:

**SIGNAL UPGRADE - FINAL**



Prepared in the Offices of:

**ARCADIS**  
 G & M of North Carolina, Inc.  
 WWW.ARCADIS-US.COM  
 801 Corporate Center Drive, Suite 300  
 Raleigh, NC 27607-5073  
 Tel: 919/854-1282 Fax: 919/854-5448

NC 24/27 AT SR 1963 (ST. MARTIN ROAD)

DIVISION 10 STANLEY COUNTY ALBEMARLE

PLAN DATE: MAY 2004 REVIEWED BY: A. ANCHORS

PREPARED BY: A. ANCHORS REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

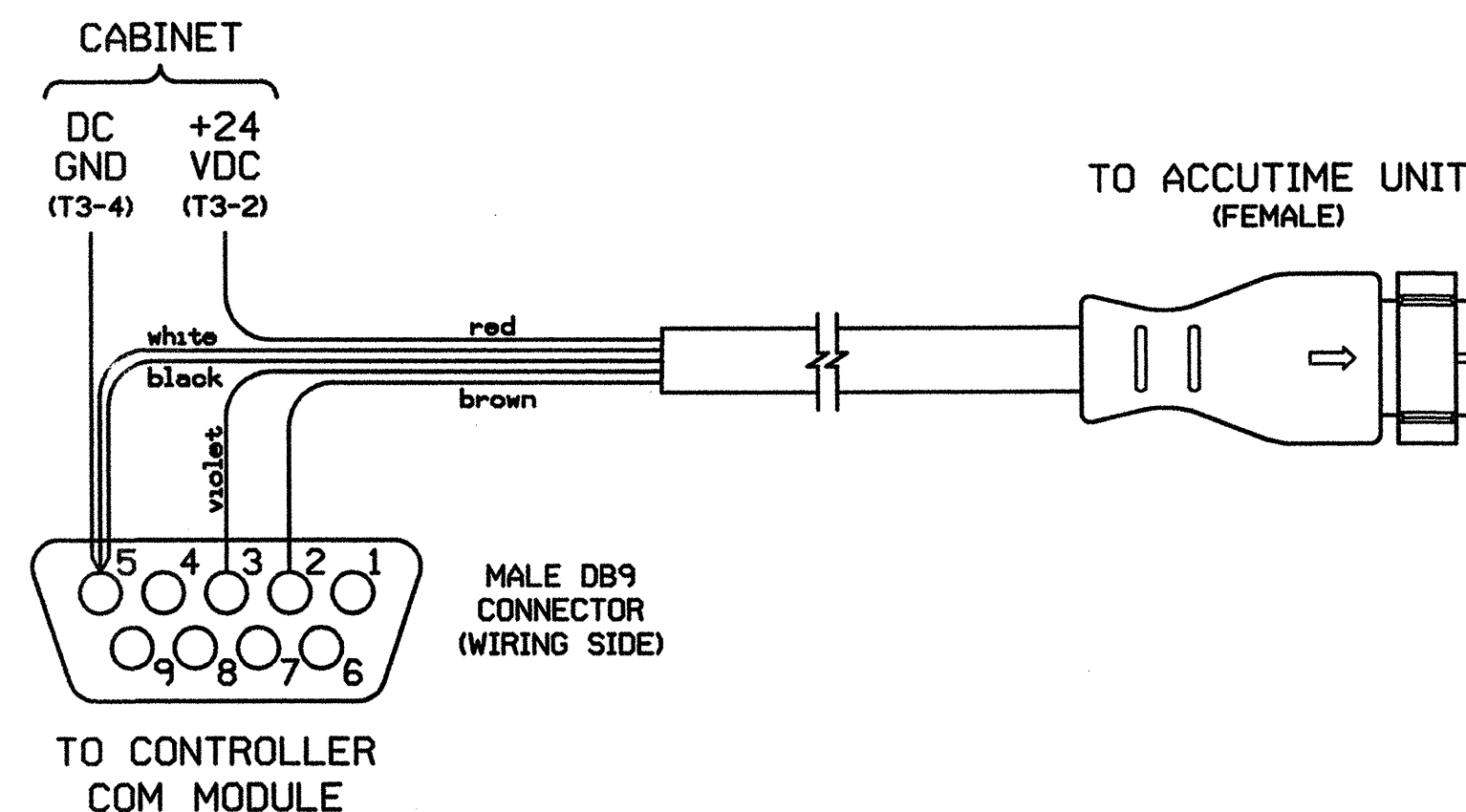
SEEK NOT VALID UNLESS SIGNED AND DATED

SIGNATURE DATE

SIG. INVENTORY NO. 10-0341

\*\*\*\*\*SYSTEMS\*\*\*\*\*  
 \*\*\*\*\*OPERATIONS\*\*\*\*\*  
 \*\*\*\*\*DESIGN\*\*\*\*\*  
 \*\*\*\*\*INSTALLATION\*\*\*\*\*  
 \*\*\*\*\*MAINTENANCE\*\*\*\*\*  
 \*\*\*\*\*USER\*\*\*\*\*

**CONNECTOR WIRING DETAIL FOR ACCUTIME 2000  
WITH RS232 INTERFACE**  
(make connections as shown)



SIGNAL DESCRIPTION	12 CONDUCTOR CABLE COLOR	ACCUTIME CONNECTOR	DB9 TO CONTROLLER	CABINET CONNECTION
DC POWER	RED	PIN 1		T3-2
PORT B: RECEIVE	VIOLET	PIN 2	PIN 3	
PORT B: TRANSMIT	BROWN	PIN 4	PIN 2	
PORT A: RECEIVE	WHITE	PIN 6	PIN 5	
DC GROUND	BLACK	PIN 9	PIN 5	T3-4

NOTE: ALL OTHER WIRES IN THE ACCUTIME CABLE ARE UNUSED AND SHOULD BE TIED OFF.

THE COM PORT USED BY THE ACCUTIME UNIT NEEDS TO BE CONFIGURED IN THE OASIS SOFTWARE USING THE SETTING BELOW:

- \* TRIMBLE TSIP GPS PROTOCOL
- \* 9600 BAUD
- \* 8 DATA BITS
- \* 1 STOP BIT
- \* ODD PARITY

FOR EAGLE 2070 CONTROLLERS, THE CURRENT TIME AND DATE MUST BE SET IN THE OS-9 SHELL, NOT IN OASIS.

SHEET 2 OF 2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0341  
DESIGNED: MAY 2004  
SEALED: JUNE 28, 2004  
REVISED:

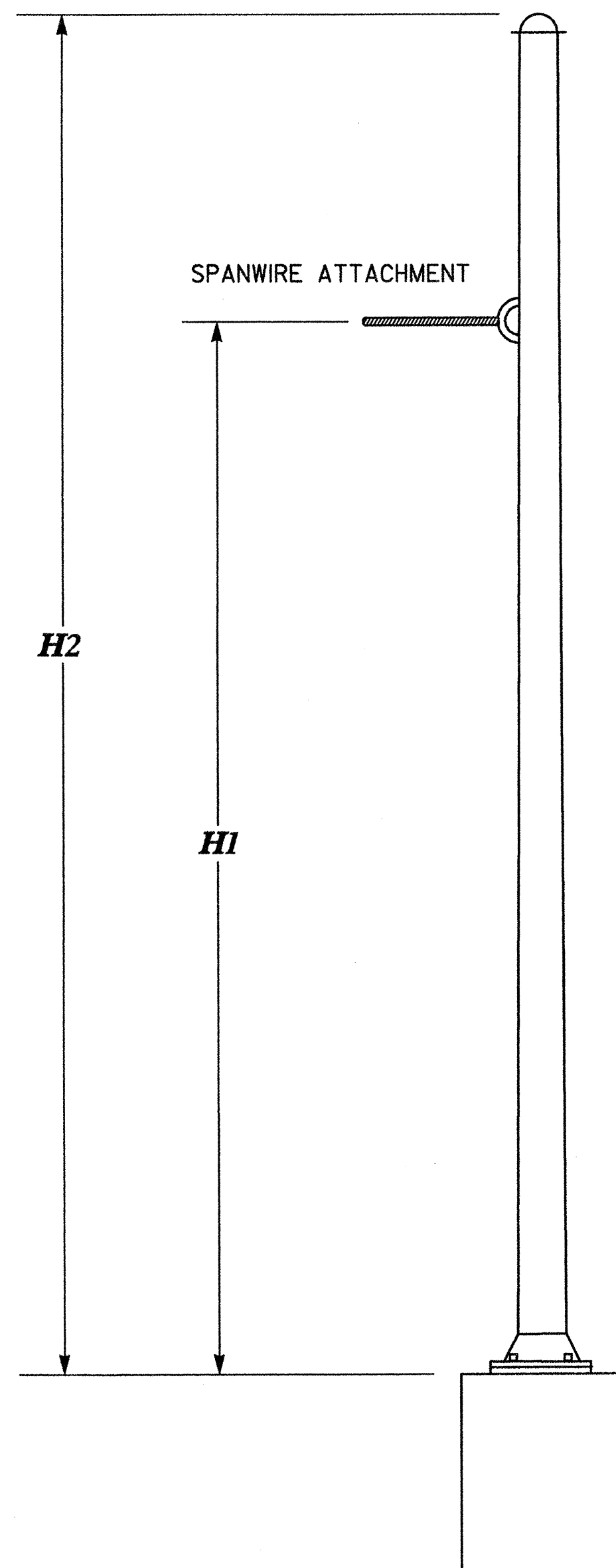
SIGNAL UPGRADE - FINAL

**ARCADIS**  
G & M of North Carolina, Inc.  
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801 Corporate Center Drive, Suite 300  
Raleigh, NC 27607-5073  
Tel: 919/854-1282 Fax: 919/854-5448

ELECTRICAL AND PROGRAMMING DETAILS FOR:  Prepared in the Office of: UNIVERSITY OF NORTH CAROLINA School of Transportation and Management Studies 122 N. McDowell St., Raleigh, NC 27603	NC 24/27 AT SR 1963 (ST. MARTIN ROAD)		SEAL 
	DIVISION 10 STANLY COUNTY ALBEMARLE PLAN DATE: MAY 2004 REVIEWED BY: A. ANCHORS PREPARED BY: A. ANCHORS REVIEWED BY:	REVISIONS INIT. DATE	

