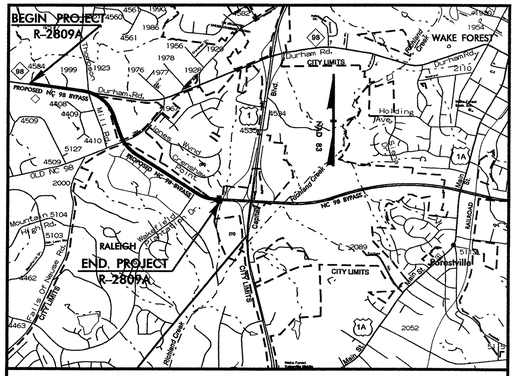
STATE	PROJECT NO.	SHEET NO.
N.C.	R-2809A	Sig. 1
F. A. PROJ. NO.		
PROJECT ID NO.		

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

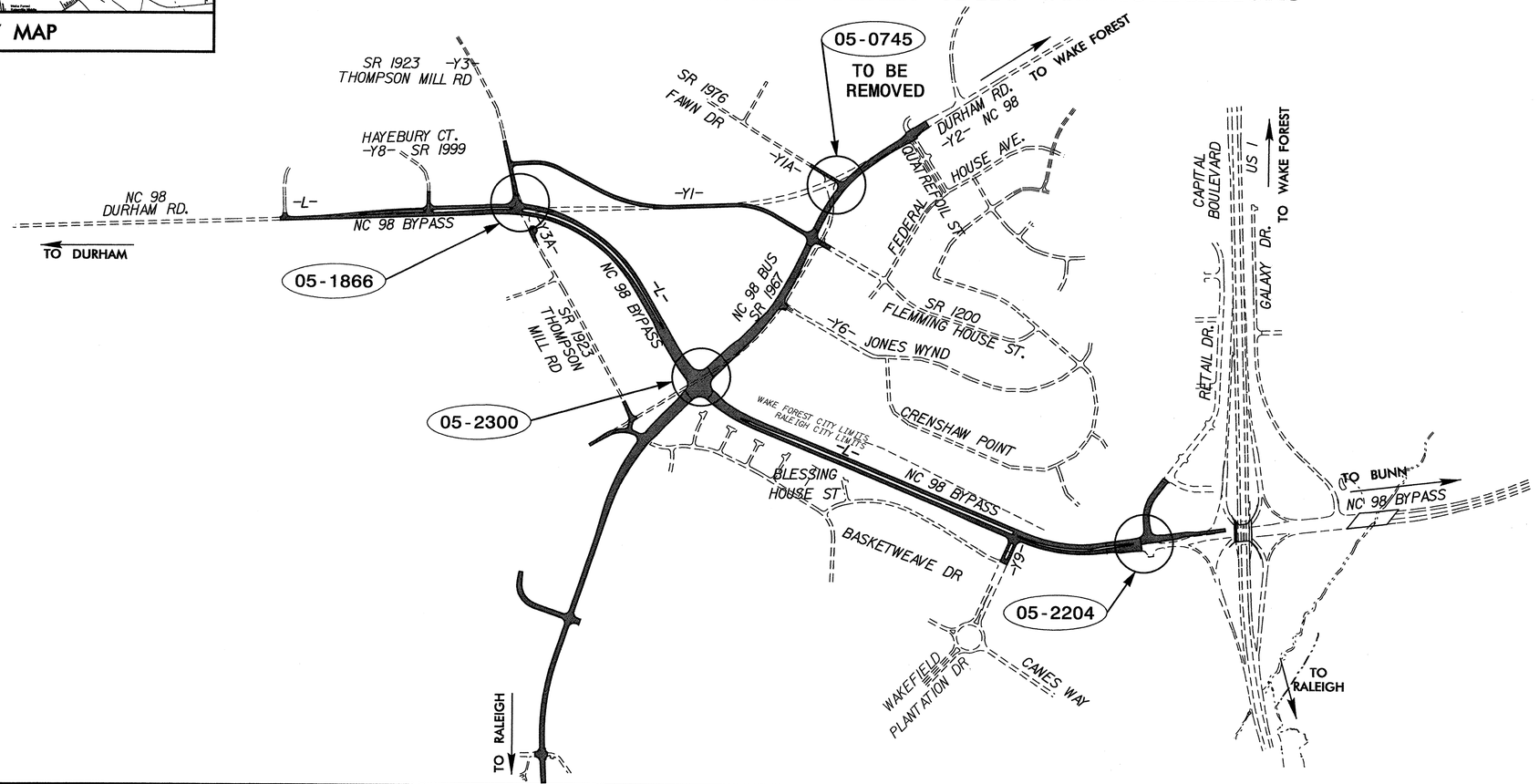
WAKE COUNTY

LOCATION: *NC 98 (WAKE FOREST BYPASS) FROM WEST OF SR 1923 (THOMPSON MILL ROAD) TO WEST OF US 1 (CAPITAL BLVD.)*

TYPE OF WORK: *TRAFFIC SIGNALS AND FIBER OPTIC COMMUNICATIONS*



VICINITY MAP



INDEX OF PLANS

LEGEND

(##-####) *SIGNAL INVENTORY NUMBER*

NCDOT CONTACTS:

TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

Timothy J. Williams , PE – S&G Contracts & PEF Support Engineer

John T. Rowe Jr. , PE – Signal Equipment Design Engineer

G. G. Murr, Jr., PE – ITS Engineer

Prepared in the Offices of:

Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS and Signals Unit

750 N. Greenfield Parkway, Garner, NC 27529

PROJECT: R–2809A

PHASING DIAGRAM

PHASING DIAGRAM DETECTION LEGEND

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

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

SIGNAL FACE I.D.

Denotes L.E.D.

300mm

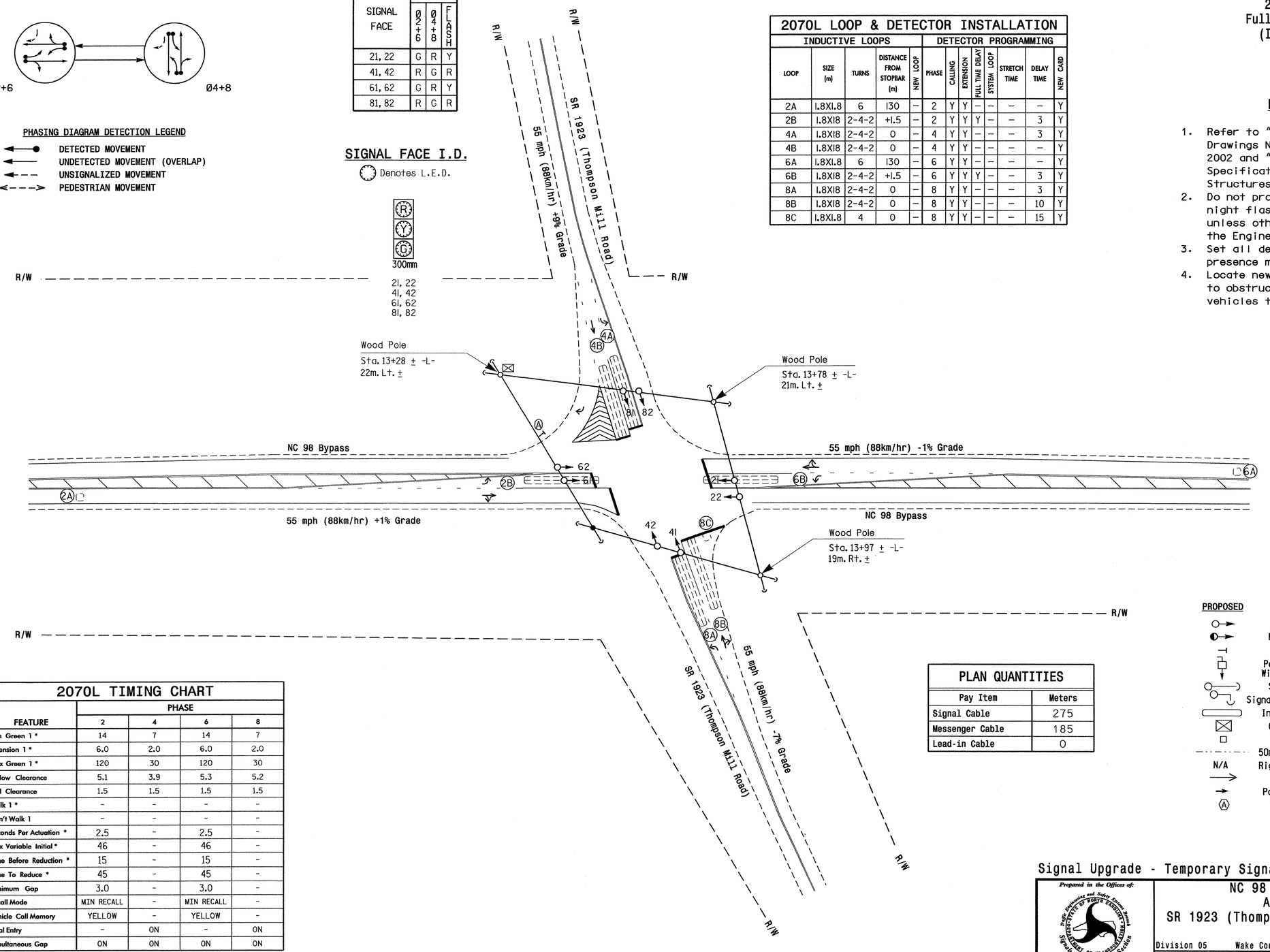
21, 22
41, 42
61, 62
81, 82

2070L LOOP & DETECTOR INSTALLATION											
INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (m)	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	6	130	–	2	Y	Y	–	–	–	–	Y
2B	1.8X18	2-4-2	+1.5	–	2	Y	Y	Y	–	–	3	Y
4A	1.8X18	2-4-2	0	–	4	Y	Y	–	–	–	3	Y
4B	1.8X18	2-4-2	0	–	4	Y	Y	–	–	–	–	Y
6A	1.8X1.8	6	130	–	6	Y	Y	–	–	–	–	Y
6B	1.8X18	2-4-2	+1.5	–	6	Y	Y	Y	–	–	3	Y
8A	1.8X18	2-4-2	0	–	8	Y	Y	–	–	–	3	Y
8B	1.8X18	2-4-2	0	–	8	Y	Y	–	–	–	10	Y
8C	1.8X1.8	4	0	–	8	Y	Y	–	–	–	15	Y

2 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. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.



2070L TIMING CHART				
FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green 1 *	14	7	14	7
Extension 1 *	6.0	2.0	6.0	2.0
Max Green 1 *	120	30	120	30
Yellow Clearance	5.1	3.9	5.3	5.2
Red Clearance	1.5	1.5	1.5	1.5
Walk 1 *	–	–	–	–
Don't Walk 1	–	–	–	–
Seconds Per Actuation *	2.5	–	2.5	–
Max Variable Initial *	46	–	46	–
Time Before Reduction *	15	–	15	–
Time To Reduce *	45	–	45	–
Minimum Gap	3.0	–	3.0	–
Recall Mode	MIN RECALL	–	MIN RECALL	–
Vehicle Call Memory	YELLOW	–	YELLOW	–
Dual Entry	–	ON	–	ON
Simultaneous Gap	ON	ON	ON	ON

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

PLAN QUANTITIES	
Pay Item	Meters
Signal Cable	275
Messenger Cable	185
Lead-in Cable	0

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
⊓	Pedestrian Signal Head With Push Button & Sign	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----	50mm Underground Conduit	----
N/A	Right of Way with Marker	— — —
→	Directional Arrow	→
→	Pavement Marking Arrow	→
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ

Signal Upgrade - Temporary Signal

Prepared in the Offices of:
Public Transportation and Rail Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

NC 98 Bypass
At
SR 1923 (Thompson Mill Road)

Division 05 Wake County Wake Forest
PLAN DATE: July 2007 REVIEWED BY:
PREPARED BY: I. O. Umozurike REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 5 0 10 1:500

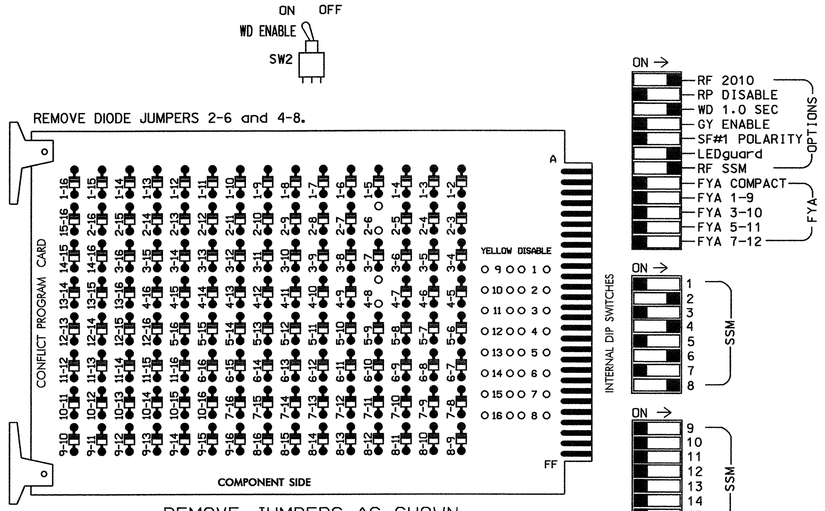
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 8/23/07 DATE
SIG. INVENTORY NO. 05-1866 T

29-AUG-2007 08:42
S:\rts signals\workgroups\tip projects\r-2809a\signal file\05-1866\05-1866_sig_dsn_2007mod.dgn
IOumozurike

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	Sig.3

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5, 7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Dual Entry.
6. 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.....S2,S4,S6,S8
PHASES USED.....2,4,6,8
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	SLOT EMPTY	ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
FILE "I" L		ø2 2B				ø4 4B								ST DC ISOLATOR
FILE "J" U	SLOT EMPTY	SLOT EMPTY	ø6 6A	SLOT EMPTY	SLOT EMPTY	ø8 8A	ø8 8C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
FILE "J" L			ø6 6B			ø8 8B	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	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	Y		3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y	Y		3
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			10
8C	TB7-1,2	J7U	66	28	38	8	Y	Y			15

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1866 T
DESIGNED: July 2007
SEALED: 08-23-07
REVISED: N/A

Singal Upgrade - Temporary

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 98 Bypass
at
SR 1923 (Thompson Mill Road)

Division 05 | Wake County | Wake Forest

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

REVISIONS	INIT.	DATE

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

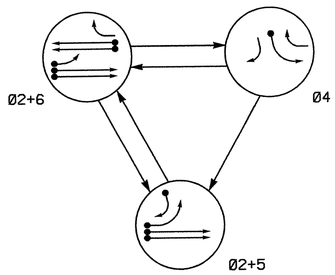
John T. Rowe, Jr. 8-29-07
SIGNATURE DATE

SIG. INVENTORY NO. 05-1866 T

29-AUG-2007 07:47
s:\ets signals\workgroups\sig man\jpeterson\m051866_sm_ele_xxx.dgn
jpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	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	PHASE Ø2+6	PHASE Ø4	FLASH
21	G	G	R	Y
22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
61	R	G	R	Y
62	R	G	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.

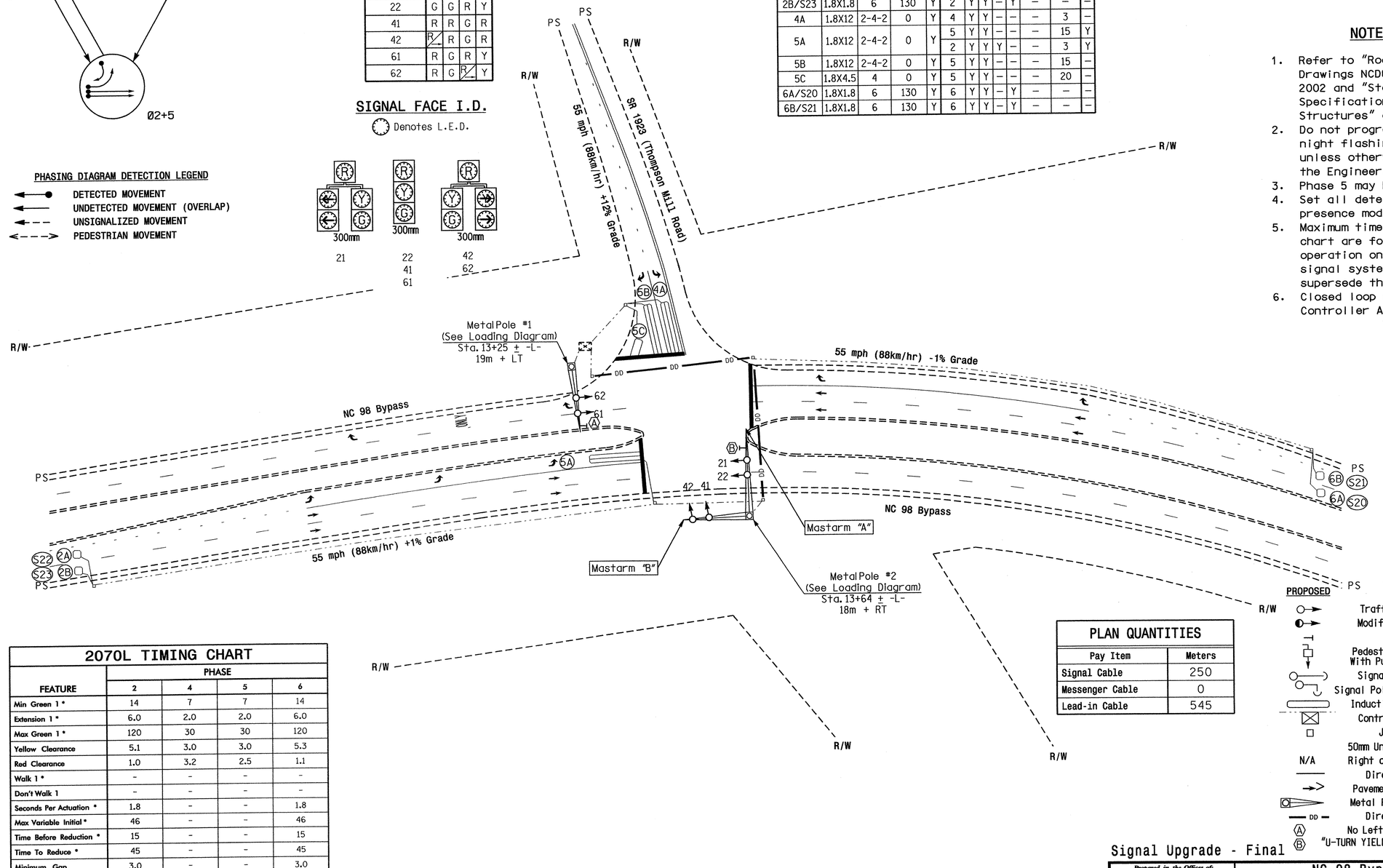
2070L LOOP & DETECTOR INSTALLATION

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
2A/S22	1.8X1.8	6	130	Y	2	Y	Y	–	Y	–	–	–
2B/S23	1.8X1.8	6	130	Y	2	Y	Y	–	Y	–	–	–
4A	1.8X12	2-4-2	0	Y	4	Y	Y	–	–	–	3	–
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	–
5C	1.8X4.5	4	0	Y	5	Y	Y	–	–	–	20	–
6A/S20	1.8X1.8	6	130	Y	6	Y	Y	–	Y	–	–	–
6B/S21	1.8X1.8	6	130	Y	6	Y	Y	–	Y	–	–	–

3 Phase
Fully Actuated
(Wake Forest Bypass Closed Loop System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. Closed loop system data: Controller Asset #1866.



