TIP: R-2555A

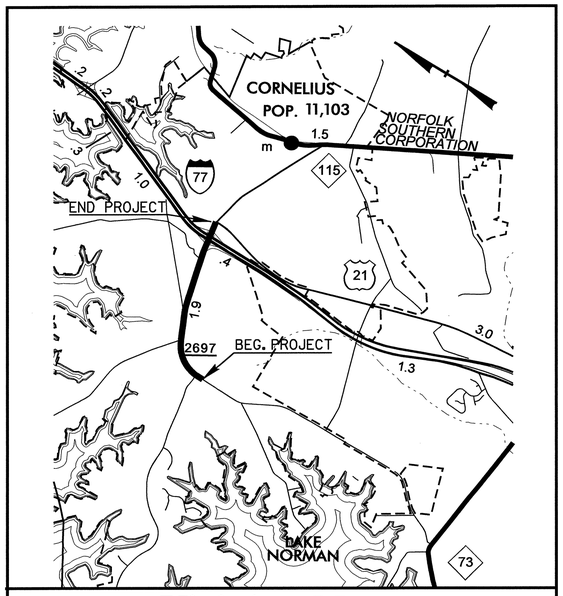
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MECKLENBURG COUNTY

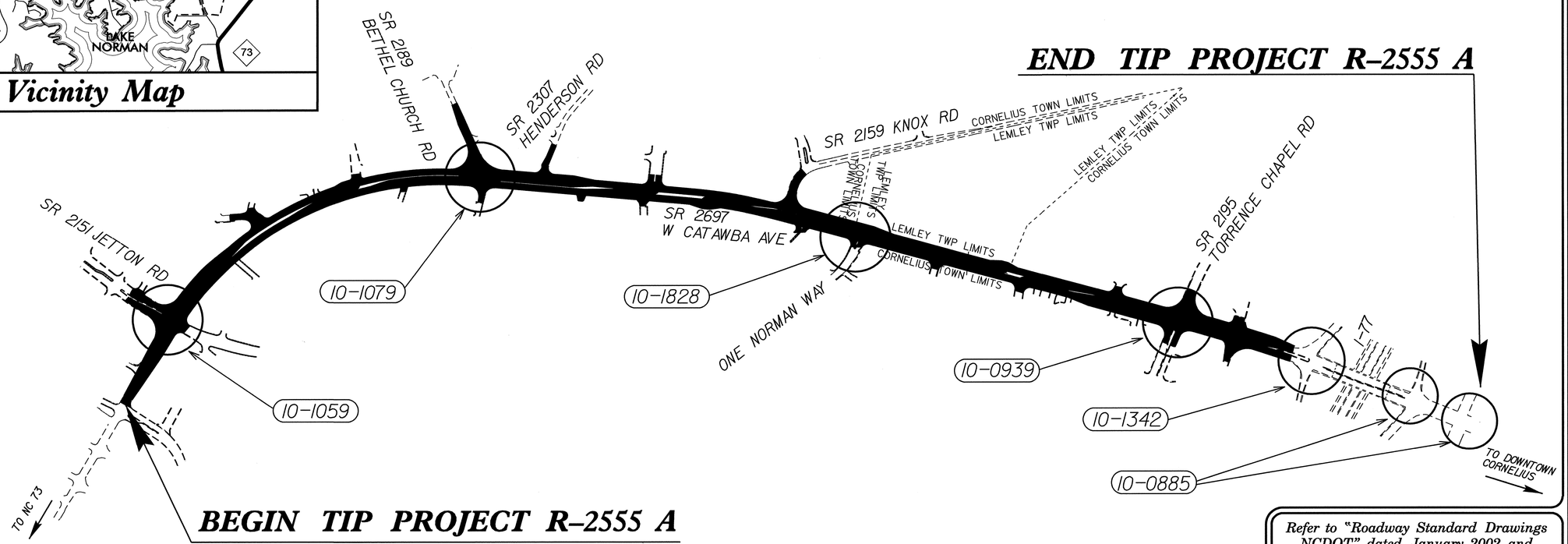
Project No.	Sheet No.
R-2555A	Sig. 1

LOCATION: SR 2697 (W. CATAWBA AVE) FROM SR 2151 (JETTON RD) TO I-77

TYPE OF WORK: TRAFFIC SIGNALS & FIBER OPTIC COMMUNICATIONS PLANS



Vicinity Map



END TIP PROJECT R-2555 A

BEGIN TIP PROJECT R-2555 A

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

Index of Plans

Sheet #	Reference #	Location/Description
Sig. 1	————	Title Sheet
Sig. 2–7	10–1059	SR 2697 (W. Catawba Ave.) at SR 2151 (Jetton Rd)
Sig. 8–13	10–1079	SR 2697 (W. Catawba Ave.) at SR 2189 (Bethel Church Rd)
Sig. 14–19	10–1828	SR 2697 (W. Catawba Ave.) at One Norman Way
Sig. 20–26	10–0939	SR 2697 (W. Catawba Ave.) at SR 2195 (Torrence Chapel Rd)/SR 2317 (Liverpool Pkwy)
Sig. 27–28	10–1342	SR 2697 (W.Catawba Ave.) at I-77 Southbound Ramps
Sig. 29–30	10–0885	SR 2697 (W. Catawba Ave.) at I-77 Northbound Ramps/Holiday Lane & US 21/NC 73
Sig. 31–36	N/A	Standard Drawings for Metal Poles
Sig. 37–42	N/A	Communications Cable and Conduit Routing Plans

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

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

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

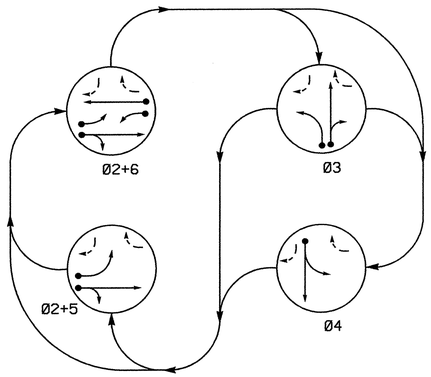
Intelligent Transportation Systems & Signals Unit

750 N. Greenfield Parkway, Garner, NC 27529

02-AUG-2007 15:06
s:\its signals\workgroups\tip projects\r-2555a\signals\r2555a_titlesheet.dgn
tthigpen

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig. 2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

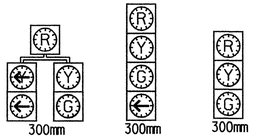
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	G	G	R	R	Y
22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	R	R	R	G	R
42	R	R	R	G	R
61, 62	R	G	R	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



21 | 31, 41 | 22, 32, 42, 61, 62

2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
2A	1.8x1.8	✳	90	✳	2	Y	Y	-	-	1.6	-	✳
2B	1.8x1.8	✳	27	✳	2	Y	Y	-	-	-	-	✳
3A	1.8x12	✳	0	✳	3	Y	Y	-	-	-	3	✳
3B	1.8x12	✳	0	✳	3	Y	Y	-	-	-	10	✳
4A	1.8x12	✳	0	✳	4	Y	Y	-	-	-	-	✳
5A	1.8x12	✳	0	✳	5	Y	Y	-	-	-	15	✳
					2	Y	Y	-	-	-	-	✳
6A	1.8x1.8	✳	90	✳	6	Y	Y	-	-	1.6	-	✳
6B	1.8x1.8	✳	27	✳	6	Y	Y	-	-	-	-	✳
6C	1.8x12	✳	0	✳	6	Y	Y	-	-	-	-	✳

✳ Video Detection Zone

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	140
Messenger Cable	110
Lead-in Cable	—

4 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 5 during phase 6 on.
4. Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4 (see Electrical Details).
5. The order of phase 3 and phase 4 may be reversed.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Incorporate Loop Emulator Detection System for Vehicle Detection.
9. Provide the Engineer with the Manufacturer's approved camera locations and mounting heights to obtain detection zones as shown.

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	
	Video Detection Zone	
	"YIELD" Sign (R1-2)	
	Metal Strain Pole	

2070L TIMING CHART

FEATURE	PHASE 2	3	4	5	6
Min Green 1 *	12	7	7	7	12
Extension 1 *	2.0	2.0	2.0	2.0	2.0
Max Green 1 *	60	20	20	20	60
Yellow Clearance	4.4	3.1	4.7	3.0	4.6
Red Clearance	1.0	2.2	1.0	2.3	1.3
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	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 Revision - Temporary Design 1(TCP Phase I)

Prepared in 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

SR 2697 (W.Catawba Ave.)
at
SR 2151 (Jetton Rd)

Division 10 Mecklenburg County Cornelius

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

REVISIONS	INIT.	DATE

SCALE 5 0 10 1:500

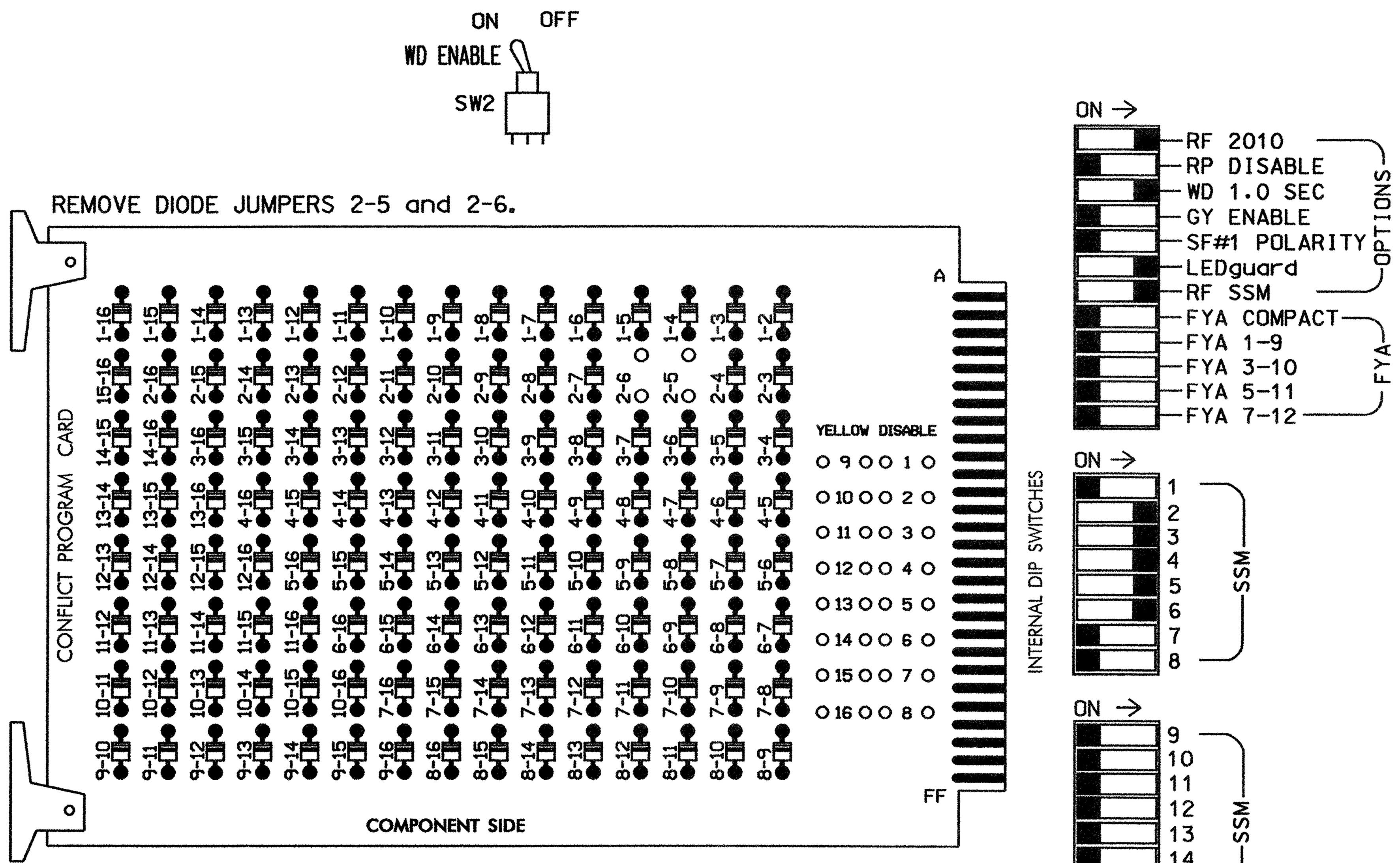
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY S. WILLIAMS
SIGNATURE 7/21/07 DATE
SIG. INVENTORY NO. 10-1059 T1

01-AUG-2007 12:08
s:\ts signals\workgroups\tip projects\r-2555a\esignals\10-1059_2007.dgn
thigpen

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 3

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 1,7,8, 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.

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	31	32	41	42	NU	21	61,62	NU	NU	NU	NU
RED		128		116	116	101	101		*	134				
YELLOW		129		117	117	102	102			135				
GREEN		130		118	118	103	103			136				
RED ARROW														
YELLOW ARROW									132					
GREEN ARROW				118		103			133					

NU = Not Used

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

EQUIPMENT INFORMATION

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

DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

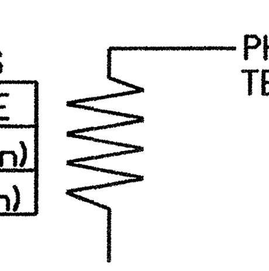
1. From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Function 1.
2. From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

```
 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

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 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.

SPECIAL DETECTOR NOTE

Install a loop emulation detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1059 T1
DESIGNED: June 2007
SEALED: 7-27-07
REVISED: N/A

Signal Revision - Temporary 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 2697 (W. Catawba Ave.) at SR 2151 (Jetton Rd.)

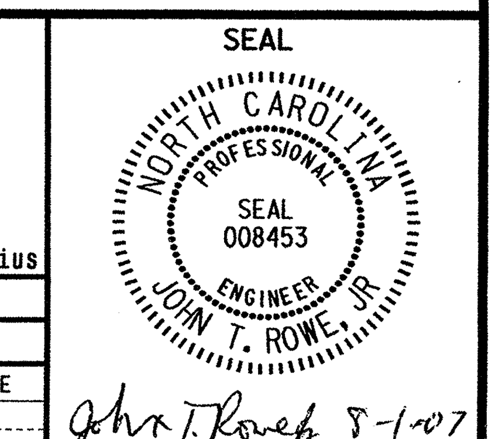
Division 10 | Mecklenburg County | Cornelius

PLAN DATE: July 2007 | REVIEWED BY: JTR

PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS | INIT. | DATE

SEAL



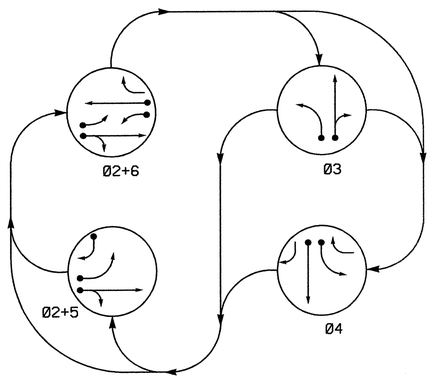
SIGNATURE 8-1-07 DATE

SIG. INVENTORY NO. 10-1059 T1

31-JUL-2007 14:07
s:\its_signals\workgroups\sig man\peterson\101059_sm_ele_xxx.dgn
jpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig. 4

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

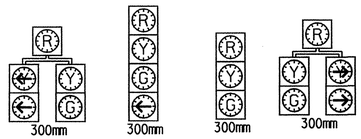
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	G	G	R	R	Y
22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	R	R	R	G	R
42	R	R	R	G	R
61	R	G	R	R	Y
62	R	G	R	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
2B	1.8x1.8	4	90	Y	2	Y	Y	-	-	-	-	Y
3A	1.8x12	2-4-2	0	Y	3	Y	Y	-	-	-	3	Y
3B	1.8x12	2-4-2	0	Y	3	Y	Y	-	-	-	10	Y
4A	1.8x12	2-4-2	0	Y	4	Y	Y	-	-	-	-	Y
4B	1.8x12	2-4-2	0	Y	4	Y	Y	-	-	-	-	Y
5A	1.8x12	2-4-2	0	Y	5	Y	Y	-	-	-	15	Y
					2	Y	Y	Y	-	-	3	Y
5B	1.8x12	2-4-2	0	Y	5	Y	Y	-	-	-	15	Y
6B	1.8x1.8	6	90	Y	6	Y	Y	-	-	-	-	Y
6C	1.8x12	2-4-2	0	Y	6	Y	Y	Y	-	-	3	Y

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	70
Messenger Cable	–
Lead-in Cable	600

4 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 5 during phase 6 on.
4. Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4 (see Electrical Details).
5. The order of phase 3 and phase 4 may be reversed.
6. Reposition existing signal heads numbered 21, 22, and 61.
7. Set all detector units to presence mode.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone	

2070L TIMING CHART

FEATURE	PHASE 2	3	4	5	6
Min Green 1 *	12	7	7	7	12
Extension 1 *	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	60	20	20	20	60
Yellow Clearance	4.4	3.1	4.7	3.0	4.6
Red Clearance	1.7	2.6	1.6	3.1	1.6
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	2.5	-	-	-	2.5
Max Variable Initial *	34	-	-	-	34
Time Before Reduction *	15	-	-	-	15
Time To Reduce *	30	-	-	-	30
Minimum Gap	3.0	-	-	-	3.0
Recall Mode	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	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 Revision - Temporary Design 2 (TCP Phase II)

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

SR 2697 (W.Catawba Ave.)
at
SR 2151 (Jetton Rd)

Division 10 Mecklenburg County Cornelius

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

SCALE 5 0 10 1:500

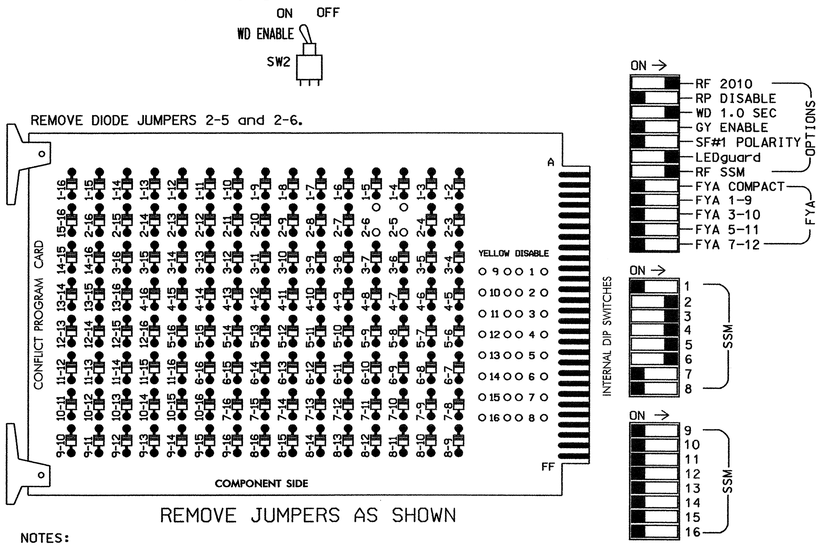
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY A. WILLIAMS
SIGNATURE 7/27/07. DATE
SIG. INVENTORY NO. 10-1059 T2

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 5

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 1,7,8, 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. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.

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	31	32	41	42	62	NU	21,42	61,62	NU	NU	NU	NU
RED		128		116	116	101	101			*	134				
YELLOW		129		117	117	102	102				135				
GREEN		130		118	118	103	103				136				
RED ARROW															
YELLOW ARROW								102		132					
GREEN ARROW				118		103		103		133					

NU = Not Used

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

EQUIPMENT INFORMATION

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

DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

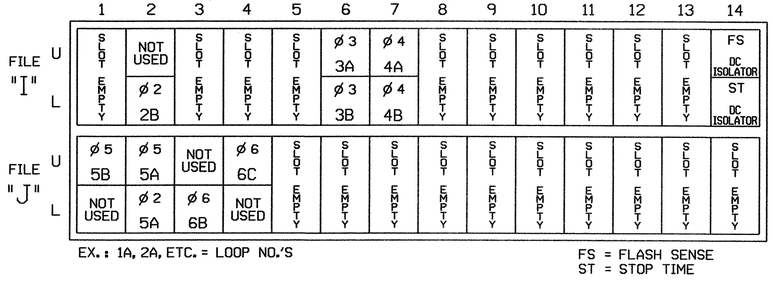
1. From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Function 1.
2. From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

```
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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			10
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			
5B	TB3-1,2	J1U	55	17	5	5	Y	Y			15
5A[1]	TB3-5,6	J2U	40	2	6	5	Y	Y			15
	TB3-7,8	J2L	44	6	16	2	Y	Y	Y		3
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
6C	TB5-1,2	J4U	48	10	26	6	Y	Y	Y		3

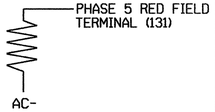
[1] Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

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 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.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1059 T2
DESIGNED: June 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Temporary 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 2697 (W. Catawba Ave.) at SR 2151 (Jetton Rd.)

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: July 2007 | REVIEWED BY: JTR

PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

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

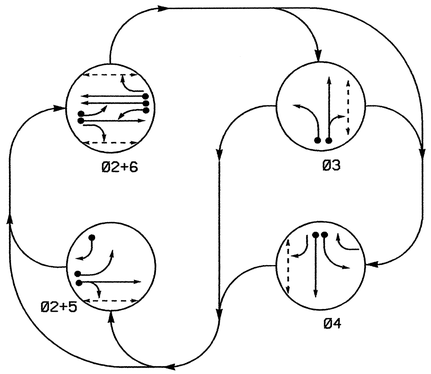
John T. Rowe Jr. 8-1-07
SIGNATURE DATE

SIG. INVENTORY NO. 10-1059 T2

30-JUL-2007 08:27
s:\traffic\signals\workgroups\sig mon\petersom\101059_sm_ele_xxx.dgn
tpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig. 6

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

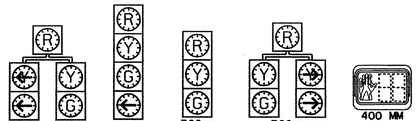
TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	G	G	R	R	Y
22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	R	R	R	G	R
42	R	R	R	G	R
61, 62	R	G	R	R	Y
63	R	G	R	R	Y
P21, P22	W	W	DW	DW	DRK
P31, P32	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	DW	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

Denotes L.E.D.



21 | 31, 41 | 22, 32, 61, 62 | 42, 63 | P21, P22, P31, P32, P41, P42, P61, P62

2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
2A/S1	1.8x1.8	5	90	Y	2	Y	Y	-	Y	-	-	Y
2B/S2	1.8x1.8	5	90	-	2	Y	Y	-	Y	-	-	Y
3A	1.8x12	2-4-2	0	-	3	Y	Y	-	-	-	3	-
3B	1.8x12	2-4-2	0	-	3	Y	Y	-	-	-	10	-
4A	1.8x12	2-4-2	0	-	4	Y	Y	-	-	-	-	-
4B	1.8x12	2-4-2	0	-	4	Y	Y	-	-	-	-	-
5A	1.8x12	2-4-2	0	Y	5	Y	Y	-	-	-	15	Y
					2	Y	Y	Y	-	-	3	Y
5B	1.8x12	2-4-2	0	-	5	Y	Y	-	-	-	15	-
6A/S3	1.8x1.8	6	90	Y	6	Y	Y	-	Y	-	-	Y
6B/S4	1.8x1.8	6	90	-	6	Y	Y	-	Y	-	-	Y
6C	1.8x12	2-4-2	0	Y	6	Y	Y	Y	-	-	3	Y

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	570
Messenger Cable	110
Lead-in Cable	200

2070L TIMING CHART

FEATURE	PHASE 2	3	4	5	6
Min Green 1 *	12	7	7	7	12
Extension 1 *	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	90	20	20	20	90
Yellow Clearance	4.4	3.1	4.7	3.0	4.6
Red Clearance	1.7	3.1	1.7	3.1	1.7
Walk 1 *	7	7	7	-	7
Don't Walk 1	13	20	18	-	22
Seconds Per Actuation *	1.5	-	-	-	1.5
Max Variable Initial *	34	-	-	-	34
Time Before Reduction *	15	-	-	-	15
Time To Reduce *	30	-	-	-	30
Minimum Gap	3.0	-	-	-	3.0
Recall Mode	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	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.

4 Phase
Fully Actuated
(Cornelius Closed Loop Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 5 during phase 6 on.
4. Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4 (see Electrical Details).
5. The order of phase 3 and phase 4 may be reversed.
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Closed loop system data: Controller Asset #1059.

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	
	Metal Strain Pole	

Signal Revision Final Design

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

SCALE 5 0 10 1:500

SR 2697 (W.Catawba Ave.)
at
SR 2151 (Jetton Rd)

Division 10 Mecklenburg County Cornelius

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

REVISIONS	INIT.	DATE

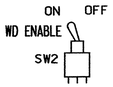
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
7/27/07.
SIGNATURE DATE

SIG. INVENTORY NO. 10-1059

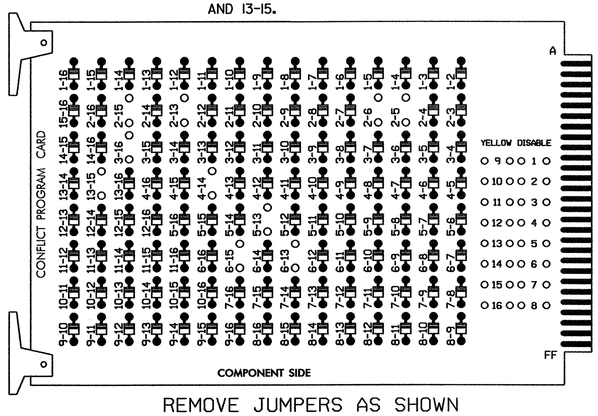
PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 7

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

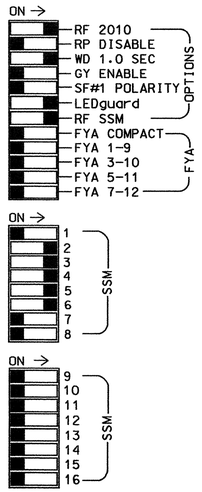
(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 2-5, 2-6, 2-13, 2-15, 3-16, 4-14, 5-13, 6-13, 6-15. AND 13-15.



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 1,7,8, 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. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.
6. Program phases 2, 3, 4 and 6 for 'STARTUP PED CALL'.
7. The cabinet and controller are part of the Cornelius Closed Loop Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S2P,S3,S4,S4P,S5,S6,S6P,S8P
PHASES USED.....2,3,4,5,6,2 PED,3 PED,4 PED,6 PED
OVERLAPS.....NONE

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

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	3 PED
SIGNAL HEAD NO.	NU	21,22	P21, P22	31	32	41	42	63	P41, P42	21,42	61, 62,63	P61, P62	NU	NU	P31, P32
RED		128		116	116	101	101			*	134				
YELLOW		129		117	117	102	102				135				
GREEN		130		118	18	103	103				136				
RED ARROW															
YELLOW ARROW								102		132					
GREEN ARROW				118		103		103		133					
✋			113						104			119			110
🚶			115						106			121			112

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.

