Project No.	Sheet No.
B–4103	Sig. 1

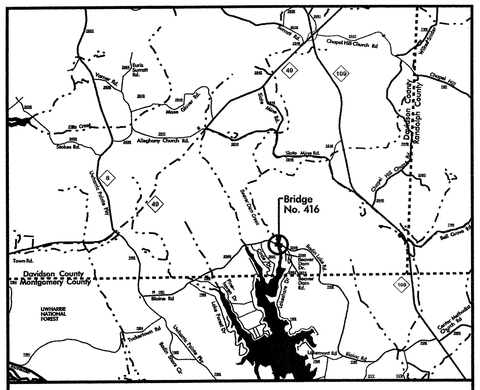
Project: B–4103

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

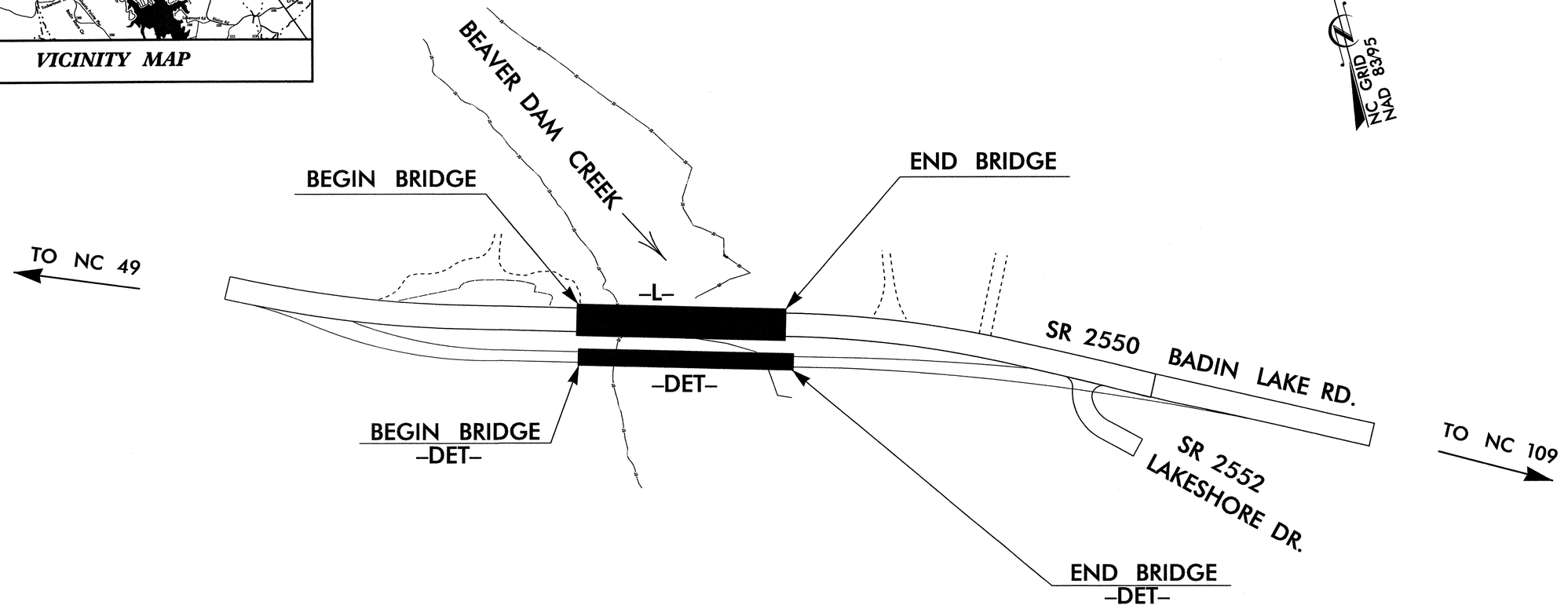
DAVIDSON COUNTY

LOCATION: BRIDGE #416 ON SR 2550 (BADIN LAKE ROAD)

TYPE OF WORK: TEMPORARY TRAFFIC SIGNAL



VICINITY MAP



NC GRID
NAD 83/95

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

Index of Plans

Sheet #	Reference #	Location/Description
Sig. 1	--------	Title Sheet
Sig. 2–4	09–1327	Bridge #416 on SR 2550 (Badin Lake Road)

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT
Contacts:

Timothy J. Williams, PE – S&G Contracts & PEF Support Engineer
John T. Rowe Jr., PE – Signal Equipment Design Engineer

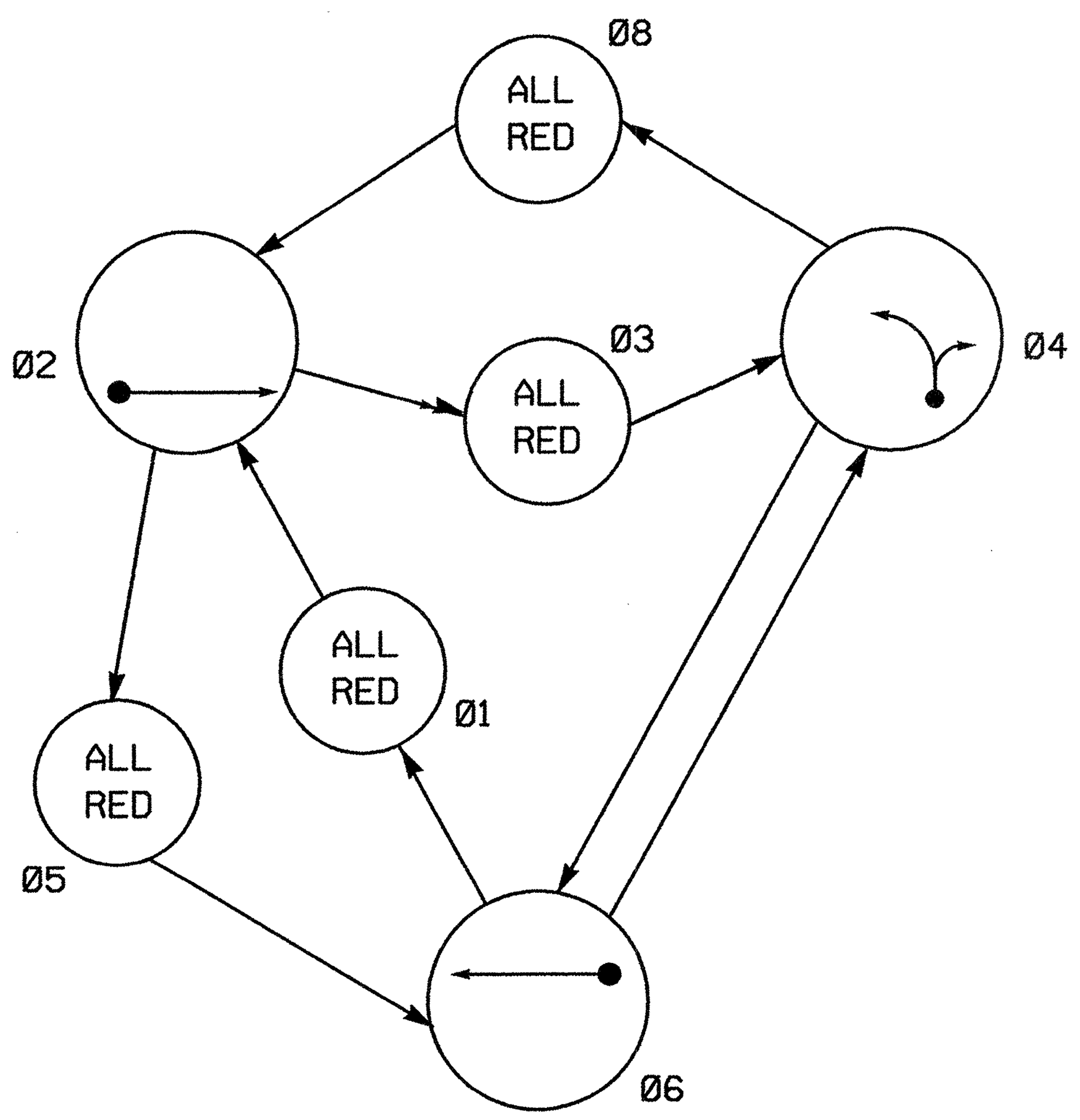
Prepared In the Office of:
DIVISION OF HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

Intelligent Transportation Systems & Signals Unit
STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

750 N. Greenfield Parkway, Garner, NC 27529

PROJECT REFERENCE NO.	SHEET NO.
B-4103	Sig. 2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

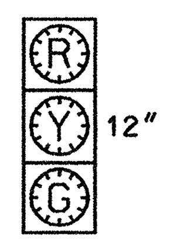
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø8	FLASH
21, 22	R	G	R	R	R	R	R	R
41, 42	R	R	R	G	R	R	R	R
61, 62	R	R	R	R	R	G	R	R

SIGNAL FACE I.D.

Denotes L.E.D.



21, 22
41, 42
61, 62

2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6x40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
4A	6x40	0	2-4-2	Y	4	Y	Y	-	-	5	-	Y
6A	6x40	0	2-4-2	Y	6	Y	Y	-	-	-	-	Y

3 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation.
3. Program controller to start-up in Phase 6 red clearance. Program "First Phases" as Phase 1.
4. In the absence of vehicle calls, program controller for Red Rest after phase 2, 4, or 6.
5. Set all detector units to presence mode.

2070L TIMING CHART

FEATURE	PHASE 1 (ALL RED)	2	3 (ALL RED)	4	5 (ALL RED)	6	8 (ALL RED)
Min Green 1 *	15	10	5	10	15	10	5
Extension 1 *	-	2.0	-	2.0	-	2.0	-
Max Green 1 *	15	45	5	20	15	45	5
Yellow Clearance	4.0	5.4	4.0	4.0	4.0	5.7	4.0
Red Clearance	6.0	10.0	6.0	10.0	6.0	10.0	6.0
Walk 1 *	-	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-
Recall Mode	-	-	-	-	-	-	-
Vehicle Call Memory	-	-	-	-	-	-	-
Dual Entry	-	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON

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

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone	
A	"STOP HERE ON RED" Sign (R10-6)	A
B	"NO TURN ON RED" Sign (R10-11a)	B

Temporary Signal Design 1

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, North Carolina Department of Transportation, Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

Bridge # 416 on SR 2550 (Badin Lake Road)

Division 9 Davidson County near Badin Lake

PLAN DATE:	July 2007	REVIEWED BY:	TJ Williams
PREPARED BY:	TS Thiggen	REVIEWED BY:	

REVISIONS | INIT. | DATE

SCALE 0 40 1"=40'

SEAL
North Carolina Professional Engineer Seal 24393 Timothy J. Williams

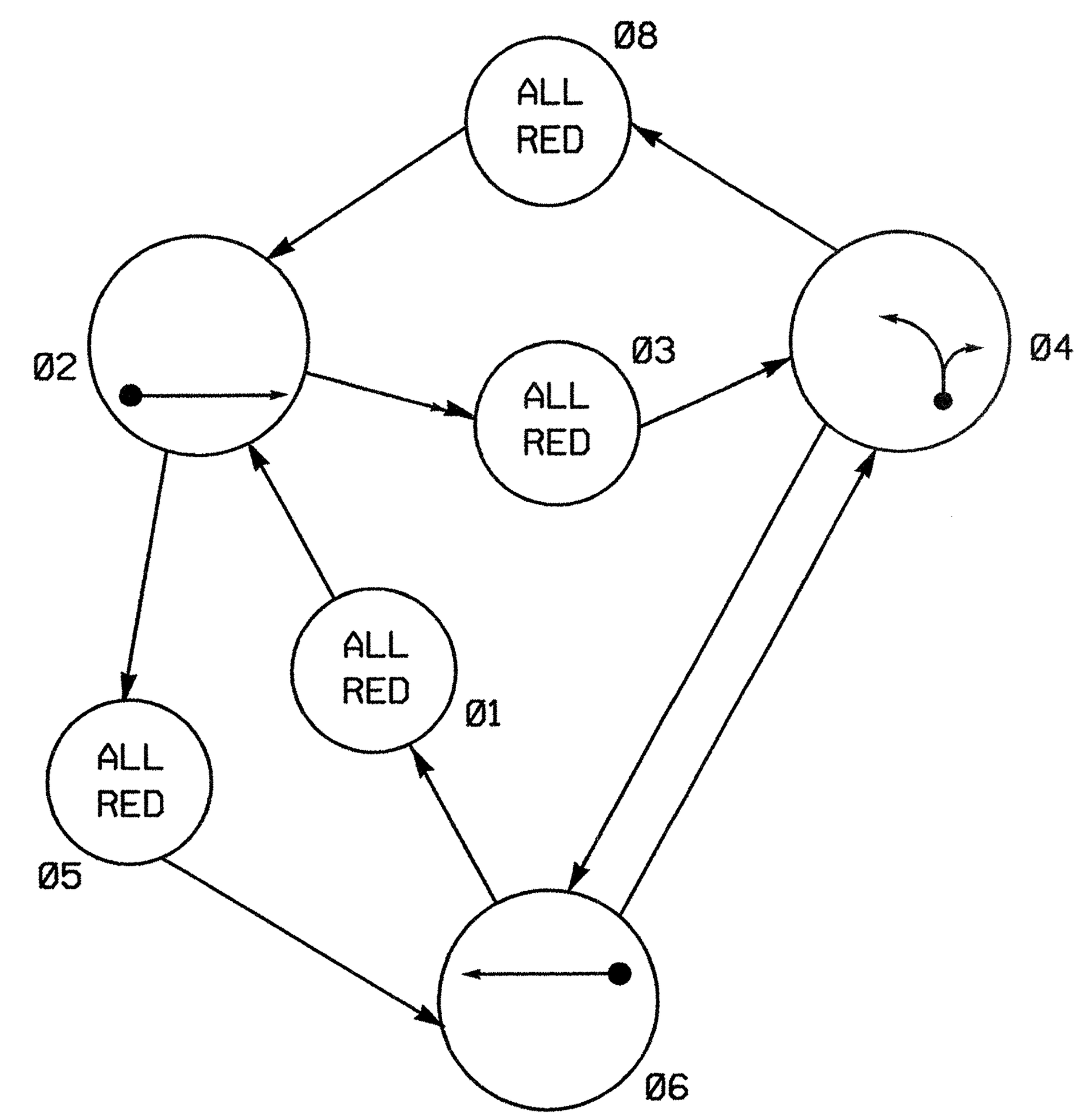
SIGNATURE 8/10/07 DATE

SIG. INVENTORY NO. 09-1327 T1

10-AUG-2007 06:46
S:*Its signals*workgroups*ip projects*b-4103*signals*b-4103_sig_2007mods.dgn
tthiggen

PROJECT REFERENCE NO.	SHEET NO.
B-4103	Sig. 3

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

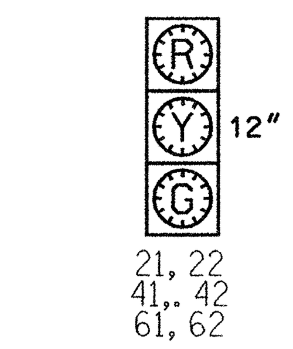
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø8	FLASH
21, 22	R	G	R	R	R	R	R	R
41, 42	R	R	R	G	R	R	R	R
61, 62	R	R	R	R	R	G	R	R

SIGNAL FACE I.D.

Denotes L.E.D.



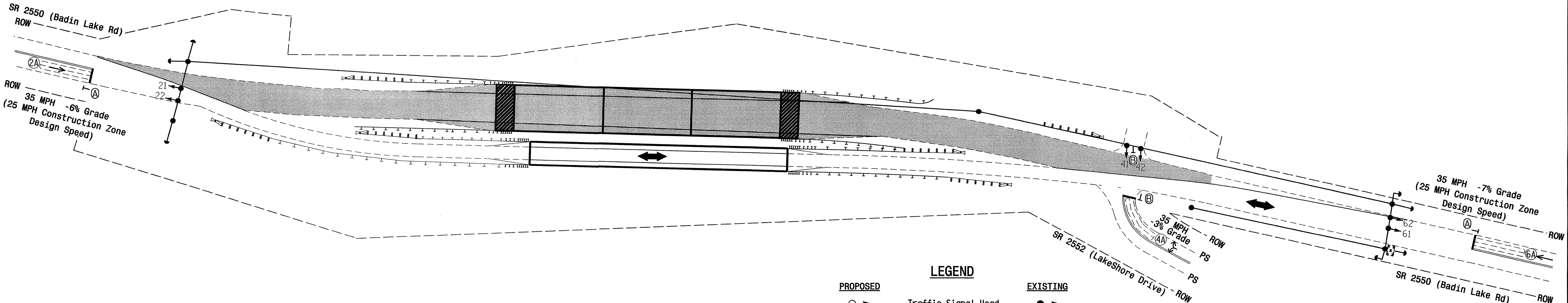
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6x40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
4A	6x40	0	2-4-2	Y	4	Y	Y	-	-	5	-	Y
6A	6x40	0	2-4-2	Y	6	Y	Y	-	-	-	-	Y

3 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation.
3. Program controller to start-up in Phase 6 red clearance. Program "First Phases" as Phase 1.
4. In the absence of vehicle calls, program controller for Red Rest after phase 2, 4, or 6.
5. Set all detector units to presence mode.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone	
Ⓐ	"STOP HERE ON RED" Sign (R10-6)	Ⓐ
Ⓑ	"NO TURN ON RED" Sign (R10-11a)	Ⓑ

2070L TIMING CHART

FEATURE	PHASE						
	1 (ALL RED)	2	3 (ALL RED)	4	5 (ALL RED)	6	8 (ALL RED)
Min Green 1 *	15	10	5	10	15	10	5
Extension 1 *	-	2.0	-	2.0	-	2.0	-
Max Green 1 *	15	45	5	20	15	45	5
Yellow Clearance	4.0	5.4	4.0	4.0	4.0	5.7	4.0
Red Clearance	6.0	10.0	6.0	10.0	6.0	10.0	6.0
Walk 1 *	-	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-
Recall Mode	-	-	-	-	-	-	-
Vehicle Call Memory	-	-	-	-	-	-	-
Dual Entry	-	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON

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

Temporary Signal Design 2 - To Be Removed upon Project Completion

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, North Carolina Department of Transportation
750 N. Greenfield Pkwy, Garner, NC 27529

Bridge # 416
on
SR 2550 (Badin Lake Road)

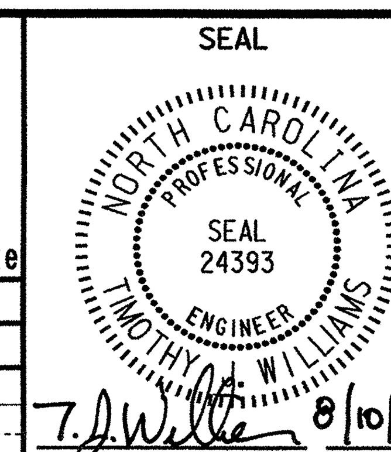
Division 9 Davidson County near Badin Lake

PLAN DATE: July 2007	REVIEWED BY: TJ Williams
PREPARED BY: TS Thigpen	REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL



SIGNATURE 8/10/07 DATE

SIG. INVENTORY NO. 09-1327 T2

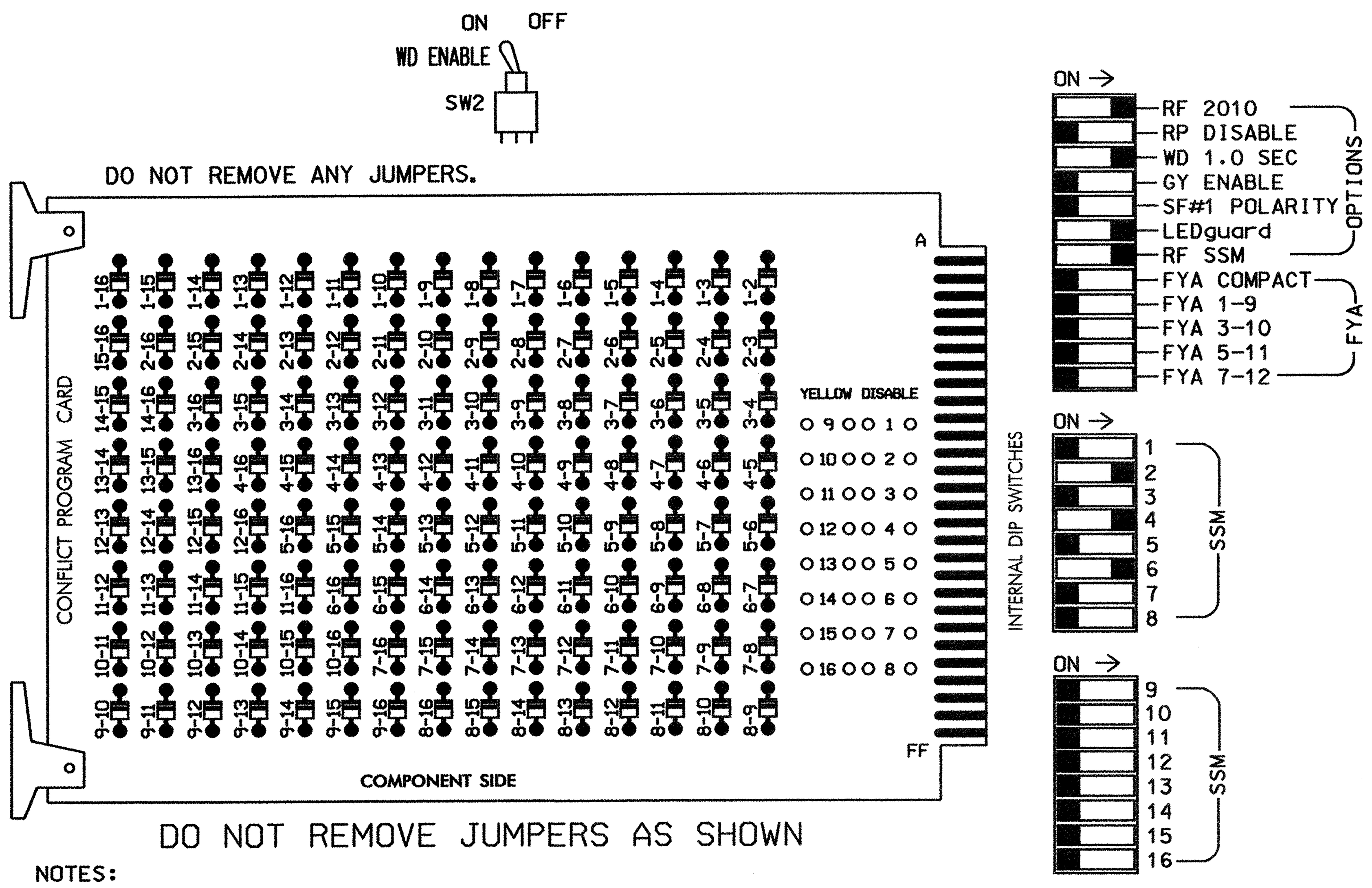
10-AUG-2007 06:48
s:\its signals\workgroups\ip projects\b-4103\signals\b-4103_sig_2007mods.dgn
tthigpen

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5,7,8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phase 6, on the controller unit, for Start Up In Red Clearance.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phase 1, on the controller unit, as First Phase.
6. Program phases 2, 4 and 6 for Red Rest.

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



DO NOT REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB21-3,4	I2U	39	1	2	2	Y	Y			
4A	TB21-7,8	I4U	41	3	4	4	Y	Y			5
6A	TB21-11,12	I6U	40	2	6	6	Y	Y			

INPUT FILE POSITION LEGEND: I2L

FILE I
SLOT 2
LOWER

BACK-UP PROTECTION PROGRAMMING DETAIL

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE DYNAMIC/BACKUP CONTROL FUNCTIONS 1,2,3,4,5,6,7,8,9,10 AND 11.
2. FROM PHASE CONTROL FUNCTIONS MENU PRESS '2' (DYNAMIC/BACKUP CONTROL FUNCTIONS).

```
DYNAMIC/BACKUP CONTROL FUNCTION #01
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦X
OMIT PHASES     ¦   XXXX X
CALL PHASES     ¦
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #02
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦ X
OMIT PHASES     ¦X  X X X
CALL PHASES     ¦
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #03
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦  X
OMIT PHASES     ¦XX  XX X
CALL PHASES     ¦
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #04
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦   X
OMIT PHASES     ¦XXX X
CALL PHASES     ¦
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #05
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦    X
OMIT PHASES     ¦XXXX   X
CALL PHASES     ¦
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #06
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦     X
OMIT PHASES     ¦ XX X  X
CALL PHASES     ¦
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #07
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦      X
OMIT PHASES     ¦X XXXX
CALL PHASES     ¦
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #08
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦X
OMIT PHASES     ¦
CALL PHASES     ¦ X
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #09
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦ X
OMIT PHASES     ¦
CALL PHASES     ¦   X
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #10
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦   X
OMIT PHASES     ¦
CALL PHASES     ¦    X
```

PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #11
                  OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR          PHASES:¦12345678910111213141516
IF PHASES ARE ON¦      X
OMIT PHASES     ¦
CALL PHASES     ¦ X
```

BACKUP PROTECTION PROGRAMMING COMPLETE

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3 AND 4.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).
3. THE PROGRAMMING SHOWN BELOW IS NECESSARY FOR SIGNALS TO OPERATE AS SHOWN ON THE SIGNAL DESIGN PLANS.

```
LOGICAL I/O COMMAND #1  (+/-COMMAND#)
IF  ACTIVE PHASE              #2   IS ON
AND VEHICLE CALL ON PHASE     #4   IS ON
            SCROLL DOWN
THEN:
SET  INPUT ASSIGNMENT         #20  ON
```

NOTE: CALL PHASE 3 THROUGH DETECTOR 3

PRESS '+'

```
LOGICAL I/O COMMAND #2  (+/-COMMAND#)
IF  ACTIVE PHASE              #2   IS ON
AND VEHICLE CALL ON PHASE     #6   IS ON
            SCROLL DOWN
THEN:
SET INPUT ASSIGNMENT          #17  ON
```

NOTE: CALL PHASE 5 THROUGH DETECTOR 5

PRESS '+'

```
LOGICAL I/O COMMAND #3  (+/-COMMAND#)
IF  ACTIVE PHASE              #4   IS ON
AND VEHICLE CALL ON PHASE     #2   IS ON
            SCROLL DOWN
THEN:
SET INPUT ASSIGNMENT          #4   ON
```

NOTE: CALL PHASE 8 THROUGH DETECTOR 8

PRESS '+'

```
LOGICAL I/O COMMAND #4  (+/-COMMAND#)
IF  ACTIVE PHASE              #6   IS ON
AND VEHICLE CALL ON PHASE     #2   IS ON
            SCROLL DOWN
THEN:
SET INPUT ASSIGNMENT          #18  ON
```

NOTE: CALL PHASE 1 THROUGH DETECTOR 1

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER..............CONTRACTOR SUPPLIED 2070L
CABINET.................CONTRACTOR SUPPLIED 336
SOFTWARE................ECONOLITE OASIS
CABINET MOUNT...........POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S2,S4,S6
PHASES USED.............1,2,3,4,5,6,8
OVERLAPS................NONE

PHASE SEQUENCE PROGRAMMING DETAIL

(program controller as shown below)

FROM OASIS LOCAL CONTROLLER MAIN MENU
SELECT: 4 PHASE SEQUENCE

```
PHASE SEQUENCE: PAGE 1   NEXT: PAGES)  ↘
RNG¦LEAD    BARRIER 1   X-LAG¦LEAD    BARRIER 2   X-LAG
1  ¦1       2     3     4    ¦5       6     8     0
2  ¦0       0     0     0    ¦0       0     0     0
3  ¦0       0     0     0    ¦0       0     0     0
4  ¦0       0     0     0    ¦0       0     0     0
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-1327 T1&T2
DESIGNED: July 2007
SEALED: 08-10-07
REVISED: NA

Temporary Signal Design 1 and 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals Management Section
750 N. Greenfield Pwky, Garner, NC 27529

Bridge #416 on SR 2550 (Badin Lake Road)

Division 09 | Davidson County | near Badin Lake

PLAN DATE: August 2007 | REVIEWED BY: JTR
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE, JR

John T. Rowe Jr. (signature) 8-15-07
SIGNATURE DATE

SIG. INVENTORY NO. 09-1327 T1&T2