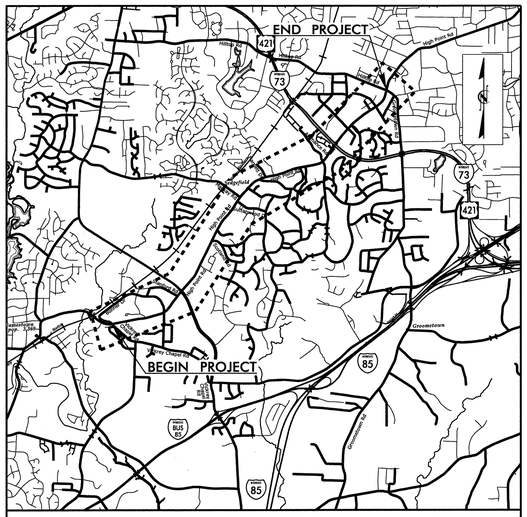
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2412B & U-2524AE	SIG. 1	121

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

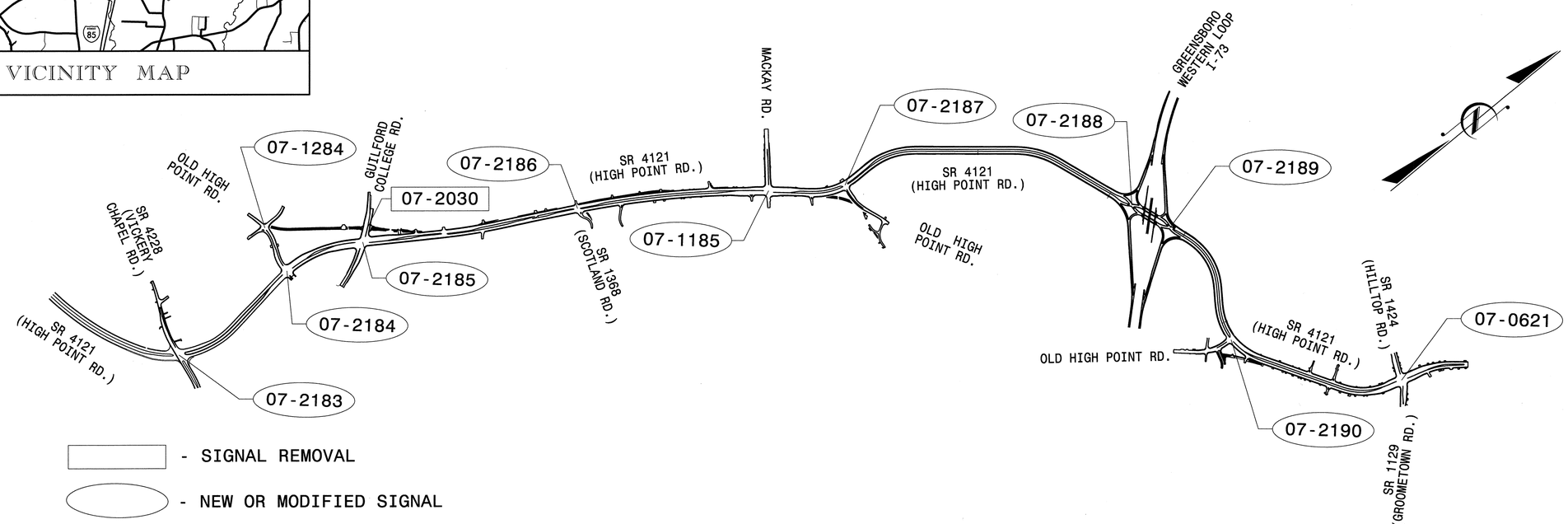
GUILFORD COUNTY

LOCATION: SR 4121 (HIGH POINT ROAD) FROM WEST OF SR 4228 (VICKERY CHAPEL ROAD) TO SR 1424 (HILLTOP ROAD)

TYPE OF WORK: TRAFFIC SIGNALS AND COMMUNICATIONS CABLE



VICINITY MAP



INDEX OF PLANS

SHEET NUMBER	SIGNAL INVENTORY NUMBER	LOCATION/ DESCRIPTION
SIG. 1		TITLE SHEET
SIG. 2–3	07–2183	SR 4121 (HIGH POINT RD.) AT SR 4228 (VICKERY CHAPEL RD.)
SIG. 4–5	07–2184	SR 4121 (HIGH POINT RD.) AT OLD HIGH POINT RD.
SIG. 6–13	07–1284	OLD HIGH POINT RD. AT SR 1357/1673 (MILLIS/BONNER ROADS)
SIG. 14–17	07–2030	SR 4121 (HIGH POINT RD.) AT SR 2162 (GUILFORD COLLEGE RD)
SIG. 18–26	07–2185	SR 4121 (HIGH POINT RD.) AT RELOCATED SR 2162 (GUILFORD COLLEGE RD)
SIG. 27–30	07–2186	SR 4121 (HIGH POINT RD.) AT SR 1368 (SCOTLAND RD.)
SIG. 31–49	07–1185	SR 4121 (HIGH POINT RD.) AT SR 1549 (MACKAY RD.)
SIG. 50–52	07–2187	SR 4121 (HIGH POINT RD.) AT OLD HIGH POINT RD.
SIG. 53–54	07–2188	SR 4121 (HIGH POINT RD.) AT I–73 SB RAMPS
SIG. 55–56	07–2189	SR 4121 (HIGH POINT RD.) AT I–73 NB RAMPS
SIG. 57–60	07–2190	SR 4121 (HIGH POINT RD.) AT OLD HIGH POINT RD.
SIG. 61–80	07–0621	SR 4121 (HIGH POINT RD.) AT SR 1424/1129 (HILLTOP / GROOMETOWN ROADS)
SIG. 81–84		METAL POLE LOADING DETAILS AND STANDARDS
SIG. 85–121		COMMUNICATIONS CABLE PLANS

NCDOT CONTACTS:
Transportation Mobility and Safety Branch
Boniface A. Maduabuchukwu, P.E. – Central Region Signals Engineer
Robert J. Ziemba, P.E. – Signals Project Engineer
I. Neil Avery – Signal Communications Project Engineer

STANTEC CONTACTS:
Betsy L. Watson, P.E. – Transportation Engineer
Lori Mahany, P.E. – Transportation Engineer
Brian Laton, E.I. – Transportation Designer
Kellie Wieskamp, E.I. – Transportation Designer

Legend

XX-XXXX OR XX-XXXX SIGNAL INVENTORY NUMBER

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

Stantec
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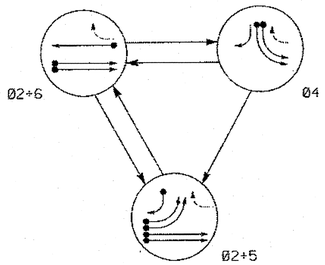
www.stantec.com
License No. F-0672

CONTRACT: 34802.1.1 TIP PROJECT: U-2412B & U-2524AE

5/5/2012
J:\170028 7\transportation\design\Traffic\Signals\SigPlans\170028 7_sig_tsh.dgn
blaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

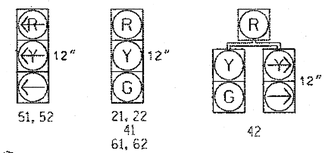
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	FLASH
21, 22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51, 52	~~R~~	~~R~~	~~R~~	~~R~~
61, 62	R	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

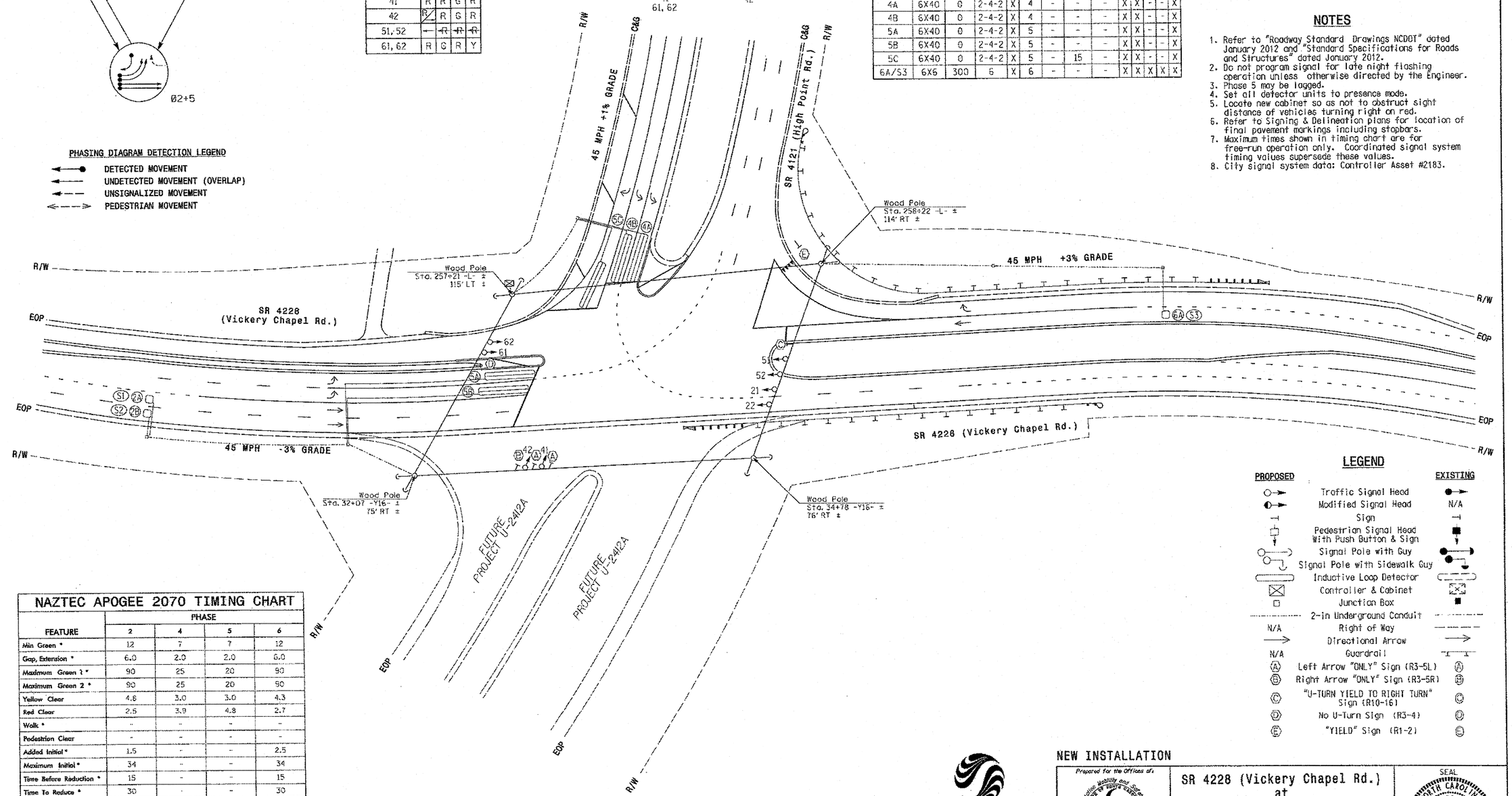
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A/S1	6X6	300	5	X	2	-	-	-	X	X	X	X	X
2B/S2	6X6	300	5	X	2	-	-	-	X	X	X	X	X
4A	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
4B	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
5A	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	X
5B	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	X
5C	6X40	0	2-4-2	X	5	-	15	-	X	X	-	-	X
6A/S3	6X6	300	6	X	6	-	-	-	X	X	X	X	X

3 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. City signal system data: Controller Asset #2183.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
	Left Arrow "ONLY" Sign (R3-5L)	
	Right Arrow "ONLY" Sign (R3-5R)	
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	
	No U-Turn Sign (R3-4)	
	"YIELD" Sign (R1-2)	

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green *	12	7	7	12
Gap, Extension *	6.0	2.0	2.0	6.0
Maximum Green 1 *	90	25	20	90
Maximum Green 2 *	90	25	20	90
Yellow Clear	4.6	3.0	3.0	4.3
Red Clear	2.5	3.9	4.8	2.7
Walk *	-	-	-	-
Pedestrian Clear	-	-	-	-
Added Initial *	1.5	-	-	2.5
Maximum Initial *	34	-	-	34
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.0	-	-	3.0
Recall Mode	MIN RECALL	-	-	MIN RECALL
Lock Calls	YES	NO	NO	YES
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

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NEW INSTALLATION

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N. Greenfield Pkwy, Garner, NC 27529

SR 4228 (Vickery Chapel Rd.) at SR 4121 (High Point Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	B.L. WATSON
PREPARED BY:	K. WIESKAMP	REVIEWED BY:	

SCALE 1" = 40' (0 – 40)

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 29449 BETSY L. WATSON

SIGNATURE Betsy L. Watson DATE 4/26/12

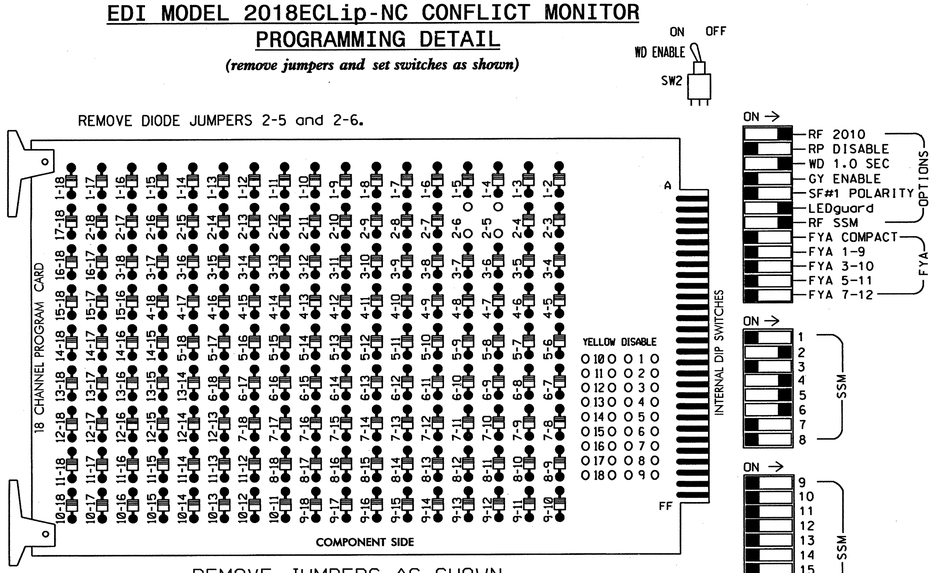
SIG. INVENTORY NO. 07-2183

5/8/2012
J:\0817100\287\Mr.Ansper\traffic\signals\sig\plans\71007287_sig_dsn_1_07-2183.dgn
21:20P

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 3

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S5,S7,S8
PHASES USED.....2,4,5,6
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7	8	16
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	42	51,52	61,62	NU	NU	NU	NU
RED		128			101				134				
YELLOW		129			102				135				
GREEN		130			103				136				
RED ARROW								131					
YELLOW ARROW							132	132					
GREEN ARROW							133	133					

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø2/SYS 2A/S1	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/S2				Ø4 4B								ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø5 5B	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
	L	NOT USED	Ø5 5C	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.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
2A/S1	TB2-5,6	I2U	39	2	2/SYS				X	X	X
2B/S2	TB2-7,8	I2L	43	3	2/SYS				X	X	X
4A	TB4-9,10	I6U	41	8	4				X	X	
4B	TB4-11,12	I6L	45	9	4				X	X	
5A	TB3-1,2	J1U	55	15	5				X	X	
5B	TB3-5,6	J2U	40	16	5				X	X	
5C	TB3-7,8	J2L	44	17	5		15		X	X	
6A/S3	TB3-9,10	J3U	64	18	6/SYS				X	X	X

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2183
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4228 (Vickery Chapel Rd.)
at
SR 4121 (High Point Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY: T. Jones
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE 4/30/12 DATE
SIG. INVENTORY NO. 07-2183

27-APR-2012 08:10
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cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 4

PHASING DIAGRAM

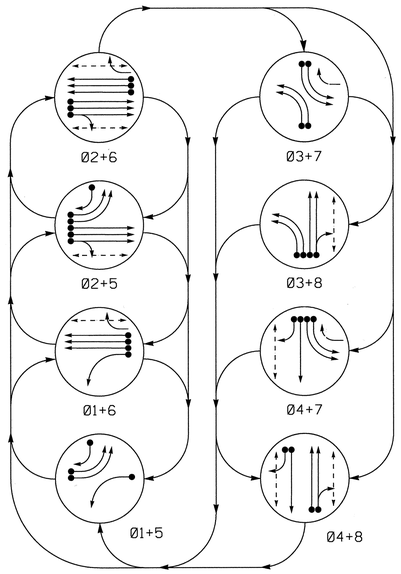


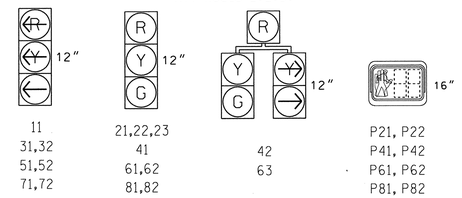
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21, 22, 23	R	R	G	G	R	R	R	R	Y
31, 32	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~R~~	~~R~~	~~R~~
41	R	R	R	R	R	R	G	G	R
42	R/	R	R/	R	R	R	G	G	R
51, 52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61, 62	R	G	R	G	R	R	R	R	Y
63	R	G	R	G	R/	R	R/	R	Y
71, 72	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	←	~~R~~	~~R~~
81, 82	R	R	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

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

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

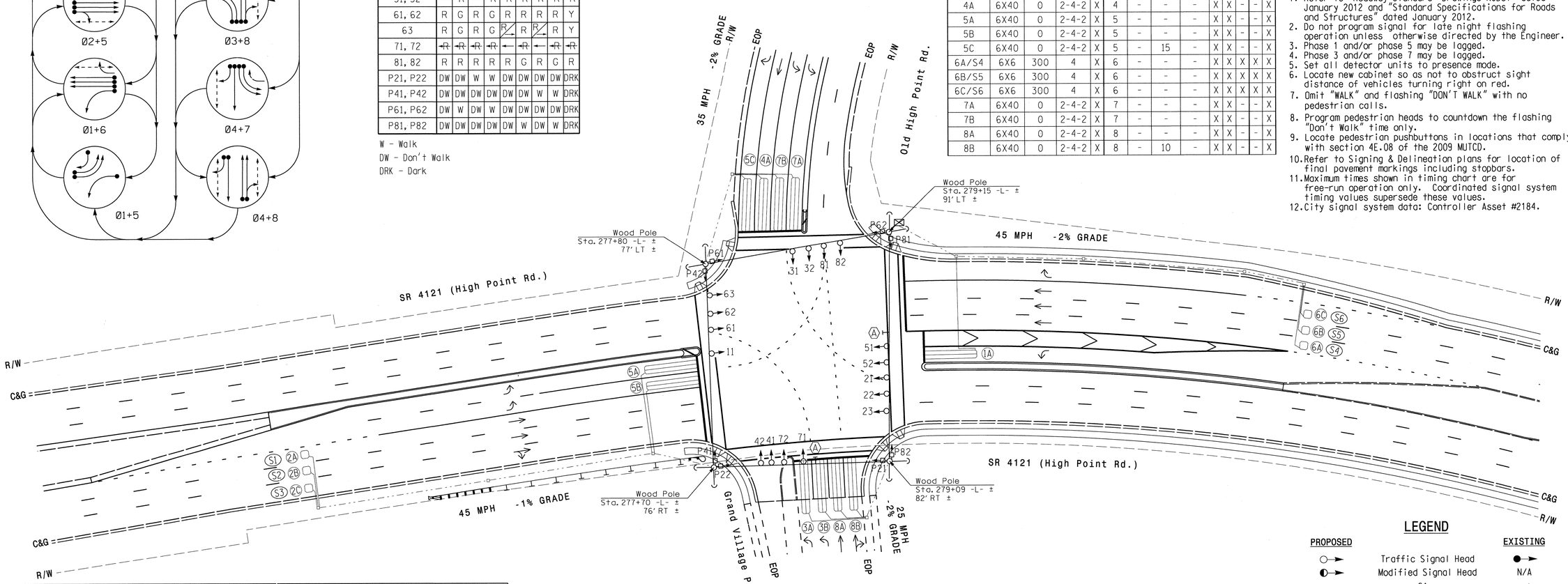
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	-	-	-	X	X	-	-	X
2A/S1	6X6	300	6	X	2	-	-	-	X	X	X	X	X
2B/S2	6X6	300	6	X	2	-	-	-	X	X	X	X	X
2C/S3	6X6	300	6	X	2	-	-	-	X	X	X	X	X
3A	6X40	0	2-4-2	X	3	-	-	-	X	X	-	-	X
3B	6X40	0	2-4-2	X	3	-	-	-	X	X	-	-	X
4A	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
5A	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	X
5B	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	X
5C	6X40	0	2-4-2	X	5	-	15	-	X	X	-	-	X
6A/S4	6X6	300	4	X	6	-	-	-	X	X	X	X	X
6B/S5	6X6	300	4	X	6	-	-	-	X	X	X	X	X
6C/S6	6X6	300	4	X	6	-	-	-	X	X	X	X	X
7A	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	X
7B	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X
8B	6X40	0	2-4-2	X	8	-	10	-	X	X	-	-	X

8 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Locate pedestrian pushbuttons in locations that comply with section 4E.08 of the 2009 MUTCD.
10. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. City signal system data: Controller Asset #2184.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Gap, Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Maximum Green 1 *	20	90	20	25	20	90	20	25
Maximum Green 2 *	20	90	20	25	20	90	20	25
Yellow Clear	3.0	4.6	3.0	4.0	3.0	4.7	3.0	3.3
Red Clear	3.9	2.2	3.9	3.2	3.9	2.3	4.1	3.7
Walk *	-	7	-	7	-	7	-	7
Pedestrian Clear	-	27	-	31	-	26	-	36
Added Initial *	-	1.0	-	-	-	1.0	-	-
Maximum Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	NO	YES	NO	NO
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.

NEW INSTALLATION

Stantec
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801 Jones Franklin Road
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Fax. (919) 851-7024
www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
Old High Point Rd./Grand Village Parkway

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012	REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP	REVIEWED BY:

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

Betsy L. Watson 4/26/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-2184

5/5/2012
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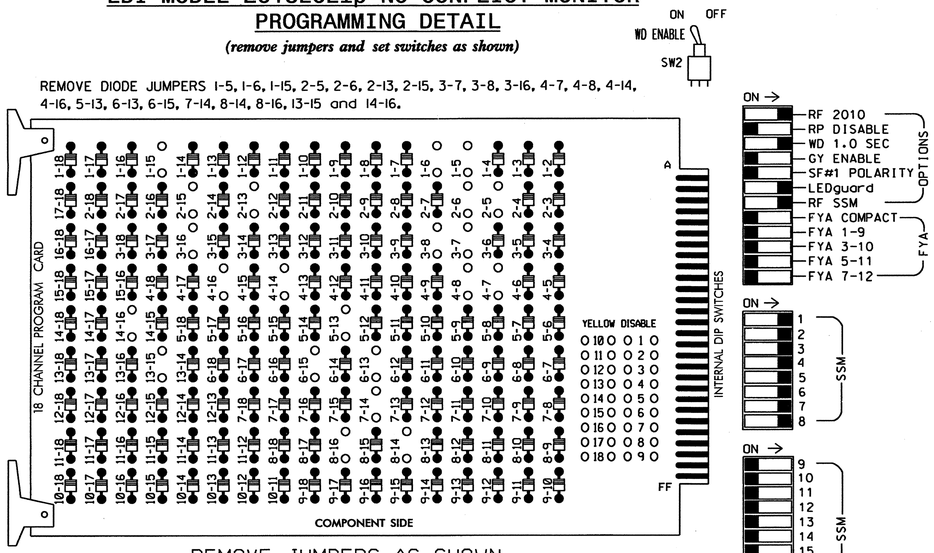
Division

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 5

EDI MODEL 2018ECLip-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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Walk.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8, S9,S10,S11,S12
PHASES USED.....1,2,2 PED,3,4,4 PED,5,6, 6 PED,7,8,8 PED
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10		S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7		8	16
PHASE	1	2	2 PED	3	4	4 PED	5		6	6 PED	7		8	8 PED
SIGNAL HEAD NO.	11	21, 22,23	P21, P22	31,32	41,42	P41, P42	42	51,52	61, 62,63	P61, P62	63	71,72	81,82	P81, P82
RED		128			101				134				107	
YELLOW		129			102				135				108	
GREEN		130			103				136				109	
RED ARROW	125			116				131				122		
YELLOW ARROW	126			117			132	132			123	123		
GREEN ARROW	127			118			133	133			124	124		
✋			113			104				119				110
🚶			115			106				121				112

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1	Ø2/SYS	Ø2/SYS	SLOT	Ø 3	Ø 4	SLOT	SLOT	SLOT	SLOT	SLOT	Ø2 PED	Ø6 PED	FS
		1A	2A/S1	2C/S3	EMPTY	3A	4A	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
	L	NOT USED	Ø2/SYS	NOT USED		Ø 3	NOT USED						Ø4 PED	Ø8 PED	ST
			2B/S2			3B							DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
FILE "J"	U	Ø 5	Ø 5	Ø6/SYS	Ø6/SYS	Ø 7	Ø 8	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
		5A	5B	6A/S4	6C/S6	7A	8A	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY
	L	NOT USED	Ø 5	Ø6/SYS	NOT USED	Ø 7	Ø 8								
			5C	6B/S5		7B	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.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1				X	X	
2A/S1	TB2-5,6	I2U	39	2	2/SYS				X	X	X
2B/S2	TB2-7,8	I2L	43	3	2/SYS				X	X	X
2C/S3	TB2-9,10	I3U	63	4	2/SYS				X	X	X
3A	TB4-5,6	I5U	58	7	3				X	X	
3B	TB4-7,8	I5L	58	7	3				X	X	
4A	TB4-9,10	I6U	41	8	4				X	X	
5A	TB3-1,2	J1U	55	15	5				X	X	
5B	TB3-5,6	J2U	40	16	5				X	X	
5C	TB3-7,8	J2L	44	17	5		15		X	X	
6A/S4	TB3-9,10	J3U	64	18	6/SYS				X	X	X
6B/S5	TB3-11,12	J3L	77	19	6/SYS				X	X	X
6C/S6	TB5-1,2	J4U	48	20	6/SYS				X	X	X
7A	TB5-5,6	J5U	57	21	7				X	X	
7B	TB5-7,8	J5L	57	21	7				X	X	
8A	TB5-9,10	J6U	42	22	8				X	X	
8B	TB5-11,12	J6L	46	23	8		10		X	X	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED						
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED						
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED						
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED						

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2184
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 4121 (High Point Rd.) at Old High Point Rd./Grand Village Parkway

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY: T. Jones
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS | INIT. | DATE

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

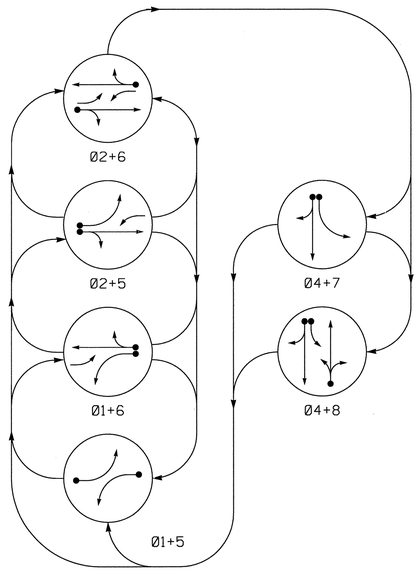
George C. Brown 4/30/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-2184

27-APR-2012 08:22
S:*MTS&SIMTS Signals*Workgroups*Sig Man*Strickland*07184_smudle_xxx.dgn
cassrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 6

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

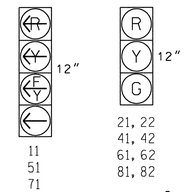
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+7	04+8	FLASH
11	←	←	F Y	F Y	R	R	Y
21, 22	R	R	G	G	R	R	Y
41, 42	R	R	R	R	G	G	R
51	←	F Y	←	F Y	R	R	Y
61, 62	R	G	R	G	R	R	Y
71	R	R	R	R	←	F Y	R
81, 82	R	R	R	R	R	G	R

F Y = Flashing Yellow Arrow

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

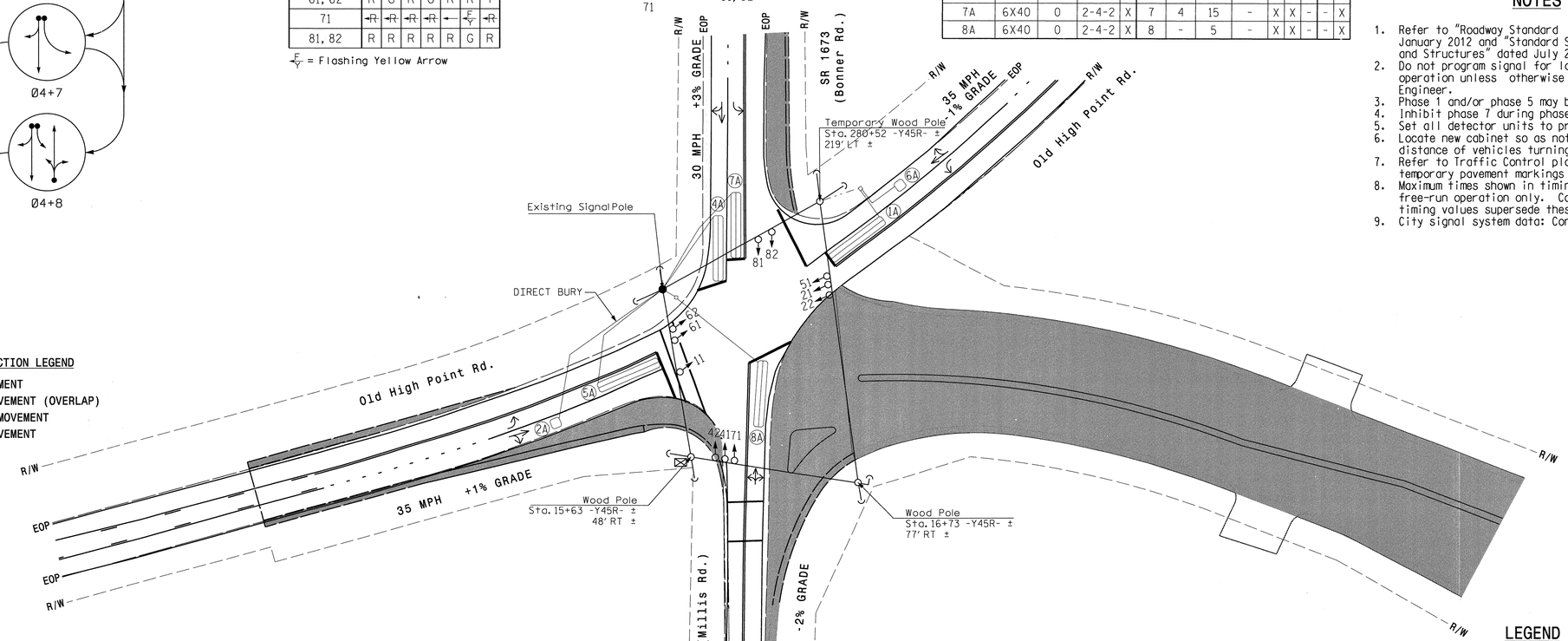
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	-	15	-	X	X	-	-	X
2A	6X6	70	5	X	2	-	-	-	X	X	-	-	X
4A	6X40	0	2-4-2	X	4	-	10	-	X	X	-	-	X
5A	6X40	0	2-4-2	X	5	-	15	-	X	X	-	-	X
6A	6X6	70	5	X	6	-	-	-	X	X	-	-	X
7A	6X40	0	2-4-2	X	7	4	15	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	5	-	X	X	-	-	X

6 Phase Fully Actuated (Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Inhibit phase 7 during phase 8 on.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Refer to Traffic Control plans for location of temporary pavement markings including stopbars.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. City signal system data: Controller Asset #1284.



LEGEND

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

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	7	8
Min Green *	7	10	7	7	10	7	7
Gap, Extension *	2.0	3.0	2.0	2.0	3.0	2.0	2.0
Maximum Green 1 *	20	60	30	20	60	20	30
Maximum Green 2 *	20	60	30	20	60	20	30
Yellow Clear	3.0	3.9	3.6	3.0	3.9	3.0	3.6
Red Clear	2.4	1.8	1.8	2.6	1.8	1.6	1.8
Walk *	-	-	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-	-	-
Added Initial *	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	YES	NO	NO
Dual Entry	-	-	ON	-	-	-	ON
Simultaneous Gap	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.

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

SIGNAL UPGRADE - TEMPORARY DESIGN

Prepared for the Offices of: Transportation Mobility and Safety Division, State of North Carolina, Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

Old High Point Rd. at SR 1357 (Millis Rd.) / SR 1673 (Bonner Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON

PREPARED BY: K. WIESKAMP REVIEWED BY:

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE Betsy L. Watson DATE 4/26/12

SIG. INVENTORY NO. 07-1284T1

5/5/2012
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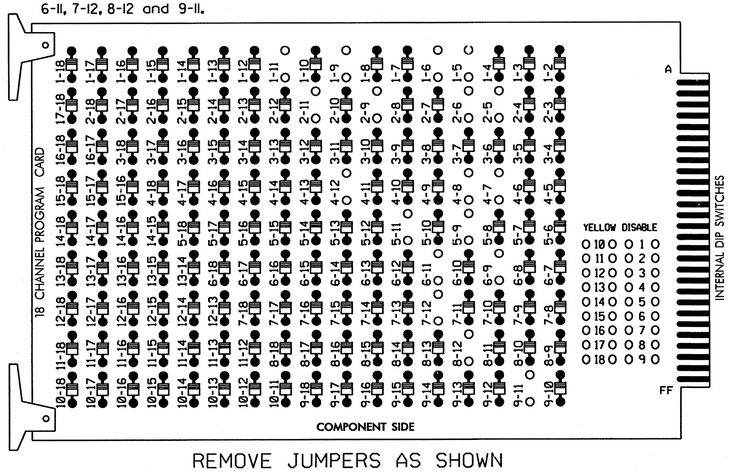
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 7

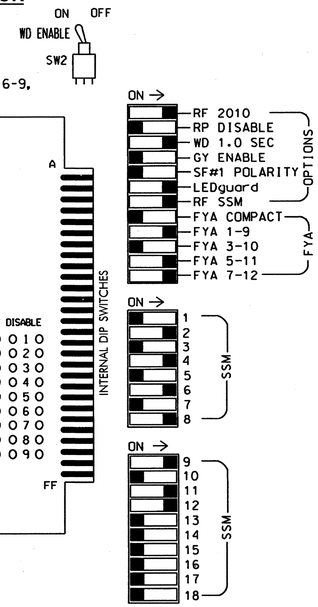
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 4-7, 4-8, 4-12, 5-9, 5-11, 6-9, 6-11, 7-12, 8-12 and 9-11.



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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phases 4 and 8 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S10,S11, AUX S1,AUX S4,AUX S5
PHASES USED.....1,2,4,5,6,7,8
OVERLAP A.....*
OVERLAP B.....NONE
OVERLAP C.....*
OVERLAP D.....*

* See Sheet 2 of 3 Overlap Programming Detail.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
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★	21,22	NU	NU	41,42	NU	51★	61,62	NU	71★	81,82	NU	11★	NU	NU	51★	71★	NU
RED		128			101			134			107							
YELLOW	*	129			102		*	135		*	108							
GREEN		130			103			136			109							
RED ARROW													A121			A114	A101	
YELLOW ARROW													A122			A115	A102	
FLASHING YELLOW ARROW													A123			A116	A103	
GREEN ARROW	127						133			124								

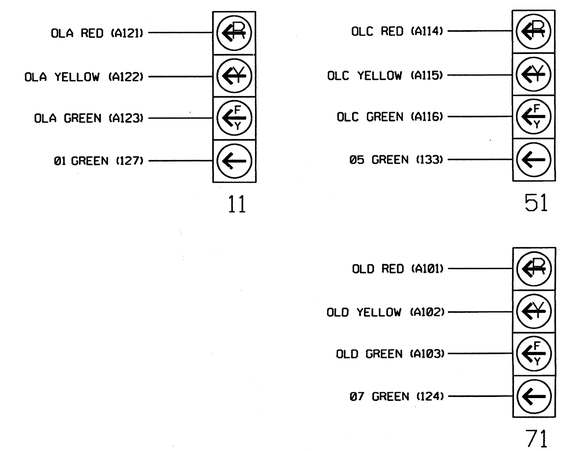
NU = Not Used

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

★ See pictorial of head wiring in detail below.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø1 1A	ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	NOT USED				NOT USED								ST DC ISOLATOR
FILE "J"	U	ø5 5A	ø6 6A	SLOT EMPTY	SLOT EMPTY	ø7 7A	ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED			NOT USED	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.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1		15		X	X	
2A	TB2-5,6	I2U	39	2	2				X	X	
4A	TB4-9,10	I6U	41	8	4		10		X	X	
5A	TB3-1,2	J1U	55	15	5		15		X	X	
6A	TB3-5,6	J2U	40	16	6				X	X	
7A	TB5-5,6	J5U	57	21	7	4	15		X	X	
8A	TB5-9,10	J6U	42	22	8		5		X	X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

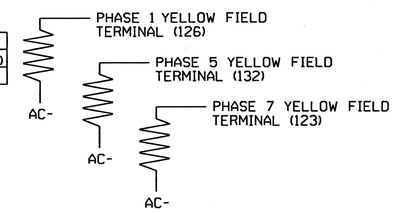
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1284T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

Electrical Detail - Temp - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Old High Point Rd.
at
SR 1357 (Millis Rd.) /
SR 1673 (Bonner Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY: T. Lyle
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE 5/1/12 DATE
SIG. INVENTORY NO. 07-1284T1

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cass\Strickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 8

OVERLAP PROGRAMMING DETAIL FOR OVERLAPS A, C, and D *

(program controller as shown below)

* NOTE FOR ALL OVERLAPS: Use Default values for Overlap 'PLUS' programming details.

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
Lock Inhibit OFF
Confl Lock Enable OFF
Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  1
then press Enter
```

```
Overlap A-1
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
Ovrlp A-1   Ps....................
Included Ps   1 0 0 0 0 0 0 0
Modifier Ps   2 0 0 0 0 0 0 0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC" TWICE

```
Enter Overlap #  3
then press Enter
```

```
Overlap C-3
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
Ovrlp C-3   Ps....................
Included Ps   5 0 0 0 0 0 0 0
Modifier Ps   6 0 0 0 0 0 0 0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC" TWICE

```
Enter Overlap #  4
then press Enter
```

```
Overlap D-4
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
Ovrlp D-4   Ps....................
Included Ps   7 0 0 0 0 0 0 0
Modifier Ps   8 0 0 0 0 0 0 0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

END OF OVERLAP PROGRAMMING DETAIL

CALL, INHIBIT, REDIRECT PROGRAMMING DETAIL

(USED FOR BACK-UP PROTECTION)

(program controller as shown below)

From Main Menu press '1' (Controller), then '1' (Phases), then '5' (CAll, Inh, Redirect).

```
                    Inhibit Ps 1111111      >
P   ..Call.Ps..  12345678 90123456
1    0  0  0  0  ........ ........
2    0  0  0  0  ........ ........
3    0  0  0  0  ........ ........
4    0  0  0  0  ........ ........
5    0  0  0  0  ........ ........
6    0  0  0  0  ........ ........
7    0  0  0  0  ........ ........
8    0  0  0  0  ......X. ........
```

OPERATIONAL NOTE

This programming will omit phase 7 when phase 8 is "ON".

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1284T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Old High Point Rd.
at
SR 1357 (Millis Rd.) /
SR 1673 (Bonner Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012	REVIEWED BY: T. Yates		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS		INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE 5/1/12 DATE

SIG. INVENTORY NO. 07-1284T1

27-APR-2012 08:29
S:#ITS&SU#TS Signals#workgroups#Sig Man#Strickland#071284_sm_ele_xxx.dgn
cbstrickland

4-SECTION PPLT FYA OUTPUT PROGRAMMING DETAIL

(program controller as shown below)

1. Before proceeding with output programming, be sure to switch the "RUN ENABLE STATUS" to "OFF". The "RUN ENABLE STATUS" setting is located from Main Menu, key strokes 1-7.
2. The Flashing Yellow Arrow in a 4-section PPLT FYA head is controlled by a normally unused PED Yellow output. This programming takes a specific PED Yellow output and remaps it to the appropriate Overlap Green output.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

```
I/O Parameters
C1-C11-ABC IO Mode: USER
     D Conn Mapping: NONE
        T&F Biu Map: DEFAULT
 Invert Rail Inputs: OFF
    EVP Ped Confirm: OFF
```

SELECT USER MODE →

PRESS "ESC"

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

```
User I/O Maps
1. Inputs
2. Outputs
3. Init Map
```

```
Initialize User I/O Maps
   Init ABC with: NONE
     Init D with: NONE
    Init 2A with: MODE 5
Init TF BIUs with: NONE
```

SELECT MODE 5 →

PRESS "ESC"

```
User I/O Maps
1. Inputs
2. Outputs
3. Init Map
```

```
User Output Maps
1.NEMA A   4.NEMA D
2.NEMA B   5.FIO 2A
3.NEMA C                 9.TS2 IO
```

PRESS "+" KEY TWICE

Pin	Fcn	Description	Pin	Fcn	Description
4-5	54	Ch6 Green	4-6	5	Ch5 Red
4-7	29	Ch5 Yellow	4-8	53	Ch5 Green
5-1	0	Unused	5-2	0	Unused
5-3	38	Ch14 Yellow	5-4	0	Unused
5-5	42	Ch18 Yellow	5-6	41	Ch17 Yellow
5-7	115	Not Used	5-8	114	Watchdog
6-1	18	Ch18 Red	6-2	66	Ch18 Green

Programming notes:

Pin	Default Fcn	Default Description	Change To: Fcn	Change To: Description
5-1	37	Ch13 Yellow....	0	Unused
5-2	39	Ch15 Yellow....	0	Unused
5-4	40	Ch16 Yellow....	0	Unused

PRESS "+" KEY ONCE

Pin	Fcn	Description	Pin	Fcn	Description
6-3	12	Ch12 Red	6-4	36	Ch12 Yellow
6-5	40	Ch16 Yellow	6-6	11	Ch11 Red
6-7	35	Ch11 Yellow	6-8	39	Ch15 Yellow
7-1	17	Ch17 Red	7-2	65	Ch17 Green
7-3	10	Ch10 Red	7-4	34	Ch10 Yellow
7-5	58	Ch10 Green	7-6	9	Ch9 Red
7-7	33	Ch9 Yellow	7-8	37	Ch13 Yellow

Programming notes:

Pin	Default Fcn	Default Description	Change To: Fcn	Change To: Description
7-8	57	Ch9 Green	37	Ch13 Yellow
6-8	59	Ch11 Green	39	Ch15 Yellow
6-5	60	Ch12 Green	40	Ch16 Yellow

OUTPUT PROGRAMMING COMPLETE

```
Pin 5-1 (C1 pin 35) = Load Switch S3-Y
Pin 5-2 (C1 pin 36) = Load Switch S9-Y
Pin 5-4 (C1 pin 38) = Load Switch S12-Y
Pin 7-8 (C1 pin 99) = Load Switch AUX S1-G
Pin 6-8 (C1 pin 90) = Load Switch AUX S4-G
Pin 6-5 (C1 pin 87) = Load Switch AUX S5-G
```

! Press the "*" key to return to Main Menu. Now go back to "RUN-ENABLE STATUS" and switch to "ON".

NOTE

I/O re-programming is necessary for proper FYA operation. See Channel & I/O Programming Detail For FYA Operation on this sheet.

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash. It also specifies which overlap is to be overridden for the FYA to display properly.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
      Chan.1...2...3...4...5...6...7...8 >
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

```
      Chan.9..10..11..12..13..14..15..16
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   X   .   X   X
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   1   0   3   4
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

NOTE

Output re-mapping is necessary for proper FYA operation. See the 4-Section PPLT FYA Output Programming Detail on this sheet.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1284T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Old High Point Rd.
at
SR 1357 (Millis Rd.) /
SR 1673 (Bonner Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T. Jyn
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

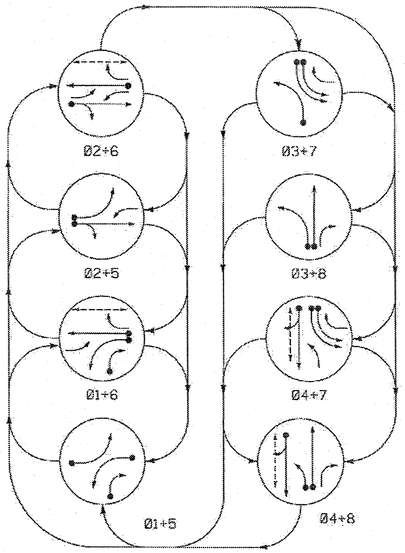
SIGNATURE | DATE 5/1/12

SIG. INVENTORY NO. 07-1284T1

27-APR-2012 08:31
S:\TPGSUM\TS Signals\Workgroups\Sig Mom\Strickland\H071284_smele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 10

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

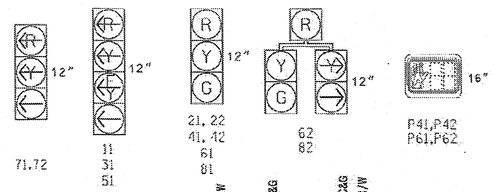
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+07	03+08	04+07	04+08	FLASH
11	—	—	F Y	F Y	R	R	R	R	Y
21, 22	R	R	G	G	R	R	R	R	Y
31	R	R	R	R	—	—	F Y	F Y	R
41, 42	R	R	R	R	R	R	G	G	R
51	—	F Y	—	F Y	R	R	R	R	Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/G	R	R/G	R	Y
71, 72	R	R	R	R	—	R	—	R	R
81	R	R	R	R	R	G	R	G	R
82	R/G	R	R	R	R	G	R	G	R
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK

F Y = Flashing Yellow Arrow
W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

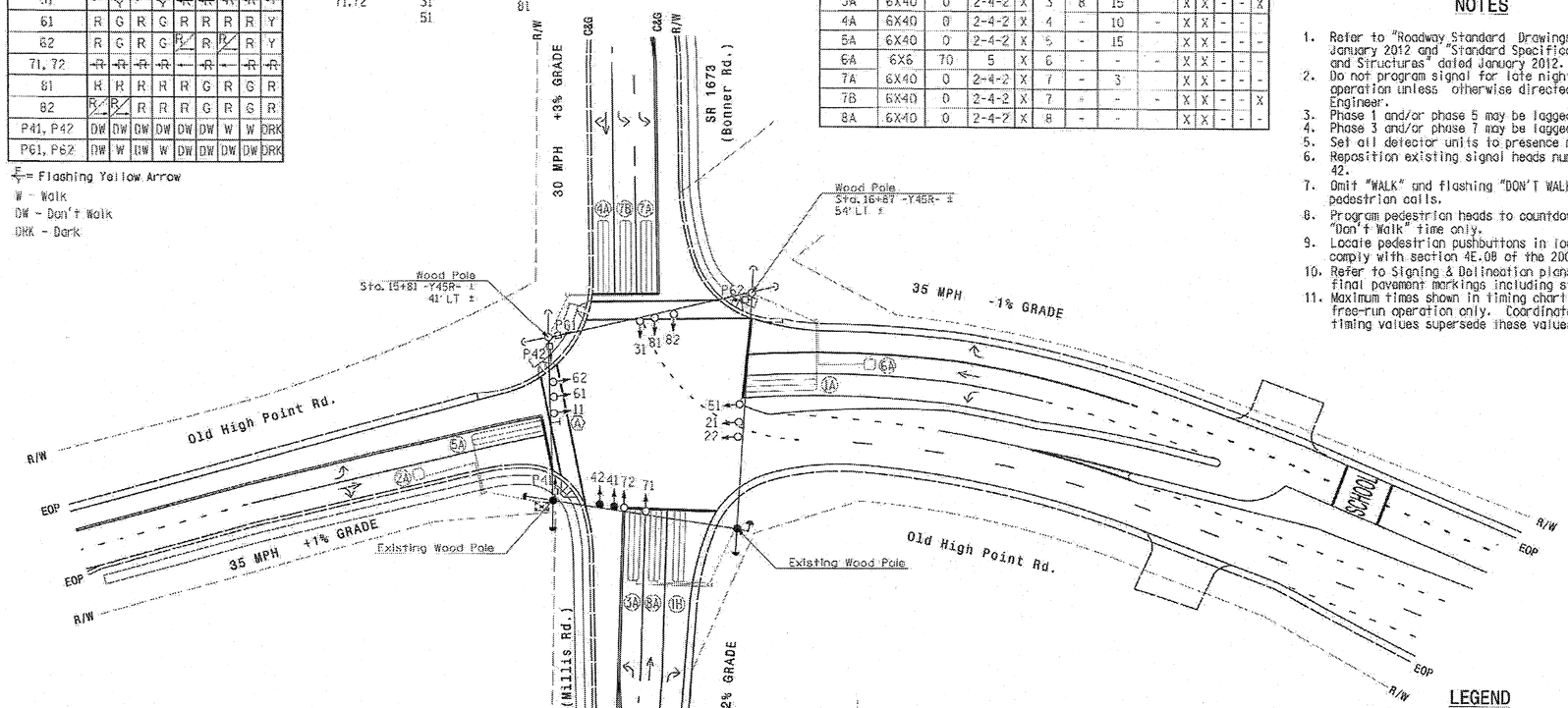
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1		15	-	X	X	-	-	-
1B	6X40	0	2-4-2	X	1	-	15		X	X	-	-	X
2A	6X6	70	5	X	2	-	-	-	X	X	-	-	-
3A	6X40	0	2-4-2	X	3	8	15		X	X	-	-	X
4A	6X40	0	2-4-2	X	4	-	10	-	X	X	-	-	-
5A	6X40	0	2-4-2	X	5	-	15		X	X	-	-	-
6A	6X6	70	5	X	6	-	-	-	X	X	-	-	-
7A	6X40	0	2-4-2	X	7	-	3		X	X	-	-	-
7B	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	-		X	X	-	-	-

8 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Reposition existing signal heads numbered 41 and 42.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Locate pedestrian pushbuttons in locations that comply with section 4E.08 of the 2009 MUTCD.
10. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	10	7	7	7	10	7	7
Gap, Extension *	2.0	3.0	2.0	2.0	2.0	3.0	2.0	2.0
Maximum Green 1 *	20	90	20	25	20	90	20	25
Maximum Green 2 *	20	90	20	25	20	90	20	25
Yellow Clear	3.0	3.9	3.0	3.6	3.0	3.9	3.0	3.6
Red Clear	2.8	2.3	2.4	2.5	3.2	2.3	3.2	2.5
Walk *	-	-	-	7	-	7	-	-
Pedestrian Clear	-	-	-	16	-	19	-	-
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-		-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-		-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	
Lock Calls	NO	YES	NO	NO	NO	YES	NO	NO
Dual Entry	-	-	-	ON	-	-	-	-
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.

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 651-5666
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www.stantec.com
License No. F-0672

SIGNAL UPGRADE - FINAL DESIGN

Prepared for the Offices of: Transportation Mobility and Safety Division, Signal Design Section, 750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 0 40 — 1" = 40'

Old High Point Rd.
at
SR 1357 (Millis Rd.) /
SR 1673 (Bonner Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE Betsy L. Watson DATE 6/26/12

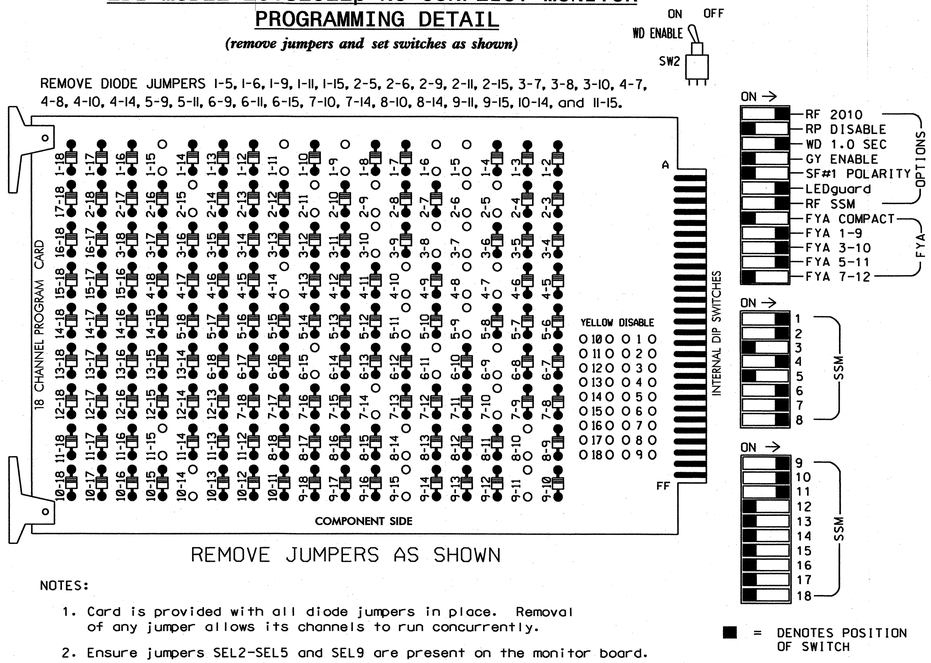
SIG. INVENTORY NO. 07-1284

6/26/2012
C:\Users\kwieskamp\Desktop\PROJECTS\Greensboro\07-1284_Sig_Opt_3_Ph_8_Fully_Actuated.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 11

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-15, 3-7, 3-8, 3-10, 4-7, 4-8, 4-10, 4-14, 5-9, 5-11, 6-9, 6-11, 6-15, 7-10, 7-14, 8-10, 8-14, 9-11, 9-15, 10-14, and 11-15.

REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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 with the Signal Plans.
2. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phase 2 for Start Up In Green, and phase 6 for Start Up In Walk.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phase 4 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S4,S5,S6,S7,S8,S9,S10, S11,AUX S1,AUX S2,AUX S4
PHASES USED.....1,2,3,4,4 PED,5,6,6 PED,7,8
OVERLAP A.....*
OVERLAP B.....*
OVERLAP C.....*
OVERLAP D.....NONE

* See Sheet 2 of 3 Overlap Programming Detail.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4	S5	S6	S7	S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3	4	14	5	6	15	7		8	16	9	10	17	11	12	18
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★	82	21,22	NU	31★	41,42	P41, P42	51★	61,62	P61, P62	62	71,72	81,82	NU	11★	31★	NU	51★	NU	NU
RED		*	128			101			134				107							
YELLOW			129		*	102		*	135				108							
GREEN			130			103			136				109							
RED ARROW												122			A121	A124		A114		
YELLOW ARROW		126									123	123			A122	A125		A115		
FLASHING YELLOW ARROW															A123	A126		A116		
GREEN ARROW	127	127			118			133			124	124								
✋							104			119										
🚶							106			121										

NU = Not Used

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

★ See pictorial of head wiring in detail below.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø1 1B	SLOT EMPTY	SLOT EMPTY	Ø3 3A	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø2 2A			NOT USED	NOT USED						Ø4 PED DC ISOLATOR	NOT USED	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	SLOT EMPTY	SLOT EMPTY	Ø7 7A	Ø7 7B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED			NOT USED	Ø8 8A								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

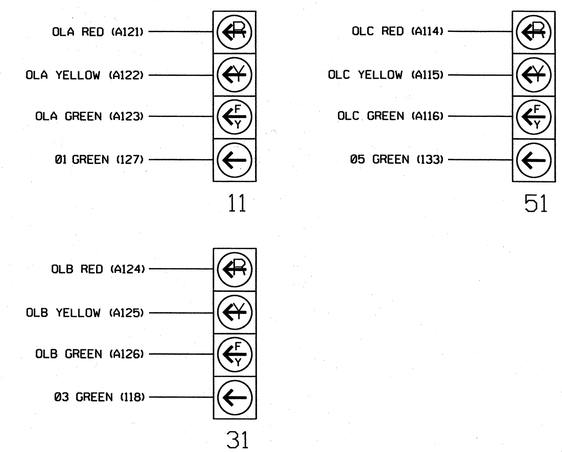
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1		15		X	X	
1B	TB2-5,6	I2U	39	2	1		15		X	X	
2A	TB2-7,8	I2L	43	3	2				X	X	
3A	TB4-5,6	I5U	58	7	3	8	15		X	X	
4A	TB4-9,10	I6U	41	8	4		10		X	X	
5A	TB3-1,2	J1U	55	15	5		15		X	X	
6A	TB3-5,6	J2U	40	16	6				X	X	
7A	TB5-5,6	J5U	57	21	7		3		X	X	
7B	TB5-9,10	J6U	42	22	7				X	X	
8A	TB5-11,12	J6L	46	23	8				X	X	
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED						
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED						

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)

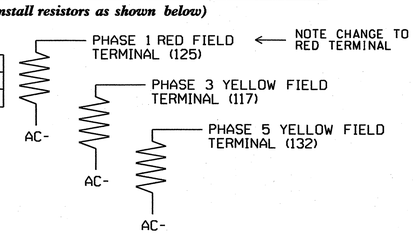


LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



! IMPORTANT: Move Load Resistor from Yellow Field Terminal to Red Field Terminal for Phase 1.

LOAD RESISTOR REMOVAL DETAIL

(remove resistor as shown below)

! IMPORTANT: If present, remove load resistor PHASE 7 YELLOW FIELD TERMINAL (123)

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: Ø7-1284
DESIGNED: February 2012
SEALED: 06/26/12
REVISED: N/A

Electrical Detail - Final - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Old High Point Rd.
at
SR 1357 (Millis Rd.) /
SR 1673 (Bonner Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: June 2012 | REVIEWED BY: T. Vogt
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE DATE 6/27/12
SIG. INVENTORY NO. 07-1284

26-JUN-2012 13:37
S:*ITSASLWITS Signals*WorkGroups*Sig Mom*Strickland*071284_sm_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.12

OVERLAP PROGRAMMING DETAIL FOR OVERLAPS A, B, and C *

(program controller as shown below)

* NOTE FOR ALL OVERLAPS: Use Default values for Overlap 'PLUS' programming details.

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
   Confl Lock Enable OFF
     Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  1
  then press Enter
```

```
Overlap A-1
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
 Ovrlp A-1   Ps....................
Included Ps   1 0 0 0 0 0 0 0
Modifier Ps   2 0 0 0 0 0 0 0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC" TWICE

```
Enter Overlap #  2
  then press Enter
```

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
 Ovrlp B-2   Ps....................
Included Ps   3 0 0 0 0 0 0 0
Modifier Ps   4 0 0 0 0 0 0 0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC" TWICE

```
Enter Overlap #  3
  then press Enter
```

```
Overlap C-3
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
 Ovrlp C-3   Ps....................
Included Ps   5 0 0 0 0 0 0 0
Modifier Ps   6 0 0 0 0 0 0 0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

END OF OVERLAP PROGRAMMING DETAIL

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

~~CALL, INHIBIT, REDIRECT PROGRAMMING DETAIL~~

(USED FOR BACK-UP PROTECTION)

(program controller as shown below)

From Main Menu press '1' (Controller), then '1' (Phases), then '5' (CAll, Inh, Redirect).

```
                    Inhibit Ps 1111111    >
P   ..Call.Ps..  12345678 90123456
1   0 0 0 0  ........ ........
2   0 0 0 0  ........ ........
3   0 0 0 0  ........ ........
4   0 0 0 0  ........ ........
5   0 0 0 0  ........ ........
6   0 0 0 0  ........ ........
7   0 0 0 0  ........ ........
8   0 0 0 0  .......X. ........
```

OPERATIONAL NOTE

This programming will omit phase 7 when phase 8 is "ON".

! IMPORTANT: If present, remove all phases from 'CALL, Inh, Redirect' Function.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1284
DESIGNED: February 2012
SEALED: 06/26/12
REVISED: N/A

Electrical Detail - Final - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division, STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, Signal Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

Old High Point Rd. at SR 1357 (Millis Rd.) / SR 1673 (Bonner Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: June 2012 | REVIEWED BY: T. Joy

PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 6/27/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-1284

26-JUN-2012 13:38
c:\pwworking\scdot5\signals\workgroups\sig mgmt\strickland\07-1284_sml_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 13

4-SECTION PPLT FYA OUTPUT PROGRAMMING DETAIL

(program controller as shown below)

1. Before proceeding with output programming, be sure to switch the "RUN ENABLE STATUS" to "OFF". The "RUN ENABLE STATUS" setting is located from Main Menu, key strokes 1-7.

2. The Flashing Yellow Arrow in a 4-section PPLT FYA head is controlled by a normally unused PED Yellow output. This programming takes a specific PED Yellow output and remaps it to the appropriate Overlap Green output.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16   4.Chan+  1-16 7.IO Logic
2.chan 17-24   5.chan+ 17-24 8.IO Viewer
3.Chan Parms   6.IO Parms    9.IO UserMap
```

SELECT USER MODE →

```
I/O Parameters
C1-C11-ABC IO Mode: USER
     D Conn Mapping: NONE
        T&F Biu Map: DEFAULT
 Invert Rail Inputs: OFF
    EVP Ped Confirm: OFF
```

PRESS "ESC"

```
Channel & I/O
1.Chan  1-16   4.Chan+  1-16 7.IO Logic
2.chan 17-24   5.chan+ 17-24 8.IO Viewer
3.Chan Parms   6.IO Parms    9.IO UserMap
```

```
User I/O Maps
1. Inputs
2. Outputs
3. Init Map
```

SELECT MODE 5 →

```
Initialize User I/O Maps
Init ABC with: NONE
  Init D with: NONE
   Init 2A with: MODE 5
Init TF BIUs with: NONE
```

PRESS "ESC"

```
User I/O Maps
1. Inputs
2. Outputs
3. Init Map
```

```
User Output Maps
1.NEMA A    4.NEMA D
2.NEMA B    5.FIO 2A
3.NEMA C                9.TS2 IO
```

PRESS "+" KEY TWICE

Pin	Fcn	Description	Pin	Fcn	Description
4-5	54	Ch6 Green	4-6	5	Ch5 Red
4-7	29	Ch5 Yellow	4-8	53	Ch5 Green
5-1	0	Unused	5-2	0	Unused
5-3	0	Unused	5-4	40	Ch16 Yellow
5-5	42	Ch18 Yellow	5-6	41	Ch17 Yellow
5-7	115	Not Used	5-8	114	Watchdog
6-1	18	Ch18 Red	6-2	66	Ch18 Green

PRESS "+" KEY ONCE

Pin	Fcn	Description	Pin	Fcn	Description
6-3	12	Ch12 Red	6-4	36	Ch12 Yellow
6-5	60	Ch12 Green	6-6	11	Ch11 Red
6-7	35	Ch11 Yellow	6-8	39	Ch15 Yellow
7-1	17	Ch17 Red	7-2	65	Ch17 Green
7-3	10	Ch10 Red	7-4	34	Ch10 Yellow
7-5	38	Ch14 Yellow	7-6	9	Ch9 Red
7-7	33	Ch9 Yellow	7-8	37	Ch13 Yellow

OUTPUT PROGRAMMING COMPLETE

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
5-1	37	Ch13 Yellow....	0	Unused
5-2	39	Ch15 Yellow....	0	Unused
5-3	38	Ch14 Yellow....	0	Unused

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
7-8	57	Ch9 Green	37	Ch13 Yellow
7-5	58	Ch10 Green	38	Ch14 Yellow
6-8	59	Ch11 Green	39	Ch15 Yellow

Pin 5-1 (C1 pin 35) = Load Switch S3-Y
Pin 5-2 (C1 pin 36) = Load Switch S9-Y
Pin 5-3 (C1 pin 37) = Load Switch S6-Y
Pin 7-8 (C1 pin 99) = Load Switch AUX S1-G
Pin 7-5 (C1 pin 96) = Load Switch AUX S2-G
Pin 6-8 (C1 pin 90) = Load Switch AUX S4-G

! Press the "*" key to return to Main Menu. Now go back to "RUN-ENABLE STATUS" and switch to "ON".

NOTE

I/O re-programming is necessary for proper FYA operation. See Channel & I/O Programming Detail For FYA Operation on this sheet.

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash. It also specifies which overlap is to be overridden for the FYA to display properly.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16   4.Chan+  1-16 7.IO Logic
2.chan 17-24   5.chan+ 17-24 8.IO Viewer
3.Chan Parms   6.IO Parms    9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
     Chan.1...2...3...4...5...6...7...8 >
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

```
     Chan.9..10..11..12..13..14..15..16
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   X   X   X   .
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   1   2   3   0
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

NOTE

Output re-mapping is necessary for proper FYA operation. See the 4-Section PPLT FYA Output Programming Detail on this sheet.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1284
DESIGNED: February 2012
SEALED: 06/26/12
REVISED: N/A

Electrical Detail - Final - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Old High Point Rd.
at
SR 1357 (Millis Rd.) /
SR 1673 (Bonner Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: June 2012 | REVIEWED BY: T. Sign
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

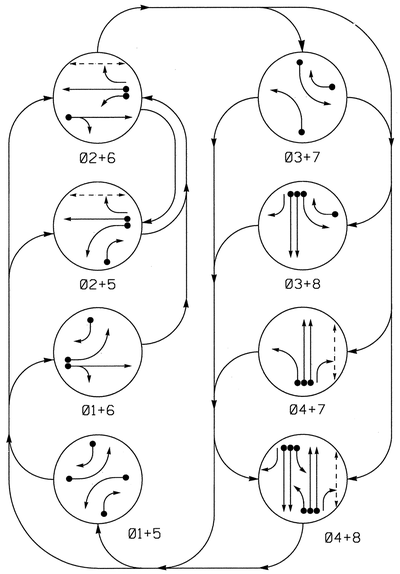
SIGNATURE | DATE 6/27/12

SIG. INVENTORY NO. 07-1284

26-JUN-2012 13:40
S:*TSSSUNITS Signals*Workgroups*Sig Mgmt*Strickland*D071284_sm_ele_xxx.dgn
ossrtjaslopez

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 14

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

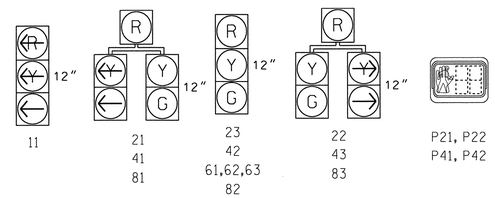
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	←	←	~~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
23	R	R	G	G	R	R	R	R	Y
41	R	R	R	R	R/←	R	G/←	G	R
42	R	R	R	R	R	R	G	G	R
43	R/→	R	R/→	R	R	R	G	G	R
61,62,63	R	G	R	G	R	R	R	R	Y
81	R	R	R	R	R/←	G/←	R	G	R
82	R	R	R	R	R	G	R	G	R
83	R/→	R/→	R	R	R	G	R	G	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DRK

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

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

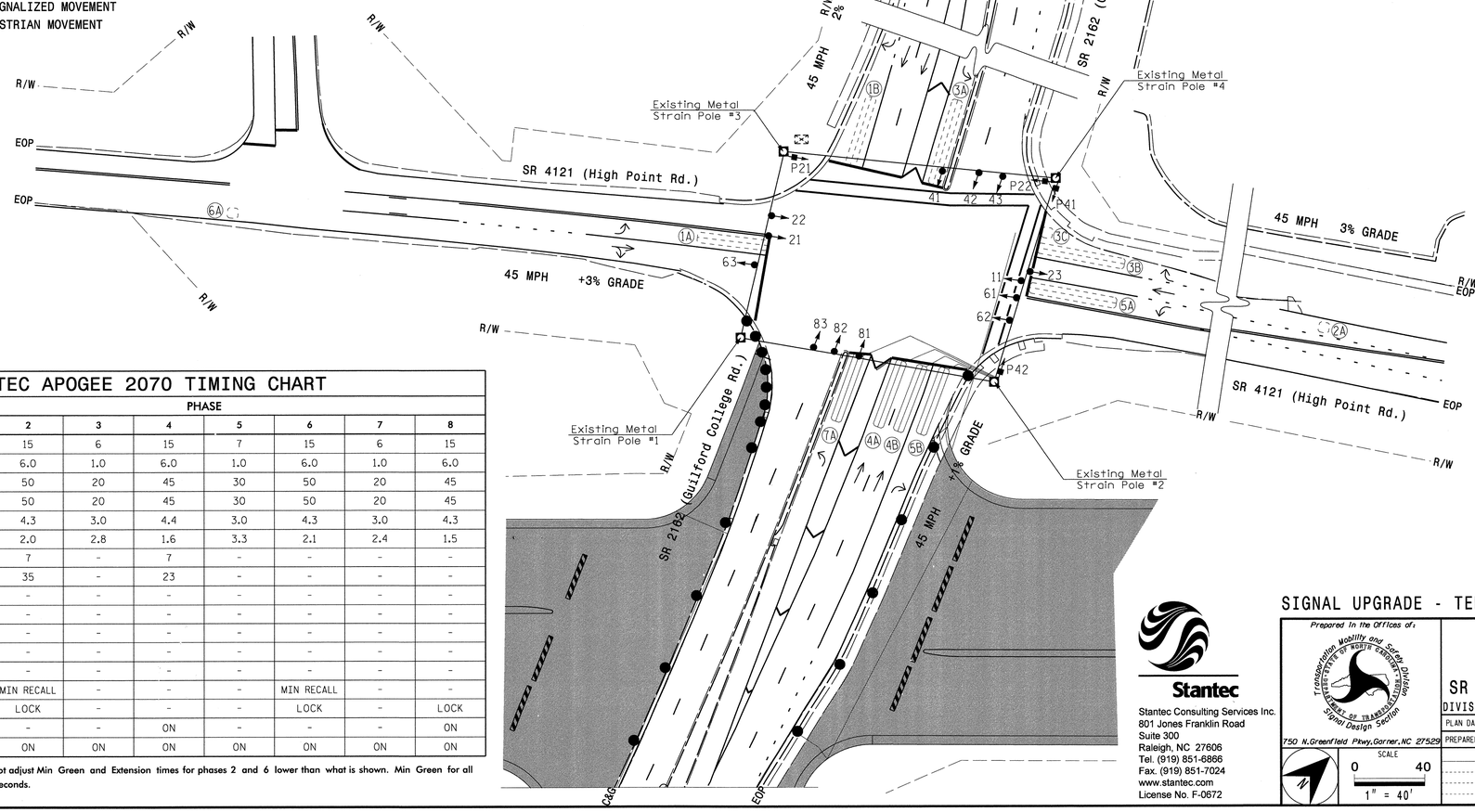
INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X50	0	EXIST	-	1	-	-	-	X	X	-	-	-
1B	6X40	0	EXIST	-	1	-	10	-	X	X	-	-	-
2A	6X6	295	EXIST	-	2	-	-	-	X	X	-	-	-
3A	6X50	0	EXIST	-	3	8	5	-	X	X	-	-	-
3B	6X50	0	EXIST	-	3	-	10	-	X	X	-	-	-
3C	6X6	0	EXIST	-	3	-	10	-	X	X	-	-	-
4A	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	-
4B	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	-
5A	6X50	0	EXIST	-	5	-	-	-	X	X	-	-	-
5B	6X40	0	2-4-2	X	5	-	10	-	X	X	-	-	-
6A	6X6	295	EXIST	-	6	-	-	-	X	X	-	-	-
7A	6X40	0	2-4-2	X	7	4	5	-	X	X	-	-	-
8A,8B	6X6	295	EXIST	-	8	-	-	-	X	X	-	-	-

* Note: Abandon existing upstream detection on NB Guilford College Road and cut new stopbar loops as shown in order to maintain detection during construction.

8 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Redirect from Phase 1 to Phase 4 during Phase 2.
5. Inhibit Phase 1 during Phase 2 on.
6. Inhibit Phase 3 during Phase 4 on.
7. Inhibit Phase 7 during Phase 8 on.
8. Set all detector units to presence mode.
9. Refer to Traffic Control plans for location of temporary pavement markings including stopbars.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. City signal system data: Controller Asset #2030.



LEGEND

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

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	15	6	15	7	15	6	15
Gap, Extension *	2.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0
Maximum Green 1 *	40	50	20	45	30	50	20	45
Maximum Green 2 *	40	50	20	45	30	50	20	45
Yellow Clear	3.0	4.3	3.0	4.4	3.0	4.3	3.0	4.3
Red Clear	3.4	2.0	2.8	1.6	3.3	2.1	2.4	1.5
Walk *	-	7	-	7	-	-	-	-
Pedestrian Clear	-	35	-	23	-	-	-	-
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Lock Calls	-	LOCK	-	-	-	LOCK	-	LOCK
Dual Entry	-	-	-	ON	-	-	-	ON
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.

Stantec
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www.stantec.com
License No. F-0672

SIGNAL UPGRADE - TEMPORARY DESIGN 1 (TMP PHASE I)

Prepared in the Offices of: Transportation Mobility and Safety Division, Signal Design Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE Betsy L. Watson DATE 4/26/12

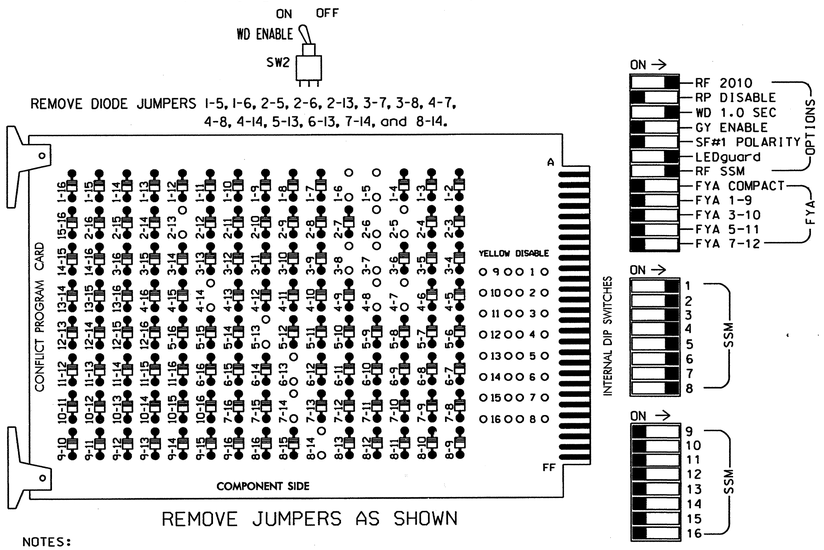
SIG. INVENTORY NO. 07-2030T1

5/5/2012
J:\71001287\transportation\design\traffic\Signals\Signlans\71001287_sig_dsn_4_07-2030_T1.dgn
Dillon

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.15

EDI MODEL 2010ECL-NC 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 SEL2-SEL5 are present on the monitor board.

INPUT FILE POSITION LAYOUT

(front view)

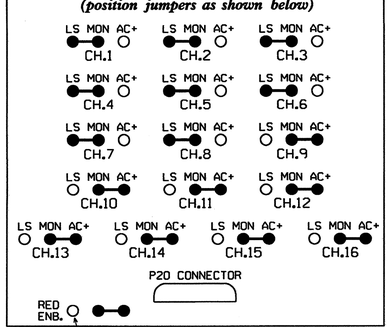
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø1 1B	SLOT	SLOT	SLOT	Ø3 3A	Ø4 3C	Ø4 4B	SLOT	SLOT	SLOT	Ø2 PED DC ISOLATOR	SLOT	FS DC ISOLATOR
	L	NOT USED	Ø2 2A	EMPTY	EMPTY	EMPTY	Ø3 3B	Ø4 4A	NOT USED	EMPTY	EMPTY	EMPTY	Ø4 PED DC ISOLATOR	EMPTY	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø5 5B	SLOT	SLOT	SLOT	Ø7 7A	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	L	NOT USED	Ø6 6A	EMPTY	EMPTY	EMPTY	Ø8 8A,8B	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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

FS = FLASH SENSE
ST = STOP TIME

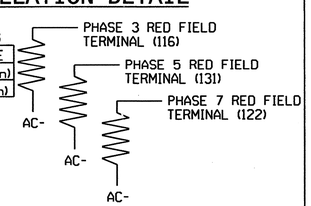
RED MONITOR BOARD PROGRAMMING

(position jumpers as shown below)



LOAD RESISTOR INSTALLATION DETAIL

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



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

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
4. Program phase 2 for Start Up In Walk, and phase 6 for Start Up In Green.
5. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
6. Ensure "Local Flash Start" feature is set to "ON".
7. Program phases 4 and 8 for Dual Entry.
8. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....NAZTEC 2070L
CABINET.....McCAIN/CONTROL TECHNOLOGIES (DWG.NO.9500-332-NCDOT)
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S4P,S5,S6,S7,S8
PHASES USED.....1,2,2 PED,3,4,4 PED,5,6,7,8
OVERLAPS.....NONE

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1				X	X	
1B	TB2-5,6	I2U	39	2	1		10		X	X	
2A	TB2-7,8	I2L	43	3	2				X	X	
3A	TB4-9,10	I6U	41	8	3	8	5		X	X	
3B	TB4-11,12	I6L	45	9	3		10		X	X	
3C	TB6-1,2	I7U	65	10	3		10		X	X	
4A	TB6-3,4	I7L	78	11	4				X	X	
4B	TB6-5,6	I8U	49	12	4				X	X	
5A	TB3-1,2	J1U	55	15	5				X	X	
5B	TB3-5,6	J2U	40	16	5		10		X	X	
6A	TB3-7,8	J2L	44	17	6				X	X	
7A	TB5-9,10	J6U	42	22	7	4	5		X	X	
8A,8B	TB5-11,12	J6L	46	23	8				X	X	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED						
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED						

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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	83	21, 22,23	P21, P22	22,81	41, 42,43	P41, P42	21,43	61, 62,63	NU	41	81, 82,83	NU
RED			128		*	101		*	134		*	107	
YELLOW			129			102			135			108	
GREEN			130			103			136			109	
RED ARROW	125												
YELLOW ARROW	126	126			117			132			123		
GREEN ARROW	127	127			118			133			124		
✋				113			104						
🚶				115			106						

NU = Not Used

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

CALL, INHIBIT, REDIRECT PROGRAMMING DETAIL

(USED FOR BACK-UP PROTECTION)

(program controller as shown below)

From Main Menu press '1' (Controller), then '1' (Phases), then '5' (CAll, Inh, Redirect).

```
                    Inhibit Ps 1111111   >
P   ..Call.Ps..  12345678 90123456
1   0 0 0 0  ........ ........
2   0 0 0 0  X....... ........
3   0 0 0 0  ........ ........
4   0 0 0 0  ..X..... ........
5   0 0 0 0  ........ ........
6   0 0 0 0  ........ ........
7   0 0 0 0  ........ ........
8   0 0 0 0  ......X. ........
```

SCROLL TO THE RIGHT TO ACCESS "REDIRECT P CALLS" SCREEN BELOW

```
<      Redirect P Calls (from P to P)
P    From-To   From-To   From-To   From-To
1     0  0      0  0      0  0      0  0
2     1  4      0  0      0  0      0  0
3     0  0      0  0      0  0      0  0
4     0  0      0  0      0  0      0  0
5     0  0      0  0      0  0      0  0
6     0  0      0  0      0  0      0  0
7     0  0      0  0      0  0      0  0
8     0  0      0  0      0  0      0  0
```

OPERATIONAL NOTE

This programming will omit phase 1 when phase 2 is "ON", omit phase 3 when phase 4 is "ON", and omit phase 7 when phase 8 is "ON". Also, calls will be redirected from phase 1 to phase 4 during phase 2.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2030T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Signal Upgrade - Temp Design 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

Prepared in the Offices of:
Transportation Mobility and Safety Division
Department of Transportation
Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

Division 07 | Guilford County | Greensboro
PLAN DATE: April 2012 | REVIEWED BY: T. Jam
PREPARED BY: C. Strickland | REVIEWED BY:

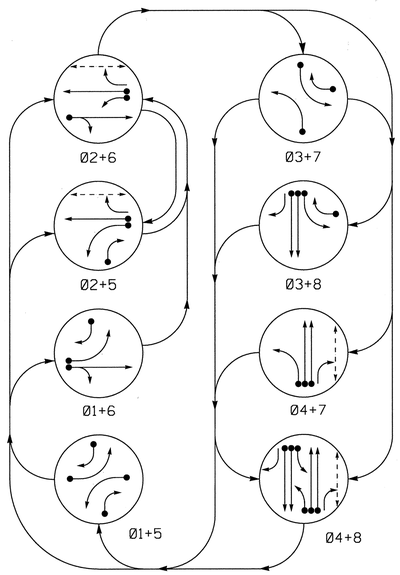
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE | DATE 4/30/12
SIG. INVENTORY NO. 07-2030T1

27-APR-2012 08:53
S:*ITSAS(W)ITS Signals*Workgroups*Sig Man*Strickland*072030_sm_ele_xxx.dgn
cbstrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 16

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

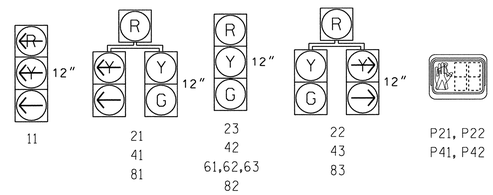
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	←	←	←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
23	R	R	G	G	R	R	R	R	Y
41	R	R	R	R	↘R	R	↘G	G	R
42	R	R	R	R	R	R	G	G	R
43	↗R	R	↗R	R	R	R	G	G	R
61,62,63	R	G	R	G	R	R	R	R	Y
81	R	R	R	R	↘R	↘G	R	G	R
82	R	R	R	R	R	G	R	G	R
83	↗R	↗R	R	R	R	G	R	G	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DRK

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

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

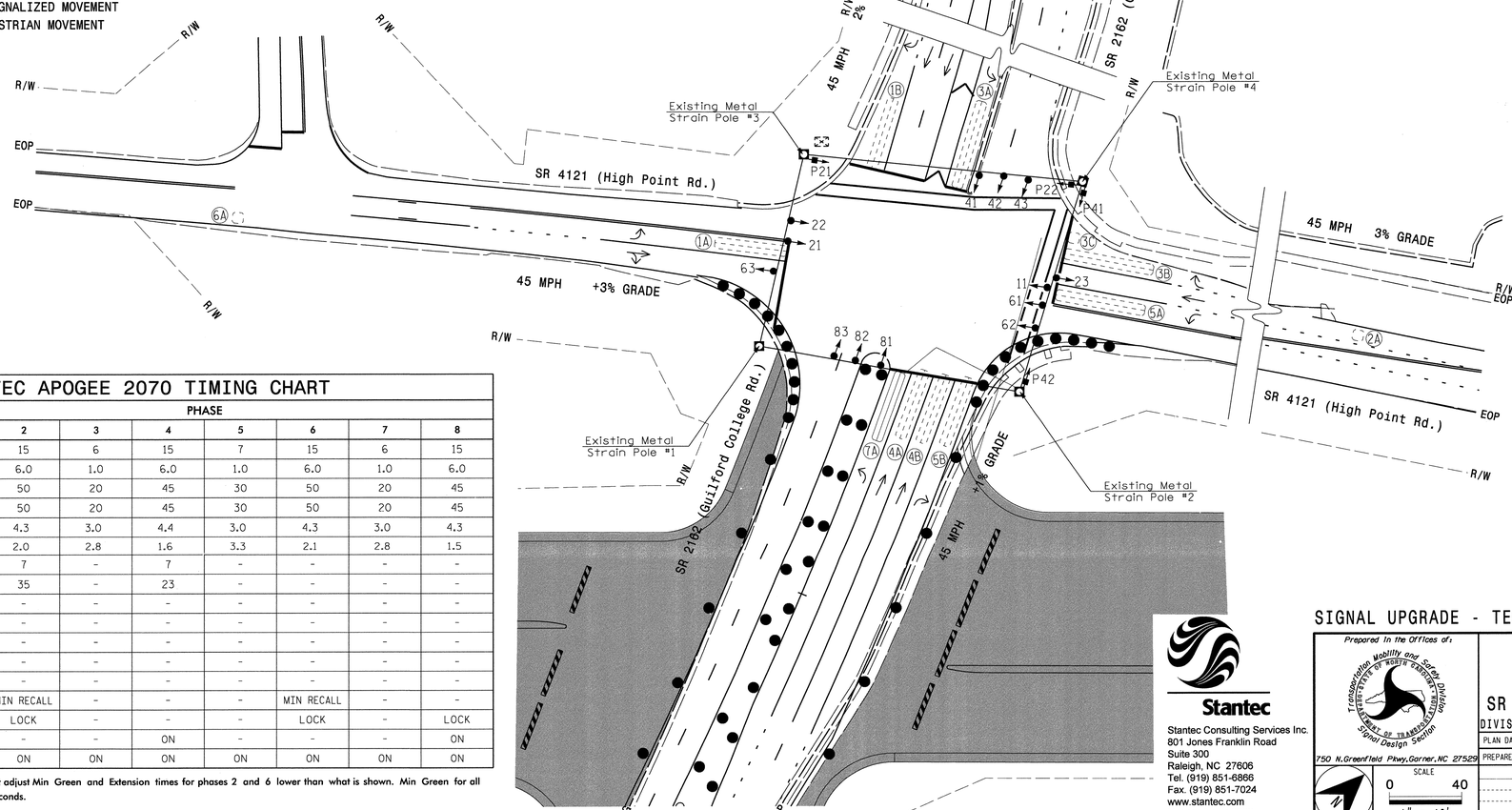
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X50	0	EXIST	-	1	-	-	-	X	X	-	-	-
1B	6X40	0	EXIST	-	1	-	10	-	X	X	-	-	-
2A	6X6	295	EXIST	-	2	-	-	-	X	X	-	-	-
3A	6X50	0	EXIST	-	3	8	5	-	X	X	-	-	-
3B	6X50	0	EXIST	-	3	-	10	-	X	X	-	-	-
3C	6X6	0	EXIST	-	3	-	10	-	X	X	-	-	-
4A	6X40	0	2-4-2	-	4	-	-	-	X	X	-	-	-
4B	6X40	0	2-4-2	-	4	-	-	-	X	X	-	-	-
5A	6X50	0	EXIST	-	5	-	-	-	X	X	-	-	-
5B	6X40	0	2-4-2	-	5	-	10	-	X	X	-	-	-
6A	6X6	295	EXIST	-	6	-	-	-	X	X	-	-	-
7A	6X40	0	2-4-2	X	7	4	5	-	X	X	-	-	-
8A,8B	6X6	295	EXIST	-	8	-	-	-	X	X	-	-	-

8 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal forlate night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Redirect from Phase 1 to Phase 4 during Phase 2.
5. Inhibit Phase 1 during Phase 2 on.
6. Inhibit Phase 3 during Phase 4 on.
7. Inhibit Phase 7 during Phase 8 on.
8. Set all detector units to presence mode.
9. Reposition existing signal head numbered 41.
10. Refer to Traffic Control plans for location of temporary pavement markings including stopbars.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. City signal system data: Controller Asset #2030.



LEGEND

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

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	15	6	15	7	15	6	15
Gap, Extension *	2.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0
Maximum Green 1 *	40	50	20	45	30	50	20	45
Maximum Green 2 *	40	50	20	45	30	50	20	45
Yellow Clear	3.0	4.3	3.0	4.4	3.0	4.3	3.0	4.3
Red Clear	3.4	2.0	2.8	1.6	3.3	2.1	2.8	1.5
Walk *	-	7	-	7	-	-	-	-
Pedestrian Clear	-	35	-	23	-	-	-	-
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Lock Calls	-	LOCK	-	-	-	LOCK	-	LOCK
Dual Entry	-	-	-	ON	-	-	-	ON
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.

Stantec
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801 Jones Franklin Road
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Tel. (919) 851-6866
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www.stantec.com
License No. F-0672

SIGNAL UPGRADE - TEMPORARY DESIGN 2 (TMP PHASE Ia)

Prepared In the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

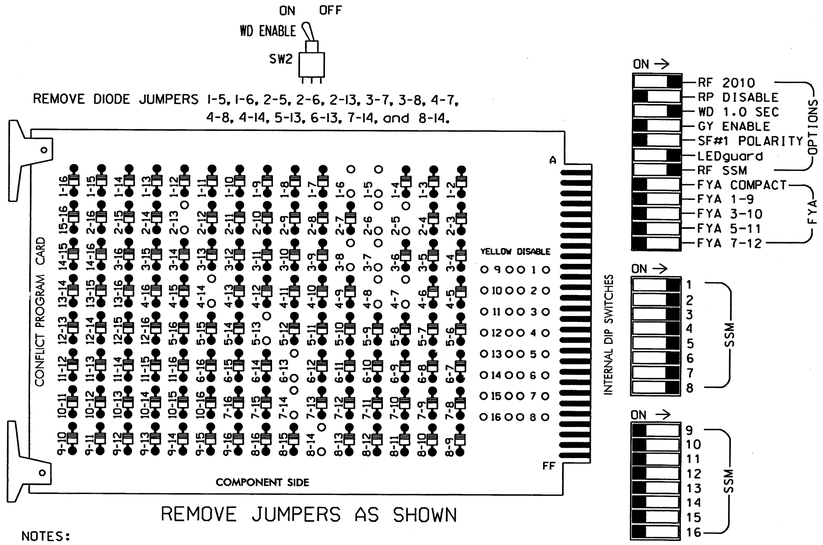
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON
SIGNATURE Betsy L. Watson DATE 4/26/12
SIG. INVENTORY NO. 07-2030T2

5/5/2012
J:\#T100128\#transportation\design\Traffic\Signals\Sig Plans\#T100128T_sig_dsn_4_07-2030_T2.dgn
DLT:SM

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	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. To prevent red failures on unused monitor channels, see Red Monitor Board Programming Detail this sheet.
3. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
4. Program phase 2 for Start Up In Walk, and phase 6 for Start Up In Green.
5. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
6. Ensure "Local Flash Start" feature is set to "ON".
7. Program phases 4 and 8 for Dual Entry.
8. The cabinet and controller are part of the City of Greensboro Signal System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1		2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11	83	21, 22,23	P21, P22	22,81	41, 42,43	P41, P42	21,43	61, 62,63	NU	41	81, 82,83	NU
RED			128		*	101		*	134		*	107	
YELLOW			129			102			135			108	
GREEN			130			103			136			109	
RED ARROW	125												
YELLOW ARROW	126	126			117			132			123		
GREEN ARROW	127	127			118			133			124		
✋				113			104						
🚶				115			106						

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	Ø1 1A	Ø1 1B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø3 3A	Ø4 3C	Ø4 4B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø2 2A				Ø3 3B	Ø4 4A	NOT USED				Ø4 PED DC ISOLATOR		ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø5 5B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø7 7A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø6 6A				Ø8 8A,8B								

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

FS = FLASH SENSE
ST = STOP TIME

EQUIPMENT INFORMATION

CONTROLLER.....NAZTEC 2070L
CABINET.....McCAIN/CONTROL TECHNOLOGIES
(DWG.NO.9500-332-NCDOT)
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S4P,S5,S6,S7,S8
PHASES USED.....1,2,2 PED,3,4,4 PED,5,6,7,8
OVERLAPS.....NONE

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

CALL, INHIBIT, REDIRECT PROGRAMMING DETAIL

(USED FOR BACK-UP PROTECTION)

(program controller as shown below)

From Main Menu press '1' (Controller), then '1' (Phases), then '5' (CAll, Inh, Redirect).

```
                    Inhibit Ps 1111111     >
P   ..Call.Ps..   12345678 90123456
1    0  0  0  0   ........ ........
2    0  0  0  0   X....... ........
3    0  0  0  0   ........ ........
4    0  0  0  0   ..X..... ........
5    0  0  0  0   ........ ........
6    0  0  0  0   ........ ........
7    0  0  0  0   ........ ........
8    0  0  0  0   ......X. ........
```

SCROLL TO THE RIGHT TO ACCESS "REDIRECT P CALLS" SCREEN BELOW

```
<        Redirect P Calls (from P to P)
P    From-To   From-To   From-To   From-To
1     0  0      0  0      0  0      0  0
2     1  4      0  0      0  0      0  0
3     0  0      0  0      0  0      0  0
4     0  0      0  0      0  0      0  0
5     0  0      0  0      0  0      0  0
6     0  0      0  0      0  0      0  0
7     0  0      0  0      0  0      0  0
8     0  0      0  0      0  0      0  0
```

OPERATIONAL NOTE

This programming will omit phase 1 when phase 2 is "ON", omit phase 3 when phase 4 is "ON", and omit phase 7 when phase 8 is "ON". Also, calls will be redirected from phase 1 to phase 4 during phase 2.

INPUT FILE CONNECTION & PROGRAMMING CHART

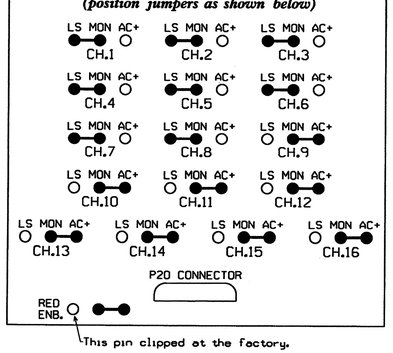
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1				X	X	
1B	TB2-5,6	I2U	39	2	1		10		X	X	
2A	TB2-7,8	I2L	43	3	2				X	X	
3A	TB4-9,10	I6U	41	8	3	8	5		X	X	
3B	TB4-11,12	I6L	45	9	3		10		X	X	
3C	TB6-1,2	I7U	65	10	3		10		X	X	
4A	TB6-3,4	I7L	78	11	4				X	X	
4B	TB6-5,6	I8U	49	12	4				X	X	
5A	TB3-1,2	J1U	55	15	5				X	X	
5B	TB3-5,6	J2U	40	16	5		10		X	X	
6A	TB3-7,8	J2L	44	17	6				X	X	
7A	TB5-9,10	J6U	42	22	7	4	5		X	X	
8A,8B	TB5-11,12	J6L	46	23	8				X	X	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED						
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED						

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

RED MONITOR BOARD PROGRAMMING

(position jumpers as shown below)

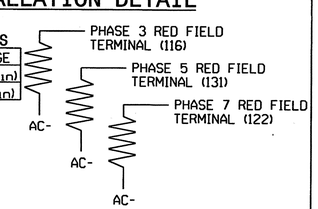


This pin clipped at the factory.

LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES

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



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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2030T2
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Signal Upgrade - Temp Design 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

Division 07 | Guilford County | Greensboro

PLAN DATE: April 2012	REVIEWED BY: T. Joyce		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS		INIT.	DATE

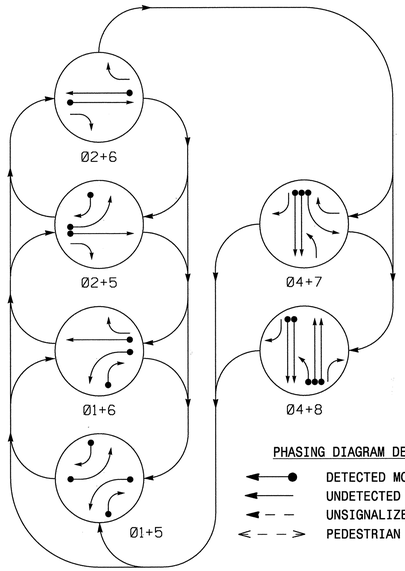
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
George C. Brown 4/26/12
SIGNATURE DATE
SIG. INVENTORY NO. 07-2030T2

27-APR-2012 08:57
S:*TTSSU*ITS Signals*Workgroups*Sig Man*Strickland*2010_smale_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 18

6 Phase
Fully Actuated
(Greensboro Signal System)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

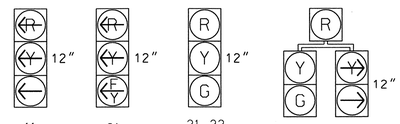
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+7	04+8	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21, 22	R	R	G	G	R	R	Y
41, 43	R	R	R	R	G	G	R
42	R→	R	R→	R	G	G	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
61	R	G	R	G	R	R	Y
63	R	G	R	G	R→	R	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
81	~~R~~	~~R~~	~~R~~	~~R~~	FY	FY	~~R~~
82, 84	R	R	R	R	R	G	R
83	R→	R→	R	R	R	G	R

FY = Flashing Yellow Arrow

SIGNAL FACE I.D.

All Heads L.E.D.



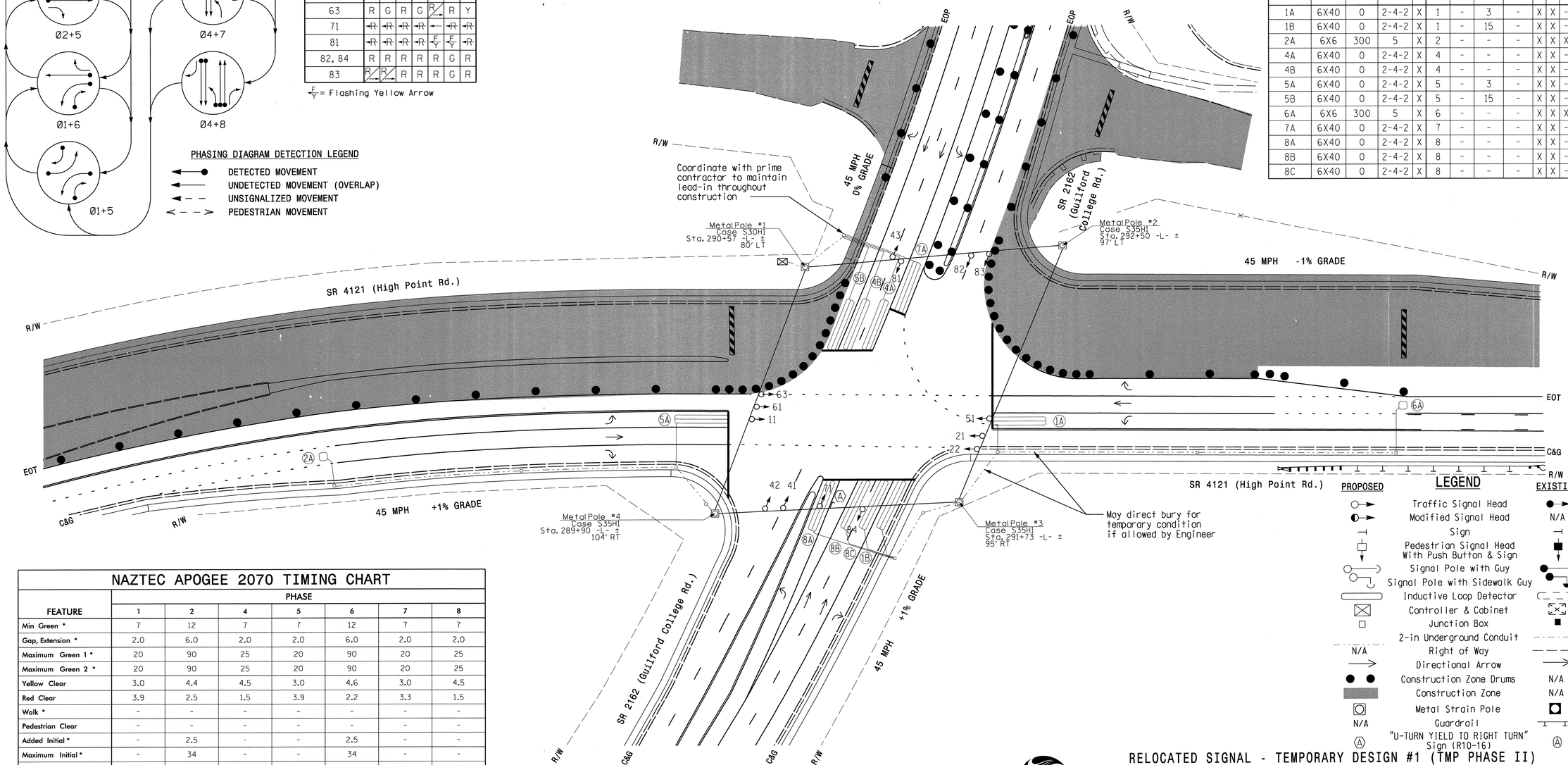
11, 51, 71 | 81 | 21, 22, 41, 43, 61, 82, 84 | 42, 63, 83

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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 7 may be lagged.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Refer to Traffic Control plans for location of temporary pavement markings including stopbars.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. City signal system data: Controller Asset #2185.

LOOP & DETECTOR UNIT INSTALLATION CHART
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	-	3	-	X	X	-	-	X
1B	6X40	0	2-4-2	X	1	-	15	-	X	X	-	-	X
2A	6X6	300	5	X	2	-	-	-	X	X	X	-	X
4A	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
4B	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
5A	6X40	0	2-4-2	X	5	-	3	-	X	X	-	-	X
5B	6X40	0	2-4-2	X	5	-	15	-	X	X	-	-	X
6A	6X6	300	5	X	6	-	-	-	X	X	X	-	X
7A	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X
8B	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X
8C	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X



NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	7	8
Min Green *	7	12	7	7	12	7	7
Gap, Extension *	2.0	6.0	2.0	2.0	6.0	2.0	2.0
Maximum Green 1 *	20	90	25	20	90	20	25
Maximum Green 2 *	20	90	25	20	90	20	25
Yellow Clear	3.0	4.4	4.5	3.0	4.6	3.0	4.5
Red Clear	3.9	2.5	1.5	3.9	2.2	3.3	1.5
Walk *	-	-	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-	-	-
Added Initial *	-	2.5	-	-	2.5	-	-
Maximum Initial *	-	34	-	-	34	-	-
Time Before Reduction *	-	15	-	-	15	-	-
Time To Reduce *	-	30	-	-	30	-	-
Minimum Gap	-	3.0	-	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	YES	NO	NO
Dual Entry	-	-	ON	-	-	-	-
Simultaneous Gap	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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone Drums	N/A
	Construction Zone	N/A
	Metal Strain Pole	
N/A	Guardrail	
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	

RELOCATED SIGNAL - TEMPORARY DESIGN #1 (TMP PHASE II)

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy, Garner, NC 27529

SCALE 0 40
1" = 40'

SR 4121 (High Point Rd.) at SR 2162 (Guilford College Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

Betsy L. Watson 4/26/12
SIGNATURE DATE

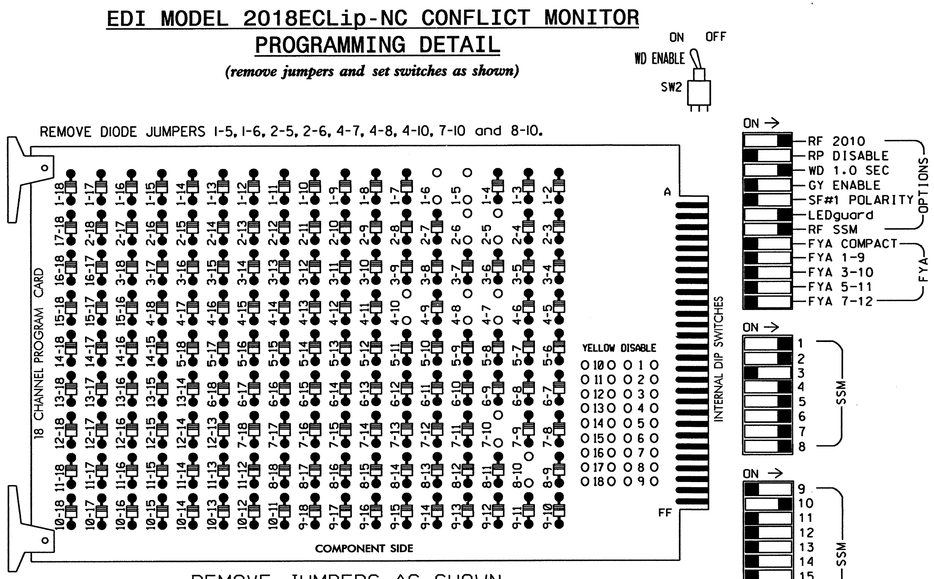
SIG. INVENTORY NO. 07-2185T1

5/5/2012
J:\#171001287\transportation\design\Traffic\Signals\Signals\171001287_sig_dsn_4_07-2185_T1.dgn
blaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.19

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



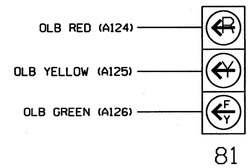
■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

3 SECTION FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S10, S11,AUX S2
PHASES USED.....1,2,4,5,6,7,8
OVERLAP A.....NOT USED
OVERLAP B.....4
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4	S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3	4	14	5		6	15	7		8	16	9	10	17	11	12	18
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	83	21,22	NU	NU	41, 42,43	NU	42	51	61,63	NU	63	71	82, 83,84	NU	NU	81 ★	NU	NU	NU	NU
RED			128			101				134				107							
YELLOW			129			102				135				108							
GREEN			130			103				136				109							
RED ARROW	125								131				122				A124				
YELLOW ARROW	126	126						132	132			123	123				A125				
FLASHING YELLOW ARROW																	A126				
GREEN ARROW	127	127						133	133			124	124								
✋																					
🚶																					

NU = Not Used

★ See pictorial of head wiring this sheet.

* Flash Note: Wire Overlap 'B' to flash on Flasher Unit #2, Circuit #1.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phase 4 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

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	Ø1 1B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø2 2A				Ø4 4B								ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø5 5B	SLOT EMPTY	SLOT EMPTY	Ø7 7A	Ø8 8A	Ø8 8C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø6 6A			NOT USED	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.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1		3		X	X	
1B	TB2-5,6	I2U	39	2	1		15		X	X	
2A	TB2-7,8	I2L	43	3	2				X	X	X
4A	TB4-9,10	I6U	41	8	4				X	X	
4B	TB4-11,12	I6L	45	9	4				X	X	
5A	TB3-1,2	J1U	55	15	5		3		X	X	
5B	TB3-5,6	J2U	40	16	5		15		X	X	
6A	TB3-7,8	J2L	44	17	6				X	X	X
7A	TB5-5,6	J5U	57	21	7				X	X	
8A	TB5-9,10	J6U	42	22	8				X	X	
8B	TB5-11,12	J6L	46	23	8				X	X	
8C	TB7-1,2	J7U	66	24	8				X	X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2185T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY: T. Vogel
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE DATE 4/26/12
SIG. INVENTORY NO. 07-2185T1

27-APR-2012 09:22
S:\ITS&SU\ITS Signals\Workgroups\Sig Mgmt\Strickland\07218S_smlele_xxx.dgn
bsstrickland

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
                Overlaps
[1.General Parms]
2.Program
3.Status
```

```
General Overlap Parameters
        Lock Inhibit OFF
     Confl Lock Enable OFF
       Parent P Clrncs ON
  Extra Included Phases OFF
```

PRESS "ESC"

```
                Overlaps
1.General Parms
[2.Program]
3.Status
```

```
Enter Overlap #  2

  then press Enter
```

```
                Overlap B-2
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Included Ps    4  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
                Overlap B-2
1.Program Parms
[2.Confl Prog+]
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
                Overlap B-2
1.Program Parms
2.Confl Prog+
[3.Program Parms+]
```

```
 Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash.

FROM MAIN MENU. KEYSTROKES 1-8

```
                Channel & I/O
1.Chan  1-16  [4.Chan+  1-16] 7.IO Logic
2.chan 17-24   5.chan+ 17-24  8.IO Viewer
3.Chan Parms   6.IO Parms     9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
      Chan.1...2...3...4...5...6...7...8 >
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

```
      Chan.9..10..11..12..13..14..15..16
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   X   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2185T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T. Vaughn

PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 4/30/12
SIGNATURE DATE

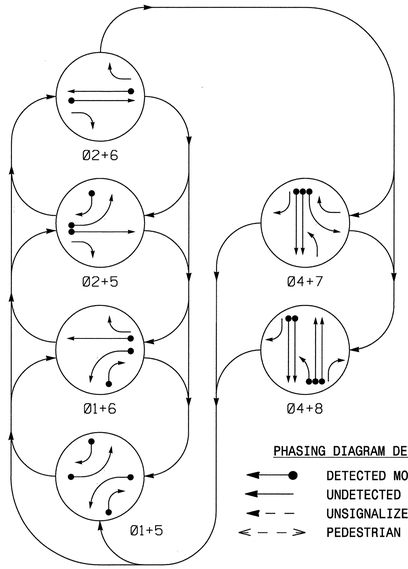
SIG. INVENTORY NO. 07-2185T1

27-APR-2012 09:22
S:\TSSKMTS\Signals\Workgroups\Sig Mgmt\Strickland\07-2185_smu_ele_xxx.dgn
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 21

6 Phase
Fully Actuated
(Greensboro Signal System)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

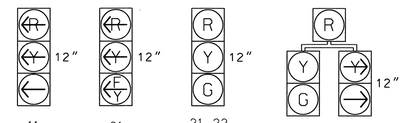
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+7	04+8	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21, 22	R	R	G	G	R	R	Y
41, 43	R	R	R	R	G	G	R
42	R↘	R	R↘	R	G	G	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
61	R	G	R	G	R	R	Y
63	R	G	R	G	R↘	R	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
81	~~R~~	~~R~~	~~R~~	~~R~~	F Y	F Y	~~R~~
82, 84	R	R	R	R	R	G	R
83	R↘	R↘	R	R	R	G	R

F Y = Flashing Yellow Arrow

SIGNAL FACE I.D.

All Heads L.E.D.



11, 51, 71 — 81 — 21, 22, 41, 43, 61, 82, 84 — 42, 63, 83

NOTES

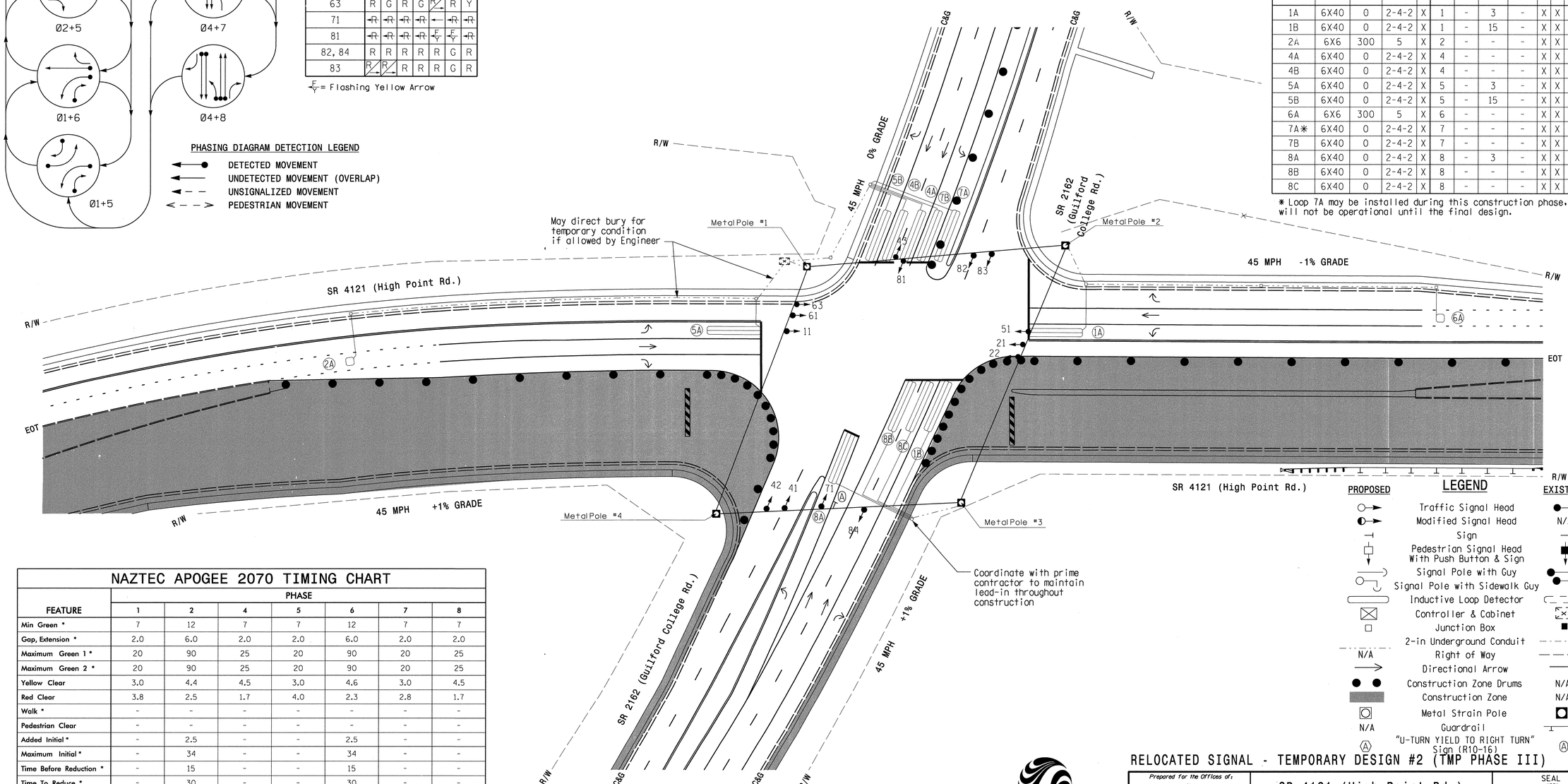
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Reposition existing signal heads numbered 11, 21, 22, 51, 61, and 63.
7. Refer to Traffic Control plans for location of temporary pavement markings including stopbars.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. City signal system data: Controller Asset #2185.

LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	-	3	-	X	X	-	-	-
1B	6X40	0	2-4-2	X	1	-	15	-	X	X	-	-	-
2A	6X6	300	5	X	2	-	-	-	X	X	X	-	-
4A	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	-
4B	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	-
5A	6X40	0	2-4-2	X	5	-	3	-	X	X	-	-	-
5B	6X40	0	2-4-2	X	5	-	15	-	X	X	-	-	-
6A	6X6	300	5	X	6	-	-	-	X	X	X	-	-
7A*	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	-
7B	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	-
8A	6X40	0	2-4-2	X	8	-	3	-	X	X	-	-	-
8B	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	-
8C	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	-

* Loop 7A may be installed during this construction phase, but will not be operational until the final design.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone Drums	N/A
	Construction Zone	N/A
	Metal Strain Pole	
N/A	Guardrail	
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	7	8
Min Green *	7	12	7	7	12	7	7
Gap, Extension *	2.0	6.0	2.0	2.0	6.0	2.0	2.0
Maximum Green 1 *	20	90	25	20	90	20	25
Maximum Green 2 *	20	90	25	20	90	20	25
Yellow Clear	3.0	4.4	4.5	3.0	4.6	3.0	4.5
Red Clear	3.8	2.5	1.7	4.0	2.3	2.8	1.7
Walk *	-	-	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-	-	-
Added Initial *	-	2.5	-	-	2.5	-	-
Maximum Initial *	-	34	-	-	34	-	-
Time Before Reduction *	-	15	-	-	15	-	-
Time To Reduce *	-	30	-	-	30	-	-
Minimum Gap	-	3.0	-	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	YES	NO	NO
Dual Entry	-	-	ON	-	-	-	-
Simultaneous Gap	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.

RELOCATED SIGNAL - TEMPORARY DESIGN #2 (TMP PHASE III)

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

Prepared for the Offices of: Transportation Mobility and Safety Division, Traffic Engineering Branch, Signal Design Section, Division of Highways, Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 — 1" = 40'

SR 4121 (High Point Rd.) at SR 2162 (Guilford College Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE DATE 4/26/12

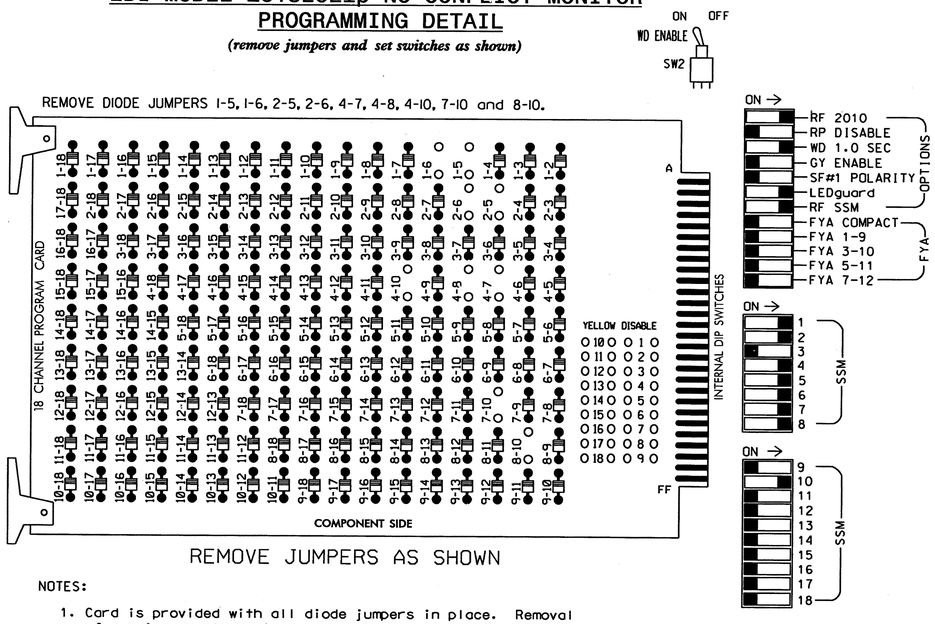
SIG. INVENTORY NO. 07-2185T2

5/5/2012
J:\47100128 7\transportation\Design\Traffic\Signals\SigPlans\71001287_sig_dsn_4_07-2185_T2.dgn
Dlaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.22

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



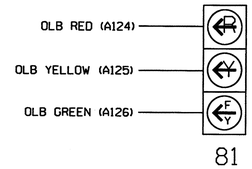
■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

3 SECTION FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S10, S11,AUX S2
PHASES USED.....1,2,4,5,6,7,8
OVERLAP A.....NOT USED
OVERLAP B.....4
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4	S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3	4	14	5		6	15	7		8	16	9	10	17	11	12	18
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	83	21,22	NU	NU	41, 42,43	NU	42	51	61,63	NU	63	71	82, 83,84	NU	NU	81★	NU	NU	NU	NU
RED			128			101				134				107							
YELLOW			129			102				135				108							
GREEN			130			103				136				109							
RED ARROW	125								131				122				A124				
YELLOW ARROW	126	126						132	132			123	123				A125				
FLASHING YELLOW ARROW																	A126				
GREEN ARROW	127	127						133	133			124	124								
✋																					
🚶																					

NU = Not Used

★ See pictorial of head wiring this sheet.

* Flash Note: Wire Overlap 'B' to flash on Flasher Unit #2, Circuit #1.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phase 4 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

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	Ø1 1B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø2 2A				Ø4 4B								ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø5 5B	SLOT EMPTY	SLOT EMPTY	NOT USED	Ø8 8A	Ø8 8C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø6 6A				Ø7 7B	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.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1		3		X	X	
1B	TB2-5,6	I2U	39	2	1		15		X	X	
2A	TB2-7,8	I2L	43	3	2				X	X	X
4A	TB4-9,10	I6U	41	8	4				X	X	
4B	TB4-11,12	I6L	45	9	4				X	X	
5A	TB3-1,2	J1U	55	15	5		3		X	X	
5B	TB3-5,6	J2U	40	16	5		15		X	X	
6A	TB3-7,8	J2L	44	17	6				X	X	X
7B	TB5-7,8	J5L	57	21	7				X	X	
8A	TB5-9,10	J6U	42	22	8		3		X	X	
8B	TB5-11,12	J6L	46	23	8				X	X	
8C	TB7-1,2	J7U	66	24	8				X	X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2185T2
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 2 - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012	REVIEWED BY:		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS		INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE 4/26/12 DATE
SIG. INVENTORY NO. 07-2185T2

30-APR-2012 11:47
S:\TISS\Signals\Workgroups\Sig Man\Strickland\07-2185_sm_ele_xxx.dgn
cestrickland

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
        Lock Inhibit OFF
     Confl Lock Enable OFF
       Parent P Clrncs ON
  Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  2

  then press Enter
```

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Included Ps   4  0  0  0  0  0  0  0
Modifier Ps   0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Confl Ps      0  0  0  0  0  0  0  0
Confl Ovrlps  0  0  0  0  0  0  0  0
Confl Peds    0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16  7.IO Logic
2.chan 17-24  5.chan+ 17-24  8.IO Viewer
3.Chan Parms  6.IO Parms     9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
     Chan.1...2...3...4...5...6...7...8 >
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

```
     Chan.9..10..11..12..13..14..15..16
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   X   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2185T2
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 2 - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
Traffic Engineering Branch
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012	REVIEWED BY: T. Lyn		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS		INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE | DATE 4/30/12

SIG. INVENTORY NO. 07-2185T2

27-APR-2012 09:31
S:\TSS&SM\TS Signals\workgroups\Sig Mgmt\Strickland\07-2185_sm_ele_xxx.dgn
cbstrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 24

PHASING DIAGRAM

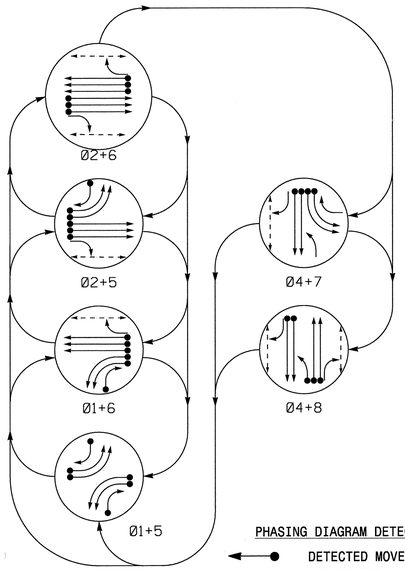


TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+7	04+8	FLASH
11, 12	←	←	←R	←R	←R	←R	←R
21, 22, 23	R	R	G	G	R	R	Y
41, 43	R	R	R	R	G	G	R
42	R/→	R	R/→	R	G	G	R
51, 52	←	←R	←	←R	←R	←R	←R
61, 62	R	G	R	G	R	R	Y
63	R	G	R	G	R/→	R	Y
71, 72	←R	←R	←R	←R	←	←R	←R
81	←R	←R	←R	←R	F/Y	F/Y	←R
82, 84	R	R	R	R	R	G	R
83	R/→	R/→	R	R	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DRK
P41, P42	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DRK

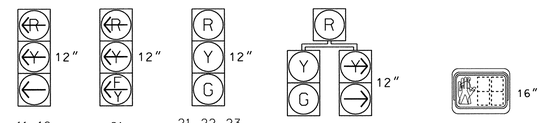
F/Y = Flashing Yellow Arrow
W - Walk
DW - Don't Walk
DRK - Dark

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



11, 12
51, 52
71, 72

81

21, 22, 23
41, 43
61, 62
82, 84

42
63
83

P21, P22
P41, P42
P61, P62
P81, P82

LOOP & DETECTOR UNIT INSTALLATION CHART

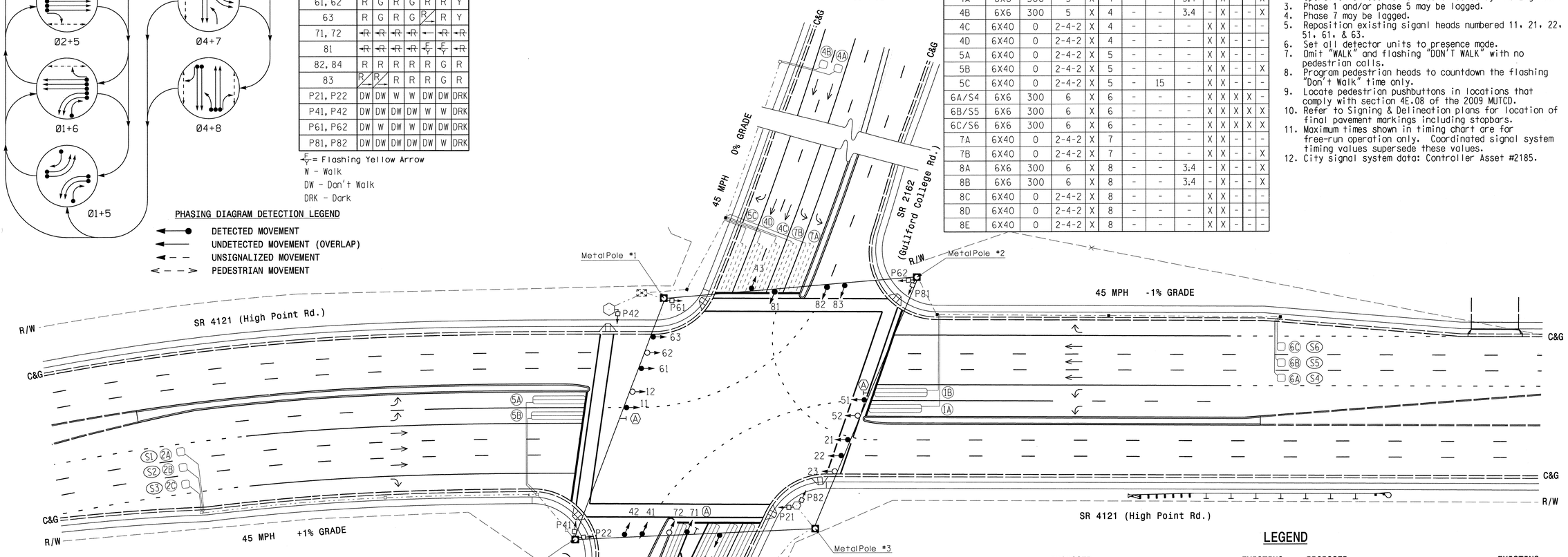
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	-	-	-	X	X	-	-	-
1B	6X40	0	2-4-2	X	1	-	-	-	X	X	-	-	X
1C	6X40	0	2-4-2	X	1	-	15	-	X	X	-	-	-
2A/S1	6X6	300	6	X	2	-	-	-	X	X	X	X	-
2B/S2	6X6	300	6	X	2	-	-	-	X	X	X	X	X
2C/S3	6X6	300	6	X	2	-	-	-	X	X	X	X	X
4A	6X6	300	5	X	4	-	-	3.4	-	X	-	-	X
4B	6X6	300	5	X	4	-	-	3.4	-	X	-	-	X
4C	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	-
4D	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	-
5A	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	-
5B	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	X
5C	6X40	0	2-4-2	X	5	-	15	-	X	X	-	-	-
6A/S4	6X6	300	6	X	6	-	-	-	X	X	X	X	-
6B/S5	6X6	300	6	X	6	-	-	-	X	X	X	X	X
6C/S6	6X6	300	6	X	6	-	-	-	X	X	X	X	X
7A	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	-
7B	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	X
8A	6X6	300	6	X	8	-	-	3.4	-	X	-	-	X
8B	6X6	300	6	X	8	-	-	3.4	-	X	-	-	X
8C	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	-
8D	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	-
8E	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	-

6 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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 7 may be lagged.
5. Reposition existing siganl heads numbered 11, 21, 22, 51, 61, & 63.
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Locate pedestrian pushbuttons in locations that comply with section 4E.08 of the 2009 MUTCD.
10. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. City signal system data: Controller Asset #2185.



NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	7	8
Min Green *	7	12	7	7	12	7	7
Gap, Extension *	2.0	6.0	2.0	2.0	6.0	2.0	2.0
Maximum Green 1 *	20	90	60	20	90	20	60
Maximum Green 2 *	20	90	60	20	90	20	60
Yellow Clear	3.0	4.4	4.5	3.0	4.6	3.0	4.5
Red Clear	4.9	3.1	2.8	5.0	3.1	3.8	2.8
Walk *	-	7	7	-	7	-	7
Pedestrian Clear	-	38	36	-	37	-	36
Added Initial *	-	1.0	-	-	1.0	-	-
Maximum Initial *	-	34	-	-	34	-	-
Time Before Reduction *	-	15	-	-	15	-	-
Time To Reduce *	-	30	-	-	30	-	-
Minimum Gap	-	3.0	-	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	YES	NO	NO
Dual Entry	-	-	ON	-	-	-	-
Simultaneous Gap	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.

LEGEND

PROPOSED		EXISTING	PROPOSED		EXISTING
	Traffic Signal Head			2-in Underground Conduit	
	Modified Signal Head	N/A	N/A	Right of Way	
	Sign			Directional Arrow	
	Pedestrian Signal Head With Push Button & Sign			Signal Pedestal	N/A
	Signal Pole with Guy			Metal Strain Pole	
	Signal Pole with Sidewalk Guy		N/A	Guardrail	
	Inductive Loop Detector			"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	
	Controller & Cabinet				
	Junction Box				

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

RELOCATED SIGNAL - FINAL DESIGN

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	B.L. WATSON
PREPARED BY:	K. WIESKAMP	REVIEWED BY:	

SCALE 0 40 — 1" = 40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

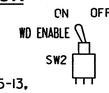
SIGNATURE DATE 4/26/12

SIG. INVENTORY NO. 07-2185

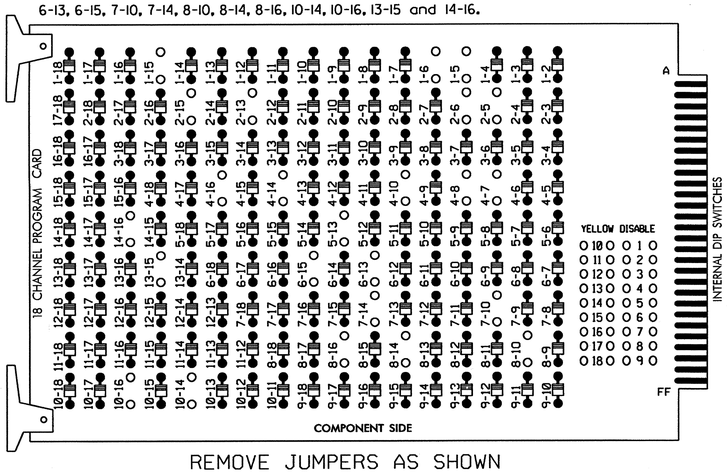
5/5/2012
J:\171001287\transportation\design\traffic\signals\sigplans\171001287_sig_dsn_4_07-2185.dgn
bwatson

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

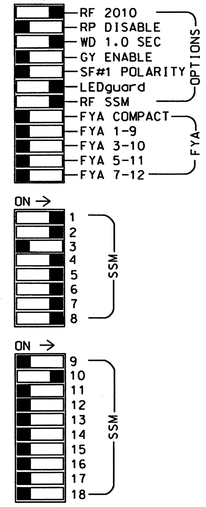
(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 1-15, 2-5, 2-6, 2-13, 2-15, 4-7, 4-8, 4-10, 4-14, 4-16, 5-13, 6-13, 6-15, 7-10, 7-14, 8-10, 8-14, 8-16, 10-14, 10-16, 13-15 and 14-16.



REMOVE JUMPERS AS SHOWN



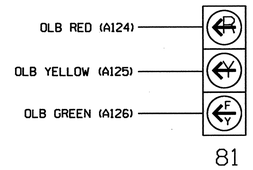
■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

3 SECTION FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S7, S8,S9,S10,S11,S12, AUX S2
PHASES USED.....1,2,2 PED,4,4 PED,5, 6,6 PED,7,8,8 PED
OVERLAP A.....NOT USED
OVERLAP B.....4
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4	S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CHU CHANNEL NO.	1		2	13	3	4	14	5		6	15	7		8	16	9	10	17	11	12	18
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	83	21, 22,23	P21, P22	NU	41, 42,43	P41, P42	42	51,52	61, 62,63	P61, P62	63	71,72	82, 83,84	P81, P82	NU	81★	NU	NU	NU	NU
RED			128			101				134				107							
YELLOW			129			102				135				108							
GREEN			130			103				136				109							
RED ARROW	125								131				122				A124				
YELLOW ARROW	126	126						132	132			123	123				A125				
FLASHING YELLOW ARROW																	A126				
GREEN ARROW	127	127						133	133			124	124								
✋				113			104				119				110						
🚶				115			106				121				112						

NU = Not Used

★ See pictorial of head wiring this sheet.

✱ Flash Note: Wire Overlap 'B' to flash on Flasher Unit #2, Circuit #1.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Walk.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phase 4 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 1 1B	Ø2/SYS 2A/S1	Ø2/SYS 2C/S3	SLOT EMPTY	Ø 4 4A	Ø 4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø 1 1C	Ø2/SYS 2B/S2	NOT USED		Ø 4 4B	Ø 4 4D					Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 5 5B	Ø6/SYS 6A/S4	Ø6/SYS 6C/S6	Ø 7 7A	Ø 8 8A	Ø 8 8C	Ø 8 8E	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø 5 5C	Ø6/SYS 6B/S5	NOT USED	Ø 7 7B	Ø 8 8B	Ø 8 8D	NOT USED						

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1				X	X	
1B	TB2-5,6	I2U	39	2	1				X	X	
1C	TB2-7,8	I2L	43	3	1		15		X	X	
2A/S1	TB2-9,10	I3U	63	4	2/SYS				X	X	X
2B/S2	TB2-11,12	I3L	76	5	2/SYS				X	X	X
2C/S3	TB4-1,2	I4U	47	6	2/SYS				X	X	X
4A	TB4-9,10	I6U	41	8	4			3.4		X	
4B	TB4-11,12	I6L	45	9	4			3.4		X	
4C	TB6-1,2	I7U	65	10	4				X	X	
4D	TB6-3,4	I7L	78	11	4				X	X	
5A	TB3-1,2	J1U	55	15	5				X	X	
5B	TB3-5,6	J2U	40	16	5				X	X	
5C	TB3-7,8	J2L	44	17	5		15		X	X	
6A/S4	TB3-9,10	J3U	64	18	6/SYS				X	X	X
6B/S5	TB3-11,12	J3L	77	19	6/SYS				X	X	X
6C/S6	TB5-1,2	J4U	48	20	6/SYS				X	X	X
7A	TB5-5,6	J5U	57	21	7				X	X	
7B	TB5-7,8	J5L	57	21	7				X	X	
8A	TB5-9,10	J6U	42	22	8			3.4		X	
8B	TB5-11,12	J6L	46	23	8			3.4		X	
8C	TB7-1,2	J7U	66	24	8				X	X	
8D	TB7-3,4	J7L	79	25	8				X	X	
8E	TB7-5,6	J8U	50	26	8				X	X	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED						
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED						
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED						
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED						

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2185
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Final - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012	REVIEWED BY: T. Lyn
PREPARED BY: C. Strickland	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE George C. Brown DATE 4/30/12

SIG. INVENTORY NO. 07-2185

27-APR-2012 09:35
S:*MTSSSIMTS Signals*Workgroups*Sig Mgmt*Strickland*07-2185_sample_xxx.dgn
$$$$TSCLOCK

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
[1.General Parms]
2.Program
3.Status
```

```
General Overlap Parameters
        Lock Inhibit OFF
     Confl Lock Enable OFF
       Parent P Clrncs ON
  Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
[2.Program]
3.Status
```

```
Enter Overlap #  2

  then press Enter
```

```
Overlap B-2
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Included Ps    4  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
[2.Confl Prog+]
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
[3.Program Parms+]
```

```
 Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash.

FROM MAIN MENU. KEYSTROKES 1-8

```
          Channel & I/O
1.Chan  1-16  [4.Chan+  1-16] 7.IO Logic
2.chan 17-24   5.chan+ 17-24  8.IO Viewer
3.Chan Parms   6.IO Parms     9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
     Chan.1...2...3...4...5...6...7...8 >
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

```
     Chan.9..10..11..12..13..14..15..16
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   X   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2185
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Final - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
Department of Transportation State of North Carolina
Signal Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 2162 (Guilford College Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012	REVIEWED BY: T. Jia		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS		INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

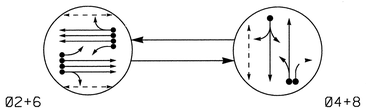
SIGNATURE | DATE 4/30/12

SIG. INVENTORY NO. 07-2185

27-APR-2012 09:36
S:\MTSSUN\TS Signals\workgroups\Sig Mgmt\Strickland\07-2185_sm_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 27

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

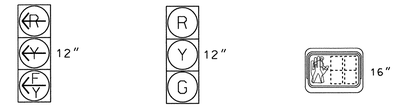
TABLE OF OPERATION

SIGNAL FACE	PHASE 02+6	PHASE 04+8	FLASH
21, 22, 23	G	R	Y
24	~~F Y~~	~~R~~	~~Y~~
41, 42	R	G	R
61, 62, 63	G	R	Y
64	~~F Y~~	~~R~~	~~Y~~
81, 82, 83, 84	R	G	R
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK
P61, P62	W	DW	DRK

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

SIGNAL FACE I.D.

All Heads L.E.D.



24
64

21, 22, 23
41, 42
61, 62, 63
81, 82, 83, 84

P21, P22
P41, P42
P61, P62

LOOP & DETECTOR UNIT INSTALLATION CHART

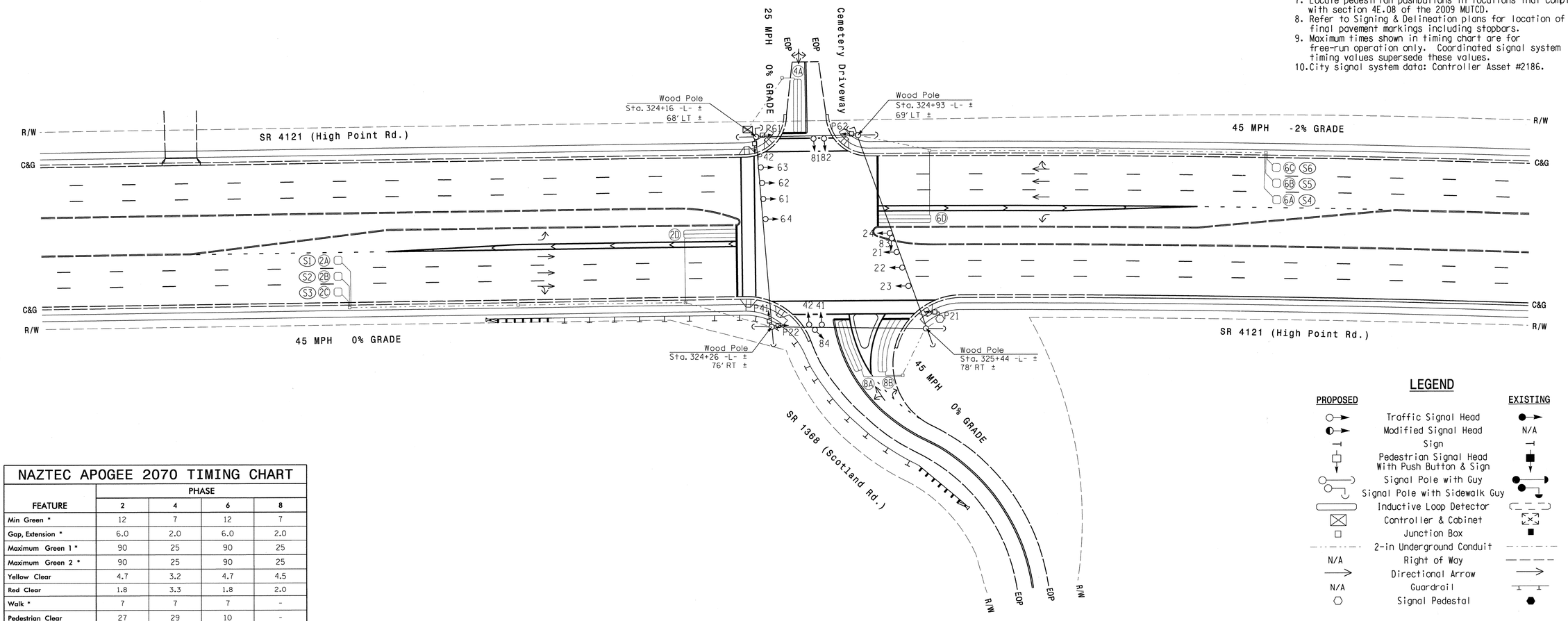
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A/S1	6X6	300	6	X	2	-	-	-	X	X	X	X
2B/S2	6X6	300	6	X	2	-	-	-	X	X	X	X
2C/S3	6X6	300	6	X	2	-	-	-	X	X	X	X
2D	6X40	0	2-4-2	X	2	-	-	-	X	X	-	X
4A	6X40	0	2-4-2	X	4	-	5	-	X	X	-	X
6A/S4	6X6	300	5	X	6	-	-	-	X	X	X	X
6B/S5	6X6	300	5	X	6	-	-	-	X	X	X	X
6C/S6	6X6	300	5	X	6	-	-	-	X	X	X	X
6D	6X40	0	2-4-2	X	6	-	-	-	X	X	-	X
8A	6X40	0	2-4-2	X	8	-	3	-	X	X	-	X
8B	6X40	0	2-4-2	X	8	-	15	-	X	X	-	X

2 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. Locate pedestrian pushbuttons in locations that comply with section 4E.08 of the 2009 MUTCD.
8. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. City signal system data: Controller Asset #2186.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
	Signal Pedestal	

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	12	7	12	7
Gap, Extension *	6.0	2.0	6.0	2.0
Maximum Green 1 *	90	25	90	25
Maximum Green 2 *	90	25	90	25
Yellow Clear	4.7	3.2	4.7	4.5
Red Clear	1.8	3.3	1.8	2.0
Walk *	7	7	7	-
Pedestrian Clear	27	29	10	-
Added Initial *	1.0	-	1.0	-
Maximum Initial *	34	-	34	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	30	-	30	-
Minimum Gap	3.0	-	3.0	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Lock Calls	YES	NO	YES	NO
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.