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:|1234567891011121314151 6
IF PHASES ARE ON|      X
OMIT PHASES     |    X
CALL PHASES     |  X
```

BACKUP PROTECTION PROGRAMMING COMPLETE

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/SYS 2A/S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 3 3A	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
FILE "I" L		Ø2/SYS 2B/S2				Ø 3 3B	Ø 4 4B					Ø4 PED DC ISOLATOR	Ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J" U	Ø 5 5B	Ø 5 5A	Ø6/SYS 6A/S3	Ø 6 6C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
FILE "J" L	NOT USED	Ø 2 5A	Ø6/SYS 6B/S4	NOT USED										

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

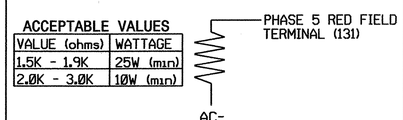
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A/S1	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S2	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			10
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			
5B	TB3-1,2	J1U	55	17	5	5	Y	Y			15
5A[1]	TB3-5,6	J2U	40	2	6	5	Y	Y			15
	TB3-7,8	J2L	44	6	16	2	Y	Y	Y		3
6A/S3	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
6B/S4	TB3-11,12	J3L	77	39	46	6/SYS	Y	Y			
6C	TB5-1,2	J4U	48	10	26	6	Y	Y	Y		3
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P31,P32	TB8-8,9	I13L	70	32	PED 8	3 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

[1] Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL



NOTE: The purpose of this resistor 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.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1059
DESIGNED: July 2007
SEALED: 07-27-07
REVISED: N/A

PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
2. ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
3. SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING!
4. ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
5. BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
6. SELECT '1' (OUTPUT ASSIGNMENTS)
7. ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
8. REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
2. CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
3. MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

Signal Revision - Final

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 2697 (W. Catawba Ave.) at SR 2151 (Jetton Rd)

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: July 2007	REVIEWED BY: JTR
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

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

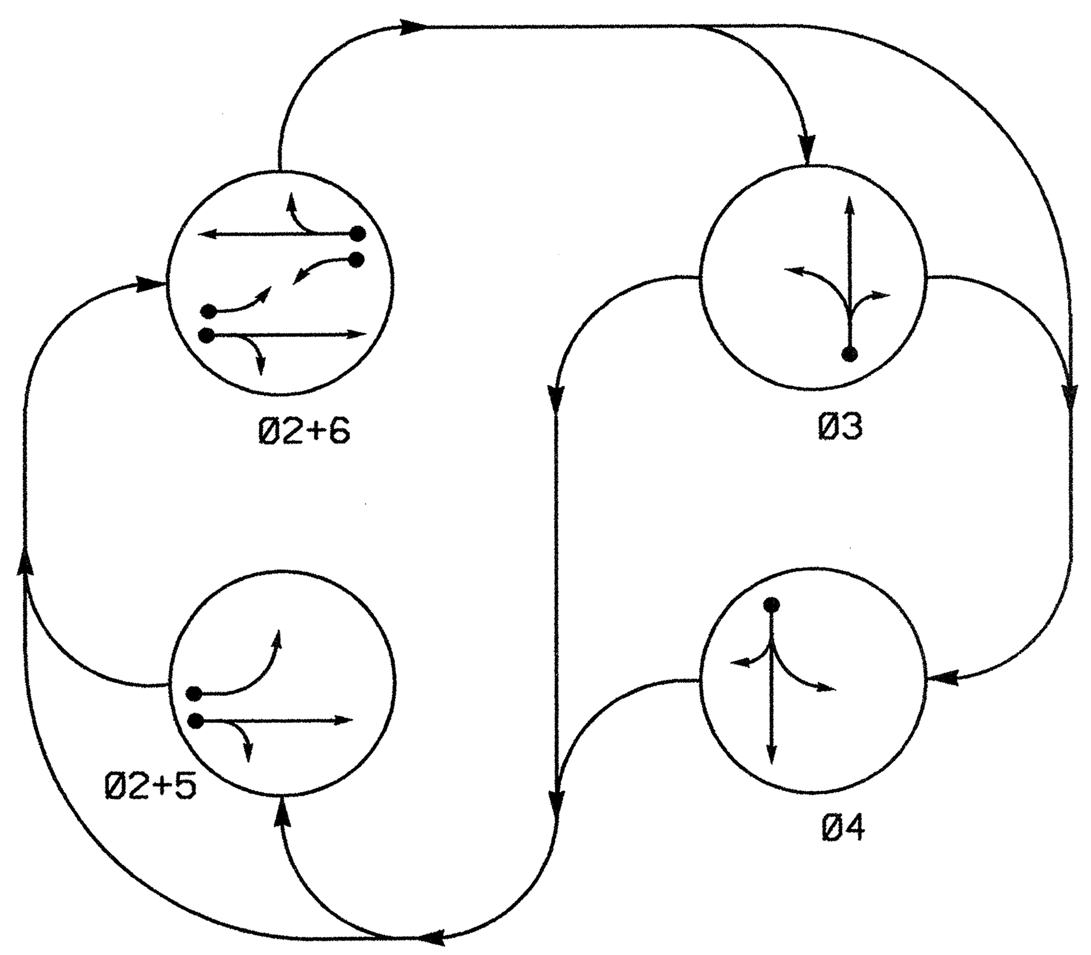
John T. Rowe Jr. 8-1-07
SIGNATURE DATE

SIG. INVENTORY NO. 10-1059

01-AUG-2007 07:37
c:*its signalsworkgroup*sig manpeterson\10159_sml_ele_xxx.dgn
jpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555 A	Sig.8

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

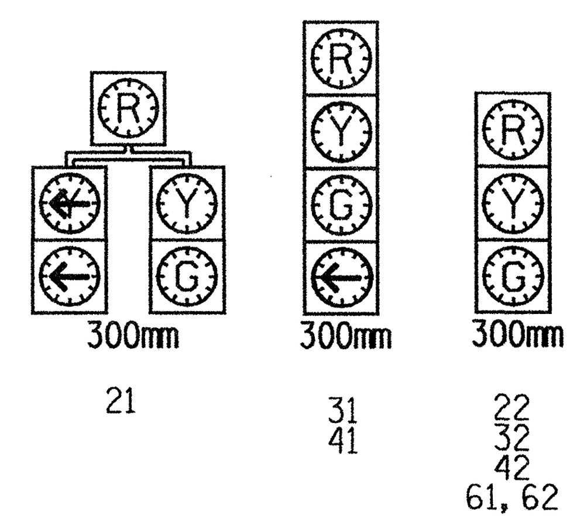
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE				
	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	←/G	G	R	R	Y
22	G	G	R	R	Y
31	R	R	G/←	R	R
32	R	R	G	R	R
41	R	R	R	G/←	R
42	R	R	R	G	R
61, 62	R	G	R	R	Y

SIGNAL FACE I.D.

◌ Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

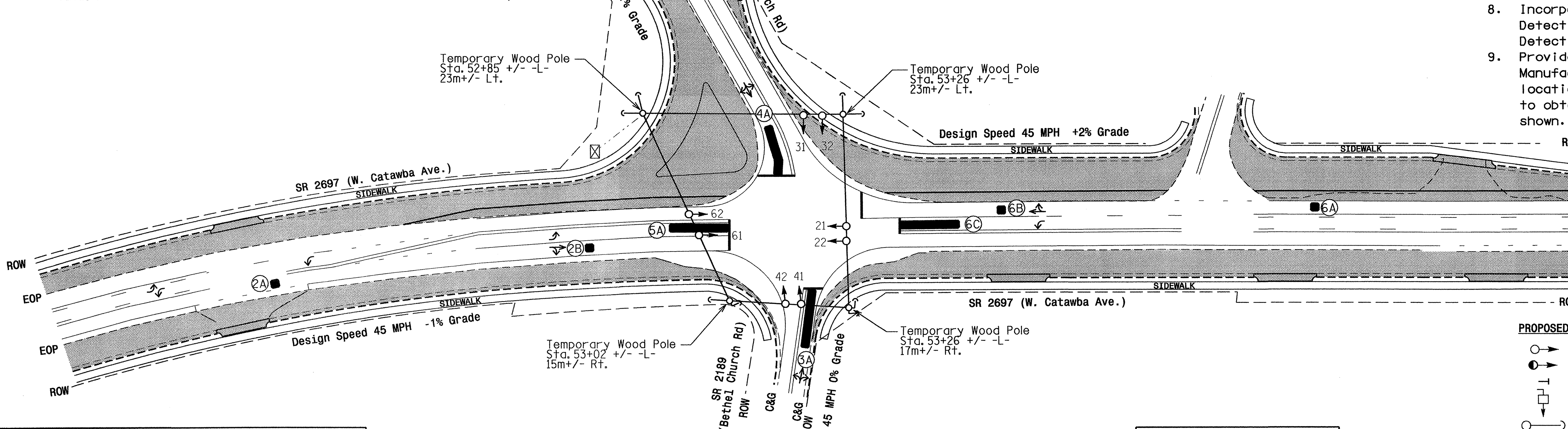
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
2A	1.6X1.6	*	90	*	2	Y	Y	-	-	1.6	-	*
2B	1.6X1.6	*	27	*	2	Y	Y	-	-	-	-	*
3A	1.6X12	*	0	*	3	Y	Y	-	-	-	5	*
4A	1.6X12	*	0	*	4	Y	Y	-	-	-	5	*
5A	1.6X12	*	0	*	5	Y	Y	-	-	-	15	*
					2	Y	Y	-	-	-	-	*
6A	1.6X1.6	*	90	*	6	Y	Y	-	-	1.6	-	*
6B	1.6X1.6	*	27	*	6	Y	Y	-	-	-	-	*
6C	1.6X1.6	*	0	*	6	Y	Y	-	-	-	-	*

* Video Detection Zone

4 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 5 during phase 6 on.
4. Program controller to clear from phase 2+6 to phase 2+5 by processing through phase 4 (see Electrical Details).
5. The order of phase 3 and phase 4 may be reversed.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Incorporate Loop Emulator Detection System for Vehicle Detection.
9. Provide the Engineer with the Manufacturer's approved camera locations and mounting heights to obtain detection zones as shown.



2070L TIMING CHART

FEATURE	PHASE				
	2	3	4	5	6
Min Green 1 *	12	7	7	7	12
Extension 1 *	2.0	2.0	2.0	2.0	2.0
Max Green 1 *	60	20	20	20	60
Yellow Clearance	4.6	4.5	4.4	3.0	4.3
Red Clearance	1.1	1.0	1.0	1.7	1.1
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	ON

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

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	290
Messenger Cable	150
Lead-in Cable	-

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	
	Video Detection Zone	

Signal Revision - Temporary Design 1 (TCP Phase I)

Prepared in 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

SR 2697 (W. Catawba Ave.)
at
SR 2189 (Bethel Church Rd)

Division 10 Mecklenburg County Cornelius

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

SCALE 5 0 10 — 1:500

REVISIONS	INIT.	DATE

SEAL: North Carolina Professional Engineer Seal 24393 Timothy J. Williams

SIGNATURE: T. J. Williams DATE: 7/27/07.

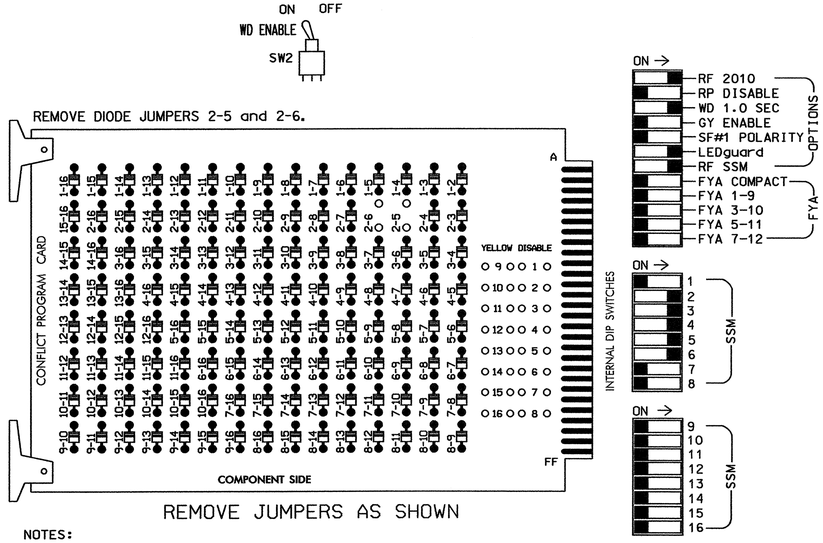
SIG. INVENTORY NO. 10-1079 T1

01-AUG-2007 12:12
s:\its signals\workgroups\tip projects\r-2555a\signals\10-1079_2007.dgn
tthigpen

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	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

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 1,7,8, 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.

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	31	32	41	42	NU	21	61,62	NU	NU	NU	NU
RED		128		116	116	101	101		*	134				
YELLOW		129		117	117	102	102			135				
GREEN		130		118	118	103	103			136				
RED ARROW														
YELLOW ARROW									132					
GREEN ARROW				118		103			133					

NU = Not Used

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

EQUIPMENT INFORMATION

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

DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

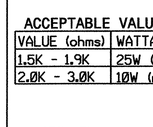
1. From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Function 1.
2. From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

```
 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

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 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.

SPECIAL DETECTOR NOTE

Install a loop emulation detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1079 T1
DESIGNED: June 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Temporary 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2697 (W. Catawba Ave.)
at
SR 2189 (Bethel Church Rd.)

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

PLAN DATE: July 2007	REVIEWED BY: JTR
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

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

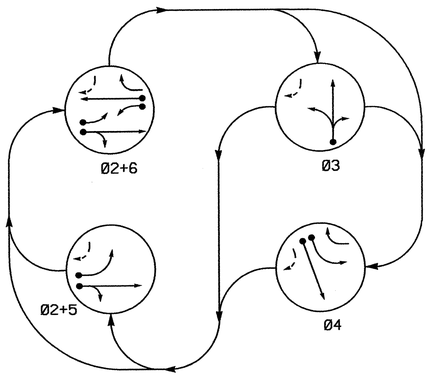
John T. Rowe, Jr. 8-1-07
SIGNATURE DATE

SIG. INVENTORY NO. 10-1079 T1

30-JUL-2007 07:58
s:\ts signals\workgroups\sig man\peterson\10179_sm_ele_xxx.dgn
jtpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig.10

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

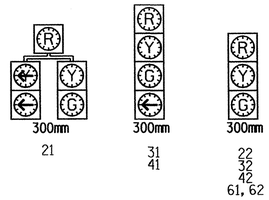
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	G	G	R	R	Y
22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	R	R	R	G	R
42	R	R	R	G	R
61, 62	R	G	R	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
2B	1.6X1.6	6	90	Y	2	Y	Y	-	-	-	-	Y
3A	1.6X12	2-4-2	0	Y	3	Y	Y	-	-	-	5	Y
4A	1.6X12	2-4-2	0	Y	4	Y	Y	-	-	-	3	Y
4B	1.6X12	2-4-2	0	Y	4	Y	Y	-	-	-	-	Y
5A	1.6X12	2-4-2	0	Y	5	Y	Y	-	-	-	15	Y
					2	Y	Y	Y	-	-	3	Y
6B	1.6X1.6	6	90	Y	6	Y	Y	-	-	-	-	Y
6C	1.6X12	2-4-2	0	Y	6	Y	Y	Y	-	-	3	Y

4 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 5 during phase 6 on.
4. Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4 (see Electrical Details).
5. The order of phase 3 and phase 4 may be reversed.
6. Reposition existing signal heads numbered 21, 22, 41, 42, 61 & 62.
7. Set all detector units to presence mode.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone	
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ

2070L TIMING CHART

FEATURE	PHASE 2	3	4	5	6
Min Green 1 *	12	7	7	7	12
Extension 1 *	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	60	20	20	20	60
Yellow Clearance	4.6	4.5	4.4	3.0	4.3
Red Clearance	1.6	1.7	1.7	3.2	1.9
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	2.5	-	-	-	2.5
Max Variable Initial *	34	-	-	-	34
Time Before Reduction *	15	-	-	-	15
Time To Reduce *	30	-	-	-	30
Minimum Gap	3.0	-	-	-	3.0
Recall Mode	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON

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

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	90
Messenger Cable	-
Lead-in Cable	650

Signal Revision - Temporary Design 2 (TCP Phase II)

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
DIVISION OF HIGHWAYS
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

SCALE 5 0 10 1:500

W. Catawba Ave
at
SR 2189 (Bethel Church Rd)

Division 10 Mecklenburg County Cornelius

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

REVISIONS	INIT.	DATE

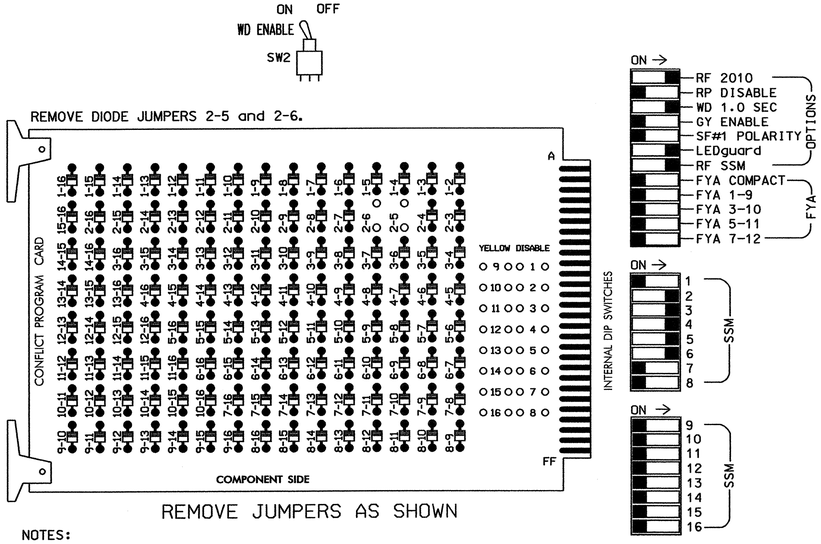
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY WILLIAMS
SIGNATURE 7/27/07 DATE
SIG. INVENTORY NO. 10-1079 T2

26-JUL-2007 08:54
s:\#ts signal&workgroups#tip projects#r-2555a#signals#10-1079_2007.dgn
timpen

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	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

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 1,7,8, 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. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.

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	31	32	41	42	NU	21	61,62	NU	NU	NU	NU
RED		128		116	116	101	101		*	134				
YELLOW		129		117	117	102	102			135				
GREEN		130		118	118	103	103			136				
RED ARROW														
YELLOW ARROW									132					
GREEN ARROW				118		103			133					

NU = Not Used

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

EQUIPMENT INFORMATION

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

DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

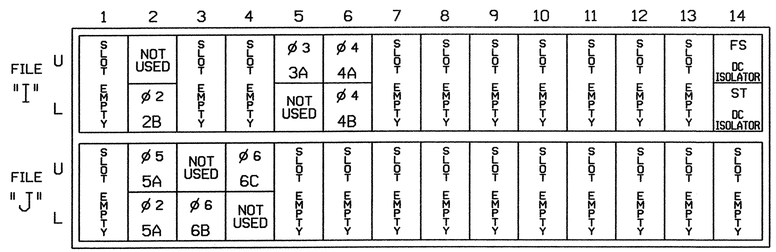
1. From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Function 1.
2. From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

```
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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

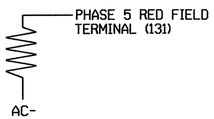
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			5
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A[1]	TB3-5,6	J2U	40	2	6	5	Y	Y			15
	TB3-7,8	J2L	44	6	16	2	Y	Y	Y		3
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
6C	TB5-1,2	J4U	48	10	26	6	Y	Y	Y		3

[1] Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

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 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.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1079 T2
DESIGNED: June 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Temporary 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

W. Catawba Ave.
at
SR 2189 (Bethel Church Rd)

Division 10 | Mecklenburg County | Cornelius

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

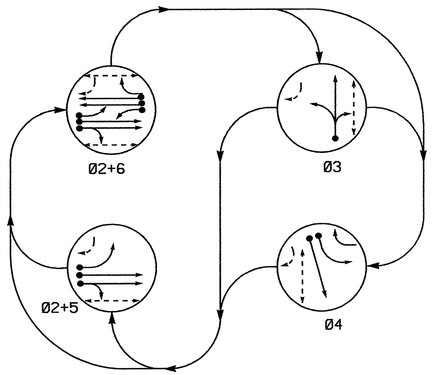
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
SIGNATURE
8-1-07 DATE
SIG. INVENTORY NO. 10-1079 T2

10-JUL-2007 07:58
c:\its_signals\workgroups\sig mon\peterson\101079_sm_ele_xxx.dgn
jtr\peterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig. 12

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

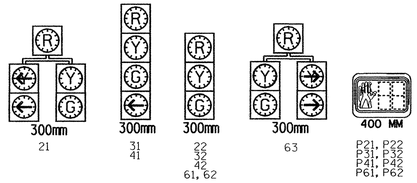
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	G	G	R	R	Y
22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	R	R	R	G	R
42	R	R	R	G	R
61, 62	R	G	R	R	Y
63	R	G	R	R	Y
P21, P22	W	W	DW	DW	DRK
P31, P32	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
2A/S5	1.6X1.6	6	90	Y	2	Y	Y	-	Y	-	-	Y
2B/S6	1.6X1.6	6	90	-	2	Y	Y	-	Y	-	-	-
3A	1.6X12	2-4-2	0	-	3	Y	Y	-	-	-	5	-
4A	1.6X12	2-4-2	0	-	4	Y	Y	-	-	-	3	-
4B	1.6X12	2-4-2	0	-	4	Y	Y	-	-	-	-	-
5A	1.6X12	2-4-2	0	Y	5	Y	Y	-	-	-	15	-
					2	Y	Y	Y	-	-	3	-
6A/S7	1.6X1.6	6	90	Y	6	Y	Y	-	Y	-	-	-
6B/S8	1.6X1.6	6	90	-	6	Y	Y	-	Y	-	-	Y
6C	1.6X12	2-4-2	0	Y	6	Y	Y	Y	-	-	3	-

2070L TIMING CHART

FEATURE	PHASE 2	3	4	5	6
Min Green 1 *	12	7	7	7	12
Extension 1 *	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	90	20	20	20	90
Yellow Clearance	4.6	4.5	4.4	3.0	4.3
Red Clearance	1.6	1.6	1.7	2.8	1.6
Walk 1 *	7	7	7	-	7
Don't Walk 1	16	13	16	-	17
Seconds Per Actuation *	1.5	-	-	-	1.5
Max Variable Initial *	34	-	-	-	34
Time Before Reduction *	15	-	-	-	15
Time To Reduce *	30	-	-	-	30
Minimum Gap	3.0	-	-	-	3.0
Recall Mode	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON

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

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	780
Messenger Cable	160
Lead-in Cable	250

4 Phase
Fully Actuated
(Cornelius Closed Loop Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 5 during phase 6 on.
4. Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4 (see Electrical Details).
5. The order of phase 3 and phase 4 may be reversed.
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Closed loop system data: Controller Asset #1079.

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	
	Wheelchair Ramp	N/A
	Pedestrian Signal Pedestal	
DD	Directional Drill	N/A
A	"YIELD" Sign (R1-2)	A

Signal Revision - Final Design

Prepared in 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

W. Catawba Ave
at
SR 2189 (Bethel Church Rd)

Division 10 Mecklenburg County Cornelius

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

SCALE 5 0 10 1:500

REVISIONS	INIT.	DATE

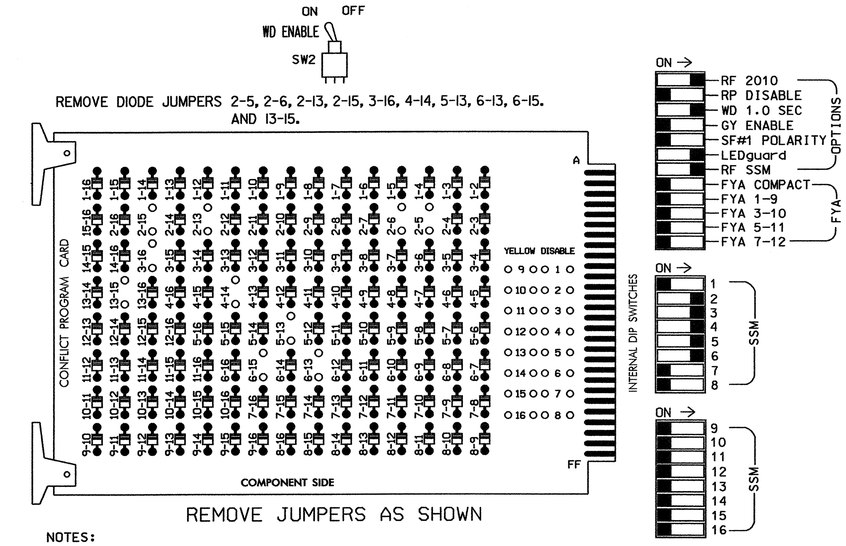
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY S. WILLIAMS
SIGNATURE 7/27/07 DATE
SIG. INVENTORY NO. 10-1079

25-JUL-2007 07:01
s:\Traffic Signals\Workgroups\tip projects\r-2555a\signals\10-1079_2007.dgn
ts thigpen

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 13

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 1,7,8, 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. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.
6. Program phases 2, 3, 4 and 6 for 'STARTUP PED CALL'.
7. The cabinet and controller are part of the Cornelius Closed Loop Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S2P,S3,S4,S4P,S5,S6,S6P,S8P
PHASES USED.....2,3,4,5,6,2 PED,3 PED,4 PED,6 PED
OVERLAPS.....NONE

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

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	3 PED
SIGNAL HEAD NO.	NU	21,22	P21, P22	31	32	41	42	63	P41, P42	21	61, 62,63	P61, P62	NU	NU	P31, P32
RED		128		116	116	101	101			*	134				
YELLOW		129		117	117	102	102				135				
GREEN		130		118	118	103	103				136				
RED ARROW															
YELLOW ARROW								102		132					
GREEN ARROW				118		103		103		133					
✋			113						104			119			110
🚶			115						106			121			112

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.

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:|123456789101112131415 16
IF PHASES ARE ON|      X
OMIT PHASES     |      X
CALL PHASES     |      X
```

BACKUP PROTECTION PROGRAMMING COMPLETE

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/SYS 2A/S5	SLOT EMPTY	SLOT EMPTY	Ø3 3A	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L		Ø2/SYS 2B/S6			NOT USED	Ø4 4B						Ø4 PED DC ISOLATOR	Ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø5 5A	Ø6/SYS 6A/S7	Ø6 6C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø2 5A	Ø6/SYS 6B/S8	NOT USED										

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A/S5	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S6	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			5
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A[1]	TB3-5,6	J2U	40	2	6	5	Y	Y			15
	TB3-7,8	J2L	44	6	16	2	Y	Y	Y		3
6A/S7	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
6B/S8	TB3-11,12	J3L	77	39	46	6/SYS	Y	Y			
6C	TB5-1,2	J4U	48	10	26	6	Y	Y	Y		3
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P31,P32	TB8-8,9	I13L	70	32	PED 8	3 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

[1] Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

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)

PHASE 5 RED FIELD TERMINAL (131)
AC-

NOTE: The purpose of this resistor 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.

PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
2. ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
3. SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING!
4. ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
5. BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
6. SELECT '1' (OUTPUT ASSIGNMENTS)
7. ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
8. REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
2. CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
3. MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

Signal Revision - Final

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1079
DESIGNED: June 2007
SEALED: 07-27-07
REVISED: N/A

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

W. Catawba Ave.
at
SR 2189 (Bethel Church Rd)

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: July 2007	REVIEWED BY: JTR
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

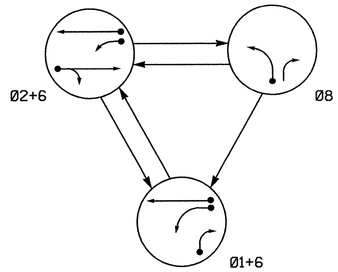
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
SIGNATURE 8-1-07 DATE
SIG. INVENTORY NO. 10-1079

11-JUL-2007 13:07
s:\traffic signals\workgroups\sig man\peterson\m10179_sm_ele_xxx.dgn
jtpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig.14

3 Phase
Fully Actuated
(Isolated)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

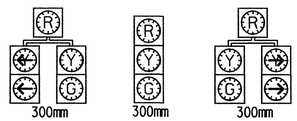
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	FLASH
21, 22	R	G	R	Y
61	R/G	G	R	Y
62	G	G	R	Y
81	R	R	G	R
82	R/Y	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	1.8X12	*	0	*	1	Y	Y	-	-	-	15	*
					6	Y	Y	-	-	-	-	*
1B	1.8X12	*	0	*	1	Y	Y	-	-	-	15	*
2A	1.8X1.8	*	90	*	2	Y	Y	-	-	1.6	-	*
2B	1.8X1.8	*	90	*	2	Y	Y	-	-	-	-	*
6A	1.8X1.8	*	90	*	6	Y	Y	-	-	1.6	-	*
6B	1.8X1.8	*	90	*	6	Y	Y	-	-	-	-	*
8A	1.8X12	*	0	*	8	Y	Y	-	-	-	5	*

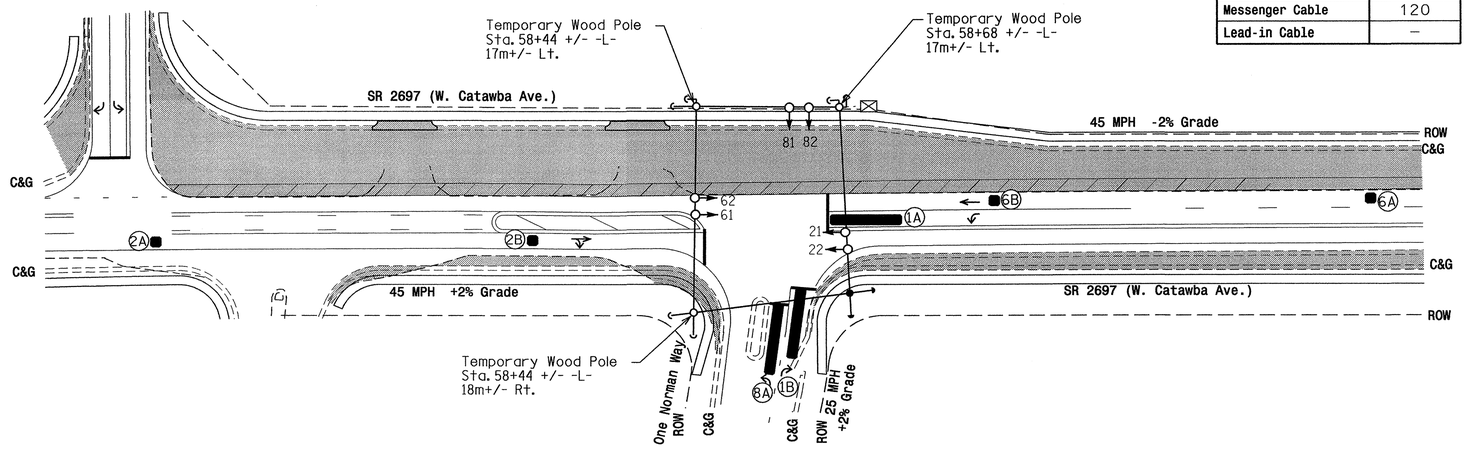
* Video Detection Zone

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	130
Messenger Cable	120
Lead-in Cable	-

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet as as not to obstruct sight distance of vehicles turning right on red.
5. Incorporate Loop Emulator Detection System for vehicle Detection.
6. Provide the Engineer with the Manufacturer's approved camera locations and mounting heights to obtain detection zones as shown.



2070L TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Min Green 1 *	7	12	12	7
Extension 1 *	2.0	2.0	2.0	2.0
Max Green 1 *	20	75	75	20
Yellow Clearance	3.0	4.3	4.7	3.0
Red Clearance	1.5	1.0	1.0	2.2
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	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	
	Video Detection Zone	
	Construction Zone	

Signal Revision - Temporary Design 1 (TCP Phase I)

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

SR 2697 (W. Catawba Ave)
at
One Norman Way

Division 10 Mecklenburg County Cornelius

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

SCALE 5 0 10 1:500

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY S. WILLIAMS
SIGNATURE 7/27/07 DATE

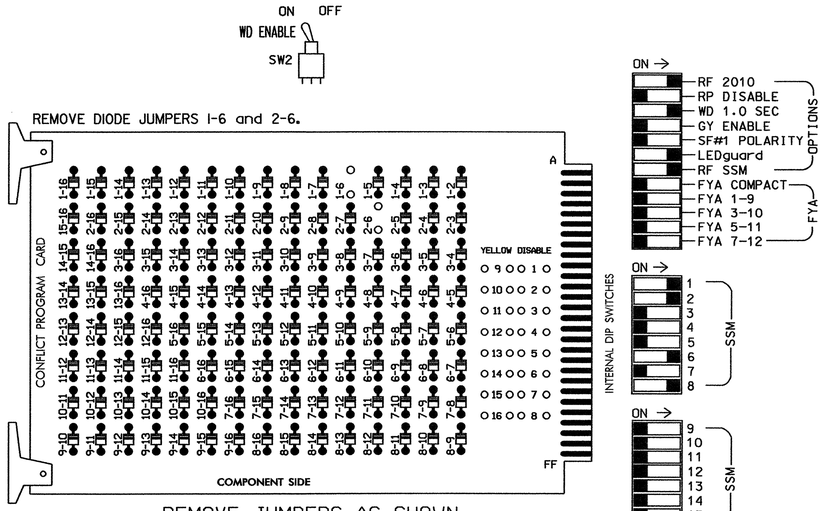
SIG. INVENTORY NO. 10-1828 T1

01-AUG-2007 12:14
s:\rtg signals\workgroups\tip projects\r-2555a\signals\10-1828_2007.dgn
tthigpen

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 15

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 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.....S1,S2,S6,S8
PHASES USED.....1,2,6,8
OVERLAPS.....NONE

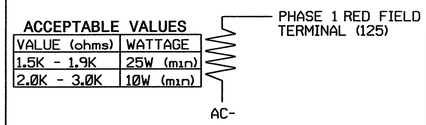
SIGNAL HEAD HOOK-UP CHART

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.	61,82	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	126											
GREEN ARROW	127											

NU = Not Used

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

LOAD RESISTOR INSTALLATION DETAIL



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.

SPECIAL DETECTOR NOTE

Install a loop emulation detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1828 T1
DESIGNED: July 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Temporary 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 2697 (W. Catawba Ave.)
at
One Norman Way

Division 10 Mecklenburg County Cornelius

PLAN DATE: July 2007	REVIEWED BY: JTR
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

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

John T. Rowe Jr. 8-1-07
SIGNATURE DATE

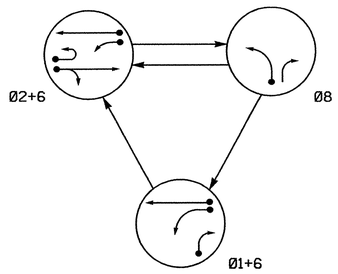
SIG. INVENTORY NO. 10-1828 T1

30-JUL-2007 09:54
s:\traffic signals\workgroups\sig mon\peterson\101828_sm_ele.xxx.dgn
jpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig.16

3 Phase
Fully Actuated
(Isolated)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

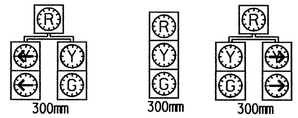
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
21, 22	R	G	R	Y
61	G	G	R	Y
62	G	G	R	Y
81	R	R	G	R
82	R	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

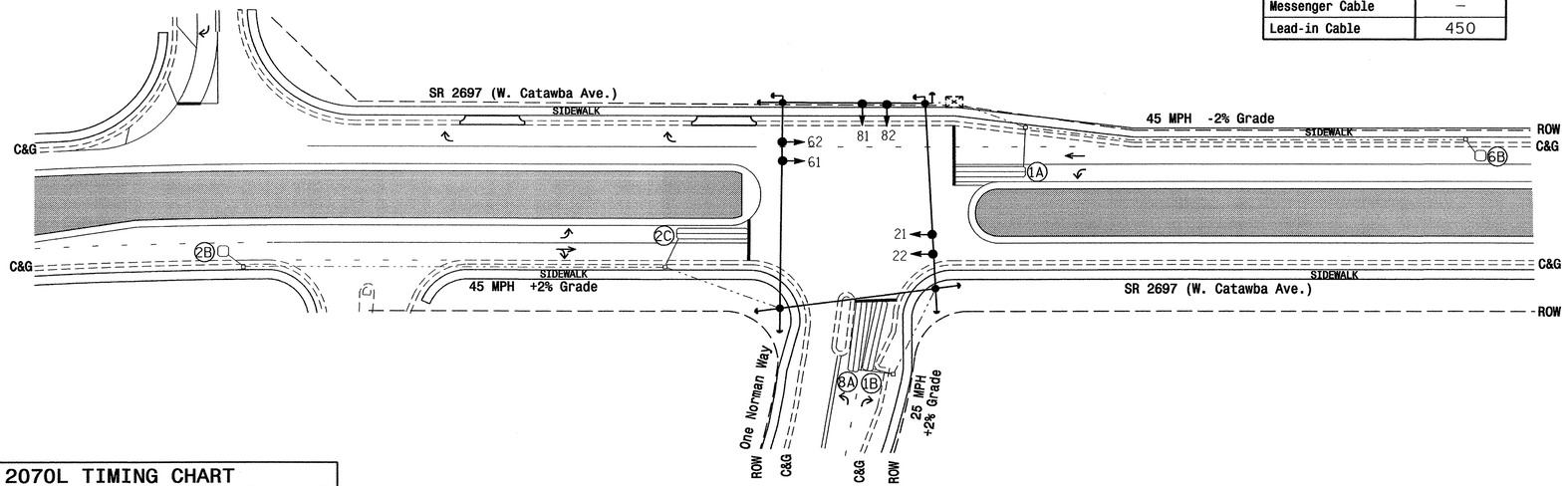
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	1.8X12	2-4-2	0	Y	1	Y	Y	-	-	-	15	Y
					6	Y	Y	Y	-	-	3	Y
1B	1.8X12	2-4-2	0	Y	1	Y	Y	-	-	-	15	Y
2B	1.8X1.8	6	87	Y	2	Y	Y	-	-	-	-	Y
2C	1.8X12	2-4-2	0	Y	2	Y	Y	Y	-	-	3	Y
6B	1.8X1.8	4	87	Y	6	Y	Y	-	-	-	-	Y
8A	1.8X12	2-4-2	0	Y	8	Y	Y	-	-	-	3	Y

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	–
Messenger Cable	–
Lead-in Cable	450

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Program controller to clear from phase 2+6 to phase 1+6 by progressing through phase 8 (see Electrical Details).
5. Reposition existing signal heads numbered 21, 22, 61, 62, 81, and 82.
6. Set all detector units to presence mode.



2070L TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Min Green 1 *	7	12	12	7
Extension 1 *	2.0	6.0	6.0	2.0
Max Green 1 *	20	75	75	20
Yellow Clearance	3.0	4.3	4.7	3.0
Red Clearance	2.8	1.8	1.2	2.8
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	2.5	2.5	-
Max Variable Initial *	-	33	33	-
Time Before Reduction *	-	15	15	-
Time To Reduce *	-	30	30	-
Minimum Gap	-	3.0	3.0	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

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	

Signal Revision - Temporary Design 2 (TCP Phase II)

Prepared in 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

SR 2697 (W. Catawba Ave)
at
One Norman Way

Division 10 Mecklenburg County Cornelius
PLAN DATE: July 2007 REVIEWED BY: TJ Williams
PREPARED BY: TS Thigpen REVIEWED BY:

SCALE 5 0 10 1:500

REVISIONS	INIT.	DATE

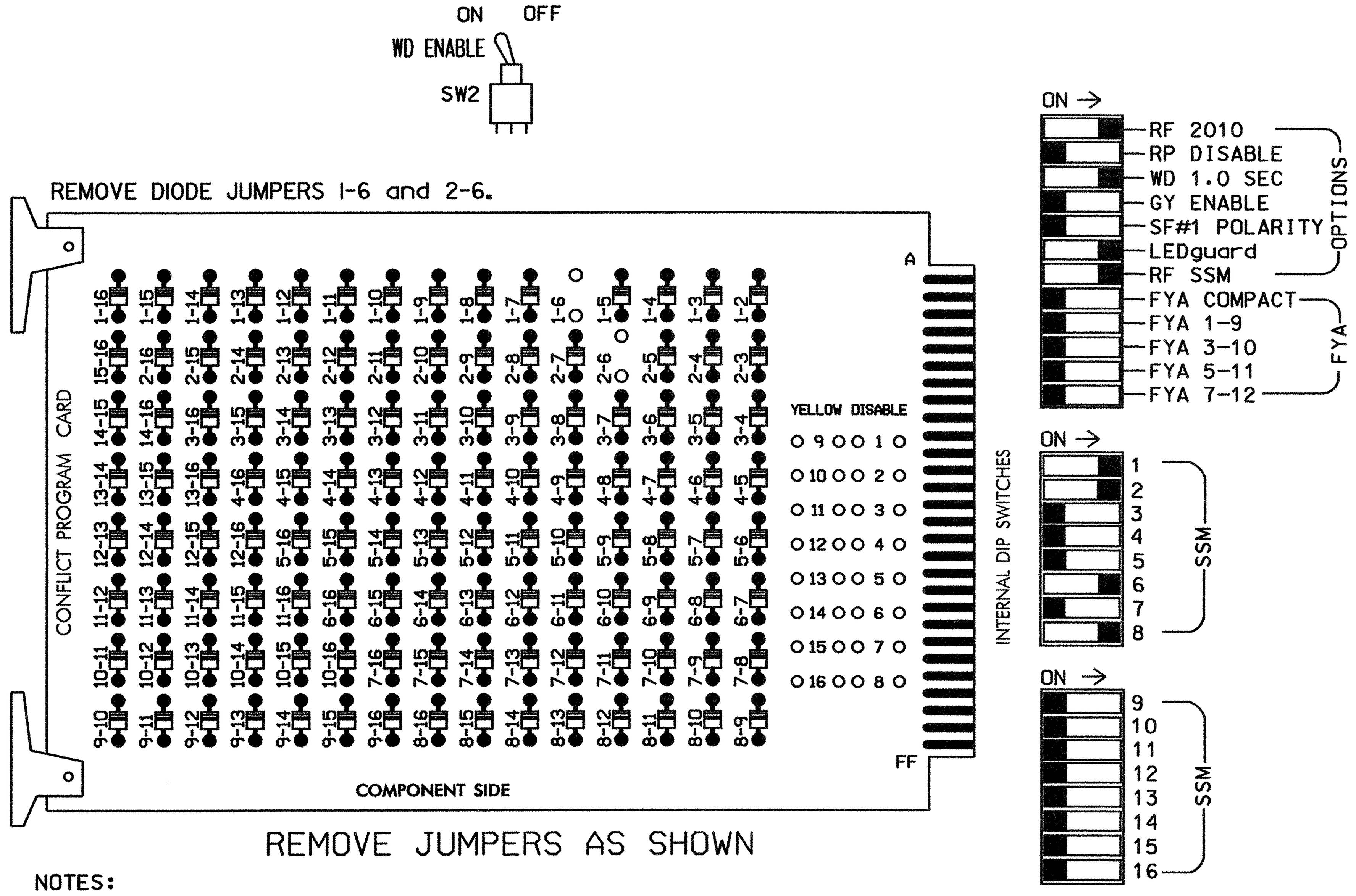
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 7/21/07 DATE
SIG. INVENTORY NO. 10-1828 T2

27-JUL-2007 11:15
S:\TIS signals\workgroups\tip projects\r-2555a\signals\10-1828_2007.dgn
tsthigpen

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 17

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 the unused red monitor inputs 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.
5. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.

EQUIPMENT INFORMATION

CONTROLLER..............CONTRACTOR SUPPLIED 2070L
CABINET.................CONTRACTOR SUPPLIED 332
SOFTWARE................ECONOLITE OASIS
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S1,S2,S6,S8
PHASES USED.............1,2,6,8
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.	61,82	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	126											
GREEN ARROW	127											

NU = Not Used

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

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

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1B	TB2-1,2	I1U	56	18	1	1	Y	Y			15
1A [1]	TB2-5,6	I2U	39	1	2	1	Y	Y			15
	TB2-7,8	I2L	43	5	12	6	Y	Y	Y		3
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
2C	TB4-1,2	I4U	47	9	22	2	Y	Y	Y		3
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3

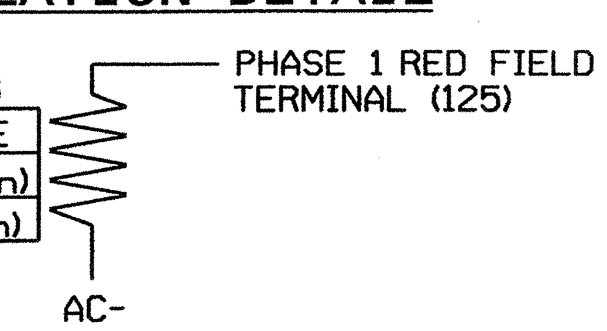
[1] Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.

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 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.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1828 T2
DESIGNED: July 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Temporary 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2697 (W. Catawba Ave.)
at
One Norman Way

Division 10 Mecklenburg County Cornelius

PLAN DATE: July 2007 REVIEWED BY: JTR
PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals Management Section, Department of Transportation, North Carolina

750 N. Greenfield Pkwy, Garner, NC 27529

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

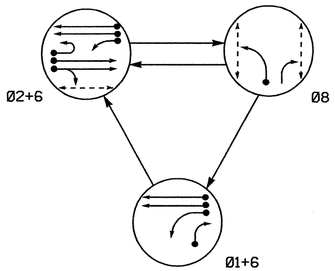
SIGNATURE 8-1-07 DATE

SIG. INVENTORY NO. 10-1828 T2

30-JUL-2007 09:55
signals#workgroups#sig man#peterson#101828_sm_ele_xxx.dgn
peterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig.18

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

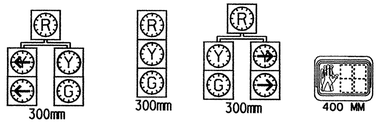
TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	FLASH
21, 22	R	G	R	Y
61	G	G	R	Y
62, 63	G	G	R	Y
81	R	R	G	R
82	R	R	G	R
P21, P22	DW	W	DW	DRK
P81, P82	DW	DW	W	DRK
P83, P84	DW	DW	W	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	1.8X12	2-4-2	0	Y	1	Y	Y	-	-	-	15	-
					6	Y	Y	Y	-	-	3	-
1B	1.8X12	2-4-2	0	-	1	Y	Y	-	-	-	15	-
2A/S9	1.8X1.8	6	90	Y	2	Y	Y	-	Y	-	-	Y
2B/S10	1.8X1.8	6	90	-	2	Y	Y	-	Y	-	-	-
2C	1.8X12	2-4-2	0	Y	2	Y	Y	Y	-	-	3	-
6A/S11	1.8X1.8	4	90	Y	6	Y	Y	-	Y	-	-	Y
6B/S12	1.8X1.8	4	90	-	6	Y	Y	-	Y	-	-	-
8A	1.8X12	2-4-2	0	-	8	Y	Y	-	-	-	3	-

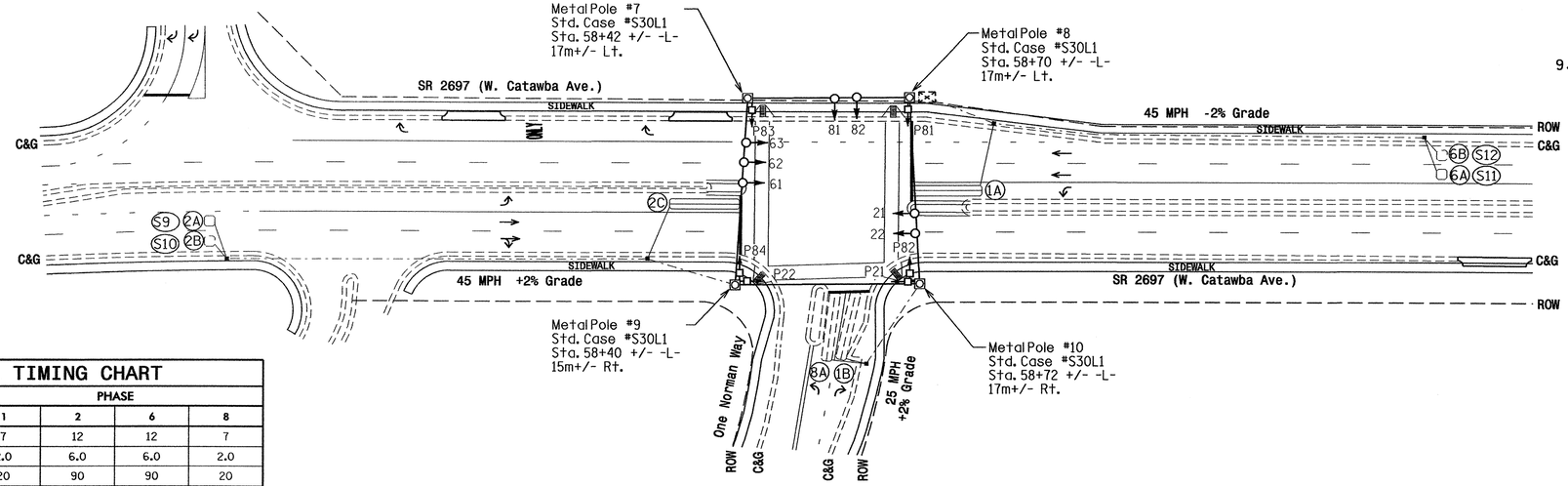
PLAN QUANTITIES

Pay Item	Meters
Signal Cable	410
Messenger Cable	130
Lead-in Cable	190

3 Phase
Fully Actuated
(Cornelius Closed Loop Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Program controller to clear from phase 2+6 to phase 1+6 by progressing through phase 8 (see Electrical Details).
5. Set all detector units to presence mode.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset # 1828.



2070L TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Min Green 1 *	7	12	12	7
Extension 1 *	2.0	6.0	6.0	2.0
Max Green 1 *	20	90	90	20
Yellow Clearance	3.0	4.3	4.7	3.0
Red Clearance	2.4	1.3	1.2	2.6
Walk 1 *	-	7	-	7
Don't Walk 1	-	12	-	17
Seconds Per Actuation *	-	1.5	1.5	-
Max Variable Initial *	-	34	34	-
Time Before Reduction *	-	15	15	-
Time To Reduce *	-	30	30	-
Minimum Gap	-	3.0	3.0	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

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	
	Metal Strain Pole	

Signal Revision - Final Design

Prepared in 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 2697 (W. Catawba Ave) at One Norman Way

Division 10 Mecklenburg County Cornelius

PLAN DATE: July 2007 REVIEWED BY: TJ Williams

PREPARED BY: TS Thigpen REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 7/27/07 DATE

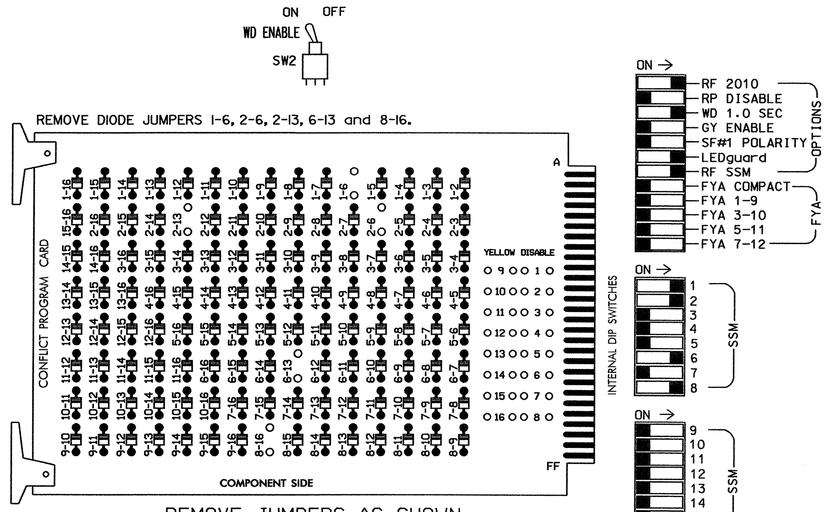
SIG. INVENTORY NO. 10-1828

27-JUL-2007 09:43
S:\TS signals\workgroups\tip projects\R-2555A\signals\10-1828_2007.dgn
TS: Thigpen

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 19

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 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.
5. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.
6. Program phases 2 and 8 for 'STARTUP PED CALL'.
7. The cabinet and controller are part of the Cornelius Closed Loop Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S2P,S6,S8,S8P
PHASES USED.....1,2,6,8,2 PED,8 PED
OVERLAPS.....NONE

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

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.	61,82	21,22	P21, P22	NU	NU	NU	NU	61, 62,63	NU	NU	81,82	P81,P82 P83,P84
RED	*	128						134			107	
YELLOW		129						135			108	
GREEN		130						136			109	
RED ARROW												
YELLOW ARROW	126											
GREEN ARROW	127											
✋			113									110
🚶			115									112

NU = Not Used

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

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø1 1B	ø1 1A	ø2/SYS 2A/S9	ø2 2C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø2 PED DC ISOLATOR	NOT USED	FS DC ISOLATOR
	L	NOT USED	ø6 1A	ø2/SYS 2B/S10	NOT USED								NOT USED	ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	ø6/SYS 6A/S11	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		ø6/SYS 6B/S12				NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

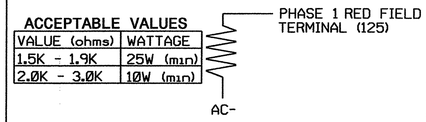
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1B	TB2-1,2	I1U	56	18	1	1	Y	Y			15
1A [1]	TB2-5,6	I2U	39	1	2	1	Y	Y			15
	TB2-7,8	I2L	43	5	12	6	Y	Y	Y		3
2A/S9	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
2B/S10	TB2-11,12	I3L	76	38	42	2/SYS	Y	Y			
2C	TB4-1,2	I4U	47	9	22	2	Y	Y	Y		3
6A/S11	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S12	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P81,P82,P83,P84	TB8-8,9	I13L	70	32	PED 8	8 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

[1] Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL



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.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1828
DESIGNED: July 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Final

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2697 (W. Catawba Ave.) at One Norman Way

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: July 2007 | REVIEWED BY: JTR

PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

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

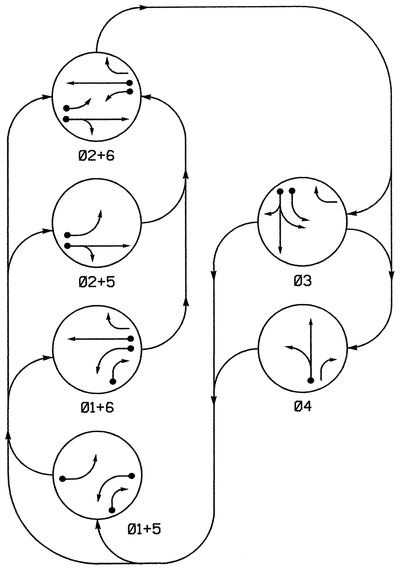
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
SIGNATURE
8-1-07
DATE

SIG. INVENTORY NO. 10-1828

3-JUL-2007 09:55
c:\mts signals\workgroups\sig mgr\peterson\101828_sm_ele_xxx.dgn
jpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig.20

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

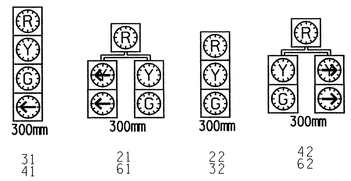
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R	Y
31	R	R	R	R	G	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G	R
42	R	R	R	R	R	G	R
61	R	R	G	R	G	R	Y
62	R	G	R	G	R	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

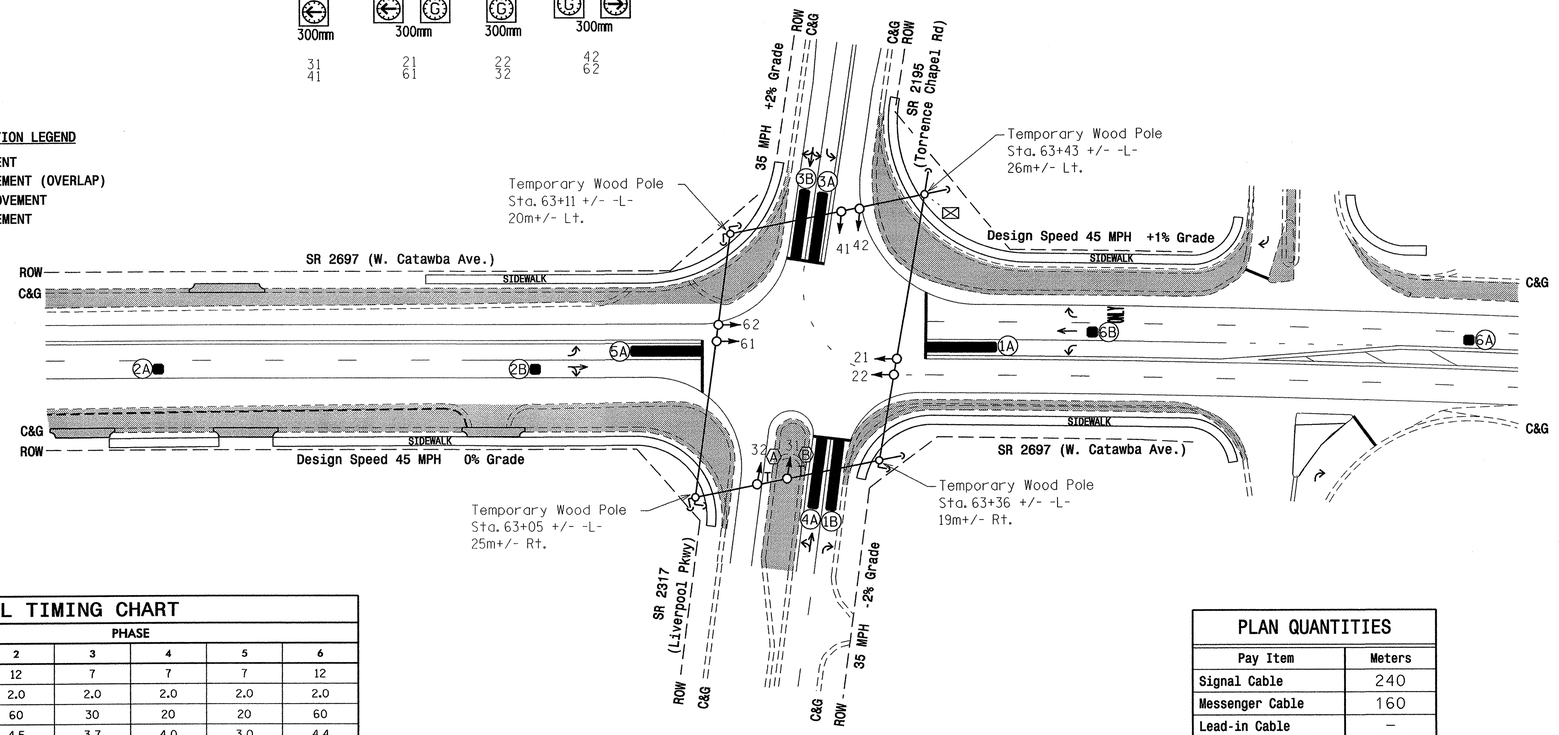
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	1.8X12	✳	0	✳	1	Y	Y	-	-	-	15	✳
					6	Y	Y	-	-	-	-	✳
1B	1.8X12	✳	0	✳	1	Y	Y	-	-	-	15	✳
2A	1.8X1.8	✳	90	✳	2	Y	Y	-	-	1.6	-	✳
2B	1.8X1.8	✳	27	✳	2	Y	Y	-	-	-	-	✳
3A	1.8X12	✳	0	✳	3	Y	Y	-	-	-	3	✳
3B	1.8X12	✳	0	✳	3	Y	Y	-	-	-	5	✳
4A	1.8X12	✳	0	✳	4	Y	Y	-	-	-	-	✳
5A	1.8X12	✳	0	✳	5	Y	Y	-	-	-	15	✳
					2	Y	Y	-	-	-	-	✳
6A	1.8X1.8	✳	90	✳	6	Y	Y	-	-	1.6	-	✳
6B	1.8X1.8	✳	27	✳	6	Y	Y	-	-	-	-	✳

✳ Video Detection Zone

6 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Omit phase 5 during phase 6 on.
5. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4 (see Electrical Details).
6. The order of phase 3 and phase 4 may be reversed.
7. Set all detector units to presence mode.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Incorporate Loop Emulator Detection System for Vehicle Detection.
10. Provide the Engineer with the Manufacturer's approved camera locations and mounting heights to obtain detection zones as shown.



2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	2.0	2.0	2.0	2.0	2.0	2.0
Max Green 1 *	20	60	30	20	20	60
Yellow Clearance	3.0	4.5	3.7	4.0	3.0	4.4
Red Clearance	3.0	1.4	1.5	1.5	2.4	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	ON	ON

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

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	240
Messenger Cable	160
Lead-in Cable	–

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	
	Video Detection Zone	
Ⓐ	Dual Turn and Through Arrows Sign	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ

Signal Revision - Temporary Design 1 (TCP Phase I)

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

SCALE 5 0 10 1:500

SR 2697 (W. Catawba Avenue) at SR 2195 (Torrence Chapel Rd.)/ SR 2317(Liverpool Pkwy)

Division 10 Mecklenburg County Cornelius

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

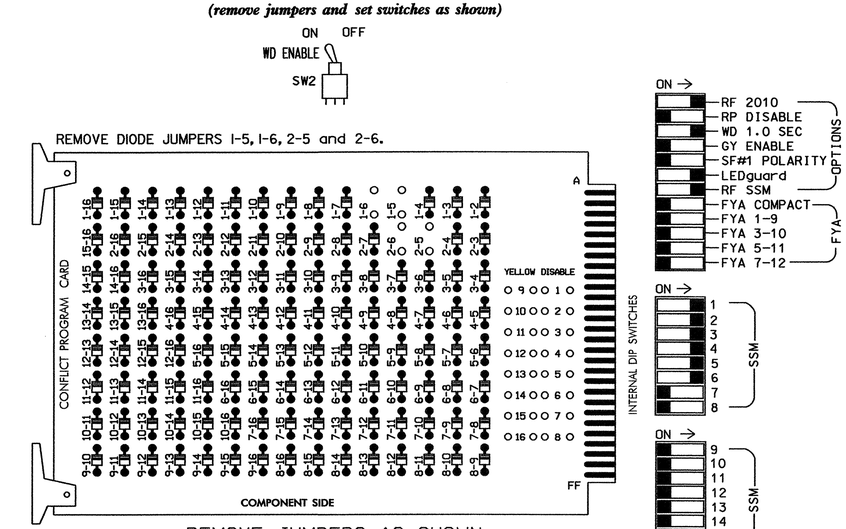
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 7/27/07 DATE
SIG. INVENTORY NO. 10-0939 T1

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 21

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 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.

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.	42,61	21,22	NU	31	32	62	41	42	NU	21	61,62	NU	NU	NU	NU
RED	*	128		116	116		101	101		*	134				
YELLOW		129		117	117		102	102			135				
GREEN		130		118	118		103	103			136				
RED ARROW															
YELLOW ARROW	126					117				132					
GREEN ARROW	127			118		118	103			133					

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.

EQUIPMENT INFORMATION

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

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 Functions 1 and 2.
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:¦123456789101112131415 16
IF PHASES ARE ON¦ X
OMIT PHASES     ¦X
CALL PHASES     ¦  X
```

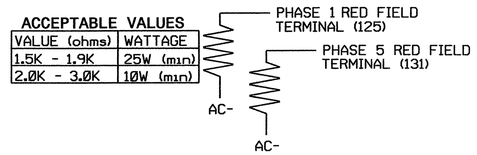
PRESS 'NEXT'

```
DYNAMIC/BACKUP CONTROL FUNCTION #02
                OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR        PHASES:¦123456789101112131415 16
IF PHASES ARE ON¦    X
OMIT PHASES     ¦   X
CALL PHASES     ¦  X
```

BACKUP PROTECTION PROGRAMMING COMPLETE

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

SPECIAL DETECTOR NOTE

Install a loop emulation detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

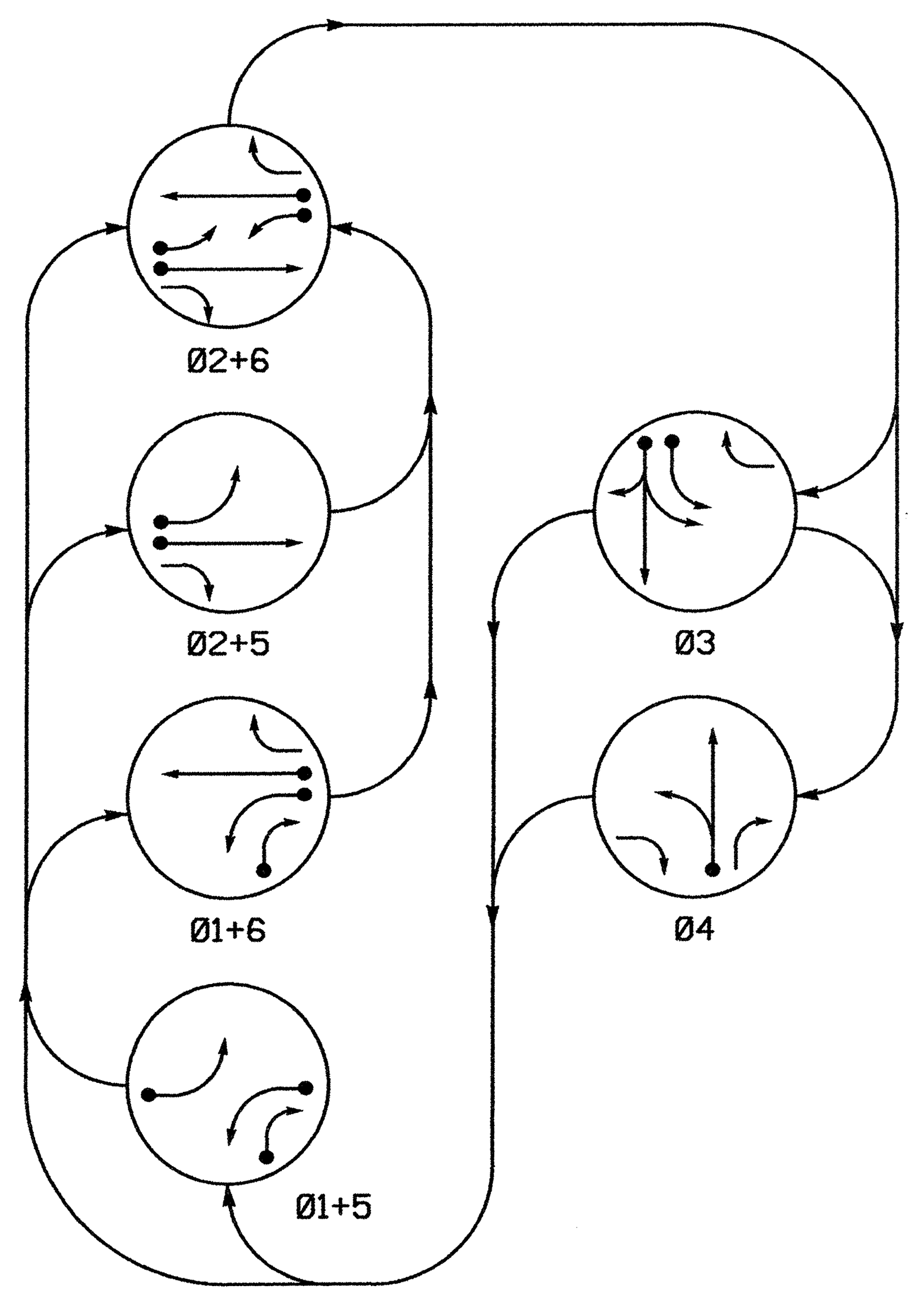
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0939 T1
DESIGNED: July 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Temporary 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:	SR 2697 (W. Catawba Avenue) at SR 2195 (Torrence Chapel Rd.) / SR 2317 (Liverpool Pkwy)	SEAL
Prepared in the Offices of: NCDOT Traffic Engineering and Safety Systems Branch, Signals Management Section	Division 10 Mecklenburg County Cornelius	NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
750 N. Greenfield Pkwy, Garner, NC 27529	PLAN DATE: July 2007 REVIEWED BY: JTR	SIGNATURE DATE 8-1-07
	PREPARED BY: James Peterson REVIEWED BY:	SIG. INVENTORY NO. 10-0939 T1
	REVISIONS / INIT. / DATE	

30-JUL-2007 09:03
c:\mtb signals\workgroups\sig man\peterson\100939_sht1e.xxx.dgn
jpeterson

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

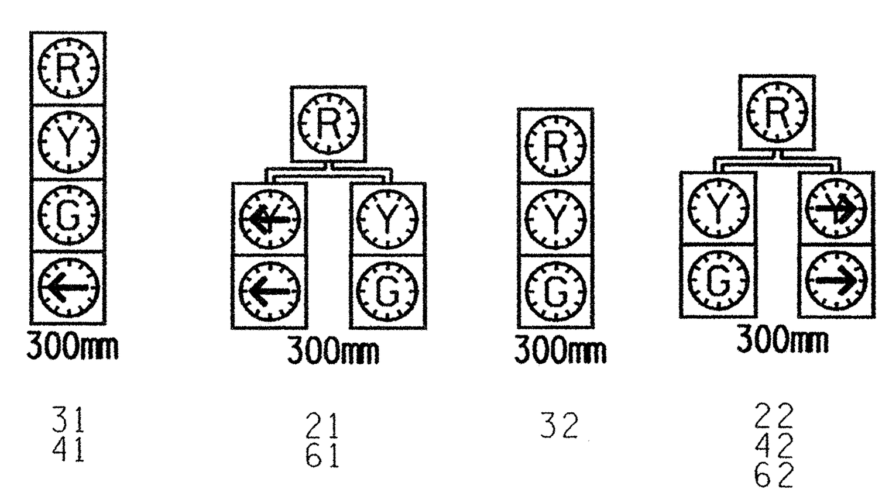
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	R/←	R	G/←	G	R	R	Y
22	R	R	G	G	R	R/→	Y
31	R	R	R	R	G/←	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G/←	R
42	R/→	R/→	R	R	R	G	R
61	R/←	G/←	R	G	R	R	Y
62	R	G	R	G	R/→	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



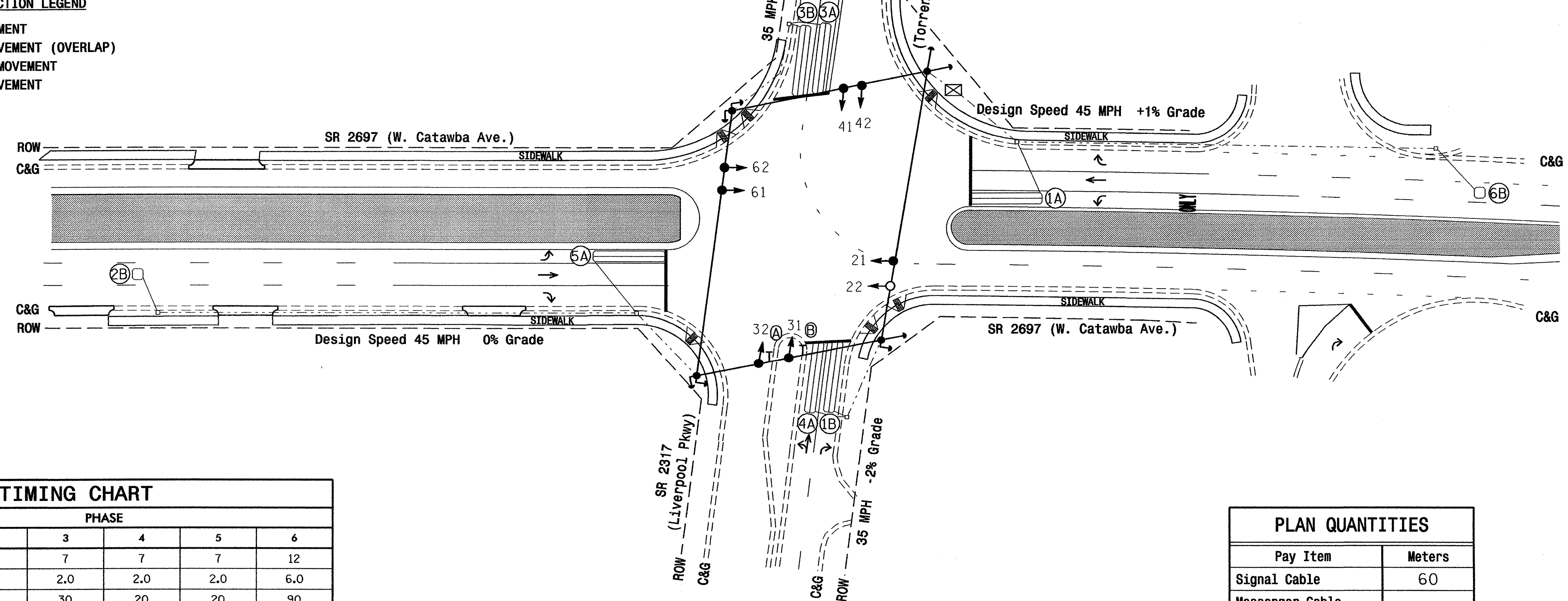
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS: LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	DETECTOR PROGRAMMING: PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	1.8X12	2-4-2	0	Y	1	Y	Y	-	-	-	15	Y
					6	Y	Y	Y	-	-	3	Y
1B	1.8X12	2-4-2	0	Y	1	Y	Y	-	-	-	15	Y
2B	1.8X1.8	6	87	Y	2	Y	Y	-	-	-	-	Y
3A	1.8X12	2-4-2	0	Y	3	Y	Y	-	-	-	3	Y
3B	1.8X12	2-4-2	0	Y	3	Y	Y	-	-	-	5	Y
4A	1.8X12	2-4-2	0	Y	4	Y	Y	-	-	-	-	Y
5A	1.8X12	2-4-2	0	Y	5	Y	Y	-	-	-	15	Y
					2	Y	Y	Y	-	-	3	Y
6B	1.8X1.8	4	84	Y	6	Y	Y	-	-	-	-	Y

6 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Omit phase 5 during phase 6 on.
5. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4 (see Electrical Details).
6. The order of phase 3 and phase 4 may be reversed.
7. Reposition existing signal heads numbered 21, 61, and 62.
8. Set all detector units to presence mode.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone	
	Wheelchair Ramp	N/A
Ⓐ	Dual Turn and Through Arrows Sign	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ

2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	20	90	30	20	20	90
Yellow Clearance	3.0	4.5	3.7	4.0	3.0	4.4
Red Clearance	3.6	1.8	2.4	2.2	3.3	2.2
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	2.5	-	-	-	2.5
Max Variable Initial *	-	33	-	-	-	32
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	60
Messenger Cable	–
Lead-in Cable	570

Signal Revision - Temporary Design 2 (TCP Phase II)

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

SR 2697 (W. Catawba Avenue) at SR 2195 (Torrence Chapel Rd.)/ SR 2317(Liverpool Pkwy)

Division 10 Mecklenburg County Cornelius

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

REVISIONS | INIT. | DATE

SCALE 5 0 10 — 1:500

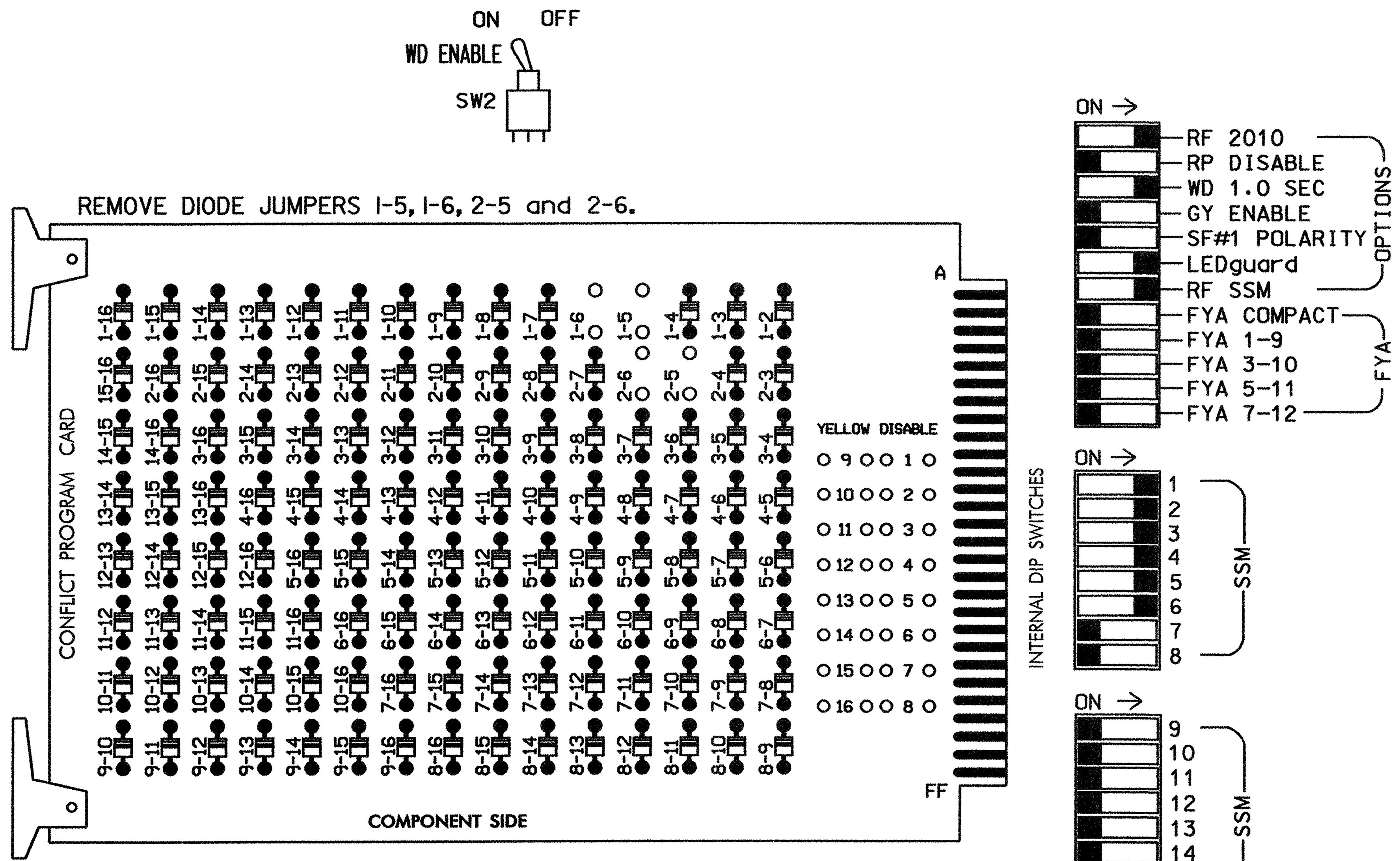
SEAL: NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS — 7/27/07 — SIGNATURE — DATE

SIG. INVENTORY NO. 10-0939 T2

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig.23

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 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. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.

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.	42,61	21,22	NU	31	32	62	41	42	22	NU	21	61,62	NU	NU	NU	NU
RED	*	128		116	116		101	101			*	134				
YELLOW		129		117	117		102	102				135				
GREEN		130		118	118		103	103				136				
RED ARROW																
YELLOW ARROW	126					117			102		132					
GREEN ARROW	127			118		118	103		103		133					

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.

EQUIPMENT INFORMATION

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

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 Functions 1 and 2.
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
```

PRESS 'NEXT'

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

BACKUP PROTECTION PROGRAMMING COMPLETE

INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	U	ø1 1B	ø1 1A	NOT USED	SLOT EMPTY	SLOT EMPTY	ø3 3A	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
"I"	L	NOT USED	ø6 1A	ø2 2B			ø3 3B	NOT USED							ST DC ISOLATOR
"J"	U	SLOT EMPTY	ø5 5A	NOT USED	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
"J"	L		ø2 5A	ø6 6B											

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1B	TB2-1,2	I1U	56	18	1	1	Y	Y			15
1A[1]	TB2-5,6	I2U	39	1	2	1	Y	Y			15
	TB2-7,8	I2L	43	5	12	6	Y	Y	Y		3
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			5
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
5A[2]	TB3-5,6	J2U	40	2	6	5	Y	Y			15
	TB3-7,8	J2L	44	6	16	2	Y	Y	Y		3
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			

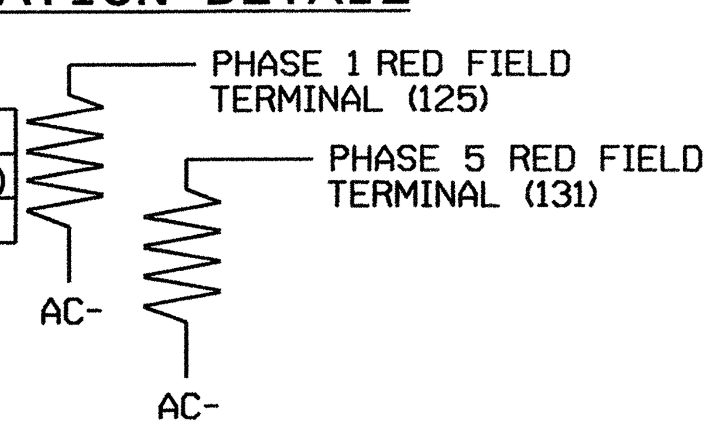
[1] Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.

[2] Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0939 T2
DESIGNED: July 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Temporary 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

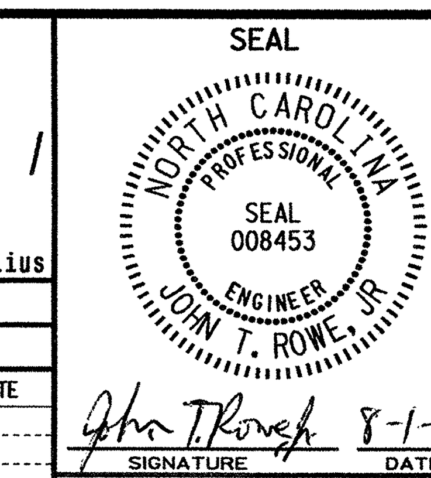
SR 2697 (W. Catawba Avenue)
at
SR 2195 (Torrence Chapel Rd.) / SR 2317 (Liverpool Pkwy)

Division 10 Mecklenburg County Cornelius

PLAN DATE: July 2007 REVIEWED BY: JTR
PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

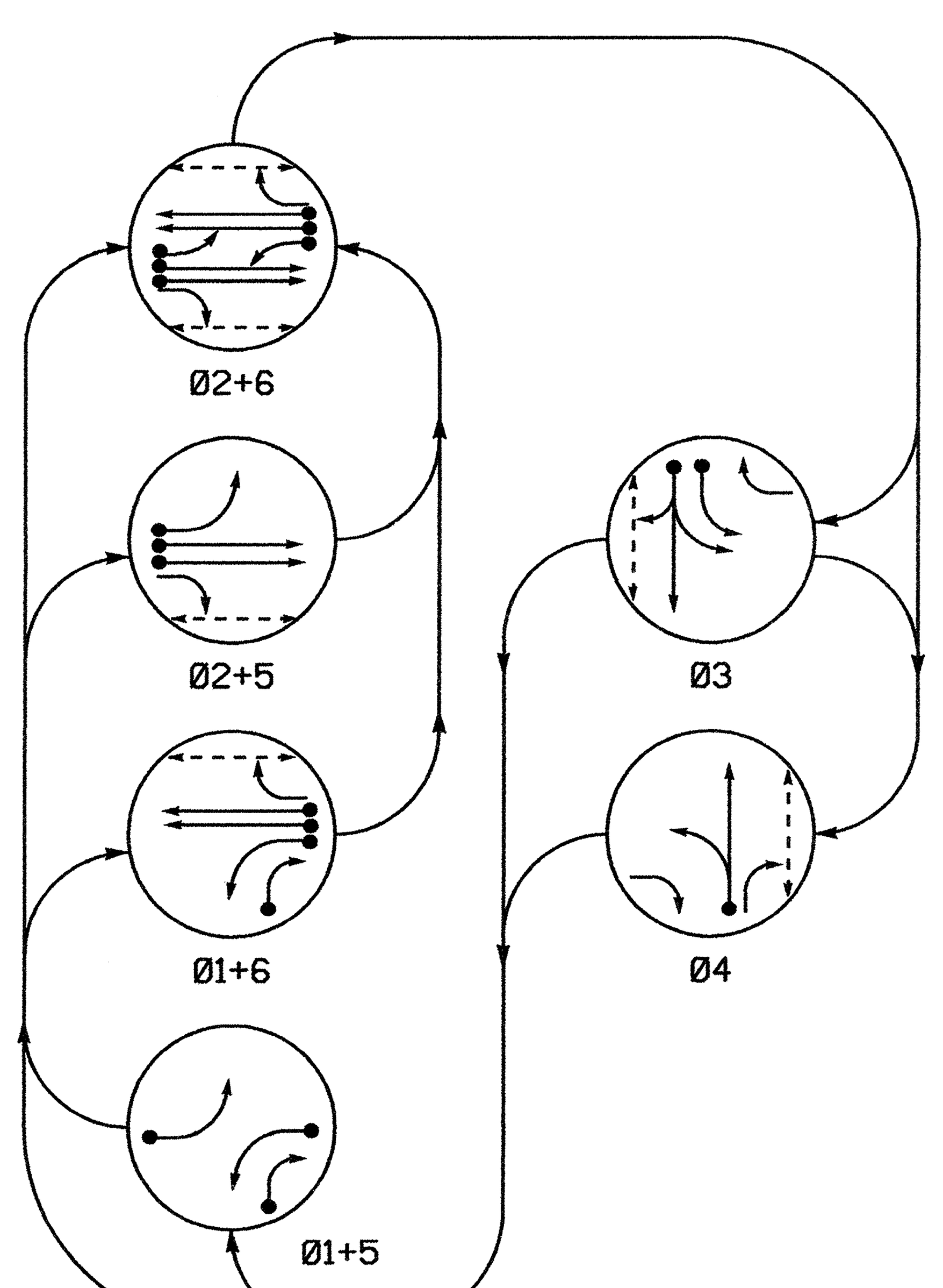
Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch, Signal Management Section, North Carolina Department of Transportation
750 N. Greenfield Pkwy, Garner, NC 27529

SEAL


8-1-07
SIGNATURE DATE

SIG. INVENTORY NO. 10-0939 T2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

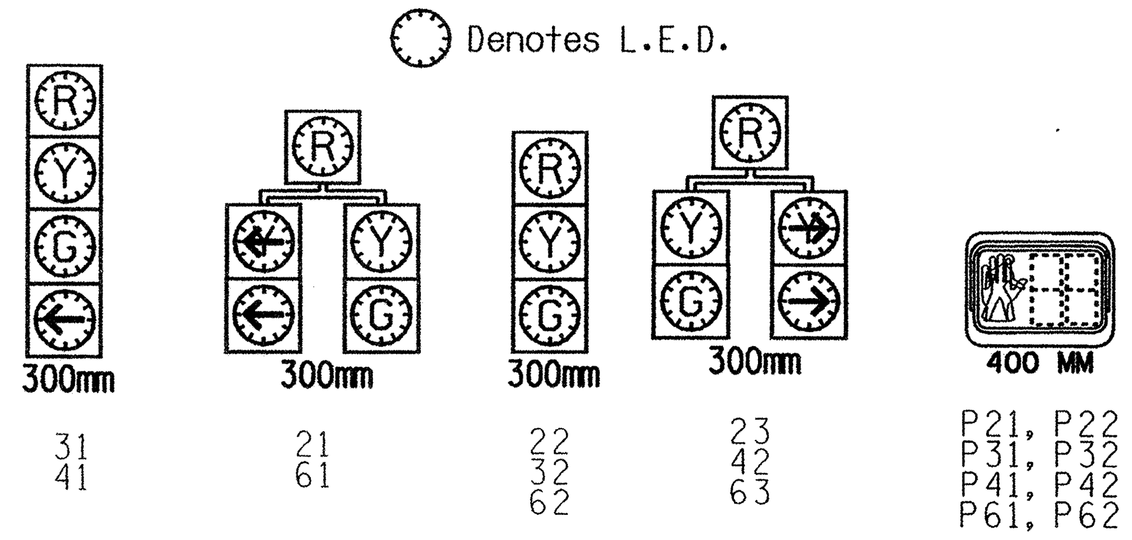
TABLE OF OPERATION

SIGNAL FACE	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	R / ←	R	G / ←	G	R	R	Y
22	R	R	G	G	R	R	Y
23	R	R	G	G	R	R / →	Y
31	R	R	R	R	G ←	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G ←	R
42	R / →	R / →	R	R	R	G	R
61	R / ←	G / ←	R	G	R	R	Y
62	R	G	R	G	R	R	Y
63	R	G	R	G	R / →	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

Denotes L.E.D.



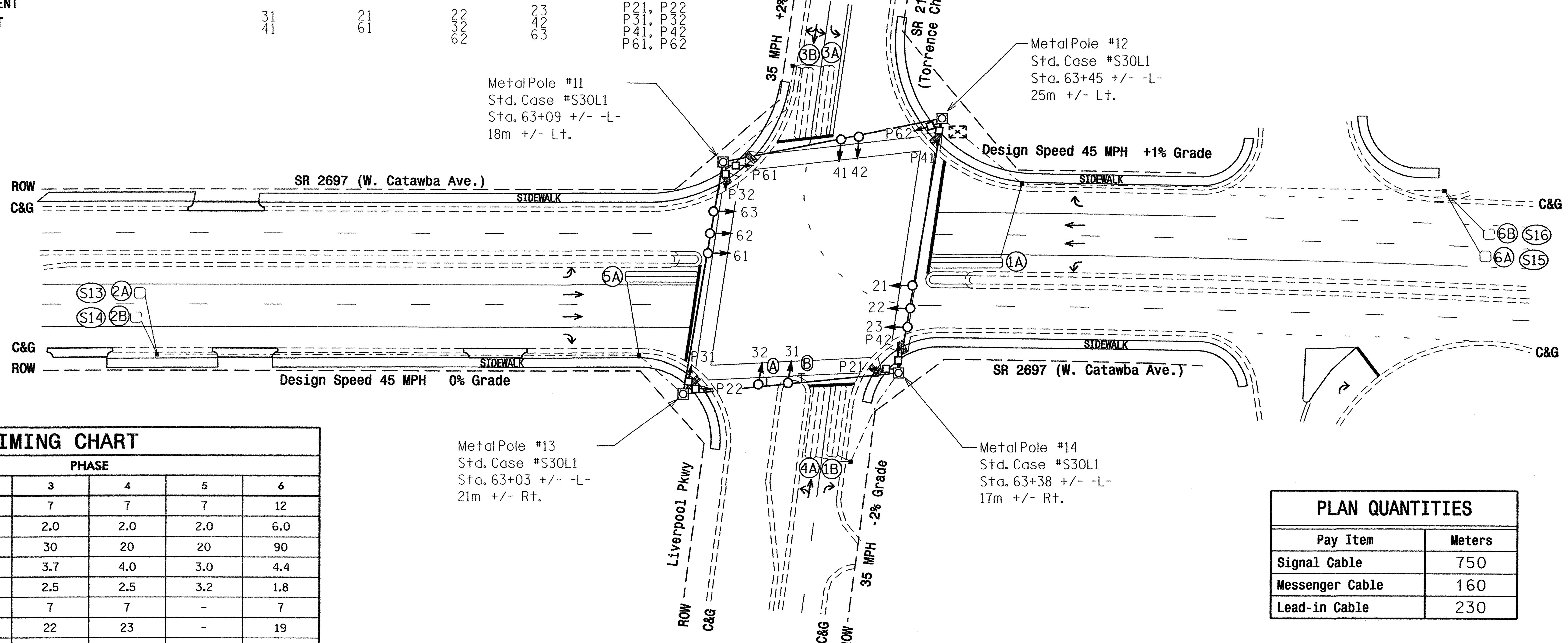
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	1.8X12	2-4-2	0	Y	1	Y	Y	-	-	-	15	-
					6	Y	Y	Y	-	-	3	-
1B	1.8X12	2-4-2	0	-	1	Y	Y	-	-	-	15	-
2A/S13	1.8X1.8	4	90	Y	2	Y	Y	-	Y	-	-	Y
2B/S14	1.8X1.8	4	90	-	2	Y	Y	-	Y	-	-	-
3A	1.8X12	2-4-2	0	-	3	Y	Y	-	-	-	3	-
3B	1.8X12	2-4-2	0	-	3	Y	Y	-	-	-	5	-
4A	1.8X12	2-4-2	0	-	4	Y	Y	-	-	-	-	-
5A	1.8X12	2-4-2	0	Y	5	Y	Y	-	-	-	15	-
					2	Y	Y	Y	-	-	3	-
6A/S15	1.8X1.8	6	90	Y	6	Y	Y	-	Y	-	-	Y
6B/S16	1.8X1.8	6	90	-	6	Y	Y	-	Y	-	-	-

6 Phase
Fully Actuated
(Cornelius Closed Loop Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Omit phase 5 during phase 6 on.
5. Program controller to clear from phase 2+6 to phase 1and/or 5 by progressing through phase 4 (see Electrical Details).
6. The order of phase 3 and phase 4 may be reversed.
7. Set all detector units to presence mode.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Closed loop system data: Controller Asset #0939.



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	
(A)	Dual Turn and Through Arrows Sign	(A)
(B)	Combined Through and Left Arrow Sign (R3-6L)	(B)
(C)	Left Arrow "ONLY" Sign (R3-5L)	(C)
(D)	Right Arrow "ONLY" Sign (R3-5R)	(D)

2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	20	90	30	20	20	90
Yellow Clearance	3.0	4.5	3.7	4.0	3.0	4.4
Red Clearance	3.2	1.7	2.5	2.5	3.2	1.8
Walk 1 *	-	7	7	7	-	7
Don't Walk 1	-	17	22	23	-	19
Seconds Per Actuation *	-	1.5	-	-	-	1.5
Max Variable Initial *	-	34	-	-	-	34
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	750
Messenger Cable	160
Lead-in Cable	230

Signal Revision - Temporary Design 1 (TCP Phase I)

Prepared in 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

SR 2697 (W. Catawba Avenue)
at
SR 2195 (Torrence Chapel Rd.)/
SR 2317(Liverpool Pkwy)

Division 10 Mecklenburg County Cornelius

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

SCALE 5 0 10
1:500

REVISIONS	INIT.	DATE

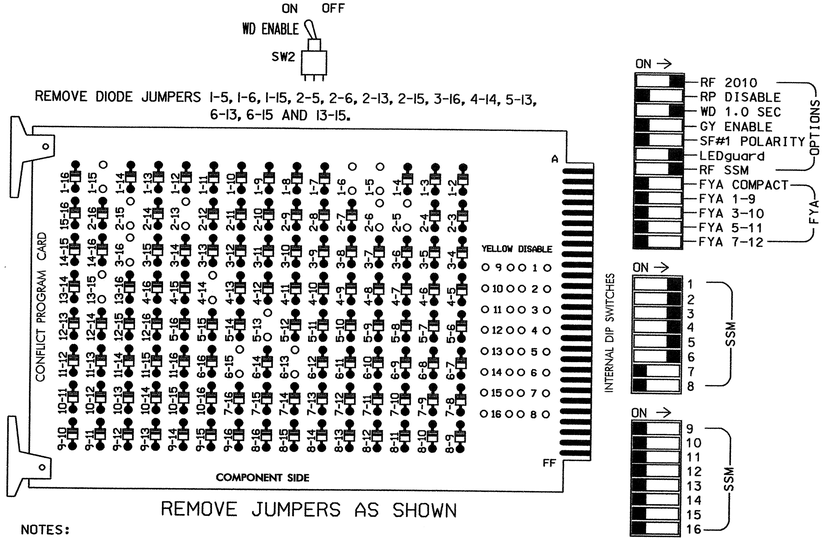
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393 TIMOTHY J. WILLIAMS
T. J. Williams 7/27/07.
SIGNATURE DATE
SIG. INVENTORY NO. 10-0939

20-JUL-2007 07:46
s:\its signals\workgroups\tip projects\r-2555a\signals\s10-0939_2007.dgn
ttthigpen

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 25

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 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. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.
6. Program phases 2, 3, 4 and 6 for 'STARTUP PED CALL'.
7. The cabinet and controller are part of the Cornelius Closed Loop Signal 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	3 PED
SIGNAL HEAD NO.	42,61	21, 22,23	P21, P22	31	32	63	41	42	23	P41, P42	21	61, 62,63	P61, P62	NU	NU	P31, P32
RED	*	128		116	116		101	101			*	134				
YELLOW		129		117	117		102	102				135				
GREEN		130		118	118		103	103				136				
RED ARROW																
YELLOW ARROW	126					117			102		132					
GREEN ARROW	127			118		118	103		103		133					
✋			113							104			119			110
🚶			115							106			121			112

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.

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,S2P,S3,S4,S4P,S5,S6,S6P,S8P
PHASES USED.....1,2,3,4,5,6,2 PED,3 PED,4 PED,6 PED
OVERLAPS.....NONE

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø1 1B	ø1 1A	ø2/SYS 2A/S13	SLOT EMPTY	SLOT EMPTY	ø3 3A	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø2 PED DC ISOLATOR	ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	ø6 1A	ø2/SYS 2B/S14			ø3 3B	NOT USED					ø4 PED DC ISOLATOR	ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	ø5 5A	ø6/SYS 6A/S15	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		ø2 5A	ø6/SYS 6B/S16											

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1B	TB2-1,2	I1U	56	18	1	1	Y	Y			15
1A[1]	TB2-5,6	I2U	39	1	2	1	Y	Y			15
	TB2-7,8	I2L	43	5	12	6	Y	Y	Y		3
2A/S13	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
2B/S14	TB2-11,12	I3L	76	38	42	2/SYS	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			5
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
5A[2]	TB3-5,6	J2U	40	2	6	5	Y	Y			15
	TB3-7,8	J2L	44	6	16	2	Y	Y	Y		3
6A/S15	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
6B/S16	TB3-11,12	J3L	77	39	46	6/SYS	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB22-9,10	I12U	67	29	PED 2	2 PED					
P31,P32	TB24-11,12	I13L	70	32	PED 8	3 PED					
P41,P42	TB24-9,10	I12L	69	31	PED 4	4 PED					
P61,P62	TB22-11,12	I13U	68	30	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

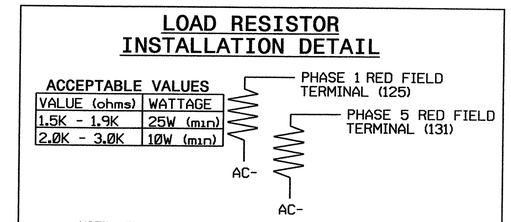
[1] Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.

