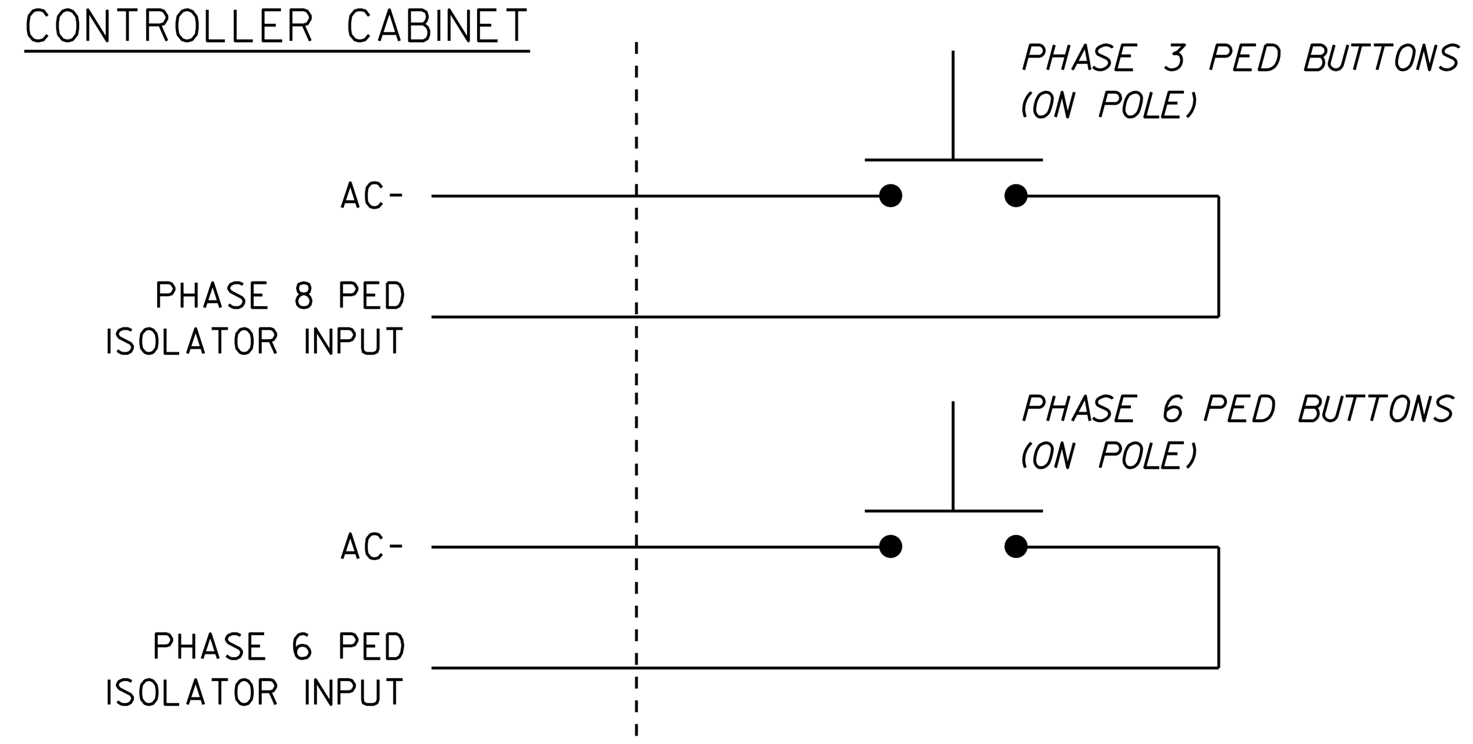
PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

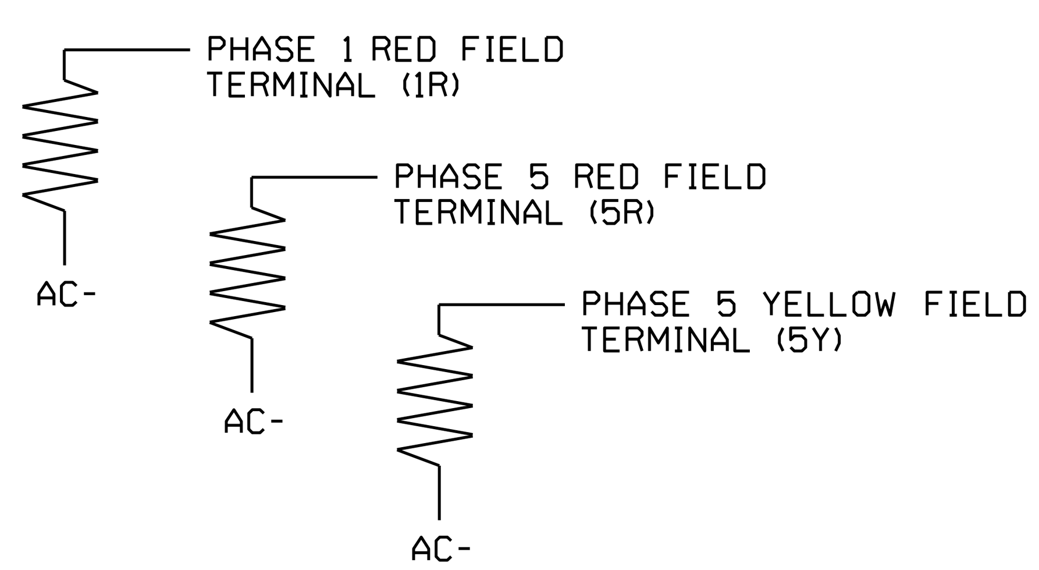
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



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	2	P	. . . +	A	R	.
10	4	P	. . . +	A	R	.
11	6	P	. . . −	A	R	.
12	3	P	. . . −	A	R	.
13	1	O	. . . +	A	.	X
14	2	O	. . . −	A	.	X
15	3	O	. . . +	A	.	.
16	4	O	. . . −	A	.	.

NOTICE PHASE 3 PED ASSIGNED TO LD SWITCH 12

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726T2
DESIGNED: March 2019
SEALED: 7/24/2018
REVISED: N/A

Electrical Detail - Temp 2 (TMP Phase I, Step B)
Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 | Wake County | Morrisville

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

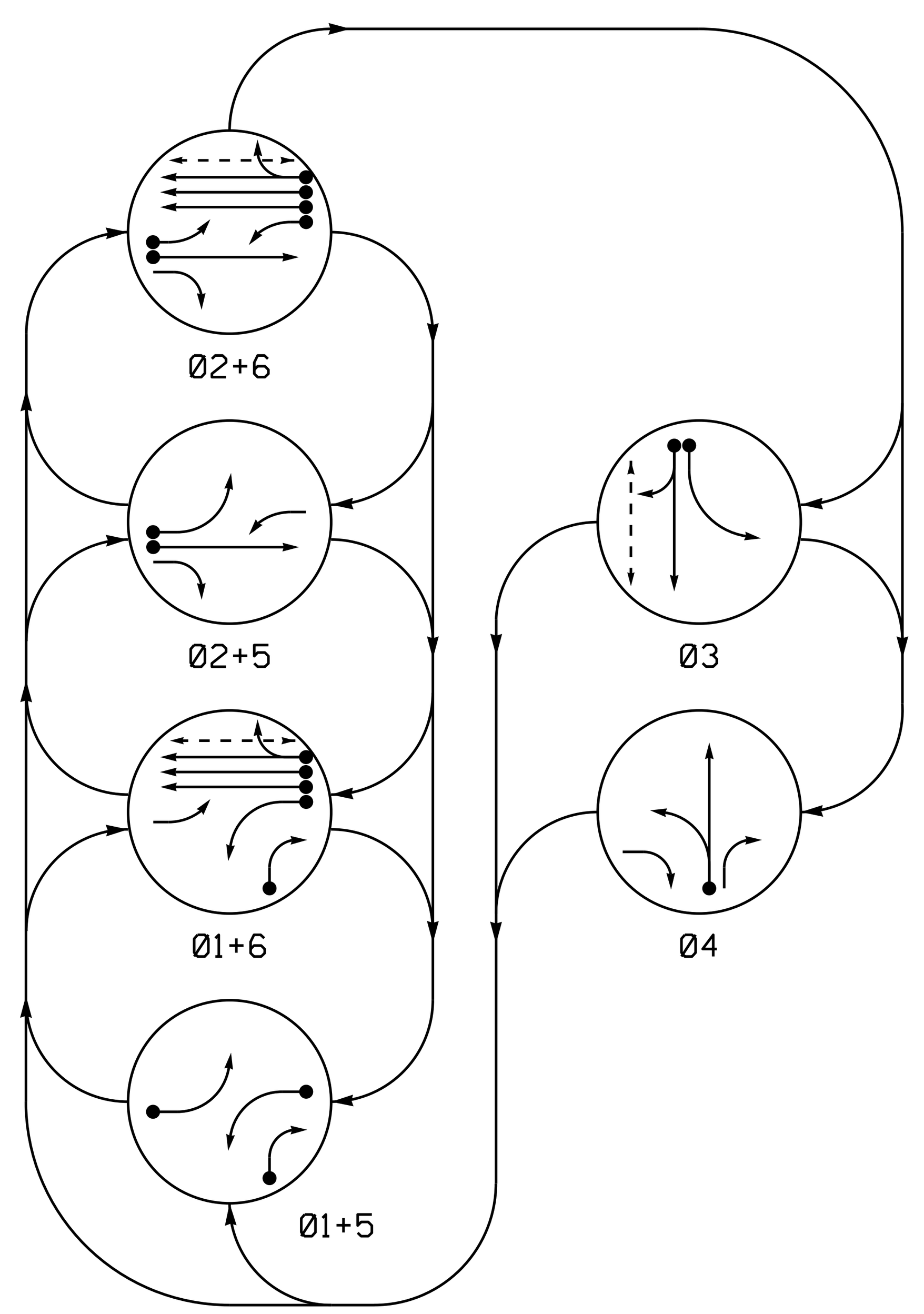
DocuSigned by: Ryan W. Hough 430320FAA2654C3...
8/1/2019
DATE

SIG. INVENTORY NO. 05-1726T2

25-JUL-2019 10:22
sarmstrong

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig. 9.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

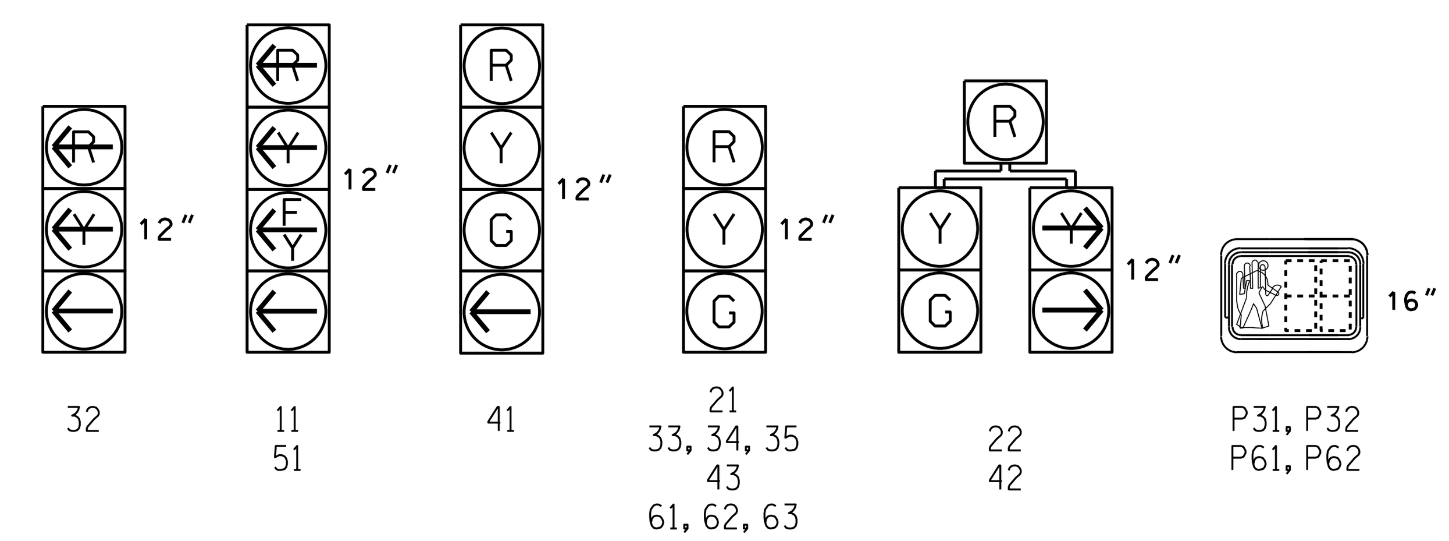
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	←F/Y	←F/Y	←R	←R	←Y
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R/→	Y
32	←R	←R	←R	←R	←	←R	←R
33, 34, 35	R	R	R	R	G	R	R
41	R	R	R	R	R	G/←	R
42	R/→	R/→	R	R	R	G	R
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
P31, P32	DW	DW	DW	DW	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR INSTALLATION CHART

ASC/3-2070EN2 CONTROLLER w/ TS-2 CABINET

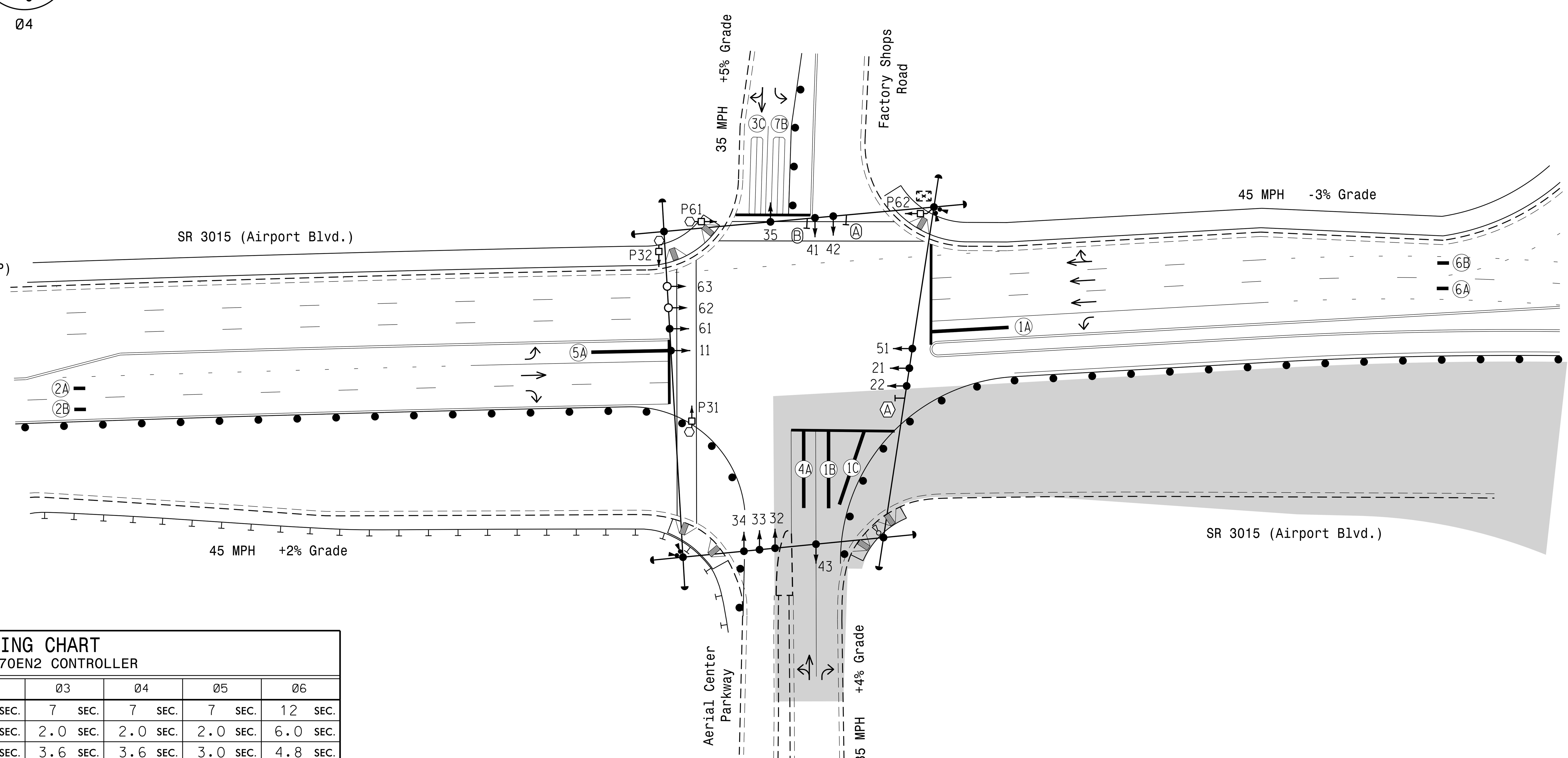
INDUCTIVE LOOPS: LOOP / ZONE NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	DETECTOR UNITS: NEMA PHASE	NEW	EXISTING	TIMING: FEATURE	TIME (sec)	ADDED INITIAL	DET. TYPE
1A*	6X40	0	*	X	-	1	-	*	DELAY	15	-	S
						6	-	*	DELAY	3	-	G
1B*	6X40	0	*	X	-	1	-	*	DELAY	15	-	S
1C*	6X40	0	*	X	-	1	-	*	DELAY	15	-	S
2A*	6X6	300	*	X	-	2	-	*	-	-	X	N
2B*	6X6	300	*	X	-	2	-	*	-	-	X	N
3C	6X40	0	2-4-2	X	-	3	-	X	DELAY	10	-	S
4A*	6X40	0	*	X	-	4	-	*	-	-	-	S
5A*	6X40	0	*	X	-	5	-	*	DELAY	15	-	S
						2	-	*	DELAY	3	-	G
6A*	6X6	260	*	X	-	6	-	*	-	-	X	N
6B*	6X6	260	*	X	-	6	-	*	-	-	X	N
7B	6X40	0	2-4-2	X	-	3	-	X	-	-	-	S

* Video detection zone.

6 Phase
Fully Actuated
(Cary 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. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Reposition existing signal heads numbered 11, 21, 22, 51, and 61.
7. Remove existing signal head numbered 31.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Cary signal system data:
    Fiber Channel #: 26.
12. This intersection features a video detection system. Shown locations of detectors are conceptual only. Refer to the manufacturer's guidelines for optimal detector placement.