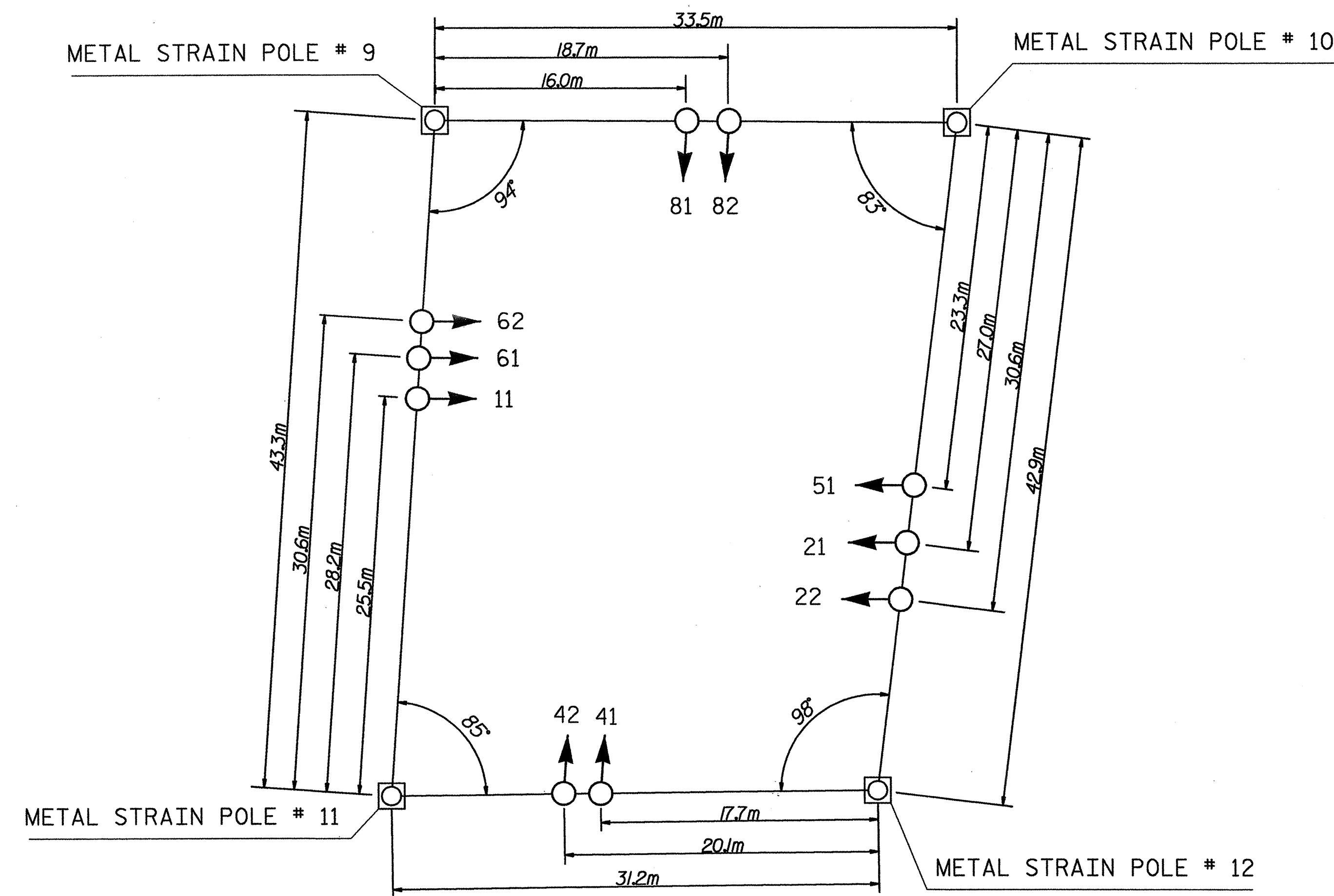
\*\*\*\*\*SYSTEMS\*\*\*\*\*  
\*\*\*\*\*CONTRACT\*\*\*\*\*  
\*\*\*\*\*USER NAME\*\*\*\*\*





STRAIN POLE ELEVATION

POLE NUMBER	SPAN		ATTACHMENT HEIGHT (H1) (feet / m)	POLE HEIGHT (H2) (feet / m)
	FROM POLE	TO POLE		
9	9	10	25.76/7.85	27.8/8.5
	9	11	26.25/8.00	
10	10	9	27.76/8.46	30/9.2
	10	12	28.41/8.66	
11	11	9	27.25/8.31	28.9/8.9
	11	12	27.39/8.35	
12	12	10	29.41/8.96	31/9.5
	12	11	29.39/8.96	



STRAIN-POLE AND SPANWIRE PLAN

LOADING SCHEDULE				
I. D. No.	DESCRIPTION	AREA (m <sup>2</sup> )	SIZE (mm)	WEIGHT (kg)
11, 22 41 51 61, 62 81, 82	SIGNAL HEAD 300mm-3 SECTION-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	0.9	650 W X 1340 L	25.4
42	SIGNAL HEAD 300mm-5 SECTION-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	1.5	1070 W X 1430 L	40.4

NOTES

- NO LESS THAN 5.2M(17 FT) OR NO MORE THAN 5.8M(19 FT) CLEARANCE SHALL BE MAINTAINED FROM BOTTOM OF THE LOWEST SIGNAL OR SIGN TO THE HIGHEST POINT ON THE ROADWAY.
- DESIGNS TO BE IN ACCORDANCE TO THE NCDOT STANDARD SPECIFICATIONS, AND STANDARD DRAWINGS (SEC. 1098-15, 1740 & 1742)

FOR DESIGN OF METAL STRAIN POLES 9 THRU 12 AND FOUNDATIONS



<p>METAL STRAIN POLE DETAILS NC 24/27 @ SR 1963 (ST. MARTAN RD)</p>		
<p>DIVISION 10 STANLY COUNTY ALBEMARLE</p>		
REVISIONS	INIT.	DATE
<p>SCALE: NONE DATE: MAY 2004</p>		<p>SEAL NOT VALID UNLESS SIGNED AND DATED</p> <p>Signature: <i>[Signature]</i> DATE: 6-28-04</p>
<p>N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING BRANCH</p>		<p>PREPARED BY: K MILAM REVIEWED BY: S/G REV. NO. 10-0341</p>

# STANDARD STRAIN POLE NOTES

GENERAL

1. THESE NOTES PROVIDE INFORMATION AND REQUIREMENTS FOR THE DESIGN, FABRICATION, AND INSTALLATION OF STANDARD METAL STRAIN POLES. THEY ARE TO BE USED BY DESIGN ENGINEERS, CONTRACTORS, AND POLE MANUFACTURERS IN THE SELECTION, FABRICATION, AND INSTALLATION OF METAL TRAFFIC SIGNAL SUPPORTS IN NORTH CAROLINA. THE NOTES ARE CATEGORIZED FOR EASE OF USE, AND ARE NUMBERED CHRONOLOGICALLY. NOTES THAT ARE SPECIFIC TO A PARTICULAR SITUATION, DESIGN DETAIL OR REQUIREMENT ARE SHOWN ON THE APPLICABLE PAGE TO CLARIFY INTENT AND UNDERSTANDING.
2. THE FOLLOWING STANDARD DESIGNS ARE BASED ON LIGHT AND HEAVY LOADING CASES. NO VARIATIONS, SUBSTITUTION OR RE-DESIGN OF THE SPECIFIED POLES AND FOUNDATIONS WILL BE PERMITTED UNLESS IT IS APPROVED BY THE TRAFFIC ENGINEERING BRANCH.
3. THESE METAL POLE STANDARDS MAKE REFERENCE TO THE NCDOT "ROADWAY STANDARD DRAWINGS" DATED JANUARY 2002 HERE IN AFTER REFERED TO AS THE STANDARD DRAWINGS AND TO THE NCDOT "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" DATED JANUARY 2002 HERE IN AFTER REFERED TO AS THE STANDARD SPECIFICATIONS. IF THERE IS A DISCREPANCY BETWEEN THE STANDARD DRAWINGS/SPECIFICATIONS AND THESE STANDARDS, THEN THESE DRAWINGS AND SPECIFICATIONS SHALL GOVERN.
4. POLE CASES PREAPPROVED ON THE DEPARTMENTS QUALIFIED PRODUCTS LIST (QPL) WILL NOT REQUIRE MANUFACTURER'S SHOP DRAWINGS. HOWEVER, CERTIFICATION OF COMPLIANCE WITH THE MANUFACTURER'S PREAPPROVED SHOP DRAWING ON FILE WITH THE DEPARTMENT SHALL BE FURNISHED TO THE ENGINEER. IF POLE CASES ARE NOT ON THE QPL, OR VARIATIONS TO A CASE STANDARD HAS BEEN APPROVED, MANUFACTURER'S SHOP DRAWINGS SHALL BE REQUIRED.

DESIGN CRITERIA

5. THE METAL POLE DESIGN SHALL CONFORM TO THE "2002 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS" AND LATEST APPROVED INTERIM SPECIFICATIONS. DESIGN WIND PRESSURES AND APPLICATIONS ARE IN ACCORDANCE WITH SECTION 3.8 AND 3.9 OF THE 2001 AASHTO SPECIFICATIONS.
6. THE THICKNESS OF A SINGLE PLY POLE MAY BE SUBSTITUTED BY USING A 2 PLY POLE AS LONG AS THE POLE BASE DOES NOT EXCEED THE SPECIFIED MINIMUM DIAMETER BY MORE THAN 1.25". NO EXCEPTIONS TO THIS DESIGN PARAMETER WILL BE ALLOWED.
7. THESE STRAIN POLE STANDARDS ALLOW FOR SIGNAL HEADS TO BE PLACED ANYWHERE ALONG THE SPANWIRE. THE MOST CRITICAL LOCATIONS ARE SHOWN IN THE TYPICAL INTERSECTION LOADING CASES SHOWN ON DRAWING SP3 (LOAD CASE AND DESIGN DETAILS SHEET) OF THESE STANDARDS. FOR DESIGN PURPOSES, USE 4% SAG FOR THE SPANWIRE. ROADWAY DESIGN CLEARANCE RANGE FROM BOTTOM OF SIGNAL HEADS TO PAVEMENT IS 17 FEET.
8. PROVISIONS SHALL BE MADE FOR DRAINAGE OF WATER FROM INSIDE THE METAL POLE.

POLE MATERIALS

9. PROVIDE MATERIALS FOR STEEL METAL POLES THAT COMPLY WITH SECTION 1098-15 OF THE STANDARD SPECIFICATIONS. POLE MONOTUBE SHALL:
  - BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.
  - USE ASTM A595 MATERIAL (55 KSI) OR EQUIVALENT AS APPROVED BY THE ENGINEER.
  - HAVE A LINEAR TAPER OF 0.14 IN/FT.
10. BASE PLATE SHALL:
  - BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.
  - CONFORM TO AASHTO M270 GRADE 36 OR EQUIVALENT.
11. ANCHOR BOLTS, NUTS, AND WASHER MATERIAL:
  - ANCHOR BOLTS - USE AASHTO M 314 GRADE 55 MATERIAL OR EQUIVALENT.
  - NUTS - USE AASHTO M291 GRADE 2H, DH, OR DHS MATERIAL OR EQUIVALENT.
  - WASHERS - USE AASHTO M293 MATERIAL OR EQUIVALENT.
12. ALL ANCHOR BOLTS, NUTS, WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M232 OR M298.

POLE FABRICATION

13. ALL OTHER STEEL HARDWARE MATERIAL REQUIRED BUT NOT SPECIFIED ABOVE SHALL COMPLY WITH SECTION 1098-15 OF THE STANDARD SPECIFICATIONS.
14. POLE ASSEMBLIES SHALL BE PERMANENTLY TAGGED OR ENGRAVED WITH THE FOLLOWING:
  - POLE MANUFACTURERS NAME
  - MANUFACTURE DATE
  - POLE CASE NUMBER
  - THICKNESS AND GRADE OF STEEL
15. CIRCUMFERENTIAL WELDING OF THE POLES ARE ALLOWED PROVIDED THE FOLLOWING CONDITIONS ARE MET:
  - THE METAL POLES SHALL NOT BE SPLICED WITHIN 5 FEET FROM BASE NOR WITHIN 2 FEET FROM ANY CONNECTION.
  - ONLY ONE SPLICE PER UPRIGHT WILL BE PERMITTED.
  - THE QUALITY CONTROL AND WORKMANSHIP OF THE SPLICE WELDS ARE THE SOLE RESPONSIBILITY OF THE POLE MANUFACTURER.
16. ALL WELDS SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF THE AWS D1.1 STRUCTURAL WELDING CODE.
17. PROVIDE 2- 3" FACTORY DRILLED HOLES THROUGH THE POLE WALL FOR WIRE ENTRANCE ACCESS TO THE TERMINAL STRIP INSIDE THE TERMINAL COMPARTMENT. THE HOLES SHALL BE IN THE CENTER OF THE TERMINAL COMPARTMENT (0 DEGREES ON THE POLES RADIAL INDEX) LOCATED AT 26" AND 36" FROM THE BASE OF THE POLE. SEE DRAWING SP4 (POLE FABRICATION DETAILS) OF THESE METAL POLE STANDARDS FOR GRAPHIC DETAILS.
18. THE METAL POLE SHALL BE FABRICATED WITH 3-2" THREADED HALF COUPLINGS AND 1-1" THREADED HALF COUPLING INSTALLED 9" FROM THE TOP OF THE POLE TO RECEIVE THE WEATHERHEADS FOR SIGNAL WIRE ENTRANCES TO THE POLE. THE HALF COUPLINGS SHALL BE WELDED AT NO LESS THAN A 45 DEGREE ANGLE FROM HORIZONTAL TO PROPERLY INSTALL THE WEATHERHEADS. THE 1" HALF COUPLING FOR ELECTRICAL SERVICE ENTRANCE SHALL BE LOCATED AT 0 DEGREES ON THE POLES RADIAL INDEX. ALL OTHER 2" HALF COUPLINGS SHALL BE LOCATED AT 90 DEGREE INCREMENTS. PROVIDE WEATHER TIGHT BUSHING CAPS FOR ALL HALF COUPLINGS. REFER TO DRAWING SP4 (POLE FABRICATION DETAILS) OF THESE METAL POLE STANDARDS FOR GRAPHIC DETAILS.
19. PROVIDE A FACTORY STANDARD "J" HOOK FOR CABLE SUPPORT WELDED INSIDE THE TOP OF THE POLE AT 225 DEGREES ON THE POLES RADIAL INDEX. REFER TO DRAWING SP4 (POLE FABRICATION DETAILS) OF THESE METAL POLE STANDARDS FOR GRAPHIC DETAILS.
20. FOR ALL OTHER NON-STRUCTURAL DETAILS AND REQUIREMENTS, REFER TO APPLICABLE SECTIONS OF THESE STANDARDS, THE TRAFFIC SIGNAL PLANS AND SPECIFICATIONS.
21. AT THE TIME OF SHIPMENT FROM THE FACTORY, ENSURE THE POLE IS PACKAGED SO THAT WATER CAN NOT GET INSIDE OF THE POLE.
22. SHIP ALL POLE ACCESSORIES FOR EACH POLE IN A SEPARATE WATERTIGHT CONTAINER WITH A LABEL THAT IDENTIFIES THE SPECIFIC POLE AND DESCRIBES THE CONTENTS.

SOIL TESTING AND STANDARD POLE FOUNDATIONS

23. THE FOUNDATION SIZE FOR POLES IN THESE METAL POLE STANDARDS IS DETERMINED BY CONDUCTING A SUBSURFACE SOIL INVESTIGATION. FOR DETAILS OF THE SUBSURFACE INVESTIGATION, AND PROPER SELECTION/DETERMINATION OF THE METAL POLE FOUNDATIONS, REFER TO AND COMPLY WITH THE "METAL POLE STANDARD FOUNDATIONS" SPECIAL PROVISION WHICH IS TO BE CONSIDERED AN INTEGRAL PART OF THESE METAL POLE STANDARDS.
24. STRAIN POLE FOUNDATIONS DEPTHS HAVE BEEN PRE-DESIGNED USING THE CHART SHOWN BELOW. TO DETERMINE THE CORRECT DEPTH OF EACH FOUNDATION:
  - a.- USING THE STATEWIDE COUNTY WIND ZONE CHART ON DRAWING SP3 (LOAD CASE AND DESIGN DETAILS), MAKE SURE YOU HAVE THE APPROPRIATE WIND ZONE SELECTED
  - b.- SELECT THE SOIL TYPE THAT BEST DESCRIBES THE SOIL CHARACTERISTICS (EITHER CLAY OR SAND)
  - c.- PERFORM A STANDARD PENETRATION TEST AT EACH PROPOSED FOUNDATION SITE TO DETERMINE "N" VALUE. (NUMBER OF BLOWS PER FOOT FROM STANDARD PENETRATION TEST).
  - d.- GET THE APPROPRIATE POLE CASE LOAD NUMBER FROM THE PLANS OR FROM THE DIVISION TRAFFIC ENGINEER.
  - e.- USING THE PREVIOUSLY DETERMINED SOIL TYPE AND "N" VALUE, SELECT THE APPROPRIATE COLUMN IN THE CHART. SELECT THE APPROPRIATE LINE THAT THE POLE LOAD CASE IS SHOWN ON IN THE CHART. THE CORRECT DEPTH OF THE FOUNDATION IS THE VALUE THAT IS SHOWN WHERE THE COLUMN AND THE LINE INTERSECT.
  - f.- FILL OUT AND SUBMIT FOR APPROVAL TO THE DIVISION A "STANDARD FOUNDATION SELECTION FORM" FOR EACH PROPOSED FOUNDATION LOCATION.

## FOUNDATION SELECTION TABLE

42" Diameter Drilled Pier Length (L) - Feet

LOAD CASE	WIND ZONE 4 - SOIL TYPES						
	Clay				Sand		
	Medium Design N-Value 4-8	Stiff Design N-Value 9-15	Very Stiff Design N-Value 16-30	Hard Design N-Value >30	Loose Design N-Value 4-10	Medium Design N-Value 11-30	Dense Design N-Value >30
S26L1	18.0	13.0	10.5	9.0	16.5	14.5	13.0
S30L1	18.5	13.0	10.5	9.0	17.0	15.0	13.5
S35L1	19.0	13.5	11.0	9.0	17.5	15.5	14.0
S30H1	22.0	15.0	12.0	9.5	19.5	17.0	15.0
S35H1	23.0	15.5	12.5	10.0	20.0	17.5	15.5

CONCRETE VOLUME (cubic yards)=.356xL

25. A "STANDARD FOUNDATION SELECTION FORM" FOR EACH PROPOSED FOUNDATION IS REQUIRED TO BE SUBMITTED AND APPROVED PRIOR TO ANY DRILLING IN THE FIELD. THIS FORM AS WELL AS THE STANDARD FOUNDATION SPECIAL PROVISIONS CAN BE OBTAINED AT THE FOLLOWING WEBSITE:

[http://www.doh.dot.state.nc.us/preconstruct/highway/dsn\\_srv/soils/form/default.htm](http://www.doh.dot.state.nc.us/preconstruct/highway/dsn_srv/soils/form/default.htm)

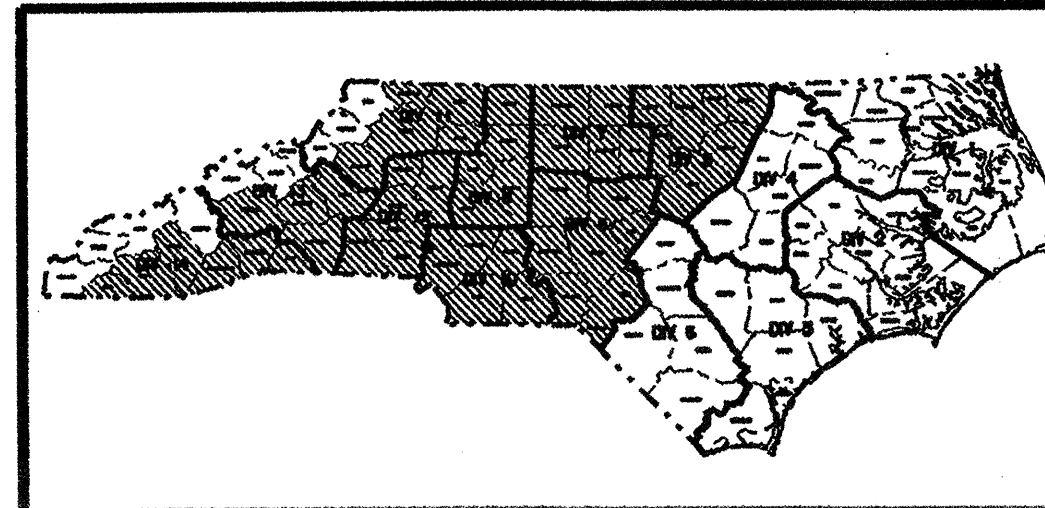
26. COMPLY WITH THE PROVISIONS OF SECTION 1742 OF THE STANDARD SPECIFICATIONS FOR INSTALLATION.
27. REFER TO STANDARD DRAWING 1742.01 FOR FOR FOUNDATION INSTALLATION DETAILS.
28. REINFORCING STEEL SHALL BE DEFORMED AND CONFORM TO ASTM A615 GRADE 60. TIES MAY BE DEFORMED OR PLAIN.
29. CIRCULAR TIE REINFORCING 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.
30. THE CONCRETE SHALL BE DRILL PIER CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4500 PSI AT 28 DAYS IN ACCORDANCE WITH SECTION 1000 OF THE NORTH CAROLINA STANDARD SPECIFICATIONS. FOR DETAILS, SEE SPECIAL PROVISIONS.
31. THE TRAFFIC SIGNAL SUPPORT STRUCTURE SHALL NOT BE ERRECTED BEFORE THE CONCRETE IN THE FOUNDATION HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.
32. NON-SHRINK GROUT SHALL BE A MIX CONSISTING OF 1 PART CEMENT, 3 PARTS SAND BY WEIGHT, AND 2 GRAMS OF ALUMINUM POWDER PER 94 LBS. OF CEMENT USED. WATER SHALL BE LIMITED TO THAT AMOUNT REQUIRED TO PRODUCE A WORKABLE MIX. PROVIDE SMALL PIPE TO DRAIN WATER PER STANDARD SPECIFICATIONS.
33. THE TOP OF EACH FOUNDATION SHALL BE PERMANENTLY MARKED (WITH STAMP OR EMBEDDED PLATE) TO IDENTIFY THE TYPE OR DEPTH OF THE FOUNDATION.
34. FOR OTHER DETAILS REGARDING CONSTRUCTION OF CONCRETE FOUNDATION, SEE PROJECT SPECIAL PROVISIONS.

POLE INSTALLATION

35. COMPLY WITH THE PROVISIONS OF SECTION 1072 & 1742 OF THE STANDARD SPECIFICATIONS FOR INSTALLATION.
36. REFER TO STANDARD DRAWING 1742.01 FOR FOR POLE AND HARDWARE INSTALLATION DETAILS.
37. SIGNAL HEADS CAN BE PLACED ANYWHERE ALONG THE SPANWIRE. THE MOST CRITICAL LOCATIONS ARE SHOWN IN THE TYPICAL INTERSECTION LOADING CASE. FOR DESIGN PURPOSES, USE 4% SAG FOR THE SPANWIRE.
38. WHEN ATTACHING POLE TO FOUNDATION, THE DISTANCE BETWEEN THE BOTTOM OF THE LEVELING NUT TO THE TOP OF THE CONCRETE FOUNDATION SHOULD NOT BE GREATER THEN ONE ANCHOR NUT HEIGHT. THE TOP OF EACH ANCHOR BOLT SHOULD NOT EXTEND MORE THAN ONE ANCHOR NUT HEIGHT ABOVE TOP NUT TO FACILITATE THE INSTALLATION OF A THREADED NUT COVER.
39. STRAP ALL SIGNAL CABLES TO THE SIDE OF THE POLE WHEN THE DISTANCE BETWEEN THE SPANWIRE ATTACHMENT CLAMP ON THE POLE AND THE WEATHER HEADS EXCEEDS 36". USE 3/4" STAINLESS STEEL STRAPS TO LASH WIRE TO THE POLE. SEE DRAWING SP4 (POLE FABRICATION DETAILS) OF THESE STANDARDS FOR GRAPHIC DETAILS.
40. FOR OTHER DETAILS REGARDING METAL POLE INSTALLATION, SEE PROJECT SPECIAL PROVISIONS.

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## WIND ZONE 4 (90 MPH)



222 N. McDowell St., Raleigh, NC 27603

**METAL POLE STANDARD NOTES**

PLAN DATE: SEPTEMBER 2002 REVIEWED BY: R. E. MULLINAX

PREPARED BY: C. F. ANDREWS REVIEWED BY: D. C. SARKAR

REVISIONS	INIT.	DATE

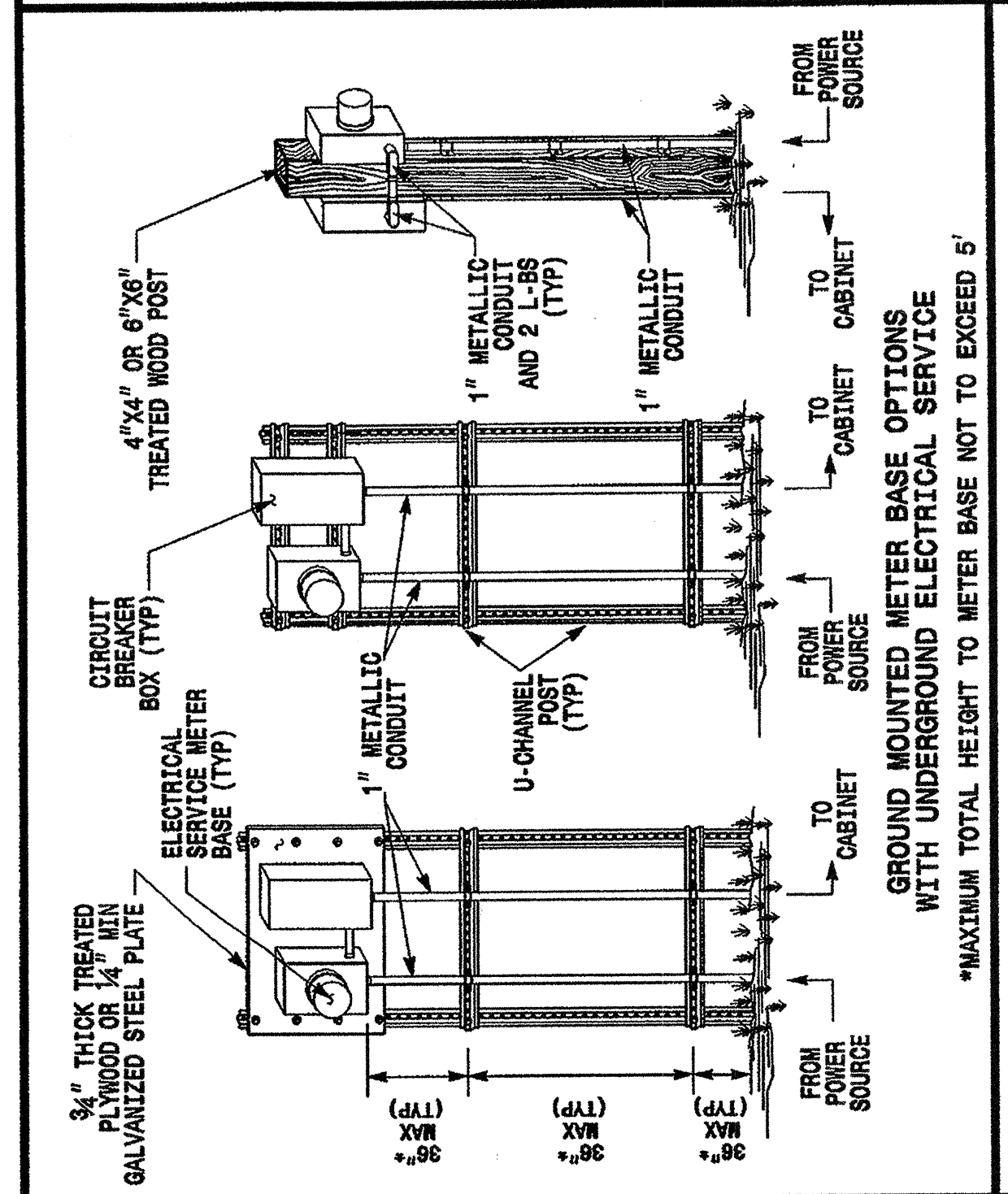
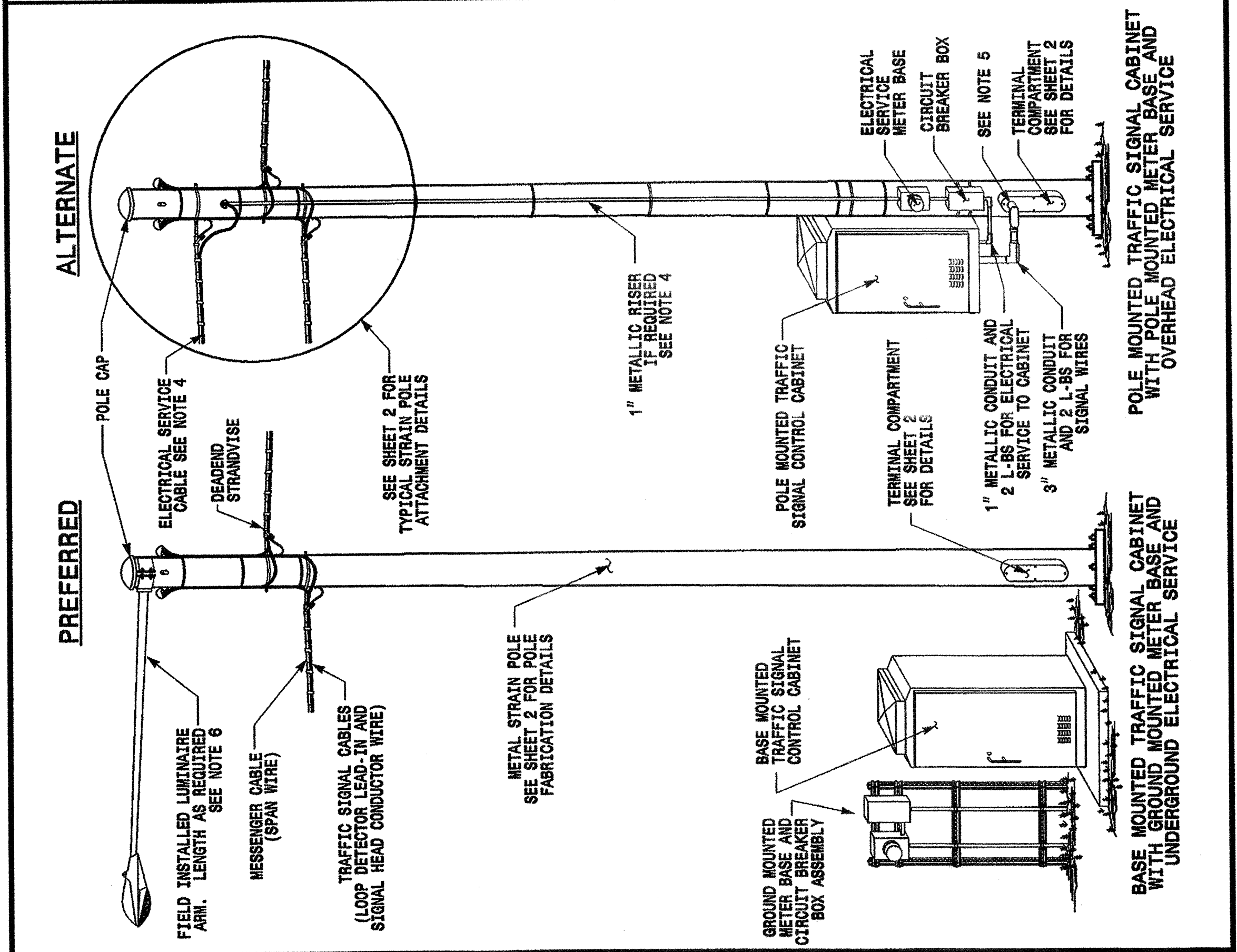
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D. Sarkar 2.14.03  
SIGNATURE DATE

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

ENGLISH STANDARD DRAWING FOR METAL POLES ELECTRICAL SERVICE AND SIGNAL CABINET MOUNTING OPTIONS

SHEET 1 OF 3 1740.01



**GENERAL NOTES**

- WHEN TRAFFIC SIGNALS ARE INSTALLED USING METAL SIGNAL SUPPORTS:
  - BASE MOUNTED CABINETS ARE THE PREFERRED CABINET OPTION.
  - ROUTE POWER SOURCE UNDERGROUND AND USE GROUND MOUNTING OPTIONS SHOWN ABOVE TO INSTALL METER BASE AND CIRCUIT BREAKER BOX IF POSSIBLE.
- LOCATE THE METER BASE ASSEMBLY NEAR THE SIGNAL CABINET IN A MANNER THAT WILL ALLOW EASY ACCESS TO THE CIRCUIT BREAKER BOX.
- INSTALL METER BASE ASSEMBLIES AS SHOWN ABOVE. ENSURE 1" METALLIC CONDUITS ARE PROPERLY SECURED BETWEEN THE METER BASE ASSEMBLIES AND THE GROUND TO MINIMIZE DAMAGE POTENTIAL. REFER TO ROADWAY STANDARD DRAWING 1751.02 FOR ELECTRICAL SERVICE DETAILS.
- INSTALL ELECTRICAL SERVICE ENTRANCE CONDUCTOR AS SHOWN WHEN UNDERGROUND SOURCE IS NOT AN OPTION. METER BASE AND CIRCUIT BREAKER BOX MAY BE INSTALLED ON THE POLE WHEN POLE MOUNTED CABINETS ARE REQUIRED FOR THE INSTALLATION. SEE SHEET 2 FOR ADDITIONAL INSTALLATION DETAILS.
- FOR POLE MOUNTED CABINETS, USE A FACTORY DRILLED HOLE IN THE TERMINAL COMPARTMENT TO PROVIDE ACCESS FOR SIGNAL WIRES ENTERING THE POLE FROM THE CABINET. FIELD DRILLED HOLES ARE ACCEPTABLE ONLY IF APPROVED BY THE ENGINEER.
- SEE ROADWAY STANDARD DRAWING 1409.01 (LIGHT STANDARD LUMINAIRES) FOR LUMINAIRE INSTALLATIONS.

\*MAXIMUM TOTAL HEIGHT TO METER BASE NOT TO EXCEED 5'

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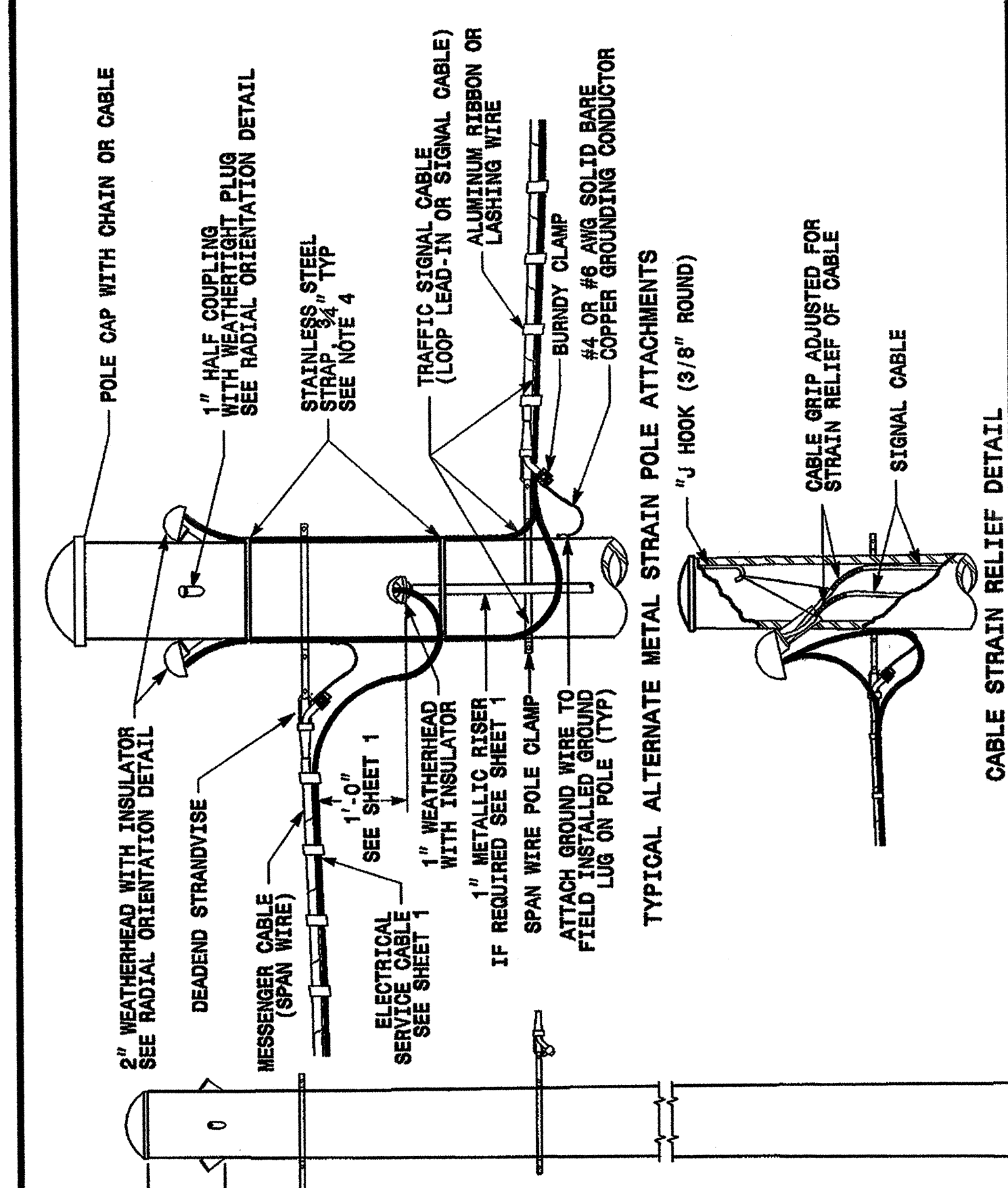
ENGLISH STANDARD DRAWING FOR METAL POLES ELECTRICAL SERVICE AND SIGNAL CABINET MOUNTING OPTIONS

SHEET 1 OF 3 1740.01

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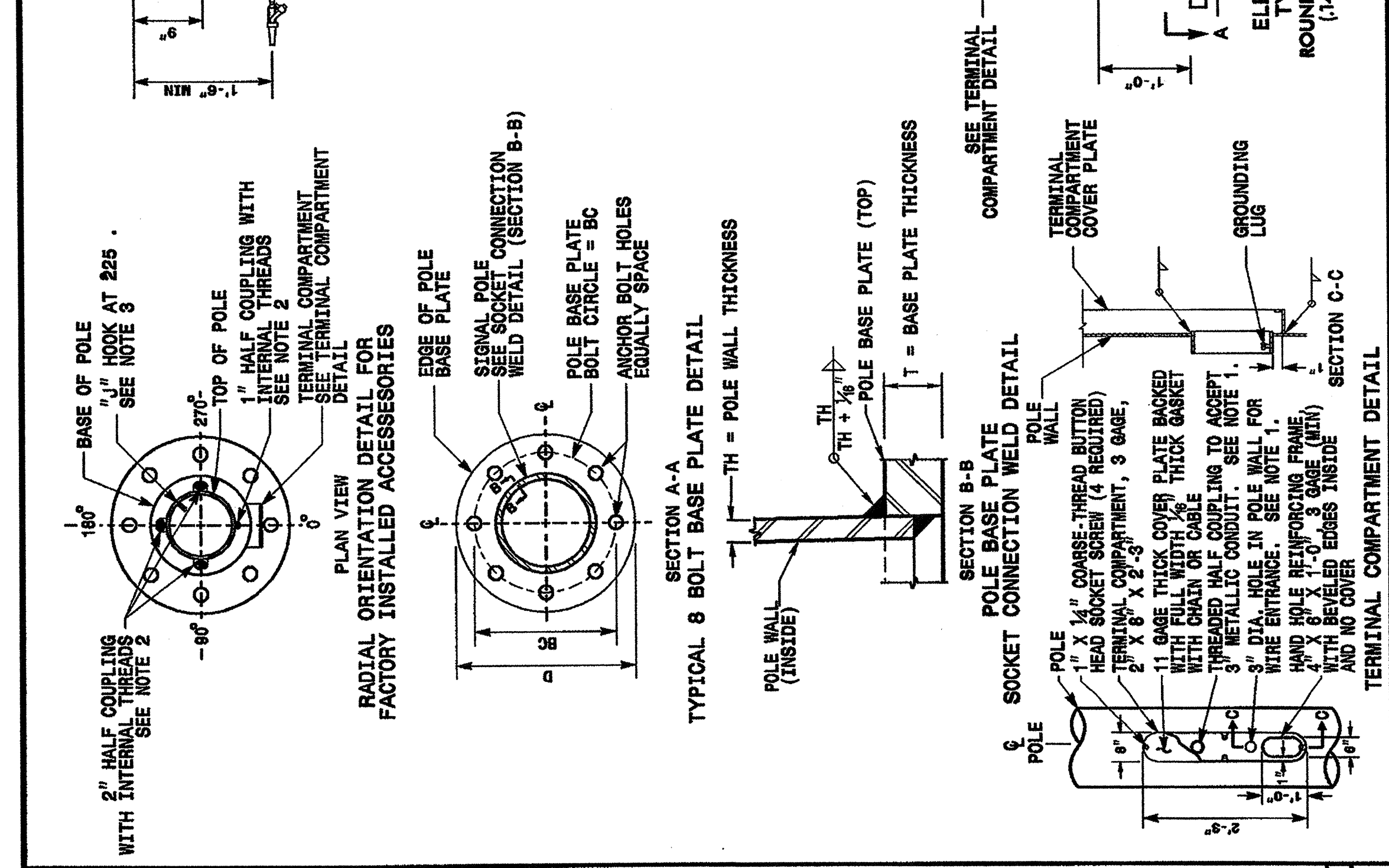
ENGLISH STANDARD DRAWING FOR METAL POLES FABRICATION AND ATTACHMENT DETAILS

SHEET 2 OF 3 1740.01



**GENERAL NOTES**

- PROVIDE 2-3" FACTORY DRILLED HOLES THROUGH THE POLE WALL FOR WIRE ENTRANCE ACCESS INSIDE THE TERMINAL COMPARTMENT. LOCATE THE HOLES IN THE CENTER OF THE TERMINAL COMPARTMENT (0 DEGREES ON THE POLES RADIAL INDEX), AT 25 AND 38" FROM BASE OF THE "P.O.L.E.". WELD A THREADED HALF COUPLING IN THE TOP HOLE THAT CAN RECEIVE A 3" DIA. METALLIC CONDUIT.
- FABRICATE THE METAL POLE WITH 3-2" THREADED HALF COUPLINGS AND 1-1" THREADED HALF COUPLING INSTALLED 9" FROM THE TOP OF THE POLE TO FACILITATE WEATHERHEAD INSTALLATION FOR SIGNAL WIRE ENTRANCE TO THE POLE. WELD THE COUPLINGS TO THE POLE AT AN ANGLE OF NO LESS THAN 45 DEGREES FROM HORIZONTAL TO PROPERLY INSTALL THE WEATHERHEADS. LOCATE THE HALF COUPLINGS ON THE POLE AS SHOWN IN THE RADIAL ORIENTATION DETAIL.
- PROVIDE A FACTORY STANDARD 1/2" HOOK FOR CABLE SUPPORT WELDED INSIDE THE TOP OF THE POLE AT 285 DEGREES ON THE POLES RADIAL INDEX.
- STRAP ALL SIGNAL CABLES TO THE SIDE OF THE POLE WHEN THE DISTANCE BETWEEN THE SIGNAL WIRE ATTACHMENT CLAMP ON THE POLE AND THE WEATHERHEADS EXCEEDS 36". USE 3/8" STAINLESS STEEL STRAPS TO SECURE WIRE TO THE POLE.
- DO NOT INSTALL FIBER OPTIC COMMUNICATION CABLE IN OR ON ANY METAL POLES FOR THE PURPOSE OF TRANSITIONING THE RUNS FROM OVERHEAD TO UNDERGROUND. OVERHEAD ATTACHMENTS MAY BE ALLOWED USING A 3-BOLT CLAMP WITH "J" HOOK IF THE PURPOSE OF THE ATTACHMENT IS TO CONTINUE A RUN OVERHEAD. SEE SHEET 5.



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

ENGLISH STANDARD DRAWING FOR METAL POLES FABRICATION AND ATTACHMENT DETAILS

SHEET 2 OF 3 1740.01

<p>Structural Engineer</p> <p><i>J. Sarker</i> 9-23-03</p> <p>SIGNATURE DATE</p>	<p>Electrical Engineer</p> <p><i>Milton J. Dean</i> 9-24-03</p> <p>SIGNATURE DATE</p>
<p><b>Standard Drawings</b></p> <p>Traffic Management and Signal Systems Unit 122 N. McDowell St., Raleigh, NC 27603</p>	
<p><b>See Plate for Title</b></p>	
<p>Original: 2002 Standards</p>	

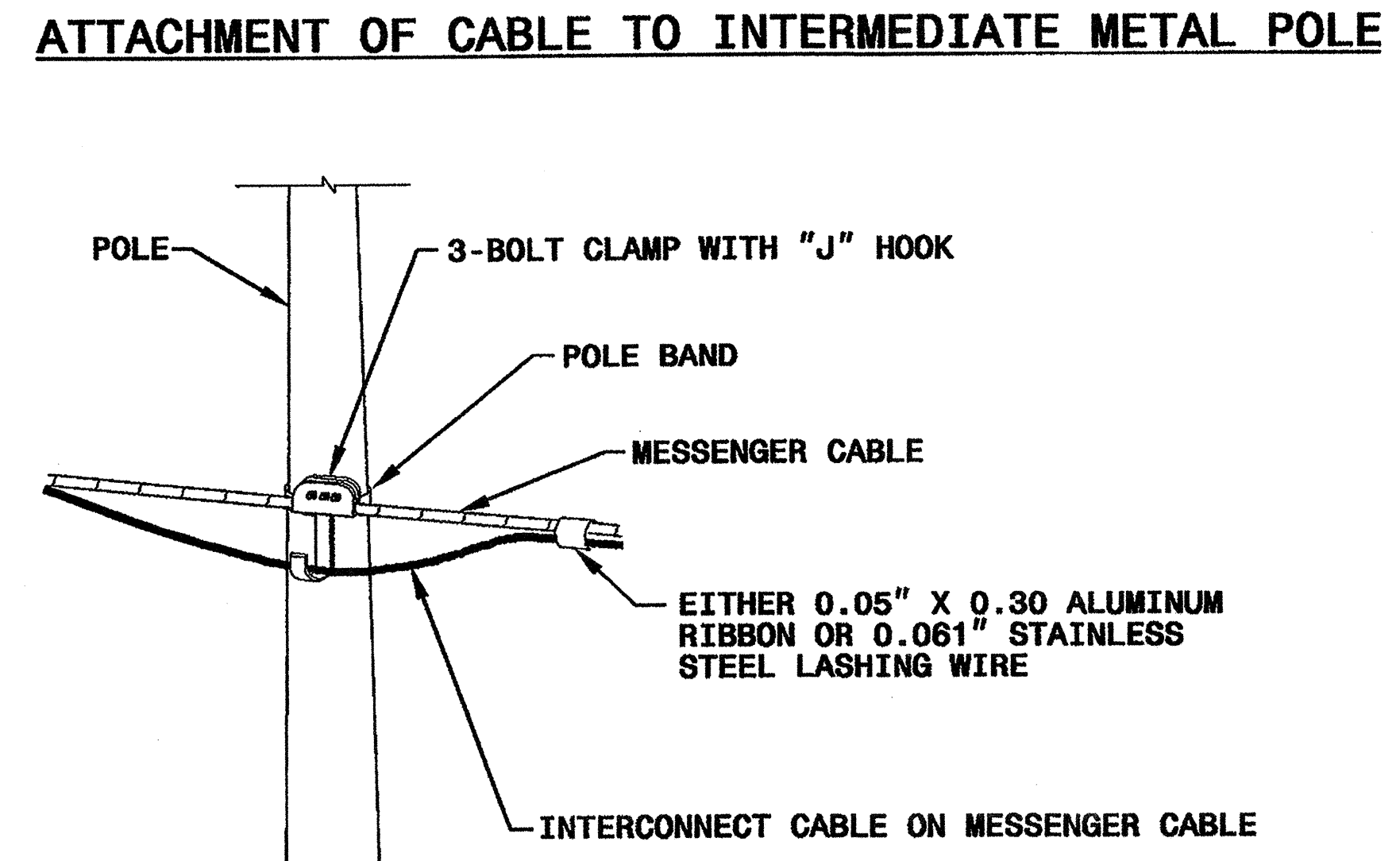
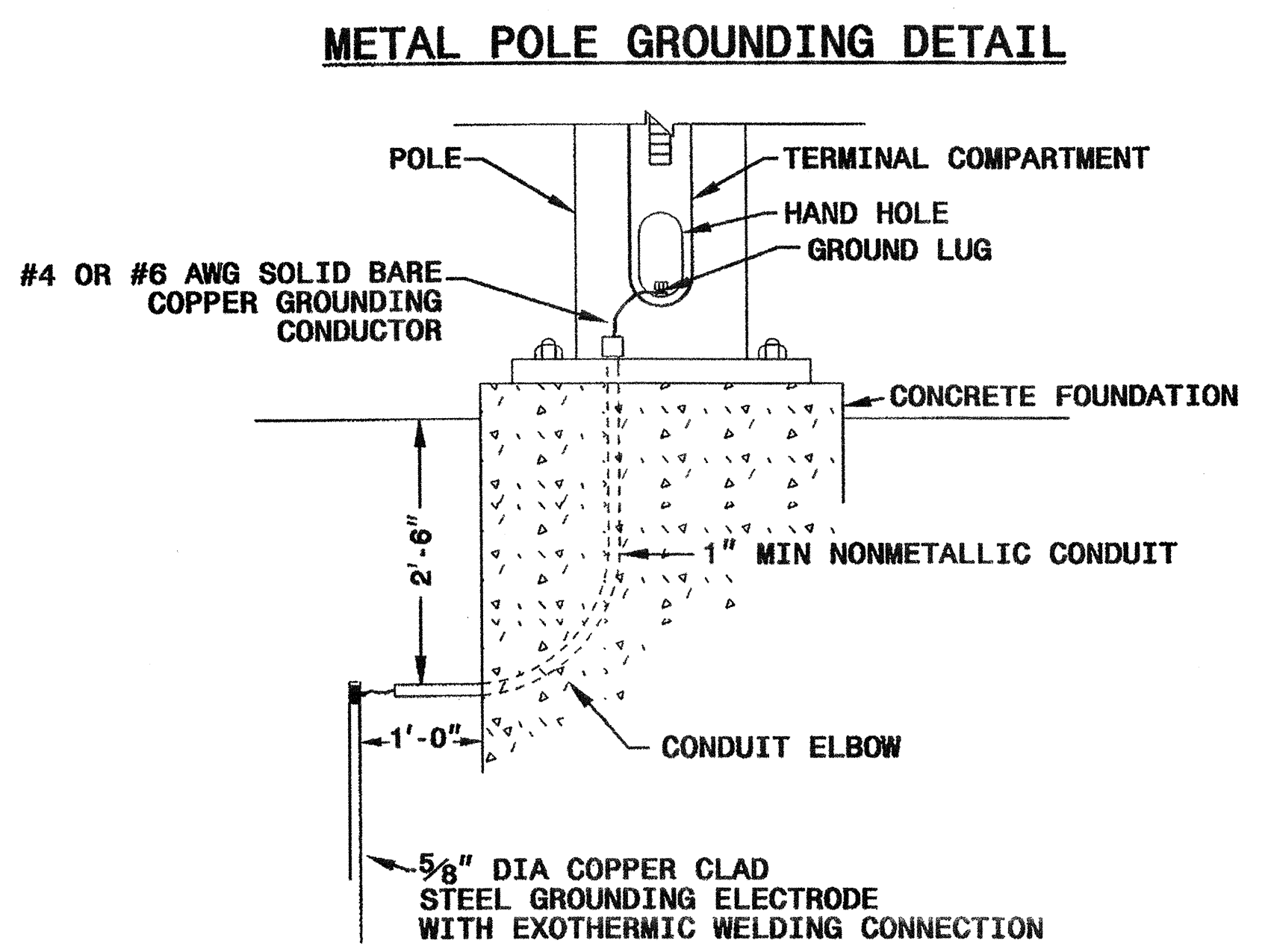
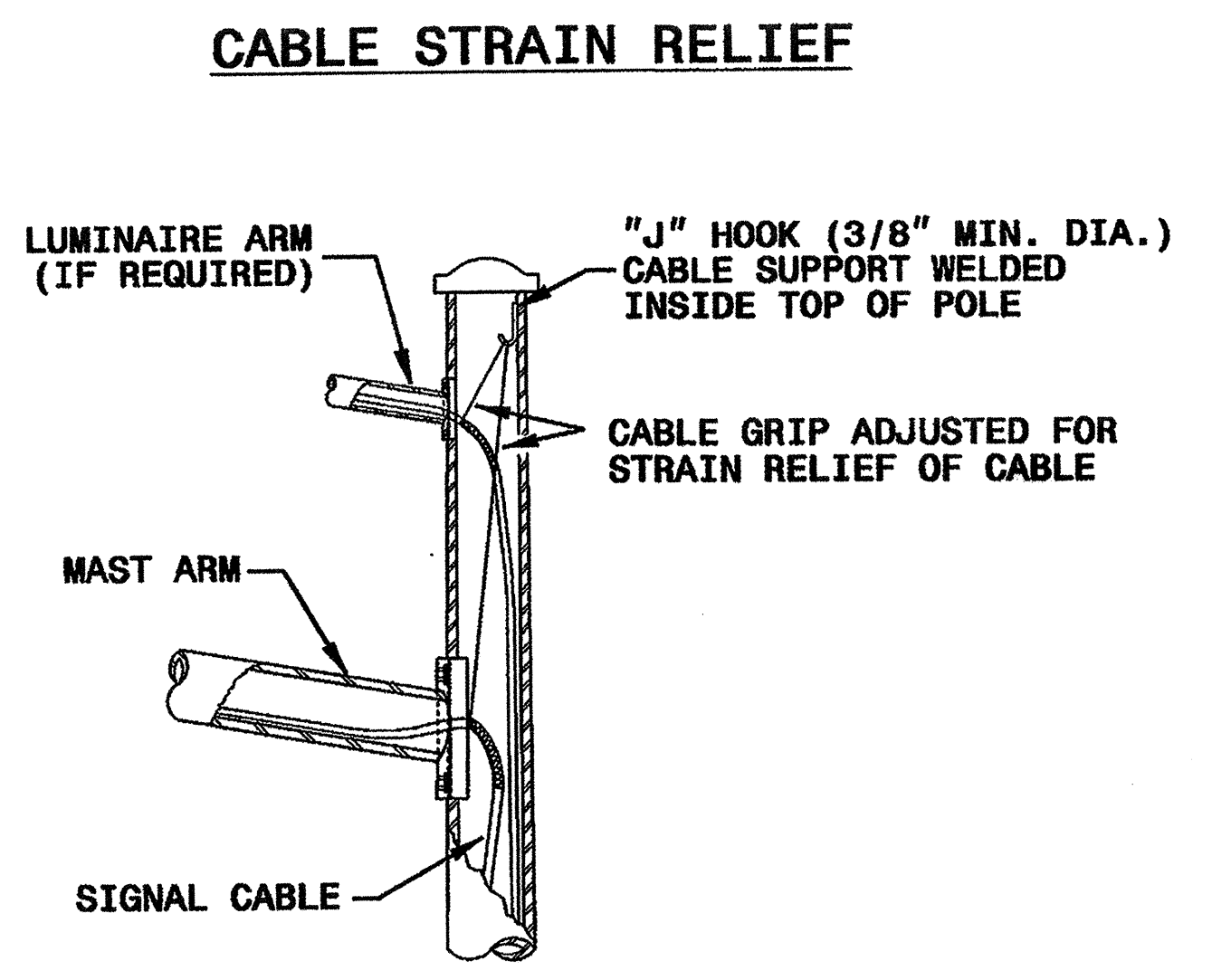
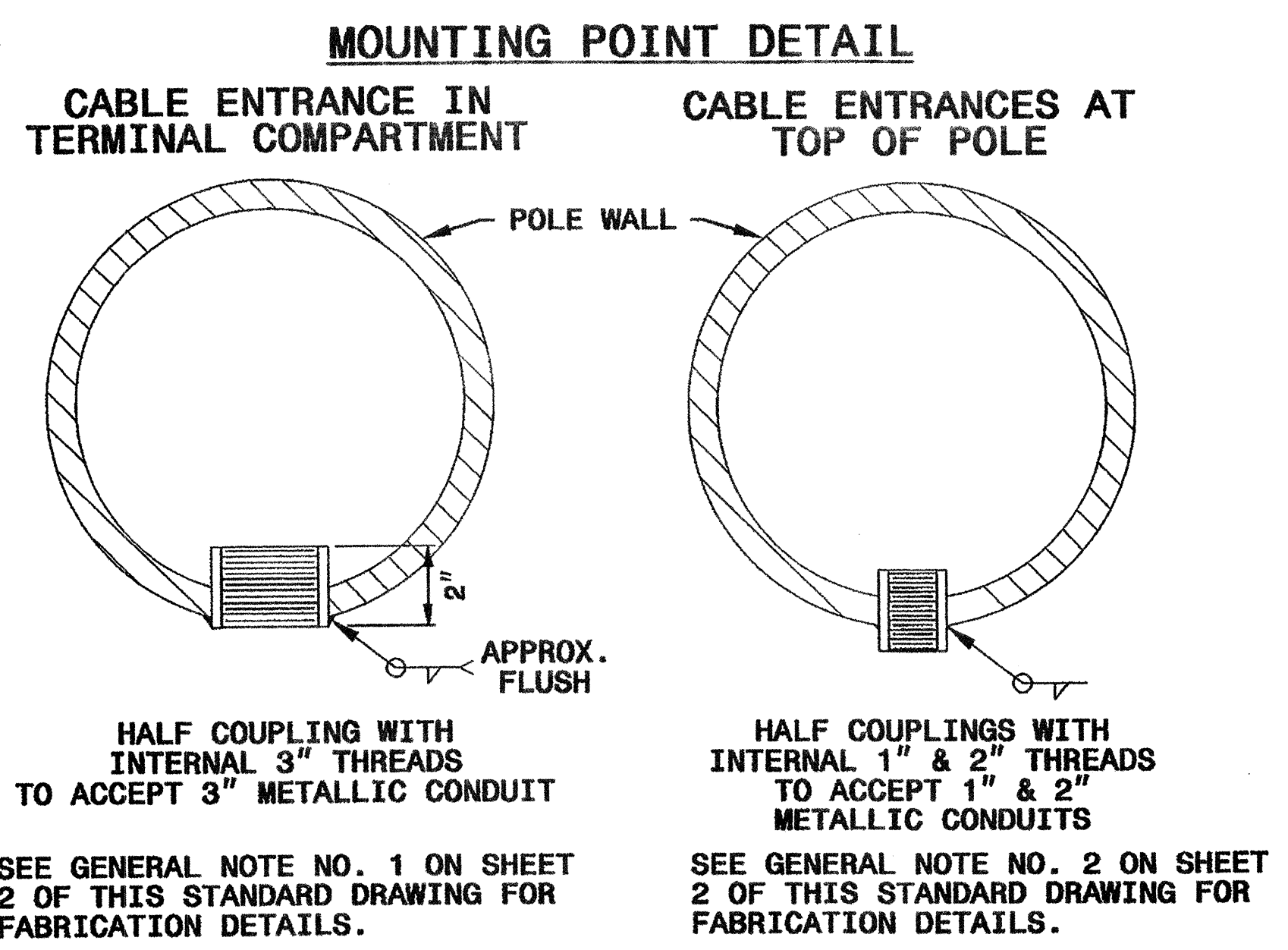
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DIVISION OF HIGHWAYS  
RALEIGH, N.C.

9-03

ENGLISH STANDARD DRAWING FOR  
METAL POLES  
MISCELLANEOUS DETAILS

SHEET 3 OF 3  
1740.01



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DIVISION OF HIGHWAYS  
RALEIGH, N.C.

9-03

ENGLISH STANDARD DRAWING FOR  
METAL POLES  
MISCELLANEOUS DETAILS

SHEET 3 OF 3  
1740.01

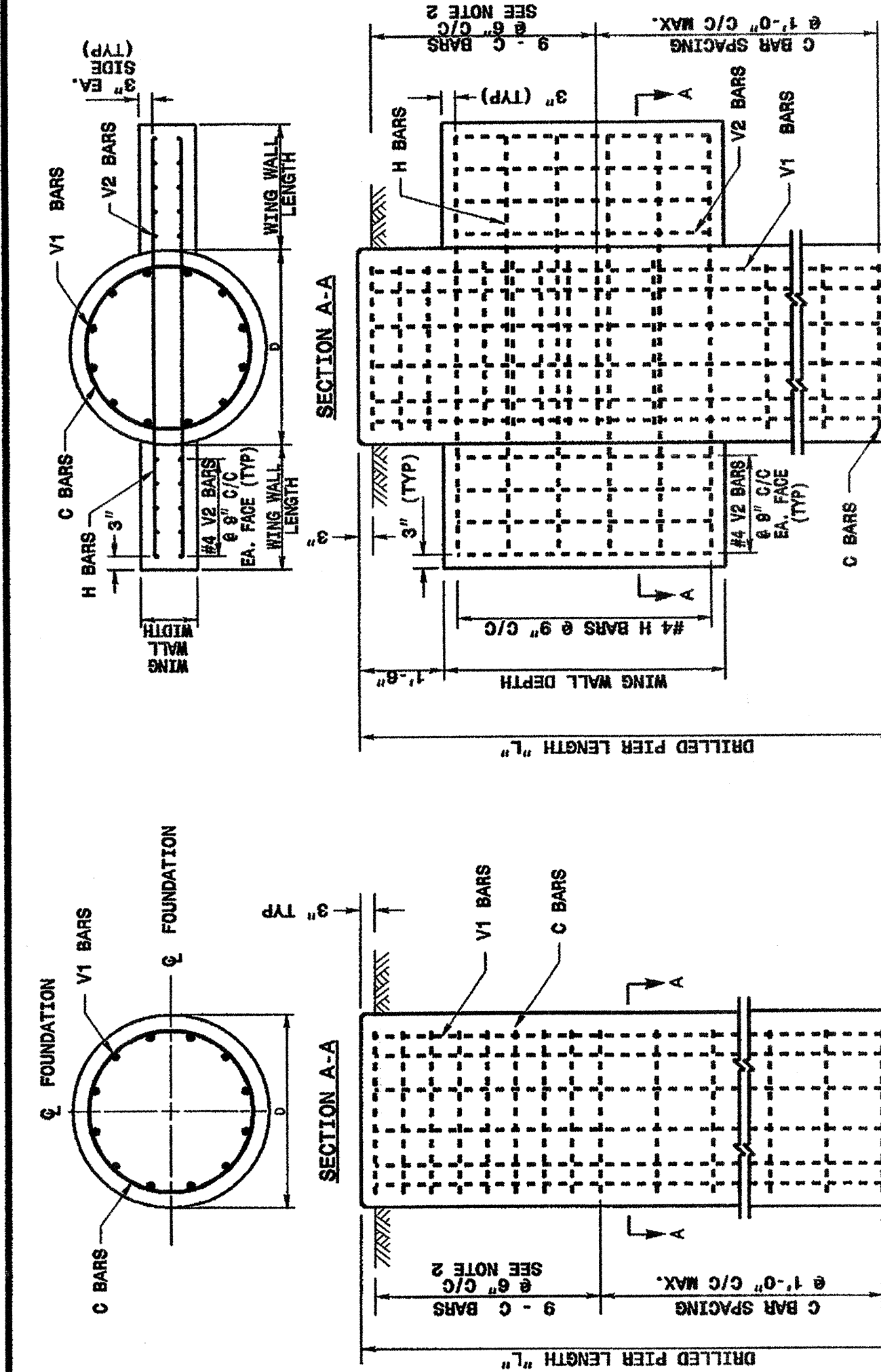
Structural Engineer	Electrical Engineer
<i>D. Saxe</i>	<i>Milton J. Deane</i>
9/19/03	9/22/03
SIGNATURE	SIGNATURE
DATE	DATE
<b>Standard Drawings</b>	
Traffic Management and Signal Systems Unit 122 N. McDowell St., Raleigh, NC 27603	
<b>See Plate for Title</b>	
Original: 2002 Standards	

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 RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR  
**METAL POLE FOUNDATIONS  
 REINFORCING CAGE DETAILS**

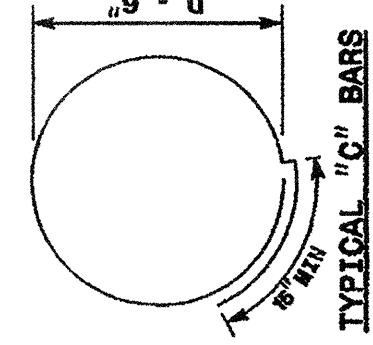
SHEET 1 OF 2  
**1742.01**



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

SHAFT DIA. (in.)	VOLUME OF CONC. (cu. yds.)	BAR NO.	BAR SIZE	BAR STR.	BAR LENGTH
42"	.386 x L	V1	#4	STR.	44'
42"	.386 x L	C	#4	STR.	10'-9"
48"	.465 x L	V1	#4	STR.	44'
48"	.465 x L	C	#4	STR.	12'-5"

\* See Construction Note No. 2.  
 \*\* See Construction 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.)	Bar No.	Bar Size	Bar Type	Bar Length
TYPE 1	42"	V1	#4	STR.	34'-2"
		H	#4	STR.	2'-6"
TYPE 2	42"	V1	#4	STR.	6'-0"
		C	#4	STR.	10'-9"
TYPE 2	48"	V1	#4	STR.	34'-2"
		H	#4	STR.	2'-6"
TYPE 2	48"	V1	#4	STR.	6'-0"
		C	#4	STR.	10'-9"

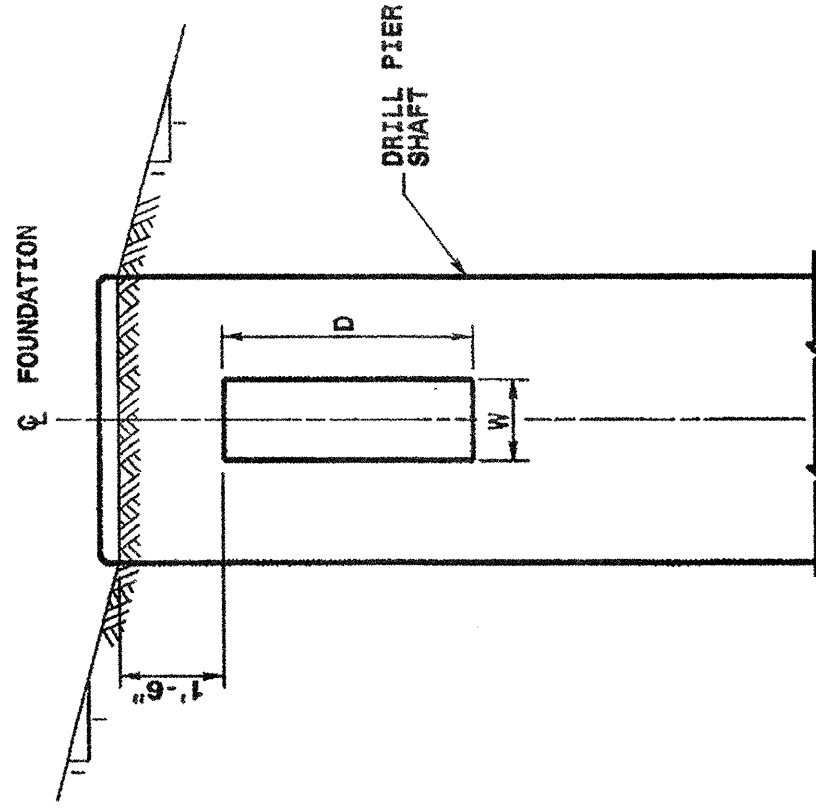
\* See Construction Note No. 1.  
 \*\* See Construction Note No. 2.

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'-8"	1'-0"	8'-0"	.4
TYPE 2	3'-0"	1'-0"	8'-0"	1.2

\* See Construction Note No. 3.

- NOTES**
- THE NUMBER OF C-BARS IS BASED ON FOUNDATION DEPTH. SEE FOUNDATION SELECTION TABLES.
  - CIRCULAR TIE REINFORCING RINGS MAY BE VERTICALLY ADJUSTED BY +/- 8" 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. SEE FOUNDATION SELECTION TABLES.
  - 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 DRILL PIER SHAFT.)
  - CONCRETE DRILL PIER SHAFT VOLUME (CU. YDS.):  
 FOR 42" DIA. = .386X L  
 FOR 48" DIA. = .465X L
  - DEFORM REINFORCING STEEL TO CONFORM TO ASTM A615 GRADE 60. TIES MAY BE DEFORMED OR PLAIN.
  - CAST CONCRETE AGAINST UNDISTURBED SOIL.
  - DO NOT ERECT TRAFFIC SIGNAL STRUCTURES BEFORE THE CONCRETE IN THE FOUNDATION HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.
  - MAKE PROVISIONS FOR DRAINAGE OF WATER FROM INSIDE OF THE METAL SUPPORT.
  - FOR OTHER DETAILS REGARDING CONSTRUCTION OF CONCRETE FOUNDATION SEE PROJECT SPECIAL PROVISIONS.
  - IN CASE OF ANY CROSS SLOPES, GRADE AROUND THE FOUNDATION AS FOLLOWS:



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ENGLISH STANDARD DRAWING FOR  
**METAL POLE FOUNDATIONS  
 REINFORCING CAGE DETAILS**

SHEET 1 OF 2  
**1742.01**

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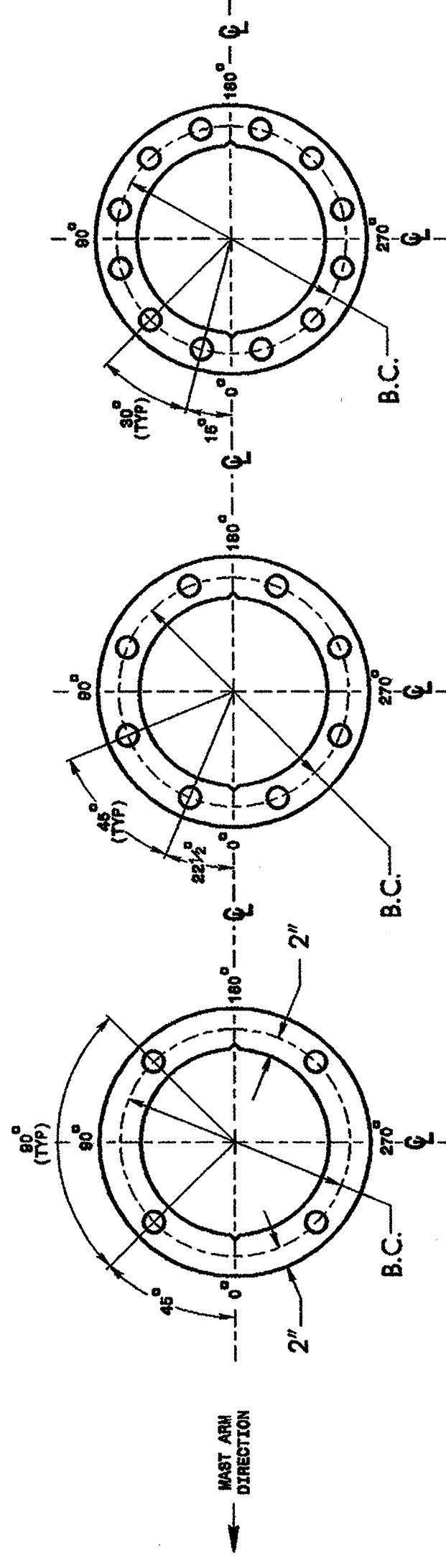
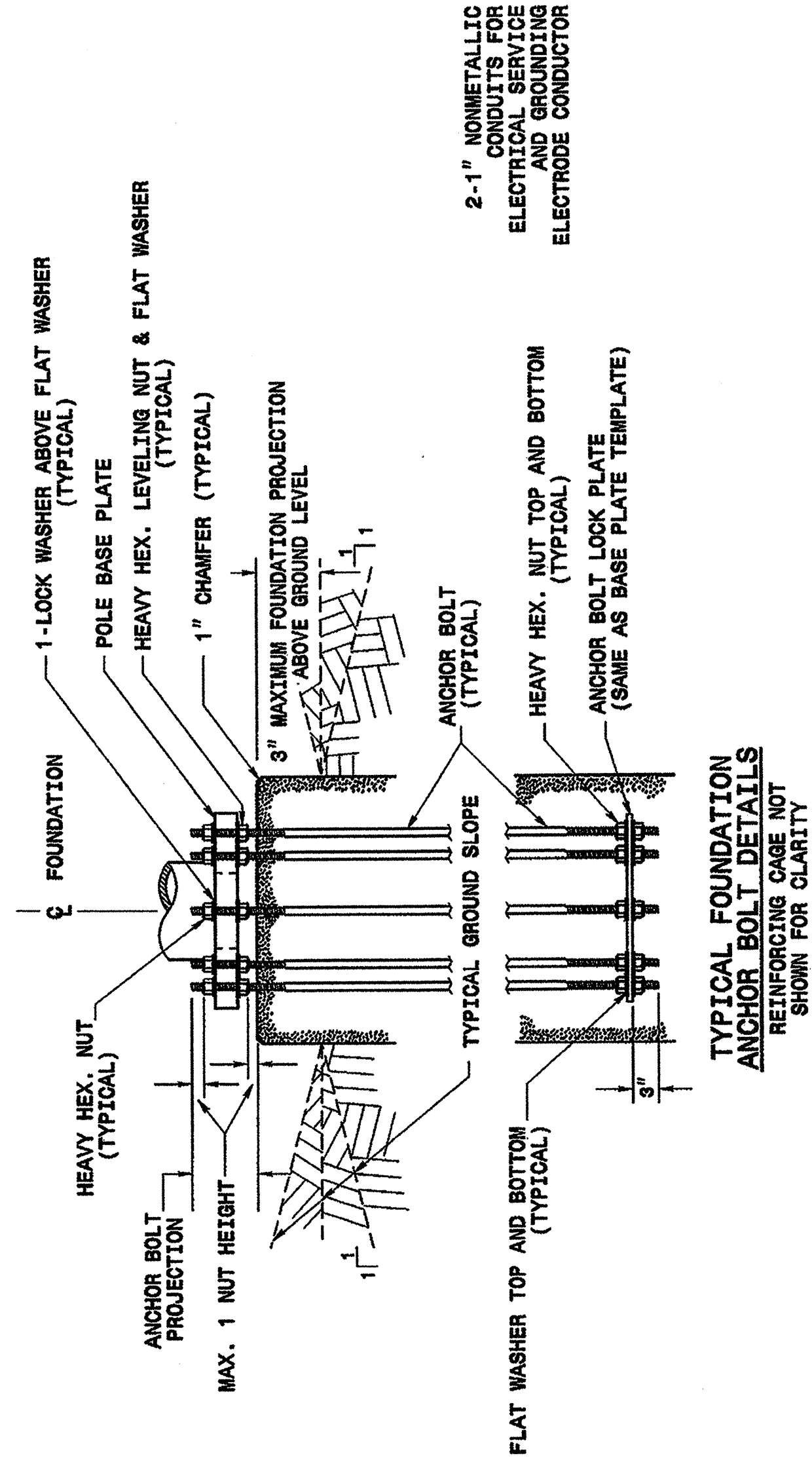
ENGLISH STANDARD DRAWING FOR  
**METAL POLE FOUNDATIONS  
 INSTALLATION DETAILS**

SHEET 2 OF 2  
**1742.01**

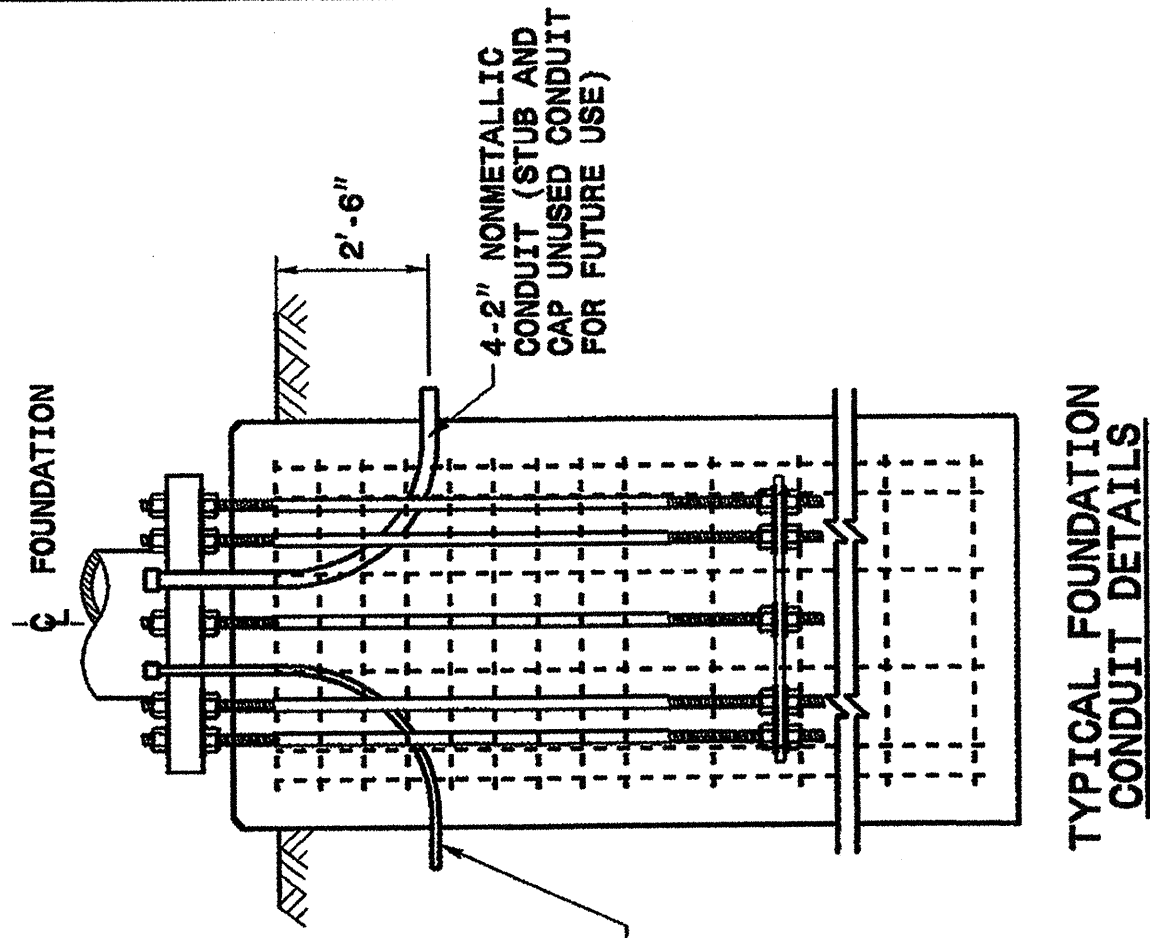
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 RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR  
**METAL POLE FOUNDATIONS  
 INSTALLATION DETAILS**

SHEET 2 OF 2  
**1742.01**



FOR 4 BOLT BASE PLATE FOR 8 BOLT BASE PLATE FOR 12 BOLT BASE PLATE  
 CONSTRUCT TEMPLATES AND PLATES FROM 1/4" THICK STEEL. GALVANIZING IS NOT REQUIRED.  
**BASE PLATE TEMPLATE AND ANCHOR BOLT LOCK PLATE DETAILS**



TYPICAL FOUNDATION CONDUIT DETAILS

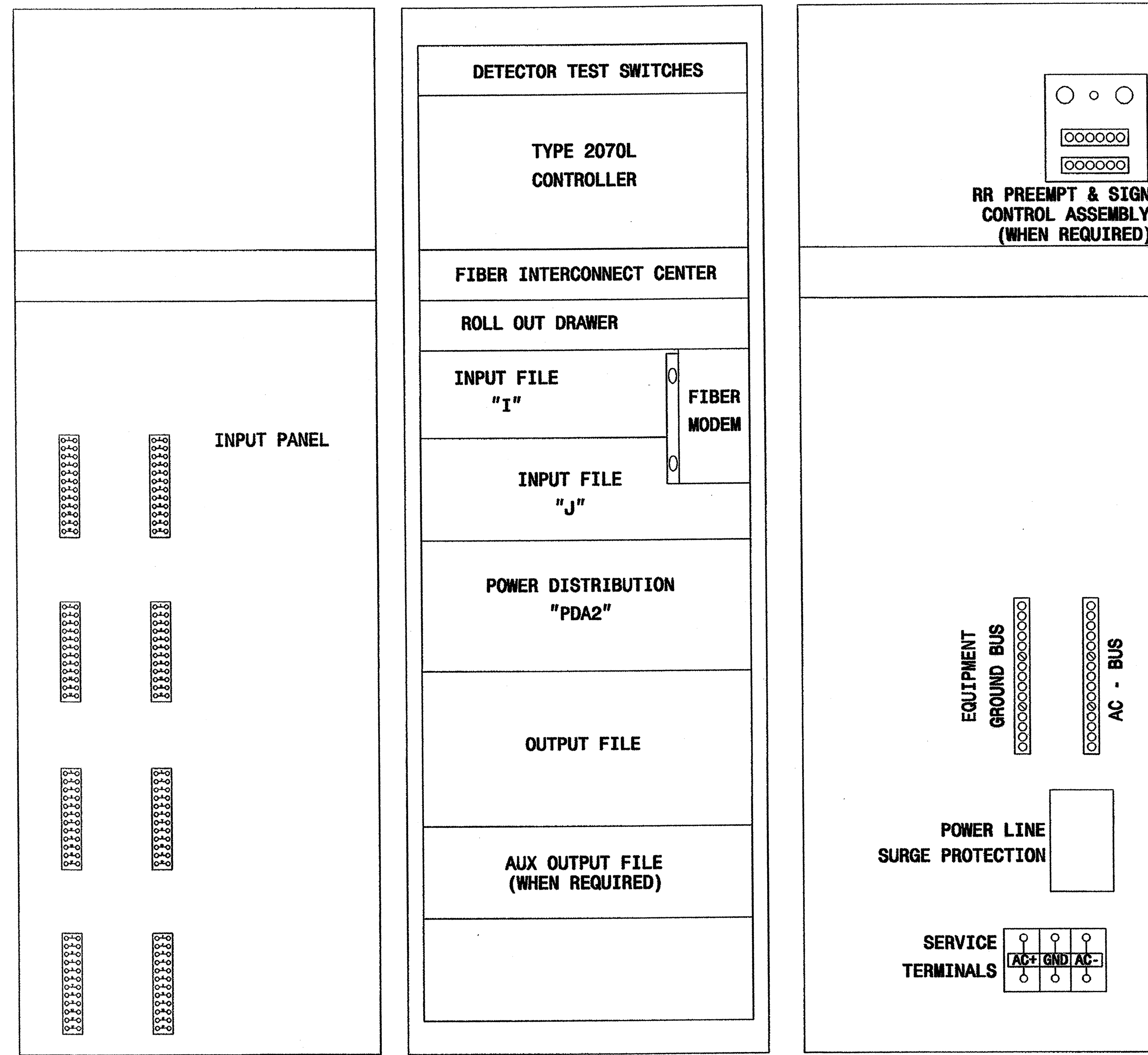
2-1" NONMETALLIC CONDUITS FOR ELECTRICAL SERVICE AND GROUNDING ELECTRODE CONDUCTOR

Structural Engineer  D. Sarkar 8/20/04 SIGNATURE DATE	Electrical Engineer  Gregory A. Fuller 8/25/04 SIGNATURE DATE
----------------------------------------------------------------	------------------------------------------------------------------------

Standard Drawings  
 Traffic Management and Signal Systems Unit  
 122 N. McDowell St., Raleigh, NC 27605

See Plate for Title

Original: 2002 Standards



332A CABINET  
LEFT SIDE

332A CABINET

332A CABINET  
RIGHT SIDE

REAR VIEW

**NOTE**

-PROVIDE A 50 MM SPACE BETWEEN THE CONTROLLER AND THE ROLL OUT DRAWER TO ACCOMMODATE A FIBER INTERCONNECT CENTER.

Typical Drawing

	<b>Cabinet Component Layout</b> <b>170 Cabinet Model 332A</b> <b>with 2070L Controller</b>	
	PLAN DATE: <b>October 2002</b> PREPARED BY: <b>P L Alexander</b>	REVIEWED BY: REVIEWED BY:
REVISIONS _____ _____	INIT. DATE _____ _____	SIGNATURE: <i>Wilton L. Dean</i> DATE: <b>4/13/02</b> SIG. INVENTORY NO. <b>NA</b>

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P L Alexander