[2] Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0939
DESIGNED: July 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Final - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in 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 2697 (W. Catawba Avenue) at SR 2195 (Torrence Chapel Rd.) / SR 2317 (Liverpool Pkwy)

Division 10 | Mecklenburg County | Cornelius
PLAN DATE: July 2007 | REVIEWED BY: JTR
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
John T. Rowe Jr. 8-1-07
SIGNATURE DATE
SIG. INVENTORY NO. 10-0939

31-JUL-2007 14:11
S:\Traffic Signals\Working\projects\sig mpeterson\10939_sm_ele_xxx.dgn
jpeterson

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 Functions 1 and 2.

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:¦1234567891011121314151 6
IF PHASES ARE ON¦ X
OMIT PHASES     ¦X
CALL PHASES     ¦   X
```

PRESS 'NEXT'

```
 DYNAMIC/BACKUP CONTROL FUNCTION #02
                OVERLAPS:¦ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE ¦
OR       PHASES:¦1234567891011121314151 6
IF PHASES ARE ON¦     X
OMIT PHASES     ¦    X
CALL PHASES     ¦   X
```

BACKUP PROTECTION PROGRAMMING COMPLETE

PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
2. ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
3. SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING!
4. ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
5. BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
6. SELECT '1' (OUTPUT ASSIGNMENTS)
7. ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
8. REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
2. CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
3. MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0939
DESIGNED: July 2007
SEALED: 07-27-07
REVISED: N/A

Signal Revision - Final - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

NCDEPARTMENT OF TRANSPORTATION — Traffic Engineering and Safety Systems Branch — Signals Management Section

750 N. Greenfield Pwky, Garner, NC 27529

SR 2697 (W. Catawba Avenue) at SR 2195 (Torrence Chapel Rd.) / SR 2319 (Liverpool Pkwy)

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: July 2007 | REVIEWED BY: JTR

PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

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

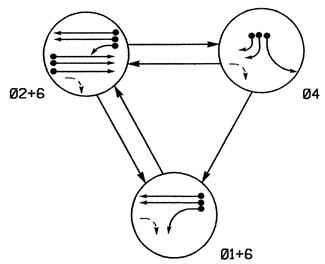
John T Rowe 8-1-07

SIGNATURE DATE

SIG. INVENTORY NO. 10-0939

31-JUL-2007 09:04
c:\rte signals\workgroups\sig mon\jpeterson\t00939_sm_e10_xxx.dgn
jpeterson

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

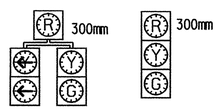
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

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
43, 44	R	R	G	R
61	G	G	R	Y
62	G	G	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.

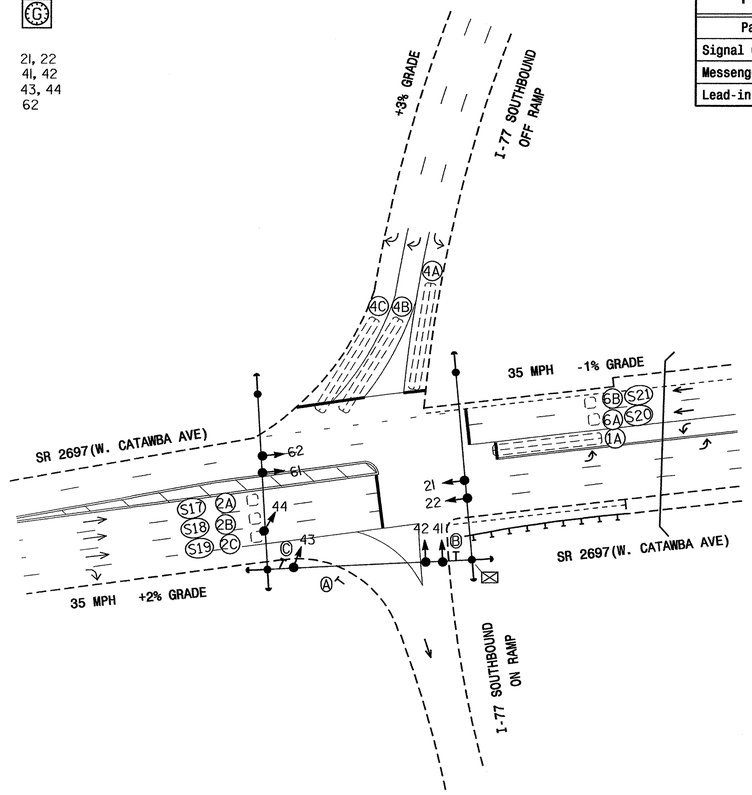


2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (M)	TURNS	DISTANCE FROM STOPBAR (M)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	1.8x18	EXIST	0	-	1	Y	Y	-	-	-	15	Y
				-	6	Y	Y	-	-	-	3	Y
2A/S17	1.8x1.8	EXIST	20	-	2	Y	Y	-	Y	-	-	Y
2B/S18	1.8x1.8	EXIST	20	-	2	Y	Y	-	Y	-	-	Y
2C/S19	1.8x1.8	EXIST	20	-	2	Y	Y	-	Y	-	-	Y
4A	1.8x18	EXIST	0	-	4	Y	Y	-	-	-	-	Y
4B	1.8x18	EXIST	+1.5	-	4	Y	Y	-	-	-	15	Y
4C	1.8x18	EXIST	+1.5	-	4	Y	Y	-	-	-	15	Y
6A/S20	1.8x1.8	EXIST	20	-	6	Y	Y	-	Y	-	-	Y
6B/S21	1.8x1.8	EXIST	20	-	6	Y	Y	-	Y	-	-	Y

PLAN QUANTITIES

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



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	"YIELD" Sign (R1-2)	Ⓐ
N/A	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
N/A	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ

3 Phase
Fully Actuated
(Cornelius Closed Loop Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. 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. 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: Master Asset # 1342.

2070L TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 4	PHASE 6
Min Green 1 *	7	10	7	10
Extension 1 *	1.0	3.0	1.0	3.0
Max Green 1 *	20	45	25	45
Yellow Clearance	3.0	3.7	3.0	3.9
Red Clearance	2.1	1.0	1.9	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.

Signal Upgrade

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

SCALE 5 0 10 1:500

SR 2697 (W. Catawba Ave.) at I-77 (Southbound Ramps)

Division 10 Mecklenburg County Cornelius

PLAN DATE: June 2007 REVIEWED BY: T. S. Thigpen
PREPARED BY: C. E. Pierce REVIEWED BY:

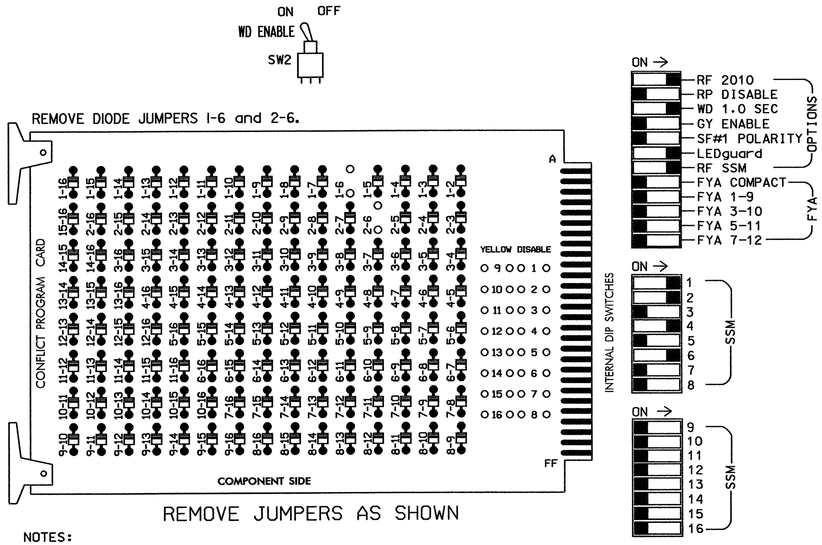
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 7/27/07. DATE
SIG. INVENTORY NO. 10-1342

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	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

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 Cornelius Closed Loop Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S4,S6
PHASES USED.....1,2,4,6
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.	61	21,22	NU	NU	41,42 43,44	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.

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	ø1 1A	ø2/SYS 2A/S17	ø2/SYS 2C/S19	SLOT EMPTY	ø4 4A	ø4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		ø6 1A	ø2/SYS 2B/S18	NOT USED		ø4 4B	NOT USED							ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	ø6/SYS 6A/S20	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		ø6/SYS 6B/S21												

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

FS = FLASH SENSE
ST = STOP TIME

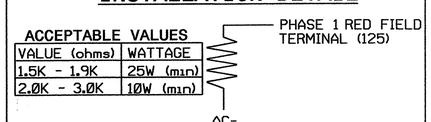
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-5,6	I2U	39	1	2	1	Y	Y			15
	TB2-7,8	I2L	43	5	12	6	Y	Y			3
2A/S17	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
2B/S18	TB2-11,12	I3L	76	38	42	2/SYS	Y	Y			
2C/S19	TB4-1,2	I4U	47	9	22	2/SYS	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
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			15
6A/S20	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S21	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			

[1] Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.

INPUT FILE POSITION LEGEND: J2L
- FILE J
- SLOT 2
- LOWER

LOAD RESISTOR INSTALLATION DETAIL



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.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1342
DESIGNED: June 2007
SEALED: 07-27-07
REVISED: N/A

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 2697 (Catawba Ave.)
at
I-77 (Southbound Ramps)

Division 10 | Mecklenburg County | Cornelius
PLAN DATE: July 2007 | REVIEWED BY: JTR
PREPARED BY: James Peterson | REVIEWED BY:

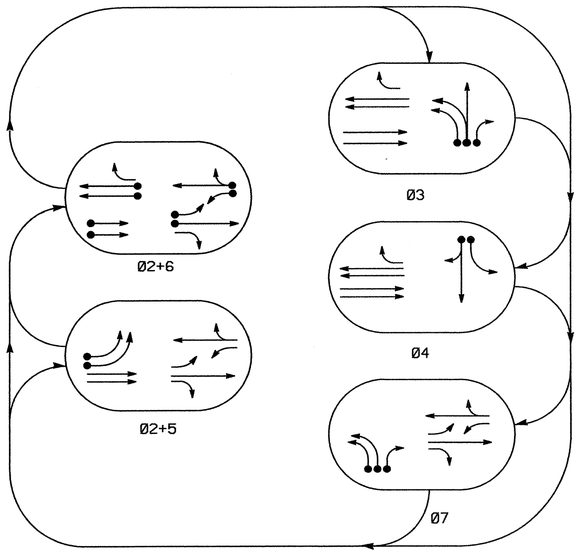
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR
John T Rowe Jr 8-1-07
SIGNATURE DATE
SIG. INVENTORY NO. 10-1342

30-JUL-2007 09:06
s:\hits signals\workgroups\sig mon\peterson\10342_sm_ele_xxx.dgn
jtpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	Sig.29

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

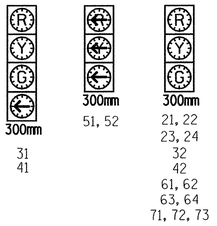
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3	Ø4	Ø7	FLASH
21, 22	G	G	G	G	R	Y
23, 24	G	G	R	R	G	Y
31	R	R	G (←)	R	R	R
32	R	R	G	R	R	R
41	R	R	R	G (←)	R	R
42	R	R	R	G	R	R
51, 52	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61, 62	G	G	R	R	G	Y
63, 64	R	G	G	G	R	Y
71, 72, 73	R	R	R	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



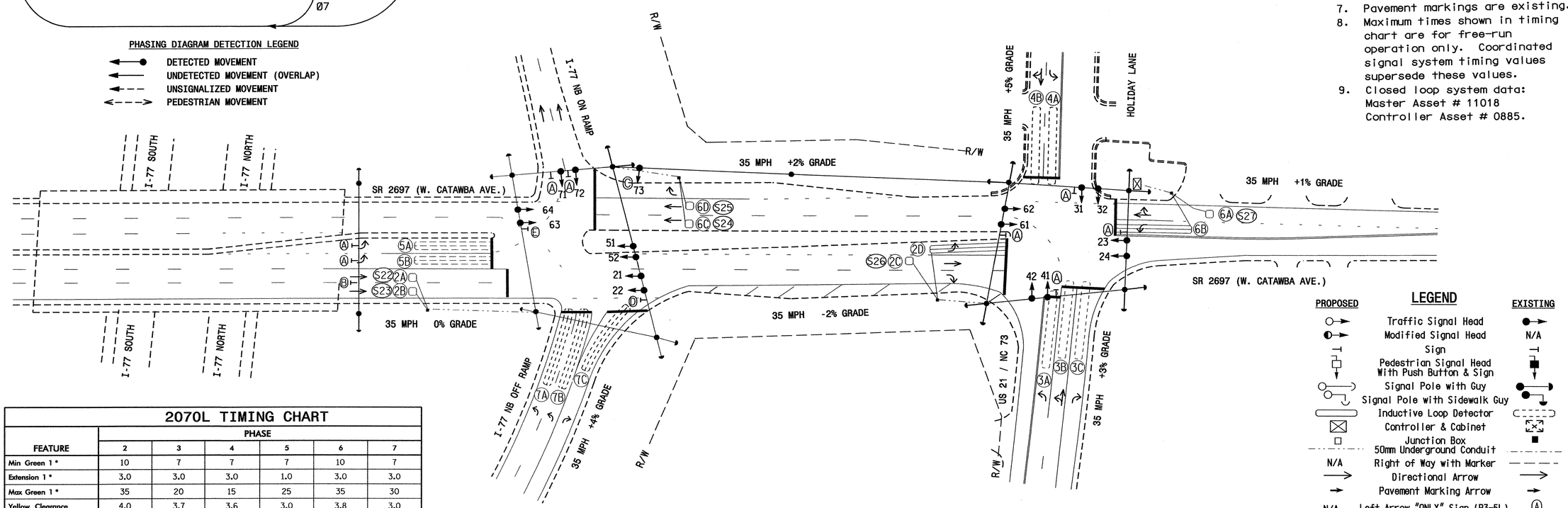
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (METERS)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
2A/S22	1.8x1.8	EXIST	20	Y	2	Y	Y	-	Y	-	-	Y
2B/S23	1.8x1.8	EXIST	20	Y	2	Y	Y	-	Y	-	-	Y
2C/S26	1.8x1.8	4	20	Y	2	Y	Y	-	Y	-	-	Y
2D	1.8x18	2-4-2	0	Y	2	Y	Y	-	-	-	-	Y
3A	1.8x18	EXIST	+1.5	-	3	Y	Y	-	-	-	3	Y
3B	1.8x18	EXIST	+1.5	-	3	Y	Y	-	-	-	-	Y
3C	1.8x18	EXIST	+1.5	-	3	Y	Y	-	-	-	15	Y
4A	1.8x18	EXIST	+1.5	-	4	Y	Y	-	-	-	3	Y
4B	1.8x18	EXIST	+1.5	-	4	Y	Y	-	-	-	10	Y
5A	1.8x18	EXIST	0	-	5	Y	Y	-	-	-	-	Y
5B	1.8x18	EXIST	0	-	5	Y	Y	-	-	-	-	Y
6A/S27	1.8x1.8	3	20	Y	6	Y	Y	-	Y	-	-	Y
6B	1.8x18	2-4-2	0	Y	6	Y	Y	-	-	-	-	Y
6C/S24	1.8x1.8	6	20	-	6	Y	Y	-	Y	-	-	Y
6D/S25	1.8x1.8	6	20	-	6	Y	Y	-	Y	-	-	Y
7A	1.8x18	EXIST	+1.5	-	7	Y	Y	-	-	-	-	Y
7B	1.8x18	EXIST	+1.5	-	7	Y	Y	-	-	-	-	Y
7C	1.8x18	EXIST	+1.5	-	7	Y	Y	-	-	-	15	Y

5 Phase
Fully Actuated
(Cornelius Closed Loop Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
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.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data:
   Master Asset # 11018
   Controller Asset # 0885.



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	Left Arrow "ONLY" Sign (R3-5L).	(A)
N/A	Through Arrow "ONLY" Sign (R3-5A)	(B)
N/A	Right Arrow "ONLY" Sign (R3-5R).	(C)
N/A	No Right Turn Sign (R3-1)	(D)
N/A	No Left Turn Sign (R3-2)	(E)

2070L TIMING CHART

FEATURE	PHASE 2	3	4	5	6	7
Min Green 1 *	10	7	7	7	10	7
Extension 1 *	3.0	3.0	3.0	1.0	3.0	3.0
Max Green 1 *	35	20	15	25	35	30
Yellow Clearance	4.0	3.7	3.6	3.0	3.8	3.0
Red Clearance	1.3	1.4	1.4	3.0	1.8	3.3
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	ON	ON

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

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	–
Messenger Cable	–
Lead-in Cable	490

Signal Upgrade

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
NCDEPARTMENT OF TRANSPORTATION
Signals and Geometrics Section
750 N. Greenfield Parkway Garner NC 27529

SR 2697 (W. Catawba Ave.)
at
I-77 NB Ramps & Holiday Lane / US 21 / NC 73

Division 10 Mecklenburg County in Cornelius

PLAN DATE:	July 2007	REVIEWED BY:	T. S. Thigpen
PREPARED BY:	C. E. Pierce	REVIEWED BY:	

REVISIONS	INIT.	DATE

SCALE 5 0 10 1:500

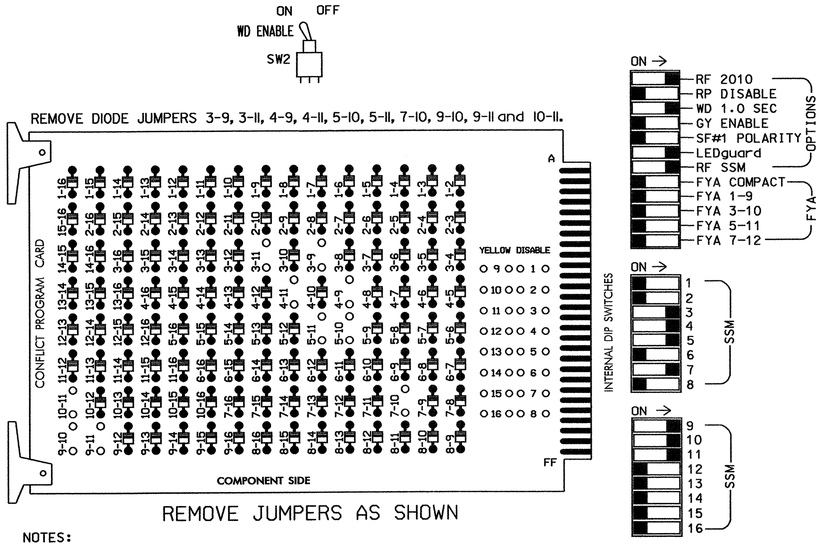
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 7/27/07 DATE

SIG. INVENTORY NO. 10-0885

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig.30

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 1,2,6, 8,12,13,14,15 & 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.
8. The cabinet and controller are part of the Cornelius Closed Loop Signal 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	NC	NU	31	32	41	42	NU	51,52	NC	NU	71, 72,73	NU	NU	63,64	23,24 61,62	NU	21,22	NU	NU
RED				116	116	101	101					122			A121	A124		A114		
YELLOW				117	117	102	102					123			A122	A125		A115		
GREEN				118	118	103	103					124			A123	A126		A116		
RED ARROW									131											
YELLOW ARROW									132											
GREEN ARROW				118		103			133											

NU = NOT USED

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET .....CONTRACTOR SUPPLIED 332
SOFTWARE .....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS..18 (12-STD, 6 AUX)
LOAD SWITCHES USED.....S3,S4,S5,S7,S9,S10,S12
PHASES USED.....2,3,4,5,6,7
OVERLAP A:.....3+4+6
OVERLAP B:.....2+7
OVERLAP C:.....2+3+4
OVERLAP D:.....NOT USED

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:          |123456789101112131415 16
VEH OVL PARENTS:  |  XX X
VEH OVL NOT VEH:  |
VEH OVL NOT PED:  |
VEH OVL GRN EXT:  |
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
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
```

PRESS 'NEXT'

```
 PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
  PHASE:          |123456789101112131415 16
VEH OVL PARENTS:  | X     X
VEH OVL NOT VEH:  |
VEH OVL NOT PED:  |
VEH OVL GRN EXT:  |
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
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
```

PRESS 'NEXT'

```
 PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
  PHASE:          |123456789101112131415 16
VEH OVL PARENTS:  | XXX
VEH OVL NOT VEH:  |
VEH OVL NOT PED:  |
VEH OVL GRN EXT:  |
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
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
```

OVERLAP PROGRAMMING COMPLETE

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/SYS 2A/S22	ø2/SYS 2C/S26	SLOT EMPTY	ø3 3A	ø3 3B	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		ø2/SYS 2B/S23	ø2 2D		NOT USED	ø3 3C	ø4 4B							ST DC ISOLATOR
FILE "J"	U	ø5 5A	ø6/SYS 6A/S27	ø6/SYS 6C/S24	SLOT EMPTY	ø7 7A	ø7 7B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	ø5 5B	ø6 6B	ø6/SYS 6D/S25		NOT USED	ø7 7C								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A/S22	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B/S23	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C/S26	TB2-9,10	I3U	63	25	32	2	Y	Y			
2D	TB2-11,12	I3L	76	38	42	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
3B	TB4-9,10	I6U	41	3	4	3	Y	Y			
3C	TB4-11,12	I6L	45	7	14	3	Y	Y			15
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			10
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-3,4	J1L	55	17	5	5	Y	Y			
6A/S27	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
6C/S24	TB3-9,10	J3U	64	26	36	6	Y	Y			
6D/S25	TB3-11,12	J3L	77	39	46	6	Y	Y			
7A	TB5-5,6	J5U	57	19	7	7	Y	Y			
7B	TB5-9,10	J6U	42	4	8	7	Y	Y			
7C	TB5-11,12	J6L	46	8	18	7	Y	Y			15

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0885
DESIGNED: July 2007
SEALED: 07-27-07
REVISED: N/A

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2697 (West Catawba Ave.) at I-77 NB Ramps & Holiday Lane / US 21 / NC 73

Division 10 Mecklenburg County in Cornelius

PLAN DATE: July 2007 REVIEWED BY: JTR

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in 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

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

John T. Rowe, Jr. 8-1-07
SIGNATURE DATE

SIG. INVENTORY NO. 10-0885

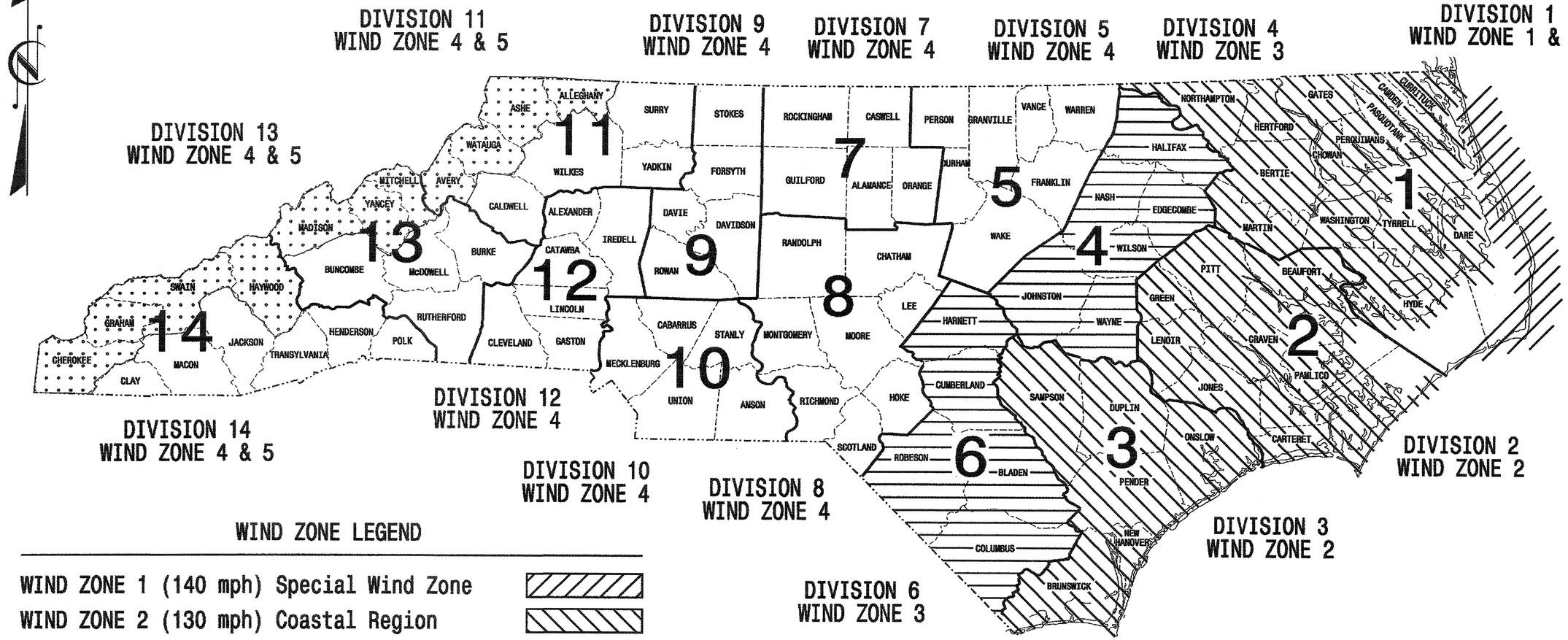
STATE	PROJECT NO.	SHEET NO.
N.C.	R-2555A	Sig. 31
F. A. PROJ. NO.		M 1
PROJECT ID. NO.		

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR METAL POLES

POLE STANDARDS

NCDOT METAL



WIND ZONE LEGEND

WIND ZONE 1 (140 mph) Special Wind Zone	
WIND ZONE 2 (130 mph) Coastal Region	
WIND ZONE 3 (110 mph) Eastern Region	
WIND ZONE 4 (90 mph) Central & Mtn. Region	
WIND ZONE 5 (120 mph) Special Wind Zone	

http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/default.htm

Prepared in the Offices of:

Traffic Engineering and Safety Systems Branch
STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION · NORTH
Signals and Geometrics Section

122 N. McDowell St., Raleigh, NC 27603

Designed in conformance with the 2002 Interim to the 4th Edition 2001

AASHTO

Standard Specifications for Structural Supports for Highway Signs, Luminares, and Traffic Signals

INDEX OF PLANS

DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details – All Poles
M 3	Fabrication Details – Strain Poles
M 4,5	Fabrication Details – Mast Arm Poles
M 6	Construction Details – Strain Poles
M 7	Construction Details – Foundations
M 8	Standard Strain Poles

NCDOT CONTACTS:

TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

G. A. Fuller, P.E. – State ITS and Signals Engineer
R. E. Mullinax, P.E. – Signals and Geometrics Engineer
P. L. Alexander, P.E. – Signals and Geometrics Special Projects Engineer
D. C. Sarkar, P.E. – Signals and Geometrics Structural Engineer
A. M. Esposito, P.E. – Signals and Geometrics Project Engineer
C. F. Andrews, Jr. – Signals and Geometrics Project Engineer

SEAL

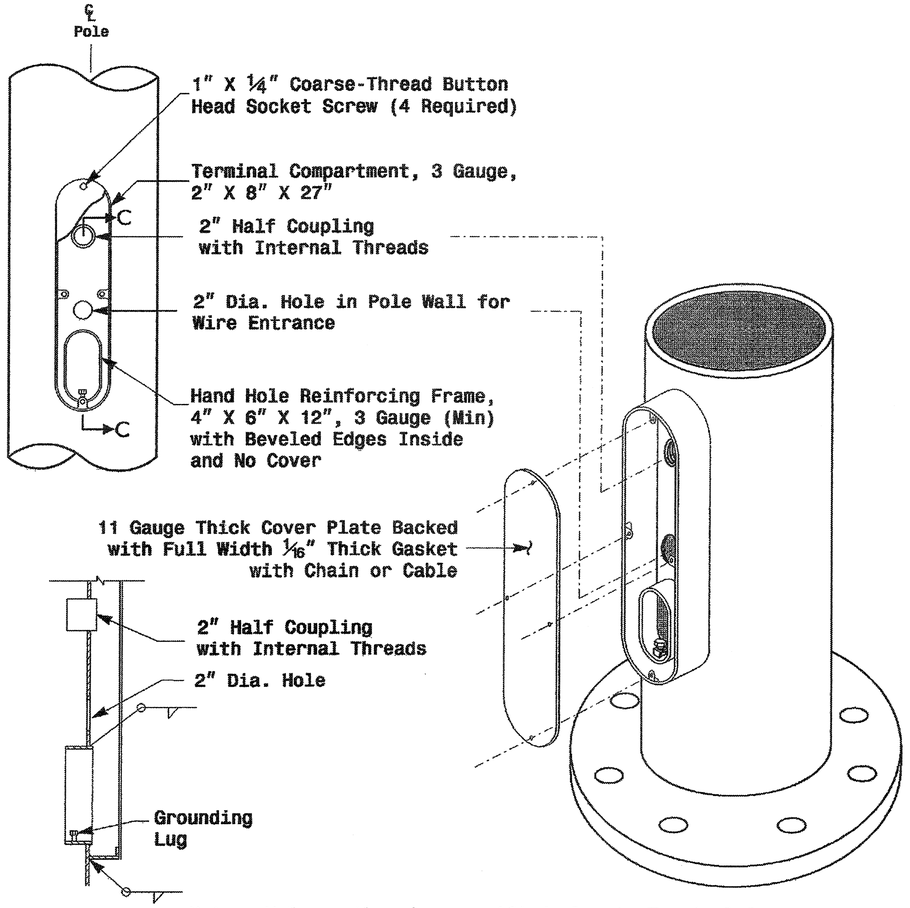
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

D. Sarkar — SIGNATURE

9.2.2005 — DATE

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 32 M 2

Fabrication Details – All Poles



Section C-C

Note: Unless otherwise specified, locate Terminal Compartment 1 foot above the pole base plate at 180 degrees on the pole's radial index.

Terminal Compartment Detail

MFG _____ MFG. DATE: MM/YY
SHAFT D/T/L/Y ----/----/----/----
ARM-A D/T/L/Y ----/----/----/----
----/----/----/----
ARM-B D/T/L/Y ----/----/----/----
----/----/----/----
A.B. DIA./B.C./L/Y ----/----/----/----
NCDOT STANDARD ----------

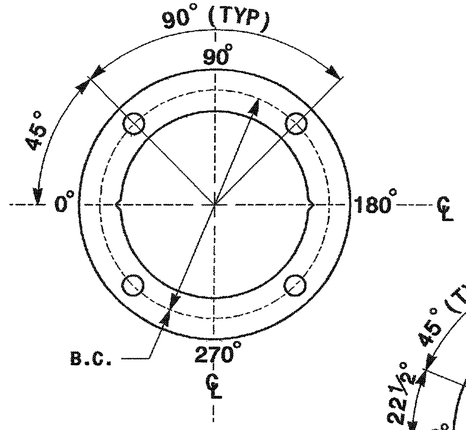
Shaft I.D. Tag
(Provide on Strain Poles and Mast Arm Poles)

MFG _____ MFG. DATE: MM/YY
SECTION D/T/L/Y ----/----/----/----
NCDOT STANDARD ----------

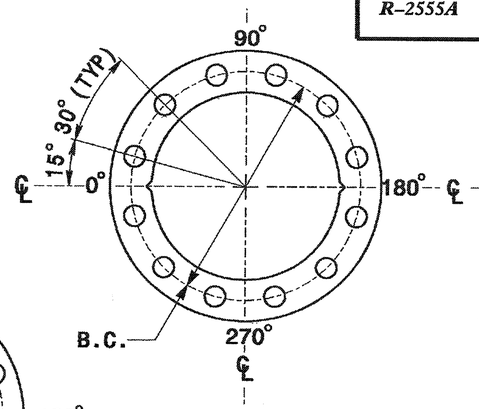
Arm I.D. Tag
(Provide on each section of a multi-section mast arm)

Notes:
1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
2) A.B. = Anchor Bolt
3) B.C. = Bolt Circle of Anchor Bolts
4) If Custom Design, use "NCDOT STANDARD" line for plan pole I.D.
5) See drawing M4 for mounting positions of I.D. tags.

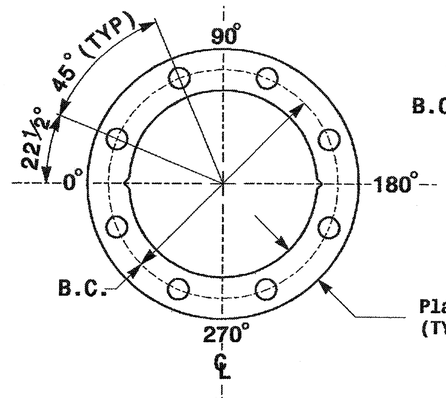
Identification Tag Details



4 Bolt Pattern



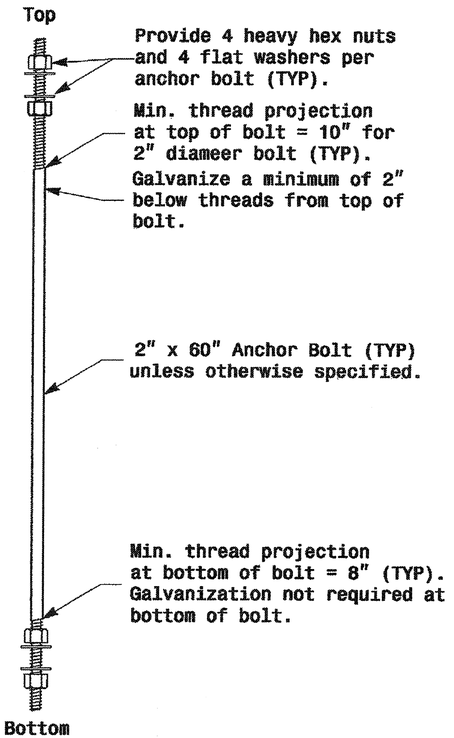
12 Bolt Pattern



8 Bolt Pattern

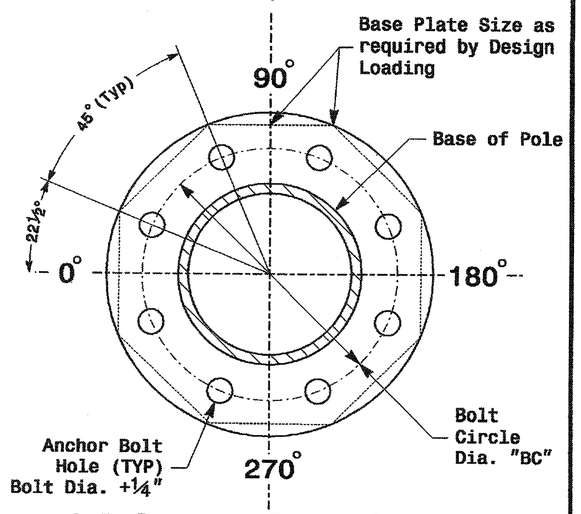
Construct Templates and Plates from ¼" min. thick Steel. Galvanizing is not required.

Base Plate Template and Anchor Bolt Lock Plate Details



Anchor Bolt Detail

Note: See Strain Pole drawing M3 and Mast arm drawing M4 for base plate weld details.



8 Bolt Base Plate Detail

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Department of Transportation, Division of Roads, Traffic Engineering and Safety Systems Section, 122 N. McDowell St., Raleigh, NC 27603

Typical Fabrication Details Common To All Metal Poles

PLAN DATE:	May 2005	REVIEWED BY:	C.F. Andrews
PREPARED BY:	P.L. Alexander	REVIEWED BY:	A.W. Esposito

REVISIONS	INIT.	DATE

SCALE: 0 NA NONE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DIBESH C. SARKAR

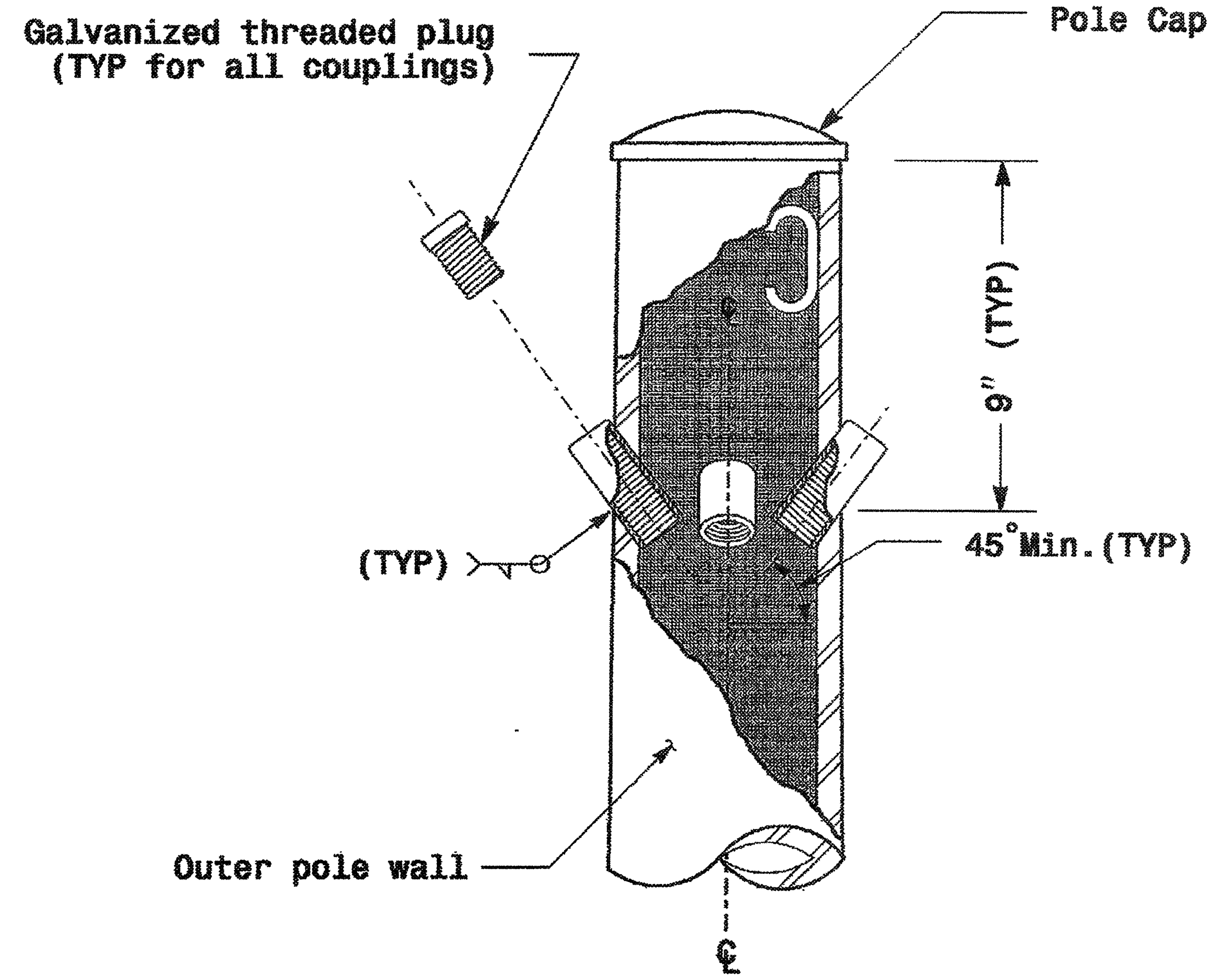
D. Sarkar 9.2.2005
SIGNATURE DATE

SIG. INVENTORY NO.

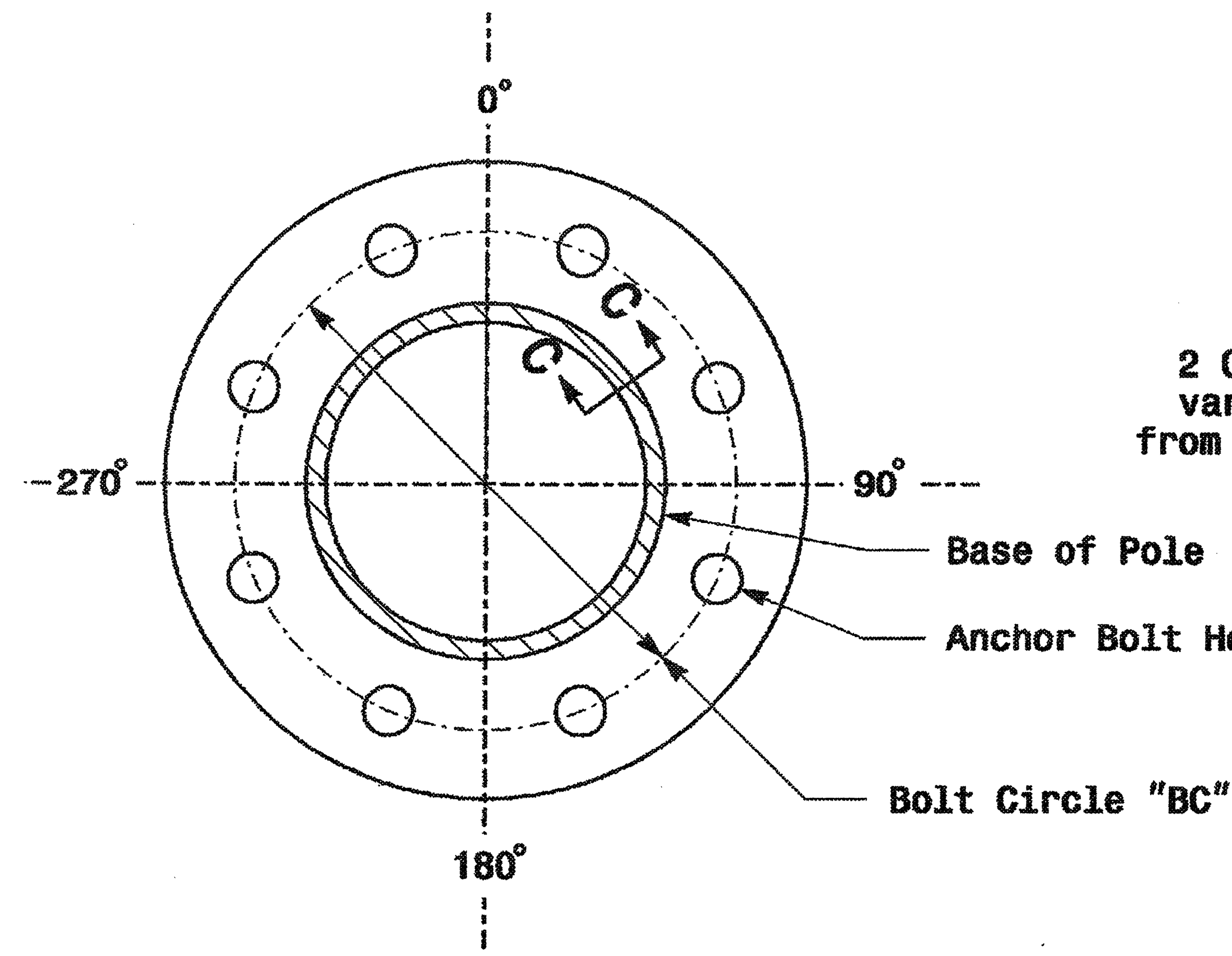
01-SEP-2005 18:22
D:\m2004 Metal Pole Standards\m2004 m2 thru m5.dgn
cmdrees

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 33 M 3

Fabrication Details – Strain Poles



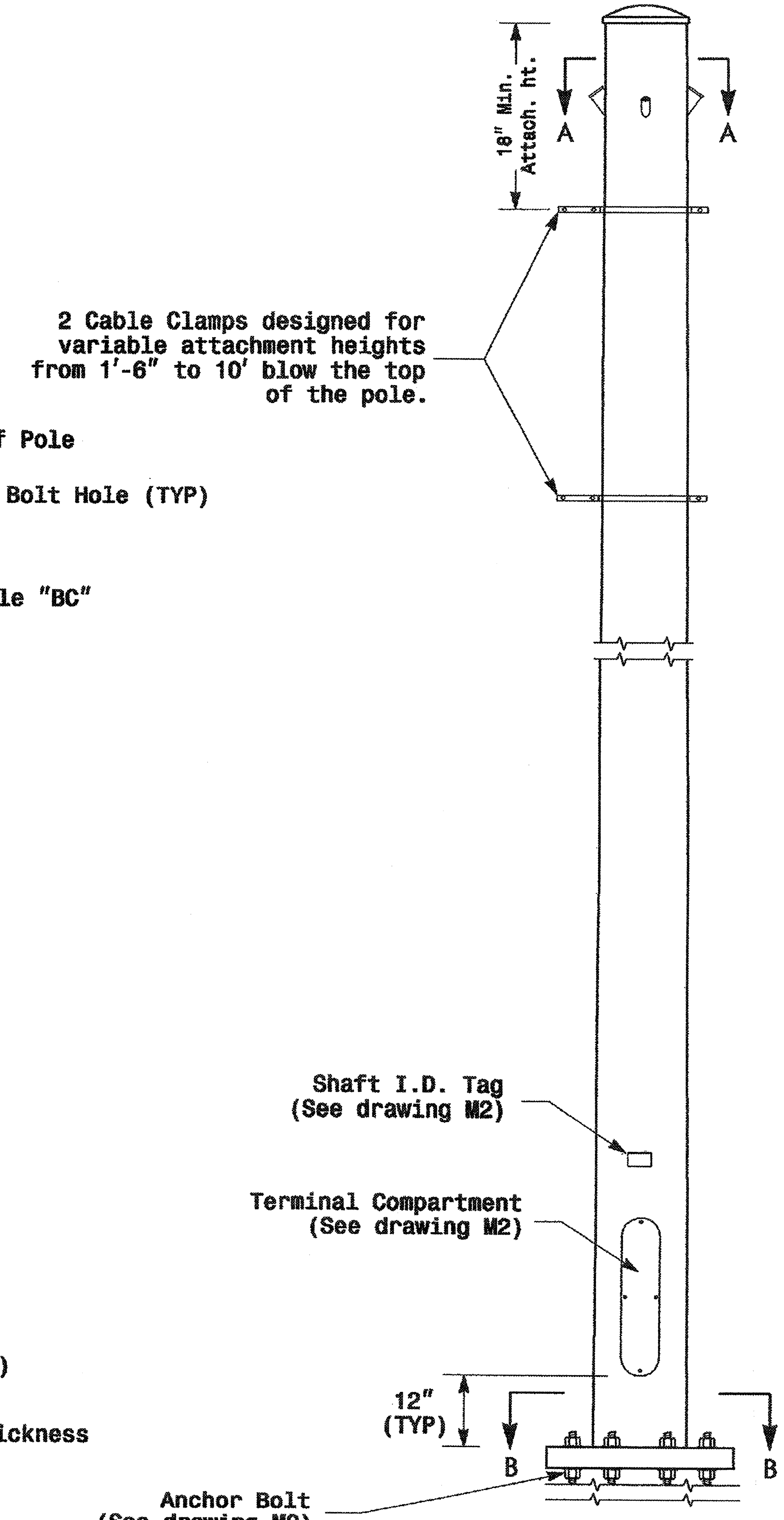
Cable Entrances at Top of Pole



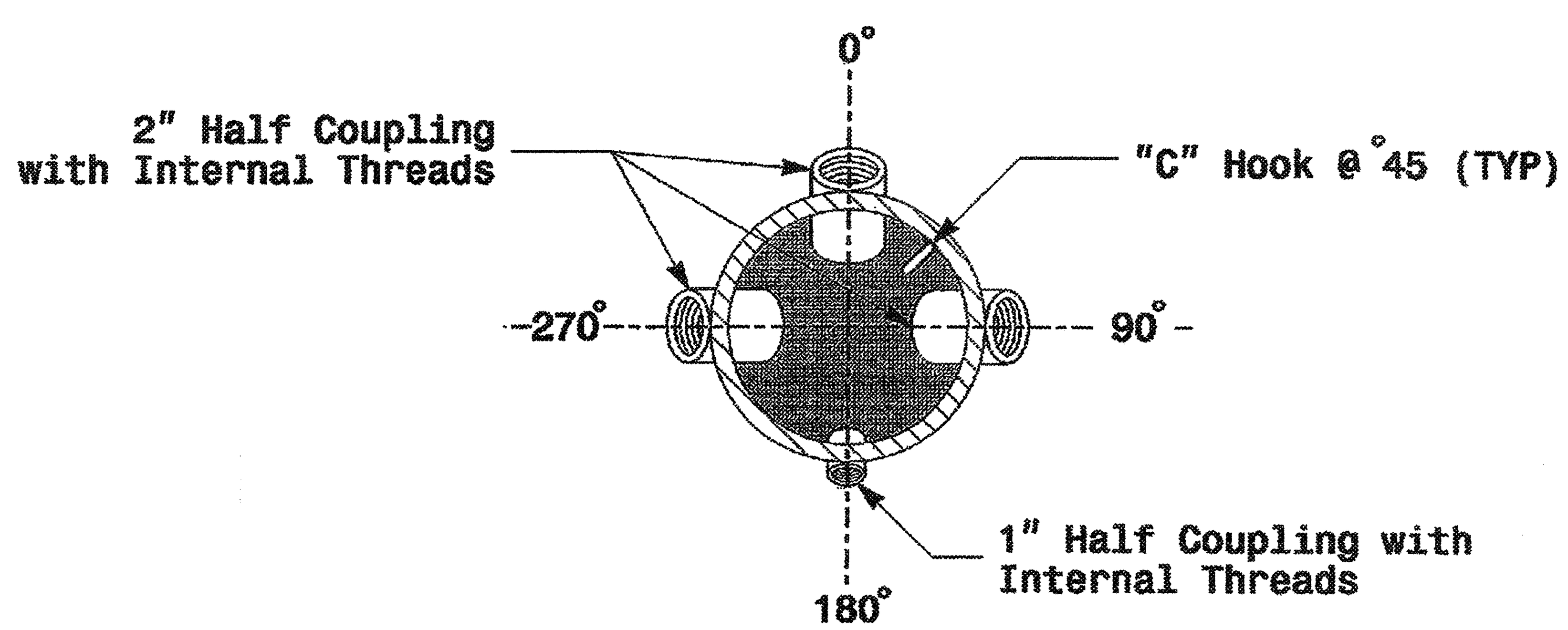
Section B-B

(See drawing M2)

Pole Base Plate

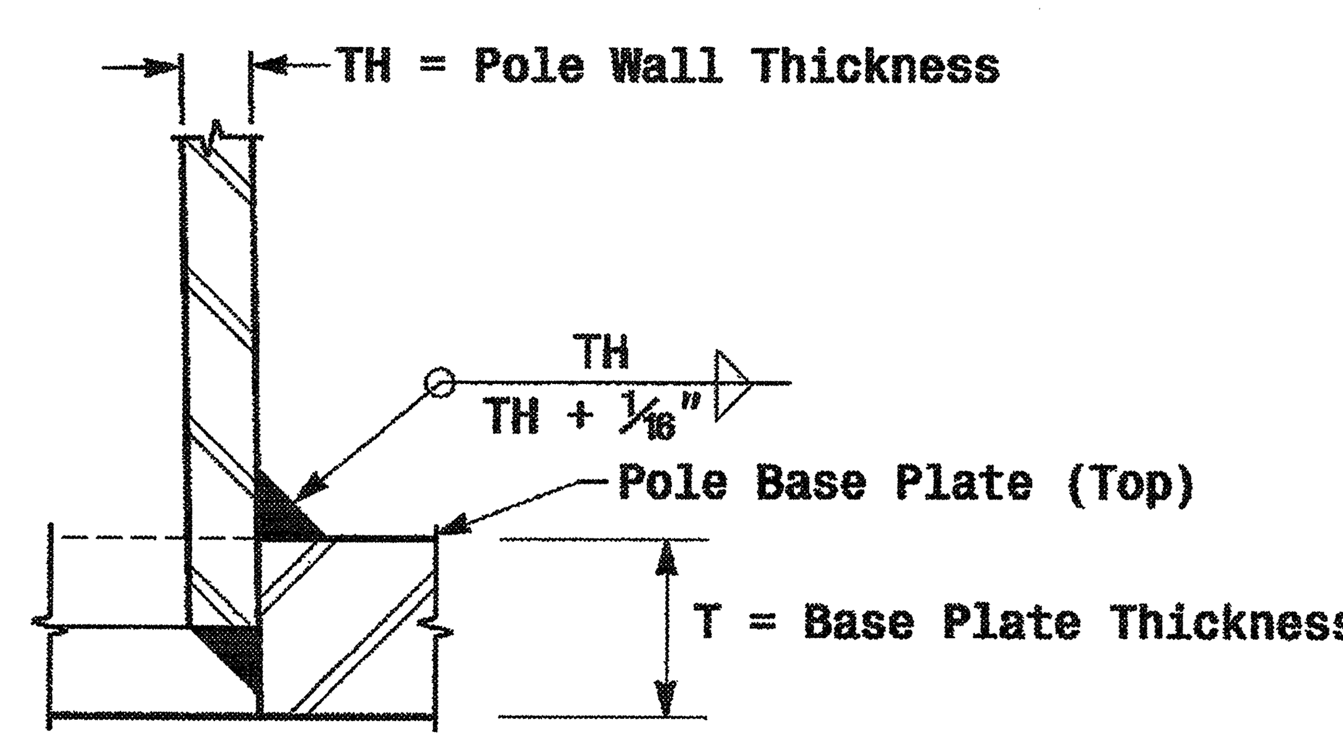


Monotube Strain Pole (.14"/Foot Taper)



Section A-A

Radial Orientation for Factory Installed Accessories at Top of Pole



Section C-C

Socket Connection Weld Detail

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

Typical Fabrication Details For Strain Poles

PLAN DATE:	May 2005	REVIEWED BY:	C.F. Andrews
PREPARED BY:	P.L. Alexander	REVIEWED BY:	A.M. Esposito

SCALE: 0 NA — NONE

REVISIONS	INIT.	DATE

SEAL

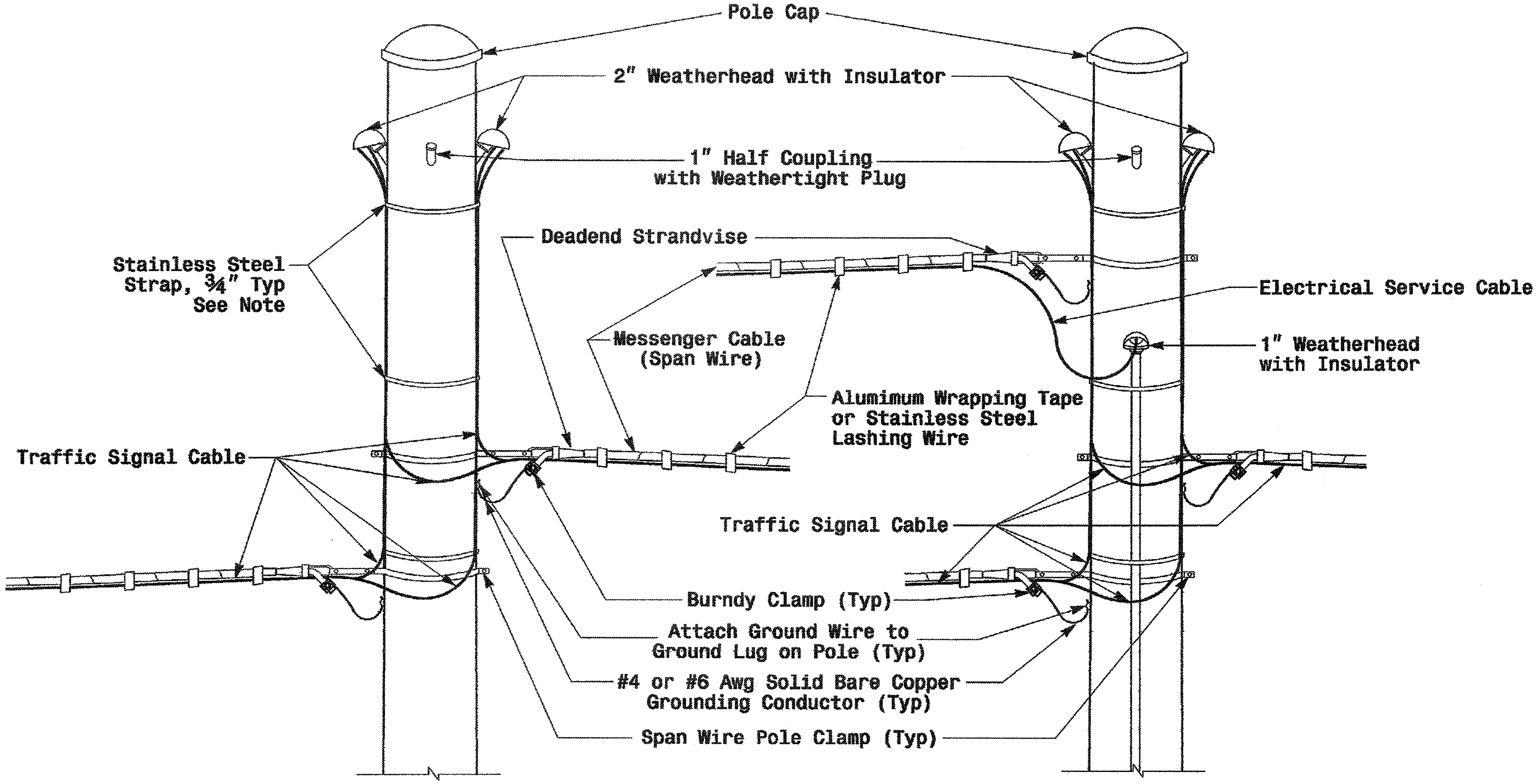
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094 DEBESH C. SARKAR

D. Sarkar 9.2.2005
SIGNATURE DATE

SIG. INVENTORY NO.

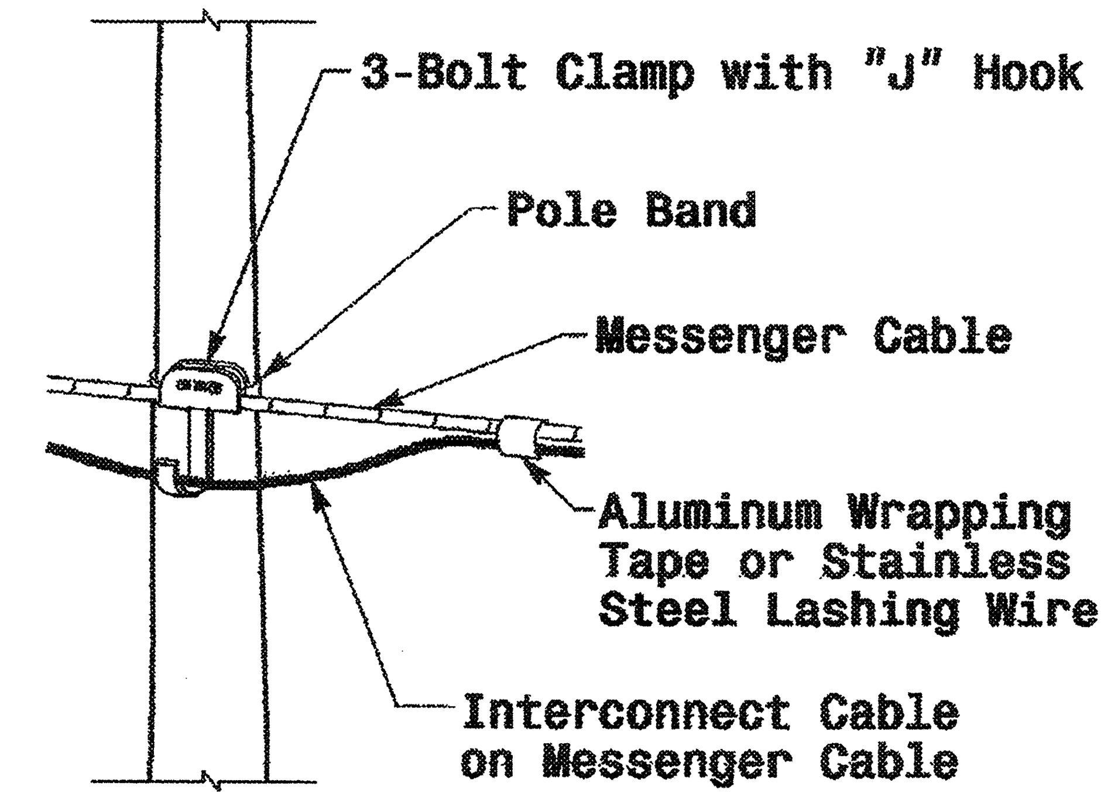
PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 34 M 6

Construction Details – Strain Poles

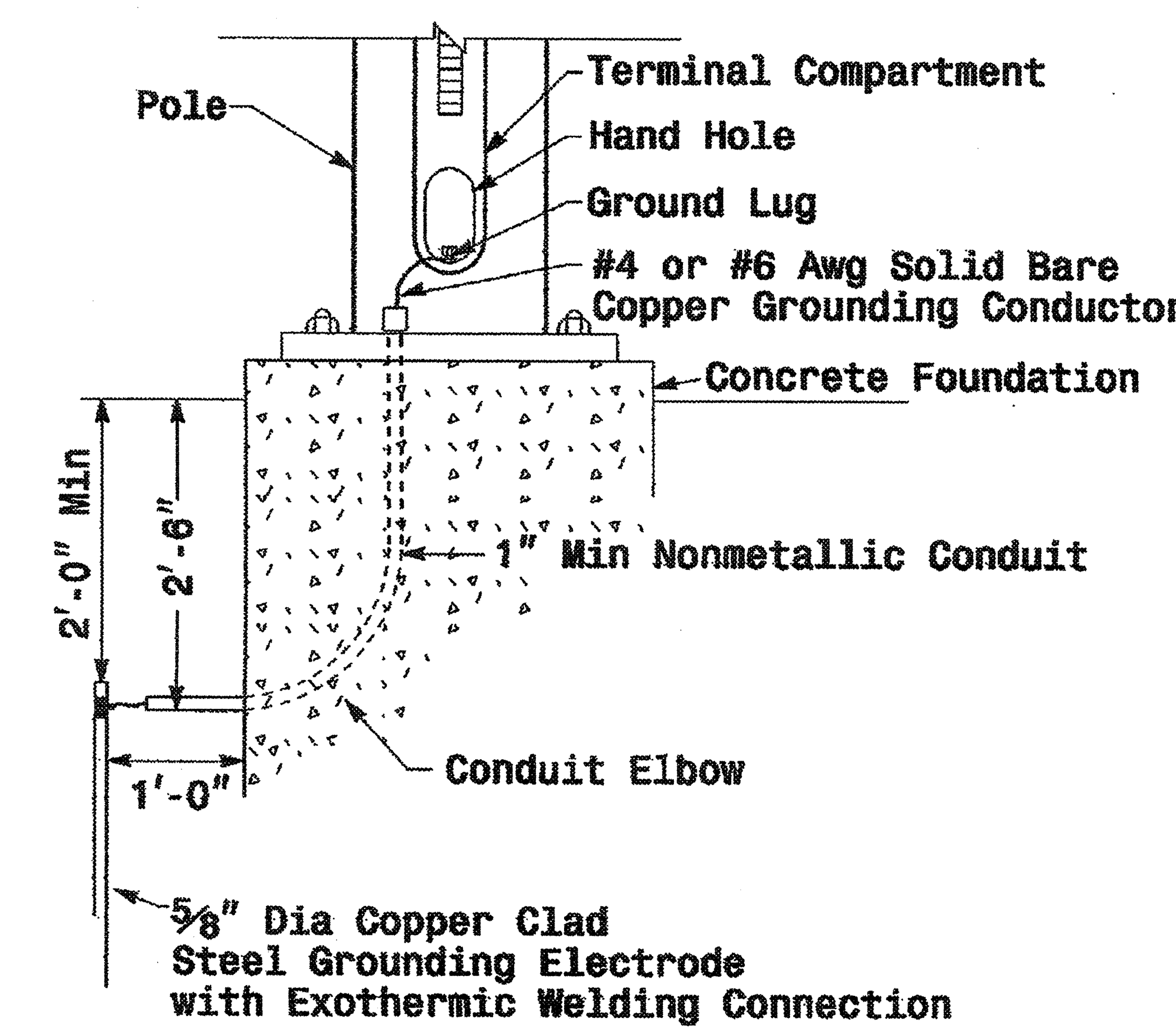


Note: Strap all signal cables to the side of the pole with ¾" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole



Metal Pole Grounding Detail

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

SCALE 0 NA NONE

Construction Details
Strain Poles

PLAN DATE: May 2005	REVIEWED BY: P.L. ALEXANDER
PREPARED BY: C.F. ANDREWS	REVIEWED BY: D.C. SARKAR

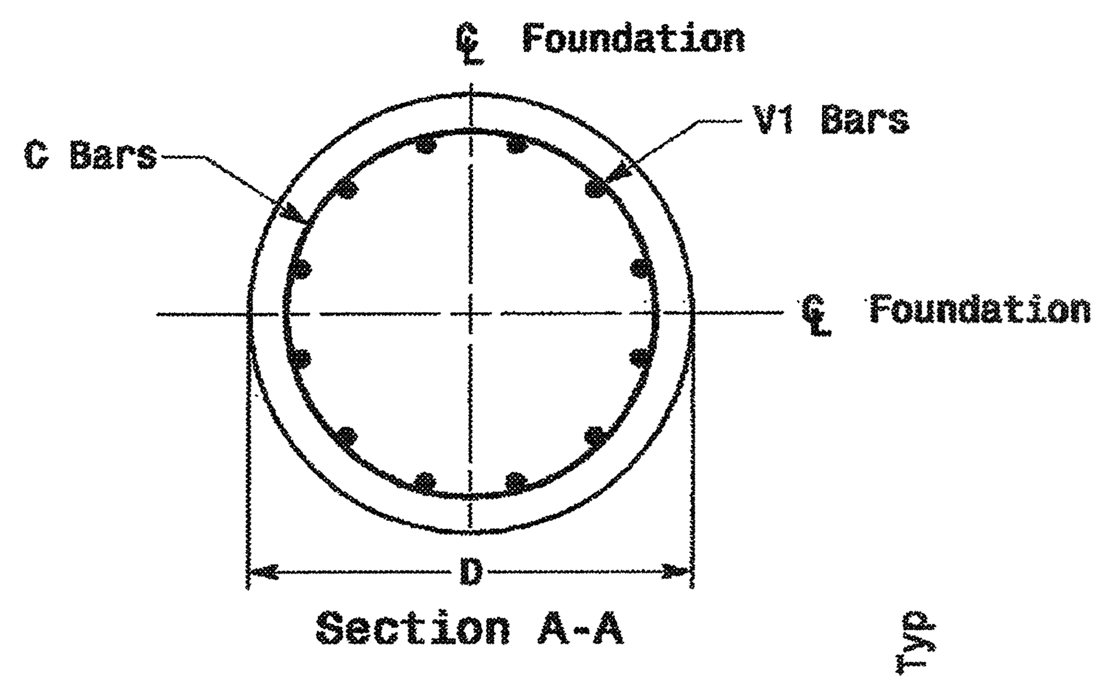
REVISIONS	INIT.	DATE

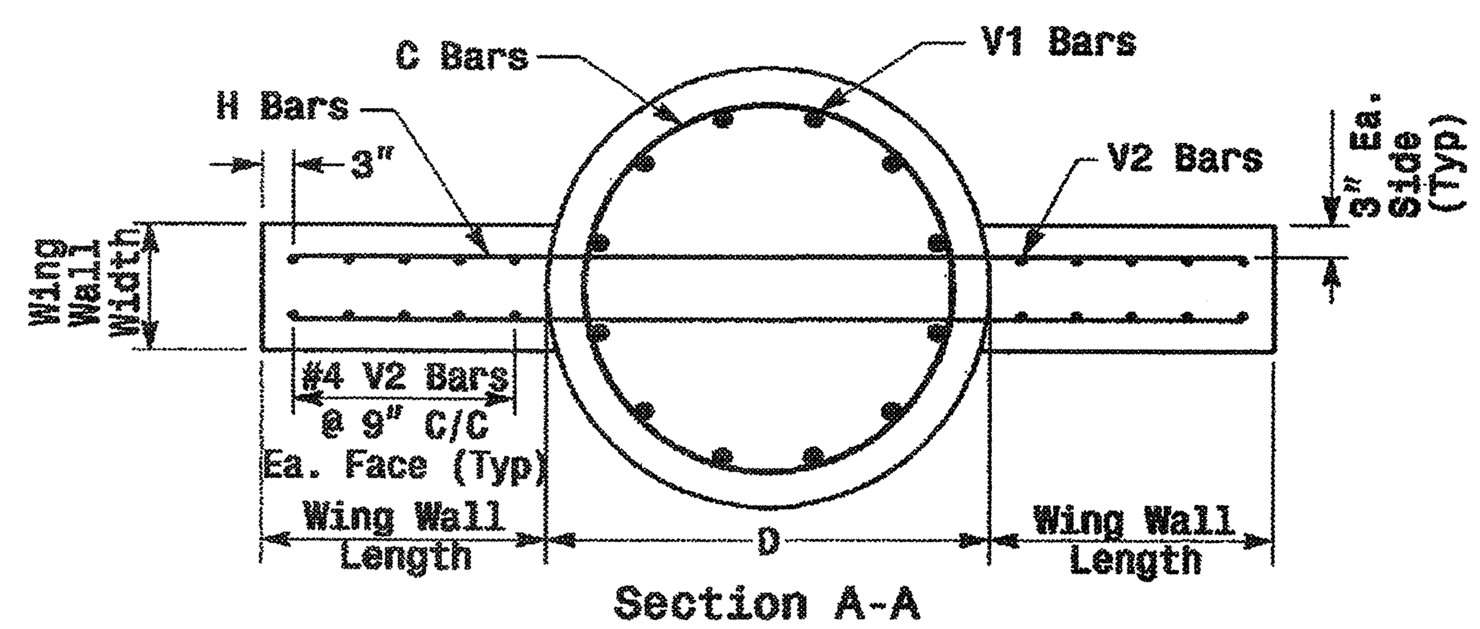
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 016286 ENGINEER MILTON I. DEAN
SIGNATURE 9-1-05 DATE
SIG. INVENTORY NO.

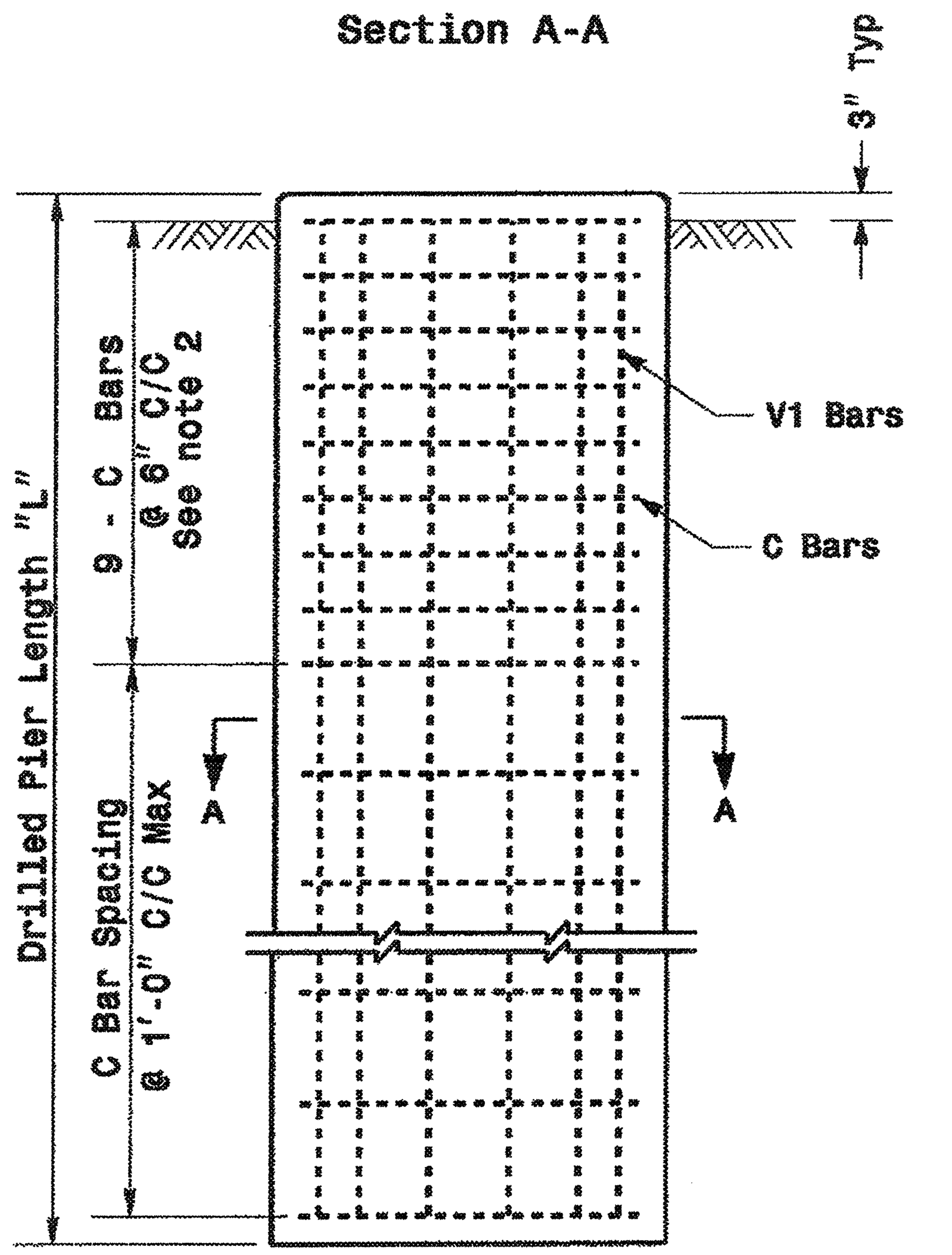
PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 35 M 7

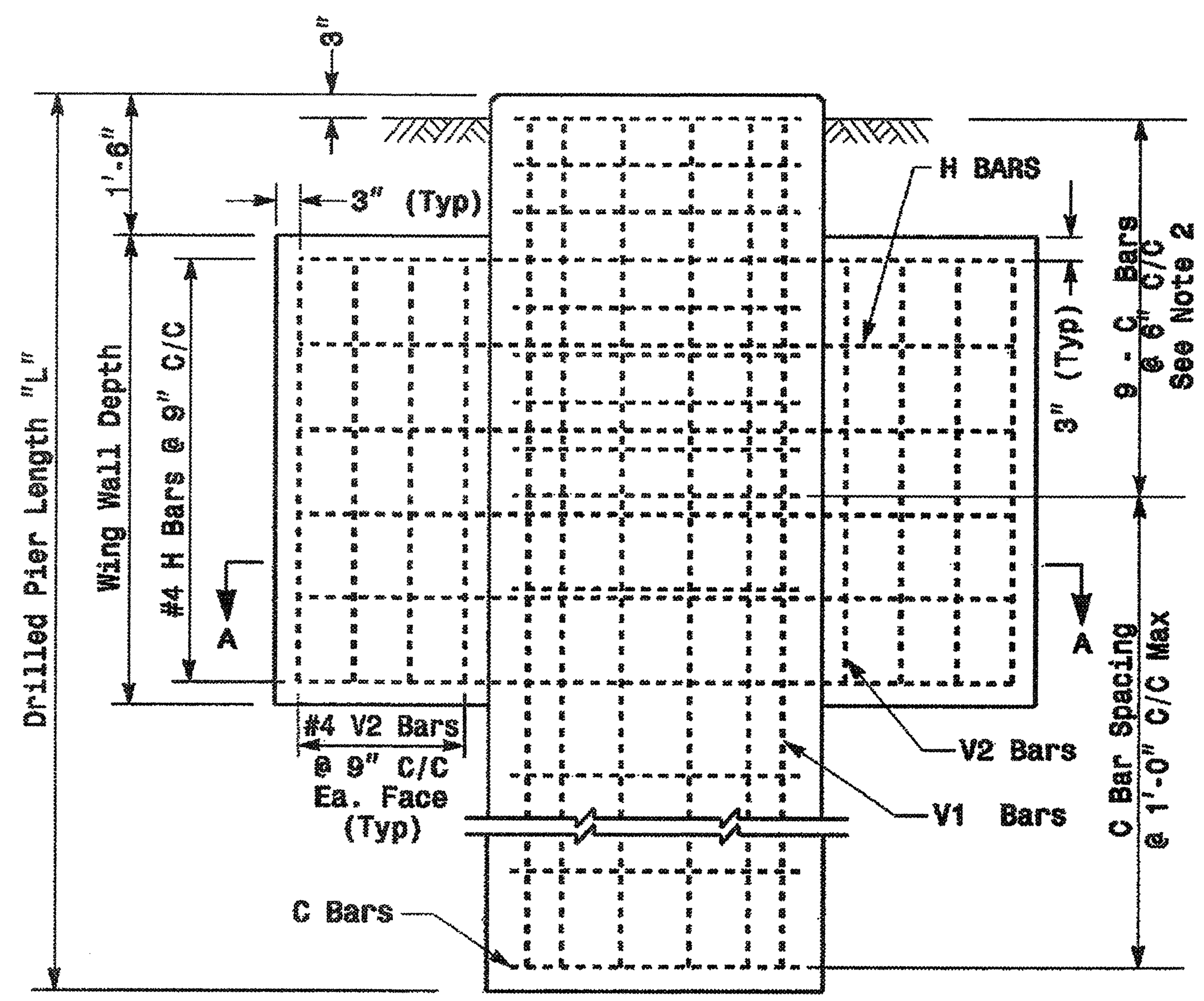
Construction Details – Foundations

Reinforcing Steel Bars







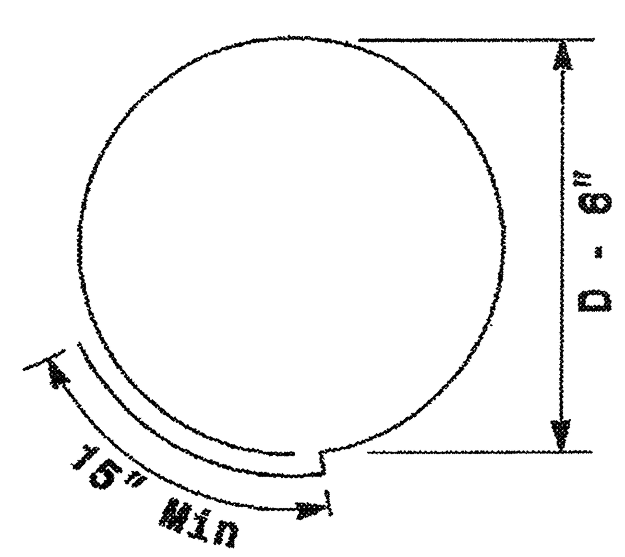


REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER)						
Shaft Dia (in.)	Conc. Volume (cu. yds.)	Bar Name	No.	Size	Type	Length
42"	.356 x L	V1	9	#8	STR.	**
		C	*	#4	CIR.	10'-9"
48"	.465 x L	V1	12	#8	STR.	**
		C	*	#4	CIR.	12'-6"

* See Note No. 1
** See Note No. 3

REINFORCING STEEL TABLE FOR STANDARD 42" and 48" DRILL PIER SHAFT WITH TYPE 1 AND TYPE 2 WING WALLS						
Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel				
		Bar Name	No.	Size	Type	Length
TYPE 1	42"	V1	9	#8	STR.	**
		V2	12	#4	STR.	2'-6"
		H	8	#4	STR.	6'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	42"	V1	9	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	48"	V1	12	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-6"
		C	*	#4	CIR.	12'-6"

* See Note No. 1
** See Note No. 3



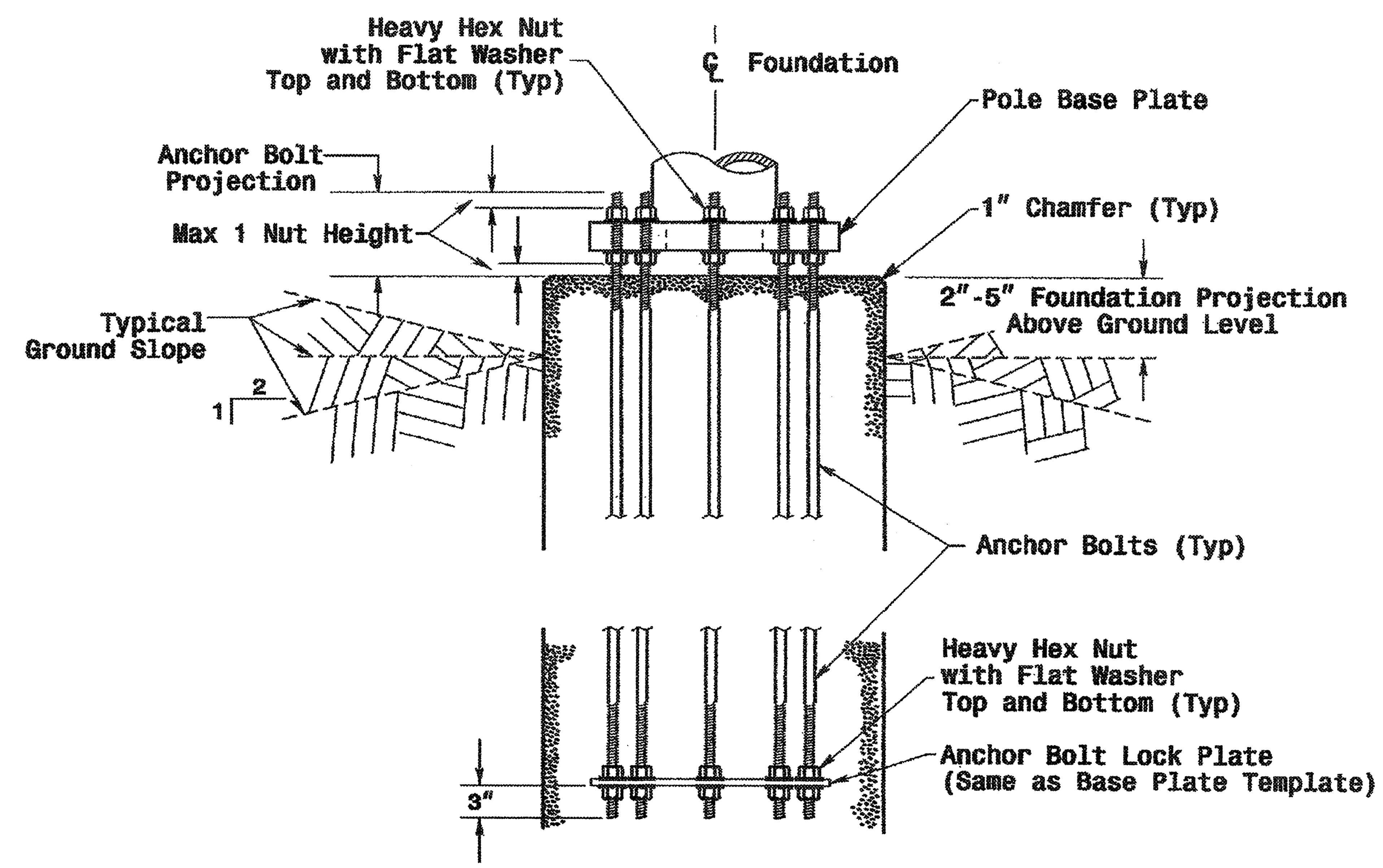
Typical "C" Bars

WING WALL DETAILS				
Wing Wall Type	Wing Wall Length (Ft.)	Wing Wall Width (Ft.)	Wing Wall Depth (Ft.)	Concrete Volume (Cu. Yds.)
TYPE 1	1'-6"	1'-0"	3'-0"	.4
TYPE 2	3'-0"	1'-0"	5'-0"	1.2

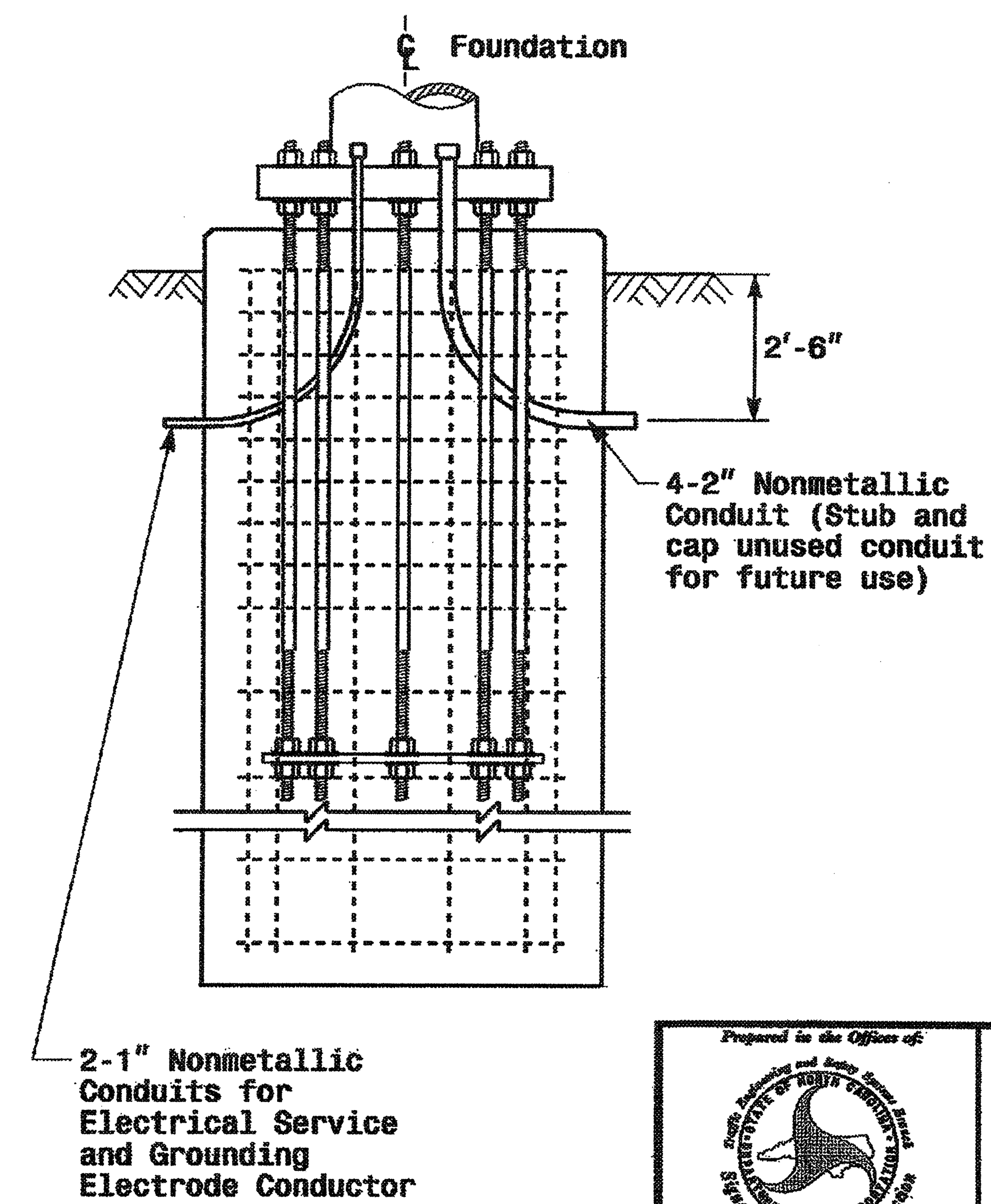
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



Notes

1. The number of C-bars is based on foundation depth. For standard foundations, see sheet M 8.
2. Circular tie reinforcing rings may be vertically adjusted by +/- 3" at a depth between 2'-0" and 3'-0" to facilitate the installation of electrical conduit entering in the cage.
3. The length of V1-bars is based on foundation depth. For standard foundations, see sheet M 8.
4. The quantities for steel and concrete shown in the Wing Wall Details Chart reflect the amount of material for 1 pair of wing walls (2 wing walls per drilled pier shaft.)

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, N.C. Department of Transportation
122 N. McDowell St., Raleigh, NC 27603

Construction Details
Foundations

PLAN DATE:	May 2005	REVIEWED BY:	P.L. ALEXANDER
PREPARED BY:	C.F. ANDREWS	REVIEWED BY:	A.M. ESPOSITO

SCALE: 0 NA — NONE

REVISIONS	INIT.	DATE

SEAL
North Carolina Professional Engineer Seal 028094 Debesh C. Sarkar
D. Sarkar 9.2.2005
SIGNATURE DATE
SIG. INVENTORY NO.

01-SEP-2005 11:48
p:\aandrews

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	Sig. 36 M 8

Standard Strain Poles

		STANDARD STRAIN POLES				STANDARD FOUNDATIONS 42" Diameter Drilled Pier Length (L) – Feet						
						Clay				Sand		
		Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Moment at the Pole Base (ft-kp)	Medium N-Value 4-8	Stiff N-Value 9-15	Very Stiff N-Value 16-30	Hard N-Value >30	Loose N-Value 4-10	Medium N-Value 11-30	Dense N-Value >30
WIND ZONE 1	LIGHT	S26L3	26	25	280	20.5	14.0	11.5	9.5	18.0	16.0	14.0
		S30L3	30	25	310	21.0	14.5	11.5	9.5	18.5	16.5	14.5
		S35L3	35	25	350	22.5	15.0	12.0	10.0	19.5	17.5	15.5
	HEAVY	S30H3	30	29	450	25.5	16.5	13.0	11.0	21.0	18.5	16.5
		S35H3	35	29	540	26.0	17.0	13.5	11.5	22.0	19.5	17.0
WIND ZONE 2	LIGHT	S26L2	26	23	250	19.5	13.5	11.0	9.0	18.0	15.5	14.0
		S30L2	30	23	290	20.0	14.0	11.5	9.5	18.5	16.0	14.0
		S35L2	35	23	315	21.0	14.5	11.5	9.5	19.0	16.5	14.5
	HEAVY	S30H2	30	29	415	24.5	16.0	13.0	10.5	21.0	18.5	16.0
		S35H2	35	29	485	25.5	16.5	13.5	11.0	21.5	19.0	16.5
WIND ZONE 3	LIGHT	S26L2	26	23	250	18.5	13.0	10.5	9.0	17.5	15.0	13.5
		S30L2	30	23	290	19.5	13.5	11.0	9.0	18.0	15.5	14.0
		S35L2	35	23	315	20.0	14.0	11.5	9.5	18.5	16.0	14.5
	HEAVY	S30H2	30	29	415	23.0	15.5	12.5	10.0	20.5	17.5	16.0
		S35H2	35	29	485	24.0	16.0	13.0	10.5	21.0	18.0	16.5
WIND ZONE 4	LIGHT	S26L1	26	22	195	18.0	13.0	10.5	9.0	16.5	14.5	13.0
		S30L1	30	22	225	18.5	13.0	10.5	9.0	17.0	15.0	13.5
		S35L1	35	22	255	19.0	13.5	11.0	9.0	17.5	15.5	14.0
	HEAVY	S30H1	30	25	330	22.0	15.0	12.0	9.5	19.5	17.0	15.0
		S35H1	35	25	385	23.0	15.5	12.5	10.0	20.0	17.5	15.5
WIND ZONE 5	LIGHT	S26L2	26	23	250	19.0	13.5	10.5	9.0	17.5	15.5	13.5
		S30L2	30	23	290	20.0	14.0	11.0	9.5	18.0	16.0	14.0
		S35L2	35	23	315	21.0	14.5	11.5	10.0	19.0	16.5	14.5
	HEAVY	S30H2	30	29	415	23.5	15.5	12.5	10.5	21.0	18.0	16.0
		S35H2	35	29	485	25.0	16.5	13.0	11.0	21.5	18.5	16.5

Concrete Volume (cubic yards)=.356 X L

Fabrication Design Notes:

1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.
2. Base plate thickness (T) is 2.0 inches.

Foundation Selection:

1. Perform a standard penetration test at each proposed foundation site to determine "N" value.
2. Select the appropriate wind zone from sheet M 1.
3. Select the soil type (Clay or Sand) that best describes the soil characteristics.
4. Get the appropriate pole case load number from the plans or from the Engineer.
5. Select the appropriate column in the chart based on soil type and "N" value. Select the appropriate row based on the pole load case. The foundation depth is the value where the column and the row intersect.

Prepared in the Offices of: North Carolina Department of Transportation, Roads and Geometrics Section, 1122 N. McDowell St., Raleigh, NC 27603

Standard Strain Poles and Standard Foundations

PLAN DATE:	May 2005	REVIEWED BY:	C.F. Andrews
PREPARED BY:	P.L. Alexander	REVIEWED BY:	A.W. Esposito

REVISIONS	INIT.	DATE

SCALE: 0 NA — None

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

D. Sarkar 9.2.2005
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
R-2555A	SIG. 37

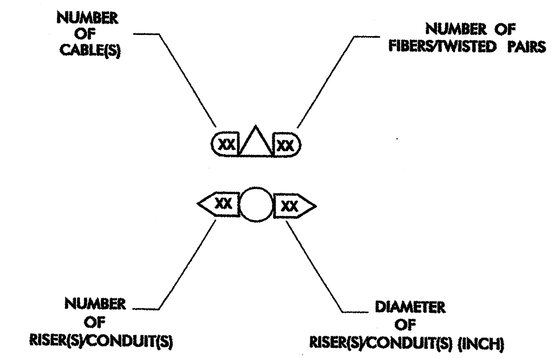
1. INSTALL REA, PE – 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
2. INSTALL REA, PE – 38, (FIGURE 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
3. INSTALL REA, PE – 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
4. INSTALL SMFO CABLE
5. INSTALL MMFO CABLE
6. INSTALL FIBER OPTIC DROP CABLE
7. INSTALL TRACER WIRE
8. TRENCH
9. INSTALL PVC CONDUIT
10. INSTALL RIGID, GALVANIZED STEEL CONDUIT
11. INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
12. INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
13. INSTALL OUTER-DUCT POLYETHYLENE CONDUIT
14. INSTALL POLYETHYLENE CONDUIT
15. DIRECTIONAL DRILL CONDUIT
16. BORE AND JACK CONDUIT
17. INSTALL CABLE(S) IN EXISTING CONDUIT
18. INSTALL CABLE(S) IN NEW CONDUIT
19. INSTALL CABLE(S) IN EXISTING RISER
20. INSTALL CABLE(S) IN NEW RISER
21. INSTALL CABLE(S) IN EXISTING CONDUIT STUB-OUTS
22. INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
23. INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
24. INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
25. INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
26. TERMINATE COMMUNICATIONS CABLE ON EXISTING TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
27. INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
28. INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPLICE CABLE IN CABINET
29. INSTALL UNDERGROUND SPLICE ENCLOSURE
30. INSTALL AERIAL SPLICE ENCLOSURE
31. INSTALL POLE MOUNTED SPLICE CABINET
32. INSTALL BASE MOUNTED SPLICE CABINET
33. REMOVE EXISTING SPLICE CABINET
34. INSTALL CABINET FOUNDATION
35. REMOVE EXISTING CABINET FOUNDATION
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL CCTV CAMERA WOOD POLE
38. INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
39. INSTALL JUNCTION BOX
40. INSTALL OVERSIZED JUNCTION BOX
41. REMOVE EXISTING JUNCTION BOX
42. INSTALL WOOD POLE
43. REMOVE EXISTING WOOD POLE
44. INSTALL AERIAL GUY ASSEMBLY
45. INSTALL STANDARD GUY ASSEMBLY
46. INSTALL SIDEWALK GUY ASSEMBLY
47. INSTALL MESSENGER CABLE
48. REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
49. REMOVE EXISTING MESSENGER CABLE
50. INSTALL TELEPHONE SERVICE
51. INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
52. INSTALL DELINEATOR MARKER
53. STORE 20 FEET OF COMMUNICATIONS CABLE
54. LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
55. LASH CABLE(S) TO EXISTING MESSENGER CABLE
56. LASH CABLE(S) TO NEW MESSENGER CABLE
57. MODIFY EXISTING ELECTRICAL SERVICE
58. INSTALL NEW ELECTRICAL SERVICE

LEGEND

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

CONSTRUCTION NOTE SYMBOLOGY KEY

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



Prepared in the Office of
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Management Systems
122 N. McDonald St., Raleigh, NC 27603

CONSTRUCTION NOTES

PLAN DATE: | REVIEWED BY:
PREPARED BY: | REVIEWED BY: G. A. FULLER

SCALE: 0

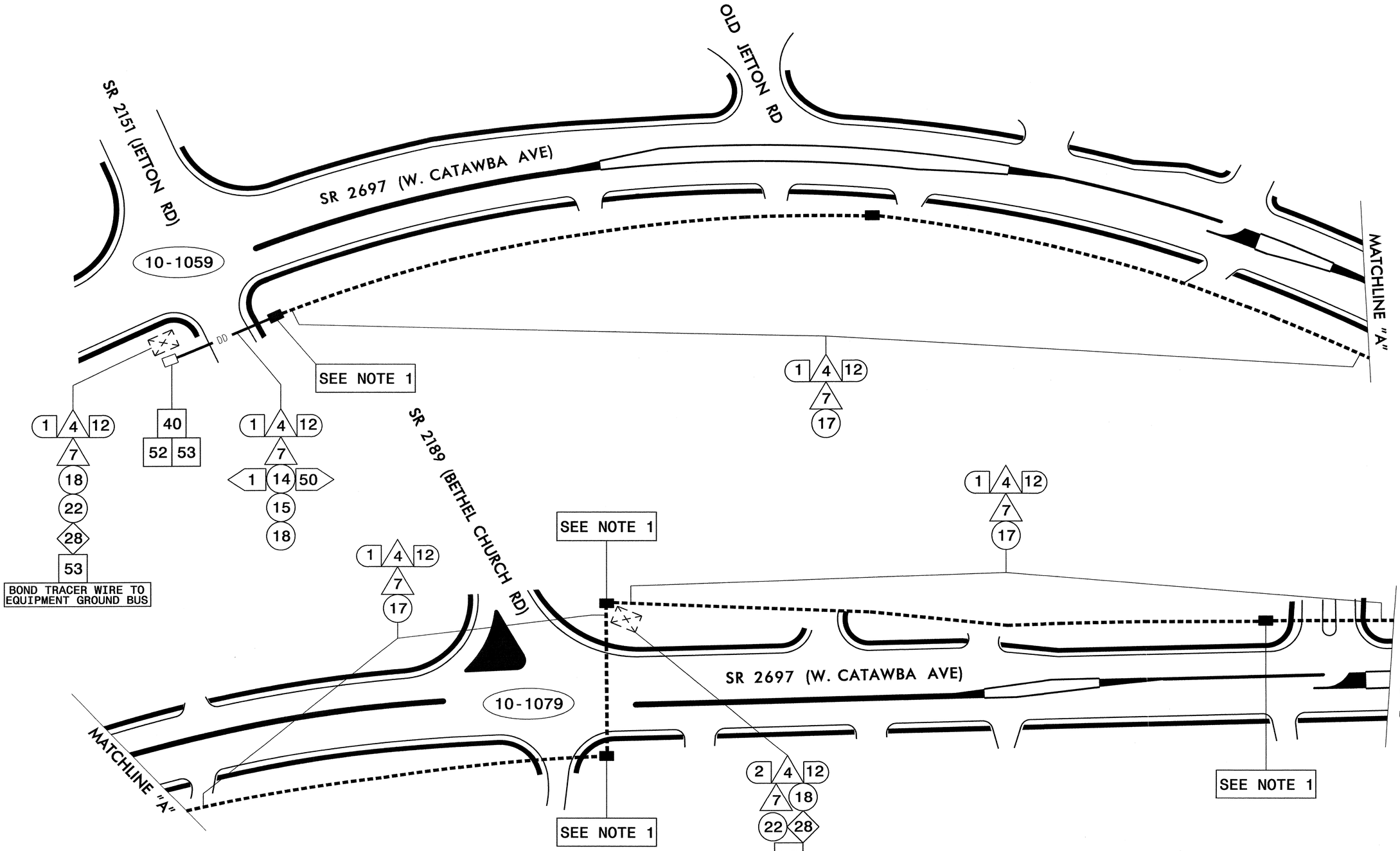
REVISIONS	INIT.	DATE

CADD Filename:

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

Gregory A. Fuller 10/31/02
SIGNATURE DATE

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	SIG.38



NOTES:

1. STORE 20 METERS OF COMMUNICATIONS CABLE.

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

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Integrated Mobility Division
750 N. Greenfield Pkwy., Garner, NC 27529

SCALE: 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS ALONG WEST CATAWBA AVENUE

DIVISION 10 MECKLENBURG CO. CORNELIUS

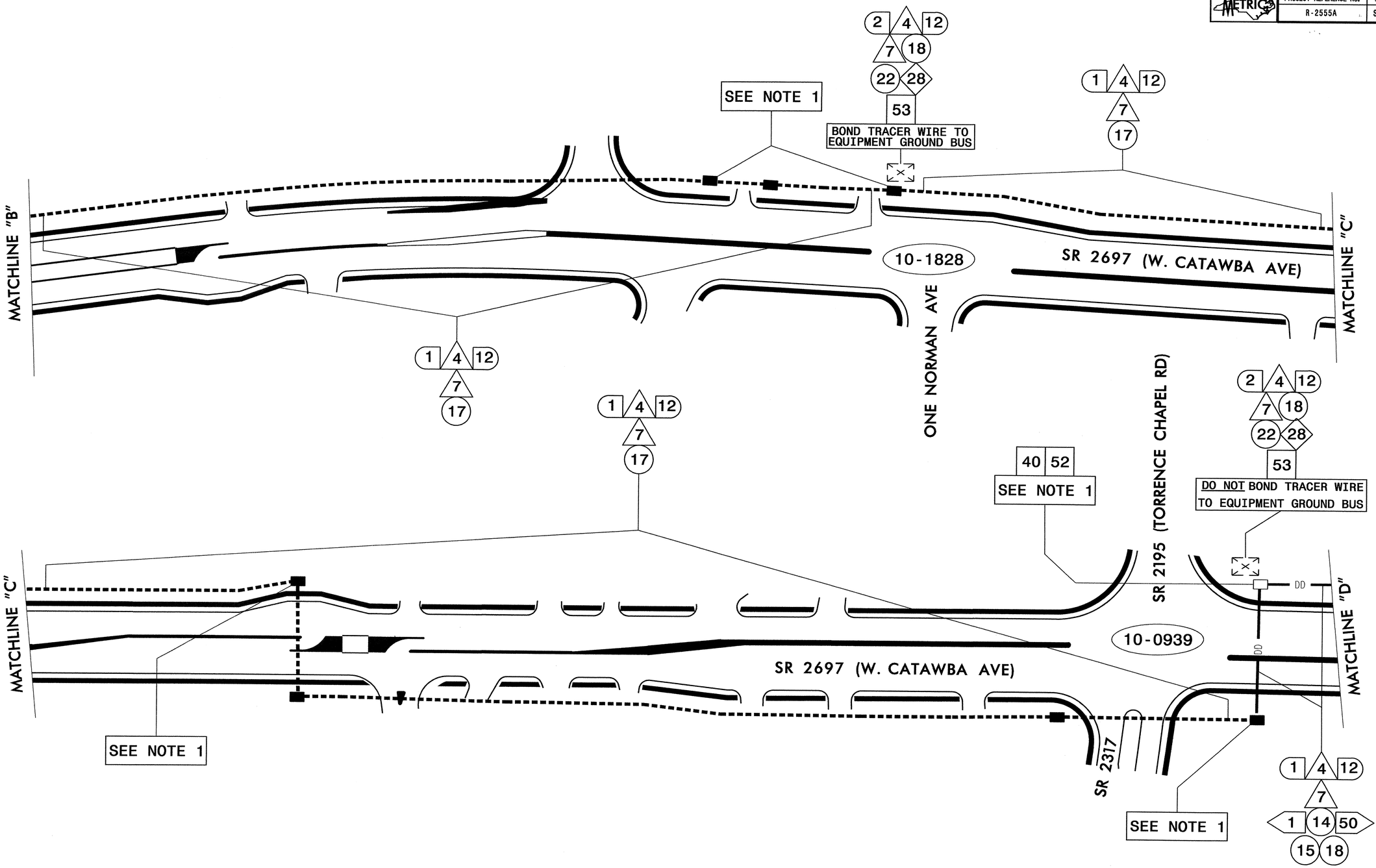
PLAN DATE:	JULY 2007	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR, JR.

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR, JR.
SIGNATURE 7-26-07 DATE

CADD Filename:

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	SIG. 39



NOTES:

1. STORE 20 METERS OF COMMUNICATIONS CABLE.

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

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
Intelligent Transportation Systems
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Pkwy., Garner, NC 27529

SCALE: 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS ALONG WEST CATAWBA AVENUE

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: JULY 2007 REVIEWED BY: I.N. AVERY

PREPARED BY: S.C. WARDLE REVIEWED BY: G.G. MURR, JR.

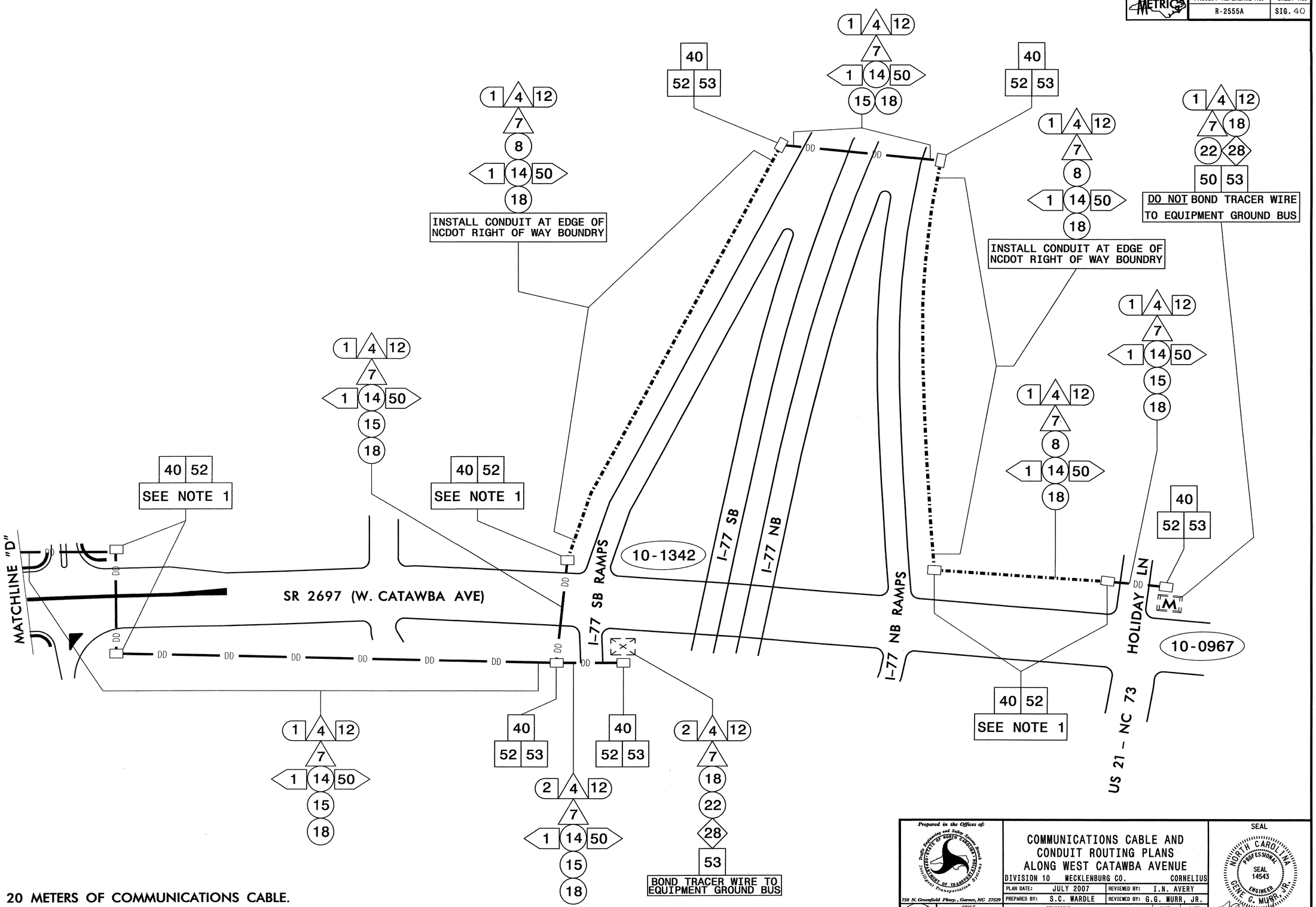
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GREGORY G. MURR, JR.

SIGNATURE 7-26-07 DATE

CADD Filename:

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	SIG. 40



NOTES:

1. STORE 20 METERS OF COMMUNICATIONS CABLE.

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

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Transportation Mobility & Safety Division
750 N. Greenfield Pkwy., Garner, NC 27529

SCALE 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS ALONG WEST CATAWBA AVENUE

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE:	JULY 2007	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR, JR.

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR, JR.
SIGNATURE 2-26-07 DATE

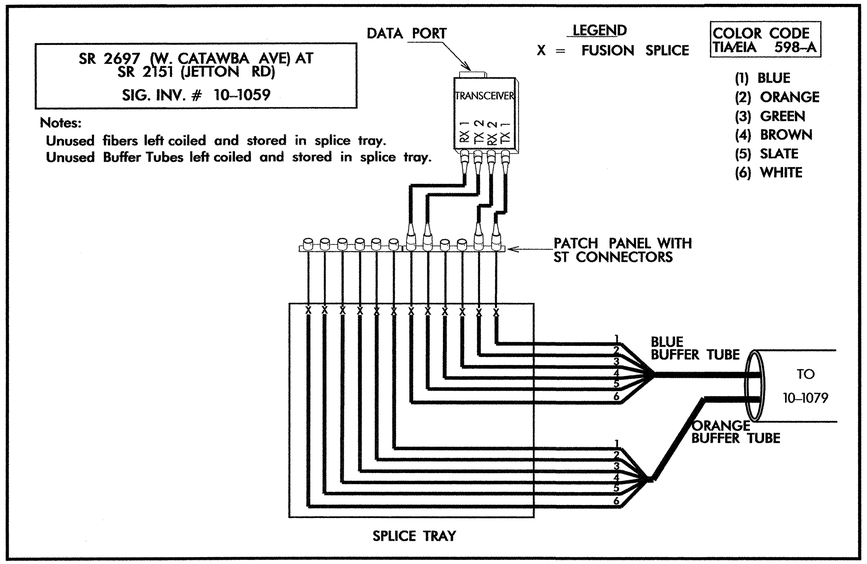
CADD Filename:

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2555A	SIG. 41

FIBER OPTIC CABLE

SR 2697 (W. CATAWBA AVE) AT
SR 2151 (JETTON RD)
SIG. INV. # 10–1059

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

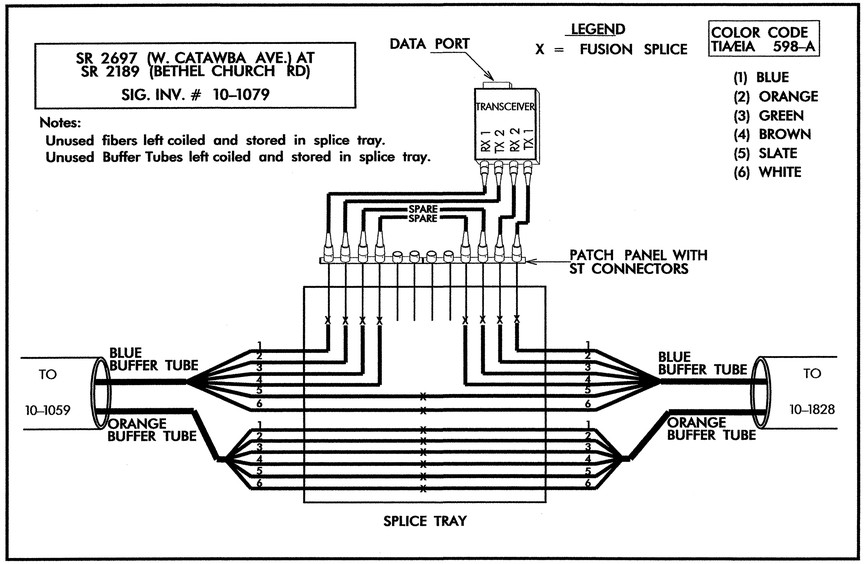


LEGEND
X = FUSION SPLICE

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

SR 2697 (W. CATAWBA AVE.) AT
SR 2189 (BETHEL CHURCH RD)
SIG. INV. # 10–1079

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

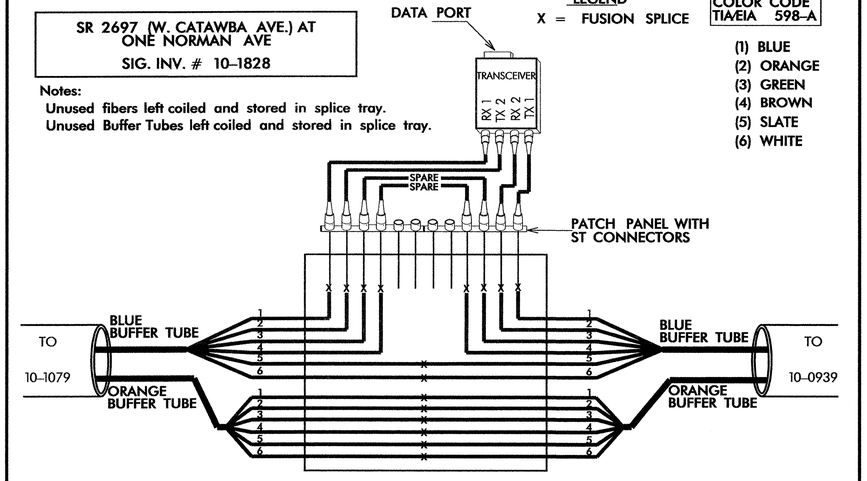


LEGEND
X = FUSION SPLICE

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

SR 2697 (W. CATAWBA AVE.) AT
ONE NORMAN AVE
SIG. INV. # 10–1828

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

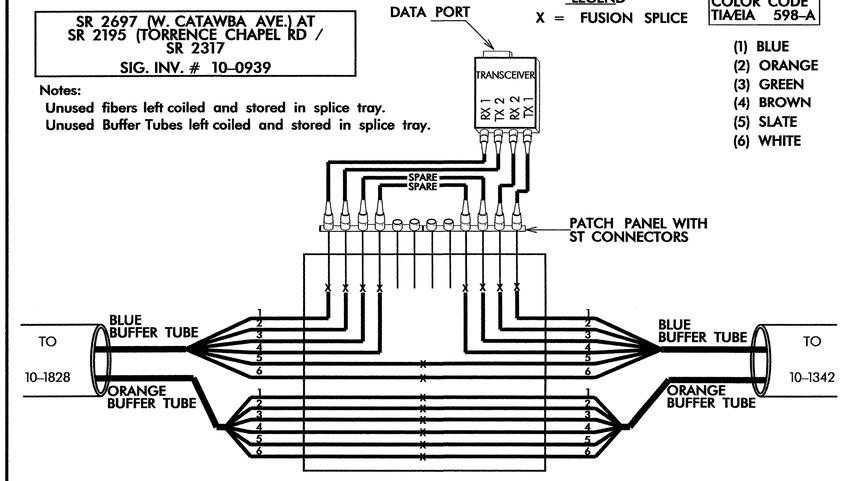


LEGEND
X = FUSION SPLICE

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

SR 2697 (W. CATAWBA AVE.) AT
SR 2195 (TORRENCE CHAPEL RD /
SR 2317
SIG. INV. # 10–0939

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–A
(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE

NOTE: FURNISH SELF–HEALING RING TYPE TRANSCEIVERS.

TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
Intelligent Transportation Systems
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Pkwy., Garner, NC 27529

SCALE
0

SPLICE PLANS
ALONG WEST CATAWBA AVENUE

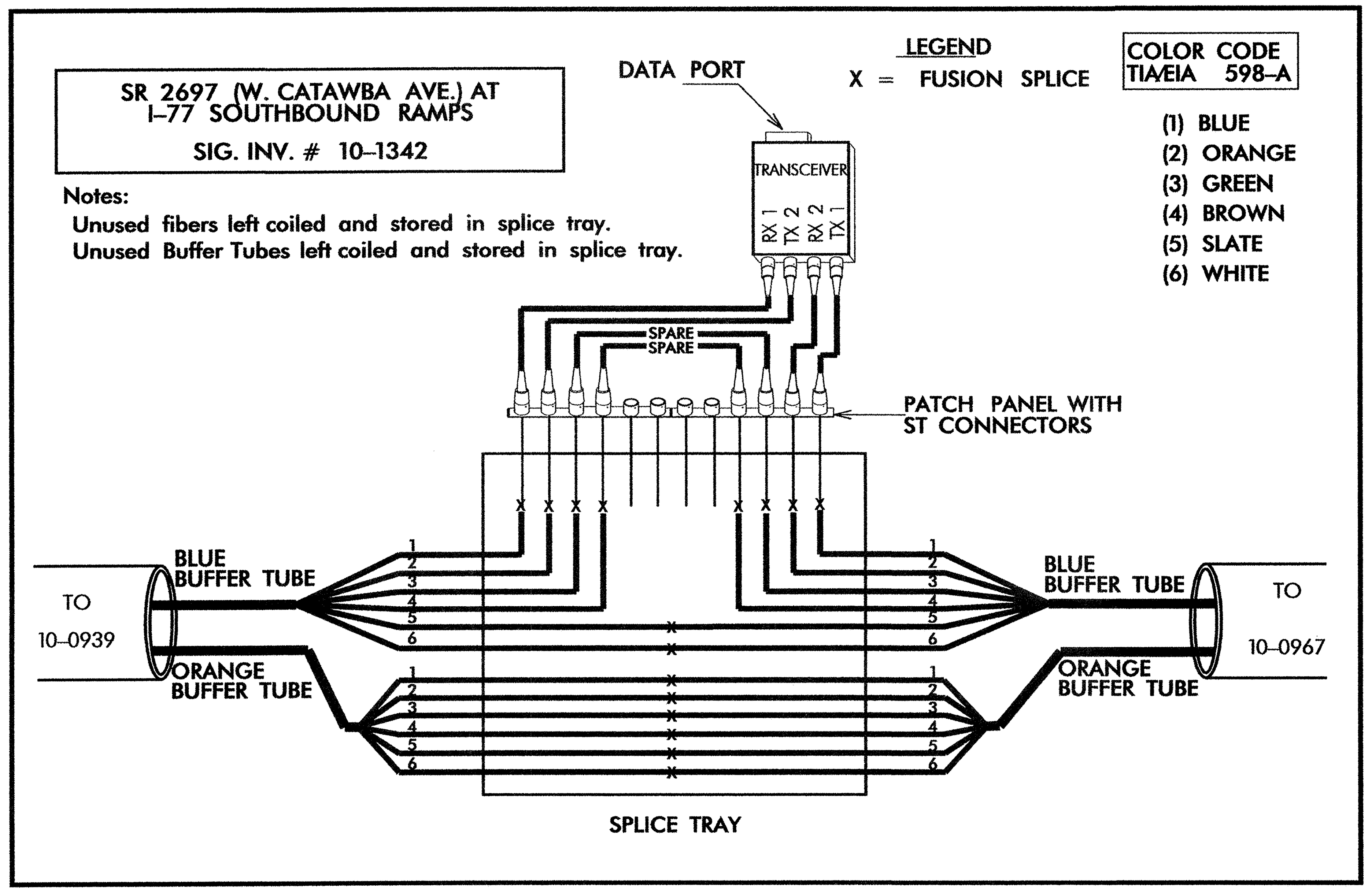
DIVISION 10 MECKLENBURG CO. CORNELIUS

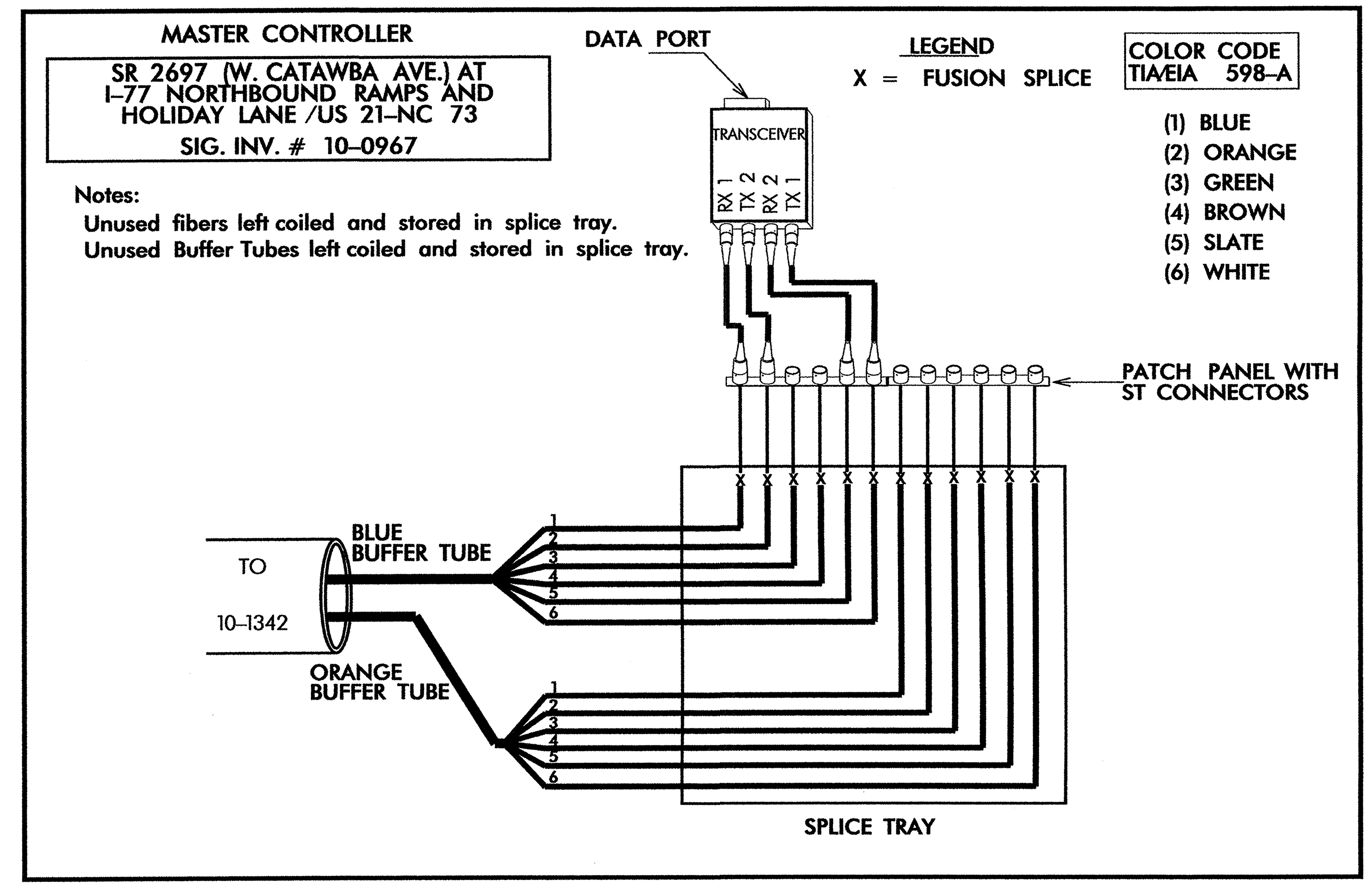
PLAN DATE:	JULY 2007	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR, JR.

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR, JR.
SIGNATURE 7-26-07 DATE
CADD Filename:

FIBER OPTIC CABLE





NOTE: FURNISH SELF-HEALING RING TYPE TRANSCEIVERS.

TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS

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

SCALE 0

SPLICE PLANS
ALONG WEST CATAWBA AVENUE

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE:	JULY 2007	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR, JR.

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR, JR.

SIGNATURE DATE 7-26-07

CADD Filename: