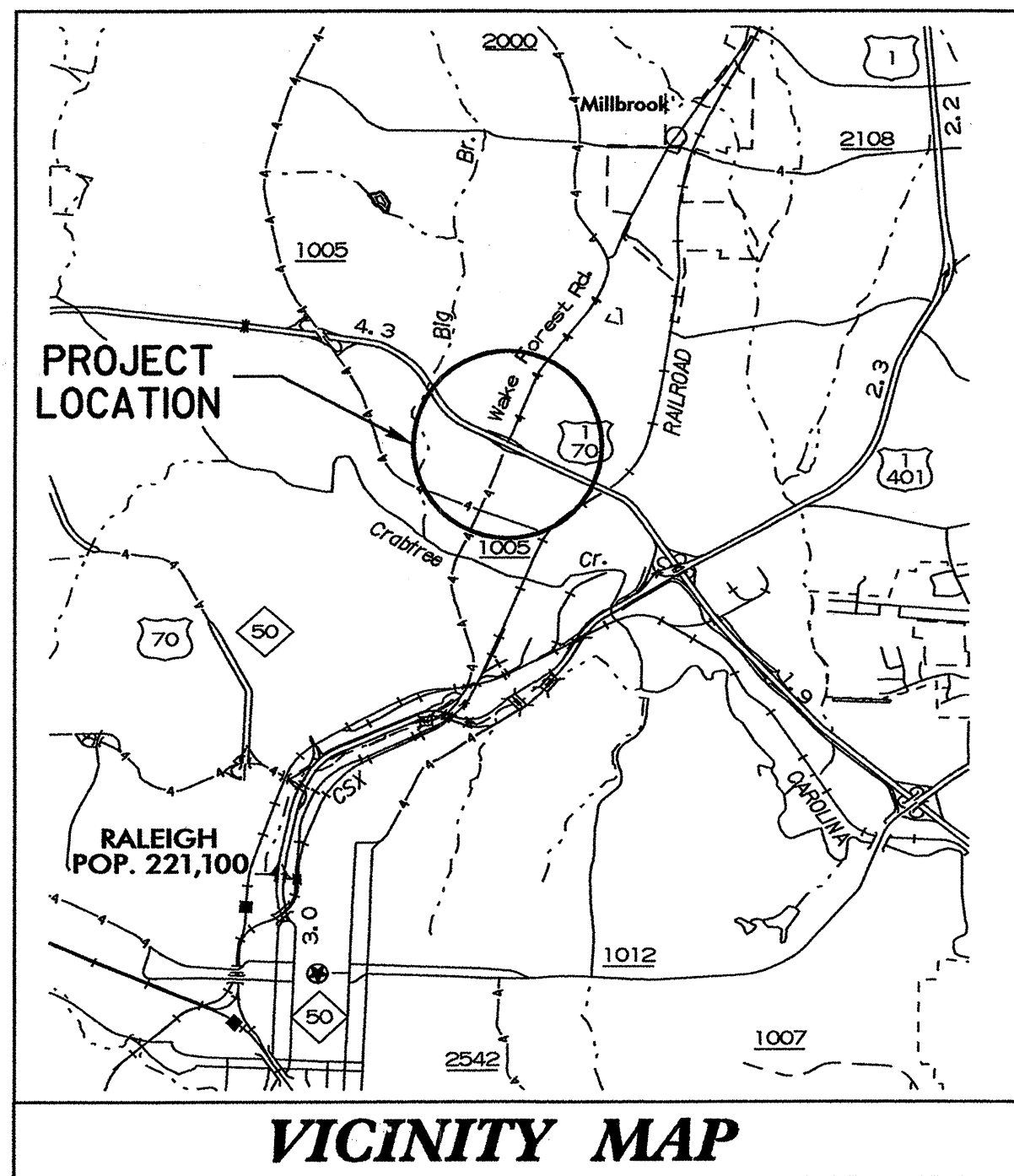


PROJECT: W-4404

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

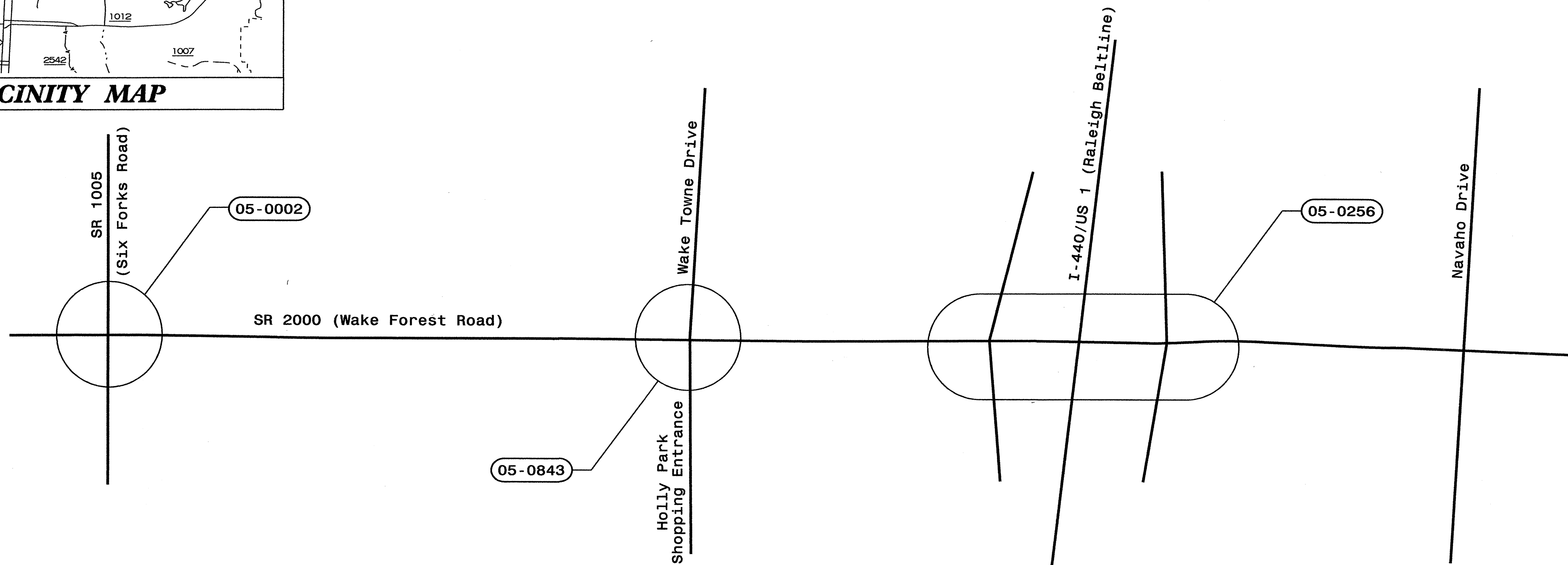
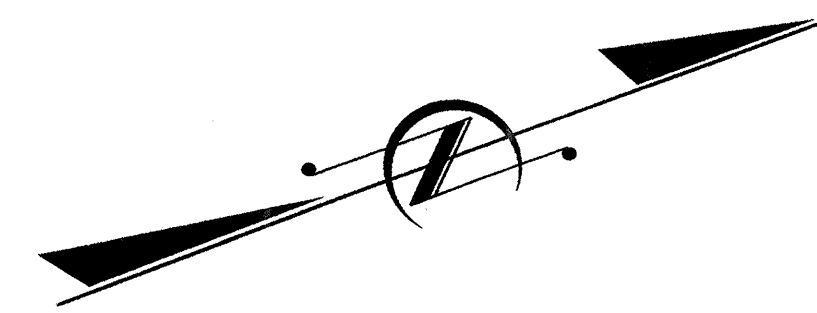
STATE	PROJECT NO.	SHEET NO.
N.C.	W-4404	Fig. 1
F.A. PROJ. NO.		
PROJECT ID. NO.		



WAKE COUNTY

**LOCATION: SR 2000 (WAKE FOREST ROAD)
BETWEEN SR 1005 (SIX FORKS ROAD)
AND NAVAHO DRIVE IN RALEIGH**

**TYPE OF WORK: TRAFFIC SIGNALS AND
COMMUNICATIONS CABLE**



INDEX OF PLANS

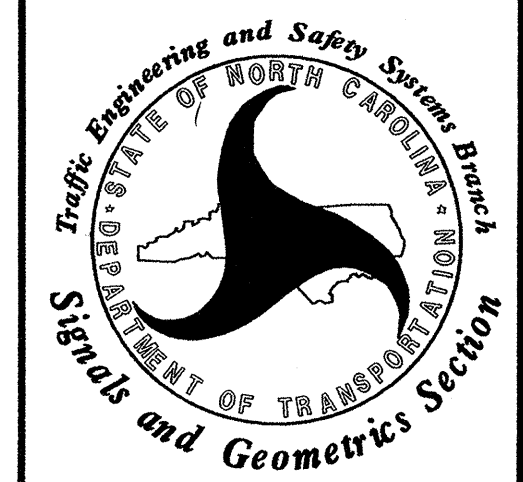
SHEET NUMBER	SIGNAL INVENTORY NUMBER	LOCATION /DESCRIPTION
Fig. 1	---	Title Sheet
Fig. 2-5	05-0002	SR 2000 (Wake Forest Road) at SR 1005 (Six Forks Road)
Fig. 6-11	05-0843	SR 2000 (Wake Forest Road) at Wake Towne Dr. and Holly Park Shopping Center
Fig. 12-21	05-0256	SR 2000 (Wake Forest Road) at I-440/US 1 (Beltline) Ramps
Fig. 22-24	---	Communications Cable and Conduit Routing Plans

LEGEND

##-#### SIGNAL INVENTORY NUMBER
NCDOT CONTACTS:

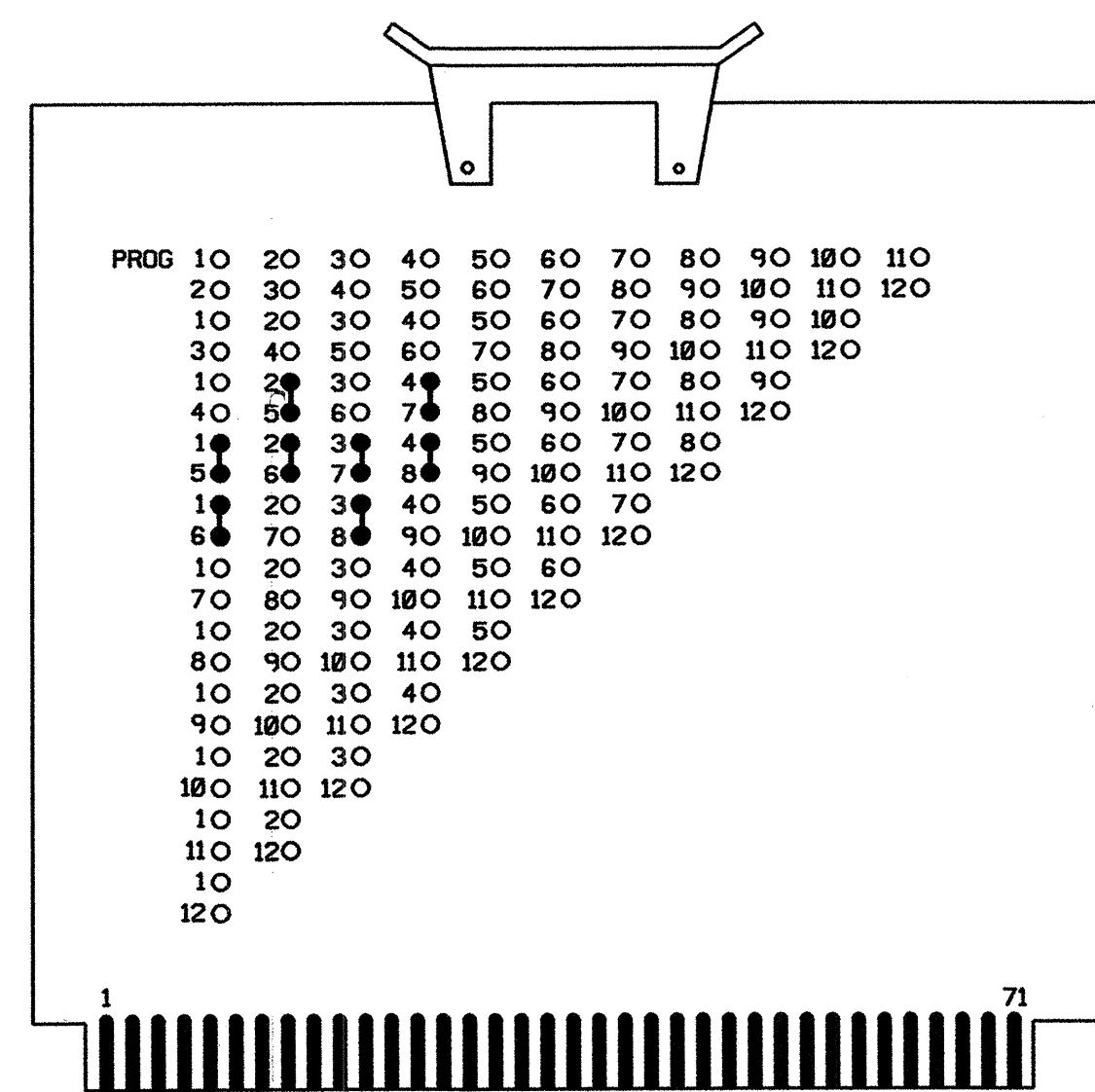
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

ROBERT J. ZIEMBA, PE - S&G RAILROAD AND SPECIAL PROJECTS ENGINEER
GEORGE C. BROWN, PE - SIGNAL EQUIPMENT DESIGN ENGINEER
G. G. MURR, JR., PE - INTELLIGENT TRANSPORTATION SYSTEMS ENGINEER



NEMA CONFLICT MONITOR PROGRAMMING CARD

(install jumpers as shown below)



NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED PHASES AND OVERLAPS TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 1,2,3 AND 4 ON PANEL C 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.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE CONFLICT MONITOR. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. WIRE DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. SET ALL DETECTOR UNIT CHANNELS TO "PRESENCE" MODE.
8. THE PED PUSH BUTTONS 2 PED, 4 PED AND 6 PED ARE EXISTING.
9. THE CABINET AND CONTROLLER ARE A PART OF THE RALEIGH CITY SIGNAL SYSTEM.

SIGNAL HEAD HOOK-UP CHART

PHASE	8 PED	6 PED	4 PED	2 PED	OLD	OLC	OLB	OLA	8	7	6	5	4	3	2	1	
SIGNAL HEAD NO.	NU	P61, P62	P41, P42	P21, P22	NU	NU	NU	NU	81,82	71	61,62	51,52	41,42	31,32	21,22	11,12	82
PANEL	D	D	D	D	C	C	C	C	B	B	B	B	A	A	A	A	A
TERM. STRIP	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6
GREEN									10	4	10				4		
YELLOW									11	5	11				5		
RED									12	6	12				6		
RED ARROW										9				9		3	
YELLOW ARROW										8		2		8		2	2
GREEN ARROW										7		1		7		1	1
PEDESTRIAN		7	4	1													
HAND		9	6	3													

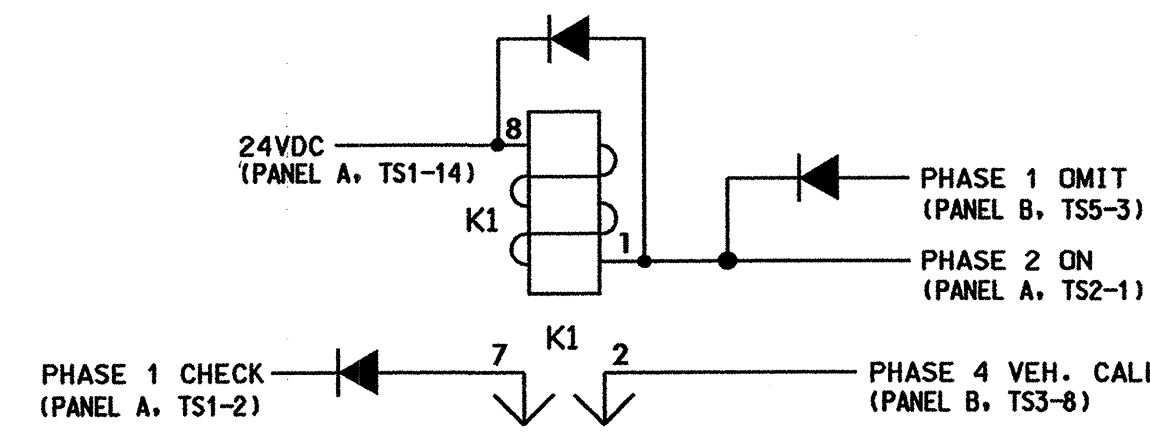
NU = NOT USED

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

BACK-UP PROTECTION WIRING DETAIL

(wire as shown)



NOTES

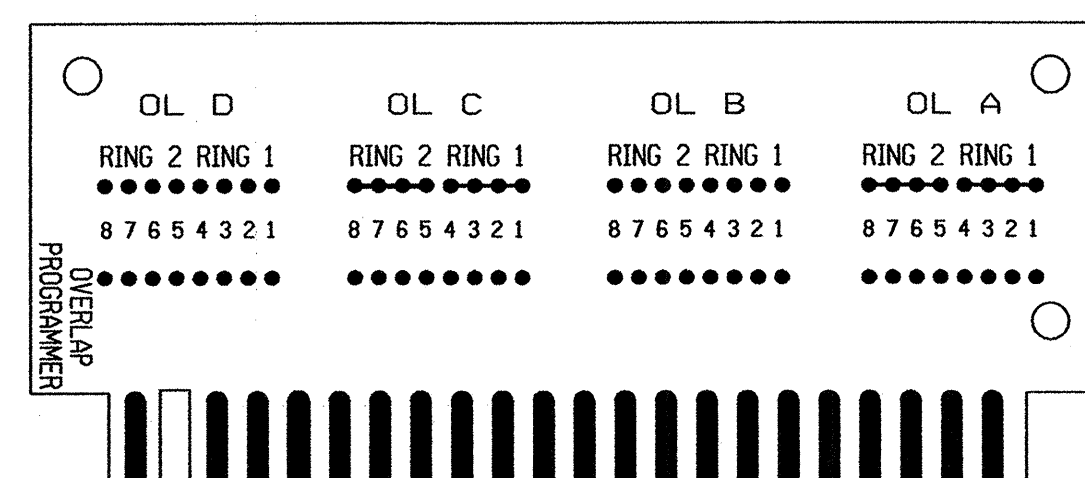
1. RELAY 'K1' IS A SPST WITH A 24VDC COIL (P&B* KRP3DH SHOWN, APPROVED EQUIVALENT MAY BE USED)
2. ALL DIODES ARE VALUED AT 600V PIV, 1 AMP MINIMUM. (RECOMMENDED PART NO. IN4005)
3. WHEN TRAFFIC CONDITIONS REQUIRE THE CONTROLLER TO BACK-UP FROM PHASE 2+6 TO PHASE 1, THIS RELAY LOGIC CIRCUIT WILL FORCE THE CONTROLLER TO CYCLE THROUGH PHASE 4. THE CONTROLLER IS NOT ALLOWED TO BACK UP DIRECTLY TO PHASE 1 FROM PHASE 2+6.

EQUIPMENT INFORMATION

CONTROLLER.....EAGLE EPAC300 (M10)
 CABINET.....SSS-5B-16P-C
 CABINET MOUNT.....BASE
 LOADBAY POSITIONS.....16
 LOAD SWITCHES USED.....PANEL A: 1,2,3,4
 PANEL B: 1,2,3,4
 PANEL D: 1,2,3
 PHASES USED.....1,2,3,4,5,6,7,8,2 PED,4 PED,6 PED
 OVERLAP A.....NOT USED
 OVERLAP B.....NOT USED
 OVERLAP C.....NOT USED
 OVERLAP D.....NOT USED

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0002T
 DESIGNED: APRIL 2006
 SEALED: 05-16-06
 REVISED: NA

NEMA OVERLAP CARD



OVERLAP CARD SHALL BE COMPLETELY BLANK (NO OVERLAPS)

TYPICAL CONNECTION CHART FOR DETECTORS

PIN FUNCTION	LOOP PANEL TERMINATION
AC+	AC+
AC-	AC-
CHASSIS GROUND	CHASSIS GROUND
LOOP INPUT	LOOP
LOOP INPUT	LOOP
RELAY NORMALLY OPEN	VEHICLE CALL INPUT
RELAY COMMON	LOGIC GROUND
TIMER INHIBIT	ASSOCIATED PHASE GREEN

NOTE:

THE TIMER INHIBIT WIRE SHALL BE CONNECTED TO THE ASSOCIATED PHASE GREEN LOAD SWITCH OUTPUT WHEN ONLY DELAY OPERATION IS REQUIRED UNLESS OTHERWISE SPECIFIED BY THE LOOP AND DETECTOR UNIT INSTALLATION CHART.

SIGNAL UPGRADE - TEMPORARY DESIGN

Electrical and Programming Details For:

SR 2000 (WAKE FOREST ROAD) AT SR 1005 (SIX FORKS ROAD)

Prepared in the Offices of: *James Peterson*

122 N. McDowell St., Raleigh, NC 27603

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

DIVISION 05 WAKE COUNTY RALEIGH

PLAN DATE: MAY 2006 REVIEWED BY: *T. Joyce*

PREPARED BY: JAMES PETERSON REVIEWED BY:

REVISIONS: INIT. DATE

Signature: *James Peterson* 5/25/06

SIG. INVENTORY NO. 05-0002T

8 Phase Fully Actuated (Raleigh City Signal System)

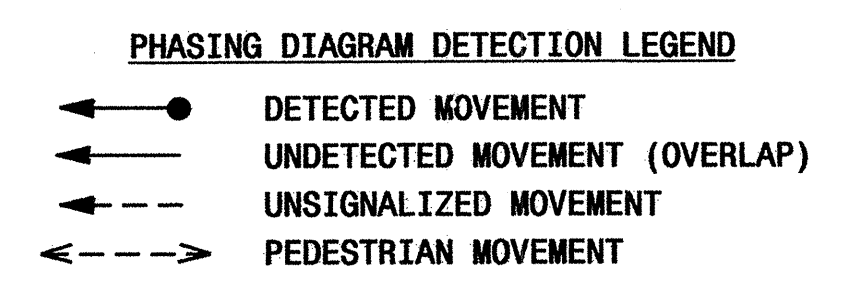
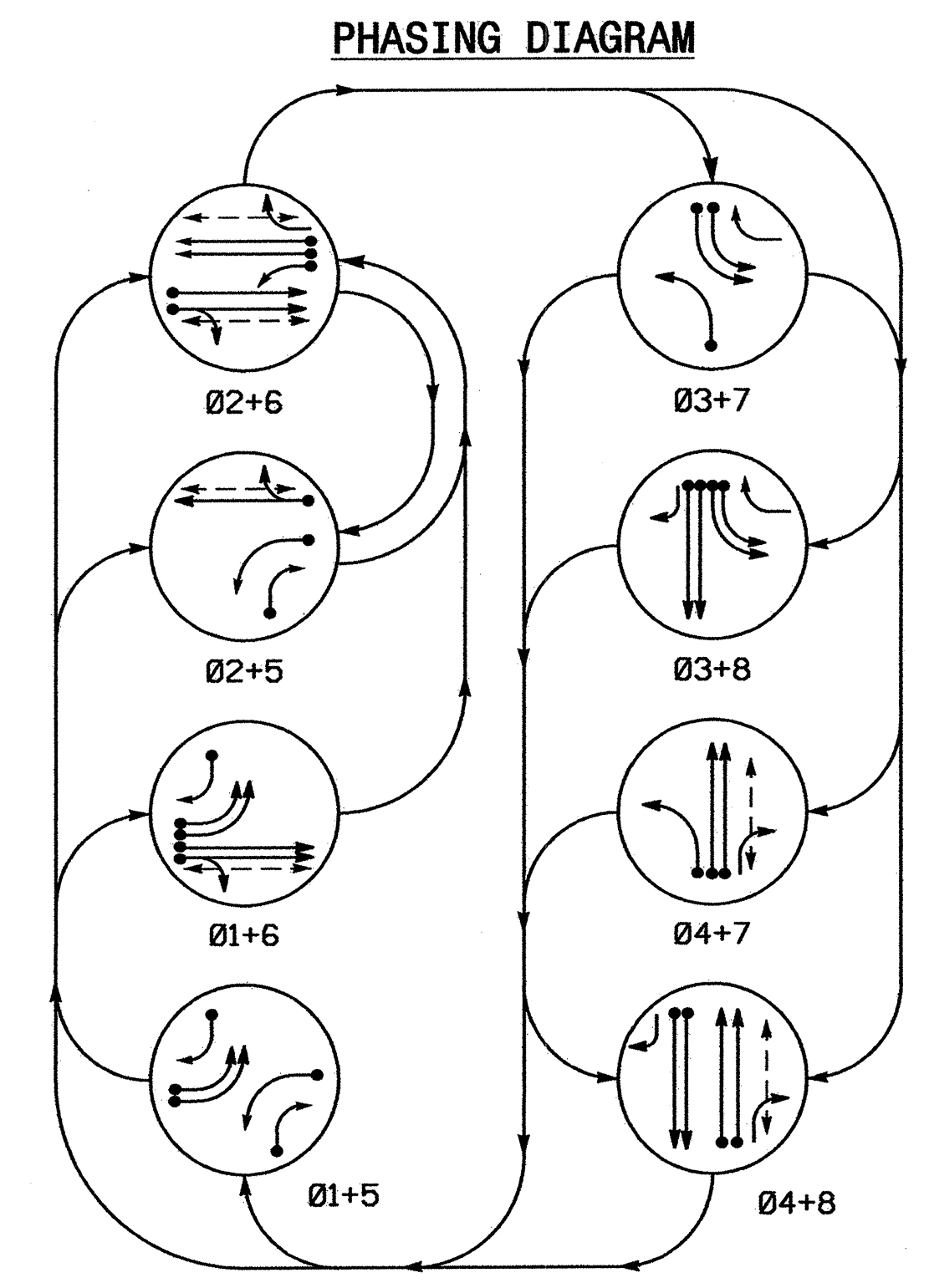
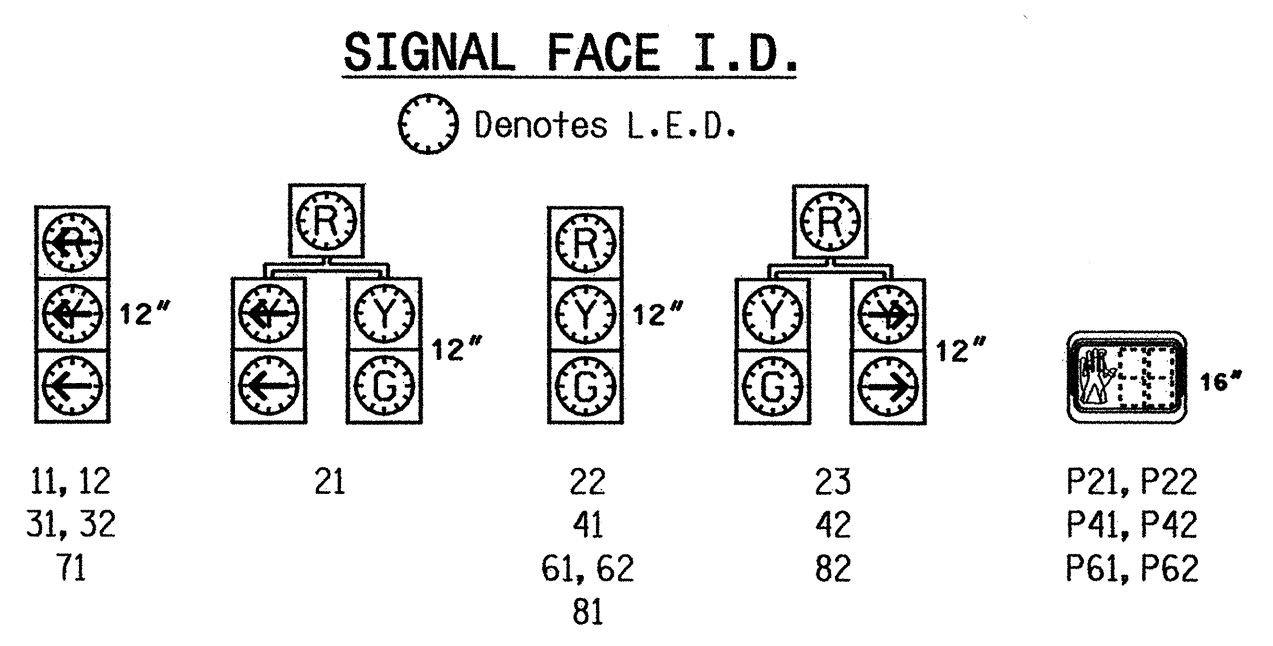


TABLE OF OPERATION

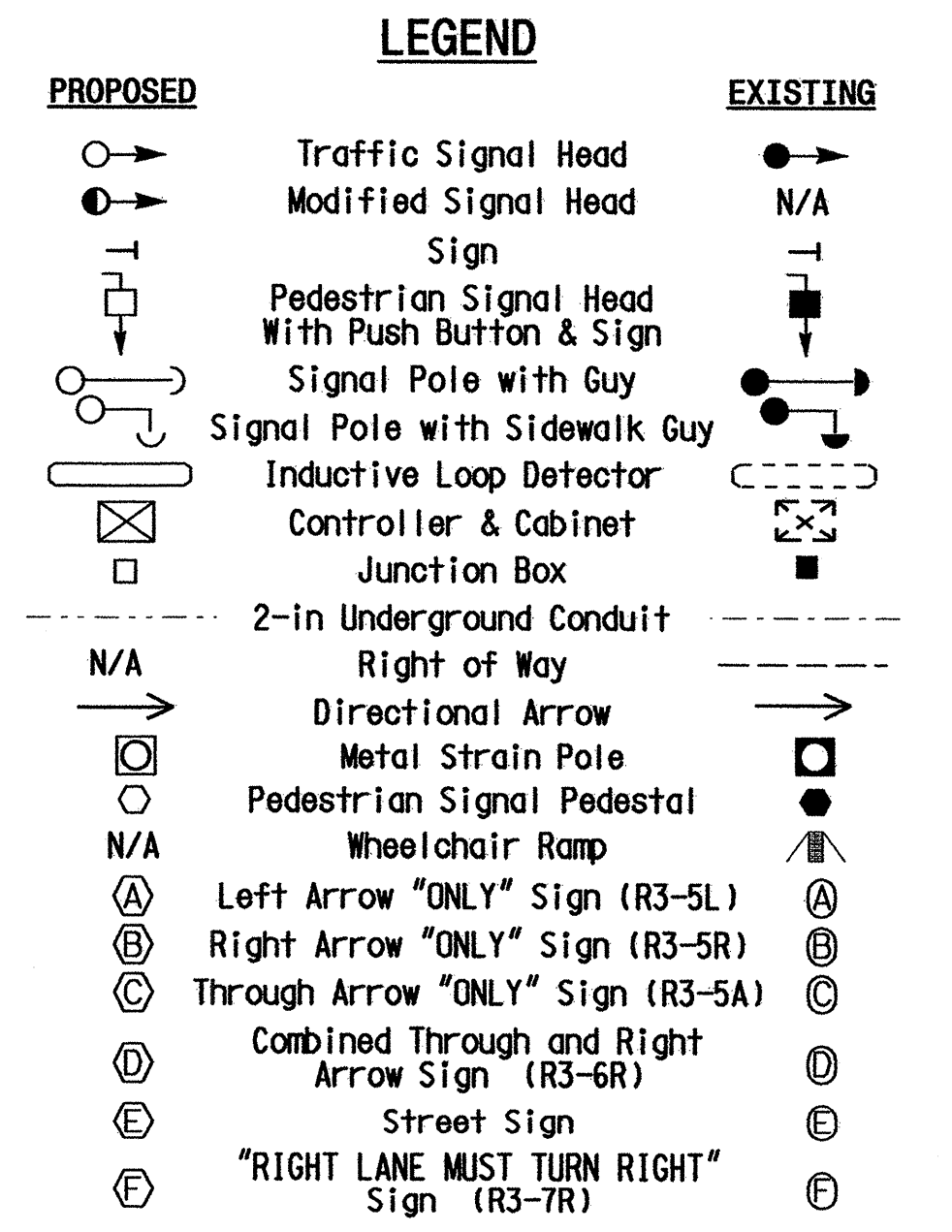
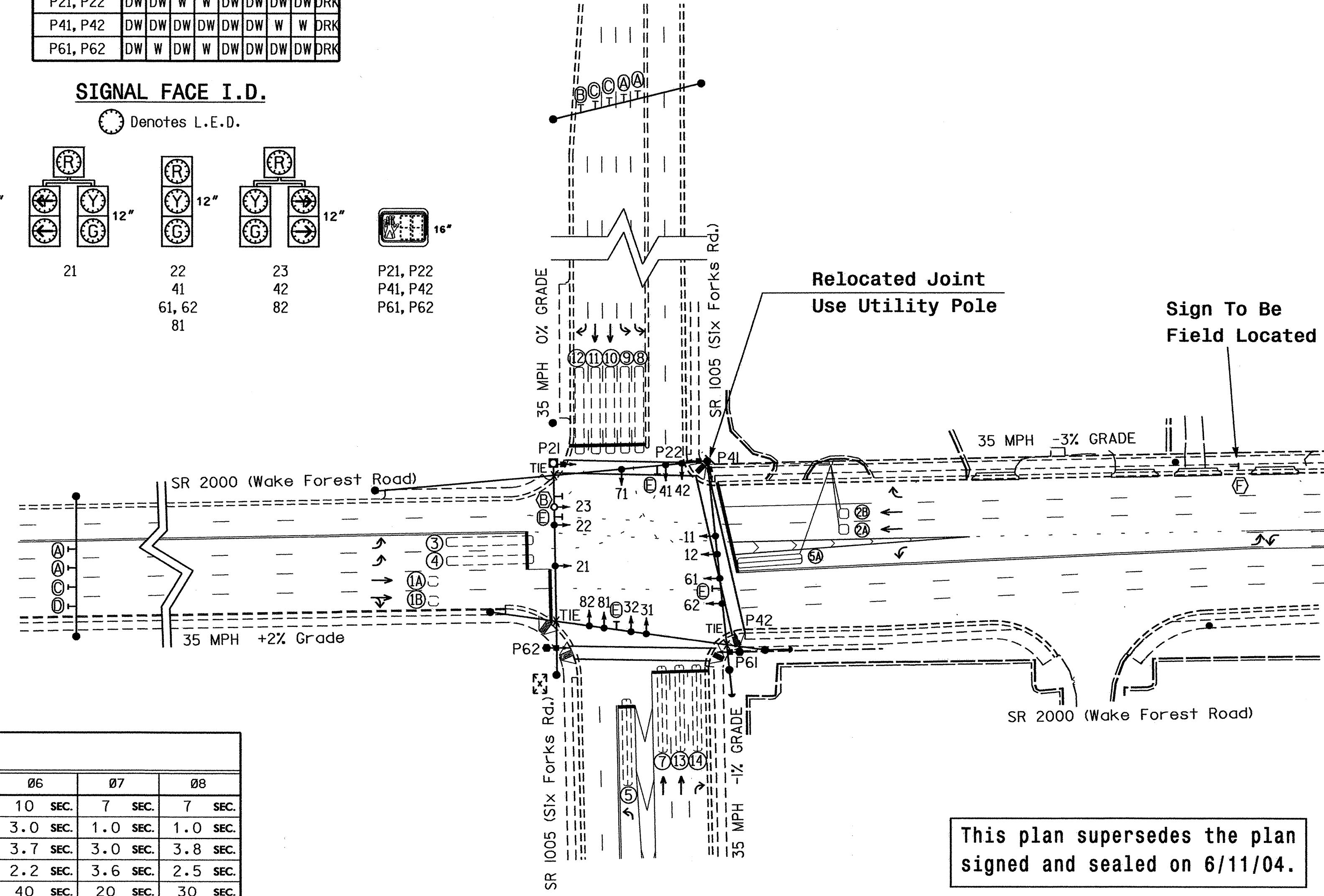
SIGNAL FACE	PHASE								FLASH
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	
11, 12	---	---	---	---	---	---	---	---	---
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R	R	R	R	Y
23	R	R	G	G	R	R	R	R	Y
31, 32	---	---	---	---	---	---	---	---	---
41	R	R	R	R	R	R	R	G	G
42	R	R	R	R	R	R	R	G	G
61, 62	R	G	R	G	R	R	R	R	Y
71	---	---	---	---	---	---	---	---	---
81	R	R	R	R	R	G	R	G	R
82	R	R	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK



LOOP & DETECTOR UNIT INSTALLATION CHART
NEMA CONTROLLER WITH TS-1 CABINET

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	INDUCTIVE LOOPS			NEMA PHASE	DETECTOR UNITS		PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?	
				NEW	EXISTING	CHANNEL		FEATURE	TIME			
IA, IB	6X6	EXISTING	70	X	X	X	6	---	---	SEC.	ALL	NO
2A, 2B	6X6	4	70	X	X	X	2	---	---	SEC.	ALL	NO
3, 4	6X60	EXISTING	+5	X	X	X	1	DELAY	3 SEC.	---	ALL	YES
5	6X60	EXISTING	+5	X	X	X	7	DELAY	3 SEC.	---	ALL	YES
5A	6X40	2-4-2	0	X	X	X	5	DELAY	15 SEC.	---	ALL	YES
7	6X60	EXISTING	+5	X	X	X	4	---	---	SEC.	ALL	NO
8, 9	6X60	EXISTING	+5	X	X	X	3	---	---	SEC.	ALL	NO
10	6X60	EXISTING	+5	X	X	X	8	---	---	SEC.	ALL	NO
II	6X60	EXISTING	+5	X	X	X	8	---	---	SEC.	ALL	NO
12	6X60	EXISTING	+5	X	X	X	1	DELAY	15 SEC.	---	ALL	YES
13	6X60	EXISTING	+5	X	X	X	4	---	---	SEC.	ALL	NO
14	6X60	EXISTING	+5	X	X	X	5	DELAY	15 SEC.	---	ALL	YES

- NOTES**
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
 - Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
 - Omit phase 1 during phase 2 on.
 - Wire cabinet to allow the controller to clear from phase 2+6 to phase 1 by progressing through phase 4+8 (see Electrical Details for wiring).
 - Phase 5 may be lagged.
 - Phase 3 or phase 7 may be lagged.
 - Reposition existing signal heads numbered 11, 12, 21, 22, 61, and 62 and Sign Ⓜ.
 - Set all detector units to presence mode.
 - In the event of loop replacement, refer to the current Signals and Geometrics Design Manual and submit a Plan of Record to the Signals and Geometrics Section.
 - Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
 - Program pedestrian heads to countdown the flashing "Don't Walk" time only.
 - Existing Lane Control signs on Six Forks Road and Wake Forest Road may be removed at the discretion of the Regional Traffic Engineer.
 - Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



TIMING CHART
NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN*	7 SEC.	10 SEC.	7 SEC.	7 SEC.	7 SEC.	10 SEC.	7 SEC.	7 SEC.
PASSAGE/GAP*	1.0 SEC.	3.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	3.0 SEC.	1.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.1 SEC.	3.0 SEC.	3.9 SEC.	3.0 SEC.	3.7 SEC.	3.0 SEC.	3.8 SEC.
RED CLEARANCE	3.3 SEC.	2.1 SEC.	3.3 SEC.	2.5 SEC.	3.2 SEC.	2.2 SEC.	3.6 SEC.	2.5 SEC.
MAX. I*	20 SEC.	40 SEC.	20 SEC.	30 SEC.	20 SEC.	40 SEC.	20 SEC.	30 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK	NONLOCK	NONLOCK
WALK*	---	4 SEC.	---	4 SEC.	---	4 SEC.	---	---
FLASHING DON'T WALK	---	17 SEC.	---	17 SEC.	---	19 SEC.	---	---
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD	---	VEH.	---	VEH.	---	VEH.	---	VEH.
SEC. PER ACTUATION*	---	---	---	---	---	---	---	---
MAX. INITIAL*	---	---	---	---	---	---	---	---
TIME B4 REDUCTION*	---	---	---	---	---	---	---	---
TIME TO REDUCE*	---	---	---	---	---	---	---	---
MINIMUM GAP	---	---	---	---	---	---	---	---

*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.

This plan supersedes the plan signed and sealed on 6/11/04.

Signal Upgrade Final Design

SR 2000 (Wake Forest Road) at SR 1005 (Six Forks Road)

Division 5 Wake County Raleigh

PLAN DATE: April 2006 REVIEWED BY: Sterling

PREPARED BY: B.E. Wynn REVIEWED BY:

REVISIONS: INIT. DATE

SCALE: 1"=50'

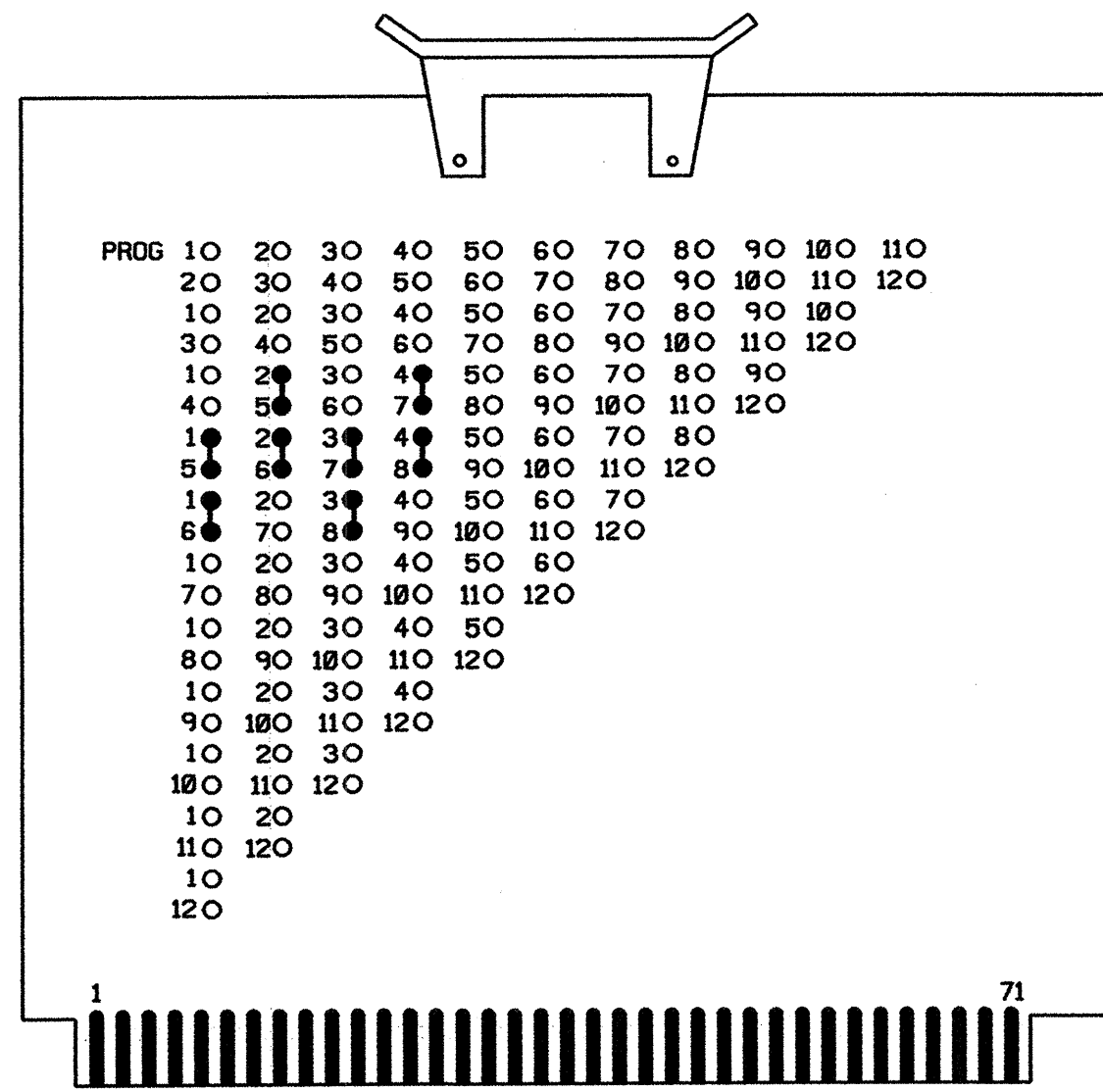
SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER ROBERT J. ZIERBA ENGINEER NO. 026486

SIG. INVENTORY NO. 05-0002

15-MAY-2006 07:19
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 11/10/06 11:02 AM

NEMA CONFLICT MONITOR PROGRAMMING CARD

(install jumpers as shown below)



NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED PHASES AND OVERLAPS TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 1,2,3 AND 4 ON PANEL C 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.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE CONFLICT MONITOR. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. WIRE DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. SET ALL DETECTOR UNIT CHANNELS TO "PRESENCE" MODE.
8. THE PED PUSH BUTTONS 2 PED, 4 PED AND 6 PED ARE EXISTING.
9. THE CABINET AND CONTROLLER ARE A PART OF THE RALEIGH CITY SIGNAL SYSTEM.

SIGNAL HEAD HOOK-UP CHART

PHASE	8 PED	6 PED	4 PED	2 PED	OLD	OLC	OLB	OLA	8	7	6	5	4	3	2	1			
SIGNAL HEAD NO.	NU	P61, P62	P41, P42	P21, P22	NU	NU	NU	NU	81,82	71	61,62	21,42	41,42	23	31,32	21,22,23	11,12	82	
PANEL	D	D	D	D	C	C	C	C	B	B	B	B	A	A	A	A	A	A	
TERM. STRIP	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	TS6	
GREEN									10		4		10				4		
YELLOW									11		5		11				5		
RED									12		6		12				6		
RED ARROW										9					9			3	
YELLOW ARROW										8		2		8	8			2	2
GREEN ARROW										7		1		7	7			1	1
PEDESTRIAN		7	4	1															
HAND		9	6	3															

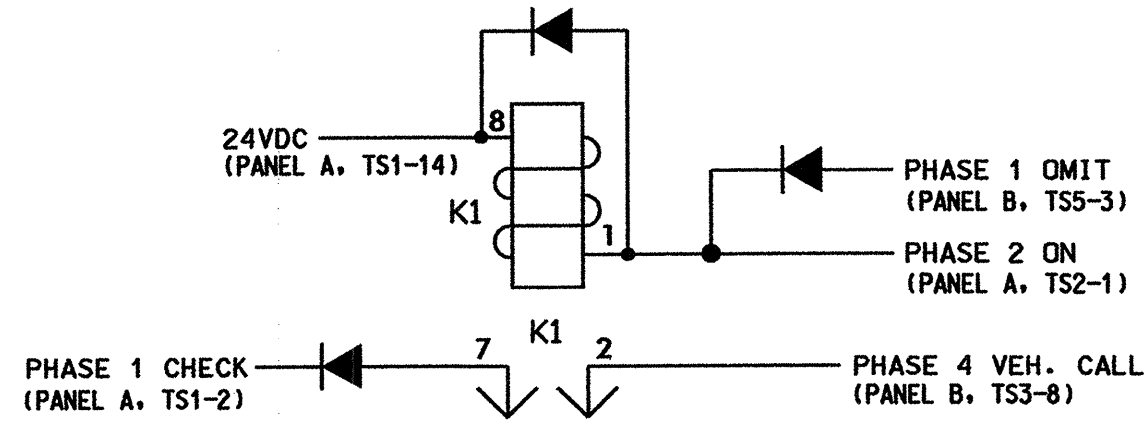
NU = NOT USED

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

BACK-UP PROTECTION WIRING DETAIL

(wire as shown)



NOTES

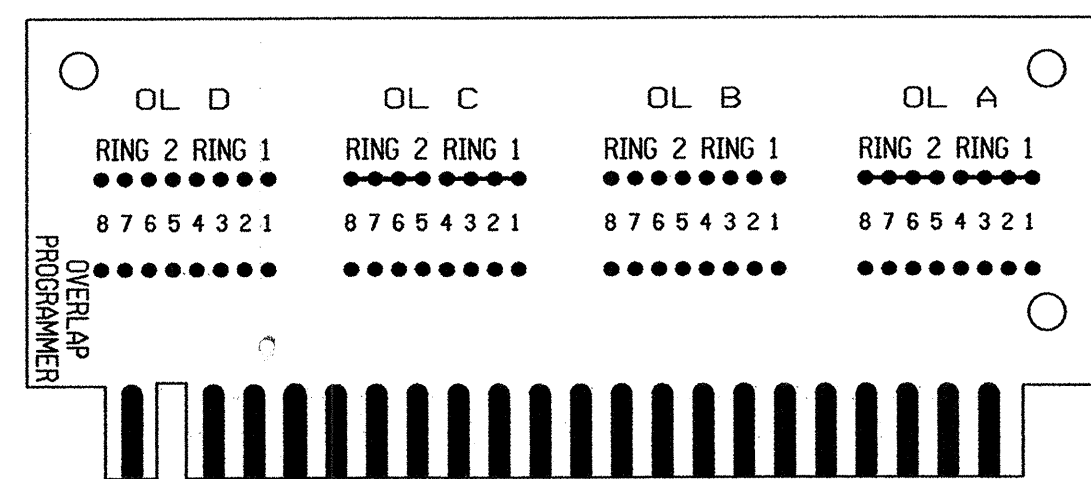
1. RELAY 'K1' IS A SPST WITH A 24VDC COIL. (P&B* KRP3DH SHOWN, APPROVED EQUIVALENT MAY BE USED)
2. ALL DIODES ARE VALUED AT 600V PIV, 1 AMP MINIMUM. (RECOMMENDED PART NO. 1N4005)
3. WHEN TRAFFIC CONDITIONS REQUIRE THE CONTROLLER TO BACK-UP FROM PHASE 2+6 TO PHASE 1, THIS RELAY LOGIC CIRCUIT WILL FORCE THE CONTROLLER TO CYCLE THROUGH PHASE 4. THE CONTROLLER IS NOT ALLOWED TO BACK UP DIRECTLY TO PHASE 1 FROM PHASE 2+6.

EQUIPMENT INFORMATION

CONTROLLER.....EAGLE EPAC300 (M10)
 CABINET.....SSS-5B-16P-C
 CABINET MOUNT.....BASE
 LOADBAY POSITIONS.....16
 LOAD SWITCHES USED.....PANEL A: 1,2,3,4
 PANEL B: 1,2,3,4
 PANEL D: 1,2,3
 PHASES USED.....1,2,3,4,5,6,7,8,2 PED,4 PED,6 PED
 OVERLAP A.....NOT USED
 OVERLAP B.....NOT USED
 OVERLAP C.....NOT USED
 OVERLAP D.....NOT USED

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0002
 DESIGNED: APRIL 2006
 SEALED: 05-16-06
 REVISED: NA

NEMA OVERLAP CARD



OVERLAP CARD SHALL BE COMPLETELY BLANK (NO OVERLAPS)

TYPICAL CONNECTION CHART FOR DETECTORS

PIN FUNCTION	LOOP PANEL TERMINATION
AC+	AC+
AC-	AC-
CHASSIS GROUND	CHASSIS GROUND
LOOP INPUT	LOOP
LOOP INPUT	LOOP
RELAY NORMALLY OPEN	VEHICLE CALL INPUT
RELAY COMMON	LOGIC GROUND
TIMER INHIBIT	ASSOCIATED PHASE GREEN

NOTE:

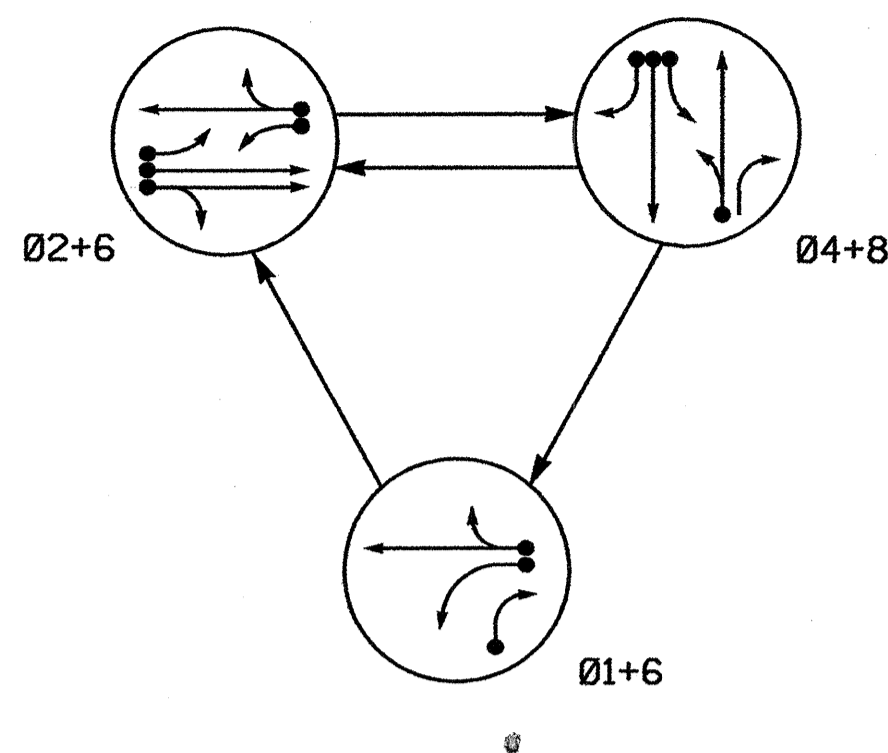
THE TIMER INHIBIT WIRE SHALL BE CONNECTED TO THE ASSOCIATED PHASE GREEN LOAD SWITCH OUTPUT WHEN ONLY DELAY OPERATION IS REQUIRED UNLESS OTHERWISE SPECIFIED BY THE LOOP AND DETECTOR UNIT INSTALLATION CHART.

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 07/09/04.

SIGNAL UPGRADE - FINAL DESIGN

	SR 2000 (WAKE FOREST ROAD) AT SR 1005 (SIX FORKS ROAD)	
	DIVISION 05 WAKE COUNTY RALEIGH	PREPARED BY: JAMES PETERSON REVIEWED BY: T. J. J.
	PLAN DATE: MAY 2006	REVISIONS: _____ INIT. DATE _____
	122 N. McDowell St., Raleigh, NC 27603	SIGNATURE: <i>James C. Brown</i> 5/26/06 DATE: _____ SIG. INVENTORY NO. 05-0002

PHASING DIAGRAM



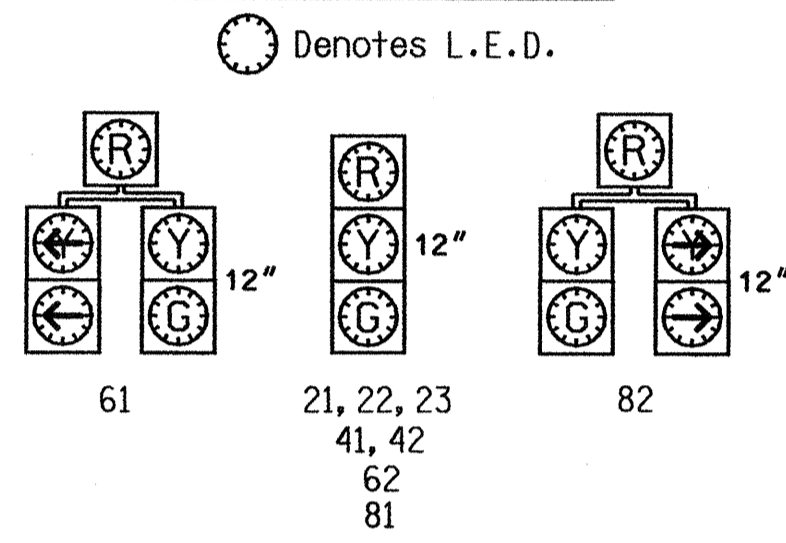
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø1+6	Ø2+6	Ø4+8	F
21, 22, 23	R	G	R	Y
41, 42	R	R	G	R
61		G	R	Y
62	G	G	R	Y
81	R	R	G	R
82	R	G	R	

SIGNAL FACE I.D.



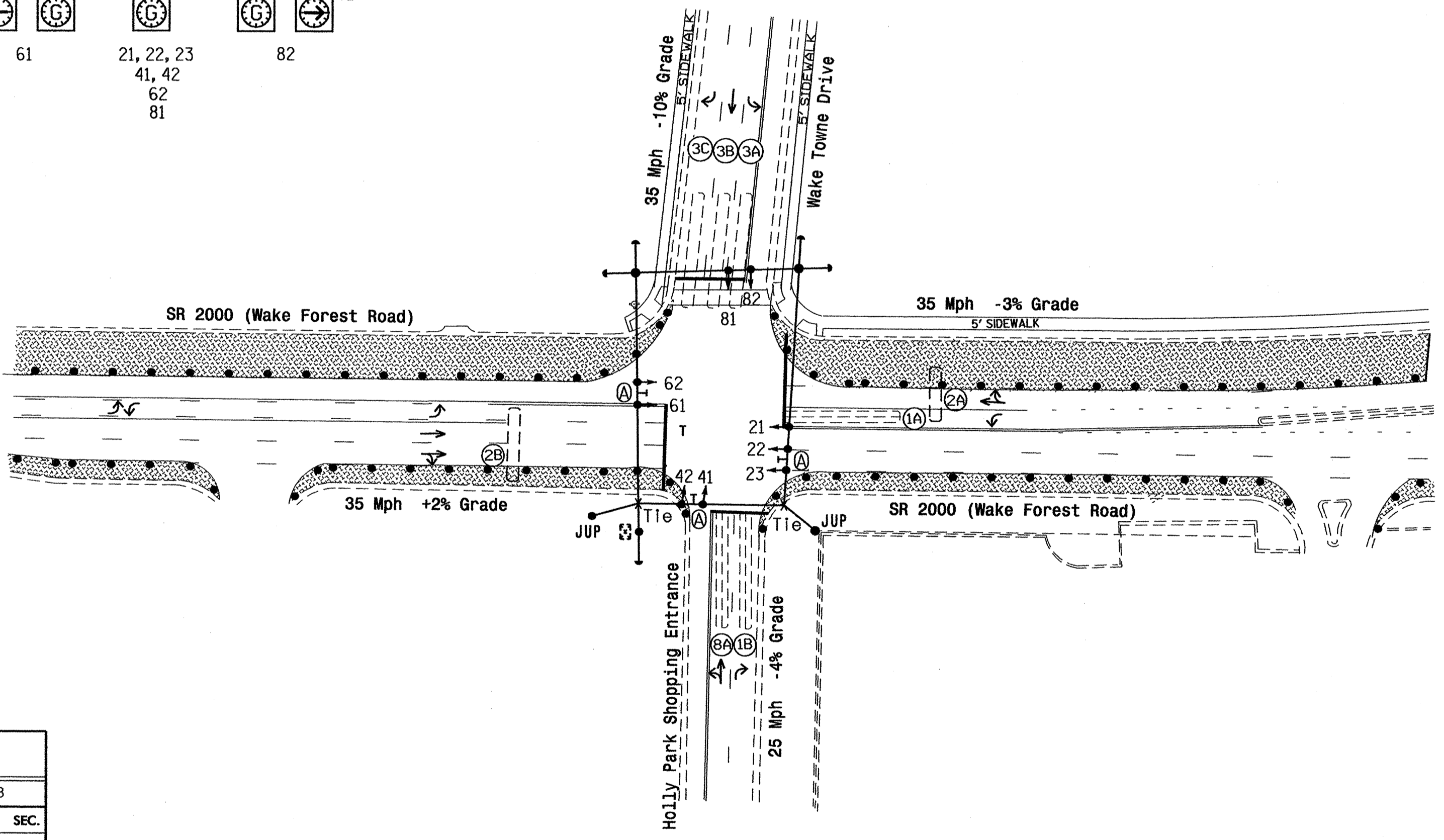
LOOP & DETECTOR UNIT INSTALLATION CHART
NEMA CONTROLLER WITH TS-2 CABINET

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	INDUCTIVE LOOPS		DETECTOR UNITS					
				EXISTING	NEW	NEMA PHASE	NEW	EXISTING	TIMING	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN
1A	6 X 60	Existing	0	X	X	1	X	DELAY	15 SEC.	ALL	YES
1B	6 X 60	2-4-2	0	X	X	1	X	DELAY	25 SEC.	ALL	YES
2A	6 X 28	Existing	70	X	X	6	X			ALL	NO
2B	6 X 38	Existing	70	X	X	2	X			ALL	NO
3A	6 X 60	Existing	+15	X	X	4	X	DELAY	3 SEC.	ALL	YES
3B	6 X 60	Existing	+15	X	X	4	X			ALL	NO
3C	6 X 60	Existing	+15	X	X	4	X	DELAY	15 SEC.	ALL	YES
8A	6 X 60	2-4-2	0	X	X	8	X	DELAY	3 SEC.	ALL	YES

3 Phase Fully Actuated (Raleigh City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Omit phase 1 during phase 2 on.
- Program controller to clear from phase 2+6 to phase 1+6 by progressing through phase 4+8 (see Electrical Details).
- Program phase 4 and phase 8 for dual entry.
- Set all detector units to presence mode.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

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

TIMING CHART
NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø4	Ø6	Ø8
MINIMUM GREEN *	7 SEC.	10 SEC.	7 SEC.	10 SEC.	7 SEC.
PASSAGE/GAP *	1.0 SEC.	3.0 SEC.	1.0 SEC.	3.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	3.7 SEC.	4.8 SEC.	4.1 SEC.	4.4 SEC.
RED CLEARANCE	1.8 SEC.	1.9 SEC.	1.9 SEC.	1.0 SEC.	1.9 SEC.
MAX. 1*	25 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	MIN. RECALL	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	LOCK	NONLOCK
WALK *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD	- VEH.	- VEH.	- VEH.	- VEH.	- VEH.
SEC. PER ACTUATION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAX. INITIAL *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME B4 REDUCTION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME TO REDUCE *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.

*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 Design 1

122 N. McDowell St., Raleigh, NC 27603

SR 2000 (Wake Forest Road)
at
Wake Towne Drive and
Holly Park Shopping Center

Division 5 Wake County Raleigh

PLAN DATE: April 2006 REVIEWED BY:

PREPARED BY: Sterling REVIEWED BY:

SEAL

ROBERT J. ZIEMBA
ENGINEER
026486

5/16/06

SCALE: 0 50
1" = 50'

REVISIONS: Revised for existing equipment and spans.

INIT. DATE: RS 4/13/07

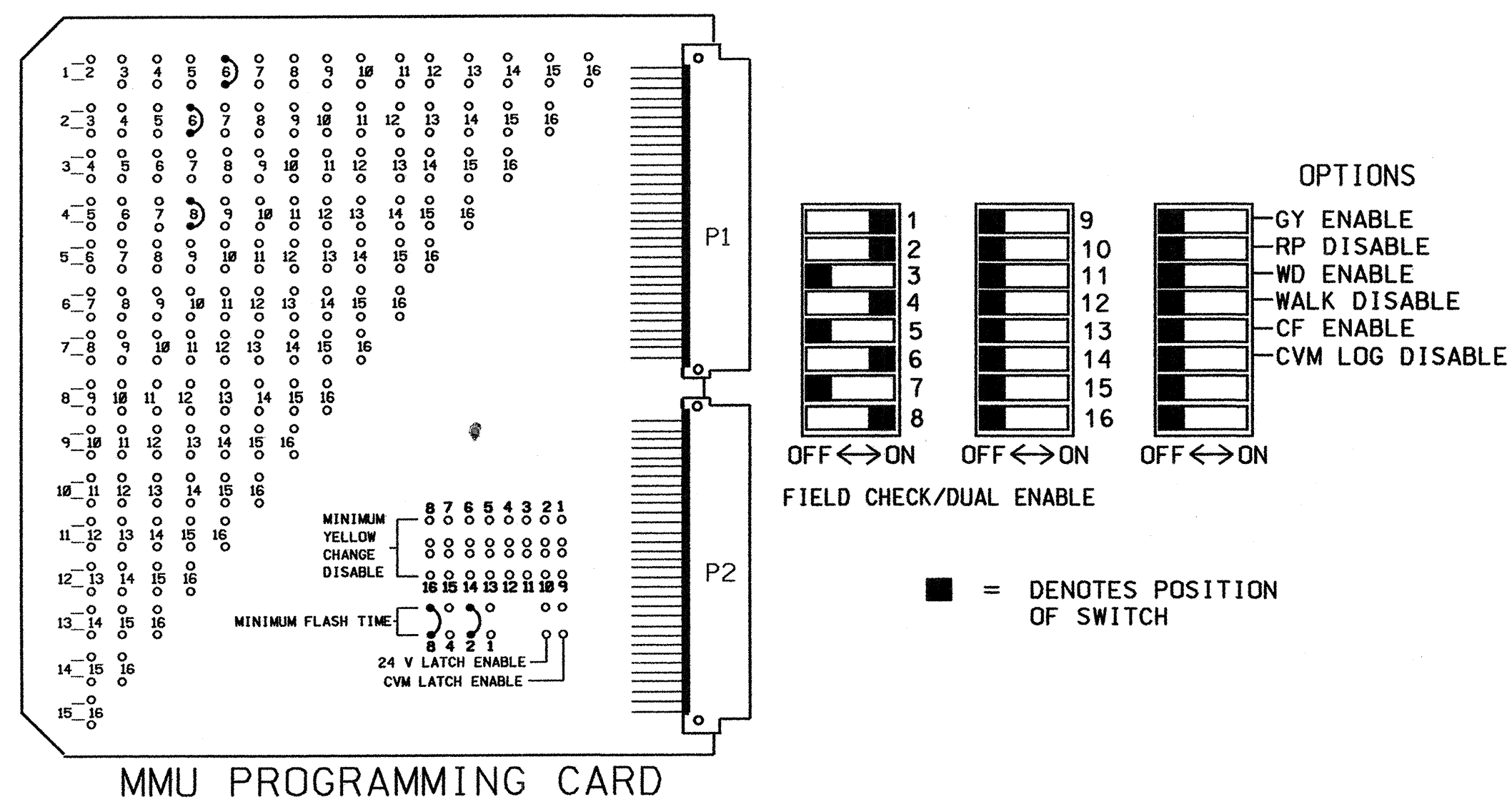
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SIG. INVENTORY NO. 05-0843T1

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PZ:tembo

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



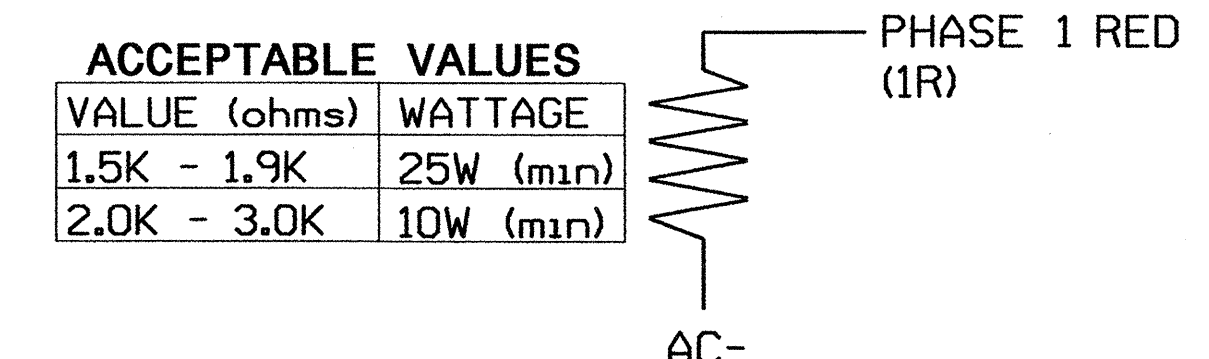
- #### NOTES
1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
 2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 3,5,7,9,10,11, & 12 TO LOAD SWITCH AC+ BY INSERTING 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.
 3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
 4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
 5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
 6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
 7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
 8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
 9. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
 10. THE CABINET AND CONTROLLER ARE A PART OF THE RALEIGH CITY SIGNAL SYSTEM.

SIGNAL HEAD HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	61,82	21,22,23	NU	41,42	NU	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												
YELLOW ARROW	1Y											
GREEN ARROW	1G											

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

LOAD RESISTOR INSTALLATION DETAIL



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

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	CH1	SLOT	NOT USED	SLOT	SLOT	SLOT	SLOT	SLOT
	L3	L1	L7	L5	Ø 1							
	Ø 1	Ø 1	Ø 4	Ø 2								
	CH2	CH2	CH2	CH2	CH2	EMPTY	L10	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY
	L4	NOT USED	L8	L6	Ø 6							

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
	L2A,L2B
1B	L3A,L3B
2A	L4A,L4B
2B	L5A,L5B
3A	L6A,L6B
3B	L7A,L7B
3C	L8A,L8B
	L9A,L9B
8A	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	Ø 1	DELAY	15
2			
3	Ø 1	DELAY	25
4	Ø 6		
5	Ø 2		
6	Ø 4	DELAY	3
7	Ø 4		
8	Ø 4	DELAY	15
9			
10	Ø 8	DELAY	3
11			
12			
13			
14			
15			
16			

EQUIPMENT INFORMATION

- * CONTROLLER.....EAGLE EPAC 300
- * CABINETCONTRACTOR SUPPLIED [TS-2] NC-3
- CABINET MOUNT.....BASE
- LOADBAY POSITIONS.....12
- LOAD SWITCHES USED.....1,2,4,6,8
- PHASES USED.....1,2,4,6,8
- OLA.....NOT USED
- OLB.....NOT USED
- OLC.....NOT USED
- OLD.....NOT USED

EXISTING TO REMAIN IN USE *

BACK-UP PROTECTION PROGRAMMING DETAIL

(program controller as shown below)

From Main Menu, press '3' (Phase Data)

EPAC PHASE DATA PRESS # DESIRED

1-VEHICLE TIMES	5-V & P RECALLS
2-DENSITY TIMES	6-N.LOCK & MISC
3-PEDEST. TIMES	7-SPEC. SEQUENCE
4-INITIALIZE & N.A. RESPONSE	8-SPEC. DETECTOR
	9-PHASE COPY

F-PRIOR MENU

PHASE.....1...2...3...4...5...6...7...8

OMIT 2 0 0 0 0 0 0 0

-YEL 0 0 0 0 0 0 0 0

OCAL 4 0 0 0 0 0 0 0

OMIT:### PHS ON OMITS THIS PHASE
-YEL:### PHS YEL OMITS THIS PHS YEL
OCAL: WHEN OMIT, DETS CALL### PHS

A-UP B-DN C-LT D-RT E-ENTER F-PRIOR MENU

Special Sequence programming complete.

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	Ø 1
2	Ø 2
3	Ø 3
4	Ø 4
5	Ø 5
6	Ø 6
7	Ø 7
8	Ø 8
9	2 PED
10	4 PED
11	6 PED
12	8 PED

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0843 T1
DESIGNED: APRIL 2006
SEALED: 05-16-06
REVISED: 4/13/07

REVISION SEAL

JOHN T. ROWE
ENGINEER
008453
4-23-07

SIGNAL UPGRADE - TEMPORARY 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2000 (WAKE FOREST ROAD)
AT
WAKE TOWNE DRIVE AND
HOLLY PARK SHOPPING CENTER

Prepared in the Office of:
Traffic Engineering and Signal Systems Section
DEPARTMENT OF TRANSPORTATION
Signal Management Section
122 N. McDowell St., Raleigh, NC 27603

DIVISION 05 WAKE COUNTY RALEIGH

PLAN DATE: MAY 2006 REVIEWED BY: T. JOYCE

PREPARED BY: JAMES PETERSON REVIEWED BY:

REVISIONS

REVISIONS	INIT.	DATE
REVISED SPAN, NO CHANGES TO ELECTRICAL DETAIL. FER 4-17-07 JTP	JTP	4-23-07

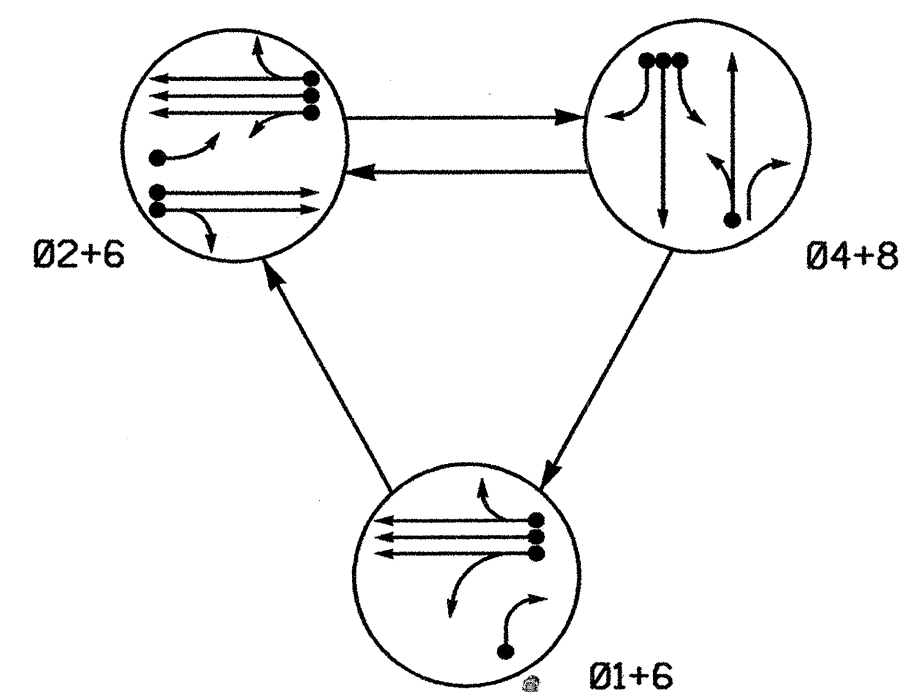
Not a certified document as to the Original Document but Only as to the Revisions - This document originally Issued and sealed by George C. Brown, #022013 on 5/25/06. This document is only certified as to the Revisions.

SIGNATURE DATE

SIG. INVENTORY NO. 05-0843 T1

10-100-0007 14-1-07
JTP/OT/FR/11/050843_sml.eie.200704xx.dgn
fpt/las

PHASING DIAGRAM



SIGNAL FACE	PHASE				
	Ø1 +6	Ø2 +6	Ø4 +8	Ø6 +8	Ø8 +8
21, 22, 23	R	G	R	Y	
41, 42	R	R	G	R	
61	G	G	R	Y	
62, 63	G	G	R	Y	
81	R	R	G	R	
82	R	R	G	R	

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	INDUCTIVE LOOPS		DETECTOR UNITS		TIMING		PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN
				NEW	EXISTING	NEMA PHASE	NEW	EXISTING	FEATURE		
1A	6 X 40	2-4-2	0	X		Ø1	X	DELAY	10 SEC.	ALL	YES
1B	6 X 60	2-4-2	0	X		Ø1	X	DELAY	20 SEC.	ALL	YES
2A, 2B, 2C	6 X 6	3	70	X		Ø2	X			ALL	NO
2D	6 X 40	2-4-2	0	X		Ø2	X			ALL	NO
4A	6 X 40	2-4-2	0	X		Ø4	X	DELAY	3 SEC.	ALL	YES
4B	6 X 40	2-4-2	0	X		Ø4	X			ALL	NO
4C	6 X 40	2-4-2	0	X		Ø4	X	DELAY	15 SEC.	ALL	YES
6A, 6B, 6C	6 X 6	3	70	X		Ø6	X			ALL	NO
8A	6 X 60	2-4-2	0	X		Ø8	X	DELAY	3 SEC.	ALL	YES

3 Phase Fully Actuated (Raleigh City Signal System)

NOTES

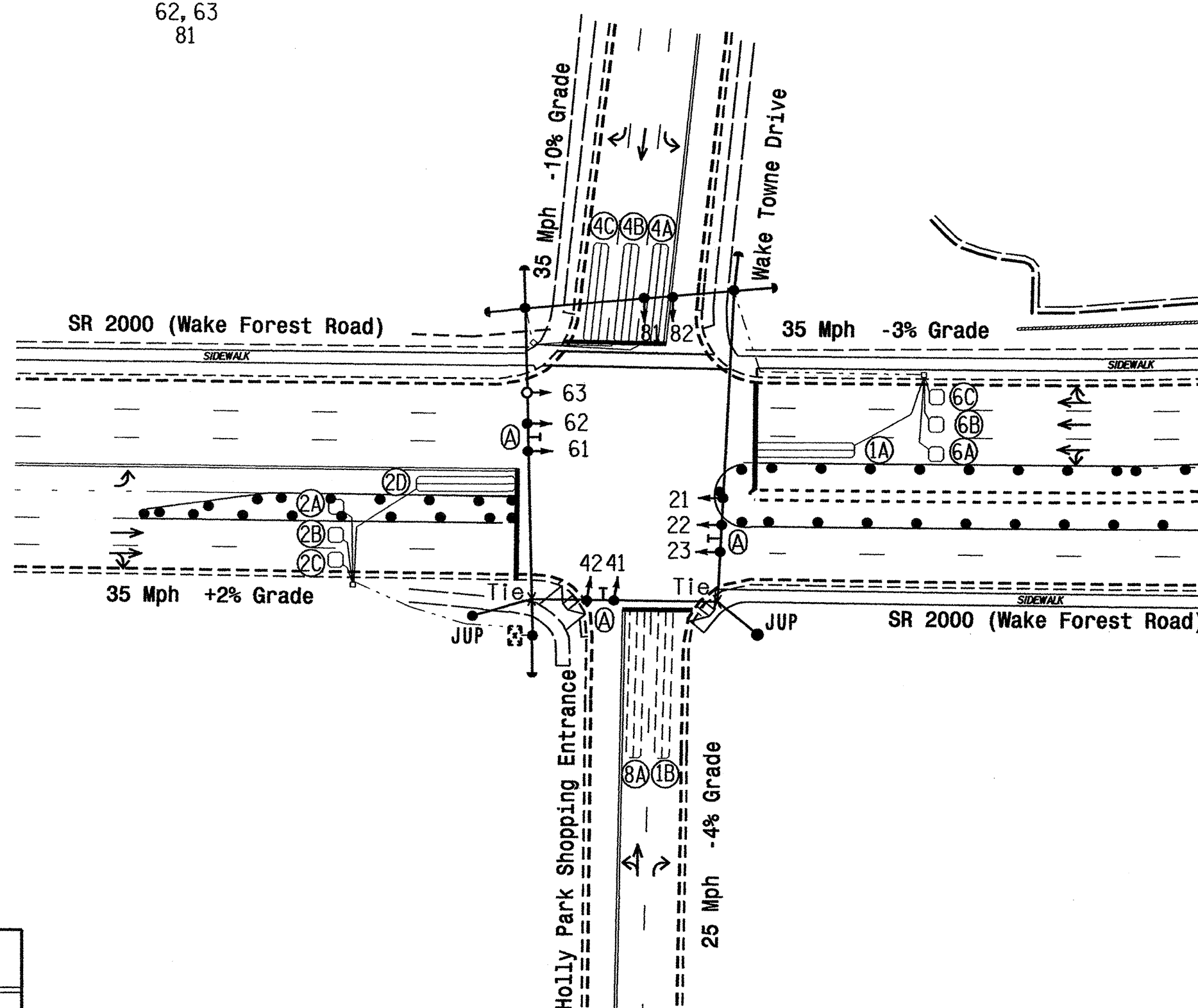
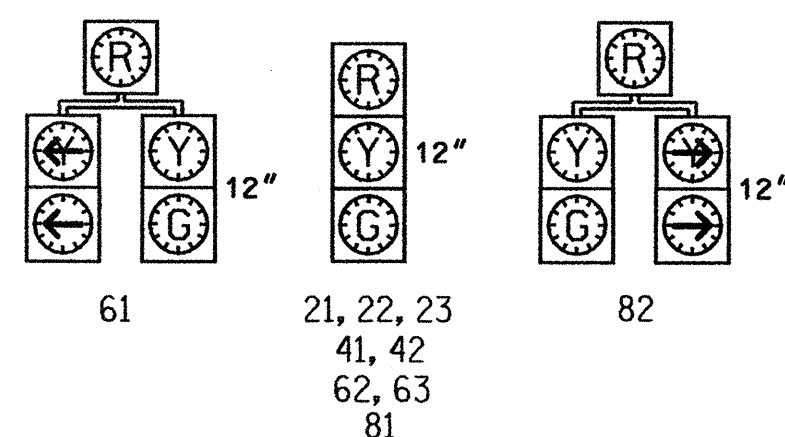
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Omit phase 1 during phase 2 on.
- Program controller to clear from phase 2+6 to phase 1+6 by progressing through phase 4+8 (see Electrical Details).
- Reposition existing signal heads numbered 21, 22, 23, 61, and 62.
- Program phase 4 and phase 8 for dual entry.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Install pavement markings in accordance with the Traffic Control and Pavement Marking Plans.

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

⊙ Denotes L.E.D.



TIMING CHART NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø4	Ø6	Ø8
MINIMUM GREEN*	7 SEC.	10 SEC.	7 SEC.	10 SEC.	7 SEC.
PASSAGE GAP*	2.0 SEC.	3.0 SEC.	2.0 SEC.	3.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	3.7 SEC.	4.8 SEC.	4.1 SEC.	4.4 SEC.
RED CLEARANCE	2.8 SEC.	2.1 SEC.	2.0 SEC.	1.7 SEC.	1.6 SEC.
MAX. 1*	25 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	MIN. RECALL	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	LOCK	NONLOCK
WALK*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD	- VEHI.	- VEHI.	- VEHI.	- VEHI.	- VEHI.
SEC. PER ACTUATION*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAX. INITIAL*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME B4 REDUCTION*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME TO REDUCE*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.

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

LEGEND

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

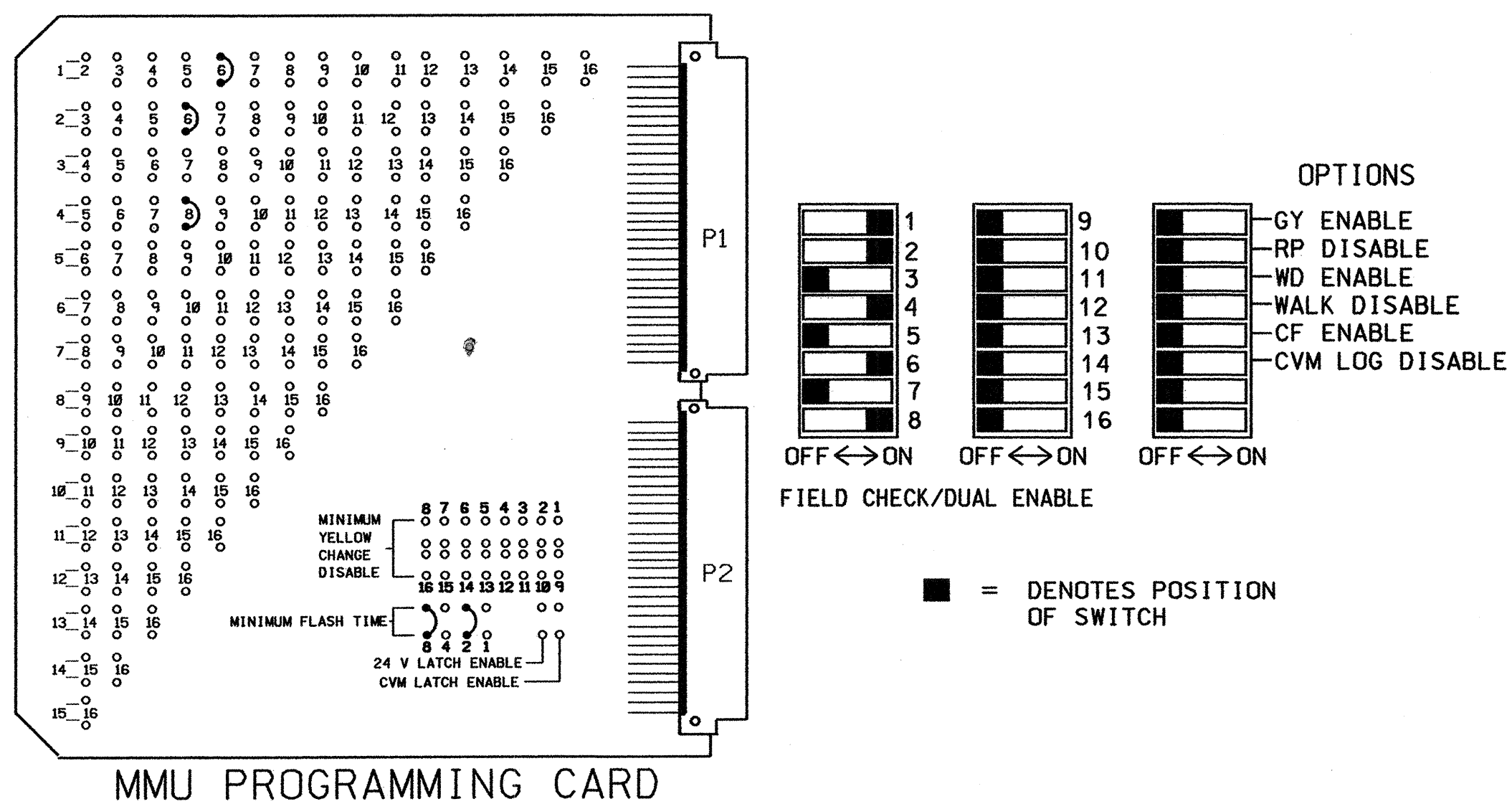
Signal Upgrade Temporary Design 2

	SR 2000 (Wake Forest Road) at Wake Towne Drive and Holly Park Shopping Center		
	Division 5 Wake County Raleigh	PREPARED BY: Sterling	
122 N. McDowell St., Raleigh, NC 27603	SCALE: 1"=50'	REVISIONS:	INIT. DATE: 4/13/07
SEAL		SEAL	
INVENTORY NO. 05-0843T2		DATE: 5/16/06	

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EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



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 3,5,7,9,10,11, & 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 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
- THE CABINET AND CONTROLLER ARE A PART OF THE RALEIGH CITY SIGNAL SYSTEM.

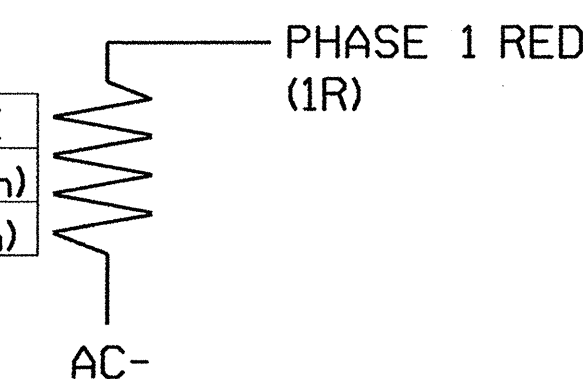
SIGNAL HEAD HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	61,82	21 22,23	NU	41,42	NU	61 62,63	NU	81,82	NU	NU	NU	NU
GREEN		2G		4G		6G		8G				
YELLOW		2Y		4Y		6Y		8Y				
RED	*	2R		4R		6R		8R				
RED ARROW												
YELLOW ARROW	1Y											
GREEN ARROW	1G											

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

LOAD RESISTOR INSTALLATION DETAIL

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



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

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	L1	L7	L5		L9					
	∅ 1	∅ 1	∅ 4	∅ 2		∅ 6					
	CH2	CH2	CH2	CH2	E M P T Y	CH2	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
	L4	NOT USED	∅ 4	∅ 4		L10					

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
	L2A,L2B
1B	L3A,L3B
2A,2B,2C	L4A,L4B
2D	L5A,L5B
4A	L6A,L6B
4B	L7A,L7B
4C	L8A,L8B
6A,6B,6C	L9A,L9B
8A	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	∅ 1	DELAY	10
2			
3	∅ 1	DELAY	20
4	∅ 2		
5	∅ 2		
6	∅ 4	DELAY	3
7	∅ 4		
8	∅ 4	DELAY	15
9	∅ 6		
10	∅ 8	DELAY	3
11			
12			
13			
14			
15			
16			

EQUIPMENT INFORMATION

- *CONTROLLER.....EAGLE EPAC 300
- *CABINETCONTRACTOR SUPPLIED TS-2 NC-3
- CABINET MOUNT.....BASE
- LOADBAY POSITIONS.....12
- LOAD SWITCHES USED.....1,2,4,6,8
- PHASES USED.....1,2,4,6,8
- OLA.....NOT USED
- OLB.....NOT USED
- OLC.....NOT USED
- OLD.....NOT USED

EXISTING TO REMAIN IN USE*

BACK-UP PROTECTION PROGRAMMING DETAIL

(program controller as shown below)

From Main Menu, press '3' (Phase Data)

EPAC PHASE DATA	PRESS # DESIRED
1-VEHICLE TIMES	5-V & P RECALLS
2-DENSITY TIMES	6-N.LOCK & MISC
3-PEDEST. TIMES	7-SPEC. SEQUENCE
4-INITIALIZE & N.A. RESPONSE	8-SPEC. DETECTOR
	9-PHASE COPY
	F-PRIOR MENU

PHASE.....	1	2	3	4	5	6	7	8
OMIT	2	0	0	0	0	0	0	0
-YEL	0	0	0	0	0	0	0	0
OCAL	4	0	0	0	0	0	0	0

OMIT:## PHS ON OMITS THIS PHASE
-YEL:## PHS YEL OMITS THIS PHS YEL
OCAL: WHEN OMIT, DETS CALL## PHS

A-UP B-DN C-LT D-RT E-ENTER F-PRIOR MENU

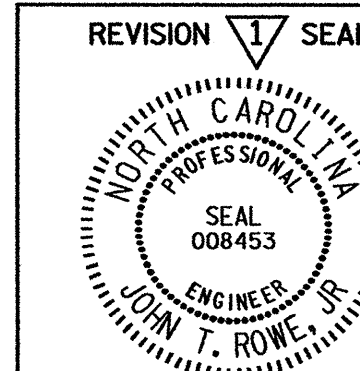
Special Sequence programming complete.

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	∅ 1
2	∅ 2
3	∅ 3
4	∅ 4
5	∅ 5
6	∅ 6
7	∅ 7
8	∅ 8
9	2 PED
10	4 PED
11	6 PED
12	8 PED

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0843 T2
DESIGNED: APRIL 2006
SEALED: 05-16-06
REVISED: 4/13/07



SIGNAL UPGRADE - TEMPORARY 2

Electrical and Programming Details For: **SR 2000 (WAKE FOREST ROAD) AT WAKE TOWNE DRIVE AND HOLLY PARK SHOPPING CENTER**

Prepared in the Offices of: **JAMES PETERSON**

PLANNED BY: JAMES PETERSON
REVIEWED BY: T. JOYCE

PREPARED BY: JAMES PETERSON
REVIEWED BY: JTR

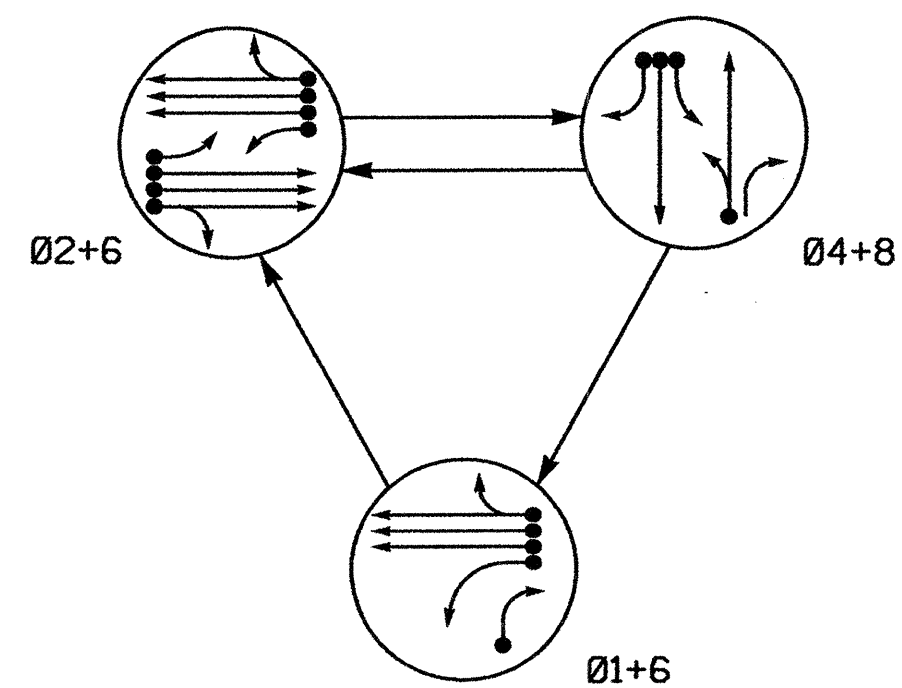
REVISIONS: REVISION SPAN, NO CHANGES TO ELECTRICAL DETAIL. 4-17-07

INITIALS: JTR DATE: 4-23-07

Not a certified document as to the Original Document but Only as to the Revisions - This document originally Issued and sealed by George C. Brown, #022013 on 5/25/06. This document is only certified as to the Revisions.

SIG. INVENTORY NO. 05-0843 T2

PHASING DIAGRAM



SIGNAL FACE	PHASE			
	Ø1 1 6	Ø2 2 6	Ø4 4 8	Ø8 8 H
21, 22, 23	R	G	R	Y
41, 42	R	R	G	R
61	G	G	R	Y
62, 63	G	G	R	Y
81	R	R	G	R
82	R	R	G	R

LOOP & DETECTOR UNIT INSTALLATION CHART											
NEMA CONTROLLER WITH TS-2 CABINET											
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	DETECTOR UNITS				PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREENS	
					NEMA PHASE	NEW EXISTING	FEATURE	TIME			
1A	6 X 40	2-4-2	0	X	Ø1	X	DELAY	15 SEC.	ALL	YES	
					Ø6	X					ALL
1B	6 X 60	2-4-2	0	X	Ø1	X	DELAY	20 SEC.	ALL	YES	
2A, 2B, 2C	6 X 6	3	70	X	Ø2	X			ALL	NO	
2D	6 X 40	2-4-2	0	X	Ø2	X			ALL	NO	
4A	6 X 40	2-4-2	0	X	Ø4	X	DELAY	3 SEC.	ALL	YES	
4B	6 X 40	2-4-2	0	X	Ø4	X			ALL	NO	
4C	6 X 40	2-4-2	0	X	Ø4	X	DELAY	15 SEC.	ALL	YES	
6A, 6B, 6C	6 X 6	3	70	X	Ø6	X			ALL	NO	
8A	6 X 60	2-4-2	0	X	Ø8	X	DELAY	3 SEC.	ALL	YES	

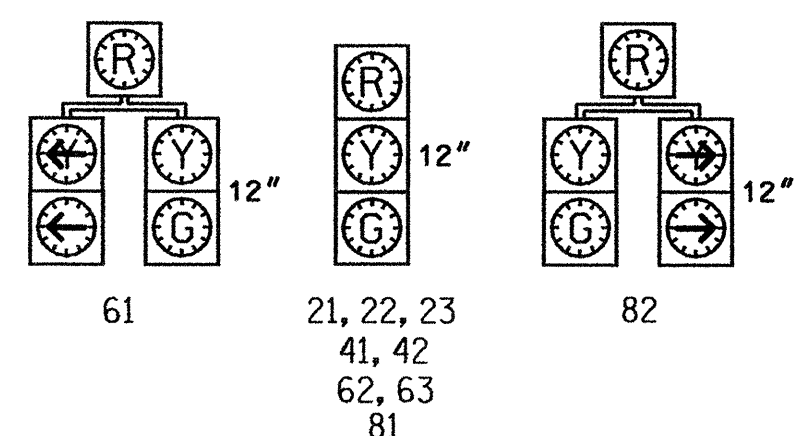
3 Phase Fully Actuated (Raleigh City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Omit phase 1 during phase 2 on.
- Program controller to clear from phase 2+6 to phase 1+6 by progressing through phase 4+8 (see Electrical Details).
- Program phase 4 and phase 8 for dual entry.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

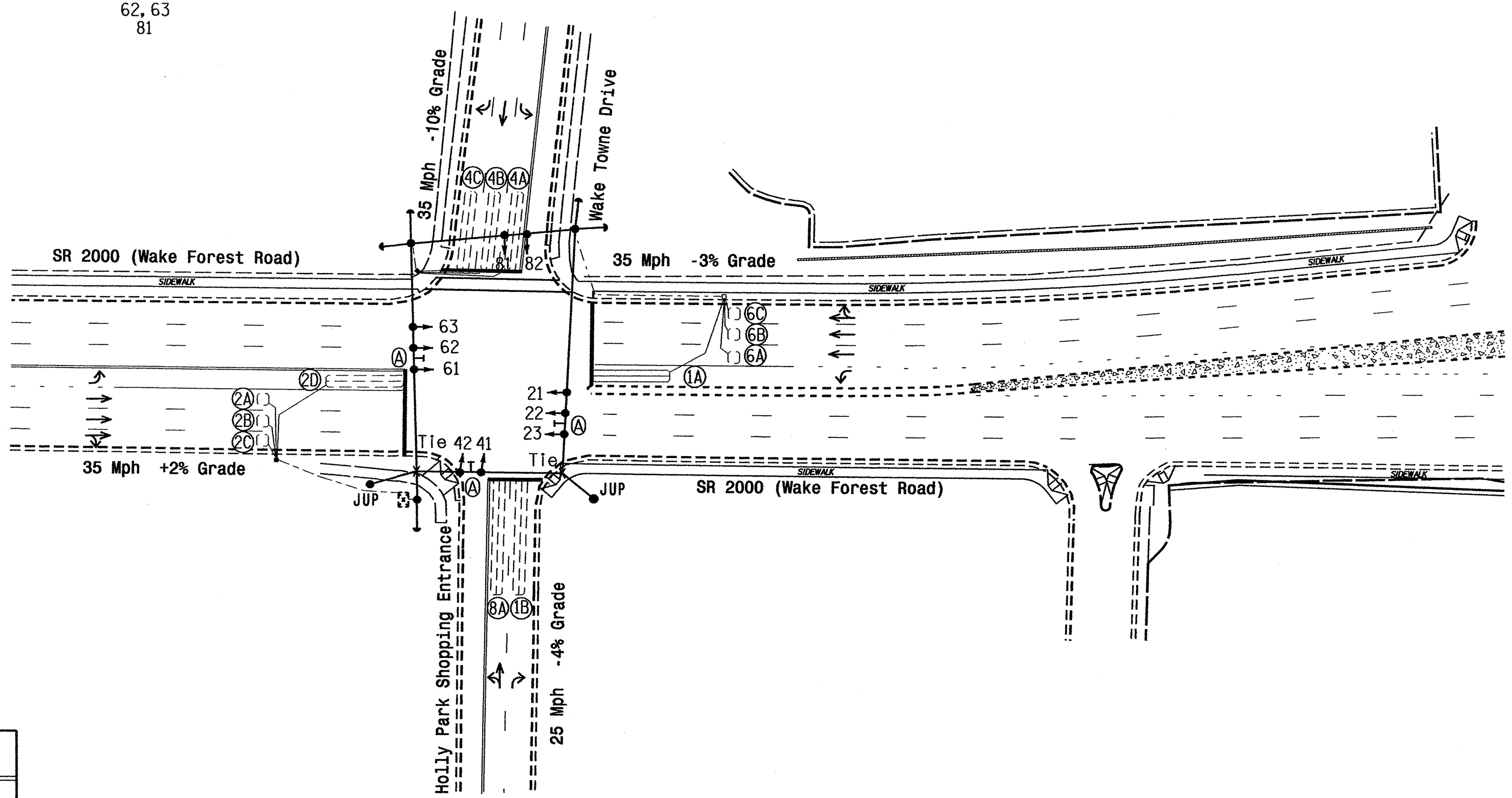
SIGNAL FACE I.D.

Denotes L.E.D.



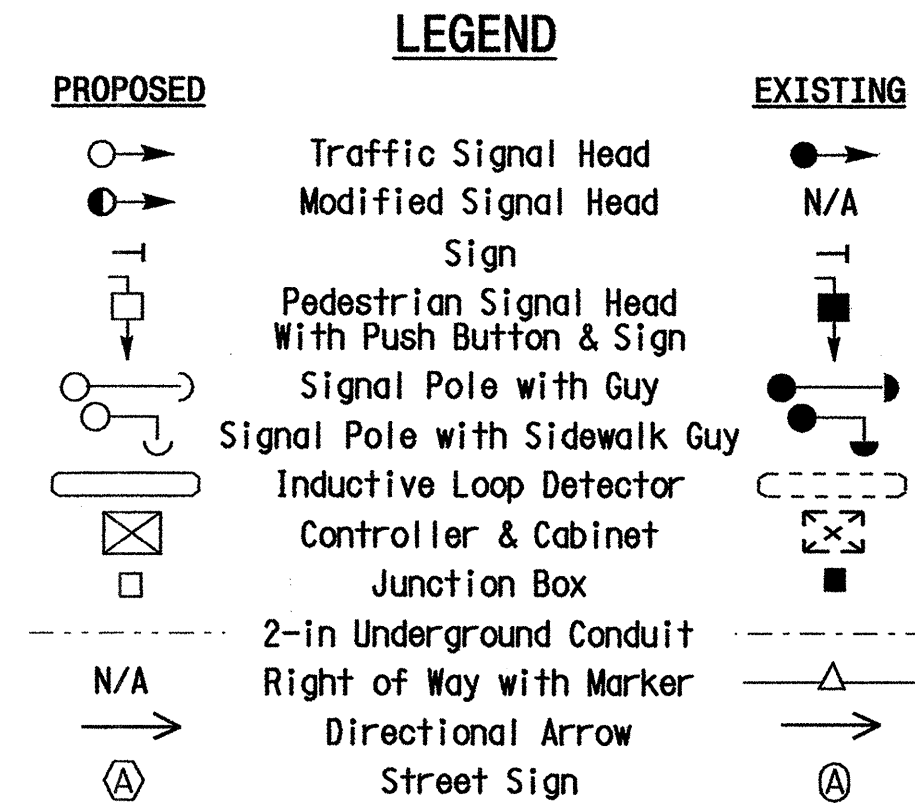
PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT
 UNDETECTED MOVEMENT (OVERLAP)
 UNSIGNALIZED MOVEMENT
 PEDESTRIAN MOVEMENT



TIMING CHART					
NEMA CONTROLLER					
PHASE	Ø1	Ø2	Ø4	Ø6	Ø8
MINIMUM GREEN*	7 SEC.	10 SEC.	7 SEC.	10 SEC.	7 SEC.
PASSAGE GAP*	2.0 SEC.	3.0 SEC.	2.0 SEC.	3.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	3.7 SEC.	4.8 SEC.	4.1 SEC.	4.4 SEC.
RED CLEARANCE	2.4 SEC.	2.1 SEC.	2.0 SEC.	1.6 SEC.	1.6 SEC.
MAX. I*	25 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	MIN. RECALL	NONE
VEH. CALL MEMORY	NONLOCK	LOCK	NONLOCK	LOCK	NONLOCK
WALK*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD	- VEH.	- VEH.	- VEH.	- VEH.	- VEH.
SEC. PER ACTUATION*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAX. INITIAL*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME B4 REDUCTION*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME TO REDUCE*	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.

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



Signal Upgrade Final Design

SR 2000 (Wake Forest Road) at Wake Towne Drive and Holly Park Shopping Center

Division 5 Wake County Raleigh

PLAN DATE: April 2006 REVIEWED BY:
 PREPARED BY: Sterling REVIEWED BY:
 REVISIONS: *Revised span...*

SCALE: 1"=50'

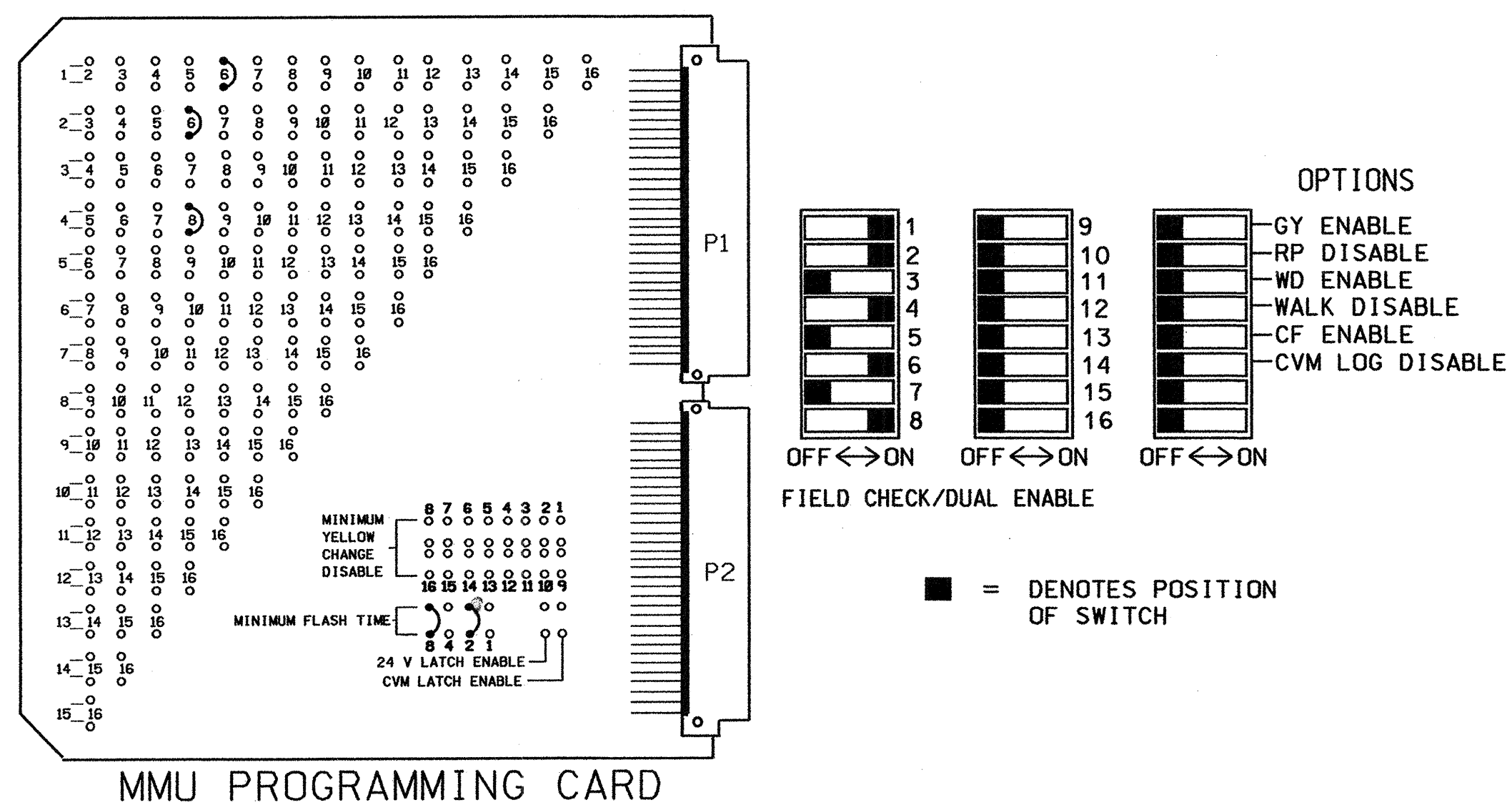
SIGNATURE: [Signature] DATE: 5/16/06

SIG. INVENTORY NO. 05-0843

15:49:56 2007 11:51
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 271:8100

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



- #### NOTES
1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
 2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 3,5,7,9,10,11, & 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.
 3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
 4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
 5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
 6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
 7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
 8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
 9. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
 10. THE CABINET AND CONTROLLER ARE A PART OF THE RALEIGH CITY SIGNAL SYSTEM.

SIGNAL HEAD HOOK-UP CHART

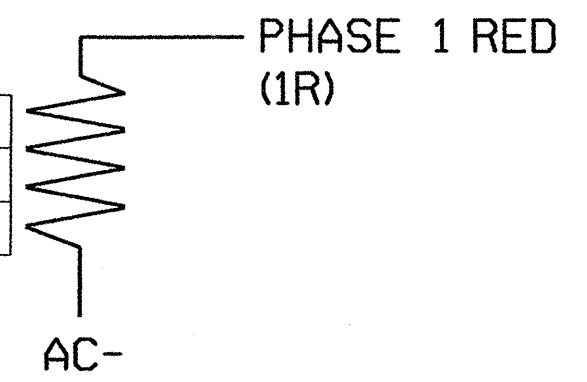
PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	61,82	21 22,23	NU	41,42	NU	61 62,63	NU	81,82	NU	NU	NU	NU
GREEN		2G		4G		6G		8G				
YELLOW		2Y		4Y		6Y		8Y				
RED	*	2R		4R		6R		8R				
RED ARROW												
YELLOW ARROW	1Y											
GREEN ARROW	1G											

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

LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES

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



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

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	CH1	S L O T	S L O T	S L O T	S L O T	S L O T
	L3	L1	L7	L5	L9					
	∅ 1	∅ 1	∅ 4	∅ 2	∅ 6					
	CH2	CH2	CH2	CH2	CH2	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
	L4	L2	L8	L6	L10					
	∅ 2	∅ 6	∅ 4	∅ 4	∅ 8					

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

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B L2A,L2B
1B	L3A,L3B
2A,2B,2C	L4A,L4B
2D	L5A,L5B
4A	L6A,L6B
4B	L7A,L7B
4C	L8A,L8B
6A,6B,6C	L9A,L9B
8A	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.

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	∅ 1	DELAY	15
2	∅ 6		
3	∅ 1	DELAY	20
4	∅ 2		
5	∅ 2		
6	∅ 4	DELAY	3
7	∅ 4		
8	∅ 4	DELAY	15
9	∅ 6		
10	∅ 8	DELAY	3
11			
12			
13			
14			
15			
16			

EQUIPMENT INFORMATION

- * CONTROLLER.....EAGLE EPAC 300
- * CABINETCONTRACTOR SUPPLIED [TS-2] NC-3
- CABINET MOUNT.....BASE
- LOADBAY POSITIONS.....12
- LOAD SWITCHES USED.....1,2,4,6,8
- PHASES USED.....1,2,4,6,8
- OLA.....NOT USED
- OLB.....NOT USED
- OLC.....NOT USED
- OLD.....NOT USED

EXISTING TO REMAIN IN USE*

BACK-UP PROTECTION PROGRAMMING DETAIL

(program controller as shown below)

From Main Menu, press '3' (Phase Data)

EPAC PHASE DATA	PRESS # DESIRED
1-VEHICLE TIMES	5-V & P RECALLS
2-DENSITY TIMES	6-N.LOCK & MISC
3-PEDEST. TIMES	7-SPEC. SEQUENCE
4-INITIALIZE & N.A. RESPONSE	8-SPEC. DETECTOR
	9-PHASE COPY
	F-PRIOR MENU

PHASE.....	1	2	3	4	5	6	7	8
OMIT	2	0	0	0	0	0	0	0
-YEL	0	0	0	0	0	0	0	0
OCAL	4	0	0	0	0	0	0	0

OMIT:### PHS ON OMITS THIS PHASE
-YEL:### PHS YEL OMITS THIS PHS YEL
OCAL: WHEN OMIT, DETS CALL## PHS

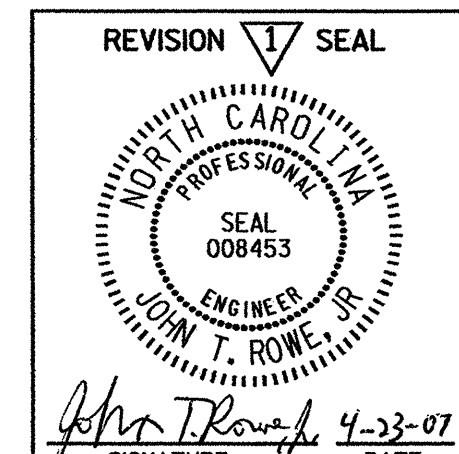
A-UP B-DN C-LT D-RT E-ENTER F-PRIOR MENU
Special Sequence programming complete.

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	∅ 1
2	∅ 2
3	∅ 3
4	∅ 4
5	∅ 5
6	∅ 6
7	∅ 7
8	∅ 8
9	2 PED
10	4 PED
11	6 PED
12	8 PED

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0843
DESIGNED: APRIL 2006
SEALED: 05-16-06
REVISED: 4/13/07



SIGNAL UPGRADE - FINAL

ELECTRICAL AND PROGRAMMING DETAILS FOR:
Prepared in the Offices of:
Traffic Engineering and Signal Systems
Division of Transportation
Signal Management Section
122 N. McDowell St., Raleigh, NC 27603

SR 2000 (WAKE FOREST ROAD) AT WAKE TOWNE DRIVE AND HOLLY PARK SHOPPING CENTER	
DIVISION 05	WAKE COUNTY RALEIGH
PLAN DATE: MAY 2006	REVIEWED BY: T. JOYCE
PREPARED BY: JAMES PETERSON	REVIEWED BY:
REVISIONS	INIT. DATE
REVISED SPAN. NO CHANGES TO ELECTRICAL DETAIL. FER 4-17-07	JTR 4-27-07

SEAL
Not a certified document as to the Original Document but Only as to the Revisions - This document originally Issued and sealed by George C. Brown, #022013 on 5/25/06.
This document is only certified as to the Revisions.
SIGNATURE DATE
SIG. INVENTORY NO. 05-0843

PHASING DIAGRAM

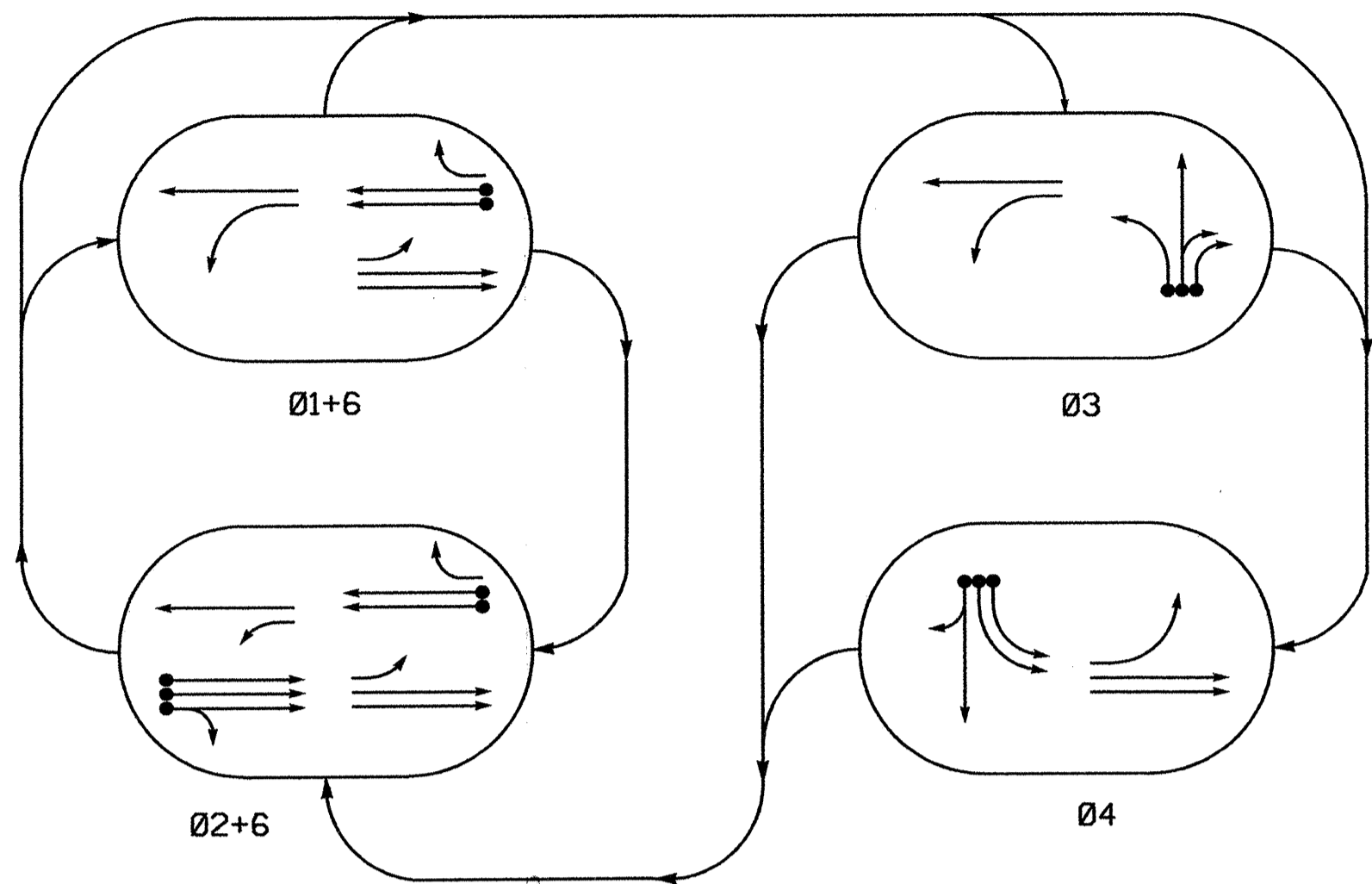
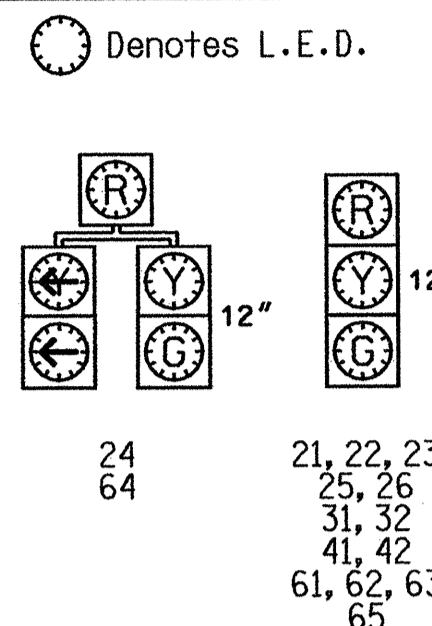


TABLE OF OPERATION

SIGNAL FACE	PHASE				
	Ø 2+6	Ø 1+6	Ø 3	Ø 4	F L E D
21, 22, 23	G	R	R	R	Y
24	G	G	R	G	Y
25, 26	G	G	R	G	Y
31, 32	R	R	G	R	R
41, 42	R	R	G	R	R
61, 62, 63	G	G	R	R	Y
64	G	G	R	R	Y
65	G	G	R	R	Y

SIGNAL FACE I.D.



4 Phase Fully Actuated (Raleigh City Signal System)

LOOP & DETECTOR UNIT INSTALLATION CHART
NEMA CONTROLLER WITH TS-2 CABINET

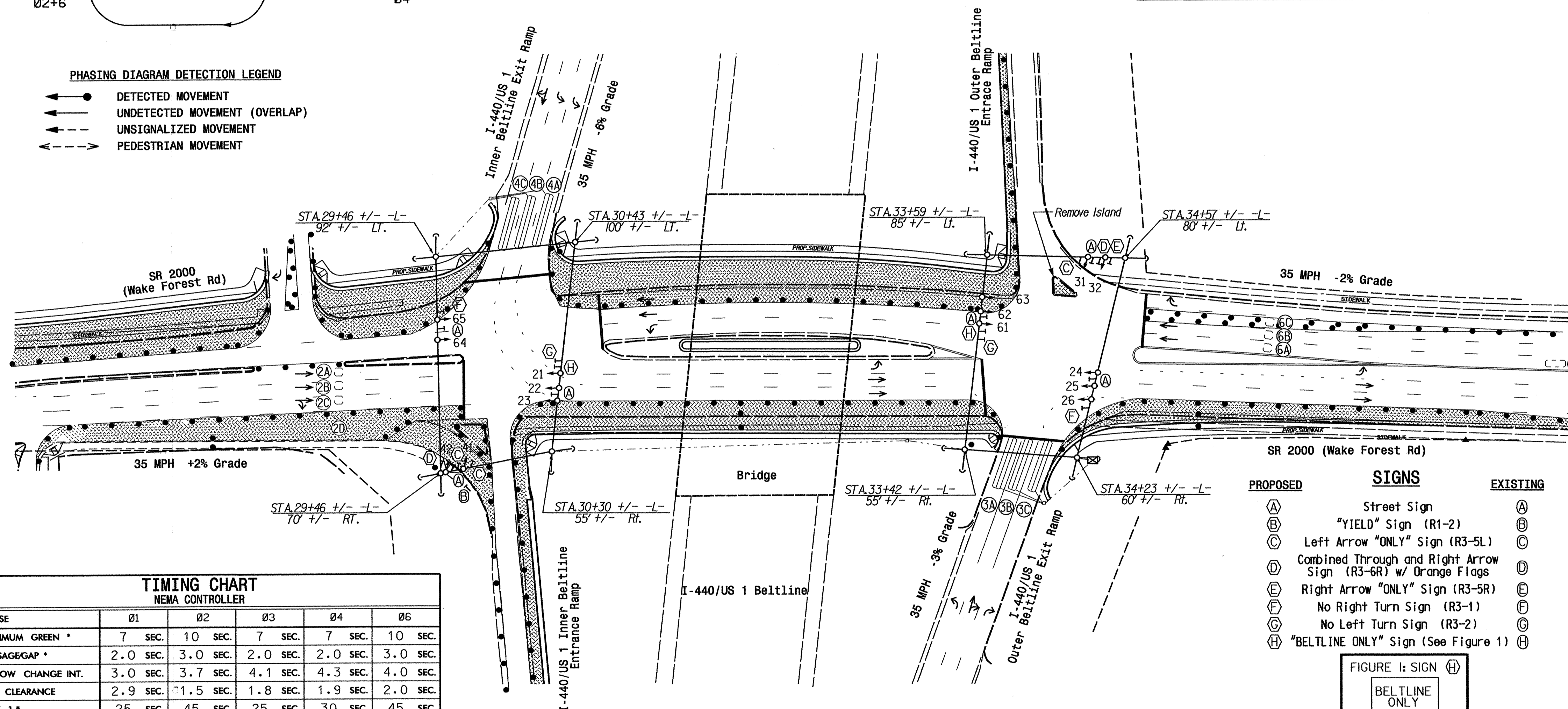
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	NEW EXISTING	TIMING		PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
							FEATURE	TIME		
1A	5X15	Existing	300	X	1	X	DELAY	25 SEC.	ALL	YES
2A, 2B, 2C, 2D	6X6	Existing	90	X	2	X	-	- SEC.	ALL	NO
3A	6X40	2-4-2	0	X	3	X	-	- SEC.	ALL	NO
3B	6X40	2-4-2	0	X	3	X	DELAY	5 SEC.	ALL	YES
3C	6X40	2-4-2	0	X	3	X	DELAY	15 SEC.	ALL	YES
4A	6X40	2-4-2	23	X	4	X	-	- SEC.	ALL	NO
4B	6X40	2-4-2	23	X	4	X	-	- SEC.	ALL	NO
4C	6X40	2-4-2	23	X	4	X	DELAY	5 SEC.	ALL	YES
6A, 6B, 6C	6X6	Existing	90	X	6	X	-	- SEC.	ALL	NO

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may lead.
- The order of phase 3 and phase 4 may be reversed.
- Relocate existing sign (A) to new span.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Orange flags shall remain for the duration of this temporary Design.

PHASING DIAGRAM DETECTION LEGEND

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



TIMING CHART
NEMA CONTROLLER

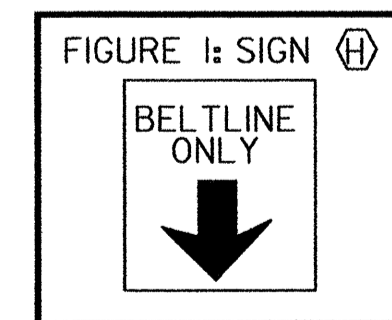
PHASE	Ø1	Ø2	Ø3	Ø4	Ø6
MINIMUM GREEN *	7 SEC.	10 SEC.	7 SEC.	7 SEC.	10 SEC.
PASSAGE GAP *	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	3.7 SEC.	4.1 SEC.	4.3 SEC.	4.0 SEC.
RED CLEARANCE	2.9 SEC.	1.5 SEC.	1.8 SEC.	1.9 SEC.	2.0 SEC.
MAX. I *	25 SEC.	45 SEC.	25 SEC.	30 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	MIN. RECALL
VEH. CALL MEMORY	NONLOCK	LOCK	NONLOCK	LOCK	LOCK
WALK *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD	- VEH.	- VEH.	- VEH.	- VEH.	- VEH.
SEC. PER ACTUATION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAX. INITIAL *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME B4 REDUCTION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME TO REDUCE *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.

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

LEGEND

- | | | | |
|--|--|--|--|
| | PROPOSED Traffic Signal Head | | EXISTING Traffic Signal Head |
| | PROPOSED Modified Signal Head | | EXISTING Modified Signal Head |
| | PROPOSED Pedestrian Signal Head | | EXISTING Pedestrian Signal Head |
| | PROPOSED Signal Pole with Guy | | EXISTING Signal Pole with Guy |
| | PROPOSED Signal Pole with Sidewalk Guy | | EXISTING Signal Pole with Sidewalk Guy |
| | PROPOSED Inductive Loop Detector | | EXISTING Inductive Loop Detector |
| | PROPOSED Controller & Cabinet | | EXISTING Controller & Cabinet |
| | PROPOSED Junction Box | | EXISTING Junction Box |
| | PROPOSED 2-in Underground Conduit | | EXISTING 2-in Underground Conduit |
| | PROPOSED Right of Way with Marker | | EXISTING Right of Way with Marker |
| | PROPOSED Directional Arrow | | EXISTING Directional Arrow |
| | PROPOSED Construction Zone Drums | | EXISTING Construction Zone Drums |
| | PROPOSED Construction Zone | | EXISTING Construction Zone |

- PROPOSED SIGNS**
- (A) Street Sign
 - (B) "YIELD" Sign (R1-2)
 - (C) Left Arrow "ONLY" Sign (R3-5L)
 - (D) Combined Through and Right Arrow Sign (R3-6R) w/ Orange Flags
 - (E) Right Arrow "ONLY" Sign (R3-5R)
 - (F) No Right Turn Sign (R3-1)
 - (G) No Left Turn Sign (R3-2)
 - (H) "BELTLINE ONLY" Sign (See Figure 1)



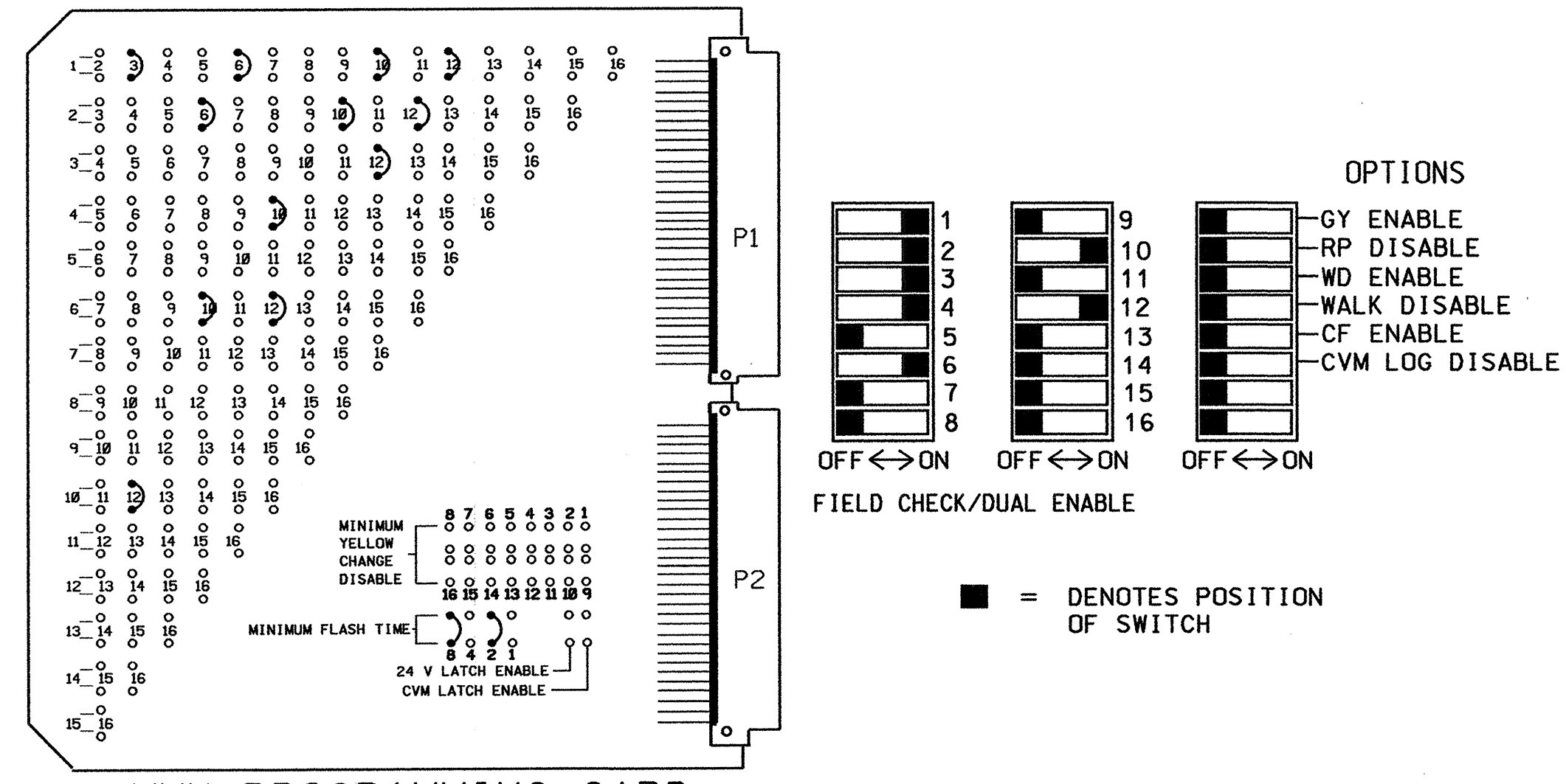
Signal Upgrade Temporary Design 1

Prepared in the Office of:
SR 2000 (Wake Forest Road) at I-440/US 1 (Beltline) Ramps
 Division 5 Wake County Raleigh
 PLAN DATE: April 2006 PREPARED BY: Sterling
 PREPARED BY: RNW/BEW REVIEWED BY:
 SCALE: 1"=50'

 DATE: 5/26/06
 SIG. INVENTORY NO. 05-025611

05-UN-2006-16107
 82-113 Signal Upgrade/05/26/06/evander-w-4404-raleigh/signals.apr11.2006/05025611.sig_den_2006xxxx.dgn
 PZ:BRD

**EDI MODEL MMU-16E
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL**
(program card and set switches as shown below)



MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 5, 7, 8, 9 & 11 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.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. THE CONTROLLER AND CABINET IS PART OF THE RALEIGH CITY SIGNAL SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	OLA	2	3	4	OLB	6	7	8	2 PED	OLC	6 PED	OLD
SIGNAL HEAD NO.	64	21, 22, 23	31, 32	24	41, 42	61, 62, 63	NU	NU	NU	24, 25, 26	NU	64, 65
GREEN		2G	3G		4G	6G				10G		12G
YELLOW		2Y	3Y		4Y	6Y				10Y		12Y
RED	*	2R	3R		4R	6R				10R		12R
RED ARROW												
YELLOW ARROW	1Y			4Y								
GREEN ARROW	1G			4G								

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

DETECTOR RACK SET-UP DETAIL

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

SLOT	CH1	CH1	CH1	CH1	CH1	CH1	SLOT
	L1	L7	L5	L11	L9	NOT USED	
BIU	∅ 1	∅ 3	∅ 2	∅ 4	∅ 4		EMPTY
	CH2 NOT USED	CH2 L8 ∅ 3	CH2 L6 ∅ 3	CH2 NOT USED	CH2 L10 ∅ 4	CH2 L16 ∅ 6	

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A, L1B
	L2A, L2B
	L3A, L3B
	L4A, L4B
2A, 2B, 2C, 2D	L5A, L5B
3A	L6A, L6B
3B	L7A, L7B
3C	L8A, L8B
4A	L9A, L9B
4B	L10A, L10B
4C	L11A, L11B
	L12A, L12B
	L13A, L13B
	L14A, L14B
	L15A, L15B
6A, 6B, 6C	L16A, L16B
	L17A, L17B
	L18A, L18B
	L19A, L19B
	L20A, L20B
	L21A, L21B
	L22A, L22B
	L23A, L23B
	L24A, L24B

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	∅ 1	DELAY	25
2			
3			
4			
5	∅ 2		
6	∅ 3		
7	∅ 3	DELAY	5
8	∅ 3	DELAY	15
9	∅ 4		
10	∅ 4		
11	∅ 4	DELAY	5
12			
13			
14			
15			
16	∅ 6		
17			
18			
19			
20			
21			
22			
23			
24			

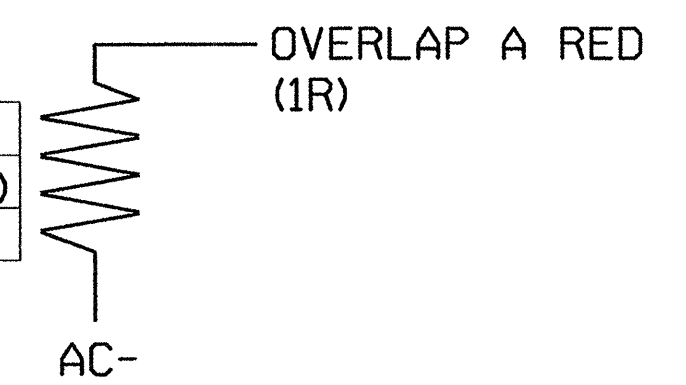
DETECTOR RACK NO. 2 SET-UP DETAIL

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

SLOT	SLOT	SLOT	SLOT
BIU	EMPTY	EMPTY	EMPTY

LOAD RESISTOR INSTALLATION DETAIL

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



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

EQUIPMENT INFORMATION

CONTROLLER.....EAGLE EPAC 300 CONTRACTOR SUPPLIED
CABINETCONTRACTOR SUPPLIED TS-2 NC-3B
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....12
LOAD SWITCHES USED.....1,2,3,4,6,10,12
PHASES USED.....*1,2,3,4,6
OLA.....1+3
OLB.....NOT USED
OLC.....4+6
OLD.....3+6
* PHASE 1 USED FOR TIMING ONLY

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0256T1
DESIGNED: APRIL 2006
SEALED: 05-26-06
REVISED: NA

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	OLA
2	∅ 2
3	∅ 3
4	∅ 4
5	OLB
6	∅ 6
7	∅ 7
8	∅ 8
9	2 PED
10	OLC
11	6 PED
12	OLD

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 07-07-04

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - SHEET 1 OF 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: **SR 2000 (WAKE FOREST ROAD) AT I-440/US 1 (BELTLINE) RAMPS**

Prepared in the Office of:

122 N. McDowell St., Raleigh, NC 27603

DIVISION 05	WAKE COUNTY,	RALEIGH
PLAN DATE: MAY 2006	REVIEWED BY:	
PREPARED BY: JAMES PETERSON	REVIEWED BY:	
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
GEORGE C. BROWN
022013

Signature: *George C. Brown* 6/2/06
DATE: 6/2/06
SIG. INVENTORY NO. 05-0256T1

02-JUN-2006 07:38
j.peterson

EAGLE EPAC300 CONTROLLER RING CONFIGURATION DETAIL

(program controller as shown below)

NOTE:
BEFORE PROGRAMMING CONTROLLER, BE SURE TO LOAD DEFAULT PARAMETERS.

SELECT 4 FROM MAIN MENU

EPAC UNIT DATA PRESS # DESIRED

1- STARTUP & MISC	6- ALT SEQUENCES
2- REMOTE FLASH	7- PORT 1 DATA
3- OVERLAP STANDARD	8- I/O MISC
4- OVERLAP SPECIAL	9- SIG DRV OUT
5- RING STRUCTURE	

F- PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 3 RING: 1 NXT PHS: 4

CONCUR PHS: 001000110 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 001000000 000000000 00000

PED CHN(S): 000000000 000000010 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 6 RING: 2 NXT PHS: 7

CONCUR PHS: 110001000 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000001000 000000000 00000

PED CHN(S): 000000000 010000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 1 RING: 1 NXT PHS: 3

CONCUR PHS: 100011000 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 100000000 000000000 00000

PED CHN(S): 000000000 000000010 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 4 RING: 1 NXT PHS: 2

CONCUR PHS: 000100110 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000100000 000000000 00000

PED CHN(S): 000000000 100000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 7 RING: 2 NXT PHS: 8

CONCUR PHS: 001100100 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000000100 000000000 00000

PED CHN(S): 000000000 000000000 10000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 2 RING: 1 NXT PHS: 1

CONCUR PHS: 010011000 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 010000000 000000000 00000

PED CHN(S): 000000001 000000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 5 RING: 2 NXT PHS: 6

CONCUR PHS: 110010000 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000010000 000000000 00000

PED CHN(S): 000000000 000000001 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 8 RING: 2 NXT PHS: 5

CONCUR PHS: 001100010 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000000010 000000000 00000

PED CHN(S): 000000000 001000000 00000

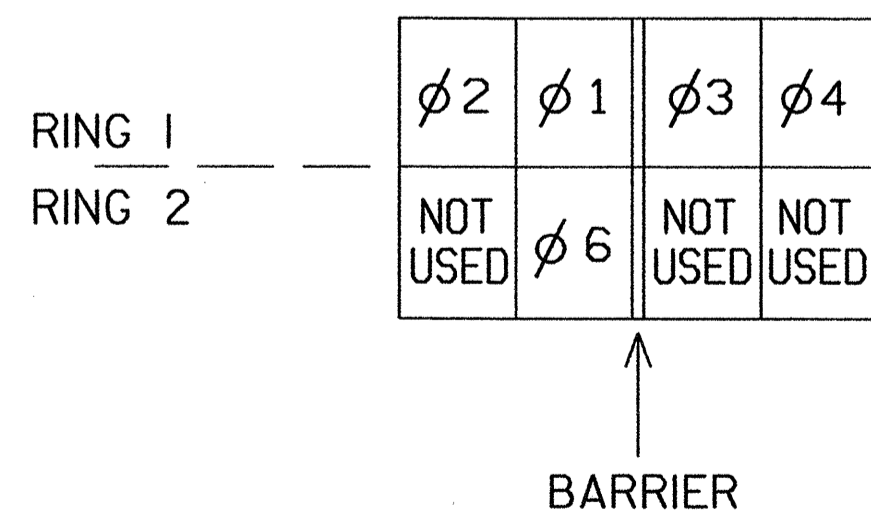
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

end of programming

RING CONFIGURATION NOTE:

PROGRAM THE CONTROLLER TO FOLLOW THE SEQUENCE SHOWN BELOW.

DUAL-QUAD WITH
PHASES 1 & 2 ROTATED



**EAGLE EPAC300 CONTROLLER
OVERLAP PROGRAMMING**

(program controller as shown below)

FROM MAIN MENU PRESS 4 (UNIT DATA)

EPAC UNIT DATA PRESS # DESIRED

1- STARTUP & MISC	6- ALT SEQUENCES
2- REMOTE FLASH	7- PORT 1 DATA
3- OVERLAP STANDARD	8- I/O MISC
4- OVERLAP SPECIAL	9- SIG DRV OUT
5- RING STRUCTURE	

F- PRIOR MENU

EPAC OVERLAP - A (0-NO / 1-YES)

OVL PHASES: 101000000 0000000

PHS/CHN: 123456789 0123456789 01234

OVL CHN(S): 100000000 0001000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC OVERLAP - C (0-NO / 1-YES)

OVL PHASES: 000101000 0000000

PHS/CHN: 123456789 0123456789 01234

OVL CHN(S): 000000000 1000000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC OVERLAP - D (0-NO / 1-YES)

OVL PHASES: 001001000 0000000

PHS/CHN: 123456789 0123456789 01234

OVL CHN(S): 000000000 0010000000 00000


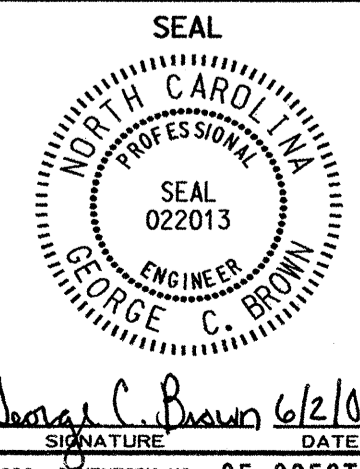
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

PRESS "F" TO RETURN TO UNIT DATA

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0256T1
DESIGNED: April 2006
SEALED: 05-26-06
REVISED: NA

THIS ELECTRICAL DETAIL SUPERSEDES
THE DETAIL SEALED ON 07-07-04

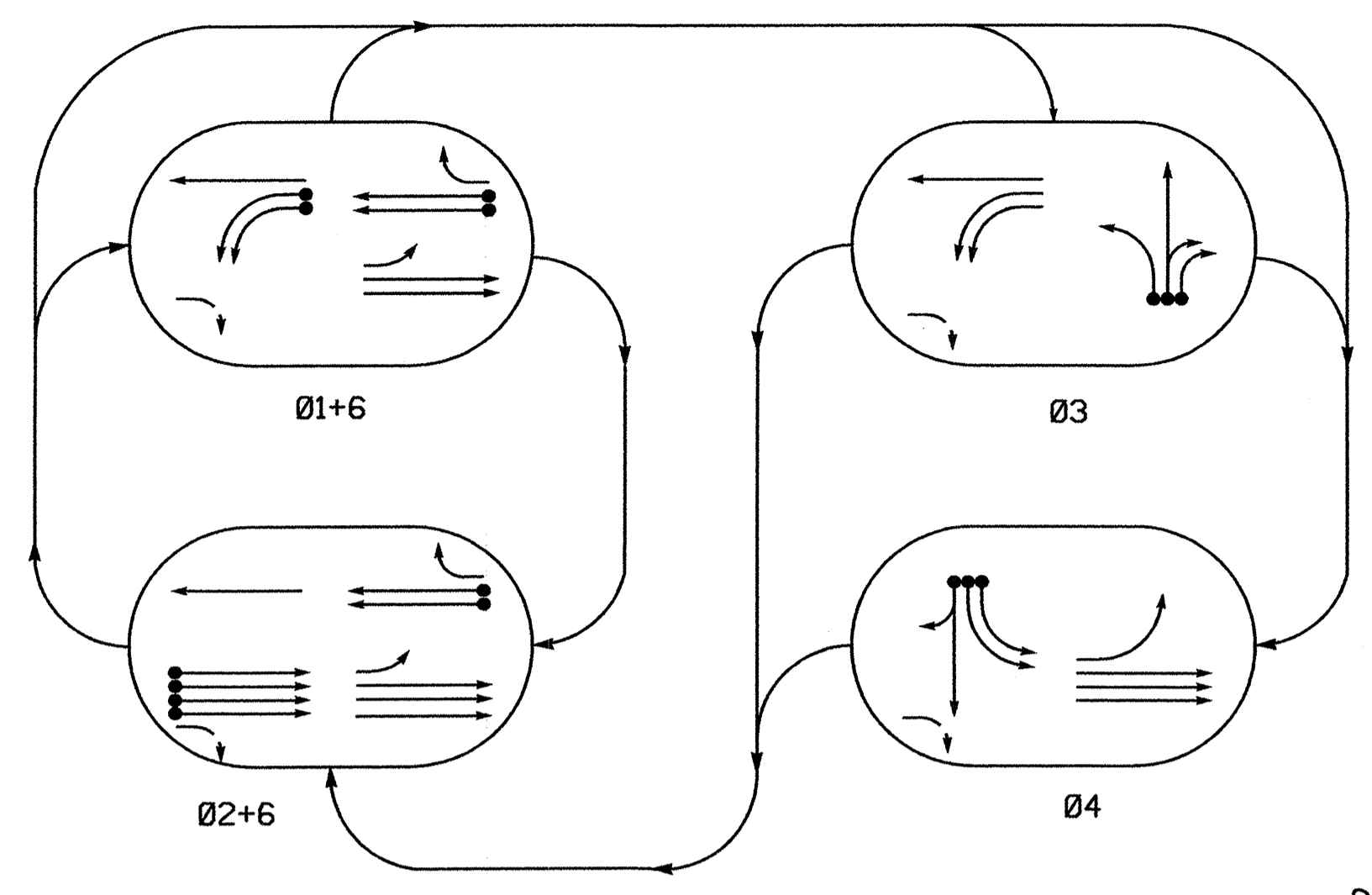
SIGNAL UPGRADE - TEMPORARY DESIGN 1 - Sheet 2 of 2

	ELECTRICAL AND PROGRAMMING DETAILS FOR: SR 2000 (WAKE FOREST ROAD) AT I-440/US 1 (BELTLINE) RAMPS		
	DIVISION 05 WAKE COUNTY RALEIGH PLAN DATE: MAY 2006 PREPARED BY: JAMES PETERSON	REVIEWED BY: REVIEWED BY:	

122 N. McDowell St., Raleigh, NC 27603

SIG. INVENTORY NO. 05-0256T1

PHASING DIAGRAM



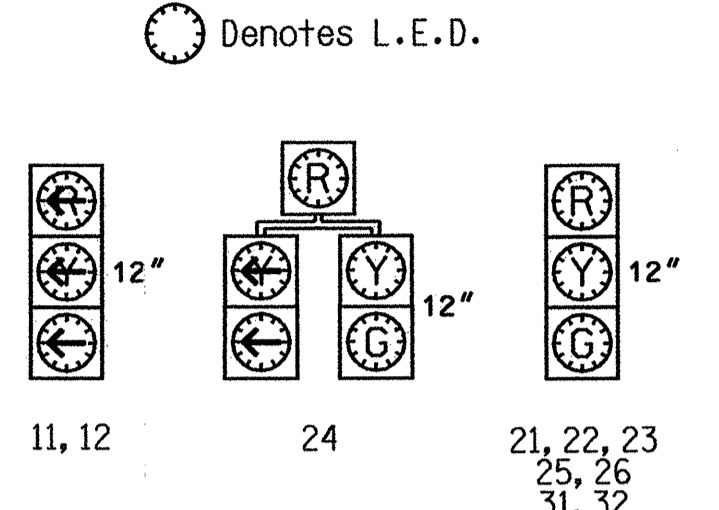
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE				
	Ø1+6	Ø2+6	Ø3	Ø4	F
11, 12	→	→	→	→	→
21, 22, 23	G	R	R	R	Y
24	G	G	R	G	Y
25, 26	G	G	R	G	Y
31, 32	R	R	G	R	R
41, 42	R	R	R	G	R
61, 62, 63	G	G	R	R	Y
64, 65	G	G	G	R	Y

SIGNAL FACE I.D.



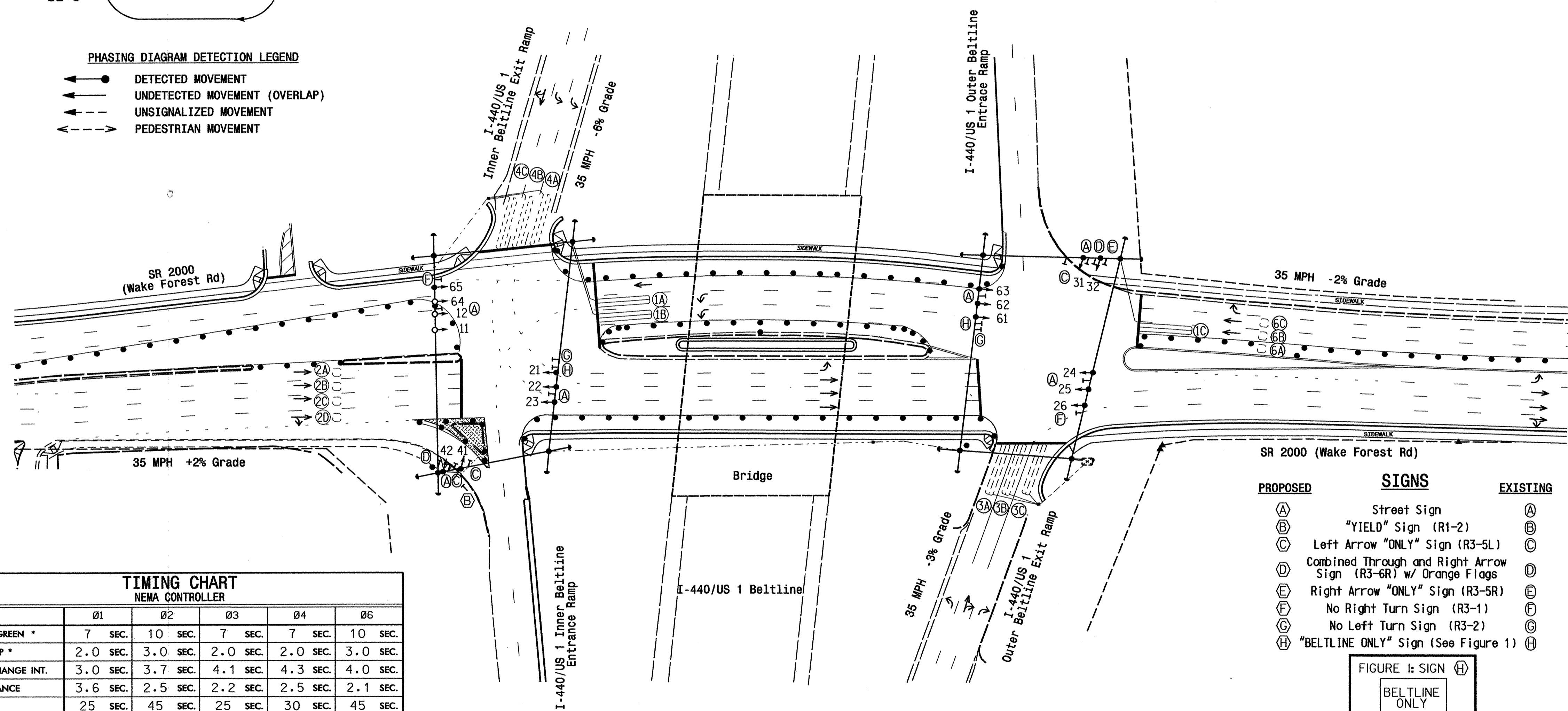
LOOP & DETECTOR UNIT INSTALLATION CHART
NEMA CONTROLLER WITH TS-2 CABINET

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	INDUCTIVE LOOPS		DETECTOR UNITS		TIMING		PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?	
				NEW	EXISTING	NEW	EXISTING	FEATURE	TIME			
1A	6X40	2-4-2	0	X		1	X	-	-	SEC.	ALL	NO
1B	6X40	2-4-2	0	X		1	X	-	-	SEC.	ALL	NO
1C	6X40	2-4-2	0	X		1	X	-	-	SEC.	ALL	NO
2A, 2B, 2C, 2D	6X6	Existing	90	X		2	X	-	-	SEC.	ALL	NO
3A	6X40	2-4-2	0	X		3	X	DELAY	5 SEC.	-	ALL	NO
3B	6X40	2-4-2	0	X		3	X	DELAY	15 SEC.	-	ALL	YES
3C	6X40	2-4-2	0	X		3	X	DELAY	15 SEC.	-	ALL	YES
4A	6X40	2-4-2	0	X		4	X	-	-	SEC.	ALL	NO
4B	6X40	2-4-2	0	X		4	X	-	-	SEC.	ALL	NO
4C	6X40	2-4-2	0	X		4	X	DELAY	5 SEC.	-	ALL	YES
6A, 6B, 6C	6X6	Existing	90	X		6	X	-	-	SEC.	ALL	NO

4 Phase Fully Actuated
(Raleigh City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may lead.
- The order of phase 3 and phase 4 may be reversed.
- Reposition existing signal heads numbered 21, 22, 23, 24, 25, 26, 61, 62, 63, and 65.
- Reposition existing signs as needed.
- Set all detector units to presence mode.
- Orange flags shall remain for the duration of this temporary Design.
- Install pavement markings in accordance with the Traffic Control and Pavement Marking Plans.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

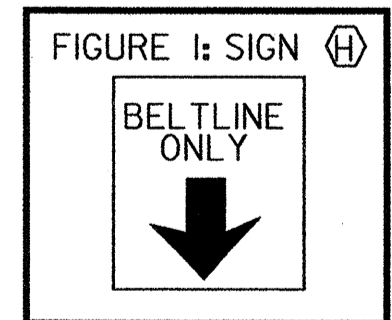


TIMING CHART
NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø6
MINIMUM GREEN *	7 SEC.	10 SEC.	7 SEC.	7 SEC.	10 SEC.
PASSAGE GAP *	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	3.7 SEC.	4.1 SEC.	4.3 SEC.	4.0 SEC.
RED CLEARANCE	3.6 SEC.	2.5 SEC.	2.2 SEC.	2.5 SEC.	2.1 SEC.
MAX. I *	25 SEC.	45 SEC.	25 SEC.	30 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	MIN. RECALL
VEH. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	LOCK
WALK *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD	- VEH.	- VEH.	- VEH.	- VEH.	- VEH.
SEC. PER ACTUATION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAX. INITIAL *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME B4 REDUCTION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME TO REDUCE *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.

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

- PROPOSED SIGNS**
- (A) Street Sign
 - (B) "YIELD" Sign (R1-2)
 - (C) Left Arrow "ONLY" Sign (R3-5L)
 - (D) Combined Through and Right Arrow Sign (R3-6R) w/ Orange Flags
 - (E) Right Arrow "ONLY" Sign (R3-5R)
 - (F) No Right Turn Sign (R3-1)
 - (G) No Left Turn Sign (R3-2)
 - (H) "BELTLINE ONLY" Sign (See Figure 1)



- LEGEND**
- | PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → Traffic Signal Head |
| ○ → Modified Signal Head | ○ → Modified Signal Head |
| → → Pedestrian Signal Head With Push Button & Sign | → → Pedestrian Signal Head With Push Button & Sign |
| → → Signal Pole with Guy | → → Signal Pole with Guy |
| → → Signal Pole with Sidewalk Guy | → → Signal Pole with Sidewalk Guy |
| ⊗ → Inductive Loop Detector | ⊗ → Inductive Loop Detector |
| ⊗ → Controller & Cabinet | ⊗ → Controller & Cabinet |
| □ → Junction Box | □ → Junction Box |
| → → 2-in Underground Conduit | → → 2-in Underground Conduit |
| → → Right of Way with Marker | → → Right of Way with Marker |
| → → Directional Arrow | → → Directional Arrow |
| → → Construction Zone Drums | → → Construction Zone Drums |
| → → Construction Zone | → → Construction Zone |

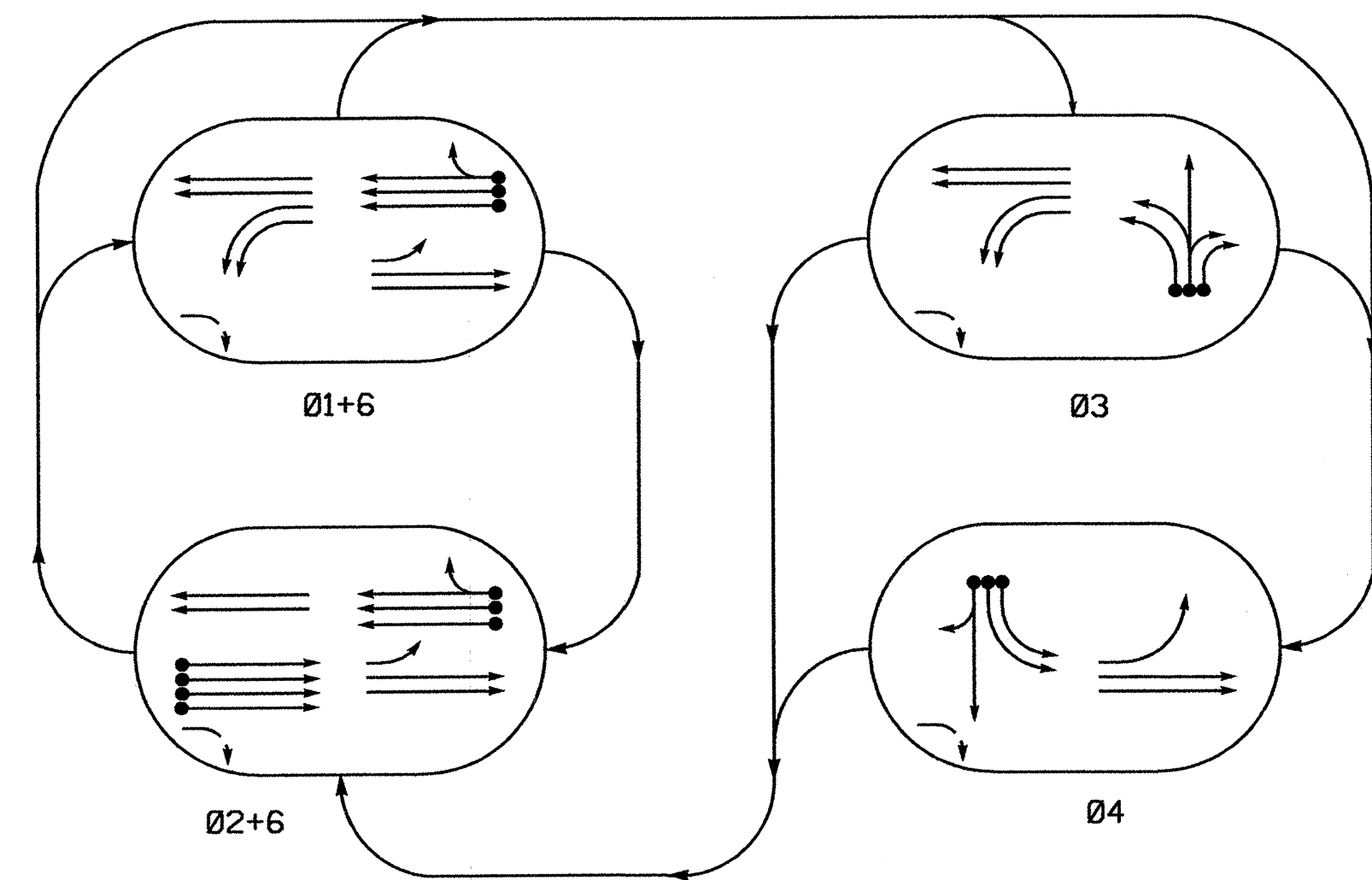
Signal Upgrade

Temporary Design 2

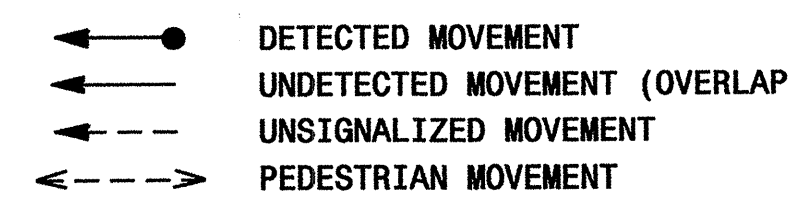
Prepared in the Office of:

 SR 2000 (Wake Forest Road) at I-440/US 1 (Beltline) Ramps
 Division 5 Wake County Raleigh
 PLAN DATE: April 2006 PREPARED BY: Sterling
 PREPARED BY: RNM/BEW REVIEWED BY:
 REVISIONS: INIT. DATE
 SCALE: 1"=50'
 SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 026486
 ROBERT J. ZIEBBA ENGINEER
 SIGNATURE: [Signature] DATE: 5/26/06
 SIG. INVENTORY NO. 05-025612

PHASING DIAGRAM

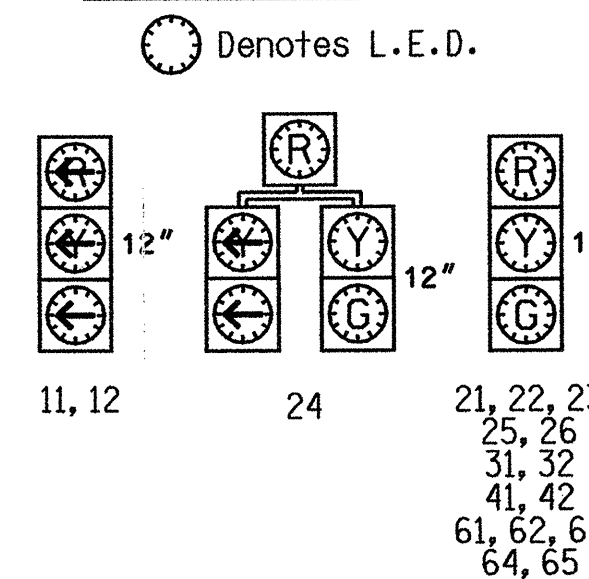


PHASING DIAGRAM DETECTION LEGEND



SIGNAL FACE	PHASE				
	Ø1+6	Ø3	Ø4	Ø2+6	Ø6
11, 12	R	L	L	R	R
21, 22, 23	G	R	R	R	Y
24	G	G	R	G	Y
25, 26	G	G	R	G	Y
31, 32	R	R	G	R	R
41, 42	R	R	R	G	R
61, 62, 63	G	G	R	R	Y
64, 65	G	G	R	Y	

SIGNAL FACE I.D.



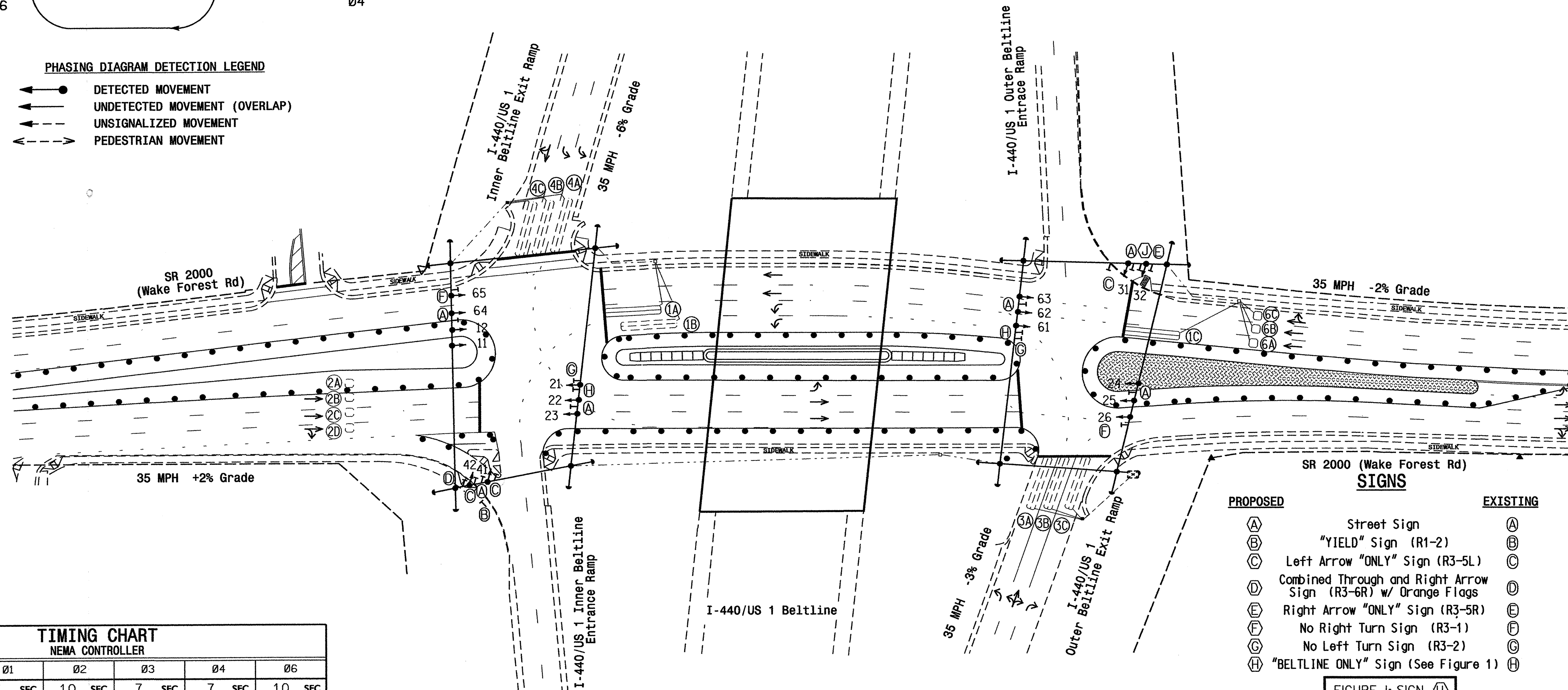
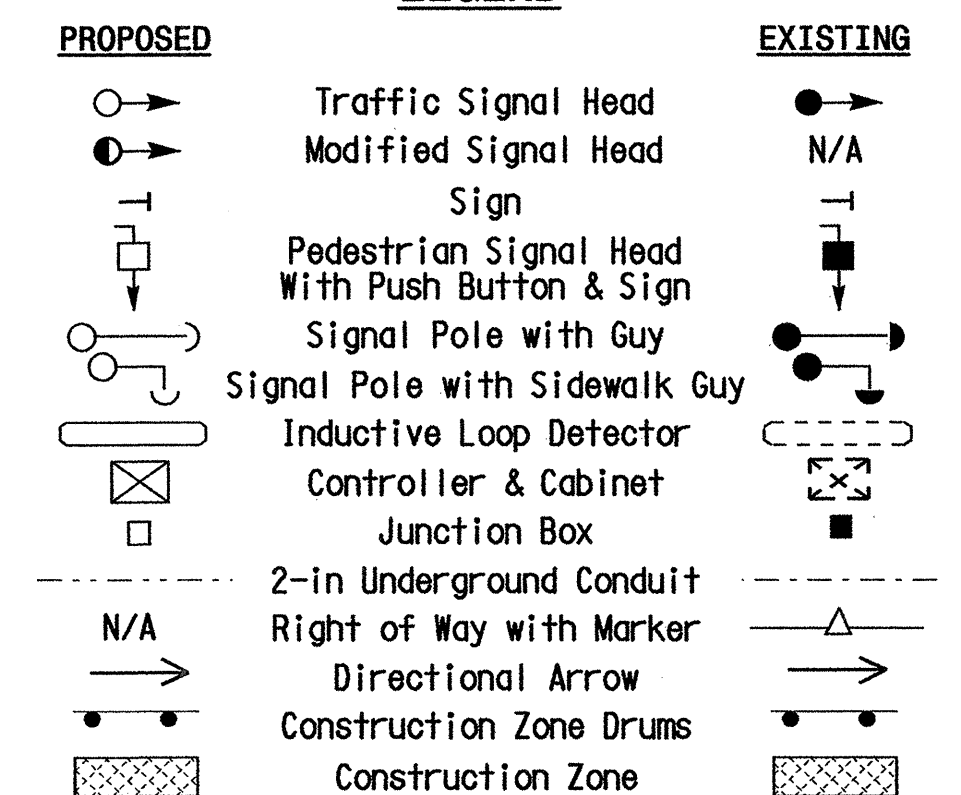
LOOP NO.	INDUCTIVE LOOPS			DETECTOR UNITS						
	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	TIMING	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN	
1A	6X40	2-4-2	0	X		1	-	SEC.	ALL	NO
1B	6X40	2-4-2	11	X		1	-	SEC.	ALL	NO
1C	6X40	2-4-2	0	X		1	-	SEC.	ALL	NO
2A, 2B, 2C, 2D	6X6	Existing	90	X		2	-	SEC.	ALL	NO
3A	6X40	2-4-2	0	X		3	-	SEC.	ALL	NO
3B	6X40	2-4-2	0	X		3	DELAY 5 SEC.	ALL	YES	
3C	6X40	2-4-2	0	X		3	DELAY 15 SEC.	ALL	YES	
4A	6X40	2-4-2	0	X		4	-	SEC.	ALL	NO
4B	6X40	2-4-2	0	X		4	-	SEC.	ALL	NO
4C	6X40	2-4-2	0	X		4	DELAY 5 SEC.	ALL	YES	
6A, 6B, 6C	6X6	4	90	X		6	-	SEC.	ALL	NO

4 Phase Fully Actuated (Raleigh City Signal System)

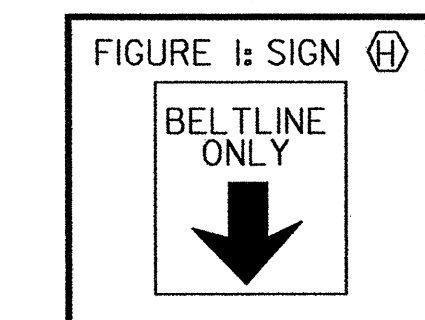
NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Reposition existing signal heads numbered 21, 22, and 23.
- Reposition existing signs (A), (C), (E), and (H) as necessary.
- Set all detector units to presence mode.
- Orange flags shall remain for the duration of this Temporary Design.
- Install pavement markings in accordance with the Traffic Control and Pavement Marking Plans.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

LEGEND



PROPOSED	EXISTING
(A) Street Sign	(A) Street Sign
(B) "YIELD" Sign (R1-2)	(B) "YIELD" Sign (R1-2)
(C) Left Arrow "ONLY" Sign (R3-5L)	(C) Left Arrow "ONLY" Sign (R3-5L)
(D) Combined Through and Right Arrow Sign (R3-6R) w/ Orange Flags	(D) Combined Through and Right Arrow Sign (R3-6R) w/ Orange Flags
(E) Right Arrow "ONLY" Sign (R3-5R)	(E) Right Arrow "ONLY" Sign (R3-5R)
(F) No Right Turn Sign (R3-1)	(F) No Right Turn Sign (R3-1)
(G) No Left Turn Sign (R3-2)	(G) No Left Turn Sign (R3-2)
(H) "BELTLINE ONLY" Sign (See Figure 1)	(H) "BELTLINE ONLY" Sign (See Figure 1)



ⓓ Dual Turn and Through Arrows (R3-19R) w/ Orange Flags ⓔ

TIMING CHART NEMA CONTROLLER					
PHASE	Ø1	Ø2	Ø3	Ø4	Ø6
MINIMUM GREEN *	7 SEC.	10 SEC.	7 SEC.	7 SEC.	10 SEC.
PASSAGE GAP *	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	3.7 SEC.	4.1 SEC.	4.3 SEC.	4.0 SEC.
RED CLEARANCE	3.4 SEC.	2.5 SEC.	2.3 SEC.	2.5 SEC.	1.5 SEC.
MAX. 1 *	25 SEC.	45 SEC.	25 SEC.	30 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	MIN. RECALL
VEH. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	LOCK
WALK *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD	- VEH.	- VEH.	- VEH.	- VEH.	- VEH.
SEC. PER ACTUATION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAX. INITIAL *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME B4 REDUCTION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME TO REDUCE *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.

* 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.

SR 2000 (Wake Forest Road) at I-440/US 1 (Beltline) Ramps

Division 5 Wake County Raleigh

PLAN DATE: April 2006 PREPARED BY: Sterling

PREPARED BY: RNM/BEW REVIEWED BY:

SCALE 0 50
1"=50'

REVISIONS
INIT. DATE

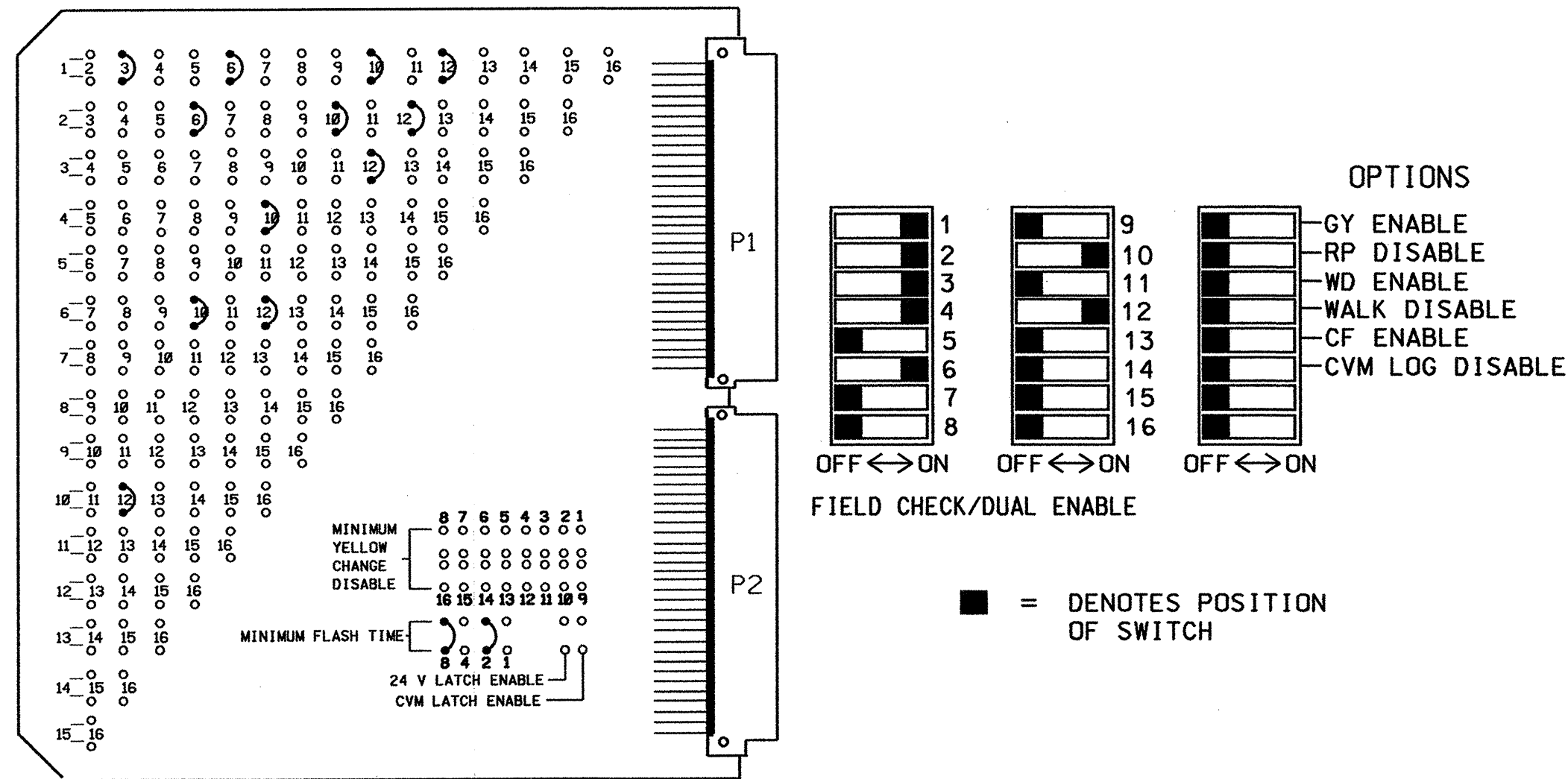
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SIG. INVENTORY NO. 05-0256T3

02-JUN-2006 16:16 s:\t13\signal\work\050256T3.dgn

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

(program card and set switches as shown below)



MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 5, 7, 8, 9 & 11 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.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. THE CONTROLLER AND CABINET IS PART OF THE RALEIGH CITY SIGNAL SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	OLA	2	3	4	OLB	6	7	8	2 PED	OLC	6 PED	OLD
SIGNAL HEAD NO.	11,12	21, 22,23	31,32	24	41,42	NU	61	62,63	NU	NU	24, 25,26	64,65
GREEN		2G	3G		4G		6G				10G	12G
YELLOW		2Y	3Y		4Y		6Y				10Y	12Y
RED		2R	3R		4R		6R				10R	12R
RED ARROW	1R											
YELLOW ARROW	1Y			4Y								
GREEN ARROW	1G			4G								

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	CH1	CH1	CH1	S L O T
	L3 ø 1	L1 ø 1	L7 ø 3	L5 ø 2	L11 ø 4	L9 ø 4	NOT USED	
	CH2	CH2	CH2	CH2	CH2	CH2	CH2	E M P T Y
	NOT USED	L2 ø 1	L8 ø 3	L6 ø 3	NOT USED	L10 ø 4	L16 ø 6	

DETECTOR RACK NO. 2 SET-UP DETAIL

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

BIU	S L O T	S L O T	S L O T	S L O T
		E M P T Y	E M P T Y	E M P T Y

EQUIPMENT INFORMATION

CONTROLLER.....EAGLE EPAC 300 CONTRACTOR SUPPLIED
 CABINETCONTRACTOR SUPPLIED **TS-2 NC-3B**
 CABINET MOUNT.....BASE
 LOADBAY POSITIONS.....12
 LOAD SWITCHES USED.....1,2,3,4,6,10,12
 PHASES USED.....*1,2,3,4,6
 OLA.....1+3
 OLB.....NOT USED
 OLC.....4+6
 OLD.....3+6
 *PHASE 1 USED FOR TIMING ONLY

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
	L4A,L4B
2A,2B,2C,2D	L5A,L5B
3A	L6A,L6B
3B	L7A,L7B
3C	L8A,L8B
4A	L9A,L9B
4B	L10A,L10B
4C	L11A,L11B
	L12A,L12B
	L13A,L13B
	L14A,L14B
	L15A,L15B
6A,6B,6C	L16A,L16B
	L17A,L17B
	L18A,L18B
	L19A,L19B
	L20A,L20B
	L21A,L21B
	L22A,L22B
	L23A,L23B
	L24A,L24B

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	ø 1		
2	ø 1		
3	ø 1		
4			
5	ø 2		
6	ø 3		
7	ø 3	DELAY	5
8	ø 3	DELAY	15
9	ø 4		
10	ø 4		
11	ø 4	DELAY	5
12			
13			
14			
15			
16	ø 6		
17			
18			
19			
20			
21			
22			
23			
24			

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	OLA
2	ø 2
3	ø 3
4	ø 4
5	OLB
6	ø 6
7	ø 7
8	ø 8
9	2 PED
10	OLC
11	6 PED
12	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0256 T2 AND 05-0256 T3
 DESIGNED: April 2006
 SEALED: 05-26-06
 REVISED: NA

SIGNAL UPGRADE - TEMPORARY 2 & TEMPORARY 3 - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:
SR 2000 (WAKE FOREST ROAD) AT I-440/US 1 (BELTLINE) RAMPS

Prepared in the Offices of:

 122 N. McDowell St., Raleigh, NC 27603

DIVISION 05 WAKE COUNTY RALEIGH

PLAN DATE: MAY 2006 REVIEWED BY:
 PREPARED BY: JAMES PETERSON REVIEWED BY:
 REVISIONS: INT. DATE:

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 022013
 GEORGE C. BROWN
 SIGNATURE DATE: 6/2/06

Sig. Inventory No. 05-0256 T2&T3

EAGLE EPAC300 CONTROLLER RING CONFIGURATION DETAIL

(program controller as shown below)

NOTE:
BEFORE PROGRAMMING CONTROLLER, BE SURE TO LOAD DEFAULT PARAMETERS.

SELECT 4 FROM MAIN MENU

EPAC UNIT DATA PRESS # DESIRED
1- STARTUP & MISC 6- ALT SEQUENCES
2- REMOTE FLASH 7- PORT 1 DATA
3- OVERLAP STANDARD 8- I/O MISC
4- OVERLAP SPECIAL 9- SIG DRV OUT
5- RING STRUCTURE
F- PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)
PHASE: 1 RING: 1 NXT PHS: 3
CONCUR PHS: 100011000 0000000
PHS/CHN: 123456789 0123456789 01234
VEH CHN(S): 100000000 0000000000 00000
PED CHN(S): 000000000 0000000100 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)
PHASE: 2 RING: 1 NXT PHS: 1
CONCUR PHS: 010011000 0000000
PHS/CHN: 123456789 0123456789 01234
VEH CHN(S): 010000000 0000000000 00000
PED CHN(S): 000000001 0000000000 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)
PHASE: 3 RING: 1 NXT PHS: 4
CONCUR PHS: 001000110 0000000
PHS/CHN: 123456789 0123456789 01234
VEH CHN(S): 001000000 0000000000 00000
PED CHN(S): 000000000 0000000010 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)
PHASE: 4 RING: 1 NXT PHS: 2
CONCUR PHS: 000100110 0000000
PHS/CHN: 123456789 0123456789 01234
VEH CHN(S): 000100000 0000000000 00000
PED CHN(S): 000000000 1000000000 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)
PHASE: 5 RING: 2 NXT PHS: 6
CONCUR PHS: 110010000 0000000
PHS/CHN: 123456789 0123456789 01234
VEH CHN(S): 000010000 0000000000 00000
PED CHN(S): 000000000 0000000001 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)
PHASE: 6 RING: 2 NXT PHS: 7
CONCUR PHS: 110001000 0000000
PHS/CHN: 123456789 0123456789 01234
VEH CHN(S): 000001000 0000000000 00000
PED CHN(S): 000000000 0100000000 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

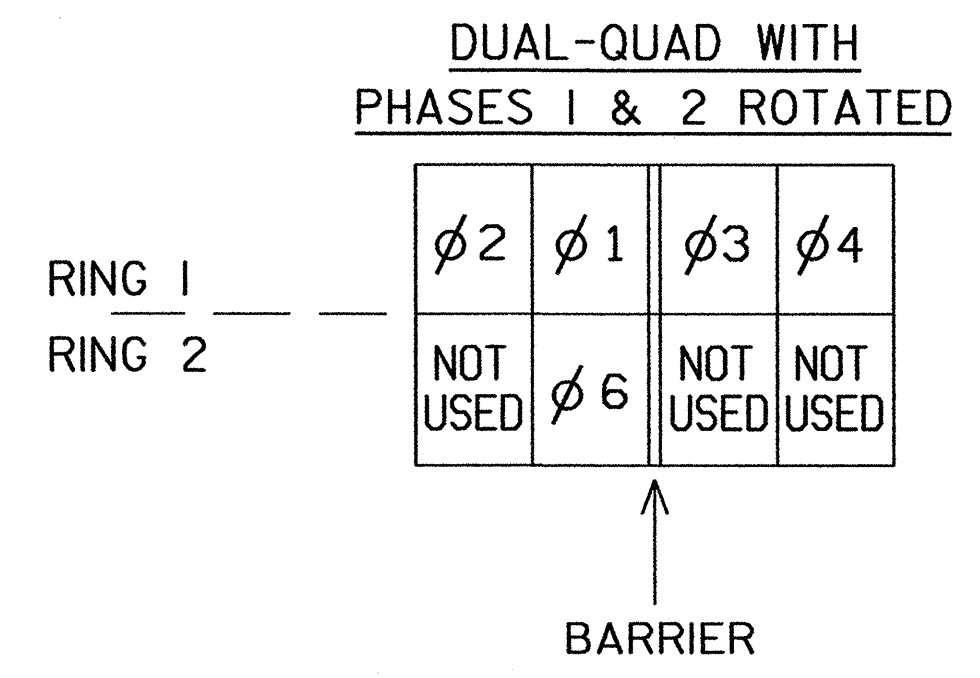
EPAC RING STRUCTURE (0-NO / 1-YES)
PHASE: 7 RING: 2 NXT PHS: 8
CONCUR PHS: 001100100 0000000
PHS/CHN: 123456789 0123456789 01234
VEH CHN(S): 000000100 0000000000 00000
PED CHN(S): 000000000 0000000000 10000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)
PHASE: 8 RING: 2 NXT PHS: 5
CONCUR PHS: 001100010 0000000
PHS/CHN: 123456789 0123456789 01234
VEH CHN(S): 000000010 0000000000 00000
PED CHN(S): 000000000 0010000000 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

end of programming

RING CONFIGURATION NOTE:

PROGRAM THE CONTROLLER TO FOLLOW THE SEQUENCE SHOWN BELOW.



EAGLE EPAC300 CONTROLLER OVERLAP PROGRAMMING

(program controller as shown below)

FROM MAIN MENU PRESS 4 (UNIT DATA)
EPAC UNIT DATA PRESS # DESIRED
1- STARTUP & MISC 6- ALT SEQUENCES
2- REMOTE FLASH 7- PORT 1 DATA
3- OVERLAP STANDARD 8- I/O MISC
4- OVERLAP SPECIAL 9- SIG DRV OUT
5- RING STRUCTURE
F- PRIOR MENU

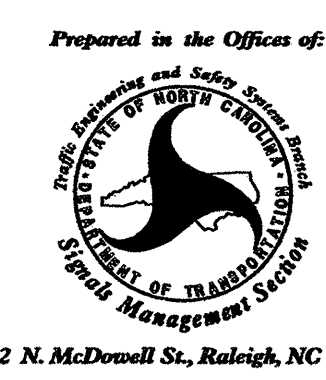
EPAC OVERLAP - A (0-NO / 1-YES)
OVL PHASES: 101000000 0000000
PHS/CHN: 123456789 0123456789 01234
OVL CHN(S): 100000000 0000000000 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC OVERLAP - C (0-NO / 1-YES)
OVL PHASES: 000101000 0000000
PHS/CHN: 123456789 0123456789 01234
OVL CHN(S): 000000000 1000000000 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC OVERLAP - D (0-NO / 1-YES)
OVL PHASES: 001001000 0000000
PHS/CHN: 123456789 0123456789 01234
OVL CHN(S): 000000000 0010000000 00000
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU
PRESS "F" TO RETURN TO UNIT DATA

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0256 T2 AND 05-0256 T3
DESIGNED: April 2006
SEALED: 05-26-06
REVISED: NA

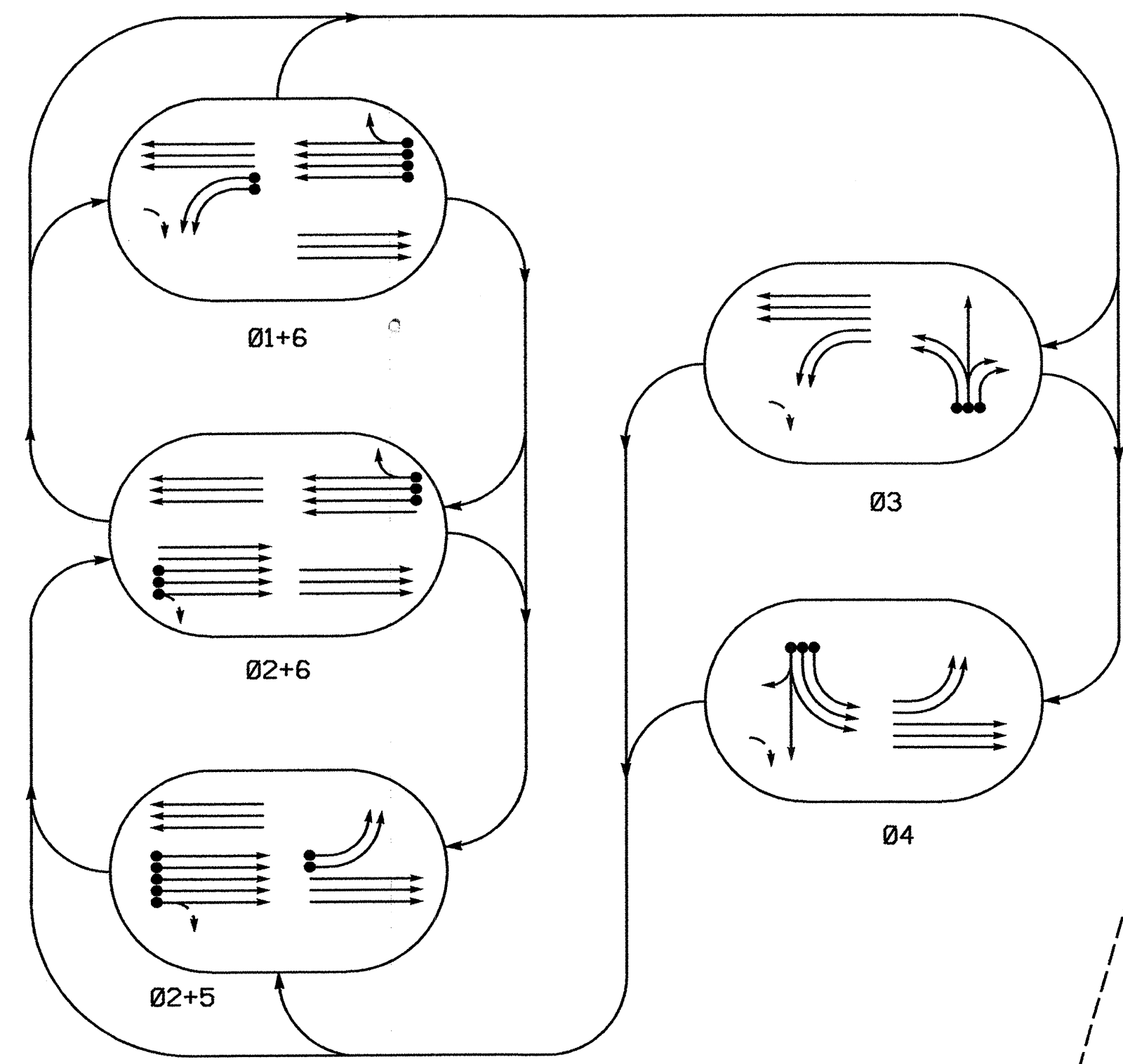
SIGNAL UPGRADE - TEMPORARY 2 & TEMPORARY 3 - Sheet 2 of 2

 Prepared in the Offices of: Traffic Engineering and Safety Section STATE OF NORTH CAROLINA Department of Transportation Signal Management Section 122 N. McDowell St., Raleigh, NC 27603	ELECTRICAL AND PROGRAMMING DETAILS FOR:		SR 2000 (WAKE FOREST ROAD) AT I-440/US 1 (BELTLINE) RAMPS		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 ENGINEER GEORGE C. BROWN SIGNATURE DATE 6/2/06
	DIVISION 05 WAKE COUNTY RALEIGH		PLAN DATE: MAY 2006 REVIEWED BY:		
	PREPARED BY: JAMES PETERSON REVIEWED BY:		REVISIONS INIT. DATE		
	REVISIONS		DATE		

SIG. INVENTORY NO. 05-0256 T2&T3

02-JUN-2006 14:08
1-peterson

PHASING DIAGRAM

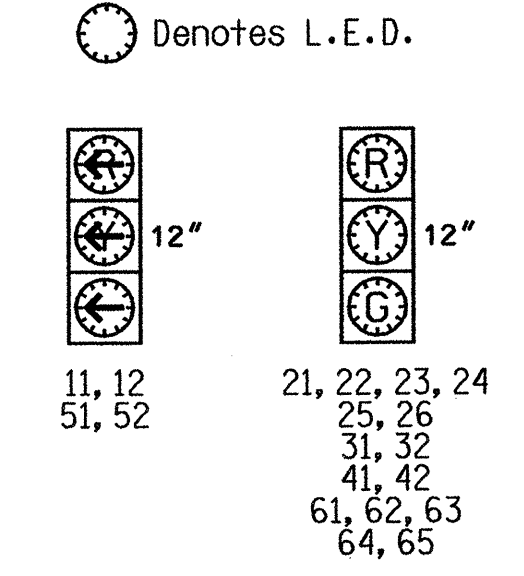


PHASING DIAGRAM DETECTION LEGEND
 ● DETECTED MOVEMENT
 ○ UNDETECTED MOVEMENT (OVERLAP)
 - UNSIGNALIZED MOVEMENT
 - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE					
	Ø2+5	Ø2+6	Ø1+6	Ø3	Ø4	F L H S
11, 12	R	R	-	R	R	R
21, 22, 23, 24	G	G	R	R	R	Y
25, 26	G	G	G	R	G	Y
31, 32	R	R	R	G	R	R
41, 42	R	R	R	R	G	R
51, 52	-	R	R	R	-	R
61, 62, 63	R	G	G	R	R	Y
64, 65	G	G	G	G	R	Y

SIGNAL FACE I.D.



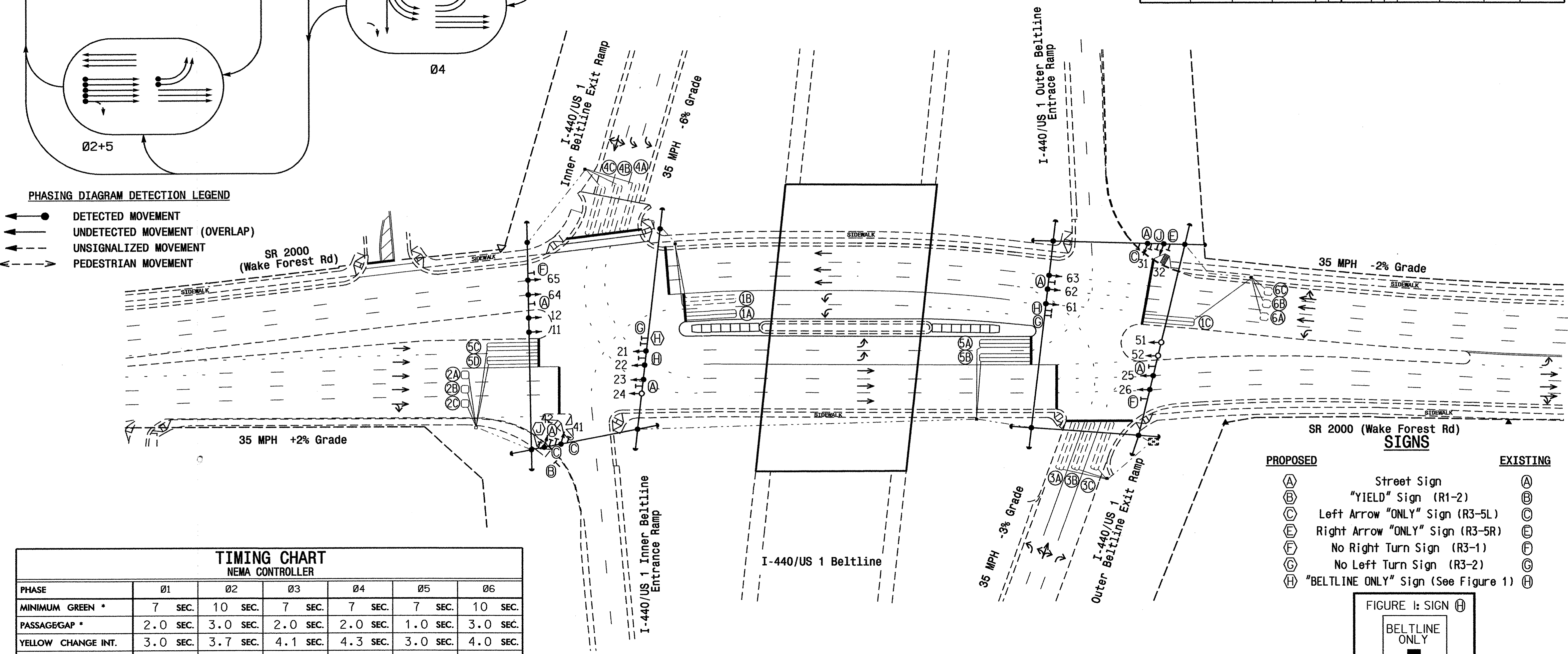
LOOP & DETECTOR UNIT INSTALLATION CHART
 NEMA CONTROLLER WITH TS-2 CABINET

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	INDUCTIVE LOOPS		DETECTOR UNITS		TIMING	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN	
				NEW	EXISTING	NEMA PHASE	NEW				EXISTING
1A	6X40	2-4-2	0	X		1	X	-	SEC.	ALL	NO
1B	6X40	2-4-2	0	X		1	X	-	SEC.	ALL	NO
1C	6X40	2-4-2	0	X		1	X	-	SEC.	ALL	NO
2A, 2B, 2C	6X6	4	70	X		2	X	-	SEC.	ALL	NO
3A	6X40	2-4-2	0	X		3	X	-	SEC.	ALL	NO
3B	6X40	2-4-2	0	X		3	X	DELAY	5 SEC.	ALL	YES
3C	6X40	2-4-2	0	X		3	X	DELAY	15 SEC.	ALL	YES
4A	6X40	2-4-2	0	X		4	X	-	SEC.	ALL	NO
4B	6X40	2-4-2	0	X		4	X	-	SEC.	ALL	NO
4C	6X40	2-4-2	0	X		4	X	DELAY	5 SEC.	ALL	YES
5A	6X40	2-4-2	0	X		5	X	-	SEC.	ALL	NO
5B	6X40	2-4-2	0	X		5	X	-	SEC.	ALL	NO
5C	6X40	2-4-2	0	X		5	X	-	SEC.	ALL	NO
5D	6X40	2-4-2	0	X		5	X	-	SEC.	ALL	NO
6A, 6B, 6C	6X6	3	70	X		6	X	-	SEC.	ALL	NO

5 Phase Fully Actuated (Raleigh City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- The order of Phase 1 and Phase 5 may be reversed.
- The order of Phase 3 and Phase 4 may be reversed.
- Reposition existing signal heads numbered 11, 12, 21, 22, 23, 25, 26, 61, 62, 63, 64, and 65.
- Reposition existing signs (A), (B), (C), and (H) as needed.
- Set all detector units to presence mode.
- Thirty days after implementation of the revised signal operation, orange flags may be removed at the discretion of the Regional Traffic Engineer.
- Install pavement markings in accordance with Traffic Control and Pavement Marking Plans.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



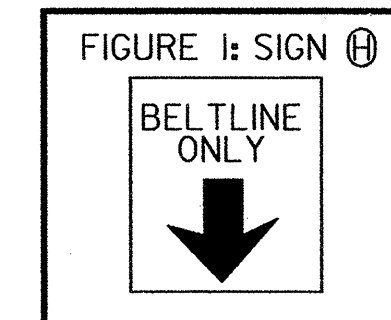
TIMING CHART
 NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6
MINIMUM GREEN *	7 SEC.	10 SEC.	7 SEC.	7 SEC.	7 SEC.	10 SEC.
PASSAGE GAP *	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	1.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	3.7 SEC.	4.1 SEC.	4.3 SEC.	3.0 SEC.	4.0 SEC.
RED CLEARANCE	3.6 SEC.	1.3 SEC.	2.5 SEC.	2.6 SEC.	3.2 SEC.	1.6 SEC.
MAX. 1 *	25 SEC.	45 SEC.	25 SEC.	30 SEC.	20 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL
VEH. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK
WALK *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD	- VEH.	- VEH.	- VEH.	- VEH.	- VEH.	- VEH.
SEC. PER ACTUATION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAX. INITIAL *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME B4 REDUCTION *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TIME TO REDUCE *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.

* 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
(A) Street Sign	(A) Street Sign
(B) "YIELD" Sign (R1-2)	(B) "YIELD" Sign (R1-2)
(C) Left Arrow "ONLY" Sign (R3-5L)	(C) Left Arrow "ONLY" Sign (R3-5L)
(E) Right Arrow "ONLY" Sign (R3-5R)	(E) Right Arrow "ONLY" Sign (R3-5R)
(F) No Right Turn Sign (R3-1)	(F) No Right Turn Sign (R3-1)
(G) No Left Turn Sign (R3-2)	(G) No Left Turn Sign (R3-2)
(H) "BELTLINE ONLY" Sign (See Figure 1)	(H) "BELTLINE ONLY" Sign (See Figure 1)
○ Traffic Signal Head	● Traffic Signal Head
○ Modified Signal Head	N/A
○ Sign	○ Sign
○ Pedestrian Signal Head With Push Button & Sign	○ Pedestrian Signal Head With Push Button & Sign
○ Signal Pole with Guy	○ Signal Pole with Guy
○ Signal Pole with Sidewalk Guy	○ Signal Pole with Sidewalk Guy
○ Inductive Loop Detector	○ Inductive Loop Detector
○ Controller & Cabinet	○ Controller & Cabinet
○ Junction Box	○ Junction Box
○ 2-in Underground Conduit	○ 2-in Underground Conduit
○ Right of Way with Marker	○ Right of Way with Marker
→ Directional Arrow	→ Directional Arrow



This plan supersedes the plans signed and sealed on 6/28/02 and 6/11/04.

Signal Upgrade Final Design

SR 2000 (Wake Forest Road) at I-440/US 1 (Beltline) Ramps

Division 5 Wake County Raleigh

PLAN DATE: April 2006 PREPARED BY: Sterling

PREPARED BY: RNM/BEW REVIEWED BY:

REVISIONS

SCALE: 1"=50'

0 50

1"=50'

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER

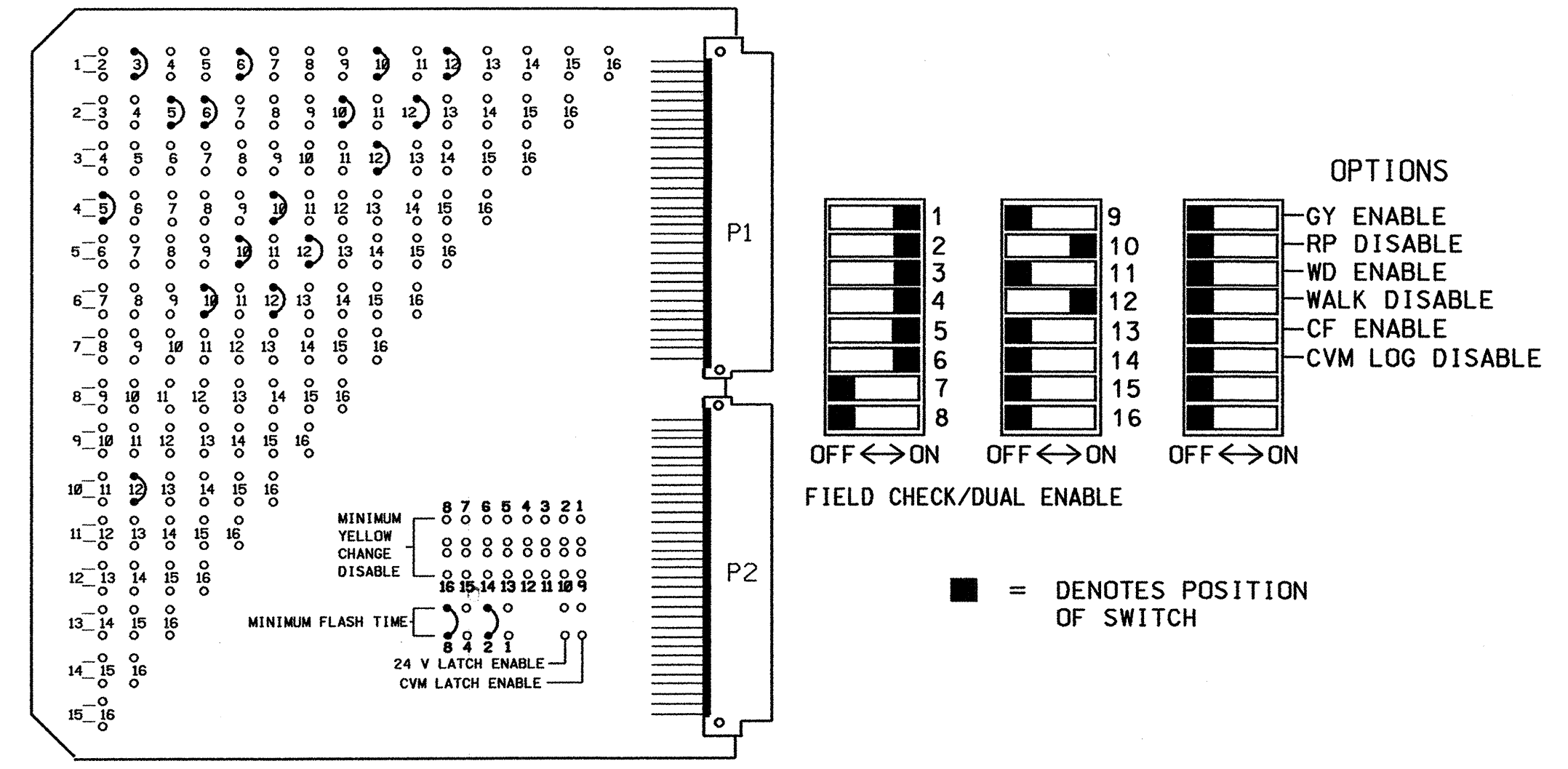
ROBERT J. ZIEBBA

5/16/06

SIG. INVENTORY NO. 05-0256

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

(program card and set switches as shown below)



MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 7, 8, 9 & 11 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.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. THE CONTROLLER AND CABINET IS PART OF THE RALEIGH CITY SIGNAL SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	OLA	2	3	4	OLB	6	7	8	2 PED	OLC	6 PED	OLD
SIGNAL HEAD NO.	11,12	21,22 23,24	31,32	41,42	51,52	61 62,63	NU	NU	NU	25,26	NU	64,65
GREEN		2G	3G	4G		6G				10G		12G
YELLOW		2Y	3Y	4Y		6Y				10Y		12Y
RED		2R	3R	4R		6R				10R		12R
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	CH1	CH1	CH1	CH1
	L3	L1	L7	L5	L11	L9	L15	L13
	∅ 1	∅ 1	∅ 3	∅ 2	∅ 4	∅ 4	∅ 5	∅ 5
CH2	CH2	CH2	CH2	CH2	CH2	CH2	CH2	CH2
NOT USED	L2	L8	L6	L12	L10	L16	L14	
	∅ 1	∅ 3	∅ 3	∅ 5	∅ 4	∅ 6	∅ 5	

DETECTOR RACK NO. 2 SET-UP DETAIL

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

BIU	SLOT	SLOT	SLOT	SLOT
	EMPTY	EMPTY	EMPTY	EMPTY

EQUIPMENT INFORMATION

CONTROLLER.....EAGLE EPAC 300 CONTRACTOR SUPPLIED
 CABINETCONTRACTOR SUPPLIED **TS-2 NC-3B**
 CABINET MOUNT.....BASE
 LOADBAY POSITIONS.....12
 LOAD SWITCHES USED.....1,2,3,4,5,6,10,12
 PHASES USED.....*1,2,3,4,*5,6
 OLA.....1+3
 OLB.....4+5
 OLC.....1+2+4
 OLD.....3+5+6
 *PHASE 1 AND 5 USED FOR TIMING ONLY

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
	L4A,L4B
2A,2B,2C	L5A,L5B
3A	L6A,L6B
3B	L7A,L7B
3C	L8A,L8B
4A	L9A,L9B
4B	L10A,L10B
4C	L11A,L11B
5A	L12A,L12B
5B	L13A,L13B
5C	L14A,L14B
5D	L15A,L15B
6A,6B,6C	L16A,L16B
	L17A,L17B
	L18A,L18B
	L19A,L19B
	L20A,L20B
	L21A,L21B
	L22A,L22B
	L23A,L23B
	L24A,L24B

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	∅ 1		
2	∅ 1		
3	∅ 1		
4			
5	∅ 2		
6	∅ 3		
7	∅ 3	DELAY	5
8	∅ 3	DELAY	15
9	∅ 4		
10	∅ 4		
11	∅ 4	DELAY	5
12	∅ 5		
13	∅ 5		
14	∅ 5		
15	∅ 5		
16	∅ 6		
17			
18			
19			
20			
21			
22			
23			
24			

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	OLA
2	∅ 2
3	∅ 3
4	∅ 4
5	OLB
6	∅ 6
7	∅ 7
8	∅ 8
9	2 PED
10	OLC
11	6 PED
12	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0256
 DESIGNED: April 2006
 SEALED: 05-26-06
 REVISED: NA

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 07-08-04

SIGNAL UPGRADE - FINAL DESIGN - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: **SR 2000 (WAKE FOREST ROAD) AT I-440/US 1 (BELTLINE) RAMPS**

Prepared in the Office of:

122 N. McDowell St., Raleigh, NC 27603

DIVISION 05 WAKE COUNTY RALEIGH

PLAN DATE: MAY 2006 REVIEWED BY:

PREPARED BY: JAMES PETERSON REVIEWED BY:

REVISIONS: INIT. DATE

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

SIGNATURE: *James Peterson* DATE: 6/2/06

SIG. INVENTORY NO. 05-0256

02-JUN-2006 08:12
1:10:00 PM
1:10:00 PM

EAGLE EPAC300 CONTROLLER RING CONFIGURATION DETAIL

(program controller as shown below)

NOTE:
BEFORE PROGRAMMING CONTROLLER, BE SURE TO LOAD DEFAULT PARAMETERS.

SELECT ④ FROM MAIN MENU

EPAC UNIT DATA PRESS # DESIRED

1- STARTUP & MISC	6- ALT SEQUENCES
2- REMOTE FLASH	7- PORT 1 DATA
3- OVERLAP STANDARD	8- I/O MISC
4- OVERLAP SPECIAL	9- SIG DRV OUT
5- RING STRUCTURE	

F- PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 3 RING: 1 NXT PHS: 4

CONCUR PHS: 001000110 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 001000000 0000000000 00000

PED CHN(S): 000000000 0000000010 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 6 RING: 2 NXT PHS: 7

CONCUR PHS: 110001000 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000001000 0000000000 00000

PED CHN(S): 000000000 0100000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 1 RING: 1 NXT PHS: 3

CONCUR PHS: 100001000 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 100000000 0000000000 00000

PED CHN(S): 000000000 0000000100 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 4 RING: 1 NXT PHS: 2

CONCUR PHS: 000100110 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000100000 0000000000 00000

PED CHN(S): 000000000 1000000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 7 RING: 2 NXT PHS: 8

CONCUR PHS: 001100100 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000000100 0000000000 00000

PED CHN(S): 000000000 0000000000 10000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 2 RING: 1 NXT PHS: 1

CONCUR PHS: 010011000 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 010000000 0000000000 00000

PED CHN(S): 000000001 0000000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 5 RING: 2 NXT PHS: 6

CONCUR PHS: 010010000 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000010000 0000000000 00000

PED CHN(S): 000000000 0000000001 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC RING STRUCTURE (0-NO / 1-YES)

PHASE: 8 RING: 2 NXT PHS: 5

CONCUR PHS: 001100010 0000000

PHS/CHN: 123456789 0123456789 01234

VEH CHN(S): 000000010 0000000000 00000

PED CHN(S): 000000000 0010000000 00000

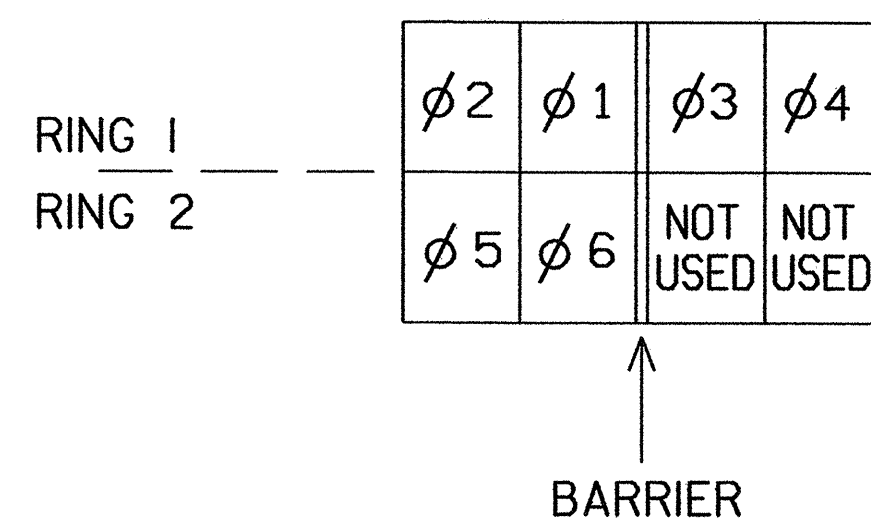
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

end of programming

RING CONFIGURATION NOTE:

PROGRAM THE CONTROLLER TO FOLLOW THE SEQUENCE SHOWN BELOW.

DUAL-QUAD WITH
PHASES 1 & 2 ROTATED



EAGLE EPAC300 CONTROLLER

OVERLAP PROGRAMMING

(program controller as shown below)

FROM MAIN MENU PRESS 4 (UNIT DATA)

EPAC UNIT DATA PRESS # DESIRED

1- STARTUP & MISC	6- ALT SEQUENCES
2- REMOTE FLASH	7- PORT 1 DATA
3- OVERLAP STANDARD	8- I/O MISC
4- OVERLAP SPECIAL	9- SIG DRV OUT
5- RING STRUCTURE	

F- PRIOR MENU

EPAC OVERLAP - A (0-NO / 1-YES)

OVL PHASES: 101000000 0000000

PHS/CHN: 123456789 0123456789 01234

OVL CHN(S): 100000000 0000000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC OVERLAP - B (0-NO / 1-YES)

OVL PHASES: 000110000 0000000

PHS/CHN: 123456789 0123456789 01234

OVL CHN(S): 000010000 0000000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC OVERLAP - C (0-NO / 1-YES)

OVL PHASES: 110100000 0000000

PHS/CHN: 123456789 0123456789 01234

OVL CHN(S): 000000000 1000000000 00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

EPAC OVERLAP - D (0-NO / 1-YES)

OVL PHASES: 001011000 0000000

PHS/CHN: 123456789 0123456789 01234

OVL CHN(S): 000000000 0010000000 00000

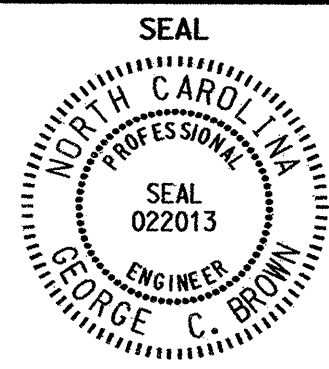
A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

PRESS "F" TO RETURN TO UNIT DATA

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0256
DESIGNED: April 2006
SEALED: 05-26-06
REVISED: NA

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 07-08-04

SIGNAL UPGRADE - FINAL - Sheet 2 of 2

	<p>SR 2000 (WAKE FOREST ROAD) AT I-440/US 1 (BELTLINE) RAMPS</p>	
	<p>DIVISION 05 WAKE COUNTY RALEIGH</p>	<p>PREPARED BY: JAMES PETERSON</p>
	<p>REVISIONS</p>	<p>REVIEWED BY:</p>
	<p>INIT. DATE</p>	<p>DATE</p>

122 N. McDowell St., Raleigh, NC 27603

Signature: *James C. Brown* 6/2/06

SIG. INVENTORY NO. 05-0256

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

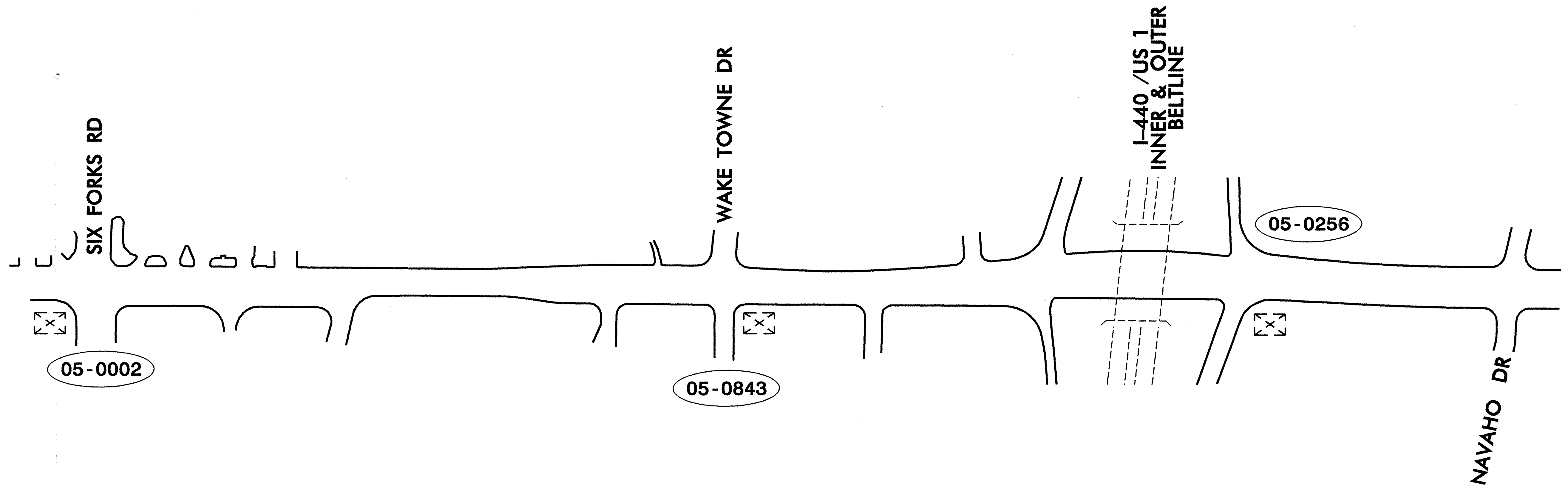
WAKE COUNTY


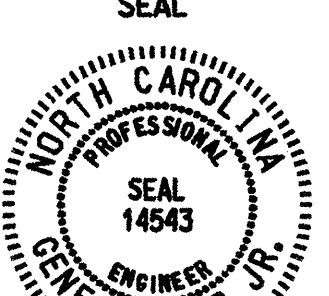
LOCATION: SR 2000 (WAKE FOREST ROAD) FROM
SR 1005 (SIX FORKS ROAD) TO NAVAHO DRIVE

TYPE OF WORK: COMMUNICATIONS CABLE AND CONDUIT ROUTING

W - 4404

PROJECT:



 Prepared in the Office of DIVISION OF HIGHWAYS 222 N. McDowell St., Raleigh, NC 27603	COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS		SEAL  G.G. MURR ENGINEER
	PLAN DATE: AUGUST 2004 PREPARED BY: S.C. WARDLE SCALE: 0	REVIEWED BY: PCL/INA REVIEWED BY: G.G. MURR INIT. DATE SIGNATURE DATE	

- 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

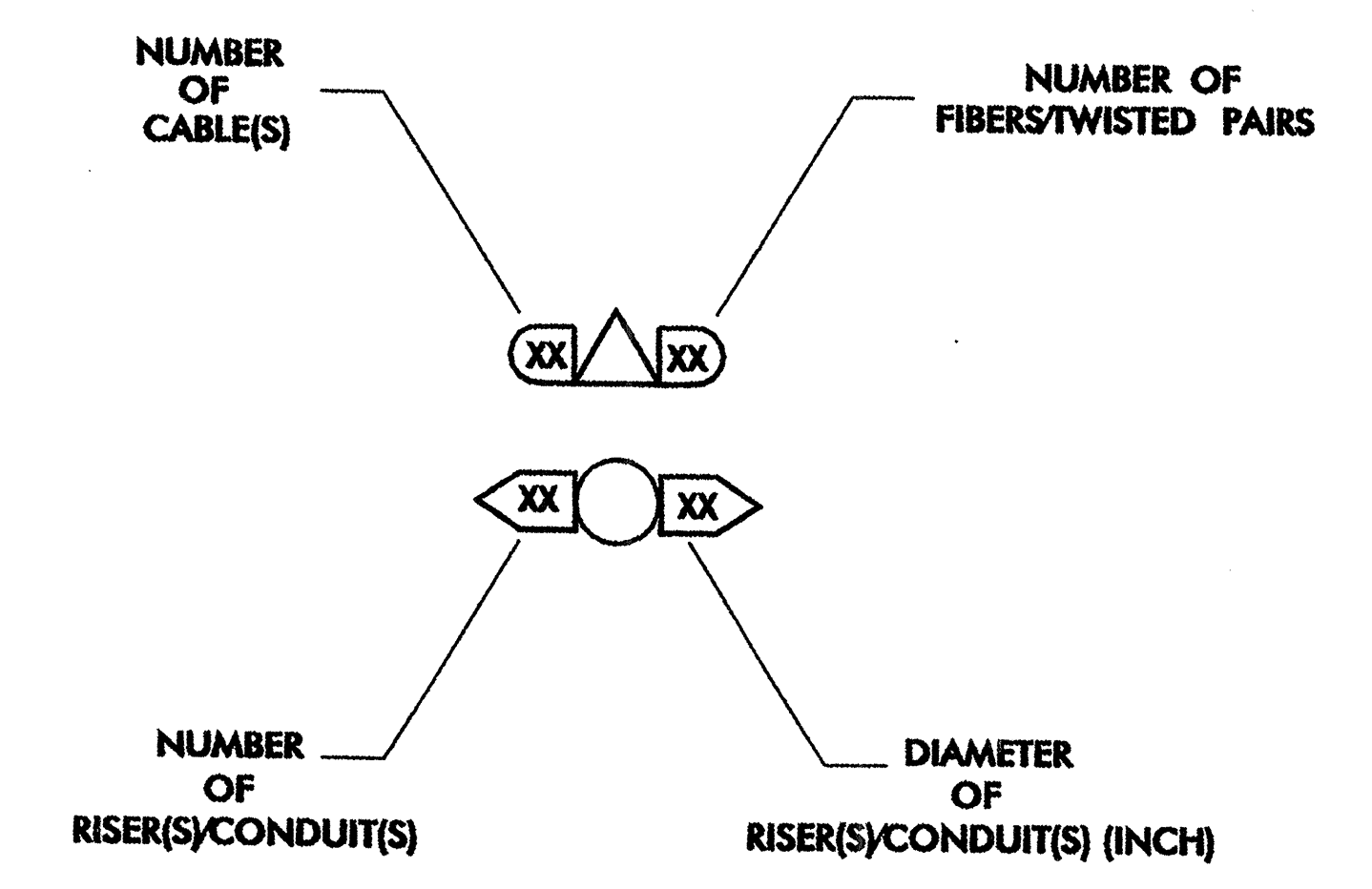
- 34 INSTALL CABINET FOUNDATION
- 35 REMOVE EXISTING CABINET FOUNDATION
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40 INSTALL OVERSIZED JUNCTION BOX
- 41 REMOVE EXISTING JUNCTION BOX
- 42 INSTALL 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

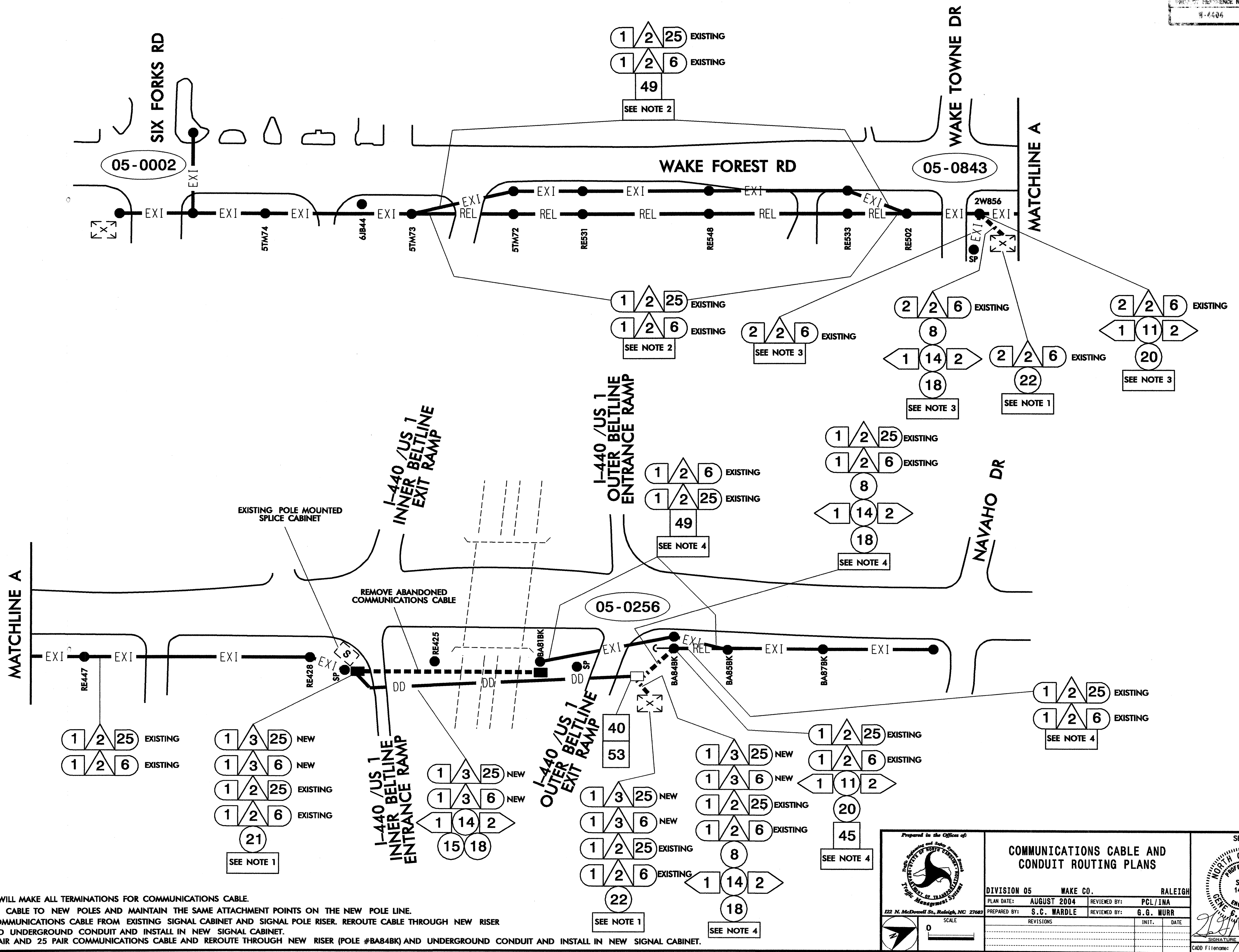
- FO NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST PR NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXI EXISTING COMMUNICATIONS CABLE
- REM EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD NEW DIRECTIONAL DRILLED CONDUIT
- B&J NEW BORED AND JACKED CONDUIT
- 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		SEAL
122 N. McDowell St., Raleigh, NC 27603	PLAN DATE: _____ PREPARED BY: _____	REVIEWED BY: G. A. FULLER REVIEWED BY: _____	SCALE: _____ DATE: _____
REVISIONS: _____	INIT.: _____	DATE: _____	SIGNATURE: _____ DATE: _____



NOTES:

1. CITY OF RALEIGH WILL MAKE ALL TERMINATIONS FOR COMMUNICATIONS CABLE.
2. TRANSFER EXISTING CABLE TO NEW POLES AND MAINTAIN THE SAME ATTACHMENT POINTS ON THE NEW POLE LINE.
3. REMOVE 6 PAIR COMMUNICATIONS CABLE FROM EXISTING SIGNAL CABINET AND SIGNAL POLE RISER. REROUTE CABLE THROUGH NEW RISER (POLE #2W856) AND UNDERGROUND CONDUIT AND INSTALL IN NEW SIGNAL CABINET.
4. CUT EXISTING 6 PAIR AND 25 PAIR COMMUNICATIONS CABLE AND REROUTE THROUGH NEW RISER (POLE #BA84BK) AND UNDERGROUND CONDUIT AND INSTALL IN NEW SIGNAL CABINET.

	COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS		
	DIVISION 05 WAKE CO. RALEIGH PLAN DATE: AUGUST 2004 REVIEWED BY: PCL/INA PREPARED BY: S.C. WARDLE REVIEWED BY: G.G. MURR	REVISIONS INIT. DATE	

SCALE: 0

CADD File name: _____