

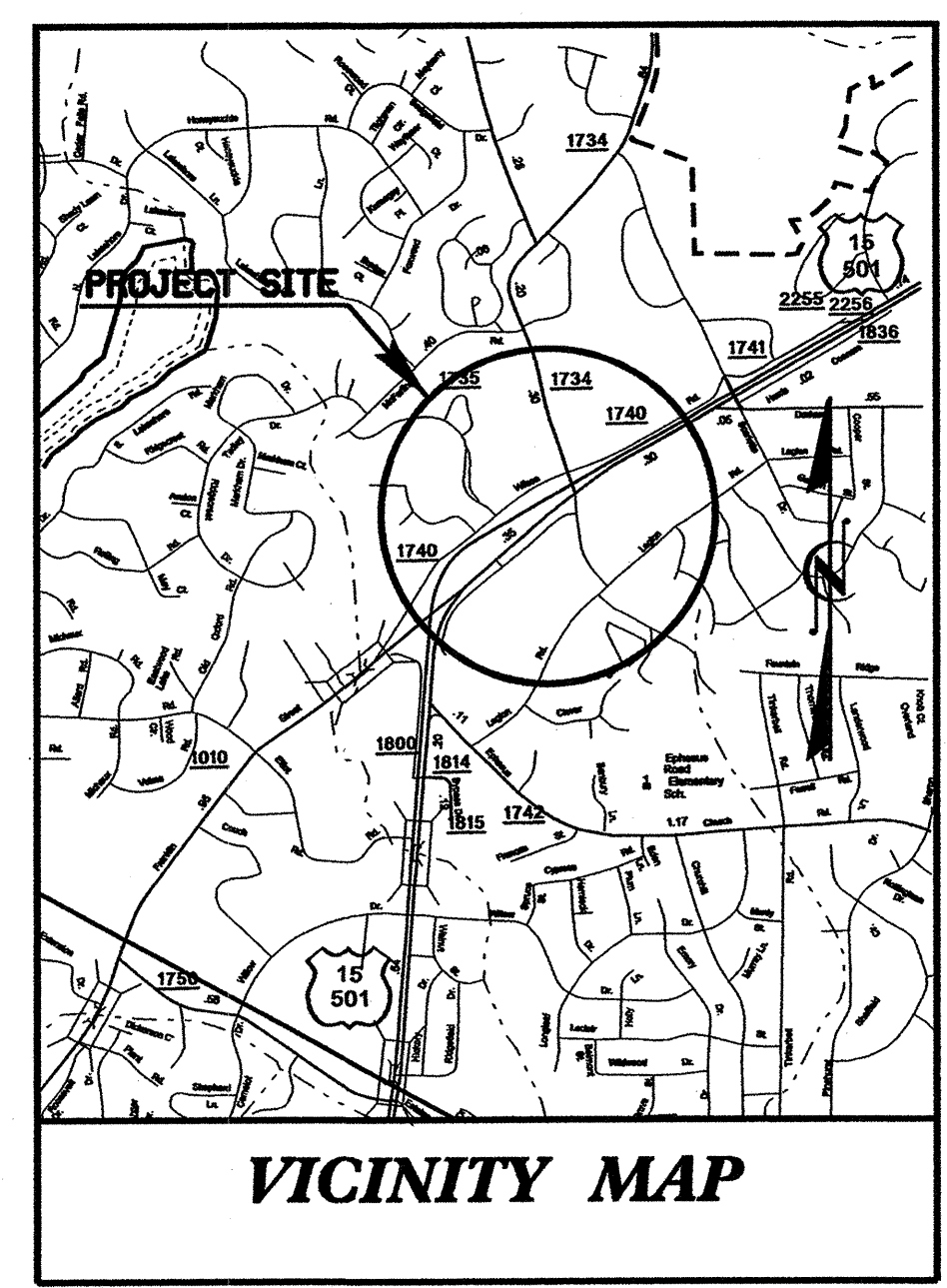
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ORANGE COUNTY

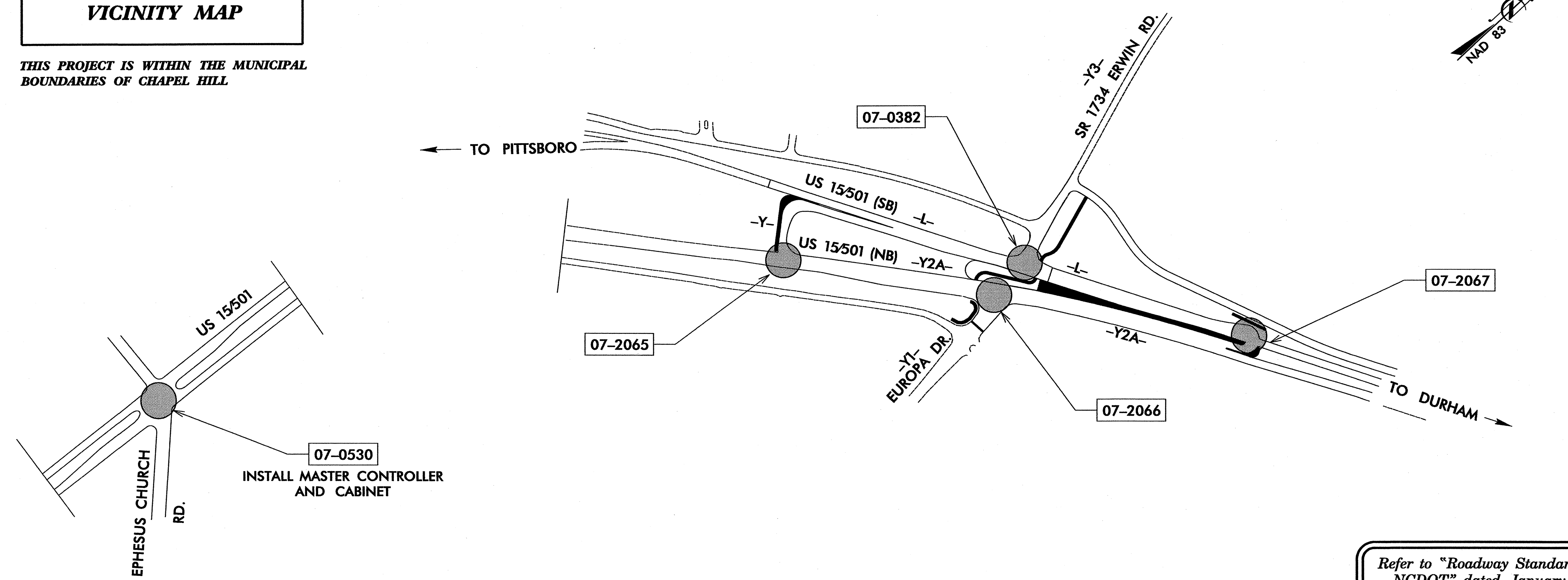
**LOCATION: INTERSECTION IMPROVEMENT AT US 15-501
AND ERWIN ROAD IN CHAPEL HILL**

TYPE OF WORK: TRAFFIC SIGNALS AND COMMUNICATIONS CABLE ROUTING

TIP PROJECT: U-4008



VICINITY MAP
THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF CHAPEL HILL



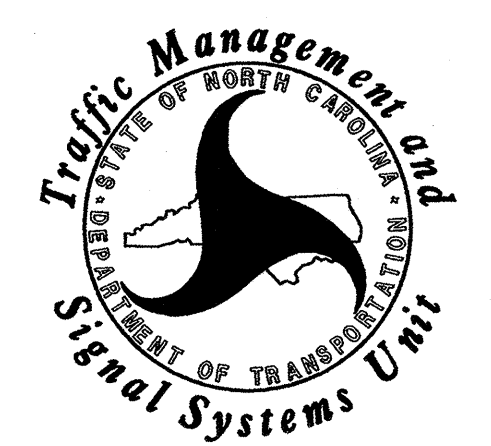
Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.

Sheet #	Reference #	Index of Plans	Location/Description
Sig. 1	N/A	Title Sheet	
Sig. 2	07-0382	US 15-501 At SR 1734 (Erwin Road)	
Sig. 3	07-2066	US 15-501 At Europa Drive	
Sig. 12	07-2065	US 15-501 Southbound U-Turn .14 Miles South of SR 1734 (Erwin Road)	
Sig. 17	07-2067	US 15-501 Northbound U-Turn .15 Miles North of Europa Drive	
Sig. 20	N/A	2070L Cabinet Component Layout	
Sig. 21	N/A	Communications Cable Routing Plans	

TRAFFIC MANAGEMENT AND SIGNAL SYSTEMS UNIT

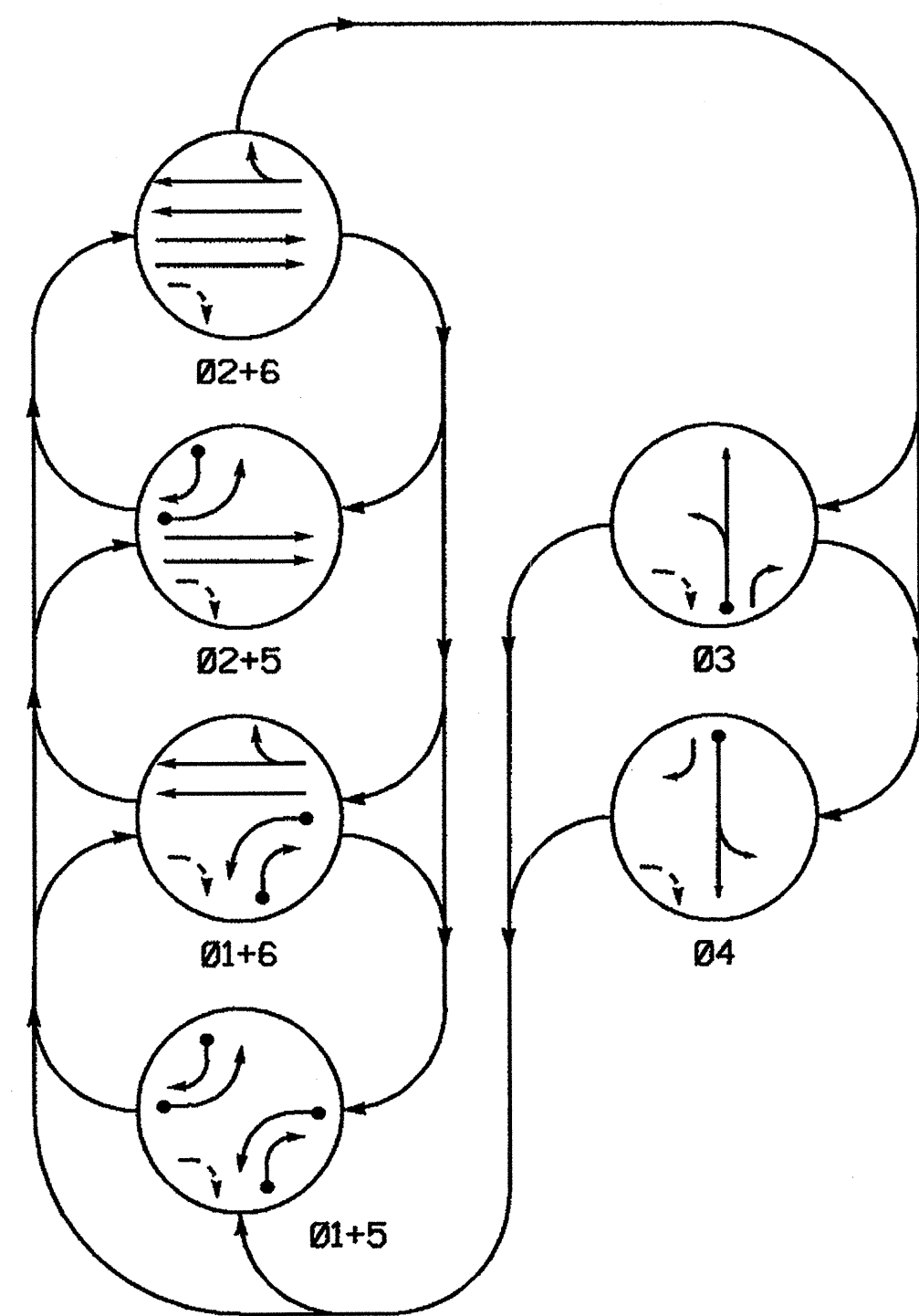
Contacts:
D. Y. Ishak - Signals and Geometrics Contracts Engineer
G. C. Brown, PE - Signal Equipment Design Engineer
G. G. Murr, Jr., PE - Traffic Management Systems Engineer

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



27-MAR-2006 08:23 s:\sig_signals\workgroups\tip_projects\U-4008\4008_sig_tsh_20040816.dgn

PHASING DIAGRAM



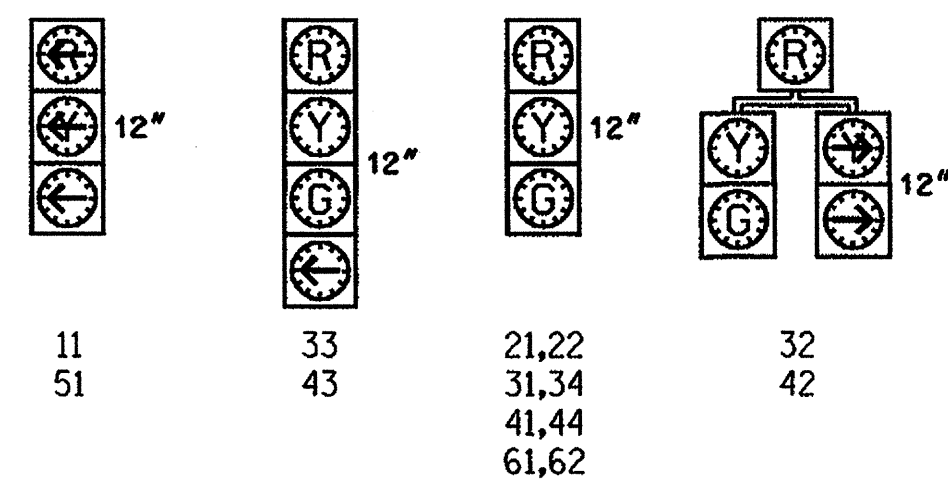
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE					
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4
11	←	←	←	←	←	←
21, 22	R	R	G	G	R	R
31, 34	R	R	R	R	G	R
32	R	R	R	R	G	R
33	R	R	R	R	G	R
41, 44	R	R	R	R	G	R
42	R	R	R	R	G	R
43	R	R	R	R	G	R
51	←	←	←	←	←	←
61, 62	R	G	R	G	R	R

SIGNAL FACE I.D.

○ Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CAB
1A	6x40	2-4-2	0	Y	1	Y	Y	-	-	-	-	Y
1B	6x40	2-4-2	0	Y	1	Y	Y	-	-	-	15	Y
3A	6x40	2-4-2	0	Y	3	Y	Y	-	-	-	-	Y
4A	6x40	2-4-2	0	Y	4	Y	Y	-	-	-	3	Y
5A	6x40	2-4-2	0	Y	5	Y	Y	-	-	-	-	Y
5B	6x40	2-4-2	0	Y	5	Y	Y	-	-	-	15	Y

6 Phase Semi-Actuated Chapel Hill Closed Loop System

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Install backplates for signal heads numbered #11, 21, 22, 51, 61, & 62.
- Phase 1 or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.

PLAN QUANTITIES

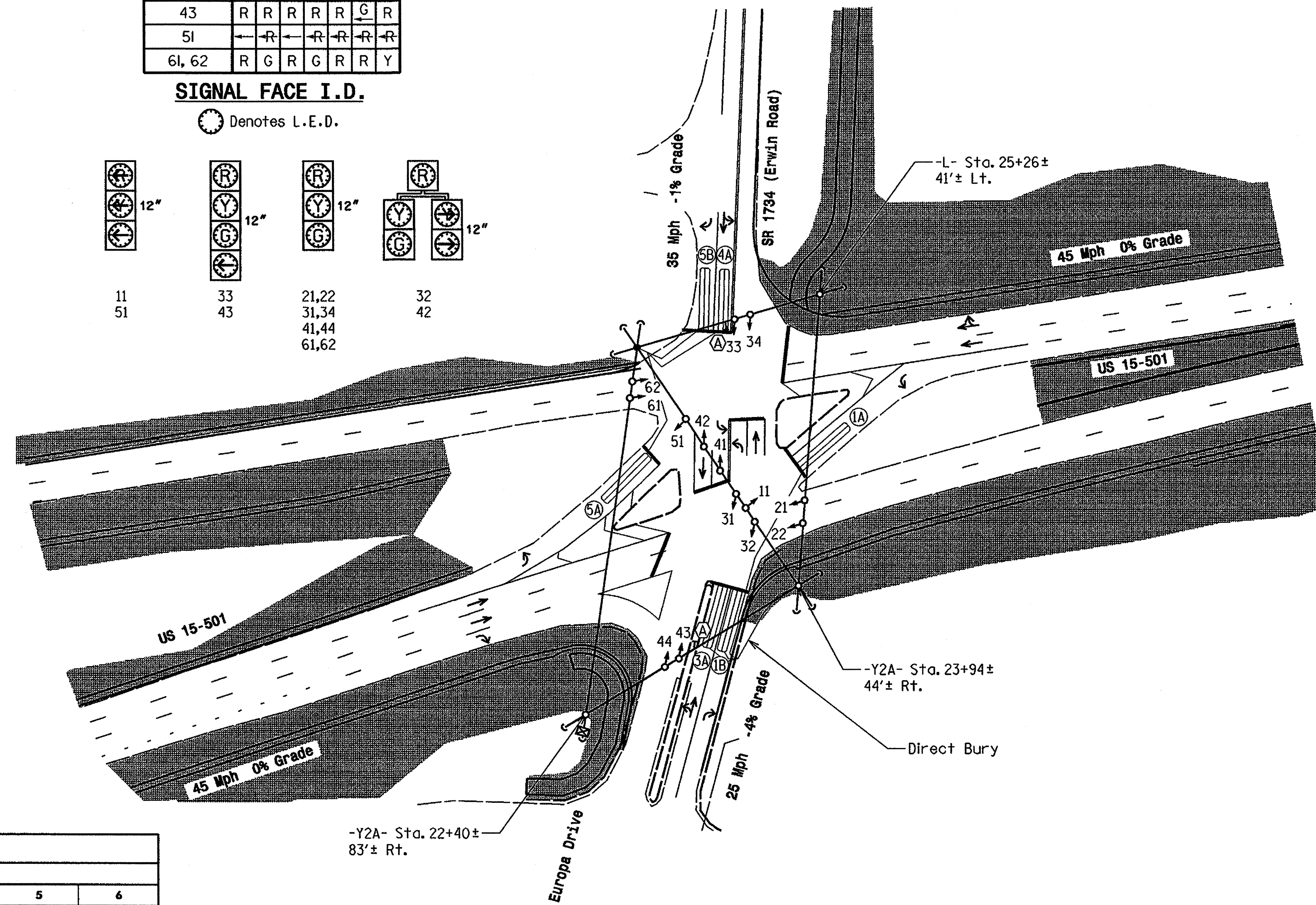
Pay Item	Feet
Signal Cable	2250
Messenger Cable	875
Lead-in Cable	530

LEGEND

- | | | |
|-----------------|--|-----------------|
| PROPOSED | | EXISTING |
| ○ | Traffic Signal Head | ● |
| ● | Modified Signal Head | N/A |
| ⊥ | Sign | ⊥ |
| ⊥ | Pedestrian Signal Head With Push Button & Sign | ⊥ |
| ⊥ | Signal Pole with Guy | ⊥ |
| ⊥ | Signal Pole with Sidewalk Guy | ⊥ |
| ⊥ | Inductive Loop Detector | ⊥ |
| ⊥ | Controller & Cabinet | ⊥ |
| ⊥ | Junction Box | ⊥ |
| ⊥ | 2-in Underground Conduit | ⊥ |
| N/A | Right of Way | ⊥ |
| → | Directional Arrow | → |
| ⊙ | Left Arrow "ONLY" Sign (R3-5L) | ⊙ |
| ■ | Construction Zone | ■ |

FEATURE	2070L TIMING CHART					
	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	2.0	0.0	3.0	3.0	2.0	0.0
Max Green 1 *	20	70	20	20	35	70
Yellow Clearance	4.0	4.7	4.0	4.0	4.0	4.7
Red Clearance	2.0	1.0	3.8	3.1	2.0	1.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	MAX RECALL	-	-	-	MAX RECALL
Vehicle Call Memory	-	-	-	-	-	-
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

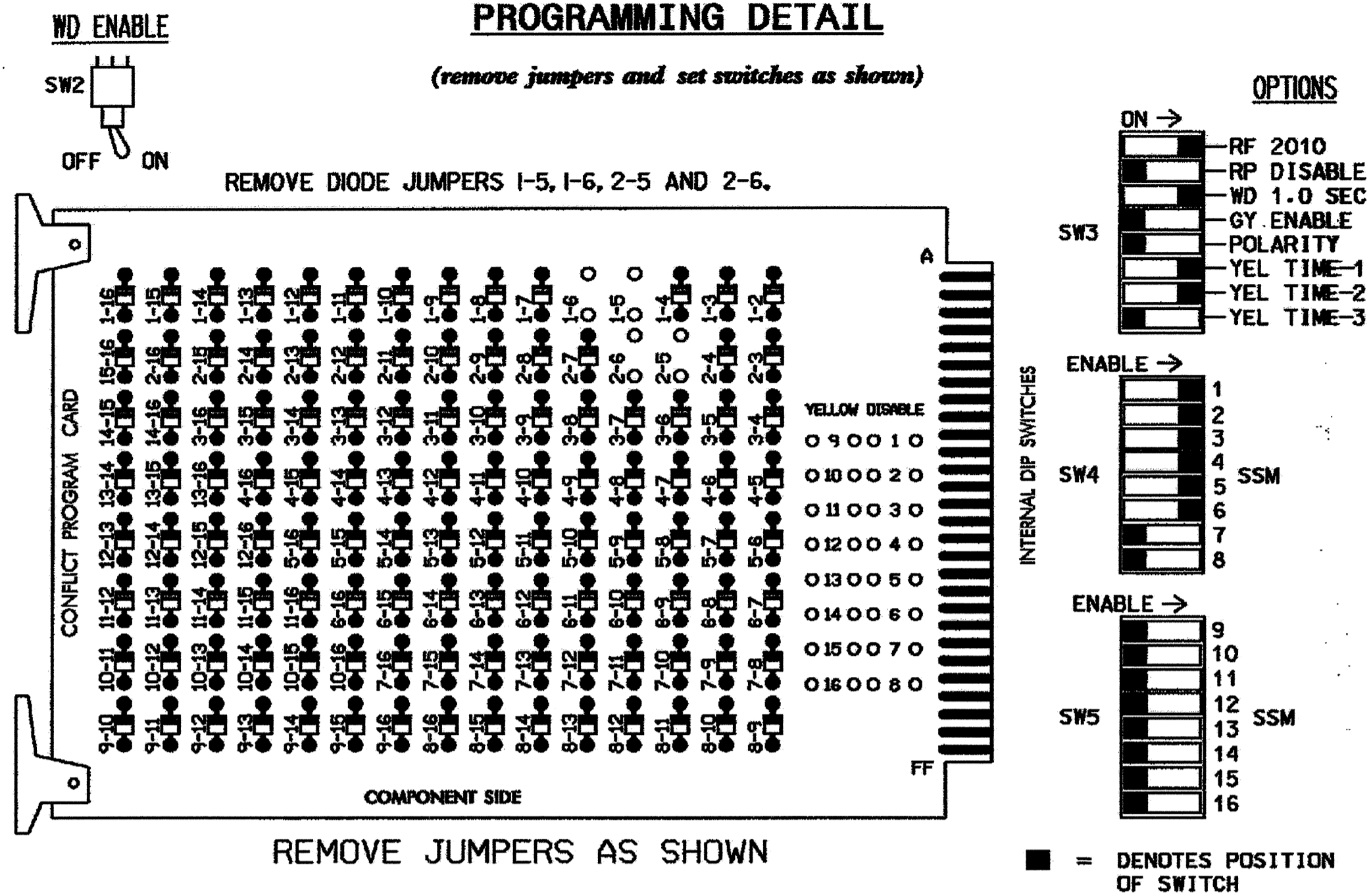


Signal Upgrade-Temporary Signal 1-Construction Phase I

	US 15-501 At SR 1734 (Erwin Drive)/ Europa Drive		
	Division 7 Orange County Chapel Hill	PREPARED BY: JGalloway REVIEWED BY: JGalloway	
PLAN DATE: July 2004 PREPARED BY: JGalloway REVIEWED BY: JGalloway	REVISIONS:	INIT.:	DATE: 9/1/04
SCALE: 1"=50' 	SIG. INVENTORY NO. 07-0382 T1		

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 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.
- THE CABINET AND CONTROLLER ARE PART OF CHAPEL HILL CLOSED LOOP SYSTEM.

EQUIPMENT INFORMATION

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

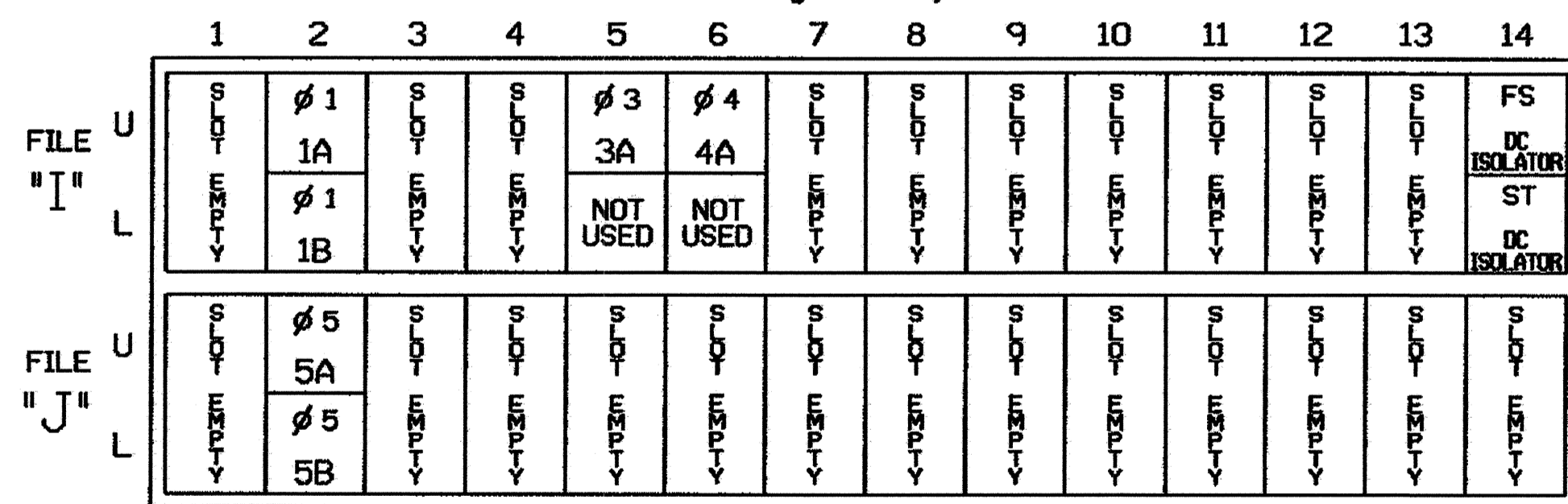
FIELD CONNECTION HOOK-UP CHART

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.	11	32	21,22	31 32,34	33	41 42,44	43	51	61,62	71	81	82
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					132	132				
GREEN ARROW	127	127		118	103	133	133					

NU = NOT USED

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-5,6	I2U	39	1	2	1	Y	Y			
1B	TB2-7,8	I2L	43	5	12	1	Y	Y			15
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
5A	TB3-5,6	J2U	40	2	6	5	Y	Y			
5B	TB3-7,8	J2L	44	6	16	5	Y	Y			15

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0382 T1
 DESIGNED: JULY 2004
 SEALED: 09/07/04
 REVISED:

SIGNAL UPGRADE - TEMPORARY SIGNAL 1

	US 15-501 AT SR 1734 (ERWIN DRIVE)/ EUROPA DRIVE		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN
	DIVISION 07 PLAN DATE: AUGUST 2004 PREPARED BY: JAMES PETERSON	ORANGE COUNTY REVIEWED BY: R. Henderson REVIEWED BY:	
222 N. McDowell St., Raleigh, NC 27603			SIG. INVENTORY NO. 07-0382 T1

PHASING DIAGRAM

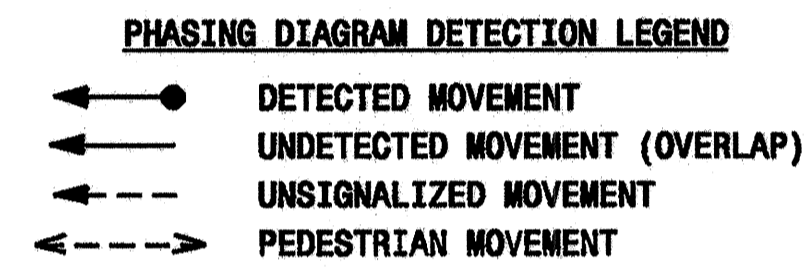
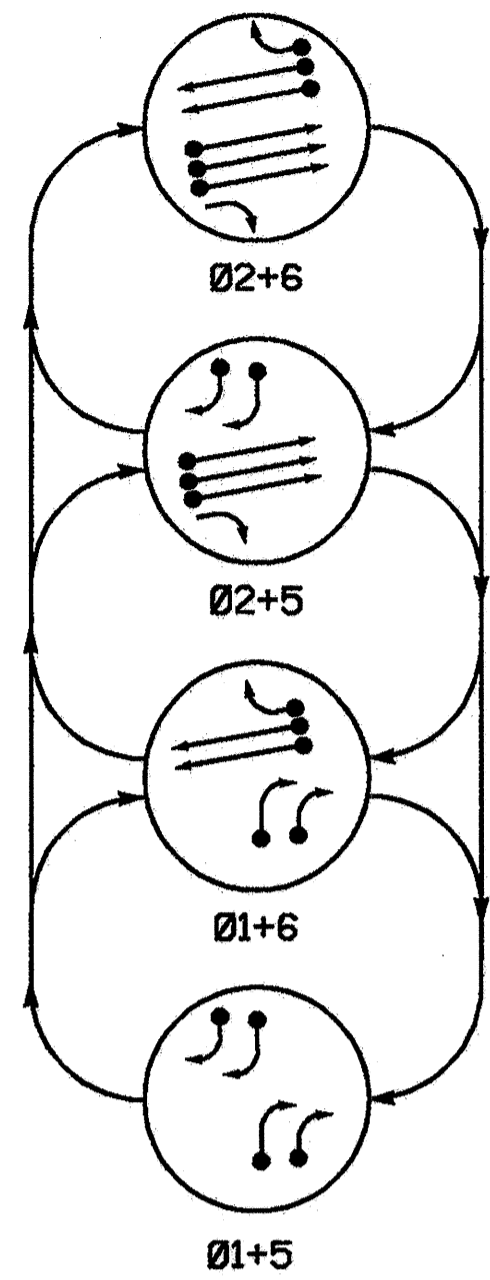
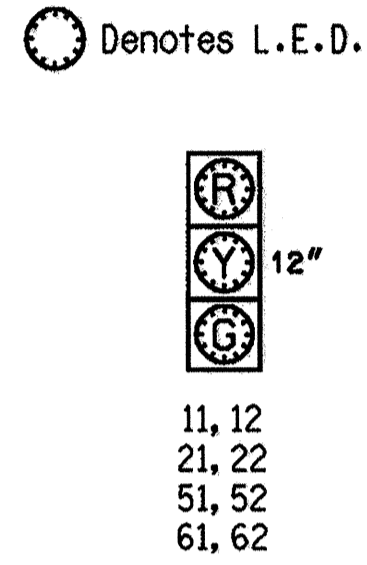


TABLE OF OPERATION

SIGNAL FACE	PHASE				F LASH
	Ø 2+6	Ø 1+5	Ø 1+6	Ø 2+5	
11, 12	R	R	G	G	R
21, 22	G	G	R	R	Y
51, 52	R	G	R	G	R
61, 62	G	R	G	R	Y

SIGNAL FACE I.D.