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

NEW INSTALLATION

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1368 (Scotland Rd.)/
Cemetery Driveway

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	B.L. WATSON
PREPARED BY:	K. WIESKAMP	REVIEWED BY:	

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON
SIGNATURE
DATE 4/26/12
SIG. INVENTORY NO. 07-2186

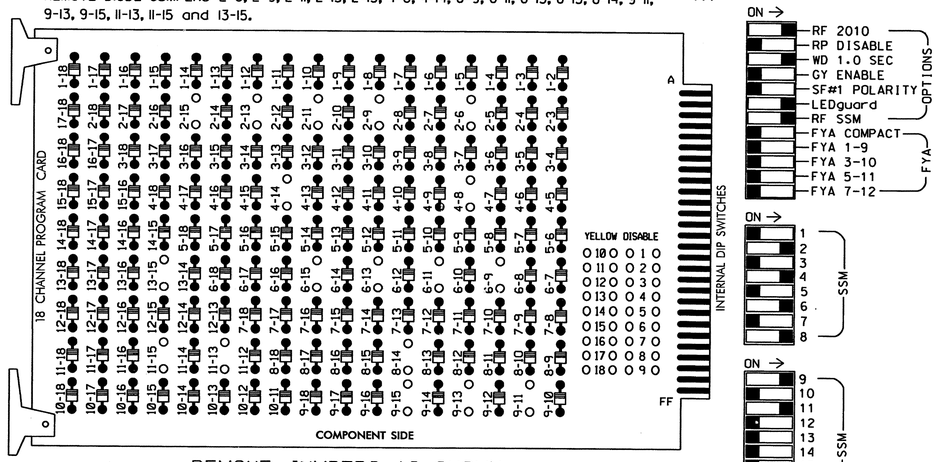
5/5/2012
J:\71001287\transportation\Designs\Traffic\Signals\SigPlans\71001287_sig_dsn_5_07-2186.dgn
DIGITON

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.28

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-6, 2-9, 2-11, 2-13, 2-15, 4-8, 4-14, 6-9, 6-11, 6-13, 6-15, 8-14, 9-11, 9-13, 9-15, 11-13, 11-15 and 13-15.



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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Walk.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phases 4 and 8 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S3,S5,S6,S8,S9,S11, AUX S1,AUX S4
PHASES USED.....2,4,6,8
OVERLAP A.....6
OVERLAP B.....NOT USED
OVERLAP C.....2
OVERLAP D.....NOT USED

SIGNAL HEAD HOOK-UP CHART

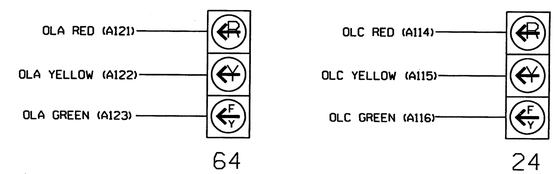
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21, 22,23	P21, P22	NU	41,42	P41, P42	NU	61, 62,63	P61, P62	NU	81,82, 83,84	NU	64★	NU	NU	24★	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW																		
✋			113			104			119									
🚶			115			106			121									

NU = Not Used

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT	Ø2/SYS	Ø2/SYS	SLOT	SLOT	Ø4	SLOT	SLOT	SLOT	SLOT	SLOT	Ø2 PED	Ø6 PED	FS
			2A/S1	2C/S3			4A						DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
	L	EMPTY	Ø2/SYS	Ø2	EMPTY	EMPTY	NOT USED	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	Ø4 PED	NOT USED	ST
			2B/S2	2D									DC ISOLATOR		DC ISOLATOR
FILE "J"	U	SLOT	Ø6/SYS	Ø6/SYS	SLOT	SLOT	Ø8	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
			6A/S4	6C/S6			8A								
	L	EMPTY	Ø6/SYS	Ø6	EMPTY	EMPTY	Ø8	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY
			6B/S5	6D			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.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
2A/S1	TB2-5,6	I2U	39	2	2/SYS				X	X	X
2B/S2	TB2-7,8	I2L	43	3	2/SYS				X	X	X
2C/S3	TB2-9,10	I3U	63	4	2/SYS				X	X	X
2D	TB2-11,12	I3L	76	5	2				X	X	
4A	TB4-9,10	I6U	41	8	4		5		X	X	
6A/S4	TB3-5,6	J2U	40	16	6/SYS				X	X	X
6B/S5	TB3-7,8	J2L	44	17	6/SYS				X	X	X
6C/S6	TB3-9,10	J3U	64	18	6/SYS				X	X	X
6D	TB3-11,12	J3L	77	19	6				X	X	
8A	TB5-9,10	J6U	42	22	8		3		X	X	
8B	TB5-11,12	J6L	46	23	8		15		X	X	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED						
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED						
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED						

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2186
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.)
at
SR 1368 (Scotland Rd.)/
Cemetery Driveway

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY: T. Jall
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE 4/30/12 DATE

SIG. INVENTORY NO. 07-2186

27-APR-2012 09:50
S:\TTSASU\ITS Signals\Workgroups\Sig Man\Strickland\07186_sm.ele_xxx.dgn
cbestrickland

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
     Lock Inhibit OFF
  Confl Lock Enable OFF
     Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  1
  then press Enter
```

```
Overlap A-1
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp A-1   Ps....................
Included Ps    6  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap A-1
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp A-1   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap A-1
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp A-1
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

PRESS "ESC" THREE TIMES

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  3
  then press Enter
```

```
Overlap C-3
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp C-3   Ps....................
Included Ps    2  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap C-3
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp C-3   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap C-3
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp C-3
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2186
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1368 (Scotland Rd.)/
Cemetery Driveway

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T. Jones
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE | DATE 4/26/12

SIG. INVENTORY NO. 07-2186

27-APR-2012 03:51
S:\4153\Sheets\Signals\Workgroups\Sig MarkStrickland\07186_sm_ele_xxx.dgn
$$$$USERNAME

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash.

FROM MAIN MENU, KEYSTROKES 1-8

```
                 Channel & I/O
1.Chan   1-16  [4.Chan+  1-16] 7.IO Logic
2.chan 17-24    5.chan+ 17-24  8.IO Viewer
3.Chan Parms    6.IO'Parms     9.IO UserMap
```

PRESS THE RIGHT ARROW KEY
UNTIL THE SCREEN AT RIGHT APPEARS

```
        Chan.1...2...3...4...5...6...7...8 >
 Flash Red .   .   .   .   .   .   .   .
 Flash Yel .   .   .   .   .   .   .   .
 Flash Grn .   .   .   .   .   .   .   .
 Inhibit Red Flash In
   Preempt .   .   .   .   .   .   .   .
 Olap Ovrd 0   0   0   0   0   0   0   0
```

```
        Chan.9..10..11..12..13..14..15..16
 Flash Red .   .   .   .   .   .   .   .
 Flash Yel .   .   .   .   .   .   .   .
 Flash Grn X   .   X   .   .   .   .   .
 Inhibit Red Flash In
   Preempt .   .   .   .   .   .   .   .
 Olap Ovrd 0   0   0   0   0   0   0   0
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2186
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 4121 (High Point Rd.)
at
SR 1368 (Scotland Rd.)/
Cemetery Driveway

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T.Vga

PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 4/26/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-2186

27-APR-2012 09:52
S:*ITSS&SW*ITS Signals*Workgroups*Sig Mgmt*Strickland*072186_smu_ela.xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 31

PHASING DIAGRAM

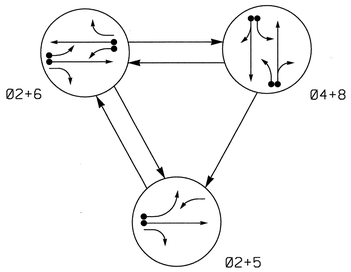


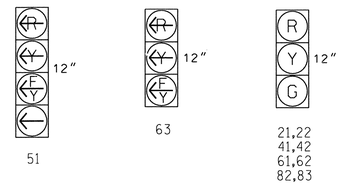
TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4+8	FLASH
21,22	G	G	R	Y
41,42	R	R	G	R
51	←	F Y	R	Y
61,62	R	G	R	Y
63	F Y	F Y	R	Y
82,83	R	R	G	R

F Y = Flashing Yellow Arrow

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A✳	6X6	300	✳	X	2	-	-	1.6	X	X	-	-	✳
2B✳	6X6	90	✳	X	2	-	-	-	X	X	-	-	✳
4A✳	6X40	0	✳	X	4	-	3	-	X	X	-	-	✳
4B✳	6X40	0	✳	X	4	-	10	-	X	X	-	-	✳
5A✳	6X40	0	✳	X	5	2	15	-	X	X	-	-	✳
6A✳	6X6	300	✳	X	6	-	-	1.6	X	X	-	-	✳
6B✳	6X6	90	✳	X	6	-	-	-	X	X	-	-	✳
6C✳	6X40	0	✳	X	6	-	-	-	X	X	-	-	✳
8A✳	6X40	0	✳	X	8	-	3	-	X	X	-	-	✳
8B✳	6X40	0	✳	X	8	-	10	-	X	X	-	-	✳

✳ Video Detection Area

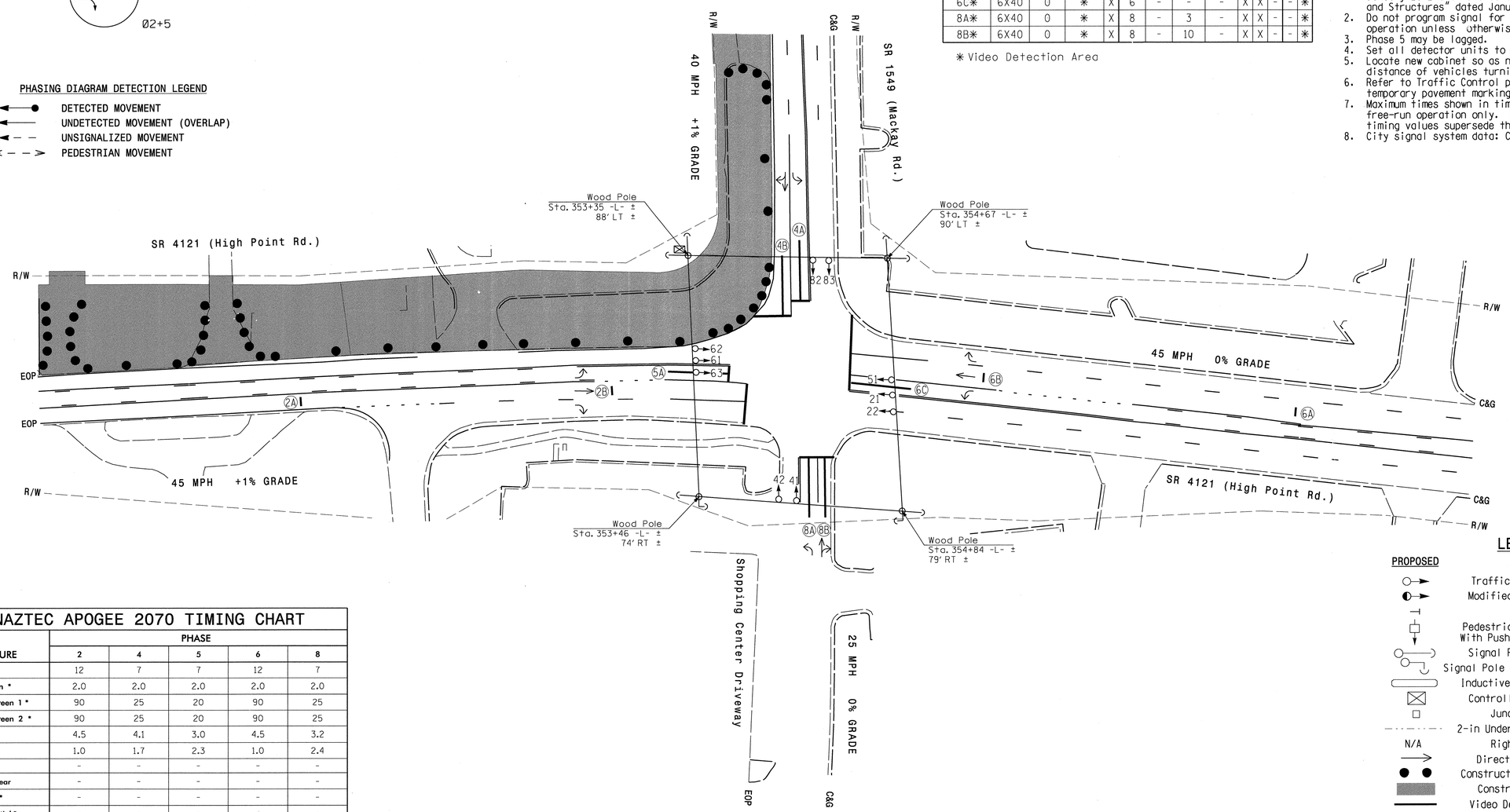
3 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Refer to Traffic Control plans for location of temporary pavement markings including stopbars.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. City signal system data: Controller Asset #1185.

PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone Drums	N/A
	Construction Zone	N/A
	Video Detection Area	N/A

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	4	5	6	8
Min Green *	12	7	7	12	7
Gap, Extension *	2.0	2.0	2.0	2.0	2.0
Maximum Green 1 *	90	25	20	90	25
Maximum Green 2 *	90	25	20	90	25
Yellow Clear	4.5	4.1	3.0	4.5	3.2
Red Clear	1.0	1.7	2.3	1.0	2.4
Walk *	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-
Added Initial *	-	-	-	-	-
Maximum Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL	-
Lock Calls	YES	NO	NO	YES	NO
Dual Entry	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON

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

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
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www.stantec.com
License No. F-0672

SIGNAL UPGRADE - TEMPORARY DESIGN 1 (TMP PHASE I)

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

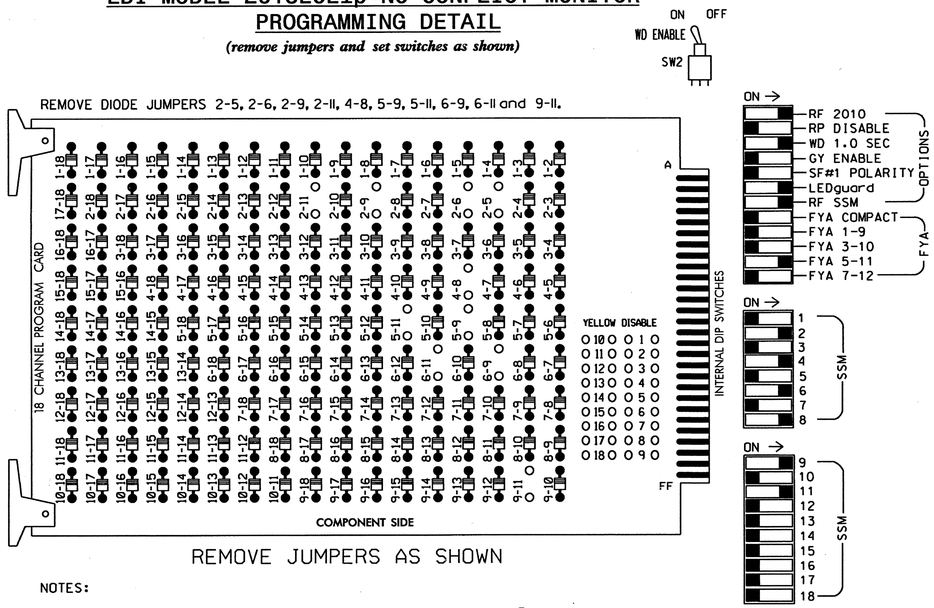
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON
SIGNATURE Betsy L. Watson DATE 4/26/12
SIG. INVENTORY NO. 07-1185T1

5/5/2012
J:\47100128T\transportation\design\Traffic\Signals\SigPlans\47100128T_sig_dsn_6_07-1185_T1.dgn
Digitan

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.32

EDI MODEL 2018ECLip-NC 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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phases 4 and 8 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S5,S7,S8,S11,AUX S1,AUX S4
PHASES USED.....2,4,5,6,8
OVERLAP A.....2
OVERLAP B.....NOT USED
OVERLAP C.....*
OVERLAP D.....NOT USED

*Refer to Overlap Programming Detail sheet 2 of 3.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	51★	61,62	NU	NU	82,83	NU	63★	NU	NU	51★	NU	NU
RED		128			101			134			107							
YELLOW		129			102		*	135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW							133											

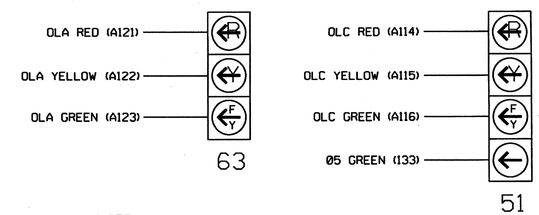
NU = Not Used

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

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

1. See Overlap Programming Detail Sheet 2 of 3.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	FS DC ISOLATOR
	L	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	ST DC ISOLATOR
FILE "J"	U	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	L	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

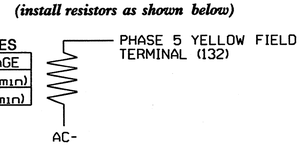
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY: T. Vaughn
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE DATE 5/2/11

SIG. INVENTORY NO. 07-1185T1

27-APR-2012 10:44
S:*MTS&SDM\TS Signals*workgroups*Sig Mgmt*Strickland*071185_sml_ele_xxx.dgn
desff1colors

OVERLAP PROGRAMMING DETAIL FOR OVERLAPS A and C*

(program controller as shown below)

* NOTE FOR ALL OVERLAPS: Use Default values for Overlap 'PLUS' programming details.

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
   Confl Lock Enable OFF
     Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  1
  then press Enter
```

```
Overlap A-1
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
Ovrlp A-1   Ps....................
Included Ps   2  0  0  0  0  0  0  0
Modifier Ps   0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC" TWICE

```
Enter Overlap #  3
  then press Enter
```

```
Overlap C-3
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
Ovrlp C-3   Ps....................
Included Ps   5  0  0  0  0  0  0  0
Modifier Ps   6  0  0  0  0  0  0  0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

END OF OVERLAP PROGRAMMING DETAIL

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
Traffic Engineering Branch
Signal Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1549 (MacKay Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T. Lyn

PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BRUNN

SIGNATURE | DATE 5/2/12

SIG. INVENTORY NO. 07-1185T1

27-APR-2012 10:50
S:\TSAS\TS Signals\Workgroups\Sig Mom\Strickland\07-1185_sm_ele_xxx.dgn
cestrickland

4-SECTION PPLT FYA OUTPUT PROGRAMMING DETAIL

(program controller as shown below)

1. Before proceeding with output programming, be sure to switch the "RUN ENABLE STATUS" to "OFF". The "RUN ENABLE STATUS" setting is located from Main Menu, key strokes 1-7.

2. The Flashing Yellow Arrow in a 4-section PPLT FYA head is controlled by a normally unused PED Yellow output. This programming takes a specific PED Yellow output and remaps it to the appropriate Overlap Green output.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  [6.IO Parms]  9.IO UserMap
```

SELECT USER MODE →

```
I/O Parameters
C1-C11-ABC IO Mode: USER
     D Conn Mapping: NONE
        T&F Biu Map: DEFAULT
Invert Rail Inputs: OFF
   EVP Ped Confirm: OFF
```

PRESS "ESC"

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms  [9.IO UserMap]
```

```
User I/O Maps
1. Inputs
[2. Outputs]
3. Init Map
```

SELECT MODE 5 →

```
Initialize User I/O Maps
Init ABC with: NONE
  Init D with: NONE
 Init 2A with: MODE 5
Init TF BIUs with: NONE
```

PRESS "ESC"

```
User I/O Maps
[1. Inputs]
2. Outputs
3. Init Map
```

```
User Output Maps
1.NEMA A   4.NEMA D
2.NEMA B   [5.FIO 2A]
3.NEMA C                 9.TS2 IO
```

PRESS "+" KEY TWICE

Pin	Fcn	Description	Pin	Fcn	Description
4-5	54	Ch6 Green	4-6	5	Ch5 Red
4-7	29	Ch5 Yellow	4-8	53	Ch5 Green
5-1	37	Ch13 Yellow	5-2	0	Unused
5-3	38	Ch14 Yellow	5-4	40	Ch16 Yellow
5-5	115	Not Used	5-6	124	LdSwtchFlsh
5-7	115	Not Used	5-8	114	Watchdog
6-1	115	Not Used	6-2	115	Not Used

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
5-2	39	Ch15 Yellow....	0	Unused

PRESS "+" KEY ONCE

Pin	Fcn	Description	Pin	Fcn	Description
6-3	12	Ch12 Red	6-4	36	Ch12 Yellow
6-5	60	Ch12 Green	6-6	11	Ch11 Red
6-7	35	Ch11 Yellow	6-8	39	Ch15 Yellow
7-1	115	Not Used	7-2	115	Not Used
7-3	10	Ch10 Red	7-4	34	Ch10 Yellow
7-5	58	Ch10 Green	7-6	9	Ch9 Red
7-7	33	Ch9 Yellow	7-8	57	Ch9 Green

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
6-8	59	Ch11 Green	39	Ch15 Yellow

OUTPUT PROGRAMMING COMPLETE

Pin 5-2 (C1 pin 36) = Load Switch S9-Y
Pin 6-8 (C1 pin 90) = Load Switch AUX S4-G

! Press the "*" key to return to Main Menu. Now go back to "RUN-ENABLE STATUS" and switch to "ON".

NOTE

I/O re-programming is necessary for proper FYA operation. See Channel & I/O Programming Detail For FYA Operation on this sheet.

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash. It also specifies which overlap is to be overridden for the FYA to display properly.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  [4.Chan+  1-16] 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
     Chan.1...2...3...4...5...6...7...8 >
Flash Red .  .  .  .  .  .  .  .
Flash Yel .  .  .  .  .  .  .  .
Flash Grn .  .  .  .  .  .  .  .
Inhibit Red Flash In
  Preempt .  .  .  .  .  .  .  .
Olap Ovrd 0  0  0  0  0  0  0  0
```

```
     Chan.9..10..11..12..13..14..15..16
Flash Red .  .  .  .  .  .  .  .
Flash Yel .  .  .  .  .  .  X  .
Flash Grn X  .  .  .  .  .  .  .
Inhibit Red Flash In
  Preempt .  .  .  .  .  .  .  .
Olap Ovrd 0  0  0  0  0  0  3  0
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

NOTE

Output re-mapping is necessary for proper FYA operation. See the 4-Section PPLT FYA Output Programming Detail on this sheet.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T. Gg
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

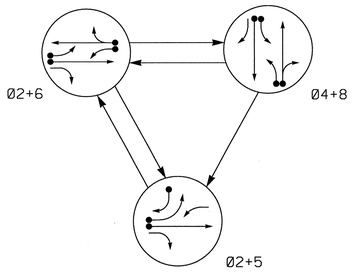
SIGNATURE | DATE 5/2/12

SIG. INVENTORY NO. 07-1185T1

27-APR-2012 10:50
S:\MTS&SU\MTS Signals\Workgroups\Sig Mgmt\Strickland\07-1185_smlele_xxx.dgn
cbstrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 35

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

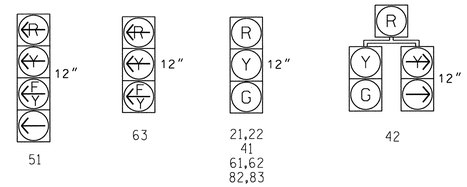
TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 04+8	FLASH
21,22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51	←	F Y	R	Y
61,62	R	G	R	Y
63	F Y	F Y	R	Y
82,83	R	R	G	R

F Y = Flashing Yellow Arrow

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

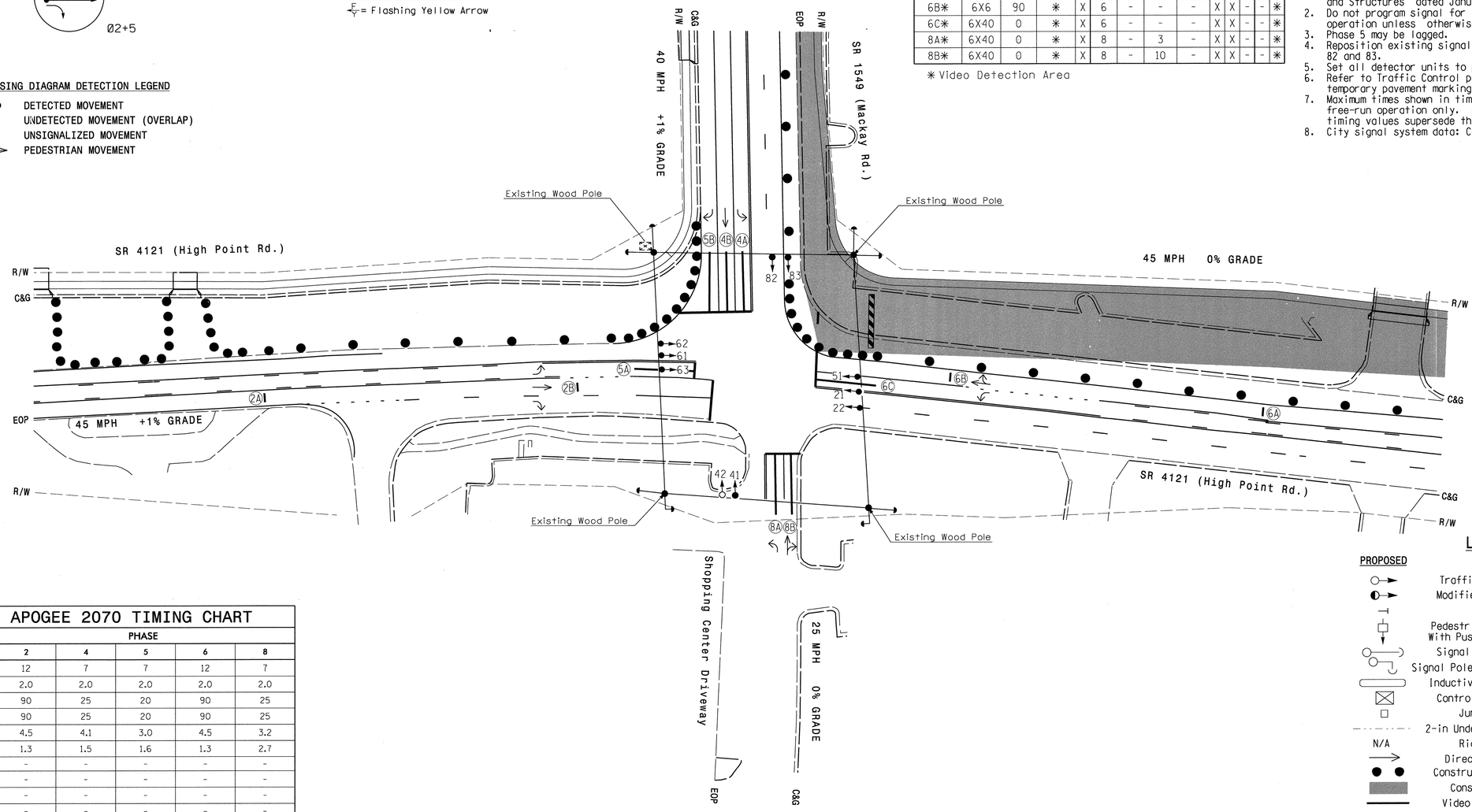
INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A✳	6X6	300	✳	X	2	-	-	1.6	X	X	-	-	✳
2B✳	6X6	90	✳	X	2	-	-	-	X	X	-	-	✳
4A✳	6X40	0	✳	X	4	-	3	-	X	X	-	-	✳
4B✳	6X40	0	✳	X	4	-	3	-	X	X	-	-	✳
5A✳	6X40	0	✳	X	5	2	15	-	X	X	-	-	✳
5B✳	6X40	0	✳	X	5	-	15	-	X	X	-	-	✳
6A✳	6X6	300	✳	X	6	-	-	1.6	X	X	-	-	✳
6B✳	6X6	90	✳	X	6	-	-	-	X	X	-	-	✳
6C✳	6X40	0	✳	X	6	-	-	-	X	X	-	-	✳
8A✳	6X40	0	✳	X	8	-	3	-	X	X	-	-	✳
8B✳	6X40	0	✳	X	8	-	10	-	X	X	-	-	✳

✳ Video Detection Area

3 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered 41, 61, 62, 63, 82 and 83.
5. Set all detector units to presence mode.
6. Refer to Traffic Control plans for location of temporary pavement markings including stopbars.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. City signal system data: Controller Asset #1185.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone Drums	N/A
	Construction Zone	N/A
	Video Detection Area	N/A

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6	PHASE 8
Min Green *	12	7	7	12	7
Gap, Extension *	2.0	2.0	2.0	2.0	2.0
Maximum Green 1 *	90	25	20	90	25
Maximum Green 2 *	90	25	20	90	25
Yellow Clear	4.5	4.1	3.0	4.5	3.2
Red Clear	1.3	1.5	1.6	1.3	2.7
Walk *	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-
Added Initial *	-	-	-	-	-
Maximum Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL	-
Lock Calls	YES	NO	NO	YES	NO
Dual Entry	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON

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

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
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Tel. (919) 851-6866
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License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

SIGNAL UPGRADE - TEMPORARY DESIGN 2 (TMP PHASE II)

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE DATE 4/06/12

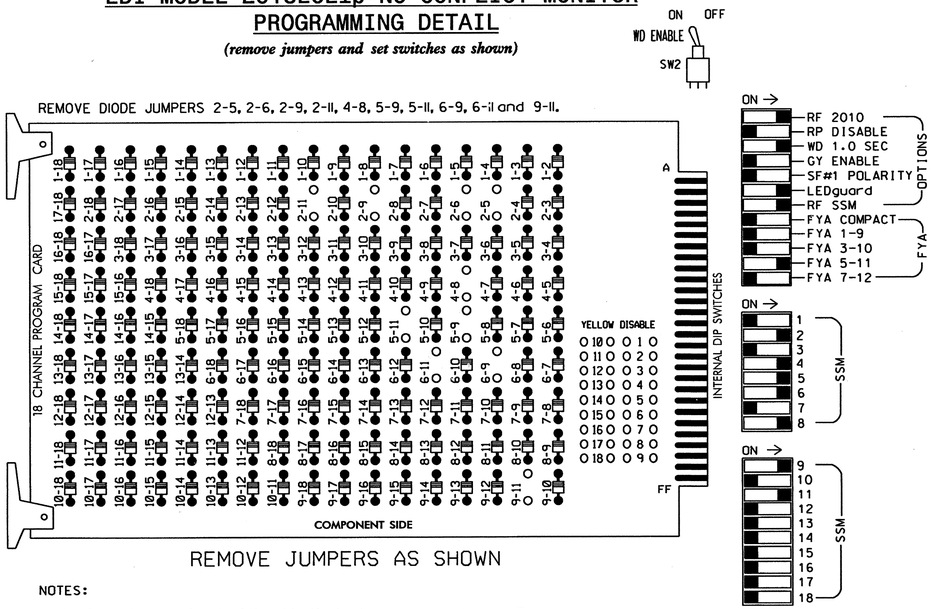
SIG. INVENTORY NO. 07-1185T2

5/5/2012
J:\171001287\transportation\Design\Traffic\Signals\SigPlans\171001287_sig_dsn_6_07-1185_T2.dgn
Dixton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.36

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phases 4 and 8 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S5,S7,S8,S11,AUX S1, AUX S4
PHASES USED.....2,4,5,6,8
OVERLAP A.....2
OVERLAP B.....NOT USED
OVERLAP C.....*
OVERLAP D.....NOT USED

*Refer to Overlap Programming Detail sheet 2 of 3.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5		6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	42	51★	61,62	NU	NU	82,83	NU	63★	NU	NU	51★	NU	NU
RED		128			101		*		134			107							
YELLOW		129			102				135			108							
GREEN		130			103				136			109							
RED ARROW														A121			A114		
YELLOW ARROW							132							A122			A115		
FLASHING YELLOW ARROW														A123			A116		
GREEN ARROW							133	133											

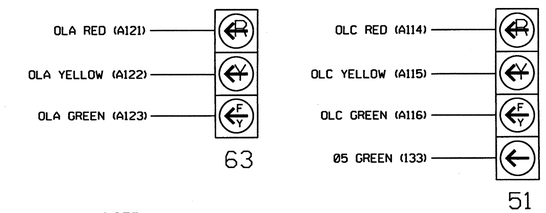
NU = Not Used

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

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

1. See Overlap Programming Detail Sheet 2 of 3.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	FS DC ISOLATOR
	L	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	ST DC ISOLATOR
FILE "J"	U	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	L	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

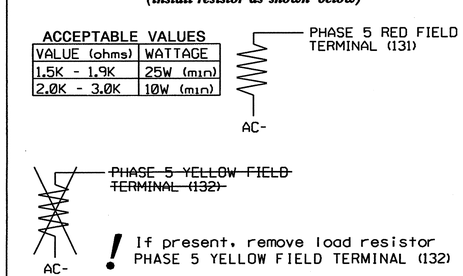
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T2
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 2 - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 4121 (High Point Rd.) at SR 1549 (Mackay Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY:
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of: Transportation Mobility and Safety Division, State of North Carolina Department of Transportation, Signals Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE DATE 5/2/12
SIG. INVENTORY NO. 07-1185T2

27-APR-2012 11:12
S:*MTS&SU*ITS Signals*workgroups*sig Mark*Strickland*071185_smu_ele_xxx.dgn
$$$$USERPROFILE$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.37

OVERLAP PROGRAMMING DETAIL FOR OVERLAPS A and C*

(program controller as shown below)

* NOTE FOR ALL OVERLAPS: Use Default values for Overlap 'PLUS' programming details.

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
[1.General Parms]
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
   Confl Lock Enable OFF
     Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
[2.Program]
3.Status
```

```
Enter Overlap #  1

  then press Enter
```

```
Overlap A-1
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp A-1   Ps....................
Included Ps   2  0  0  0  0  0  0  0
Modifier Ps   0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC" TWICE

```
Enter Overlap #  3

  then press Enter
```

```
Overlap C-3
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
 Ovrlp C-3   Ps....................
Included Ps   5  0  0  0  0  0  0  0
Modifier Ps   6  0  0  0  0  0  0  0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

END OF OVERLAP PROGRAMMING DETAIL

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T2
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 2 - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1549 (MacKay Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T. Jyh
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE | DATE 5/2/12

SIG. INVENTORY NO. 07-1185T2

27-APR-2012 11:13
S:\#TSSSUM\TS Signals\Workgroups\Sig Mgmt\Strickland\07-1185_sml_ele_xxx.dgn
USER: cbrown

4-SECTION PPLT FYA OUTPUT PROGRAMMING DETAIL

(program controller as shown below)

1. Before proceeding with output programming, be sure to switch the "RUN ENABLE STATUS" to "OFF". The "RUN ENABLE STATUS" setting is located from Main Menu, key strokes 1-7.
2. The Flashing Yellow Arrow in a 4-section PPLT FYA head is controlled by a normally unused PED Yellow output. This programming takes a specific PED Yellow output and remaps it to the appropriate Overlap Green output.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  [6.IO Parms]  9.IO UserMap
```

SELECT USER MODE →

```
I/O Parameters
C1-C11-ABC IO Mode: USER
     D Conn Mapping: NONE
        T&F Biu Map: DEFAULT
 Invert Rail Inputs: OFF
    EVP Ped Confirm: OFF
```

PRESS "ESC"

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms  [9.IO UserMap]
```

```
User I/O Maps
1. Inputs
[2. Outputs]
3. Init Map
```

SELECT MODE 5 →

```
Initialize User I/O Maps
   Init ABC with: NONE
       Init D with: NONE
      Init 2A with: MODE 5
 Init TF BIUs with: NONE
```

PRESS "ESC"

```
User I/O Maps
1. Inputs
[2. Outputs]
3. Init Map
```

```
User Output Maps
1.NEMA A   4.NEMA D
2.NEMA B   [5.FIO 2A]
3.NEMA C                 9.TS2 IO
```

PRESS "+" KEY TWICE

Pin	Fcn	Description	Pin	Fcn	Description
4-5	54	Ch6 Green	4-6	5	Ch5 Red
4-7	29	Ch5 Yellow	4-8	53	Ch5 Green
5-1	37	Ch13 Yellow	5-2	0	Unused
5-3	38	Ch14 Yellow	5-4	40	Ch16 Yellow
5-5	115	Not Used	5-6	124	LdSwtchFlsh
5-7	115	Not Used	5-8	114	Watchdog
6-1	115	Not Used	6-2	115	Not Used

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
5-2	39	Ch15 Yellow....	0	Unused

PRESS "+" KEY ONCE

Pin	Fcn	Description	Pin	Fcn	Description
6-3	12	Ch12 Red	6-4	36	Ch12 Yellow
6-5	60	Ch12 Green	6-6	11	Ch11 Red
6-7	35	Ch11 Yellow	6-8	39	Ch15 Yellow
7-1	115	Not Used	7-2	115	Not Used
7-3	10	Ch10 Red	7-4	34	Ch10 Yellow
7-5	58	Ch10 Green	7-6	9	Ch9 Red
7-7	33	Ch9 Yellow	7-8	57	Ch9 Green

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
6-8	59	Ch11 Green	39	Ch15 Yellow

OUTPUT PROGRAMMING COMPLETE

Pin 5-2 (C1 pin 36) = Load Switch S9-Y
Pin 6-8 (C1 pin 90) = Load Switch AUX S4-G

! Press the "*" key to return to Main Menu. Now go back to "RUN-ENABLE STATUS" and switch to "ON".

NOTE

I/O re-programming is necessary for proper FYA operation. See Channel & I/O Programming Detail For FYA Operation on this sheet.

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash. It also specifies which overlap is to be overridden for the FYA to display properly.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  [4.Chan+  1-16] 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
     Chan.1...2...3...4...5...6...7...8 >
Flash Red .  .  .  .  .  .  .  .
Flash Yel .  .  .  .  .  .  .  .
Flash Grn .  .  .  .  .  .  .  .
Inhibit Red Flash In
  Preempt .  .  .  .  .  .  .  .
Olap Ovrd 0  0  0  0  0  0  0  0
```

```
     Chan.9..10..11..12..13..14..15..16
Flash Red .  .  .  .  .  .  .  .
Flash Yel .  .  .  .  .  .  X  .   ←
Flash Grn X  .  .  .  .  .  .  .
Inhibit Red Flash In
  Preempt .  .  .  .  .  .  .  .
Olap Ovrd 0  0  0  0  0  0  3  0   ←
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

NOTE

Output re-mapping is necessary for proper FYA operation. See the 4-Section PPLT FYA Output Programming Detail on this sheet.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T2
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 2 - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T.Vaja
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

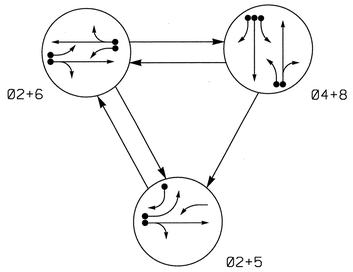
George C. Brown 5/2/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-1185T2

27-APR-2012 11:15
S:\#ITSSG\#ITS Signals\workgroups\Sig Mark\Strickland\071185_sml_ele_xxx.dgn
cbstrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 39

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

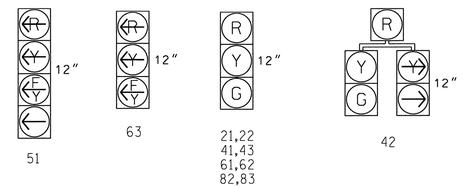
TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 04+8	FLASH
21,22	G	G	R	Y
41,43	R	R	G	R
42	R	R	G	R
51	←	F Y	R	Y
61,62	R	G	R	Y
63	F Y	F Y	R	Y
82,83	R	R	G	R

F Y = Flashing Yellow Arrow

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

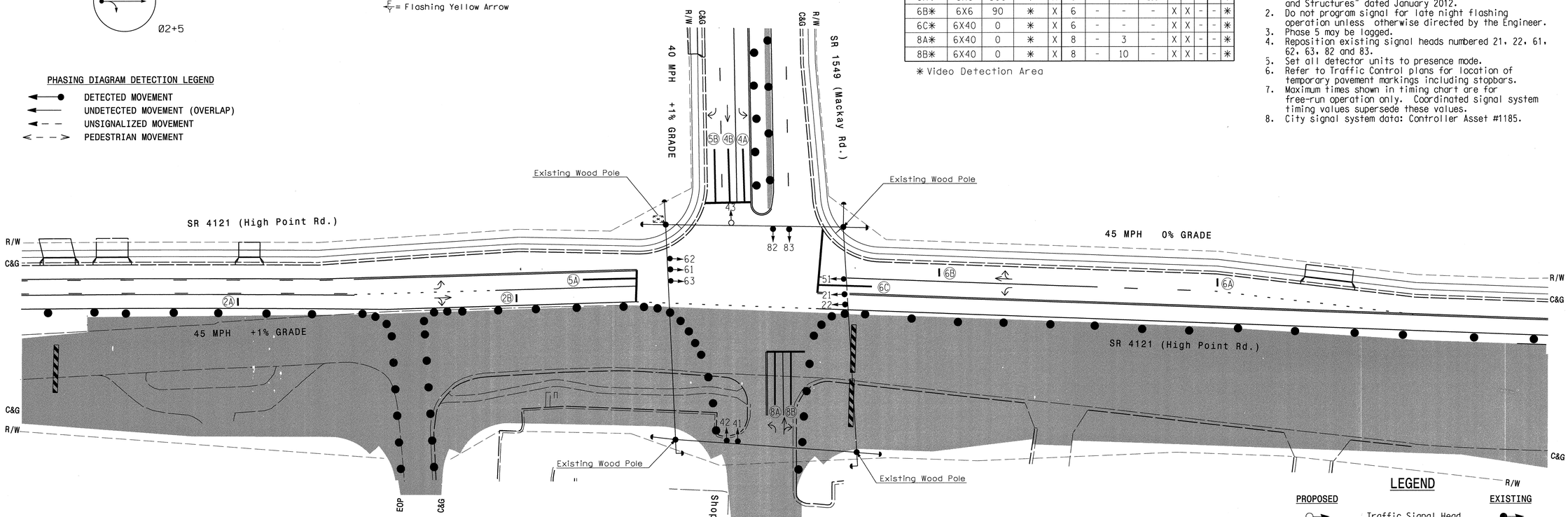
INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A*	6X6	300	*	X	2	-	-	1.6	X	X	-	-	*
2B*	6X6	90	*	X	2	-	-	-	X	X	-	-	*
4A*	6X40	0	*	X	4	-	-	-	X	X	-	-	*
4B*	6X40	0	*	X	4	-	-	-	X	X	-	-	*
5A*	6X40	0	*	X	5	2	15	-	X	X	-	-	*
5B*	6X40	0	*	X	5	-	15	-	X	X	-	-	*
6A*	6X6	300	*	X	6	-	-	1.6	X	X	-	-	*
6B*	6X6	90	*	X	6	-	-	-	X	X	-	-	*
6C*	6X40	0	*	X	6	-	-	-	X	X	-	-	*
8A*	6X40	0	*	X	8	-	3	-	X	X	-	-	*
8B*	6X40	0	*	X	8	-	10	-	X	X	-	-	*

* Video Detection Area

3 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered 21, 22, 61, 62, 63, 82 and 83.
5. Set all detector units to presence mode.
6. Refer to Traffic Control plans for location of temporary pavement markings including stopbars.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. City signal system data: Controller Asset #1185.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone Drums	N/A
	Construction Zone	N/A
	Video Detection Area	N/A

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6	PHASE 8
Min Green *	12	7	7	12	7
Gap, Extension *	2.0	2.0	2.0	2.0	2.0
Maximum Green 1 *	90	25	20	90	25
Maximum Green 2 *	90	25	20	90	25
Yellow Clear	4.5	4.1	3.0	4.5	3.2
Red Clear	2.2	1.8	3.6	2.2	2.7
Walk *	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-
Added Initial *	-	-	-	-	-
Maximum Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL	-
Lock Calls	YES	NO	NO	YES	NO
Dual Entry	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON

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

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
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Raleigh, NC 27606
Tel. (919) 851-6866
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www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering & Asset Management
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

SIGNAL UPGRADE - TEMPORARY DESIGN 3 (TMP PHASE III)

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON

PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE DATE 4/26/12

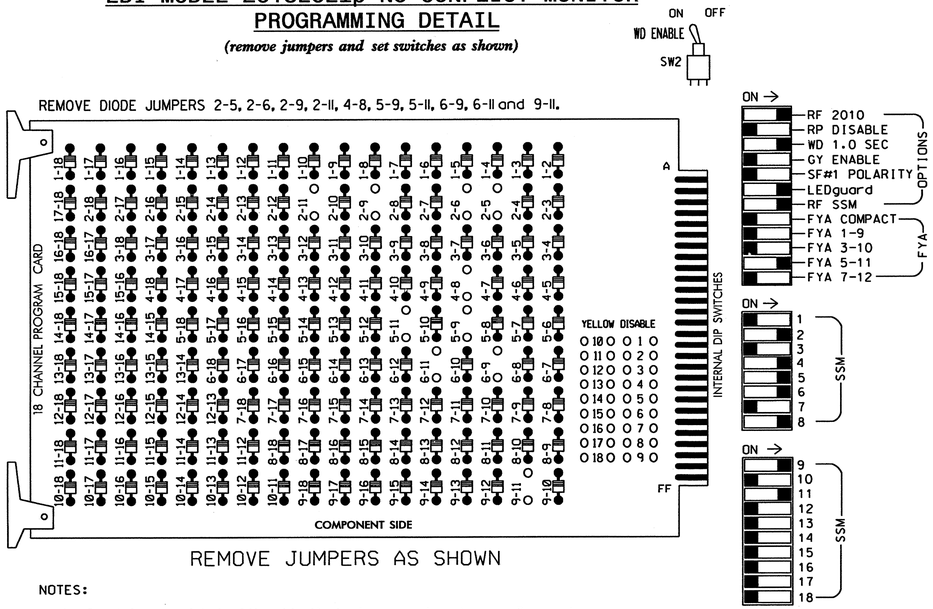
SIG. INVENTORY NO. 07-1185T3

5/5/2012
J:\71001287\transportation\design\Traffic\Signals\SignPlans\71001287_sig_dsn_6_07-1185_T3.dgn
Dlaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.4O

EDI MODEL 2018ECLip-NC 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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phases 4 and 8 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S5,S7,S8,S11,AUX S1, AUX S4
PHASES USED.....2,4,5,6,8
OVERLAP A.....2
OVERLAP B.....NOT USED
OVERLAP C.....*
OVERLAP D.....NOT USED

*Refer to Overlap Programming Detail sheet 2 of 3.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5		6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41, 42,43	NU	42	51★	61,62	NU	NU	82,83	NU	63★	NU	NU	51★	NU	NU
RED		128			101		*		134			107							
YELLOW		129			102				135			108							
GREEN		130			103				136			109							
RED ARROW														A121			A114		
YELLOW ARROW							132							A122			A115		
FLASHING YELLOW ARROW														A123			A116		
GREEN ARROW							133	133											

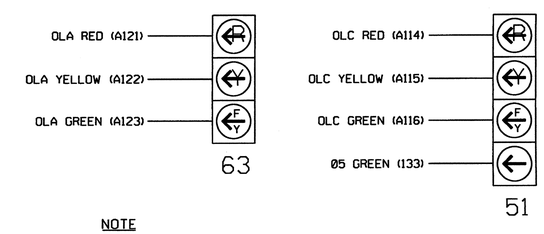
NU = Not Used

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

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

1. See Overlap Programming Detail Sheet 2 of 3.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

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

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

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

PHASE 5 RED FIELD TERMINAL (131)

AC-

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: 07-1185T3
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 3 - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012	REVIEWED BY: T. Lyon
PREPARED BY: C. Strickland	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/2/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-1185T3

27-APR-2012 11:25
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cass\rickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.41

OVERLAP PROGRAMMING DETAIL FOR OVERLAPS A and C*

(program controller as shown below)

* NOTE FOR ALL OVERLAPS: Use Default values for Overlap 'PLUS' programming details.

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
[1.General Parms]
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
   Confl Lock Enable OFF
     Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
[2.Program]
3.Status
```

```
Enter Overlap #  1
  then press Enter
```

```
Overlap A-1
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp A-1   Ps....................
Included Ps   2 0 0 0 0 0 0 0
Modifier Ps   0 0 0 0 0 0 0 0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC" TWICE

```
Enter Overlap #  3
  then press Enter
```

```
Overlap C-3
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
 Ovrlp C-3   Ps....................
Included Ps   5 0 0 0 0 0 0 0
Modifier Ps   6 0 0 0 0 0 0 0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

END OF OVERLAP PROGRAMMING DETAIL

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T3
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 3 - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.)
at
SR 1549 (MacKay Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY: T. Jym
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/2/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-1185T3

27-APR-2012 11:32
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cesstrickland

4-SECTION PPLT FYA OUTPUT PROGRAMMING DETAIL

(program controller as shown below)

1. Before proceeding with output programming, be sure to switch the "RUN ENABLE STATUS" to "OFF". The "RUN ENABLE STATUS" setting is located from Main Menu, key strokes 1-7.

2. The Flashing Yellow Arrow in a 4-section PPLT FYA head is controlled by a normally unused PED Yellow output. This programming takes a specific PED Yellow output and remaps it to the appropriate Overlap Green output.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  [6.IO Parms]  9.IO UserMap
```

SELECT USER MODE →

```
I/O Parameters
C1-C11-ABC IO Mode: USER
     D Conn Mapping: NONE
         T&F Biu Map: DEFAULT
 Invert Rail Inputs: OFF
    EVP Ped Confirm: OFF
```

PRESS "ESC"

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms  [9.IO UserMap]
```

```
User I/O Maps
1. Inputs
2. Outputs
[3. Init Map]
```

```
Initialize User I/O Maps
     Init ABC with: NONE
       Init D with: NONE
      Init 2A with: MODE 5
  Init TF BIUs with: NONE
```

SELECT MODE 5 →

PRESS "ESC"

```
User I/O Maps
1. Inputs
[2. Outputs]
3. Init Map
```

```
User Output Maps
1.NEMA A    4.NEMA D
2.NEMA B    [5.FIO 2A]
3.NEMA C                9.TS2 IO
```

PRESS "+" KEY TWICE

Pin	Fcn	Description	Pin	Fcn	Description
4-5	54	Ch6 Green	4-6	5	Ch5 Red
4-7	29	Ch5 Yellow	4-8	53	Ch5 Green
5-1	37	Ch13 Yellow	5-2	0	Unused
5-3	38	Ch14 Yellow	5-4	40	Ch16 Yellow
5-5	115	Not Used	5-6	124	LdSwtchFlsh
5-7	115	Not Used	5-8	114	Watchdog
6-1	115	Not Used	6-2	115	Not Used

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
5-2	39	Ch15 Yellow....	0	Unused

PRESS "+" KEY ONCE

Pin	Fcn	Description	Pin	Fcn	Description
6-3	12	Ch12 Red	6-4	36	Ch12 Yellow
6-5	60	Ch12 Green	6-6	11	Ch11 Red
6-7	35	Ch11 Yellow	6-8	39	Ch15 Yellow
7-1	115	Not Used	7-2	115	Not Used
7-3	10	Ch10 Red	7-4	34	Ch10 Yellow
7-5	58	Ch10 Green	7-6	9	Ch9 Red
7-7	33	Ch9 Yellow	7-8	57	Ch9 Green

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
6-8	59	Ch11 Green	39	Ch15 Yellow

OUTPUT PROGRAMMING COMPLETE

Pin 5-2 (C1 pin 36) = Load Switch S9-Y
Pin 6-8 (C1 pin 90) = Load Switch AUX S4-G

! Press the "*" key to return to Main Menu. Now go back to "RUN-ENABLE STATUS" and switch to "ON".

NOTE

I/O re-programming is necessary for proper FYA operation. See Channel & I/O Programming Detail For FYA Operation on this sheet.

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash. It also specifies which overlap is to be overridden for the FYA to display properly.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  [4.Chan+  1-16] 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
      Chan.1...2...3...4...5...6...7...8 >
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

```
      Chan.9..10..11..12..13..14..15..16
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   X   .   ←
Flash Grn X   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   3   0   ←
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

NOTE

Output re-mapping is necessary for proper FYA operation. See the 4-Section PPLT FYA Output Programming Detail on this sheet.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T3
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 3 - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012	REVIEWED BY:
PREPARED BY: C. Strickland	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE 5/2/12 DATE

SIG. INVENTORY NO. 07-1185T3

27-APR-2012 11:33
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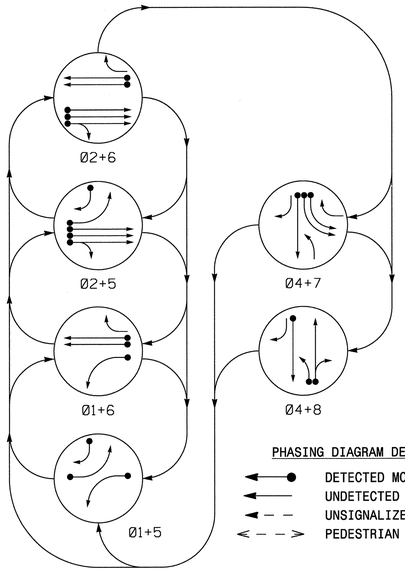
cesstrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 43

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

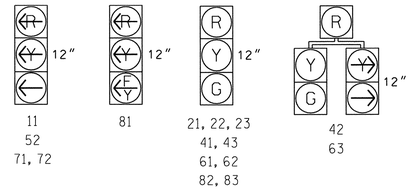
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	04+07	04+08	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21, 22, 23	R	R	G	G	R	R	Y
41, 43	R	R	R	R	G	G	R
42	R/←	R	R/←	R	G	G	R
52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
61, 62	R	G	R	G	R	R	Y
63	R	G	R	G	R/←	R	Y
71, 72	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
81	~~R~~	~~R~~	~~R~~	~~R~~	F Y	F Y	~~R~~
82, 83	R	R	R	R	R	G	R

F Y = Flashing Yellow Arrow

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

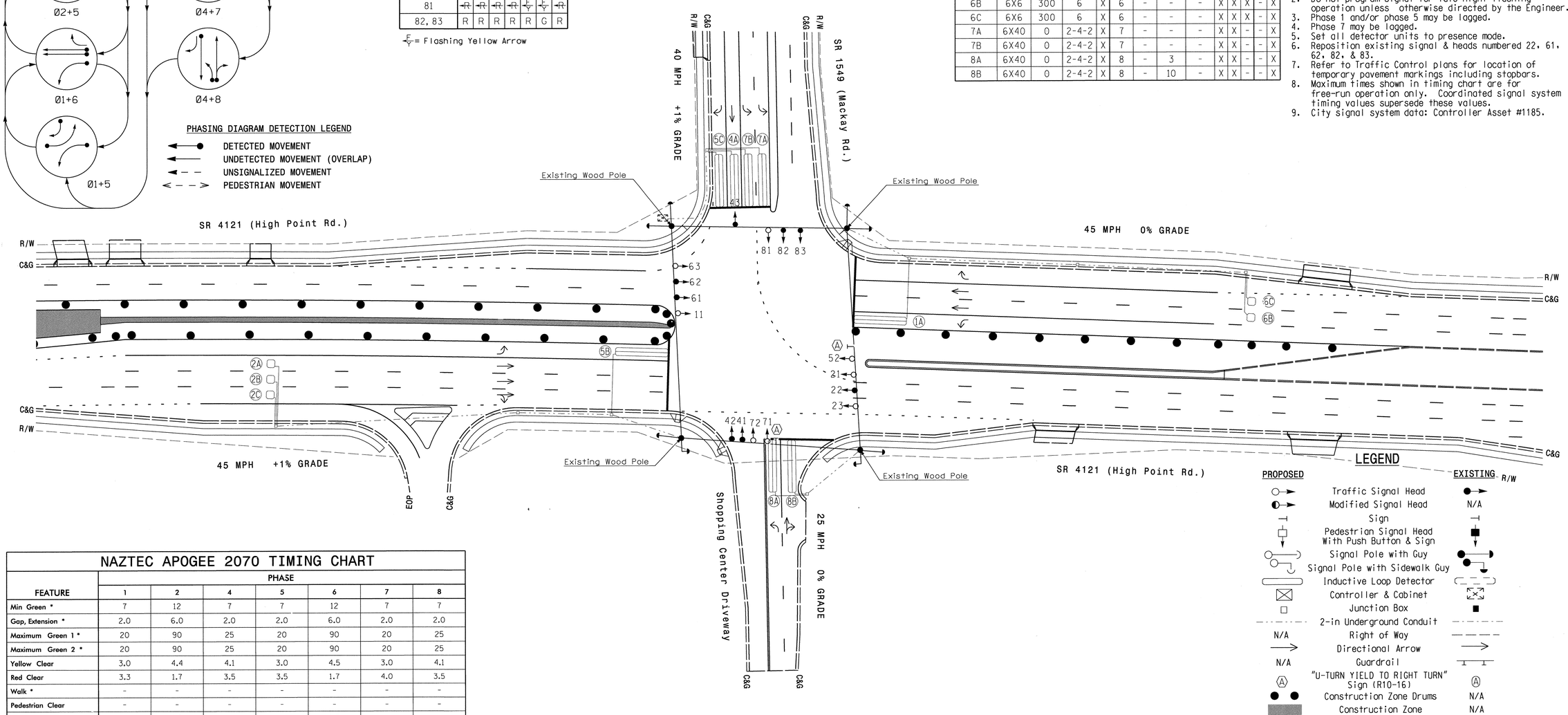
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	-	-	-	X	X	-	-	X
2A	6X6	300	6	X	2	-	-	-	X	X	X	-	X
2B	6X6	300	6	X	2	-	-	-	X	X	X	-	X
2C	6X6	300	6	X	2	-	-	-	X	X	X	-	X
4A	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
5B	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	X
5C	6X40	0	2-4-2	X	5	-	15	-	X	X	-	-	X
6B	6X6	300	6	X	6	-	-	-	X	X	X	-	X
6C	6X6	300	6	X	6	-	-	-	X	X	X	-	X
7A	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	X
7B	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	3	-	X	X	-	-	X
8B	6X40	0	2-4-2	X	8	-	10	-	X	X	-	-	X

6 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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 7 may be lagged.
5. Set all detector units to presence mode.
6. Reposition existing signal & heads numbered 22, 61, 62, 82, & 83.
7. Refer to Traffic Control plans for location of temporary pavement markings including stopbars.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. City signal system data: Controller Asset #1185.



NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	7	8
Min Green *	7	12	7	7	12	7	7
Gap, Extension *	2.0	6.0	2.0	2.0	6.0	2.0	2.0
Maximum Green 1 *	20	90	25	20	90	20	25
Maximum Green 2 *	20	90	25	20	90	20	25
Yellow Clear	3.0	4.4	4.1	3.0	4.5	3.0	4.1
Red Clear	3.3	1.7	3.5	3.5	1.7	4.0	3.5
Walk *	-	-	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-	-	-
Added Initial *	-	1.0	-	-	1.5	-	-
Maximum Initial *	-	34	-	-	34	-	-
Time Before Reduction *	-	15	-	-	15	-	-
Time To Reduce *	-	30	-	-	30	-	-
Minimum Gap	-	3.0	-	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	YES	NO	NO
Dual Entry	-	-	ON	-	-	-	-
Simultaneous Gap	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.

Stantec
Stantec Consulting Services Inc.
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Tel. (919) 851-6866
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License No. F-0672

SIGNAL UPGRADE - TEMPORARY DESIGN 4 (TMP PHASE IV)

Prepared for the Offices of: Transportation Mobility and Safety Division, Traffic Engineering Branch, Signal Design Section, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.) at SR 1549 (Mackay Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE Betsy L. Watson DATE 4/26/12

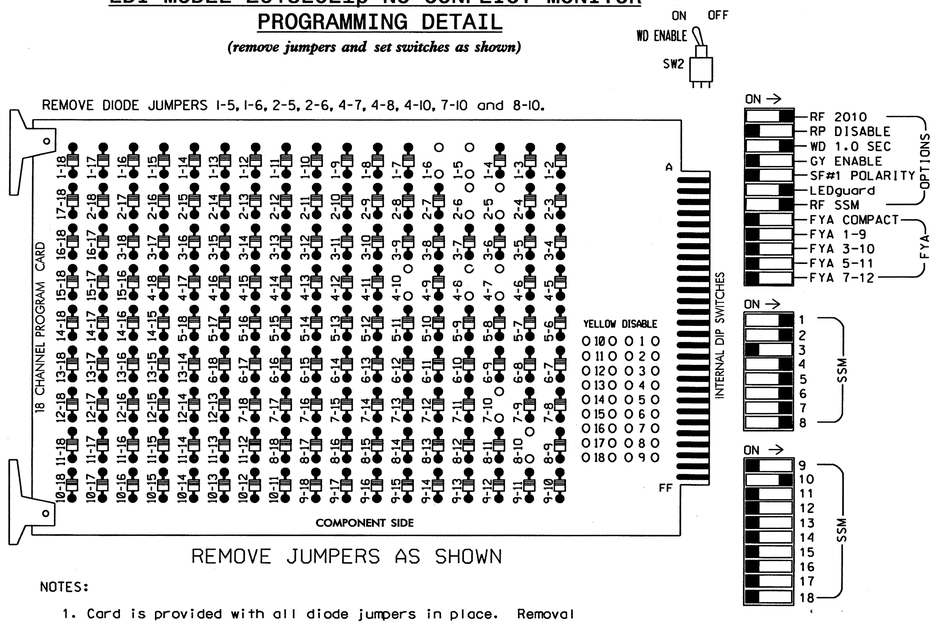
SIG. INVENTORY NO. 07-1185T4

5/5/2012
J:\#171001287\transportation\design\Traffic\Signals\Signlans\171001287_sig_dsn_6_07-1185_T4.dgn
bldron

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.44

EDI MODEL 2018ECLip-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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phase 4 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7		8	16	9	10	17	11	12	18
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	21, 22,23	NU	NU	41, 42,43	NU	42	52	61, 62,63	NU	63	71,72	82,83	NU	NU	81★	NU	NU	NU	NU
RED		128			101				134				107							
YELLOW		129			102				135				108							
GREEN		130			103				136				109							
RED ARROW	125							131				122				A124				
YELLOW ARROW	126						132	132			123	123				A125				
FLASHING YELLOW ARROW																A126				
GREEN ARROW	127						133	133			124	124								

NU = Not Used

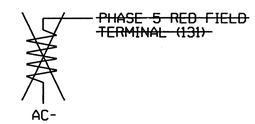
★ See pictorial of head wiring this sheet.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S10,S11,AUX S2
PHASES USED.....1,2,4,5,6,7,8
OVERLAP A.....NOT USED
OVERLAP B.....4
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

LOAD RESISTOR REMOVAL DETAIL

(remove resistor as shown below)



! IMPORTANT: If present, remove load resistor PHASE 5 RED FIELD TERMINAL (131)

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø2 2A	Ø2 2C	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø2 2B	NOT USED			NOT USED								ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø5 5B	NOT USED	Ø6 6C	Ø7 7A	Ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø5 5C	Ø6 6B	NOT USED	Ø7 7B	Ø8 8B								

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

FS = FLASH SENSE
ST = STOP TIME

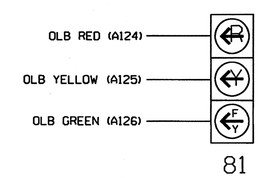
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1				X	X	
2A	TB2-5,6	I2U	39	2	2				X	X	X
2B	TB2-7,8	I2L	43	3	2				X	X	X
2C	TB2-9,10	I3U	63	4	2				X	X	X
4A	TB4-9,10	I6U	41	8	4				X	X	
5B	TB3-5,6	J2U	40	16	5				X	X	
5C	TB3-7,8	J2L	44	17	5		15		X	X	
6B	TB3-11,12	J3L	77	19	6				X	X	X
6C	TB5-1,2	J4U	48	20	6				X	X	X
7A	TB5-5,6	J5U	57	21	7				X	X	
7B	TB5-7,8	J5L	57	21	7				X	X	
8A	TB5-9,10	J6U	42	22	8		3		X	X	
8B	TB5-11,12	J6L	46	23	8		10		X	X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

3 SECTION FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T4
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

Electrical Detail - Temp 4 - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T.Vaz
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE DATE 5/2/12
SIG. INVENTORY NO. 07-1185T4

27-APR-2012 13:52
s:\traffic\Signals\Workgroups\Sig Mgmt\Strickland\07-1185_smlele_xxx.dgn
C. Strickland

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
[1.General Parms]
2.Program
3.Status
```

```
General Overlap Parameters
Lock Inhibit OFF
Confl Lock Enable OFF
Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
[2.Program]
3.Status
```

```
Enter Overlap # 2

then press Enter
```

```
Overlap B-2
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

```
Ovrlp B-2   Ps.....................
Included Ps   4 0 0 0 0 0 0 0
Modifier Ps   0 0 0 0 0 0 0 0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
[2.Confl Prog+]
3.Program Parms+
```

```
Ovrlp B-2   Ps.....................
Confl Ps      0 0 0 0 0 0 0 0
Confl Ovrlps  0 0 0 0 0 0 0 0
Confl Peds    0 0 0 0 0 0 0 0
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
[3.Program Parms+]
```

```
Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0 0 0 0 0 0 0 0
```

OVERLAP PROGRAMMING COMPLETE

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash.

FROM MAIN MENU. KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  [4.Chan+  1-16] 7.IO Logic
2.chan 17-24   5.chan+ 17-24  8.IO Viewer
3.Chan Parms   6.IO Parms     9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
     Chan.1...2...3...4...5...6...7...8 >
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

```
     Chan.9..10..11..12..13..14..15..16
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   X   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185T4
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 4 - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
Intelligent Transportation Systems
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1549 (MacKay Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T. Jye
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/2/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-1185T4

27-APR-2012 11:43
S:#ITSAS&#ITS Signals#workgroups#Sig Mans#Strickland#071185_smlelte.xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 46

PHASING DIAGRAM

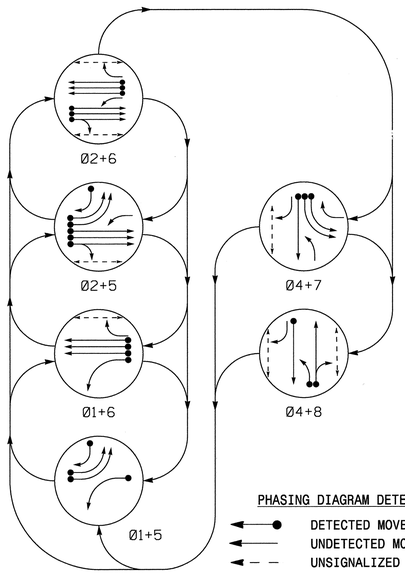


TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+7	04+8	FLASH
11	←	←	F	F	R	R	Y
21, 22, 23	R	R	G	G	R	R	Y
41, 43	R	R	R	R	G	G	R
42	R	R	R	R	G	G	R
51, 52	←	R	←	R	R	R	R
61, 62	R	G	R	G	R	R	Y
63	R	G	R	G	R	R	Y
71, 72	R	R	R	R	←	R	R
81	R	R	R	R	F	F	R
82, 83	R	R	R	R	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DRK
P41, P42	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DRK

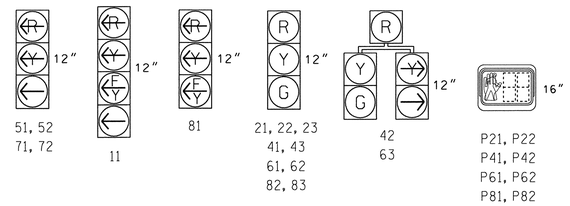
F = Flashing Yellow Arrow
W - Walk
DW - Don't Walk
DRK - Dark

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

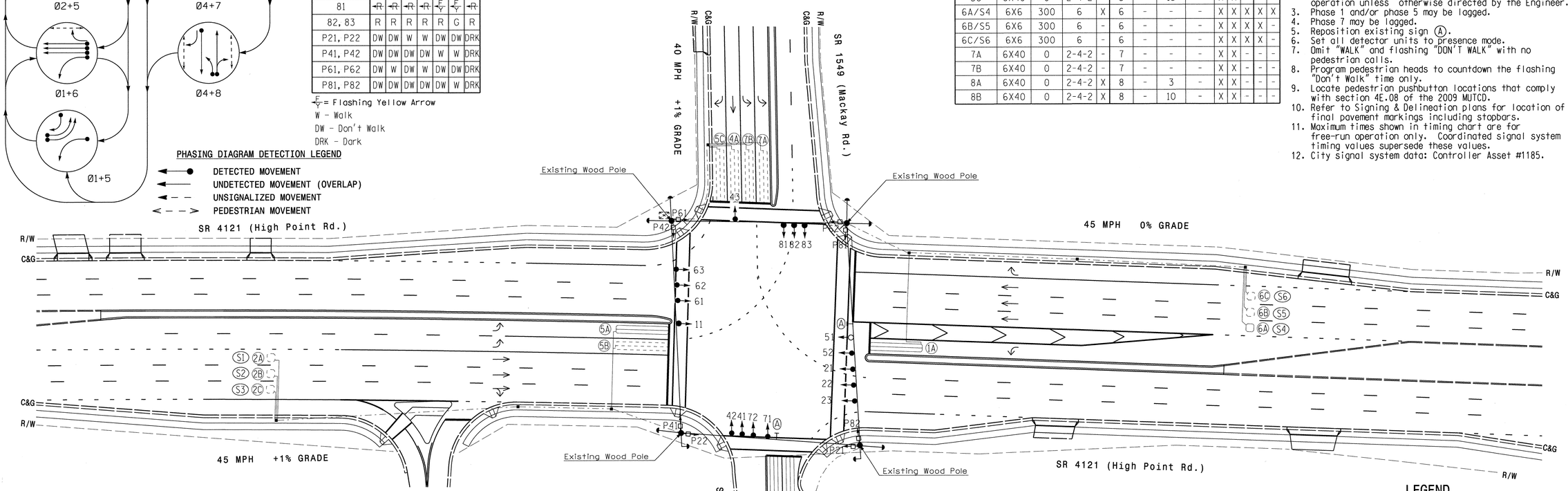
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	6	15	-	X	X	-	-	-
2A/S1	6X6	300	6	-	2	-	-	-	X	X	X	X	-
2B/S2	6X6	300	6	-	2	-	-	-	X	X	X	X	-
2C/S3	6X6	300	6	-	2	-	-	-	X	X	X	X	-
4A	6X40	0	2-4-2	-	4	-	-	-	X	X	-	-	-
5A	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	X
5B	6X40	0	2-4-2	-	5	-	-	-	X	X	-	-	-
5C	6X40	0	2-4-2	-	5	-	15	-	X	X	-	-	-
6A/S4	6X6	300	6	X	6	-	-	-	X	X	X	X	X
6B/S5	6X6	300	6	-	6	-	-	-	X	X	X	X	-
6C/S6	6X6	300	6	-	6	-	-	-	X	X	X	X	-
7A	6X40	0	2-4-2	-	7	-	-	-	X	X	-	-	-
7B	6X40	0	2-4-2	-	7	-	-	-	X	X	-	-	-
8A	6X40	0	2-4-2	X	8	-	3	-	X	X	-	-	-
8B	6X40	0	2-4-2	X	8	-	10	-	X	X	-	-	-

6 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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 7 may be lagged.
5. Reposition existing sign (A).
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Locate pedestrian pushbutton locations that comply with section 4E.08 of the 2009 MUTCD.
10. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. City signal system data: Controller Asset #1185.



NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	7	8
Min Green *	7	12	7	7	12	7	7
Gap, Extension *	2.0	6.0	2.0	2.0	6.0	2.0	2.0
Maximum Green 1 *	20	90	25	20	90	20	25
Maximum Green 2 *	20	90	25	20	90	20	25
Yellow Clear	3.0	4.5	4.1	3.0	4.5	3.0	4.1
Red Clear	3.4	2.0	4.0	3.9	2.0	4.1	4.0
Walk *	-	7	7	-	7	-	7
Pedestrian Clear	-	16	34	-	22	-	39
Added Initial *	-	1.0	-	-	1.0	-	-
Maximum Initial *	-	34	-	-	34	-	-
Time Before Reduction *	-	15	-	-	15	-	-
Time To Reduce *	-	30	-	-	30	-	-
Minimum Gap	-	3.0	-	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	YES	NO	NO
Dual Entry	-	-	ON	-	-	-	-
Simultaneous Gap	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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
(A)	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	(A)

SIGNAL UPGRADE - FINAL DESIGN

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering & Safety Systems Branch
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

SR 4121 (High Point Rd.) at SR 1549 (Mackay Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

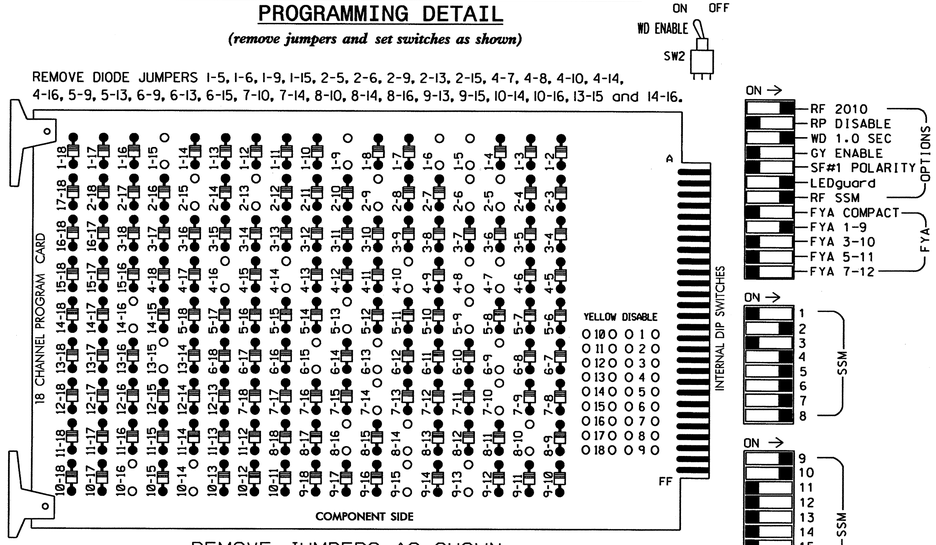
SIGNATURE 4/06/12 DATE

SIG. INVENTORY NO. 07-1185

5/5/2012
J:\47100128?\transportation\Design\Traffic\Signals\SigPlans\47100128?_sig_dsn_6_07-1185.dgn
Dixton

EDI MODEL 2018ECLip-NC 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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Walk.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. Program phase 4 for Dual Entry.
7. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S7,S8,S9, S10,S11,S12,AUX S1,AUX S2
PHASES USED.....1,2,2 PED,4,4 PED,5,6, 6 PED,7,8,8 PED
OVERLAP A.....*
OVERLAP B.....4
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

*Refer to Overlap Programming Detail sheet 2 of 3.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7		8	16	9	10	17	11	12	18
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★	21, 22,23	P21, P22	NU	41, 42,43	P41, P42	42	51,52	61, 62,63	P61, P62	63	71,72	82,83	P81, P82	11★	81★	NU	NU	NU	NU
RED		128			101				134				107							
YELLOW	*	129			102				135				108							
GREEN		130			103				136				109							
RED ARROW								131				122			A121	A124				
YELLOW ARROW							132	132			123	123			A122	A125				
FLASHING YELLOW ARROW															A123	A126				
GREEN ARROW	127						133	133			124	124								
✋			113			104				119				110						
🚶			115			106				121				112						

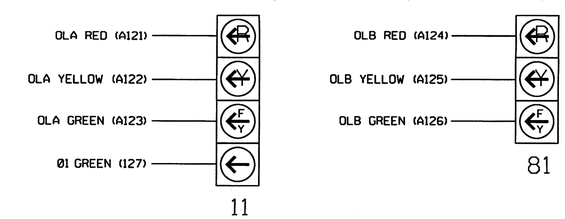
NU = Not Used

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

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

1. See Overlap Programming Detail Sheet 2 of 3.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø2/SYS 2A/S1	Ø2/SYS 2C/S3	SLOT EMPTY	SLOT EMPTY	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø2/SYS 2B/S2	NOT USED			NOT USED						Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 5 5B	Ø6/SYS 6A/S4	Ø6/SYS 6C/S6	Ø 7 7A	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø 5 5C	Ø6/SYS 6B/S5	NOT USED	Ø 7 7B	Ø 8 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.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1	6	15		X	X	
2A/S1	TB2-5,6	I2U	39	2	2/SYS				X	X	X
2B/S2	TB2-7,8	I2L	43	3	2/SYS				X	X	X
2C/S3	TB2-9,10	I3U	63	4	2/SYS				X	X	X
4A	TB4-9,10	I6U	41	8	4				X	X	
5A	TB3-1,2	J1U	55	15	5				X	X	
5B	TB3-5,6	J2U	40	16	5				X	X	
5C	TB3-7,8	J2L	44	17	5		15		X	X	
6A/S4	TB3-9,10	J3U	64	18	6/SYS				X	X	X
6B/S5	TB3-11,12	J3L	77	19	6/SYS				X	X	X
6C/S6	TB5-1,2	J4U	48	20	6/SYS				X	X	X
7A	TB5-5,6	J5U	57	21	7				X	X	
7B	TB5-7,8	J5L	57	21	7				X	X	
8A	TB5-9,10	J6U	42	22	8		3		X	X	
8B	TB5-11,12	J6L	46	23	8		10		X	X	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED						
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED						
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED						
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED						

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

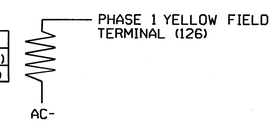
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

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



FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Final - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 4121 (High Point Rd.)
at
SR 1549 (Mackay Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY: T. Vogel
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS | INIT. | DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
George C. Brown 5/2/12
SIGNATURE DATE
SIG. INVENTORY NO. 07-1185

27-APR-2012 14:06
S:\TSS\UITS\Signals\Workgroups\Sig Mgmt\Strickland\07185_sm.ele_xxx.dgn
castrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.48

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
[1.General Parms]
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
   Confl Lock Enable OFF
     Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
[2.Program]
3.Status
```

```
Enter Overlap #  1
  then press Enter
```

```
Overlap A-1
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

Notice type FYA-4 →

```
 Ovrlp A-1   Ps....................
Included Ps    1  0  0  0  0  0  0  0
Modifier Ps    2  0  0  0  0  0  0  0
Type:FYA-4   Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap A-1
1.Program Parms
[2.Confl Prog+]
3.Program Parms+
```

```
 Ovrlp A-1   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap A-1
1.Program Parms
2.Confl Prog+
[3.Program Parms+]
```

```
 Ovrlp A-1
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

PRESS "ESC" TWICE

```
Enter Overlap #  2
  then press Enter
```

```
Overlap B-2
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Included Ps    4  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
[2.Confl Prog+]
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
[3.Program Parms+]
```

```
 Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Final - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.)
at
SR 1549 (MacKay Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T.V.
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/2/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-1185

27-APR-2012 11:59
S:*ITSASU*ITS Signals*Workgroups*Sig Mana*Strickland*071185_sml_ele_xxx.dgn
cassfrl&&tlong2

4-SECTION PPLT FYA OUTPUT PROGRAMMING DETAIL

(program controller as shown below)

1. Before proceeding with output programming, be sure to switch the "RUN ENABLE STATUS" to "OFF". The "RUN ENABLE STATUS" setting is located from Main Menu, key strokes 1-7.
2. The Flashing Yellow Arrow in a 4-section PPLT FYA head is controlled by a normally unused PED Yellow output. This programming takes a specific PED Yellow output and remaps it to the appropriate Overlap Green output.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

SELECT USER MODE →

```
I/O Parameters
C1-C11-ABC IO Mode: USER
     D Conn Mapping: NONE
         T&F Biu Map: DEFAULT
 Invert Rail Inputs: OFF
    EVP Ped Confirm: OFF
```

PRESS "ESC"

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

```
User I/O Maps
1. Inputs
3. Init Map
```

SELECT MODE 5 →

```
Initialize User I/O Maps
Init ABC with: NONE
     Init D with: NONE
    Init 2A with: MODE 5
Init TF BIUs with: NONE
```

PRESS "ESC"

```
User I/O Maps
1. Inputs
2. Outputs
3. Init Map
```

```
User Output Maps
1.NEMA A    4.NEMA D
2.NEMA B    5.FIO 2A
3.NEMA C                9.TS2 IO
```

PRESS "+" KEY TWICE

Pin	Fcn	Description	Pin	Fcn	Description
4-5	54	Ch6 Green	4-6	5	Ch5 Red
4-7	29	Ch5 Yellow	4-8	53	Ch5 Green
5-1	0	Unused	5-2	39	Ch15 Yellow
5-3	38	Ch14 Yellow	5-4	40	Ch16 Yellow
5-5	115	Not Used	5-6	124	LdSwtchFlsh
5-7	115	Not Used	5-8	114	Watchdog
6-1	115	Not Used	6-2	115	Not Used

PRESS "+" KEY ONCE

Pin	Fcn	Description	Pin	Fcn	Description
6-3	12	Ch12 Red	6-4	36	Ch12 Yellow
6-5	60	Ch12 Green	6-6	11	Ch11 Red
6-7	35	Ch11 Yellow	6-8	59	Ch11 Green
7-1	115	Not Used	7-2	115	Not Used
7-3	10	Ch10 Red	7-4	34	Ch10 Yellow
7-5	58	Ch10 Green	7-6	9	Ch9 Red
7-7	33	Ch9 Yellow	7-8	37	Ch13 Yellow

OUTPUT PROGRAMMING COMPLETE

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
5-1	37	Ch13 Yellow....	0	Unused

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
7-8	57	Ch9 Green	37	Ch13 Yellow

Pin 5-1 (C1 pin 35) = Load Switch S3-Y
Pin 7-8 (C1 pin 99) = Load Switch AUX S1-G

! Press the "*" key to return to Main Menu. Now go back to "RUN-ENABLE STATUS" and switch to "ON".

NOTE

I/O re-programming is necessary for proper FYA operation. See Channel & I/O Programming Detail For FYA Operation on this sheet.

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash. It also specifies which overlap is to be overridden for the FYA to display properly.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
     Chan.1...2...3...4...5...6...7...8 >
Flash Red .  .  .  .  .  .  .  .
Flash Yel .  .  .  .  .  .  .  .
Flash Grn .  .  .  .  .  .  .  .
Inhibit Red Flash In
  Preempt .  .  .  .  .  .  .  .
Olap Ovrd 0  0  0  0  0  0  0  0
```

```
     Chan.9..10..11..12..13..14..15..16
Flash Red .  .  .  .  .  .  .  .
Flash Yel .  .  .  .  X  .  .  .   ←
Flash Grn .  X  .  .  .  .  .  .
Inhibit Red Flash In
  Preempt .  .  .  .  .  .  .  .
Olap Ovrd 0  0  0  0  1  0  0  0   ←
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

NOTE

Output re-mapping is necessary for proper FYA operation. See the 4-Section PPLT FYA Output Programming Detail on this sheet.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1185
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Final - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.)
at
SR 1549 (MacKay Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: March 2012 | REVIEWED BY: T. Vogel
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE | DATE 5/2/12
SIG. INVENTORY NO. 07-1185

27-APR-2012 12:00
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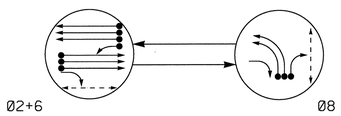
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 50

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

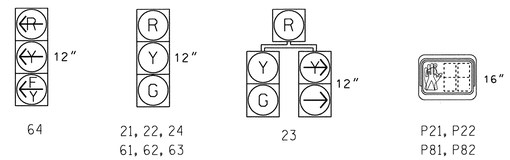
TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø8	FLASH
21, 22, 24	G	R	Y
23	G	R	Y
61, 62, 63	G	R	Y
64	F Y	R	Y
81, 82	R	G	R
P21, P22	W	DW	DRK
P81, P82	DW	W	DRK

F Y = Flashing Yellow Arrow
W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

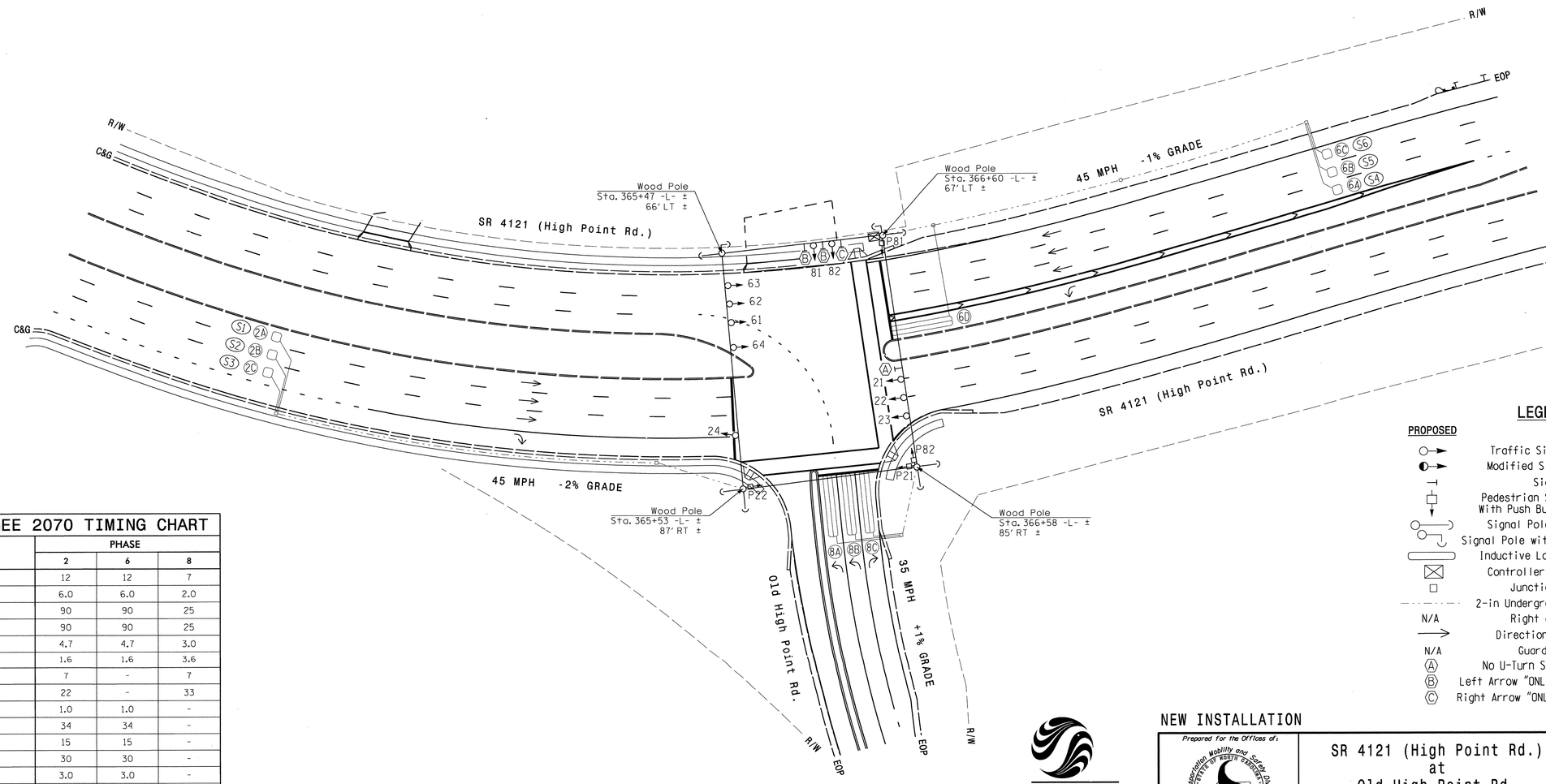
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A/S1	6X6	300	6	X	2	-	-	-	X	X	X	X	X
2B/S2	6X6	300	6	X	2	-	-	-	X	X	X	X	X
2C/S3	6X6	300	6	X	2	-	-	-	X	X	X	X	X
6A/S4	6X6	300	4	X	6	-	-	-	X	X	X	X	X
6B/S5	6X6	300	4	X	6	-	-	-	X	X	X	X	X
6C/S6	6X6	300	4	X	6	-	-	-	X	X	X	X	X
6D	6X40	0	2-4-2	X	6	-	-	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X
8B	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X
8C	6X40	0	2-4-2	X	8	-	15	-	X	X	-	-	X

2 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. Locate pedestrian pushbuttons in locations that comply with section 4E.08 of the 2009 MUTCD.
8. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. City signal system data: Controller Asset #2187.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
Ⓐ	No U-Turn Sign (R3-4)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 6	PHASE 8
Min Green *	12	12	7
Gap, Extension *	6.0	6.0	2.0
Maximum Green 1 *	90	90	25
Maximum Green 2 *	90	90	25
Yellow Clear	4.7	4.7	3.0
Red Clear	1.6	1.6	3.6
Walk *	7	-	7
Pedestrian Clear	22	-	33
Added Initial *	1.0	1.0	-
Maximum Initial *	34	34	-
Time Before Reduction *	15	15	-
Time To Reduce *	30	30	-
Minimum Gap	3.0	3.0	-
Recall Mode	MIN RECALL	MIN RECALL	-
Lock Calls	YES	YES	NO
Dual Entry	-	-	-
Simultaneous Gap	ON	ON	ON

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

Stantec
Stantec Consulting Services Inc.
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Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

NEW INSTALLATION

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

SR 4121 (High Point Rd.) at Old High Point Rd.

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON
SIGNATURE 4/26/12 DATE
SIG. INVENTORY NO. 07-2187

5/5/2012
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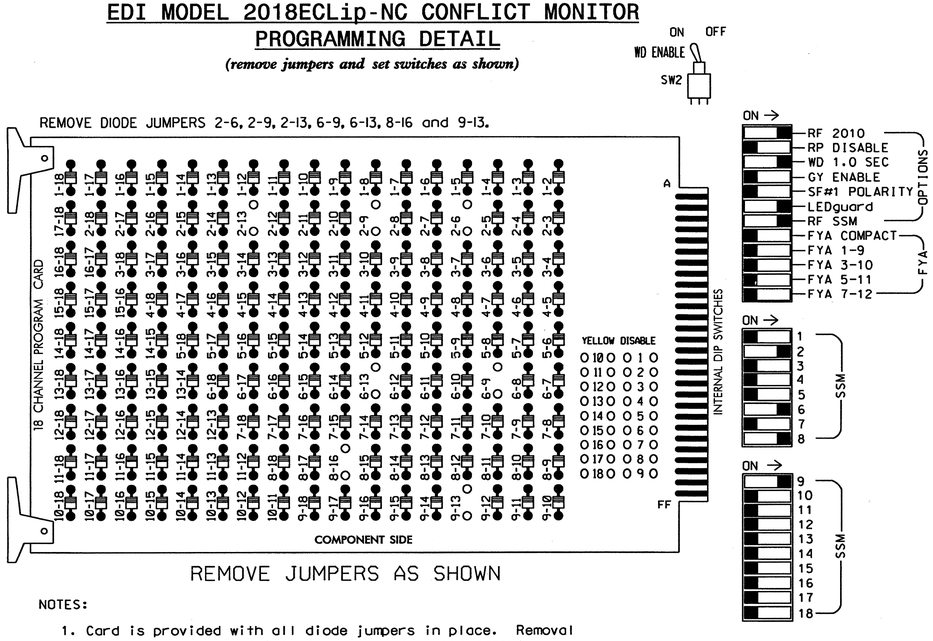
DIGITON

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 51

EDI MODEL 2018ECLip-NC 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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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 with the Signal Plans.
2. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phase 2 for Start Up In Walk, and phase 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S3,S8,S11,S12,AUX S1
PHASES USED.....2,2 PED,6,8,8 PED
OVERLAP A.....6

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11		S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8		16	9	10	17	11	12	18
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, 23,24	P21, P22	NU	NU	NU	NU	61, 62,63	NU	NU	23	81,82	P81, P82	64★	NU	NU	NU	NU	NU
RED		128						134				107							
YELLOW		129						135				108							
GREEN		130						136				109							
RED ARROW														A121					
YELLOW ARROW											108			A122					
FLASHING YELLOW ARROW														A123					
GREEN ARROW											109								
✋			113										110						
🚶			115										112						

NU = Not Used

★ See pictorial of head wiring in detail below.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT	Ø2/SYS 2A/S1	Ø2/SYS 2C/S3	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	Ø2 PED DC ISOLATOR	NOT USED	FS DC ISOLATOR
	L	EMPTY	Ø2/SYS 2B/S2	NOT USED	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	NOT USED	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT	Ø6/SYS 6A/S4	Ø6/SYS 6C/S6	SLOT	SLOT	Ø 8 8A	Ø 8 8C	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	L	EMPTY	Ø6/SYS 6B/S5	Ø 6 6D	EMPTY	EMPTY	Ø 8 8B	NOT USED	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

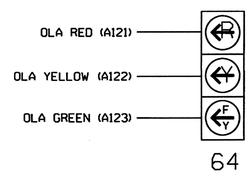
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
2A/S1	TB2-5,6	I2U	39	2	2/SYS				X	X	X
2B/S2	TB2-7,8	I2L	43	3	2/SYS				X	X	X
2C/S3	TB2-9,10	I3U	63	4	2/SYS				X	X	X
6A/S4	TB3-5,6	J2U	40	16	6/SYS				X	X	X
6B/S5	TB3-7,8	J2L	44	17	6/SYS				X	X	X
6C/S6	TB3-9,10	J3U	64	18	6/SYS				X	X	X
6D	TB3-11,12	J3L	77	19	6				X	X	
8A	TB5-9,10	J6U	42	22	8				X	X	
8B	TB5-11,12	J6L	46	23	8				X	X	
8C	TB7-1,2	J7U	66	24	8		15		X	X	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED						
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED						

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

3 SECTION FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2187
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.)
at
Old High Point Rd.

Division 7 Guilford County Greensboro

PLAN DATE: April 2012 REVIEWED BY: T. Vaz
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
George C. Brown 5/1/12
SIGNATURE DATE
SIG. INVENTORY NO. 07-2187

27-APR-2012 12:07
S:*ITSAS&U*ITS Signals*Workgroups*Sig Mgmt*Strickland*07218?_sml_ele_xxx.dgn
cdstrickland

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
[1.General Parms]
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
   Confl Lock Enable OFF
      Parent P Clrncs ON
 Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
[2.Program]
3.Status
```

```
Enter Overlap #  1

  then press Enter
```

```
Overlap A-1
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp A-1   Ps....................
Included Ps    6  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap A-1
1.Program Parms
[2.Confl Prog+]
3.Program Parms+
```

```
 Ovrlp A-1   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap A-1
1.Program Parms
2.Confl Prog+
[3.Program Parms+]
```

```
 Ovrlp A-1
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  [4.Chan+  1-16] 7.IO Logic
2.chan 17-24   5.chan+ 17-24  8.IO Viewer
3.Chan Parms   6.IO Parms     9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
     Chan.1...2...3...4...5...6...7...8 >
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn .   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

```
     Chan.9..10..11..12..13..14..15..16
Flash Red .   .   .   .   .   .   .   .
Flash Yel .   .   .   .   .   .   .   .
Flash Grn X   .   .   .   .   .   .   .
Inhibit Red Flash In
  Preempt .   .   .   .   .   .   .   .
Olap Ovrd 0   0   0   0   0   0   0   0
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2187
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 4121 (High Point Rd.)
at
Old High Point Rd.

Division 7 Guilford County Greensboro

PLAN DATE: April 2012 REVIEWED BY: T. Jones

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

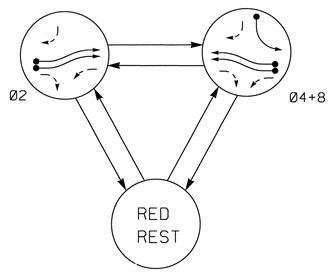
George C. Brown 5/1/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-2187

27-APR-2012 14:23
S:\TEAMS\ITS\Signals\Workgroups\Sig Mgmt\Strickland\07-2187_smlele_xxx.dgn
cbstrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 53

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

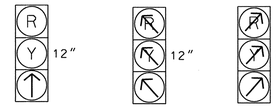
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø4+8	PHASE RED REST	PHASE FLASH
21, 22	↑	R	R	R
23	↖	↖	↖	↖
41, 42, 43	↖	↖	↖	↖
81, 82	R	↑	R	R
83	↗	↗	↗	↗

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

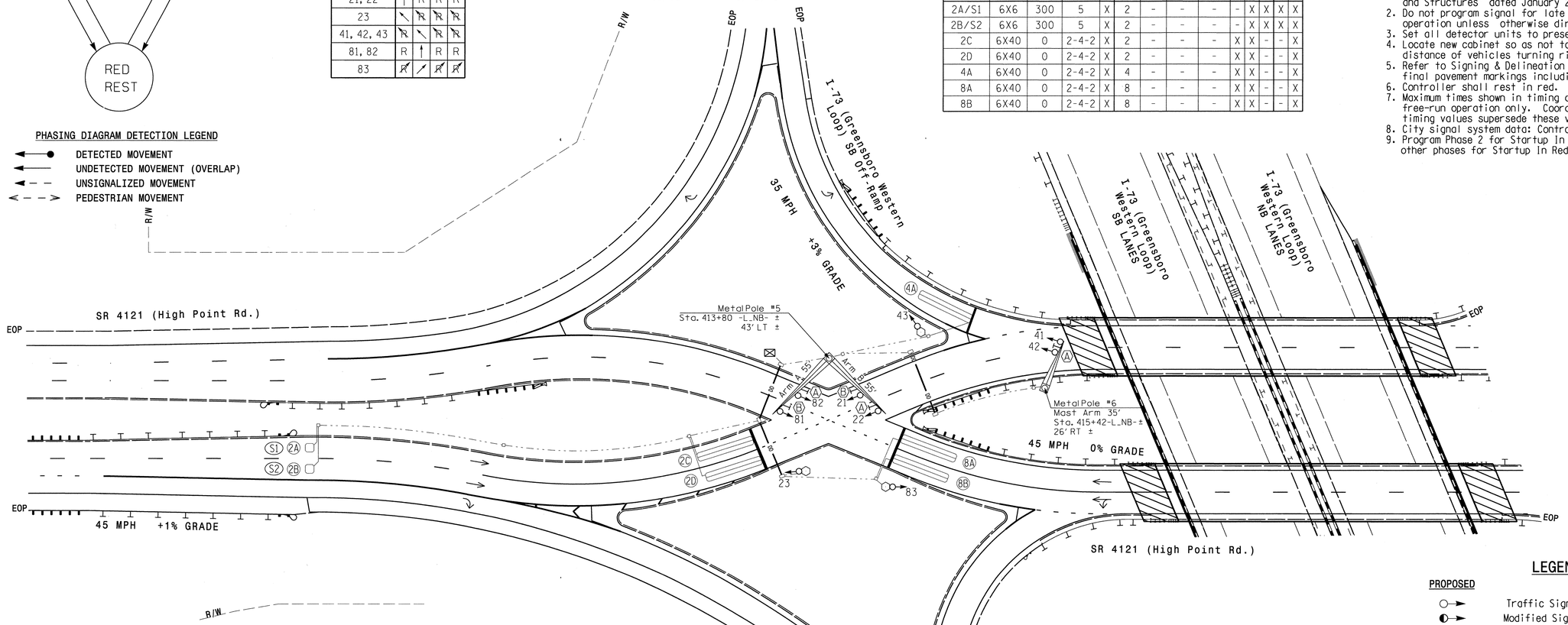
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A/S1	6X6	300	5	X	2	-	-	-	-	X	X	X	X
2B/S2	6X6	300	5	X	2	-	-	-	-	X	X	X	X
2C	6X40	0	2-4-2	X	2	-	-	-	X	X	-	-	X
2D	6X40	0	2-4-2	X	2	-	-	-	X	X	-	-	X
4A	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X
8B	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X

2 Phase Fully Actuated (Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
6. Controller shall rest in red.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. City signal system data: Controller Asset #2188.
9. Program Phase 2 for Startup In Red Clear. Program all other phases for Startup In 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	
	Oversized Junction Box	
	Signal Pedestal	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
DD	Directional Drill	N/A
	Metal Pole with Mastarm	
A	No Right Turn Sign (R3-1)	A
B	No Left Turn Sign (R3-2)	B

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 8
Min Green *	12	12	12
Gap, Extension *	6.0	2.0	2.0
Maximum Green 1 *	60	60	60
Maximum Green 2 *	60	60	60
Yellow Clear	3.5	3.7	3.5
Red Clear	3.7	1.0	2.0
Walk *	-	-	-
Pedestrian Clear	-	-	-
Added Initial *	1.5	-	-
Maximum Initial *	34	-	-
Time Before Reduction *	15	-	-
Time To Reduce *	30	-	-
Minimum Gap	3.0	-	-
Recall Mode	-	-	-
Lock Calls	NO	NO	NO
Dual Entry	-	ON	ON
Simultaneous Gap	ON	ON	ON

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

NEW INSTALLATION

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering & Safety Systems Branch
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

SR 4121 (High Point Rd.) at I-73 (Greensboro Western Loop) SB Ramps

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	B.L. WATSON
PREPARED BY:	K. WIESKAMP	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

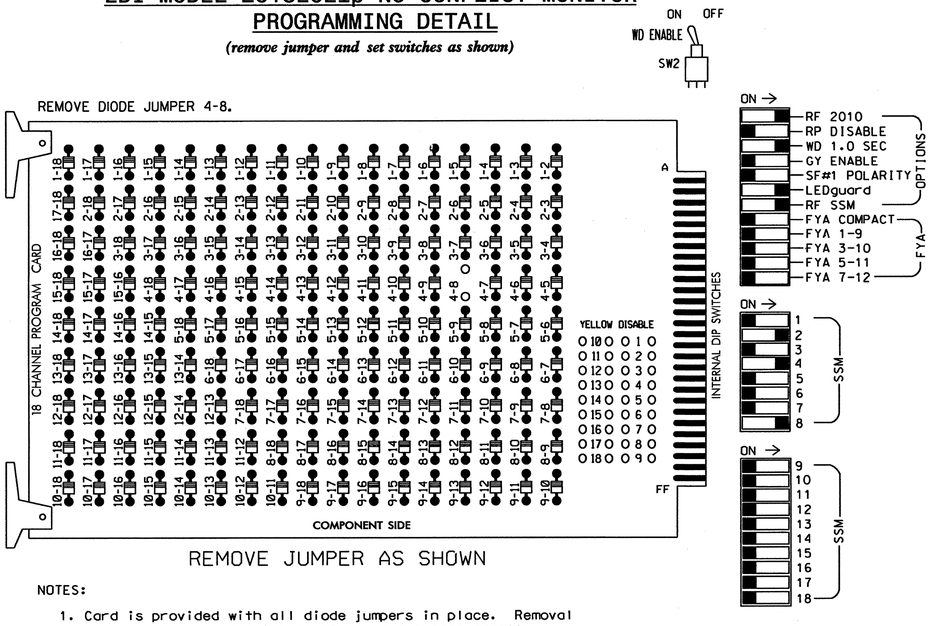
SIGNATURE 4/26/12 DATE

SIG. INVENTORY NO. 07-2188

5/5/2012
J:\47100128?\transportation\Design\Traffic\Signals\SigPlans\47100128?_sig_dsn_8_07-2188.dgn
bwatson

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper 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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phase 2 for Start Up In Red Clear. Program all other phases for Start Up In Red.
4. Program phases 2, 4 and 8 for Red Rest.
5. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
6. Ensure "Local Flash Start" feature is set to "ON".
7. Program phases 4 and 8 for Dual Entry.
8. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S5,S11
PHASES USED.....2,4,8
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11		S12
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8		16
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8		8 PED
SIGNAL HEAD NO.	NU	21,22	23	NU	NU	41, 42,43	NU	NU	NU	NU	NU	81,82	83	NU
RED		128										107		
YELLOW		129										108		
GREEN														
RED ARROW			128			101							107	
YELLOW ARROW			129			102							108	
GREEN ARROW		130	130			103						109	109	

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	Ø2/SYS 2A/S1	Ø2 2C	SLOT	SLOT	Ø4 4A	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	FS DC ISOLATOR
	L	EMPTY	Ø2/SYS 2B/S2	Ø2 2D	EMPTY	EMPTY	NOT USED	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	ST DC ISOLATOR
FILE "J"	U	SLOT	SLOT	SLOT	SLOT	SLOT	Ø8 8A	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	L	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	Ø8 8B	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
2A/S1	TB2-5,6	I2U	39	2	2/SYS					X	X
2B/S2	TB2-7,8	I2L	43	3	2/SYS					X	X
2C	TB2-9,10	I3U	63	4	2				X	X	
2D	TB2-11,12	I3L	76	5	2				X	X	
4A	TB4-9,10	I6U	41	8	4				X	X	
8A	TB5-9,10	J6U	42	22	8				X	X	
8B	TB5-11,12	J6L	46	23	8				X	X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2188
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 4121 (High Point Rd.)
at
I-73 (Greensboro Western Loop)
SB Ramps

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY:
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

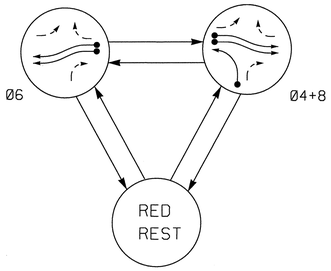
Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE DATE 5/1/12
SIG. INVENTORY NO. 07-2188

01-MAY-2012 10:37
S:\MTSAS\MTS Signals\Workgroups\Sig Mgmt\Strickland\072188_sm_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 55

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

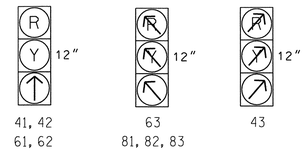
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø4+8	PHASE RED REST	PHASE FLASH
41, 42	R	↑	R	R
43	⤫	↗	⤫	⤫
61, 62	↑	R	R	R
63	↖	⤫	⤫	⤫
81, 82, 83	⤫	↖	⤫	⤫

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

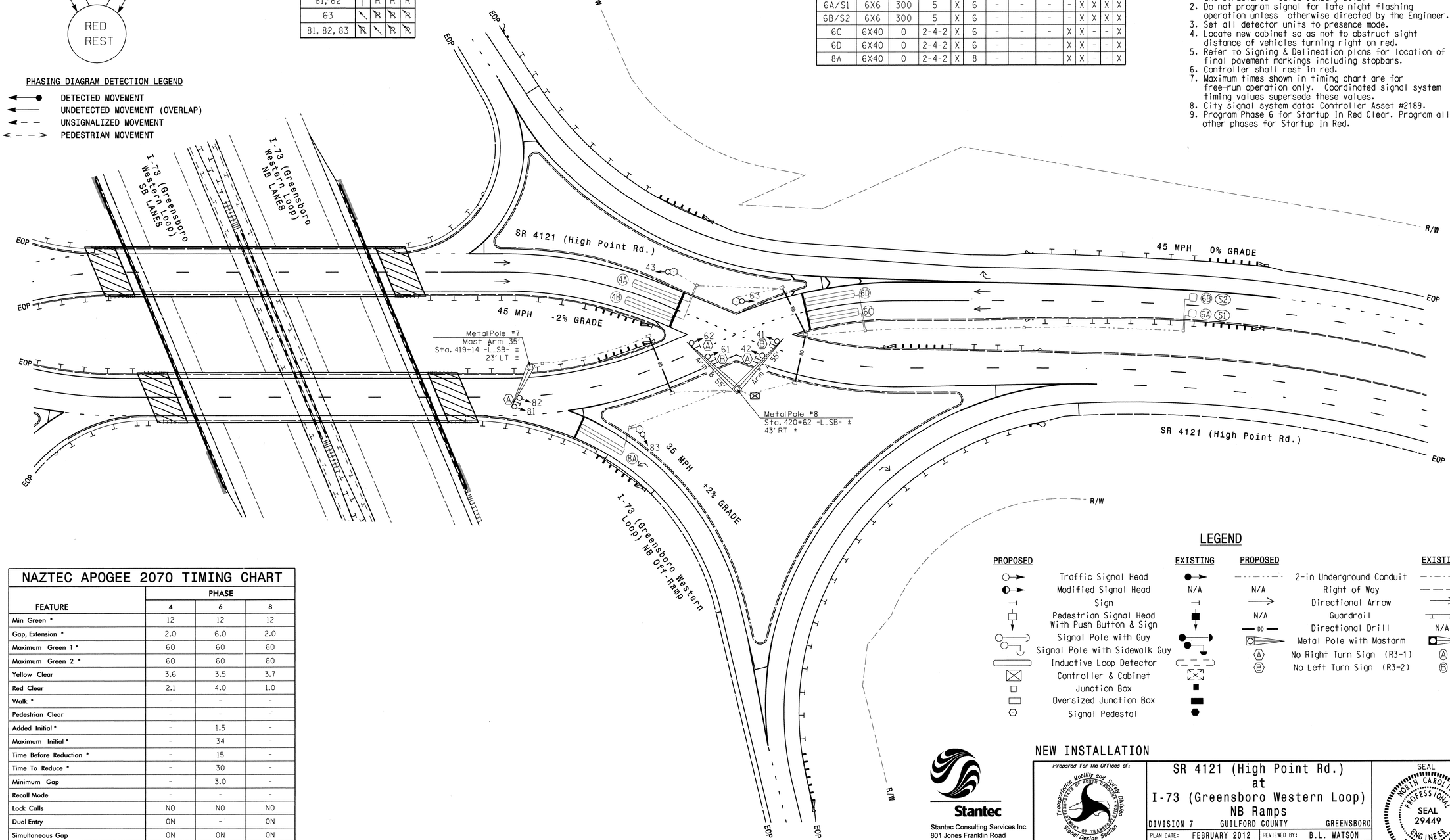
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
4A	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
4B	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
6A/S1	6X6	300	5	X	6	-	-	-	-	X	X	X	X
6B/S2	6X6	300	5	X	6	-	-	-	-	X	X	X	X
6C	6X40	0	2-4-2	X	6	-	-	-	X	X	-	-	X
6D	6X40	0	2-4-2	X	6	-	-	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X

2 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
6. Controller shall rest in red.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. City signal system data: Controller Asset #2189.
9. Program Phase 6 for Startup in Red Clear. Program all other phases for Startup in Red.



NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 4	PHASE 6	PHASE 8
Min Green *	12	12	12
Gap, Extension *	2.0	6.0	2.0
Maximum Green 1 *	60	60	60
Maximum Green 2 *	60	60	60
Yellow Clear	3.6	3.5	3.7
Red Clear	2.1	4.0	1.0
Walk *	-	-	-
Pedestrian Clear	-	-	-
Added Initial *	-	1.5	-
Maximum Initial *	-	34	-
Time Before Reduction *	-	15	-
Time To Reduce *	-	30	-
Minimum Gap	-	3.0	-
Recall Mode	-	-	-
Lock Calls	NO	NO	NO
Dual Entry	ON	-	ON
Simultaneous Gap	ON	ON	ON

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

LEGEND

PROPOSED		EXISTING	PROPOSED		EXISTING
	Traffic Signal Head			2-in Underground Conduit	
	Modified Signal Head	N/A	N/A	Right of Way	
	Sign			Directional Arrow	
	Pedestrian Signal Head With Push Button & Sign		N/A	Guardrail	
	Signal Pole with Guy		DD	Directional Drill	N/A
	Signal Pole with Sidewalk Guy			Metal Pole with Mastarm	
	Inductive Loop Detector		A	No Right Turn Sign (R3-1)	A
	Controller & Cabinet		B	No Left Turn Sign (R3-2)	B
	Junction Box				
	Oversized Junction Box				
	Signal Pedestal				

NEW INSTALLATION

Stantec
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www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

SR 4121 (High Point Rd.) at I-73 (Greensboro Western Loop) NB Ramps

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012	REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE 4/26/12 DATE

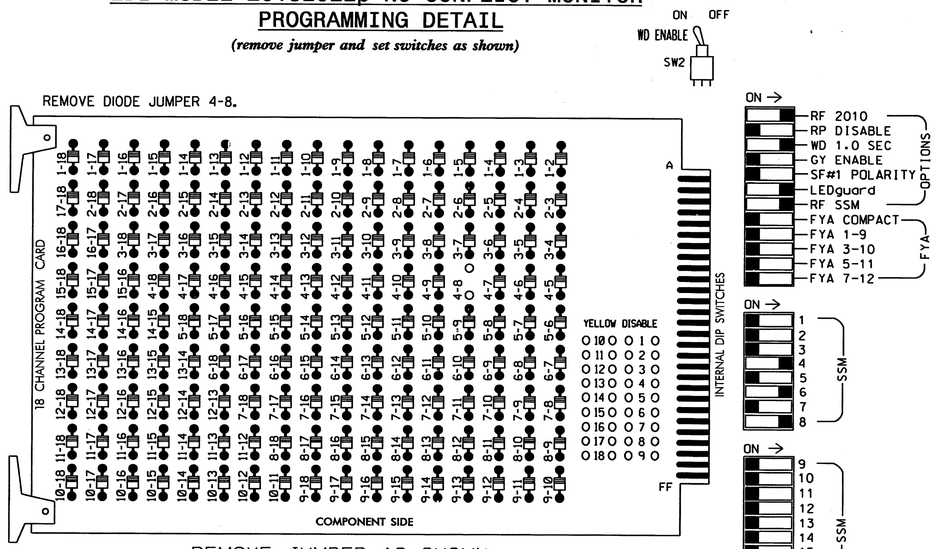
SIG. INVENTORY NO. 07-2189

5/5/2012
J:\47100128\transportation\design\Traffic\Signals\SigPlans\47100128_sig_dsn_9_07-2189.dgn
BLWatson

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.56

EDI MODEL 2018ECLip-NC CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumper and set switches as shown)



REMOVE JUMPER AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phase 6 for Start Up In Red Clear. Program all other phases for Start Up In Red.
4. Program phases 4, 6 and 8 for Red Rest.
5. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
6. Ensure "Local Flash Start" feature is set to "ON".
7. Program phases 4 and 8 for Dual Entry.
8. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S5,S8,S11
PHASES USED.....4,6,8
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5		S6	S7	S8		S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4		14	5	6		15	7	8	16
PHASE	1	2	2 PED	3	4		4 PED	5	6		6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	NU	NU	NU	41,42	43	NU	NU	61,62	63	NU	NU	81, 82,83	NU
RED					101				134					
YELLOW					102				135					
GREEN														
RED ARROW						101				134			107	
YELLOW ARROW						102				135			108	
GREEN ARROW					103	103			136	136			109	

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	SLOT	SLOT	SLOT	SLOT	Ø 4 4A	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	FS DC ISOLATOR
	L	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	Ø 4 4B	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	ST DC ISOLATOR
FILE "J"	U	SLOT	Ø6/SYS 6A/S1	Ø 6 6C	SLOT	SLOT	Ø 8 8A	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	L	EMPTY	Ø6/SYS 6B/S2	Ø 6 6D	EMPTY	EMPTY	NOT USED	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
4A	TB4-9,10	I6U	41	8	4				X	X	
4B	TB4-11,12	I6L	45	9	4				X	X	
6A/S1	TB3-5,6	J2U	40	16	6/SYS					X	X
6B/S2	TB3-7,8	J2L	44	17	6/SYS					X	X
6C	TB3-9,10	J3U	64	18	6				X	X	
6D	TB3-11,12	J3L	77	19	6				X	X	
8A	TB5-9,10	J6U	42	22	8				X	X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2189
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
I-73 (Greensboro Western Loop)
NB Ramps

Division 7 Guilford County Greensboro

PLAN DATE: March 2012 REVIEWED BY: T. Jan
PREPARED BY: C. Strickland REVIEWED BY:

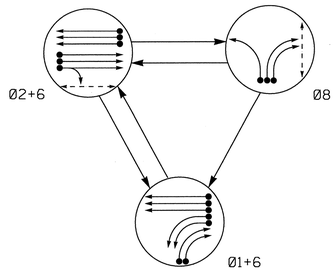
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
George C. Brown 5/1/12
SIGNATURE DATE
SIG. INVENTORY NO. 07-2189

01-MAY-2012 10:45
S:\TSSGINTS\Signals\Workgroups\Sig Man\Strickland\07189_sm_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 57

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

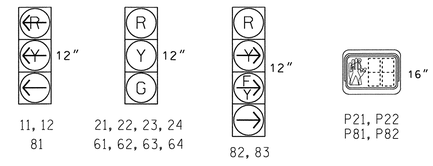
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+6	PHASE 02+6	PHASE 08	FLASH
11, 12	→	~~R~~	~~R~~	~~R~~
21,22,23,24	R	G	R	Y
61,62,63,64	G	G	R	Y
81	~~R~~	~~R~~	→	~~R~~
82, 83	→	R	FY	R
P21, P22	DW	W	DW	DRK
P81, P82	DW	DW	W	DRK

FY = Flashing Yellow Arrow
W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

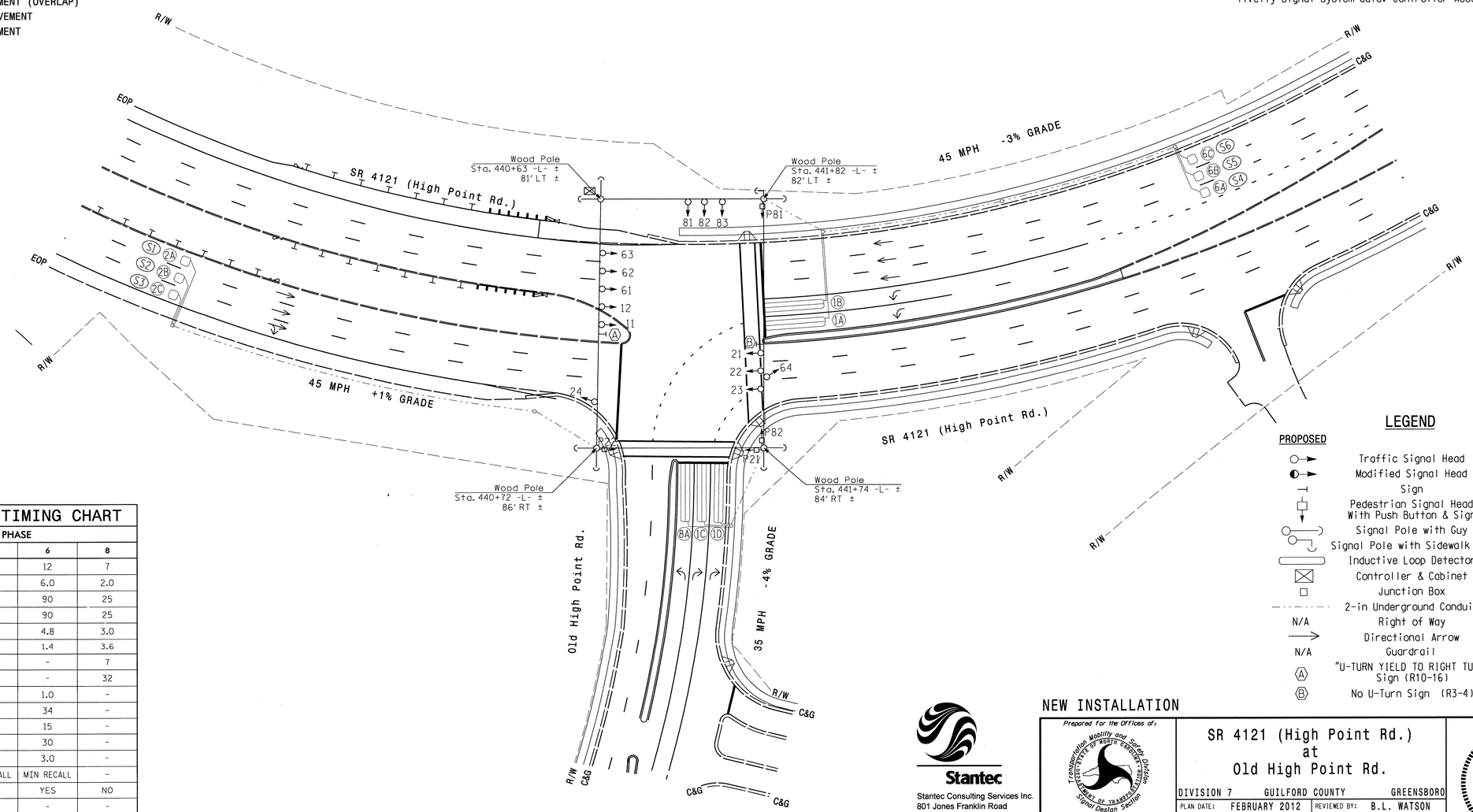
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	-	-	-	X	X	-	-	X
1B	6X40	0	2-4-2	X	1	-	-	-	X	X	-	-	X
1C	6X40	0	2-4-2	X	1	-	15	-	X	X	-	-	X
1D	6X40	0	2-4-2	X	1	-	15	-	X	X	-	-	X
2A/S1	6X6	300	6	X	2	-	-	-	X	X	X	X	X
2B/S2	6X6	300	6	X	2	-	-	-	X	X	X	X	X
2C/S3	6X6	300	6	X	2	-	-	-	X	X	X	X	X
6A/S4	6X6	300	5	X	6	-	-	-	X	X	X	X	X
6B/S5	6X6	300	5	X	6	-	-	-	X	X	X	X	X
6C/S6	6X6	300	5	X	6	-	-	-	X	X	X	X	X
8A	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X

3 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Locate pedestrian pushbuttons in locations that comply with section 4E.08 of the 2009 MUTCD.
9. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. City signal system data: Controller Asset #2190.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
A	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	A
B	No U-Turn Sign (R3-4)	B

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Min Green *	7	12	12	7
Gap, Extension *	2.0	6.0	6.0	2.0
Maximum Green 1 *	20	90	90	25
Maximum Green 2 *	20	90	90	25
Yellow Clear	3.0	4.4	4.8	3.0
Red Clear	3.7	1.3	1.4	3.6
Walk *	-	7	-	7
Pedestrian Clear	-	18	-	32
Added Initial *	-	1.0	1.0	-
Maximum Initial *	-	34	34	-
Time Before Reduction *	-	15	15	-
Time To Reduce *	-	30	30	-
Minimum Gap	-	3.0	3.0	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Lock Calls	NO	YES	YES	NO
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.

Stantec
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www.stantec.com
License No. F-0672

NEW INSTALLATION

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 1" = 40'

SR 4121 (High Point Rd.) at Old High Point Rd.

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON

PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE DATE 4/26/12

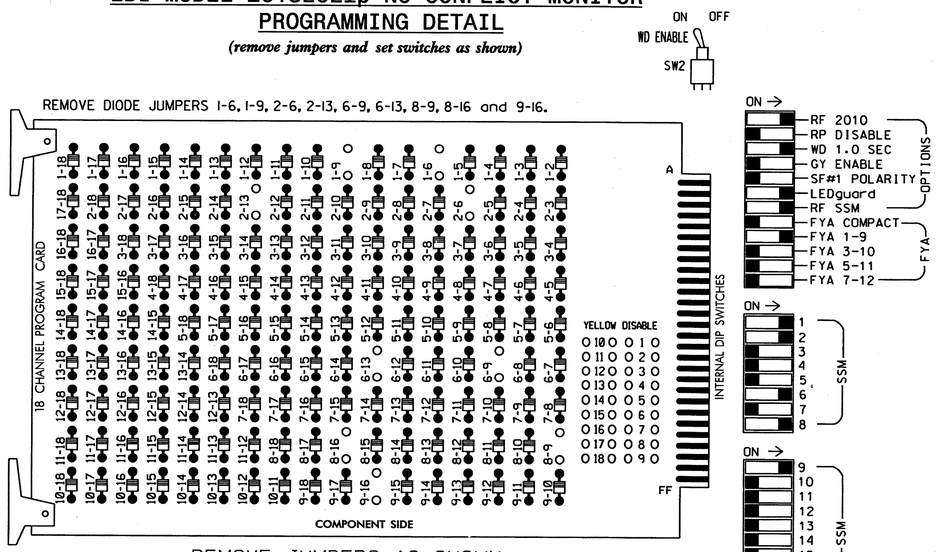
SIG. INVENTORY NO. 07-2190

5/5/2012
J:\171001287\transportation\design\Traffic\Signals\SigPlans\171001287_sig_dsn_10_07-2190.dgn
Dlgton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.58

EDI MODEL 2018ECLip-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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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 with the Signal Plans.
2. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phase 2 for Start Up In Walk, and phase 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S3,S8,S11,S12,AUX S1
PHASES USED.....1,2,2 PED,6,8,8 PED
OVERLAP A.....*
OVERLAP B.....NOT USED
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

* See Sheet 2 of 3 Overlap Programming Detail.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
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	★ 82,83	21,22, 23,24	P21, P22	NU	NU	NU	61,62, 63,64	NU	NU	81	P81, P82	★ 82,83	NU	NU	NU	NU	NU
RED			128					134					A121					
YELLOW			129					135										
GREEN			130					136										
RED ARROW	125										107							
YELLOW ARROW	126										108		A122					
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127	127									109							
✋			113									110						
🚶			115									112						

NU = Not Used

★ See pictorial of head wiring in detail below.

* Flash Note: Wire Overlap 'A' to flash on Flasher Unit #2, Circuit #1.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø2/SYS 2A/S1	Ø2/SYS 2C/S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 1 1C	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	NOT USED	FS DC ISOLATOR
	L	Ø 1 1B	Ø2/SYS 2B/S2	NOT USED						Ø 1 1D			NOT USED	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6/SYS 6A/S4	Ø6/SYS 6C/S6	SLOT EMPTY	SLOT EMPTY	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø6/SYS 6B/S5	NOT USED			NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

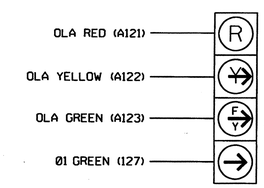
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB2-1,2	I1U	56	1	1				X	X	
1B	TB2-3,4	I1L	56	1	1				X	X	
1C	TB6-9,10	I9U	60	13	1		15		X	X	
1D	TB6-11,12	I9L	62	14	1		15		X	X	
2A/S1	TB2-5,6	I2U	39	2	2/SYS				X	X	X
2B/S2	TB2-7,8	I2L	43	3	2/SYS				X	X	X
2C/S3	TB2-9,10	I3U	63	4	2/SYS				X	X	X
6A/S4	TB3-5,6	J2U	40	16	6/SYS				X	X	X
6B/S5	TB3-7,8	J2L	44	17	6/SYS				X	X	X
6C/S6	TB3-9,10	J3U	64	18	6/SYS				X	X	X
8A	TB5-9,10	J6U	42	22	8				X	X	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED						
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED						

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

4 SECTION FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



82,83

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2190
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 4121 (High Point Rd.)
at
Old High Point Rd.

Division 7 Guilford County Greensboro

PLAN DATE: April 2012 REVIEWED BY: T. Jap
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/2/12
SIGNATURE DATE
SIG. INVENTORY NO. 07-2190

03-MAY-2012 11:09
S:#ITSSGUM$IS Signals#Workgroups#Sig Mgmt#Strickland#07219O_smu_ele_xxx.dgn
cestrickland

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
Lock Inhibit OFF
Confl Lock Enable OFF
Parent P Cirncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  1
then press Enter
```

```
Overlap A-1
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
Ovrlp A-1    Ps....................
Included Ps    1  0  0  0  0  0  0  0
Modifier Ps    8  0  0  0  0  0  0  0
Type:FYA-4    Grn:  0  Yel: 3.5  Red: 1.5
```

Notice type FYA-4 →

PRESS "ESC"

```
Overlap A-1
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
Ovrlp A-1    Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap A-1
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
Ovrlp A-1
LeadGreen  OFF   Transit 0
GreenExtInh      0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

PHASE SEQUENCE PROGRAMMING DETAIL

(program controller as shown below)

Setup controller to position phase 8 in Ring 1 Barrier 2. (Ensures compatibility for flashing right turn signal.)

From Main Menu. keystrokes 1-2-4 (Ring Sequence).

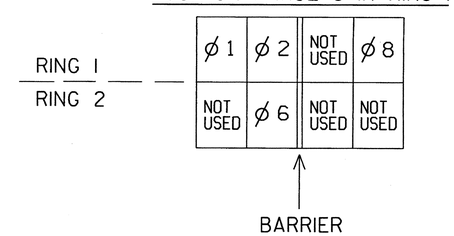
```
Unit          Ring
1. Parameters 4.Sequence
              5.Parms+
```

Seq#	Ring	Sequence.of.Phases							
1	1	1	2	0	8	0	0	0	0
1	2	0	6	0	0	0	0	0	0
1	3	0	0	0	0	0	0	0	0
1	4	0	0	0	0	0	0	0	0
2	1	1	2	3	4	0	0	0	0
2	2	5	6	7	8	0	0	0	0
2	3	0	0	0	0	0	0	0	0

MODIFY RING 1 FOR PHASE 8

End of Sequence programming

POSITION PHASE 8 IN RING 1



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2190
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 4121 (High Point Rd.) at Old High Point Rd.

Division 7 | Guilford County | Greensboro

PLAN DATE: April 2012 | REVIEWED BY: T. Vaughn

PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/2/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-2190

27-APR-2012 14:47
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cass\rickland

4-SECTION FYA OUTPUT PROGRAMMING DETAIL

(program controller as shown below)

1. Before proceeding with output programming, be sure to switch the "RUN ENABLE STATUS" to "OFF". The "RUN ENABLE STATUS" setting is located from Main Menu, key strokes 1-7.

2. The Flashing Yellow Arrow in a 4-section FYA head is controlled by a normally unused PED Yellow output. This programming takes a specific PED Yellow output and remaps it to the appropriate Overlap Green output.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

SELECT USER MODE →

```
I/O Parameters
C1-C11-ABC IO Mode: USER
     D Conn Mapping: NONE
        T&F Biu Map: DEFAULT
Invert Rail Inputs: OFF
   EVP Ped Confirm: OFF
```

PRESS "ESC"

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

```
User I/O Maps
1. Inputs
2. Outputs
3. Init Map
```

SELECT MODE 5 →

```
Initialize User I/O Maps
Init ABC with: NONE
   Init D with: NONE
  Init 2A with: MODE 5
Init TF BIUs with: NONE
```

PRESS "ESC"

```
User I/O Maps
1. Inputs
2. Outputs
3. Init Map
```

```
User Output Maps
1.NEMA A    4.NEMA D
2.NEMA B    5.FIO 2A
3.NEMA C                9.TS2 IO
```

PRESS "+" KEY TWICE

Pin	Fcn	Description	Pin	Fcn	Description
4-5	54	Ch6 Green	4-6	5	Ch5 Red
4-7	29	Ch5 Yellow	4-8	53	Ch5 Green
5-1	0	Unused	5-2	39	Ch15 Yellow
5-3	38	Ch14 Yellow	5-4	40	Ch16 Yellow
5-5	115	Not Used	5-6	124	LdSwtchFlsh
5-7	115	Not Used	5-8	114	Watchdog
6-1	115	Not Used	6-2	115	Not Used

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
5-1	37	Ch13 Yellow....	0	Unused

PRESS "+" KEY ONCE

Pin	Fcn	Description	Pin	Fcn	Description
6-3	12	Ch12 Red	6-4	36	Ch12 Yellow
6-5	60	Ch12 Green	6-6	11	Ch11 Red
6-7	35	Ch11 Yellow	6-8	59	Ch11 Green
7-1	115	Not Used	7-2	115	Not Used
7-3	10	Ch10 Red	7-4	34	Ch10 Yellow
7-5	58	Ch10 Green	7-6	9	Ch9 Red
7-7	33	Ch9 Yellow	7-8	37	Ch13 Yellow

Programming notes:

Pin	Default Fcn	Description	Change To: Fcn	Description
7-8	57	Ch9 Green	37	Ch13 Yellow

OUTPUT PROGRAMMING COMPLETE

Pin 5-1 (C1 pin 35) = Load Switch S3-Y
Pin 7-8 (C1 pin 99) = Load Switch AUX S1-G

! Press the "*" key to return to Main Menu. Now go back to "RUN-ENABLE STATUS" and switch to "ON".

NOTE

I/O re-programming is necessary for proper FYA operation. See Channel & I/O Programming Detail For FYA Operation on this sheet.

CHANNEL & I/O PROGRAMMING DETAIL FOR FYA OPERATION

(program controller as shown below)

This programming takes the output that drives a Flashing Yellow Arrow and makes it flash. It also specifies which overlap is to be overridden for the FYA to display properly.

FROM MAIN MENU, KEYSTROKES 1-8

```
Channel & I/O
1.Chan  1-16  4.Chan+  1-16 7.IO Logic
2.chan 17-24  5.chan+ 17-24 8.IO Viewer
3.Chan Parms  6.IO Parms    9.IO UserMap
```

PRESS THE RIGHT ARROW KEY UNTIL THE SCREEN AT RIGHT APPEARS

```
     Chan.1...2...3...4...5...6...7...8 >
Flash Red .  .  .  .  .  .  .  .
Flash Yel .  .  .  .  .  .  .  .
Flash Grn .  .  .  .  .  .  .  .
Inhibit Red Flash In
  Preempt .  .  .  .  .  .  .  .
Olap Ovrd 0  0  0  0  0  0  0  0
```

```
     Chan.9..10..11..12..13..14..15..16
Flash Red .  .  .  .  .  .  .  .
Flash Yel .  .  .  .  X  .  .  .   ←
Flash Grn .  .  .  .  .  .  .  .
Inhibit Red Flash In
  Preempt .  .  .  .  .  .  .  .
Olap Ovrd 0  0  0  0  1  0  0  0   ←
```

Program the controller as shown above.

CHANNEL & I/O PROGRAMMING COMPLETE

NOTE

Output re-mapping is necessary for proper FYA operation. See the 4-Section PPLT FYA Output Programming Detail on this sheet.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2190
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
Old High Point Rd.

Division 7 | Guilford County | Greensboro

PLAN DATE:	April 2012	REVIEWED BY:	T. Jam
PREPARED BY:	C. Strickland	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE | DATE 5/2/12

SIG. INVENTORY NO. 07-2190

27-APR-2012 14:48
S:#ITSASU#ITS Signals#Workgroups#Sig Mana#Strickland#072190_sm_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 61

PHASING DIAGRAM

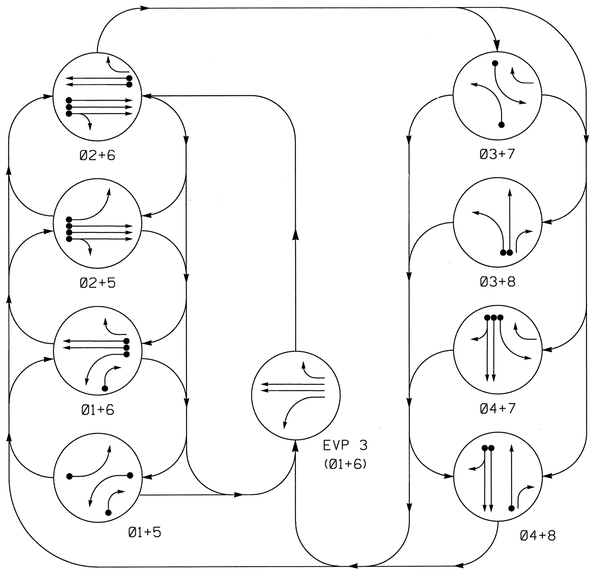
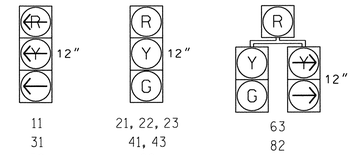


TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	EVP3	FLASH
11	←	←	↛R	↛R	↛R	↛R	↛R	↛R	←	↛R
21, 22, 23	R	R	G	G	R	R	R	R	R	Y
31	↛R	↛R	↛R	↛R	←	←	↛R	↛R	↛R	↛R
41, 43	R	R	R	R	R	R	G	G	R	R
52	←	↛R	←	↛R	↛R	↛R	↛R	↛R	↛R	↛R
62	R	G	R	G	R	R	R	R	G	Y
63	R	G	R	G	R/→	R	R/→	R	G	Y
71	↛R	↛R	↛R	↛R	←	↛R	←	↛R	↛R	↛R
81	R	R	R	R	R	G	R	G	R	R
82	R/→	R/→	R	R	R	G	R	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



11
31
52
71

21, 22, 23
41, 43
62
81

63
82

LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A ✱	6X40	0	✱	X	1	-	3	-	X	X	-	-	✱
1B ✱	6X40	0	✱	X	1	-	15	-	X	X	-	-	✱
2A ✱	6X6	300	✱	X	2	-	-	1.6	X	X	-	-	✱
2B ✱	6X6	300	✱	X	2	-	-	1.6	X	X	-	-	✱
2C ✱	6X6	300	✱	X	2	-	-	1.6	X	X	-	-	✱
2D ✱	6X6	90	✱	X	2	-	-	-	X	X	-	-	✱
2E ✱	6X6	90	✱	X	2	-	-	-	X	X	-	-	✱
2F ✱	6X6	90	✱	X	2	-	-	-	X	X	-	-	✱
3A ✱	6X40	0	✱	X	3	-	3	-	X	X	-	-	✱
4A ✱	6X40	0	✱	X	4	-	-	-	X	X	-	-	✱
4B ✱	6X40	0	✱	X	4	-	10	-	X	X	-	-	✱
5A ✱	6X40	0	✱	X	5	-	3	-	X	X	-	-	✱
6A ✱	6X6	300	✱	X	6	-	-	1.6	X	X	-	-	✱
6B ✱	6X6	300	✱	X	6	-	-	1.6	X	X	-	-	✱
6C ✱	6X6	90	✱	X	6	-	-	-	X	X	-	-	✱
6D ✱	6X6	90	✱	X	6	-	-	-	X	X	-	-	✱
7A ✱	6X40	0	✱	X	7	-	3	-	X	X	-	-	✱
8A ✱	6X40	0	✱	X	8	-	-	-	X	X	-	-	✱

✱ Video Detection Area

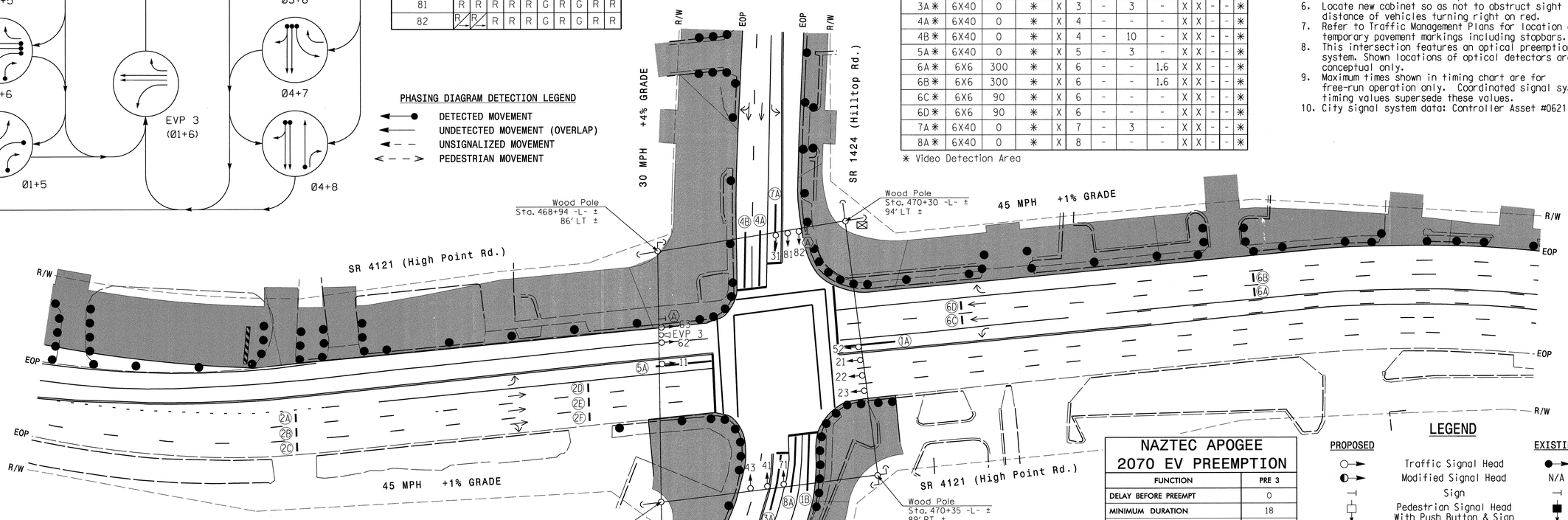
8 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Refer to Traffic Management Plans for location of temporary pavement markings including stopbars.
8. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. City signal system data: Controller Asset #0621.

PHASING DIAGRAM DETECTION LEGEND

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



NAZTEC APOGEE 2070 EV PREEMPTION

FUNCTION	PRE 3
DELAY BEFORE PREEMPT	0
MINIMUM DURATION	18
MIN GREEN BEFORE PREEMPT	6
MIN WALK BEFORE PREEMPT	0
PED CLEAR BEFORE PREEMPT	0
TRACK CLEARANCE GREEN	0
MINIMUM DWELL	6
EXIT PED CLEAR	0
EXIT YELLOW CHANGE	0.0
EXIT RED CLEAR	0.0
ENTER YELLOW CHANGE	25.5
ENTER RED CLEAR	25.5
TRACK YELLOW CHANGE	25.5
TRACK RED CLEAR	25.5
ALL-RED Ø4 DWELL	OFF
LOCK INPUT	ON
OVERRIDE HIGHER Ø PREEMPT	OFF
EXIT PREEMPT TO	Ø2+6

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Out of Pavement Detector	
	Directional Arrow	
	Construction Zone Drums	N/A
	Video Detection Area	N/A
N/A	Guardrail	
	Construction Zone	N/A
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Gap, Extension *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Maximum Green 1 *	20	90	20	25	20	90	20	25
Maximum Green 2 *	20	90	20	25	20	90	20	25
Yellow Clear	3.0	4.4	3.0	3.3	3.0	4.4	3.0	3.5
Red Clear	2.4	1.3	2.9	2.1	2.3	1.2	2.8	2.2
Walk *	-	-	-	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-	-	-	-
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	NO	YES	NO	NO
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.

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
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Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

SIGNAL UPGRADE - TEMPORARY DESIGN #1 (TMP PHASE I)

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.) /
SR 1129 (Groometown Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	B.L. WATSON
PREPARED BY:	K. WIESKAMP	REVIEWED BY:	

SCALE 1" = 40' (0 – 40)

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

Betsy L. Watson 4/26/12
SIGNATURE DATE

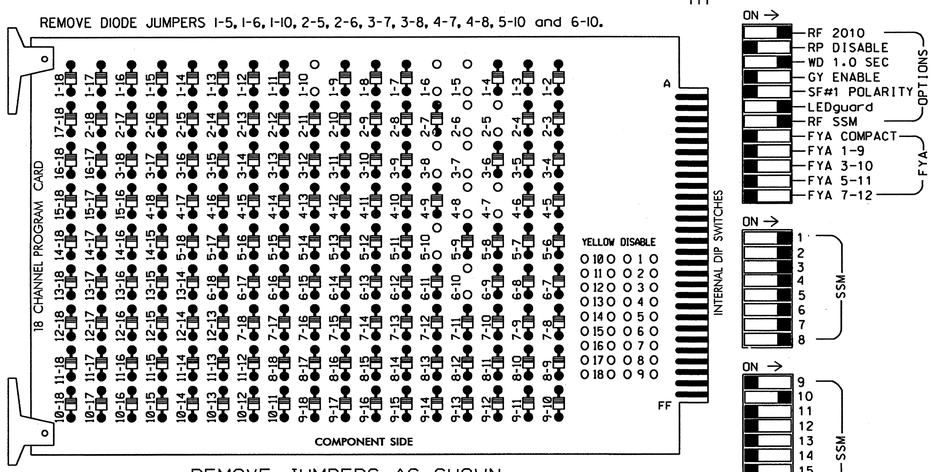
SIG. INVENTORY NO. 07-0621T1

5/5/2012
J:\171001287\transportation\design\Traffic\Signals\SignPlans\171001287_sig_dsn_T1_07-0621_T1.dgn
Dlaton

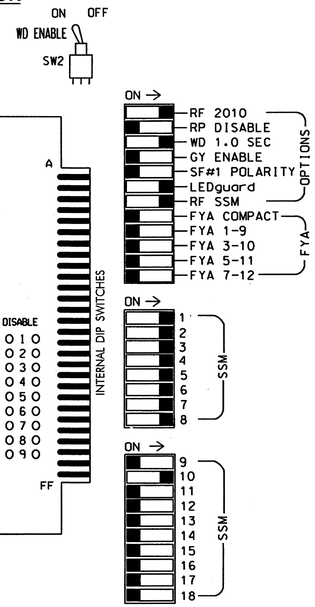
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.62

EDI MODEL 2018ECLip-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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10, S11,AUX S2
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP B.....1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7		8	16	9	10	17	11	12	18
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	21, 22,23	NU	31	41,43	NU	52	62,63	NU	63	71	81,82	NU	NU	82	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								
YELLOW ARROW	126			117			132			123	123				A125				
GREEN ARROW	127			118			133			124	124				A126				

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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE3 * Opticom 2 Ch. Card NOT USED	SLOT EMPTY	SLOT EMPTY
	L														

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

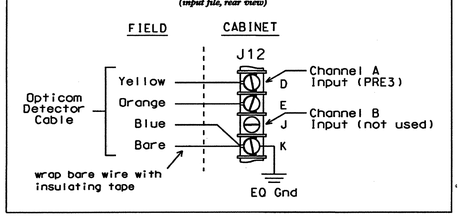
FS = FLASH SENSE
ST = STOP TIME

* See Opticom Field Wire Detail below.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

TYPICAL OPTICOM FIELD WIRE DETAIL

(input file, rear view)



SPECIAL DETECTOR NOTE

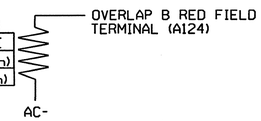
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

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



NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR4121 (High Point Rd.) at SR 1424 (Hilltop Rd.)/ SR 1129 (Groometown Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: April 2012 REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/4/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-0621T1

30-APR-2012 09:18
S:\TSS\Units\Signals\Workgroups\Sig Mgmt\Strickland\07621_smu_ele_xxx.dgn
castrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.63

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER
AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
        Lock Inhibit OFF
    Confl Lock Enable OFF
      Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  2
  then press Enter
```

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Included Ps    1  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: April 2012 | REVIEWED BY: T. Vann

PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE | DATE 5/4/12

SIG. INVENTORY NO. 07-0621T1

30-APR-2012 08:15
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castrickland

EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL FOR 'PRE3'

(program controller as shown below)

FROM MAIN MENU PRESS "3" PREEMPTS
ENTER PREEMPT #3

```
# 3            Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3  Times    :   Begin     :     Other
  Delay     0   MinGrn    6   Track Grn    0
MinDura    18   MinWlk    0   Min Dwell    6
MaxPres     0   PedClr    0
```

PRESS "ESC"

```
# 3            Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3            ---- Preempt Phases ----
Track Veh       0  0  0  0
DwellCyc Veh    1  6  0  0  0  0  0  0
DwellCyc(more)  0  0  0  0
DwellCyc (Ped)  0  0  0  0  0  0  0  0
Exit            2  6  0  0
```

PRESS "ESC"

```
# 3            Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3       Preempt Options
                    Lock input ON
            Override Auto Flash OFF
   Override higher # preempt OFF
                 Flash in dwell OFF
              Link to preempt # 0
```

PRESS "ESC"

```
# 3            Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3 Preempt Times+     --- Exit --
                       Ped Clr     0
  Extend Dwell    0        Yel   0.0
   Return Max     0        Red   0.0
```

PRESS "ESC"

```
# 3            Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3            -- Preempt Overlaps+ --
      Track      0  0  0  0  0  0  0  0
     (more)      0  0  0  0
    DwellCyc     0  0  0  0  0  0  0  0
     (more)      0  0  0  0
```

PRESS "ESC"

```
# 3            Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3       Preempt Options +
Enable ON                        Pattern    0
  Type EMERG    Skip Track if Overide OFF
Output DELAY            Coord+Preempt  OFF
                        Volt Mon Flash  OFF
Lnk Aft Dwel OFF        Return Max/Min  MAX
```

PRESS "ESC"

```
# 3            Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3 AdvTimes
enterYellowChange25.5
enterRedClear     25.5
trackYellowChange25.5
trackRedClear     25.5
All Red B4 Dwell    OFF
```

PRESS "ESC"

```
# 3            Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3        --    Initial Dwell    --
Phases      0  0  0  0
Peds        0  0  0  0
Overlaps    0  0  0  0  0  0  0  0
  (more)    0  0  0  0  0  0  0  0
```

PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T1
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signals Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 Guilford County Greensboro

PLAN DATE:	April 2012	REVIEWED BY:	T.Jay
PREPARED BY:	C. Strickland	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE DATE 5/4/12

SIG. INVENTORY NO. 07-0621T1

30-APR-2012 08:16
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castrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 65

PHASING DIAGRAM

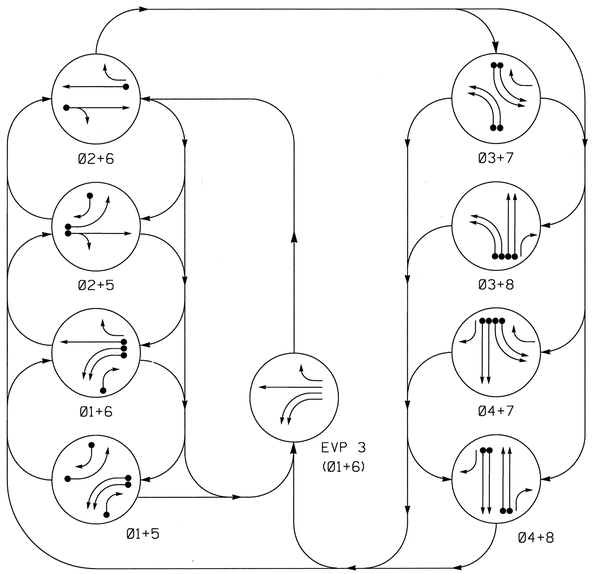
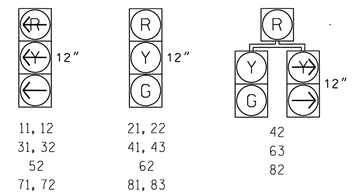


TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	EVP3	FLASH
11, 12	←	←	R	R	R	R	R	R	←	R
21, 22	R	R	G	G	R	R	R	R	R	Y
31, 32	R	R	R	R	←	←	R	R	R	R
41, 43	R	R	R	R	R	R	G	G	R	R
42	R/→	R	R/→	R	R	R	G	G	R	R
52	←	R	←	R	R	R	R	R	R	R
62	R	G	R	G	R	R	R	R	G	Y
63	R	G	R	G	R/→	R	R/→	R	G	Y
71, 72	R	R	R	R	←	R	←	R	R	R
81, 83	R	R	R	R	R	G	R	G	R	R
82	R/→	R/→	R	R	R	G	R	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A ✳	6X40	0	✳	X	1	-	-	-	X	X	-	-	✳
1B ✳	6X40	0	✳	X	1	-	-	-	X	X	-	-	✳
1C ✳	6X40	0	✳	X	1	-	15	-	X	X	-	-	✳
2A ✳	6X6	300	✳	X	2	-	-	1.6	X	X	-	-	✳
2B ✳	6X6	90	✳	X	2	-	-	-	X	X	-	-	✳
3A ✳	6X40	0	✳	X	3	-	-	-	X	X	-	-	✳
3B ✳	6X40	0	✳	X	3	-	-	-	X	X	-	-	✳
4A ✳	6X40	0	✳	X	4	-	-	-	X	X	-	-	✳
4B ✳	6X40	0	✳	X	4	-	-	-	X	X	-	-	✳
5A ✳	6X40	0	✳	X	5	-	-	-	X	X	-	-	✳
5B ✳	6X40	0	✳	X	5	-	15	-	X	X	-	-	✳
6A ✳	6X6	300	✳	X	6	-	-	1.6	X	X	-	-	✳
6B ✳	6X6	90	✳	X	6	-	-	-	X	X	-	-	✳
7A ✳	6X40	0	✳	X	7	-	-	-	X	X	-	-	✳
7B ✳	6X40	0	✳	X	7	-	-	-	X	X	-	-	✳
8A ✳	6X40	0	✳	X	8	-	-	-	X	X	-	-	✳
8B ✳	6X40	0	✳	X	8	-	-	-	X	X	-	-	✳

✳ Video Detection Area

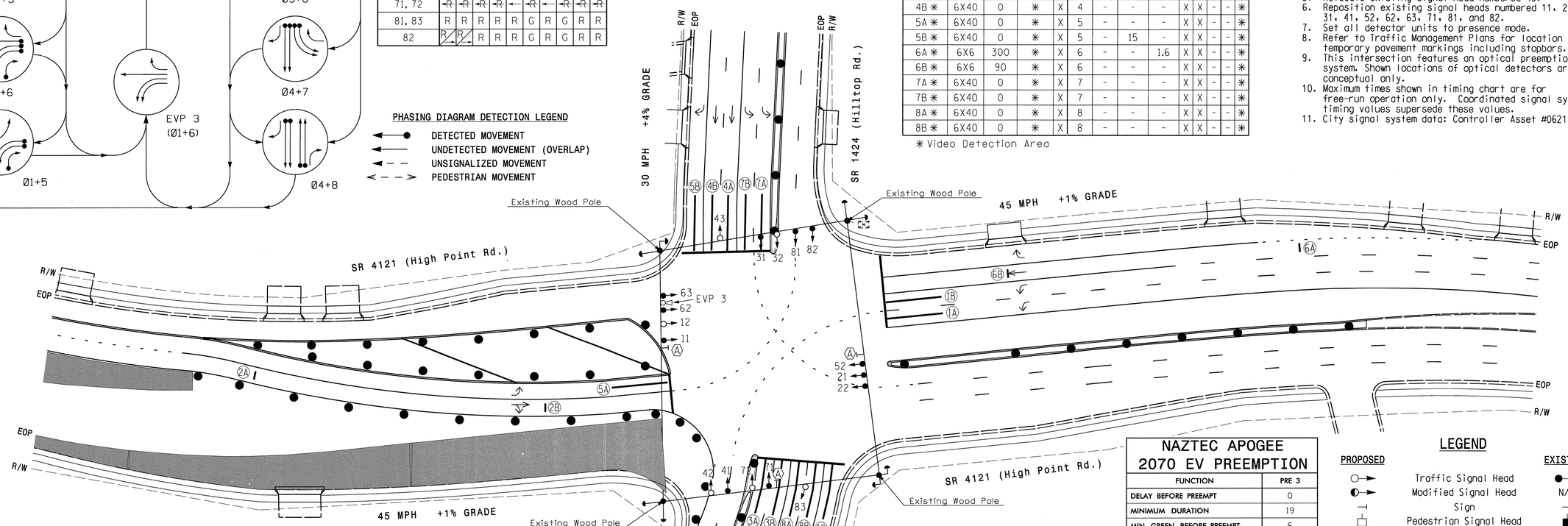
8 Phase Fully Actuated (Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Relocate existing signal head numbered 43.
6. Reposition existing signal heads numbered 11, 21, 22, 31, 41, 52, 62, 63, 71, 81, and 82.
7. Set all detector units to presence mode.
8. Refer to Traffic Management Plans for location of temporary pavement markings including stopbars.
9. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. City signal system data: Controller Asset #0621.

PHASING DIAGRAM DETECTION LEGEND

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



NAZTEC APOGEE 2070 EV PREEMPTION

FUNCTION	PRE 3
DELAY BEFORE PREEMPT	0
MINIMUM DURATION	19
MIN GREEN BEFORE PREEMPT	6
MIN WALK BEFORE PREEMPT	0
PED CLEAR BEFORE PREEMPT	0
TRACK CLEARANCE GREEN	0
MINIMUM DWELL	6
EXIT PED CLEAR	0
EXIT YELLOW CHANGE	0.0
EXIT RED CLEAR	0.0
ENTER YELLOW CHANGE	25.5
ENTER RED CLEAR	25.5
TRACK YELLOW CHANGE	25.5
TRACK RED CLEAR	25.5
ALL-RED Ø4 DWELL	OFF
LOCK INPUT	ON
OVERRIDE HIGHER Ø PREEMPT	OFF
EXIT PREEMPT TO	Ø2+6

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Out of Pavement Detector	
	Directional Arrow	
	Construction Zone Drums	N/A
	Video Detection Area	N/A
N/A	Guardrail	
	Construction Zone	N/A
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Gap, Extension *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Maximum Green 1 *	20	90	20	25	20	90	20	25
Maximum Green 2 *	20	90	20	25	20	90	20	25
Yellow Clear	3.0	4.4	3.0	3.3	3.0	4.4	3.0	3.5
Red Clear	3.7	2.1	3.9	2.5	3.6	2.2	3.8	3.2
Walk *	-	-	-	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-	-	-	-
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	NO	YES	NO	NO
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.

Stantec
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www.stantec.com
License No. F-0672

SIGNAL UPGRADE - TEMPORARY DESIGN #2 (TMP PHASE II)

Prepared for the Offices of: Transportation Mobility and Safety Division, Signal Design Section, Department of Transportation, State of North Carolina

750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.) at SR 1424 (Hilltop Rd.) / SR 1129 (Groometown Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON

PREPARED BY: K. WIESKAMP REVIEWED BY:

SCALE 1" = 40' (0 – 40)

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE DATE 4/26/12

SIG. INVENTORY NO. 07-0621 T2

5/5/2012
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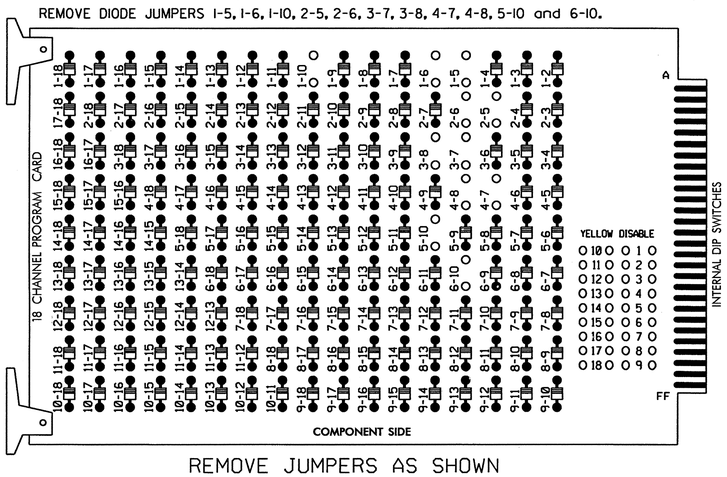
Dlaton

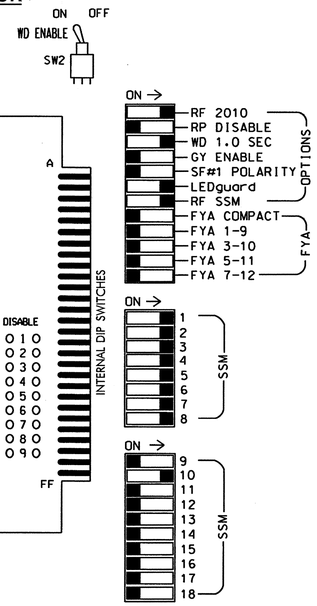
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.66

EDI MODEL 2018ECLip-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. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10, S11,AUX S2
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP B.....1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7		8	16	9	10	17	11	12	18
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	21,22	NU	31,32	41, 42,43	NU	42	52	62,63	NU	63	71,72	81, 82,83	NU	NU	82	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								
YELLOW ARROW	126			117			132	132			123	123				A125				
GREEN ARROW	127			118			133	133			124	124				A126				

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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE3 * Opticom 2 On Card NOT USED	SLOT EMPTY	SLOT EMPTY
	L														

EX.: 1A, 2A, ETC. = LOOP NO.'S
*See Opticom Field Wire Detail below.

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

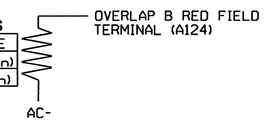
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

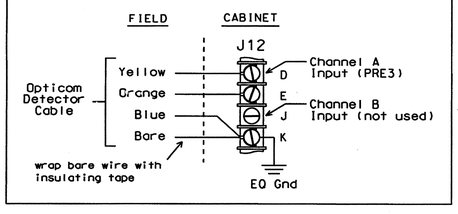
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

TYPICAL OPTICOM FIELD WIRE DETAIL

(input file, rear view)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T2
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 2 - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: April 2012 REVIEWED BY: T. Jym
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
George C. Brown 5/4/12
SIGNATURE DATE
SIG. INVENTORY NO. 07-0621T2

30-APR-2012 09:28
S:##TSGS\##TS Signals##Workgroups##Sig Man##Strickland##07062I_smu_ele_xxx.dgn
cas#Strickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.67

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER
AND THEN "5" OVERLAPS

```
Overlaps
[1.General Parms]
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
  Confl Lock Enable OFF
    Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
[2.Program]
3.Status
```

```
Enter Overlap #  2

  then press Enter
```

```
Overlap B-2
[1.Program Parms]
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Included Ps    1  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
[2.Confl Prog+]
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
[3.Program Parms+]
```

```
 Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T2
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 2 - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: April 2012	REVIEWED BY: T. Ugly		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS		INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE | DATE 5/4/12

SIG. INVENTORY NO. 07-0621T2

30-APR-2012 09:29
S:*MTS&SG*ITS Signals*workgroups*Sig Mom*Strickland*07T0621_smlele_xxx.dgn
cds*Strickland

EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL FOR 'PRE3'

(program controller as shown below)

FROM MAIN MENU PRESS "3" PREEMPTS
ENTER PREEMPT #3

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3  Times    :   Begin     :    Other
  Delay     0   MinGrn    6   Track Grn    0
MinDurg    19   MinWlk    0   Min Dwell    6
MaxPres     0   PedClr    0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3              ---- Preempt Phases ----
Track Veh        0  0  0  0
DwellCyc Veh     1  6  0  0  0  0  0  0
DwellCyc(more)   0  0  0  0
DwellCyc (Ped)   0  0  0  0  0  0  0  0
Exit             2  6  0  0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3        Preempt Options
                      Lock input ON
          Override Auto Flash OFF
Override higher # preempt OFF
                 Flash in dwell OFF
            Link to preempt # 0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3 Preempt Times+     --- Exit --
                       Ped Clr    0
  Extend Dwell    0        Yel  0.0
   Return Max     0        Red  0.0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3              -- Preempt Overlaps+ --
      Track        0  0  0  0  0  0  0  0
     (more)        0  0  0  0
    DwellCyc       0  0  0  0  0  0  0  0
     (more)        0  0  0  0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3        Preempt Options +
Enable ON                    Pattern    0
  Type EMERG    Skip Track if Overide OFF
Output DELAY             Coord+Preempt  OFF
                        Volt Mon Flash  OFF
Lnk Aft Dwel OFF        Return Max/Min  MAX
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3 AdvTimes
enterYellowChange25.5
enterRedClear     25.5
trackYellowChange25.5
trackRedClear     25.5
All Red B4 Dwell    OFF
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3        --   Initial Dwell   --
Phases     0  0  0  0
Peds       0  0  0  0
Overlaps   0  0  0  0  0  0  0  0
  (more)   0  0  0  0  0  0  0  0
```

PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T2
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 2 - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: April 2012 | REVIEWED BY: T. Vgn
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/4/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-0621T2

03-MAY-2012 12:03
S:\TrafficEng\TS\Signals\WorkGroups\Sig Mans\Strickland\07062I_smu_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 69

PHASING DIAGRAM

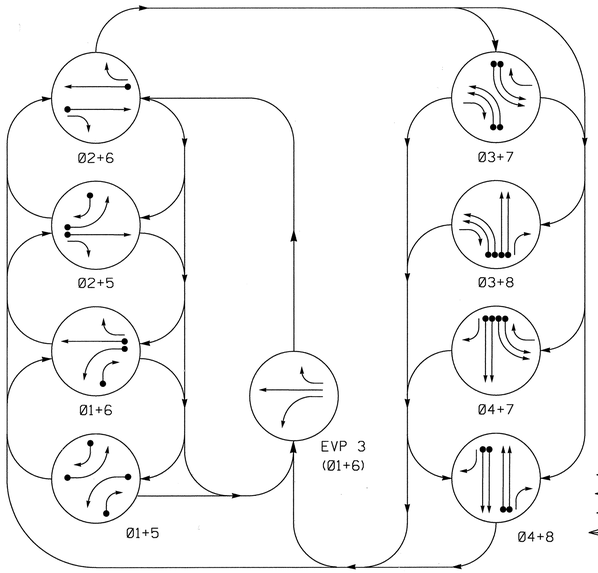
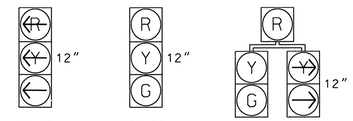


TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	EVP3	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~
22	R	R	G	G	R	R	R	R	R	Y
23	R	R	G	G	R→	R→	R	R	R	Y
31, 32	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~R~~	~~R~~	~~R~~	~~R~~
41, 43	R	R	R	R	R	R	G	G	R	R
42	R	R	R	R	R	R	G	G	R	R
52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
62	R	G	R	G	R	R	R	R	G	Y
63	R	G	R	G	R→	R	R→	R	G	Y
71, 72	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	←	~~R~~	~~R~~	~~R~~
81, 83	R	R	R	R	R	G	R	G	R	R
82	R	R	R	R	R	G	R	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A✳	6X40	0	✳	X	1	-	3	-	X	X	-	-	✳
1B✳	6X40	0	✳	X	1	-	15	-	X	X	-	-	✳
2A✳	6X6	300	✳	X	2	-	-	1.6	X	X	-	-	✳
2B✳	6X6	90	✳	X	2	-	-	-	X	X	-	-	✳
3A✳	6X40	0	✳	X	3	-	-	-	X	X	-	-	✳
3B✳	6X40	0	✳	X	3	-	-	-	X	X	-	-	✳
4A✳	6X40	0	✳	X	4	-	-	-	X	X	-	-	✳
4B✳	6X40	0	✳	X	4	-	-	-	X	X	-	-	✳
5A✳	6X40	0	✳	X	5	-	3	-	X	X	-	-	✳
5B✳	6X40	0	✳	X	5	-	15	-	X	X	-	-	✳
6A✳	6X6	300	✳	X	6	-	-	1.6	X	X	-	-	✳
6B✳	6X6	90	✳	X	6	-	-	-	X	X	-	-	✳
7A✳	6X40	0	✳	X	7	-	-	-	X	X	-	-	✳
7B✳	6X40	0	✳	X	7	-	-	-	X	X	-	-	✳
8A✳	6X40	0	✳	X	8	-	-	-	X	X	-	-	✳
8B✳	6X40	0	✳	X	8	-	-	-	X	X	-	-	✳

✳ Video Detection Area

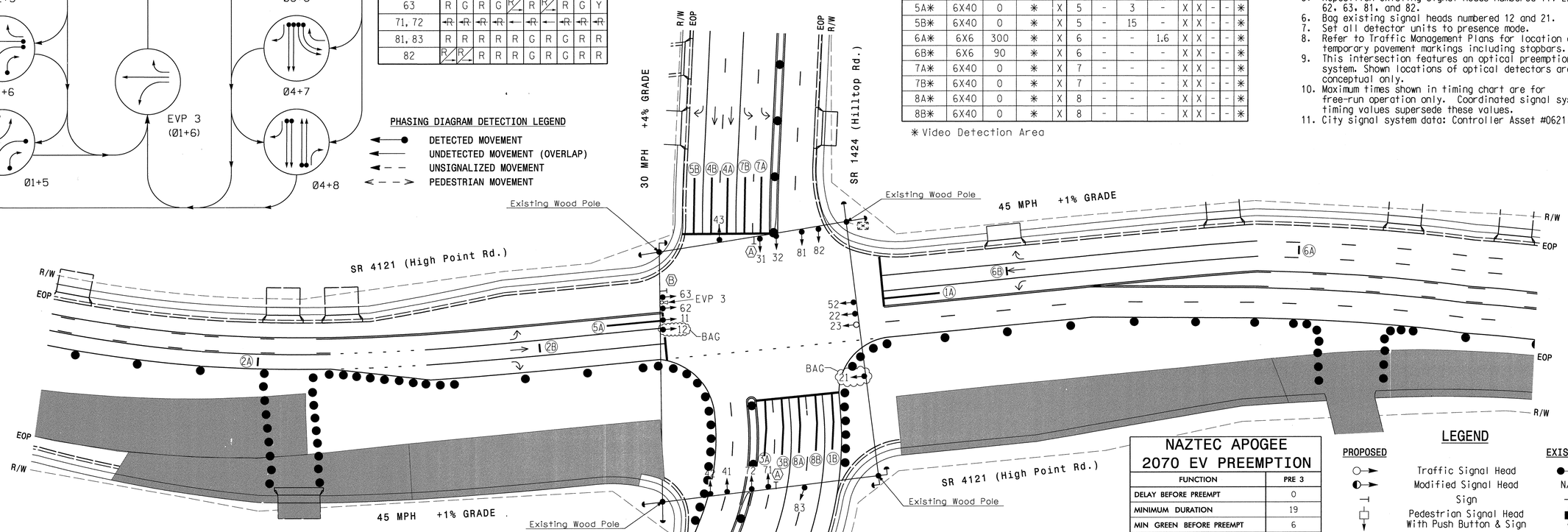
8 Phase Fully Actuated (Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Reposition existing signal heads numbered 11, 22, 52, 62, 63, 81, and 82.
6. Bag existing signal heads numbered 12 and 21.
7. Set all detector units to presence mode.
8. Refer to Traffic Management Plans for location of temporary pavement markings including stopbars.
9. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. City signal system data: Controller Asset #0621.

PHASING DIAGRAM DETECTION LEGEND

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



NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Gap, Extension *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Maximum Green 1 *	20	90	20	25	20	90	20	25
Maximum Green 2 *	20	90	20	25	20	90	20	25
Yellow Clear	3.0	4.4	3.0	3.3	3.0	4.4	3.0	3.5
Red Clear	3.7	1.9	3.3	2.0	3.2	2.2	3.3	2.2
Walk *	-	-	-	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-	-	-	-
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	NO	YES	NO	NO
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.

NAZTEC APOGEE 2070 EV PREEMPTION

FUNCTION	PRE 3
DELAY BEFORE PREEMPT	0
MINIMUM DURATION	19
MIN GREEN BEFORE PREEMPT	6
MIN WALK BEFORE PREEMPT	0
PED CLEAR BEFORE PREEMPT	0
TRACK CLEARANCE GREEN	0
MINIMUM DWELL	6
EXIT PED CLEAR	0
EXIT YELLOW CHANGE	0.0
EXIT RED CLEAR	0.0
ENTER YELLOW CHANGE	25.5
ENTER RED CLEAR	25.5
TRACK YELLOW CHANGE	25.5
TRACK RED CLEAR	25.5
ALL-RED Ø4 DWELL	OFF
LOCK INPUT	ON
OVERRIDE HIGHER Ø PREEMPT	OFF
EXIT PREEMPT TO	Ø2+6

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Out of Pavement Detector	
	Directional Arrow	
	Construction Zone Drums	N/A
	Video Detection Area	N/A
N/A	Guardrail	
	Construction Zone	N/A
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ

SIGNAL UPGRADE -TEMPORARY DESIGN #3 (TMP PHASE III)

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

Prepared for the Offices of: Transportation Mobility and Safety Division, Traffic Engineering Branch, Signal Design Section, NC Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 — 1" = 40'

SR 4121 (High Point Rd.) at SR 1424 (Hilltop Rd.) / SR 1129 (Groometown Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON

PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE DATE 4/26/12

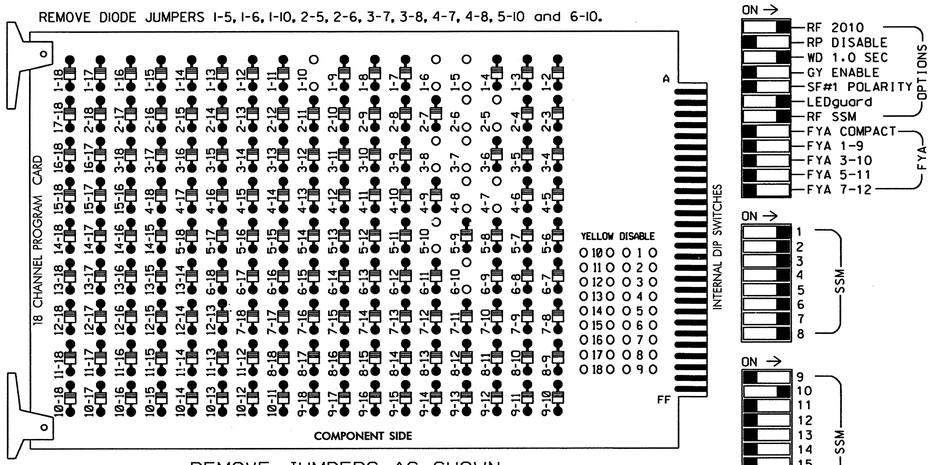
SIG. INVENTORY NO. 07-0621T3

5/5/2012
J:\171001287\transportation\design\Traffic\Signals\SigPlans\171001287_sig_dsn_11_07-0621_T3.dgn
BLWATSON

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.7O

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

NOTES:

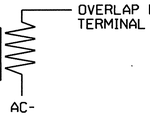
1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

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



NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4	14	5		6	15	7		8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3		4	4 PED	5		6	6 PED	7		8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	22,23	NU	23	31,32	41, 42,43	NU	42	52	62,63	NU	63	71,72	81, 82,83	NU	NU	82	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								
YELLOW ARROW	126			117	117			132	132			123	123				A125				
GREEN ARROW	127			118	118			133	133			124	124				A126				

NU = Not Used

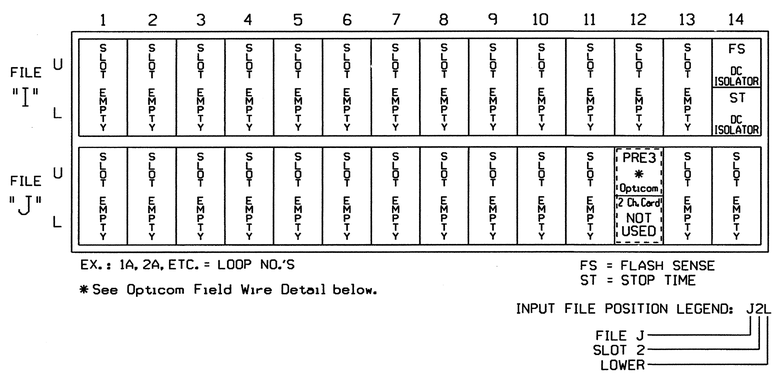
* Denotes install load resistor. See load resistor installation detail this sheet.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8, S10,S11,AUX S2
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP B.....1

INPUT FILE POSITION LAYOUT

(front view)



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

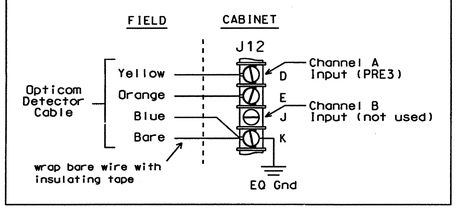
FS = FLASH SENSE
ST = STOP TIME

* See Opticom Field Wire Detail below.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

TYPICAL OPTICOM FIELD WIRE DETAIL

(input file, rear view)



SPECIAL DETECTOR NOTE

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

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. The cabinet and controller are part of the City of Greensboro Signal System.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T3
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 3 - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR4121 (High Point Rd.) at SR 1424 (Hilltop Rd.)/ SR 1129 (Groometown Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: April 2012 REVIEWED BY: T. Jap
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
George C. Brown 5/4/12
SIGNATURE DATE
SIG. INVENTORY NO. 07-0621T3

30-APR-2012 10:19
S:*ITSASU*ITS Signals\Workgroups\Sig Man\Strickland\07062T_sm_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.71

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER
AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
  Confl Lock Enable OFF
     Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  2
  then press Enter
```

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Included Ps    1  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T3
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 3 - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
Traffic Engineering Branch
Signals Management Section
DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA

750 N.Greenfield Pkwy,Garner,NC 27529

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: April 2012 | REVIEWED BY: T.V.B.
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/4/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-0621T3

30-APR-2012 10:20
S:#TTSASU#TS Signals#Workgroups#Sig Mana#cstrickland#070621_smu#e_xxx.dgn
cstrickland

EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL FOR 'PRE3'

(program controller as shown below)

FROM MAIN MENU PRESS "3" PREEMPTS
ENTER PREEMPT #3

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3  Times    :   Begin     :    Other
  Delay     0   MinGrn    6   Track Grn    0
MinDura    19   MinWlk    0   Min Dwell    6
MaxPres     0   PedClr    0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3              ---- Preempt Phases ----
Track Veh        0  0  0  0
DwellCyc Veh     1  6  0  0  0  0  0  0
DwellCyc(more)   0  0  0  0
DwellCyc (Ped)   0  0  0  0  0  0  0  0
Exit             2  6  0  0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3       Preempt Options
                      Lock input ON
            Override Auto Flash OFF
     Override higher # preempt OFF
                 Flash in dwell OFF
           Link to preempt # 0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3 Preempt Times+     --- Exit --
                       Ped Clr    0
  Extend Dwell    0        Yel  0.0
   Return Max     0        Red  0.0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3              -- Preempt Overlaps+ --
      Track      0  0  0  0  0  0  0  0
     (more)      0  0  0  0
   DwellCyc      0  0  0  0  0  0  0  0
     (more)      0  0  0  0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3       Preempt Options +
Enable ON                    Pattern    0
  Type EMERG    Skip Track if Overide OFF
Output DELAY          Coord+Preempt  OFF
                     Volt Mon Flash  OFF
Lnk Aft Dwel OFF     Return Max/Min  MAX
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3 AdvTimes
enterYellowChange25.5
enterRedClear     25.5
trackYellowChange25.5
trackRedClear     25.5
All Red B4 Dwell    OFF
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3        --   Initial Dwell   --
Phases     0  0  0  0
Peds       0  0  0  0
Overlaps   0  0  0  0  0  0  0  0
  (more)   0  0  0  0  0  0  0  0
```

PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T3
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 3 - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: April 2012 | REVIEWED BY: T. Jay
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/4/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-0621T3

03-MAY-2012 12:07
S:\TSAS\MITS\Signals\Workgroups\Sig Mon\Strickland\07621_sm_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 73

PHASING DIAGRAM

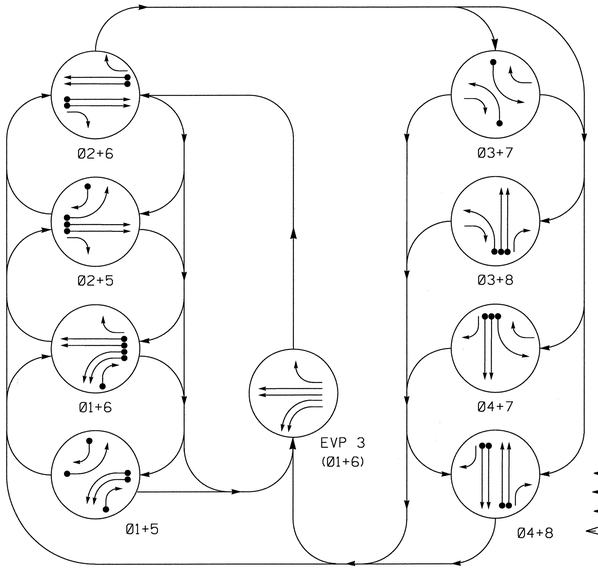
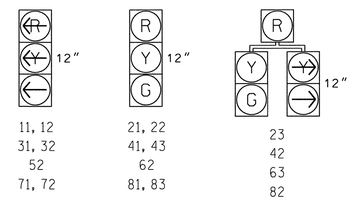


TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	EVP3	FLASH
11, 12	←	←	↓R	↓R	↓R	↓R	↓R	↓R	←	↓R
21, 22	R	R	G	G	R	R	R	R	R	Y
23	R	R	G	G	R↘	R↘	R	R	R	Y
32	↓R	↓R	↓R	↓R	←	←	↓R	↓R	↓R	↓R
41, 43	R	R	R	R	R	R	G	G	R	R
42	R↘	R	R↘	R	R	R	G	G	R	R
52	←	↓R	←	↓R	↓R	↓R	↓R	↓R	↓R	↓R
62	R	G	R	G	R	R	R	R	G	Y
63	R	G	R	G	R↘	R	R↘	R	G	Y
72	↓R	↓R	↓R	↓R	←	↓R	←	↓R	↓R	↓R
81, 83	R	R	R	R	R	G	R	G	R	R
82	R↘	R↘	R	R	R	G	R	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	-	-	-	X	X	-	-	X
1B	6X40	0	2-4-2	X	1	-	-	-	X	X	-	-	X
1C	6X40	0	2-4-2	X	1	-	15	-	X	X	-	-	X
2B	6X6	300	6	X	2	-	-	-	X	X	X	-	X
2C	6X6	300	6	X	2	-	-	-	X	X	X	-	X
3A✳	6X40	0	2-4-2	X	3	-	-	-	X	X	-	-	X
3B	6X40	0	2-4-2	X	3	-	-	-	X	X	-	-	X
4A	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
4B	6X40	0	2-4-2	X	4	-	-	-	X	X	-	-	X
5A✳	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	X
5B	6X40	0	2-4-2	X	5	-	-	-	X	X	-	-	X
5C	6X40	0	2-4-2	X	5	-	15	-	X	X	-	-	X
6A✳	6X6	300	4	X	6	-	-	-	X	X	X	-	X
6B	6X6	300	4	X	6	-	-	-	X	X	X	-	X
6C	6X6	300	4	X	6	-	-	-	X	X	X	-	X
7A✳	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	X
7B	6X40	0	2-4-2	X	7	-	-	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X
8B	6X40	0	2-4-2	X	8	-	-	-	X	X	-	-	X

✳ Loops 3A, 5A, 6A, and 7A may be installed during this construction phase, but will not be operational until the final design.

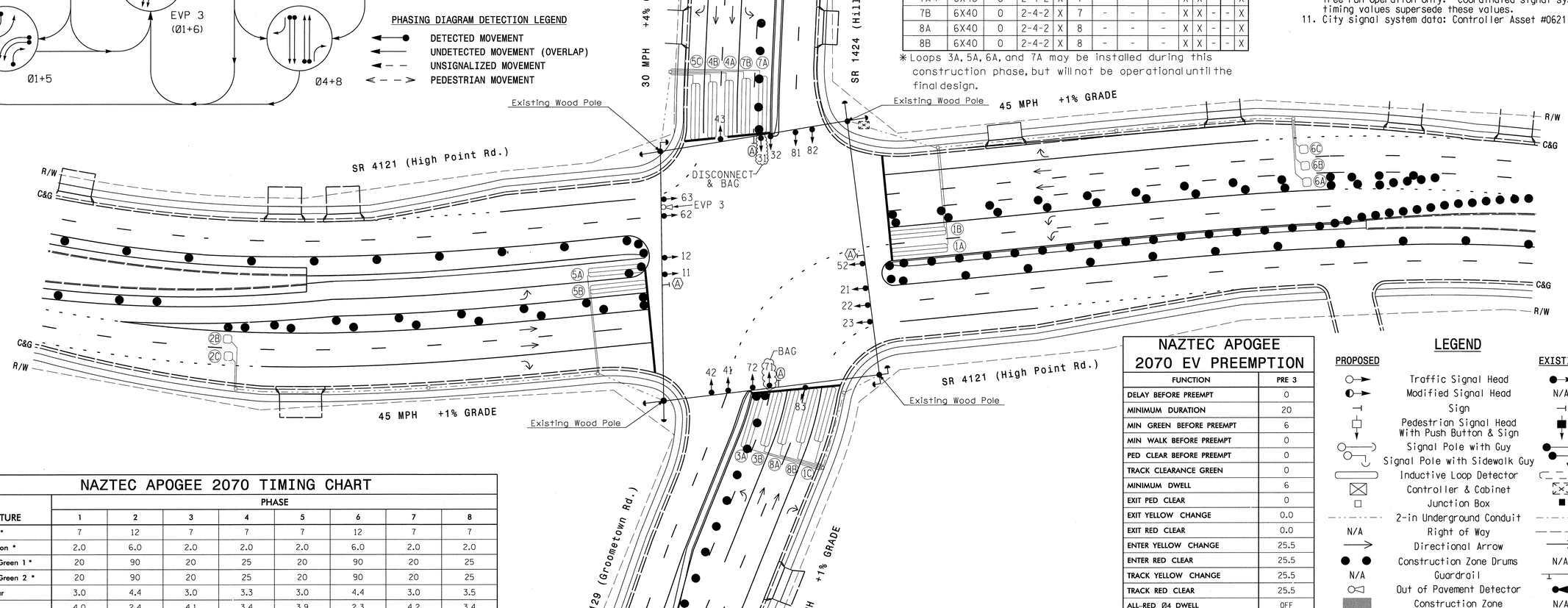
8 Phase Fully Actuated (Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Reposition existing signal heads numbered 11, 12, 22, 23, 32, 52, 62, 63, 81, and 82.
6. Bag existing signal heads numbered 21, 31, and 71.
7. Set all detector units to presence mode.
8. Refer to Traffic Management Plans for location of temporary pavement markings including stopbars.
9. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. City signal system data: Controller Asset #0621.

PHASING DIAGRAM DETECTION LEGEND

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



NAZTEC APOGEE 2070 EV PREEMPTION

FUNCTION	PRE 3
DELAY BEFORE PREEMPT	0
MINIMUM DURATION	20
MIN GREEN BEFORE PREEMPT	6
MIN WALK BEFORE PREEMPT	0
PED CLEAR BEFORE PREEMPT	0
TRACK CLEARANCE GREEN	0
MINIMUM DWELL	6
EXIT PED CLEAR	0
EXIT YELLOW CHANGE	0.0
EXIT RED CLEAR	0.0
ENTER YELLOW CHANGE	25.5
ENTER RED CLEAR	25.5
TRACK YELLOW CHANGE	25.5
TRACK RED CLEAR	25.5
ALL-RED Ø4 DWELL	OFF
LOCK INPUT	ON
OVERRIDE HIGHER Ø PREEMPT	OFF
EXIT PREEMPT TO	Ø2+6

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone Drums	N/A
N/A	Guardrail	
	Out of Pavement Detector	
	Construction Zone	N/A
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Gap, Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Maximum Green 1 *	20	90	20	25	20	90	20	25
Maximum Green 2 *	20	90	20	25	20	90	20	25
Yellow Clear	3.0	4.4	3.0	3.3	3.0	4.4	3.0	3.5
Red Clear	4.0	2.4	4.1	3.4	3.9	2.3	4.2	3.4
Walk *	-	-	-	-	-	-	-	-
Pedestrian Clear	-	-	-	-	-	-	-	-
Added Initial *	-	1.5	-	-	-	1.0	-	-
Maximum Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	NO	YES	NO	NO
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.

Stantec
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801 Jones Franklin Road
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Raleigh, NC 27606
Tel. (919) 851-6866
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www.stantec.com
License No. F-0672

SIGNAL UPGRADE - TEMPORARY DESIGN #4 (TMP PHASE IV)

Prepared for the Offices of: Transportation Mobility and Safety Division, Signal Design Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.) at SR 1424 (Hilltop Rd.) / SR 1129 (Groometown Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

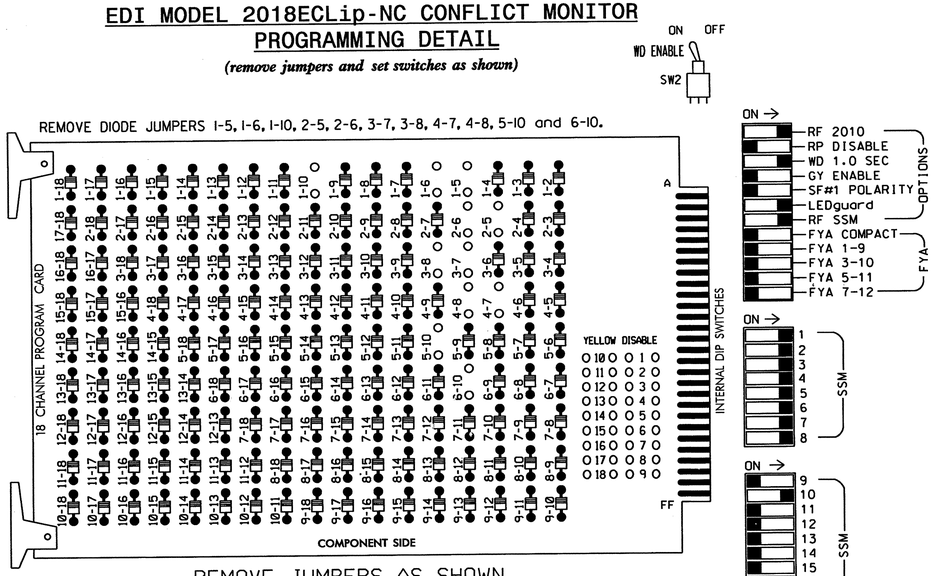
SEAL: NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON
Betsy L Watson 4/26/12
SIGNATURE DATE
SIG. INVENTORY NO. 07-0621T4

5/5/2012
J:\71001287\transportation\design\TrafficSignals\Sighting\71001287_sig_dsn_11_07-0621_T4.dgn
bwatson

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 74

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

NOTES:

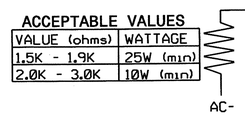
1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

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



NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8, S10,S11,AUX S2
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP B.....1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4	14	5		6	15	7		8	16	9	10	17	11	12	18
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	21, 22,23	NU	23	32	41, 42,43	NU	42	52	62,63	NU	63	72	81, 82,83	NU	NU	82	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								
YELLOW ARROW	126			117	117			132	132			123	123				A125				
GREEN ARROW	127			118	118			133	133			124	124				A126				

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	Ø1 1C	NOT USED	Ø2 2C	SLOT EMPTY	NOT USED	Ø4 4A	SLOT EMPTY	SLOT EMPTY	Ø1 1A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS OC ISOLATOR
	L	NOT USED	Ø2 2B	NOT USED		Ø3 3B	Ø4 4B			Ø1 1B					ST OC ISOLATOR
FILE "J"	U	Ø5 5C	NOT USED	Ø6 6C	SLOT EMPTY	NOT USED	Ø8 8A	SLOT EMPTY	SLOT EMPTY	NOT USED	SLOT EMPTY	SLOT EMPTY	PRE3 * Opticom 2 Ch. Card	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø6 6B	NOT USED		Ø7 7B	Ø8 8B			Ø5 5B			NOT USED		

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

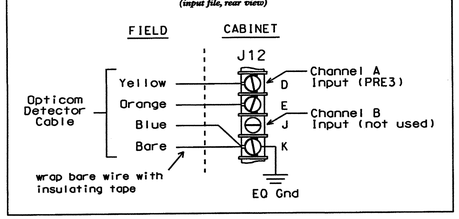
FS = FLASH SENSE
ST = STOP TIME

*See Opticom Field Wire Detail below.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

TYPICAL OPTICOM FIELD WIRE DETAIL

(input file, rear view)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB6-9,10	I9U	60	13	1				X	X	
1B	TB6-11,12	I9L	62	14	1				X	X	
1C	TB2-1,2	I1U	56	1	1		15		X	X	
2B	TB2-7,8	I2L	43	3	2				X	X	X
2C	TB2-9,10	I3U	63	4	2				X	X	X
3B	TB4-7,8	I5L	58	7	3				X	X	
4A	TB4-9,10	I6U	41	8	4				X	X	
4B	TB4-11,12	I6L	45	9	4				X	X	
5B	TB7-11,12	J9L	61	28	5				X	X	
5C	TB3-1,2	J1U	55	15	5		15		X	X	
6B	TB3-7,8	J2L	44	17	6				X	X	X
6C	TB3-9,10	J3U	64	18	6				X	X	X
7B	TB5-7,8	J5L	57	21	7				X	X	
8A	TB5-9,10	J6U	42	22	8				X	X	
8B	TB5-11,12	J6L	46	23	8				X	X	

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Green.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. The cabinet and controller are part of the City of Greensboro Signal System.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T4
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 4 - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: April 2012 REVIEWED BY: T. Jym
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE 5/4/12 DATE
SIG. INVENTORY NO. 07-0621T4

30-APR-2012 10:32
S:*TSSGUNITS Signals\Workgroups\Sig Mon\Strickland\07062I.sm_ele.xxx.dgn
gbsmith\strickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.75

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER
AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
  Confl Lock Enable OFF
    Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  2

  then press Enter
```

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Included Ps    1  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T4
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 4 - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: April 2012 REVIEWED BY: T. Vann

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/4/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-0621T4

30-APR-2012 10:33
S:\TSAS\ITS Signals\Workgroups\Sig Mgmt\Strickland\07-0621_sm_ele_xxx.dgn
cestrickland

EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL FOR 'PRE3'

(program controller as shown below)

FROM MAIN MENU PRESS "3" PREEMPTS
ENTER PREEMPT #3

```
# 3              Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3  Times    :   Begin     :    Other
  Delay     0   MinGrn    6   Track Grn    0
MinDura    20   MinWlk    0   Min Dwell    6
MaxPres     0   PedClr    0
```

PRESS "ESC"

```
# 3              Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3              ---- Preempt Phases ----
Track Veh        0  0  0  0
DwellCyc Veh     1  6  0  0  0  0  0  0
DwellCyc(more)   0  0  0  0
DwellCyc (Ped)   0  0  0  0  0  0  0  0
Exit             2  6  0  0
```

PRESS "ESC"

```
# 3              Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3        Preempt Options
                        Lock input ON
              Override Auto Flash OFF
     Override higher # preempt OFF
                  Flash in dwell OFF
             Link to preempt # 0
```

PRESS "ESC"

```
# 3              Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3 Preempt Times+     --- Exit --
                       Ped Clr    0
  Extend Dwell    0       Yel  0.0
   Return Max     0       Red  0.0
```

PRESS "ESC"

```
# 3              Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3              -- Preempt Overlaps+ --
      Track      0  0  0  0  0  0  0  0
     (more)      0  0  0  0
    DwellCyc     0  0  0  0  0  0  0  0
     (more)      0  0  0  0
```

PRESS "ESC"

```
# 3              Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3        Preempt Options +
Enable ON                     Pattern    0
  Type EMERG    Skip Track if Overide OFF
Output DELAY          Coord+Preempt  OFF
                     Volt Mon Flash  OFF
Lnk Aft Dwel OFF     Return Max/Min  MAX
```

PRESS "ESC"

```
# 3              Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3 AdvTimes
enterYellowChange25.5
enterRedClear     25.5
trackYellowChange25.5
trackRedClear     25.5
All Red B4 Dwell    OFF
```

PRESS "ESC"

```
# 3              Preemption
1.Times          4.Times+
2.Phases         5.Overlaps+    8.AdvTimes
3.Options        6.Options+     9.Init'Dwell
```

```
# 3        --   Initial Dwell    --
Phases     0  0  0  0
Peds       0  0  0  0
Overlaps   0  0  0  0  0  0  0  0
  (more)   0  0  0  0  0  0  0  0
```

PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621T4
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Temp 4 - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 Guilford County Greensboro

PLAN DATE: April 2012	REVIEWED BY: T. J.		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS		INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/4/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-0621T4

03-MAY-2012 12:10
S:\TTSSGN\413 Signals\Workgroups\Sig Man\Strickland\07021_smale_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 77

PHASING DIAGRAM

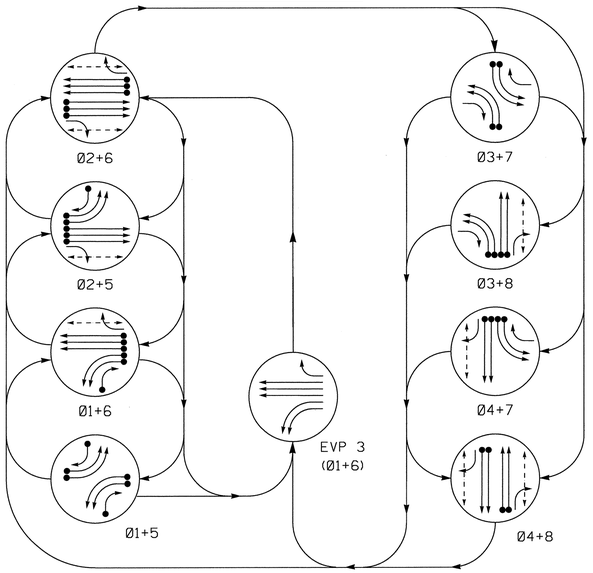


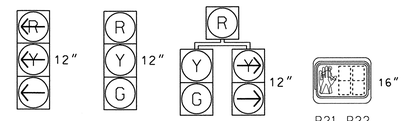
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+07	03+08	04+07	04+08	EVP3	FLASH
11, 12	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~
21, 22	R	R	G	G	R	R	R	R	R	Y
23	R	R	G	G	R/→	R/→	R	R	R	Y
31, 32	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~R~~	~~R~~	~~R~~	~~R~~
41, 43	R	R	R	R	R	R	G	G	R	R
42	R/→	R	R/→	R	R	R	G	G	R	R
51, 52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61, 62	R	G	R	G	R	R	R	R	G	Y
63	R	G	R	G	R/→	R	R/→	R	G	Y
71, 72	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	←	~~R~~	~~R~~	~~R~~
81, 83	R	R	R	R	R	G	R	G	R	R
82	R/→	R/→	R	R	R	G	R	G	R	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DW	DRK

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

SIGNAL FACE I.D.

All Heads L.E.D.



11, 12
31, 32
51, 52
71, 72

21, 22
41, 43
61, 62
81, 83

23
42
63
82

P21, P22
P41, P42
P61, P62
P81, P82

LOOP & DETECTOR UNIT INSTALLATION CHART

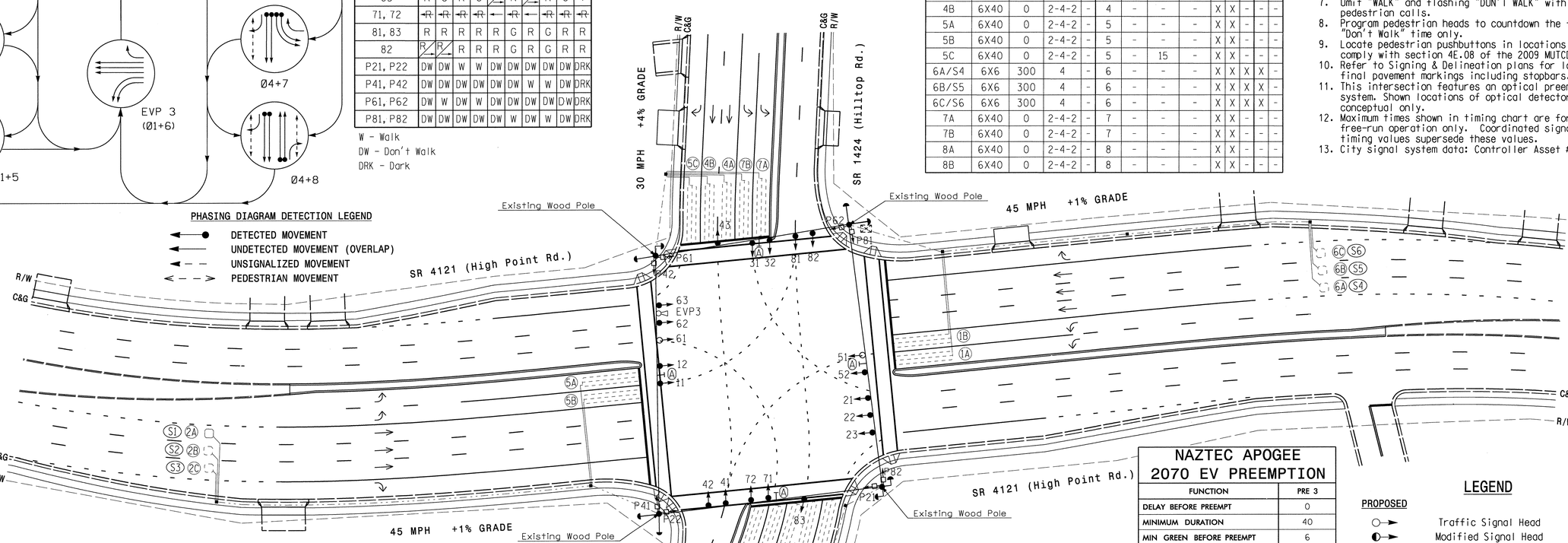
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	-	-	-	X	X	-	-	-
1B	6X40	0	2-4-2	-	1	-	-	-	X	X	-	-	-
1C	6X40	0	2-4-2	-	1	-	15	-	X	X	-	-	-
2A/S1	6X6	300	6	X	2	-	-	-	X	X	X	X	X
2B/S2	6X6	300	6	-	2	-	-	-	X	X	X	X	-
2C/S3	6X6	300	6	-	2	-	-	-	X	X	X	X	-
3A	6X40	0	2-4-2	-	3	-	-	-	X	X	-	-	-
3B	6X40	0	2-4-2	-	3	-	-	-	X	X	-	-	-
4A	6X40	0	2-4-2	-	4	-	-	-	X	X	-	-	-
4B	6X40	0	2-4-2	-	4	-	-	-	X	X	-	-	-
5A	6X40	0	2-4-2	-	5	-	-	-	X	X	-	-	-
5B	6X40	0	2-4-2	-	5	-	-	-	X	X	-	-	-
5C	6X40	0	2-4-2	-	5	-	15	-	X	X	-	-	-
6A/S4	6X6	300	4	-	6	-	-	-	X	X	X	X	-
6B/S5	6X6	300	4	-	6	-	-	-	X	X	X	X	-
6C/S6	6X6	300	4	-	6	-	-	-	X	X	X	X	-
7A	6X40	0	2-4-2	-	7	-	-	-	X	X	-	-	-
7B	6X40	0	2-4-2	-	7	-	-	-	X	X	-	-	-
8A	6X40	0	2-4-2	-	8	-	-	-	X	X	-	-	-
8B	6X40	0	2-4-2	-	8	-	-	-	X	X	-	-	-

8 Phase Fully Actuated (Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Reposition existing signal heads 21, 31, and 71.
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Locate pedestrian pushbuttons in locations that comply with section 4E.08 of the 2009 MUTCD.
10. Refer to Signing & Delineation plans for location of final pavement markings including stopbars.
11. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
13. City signal system data: Controller Asset #0621.



NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Gap, Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Maximum Green 1 *	20	90	20	25	20	90	20	25
Maximum Green 2 *	20	90	20	25	20	90	20	25
Yellow Clear	3.0	4.4	3.0	3.3	3.0	4.4	3.0	3.5
Red Clear	4.3	2.5	4.0	3.5	4.1	2.5	4.1	3.5
Walk *	-	7	-	7	-	7	-	7
Pedestrian Clear	-	30	-	39	-	29	-	37
Added Initial *	-	1.0	-	-	-	1.0	-	-
Maximum Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Lock Calls	NO	YES	NO	NO	NO	YES	NO	NO
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.

NAZTEC APOGEE 2070 EV PREEMPTION

FUNCTION	PRE 3
DELAY BEFORE PREEMPT	0
MINIMUM DURATION	40
MIN GREEN BEFORE PREEMPT	6
MIN WALK BEFORE PREEMPT	4
PED CLEAR BEFORE PREEMPT	20
TRACK CLEARANCE GREEN	0
MINIMUM DWELL	6
EXIT PED CLEAR	0
EXIT YELLOW CHANGE	0.0
EXIT RED CLEAR	0.0
ENTER YELLOW CHANGE	25.5
ENTER RED CLEAR	25.5
TRACK YELLOW CHANGE	25.5
TRACK RED CLEAR	25.5
ALL-RED Ø4 DWELL	OFF
LOCK INPUT	ON
OVERRIDE HIGHER Ø PREEMPT	OFF
EXIT PREEMPT TO	Ø2+6

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
	Out of Pavement Detector	
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	

SIGNAL UPGRADE - FINAL DESIGN

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

Prepared For the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 1" = 40' (0 – 40)

SR 4121 (High Point Rd.) at SR 1424 (Hilltop Rd.) / SR 1129 (Groometown Rd.)

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: K. WIESKAMP REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE Betsy L. Watson DATE 4/26/12

SIG. INVENTORY NO. 07-0621

5/5/2012
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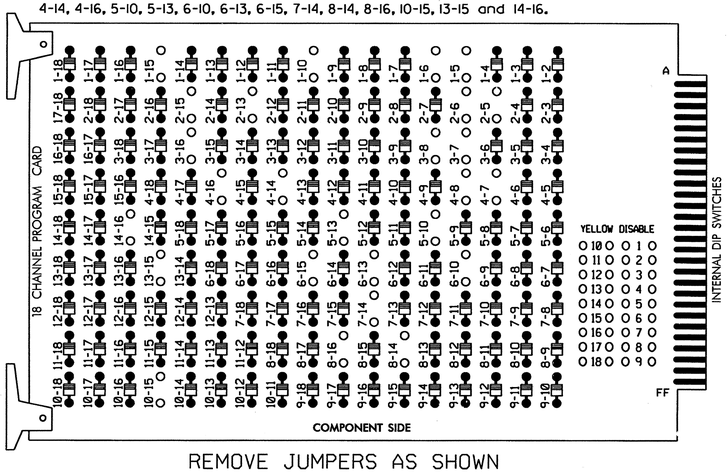
Dylan

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.78

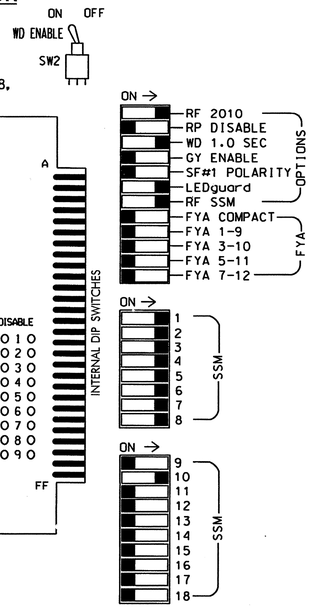
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-10, 1-15, 2-5, 2-6, 2-13, 2-15, 3-7, 3-8, 3-16, 4-7, 4-8, 4-14, 4-16, 5-10, 5-13, 6-10, 6-13, 6-15, 7-14, 8-14, 8-16, 10-15, 13-15 and 14-16.



REMOVE JUMPERS AS SHOWN



NOTES:

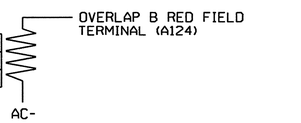
1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

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



NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7, S8,S9,S10,S11,S12,AUX S2
PHASES USED.....1,2,2 PED,3,4,4 PED,5,6, 6 PED,7,8,8 PED
OVERLAP B.....1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4	14	5		6	15	7		8	16	9	10	17	11	12	18
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	21, 22,23	P21, P22	23	31,32	41, 42,43	P41, P42	42	51,52	61, 62,63	P61, P62	63	71,72	81, 82,83	P81, P82	NU	82	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								
YELLOW ARROW	126			117	117			132	132			123	123				A125				
GREEN ARROW	127			118	118			133	133			124	124				A126				
✋			113				104				119				110						
🚶			115				106				121				112						

NU = Not Used

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

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-MODE 5. This initialization should be done prior to programming controller.
3. Program phases 2 and 6 for Start Up In Walk.
4. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
5. Ensure "Local Flash Start" feature is set to "ON".
6. The cabinet and controller are part of the City of Greensboro Signal System.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1	Ø2/SYS	Ø2/SYS	SLOT	Ø 3	Ø 4	SLOT	SLOT	Ø 1	SLOT	SLOT	Ø2 PED	Ø6 PED	FS
		1C	2A/S1	2C/S3		3A	4A			1A			DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
	L	NOT USED	Ø2/SYS	NOT USED	EMPTY	Ø 3	Ø 4	EMPTY	EMPTY	Ø 1	EMPTY	EMPTY	Ø4 PED	Ø8 PED	ST
			2B/S2			3B	4B			1B			DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
FILE "J"	U	Ø 5	Ø6/SYS	Ø6/SYS	SLOT	Ø 7	Ø 8	SLOT	SLOT	Ø 5	SLOT	SLOT	PRE3 * Opticom 2 Ch. Card	SLOT	SLOT
		5C	6A/S4	6C/S6		7A	8A			5A					
	L	NOT USED	Ø6/SYS	NOT USED	EMPTY	Ø 7	Ø 8	EMPTY	EMPTY	Ø 5	EMPTY	EMPTY	NOT USED	EMPTY	EMPTY
			6B/S5			7B	8B			5B					

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

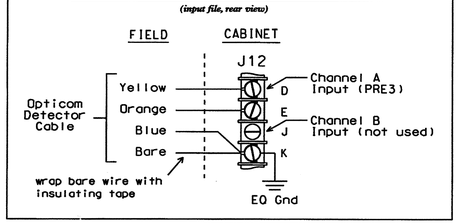
* See Opticom Field Wire Detail below.

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

TYPICAL OPTICOM FIELD WIRE DETAIL

(input file, rear view)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
1A	TB6-9,10	I9U	60	13	1				X	X	
1B	TB6-11,12	I9L	62	14	1				X	X	
1C	TB2-1,2	I1U	56	1	1		15		X	X	
2A/S1	TB2-5,6	I2U	39	2	2/SYS				X	X	X
2B/S2	TB2-7,8	I2L	43	3	2/SYS				X	X	X
2C/S3	TB2-9,10	I3U	63	4	2/SYS				X	X	X
3A	TB4-5,6	I5U	58	7	3				X	X	
3B	TB4-7,8	I5L	58	7	3				X	X	
4A	TB4-9,10	I6U	41	8	4				X	X	
4B	TB4-11,12	I6L	45	9	4				X	X	
5A	TB7-9,10	J9U	59	27	5				X	X	
5B	TB7-11,12	J9L	61	28	5				X	X	
5C	TB3-1,2	J1U	55	15	5		15		X	X	
6A/S4	TB3-5,6	J2U	40	16	6/SYS				X	X	X
6B/S5	TB3-7,8	J2L	44	17	6/SYS				X	X	X
6C/S6	TB3-9,10	J3U	64	18	6/SYS				X	X	X
7A	TB5-5,6	J5U	57	21	7				X	X	
7B	TB5-7,8	J5L	57	21	7				X	X	
8A	TB5-9,10	J6U	42	22	8				X	X	
8B	TB5-11,12	J6L	46	23	8				X	X	
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED						
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED						
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED						
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED						

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Final - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: April 2012 | REVIEWED BY: T.Jgr
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
George C. Brown 5/4/12
SIGNATURE DATE
SIG. INVENTORY NO. 07-0621

30-APR-2012 10:45
S:*ITSASUNITS Signals*Workgroups*Sig Man*Strickland*07062l_smu_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig.79

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS "1" CONTROLLER
AND THEN "5" OVERLAPS

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
General Overlap Parameters
      Lock Inhibit OFF
  Confl Lock Enable OFF
    Parent P Clrncs ON
Extra Included Phases OFF
```

PRESS "ESC"

```
Overlaps
1.General Parms
2.Program
3.Status
```

```
Enter Overlap #  2
  then press Enter
```

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Included Ps    1  0  0  0  0  0  0  0
Modifier Ps    0  0  0  0  0  0  0  0
Type:NORMAL  Grn:  0  Yel: 3.5  Red: 1.5
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2   Ps....................
Confl Ps       0  0  0  0  0  0  0  0
Confl Ovrlps   0  0  0  0  0  0  0  0
Confl Peds     0  0  0  0  0  0  0  0
```

PRESS "ESC"

```
Overlap B-2
1.Program Parms
2.Confl Prog+
3.Program Parms+
```

```
 Ovrlp B-2
LeadGreen  OFF  Transit 0
GreenExtInh     0  0  0  0  0  0  0  0
```

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Final - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
ADMINISTRATION OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signals Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE: April 2012 | REVIEWED BY: T. Vgh
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/4/12
SIGNATURE DATE

SIG. INVENTORY NO. 07-0621

30-APR-2012 10:47
S:#ITS&SU#ITS Signals#workgroups#Sig Mgmt$strickland#07062l_smlelle_xxx.dgn
cbstrickland

EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL FOR 'PRE3'

(program controller as shown below)

FROM MAIN MENU PRESS "3" PREEMPTS
ENTER PREEMPT #3

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3  Times    :   Begin     :     Other
  Delay     0   MinGrn    6   Track Grn    0
MinDura    40   MinWlk    4   Min Dwell    6
MaxPres     0   PedClr   20
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3          ---- Preempt Phases ----
Track Veh      0  0  0  0
DwellCyc Veh   1  6  0  0  0  0  0  0
DwellCyc(more) 0  0  0  0
DwellCyc (Ped) 0  0  0  0  0  0  0  0
Exit           2  6  0  0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3        Preempt Options
                    Lock input ON
          Override Auto Flash OFF
   Override higher # preempt OFF
                 Flash in dwell OFF
             Link to preempt # 0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3 Preempt Times+     --- Exit --
                       Ped Clr    0
  Extend Dwell    0        Yel  0.0
   Return Max     0        Red  0.0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3          -- Preempt Overlaps+ --
      Track     0  0  0  0  0  0  0  0
     (more)     0  0  0  0
    DwellCyc    0  0  0  0  0  0  0  0
     (more)     0  0  0  0
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3      Preempt Options +
Enable ON                    Pattern    0
  Type EMERG    Skip Track if Overide OFF
Output DELAY          Coord+Preempt    OFF
                     Volt Mon Flash    OFF
Lnk Aft Dwel OFF     Return Max/Min    MAX
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3 AdvTimes
enterYellowChange25.5
enterRedClear     25.5
trackYellowChange25.5
trackRedClear     25.5
All Red B4 Dwell    OFF
```

PRESS "ESC"

```
# 3              Preemption
1.Times            4.Times+
2.Phases           5.Overlaps+    8.AdvTimes
3.Options          6.Options+     9.Init'Dwell
```

```
# 3        --   Initial Dwell   --
Phases     0  0  0  0
Peds       0  0  0  0
Overlaps   0  0  0  0  0  0  0  0
  (more)   0  0  0  0  0  0  0  0
```

PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0621
DESIGNED: February 2012
SEALED: 04/26/2012
REVISED: N/A

Electrical Detail - Final - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR4121 (High Point Rd.)
at
SR 1424 (Hilltop Rd.)/
SR 1129 (Groometown Rd.)

Division 7 | Guilford County | Greensboro

PLAN DATE:	April 2012	REVIEWED BY:	T. Lynn
PREPARED BY:	C. Strickland	REVIEWED BY:	

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE | DATE 5/4/12

SIG. INVENTORY NO. 07-0621

03-MAY-2012 12:13
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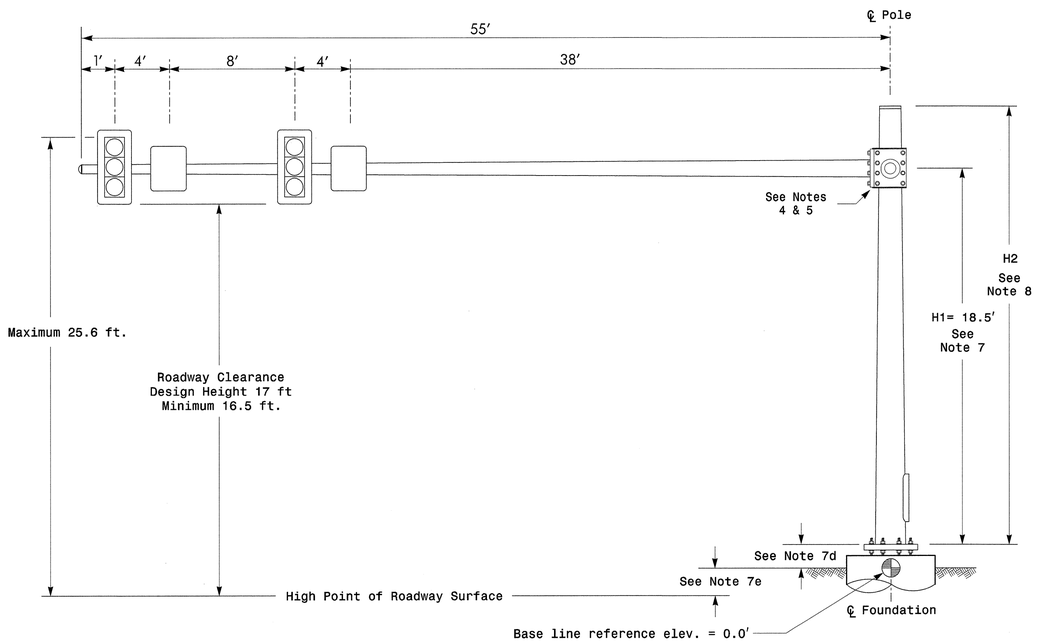
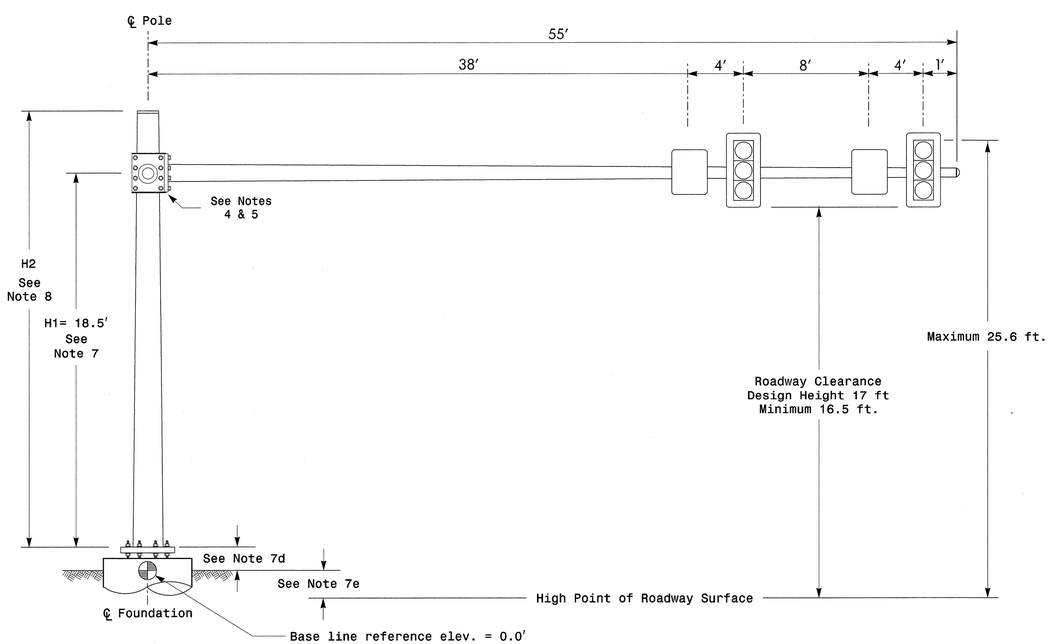
castrickland

Design Loading for METAL POLE NO. 5, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 5, MAST ARM B



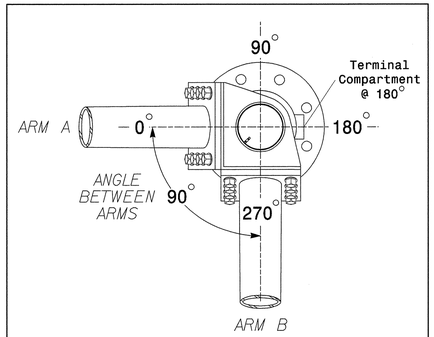
Elevation View @ 0°

SPECIAL NOTE

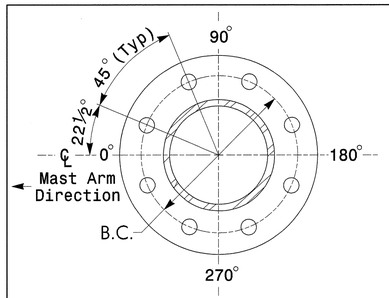
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

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	-0.1 ft.	-0.1 ft.
Elevation difference at Edge of travelway or face of curb	+0.5 ft.	+0.5 ft.

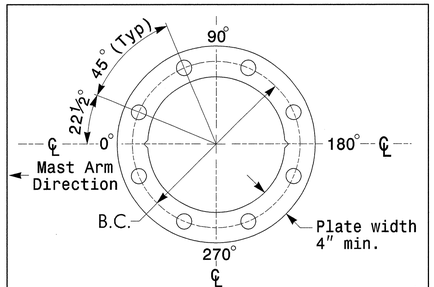


POLE RADIAL ORIENTATION



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

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 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2012 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html

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. 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.

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

NCDOT Wind Zone 4 (90 mph)

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 N/A N/A

SR 4121 (High Point Rd.)
at
I-73 (Greensboro Western Loop)
SB Ramps

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012	REVIEWED BY: B.L. WATSON
PREPARED BY: B. LATON	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE Betsy L. Watson DATE 4/26/12

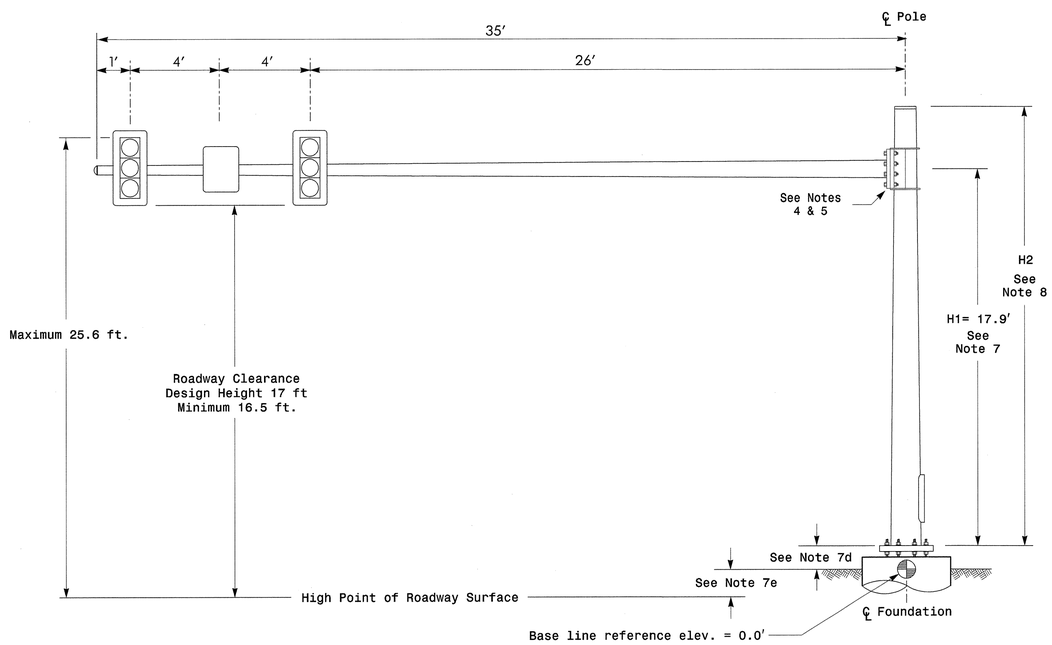
SIG. INVENTORY NO. 07-2188

5/7/2012
bwatson
$signal$sigplans$sigplans$17100128 7_mp_dsn_8_07-2188.dgn

METAL POLE No. 6

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 82

Design Loading for METAL POLE NO. 6



Elevation View

SPECIAL NOTE

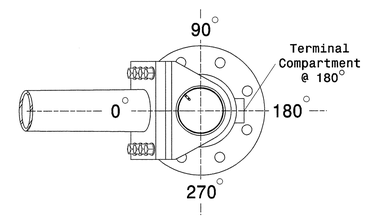
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

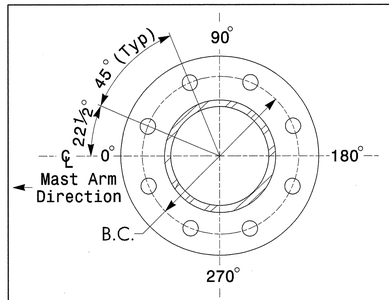
Elevation Differences for:	Pole 6	
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	-0.6 ft.	
Elevation difference at Edge of travelway or face of curb	-0.6 ft.	

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

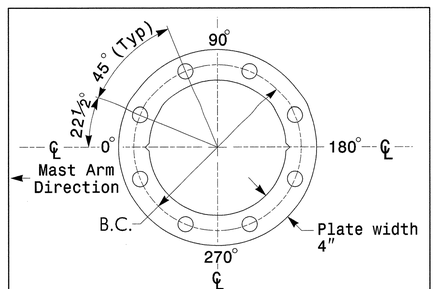


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

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 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2012 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html

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.

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NCDOT Wind Zone 4 (90 mph)

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 N/A N/A

SR 4121 (High Point Rd.) at I-73 (Greensboro Western Loop) SB Ramps

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	B.L. WATSON
PREPARED BY:	B. LATON	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE Betsy L. Watson DATE 4/26/12

SIG. INVENTORY NO. 07-2188

5/7/2012
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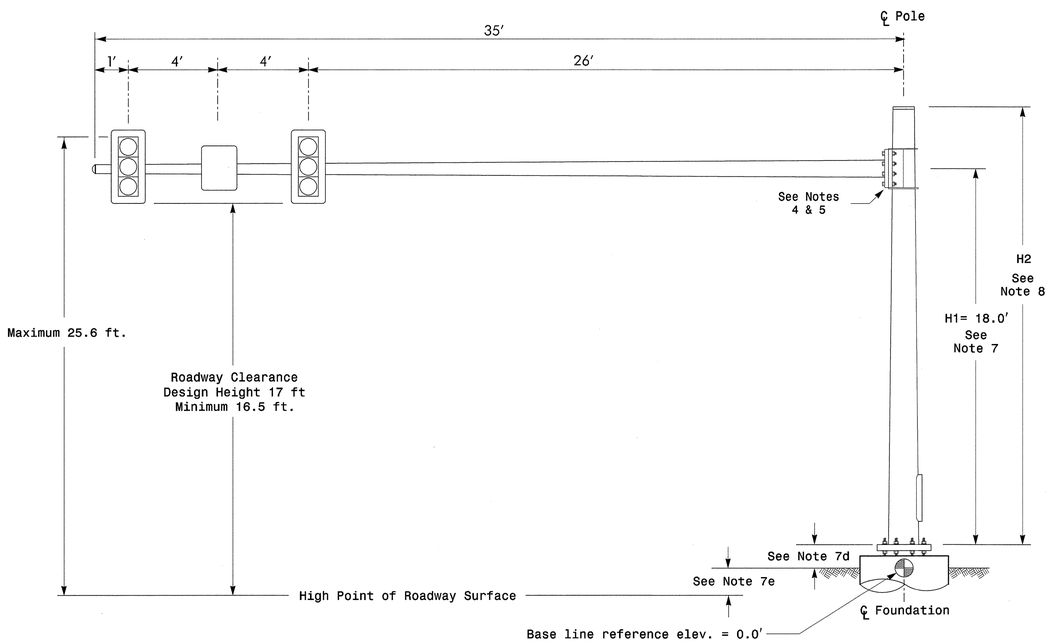
blaton

METAL POLE No. 7

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 83

Design Loading for METAL POLE NO. 7



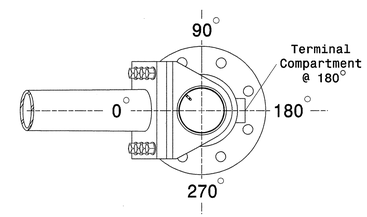
Elevation View

SPECIAL NOTE

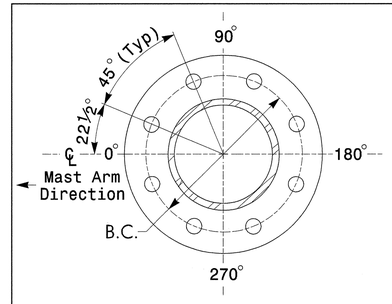
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

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	-0.5 ft.	
Elevation difference at Edge of travelway or face of curb	-0.5 ft.	

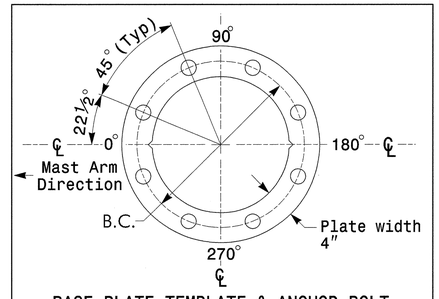


POLE RADIAL ORIENTATION



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

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 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2012 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html

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.

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License No. F-0672

NCDOT Wind Zone 4 (90 mph)

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE
0 N/A
N/A

SR 4121 (High Point Rd.)
at
I-73 (Greensboro Western Loop)
NB Ramps

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012	REVIEWED BY: B.L. WATSON		
PREPARED BY:	REVIEWED BY:		
REVISIONS		INIT.	DATE

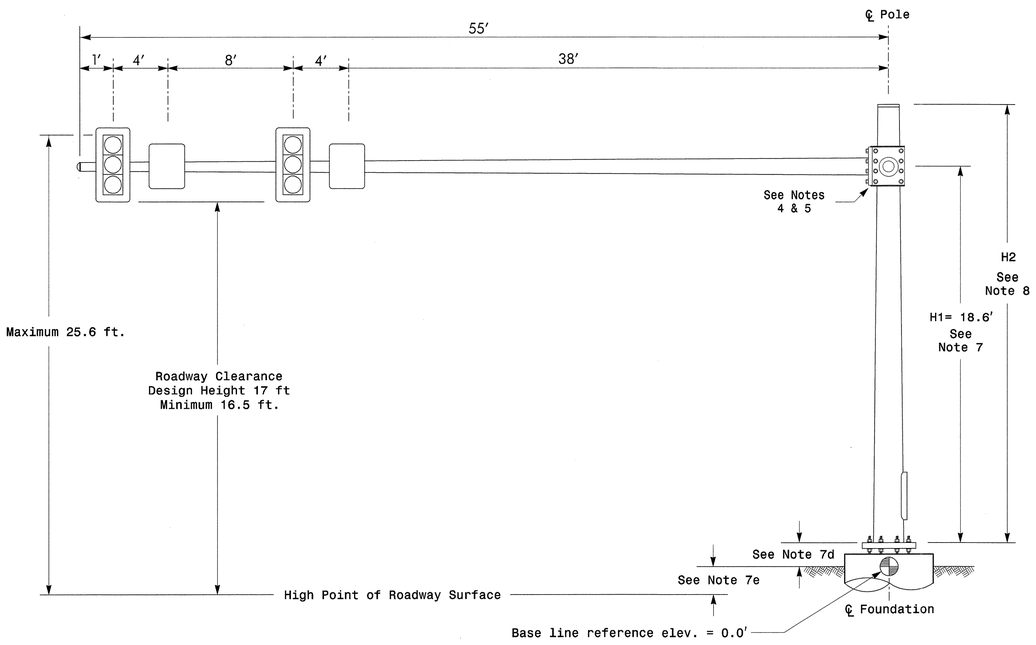
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON
SIGNATURE 4/26/12 DATE
SIG. INVENTORY NO. 07-2189

5/7/2012
U:\Traffic\Signals\Sig Plans\71001287_mp_dsn_3_07-2189.dgn
blatch

METAL POLE No. 8

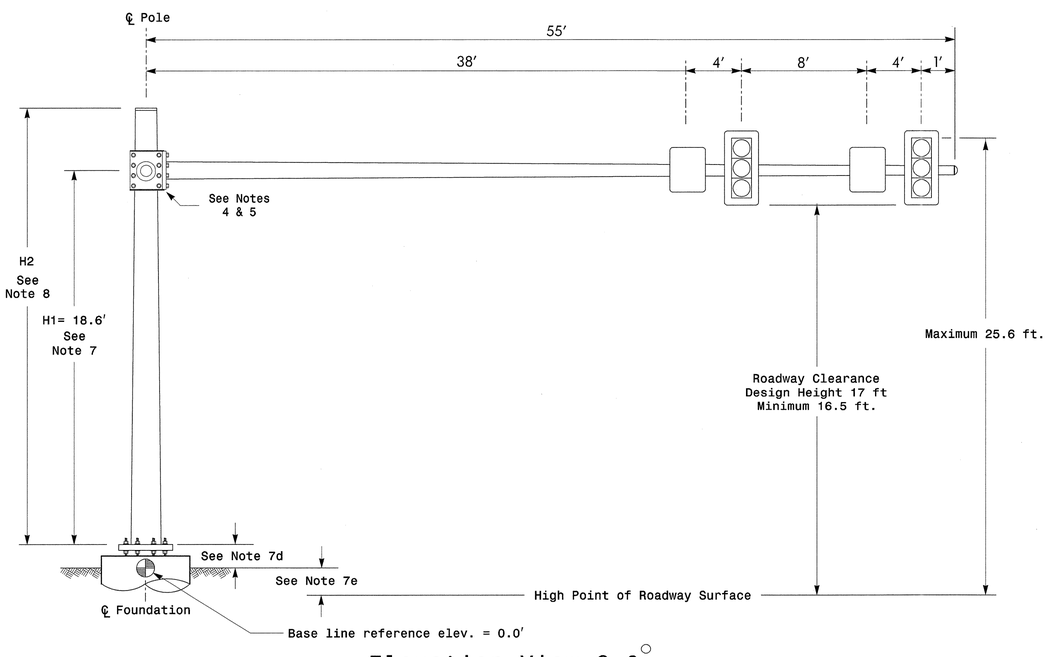
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 84

Design Loading for METAL POLE NO. 8, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 8, MAST ARM B



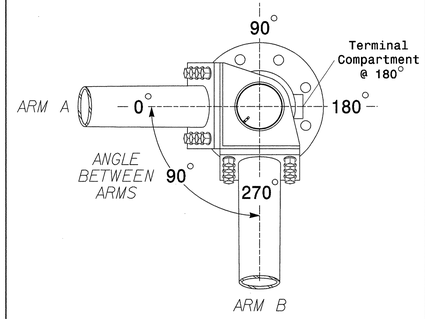
Elevation View @ 0°

SPECIAL NOTE

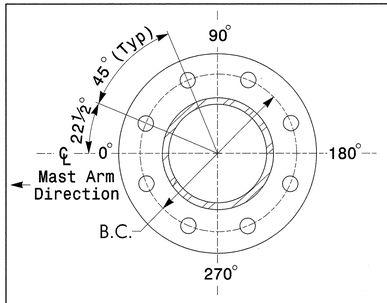
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

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	+0.1 ft.	+0.1 ft.
Elevation difference at Edge of travelway or face of curb	+0.4 ft.	+0.4 ft.

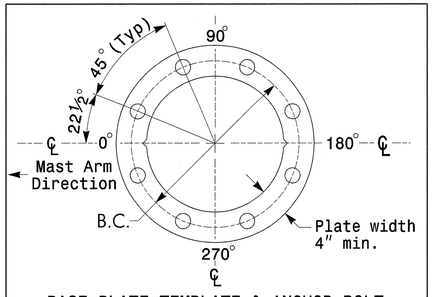


POLE RADIAL ORIENTATION



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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1. Design the traffic signal structure and foundation in accordance with:
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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. 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.

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License No. F-0672

NCDOT Wind Zone 4 (90 mph)

Prepared for the Offices of: Transportation Mobility and Safety Division, Traffic Engineering Branch, Signal Design Section, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N.Greenfield Pkwy,Garner,NC 27529

SR 4121 (High Point Rd.) at I-73 (Greensboro Western Loop) NB Ramps

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: B.L. WATSON
PREPARED BY: B. LATON REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0 N/A N/A

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

SIGNATURE Betsy L Watson DATE 4/26/12

SIG. INVENTORY NO. 07-2189

5/7/2012
USER:GOFficeSignalsSignlonsWT1001287_mp_dsn_9_07-2189.dgn
bLaton

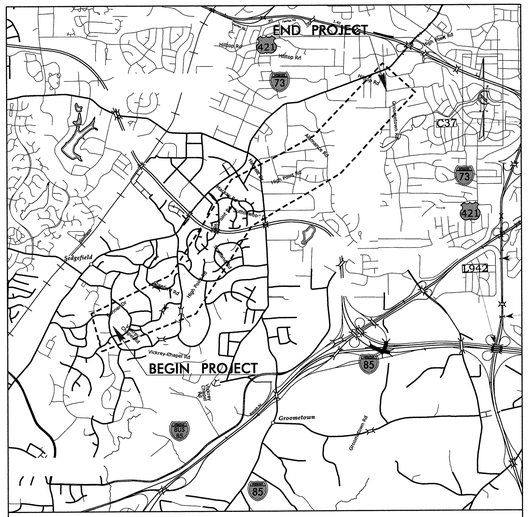
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2412B & U-2524AE	SIG. 85	

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

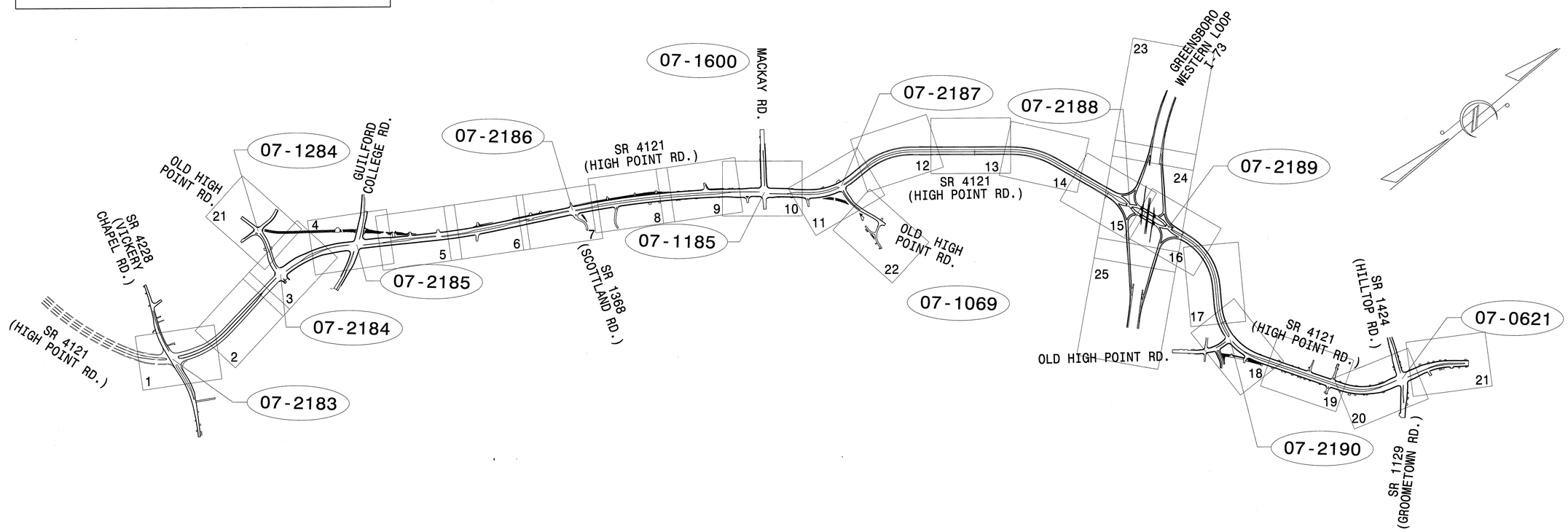
GUILFORD COUNTY

LOCATION: SR 4121 (HIGH POINT ROAD) FROM WEST OF VICKERY CHAPEL ROAD TO HILLTOP ROAD

TYPE OF WORK: COMMUNICATIONS CABLE, CONDUIT ROUTING AND WIRELESS COMMUNICATIONS PLANS



VICINITY MAP



Legend

XX-XXXX SIGNAL INVENTORY NUMBER

INDEX OF PLANS

SHEET NUMBER	DESCRIPTION
85	TITLE SHEET
86	COMMUNICATIONS CABLE AND CONDUIT ROUTING LEGEND
87–89	CONSTRUCTION PHASE I – COMMUNICATIONS CABLE AND CONDUIT ROUTING FOR I-73
90	CONSTRUCTION PHASE I – SPLICE DIAGRAMS
91–113	FINAL DESIGN – COMMUNICATIONS CABLE, CONDUIT ROUTING & WIRELESS COMMUNICATIONS FOR HIGH POINT RD
114–120	FINAL DESIGN – SPLICE DIAGRAMS
121	WIRELESS TO FIBER DETAIL

NCDOT CONTACTS:
Transportation Mobility and Safety Branch
Boniface A. Maduabuchukwu, P.E. – Central Region Signals Engineer
Robert J. Ziemba, P.E. – Signals Project Engineer
I. Neil Avery – Signal Communications Project Engineer

STANTEC CONTACTS:
Betsy L. Watson, P.E. – Transportation Engineer
Lori Mahany, P.E. – Transportation Engineer
Brian Laton, E.I. – Transportation Designer
Kellie Wieskamp, E.I. – Transportation Designer

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CONTRACT: 34802.1.1 TIP PROJECT: U-2412B & U-2524AE

5/5/2012
U:\Traffic\Signals\ITS\Plan Sheets\17100287_sig_dsn_cable_tsh.dgn
blaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 86

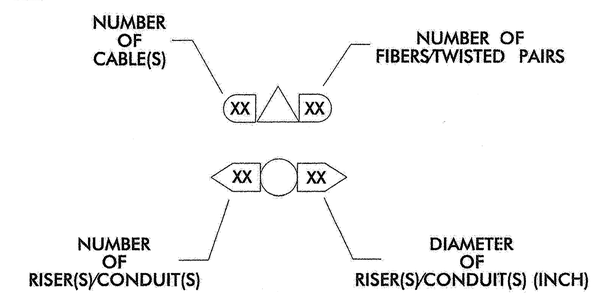
1. INSTALL REA, PE – 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
2. INSTALL REA, PE – 38, (FIGURE – 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
3. INSTALL REA, PE – 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
4. INSTALL SMFO CABLE
5. INSTALL MMFO CABLE
6. INSTALL FIBER OPTIC 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 STUBOUTS
22. INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB–OUTS WHEN AVAILABLE)
23. INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB–OUTS WHEN AVAILABLE)
24. INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
25. INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
26. TERMINATE COMMUNICATIONS CABLE ON EXISTING TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
27. INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
28. INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS, AND FUSION SPLICE CABLE IN CABINET
29. INSTALL UNDERGROUND SPLICE ENCLOSURE
30. INSTALL AERIAL SPLICE ENCLOSURE
31. INSTALL POLE MOUNTED SPLICE CABINET
32. INSTALL BASE MOUNTED SPLICE CABINET
33. REMOVE EXISTING SPLICE CABINET
34. INSTALL CABINET FOUNDATION
35. REMOVE EXISTING CABINET FOUNDATION
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL CCTV CAMERA WOOD POLE
38. INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
39. INSTALL JUNCTION BOX
40. INSTALL OVERSIZED JUNCTION BOX
41. REMOVE EXISTING JUNCTION BOX
42. INSTALL WOOD POLE
43. REMOVE EXISTING WOOD POLE
44. INSTALL AERIAL GUY ASSEMBLY
45. INSTALL STANDARD GUY ASSEMBLY
46. INSTALL SIDEWALK GUY ASSEMBLY
47. INSTALL MESSENGER CABLE
48. REMOVE EXISTING COMMUNICATIONS CABLE AND MESSENGER CABLE
49. REMOVE EXISTING COMMUNICATIONS CABLE
50. INSTALL TELEPHONE SERVICE
51. INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 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 — NEW AERIAL SPLICE ENCLOSURE
- NEW METAL POLE
- EXISTING METAL POLE
- NEW CCTV CAMERA ASSEMBLY
- NEW STANDARD GUY ASSEMBLY
- NEW STANDARD GUY USING EXISTING ANCHOR
- NEW SIDEWALK GUY ASSEMBLY
- NEW CABLE STORAGE RACKS (SNOW SHOES)
- EXISTING CONTROLLER AND CABINET
- S — EXISTING SPLICE CABINET
- S — NEW SPLICE CABINET
- M — EXISTING MASTER CONTROLLER AND CABINET
- SP — SIGNAL POLE
- XX–XXXX — SIGNAL INVENTORY NUMBER
- YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
- YAGI ANTENNA (SINGLE)
- OMNI ANTENNA

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)



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License No. F-0572

Prepared for the Offices of:
Transportation Mobility and Safety Division
Intelligent Transportation Systems Section
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Pkwy., Garner, NC 27529

CONSTRUCTION NOTES

PLAN DATE: FEBRUARY 2012	REVIEWED BY: L. MAHANY
PREPARED BY: M. KELLY	REVIEWED BY:

SCALE: 0 — N/A

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 032643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE / DATE: 5/3/12

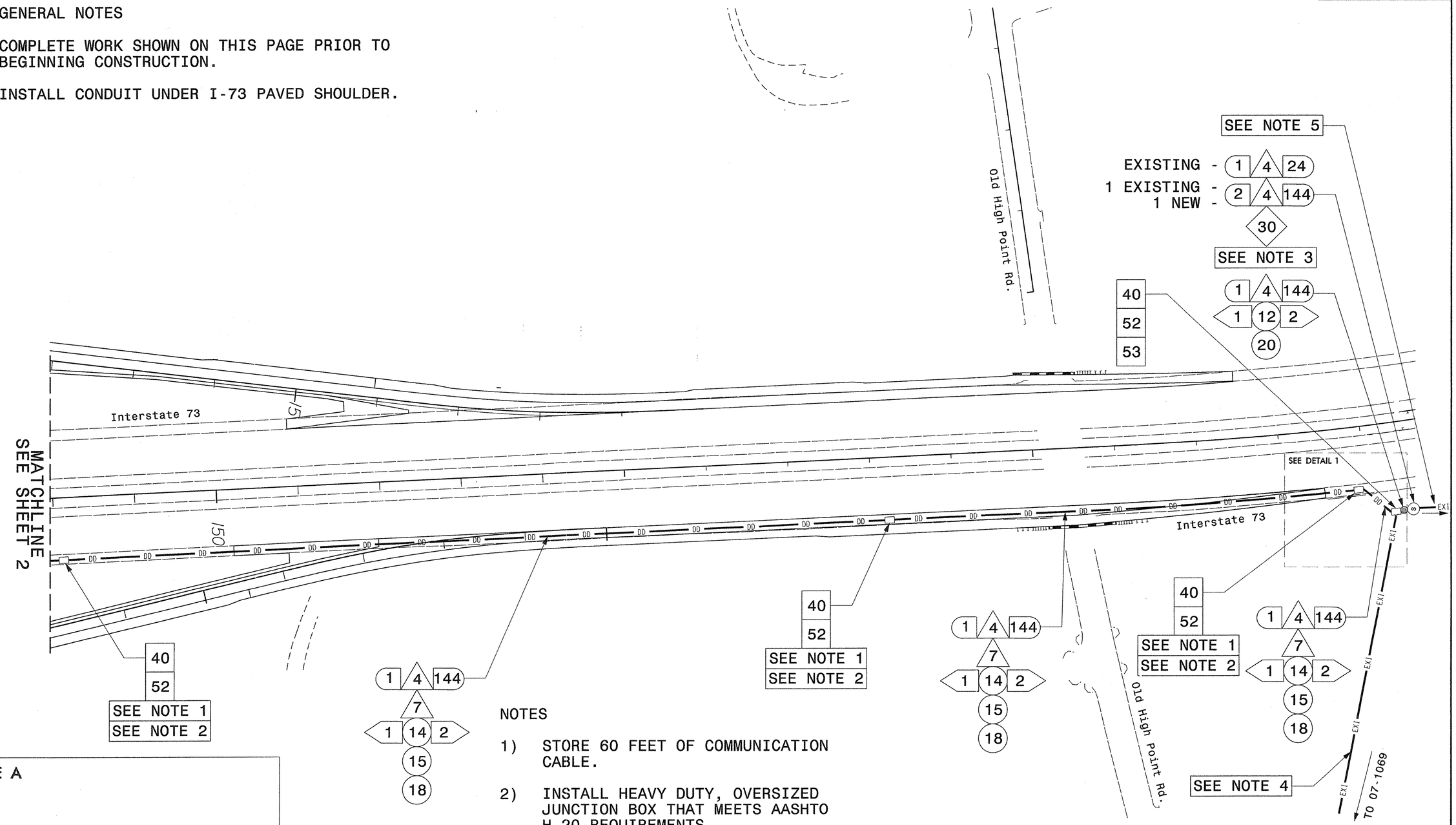
CADD FILE NAME:

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 87

GENERAL NOTES

COMPLETE WORK SHOWN ON THIS PAGE PRIOR TO BEGINNING CONSTRUCTION.

INSTALL CONDUIT UNDER I-73 PAVED SHOULDER.



NOTES

1) STORE 60 FEET OF COMMUNICATION CABLE.

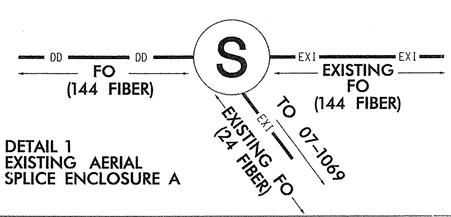
2) INSTALL HEAVY DUTY, OVERSIZED JUNCTION BOX THAT MEETS AASHTO H-20 REQUIREMENTS.

3) FIELD LOCATE EXISTING AERIAL SPLICE ENCLOSURE AT I-73 SOUTH OF GREENSBORO OUTER LOOP/I-85.

4) EXISTING 24-FIBER CABLE TO INTERSECTION 07-1069.

5) EXISTING 144-FIBER ALONG I-73.

SE A



DETAIL 1
EXISTING AERIAL SPLICE ENCLOSURE A

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CONSTRUCTION PHASE I - SHEET 1 OF 3

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

SCALE 0 60 1" = 60'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY
SIGNATURE DATE 5/3/12

5/3/2012
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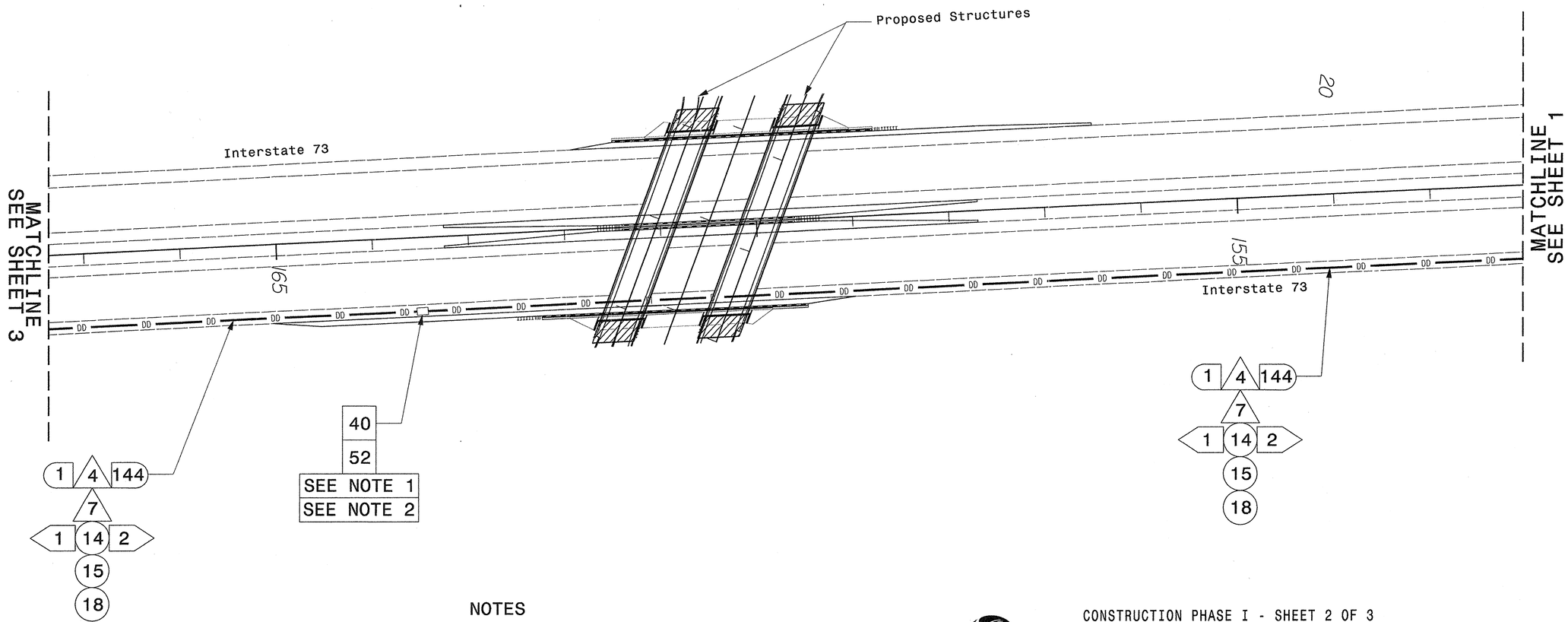
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 88

GENERAL NOTES

COMPLETE WORK SHOWN ON THIS PAGE PRIOR TO BEGINNING CONSTRUCTION.

INSTALL CONDUIT UNDER I-73 PAVED SHOULDER.



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CONSTRUCTION PHASE I - SHEET 2 OF 3

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 60
1" = 60'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE DATE 5/3/12

5/2/2012
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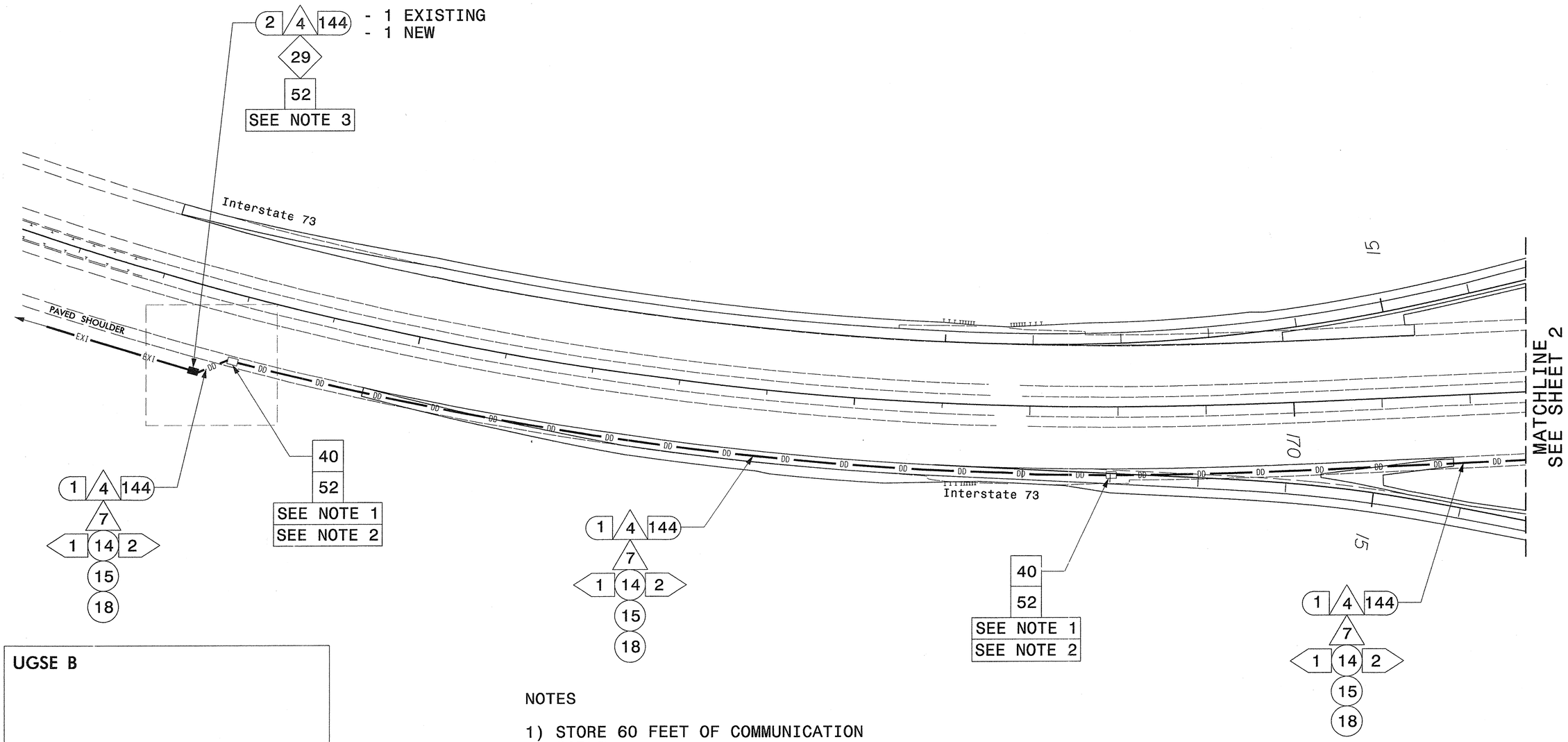
blaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 89

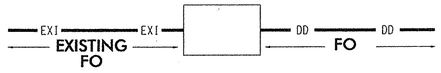
GENERAL NOTES

COMPLETE WORK SHOWN ON THIS PAGE PRIOR TO BEGINNING CONSTRUCTION.

INSTALL CONDUIT UNDER I-73 PAVED SHOULDER.



UGSE B



DETAIL 1
UNDERGROUND
SPLICE ENCLOSURE B
IN EXISTING JUNCTION BOX

NOTES

1) STORE 60 FEET OF COMMUNICATION CABLE.

2) INSTALL HEAVY DUTY, OVERSIZED JUNCTION BOX THAT MEETS AASHTO H-20 REQUIREMENTS.

3) FIELD LOCATE NEAREST EXISTING PULLBOX OUTSIDE PROPOSED CONSTRUCTION LIMITS.

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CONSTRUCTION PHASE I - SHEET 3 OF 3

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

SCALE 0 60 1" = 60'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY
SIGNATURE 5/3/12 DATE

5/2/2012
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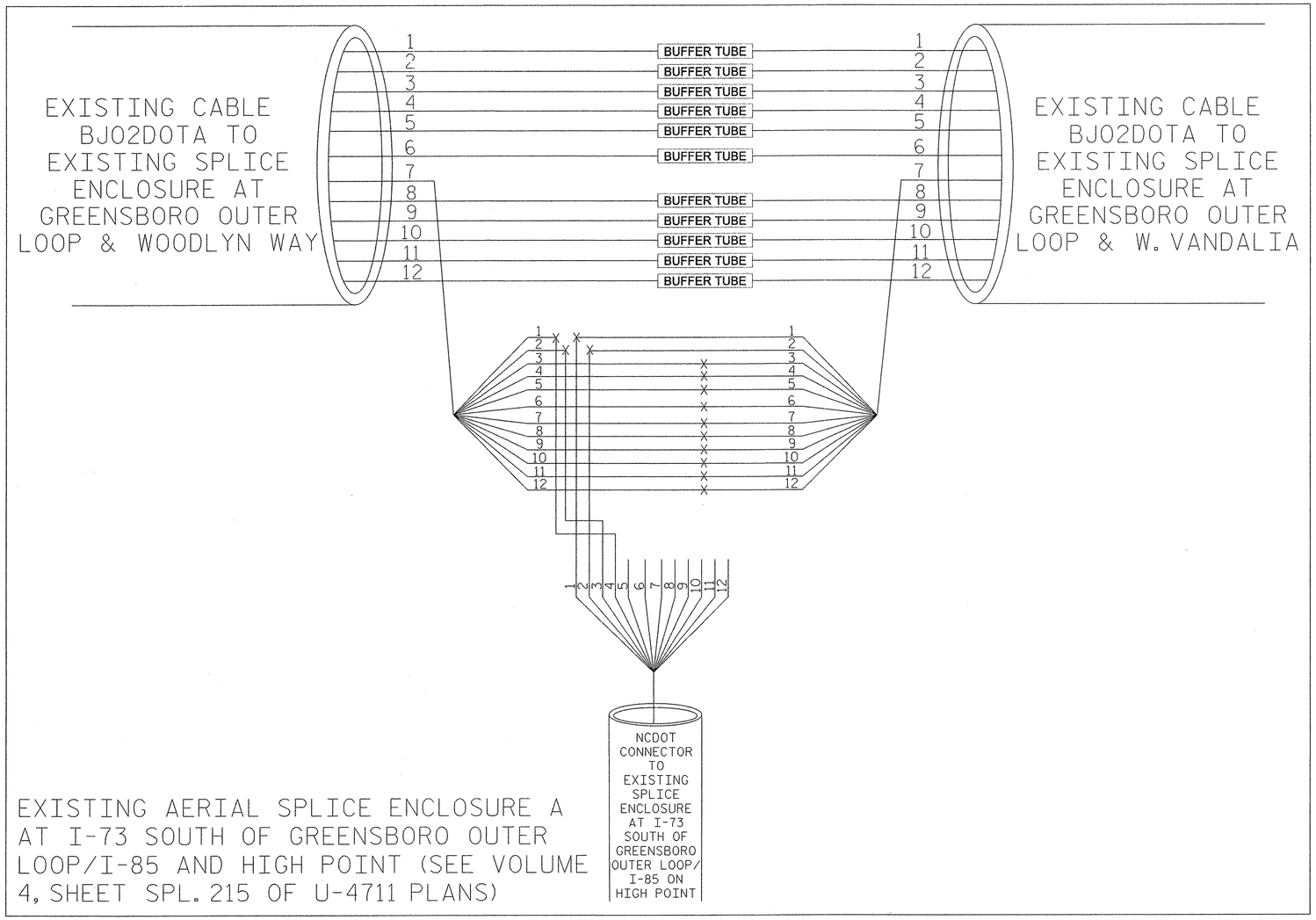
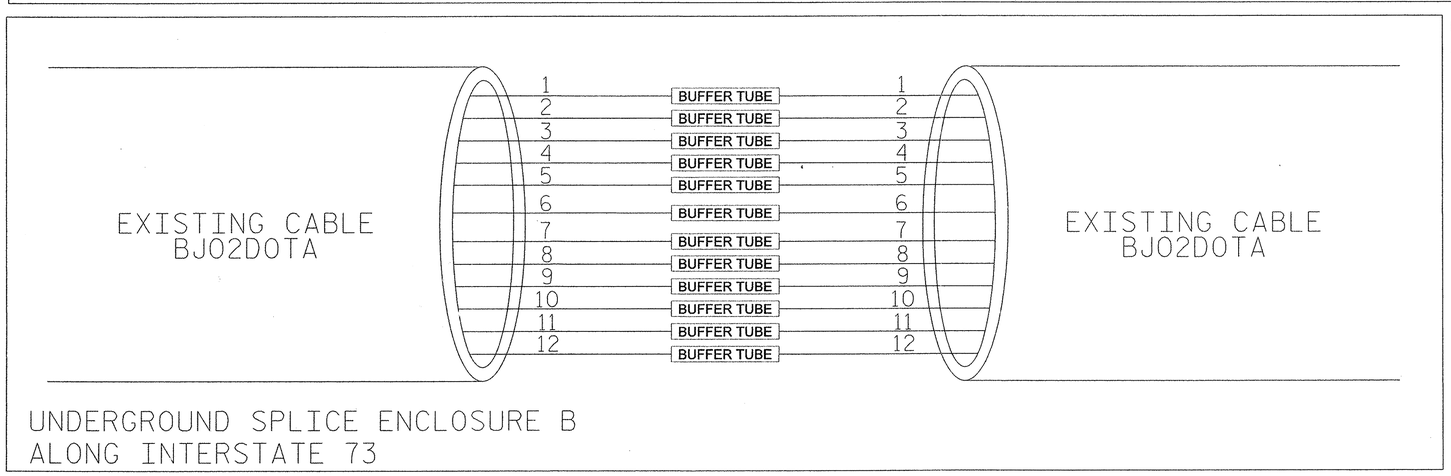
Dlaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 90

FIBER OPTIC CABLE SPLICE PLAN





NOTES:

1. EXPRESS ALL BUFFER TUBES.

LEGEND

COLOR CODE TIA/EIA 598-A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA

ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE — SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

CONSTRUCTION PHASE I

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Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SPLICE PLAN

SHEET 1 OF 1

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LON ELLIOTT MAHANY

SIGNATURE Lon Elliott Mahany DATE 5/3/12

5/3/2012
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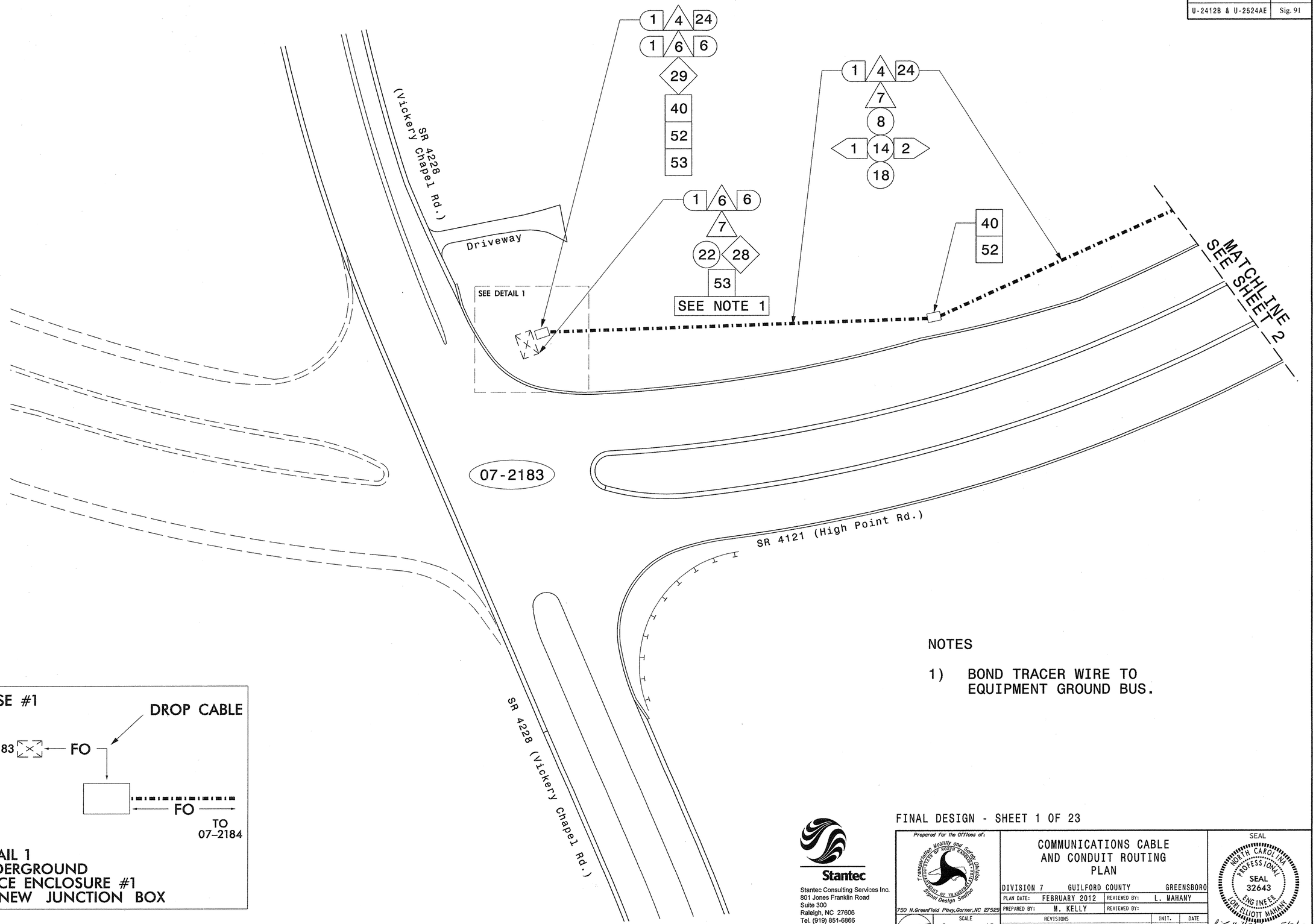
blaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 91



NOTES

1) BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

FINAL DESIGN - SHEET 1 OF 23

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Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY
PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER JOHN ELLIOTT MAHANY

SIGNATURE 5/3/12 DATE

5/2/2012
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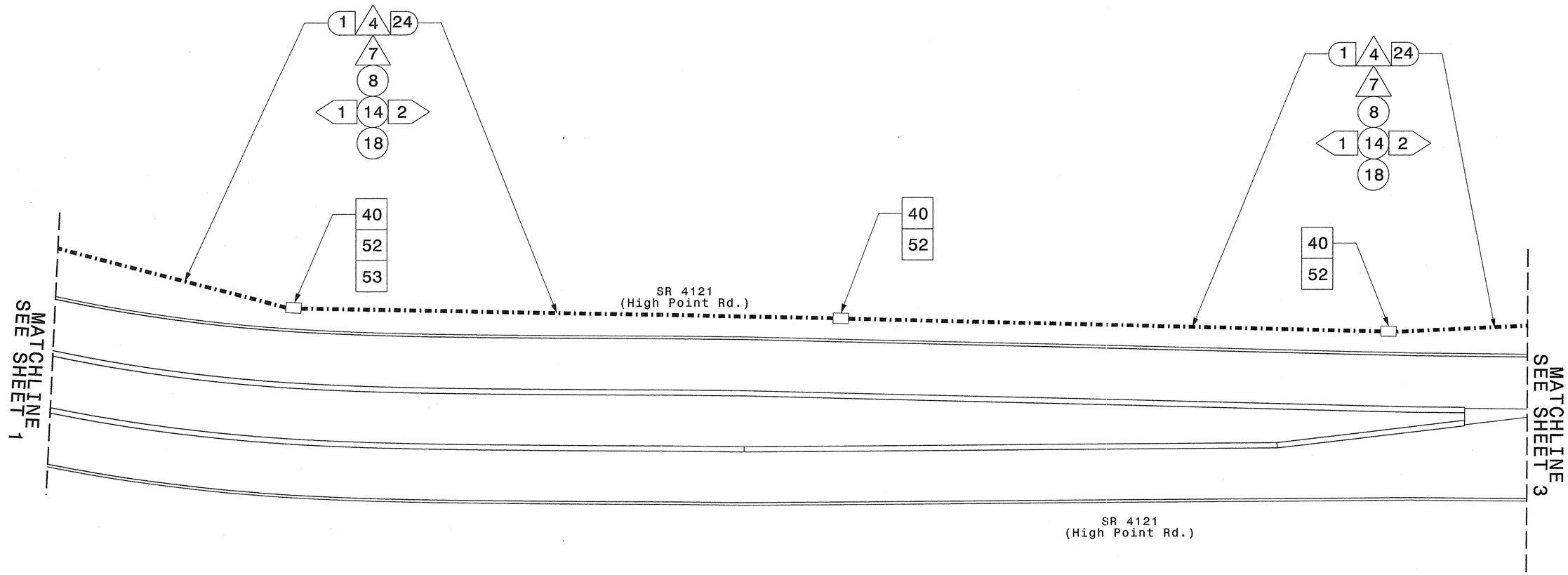
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 92



FINAL DESIGN - SHEET 2 OF 23

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Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE
0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LON ELLIOTT MAHANY

SIGNATURE Lon Elliott Mahany DATE 5/3/12

5/2/2012
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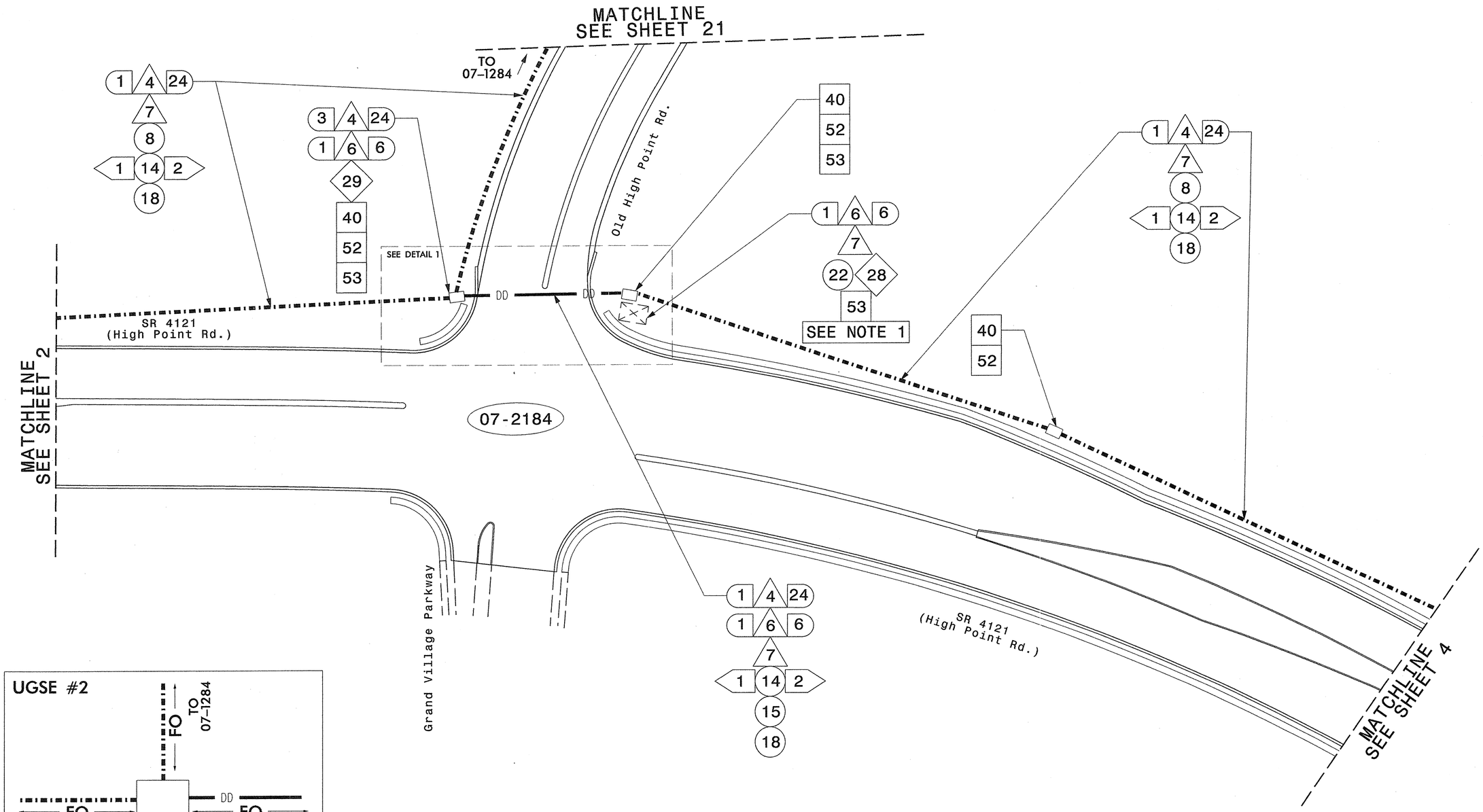
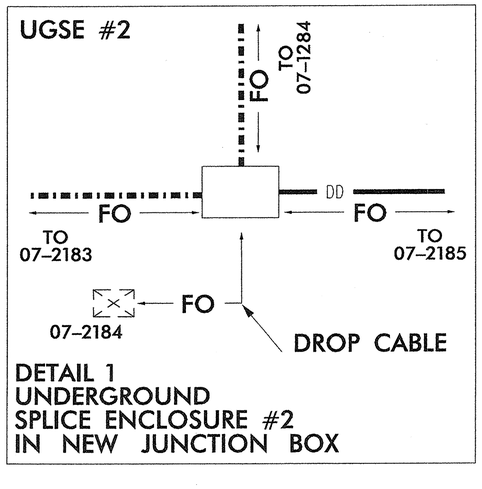
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 93





DETAIL 1
UNDERGROUND
SPLICE ENCLOSURE #2
IN NEW JUNCTION BOX

NOTES

1) DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

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FINAL DESIGN - SHEET 3 OF 23

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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

COMMUNICATIONS CABLE
AND CONDUIT ROUTING
PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

SCALE 0 40
1" = 40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
32643
ENGINEER
JOHN ELLIOTT MAHANY

SIGNATURE DATE 5/3/12

5/2/2012
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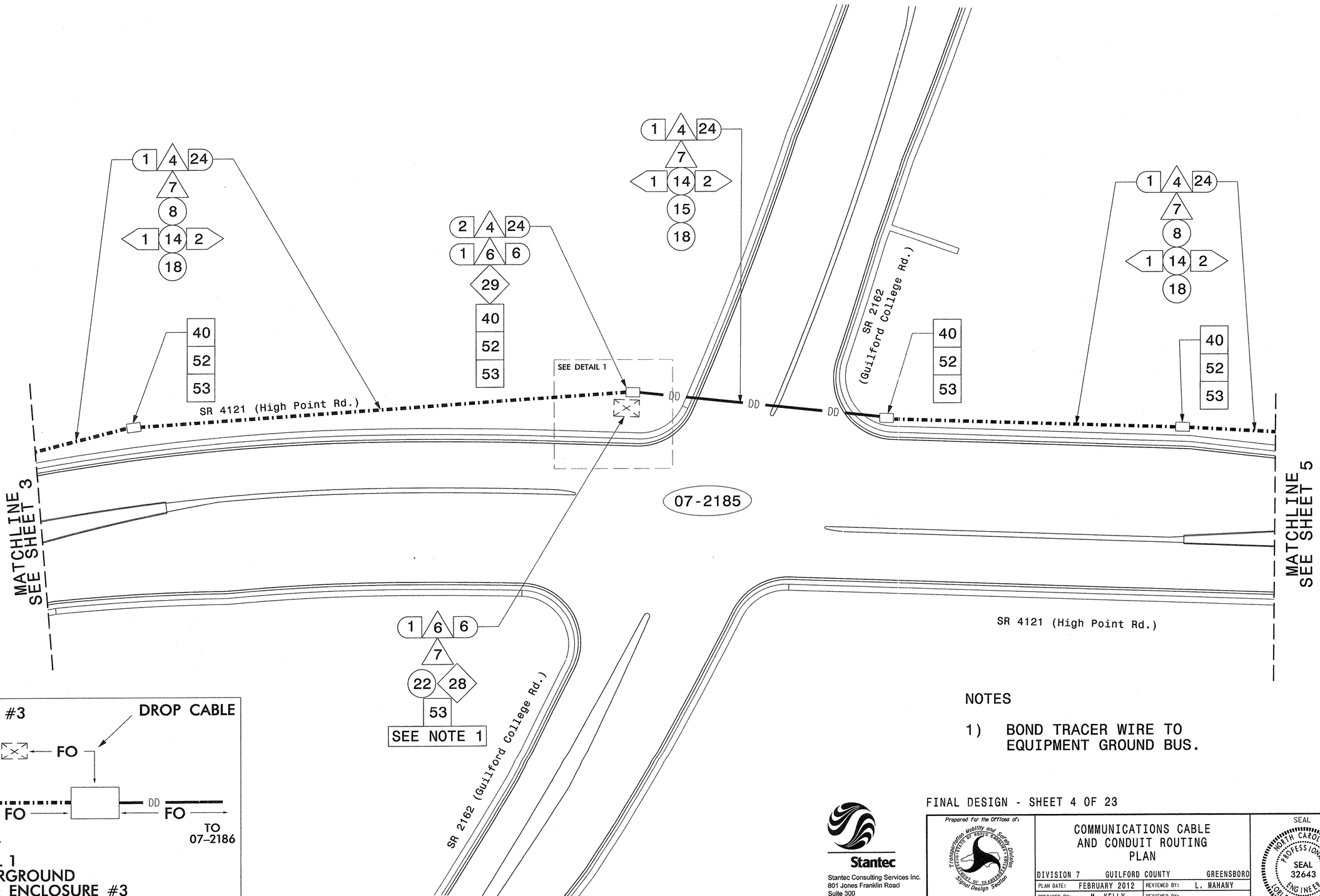
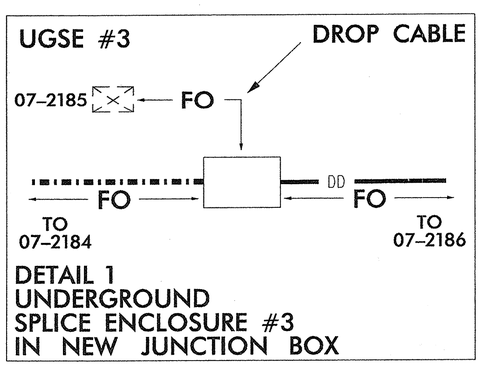
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 94





NOTES

1) BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

FINAL DESIGN - SHEET 4 OF 23

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Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY
SIGNATURE 5/3/12 DATE

5/3/2012
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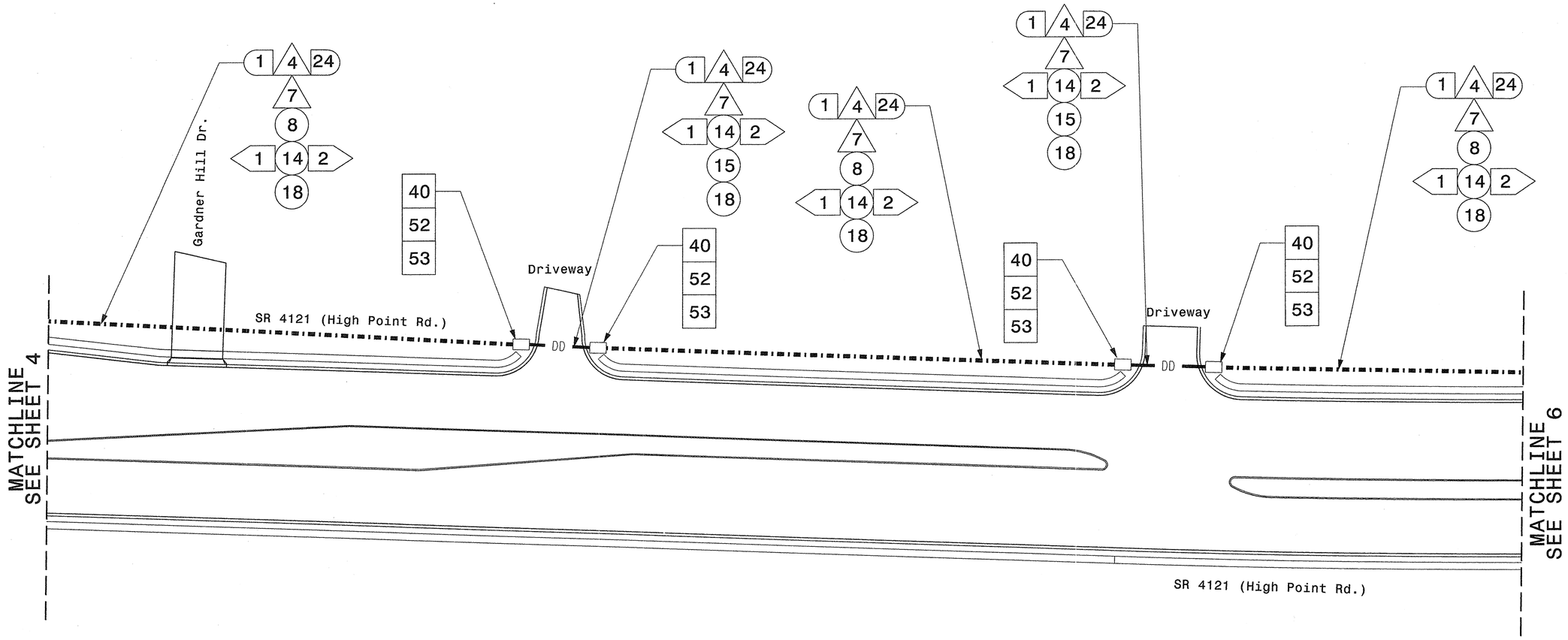
Slaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 95



FINAL DESIGN - SHEET 5 OF 23

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Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE
0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY
SIGNATURE DATE 5/3/12

5/2/2012
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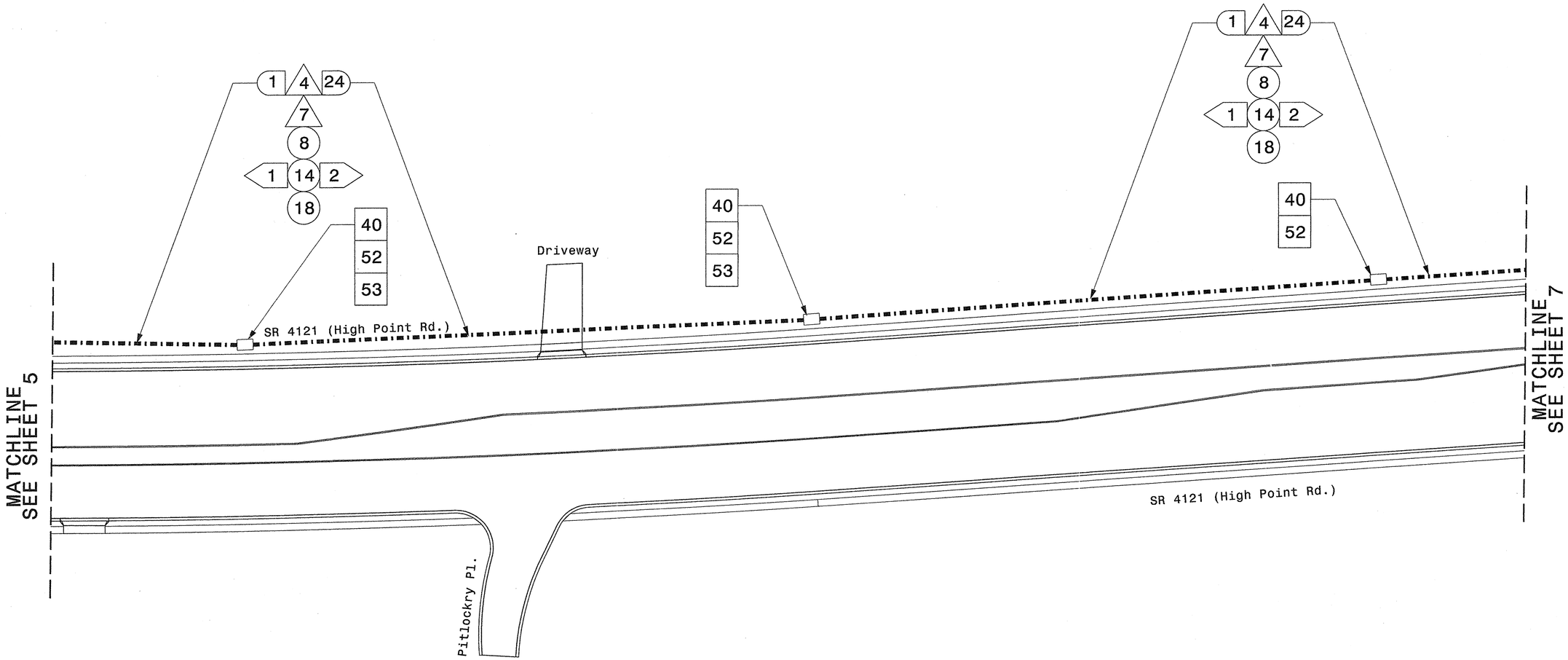
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 96



FINAL DESIGN - SHEET 6 OF 23

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Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY
SIGNATURE Lori Elliott Mahany DATE 5/3/12

5/2/2012
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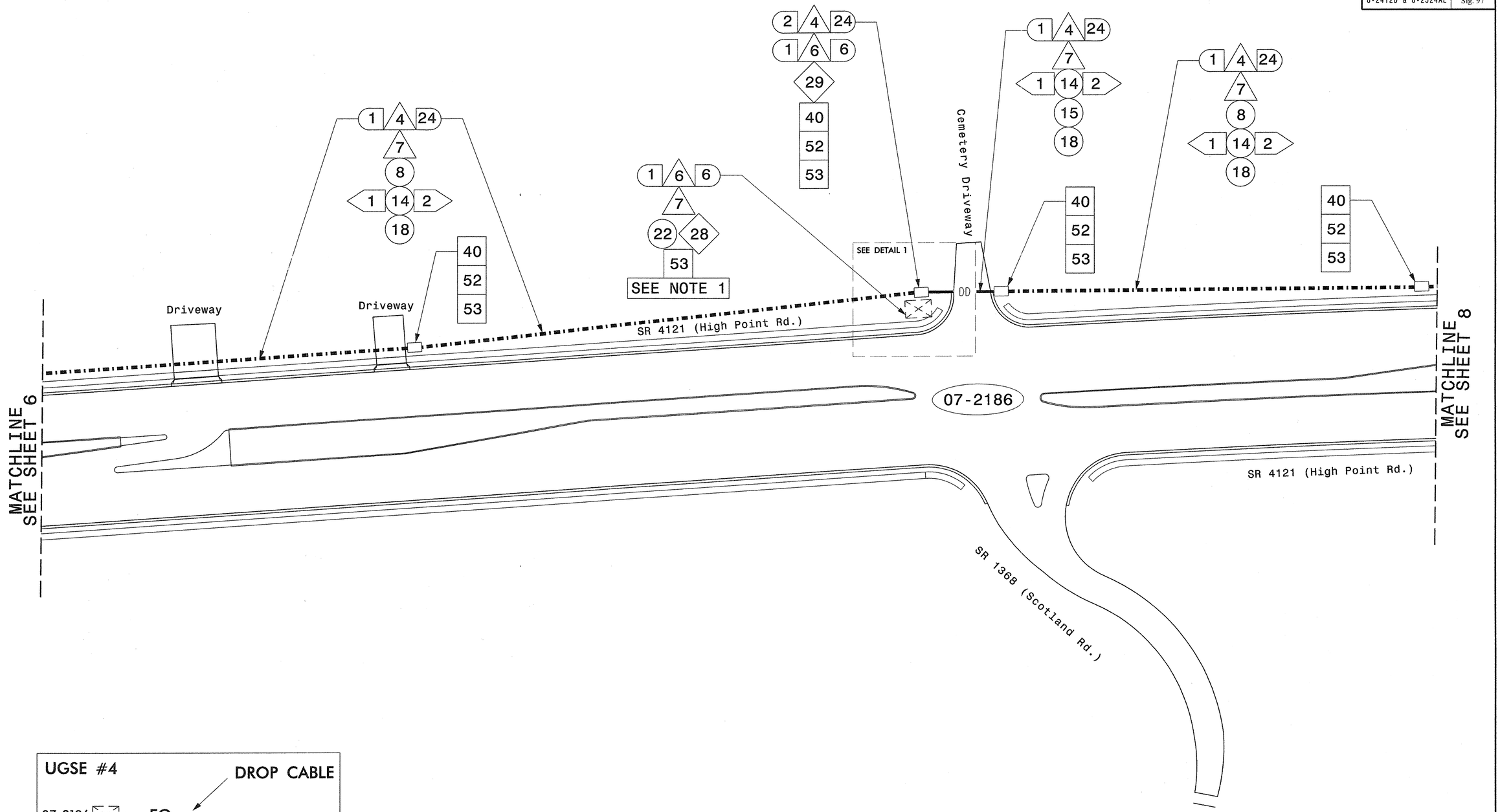
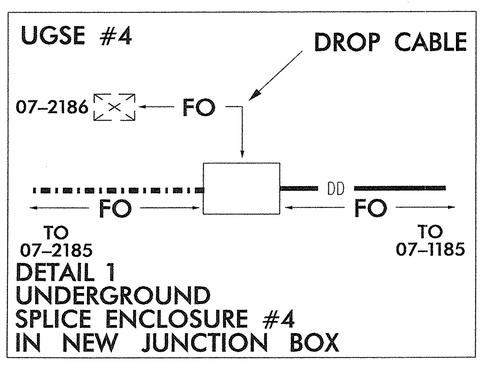
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 97





NOTES

1) DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

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FINAL DESIGN - SHEET 7 OF 23

Prepared for the Offices of:
Transportation Mobility and Safety Division
Department of Transportation
State of North Carolina
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE
0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

Lori Elliott Mahany 5/3/12
SIGNATURE DATE

5/2/2012
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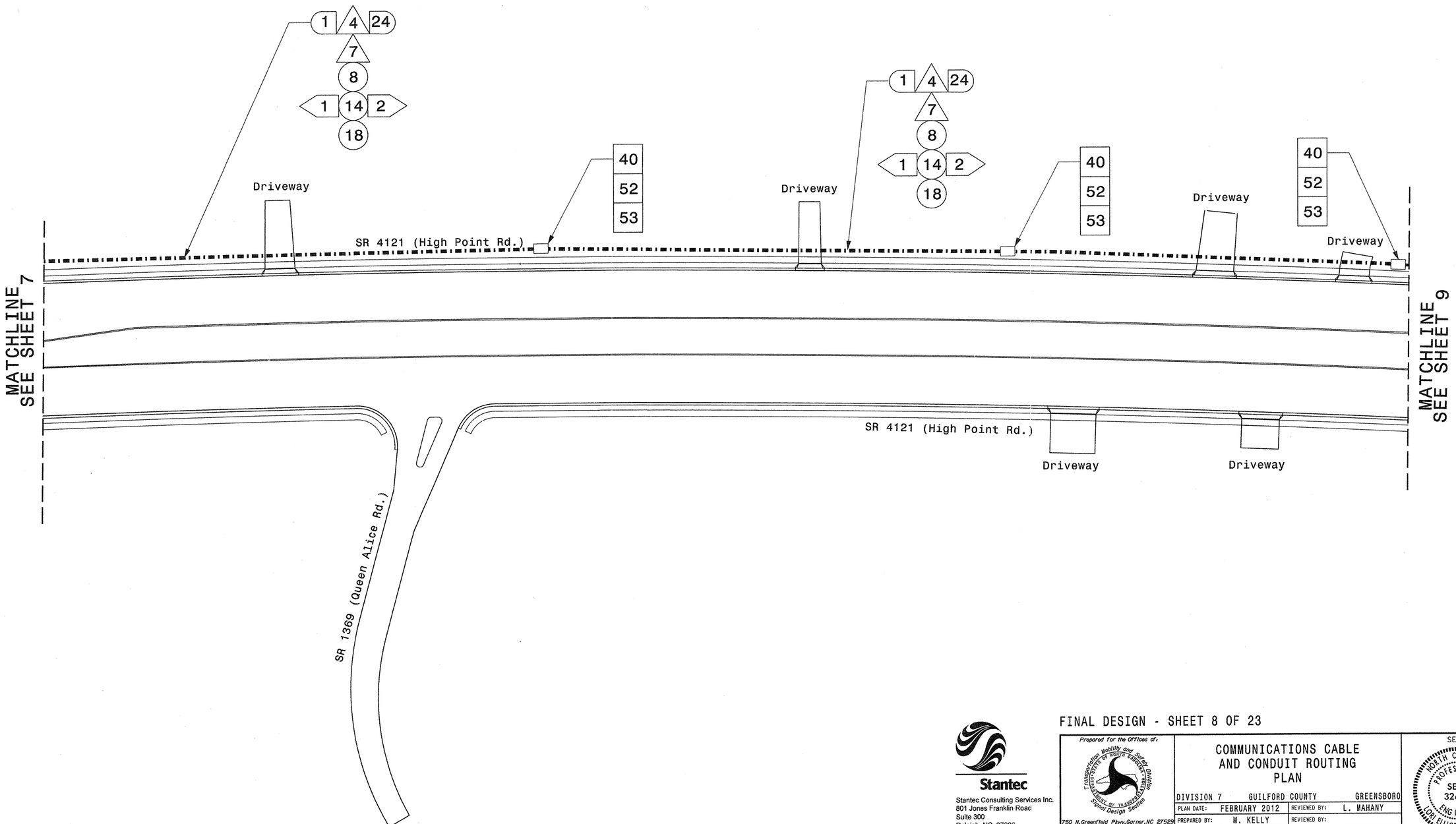
bjatch

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 98



FINAL DESIGN - SHEET 8 OF 23

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www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER JOMI ELLIOTT MAHANY
Jomi Elliott Mahany 5/3/12
SIGNATURE DATE

5/2/2012
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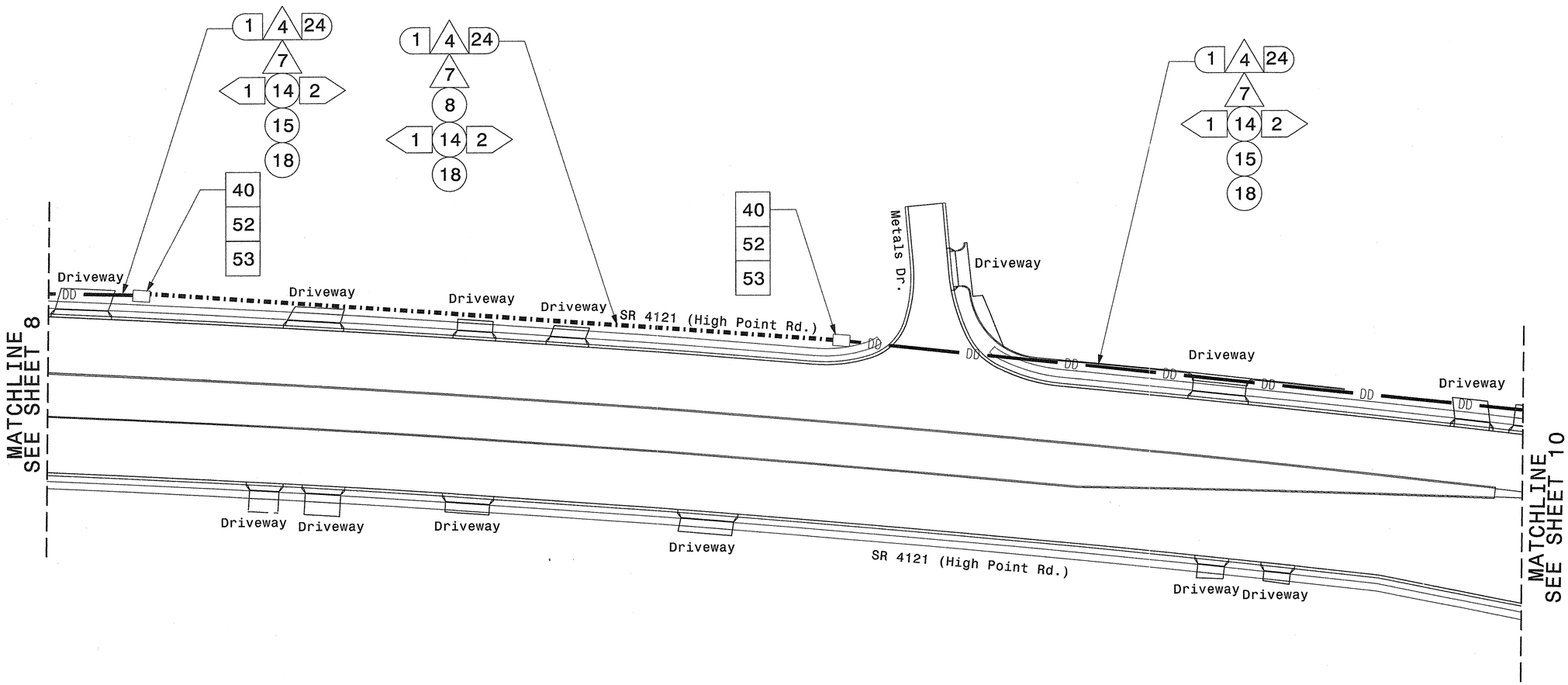
bladon

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 99



FINAL DESIGN - SHEET 9 OF 23

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www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

for Elliott Mahany 5/3/12
SIGNATURE DATE

5/2/2012
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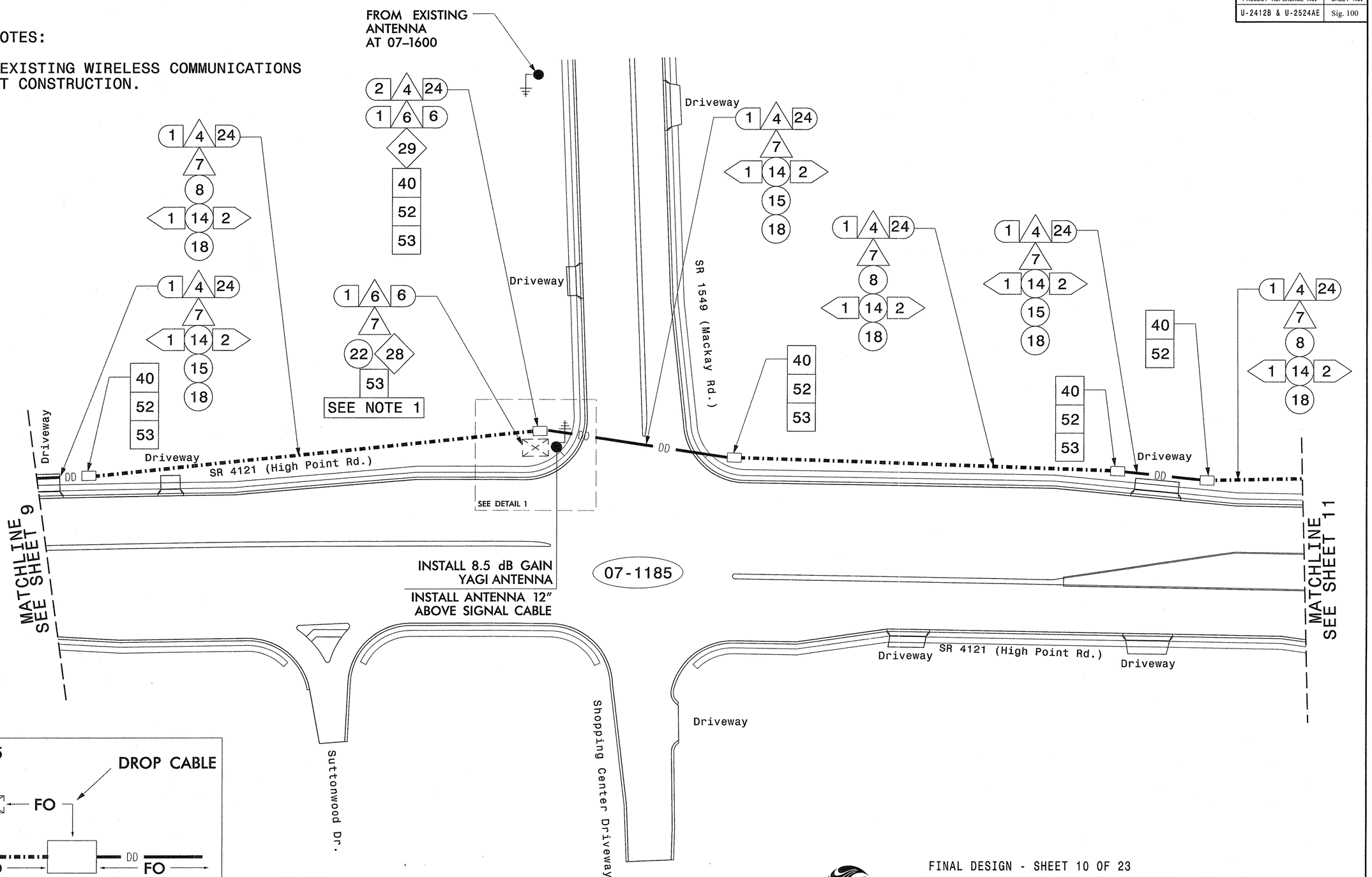
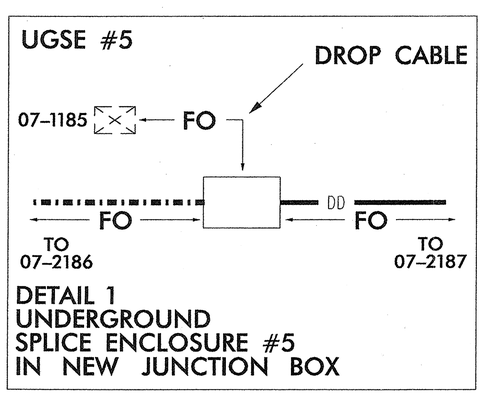
bigton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 100

GENERAL NOTES:

MAINTAIN EXISTING WIRELESS COMMUNICATIONS THROUGHOUT CONSTRUCTION.





DETAIL 1
UNDERGROUND
SPLICE ENCLOSURE #5
IN NEW JUNCTION BOX

NOTES

1) BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

2) RE-USE EXISTING RADIO AND ANTENNA. MAINTAIN ANTENNA POLARIZATION AS EXISTING IN FIELD.

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FINAL DESIGN - SHEET 10 OF 23

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY
PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LON ELLIOTT MAHANY
SIGNATURE Lon Elliott Mahany DATE 5/3/12

5/2/2012
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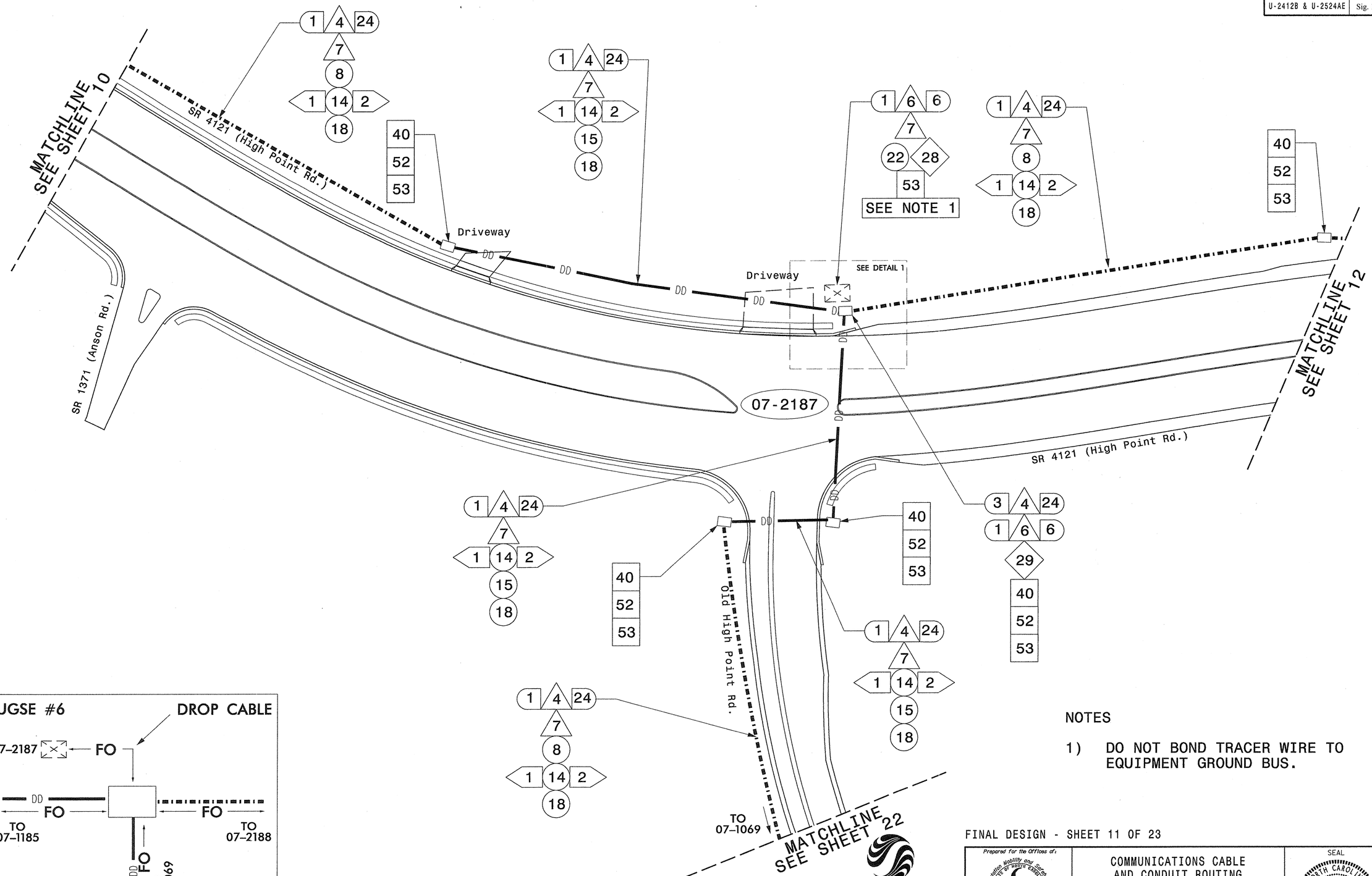
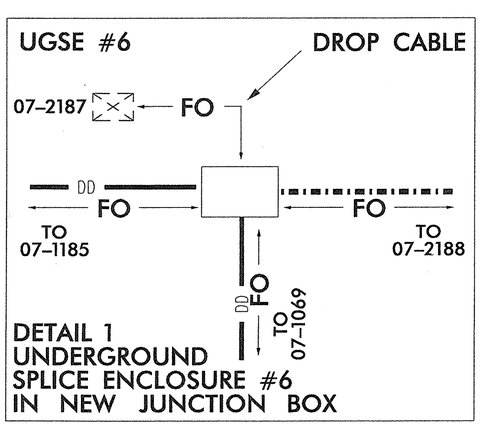
D.Dixon

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 101





NOTES

1) DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

FINAL DESIGN - SHEET 11 OF 23

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License No. F-0672

Prepared for the Offices of: Transportation Mobility and Safety Division, Signal Design Section, 750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

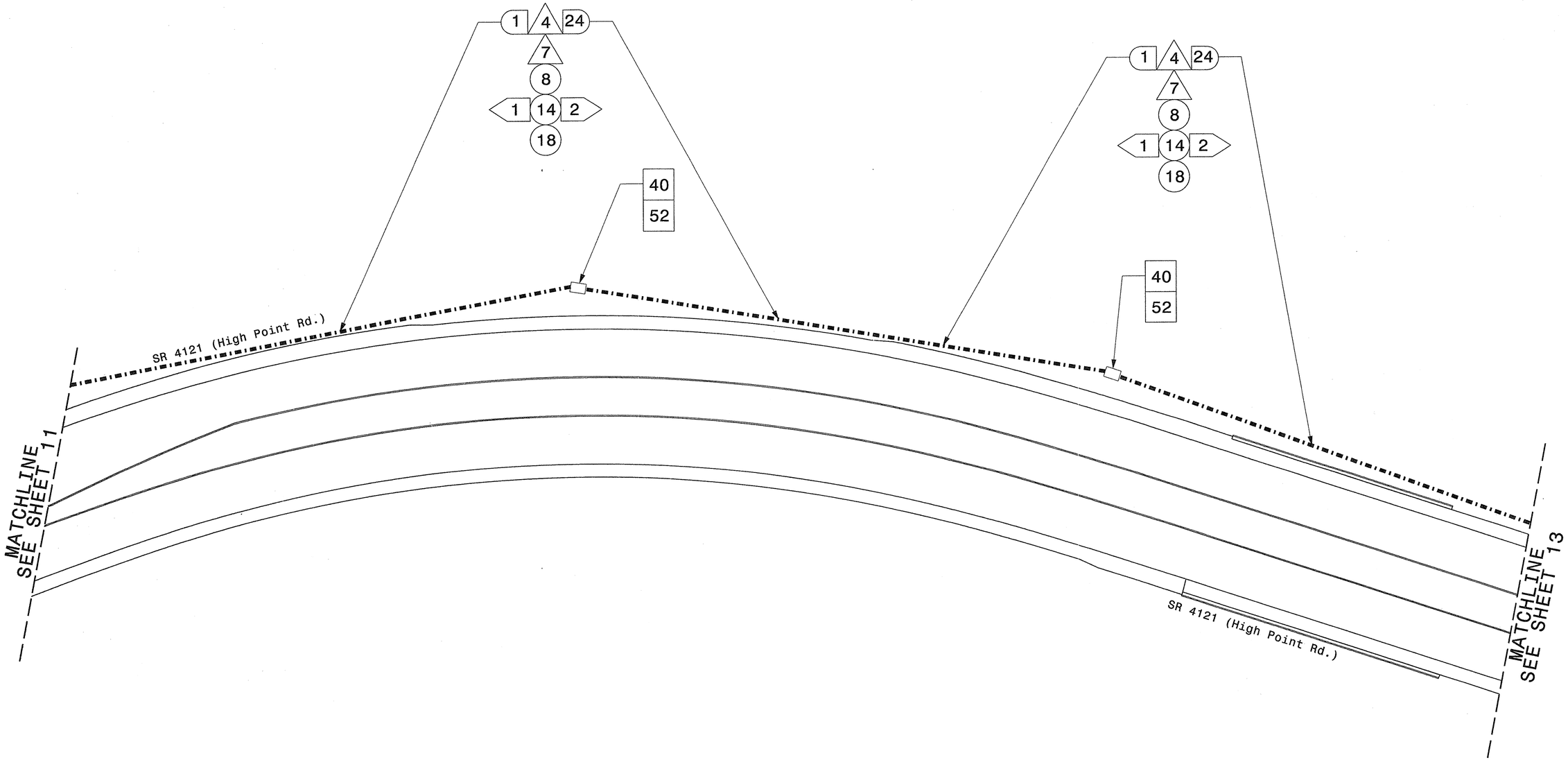
REVISIONS	INIT.	DATE

SEAL NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE DATE 5/3/12

5/2/2012
U:\Traffic\Signals\TSMPlan Sheets\U-2412B_sig_dsn_cable_11.dgn
Dlaton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 102



FINAL DESIGN - SHEET 12 OF 23

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www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LOIE ELLIOTT MAHANY

SIGNATURE Loie Elliott Mahany DATE 5/3/12

5/2/2012
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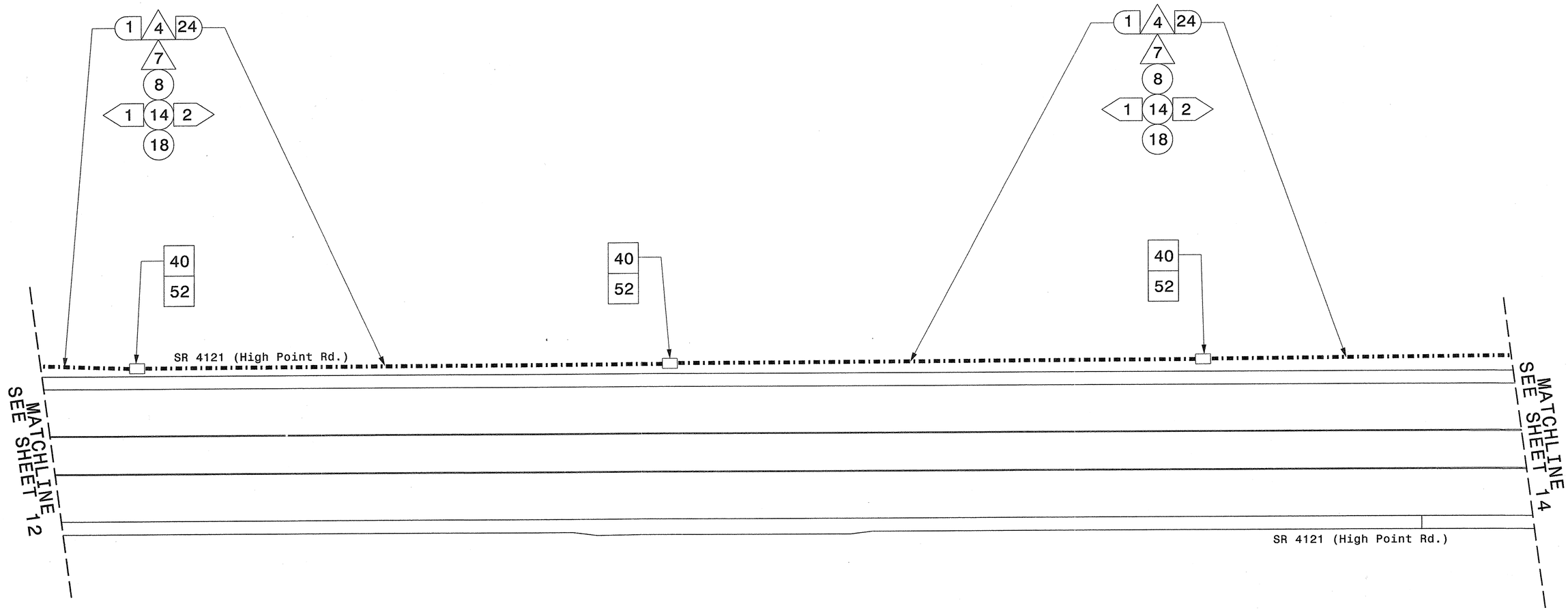
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 103



FINAL DESIGN - SHEET 13 OF 23

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License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

Lori Elliott Mahany 5/3/12
SIGNATURE DATE

5/2/2012
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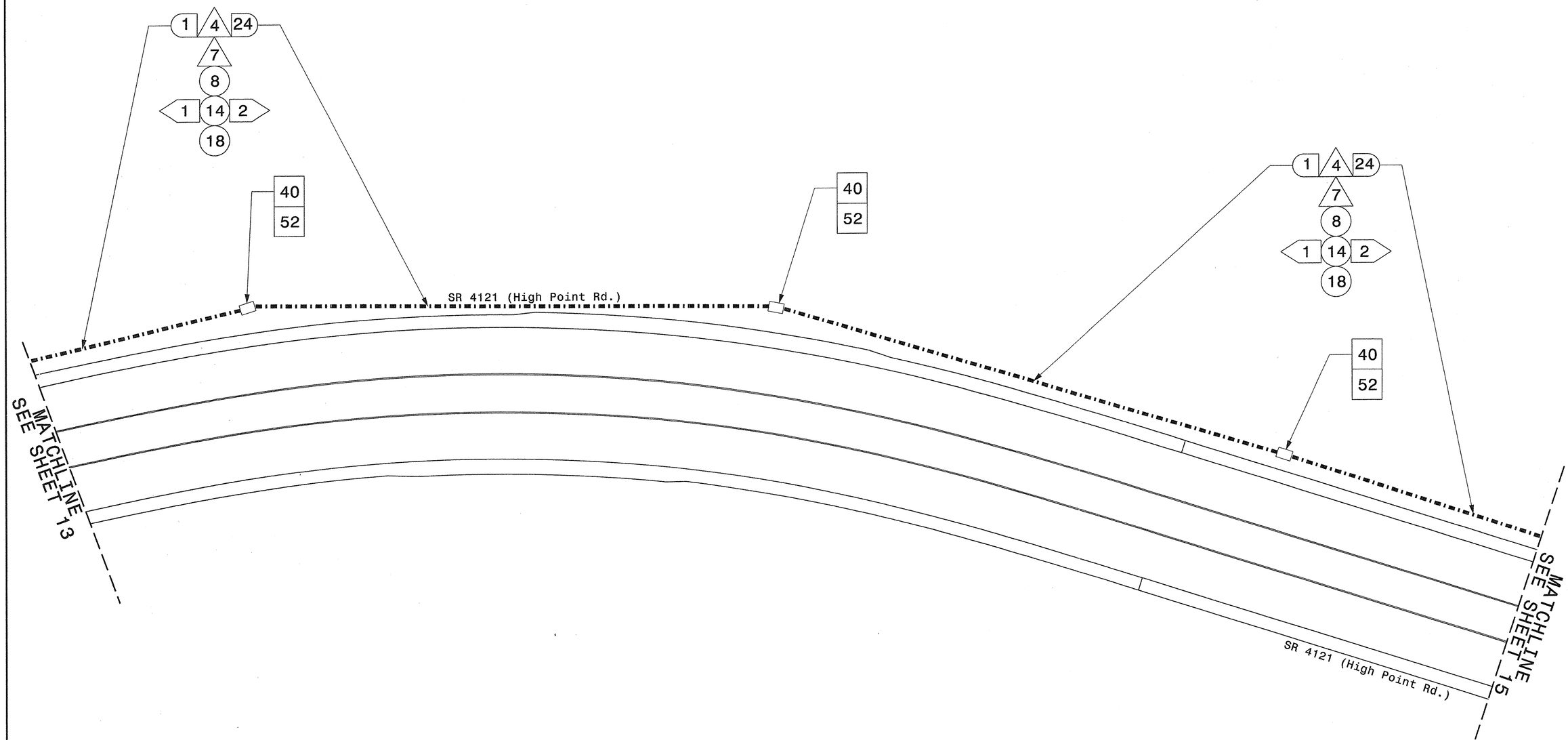
bldton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 104



FINAL DESIGN - SHEET 14 OF 23

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Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy, Garner, NC 27529

SCALE 0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 32643 LORI ELLIOTT MAHANY

SIGNATURE Lori Elliott Mahany DATE 5/3/12

5/2/2012
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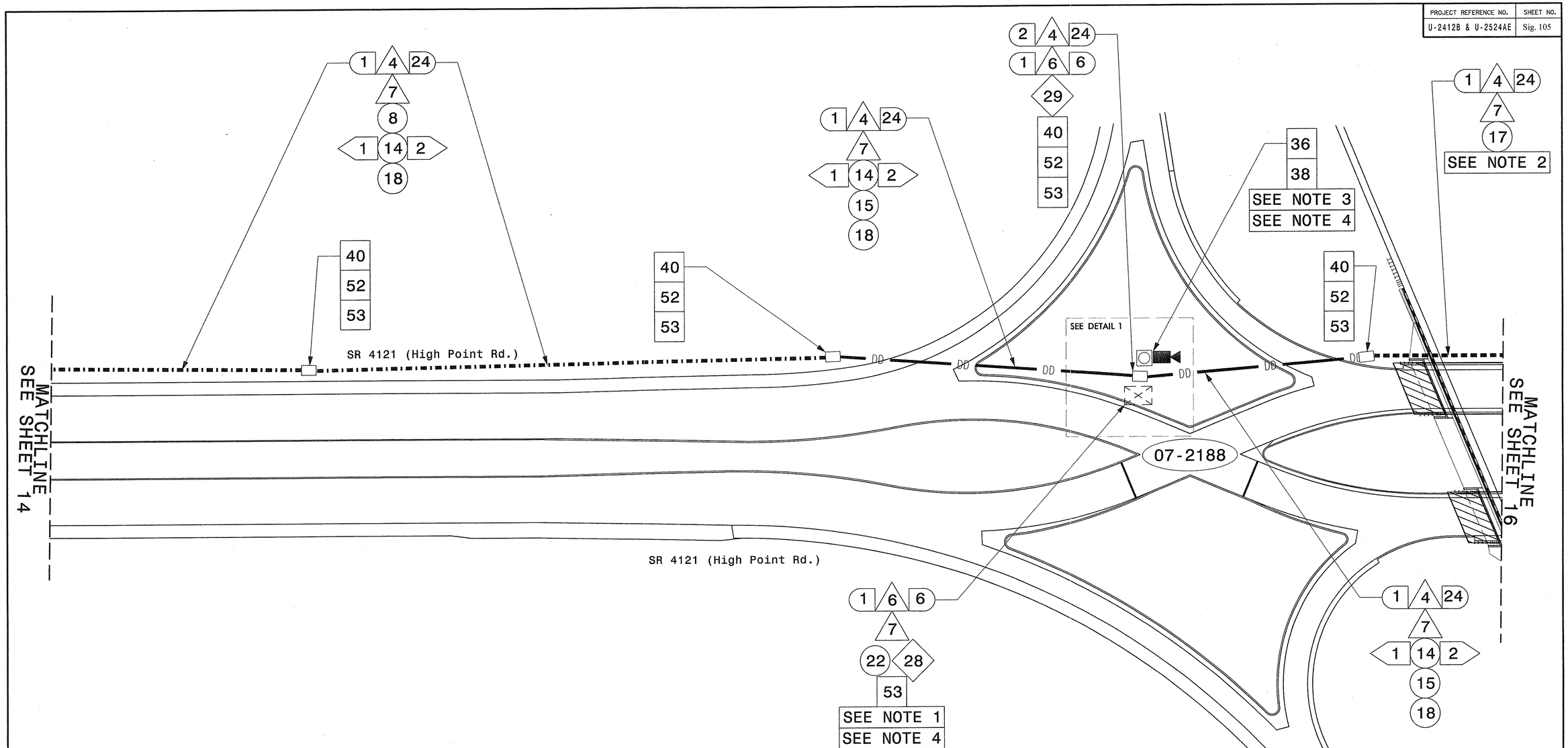
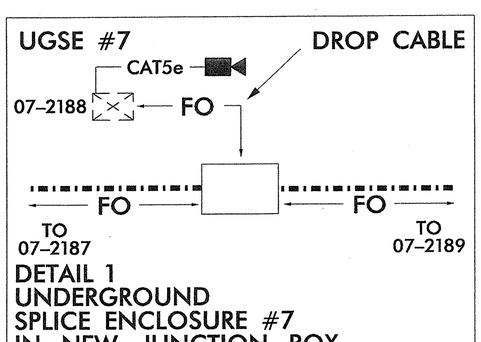
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 105





DETAIL 1
UNDERGROUND
SPLICE ENCLOSURE #7
IN NEW JUNCTION BOX

NOTES

1) BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

2) INSTALL FIBER OPTIC CABLE IN DESIGNATED CONDUIT ON NORTH SIDE OF NORTH BRIDGE.

3) CCTV CAMERAS TO BE FIELD LOCATED.

4) INSTALL CAT5e CABLE FOR CONNECTION TO CCTV CAMERA.

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FINAL DESIGN - SHEET 15 OF 23

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER JOHN ELLIOTT MAHANY
SIGNATURE
5/3/12
DATE

5/2/2012
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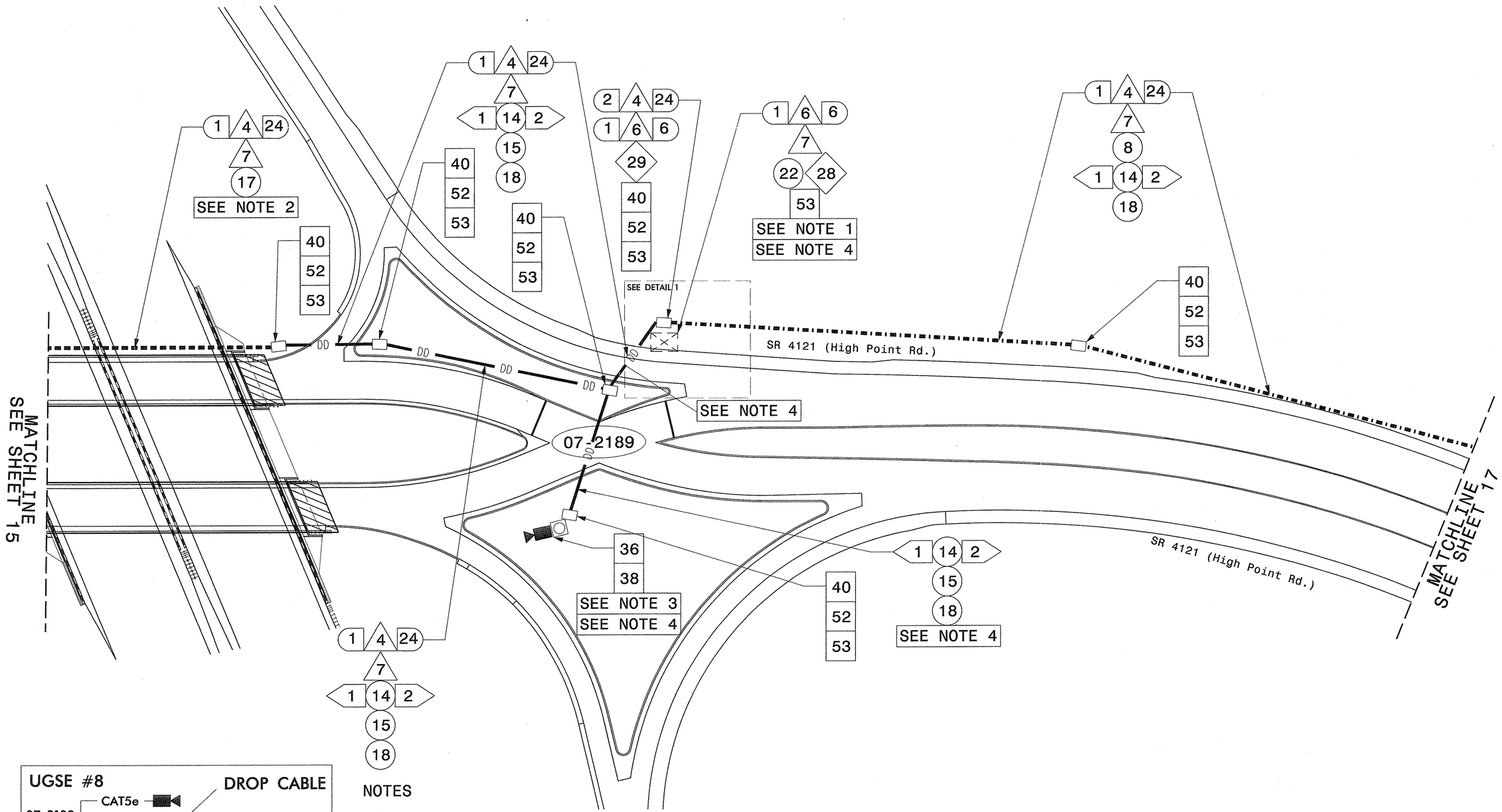
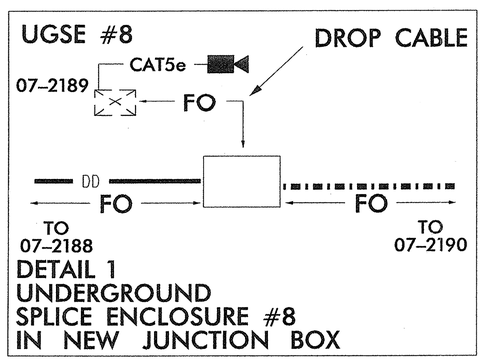
bigton

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 106





DETAIL 1
UNDERGROUND
SPLICE ENCLOSURE #8
IN NEW JUNCTION BOX

NOTES

1) DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

2) INSTALL FIBER OPTIC CABLE IN DESIGNATED CONDUIT ON NORTH SIDE OF NORTH BRIDGE.

3) CCTV CAMERAS TO BE FIELD LOCATED.

4) INSTALL CAT5e CABLE FOR CONNECTION TO CCTV CAMERA.

FINAL DESIGN - SHEET 16 OF 23

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Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE DATE 5/3/12

5/2/2012
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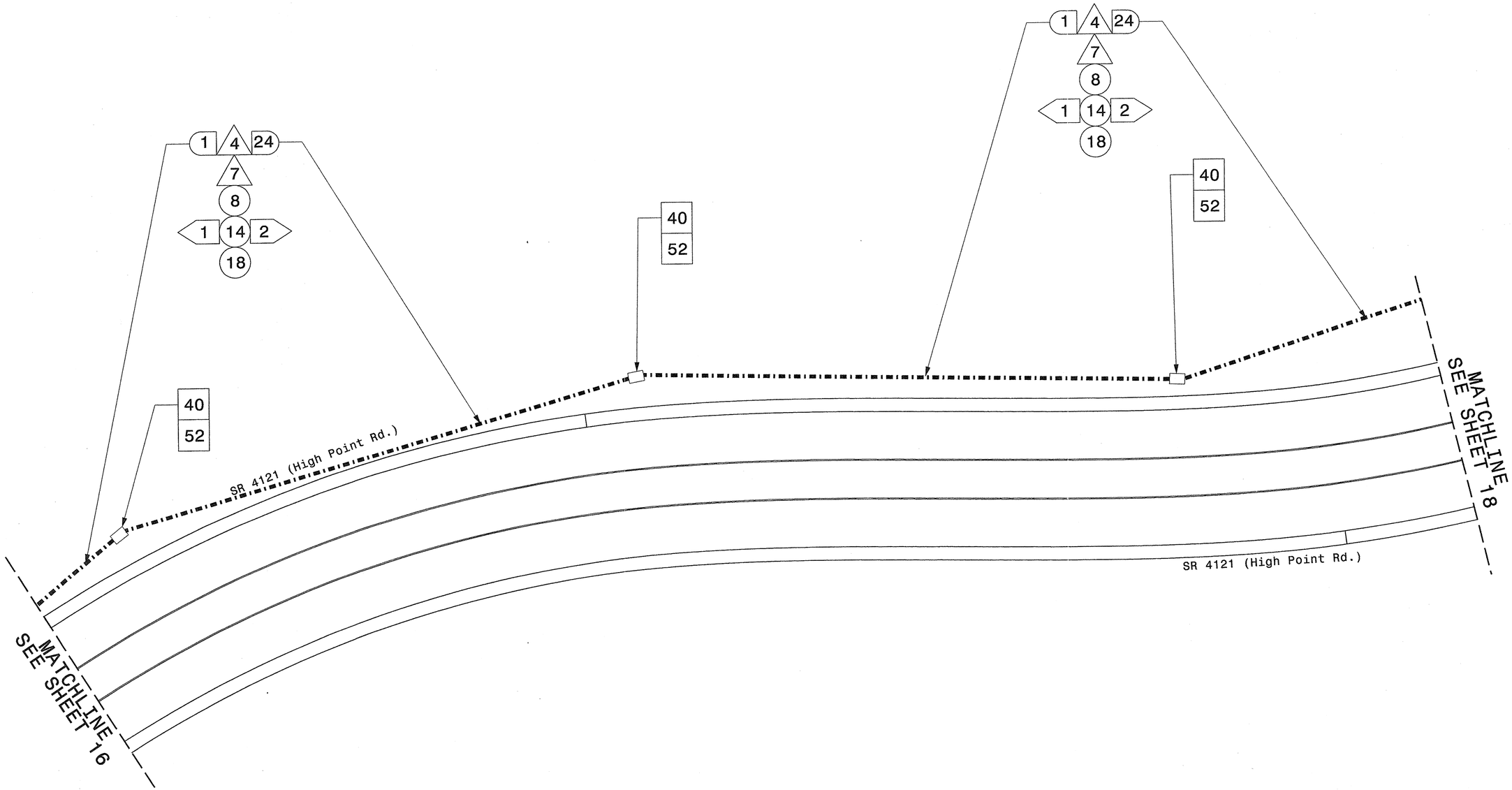
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 107



FINAL DESIGN - SHEET 17 OF 23

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Prepared for the Offices of:
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Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE
0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

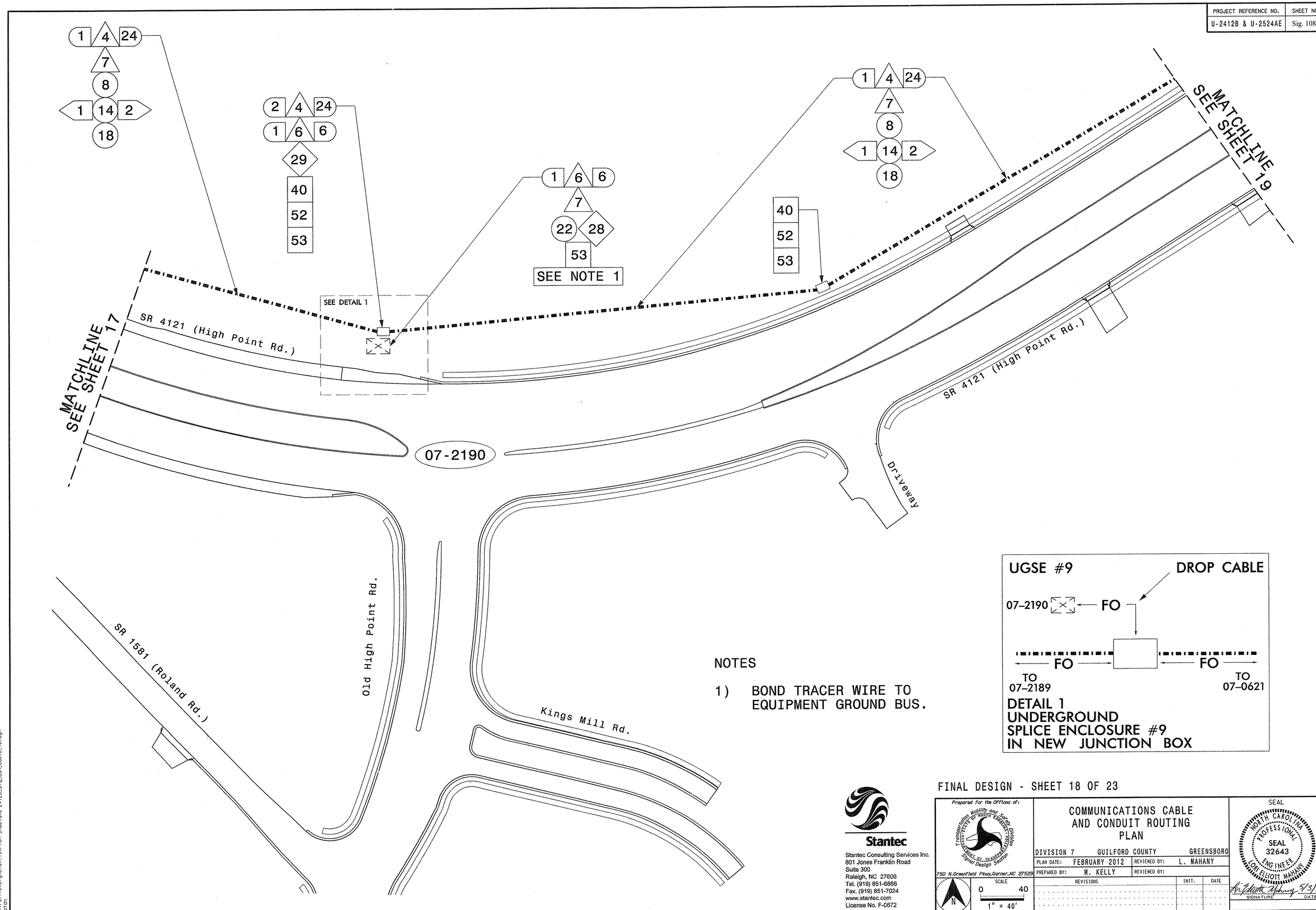
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LON ELLIOTT MAHANY

Lon Elliott Mahany 5/3/12
SIGNATURE DATE

5/2/2012
U:\Traffic\Signals\TSMPlan Sheets\U-2412B_sig_dsn_cable_17.dgn
lmahany

PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 108



NOTES

1) BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

FINAL DESIGN - SHEET 18 OF 23

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Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE DATE 5/3/12

5/2/2012
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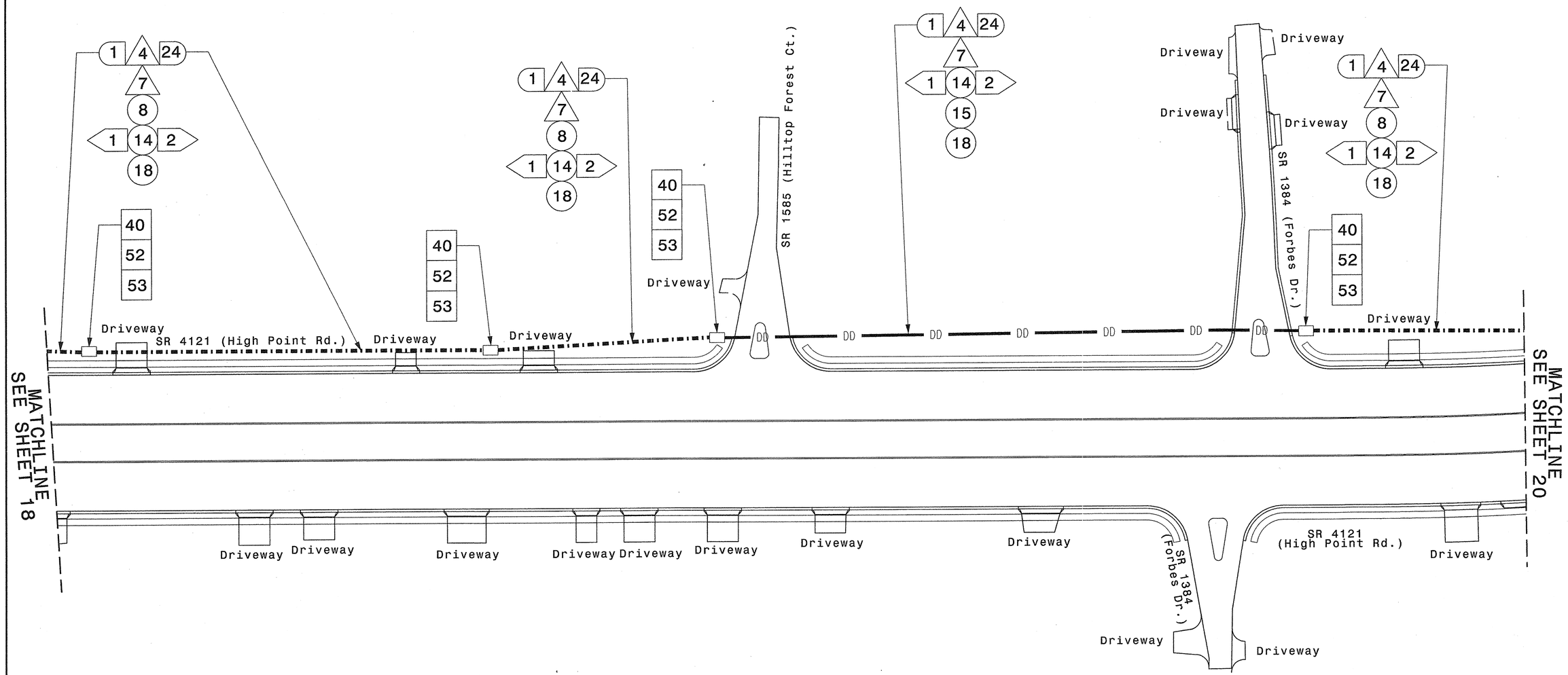
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 109



FINAL DESIGN - SHEET 19 OF 23

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Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY
SIGNATURE Lori Elliott Mahany DATE 5/3/12

5/2/2012
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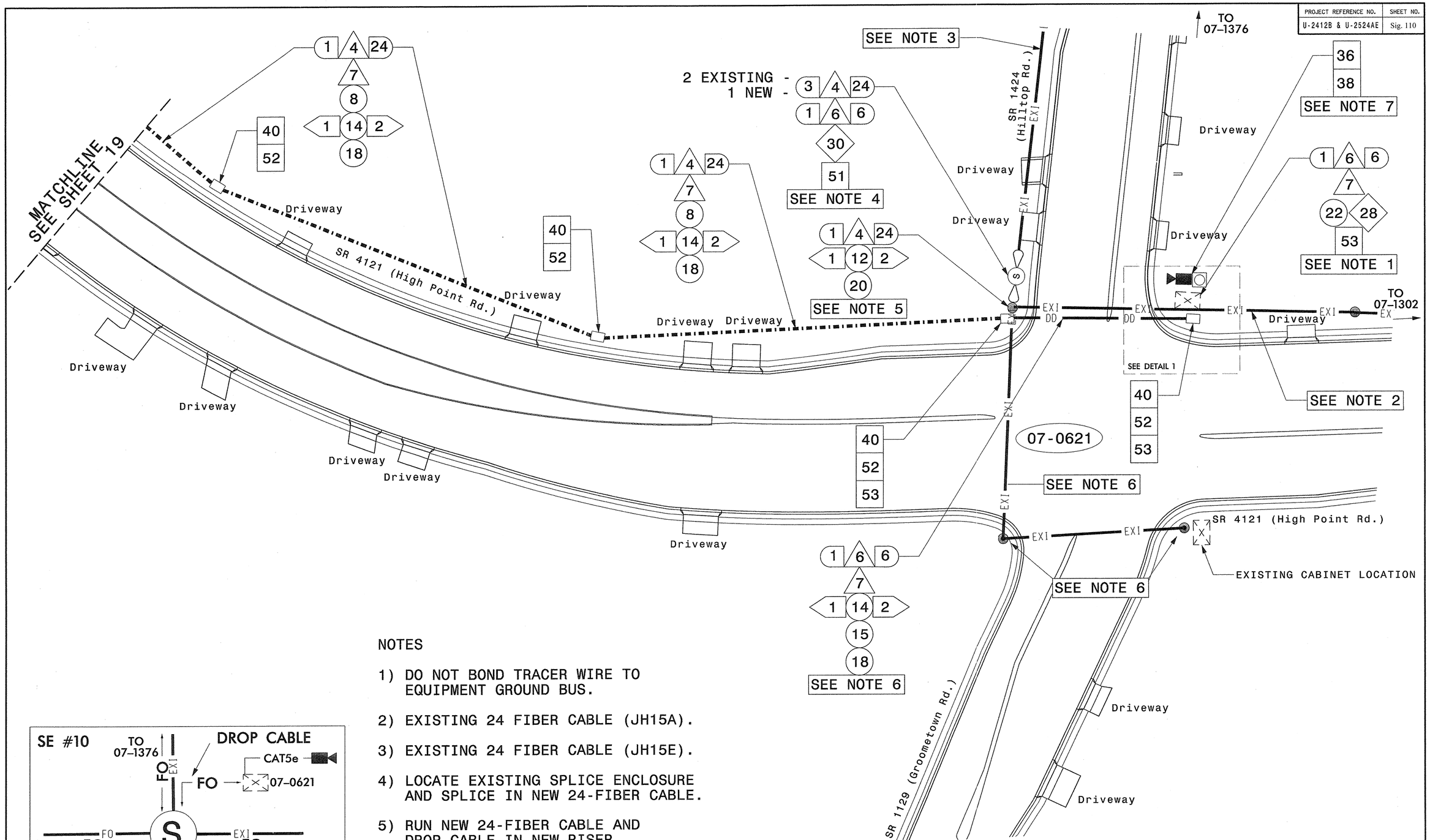
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 110



NOTES

1) DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

2) EXISTING 24 FIBER CABLE (JH15A).

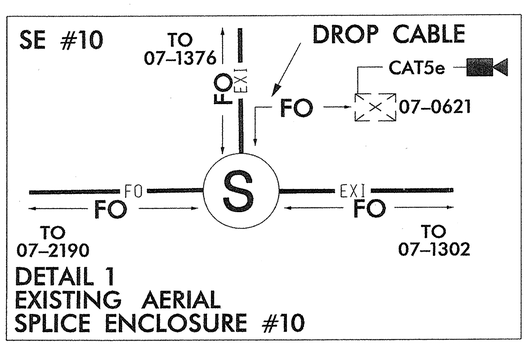
3) EXISTING 24 FIBER CABLE (JH15E).

4) LOCATE EXISTING SPLICE ENCLOSURE AND SPLICE IN NEW 24-FIBER CABLE.

5) RUN NEW 24-FIBER CABLE AND DROP CABLE IN NEW RISER.

6) BACK PULL EXISTING DROP CABLE FROM EXISTING CABINET AND RELOCATE TO NEW CABINET.

7) CCTV CAMERAS TO BE FIELD LOCATED.



DETAIL 1
EXISTING AERIAL
SPLICE ENCLOSURE #10

FINAL DESIGN - SHEET 20 OF 23

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Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY
SIGNATURE Lori Elliott Mahany DATE 5/3/10

5/2/2012
bwright
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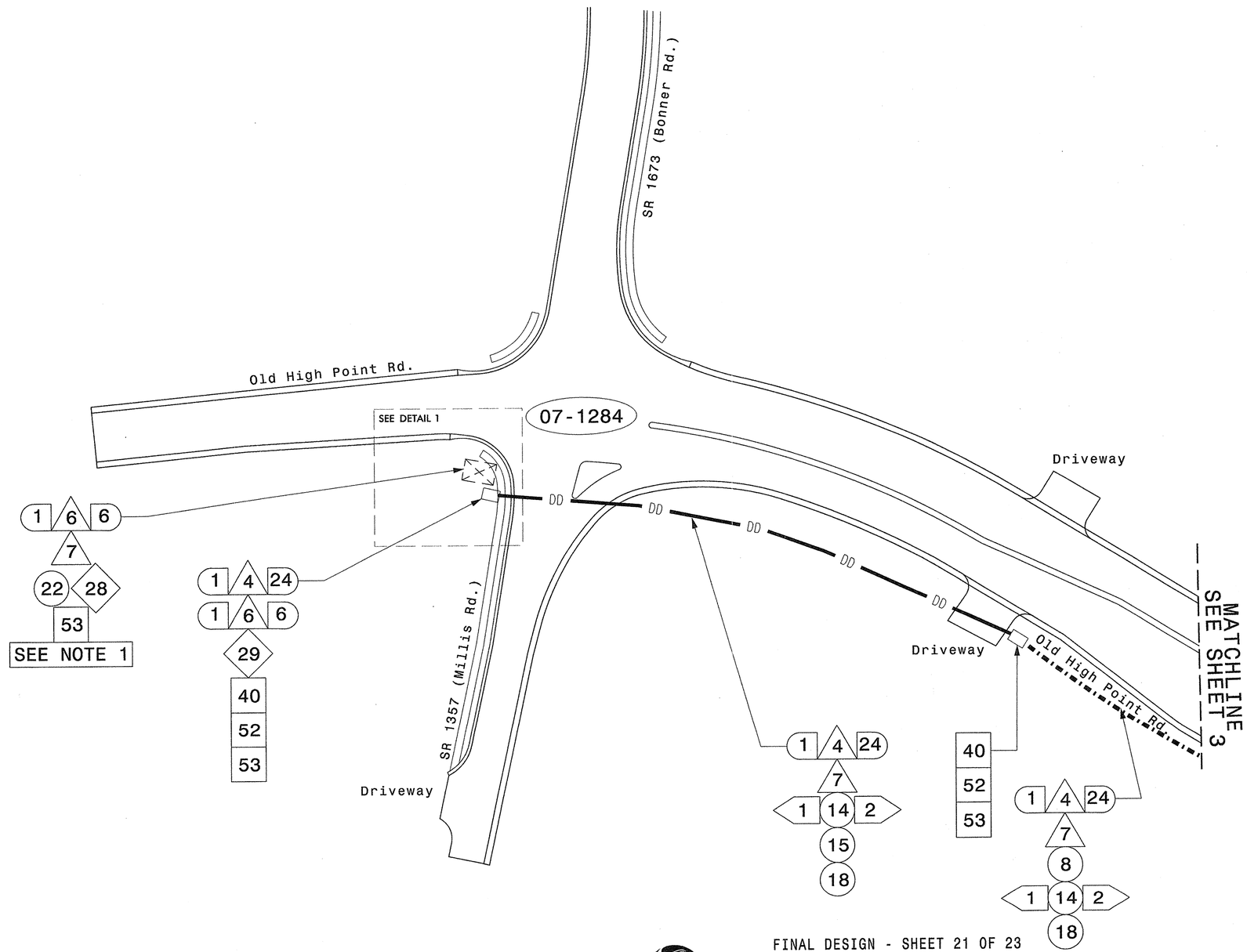
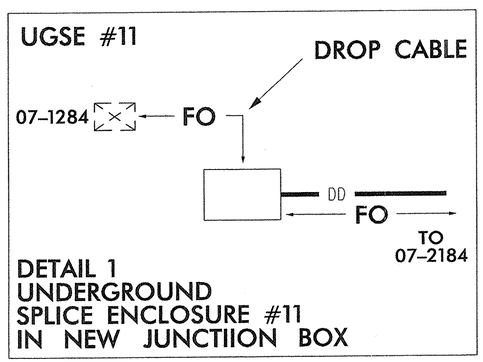
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 111





DETAIL 1
UNDERGROUND
SPLICE ENCLOSURE #11
IN NEW JUNCTIION BOX

NOTES

1) BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

FINAL DESIGN - SHEET 21 OF 23

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License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

for Elliott Mahany 5/3/12
SIGNATURE DATE

5/3/2012
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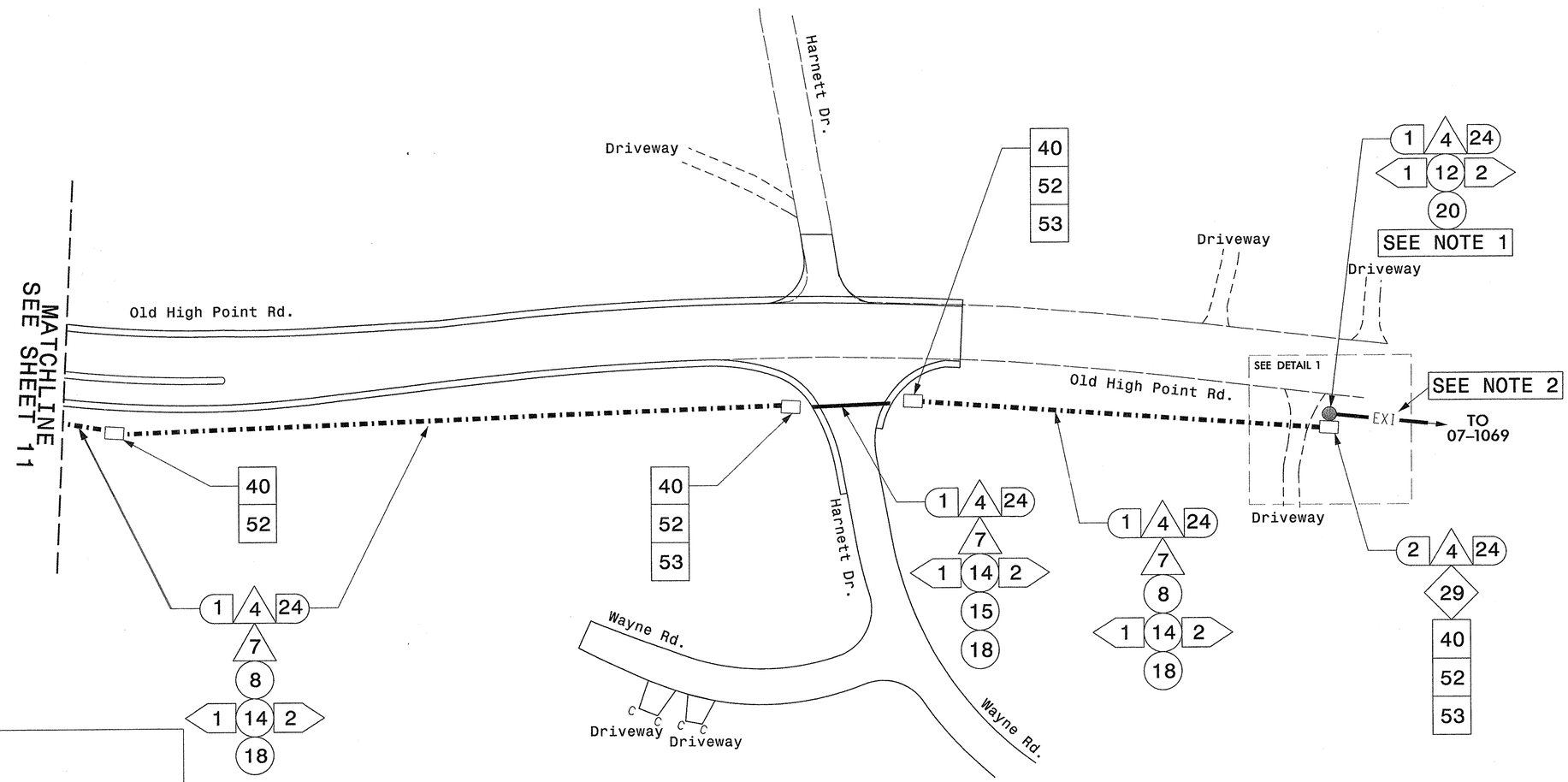
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 112



UGSE #12

FO — FO

TO 07-2187 TO 07-1069

DETAIL 1
UNDERGROUND
SPLICE ENCLOSURE #12
IN NEW JUNCTION BOX

NOTES

1) RUN EXISTING FIBER OPTIC CABLE FROM EXISTING DUKE ENERGY POLE DOWN NEW RISER INTO UNDERGROUND SPLICE ENCLOSURE.

2) AT INTERSECTION 07-1069 DISCONNECT EXISTING 24-FIBER ORIGINATING FROM I-73 AND LEAVE COILED AND CAPPED IN SPLICE TRAY.

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License No. F-0672

FINAL DESIGN - SHEET 22 OF 23

Prepared for the Offices of: Transportation Mobility and Safety Division, Signal Design Section, 750 N.Greenfield Pkwy, Garner, NC 27529

SCALE 0 40 1" = 40'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE: for Elliott Mahany DATE: 5/3/12

5/2/2012
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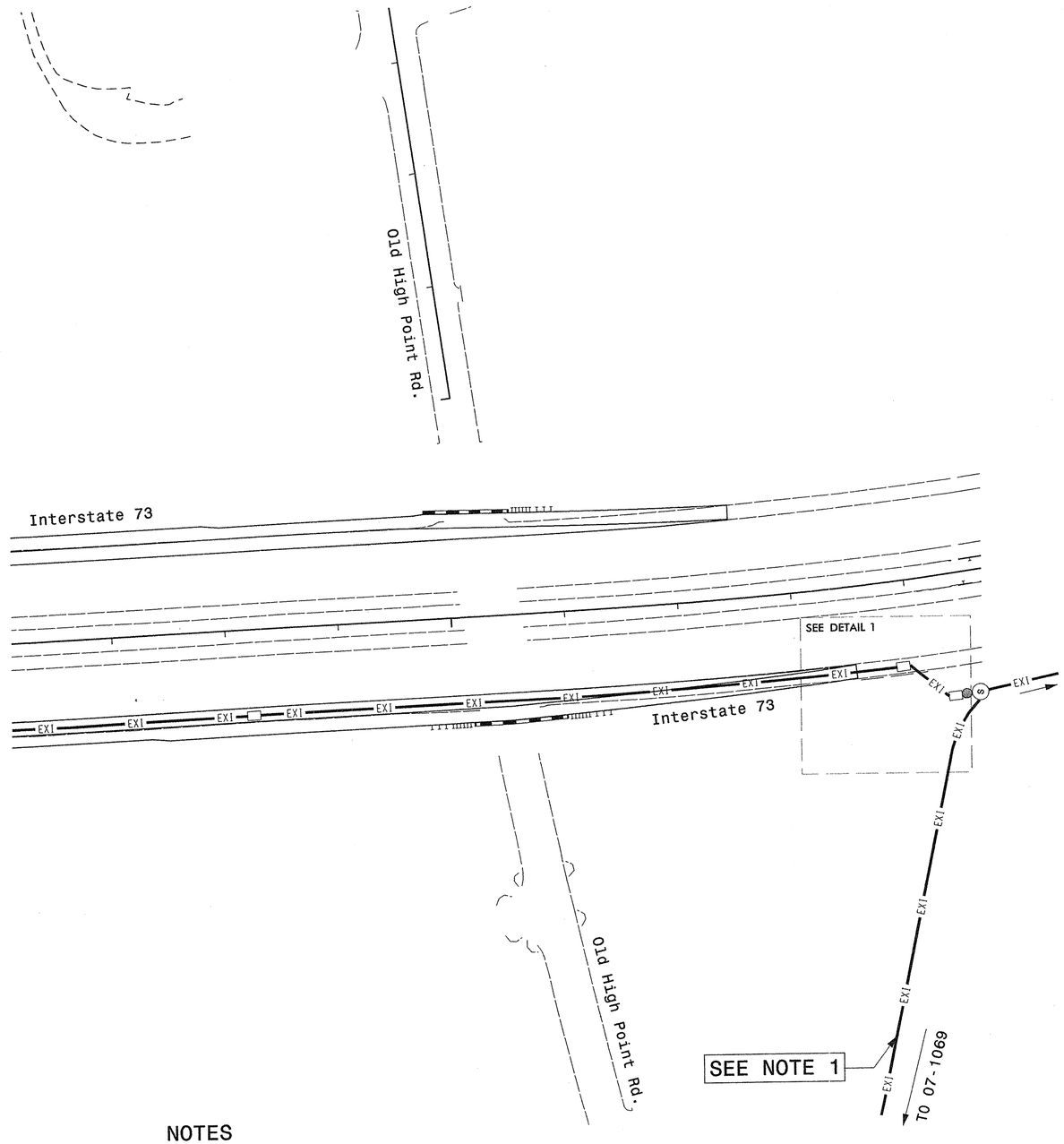
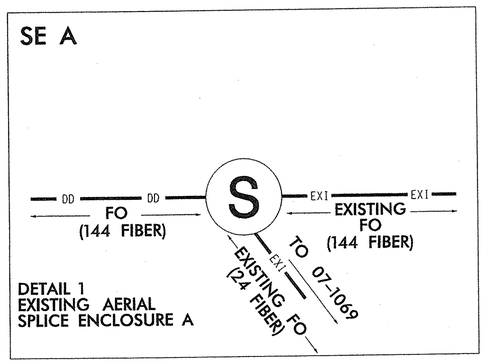
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 113





NOTES

1) AT EXISTING AERIAL SPLICE ENCLOSURE DISCONNECT EXISTING 24-FIBER TO 07-1069 AND LEAVE COILED AND CAPPED IN SPLICE TRAY.

FINAL DESIGN - SHEET 23 OF 23

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Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering & Safety Systems Branch
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 60
1" = 60'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLAN

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE Lori Elliott Mahany DATE 5/3/12

5/2/2012
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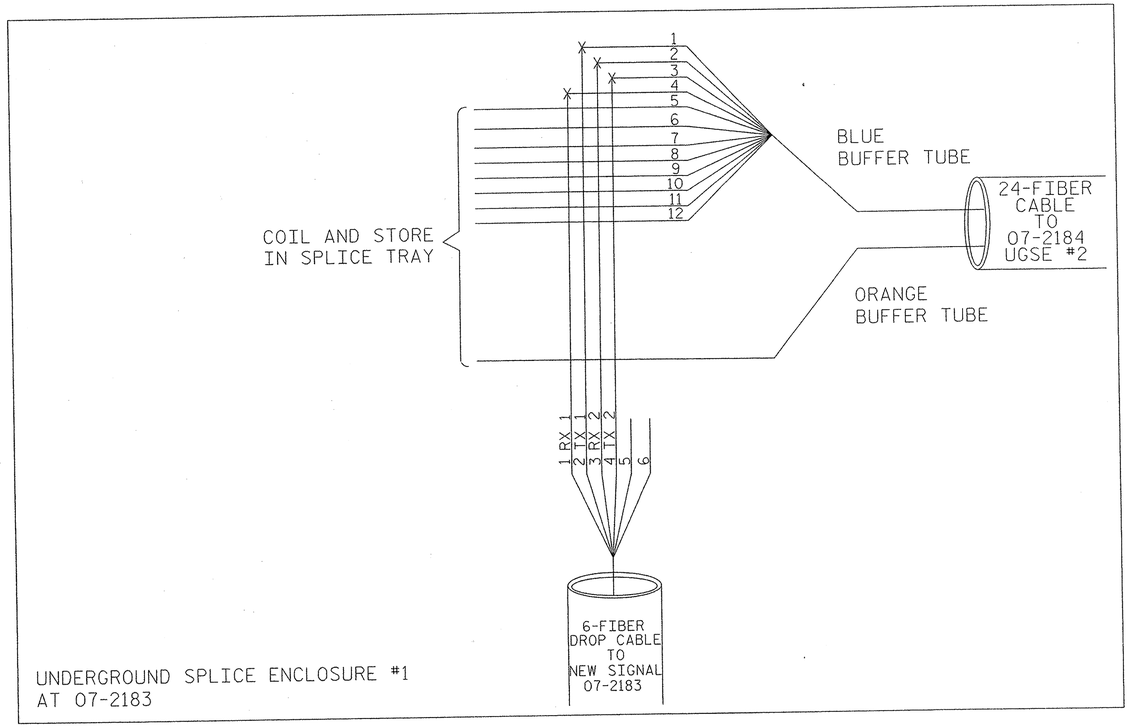
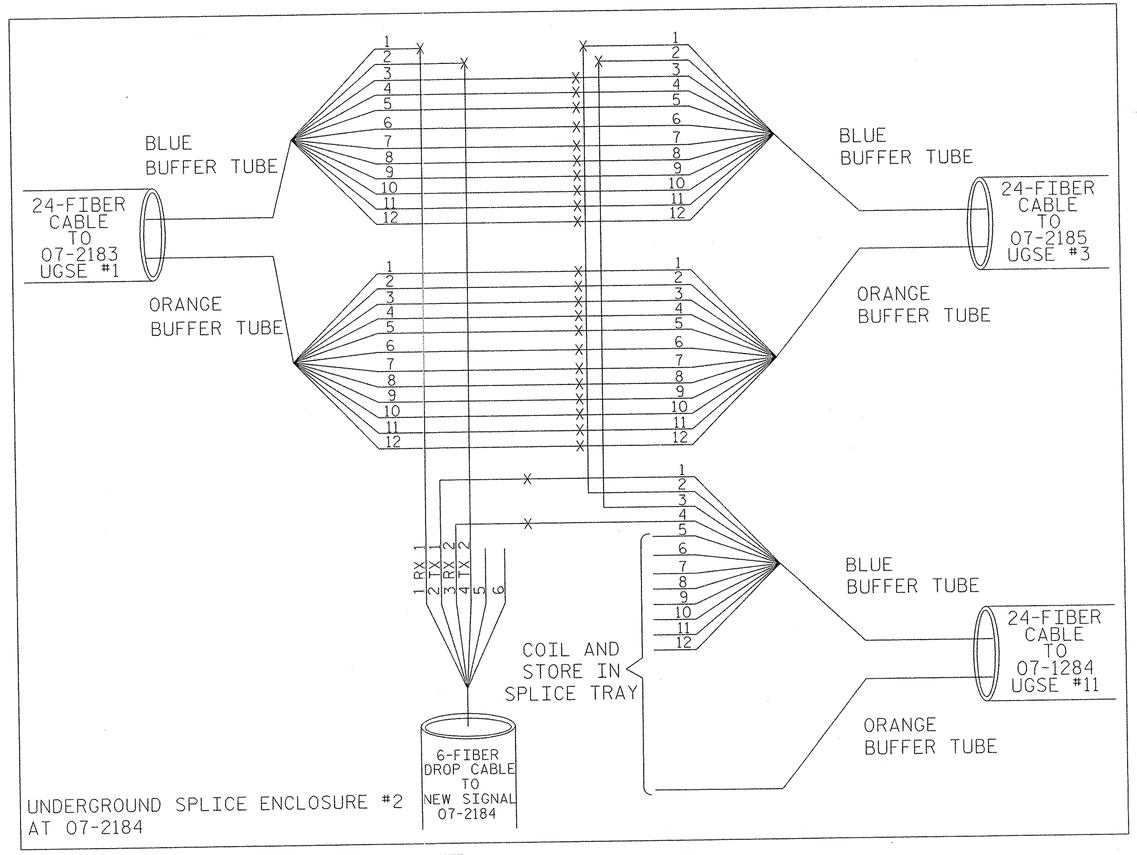
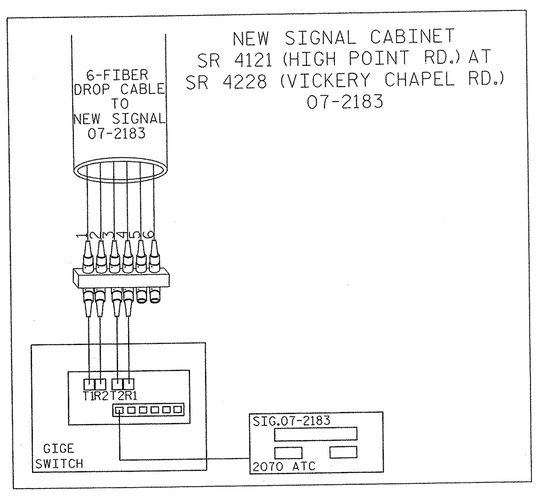
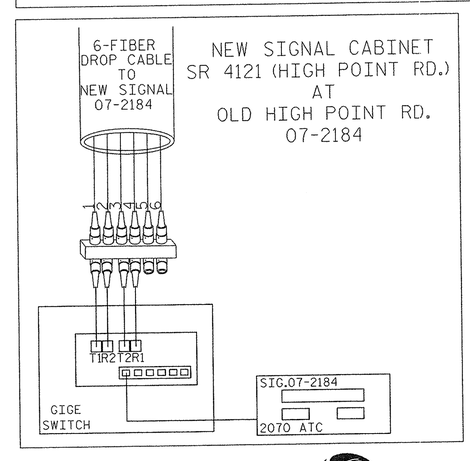
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 114

FIBER OPTIC CABLE SPLICE PLAN









NOTES:

1. UNLESS OTHERWISE NOTED, CAP AND STORE UNUSED FIBERS.
2. ALL NEW ETHERNET SWITCHES SHALL BE RUGGEDCOM RS900G EDGE SWITCHES.

LEGEND

COLOR CODE TIA/EIA 598-A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA

ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE — SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

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Fax. (919) 851-7024
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License No. F-0672

FINAL DESIGN

Prepared for the Offices of:
Transportation Mobility and Safety Division
Department of Transportation
State of North Carolina
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE: 0 — 40; 1" = 40'

SPLICE PLAN

SHEET 1 OF 7

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE DATE 5/3/12

1/30/2012
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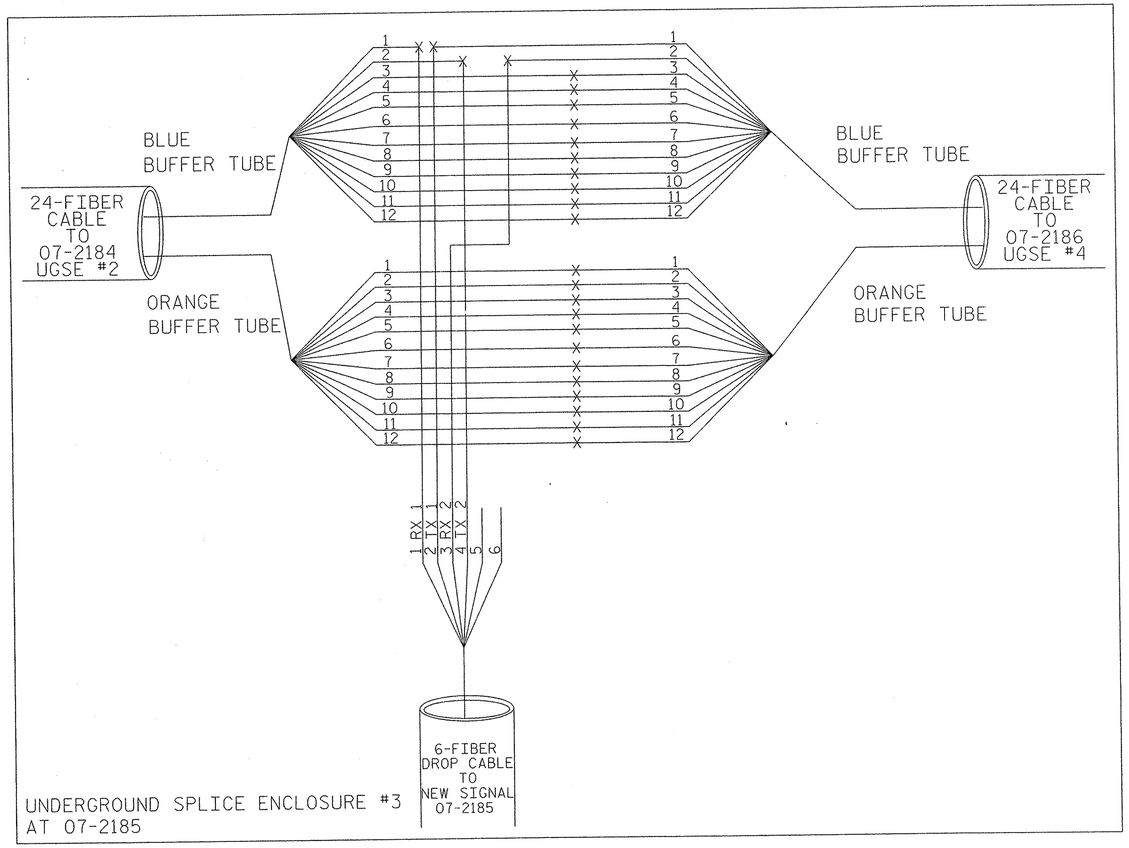
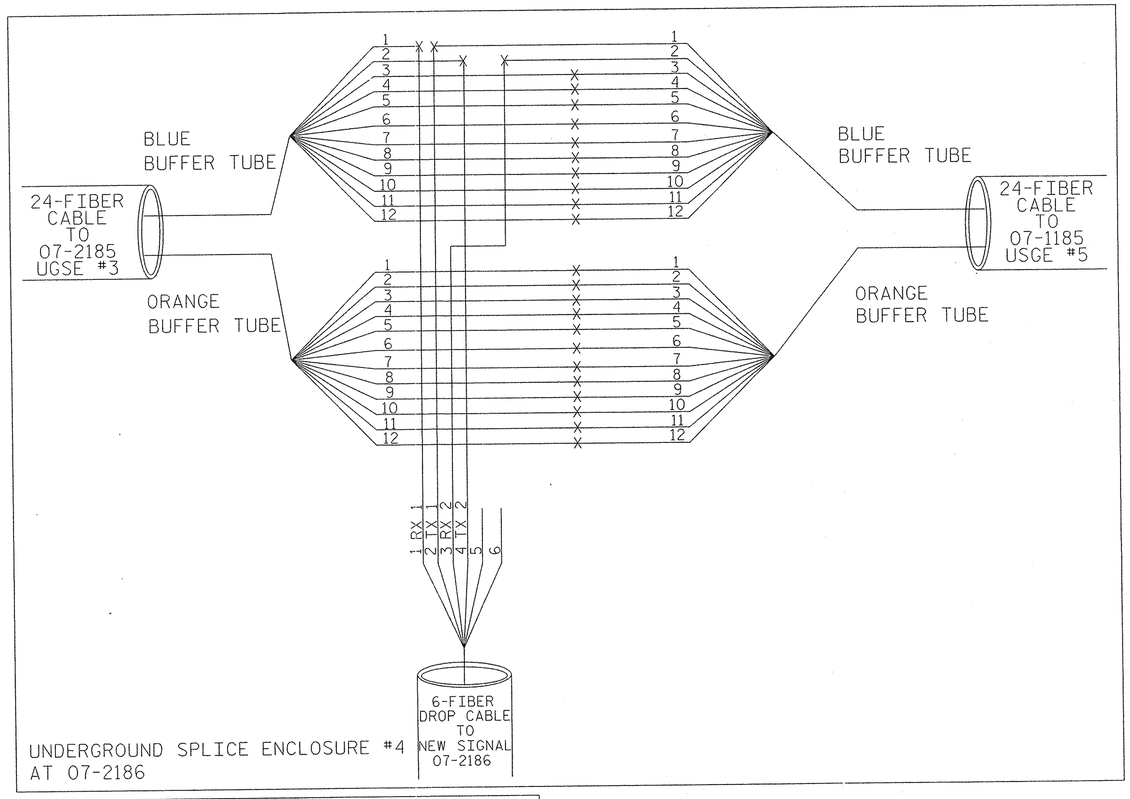
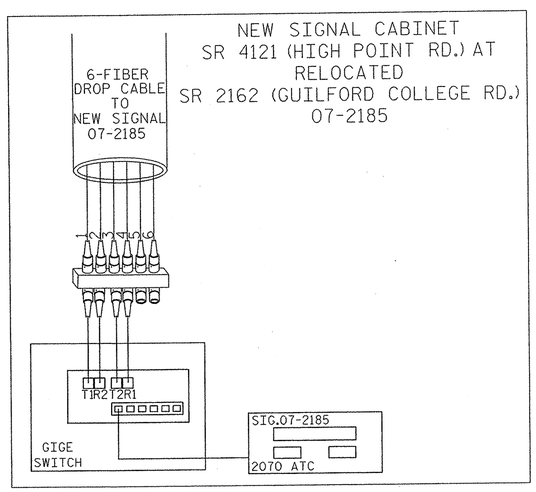
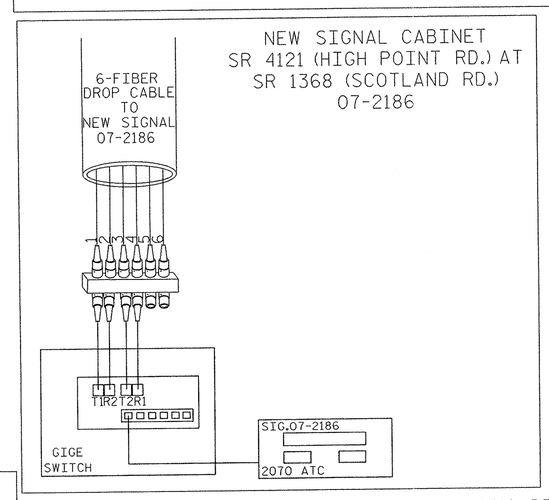
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 115

FIBER OPTIC CABLE SPLICE PLAN









NOTES:

1. UNLESS OTHERWISE NOTED, CAP AND STORE UNUSED FIBERS.
2. ALL NEW ETHERNET SWITCHES SHALL BE RUGGEDCOM RS900G EDGE SWITCHES.

LEGEND

COLOR CODE TIA/EIA 598-A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA

ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE — SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

Stantec

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801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

FINAL DESIGN

Prepared for the Offices of: Transportation Mobility and Safety Division, Signal Design Section, 750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 — 1" = 40'

SPLICE PLAN

SHEET 2 OF 7

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE Lori Elliott Mahany DATE 5/3/12

4/30/2012
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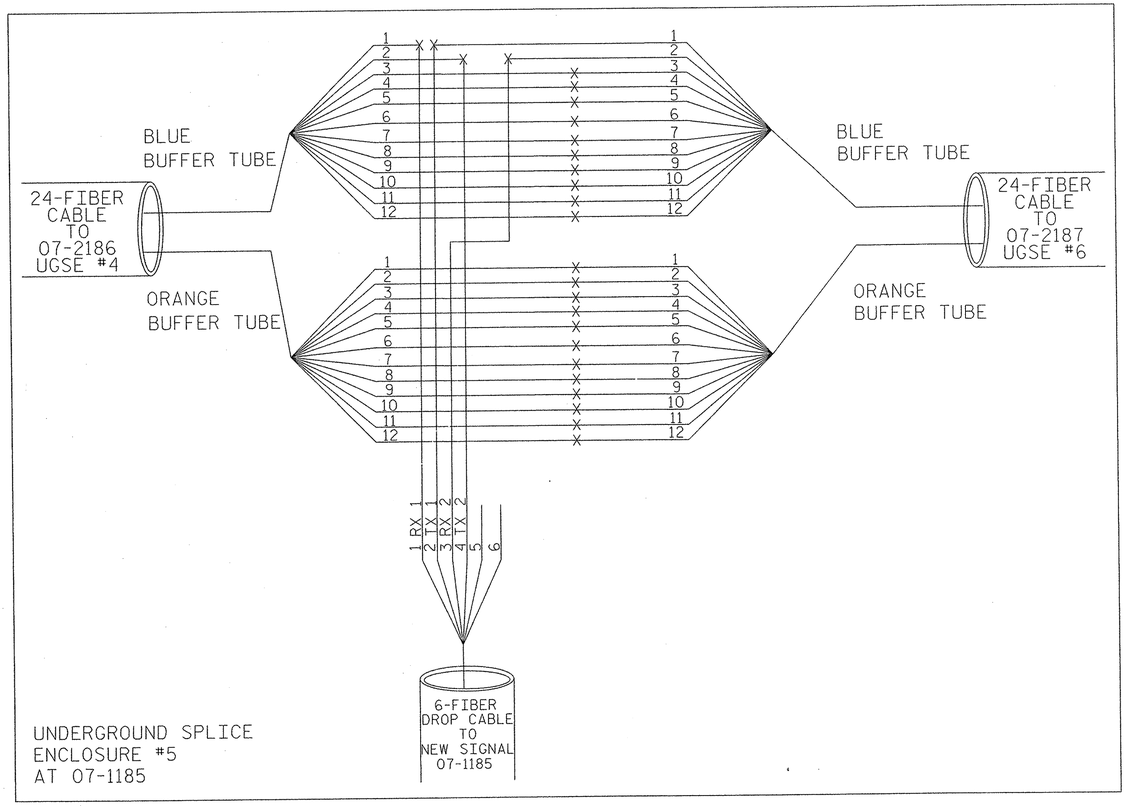
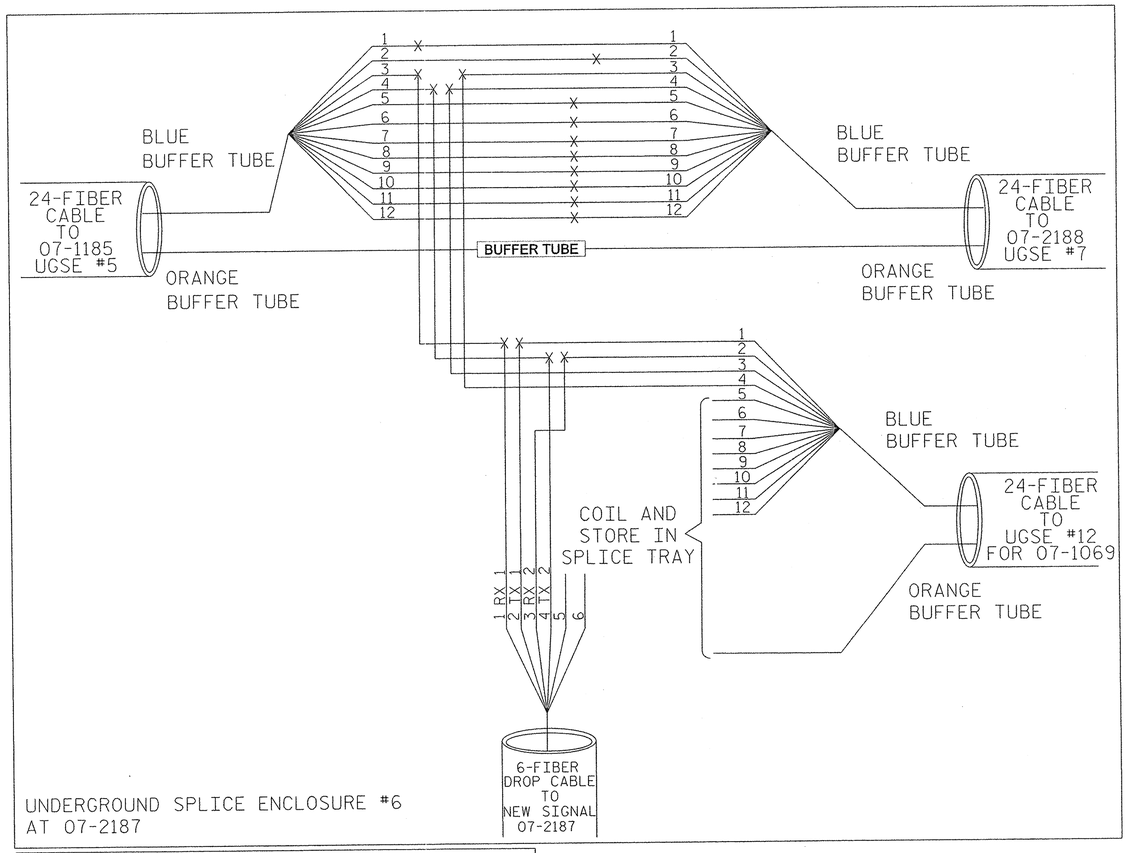
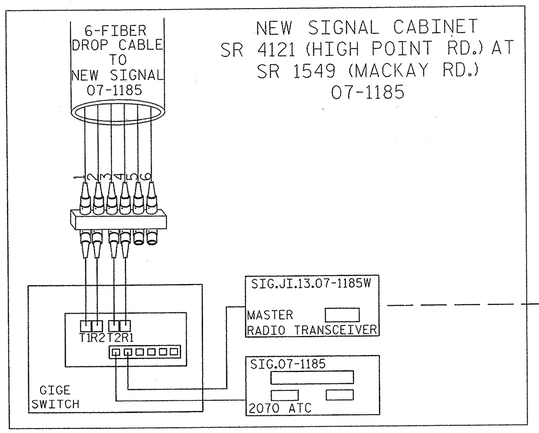
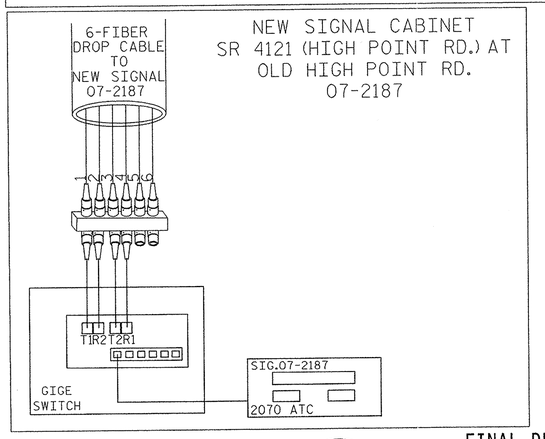
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 116

FIBER OPTIC CABLE SPLICE PLAN









LEGEND

COLOR CODE TIA/EIA 598-A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA

ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE — SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

NOTES:

1. UNLESS OTHERWISE NOTED, CAP AND STORE UNUSED FIBERS.
2. ALL NEW ETHERNET SWITCHES SHALL BE RUGGEDCOM RS900G EDGE SWITCHES.

FINAL DESIGN

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License No. F-0672

Prepared for the Offices of: Transportation Mobility and Safety Division, Signal Design Section, 750 N.Greenfield Pkwy, Garner, NC 27529

SCALE 0 40 — 1" = 40'

SPLICE PLAN

SHEET 3 OF 7

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER JOHN ELLIOTT MAHANY

SIGNATURE — DATE 5/3/12

5/1/2012
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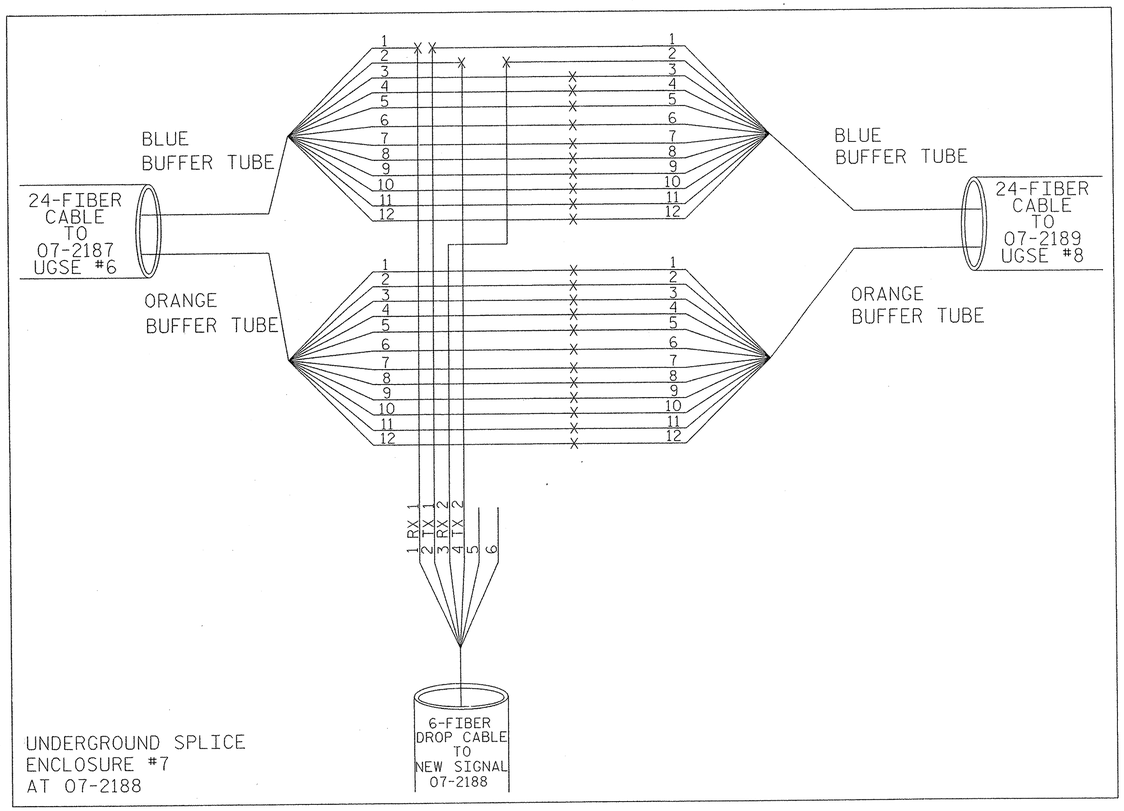
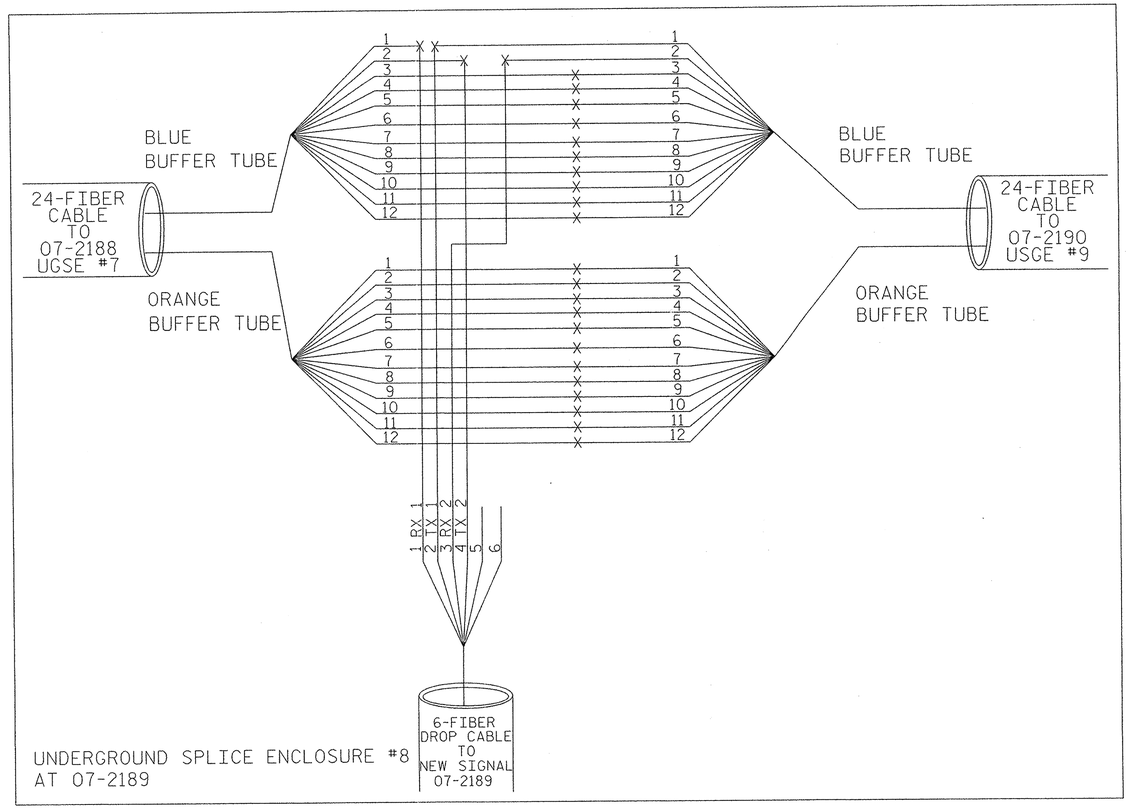
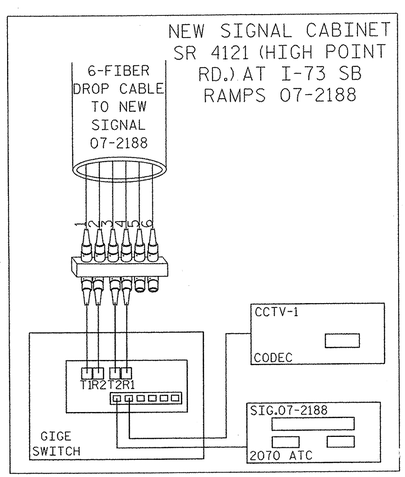
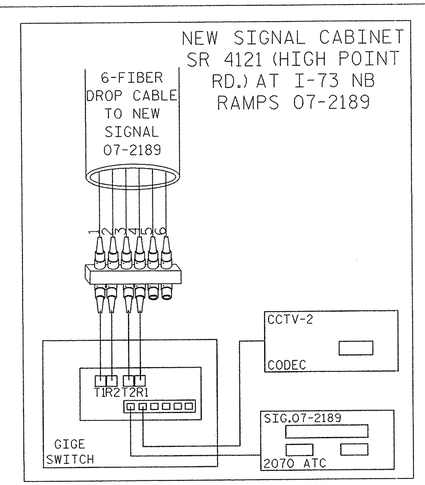
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 117

FIBER OPTIC CABLE SPLICE PLAN









NOTES:

1. UNLESS OTHERWISE NOTED, CAP AND STORE UNUSED FIBERS.
2. ALL NEW ETHERNET SWITCHES SHALL BE RUGGEDCOM RS900G EDGE SWITCHES.

LEGEND

COLOR CODE TIA/EIA 598-A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA

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X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE — SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

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Fax. (919) 851-7024
www.stantec.com
License No. F-0672

FINAL DESIGN

Prepared for the Offices of:
Transportation Mobility and Safety Division
Intelligent Transportation Systems
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 — 40
1" = 40'

SPLICE PLAN

SHEET 4 OF 7

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

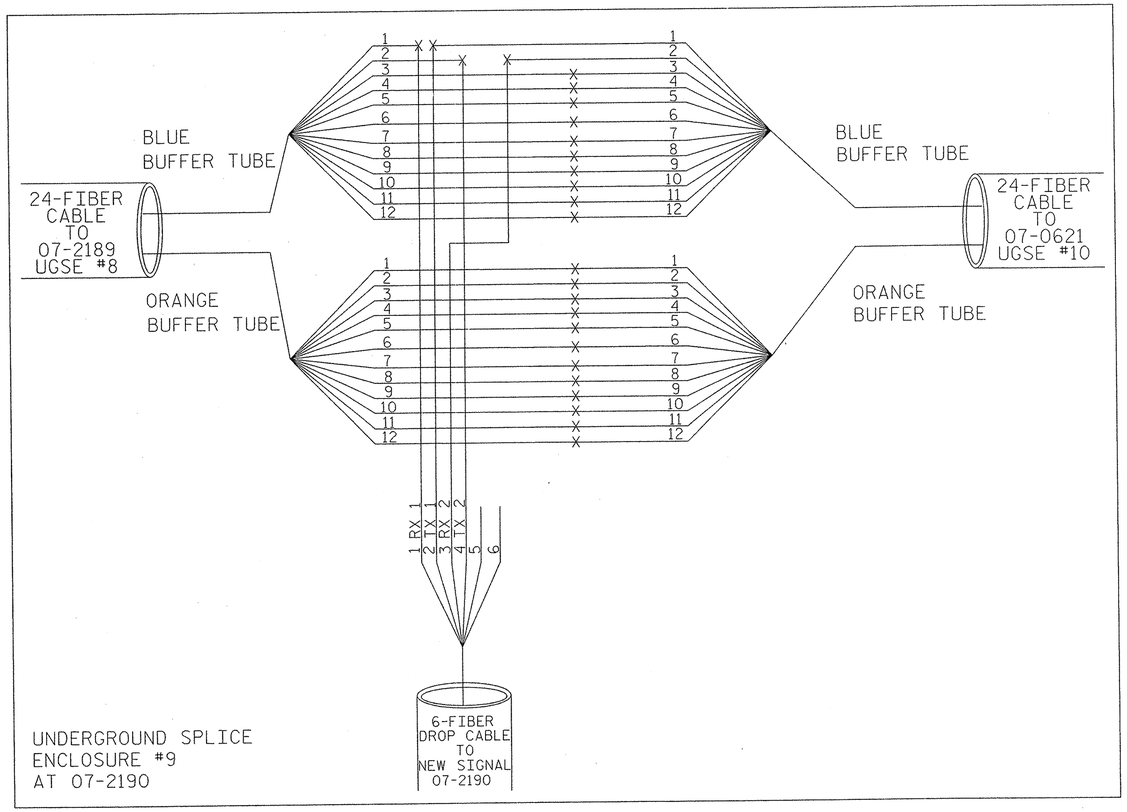
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LOU ELLIOTT MAHANY

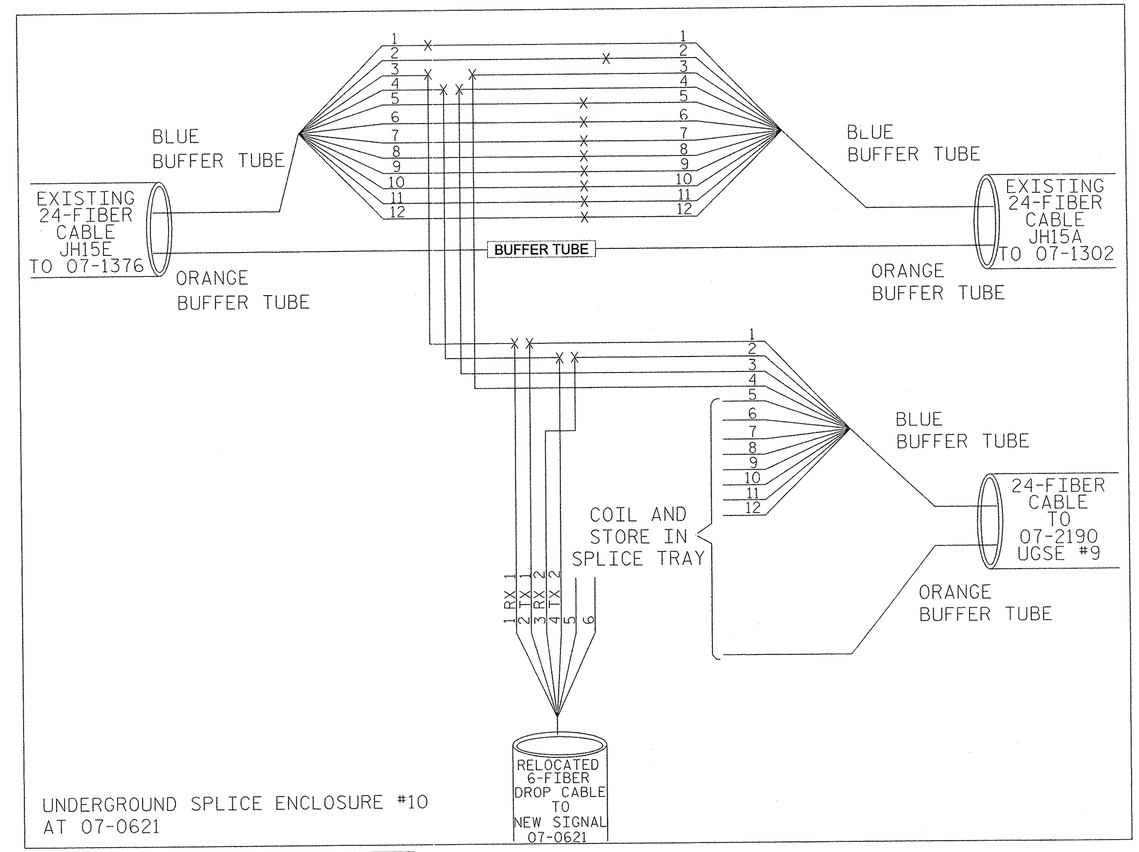
SIGNATURE DATE 5/3/12

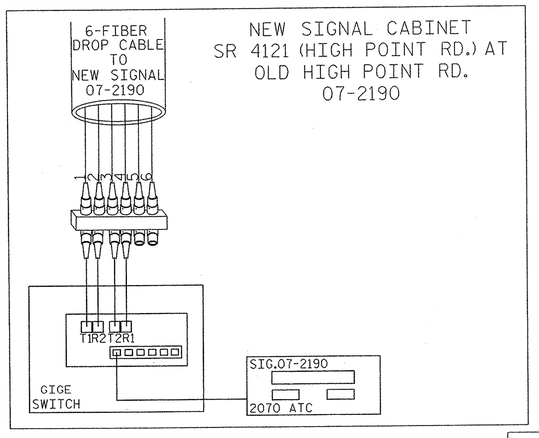
4/30/2012
12:40:01PM
jlotton

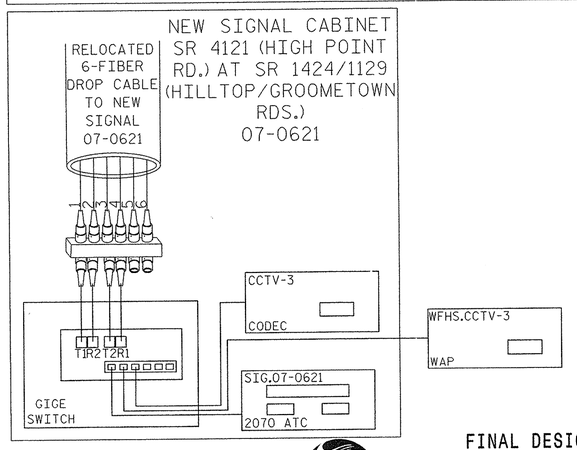
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 118

FIBER OPTIC CABLE SPLICE PLAN









NOTES:

1. UNLESS OTHERWISE NOTED, CAP AND STORE UNUSED FIBERS.
2. ALL NEW ETHERNET SWITCHES SHALL BE RUGGEDCOM RS900G EDGE SWITCHES.

LEGEND

COLOR CODE TIA/EIA 598-A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA

ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE — SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

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Raleigh, NC 27606
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Fax. (919) 851-7024
www.stantec.com
License No. F-0672

FINAL DESIGN

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 — 1" = 40'

SPLICE PLAN

SHEET 5 OF 7

DIVISION 7	GUILFORD COUNTY	GREENSBORO
PLAN DATE: FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY: M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER JOHN ELLIOTT MAHANY

SIGNATURE — DATE 5/3/12

4/30/2012
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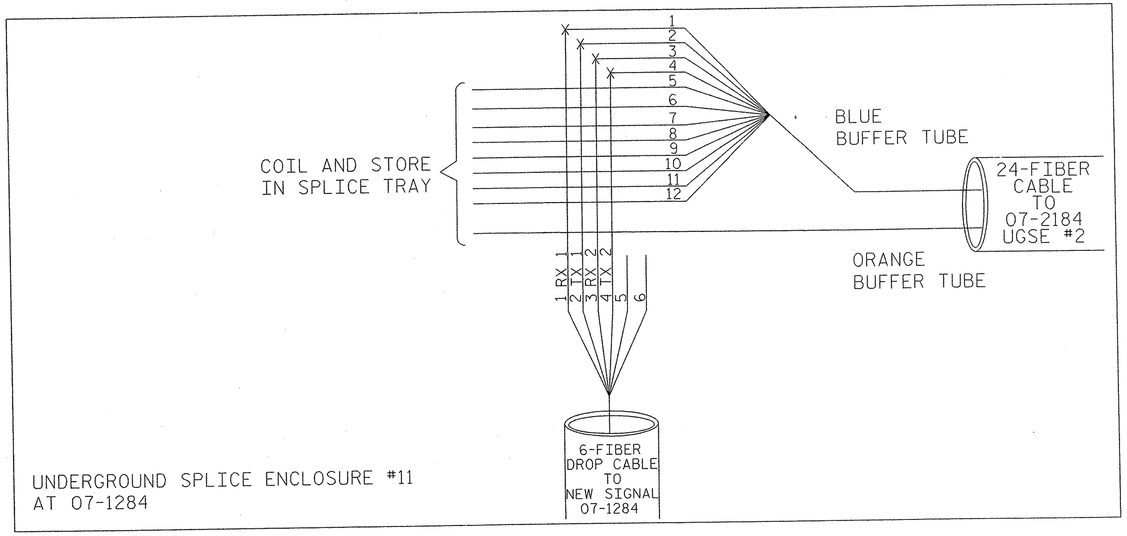
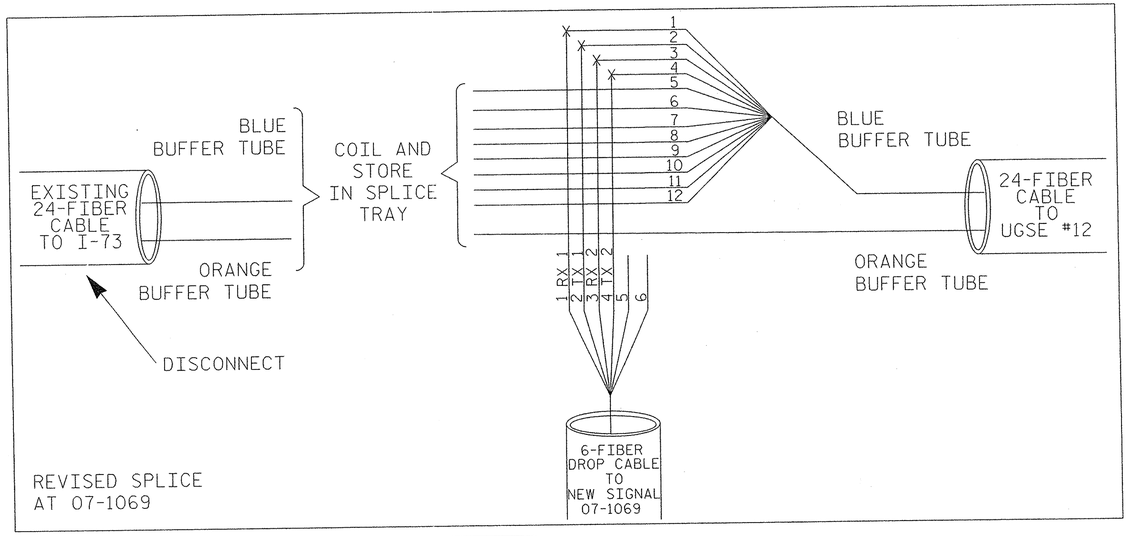
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 119

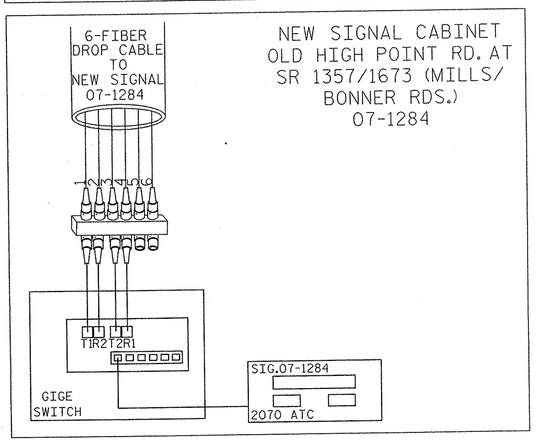
FIBER OPTIC CABLE SPLICE PLAN



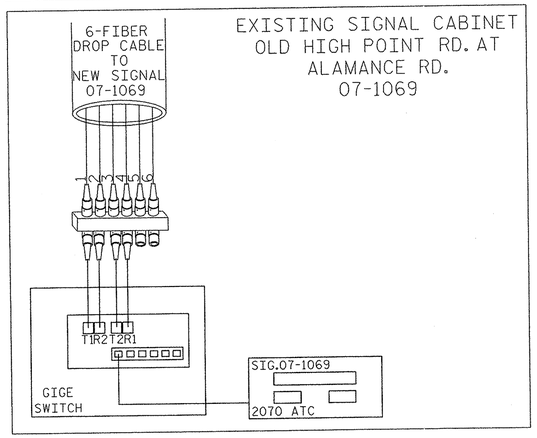
UNDERGROUND SPLICE ENCLOSURE #11
AT 07-1284



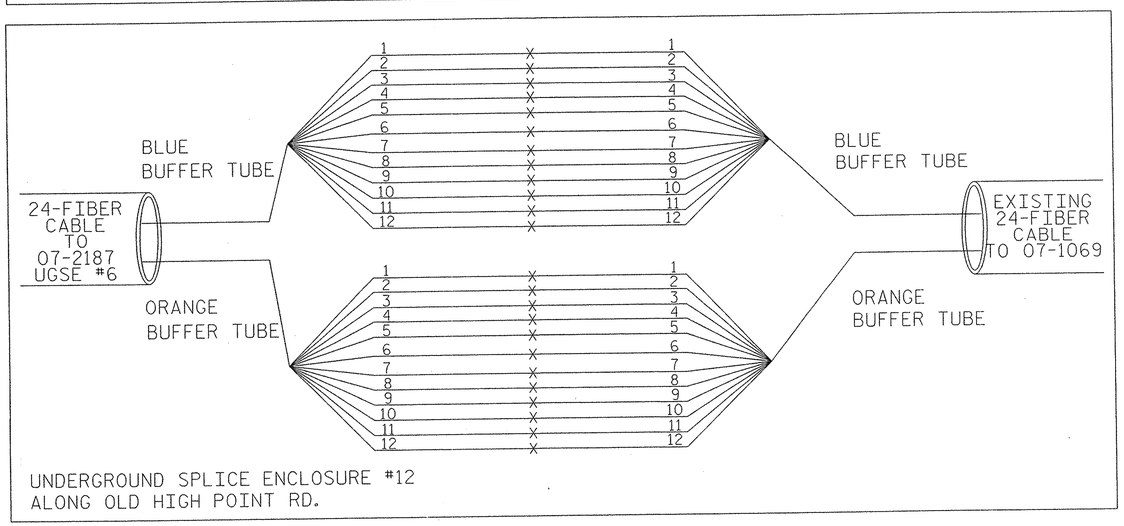
REVISED SPLICE
AT 07-1069



NEW SIGNAL CABINET
OLD HIGH POINT RD. AT
SR 1357/1673 (MILLS/
BONNER RDS.)
07-1284



EXISTING SIGNAL CABINET
OLD HIGH POINT RD. AT
ALAMANCE RD.
07-1069



UNDERGROUND SPLICE ENCLOSURE #12
ALONG OLD HIGH POINT RD.

NOTES:

1. UNLESS OTHERWISE NOTED, CAP AND STORE UNUSED FIBERS.
2. ALL NEW ETHERNET SWITCHES SHALL BE RUGGEDCOM RS900G EDGE SWITCHES.

LEGEND

COLOR CODE
TIA/EIA 598-A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA

ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE — SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

FINAL DESIGN

Stantec
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Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40
1" = 40'

SPLICE PLAN

SHEET 6 OF 7

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

for Elliott Mahany 5/3/12
SIGNATURE DATE

5/1/2012
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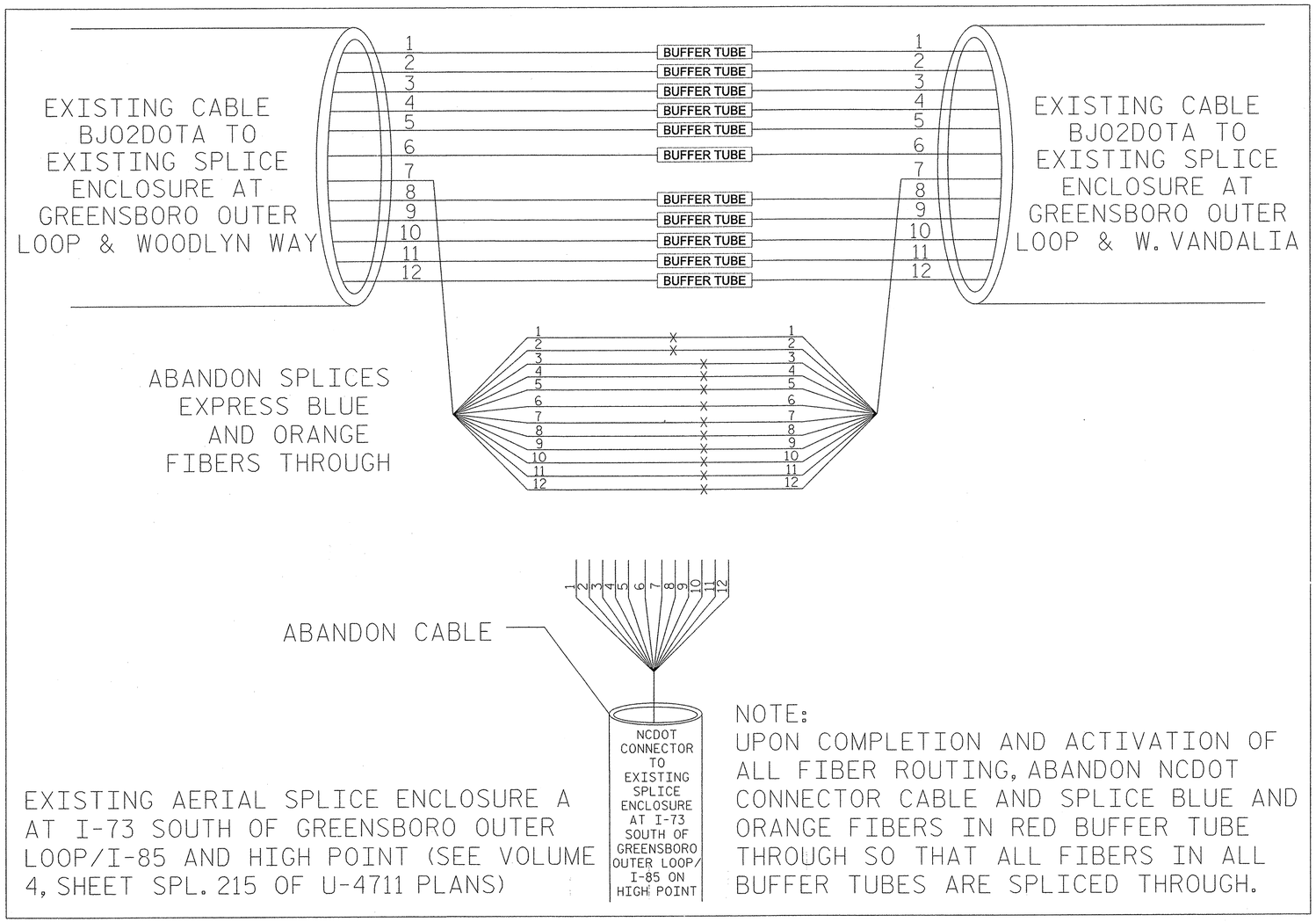
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 120

FIBER OPTIC CABLE SPLICE PLAN



NOTE:
UPON COMPLETION AND ACTIVATION OF ALL FIBER ROUTING, ABANDON NCDOT CONNECTOR CABLE AND SPLICE BLUE AND ORANGE FIBERS IN RED BUFFER TUBE THROUGH SO THAT ALL FIBERS IN ALL BUFFER TUBES ARE SPLICED THROUGH.

NOTES:

1. UNLESS OTHERWISE NOTED, CAP AND STORE UNUSED FIBERS.
2. ALL NEW ETHERNET SWITCHES SHALL BE RUGGEDCOM RS900G EDGE SWITCHES.

LEGEND

COLOR CODE TIA/EIA 598-A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
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ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE — SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

FINAL DESIGN

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Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy, Garner, NC 27529

SCALE 0 — 40
1" = 40'

SPLICE PLAN

SHEET 7 OF 7

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE:	FEBRUARY 2012	REVIEWED BY:	L. MAHANY
PREPARED BY:	M. KELLY	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE DATE 5/3/12

5/3/2012
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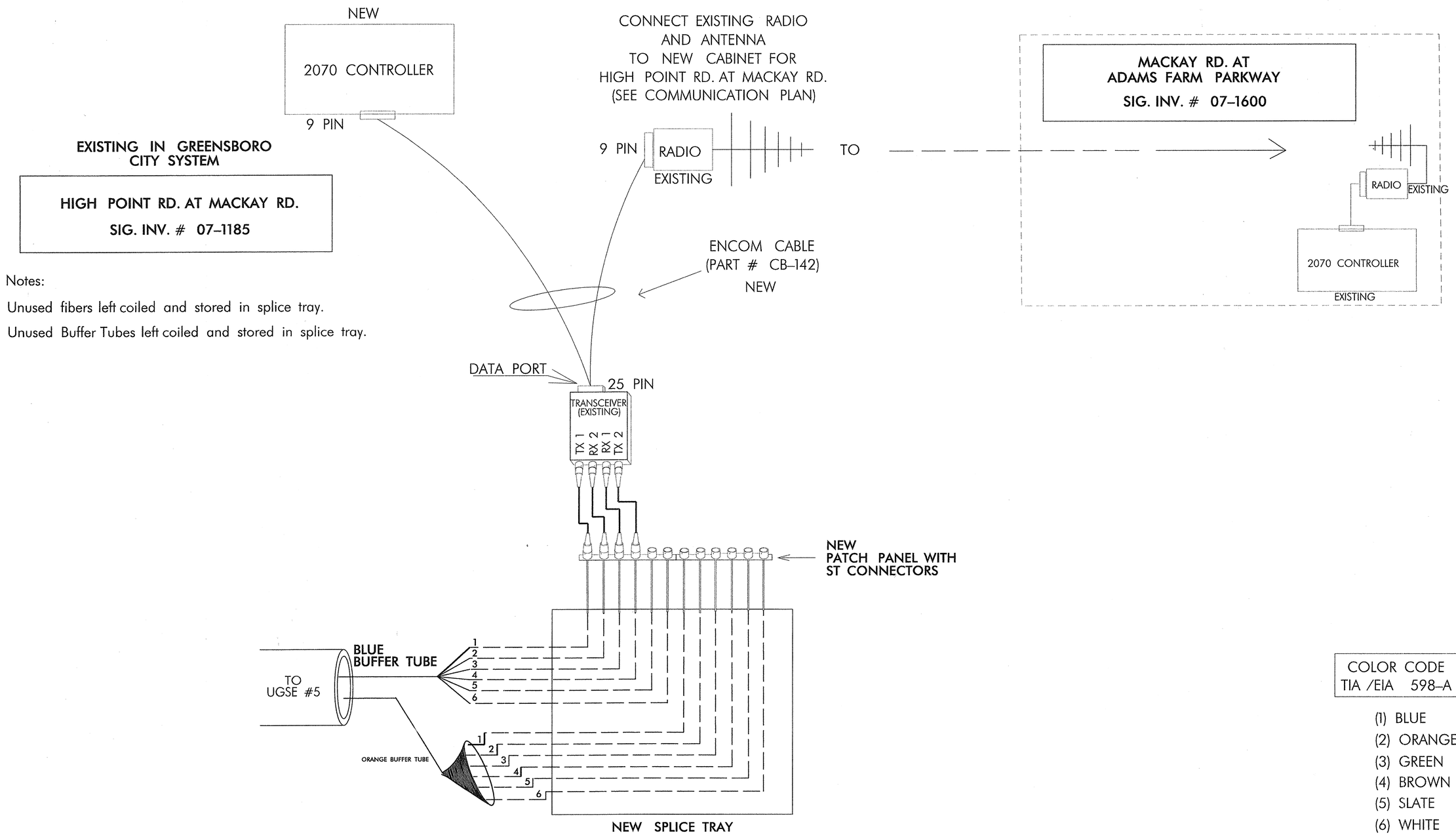
PROJECT REFERENCE NO.	SHEET NO.
U-2412B & U-2524AE	Sig. 121



Notes:

Unused fibers left coiled and stored in splice tray.

Unused Buffer Tubes left coiled and stored in splice tray.

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

NOTES:

1. FIBER CONNECTIONS SHOWN FOR INFORMATIONAL PURPOSES ONLY. SEE SPLICE DETAILS FOR CONFIGURATION.

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

Prepared for the Offices of: Transportation Mobility and Safety Division, State of North Carolina, Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

WIRELESS TO FIBER DETAIL

DIVISION 7 GUILFORD COUNTY GREENSBORO

PLAN DATE: FEBRUARY 2012 REVIEWED BY: L. MAHANY

PREPARED BY: M. KELLY REVIEWED BY:

SCALE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32643 ENGINEER LORI ELLIOTT MAHANY

SIGNATURE 5/3/12 DATE