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	
	Type II Signal Pedestal	
N/A	Guardrail	
N/A	Curb Ramp	
	Out of Pavement Detector	
	Video Detection Area	
	Construction Zone Drums	
	Construction Zone	
(A)	Right Arrow "ONLY" Sign (R3-5R)	(A)
(B)	Combined Through and Left Arrow Sign (R3-6L)	(B)

TIMING CHART

ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6
MINIMUM GREEN *	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.
VEHICLE EXT. *	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	3.6 SEC.	3.6 SEC.	3.0 SEC.	4.8 SEC.
RED CLEARANCE	3.2 SEC.	1.9 SEC.	2.2 SEC.	2.2 SEC.	3.2 SEC.	1.9 SEC.
MAX. 1 *	20 SEC.	120 SEC.	30 SEC.	20 SEC.	15 SEC.	120 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL
LOCK DET.	OFF	ON	OFF	OFF	OFF	ON
WALK *	– SEC.	– SEC.	7 SEC.	– SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	– SEC.	20 SEC.	– SEC.	– SEC.	22 SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	OFF	ON
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	1.5 SEC.	– SEC.	– SEC.	– SEC.	1.5 SEC.
MAX. INITIAL *	– SEC.	34 SEC.	– SEC.	– SEC.	– SEC.	30 SEC.
TIME B4 REDUCTION *	– SEC.	15 SEC.	– SEC.	– SEC.	– SEC.	15 SEC.
TIME TO REDUCE *	– SEC.	45 SEC.	– SEC.	– SEC.	– SEC.	45 SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	– SEC.	– SEC.	3.0 SEC.
DUAL ENTRY	OFF	OFF	OFF	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON	ON

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

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jalohr

Signal Upgrade - Temporary Design 3 (TMP Phase III, Step A)

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

SR 3015 (Airport Blvd.) at Factory Shops Road/ Aerial Center Parkway

Division 5 | Wake County | Morrisville

PLAN DATE:	March 2019	REVIEWED BY:
PREPARED BY:	J.A. Lohr	REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 026486 ROBERT J. ZIEMBA

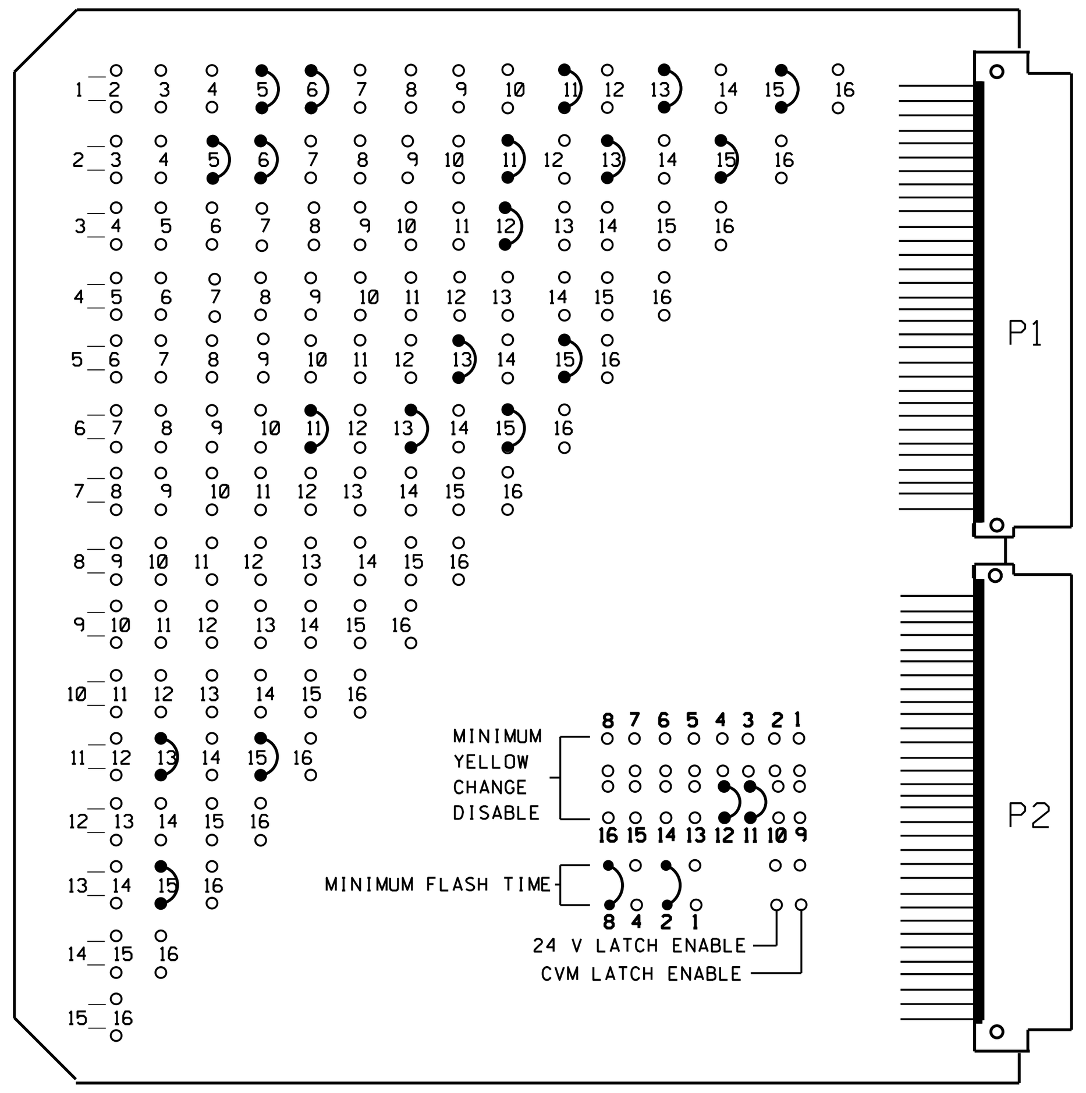
DocuSigned by: 7/24/2019 DATE

SIG. INVENTORY NO. 05-1726T3

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 9.1

EDI MODEL MMU2-16LEip MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and tables as shown below)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	ENABLE
2	ENABLE
3	ENABLE
4	ENABLE
5	DISABLE
6	ENABLE
7	DISABLE
8	DISABLE
9	DISABLE
10	DISABLE
11	ENABLE
12	ENABLE
13	ENABLE
14	DISABLE
15	ENABLE
16	DISABLE

UNIT OPTIONS	
OPTION	SETTING
RECURRENT PULSE	ON
WALK DISABLE	OFF
LOG CVM FAULTS	ON
EXTERN WATCHDOG	OFF
24V-2=12VDC	OFF
PGM CARD MEMORY	ON
LEDguard	ON
FORCE TYPE 16	OFF
TYPE12-SDLC	OFF
VM 3x/Day Latch	ON

FLASHING YELLOW ARROW	
CONFIG MODE	B
ENABLE CHANNEL PAIR, FYA	
CH 1-13	ON
CH 3-14	OFF
CH 5-15	ON
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	ON
CH 3	OFF
CH 5	ON
CH 7	OFF
FLASH RATE FAULT	ON
FYA TRAP DETECT	ON

MMU PROGRAMMING NOTE

ENSURE YELLOW CHANGE PLUS RED CLEARANCE MONITORING IS ENABLED FOR ALL CHANNELS.

SIGNAL HEAD HOOK-UP CHART

PHASE	1		2	3		4			5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11★	42	21,22	32	33,34 35	22	41	42,43	51★	61,62 63	NU	NU	NU	NU	P61, P62	P31, P32	11★	NU	51★	NU
RED		✳	2R		3R		4R	4R	✳	6R										
YELLOW			2Y		3Y		4Y	4Y	✳	6Y										
GREEN			2G		3G		4G	4G		6G										
RED ARROW				3R													13R		15R	
YELLOW ARROW		1Y		3Y		4Y											13Y		15Y	
FLASHING YELLOW ARROW																	13G		15G	
GREEN ARROW	1G	1G		3G		4G	4G		5G											
(hand)															11R	12R				
(pedestrian)															11G	12G				

NU = Not Used

✳ Denotes install load resistor. See Load Resistor Installation Detail on sheet 3.

★ See pictorial of head wiring detail this sheet.

NOTE: Signal head 31 has been disconnected and bagged but still hangs on the span.

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW.
PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

RACK #1	BIU	SLOT EMPTY	CH1 L1 ø 1 / CH2 L2 ø 6 ✳	SLOT EMPTY	CH1 L5 NOT USED / CH2 L6 ø 3	SLOT EMPTY	CH1 L9 ø 5 / CH2 L10 ø 2 ✳	CH1 L15 ø 3 / CH2 L16 NOT USED	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

	LOOP NO.	LOOP PANEL TERMINALS
ADD JUMPERS FROM: L1A TO L2A, AND L1B TO L2B	1A	L1A,L1B
		L2A,L2B
	NU	L3A,L3B
	NU	L4A,L4B
	NU	L5A,L5B
	3C	L6A,L6B
	NU	L7A,L7B
	NU	L8A,L8B
ADD JUMPERS FROM: L9A TO L10A, AND L9B TO L10B	5A	L9A,L9B
		L10A,L10B
	NU	L11A,L11B
	NU	L12A,L12B
	NU	L13A,L13B
	NU	L14A,L14B
	7B	L15A,L15B
	NU	L16A,L16B

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
1	ø 1	DELAY	15
✳ 2	ø 6	DELAY	3
3			
4			
5			
6	ø 3	DELAY	10
7			
8			
9	ø 5	DELAY	15
✳ 10	ø 2	DELAY	3
11			
12			
13			
14			
15	ø 3		
16			

✳ Detector Type - G (remove delay from existing detector card)

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans for zones 1A, 1B, 1C, 2A, 2B, 4A, 5A, 6A, and 6B.

For Detection Zones 1A and 5A, the equipment placement and slots reserved for wired inputs are typical for a NCDOT installation.

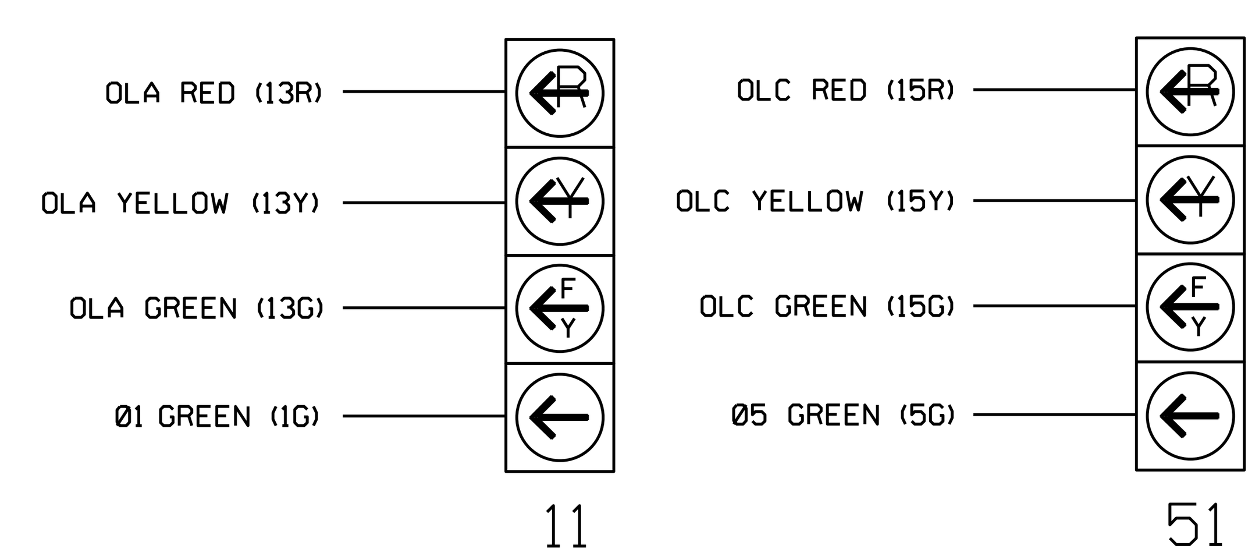
EQUIPMENT INFORMATION

CONTROLLER.............2070EN2
CABINET NC-8 TS-2
SOFTWARE ....ECONOLITE ASC/3-2070
CABINET MOUNT..........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......1,2,3,4,5,6,11,12,13,15
PHASES USED............1,2,3,3PED,4,5,6,6PED
OLA....................✳
OLB....................NOT USED
OLC....................✳
OLD....................NOT USED

✳ SEE OVERLAP PROGRAMMING DETAIL ON SHEET 2

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726T3
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø 1
2	ø 2
3	ø 3
4	ø 4
5	ø 5
6	ø 6
7	ø 7
8	ø 8
9	ø 2 PED
10	ø 4 PED
11	ø 6 PED
12	ø 3 PED
13	OLA
14	OLB
15	OLC
16	OLD

NOTES

1. To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans.
2. To prevent red failures on unused monitor channels, tie unused load switch red outputs 7,8,9,10,14, and 16 to load switch AC+ by inserting a jumper plug in the unused load switch socket from pin 1 (LS AC+) to pin 3 (RED out). Make sure all flash transfer relays are in place.
3. Program controller to start up in phase 2 Green and 6 Walk.
4. Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
5. Enable simultaneous gap-out feature for all phases.
6. Program detectors in accordance with the manufacturer's instructions to accomplish the detection schemes shown on the signal design plans.
7. Program detector call delay and extension timing on the controller, unless otherwise specified.
8. Set all detector card unit channels to "presence" mode.
9. Program phases 2 and 6 for volume density operation.
10. The cabinet and controller are a part of the Cary Signal System.

Electrical Detail - Temp 3 (TMP Phase III, Step A)
Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 Wake County Morrisville

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320FAA2654C3... 8/1/2019 DATE

SIG. INVENTORY NO. 05-1726T3

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sarmstrong

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 9.2

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.....CH13 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.....CH15 ISOLATE

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

END PROGRAMMING

ECONOLITE ASC/3-2070 SPECIAL MMU PROGRAMMING

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [4. PORT 1 (SDLC)]
3. From PORT 1 (SDLC) Submenu select [2. MMU PROGRAM]

CAUTION!

Set intersection to Flash before attempting to enter or change any MMU programming data.

This programming and that of the MMU programming card must match exactly. If they do not, the intersection will be placed into Flash.

MMU PROGRAM [MANUAL]

CH	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2
1	.	X	.	X	.	X	.	.	.	.	X	X	.	.	.
2	.	X	.	X	.	X	.	.	.	.	X	X	.	.	
3	.	.	.	.	X	.	.	.	.	.	.	.	.		
4	.	.	.	.	.	.	.	.	.	.	.	.			
5	.	X	.	X	.	.	.	.	.	.	.				
6	.	X	.	X	.	X	.	.	.	.					
7	.	.	.	.	.	.	.	.	.						
8	.	.	.	.	.	.	.	.							
9	.	.	.	.	.	.	.								
10	.	.	.	.	.	.									
11	.	X	.	X	.										
12	.	.	.	.											
13	.	X	.												
14	.	.													
15	.														

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726T3
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 3 (TMP Phase III, Step A)
Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in 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 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 | Wake County | Morrisville

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320FAA2654C3...

8/1/2019
DATE

SIG. INVENTORY NO. 05-1726T3

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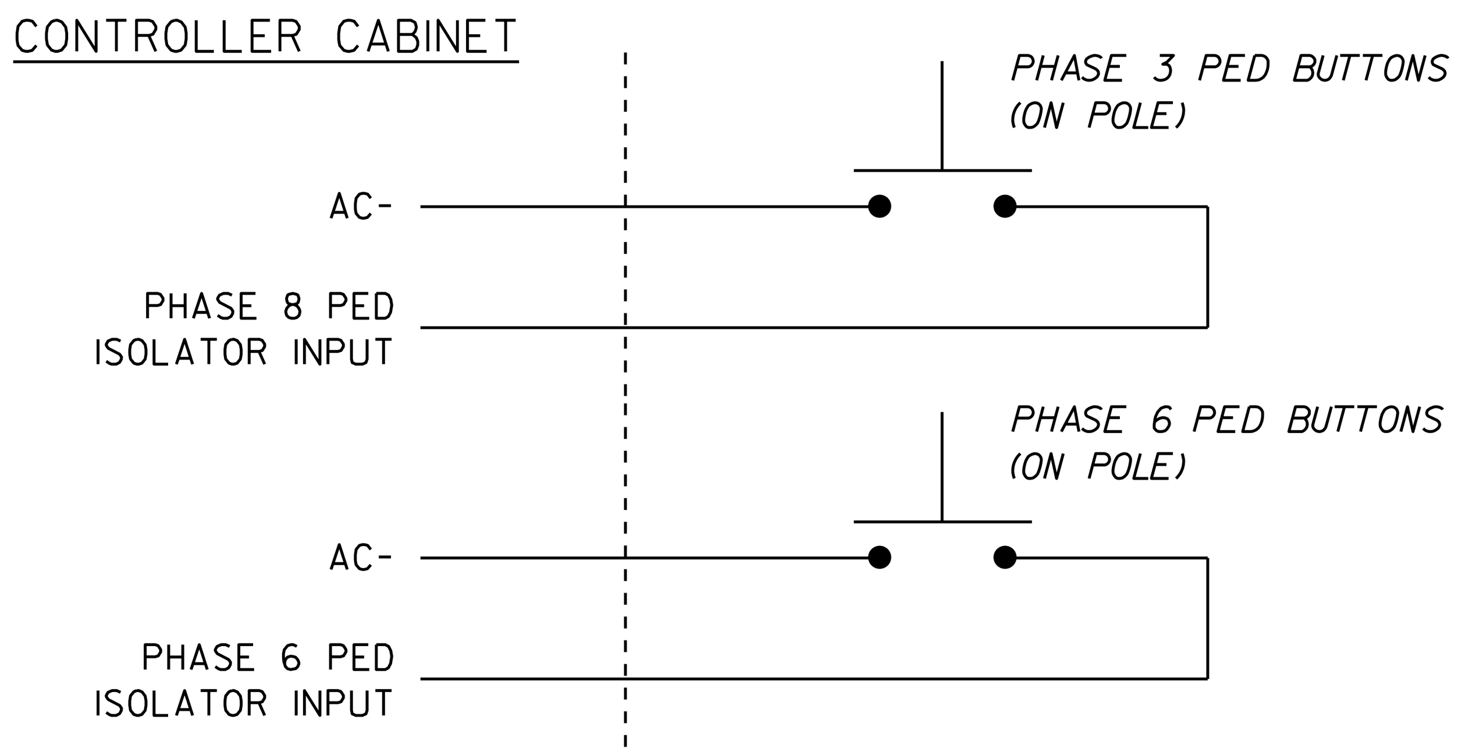
PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

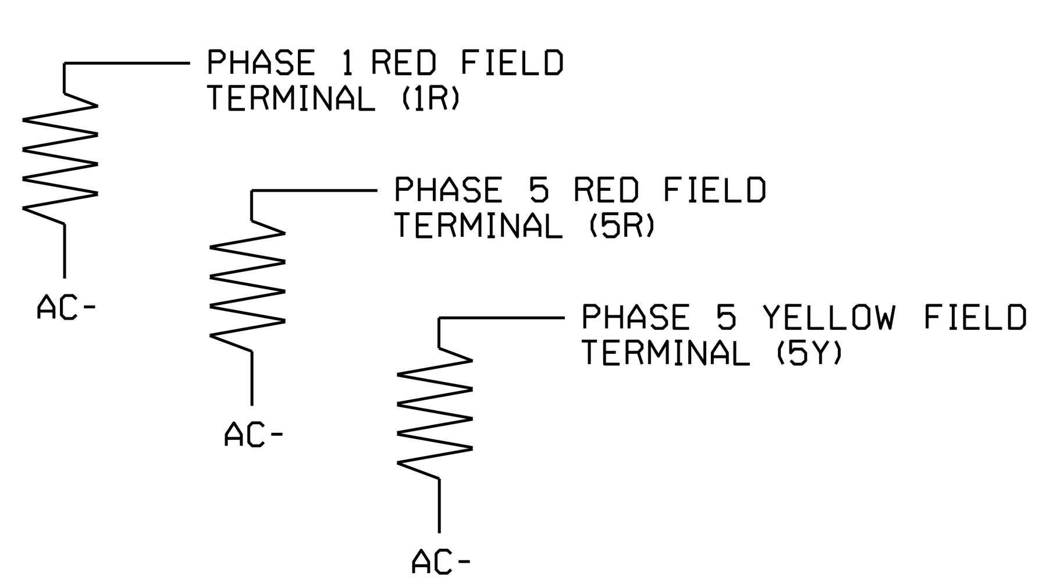
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



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	2	P	.	.	.	+	A	R	.
10	4	P	.	.	.	+	A	R	.
11	6	P	.	.	.	−	A	R	.
12	3	P	.	.	.	−	A	R	.
13	1	O	.	.	.	+	A	.	X
14	2	O	.	.	.	−	A	.	X
15	3	O	.	.	.	+	A	.	.
16	4	O	.	.	.	−	A	.	.

NOTICE PHASE 3 PED ASSIGNED TO LD SWITCH 12

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726T3
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 3 (TMP Phase III, Step A)
Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 Wake County Morrisville

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320FAA2654C3...
8/1/2019
DATE

SIG. INVENTORY NO. 05-1726T3

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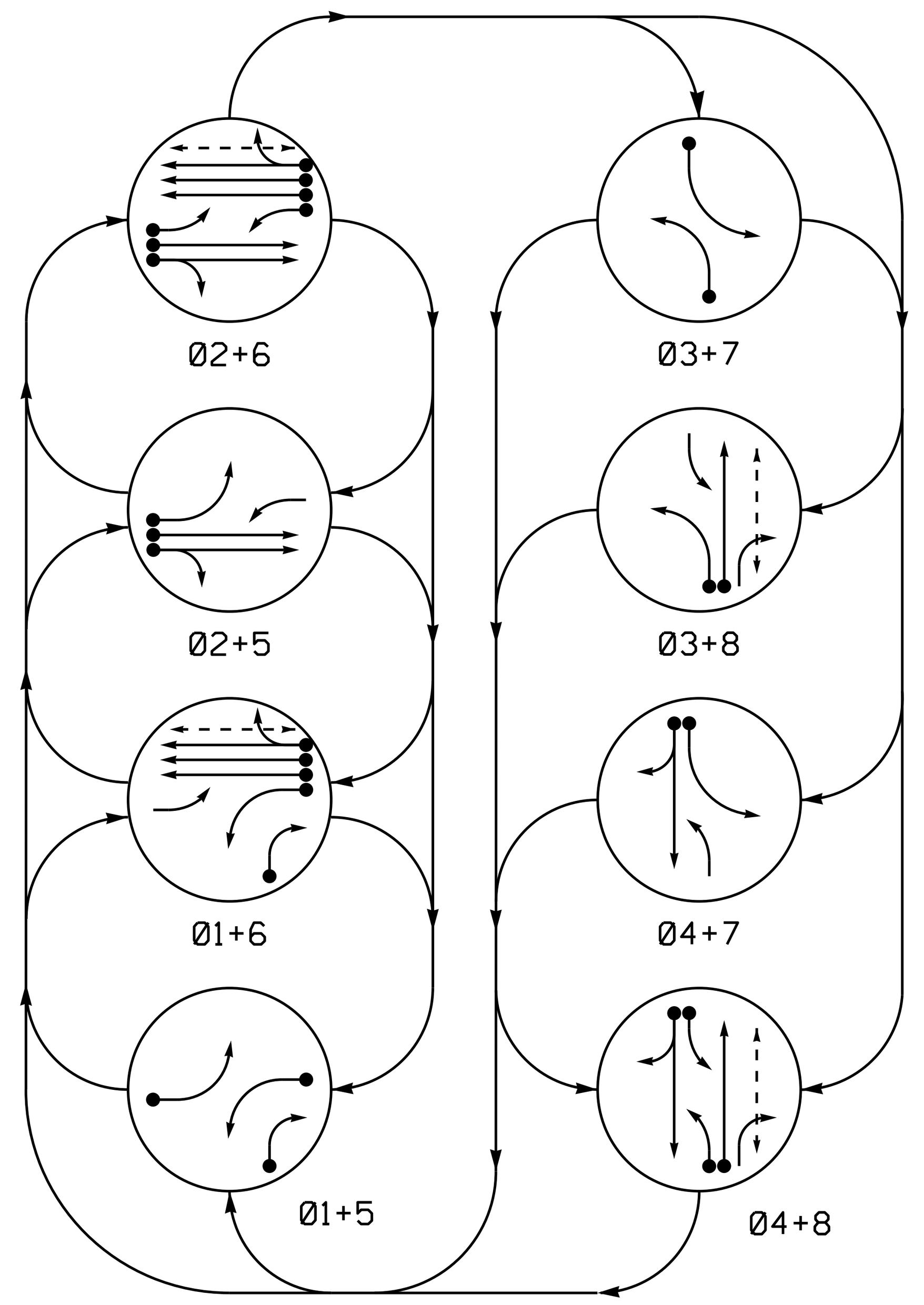
sarmstrong

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

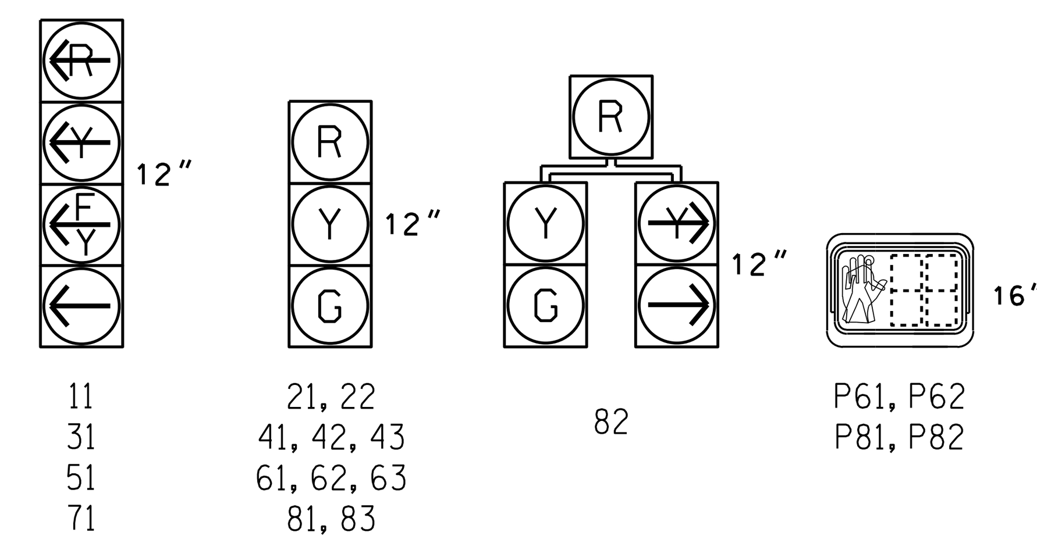
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

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, 22	R	R	G	G	R	R	R	R	Y
31	←R	←R	←R	←R	←	←	←F/Y	←F/Y	←R
41, 42, 43	R	R	R	R	R	R	G	G	R
51	←	←F/Y	←	←F/Y	←R	←R	←R	←R	←Y
61, 62, 63	R	G	R	G	R	R	R	R	Y
71	←R	←R	←R	←R	←	←F/Y	←	←F/Y	←R
81, 83	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR INSTALLATION CHART

ASC/3-2070EN2 CONTROLLER w/ TS-2 CABINET

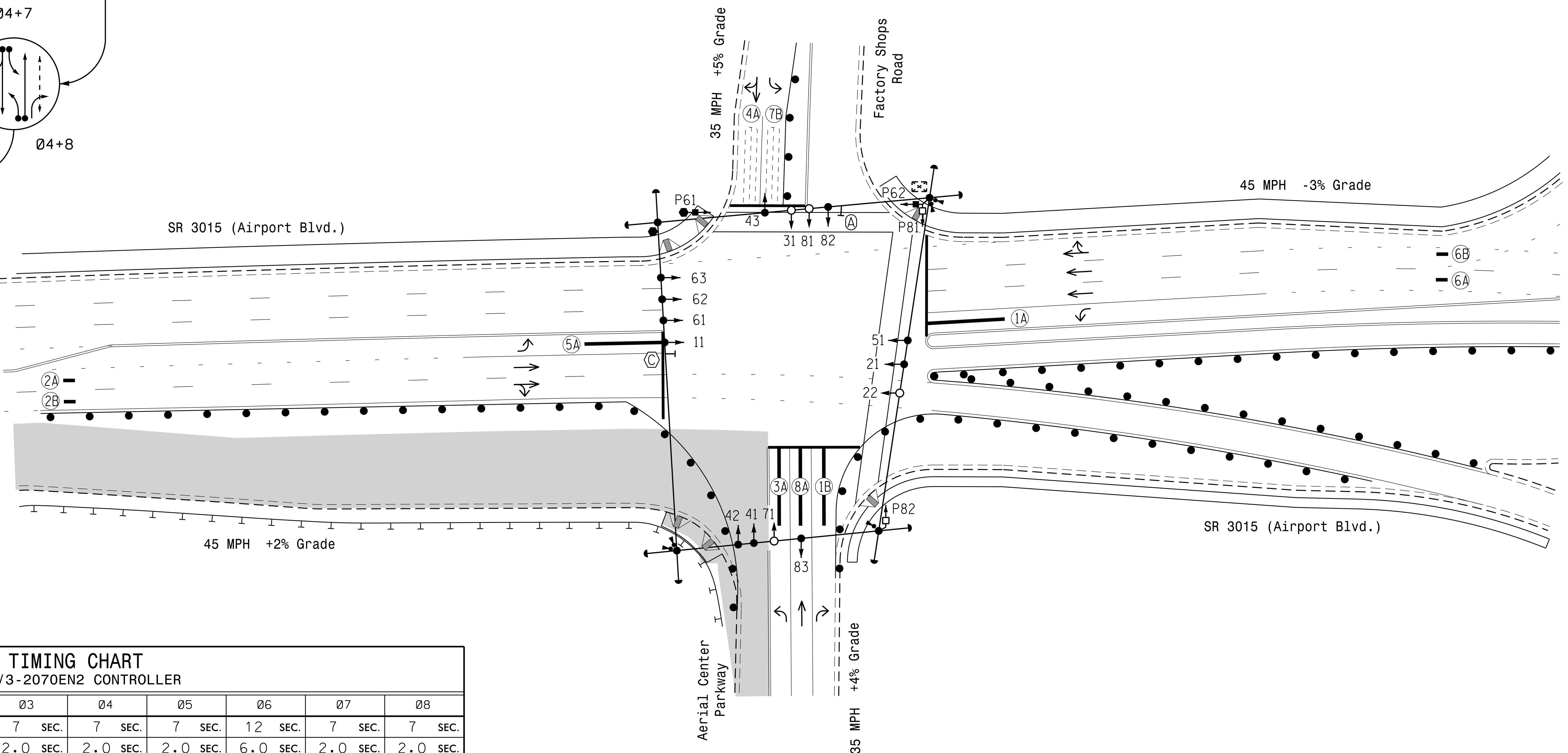
INDUCTIVE LOOPS						DETECTOR UNITS						
LOOP / ZONE NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIME (sec)	ADDED INITIAL	DET. TYPE
1A*	6X40	0	*	-	X	1	-	*	DELAY	15	-	S
						6	-	*	DELAY	3	-	G
1B*	6X40	0	*	X	-	1	-	*	DELAY	15	-	S
2A*	6X6	300	*	-	X	2	-	*	-	-	X	N
2B*	6X6	300	*	-	X	2	-	*	-	-	X	N
3A*	6X40	0	*	X	-	3	-	*	DELAY	15	-	S
						8	-	*	DELAY	3	-	S
4A	6X40	0	2-4-2	-	X	4	-	X	DELAY	10	-	S
5A*	6X40	0	*	-	X	5	-	*	DELAY	15	-	S
						2	-	*	DELAY	3	-	G
6A*	6X6	260	*	-	X	6	-	*	-	-	X	N
6B*	6X6	260	*	-	X	6	-	*	-	-	X	N
7B	6X40	0	2-4-2	-	X	7	-	X	-	-	-	S
8A*	6X40	0	*	X	-	8	-	*	-	-	-	S

* Video detection zone.

8 Phase
Fully Actuated
(Cary 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. Renumber existing loop numbered 3C to 4A.
6. Set all detector units to presence mode.
7. Renumber existing signal heads numbered 33, 34, 35, 42, and 43 to 41, 42, 43, 82, and 83, respectively.
8. Reposition existing signal heads numbered 21 and 83.
9. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
10. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. Cary signal system data:
    Fiber Channel #: 26.
13. This intersection features a video detection system. Shown locations of detectors are conceptual only. Refer to the manufacturer's guidelines for optimal detector placement.



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	
	Type II Signal Pedestal	
N/A	Curb Ramp	
	Out of Pavement Detector	
	Video Detection Area	
	Construction Zone Drums	
	Construction Zone	
Ⓐ	Right Arrow "ONLY" Sign (R3-5R)	Ⓐ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

TIMING CHART

ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN *	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	3.0 SEC.	3.6 SEC.	3.0 SEC.	4.8 SEC.	3.0 SEC.	3.6 SEC.
RED CLEARANCE	3.2 SEC.	1.9 SEC.	2.4 SEC.	2.8 SEC.	3.2 SEC.	1.9 SEC.	3.4 SEC.	2.8 SEC.
MAX. 1 *	20 SEC.	120 SEC.	20 SEC.	30 SEC.	15 SEC.	120 SEC.	20 SEC.	30 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE
LOCK DET.	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
WALK *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	22 SEC.	– SEC.	28 SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	1.5 SEC.	– SEC.	– SEC.	– SEC.	1.5 SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	34 SEC.	– SEC.	– SEC.	– SEC.	30 SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	15 SEC.	– SEC.	– SEC.	– SEC.	15 SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	45 SEC.	– SEC.	– SEC.	– SEC.	45 SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	– SEC.	– SEC.	3.0 SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
SIMULTANEOUS GAP	ON	ON	ON	ON	ON	ON	ON	ON

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

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jalohr

Signal Upgrade - Temporary Design 4 (TMP Phase III, Step B)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 3015 (Airport Blvd.) at Factory Shops Road/ Aerial Center Parkway

Division 5 | Wake County | Morrisville

PLAN DATE:	March 2019	REVIEWED BY:
PREPARED BY:	J.A. Lohr	REVIEWED BY:

SCALE 0 40 1"=40'

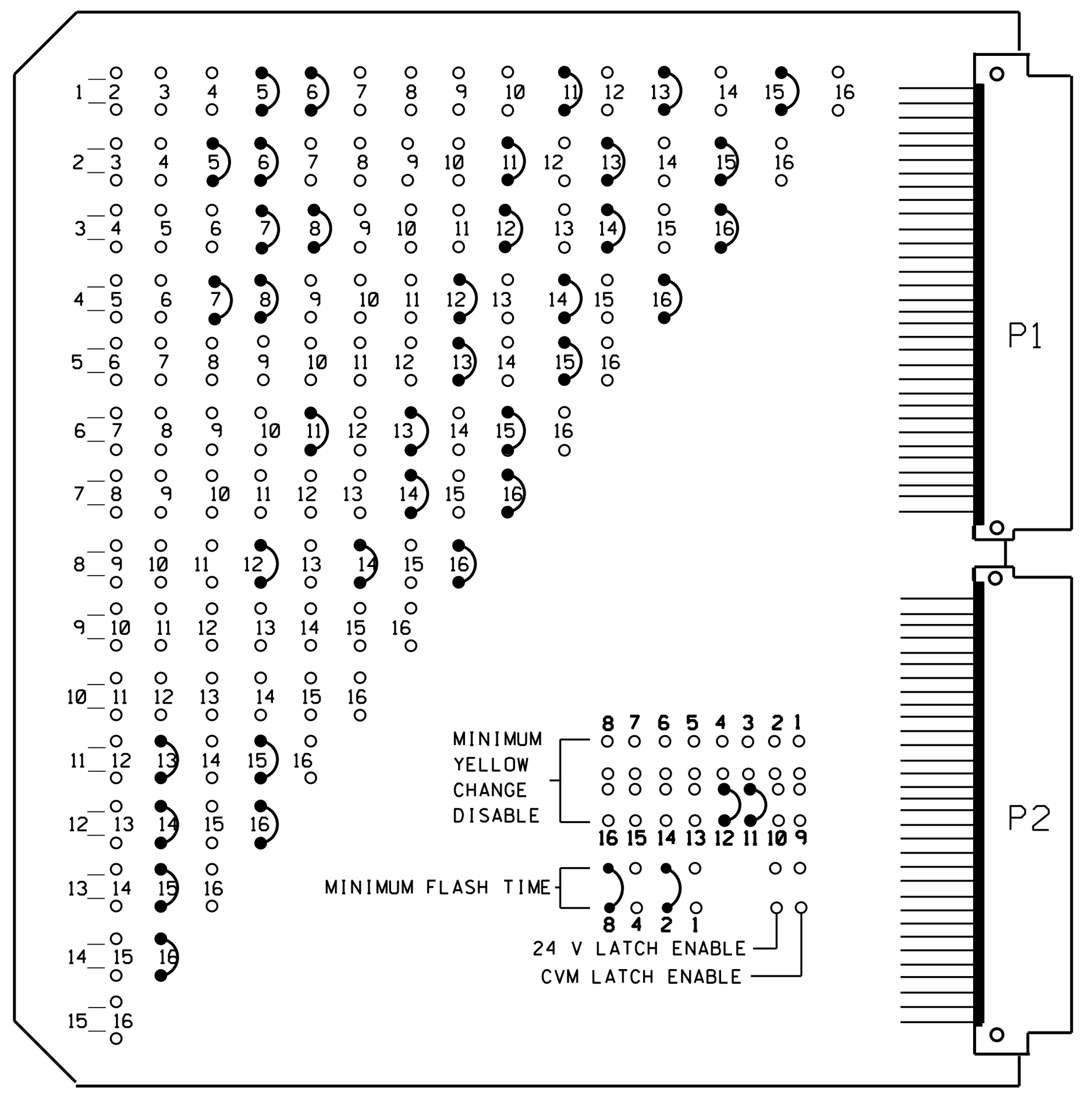
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA
DocuSigned by:
1B9B4B66274A494
7/24/2019
DATE

SIG. INVENTORY NO. 05-1726T4

EDI MODEL MMU2-16LEip MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and tables as shown below)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	ENABLE
2	ENABLE
3	DISABLE
4	ENABLE
5	DISABLE
6	ENABLE
7	DISABLE
8	ENABLE
9	DISABLE
10	DISABLE
11	ENABLE
12	ENABLE
13	ENABLE
14	ENABLE
15	ENABLE
16	ENABLE

UNIT OPTIONS	
OPTION	SETTING
RECURRENT PULSE	ON
WALK DISABLE	OFF
LOG CVM FAULTS	ON
EXTERN WATCHDOG	OFF
24V-2=12VDC	OFF
PGM CARD MEMORY	ON
LEDguard	ON
FORCE TYPE 16	OFF
TYPE12-SDLC	OFF
VM 3x/Day Latch	ON

FLASHING YELLOW ARROW	
CONFIG MODE	B
ENABLE CHANNEL PAIR, FYA	
CH 1-13	ON
CH 3-14	ON
CH 5-15	ON
CH 7-16	ON
RED/YEL INPUT ENABLE	
CH 1	ON
CH 3	ON
CH 5	ON
CH 7	ON
FLASH RATE FAULT	ON
FYA TRAP DETECT	ON

MMU PROGRAMMING NOTE

ENSURE YELLOW CHANGE PLUS RED CLEARANCE MONITORING IS ENABLED FOR ALL CHANNELS.

NOTES

1. To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans.
2. To prevent red failures on unused monitor channels, tie unused load switch red outputs 9 and 10 to load switch AC+ by inserting a jumper plug in the unused load switch socket from pin 1 (LS AC+) to pin 3 (RED out). Make sure all flash transfer relays are in place.
3. Program controller to start up in phase 2 Green and 6 Walk.
4. Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
5. Enable simultaneous gap-out feature for all phases.
6. Program detectors in accordance with the manufacturer's instructions to accomplish the detection schemes shown on the signal design plans.
7. Program detector call delay and extension timing on the controller, unless otherwise specified.
8. Set all detector card unit channels to "presence" mode.
9. Program phases 2 and 6 for volume density operation.
10. Program phases 4 and 8 for dual entry.
11. The cabinet and controller are a part of the Cary Signal System.

SIGNAL HEAD HOOK-UP CHART

PHASE	1	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11★	82	21,22	31★	41,42, 43	51★	61,62 63	71★	81,82, 83	NU	NU	P61, P62	P81, P82	11★	31★	51★	71★
RED		✳	2R	✳	4R	✳	6R	✳	8R								
YELLOW			2Y	✳	4Y	✳	6Y	✳	8Y								
GREEN			2G		4G		6G		8G								
RED ARROW														13R	14R	15R	16R
YELLOW ARROW		1Y												13Y	14Y	15Y	16Y
FLASHING YELLOW ARROW														13G	14G	15G	16G
GREEN ARROW	1G	1G		3G		5G		7G									
(hand)												11R	12R				
(walk)												11G	12G				

NU = Not Used

✳ Denotes install load resistor. See Load Resistor Installation Detail on sheet 3.

★ See pictorial of head wiring detail this sheet.

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

RACK #1	BIU	SLOT EMPTY	CH1 L1 ø1 / CH2 L2 ø6 ✳	CH1 L7 ø3 / CH2 L8 ø8	CH1 L5 NOT USED / CH2 L6 ø4	SLOT EMPTY	CH1 L9 ø5 / CH2 L10 ø2 ✳	CH1 L15 ø3 / CH2 L16 NOT USED	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

	LOOP NO.	LOOP PANEL TERMINALS
ADD JUMPERS FROM: L1A TO L2A, AND L1B TO L2B	1A	L1A, L1B
		L2A, L2B
	NU	L3A, L3B
	NU	L4A, L4B
	NU	L5A, L5B
	4A	L6A, L6B
ADD JUMPERS FROM: L7A TO L8A, AND L7B TO L8B	3A	L7A, L7B
		L8A, L8B
ADD JUMPERS FROM: L9A TO L10A, AND L9B TO L10B	5A	L9A, L9B
		L10A, L10B
	NU	L11A, L11B
	NU	L12A, L12B
	NU	L13A, L13B
	NU	L14A, L14B
	7B	L15A, L15B
	NU	L16A, L16B

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø 1	DELAY	15
✳ 2	ø 6	DELAY	3
3			
4			
5			
6	ø 4	DELAY	10
7	ø 3	DELAY	15
8	ø 8	DELAY	3
9	ø 5	DELAY	15
✳ 10	ø 2	DELAY	3
11			
12			
13			
14			
15	ø 7		
16			

✳ Detector Type - G (remove delay from existing detector card)

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans for zones 1A, 1B, 2A, 2B, 3A, 5A, 6A, 6B, and 8A.

For Detection Zones 1A, 3A, and 5A, the equipment placement and slots reserved for wired inputs are typical for a NCDOT installation.

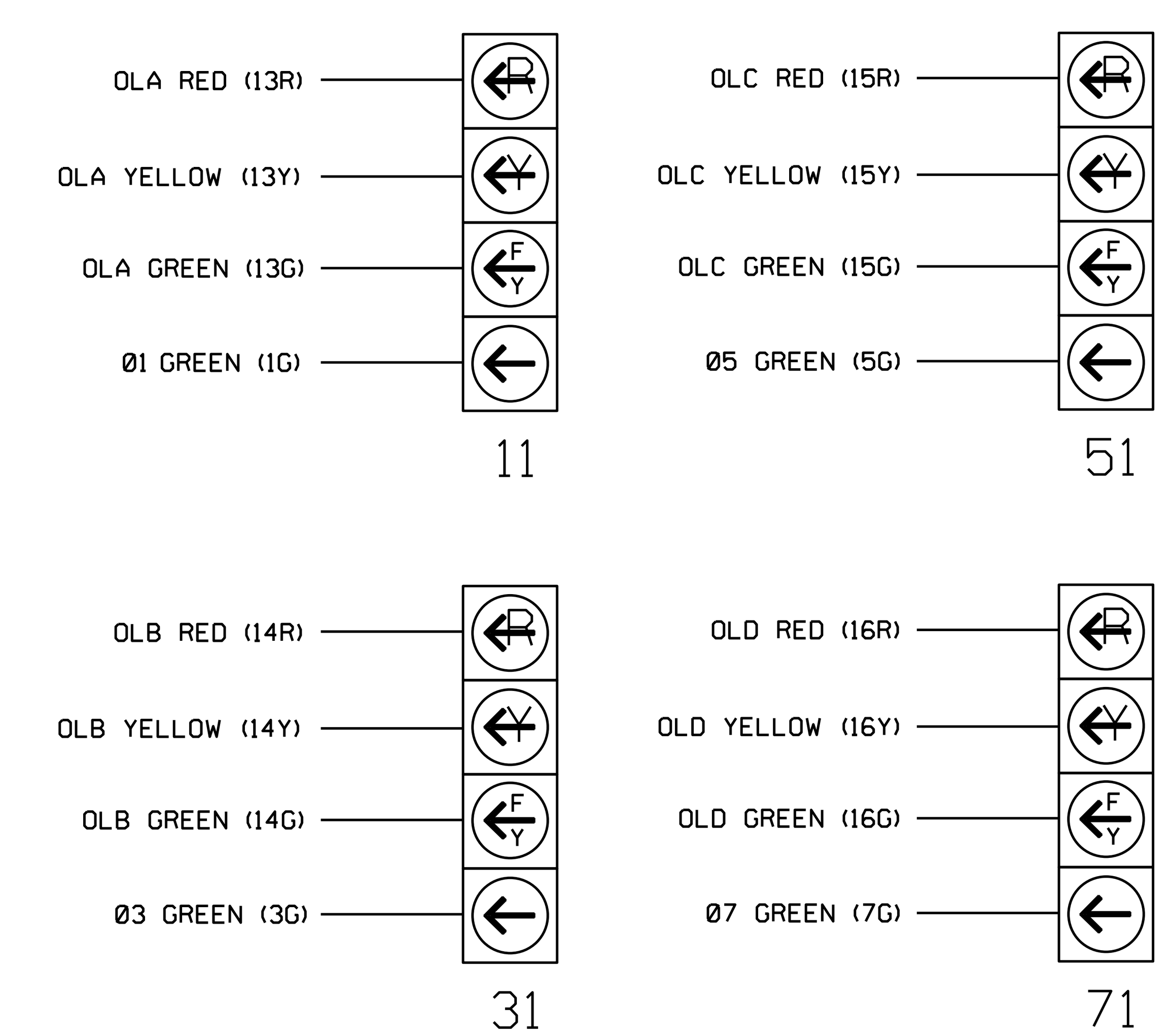
EQUIPMENT INFORMATION

CONTROLLER..............2070EN2
CABINET NC-8 TS-2
SOFTWARE ....ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......1,2,3,4,5,6,7,8,11,12,13,14,15,16
PHASES USED.............1,2,3,4,5,6,6PED,7,8,8PED
OLA.....................✳
OLB.....................✳
OLC.....................✳
OLD.....................✳

✳ SEE OVERLAP PROGRAMMING DETAIL ON SHEET 2

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø 1
2	ø 2
3	ø 3
4	ø 4
5	ø 5
6	ø 6
7	ø 7
8	ø 8
9	ø 2 PED
10	ø 4 PED
11	ø 6 PED
12	ø 8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726T4
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 4 (TMP Phase III, Step B)
Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in 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 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 — Wake County — Morrisville

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320FAA2654C3... 8/1/2019 DATE

SIG. INVENTORY NO. 05-1726T4

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 10.2

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.....CH13 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.....CH14 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.....CH15 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.....CH16 ISOLATE

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

END PROGRAMMING

ECONOLITE ASC/3-2070 SPECIAL MMU PROGRAMMING

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [4. PORT 1 (SDLC)]
3. From PORT 1 (SDLC) Submenu select [2. MMU PROGRAM]

CAUTION!

Set intersection to Flash before attempting to enter or change any MMU programming data.

This programming and that of the MMU programming card must match exactly. If they do not, the intersection will be placed into Flash.

MMU PROGRAM [MANUAL]

CH	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2
1	.	X	.	X	.	X	.	.	.	.	X	X	.	.	.
2	.	X	.	X	.	X	.	.	.	.	X	X	.	.	
3	X	.	X	.	X	.	.	.	X	X	.	.	.		
4	X	.	X	.	X	.	.	.	X	X	.	.			
5	.	X	.	X	.	.	.	.	.	.	.				
6	.	X	.	X	.	X	.	.	.	.					
7	X	.	X	.	.	.	.	.	.						
8	X	.	X	.	X	.	.	.							
9	.	.	.	.	.	.	.								
10	.	.	.	.	.	.									
11	.	X	.	X	.										
12	X	.	X	.											
13	.	X	.												
14	X	.													
15	.														

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726T4
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 4 (TMP Phase III, Step B)
Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in 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 3015 (Airport Blvd.)
at
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Division 5 | Wake County | Morrisville

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

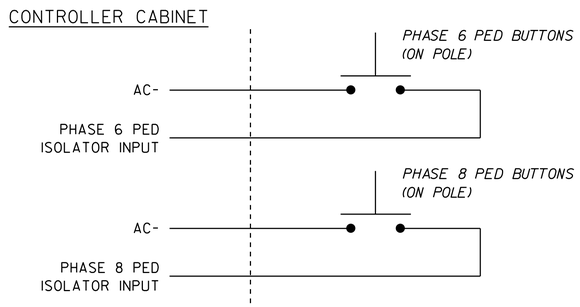
DocuSigned by: Ryan W. Hough 430320EAA2654C3
8/1/2019 DATE

SIG. INVENTORY NO. 05-1726T4

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 10.3

PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



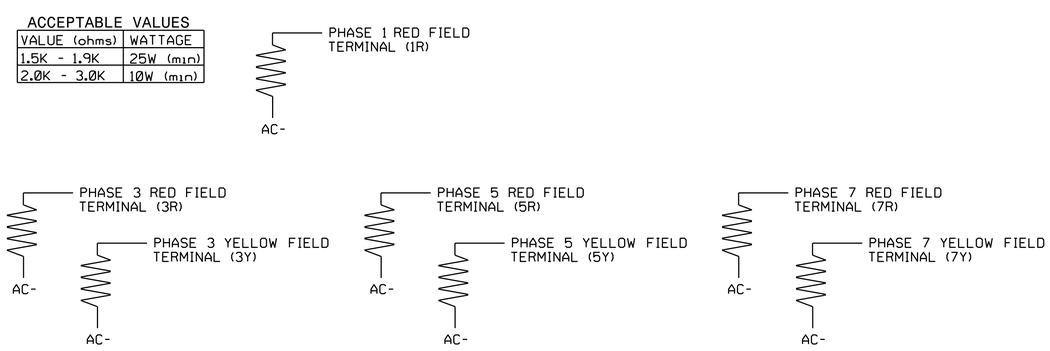
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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 below)

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



ECONOLITE ASC/3-2070 RESTORE PED 8 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  0  4  0  6  0  8

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

← NOTICE PED DETECTOR 8 RESTORED TO PHASE 8

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

NOTICE PHASE 8 PED RESTORED TO LD SWITCH 12 →

```
LD SWITCH ASSIGN
    PHASE      DIMMING ---FLASH---
    /OVLP TYPE R Y G D 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     2    P    . . . + A   R   .
10    4    P    . . . + A   R   .
11    6    P    . . . - A   R   .
12    8    P    . . . - A   R   .
13    1    O    . . . + A   .   X
14    2    O    . . . - A   .   X
15    3    O    . . . + A   .   .
16    4    O    . . . - A   .   .
```

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1726T4
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 4 (TMP Phase III, Step B)
Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 | Wake County | Morrisville

PLAN DATE: May 2019 | REVIEWED BY:
PREPARED BY: S. Armstrong | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 8/1/2019
430320FAA2654C3... DATE

SIG. INVENTORY NO. 05-1726T4

25-JUL-2019 10:26
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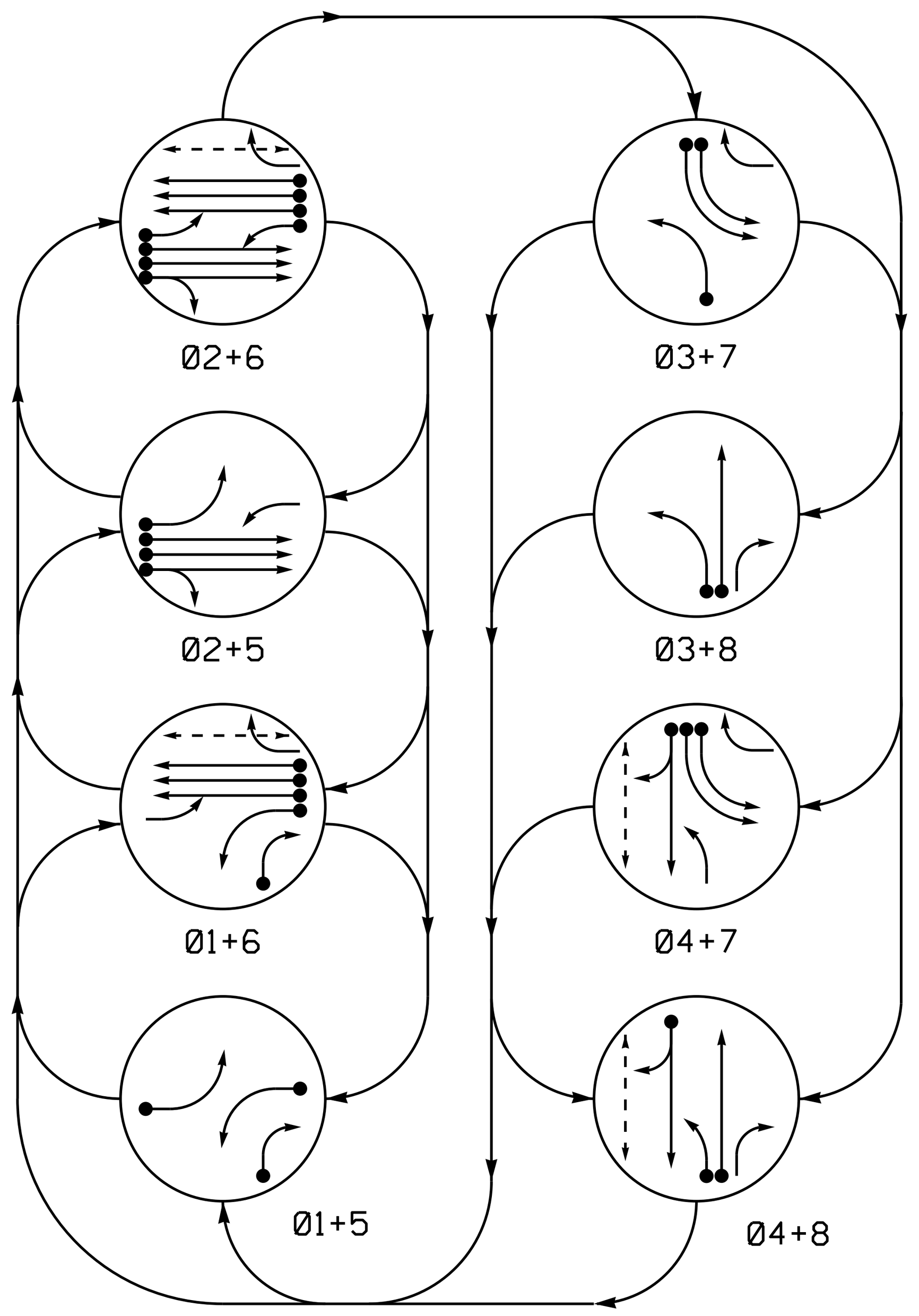
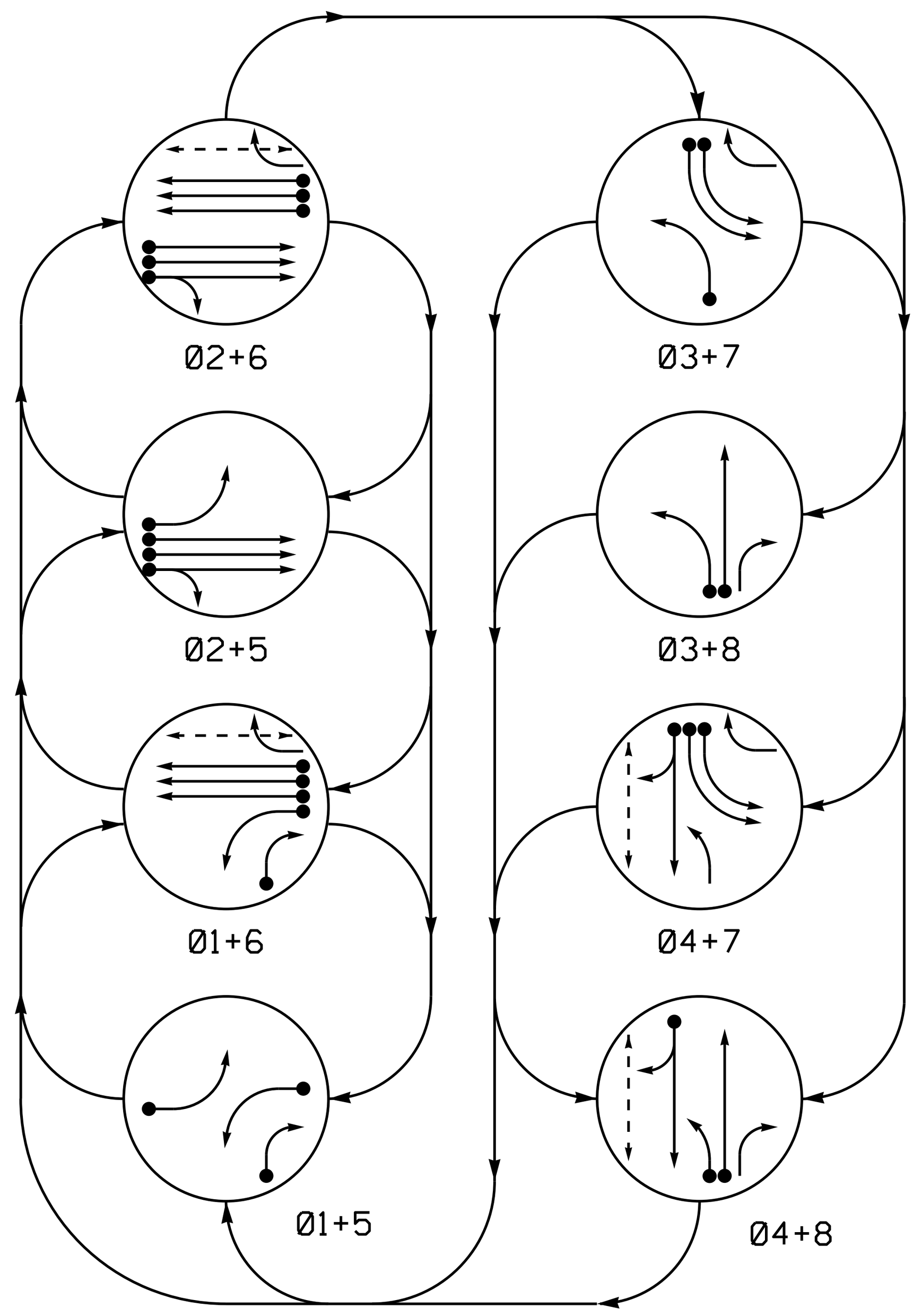
sarmstrong

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig. 11.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←-- UNSIGNALIZED MOVEMENT
- ←--→ PEDESTRIAN MOVEMENT

DEFAULT 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, 22, 23	R	R	G	G	R	R	R	R	Y
31	←R	←R	←R	←R	←	←	←F/Y	←F/Y	←R
41, 42, 43	R	R	R	R	R	R	G	G	R
51	←	←F/Y	←	←F/Y	←R	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	R	R	Y
63	R	G	R	G	R/→	R	R/→	R	Y
71, 72	←R	←R	←R	←R	←	←R	←	←R	←R
81, 83	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK

ALTERNATE TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←	←	←R	←R	←R	←R	←R	←R	←Y
21, 22, 23	R	R	G	G	R	R	R	R	Y
31	←R	←R	←R	←R	←	←	←F/Y	←F/Y	←R
41, 42, 43	R	R	R	R	R	R	G	G	R
51	←	←R	←	←R	←R	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	R	R	Y
63	R	G	R	G	R/→	R	R/→	R	Y
71, 72	←R	←R	←R	←R	←	←R	←	←R	←R
81, 83	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK

LOOP & DETECTOR INSTALLATION CHART
ASC/3-2070EN2 CONTROLLER w/ TS-2 CABINET

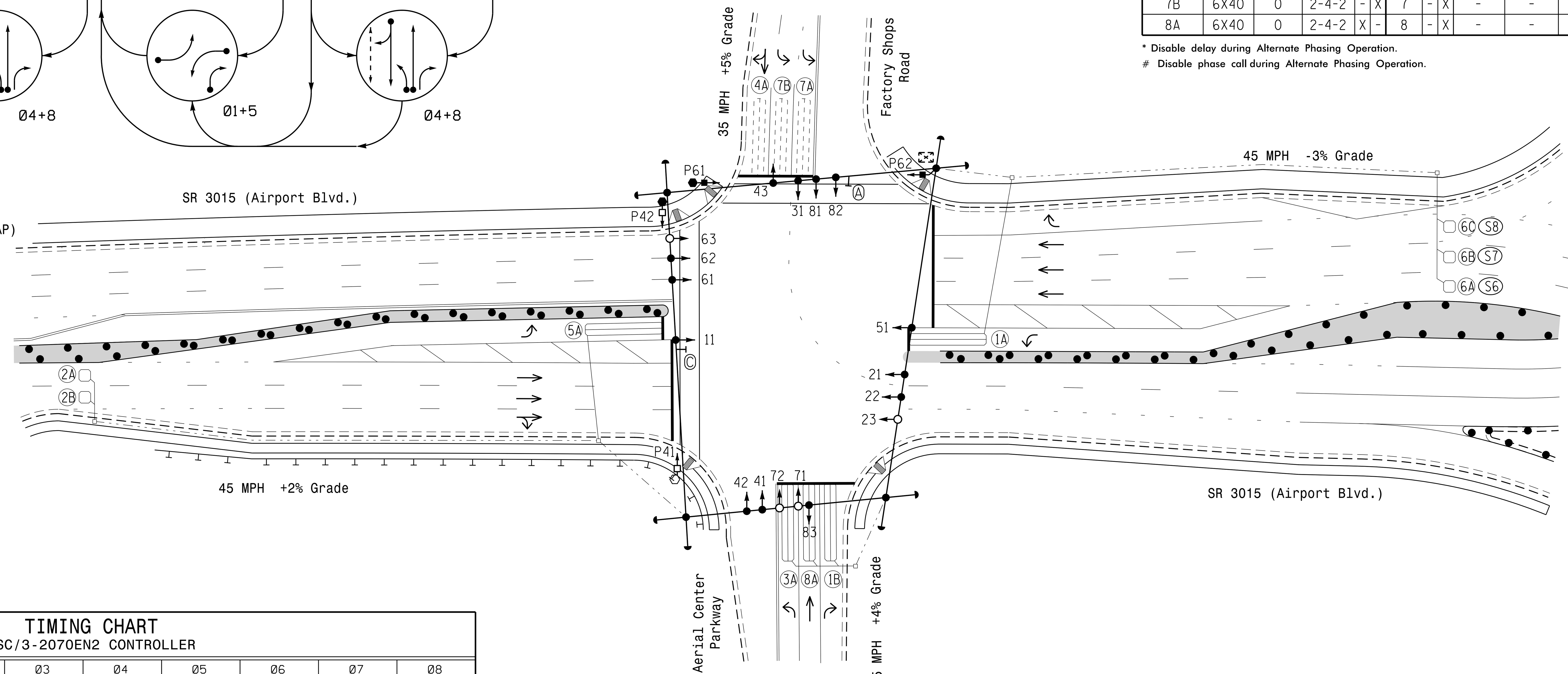
INDUCTIVE LOOPS: LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	DETECTOR UNITS: NEMA PHASE	NEW	EXISTING	TIMING: FEATURE	TIME (sec)	ADDED INITIAL	DET. TYPE
1A	6X40	0	2-4-2	X	-	1	-	X	DELAY	15*	-	S
						6#	-	X	DELAY	3	-	G
1B	6X40	0	2-4-2	X	-	1	-	X	DELAY	15	-	S
2A	6X6	300	5	X	-	2	X	-	-	-	X	N
2B	6X6	300	5	X	-	2	X	-	-	-	X	N
3A	6X40	0	2-4-2	X	-	3	-	X	DELAY	15	-	S
						8	-	X	DELAY	3	-	S
4A	6X40	0	2-4-2	-	X	4	-	X	DELAY	10	-	S
5A	6X40	0	2-4-2	X	-	5	-	X	DELAY	15*	-	S
						2#	-	X	DELAY	3	-	G
6A/S6	6X6	260	5	X	-	6	X	-	-	-	X	N
						-	X	-	SYSTEM DETECTOR		-	N
6B/S7	6X6	260	5	X	-	6	X	-	-	-	X	N
						-	X	-	SYSTEM DETECTOR		-	N
6C/S8	6X6	260	5	X	-	6	X	-	-	-	X	N
						-	X	-	SYSTEM DETECTOR		-	N
7A	6X40	0	2-4-2	-	X	7	-	X	DELAY	3	-	S
7B	6X40	0	2-4-2	-	X	7	-	X	-	-	-	S
8A	6X40	0	2-4-2	X	-	8	-	X	-	-	-	S

* Disable delay during Alternate Phasing Operation.
\# Disable phase call during Alternate Phasing Operation.

8 Phase
Fully Actuated
(Cary 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. Set all detector units to presence mode.
6. Reposition existing signal heads numbered 11, 21, 22, and 51.
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. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Cary signal system data: Fiber Channel #: 26.



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	→
○	Type II Signal Pedestal	●
N/A	Guardrail	┬┬
N/A	Curb Ramp	◭
•—•	Construction Zone Drums	•—•
▭	Construction Zone	▭
Ⓐ	Right Arrow "ONLY" Sign (R3-5R)	Ⓐ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

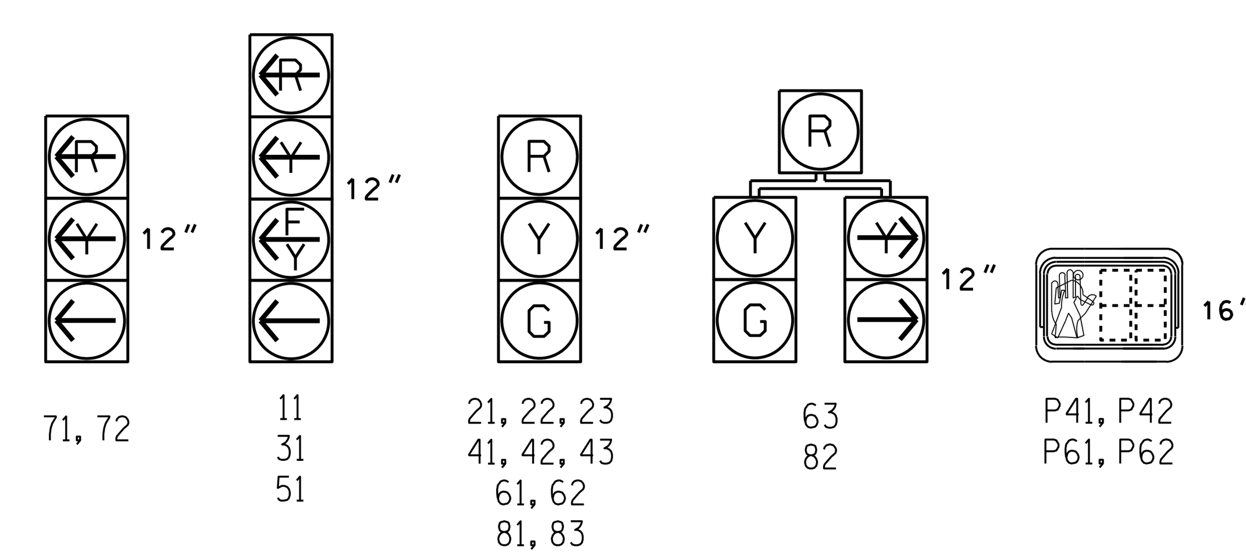
TIMING CHART
ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN *	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	5.0 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	3.0 SEC.	3.6 SEC.	3.0 SEC.	4.8 SEC.	3.0 SEC.	3.6 SEC.
RED CLEARANCE	3.1 SEC.	2.0 SEC.	3.4 SEC.	2.9 SEC.	3.3 SEC.	2.0 SEC.	3.6 SEC.	2.9 SEC.
MAX. 1 *	20 SEC.	120 SEC.	20 SEC.	30 SEC.	15 SEC.	120 SEC.	20 SEC.	30 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE
LOCK DET.	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
WALK *	– SEC.	– SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	30 SEC.	– SEC.	22 SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	1.0 SEC.	– SEC.	– SEC.	– SEC.	1.0 SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	34 SEC.	– SEC.	– SEC.	– SEC.	30 SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	20 SEC.	– SEC.	– SEC.	– SEC.	20 SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	40 SEC.	– SEC.	– SEC.	– SEC.	40 SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	– SEC.	– SEC.	3.0 SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON	ON	ON	ON

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

SIGNAL FACE I.D.

All Heads L.E.D.



Signal Upgrade - Temporary Design 5 (TMP Phase IV)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 3015 (Airport Blvd.) at Factory Shops Road/ Aerial Center Parkway

Division 5 Wake County Morrisville

PLAN DATE:	March 2019	REVIEWED BY:	
PREPARED BY:	J.A. Lohr	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by: 1B9B4B66274A494... 7/24/2019 DATE

SIG. INVENTORY NO. 05-1726T5

02-AUG-2019 13:26
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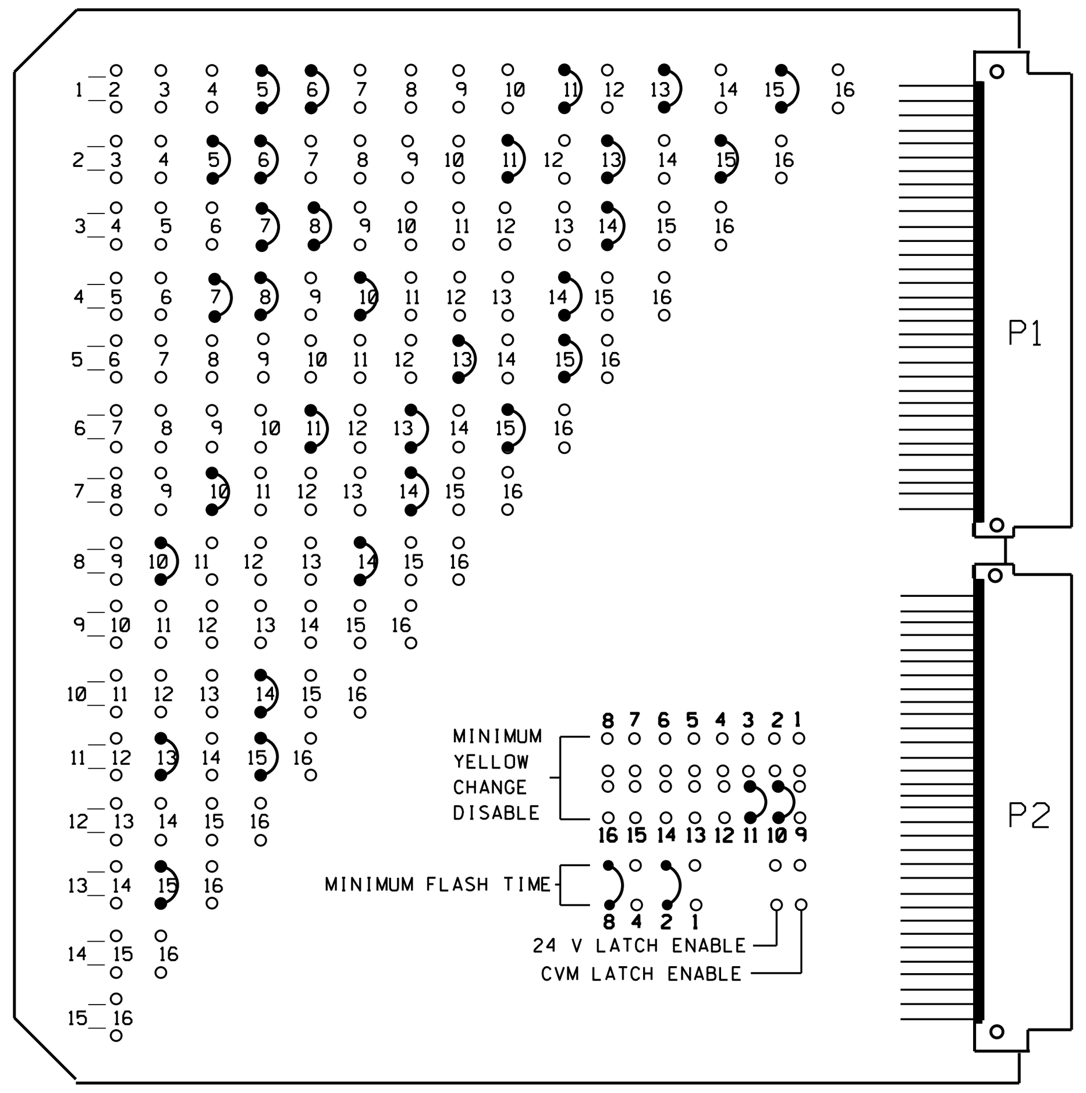
jalohr

EDI MODEL MMU2-16LEip MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and tables as shown below)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	ENABLE
2	ENABLE
3	DISABLE
4	ENABLE
5	DISABLE
6	ENABLE
7	ENABLE
8	ENABLE
9	DISABLE
10	ENABLE
11	ENABLE
12	DISABLE
13	ENABLE
14	ENABLE
15	ENABLE
16	DISABLE

UNIT OPTIONS	
OPTION	SETTING
RECURRENT PULSE	ON
WALK DISABLE	OFF
LOG CVM FAULTS	ON
EXTERN WATCHDOG	OFF
24V-2=12VDC	OFF
PGM CARD MEMORY	ON
LEDguard	ON
FORCE TYPE 16	OFF
TYPE12-SDLC	OFF
VM 3x/Day Latch	ON

FLASHING YELLOW ARROW	
CONFIG MODE	B
ENABLE CHANNEL PAIR, FYA	
CH 1-13	ON
CH 3-14	ON
CH 5-15	ON
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	ON
CH 3	ON
CH 5	ON
CH 7	OFF
FLASH RATE FAULT	ON
FYA TRAP DETECT	ON

MMU PROGRAMMING NOTE

ENSURE YELLOW CHANGE PLUS RED CLEARANCE MONITORING IS ENABLED FOR ALL CHANNELS.

NOTES

1. To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans.
2. To prevent red failures on unused monitor channels, tie unused load switch red outputs 9, 12, and 16 to load switch AC+ by inserting a jumper plug in the unused load switch socket from pin 1 (LS AC+) to pin 3 (RED out). Make sure all flash transfer relays are in place.
3. Program controller to start up in phase 2 Green and 6 Walk.
4. Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
5. Enable simultaneous gap-out feature for all phases.
6. Program detectors in accordance with the manufacturer's instructions to accomplish the detection schemes shown on the signal design plans.
7. Program detector call delay and extension timing on the controller, unless otherwise specified.
8. Set all detector card unit channels to "presence" mode.
9. Program phases 2 and 6 for volume density operation.
10. Program phase 4 for dual entry.
11. The cabinet and controller are a part of the Cary Signal System.

SIGNAL HEAD HOOK-UP CHART

PHASE	1	1	2	3	4	5	6	7	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11★	82	21,22 23	31★	41,42, 43	51★	61,62 63	63	71,72	81,82, 83	NU	P41, P42	P61, P62	NU	11★	31★	51★	NU
RED		∗	2R	∗	4R	∗	6R			8R								
YELLOW			2Y	∗	4Y	∗	6Y			8Y								
GREEN			2G		4G		6G			8G								
RED ARROW									7R						13R	14R	15R	
YELLOW ARROW		1Y						7Y	7Y						13Y	14Y	15Y	
FLASHING YELLOW ARROW															13G	14G	15G	
GREEN ARROW	1G	1G		3G		5G		7G	7G									
(hand)												10R	11R					
(walk)												10G	11G					

NU = Not Used

∗ Denotes install load resistor. See Load Resistor Installation Detail on sheet 3.

★ See pictorial of head wiring detail this sheet.

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

RACK #1	BIU											
		CH1 L3 ø 1	CH1 L1 ø 1	CH1 L7 ø 3	CH1 L5 ø 2 ∗∗	CH1 L11 ø 6 ∗∗ SYS6	CH1 L9 ø 5	CH1 L15 ø 7	CH1 L13 ø 6 ∗∗ SYS8	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
		CH2 L4 ø 2 ∗∗	CH2 L2 ø 6 ∗	CH2 L8 ø 8	CH2 L6 ø 4	CH2 L12 ø 6 ∗∗ SYS7	CH2 L10 ø 2 ∗	CH2 L16 ø 8	CH2 L14 ø 7			

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

	LOOP NO.	LOOP PANEL TERMINALS
ADD JUMPERS FROM: L1A TO L2A, AND L1B TO L2B	1A	L1A,L1B
		L2A,L2B
	1B	L3A,L3B
	2A	L4A,L4B
	2B	L5A,L5B
	4A	L6A,L6B
ADD JUMPERS FROM: L7A TO L8A, AND L7B TO L8B	3A	L7A,L7B
		L8A,L8B
ADD JUMPERS FROM: L9A TO L10A, AND L9B TO L10B	5A	L9A,L9B
		L10A,L10B
	6A/S6	L11A,L11B
	6B/S7	L12A,L12B
	6C/S8	L13A,L13B
	7A	L14A,L14B
	7B	L15A,L15B
	8A	L16A,L16B

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
★ 1	ø 1	DELAY	15
★ ∗ 2	ø 6	DELAY	3
3	ø 1	DELAY	15
∗∗ 4	ø 2		
∗∗ 5	ø 2		
6	ø 4	DELAY	10
7	ø 3	DELAY	15
8	ø 8	DELAY	3
★ 9	ø 5	DELAY	15
★ ∗ 10	ø 2	DELAY	3
∗∗ 11	ø 6	SYSTEM	
∗∗ 12	ø 6	SYSTEM	
∗∗ 13	ø 6	SYSTEM	
14	ø 7	DELAY	3
15	ø 7		
16	ø 8		

∗ Detector Type - G (remove delay from existing detector card)

∗∗ Detector Type - N

★ See the Vehicle Detector Setup Programming Detail on sheet 4 for Alternate Phasing.

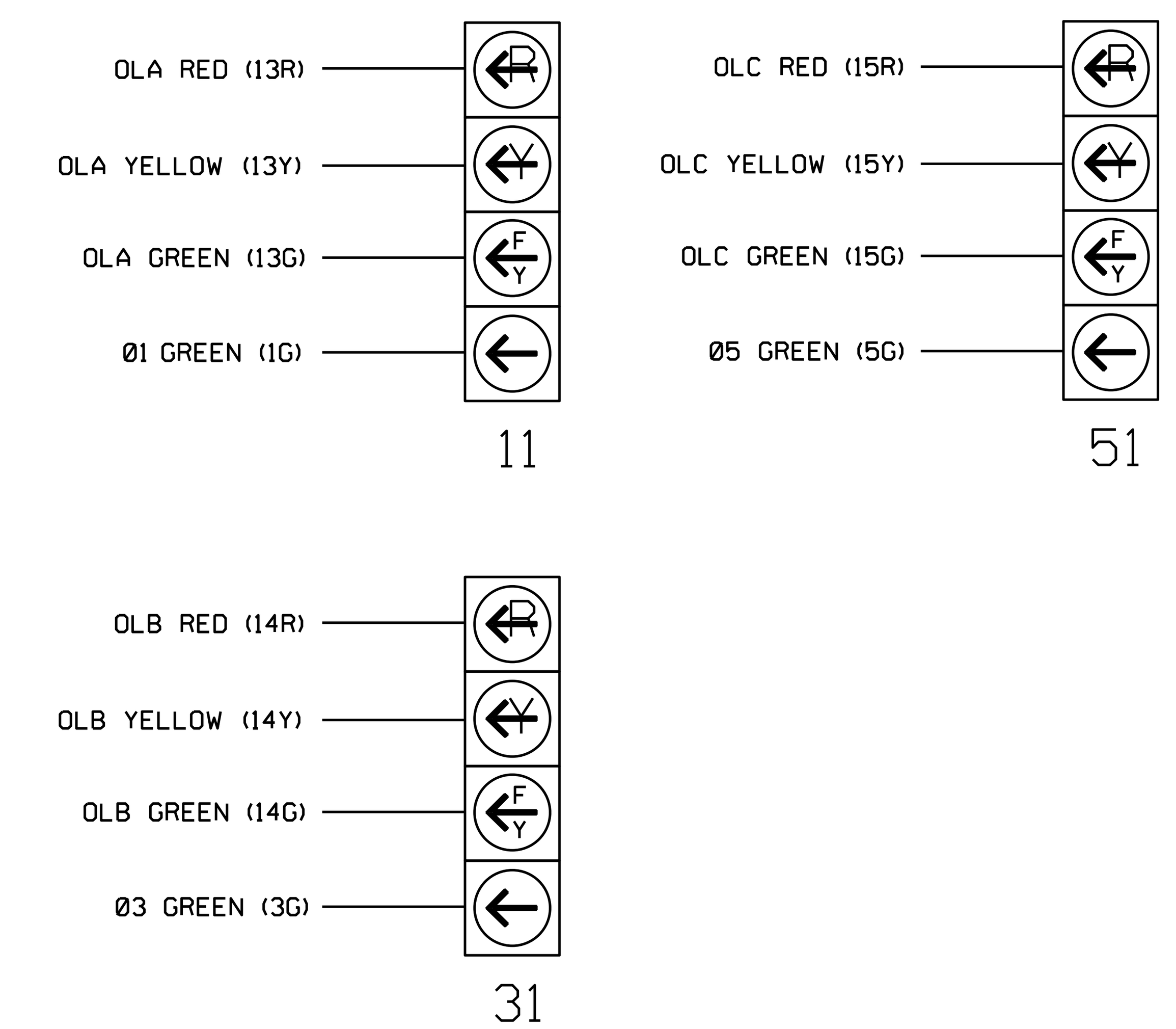
EQUIPMENT INFORMATION

CONTROLLER.............2070EN2
CABINET NC-8 TS-2
SOFTWARE ....ECONOLITE ASC/3-2070
CABINET MOUNT..........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......1,2,3,4,5,6,7,8,10,11,13,14,15
PHASES USED............1,2,3,4,4PED,5,6,6PED,7,8
OLA....................∗
OLB....................∗
OLC....................∗
OLD....................∗

∗ SEE OVERLAP PROGRAMMING DETAIL ON SHEET 2

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø 1
2	ø 2
3	ø 3
4	ø 4
5	ø 5
6	ø 6
7	ø 7
8	ø 8
9	ø 2 PED
10	ø 4 PED
11	ø 6 PED
12	ø 8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1726T5
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 5 (TMP Phase IV)
Sheet 1 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In 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 3015 (Airport Blvd.) at Factory Shops Road/ Aerial Center Parkway

Division 5 | Wake County | Morrisville

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320EAA2654C3 — 8/1/2019 DATE

SIG. INVENTORY NO. 05-1726T5

29-JUL-2019 09:10
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sarmstrong

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.....CH13 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "1"

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.....CH14 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.....CH15 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

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.....CH16 ISOLATE

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

DELETE THIS PROGRAMMING

ECONOLITE ASC/3-2070 SPECIAL MMU PROGRAMMING

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [4. PORT 1 (SDLC)]
3. From PORT 1 (SDLC) Submenu select [2. MMU PROGRAM]

CAUTION!

Set intersection to Flash before attempting to enter or change any MMU programming data.

This programming and that of the MMU programming card must match exactly. If they do not, the intersection will be placed into Flash.

MMU PROGRAM [MANUAL]

CH	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2
1	.	X	.	X	.	X	.	.	.	.	X	X	.	.	.
2	.	X	.	X	.	X	.	.	.	.	X	X	.	.	
3	.	.	X	.	.	.	.	.	X	X	.	.	.		
4	.	.	X	.	.	.	X	.	X	X	.	.			
5	.	X	.	X	.	.	.	.	.	.	.				
6	.	X	.	X	.	X	.	.	.	.					
7	.	.	X	.	.	.	X	.	.						
8	.	.	X	.	.	.	X	.							
9	.	.	.	.	.	.	.								
10	.	.	X	.	.	.									
11	.	X	.	X	.										
12	.	.	.	.											
13	.	X	.												
14	.	.													
15	.														

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726T5
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 5 (TMP Phase IV)
Sheet 2 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 | Wake County | Morrisville

PLAN DATE:	May 2019	REVIEWED BY:	
PREPARED BY:	S. Armstrong	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by:
Ryan W. Hough
430320FAA2654C3...
8/1/2019
DATE

SIG. INVENTORY NO. 05-1726T5

25-JUL-2019 10:27
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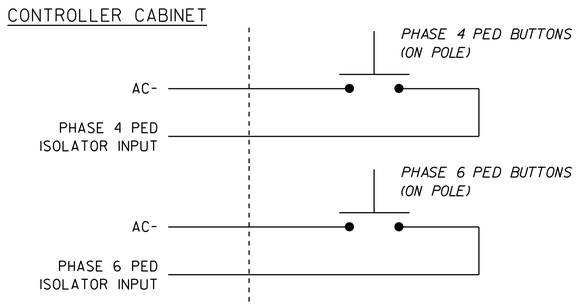
sarmstrong

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 11.3

PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



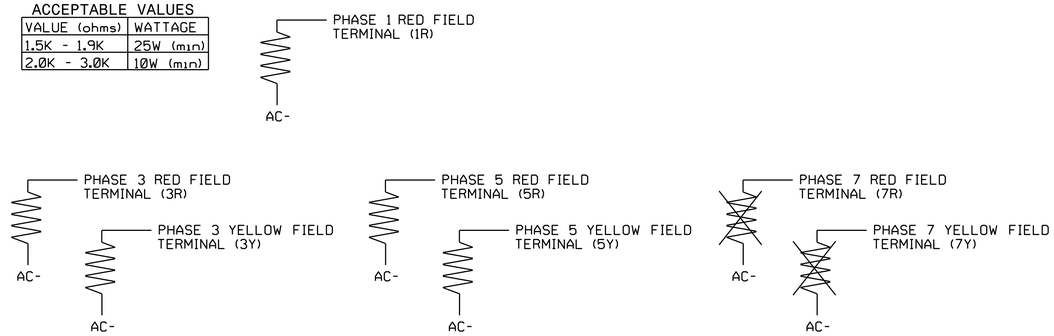
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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 below)

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



IMPORTANT! Remove phase 7 load resistors as shown.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726T5
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 5 (TMP Phase IV)
Sheet 3 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 | Wake County | Morrisville

PLAN DATE: May 2019 | REVIEWED BY:

PREPARED BY: S. Armstrong | REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by:
Ryan W. Hough
43D320FAA2654C3...
8/1/2019
DATE

SIG. INVENTORY NO. 05-1726T5

25-JUL-2019 10:27
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sarmstrong

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 11.4

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING
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 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 "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 "2".
- Set assigned phase to "0".

```
VEH DETECTOR [2]    VEH DET PLAN [ 2]        ← NOTICE VEH DET PLAN 2
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 2  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
```

- Place cursor in VEH DETECTOR [ ] position and enter "9".
- Set delay time to "0".

```
VEH DETECTOR [ 9]   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
 9  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 "10".
- Set assigned phase to "0".

```
VEH DETECTOR [10]   VEH DET PLAN [ 2]        ← NOTICE VEH DET PLAN 2
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 10 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: 05-1726T5
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 5 (TMP Phase IV)
Sheet 4 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5	Wake County	Morrisville
PLAN DATE: May 2019	REVIEWED BY:	
PREPARED BY: S. Armstrong	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by:
Ryan W. Hough
430320FAA2654C3...
8/1/2019
DATE

SIG. INVENTORY NO. 05-1726T5

25-JUL-2019 10:28
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sarmstrong

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 11.5

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING <u>FREE RUN</u> - 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 <u>COORDINATION</u> - 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 <u>DEFAULT PHASING</u>	1	NONE
ACTIONS REQUIRED TO RUN <u>ALTERNATE PHASING</u>	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).

<u>ALTERNATE PHASING CHANGE SUMMARY</u>

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.

<u>ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL</u>

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 . . . . . . . . . . . . . . .
```

NOTICE SPC FCT BITS →

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1726T5
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Temp 5 (TMP Phase IV)
Sheet 5 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 3015 (Airport Blvd.) at Factory Shops Road/ Aerial Center Parkway

Division 5 | Wake County | Morrisville

Prepared in 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

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320EAA2654C3... 8/1/2019 DATE

SIG. INVENTORY NO. 05-1726T5

25-JUL-2019 10:28
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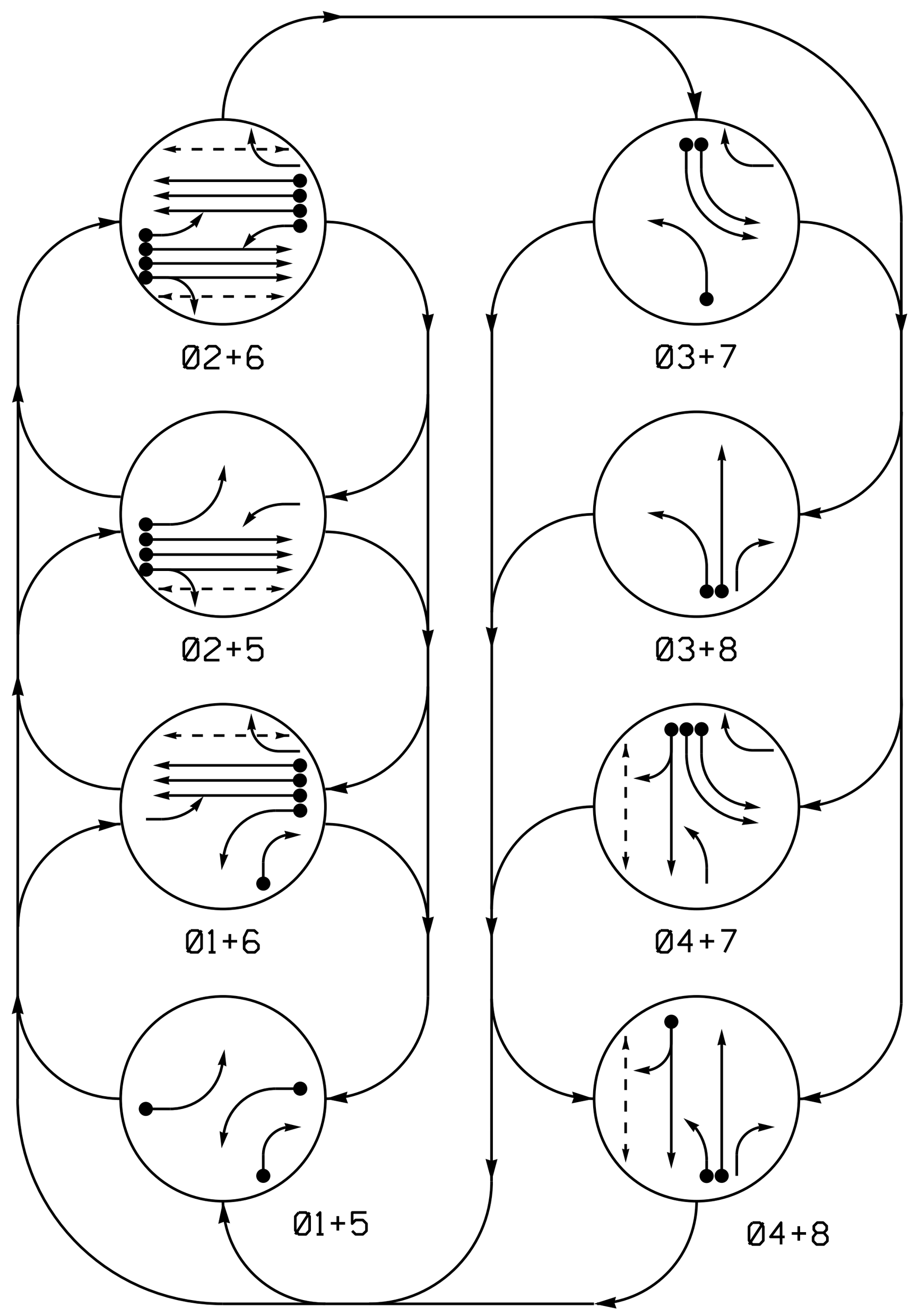
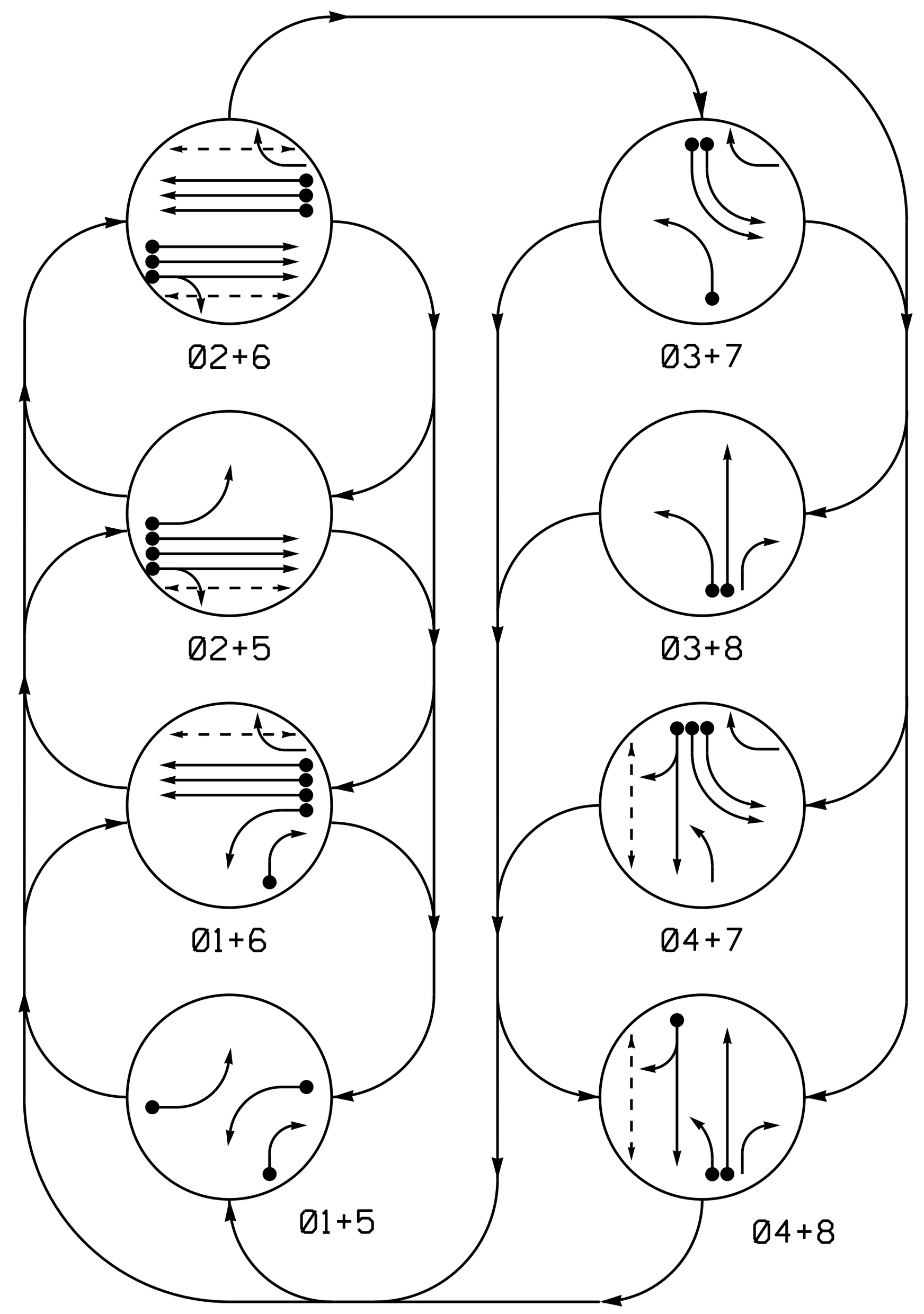
sarmstrong

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT 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, 22, 23	R	R	G	G	R	R	R	R	Y
31	←R	←R	←R	←R	←	←	←F/Y	←F/Y	←R
41, 42, 43	R	R	R	R	R	R	G	G	R
51	←	←F/Y	←	←F/Y	←R	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	R	R	Y
63	R	G	R	G	R/→	R	R/→	R	Y
71, 72	←R	←R	←R	←R	←	←R	←	←R	←R
81, 83	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK

ALTERNATE TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←	←	←R	←R	←R	←R	←R	←R	←Y
21, 22, 23	R	R	G	G	R	R	R	R	Y
31	←R	←R	←R	←R	←	←	←F/Y	←F/Y	←R
41, 42, 43	R	R	R	R	R	R	G	G	R
51	←	←R	←	←R	←R	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	R	R	Y
63	R	G	R	G	R/→	R	R/→	R	Y
71, 72	←R	←R	←R	←R	←	←R	←	←R	←R
81, 83	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK

LOOP & DETECTOR INSTALLATION CHART

ASC/3-2070EN2 CONTROLLER w/ TS-2 CABINET

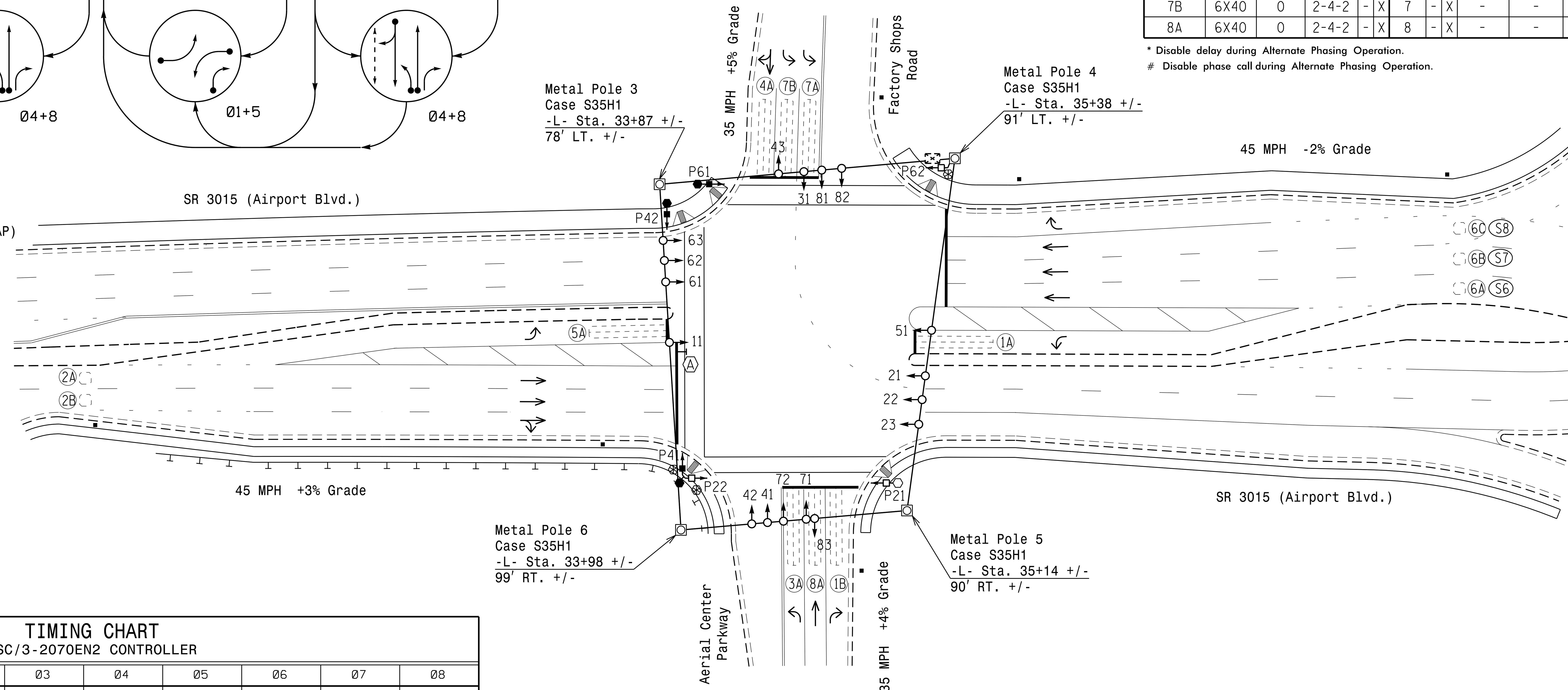
INDUCTIVE LOOPS: LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	DETECTOR UNITS: NEMA PHASE	NEW	EXISTING	TIMING: FEATURE	TIME (sec)	ADDED INITIAL	DET. TYPE
1A	6X40	0	2-4-2	-	X	1	-	X	DELAY	15*	-	S
						6#	-	X	DELAY	3	-	G
1B	6X40	0	2-4-2	-	X	1	-	X	DELAY	15	-	S
2A	6X6	300	5	-	X	2	-	X	-	-	X	N
2B	6X6	300	5	-	X	2	-	X	-	-	X	N
3A	6X40	0	2-4-2	-	X	3	-	X	DELAY	15	-	S
						8	-	X	DELAY	3	-	S
4A	6X40	0	2-4-2	-	X	4	-	X	DELAY	10	-	S
5A	6X40	0	2-4-2	-	X	5	-	X	DELAY	15*	-	S
						2#	-	X	DELAY	3	-	G
6A/S6	6X6	260	5	-	X	6	-	X	-	-	X	N
						-	-	X	SYSTEM DETECTOR		-	N
6B/S7	6X6	260	5	-	X	6	-	X	-	-	X	N
						-	-	X	SYSTEM DETECTOR		-	N
6C/S8	6X6	260	5	-	X	6	-	X	-	-	X	N
						-	-	X	SYSTEM DETECTOR		-	N
7A	6X40	0	2-4-2	-	X	7	-	X	DELAY	3	-	S
7B	6X40	0	2-4-2	-	X	7	-	X	-	-	-	S
8A	6X40	0	2-4-2	-	X	8	-	X	-	-	-	S

* Disable delay during Alternate Phasing Operation.
# Disable phase call during Alternate Phasing Operation.

8 Phase
Fully Actuated
(Cary 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. Set all detector units to presence mode.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. The Division (Town) Traffic Engineer will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Cary signal system data:
    Fiber Channel #: 26.



TIMING CHART

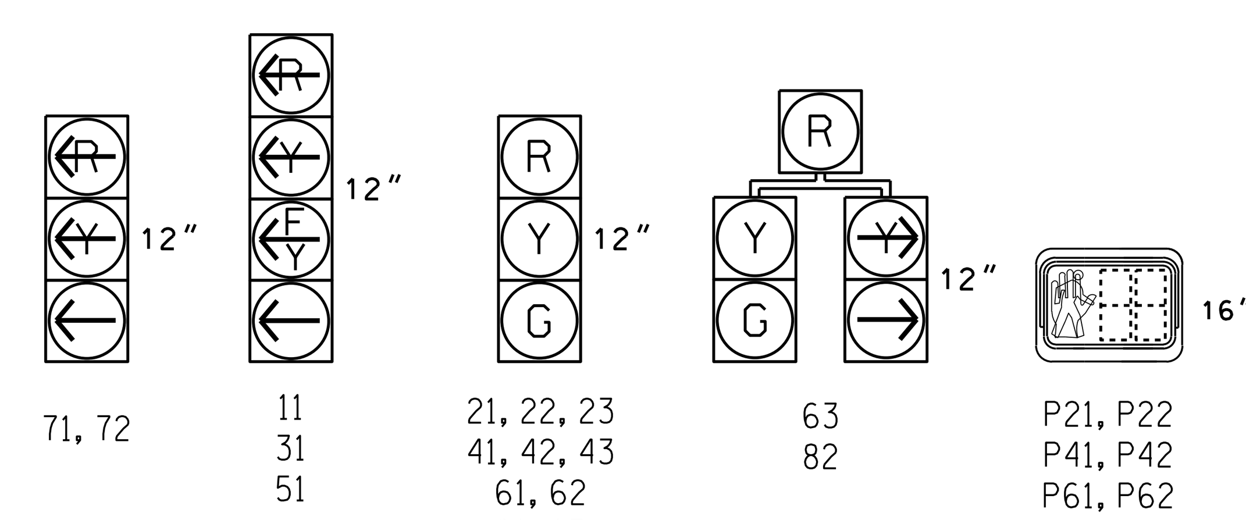
ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN *	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	5.0 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	3.0 SEC.	3.6 SEC.	3.0 SEC.	4.8 SEC.	3.0 SEC.	3.6 SEC.
RED CLEARANCE	3.2 SEC.	2.0 SEC.	3.4 SEC.	2.9 SEC.	3.3 SEC.	2.0 SEC.	3.6 SEC.	2.9 SEC.
MAX. 1 *	20 SEC.	120 SEC.	20 SEC.	30 SEC.	15 SEC.	120 SEC.	20 SEC.	30 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE
LOCK DET.	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
WALK *	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	– SEC.
PED. CLEAR	– SEC.	21 SEC.	– SEC.	30 SEC.	– SEC.	22 SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	1.0 SEC.	– SEC.	– SEC.	– SEC.	1.0 SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	34 SEC.	– SEC.	– SEC.	– SEC.	30 SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	20 SEC.	– SEC.	– SEC.	– SEC.	20 SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	40 SEC.	– SEC.	– SEC.	– SEC.	40 SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	– SEC.	– SEC.	3.0 SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON	ON	ON	ON

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

SIGNAL FACE I.D.

All Heads L.E.D.



LEGEND

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

Signal Upgrade - Final Design

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

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 Wake County Morrisville

PLAN DATE: March 2019 REVIEWED BY:
PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE 0 40
1"=40'

REVISIONS	INIT.	DATE

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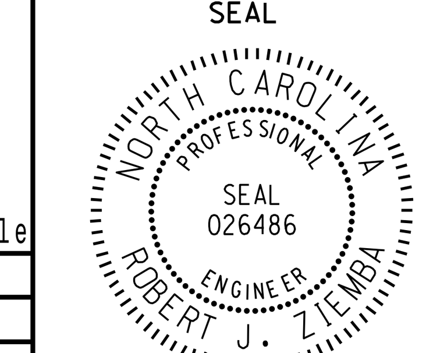
SEAL



DocuSigned by: 7/24/2019
DATE

SIG. INVENTORY NO. 05-1726

02-AUG-2019 13:28
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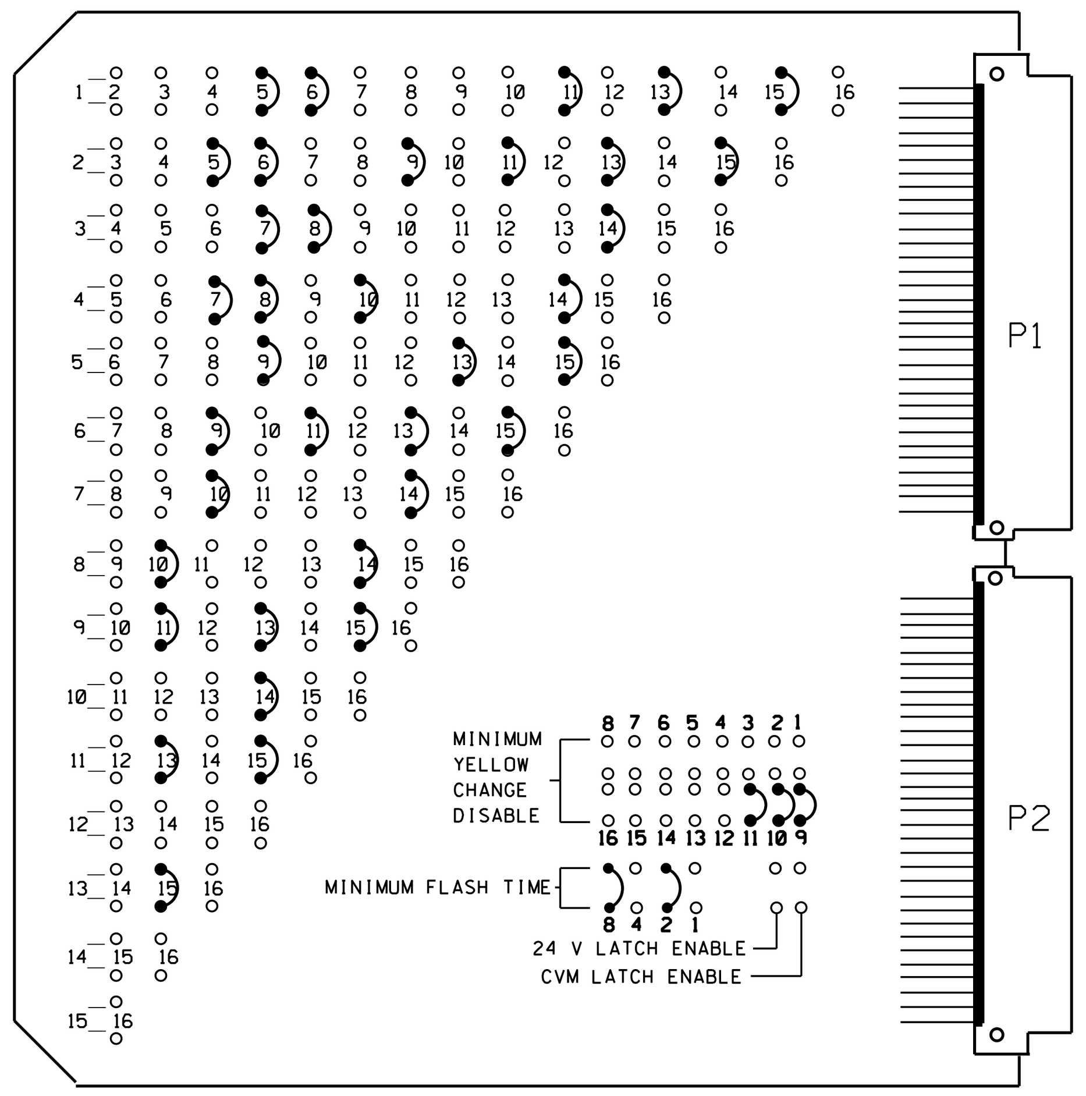
jalohr

EDI MODEL MMU2-16LEip MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and tables as shown below)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	ENABLE
2	ENABLE
3	DISABLE
4	ENABLE
5	DISABLE
6	ENABLE
7	ENABLE
8	ENABLE
9	ENABLE
10	ENABLE
11	ENABLE
12	DISABLE
13	ENABLE
14	ENABLE
15	ENABLE
16	DISABLE

UNIT OPTIONS	
OPTION	SETTING
RECURRENT PULSE	ON
WALK DISABLE	OFF
LOG CVM FAULTS	ON
EXTERN WATCHDOG	OFF
24V-2=12VDC	OFF
PGM CARD MEMORY	ON
LEDguard	ON
FORCE TYPE 16	OFF
TYPE12-SDLC	OFF
VM 3x/Day Latch	ON

FLASHING YELLOW ARROW	
CONFIG MODE	B
ENABLE CHANNEL PAIR, FYA	
CH 1-13	ON
CH 3-14	ON
CH 5-15	ON
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	ON
CH 3	ON
CH 5	ON
CH 7	OFF
FLASH RATE FAULT	ON
FYA TRAP DETECT	ON

MMU PROGRAMMING NOTE

ENSURE YELLOW CHANGE PLUS RED CLEARANCE MONITORING IS ENABLED FOR ALL CHANNELS.

NOTES

1. To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans.
2. To prevent red failures on unused monitor channels, tie unused load switch red outputs 12, and 16 to load switch AC+ by inserting a jumper plug in the unused load switch socket from pin 1 (LS AC+) to pin 3 (RED out). Make sure all flash transfer relays are in place.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
5. Enable simultaneous gap-out feature for all phases.
6. Program detectors in accordance with the manufacturer's instructions to accomplish the detection schemes shown on the signal design plans.
7. Program detector call delay and extension timing on the controller, unless otherwise specified.
8. Set all detector card unit channels to "presence" mode.
9. Program phases 2 and 6 for volume density operation.
10. Program phase 4 for dual entry.
11. The cabinet and controller are a part of the Cary Signal System.

SIGNAL HEAD HOOK-UP CHART

PHASE	1		2	3	4	5	6	7		8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11★	82	21,22 23	31★	41,42, 43	51★	61,62 63	63	71,72	81,82, 83	P21, P22	P41, P42	P61, P62	NU	11★	31★	51★	NU
RED		✱	2R	✱	4R	✱	6R			8R								
YELLOW			2Y	✱	4Y	✱	6Y			8Y								
GREEN			2G		4G		6G			8G								
RED ARROW									7R						13R	14R	15R	
YELLOW ARROW		1Y						7Y	7Y						13Y	14Y	15Y	
FLASHING YELLOW ARROW															13G	14G	15G	
GREEN ARROW	1G	1G		3G		5G		7G	7G									
✋											9R	10R	11R					
🚶											9G	10G	11G					

NU = Not Used

✱ Denotes install load resistor. See Load Resistor Installation Detail on sheet 3.

★ See pictorial of head wiring detail this sheet.

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

RACK #1	BIU											
		CH1 L3 ø1	CH1 L1 ø1	CH1 L7 ø3	CH1 L5 ø2 ✱✱	CH1 L11 ø6 ✱✱ SYS6	CH1 L9 ø5	CH1 L15 ø7	CH1 L13 ø6 ✱✱ SYS8	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
		CH2 L4 ø2 ✱✱	CH2 L2 ø6 ✱	CH2 L8 ø8	CH2 L6 ø4	CH2 L12 ø6 ✱✱ SYS7	CH2 L10 ø2 ✱	CH2 L16 ø8	CH2 L14 ø7			

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

	LOOP NO.	LOOP PANEL TERMINALS
ADD JUMPERS FROM: L1A TO L2A, AND L1B TO L2B	1A	L1A,L1B
		L2A,L2B
	1B	L3A,L3B
	2A	L4A,L4B
	2B	L5A,L5B
	4A	L6A,L6B
ADD JUMPERS FROM: L7A TO L8A, AND L7B TO L8B	3A	L7A,L7B
		L8A,L8B
ADD JUMPERS FROM: L9A TO L10A, AND L9B TO L10B	5A	L9A,L9B
		L10A,L10B
	6A/S6	L11A,L11B
	6B/S7	L12A,L12B
	6C/S8	L13A,L13B
	7A	L14A,L14B
	7B	L15A,L15B
	8A	L16A,L16B

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

	CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
			FEATURE	TIME(SEC)
★	1	ø1	DELAY	15
★	✱ 2	ø6	DELAY	3
	3	ø1	DELAY	15
	✱✱ 4	ø2		
	✱✱ 5	ø2		
	6	ø4	DELAY	10
	7	ø3	DELAY	15
	8	ø8	DELAY	3
★	9	ø5	DELAY	15
★	✱ 10	ø2	DELAY	3
	✱✱ 11	ø6	SYSTEM	
	✱✱ 12	ø6	SYSTEM	
	✱✱ 13	ø6	SYSTEM	
	14	ø7	DELAY	3
	15	ø7		
	16	ø8		

✱ Detector Type - G (remove delay from existing detector card)

✱✱ Detector Type - N

★ See the Vehicle Detector Setup Programming Detail on sheet 4 for Alternate Phasing.

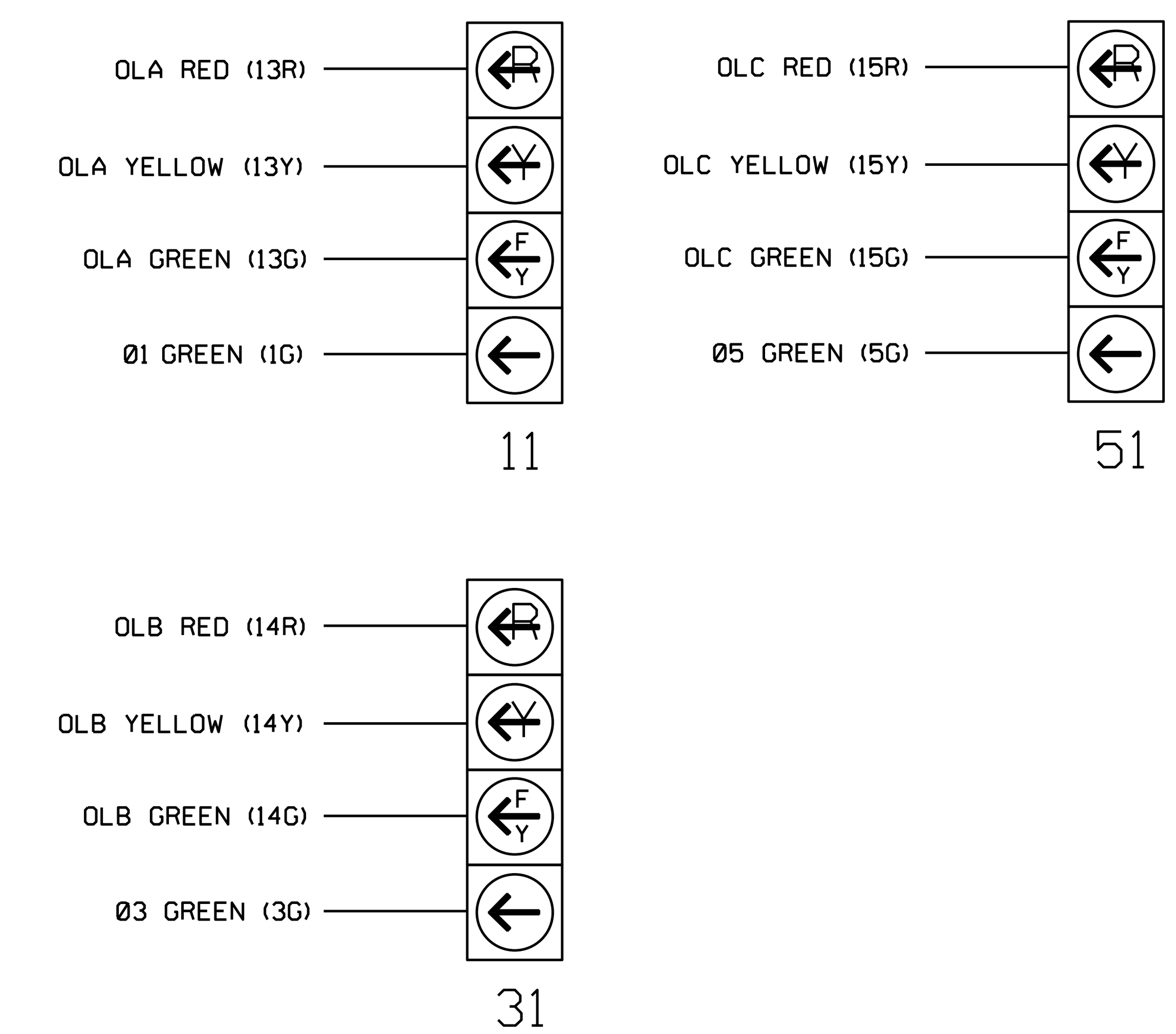
EQUIPMENT INFORMATION

CONTROLLER.............2070EN2
CABINET NC-8 TS-2
SOFTWARE ....ECONOLITE ASC/3-2070
CABINET MOUNT..........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......1,2,3,4,5,6,7,8,9,10,11,13,14,15
PHASES USED............1,2,2PED,3,4,4PED,5,6,6PED,7,8
OLA....................✱
OLB....................✱
OLC....................✱
OLD....................✱

✱ SEE OVERLAP PROGRAMMING DETAIL ON SHEET 2

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	ø2 PED
10	ø4 PED
11	ø6 PED
12	ø8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Final Design - Sheet 1 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 Wake County Morrisville

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036833 RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320EAA2654C3 8/1/2019 DATE

SIG. INVENTORY NO. 05-1726

29-JUL-2019 09:10
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sarmstrong

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 12.2

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.....CH13 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "1"

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.....CH14 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.....CH15 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

ECONOLITE ASC/3-2070 SPECIAL MMU PROGRAMMING

(program controller as shown)

1. From Main Menu select **1. CONFIGURATION**
2. From CONFIGURATION Submenu select **4. PORT 1 (SDLC)**
3. From PORT 1 (SDLC) Submenu select **2. MMU PROGRAM**

CAUTION!

Set intersection to Flash before attempting to enter or change any MMU programming data.

This programming and that of the MMU programming card must match exactly. If they do not, the intersection will be placed into Flash.

MMU PROGRAM [MANUAL]

CH	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2
1	.	X	.	X	.	X	.	.	.	.	X	X	.	.	.
2	.	X	.	X	.	X	.	X	.	.	X	X	.	.	
3	.	.	X	.	.	.	.	.	X	X	.	.	.		
4	.	.	X	.	.	.	X	.	X	X	.	.			
5	.	X	.	X	.	.	.	X	.	.	.				
6	.	X	.	X	.	X	.	X	.	.					
7	.	.	X	.	.	.	X	.	.						
8	.	.	X	.	.	.	X	.							
9	.	X	.	X	.	X	.								
10	.	.	X	.	.	.									
11	.	X	.	X	.										
12	.	.	.	.											
13	.	X	.												
14	.	.													
15	.														

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Final Design - Sheet 2 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in 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 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway**

Division 5 | Wake County | Morrisville

PLAN DATE: May 2019	REVIEWED BY:
PREPARED BY: S. Armstrong	REVIEWED BY:

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

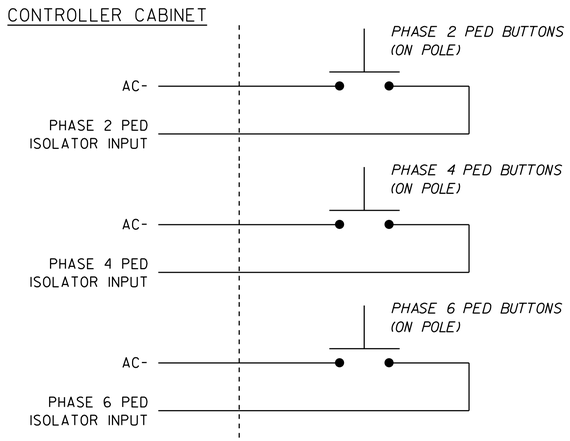
DocuSigned by: Ryan W. Hough 430320EAA2654C3...
8/1/2019
DATE

SIG. INVENTORY NO. 05-1726

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 12.3

PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

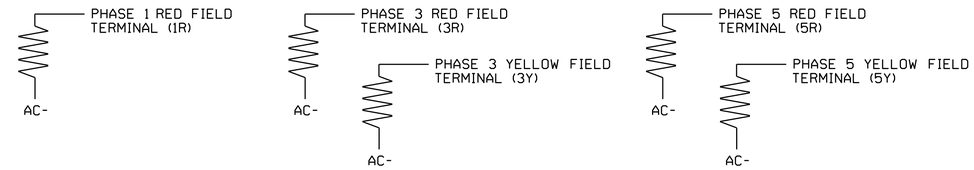
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1726
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Final Design - Sheet 3 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

Transportation Mobility and Safety Division
NCDEPARTMENT OF TRANSPORTATION
Signal Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 | Wake County | Morrisville

PLAN DATE: May 2019 | REVIEWED BY:

PREPARED BY: S. Armstrong | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by:
Ryan W. Hough
430320FAA2654C3...
8/1/2019
DATE

SIG. INVENTORY NO. 05-1726

25-JUL-2019 10:29
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sarmstrong

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING
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 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 "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 "2".
- Set assigned phase to "0".

```
                     VEH DETECTOR [2]    VEH DET PLAN [ 2]      <- NOTICE VEH DET PLAN 2
                     TYPE: G-GREEN EXTENSION/DELAY
                     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      ->  2  0   . . . . . . . . . . . . . . . .
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
```

- Place cursor in VEH DETECTOR [ ] position and enter "9".
- Set delay time to "0".

```
VEH DETECTOR [ 9]   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
 9  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 "10".
- Set assigned phase to "0".

```
                     VEH DETECTOR [10]   VEH DET PLAN [ 2]      <- NOTICE VEH DET PLAN 2
                     TYPE: G-GREEN EXTENSION/DELAY
                     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      ->  10 0   . . . . . . . . . . . . . . . .
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: 05-1726
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Final Design - Sheet 4 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 Wake County Morrisville

PLAN DATE: May 2019 REVIEWED BY:

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS	INIT.	DATE

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 8/1/2019

DATE

SIG. INVENTORY NO. 05-1726

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)												

NOTICE SPC FCT BITS →

	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: 05-1726
DESIGNED: March 2019
SEALED: 7/24/2019
REVISED: N/A

Electrical Detail - Final Design - Sheet 5 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

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

750 N.Greenfield Pkwy,Garner,NC 27529

SR 3015 (Airport Blvd.)
at
Factory Shops Road/
Aerial Center Parkway

Division 5 Wake County Morrisville

PLAN DATE: May 2019 REVIEWED BY:
PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320FAA2654C3... 8/1/2019 DATE

SIG. INVENTORY NO. 05-1726

25-JUL-2019 10:30
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sarmstrong

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig 13.0

PHASING DIAGRAM

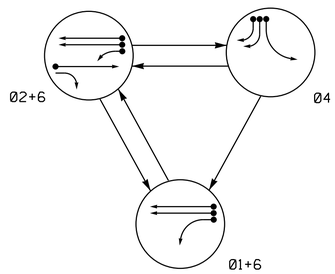
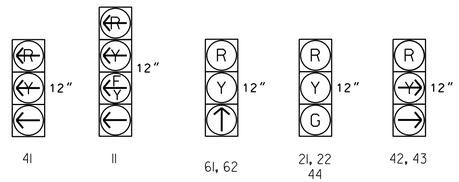


TABLE OF OPERATION				
SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø4	PHASE FLASH
11	←	~~←~~	~~R~~	~~Y~~
21, 22	R	G	R	Y
41	~~R~~	~~R~~	←	~~R~~
42, 43	R	R	→	R
44	R	R	G	R
61, 62	↑	↑	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR INSTALLATION CHART

ASC/3-2070EN2 CONTROLLER w/ TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS						
ZONE NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME (sec)	ADDED INITIAL	DET. TYPE
1A*	6X40	0	*	X	-	1	*	-	DELAY	15	-	S
						6	*	-	DELAY	3	-	G
2A*	6X6	300	*	X	-	2	*	-	-	-	X	N
4A*	6X40	0	*	X	-	4	*	-	-	-	-	S
4B*	6X40	0	*	X	-	4	*	-	DELAY	15	-	S
4C*	6X40	0	*	X	-	4	*	-	DELAY	15	-	S
6A*	6X6	300	*	X	-	6	*	-	-	-	X	N
6B*	6X6	300	*	X	-	6	*	-	-	-	X	N

* Video detection zone.

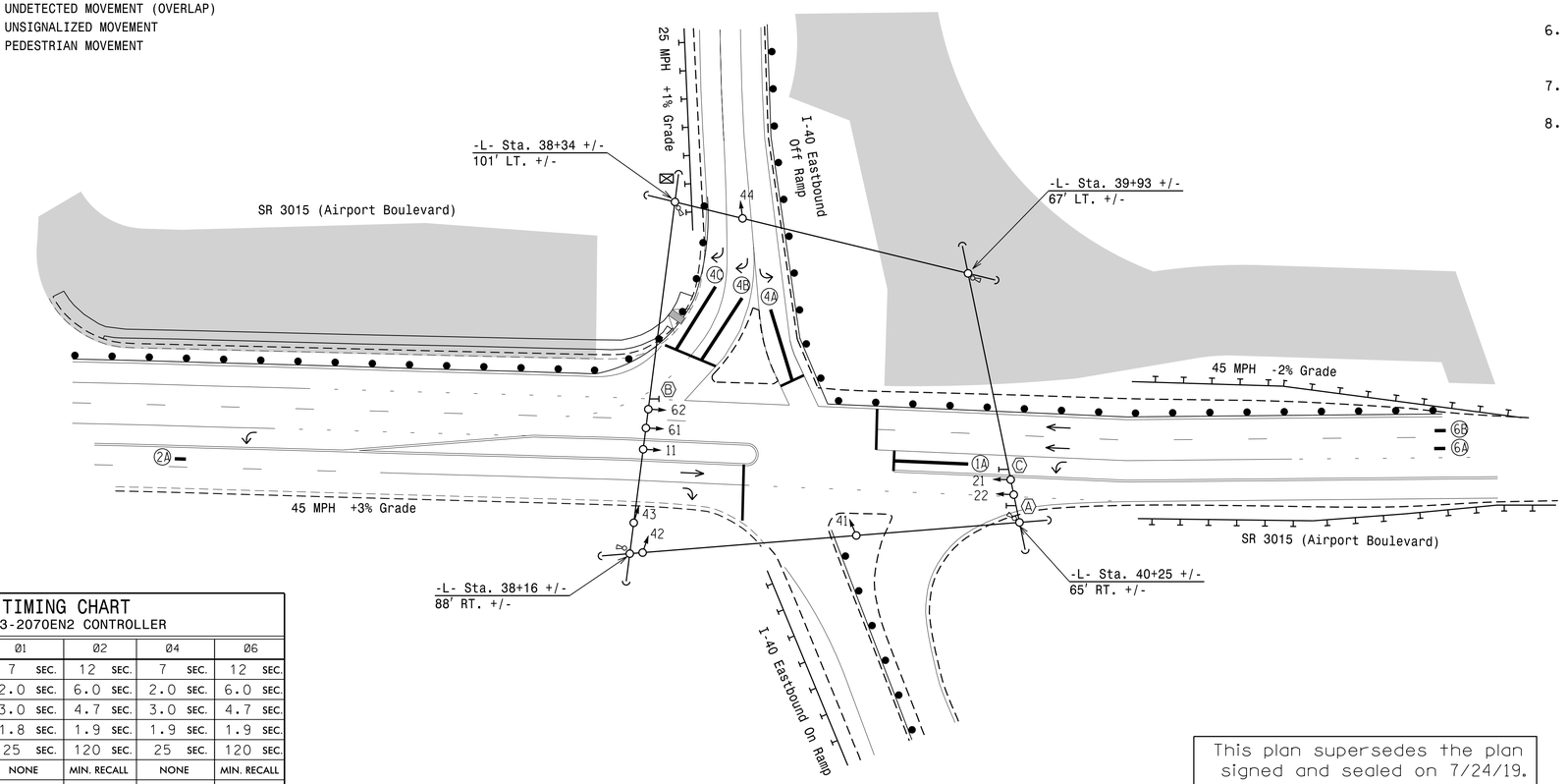
3 Phase
Fully Actuated
(Cary Signal System)

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 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Cary signal system data:
   Fiber channel # 26.
8. This intersection features a video detection system. Shown locations of detectors are conceptual only. Refer to the manufacturer's guidelines for optimal detector placement.

PHASING DIAGRAM DETECTION LEGEND

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



TIMING CHART

ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø4	Ø6
MINIMUM GREEN *	7 SEC.	12 SEC.	7 SEC.	12 SEC.
VEHICLE EXT. *	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.7 SEC.	3.0 SEC.	4.7 SEC.
RED CLEARANCE	1.8 SEC.	1.9 SEC.	1.9 SEC.	1.9 SEC.
MAX. 1 *	25 SEC.	120 SEC.	25 SEC.	120 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	MIN. RECALL
LOCK DET.	OFF	ON	OFF	ON
WALK *	– SEC.	– SEC.	– SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	ON	OFF	ON
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	2.5 SEC.	– SEC.	1.5 SEC.
MAX. INITIAL *	– SEC.	34 SEC.	– SEC.	34 SEC.
TIME B4 REDUCTION *	– SEC.	15 SEC.	– SEC.	15 SEC.
TIME TO REDUCE *	– SEC.	45 SEC.	– SEC.	45 SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.
DUAL ENTRY	OFF	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust in 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	●↓
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	– – – –
→	Directional Arrow	→
N/A	Curb Ramp	
N/A	Guardrail	
●–●	Construction Zone Drums	●–●
▒	Construction Zone	▒
○◁	Out of Pavement Detector	●◁
—	Video Detection Area	—
Ⓐ	Right Arrow "ONLY" Sign (R3-5R)	Ⓐ
Ⓑ	No Right Turn Sign (R3-1)	Ⓑ
Ⓒ	No U-Turn/No Left Turn Sign (R3-18)	Ⓒ

This plan supersedes the plan signed and sealed on 7/24/19.

Signal Upgrade - Temporary Design 1 (TMP Phase I)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 3015 (Airport Boulevard)
at
I-40 EB Ramps

Division 5 Wake County Morrisville

PLAN DATE: September 2019 REVIEWED BY:
PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZYEMBA

DocuSigned by: 10/2/2019
DATE

SIG. INVENTORY NO. 05-0947T1

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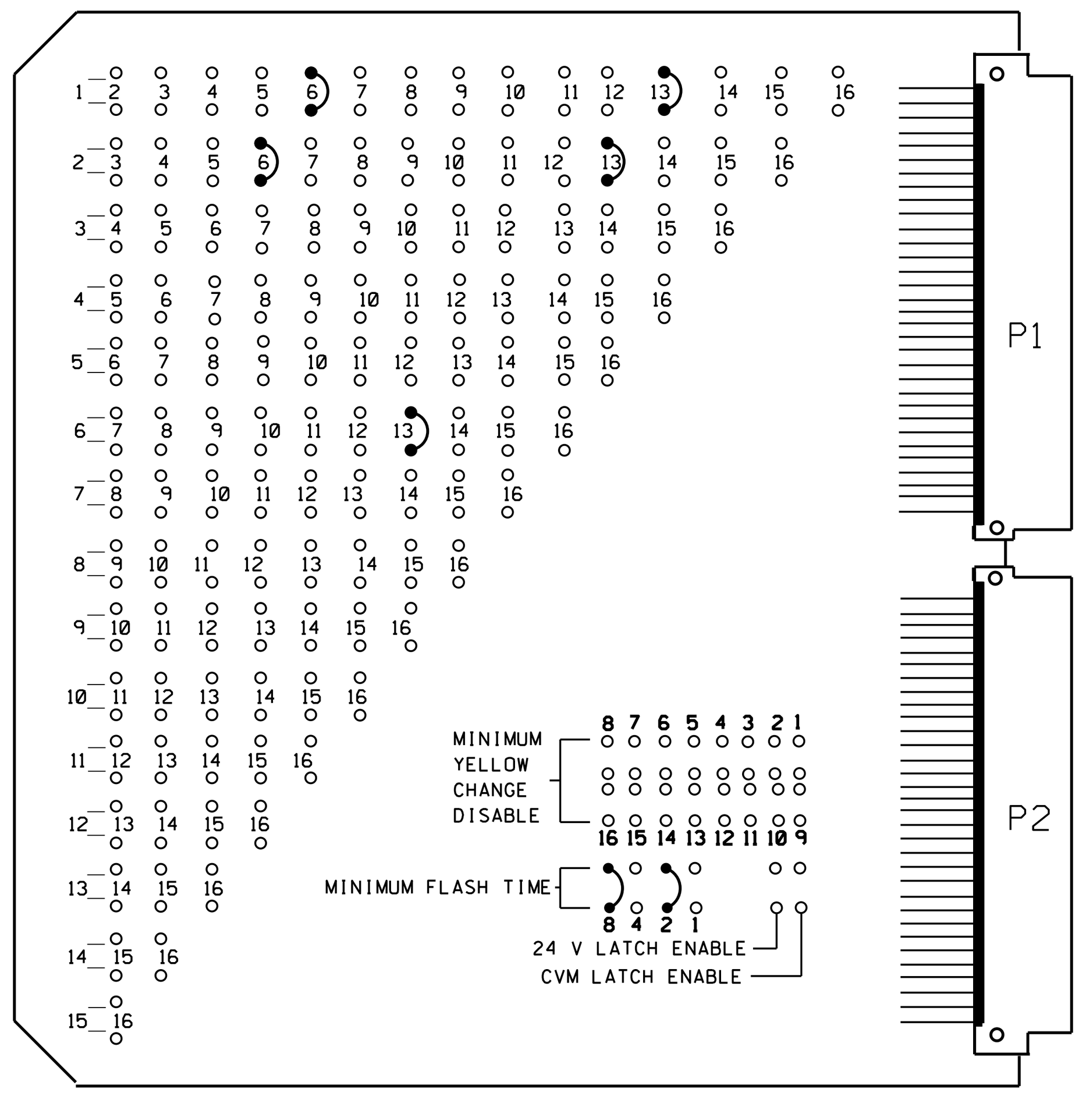
PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig. 13.1

EDI MODEL MMU2-16LEip MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and tables as shown below)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	DISABLE
2	ENABLE
3	DISABLE
4	ENABLE
5	DISABLE
6	ENABLE
7	DISABLE
8	DISABLE
9	DISABLE
10	DISABLE
11	DISABLE
12	DISABLE
13	ENABLE
14	DISABLE
15	DISABLE
16	DISABLE

UNIT OPTIONS	
OPTION	SETTING
RECURRENT PULSE	ON
WALK DISABLE	OFF
LOG CVM FAULTS	ON
EXTERN WATCHDOG	OFF
24V-2=12VDC	OFF
PGM CARD MEMORY	ON
LEDguard	ON
FORCE TYPE 16	OFF
TYPE12-SDLC	OFF
VM 3x/Day Latch	ON

FLASHING YELLOW ARROW	
CONFIG MODE	B
ENABLE CHANNEL PAIR, FYA	
CH 1-13	ON
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	ON
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	ON
FYA TRAP DETECT	ON

MMU PROGRAMMING NOTE

ENSURE YELLOW CHANGE PLUS RED CLEARANCE MONITORING IS ENABLED FOR ALL CHANNELS.

NOTES

1. To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans.
2. To prevent red failures on unused monitor channels, tie unused load switch red outputs 3,5,7,8,9,10,11,12,14,15, and 16 to load switch AC+ by inserting a jumper plug in the unused load switch socket from pin 1 (LS AC+) to pin 3 (RED out). Make sure all flash transfer relays are in place.
3. Program controller to start up in phase 2 Green and 6 Green.
4. Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
5. Enable simultaneous gap-out feature for all phases.
6. Program detectors in accordance with the manufacturer's instructions to accomplish the detection schemes shown on the signal design plans.
7. Program detector call delay and extension timing on the controller, unless otherwise specified.
8. Set all detector card unit channels to "presence" mode.
9. Program phases 2 and 6 for volume density operation.
10. The cabinet and controller are a part of the Cary Signal System.

SIGNAL HEAD HOOK-UP CHART

PHASE	1	2	3	4			5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11★	21,22	NU	41	42,43	44	NU	61,62	NU	NU	NU	NU	NU	NU	11★	NU	NU	NU
RED	✳	2R			4R	4R		6R										
YELLOW	✳	2Y				4Y		6Y										
GREEN		2G				4G												
RED ARROW				4R											13R			
YELLOW ARROW				4Y	4Y										13Y			
FLASHING YELLOW ARROW															13G			
GREEN ARROW	1G			4G	4G			6G										
(DON'T WALK)																		
(WALK)																		

NU = Not Used

✳ Denotes install load resistor. See Load Resistor Installation Detail on sheet 2.

★ See pictorial of head wiring detail this sheet.

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

RACK #1	BIU	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY

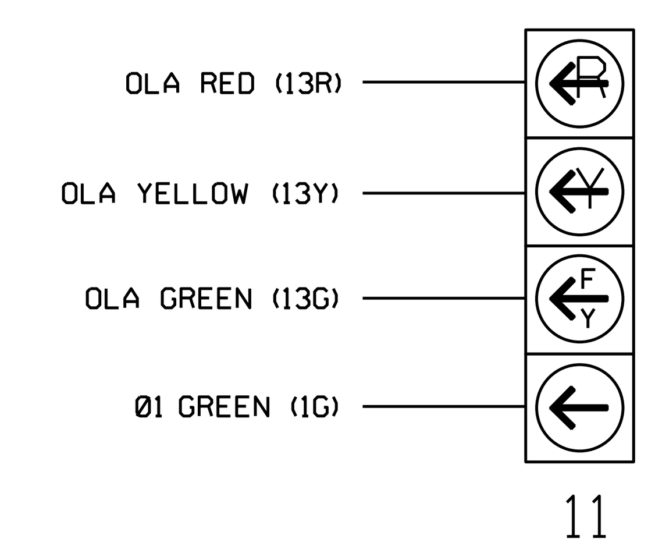
EQUIPMENT INFORMATION

CONTROLLER.............2070EN2
CABINET NC-8 TS-2
SOFTWARE ....ECONOLITE ASC/3-2070
CABINET MOUNT..........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......1,2,4,6,13
PHASES USED............1,2,4,6
OLA....................✳
OLB....................NOT USED
OLC....................NOT USED
OLD....................NOT USED

✳ SEE OVERLAP PROGRAMMING DETAIL ON SHEET 2

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
NU	L1A,L1B
NU	L2A,L2B
NU	L3A,L3B
NU	L4A,L4B
NU	L5A,L5B
NU	L6A,L6B
NU	L7A,L7B
NU	L8A,L8B
NU	L9A,L9B
NU	L10A,L10B
NU	L11A,L11B
NU	L12A,L12B
NU	L13A,L13B
NU	L14A,L14B
NU	L15A,L15B
NU	L16A,L16B

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	Ø1
2	Ø2
3	Ø3
4	Ø4
5	Ø5
6	Ø6
7	Ø7
8	Ø8
9	Ø2 PED
10	Ø4 PED
11	Ø6 PED
12	Ø8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 8/1/2019.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0947T1
DESIGNED: September 2019
SEALED: 10/2/2019
REVISED: N/A

SPECIAL DETECTOR NOTE

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

Electrical Detail - Temp Design 1 (TMP Phase I)
Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 3015 (Airport Boulevard) at I-40 EB Ramps

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

Division 5 | Wake County | Morrisville

PLAN DATE: October 2019 | REVIEWED BY:
PREPARED BY: S. Armstrong | REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320FAA2654C3...
10/8/2019
DATE

SIG. INVENTORY NO. 05-0947T1

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sarmstrong

PROJECT REFERENCE NO.	SHEET NO.
I-5700	Sig. 13.2

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.....CH13 ISOLATE

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

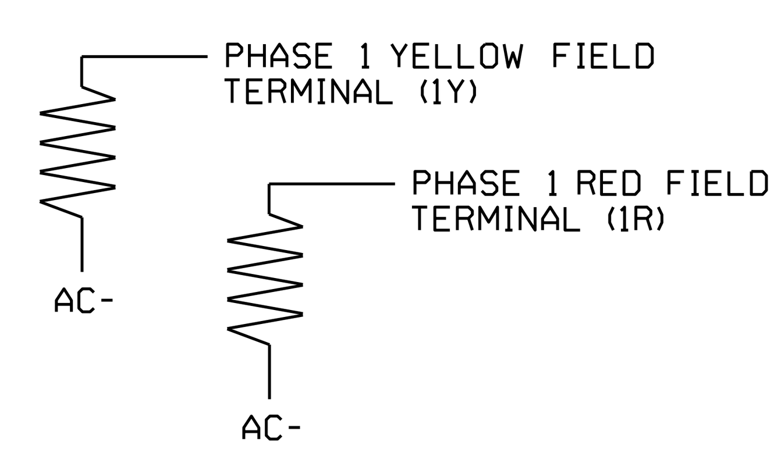
END PROGRAMMING

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



ECONOLITE ASC/3-2070 SPECIAL MMU PROGRAMMING

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [4. PORT 1 (SDLC)]
3. From PORT 1 (SDLC) Submenu select [2. MMU PROGRAM]

CAUTION!

Set intersection to Flash before attempting to enter or change any MMU programming data.

This programming and that of the MMU programming card must match exactly. If they do not, the intersection will be placed into Flash.

MMU PROGRAM [MANUAL]

CH	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2
1	.	.	.	X	.	.	.	.	.	.	X	.	.	.	.
2	.	.	.	X	.	.	.	.	.	.	X	.	.	.	
3	.	.	.	.	.	.	.	.	.	.	.	.	.		
4	.	.	.	.	.	.	.	.	.	.	.	.			
5	.	.	.	.	.	.	.	.	.	.	.				
6	.	.	.	X	.	.	.	.	.	.					
7	.	.	.	.	.	.	.	.	.						
8	.	.	.	.	.	.	.	.							
9	.	.	.	.	.	.	.								
10	.	.	.	.	.	.									
11	.	.	.	.	.										
12	.	.	.	.											
13	.	.	.												
14	.	.													
15	.														

END PROGRAMMING

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 8/1/2019.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0947T1
DESIGNED: September 2019
SEALED: 10/2/2019
REVISED: N/A

Electrical Detail - Temp Design 1 (TMP Phase I)
Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in 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 3015 (Airport Boulevard)
at
I-40 EB Ramps

Division 5	Wake County	Morrisville
PLAN DATE: October 2019	REVIEWED BY:	
PREPARED BY: S. Armstrong	REVIEWED BY:	

REVISIONS	INIT.	DATE

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DocuSigned by: Ryan W. Hough 430320FAA2654C3... DATE 10/8/2019

SIG. INVENTORY NO. 05-0947T1

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sarmstrong