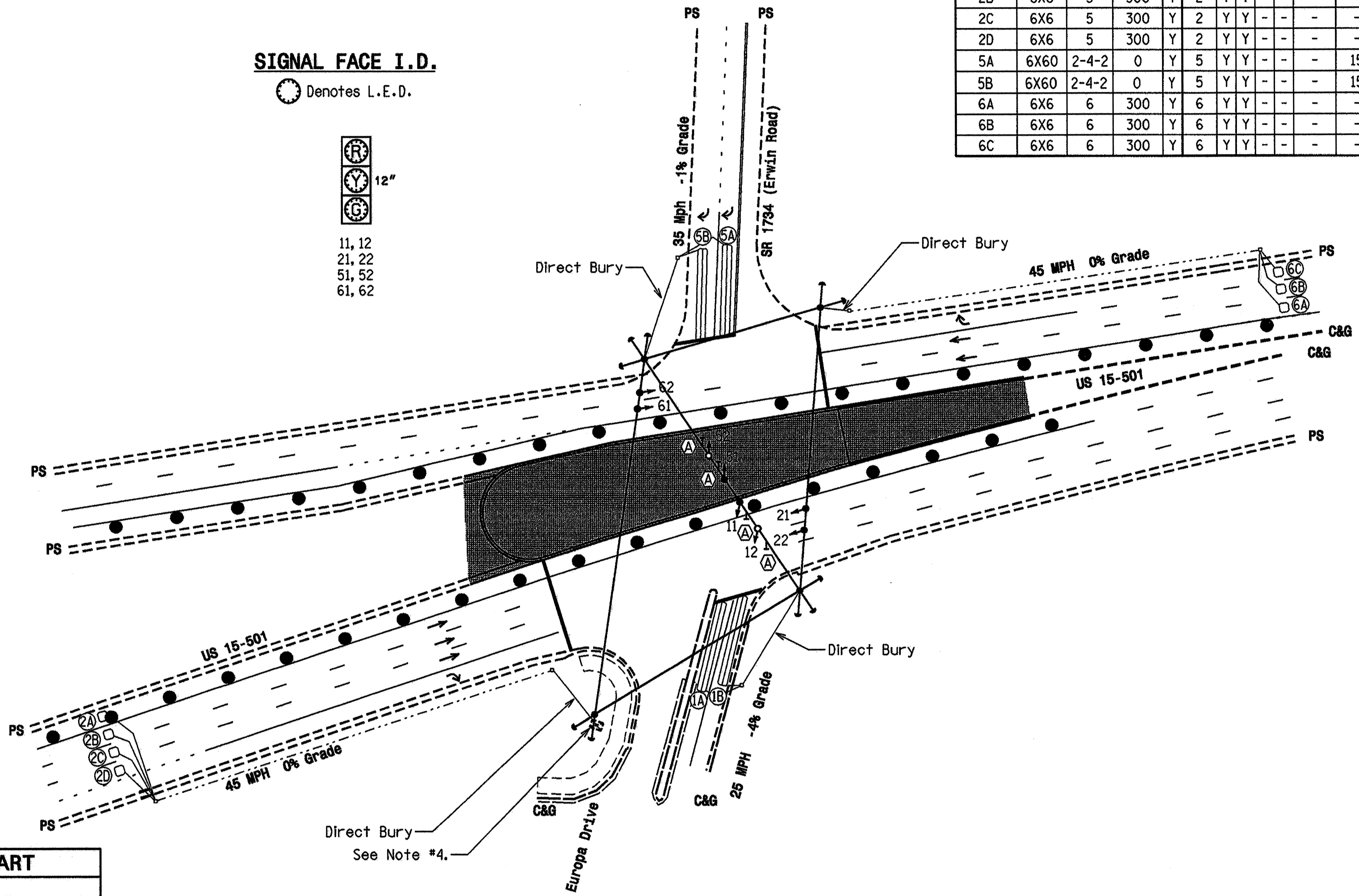
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	DETECTOR PROGRAMMING					NEW CAB	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME		DELAY TIME
1A	6X60	2-4-2	0	Y	1	Y	Y	-	-	15	-
1B	6X60	2-4-2	0	Y	1	Y	Y	-	-	15	-
2A	6X6	5	300	Y	2	Y	Y	-	-	-	-
2B	6X6	5	300	Y	2	Y	Y	-	-	-	-
2C	6X6	5	300	Y	2	Y	Y	-	-	-	-
2D	6X6	5	300	Y	2	Y	Y	-	-	-	-
5A	6X60	2-4-2	0	Y	5	Y	Y	-	-	15	-
5B	6X60	2-4-2	0	Y	5	Y	Y	-	-	15	-
6A	6X6	6	300	Y	6	Y	Y	-	-	-	Y
6B	6X6	6	300	Y	6	Y	Y	-	-	-	Y
6C	6X6	6	300	Y	6	Y	Y	-	-	-	Y

4 Phase Fully Actuated Chapel Hill Closed Loop 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.
- Set all detector units to presence mode.
- Install GPS Unit for time synchronization.



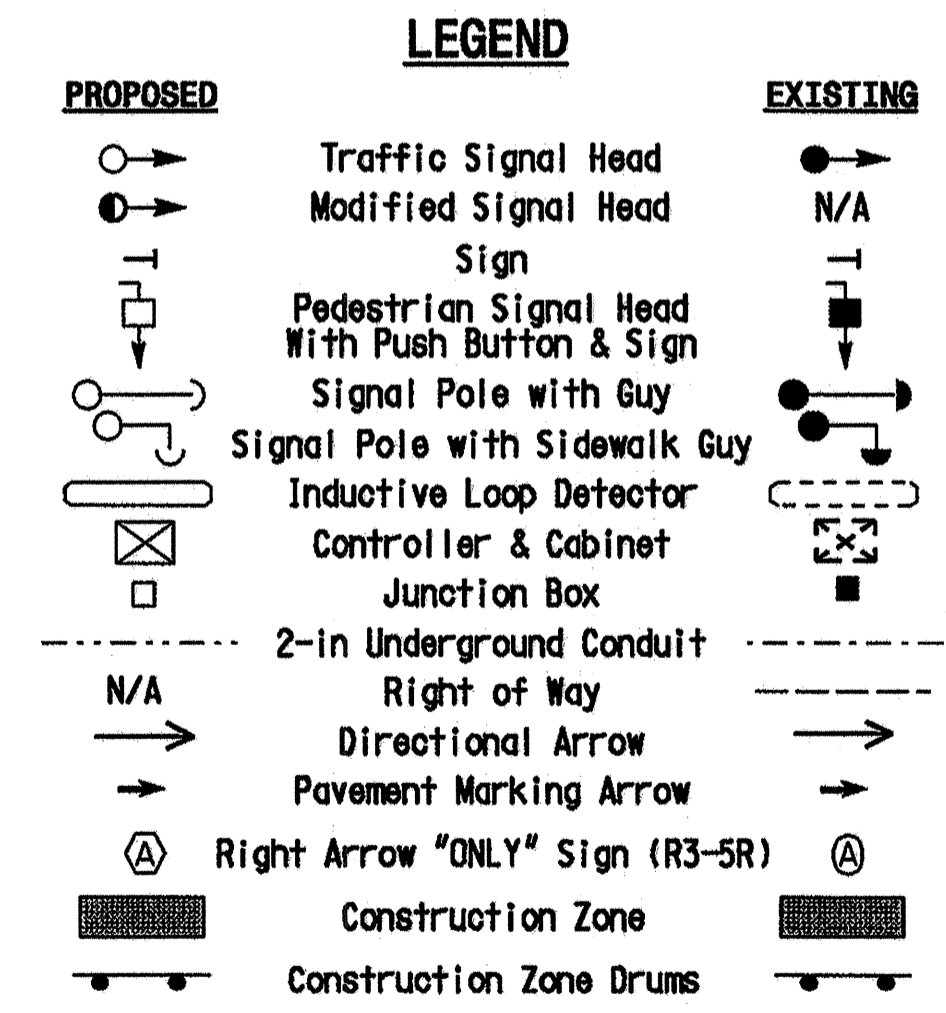
PLAN QUANTITIES

Pay Item	Feet
Signal Cable	0
Messenger Cable	0
Lead-in Cable	1690

2070L TIMING CHART

FEATURE	PHASE			
	1	2	5	6
Min Green 1 *	7	12	7	12
Extension 1 *	1.0	6.0	1.0	6.0
Max Green 1 *	20	90	20	90
Yellow Clearance	4.0	4.7	4.0	4.7
Red Clearance	2.0	2.5	2.0	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	-	3.0	-	3.0
Recall Mode	-	MIN RECALL	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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



Signal Upgrade-Temporary Signal 2-Construction Phase II

Prepared in the Office of
US 15-501 At SR 1734 (Erwin Road)

Division 7 Orange County Chapel Hill
 PLAN DATE: August 2004 REVIEWED BY: JP Galloway
 PREPARED BY: TS Brown REVIEWED BY: [Signature]
 REVISIONS: [Table] INIT. DATE: [Table]

SCALE: 1"=50'

SEAL

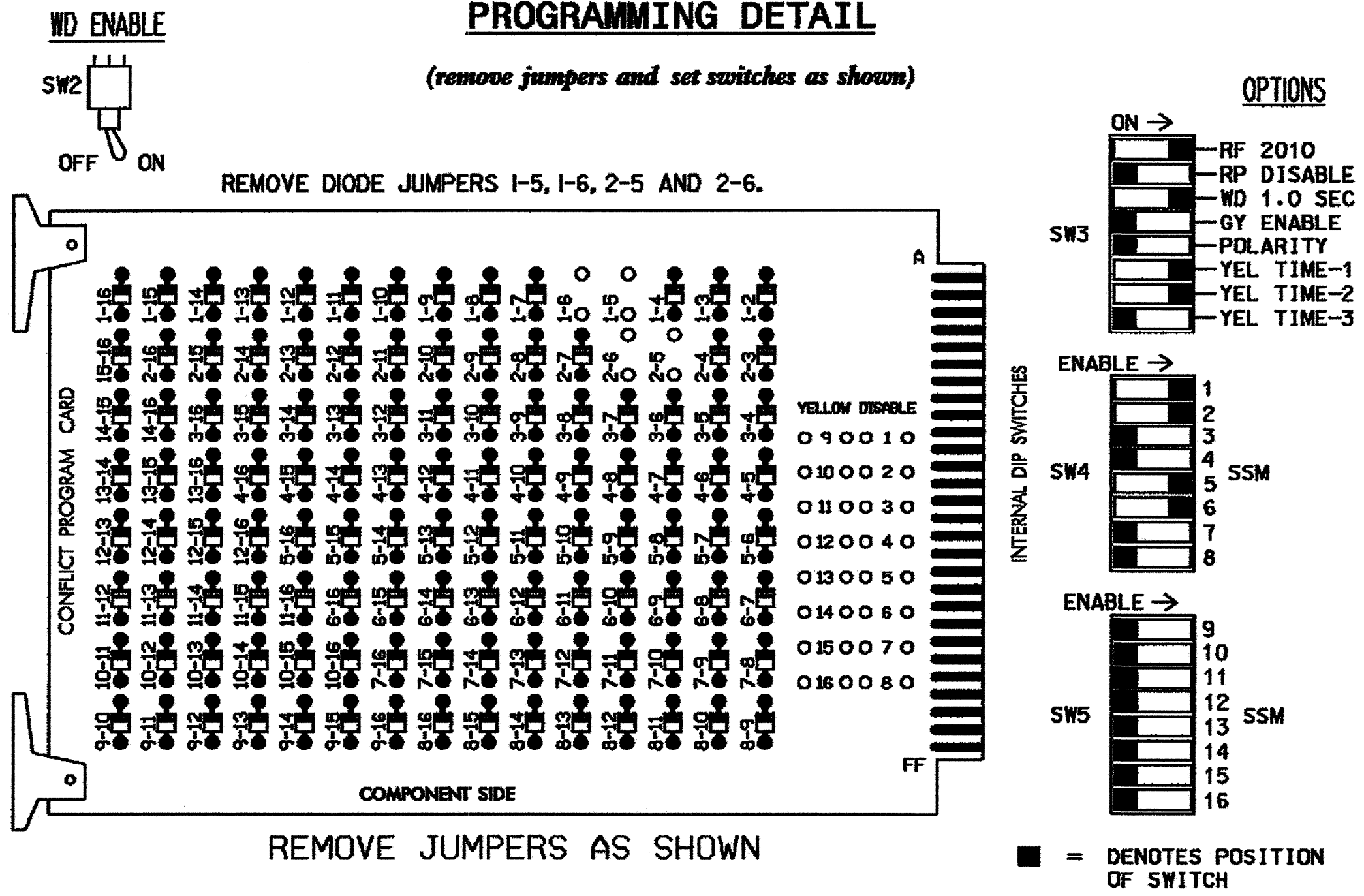
 9/26/04
 SIG. INVENTORY NO. 07-0382 T2

07-SEP-2004 15:06
 C:\p00\us-501\148\mkrgroups\TIP Projects\us-501\032722_51g_Den_2004mmd.dgn
 1:00 Lenny

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.

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 3,4,7, 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 CHAPEL HILL CLOSED LOOP 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.	11,12	21,22	NU	NU	NU	NU	51,52	61,62	NU	NU	NU	NU
GREEN	127	130					133	136				
YELLOW	126	129					132	135				
RED	125	128					131	134				
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

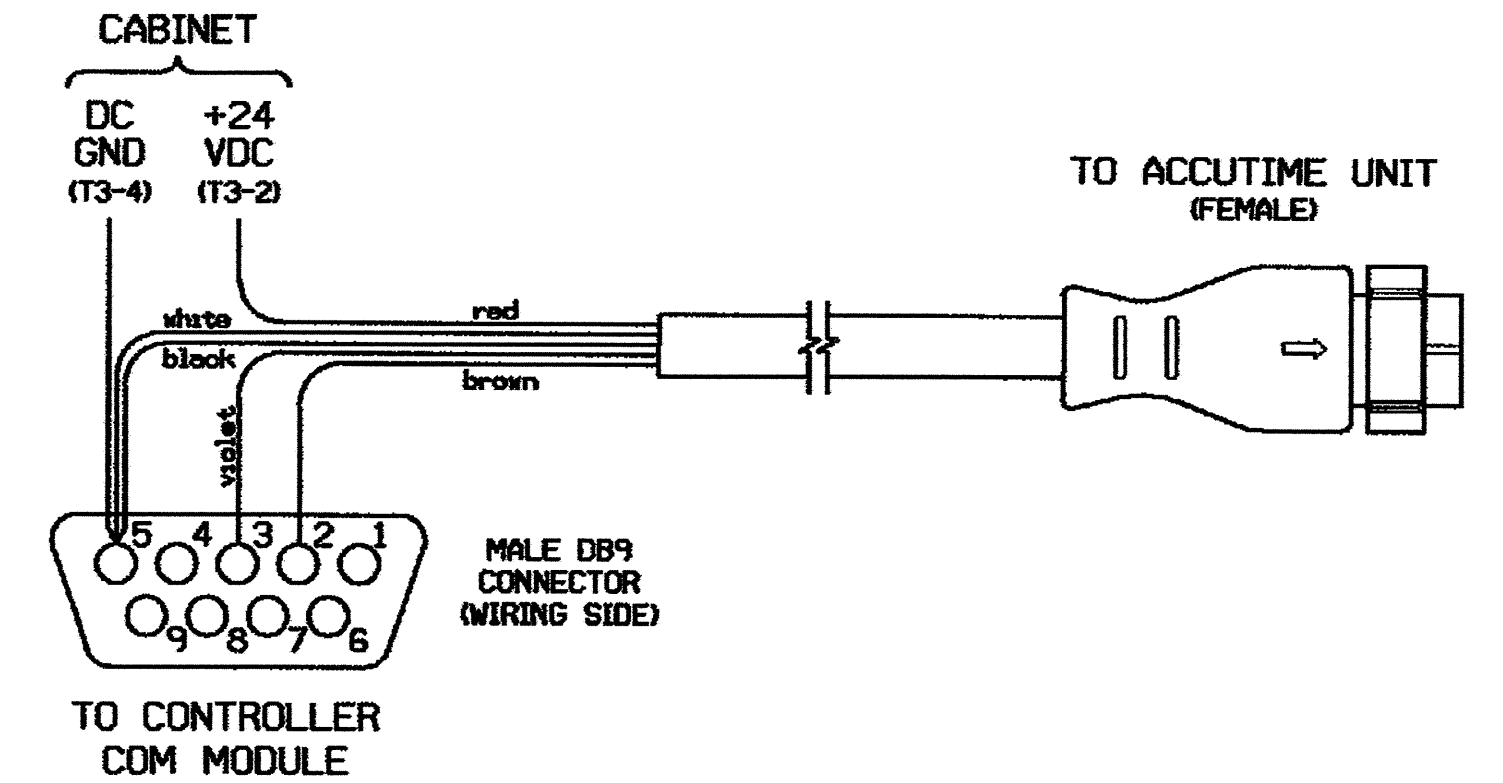
NU = NOT USED

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINETCONTRACTOR SUPPLIED 332
 SOFTWAREECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S5,S6
 PHASES USED.....1,2,5,6
 OVERLAPS.....NONE

CONNECTOR WIRING DETAIL FOR ACCUTIME 2000 WITH RS232 INTERFACE

(make connections as shown)



INPUT FILE POSITION LAYOUT

(from view)

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

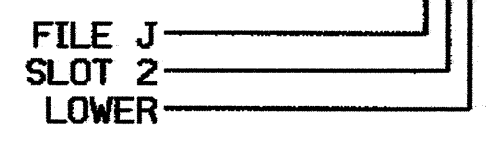
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-5,6	I2U	39	1	2	1	Y	Y			15
1B	TB2-7,8	I2L	43	5	12	1	Y	Y			15
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
2C	TB4-1,2	I4U	47	9	22	2	Y	Y			
2D	TB4-5,6	I5U	58	20	3	2	Y	Y			
5A	TB3-5,6	J2U	40	2	6	5	Y	Y			15
5B	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
6C	TB5-1,2	J4U	48	10	26	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0382 T2
 DESIGNED: AUGUST 2004
 SEALED: 09/07/04
 REVISED:

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

SIGNAL UPGRADE - TEMPORARY SIGNAL 2

Electrical and Programming Details For:

US 15-501 AT SR 1734 (ERWIN ROAD)

DIVISION 07 ORANGE COUNTY CHAPEL HILL

PLAN DATE: AUGUST 2004 REVIEWED BY: R. Peterson

PREPARED BY: JAMES PETERSON REVIEWED BY:

REVISIONS

INIT. DATE

SEAL

PROFESSIONAL ENGINEER

GEORGE C. BROWN

022013

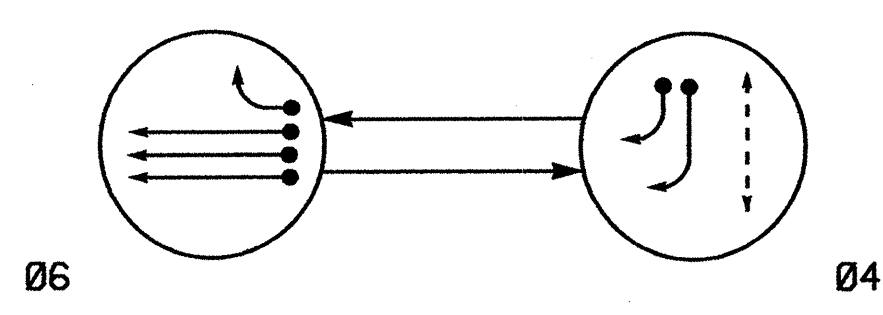
Signature: James C. Brown 9/10/04

DATE

222 N. McDowell St., Raleigh, NC 27603

SIG. INVENTORY NO. 07-0382 T2

PHASING DIAGRAM



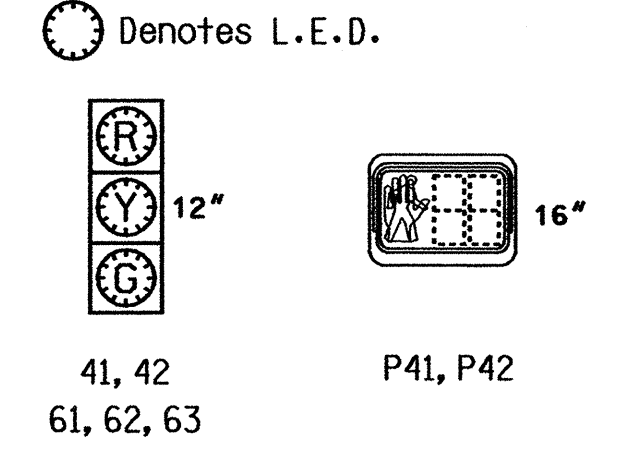
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	Ø 6	Ø 4	FLASH
41, 42	R	G	R
61, 62, 63	G	R	Y
P41, P42	DW	W	DRK

SIGNAL FACE I.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS				DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
4A	6X60	2-4-2	0	-	4	Y	Y	-	-	-	10	Y
4B	6X60	2-4-2	0	-	4	Y	Y	-	-	-	15	Y
6A/S09	6X6	6	300	-	6	Y	Y	-	Y	-	-	Y
6B/S10	6X6	6	300	-	6	Y	Y	-	Y	-	-	Y
6C/S11	6X6	6	300	-	6	Y	Y	-	Y	-	-	Y

2 Phase Fully Actuated Chapel Hill Closed Loop System

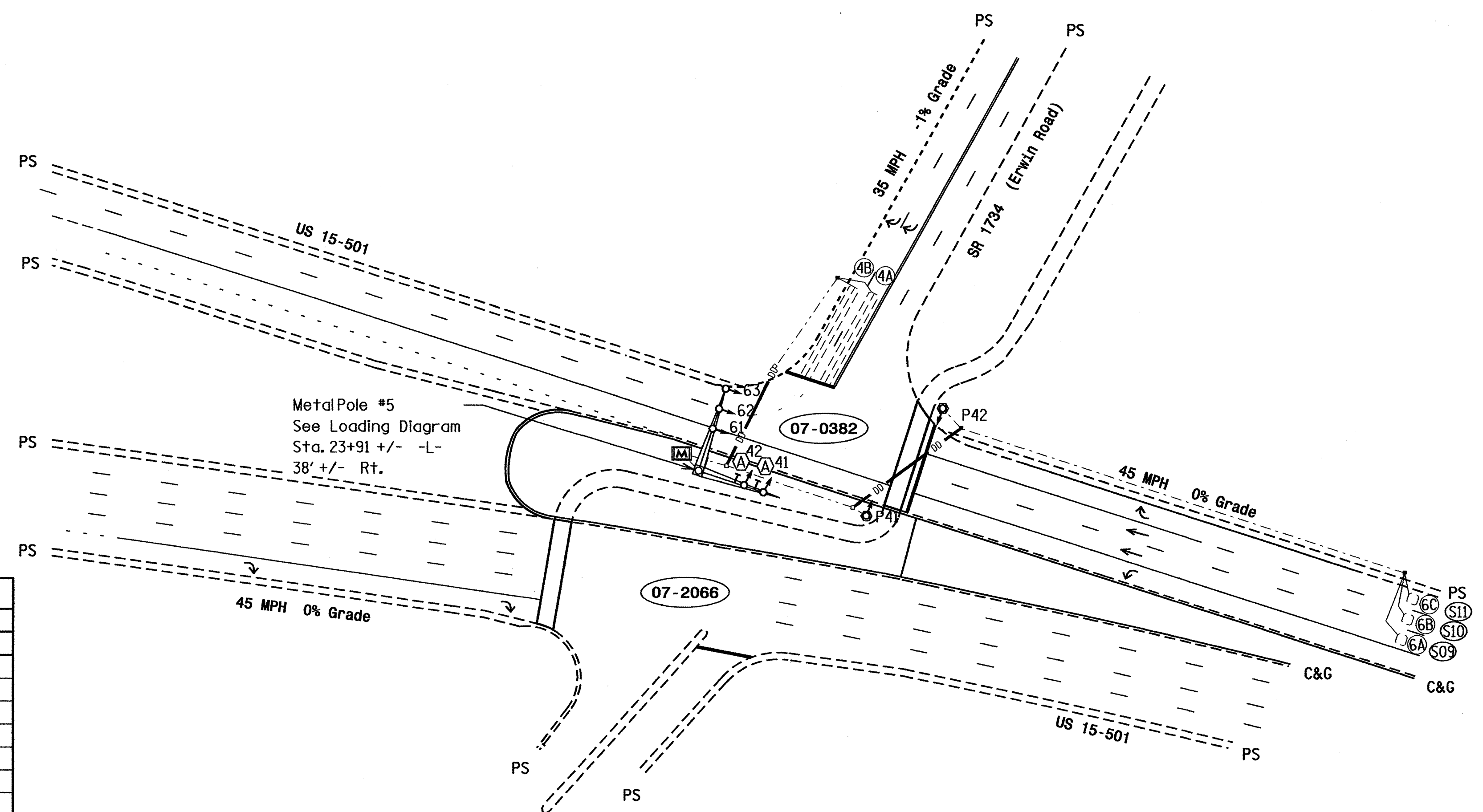
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Install backplates for signal heads numbered 61, 62, 63.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Master Asset #10707, Controller Asset #0382.

2070L TIMING CHART

FEATURE	PHASE	
	6	4
Min Green 1 *	12	7
Extension 1 *	6.0	1.0
Max Green 1 *	90	25
Yellow Clearance	4.7	4.0
Red Clearance	1.5	2.0
Walk 1 *	-	7
Don't Walk 1	-	11
Seconds Per Actuation *	1.5	-
Max Variable Initial *	34	-
Time Before Reduction *	15	-
Time To Reduce *	45	-
Minimum Gap	3.0	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

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



LEGEND

PROPOSED	EXISTING
○→ Traffic Signal Head	●→ N/A
●→ Modified Signal Head	N/A
□→ Sign	□→ N/A
□→ Pedestrian Signal Head With Push Button & Sign	□→ N/A
○→ Signal Pole with Guy	○→ N/A
○→ Signal Pole with Sidewalk Guy	○→ N/A
□→ Inductive Loop Detector	□→ N/A
MA Master Controller & Cabinet Junction Box	MA Master Controller & Cabinet Junction Box
□→ 2-in Underground Conduit	□→ N/A
N/A Right of Way	N/A
→ Directional Arrow	→ N/A
→ Pavement Marking Arrow	→ N/A
○→ Metal Pole with Mastarm	○→ N/A
○→ Pedestrian Signal Pedestal	○→ N/A
△→ Right Arrow "ONLY" Sign (R3-SR)	△→ N/A
—○— Directional Drill 2-2" Conduit	N/A

This plan shall supersede the plan signed and sealed on 9/7/04.