PLAN QUANTITIES

Pay Item	Meters
Signal Cable	250
Messenger Cable	0
Lead-in Cable	545

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 Pole with Mastarm	
DD	Directional Drill	N/A
A	No Left Turn Sign (R3-2)	A
B	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	B

2070L TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green 1 *	14	7	7	14
Extension 1 *	6.0	2.0	2.0	6.0
Max Green 1 *	120	30	30	120
Yellow Clearance	5.1	3.0	3.0	5.3
Red Clearance	1.0	3.2	2.5	1.1
Walk 1 *	–	–	–	–
Don't Walk 1	–	–	–	–
Seconds Per Actuation *	1.8	–	–	1.8
Max Variable Initial *	46	–	–	46
Time Before Reduction *	15	–	–	15
Time To Reduce *	45	–	–	45
Minimum Gap	3.0	–	–	3.0
Recall Mode	MIN RECALL	–	–	MIN RECALL
Vehicle Call Memory	YELLOW	–	–	YELLOW
Dual Entry	–	–	–	–
Simultaneous Gap	ON	ON	ON	ON

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

Signal Upgrade - Final

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

SCALE 5 0 10 1:500

NC 98 Bypass
At
SR 1923 (Thompson Mill Road)

Division 05 Wake County Wake Forest

PLAN DATE: July 2007 REVIEWED BY:

PREPARED BY: I. O. Umozurike REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

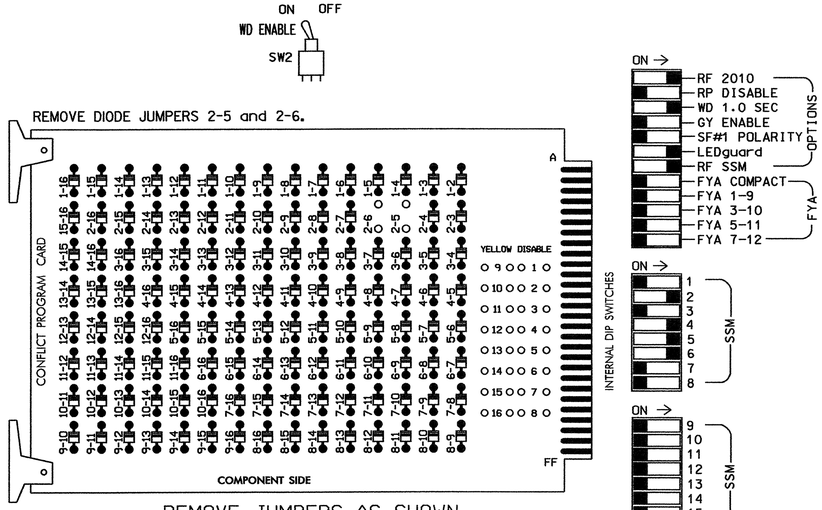
SIGNATURE 8/23/07 DATE

SIG. INVENTORY NO. 05-1866

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	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 1,3,7, 8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 2 and 6, on the controller unit, for Variable Initial and Gap Reduction.
6. The cabinet and controller are part of the Wake Forest Bypass Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S4,S5,S6
PHASES USED.....2,4,5,6
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.	NU	21,22	NU	NU	41,42	62	NU	21,42	61,62	NU	NU	NU	NU
RED		128			101			*	134				
YELLOW		129			102				135				
GREEN		130			103				136				
RED ARROW													
YELLOW ARROW						102		132					
GREEN ARROW						103		133					

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	ø2/SYS 2A/S22	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		ø2/SYS 2B/S23				NOT USED								ST DC ISOLATOR
FILE "J"	U	ø5 5B	ø5 5A	ø6/SYS 6A/S20	ø5 5C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	ø2 5A	ø6/SYS 6B/S21	NOT USED										

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

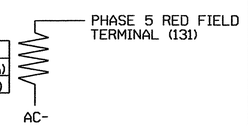
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A/S22	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S23	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
5B	TB3-1,2	J1U	55	17	5	5	Y	Y			15
5A[1]	TB3-5,6	J2U	40	2	6	5	Y	Y			15
	TB3-7,8	J2L	44	6	16	2	Y	Y	Y		3
6A/S20	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
6B/S21	TB3-11,12	J3L	77	39	46	6/SYS	Y	Y			
5C	TB5-1,2	J4U	48	10	26	5	Y	Y			20

[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 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: 05-1866
DESIGNED: July 2007
SEALED: 08-23-07
REVISED: N/A

Signal Upgrade - Final

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 Bypass
at
SR 1923 (Thompson Mill Road)

Division 5 | Wake County | Wake Forest

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

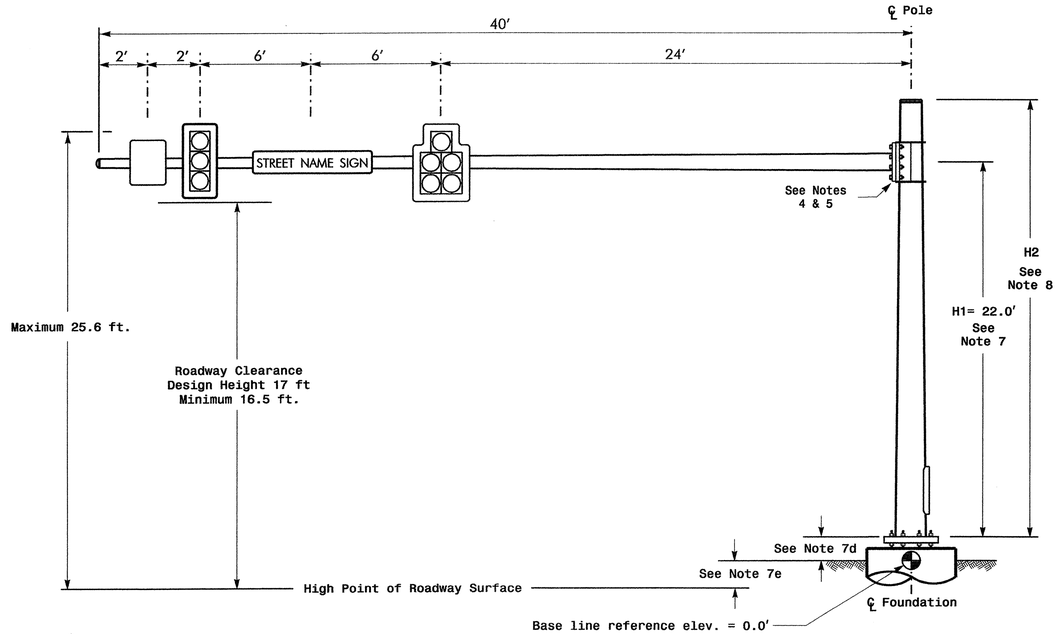
REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
SIGNATURE
8-29-07
DATE
SIG. INVENTORY NO. 05-1866

2:-AUG-2007 13:42
d:*its signals\workgroups\sig man\peterson\05186 6_sm_ele_xxx.dgn
JTPETERSON

Design Loading for METAL POLE NO. 1



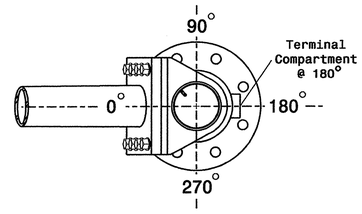
Elevation View

SPECIAL NOTE

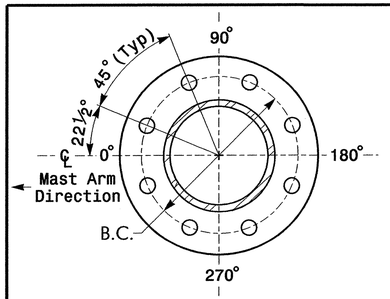
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+3.5 ft.
Elevation difference at Edge of travelway or face of curb	N/A

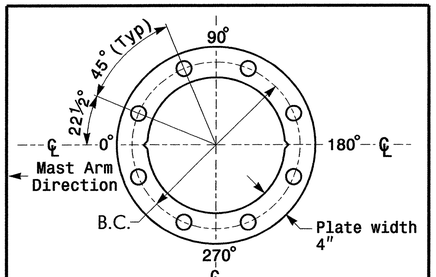


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12″–5 SECTION–WITH BACKPLATE AND ASTRO–BRAC	16.3 S.F.	42.0″ W X 56.0″ L	103 LBS
	SIGNAL HEAD 12″–3 SECTION–WITH BACKPLATE AND ASTRO–BRAC	9.3 S.F.	25.5″ W X 52.5″ L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO–SIGN–BRAC	5.0 S.F.	24.0″ W X 30.0″ L	11 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO–SIGN–BRAC	12.0 S.F.	18.0″ W X 96.0″ L	27 LBS

NOTES

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:
   - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2002 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is .75 feet above the ground elevation.
   e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus ½ of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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

SCALE 0 N/A N/A

NC 98 Bypass
At
SR 1923 (Thompson Mill Road)

Division 5 | Wake County | Wake Forest

PLAN DATE: July 2007 | REVIEWED BY: I.O.Umozurike

PREPARED BY: Luhr | REVIEWED BY:

REVISIONS	INIT.	DATE

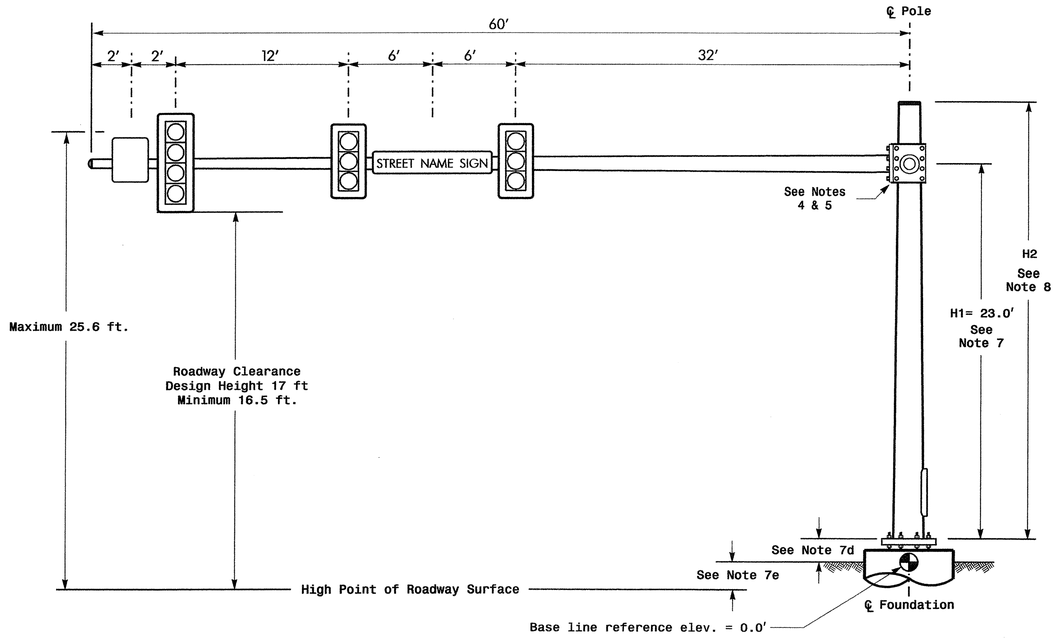
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

SIGNATURE DATE 8/29/07

SIG. INVENTORY NO. 05-1866

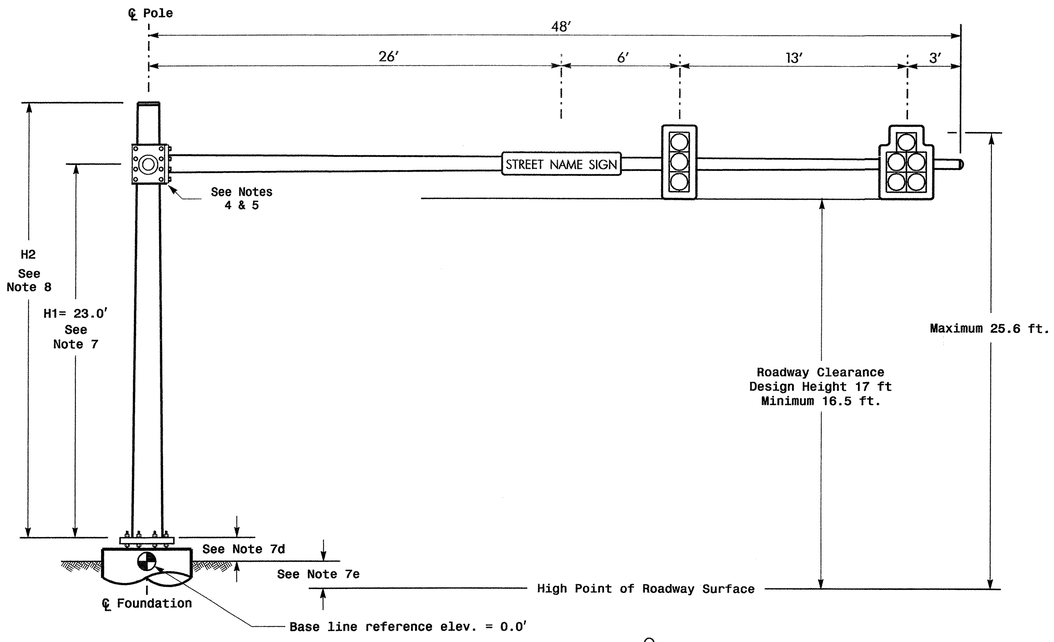
21-AUG-2007 16:22
s:\traffic signals\workgroups\tip projects\r-2809a\signal files\05186b_sig_mp1.2_2007xxxx.dgn
i.umozurike

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



Elevation View @ 270°

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



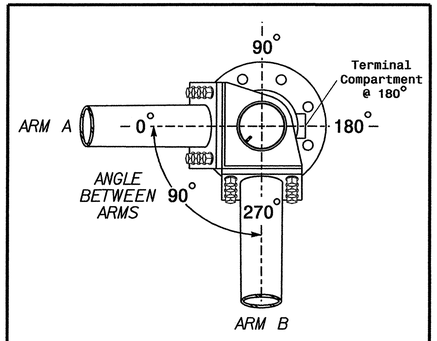
Elevation View @ 0°

SPECIAL NOTE

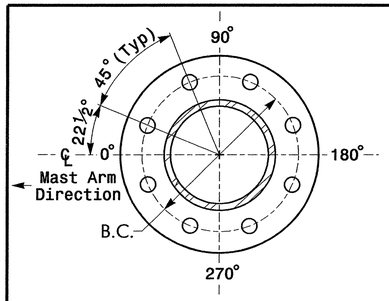
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+4.0 ft.	+4.0 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

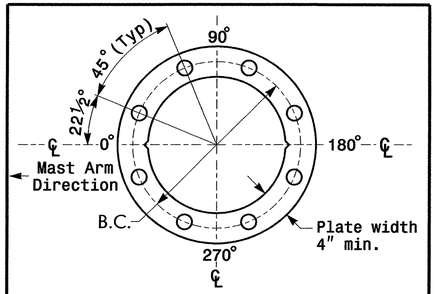


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"–5 SECTION–WITH BACKPLATE AND ASTRO–BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"–4 SECTION–WITH BACKPLATE AND ASTRO–BRAC	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	SIGNAL HEAD 12"–3 SECTION–WITH BACKPLATE AND ASTRO–BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO–SIGN–BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO–SIGN–BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

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2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is .75 feet above the ground elevation.
   e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
8. The pole manufacturer will determine the total height (H2) of the pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus ½ of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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

NC 98 Bypass
At
SR 1923 (Thompson Mill Road)

Division 5 Wake County Wake Forest

PLAN DATE: July 2007 REVIEWED BY: I.O.Umozurike

PREPARED BY: Luhr REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

SIGNATURE 8/29/07 DATE

SIG. INVENTORY NO. 05-1866

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	Sig.8

PHASING DIAGRAM

PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	Ø3+8	Ø4+8	FLASH
21	G	R	R	R
22	G	R	R	R
32	~~R~~	←	~~R~~	~~R~~
41, 42	R	R	G	Y
43	→	~~R~~	→	~~Y~~
81	R	G	G	Y
82	R	G	G	Y

SIGNAL FACE I.D.

Denotes L.E.D.

32 | 21, 41, 42, 81 | 22, 82 | 43

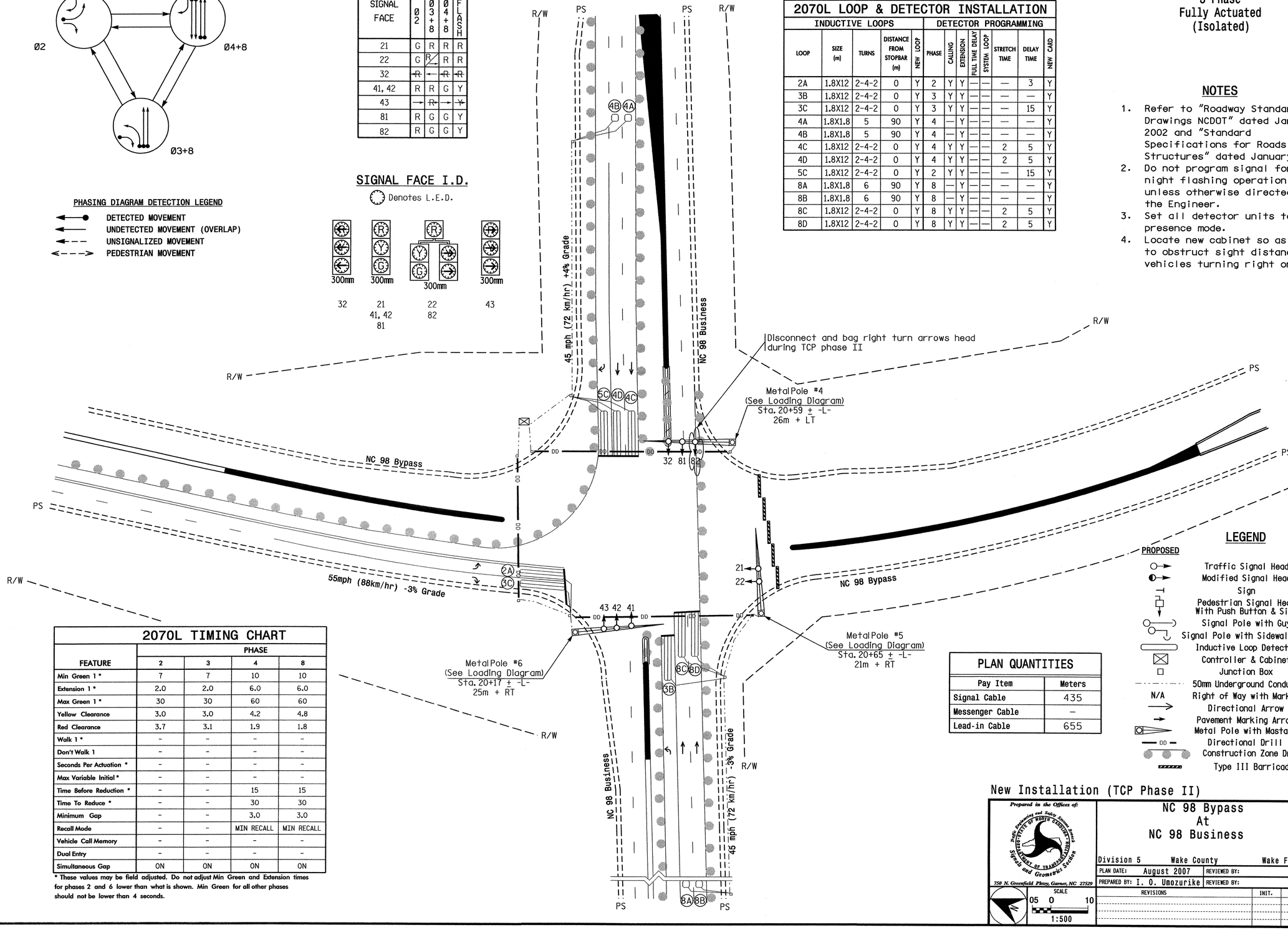
2070L LOOP & DETECTOR INSTALLATION

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	1.8X12	2-4-2	0	Y	2	Y	Y	—	—	—	3	Y
3B	1.8X12	2-4-2	0	Y	3	Y	Y	—	—	—	—	Y
3C	1.8X12	2-4-2	0	Y	3	Y	Y	—	—	—	15	Y
4A	1.8X1.8	5	90	Y	4	—	Y	—	—	—	—	Y
4B	1.8X1.8	5	90	Y	4	—	Y	—	—	—	—	Y
4C	1.8X12	2-4-2	0	Y	4	Y	Y	—	—	2	5	Y
4D	1.8X12	2-4-2	0	Y	4	Y	Y	—	—	2	5	Y
5C	1.8X12	2-4-2	0	Y	2	Y	Y	—	—	—	15	Y
8A	1.8X1.8	6	90	Y	8	—	Y	—	—	—	—	Y
8B	1.8X1.8	6	90	Y	8	—	Y	—	—	—	—	Y
8C	1.8X12	2-4-2	0	Y	8	Y	Y	—	—	2	5	Y
8D	1.8X12	2-4-2	0	Y	8	Y	Y	—	—	2	5	Y

3 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. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.



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 Pole with Mastarm	
DD	Directional Drill	N/A
	Construction Zone Drums	
	Type III Barricade	N/A

2070L TIMING CHART

FEATURE	PHASE 2	3	4	8
Min Green 1 *	7	7	10	10
Extension 1 *	2.0	2.0	6.0	6.0
Max Green 1 *	30	30	60	60
Yellow Clearance	3.0	3.0	4.2	4.8
Red Clearance	3.7	3.1	1.9	1.8
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
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	-	-	-	-
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.

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	435
Messenger Cable	–
Lead-in Cable	655

New Installation (TCP Phase II)

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

SCALE 05 0 10 1:500

NC 98 Bypass At NC 98 Business

Division 5 | Wake County | Wake Forest

PLAN DATE: August 2007 | REVIEWED BY:

PREPARED BY: I. O. Umozurike | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 8/23/07 DATE

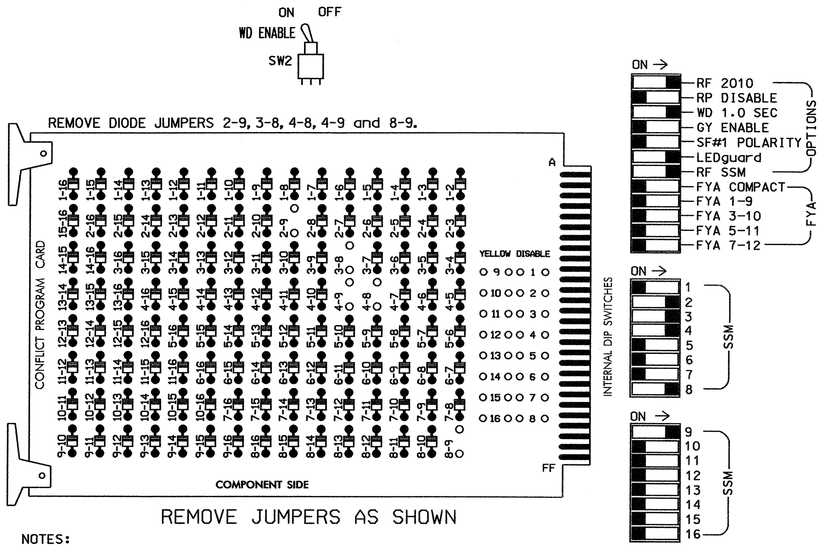
SIG. INVENTORY NO. 05-2300 T1

2:-AUG-2007 15:54
S:\TMOD\Work\Signals\workgroups\tip projects\w-2809a\signal files\05-2300\05-2300_sig_dsn_2007tmodi.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	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 1,5,6, 7,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phase 2, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Gap Reduction.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3		S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3		4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	22	32	41,42	NU	NU	NU	NU	NU	81,82	NU	43	NU	NU	NU	NU	NU
RED		128				101						107							
YELLOW		129				102						108							
GREEN		130				103						109							
RED ARROW					116									A121					
YELLOW ARROW				117	117									A122					
GREEN ARROW				118	118									A123					

NU = NOT USED

Wire Overlap 'A' to flash on Flasher unit #2, Circuit #2.

