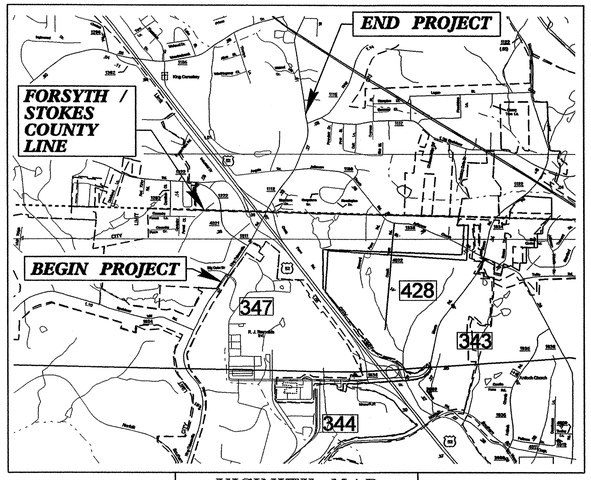
TIP PROJECT: R-2201

METRIC	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
	N.C.	R-2201	Sig. 1	
	F.A. PROJ. NO.			
	PROJECT ID. NO.			



VICINITY MAP

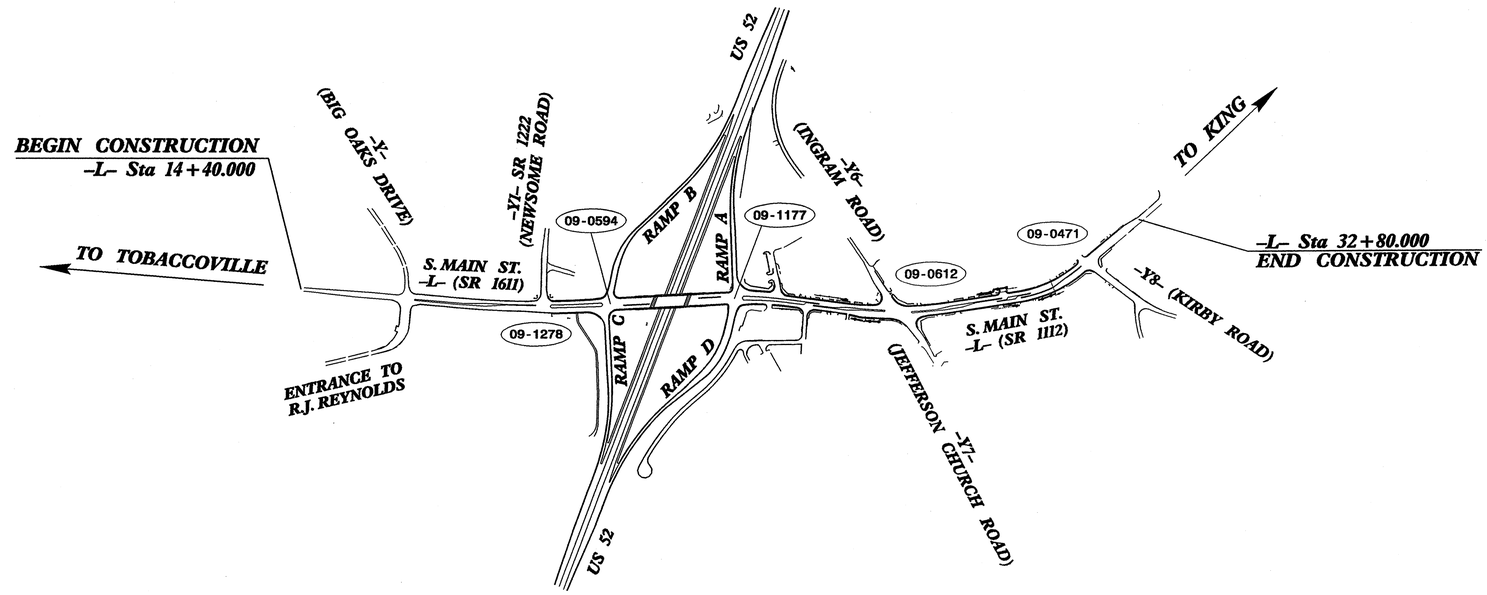
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

FORSYTH AND STOKES COUNTIES

LOCATION: SR 1611 /SR 1112 FROM SR 4021 (NEWSOME ROAD) TO SR 1115 (KIRBY ROAD)

TYPE OF WORK: TRAFFIC SIGNALS AND FIBER OPTIC COMMUNICATIONS INSTALLATION FOR CLOSED LOOP SYSTEM

NAD 83



LEGEND

(XX-XXXX) SIGNAL INVENTORY NUMBER

INDEX OF SHEETS

2006 ROADWAY STANDARD DRAWINGS AND STANDARD SPECIFICATIONS

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" – DATED JULY 2006 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED PART OF THESE PLANS:

STD. NO.	DESCRIPTION
1705.01	SIGNAL HEADS – VEHICULAR SIGNAL HEADS
1715.01	UNDERGROUND CONDUIT – TRENCHING
1716.01	JUNCTION BOXES
1720.01	WOOD POLES
1721.01	GUY ASSEMBLIES
1725.01	INDUCTIVE DETECTION LOOPS
1730.01	FIBER–OPTIC CABLE – SPARE CABLE STORAGE
1751.01	CONTROLLERS AND CABINETS – CABINET COMPONENT LAYOUT

PLANS PREPARED BY

PBSJ
1616 E. Millbrook Road, Suite 310
Raleigh, North Carolina 27609
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MELISSA R. COONEY, P.E. – PROJECT MANAGER
LISA M. MOON, P.E. – PROJECT ENGINEER

NCDOT CONTACTS:
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GEORGE C. BROWN, P.E. – SIGNALS MANAGEMENT

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch
NCDEPARTMENT OF TRANSPORTATION
750 Greenfield Parkway, Garner, NC 27529

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 025692 ENGINEER MELISSA R. COONEY

SIGNATURE Melissa R Cooney 9-19-08 DATE

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2201	Sig. 2

PHASING DIAGRAM

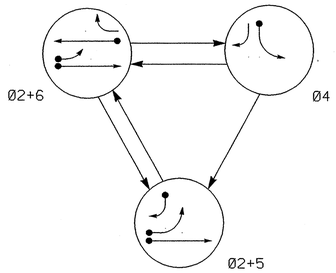
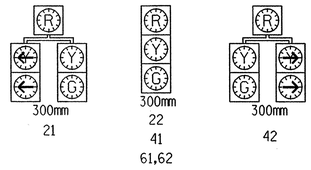


TABLE OF OPERATION				
SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	FLASH
21	G	G	R	Y
22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
61,62	R	G	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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

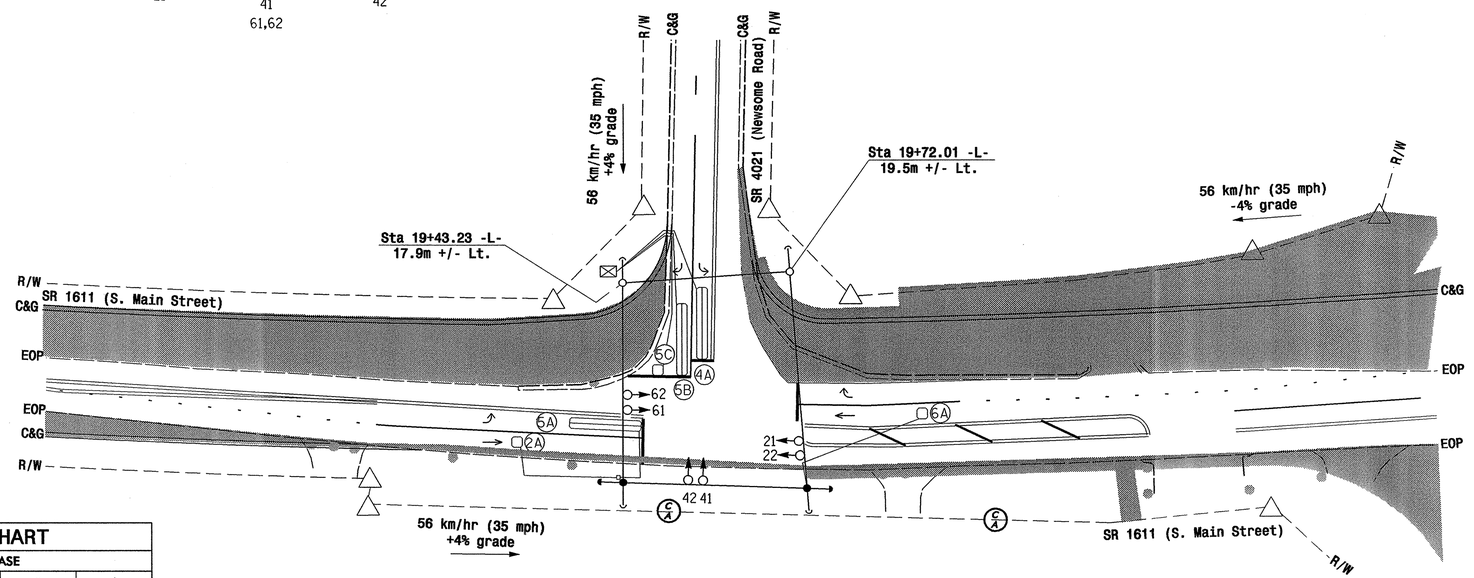
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	1.8X1.8	20	4	Y	2	Y	Y	-	-	-	-	Y
4A	1.8X12	0	2-4-2	Y	4	Y	Y	-	-	2	-	Y
5A	1.8X12	0	2-4-2	Y	5	Y	Y	-	-	15	-	Y
					2	Y	Y	-	-	-	-	Y
5B	1.8X12	0	2-4-2	Y	5	Y	Y	-	-	15	-	Y
5C	1.8X1.8	0	4	Y	5	Y	Y	-	-	15	-	Y
6A	1.8X1.8	20	4	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 unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Pavement markings are existing.
6. Direct bury all lead in from detector loops to junction boxes and controller cabinet.



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	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
	Construction Zone	
	Controlled Access	N/A

2070L TIMING CHART

FEATURE	PHASE 2	4	5	6
Min Green 1 *	10	7	7	10
Extension 1 *	3.0	2.0	2.0	3.0
Max Green 1 *	50	30	15	50
Yellow Clearance	3.6	3.0	3.0	4.1
Red Clearance	1.2	2.0	1.8	1.6
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN. RECALL	-	-	MIN. RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - TCP EXISTING CONDITIONS

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Prepared for the Offices of: Traffic Engineering Branch, Traffic Signals and Geometrics Section, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Pkwy, Garner, NC 27529

SCALE 5 0 10 1:500

SR 1611 (S. MAIN STREET) AT SR 4021 (NEWSOME ROAD)

DIVISION 9 FORSYTH COUNTY KING

PLAN DATE: SEPTEMBER 2008 REVIEWED BY: MR COONEY

PREPARED BY: KG EGGLESTON REVIEWED BY: LM MOON

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

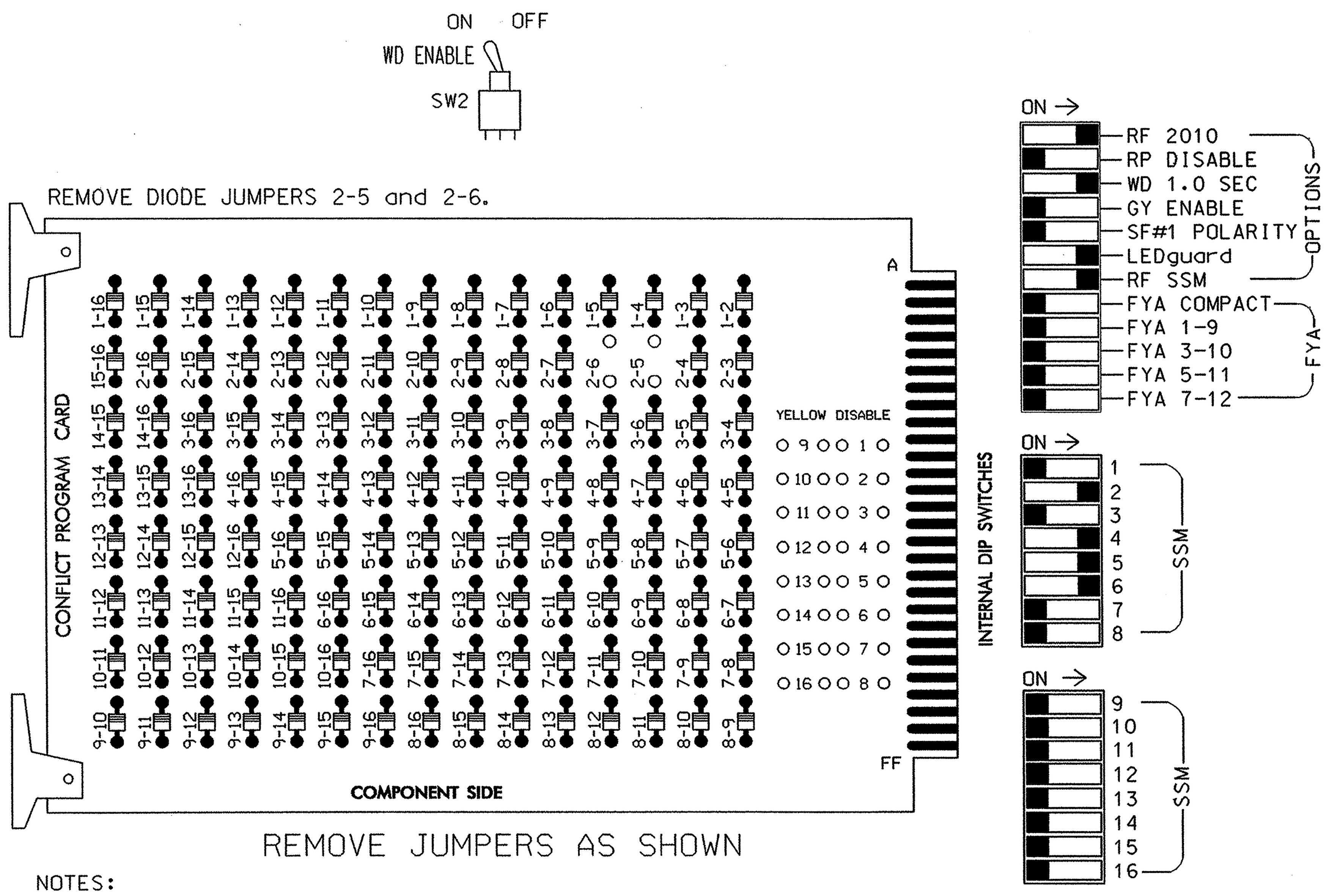
Melissa Cooney 9-19-08
SIGNATURE DATE

SIG. INVENTORY NO. 09-1278T1

19-SEP-2008 16:14
G:\TEG\Curr\10003326 R-2201 CLS\signals\09-1278T1.dgn
22976 AT RALCUSR41

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

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		1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	U	SLOT EMPTY	ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		NOT USED				NOT USED								ST DC ISOLATOR
"J"	U	ø5 5A	ø5 5B	ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	ø5 5C	NOT USED											

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

⊗ Wired Input - Do not populate slot with detector card

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L

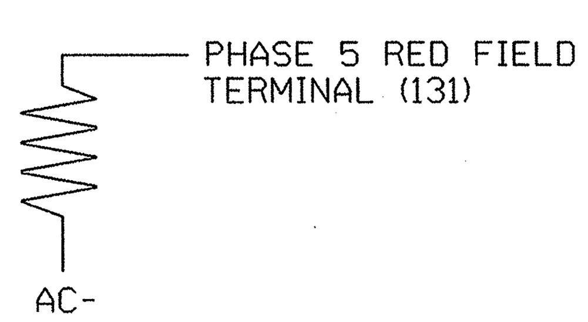
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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 Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

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 1,3,7 8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.

EQUIPMENT INFORMATION

CONTROLLER..............CONTRACTOR SUPPLIED 2070L
CABINET.................CONTRACTOR SUPPLIED 332 /W/ AUX
SOFTWARE................ECONOLITE OASIS
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S2,S4,S5,S6
PHASES USED.............2,4,5,6
OVERLAP "A".............NOT USED
OVERLAP "B".............NOT USED
OVERLAP "C".............NOT USED
OVERLAP "D".............NOT USED

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			2
5A[1]	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
5C	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			

[1] Add jumper from J1-W to I4-W, on rear of input file.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	21,42	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101		*	134										
YELLOW		129			102			135										
GREEN		130			103			136										
RED ARROW																		
YELLOW ARROW							132											
FLASHING YELLOW ARROW																		
GREEN ARROW							133											

NU = Not Used

* Denotes install load resistor. See load resistor installation detail this sheet.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGNS: 09-1278T1&T2
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Signal Upgrade - Temporary Designs 1 and 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for 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

SR 1611 (S. MAIN STREET) AT SR 4021 (NEWSOME ROAD)

DIVISION 9 FORSYTH COUNTY KING

PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY
PREPARED BY: JA WILES	REVIEWED BY: LM MOON

REVISIONS	INIT.	DATE

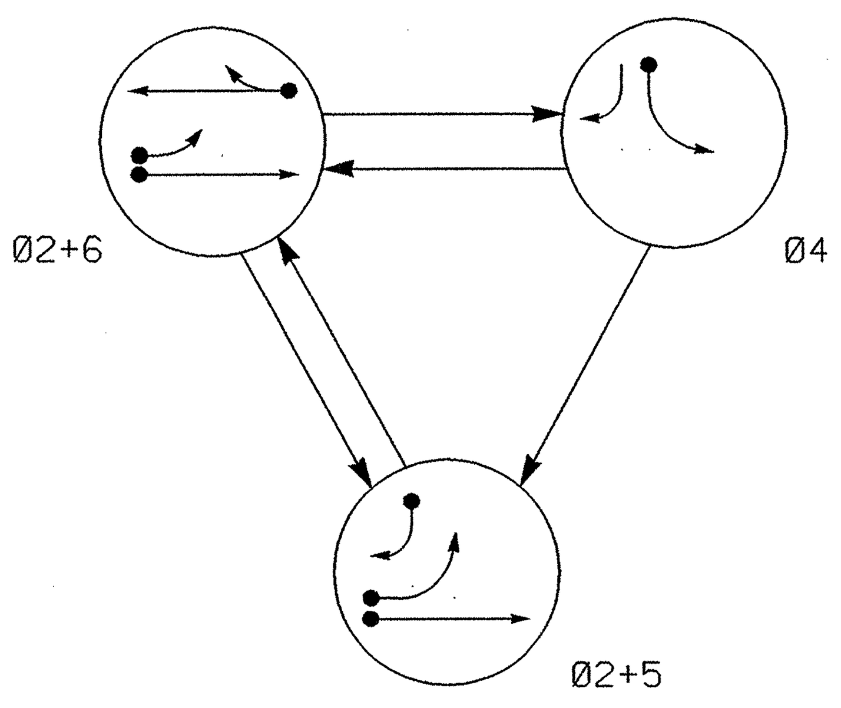
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

SIGNATURE 9-19-08 DATE

SIG. INVENTORY NO. 09-1278T1&T2

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2201	Sig. 4

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

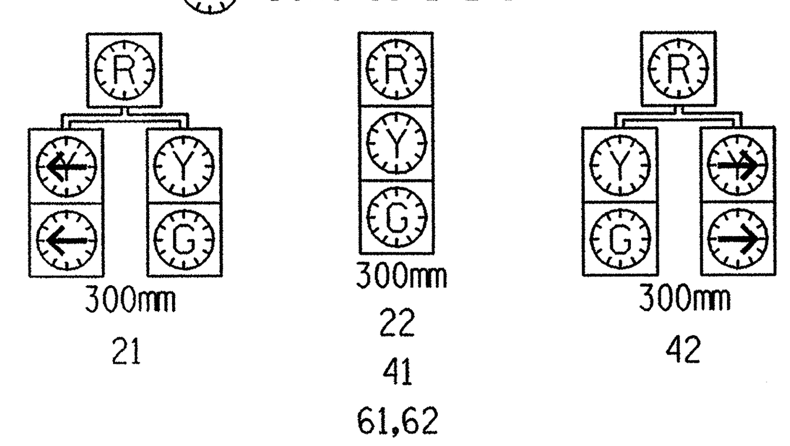
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	FLASH
21	G / ←	G	R	Y
22	G	G	R	Y
41	R	R	G	R
42	R / →	R	G	R
61,62	R	G	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



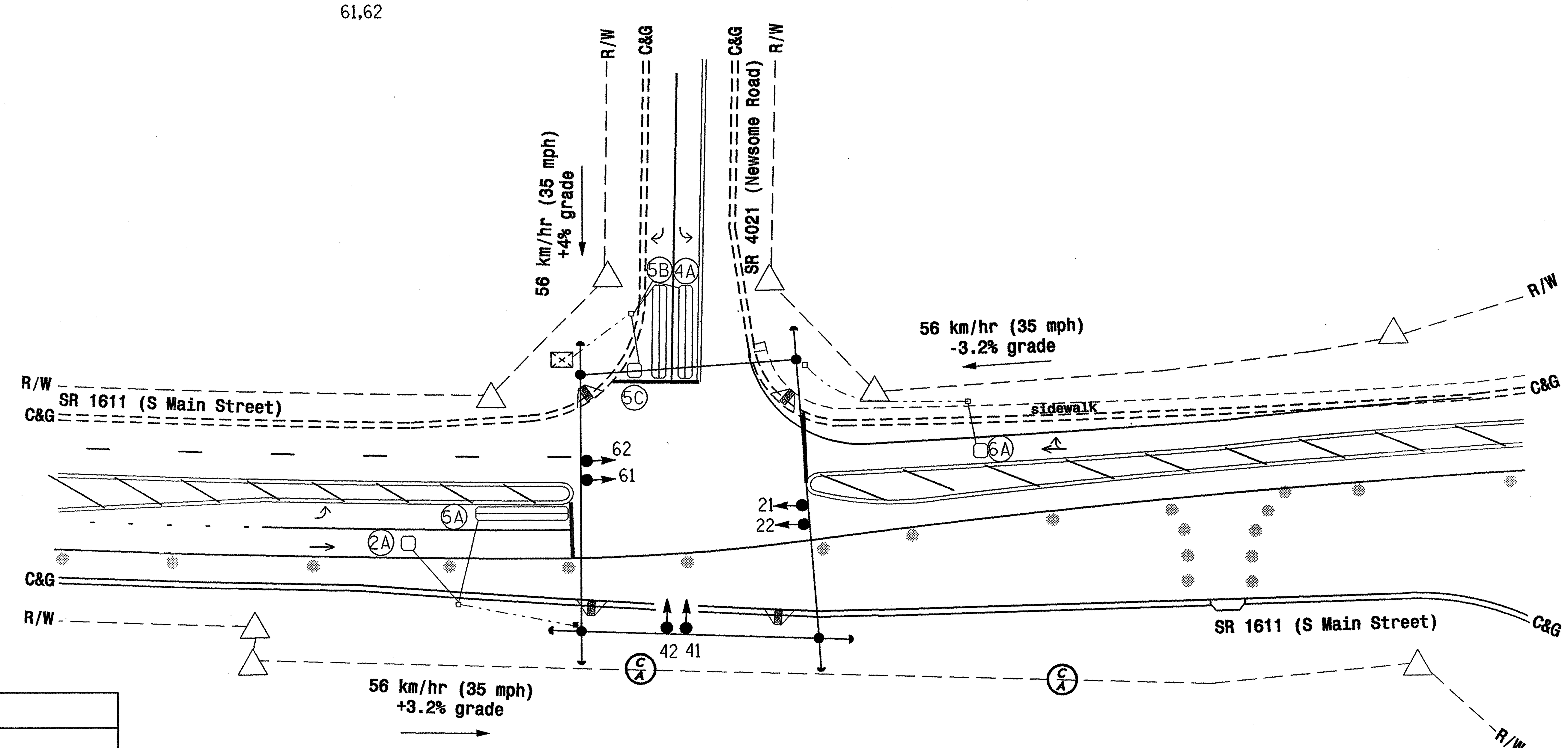
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	1.8X1.8	20	4	Y	2	Y	Y	-	-	-	-	-
4A	1.8X12	0	2-4-2	Y	4	Y	Y	-	-	2	-	-
5A	1.8X12	0	2-4-2	Y	5	Y	Y	-	-	15	-	-
					2	Y	Y	-	-	-	-	-
5B	1.8X12	0	2-4-2	Y	5	Y	Y	-	-	15	-	-
5C	1.8X1.8	0	3	Y	5	Y	Y	-	-	15	-	-
6A	1.8X1.8	20	4	Y	6	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 unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Reposition existing signal heads numbered 21, 22, 61 and 62 as shown on plans.



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	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
N/A	Wheelchair Ramp	
	Controlled Access	N/A

2070L TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green 1 *	10	7	7	10
Extension 1 *	3.0	2.0	2.0	3.0
Max Green 1 *	75	30	15	75
Yellow Clearance	3.7	3.0	3.0	4.1
Red Clearance	1.8	2.1	2.5	1.6
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN. RECALL	-	-	MIN. RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

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SIGNAL UPGRADE - TEMPORARY DESIGN 2 - TCP PHASE II

Prepared for the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

SCALE 5 0 10
1:500

SR 1611 (S. MAIN STREET) AT SR 4021 (NEWSOME ROAD)

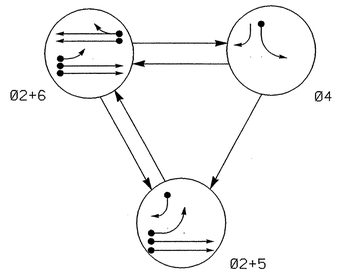
DIVISION 9	FORSYTH COUNTY		KING
PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY		
PREPARED BY: KG EGGLESTON	REVIEWED BY: LM MOON		
REVISIONS		INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025892 MELISSA R. COONEY

Melissa R. Cooney 9-19-08
SIGNATURE DATE

SIG. INVENTORY NO. 09-1278T2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

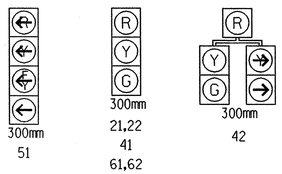
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT

TABLE OF OPERATION				
SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	FLASH
21,22	G	G	R	Y
41	R	R	G	R
42	R/G	R	G	R
51	←	←	R	R
61,62	R	G	R	Y

STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL						
		TO ←		TO ↑		TO →
		1	2	1	2	1	2
FROM ←	←	←	←	↑	R	↑	R
FROM ↑	↑	↑	↑	↑	R	↑	R
FROM →	R	R	R	R	R	R	R

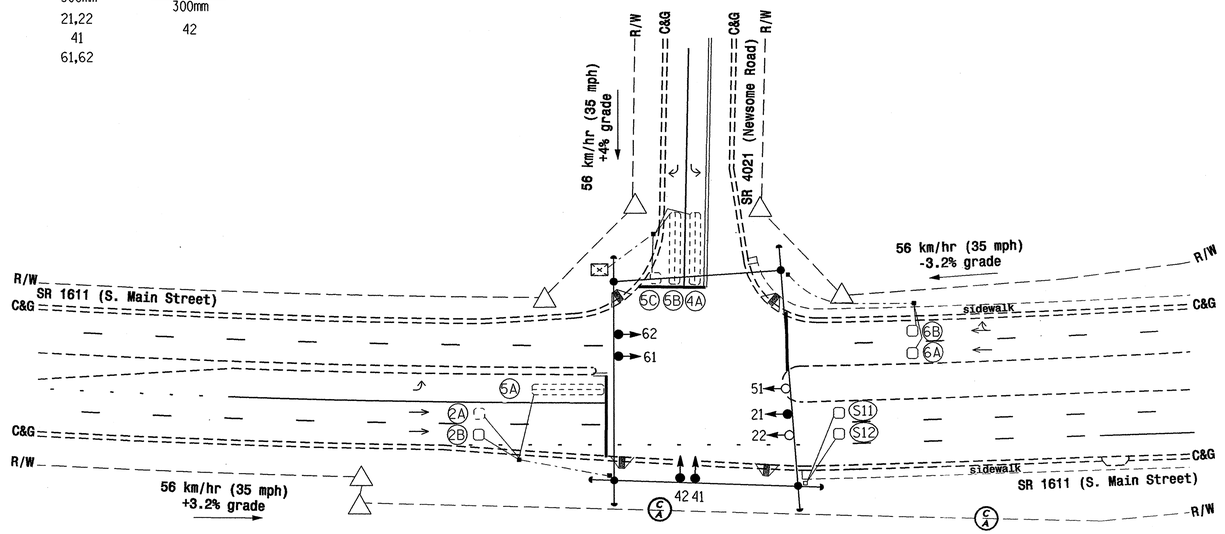
SIGNAL FACE I.D.

All Heads L.E.D.



2070L LOOP & DETECTOR INSTALLATION												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	1.8X1.8	20	4	-	2	Y	Y	-	-	-	-	-
2B	1.8X1.8	20	4	Y	2	Y	Y	-	-	-	-	Y
4A	1.8X12	0	2-4-2	-	4	Y	Y	-	-	2	-	-
5A	1.8X12	0	2-4-2	-	5	Y	Y	-	-	15	-	-
					2	Y	Y	-	-	-	-	-
5B	1.8X12	0	2-4-2	-	5	Y	Y	-	-	15	-	-
5C	1.8X1.8	0	3	-	5	Y	Y	-	-	15	-	-
6A	1.8X1.8	20	4	Y	6	Y	Y	-	-	-	-	-
6B	1.8X1.8	20	4	Y	6	Y	Y	-	-	-	-	Y
S11	1.8X1.8	+40	4	Y	-	-	-	-	-	-	Y	Y
S12	1.8X1.8	+40	4	Y	-	-	-	-	-	-	Y	Y

SYSTEM DETECTORS		
System Detector ID Number	Signal System ID Number	Control Zone
S11	1278-11	N/A
S12	1278-12	N/A



3 PHASE FULLY ACTUATED (SR 1611/1112 (S. MAIN STREET) CLOSED LOOP SYSTEM)

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 unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Reposition existing signal heads numbered 21, 61 and 62 as shown on plans.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset #: 1278.

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	■
----------	50mm Underground Conduit	----------
N/A	Right of Way with Marker	—△—
→	Directional Arrow	→
→	Pavement Marking Arrow	→
N/A	Wheelchair Ramp	♿

2070L TIMING CHART				
	PHASE			
FEATURE	2	4	5	6
Min Green 1 *	10	7	7	10
Extension 1 *	3.0	2.0	2.0	3.0
Max Green 1 *	30	30	15	30
Yellow Clearance	3.7	3.0	3.0	4.1
Red Clearance	1.8	2.4	2.5	1.6
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN. RECALL	-	-	MIN. RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

SIGNAL UPGRADE - FINAL DESIGN

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888

Prepared for the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, NC DEPARTMENT OF TRANSPORTATION, 750 N. Greenfield Pkwy, Garner, NC 27529

SR 1611 (S. MAIN STREET) AT SR 4021 (NEWSOME ROAD)

DIVISION 9 FORSYTH COUNTY KING

PLAN DATE: SEPTEMBER 2008 REVIEWED BY: MR COONEY

PREPARED BY: KG EGGLESTON REVIEWED BY: LN MOON

SCALE 5 0 10 1:500

REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 025992 ENGINEER MELISSA R. COONEY

SIGNATURE DATE 9-19-08

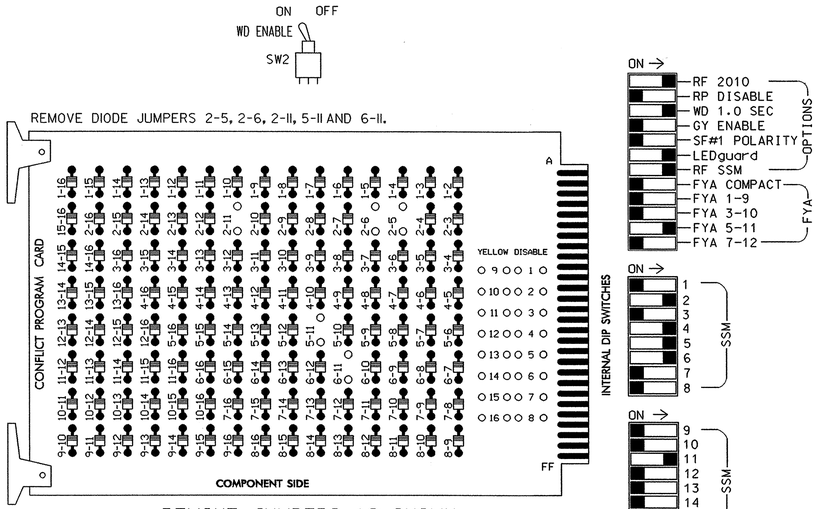
SIG. INVENTORY NO. 09-1278

19-SEP-2008 15:42
G:\ENG\Cur\#10000326 R-2201 CLS\Signals\09-1278.dgn
22976 AT RALCGJOR41

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 6

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

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.

■ = DENOTES POSITION OF SWITCH

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 1,3,7 8,9,10,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. The cabinet and controller are part of the SR 1611/1112 (S. Main Street) Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5		S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5★		6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC★	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	42	51	61,62	NU	NU	NU	NU	NU	NU	NU	51	NU	NU
RED		128			101		✳		134										
YELLOW		129			102				135										
GREEN		130			103				136										
RED ARROW																	A114		
YELLOW ARROW							132										A115		
FLASHING YELLOW ARROW																	A116		
GREEN ARROW							133	133											

NU = Not Used

✳ Denotes install load resistor. See load resistor installation detail this sheet.