PLAN QUANTITIES

Pay Item	Feet
Signal Cable	480
Messenger Cable	0
Lead-in Cable	660

Final Installation

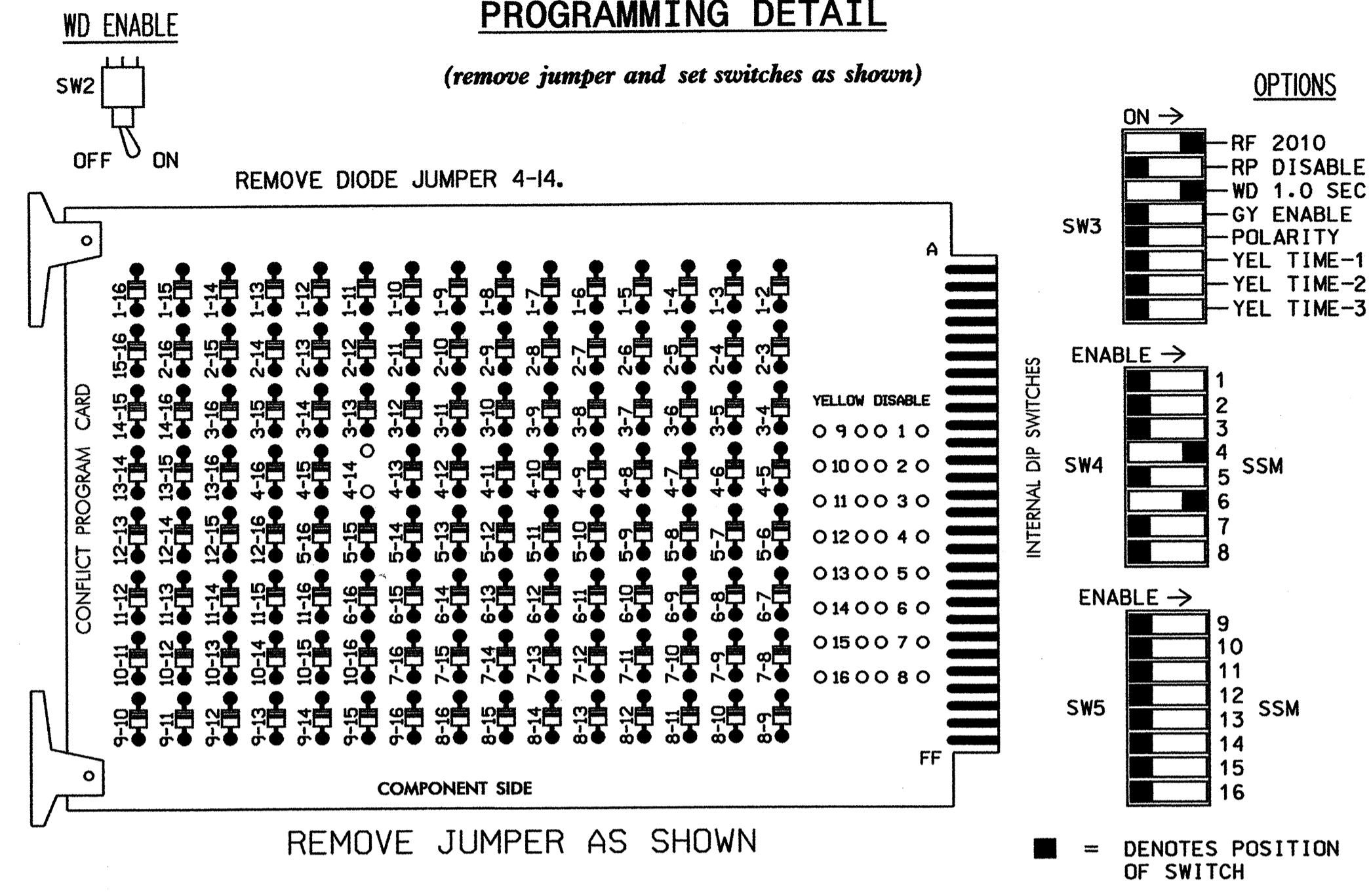
Prepared in the Offices of:

US 15-501 at SR 1734 (Erwin Road)
 Division 07 Orange County Chapel Hill
 PLAN DATE: August 2004 REVIEWED BY: J Galloway
 PREPARED BY: TDB/TSB REVIEWED BY:
 REVISIONS: INIT. DATE
 SCALE: 1"=50'
 SIGNATURE: DATE
 SIG. INVENTORY NO. 07-0382

23-FEB-2006 07:50 s:\f\ts\signal\work\projects\4008\updaterefsheets\070382.s1.g.dsn_2006xxxx.dgn

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 1,2,3, 5,7,8,9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASE 6 GREEN.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASE 6, ON CONTROLLER UNIT, FOR VARIABLE INITIAL AND GAP REDUCTION.
- PROGRAM PHASE 4 FOR 'STARTUP PED CALL'.
- THE CABINET AND CONTROLLER ARE PART OF CHAPEL HILL CLOSED LOOP SYSTEM.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINETCONTRACTOR SUPPLIED 332
 SOFTWAREECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S4,S6,S4P
 PHASES USED.....4,6,4 PED
 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	NU	NU	NU	41,42	P41, P42	NU	61, 62,63	NU	NU	NU	NU
GREEN					103			136				
YELLOW					102			135				
RED					101			134				
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
								106				
								104				

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(from view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE U	FS	FS	FS	FS	FS	∅ 4	FS	FS	FS	FS	FS	NOT USED	FS	FS
"I"	FS	FS	FS	FS	FS	4A	FS	FS	FS	FS	FS	∅ 4 PED	FS	FS
L	FS	FS	FS	FS	FS	4B	FS	FS	FS	FS	FS	DC ISOLATOR	FS	FS
FILE U	FS	FS	6A/SYS	6C/SYS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
"J"	FS	FS	6A/S09	6C/S11	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
L	FS	FS	6B/SYS	NOT USED	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
			6B/S10		FS	FS	FS	FS	FS	FS	FS	FS	FS	FS

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

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			10
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
6A/S09	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
6B/S10	TB3-11,12	J3L	77	39	46	6/SYS	Y	Y			
6C/S11	TB5-1,2	J4U	48	10	26	6/SYS	Y	Y			
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					

INPUT FILE POSITION LEGEND: J2L

FILE J
 SLOT 2
 LOWER

NOTE:
 INSTALL DC ISOLATOR IN INPUT FILE SLOT 112.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0382
 DESIGNED: AUGUST 2004
 SEALED: 02/24/06
 REVISED: NA

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 09/09/04

FINAL INSTALLATION

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

 122 N. McDowell St., Raleigh, NC 27603

US 15-501 AT SR 1734 (ERWIN ROAD)

DIVISION 07 ORANGE COUNTY CHAPEL HILL

PLAN DATE: FEBRUARY 2006 REVIEWED BY: *James Peterson*

PREPARED BY: JAMES PETERSON REVIEWED BY:

REVISIONS: INIT. DATE

SEAL

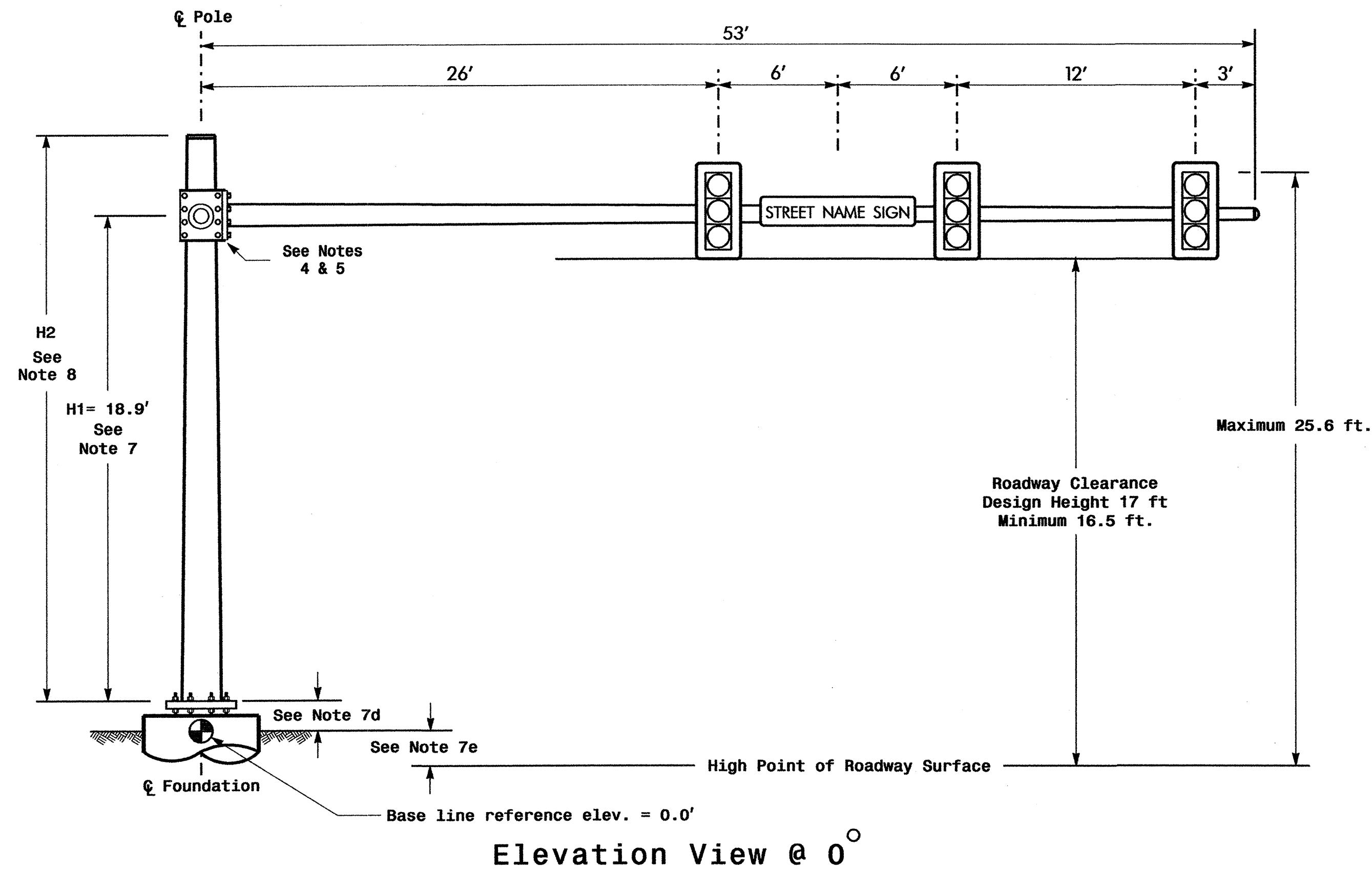
 JOHN T. ROWLAND
 ENGINEER
 STATE OF NORTH CAROLINA
 License No. 008453

SIGNATURE: *John T. Rowland* DATE: 3-8-06

SIG. INVENTORY NO. 07-0382

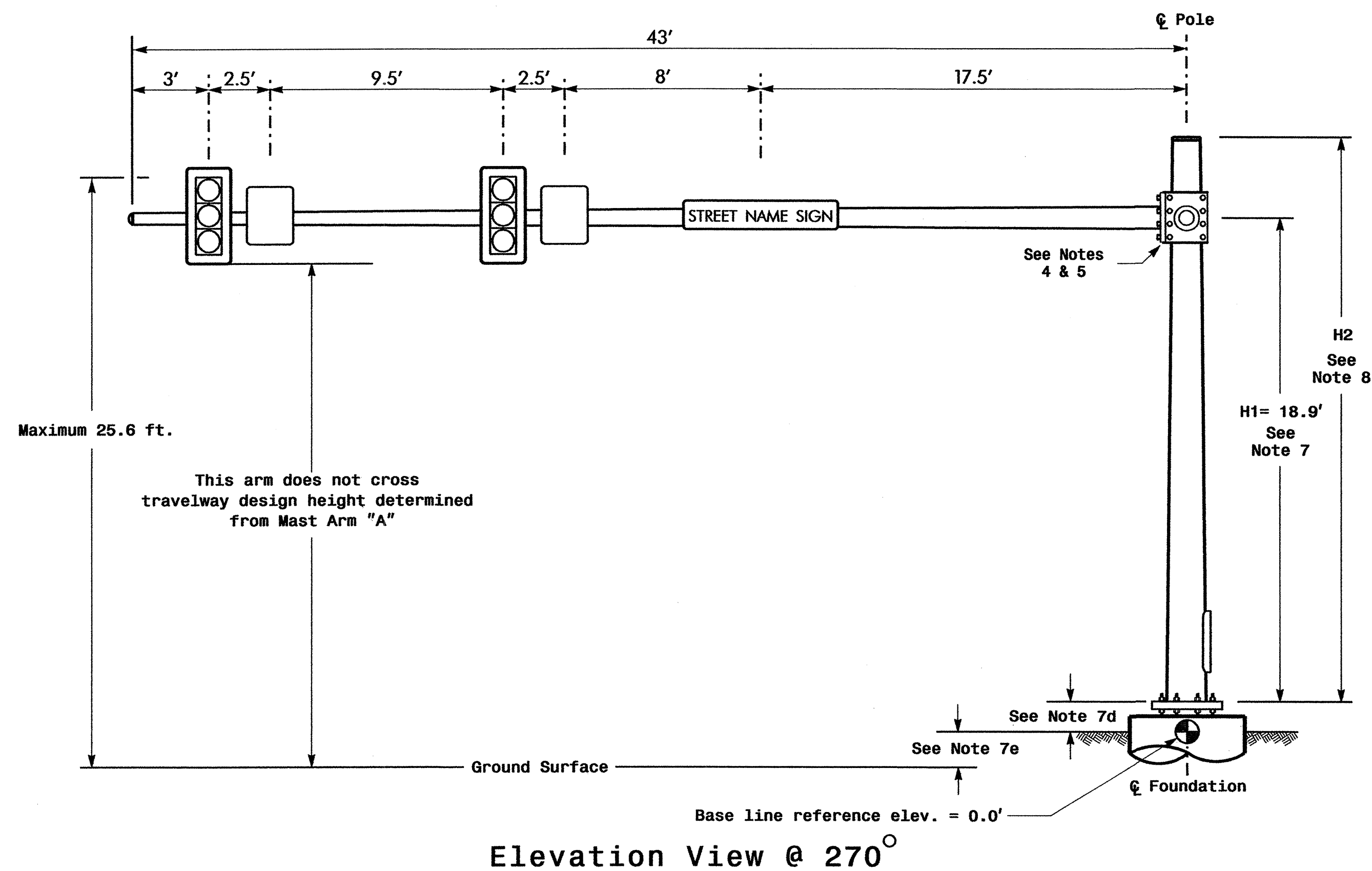
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Design Loading for METAL POLE NO. 5, MAST ARM A



Elevation View @ 0°

Design Loading for METAL POLE NO. 5, MAST ARM B

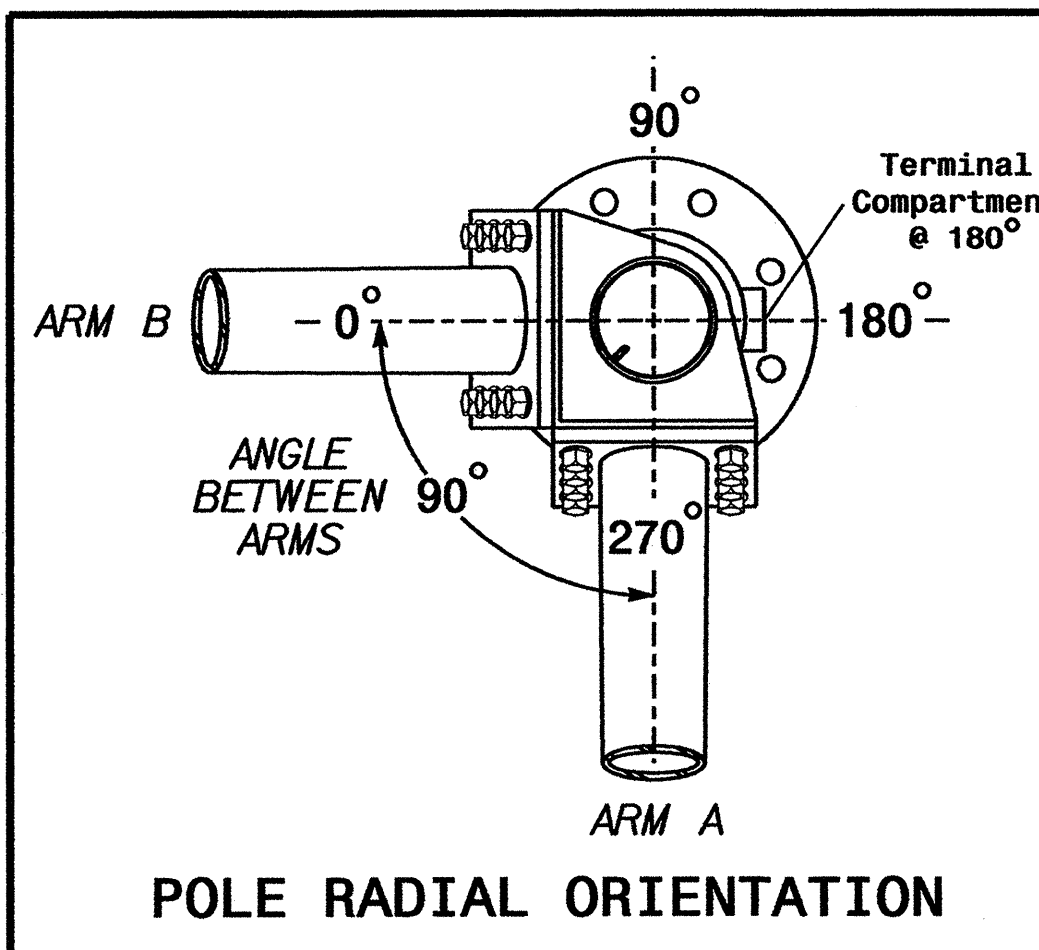


Elevation View @ 270°

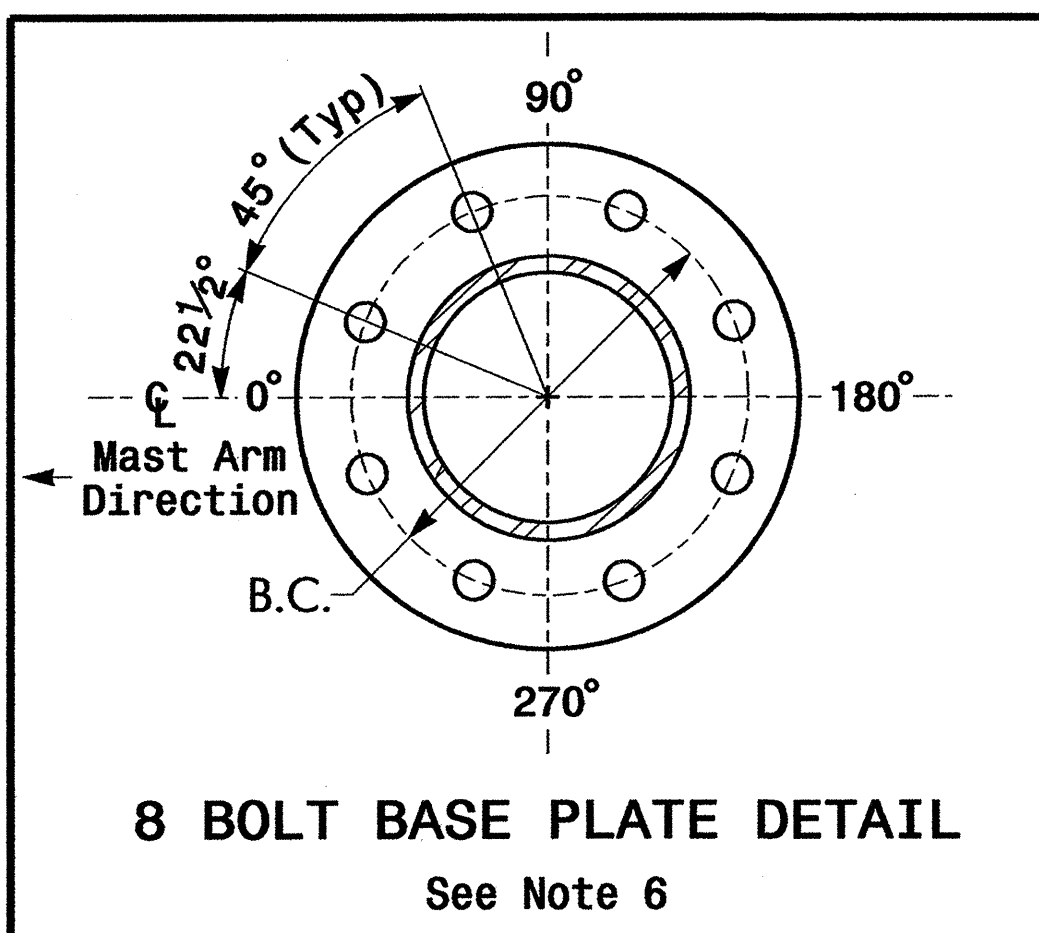
SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project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

Elevation Data for Mast Arm Attachment (H1)

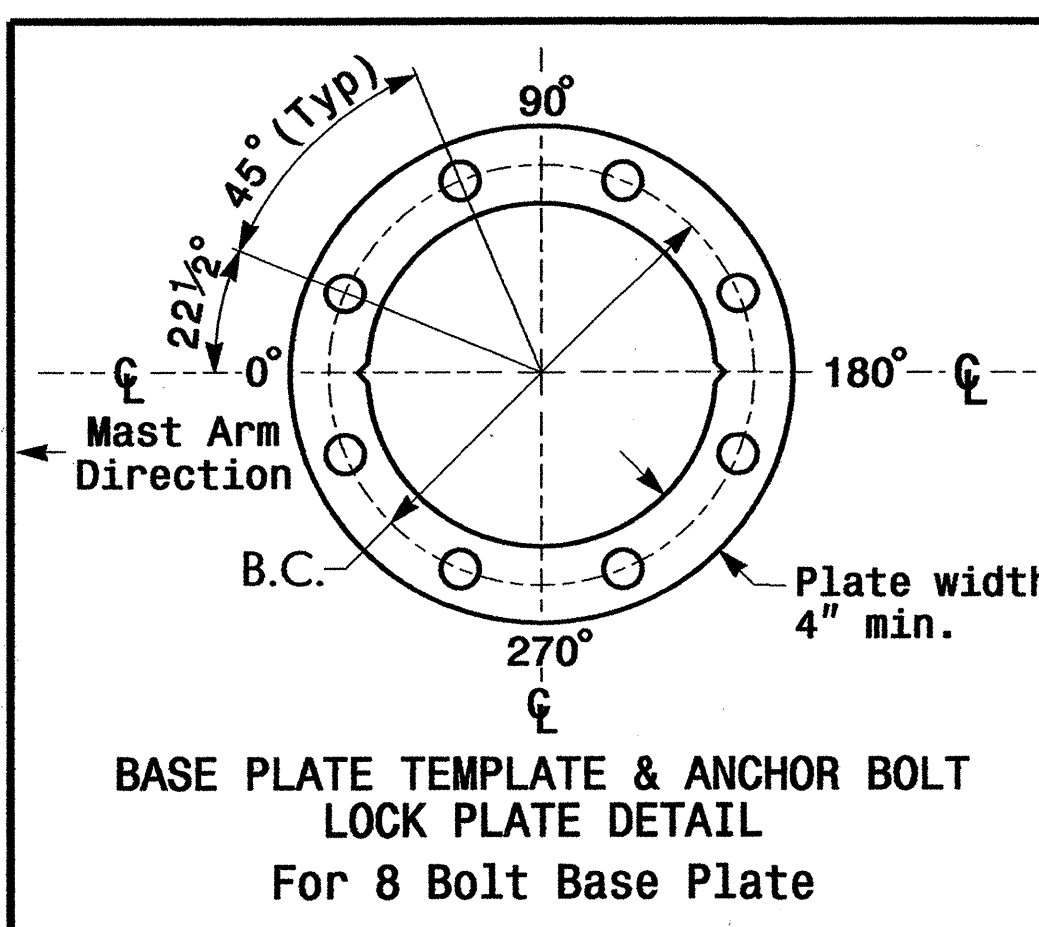
Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.4 ft.	N/A
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2002 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.doh.dot.state.nc.us/preconstruct/traffic/tmsu/ws/mpoles/poles.htm>

Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points. The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- The pole manufacturer will determine the total height (H2) of the pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

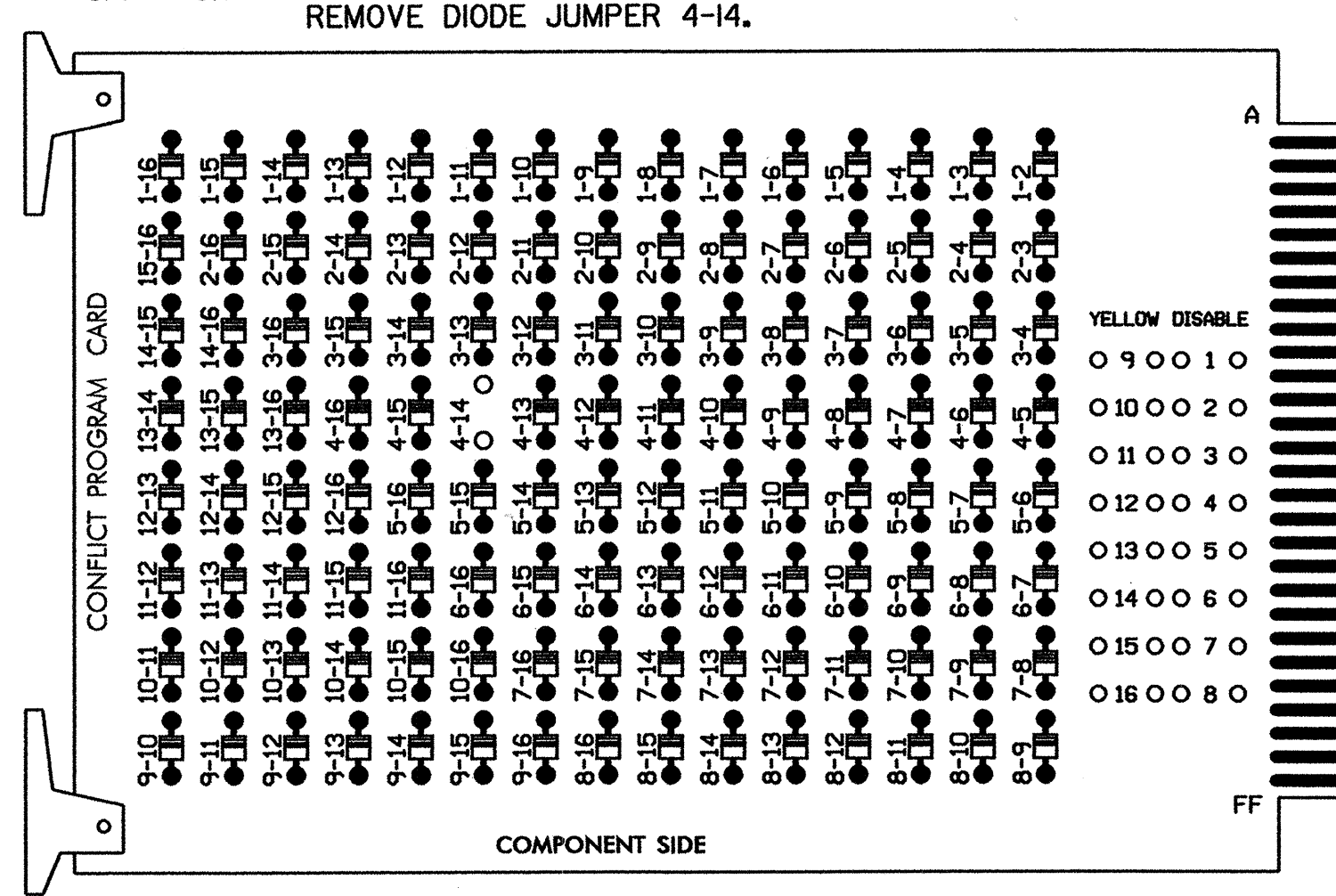
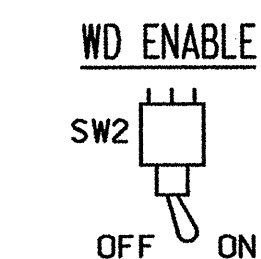
This plan shall supersede the plan signed and sealed on 9/1/04.

NCDOT Wind Zone 4 (90 mph)

	US 15-501 at SR 1734 (Erwin Road)		SEAL
	Division 7 PLAN DATE: January 2006 PREPARED BY: R M Duffy	Orange County REVIEWED BY: D Y Ishak REVIEWED BY:	
SCALE: 0 N/A N/A		REVISIONS:	INIT. DATE:
SIGNATURE:			DATE:
SIG. INVENTORY NO. 07-0382			

23-FEB-2006 11:15 s:\planner\grouse\p\project\erwin-4008\pdot\redesign\sig.ms1_2006xxx.dgn
 R. Duffy

EDI MODEL 2010ECL CONFLICT MONITOR PROGRAMMING DETAIL

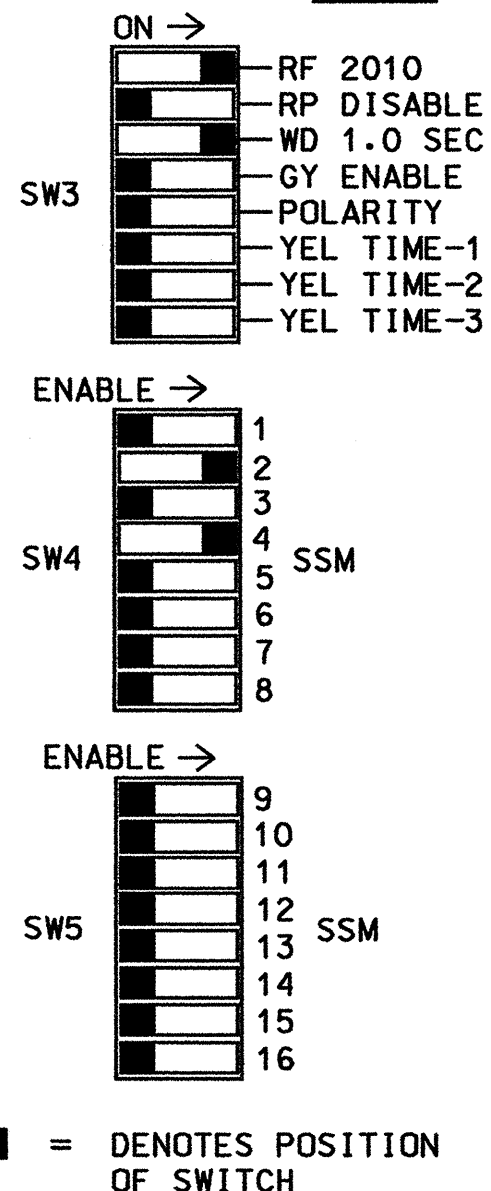


REMOVE JUMPER AS SHOWN

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.

OPTIONS



■ = DENOTES POSITION OF SWITCH

NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. THE INSTALLER SHALL VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 1,3,5, 6,7,8,9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINETS MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASE 2 GREEN.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASE 2, ON CONTROLLER UNIT, FOR VARIABLE INITIAL AND GAP REDUCTION.
- PROGRAM PHASE 4 FOR A 'STARTUP PED CALL'.
- THE CABINET AND CONTROLLER ARE PART OF THE CHAPEL HILL CLOSED LOOP 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.	NU	21,22 23,24	NU	NU	41,42	P41, P42	NU	NU	NU	NU	NU	NU
GREEN		130			103							
YELLOW		129			102							
RED		128			101							
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
												106
												104

NU = NOT USED

EQUIPMENT INFORMATION

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	S	∅2/SYS	∅2/SYS	S	S	∅ 4	S	S	S	S	S	NOT USED	S	FS
L	←-P3M	2A/S03	2C/S05	←-P3M	←-P3M	4A	←-P3M	←-P3M	←-P3M	←-P3M	←-P3M	←-P3M	←-P3M	DC ISOLATOR
FILE "J" U	S	∅2/SYS	∅2/SYS	S	S	∅ 4	S	S	S	S	S	∅ 4 PED	S	ST
L	←-P3M	2B/S04	2D/S06	←-P3M	←-P3M	4B	←-P3M	←-P3M	←-P3M	←-P3M	←-P3M	←-P3M	←-P3M	DC ISOLATOR

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

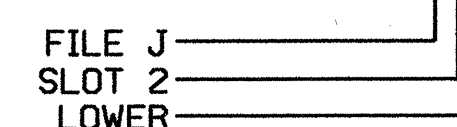
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A/S03	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S05	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
2C/S06	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
2D/S07	TB2-11,12	I3L	76	38	42	2/SYS	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			10
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					

NOTE:
 INSTALL DC ISOLATOR IN INPUT FILE SLOT 112.

INPUT FILE POSITION LEGEND: J2L

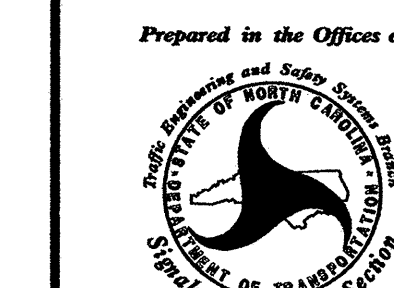


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-2066
 DESIGNED: AUGUST 2004
 SEALED: 02-24-06
 REVISED: NA

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 09-09-04.

NEW INSTALLATION

ELECTRICAL AND PROGRAMMING DETAILS FOR:

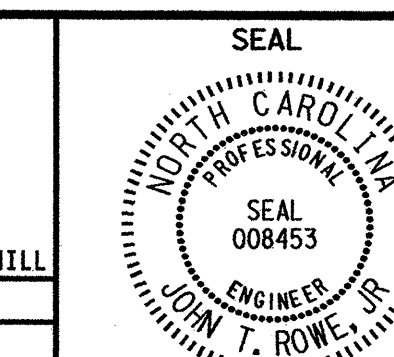


122 N. McDowell St., Raleigh, NC 27603

US 15-501 NORTHBOUND AT EUROPA DRIVE

DIVISION 07 ORANGE COUNTY CHAPEL HILL
 PLAN DATE: FEBRUARY 2006 REVIEWED BY: *YJW*
 PREPARED BY: JAMES PETERSON REVIEWED BY:

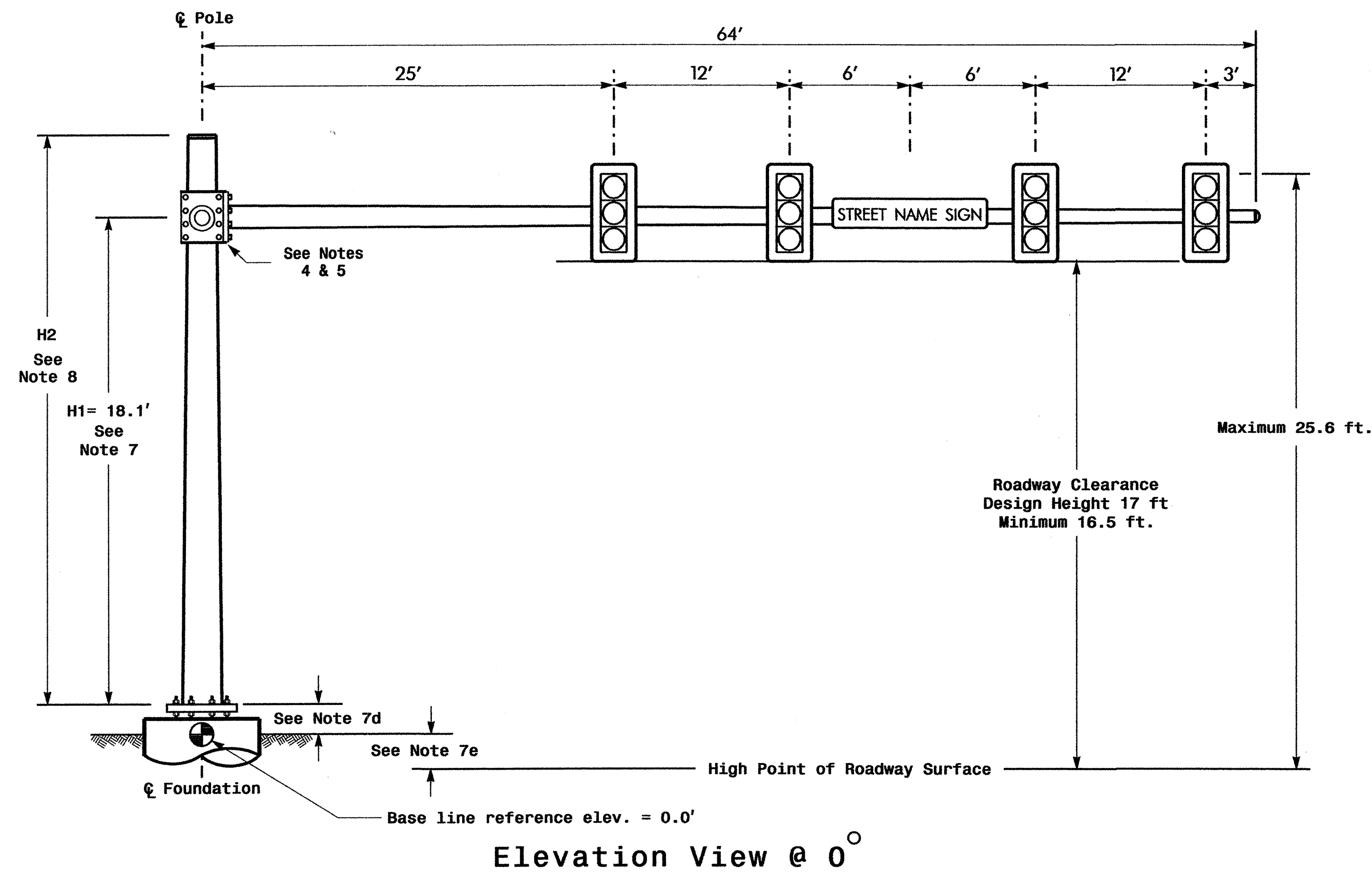
REVISIONS INIT. DATE



John T. Rowe 2-28-06
 SIGNATURE DATE

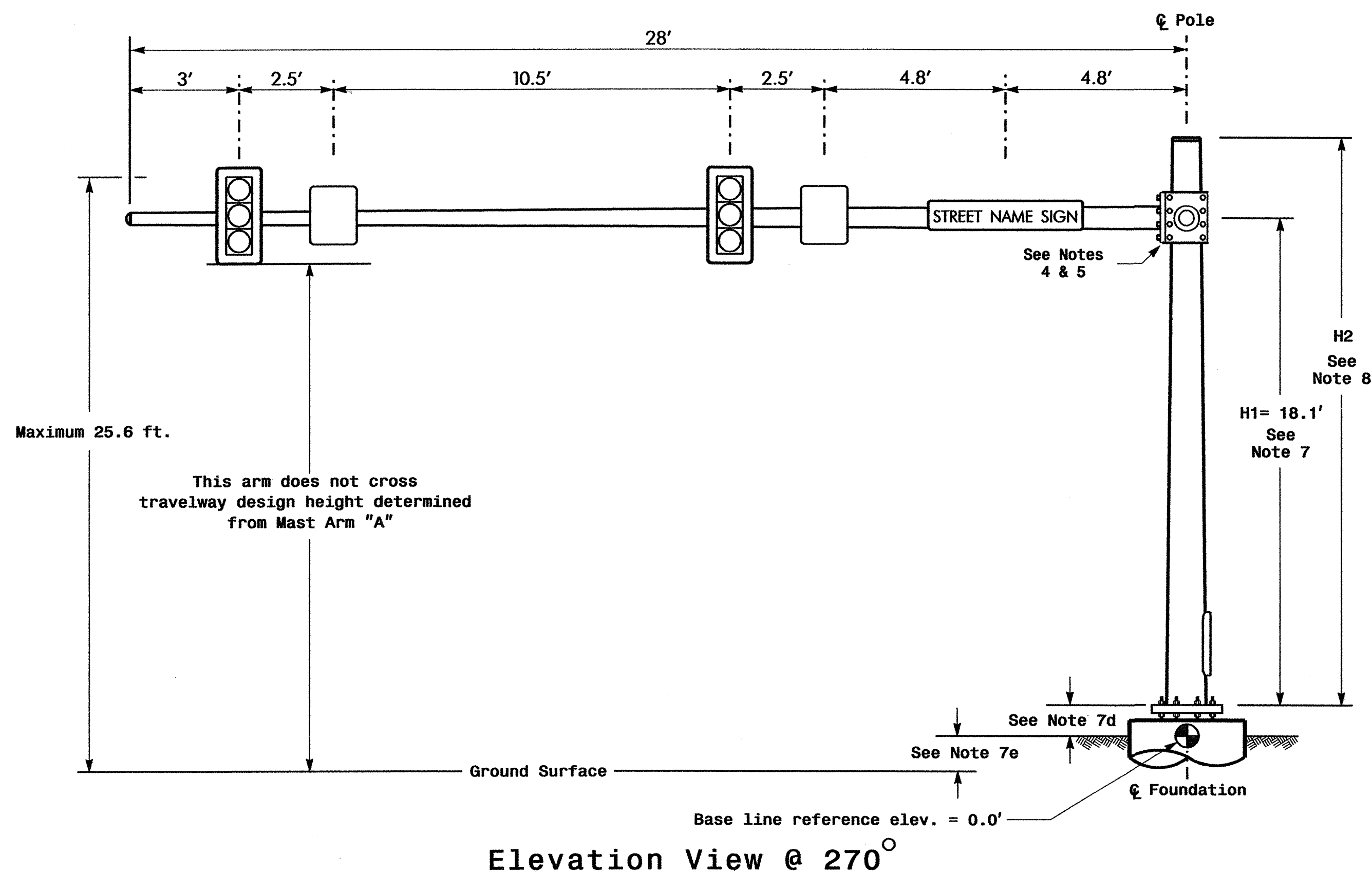
SIG. INVENTORY NO. 07-2066

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



Elevation View @ 0°

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



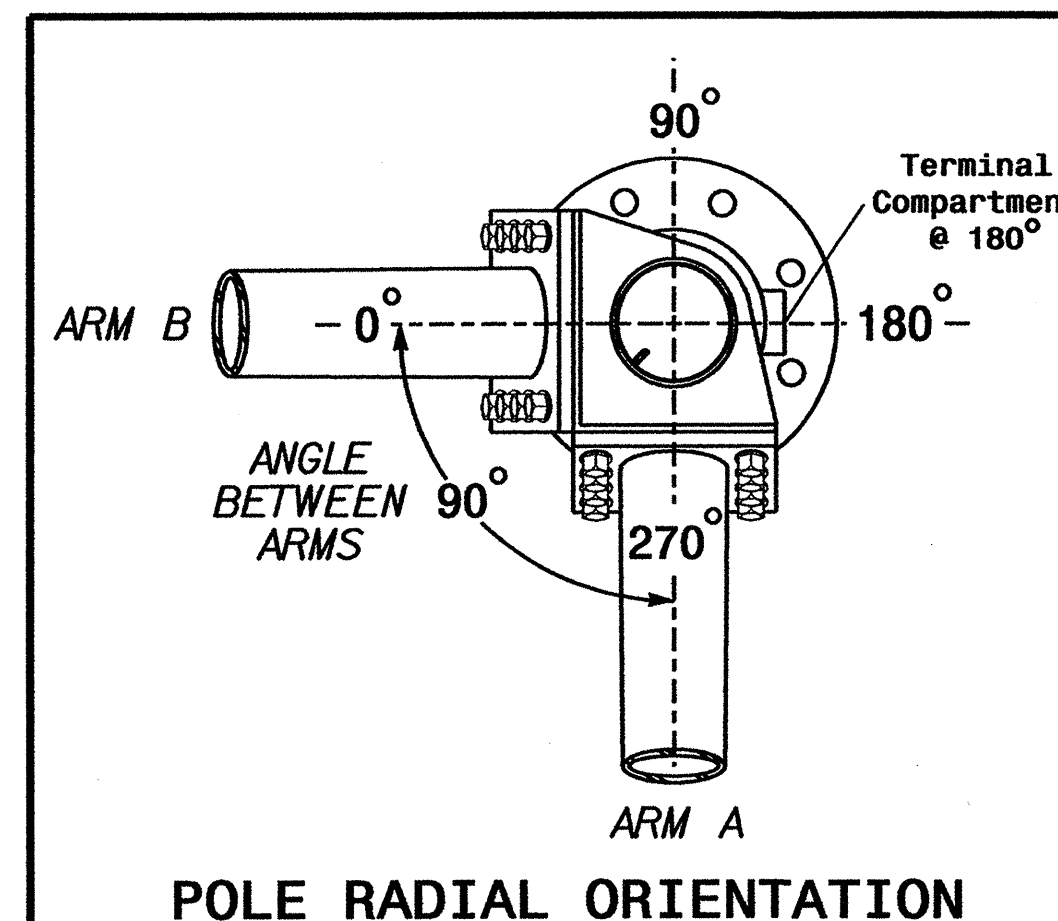
Elevation View @ 270°

SPECIAL NOTE

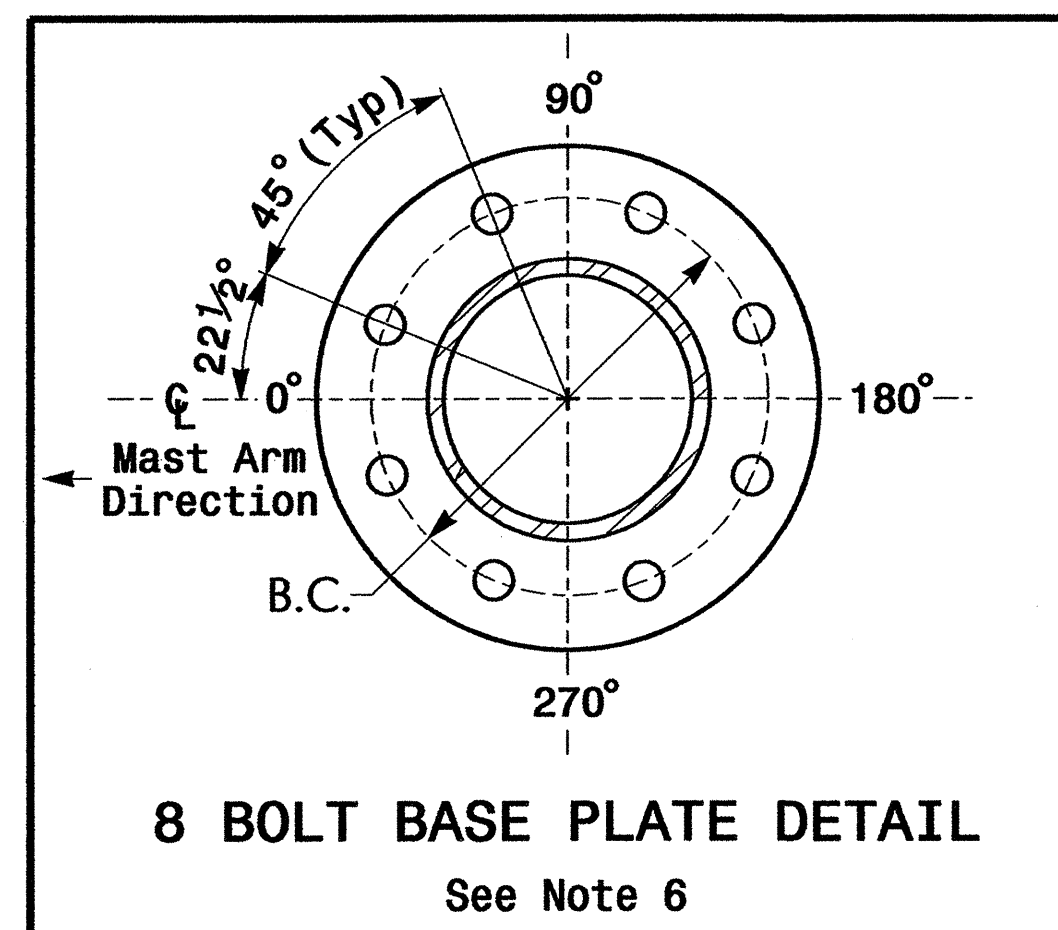
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

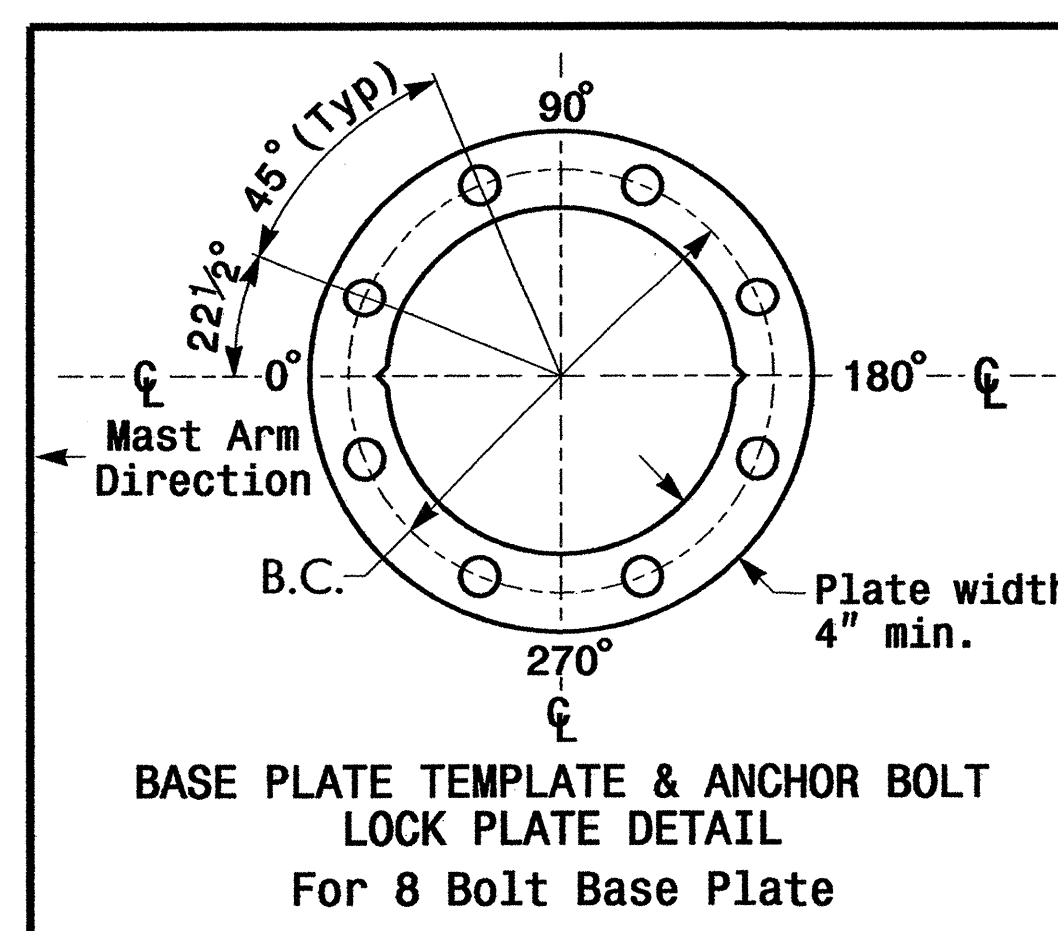
Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.4 ft.	N/A
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL See Note 6



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
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 - The 2002 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.doh.state.nc.us/preconstruct/traffic/tmsu/ws/mpoles/poles.htm>

Design Requirements

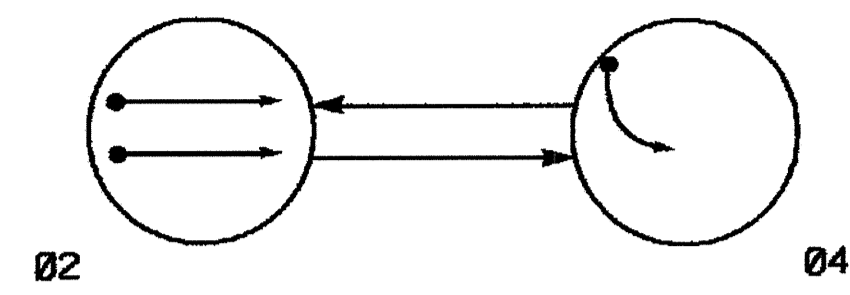
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points. The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- The pole manufacturer will determine the total height (H2) of the pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

This plan shall supersede the plan signed and sealed on 9/1/04.

NCDOT Wind Zone 4 (90 mph)

	US 15-501 Northbound at Europa Drive		SEAL
	Division 7 Orange County Chapel Hill PLAN DATE: January 2006 REVIEWED BY: D Y Ishak PREPARED BY: R M Duffy REVIEWED BY:	SIGNATURE DATE SIG. INVENTORY NO. 07-2066	

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

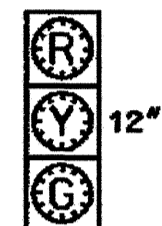
- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ←--- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	04	FLASH
21, 22	G	R	Y
41, 42	R	G	R

SIGNAL FACE I.D.

○ Denotes L.E.D.



21, 22
41, 42

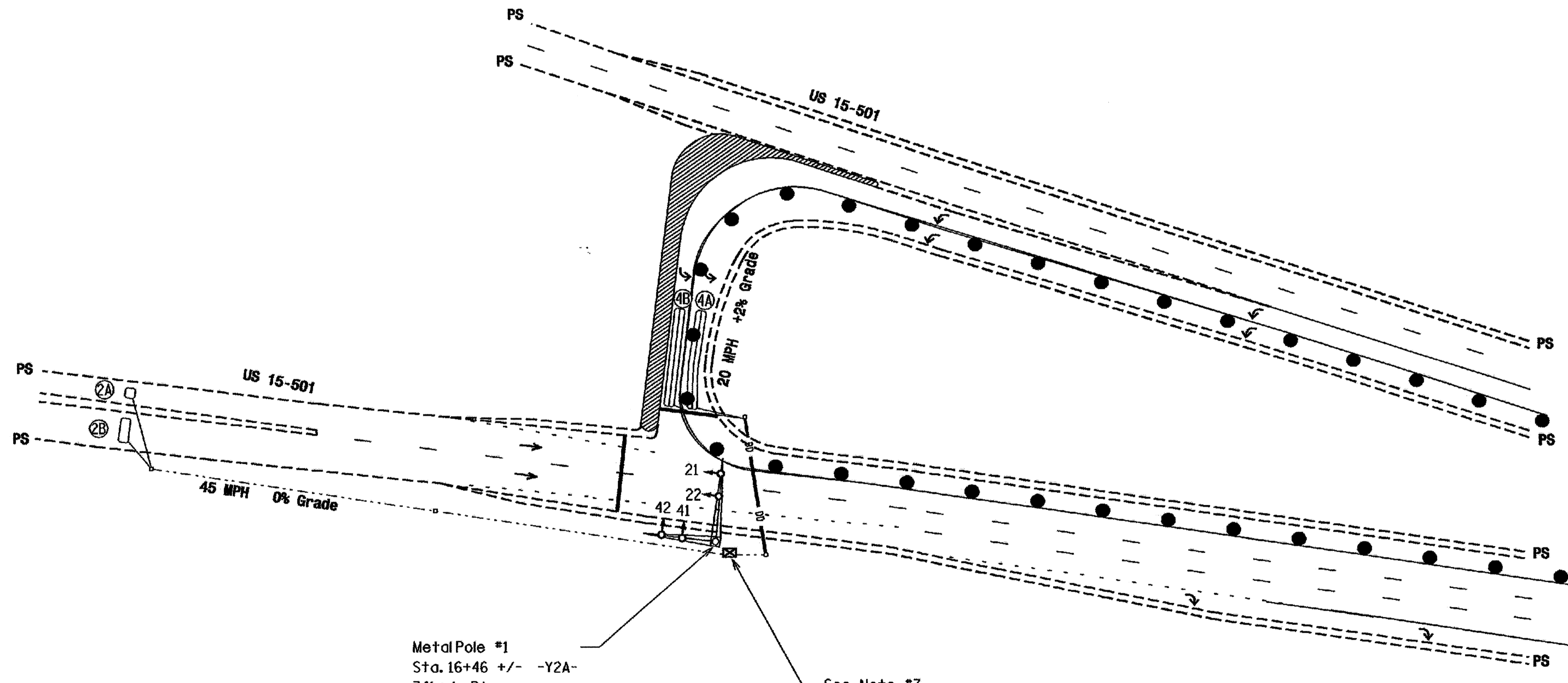
2070L LOOP & DETECTOR INSTALLATION

LOOP	INDUCTIVE LOOPS			DETECTOR PROGRAMMING							
	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
2A	6X6	4	300	Y	2	Y	Y	-	-	-	Y
2B	6X15	4	300	Y	2	Y	Y	-	-	-	Y
4A	6X60	2-4-2	0	Y	4	Y	Y	-	-	-	Y
4B	6X60	2-4-2	0	Y	4	Y	Y	-	-	-	Y

2 Phase Fully Actuated Chapel Hill Closed Loop System

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Install backplates for signal heads numbered #21 & 22.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
- Set all detector units to presence mode.
- Install GPS Unit for time synchronization.



PLAN QUANTITIES

Pay Item	Feet
Signal Cable	120
Messenger Cable	0
Lead-in Cable	460

LEGEND

- | | | | |
|--|-------------------------------|--|----------|
| | TRAFFIC SIGNAL HEAD | | EXISTING |
| | MODIFIED SIGNAL HEAD | | N/A |
| | PEDESTRIAN SIGNAL HEAD | | EXISTING |
| | SIGNAL POLE WITH GUY | | EXISTING |
| | SIGNAL POLE WITH SIDEWALK GUY | | EXISTING |
| | INDUCTIVE LOOP DETECTOR | | EXISTING |
| | CONTROLLER & CABINET | | EXISTING |
| | JUNCTION BOX | | EXISTING |
| | 2-IN UNDERGROUND CONDUIT | | EXISTING |
| | RIGHT OF WAY | | EXISTING |
| | DIRECTIONAL ARROW | | EXISTING |
| | PAVEMENT MARKING ARROW | | EXISTING |
| | METAL POLE WITH MASTARM | | EXISTING |
| | CONSTRUCTION ZONE DRUMS | | EXISTING |
| | DIRECTIONAL DRILL | | N/A |
| | 2-2 CONDUIT | | N/A |

2070L TIMING CHART

FEATURE	PHASE	
	2	4
Min Green 1 *	12	7
Extension 1 *	6.0	1.0
Max Green 1 *	90	25
Yellow Clearance	4.7	4.0
Red Clearance	1.5	2.0
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	1.5	-
Max Variable Initial *	34	-
Time Before Reduction *	15	-
Time To Reduce *	45	-
Minimum Gap	3.0	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

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

Metal Pole #1
Sta. 16+46 +/- -Y2A-
34' +/- Rt.

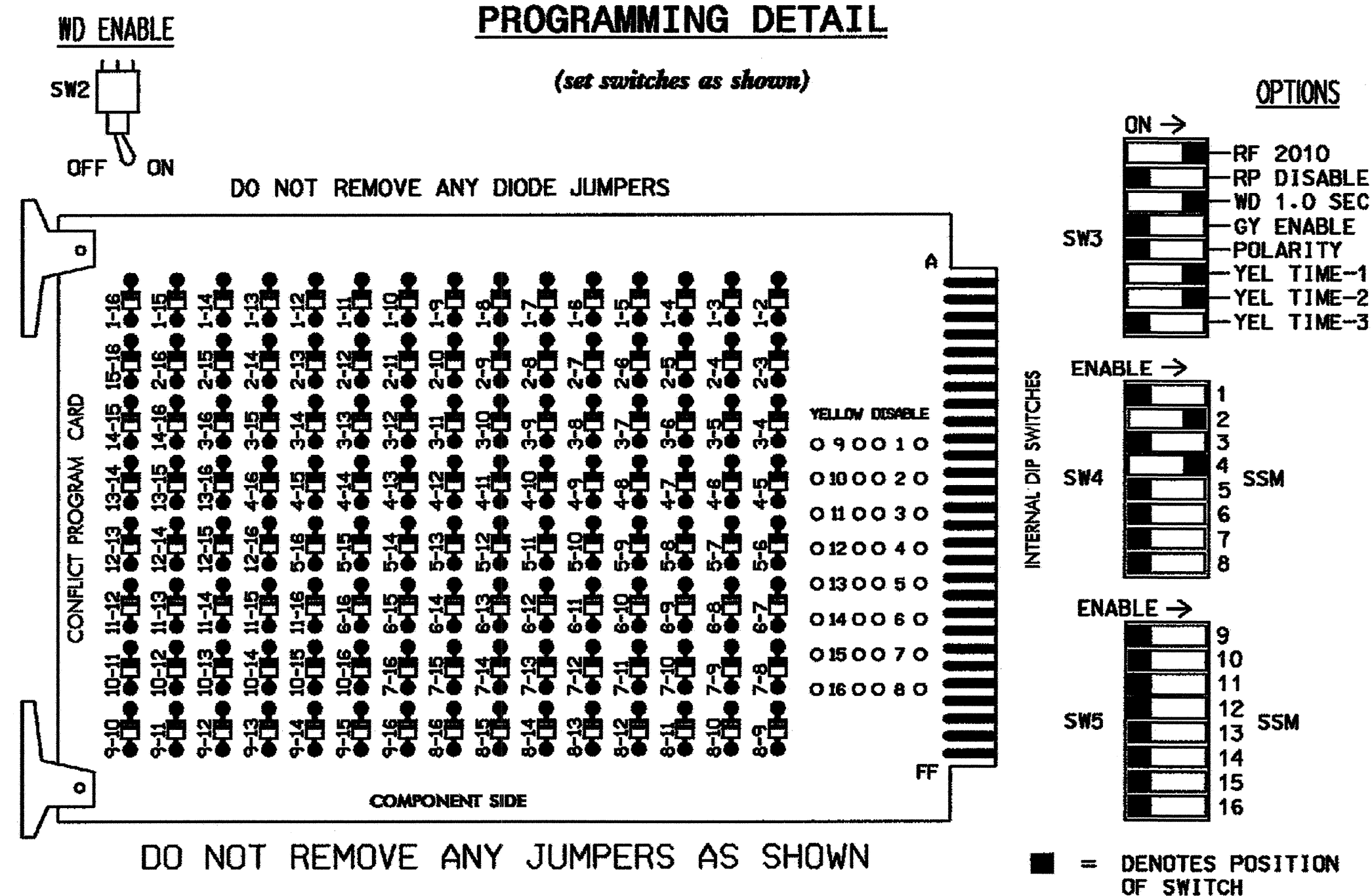
See Note #7.

Temporary Installation - Construction Phase II

	<p>US 15-501 Southbound U-Turn .14 Miles South of SR 1734 (Erwin Road)</p>		
	<p>Division 07 Orange County Chapel Hill</p>	<p>PLAN DATE: August 2004 REVIEWED BY: J Galloway</p>	
<p>222 N. McDowell St., Raleigh, NC 27609</p>	<p>SCALE: 0 50 1"=50'</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>
<p>SIGNATURE: <i>Timothy Williams</i> 9/7/04</p>			<p>DATE: 9/7/04</p>
<p>SIG. INVENTORY NO. 07-2065 T</p>			

EDI MODEL 2010ECL CONFLICT MONITOR

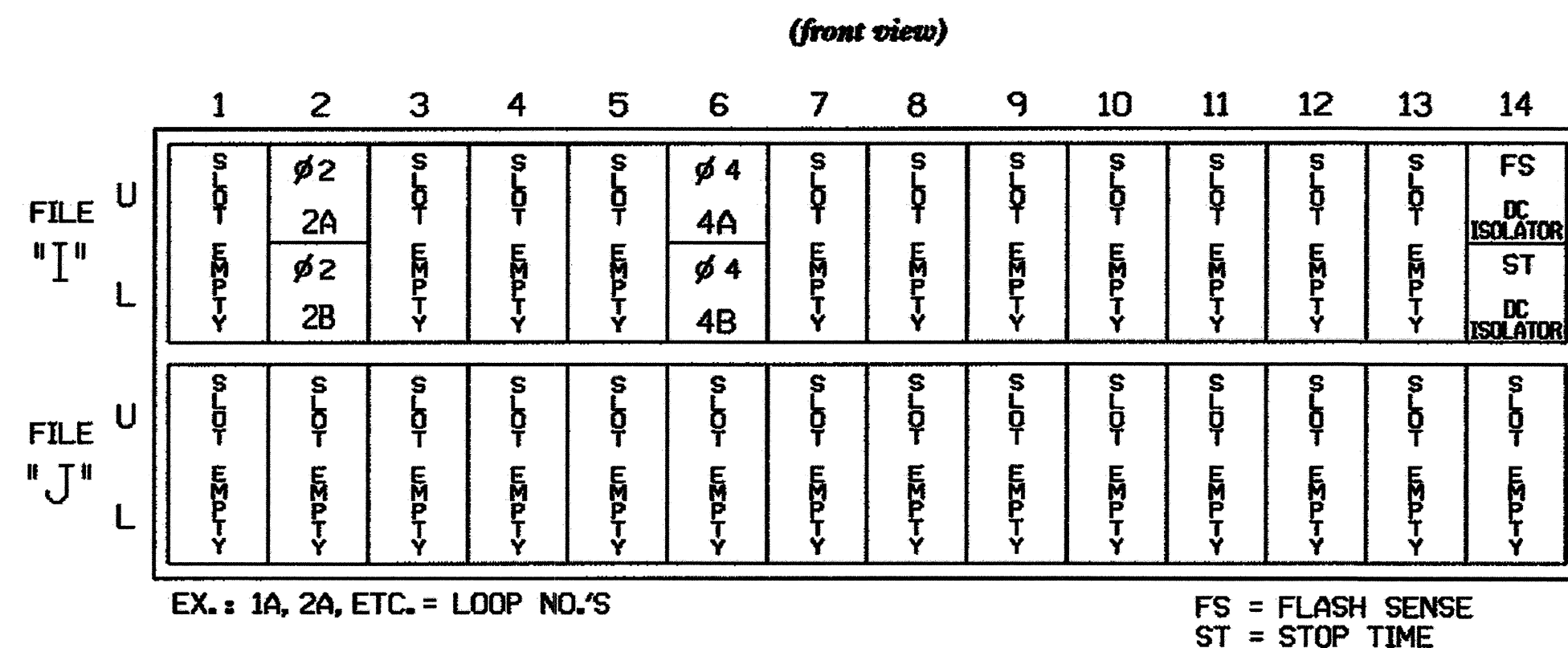
PROGRAMMING DETAIL



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.

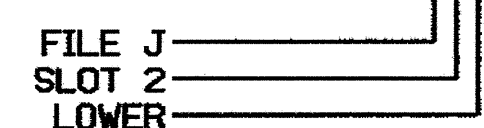
INPUT FILE POSITION LAYOUT



INPUT FILE CONNECTION & PROGRAMMING CHART

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

INPUT FILE POSITION LEGEND: J2L



NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. THE INSTALLER SHALL VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 1,3,5, 6,7,8,9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASE 2 GREEN.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASE 2, ON CONTROLLER UNIT, FOR VARIABLE INITIAL AND GAP REDUCTION.
- THE CABINET AND CONTROLLER ARE PART OF THE CHAPEL HILL CLOSED LOOP SYSTEM.

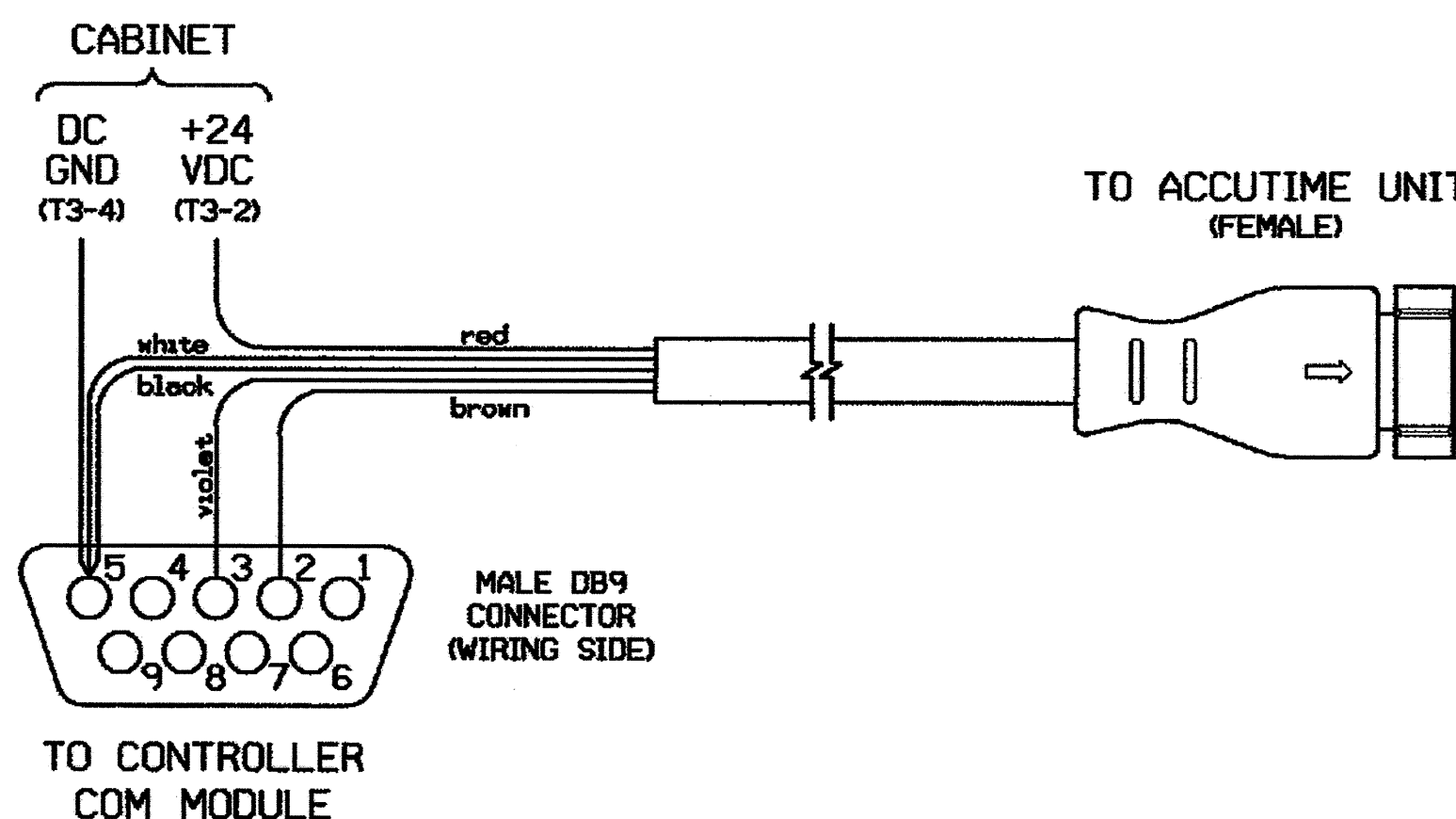
FIELD CONNECTION HOOK-UP CHART

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.	NU	2L,22	NU	NU	4L,42	NU	NU	NU	NU	NU	NU	NU
GREEN		130			103							
YELLOW		129			102							
RED		128			101							
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = NOT USED

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

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
 PHASES USED.....2,4
 OVERLAPS.....NONE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-2065 T
 DESIGNED: AUGUST 2004
 SEALED: 09/07/04
 REVISED:

TEMPORARY INSTALLATION

Electrical and Programming Details For:

US 15-501 SOUTHBOUND U-TURN .14 MILES SOUTH OF SR 1734 (ERWIN ROAD)

DIVISION 07 ORANGE COUNTY CHAPEL HILL

PLAN DATE: AUGUST 2004 REVIEWED BY: *R. Kinshaw*

PREPARED BY: JAMES PETERSON REVIEWED BY:

REVISIONS: _____ INIT. DATE

Signature: *James C. Brown* 9/10/04

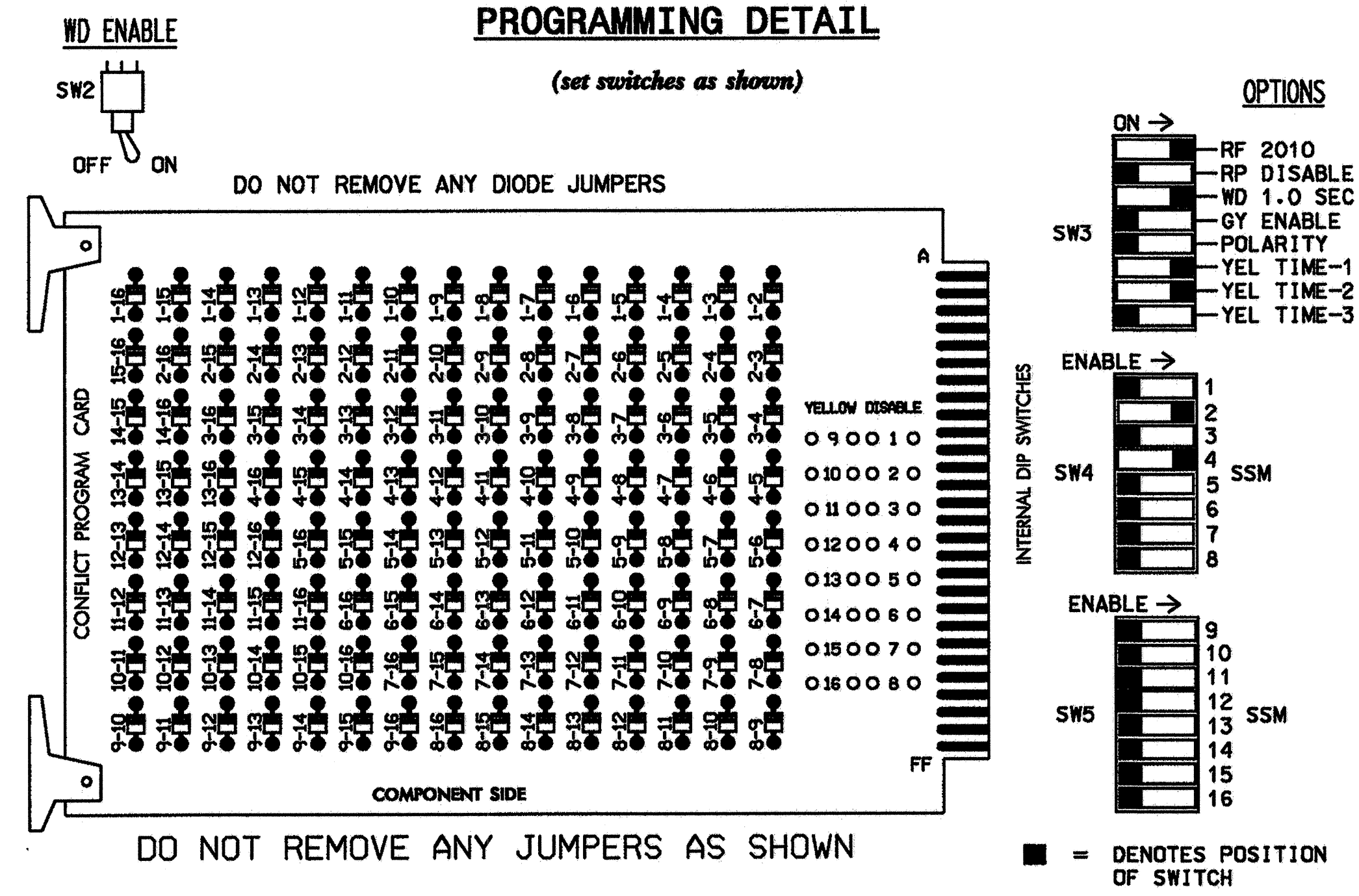
SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

122 N. McDowell St., Raleigh, NC 27603

SIG. INVENTORY NO. 07-2065 T

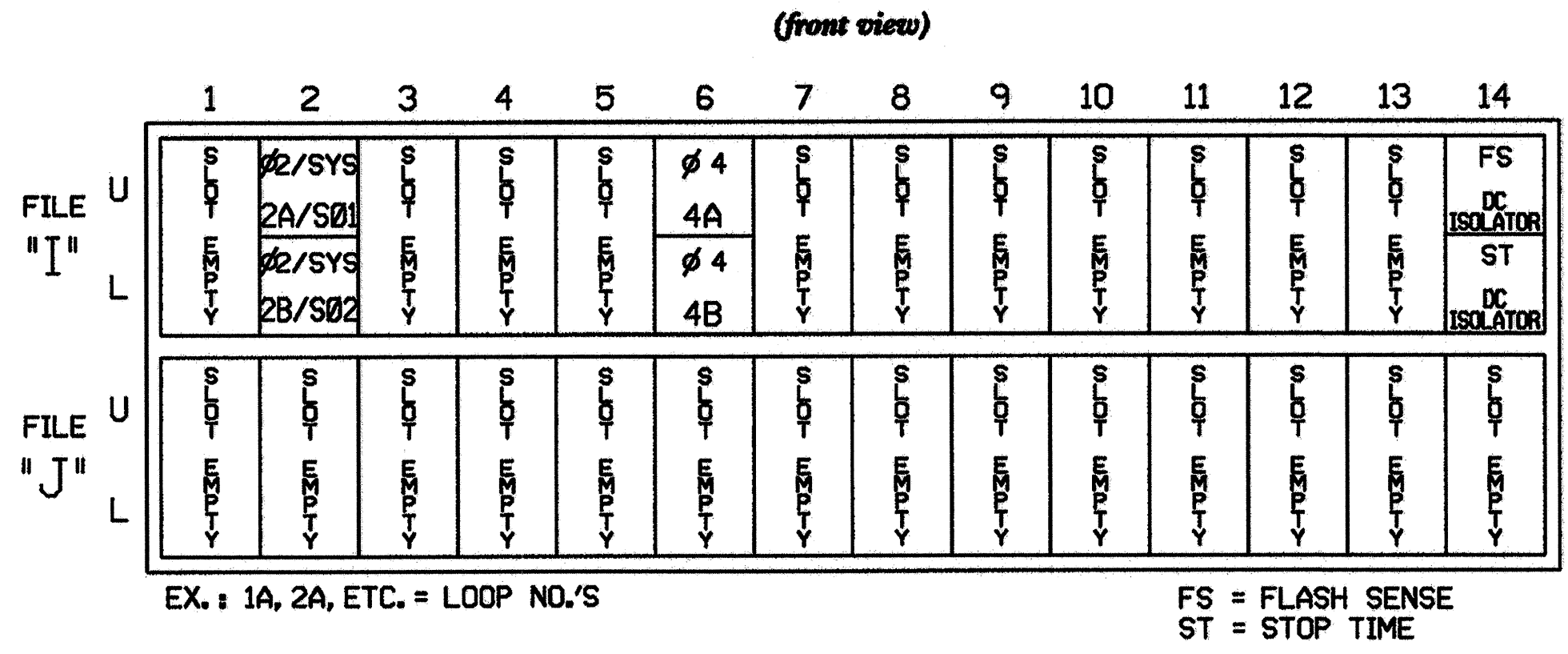
EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



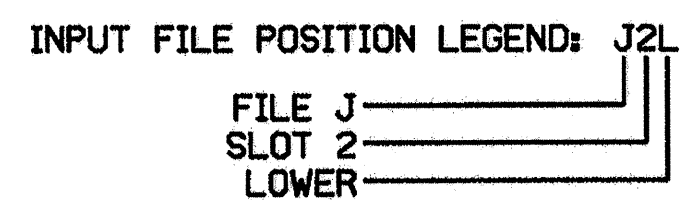
- DO NOT REMOVE ANY JUMPERS AS SHOWN
- NOTES:
- CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.
 - MAKE SURE JUMPERS SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.

INPUT FILE POSITION LAYOUT



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/S01	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S02	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
4A	TB4-9,10	I6U	41	3	4	Y	Y				
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			



NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. THE INSTALLER SHALL VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 1,3,5, 6,7,8,9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASE 2 GREEN.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASE 2, ON CONTROLLER UNIT, FOR VARIABLE INITIAL AND GAP REDUCTION.
- THE CABINET AND CONTROLLER ARE PART OF THE CHAPEL HILL CLOSED LOOP 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.	NU	21,22	NU	NU	41,42	NU	NU	NU	NU	NU	NU	NU
GREEN		130			103							
YELLOW		129			102							
RED		128			101							
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

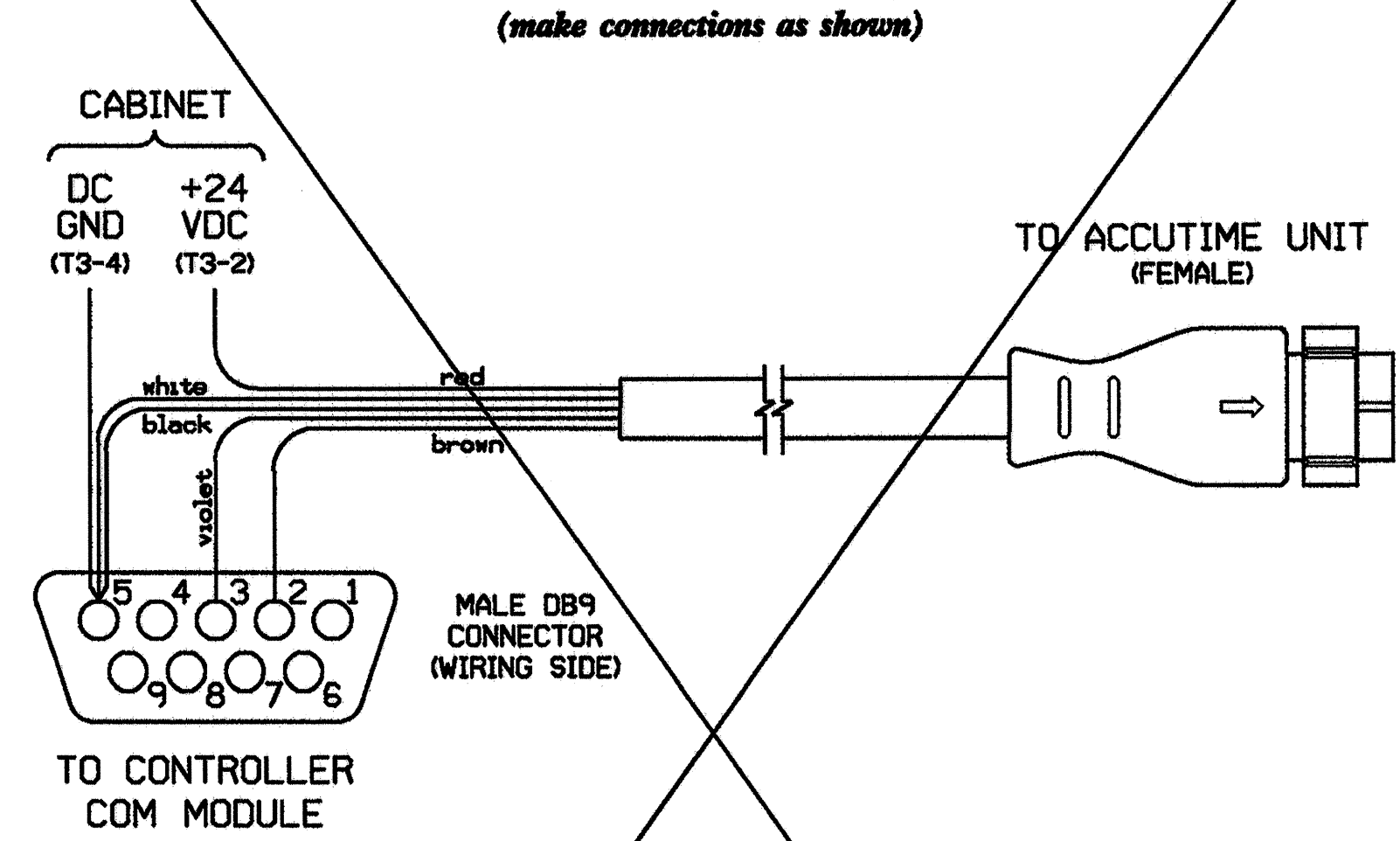
NU = NOT USED

EQUIPMENT INFORMATION

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

REMOVE GPS UNIT

CONNECTOR WIRING DETAIL FOR ACCUTIME 2000 WITH RS232 INTERFACE



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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-2065
 DESIGNED: AUGUST 2004
 SEALED: 09/07/04
 REVISED:

FINAL INSTALLATION

Prepared in the Office of:

US 15-501 SOUTHBOUND U-TURN .14 MILES SOUTH OF SR 1734 (ERWIN ROAD)

DIVISION 07 ORANGE COUNTY CHAPEL HILL

PLAN DATE: AUGUST 2004 REVIEWED BY: *R. Peterson*

PREPARED BY: JAMES PETERSON REVIEWED BY:

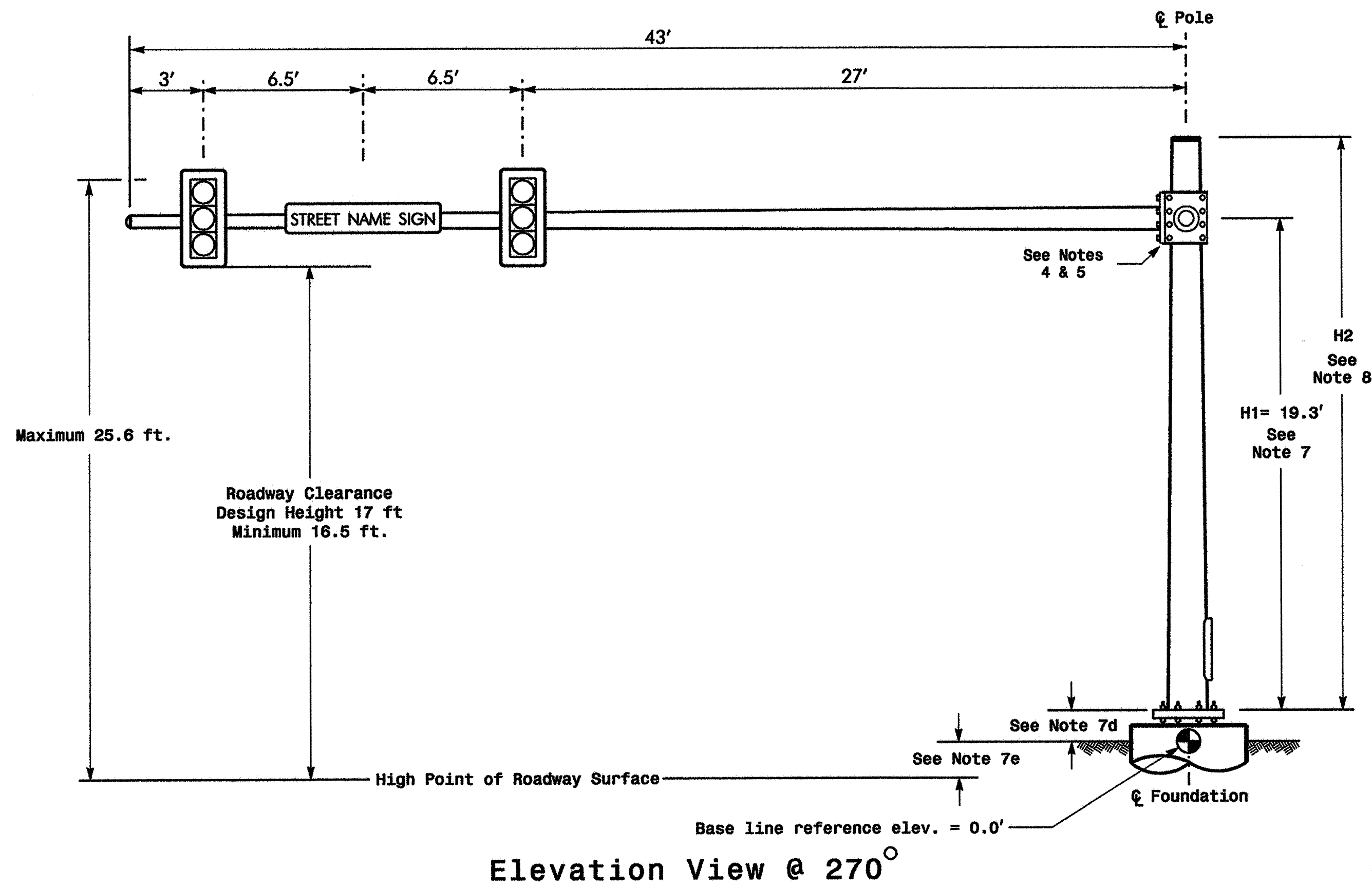
REVISIONS: _____ INIT. DATE

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

Signature: *James C. Brown* 9/9/04

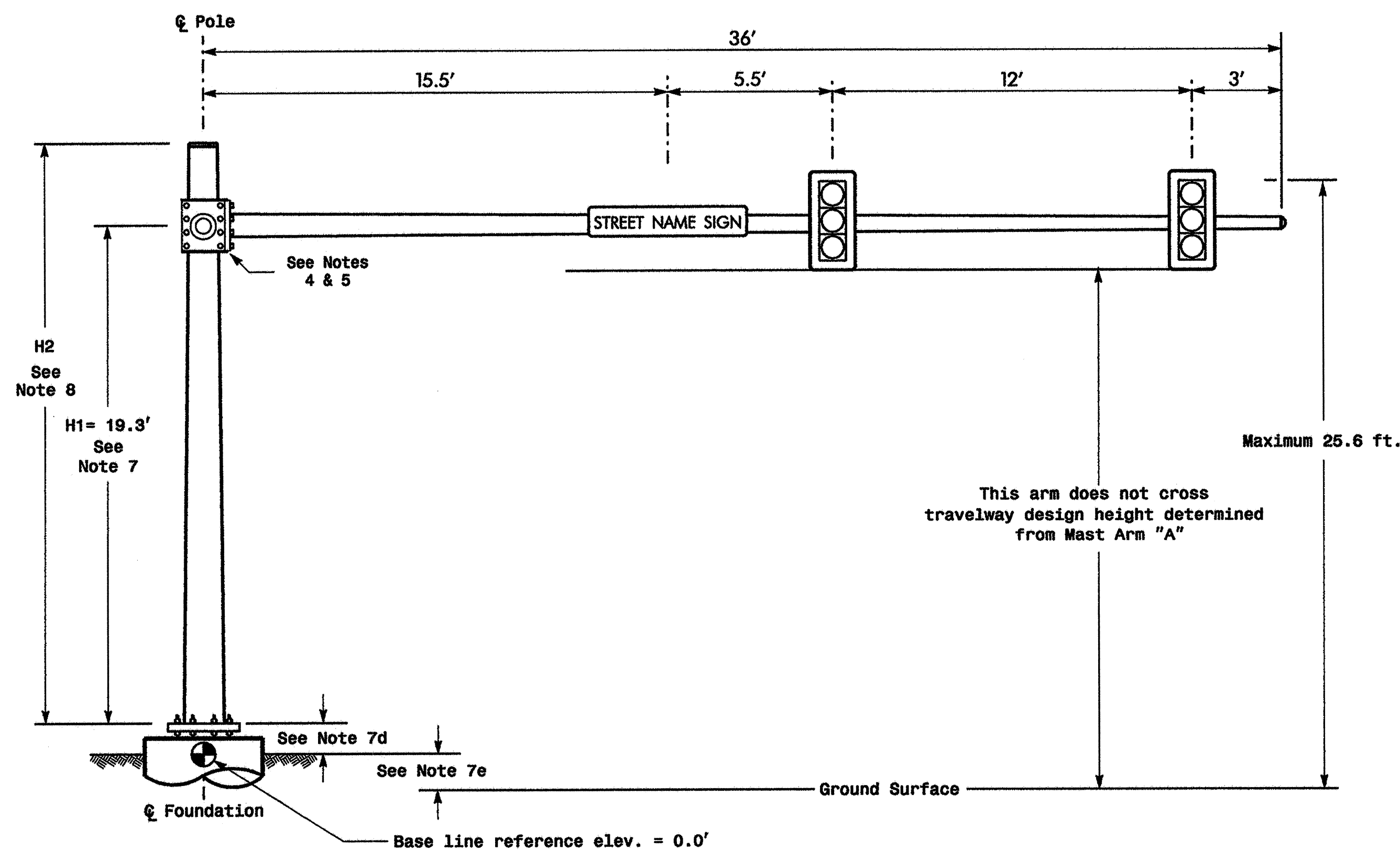
SIG. INVENTORY NO. 07-2065

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



Elevation View @ 270°

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



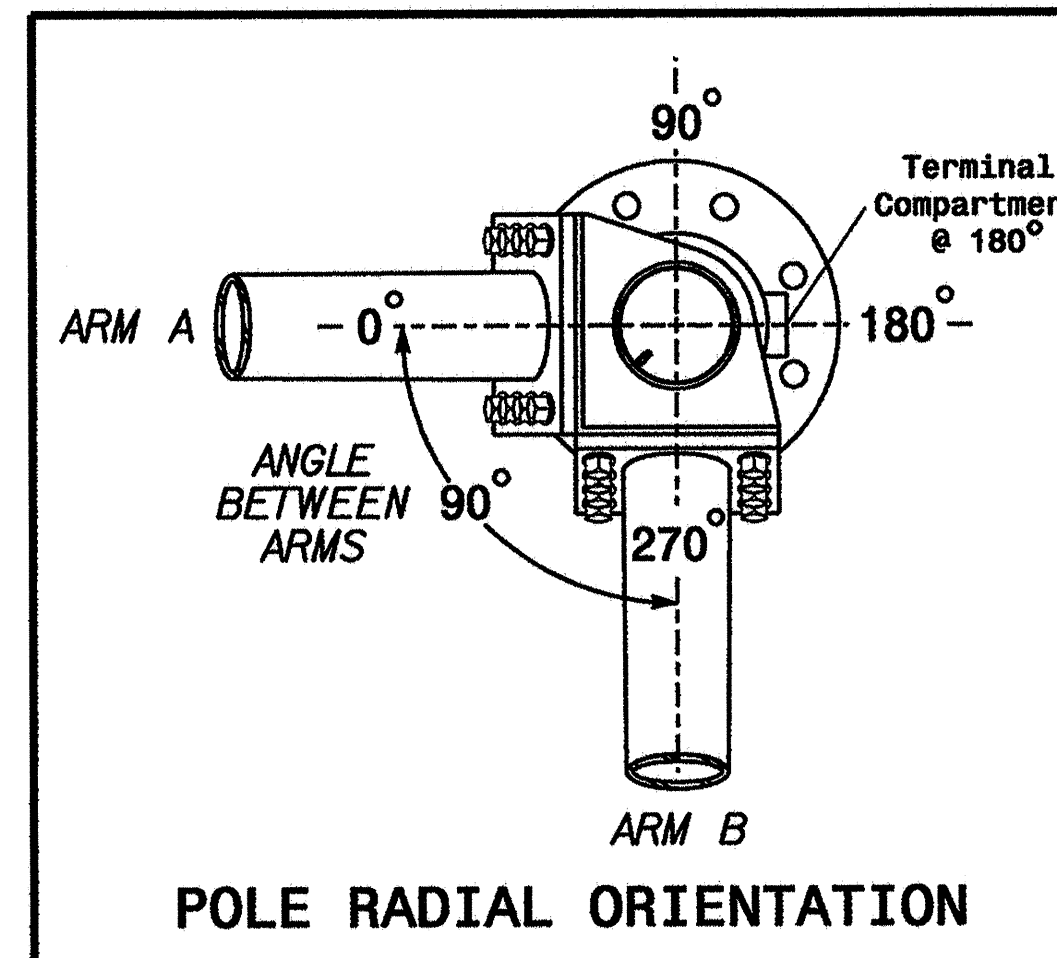
Elevation View @ 0°

SPECIAL NOTE

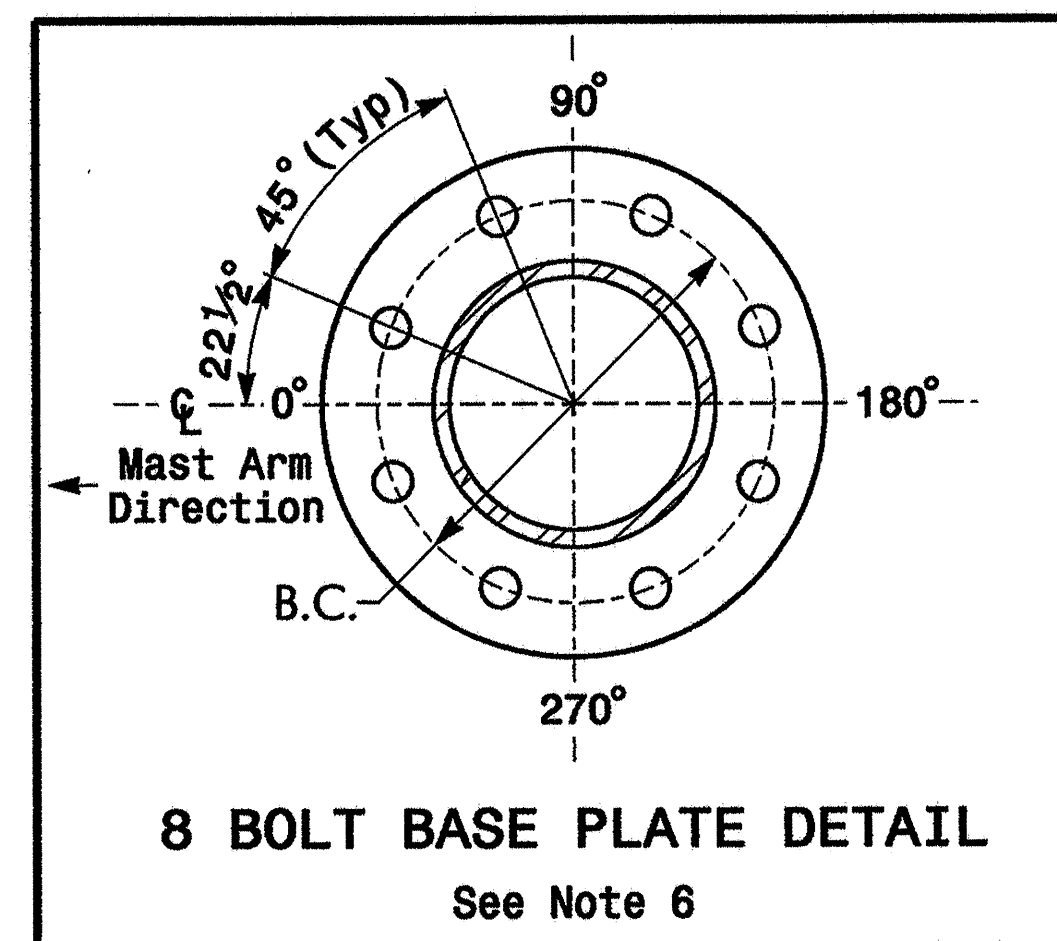
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

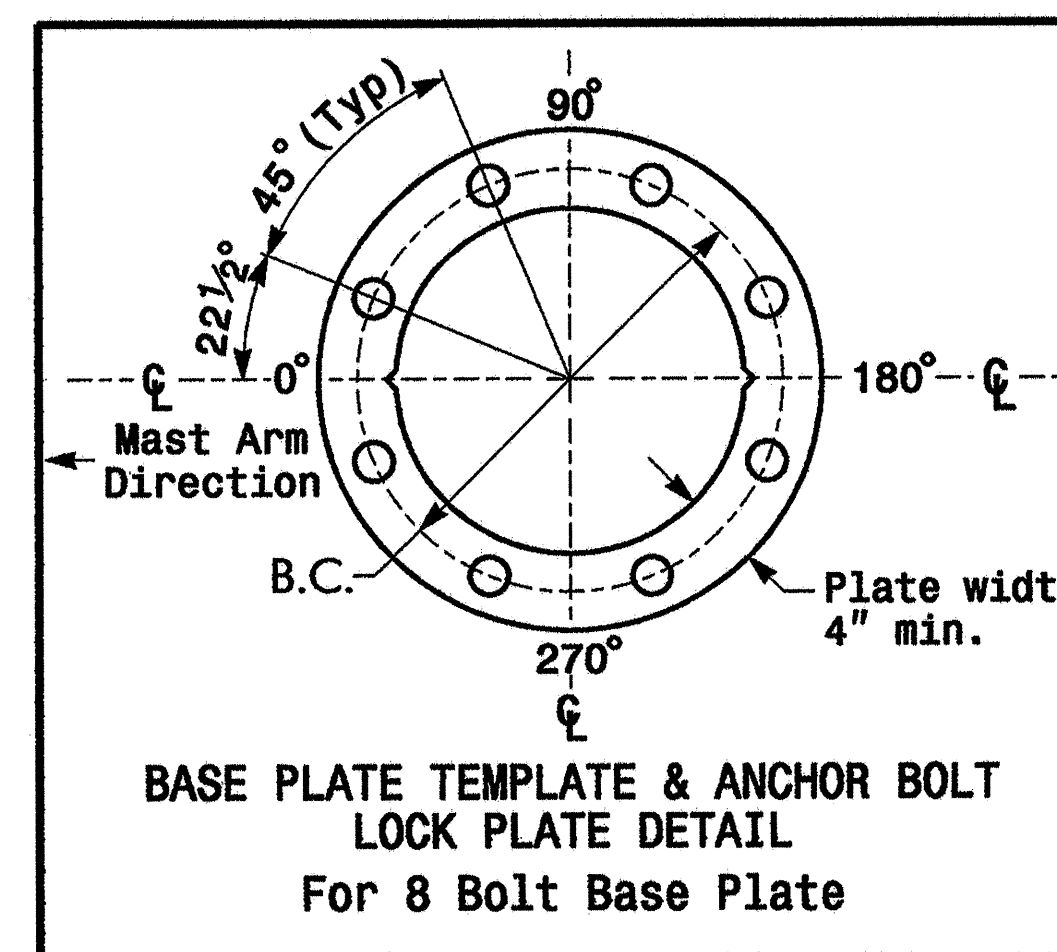
Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.8 ft.	N/A
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



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

MAST ARM LOADING SCHEDULE

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

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2002 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm>

Design Requirements

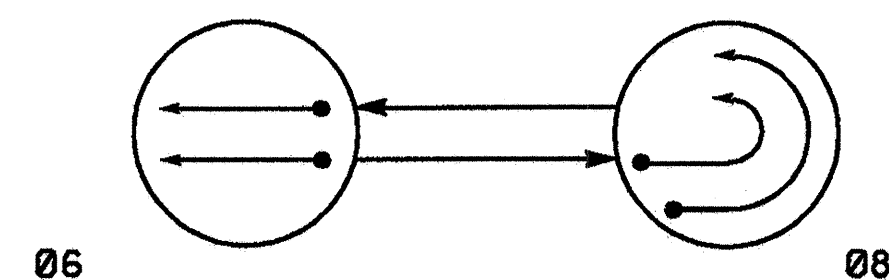
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points. The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- The pole manufacturer will determine the total height (H2) of the pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

This plan shall supersede the plan signed and sealed on 9/1/04.

NCDOT Wind Zone 4 (90 mph)

	US 15-501 Southbound U-turn 0.14 Miles South of Europa Drive		SEAL
	Division 7 Orange County Chapel Hill PLAN DATE: January 2006 REVIEWED BY: D Y Ishak PREPARED BY: R M Duffy REVIEWED BY:	REVISIONS INIT. DATE	
SCALE N/A 0 N/A		SIGNATURE DATE SIG. INVENTORY NO. 07-2065	

PHASING DIAGRAM



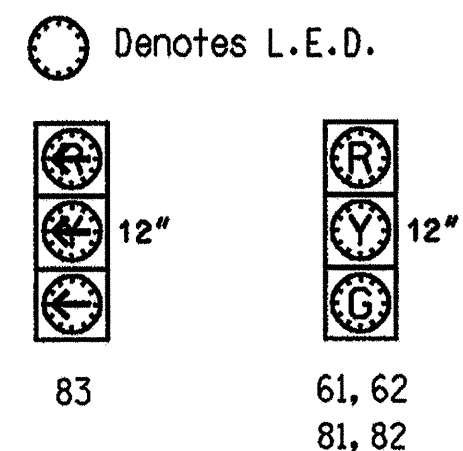
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	Ø 6	Ø 8	F L
61, 62	G	R	Y
81, 82	R	G	R
83	R	-	R

SIGNAL FACE I.D.



2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	DETECTOR PROGRAMMING								
				PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CAB	
6A/S07	6X6	4	300	Y	6	Y	Y	-	Y	-	-	Y
6B/S08	6X6	4	300	Y	6	Y	Y	-	Y	-	-	Y
8A	6X60	2-4-2	0	Y	8	Y	Y	-	-	-	-	Y
8B	6X60	2-4-2	0	Y	8	Y	Y	-	-	-	-	Y

2 Phase Fully Actuated Chapel Hill Closed Loop 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.
- Install backplates for signal heads numbered 61 & 62.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #2067.
- During Construction Phase II, install GPS unit for time synchronization. At project completion, remove GPS unit and deliver to the Division 7 Traffic Services Office.

PLAN QUANTITIES

Pay Item	Feet
Signal Cable	430
Messenger Cable	0
Lead-in Cable	360

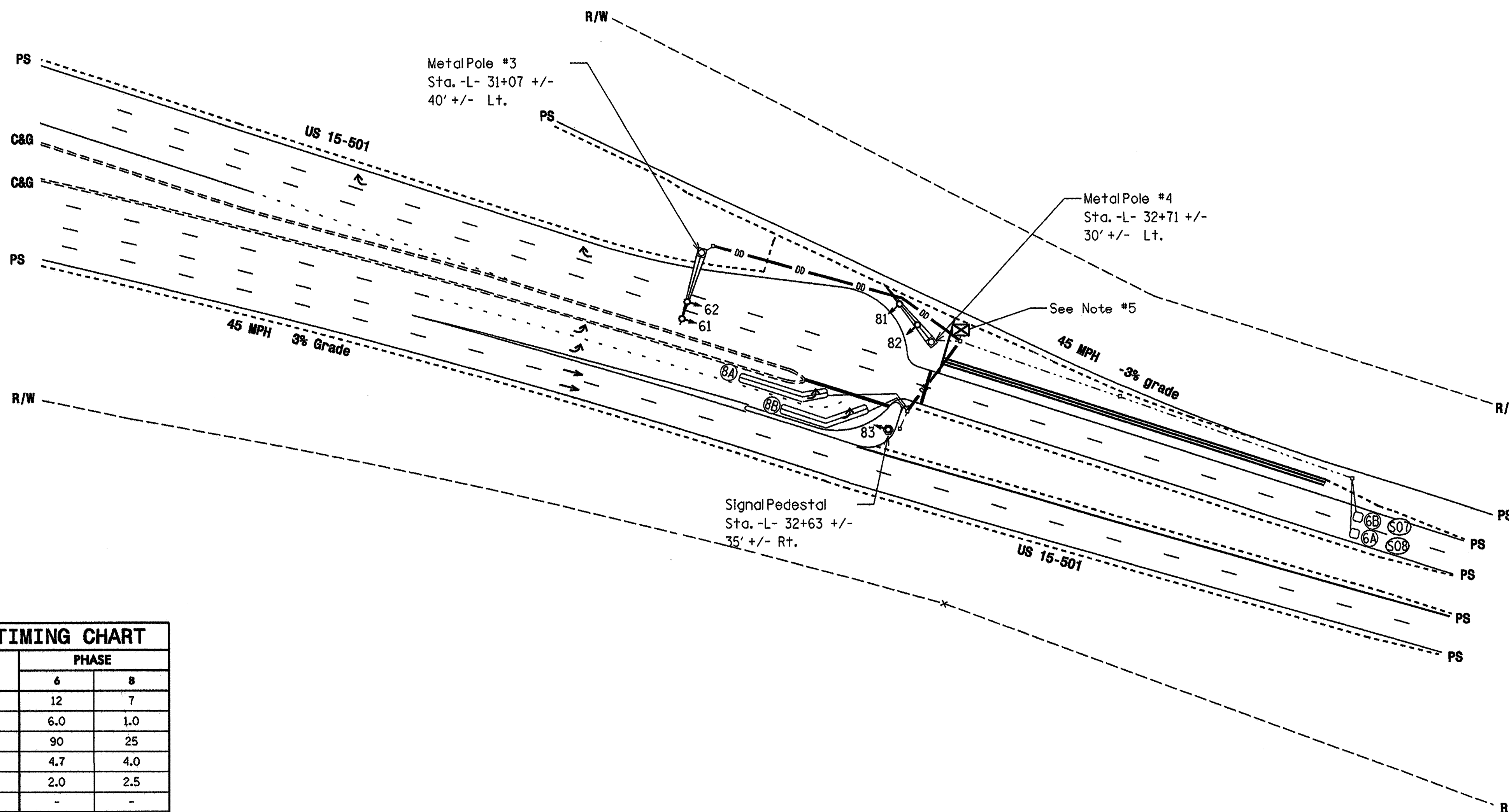
LEGEND

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

2070L TIMING CHART

FEATURE	PHASE	
	6	8
Min Green 1 *	12	7
Extension 1 *	6.0	1.0
Max Green 1 *	90	25
Yellow Clearance	4.7	4.0
Red Clearance	2.0	2.5
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	1.5	-
Max Variable Initial *	34	-
Time Before Reduction *	15	-
Time To Reduce *	45	-
Minimum Gap	3.0	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

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

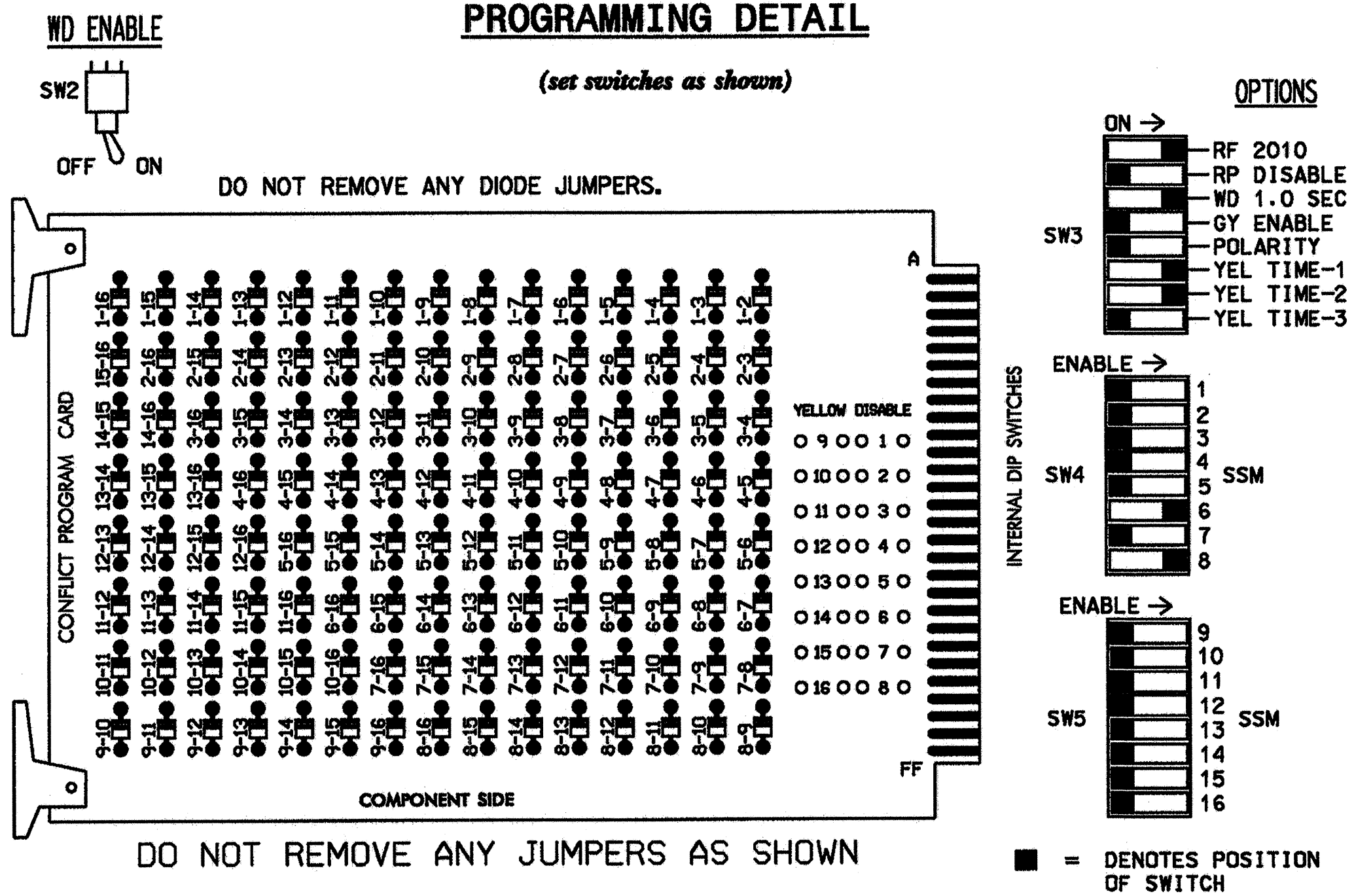


New Installation - Construction Phase II and Final

	<p>US 15-501 Northbound U-Turn .15 Miles North of Europa Drive</p>		
	<p>Division 07 Orange County Chapel Hill</p>	<p>PLN DATE: August 2004 REVIEWED BY: J. Galloway</p>	
<p>222 N. McDowell St., Raleigh, NC 27603</p>	<p>SCALE 1"=50'</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>
<p>Signature: Timothy J. Williams, 9/7/04</p>			<p>SIG. INVENTORY NO. 07-2067</p>

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

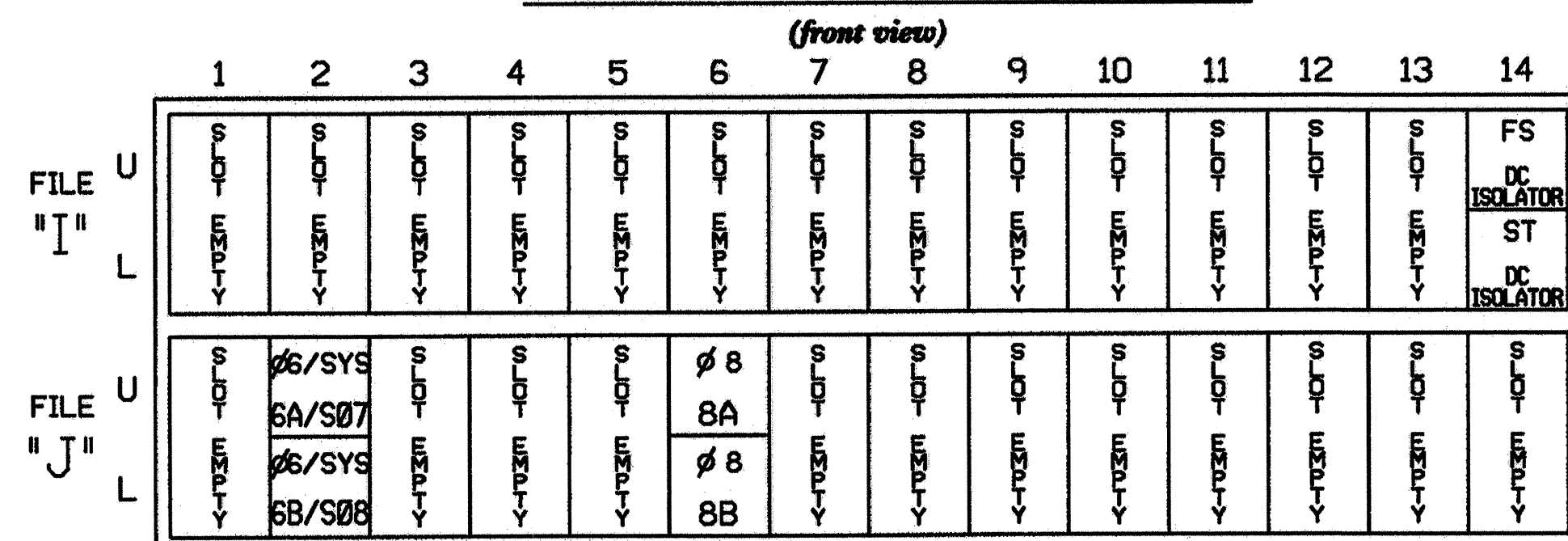


DO NOT REMOVE ANY JUMPERS AS SHOWN

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.

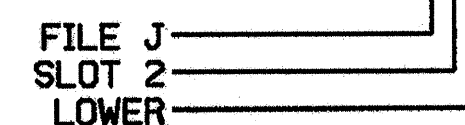
INPUT FILE POSITION LAYOUT



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
6A/07	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/08	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			
8A	TB5-9,10	J6U	42	4	8	Y	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			

INPUT FILE POSITION LEGEND: J2L



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 1,2,3, 4,5,7,9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASE 6 GREEN.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASE 6, ON CONTROLLER UNIT, FOR VARIABLE INITIAL AND GAP REDUCTION.
- THE CABINET AND CONTROLLER ARE PART OF THE CHAPEL HILL CLOSED LOOP SYSTEM.

FIELD CONNECTION HOOK-UP CHART

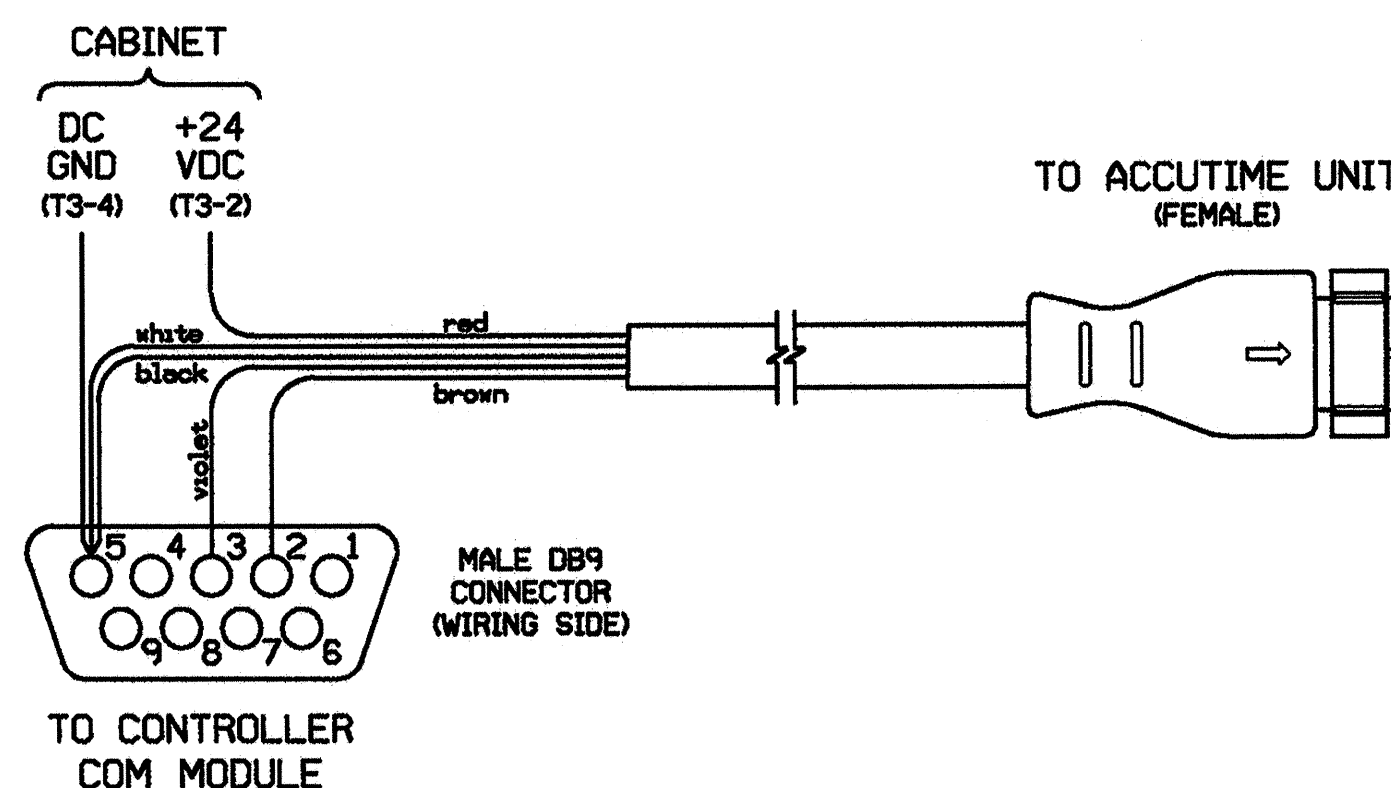
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	NU	NU	NU	NU	NU	NU	61,62	NU	NU	61,62	83
GREEN								136			109	
YELLOW								135			108	
RED								134			107	
RED ARROW												107
YELLOW ARROW												108
GREEN ARROW												109

NU = NOT USED

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	PIN 3	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 TSP GPS PROTOCOL
- 9600 BAUD
- 8 DATA BITS
- 1 STOP BIT
- ODD PARITY

NOTE: REMOVE GPS UNIT UPON COMPLETION OF PROJECT.

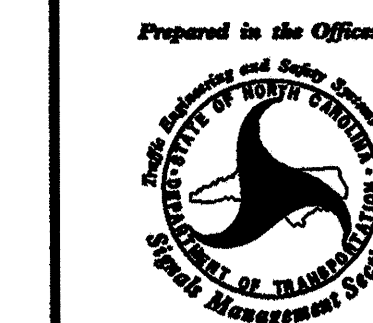
EQUIPMENT INFORMATION

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-2067
 DESIGNED: AUGUST 2004
 SEALED: 09/07/04
 REVISED:

NEW INSTALLATION

ELECTRICAL AND PROGRAMMING DETAILS FOR:



122 N. McDowell St., Raleigh, NC 27603

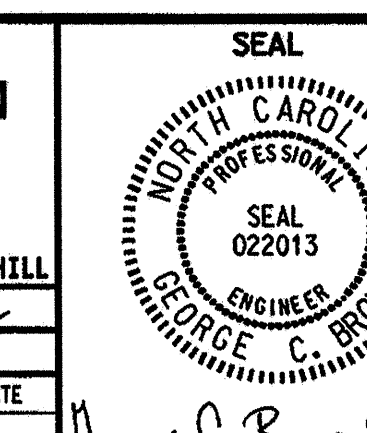
US 15/501 NORTHBOUND U-TURN
 .15 MILES NORTH OF EUROPA DRIVE

DIVISION 07 ORANGE COUNTY CHAPEL HILL

PLAN DATE: AUGUST 2004 REVIEWED BY: *R. Hinkley*

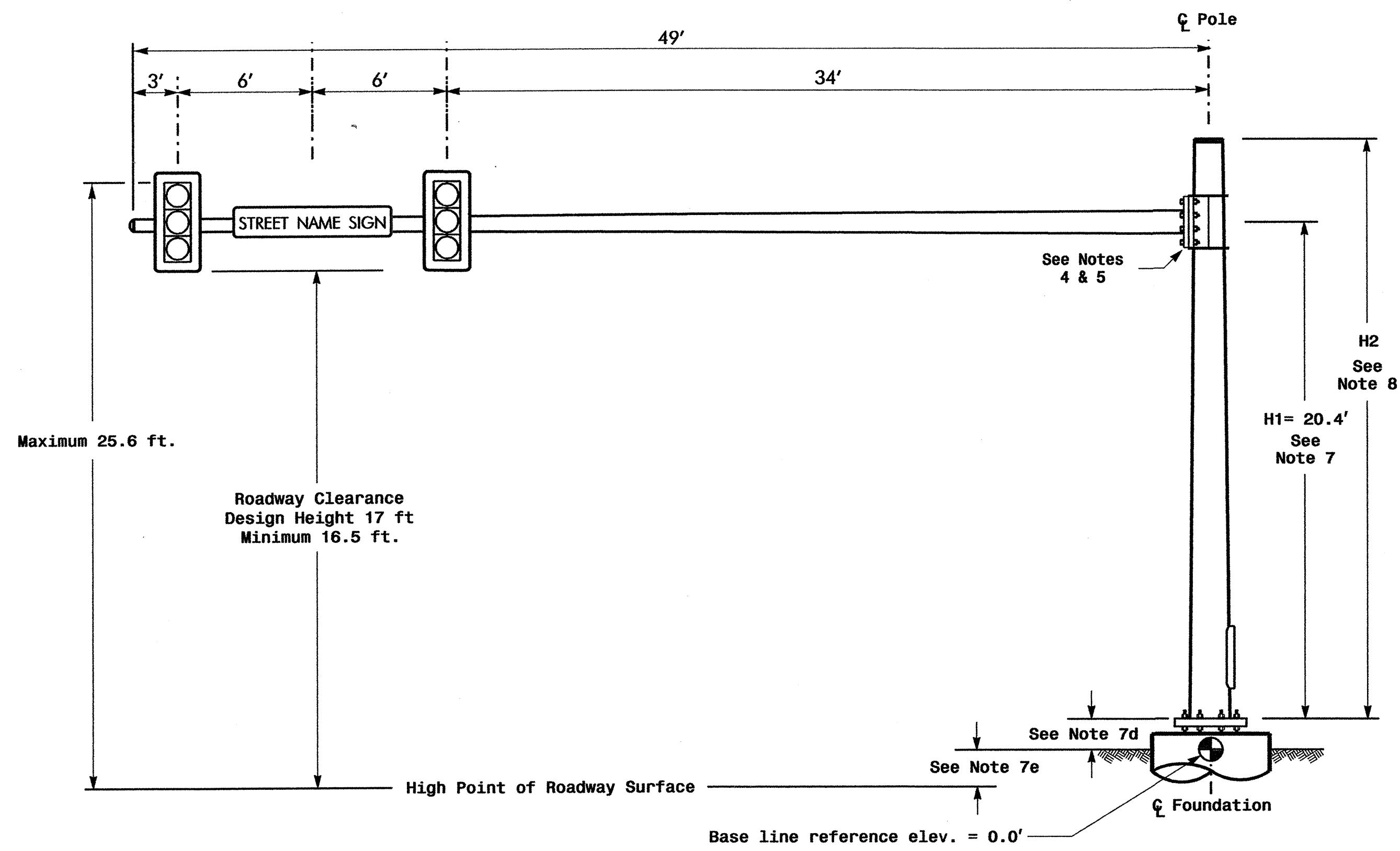
PREPARED BY: JAMES PETERSON REVIEWED BY:

REVISIONS INIT. DATE



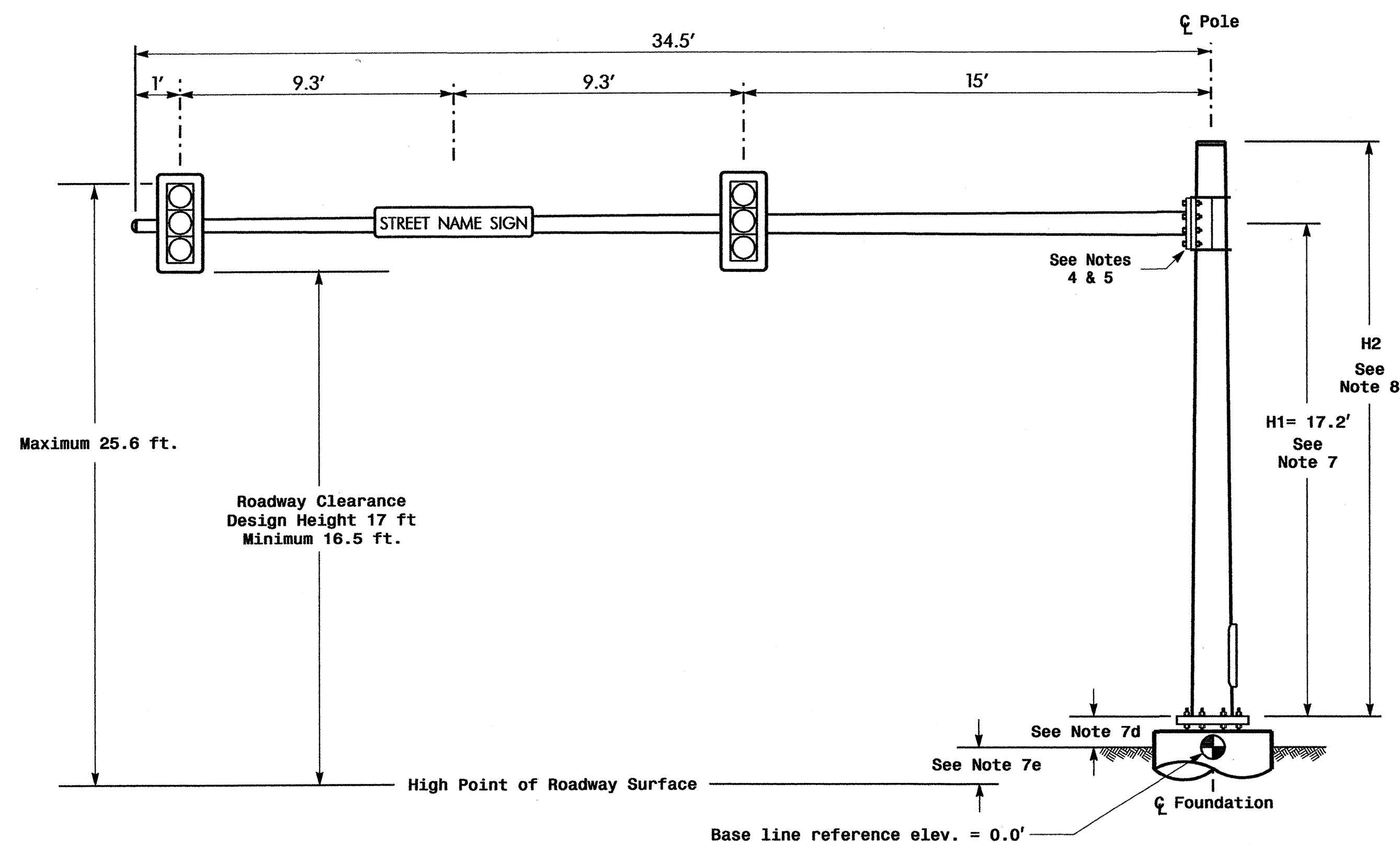
1516 INVENTORY NO. 07-2067

Design Loading for METAL POLE NO. 3



Elevation View

Design Loading for METAL POLE NO. 4

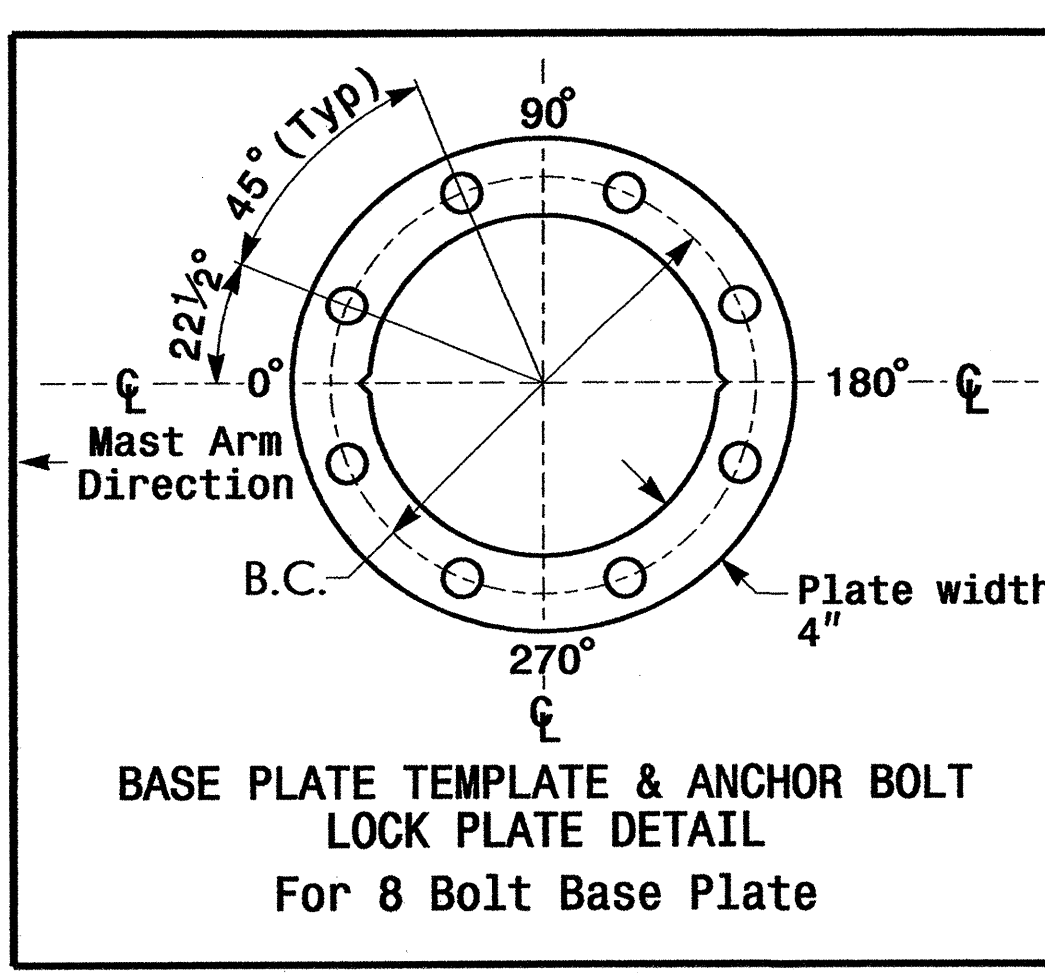
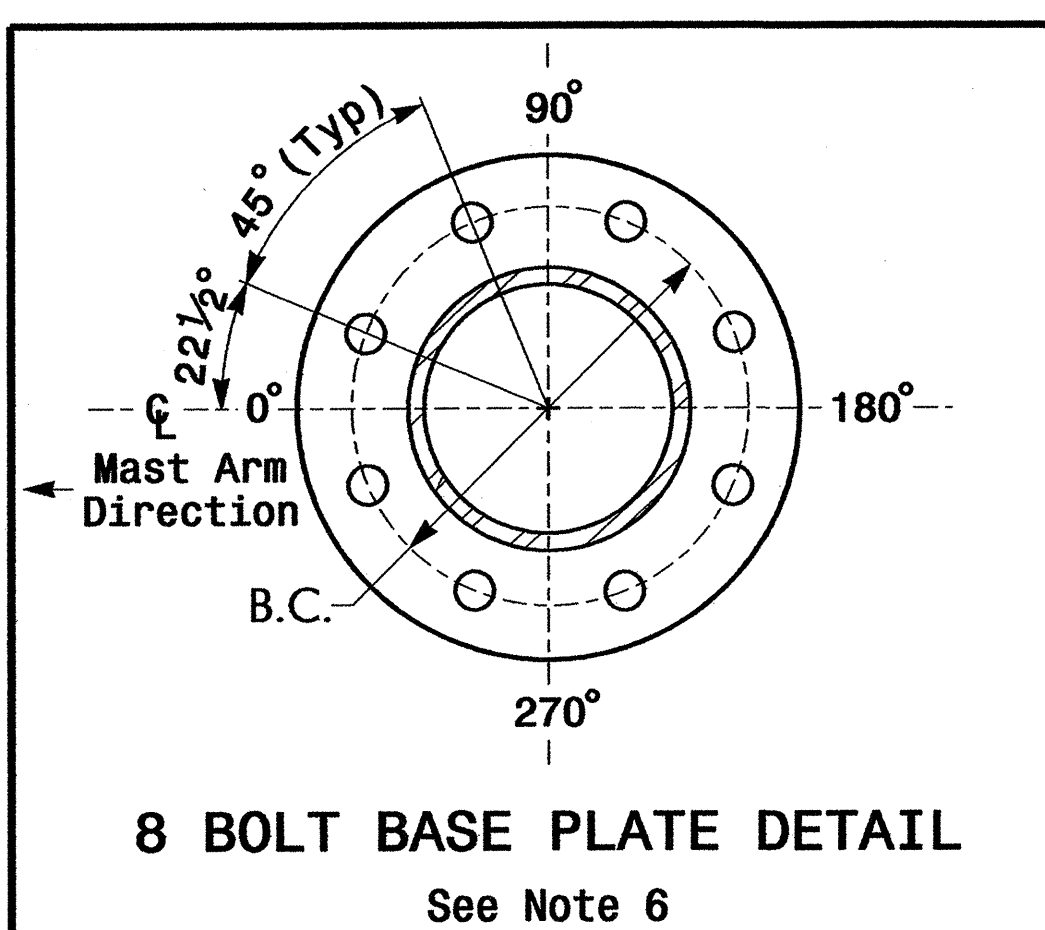
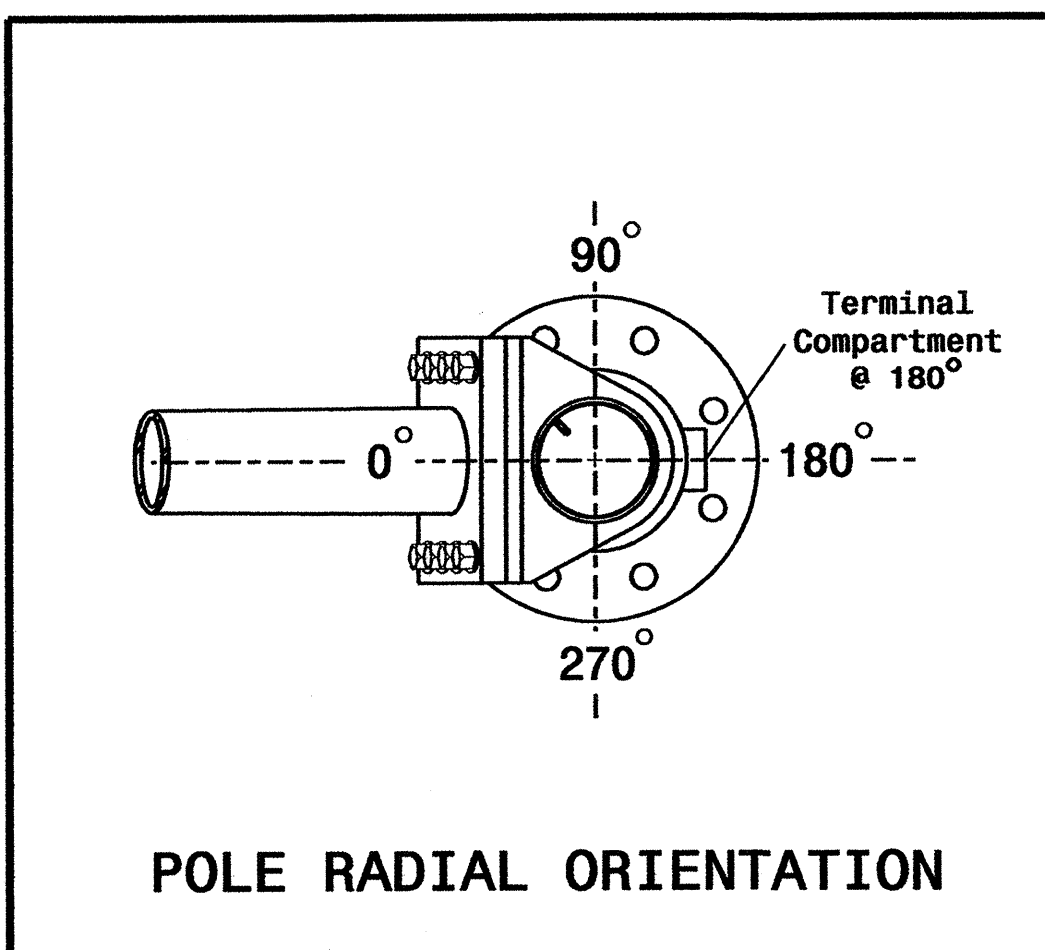


Elevation View

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

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.9 ft.	-1.3 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



MAST ARM LOADING SCHEDULE

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

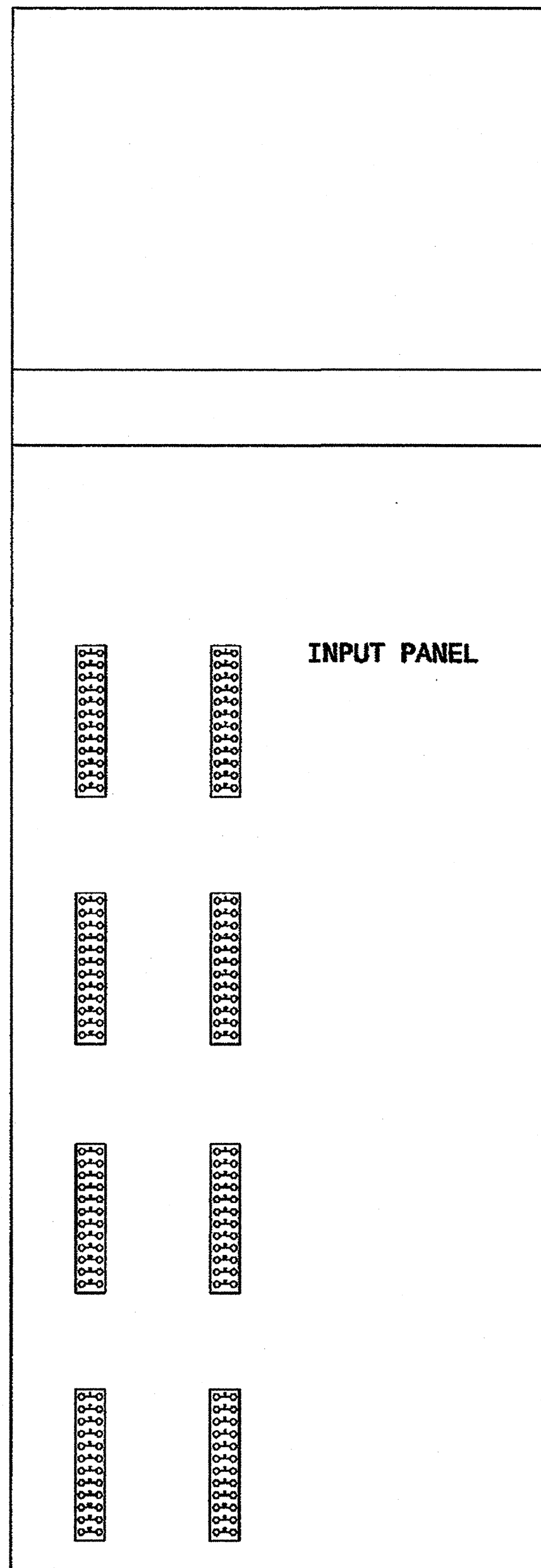
- NOTES**
- Design Reference Material
- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2002 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/tmsu/ws/mpoles/poles.htm>
 - Design Requirements
 - Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
 - Maximum allowable CSR for all signal supports is 0.9.
 - The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
 - A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
 - Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
 - The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
 - If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
 - The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
 - The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

This plan shall supersede the plan signed and sealed on 9/1/04.

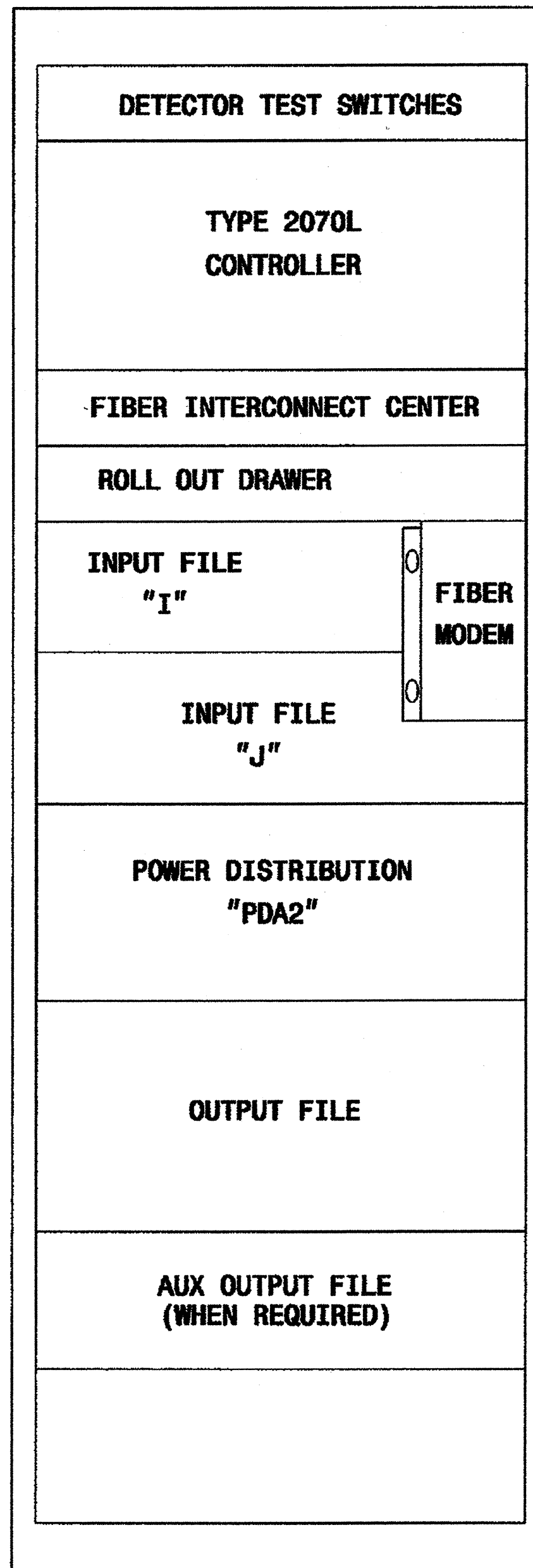
NCDOT Wind Zone 4 (90 mph)

	US 15-501 Northbound U-Turn 0.15 Miles North of Europa Drive		SEAL
	Division 7 PLAN DATE: February 2006 PREPARED BY: R M Duffy	Orange County REVIEWED BY: D Y Ishak REVIEWED BY:	
SCALE: 0 N/A N/A N/A			SIGNATURE: _____ DATE: _____ SIG. INVENTORY NO. 07-2067

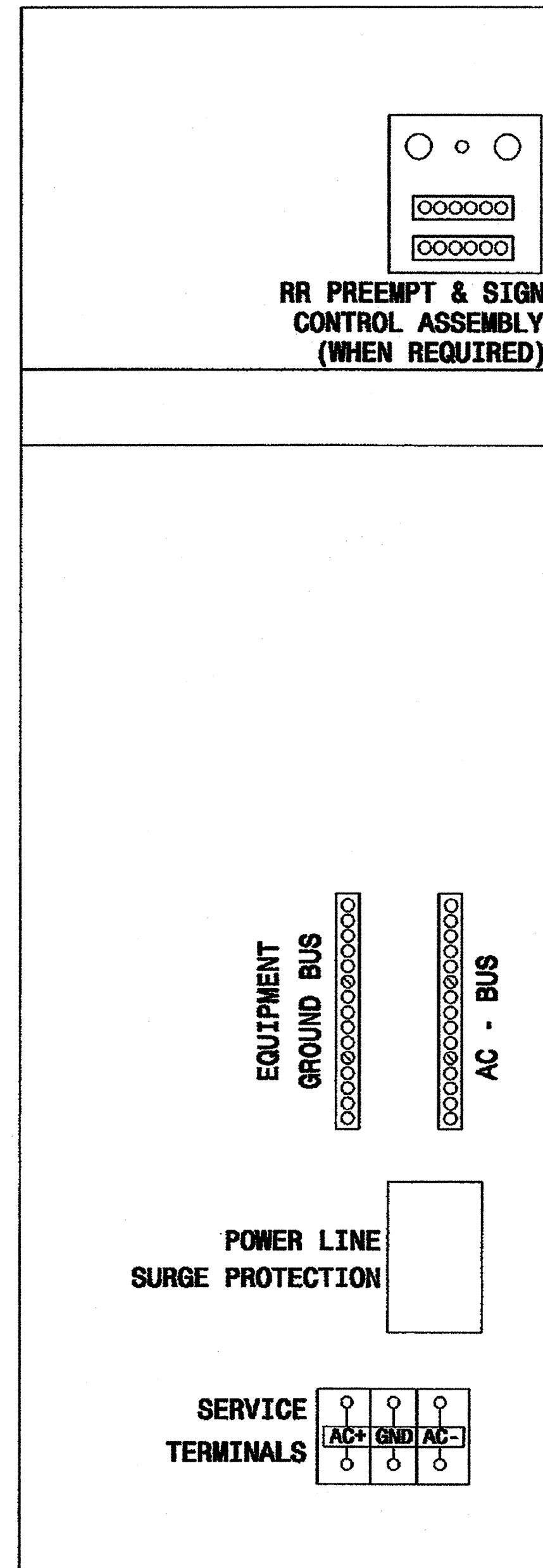
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 RUDF



332A CABINET
LEFT SIDE



332A CABINET



332A CABINET
RIGHT SIDE

REAR VIEW

NOTE

-PROVIDE A 2 " SPACE BETWEEN THE CONTROLLER AND THE ROLL OUT DRAWER TO ACCOMMODATE A FIBER INTERCONNECT CENTER.

Typical Drawing

	<p>Prepared in the Office of:</p> <p>Cabinet Component Layout 170 Cabinet Model 332A with 2070L Controller</p>							
	<p>PLAN DATE: October 2002</p> <p>PREPARED BY: P L Alexander</p>	<p>REVIEWED BY:</p> <p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		NO.	INIT.	DATE		
NO.	INIT.	DATE						
<p>122 N. McDowell St., Raleigh, NC 27603</p>		<p>SIG. INVENTORY NO.</p>	<p>MA</p>					

U - 4008

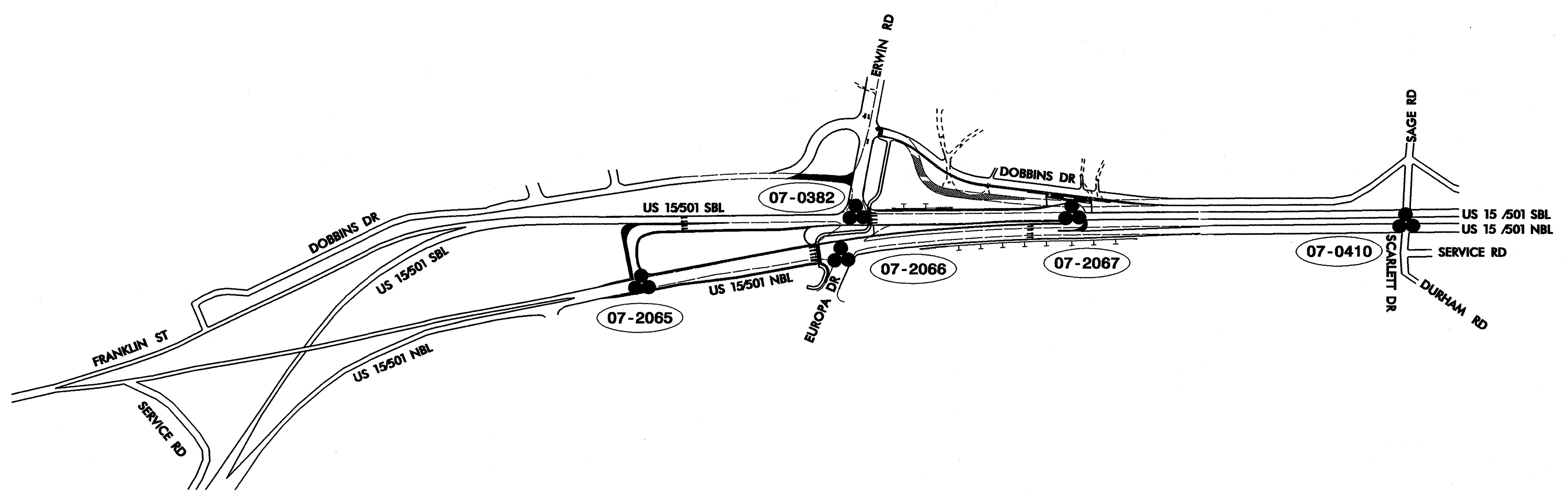
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

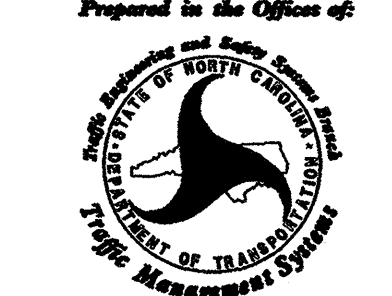
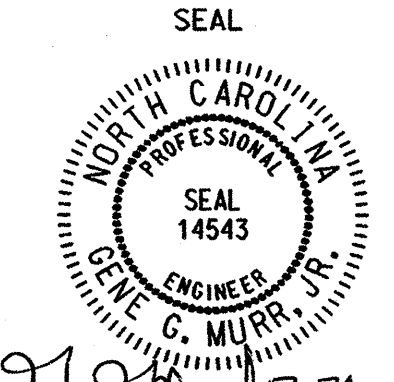
ORANGE COUNTY

LOCATION: US 15-501 AT ERWIN ROAD/EUROPA DRIVE

TYPE OF WORK: COMMUNICATIONS CABLE AND CONDUIT ROUTING

PROJECT:



 <small>Prepared in the Office of: North Carolina Department of Transportation Office of Transportation Planning</small>	COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS		 <small>SEAL 14543 ENGINEER GENE G. MURR, P.E.</small>
	<small>DIVISION 07</small> ORANGE CO. CHAPEL HILL <small>PLAN DATE:</small> AUGUST 2004 <small>REVIEWED BY:</small> PCL/INA <small>PREPARED BY:</small> S.C. WARDLE <small>REVIEWED BY:</small> G.G. MURR	<small>REVISIONS</small> _____ <small>INIT.</small> _____ <small>DATE</small> _____	

- 1 INSTALL REA, PE - 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 2 INSTALL REA, PE - 38, (FIGURE 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 3 INSTALL REA, PE - 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 4 INSTALL SMFO CABLE
- 5 INSTALL MMFO CABLE
- 6 INSTALL FIBER OPTIC DROP CABLE
- 7 INSTALL TRACER WIRE
- 8 TRENCH
- 9 INSTALL PVC CONDUIT
- 10 INSTALL RIGID, GALVANIZED STEEL CONDUIT
- 11 INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
- 12 INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
- 13 INSTALL OUTER-DUCT POLYETHYLENE CONDUIT
- 14 INSTALL POLYETHYLENE CONDUIT
- 15 DIRECTIONAL DRILL CONDUIT
- 16 BORE AND JACK CONDUIT
- 17 INSTALL CABLE(S) IN EXISTING CONDUIT
- 18 INSTALL CABLE(S) IN NEW CONDUIT
- 19 INSTALL CABLE(S) IN EXISTING RISER
- 20 INSTALL CABLE(S) IN NEW RISER
- 21 INSTALL CABLE(S) IN EXISTING CONDUIT STUB-OUTS
- 22 INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 23 INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 24 INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
- 25 INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
- 26 TERMINATE COMMUNICATIONS CABLE ON EXISTING TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
- 27 INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
- 28 INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPLICE CABLE IN CABINET
- 29 INSTALL UNDERGROUND SPLICE ENCLOSURE
- 30 INSTALL AERIAL SPLICE ENCLOSURE
- 31 INSTALL POLE MOUNTED SPLICE CABINET
- 32 INSTALL BASE MOUNTED SPLICE CABINET
- 33 REMOVE EXISTING SPLICE CABINET

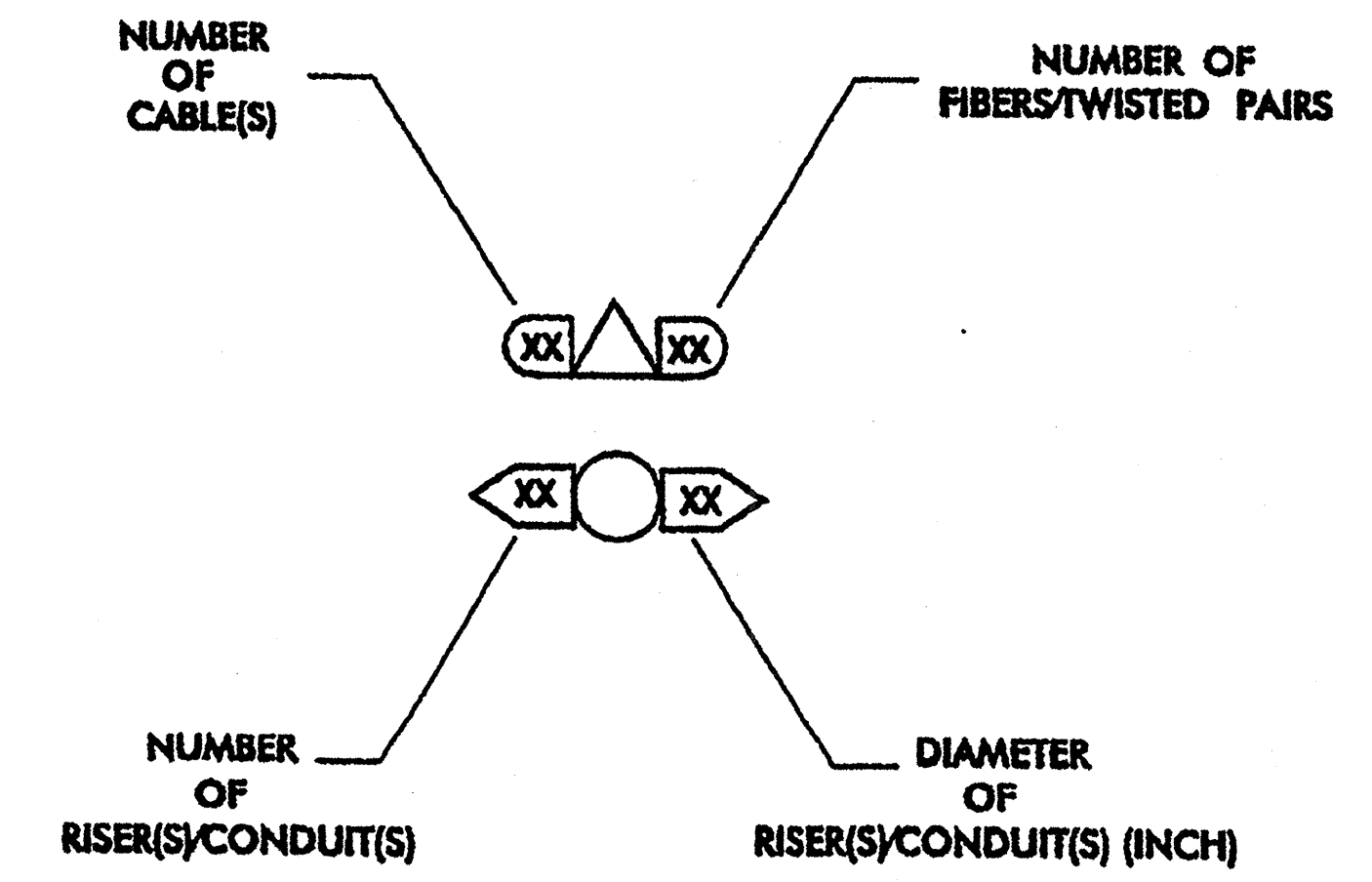
- 34 INSTALL CABINET FOUNDATION
- 35 REMOVE EXISTING CABINET FOUNDATION
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40 INSTALL OVERSIZED JUNCTION BOX
- 41 REMOVE EXISTING JUNCTION BOX
- 42 INSTALL WOOD POLE
- 43 REMOVE EXISTING WOOD POLE
- 44 INSTALL AERIAL GUY ASSEMBLY
- 45 INSTALL STANDARD GUY ASSEMBLY
- 46 INSTALL SIDEWALK GUY ASSEMBLY
- 47 INSTALL MESSENGER CABLE
- 48 REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
- 49 REMOVE EXISTING MESSENGER CABLE
- 50 INSTALL TELEPHONE SERVICE
- 51 INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
- 52 INSTALL DELINEATOR MARKER
- 53 STORE 20 FEET OF COMMUNICATIONS CABLE
- 54 LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
- 55 LASH CABLE(S) TO EXISTING MESSENGER CABLE
- 56 LASH CABLE(S) TO NEW MESSENGER CABLE
- 57 MODIFY EXISTING ELECTRICAL SERVICE
- 58 INSTALL NEW ELECTRICAL SERVICE

LEGEND

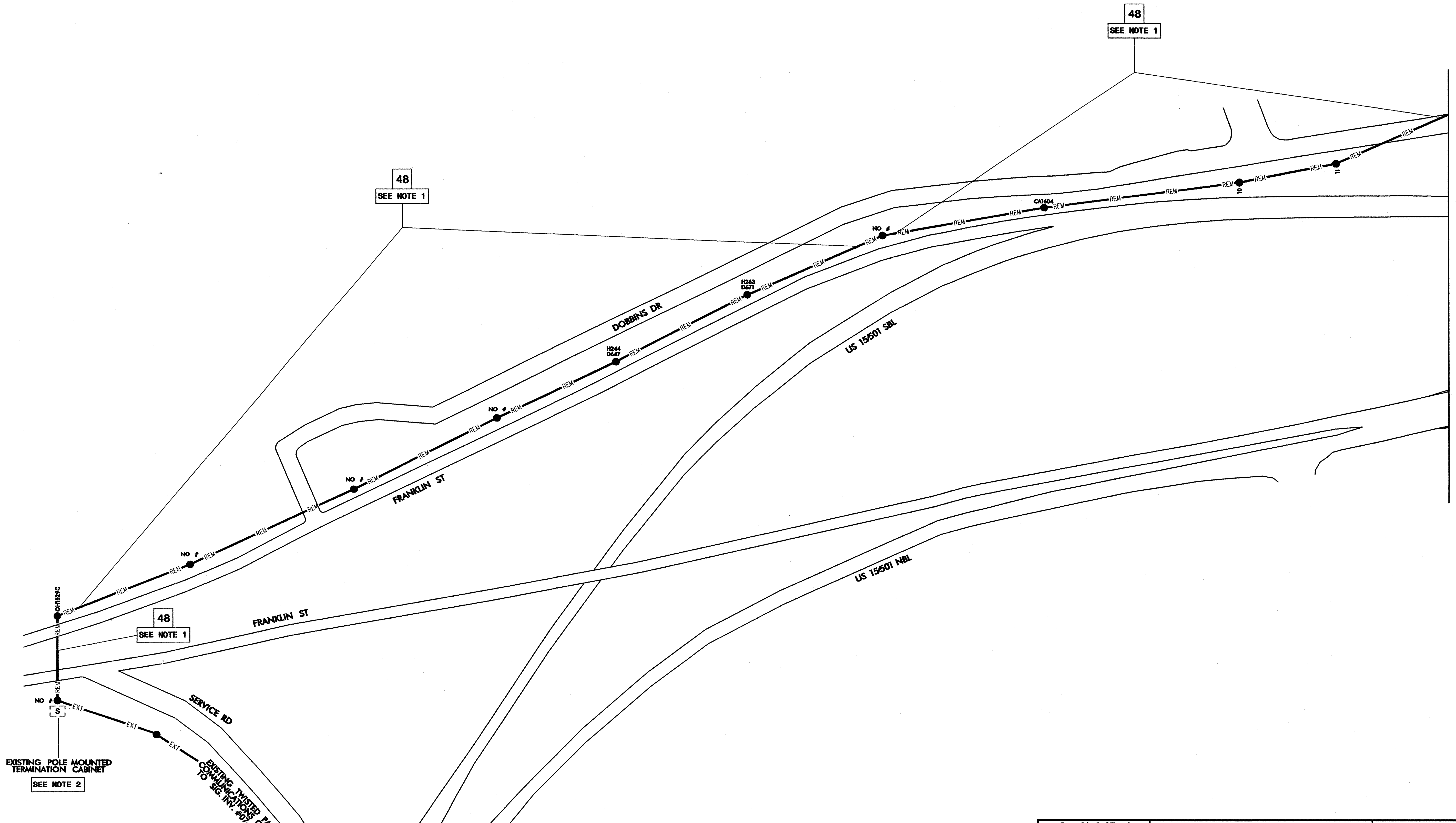
- FO NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST PR NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXI EXISTING COMMUNICATIONS CABLE
- REM EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD NEW DIRECTIONAL DRILLED CONDUIT
- B&J NEW BORED AND JACKED CONDUIT
- NEW JUNCTION BOX
- EXISTING JUNCTION BOX
- NEW WOOD POLE
- EXISTING WOOD POLE
- AERIAL SPLICE ENCLOSURE
- NEW METAL POLE
- EXISTING METAL POLE
- NEW CCTV ASSEMBLY
- NEW STANDARD GUY ASSEMBLY
- NEW SIDEWALK GUY ASSEMBLY
- NEW CABLE STORAGE RACKS (SNOW SHOES)
- EXISTING CONTROLLER AND CABINET
- EXISTING SPLICE CABINET
- NEW SPLICE CABINET
- SP SIGNAL POLE
- XX-XXXX SIGNAL INVENTORY NUMBER

CONSTRUCTION NOTE SYMBOLOGY KEY

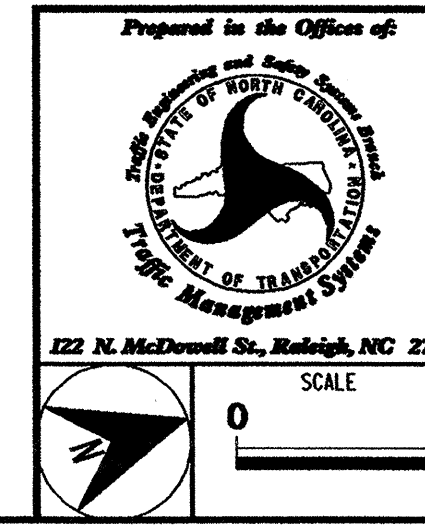
- XX INDICATES NUMBER OF CABLES, LOOPS, ETC.
- XX INDICATES NUMBER OF FIBERS PER CABLE, TWISTED PAIRS PER CABLE, ETC.
- XX INDICATES NUMBER OF RISER(S)/CONDUIT(S)
- XX INDICATES DIAMETER OF RISER(S)/CONDUIT(S) (INCH)



	CONSTRUCTION NOTES		
	PLAN DATE:	REVIEWED BY:	
122 N. McDowell St., Raleigh, NC 27603	PREPARED BY:	REVISIONS	INIT. DATE
	SCALE 		
			Signature: <i>Gregory A. Fuller</i> 10/31/02 DATE

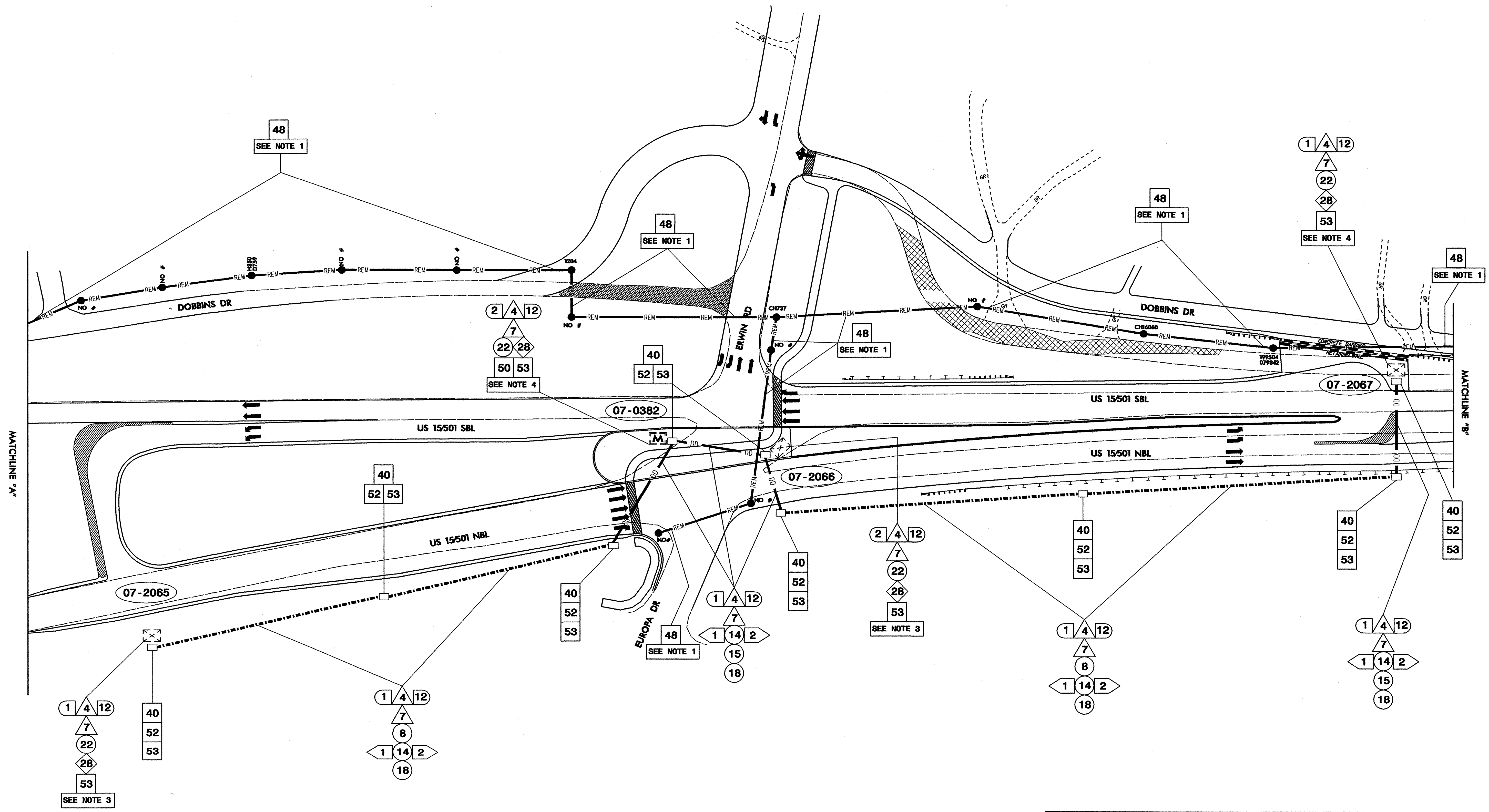


- NOTES:**
1. EXISTING TWISTED PAIR COMMUNICATIONS CABLE
 2. TOWN OF CHAPEL HILL WILL MAKE ALL TWISTED PAIR COMMUNICATIONS CABLE TERMINATIONS.



COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS	
DIVISION 07	ORANGE CO. CHAPEL HILL
PLAN DATE: AUGUST 2004	REVIEWED BY: PCL/INA
PREPARED BY: S.C. WARDLE	REVIEWED BY: G.G. MURR
REVISIONS	INIT. DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14543 G. G. MURR, P.E.
SIGNATURE: <i>G.G. Murr</i> DATE: 3-24-06
CADD FILE NAME:

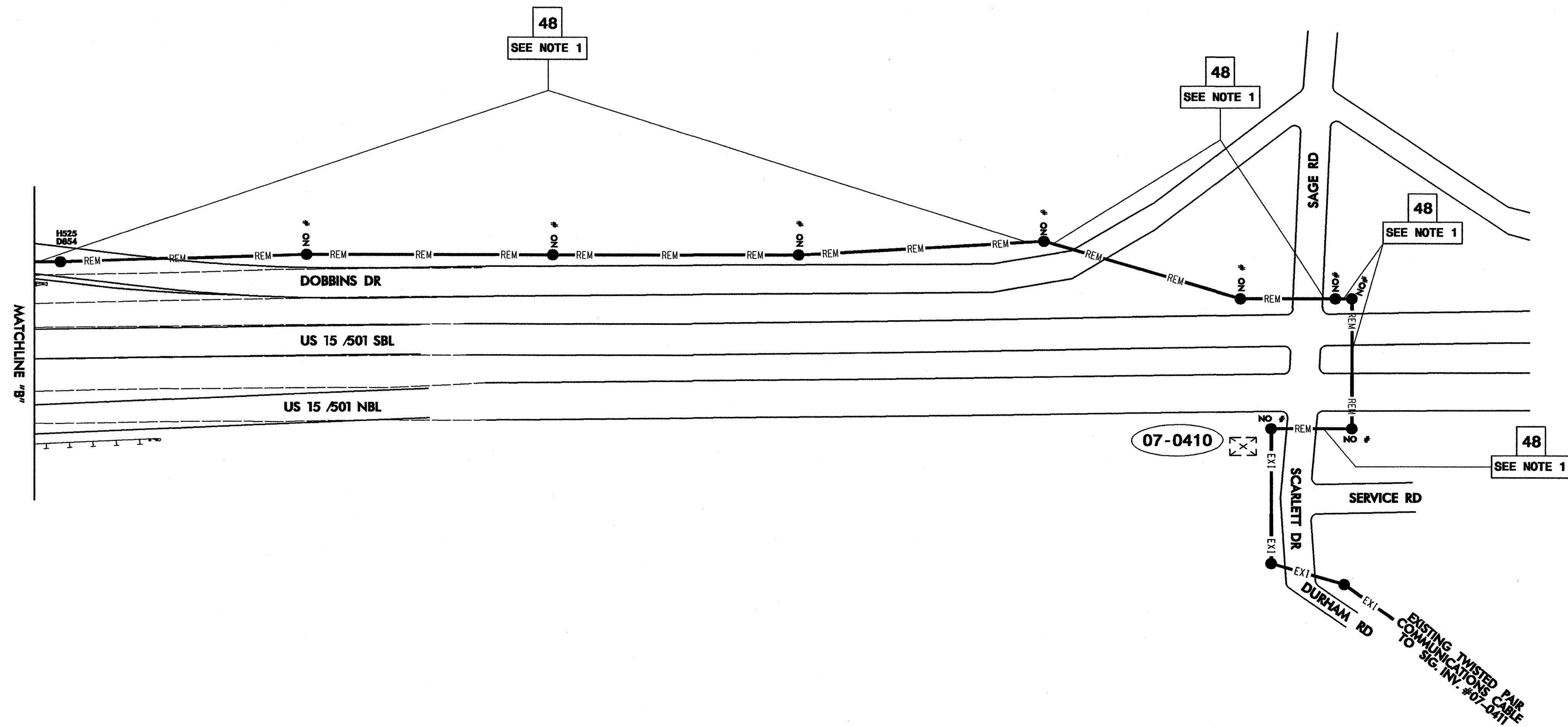


NOTES:

1. EXISTING TWISTED PAIR COMMUNICATIONS CABLE.
2. TOWN OF CHAPEL HILL WILL MAKE ALL TWISTED PAIR COMMUNICATIONS CABLE TERMINATIONS.
3. BOND TRACER WIRE TO EQUIPMENT GROUND BUS.
4. DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

SEAL ALL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX & SIGNAL CABINET ENTRANCES.

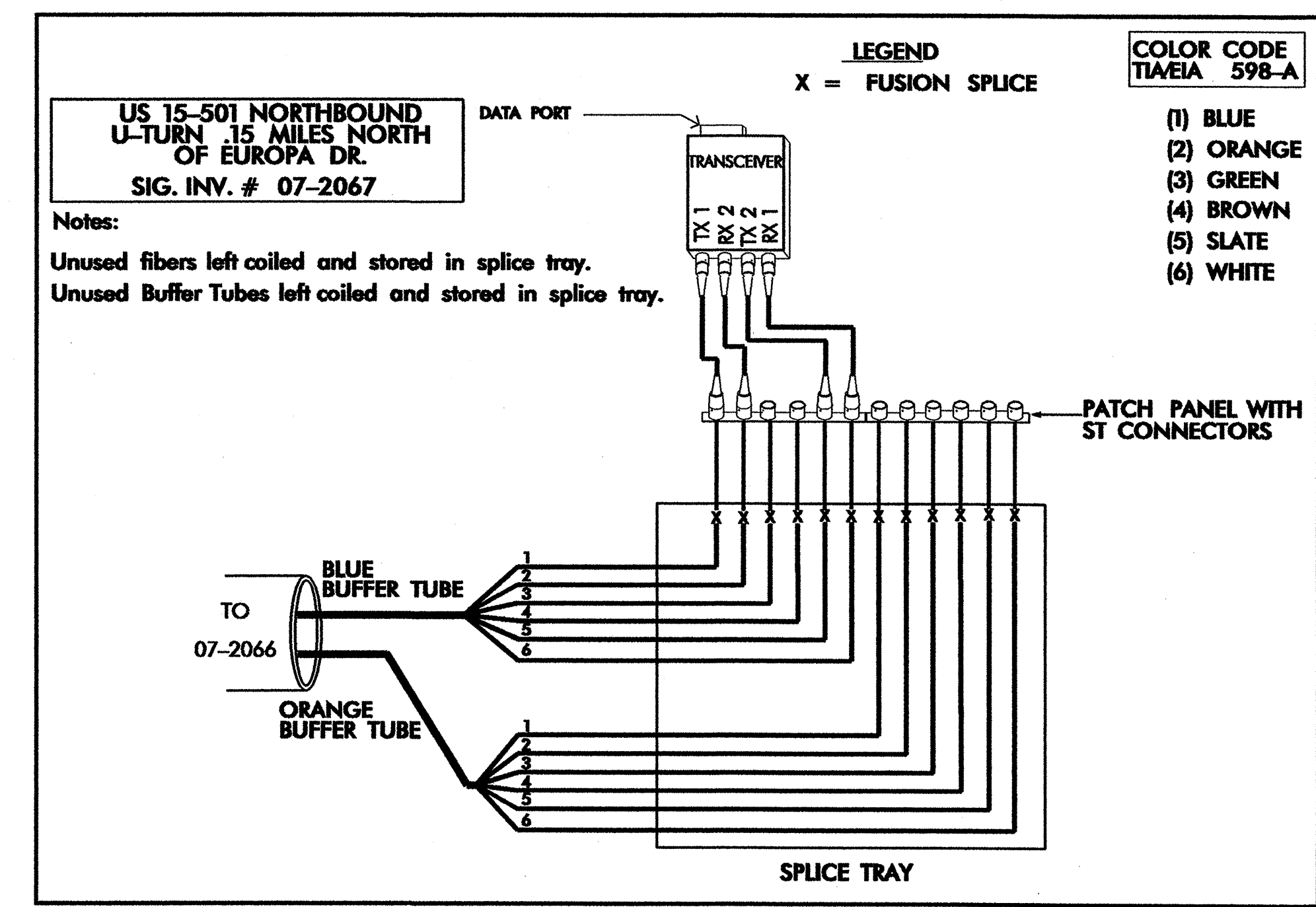
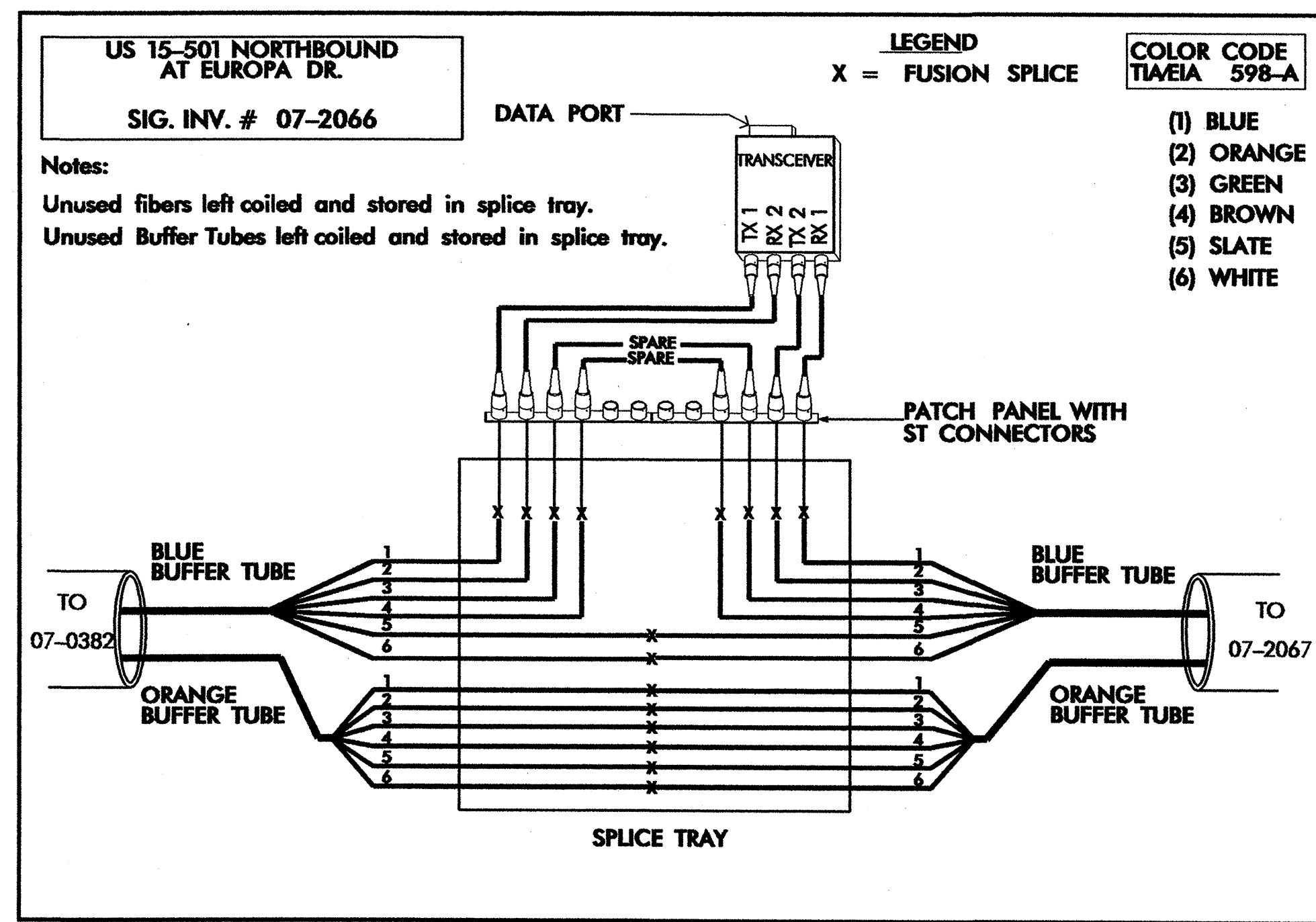
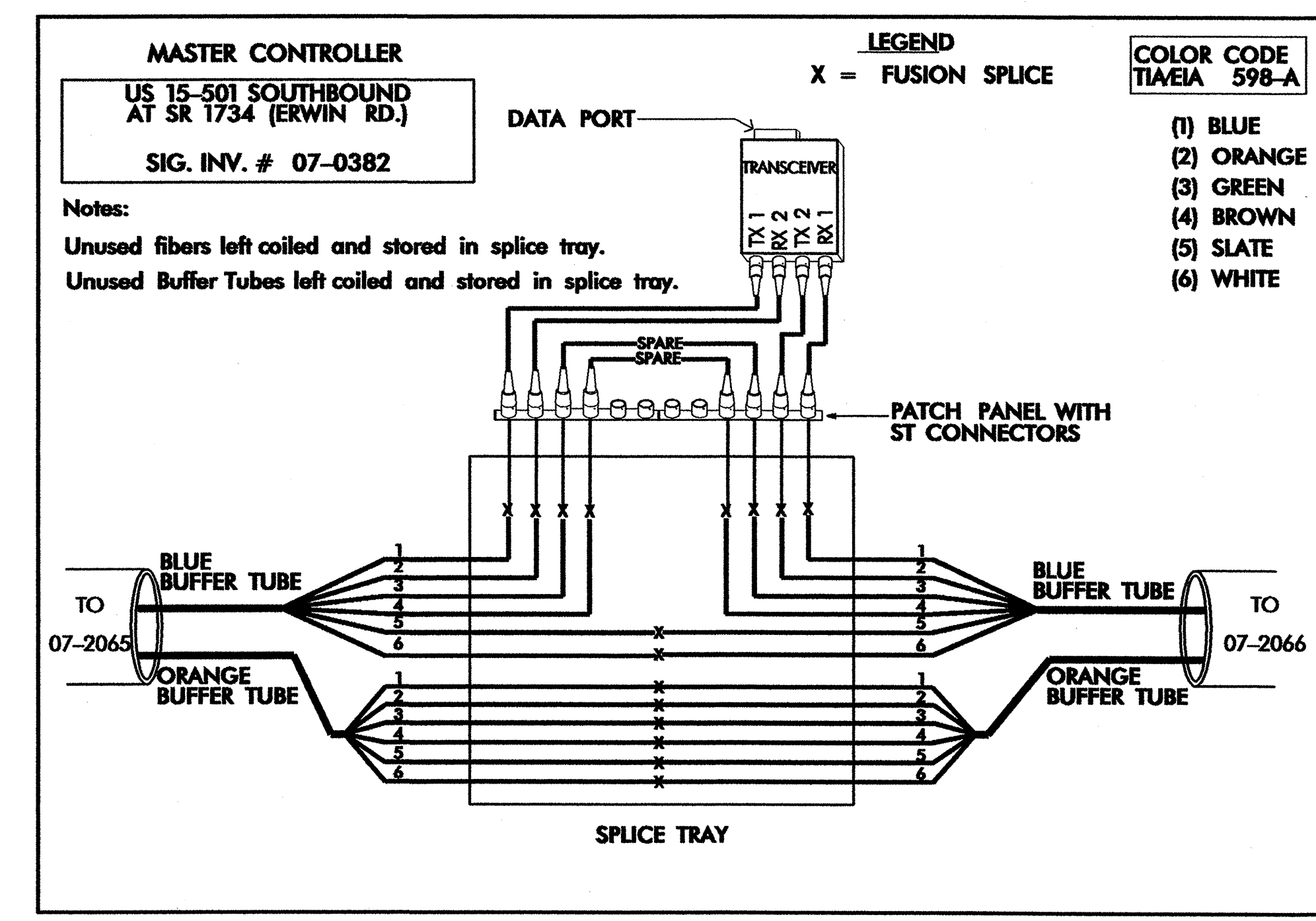
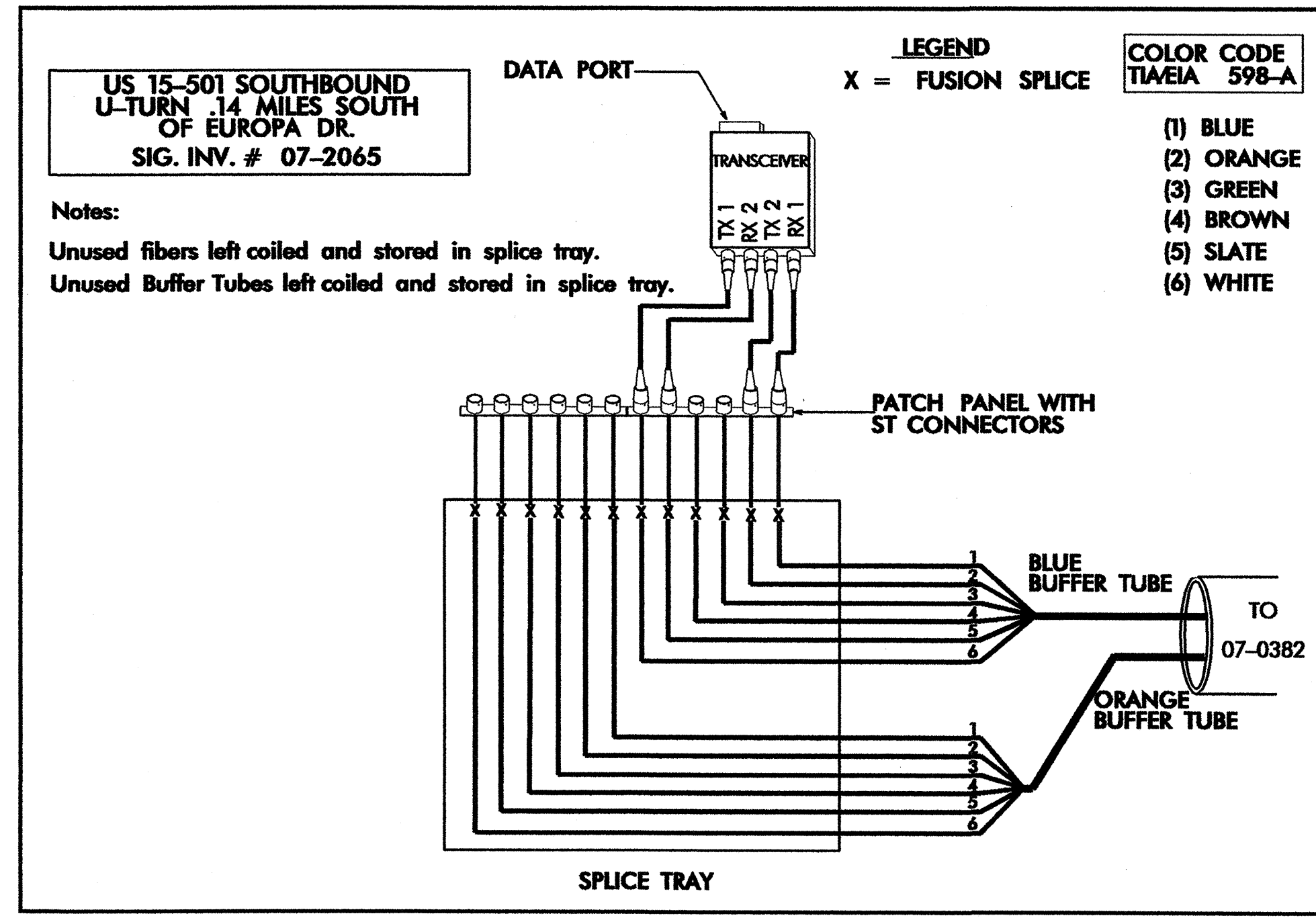
	COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS		
	DIVISION 07 ORANGE CO. CHAPEL HILL PLAN DATE: AUGUST 2004 REVIEWED BY: PCL/INA PREPARED BY: S.C. WARDLE REVIEWED BY: G.G. MURR	REVISIONS INIT. DATE _____ _____ _____	
222 N. McDowell St., Raleigh, NC 27603 SCALE: 0' = _____ 	SIGNATURE: <i>G.G. Murr</i> DATE: 3-24-06 CADD File name:		



- NOTES:
1. EXISTING TWISTED PAIR COMMUNICATIONS CABLE.
 2. TOWN OF CHAPEL HILL WILL MAKE ALL TWISTED PAIR COMMUNICATIONS CABLE TERMINATIONS.

	COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS										
	DIVISION 07 ORANGE CO. CHAPEL HILL PLAN DATE: AUGUST 2004 REVIEWED BY: PCL/INA PREPARED BY: S.C. WARDLE REVIEWED BY: G.G. MURR	<table border="1"> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>		REVISIONS	INIT.	DATE					
REVISIONS	INIT.	DATE									
122 N. McDowell St., Raleigh, NC 27603 SCALE: 0' = 1"	SIGNATURE: DATE: 3-24-06 CADD F11enamp		SEAL								

FIBER OPTIC CABLE



FURNISH SELF-HEALING RING TYPE TRANSCEIVERS.
TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING THE PROPER TERMINATIONS.

	SPLICE PLAN		
	DIVISION 07 ORANGE CO. CHAPEL HILL PLAN DATE: AUGUST 2004 REVIEWED BY: PCL/INA PREPARED BY: S.C. WARDLE REVIEWED BY: G.G. MURR	REVISIONS INT. DATE SIGNATURE DATE CADD File name:	