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.....S2,S3,S4,S8,S9
PHASES USED.....2,3,4,8
OVERLAP A:.....2+4
OVERLAP B:.....NONE
OVERLAP C:.....NONE
OVERLAP D:.....NONE

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:          :1234567891011121314 1516
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
```

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	SLOT EMPTY	ø2 2A	ø3 3C	SLOT EMPTY	ø4 4A	ø4 4C	ø3 3B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L			NOT USED	NOT USED		ø4 4B	ø4 4D	NOT USED						ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	NOT USED	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø8 8C	ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		ø2 5C					ø8 8D	ø8 8B						

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	TB2-9,10	I3U	63	25	32	2	Y	Y			3
3C	TB4-1,2	I4U	47	9	22	3	Y	Y			15
4A	TB4-9,10	I6U	41	3	4	4		Y			
4B	TB4-11,12	I6L	45	7	14	4		Y			
4C	TB6-1,2	I7U	65	27	34	4	Y	Y		2	5
4D	TB6-3,4	I7L	78	40	44	4	Y	Y		2	5
3B	TB6-5,6	I8U	49	11	24	3	Y	Y			
5C	TB3-7,8	J2L	44	6	16	2	Y	Y			15
8C	TB7-1,2	J7U	66	28	38	8	Y	Y		2	5
8D	TB7-3,4	J7L	79	41	48	8	Y	Y		2	5
8A	TB7-5,6	J8U	50	12	28	8		Y			
8B	TB7-7,8	J8L	50	12	28	8		Y			

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-2300 T1
DESIGNED: August 2007
SEALED: 08-23-07
REVISED: N/A

New Installation - Temporary 1

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

NC 98 Bypass at NC 98 Business

Division 5 | Wake County | Wake Forest
PLAN DATE: August 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. 8-24-07
SIGNATURE DATE

SIG. INVENTORY NO. 05-2300 T1

24-AUG-2007 09:02
s:\ts signals\workgroups\sig man\peterson\05230Osmlele_x.dgn
jpeterson

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	Sig.10

PHASING DIAGRAM

PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

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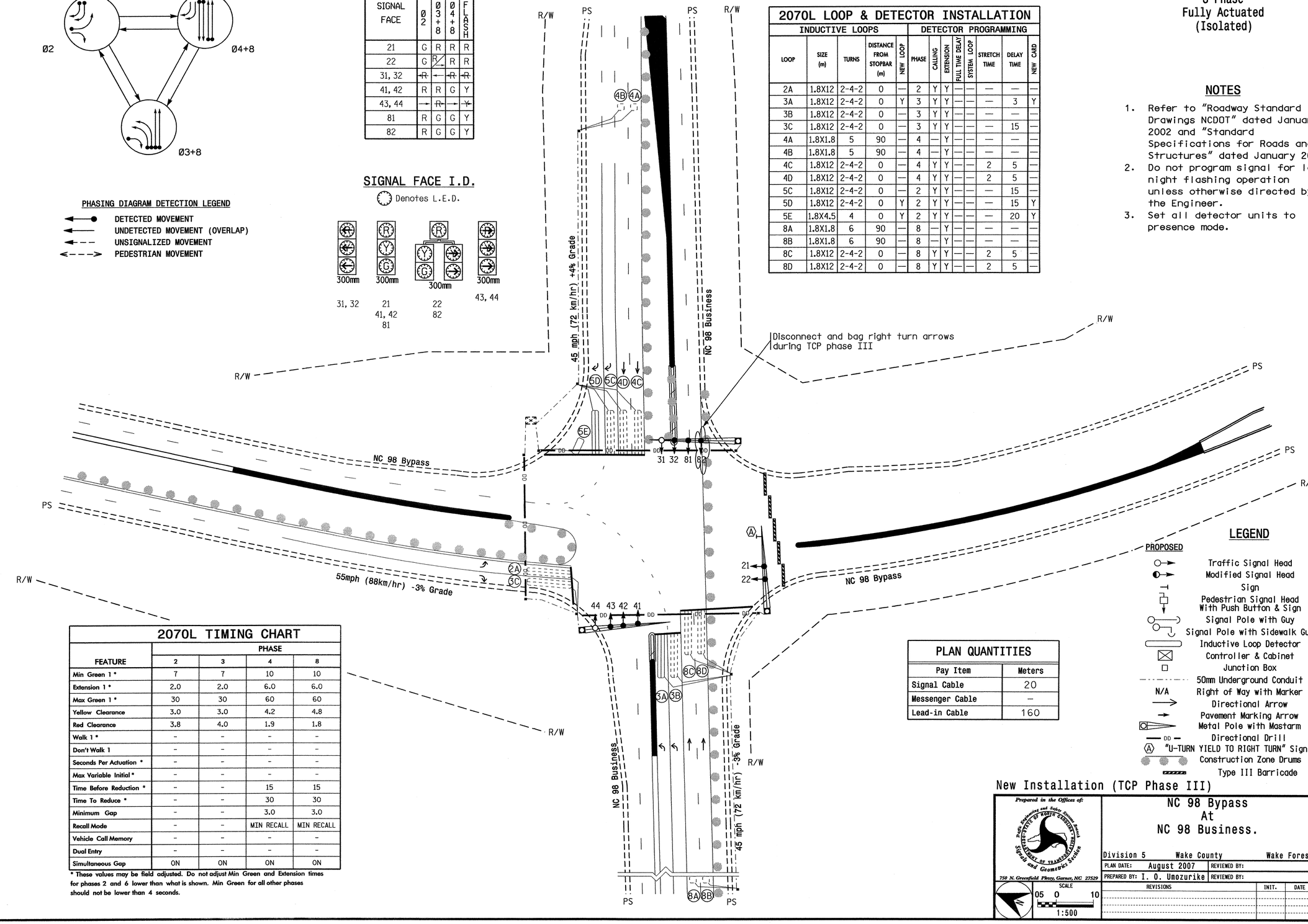
31, 32	~~R~~	←	~~R~~	~~R~~
41, 42	R	R	G	Y
43, 44	→	~~R~~	→	~~Y~~
81	R	G	G	Y
82	R	G	G	Y

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	1.8X12	2-4-2	0	—	2	Y	Y	—	—	—	—	—
3A	1.8X12	2-4-2	0	Y	3	Y	Y	—	—	—	3	Y
3B	1.8X12	2-4-2	0	—	3	Y	Y	—	—	—	—	—
3C	1.8X12	2-4-2	0	—	3	Y	Y	—	—	—	15	—
4A	1.8X1.8	5	90	—	4	—	Y	—	—	—	—	—
4B	1.8X1.8	5	90	—	4	—	Y	—	—	—	—	—
4C	1.8X12	2-4-2	0	—	4	Y	Y	—	—	2	5	—
4D	1.8X12	2-4-2	0	—	4	Y	Y	—	—	2	5	—
5C	1.8X12	2-4-2	0	—	2	Y	Y	—	—	—	15	—
5D	1.8X12	2-4-2	0	Y	2	Y	Y	—	—	—	15	Y
5E	1.8X4.5	4	0	Y	2	Y	Y	—	—	—	20	Y
8A	1.8X1.8	6	90	—	8	—	Y	—	—	—	—	—
8B	1.8X1.8	6	90	—	8	—	Y	—	—	—	—	—
8C	1.8X12	2-4-2	0	—	8	Y	Y	—	—	2	5	—
8D	1.8X12	2-4-2	0	—	8	Y	Y	—	—	2	5	—

3 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. Set all detector units to presence mode.

2070L TIMING CHART

FEATURE	PHASE 2	3	4	8
Min Green 1 *	7	7	10	10
Extension 1 *	2.0	2.0	6.0	6.0
Max Green 1 *	30	30	60	60
Yellow Clearance	3.0	3.0	4.2	4.8
Red Clearance	3.8	4.0	1.9	1.8
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
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	-	-	-	-
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.

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	20
Messenger Cable	–
Lead-in Cable	160

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 Pole with Mastarm	○
DD —	Directional Drill	N/A
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
	Construction Zone Drums	
	Type III Barricade	N/A

New Installation (TCP Phase III)

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

NC 98 Bypass At NC 98 Business.

Division 5 Wake County Wake Forest

PLAN DATE: August 2007 REVIEWED BY:

PREPARED BY: I. O. Umozurike REVIEWED BY:

SCALE 05 0 10 1:500

REVISIONS	INIT.	DATE

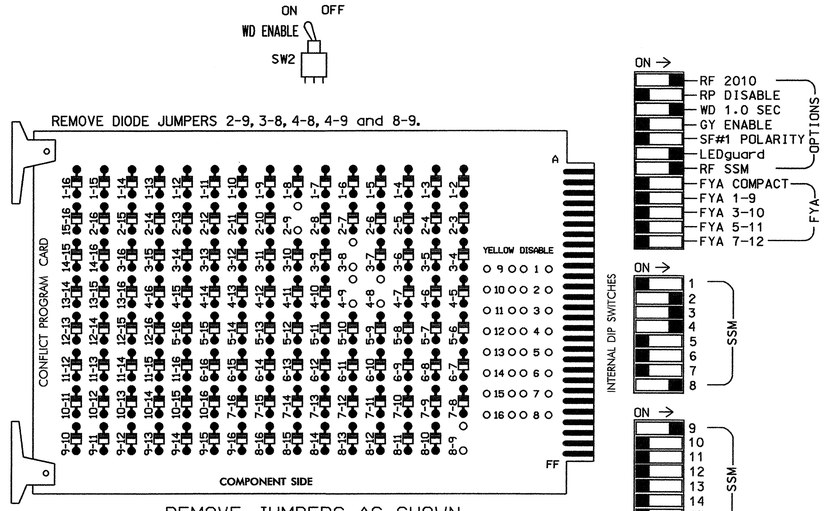
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 8/23/07 DATE

SIG. INVENTORY NO. 05-2300 T2

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	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 1,5,6, 7,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phase 2, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Gap Reduction.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3		S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3		4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	22	31,32	41,42	NU	NU	NU	NU	NU	81,82	NU	43,44	NU	NU	NU	NU	NU
RED		128				101						107							
YELLOW		129				102						108							
GREEN		130				103						109							
RED ARROW					116									A121					
YELLOW ARROW				117	117									A122					
GREEN ARROW				118	118									A123					

NU = NOT USED

Wire Overlap 'A' to flash on Flasher unit #2, Circuit #2.

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.....S2,S3,S4,S8,S9
PHASES USED.....2,3,4,8
OVERLAP A:.....2+4
OVERLAP B:.....NONE
OVERLAP C:.....NONE
OVERLAP D:.....NONE

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

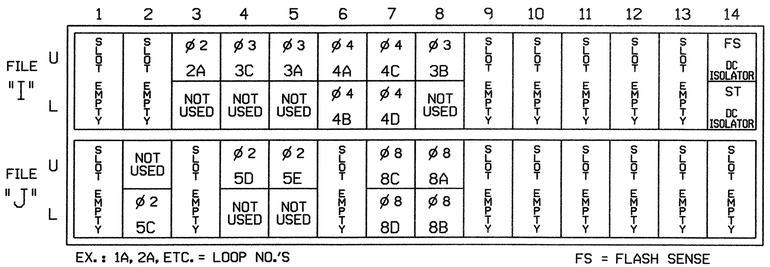
FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```
 PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          |1234567891011121314 1516
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
```

OVERLAP 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
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
3C	TB4-1,2	I4U	47	9	22	3	Y	Y			15
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
4A	TB4-9,10	I6U	41	3	4	4		Y			
4B	TB4-11,12	I6L	45	7	14	4		Y			
4C	TB6-1,2	I7U	65	27	34	4	Y	Y		2	5
4D	TB6-3,4	I7L	78	40	44	4	Y	Y		2	5
3B	TB6-5,6	I8U	49	11	24	3	Y	Y			
5C	TB3-7,8	J2L	44	6	16	2	Y	Y			15
5D	TB5-1,2	J4U	48	10	26	2	Y	Y			15
5E	TB5-5,6	J5U	57	19	7	2	Y	Y			20
8C	TB7-1,2	J7U	66	28	38	8	Y	Y		2	5
8D	TB7-3,4	J7L	79	41	48	8	Y	Y		2	5
8A	TB7-5,6	J8U	50	12	28	8		Y			
8B	TB7-7,8	J8L	50	12	28	8		Y			

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-2300 T2
DESIGNED: August 2007
SEALED: 08-23-07
REVISED: N/A

New Installation - Temporary 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 Bypass
at
NC 98 Business

Division 5 | Wake County | Wake Forest

PLAN DATE: August 2007 | REVIEWED BY: JTR

PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

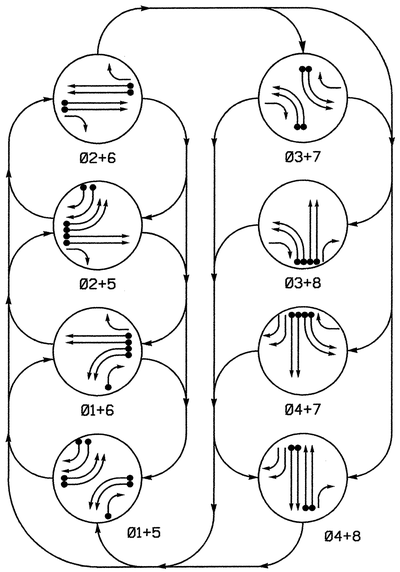
Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N. Greenfield Pwky, Garner, NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
John T. Rowe, Jr. 8-28-07
SIGNATURE DATE

SIG. INVENTORY NO. 05-2300 T2

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	Sig.12

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11, 12	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31, 32	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~R~~	~~R~~	~~R~~
41, 42	R	R	R	R	R	R	G	G	R
43, 44	→	~~R~~	→	~~R~~	~~R~~	~~R~~	→	→	~~R~~
51, 52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/→	R	R/→	R	Y
71, 72	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	←	~~R~~	~~R~~
81	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R

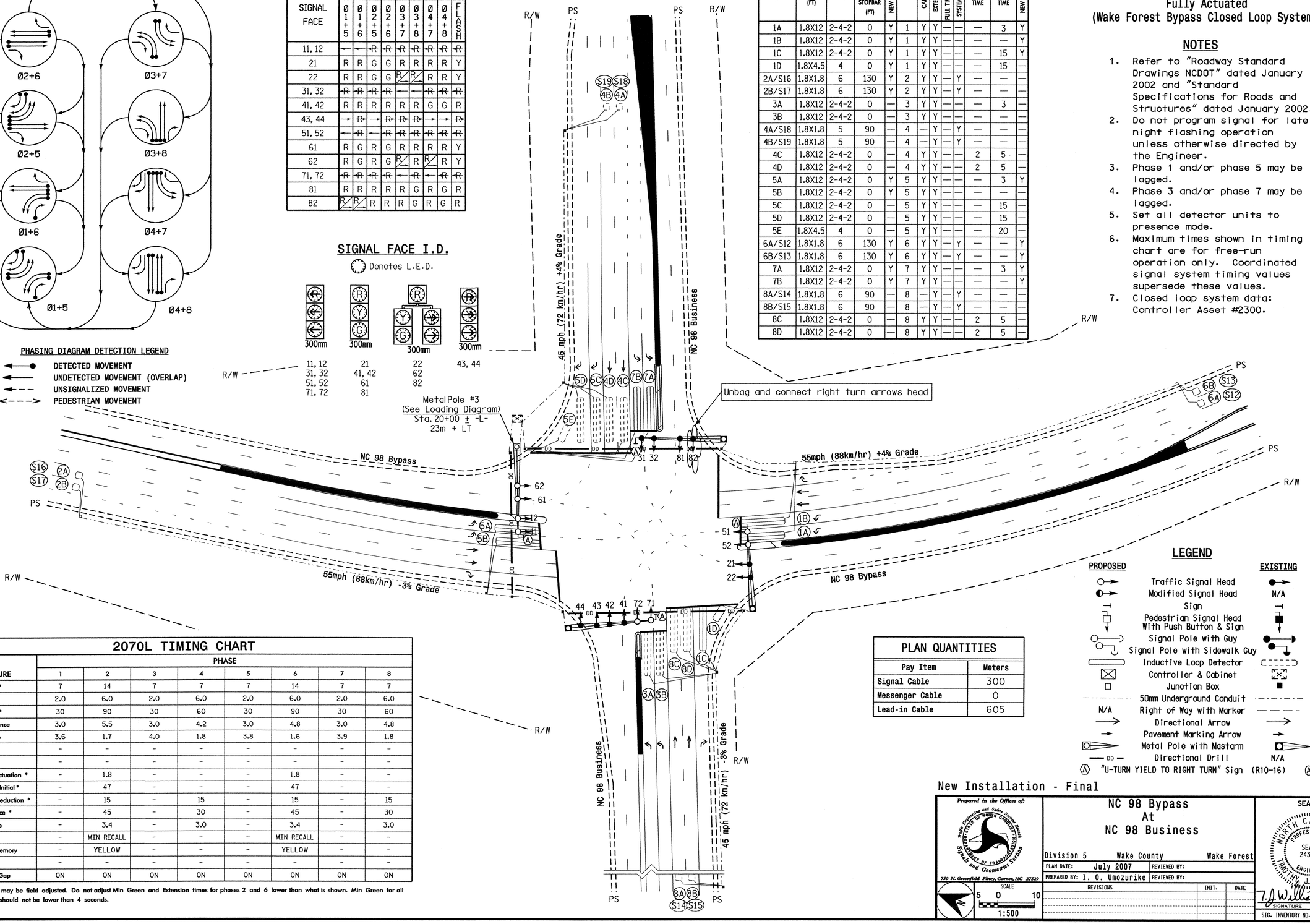
SIGNAL FACE I.D.

Denotes L.E.D.

11, 12	21	22	43, 44
31, 32	41, 42	62	
51, 52	61	82	
71, 72	81		

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	2-4-2	0	Y	1	Y	Y	—	—	—	3	Y
1B	1.8X12	2-4-2	0	Y	1	Y	Y	—	—	—	—	Y
1C	1.8X12	2-4-2	0	Y	1	Y	Y	—	—	—	15	Y
1D	1.8X4.5	4	0	Y	1	Y	Y	—	—	—	15	—
2A/S16	1.8X1.8	6	130	Y	2	Y	Y	—	Y	—	—	—
2B/S17	1.8X1.8	6	130	Y	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	—	—	—	—	—
4A/S18	1.8X1.8	5	90	—	4	—	Y	—	Y	—	—	—
4B/S19	1.8X1.8	5	90	—	4	—	Y	—	Y	—	—	—
4C	1.8X12	2-4-2	0	—	4	Y	Y	—	—	2	5	—
4D	1.8X12	2-4-2	0	—	4	Y	Y	—	—	2	5	—
5A	1.8X12	2-4-2	0	Y	5	Y	Y	—	—	—	3	Y
5B	1.8X12	2-4-2	0	Y	5	Y	Y	—	—	—	—	—
5C	1.8X12	2-4-2	0	—	5	Y	Y	—	—	—	15	—
5D	1.8X12	2-4-2	0	—	5	Y	Y	—	—	—	15	—
5E	1.8X4.5	4	0	—	5	Y	Y	—	—	—	20	—
6A/S12	1.8X1.8	6	130	Y	6	Y	Y	—	Y	—	—	Y
6B/S13	1.8X1.8	6	130	Y	6	Y	Y	—	Y	—	—	Y
7A	1.8X12	2-4-2	0	Y	7	Y	Y	—	—	—	3	Y
7B	1.8X12	2-4-2	0	Y	7	Y	Y	—	—	—	—	Y
8A/S14	1.8X1.8	6	90	—	8	—	Y	—	Y	—	—	—
8B/S15	1.8X1.8	6	90	—	8	—	Y	—	Y	—	—	—
8C	1.8X12	2-4-2	0	—	8	Y	Y	—	—	2	5	—
8D	1.8X12	2-4-2	0	—	8	Y	Y	—	—	2	5	—



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 Pole with Mastarm	
DD	Directional Drill	N/A
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	300
Messenger Cable	0
Lead-in Cable	605

2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green 1 *	7	14	7	7	7	14	7	7
Extension 1 *	2.0	6.0	2.0	6.0	2.0	6.0	2.0	6.0
Max Green 1 *	30	90	30	60	30	90	30	60
Yellow Clearance	3.0	5.5	3.0	4.2	3.0	4.8	3.0	4.8
Red Clearance	3.6	1.7	4.0	1.8	3.8	1.6	3.9	1.8
Walk 1 *	-	-	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-	-	-
Seconds Per Actuation *	-	1.8	-	-	-	1.8	-	-
Max Variable Initial *	-	47	-	-	-	47	-	-
Time Before Reduction *	-	15	-	15	-	15	-	15
Time To Reduce *	-	45	-	30	-	45	-	30
Minimum Gap	-	3.4	-	3.0	-	3.4	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	ON	ON	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.

8 Phase
Fully Actuated
(Wake Forest Bypass Closed Loop System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset #2300.

New Installation - Final

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

NC 98 Bypass At NC 98 Business

Division 5 Wake County Wake Forest

PLAN DATE: July 2007 REVIEWED BY:

PREPARED BY: I. O. Umozurike REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 5 0 10 1:500

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

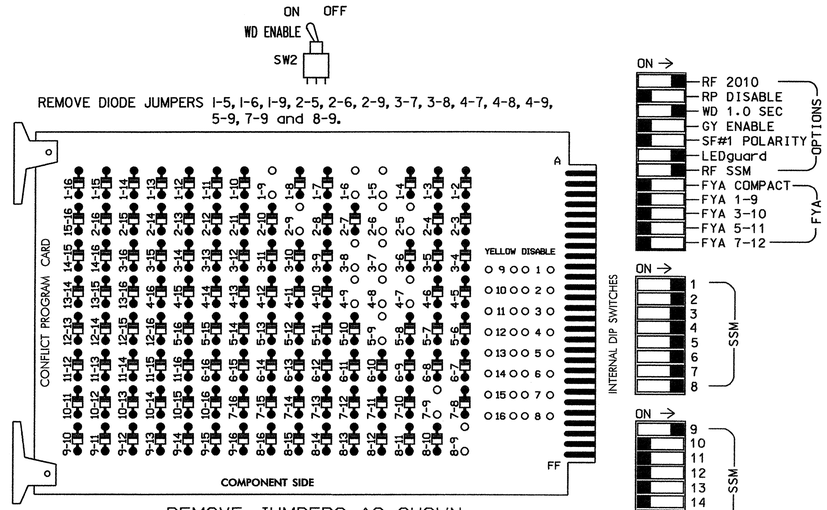
SIGNATURE DATE 8/23/07

SIG. INVENTORY NO. 05-2300

PROJECT REFERENCE NO.	SHEET NO.
R-2809-A	Sig.13

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 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.
6. Program phases 2,4,6 and 8, on the controller unit, for Gap Reduction.
7. The cabinet and controller are part of the Wake Forest Bypass Closed Loop System.

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.....S1,S2,S3,S4,S5,S6,S7,S8,S9
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP A:.....4+5
OVERLAP B:.....NONE
OVERLAP C:.....NONE
OVERLAP D:.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S2P	S3		S4	S4P	S5	S6	S6P	S7		S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1		2	2 PED	3		4	4 PED	5	6	6 PED	7		8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11,12	82	21,22	NU	22	31,32	41,42	NU	51,52	61,62	NU	62	71,72	81,82	NU	43,44	NU	NU	NU	NU	NU
RED			128				101			134				107							
YELLOW			129				102			135				108							
GREEN			130				103			136				109							
RED ARROW	125					116			131				122			A121					
YELLOW ARROW	126	126			117	117			132			123	123			A122					
GREEN ARROW	127	127			118	118			133			124	124			A123					

NU = NOT USED

Wire Overlap 'A' to flash on Flasher unit #2, Circuit #2.

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:          |1234567891011121314 1516
VEH OVL PARENTS:  |   XX
VEH OVL NOT VEH:  |     X
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?...N
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

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	ø1	ø1	ø2/SYS	ø1	ø3	ø4/SYS	ø4	ø3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
		1A	1B	2A/S16	1D	3A	4A/S18	4C	3B						
	L	NOT USED	ø1	ø2/SYS	NOT USED	NOT USED	ø4/SYS	ø4	NOT USED						ST DC ISOLATOR
			1C	2B/S17			4B/S19	4D							
FILE "J"	U	ø5	ø5	ø6/SYS	ø5	ø5	ø7	ø8	SLOT EMPTY	ø8/SYS	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
		5A	5B	6A/S12	5D	5E	7A	8C		8A/S14					
	L	NOT USED	ø5	ø6/SYS	NOT USED	NOT USED	ø7	ø8		ø8/SYS					
			5C	6B/S13			7B	8D		8B/S15					

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			3
1B	TB2-5,6	I2U	39	1	2	1	Y	Y			
1C	TB2-7,8	I2L	43	5	12	1	Y	Y			15
2A/S16	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
2B/S17	TB2-11,12	I3L	76	38	42	2/SYS	Y	Y			
1D	TB4-1,2	I4U	47	9	22	1	Y	Y			15
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
4A/S18	TB4-9,10	I6U	41	3	4	4/SYS		Y			
4B/S19	TB4-11,12	I6L	45	7	14	4/SYS		Y			
4C	TB6-1,2	I7U	65	27	34	4	Y	Y		2	5
4D	TB6-3,4	I7L	78	40	44	4	Y	Y		2	5
3B	TB6-5,6	I8U	49	11	24	3	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			
5C	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A/S12	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
6B/S13	TB3-11,12	J3L	77	39	46	6/SYS	Y	Y			
5D	TB5-1,2	J4U	48	10	26	5	Y	Y			15
5E	TB5-5,6	J5U	57	19	7	5	Y	Y			20
7A	TB5-9,10	J6U	42	4	8	7	Y	Y			3
7B	TB5-11,12	J6L	46	8	18	7	Y	Y			
8C	TB7-1,2	J7U	66	28	38	8	Y	Y		2	5
8D	TB7-3,4	J7L	79	41	48	8	Y	Y		2	5
8A/S14	TB7-9,10	J9U	59	21	15	8/SYS		Y			
8B/S15	TB7-11,12	J9L	61	23	17	8/SYS		Y			

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-2300
DESIGNED: July 2007
SEALED: 08-23-07
REVISED: N/A

New Installation

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 98 Bypass at NC 98 Business

Division 5 | Wake County | Wake Forest

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

REVISIONS	INIT.	DATE

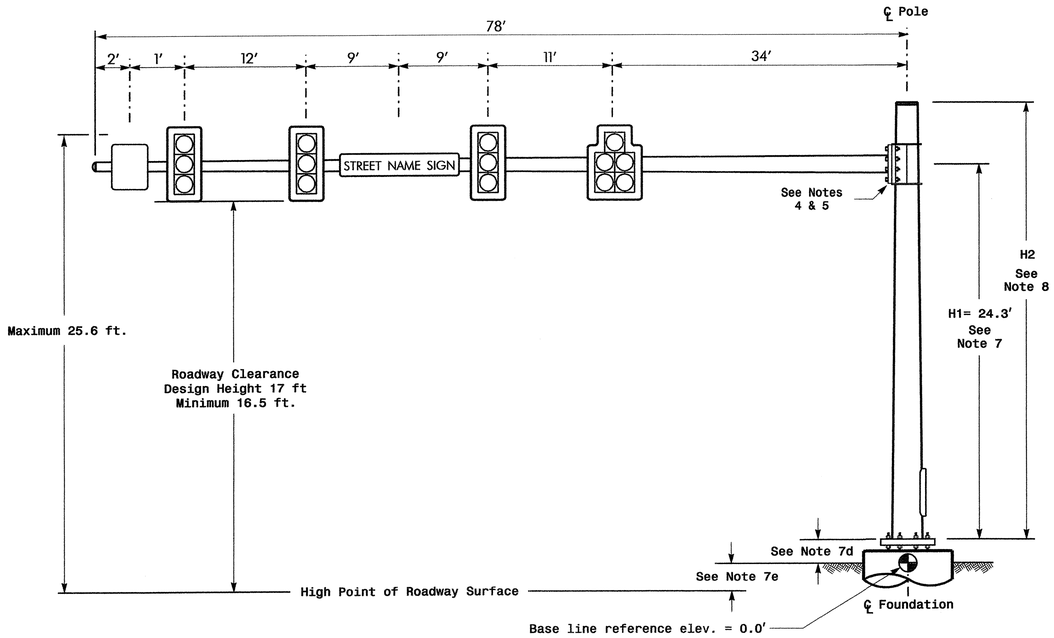
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.

John T. Rowe Jr. 8-29-07
SIGNATURE DATE

SIG. INVENTORY NO. 05-2300

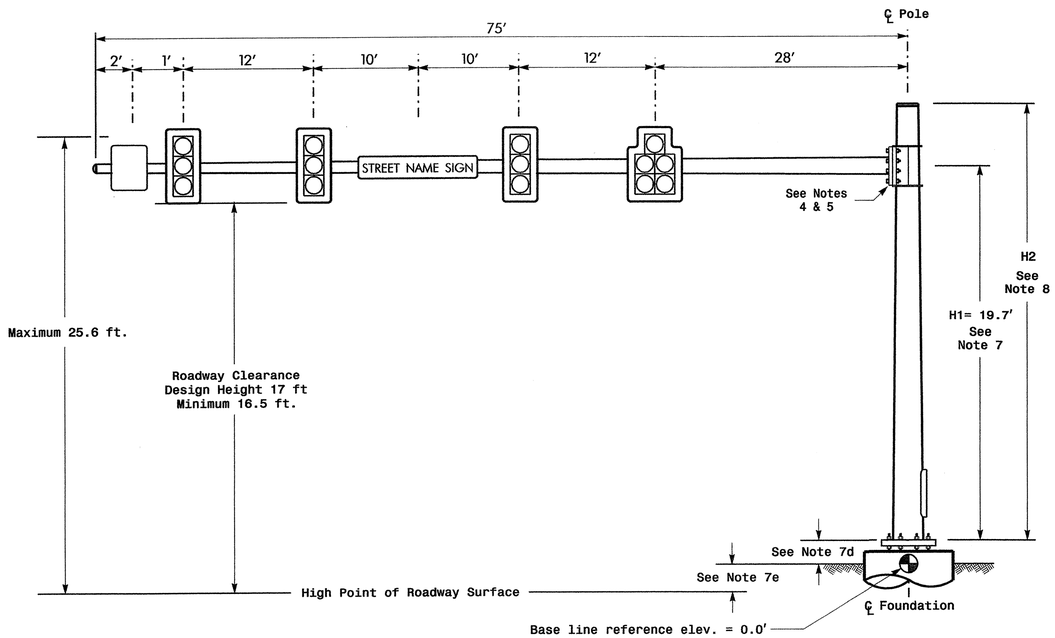
29-AUG-2007 08:00
25-mile 2010ecl-nc network groups#sig mon#peterson#052300_smle1e.x.dgn
jtr#peterson

Design Loading for METAL POLE NO. 3



Elevation View

Design Loading for METAL POLE NO. 4



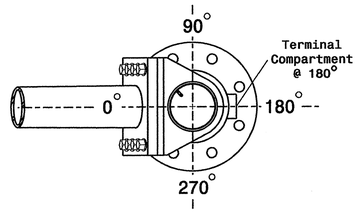
Elevation View

SPECIAL NOTE

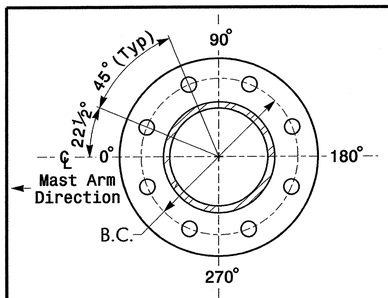
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+5.7 ft.	+1.1 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

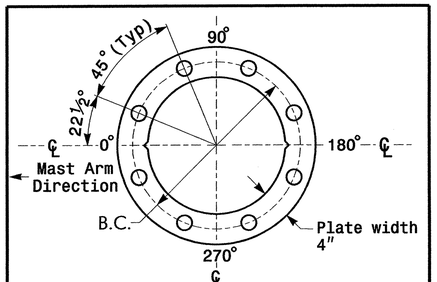


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12″–5 SECTION–WITH BACKPLATE AND ASTRO–BRAC	16.3 S.F.	42.0″ W X 56.0″ L	103 LBS
	SIGNAL HEAD 12″–3 SECTION–WITH BACKPLATE AND ASTRO–BRAC	9.3 S.F.	25.5″ W X 52.5″ L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO–SIGN–BRAC	5.0 S.F.	24.0″ W X 30.0″ L	11 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO–SIGN–BRAC	12.0 S.F.	18.0″ W X 96.0″ L	27 LBS

NOTES

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:
   - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2002 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is .75 feet above the ground elevation.
   e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus ½ of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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

NC 98 Bypass
At
NC 98. Business

Division 5 Wake County Wake Forest

PLAN DATE:	July 2007	REVIEWED BY:	I.O.Umozurike
PREPARED BY:	Luhr	REVIEWED BY:	

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

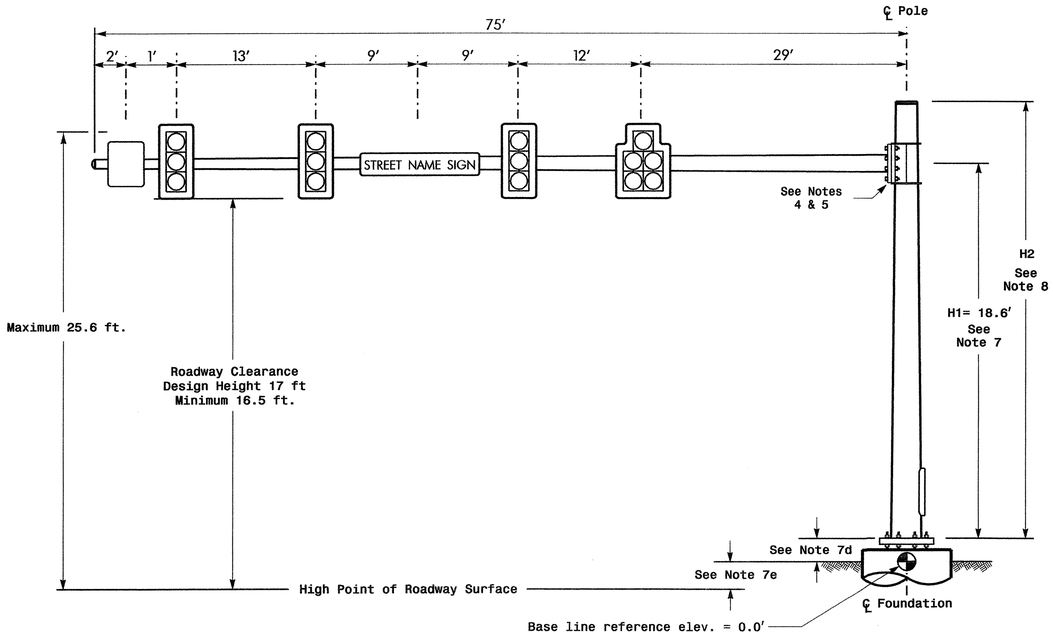
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

SIGNATURE 8/29/07 DATE

SIG. INVENTORY NO. 05-2300

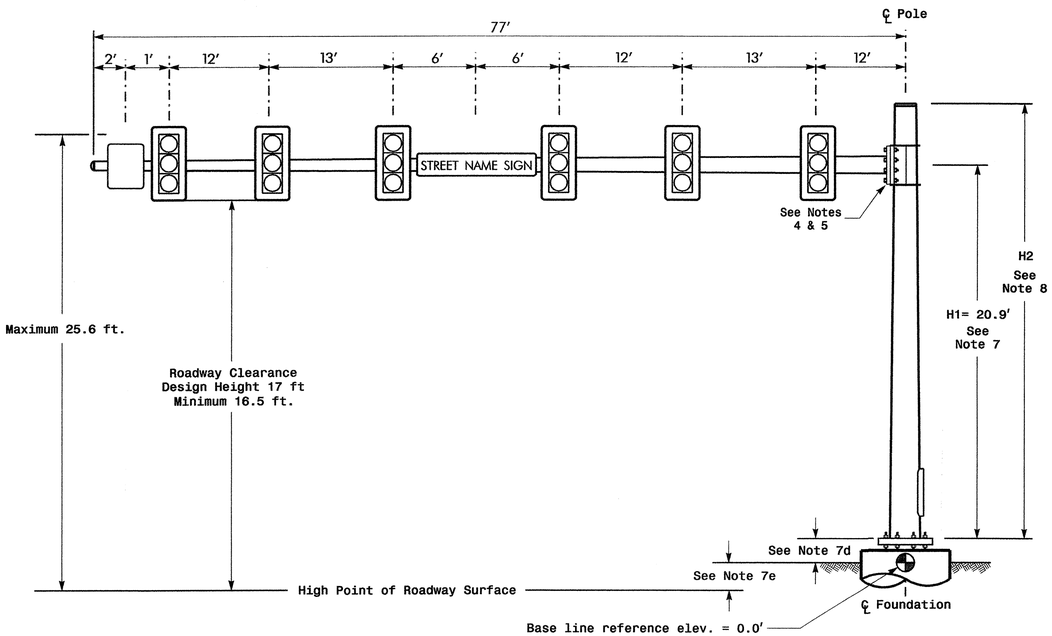
21-AUG-2007 15:56
s:\traffic signals\workgroups\tip projects\mr-2809a\signal files\052300_sig_mp3_4_5_6_2007xxx.dgn
lumozurike

Design Loading for METAL POLE NO. 5



Elevation View

Design Loading for METAL POLE NO. 6



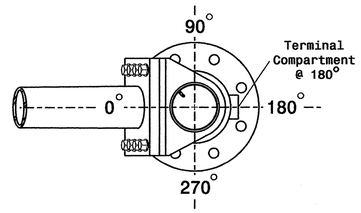
Elevation View

SPECIAL NOTE

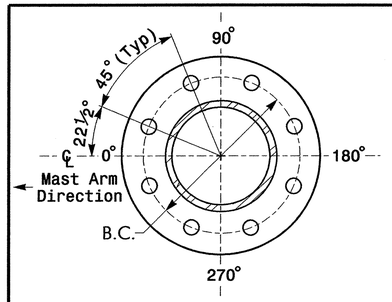
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 5	Pole 6
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	0.0 ft.	+2.3 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

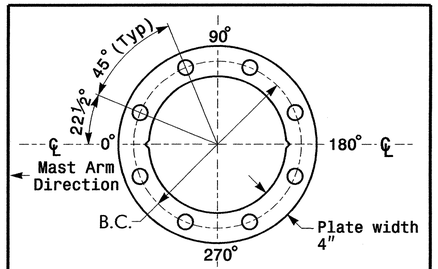


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"–5 SECTION–WITH BACKPLATE AND ASTRO–BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
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7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is .75 feet above the ground elevation.
   e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
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NCDOT Wind Zone 4 (90 mph)

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

NC 98 Bypass
At
NC 98. Business

Division 5 Wake County Wake Forest

PLAN DATE: July 2007	REVIEWED BY: I.O.Umozurike
PREPARED BY: Luhr	REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

SIGNATURE DATE 8/29/07

SIG. INVENTORY NO. 05-2300

8-AUG-2007 15:51
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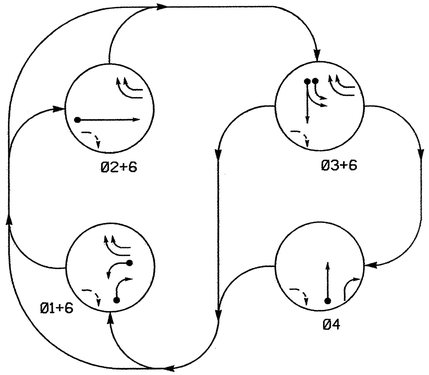
05300.fdb

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	Sig15A

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

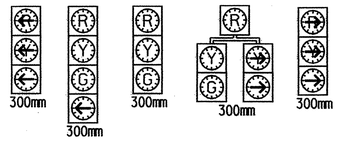
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø3+6	Ø4	FLASH
11	←	~~R~~	~~R~~	~~R~~	~~R~~
21, 22	R	G	R	R	R
31	R	R	G ←	R	Y
32, 33	R	R	G	R	Y
41, 43	R	R	R	G	R
42	R/→	R	R	G	R
61, 62	→	→	→	~~R~~	~~Y~~

SIGNAL FACE I.D.

Denotes L.E.D.



11 | 31 | 21, 22, 32, 33, 41, 43 | 42 | 61, 62

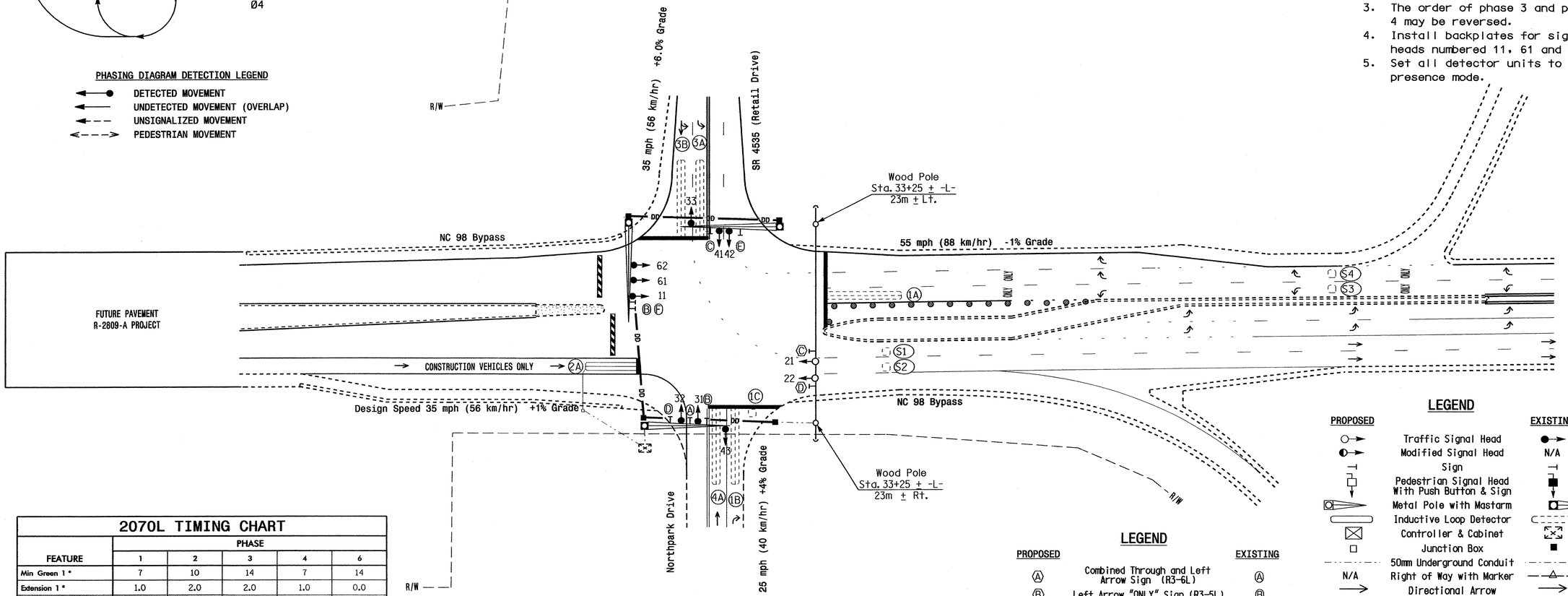
2070L LOOP & DETECTOR INSTALLATION

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
1A	1.8X18	2-4-2	0	—	1	Y	Y	—	—	—	—	—
1B	1.8X18	2-4-2	0	—	1	Y	Y	—	—	—	15	—
1C	1.8X1.8	5	0	—	1	Y	Y	—	—	—	15	—
2A	1.8X12	2-4-2	0	Y	2	Y	Y	—	—	—	—	Y
3A	1.8X18	2-4-2	0	—	3	Y	Y	—	—	—	—	—
3B	1.8X18	2-4-2	0	—	3	Y	Y	—	—	—	—	—
4A	1.8X18	2-4-2	0	—	4	Y	Y	—	—	—	3	—
S1	1.8X1.8	5	+16	—	—	—	—	—	Y	—	—	—
S2	1.8X1.8	5	+16	—	—	—	—	—	Y	—	—	—
S3	1.8X1.8	5	+118	—	—	—	—	—	Y	—	—	—
S4	1.8X1.8	5	+118	—	—	—	—	—	Y	—	—	—

4 Phase Fully Actuated (Wake Forest Bypass Closed Loop)

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. The order of phase 3 and phase 4 may be reversed.
4. Install backplates for signal heads numbered 11, 61 and 62.
5. Set all detector units to presence mode.



LEGEND

PROPOSED		EXISTING
Ⓐ	Combined Through and Left Arrow Sign (R3-6L)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	No Left Turn Sign (R3-2)	Ⓒ
Ⓓ	No Right Turn Sign (R3-1)	Ⓓ
Ⓔ	Right Arrow "ONLY" Sign (R3-5R)	Ⓔ
Ⓕ	U-Turn "MUST YIELD" Sign (R3-27)	Ⓕ

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
DD	Directional Drill Polyethylene Conduit	N/A
	Tubular markers	N/A

2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	6
Min Green 1 *	7	10	14	7	14
Extension 1 *	1.0	2.0	2.0	1.0	0.0
Max Green 1 *	15	25	90	15	90
Yellow Clearance	3.0	3.8	3.5	3.0	3.0
Red Clearance	3.6	1.6	2.9	3.2	2.0
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	-	-	MIN RECALL	-	MIN RECALL
Vehicle Call Memory	-	-	-	-	-
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	75
Messenger Cable	50
Lead-in Cable	10

Signal Upgrade

Prepared in the Offices of: Highway Design Branch, Traffic Engineering and Safety Systems Branch, NCDEPARTMENT OF TRANSPORTATION, Planning and Geographic Services Section
122 N. McDowell St., Raleigh, NC 27603

NC 98 Bypass At SR 4535 (Retail Drive)/ Northpark Drive

Division 05 Wake County Wake Forest

PLAN DATE: November 2007 REVIEWED BY:

PREPARED BY: I. O. Umozurike REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 5 0 10 1:500

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

SIGNATURE 12/6/07 DATE

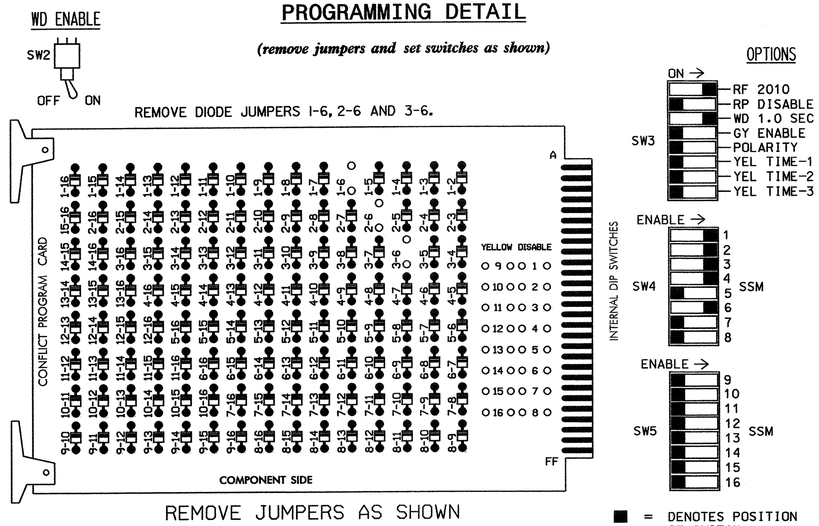
SIG. INVENTORY NO. 05-2204 T

06-DEC-2007 07:51
S:\TEC\Sig\Workgroups\#tip projects\R-2809A\#signals\#designs\signals#05-2204#05220415temp_sig_dsn_2007mdd1.dgn
tthigpen

PROJECT REFERENCE NO.	SHEET NO.
	Sig.15B

EDI MODEL 2010ECL 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 SEL1-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. To prevent red failures on unused monitor channels, see Red Monitor Board Programming Detail this sheet.
3. Program phases 3 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 Wake Forest Bypass Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S2P	S3		S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1		2	2 PED	3		4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11	42	21,22	NU	31	32,33	41, 42,43	NU	NU	61,62	NU	NU	NU	NU
RED			128		116	116	101							
YELLOW			129		117	117	102							
GREEN			130		118	118	103							
RED ARROW	125									134				
YELLOW ARROW	126	126								135				
GREEN ARROW	127	127			118					136				

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....EXISTING ECONOLITE ATC TYPE 2070L
CABINET.....EXISTING McCAIN/CONTROL TECHNOLOGIES (DWG.NO.9500-332-NCDOT)
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S3,S4,S6
PHASES USED.....1,2,3,4,6
OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

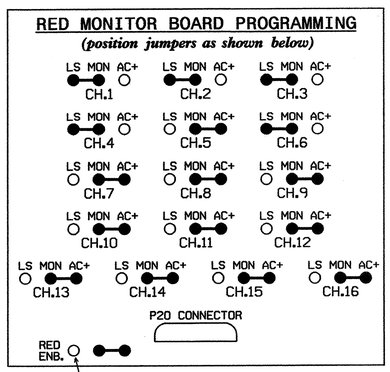
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	SLOT EMPTY	SLOT EMPTY	Ø3 3A	Ø3 3B	Ø4 4A	SYS. DET. S1	Ø1 1C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED			NOT USED	NOT USED	Ø2 2A	SYS. DET. S2	Ø1 1B						ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L							SYS. DET. S4							

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

FS = FLASH SENSE
ST = STOP TIME

RED MONITOR BOARD PROGRAMMING

(position jumpers as shown below)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
1B	TB6-7,8	I8L	49	11	24	1	Y	Y			15
1C	TB6-5,6	I8U	49	11	24	1	Y	Y			15
2A	TB4-11,12	I6L	45	7	14	2	Y	Y			
3A	TB4-1,2	I4U	47	9	22	3	Y	Y			
3B	TB4-5,6	I5U	58	20	3	3	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
✱ S1	TB6-1,2	I7U	65	27	34	SYS					
✱ S2	TB6-3,4	I7L	78	40	44	SYS					
✱ S3	TB7-1,2	J7U	66	28	38	SYS					
✱ S4	TB7-3,4	J7L	79	41	48	SYS					

✱ System Detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

PHASE SEQUENCE PROGRAMMING DETAIL

(program controller as shown below)

FROM OASIS LOCAL CONTROLLER MAIN MENU
SELECT: 4 PHASE SEQUENCE

PHASE SEQUENCE: PAGE 1 NEXT: PAGES) ↘

RNG	LEAD	BARRIER 1		X-LAG	LEAD	BARRIER 2		X-LAG
1	1	2	3	0	4	0	0	0
2	0	6	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-2204 T
DESIGNED: November 2007
SEALED: 12/06/07
REVISED: N/A

Signal Upgrade

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

NC 98 Bypass
at
SR 4535 (Retail Drive)/
Northpark Drive

Division 5 | Wake County | Wake Forest
PLAN DATE: December 2007 | REVIEWED BY: T. Lipp
PREPARED BY: C. Strickland | REVIEWED BY:

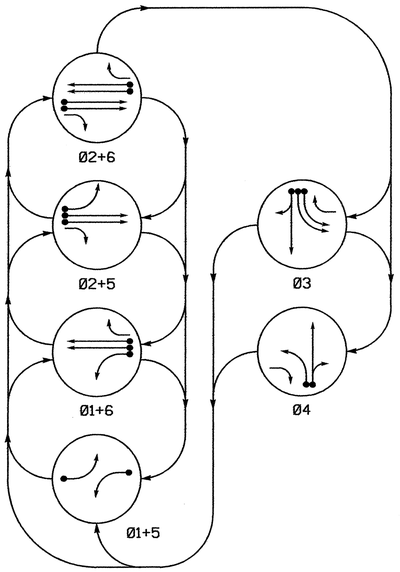
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE
12/6/07 DATE
SIG. INVENTORY NO. 05-2204 T

06-DEC-2007 09:55
s:\its signals\workgroups\sig mgmt\strickland\m052204t_sm_ele_xxx.dgn
dist\strickland

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	Sig.1

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

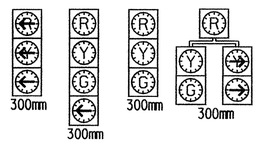
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	Ø3	Ø4	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R/→	Y
31, 32	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
33, 34, 35	R	R	R	R	G	R	R
41	R	R	R	R	R	G/←	R
42, 43	R	R	R	R	R	G	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~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.



11, 31, 32, 51 — 41 — 21, 42, 43, 33, 34, 35, 61 — 22, 62

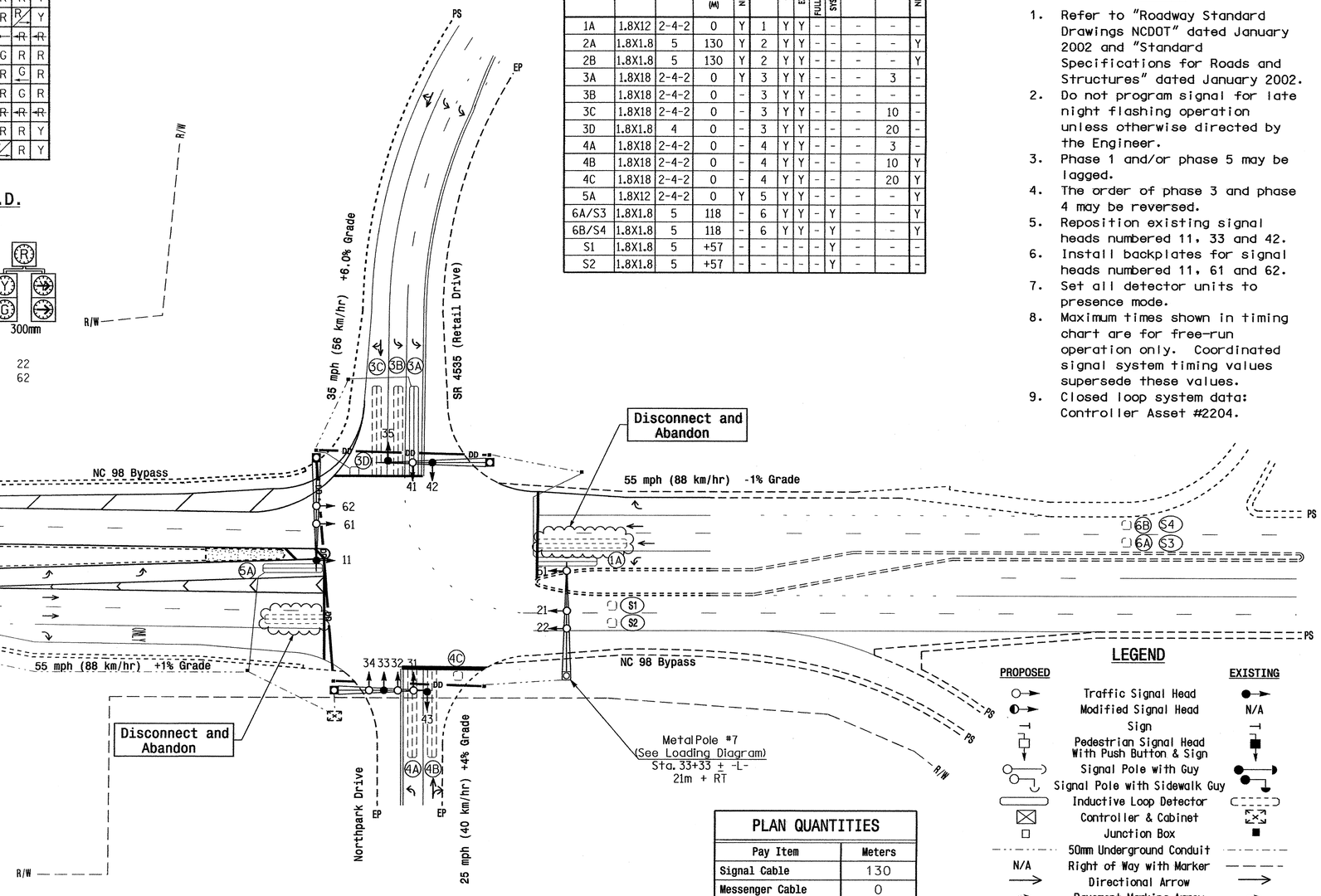
2070L LOOP & DETECTOR INSTALLATION

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
1A	1.8X12	2-4-2	0	Y	1	Y	Y	-	-	-	-	-
2A	1.8X1.8	5	130	Y	2	Y	Y	-	-	-	-	Y
2B	1.8X1.8	5	130	Y	2	Y	Y	-	-	-	-	Y
3A	1.8X18	2-4-2	0	Y	3	Y	Y	-	-	-	3	-
3B	1.8X18	2-4-2	0	-	3	Y	Y	-	-	-	-	-
3C	1.8X18	2-4-2	0	-	3	Y	Y	-	-	-	10	-
3D	1.8X1.8	4	0	-	3	Y	Y	-	-	-	20	-
4A	1.8X18	2-4-2	0	-	4	Y	Y	-	-	-	3	-
4B	1.8X18	2-4-2	0	-	4	Y	Y	-	-	-	10	Y
4C	1.8X18	2-4-2	0	-	4	Y	Y	-	-	-	20	Y
5A	1.8X12	2-4-2	0	Y	5	Y	Y	-	-	-	-	Y
6A/S3	1.8X1.8	5	118	-	6	Y	Y	-	Y	-	-	Y
6B/S4	1.8X1.8	5	118	-	6	Y	Y	-	Y	-	-	Y
S1	1.8X1.8	5	+57	-	-	-	-	-	Y	-	-	-
S2	1.8X1.8	5	+57	-	-	-	-	-	Y	-	-	-

6 Phase Fully Actuated (Wake Forest Bypass Closed Loop)

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 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads numbered 11, 33 and 42.
6. Install backplates for signal heads numbered 11, 61 and 62.
7. Set all detector units to presence mode.
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 #2204.



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	→
DD	Directional Drill	N/A
◁—	Metal Pole with Mastarm	◁—

PLAN QUANTITIES

Pay Item	Meters
Signal Cable	130
Messenger Cable	0
Lead-in Cable	325

This plan shall supersede plan sealed on 8/23/2007

2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	14	7	7	7	14
Extension 1 *	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	90	30	20	15	90
Yellow Clearance	3.0	5.1	3.5	3.0	3.0	5.3
Red Clearance	3.5	1.6	3.2	3.2	3.0	1.6
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	1.8	-	-	-	1.8
Max Variable Initial *	-	46	-	-	-	43
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	45	-	-	-	45
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	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
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals and Geometrics Section
750 N. Greenfield Pkwy, Garner, NC 27529

NC 98 Bypass At SR 4535 (Retail Drive)/ Northpark Drive

Division 05 Wake County Wake Forest

PLAN DATE: November 2007 REVIEWED BY:

PREPARED BY: I. O. Umozurike REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 5 0 10 1:500

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY WILLIAMS
SIGNATURE 12/6/07. DATE

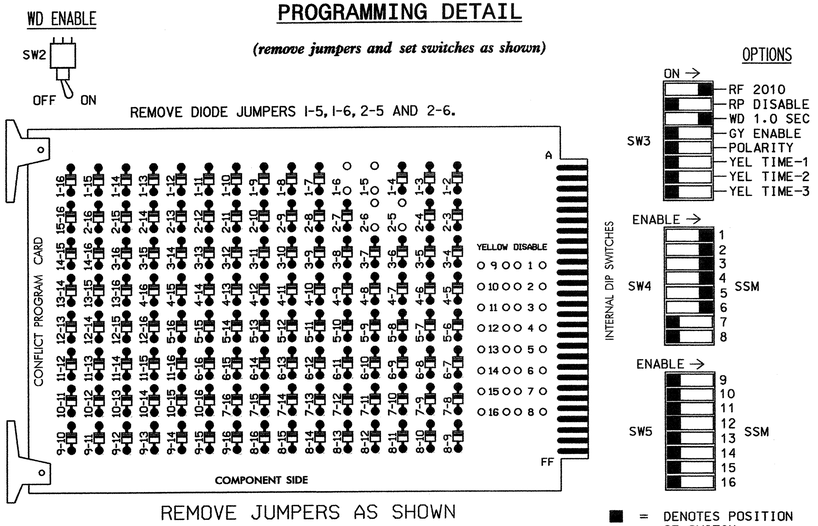
SIG. INVENTORY NO. 05-2204

06-DEC-2007 07:54
s:\rtg\signals\workgroups\tip projects\r-2809a\design\signals\d05-2204\d52204_sig_dsn_2007nmdd.dgn
timgoon

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	Sig.15D

EDI MODEL 2010ECL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches 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 SEL1-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. To prevent red failures on unused monitor channels, see Red Monitor Board Programming Detail this sheet.
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. The cabinet and controller are part of the Wake Forest Bypass Closed Loop.

EQUIPMENT INFORMATION

CONTROLLER.....EXISTING ECONOLITE ATC TYPE 2070L
CABINET.....EXISTING McCAIN/CONTROL TECHNOLOGIES (DWG.NO.9500-332-NCDOT)
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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3		S4			S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3			4		4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11	21,22	NU	31,32	33, 34,35	62	22	41	42,43	NU	51	61,62	NU	NU	NU	NU
RED		128			116			101	101			134				
YELLOW		129			117			102	102			135				
GREEN		130			118			103	103			136				
RED ARROW	125			116							131					
YELLOW ARROW	126			117		117	102				132					
GREEN ARROW	127			118		118	103	103			133					

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø1 1A	ø2 2A	ø3 3A	SLOT EMPTY	ø3 3B	ø3 3C	ø4 4A	ø4 4C	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	ø2 2B	NOT USED		NOT USED	ø3 3D	ø4 4B	NOT USED	SYS. DET. S2					ST DC ISOLATOR
FILE "J"	U	ø5 5A	ø6/SYS 6A/S3	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	NOT USED	ø6/SYS 6B/S4												

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

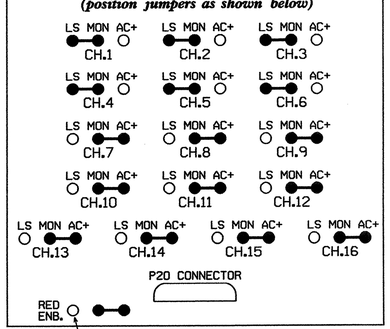
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A	TB2-9,10	I3U	63	25	32	3	Y	Y			3
3B	TB4-5,6	I5U	58	20	3	3	Y	Y			
3C	TB4-9,10	I6U	41	3	4	3	Y	Y			10
3D	TB4-11,12	I6L	45	7	14	3	Y	Y			20
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			10
4C	TB6-5,6	I8U	49	11	24	4	Y	Y			20
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A/S3	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S4	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			
* S1	TB6-9,10	I9U	60	22	11	SYS					
* S2	TB6-11,12	I9L	62	24	13	SYS					

* System Detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

RED MONITOR BOARD PROGRAMMING

(position jumpers as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-2204
DESIGNED: November 2007
SEALED: 12/06/07
REVISED: N/A

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 08/29/07

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 98 Bypass
at
SR 4535 (Retail Drive)/
Northpark Drive

Division 05 | Wake County | Wake Forest

PLAN DATE: December 2007 | REVIEWED BY: T. Hyde
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 12/6/07
SIGNATURE DATE

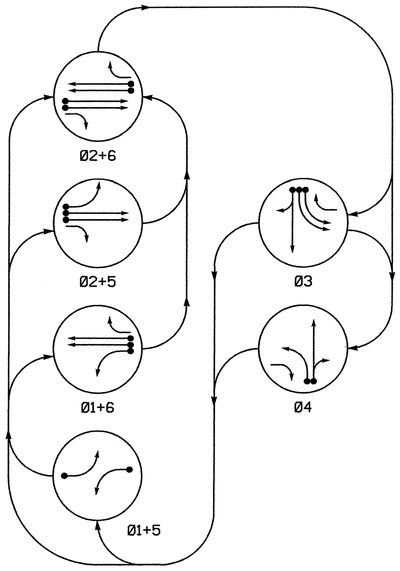
SIG. INVENTORY NO. 05-2204

06-DEC-2007 10:29
s:\rtb_sig\data\workgroups\sig mgmt\rick\and\m052204_smlete_xxx.dgn
c:\rtb_sig\data\workgroups\sig mgmt\rick\and\m052204_smlete_xxx.dgn

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	Sig.16

6 Phase
Fully Actuated
(Wake Forest Bypass Closed Loop)

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
11	←R	←R	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R/→	Y
31, 32	~~R~~	~~R~~	~~R~~	~~R~~	←R	~~R~~	~~R~~
33, 34, 35	R	R	R	R	G	R	R
41	R	R	R	R	R	G	R
42, 43	R	R	R	R	R	G	R
51	←R	~~R~~	←R	~~R~~	~~R~~	~~R~~	~~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.

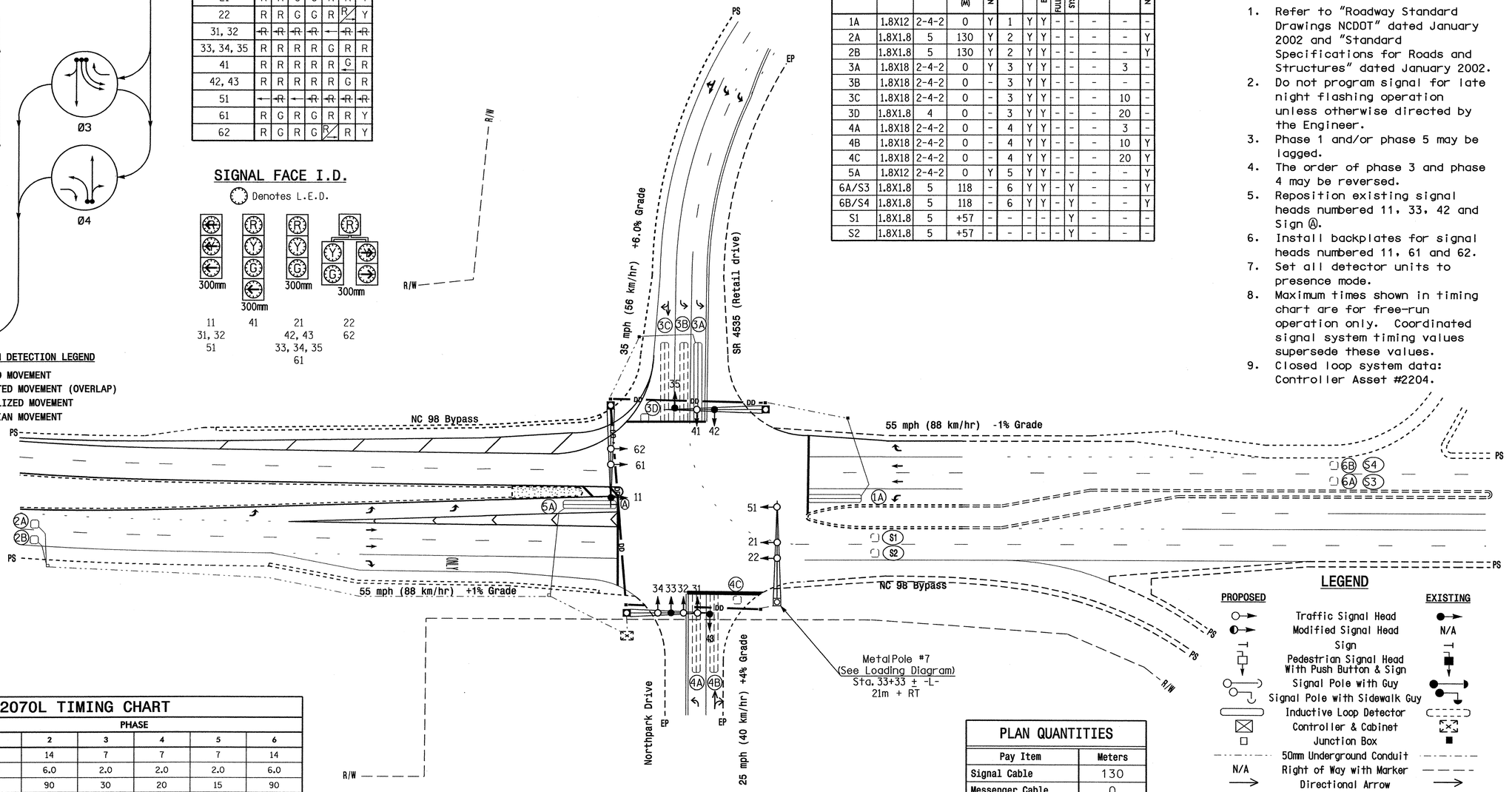
11, 31, 32, 51 | 41 | 21, 42, 43, 33, 34, 35, 61 | 22, 62

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
1A	1.8X12	2-4-2	0	Y	1	Y	Y	-	-	-	-	-
2A	1.8X1.8	5	130	Y	2	Y	Y	-	-	-	-	Y
2B	1.8X1.8	5	130	Y	2	Y	Y	-	-	-	-	Y
3A	1.8X18	2-4-2	0	Y	3	Y	Y	-	-	-	3	-
3B	1.8X18	2-4-2	0	-	3	Y	Y	-	-	-	-	-
3C	1.8X18	2-4-2	0	-	3	Y	Y	-	-	-	10	-
3D	1.8X1.8	4	0	-	3	Y	Y	-	-	-	20	-
4A	1.8X18	2-4-2	0	-	4	Y	Y	-	-	-	3	-
4B	1.8X18	2-4-2	0	-	4	Y	Y	-	-	-	10	Y
4C	1.8X18	2-4-2	0	-	4	Y	Y	-	-	-	20	Y
5A	1.8X12	2-4-2	0	Y	5	Y	Y	-	-	-	-	Y
6A/S3	1.8X1.8	5	118	-	6	Y	Y	-	Y	-	-	Y
6B/S4	1.8X1.8	5	118	-	6	Y	Y	-	Y	-	-	Y
S1	1.8X1.8	5	+57	-	-	-	-	-	Y	-	-	-
S2	1.8X1.8	5	+57	-	-	-	-	-	Y	-	-	-

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 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads numbered 11, 33, 42 and Sign Ⓐ.
6. Install backplates for signal heads numbered 11, 61 and 62.
7. Set all detector units to presence mode.
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 #2204.



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	→
— DD —	Directional Drill	N/A
◁	Metal Pole with Mastarm	◁
Ⓐ	U-Turn "MUST YIELD" Sign (R3-27)	Ⓐ

2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	14	7	7	7	14
Extension 1 *	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	90	30	20	15	90
Yellow Clearance	3.0	5.1	3.5	3.0	3.0	5.3
Red Clearance	3.5	1.6	3.2	3.2	3.0	1.6
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	1.8	-	-	-	1.8
Max Variable Initial *	-	46	-	-	-	43
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	45	-	-	-	45
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	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	130
Messenger Cable	0
Lead-in Cable	325

Signal Upgrade

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

NC 98 Bypass
At
SR 4535 (Retail Drive)/
Northpark Drive

Division 05 Wake County Wake Forest

PLAN DATE: July 2007 REVIEWED BY:

PREPARED BY: I. O. Umozurike REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 5 0 10 1:500

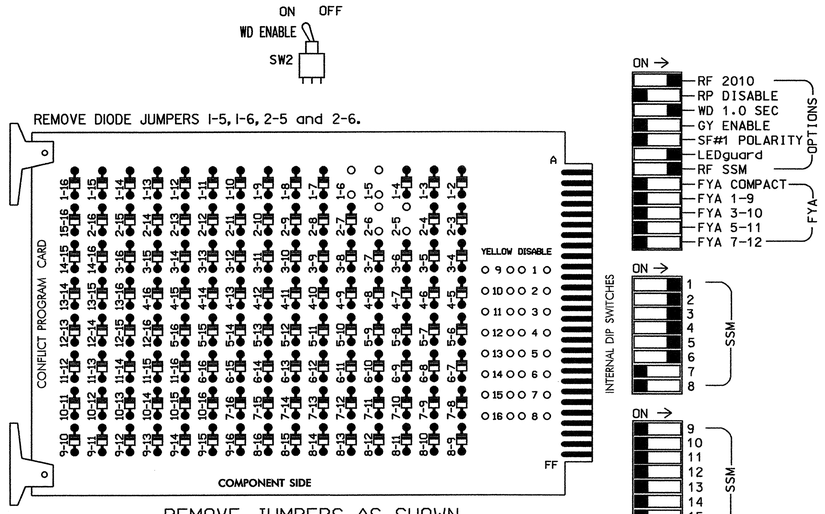
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY L WILLIAMS
SIGNATURE 8/23/07 DATE

SIG. INVENTORY NO. 05-2204

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	Sig.17

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. The cabinet and controller are part of the Wake Forest Bypass Closed Loop.

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3			S4			S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3			4			4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11	21,22	NU	31,32	33, 34,35	62	22	41	42,43	NU	51	61,62	NU	NU	NU	NU
RED		128			116			101	101			134				
YELLOW		129			117			102	102			135				
GREEN		130			118			103	103			136				
RED ARROW	125			116							131					
YELLOW ARROW	126			117		117	102				132					
GREEN ARROW	127			118		118	103	103			133					

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø1 1A	ø2 2A	SLOT EMPTY	ø3 3A	ø3 3B	ø3 3C	ø4 4A	ø4 4C	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	ø2 2B		NOT USED	NOT USED	ø3 3D	ø4 4B	NOT USED	SYS. DET. S2					ST DC ISOLATOR
FILE "J"	U	ø5 5A	ø6/SYS 6A/S3	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	NOT USED	ø6/SYS 6B/S4												

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A	TB4-1,2	I4U	47	9	22	3	Y	Y			3
3B	TB4-5,6	I5U	58	20	3	3	Y	Y			
3C	TB4-9,10	I6U	41	3	4	3	Y	Y			10
3D	TB4-11,12	I6L	45	7	14	3	Y	Y			20
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			10
4C	TB6-5,6	I8U	49	11	24	4	Y	Y			20
* S1	TB6-9,10	I9U	60	22	11	SYS					
* S2	TB6-11,12	I9L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A/S3	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S4	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2204
DESIGNED: July 2007
SEALED: 08-23-07
REVISED: N/A

Signal Upgrade

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Public Schools and State Streets Board
THE STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Management Section

750 N. Greenfield Pwky, Garner, NC 27529

NC 98 Bypass
at
SR 4535 (Retail Drive)/
Northpark Drive

Division 05 | Wake County | Wake Forest

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

REVISIONS	INIT.	DATE

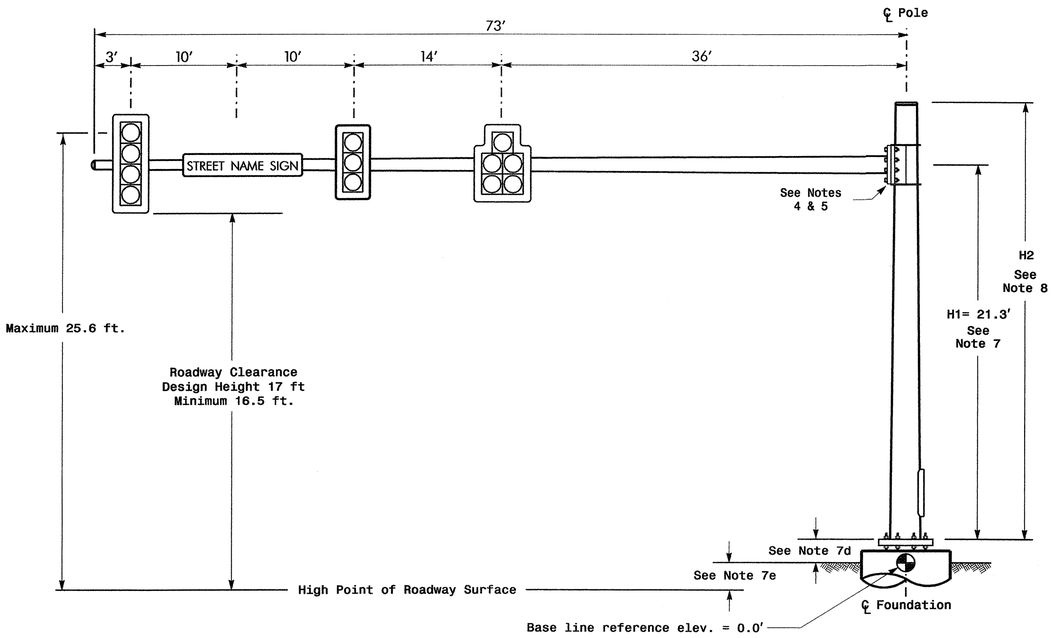
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.

John T. Rowe Jr. 8-24-07
SIGNATURE | DATE

SIG. INVENTORY NO. 05-2204

23-AUG-2007 07:46
s:\rtis signals\workgroups\sig mon\peterson\#05204_sm_ele_xxx.dgn
jpatterson

Design Loading for METAL POLE NO. 7



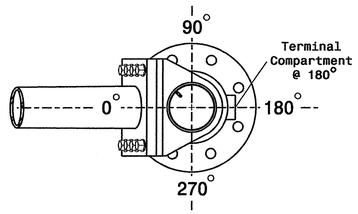
Elevation View

SPECIAL NOTE

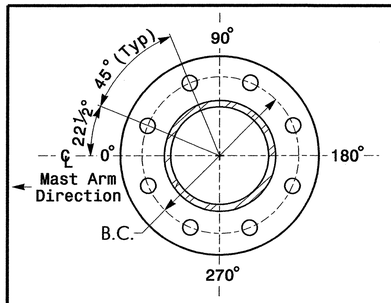
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 7
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+2.3 ft.
Elevation difference at Edge of travelway or face of curb	N/A

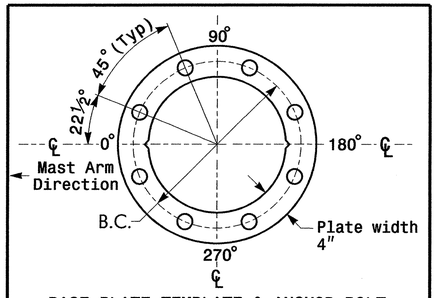


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12″–5 SECTION–WITH BACKPLATE AND ASTRO–BRAC	16.3 S.F.	42.0″ W X 56.0″ L	103 LBS
	SIGNAL HEAD 12″–4 SECTION–WITH BACKPLATE AND ASTRO–BRAC	11.5 S.F.	25.5″ W X 66.0″ L	74 LBS
	SIGNAL HEAD 12″–3 SECTION–WITH BACKPLATE AND ASTRO–BRAC	9.3 S.F.	25.5″ W X 52.5″ L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO–SIGN–BRAC	12.0 S.F.	18.0″ W X 96.0″ L	27 LBS

NOTES

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:
   - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2002 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is .75 feet above the ground elevation.
   e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus ½ of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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

SCALE 0 N/A N/A

NC 98 Bypass
At
SR 4535 (Retail Drive)/
North Park Drive

Division 5 | Wake County | Wake Forest

PLAN DATE: July 2007 | REVIEWED BY: I.O.Umozurike

PREPARED BY: Luhr | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

SIGNATURE 8/29/07 DATE

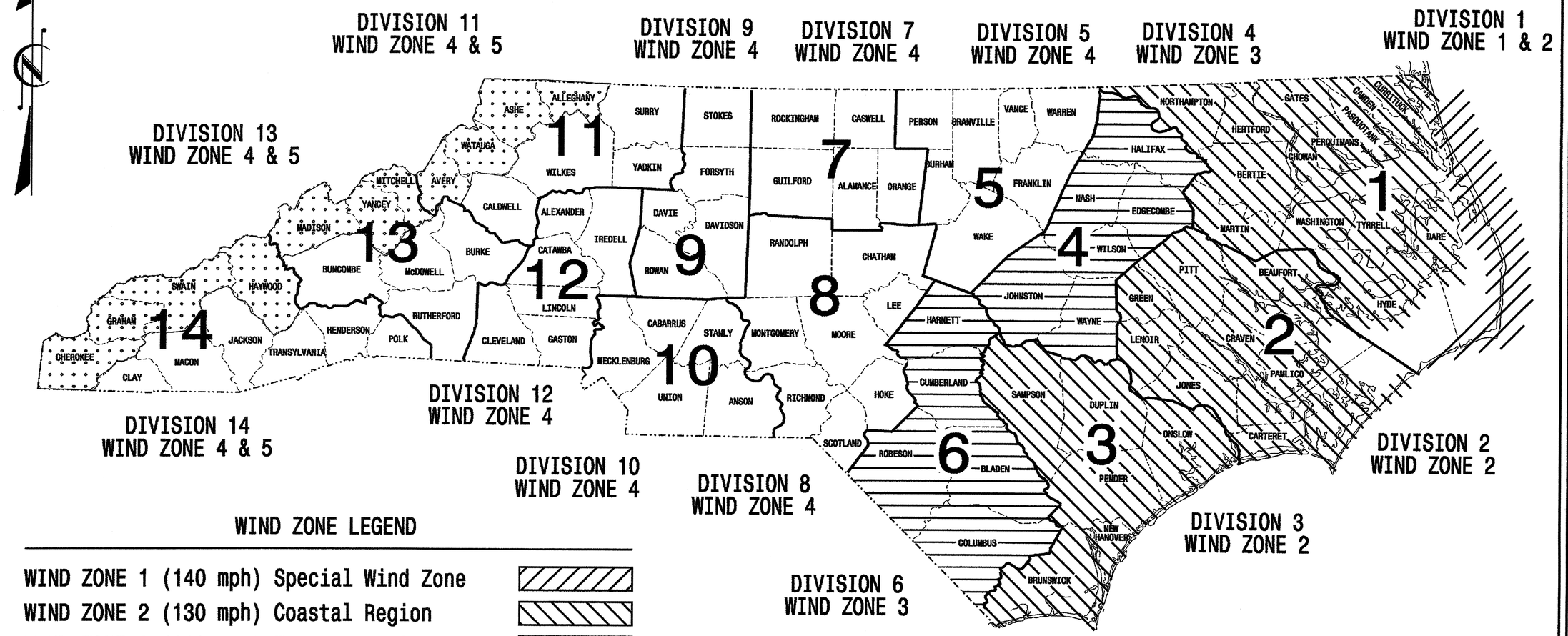
SIG. INVENTORY NO. 05-2204

STATE	PROJECT NO.	SHEET NO.
N.C.	R-2809A	Sig.19
F. A. PROJ. NO.		M 1
PROJECT ID. NO.		

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR METAL POLES

NCDOT METAL POLE STANDARDS



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
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

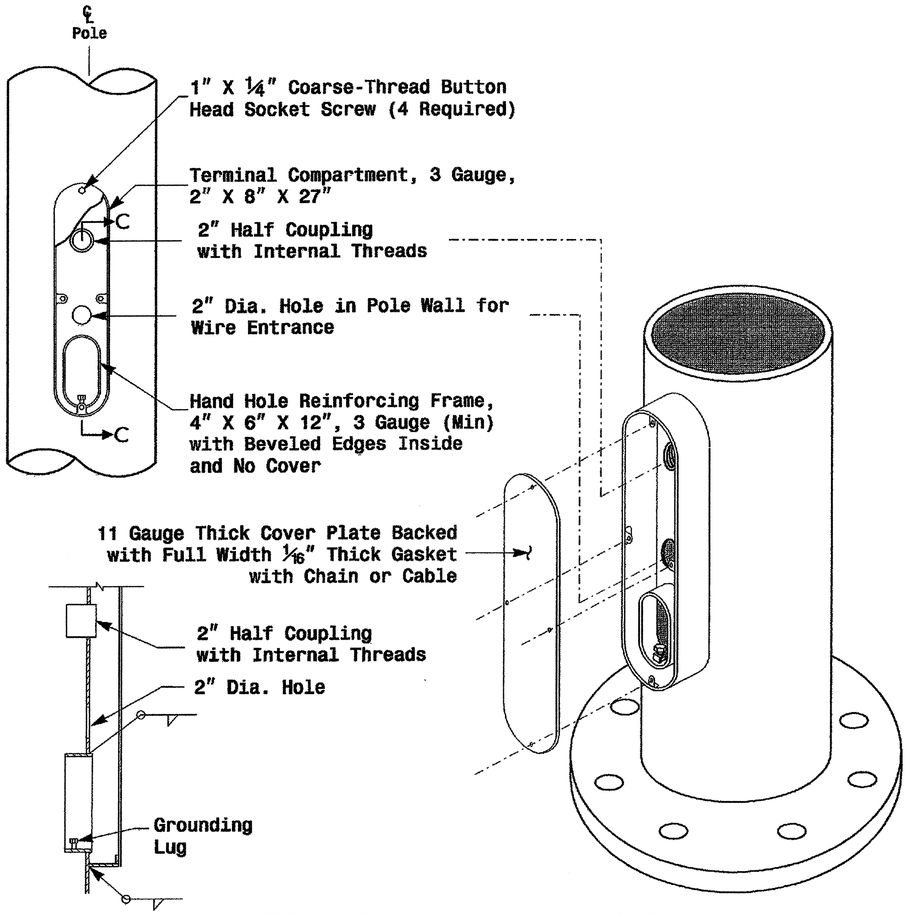
G. A. Fuller, P.E. – State ITS and Signals Engineer
R. E. Mullinax, P.E. – Signals and Geometrics Engineer
P. L. Alexander, P.E. – Signals and Geometrics Special Projects Engineer
D. C. Sarkar, P.E. – Signals and Geometrics Structural Engineer
A. M. Esposito, P.E. – Signals and Geometrics Project Engineer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



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 ----------

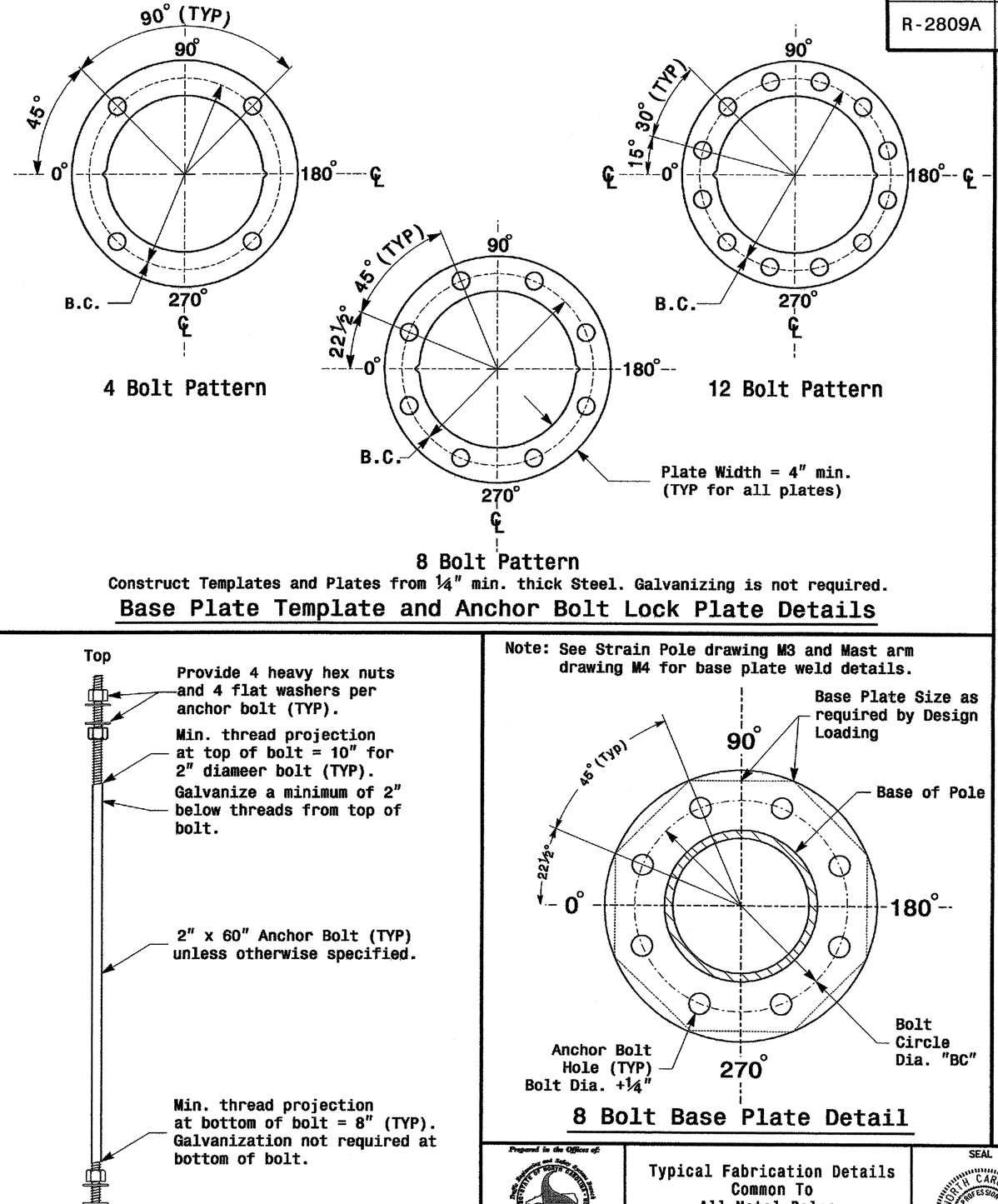
Shaft I.D. Tag
(Provide on Strain Poles and Mast Arm Poles)

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)

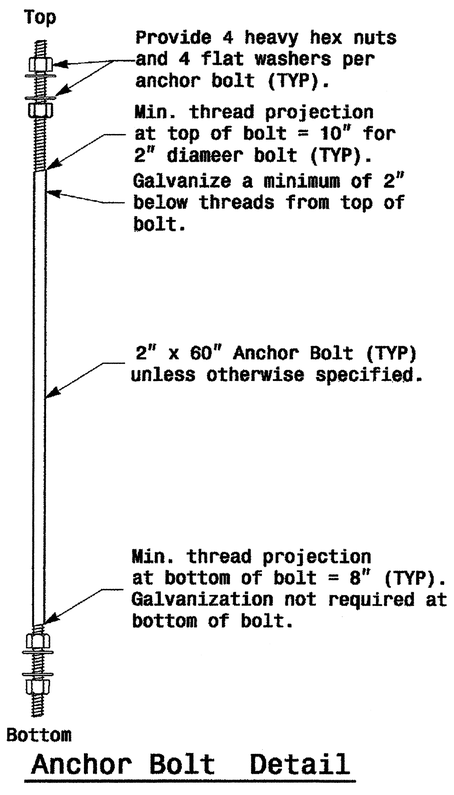
Notes:
1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
2) A.B. = Anchor Bolt
3) B.C. = Bolt Circle of Anchor Bolts
4) If Custom Design, use "NCDOT STANDARD" line for plan pole I.D.
5) See drawing M4 for mounting positions of I.D. tags.

Identification Tag Details



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

Fabrication Details – All Poles

Prepared in the Offices of: Traffic Engineering Branch, Traffic Signal Design Section, Signals and Geometrics Section, North Carolina Department of Transportation, 1722 N. McDowell St., Raleigh, NC 27603

SCALE 0 NA NONE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

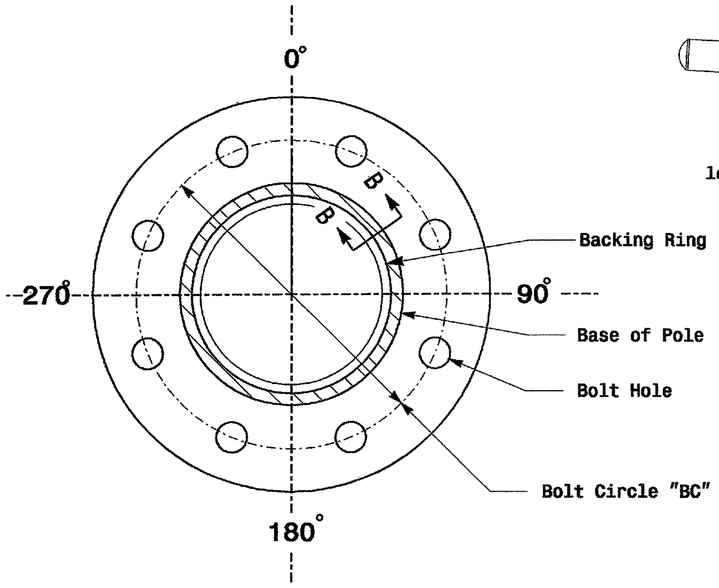
D. Sarkar 9.2.2005
SIGNATURE DATE

SIG. INVENTORY NO.

01-SEP-2005 18:22
D:\#2004 Metal Pole Standards\2004 m2 thru m6.dgn
candrews

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	Sig.21 M 4

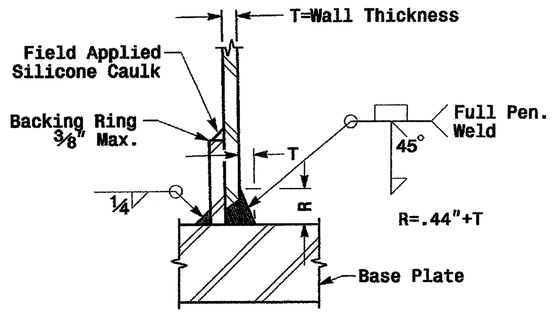
Fabrication Details – Mast Arm Poles



Section A-A

(See drawing M 2)

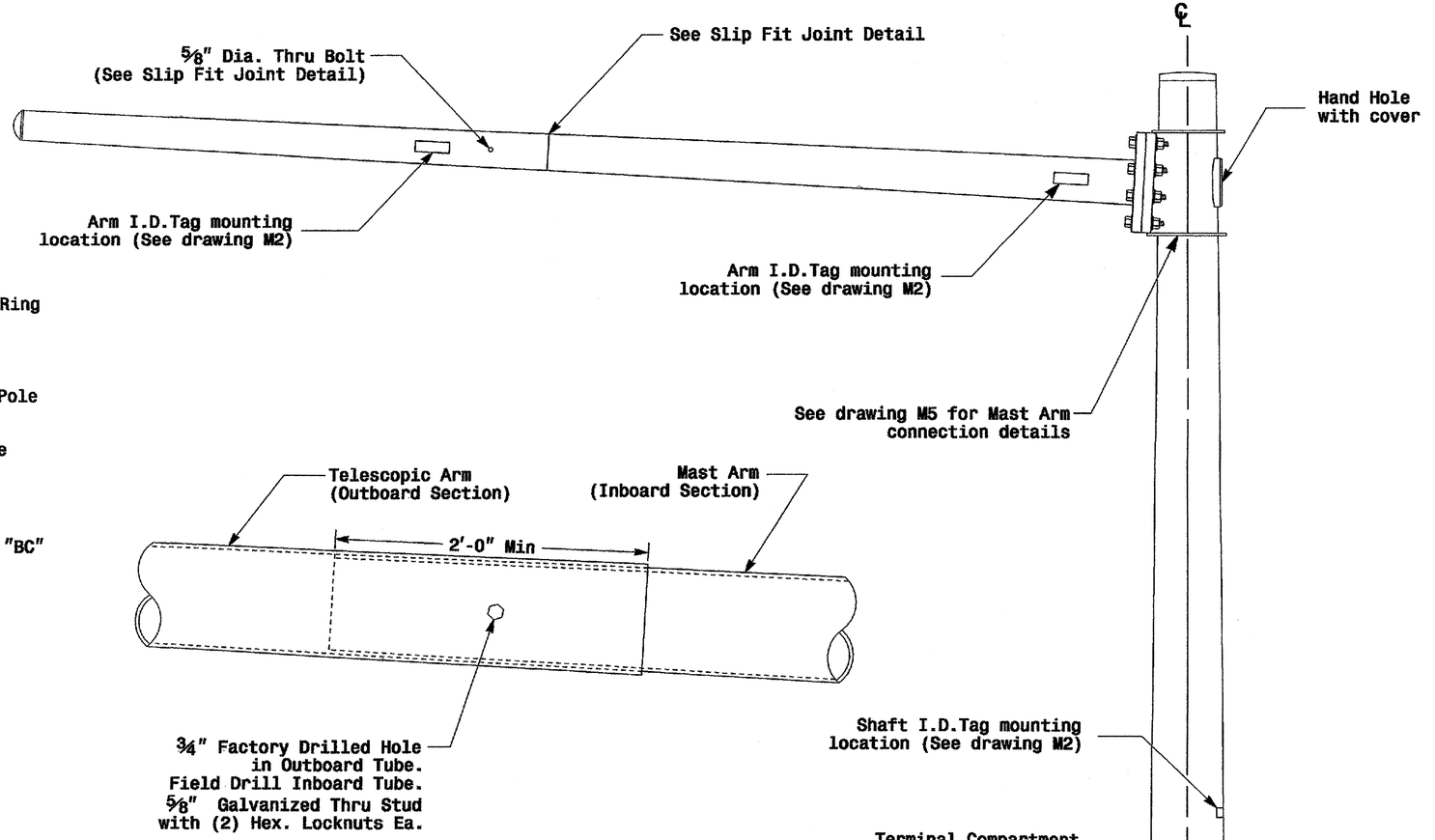
Pole Base Plate



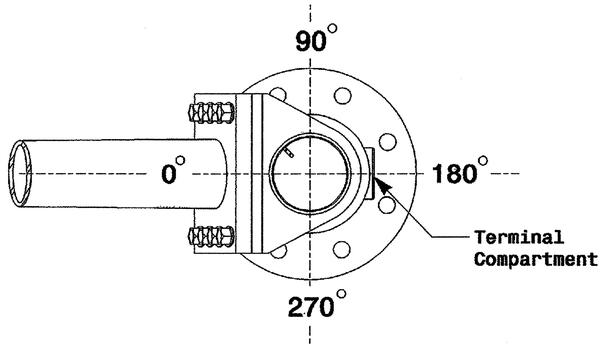
Section B-B

(Pole Attachment to Base Plate)

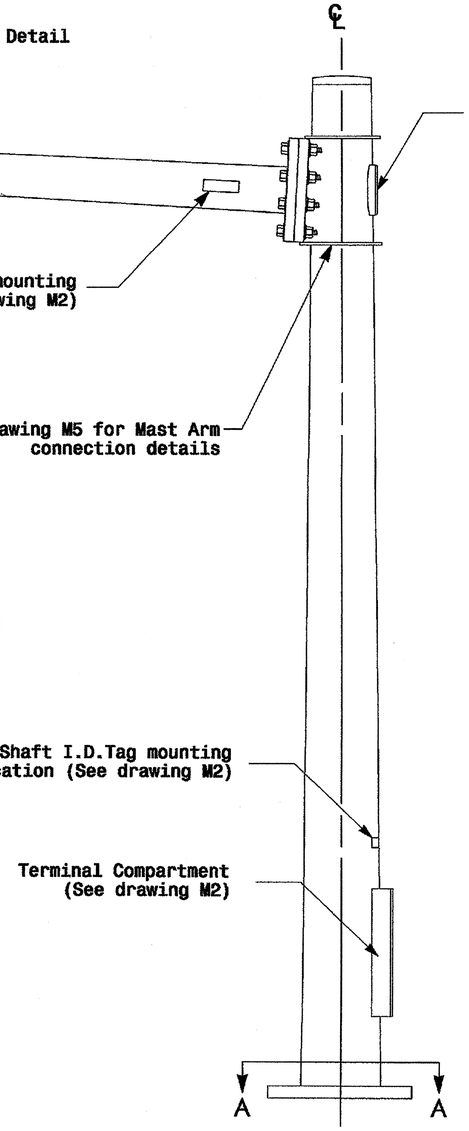
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



Monotube Mast Arm Pole
(.14in./ft. taper)

Prepared in the Office of:
Traffic Engineering and Safety Systems Branch
Signals and Geometrics Section
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
1122 N. McDowell St., Raleigh, NC 27603

Typical Fabrication Details for Mast Arm Poles

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

SCALE: 0 NA — NONE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEVESH C. SARKAR

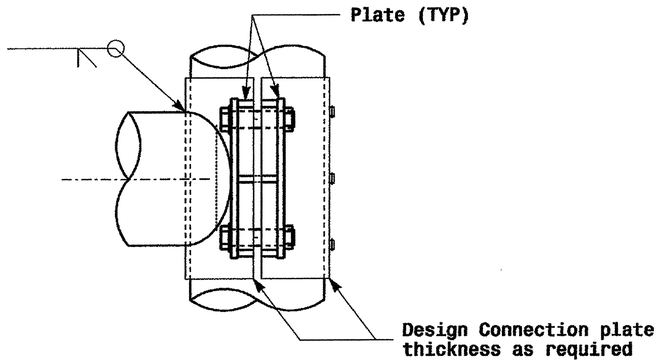
SIGNATURE: D. Sarkar 9.2.2005 DATE

SIG. INVENTORY NO.

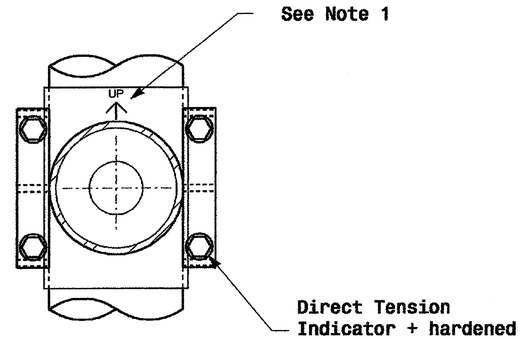
01-SEP-2005 11:08
w:\standards\traffic\workgroups\2004 metal pole standards\2004 m4.dgn
pclevander

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	Sig.22 M 5

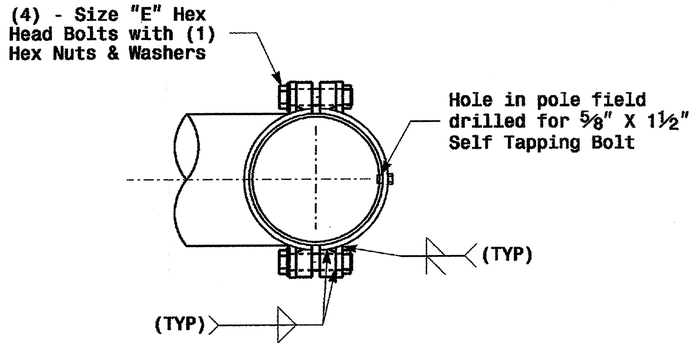
Adjustable Clamp Type Bolted Mast Arm Connection



Side Elevation View

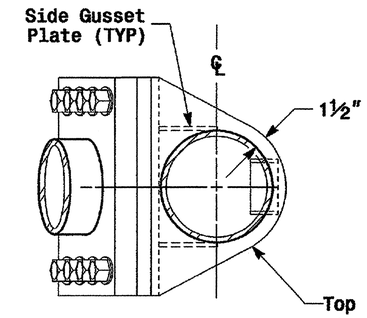


Front Elevation View

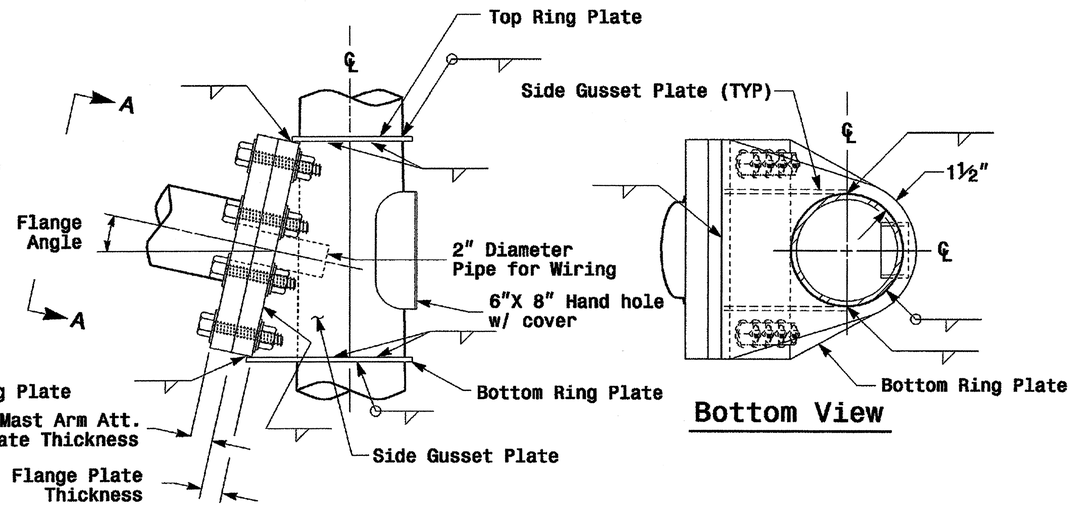


Plan View

Welded Ring Stiffened Mast Arm Connection

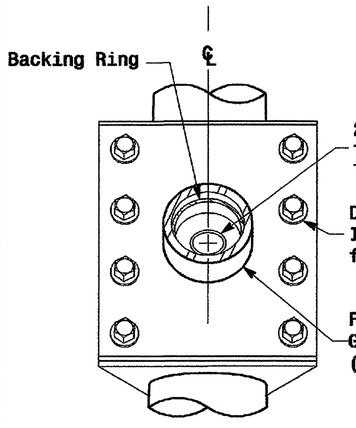


Plan View

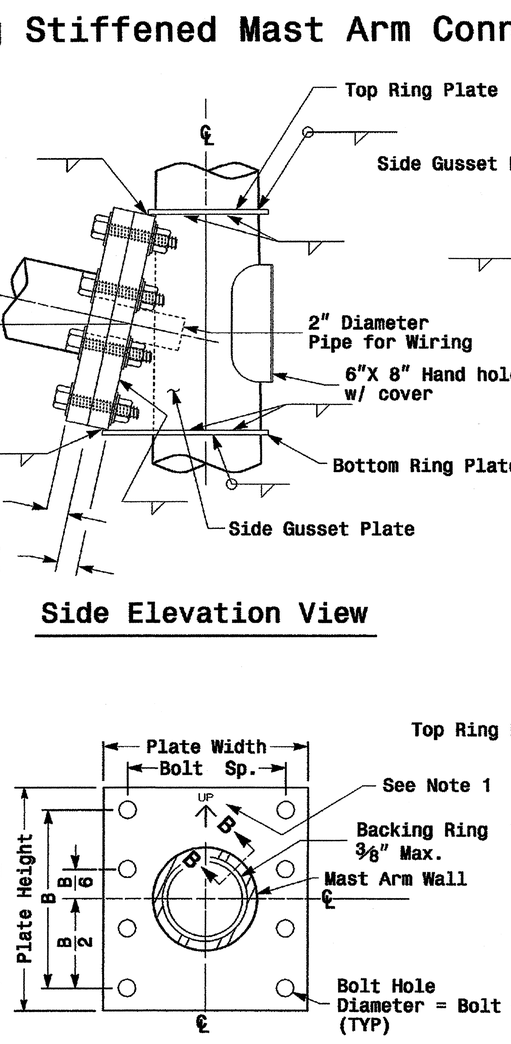


Side Elevation View

Bottom View

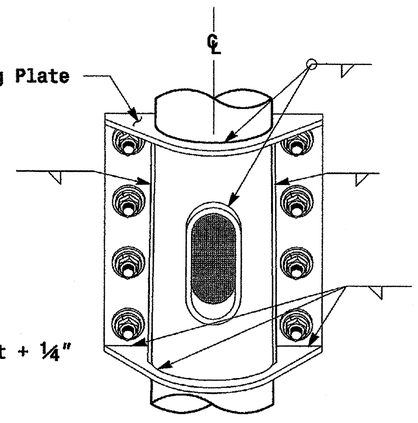


Front Elevation View

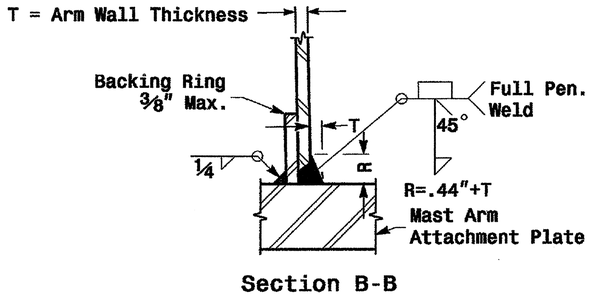


Section View A-A

Mast Arm Attachment Plate



Back Elevation View



Section B-B

Full-Penetration Groove Weld Detail

Notes:

1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Designer is responsible for providing appropriate drainage points.

Prepared in the Office of: Traffic Engineering and Safety Systems Branch, North Carolina Department of Transportation, Traffic Engineering Branch, 1020 Birch Ridge Drive, Raleigh, NC 27610

Fabrication Details For Mast Arm Connection To Pole

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

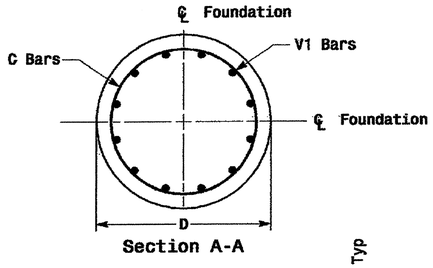
SEAL: North Carolina Professional Seal 028094 Engineer Dibesh C. Sarkar

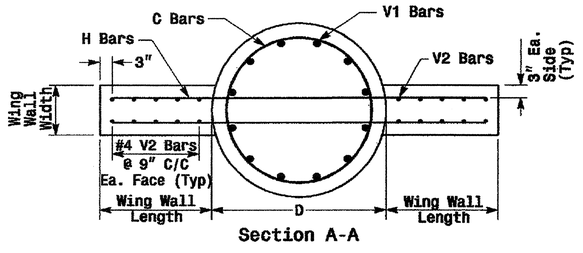
D. Sarkar 9.2.2005
SIGNATURE DATE

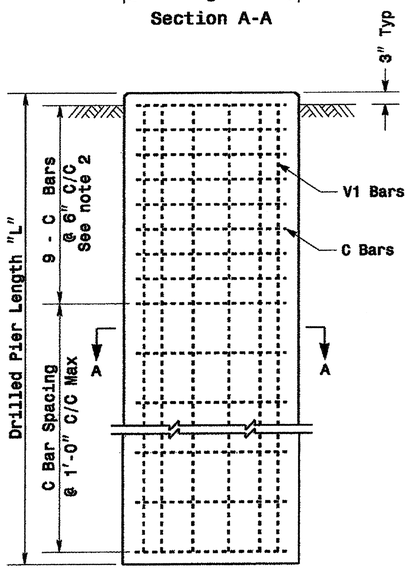
SIG. INVENTORY NO.

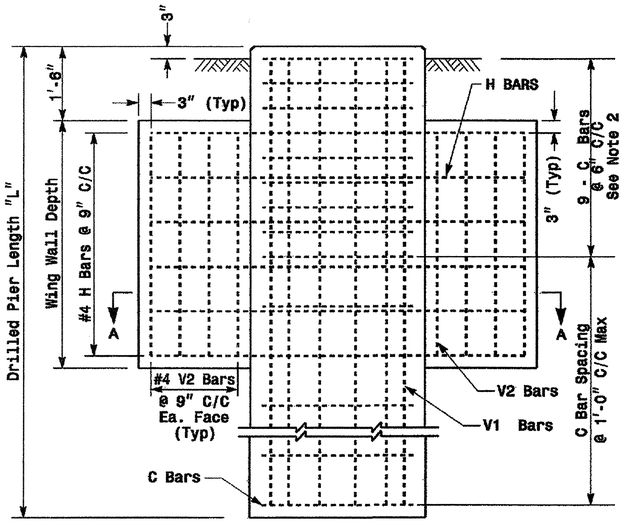
Fabrication Details — Mast Arm Poles

Reinforcing Steel Bars





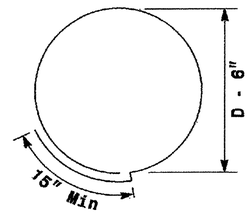




REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER)

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



Typical "C" Bars

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

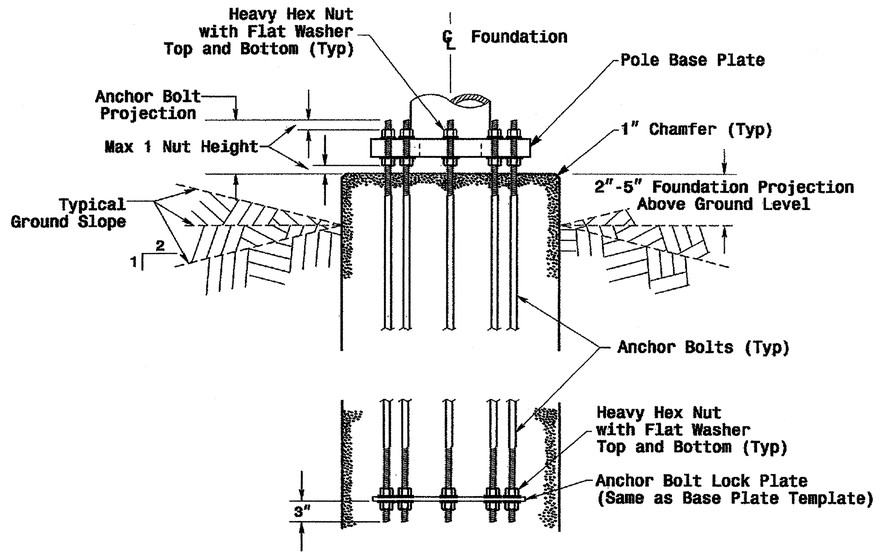
WING WALL DETAILS

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

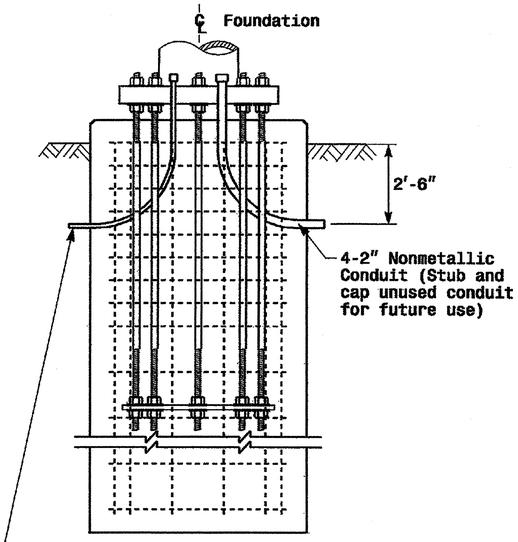
See Note No. 4

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.)

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	Sig.23 M 7

Construction Details – Foundations

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

Construction Details
Foundations

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

SCALE: 0 NA — NONE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

D. Sarkar 9.2.2005
SIGNATURE DATE

SIG. INVENTORY NO.

01-SEP-2005 17:48
w:\signalplans_unit\newcgroups\2004 metric\ pole standards\2004 mf.dgn
Daisy Gruber

PROJECT REFERENCE NO.	SHEET NO.
R-2809A	SIG24

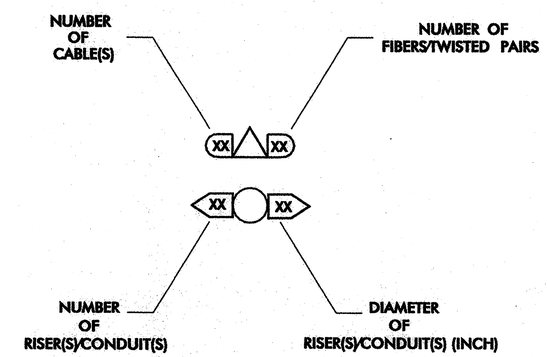
1. INSTALL REA, PE – 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
2. INSTALL REA, PE – 38, (FIGURE 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
3. INSTALL REA, PE – 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
4. INSTALL SMFO CABLE
5. INSTALL MMFO CABLE
6. INSTALL FIBER OPTIC DROP 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
- 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 Offices of
The Institute for Transportation Research and Education
NORTH CAROLINA STATE UNIVERSITY
NCDOT Traffic Management Systems
122 N. McDowell St., Raleigh, NC 27603

CONSTRUCTION NOTES

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

SCALE: 0 N

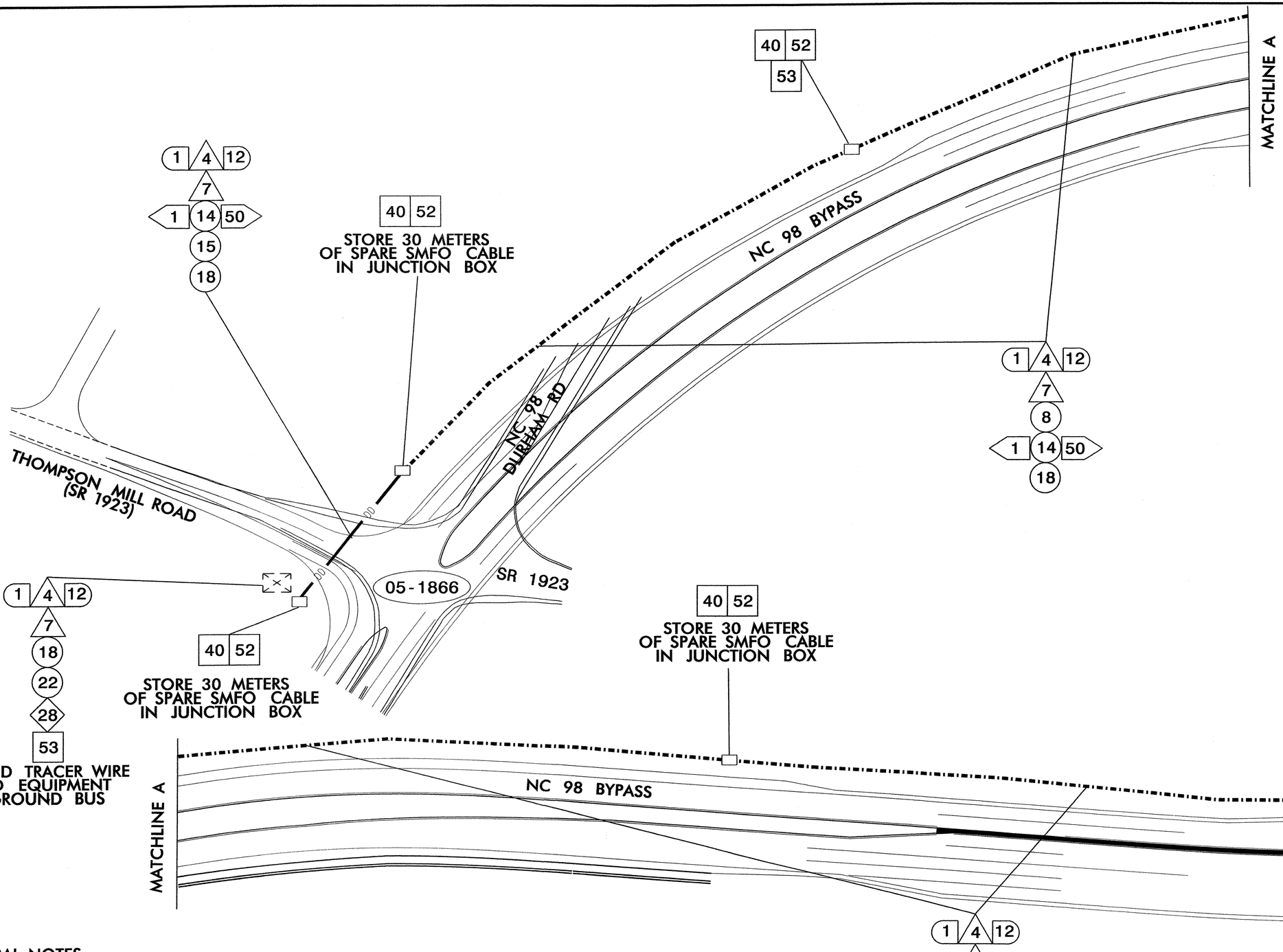
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

Gregory A. Fuller 10/31/02
SIGNATURE DATE

CADD Filename:

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	SIG.25



GENERAL NOTES:

1. ALL OVERSIZED HEAVY DUTY JUNTION BOXES ARE SHOWN APPROXIMATELY 230 METERS APART CONTRACTOR MAY FIELD ADJUST WITH THE APPROVAL OF THE ENGINEER.
2. SEAL ALL CONDUITS WITH MECHANICAL SEALING DEVICES IN JUNCTION BOXES AND SIGNAL CABINET ENTRANCES.
3. ALL NCDOT CABLE ATTACHMENT POINTS ARE TO BE 1016MM BELOW NEUTRAL, FRONT SIDE OF POLE, UNLESS OTHERWISE NOTED.
4. INSTALL MODEL IFS D-9130SHR TRANSCEIVER TO ENSURE COMPATIBILITY WITH EXISTING SYSTEM.

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

SCALE 0

COMMUNICATIONS CABLE
AND CONDUIT ROUTING PLANS
NC 98 BYPASS

DIVISION 05 | WAKE COUNTY | WAKE FOREST
PLAN DATE: JULY 2007 | REVIEWED BY: I. N. AVERY
PREPARED BY: H. TOMA BERGGREN | REVIEWED BY: G.G.MURR,JR.,PE

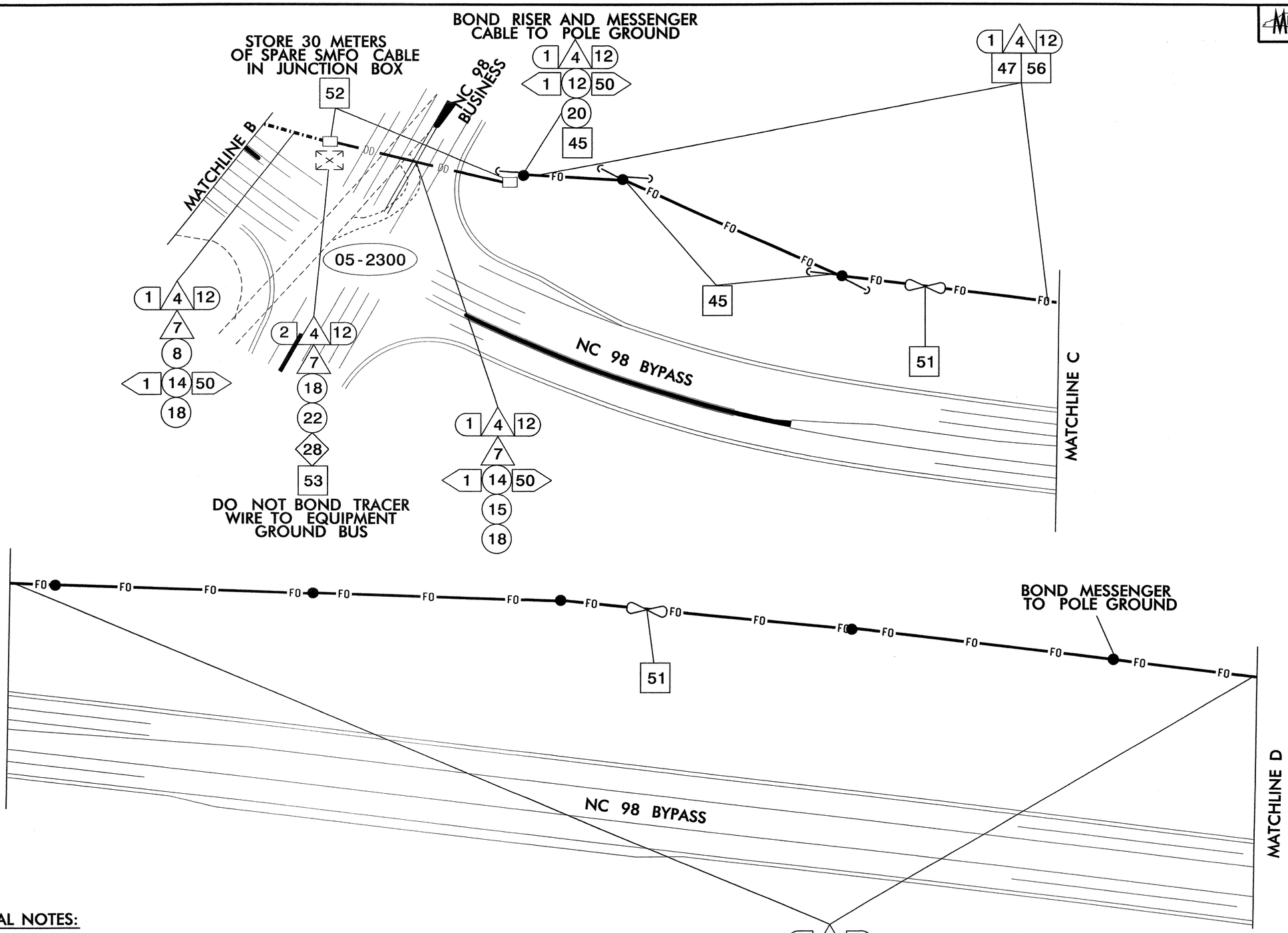
REVISIONS	INIT.	DATE

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

SIGNATURE 7-27-06
DATE

CADD Filename: d:\designsys\tb_tip\division\div05\r-2809a.mic

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	SIG.26



GENERAL NOTES:

1. ALL OVERSIZED HEAVY DUTY JUNTION BOXES ARE SHOWN APPROXIMATELY 230 METERS APART CONTRACTOR MAY FIELD ADJUST WITH THE APPROVAL OF THE ENGINEER.
2. SEAL ALL CONDUITS WITH MECHANICAL SEALING DEVICES IN JUNCTION BOXES AND SIGNAL CABINET ENTRANCES.
3. ALL NCDOT CABLE ATTACHMENT POINTS ARE TO BE 1016MM BELOW NEUTRAL, FRONT SIDE OF POLE, UNLESS OTHERWISE NOTED.
4. INSTALL MODEL IFS D-9130SHR TRANSCEIVER TO ENSURE COMPATIBILITY WITH EXISTING SYSTEM.

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

SCALE 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS NC 98 BYPASS

DIVISION 05 WAKE COUNTY WAKE FOREST

PLAN DATE: JULY 2007
PREPARED BY: H. TOMA BERGGREN
REVIEWED BY: I. N. AVERY
REVIEWED BY: G. G. MURR, JR., PE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR, JR.
SIGNATURE
7-27-07
DATE

I:\360 Filenames d:\projects\pete_hildebrand\pw\division 05\r-2809a.dgn

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	R-2809A	SIG.27

MATCHLINE D

FO

51

1 4 12
47 56

NC 98 BYPASS

MATCHLINE E

WAKEFIELD PLANTATION DR.

BOND RISER AND MESSENGER CABLE TO POLE GROUND

1 4 12
1 12 50
20
45

40 52
53

SR 4535 (RETAIL DRIVE)

EXI

TO CAPITAL BLVD. (05-2205)

05-2204

1 4 12
47 56

45

51

MATCHLINE E

NC 98 BYPASS

1 4 12
7
18
22
28
53

BOND TRACER WIRE TO EQUIPMENT GROUND BUS

1 4 12
7
8
1 14 50
18

40 52

STORE 30 METERS OF SPARE SMFO CABLE IN JUNCTION BOX

GENERAL NOTES:

1. ALL OVERSIZED HEAVY DUTY JUNTION BOXES ARE SHOWN APPROXIMATELY 230 METERS APART CONTRACTOR MAY FIELD ADJUST WITH THE APPROVAL OF THE ENGINEER.
2. SEAL ALL CONDUITS WITH MECHANICAL SEALING DEVICES IN JUNCTION BOXES AND SIGNAL CABINET ENTRANCES.
3. ALL NCDOT CABLE ATTACHMENT POINTS ARE TO BE 1016MM BELOW NEUTRAL, FRONT SIDE OF POLE, UNLESS OTHERWISE NOTED.
4. INSTALL MODEL IFS D-9130SHR TRANSCEIVER TO ENSURE COMPATIBILITY WITH EXISTING SYSTEM.

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

SCALE 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS
NC 98 BYPASS

DIVISION 05 WAKE COUNTY WAKE FOREST

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

PREPARED BY: H. TOMA BERGGREN REVIEWED BY: G.G.MURR,JR.,PE

REVISIONS	INIT.	DATE

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

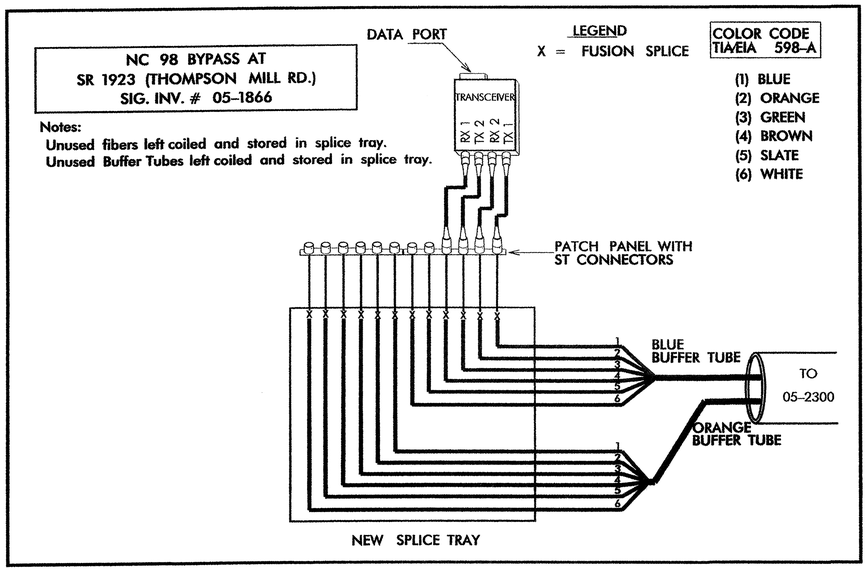
SIGNATURE 1-21-07 DATE

C:\DGN Filenames\ dc\maps\delta_trip\developer\division 05\r-2809a.dgn

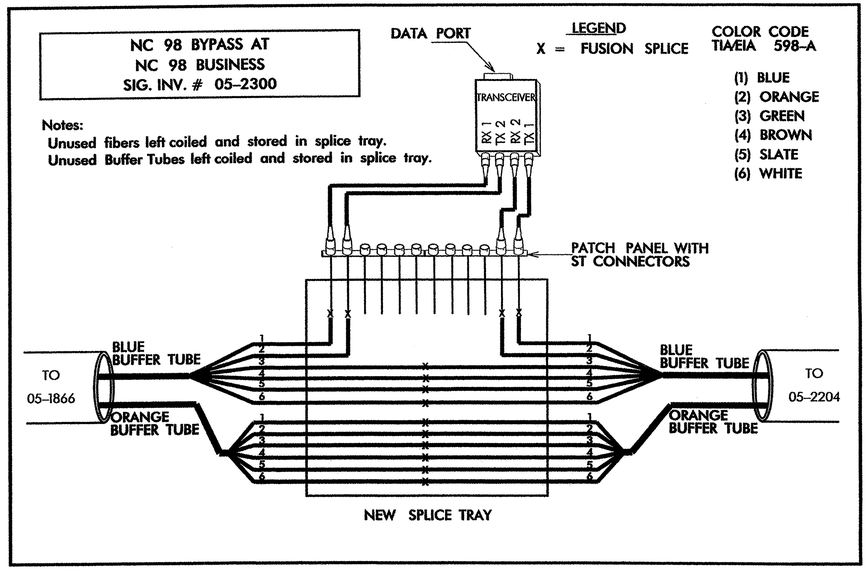
PROJECT REFERENCE NO.	SHEET NO.
R-2809A	SIG.28

FIBER OPTIC CABLE

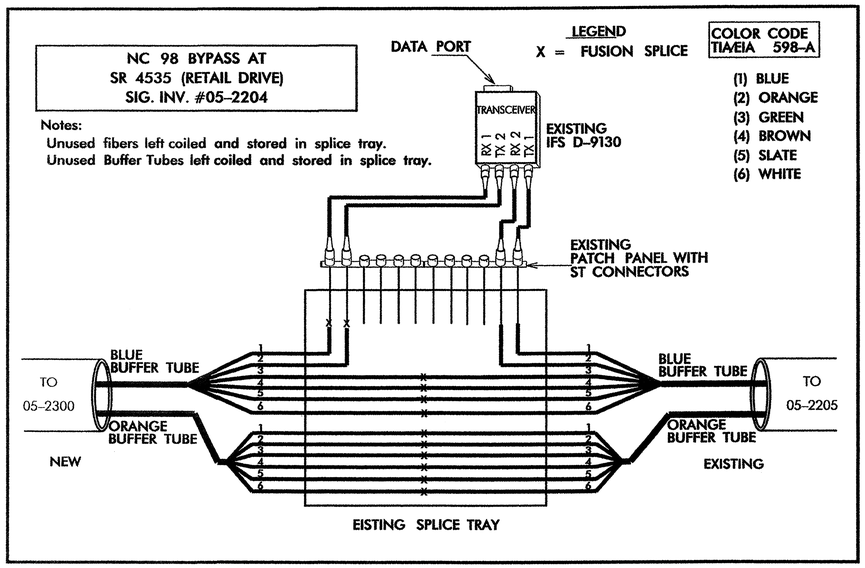
NEW



NEW



REVISE SPLICES AS SHOWN



NOTES:

1. INSTALL IFS MODEL D-9103SHR TRANSCEIVER AT NEW LOCATIONS FOR COMPATIBLITY WITH EXISTING SYSTEM.
2. TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
NC DEPARTMENT OF TRANSPORTATION
Traffic Management Systems
122 N. McDowell St., Raleigh, NC 27603

SCALE 0

SPLICE DETAIL
NC 98 BYPASS

DIVISION: 05 WAKE COUNTY WAKE FOREST
PLAN DATE: JULY 2007 REVIEWED BY: I. N. AVERY
PREPARED BY: H. TOWA BERGGREN REVIEWED BY: G. G. WURR, JR.

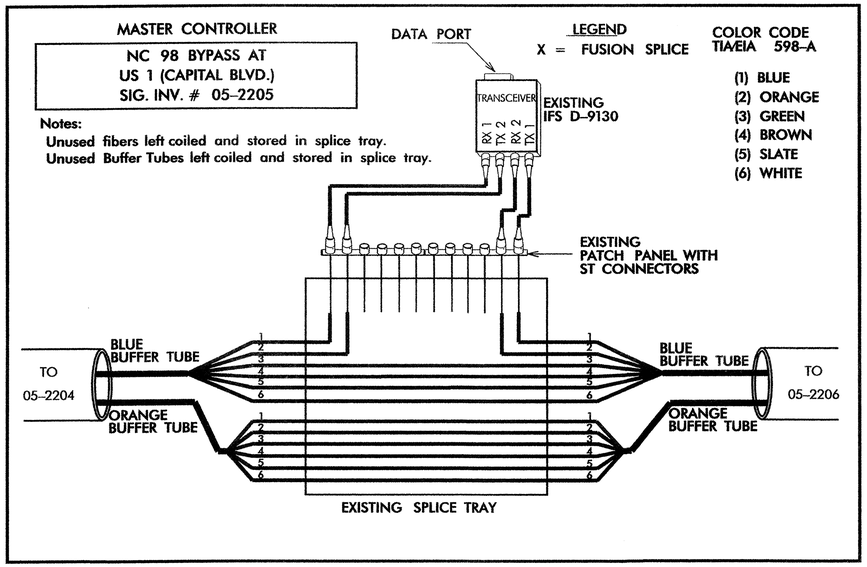
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GEORGE G. WURR, JR.
SIGNATURE 7-27-07 DATE
CADD Filename:

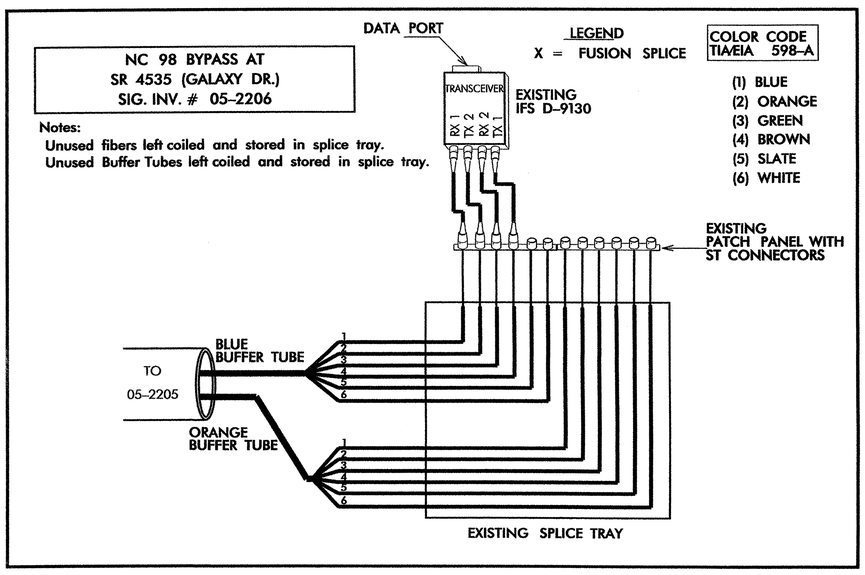
PROJECT REFERENCE NO.	SHEET NO.
R-2809A	SIG.29

FIBER OPTIC CABLE

SHOWN FOR INFORMATIONAL PURPOSES ONLY



SHOWN FOR INFORMATIONAL PURPOSES ONLY



NOTES:

1. INSTALL IFS MODEL D–9103SHR TRANSCEIVER AT NEW LOCATIONS FOR COMPATIBLITY WITH EXISTING SYSTEM.
2. TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS

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

SCALE 0

SPLICE DETAIL
NC 98 BYPASS

DIVISION: 05 WAKE COUNTY WAKE FOREST
PLAN DATE: JULY 2007 REVIEWED BY: I. N. AVERY
PREPARED BY: H. TOWA BERGGREN REVIEWED BY: G. G. MURR, JR.

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR, JR.
SIGNATURE 7-27-07 DATE
CADD File name: