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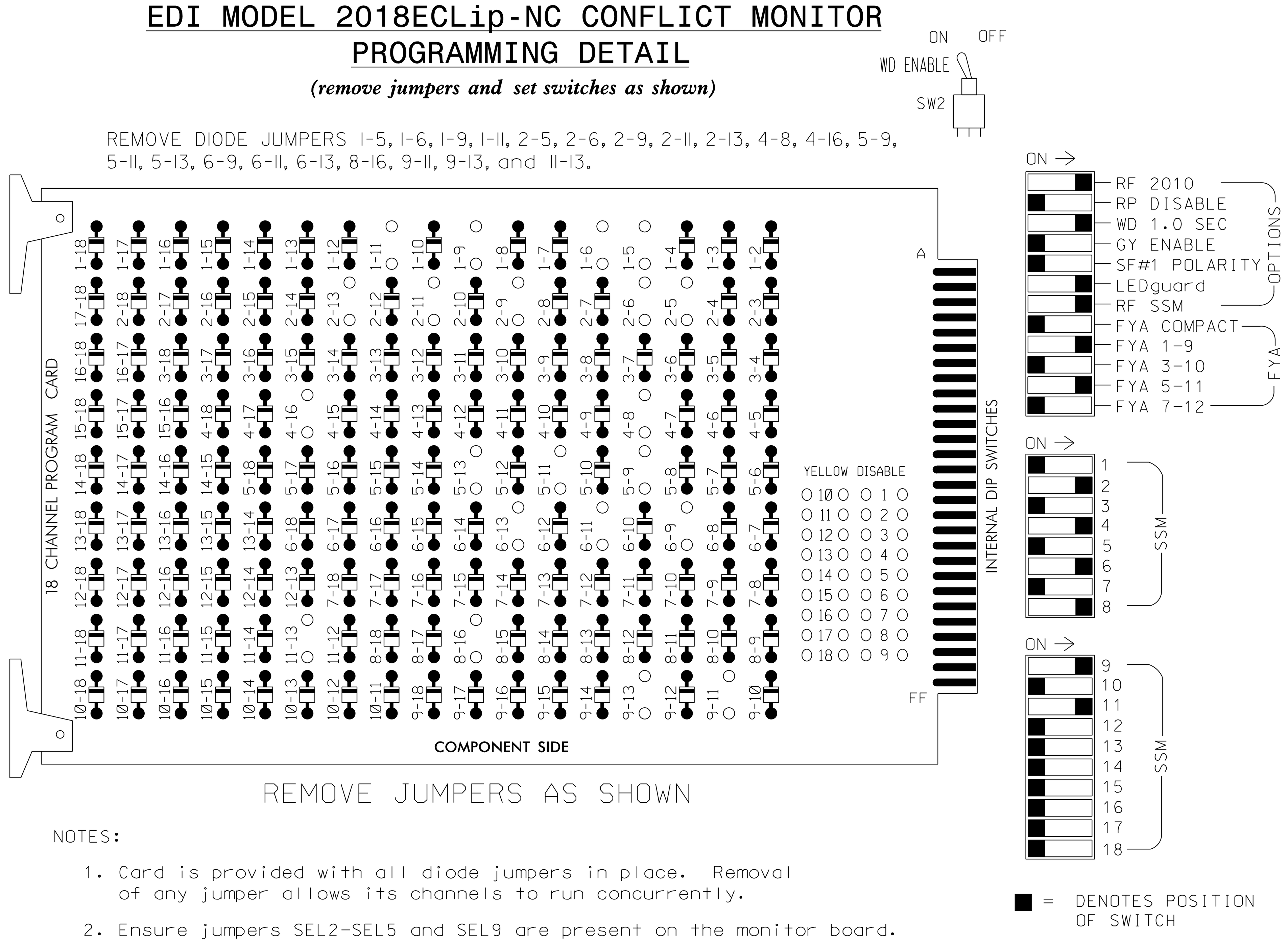
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(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, 2-13, 4-8, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 8-16, 9-11, 9-13, and 11-13.



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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and phase 6 Green.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.............2070LX
CABINET................332 W/AUX
SOFTWARE...............ECONOLITE ASC/3-2070
CABINET MOUNT..........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S1,S2,S3,S5,S7,S8,S11,S12, AUX S1,AUX S4
PHASES USED............1,2,2PED,4,5,6,8,8PED
OVERLAP "A"............*
OVERLAP "B"............NOT USED
OVERLAP "C"............*
OVERLAP "D"............NOT USED

* See overlap programming detail on sheet 2

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	P21, P22	NU	41,42	NU	51 ★	61,62	NU	NU	81,82	P81, P82	11 ★	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	127						133											
(Don't Walk)			113									110						
(Walk)			115									112						

NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

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)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	U	Ø1 1A	Ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	NOT USED	FS DC ISOLATOR
"I"	L	NOT USED	Ø2 2B				Ø4 4B			NOT USED			NOT USED	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
"J"	U	Ø5 5A	Ø6 6A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
"J"	L	NOT USED	NOT USED				Ø8 8B								

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired input - Do not populate slot with detector card.

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1★	1	YES		15		S
	-	J4U	48	26★	6	YES				S
2A	TB2-5,6	I2U	39	2	2	YES				S
2B	TB2-7,8	I2L	43	12	2	YES				S
4A	TB4-9,10	I6U	41	4	4	YES				S
4B	TB4-11,12	I6L	45	14	4	YES		10		S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
5A [2]	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES				S
6A	TB3-5,6	J2U	40	6	6	YES				S
8A	TB5-9,10	J6U	42	8	8	YES				S
8B	TB5-11,12	J6L	46	18	8	YES		10		S
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.

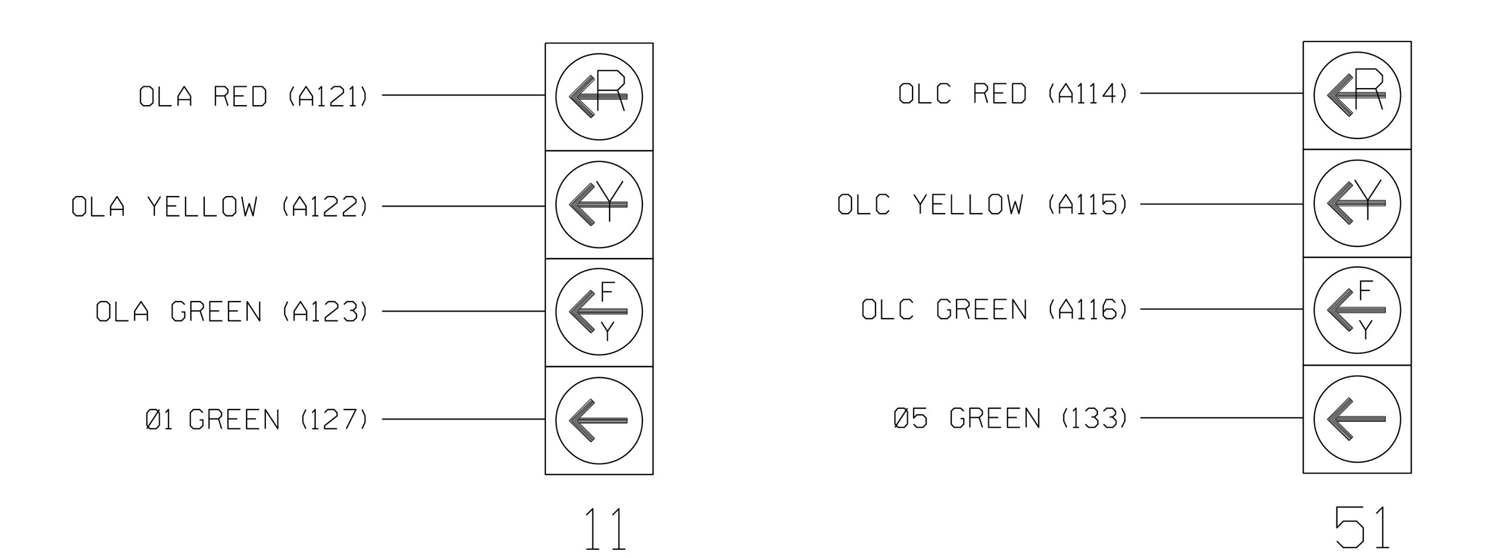
* System detector only. Remove any assigned vehicle phase.
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from J1-W to I4-W, on rear of input file.

★ See vehicle detector setup programming detail for alternate phasing on sheet 3.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

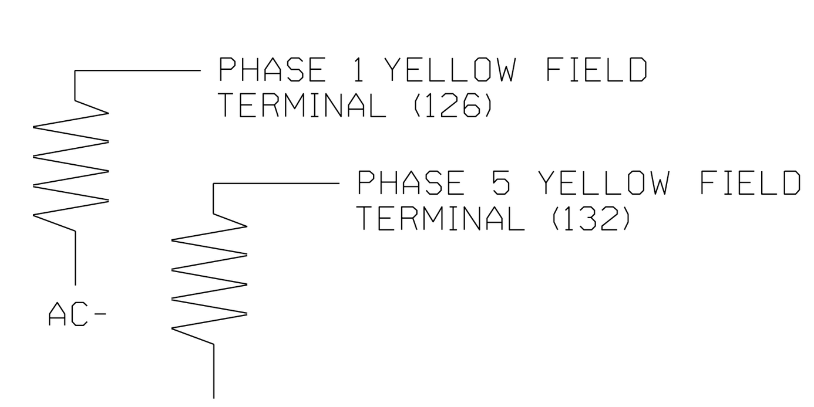


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1718
DESIGNED: DECEMBER 2017
SEALED: 06-13-2018
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



Plans Prepared By:

DRMP

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8000 Regency Parkway, Suite 175
Cary, NC 27518
NC License No. C-2213 (919) 650-1038

Electrical Detail Sheet 1 of 4

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Transportation Mobility and Safety Division — ITS & Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

Edgewood Avenue
at
SR 1452
(Rockwood Avenue/N. O'Neal Street)

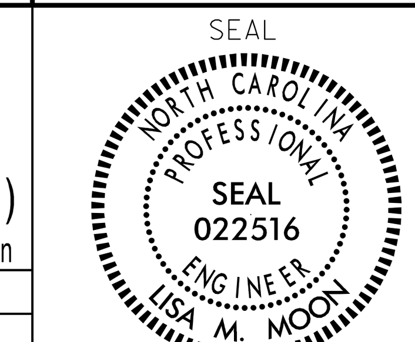
Division 7 Alamance County Burlington

PLAN DATE: December 2017 REVIEWED BY: AJ Davis
PREPARED BY: DJ White REVIEWED BY: LM Moon

REVISIONS INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL



DocuSigned by: Lisa M. Moon 6/13/2018
DATE

SIG. INVENTORY NO. 07-1718

13-JUN-2018 13:19
R:\U6015\Traffic\Signals\Design\Wiring\07-1718e.dgn
lmoon AT CAR-LMOON1-W7

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 1
```

NOTICE ACTION PLAN SF BIT "1"

Toggle Twice

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 5
```

NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1718
DESIGNED: DECEMBER 2017
SEALED: 06-13-2018
REVISED: N/A

13-JUN-2018 17:57
R:*U6015*Traffic*Signals*Design*Wiring*07-1718e.dgn
rlawton AT CAR-RLAWTON-W7

Electrical Detail Sheet 2 of 4

Plans Prepared By:

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

Transportation Mobility and Safety Division — ITS & Signals Management Section — State of North Carolina Department of Transportation

750 N.Greenfield Pkwy,Garner,NC 27529

Edgewood Avenue
at
SR 1452
(Rockwood Avenue/N. O'Neal Street)

Division 7 Alamance County Burlington

PLAN DATE:	December 2017	REVIEWED BY:	AJ Davis
PREPARED BY:	DJ White	REVIEWED BY:	LM Moon

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022516 ENGINEER LISA M. MOON

DocuSigned by: Lisa M. Moon
58CE58BD83D0421...

6/13/2018
DATE

SIG. INVENTORY NO. 07-1718

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL

FOR ALTERNATE PHASING (FOR LOOPS 1A AND 5A)

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu selet [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
        FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
          THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "0".

```
VEH DETECTOR [ 1]  VEH DET PLAN [ 2]        <- NOTICE VEH DET PLAN 2
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 1  1    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0  <- ENSURE DELAY IS SET TO '0'
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

- Place cursor in VEH DETECTOR [ ] position and enter "26".
- Set assigned phase to "0".

```
VEH DETECTOR [ 26]  VEH DET PLAN [ 2]       <- NOTICE VEH DET PLAN 2
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
ENSURE PHASE IS SET TO "0" -> 26  0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

- Place cursor in VEH DETECTOR [ ] position and enter "5".
- Set delay time to "0".

```
VEH DETECTOR [ 5]  VEH DET PLAN [ 2]        <- NOTICE VEH DET PLAN 2
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 5  5    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0  <- ENSURE DELAY IS SET TO '0'
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

- Place cursor in VEH DETECTOR [ ] position and enter "22".
- Set assigned phase to "0".

```
VEH DETECTOR [ 22]  VEH DET PLAN [ 2]       <- NOTICE VEH DET PLAN 2
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
ENSURE PHASE IS SET TO "0" -> 22  0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1718
DESIGNED: DECEMBER 2017
SEALED: 06-13-2018
REVISED: N/A

Electrical Detail Sheet 3 of 4

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Plans Prepared By:

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

Transportation Mobility and Safety Division — ITS & Signals Management Section — State of North Carolina Department of Transportation

750 N.Greenfield Pkwy,Garner,NC 27529

Edgewood Avenue
at
SR 1452
(Rockwood Avenue/N. O'Neal Street)

Division 7 Alamance County Burlington

PLAN DATE:	December 2017	REVIEWED BY:	AJ Davis
PREPARED BY:	DJ White	REVIEWED BY:	LM Moon

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022516 ENGINEER LISA M. MOON

DocuSigned by: Lisa M. Moon 58CE58BD83D0421... 6/13/2018
DATE

SIG. INVENTORY NO. 07-1718

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.136.4

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	1,5

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BITS 1 AND 5 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BITS 1,5: Modifies overlap parent phases for heads 11 and 51 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0 seconds.

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 0 seconds.

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]
2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[  1]
PATTERN.........AUTO    SYS OVERRIDE.... NO
TIMING PLAN..... 0      SEQUENCE.....  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........  --    RED REST..... NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..  NO    PRIORITY RETURN. NO
PED PR RETURN..   NO    QUEUE DELAY..... NO
PMT COND DELAY    NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   X  .  .  .  X  .  .  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1718
DESIGNED: DECEMBER 2017
SEALED: 06-13-2018
REVISED: N/A

Electrical Detail Sheet 4 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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NC Transportation Mobility and Safety Division
Traffic Engineering Branch
Traffic Signal Management Section

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PLAN DATE: December 2017	REVIEWED BY: AJ Davis
PREPARED BY: DJ White	REVIEWED BY: LW Moon

REVISIONS	INIT.	DATE

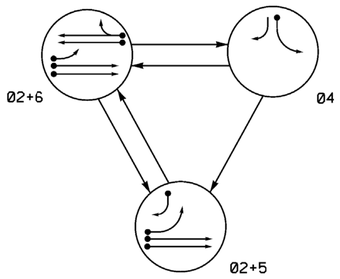
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022516 LISA M. MOON

DocuSigned by: Lisa M Moon 6/13/2018
56CE598DB3D0431... DATE

SIG. INVENTORY NO. 07-1718

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.137.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION				
SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	FLASH
21,22,23	G	G	R	Y
41	R	R	G	R
42	R/Y	R	G	R
51	~~—~~	~~F Y~~	~~R~~	~~Y~~
61,62	R	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.

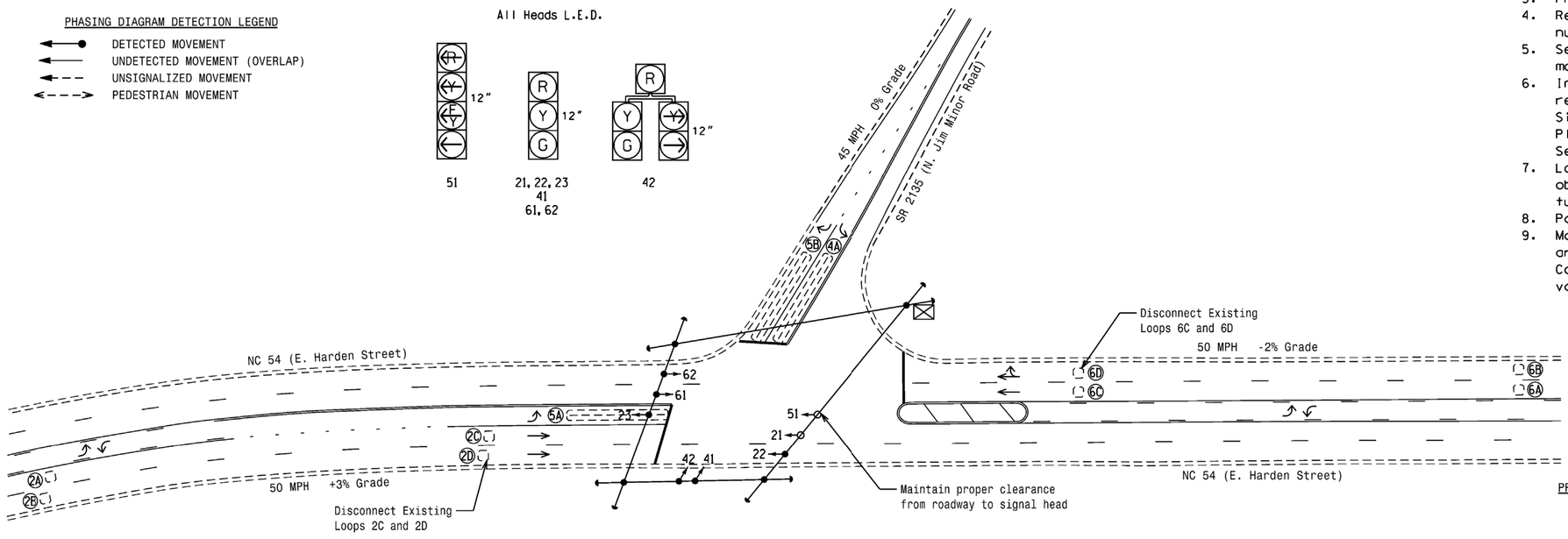
51 — 21, 22, 23, 41, 61, 62 — 42

ASC/3 DETECTOR INSTALLATION CHART												
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A,2B	6x6	360	EXIST.	-	2	Yes	-	-	X	N	-	X
4A	6x60	0	2-4-2	-	4	Yes	-	3	-	S	-	X
5A	6x60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
				-	2	Yes	-	3	-	G	-	X
5B	6x60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A,6B	6x6	360	EXIST.	-	6	Yes	-	-	X	N	-	X

3 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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 head numbered 22.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Pavement markings are existing.
9. 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	

ASC/3 TIMING CHART				
	PHASE			
FEATURE	2	4	5	6
Min Green *	14	7	7	14
Walk *	0	0	0	0
Ped Clear	0	0	0	0
Veh. Extension *	6.0	2.0	2.0	6.0
Max 1 *	90	25	15	90
Yellow	5.0	3.0	3.0	5.0
Red Clear	1.6	1.9	2.6	1.6
Actuations B4 Add *	0	-	-	0
Seconds /Actuation *	1.5	-	-	1.5
Max Initial *	40	-	-	40
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.0	-	-	3.0
Locking Detector	X	-	-	X
Recall Position	VEH. RECALL	-	-	VEH. RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	X	X

* 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.

$$$$SYSTIME$$$$
$$$$SESSION$$$$
$$$$USERNAME$$$$

Mattern & Craig
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12 BROAD STREET
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(828) 254-2201
FAX (828) 254-4562
NC LIC. NO. C-1154

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 54 (E. Harden Street) at SR 2135 (N. Jim Minor Road)

Division 7 Alamance County Graham

PLAN DATE:	November 2017	REVIEWED BY:	JB Voso
PREPARED BY:	SE Wilson	REVIEWED BY:	

REVISIONS	INIT.	DATE

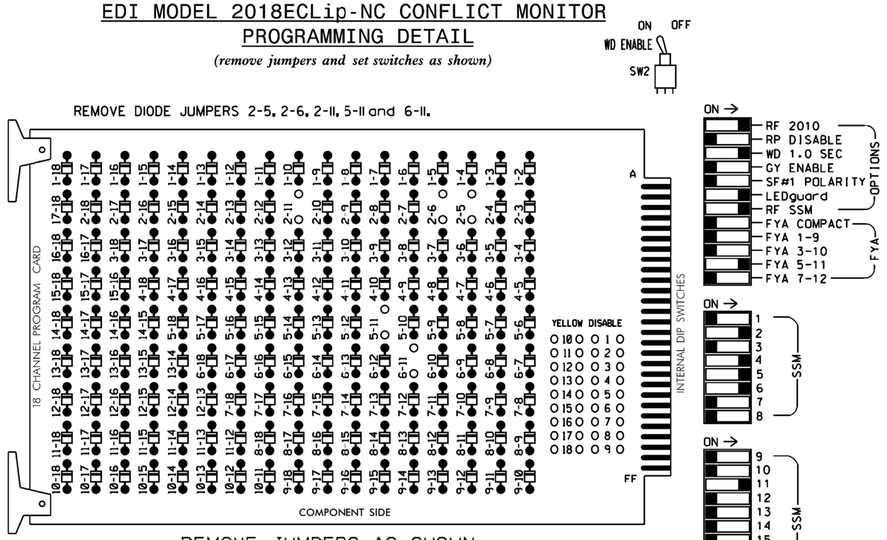
SCALE 0 40 1"=40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO
Docusigned by: James Voso 6/13/2018
SIGNATURE DATE
SIG. INVENTORY NO. 07-1719

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.137.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. 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. Integrate monitor with Ethernet network in 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. Program controller to start up in phase 2 Green and 6 Green.
3. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S5,S7,S8,AUX S4
PHASES USED.....2,4,5,6
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See overlap programming detail on sheet 2

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	NU	NU	41,42	NU	42	51 ★	61,62	NU	NU	NU	NU	NU	NU	NU	51 ★	NU	NU
RED		128			101		*		134										
YELLOW		129			102				135										
GREEN		130			103				136										
RED ARROW																	A114		
YELLOW ARROW							132										A115		
FLASHING YELLOW ARROW																	A116		
GREEN ARROW							133	133											

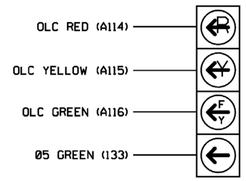
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal head 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 EMPTY	Ø2 2A,2B	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		NOT USED				NOT USED								ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø5 5B	Ø6 6A,6B	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	NOT USED	NOT USED											

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A,2B	TB2-5,6	I2U	39	2	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES		3		S
5A'	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES		3		G
5B	TB3-5,6	J2U	40	6	5	YES		15		S
6A,6B	TB3-9,10	J3U	64	36	6	YES			X	N

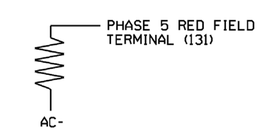
' Add jumper from J1-W to I4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)

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: 07-1719
DESIGNED: November 2017
SEALED: 6/13/2018
REVISED: NA

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NC LIC. NO. C-1154

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

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

750 N.Greenfield Pkwy.Garner,NC 27529

NC 54 (E. Harden Street)
at
SR 2135 (N. Jim Minor Road)

Division 7 | Alamance County | Graham

PLAN DATE: November 2017	REVIEWED BY: JB Voso
PREPARED BY: SE Wilson	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

DocuSigned by: James Voso 6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1719

$$$$USERNAME$$$$
$$$$USERTITLE$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.137.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle Twice

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: ....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE..... 0
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1719
DESIGNED: November 2017
SEALED: 6/13/2018
REVISED: NA

Mattern & Craig
ENGINEERS • SURVEYORS
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NC LIC. NO. C-1154

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:	NC 54 (E. Harden Street) at SR 2135 (N. Jim Minor Road)
Prepared in the Offices of: NC Department of Transportation, Mobility and Safety Division, Traffic Engineering Branch, Traffic Signal Management Section 750 N.Greenfield Pkwy.Garner,NC 27529	Division 7 — Alamance County — Graham
PLAN DATE: November 2017	REVIEWED BY: JB Voso
PREPARED BY: SE Wilson	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

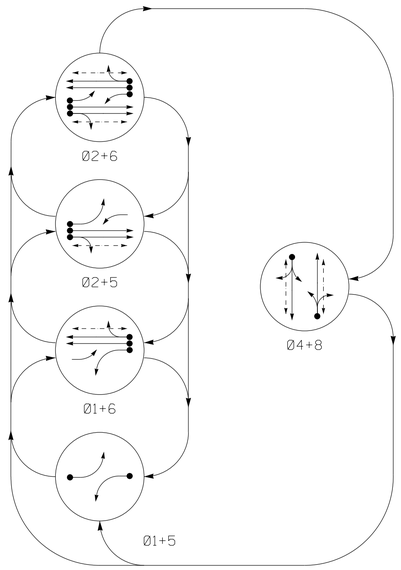
DocuSigned by: James Voso 6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1719

$$$$SYSTIME$$$$
$$$$SYSTIME$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 138.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
11	←	←	F Y	F Y	R	Y
21,22	R	R	G	G	R	Y
41,42	R	R	R	R	G	R
51	←	F Y	←	F Y	R	Y
61,62	R	G	R	G	R	Y
81,82	R	R	R	R	G	R
P21,P22	DW	DW	W	W	DW	DRK
P41,P42	DW	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	W	DW	DRK
P81,P82	DW	DW	DW	DW	W	DRK

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	+10	2-4-2	-	1	Yes	-	15	-	S	-	X
					6	Yes	-	-	-	S	-	X
2A	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
2B	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
4A	6X50	+10	2-4-2	-	4	Yes	-	5	-	S	-	X
5A	6X40	+10	2-4-2	-	5	Yes	-	15	-	S	-	X
					2	Yes	-	-	-	S	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
8A	6X50	+10	2-4-2	-	8	Yes	-	5	-	S	-	X
S1	6X6	+95	3	X	-	No	-	-	-	N	X	X
S2	6X6	+95	3	X	-	No	-	-	-	N	X	X
S3	6X6	+95	3	X	-	No	-	-	-	N	X	X

5 Phase
Fully Actuated
(Burlington-Graham Signal System)

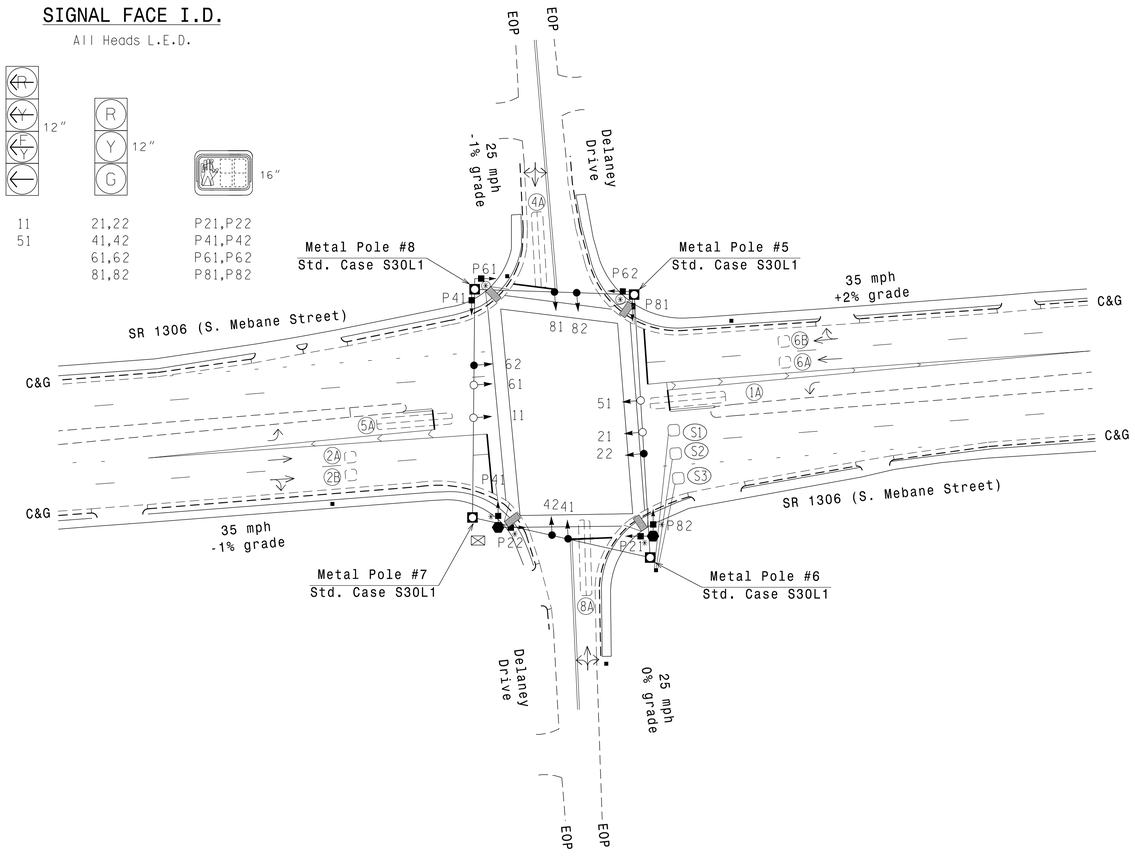
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Reposition existing signal heads numbered 22 and 62.
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. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

SIGNAL FACE I.D.

All Heads L.E.D.

11	21,22	P21,P22
51	41,42	P41,P42
	61,62	P61,P62
	81,82	P81,P82



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head	■↓
N/A	Pedestrian Push Button & Sign	*
N/A	2" Pedestrian Post with Ped Push Button & Sign	⊛
⬡	Type II Signal Pedestal	⬢
○ ○	Signal Pole with Guy	● ●
○ ○	Signal Pole with Sidewalk Guy	● ●
▣	Metal Strain Pole	■
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
- - - - -	2-in Underground Conduit	- · - · -
N/A	Right of Way	————
→	Directional Arrow	→
N/A	Curb Ramp	◢

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green *	7	10	7	7	10	7
Walk *	0	4	4	0	4	4
Ped Clear	0	14	29	0	17	28
Veh. Extension *	2.0	5.0	3.0	2.0	5.0	3.0
Max 1 *	20	45	30	20	45	30
Yellow	3.0	3.9	3.2	3.0	3.9	3.2
Red Clear	2.9	2.2	3.2	3.1	2.2	3.2
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Locking Detector	-	X	-	-	X	-
Recall Position	-	VEH. RECALL	-	-	VEH. RECALL	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	X	X

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 1306 (S. Mebane Street) at Delaney Drive

Division 7 Alamance County Burlington

PLAN DATE: February 2018 REVIEWED BY: AM Encarnacion

PREPARED BY: NA Ptak REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Document Prepared by: Pamela Alexander 6/7/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1731

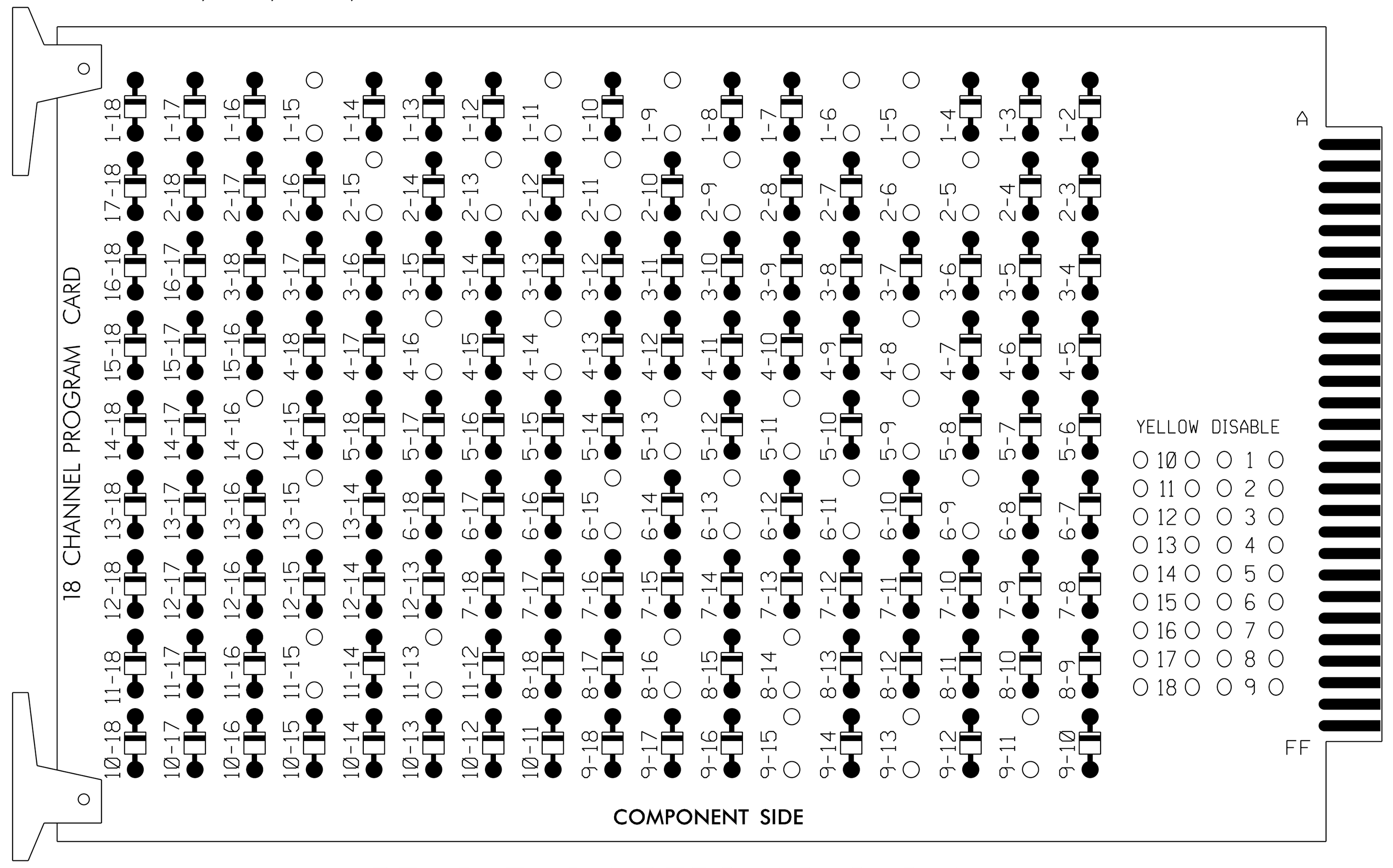
ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 138.1

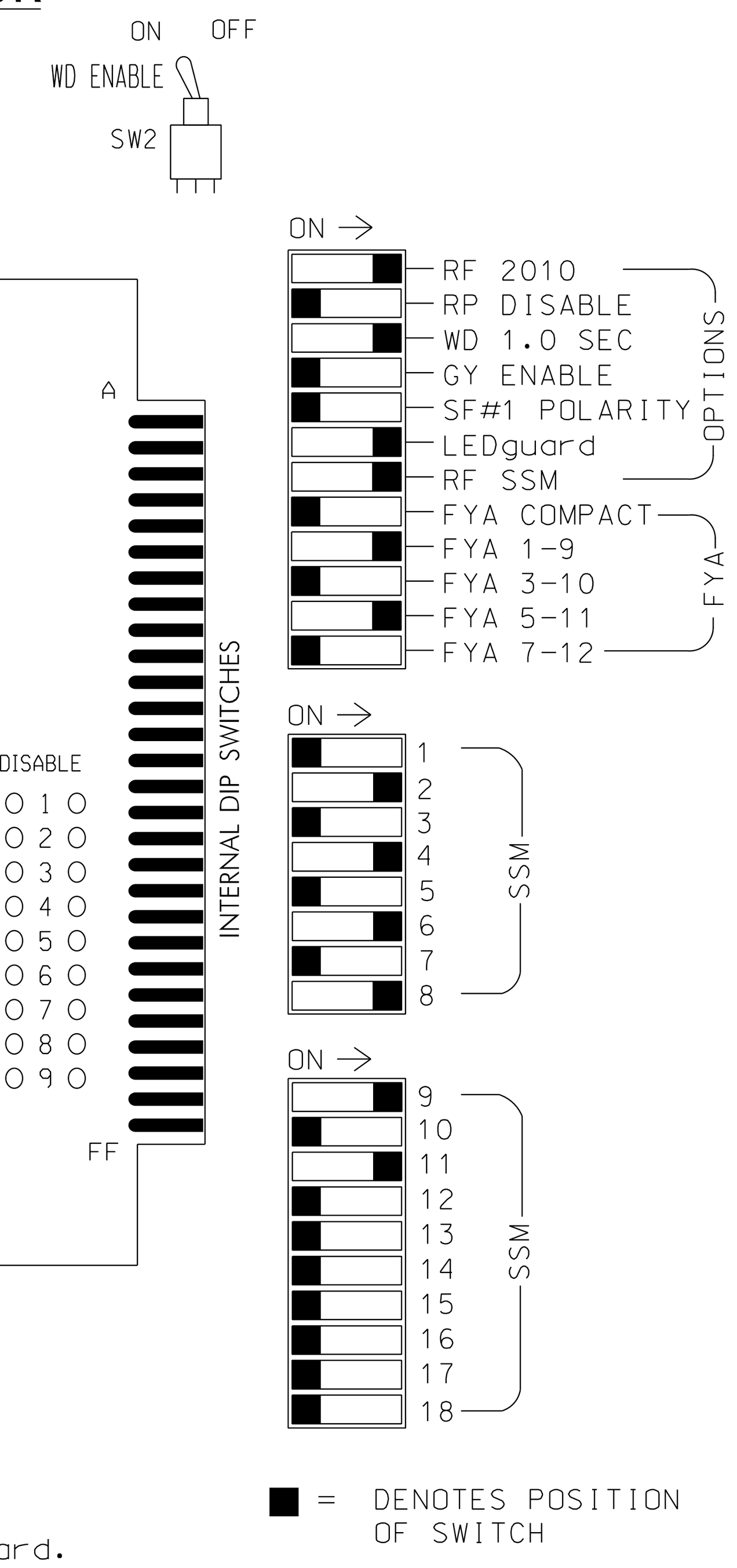
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(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, 2-13, 2-15, 4-8, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 8-14, 8-16, 9-11, 9-13, 9-15, 11-13, 11-15, 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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.............2070LX
CABINET................332 W/AUX
SOFTWARE...............ECONOLITE ASC/3-2070
CABINET MOUNT..........BASE
LOAD SWITCHES USED......S1,S2,S3,S5,S6,S7,S8,S9, S11,S12,AUX S1,AUX S4
PHASES USED............1,2,2PED,4,4PED,5,6,6PED, 8,8PED
OVERLAP "A"............*
OVERLAP "B"............NOT USED
OVERLAP "C"............*
OVERLAP "D"............NOT USED

* See sheet 2 for overlap programing.

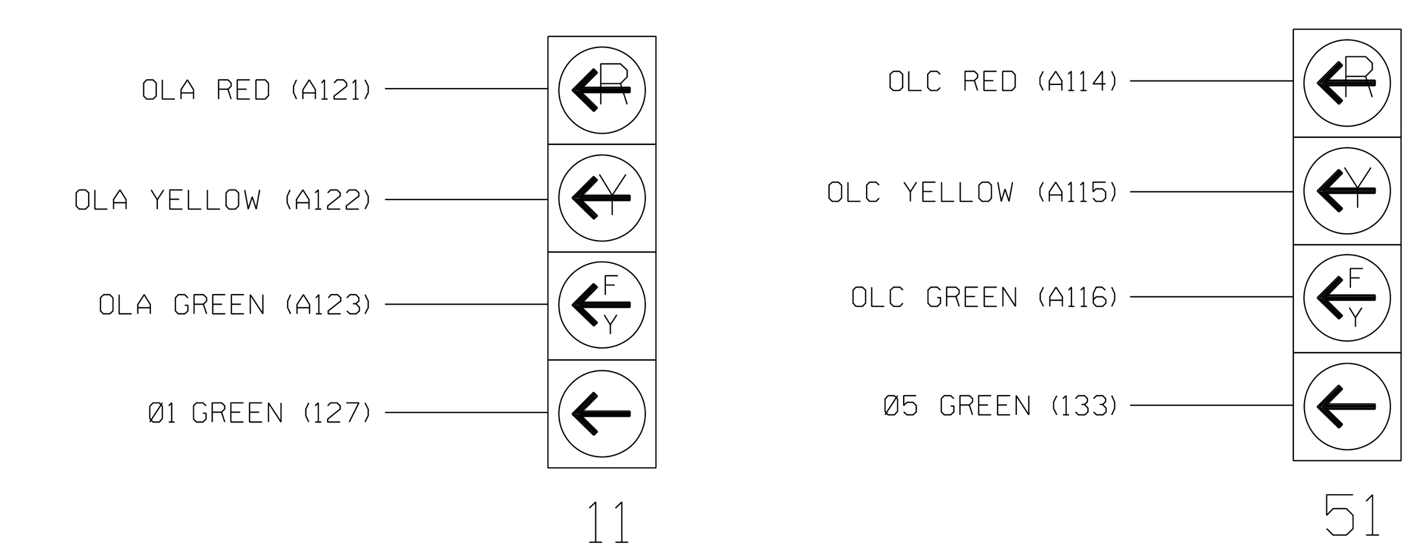
SIGNAL HEAD HOOK-UP CHART

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	P21, P22	NU	41,42	P41, P42	51★	61,62	P61, P62	NU	81,82	P81, P82	11★	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	127						133											
(Don't Walk hand)			113			104			119			110						
(Walk pedestrian)			115			106			121			112						

NU = Not Used
★ See pictorial of head wiring in detail this sheet.
* Denotes install load resistor. See load resistor installation detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 2 2A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø 2 2B				NOT USED			SYS. DET. S2			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø 6 6B				NOT USED			NOT USED					

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1	1	YES		15		S
	-	J4U	48	26	6	YES				S
2A	TB2-5,6	I2U	39	2	2	YES				S
2B	TB2-7,8	I2L	43	12	2	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		5		S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
5A [2]	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES				S
6A	TB3-5,6	J2U	40	6	6	YES				S
6B	TB3-7,8	J2L	44	16	6	YES				S
8A	TB5-9,10	J6U	42	8	8	YES		5		S
* S3	TB7-9,10	J9U	59	15	SYS	NO				N
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.

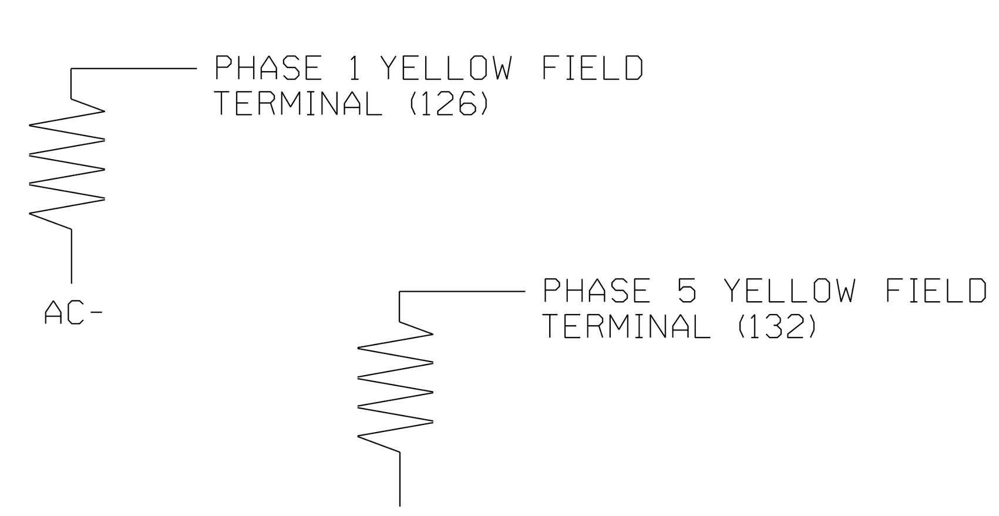
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from J1-W to I4-W, on rear of input file.
* System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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: 07-1731
DESIGNED: February 2018
SEALED: 6/7/2018
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1306 (S. Mebane Street) at Delaney Drive

Division 7 Alamance County Burlington

PLAN DATE: February 2018	REVIEWED BY: AM Encarnacion
PREPARED BY: NA Ptak	REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

DocuSigned by: Pamela Alexander
E79609AF48384AA...
6/27/2018
DATE

SIG. INVENTORY NO. 07-1731

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

Toggle Twice

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

END PROGRAMMING

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: 07-1731
DESIGNED: February 2018
SEALED: 6/7/2018
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1306 (S. Mebane Street)
at
Delaney Drive

Prepared for the Offices of: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation

750 N.Greenfield Pkwy,Garner,NC 27529

Division 7 — Alamance County — Burlington

PLAN DATE: February 2018	REVIEWED BY: AM Encarnacion
PREPARED BY: NA Ptak	REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

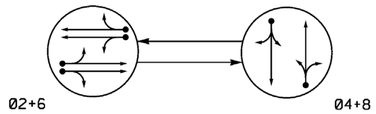
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

DocuSigned by: Pamela Alexander E79609AF48384AA... 6/9/2018 DATE

SIG. INVENTORY NO. 07-1731

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.139.0

PHASING DIAGRAM



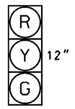
PHASING DIAGRAM DETECTION LEGEND

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

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

SIGNAL FACE I.D.

All Heads L.E.D.



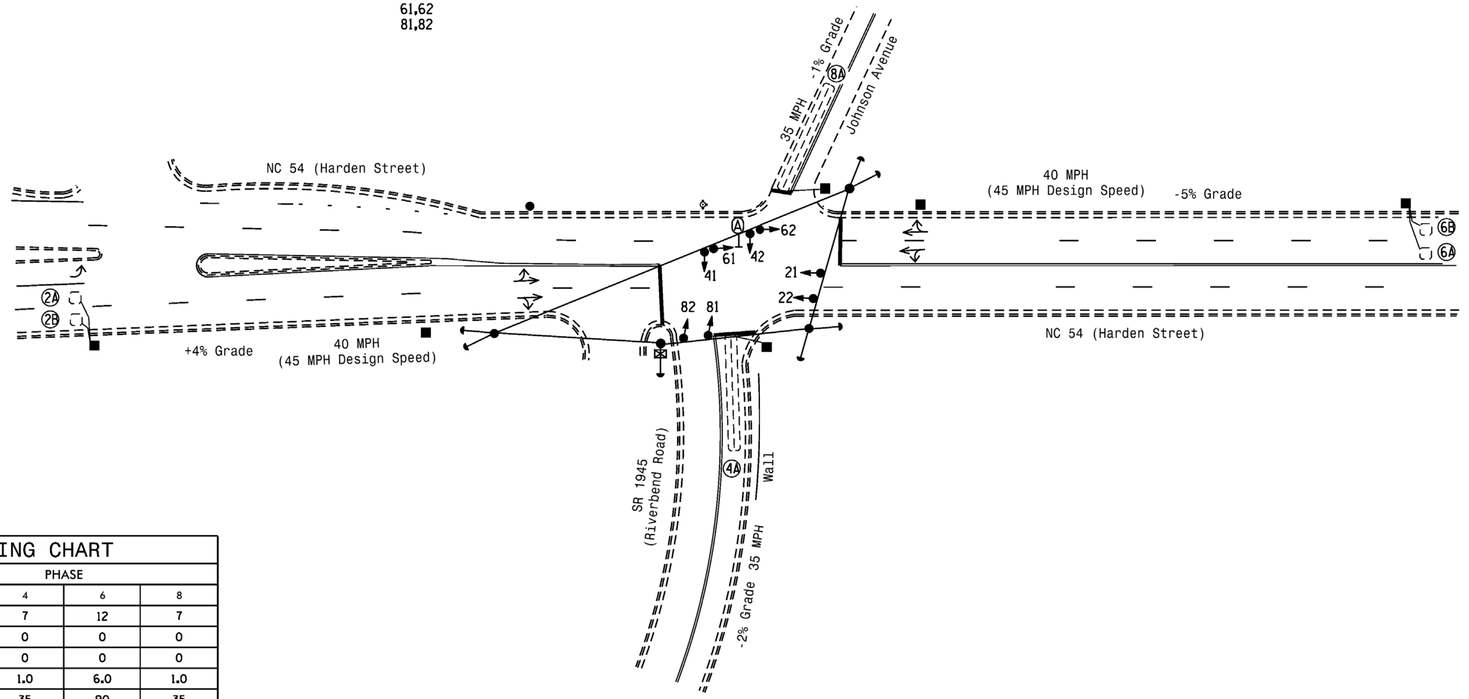
21,22
41,42
61,62
81,82

ASC/3 DETECTOR INSTALLATION CHART													
DETECTOR					PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6x6	300	5	-	2	Yes	-	-	X	N	-	X
2B	6x6	300	5	-	2	Yes	-	-	X	N	-	X
4A	6x60	0	2-4-2	-	4	Yes	-	10	-	S	-	X
6A	6x6	300	5	-	6	Yes	-	-	X	N	-	X
6B	6x6	300	5	-	6	Yes	-	-	X	N	-	X
8A	6x60	0	2-4-2	-	8	Yes	-	15	-	S	-	X

2 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. The cabinet should be designed to include an Auxiliary Output file for future use.
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



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	"LEFT TURN YIELD ON GREEN" Sign (R10-12)	Ⓐ

ASC/3 TIMING CHART				
FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	12	7	12	7
Walk *	0	0	0	0
Ped Clear	0	0	0	0
Veh. Extension *	6.0	1.0	6.0	1.0
Max 1 *	90	35	90	35
Yellow	4.2	4.0	5.0	3.9
Red Clear	1.4	1.4	1.0	1.5
Actuations B4 Add *	0	-	0	-
Seconds /Actuation *	1.5	-	1.5	-
Max Initial *	34	-	34	-
Time Before Reduction *	20	-	20	-
Time To Reduce *	40	-	40	-
Minimum Gap	3.0	-	3.0	-
Locking Detector	X	-	X	-
Recall Position	VEH. RECALL	-	VEH. RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	X

* 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.

$$$$$SYSTIME$$$$$
$$$$$SESSION$$$$$
$$$$$USERNAME$$$$$

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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 54 (Harden Street)
at
SR 1945 (Riverbend Road)
/Johnson Avenue

Division 7 Alamance County Graham

PLAN DATE:	November 2017	REVIEWED BY:	JB Voso
PREPARED BY:	SE Wilson	REVIEWED BY:	

REVISIONS	INIT.	DATE

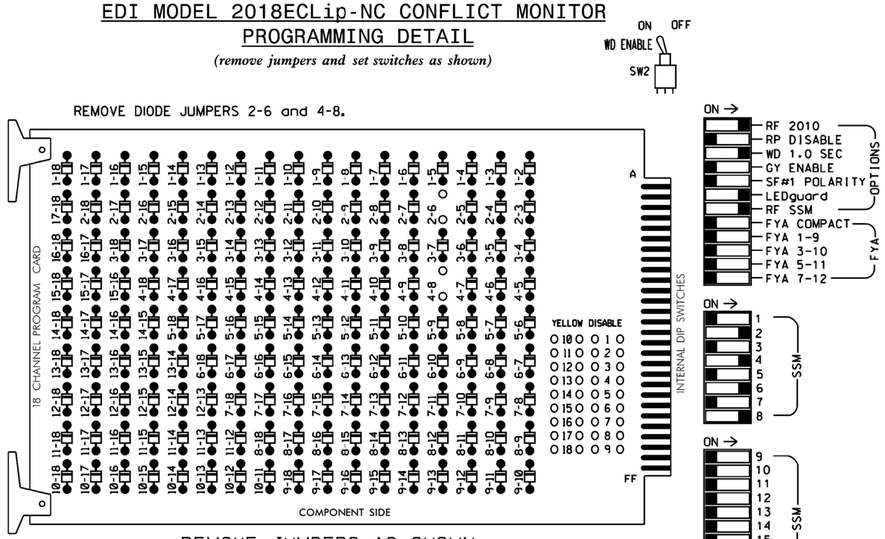
SCALE 0 40 1"=40'

N

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL 022599
ENGINEER
JAMES B. VOSO

Docusigned by: James B. Voso
140FD0378E041F...
6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1771



PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.139.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-6 and 4-8.

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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................332 W/AUX
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S2,S5,S8,S11
PHASES USED.............2,4,6,8
OVERLAP "A".............NOT USED
OVERLAP "B".............NOT USED
OVERLAP "C".............NOT USED
OVERLAP "D".............NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	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	NU	61,62	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW																		
YELLOW ARROW																		
GREEN ARROW																		

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES		10		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
8A	TB5-9,10	J6U	42	8	8	YES		15		S

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1771
DESIGNED: November 2017
SEALED: 6/13/2018
REVISED: NA

Mattern & Craig
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ASHEVILLE, NORTH CAROLINA 28801
(828) 254-2201
FAX (828) 254-4562
NC LIC. NO. C-1154

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 54 (Harden Street)
at
SR 1945 (Riverbend Road)
/Johnson Avenue

Division 7 Alamance County Graham

PLAN DATE: November 2017
REVIEWED BY: JB Voso
PREPARED BY: SE Wilson
REVIEWED BY:

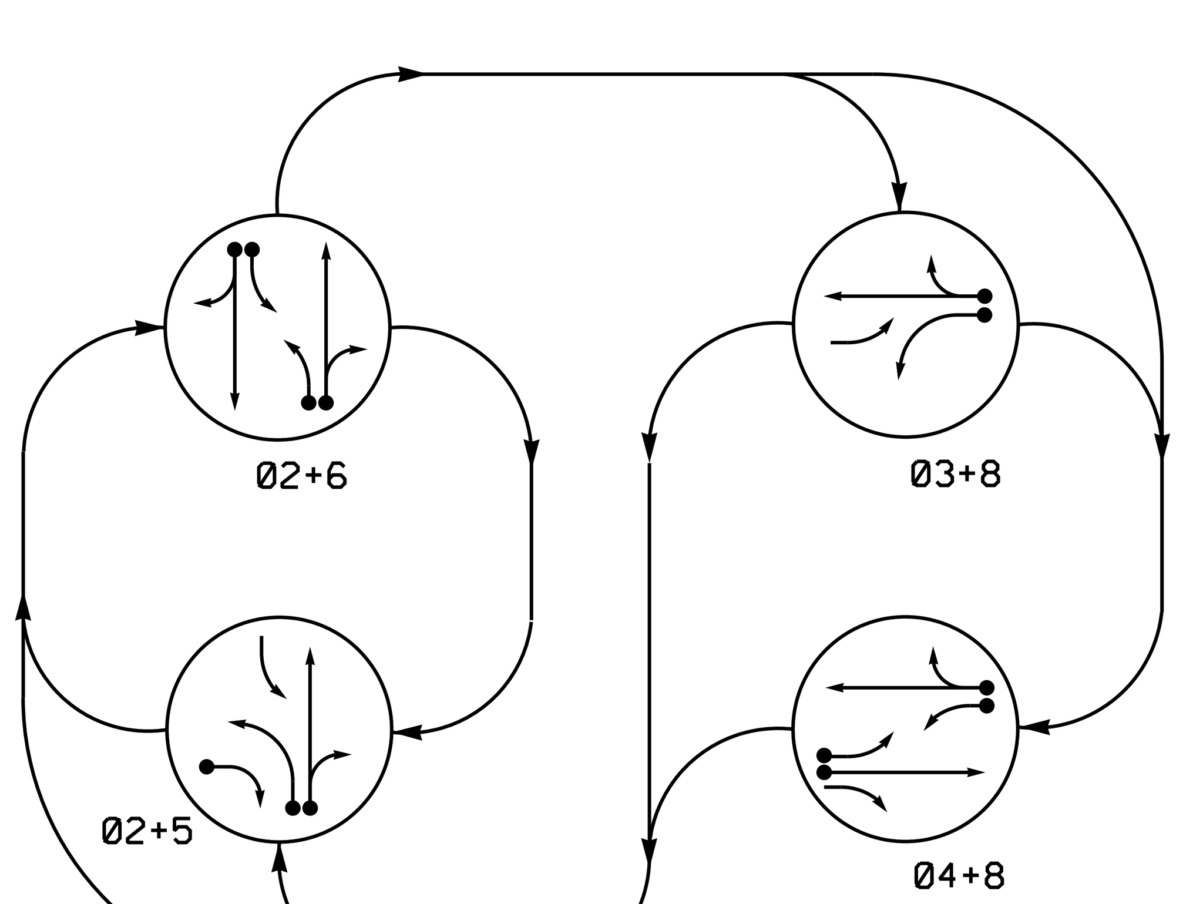
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
SEAL 022599
JAMES B. VOSO
DocuSigned by:
James Voso
140FD60379E041F...
6/13/2018
DATE

SIG. INVENTORY NO. 07-1771

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

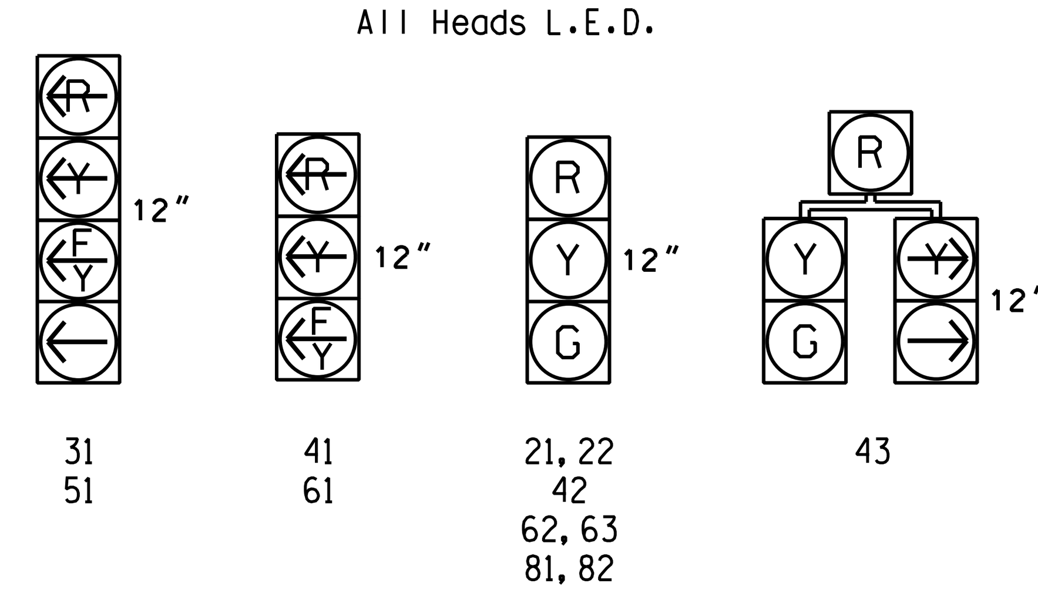
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3+8	Ø4+8	FLASH
21,22	G	G	R	R	Y
31	←R	←R	←	←F/Y	←R
41	←R	←R	←F/Y	←F/Y	←R
42	R	R	R	G	R
43	R/→	R	R	G	R
51	←	←F/Y	←R	←R	←Y
61	←F/Y	←F/Y	←R	←R	←Y
62,63	R	G	R	R	Y
81,82	R	R	G	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



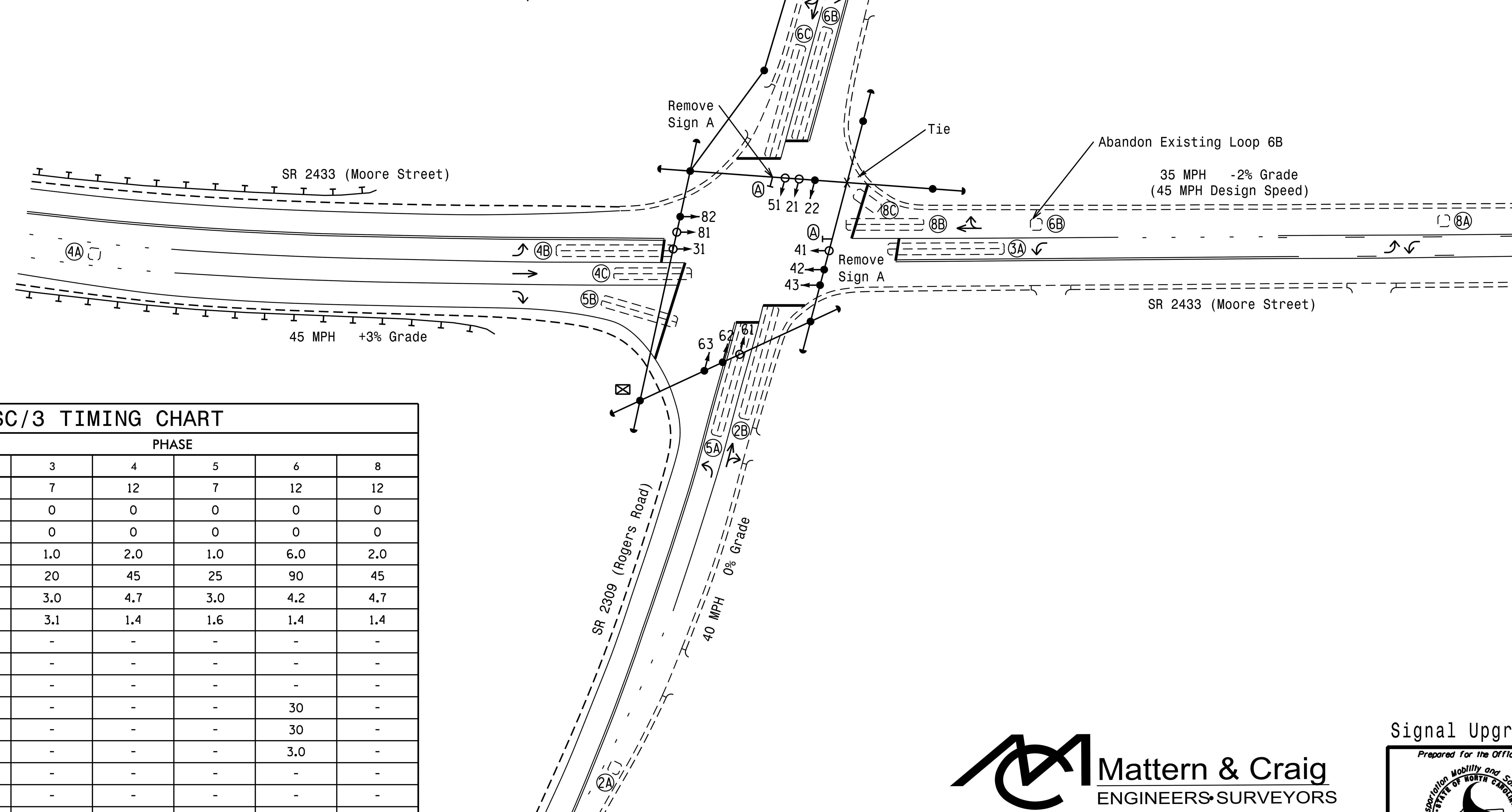
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6x6	250	EXIST.	-	2	Yes	-	-	X	N	-	X
2B	6x60	0	2-4-2	-	2	Yes	2.0	5	-	G	-	X
3A	6x60	+5	2-4-2	-	3	Yes	-	15	-	S	-	X
				-	8	Yes	-	-	-	S	-	X
4A	6x6	300	EXIST.	-	4	No	2.4	-	-	S	-	X
4B	6x60	+5	2-4-2	-	4	Yes	-	3	-	S	-	X
4C	6x40	+5	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6x60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
				-	2	Yes	-	3	-	G	-	X
5B	6x40	+5	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6x6	250	EXIST.	-	6	Yes	-	-	X	N	-	X
6B	6x60	0	2-4-2	-	6	Yes	2.0	5	-	G	-	X
6C	6x60	0	2-4-2	-	6	Yes	2.0	5	-	G	-	X
8A	6x6	300	EXIST.	-	8	No	2.4	-	-	S	-	X
8B	6x40	+5	2-4-2	-	8	Yes	-	10	-	S	-	X
8C	6x15	+5	EXIST.	-	8	Yes	-	15	-	S	-	X

4 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 3 may be lagged.
4. Phase 5 may be lagged.
5. Reposition all existing signal heads as shown.
6. Set all detector units to presence mode.
7. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Existing Left Arrow "ONLY" sign(s)-(R3-5L) may be removed at the discretion of the Regional Traffic Engineer.
10. Pavement markings are existing.
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	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ

ASC/3 TIMING CHART

FEATURE	PHASE 2	3	4	5	6	8
Min Green *	12	7	12	7	12	12
Walk *	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0
Veh. Extension *	6.0	1.0	2.0	1.0	6.0	2.0
Max 1 *	90	20	45	25	90	45
Yellow	4.2	3.0	4.7	3.0	4.2	4.7
Red Clear	1.4	3.1	1.4	1.6	1.4	1.4
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-
Time Before Reduction *	30	-	-	-	30	-
Time To Reduce *	30	-	-	-	30	-
Minimum Gap	3.0	-	-	-	3.0	-
Locking Detector	-	-	-	-	-	-
Recall Position	-	-	-	-	-	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	X	X

* 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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NC LIC. NO. C-1154

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 2433 (Moore Street)
at
SR 2309 (Rogers Road)

Division 7 Alamance County Graham

PLAN DATE: November 2017	REVIEWED BY: JB Voso
PREPARED BY: SE Wilson	REVIEWED BY:

SCALE 0 40
1"=40'

REVISIONS | INIT. | DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1804

4:14:51 PM
I:\3789 - Burlington Graham Signal System\06 Working Folders (Replace Sub-folders with NCDOT File Structure if Working on NCDOT Project)\Dwg or Dgn\07-1804\07-1804_sig_dsn_20170316.dgn
jbvoso

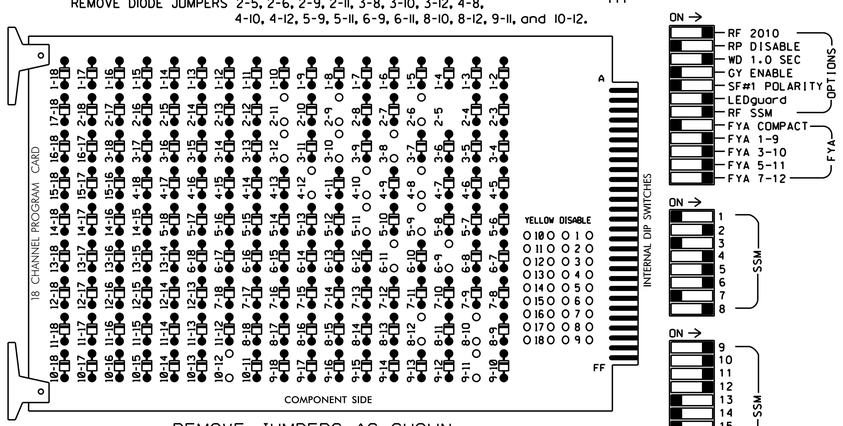
PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.140.1

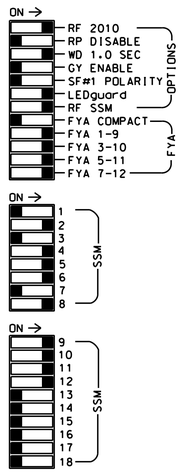
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

ON OFF
WD ENABLE
SW2

REMOVE DIODE JUMPERS 2-5, 2-6, 2-9, 2-11, 3-8, 3-10, 3-12, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 8-10, 8-12, 9-11, and 10-12.





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. Integrate monitor with Ethernet network in cabinet.

■ = 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/ AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S4,S5,S7,S8,S11,AUX S1, AUX S2,AUX S4,AUX S5
PHASES USED.....2,3,4,5,6,8
OVERLAP A.....*
OVERLAP B.....*
OVERLAP C.....*
OVERLAP D.....*

* See overlap programming detail on sheet 2

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	31★	42,43	NU	43	51★	62,63	NU	NU	81,82	NU	61★	31★	NU	51★	41★	NU
RED		128			101		*		134			107							
YELLOW		129		*	102				135			108							
GREEN		130			103				136			109							
RED ARROW														A121	A124		A114	A101	
YELLOW ARROW							132							A122	A125		A115	A102	
FLASHING YELLOW ARROW														A123	A126		A116	A103	
GREEN ARROW				118			133	133											

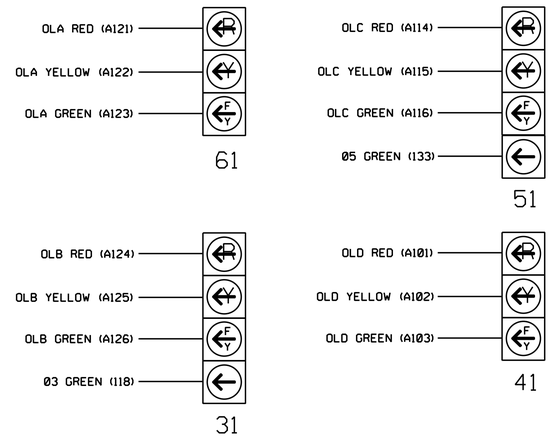
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

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 EMPTY	Ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	Ø3 3A	Ø4 4A	Ø4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		Ø2 2B			NOT USED	Ø4 4B	Ø5 5B							ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	Ø6 6C	SLOT EMPTY	SLOT EMPTY	Ø8 8A	Ø8 8C	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø6 6B	NOT USED			Ø8 8B	NOT USED							

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card.

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES	2.0	5		G
3A[1]	TB4-5,6	I5U	58	3	3	YES		15		S
	-	J8U	50	28	8	YES				S
4A	TB4-9,10	I6U	41	4	4	NO	2.4			S
4B	TB4-11,12	I6L	45	14	4	YES		3		S
4C	TB6-1,2	I7U	65	34	4	YES				S
5A[2]	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES		3		G
5B	TB6-3,4	I7L	78	44	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES	2.0	5		G
6C	TB3-9,10	J3U	64	36	6	YES	2.0	5		G
8A	TB5-9,10	J6U	42	8	8	NO	2.4			S
8B	TB5-11,12	J6L	46	18	8	YES		10		S
8C	TB7-1,2	J7U	66	38	8	YES		15		S

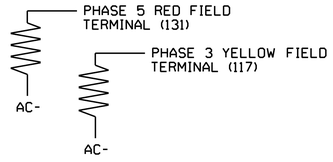
[1] Add jumper from I5-W to J8-W, on rear of input file.
[2] Add jumper from J1-W to I4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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: 07-1804
DESIGNED: November 2017
SEALED: 6/13/2018
REVISED: NA

Mattern & Craig
ENGINEERS•SURVEYORS
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(828) 254-2201
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NC LIC. NO. C-1154

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2433 (Moore Street)
at
SR 2309 (Rogers Road)

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

Division 7 | Alamance County | Graham

PLAN DATE: November 2017 | REVIEWED BY: JB Voso
PREPARED BY: SE Wilson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022599 JAMES B. VOSO
DocuSigned by: James Voso 6/13/2018
SIG. INVENTORY NO. 07-1804

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.140.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[A] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X . . . . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . 1 . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

Toggle Once

↓

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE..........  0
```

Toggle Once

↓

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE..........  0
```

Toggle Once

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[D] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . . . X . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . 1 . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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.

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NC LIC. NO. C-1154

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1804
DESIGNED: November 2017
SEALED: 6/13/2018
REVISED: NA

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2433 (Moore Street)
at
SR 2309 (Rogers Road)

Division 7 Alamance County Graham

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

PLAN DATE: November 2017	REVIEWED BY: JB Voso
PREPARED BY: SE Wilson	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO
DocuSigned by: James Voso
6/13/2018
DATE

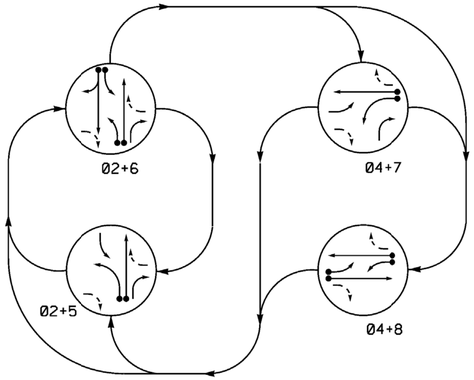
SIG. INVENTORY NO. 07-1804

4:18:02 PM
11/8/2017
jbvoso

I:\Burlington Graham Signal System\06 Working Folders (Replace Sub-folders with NCDOT File Structure if Working on NCDOT Project)\Dwg or Dgn\07-1804\071804_sm_ele_20170510.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.141.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

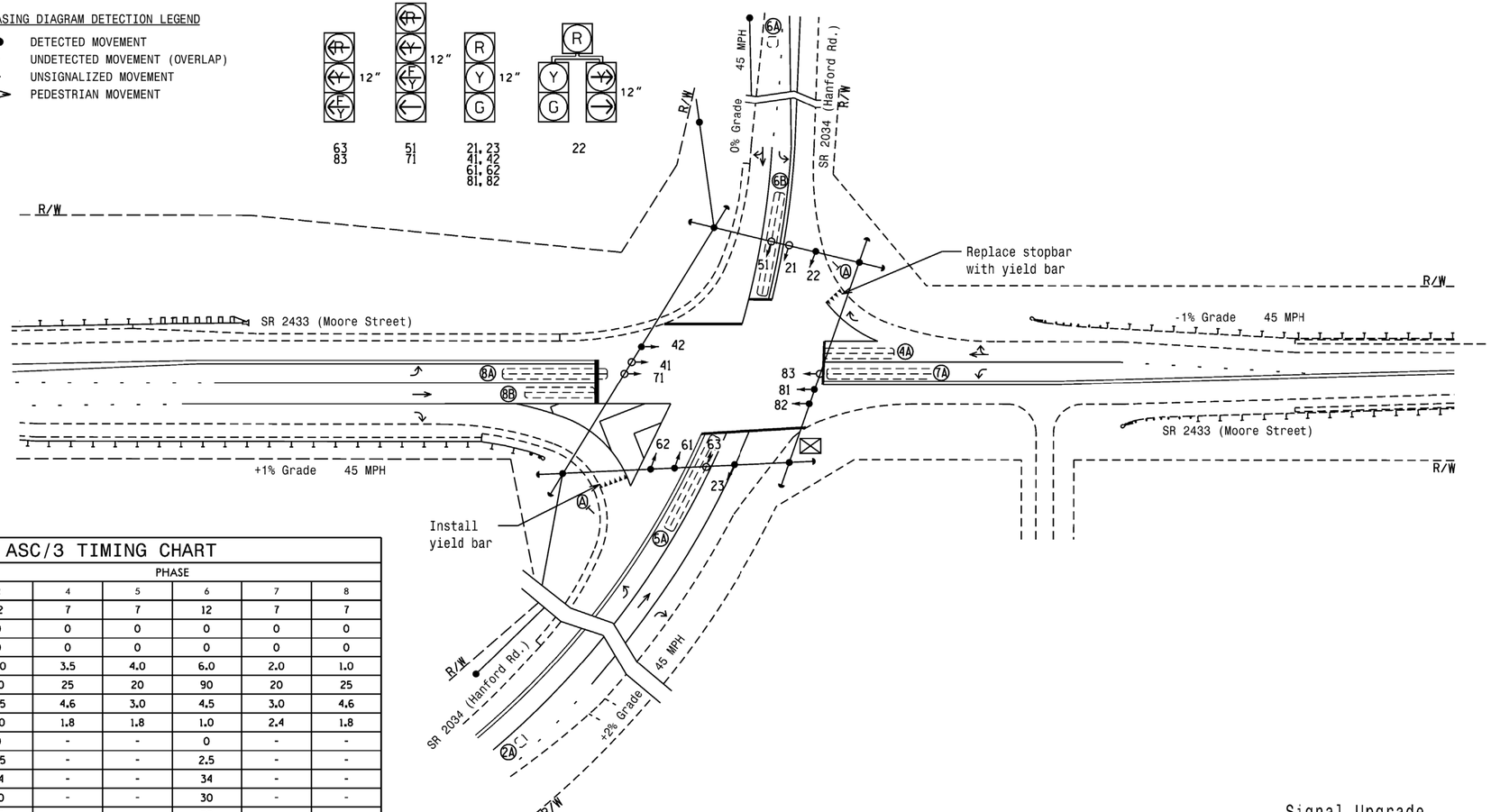
SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 04+7	PHASE 04+8	FLASH
21, 23	G	G	R	R	Y
22	G	G	R	R	Y
41, 42	R	R	G	G	R
51	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	R	Y
63	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
71	~~R~~	~~R~~	~~F Y~~	~~F Y~~	~~R~~
81, 82	R	R	R	G	R
83	~~R~~	~~R~~	~~F Y~~	~~F Y~~	~~R~~

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6x6	300	EXIST.	-	2	Yes	-	-	X	N	-	X
4A	6x40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6x60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
				-	2	Yes	-	3	-	G	-	X
6A	6x6	300	EXIST.	-	6	Yes	-	-	X	N	-	X
6B	6x60	0	2-4-2	-	6	Yes	-	3	-	G	-	X
7A	6x40	0	2-4-2	-	7	Yes	-	15	-	S	-	X
				-	4	Yes	-	-	-	S	-	X
8A	6x60	+5	2-4-2	-	8	Yes	-	3	-	S	-	X
8B	6x40	0	2-4-2	-	8	Yes	-	-	-	S	-	X

SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 TIMING CHART

FEATURE	PHASE 2	4	5	6	7	8
Min Green *	12	7	7	12	7	7
Walk *	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0
Veh. Extension *	6.0	3.5	4.0	6.0	2.0	1.0
Max 1 *	90	25	20	90	20	25
Yellow	4.5	4.6	3.0	4.5	3.0	4.6
Red Clear	1.0	1.8	1.8	1.0	2.4	1.8
Actuations B4 Add *	0	-	-	0	-	-
Seconds /Actuation *	2.5	-	-	2.5	-	-
Max Initial *	34	-	-	34	-	-
Time Before Reduction *	30	-	-	30	-	-
Time To Reduce *	30	-	-	30	-	-
Minimum Gap	3.0	-	-	3.0	-	-
Locking Detector	X	-	-	X	-	-
Recall Position	VEH. RECALL	-	-	VEH. RECALL	-	-
Dual Entry	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X

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

4 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Phase 7 may be lagged.
5. Reposition existing signal heads numbered 42, 81, and 82.
6. Set all detector units to presence mode.
7. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Provide minimum of 15' clearance from high point in roadway to bottom of proposed signal heads.

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	
N/A	"YIELD" Sign (R1-2)	

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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 2304 (Hanford Road)
at
SR 2433 (Moore Street)

Division 7 Alamance County Graham

PLAN DATE: November 2017 REVIEWED BY: JB Voso
PREPARED BY: SE Wilson REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO
Digitally signed by James Voso 6/13/2018

SIGNATURE DATE

SIG. INVENTORY NO. 07-1805

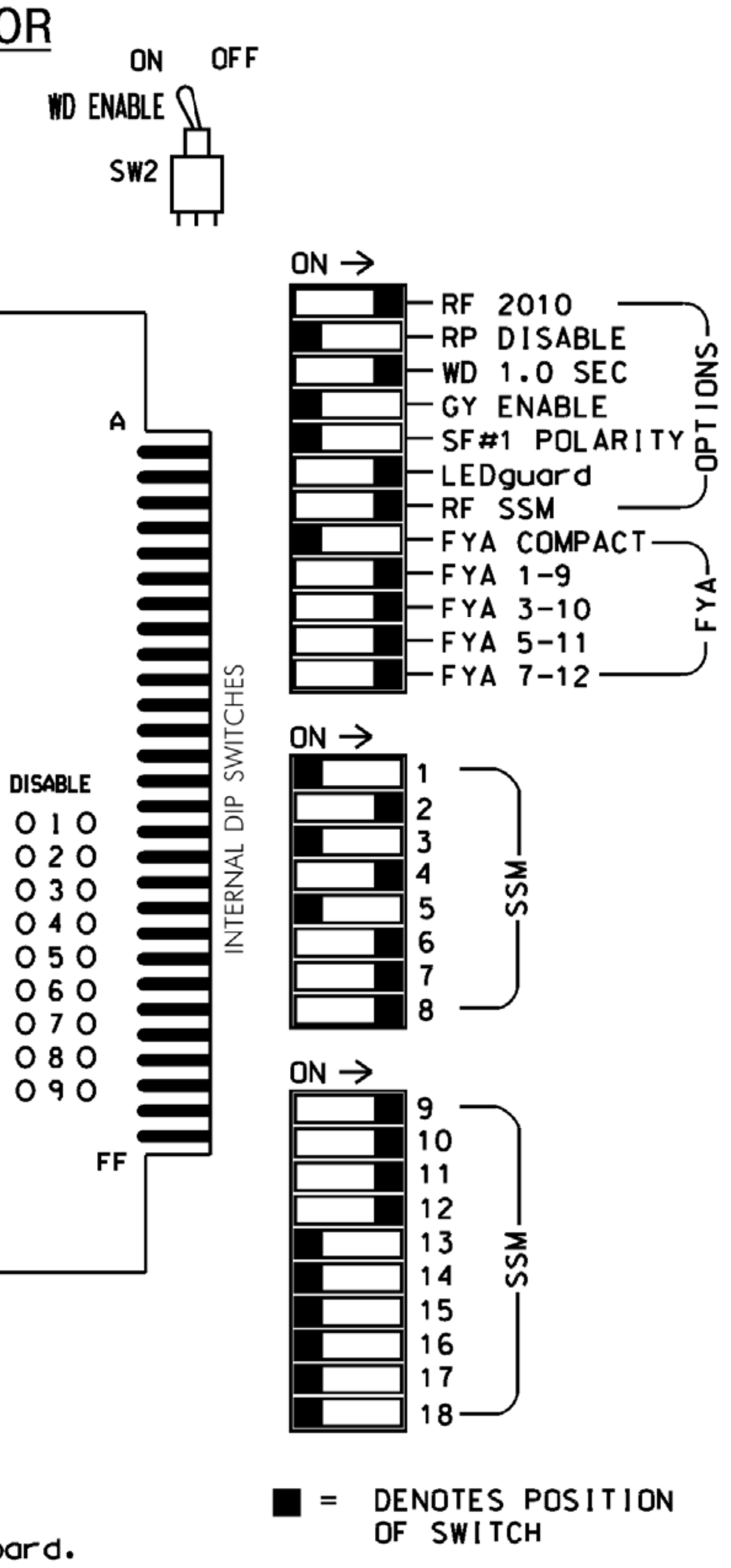
$$$$$SYSTIME$$$$$
$$$$$USERNAME$$$$$

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-9, 2-11, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11, and 10-12.

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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET................332 W/ AUX
SOFTWARE...............ECONOLITE ASC/3-2070
CABINET MOUNT..........BASE
OUTPUT FILE POSITIONS...18 WITH AUX FILE
LOAD SWITCHES USED......S2,S5,S7,S8,S10,S11, AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED............2,4,5,6,7,8
OVERLAP A...............*
OVERLAP B...............*
OVERLAP D...............*
OVERLAP A...............*

* See overlap programming detail on sheet 2

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	NU	NU	41,42	NU	51★	61,62	NU	71★	22	81,82	NU	63★	83★	NU	51★	71★	NU
RED		128			101			134		*		107							
YELLOW		129			102		*	135				108							
GREEN		130			103			136				109							
RED ARROW														A121	A124		A114	A101	
YELLOW ARROW											123			A122	A125		A115	A102	
FLASHING YELLOW ARROW														A123	A126		A116	A103	
GREEN ARROW							133			124	124								

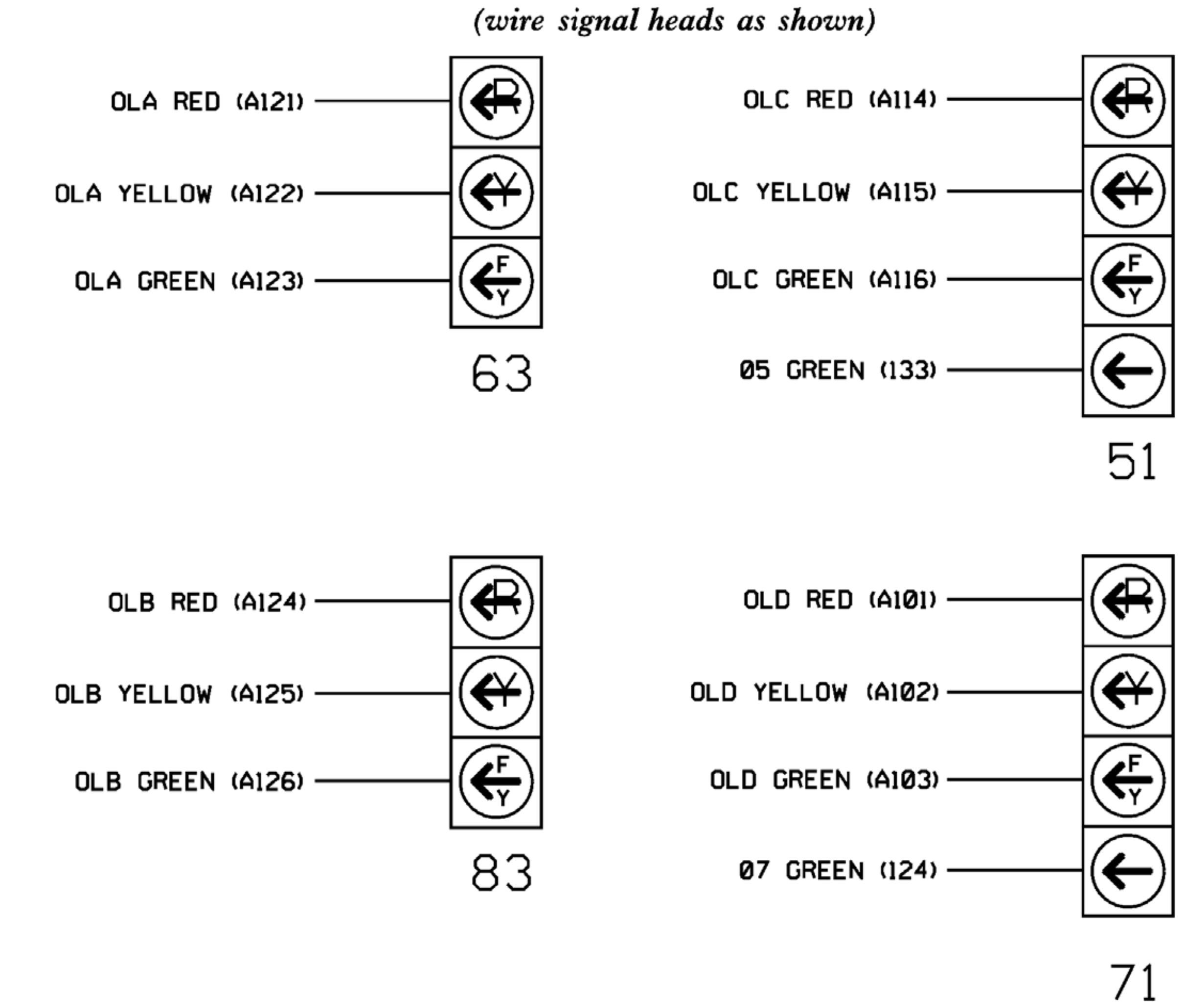
NU = Not Used

* 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)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES				S
5A[1]	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES		3		G
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES		3		G
7A[2]	TB5-5,6	J5U	57	7	7	YES		15		S
	-	I8U	49	24	4	YES				S
8A	TB5-9,10	J6U	42	8	8	YES		3		S
8B	TB5-11,12	J6L	46	18	8	YES				S

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

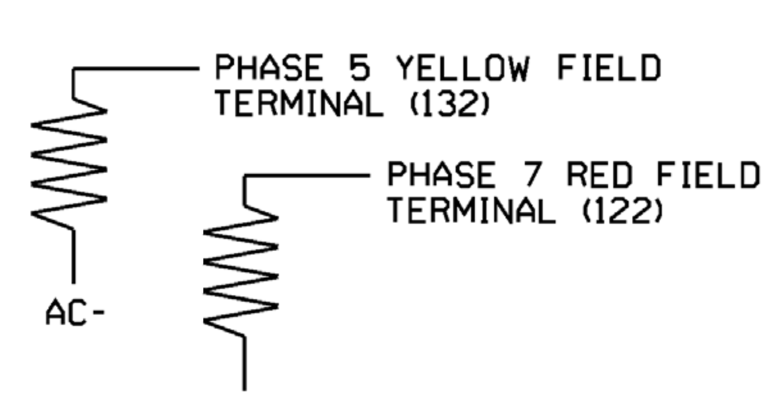
[2] Add jumper from J5-W to I8-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



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NC LIC. NO. C-1154

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1805
DESIGNED: November 2017
SEALED: 6/13/2018
REVISED: NA

Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 2304 (Hanford Road)
at
SR 2433 (Moore Street)

Division 7 Alamance County Graham

PLAN DATE:	November 2017	REVIEWED BY:	JB Voso
PREPARED BY:	SE Wilson	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

James Voso 6/13/2018

DATE

SIG. INVENTORY NO. 07-1805

$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.141.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select `2. CONTROLLER`
2. From CONTROLLER Submenu select `2. VEHICLE OVERLAPS`

OVERLAP A

Select TMG VEH OVLP [A] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[A] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X . . . . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . 1 . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

↓ Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[B] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . X . . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . 1 . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

↓ Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

↓ Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

```
TMG VEH OVLP...[D] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    7
OPPOSING THROUGH.......   PHASE    8

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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.

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NC LIC. NO. C-1154

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1805
DESIGNED: November 2017
SEALED: 6/13/2018
REVISED: NA

Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

Transportation Mobility and Safety Division
ITS & Signals Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SR 2304 (Hanford Road)
at
SR 2433 (Moore Street)

Division 7 Alamance County Graham

PLAN DATE:	November 2017	REVIEWED BY:	JB Voso
PREPARED BY:	SE Wilson	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

SEAL 022599
JAMES B. VOSO

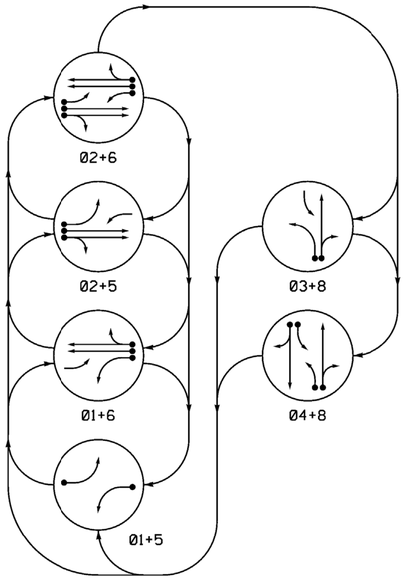
DocuSigned by:
James Voso
140FD60379E041F...

6/13/2018
DATE

SIG. INVENTORY NO. 07-1805

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.142.0

DEFAULT PHASING DIAGRAM

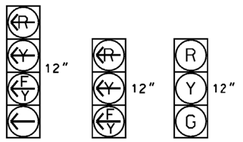


DEFAULT TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+08	04+08	FLASH
11	~~←~~	~~←~~	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
21, 22	R	R	G	G	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~F Y~~	~~R~~
41	~~R~~	~~R~~	~~R~~	~~R~~	~~F Y~~	~~F Y~~	~~R~~
42, 43	R	R	R	R	R	G	R
51	~~←~~	~~F Y~~	~~←~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
61, 62, 63	R	G	R	G	R	R	Y
81, 82	R	R	R	R	G	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

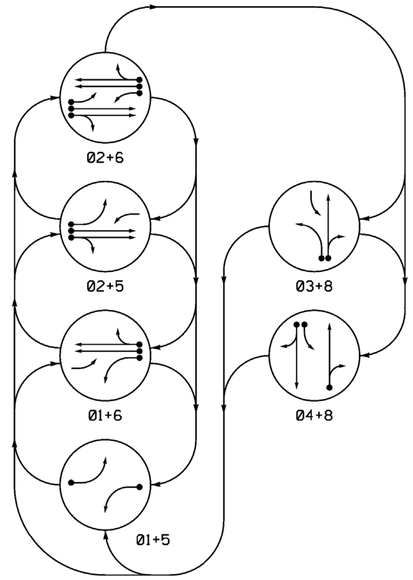


11
31
51

41

21, 22
42, 43
61, 62, 63
81, 82

ALTERNATE PHASING DIAGRAM



ALTERNATE TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+08	04+08	FLASH
11	~~←~~	~~←~~	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
21, 22	R	R	G	G	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~R~~	~~R~~
41	~~R~~	~~R~~	~~R~~	~~R~~	~~F Y~~	~~F Y~~	~~R~~
42, 43	R	R	R	R	R	G	R
51	~~←~~	~~F Y~~	~~←~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
61, 62, 63	R	G	R	G	R	R	Y
81, 82	R	R	R	R	G	G	R

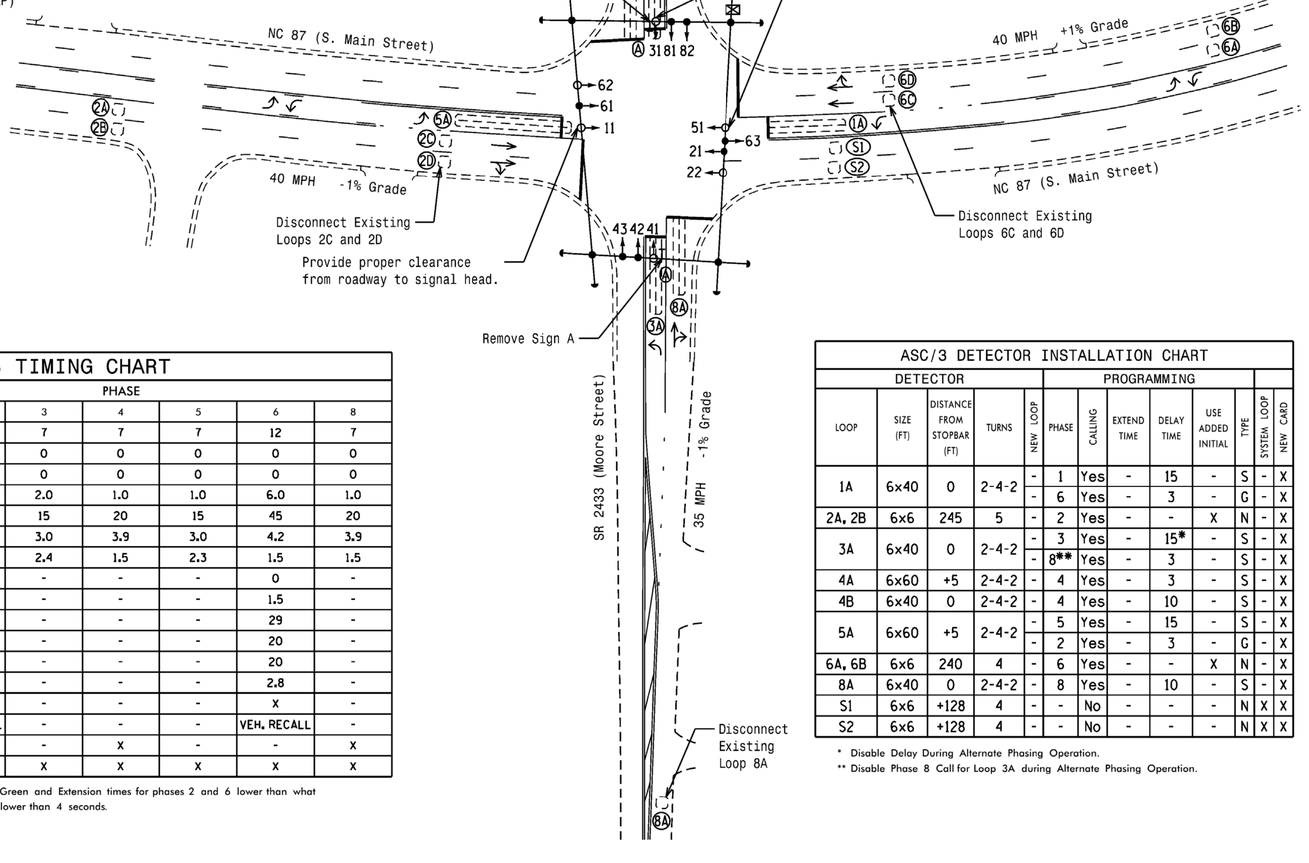
6 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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 may be lagged.
5. Reposition existing signal heads numbered 21, 42, 43, 61, 81, and 82.
6. Set all detector units to presence mode.
7. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Pavement markings are existing.
10. The City Traffic Engineer will determine the hours of use for each phasing plan.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

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



ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	8
Min Green *	7	12	7	7	7	12	7
Walk *	0	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0	0
Veh. Extension *	2.0	6.0	2.0	1.0	1.0	6.0	1.0
Max 1 *	15	45	15	20	15	45	20
Yellow	3.0	4.2	3.0	3.9	3.0	4.2	3.9
Red Clear	2.6	1.5	2.4	1.5	2.3	1.5	1.5
Actuations B4 Add *	-	0	-	-	-	0	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-
Max Initial *	-	29	-	-	-	29	-
Time Before Reduction *	-	20	-	-	-	20	-
Time To Reduce *	-	20	-	-	-	20	-
Minimum Gap	-	2.8	-	-	-	2.8	-
Locking Detector	-	X	-	-	-	X	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-
Dual Entry	-	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X

* 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.

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6x40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
				-	6	Yes	-	3	-	G	-	X
2A, 2B	6x6	245	5	-	2	Yes	-	-	X	N	-	X
3A	6x40	0	2-4-2	-	3	Yes	-	15*	-	S	-	X
				-	8**	Yes	-	3	-	S	-	X
4A	6x60	+5	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6x40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6x60	+5	2-4-2	-	5	Yes	-	15	-	S	-	X
				-	2	Yes	-	3	-	G	-	X
6A, 6B	6x6	240	4	-	6	Yes	-	-	X	N	-	X
8A	6x40	0	2-4-2	-	8	Yes	-	10	-	S	-	X
S1	6x6	+128	4	-	-	No	-	-	-	N	X	X
S2	6x6	+128	4	-	-	No	-	-	-	N	X	X

* Disable Delay During Alternate Phasing Operation.
** Disable Phase 8 Call for Loop 3A during Alternate Phasing Operation.

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	→
(A)	Left Arrow "ONLY" Sign (R3-5L)	(A)

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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 87 (S. Main Street)
at
SR 2433 (Moore Street)

Division 7 Alamance County Graham

PLAN DATE:	April 2018	REVIEWED BY:	JB Voso
PREPARED BY:	SE Greene	REVIEWED BY:	

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

Docusigned by: James Voso 6/13/2018
SIGNATURE DATE

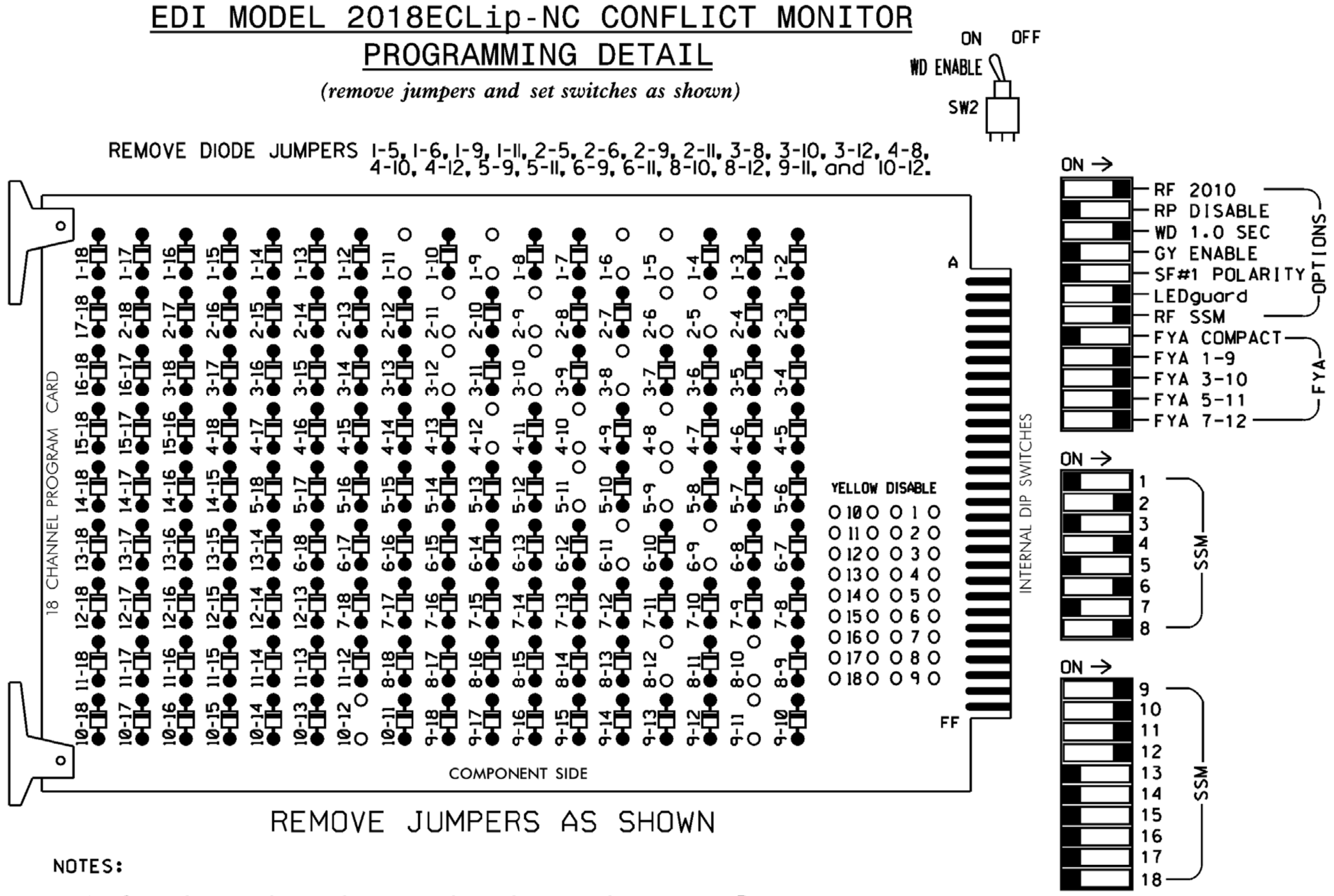
SIG. INVENTORY NO. 07-1806

$$$$USERNAME$$$$
$$$$SYSTIME$$$$
$$$$SYSDATE$$$$

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, 3-8, 3-10, 3-12, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 8-10, 8-12, 9-11, and 10-12.



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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................332 W/AUX
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S1, S2, S4, S5, S7, S8, S11,
AUX S1, AUX S2, AUX S4, AUX S5
PHASES USED.............1, 2, 3, 4, 5, 6, 8
OVERLAP "A".............*
OVERLAP "B".............*
OVERLAP "C".............*
OVERLAP "D".............*

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.142.1

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	NU	31★	42,43	NU	51★	61,62,63	NU	NU	81,82	NU	11★	31★	NU	51★	41★	NU
RED		128			101			134			107							
YELLOW	*	129		*	102		*	135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127			118			133											

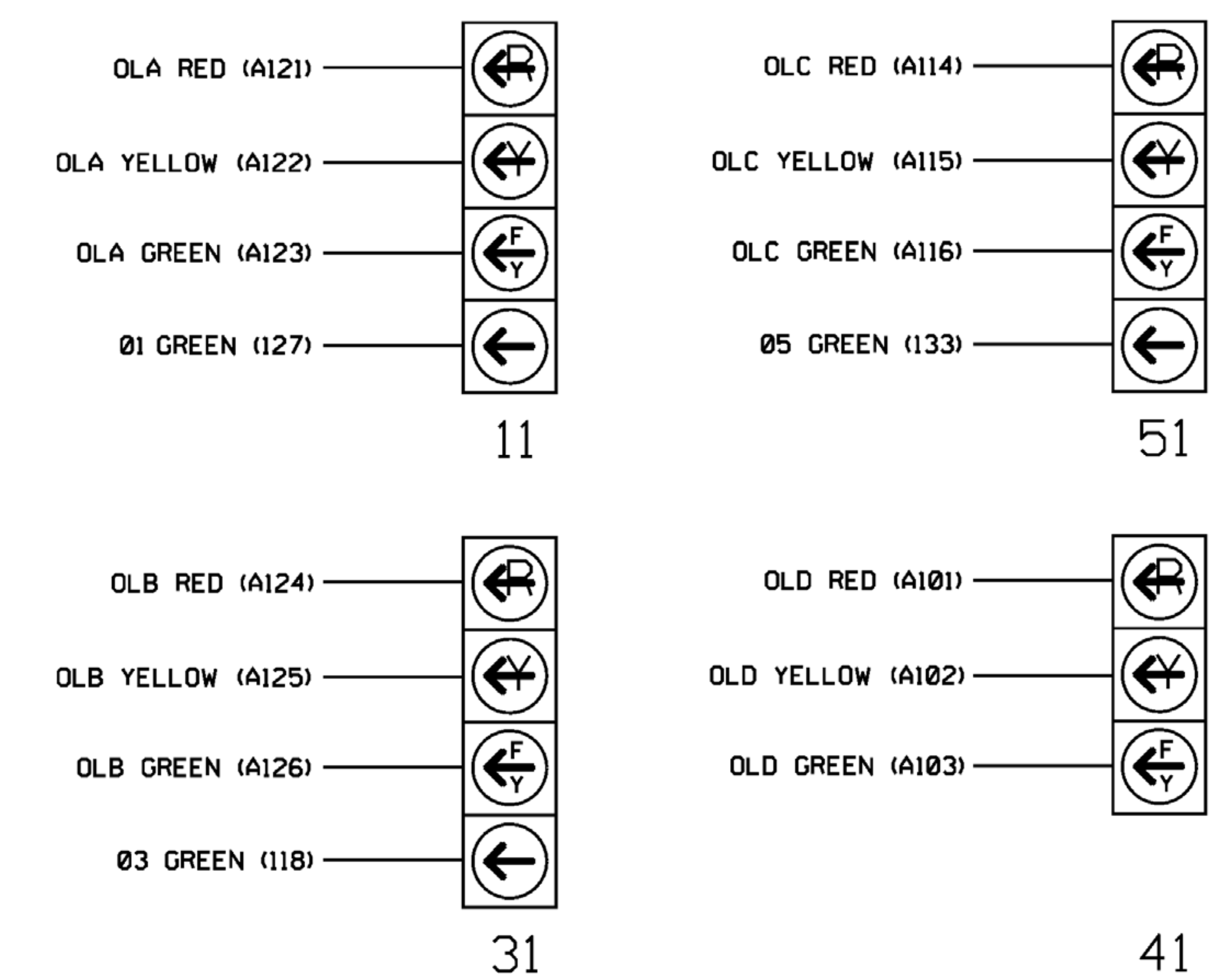
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	U	ø1 1A	ø2 2A,2B	SLOT EMPTY	WIRED INPUT ⊗	ø3 3A	ø4 4A	SLOT EMPTY	WIRED INPUT ⊗	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
"I"	L	NOT USED	NOT USED			NOT USED	ø4 4B			SYS. DET. S2					ST DC ISOLATOR
"J"	U	ø5 5A	ø6 6A,6B	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	ø8 8A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
"J"	L	NOT USED	NOT USED				NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1	1	YES		15		S
	-	J4U	48	26	6	YES		3		G
2A, 2B	TB2-5,6	I2U	39	2	2	YES			X	N
3A [2]	TB4-5,6	I5U	58	3 ★	3	YES		15		S
	-	J8U	50	28★	8	YES		3		S
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	4	4	YES		10		S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
5A [3]	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES		3		G
6A, 6B	TB3-5,6	J2U	40	6	6	YES			X	N
8A	TB5-9,10	J6U	42	8	8	YES		10		S

* System detector only. Remove any assigned vehicle phase.

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

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

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

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 3

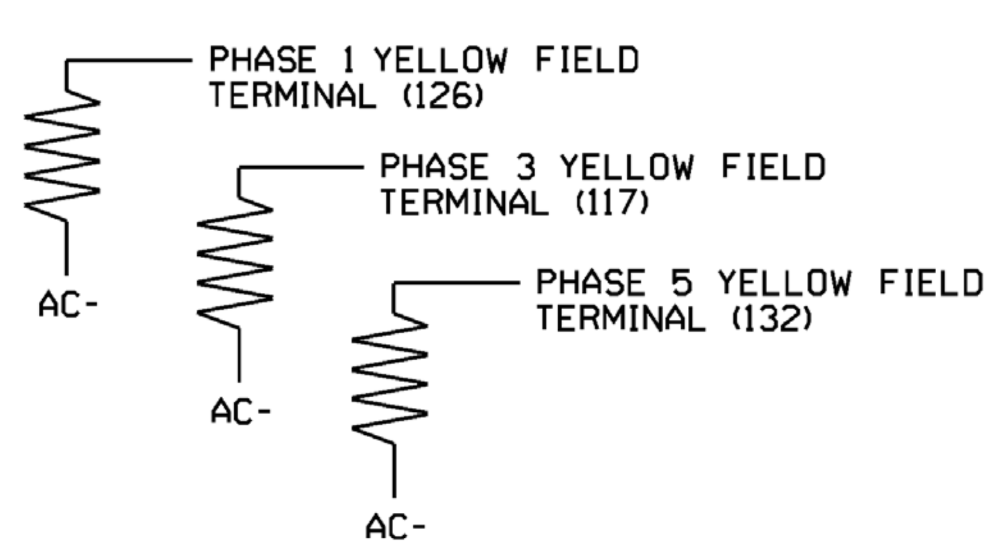
INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



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NC LIC. NO. C-1154

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1806
DESIGNED: April 2018
SEALED: 6/13/2018
REVISED: NA

Electrical Detail - Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

Transportation Mobility and Safety Division, ITS & Signals Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

NC 87 (S. Main Street)
at
SR 2433 (Moore Street)

Division 7 | Alamance County | Graham

PLAN DATE: April 2018 | REVIEWED BY: JB Voso
PREPARED BY: SE Greene | REVIEWED BY:

REVISIONS | INIT. | DATE

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022599 JAMES B. VOSO

DocuSigned by: James Voso 6/13/2018

DATE

SIG. INVENTORY NO. 07-1806

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.142.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **2. CONTROLLER**
2. From CONTROLLER Submenu select **2. VEHICLE OVERLAPS**

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 3
```

← NOTICE ACTION PLAN SF BIT "3"

Toggle Once

↓

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[D] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . X . . . . . .
PROTECT  . . . . . .
PED PRTC . . . . . .
NOT OVLP . . . . . .
FLSH GRN . . . . . 1 . . . . . .
LAG X PH . . . . . .
LAG 2 PH . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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.

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THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1806
DESIGNED: April 2018
SEALED: 6/13/2018
REVISED: NA

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 87 (S. Main Street)
at
SR 2433 (Moore Street)

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

Division 7 | Alamance County | Graham

PLAN DATE:	April 2018	REVIEWED BY:	JB Voso
PREPARED BY:	SE Greene	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

DocuSigned by: James Voso 6/13/2018
DATE

SIG. INVENTORY NO. 07-1806

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.142.3

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING
LOOP 3A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
      FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
            THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

- Place cursor in VEH DETECTOR [ ] position and enter "3".
- Set delay time to "0".

```
VEH DETECTOR [ 3]   VEH DET PLAN [ 2]        <- NOTICE VEH DET PLAN 2
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 3  3    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0 <- ENSURE DELAY IS SET TO '0'
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

- Place cursor in VEH DETECTOR [ ] position and enter "28".
- Set assigned phase to "0".

```
VEH DETECTOR [28]   VEH DET PLAN [ 2]        <- NOTICE VEH DET PLAN 2
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 28 0    . . . . . . . . . . . . . . . .     <- ENSURE PHASE IS SET TO "0"
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1806
DESIGNED: April 2018
SEALED: 6/13/2018
REVISED: NA

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Electrical Detail - Sheet 3 of 4

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 87 (S. Main Street)
at
SR 2433 (Moore Street)

Division 7 Alamance County Graham

PLAN DATE: April 2018	REVIEWED BY: JB Voso
PREPARED BY: SE Greene	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

DocuSigned by: James Voso
140FD60379E041F...
6/13/2018
DATE

SIG. INVENTORY NO. 07-1806

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 3.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 3.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	3

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BIT 3 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BIT 3: Modifies overlap parent phases for head 31 to run protected turns only.

VEH DET PLAN 2: Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 0 seconds.

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]
2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[  1]
PATTERN..........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE     1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
PED RCL     . . . . . . . . . . . . . . . .
WALK 2      . . . . . . . . . . . . . . . .
VEX 2       . . . . . . . . . . . . . . . .
VEH RCL     . . . . . . . . . . . . . . . .
MAX RCL     . . . . . . . . . . . . . . . .
MAX 2       . . . . . . . . . . . . . . . .
  PHASE     1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
MAX 3       . . . . . . . . . . . . . . . .
CS INH      . . . . . . . . . . . . . . . .
OMIT        . . . . . . . . . . . . . . . .
SPC FCT     . . X . . . . . (1-8)
AUX FCT     . . . (1-3)
            1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
LP 1-15     . . . . . . . . . . . . . . .
LP 16-30    . . . . . . . . . . . . . . .
LP 31-45    . . . . . . . . . . . . . . .
LP 46-60    . . . . . . . . . . . . . . .
LP 61-75    . . . . . . . . . . . . . . .
LP 76-90    . . . . . . . . . . . . . . .
LP 91-100   . . . . . . . . . . . . . . .
```

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THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1806
DESIGNED: April 2018
SEALED: 6/13/2018
REVISED: NA

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 87 (S. Main Street)
at
SR 2433 (Moore Street)

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

Division 7 | Alamance County | Graham

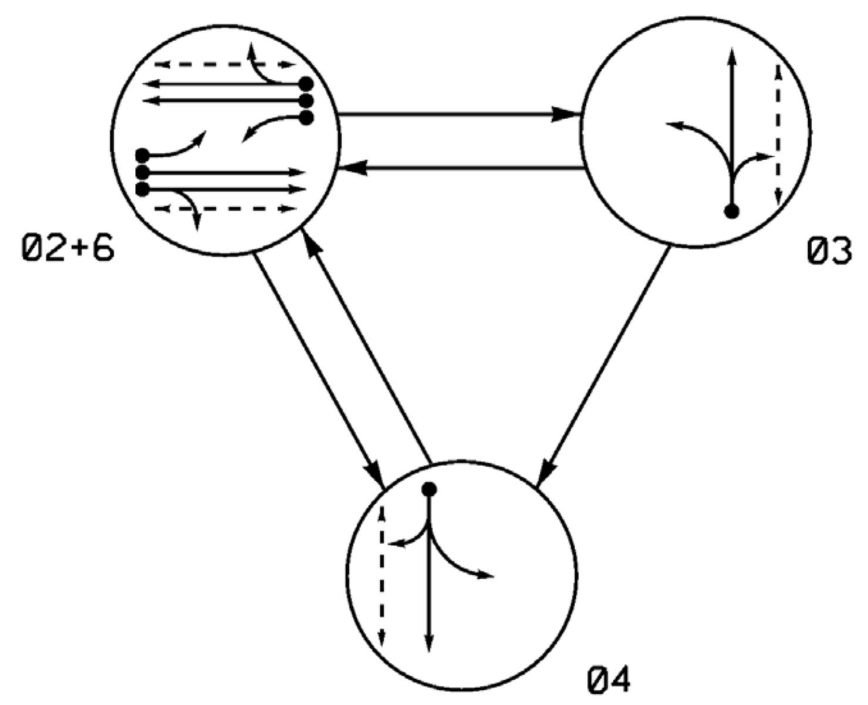
PLAN DATE: April 2018	REVIEWED BY: JB Voso
PREPARED BY: SE Greene	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO
DocuSigned by: James Voso
140FD60379E041F...
6/13/2018
DATE

SIG. INVENTORY NO. 07-1806

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

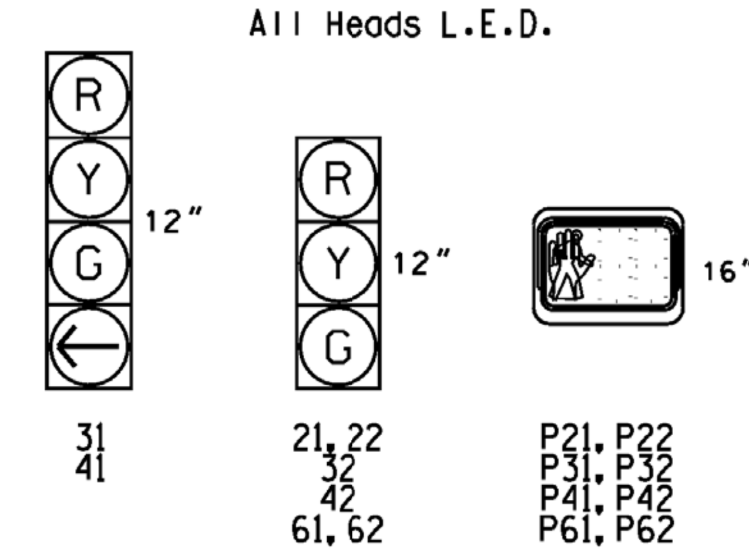
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 02+6	PHASE 03	PHASE 04	FLASH
21, 22	G	R	R	Y
31	R	G	R	R
32	R	G	R	R
41	R	R	G	R
42	R	R	G	R
61, 62	G	R	R	Y
P21, P22	W	DW	DW	DRK
P31, P32	DW	W	DW	DRK
P41, P42	DW	DW	W	DRK
P61, P62	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



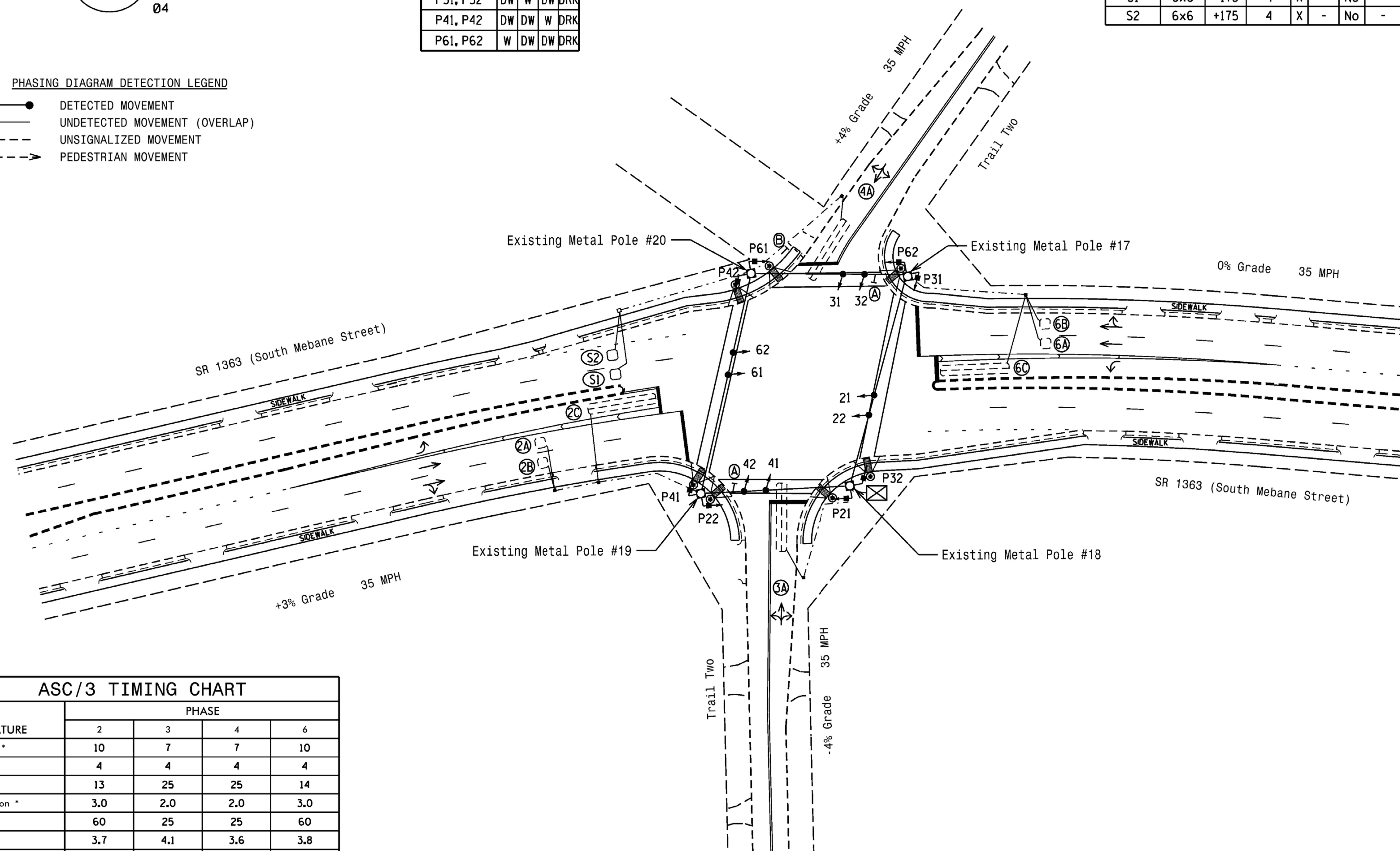
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6x6	80	EXIST.	-	2	Yes	-	-	-	S	-	X
2B	6x6	80	EXIST.	-	2	Yes	-	-	-	S	-	X
2C	6x40	0	2-4-2	-	2	Yes	-	-	-	S	-	X
3A	6x40	+10	2-4-2	-	3	Yes	-	5	-	S	-	X
4A	6x40	+10	2-4-2	-	4	Yes	-	5	-	S	-	X
6A	6x6	70	EXIST.	-	6	Yes	-	-	-	S	-	X
6B	6x6	70	EXIST.	-	6	Yes	-	-	-	S	-	X
6C	6x40	0	2-4-2	-	6	Yes	-	-	-	S	-	X
S1	6x6	+175	4	X	-	No	-	-	-	N	X	X
S2	6x6	+175	4	X	-	No	-	-	-	N	X	X

3 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. The cabinet should be designed to include an Auxiliary Output file for future use.
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. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. The order of phase 3 and phase 4 may be reversed.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
N/A	Wheelchair Ramp	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	2" Pedestrian Post with Ped Push Button & Sign	
Ⓐ	"RIGHT TURN ON RED MUST YIELD TO U-TURN" Sign (R10-30)	Ⓐ
Ⓑ	"STOP HERE ON RED" Sign (R10-6a)	Ⓑ

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 3	PHASE 4	PHASE 6
Min Green *	10	7	7	10
Walk *	4	4	4	4
Ped Clear	13	25	25	14
Veh. Extension *	3.0	2.0	2.0	3.0
Max 1 *	60	25	25	60
Yellow	3.7	4.1	3.6	3.8
Red Clear	3.0	2.6	2.6	2.8
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	X	-	-	X
Recall Position	VEH. RECALL	-	-	VEH. RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	X	X

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

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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1363 (South Mebane Street)
at
Trail Two

Division 7 Alamance County Burlington

PLAN DATE:	September 2017	REVIEWED BY:	JB Voso
PREPARED BY:	SE Wilson	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS | INIT. | DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

SIGNATURE: James Voso | DATE: 6/13/2018

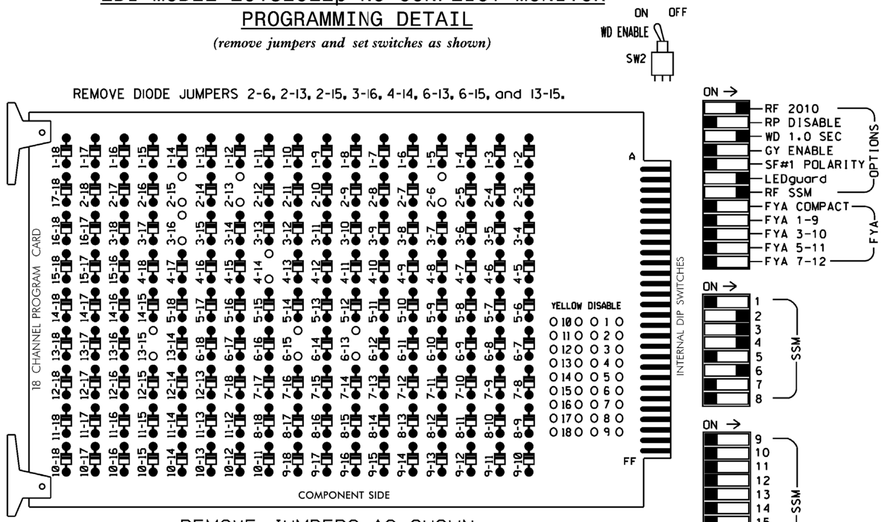
SIG. INVENTORY NO. 07-1852

$$$$SYSTIME$$$$ $$$$DGN$$$$ $$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.143.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. 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. Integrate monitor with Ethernet network in 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. Program controller to start up in phase 2 Walk and 6 Walk.
3. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 /W/ AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S3,S4,S5,S6,S8,S9,S12
PHASES USED.....2,2PED,3,3PED,4,4PED,6,6PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	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	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	P21 P22	31	32	41	42	P41 P42	NU	61,62	P61 P62	NU	NU	P31 P32	NU	NU	NU	NU	NU	NU
RED		128		116	116	101	101			134										
YELLOW		129		117	117	102	102			135										
GREEN		130		118	118	103	103			136										
RED ARROW																				
YELLOW ARROW																				
GREEN ARROW				118		103														
✋			113					104			119			110						
🚶			115					106			121			112						

NU = Not Used

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 EMPTY	Ø2 2A	Ø2 2C	SLOT EMPTY	Ø3 3A	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L		Ø2 2B	NOT USED		NOT USED	NOT USED			SYS. DET. S2			Ø4 PED DC ISOLATOR	Ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	Ø6 6C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø6 6B	NOT USED											

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES				S
2B	TB2-7,8	I2L	43	12	2	YES				S
2C	TB2-9,10	I3U	63	32	2	YES				S
3A	TB4-5,6	I5U	58	3	3	YES		5		S
4A	TB4-9,10	I6U	41	4	4	YES		5		S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
6A	TB3-5,6	J2U	40	6	6	YES				S
6B	TB3-7,8	J2L	44	16	6	YES				S
6C	TB3-9,10	J3U	64	36	6	YES				S
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P31,P32	TB8-8,9	I13L	70	PED 8	3 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.

* System Detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1852
DESIGNED: September 2017
SEALED: 6/13/2018
REVISED: NA

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Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1363 (South Mebane Street) at Trail Two

Division 7 | Alamance County | Burlington

PLAN DATE: September 2017 | REVIEWED BY: JB Voso

PREPARED BY: SE Wilson | REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO
DocuSigned by: James Voso 6/13/2018
SIGNATURE | DATE

SIG. INVENTORY NO. 07-1852

$$$$USERNAME$$$$
$$$$SYSTIME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.143.2

ECONOLITE ASC/3-2070
PED 3 PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

1. From Main Menu select [6. DETECTORS]
2. From DETECTOR Submenu select [3. PED DETECTOR INPUT ASSIGNMENT]

PED DET PHASE ASSIGNMENT MODE: NTCIP

PHASE	1	2	3	4	5	6	7	8
DETECTOR	0	2	8	4	0	6	0	0

PHASE	9	10	11	12	13	14	15	16
DETECTOR	0	0	0	0	0	0	0	0

NOTICE PED DETECTOR 8 ASSIGNED TO PHASE 3

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

LD SWITCH ASSIGN

	PHASE /OVLP	TYPE	DIMMING R Y G D	---FLASH--- PWR	AUT	TGR
1	1	V	. . . +	A	R	X
2	2	V	. . . +	A	Y	.
3	3	V	. . . +	A	R	X
4	4	V	. . . +	A	R	.
5	5	V	. . . −	A	R	.
6	6	V	. . . −	A	Y	X
7	7	V	. . . −	A	R	.
8	8	V	. . . −	A	R	X
9	1	O	. . . +	A	R	X
10	2	O	. . . +	A	R	X
11	3	O	. . . −	A	R	.
12	4	O	. . . −	A	R	.
13	2	P	. . . +	A	.	.
14	4	P	. . . −	A	.	.
15	6	P	. . . +	A	.	.
16	3	P	. . . −	A	.	.

NOTICE PHASE 3 PED ASSIGNED TO LD SWITCH 16

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1852
DESIGNED: September 2017
SEALED: 6/13/2018
REVISED: NA

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Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1363 (South Mebane Street)
at
Trail Two

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

Division 7 Alamance County Burlington

PLAN DATE: September 2017 REVIEWED BY: JB Voso
PREPARED BY: SE Wilson REVIEWED BY:

REVISIONS	INIT.	DATE

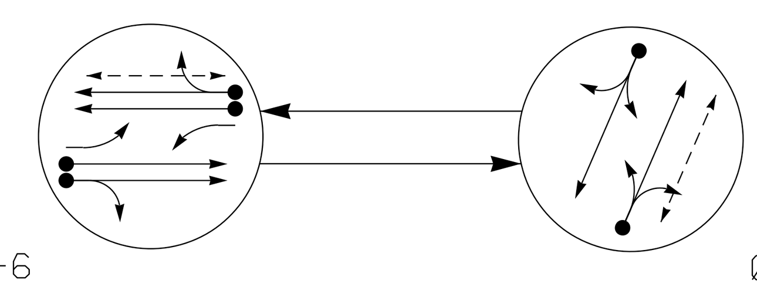
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO
DocuSigned by: James Voso 6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1852

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.144.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

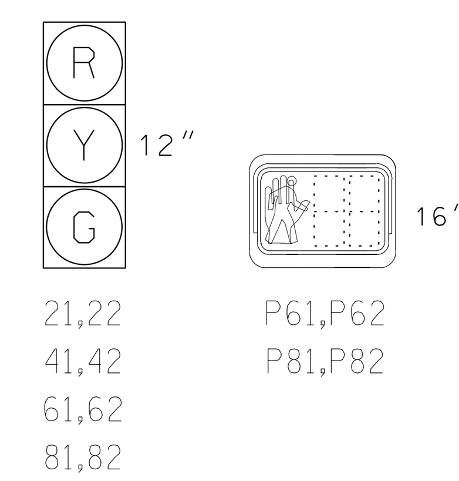
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	PHASE FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R
P61, P62	W	DW	DRK
P81, P82	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART

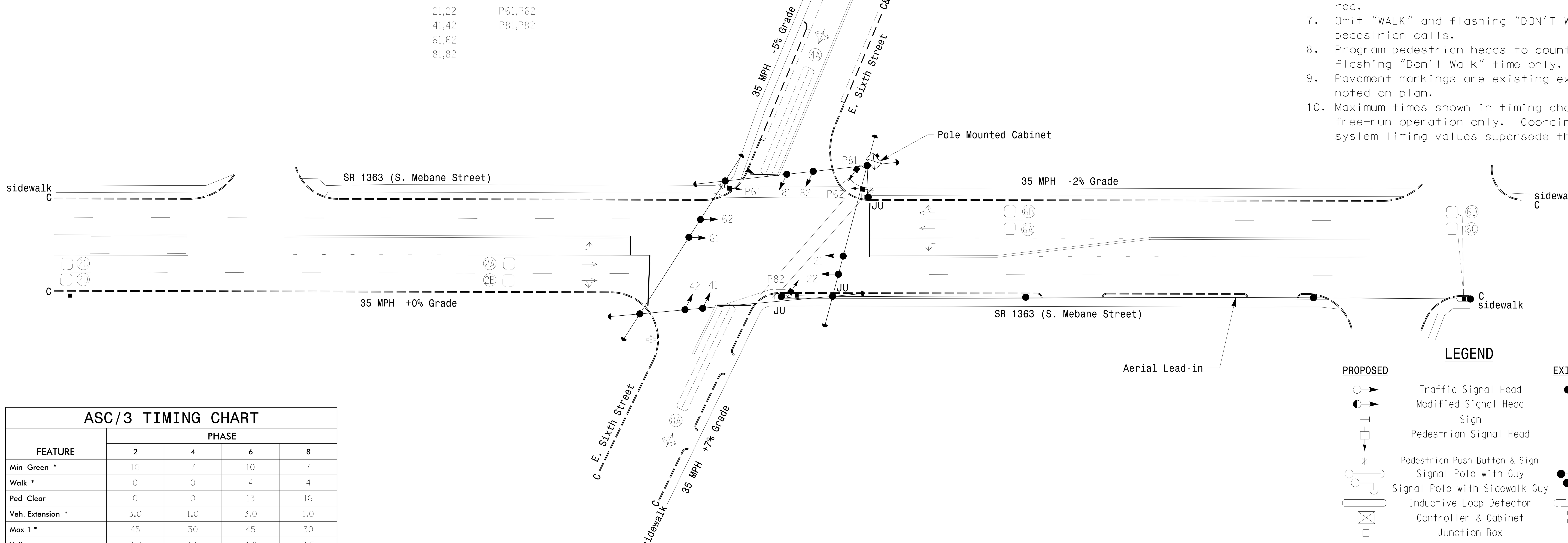
DETECTOR: LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING: PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	70	Exist	-	2	Yes	-	-	-	S	-	X
2B	6X6	70	Exist	-	2	Yes	-	-	-	S	-	X
2C✳	6X6	300	Exist	-	2	-	-	-	-	S	-	-
2D✳	6X6	300	Exist	-	2	-	-	-	-	S	-	-
4A	6X60	0	2-4-2	-	4	Yes	10	-	-	S	-	X
6A	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X
6C✳	6X6	300	Exist	-	6	-	-	-	-	S	-	-
6D✳	6X6	300	Exist	-	6	-	-	-	-	S	-	-
8A	6X60	0	2-4-2	-	8	Yes	10	-	-	S	-	X

✳ DISCONNECT LOOP

2 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Loop data based on previous plan and field observations.
4. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
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. Pavement markings are existing except where noted on plan.
10. 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	
	Pedestrian 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	Fire Hydrant	

ASC/3 TIMING CHART

FEATURE	PHASE 2	4	6	8
Min Green *	10	7	10	7
Walk *	0	0	4	4
Ped Clear	0	0	13	16
Veh. Extension *	3.0	1.0	3.0	1.0
Max 1 *	45	30	45	30
Yellow	3.8	4.2	4.0	3.5
Red Clear	2.0	1.4	1.9	1.3
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	X	-	X	-
Recall Position	VEH. RECALL	-	VEH. RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	X

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

Signal Upgrade

Plans Prepared By:

DRMP

DRMP, Inc.
8000 Regency Parkway, Suite 175
Cary, NC 27518
NC License No. C-2213 (919) 650-1038

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

SCALE 0 30
1"=30'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SR 1363 (S.Mebane Street) at E. Sixth Street

Division 7 Alamance County Burlington

PLAN DATE: November 2017 REVIEWED BY: AJ Davis
PREPARED BY: RD Lawton REVIEWED BY: LM Moon

REVISIONS INIT. DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 022516
LISA M. MOON

DocuSigned by: Lisa M. Moon 6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1886

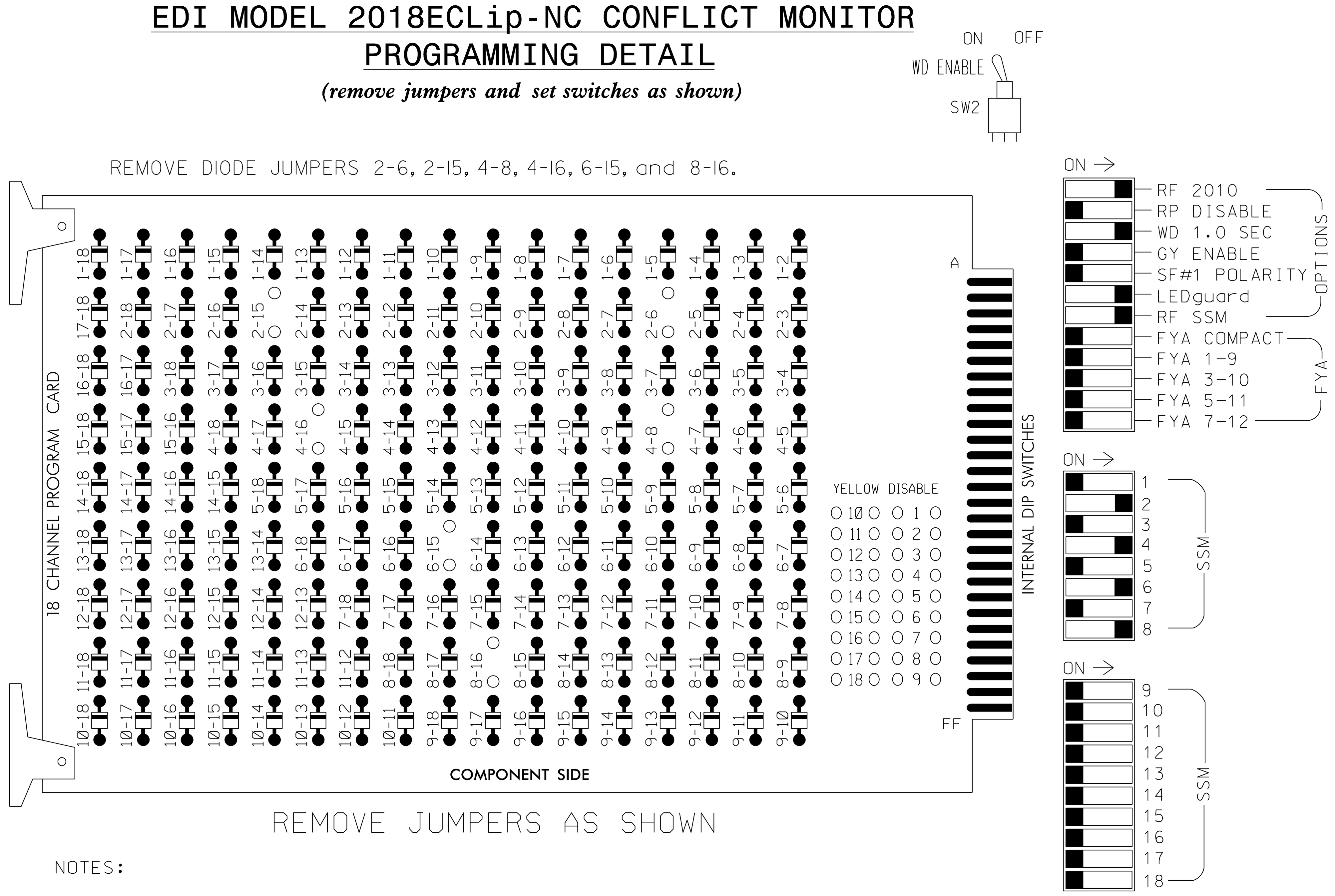
13-JUN-2018 17:47
R:\U6015\Traffic\Signals\Design\Signals\07-1886.dgn
K.Anderson AT DHA-KANDERSON

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.144.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-6, 2-15, 4-8, 4-16, 6-15, and 8-16.



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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 walk.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.............2070LX
CABINET.................336
SOFTWARE...............ECONOLITE ASC/3-2070
CABINET MOUNT...........POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S2,S5,S8,S9,S11,S12
PHASES USED.............2,4,6,6PED,8,8PED
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	NU	61,62	P61, P62	NU	81,82	P81, P82
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
(Hand symbol)									119			110
(Walking person symbol)									121			112

NU = Not Used

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: 07-1886
DESIGNED: NOVEMBER 2017
SEALED: 06-13-2018
REVISED: N/A

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	SLOT EMPTY	Ø 2 2A	SLOT EMPTY	Ø 4 4A	SLOT EMPTY	Ø 6 6A	SLOT EMPTY	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
L		Ø 2 2B		NOT USED		Ø 6 6B		NOT USED					Ø8 PED DC ISOLATOR	ST DC ISOLATOR

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB21-3,4	I2U	39	2	2	YES				S
2B	TB23-3,4	I2L	43	12	2	YES				S
4A	TB21-7,8	I4U	41	4	4	YES		10		S
6A	TB21-11,12	I6U	40	6	6	YES				S
6B	TB23-11,12	I6L	44	16	6	YES				S
8A	TB22-1,2	I8U	42	8	8	YES		10		S
PED PUSH BUTTONS										
P61,P62	TB22-11,12	I13U	68	PED 6	6 PED					
P81,P82	TB24-11,12	I13L	70	PED 8	8 PED					

NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

Plans Prepared By:
DRMP
DRMP, Inc.
8000 Regency Parkway, Suite 175
Cary, NC 27518
NC License No. C-2213 (919) 650-1038

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1363 (S. Mebane Street)
at
E. Sixth Street

Division 7 Alamance County Burlington

PLAN DATE:	November 2017	REVIEWED BY:	AJ Davis
PREPARED BY:	RD Lawton	REVIEWED BY:	LM Moon

REVISIONS	INIT.	DATE

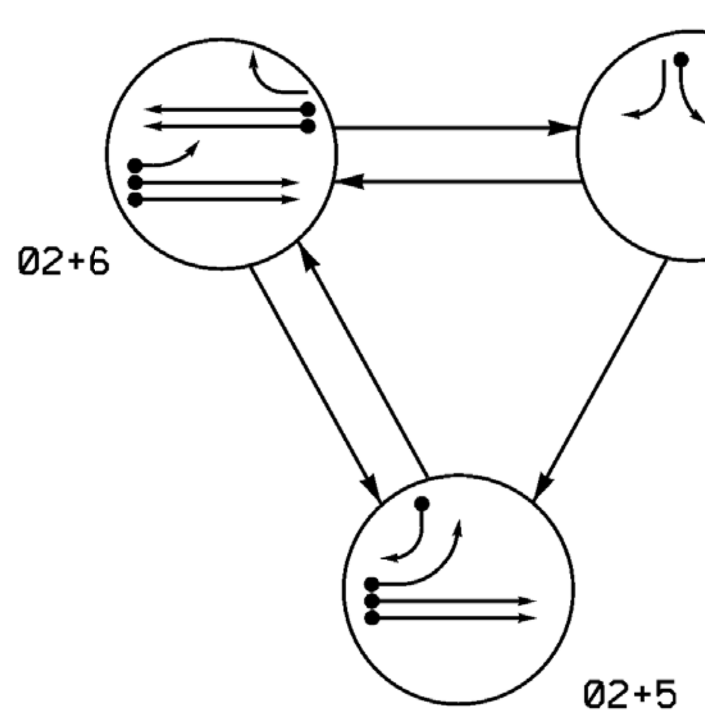
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022516 ENGINEER LISA M. MOON

DocuSigned by: Lisa M. Moon 58CE58BD83D0421... 6/13/2018 DATE

SIG. INVENTORY NO. 07-1886

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

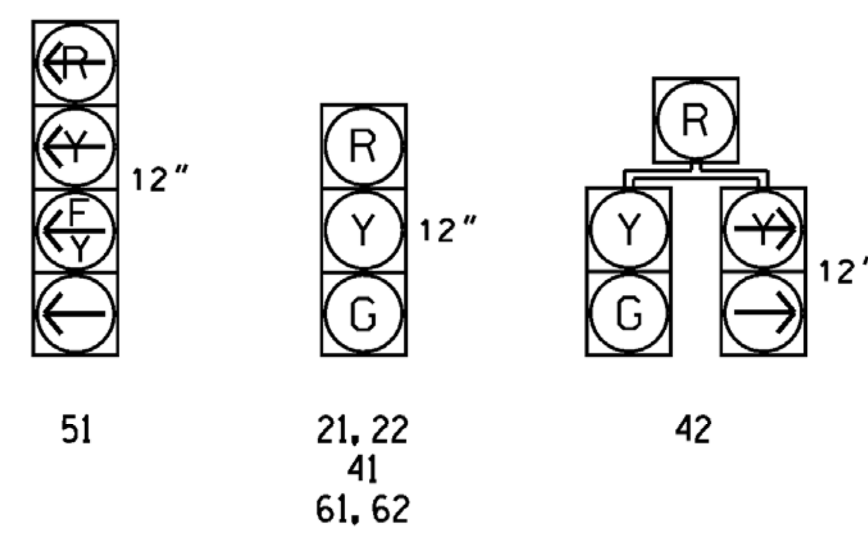
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	PHASE 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

SIGNAL FACE I.D.

All Heads L.E.D.



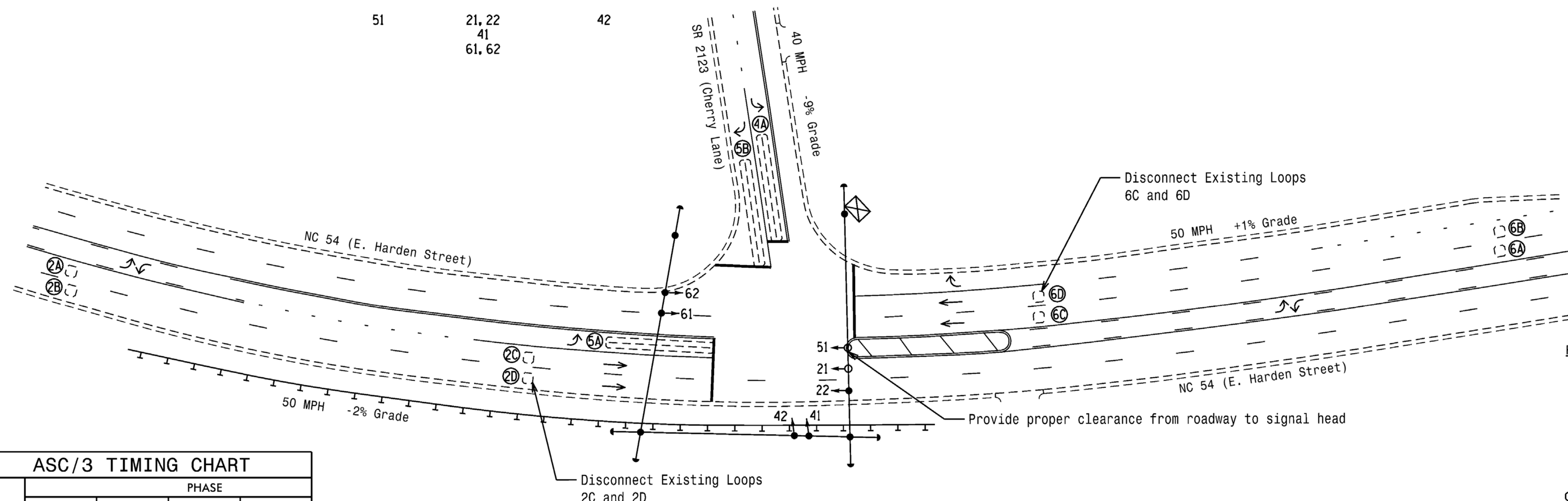
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR: LOOP	DETECTOR: SIZE (FT)	DETECTOR: DISTANCE FROM STOPBAR (FT)	DETECTOR: TURNS	DETECTOR: NEW LOOP	PROGRAMMING: PHASE	PROGRAMMING: CALLING	PROGRAMMING: EXTEND TIME	PROGRAMMING: DELAY TIME	PROGRAMMING: USE ADDED INITIAL	PROGRAMMING: TYPE	SYSTEM LOOP	NEW CARD
2A,2B	6x6	360	EXIST.	-	2	Yes	-	-	X	N	-	X
4A	6x60	0	2-4-2	-	4	Yes	-	3	-	S	-	X
5A	6x60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
				-	2	Yes	-	3	-	G	-	X
5B	6x60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A,6B	6x6	360	EXIST.	-	6	Yes	-	-	X	N	-	X

3 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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 head numbered 22.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Pavement markings are existing.
9. 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	

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green *	14	7	7	14
Walk *	0	0	0	0
Ped Clear	0	0	0	0
Veh. Extension *	6.0	1.0	1.0	6.0
Max 1 *	60	25	15	60
Yellow	5.0	3.3	3.0	5.0
Red Clear	1.0	2.6	2.3	1.0
Actuations B4 Add *	0	-	-	0
Seconds /Actuation *	1.5	-	-	1.5
Max Initial *	40	-	-	40
Time Before Reduction *	20	-	-	20
Time To Reduce *	20	-	-	20
Minimum Gap	3.0	-	-	3.0
Locking Detector	X	-	-	X
Recall Position	VEH. RECALL	-	-	VEH. RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	X	X

* 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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NC LIC. NO. C-1154

Signal Upgrade

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

NC 54 (E. Harden Street)
at
SR 2123 (Cherry Lane)

Division 7 | Alamance County | Burlington

PLAN DATE:	September 2017	REVIEWED BY:	JB Voso
PREPARED BY:	SE Wilson	REVIEWED BY:	

SCALE 0 40 — 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

James Voso — 6/13/2018
SIGNATURE — DATE

SIG. INVENTORY NO. 07-1938

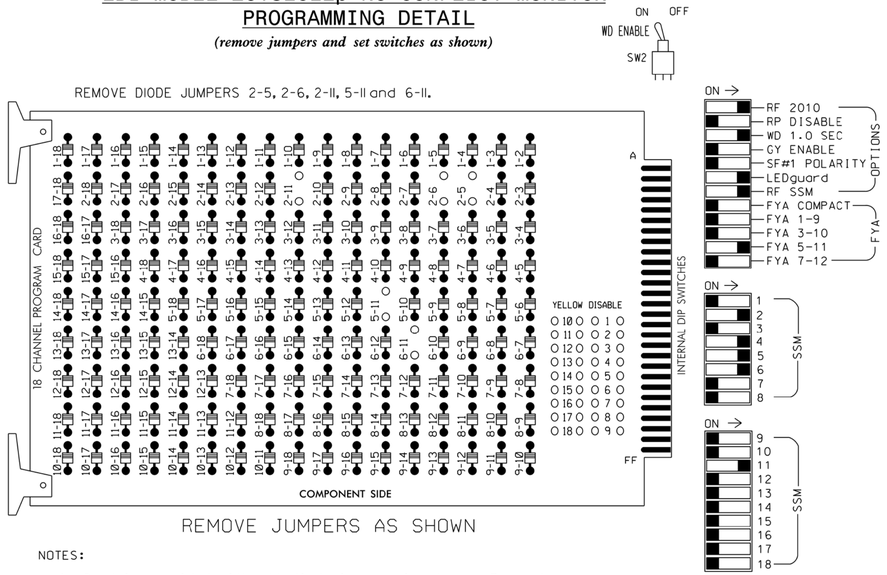
$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.145.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 5-11 and 6-11.



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. Integrate monitor with Ethernet network in 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. Program controller to start up in phase 2 Green and 6 Green.
3. The cabinet and controller are part of the Burlington-Graham 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.	NU	21,22	NU	NU	41,42	NU	42	51★	61,62	NU	NU	NU	NU	NU	NU	NU	51★	NU	NU
RED		128			101		✳		134										
YELLOW		129			102				135										
GREEN		130			103				136										
RED ARROW																	A114		
YELLOW ARROW							132										A115		
FLASHING YELLOW ARROW																	A116		
GREEN ARROW							133	133											

NU = Not Used

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

★ See pictorial of head wiring in detail below.

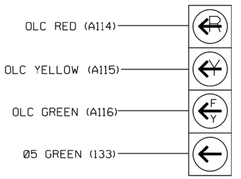
EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................332 /W/ AUX
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S2,S5,S7,S8,AUXS4
PHASES USED.............2,4,5,6
OVERLAP "A".............NOT USED
OVERLAP "B".............NOT USED
OVERLAP "C".............✳
OVERLAP "D".............NOT USED

✳ See overlap programming detail on sheet 2

FYA SIGNAL WIRING DETAIL

(wire signal head 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 EMPTY	Ø2 2A,2B	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		NOT USED				NOT USED								ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A,6B	Ø5 5B	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	NOT USED	NOT USED											

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A,2B	TB2-5,6	I2U	39	2	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES		3		S
5A [1]	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES		3		G
6A,6B	TB3-5,6	J2U	40	6	6	YES			X	N
5B	TB3-9,10	J3U	64	36	5	YES		15		S

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

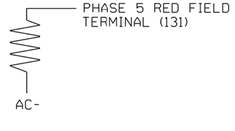
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1938
DESIGNED: September 2017
SEALED: 6/13/2018
REVISED: NA

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES

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



Mattern & Craig
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12 BROAD STREET
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(828) 254-2201
FAX (828) 254-4562
NC LIC. NO. C-1154

Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 54 (E. Harden Street) at SR 2123 (Cherry Lane)

Division 7 Alamance County Burlington

PLAN DATE: September 2017	REVIEWED BY: JB Voso
PREPARED BY: SE Wilson	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
SEAL 022599
JAMES B. VOSO

DocuSigned by:
James Voso
140FD60379E041F...
SIGNATURE
6/13/2018
DATE

SIG. INVENTORY NO. 07-1938

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.145.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

1. From Main Menu select [2. CONTROLLER]

1. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle Twice

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

TMG VEH OVLP...[C] TYPE: ..... [PPLT FYA]
PROTECTED LEFT TURN.... PHASE 5
OPPOSING THROUGH..... PHASE 6
FLASHING ARROW OUTPUT.....CH11 ISOLATE
DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE..... 0

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1938
DESIGNED: September 2017
SEALED: 6/13/2018
REVISED: NA

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DGN$$$$$$$$$$$$$$$$$$$$

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12 BROAD STREET
ASHEVILLE, NORTH CAROLINA 28801
(828) 254-2201
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NC LIC. NO. C-1154

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 54 (E. Harden Street)
at
SR 2123 (Cherry Lane)

Prepared for the Offices of:
NC DEPARTMENT OF TRANSPORTATION Transportation Mobility and Safety Division Traffic Engineering & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

Division 7 | Alamance County | Burlington

PLAN DATE: September 2017	REVIEWED BY:	JB Voso	
PREPARED BY: SE Wilson	REVIEWED BY:		

REVISIONS	INIT.	DATE

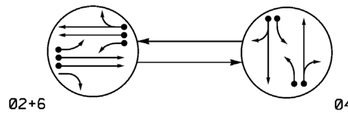
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

DocuSigned by: James Voso 140FD65379E041F... 6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1938

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.146.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

←●	DETECTED MOVEMENT
←	UNDETECTED MOVEMENT (OVERLAP)
←--	UNSIGNALIZED MOVEMENT
<--->	PEDESTRIAN MOVEMENT

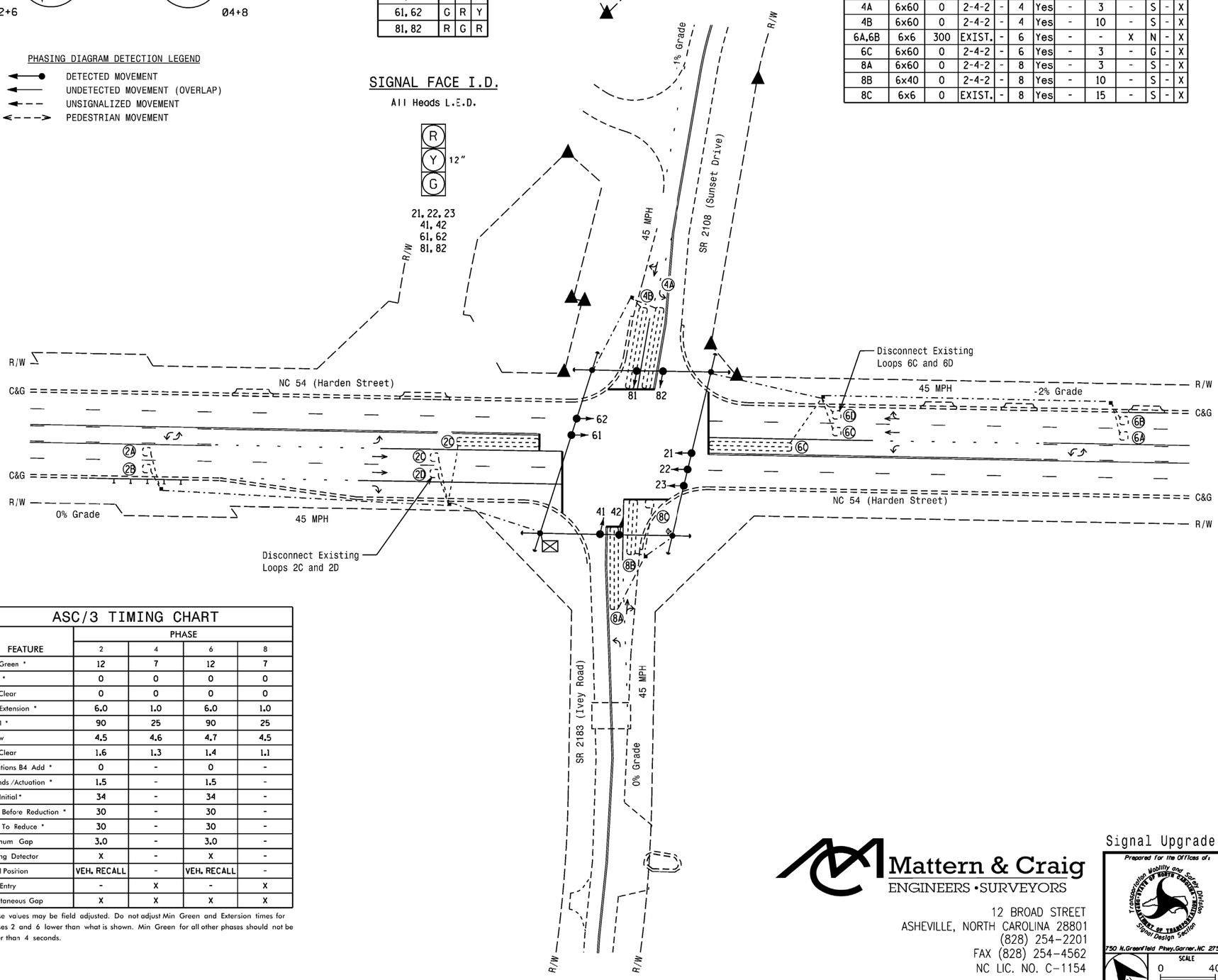
TABLE OF OPERATION			
SIGNAL FACE	PHASE		
	Ø2+6	Ø4+8	FLASH
21, 22, 23	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

R
Y 12"
G

21, 22, 23
41, 42
61, 62
81, 82



ASC/3 DETECTOR INSTALLATION CHART													
DETECTOR					PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A,2B	6x6	300	EXIST.	-	2	Yes	-	-	X	N	-	X
2C	6x60	0	2-4-2	-	2	Yes	-	3	-	G	-	X
4A	6x60	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6x60	0	2-4-2	-	4	Yes	-	10	-	S	-	X
6A,6B	6x6	300	EXIST.	-	6	Yes	-	-	X	N	-	X
6C	6x60	0	2-4-2	-	6	Yes	-	3	-	G	-	X
8A	6x60	0	2-4-2	-	8	Yes	-	3	-	S	-	X
8B	6x40	0	2-4-2	-	8	Yes	-	10	-	S	-	X
8C	6x6	0	EXIST.	-	8	Yes	-	15	-	S	-	X

2 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. The cabinet should be designed to include an Auxiliary Output file for future use.
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

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	→

ASC/3 TIMING CHART				
FEATURE	PHASE			
	2	4	6	8
Min Green *	12	7	12	7
Walk *	0	0	0	0
Ped Clear	0	0	0	0
Veh. Extension *	6.0	1.0	6.0	1.0
Max 1 *	90	25	90	25
Yellow	4.5	4.6	4.7	4.5
Red Clear	1.6	1.3	1.4	1.1
Actuations B4 Add *	0	-	0	-
Seconds /Actuation *	1.5	-	1.5	-
Max Initial *	34	-	34	-
Time Before Reduction *	30	-	30	-
Time To Reduce *	30	-	30	-
Minimum Gap	3.0	-	3.0	-
Locking Detector	X	-	X	-
Recall Position	VEH. RECALL	-	VEH. RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	X

* 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.

Mattern & Craig
ENGINEERS • SURVEYORS

12 BROAD STREET
ASHEVILLE, NORTH CAROLINA 28801
(828) 254-2201
FAX (828) 254-4562
NC LIC. NO. C-1154

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 54 (Harden Street)
at
SR 2108 (Sunset Drive)
/ SR 2183 (Ivey Road)

Division 7 Alamance County Graham

PLAN DATE:	September 2017	REVIEWED BY:	JB Voso
PREPARED BY:	SE Wilson	REVIEWED BY:	

SCALE
0 40
1"=40'

REVISIONS	INIT.	DATE

SEAL
SEAL 022599
JAMES B. VOSO

DocuSigned by:
James Voso
140ED60379E041E
SIGNATURE 6/13/2018
DATE

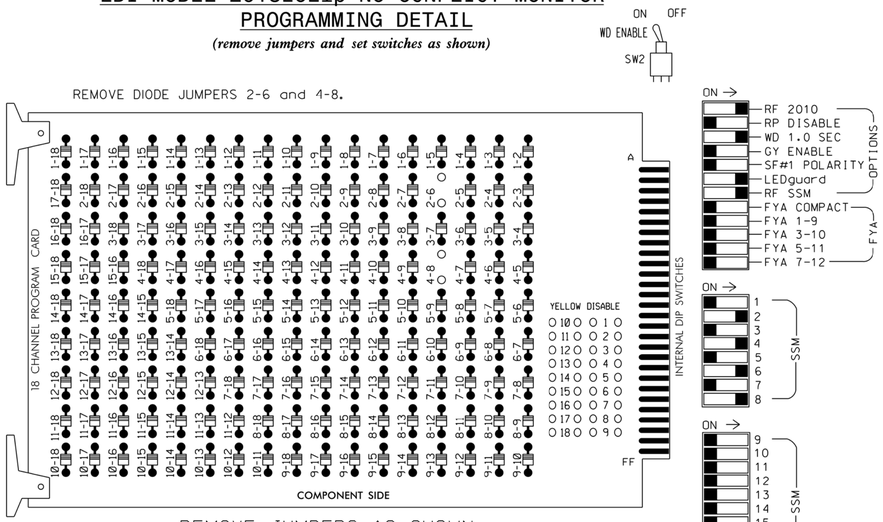
SIG. INVENTORY NO. 07-1939

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.146.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-6 and 4-8.



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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.............2070LX
CABINET................332 /W/ AUX
SOFTWARE...............ECONOLITE ASC/3-2070
CABINET MOUNT..........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S2,S5,S8,S11
PHASES USED............2,4,6,8
OVERLAP "A"............NOT USED
OVERLAP "B"............NOT USED
OVERLAP "C"............NOT USED
OVERLAP "D"............NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	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	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW																		
YELLOW ARROW																		
GREEN ARROW																		

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø 2 2A,2B	SLOT EMPTY	Ø 2 2C	SLOT EMPTY	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		NOT USED		NOT USED		Ø 4 4B								ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø 6 6A,6B	SLOT EMPTY	Ø 6 6C	SLOT EMPTY	Ø 8 8A	Ø 8 8C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		NOT USED		NOT USED		Ø 8 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.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A,2B	TB2-5,6	I2U	39	2	2	YES			X	N
2C	TB4-1,2	I4U	47	22	2	YES		3		G
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	14	4	YES		10		S
6A,6B	TB3-5,6	J2U	40	6	6	YES			X	N
6C	TB5-1,2	J4U	48	26	6	YES		3		G
8A	TB5-9,10	J6U	42	8	8	YES		3		S
8B	TB5-11,12	J6L	46	18	8	YES		10		S
8C	TB7-1,2	J7U	66	38	8	YES		15		S

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1939
DESIGNED: September 2017
SEALED: 6/13/2018
REVISED: NA

Mattern & Craig
ENGINEERS·SURVEYORS

12 BROAD STREET
ASHEVILLE, NORTH CAROLINA 28801
(828) 254-2201
FAX (828) 254-4562
NC LIC. NO. C-1154

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 54 (Harden Street)
at
SR 2108 (Sunset Drive)
/ SR 2183 (Ivey Road)

Division 7 Alamance County Graham

PLAN DATE: September 2017	REVIEWED BY: JB Voso
PREPARED BY: SE Wilson	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

SEAL 022599
JAMES B. VOSO

DocuSigned by:
James Voso
140FD60379E041F...

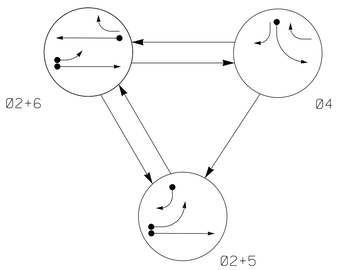
SIGNATURE 6/13/2018 DATE

SIG. INVENTORY NO. 07-1939

$$$$$$SYSTIME$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 147.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

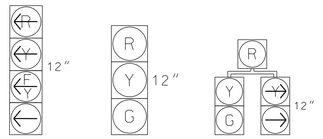
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

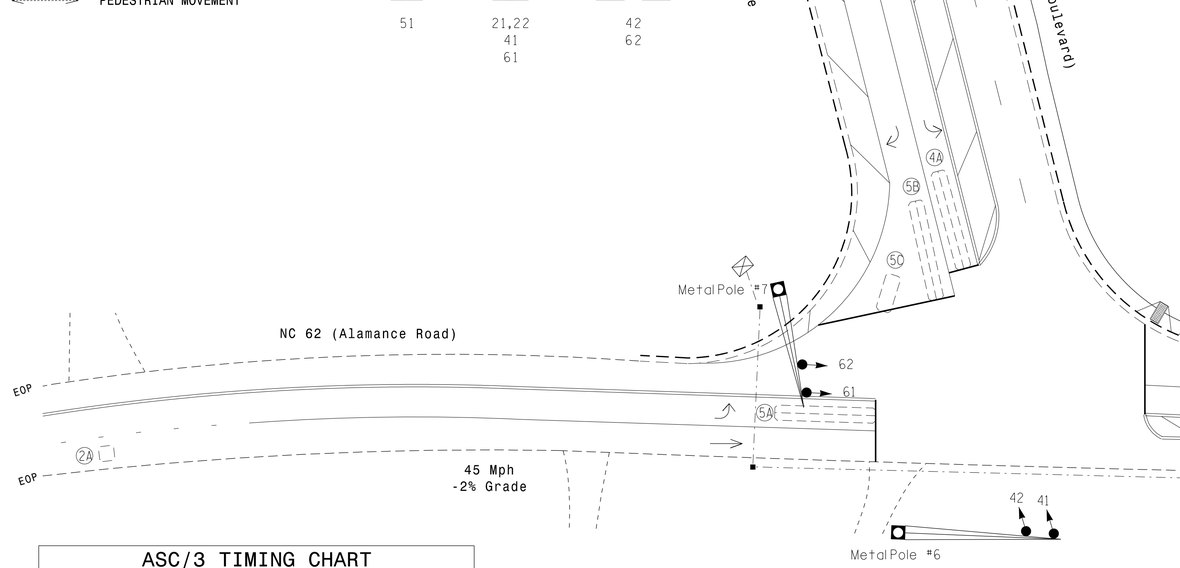
TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.





ASC/3 DETECTOR INSTALLATION CHART

DETECTOR: LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING: PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
					2	Yes	-	3	-	G	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	10	-	S	-	X
5C	6X15	0	EXIST	-	5	Yes	-	15	-	S	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
S1	6X6	+140	4	X	-	No	-	-	-	N	X	X

3 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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 head numbered 22.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as to obstruct sight distances of vehicles turning right on red.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green *	12	7	7	12
Walk *	0	0	0	0
Ped Clear	0	0	0	0
Veh. Extension *	6.0	2.0	2.0	6.0
Max 1 *	90	30	45	90
Yellow	4.7	3.0	3.0	4.7
Red Clear	1.6	3.2	2.4	1.6
Actuations B4 Add *	0	-	-	0
Seconds /Actuation *	2.5	-	-	2.5
Max Initial *	34	-	-	34
Time Before Reduction *	15	-	-	15
Time To Reduce *	45	-	-	45
Minimum Gap	3.0	-	-	3.0
Locking Detector	X	-	-	X
Recall Position	VEH. RECALL	-	-	VEH. RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	X	X

* 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	●→ ●↓
▷	Metal Pole with Mastarm	▷
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·-·-·	2-in Underground Conduit	·-·-·-·-·
N/A	Right of Way	- - - - -
→	Directional Arrow	→
N/A	Curb Ramp	N/A

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 62 (Alamance Road)
at
SR 1213 (Grand Oaks Boulevard)

Division 7 Alamance County Burlington

PLAN DATE: November 2017 REVIEWED BY: AM Encarnacion
PREPARED BY: NA Ptak REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

SCALE 0 30 1"=30'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

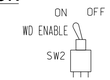
Docusigned by: Pamela Alexander 6/7/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1990

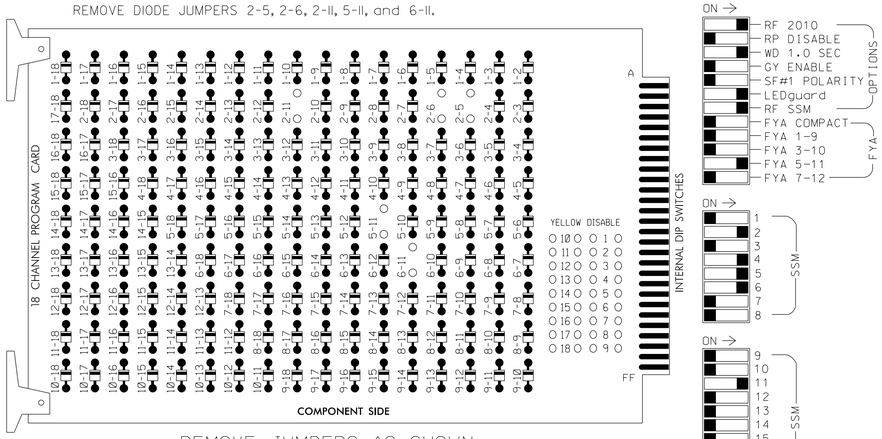
ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 5-11, and 6-11.



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 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Integrate monitor with Ethernet network in cabinet.

■ = 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. Program controller to start up in phase 2 Green and 6 Green.
3. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S5,S7,S8,AUX S4
PHASES USED.....2,4,5,6
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See sheet 2 for overlap programing.

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 147.1

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.	NU	21,22	NU	NU	41,42	62	NU	42	51 ★	61,62	NU	NU	NU	NU	NU	NU	51 ★	NU	NU
RED		128			101				*	134									
YELLOW		129			102					135									
GREEN		130			103					136									
RED ARROW																	A114		
YELLOW ARROW						102		132									A115		
FLASHING YELLOW ARROW																	A116		
GREEN ARROW						103		133	133										

NU = Not Used
★ See pictorial of head wiring in detail this sheet.
* Denotes install load resistor. See load resistor installation detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal head 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 EMPTY	Ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	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	Ø5 5B	Ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø5 5C	NOT USED												

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES		3		S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
5A [1]	TB3-1,2	J1U	55	5 ★	5	YES		15		S
	-	I4U	47	22 ★	2	YES		3		G
5B	TB3-5,6	J2U	40	6	6	YES		10		S
5C	TB3-7,8	J2L	44	16	6	YES		15		S
6A	TB3-9,10	J3U	64	36	6	YES			X	N

* System detector only. Remove any assigned vehicle phase.
[1] Add jumper from J1-W to I4-W. on rear of input file.

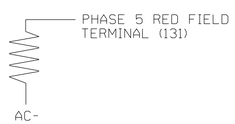
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)

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: 07-1990
DESIGNED: November 2017
SEALED: 6/7/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 62 (Alamance Road)
at
SR 1213 (Grand Oaks Boulevard)

Division 7 | Alamance County | Burlington

PLAN DATE: November 2017	REVIEWED BY: AM Encarnacion
PREPARED BY: NA Ptak	REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Designed by: Pamela Alexander 6/9/2018
DATE

SIG. INVENTORY NO. 07-1990

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 147.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle Twice

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1990
DESIGNED: November 2017
SEALED: 6/7/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 62 (Alamance Road)
at
SR 1213 (Grand Oaks Boulevard)

Division 7 Alamance County Burlington

PLAN DATE: November 2017 REVIEWED BY: AM Encarnacion

PREPARED BY: NA Ptak REVIEWED BY: PL Alexander

REVISIONS INIT. DATE

Prepared for the Offices of: ITS & Signals Management Section, Transportation Mobility and Safety Division

750 N.Greenfield Pkwy,Garner,NC 27529

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Pamela Alexander 6/9/2018
DATE

SIG. INVENTORY NO. 07-1990

09-JUN-2018 14:15
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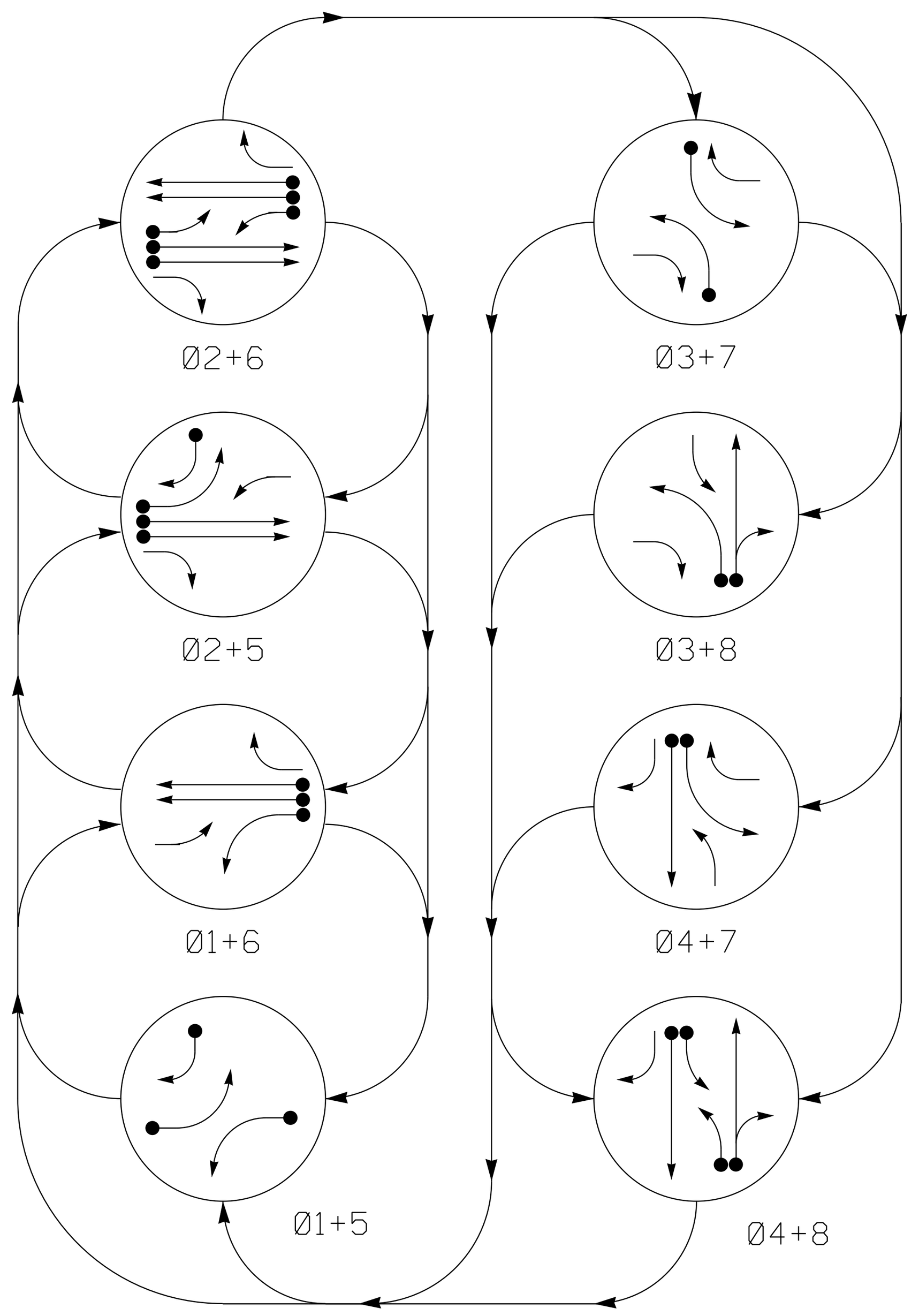
ALEX3361 AT LUS340649

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

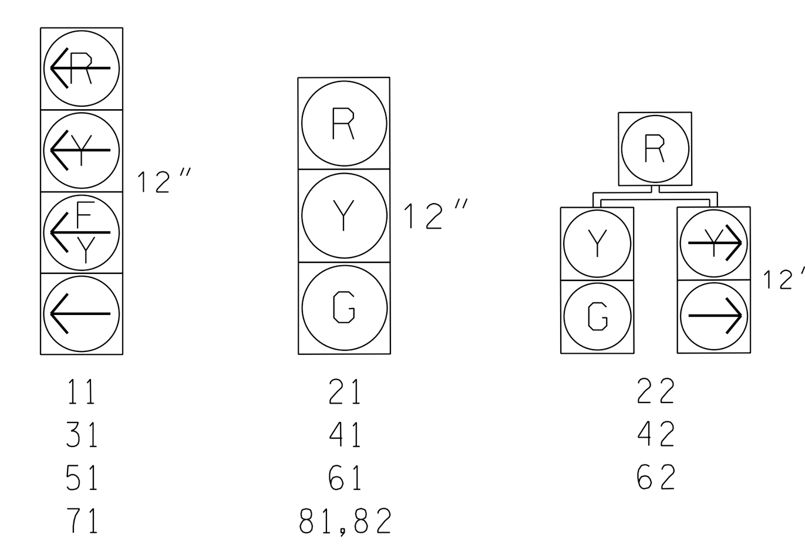
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←	←	← F/Y	← F/Y	←R	←R	←R	←R	←Y
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←R	←R	←R	←R	←	←	← F/Y	← F/Y	←R
41	R	R	R	R	R	R	G	G	R
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/→	R	R/→	R	Y
71	←R	←R	←R	←R	←	← F/Y	←	← F/Y	←R
81,82	R	R	R	R	R	G	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



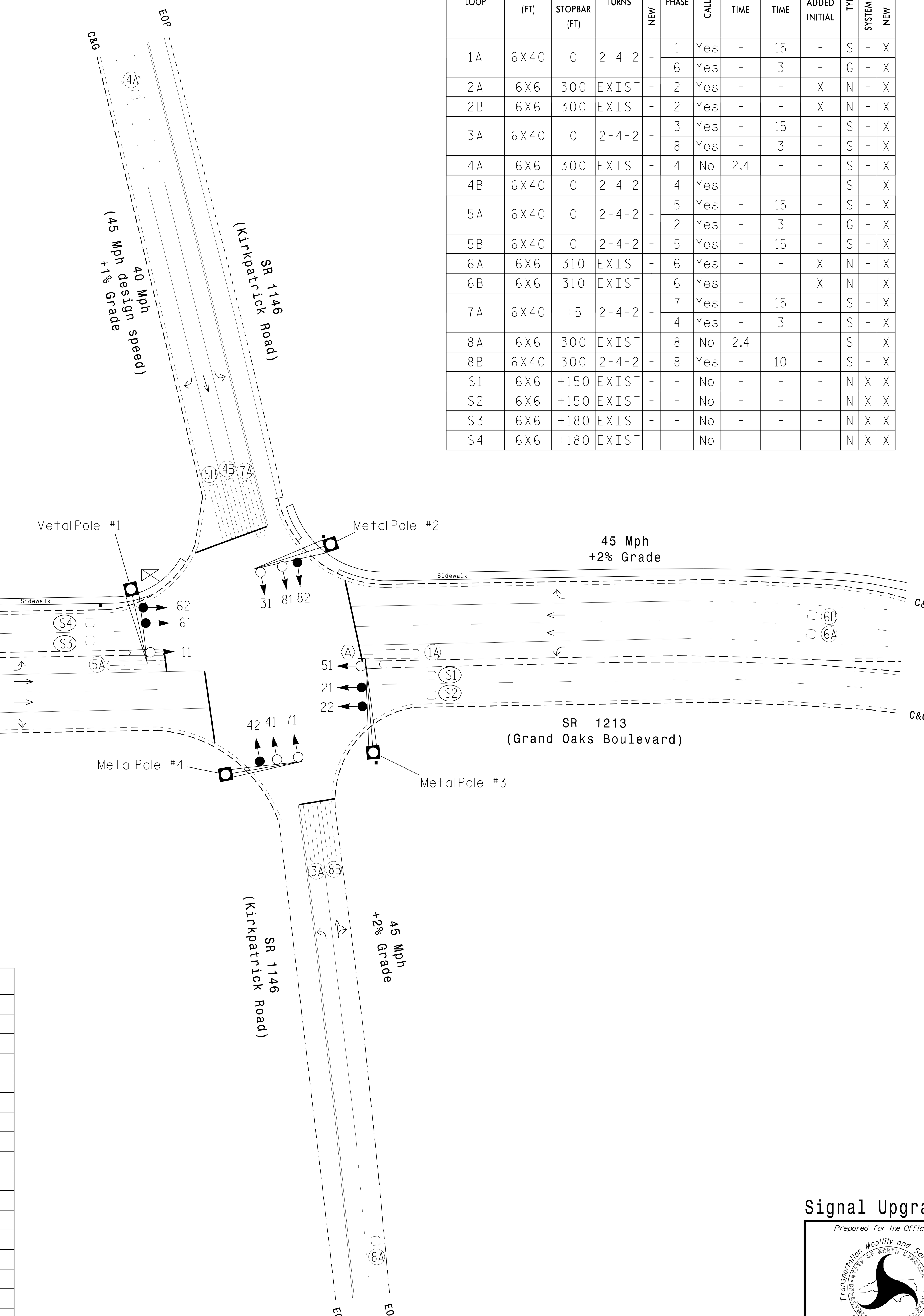
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
					6	Yes	-	3	-	G	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	15	-	S	-	X
					8	Yes	-	3	-	S	-	X
4A	6X6	300	EXIST	-	4	No	2.4	-	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
					2	Yes	-	3	-	G	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	310	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	310	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	+5	2-4-2	-	7	Yes	-	15	-	S	-	X
					4	Yes	-	3	-	S	-	X
8A	6X6	300	EXIST	-	8	No	2.4	-	-	S	-	X
8B	6X40	300	2-4-2	-	8	Yes	-	10	-	S	-	X
S1	6X6	+150	EXIST	-	-	No	-	-	-	N	X	X
S2	6X6	+150	EXIST	-	-	No	-	-	-	N	X	X
S3	6X6	+180	EXIST	-	-	No	-	-	-	N	X	X
S4	6X6	+180	EXIST	-	-	No	-	-	-	N	X	X

8 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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 head numbered 82.
6. Set all detector units to presence mode.
7. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
8. Locate new cabinet so as to obstruct sight distances of vehicles turning right on red.
9. Pavement markings are existing.
10. 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	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	0	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0	0	0
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	25	90	25	30	25	90	25	30
Yellow	3.0	4.4	3.0	4.4	3.0	4.4	3.0	4.4
Red Clear	2.6	1.9	3.6	2.3	3.3	1.9	3.4	2.3
Actuations B4 Add *	-	0	-	-	-	0	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	35	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X	X

* 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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ALEX3361 AT LUS40649

ATKINS
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(919) 876-6888 NCBEES #F-0326

Signal Upgrade

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

SR 1213 (Grand Oaks Boulevard)
at
SR 1146 (Kirkpatrick Road)

Division 7 Alamance County Burlington

PLAN DATE: November 2017	REVIEWED BY: AM Encarnacion
PREPARED BY: NA Ptak	REVIEWED BY: PL Alexander

SCALE 0 50
1"=50'

REVISIONS | INIT. | DATE

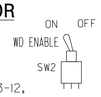
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

DocuSigned by: Pamela Alexander
SIGNATURE 6/7/2018 DATE

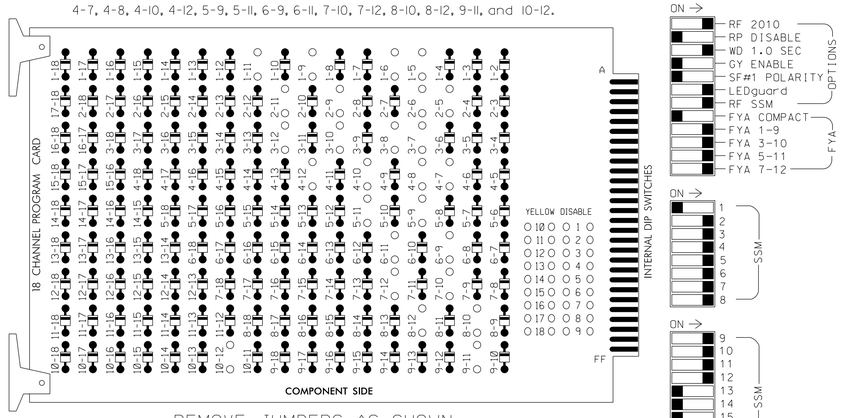
SIG. INVENTORY NO. 07-1991

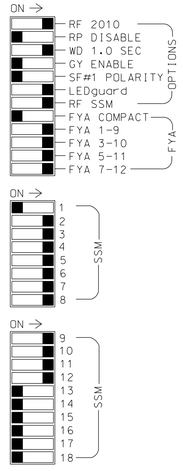
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS I-5, I-6, I-9, I-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11, and 10-12.





■ = DENOTES POSITION OF SWITCH

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. Integrate monitor with Ethernet network in 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. Program phases 4 & 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10,S11, AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 148.1

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	NU	22	31 ★	41,42	NU	42	51 ★	61,62	NU	62	71 ★	81,82	NU	11 ★	31 ★	NU	51 ★	71 ★	NU
RED		128			*	101			*	134			*	107							
YELLOW	*	129				102				135				108							
GREEN		130				103				136				109							
RED ARROW																A121	A124		A114	A101	
YELLOW ARROW				117				132				123				A122	A125		A115	A102	
FLASHING YELLOW ARROW																A123	A126		A116	A103	
GREEN ARROW	127			118	118			133	133			124	124								

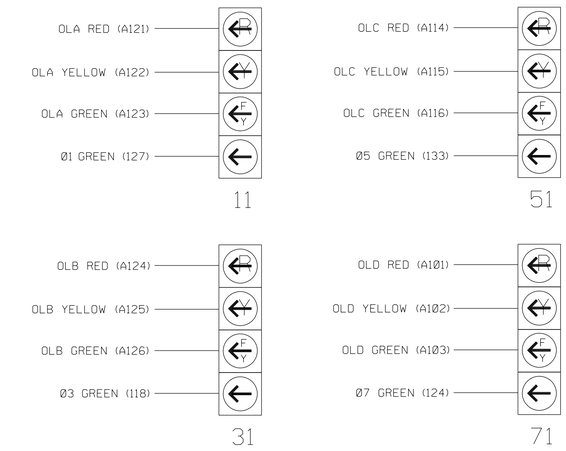
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

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	Ø 1 1A	Ø 2 2A	SLOT EMPTY	WIRED INPUT ⊗	Ø 3 3A	Ø 4 4A	SLOT EMPTY	WIRED INPUT ⊗	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø 2 2B			NOT USED	Ø 4 4B			SYS. DET. S2					ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 5 5B	Ø 6 6A	WIRED INPUT ⊗	Ø 7 7A	Ø 8 8A	SLOT EMPTY	WIRED INPUT ⊗	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED	Ø 6 6B		NOT USED	Ø 8 8B			SYS. DET. S4					

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1	1	YES		15		S
	-	J4U	48	26	6	YES		3		G
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
3A [2]	TB4-5,6	I5U	58	3	3	YES		15		S
	-	J8U	50	28	8	YES		3		S
4A	TB4-9,10	I6U	41	4	4	NO	2.4			S
4B	TB4-11,12	I6L	45	14	4	YES				S
•S1	TB6-9,10	I9U	60	11	SYS	NO				N
•S2	TB6-11,12	I9L	62	13	SYS	NO				N
5A [3]	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES		3		G
5B	TB3-5,6	J2U	40	6	5	YES		15		S
6A	TB3-9,10	J3U	64	36	6	YES			X	N
6B	TB3-11,12	J3L	77	46	6	YES			X	N
7A [4]	TB5-5,6	J5U	57	7	7	YES		15		S
	-	I8U	49	24	4	YES		3		S
8A	TB5-9,10	J6U	42	8	8	NO	2.4			S
8B	TB5-11,12	J6L	46	18	8	YES		10		S
•S3	TB7-9,10	J9U	59	15	SYS	NO				N
•S4	TB7-11,12	J9L	61	17	SYS	NO				N

[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

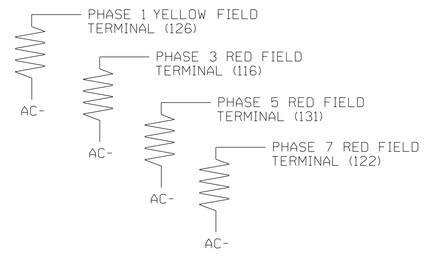
* System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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: 07-1991
DESIGNED: November 2017
SEALED: 6/7/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1213 (Grand Oaks Boulevard)
at
SR 1146 (Kirkpatrick Road)

Division 7 | Alamance County | Burlington

PLAN DATE: November 2017 | REVIEWED BY: AM Encarnacion
PREPARED BY: NA Ptak | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

Prepared for the Offices of:
NC Department of Transportation Mobility and Safety Division Traffic Engineering Branch & Signals Management Section
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Pamela Alexander 6/9/2018
DATE

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PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 148.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once ↓

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once ↓

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once ↓

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

```
TMG VEH OVLP...[D] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    7
OPPOSING THROUGH.......   PHASE    8

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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: 07-1991
DESIGNED: November 2017
SEALED: 6/7/2018
REVISED: N/A

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Electrical Detail - Sheet 2 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1213 (Grand Oaks Boulevard)
at
SR 1146 (Kirkpatrick Road)

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

Division 7 | Alamance County | Burlington

PLAN DATE: November 2017	REVIEWED BY: AM Encarnacion		
PREPARED BY: NA Ptak	REVIEWED BY: PL Alexander		
REVISIONS		INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Pamela Alexander 6/9/2018
DATE

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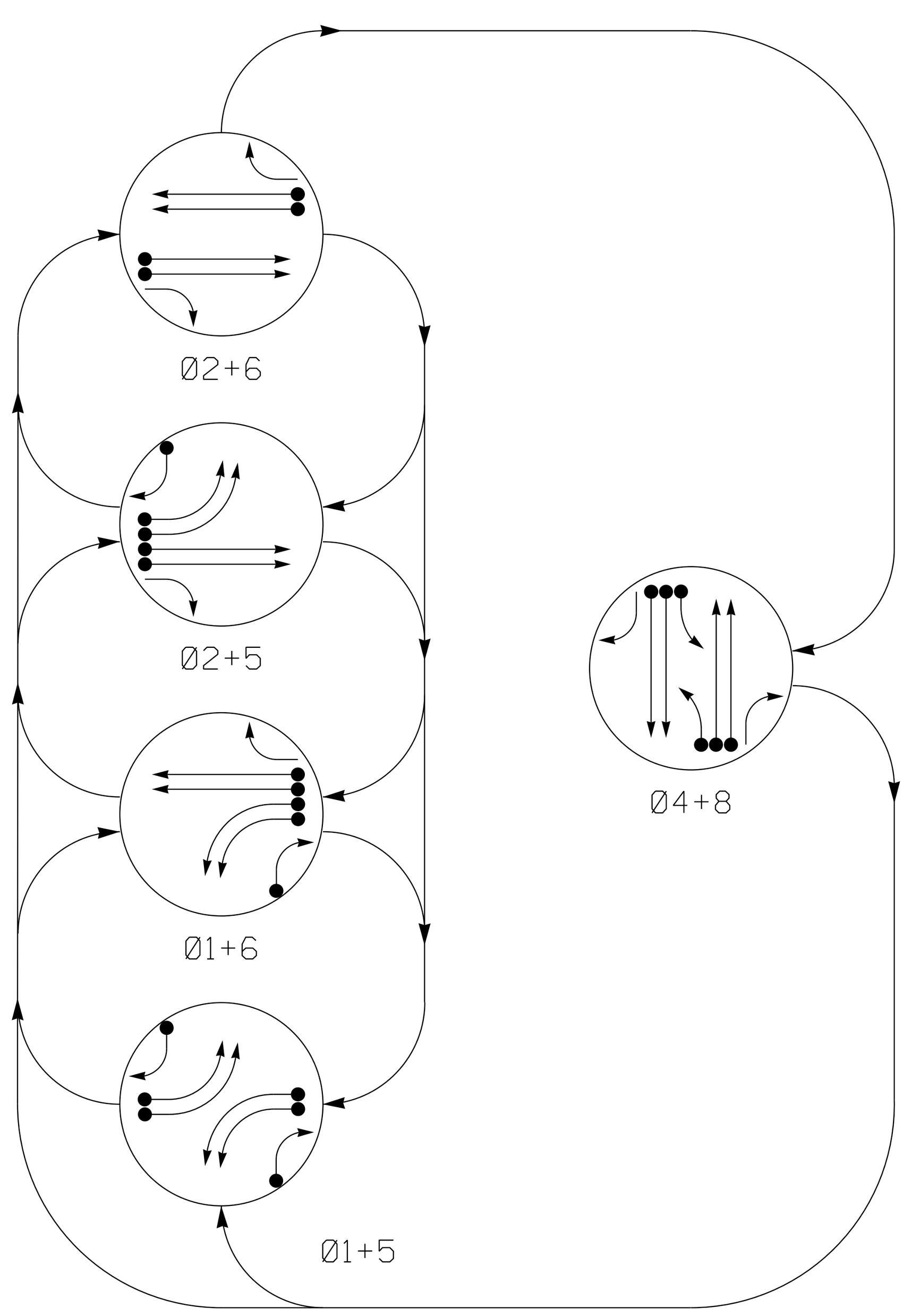
PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.149.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

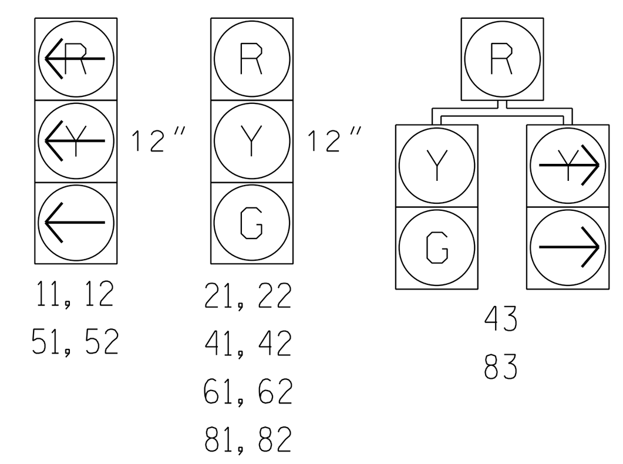
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
11, 12	←	←	←R	←R	←R	←R
21, 22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
43	R/→	R	R/→	R	G	R
51, 52	←	←R	←	←R	←R	←R
61, 62	R	G	R	G	R	Y
81, 82	R	R	R	R	G	R
83	R/→	R/→	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



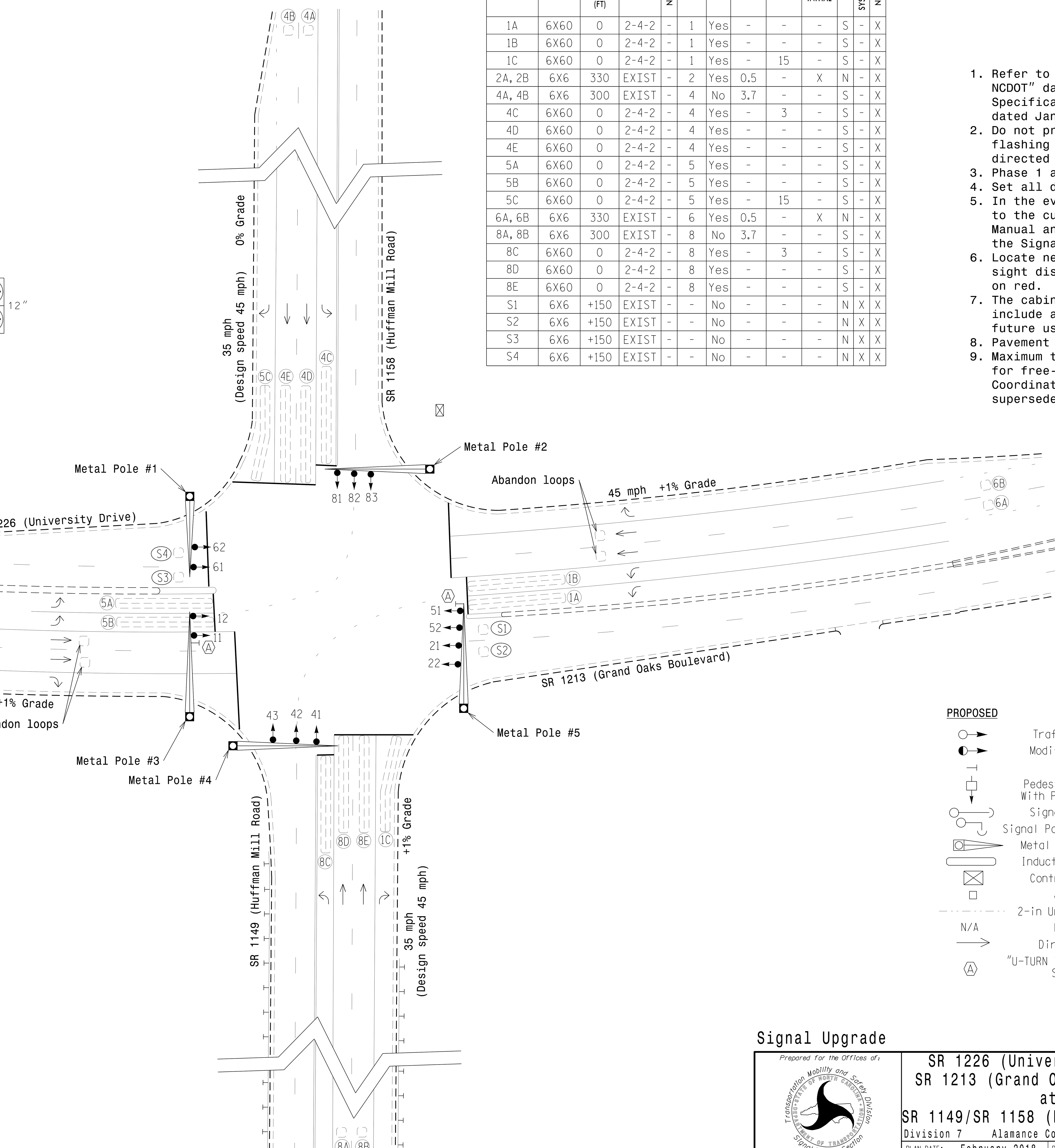
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR: LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING: PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	-	-	S	-	X
1B	6X60	0	2-4-2	-	1	Yes	-	-	-	S	-	X
1C	6X60	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A, 2B	6X6	330	EXIST	-	2	Yes	0.5	-	X	N	-	X
4A, 4B	6X6	300	EXIST	-	4	No	3.7	-	-	S	-	X
4C	6X60	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4D	6X60	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4E	6X60	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	-	-	S	-	X
5B	6X60	0	2-4-2	-	5	Yes	-	-	-	S	-	X
5C	6X60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A, 6B	6X6	330	EXIST	-	6	Yes	0.5	-	X	N	-	X
8A, 8B	6X6	300	EXIST	-	8	No	3.7	-	-	S	-	X
8C	6X60	0	2-4-2	-	8	Yes	-	3	-	S	-	X
8D	6X60	0	2-4-2	-	8	Yes	-	-	-	S	-	X
8E	6X60	0	2-4-2	-	8	Yes	-	-	-	S	-	X
S1	6X6	+150	EXIST	-	-	No	-	-	-	N	X	X
S2	6X6	+150	EXIST	-	-	No	-	-	-	N	X	X
S3	6X6	+150	EXIST	-	-	No	-	-	-	N	X	X
S4	6X6	+150	EXIST	-	-	No	-	-	-	N	X	X

5 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. The cabinet should be designed to include an Auxiliary Output File for future use.
8. Pavement markings are existing.
9. 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	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green *	7	12	7	7	12	7
Walk *	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0
Veh. Extension *	1.0	6.0	1.0	1.0	6.0	1.0
Max 1 *	25	90	30	25	90	30
Yellow	3.0	4.9	4.5	3.0	4.4	4.4
Red Clear	3.7	1.6	2.0	3.5	1.9	2.2
Actuations B4 Add *	-	0	-	-	0	-
Seconds /Actuation *	-	2.0	-	-	2.0	-
Max Initial *	-	34	-	-	34	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	30	-	-	30	-
Minimum Gap	-	3.0	-	-	3.0	-
Locking Detector	-	X	-	-	X	-
Recall Position	-	VEH. RECALL	-	-	VEH. RECALL	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	X	X

* 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.

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Signal Upgrade

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

SR 1226 (University Drive)/ SR 1213 (Grand Oaks Boulevard) at SR 1149/SR 1158 (Huffman Mill Rd)

Division 7 Alamance County Burlington

PLAN DATE:	February 2018	REVIEWED BY:	MB Toth
PREPARED BY:	PL Alexander	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

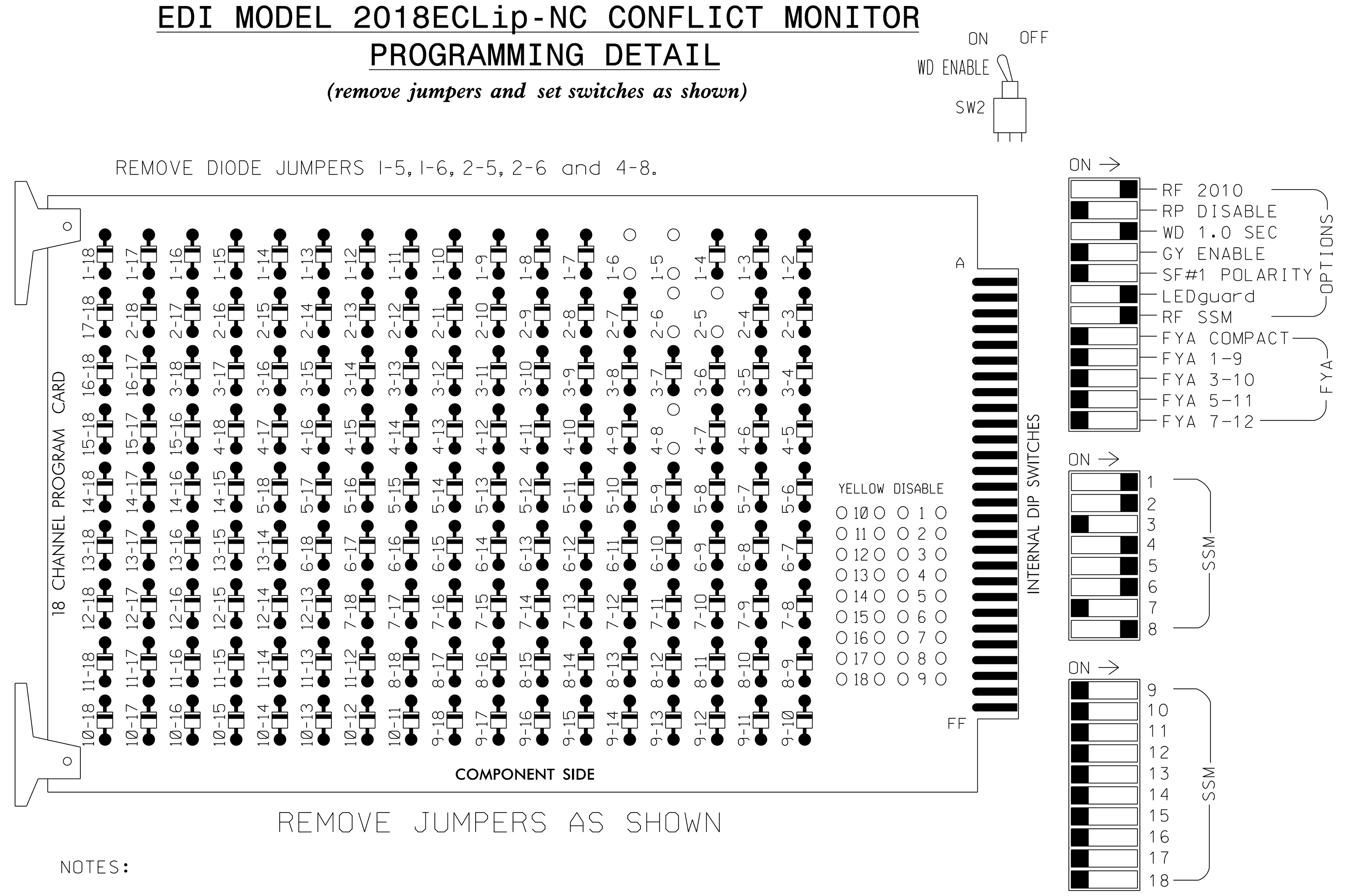
DocuSigned by: Pamela Alexander 6/7/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-1992

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 2-5, 2-6 and 4-8.



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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. The cabinet and controller are part of the Burlington-Graham 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.	11,12	83	21,22	NU	NU	41,42 43	NU	43	51,52	61,62	NU	NU	81,82 83	NU	NU	NU	NU	NU	NU	NU
RED			128			101				134			107							
YELLOW			129			102				135			108							
GREEN			130			103				136			109							
RED ARROW	125								131											
YELLOW ARROW	126	126						132	132											
GREEN ARROW	127	127						133	133											

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................332 W/AUX
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S1,S2,S5,S7,S8,S11
PHASES USED.............1,2,4,5,6,8
OVERLAP "A".............NOT USED
OVERLAP "B".............NOT USED
OVERLAP "C".............NOT USED
OVERLAP "D".............NOT USED

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø1 1A	ø1 1B	ø2 2A,2B	SLOT EMPTY	SLOT EMPTY	ø4 4A,4B	ø4 4D	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	ø1 1C	NOT USED			ø4 4C	ø4 4E		SYS. DET. S2					ST DC ISOLATOR
FILE "J"	U	ø5 5A	ø5 5B	ø6 6A,6B	SLOT EMPTY	SLOT EMPTY	ø8 8A,8B	ø8 8D	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	ø5 5C	NOT USED			ø8 8C	ø8 8E		SYS. DET. S4					

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-1,2	I1U	56	1	1	YES				S
1B	TB2-5,6	I2U	39	2	1	YES				S
1C	TB2-7,8	I2L	43	12	1	YES		15		S
2A, 2B	TB2-9,10	I3U	63	32	2	YES			X	N
4A, 4B	TB4-9,10	I6U	41	4	4	NO	3.7			S
4C	TB4-11,12	I6L	45	14	4	YES		3		S
4D	TB6-1,2	I7U	65	34	4	YES				S
4E	TB6-3,4	I7L	78	44	4	YES				S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
5A	TB3-1,2	J1U	55	5	5	YES				S
5B	TB3-5,6	J2U	40	6	5	YES				S
5C	TB3-7,8	J2L	44	16	5	YES		15		S
6A, 6B	TB3-9,10	J3U	64	36	6	YES			X	N
8A, 8B	TB5-9,10	J6U	42	8	8	NO	3.7			S
8C	TB5-11,12	J6L	46	18	8	YES		3		S
8D	TB7-1,2	J7U	66	38	8	YES				S
8E	TB7-3,4	J7L	79	48	8	YES				S
* S3	TB7-9,10	J9U	59	15	SYS	NO				N
* S4	TB7-11,12	J9L	61	17	SYS	NO				N

* System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1992
DESIGNED: February 2018
SEALED: 6/7/2018
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of: ITS & Signals Management Section, Mobility and Safety Division

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1226 (University Drive)/ SR 1213 (Grand Oaks Boulevard) at SR 1149/SR 1158 (Huffman Mill Road)

Division 7 | Alamance County | Burlington

PLAN DATE: February 2018 | REVIEWED BY: MB Toth

PREPARED BY: PL Alexander | REVIEWED BY:

REVISIONS | INIT. | DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

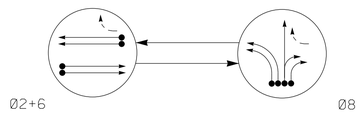
SEAL: NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Pamela Alexander 6/9/2018 DATE

SIG. INVENTORY NO. 07-1992

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 150.0

PHASING DIAGRAM



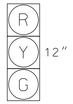
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø2+6	PHASE Ø8	FLASH
21,22	G	R	Y
61,62	G	R	Y
81,82,83	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



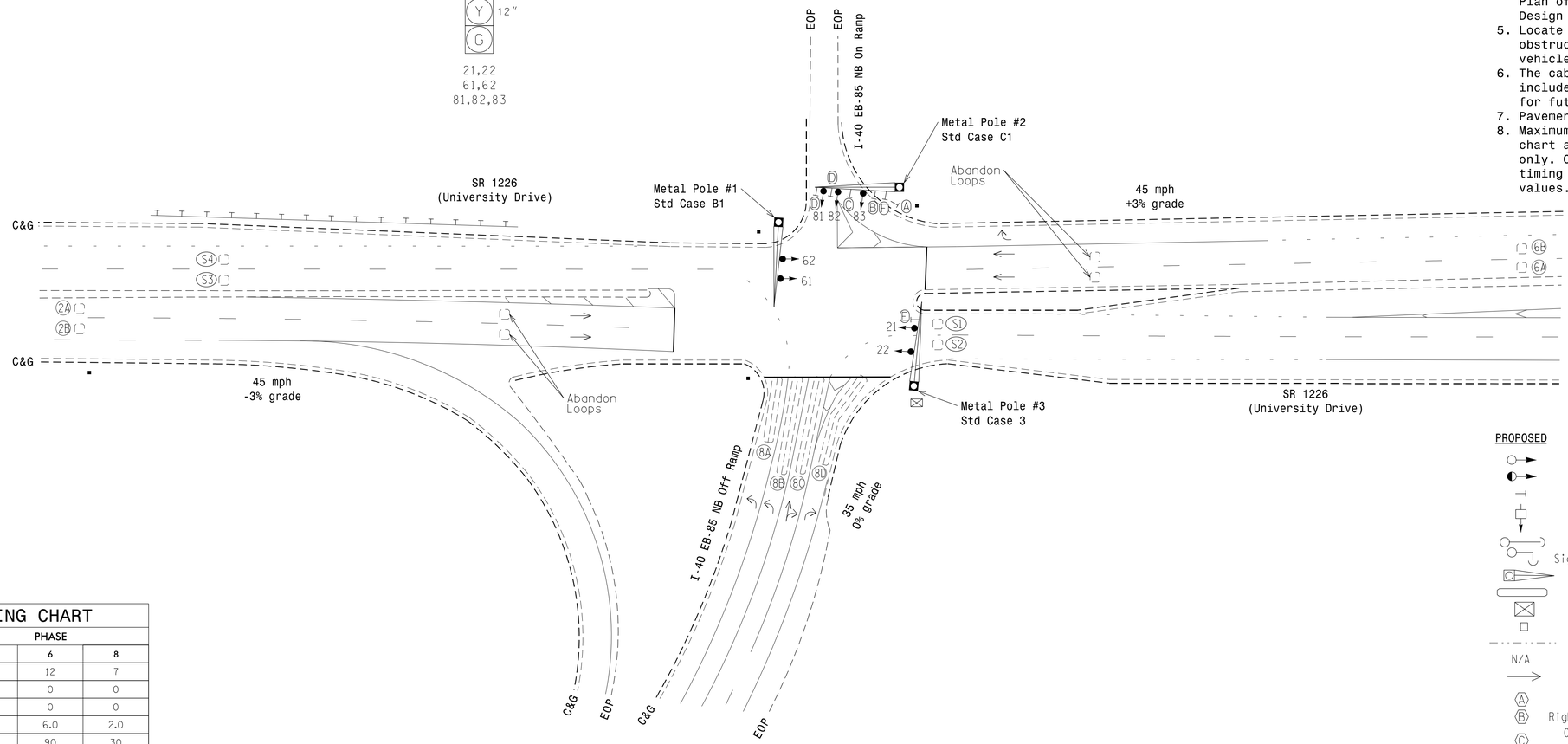
21,22
61,62
81,82,83

ASC/3 DETECTOR INSTALLATION CHART												
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A,2B	6X6	360	EXIST	-	2	Yes	1.0	-	X	N	-	X
6A,6B	6X6	360	EXIST	-	6	Yes	1.0	-	X	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X
8B	6X60	0	2-4-2	-	8	Yes	-	-	-	S	-	X
8C	6X60	0	2-4-2	-	8	Yes	-	10	-	S	-	X
8D	6X60	0	2-4-2	-	8	Yes	-	15	-	S	-	X
S1	6X6	+150	EXIST	-	-	NO	-	-	-	N	X	X
S2	6X6	+150	EXIST	-	-	NO	-	-	-	N	X	X
S3	6X6	+425	EXIST	-	-	NO	-	-	-	N	X	X
S4	6X6	+425	EXIST	-	-	NO	-	-	-	N	X	X

2 Phase Fully Actuated (Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by Engineer.
3. Set all detector units to presence mode.
4. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. The cabinet should be designed to include an Auxiliary Output File for future use.
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
○	Metal Pole with Mastarm	○
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----	2-in Underground Conduit	----
N/A	Right of Way	----
→	Directional Arrow	→
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	Combined Through and Right Arrow Sign (R3-6R)	Ⓒ
Ⓓ	Left Arrow "ONLY" Sign (R3-5L)	Ⓓ
Ⓔ	"NO LEFT TURN" Sign (R3-2)	Ⓔ
Ⓕ	Street Name Sign	Ⓕ

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 6	PHASE 8
Min Green *	12	12	7
Walk *	0	0	0
Ped Clear	0	0	0
Veh. Extension *	6.0	6.0	2.0
Max 1 *	90	90	30
Yellow	4.8	4.3	3.8
Red Clear	2.2	1.4	1.6
Actuations B4 Add *	0	0	-
Seconds /Actuation *	2.0	2.0	-
Max Initial *	40	40	-
Time Before Reduction *	15	15	-
Time To Reduce *	30	30	-
Minimum Gap	3.0	3.0	-
Locking Detector	X	X	-
Recall Position	VEH. RECALL	VEH. RECALL	-
Dual Entry	-	-	-
Simultaneous Gap	X	X	X

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 1226 (University Drive) at I-40 EB-85 NB Ramps

Division 7 Alamance County Burlington

PLAN DATE:	March 2018	REVIEWED BY:	PL Alexander
PREPARED BY:	NA Ptak	REVIEWED BY:	AM Encarnacion

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Designed by: Pamela Alexander 6/7/2018
SIGNATURE DATE

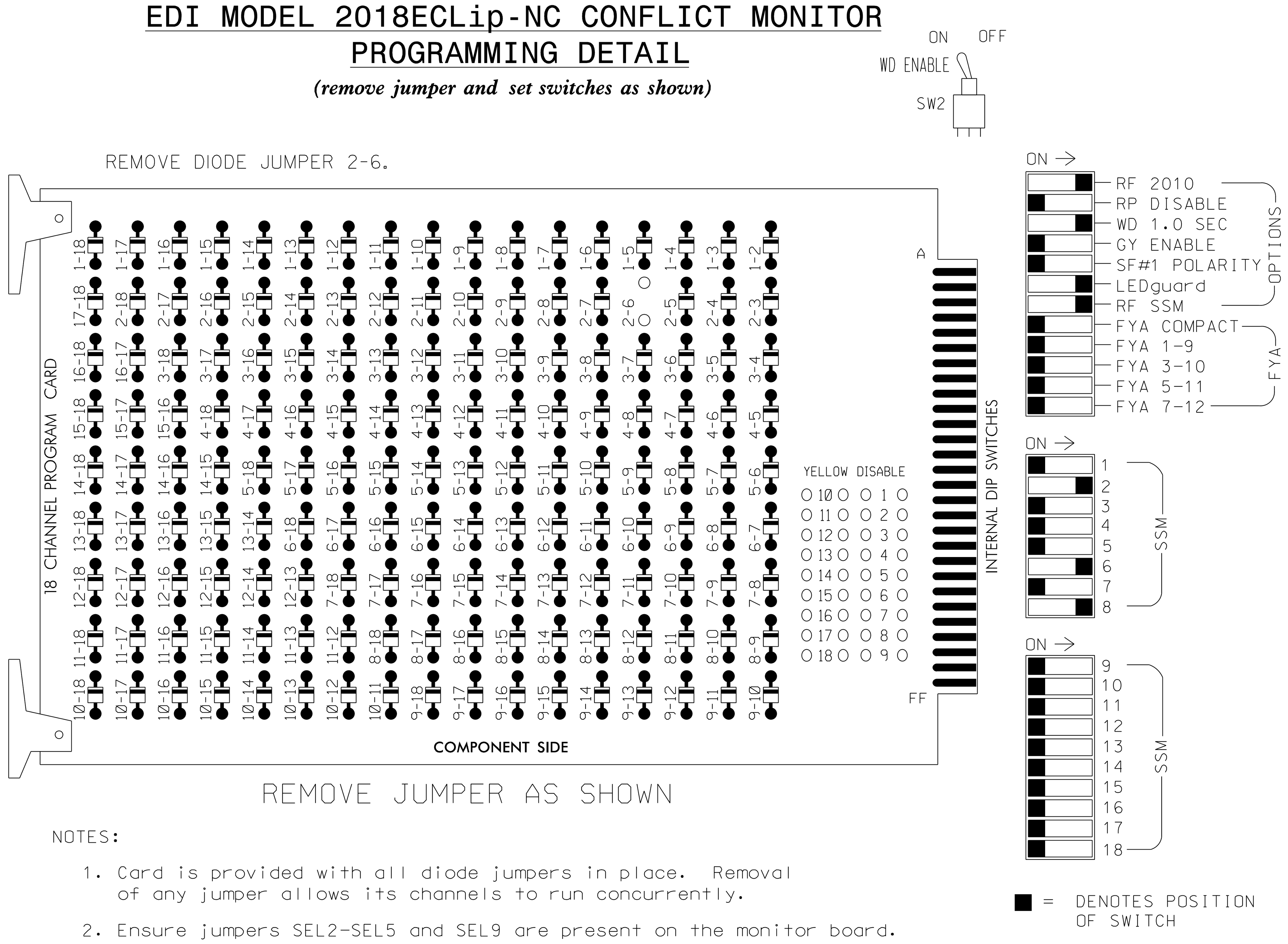
SIG. INVENTORY NO. 07-1993

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 150.1

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. Integrate monitor with Ethernet network in 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. Program controller to start up in phase 2 Green and 6 Green.
3. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.............2070LX
CABINET.................332 W/AUX
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S2,S8,S11
PHASES USED.............2,6,8
OVERLAPS................NONE

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	NU	NU	NU	61,62	NU	NU	81,82,83	NU	NU	NU	NU	NU	NU	NU
RED		128						134			107							
YELLOW		129						135			108							
GREEN		130						136			109							
RED ARROW																		
YELLOW ARROW																		
GREEN ARROW																		

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

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.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A,2B	TB2-5,6	I2U	39	2	2	YES	1.0		X	N
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
6A,6B	TB3-5,6	J2U	40	6	6	YES	1.0		X	N
8A	TB5-9,10	J6U	42	8	8	YES				S
8B	TB5-11,12	J6L	46	18	8	YES				S
8C	TB7-1,2	J7U	66	38	8	YES		10		S
8D	TB7-3,4	J7L	79	48	8	YES		15		S

* System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1993
DESIGNED: March 2018
SEALED: 6/7/2018
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

ITS & Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1226 (University Drive) at I-40 EB-85 NB Ramps

Division 7 | Alamance County | Burlington

PLAN DATE: March 2018 | REVIEWED BY: PL Alexander

PREPARED BY: NA Ptak | REVIEWED BY: AM Encarnacion

REVISIONS | INIT. | DATE

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

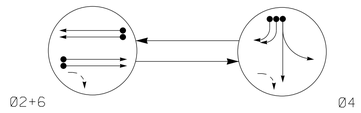
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Pamela Alexander 6/9/2018
DATE

SIG. INVENTORY NO. 07-1993

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 151.0

PHASING DIAGRAM



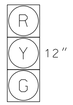
PHASING DIAGRAM DETECTION LEGEND

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

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

SIGNAL FACE I.D.

All Heads L.E.D.



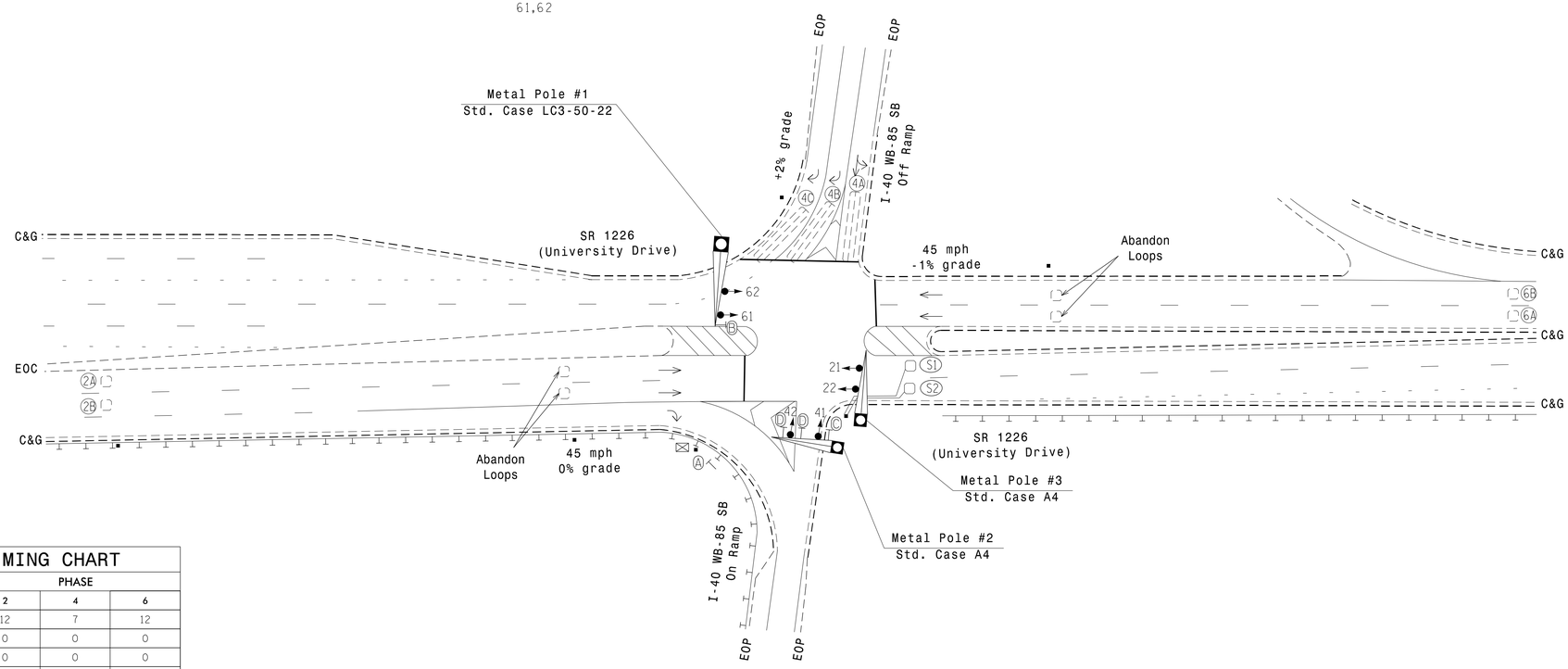
21,22
41,42
61,62

ASC/3 DETECTOR INSTALLATION CHART												
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A,2B	6X6	360	EXIST	-	2	Yes	0.5	-	X	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	15	-	S	-	X
4C	6X40	0	2-4-2	-	4	Yes	-	15	-	S	-	X
6A,6B	6X6	360	EXIST	-	6	Yes	0.5	-	X	N	-	X
S1	6X6	+90	3	X	-	No	-	-	-	N	X	X
S2	6X6	+90	3	X	-	No	-	-	-	N	X	X

2 Phase
Fully Actuated
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by Engineer.
3. Set all detector units to presence mode.
4. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. The cabinet should be designed to include an Auxiliary Output File for future use.
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	"NO LEFT TURN" Sign (R3-2)	Ⓑ
Ⓒ	Combined Through and Left Arrow Sign (R3-6L)	Ⓒ
Ⓓ	Right Arrow "ONLY" Sign (R3-5R)	Ⓓ

ASC/3 TIMING CHART			
FEATURE	PHASE 2	PHASE 4	PHASE 6
Min Green *	12	7	12
Walk *	0	0	0
Ped Clear	0	0	0
Veh. Extension *	6.0	2.0	6.0
Max 1 *	90	30	90
Yellow	4.5	3.7	4.6
Red Clear	1.0	1.7	1.3
Actuations B4 Add *	0	-	0
Seconds /Actuation *	2.0	-	2.0
Max Initial *	40	-	40
Time Before Reduction *	15	-	15
Time To Reduce *	30	-	30
Minimum Gap	3.0	-	3.0
Locking Detector	X	-	X
Recall Position	VEH. RECALL	-	VEH. RECALL
Dual Entry	-	-	-
Simultaneous Gap	X	X	X

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 1226 (University Drive) at I-40 WB-85 SB Ramps

Division 7 Alamance County Burlington

PLAN DATE: February 2018 REVIEWED BY: PL Alexander

PREPARED BY: NA Ptak REVIEWED BY: AM Encarnacion

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Developed by: Pamela Alexander 6/7/2018
ELECTRONIC SIGNATURE DATE

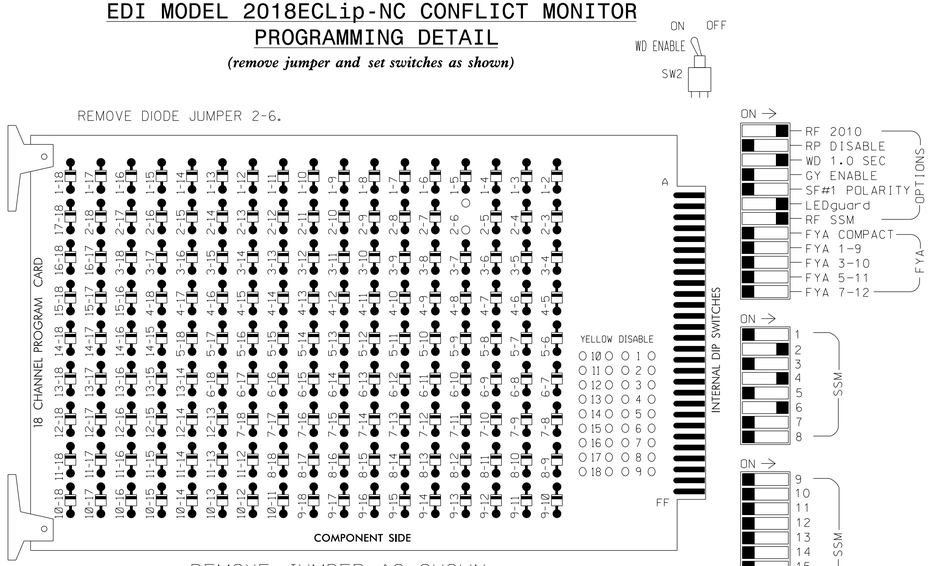
SIG. INVENTORY NO. 07-1994

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

07-JUN-2018 11:15
O:\Transportation\Traffic\Curr\100056469 U-6015 B-G Sig Sys\Task 05_11_Signals\Design\07-1994.dgn
ALEX3361 AT LUS340649

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



REMOVE JUMPER 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. Integrate monitor with Ethernet network in 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. Program controller to start up in phase 2 Green and 6 Green.
3. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S5,S8
PHASES USED.....2,4,6
OVERLAPS.....NONE

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 151.1

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

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

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.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A,2B	TB2-5,6	I2U	39	2	2	YES	0.5		X	N
4A	TB4-9,10	I6U	41	4	4	YES				S
4B	TB4-11,12	I6L	45	14	4	YES		15		S
4C	TB6-1,2	I7U	65	34	4	YES		15		S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
6A,6B	TB3-5,6	J2U	40	6	6	YES	0.5		X	N

* System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1994
DESIGNED: February 2018
SEALED: 6/7/2018
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1226 (University Drive) at I-40 WB-85 SB Ramps

Division 7 Alamance County Burlington

PLAN DATE: February 2018 REVIEWED BY: PL Alexander

PREPARED BY: NA Ptak REVIEWED BY: AM Encarnacion

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Documents by: Pamela Alexander 6/9/2018
DATE

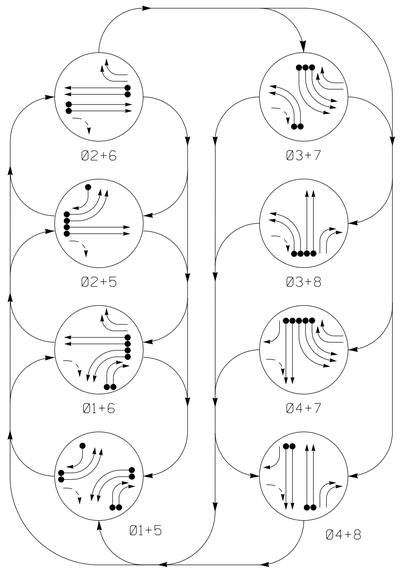
SIG. INVENTORY NO. 07-1994

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 152.0

8 Phase
Fully Actuated
Burlington-Graham Signal System

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

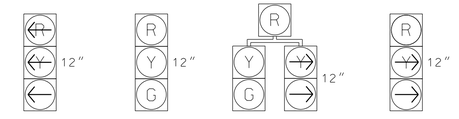
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11,12	←̶	←̶	R̶	R̶	R̶	R̶	R̶	R̶	R̶
13,14	→	→	R	R	R	→	R	→	R
21,22	R	R	G	G	R	R	R	R	Y
31,32	R̶	R̶	R̶	R̶	←̶	←̶	R̶	R̶	R̶
41	R	R	R	R	R	R	G	G	R
42	R⁄→	R	R⁄→	R	R	R	G	G	R
51,52	←̶	R̶	←̶	R̶	R̶	R̶	R̶	R̶	R̶
61,62	R	G	R	G	R	R	R	R	Y
63,64	R	→	R	→	→	R	→	R	R
71,72,73	R̶	R̶	R̶	R̶	←̶	R̶	←̶	R̶	R̶
81,82	R	R	R	R	R	G	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



11,12
31,32
51,52
71,72,73

21,22
41
61,62
81,82

42

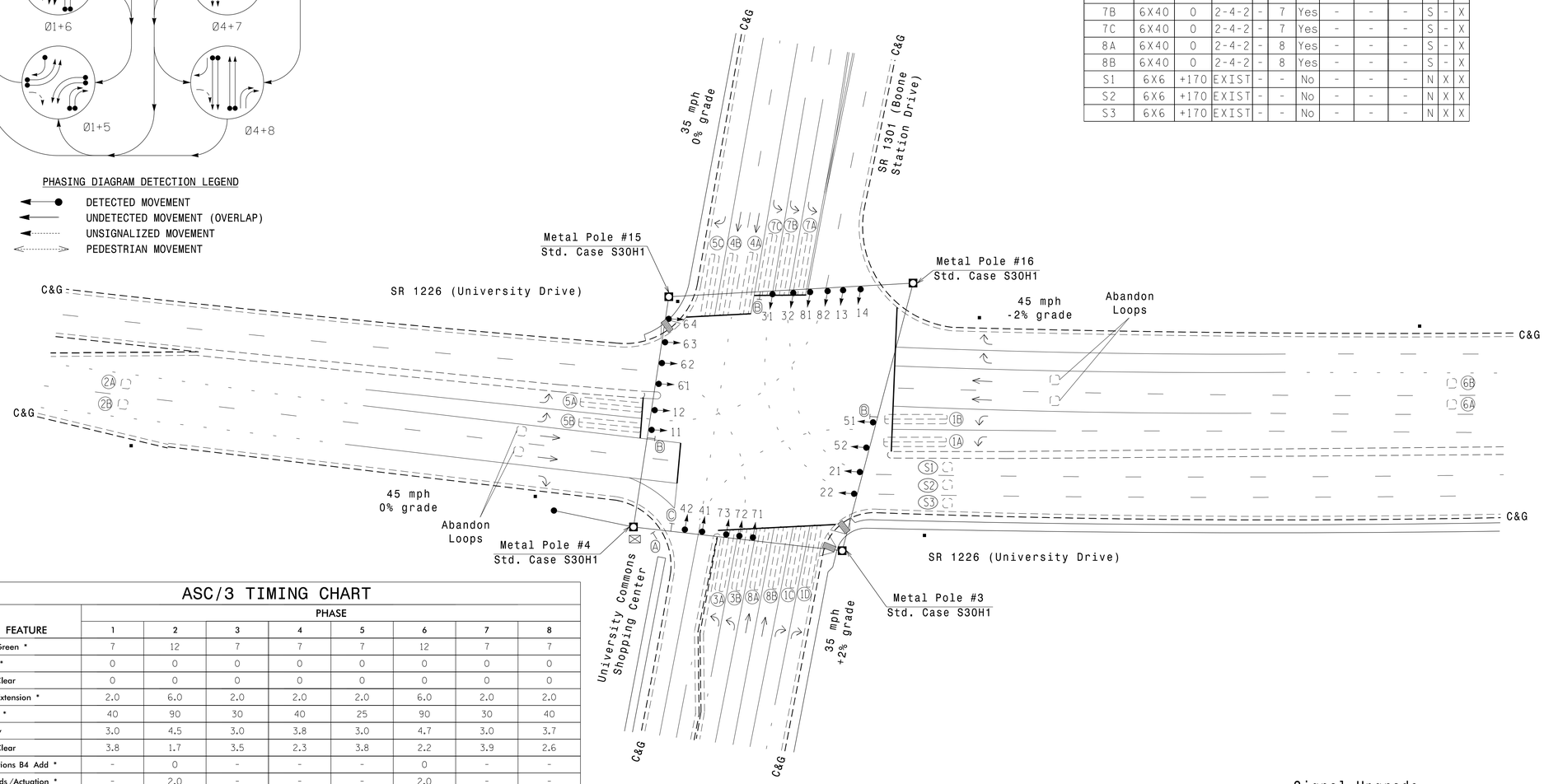
13,14
63,64

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	+5	2-4-2	-	1	Yes	-	-	-	S	-	X
1B	6X40	+5	2-4-2	-	1	Yes	-	-	-	S	-	X
1C	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
1D	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A,2B	6X6	355	EXIST	-	2	Yes	0.8	-	X	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
3B	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	-	-	S	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	-	-	S	-	X
5C	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A,6B	6X6	355	EXIST	-	6	Yes	0.8	-	X	N	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	-	-	S	-	X
7B	6X40	0	2-4-2	-	7	Yes	-	-	-	S	-	X
7C	6X40	0	2-4-2	-	7	Yes	-	-	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X
S1	6X6	+170	EXIST	-	-	No	-	-	-	N	X	X
S2	6X6	+170	EXIST	-	-	No	-	-	-	N	X	X
S3	6X6	+170	EXIST	-	-	No	-	-	-	N	X	X

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by 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. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	0	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0	0	0
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	40	90	30	40	25	90	30	40
Yellow	3.0	4.5	3.0	3.8	3.0	4.7	3.0	3.7
Red Clear	3.8	1.7	3.5	2.3	3.8	2.2	3.9	2.6
Actuations B4 Add *	-	0	-	-	-	0	-	-
Seconds /Actuation *	-	2.0	-	-	-	2.0	-	-
Max Initial *	-	40	-	-	-	40	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X	X	X

* 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	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Metal Strain Pole	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	"U-Turn Yield To Right Turn" Sign (R10-16)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 1226 (University Drive)
at
SR 1301 (Boone Station Drive)/
University Commons Shopping Center

Division 7 Alamance County Burlington

PLAN DATE: March 2018 REVIEWED BY: PL Alexander
PREPARED BY: NA Ptak REVIEWED BY: AM Encarnacion

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Designed by: Pamela Alexander 6/7/2018
ENGINEER SIGNATURE DATE

SIG. INVENTORY NO. 07-1995

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

07-JUN-2018 11:15
O:*Transportation*Traffic*Curr*100056469 U-6015 B-G Sig Sys*Task 05_11_Signals*Design*07-1995.dgn
ALEX3361 AT LUS340649

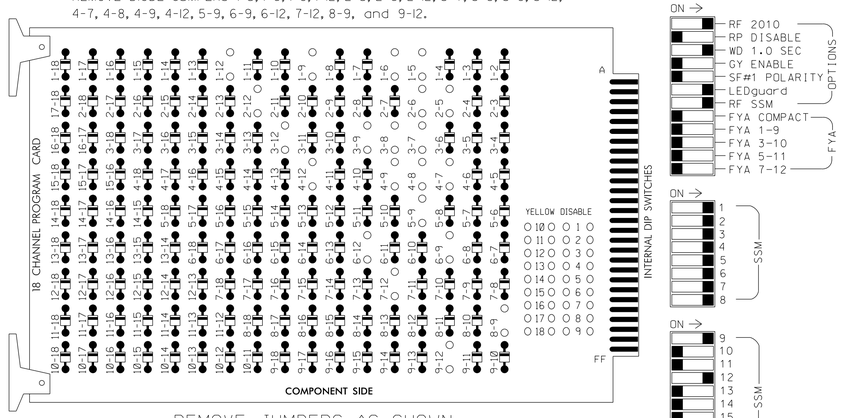
PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 152.1

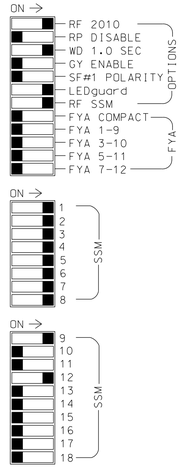
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

ON OFF
WD ENABLE
SW2

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-12, 2-5, 2-6, 2-12, 3-7, 3-8, 3-9, 3-12, 4-7, 4-8, 4-9, 4-12, 5-9, 6-9, 6-12, 7-12, 8-9, and 9-12.





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. Integrate monitor with Ethernet network in cabinet.

■ = 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. Program controller to start up in phase 2 Green and 6 Green.
3. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10,S11, AUX S1,AUX S5.
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP "A".....1+8
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....6+7

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	NU	42	51,52	61,62	NU	71,72, 73	81,82	NU	13,14	NU	NU	NU	63,64	NU
RED		128			101				134			107		A121				A101	
YELLOW		129			102				135			108							
GREEN		130			103				136			109							
RED ARROW	125			116				131			122								
YELLOW ARROW	126			117			132	132			123			A122				A102	
GREEN ARROW	127			118			133	133			124			A123				A103	

NU = Not Used

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'NORMAL'

```
TMG VEH OVLP...[A] TYPE: ......NORMAL
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED X . . . . . X . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle 3 Times

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

```
TMG VEH OVLP...[D] TYPE: ......NORMAL
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . X X . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

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 1C	ø2 2A,2B	SLOT EMPTY	ø3 3A	ø3 3B	ø4 4A	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	ø1 1B	ø1 1D	NOT USED		NOT USED	NOT USED	ø4 4B		SYS. DET. S2					ST DC ISOLATOR
FILE "J"	U	ø5 5A	ø5 5B	ø6 6A,6B	SLOT EMPTY	ø7 7A	ø7 7B	ø8 8A	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	ø5 5C	NOT USED		NOT USED	ø7 7C	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.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-1,2	I1U	56	1	1	YES				S
1B	TB2-3,4	I1L	56	1	1	YES				S
1C	TB2-5,6	I2U	39	2	1	YES		15		S
1D	TB2-7,8	I2L	43	12	1	YES		15		S
2A,2B	TB2-9,10	I3U	63	32	2	YES	Ø.8		X	S
3A	TB4-5,6	I5U	58	3	3	YES				S
3B	TB4-9,10	I6U	41	4	3	YES				S
4A	TB6-1,2	I7U	65	34	4	YES				S
4B	TB6-3,4	I7L	78	44	4	YES				S
✳ S1	TB6-9,10	I9U	60	11	SYS	NO				N
✳ S2	TB6-11,12	I9L	62	13	SYS	NO				N
5A	TB3-1,2	J1U	55	5	5	YES				S
5B	TB3-5,6	J2U	40	6	5	YES				S
5C	TB3-7,8	J2L	44	16	5	YES		15		S
6A,6B	TB3-9,10	J3U	64	36	6	YES	Ø.8		X	N
7A	TB5-5,6	J5U	57	7	7	YES				S
7B	TB5-9,10	J6U	42	8	7	YES				S
7C	TB5-11,12	J6L	46	18	7	YES				S
8A	TB7-1,2	J7U	66	38	8	YES				S
8B	TB7-3,4	J7L	79	48	8	YES				S
✳ S3	TB7-9,10	J9U	59	15	SYS	NO				N

✳ System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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: Ø7-1995
DESIGNED: March 2018
SEALED: 6/7/2018
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1226 (University Drive) at SR 1301 (Boone Station Drive)/ University Commons Shopping Center

Division 7 | Alamance County | Burlington

PLAN DATE: March 2018 | REVIEWED BY: AM Encarnacion
PREPARED BY: NA Ptak | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023489 PAMELA L. ALEXANDER

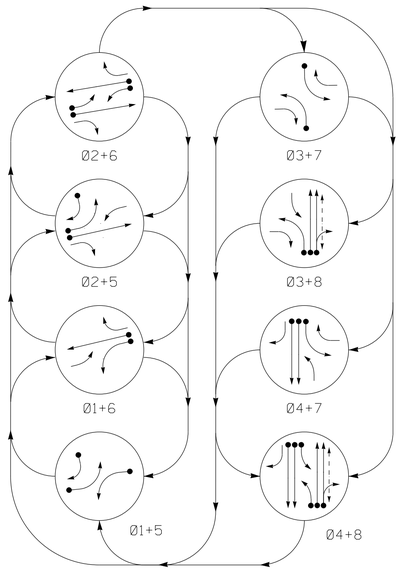
Pamela L. Alexander 6/9/2018
DATE

SIG. INVENTORY NO. 07-1995

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.153.0

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	←	←	F Y	F Y	~~R~~	~~R~~	~~R~~	~~R~~	Y
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R→	R⇉	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←	←	F Y	F Y	~~R~~
41	R	R	R	R	R	R	G	G	R
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→	R	R→	R	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	←	F Y	←	F Y	~~R~~
81, 82	R	R	R	R	R	G	R	G	R
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

11	21	22	P81, P82
31	41	42	
51	61	62	
71	81, 82		

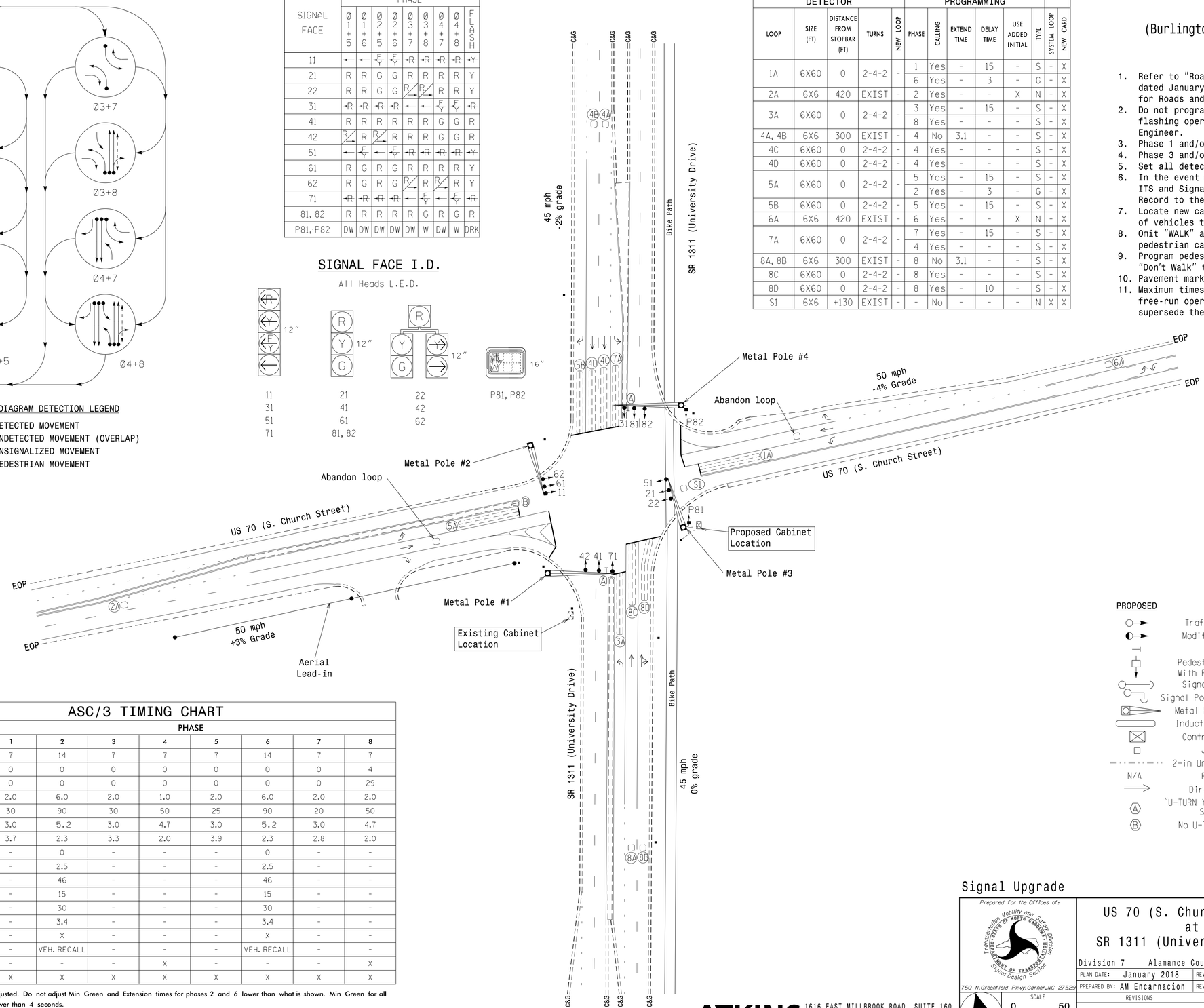
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	15	-	S	-	X
					6	Yes	-	3	-	G	-	X
2A	6X6	420	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X60	0	2-4-2	-	3	Yes	-	15	-	S	-	X
					8	Yes	-	-	-	S	-	X
4A, 4B	6X6	300	EXIST	-	4	No	3.1	-	-	S	-	X
4C	6X60	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4D	6X60	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
					2	Yes	-	3	-	G	-	X
5B	6X60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	420	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X60	0	2-4-2	-	7	Yes	-	15	-	S	-	X
					4	Yes	-	-	-	S	-	X
8A, 8B	6X6	300	EXIST	-	8	No	3.1	-	-	S	-	X
8C	6X60	0	2-4-2	-	8	Yes	-	-	-	S	-	X
8D	6X60	0	2-4-2	-	8	Yes	-	10	-	S	-	X
S1	6X6	+130	EXIST	-	-	No	-	-	-	N	X	X

8 Phase Fully Actuated (Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or 5 may be lagged.
4. Phase 3 and/or 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system supersede these values.



ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	14	7	7	7	14	7	7
Walk *	0	0	0	0	0	0	0	4
Ped Clear	0	0	0	0	0	0	0	29
Veh. Extension *	2.0	6.0	2.0	1.0	2.0	6.0	2.0	2.0
Max 1 *	30	90	30	50	25	90	20	50
Yellow	3.0	5.2	3.0	4.7	3.0	5.2	3.0	4.7
Red Clear	3.7	2.3	3.3	2.0	3.9	2.3	2.8	2.0
Actuations B4 Add *	-	0	-	-	-	0	-	-
Seconds /Actuation *	-	2.5	-	-	-	2.5	-	-
Max Initial *	-	46	-	-	-	46	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.4	-	-	-	3.4	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X	X

* 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 Pushbutton & Sign	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
○	Metal Pole with Mastarm	□
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	– – –
→	Directional Arrow	→
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 70 (S. Church Street) at SR 1311 (University Drive)

Division 7 Alamance County Burlington

PLAN DATE: January 2018 REVIEWED BY: PL Alexander

PREPARED BY: AM Encarnacion REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Designed by: Pamela Alexander 6/7/2018
SIGNATURE DATE

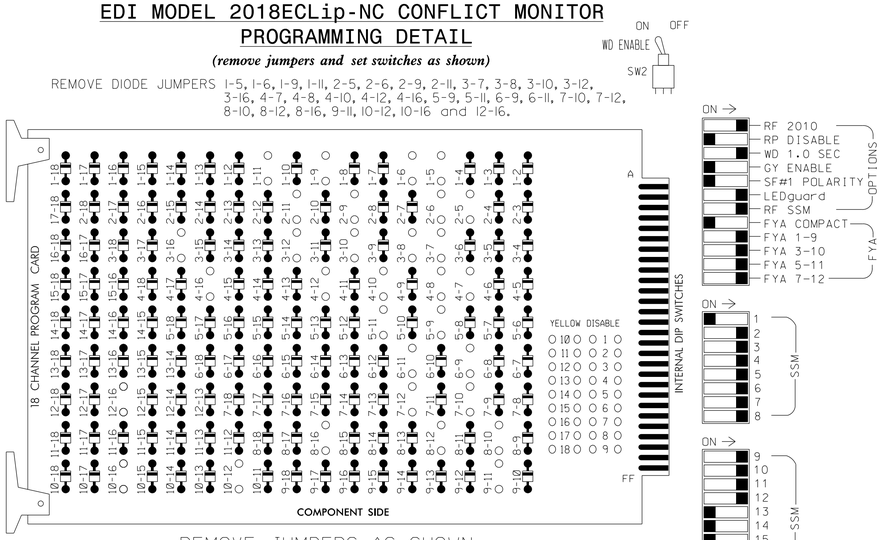
SIG. INVENTORY NO. 07-1996

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS I-5, I-6, I-9, I-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 3-16, 4-7, 4-8, 4-10, 4-12, 4-16, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 8-16, 9-11, 10-12, 10-16 and 12-16.



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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10,S11,S12
AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.....1,2,3,4,5,6,7,8,8PED
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.153.1

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	NU	22	31 ★	41,42	NU	42	51 ★	61,62	NU	62	71 ★	81,82	P81, P82	11 ★	31 ★	NU	51 ★	71 ★	NU
RED		128			*	101			*	134			*	107							
YELLOW	*	129				102				135				108							
GREEN		130				103				136				109							
RED ARROW																A121	A124		A114	A101	
YELLOW ARROW				117				132				123				A122	A125		A115	A102	
FLASHING YELLOW ARROW																A123	A126		A116	A103	
GREEN ARROW	127			118	118			133	133			124	124								
✋															110						
🚶															112						

NU = Not Used

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

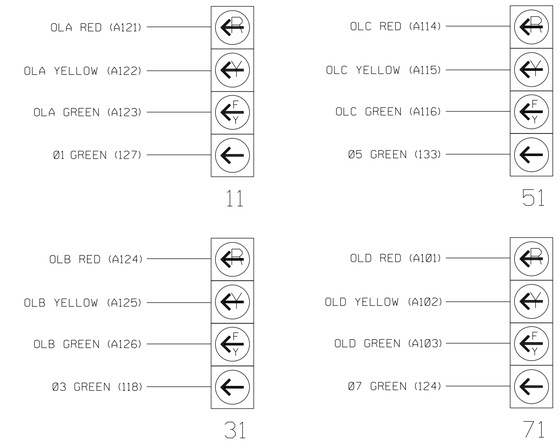
★ See pictorial of head wiring in detail this sheet.

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.

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	Ø1 1A	Ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	Ø3 3A	Ø4 4A,4B	Ø4 4D	WIRED INPUT ⊗	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	FS DC ISOLATOR
L	NOT USED	NOT USED			NOT USED	Ø4 4C	NOT USED		NOT USED				Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J" U	Ø5 5A	Ø5 5B	Ø6 6A	WIRED INPUT ⊗	Ø7 7A	Ø8 8A,8B	Ø8 8D	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
L	NOT USED	NOT USED	NOT USED		NOT USED	Ø8 8C	NOT USED							

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1	1	YES		15		S
	-	J4U	48	26	6	YES		3		G
2A	TB2-5,6	I2U	39	2	2	YES			X	N
3A [2]	TB4-5,6	I5U	58	3	3	YES		15		S
	-	J8U	50	28	8	YES				S
4A,4B	TB4-9,10	I6U	41	4	4	YES	3.1			S
4C	TB4-11,12	I6L	45	14	4	YES				S
4D	TB6-1,2	I7U	65	34	4	YES				S
*S1	TB6-9,10	I9U	60	11	SYS	NO				N
5A [3]	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES		3		G
5B	TB3-5,6	J2U	40	6	5	YES		15		S
6A	TB3-9,10	J3U	64	36	6	YES			X	N
7A [4]	TB5-5,6	J5U	57	7	7	YES		15		S
	-	I8U	49	24	4	YES				S
8A,8B	TB5-9,10	J6U	42	8	8	YES	3.1			S
8C	TB5-11,12	J6L	46	18	8	YES				S
8D	TB7-1,2	J7U	66	38	8	YES		10		S
PED PUSH BUTTONS										
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

* System detector only. Remove any assigned vehicle phase.

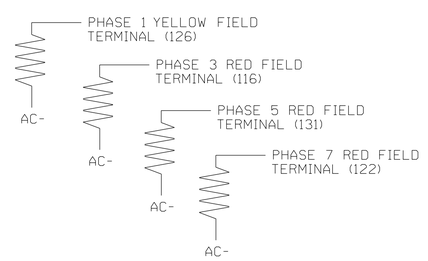
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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: 07-1996
DESIGNED: January 2018
SEALED: 6/7/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 (S. Church Street) at SR 1311 (University Drive)

Division 7 Alamance County Burlington

PLAN DATE: January 2018 REVIEWED BY: PL Alexander

PREPARED BY: AM Encarnacion REVIEWED BY:

REVISIONS	INIT.	DATE

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

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Developed by: Pamela Alexander 6/9/2018
DATE

SIG. INVENTORY NO. 07-1996

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

```
TMG VEH OVLP...[D] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    7
OPPOSING THROUGH.......   PHASE    8

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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: 07-1996
DESIGNED: January 2018
SEALED: 6/7/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 2

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation

750 N.Greenfield Pkwy,Garner,NC 27529

US 70 (S. Church Street) at SR 1311 (University Drive)

Division 7 Alamance County Burlington

PLAN DATE:	January 2018	REVIEWED BY:	PL Alexander
PREPARED BY:	AM Encarnacion	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

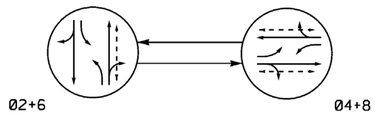
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023489 PAMELA L. ALEXANDER

DocuSigned by: Pamela Alexander
E79609AF48384AA...
6/9/2018
DATE

SIG. INVENTORY NO. 07-1996

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.154.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

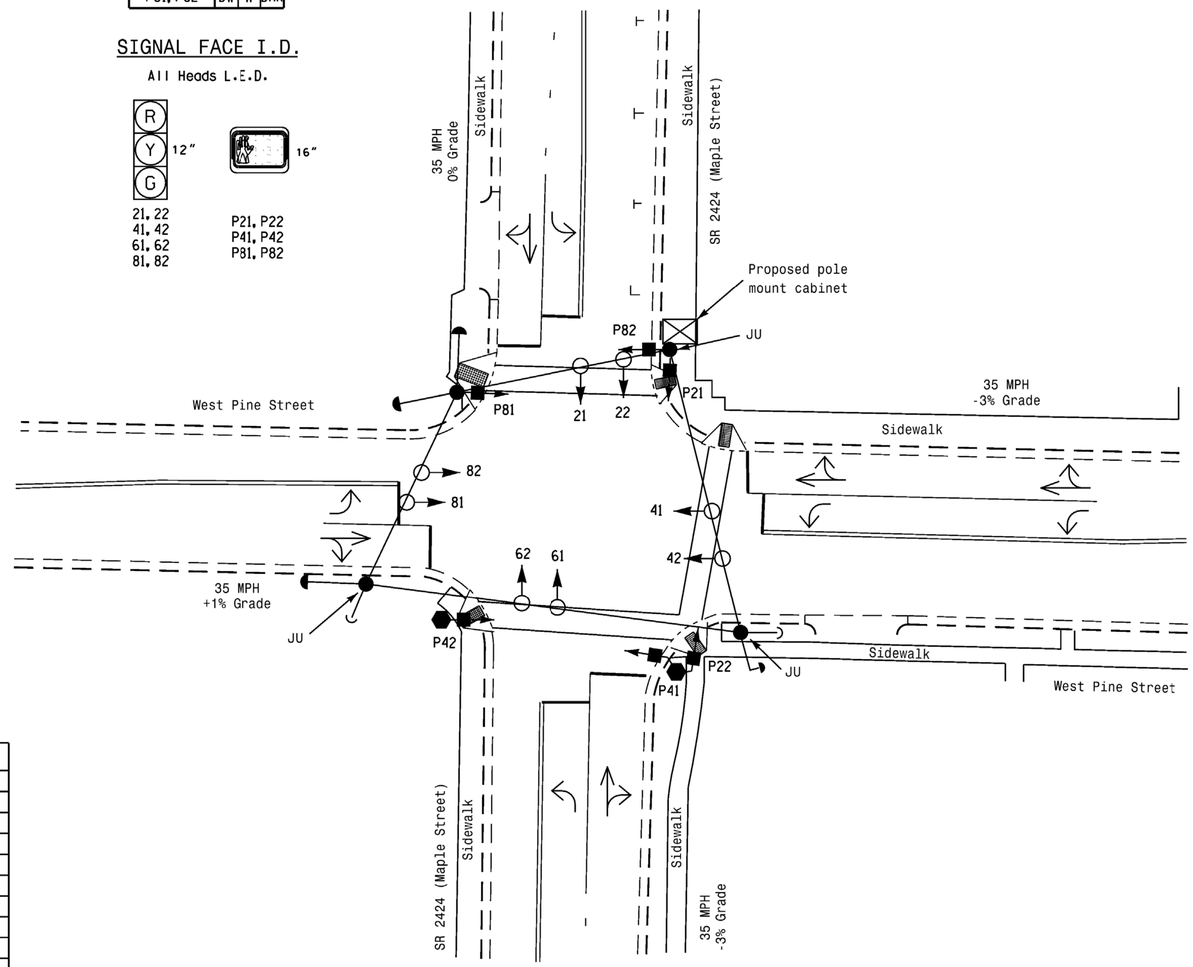
TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK
P81, P82	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

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

P21, P22
P41, P42
P81, P82



2 Phase
Pre-Timed
(Burlington-Graham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
4. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
5. Pavement markings are existing.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Provide minimum of 15' clearance from high point in roadway to bottom of proposed signal heads.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With 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	
	Type II Signal Pedestal	
	Wheelchair Ramp	

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	10	7	10	7
Walk *	4	4	0	4
Ped Clear	11	12	0	9
Veh. Extension *	0.0	0.0	0.0	0.0
Max 1 *	43	25	43	25
Yellow	4.1	3.8	3.8	4.1
Red Clear	1.5	1.4	1.6	1.3
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	-	-	-
Recall Position	MAX/PED	MAX/PED	MAX	MAX/PED
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	X	X

* 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.

Mattern & Craig
ENGINEERS • SURVEYORS
12 BROAD STREET
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FAX (828) 254-4562
NC LIC. NO. C-1154

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 2424 (Maple Street)
at
West Pine Street

Division 7 Alamance County Graham

PLAN DATE: September 2017 REVIEWED BY: JB Voso
PREPARED BY: SE Wilson REVIEWED BY:

REVISIONS	INIT.	DATE

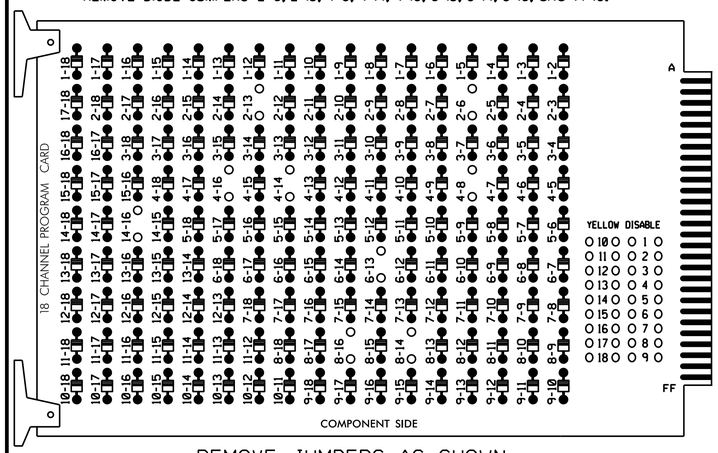
SCALE 1"=20' (0 20)

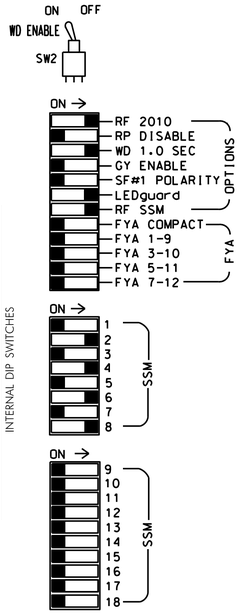
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

Documents originated electronically
James Voso 6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-2063

$$$$USERNAME$$$$
$$$$SYSTIME$$$$
$$$$SCENARIO$$$$





PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.154.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-6, 2-13, 4-8, 4-14, 4-16, 6-13, 8-14, 8-16, 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. Integrate monitor with Ethernet network in 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. Program controller to start up in phase 2 Walk and 6 Green.
3. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................336
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S2,S3,S5,S6,S8,S11,S12
PHASES USED.............2,2PED,4,4PED,6,8,8PED
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	P21, P22	NU	41,42	P41, P42	NU	61,62	NU	NU	81,82	P81, P82
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋			113			104						110
🚶			115			106						112

NU = Not Used

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)

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

FS = FLASH SENSE
ST = STOP TIME

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2063
DESIGNED: September 2017
SEALED: 6/13/2018
REVISED: NA

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NC LIC. NO. C-1154

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 2424 (Maple Street)
at
West Pine Street

Division 7 | Alamance County | Graham

PLAN DATE: September 2017	REVIEWED BY: JB Voso
PREPARED BY: SE Wilson	REVIEWED BY:

REVISIONS	INIT.	DATE

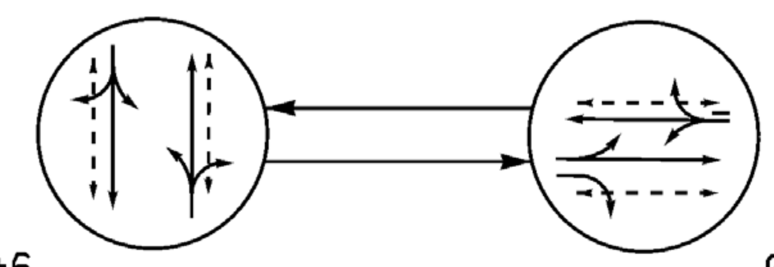
SEAL
SEAL 022599
JAMES B. VOSO
DocuSigned by:
James Voso
140ED60379E041E
6/13/2018
DATE

SIG. INVENTORY NO. 07-2063

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.155.0

2 Phase
Pre-Timed
(Burlington-Graham Signal System)

PHASING DIAGRAM



02+6 04+8

PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	Ø4+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK
P61, P62	W	DW	DRK
P81, P82	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

R Y G 12"

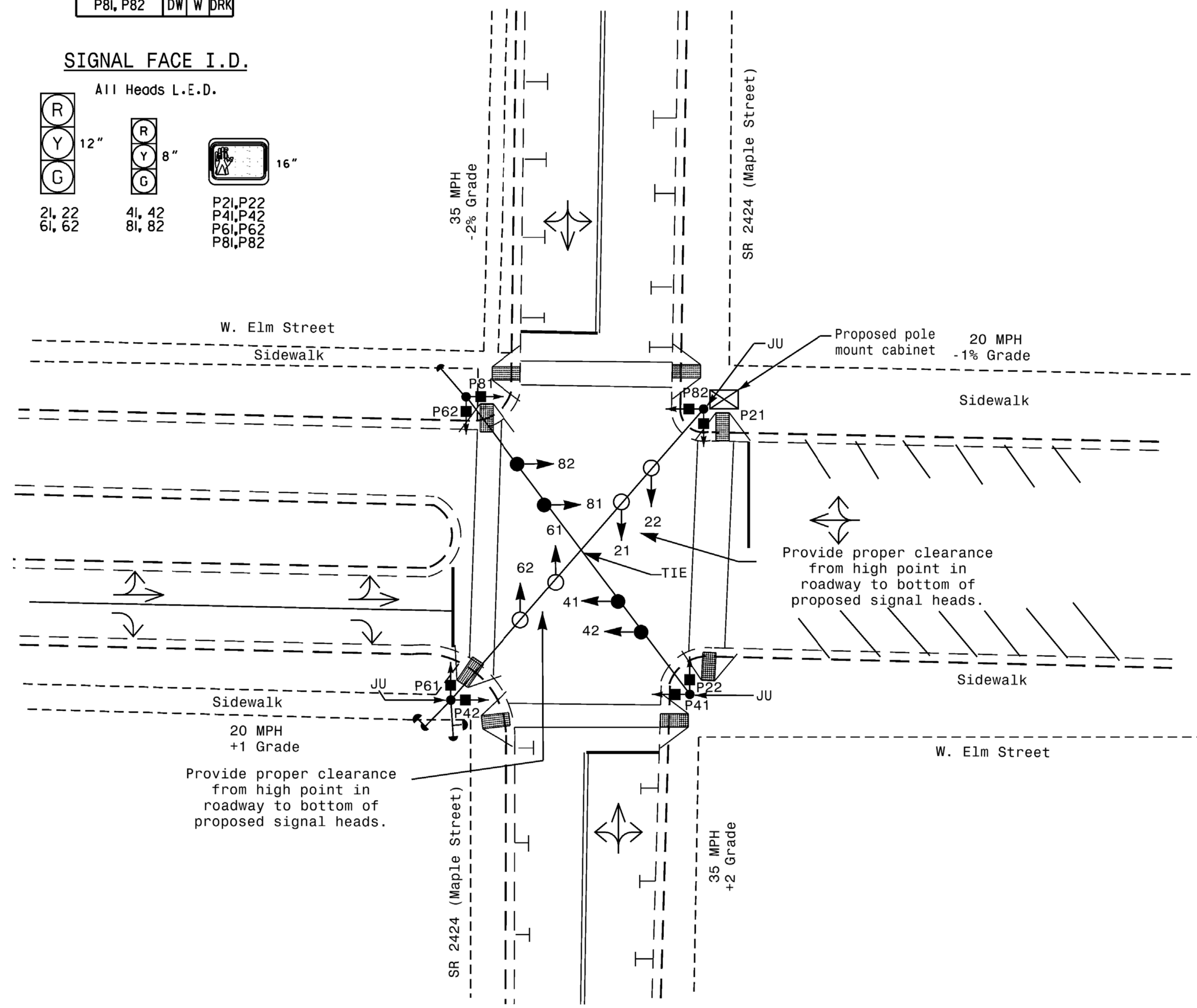
R Y G 8"

16"

21, 22
61, 62

41, 42
81, 82

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



NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
4. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
5. Pavement markings are existing.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	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	
	Wheelchair Ramp	

ASC/3 TIMING CHART

FEATURE	PHASE 2	4	6	8
Min Green *	10	7	10	7
Walk *	4	4	4	4
Ped Clear	13	9	15	9
Veh. Extension *	0.0	0.0	0.0	0.0
Max 1 *	31	37	31	37
Yellow	3.7	3.0	4.0	3.0
Red Clear	1.9	2.4	1.9	2.6
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	-	-	-
Recall Position	MAX/PED	MAX/PED	MAX/PED	MAX/PED
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	X	X

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

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Signal Upgrade

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

SR 2424 (Maple Street)
at
W. Elm Street

Division 7 Alamance County Graham

PLAN DATE:	September 2017	REVIEWED BY:	JB Voso
PREPARED BY:	SE Wilson	REVIEWED BY:	

SCALE 0 20
1"=20'

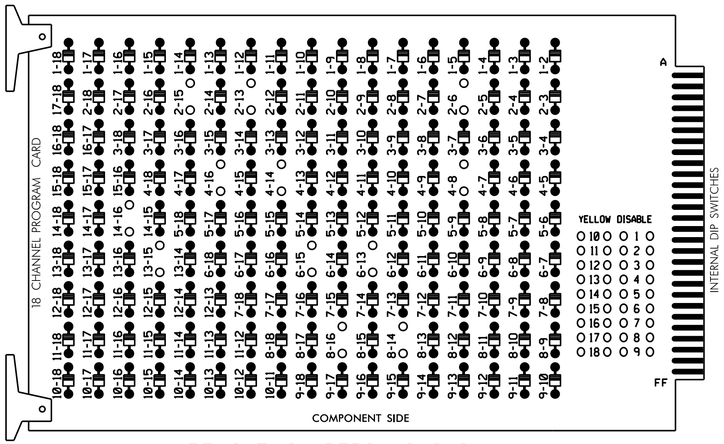
REVISIONS	INIT.	DATE

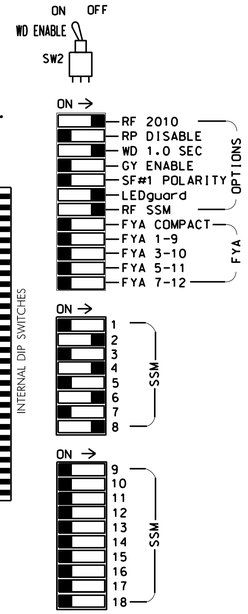
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022599 ENGINEER JAMES B. VOSO

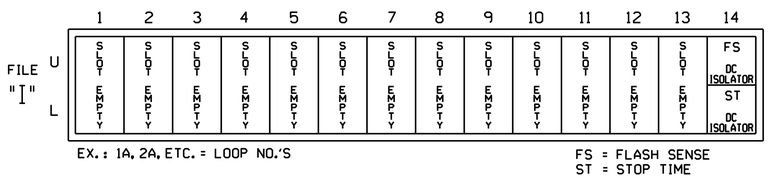
James Voso 6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-2064

$$$$SYSTIME$$$$
$$$$USERNAME$$$$







PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig.155.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-6, 2-13, 2-15, 4-8, 4-14, 4-16, 6-13, 6-15, 8-14, 8-16, 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. Integrate monitor with Ethernet network in 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. Program controller to start up in phase 2 Walk and 6 Walk.
3. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.............2070LX
CABINET.................336
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S2,S3,S5,S6,S8,S9,S11,S12
PHASES USED.............2,2PED,4,4PED,6,6PED,8,8PED
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	P21, P22	NU	41,42	P41, P42	NU	61,62	P61, P62	NU	81,82	P81, P82
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋			113			104			119			110
🚶			115			106			121			112

NU = Not Used

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)

FILE "I"		1	2	3	4	5	6	7	8	9	10	11	12	13	14
	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

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

FS = FLASH SENSE
ST = STOP TIME

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2064
DESIGNED: September 2017
SEALED: 6/13/2018
REVISED: NA

Mattern & Craig
ENGINEERS • SURVEYORS

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NC LIC. NO. C-1154

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 2424 (Maple Street)
at
W. Elm Street

Division 7 Alamance County Graham

PLAN DATE:	September 2017	REVIEWED BY:	JB Voso
PREPARED BY:	SE Wilson	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
SEAL 022599 JAMES B. VOSO

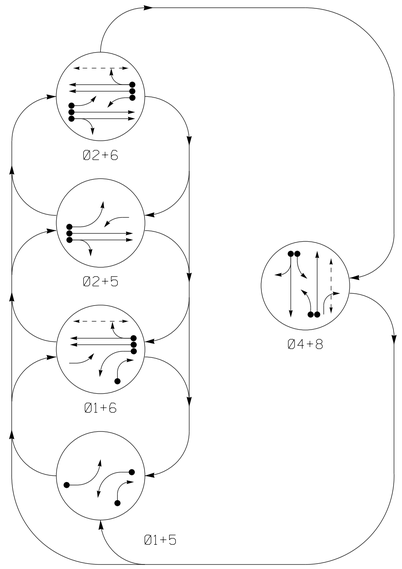
DocuSigned by:
James Voso
6/13/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-2064

$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 156.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

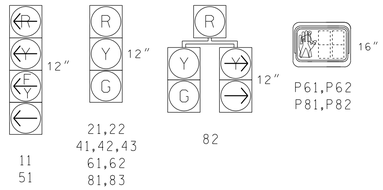
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
11	←	←	←F/Y	←F/Y	←R	←Y
21,22	R	R	G	G	R	Y
41,42,43	R	R	R	R	G	R
51	←	←F/Y	←	←F/Y	←R	←Y
61,62	R	G	R	G	R	Y
81,83	R	R	R	R	G	R
82	R/→	R/→	R	R	G	R
P61,P62	DW	W	DW	W	DW	DRK
P81,P82	DW	DW	DW	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



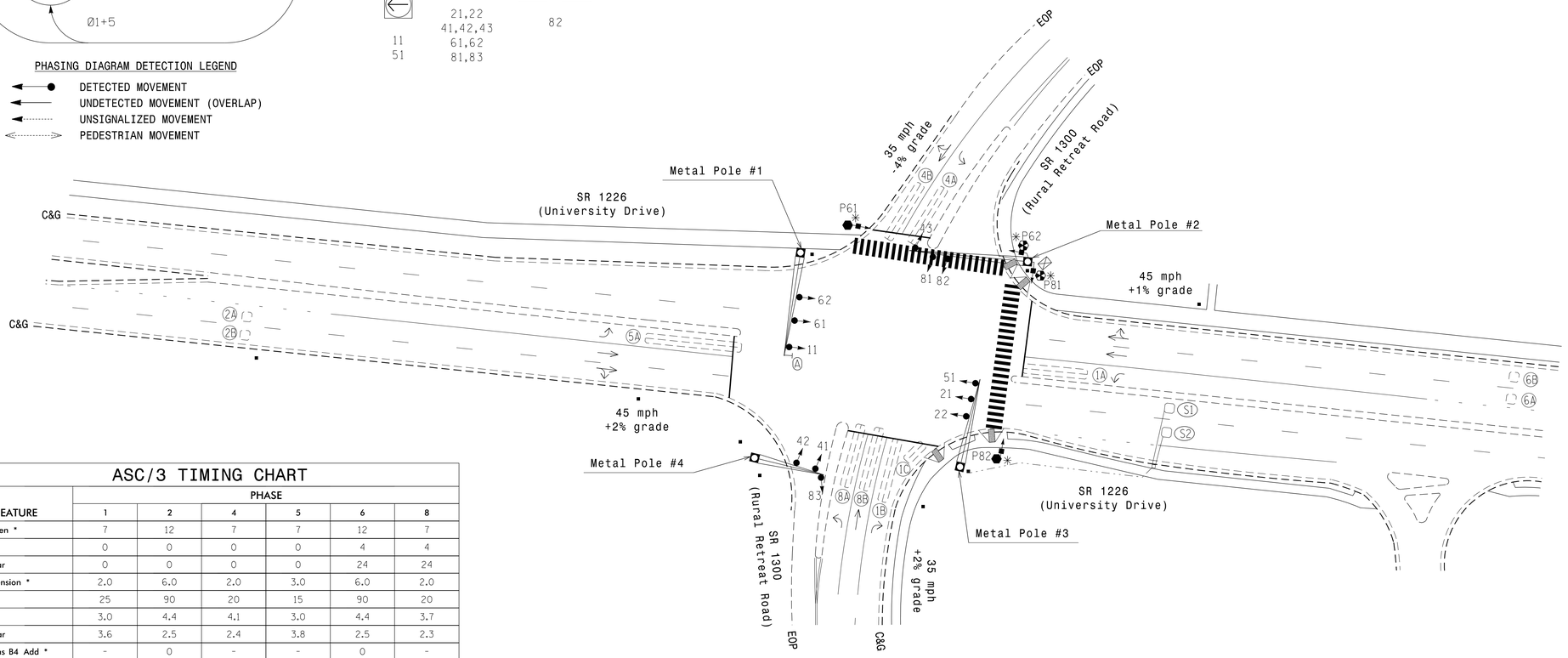
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
					6	Yes	-	3	-	G	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
1C	6X15	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X40	+5	2-4-2	-	4	Yes	-	-	-	S	-	X
4B	6X40	+5	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X60	+5	2-4-2	-	5	Yes	-	15	-	S	-	X
					2	Yes	-	3	-	G	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X40	+5	2-4-2	-	8	Yes	-	-	-	S	-	X
8B	6X40	+5	2-4-2	-	8	Yes	-	-	-	S	-	X
S1	6X6	+270	4	X	-	No	-	-	-	N	X	X
S2	6X6	+270	4	X	-	No	-	-	-	N	X	X

5 Phase
Fully Actuated
(Burlington-Graham Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
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. Pavement markings are existing.
10. 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	■↓
✳	Pedestrian Push Button & Sign	✳
⊛	Type I Pushbutton Post	◉
⬡	Type II Signal Pedestal	⬢
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
⊠	Controller & Cabinet	⊠
□	Junction Box	■
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
N/A	Curb Ramp	
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green *	7	12	7	7	12	7
Walk *	0	0	0	0	4	4
Ped Clear	0	0	0	0	24	24
Veh. Extension *	2.0	6.0	2.0	3.0	6.0	2.0
Max 1 *	25	90	20	15	90	20
Yellow	3.0	4.4	4.1	3.0	4.4	3.7
Red Clear	3.6	2.5	2.4	3.8	2.5	2.3
Actuations B4 Add *	-	0	-	-	0	-
Seconds /Actuation *	-	1.5	-	-	1.5	-
Max Initial *	-	34	-	-	34	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	30	-	-	30	-
Minimum Gap	-	3.0	-	-	3.0	-
Locking Detector	-	X	-	-	X	-
Recall Position	-	VEH. RECALL	-	-	VEH. RECALL	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	X	X

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

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 1226 (University Drive)
at
SR 1300 (Rural Retreat Road)

Division 7 Alamance County Burlington

PLAN DATE:	March 2018	REVIEWED BY:	PL Alexander
PREPARED BY:	NA Ptak	REVIEWED BY:	AM Encarnacion

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

Developed by: Pamela Alexander SIGNATURE 6/7/2018 DATE

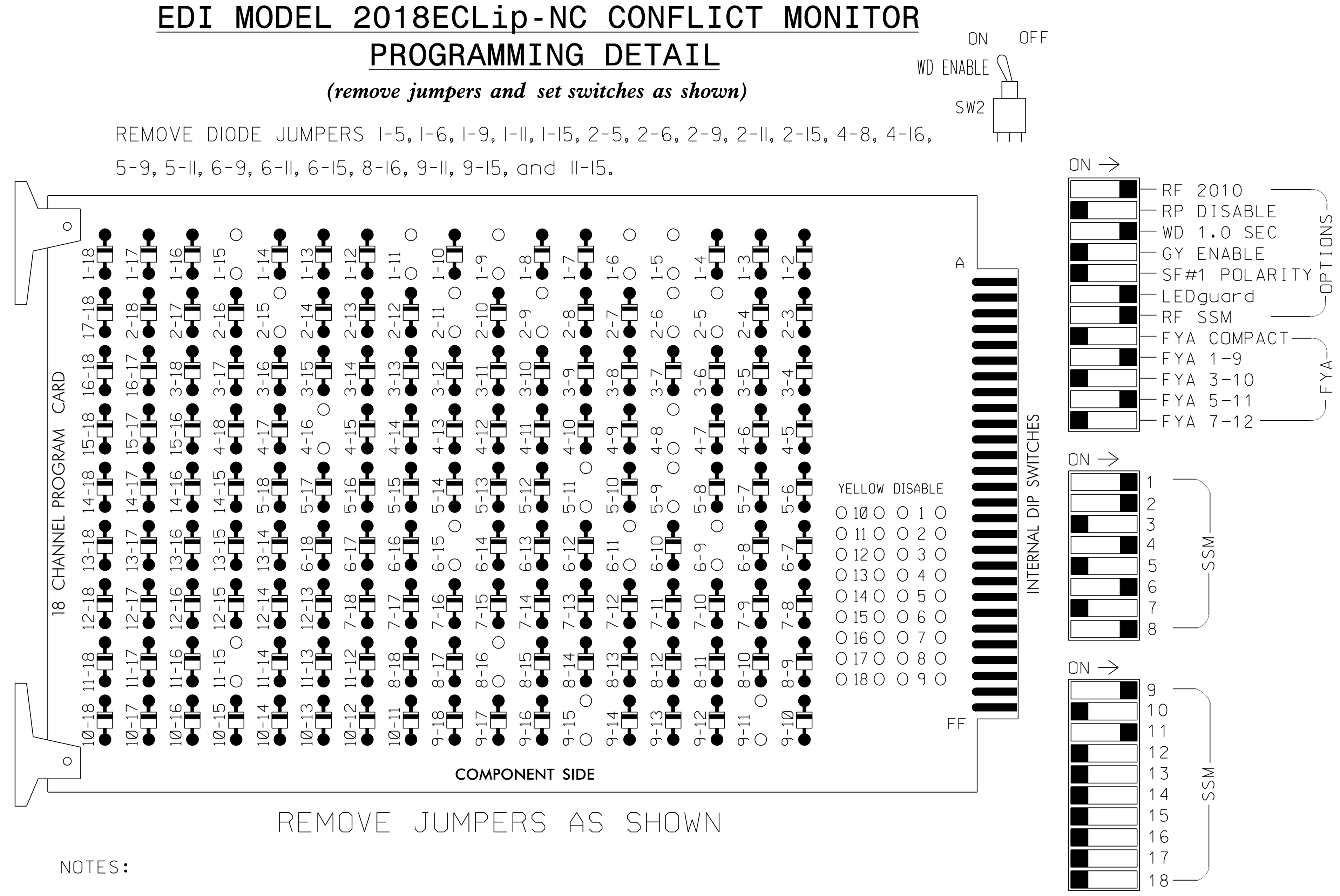
SIG. INVENTORY NO. 07-2070

PROJECT REFERENCE NO.	SHEET NO.
U-6015	Sig. 156.1

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, 4-8, 4-16, 5-9, 5-11, 6-9, 6-11, 6-15, 8-16, 9-11, 9-15, and 11-15.



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. Integrate monitor with Ethernet network in 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. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Walk.
4. The cabinet and controller are part of the Burlington-Graham Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................332 W/AUX
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S1,S2,S5,S7,S8,S9,S11,S12, AUX S1,AUX S4
PHASES USED.............1,2,4,5,6,6PED,8,8PED
OVERLAP "A".............*
OVERLAP "B".............NOT USED
OVERLAP "C".............*
OVERLAP "D".............NOT USED

* See overlap programming detail on sheet 2

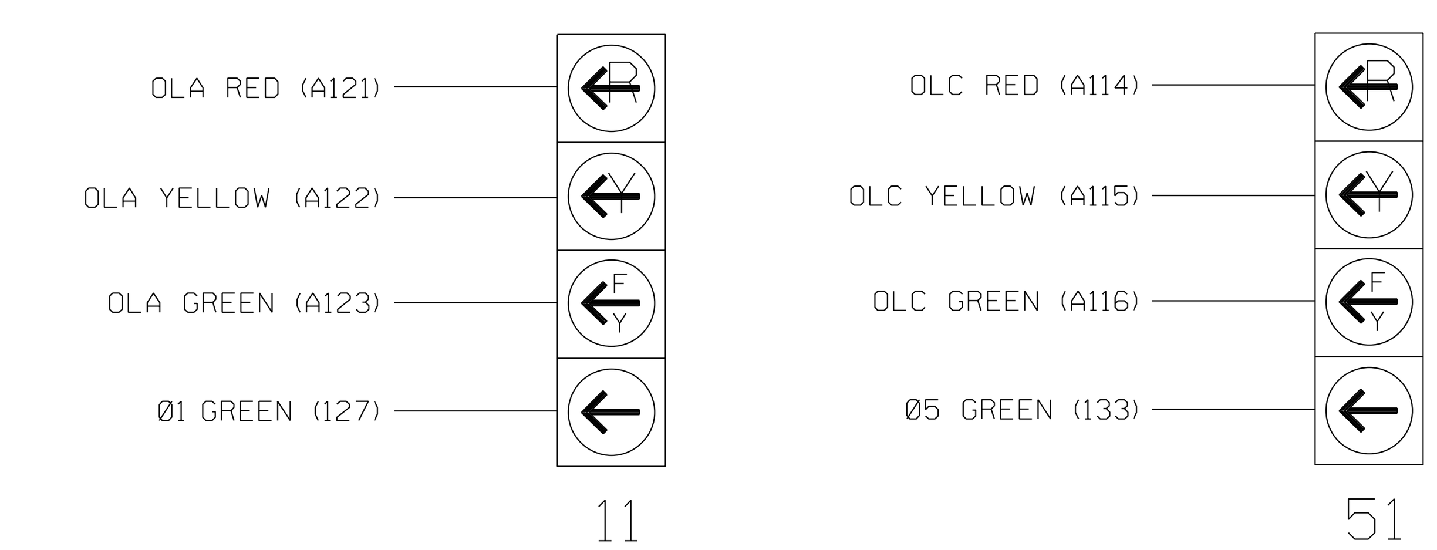
SIGNAL HEAD HOOK-UP CHART

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	NU	41,42,43	NU	51★	61,62	P61,P62	NU	81,82,83	P81,P82	11★	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		126												A122			A115		
FLASHING YELLOW ARROW														A123			A116		
GREEN ARROW	127	127						133											
(Don't Walk symbol)										119			110						
(Walk symbol)										121			112						

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1	1	YES		15		S
	-	J4U	48	26	6	YES		3		G
1B	TB2-5,6	I2U	39	2	1	YES		15		S
1C	TB2-7,8	I2L	43	12	1	YES		15		S
2A	TB2-9,10	I3U	63	32	2	YES			X	N
2B	TB2-11,12	I3L	76	42	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES				S
4B	TB4-11,12	I6L	45	14	4	YES		10		S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
5A [2]	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES		3		G
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
8A	TB5-9,10	J6U	42	8	8	YES				S
8B	TB5-11,12	J6L	46	18	8	YES				S
PED PUSH BUTTONS										
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

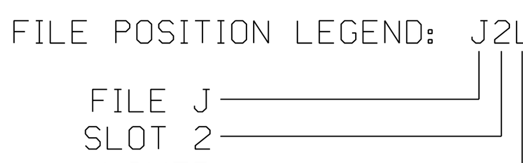
NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

* System detector only. Remove any assigned vehicle phase.

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

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

INPUT FILE POSITION LEGEND: J2L



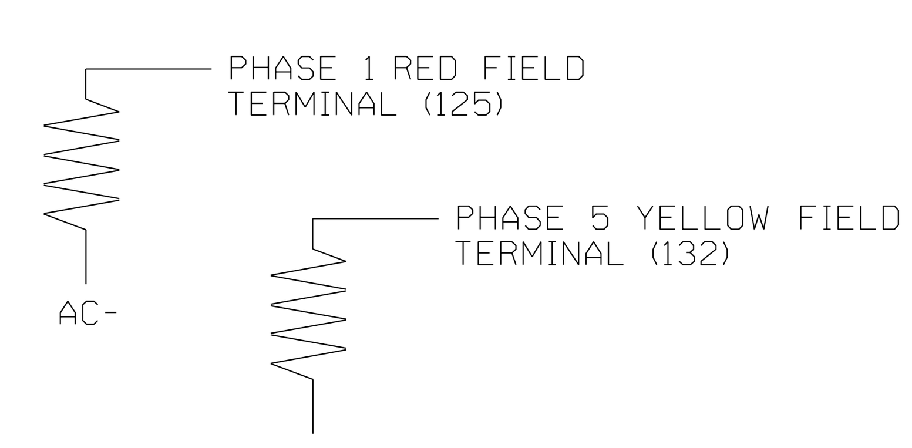
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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: 07-2070
DESIGNED: March 2018
SEALED: 6/7/2018
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
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Electrical Details - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1226 (University Drive)
at
SR 1300 (Rural Retreat Road)

Division 7 Alamance County Burlington

PLAN DATE: March 2018	REVIEWED BY: PL Alexander
PREPARED BY: NA Ptak	REVIEWED BY: AM Encarnacion

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023489 ENGINEER PAMELA L. ALEXANDER

DocuSigned by: Pamela Alexander
E79609AF48384AA...
6/9/2018
DATE

SIG. INVENTORY NO. 07-2070