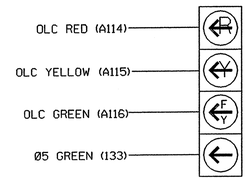
★ See pictorial of head wiring in detail below.

EQUIPMENT INFORMATION

CONTROLLER.....EXISTING 2070L
CABINET.....CONTRACTOR SUPPLIED 332 /W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S4,S5,S6,S12
PHASES USED.....2,4,5,6
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....5+6
OVERLAP "D".....NOT USED

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)



NOTE

1. The sequence display for this signal requires special logic programming. See sheet 2 of 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S11	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		Ø2 2B				NOT USED			SYS. DET. S12					ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø5 5B	Ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø5 5C	Ø6 6B											

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

⊗ Wired Input - Do not populate slot with detector card

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

INPUT FILE CONNECTION & PROGRAMMING CHART

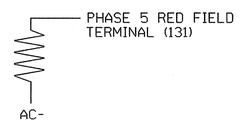
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			2
✳ S11	TB6-9,10	I9U	60	22	11	SYS					
✳ S12	TB6-11,12	I9L	62	24	13	SYS					
5A[1]	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
5C	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			

✳ SYSTEM DETECTOR ONLY. REMOVE THE VEHICLE PHASE ASSIGNED TO THIS DETECTOR IN THE DEFAULT PROGRAMMING.

[1] Add jumper from J1-W to I4-W, on rear of input file.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



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 Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

CLOSED LOOP SYSTEM DATA :	
CONTROLLER ASSET	1278

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-1278
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Final Design - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N. Greenfield Pwky, Garner, NC 27529

SR 1611 (S. MAIN STREET) AT SR 4021 (NEWSOME ROAD)

DIVISION 9 FORSYTH COUNTY KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA H. COONEY
SIGNATURE 9-19-08 DATE
SIG. INVENTORY NO. 09-1278

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888

06-OCT-2008 13:03
C:\Projects\2008\1336 R-2201 CLS\Signals\Wiring\M09-1278w.dgn
18568
AT RAL2004001

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 7

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL

TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(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 AND 3.

2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```
LOGICAL I/O COMMAND #1  (+/-COMMAND#)
IF  ACTIVE PHASE       #5  IS ON
AND RED CLEAR ON PHASE #5  IS ON

SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #42 ON
SET OUTPUT  ASSIGNMENT #43 OFF
```

NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

PRESS '+'

```
LOGICAL I/O COMMAND #2  (+/-COMMAND#)
IF  ACTIVE PHASE       #5  IS ON

SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #44 OFF
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 5 (HEAD 51).

PRESS '+'

```
LOGICAL I/O COMMAND #3  (+/-COMMAND#)
IF  YELLOW ON PHASE    #5  IS ON

SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #43 ON
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

OUTPUT 42 = Overlap C Red
OUTPUT 43 = Overlap C Yellow
OUTPUT 44 = Overlap C Green

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).
PRESS '+' TWICE.

```
PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE:          |12345678910111213141516
VEH OVL PARENTS: |    XX
VEH OVL NOT VEH: |
VEH OVL NOT PED: |
VEH OVL GRN EXT: |
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-1278
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Signal Upgrade - Final Design - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
North Carolina Traffic Engineering and Safety Systems Branch
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1611 (S. MAIN STREET)
AT
SR 4021 (NEWSOME ROAD)

DIVISION 9	FORSYTH COUNTY	KING
PLAN DATE: SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY: MRC	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

SEAL

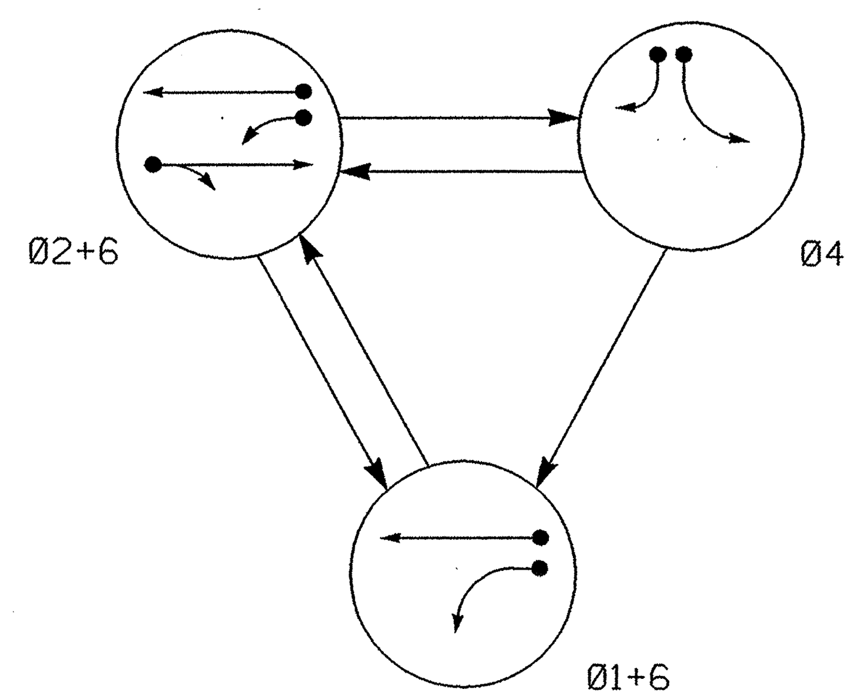
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

SIGNATURE: MRCooney 9-19-08 DATE

SIG. INVENTORY NO. 09-1278

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2201	Sig. 8

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

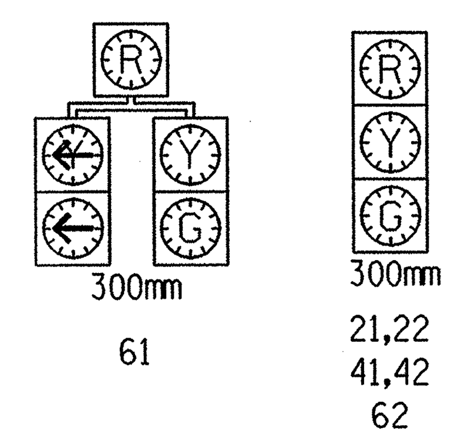
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø4	FLASH
21,22	R	G	R	Y
41,42	R	R	G	R
61	G	G	R	Y
62	G	G	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



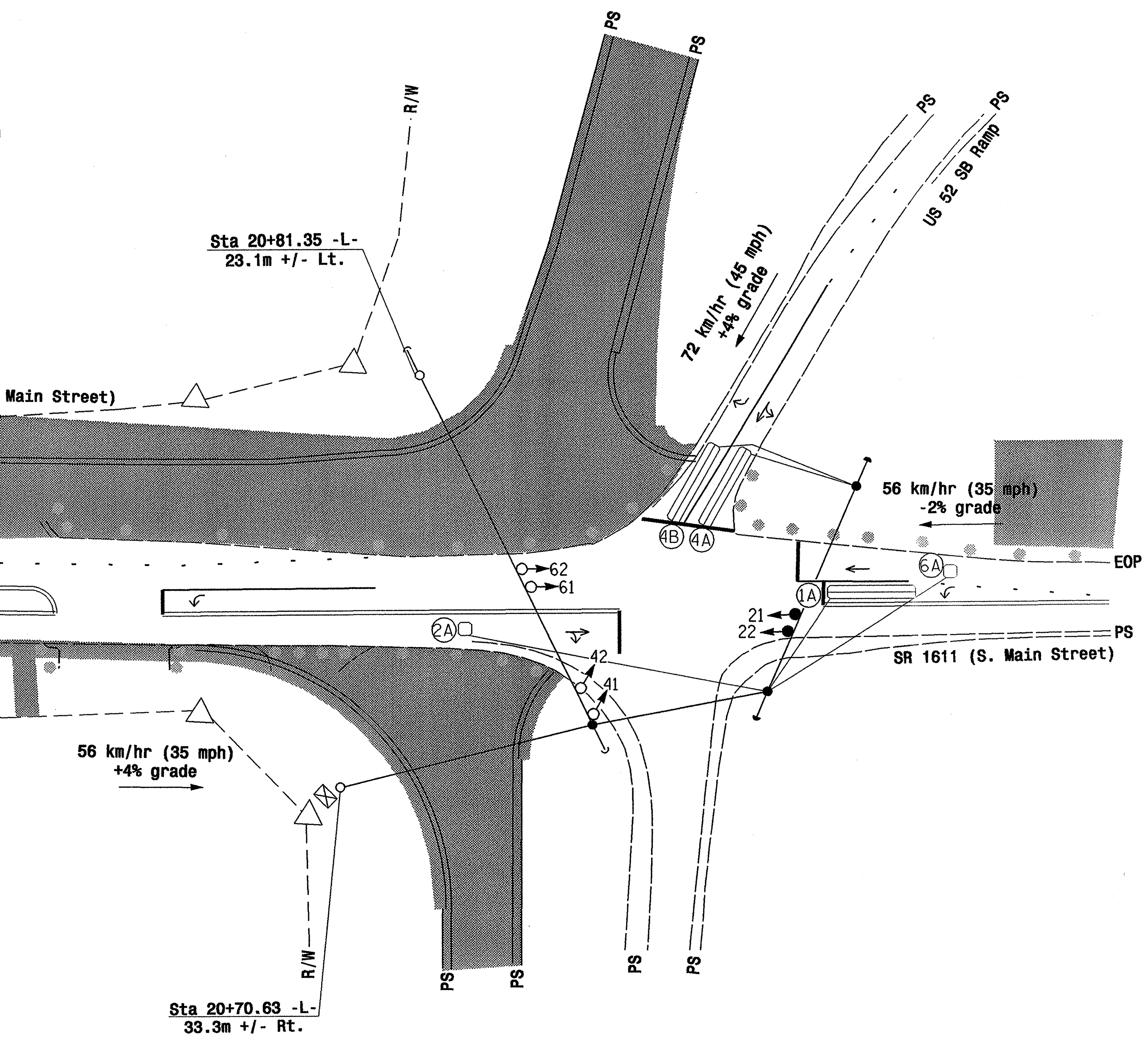
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	1.8X12	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
					6	Y	Y	-	-	-	-	Y
2A	1.8x1.8	20	4	Y	2	Y	Y	-	-	-	-	Y
4A	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	15	-	Y
6A	1.8x1.8	20	4	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 unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Pavement markings are existing.
6. Direct bury all lead in from detector loops to junction boxes and controller cabinet.



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 with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
	Construction Zone	
	Controlled Access	N/A

2070L TIMING CHART

FEATURE	PHASE 1	2	4	6
Min Green 1 *	7	10	7	10
Extension 1 *	2.0	3.0	4.0	3.0
Max Green 1 *	25	75	15	75
Yellow Clearance	3.0	3.6	4.2	4.0
Red Clearance	2.1	1.1	1.0	1.6
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	MIN. RECALL	-	MIN. RECALL
Vehicle Call Memory	-	YELLOW	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - TCP EXISTING CONDITIONS

Prepared for the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1611 (S. MAIN STREET)
AT
US 52 SB RAMPS

DIVISION 9	FORSYTH COUNTY	KING
PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY	
PREPARED BY: KG EGGLESTON	REVIEWED BY: LW MOON	
REVISIONS	INIT.	DATE

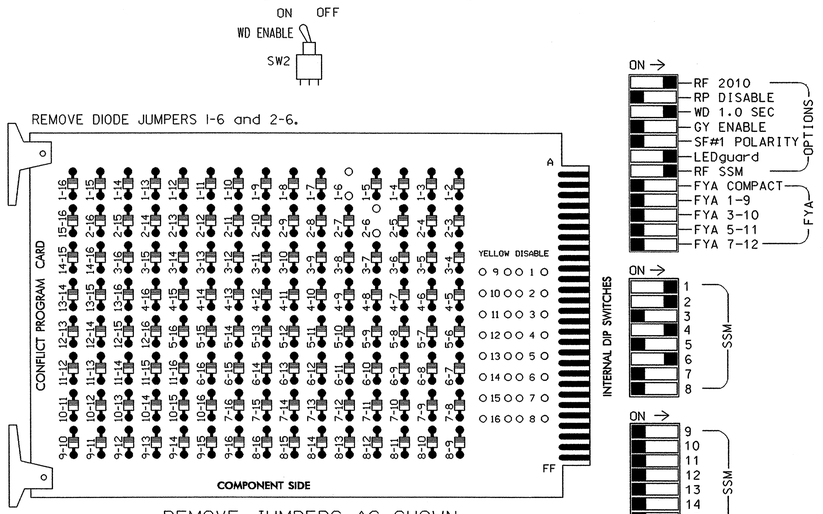
SCALE 1:500

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY
SIGNATURE 9-19-08 DATE
SIG. INVENTORY NO. 09-0594T1

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 9

EDI MODEL 2010ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

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.

■ = DENOTES POSITION OF SWITCH

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø1 1A	ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	NOT USED				ø4 4B								ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	ø6 6A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		NOT USED												

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

⊗ Wired Input - Do not populate slot with detector card

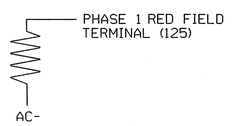
FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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 inputs in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

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 3,5,7 8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.

EQUIPMENT INFORMATION

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

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			

[1] Add jumper from I1-W to J4-W, on rear of input file.

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.	61	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU
RED	✳	128			101			134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW												
YELLOW ARROW	126											
GREEN ARROW	127											
✋												
🚶												

NU = Not Used

✳ Denotes install load resistor. See load resistor installation detail this sheet.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGNS: 09-0594T1&T3
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Temporary Designs 1 & 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION — Traffic Engineering and Safety Systems Branch — Signals Management Section

750 N. Greenfield Pwky, Garner, NC 27529

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SR 1611 (S. MAIN STREET)
AT
US 52 SB RAMPS

DIVISION 9 FORSYTH COUNTY KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LW MOON

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025992 MELISSA R. COONEY

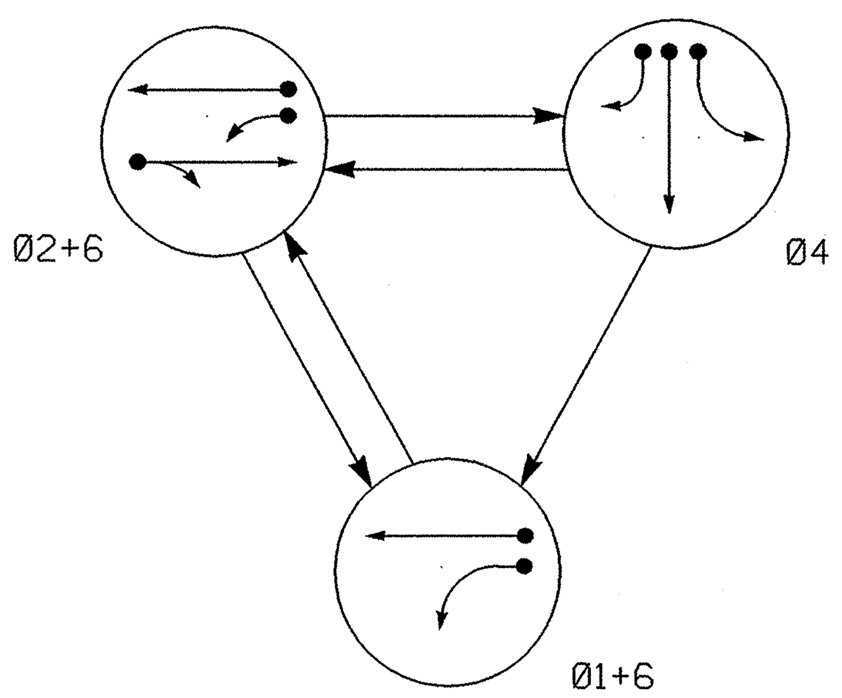
SIGNATURE DATE 9-19-08

SIG. INVENTORY NO. 09-0594T1&T3

03-OCT-2008 16:51
G:\TEC\Cur*\10003326 R-2201 CLS\Signals\Wiring\09-0594_t1w.dgn
22508 AT RAL81C6511

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 10

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

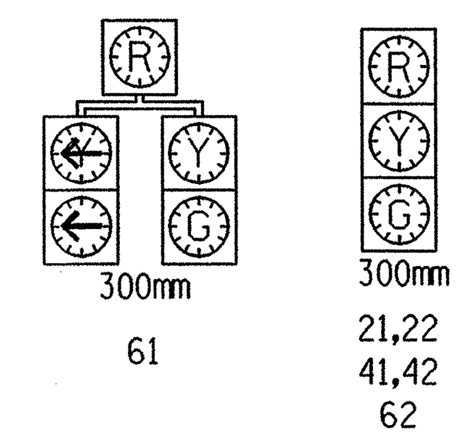
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø4	FLASH
21,22	R	G	R	Y
41,42	R	R	G	R
61	↘G	G	R	Y
62	G	G	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



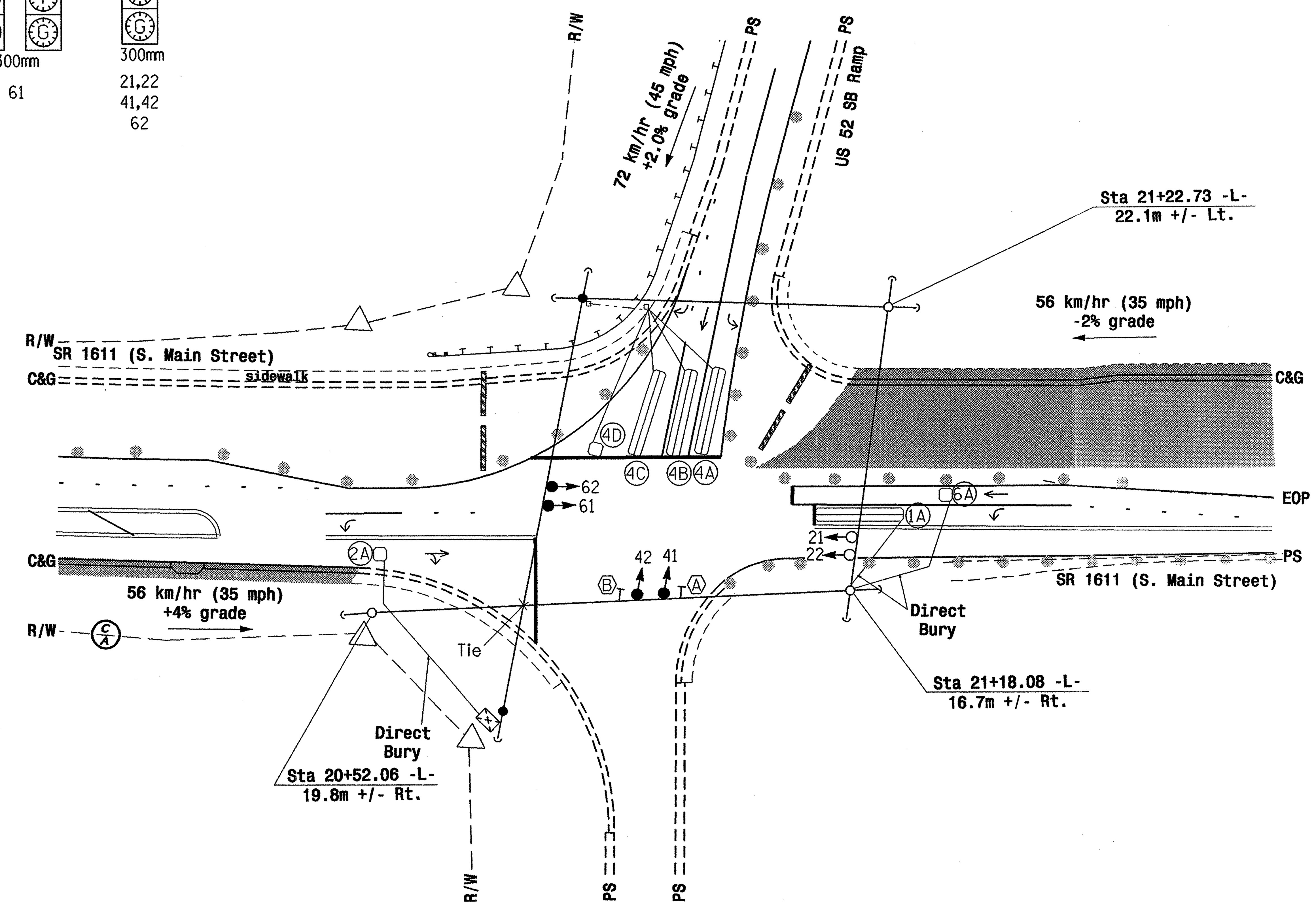
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
1A	1.8X12	0	2-4-2	Y	1	Y	Y	-	-	15	-	-
					6	Y	Y	-	-	-	-	-
2A	1.8x1.8	20	4	Y	2	Y	Y	-	-	-	-	-
4A	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	-	-	-
4B	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	-	-	-
4C	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	15	-	Y
4D	1.8x1.8	0	4	Y	4	Y	Y	-	-	15	-	Y
6A	1.8x1.8	20	4	Y	6	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 unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Relocate existing signal heads numbered 41, 42, 61 and 62.



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 with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
N/A	Guardrail	
	Construction Zone	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
	Type III Barricade	N/A

2070L TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 4	PHASE 6
Min Green 1 *	7	10	7	10
Extension 1 *	2.0	3.0	3.0	3.0
Max Green 1 *	25	75	15	75
Yellow Clearance	3.0	3.6	4.3	4.0
Red Clearance	2.8	1.6	1.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	MIN. RECALL	-	MIN. RECALL
Vehicle Call Memory	-	YELLOW	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SIGNAL UPGRADE - TEMPORARY DESIGN 2 - TCP PHASE I

SR 1611 (S. MAIN STREET)
AT
US 52 SB RAMPS

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch
Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

DIVISION 9	FORSYTH COUNTY	KING
PLAN DATE: SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY: KG EGGLESTON	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

SCALE 1:500 (0, 5, 10)

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025892 MELISSA R. COONEY

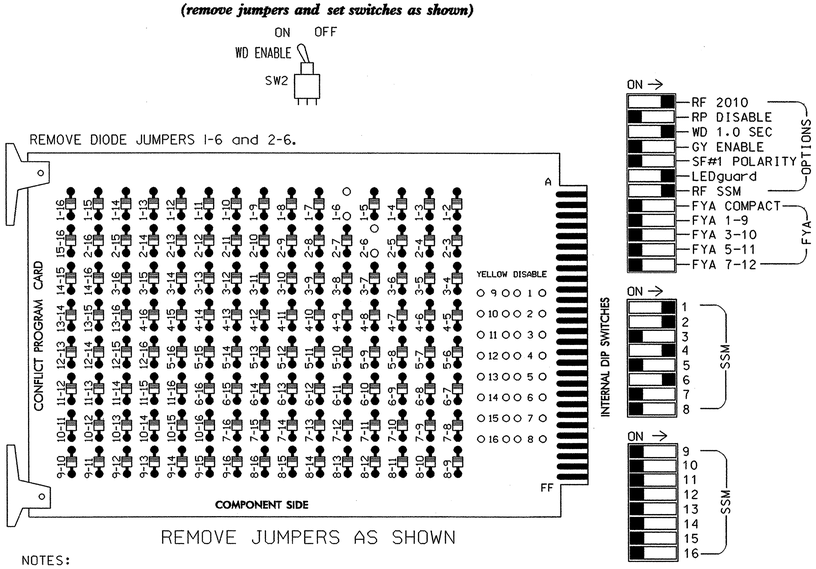
SIGNATURE 9-19-08 DATE

SIG. INVENTORY NO. 09-0594T2

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 11

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

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.

■ = DENOTES POSITION OF SWITCH

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø4 4A	Ø4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	NOT USED				Ø4 4B	Ø4 4D							ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	SLOT EMPTY	WIRED ⊗ INPUT	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		NOT USED												

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

⊗ Wired Input - Do not populate slot with detector card

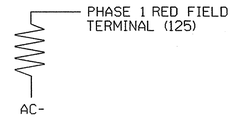
FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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 inputs in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

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 3,5,7, 8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.

EQUIPMENT INFORMATION

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

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			15
4D	TB6-3,4	I7L	78	40	44	4	Y	Y			15
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			

[1]Add jumper from I1-W to J4-W, on rear of input file.

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.	61	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU
RED	✳	128			101			134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW												
YELLOW ARROW	126											
GREEN ARROW	127											
✋												
🚶												

NU = Not Used

✳ Denotes install load resistor. See load resistor installation detail this sheet.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0594T2
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Temporary Design 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1611 (S. MAIN STREET)
AT
US 52 SB RAMPS

DIVISION 9 FORSYTH COUNTY KING

PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY
PREPARED BY: JA WILES	REVIEWED BY: LM MOON

REVISIONS	INIT.	DATE

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch
Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025092 ENGINEER MELISSA R. COONEY
SIGNATURE 9-19-08 DATE

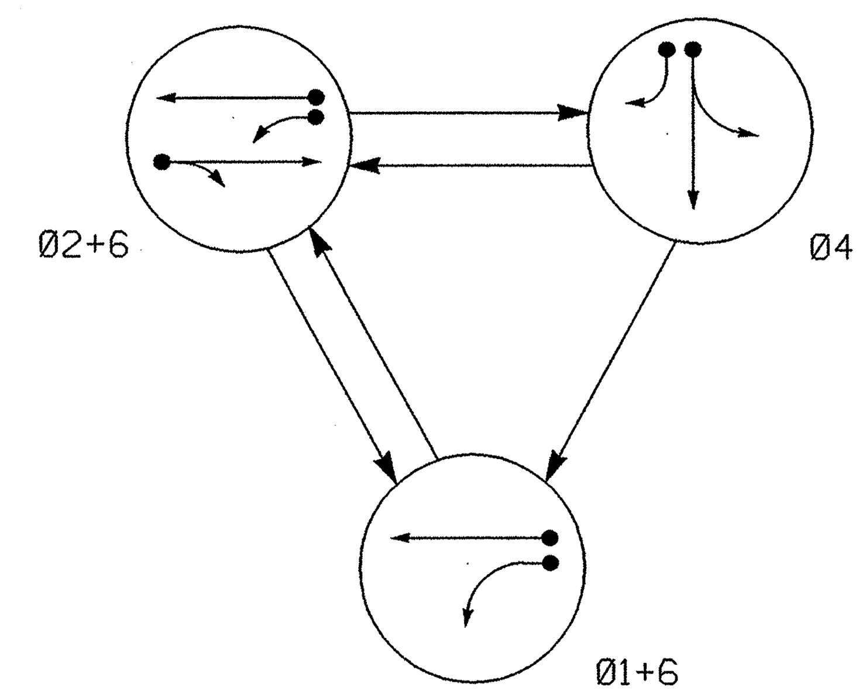
SIG. INVENTORY NO. 09-0594T2

03-OCT-2008 15:51
U:\ECL-NC.DGN #1002003136 R-2201 CLS#Signals#Wiring#09-0594-T2w.dgn
22508 AT RAL81065511

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 12

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

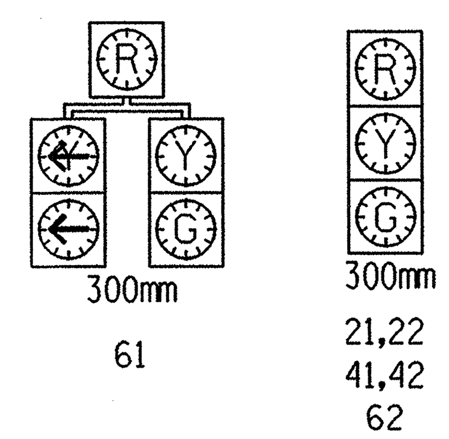
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø4	FLASH
21,22	R	G	R	Y
41,42	R	R	G	R
61	G	G	R	Y
62	G	G	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



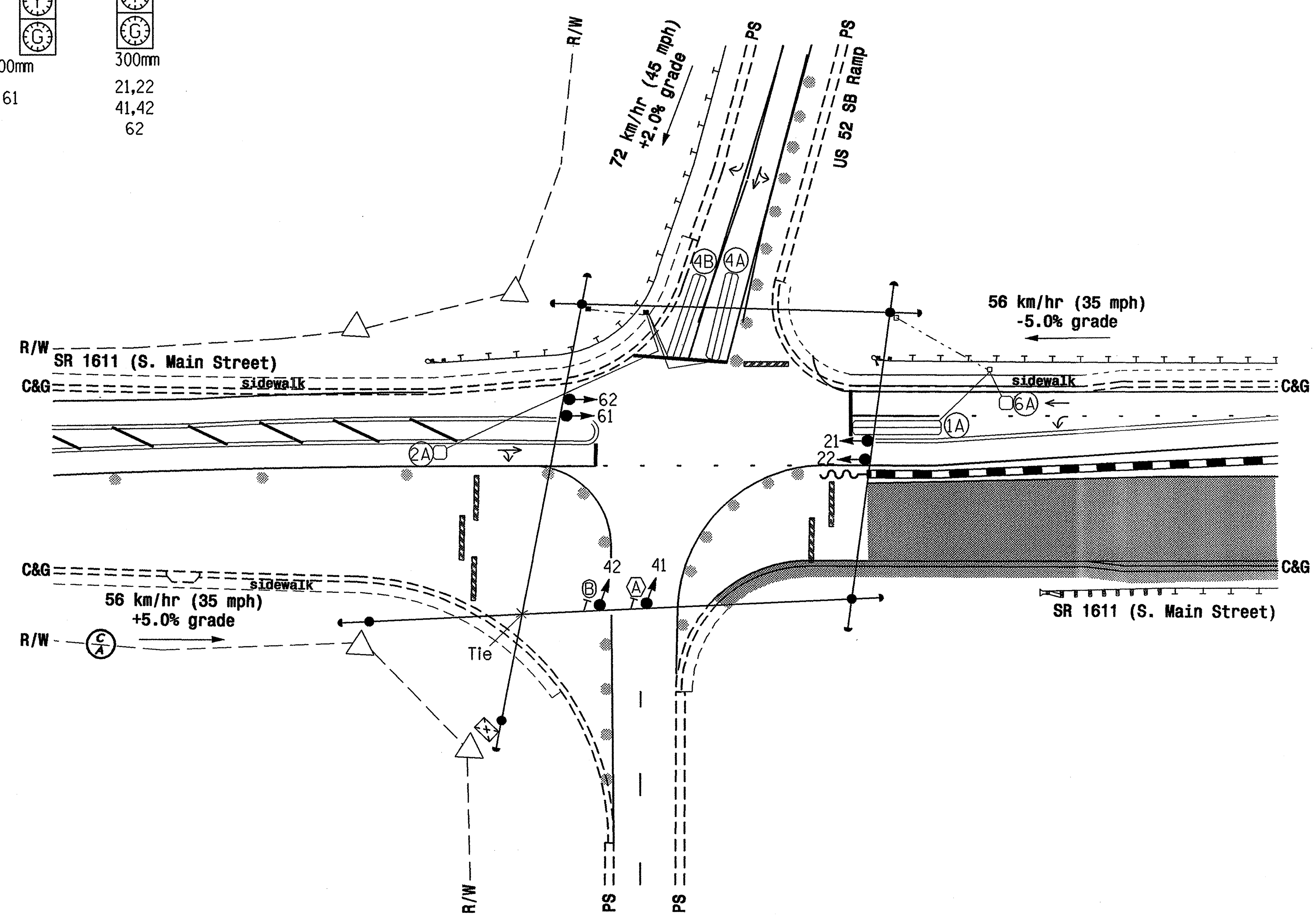
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	1.8X12	0	2-4-2	Y	1	Y	Y	-	-	15	-	-
					6	Y	Y	-	-	-	-	-
2A	1.8x1.8	20	4	Y	2	Y	Y	-	-	-	-	-
4A	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	-	-	-
4B	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	15	-	-
6A	1.8x1.8	20	4	Y	6	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 unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered 21, 22, 41, 42, 61 and 62.
4. Set all detector units to presence mode.
5. Reposition existing sign B.
6. Remove existing Left Arrow "ONLY" sign (R3-5L).



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 with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
N/A	Guardrail	
	Construction Zone	
Ⓐ	Combined Through and Left Arrow Sign (R5-6L)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
	Type III Barricade	N/A
	Barrier Wall With Crash Cushion	N/A

2070L TIMING CHART

FEATURE	PHASE 1	2	4	6
Min Green 1 *	7	10	7	10
Extension 1 *	2.0	3.0	3.0	3.0
Max Green 1 *	25	75	15	75
Yellow Clearance	3.1	3.6	4.3	4.2
Red Clearance	2.8	1.1	1.0	1.9
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	MIN. RECALL	-	MIN. RECALL
Vehicle Call Memory	-	YELLOW	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

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SIGNAL UPGRADE - TEMPORARY DESIGN 3 - TCP PHASE II

Prepared for the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section

750 N. Greenfield Pkwy, Garner, NC 27529

SR 1611 (S. MAIN STREET) AT US 52 SB RAMPS

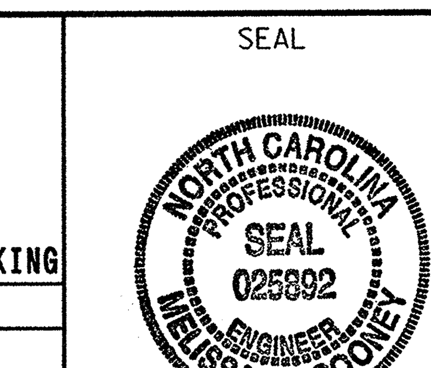
DIVISION 9 FORSYTH COUNTY KING

PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY
PREPARED BY: KG EGGLESTON	REVIEWED BY: LM MOON

SCALE 5 0 10 1:500

REVISIONS INIT. DATE

SEAL



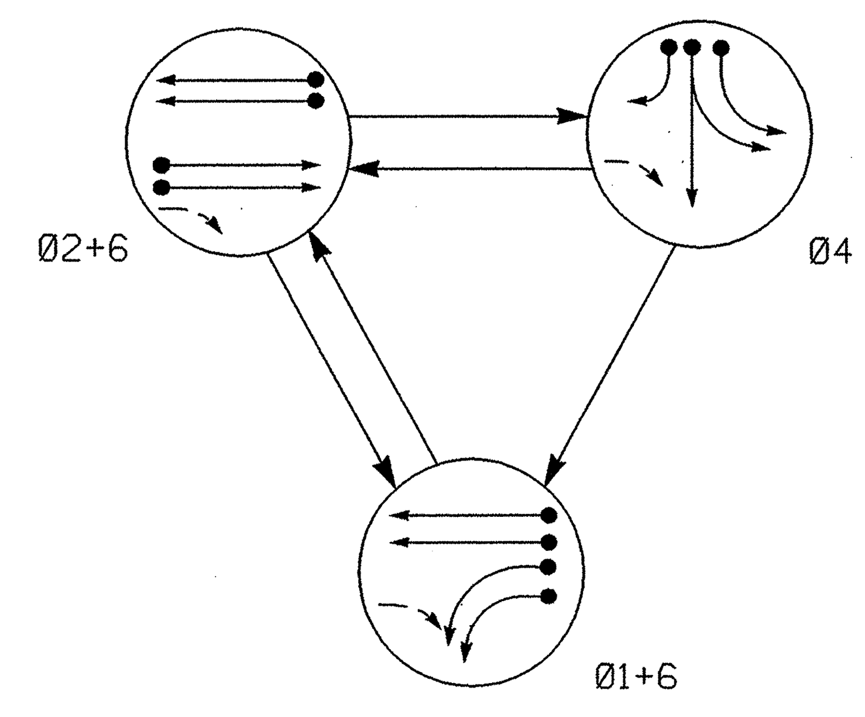
9-19-08

SIGNATURE DATE

SIG. INVENTORY NO. 09-0594T3

19-SEP-2008 15:42
R-2201 CLS#Signals#09-0594T3.dgn
22976 AT RALCGJOR41

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

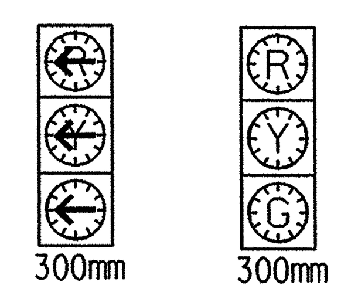
- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ← – – UNSIGNALIZED MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø4	PHASE FLASH
11,12	←	~~←R~~	~~←R~~	~~←R~~
21,22	R	G	R	Y
41,42	R	R	G	R
61,62	G	G	R	Y

SIGNAL FACE I.D.

◌ Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS: LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	DETECTOR PROGRAMMING: PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	1.8x12	0	2-4-2	Y	1	Y	Y	-	-	-	-	-
1B	1.8x12	0	2-4-2	Y	1	Y	Y	-	-	-	-	Y
2A	1.8x1.8	20	3	Y	2	Y	Y	-	-	-	-	-
2B	1.8x1.8	20	3	Y	2	Y	Y	-	-	-	-	Y
4A	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	-	-	-
4B	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	-	-	-
4C	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	15	-	-
6A	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	-
6B	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	Y
S9	1.8x1.8	+50	4	Y	-	-	-	-	-	-	Y	Y
S10	1.8x1.8	+50	4	Y	-	-	-	-	-	-	Y	Y

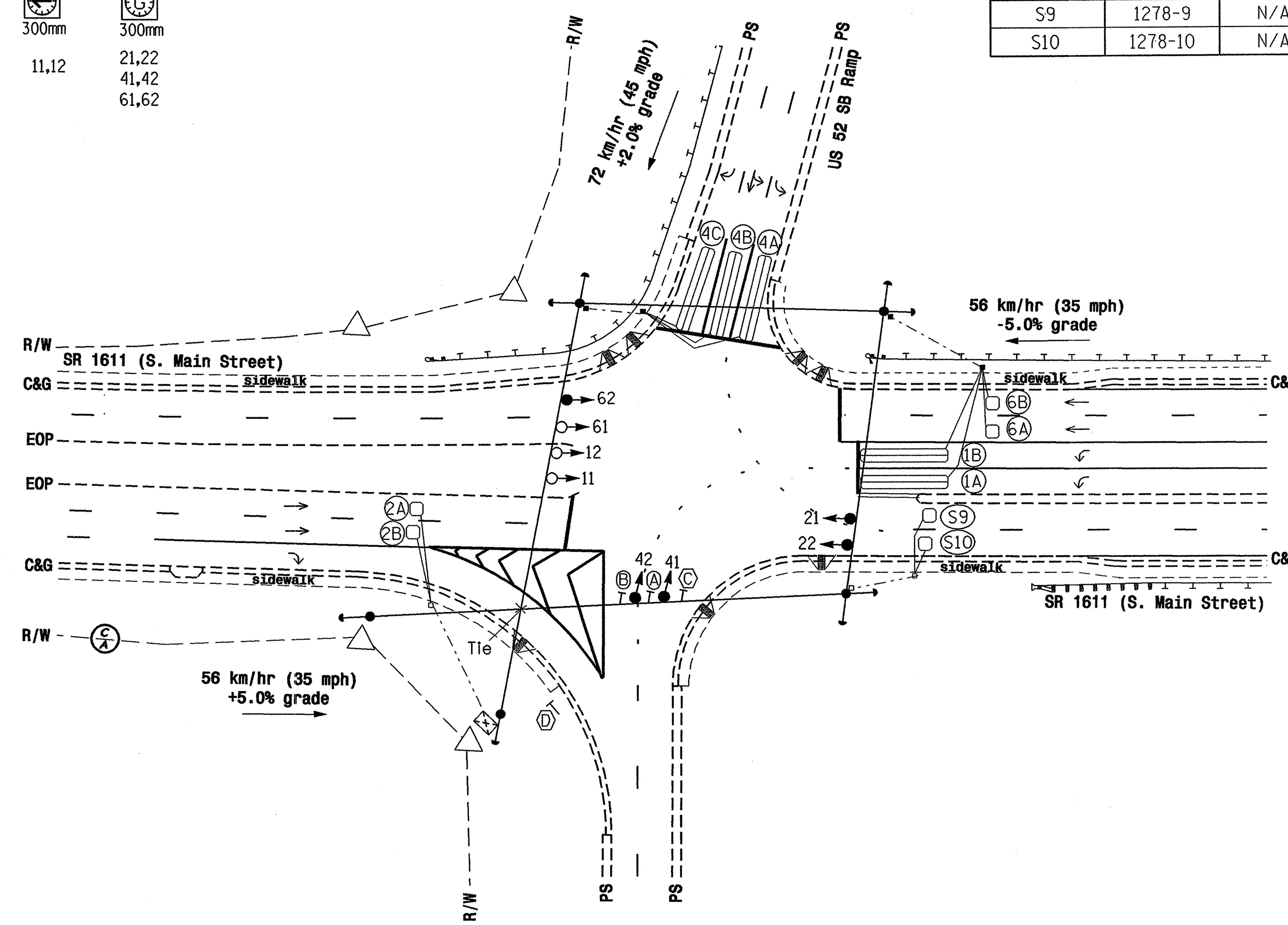
SYSTEM DETECTORS

System Detector ID Number	Signal System ID Number	Control Zone
S9	1278-9	N/A
S10	1278-10	N/A

3 PHASE FULLY ACTUATED (SR 1611/1112 (S. MAIN STREET) CLOSED LOOP SYSTEM)

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 unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Reposition existing signal heads numbered 21, 22, 41, 42 and 62.
5. Set all detector units to presence mode.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset #: 0594.



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 with Marker	
⟶	Directional Arrow	⟶
➜	Pavement Marking Arrow	➜
N/A	Guardrail	
Ⓐ	Combined Through and Left Arrow Sign (R5-6L)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	Left Arrow "ONLY" Sign (R2-5L)	Ⓒ
Ⓓ	"YIELD" Sign (R1-2)	Ⓓ

2070L TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 4	PHASE 6
Min Green 1 *	7	10	7	10
Extension 1 *	2.0	3.0	3.0	3.0
Max Green 1 *	15	40	15	40
Yellow Clearance	3.1	3.6	4.3	4.2
Red Clearance	3.5	1.4	1.8	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	MIN. RECALL	-	MIN. RECALL
Vehicle Call Memory	-	YELLOW	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

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RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

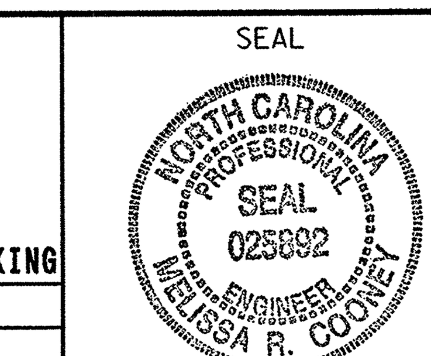
SIGNAL UPGRADE - FINAL DESIGN

Prepared for the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1611 (S. MAIN STREET) AT US 52 SB RAMPS

DIVISION 9	FORSYTH COUNTY		KING
PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	KG EGGLESTON	REVIEWED BY:	LW MOON
REVISIONS		INIT.	DATE

SCALE 5 0 10 — 1:500



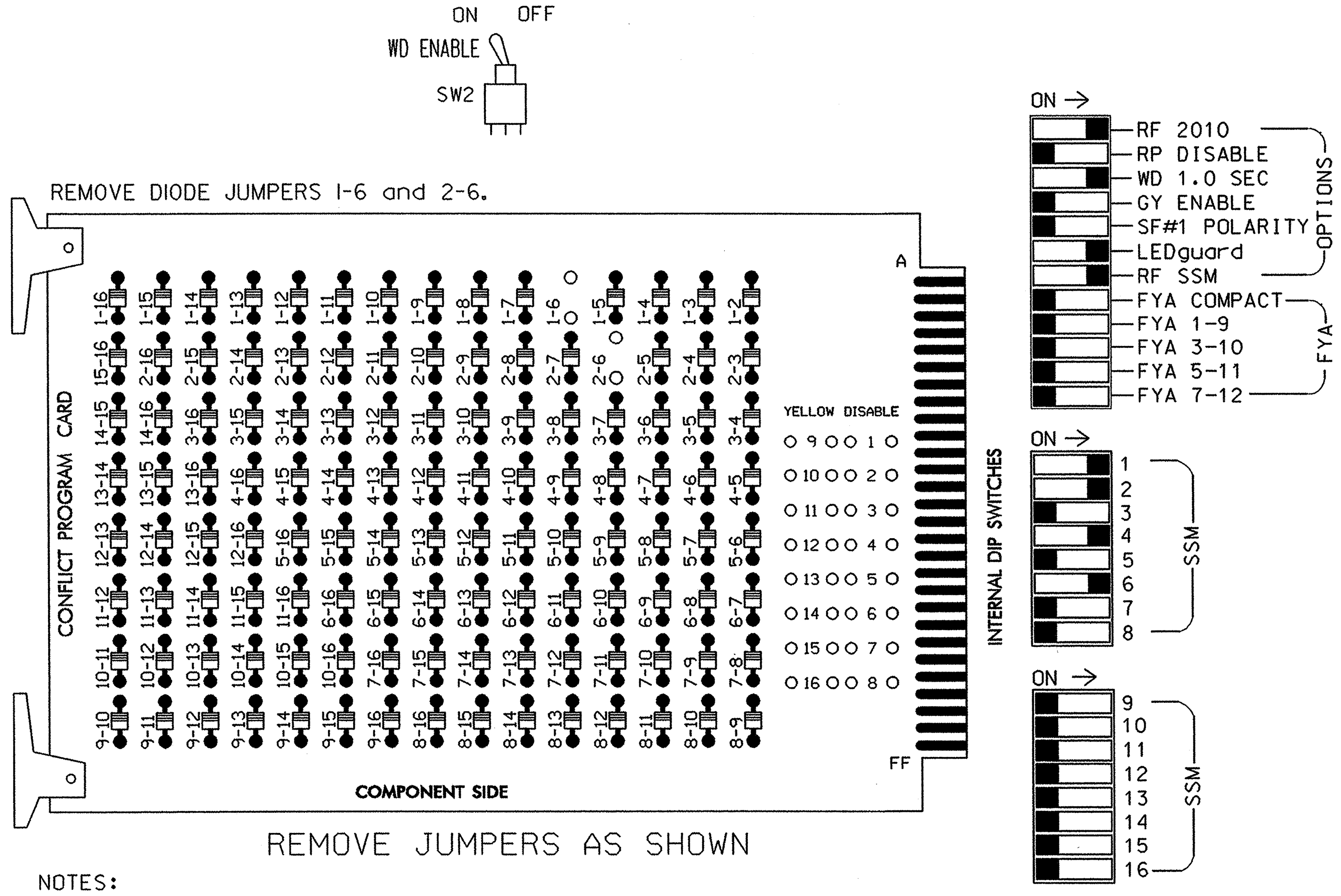
9-19-08
SIGNATURE DATE

SIG. INVENTORY NO. 09-0594

01-OCT-2008 16:49
G:\TEG\Curr\100003326 R-2201 CLS\Signals\09-0594.dgn
22508 AT RAL81C6511

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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.

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 3,5,7, 8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. The cabinet and controller are part of the SR 1611/1112 (S. Main Street) Closed Loop System.

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.	11,12	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU
RED		128			101			134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW	125											
YELLOW ARROW	126											
GREEN ARROW	127											
(hand symbol)												
(walking person symbol)												

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	U	SLOT	ø1 1A	ø2 2A	SLOT	SLOT	ø4 4A	ø4 4C	SLOT	SYS. DET. S9	SLOT	SLOT	SLOT	SLOT	FS DC ISOLATOR
"I"	L	EMPTY	ø1 1B	ø2 2B	EMPTY	EMPTY	ø4 4B	NOT USED	EMPTY	SYS. DET. S10	EMPTY	EMPTY	EMPTY	EMPTY	ST DC ISOLATOR
"J"	U	SLOT	ø6 6A	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
"J"	L	EMPTY	ø6 6B	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

EQUIPMENT INFORMATION

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

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-5,6	I2U	39	1	2	1	Y	Y			
1B	TB2-7,8	I2L	43	5	12	1	Y	Y			
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			15
* S9	TB6-9,10	I9U	60	22	11	SYS					
* S10	TB6-11,12	I9L	62	24	13	SYS					
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			

* SYSTEM DETECTOR ONLY. REMOVE THE VEHICLE PHASE ASSIGNED TO THIS DETECTOR IN THE DEFAULT PROGRAMMING.

CLOSED LOOP SYSTEM DATA :	
CONTROLLER ASSET	0594

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0594
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Signal Upgrade - Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1611 (S. MAIN STREET) AT US 52 SB RAMPS

Prepared for the Offices of: Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

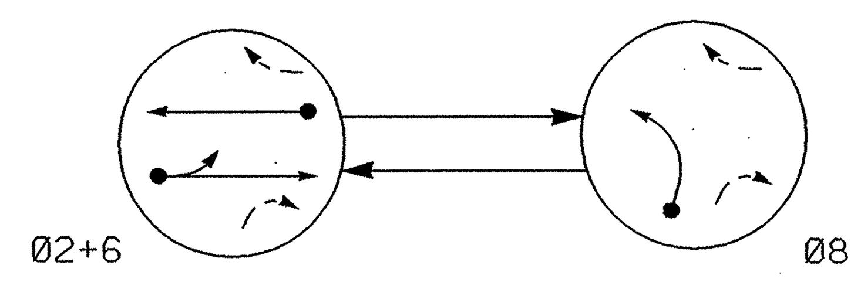
DIVISION 9 FORSYTH COUNTY KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LM MOON

REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY
SIGNATURE 9-19-08 DATE
SIG. INVENTORY NO. 09-0594

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	Ø8	FLASH
21,22	G	R	Y
61,62	G	R	Y
81,82	R	G	R

2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	1.8x1.8	20	3	Y	2	Y	Y	-	-	-	-	Y
6A	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	Y
8A	1.8x18	0	Exist.	-	8	Y	Y	-	-	-	-	Y

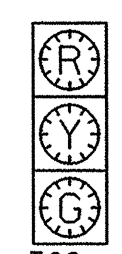
2 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

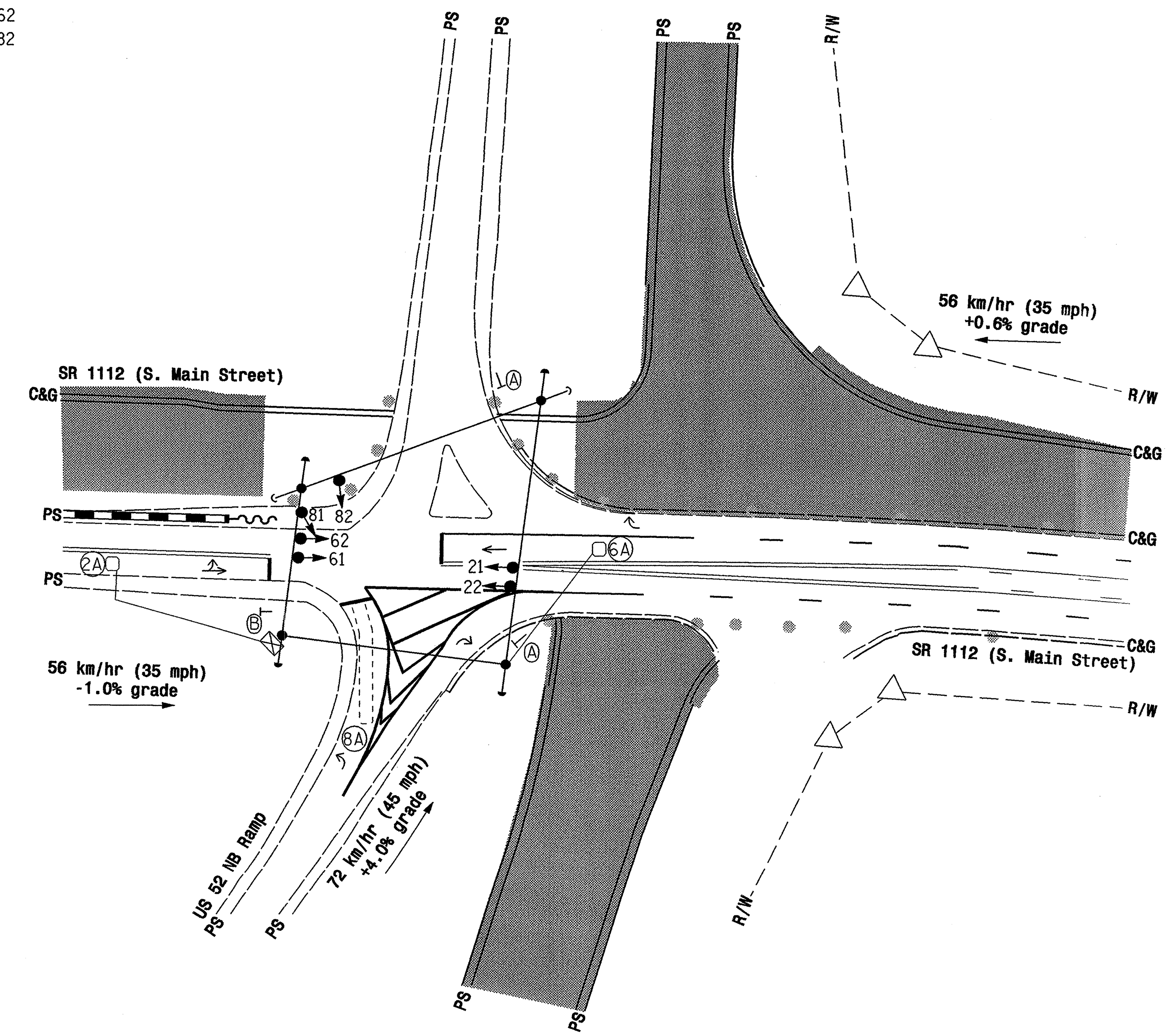
1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Relocate existing signal head numbered 82.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Pavement markings are existing.
7. Direct bury all lead in from detector loops to junction boxes and controller cabinet.

SIGNAL FACE I.D.

Denotes L.E.D.



300mm
21,22
61,62
81,82



2070L TIMING CHART

FEATURE	PHASE 2	6	8
Min Green 1 *	10	10	7
Extension 1 *	3.0	3.0	3.0
Max Green 1 *	85	85	15
Yellow Clearance	3.9	3.8	3.0
Red Clearance	1.0	1.4	1.2
Walk 1 *	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation *	-	-	-
Max Variable Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Recall Mode	MIN. RECALL	MIN. RECALL	-
Vehicle Call Memory	YELLOW	YELLOW	-
Dual Entry	-	-	-
Simultaneous Gap	ON	ON	ON

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

LEGEND

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 with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	"YEILD" Sign (R1-2)	
	No Right Turn Sign (R3-1)	
	Construction Zone Drums	
	Construction Zone	
	Barrier Wall With Crash Cushion	N/A

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - TCP EXISTING CONDITIONS

SR 1112 (S. MAIN STREET)
AT
US 52 NB RAMPS

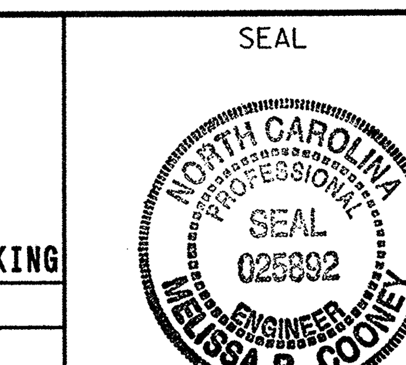
Prepared for the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

DIVISION 9	STOKES COUNTY		KING
PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	KG EGGLESTON	REVIEWED BY:	LM MOON

SCALE 5 0 10
1:500

REVISIONS | INIT. | DATE

SEAL



SIGNATURE 9-19-09 DATE

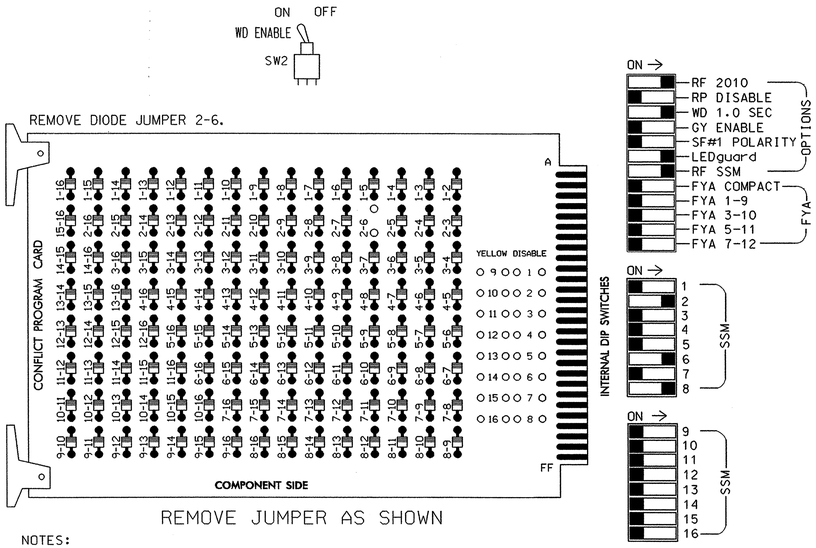
SIG. INVENTORY NO. 09-1177T1

19-SEP-2008 15:42
G:\ECW\r100003326 R-2201 CLS\Signals\09-1177T1.dgn
22976 AT RALOCJOR41

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 16

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



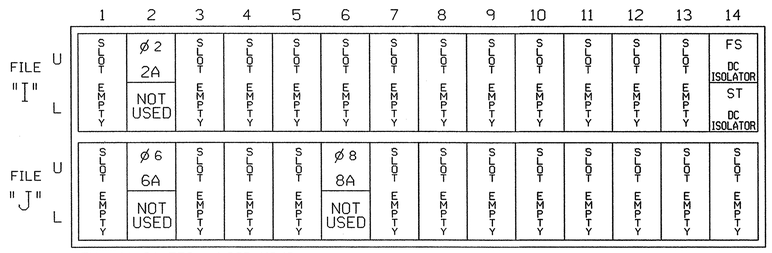
NOTES:

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.

■ = DENOTES POSITION OF SWITCH

INPUT FILE POSITION LAYOUT

(front view)



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 1,3,4,5,7, 9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.

EQUIPMENT INFORMATION

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

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.	NU	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	81,82	NU
RED		128						134			107	
YELLOW		129						135			108	
GREEN		130						136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋												
🚶												

NU = Not Used

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-1177T1
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Temporary Design 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET) AT US 52 NB RAMPS

DIVISION 9 | STOKES COUNTY | KING

PLAN DATE: SEPTEMBER 2008 | REVIEWED BY: MR COONEY
PREPARED BY: JA WILES | REVIEWED BY: LM MOON

REVISIONS	INIT.	DATE

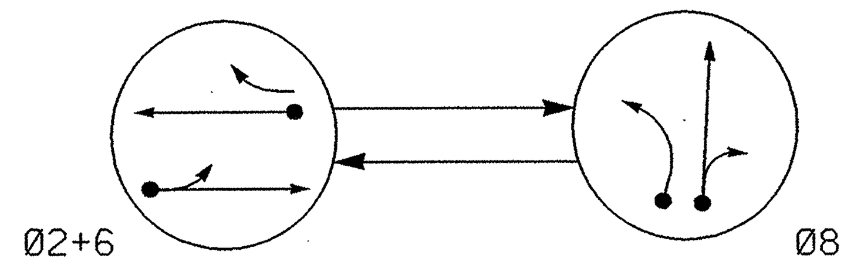
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025692 ENGINEER MELISSA R. COONEY

SIGNATURE | DATE 9-19-08

SIG. INVENTORY NO. 09-1177T1

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	Ø8	FLASH
21,22	G	R	Y
61,62	G	R	Y
81,82	R	G	R

2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	1.8x1.8	20	4	Y	2	Y	Y	-	-	-	-	-
6A	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	-
8A	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	-	-	-
8B	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	15	-	Y
8C	1.8x4.5	0	4	Y	8	Y	Y	-	-	15	-	Y

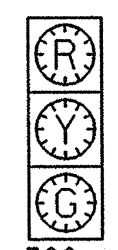
2 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

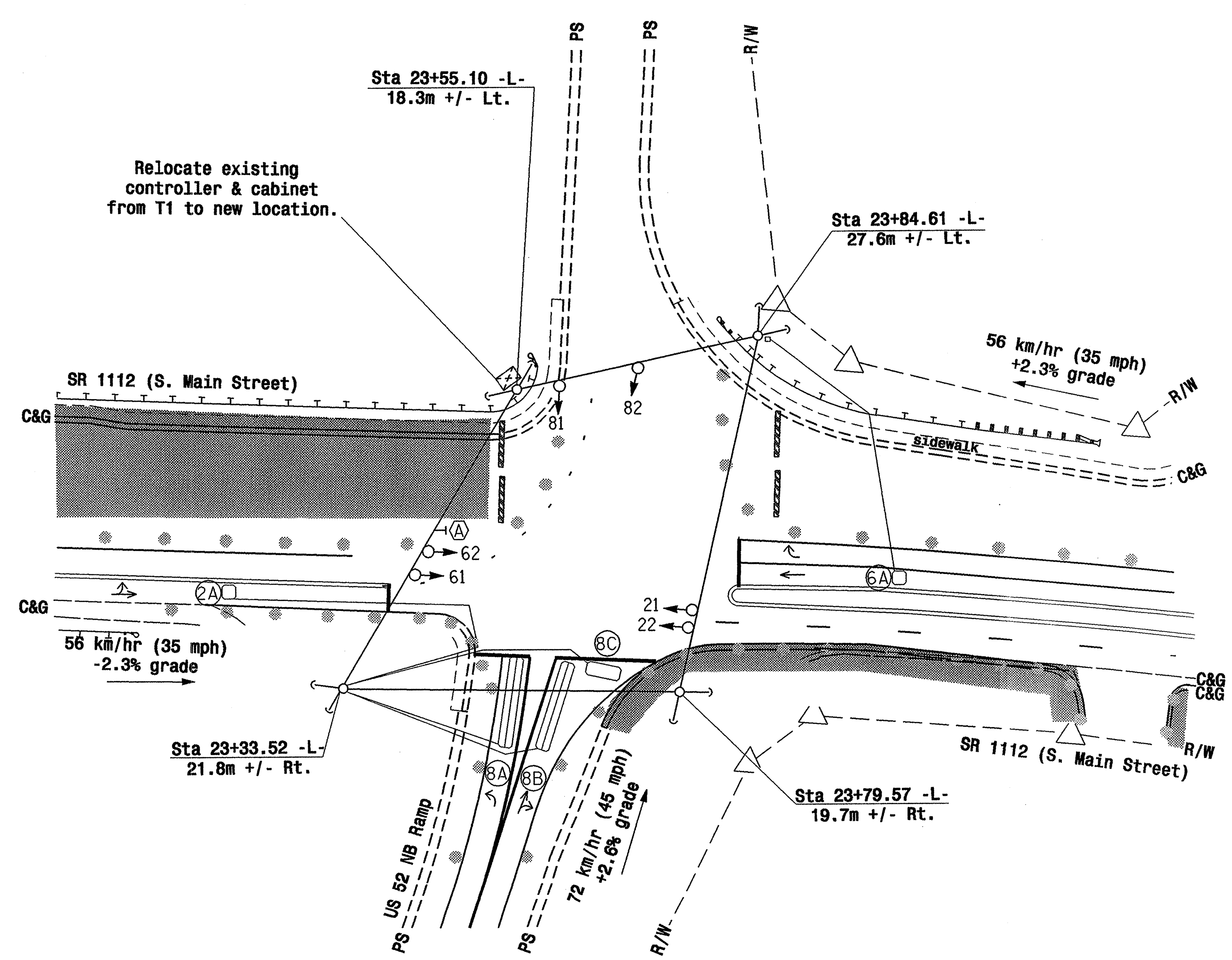
1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Direct bury all lead in from detector loops to junction boxes and controller cabinet.

SIGNAL FACE I.D.

Denotes L.E.D.



300mm
21,22
61,62
81,82



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 with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
N/A	Guardrail	
	Construction Zone	
	Type III Barricade	N/A
(A)	Right Arrow "ONLY" Sign (R3-5R)	(A)

2070L TIMING CHART

FEATURE	PHASE 2	6	8
Min Green 1 *	10	10	7
Extension 1 *	3.0	3.0	3.0
Max Green 1 *	85	85	15
Yellow Clearance	4.1	3.7	4.3
Red Clearance	2.1	2.0	1.0
Walk 1 *	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation *	-	-	-
Max Variable Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Recall Mode	MIN. RECALL	MIN. RECALL	-
Vehicle Call Memory	YELLOW	YELLOW	-
Dual Entry	-	-	-
Simultaneous Gap	ON	ON	ON

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

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SIGNAL UPGRADE - TEMPORARY DESIGN 2 - TCP PHASE I

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

**SR 1112 (S. MAIN STREET)
AT
US 52 NB RAMPS**

DIVISION 9	STOKES COUNTY		KING
PLAN DATE: SEPTEMBER 2008		REVIEWED BY:	MR COONEY
PREPARED BY: KG EGGLESTON		REVIEWED BY:	LM MOON
REVISIONS		INIT.	DATE

SCALE 5 0 10
1:500

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

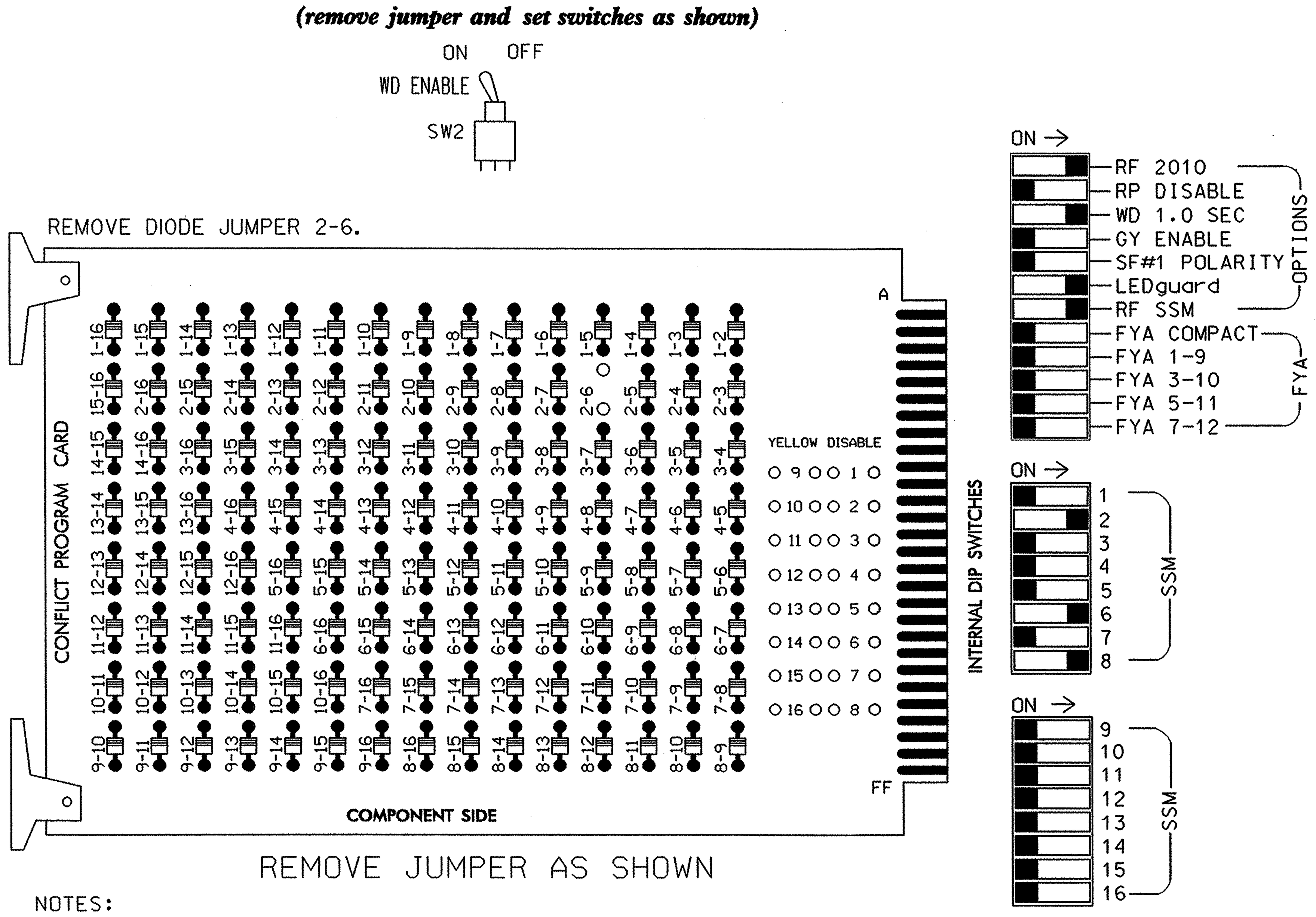
SIGNATURE 9-19-08 DATE

SIG. INVENTORY NO. 09-1177T2

19-SEP-2008 15:42
G:\TEG\Curr\00003326 R-2201 CLS\Signals\09-1177T2.dgn
22976 AT RALGCJOR41

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



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.

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 1,3,4,5,7, 9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.

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.	NU	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	81,82	NU
RED		128						134			107	
YELLOW		129						135			108	
GREEN		130						136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
(don't walk symbol)												
(walk symbol)												

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.............EXISTING 2070L
CABINET................EXISTING 332
SOFTWARE...............ECONOLITE OASIS
CABINET MOUNT..........BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S2,S6,S8
PHASES USED............2,6,8
OVERLAPS...............NONE

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			15
8C	TB7-1,2	J7U	66	28	38	8	Y	Y			15

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGNS: 09-1177T2&T3
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Signal Upgrade - Temporary Designs 2 & 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1112 (S. MAIN STREET) AT US 52 NB RAMPS

DIVISION 9 STOKES COUNTY KING

PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY
PREPARED BY: JA WILES	REVIEWED BY: LM MOON

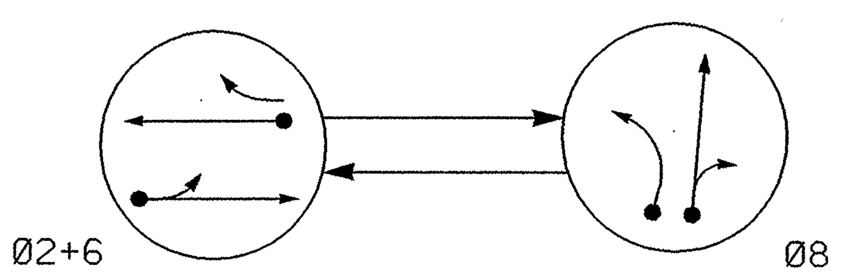
REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025892 MELISSA R. COONEY

SIGNATURE: MRCooney DATE: 9-19-08

SIG. INVENTORY NO. 09-1177T2&T3

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø8	FLASH
21,22	G	R	Y
61,62	G	R	Y
81,82	R	G	R

2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	1.8x1.8	20	4	Y	2	Y	Y	-	-	-	-	-
6A	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	-
8A	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	-	-	-
8B	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	15	-	-
8C	1.8x1.8	0	4	Y	8	Y	Y	-	-	15	-	-

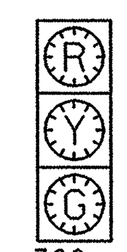
2 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

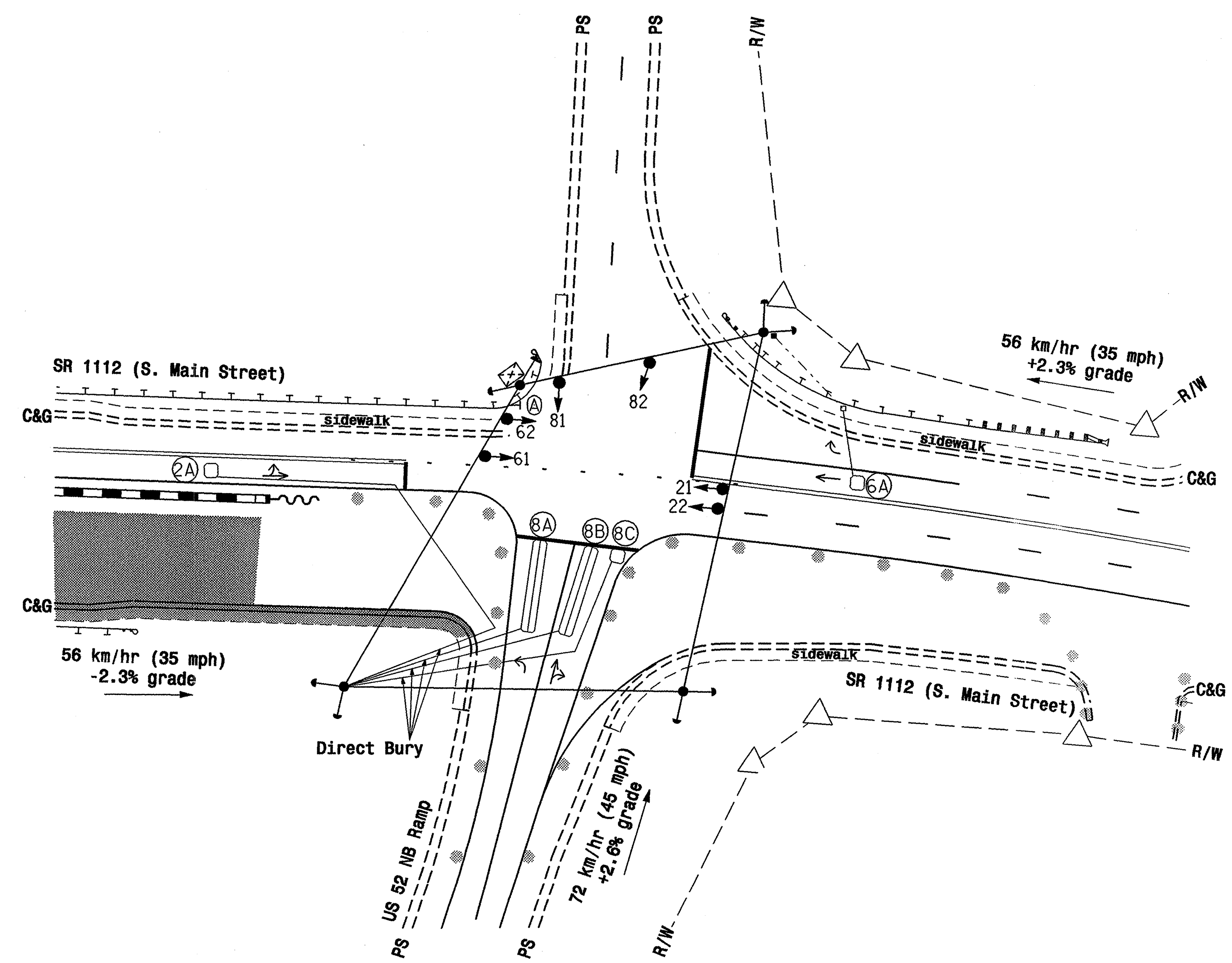
1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
2. Set all detector units to presence mode.
3. Reposition existing signal heads numbered 21, 22, 61 and 62 as shown on plans.
4. Reposition existing Right Arrow "ONLY" sign.

SIGNAL FACE I.D.

Denotes L.E.D.



300mm
21,22
61,62
81,82



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 with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
N/A	Guardrail	
	Construction Zone	
	Barrier Wall With Crash Cushion	N/A
Ⓐ	Right Arrow "ONLY" Sign (R3-5R)	Ⓐ

2070L TIMING CHART

FEATURE	PHASE 2	PHASE 6	PHASE 8
Min Green 1 *	10	10	7
Extension 1 *	3.0	3.0	3.0
Max Green 1 *	85	85	15
Yellow Clearance	4.1	3.7	4.3
Red Clearance	2.2	1.5	1.0
Walk 1 *	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation *	-	-	-
Max Variable Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Recall Mode	MIN. RECALL	MIN. RECALL	-
Vehicle Call Memory	YELLOW	YELLOW	-
Dual Entry	-	-	-
Simultaneous Gap	ON	ON	ON

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

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SIGNAL UPGRADE - TEMPORARY DESIGN 3 - TCP PHASE II

Prepared for the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET)
AT
US 52 NB RAMPS

DIVISION 9 | STOKES COUNTY | KING

PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY
PREPARED BY: KG EGGLESTON	REVIEWED BY: LW MOON

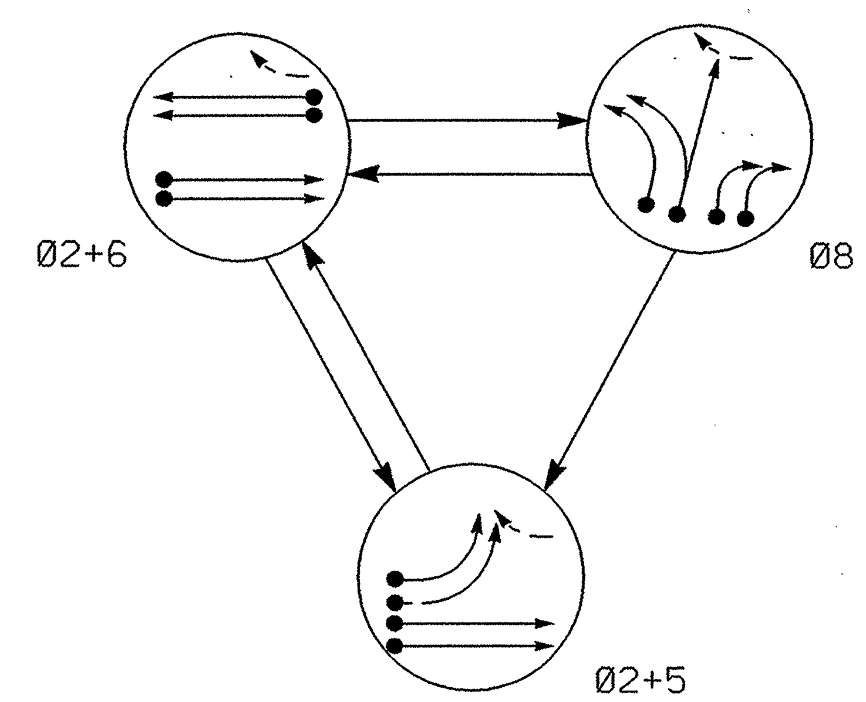
SCALE 1:500

REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 026692 MELISSA R. COONEY
SIGNATURE 9-19-08 DATE

SIG. INVENTORY NO. 09-1177T3

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

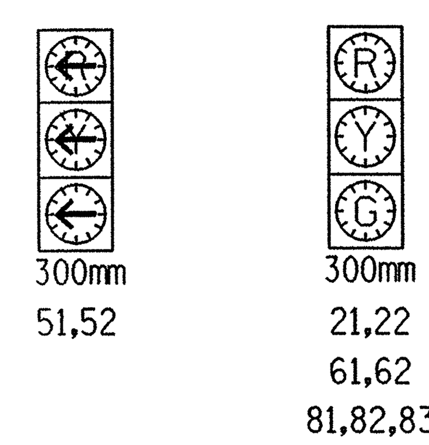
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø8	FLASH
21,22	G	G	R	Y
51,52	←	←R	←R	←R
61,62	R	G	R	Y
81,82,83	R	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	1.8x1.8	20	4	Y	2	Y	Y	-	-	-	-	-
2B	1.8x1.8	20	4	Y	2	Y	Y	-	-	-	-	Y
5A	1.8x12	0	2-4-2	Y	5	Y	Y	-	-	2	-	Y
5B	1.8x12	0	2-4-2	Y	5	Y	Y	-	-	-	-	Y
6A	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	-
6B	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	Y
8A	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	-	-	-
8B	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	-	-	-
8C	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	15	-	-
8D	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	15	-	Y
S5	1.8x1.8	+48	3	Y	-	-	-	-	-	-	Y	Y
S6	1.8x1.8	+48	3	Y	-	-	-	-	-	-	Y	Y
S7	1.8x1.8	+48	4	Y	-	-	-	-	-	-	Y	Y
S8	1.8x1.8	+48	4	Y	-	-	-	-	-	-	Y	Y

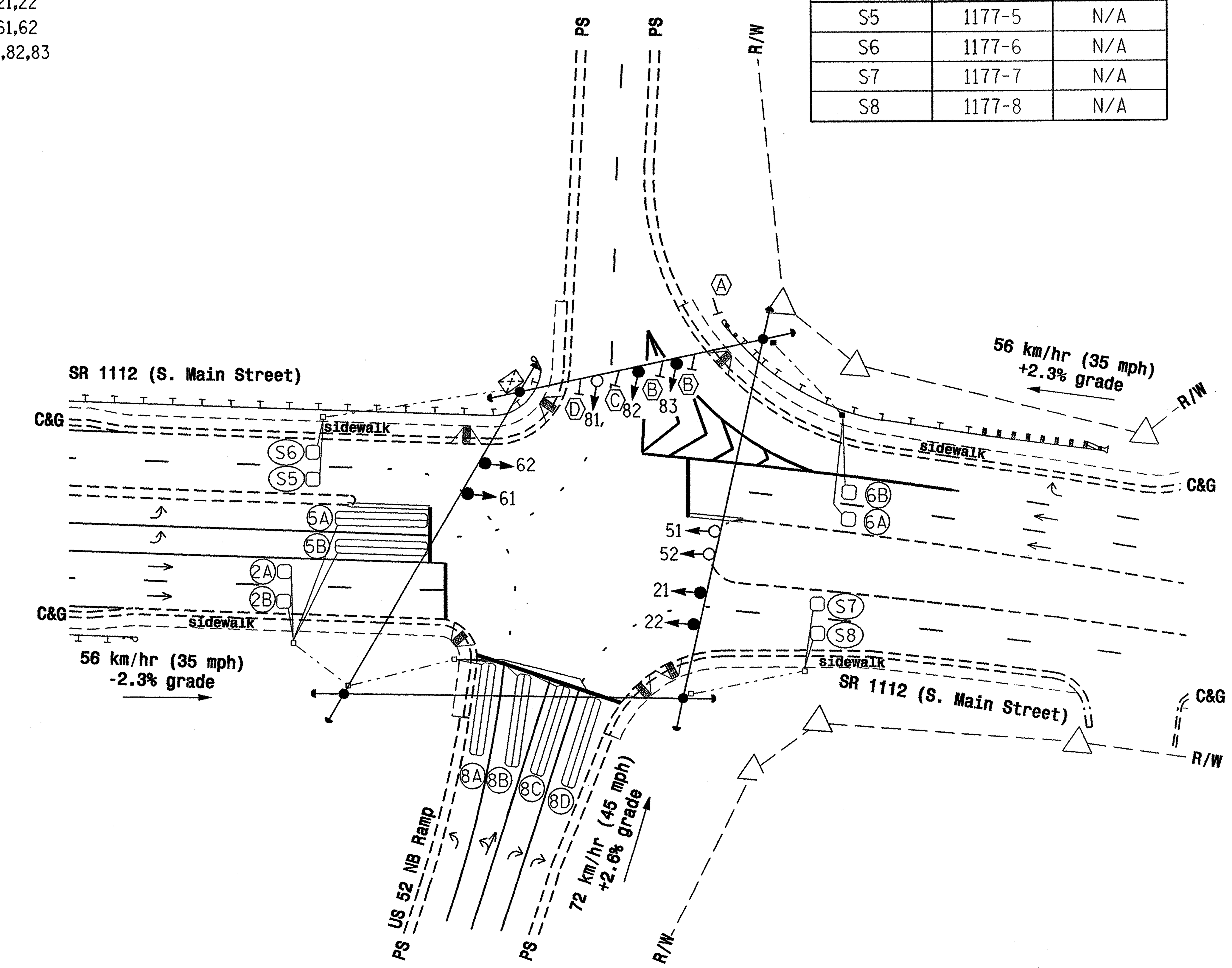
SYSTEM DETECTORS

System Detector ID Number	Signal System ID Number	Control Zone
S5	1177-5	N/A
S6	1177-6	N/A
S7	1177-7	N/A
S8	1177-8	N/A

3 PHASE FULLY ACTUATED (SR 1611/1112 S. MAIN STREET) CLOSED LOOP SYSTEM)

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 unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Reposition existing signal heads numbered 21, 22, 61, 62, 82 and 83 as shown on plans.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. Closed loop system data: Controller Asset #: 1177.



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 with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
N/A	Guardrail	
Ⓐ	"YEILD" Sign (R1-2)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	Combined Through and Left Arrow Sign (R3-6L)	Ⓒ
Ⓓ	Left Arrow "ONLY" Sign (R3-5L)	Ⓓ

2070L TIMING CHART

FEATURE	PHASE 2	5	6	8
Min Green 1 *	10	7	10	7
Extension 1 *	3.0	2.0	3.0	3.0
Max Green 1 *	45	15	45	15
Yellow Clearance	4.1	3.0	3.7	4.3
Red Clearance	2.0	3.1	1.6	1.8
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN. RECALL	-	MIN. RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SIGNAL UPGRADE - FINAL DESIGN

Prepared for the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET) AT US 52 NB RAMPS

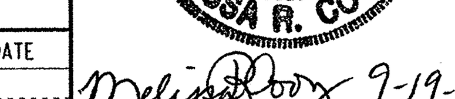
DIVISION 9 | STOKES COUNTY | KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	KG EGGLESTON	REVIEWED BY:	LM MOON

REVISIONS | INIT. | DATE

SCALE 5 0 10 1:500

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY



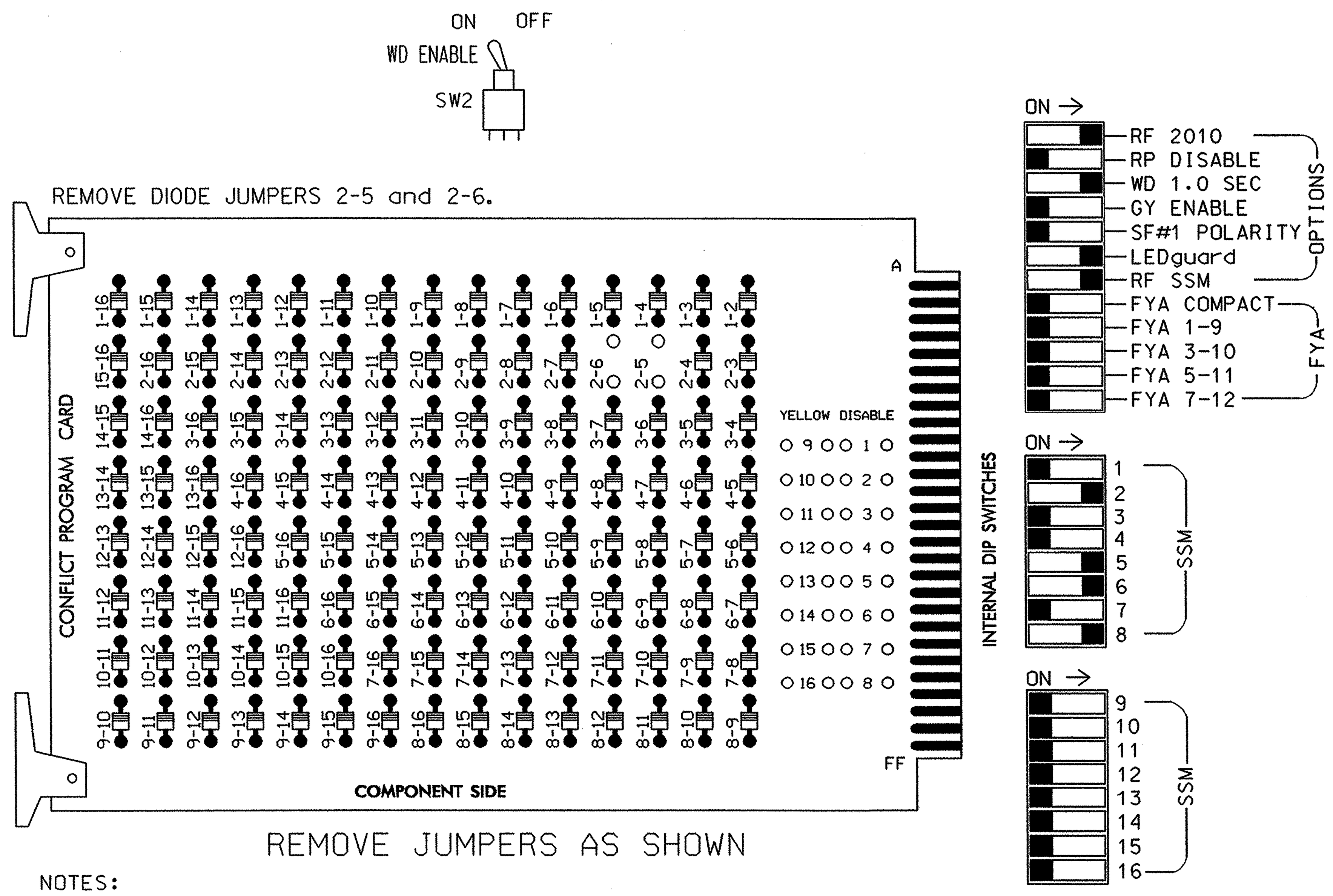
SIGNATURE | DATE 9-19-08

SIG. INVENTORY NO. 09-1177

19-SEP-2008 15:42 R-2201 CLS#Signals#09-1177.dgn 22976 AT RALGCJOR41

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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.

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 1,3,4,7, 9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. The cabinet and controller are part of the SR 1611/1112 (S. Main Street) Closed Loop System.

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.	NU	21,22	NU	NU	NU	NU	51,52	61,62	NU	NU	81, 82,83	NU
RED		128						134			107	
YELLOW		129						135			108	
GREEN		130						136			109	
RED ARROW							131					
YELLOW ARROW							132					
GREEN ARROW							133					

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SYS. DET. S5	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		ø2 2B							SYS. DET. S6					ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	ø5 5A	ø6 6A	SLOT EMPTY	SLOT EMPTY	ø8 8A	ø8 8C	SLOT EMPTY	SYS. DET. S7	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		ø5 5B	ø6 6B			ø8 8B	ø8 8D		SYS. DET. S8					

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

EQUIPMENT INFORMATION

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

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
* S5	TB6-9,10	I9U	60	22	11	SYS					
* S6	TB6-11,12	I9L	62	24	13	SYS					
5A	TB3-5,6	J2U	40	2	6	5	Y	Y			2
5B	TB3-7,8	J2L	44	6	16	5	Y	Y			
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
8C	TB7-1,2	J7U	66	28	38	8	Y	Y			15
8D	TB7-3,4	J7L	79	41	48	8	Y	Y			15
* S7	TB7-9,10	J9U	59	21	15	SYS					
* S8	TB7-11,12	J9L	61	23	17	SYS					

* SYSTEM DETECTOR ONLY. REMOVE THE VEHICLE PHASE ASSIGNED TO THIS DETECTOR IN THE DEFAULT PROGRAMMING.

CLOSED LOOP SYSTEM DATA :	
CONTROLLER ASSET	1177

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-1177
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888

Signal Upgrade - Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:
Prepared for the Offices of: Traffic Engineering and Safety Systems Branch, Signals Management Section, N.C. Department of Transportation
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET) AT US 52 NB RAMPS

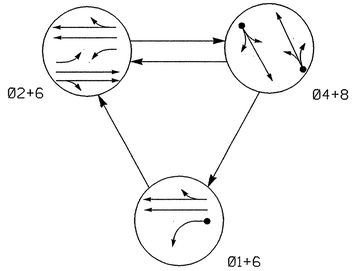
DIVISION 9 STOKES COUNTY KING
PLAN DATE: SEPTEMBER 2008 REVIEWED BY: MR COONEY
PREPARED BY: JA WILES REVIEWED BY: LM MOON
REVISIONS INIT. DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY
SIGNATURE 9-19-08 DATE
SIG. INVENTORY NO. 09-1177

01-OCT-2008 16:51
G:\TEG\Curr\0003326 R-2201 CLS\Signals\Wiring\09-1177w.dgn
22508 AT RAL8IC6511

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2201	Sig. 22

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

Denotes L.E.D.

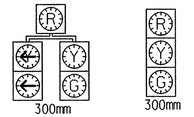


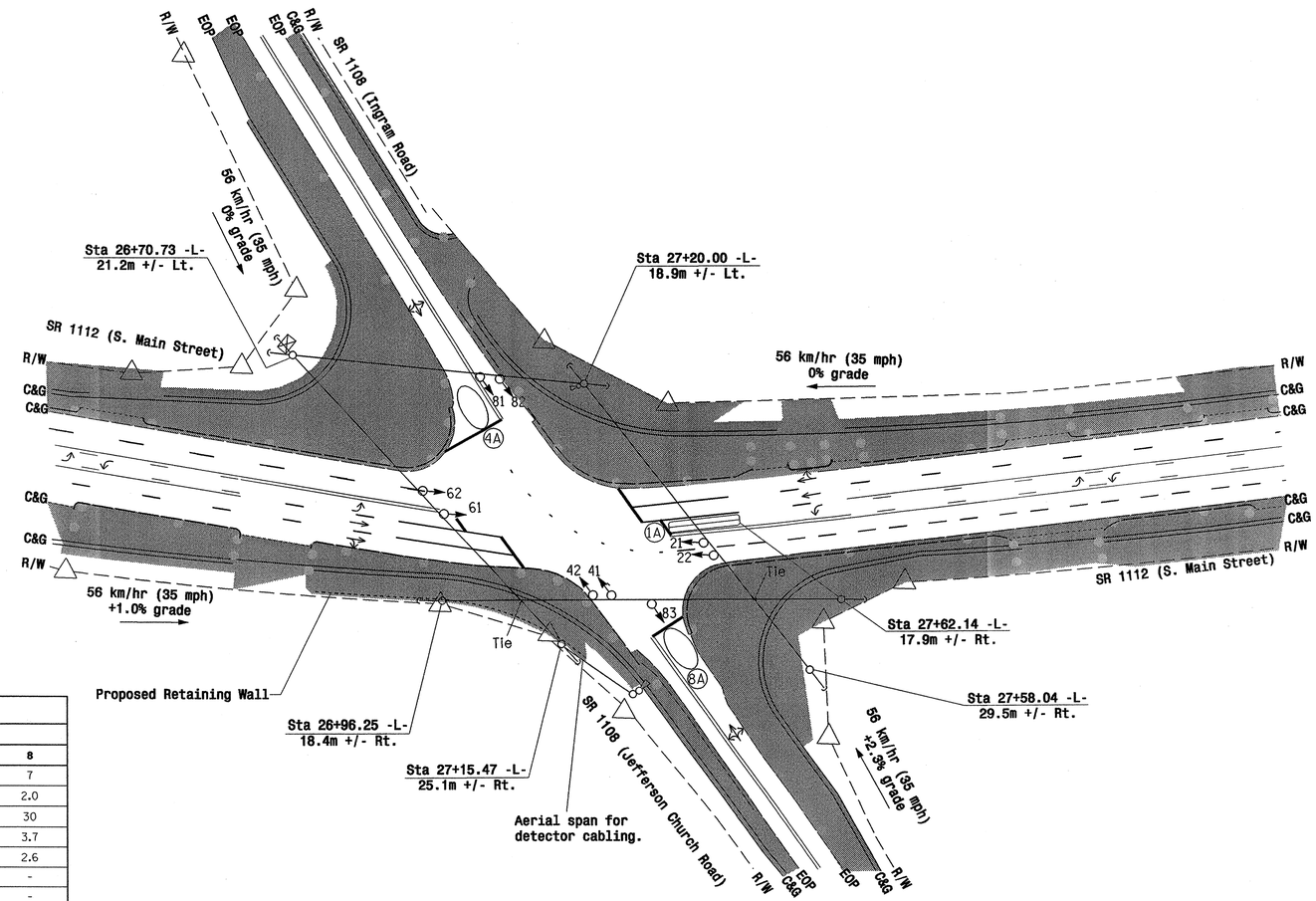
TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø4+8	FLASH
21,22	R	G	R	Y
41,42	R	R	G	R
61	G	G	R	Y
62	G	G	R	Y
81,82,83	R	R	G	R

2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	1.8x12	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
4A	*	0	*	Y	4	Y	Y	-	-	5	-	*
8A	*	0	*	Y	8	Y	Y	-	-	5	-	*

*Microwave Detection Zone



2070L TIMING CHART

FEATURE	PHASE 1	2	4	6	8
Min Green 1 *	7	10	7	10	7
Extension 1 *	2.0	0.0	2.0	0.0	2.0
Max Green 1 *	20	35	30	35	30
Yellow Clearance	3.0	3.8	3.8	3.8	3.7
Red Clearance	1.6	1.5	2.5	1.5	2.6
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	-	MAX. RECALL	-	MAX. RECALL	-
Vehicle Call Memory	-	N/A	-	N/A	-
Dual Entry	-	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON

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

3 PHASE
SEMI-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 unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Program controller to clear from phase 2 to phase 1 by progressing through phase 4.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.

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	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
	Construction Zone	
	Microwave Detection Zone	
	Out of Pavement Detector	

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - TCP EXISTING CONDITIONS

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

SR 1112 (S. MAIN STREET) AT SR 1108 (INGRAM ROAD/ JEFFERSON CHURCH ROAD)

DIVISION 9 STOKES COUNTY KING

PLAN DATE: SEPTEMBER 2008 REVIEWED BY: MR COONEY

PREPARED BY: KG EGGLESTON REVIEWED BY: LM MOON

SCALE 5 0 10 1:500

REVISIONS	INIT.	DATE

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

SIGNATURE MR Cooney DATE 9-19-08

SIG. INVENTORY NO. 09-0612T1

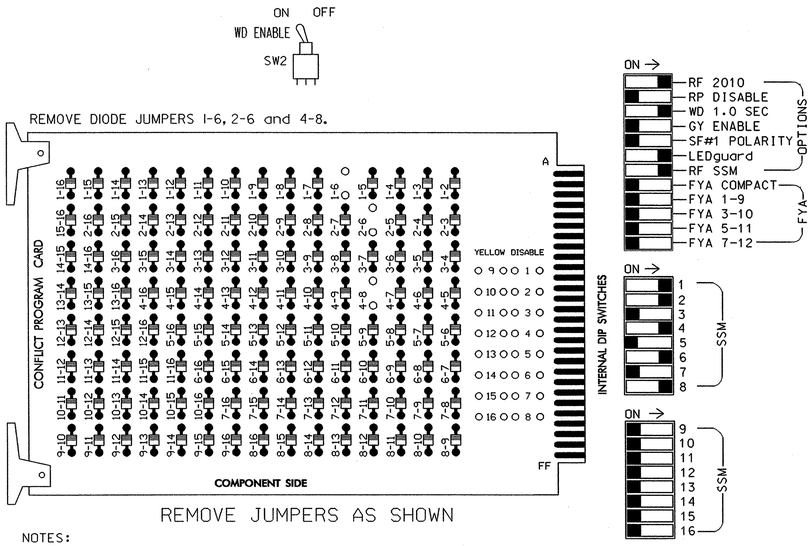
PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888

06-OCT-2008 13:13
G:\ECM\Corr\0003326 R-2201 CLS\Signals\09-0612T1.dgn
18566 AT RAL2004G01

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 23

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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.

■ = DENOTES POSITION OF SWITCH

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø1 1A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY *	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC
	L	NOT USED													ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY **	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

* Microwave Detector. See Accuwave Detector Panel Wiring Detail for 4A.
* * Microwave Detector. See Accuwave Detector Panel Wiring Detail for 8A.

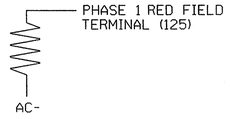
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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 Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

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 3,5,7, 9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Dual Entry.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	61	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81, 82,83	NU	NU	NU	NU	NU	NU	NU
RED	*	128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW																		
YELLOW ARROW	126																	
FLASHING YELLOW ARROW																		
GREEN ARROW	127																	

NU = Not Used

* Denotes install load resistor. See load resistor installation detail this sheet.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332 /W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S6,S8
PHASES USED.....1,2,4,6,8
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			15
4A	*	I8U	49	11	24	4	Y	Y			5
8A	**	J8U	50	12	28	8	Y	Y			5

DYNAMIC BACK-UP CONTROL PROGRAMMING

(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 Function 1.
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     ¦X
CALL PHASES     ¦  X
```

BACKUP PROTECTION PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGNS: 09-0612T1
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Temporary Design 1 - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET) AT SR 1108 (INGRAM ROAD/ JEFFERSON CHURCH ROAD)

DIVISION 9 STOKES COUNTY KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	MRC	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 025392 ENGINEER MELISSA R. COONEY

SIGNATURE DATE 9-19-08

SIG. INVENTORY NO. 09-0612T1

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888

09-OCT-2008 08:44
G:\IEG\Curr\10003326 R-2201 CLS\signals\Wiring\09-0612.tiw.dgn
15637 AT RAL36XVNC1

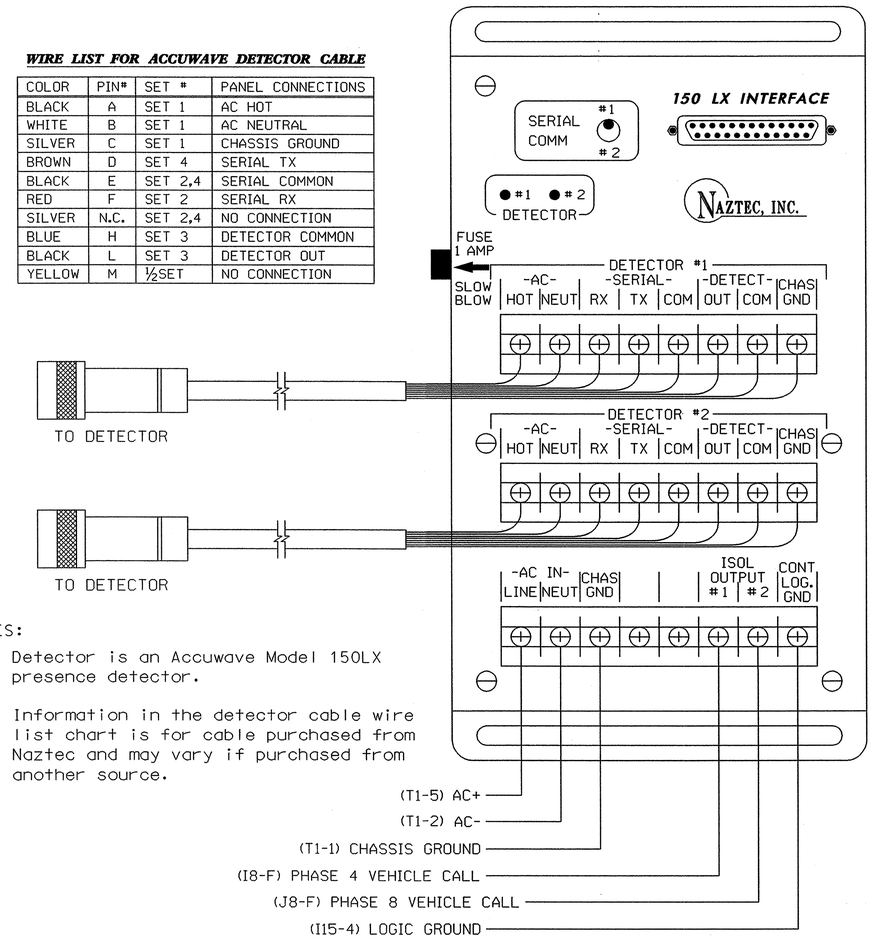
PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 24

ACCUWAVE DETECTOR PANEL WIRING DETAIL

(wire as shown)

WIRE LIST FOR ACCUWAVE DETECTOR CABLE

COLOR	PIN#	SET #	PANEL CONNECTIONS
BLACK	A	SET 1	AC HOT
WHITE	B	SET 1	AC NEUTRAL
SILVER	C	SET 1	CHASSIS GROUND
BROWN	D	SET 4	SERIAL TX
BLACK	E	SET 2,4	SERIAL COMMON
RED	F	SET 2	SERIAL RX
SILVER	N.C.	SET 2,4	NO CONNECTION
BLUE	H	SET 3	DETECTOR COMMON
BLACK	L	SET 3	DETECTOR OUT
YELLOW	M	½SET	NO CONNECTION



NOTES:

1. Detector is an Accuwave Model 150LX presence detector.
2. Information in the detector cable wire list chart is for cable purchased from Naztec and may vary if purchased from another source.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGNS: 09-0612T1
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Temporary Design 1 - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section

750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET) AT SR 1108 (INGRAM ROAD/ JEFFERSON CHURCH ROAD)

DIVISION 9	STOKES COUNTY	KING
PLAN DATE: SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY: MRC	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

SEAL

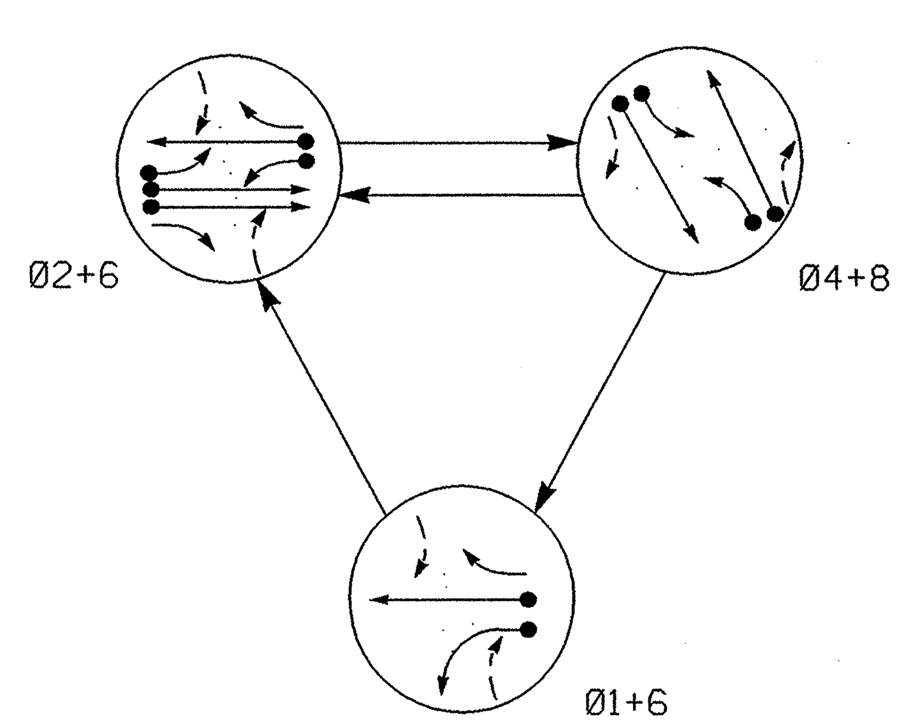
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

SIGNATURE 9-19-08 DATE

SIG. INVENTORY NO. 09-0612T1

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

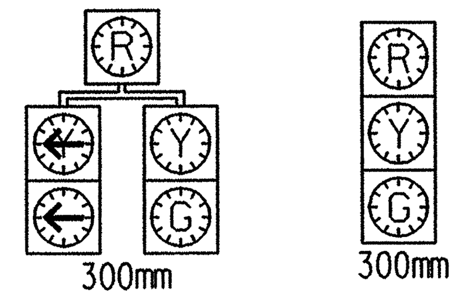
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø4+8	FLASH
21,22,23	R	G	R	Y
41,42,43	R	R	G	R
61	← / G	G	R	Y
62	G	G	R	Y
81,82,83	R	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

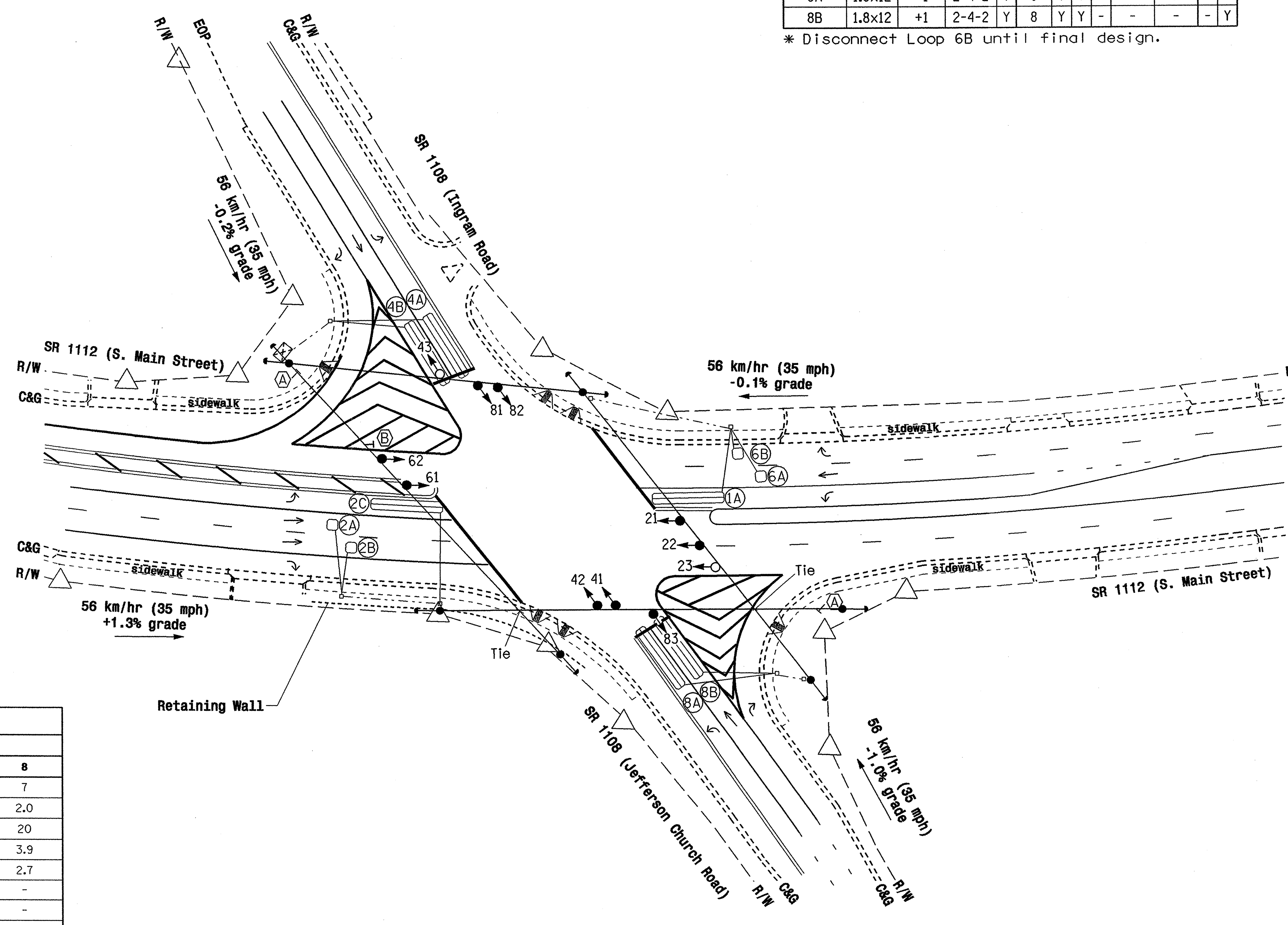
INDUCTIVE LOOPS: LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	DETECTOR PROGRAMMING: PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	1.8x12	0	2-4-2	Y	1	Y	Y	-	-	15	-	-
					6	Y	Y	-	-	-	-	-
2A	1.8x1.8	20	4	Y	2	Y	Y	-	-	-	-	Y
2B	1.8x1.8	20	4	Y	2	Y	Y	-	-	-	-	Y
2C	1.8x12	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
4A	1.8x12	+1	2-4-2	Y	4	Y	Y	-	-	2	-	Y
4B	1.8x12	+1	2-4-2	Y	4	Y	Y	-	-	-	-	Y
6A	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	Y
6B*	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	Y
8A	1.8x12	+1	2-4-2	Y	8	Y	Y	-	-	2	-	Y
8B	1.8x12	+1	2-4-2	Y	8	Y	Y	-	-	-	-	Y

* Disconnect Loop 6B until final design.

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 unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Program controller to clear from phase 2 to phase 1 by progressing through phase 4 (see Electrical Details for wiring).
5. Reposition existing signal heads numbered 21, 22, 41, 42, 61, 62, 81,82 and 83 as shown on plans.
6. Set all detector units to presence mode.
7. Remove microwave detectors and pole for microwave detector.



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	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
N/A	Wheelchair Ramp	

2070L TIMING CHART

FEATURE	PHASE 1	2	4	6	8
Min Green 1 *	7	10	7	10	7
Extension 1 *	2.0	3.0	2.0	3.0	2.0
Max Green 1 *	20	35	20	35	20
Yellow Clearance	3.0	3.8	3.9	3.9	3.9
Red Clearance	2.2	1.6	2.7	1.6	2.7
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	-	MIN. RECALL	-	MIN. RECALL	-
Vehicle Call Memory	-	YELLOW	-	YELLOW	-
Dual Entry	-	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON

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

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1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SIGNAL UPGRADE - TEMPORARY DESIGN 2 - TCP PHASE II

SR 1112 (S. MAIN STREET) AT SR 1108 (INGRAM ROAD/ JEFFERSON CHURCH ROAD)

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

SCALE 5 0 10 1:500

DIVISION 9	STOKES COUNTY		KING
PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	KG EGGLESTON	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

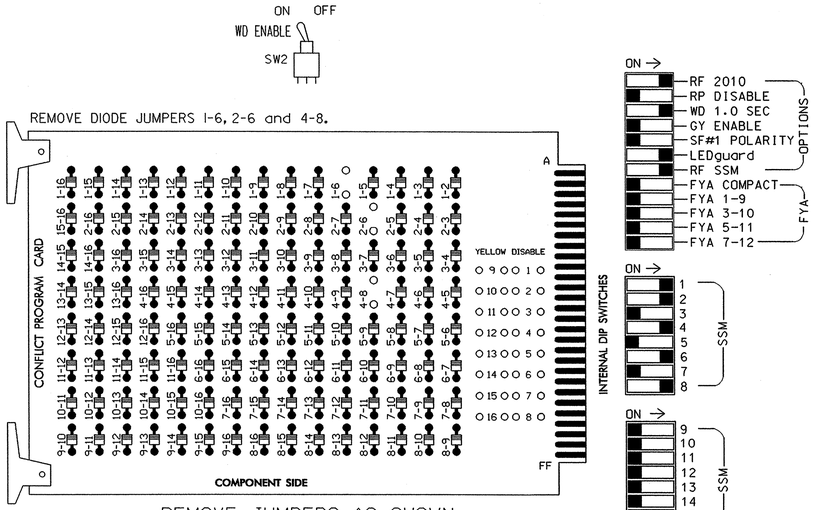
MRCooney 9-19-08
SIGNATURE DATE

SIG. INVENTORY NO. 09-0612T2

15637 AT RAL3GKYMC1

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

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.

■ = DENOTES POSITION OF SWITCH

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø2 2A	Ø2 2C	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø2 2B	NOT USED			Ø4 4B								ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø6 6B				Ø8 8B								

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

⊗ Wired Input - Do not populate slot with detector card

FS = FLASH SENSE
ST = STOP TIME

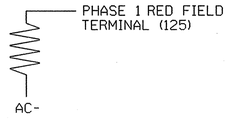
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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 Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

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 3,5,7,9, 10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Dual Entry.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	61	21, 22,23	NU	NU	41, 42,43	NU	NU	61,62	NU	NU	81, 82,83	NU	NU	NU	NU	NU	NU	NU
RED	✳	128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW																		
YELLOW ARROW	126																	
FLASHING YELLOW ARROW																		
GREEN ARROW	127																	

NU = Not Used

✳ Denotes install load resistor. See load resistor installation detail this sheet.

EQUIPMENT INFORMATION

CONTROLLER.....EXISTING 2070L
CABINET.....EXISTING 332 /W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S6,S8
PHASES USED.....1,2,4,6,8
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			2
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B[2]	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			2
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			

[1] Add jumper from I1-W to J4-W. on rear of input file.
[2] Disconnect Loop 6B for this temporary.

DYNAMIC BACK-UP CONTROL PROGRAMMING

(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 Function 1.
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     ¦X
CALL PHASES     ¦  X
```

BACKUP PROTECTION PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGNS: 09-0612T2
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Temporary Design 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET) AT SR 1108 (INGRAM ROAD/ JEFFERSON CHURCH ROAD)

DIVISION 9 | STOKES COUNTY | KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	MRC	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

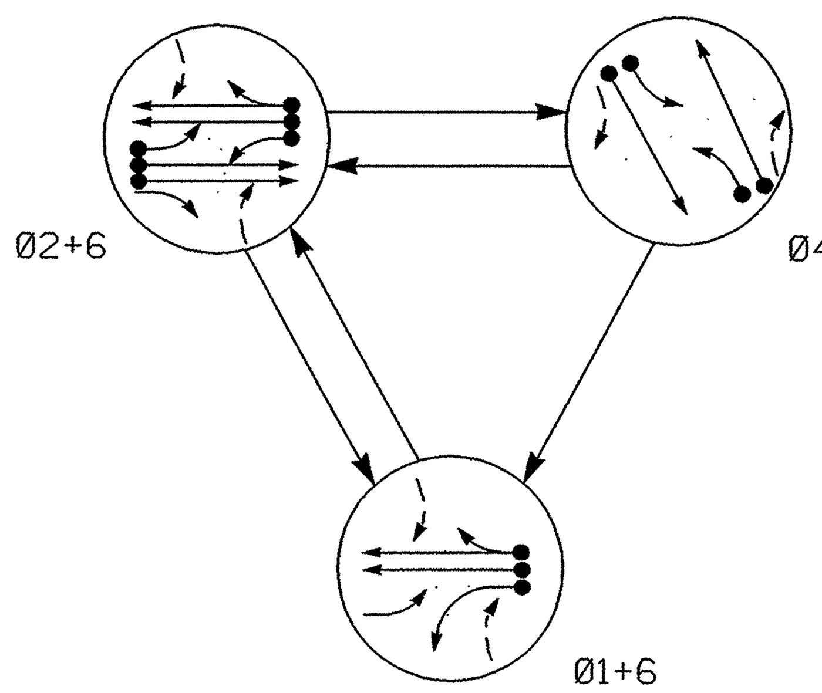
SIGNATURE | DATE 9-19-08

SIG. INVENTORY NO. 09-0612T2

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888

03-OCT-2008 16:51
G:\TEC\Curr\10000326 R-2201 CLS\Signals\Wiring\09-0612_T2w.dgn
22508 AT RAL81C6511

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø4+8	FLASH
11	←	←F/Y	←R	←R
21	←F/Y	←F/Y	←R	←R
22,23	R	G	R	Y
41,42,43	R	R	G	R
61,62	G	G	R	Y
81,82,83	R	R	G	R

STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNALS

FROM \ TO	← 1	← 2	←F/Y 1	←F/Y 2	←R 1	←R 2
←	←	←	←Y	←R	←Y	←R
←F/Y	←F/Y	←F/Y	←F/Y	←F/Y	←Y	←R
←R	←R	←R	←R	←R	←R	←R

2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	1.8x12	0	2-4-2	-	1	Y	Y	-	-	15	-	-
					6	Y	Y	-	-	-	-	-
2A	1.8x1.8	20	4	-	2	Y	Y	-	-	-	-	-
2B	1.8x1.8	20	4	-	2	Y	Y	-	-	-	-	-
2C	1.8x12	0	2-4-2	-	2	Y	Y	-	-	-	-	-
4A	1.8x12	+1	2-4-2	-	4	Y	Y	-	-	2	-	-
4B	1.8x12	+1	2-4-2	-	4	Y	Y	-	-	-	-	-
6A	1.8x1.8	20	4	-	6	Y	Y	-	-	-	-	-
6B	1.8x1.8	20	4	-	6	Y	Y	-	-	-	-	-
8A	1.8x12	+1	2-4-2	-	8	Y	Y	-	-	2	-	-
8B	1.8x12	+1	2-4-2	-	8	Y	Y	-	-	-	-	-
S3	1.8x1.8	+70	3	Y	-	-	-	-	-	-	Y	Y
S4	1.8x1.8	+70	3	Y	-	-	-	-	-	-	Y	Y

SYSTEM DETECTORS

System Detector ID Number	Signal System ID Number	Control Zone
S3	0612-3	N/A
S4	0612-4	N/A

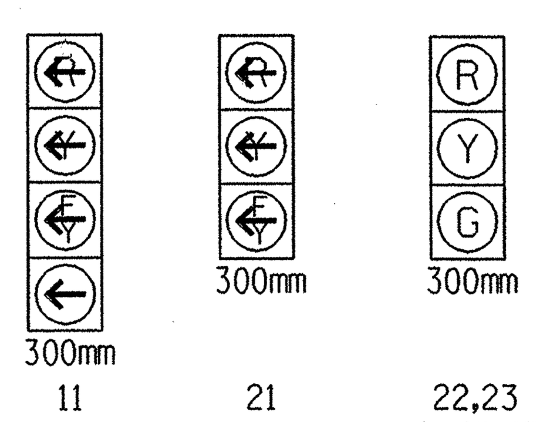
3 PHASE FULLY ACTUATED (SR 1611/1112 (S. MAIN STREET) CLOSED LOOP SYSTEM)

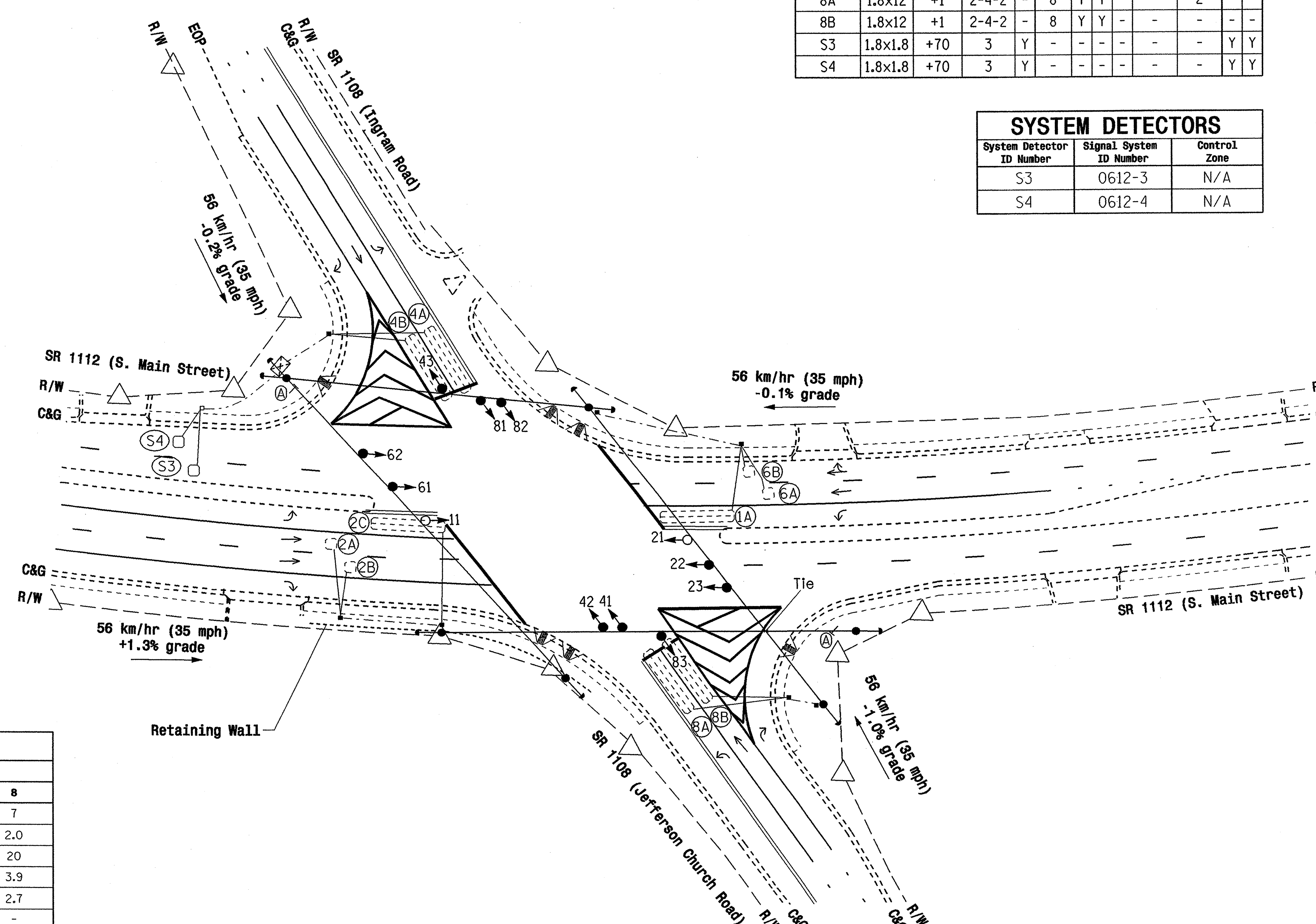
NOTES

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 unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Reposition existing signal heads numbered 61 and 62.
5. Set all detector units to presence mode.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset #: 0612.

SIGNAL FACE I.D.

All Heads L.E.D.





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	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
(A)	"YEILD" Sign (R1-2)	(A)

2070L TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green 1 *	7	10	7	10	7
Extension 1 *	2.0	3.0	2.0	3.0	2.0
Max Green 1 *	20	35	20	35	20
Yellow Clearance	3.0	3.8	3.9	3.9	3.9
Red Clearance	2.2	1.6	2.7	1.6	2.7
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	-	MIN. RECALL	-	MIN. RECALL	-
Vehicle Call Memory	-	YELLOW	-	YELLOW	-
Dual Entry	-	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON

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

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

SIGNAL UPGRADE - FINAL DESIGN

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

SCALE 5 0 10 — 1:500

SR 1112 (S. MAIN STREET) AT SR 1108 (INGRAM ROAD/ JEFFERSON CHURCH ROAD)

DIVISION 9 STOKES COUNTY KING

PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY
PREPARED BY: KG EGGLESTON	REVIEWED BY: LM MOON

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

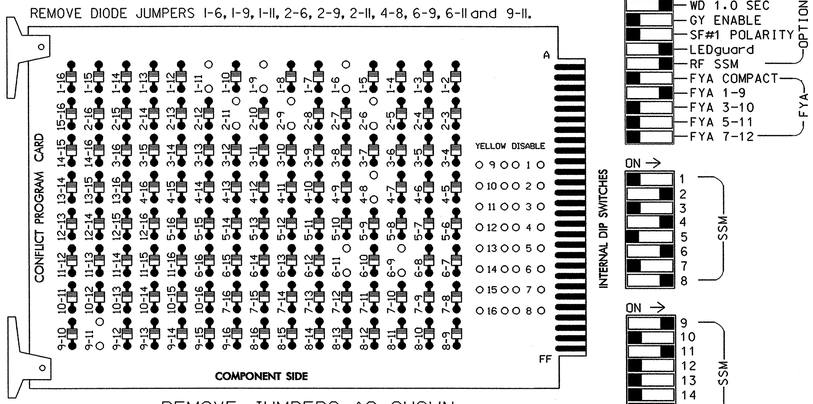
SIGNATURE — DATE 9-19-08

SIG. INVENTORY NO. 09-0612

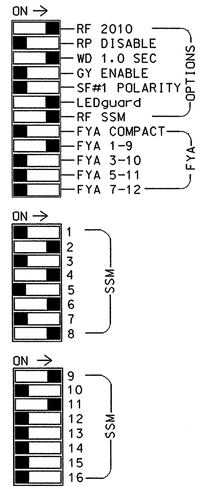
PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 28

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN



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.

■ = DENOTES POSITION OF SWITCH

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø2 2A	Ø2 2C	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC
	L	NOT USED	Ø2 2B	NOT USED			Ø4 4B			SYS. DET. S4					ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø6 6B				Ø8 8B								

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

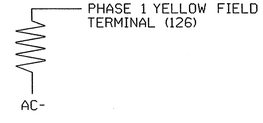
INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



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, 10,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Dual Entry.
6. The cabinet and controller are part of the SR 1611/1112 (S. Main Street) Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1★	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA★	OLB	SPARE	OLC★	OLD	SPARE
SIGNAL HEAD NO.	11	22,23	NU	NU	41, 42,43	NU	NU	61,62	NU	NU	81, 82,83	NU	11	NU	NU	21	NU	NU
RED		128			101			134			107							
YELLOW	✳	129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW	127																	

NU = Not Used

✳ Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail below.

EQUIPMENT INFORMATION

CONTROLLER.....EXISTING 2070L
CABINET.....EXISTING 332 /W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S6,S8,S9,S12
PHASES USED.....1,2,4,6,8
OVERLAP "A".....1+2
OVERLAP "B".....NOT USED
OVERLAP "C".....1+2
OVERLAP "D".....NOT USED

INPUT FILE CONNECTION & PROGRAMMING CHART

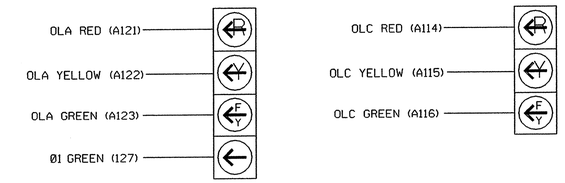
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			2
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			2
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
✳ S3	TB6-9,10	I9U	60	22	11	SYS					
✳ S4	TB6-11,12	I9L	62	24	13	SYS					

[1] Add jumper from I1-W to J4-W, on rear of input file.

✳ SYSTEM DETECTOR ONLY. REMOVE THE VEHICLE PHASE ASSIGNED TO THIS DETECTOR IN THE DEFAULT PROGRAMMING.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)



NOTE

1. The sequence display for signal head #11 requires special logic programming. See sheet 2 of 2 for programming instructions.

CLOSED LOOP SYSTEM DATA :	
CONTROLLER ASSET	0612

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGNS: 09-0612
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Final Design - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET) AT SR 1108 (INGRAM ROAD/ JEFFERSON CHURCH ROAD)

DIVISION 9 | STOKES COUNTY | KING

PLAN DATE: SEPTEMBER 2008 | REVIEWED BY: MR COONEY

PREPARED BY: MRC | REVIEWED BY: LM MOON

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 025622 ENGINEER MELISSA R. COONEY

SIGNATURE | DATE

SIG. INVENTORY NO. 09-0612

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 29

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL
TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(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, AND 3.

2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```
  LOGICAL I/O COMMAND #1  (+/-COMMAND#)
IF  ACTIVE PHASE       #1  IS ON
AND RED CLEAR ON PHASE #1  IS ON

                 SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #50 ON
SET OUTPUT  ASSIGNMENT #51 OFF
```

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

PRESS '+'

```
  LOGICAL I/O COMMAND #2  (+/-COMMAND#)
IF  ACTIVE PHASE       #1  IS ON

                 SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #52 OFF
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 1 (HEAD 11).

PRESS '+'

```
  LOGICAL I/O COMMAND #3  (+/-COMMAND#)
IF  YELLOW ON PHASE    #1  IS ON

                 SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #51 ON
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

OUTPUT 50 = Overlap A Red
OUTPUT 51 = Overlap A Yellow
OUTPUT 52 = Overlap A Green

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```
 PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          |12345678910111213141516
VEH OVL PARENTS: |XX
VEH OVL NOT VEH: |
VEH OVL NOT PED: |
VEH OVL GRN EXT: |
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

← NOTICE GREEN FLASH

PRESS '+' TWICE.

```
 PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE:          |12345678910111213141516
VEH OVL PARENTS: |XX
VEH OVL NOT VEH: |
VEH OVL NOT PED: |
VEH OVL GRN EXT: |
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGNS: 09-0612
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Final Design - Sheet 2 of 2

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Public Engineering and Safety Systems Branch
NCDEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET) AT SR 1108 (INGRAM ROAD/ JEFFERSON CHURCH ROAD)

DIVISION 9 | STOKES COUNTY | KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	MRC	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

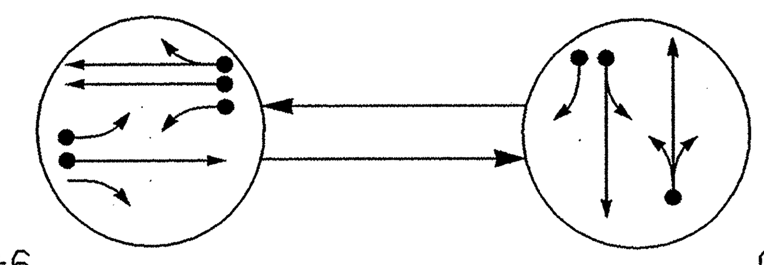
SEAL

NORTH CAROLINA PROFESSIONAL SEAL 025392 ENGINEER MELISSA R. COONEY

SIGNATURE | DATE 9-19-08

SIG. INVENTORY NO. 09-0612

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

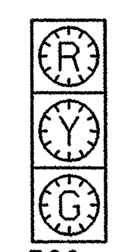
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT

TABLE OF OPERATION

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

SIGNAL FACE I.D.

Denotes L.E.D.



300mm
21,22
41,42
61,62
81,82

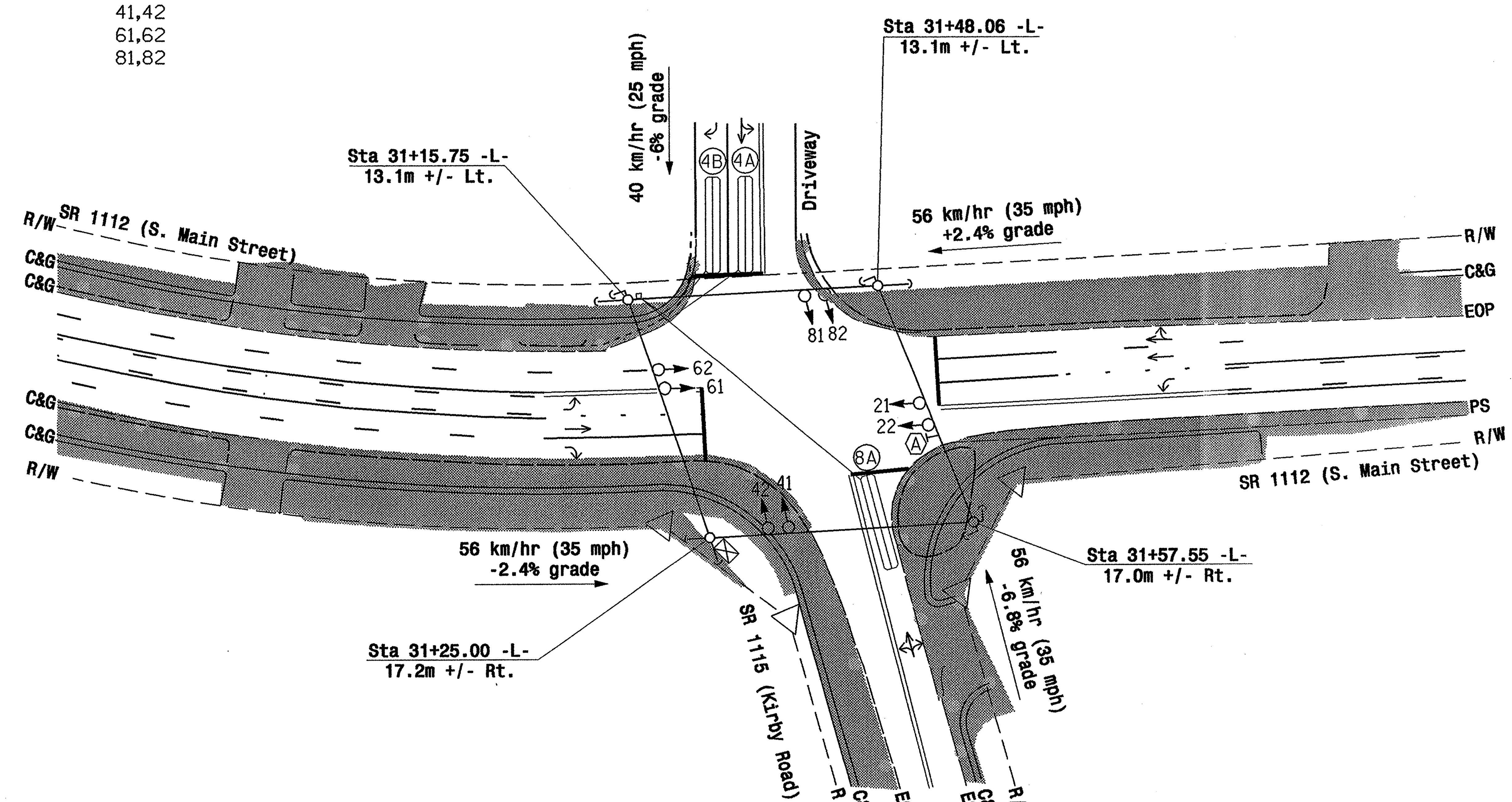
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
4A	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	2	-	Y
4B	1.8x12	0	2-4-2	Y	4	Y	Y	-	-	15	-	Y
8A	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	5	-	Y

2 PHASE SEMI-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 unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Pavement markings are existing.
6. Direct bury all lead in from detector loops to junction boxes and controller cabinet.
7. Future master location.



2070L TIMING CHART

FEATURE	PHASE 2	4	6	8
Min Green 1 *	10	7	10	7
Extension 1 *	0.0	2.0	0.0	2.0
Max Green 1 *	40	25	40	25
Yellow Clearance	4.1	3.5	3.7	4.4
Red Clearance	1.3	2.3	1.7	1.2
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MAX. RECALL	-	MAX. RECALL	-
Vehicle Call Memory	N/A	-	N/A	-
Dual Entry	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON

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

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	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
	Construction Zone	
(A)	Right Arrow "ONLY" Sign (R3-5)	(A)

SIGNAL UPGRADE - TEMPORARY DESIGN - TCP EXISTING CONDITIONS

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

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

SR 1112 (S MAIN STREET)
AT
SR 1115 (KIRBY ROAD)

DIVISION 9 | STOKES COUNTY | KING
PLAN DATE: SEPTEMBER 2008 | REVIEWED BY: MR COONEY
PREPARED BY: KG EGGLESTON | REVIEWED BY: LM MOON
REVISIONS | INIT. | DATE

SCALE 5 0 10
1:500

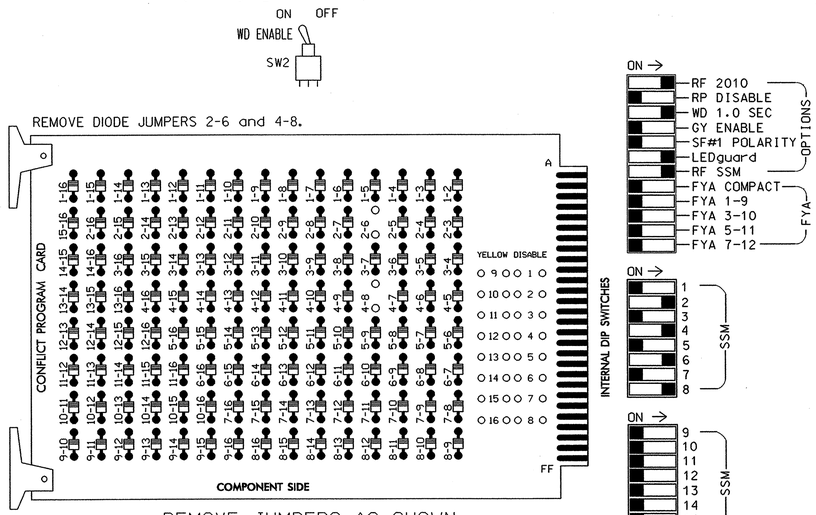
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY
SIGNATURE 9-19-08 DATE
SIG. INVENTORY NO. 09-0471T

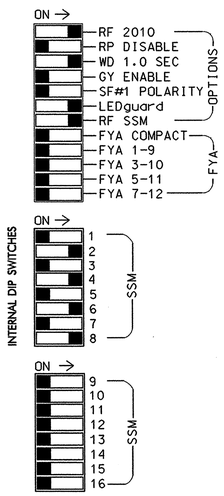
19-SEP-2008 15:42
G:\TEG\Cur\100003326 R-2201 CLS\Signals\09-0471T.dgn
22976 AT RALGCJOR41

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 31

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)





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.

■ = DENOTES POSITION OF SWITCH

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 9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Dual Entry.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332 /W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S4,S6,S8
PHASES USED.....2,4,6,8
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW																		
YELLOW ARROW																		
FLASHING YELLOW ARROW																		
GREEN ARROW																		

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
FILE "I" L						ø4 4B								ST DC ISOLATOR
FILE "J" U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
FILE "J" L						NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			2
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			5

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0471T
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Temporary Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Traffic Engineering and Safety Systems
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 1112 (S. MAIN STREET)
AT
SR 1115 (KIRBY ROAD)

DIVISION 9 | STOKES COUNTY | KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	WR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LW MOON

REVISIONS	INIT.	DATE

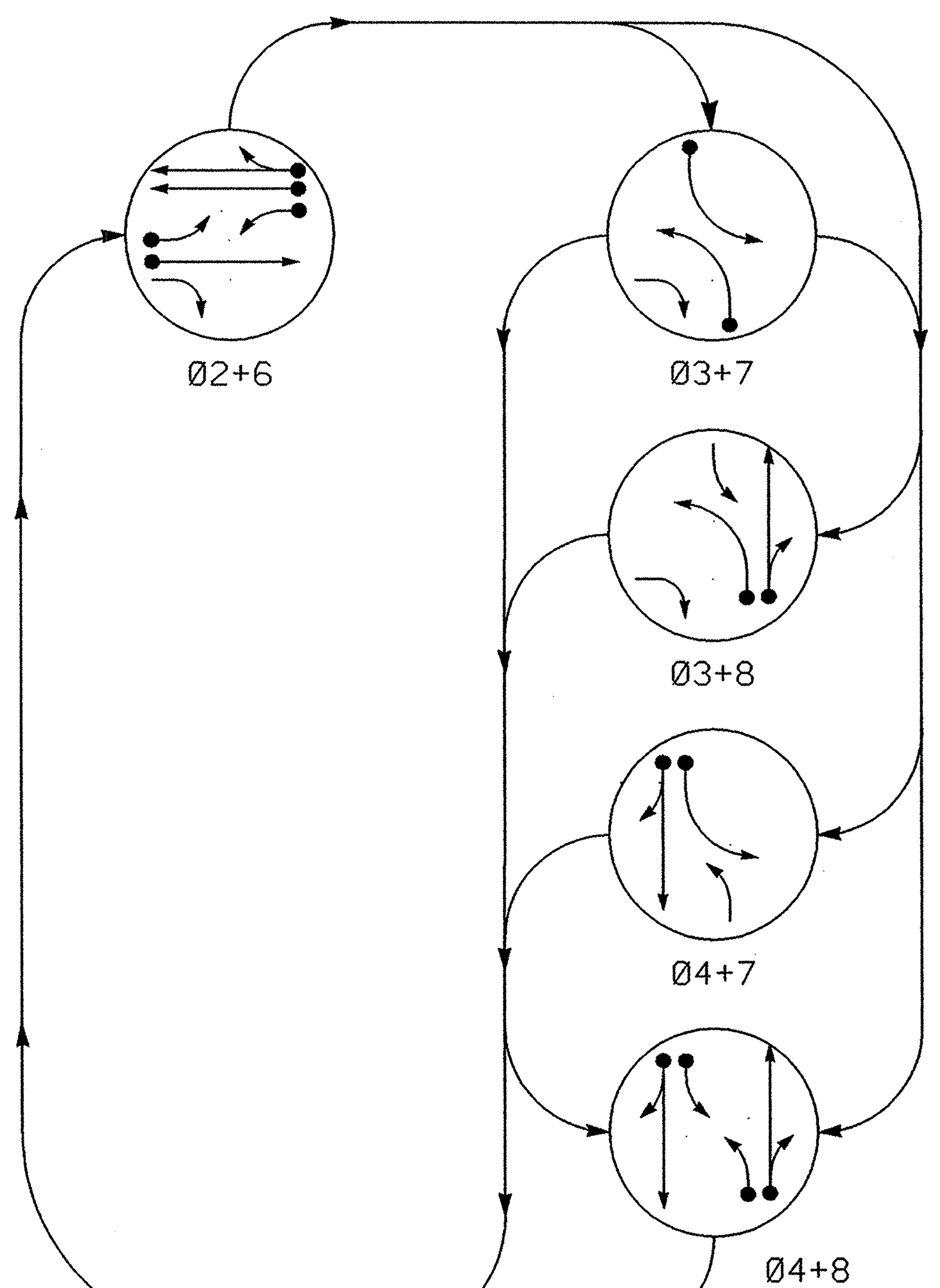
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY
SIGNATURE
DATE 9-19-08
SIG. INVENTORY NO. 09-0471T

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888

08-OCT-2008 08:44
G:\TEO\Curr\10003326.R-2201 CLS\Signals\Wiring\09-0471_tw.dgn
15637 AT PAL30(YMC)

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2201	Sig. 32

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

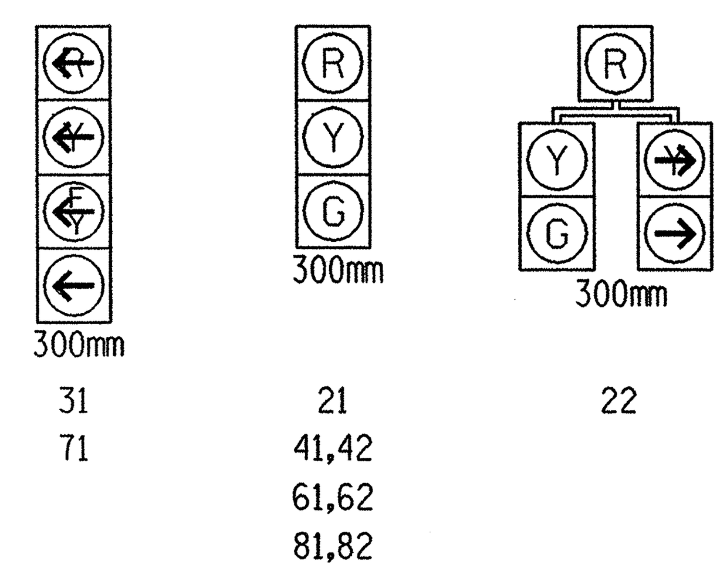
SIGNAL FACE	PHASE Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
21	G	R	R	R	R	Y
22	G	R/→	R/→	R	R	Y
31	←R	←	←	←FY	←FY	←R
41,42	R	R	R	G	G	R
61,62	G	R	R	R	R	Y
71	←R	←	←FY	←	←FY	←R
81,82	R	R	G	R	G	R

STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNALS

FROM \ TO	← 1	← 2	←FY 1	←FY 2	←R 1	←R 2
←	←	←	←Y	←R	←Y	←R
←FY	←FY	←FY	←FY	←FY	←Y	←R
←R	←R	←R	←R	←R	←R	←R

SIGNAL FACE I.D.

All Heads L.E.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS: LOOP	SIZE (M)	DISTANCE FROM STOPBAR (M)	TURNS	NEW LOOP	DETECTOR PROGRAMMING: PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	1.8x1.8	20	3	Y	2	Y	Y	-	-	-	-	Y
2B	1.8x12	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
3A	1.8x12	0	2-4-2	Y	3	Y	Y	-	-	15	-	Y
					8	Y	Y	-	-	2	-	Y
4A	1.8x12	0	2-4-2	-	4	Y	Y	-	-	10	-	-
6A	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	Y
6B	1.8x1.8	20	4	Y	6	Y	Y	-	-	-	-	Y
6C	1.8x12	0	2-4-2	Y	6	Y	Y	-	-	-	-	Y
7A	1.8x12	0	2-4-2	-	7	Y	Y	-	-	15	-	Y
					4	Y	Y	-	-	2	-	Y
8A	1.8x12	0	2-4-2	Y	8	Y	Y	-	-	10	-	-
S1	1.8x1.8	+45	4	Y	-	-	-	-	-	-	Y	Y
S2	1.8x1.8	+45	4	Y	-	-	-	-	-	-	Y	Y

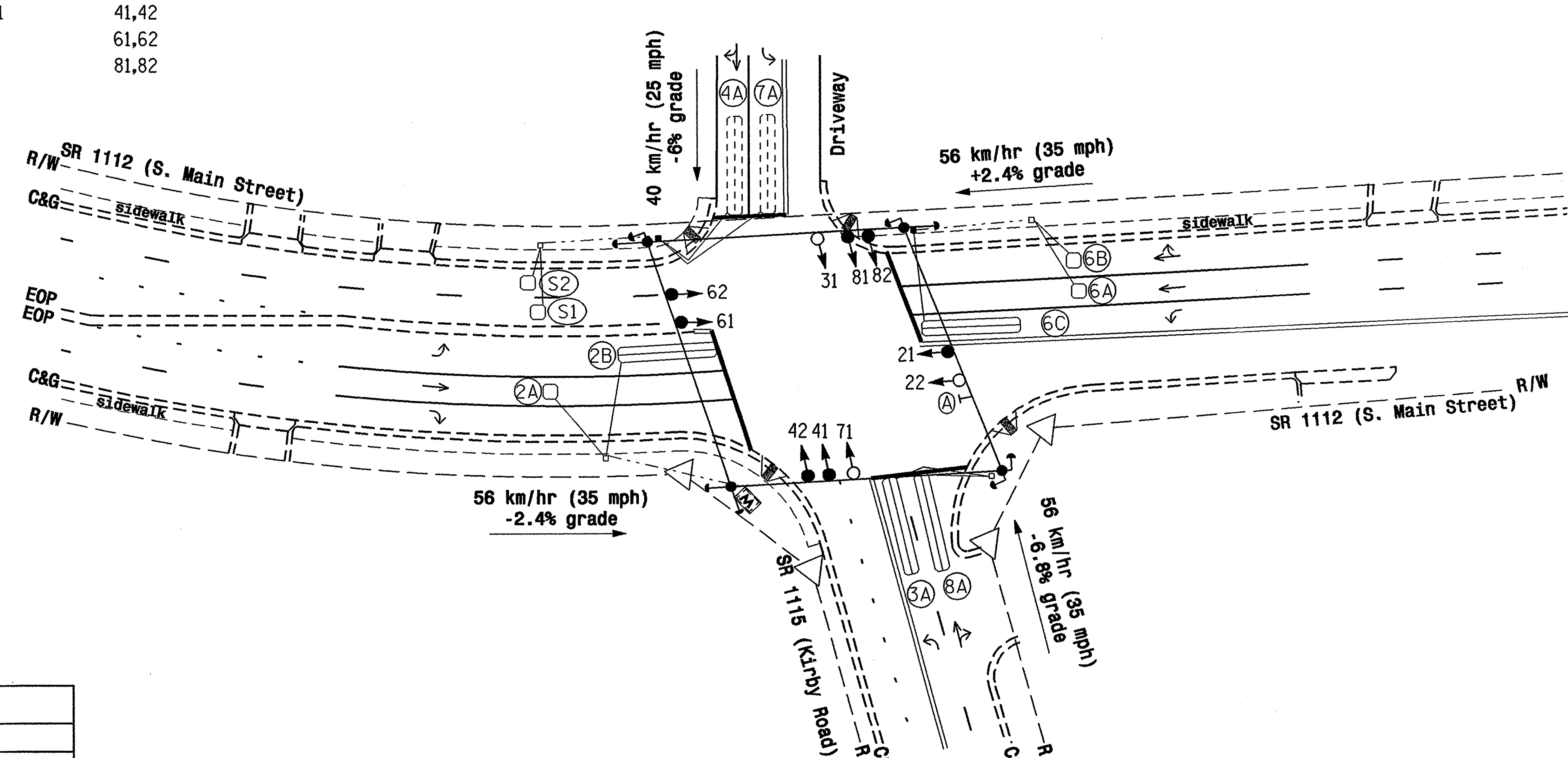
SYSTEM DETECTORS

System Detector ID Number	Signal System ID Number	Control Zone
S1	0471-1	N/A
S2	0471-2	N/A

5 PHASE FULLY ACTUATED (SR 1611/1112 (S. MAIN STREET) CLOSED LOOP SYSTEM)

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 unless otherwise directed by the Engineer.
3. Phase 3 or Phase 7 may be lagged.
4. Set all detector units to presence mode.
5. Reposition all existing signal heads as shown on plans.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data:
   Controller Asset #: 0471
   Master Asset #: 10918.



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	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
Ⓐ	Right Arrow "ONLY" Sign (R3-5R)	Ⓐ
M	Master Controller & Cabinet	M

2070L TIMING CHART

FEATURE	PHASE 2	3	4	6	7	8
Min Green 1 *	10	7	7	10	7	7
Extension 1 *	3.0	2.0	2.0	3.0	2.0	2.0
Max Green 1 *	35	45	15	35	15	15
Yellow Clearance	4.1	3.2	3.5	3.7	3.1	4.4
Red Clearance	1.5	3.0	2.4	1.5	2.7	1.9
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	MIN. RECALL	-	-	MIN. RECALL	-	-
Vehicle Call Memory	YELLOW	-	-	YELLOW	-	-
Dual Entry	-	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
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(919) 876-6888

SIGNAL UPGRADE - FINAL DESIGN

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

SR 1112 (S. MAIN STREET)
AT
SR 1115 (KIRBY ROAD)

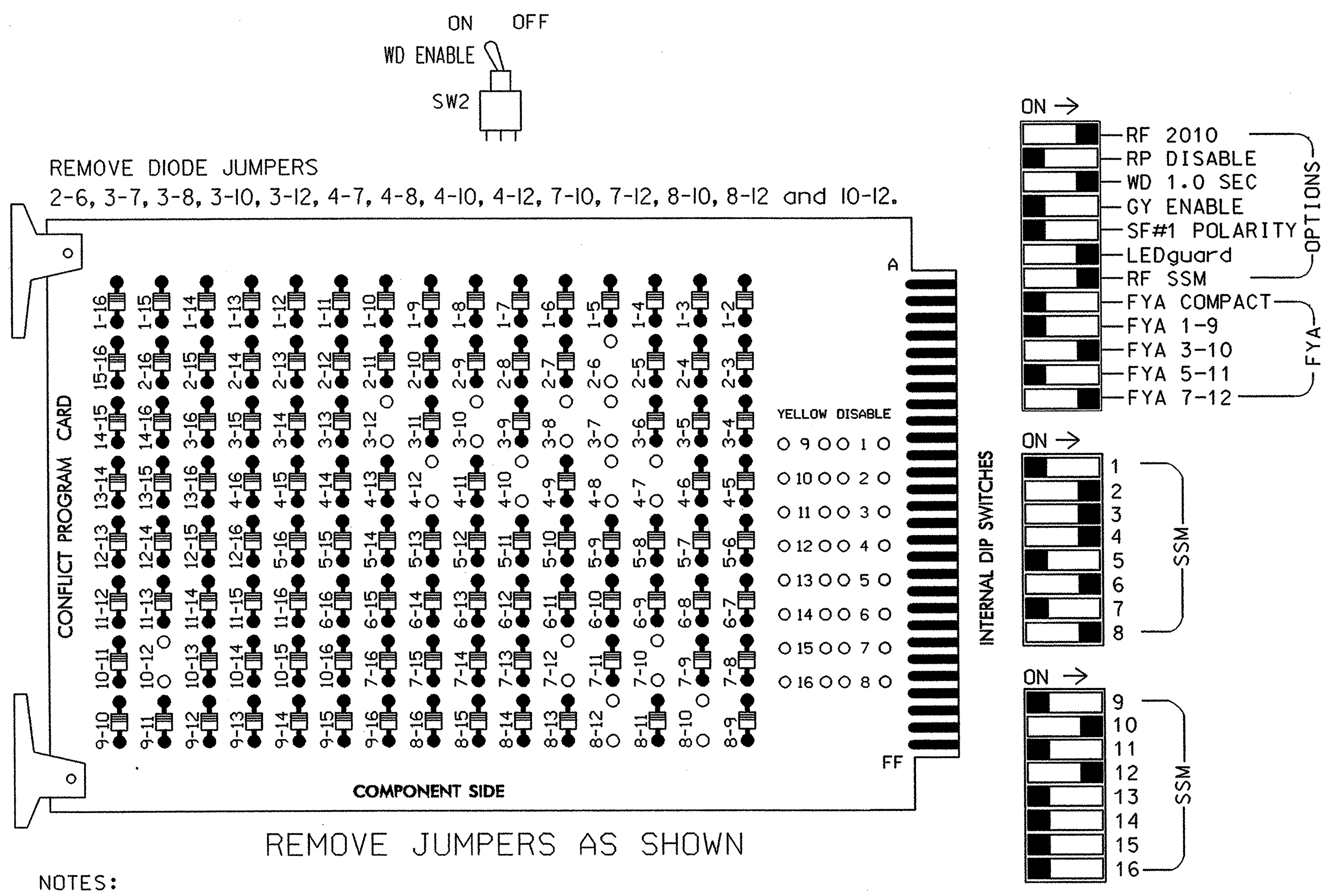
DIVISION 9	STOKES COUNTY	KING
PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY	
PREPARED BY: KG EGGLESTON	REVIEWED BY: LM MOON	
REVISIONS	INIT.	DATE

SCALE 5 0 10
1:500

SEAL
SIGNATURE 9-19-08 DATE
SIG. INVENTORY NO. 09-0471

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

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.

■ = DENOTES POSITION OF SWITCH

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 1,5,7, 9,11,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Dual Entry.
6. The cabinet and controller are part of the SR 1611/1112 (S. Main Street) Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3		4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	22	31★	41,42	NU	NU	61,62	NU	71★	81,82	NU	NU	31★	NU	NU	71★	NU
RED		128		✳		101			134			107							
YELLOW		129				102			135		✳	108							
GREEN		130				103			136			109							
RED ARROW															A124			A101	
YELLOW ARROW				117											A125			A102	
FLASHING YELLOW ARROW															A126			A103	
GREEN ARROW				118	118						124								

NU = Not Used

✳ Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø2 2A	SLOT EMPTY	SLOT EMPTY	Ø3 3A	Ø4 4A	SLOT EMPTY	WIRED INPUT ⊗	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		Ø2 2B			NOT USED	NOT USED			SYS. DET. S2					ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	Ø6 6C	SLOT EMPTY	Ø7 7A	Ø8 8A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø6 6B	NOT USED		NOT USED	NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

EQUIPMENT INFORMATION

CONTROLLER.............EXISTING 2070L
CABINET................EXISTING 332 /W/ AUX
SOFTWARE...............ECONOLITE OASIS
CABINET MOUNT..........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S2,S3,S4,S6,S7,S8,S10,S13
PHASES USED............2,3,4,6,7,8
OVERLAP "A"............NOT USED
OVERLAP "B"............3+4
OVERLAP "C"............NOT USED
OVERLAP "D"............7+8

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A[1]	TB4-5,6	I5U	58	20	3	3	Y	Y			15
	-	J8U	50	12	28	8	Y	Y			2
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			10
✳ S1	TB6-9,10	I9U	60	22	11	SYS					
✳ S2	TB6-11,12	I9L	62	24	13	SYS					
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
6C	TB3-9,10	J3U	64	26	36	6	Y	Y			
7A[2]	TB5-5,6	J5U	57	19	7	7	Y	Y			15
	-	I8U	49	11	24	4	Y	Y			2
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			10

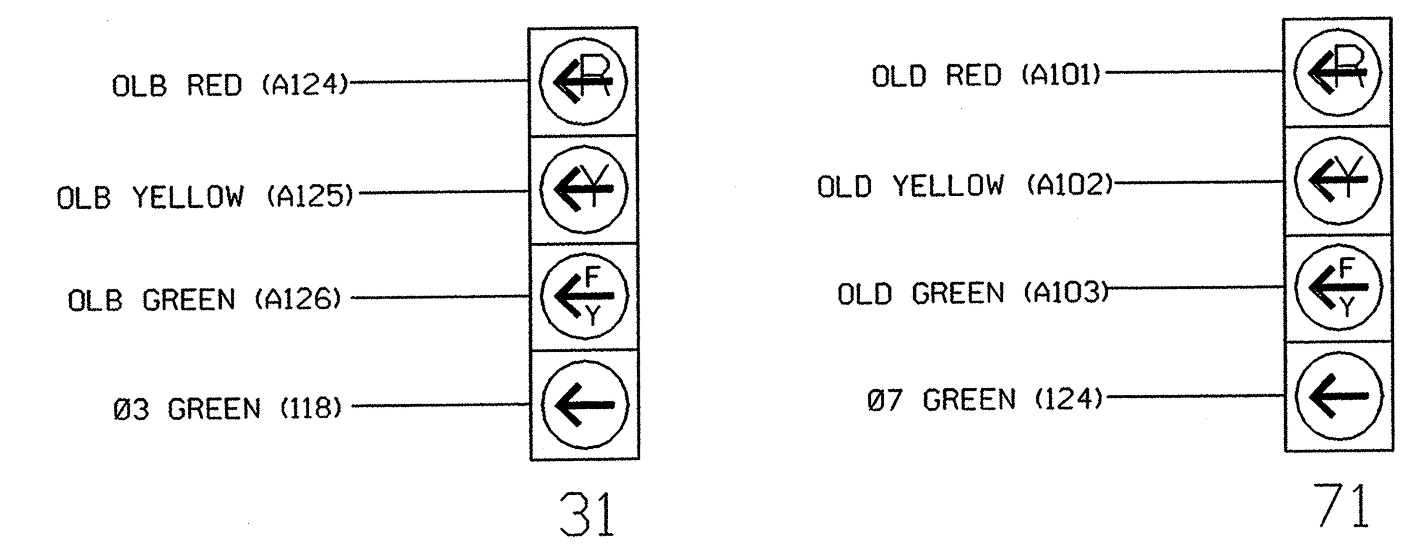
[1] Add jumper from I5-W to J8-W, on rear of input file.

[2] Add jumper from J5-W to I8-W, on rear of input file.

✳ SYSTEM DETECTOR ONLY. REMOVE THE VEHICLE PHASE ASSIGNED TO THIS DETECTOR IN THE DEFAULT PROGRAMMING.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

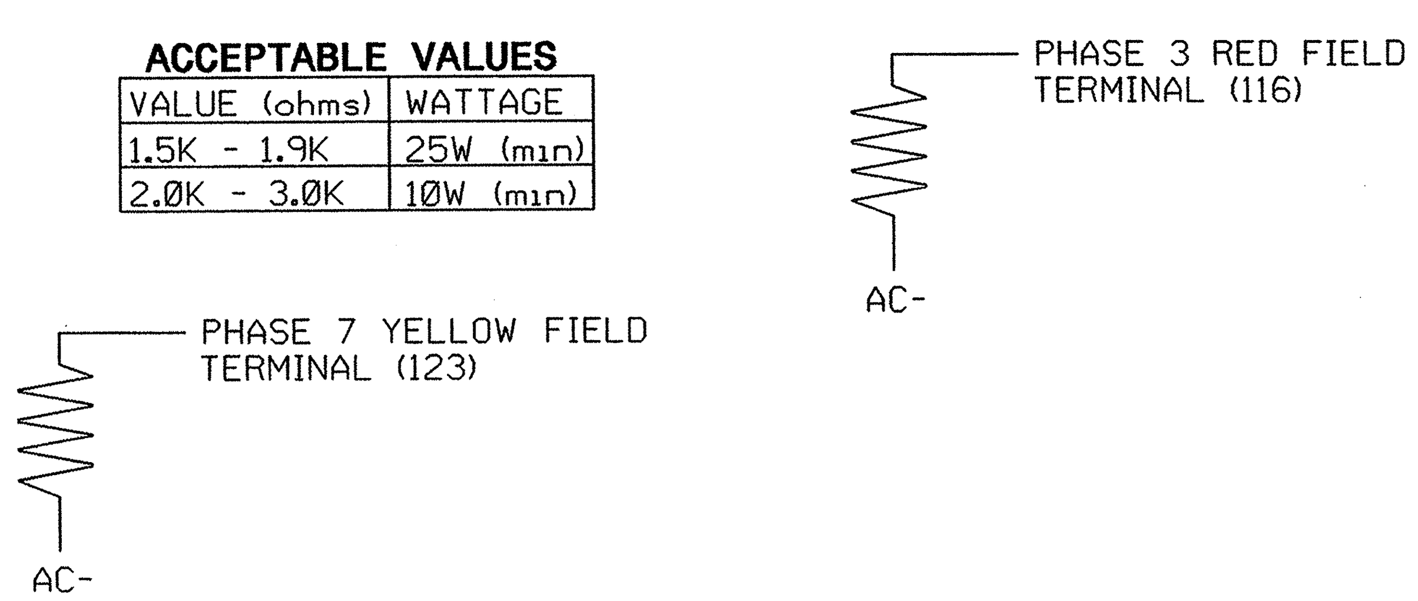
1. The sequence display for these signals require special logic programming. See sheet 2 of 2 for programming instructions.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



CLOSED LOOP SYSTEM DATA :	
MASTER ASSET	10918
CONTROLLER ASSET	0471

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0471
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Final Design - Sheet 1 of 2

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for 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

SR 1112 (S. MAIN STREET) AT SR 1115 (KIRBY ROAD)

DIVISION 9 — STOKES COUNTY — KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	KG EGGLESTON	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025992 ENGINEER MELISSA R. COONEY
SIGNATURE: M R Cooney DATE: 9-19-08

SIG. INVENTORY NO. 09-0471

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(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, 4, 5, AND 6.

2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```
LOGICAL I/O COMMAND #1  (+/-COMMAND#)
IF  ACTIVE PHASE        #3  IS ON
AND RED CLEAR ON PHASE #3   IS ON
            SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #47 ON
SET OUTPUT  ASSIGNMENT #48 OFF
```

NOTE: LOGIC FOR PHASE 3 RED CLEAR WHEN TRANSITIONING FROM PHASE 3 TO PHASE 4 (HEAD 31).

PRESS '+'

```
LOGICAL I/O COMMAND #2  (+/-COMMAND#)
IF  ACTIVE PHASE        #3  IS ON
            SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #49 OFF
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 3 (HEAD 31).

PRESS '+'

```
LOGICAL I/O COMMAND #3  (+/-COMMAND#)
IF  YELLOW ON PHASE     #3  IS ON
            SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #48 ON
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 3 (HEAD 31).

PRESS '+'

```
LOGICAL I/O COMMAND #4 (+/-COMMAND#)
IF  ACTIVE PHASE        #7  IS ON
AND RED CLEAR ON PHASE #7   IS ON
            SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #39 ON
SET OUTPUT  ASSIGNMENT #40 OFF
```

NOTE: LOGIC FOR PHASE 7 RED CLEAR WHEN TRANSITIONING FROM PHASE 7 TO PHASE 8 (HEAD 71).

PRESS '+'

```
LOGICAL I/O COMMAND #5 (+/-COMMAND#)
IF  ACTIVE PHASE        #7  IS ON
            SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #41 OFF
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 7 (HEAD 71).

PRESS '+'

```
LOGICAL I/O COMMAND #6 (+/-COMMAND#)
IF  YELLOW ON PHASE     #7  IS ON
            SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #40 ON
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 7 (HEAD 71).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

USE TO INTERPRET LOGIC PROCESSOR

OUTPUT 39 = Overlap D Red
OUTPUT 40 = Overlap D Yellow
OUTPUT 41 = Overlap D Green
OUTPUT 47 = Overlap B Red
OUTPUT 48 = Overlap B Yellow
OUTPUT 49 = Overlap B Green

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS). PRESS '+'

```
PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
PHASE:          |12345678910111213141516
VEH OVL PARENTS:|  XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR:  _ RED  _ YELLOW  _ GREEN
FLASH COLORS:   _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:    (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC)........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

NOTICE GREEN FLASH

PRESS '+' TWICE.

```
PAGE 1: VEHICLE OVERLAP 'D' SETTINGS
PHASE:          |12345678910111213141516
VEH OVL PARENTS:|      XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR:  _ RED  _ YELLOW  _ GREEN
FLASH COLORS:   _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:    (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC)........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
3. REMOVE FLASHER UNIT 2.

THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0471
DESIGNED: SEPTEMBER 2008
SEALED: 09-19-2008
REVISED: N/A

Signal Upgrade - Final Design - Sheet 2 of 2

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for 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

SR 1112 (S. MAIN STREET) AT SR 1115 (KIRBY ROAD)

DIVISION 9	STOKES COUNTY	KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	KG EGGLESTON	REVIEWED BY:	LM MOON

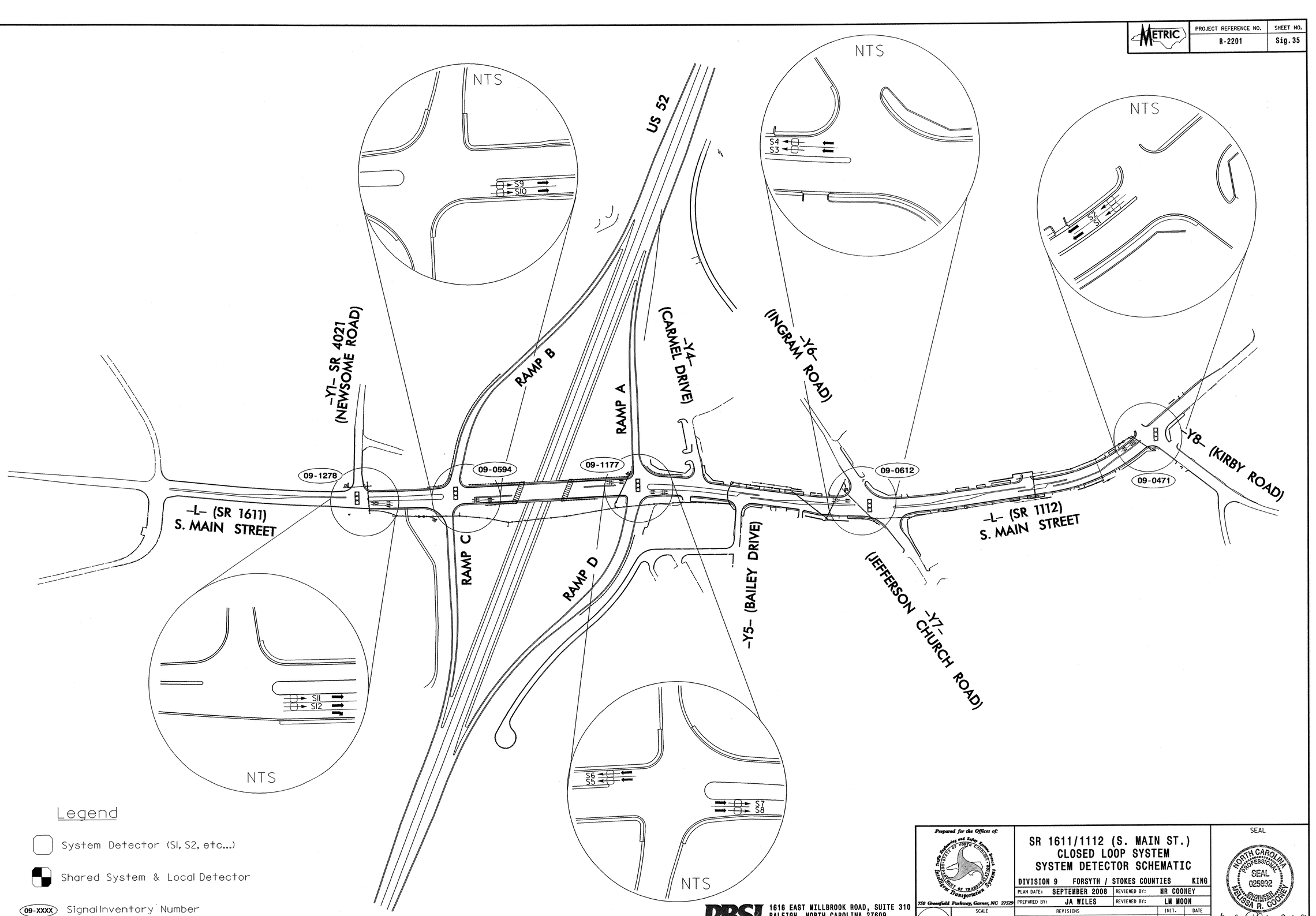
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY
SIGNATURE M R Cooney DATE 9-19-08

SIG. INVENTORY NO. 09-0471

06-OCT-2008 13:12
G:*TEG*Curr*100003326 R-2201 CLS*Signals*Wiring*09-0471w.dgn
18566 AT RAL2004GD1

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2201	Sig.35



Legend

- System Detector (SI, S2, etc...)
- Shared System & Local Detector
- 09-XXXX Signal Inventory Number

19-SEP-2008 15:41
G:\TEG\MCurr\100003326 R-2201 CLS\MCR\systemdetectors.dgn
22976 AT RALCLOR41

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1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Prepared for the Offices of:
759 Greenfield Parkway, Garner, NC 27529

SCALE: NONE

SR 1611/1112 (S. MAIN ST.) CLOSED LOOP SYSTEM SYSTEM DETECTOR SCHEMATIC

DIVISION 9 FORSYTH / STOKES COUNTIES KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LW MOON

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY
SIGNATURE DATE 9-19-08

CADD Filename: systemdetectors.dgn

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 HEAT SHRINK TUBING
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 STUBOUTS
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, TRANSCEIVER, 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 CABLE AND MESSENGER CABLE
49. REMOVE EXISTING COMMUNICATIONS CABLE
50. INSTALL TELEPHONE SERVICE
51. INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 30 METERS OF CABLE
52. INSTALL DELINEATOR MARKER
53. STORE 6 METERS 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
59. CONFIGURE 2070L CONTROLLER AS MASTER CONTROLLER
60. BOND RISER TO POLE GROUND
61. BOND MESSENGER CABLE TO POLE GROUND
62. BOND TRACER WIRE TO EQUIPMENT GROUND BUS

LEGEND

CL-1

—— F. O. ——	NEW FIBER OPTIC COMMUNICATIONS CABLE
—— TWIST. PR. ——	NEW TWISTED PAIR COMMUNICATIONS CABLE
—— EXIST. ——	EXISTING COMMUNICATIONS CABLE
—— REM. ——	EXISTING COMMUNICATIONS CABLE TO BE REMOVED
————	NEW AERIAL GUY ASSEMBLY
— · — · — · —	NEW CONDUIT
– – – – – – –	EXISTING CONDUIT
—— D D ——	NEW DIRECTIONAL DRILLED CONDUIT
—— B & J ——	NEW BORED AND JACKED CONDUIT
□	NEW JUNCTION BOX
■	EXISTING JUNCTION BOX
○	NEW WOOD POLE
●	EXISTING WOOD POLE
(S)	NEW AERIAL SPLICE ENCLOSURE
⊡	NEW METAL POLE
▣	EXISTING METAL POLE
	NEW STANDARD GUY ASSEMBLY
	NEW SIDEWALK GUY ASSEMBLY
	NEW CABLE STORAGE RACKS (SNOW SHOES)
	EXISTING CONTROLLER AND CABINET
M	EXISTING MASTER CONTROLLER AND CABINET
S	EXISTING SPLICE CABINET
S	NEW SPLICE CABINET
SP	SIGNAL POLE
LP	LIGHT POLE
XX–XXXX	SIGNAL INVENTORY NUMBER

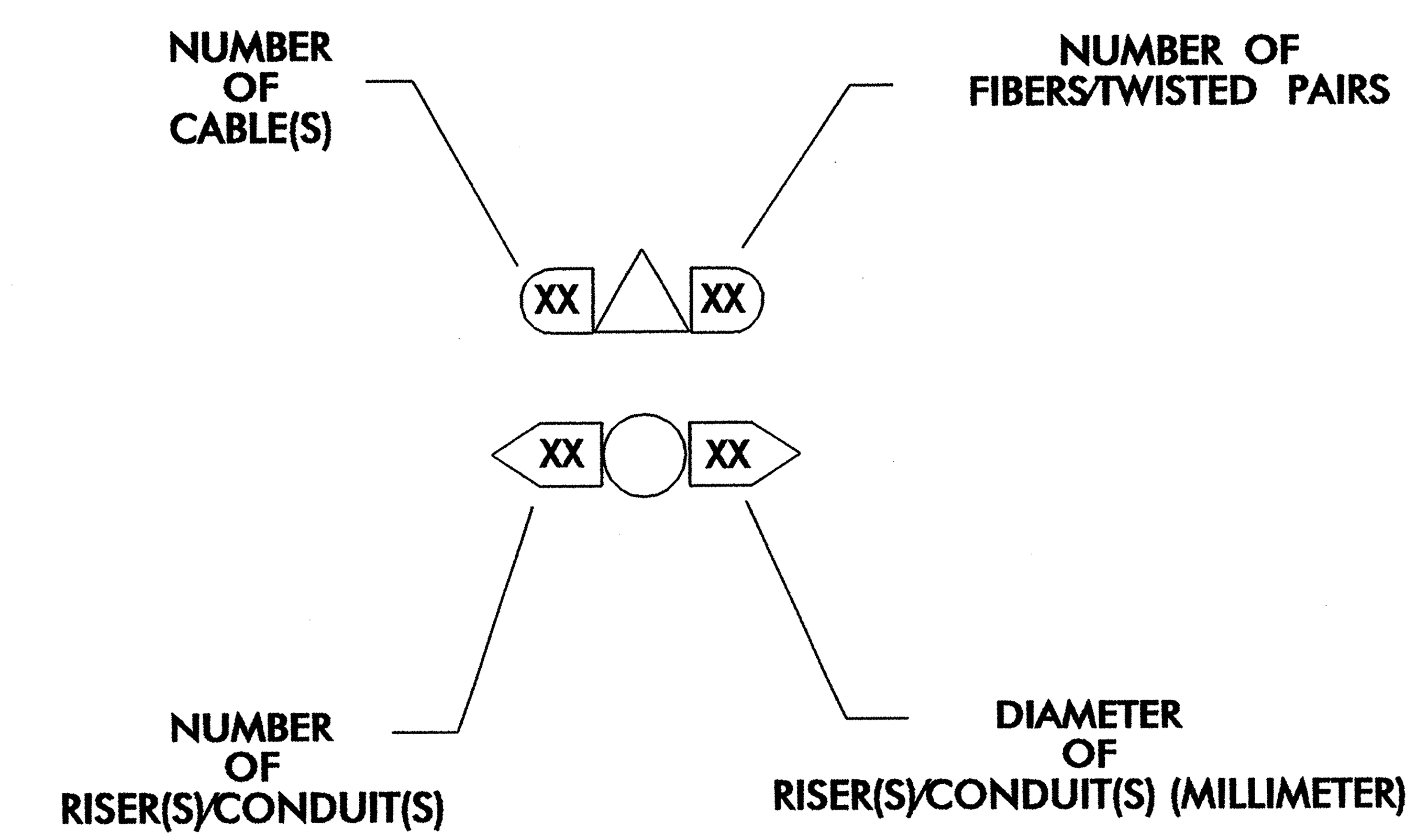
CONSTRUCTION NOTE SYMBOLOGY KEY

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) (MILLIMETER)



PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch
Intelligent Transportation Systems
State of North Carolina Department of Transportation
750 Greenfield Parkway, Garner, NC 27529

SR 1611/1112 (S. MAIN ST.)
CLOSED LOOP SYSTEM
CONSTRUCTION NOTES

DIVISION 9 FORSYTH / STOKES COUNTIES KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LM MOON

SCALE: NONE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY
Melissa Cooney 9-19-08
SIGNATURE DATE

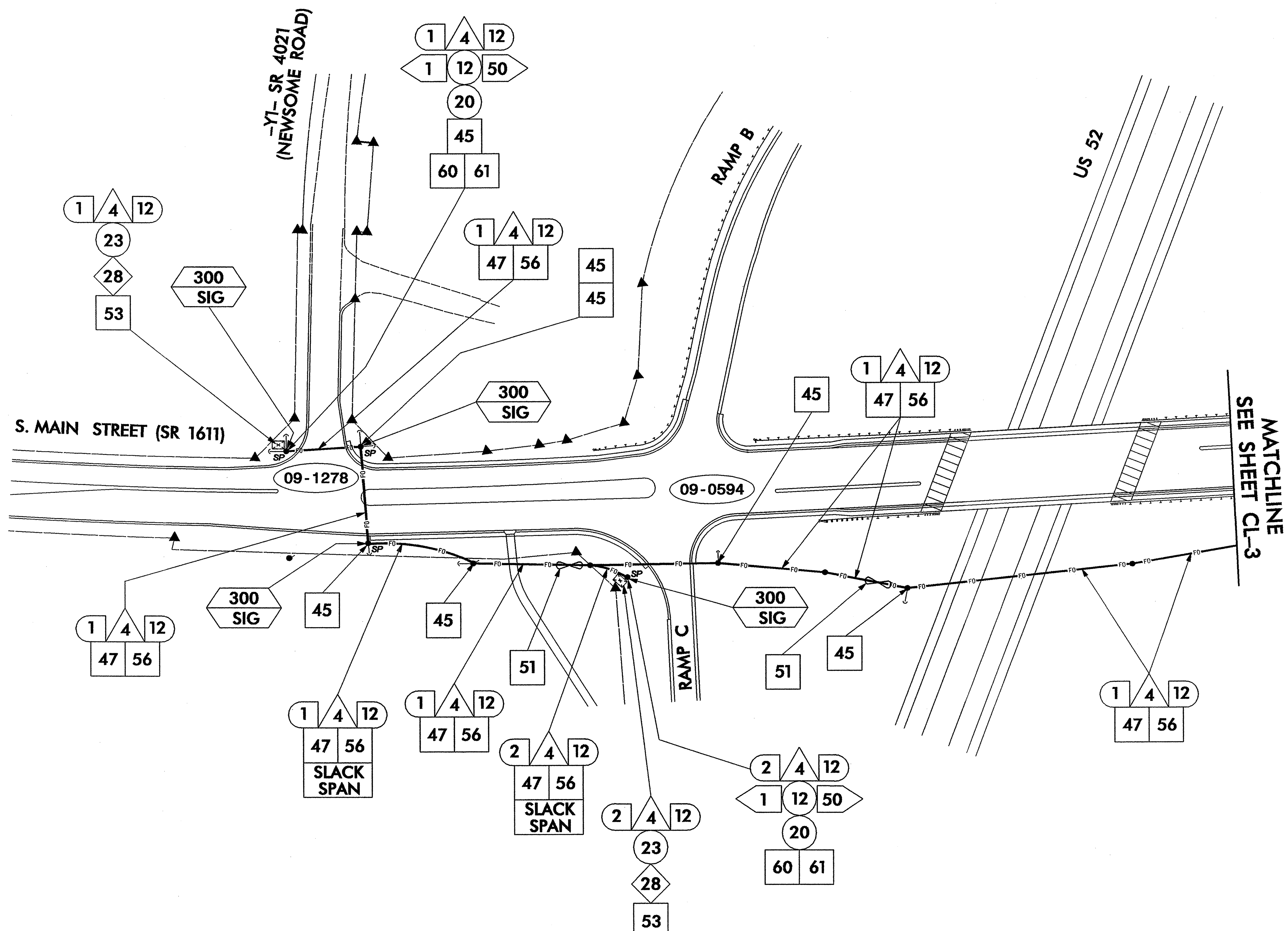
CADD Filename: cl_01.dgn

19-SEP-2008 15:41
G:*TEG*Curr*10003326 R-2201 CLS*CR*cl_01.dgn
22976 AT RALCCJOR41

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 37

METRIC

CL-2



Note: Poles on this sheet are schematic in nature and represent available information supplied by Duke Energy. Refer to utility plans for actual pole locations.

-AT THE DIRECTION OF THE ENGINEER, INSTALL THE MESSENGER CABLE TO RESERVE AN ATTACHMENT LOCATION ON THE NEW POLE
-UNLESS OTHERWISE NOTED, ALL NCDOT ATTACHMENT POINTS ARE 1000 mm BELOW POWER, FRONT SIDE OF POLE
-OVER-SIZED JUNCTION BOXES TO BE PLACED APPROXIMATELY 122 METERS APART UNLESS OTHERWISE NOTED
-SEAL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX/CABINET ENTRANCES
-ALL MEASUREMENTS ARE IN mm UNLESS OTHERWISE NOTED

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888

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750 Greenfield Parkway, Garner, NC 27529

SCALE 10 0 20
1:1000

COMMUNICATIONS CABLE
ROUTING PLANS
ALONG SR 1611/1112
S. MAIN STREET

DIVISION 9 FORSYTH / STOKES COUNTIES KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LM MOON

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029302 ENGINEER MELISSA R. COONEY
SIGNATURE 9-19-08 DATE

CADD Filename: cl_02.dgn

06-OCT-2008 14:24
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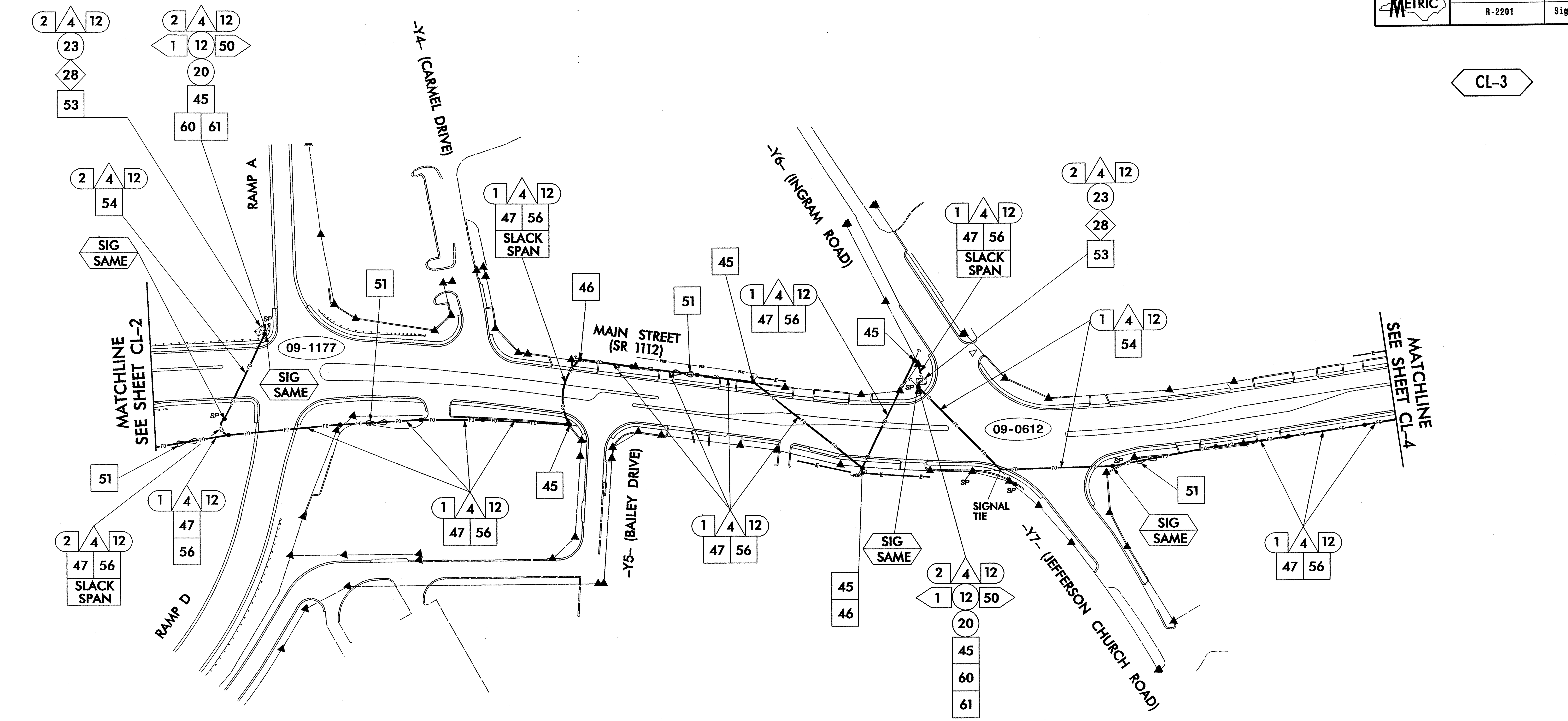

Note: Poles on this sheet are schematic in nature and represent available information supplied by Duke Energy. Refer to utility plans for actual pole locations.

-AT THE DIRECTION OF THE ENGINEER, INSTALL THE MESSENGER CABLE TO RESERVE AN ATTACHMENT LOCATION ON THE NEW POLE
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-SEAL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX/CABINET ENTRANCES
-ALL MEASUREMENTS ARE IN mm UNLESS OTHERWISE NOTED

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RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch — Intelligent Transportation Systems
750 Greenfield Parkway, Garner, NC 27529

SCALE 10 0 20
1:1000

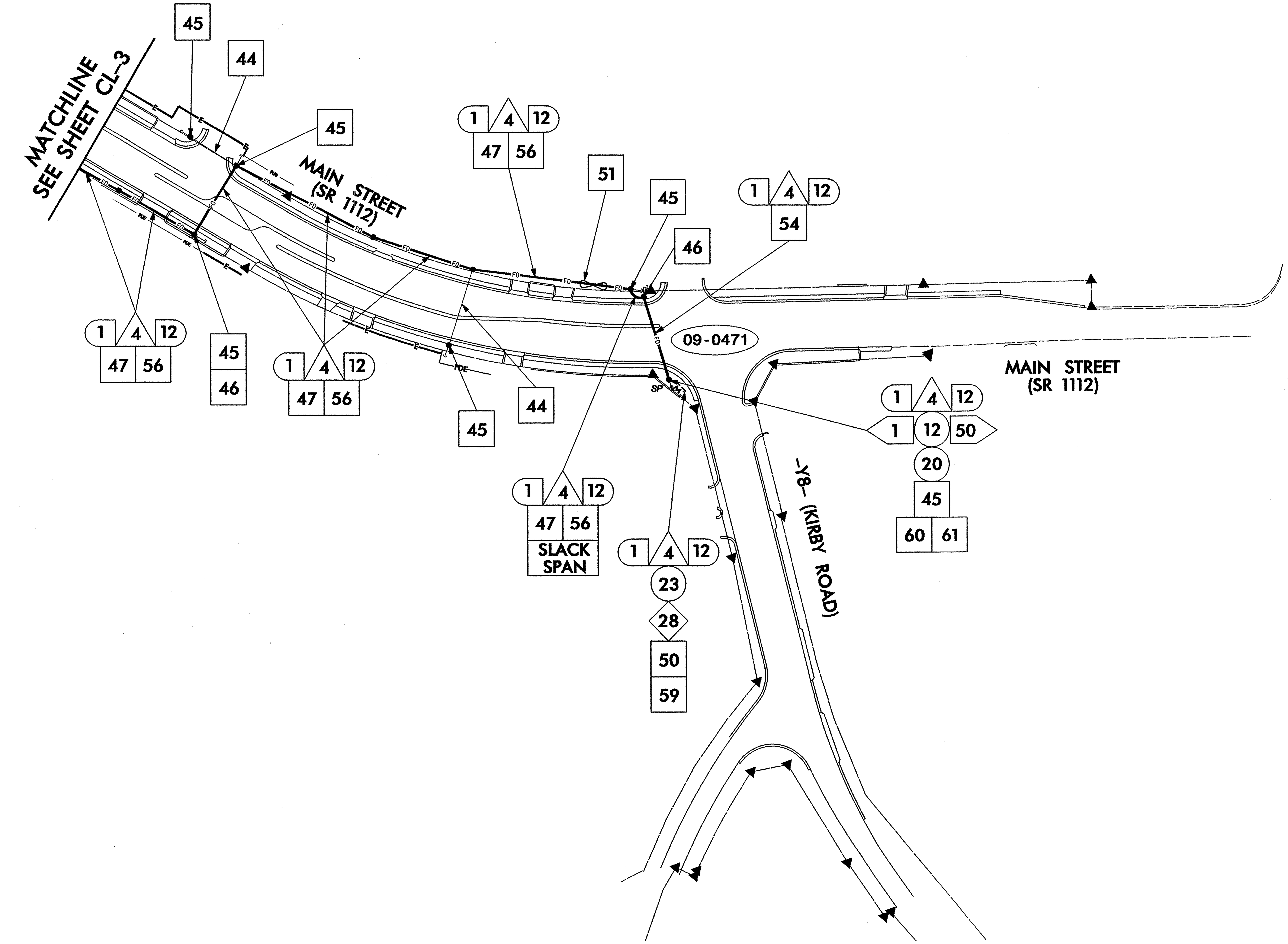
COMMUNICATIONS CABLE
ROUTING PLANS
ALONG SR 1611/1112
S. MAIN STREET

DIVISION 9	FORSYTH / STOKES COUNTIES		KING
PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LM MOON
REVISIONS		INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025392 MELISSA R. COONEY
SIGNATURE 9-19-08 DATE
CADD Filename: cl_03.dgn

06-OCT-2008 14:24
18566 AT RAL2004GD1

CL-4



Note: Poles on this sheet are schematic in nature and represent available information supplied by Duke Energy. Refer to utility plans for actual pole locations.

- AT THE DIRECTION OF THE ENGINEER, INSTALL THE MESSENGER CABLE TO RESERVE AN ATTACHMENT LOCATION ON THE NEW POLE
- UNLESS OTHERWISE NOTED, ALL NCDOT ATTACHMENT POINTS ARE 1000 mm BELOW POWER, FRONT SIDE OF POLE
- OVER-SIZED JUNCTION BOXES TO BE PLACED APPROXIMATELY 122 METERS APART UNLESS OTHERWISE NOTED
- SEAL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX/CABINET ENTRANCES
- ALL MEASUREMENTS ARE IN mm UNLESS OTHERWISE NOTED

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Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch, Intelligent Transportation Systems
750 Greenfield Parkway, Garner, NC 27529

SCALE 10 0 20
1:1000

COMMUNICATIONS CABLE
ROUTING PLANS
ALONG SR 1611/1112
S. MAIN STREET

DIVISION 9	FORSYTH / STOKES COUNTIES		KING
PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LM MOON
REVISIONS		INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY
SIGNATURE 9-19-08 DATE

CADD Filename: cl_04.dgn

19-SEP-2008 15:41
22976 AT RALC_LOA41

FIBER OPTIC CABLE

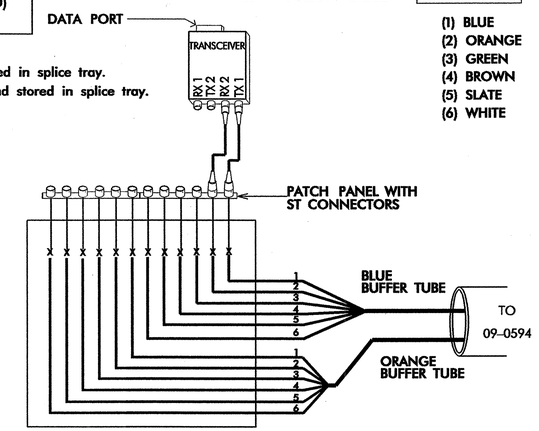
METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2201	Sig. 40

SR 1611 (S. MAIN STREET)
AT SR 4021 (NEWSOME ROAD)
SIG. INV. # 09-1278

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE

COLOR CODE TIA/EIA 598-B
(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE



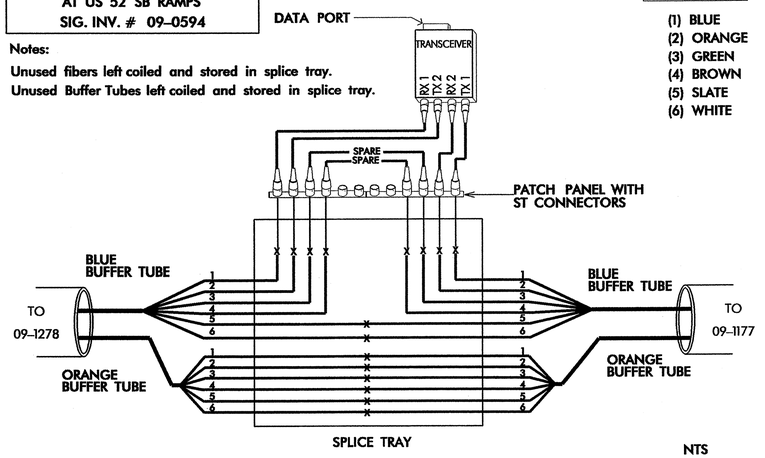
NTS

SR 1611 (S. MAIN STREET)
AT US 52 SB RAMPS
SIG. INV. # 09-0594

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE

COLOR CODE TIA/EIA 598-B
(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE



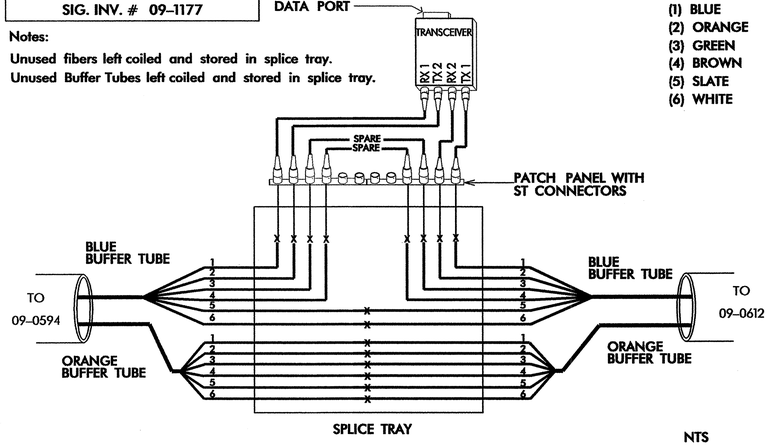
NTS

SR 1112 (S. MAIN STREET)
AT US 52 NB RAMPS
SIG. INV. # 09-1177

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE

COLOR CODE TIA/EIA 598-B
(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE



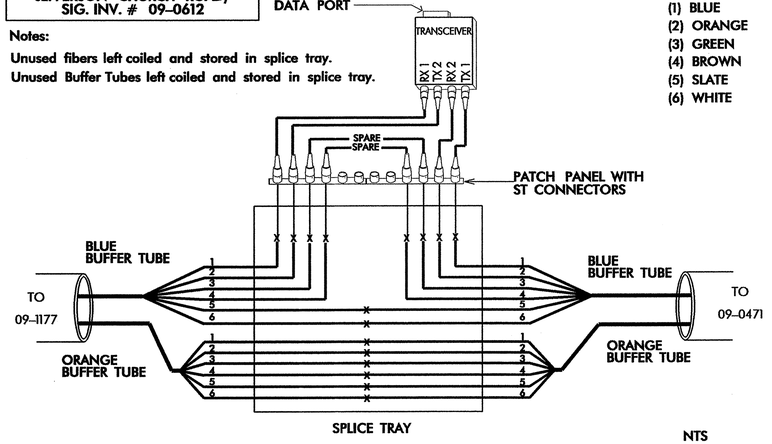
NTS

SR 1112 (S. MAIN STREET)
AT SR 1108 (INGRAM ROAD/
JEFFERSON CHURCH ROAD)
SIG. INV. # 09-0612

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE

COLOR CODE TIA/EIA 598-B
(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE



NTS

1. CONTRACTOR TO FURNISH DROP AND REPEAT TYPE TRANSCEIVERS IN ALL SIGNAL CABINETS.
2. TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING THE PROPER TERMINATIONS.

PBSJ
1616 EAST MILLBROOK ROAD, SUITE 310
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Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Integrated Mobility Division
750 N. Greenfield Pkwy, Garner, NC 27529

ST 1611/1112 (S. MAIN ST.)
CLOSED LOOP SYSTEM
SPLICE PLAN

DIVISION 09 FORSYTH/STOKES COUNTIES KING

PLAN DATE: SEPTEMBER 2008	REVIEWED BY: MR COONEY
PREPARED BY: KG EGGLESTON	REVIEWED BY: LW MOON

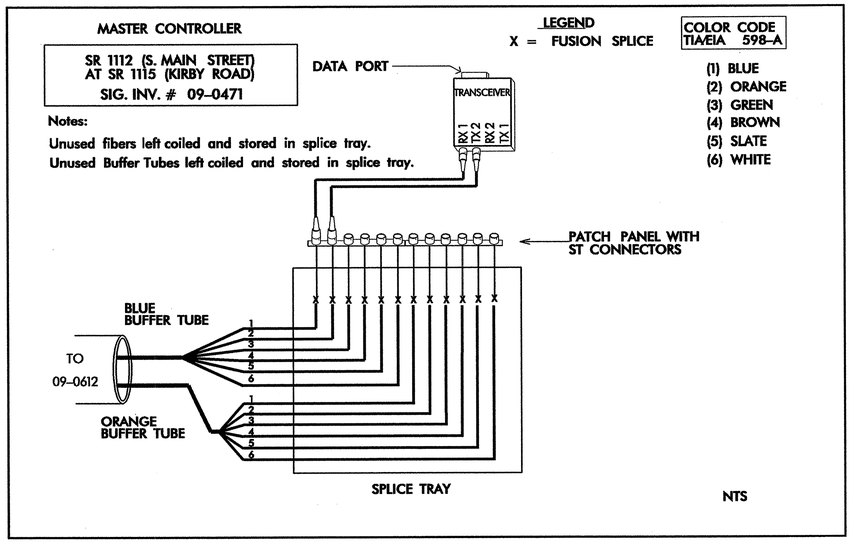
SCALE: NTS

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025392 ENGINEER MELISSA R. COONEY
SIGNATURE DATE 9-19-08

CADD Filename: Splice_Detail_1.dgn

FIBER OPTIC CABLE



1. CONTRACTOR TO FURNISH DROP AND REPEAT TYPE TRANSCEIVERS IN ALL SIGNAL CABINETS.
2. TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING THE PROPER TERMINATIONS.

PBSJ 1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Prepared for the Offices of:
NCDOT Traffic Engineering and Safety Systems Branch
759 N. Greenfield Pkwy, Garner, NC 27529

SR 1611/1112 (S. MAIN ST.)
CLOSED LOOP SYSTEM
SPLICE PLAN

DIVISION 09 FORSYTH/STOKES COUNTIES KING

PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	KG EGGLESTON	REVIEWED BY:	LW MOON

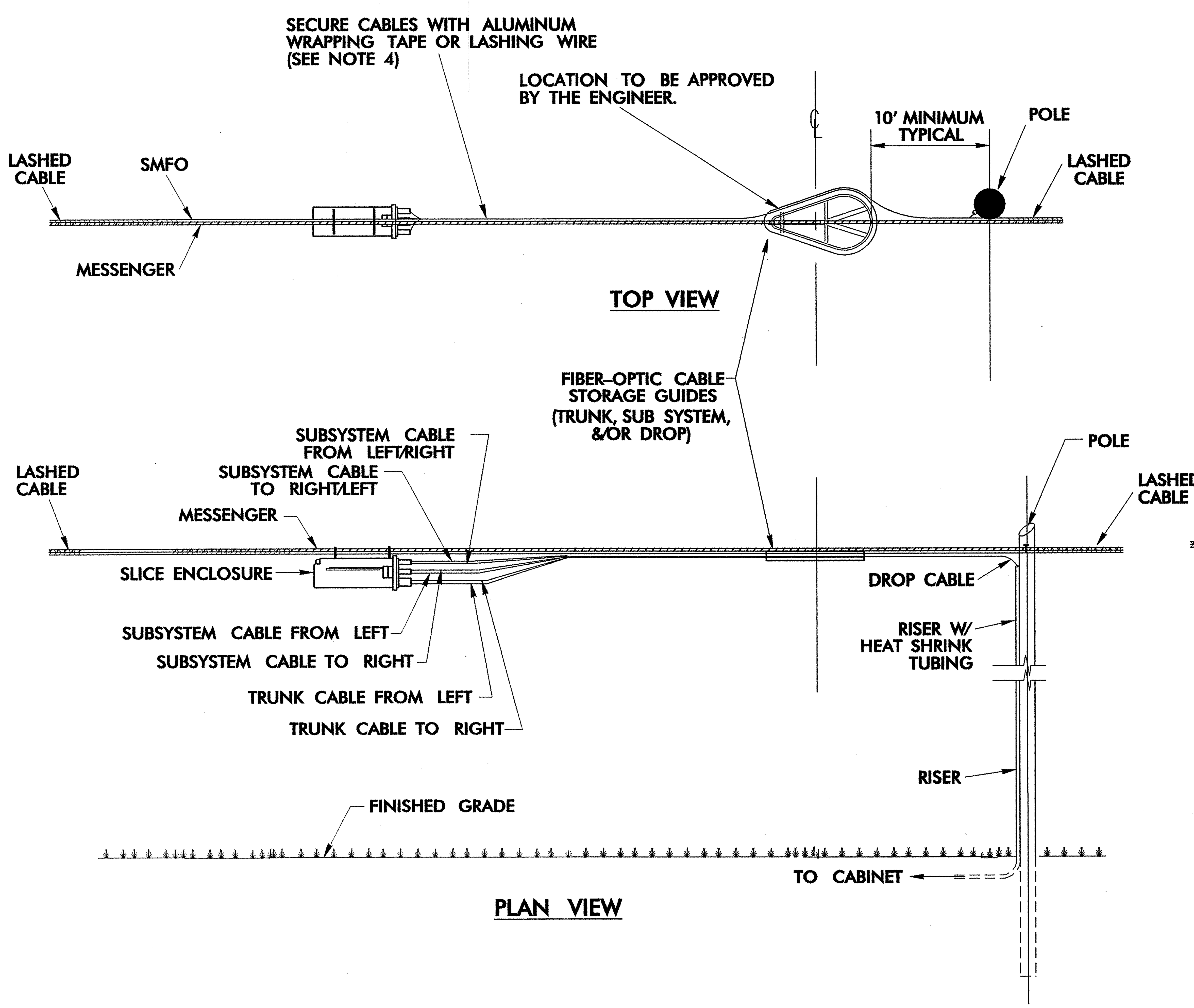
SCALE	REVISIONS	INIT.	DATE
NTS			

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025892 MELISSA R. COONEY
SIGNATURE
9-19-08
DATE

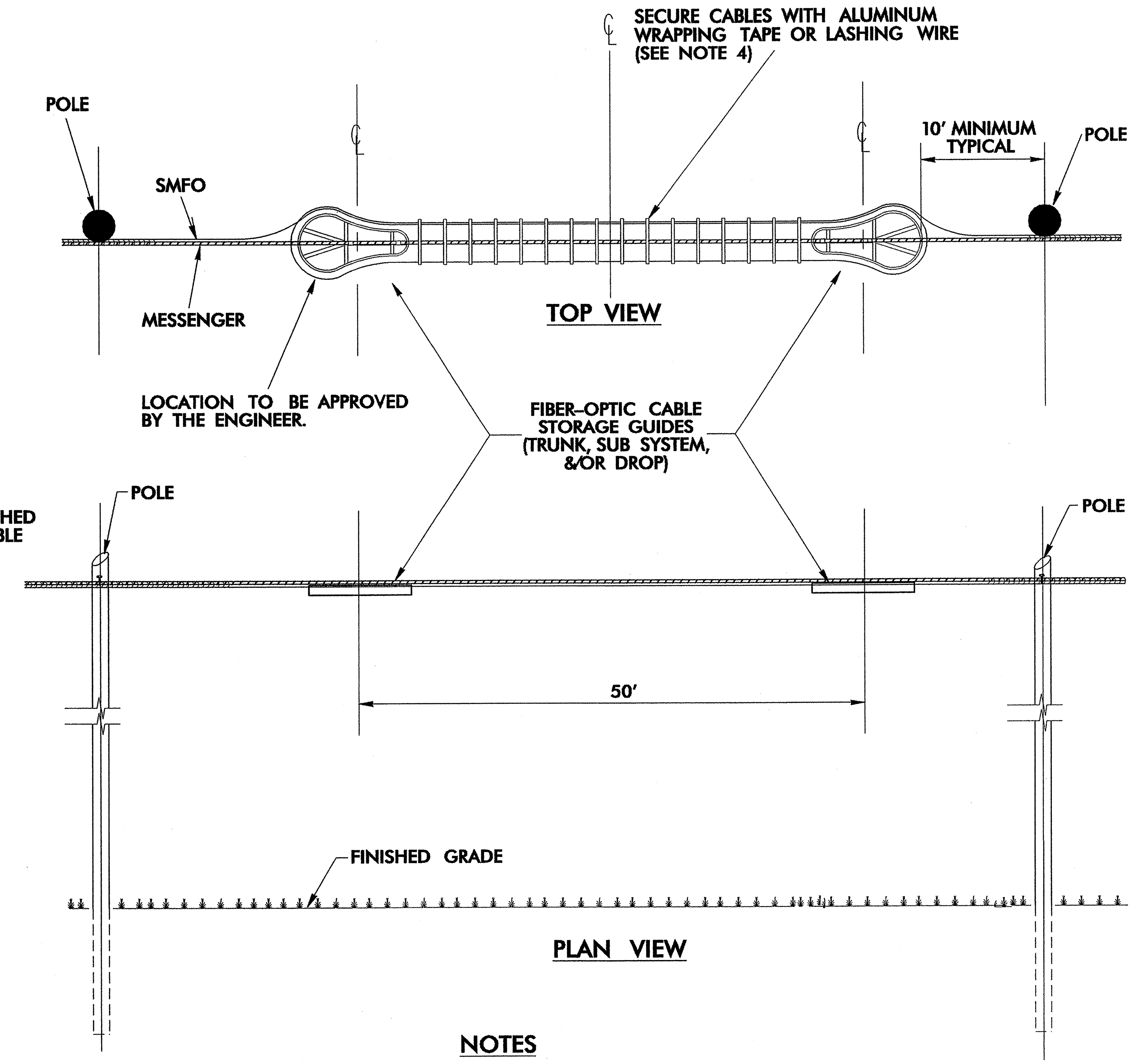
CADD Filename: Splice_Detail_2.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 42

SPLICE ENCLOSURE WITH STORAGE TYP. DETAIL



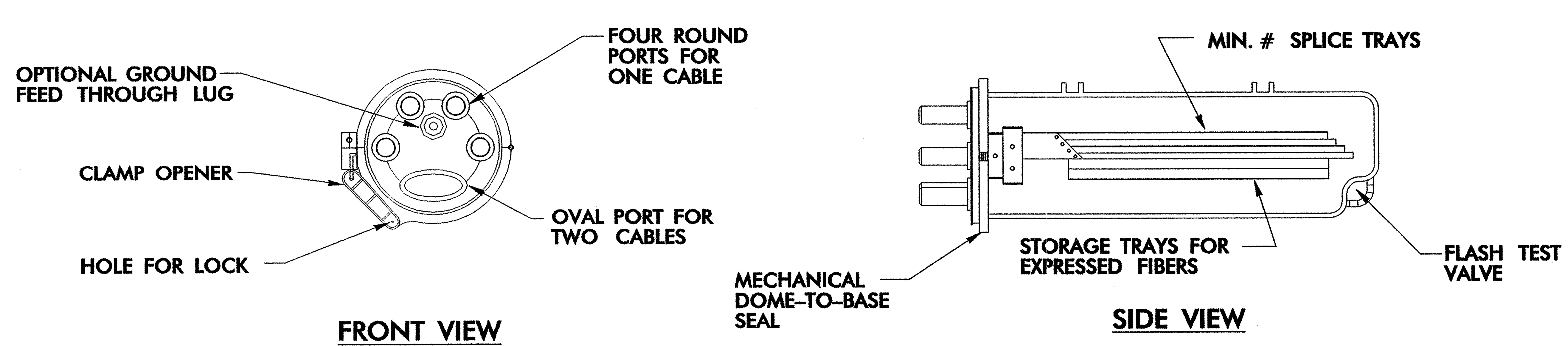
SPARE CABLE STORAGE TYP. DETAIL



NOTES

1. SPARE FIBER-OPTIC CABLE SHALL NOT BE STORED OVER ROADWAYS OR DRIVEWAYS.
2. STORE 100' OF SPARE FIBER-OPTIC CABLE WHERE SHOWN ON PLANS.
3. FIBER-OPTIC CABLE STORAGE GUIDE MATERIAL AND SIZE SHALL BE AS INDICATED IN THE PROJECT SPECIAL PROVISIONS.
4. 0.05" THICK BY 0.3" WIDE ALUMINUM WRAPPING TAPE (FOUR TURNS MINIMUM) AT 6" ON CENTER OR .061" LASHING WIRE WITH ONE 360 DEGREE SPIRAL PER FOOT.
5. FOR SPLICE ENCLOSURES:
   A) APPLY A HEAT SOURCE, AS RECOMMENDED BY THE MANUFACTURER, TO SHRINK THE HEAT SHRINKABLE TUBING TO PROVIDE A SECURE FIT AROUND THE CABLES AND PORTS.
   B) PERFORM A PRESSURIZATION FLASH TEST UPON CONCLUSION OF THE SPLICING AND PRIOR TO THE FINAL PLACEMENT OF THE ENCLOSURE.

SPLICE ENCLOSURE DETAILS



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RALEIGH, NORTH CAROLINA 27609
(919) 876-6888

Prepared for the Offices of:
Traffic Engineering and Safety Systems Branch, Intelligent Transportation Systems
750 Greenfield Parkway, Garner, NC 27529

AERIAL FIBER-OPTIC CABLE STORAGE & SPLICE ENCLOSURES TYPICAL DETAIL

DIVISION 09	FORSYTH/STOKES COUNTIES		KING
PLAN DATE:	SEPTEMBER 2008	REVIEWED BY:	MR COONEY
PREPARED BY:	JA WILES	REVIEWED BY:	LM MOON

SCALE	REVISIONS	INIT.	DATE
NONE			

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 025892 ENGINEER MELISSA R. COONEY

Melissa R. Cooney 9-19-08
SIGNATURE DATE

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

5-07

ENGLISH DETAIL DRAWING FOR

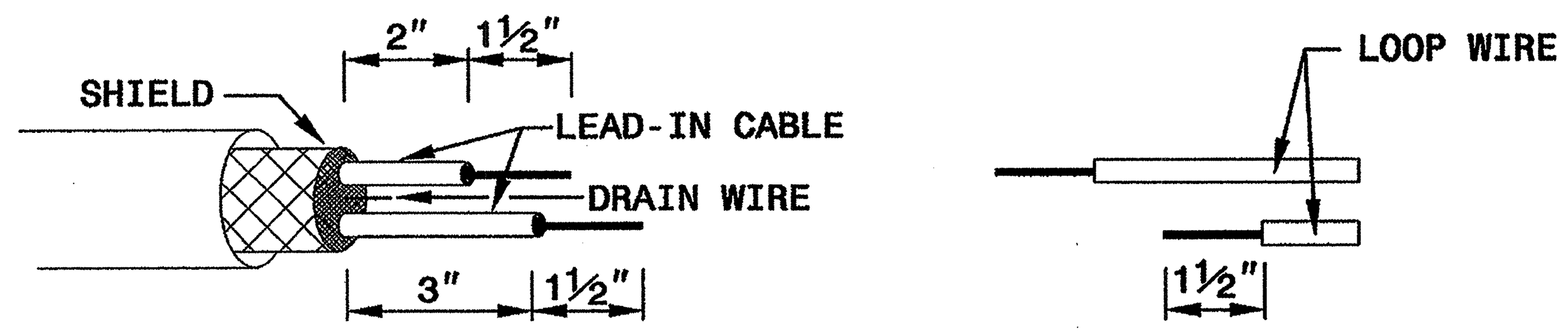
INDUCTION DETECTION LOOPS

SPLICING FOR LEAD-IN CABLE AND LOOP WIRE

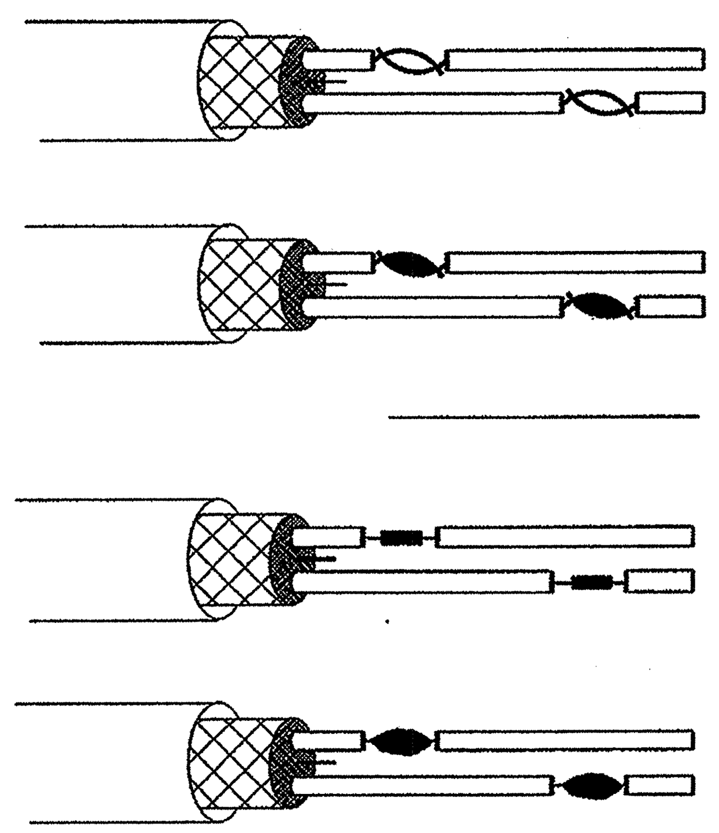
SHEET 3 OF 3

1725D01

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE



STEP 2. CONNECT AND SOLDER



TWIST BARE CONDUCTORS TOGETHER AND SOLDER WITH RESIN CORE SOLDER

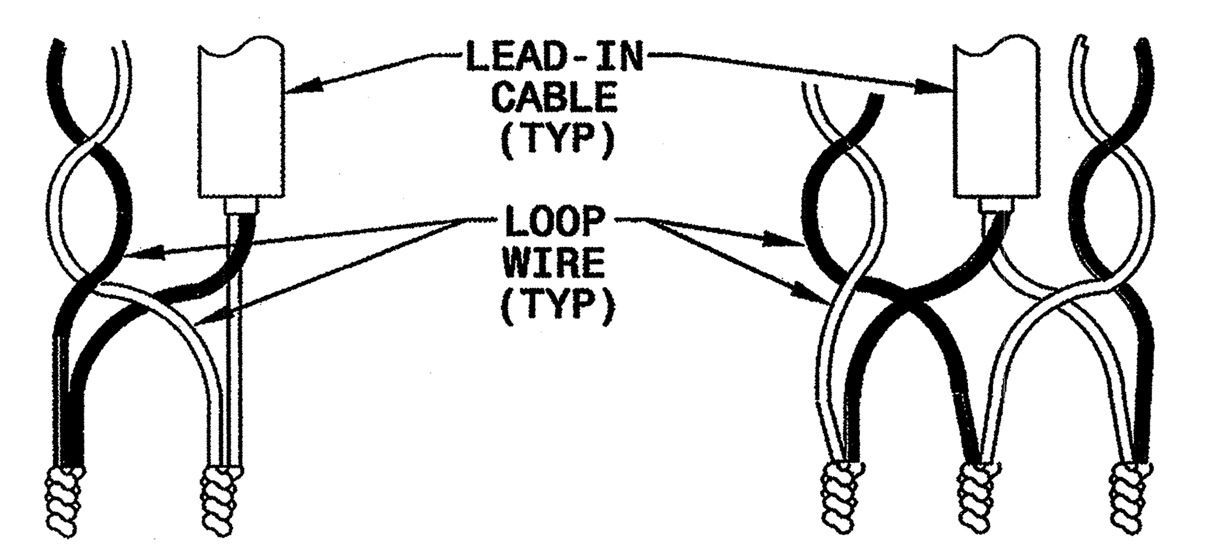
OR

CRIMP BARE CONDUCTORS TOGETHER WITH AN UNINSULATED BUTT CONNECTOR AND SOLDER WITH RESIN CORE SOLDER

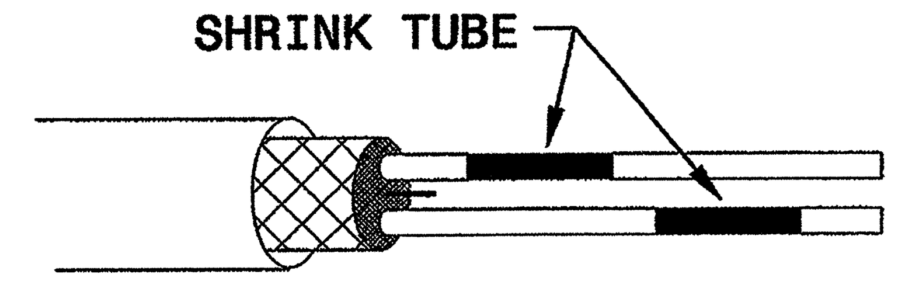
BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS

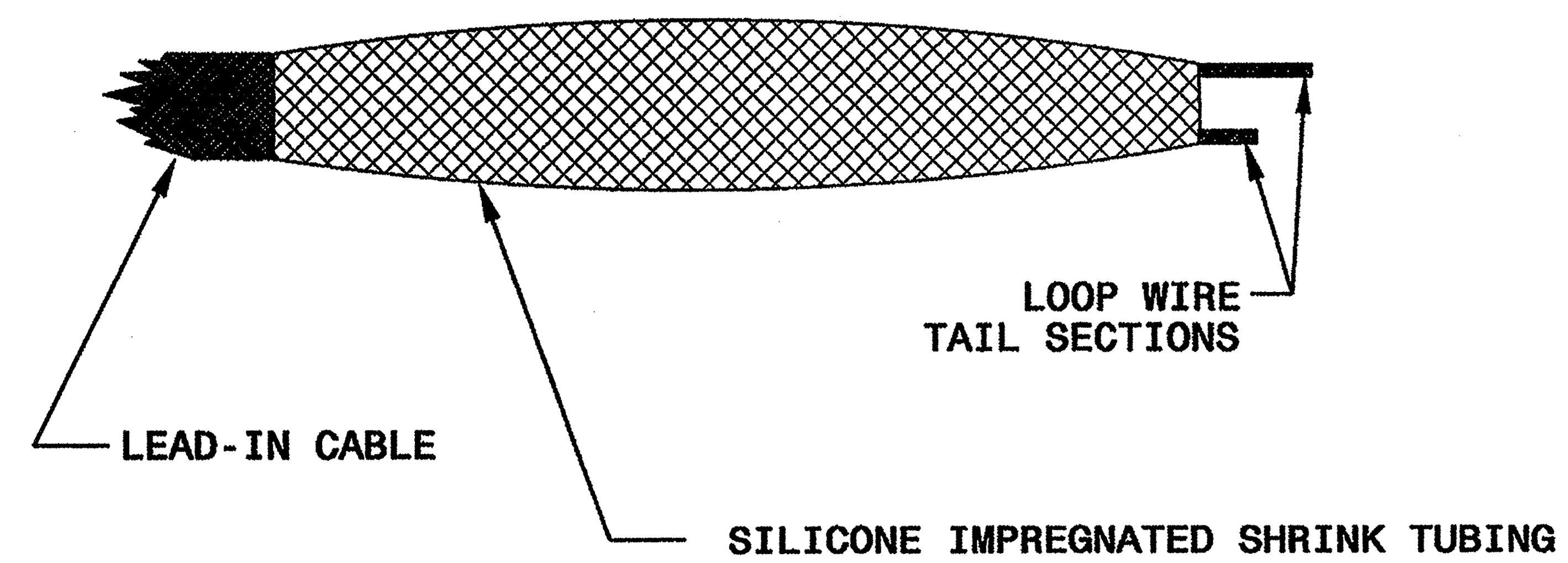
SINGLE CONNECTION   SERIES CONNECTION



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY PROTECT SPLICE



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

5-07

ENGLISH DETAIL DRAWING FOR

INDUCTIVE DETECTION LOOPS

SPLICING FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3

1725D01

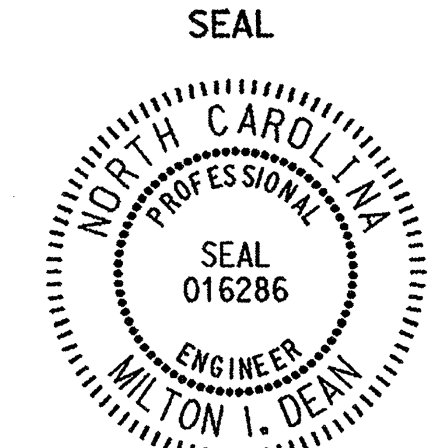
See Plate for Title

Prepared in the Offices of:

Intelligent Transportation Systems & Signals Unit

750 N. Greenfield Parkway
Garner, NC 27529

SEAL



Milton I. Dean 9/5/07
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 44

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

5-07

ENGLISH DETAIL DRAWING FOR

INDUCTIVE DETECTION LOOPS

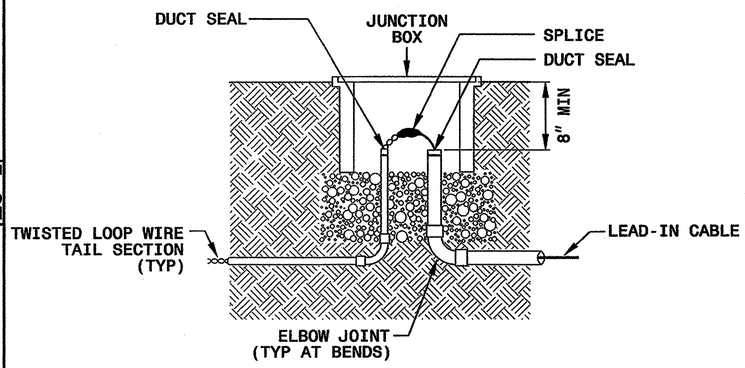
LOOP WIRE DETAILS

SHEET 2 OF 3

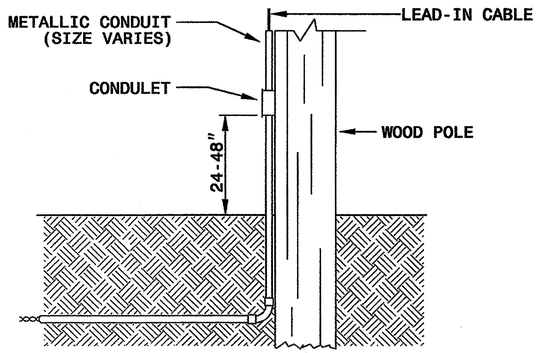
1725D01

LOOP WIRE SPLICE POINT DETAILS

LOOP WIRE AT JUNCTION BOX



LOOP WIRE AT POLE

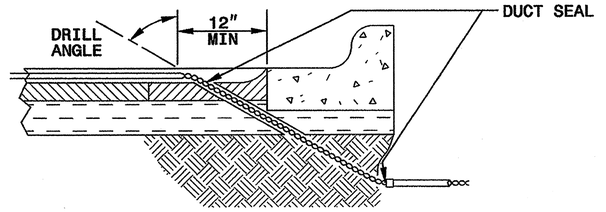


NOTE

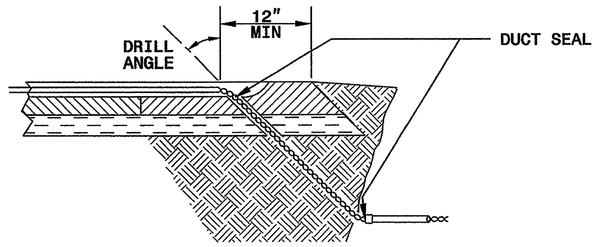
SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

LOOP WIRE PAVEMENT EDGE DETAILS

LOOP WIRE AT CURB & GUTTER SECTION



LOOP WIRE AT PAVEMENT SECTION



NOTES

1. DO NOT EXCAVATE UNDER CURB AND GUTTER SECTIONS FOR CONDUIT INSTALLATION.
2. TWIST LOOP WIRE TAIL SECTIONS FROM WHERE LOOP WIRE TAIL LEAVES SAW CUT TO JUNCTION BOX, INCLUDING THROUGH CONDUIT.
3. BEFORE SEALING LOOPS, INSTALL DUCT SEAL WHERE LOOP WIRE TAIL SECTION LEAVES SAW CUT IN PAVEMENT AND AT ENTRANCE OF CONDUIT TO JUNCTION BOX.

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

5-07

ENGLISH DETAIL DRAWING FOR

INDUCTIVE DETECTION LOOPS

LOOP WIRE DETAILS

SHEET 2 OF 3

1725D01

See Plate for Title

Prepared in the Offices of:

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

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 016286 ENGINEER MILTON I. DEAN

SIGNATURE

9/5/07
DATE

05-SEP-2007 14:00
c:\documents and settings\mzmillitte.dot\desktop\standard metal pole sheets\1725102_mcy2307.dgn
zmillitte

PROJECT REFERENCE NO.	SHEET NO.
R-2201	Sig. 45

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

5-07

ENGLISH DETAIL DRAWING FOR

INDUCTIVE DETECTION LOOPS

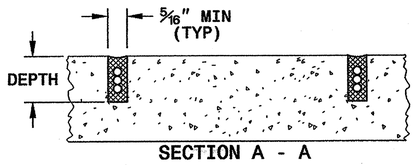
SHEET 1 OF 3

1725D01

CONVENTIONAL 4-SIDED LOOP

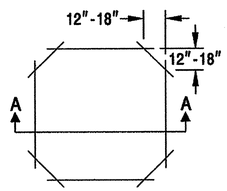
SAW SLOT DEPTH CHART

DEPTH (IN)	NO. OF WIRE TURNS				
	2	3	4	5	6
CONCRETE	2.0	2.0	2.5	2.5	3.0
ASPHALT	2.0	2.5	3.0	3.0	3.0

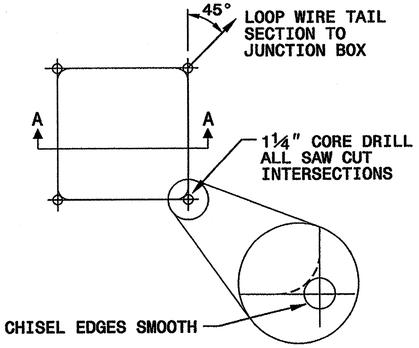


SAW CUT OPTIONS

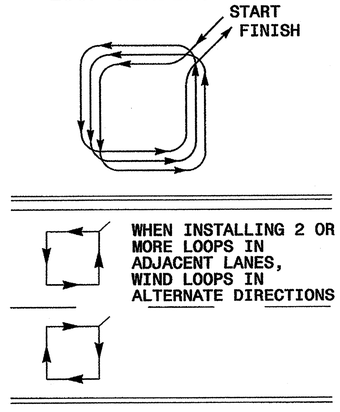
OPTION 1



OPTION 2 (POOR PAVEMENT)



LOOP WINDING METHOD



LOOP WIRE TWISTING METHOD

INCORRECT WAY TO TWIST WIRE

CORRECT WAY TO TWIST WIRE

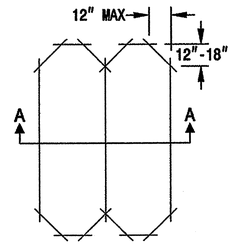
NOTES

1. OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
2. MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
3. WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
4. LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

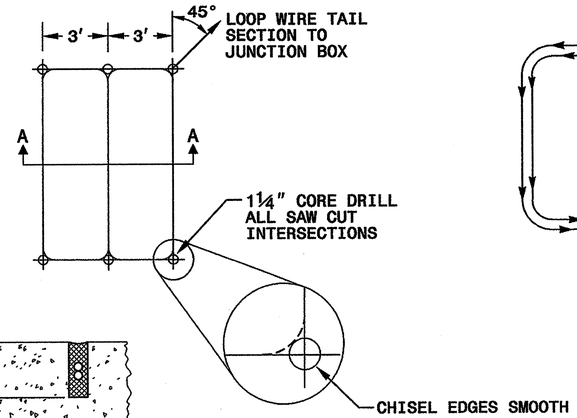
QUADRUPOLE LOOP

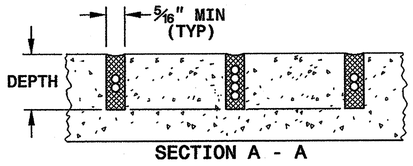
SAW CUT OPTIONS

OPTION 1



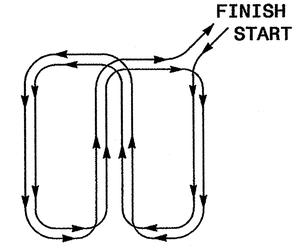
OPTION 2 (POOR PAVEMENT)





DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

LOOP WINDING METHOD



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

5-07

ENGLISH DETAIL DRAWING FOR

INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3

1725D01

See Plate for Title

Prepared in the Offices of:
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SEAL

NORTH CAROLINA PROFESSIONAL SEAL 016286 ENGINEER MILTON I. DEAN

Milton I. Dean 9/5/07
SIGNATURE DATE