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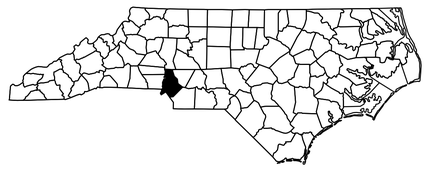
Project No.	Sheet No.
U–6084	SIG–1.0

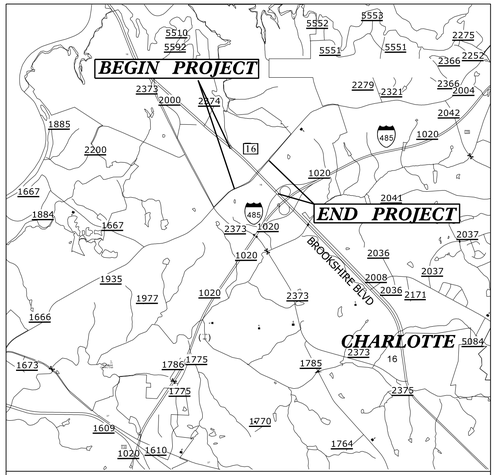
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MECKLENBURG COUNTY

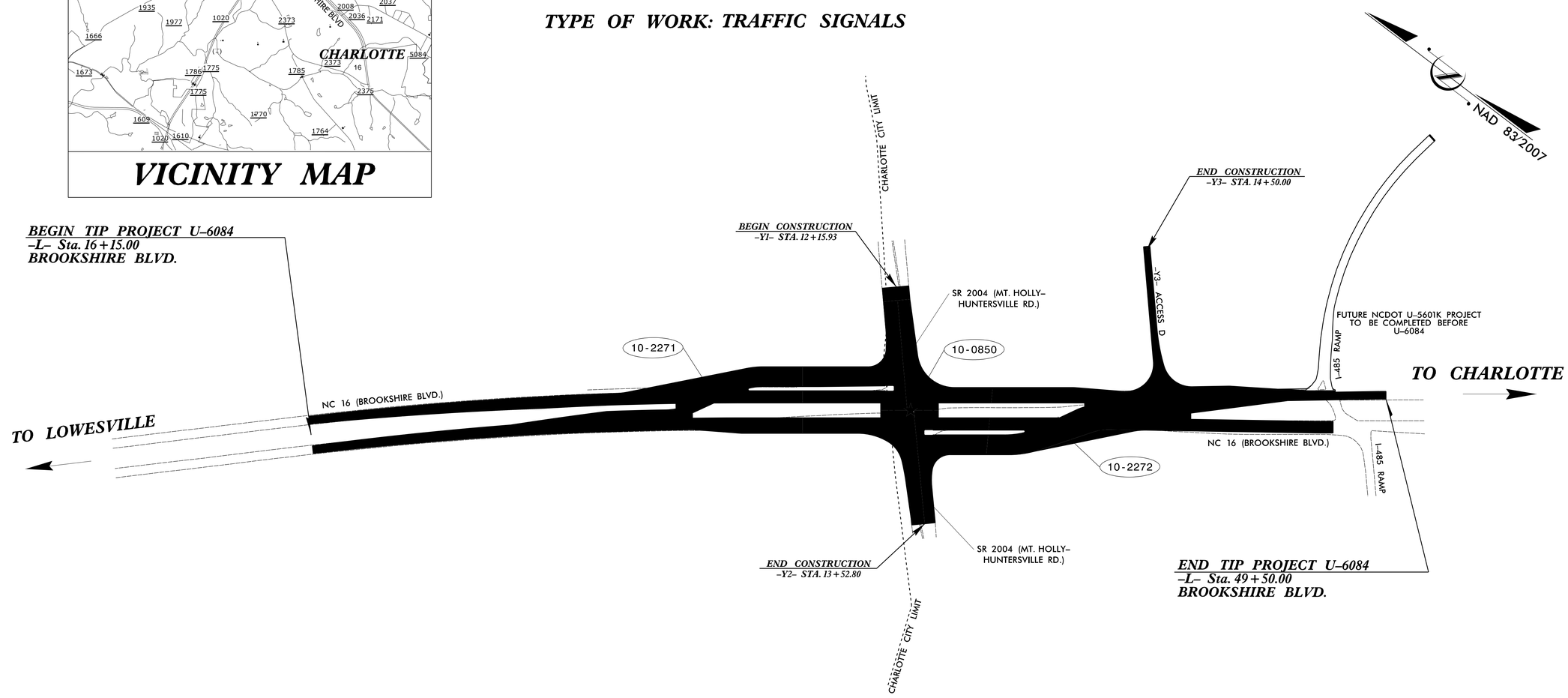


LOCATION: CHARLOTTE – NC 16 (BROOKSHIRE BOULEVARD) AT SR 2004 (MT. HOLLY–HUNTERSVILLE ROAD)

TYPE OF WORK: TRAFFIC SIGNALS



VICINITY MAP



CONTRACT:

TIP PROJECT: U–6084

Index of Plans

SIG. 1.0		*TITLE SHEET*
SIG. 2.0–4.2	*10–2271*	*NC 16 (BROOKSHIRE BOULEVARD) AT WEST CROSS–OVER*
SIG. 5.0–11.4	*10–0850*	*NC 16 (BROOKSHIRE BOULEVARD) AT SR 2004 (MT. HOLLY–HUNTERSVILLE ROAD)*
SIG. 12.0–14.2	*10–2272*	*NC 16 (BROOKSHIRE BOULEVARD) AT EAST CROSS–OVER*
SIG. 15.0–19.0		*METAL POLE LOADING DETAILS*
SIG. M1–M8		*METAL POLE STANDARD DRAWINGS*

LEGEND

10-#### – *SIGNAL INVENTORY NUMBER*

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT
Contacts:
Tim Williams, PE – Signals Engineer, Western Region
Todd Joyce, PE – Signal Equipment Design Review Engineer
I. Neil Avery – Signal Communications Project Engineer

NCDOT Division 10
Contacts:
Tony Tagliaferri, PE – Division Traffic Engineer

Plans Prepared for:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY DIVISION

750 N. Greenfield Parkway, Garner, NC 27529

Stantec
Stantec Consulting Services Inc. Tel. 919.851.6866
801 Jones Franklin Rd-Suite 300 Fax. 919.851.7024
Raleigh, NC 27606 License No. F-0672

Betsy Watson, PE – Senior Principal
Larry Overn, PE – Senior Transporartion Engineer
Dean Harris – Senior Transportation Designer
James Hambright – Senior Transportation Technician
Regina Muncey, PE – Transportation Engineer
Grayson Spell, EI – Signals Technician
Jim Ingram – Senior ITS Technician

APPROVED: DocuSigned by: Lawrence Overn
DATE: 1/26/2018

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DATE-
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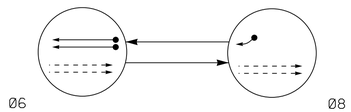
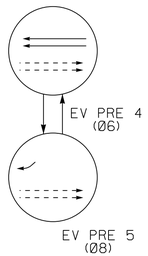
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-2.0

PHASING DIAGRAM



EV PREEMPT PHASES
(Medium Priority)



PHASING DIAGRAM DETECTION LEGEND

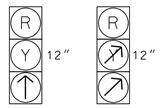
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø8	PHASE PREEMPT 4	PHASE PREEMPT 5	PHASE FLASH
61,62	↑	R	↑	R	Y
81,82	R	↗	R	↗	R

SIGNAL FACE I.D.

All Heads L.E.D.



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

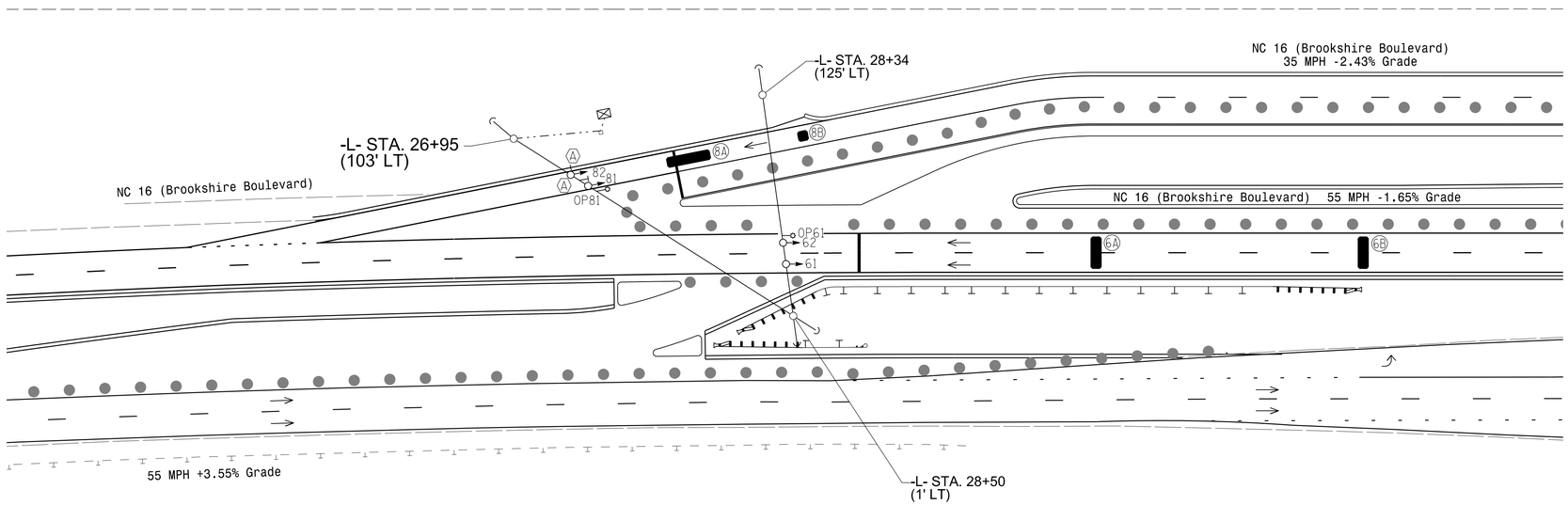
INDUCTIVE LOOPS						DETECTOR UNITS					
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
6A	6X18	130	✳	Y	-	6	Y	-	-	-	N
6B	6X18	280	✳	Y	-	6	Y	-	-	-	N
8A	6X25	+5	✳	Y	-	8	Y	-	-	-	N
8B	6X6	70	✳	Y	-	8	Y	-	-	-	S

✳ Video Detection Area.
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.

2 Phase
Fully Actuated w/
Emergency Vehicle Preemption
(Charlotte Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
5. Optical Detector OP61 calls EV PRE 4
   Optical Detector OP81 calls EV PRE 5
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system values supersede these values.



TIMING CHART
ASC/3-2070EN2 CONTROLLER

PHASE	Ø6	Ø8
MINIMUM GREEN *	14 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	5.4 SEC.	4.1 SEC.
RED CLEARANCE	3.4 SEC.	3.9 SEC.
MAX. 1 *	45 SEC.	30 SEC.
RECALL POSITION	MIN. RECALL	NONE
LOCK DET.	ON	OFF
WALK *	– SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.
VOLUME DENSITY	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF
SIMULTANEOUS GAP	ON	ON

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

EMERGENCY VEHICLE PREEMPTION

FUNCTION	EV PRE 4	EV PRE 5
DELAY BEFORE PREEMPT	0	0
PMT OVERRIDE	OFF	OFF
PED CLEAR THROUGH YELLOW	N	N
TERMINATE PHASES	N	N
ENTRANCE WALK	0	0
ENTRANCE PED CLEAR	255	255
ENTRANCE MIN GREEN	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*
MIN DWELL GREEN	14	7
MAX CALL TIME	60	60
EXIT OPTIONS	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller and Cabinet	■
□	Junction Box	■
-·-·-·-	2-in Underground Conduit	-·-·-·-
N/A	Right of Way	— — —
→	Directional Arrow	→
—☼	Optical EV Detector	—●
○	Wood Pole	○
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
● ●	Construction Zone Drums	N/A
⊥⊥	Guardrail	⌐ ¬
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ

Signal Upgrade
Temporary Design 1 - TMP Phase III

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

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

SCALE 0 40 1"=40'

NC 16 (Brookshire Boulevard)
at
West Cross-Over

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	D Harris
PREPARED BY:	R M Muncey	REVIEWED BY:	B L Watson

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERHULT

DocuSigned by:
SIGNATURE 1/23/2018 DATE

SIG. INVENTORY NO. 10-2271TI

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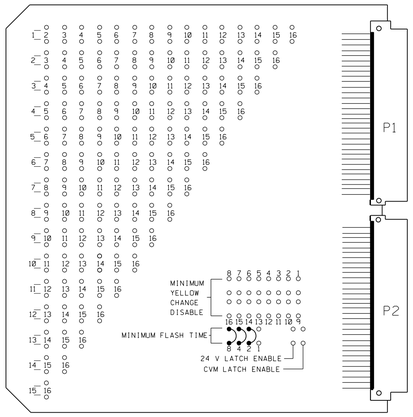
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	DISABLE
2	DISABLE
3	DISABLE
4	DISABLE
5	DISBALE
6	ENABLE
7	DISABLE
8	ENABLE
9	DISABLE
10	DISABLE
11	DISABLE
12	DISABLE
13	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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 1,2,3,4,5,7,9,10,11,12,13,14,15 & 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 6 Green.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-2.1

FIELD CONNECTION 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.	NU	NU	NU	NU	NU	61,62, 63	NU	81,82	NU	NU	NU	NU	NU	NU	NU	NU
RED						6R		8R								
YELLOW						6Y										
GREEN																
RED ARROW																
YELLOW ARROW								8Y								
GREEN ARROW						6G		8G								
✋																
🚶																

NU = NOT USED

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 NOT USED	CH1 L1 NOT USED	CH1 L7 ø8 8B	CH1 L5 ø6 6B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	CHA NOT USED	CHC EVP 5 ø8	SLOT EMPTY
		CH2 L4 ø6 6A	CH2 L2 NOT USED	CH2 L8 NOT USED	CH2 L6 ø8 8A					CHB EVP 4 ø6	CHD NOT USED	

LOOP NO.	LOOP PANEL TERMINALS
NU	L1A,L1B
NU	L2A,L2B
NU	L3A,L3B
6A	L4A,L4B
6B	L5A,L5B
8A	L6A,L6B
8B	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

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	-	-	-
2	-	-	-
3	-	-	-
4	ø6	-	-
5	ø6	-	-
6	ø8	-	-
* 7	ø8	-	-
8	-	-	-
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	-	-	-

* Detector Type - S

EQUIPMENT INFORMATION

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

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	-
2	-
3	-
4	-
5	-
6	ø6
7	-
8	ø8
9	-
10	-
11	-
12	-
13	-
14	-
15	-
16	-

UNUSED LOAD SWITCH CHANNELS SHALL BE DISABLED IN CONTROLLER PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2271T1
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 1 - TMP Phase III
Electrical Detail - Sheet 1 of 2

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

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

NC 16 (Brookshire Boulevard)
at
West Cross-Over

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2271T1

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-2.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL     NO|TERM PH    NO
PED DARK.. NO|TC RESRV   NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR|I YEL|I RED
ENTRANCE TM.   0|  25|5   7|25.5|25.5
-----------MIN GR|EXT GR|MX GR|I YEL|I RED
TRACK CLEAR    0|   0|   0|   0|   0
-----------MIN DL|PMT|EXT|MX TM|I YEL|I RED
DWL/CYC-EXIT  14|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL     NO|TERM PH    NO
PED DARK.. NO|TC RESRV   NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR|I YEL|I RED
ENTRANCE TM.   0|  25|5   7|25.5|25.5
-----------MIN GR|EXT GR|MX GR|I YEL|I RED
TRACK CLEAR    0|   0|   0|   0|   0
-----------MIN DL|PMT|EXT|MX TM|I YEL|I RED
DWL/CYC-EXIT   7|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2271T1
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 1 -TMP Phase III
Electrical Detail - Sheet 2 of 2

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Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
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NC 16 (Brookshire Boulevard)
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Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2271TI

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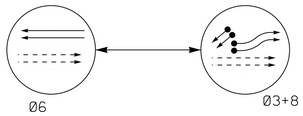
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-3.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)

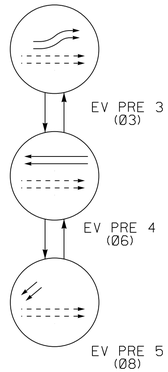
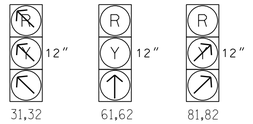


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	Ø3+8	PREVE 3	PREVE 4	PREVE 5	FLASH
31,32	R	↘	↘	R	R	R
61,62	↑	R	R	↑	R	Y
81,82	R	↗	R	R	↗	R

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR INSTALLATION CHART

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

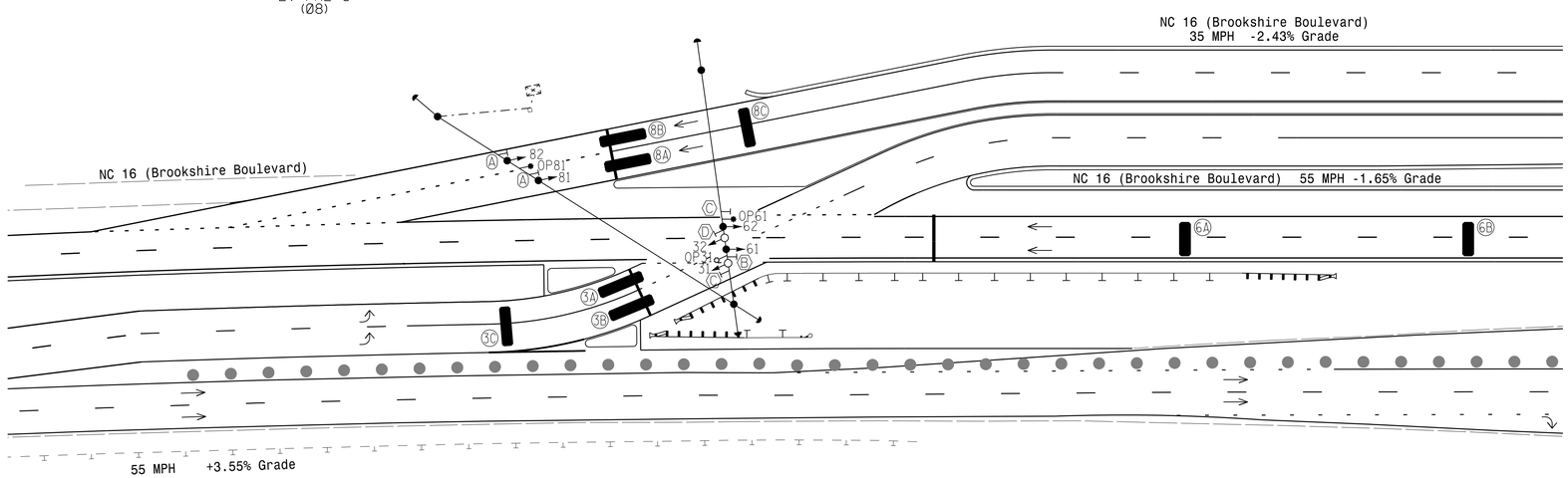
INDUCTIVE LOOPS						DETECTOR UNITS					
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
3A	6X25	+5	*	Y	-	3	Y	-	-	-	N
3B	6X25	+5	*	Y	-	3	Y	-	-	-	N
3C	6X21	70	*	Y	-	3	Y	-	-	-	N
6A	6X30	130	*	Y	-	6	-	Y	-	-	N
6B	6X30	280	*	Y	-	6	-	Y	-	-	N
8A	6X25	+5	*	Y	-	8	-	Y	-	-	N
8B	6X25	+5	*	Y	-	8	-	Y	-	-	N
8C	6X21	70	*	Y	-	8	Y	-	-	-	S

* Video Detection Area.
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.

2 Phase
Fully Actuated w/
Emergency Vehicle Preemption
(Charlotte Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
5. Reposition signal heads #81, and 82.
6. Optical Detector OP31 calls EV PRE 3
   Optical Detector OP61 calls EV PRE 4
   Optical Detector OP81 calls EV PRE 5
7. Maximum times shown in timing chart are for free-run operation only. Coordinated sinal system values supersede these values.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
○→	Signal Pole with Guy	●→
○→	Signal Pole with Sidewalk Guy	●→
▭	Inductive Loop Detector	▭
⊠	Controller and Cabinet	■
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
DD	Directional Drill	N/A
N/A	Right of Way	— — —
→	Directional Arrow	→
☼	Optical EV Detector	✸
⊙	Metal Pole with Mastarm	⊙
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
● ●	Construction Zone Drums	N/A
T T	Guardrail	T T
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	NO LEFT SYMBOL SIGN (R3-2)	Ⓑ
Ⓒ	NO RIGHT SYMBOL SIGN (R3-2)	Ⓒ
Ⓓ	NO U-TURN SIGN (R3-4)	Ⓓ

TIMING CHART

ASC/3-2070EN2 CONTROLLER

PHASE	Ø3	Ø6	Ø8
MINIMUM GREEN *	7 SEC.	14 SEC.	7 SEC.
VEHICLE EXT. *	3.0 SEC.	2.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.4 SEC.	4.1 SEC.
RED CLEARANCE	3.4 SEC.	3.3 SEC.	3.5 SEC.
MAX. 1 *	45 SEC.	35 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE
LOCK DET.	OFF	ON	OFF
WALK *	– SEC.	– SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.
DUAL ENTRY	ON	OFF	ON
SIMULTANEOUS GAP	ON	ON	ON

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

EMERGENCY VEHICLE PREEMPTION

FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5
DELAY BEFORE PREEMPT	0	0	0
PMT OVERRIDE	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	N	N	N
TERMINATE PHASES	N	N	N
ENTRANCE WALK	0	0	0
ENTRANCE PED CLEAR	255	255	255
ENTRANCE MIN GREEN	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*
MIN DWELL GREEN	7	14	7
MAX CALL TIME	60	60	60
EXIT OPTIONS	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

Signal Upgrade
Temporary Design 2 - TMP Phase IV - Steps 1 & 2

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

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

NC 16 (Brookshire Boulevard)
at
West Cross-Over

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	D Harris
PREPARED BY:	R M Muncey	REVIEWED BY:	B L Watson

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERCAMP II

DocuSigned by:
1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-227IT2

DATE:
User:rmuncey

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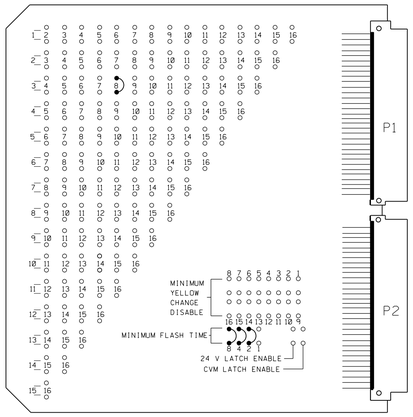
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	DISABLE
2	DISABLE
3	ENABLE
4	DISABLE
5	DISBALE
6	ENABLE
7	DISABLE
8	ENABLE
9	DISABLE
10	DISABLE
11	DISABLE
12	DISABLE
13	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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 1,2,4,5,7,9,10,11,12,13,14,15 & 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 6 Green.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-3.1

FIELD CONNECTION 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.	NU	NU	31,32	NU	NU	61,62	NU	81,82	NU	NU	NU	NU	NU	NU	NU	NU
RED						6R		8R								
YELLOW						6Y										
GREEN																
RED ARROW			3R													
YELLOW ARROW			3Y					8Y								
GREEN ARROW			3G			6G		8G								
✋																
🚶																

NU = NOT USED

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 ø3 3C	CH1 L1 ø3 3A	CH1 L7 ø8 8B	CH1 L5 ø6 6B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	CHA EVP 3 ø3	CHC EVP 5 ø8	SLOT EMPTY
		CH2 L4 ø6 6A	CH2 L2 ø3 3B	CH2 L8 ø8 8C	CH2 L6 ø8 8A					CHB EVP 4 ø6	CHD NOT USED	

LOOP NO.	LOOP PANEL TERMINALS
3A	L1A,L1B
3B	L2A,L2B
3C	L3A,L3B
6A	L4A,L4B
6B	L5A,L5B
8A	L6A,L6B
8B	L7A,L7B
8C	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

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø3	–	–
2	ø3	–	–
✱ 3	ø3	–	–
4	ø6	–	–
5	ø6	–	–
6	ø8	–	–
7	ø8	–	–
✱ 8	ø8	–	–
9	–	–	–
10	–	–	–
11	–	–	–
12	–	–	–
13	–	–	–
14	–	–	–
15	–	–	–
16	–	–	–

✱ Detector Type - S

EQUIPMENT INFORMATION

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

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	-
2	-
3	ø3
4	-
5	-
6	ø6
7	-
8	ø8
9	-
10	-
11	-
12	-
13	-
14	-
15	-
16	-

UNUSED LOAD SWITCH CHANNELS SHALL BE DISABLED IN CONTROLLER PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2271T2
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 2 - TMP Phase IV - Steps 1 & 2
Electrical Detail - Sheet 1 of 2

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

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Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 16 (Brookshire Boulevard)
at
West Cross-Over

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2271T2

DATE:
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User:rmurchy

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-3.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  0
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL     NOITERM PH    NO
PED DARK.. NOITC RESRV   NOIDWELL FL   OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. CRD
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2   NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    OI   255I    7I25.5I25.5
----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI    OI    OI  OI  O
----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I    OI   60I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  0
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL     NOITERM PH    NO
PED DARK.. NOITC RESRV   NOIDWELL FL   OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. CRD
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2   NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    OI   255I    7I25.5I25.5
----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI    OI    OI  OI  O
----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT   14I    OI   60I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  0
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL     NOITERM PH    NO
PED DARK.. NOITC RESRV   NOIDWELL FL   OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. CRD
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2   NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    OI   255I    7I25.5I25.5
----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI    OI    OI  OI  O
----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I    OI   60I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2271T2
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Tmporary Design 2 - TMP Phase IV - Steps 1 & 2
Electrical Detail - Sheet 2 of 2

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Stantec Consulting Services Inc.
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REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2271T2

DATE:
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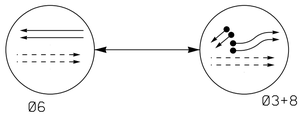
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-4.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)

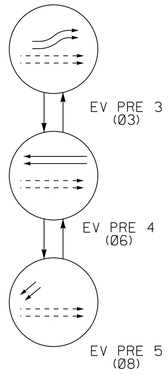
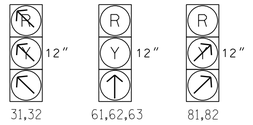


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	Ø3+8	EVE 3	EVE 4	EVE 5	FLASH
31,32	R			R	R	R
61,62,63	↑	R	R	↑	R	Y
81,82	R	↗	R	R	↗	R

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR INSTALLATION CHART

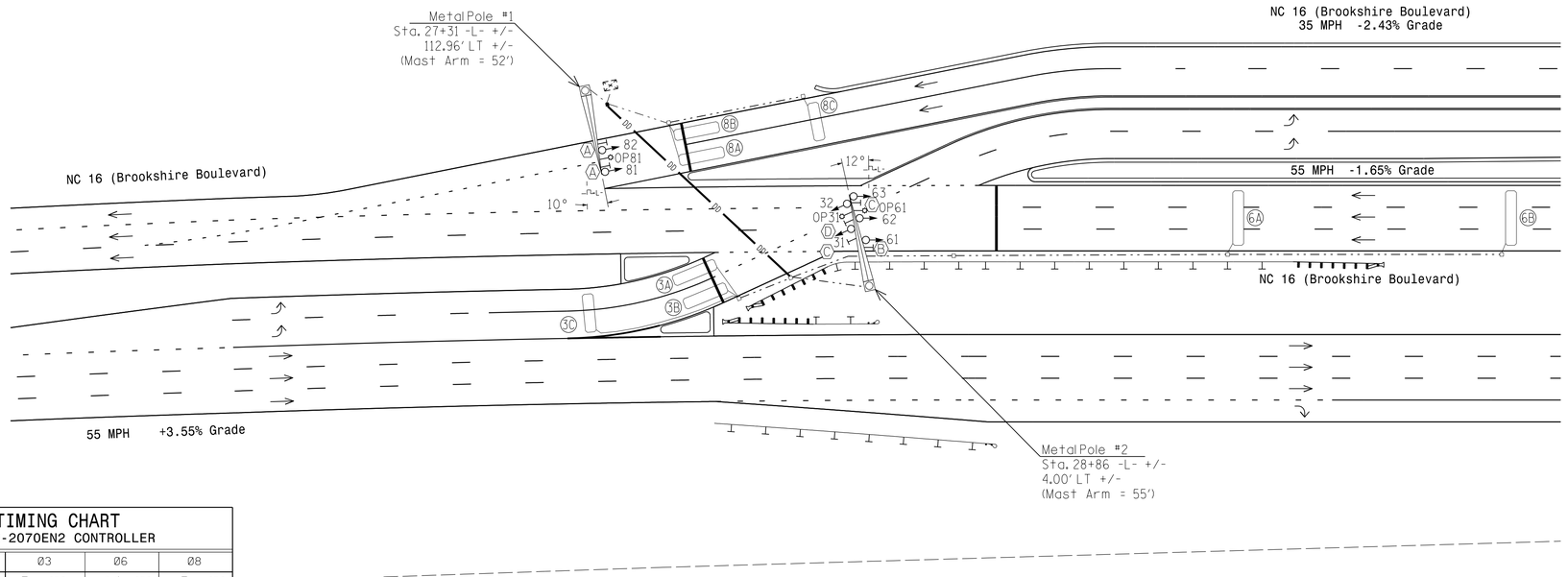
ASC/3-2070EN2 CONTROLLER w/ TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
3A	6X25	+5	3	Y	-	3	Y	-	-	-	N
3B	6X25	+5	3	Y	-	3	Y	-	-	-	N
3C	6X21	70	3	Y	-	3	Y	-	-	-	S
6A	6X30	130	3	Y	-	6	Y	-	-	-	N
6B	6X30	280	3	Y	-	6	Y	-	-	-	N
8A	6X25	+5	3	Y	-	8	Y	-	-	-	N
8B	6X25	+5	3	Y	-	8	Y	-	-	-	N
8C	6X21	70	3	Y	-	8	Y	-	-	-	S

3 Phase
Fully Actuated w/
Emergency Vehicle Preemption
(Charlotte Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Optical Detector OP31 calls EV PRE 3
   Optical Detector OP61 calls EV PRE 4
   Optical Detector OP81 calls EV PRE 5
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system values supersede these values.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
DD	Directional Drill	EXI
N/A	Guardrail	
	Metal Pole with Mastarm	
	Optical EV Detector	
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	NO LEFT SYMBOL SIGN (R3-2)	Ⓑ
Ⓒ	NO RIGHT SYMBOL SIGN (R3-2)	Ⓒ
Ⓓ	NO U-TURN SIGN (R3-4)	Ⓓ

TIMING CHART

ASC/3-2070EN2 CONTROLLER

PHASE	Ø3	Ø6	Ø8
MINIMUM GREEN *	7 SEC.	14 SEC.	7 SEC.
VEHICLE EXT. *	3.0 SEC.	2.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.4 SEC.	4.1 SEC.
RED CLEARANCE	3.4 SEC.	3.4 SEC.	2.7 SEC.
MAX. 1 *	45 SEC.	35 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE
LOCK DET.	OFF	ON	OFF
WALK *	– SEC.	– SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON

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

EMERGENCY VEHICLE PREEMPTION

FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5
DELAY BEFORE PREEMPT	0	0	0
PMT OVERRIDE	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	N	N	N
TERMINATE PHASES	N	N	N
ENTRANCE WALK	0	0	0
ENTRANCE PED CLEAR	255	255	255
ENTRANCE MIN GREEN	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*
MIN DWELL GREEN	7	14	7
MAX CALL TIME	60	60	60
EXIT OPTIONS	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

Signal Upgrade - Final Design

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

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

NC 16 (Brookshire Boulevard)
at
West Cross-Over

Division 10 Mecklenburg County Charlotte

PLAN DATE: January 2018 REVIEWED BY: D Harris
PREPARED BY: R M Muncey REVIEWED BY: B L Watson

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERCAST

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2271

DATE
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User:rmuncey

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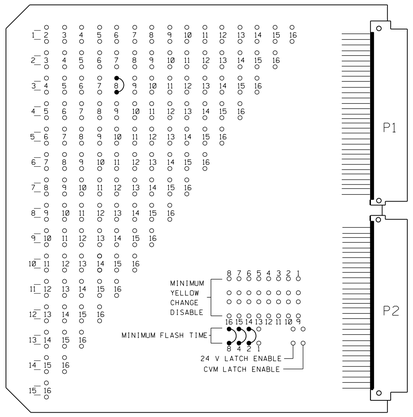
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	DISABLE
2	DISABLE
3	ENABLE
4	DISABLE
5	DISBALE
6	ENABLE
7	DISABLE
8	ENABLE
9	DISABLE
10	DISABLE
11	DISABLE
12	DISABLE
13	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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 1,2,4,5,7,9,10,11,12,13,14,15 & 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 6 Green.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-4.1

FIELD CONNECTION 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.	NU	NU	31,32	NU	NU	61,62, 63	NU	81,82	NU	NU	NU	NU	NU	NU	NU	NU
RED						6R		8R								
YELLOW						6Y										
GREEN																
RED ARROW			3R													
YELLOW ARROW			3Y					8Y								
GREEN ARROW			3G			6G		8G								
✋																
🚶																

NU = NOT USED

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 ø3 3C	CH1 L1 ø3 3A	CH1 L7 ø8 8B	CH1 L5 ø6 6B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	CHA EVP 3 ø3	CHC EVP 5 ø8	SLOT EMPTY
		CH2 L4 ø6 6A	CH2 L2 ø3 3B	CH2 L8 ø8 8C	CH2 L6 ø8 8A					CHB EVP 4 ø6	CHD NOT USED	

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

LOOP NO.	LOOP PANEL TERMINALS
3A	L1A,L1B
3B	L2A,L2B
3C	L3A,L3B
6A	L4A,L4B
6B	L5A,L5B
8A	L6A,L6B
8B	L7A,L7B
8C	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

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø3	–	–
2	ø3	–	–
✱ 3	ø3	–	–
4	ø6	–	–
5	ø6	–	–
6	ø8	–	–
7	ø8	–	–
✱ 8	ø8	–	–
9	–	–	–
10	–	–	–
11	–	–	–
12	–	–	–
13	–	–	–
14	–	–	–
15	–	–	–
16	–	–	–

✱ Detector Type - S

EQUIPMENT INFORMATION

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

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	-
2	-
3	ø3
4	-
5	-
6	ø6
7	-
8	ø8
9	-
10	-
11	-
12	-
13	-
14	-
15	-
16	-

UNUSED LOAD SWITCH CHANNELS SHALL BE DISABLED IN CONTROLLER PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2271
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Final Design
Electrical Detail - Sheet 1 of 2

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Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

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User:rmurchy

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-4.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  0
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL     NOITERM PH    NO
PED DARK.. NOITC RESRV   NOIDWELL FL   OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. CRD
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2   NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    OI   255I    7I25.5I25.5
----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI    OI    OI  OI  OI  0
----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I    OI    60I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  0
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL     NOITERM PH    NO
PED DARK.. NOITC RESRV   NOIDWELL FL   OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. CRD
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2   NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    OI   255I    7I25.5I25.5
----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI    OI    OI  OI  OI  0
----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    14I   OI    60I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  0
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL     NOITERM PH    NO
PED DARK.. NOITC RESRV   NOIDWELL FL   OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. CRD
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2   NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    OI   255I    7I25.5I25.5
----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI    OI    OI  OI  OI  0
----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I    OI    60I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-2271
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Final Design
Electrical Detail - Sheet 2 of 2

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PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

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SIG. INVENTORY NO. 10-2271

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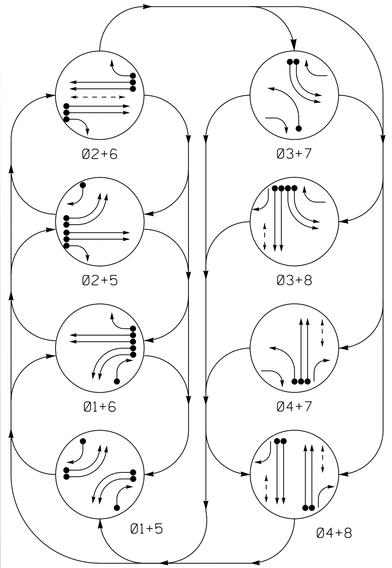
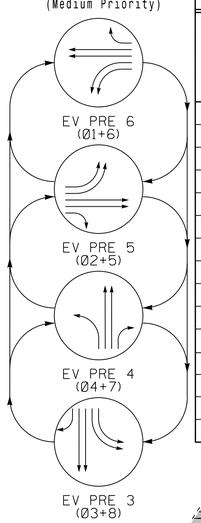
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-5.0

PHASING DIAGRAM



EV PREEMPT PHASES
(Medium Priority)



PHASING DIAGRAM DETECTION LEGEND

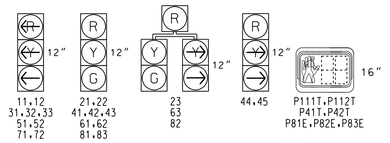
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	EVP3	EVP4	EVP5	EVP6	FLASH
11, 12	←	←	↱	↱	↱	↱	↱	↱	↱	↱	↱	←	↱
21,22	R	R	G	G	R	R	R	R	R	R	G	R	Y
23	R	R	G	G	R/→	R	R/→	R	R	R	G	R	Y
31,32,33	↱	↱	↱	↱	←	←	↱	↱	↱	↱	↱	↱	↱
41,42,43	R	R	R	R	R	R	G	G	R	R	R	R	R
44,45	→	→	R	R	R	R	→	→	R	→	R	R	R
51, 52	←	↱	←	↱	↱	↱	↱	↱	↱	↱	←	↱	↱
61,62	R	G	R	G	R	R	R	R	R	R	R	G	Y
63	R	G	R	G	R/→	R/→	R	R	R	R	R	G	Y
71,72	↱	↱	↱	↱	←	←	↱	↱	↱	↱	↱	↱	↱
81,83	R	R	R	R	R	G	R	G	G	R	R	R	R
82	R/→	R	R/→	R	R	G	R	G	G	R	R	R	R
P41T-P42T	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P111T-P112T	DW	DW	DW	W	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P81E-P83E	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK

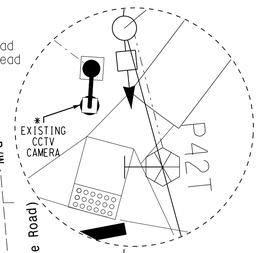
SIGNAL FACE I.D.

All Heads L.E.D.



PED FACE LEGEND

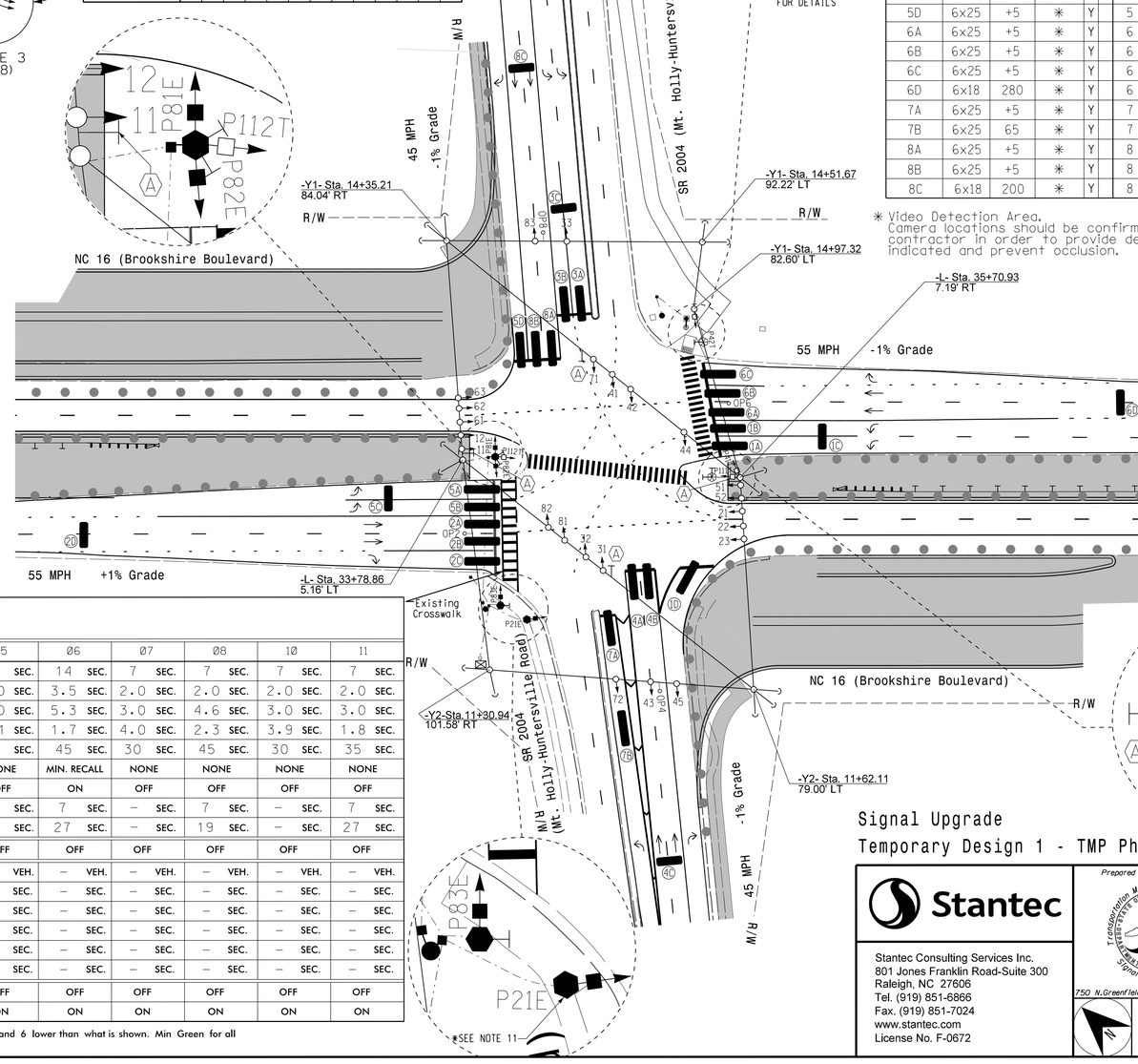
P##E = Existing PED Head
P##I = Temporary PED Head
P##F = Final PED Head



LOOP & DETECTOR INSTALLATION CHART
ASC/3-2070LN2 CONTROLLER w/ TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
1A	6x25	+5	✳	Y		1	Y	-	-	-	N
1B	6x25	+5	✳	Y		1	Y	-	-	-	N
1C	6x18	70	✳	Y		1	Y	-	-	-	N
1D	6x25	+5	✳	Y		1	Y	-	DELAY	15	D
2A	6x25	+5	✳	Y		2	Y	-	-	-	N
2B	6x25	+5	✳	Y		2	Y	-	-	-	N
2C	6x25	+5	✳	Y		2	Y	-	-	-	N
2D	6x18	280	✳	Y		2	Y	-	-	-	N
3A	6x25	+5	✳	Y		3	Y	-	-	-	N
3B	6x25	+5	✳	Y		3	Y	-	-	-	N
3C	6x18	70	✳	Y		3	Y	-	-	-	N
4A	6x25	+5	✳	Y		4	Y	-	-	-	N
4B	6x25	+5	✳	Y		4	Y	-	-	-	N
4C	6x18	200	✳	Y		4	Y	-	-	-	S
5A	6x25	+5	✳	Y		5	Y	-	-	-	N
5B	6x25	+5	✳	Y		5	Y	-	-	-	N
5C	6x18	70	✳	Y		5	Y	-	-	-	N
5D	6x25	+5	✳	Y		5	Y	-	DELAY	15	D
6A	6x25	+5	✳	Y		6	Y	-	-	-	N
6B	6x25	+5	✳	Y		6	Y	-	-	-	N
6C	6x25	+5	✳	Y		6	Y	-	-	-	N
6D	6x18	280	✳	Y		6	Y	-	-	-	N
7A	6x25	+5	✳	Y		7	Y	-	-	-	N
7B	6x25	65	✳	Y		7	Y	-	-	-	N
8A	6x25	+5	✳	Y		8	Y	-	-	-	N
8B	6x25	+5	✳	Y		8	Y	-	-	-	N
8C	6x18	200	✳	Y		8	Y	-	-	-	S

✳ Video Detection Area.
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.



EMERGENCY VEHICLE PREEMPTION

FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5	EV PRE 6
DELAY BEFORE PREEMPT	0	0	0	0
PMT OVERRIDE	OFF	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	Y	Y	Y	Y
TERMINATE PHASES	N	N	N	N
ENTRANCE WALK	0	0	0	0
ENTRANCE PED CLEAR	255	255	255	255
ENTRANCE MIN GREEN	7	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*	25.5*
MIN DWELL GREEN	7	7	14	14
MAX CALL TIME	60	60	60	60
EXIT OPTIONS	CRD	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

TIMING CHART
ASC/3-2070LN2 CONTROLLER

PHASE	01	02	03	04	05	06	07	08	10	11
MINIMUM GREEN *	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.1 SEC.	3.0 SEC.	4.6 SEC.	3.0 SEC.	5.3 SEC.	3.0 SEC.	4.6 SEC.	3.0 SEC.	3.0 SEC.
RED CLEARANCE	3.9 SEC.	1.7 SEC.	4.5 SEC.	2.3 SEC.	4.1 SEC.	1.7 SEC.	4.0 SEC.	2.3 SEC.	3.9 SEC.	1.8 SEC.
MAX. 1 *	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	35 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE	NONE	NONE
LOCK DET.	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
WALK *	– SEC.	– SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	17 SEC.	– SEC.	27 SEC.	– SEC.	19 SEC.	– SEC.	27 SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

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

8 Phase
Fully Actuated w/
Emergency Vehicle Preemption
(Charlotte 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 not be lagged.
4. Set all detector units to presence mode.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
7. Pedestrian pedestals are conceptual and shown for reference only. See 2018 NCDOT Roadway Standard Drawings #1705.04, Sheets 1-3, for push button location details.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only. Contractor shall make sure none of the left turns are occluded.
10. Optical Detector OP2 calls EV PRE 5
    Optical Detector OP4 calls EV PRE 4
    Optical Detector OP6 calls EV PRE 6
    Optical Detector OP8 calls EV PRE 3
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system values supersede these values.
12. Cover and disconnect existing ped signal head P81E. Remove existing head P21E.
13. Reuse existing conduit and junction boxes for operation of existing ped signals as shown.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
⊛	Type I Pushbutton Post	⊛
⬡	Type II Signal Pedestal	⬢
⊢	Ped Push Button w/Sign	◗⊢
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller and Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	------
→	Directional Arrow	→
○	Optical EV Detector	✸
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
● ●	Construction Zone Drums	N/A
⊢ ⊢	Guardrail	⊢ ⊢
Ⓐ	"NO U-TURN" SIGN (R3-4)	Ⓐ

Signal Upgrade
Temporary Design 1 - TMP Phase II

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

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

SCALE 0 50 1"=50'

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)
Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	E D Harris
PREPARED BY:	J B Hambright	REVIEWED BY:	B L Watson

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERCAST

Docu Signed by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850TI

CDOT ASSET NO.: 941

DATE
I:\Traffic\Signals\Designs\Signals\Temporary Designs\U6084_sig_10-0850_T1.dgn
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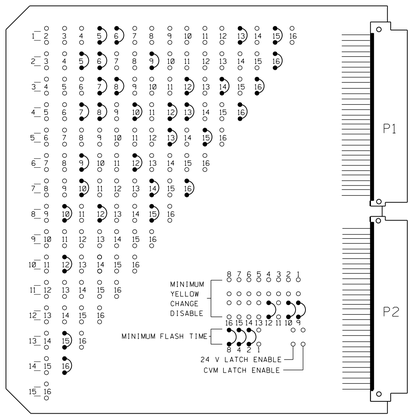
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	ENABLE
6	ENABLE
7	ENABLE
8	ENABLE
9	ENABLE
10	ENABLE
11	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

MMU PROGRAMMING NOTE

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

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	ø11P
10	ø4P
11	øOLE
12	ø8P
13	øOLA
14	øOLB
15	øOLC
16	øOLD

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-5.1

FIELD CONNECTION 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.	11,12	21,22	23	31,32, 33	41,42, 43	51,52	61,62	63	71,72	81,83	82	P111T P112T	P41T, P42T	NU	P81E, P82E, P83E	44,45	63	82	23
RED		2R	2R		4R		6R	6R		8R	8R					13R	*	*	*
YELLOW		2Y	2Y		4Y		6Y	6Y		8Y	8Y								
GREEN		2G	2G		4G		6G	6G		8G	8G								
RED ARROW	1R			3R		5R			7R										
YELLOW ARROW	1Y			3Y		5Y			7Y							13Y	14Y	15Y	16Y
GREEN ARROW	1G			3G		5G			7G							13G	14G	15G	16G
✋												9R	10R		12R				
🚶												9G	10G		12G				

NU = Not Used

* Denotes install load resistor. See load resistor installation 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	CH1	CH1	CH1	CH1	CH1	CH1	CH1	CHA	CHC	SLOT EMPTY
L3 ø1 1C	L1 ø1 1A	L7 ø2 2C	L5 ø2 2A	L11 ø3 3C	L9 ø3 3A	L15 ø5 5A	L13 ø4 4B	EVP3 ø3,8	EVP5 ø2,5	
CH2	CH2	CH2	CH2	CH2	CH2	CH2	CH2	CHB	CHD	
L4 ø1 1D	L2 ø1 1B	L8 ø2 2D	L6 ø2 2B	L12 ø4 4A	L10 ø3 3B	L16 ø5 5B	L14 ø4 4C	EVP4 ø4,7	EVP6 ø1,6	

RACK #2 — BIU

CH1	CH1	CH1	CH1	CH1	CH1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
L19 ø6 6A	L17 ø5 5C	L23 ø7 7A	L21 ø6 6C	L27 ø8 8C	L25 ø8 8A					
CH2	CH2	CH2	CH2	CH2	CH2					
L20 ø6 6B	L18 ø5 5D	L24 ø7 7B	L22 ø6 6D	L28 NOT USED	L26 ø8 8B					

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
1D	L4A,L4B
2A	L5A,L5B
2B	L6A,L6B
2C	L7A,L7B
2D	L8A,L8B
3A	L9A,L9B
3B	L10A,L10B
3C	L11A,L11B
4A	L12A,L12B
4B	L13A,L13B
4C	L14A,L14B
5A	L15A,L15B
5B	L16A,L16B
5C	L17A,L17B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
· 1	ø1	–	–
· 2	ø1	–	–
· 3	ø1	–	–
** 4	ø1	DELAY	15
· 5	ø2	–	–
· 6	ø2	–	–
· 7	ø2	–	–
· 8	ø2	–	–
· 9	ø3	–	–
· 10	ø3	–	–
· 11	ø3	–	–
· 12	ø4	–	–
· 13	ø4	–	–
* 14	ø4	–	–
· 15	ø5	–	–
· 16	ø5	–	–
· 17	ø5	–	–

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

LOOP NO.	LOOP PANEL TERMINALS
5D	L18A,L18B
6A	L19A,L19B
6B	L20A,L20B
6C	L21A,L21B
6D	L22A,L22B
7A	L23A,L23B
7B	L24A,L24B
8A	L25A,L25B
8B	L26A,L26B
8C	L27A,L27B
NU	L28A,L28B
NU	L29A,L29B
NU	L30A,L30B
NU	L31A,L31B
NU	L32A,L32B
NU	L33A,L33B
NU	L33A,L33B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
** 18	ø5	DELAY	15
· 19	ø6	–	–
· 20	ø6	–	–
· 21	ø6	–	–
· 22	ø6	–	–
· 23	ø7	–	–
· 24	ø7	–	–
· 25	ø8	–	–
· 26	ø8	–	–
* 27	ø8	–	–
· 28	NU	–	–
· 29	NU	–	–
· 30	NU	–	–
· 31	NU	–	–
· 32	NU	–	–
· 33	NU	–	–
· 34	NU	–	–

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

* Detector Type - S
** Detector Type - D

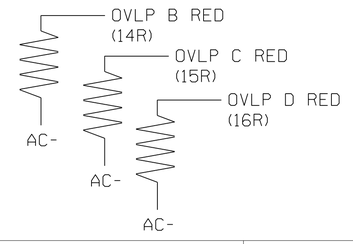
EQUIPMENT INFORMATION

CONTROLLER.....2070LN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8,9,10,12,13
PHASES USED.....1,2,3,4,5,6,7,8,PED4,PED8,PED11, OLA,OLB,OLC,OLD
OLA.....1+4
OLB.....3
OLC.....5
OLD.....7
OLE(DUMMY).....1+4

LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES

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



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 output 11 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 Phases 2 Green and 6 Walk.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T1
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 1 - TMP Phase I
Electrical Detail - Sheet 1 of 3

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T1

DATE:
User:rmccoy

DocuSign Envelope ID: 7F63B837-9AA6-4993-A72E-E43D2E9B24E9

ECONOLITE ASC/3-2070 PHASE PROGRAMMING

(program controller as shown)

The following logic processor configuration deactivates pedestrian phase 6 while phase 1 is active.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [1. CONTROLLER SEQUENCE]
3. From CONTROLLER SEQUENCE Submenu select [2. PHASE RING SEQUENCE AND ASSIGNMENT]
4. Position cursor over SEQUENCE COMMAND and toggle to [4. SEL COMPAT MODE]

PROGRAM AS SHOWN BELOW:

```
CONTROLLER SEQUENCE [1]
SEQUENCE COMMANDS        .  HW  ALT  SEQ  ENA.  NO
    01  02  03  04  05  06  07  08  09  10  11  12
BC-  C   C   C   C   C   C   C   C   C   C   C   C
R1-  1   2   3   4   .   .   .   .   .   .   .   .
R1-  5   6   7   8   .   .   .   .   .   .   .   .
R3-  10  11  .   .   .   .   .   .   .   .   .   .
R1-  .   .   .   .   .   .   .   .   .   .   .   .
```

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [1. CONTROLLER SEQUENCE]
3. From CONTROLLER SEQUENCE Submenu select [2. PHASE COMPATIBILITY]

PROGRAM AS SHOWN BELOW:

```
PHASE COMPATIBILITY                                  v
         6  5  4  3  2  1  0  9  8  7  6  5  4  3  2
      1  .  .  .  .  .  .  X  .  .  .  X  X  .  .  .
      2  .  .  .  .  .  X  X  .  .  .  X  X  .  .
      3  .  .  .  .  .  .  .  .  X  X  .  .  .
      4  .  .  .  .  .  .  .  .  X  X  .  .
      5  .  .  .  .  .  .  X  .  .  .  .
      6  .  .  .  .  .  X  X  .  .  .
      7  .  .  .  .  .  .  .  .  .
      8  .  .  .  .  .  .  .  .
      9  .  .  .  .  .  .  .
     10  .  .  .  .  .  .
     11  .  .  .  .  .
     12  .  .  .  .
     13  .  .  .
     14  .  .
```

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [2. PHASE IN USE/PED]

PROGRAM AS SHOWN BELOW:

```
PHASES IN USE / EXCLUSIVE PED
            PHASE 1  2  3  4  5  6  7  8
IN USE.......    X  X  X  X  X  X  X  X
EXCLUSIVE PED    .  .  .  .  .  .  .  .

            PHASE 9 10 11 12 13 14 15 16
IN USE.......    .  X  X  .  .  .  .  .
EXCLUSIVE PED    .  .  .  .  .  .  .  .
```

END PROGRAMMING

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

Select TMG VEH OVLP [A] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP E (DUMMY)

Select TMG VEH OVLP [D] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T1
DESIGNED: December 2017
SEALED: 01-23-2018
REVISED: _____

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-5.2

ECONOLITE ASC/3-2070 PED PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

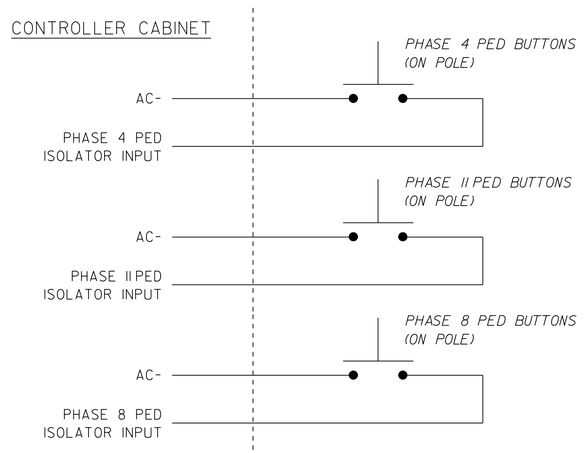
1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

LD SWITCH ASSIGN

	PHASE /OVLP	TYPE	DIMMING R	Y	G	D	---FLASH--- PWR	AUT	TGR
	1	V	.	.	.	+	A	R	.
	2	V	.	.	.	+	A	Y	X
	3	V	.	.	.	+	A	R	.
	4	V	.	.	.	+	A	R	X
	5	V	.	.	.	−	A	R	.
	6	V	.	.	.	−	A	Y	X
	7	V	.	.	.	−	A	R	.
	8	V	.	.	.	−	A	R	X
NOTICE PHASE 11 PED ASSIGNED TO LD SWITCH 9 →	9	P	.	.	.	+	A	.	.
	10	P	.	.	.	+	A	.	.
NOTICE OVLP E ASSIGNED TO LD SWITCH 11 →	11	O	.	.	.	−	A	.	.
	12	P	.	.	.	−	A	.	.
NOTICE OVLP A ASSIGNED TO LD SWITCH 13 →	13	O	.	.	.	+	A	R	.
NOTICE OVLP B ASSIGNED TO LD SWITCH 14 →	14	O	.	.	.	−	A	R	X
NOTICE OVLP C ASSIGNED TO LD SWITCH 15 →	15	O	.	.	.	+	A	R	.
NOTICE OVLP D ASSIGNED TO LD SWITCH 16 →	16	O	.	.	.	−	A	R	X

PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



Temporary Design 1 - TMP Phase I
Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T1

DATE:
FILE: Traffic\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-0850T1.dgn
User:rmuncey

DocuSign Envelope ID: 7F63B837-9AA6-4993-A72E-E43D2E9B24E9

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-5.3

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YELI RED
ENTRANCE TM.   0|  25|5   7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YELI RED
TRACK CLEAR    0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT   7|   0|   6|0|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YELI RED
ENTRANCE TM.   0|  25|5   7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YELI RED
TRACK CLEAR    0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT   7|   0|   6|0|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YELI RED
ENTRANCE TM.   0|  25|5   7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YELI RED
TRACK CLEAR    0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT  14|   0|   6|0|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 6. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #6.

```
PREEMPT PLAN [  6]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YELI RED
ENTRANCE TM.   0|  25|5   7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YELI RED
TRACK CLEAR    0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT  14|   0|   6|0|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0850T1
DESIGNED: December 2017
SEALED: 01-23-2018
REVISED: _____

Temporary Design 1 - TMP Phase I
Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 | Mecklenburg County | Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

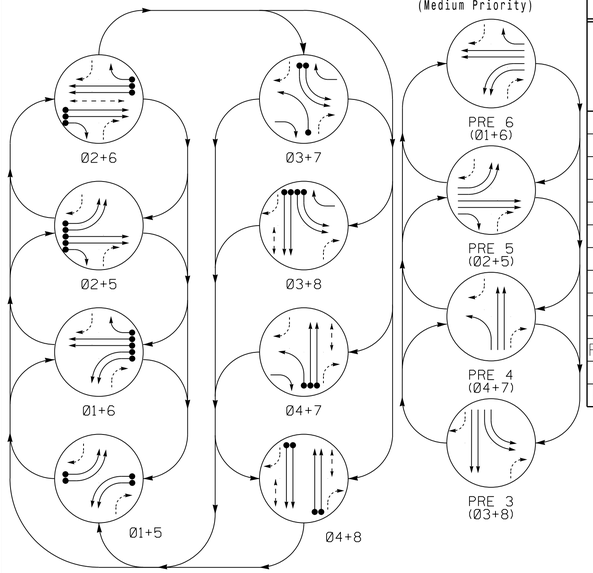
SIG. INVENTORY NO. 10-0850T1

DATE:
User:
File: C:\Traffic\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-0850T1.dgn

DocuSign Envelope ID: 7F63B837-9AA6-4993-A72E-E43D2E9B24E9

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-6.0

PHASING DIAGRAM



EV PREEMPT PHASES
(Medium Priority)

PHASING DIAGRAM DETECTION LEGEND

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

EMERGENCY VEHICLE PREEMPTION

FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5	EV PRE 6
DELAY BEFORE PREEMPT	0	0	0	0
PMT OVERRIDE	OFF	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	Y	Y	Y	Y
TERMINATE PHASES	N	N	N	N
ENTRANCE WALK	0	0	0	0
ENTRANCE PED CLEAR	255	255	255	255
ENTRANCE MIN GREEN	7	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*	25.5*
MIN DWELL GREEN	7	7	14	14
MAX CALL TIME	60	60	60	60
EXIT OPTIONS	CRD	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

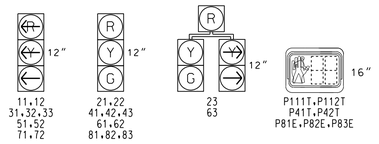
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	EVP3	EVP4	EVP5	EVP6	FLASH
11,12	←R	←R	↑R	↑R	↑R	↑R	↑R	↑R	↑R	↑R	↑R	←R	↑R
21,22	R	R	G	G	R	R	R	R	R	R	G	R	Y
23	R	R	G	G	R/→	R	R/→	R	R	R	G	R	Y
31,32,33	←R	←R	↑R	↑R	←R	←R	↑R	↑R	←R	↑R	↑R	↑R	↑R
41,42,43	R	R	R	R	R	R	G	G	R	G	R	R	R
51,52	←R	↑R	←R	↑R	↑R	↑R	↑R	↑R	↑R	↑R	←R	↑R	↑R
61,62	R	G	R	G	R	R	R	R	R	R	R	G	Y
63	R	G	R	G	R/→	R/→	R	R	R	R	R	G	Y
71,72	←R	←R	↑R	↑R	←R	↑R	←R	↑R	↑R	←R	↑R	↑R	↑R
81,82,83	R	R	R	R	R	G	R	G	G	R	R	R	R
P111T-P112T	DW	DW	DW	W	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P41T-P42T	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P81E-P83E	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK

PED FACE LEGEND
P###E = Existing PED Head
P###T = Temporary PED Head
P###F = Final PED Head

SIGNAL FACE I.D.

All Heads L.E.D.



11,12
31,32,33
51,52
71,72

21,22
41,42,43
61,62
81,82,83

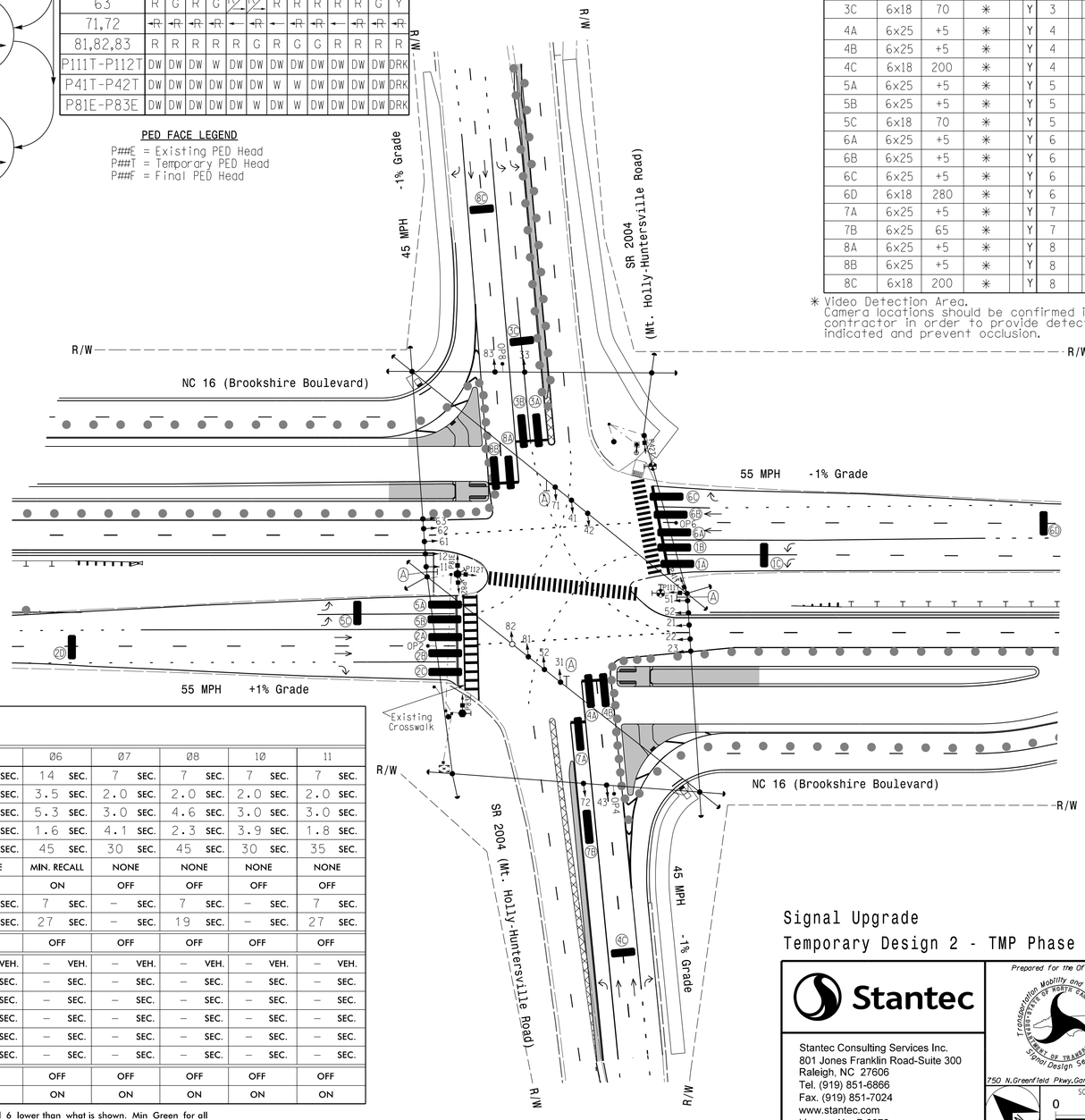
23
63

P111T,P112T
P41T,P42T
P81E,P82E,P83E

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

INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
1A	6x25	+5	*		Y	1		Y	-	-	N
1B	6x25	+5	*		Y	1		Y	-	-	N
1C	6x18	70	*		Y	1		Y	-	-	N
2A	6x25	+5	*		Y	2		Y	-	-	N
2B	6x25	+5	*		Y	2		Y	-	-	N
2C	6x25	+5	*		Y	2		Y	-	-	N
2D	6x18	280	*		Y	2		Y	-	-	N
3A	6x25	+5	*		Y	3		Y	-	-	N
3B	6x25	+5	*		Y	3		Y	-	-	N
3C	6x18	70	*		Y	3		Y	-	-	N
4A	6x25	+5	*		Y	4		Y	-	-	N
4B	6x25	+5	*		Y	4		Y	-	-	N
4C	6x18	200	*		Y	4		Y	-	-	S
5A	6x25	+5	*		Y	5		Y	-	-	N
5B	6x25	+5	*		Y	5		Y	-	-	N
5C	6x18	70	*		Y	5		Y	-	-	N
6A	6x25	+5	*		Y	6		Y	-	-	N
6B	6x25	+5	*		Y	6		Y	-	-	N
6C	6x25	+5	*		Y	6		Y	-	-	N
6D	6x18	280	*		Y	6		Y	-	-	N
7A	6x25	+5	*		Y	7		Y	-	-	N
7B	6x25	65	*		Y	7		Y	-	-	N
8A	6x25	+5	*		Y	8		Y	-	-	N
8B	6x25	+5	*		Y	8		Y	-	-	N
8C	6x18	200	*		Y	8		Y	-	-	S

* Video Detection Area.
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.



TIMING CHART
ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	10	11
MINIMUM GREEN *	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.1 SEC.	3.0 SEC.	4.6 SEC.	3.0 SEC.	5.3 SEC.	3.0 SEC.	4.6 SEC.	3.0 SEC.	3.0 SEC.
RED CLEARANCE	4.2 SEC.	1.5 SEC.	4.5 SEC.	2.2 SEC.	4.1 SEC.	1.6 SEC.	4.1 SEC.	2.3 SEC.	3.9 SEC.	1.8 SEC.
MAX. 1 *	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	35 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE	NONE	NONE
LOCK DET.	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
WALK *	– SEC.	– SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	17 SEC.	– SEC.	27 SEC.	– SEC.	19 SEC.	– SEC.	27 SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

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

8 Phase
Fully Actuated w/
Emergency Vehicle Preemption
(Charlotte 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 not be lagged.
4. Set all detector units to presence mode.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
7. Pedestrain pedestals are conceptual and shown for reference only. See 2018 NCDOT Roadway Standard Drawings #1705.04, Sheets 1-3, for push button location details.
8. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only. Contractor shall make sure none of the left turns are occluded.
9. Optical Detector OP2 calls EV PRE 5
   Optical Detector OP4 calls EV PRE 4
   Optical Detector OP6 calls EV PRE 6
   Optical Detector OP8 calls EV PRE 3
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system values supersede these values.
11. Existing ped signal head P81E will remain covered and disconnected.
12. Relocate signal heads 41.42.43.71.72 and 81. Remove signal head 44 & 45.
13. Reuse existing conduit and junction boxes for operation of existing ped signals as shown.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
⊛	Type I Pushbutton Post	●
⬡	Type II Signal Pedestal	⬢
⊢	Ped Push Button w/Sign	⊢
○—	Signal Pole with Guy	●—
○⌐	Signal Pole with Sidewalk Guy	●⌐
▭	Inductive Loop Detector	▭
⊠	Controller and Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	-----
→	Directional Arrow	→
○	Optical EV Detector	✱
▬	Video Detection Area	N/A
▭	Metal Pole with Mastarm	□
▭	Construction Zone	N/A
● ●	Construction Zone Drums	N/A
⊥	Guardrail	- - -
Ⓐ	"NO U-TURN" SIGN (R3-4)	Ⓐ

Signal Upgrade
Temporary Design 2 - TMP Phase III

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Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
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Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 50 1"=50'

NC 16 (Brookshire Boulevard)
at
SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	E D Harris
PREPARED BY:	J B HAMBRIGHT	REVIEWED BY:	B L Watson

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERMIRE II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-085012

CDOT ASSET NO.: 941

DATE:
User:rmuncy

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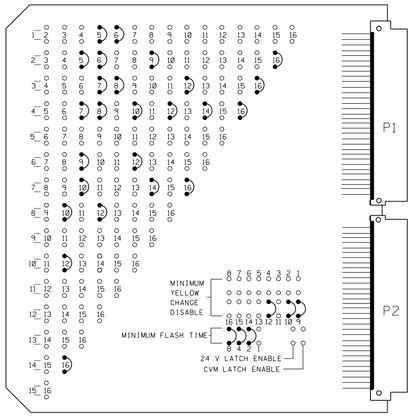
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	ENABLE
6	ENABLE
7	ENABLE
8	ENABLE
9	ENABLE
10	ENABLE
11	DISABLE
12	ENABLE
13	DISABLE
14	ENABLE
15	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

MMU PROGRAMMING NOTE

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

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	ø11P
10	ø4P
11	øOLE
12	ø8P
13	-
14	øOLB
15	-
16	øOLD

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-6.1

FIELD CONNECTION 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.	11,12	21,22	23	31,32, 33	41,42, 43	51,52	61,62	63	71,72	81,82, 83	P11T, P12T	P41T, P42T	NU	P81E, P82E, P83E	NU	63	NU	23
RED		2R	2R		4R		6R	6R		8R						*		*
YELLOW		2Y	2Y		4Y		6Y	6Y		8Y								
GREEN		2G	2G		4G		6G	6G		8G								
RED ARROW	1R			3R		5R			7R									
YELLOW ARROW	1Y			3Y		5Y			7Y							14Y		16Y
GREEN ARROW	1G			3G		5G			7G							14G		16G
✋											9R	10R		12R				
🚶											9G	10G		12G				

NU = Not Used

* Denotes install load resistor. See load resistor installation 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 1C	CH1 L1 ø1 1A	CH1 L7 ø2 2C	CH1 L5 ø2 2A	CH1 L11 ø3 3C	CH1 L9 ø3 3A	CH1 L15 ø5 5A	CH1 L13 ø4 4B	CHA EVP3 ø3,8	CHC EVP5 ø2,5	SLOT EMPTY
		CH2 L4 NOT USED	CH2 L2 ø1 1B	CH2 L8 ø2 2D	CH2 L6 ø2 2B	CH2 L12 ø4 4A	CH2 L10 ø3 3B	CH2 L16 ø5 5B	CH2 L14 ø4 4C	CHB EVP4 ø4,7	CHD EVP6 ø1,6	

RACK #2	BIU	CH1 L19 ø6 6A	CH1 L17 ø5 5C	CH1 L23 ø7 7A	CH1 L21 ø6 6C	CH1 L27 ø8 8C	CH1 L25 ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
		CH2 L20 ø6 6B	CH2 L18 NOT USED	CH2 L24 ø7 7B	CH2 L22 ø6 6D	CH2 L28 NOT USED	CH2 L26 ø8 8B					

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
NU	L4A,L4B
2A	L5A,L5B
2B	L6A,L6B
2C	L7A,L7B
2D	L8A,L8B
3A	L9A,L9B
3B	L10A,L10B
3C	L11A,L11B
4A	L12A,L12B
4B	L13A,L13B
4C	L14A,L14B
5A	L15A,L15B
5B	L16A,L16B
5C	L17A,L17B

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
1	ø1	-	-
2	ø1	-	-
3	ø1	-	-
4	NU	-	-
5	ø2	-	-
6	ø2	-	-
7	ø2	-	-
8	ø2	-	-
9	ø3	-	-
10	ø3	-	-
11	ø3	-	-
12	ø4	-	-
13	ø4	-	-
* 14	ø4	-	-
15	ø5	-	-
16	ø5	-	-
17	ø5	-	-

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

LOOP NO.	LOOP PANEL TERMINALS
NU	L18A,L18B
6A	L19A,L19B
6B	L20A,L20B
6C	L21A,L21B
6D	L22A,L22B
7A	L23A,L23B
7B	L24A,L24B
8A	L25A,L25B
8B	L26A,L26B
8C	L27A,L27B
NU	L28A,L28B
NU	L29A,L29B
NU	L30A,L30B
NU	L31A,L31B
NU	L32A,L32B
NU	L33A,L33B
NU	L33A,L33B

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
18	NU	-	-
19	ø6	-	-
20	ø6	-	-
21	ø6	-	-
22	ø6	-	-
23	ø7	-	-
24	ø7	-	-
25	ø8	-	-
26	ø8	-	-
* 27	ø8	-	-
28	NU	-	-
29	NU	-	-
30	NU	-	-
31	NU	-	-
32	NU	-	-
33	NU	-	-
34	NU	-	-

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

* Detector Type - S

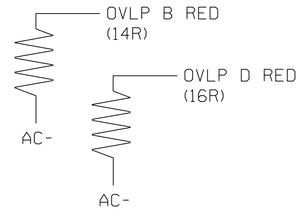
EQUIPMENT INFORMATION

CONTROLLER.....2070LN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8,9,10,12
PHASES USED.....1,2,3,4,5,6,7,8,P4,P6,P8,P11
OLA.....NOT USED
OLB.....3
OLC.....NOT USED
OLD.....7
OLE(DUMMY).....1+4

LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES

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



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 11,13 & 15 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 Phases 2 Green and 6 Walk.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T2
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 2 - TMP Phase III
Electrical Detail - Sheet 1 of 3

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

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Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T2

DATE:
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User:rmuncey

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-6.2

ECONOLITE ASC/3-2070 PHASE PROGRAMMING

(program controller as shown)

The following logic processor configuration deactivates pedestrian phase 6 while phase 1 is active.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [1. CONTROLLER SEQUENCE]
3. From CONTROLLER SEQUENCE Submenu select [2. PHASE RING SEQUENCE AND ASSIGNMENT]
4. Position cursor over SEQUENCE COMMAND and toggle to [4. SEL COMPAT MODE]

PROGRAM AS SHOWN BELOW:

```
CONTROLLER SEQUENCE [1]
SEQUENCE COMMANDS          .  HW  ALT  SEQ  ENA.  NO
     01  02  03  04  05  06  07  08  09  10  11  12
BC-  C   C   C   C   C   C   C   C   C   C   C   C
R1-  1   2   3   4   .   .   .   .   .   .   .   .
R1-  5   6   7   8   .   .   .   .   .   .   .   .
R3-  10  11  .   .   .   .   .   .   .   .   .   .
R1-  .   .   .   .   .   .   .   .   .   .   .   .
```

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [1. CONTROLLER SEQUENCE]
3. From CONTROLLER SEQUENCE Submenu select [2. PHASE COMPATIBILITY]

PROGRAM AS SHOWN BELOW:

```
PHASE COMPATIBILITY                                  v
         6  5  4  3  2  1  0  9  8  7  6  5  4  3  2
      1  .  .  .  .  .  .  X  .  .  .  X  X  .  .  .
      2  .  .  .  .  .  X  X  .  .  .  X  X  .  .
      3  .  .  .  .  .  .  .  X  X  .  .  .
      4  .  .  .  .  .  .  .  .  X  X  .  .
      5  .  .  .  .  .  .  X  .  .  .  .
      6  .  .  .  .  .  X  X  .  .  .
      7  .  .  .  .  .  .  .  .  .
      8  .  .  .  .  .  .  .  .
      9  .  .  .  .  .  .  .  .
     10  .  .  .  .  .  .  .
     11  .  .  .  .  .  .
     12  .  .  .  .
     13  .  .  .
     14  .  .
```

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [2. PHASE IN USE/PED]

PROGRAM AS SHOWN BELOW:

```
PHASES IN USE / EXCLUSIVE PED
            PHASE 1  2  3  4  5  6  7  8
IN USE.......    X  X  X  X  X  X  X  X
EXCLUSIVE PED    .  .  .  .  .  .  .  .

            PHASE 9 10 11 12 13 14 15 16
IN USE.......    .  X  X  .  .  .  .  .
EXCLUSIVE PED    .  .  .  .  .  .  .  .
```

END PROGRAMMING

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

Toggle Twice

OVERLAP B

Select TMG VEH OVLP [B] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Three Times

OVERLAP E (DUMMY)

Select TMG VEH OVLP [D] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T2
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

ECONOLITE ASC/3-2070 PED PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

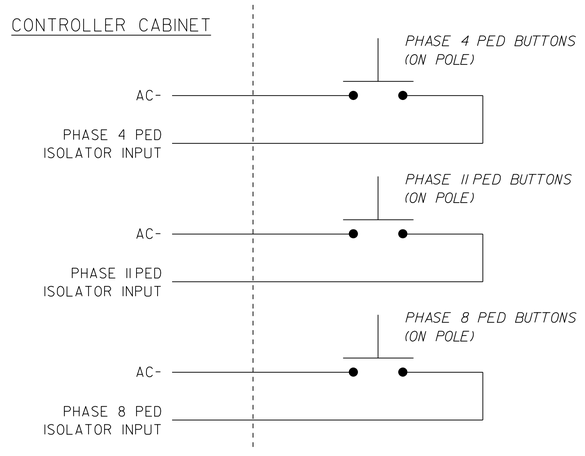
1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

LD SWITCH ASSIGN

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

PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



Temporary Design 2 - TMP Phase III
Electrical Detail - Sheet 2 of 3

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Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, III

DocuSigned by: 1/23/2018
DESIGNER/ENGINEER SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T2

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-6.3

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLMN GRI YELI RED
ENTRANCE TM.  0|  255|  7|25.5|25.5
-----------MIN GR|EXT GR|MX GRI YELI RED
TRACK CLEAR   0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT  7|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLMN GRI YELI RED
ENTRANCE TM.  0|  255|  7|25.5|25.5
-----------MIN GR|EXT GR|MX GRI YELI RED
TRACK CLEAR   0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT  7|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLMN GRI YELI RED
ENTRANCE TM.  0|  255|  7|25.5|25.5
-----------MIN GR|EXT GR|MX GRI YELI RED
TRACK CLEAR   0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT 14|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 6. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #6.

```
PREEMPT PLAN [  6]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLMN GRI YELI RED
ENTRANCE TM.  0|  255|  7|25.5|25.5
-----------MIN GR|EXT GR|MX GRI YELI RED
TRACK CLEAR   0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT 14|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T2
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 2 - TMP Phase III
Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

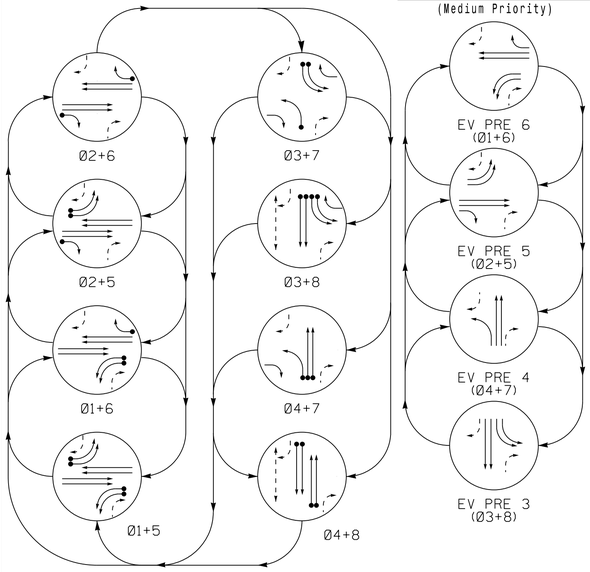
SIG. INVENTORY NO. 10-0850T2

DATE:
User:rtmurchy
I:\Traffic\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-0850T2.dgn

DocuSign Envelope ID: 7F63B837-9AA6-4993-A72E-E43D2E9B24E9

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-7.0

PHASING DIAGRAM



EV PREEMPT PHASES
(Medium Priority)

PHASING DIAGRAM DETECTION LEGEND

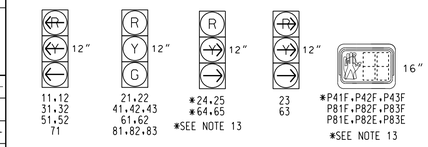
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF TOPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+07	03+08	04+07	04+08	EVP3	EVP4	EVP5	EVP6	FLASH
11, 12	←	←	~~←~~R	~~←~~R	~~←~~R	~~←~~R	~~←~~R	~~←~~R	~~←~~R	~~←~~R	~~←~~R	←	~~←~~R
21,22	G	G	G	G	R	R	R	R	R	R	G	R	Y
23	~~→~~R	~~→~~R	→	→	→	~~→~~R	→	~~→~~R	~~→~~R	~~→~~R	→	~~→~~R	~~→~~R
31,32	~~←~~R	~~←~~R	~~←~~R	~~←~~R	←	←	~~←~~R	~~←~~R	←	~~←~~R	~~←~~R	~~←~~R	~~←~~R
41, 42, 43	R	R	R	R	R	R	G	G	R	G	R	R	R
51, 52	←	~~←~~R	←	~~←~~R	~~←~~R	~~←~~R	~~←~~R	~~←~~R	~~←~~R	~~←~~R	←	~~←~~R	~~←~~R
61,62	G	G	G	G	R	R	R	R	R	R	G	R	Y
63	~~→~~R	→	~~→~~R	→	→	→	~~→~~R	~~→~~R	~~→~~R	~~→~~R	~~→~~R	→	~~→~~R
71	~~←~~R	~~←~~R	~~←~~R	~~←~~R	←	~~←~~R	←	~~←~~R	~~←~~R	←	~~←~~R	~~←~~R	~~←~~R
81, 82, 83	R	R	R	R	R	G	R	G	G	R	R	R	R
P81F-P82F	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK
P83F-P81E	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK
P82E-P83E	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



PED FACE LEGEND

P##E = Existing PED Head
P##T = Temporary PED Head
P##F = Final PED Head

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

INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
1A	6x25	+5	*	Y	-	1	Y	-	-	-	N
1B	6x25	+5	*	Y	-	1	Y	-	-	-	N
1C	6x18	70	*	Y	-	1	Y	-		-	N
2A	6x25	+5	*	-	Y	2	-	Y		-	N
2B	6x25	+5	*	-	Y	2	-	Y			N
2C	6x25	+5	*	-	Y	2	-	Y	-	-	N
2D	6x18	280	*	-	Y	2	-	Y	-	-	N
3A	6x25	+5	*	-	Y	3	-	Y	-	-	N
3B	6x25	+5	*	-	Y	3	-	Y	-	-	N
3C	6x18	70	*	-	Y	3	-	Y	-	-	N
4A	6x25	+5	*	-	Y	4	-	Y	-	-	N
4B	6x25	+5	*	-	Y	4	-	Y	-	-	N
4C	6x18	200	*	-	Y	4	-	Y	-	-	S
5A	6x25	+5	*	-	Y	5	Y	-	-	-	N
5B	6x25	+5	*	-	Y	5	Y	-	-	-	N
5C	6x18	70	*	-	Y	5	Y	-	-	-	N
6A	6x25	+5	*	-	Y	6	-	Y		-	N
6B	6x25	+5	*	-	Y	6	-	Y		-	N
6C	6x25	+5	*	-	Y	6	-	Y	-	-	N
6D	6x18	280	*	-	Y	6	-	Y	-	-	N
7A	6x25	+5	*	-	Y	7	-	Y	-	-	N
7B	6x25	65	*	-	Y	7	-	Y	-	-	N
8A	6x25	+5	*	-	Y	8	-	Y	-	-	N
8B	6x25	+5	*	-	Y	8	-	Y	-	-	N
8C	6x18	200	*	-	Y	8	-	Y	-	-	S

* Video Detection Area.
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.

8 Phase
Fully Actuated w/
Emergency Vehicle Preemption
(Charlotte Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrain heads to countdown the flashing "DON'T WALK" time only.
6. Pedestrian pedestals are conceptual and shown for reference only. See 2018 NCDOT Roadway Standard Drawings #1705.04, Sheets 1-3, for push button location details.
7. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only. Contractor shall make sure none of the left turns are occluded.
8. Optical Detector OP1 calls EV PRE 6
   Optical Detector OP2 calls EV PRE 5
   Optical Detector OP4 calls EV PRE 4
   Optical Detector OP5 calls EV PRE 5
   Optical Detector OP6 calls EV PRE 6
   Optical Detector OP8 calls EV PRE 3
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system values supersede these values.
10. Ped signal heads P61T,P62T,P41T,P42T can be removed. Uncover and energize ped head P81E.
11. Relocate heads 31,32, and 71.
12. Reuse existing conduit and junction boxes for operation of existing ped signals as shown.
13. Install, cover, but do not connect signal heads P41F,P42F,P43F,24,25,64,65 (including adjacent signs), sign Ⓔ, and sign Ⓒ.

EMERGENCY VEHICLE PREEMPTION

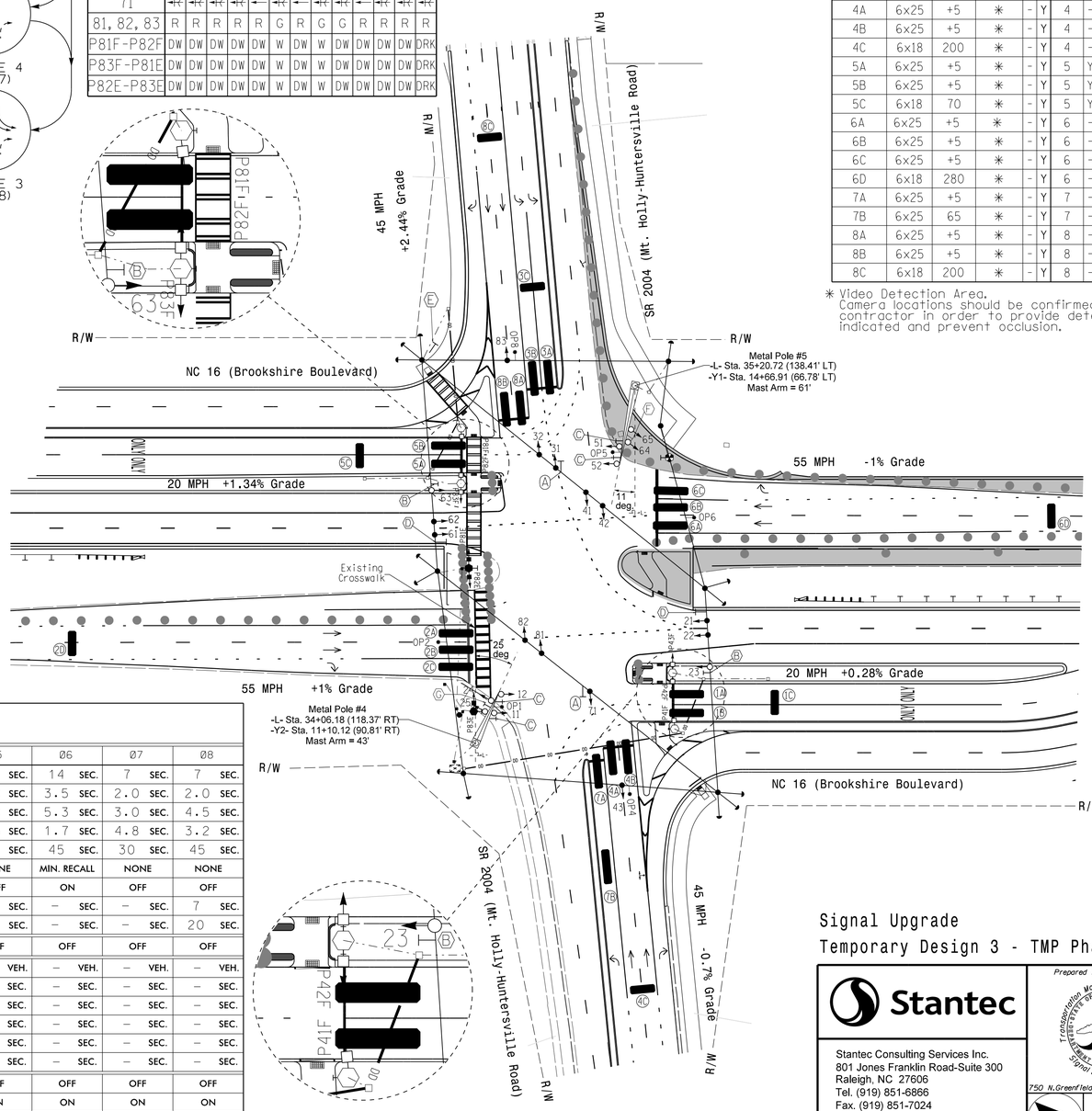
FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5	EV PRE 6
DELAY BEFORE PREEMPT	0	0	0	0
PMT OVERRIDE	OFF	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	Y	Y	Y	Y
TERMINATE PHASES	N	N	N	N
ENTRANCE WALK	0	0	0	0
ENTRANCE PED CLEAR	255	255	255	255
ENTRANCE MIN GREEN	7	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*	25.5*
MIN DWELL GREEN	7	7	14	14
MAX CALL TIME	60	60	60	60
EXIT OPTIONS	CRD	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

TIMING CHART
ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN *	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.1 SEC.	3.0 SEC.	4.6 SEC.	3.0 SEC.	5.3 SEC.	3.0 SEC.	4.5 SEC.
RED CLEARANCE	3.4 SEC.	1.5 SEC.	4.8 SEC.	3.3 SEC.	3.5 SEC.	1.7 SEC.	4.8 SEC.	3.2 SEC.
MAX. 1 *	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 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.	– SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	20 SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	OFF	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.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
⊛	Type I Pushbutton Post	✣
⬡	Type II Signal Pedestal	⬢
⊢	Ped Push Button w/Sign	⊢
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller and Cabinet	⊠
□	Junction Box	■
	Directional Drill	N/A
	2-in Underground Conduit	
	Right of Way	
Ⓐ	NO U-TURN SIGN (R3-4)	Ⓐ
Ⓑ	"NO TURN ON RED" SIGN (R10-11a)	Ⓑ
Ⓒ	LEFT "ONLY" SIGN (R3-5L)	Ⓒ
Ⓓ	NO LEFT/U-TURN SYMBOL SIGN (R3-18)	Ⓓ
Ⓔ	"PEDESTRIAN CROSSING" SIGN (W11-2) W/ ARROW PANEL (W16-7p)	Ⓔ
Ⓕ	"NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign	Ⓕ
Ⓖ	"NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign	Ⓖ
	Directional Arrow	
	Optical EV Detector	
	Video Detection Area	
	Metal Pole with Mastarm	
	Construction Zone	
	Construction Zone Drums	
	Guardrail	

Signal Upgrade
Temporary Design 3 - TMP Phase IV

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

SCALE 0 50 1"=50'

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE: January 2018 REVIEWED BY: E D Harris
PREPARED BY: J B HAMBRIGHT REVIEWED BY: B L Watson

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-085073

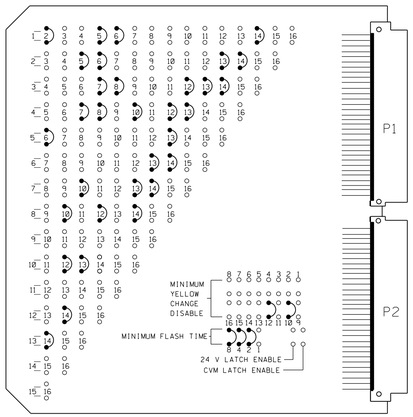
CDOT ASSET NO.: 941

DATE: 1/17/2018
FILE: C:\Traffic\Signals\Design\Signals\Temporary Designs\U6084_sig_10-085D_T3.dgn
User: rmuncey

DocuSign Envelope ID: 7F63B837-9AA6-4993-A72E-E43D2E9B24E9

EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	ENABLE
6	ENABLE
7	ENABLE
8	ENABLE
9	DISABLE
10	ENABLE
11	DISABLE
12	ENABLE
13	ENABLE
14	ENABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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 9,11,14,15, & 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 trasfer relays are in place.
3. Program controller to start up in Phases 2 and 6 Green.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-7.1

FIELD CONNECTION HOOK-UP CHART

PHASE	1	OLA	3	4	5	OLC	7	8	2 PED	4 PED	6 PED	8 PED	OLB	OLD	1 PED	5 PED
SIGNAL HEAD NO.	11,12	21,22	31,32	41,42, 43	51,52	61,62	71	81,82, 83	NU	P41F, P42F, P43F	NU	P81F, P82F, P83F, P81E, P82E, P83E	23	63	NU	NU
RED		2R		4R		6R		8R								
YELLOW		2Y		4Y		6Y		8Y								
GREEN		2G		4G		6G		8G								
RED ARROW	1R		3R		5R		7R						13R	14R		
YELLOW ARROW	1Y		3Y		5Y		7Y						13Y	14Y		
GREEN ARROW	1G		3G		5G		7G						13G	14G		
✋										10R		12R				
🚶										10G		12G				

NU = NOT USED

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	CH1	CH1	CH1	CH1	CH1	CH1	CH1	CHA	CHC	SLOT EMPTY
L3	L1	L7	L5	L11	L9	L15	L13	EVP3	EVP5	
ø1	ø1	ø2	ø2	ø3	ø3	ø5	ø4	ø3,8	ø2,5	
1C	1A	2D	2B	3C	3A	5A	4B			
CH2	CH2	CH2	CH2	CH2	CH2	CH2	CH2	CHB	CHD	
L4	L2	L8	L6	L12	L10	L16	L14	EVP4	EVP6	
ø2	ø1		ø2	ø4	ø3	ø5	ø4	ø4,7	ø1,6	
2A	1B	NOT USED	2C	4A	3B	5B	4C			

RACK #2 — BIU

CH1	CH1	CH1	CH1	CH1	CH1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
L19	L17	L23	L21	L27	L25					
ø6	ø5	ø7	ø6	ø8	ø8					
6B	5C	7A	6D	8C	8A					
CH2	CH2	CH2	CH2	CH2	CH2					
L20	L18	L24	L22	L28	L26					
ø6	ø6	ø7			ø8					
6C	6A	7B	NOT USED	NOT USED	8B					

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

* Detector Type - S

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
2A	L4A,L4B
2B	L5A,L5B
2C	L6A,L6B
2D	L7A,L7B
NU	L8A,L8B
3A	L9A,L9B
3B	L10A,L10B
3C	L11A,L11B
4A	L12A,L12B
4B	L13A,L13B
4C	L14A,L14B
5A	L15A,L15B
5B	L16A,L16B
5C	L17A,L17B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø1	-	-
2	ø1	-	-
3	ø1	-	-
4	ø2	-	-
5	ø2	-	-
6	ø2	-	-
7	ø2	-	-
8	NU	-	-
9	ø3	-	-
10	ø3	-	-
11	ø3	-	-
12	ø4	-	-
13	ø4	-	-
* 14	ø4	-	-
15	ø5	-	-
16	ø5	-	-
17	ø5	-	-

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

LOOP NO.	LOOP PANEL TERMINALS
6A	L18A,L18B
6B	L19A,L19B
6C	L20A,L20B
6D	L21A,L21B
NU	L22A,L22B
7A	L23A,L23B
7B	L24A,L24B
8A	L25A,L25B
8B	L26A,L26B
8C	L27A,L27B
NU	L28A,L28B
NU	L29A,L29B
NU	L30A,L30B
NU	L31A,L31B
NU	L32A,L32B
NU	L33A,L33B
NU	L33A,L33B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
18	ø6	-	-
19	ø6	-	-
20	ø6	-	-
21	ø6	-	-
22	NU	-	-
23	ø7	-	-
24	ø7	-	-
25	ø8	-	-
26	ø8	-	-
* 27	ø8	-	-
28	NU	-	-
29	NU	-	-
30	NU	-	-
31	NU	-	-
32	NU	-	-
33	NU	-	-
34	NU	-	-

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8,12,13,15
PHASES USED.....1,3,4,5,7,8,PED4,PED8,OLA,OLB,OLC,OLD
OLA.....1+2
OLB.....2+7
OLC.....5+6
OLD.....3+6

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	øOLA
3	ø3
4	ø4
5	ø5
6	øOLC
7	ø7
8	ø8
9	-
10	ø4P
11	-
12	ø8P
13	øOLB
14	øOLD
15	-
16	-

SEE LOAD SWITCH PROGRAMMING ASSIGNMENT DETAILS

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T3
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 3 - TMP Phase IV
Electrical Detail - Sheet 1 of 3

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Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, II

DocuSigned by: 1/23/2018
DESIGNER-ENGINEER SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T3

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-7.2

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 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

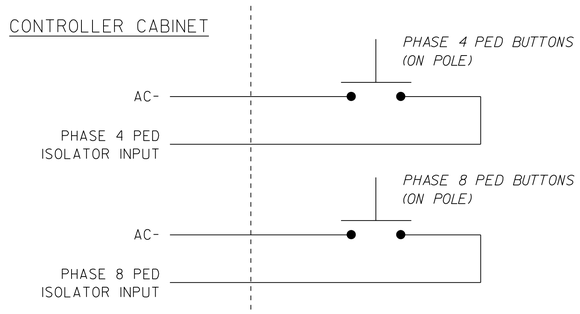
```
TMG VEH OVLP...[D] TYPE: ......[NORMAL]
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . X . . X . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

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.

ECONOLITE ASC/3-2070 PED PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

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	.	
2	1	O	.	.	.	+	A	R	X	NOTICE OVLP A ASSIGNED TO LD SWITCH 2 →
3	3	V	.	.	.	+	A	R	.	
4	4	V	.	.	.	+	A	R	X	
5	5	V	.	.	.	−	A	R	.	
6	3	O	.	.	.	−	A	R	X	NOTICE OVLP C ASSIGNED TO LD SWITCH 6 →
7	7	V	.	.	.	−	A	R	.	
8	8	V	.	.	.	−	A	R	X	
9	Ø	.	.	.	.	+	A	.	.	
10	4	P	.	.	.	+	A	.	.	
11	Ø	.	.	.	.	−	A	.	.	
12	8	P	.	.	.	−	A	.	.	
13	2	O	.	.	.	+	A	R	.	NOTICE OVLP B ASSIGNED TO LD SWITCH 13 →
14	4	O	.	.	.	−	A	R	X	NOTICE OVLP D ASSIGNED TO LD SWITCH 14 →
15	Ø	.	.	.	.	+	A	R	.	
16	Ø	.	.	.	.	−	A	R	X	

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T5
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 3 - TMP Phase IV
Electrical Detail - Sheet 2 of 3

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PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, II

DocuSigned by: 1/23/2018
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SIG. INVENTORY NO. 10-0850T3

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-7.3

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.   0|  25|5|  7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR    0|   0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT   7|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.   0|  25|5|  7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR    0|   0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT   7|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.   0|  25|5|  7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR    0|   0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT  14|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 6. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #6.

```
PREEMPT PLAN [  6]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.   0|  25|5|  7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR    0|   0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT  14|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T3
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 3 - TMP Phase IV
Electrical Detail - Sheet 3 of 3

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Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T3

DATE:
User:rmurchy
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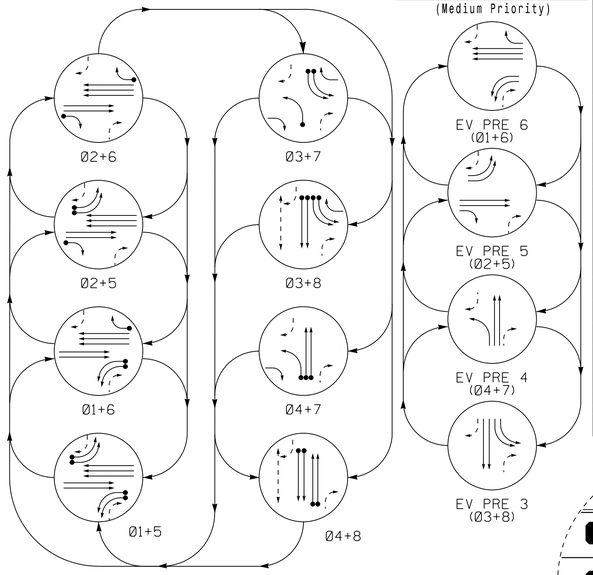
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-8.0

8 Phase Fully Actuated w/ Emergency Vehicle Preemption (Charlotte Signal System)

PHASING DIAGRAM



EV PREEMPT PHASES

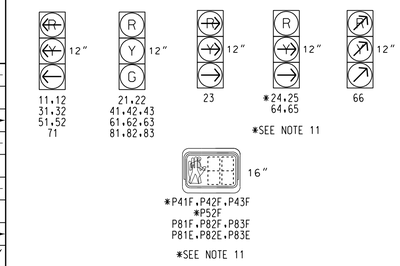
(Medium Priority)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	EVP3	EVP4	EVP5	EVP6	FLASH
11, 12	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~
21,22	G	G	G	G	R	R	R	R	R	R	G	R	Y
23	~~R~~	~~R~~	→	→	~~R~~	→	~~R~~	~~R~~	~~R~~	~~R~~	→	~~R~~	~~Y~~
31,32	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~R~~	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
41, 42, 43	R	R	R	R	R	R	G	G	R	G	R	R	R
51, 52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
61,62,63	G	G	G	G	R	R	R	R	R	R	G	Y	
64,65	R	→	R	→	→	→	R	R	R	R	→	~~R~~	~~Y~~
66	~~R~~	↗	~~R~~	↗	↗	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	↗	~~R~~
71	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	←	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
81, 82, 83	R	R	R	R	R	G	R	G	G	R	R	R	R
P81F-P82F	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK
P83F-P81E	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK
P82E-P83E	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK
Sign Ⓕ	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF

SIGNAL FACE I.D.

All Heads L.E.D.



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	TIMING: TIME	DET. TYPE
1A	6x25	+5	✳	-	Y	1	-	Y	-	-	N
1B	6x25	+5	✳	-	Y	1	-	Y	-	-	N
1C	6x18	70	✳	-	Y	1	-	Y	-	-	N
2A	6x25	+5	✳	-	Y	2	-	Y		-	N
2B	6x25	+5	✳	-	Y	2	-	Y		-	N
2C	6x25	+5	✳	-	Y	2	-	Y	-	-	N
2D	6x18	280	✳	-	Y	2	-	Y		-	N
3A	6x25	+5	✳	-	Y	3	-	Y	-	-	N
3B	6x25	+5	✳	-	Y	3	-	Y		-	N
3C	6x18	70	✳	-	Y	3	-	Y	-	-	N
4A	6x25	+5	✳	Y	-	4	-	Y	-	-	N
4B	6x25	+5	✳	-	Y	4	-	Y	-	-	N
4C	6x18	200	✳	-	Y	4	-	Y	-	-	S
5A	6x25	+5	✳	-	Y	5	-	Y	-	-	N
5B	6x25	+5	✳	-	Y	5	-	Y	-	-	N
5C	6x18	70	✳	-	Y	5	-	Y	-	-	N
6A	6x25	+5	✳	-	Y	6	-	Y		-	N
6B	6x25	+5	✳	-	Y	6	-	Y		-	N
6C	6x25	+5	✳	-	Y	6	-	Y	-	-	N
6D	6x25	+5	✳	Y	-	6	-	Y	-	-	N
6E	6x30	280	✳	-	Y	6	-	Y	-	-	N
7A	6x25	+5	✳	-	Y	7	-	Y	-	-	N
7B	6x25	65	✳	-	Y	7	-	Y	-	-	N
8A	6x25	+5	✳	-	Y	8	-	Y	-	-	N
8B	6x25	+5	✳	-	Y	8	-	Y	-	-	N
8C	6x18	200	✳	-	Y	8	-	Y	-	-	S

✳ Video Detection Area.
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
6. Pedestrian pedestals are conceptual and shown for reference only. See 2018 NCDOT Roadway Standard Drawings #1705.04, Sheets 1-3, for push button location details.
7. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only. Contractor shall make sure none of the left turns are occluded.
8. Optical Detector OP1 calls EV PRE 6
   Optical Detector OP2 calls EV PRE 5
   Optical Detector OP4 calls EV PRE 4
   Optical Detector OP5 calls EV PRE 5
   Optical Detector OP6 calls EV PRE 6
   Optical Detector OP8 calls EV PRE 3
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system values supersede these values.
10. Reuse existing conduit and junction boxes for operation of existing ped signals as shown.
11. Signal heads 24,25 (including adjacent signs),P41F,P42F,P43F,P52F, and sign Ⓒ will remain covered and disconnected.
12. Uncover and connect existing sign Ⓕ.

PHASING DIAGRAM DETECTION LEGEND

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

EMERGENCY VEHICLE PREEMPTION

FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5	EV PRE 6
DELAY BEFORE PREEMPT	0	0	0	0
PMT OVERRIDE	OFF	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	Y	Y	Y	Y
TERMINATE PHASES	N	N	N	N
ENTRANCE WALK	0	0	0	0
ENTRANCE PED CLEAR	255	255	255	255
ENTRANCE MIN GREEN	7	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*	25.5*
MIN DWELL GREEN	7	7	14	14
MAX CALL TIME	60	60	60	60
EXIT OPTIONS	CRD	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*	25.5*

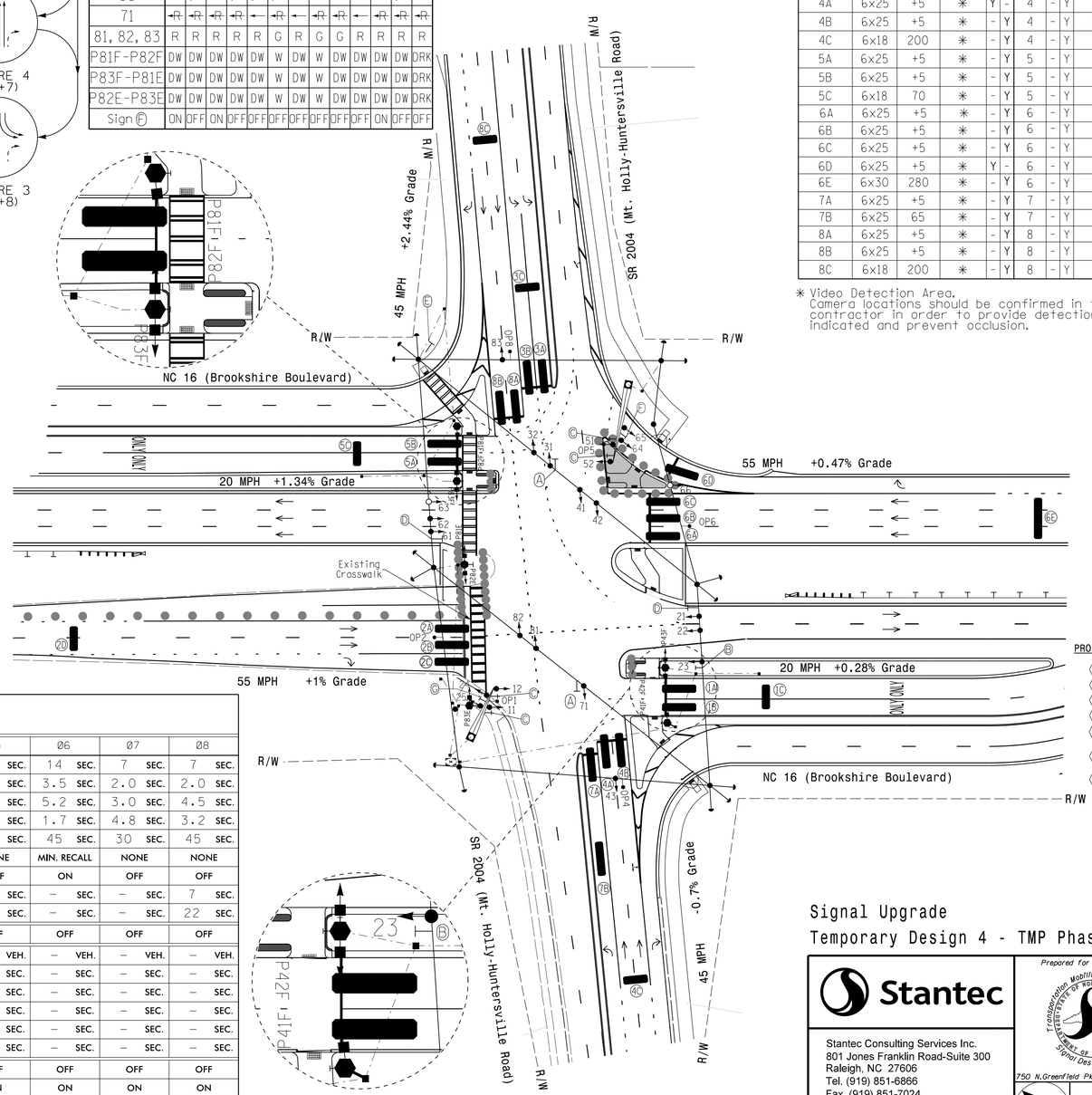
* Time defaults to time used for phase during normal operation.

TIMING CHART

ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN *	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.1 SEC.	3.0 SEC.	4.6 SEC.	3.0 SEC.	5.2 SEC.	3.0 SEC.	4.5 SEC.
RED CLEARANCE	3.4 SEC.	1.5 SEC.	4.8 SEC.	3.3 SEC.	3.5 SEC.	1.7 SEC.	4.8 SEC.	3.2 SEC.
MAX. 1 *	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 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.	– SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	22 SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	OFF	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.



SIGNS

PROPOSED		EXISTING
Ⓐ	NO U-TURN SIGN (R3-4)	Ⓐ
Ⓑ	"NO TURN ON RED" SIGN (R10-11a)	Ⓑ
Ⓒ	LEFT "ONLY" SIGN (R3-5L)	Ⓒ
Ⓓ	NO LEFT/U-TURN SYMBOL SIGN (R3-18)	Ⓓ
Ⓔ	"PEDESTRIAN CROSSING" SIGN (W11-2) W/ ARROW PANEL (W16-7p)	Ⓔ
Ⓕ	"NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign	Ⓕ
Ⓖ	"NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign	Ⓖ

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Ped Push Button w/Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller and Cabinet	
	Junction Box	
	Directional Drill	N/A
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Optical EV Detector	
	Video Detection Area	N/A
	Metal Pole with Mastarm	
	Construction Zone	N/A
	Construction Zone Drums	N/A
	Guardrail	

Signal Upgrade
Temporary Design 4 - TMP Phase IV-A

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)
Division 10 Mecklenburg County Charlotte
PLAN DATE: January 2018 REVIEWED BY: E D Harris
PREPARED BY: J B HAMBRIGHT REVIEWED BY: B L Watson
SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERMIER II
DocuSigned by: 9636258A0A5D4DA... SIGNATURE
1/23/2018 DATE
SIG. INVENTORY NO. 10-0850T4
CDOT ASSET NO.: 941

DATE:
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User:rmurphy

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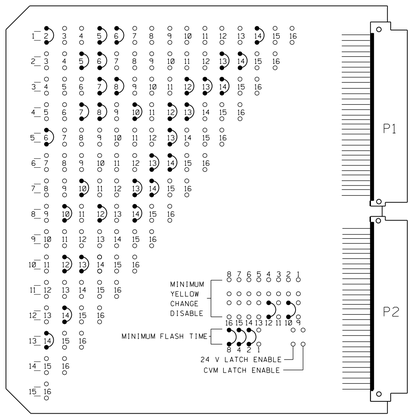
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	ENABLE
6	ENABLE
7	ENABLE
8	ENABLE
9	DISABLE
10	ENABLE
11	DISABLE
12	ENABLE
13	ENABLE
14	ENABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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 9,11,15, & 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 trasfer relays are in place.
3. Program controller to start up in Phases 2 and 6 Green.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-8.1

FIELD CONNECTION HOOK-UP CHART

PHASE	1	OLA	3	4	5	OLC	7	8	2 PED	4 PED	6 PED	8 PED	OLB	OLD		1 PED	5 PED
SIGNAL HEAD NO.	11,12	21,22	31,32	41,42, 43	51,52	61,62, 63	71	81,82, 83	NU	P41F, P42F, P43F	NU	P81F, P82F, P83F, P81E, P82E, P83E	23	64,65	66	NU	NU
RED		2R		4R		6R		8R						14R			
YELLOW		2Y		4Y		6Y		8Y									
GREEN		2G		4G		6G		8G									
RED ARROW	1R		3R		5R		7R						13R		14R		
YELLOW ARROW	1Y		3Y		5Y		7Y						13Y	14Y	14Y		
GREEN ARROW	1G		3G		5G		7G						13G	14G	14G		
✋										10R		12R					
🚶										10G		12G					

NU = NOT USED

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	CH1	CH1	CH1	CH1	CH1	CH1	CH1	CHA	CHC	
L3	L1	L7	L5	L11	L9	L15	L13	EVP3	EVP5	SLOT EMPTY
ø1	ø1	ø2	ø2	ø3	ø3	ø5	ø4	ø3,8	ø2,5	
1C	1A	2D	2B	3C	3A	5A	4B			
CH2	CH2	CH2	CH2	CH2	CH2	CH2	CH2	CHB	CHD	
L4	L2	L8	L6	L12	L10	L16	L14	EVP4	EVP6	
ø2	ø1		ø2	ø4	ø3	ø5	ø4	ø4,7	ø1,6	
2A	1B	NOT USED	2C	4A	3B	5B	4C			

RACK #2 — BIU

CH1	CH1	CH1	CH1	CH1	CH1					
L19	L17	L23	L21	L27	L25	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
ø6	ø5	ø7	ø6	ø8	ø8					
6B	5C	7A	6D	8C	8A					
CH2	CH2	CH2	CH2	CH2	CH2					
L20	L18	L24	L22	L28	L26					
ø6	ø6	ø7	ø6		ø8					
6C	6A	7B	6E	NOT USED	8B					

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

* Detector Type - S

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
2A	L4A,L4B
2B	L5A,L5B
2C	L6A,L6B
2D	L7A,L7B
NU	L8A,L8B
3A	L9A,L9B
3B	L10A,L10B
3C	L11A,L11B
4A	L12A,L12B
4B	L13A,L13B
4C	L14A,L14B
5A	L15A,L15B
5B	L16A,L16B
5C	L17A,L17B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø1	-	-
2	ø1	-	-
3	ø1	-	-
4	ø2	-	-
5	ø2	-	-
6	ø2	-	-
7	ø2	-	-
8	NU	-	-
9	ø3	-	-
10	ø3	-	-
11	ø3	-	-
12	ø4	-	-
13	ø4	-	-
* 14	ø4	-	-
15	ø5	-	-
16	ø5	-	-
17	ø5	-	-

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

LOOP NO.	LOOP PANEL TERMINALS
6A	L18A,L18B
6B	L19A,L19B
6C	L20A,L20B
6D	L21A,L21B
6E	L22A,L22B
7A	L23A,L23B
7B	L24A,L24B
8A	L25A,L25B
8B	L26A,L26B
8C	L27A,L27B
NU	L28A,L28B
NU	L29A,L29B
NU	L30A,L30B
NU	L31A,L31B
NU	L32A,L32B
NU	L33A,L33B
NU	L33A,L33B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
18	ø6	-	-
19	ø6	-	-
20	ø6	-	-
21	ø6	-	-
22	ø6	-	-
23	ø7	-	-
24	ø7	-	-
25	ø8	-	-
26	ø8	-	-
* 27	ø8	-	-
28	NU	-	-
29	NU	-	-
30	NU	-	-
31	NU	-	-
32	NU	-	-
33	NU	-	-
34	NU	-	-

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8,10,12,13,14
PHASES USED.....1,3,4,5,7,8,PED4,PED8,OLA,OLB,OLC,OLD
OLA.....1+2
OLB.....2+7
OLC.....5+6
OLD.....3+6
OLE(DUMMY).....1+2+3+4+6+7+8

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	øOLA
3	ø3
4	ø4
5	ø5
6	øOLC
7	ø7
8	ø8
9	-
10	ø4P
11	-
12	ø8P
13	øOLB
14	øOLD
15	-
16	-

SEE LOAD SWITCH PROGRAMMING ASSIGNMENT DETAILS

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T4
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 4 - TMP Phase IV-A
Electrical Detail - Sheet 1 of 3

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T4

DATE:
USER:
C:\Traffic\Signals\Designs\Signals\Temporary Designs\Electrical Details\MU-6084 sm_ele_10-0850T4.dgn
User:rmcuey

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ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

Select TMG VEH OVLP [A] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP E (DUMMY)

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

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

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

END PROGRAMMING

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR "NO TURN ON RED" BLANK OUT SIGN

(program controller as shown)

The following logic processor configuration activates the blank out sign during normal operation. Upon the red interval preceeding phase 1 and/or 5, the logic will activate the blank out sign.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1 & 2 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
LP 1-15   E . . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . .
```

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:     1  COPY FROM:   1  ACTIVE:  M   (T/F)

IF       VEH OVERLAP RED      5   IS  ON   T
OR       CTR PHASE TIMING     5   IS  ON   F
AND      LP COB CODE OFF                544  T

THEN     SIG SET PH PED CLR   5       ON

ELSE     SIG SET PH PED CLR   5       OFF
```

LOGIC FOR ACTIVATING THE BLANK OUT SIGN DURING NORMAL OPERATION. THE AND CONDITION ENSURES SIGN IS OFF DUING CONTROLLER FLASH.

END PROGRAMMING

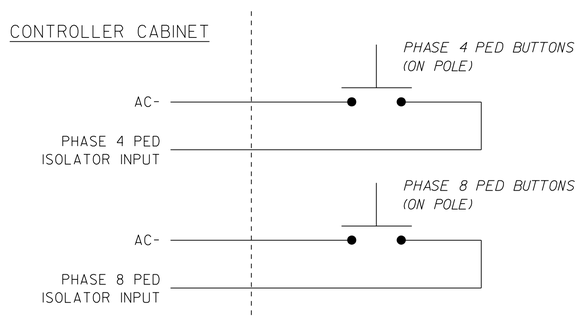
Notes:
1. COB 544 is a controller flash internal logic processor reference.

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.

PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-8.2

ECONOLITE ASC/3-2070 PED PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

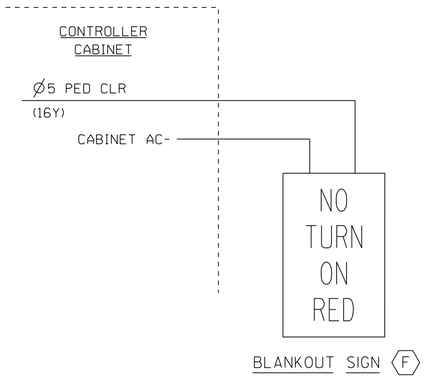
1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

LD SWITCH ASSIGN

	LD SWITCH	PHASE /OVLP	TYPE	DIMMING R	Y	G	D	FLASH PWR	AUT	TGR
	1	1	V	.	.	.	+	A	R	.
NOTICE OVLP A ASSIGNED TO LD SWITCH 2 →	2	1	O	.	.	.	+	A	R	X
	3	3	V	.	.	.	+	A	R	.
	4	4	V	.	.	.	+	A	R	X
	5	5	V	.	.	.	–	A	R	.
NOTICE OVLP C ASSIGNED TO LD SWITCH 6 →	6	3	O	.	.	.	–	A	R	X
	7	7	V	.	.	.	–	A	R	.
	8	8	V	.	.	.	–	A	R	X
	9	Ø	.	.	.	.	+	A	.	.
	10	4	P	.	.	.	+	A	.	.
	11	Ø	.	.	.	.	–	A	.	.
	12	8	P	.	.	.	–	A	.	.
NOTICE OVLP B ASSIGNED TO LD SWITCH 13 →	13	2	O	.	.	.	+	A	R	.
NOTICE OVLP D ASSIGNED TO LD SWITCH 14 →	14	4	O	.	.	.	–	A	R	X
	15	Ø	.	.	.	.	+	A	R	.
	16	Ø	.	.	.	.	–	A	R	X

BLANKOUT SIGN WIRING DETAIL

(wire as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T5
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 4 - TMP Phase IV-A
Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T5

DATE:
USER:
File:
K:\Traffic\Signals\Design\Signals\Temporary Designs\Electrical Details\U-6084 smale.10-0850T4.dgn

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-8.3

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YELI RED
ENTRANCE TM.  0|  25|5    7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YELI RED
TRACK CLEAR   0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT  7|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YELI RED
ENTRANCE TM.  0|  25|5    7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YELI RED
TRACK CLEAR   0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT  7|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YELI RED
ENTRANCE TM.  0|  25|5    7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YELI RED
TRACK CLEAR   0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT 14|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 6. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #6.

```
PREEMPT PLAN [  6]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YELI RED
ENTRANCE TM.  0|  25|5    7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YELI RED
TRACK CLEAR   0|   0|   0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT 14|   0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T4
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 4 - TMP Phase IV-A
Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 | Mecklenburg County | Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T4

DATE:
User:rtmurchy
I:\Traffic\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-0850T4.dgn

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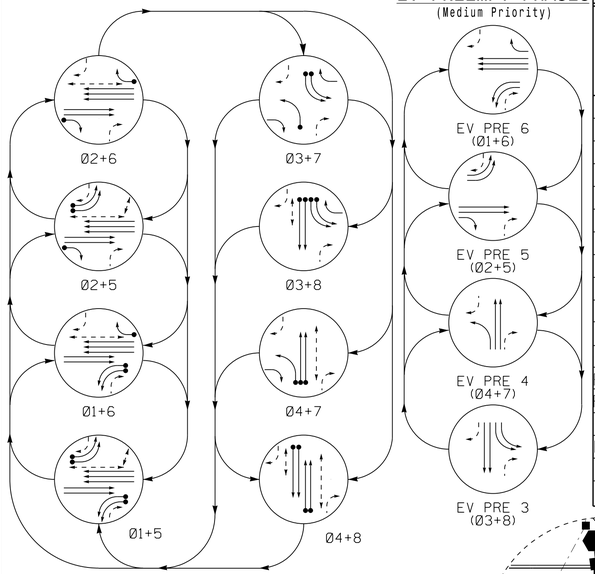
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-9.0

8 Phase Fully Actuated w/ Emergency Vehicle Preemption (Charlotte Signal System)

PHASING DIAGRAM



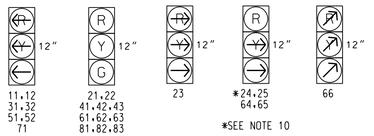
EV PREEMPT PHASES
(Medium Priority)

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	EVP3	EVP4	EVP5	EVP6	FLASH
11, 12	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~
21,22	G	G	G	G	R	R	R	R	R	R	G	R	Y
23	~~R~~	~~R~~	→	→	~~R~~	→	~~R~~	→	~~R~~	~~R~~	→	~~R~~	~~R~~
31,32	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~R~~	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
41, 42, 43	R	R	R	R	R	R	G	G	R	G	R	R	R
51, 52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
61,62,63	G	G	G	G	R	R	R	R	R	R	R	G	Y
64,65	R	→	R	→	→	→	R	R	R	R	R	→	~~Y~~
66	~~R~~	↗	~~R~~	↗	↗	↗	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	↗	~~Y~~
71	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
81, 82, 83	R	R	R	R	R	G	R	G	R	R	R	R	R
P41F-P42F	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P43F-P44F	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P45F-P46F	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P51F-P52F	W	DW	W	DW	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P61F-P62F	W	W	W	W	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P81F-P82F	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK
Sign Ⓕ	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF

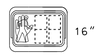
SIGNAL FACE I.D.

All Heads L.E.D.



PED FACE LEGEND

P##E = Existing PED Head
P##T = Temporary PED Head
P##F = Final PED Head



P41F,P42F
P43F,P44F
P45F,P46F
P51F,P52F
P61F,P62F
P81F,P82F
* P83F

*SEE NOTE 10

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

INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
1A	6x25	+5	*	-	Y	1	-	Y	-	-	N
1B	6x25	+5	*	-	Y	1	-	Y	-	-	N
1C	6x18	70	*	-	Y	1	-	Y	-	-	N
2A	6x25	+5	*	-	Y	2	-	Y	-	-	N
2B	6x25	+5	*	-	Y	2	-	Y	-	-	N
2C	6x25	+5	*	-	Y	2	-	Y	-	-	N
2D	6x18	280	*	-	Y	2	-	Y	-	-	N
3A	6x25	+5	*	-	Y	3	-	Y	-	-	N
3B	6x25	+5	*	-	Y	3	-	Y	-	-	N
3C	6x18	70	*	-	Y	3	-	Y	-	-	N
4A	6x25	+5	*	-	Y	4	-	Y	-	-	N
4B	6x25	+5	*	-	Y	4	-	Y	-	-	N
4C	6x18	200	*	-	Y	4	-	Y	-	-	S
5A	6x25	+5	*	-	Y	5	-	Y	-	-	N
5B	6x25	+5	*	-	Y	5	-	Y	-	-	N
5C	6x18	70	*	-	Y	5	-	Y	-	-	N
6A	6x25	+5	*	-	Y	6	-	Y	-	-	N
6B	6x25	+5	*	-	Y	6	-	Y	-	-	N
6C	6x25	+5	*	-	Y	6	-	Y	-	-	N
6D	6x25	+5	*	-	Y	6	-	Y	-	-	N
6E	6x30	280	*	-	Y	6	-	Y	-	-	N
7A	6x25	+5	*		Y	7	-	Y	-	-	N
7B	6x25	65	*	-	Y	7	-	Y	-	-	N
8A	6x25	+5	*	-	Y	8	-	Y	-	-	N
8B	6x25	+5	*	-	Y	8	-	Y	-	-	N
8C	6x18	200	*	-	Y	8	-	Y	-	-	S

* Video Detection Area.
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
6. Pedestrian pedestals are conceptual and shown for reference only. See 2018 NCDOT Roadway Standard Drawings #1705.04, Sheets 1-3, for push button location details.
7. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.Contractor shall make sure none of the left turns are occluded.
8. Optical Detector OP1 calls EV PRE 6
   Optical Detector OP2 calls EV PRE 5
   Optical Detector OP4 calls EV PRE 4
   Optical Detector OP5 calls EV PRE 5
   Optical Detector OP6 calls EV PRE 6
   Optical Detector OP8 calls EV PRE 3
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system values supersede these values.
10. Ped head P83F will be covered and disconnected. Signal heads 24,25 (including adjacent signs), and Sign Ⓒ will remain covered and disconnected.

PHASING DIAGRAM DETECTION LEGEND

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

EMERGENCY VEHICLE PREEMPTION

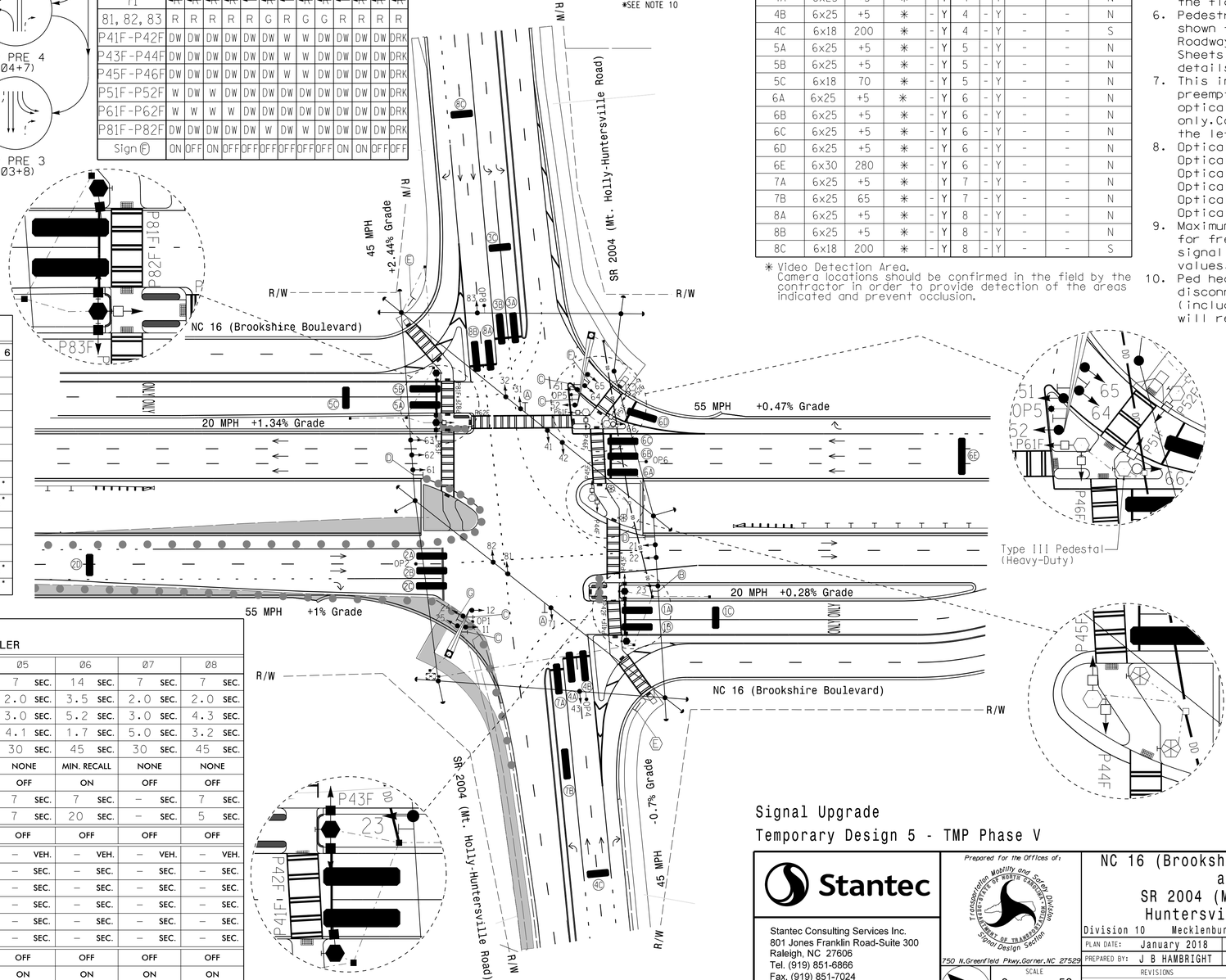
FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5	EV PRE 6
DELAY BEFORE PREEMPT	0	0	0	0
PMT OVERRIDE	OFF	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	Y	Y	Y	Y
TERMINATE PHASES	N	N	N	N
ENTRANCE WALK	0	0	0	0
ENTRANCE PED CLEAR	255	255	255	255
ENTRANCE MIN GREEN	7	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*	25.5*
MIN DWELL GREEN	7	7	14	14
MAX CALL TIME	60	60	60	60
EXIT OPTIONS	CRD	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

TIMING CHART
ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN *	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.1 SEC.	3.0 SEC.	4.6 SEC.	3.0 SEC.	5.2 SEC.	3.0 SEC.	4.3 SEC.
RED CLEARANCE	3.5 SEC.	1.7 SEC.	5.0 SEC.	3.3 SEC.	4.1 SEC.	1.7 SEC.	5.0 SEC.	3.2 SEC.
MAX. 1 *	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 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.	7 SEC.	7 SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	23 SEC.	7 SEC.	20 SEC.	– SEC.	5 SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	OFF	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.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
⊗	Type I Pushbutton Post	✤
⬡	Type II Signal Pedestal	●
⊢	Ped Push Button w/Sign	⊢
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
⊠	Controller and Cabinet	⊠
□	Junction Box	■
∞——∞	Directional Drill	N/A
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
○	Optical EV Detector	✱
▬	Video Detection Area	N/A
	Metal Pole with Mastarm	
▭	Construction Zone	N/A
● ●	Construction Zone Drums	N/A
	Guardrail	

Ⓐ NO U-TURN SIGN (R3-4) Ⓐ
Ⓑ "NO TURN ON RED" SIGN (R10-11a) Ⓑ
Ⓒ LEFT "ONLY" SIGN (R3-5L) Ⓒ
Ⓓ NO LEFT/U-TURN SYMBOL SIGN (R3-18) Ⓓ
Ⓔ "PEDESTRIAN CROSSING" SIGN (W11-2) W/ ARROW PANEL (W16-7p) Ⓔ
Ⓕ "NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign Ⓕ
Ⓖ "NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign Ⓖ

Signal Upgrade
Temporary Design 5 - TMP Phase V

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)
Division 10 Mecklenburg County Charlotte

PLAN DATE: January 2018 REVIEWED BY: E D Harris
PREPARED BY: J B HAMBRIGHT REVIEWED BY: B L Watson

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-085015

CDOT ASSET NO.: 941

DATE:
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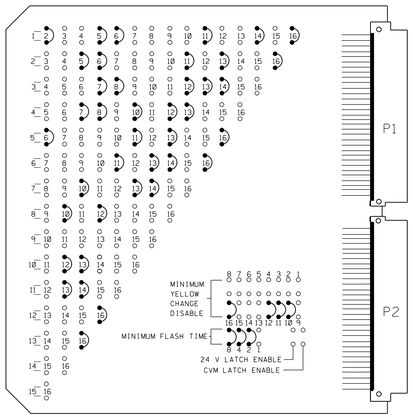
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	ENABLE
6	ENABLE
7	ENABLE
8	ENABLE
9	DISABLE
10	ENABLE
11	ENABLE
12	ENABLE
13	ENABLE
14	ENABLE
15	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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 9,10,11,14, & 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 trasfer relays are in place.
3. Program controller to start up in Phases 2 and 6 Green.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-9.1

FIELD CONNECTION HOOK-UP CHART

PHASE	1	OLA	3	4	5	OLC	7	8	2 PED	4 PED	6 PED	8 PED	OLB	OLD		1 PED	5 PED
SIGNAL HEAD NO.	11,12	21,22	31,32	41,42, 43	51,52	61,62, 63	71	81,82, 83	NU	P41F, P42F, P43F, P44F, P45F, P46F	P61F, P62F	P81F, P82F	23	64,65	66	NU	P51F, P52F
RED		2R		4R		6R		8R						14R			
YELLOW		2Y		4Y		6Y		8Y									
GREEN		2G		4G		6G		8G									
RED ARROW	1R		3R		5R		7R						13R		14R		
YELLOW ARROW	1Y		3Y		5Y		7Y						13Y	14Y	14Y		
GREEN ARROW	1G		3G		5G		7G						13G	14G	14G		
✋										10R	11R	12R					16R
🚶										10G	11G	12G					16G

NU = NOT USED

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	CH1	CH1	CH1	CH1	CH1	CH1	CH1	CHA	CHC		
L3 ø1 1C	L1 ø1 1A	L7 ø2 2D	L5 ø2 2B	L11 ø3 3C	L9 ø3 3A	L15 ø5 5A	L13 ø4 4B	EVP3 ø3,8	EVP5 ø2,5	SLOT EMPTY	
CH2	CH2	CH2	CH2	CH2	CH2	CH2	CH2	CHB	CHD		
L4 ø2 2A	L2 ø1 1B	L8 NOT USED	L6 ø2 2C	L12 ø4 4A	L10 ø3 3B	L16 ø5 5B	L14 ø4 4C	EVP4 ø4,7	EVP6 ø1,6		

RACK #2 — BIU

CH1	CH1	CH1	CH1	CH1	CH1					
L19 ø6 6B	L17 ø5 5C	L23 ø7 7A	L21 ø6 6D	L27 ø8 8C	L25 ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
CH2	CH2	CH2	CH2	CH2	CH2					
L20 ø6 6C	L18 ø6 6A	L24 ø7 7B	L22 ø6 6E	L28 NOT USED	L26 ø8 8B					

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

* Detector Type - S

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
2A	L4A,L4B
2B	L5A,L5B
2C	L6A,L6B
2D	L7A,L7B
NU	L8A,L8B
3A	L9A,L9B
3B	L10A,L10B
3C	L11A,L11B
4A	L12A,L12B
4B	L13A,L13B
4C	L14A,L14B
5A	L15A,L15B
5B	L16A,L16B
5C	L17A,L17B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø1	–	–
2	ø1	–	–
3	ø1	–	–
4	ø2	–	–
5	ø2	–	–
6	ø2	–	–
7	ø2	–	–
8	NU	–	–
9	ø3	–	–
10	ø3	–	–
11	ø3	–	–
12	ø4	–	–
13	ø4	–	–
* 14	ø4	–	–
15	ø5	–	–
16	ø5	–	–
17	ø5	–	–

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

LOOP NO.	LOOP PANEL TERMINALS
6A	L18A,L18B
6B	L19A,L19B
6C	L20A,L20B
6D	L21A,L21B
6E	L22A,L22B
7A	L23A,L23B
7B	L24A,L24B
8A	L25A,L25B
8B	L26A,L26B
8C	L27A,L27B
NU	L28A,L28B
NU	L29A,L29B
NU	L30A,L30B
NU	L31A,L31B
NU	L32A,L32B
NU	L33A,L33B
NU	L33A,L33B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
18	ø6	–	–
19	ø6	–	–
20	ø6	–	–
21	ø6	–	–
22	ø6	–	–
23	ø7	–	–
24	ø7	–	–
25	ø8	–	–
26	ø8	–	–
* 27	ø8	–	–
28	NU	–	–
29	NU	–	–
30	NU	–	–
31	NU	–	–
32	NU	–	–
33	NU	–	–
34	NU	–	–

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8,10,11,12,13,14,16
PHASES USED.....1,3,4,5,7,8,PED4,PED5,PED6,PED8, OLA,OLB,OLC,OLD
OLA.....1+2
OLB.....2+7
OLC.....5+6
OLD.....3+6
OLE(DUMMY).....1+2+3+4+6+7+8

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	øOLA
3	ø3
4	ø4
5	ø5
6	øOLC
7	ø7
8	ø8
9	-
10	ø4P
11	ø6P
12	ø8P
13	øOLB
14	øOLD
15	-
16	ø5P

SEE LOAD SWITCH PROGRAMMING ASSIGNMENT DETAILS

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T5
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 5 - TMP Phase V
Electrical Detail - Sheet 1 of 4

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, II

DocuSigned by: 1/23/2018
SIGNATURE DATE
SIG. INVENTORY NO. 10-0850T5

DATE:
User:tfficek
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User:rmuncy

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ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

Select TMG VEH OVLP [A] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP E (DUMMY)

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

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

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

END PROGRAMMING

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR "NO TURN ON RED" BLANK OUT SIGN

(program controller as shown)

The following logic processor configuration activates the blank out sign during normal operation. Upon the red interval preceeding phase 1 and/or 5, the logic will activate the blank out sign.

1. From Main Menu select **1. CONFIGURATION**
2. From CONFIGURATION Submenu select **8. LOGIC PROCESSOR**
3. From LOGIC PROCESSOR Submenu select **1. LOGIC STATEMENT CONTROL**

ENABLE LOGIC PROCESSOR STATEMENTS 1 & 2 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
LP 1-15   E . . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . .
```

END PROGRAMMING

1. From Main Menu select **1. CONFIGURATION**
2. From CONFIGURATION Submenu select **8. LOGIC PROCESSOR**
3. From LOGIC PROCESSOR Submenu select **2. LOGIC STATEMENTS**

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:     1  COPY FROM:   1  ACTIVE:  M   (T/F)

IF       VEH OVERLAP RED      5   IS  ON   T
OR       CTR PHASE TIMING     5   IS  ON   F
AND      LP COB CODE OFF                544  T

THEN     SIG SET PH PED CLR   5       ON

ELSE     SIG SET PH PED CLR   5       OFF
```

LOGIC FOR ACTIVATING THE BLANK OUT SIGN DURING NORMAL OPERATION. THE AND CONDITION ENSURES SIGN IS OFF DUING CONTROLLER FLASH.

END PROGRAMMING

Notes:
1. COB 544 is a controller flash internal logic processor reference.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-9.2

ECONOLITE ASC/3-2070 PED PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

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

LD SWITCH ASSIGN

	LD SWITCH	PHASE /OVLP	TYPE	DIMMING R	Y	G	D	FLASH PWR	AUT	TGR
	1	1	V	.	.	.	+	A	R	.
NOTICE OVLP A ASSIGNED TO LD SWITCH 2 →	2	1	O	.	.	.	+	A	R	X
	3	3	V	.	.	.	+	A	R	.
	4	4	V	.	.	.	+	A	R	X
	5	5	V	.	.	.	−	A	R	.
NOTICE OVLP C ASSIGNED TO LD SWITCH 6 →	6	3	O	.	.	.	−	A	R	X
	7	7	V	.	.	.	−	A	R	.
	8	8	V	.	.	.	−	A	R	X
	9	Ø	.	.	.	.	+	A	.	.
	10	4	P	.	.	.	+	A	.	.
	11	6	P	.	.	.	−	A	.	.
	12	8	P	.	.	.	−	A	.	.
NOTICE OVLP B ASSIGNED TO LD SWITCH 13 →	13	2	O	.	.	.	+	A	R	.
NOTICE OVLP D ASSIGNED TO LD SWITCH 14 →	14	4	O	.	.	.	−	A	R	X
	15	Ø	.	.	.	.	+	A	R	.
NOTICE PHASE 5 PED ASSIGNED TO LD SWITCH 16 →	16	5	P	.	.	.	−	A	R	X

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T5
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 5 - TMP Phase V
Electrical Detail - Sheet 2 of 4

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Stantec

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE: January 2018	REVIEWED BY: L Overn
PREPARED BY: G B Spell	REVIEWED BY:

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T5

DATE:
User:rmuncey
I:\Traffic\Signals\Design\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-0850T5.dgn

DocuSign Envelope ID: 2C88EAD4-B6B0-4DB0-954B-5E71A8789B4F

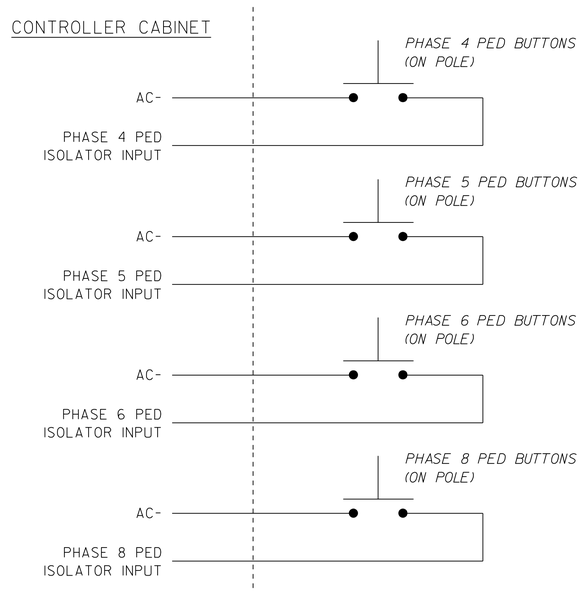
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-9.3

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

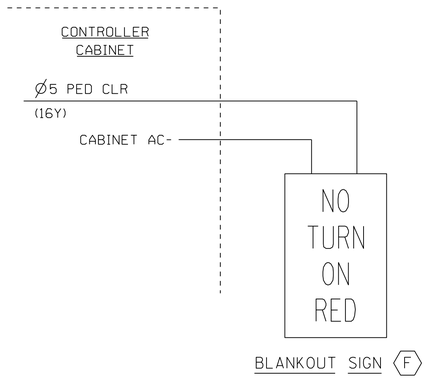
PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



BLANKOUT SIGN WIRING DETAIL

(wire as shown)



BLANKOUT SIGN (F)

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [3. VEH/PED OVERLAPS]

Program Ped OL6 as noted below:

VEH/PED OVERALPS INCLUDED	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
PD OL Ø1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø6	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.
PD OL Ø7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0850T5
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 5 - TMP Phase V
Electrical Detail - Sheet 3 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
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PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 2/12/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T5

DATE:
USER:
C:\Traffic\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-0850T5.dgn
User:rmcvey

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-9.4

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLMN GRI YELI RED
ENTRANCE TM.  0|  25|5  7|25.5|25.5
-----------MIN GR|EXT GR|MX GRI YELI RED
TRACK CLEAR   0|  0|  0|  0|  0
-----------MIN DL|IPMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT  7|  0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLMN GRI YELI RED
ENTRANCE TM.  0|  25|5  7|25.5|25.5
-----------MIN GR|EXT GR|MX GRI YELI RED
TRACK CLEAR   0|  0|  0|  0|  0
-----------MIN DL|IPMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT  7|  0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLMN GRI YELI RED
ENTRANCE TM.  0|  25|5  7|25.5|25.5
-----------MIN GR|EXT GR|MX GRI YELI RED
TRACK CLEAR   0|  0|  0|  0|  0
-----------MIN DL|IPMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT 14|  0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 6. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #6.

```
PREEMPT PLAN [  6]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLMN GRI YELI RED
ENTRANCE TM.  0|  25|5  7|25.5|25.5
-----------MIN GR|EXT GR|MX GRI YELI RED
TRACK CLEAR   0|  0|  0|  0|  0
-----------MIN DL|IPMT|EXT|MX TMI YELI RED
DWL/CYC-EXIT 14|  0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0850T5
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 5 - TMP Phase V
Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
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Division 10 | Mecklenburg County | Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 2/12/2018
SIGNATURE DATE

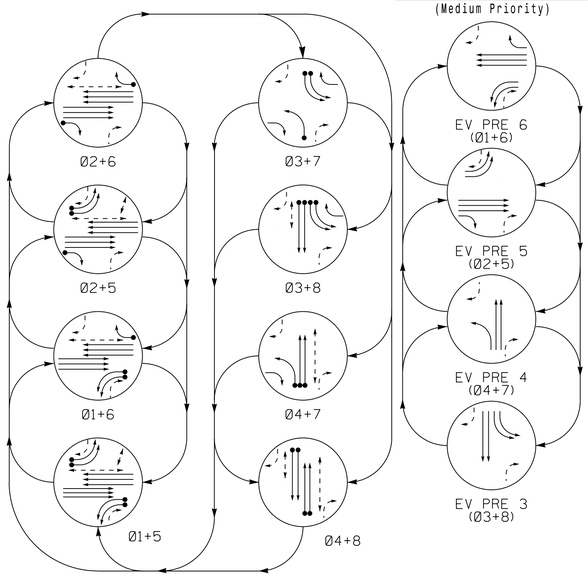
SIG. INVENTORY NO. 10-0850T5

DATE:
User:cfuller
I:\Traffic\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-0850T5.dgn
User:rmurchy

DocuSign Envelope ID: 7F63B837-9AA6-4993-A72E-E43D2E9B24E9

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-10.0

PHASING DIAGRAM



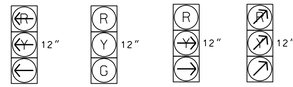
EV PREEMPT PHASES
(Medium Priority)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	EVP3	EVP4	EVP5	EVP6	FLASH
11, 12	←	←	↱R	↱R	↱R	↱R	↱R	↱R	↱R	↱R	↱R	←	↱R
21,22,23	G	G	G	G	R	R	R	R	R	R	G	R	Y
24,25	R	R	→	→	→	→	R	→	R	R	R	→	R
26	↗R	↗R	↗	↗	↗	↗	↗R	↗	↗R	↗R	↗R	↗	↗R
31,32	↱R	↱R	↱R	↱R	↱R	←	←	↱R	↱R	←	↱R	↱R	↱R	↱R
41, 42, 43	R	R	R	R	R	R	G	G	R	G	R	R	R
51, 52	←	↱R	←	↱R	↱R	↱R	↱R	↱R	↱R	↱R	↱R	←	↱R	↱R
61,62,63	G	G	G	G	R	R	R	R	R	R	R	G	Y
64,65	R	→	R	→	→	→	R	R	R	R	R	→	R
66	↗R	↗	↗R	↗	↗	↗	↗R	↗R	↗R	↗R	↗R	↗	↗R
71	↱R	↱R	↱R	↱R	←	↱R	←	↱R	↱R	←	↱R	↱R	↱R	↱R
81, 82, 83	R	R	R	R	R	G	R	G	G	R	R	R	R
P41F-P42F	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P43F-P44F	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P45F-P46F	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P51F-P52F	W	DW	W	DW	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P61F-P62F	W	W	W	W	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P81F-P82F	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK
Sign Ⓕ	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
Sign Ⓖ	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF

SIGNAL FACE I.D.

All Heads L.E.D.



*SEE NOTE 10

PED FACE LEGEND

P##E = Existing PED Head
P##T = Temporary PED Head
P##F = Final PED Head

PHASING DIAGRAM DETECTION LEGEND

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

EMERGENCY VEHICLE PREEMPTION

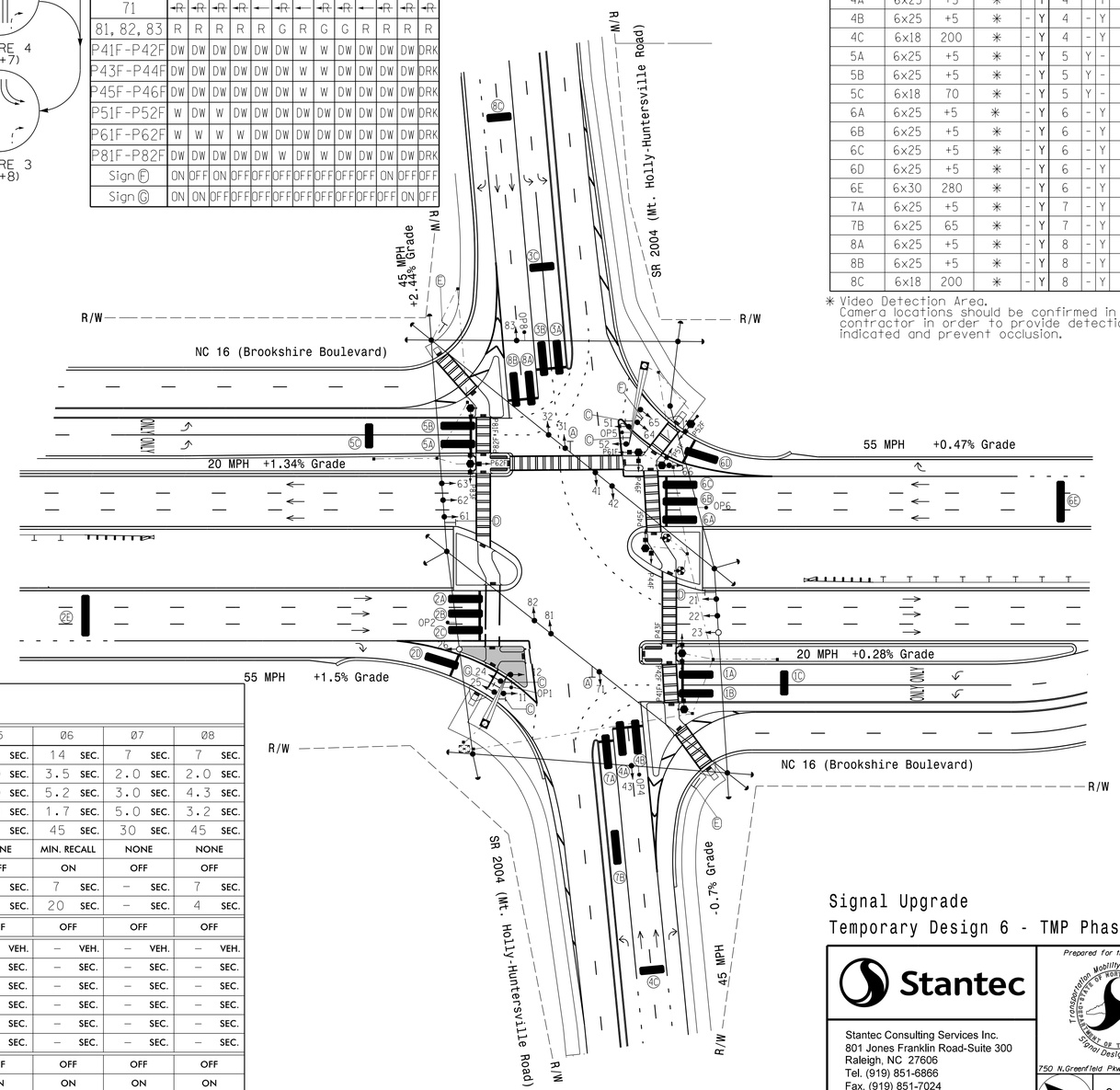
FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5	EV PRE 6
DELAY BEFORE PREEMPT	0	0	0	0
PMT OVERRIDE	OFF	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	Y	Y	Y	Y
TERMINATE PHASES	N	N	N	N
ENTRANCE WALK	0	0	0	0
ENTRANCE PED CLEAR	255	255	255	255
ENTRANCE MIN GREEN	7	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*	25.5*
MIN DWELL GREEN	7	7	14	14
MAX CALL TIME	60	60	60	60
EXIT OPTIONS	CRD	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

TIMING CHART
ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN *	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	3.5 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.1 SEC.	3.0 SEC.	4.5 SEC.	3.0 SEC.	5.2 SEC.	3.0 SEC.	4.3 SEC.
RED CLEARANCE	3.9 SEC.	1.7 SEC.	5.2 SEC.	3.3 SEC.	3.9 SEC.	1.7 SEC.	5.0 SEC.	3.2 SEC.
MAX. 1 *	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 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.	7 SEC.	7 SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	23 SEC.	7 SEC.	20 SEC.	– SEC.	4 SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	OFF	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.



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

INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
1A	6x25	+5	✳	-	Y	1	Y	-	-	-	N
1B	6x25	+5	✳	-	Y	1	Y	-	-	-	N
1C	6x18	70	✳	-	Y	1	Y	-	-	-	N
2A	6x25	+5	✳	-	Y	2	-	Y	-	-	N
2B	6x25	+5	✳	-	Y	2	-	Y	-	-	N
2C	6x25	+5	✳	-	Y	2	-	Y	-	-	N
2D	6x25	+5	✳	Y	-	2	-	Y	-	-	N
2E	6x30	280	✳	-	Y	2	-	Y	-	-	N
3A	6x25	+5	✳	-	Y	3	-	Y	-	-	N
3B	6x25	+5	✳	-	Y	3	-	Y	-	-	N
3C	6x18	70	✳	-	Y	3	-	Y	-	-	N
4A	6x25	+5	✳	-	Y	4	-	Y	-	-	N
4B	6x25	+5	✳	-	Y	4	-	Y	-	-	N
4C	6x18	200	✳	-	Y	4	-	Y	-	-	S
5A	6x25	+5	✳	-	Y	5	Y	-	-	-	N
5B	6x25	+5	✳	-	Y	5	Y	-	-	-	N
5C	6x18	70	✳	-	Y	5	Y	-	-	-	N
6A	6x25	+5	✳	-	Y	6	-	Y	-	-	N
6B	6x25	+5	✳	-	Y	6	-	Y	-	-	N
6C	6x25	+5	✳	-	Y	6	-	Y	-	-	N
6D	6x25	+5	✳	-	Y	6	-	Y	-	-	N
6E	6x30	280	✳	-	Y	6	-	Y	-	-	N
7A	6x25	+5	✳	-	Y	7	-	Y	-	-	N
7B	6x25	65	✳	-	Y	7	-	Y	-	-	N
8A	6x25	+5	✳	-	Y	8	-	Y	-	-	N
8B	6x25	+5	✳	-	Y	8	-	Y	-	-	N
8C	6x18	200	✳	-	Y	8	-	Y	-	-	S

✳ Video Detection Area.
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.

8 Phase
Fully Actuated w/
Emergency Vehicle Preemption
(Charlotte Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
6. Pedestrian pedestals are conceptual and shown for reference only. See 2018 NCDOT Roadway Standard Drawings #1705.04, Sheets 1-3, for push button location details.
7. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.Contractor shall make sure none of the left turns are occluded.
8. Optical Detector OP1 calls EV PRE 6
   Optical Detector OP2 calls EV PRE 5
   Optical Detector OP4 calls EV PRE 4
   Optical Detector OP5 calls EV PRE 5
   Optical Detector OP6 calls EV PRE 6
   Optical Detector OP8 calls EV PRE 3
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system values supersede these values.
10. Ped head P83F will remain covered and disconnected.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
⊛	Type I Pushbutton Post	⊛
⬡	Type II Signal Pedestal	●
⊢	Ped Push Button w/Sign	⊢
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller and Cabinet	⊠
□	Junction Box	■
----	2-in Underground Conduit	----
N/A	Right of Way	----
→	Directional Arrow	→
⊸	Optical EV Detector	✸
▬	Video Detection Area	N/A
○▱	Metal Pole with Mastarm	○▱
▭	Construction Zone	N/A
● ●	Construction Zone Drums	N/A
ıı	Guardrail	ıı
Ⓐ	NO U-TURN SIGN (R3-4)	Ⓐ
Ⓒ	LEFT "ONLY" SIGN (R3-5L)	Ⓒ
Ⓓ	NO LEFT/U-TURN SYMBOL SIGN (R3-18)	Ⓓ
Ⓔ	"PEDESTRIAN CROSSING" SIGN (W11-2) W/ ARROW PANEL (W16-7p)	Ⓔ
Ⓕ	"NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign	Ⓕ
Ⓖ	"NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign	Ⓖ

Signal Upgrade
Temporary Design 6 - TMP Phase V

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Stantec
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Raleigh, NC 27606
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1750 N.Greenfield Pkwy,Garner,NC 27529

NC 16 (Brookshire Boulevard)
at
SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE: January 2018 REVIEWED BY: E D Harris
PREPARED BY: J B HAMBRIGHT REVIEWED BY: B L Watson

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T6

CDOT ASSET NO.: 941

DATE:
User:rmurcay
K:\Traffic\Signals\Designs\Signals\Temporary Designs\U6084_sig_10-0850_T6.dgn

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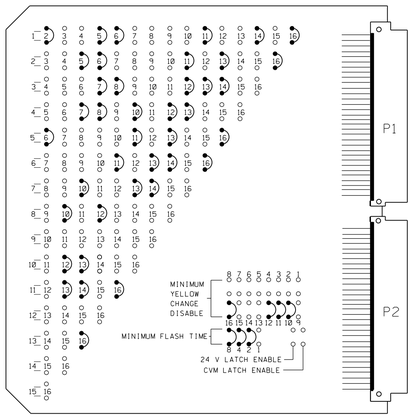
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	ENABLE
6	ENABLE
7	ENABLE
8	ENABLE
9	DISABLE
10	ENABLE
11	ENABLE
12	ENABLE
13	ENABLE
14	ENABLE
15	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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, 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 Phases 2 and 6 Green.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-10.1

FIELD CONNECTION HOOK-UP CHART

PHASE	1	OLA	3	4	5	OLC	7	8	2 PED	4 PED	6 PED	8 PED	OLB		OLD		1 PED	5 PED
SIGNAL HEAD NO.	11,12	21,22, 23	31,32	41,42, 43	51,52	61,62, 63	71	81,82, 83	NU	P41F, P42F, P43F, P44F, P45F, P46F, P47F, P48F	P61F, P62F	P81F, P82F	24,25	26	64,65	66	NU	P51F, P52F
RED		2R		4R		6R		8R					13R		14R			
YELLOW		2Y		4Y		6Y		8Y										
GREEN		2G		4G		6G		8G										
RED ARROW	1R		3R		5R		7R							13R		14R		
YELLOW ARROW	1Y		3Y		5Y		7Y						13Y	13Y	14Y	14Y		
GREEN ARROW	1G		3G		5G		7G						13G	13G	14G	14G		
✋										10R	11R	12R						16R
🚶										10G	11G	12G						16G

NU = NOT USED

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	CH1	CH1	CH1	CH1	CH1	CH1	CH1	CHA	CHC	SLOT EMPTY
L3 ø1 1C	L1 ø1 1A	L7 ø2 2D	L5 ø2 2B	L11 ø3 3C	L9 ø3 3A	L15 ø5 5A	L13 ø4 4B	EVP3 ø3,8	EVP5 ø2,5	
CH2	CH2	CH2	CH2	CH2	CH2	CH2	CH2	CHB	CHD	
L4 ø2 2A	L2 ø1 1B	L8 ø2 2E	L6 ø2 2C	L12 ø4 4A	L10 ø3 3B	L16 ø5 5B	L14 ø4 4C	EVP4 ø4,7	EVP6 ø1,6	

RACK #2 — BIU

CH1	CH1	CH1	CH1	CH1	CH1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
L19 ø6 6B	L17 ø5 5C	L23 ø7 7A	L21 ø6 6D	L27 ø8 8C	L25 ø8 8A					
CH2	CH2	CH2	CH2	CH2	CH2					
L20 ø6 6C	L18 ø6 6A	L24 ø7 7B	L22 ø6 6E	L28 NOT USED	L26 ø8 8B					

NOTE
BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

* Detector Type - S

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
2A	L4A,L4B
2B	L5A,L5B
2C	L6A,L6B
2D	L7A,L7B
2E	L8A,L8B
3A	L9A,L9B
3B	L10A,L10B
3C	L11A,L11B
4A	L12A,L12B
4B	L13A,L13B
4C	L14A,L14B
5A	L15A,L15B
5B	L16A,L16B
5C	L17A,L17B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø1	–	–
2	ø1	–	–
3	ø1	–	–
4	ø2	–	–
5	ø2	–	–
6	ø2	–	–
7	ø2	–	–
8	ø2	–	–
9	ø3	–	–
10	ø3	–	–
11	ø3	–	–
12	ø4	–	–
13	ø4	–	–
* 14	ø4	–	–
15	ø5	–	–
16	ø5	–	–
17	ø5	–	–

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

LOOP NO.	LOOP PANEL TERMINALS
6A	L18A,L18B
6B	L19A,L19B
6C	L20A,L20B
6D	L21A,L21B
6E	L22A,L22B
7A	L23A,L23B
7B	L24A,L24B
8A	L25A,L25B
8B	L26A,L26B
8C	L27A,L27B
NU	L28A,L28B
NU	L29A,L29B
NU	L30A,L30B
NU	L31A,L31B
NU	L32A,L32B
NU	L33A,L33B
NU	L33A,L33B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
18	ø6	–	–
19	ø6	–	–
20	ø6	–	–
21	ø6	–	–
22	ø6	–	–
23	ø7	–	–
24	ø7	–	–
25	ø8	–	–
26	ø8	–	–
* 27	ø8	–	–
28	NU	–	–
29	NU	–	–
30	NU	–	–
31	NU	–	–
32	NU	–	–
33	NU	–	–
34	NU	–	–

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8,10,11,12,13,14,16
PHASES USED.....1,3,4,5,7,8,PED4,PED5,PED6,PED8, OLA,OLB,OLC,OLD
OLA.....1+2
OLB.....2+7
OLC.....5+6
OLD.....3+6
OLE(DUMMY).....1+2+3+4+6+7+8
OLF(DUMMY).....2+3+4+5+6+7+8

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	øOLA
3	ø3
4	ø4
5	ø5
6	øOLC
7	ø7
8	ø8
9	-
10	ø4P
11	ø6P
12	ø8P
13	øOLB
14	øOLD
15	-
16	ø5P

SEE LOAD SWITCH PROGRAMMING ASSIGNMENT DETAILS

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T6
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 6 - TMP Phase V
Electrical Detail - Sheet 1 of 4

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Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
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750 N.Greenfield Pkwy.Garner,NC 27529

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE
SIG. INVENTORY NO. 10-0850T6

DATE:
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PROJECT REFERENCE NO.	SHEET NO.
U-6084	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 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP E (DUMMY)

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

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

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

Toggle Once

OVERLAP F (DUMMY)

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

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

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

END PROGRAMMING

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR "NO TURN ON RED" BLANK OUT SIGN

(program controller as shown)

The following logic processor configuration activates the blank out sign during normal operation. Upon the red interval preceeding phase 1 and/or 5, the logic will activate the blank out sign.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1 & 2 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
LP 1-15   E E . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . .
```

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:      1  COPY FROM:   1  ACTIVE:  M   (T/F)

IF        VEH OVERLAP RED       5   IS  ON   T
OR        CTR PHASE TIMING      5   IS  ON   F
AND       LP COB CODE OFF             544  T

THEN      SIG SET PH PED CLR    5       ON

ELSE      SIG SET PH PED CLR    5       OFF
```

LOGIC FOR ACTIVATING THE BLANK OUT SIGN DURING NORMAL OPERATION. THE AND CONDITION ENSURES SIGN IS OFF DUING CONTROLLER FLASH.

Toggle Once

ENTER A "2" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:      2  COPY FROM:   2  ACTIVE:  M   (T/F)

IF        VEH OVERLAP RED       1   IS  ON   T
OR        CTR PHASE TIMING      1   IS  ON   F
AND       LP COB CODE OFF             544  T

THEN      SIG SET PH PED CLR    1       ON

ELSE      SIG SET PH PED CLR    1       OFF
```

LOGIC FOR ACTIVATING THE BLANK OUT SIGN DURING NORMAL OPERATION. THE AND CONDITION ENSURES SIGN IS OFF DUING CONTROLLER FLASH.

END PROGRAMMING

Notes:
1. COB 544 is a controller flash internal logic processor reference.

ECONOLITE ASC/3-2070 PED PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

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

	LD SWITCH	PHASE /OVLP	TYPE	DIMMING R	Y	G	D	---FLASH--- PWR	AUT	TGR
	1	1	V	.	.	.	+	A	R	.
NOTICE OVLP A ASSIGNED TO LD SWITCH 2 →	2	1	O	.	.	.	+	A	R	X
	3	3	V	.	.	.	+	A	R	.
	4	4	V	.	.	.	+	A	R	X
	5	5	V	.	.	.	−	A	R	.
NOTICE OVLP C ASSIGNED TO LD SWITCH 6 →	6	3	O	.	.	.	−	A	R	X
	7	7	V	.	.	.	−	A	R	.
	8	8	V	.	.	.	−	A	R	X
	9	Ø	.	.	.	.	+	A	.	.
	10	4	P	.	.	.	+	A	.	.
	11	6	P	.	.	.	−	A	.	.
	12	8	P	.	.	.	−	A	.	.
NOTICE OVLP B ASSIGNED TO LD SWITCH 13 →	13	2	O	.	.	.	+	A	R	.
NOTICE OVLP D ASSIGNED TO LD SWITCH 14 →	14	4	O	.	.	.	−	A	R	X
	15	Ø	.	.	.	.	+	A	R	.
NOTICE PHASE 5 PED ASSIGNED TO LD SWITCH 16 →	16	5	P	.	.	.	−	A	R	X

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T6
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 6 - TMP Phase V
Electrical Detail - Sheet 2 of 4

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PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
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SIG. INVENTORY NO. 10-0850T6

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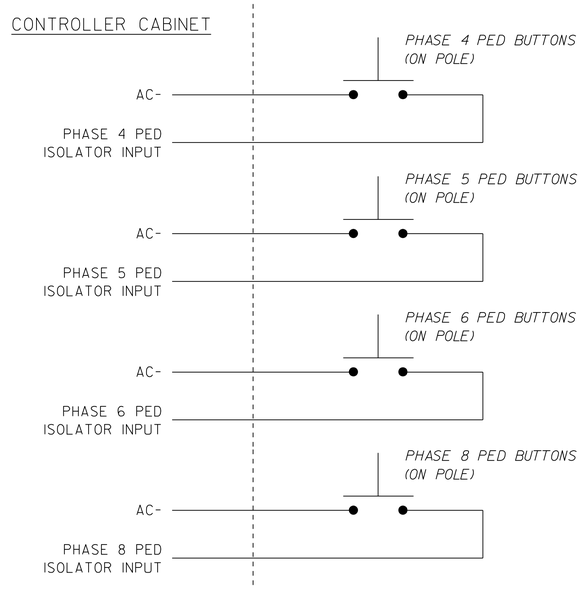
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-10.3

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

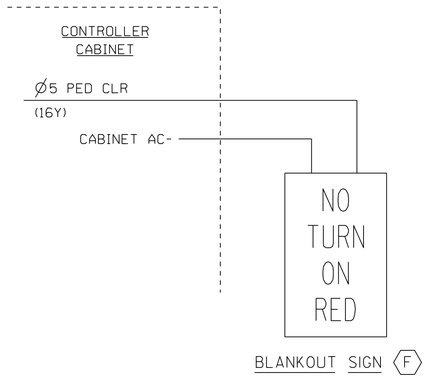
PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



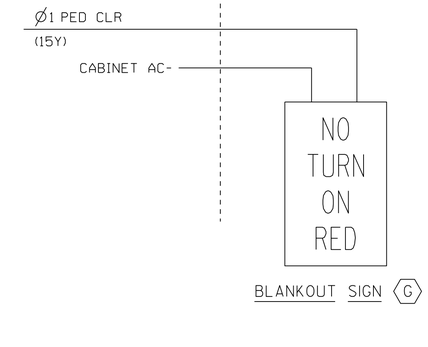
BLANKOUT SIGN WIRING DETAIL

(wire as shown)



BLANKOUT SIGN WIRING DETAIL

(wire as shown)



ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [3. VEH/PED OVERLAPS]

Program Ped OL6 as noted below:

VEH/PED OVERALPS INCLUDED	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
PD OL Ø1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø6	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.
PD OL Ø7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL Ø8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850T6
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 6 - TMP Phase V
Electrical Detail - Sheet 3 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850T6

DATE:
User:traffic
File:C:\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-0850T6.dgn
User:rmurchy

DocuSign Envelope ID: 2C88EAD4-B6B0-4DB0-954B-5E71A8789B4F

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-10.4

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.    0|  25.5|  7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR     0|      0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT    7|      0|  6|0|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.    0|  25.5|  7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR     0|      0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT    7|      0|  6|0|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.    0|  25.5|  7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR     0|      0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT   14|      0|  6|0|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 6. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #6.

```
PREEMPT PLAN [  6]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.    0|  25.5|  7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR     0|      0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT   14|      0|  6|0|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0850T6
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 6 - TMP Phase V
Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

NC 16 (Brookshire Boulevard)
at SR 2004
(Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 2/12/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-850T6

DATE:
User:traffic
File:C:\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-0850T6.dgn
User:rmurchy

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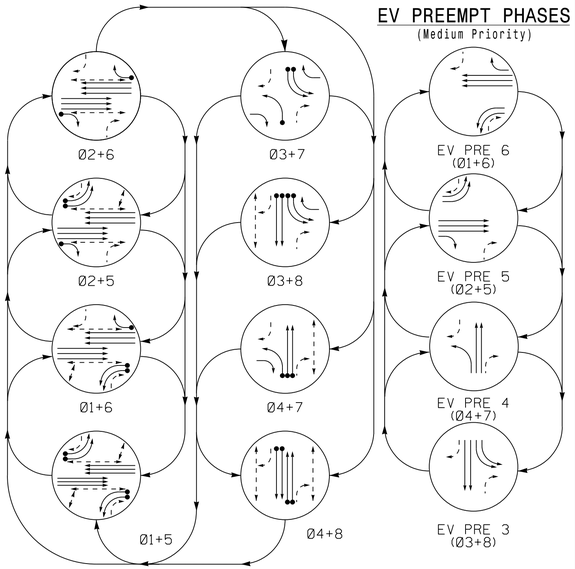
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-11.0

8 Phase Fully Actuated w/ Emergency Vehicle Preemption (Charlotte Signal System)

PHASING DIAGRAM



EV PREEMPT PHASES
(Medium Priority)

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	EVE 3	EVE 4	EVE 5	EVE 6	FLASH
11,12	←	←	↛	↛	↛	↛	↛	↛	↛	↛	↛	←	↛
21,22,23	G	G	G	G	R	R	R	R	R	R	G	R	Y
24,25	R	R	→	→	→	R	→	R	R	R	→	R	↛
26	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
31,32	↛	↛	↛	↛	←	↛	←	↛	←	↛	↛	↛	↛
41,42	R	R	R	R	R	G	G	R	G	R	R	R	R
51,52	←	↛	←	↛	↛	↛	↛	↛	↛	↛	←	↛	↛
61,62,63	G	G	G	G	R	R	R	R	R	R	R	G	Y
64,65	R	→	R	→	→	→	R	R	R	R	→	→	↛
66	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
71	↛	↛	↛	↛	←	↛	←	↛	↛	↛	←	↛	↛
81,82	R	R	R	R	R	G	R	G	G	R	R	R	R
P11,P12	W	W	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P21,P22	W	W	W	W	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P41,P42,P43, P44,P45,P46	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P51,P52	W	DW	W	DW	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P61,P62	W	W	W	W	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P81,P82,P83, P84,P85,P86	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK
Sign Ⓔ	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
Sign Ⓕ	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF

EMERGENCY VEHICLE PREEMPTION

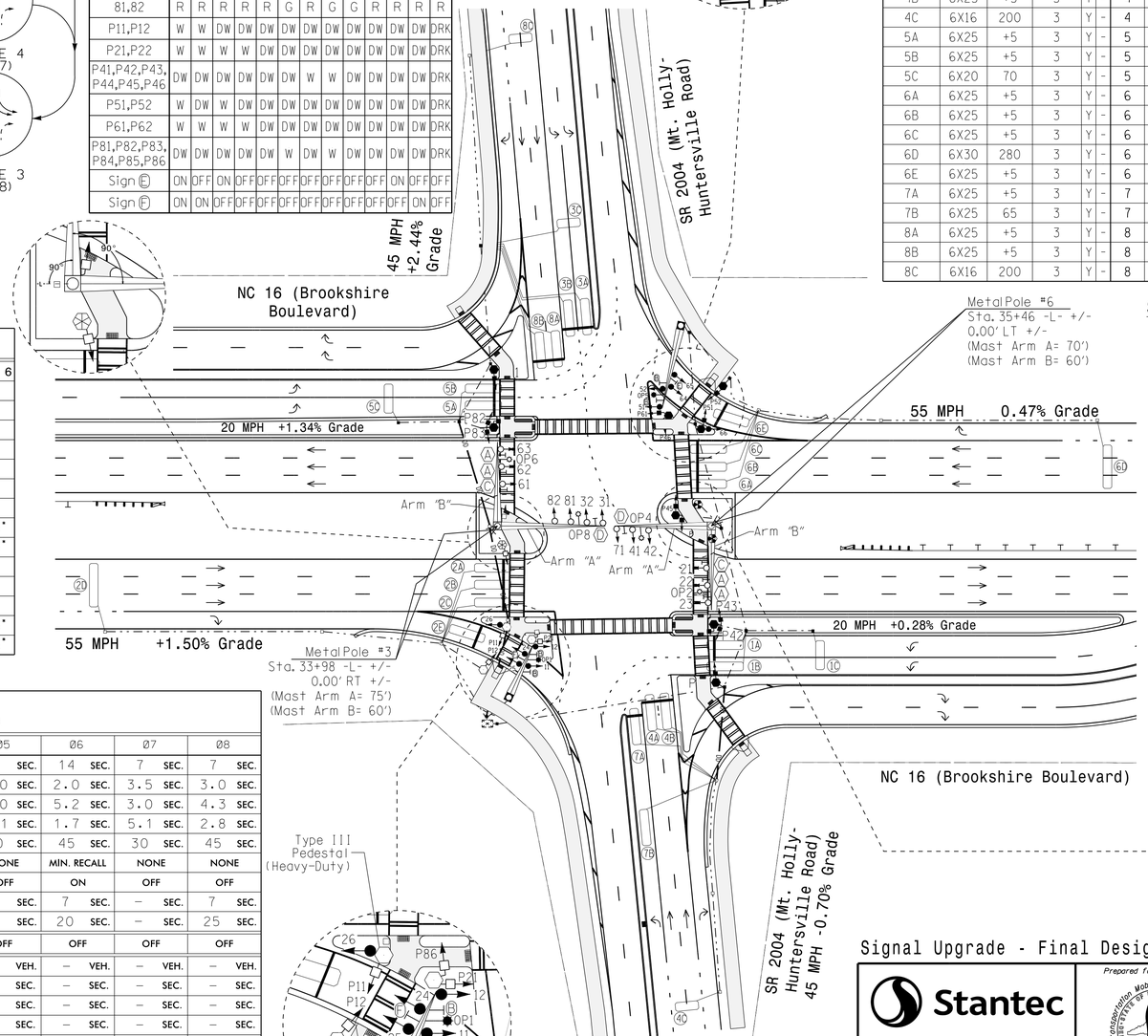
FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5	EV PRE 6
DELAY BEFORE PREEMPT	0	0	0	0
PMT OVERRIDE	OFF	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	Y	Y	Y	Y
TERMINATE PHASES	N	N	N	N
ENTRANCE WALK	0	0	0	0
ENTRANCE PED CLEAR	255	255	255	255
ENTRANCE MIN GREEN	7	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*	25.5*
MIN DWELL GREEN	7	7	14	14
MAX CALL TIME	60	60	60	60
EXIT OPTIONS	CRD	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

TIMING CHART
ASC/3-2070EN2 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN *	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.5 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	3.5 SEC.	3.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.1 SEC.	3.0 SEC.	4.6 SEC.	3.0 SEC.	5.2 SEC.	3.0 SEC.	4.3 SEC.
RED CLEARANCE	4.0 SEC.	1.7 SEC.	5.2 SEC.	2.9 SEC.	4.1 SEC.	1.7 SEC.	5.1 SEC.	2.8 SEC.
MAX. 1 *	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.	30 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE
LOCK DET.	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
WALK *	7 SEC.	7 SEC.	– SEC.	7 SEC.	7 SEC.	7 SEC.	– SEC.	7 SEC.
PED. CLEAR	5 SEC.	21 SEC.	– SEC.	23 SEC.	7 SEC.	20 SEC.	– SEC.	25 SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF	OFF	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.

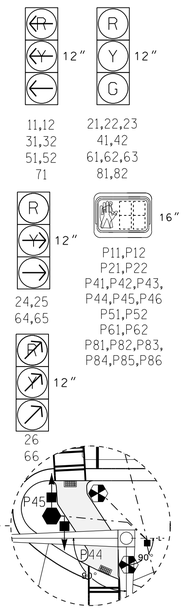


LOOP & DETECTOR INSTALLATION CHART
ASC/3-2070EN2 CONTROLLER w/ TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS					
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
1A	6X25	+5	3	Y	-	1	Y	-	-	-	N
1B	6X25	+5	3	Y	-	1	Y	-	-	-	N
1C	6X20	70	3	Y	-	1	Y	-	-	-	N
2A	6X25	+5	3	Y	-	2	Y	-	-	-	N
2B	6X25	+5	3	Y	-	2	Y	-	-	-	N
2C	6X25	+5	3	Y	-	2	Y	-	-	-	N
2D	6X30	280	3	Y	-	2	Y	-	-	-	N
2E	6X25	+5	3	Y	-	2	Y	-	-	-	N
3A	6X25	+5	3	Y	-	3	Y	-	-	-	N
3B	6X25	+5	3	Y	-	3	Y	-	-	-	N
3C	6X16	70	3	Y	-	3	Y	-	-	-	N
4A	6X25	+5	3	Y	-	4	Y	-	-	-	N
4B	6X25	+5	3	Y	-	4	Y	-	-	-	N
4C	6X16	200	3	Y	-	4	Y	-	-	-	S
5A	6X25	+5	3	Y	-	5	Y	-	-	-	N
5B	6X25	+5	3	Y	-	5	Y	-	-	-	N
5C	6X20	70	3	Y	-	5	Y	-	-	-	N
6A	6X25	+5	3	Y	-	6	Y	-	-	-	N
6B	6X25	+5	3	Y	-	6	Y	-	-	-	N
6C	6X25	+5	3	Y	-	6	Y	-	-	-	N
6D	6X30	280	3	Y	-	6	Y	-	-	-	N
6E	6X25	+5	3	Y	-	6	Y	-	-	-	N
7A	6X25	+5	3	Y	-	7	Y	-	-	-	N
7B	6X25	65	3	Y	-	7	Y	-	-	-	N
8A	6X25	+5	3	Y	-	8	Y	-	-	-	N
8B	6X25	+5	3	Y	-	8	Y	-	-	-	N
8C	6X16	200	3	Y	-	8	Y	-	-	-	S

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	■
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----	2-in Underground Conduit	----
N/A	Right of Way	----
→	Directional Arrow	→
DD	Directional Drill	N/A
N/A	Guardrail	⊥
○	Metal Pole with Mastarm	○
⊸	Optical EV Detector	⊸
⊛	Type I Pushbutton Post	⊛
⬡	Type II Signal Pedestal	⬢
⬡	Type III Signal Pedestal (Heavy Duty)	⬢
Ⓐ	Through Arrow "ONLY" Sign (R3-5A)	Ⓐ
Ⓑ	Left "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	"NO LEFT/U-TURN" Symbol Sign (R3-18)	Ⓒ
Ⓓ	No U-Turn Sign (R3-4)	Ⓓ
Ⓔ	"NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign	Ⓔ
Ⓕ	"NO TURN ON RED" Sign (R10-11A) L.E.D. Blankout Sign	Ⓕ

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2018 and "Standard Specifications for Roads and Structures" dated July 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrain heads to countdown the flashing "DON'T WALK" time only.
6. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
7. Optical Detectors OP2,OP5 call EV PRE 5
   Optical Detectors OP1,OP6 call EV PRE 6
   Optical Detector OP4 calls EV PRE 4
   Optical Detector OP8 calls EV PRE 3
8. Maximum times shown in timing chart are for free-run operation only. Coordinated sinal system values supersede these values.
9. Ensure flashing operation does not alter operation of blankout sign.
10. Upon completion of Emergency Vehicle Preemption, controller returns to normal coordinated operation.
11. Charlotte Signal System data: Controller Asset #941.

Signal Upgrade - Final Design

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801 Jones Franklin Road-Suite 300
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Tel. (919) 851-6866
Fax. (919) 851-7024
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Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	D Harris
PREPARED BY:	G B Spell	REVIEWED BY:	B L Watson

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERMILT

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850

DATE: 1/23/2018
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User:rmuncey

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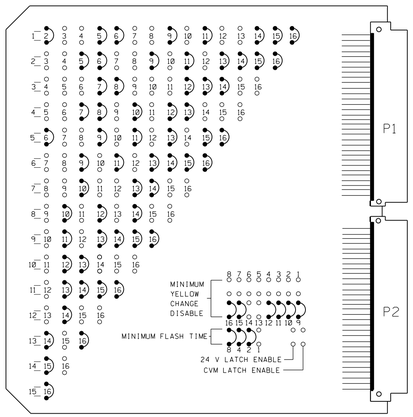
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	ENABLE
6	ENABLE
7	ENABLE
8	ENABLE
9	ENABLE
10	ENABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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. Program Phases 4 and 8 for Dual Entry.
3. Program controller to start up in Phases 2 and 6 Green.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-11.1

FIELD CONNECTION HOOK-UP CHART

PHASE	1	OLA	3	4	5	OLC	7	8	2 PED	4 PED	6 PED	8 PED	OLB		OLD		1 PED	5 PED
SIGNAL HEAD NO.	11,12	21,22, 23	31	41,42	51,52	61,62, 63	71,72	81,82	P21, P22	P41, P42, P43, P44, P45 P46	P61, P62	P81, P82, P83, P84, P85, P86	24,25	26	64,65	66	P11, P12	P51, P52
RED		2R		4R		6R		8R					13R		14R			
YELLOW		2Y		4Y		6Y		8Y										
GREEN		2G		4G		6G		8G										
RED ARROW	1R		3R		5R		7R							13R		14R		
YELLOW ARROW	1Y		3Y		5Y		7Y						13Y	13Y	14Y	14Y		
GREEN ARROW	1G		3G		5G		7G						13G	13G	14G	14G		
✋									9R	10R	11R	12R					15R	16R
🚶									9G	10G	11G	12G					15G	16G

NU = NOT USED

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	CH1	CH1	CH1	CH1	CH1	CH1	CH1	CHA	CHC	SLOT EMPTY
L3 ø1 1C	L1 ø1 1A	L7 ø2 2D	L5 ø2 2B	L11 ø3 3C	L9 ø3 3A	L15 ø5 5A	L13 ø4 4B	EVP3 ø3,8	EVP5 ø2,5	
CH2	CH2	CH2	CH2	CH2	CH2	CH2	CH2	CHB	CHD	
L4 ø2 2A	L2 ø1 1B	L8 ø2 2E	L6 ø2 2C	L12 ø4 4A	L10 ø3 3B	L16 ø5 5B	L14 ø4 4C	EVP4 ø4,7	EVP6 ø1,6	

RACK #2 — BIU

CH1	CH1	CH1	CH1	CH1	CH1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
L19 ø6 6B	L17 ø5 5C	L23 ø7 7A	L21 ø6 6D	L27 ø8 8C	L25 ø8 8A					
CH2	CH2	CH2	CH2	CH2	CH2					
L20 ø6 6C	L18 ø6 6A	L24 ø7 7B	L22 ø6 6E	L28 NOT USED	L26 ø8 8B					

NOTE
BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

* Detector Type - S

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

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
2A	L4A,L4B
2B	L5A,L5B
2C	L6A,L6B
2D	L7A,L7B
2E	L8A,L8B
3A	L9A,L9B
3B	L10A,L10B
3C	L11A,L11B
4A	L12A,L12B
4B	L13A,L13B
4C	L14A,L14B
5A	L15A,L15B
5B	L16A,L16B
5C	L17A,L17B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø1	–	–
2	ø1	–	–
3	ø1	–	–
4	ø2	–	–
5	ø2	–	–
6	ø2	–	–
7	ø2	–	–
8	ø2	–	–
9	ø3	–	–
10	ø3	–	–
11	ø3	–	–
12	ø4	–	–
13	ø4	–	–
* 14	ø4	–	–
15	ø5	–	–
16	ø5	–	–
17	ø5	–	–

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

LOOP NO.	LOOP PANEL TERMINALS
6A	L18A,L18B
6B	L19A,L19B
6C	L20A,L20B
6D	L21A,L21B
6E	L22A,L22B
7A	L23A,L23B
7B	L24A,L24B
8A	L25A,L25B
8B	L26A,L26B
8C	L27A,L27B
NU	L28A,L28B
NU	L29A,L29B
NU	L30A,L30B
NU	L31A,L31B
NU	L32A,L32B
NU	L33A,L33B
NU	L33A,L33B

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
18	ø6	–	–
19	ø6	–	–
20	ø6	–	–
21	ø6	–	–
22	ø6	–	–
23	ø7	–	–
24	ø7	–	–
25	ø8	–	–
26	ø8	–	–
* 27	ø8	–	–
28	NU	–	–
29	NU	–	–
30	NU	–	–
31	NU	–	–
32	NU	–	–
33	NU	–	–
34	NU	–	–

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16
PHASES USED.....1,3,4,5,7,8,PED1,PED2,PED4, PED5,PED6,PED8,OLA,OLB,OLC,OLD
OLA.....1+2
OLB.....2+7
OLC.....5+6
OLD.....3+6
OLE(DUMMY).....1+2+3+4+6+7+8
OLF(DUMMY).....2+3+4+5+6+7+8

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	øOLA
3	ø3
4	ø4
5	ø5
6	øOLC
7	ø7
8	ø8
9	ø2P
10	ø4P
11	ø6P
12	ø8P
13	øOLB
14	øOLD
15	ø1P
16	ø5P

SEE LOAD SWITCH PROGRAMMING ASSIGNMENT DETAILS

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Final Design
Electrical Detail - Sheet 1 of 4

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Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850

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User:rmuncy

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-11.2

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 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP E (DUMMY)

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

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

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

Toggle Once

OVERLAP F (DUMMY)

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

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

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

END PROGRAMMING

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR "NO TURN ON RED" BLANK OUT SIGN

(program controller as shown)

The following logic processor configuration activates the blank out sign during normal operation. Upon the red interval preceeding phase 1 and/or 5, the logic will activate the blank out sign.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1 & 2 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
LP 1-15   E E . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . .
```

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:     1  COPY FROM:   1  ACTIVE:  M   (T/F)

IF       VEH OVERLAP RED      5   IS  ON   T
OR       CTR PHASE TIMING     5   IS  ON   F
AND      LP COB CODE OFF              544  T

THEN     SIG SET PH PED CLR   5       ON

ELSE     SIG SET PH PED CLR   5       OFF
```

LOGIC FOR ACTIVATING THE BLANK OUT SIGN DURING NORMAL OPERATION. THE AND CONDITION ENSURES SIGN IS OFF DUING CONTROLLER FLASH.

Toggle Once

ENTER A "2" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:     2  COPY FROM:   2  ACTIVE:  M   (T/F)

IF       VEH OVERLAP RED      1   IS  ON   T
OR       CTR PHASE TIMING     1   IS  ON   F
AND      LP COB CODE OFF              544  T

THEN     SIG SET PH PED CLR   1       ON

ELSE     SIG SET PH PED CLR   1       OFF
```

LOGIC FOR ACTIVATING THE BLANK OUT SIGN DURING NORMAL OPERATION. THE AND CONDITION ENSURES SIGN IS OFF DUING CONTROLLER FLASH.

END PROGRAMMING

Notes:
1. COB 544 is a controller flash internal logic processor reference.

ECONOLITE ASC/3-2070 PED PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

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	.
2	1	O	.	.	.	+	A	R	X
3	3	V	.	.	.	+	A	R	.
4	4	V	.	.	.	+	A	R	X
5	5	V	.	.	.	−	A	R	.
6	3	O	.	.	.	−	A	R	X
7	7	V	.	.	.	−	A	R	.
8	8	V	.	.	.	−	A	R	X
9	2	P	.	.	.	+	A	.	.
10	4	P	.	.	.	+	A	.	.
11	6	P	.	.	.	−	A	.	.
12	8	P	.	.	.	−	A	.	.
13	2	O	.	.	.	+	A	R	.
14	4	O	.	.	.	−	A	R	X
15	1	P	.	.	.	+	A	R	.
16	5	P	.	.	.	−	A	R	X

NOTICE OVLP A ASSIGNED TO LD SWITCH 2
NOTICE OVLP C ASSIGNED TO LD SWITCH 6
NOTICE OVLP B ASSIGNED TO LD SWITCH 13
NOTICE OVLP D ASSIGNED TO LD SWITCH 14
NOTICE PHASE 1 PED ASSIGNED TO LD SWITCH 15
NOTICE PHASE 5 PED ASSIGNED TO LD SWITCH 16

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0850
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Final Design
Electrical Detail - Sheet 2 of 4

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PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850

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User:rmurchy

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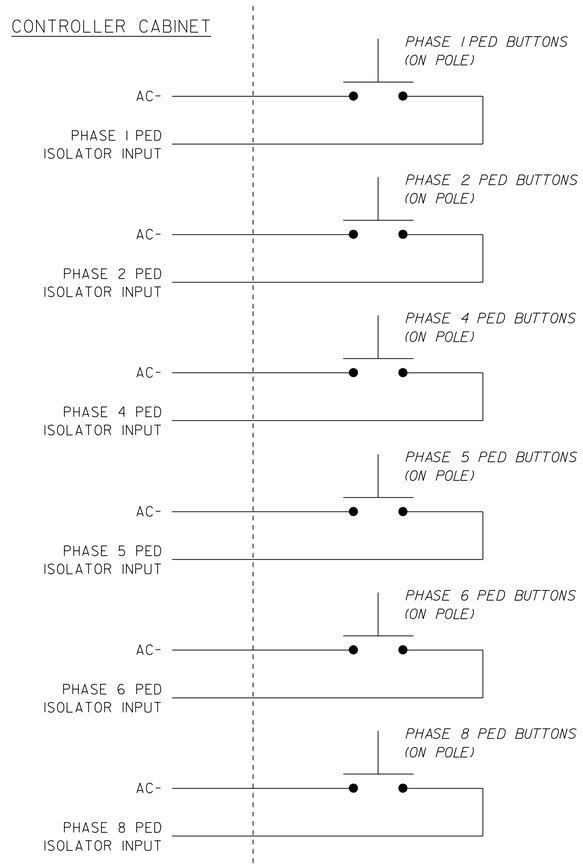
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-11.3

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

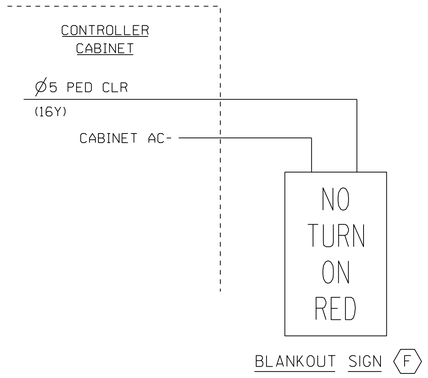
PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



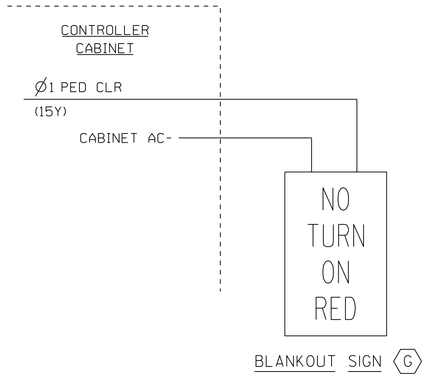
BLANKOUT SIGN WIRING DETAIL

(wire as shown)



BLANKOUT SIGN WIRING DETAIL

(wire as shown)



ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [3. VEH/PED OVERLAPS]

Program Ped OL2 and Ped OL6 as noted below:

VEH/PED OVERALPS INCLUDED	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
PD OL 01	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL 02	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL 03	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL 04	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL 05	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL 06	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.
PD OL 07	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PD OL 08	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0850
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Final Design
Electrical Detail - Sheet 3 of 4

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

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850

DATE
User:rmuncey
File:C:\Projects\Signals\Design\Signals\Final Design\Electrical Details\U-6084 sm_ele_10-0850.dgn

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-11.4

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select **4. PREEMPTOR/TSP**
2. From PREEMPTOR/TSP/SCP Submenu select **1. PREEMPT PLAN 1-10**

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.   0|  25|5|   7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR    0|   0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT   7|I  0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.   0|  25|5|   7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR    0|   0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT   7|I  0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.   0|  25|5|   7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR    0|   0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT  14|I  0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

Place cursor in [ ] next to Preempt Plan and press 6. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #6.

```
PREEMPT PLAN [  6]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH X . . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . X . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|IR1 NOIR2 NOIR3 NOIR4 NO
--TIMING-----WALK|PED CLR|MIN GRI YEL| RED
ENTRANCE TM.   0|  25|5|   7|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR    0|   0|  0|  0|  0
-----------MIN DLI|PMT|EXT|MX TMI YEL| RED
DWL/CYC-EXIT  14|I  0|  60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0850
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Final Design
Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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Division 10 | Mecklenburg County | Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850

DATE:
User:rmurchy
M:\Traffic\Signals\Design\Signals\Final Designs\Electrical Details\U-6084 sm_ele_10-0850.dgn

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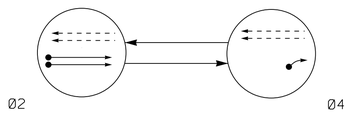
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-12.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)

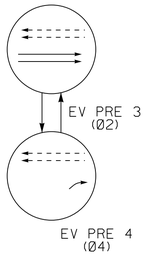
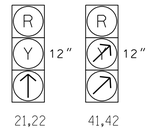


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	Ø4	PREV 3	PREV 4	FLASH
21,22	↑	R	↑	R	Y
41,42	R	↗	R	↗	R

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR INSTALLATION CHART

ASC/3-2070LN2 CONTROLLER w/ TS-2 CABINET

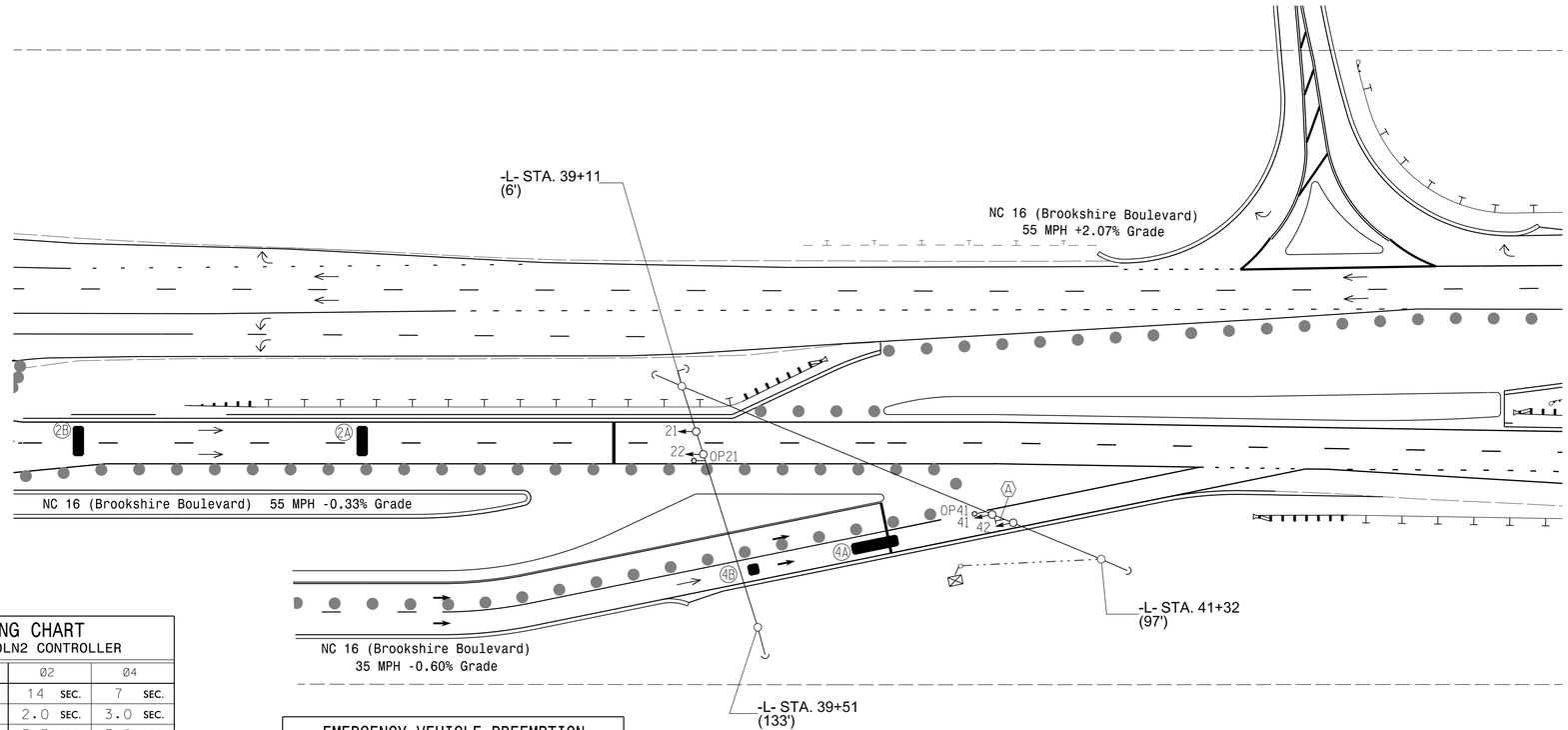
INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
2A	6X16	130	✳	Y	-	2	Y	-	-	-	N
2B	6X16	280	✳	Y	-	2	Y	-	-	-	N
4A	6X25	+5	✳	Y	-	4	Y	-	-	-	N
4B	6X6	70	✳	Y	-	4	Y	-	-	-	S

✳ Video Detection Area.
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.

2 Phase
Fully Actuated w/
Emergency Vehicle Preemption
(Charlotte Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
5. Optical Detector OP21 calls EV PRE 3
   Optical Detector OP41 calls EV PRE 4
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system values supersede these values.



TIMING CHART

ASC/3-2070LN2 CONTROLLER

PHASE	Ø2	Ø4
MINIMUM GREEN *	14 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	5.3 SEC.	3.9 SEC.
RED CLEARANCE	3.5 SEC.	3.5 SEC.
MAX. 1 *	45 SEC.	45 SEC.
RECALL POSITION	MIN. RECALL	NONE
LOCK DET.	ON	OFF
WALK *	– SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.
VOLUME DENSITY	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF
SIMULTANEOUS GAP	ON	ON

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

EMERGENCY VEHICLE PREEMPTION

FUNCTION	EV PRE 3	EV PRE 4
DELAY BEFORE PREEMPT	0	0
PMT OVERRIDE	OFF	OFF
PED CLEAR THROUGH YELLOW	N	N
TERMINATE PHASES	N	N
ENTRANCE WALK	0	0
ENTRANCE PED CLEAR	255	255
ENTRANCE MIN GREEN	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*
MIN DWELL GREEN	14	7
MAX CALL TIME	60	60
EXIT OPTIONS	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller and Cabinet	■
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	————
→	Directional Arrow	→
☼	Optical EV Detector	●
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
● ●	Construction Zone Drums	N/A
⊥⊥⊥	Guardrail	⊢ — ⊣

Ⓐ "NO TURN ON RED" Sign (R10-11) Ⓐ

Signal Upgrade
Temporary Design 1 - TMP Phase III

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Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
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Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 16 (Brookshire Boulevard)
at
East Cross-Over

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	D Harris
PREPARED BY:	R M Muncey	REVIEWED BY:	B L Watson

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERTI II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2272TI

DATE:
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User:rmuncey

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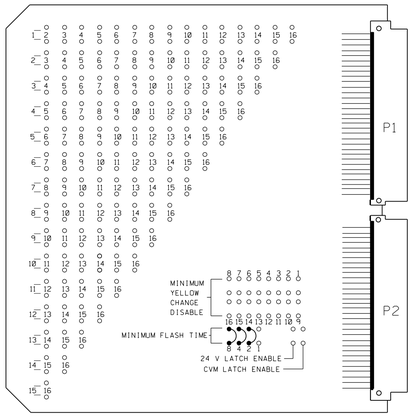
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	DISABLE
7	DISABLE
8	DISABLE
9	DISABLE
10	DISABLE
11	DISABLE
12	DISABLE
13	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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 1,3,5,6,7,8,9,10,11,12,13,14,15 & 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.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-12.1

FIELD CONNECTION 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.	NU	21,22	NU	41,42	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		2R		4R												
YELLOW		2Y														
GREEN																
RED ARROW																
YELLOW ARROW				4Y												
GREEN ARROW		2G		4G												
✋																
🚶																

NU = NOT USED

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 ø4 4A	CH1 L1 ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	CHA EVP 3 ø2	SLOT EMPTY	SLOT EMPTY
		CH2 L4 ø4 4B	CH2 L2 ø2 2B							CHB EVP 4 ø4		

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

LOOP NO.	LOOP PANEL TERMINALS
2A	L1A,L1B
2B	L2A,L2B
4A	L3A,L3B
4B	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

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø2	–	–
2	ø2	–	–
3	ø4	–	–
✱ 4	ø4	–	–
5	–	–	–
6	–	–	–
7	–	–	–
8	–	–	–
9	–	–	–
10	–	–	–
11	–	–	–
12	–	–	–
13	–	–	–
14	–	–	–
15	–	–	–
16	–	–	–

✱ Detector Type – S

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,4
PHASES USED.....2,4
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	-
2	ø2
3	-
4	ø4
5	-
6	-
7	-
8	-
9	-
10	-
11	-
12	-
13	-
14	-
15	-
16	-

UNUSED LOAD SWITCH CHANNELS SHALL BE DISABLED IN CONTROLLER PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2272T1
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 1 - TMP Phase III
Electrical Detail - Sheet 1 of 2

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

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

NC 16 (Brookshire Boulevard)
at
East Cross-Over

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2272T1

DATE:
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User:rmurchy

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-12.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  O
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL    NOITERM PH    NO
PED DARK.. NOITC RESRV  NOIDWELL FL   OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. CRD
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2  NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    OI   255I    7I25.5I25.5
----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI    OI    OI   OI   O
----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT   14I    OI   60I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  O
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL    NOITERM PH    NO
PED DARK.. NOITC RESRV  NOIDWELL FL   OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. CRD
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2  NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    OI   255I    7I25.5I25.5
----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI    OI    OI   OI   O
----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I    OI   60I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-2272T1
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 1 - TMP Phase III
Electrical Detail - Sheet 2 of 2

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PLAN DATE: January 2018	REVIEWED BY: L Overn
PREPARED BY: G B Spell	REVIEWED BY:

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2272T1

DATE:
User:
File: C:\Traffic\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-2722T1_EastOver.dgn
User:rmurcay

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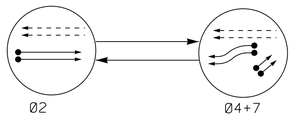
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-13.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)

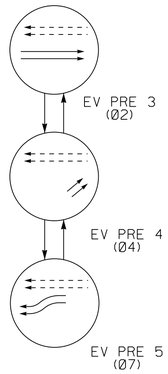
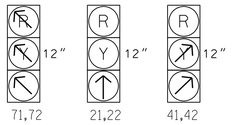


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	Ø4+7	PREVE 3	PREVE 4	PREVE 5	FLASH
21,22	↑	R	↑	R	R	Y
41,42	R	↗	R	↗	R	R
71,72	↖	↖	↖	↖	↖	↖

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR INSTALLATION CHART

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

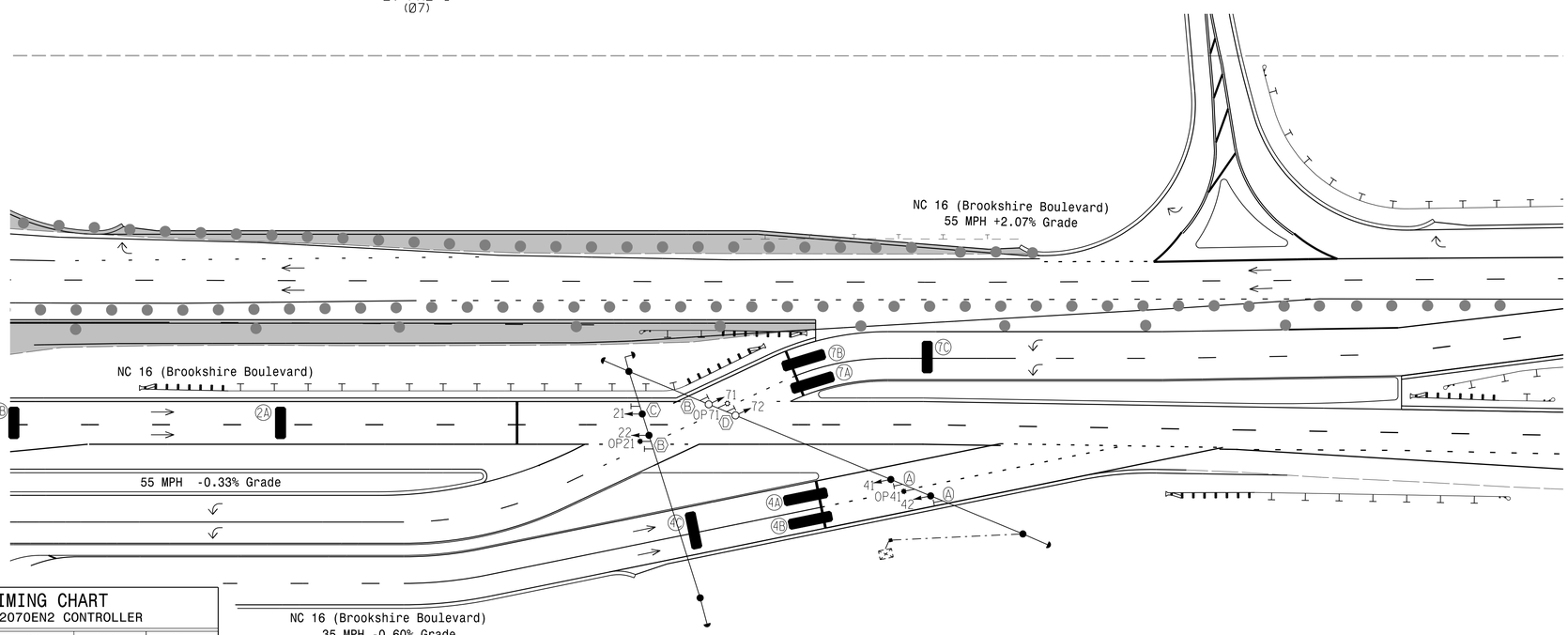
INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
2A	6X30	130	✳	Y	-	2	-	Y	-	-	N
2B	6X30	280	✳	Y	-	2	-	Y	-	-	N
4A	6X25	+5	✳	Y	-	4	-	Y	-	-	N
4B	6X25	+5	✳	Y	-	4	-	Y	-	-	N
4C	6X21	70	✳	Y	-	4	Y	-	-	-	N
7A	6X25	+5	✳	Y	-	7	Y	-	-	-	N
7B	6X25	+5	✳	Y	-	7	Y	-	-	-	N
7C	6X21	70	✳	Y	-	7	Y	-	-	-	S

✳ Video Detection Area.
Camera locations shown are schematic and should be confirmed in the field by the contractor in order to provide detection of the areas indicated and prevent occlusion.

3 Phase
Fully Actuated
w/ Emergency Vehicle Preemption
(Charlotte Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Reposition existing heads #41 and #42.
5. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
6. Optical Detector OP21 calls EV PRE 3
   Optical Detector OP41 calls EV PRE 4
   Optical Detector OP71 calls EV PRE 5
7. Maximum times shown in timing chart are for free-run operation only.



TIMING CHART

ASC/3-2070EN2 CONTROLLER

PHASE	Ø2	Ø4	Ø7
MINIMUM GREEN *	14 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	5.3 SEC.	3.9 SEC.	3.0 SEC.
RED CLEARANCE	3.2 SEC.	3.2 SEC.	3.4 SEC.
MAX. 1 *	45 SEC.	45 SEC.	45 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE
LOCK DET.	ON	OFF	OFF
WALK *	– SEC.	– SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	ON	ON
SIMULTANEOUS GAP	ON	ON	ON

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

EMERGENCY VEHICLE PREEMPTION

FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5
DELAY BEFORE PREEMPT	0	0	0
PMT OVERRIDE	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	N	N	N
TERMINATE PHASES	N	N	N
ENTRANCE WALK	0	0	0
ENTRANCE PED CLEAR	255	255	255
ENTRANCE MIN GREEN	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*
MIN DWELL GREEN	14	7	7
MAX CALL TIME	60	60	60
EXIT OPTIONS	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
○—	Signal Pole with Guy	●—
○⌐	Signal Pole with Sidewalk Guy	●⌐
▭	Inductive Loop Detector	▭
⊠	Controller and Cabinet	■
□	Junction Box	■
-----	2-in Underground Conduit	-----
N/A	Right of Way	-----
→	Directional Arrow	→
—☼	Optical EV Detector	—●
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
● ●	Construction Zone Drums	N/A
⊥ ⊥	Guardrail	⊥ ⊥
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	NO RIGHT SYMBOL SIGN (R3-2)	Ⓑ
Ⓒ	NO LEFT SYMBOL SIGN (R3-2)	Ⓒ
Ⓓ	NO U-TURN SIGN (R3-4)	Ⓓ

Signal Upgrade
Temporary Design 2 - TMP Phase IV - Step 1, IV - Step 2, & V

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SCALE 0 40 1"=40'

NC 16 (Brookshire Boulevard)
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Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	D Harris
PREPARED BY:	R M Muncey	REVIEWED BY:	B L Watson

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN, II

DocuSigned by: 1/23/2018
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SIG. INVENTORY NO. 10-22712

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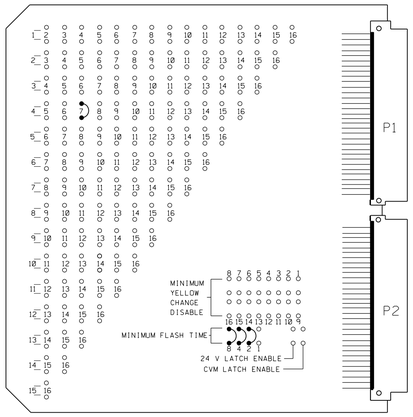
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	DISABLE
7	ENABLE
8	DISABLE
9	DISABLE
10	DISABLE
11	DISABLE
12	DISABLE
13	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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 1,3,5,6,8,9,10,11,12,13,14,15 & 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.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-13.1

FIELD CONNECTION 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.	NU	21,22	NU	41,42	NU	NU	71,72	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		2R		4R												
YELLOW		2Y														
GREEN																
RED ARROW							7R									
YELLOW ARROW				4Y			7Y									
GREEN ARROW		2G		4G			7G									
✋																
🚶																

NU = NOT USED

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 ø4 4A	CH1 L1 ø2 2A	CH1 L7 ø7 7B	CH1 L5 ø4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	CHA EVP 3 ø2	CHC EVP 5 ø7	SLOT EMPTY
		CH2 L4 ø4 4B	CH2 L2 ø2 2B	CH2 L8 ø7 7C	CH2 L6 ø7 7A					CHB EVP 4 ø4	CHD L1Ø NOT USED	

LOOP NO.	LOOP PANEL TERMINALS
2A	L1A,L1B
2B	L2A,L2B
4A	L3A,L3B
4B	L4A,L4B
4C	L5A,L5B
7A	L6A,L6B
7B	L7A,L7B
7C	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

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø2	–	–
2	ø2	–	–
3	ø4	–	–
4	ø4	–	–
✱ 5	ø4	–	–
6	ø7	–	–
7	ø7	–	–
8	ø7	–	–
9	–	–	–
10	–	–	–
11	–	–	–
12	–	–	–
13	–	–	–
14	–	–	–
15	–	–	–
16	–	–	–

✱ Detector Type - S

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,4,7
PHASES USED.....2,4,7
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	-
2	ø2
3	-
4	ø4
5	-
6	-
7	ø7
8	-
9	-
10	-
11	-
12	-
13	-
14	-
15	-
16	-

UNUSED LOAD SWITCH CHANNELS SHALL BE DISABLED IN CONTROLLER PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2272T2
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 2 - TMP Phase IV - Step 1, IV - Step 2, & V
Electrical Detail - Sheet 1 of 2

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PREPARED BY:	G B Spell	REVIEWED BY:	

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U-6084	SIG-13.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES!PMT OVRIDE..!INTERLOCK. NO
DET LOCK... X!DELAY..    0!INHIBIT...  0
OVERIDE FL. .!DURATION   0!CLR-GRN... NO
TERM OLP.  NO!PC>YEL    NO!TERM PH    NO
PED DARK.. NO!TC RESRV  NO!DWELL FL   OFF
LINK PMT....0!X FLCOLR RED!EXIT OPT. CRD
X TMG PLN...0!RE-SERV..  0!FLT TYPE.HARD
FREE DUR PMT!R1  NO!R2  NO!R3  NO!R4  NO
--TIMING-----WALK!PED CLR!MN GRI YEL! RED
ENTRANCE TM.    0!  255!   7!25.5!25.5
----------MIN GRI!EXT GRI!MX GRI YEL! RED
TRACK CLEAR     0!   0!   0!   0!   0
----------MIN DLI!PMT!EXT!MX TMI YEL! RED
DWL/CYC-EXIT   14!   0!  60!25.5!25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES!PMT OVRIDE..!INTERLOCK. NO
DET LOCK... X!DELAY..    0!INHIBIT...  0
OVERIDE FL. .!DURATION   0!CLR-GRN... NO
TERM OLP.  NO!PC>YEL    NO!TERM PH    NO
PED DARK.. NO!TC RESRV  NO!DWELL FL   OFF
LINK PMT....0!X FLCOLR RED!EXIT OPT. CRD
X TMG PLN...0!RE-SERV..  0!FLT TYPE.HARD
FREE DUR PMT!R1  NO!R2  NO!R3  NO!R4  NO
--TIMING-----WALK!PED CLR!MN GRI YEL! RED
ENTRANCE TM.    0!  255!   7!25.5!25.5
----------MIN GRI!EXT GRI!MX GRI YEL! RED
TRACK CLEAR     0!   0!   0!   0!   0
----------MIN DLI!PMT!EXT!MX TMI YEL! RED
DWL/CYC-EXIT    7!   0!  60!25.5!25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . . . X . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES!PMT OVRIDE..!INTERLOCK. NO
DET LOCK... X!DELAY..    0!INHIBIT...  0
OVERIDE FL. .!DURATION   0!CLR-GRN... NO
TERM OLP.  NO!PC>YEL    NO!TERM PH    NO
PED DARK.. NO!TC RESRV  NO!DWELL FL   OFF
LINK PMT....0!X FLCOLR RED!EXIT OPT. CRD
X TMG PLN...0!RE-SERV..  0!FLT TYPE.HARD
FREE DUR PMT!R1  NO!R2  NO!R3  NO!R4  NO
--TIMING-----WALK!PED CLR!MN GRI YEL! RED
ENTRANCE TM.    0!  255!   7!25.5!25.5
----------MIN GRI!EXT GRI!MX GRI YEL! RED
TRACK CLEAR     0!   0!   0!   0!   0
----------MIN DLI!PMT!EXT!MX TMI YEL! RED
DWL/CYC-EXIT    7!   0!  60!25.5!25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2272T2
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Temporary Design 2 - TMP Phase IV - Step 1, IV - Step 2, & V
Electrical Detail - Sheet 2 of 2

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

Prepared for the Offices of:
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 16 (Brookshire Boulevard)
at
East Cross-Over

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2272T2

DATE:
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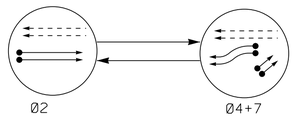
C:\Signals\Designs\Signals\Temporary Designs\Electrical Details\U-6084 sm_ele_10-2772T2_EastOver.dgn
User:rmurchy

DocuSign Envelope ID: 7F63B837-9AA6-4993-A72E-E43D2E9B24E9

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-14.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)

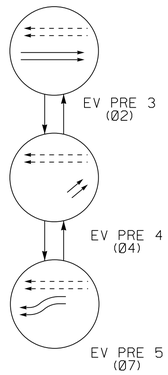
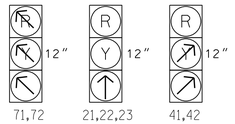


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	Ø4+7	EV PRE 3	EV PRE 4	EV PRE 5	FLASH
21,22,23	↑	R	↑	R	R	Y
41,42	R	↗	R	↗	R	R
71,72	~~R~~	↖	~~R~~	~~R~~	↖	~~R~~

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR INSTALLATION CHART

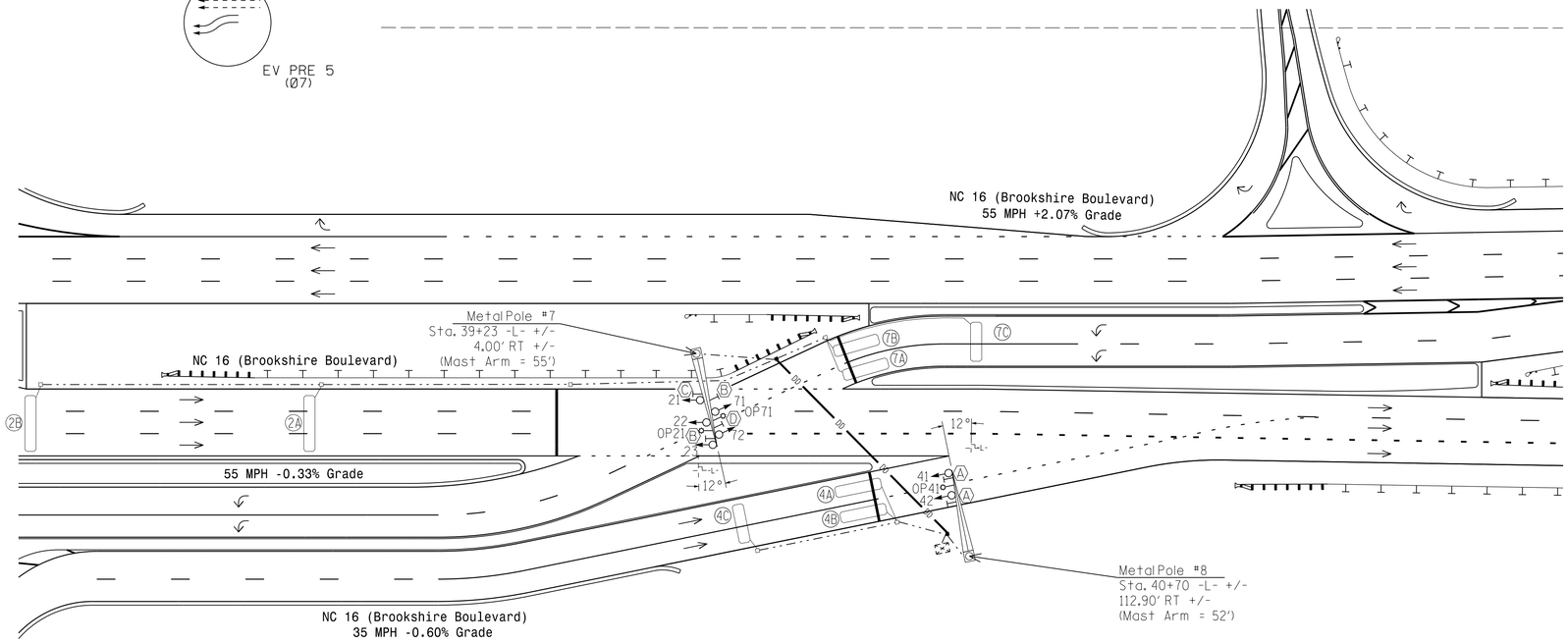
ASC/3-2070EN2 CONTROLLER w/ TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	DET. TYPE
2A	6X30	130	3	Y	-	2	Y	-	-	-	N
2B	6X30	280	3	Y	-	2	Y	-	-	-	N
4A	6X25	+5	3	Y	-	4	Y	-	-	-	N
4B	6X25	+5	3	Y	-	4	Y	-	-	-	N
4C	6X21	70	3	Y	-	4	Y	-	-	-	S
7A	6X25	+5	3	Y	-	7	Y	-	-	-	N
7B	6X25	+5	3	Y	-	7	Y	-	-	-	N
7C	6X21	70	3	Y	-	7	Y	-	-	-	N

3 Phase
Fully Actuated w/
Emergency Vehicle Preemption
(Charlotte Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Optical Detector OP21 calls EV PRE 3
   Optical Detector OP41 calls EV PRE 4
   Optical Detector OP71 calls EV PRE 5
5. Maximum times shown in timing chart are for free-run operation only.
6. Charlotte Signal System data:
   Controller Asset #XXX.



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	→
—DD—	Directional Drill	N/A
N/A	Guardrail	
⊙—	Metal Pole with Mastarm	⊙—
—☼	Optical EV Detector	—●
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	NO RIGHT SYMBOL SIGN (R3-2)	Ⓑ
Ⓒ	No Left Turn Sign (R3-2)	Ⓒ
Ⓓ	No U-Turn Sign (R3-4)	Ⓓ

TIMING CHART

ASC/3-2070EN2 CONTROLLER

PHASE	Ø2	Ø4	Ø7
MINIMUM GREEN *	14 SEC.	7 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	3.0 SEC.	3.0 SEC.
YELLOW CHANGE INT.	5.3 SEC.	3.9 SEC.	3.0 SEC.
RED CLEARANCE	3.3 SEC.	2.4 SEC.	3.9 SEC.
MAX. 1 *	45 SEC.	45 SEC.	45 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE
LOCK DET.	ON	OFF	OFF
WALK *	– SEC.	– SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	OFF	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON

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

EMERGENCY VEHICLE PREEMPTION

FUNCTION	EV PRE 3	EV PRE 4	EV PRE 5
DELAY BEFORE PREEMPT	0	0	0
PMT OVERRIDE	OFF	OFF	OFF
PED CLEAR THROUGH YELLOW	N	N	N
TERMINATE PHASES	N	N	N
ENTRANCE WALK	0	0	0
ENTRANCE PED CLEAR	255	255	255
ENTRANCE MIN GREEN	7	7	7
ENTRANCE YELLOW CLEAR	25.5*	25.5*	25.5*
ENTRANCE RED CLEAR	25.5*	25.5*	25.5*
MIN DWELL GREEN	14	7	7
MAX CALL TIME	60	60	60
EXIT OPTIONS	CRD	CRD	CRD
EXIT YELLOW CLEAR	25.5*	25.5*	25.5*
EXIT RED CLEAR	25.5*	25.5*	25.5*

* Time defaults to time used for phase during normal operation.

Signal Upgrade - Final Design

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Stantec
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Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
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NC 16 (Brookshire Boulevard) at East Cross-over

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	D Harris
PREPARED BY:	R M Muncey	REVIEWED BY:	B L Watson

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2272

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FILE: C:\Traffic\Signals\Designs\Signals\Final Designs\U6084_EASTXOVER_sig_dsn.dgn
User:rmuncey

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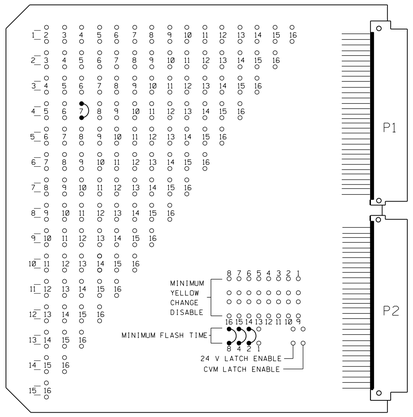
EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown)



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	DISABLE
7	ENABLE
8	DISABLE
9	DISABLE
10	DISABLE
11	DISABLE
12	DISABLE
13	DISABLE
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	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

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 1,3,5,6,8,9,10,11,12,13,14,15 & 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.
4. Set power-up flash time to 12 seconds and implement on the malfunction management unit. Set controller power-up flash time to 22 seconds.
5. Enable simultaneous gap-out feature, on controller unit, 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. The cabinet and controller are a part of the Charlotte Signal System.

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-14.1

FIELD CONNECTION 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.	NU	21,22, 23	NU	41,42	NU	NU	71,72	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		2R		4R												
YELLOW		2Y														
GREEN																
RED ARROW							7R									
YELLOW ARROW				4Y			7Y									
GREEN ARROW		2G		4G			7G									
✋																
🚶																

NU = NOT USED

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 ø4 4A	CH1 L1 ø2 2A	CH1 L7 ø7 7B	CH1 L5 ø4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	CHA EVP 3 ø2	CHC EVP 5 ø7	SLOT EMPTY
		CH2 L4 ø4 4B	CH2 L2 ø2 2B	CH2 L8 ø7 7C	CH2 L6 ø7 7A					CHB EVP 4 ø4	CHD L1Ø NOT USED	

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

LOOP NO.	LOOP PANEL TERMINALS
2A	L1A,L1B
2B	L2A,L2B
4A	L3A,L3B
4B	L4A,L4B
4C	L5A,L5B
7A	L6A,L6B
7B	L7A,L7B
7C	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

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø2	–	–
2	ø2	–	–
3	ø4	–	–
4	ø4	–	–
✱ 5	ø4	–	–
6	ø7	–	–
7	ø7	–	–
8	ø7	–	–
9	–	–	–
10	–	–	–
11	–	–	–
12	–	–	–
13	–	–	–
14	–	–	–
15	–	–	–
16	–	–	–

✱ Detector Type - S

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE W/ RISER
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,4,7
PHASES USED.....2,4,7
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	-
2	ø2
3	-
4	ø4
5	-
6	-
7	ø7
8	-
9	-
10	-
11	-
12	-
13	-
14	-
15	-
16	-

UNUSED LOAD SWITCH CHANNELS SHALL BE DISABLED IN CONTROLLER PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2272
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Final Design
Electrical Detail - Sheet 1 of 2

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PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
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SIG. INVENTORY NO. 10-2272

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PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-14.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1 NO|R2 NO|R3 NO|R4 NO
--TIMING-----WALK|PED CL|MN GR|I YEL|I RED
ENTRANCE TM.    0|  255|    7|25.5|25.5
----------MIN GR|EXT GR|MX GR|I YEL|I RED
TRACK CLEAR     0|    0|   0|   0|   0
----------MIN DL|IP|MTEXT|MX TM|I YEL|I RED
DWL/CYC-EXIT   14|I   0|   60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Place cursor in [ ] next to Preempt Plan and press 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

```
PREEMPT PLAN [  4]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . X . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1 NO|R2 NO|R3 NO|R4 NO
--TIMING-----WALK|PED CL|MN GR|I YEL|I RED
ENTRANCE TM.    0|  255|    7|25.5|25.5
----------MIN GR|EXT GR|MX GR|I YEL|I RED
TRACK CLEAR     0|    0|   0|   0|   0
----------MIN DL|IP|MTEXT|MX TM|I YEL|I RED
DWL/CYC-EXIT    7|I   0|   60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . . . X . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. CRD
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1 NO|R2 NO|R3 NO|R4 NO
--TIMING-----WALK|PED CL|MN GR|I YEL|I RED
ENTRANCE TM.    0|  255|    7|25.5|25.5
----------MIN GR|EXT GR|MX GR|I YEL|I RED
TRACK CLEAR     0|    0|   0|   0|   0
----------MIN DL|IP|MTEXT|MX TM|I YEL|I RED
DWL/CYC-EXIT    7|I   0|   60|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2272
DESIGNED: January 2018
SEALED: 01-23-2018
REVISED: _____

Final Design
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

NC 16 (Brookshire Boulevard)
at
East Cross-Over

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	L Overn
PREPARED BY:	G B Spell	REVIEWED BY:	

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 045933 ENGINEER LAWRENCE E. OVERN II

DocuSigned by: 1/23/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2272

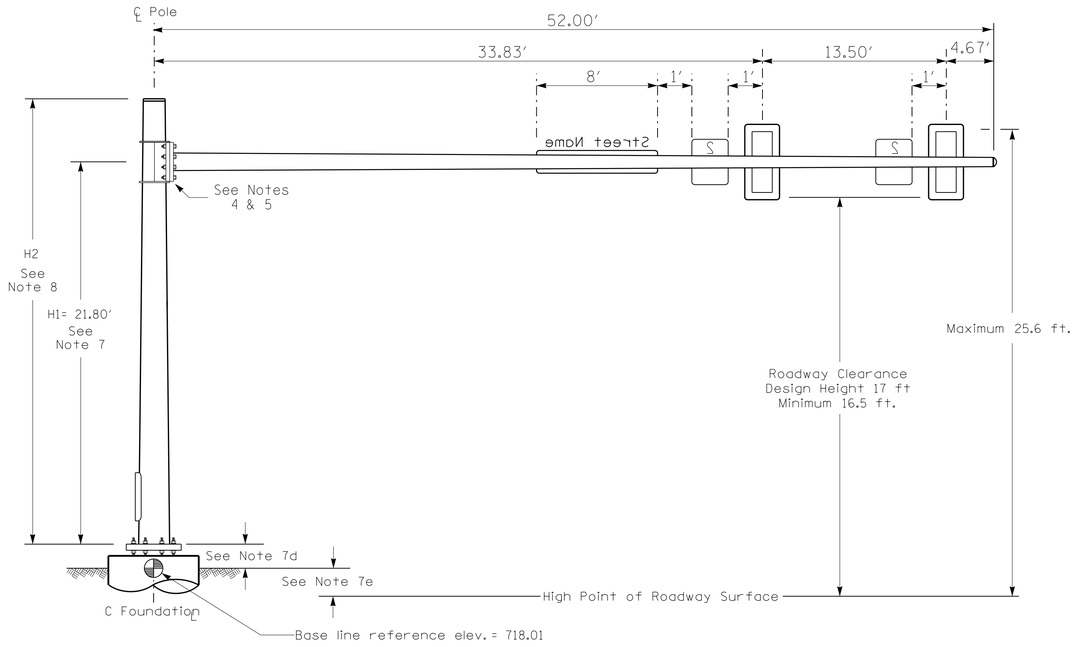
DATE:
User:rtmurchy
File: G:\traffic\Signals\Designs\Signals\Final Designs\Electrical Details\U-6084 sm_ele_10-2272_EastOver.dgn

DocuSign Envelope ID: F4E074A8-87CF-42CA-9339-A28C0E5681EB

METAL POLE No. 1 and 2

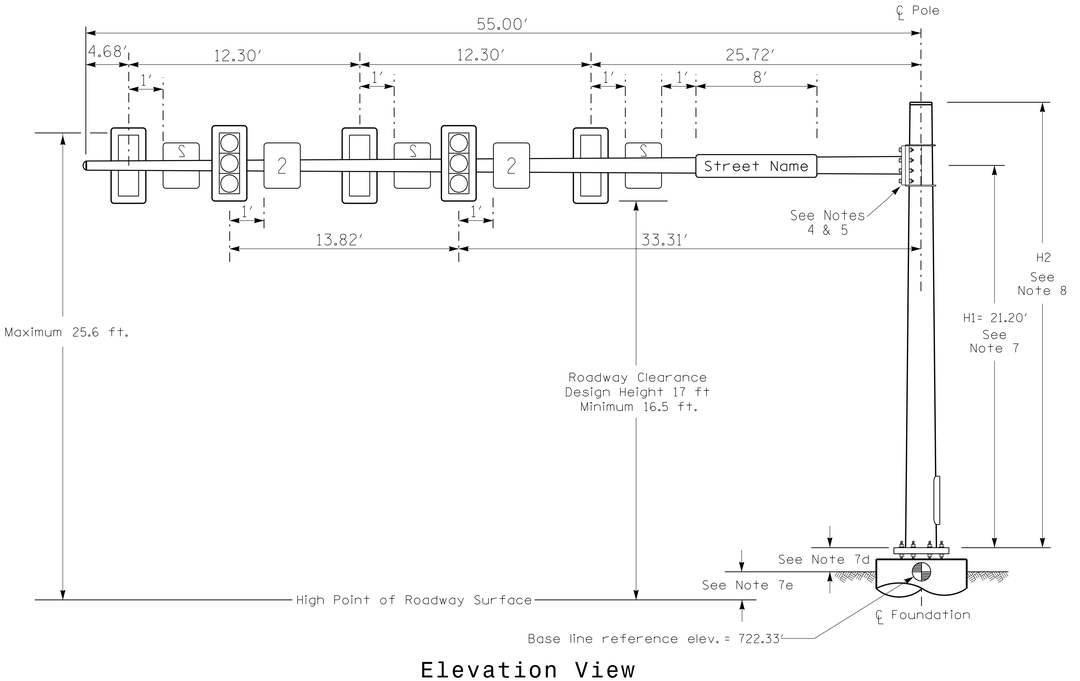
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-15.0

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2



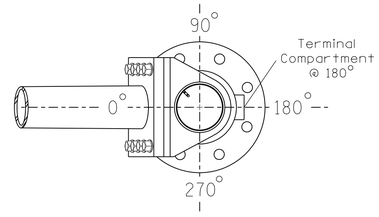
Elevation View

SPECIAL NOTE

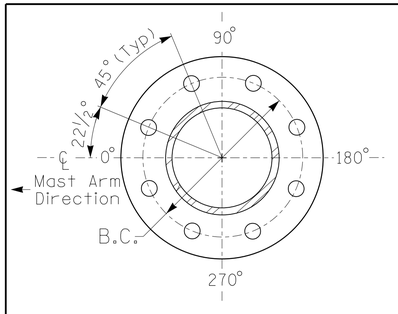
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ℄ Foundation @ ground level	718.01 ft.	722.33 ft.
Elevation difference at High point of roadway surface	+ 3.31 ft.	+ 2.71 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

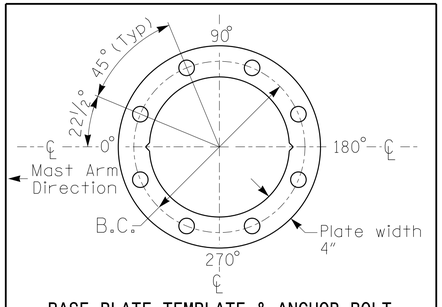


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5″W X 52.5″L	60 LBS
1	SIGN RIGID MOUNTED	5.0 S.F.	24.0″W X 30.0″L	11 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0″W X 36.0″L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0″W X 96.0″L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 16 (Brookshire Boulevard) at West Crossover

Division 10 Mecklenburg County Charlotte

PLAN DATE:	January 2018	REVIEWED BY:	E D Harris
PREPARED BY:	J B Hambright	REVIEWED BY:	B L Watson

REVISIONS	INIT.	DATE

SCALE: 0 N/A — N/A

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L WATSON

Docusigned by: Betsy L. Watson 1/22/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2271

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

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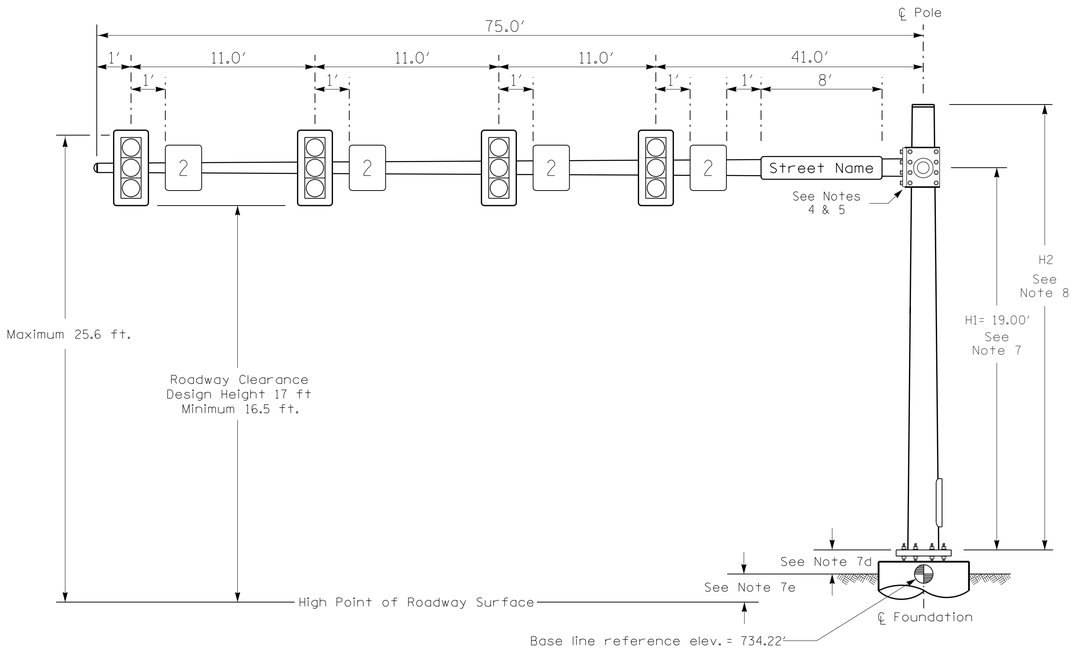
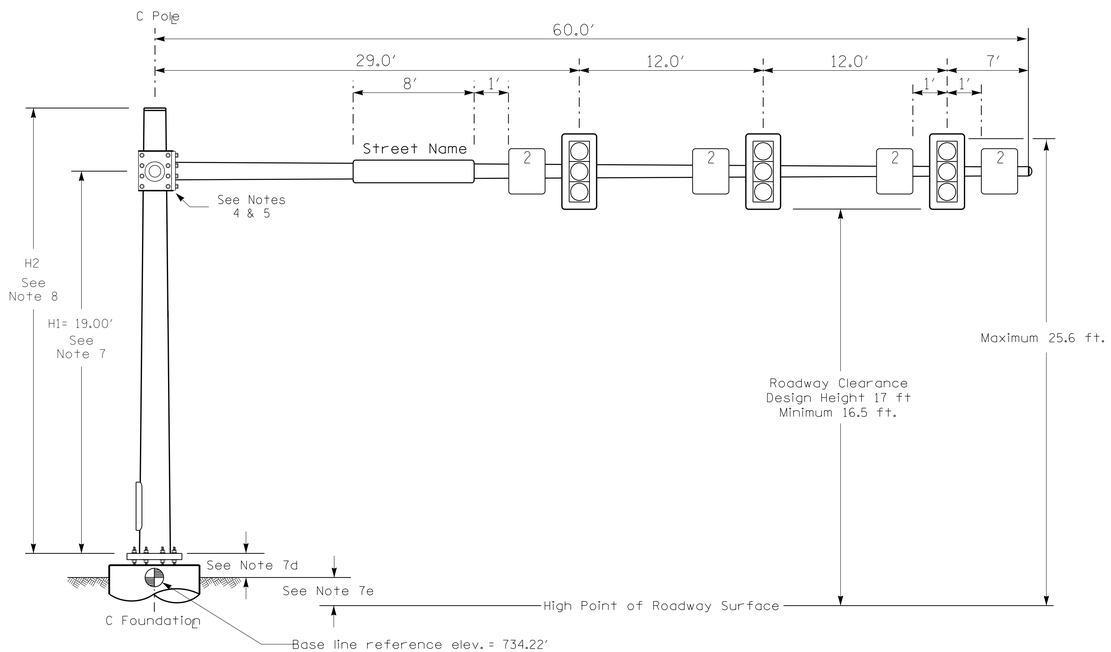
Design Loading for METAL POLE NO. 3, MAST ARM A



Elevation View @ 0°

Design Loading for METAL POLE NO. 3, MAST ARM B



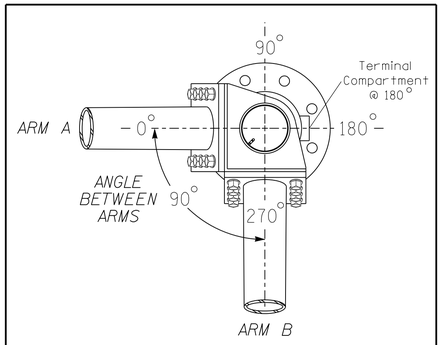
Elevation View @ 270°

SPECIAL NOTE

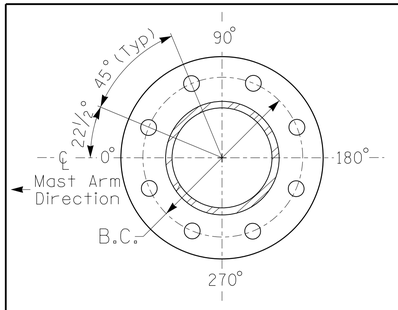
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3 (Arm "A")	Pole 3 (Arm "B")
Baseline reference point at ℄ Foundation @ ground level	734.22 ft.	734.22 ft.
Elevation difference at High point of roadway surface	+/-0.0 ft.	+ 0.50 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

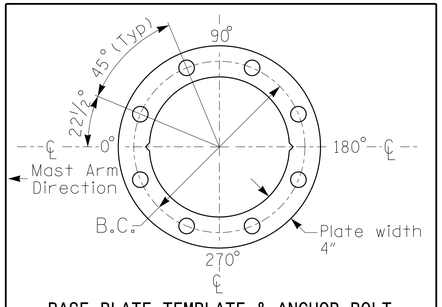


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 3

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-16.0

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5″W X 52.5″L	60 LBS
1	SIGN RIGID MOUNTED	5.0 S.F.	24.0″W X 30.0″L	11 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0″W X 36.0″L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0″W X 96.0″L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of: Transportation Mobility and Safety Division, Signal Design Section, NC Department of Transportation

750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 N/A N/A

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE: January 2018 REVIEWED BY: E D Harris

PREPARED BY: J B Hambright REVIEWED BY: B L Watson

REVISIONS	INIT.	DATE

SEAL NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

DocuSigned by: Betsy L. Watson 1/22/2018

35E67BB34F3743F

SIGNATURE DATE

SIG. INVENTORY NO. 10-0850

$$$$SYSTIMC$$$$
$$$$SYSTIMF$$$$
$$$$USERNAME$$$$

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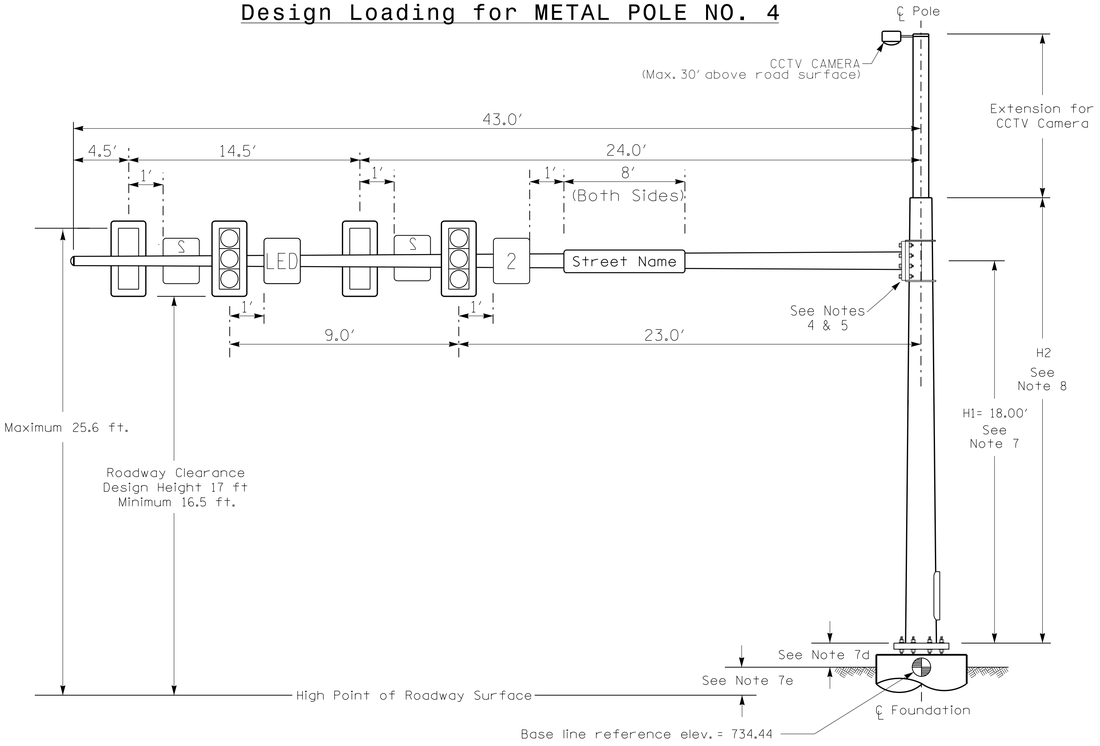
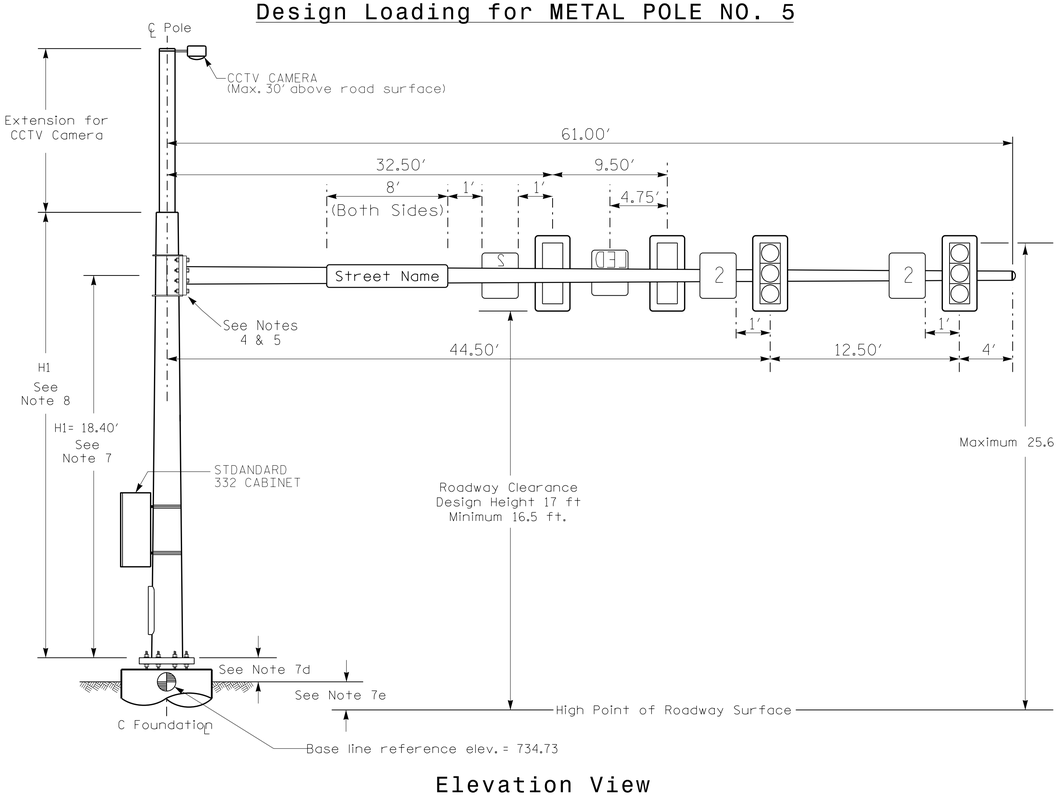
Design Loading for METAL POLE NO. 4



Elevation View

Design Loading for METAL POLE NO. 5



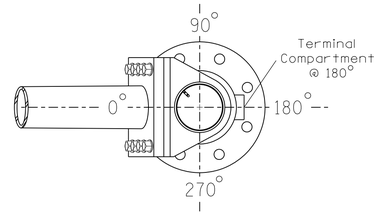
Elevation View

SPECIAL NOTE

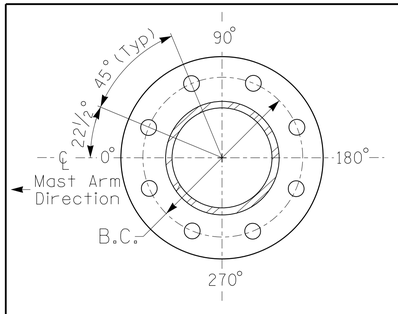
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 4	Pole 5
Baseline reference point at ℄ Foundation @ ground level	734.44 ft.	734.73 ft.
Elevation difference at High point of roadway surface	- 0.45 ft.	- 0.12 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

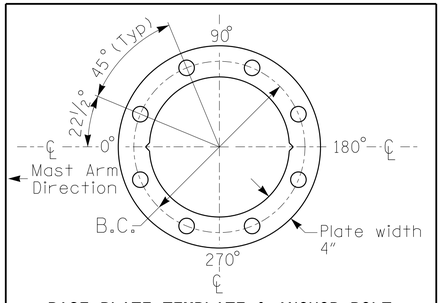


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 4 and 5

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-17.0

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
1	SIGN RIGID MOUNTED	5.0 S.F.	24.0"W X 30.0"L	11 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0"W X 36.0"L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS
LED	L.E.D. BLANKOUT SIGN RIGID MOUNTED	5.0 S.F.	24.0"W X 36.0"L	110 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE: January 2018 REVIEWED BY: E D Harris

PREPARED BY: J B Hambright REVIEWED BY: B L Watson

SCALE: 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

DocuSigned by: Betsy L. Watson 1/22/2018

SIGNATURE DATE

SIG. INVENTORY NO. 10-0850

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

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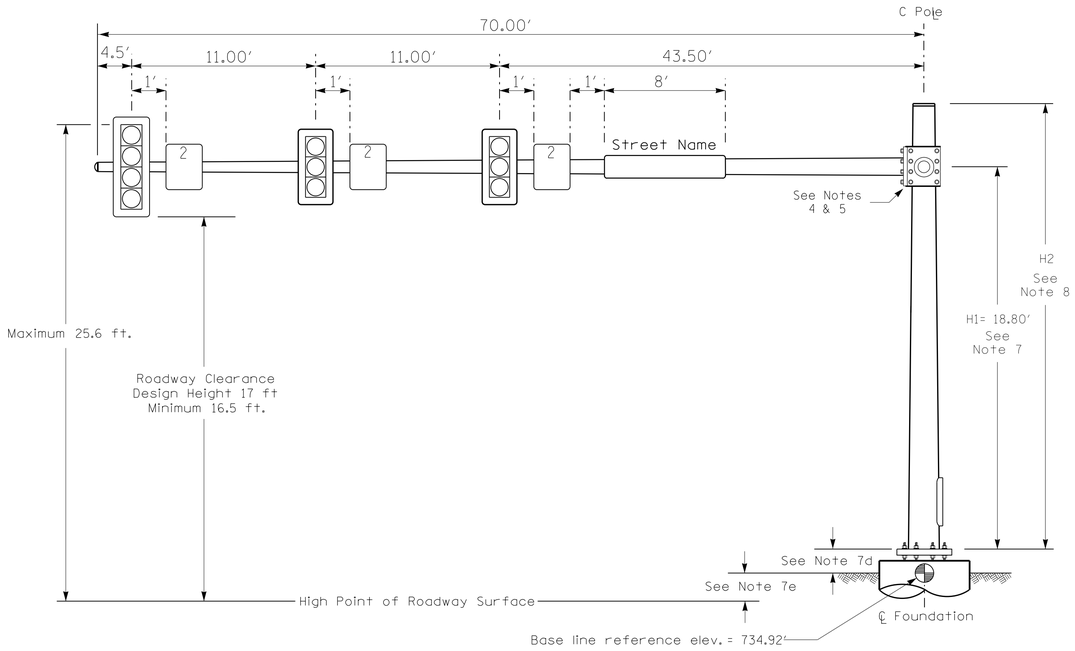
METAL POLE No. 6

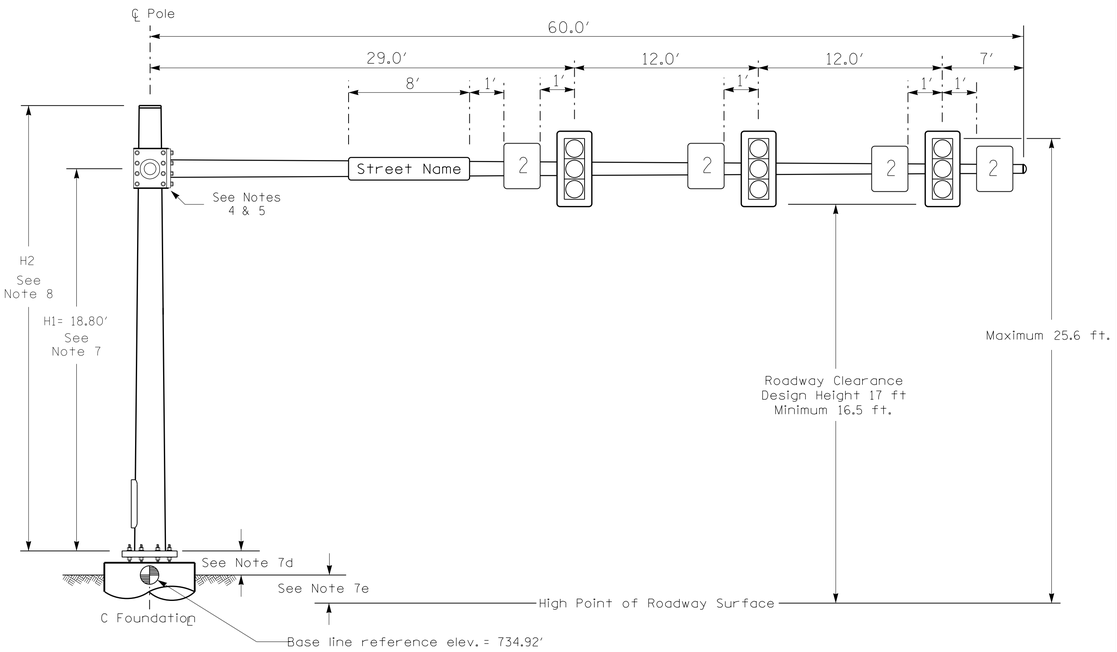
PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-18.0

Design Loading for METAL POLE NO. 6, MAST ARM A



Elevation View @ 0°

Design Loading for METAL POLE NO. 6, MAST ARM B



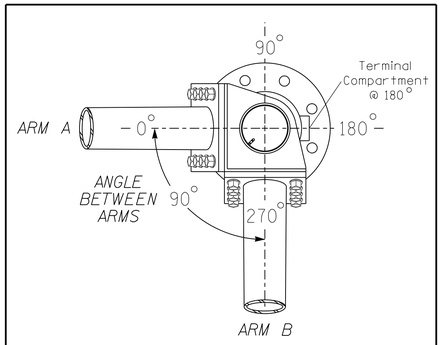
Elevation View @ 270°

SPECIAL NOTE

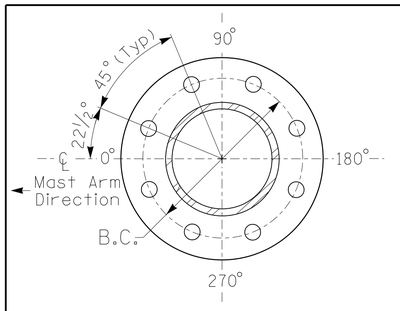
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 6 (Arm A)	Pole 6 (Arm B)
Baseline reference point at ℄ Foundation @ ground level	734.92 ft.	734.92 ft.
Elevation difference at High point of roadway surface	- 0.24 ft.	0.0 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

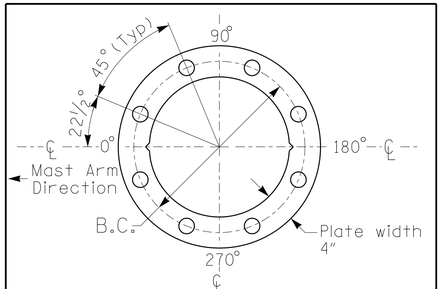


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5″W X 52.5″L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0″W X 36.0″L	14 LBS
1	SIGN RIGID MOUNTED	5.0 S.F.	24.0″W X 30.0″L	11 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0″W X 96.0″L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 16 (Brookshire Boulevard) at SR 2004 (Mt. Holly-Huntersville Road)

Division 10 Mecklenburg County Charlotte

PLAN DATE: January 2018 REVIEWED BY: E D Harris

PREPARED BY: J B Hambright REVIEWED BY: B L Watson

REVISIONS	INIT.	DATE

SCALE 0 N/A N/A

SEAL
NORTH CAROLINA PROFESSIONAL
SEAL 29449 ENGINEER
BETSY L WATSON

DocuSigned by: Betsy L. Watson 1/22/2018
35E67BB34E9743F...
SIGNATURE DATE

SIG. INVENTORY NO. 10-0850

$$$$SYSTIMC$$$$
$$$$SYSTIME$$$$
$$$$USERNAME$$$$

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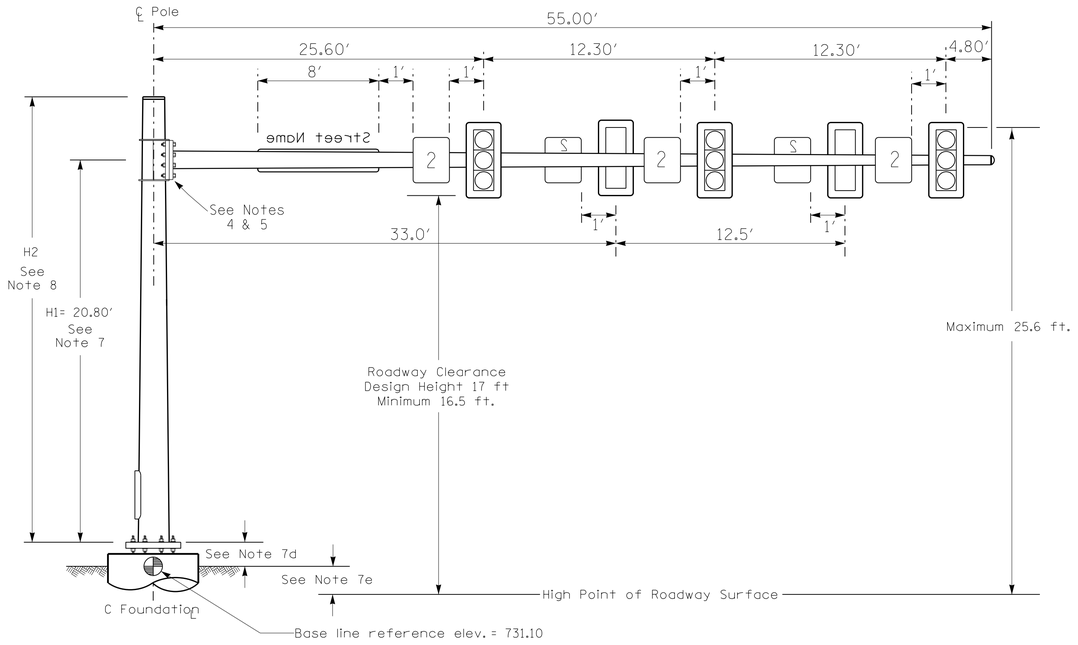
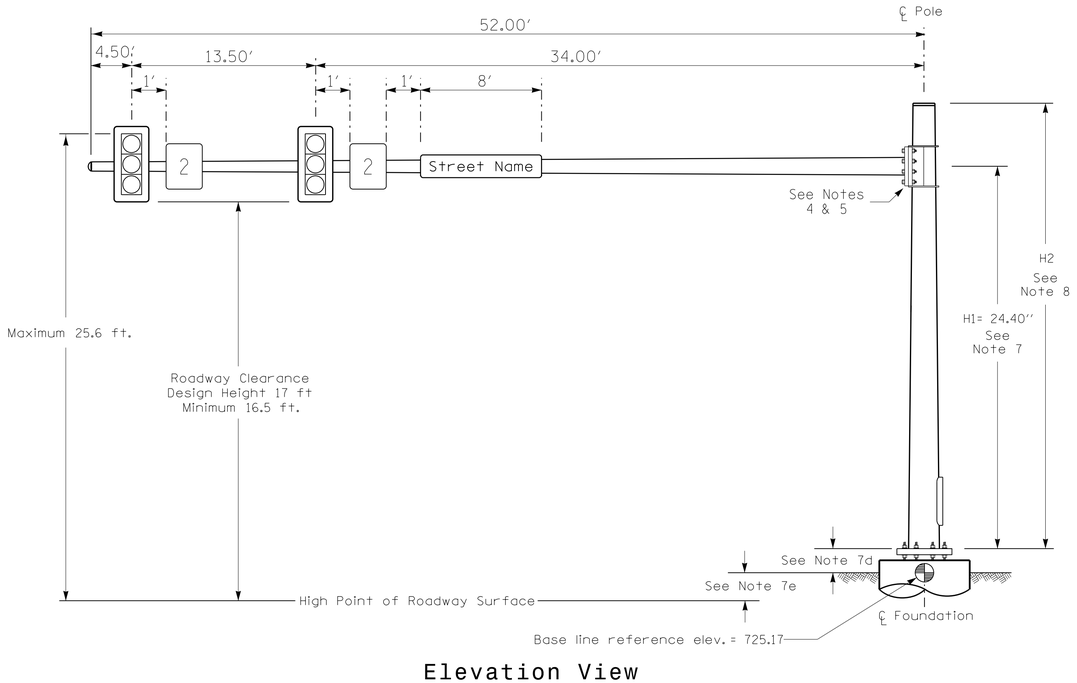
Design Loading for METAL POLE NO. 7



Elevation View

Design Loading for METAL POLE NO. 8



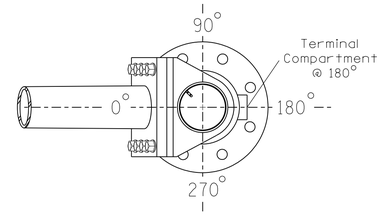
Elevation View

SPECIAL NOTE

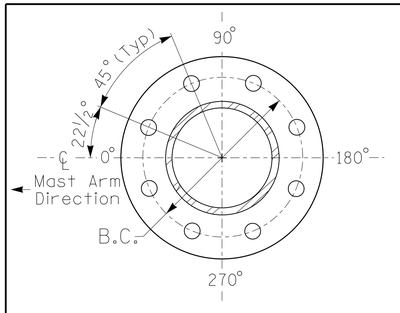
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 7	Pole 8
Baseline reference point at ℄ Foundation @ ground level	731.10 ft.	725.17 ft.
Elevation difference at High point of roadway surface	+ 2.32 ft.	+ 5.92 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

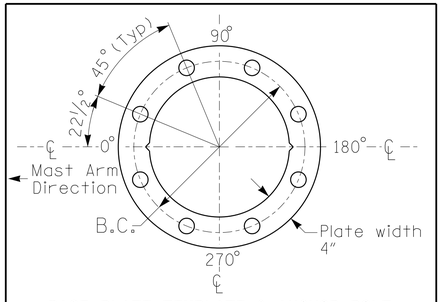


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 7 and 8

PROJECT REFERENCE NO.	SHEET NO.
U-6084	SIG-19.0

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5″W X 52.5″L	60 LBS
1	SIGN RIGID MOUNTED	5.0 S.F.	24.0″W X 30.0″L	11 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0″W X 36.0″L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0″W X 96.0″L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
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   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 16 (Brookshire Boulevard) at East Crossover

Division 10 Mecklenburg County Charlotte

PLAN DATE: January 2018 REVIEWED BY: E D Harris

PREPARED BY: J B Hambright REVIEWED BY: B L Watson

REVISIONS	INIT.	DATE

SCALE 0 N/A N/A

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 29449 ENGINEER BETSY L. WATSON

DocuSigned by: Betsy L. Watson 1/22/2018
SIGNATURE DATE

SIG. INVENTORY NO. 10-2272

$$$$$SYST1MC$$$$$
$$$$$SYST1MC$$$$$
$$$$$USERNAME$$$$$

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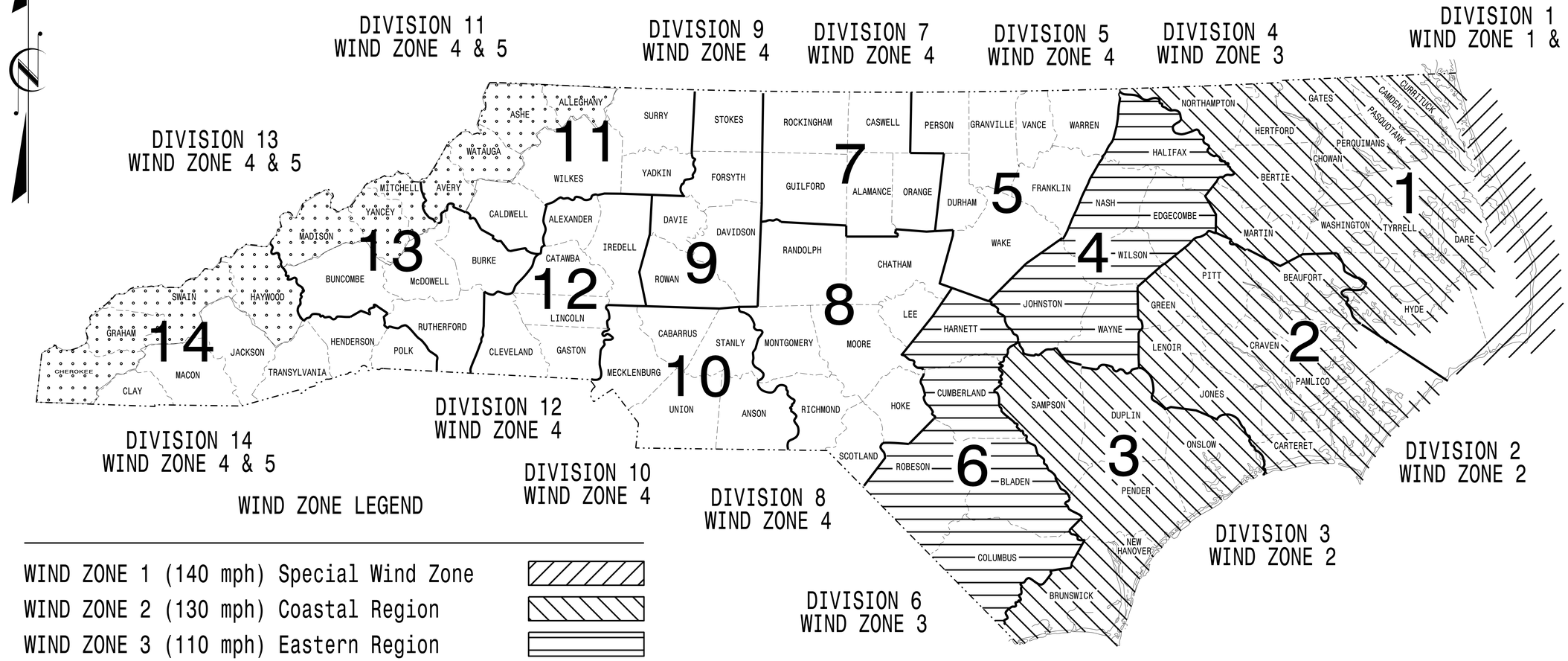
POLE STANDARDS

NCDOT METAL POLES

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT I.D. NO.	SHEET NO.
U-6084	Sig.M1

STANDARD DRAWINGS FOR ALL METAL POLES



WIND ZONE LEGEND

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

https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

Prepared In the Offices of:

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

750 N.Greenfield Pkwy.
Garner,NC 27529

Designed in conformance with the latest 2015 Interim to the 6th Edition 2013

AASHTO

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

INDEX OF PLANS

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION – ITS AND SIGNALS UNIT

M.M. MCDIARMID, P.E. – STATE ITS AND SIGNALS ENGINEER

J. P. GALLOWAY, P.E. – STATE SIGNALS ENGINEER

D.C. SARKAR, P.E. – ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar 44E8E3...
SIGNATURE

10/11/2017
DATE

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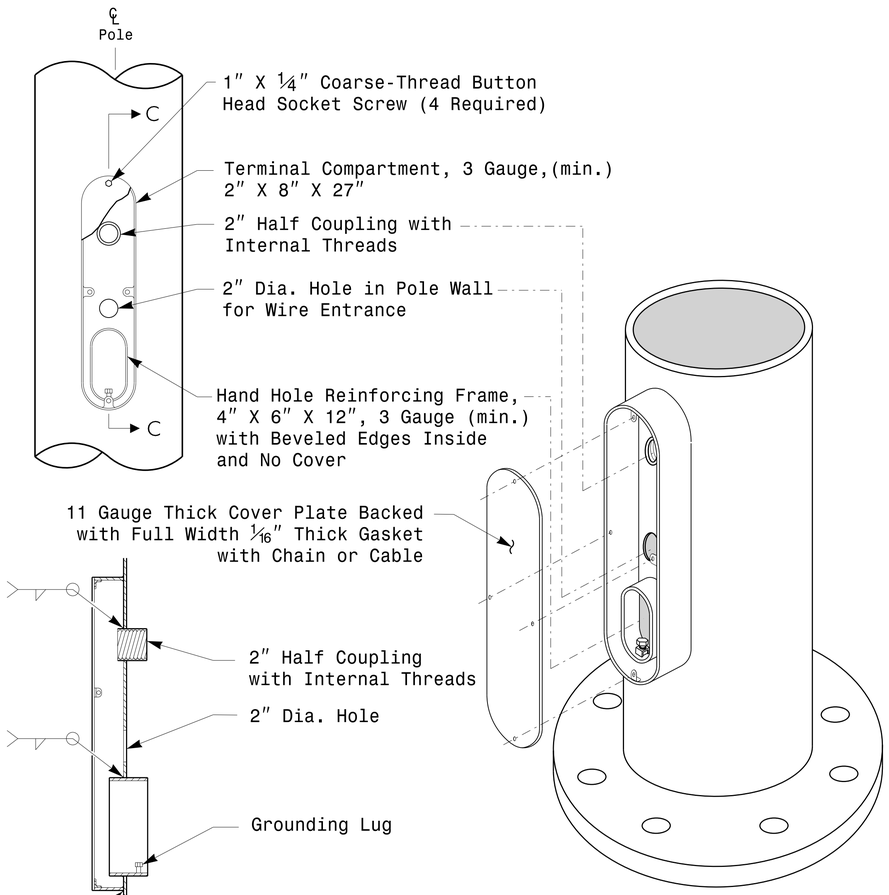


Section C-C

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

Terminal Compartment Detail

MFG _____	MFG. DATE: MM/YY
SHAFT D/T/L/Y	----/----/----/----
ARM-A D/T/L/Y	----/----/----/----
	----/----/----/----
ARM-B D/T/L/Y	----/----/----/----
	----/----/----/----
A.B. DIA./B.C./L/Y	----/----/----/----
NCDOT SIG. INV. NO.	_____
NCDOT POLE NO.	_____

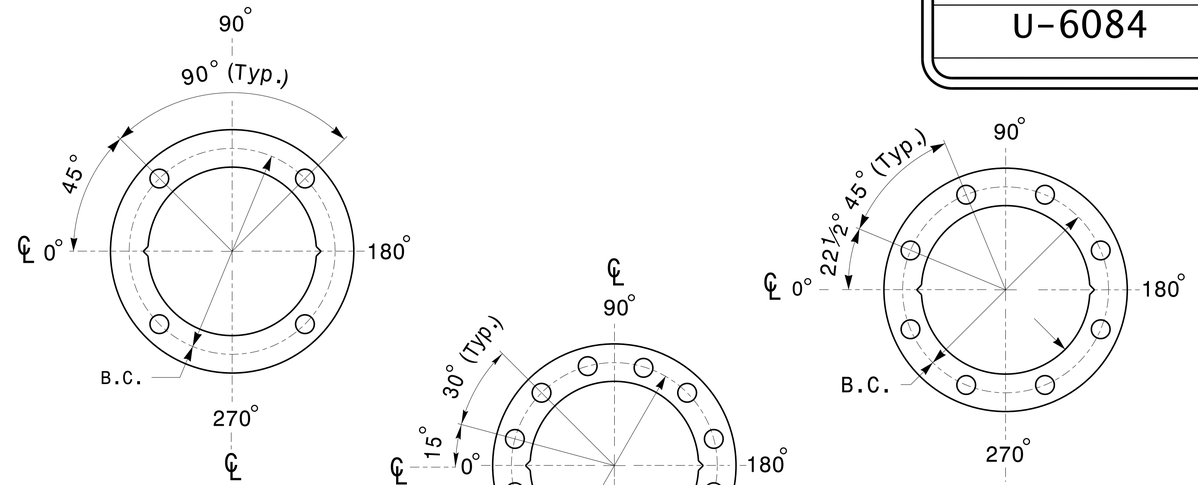
Shaft I.D. Tag
(Provide on Shaft of Strain Poles and Mast Arm Poles Shaft)

MFG _____	MFG. DATE: MM/YY
SECTION D/T/L/Y	----/----/----/----
NCDOT SIG. INV. NO.	_____
NCDOT POLE NO.	_____

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

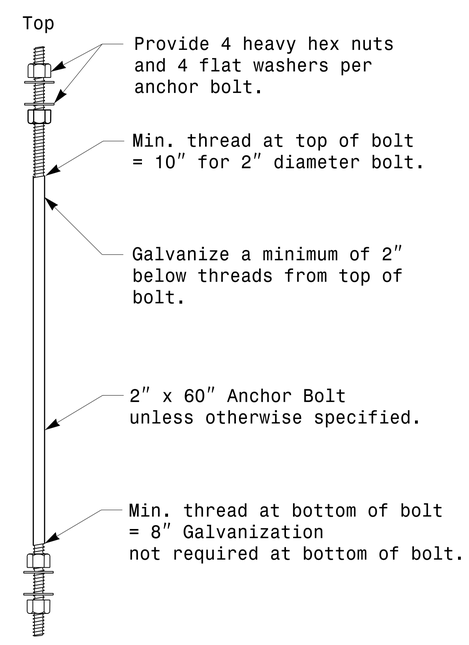
Notes:
1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
2) A.B. = Anchor Bolt
3) B.C. = Bolt Circle of Anchor Bolts
4) If Custom Design, use "NCDOT STANDARD" line for Signal Inv. Number and pole I.D. number
5) See drawing M3 and M4 for mounting positions of I.D. tags.

Identification Tag Details

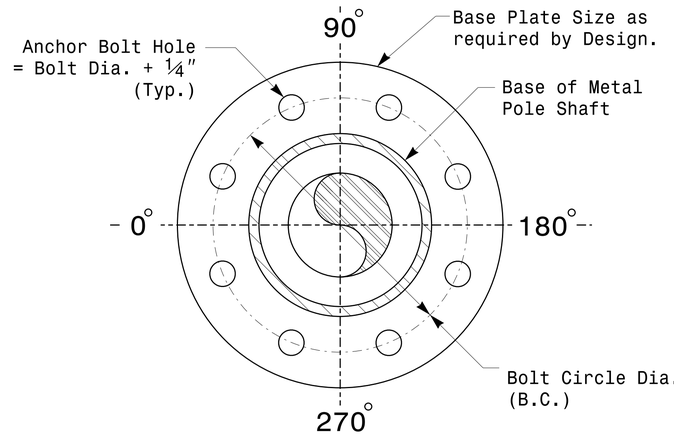


Construct Templates and Plates from ¼" min. thick Steel. Galvanizing is not required.

Base Plate Template and Anchor Bolt Lock Plate Details



Anchor Bolt Detail



Note: Base plate may be circular,octagonal,square or rectangular in shape.

Typical Base Plate Detail

Fabrication Details – All Metal Poles

PROJECT ID. NO.	SHEET NO.
U-6084	Sig.M2

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

SCALE 0 NA NONE

Typical Fabrication Details For All Metal Poles

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	C.F.ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar 44EBE32B5B5A4...
SIGNATURE

10/11/2017
DATE

11-OCT-2017 08:30
S:\ITS&SU\ITS Signals\Signal Design Section\Eastern Region\MM Sheets\2016\2014 Sig.M2 Std. Fabrication Details-All Poles..dgn
rstrickler

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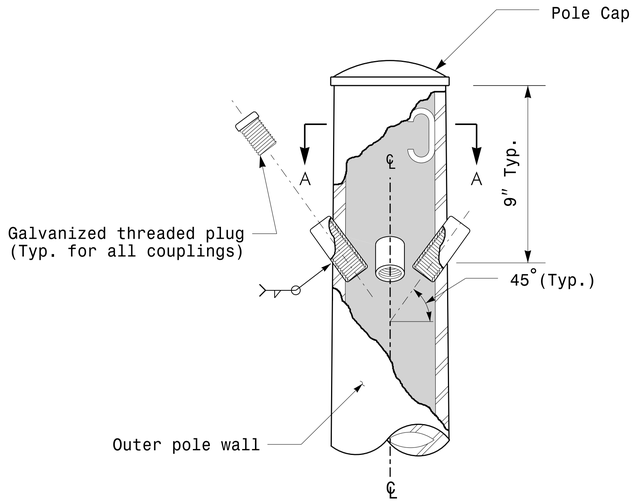
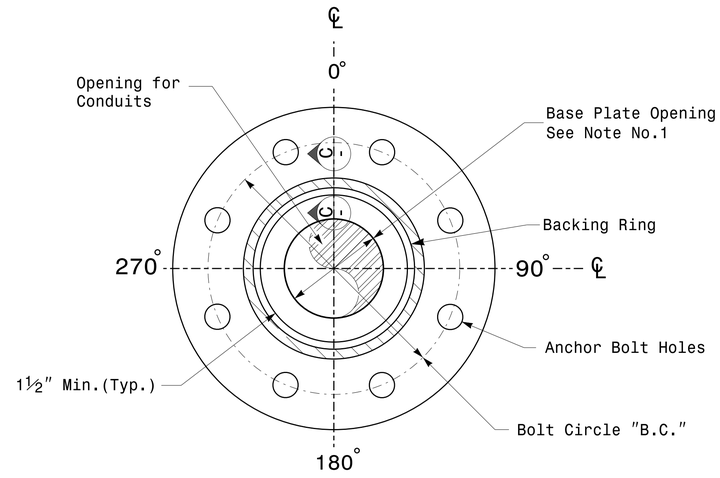
PROJECT ID. NO.	SHEET NO.
U-6084	Sig.M3

Details – Strain Poles



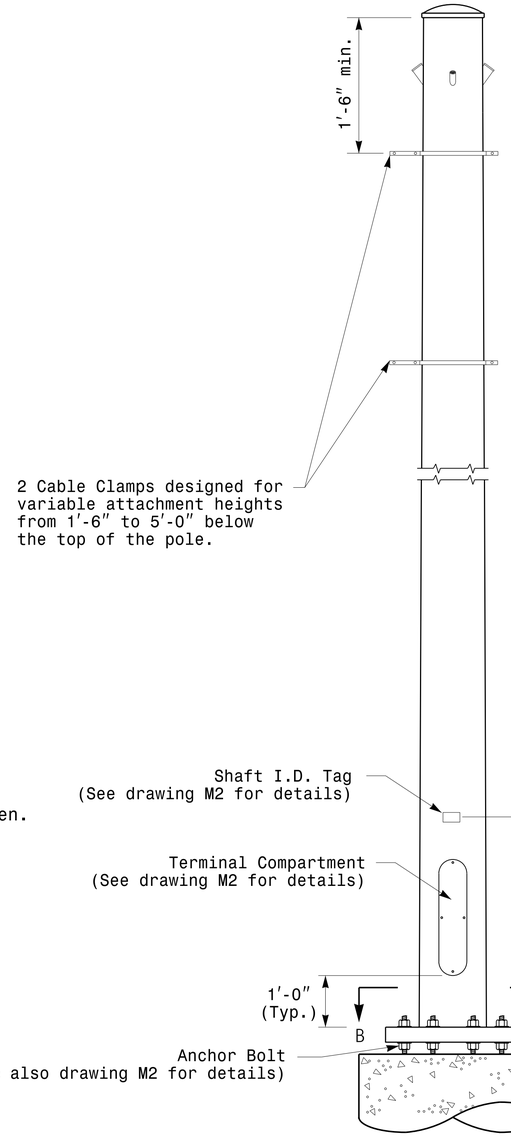
Cable Entrances at Top of Pole

Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3½" but shall not be less than 8½".

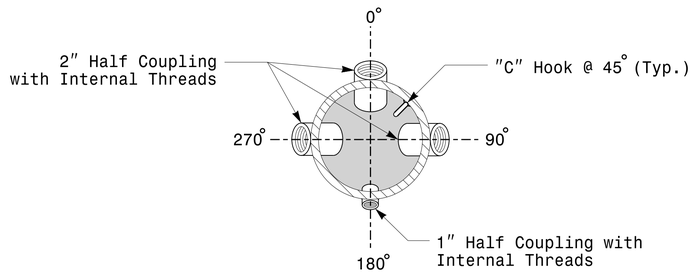


Section B-B

Pole Base Plate Details
(8 and 12 Bolt Pattern)

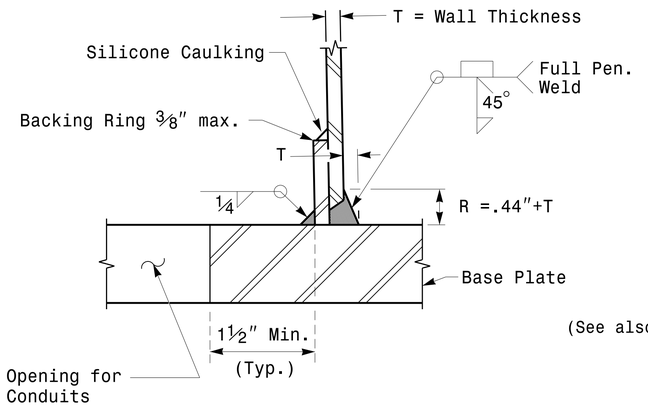


Monotube Strain Pole



Section A-A

Radial Orientation for Factory Installed
Accessories at Top of Pole



Section C-C
(Pole Attachment to Base Plate)

Full-Penetration
Groove Weld Detail

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

Typical Fabrication Details
For
Strain Poles

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	K.C.DURIGON
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SCALE
0 NA
NONE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
028094
ENGINEER
DEBESH C. SARKAR

DocuSigned by:
Debesh C. Sarkar
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SIGNATURE

10/11/2017
DATE

11-OCT-2017 08:25
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rmathisdgn

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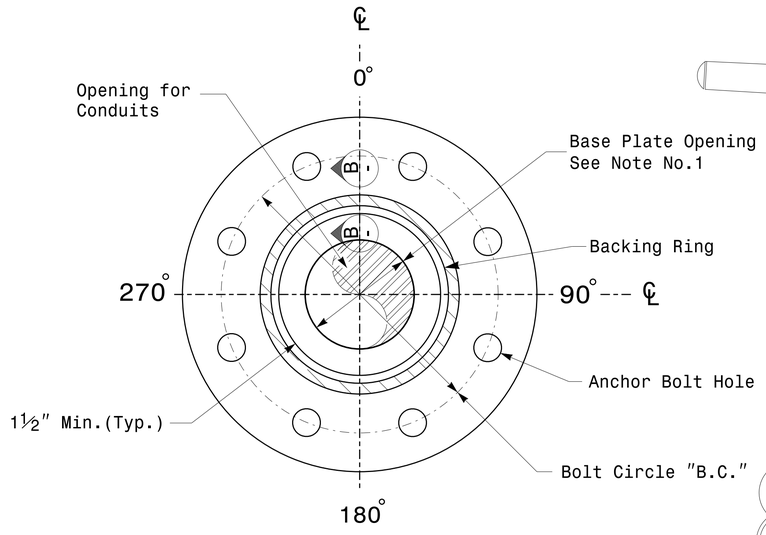
PROJECT ID. NO.	SHEET NO.
U-6084	Sig.M4

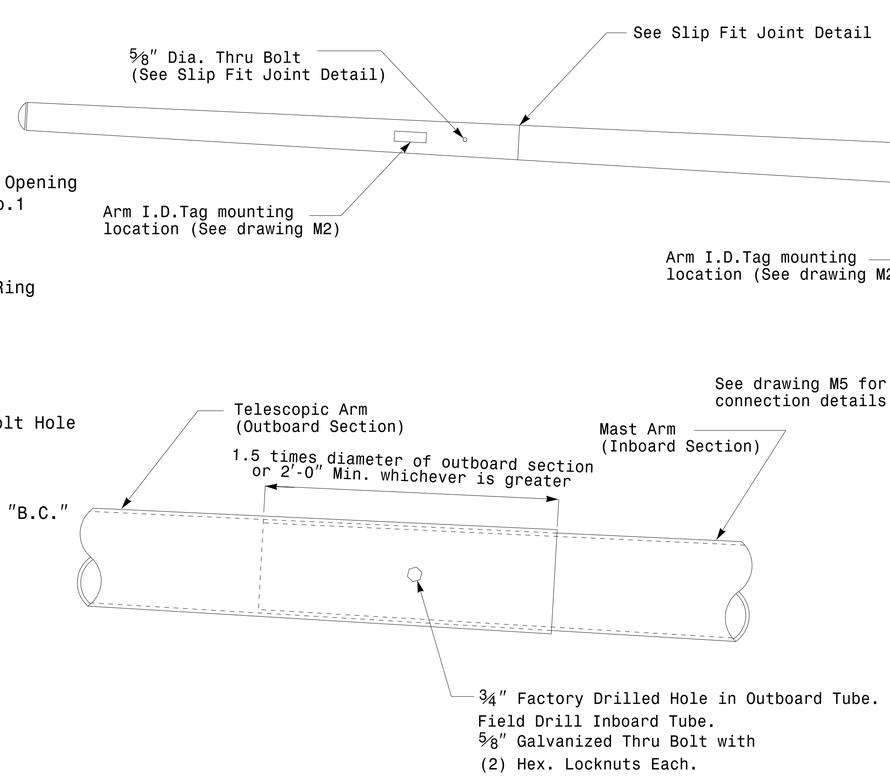
Fabrication Details – Mast Arm Poles

Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3½" but shall not be less than 8½".

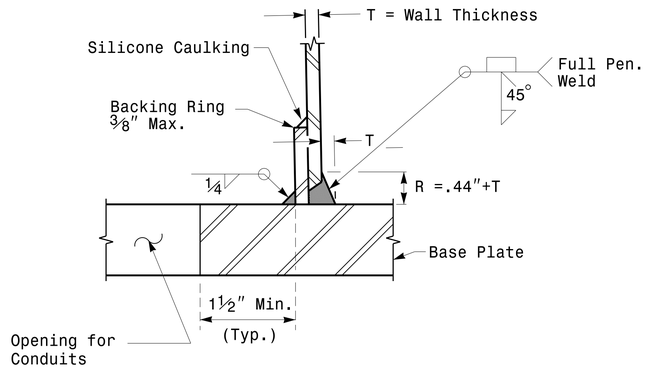


Section A-A

Pole Base Plate Details



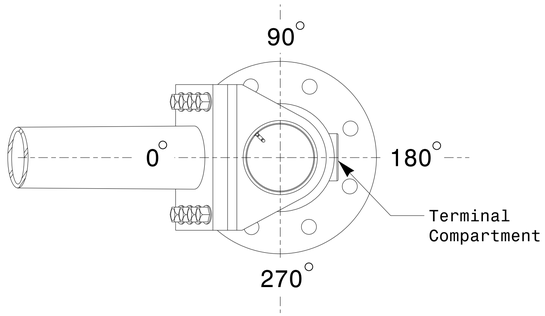
Slip Fit Joint Detail for Mast Arm



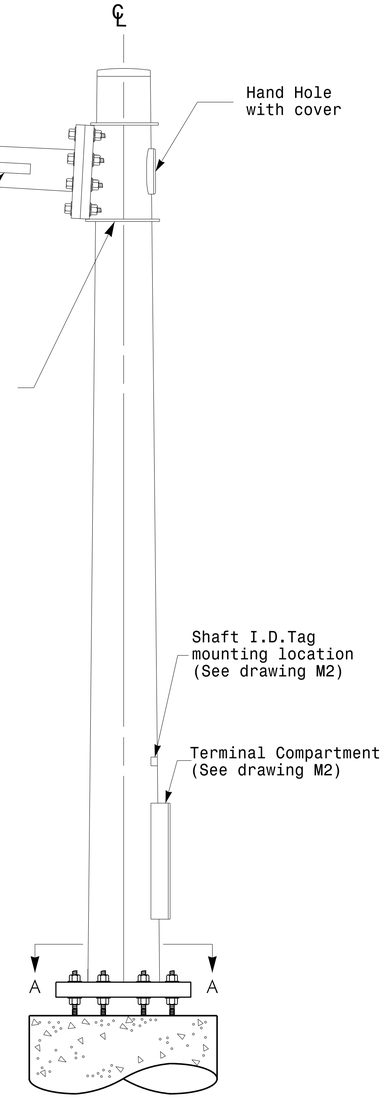
Section B-B

(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail



Mast Arm Radial Orientation



Mast Arm Pole

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

SCALE: 0 NA — NONE

Typical Fabrication Details For Mast Arm Poles

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	K.C.DURIGON
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

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SIGNATURE

10/11/2017
DATE

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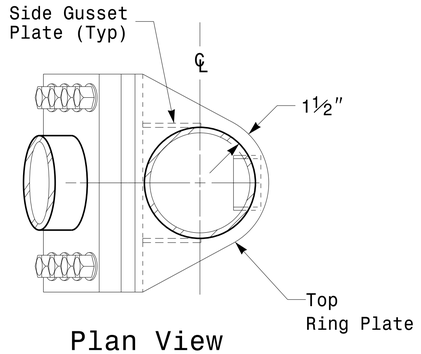
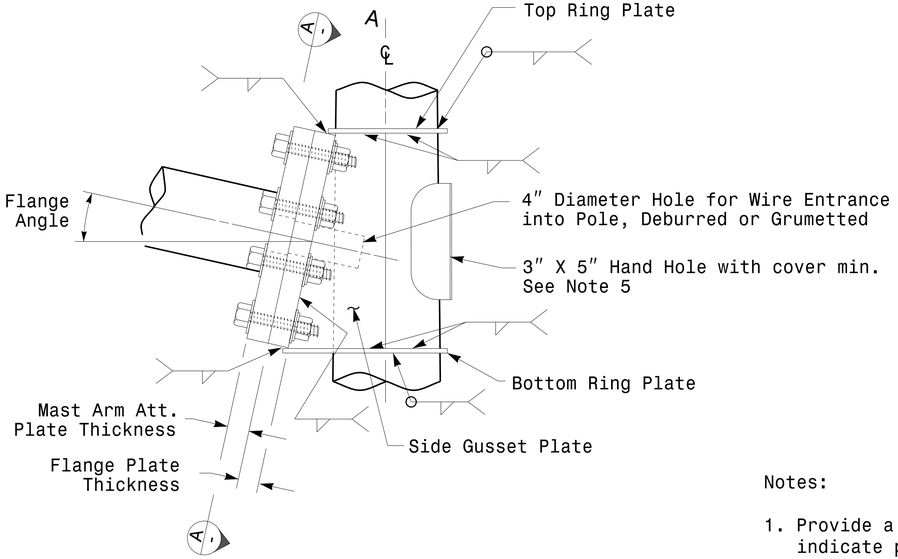
Welded Ring Stiffened Mast Arm Connection

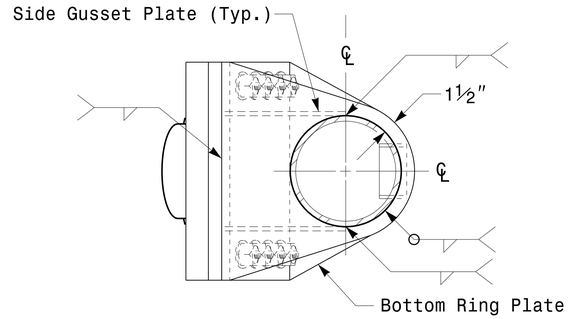
PROJECT ID. NO.	SHEET NO.
U-6084	Sig.M5



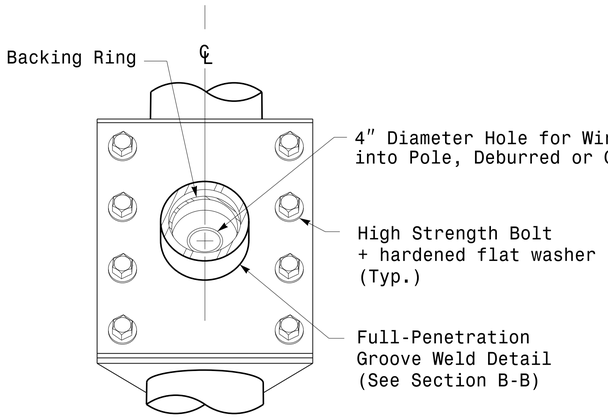
Plan View



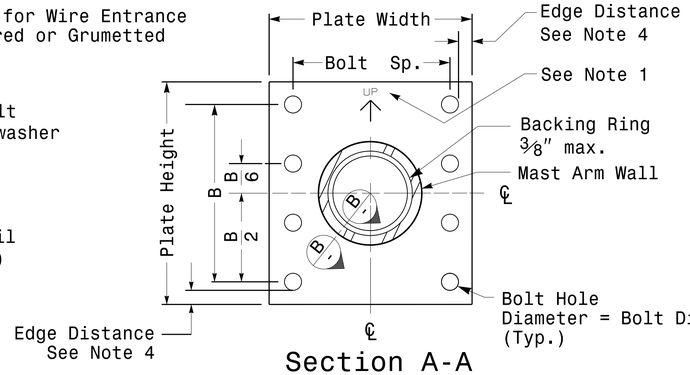
Side Elevation View



Bottom View

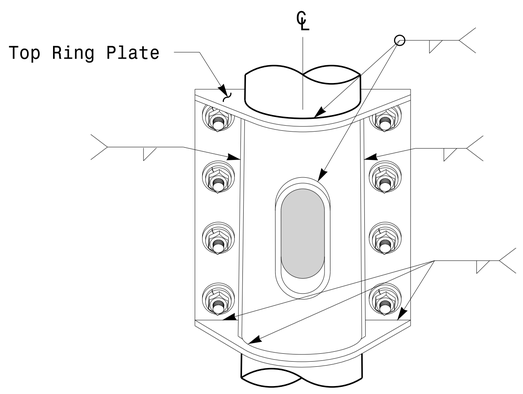


Front Elevation View

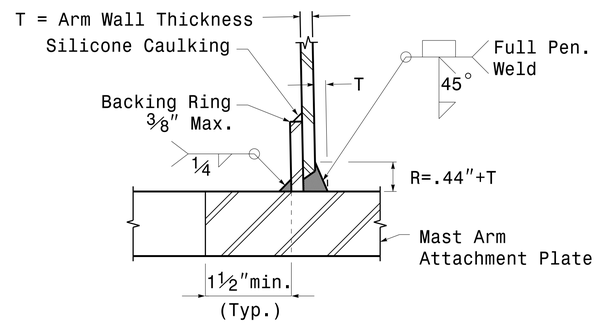


Section A-A

Mast Arm Attachment Plate



Back Elevation View



Section B-B

Full-Penetration Groove Weld Detail

Notes:

1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Fabricator is responsible for providing appropriate holes at drainage points to drain galvanizing materials.
4. For minimum edge distance follow AISC Table J3.4 and J3.5. For nominal bolt hole size use Table J3.3.
5. Provide upper handhole as necessary when shaft extensions are required for luminaire arms or camera. For poles without luminaires/camera, wiring can be done through the top of pole.
6. Allowable range of flange tilt angle will vary from 0° to as required.

Fabrication Details – Mast Arm Connection

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

Typical Fabrication Details For Mast Arm Connection To Pole

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	C.F.ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SCALE 0 NA NONE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar 4AEBE3E5A0A54... SIGNATURE

10/11/2017 DATE

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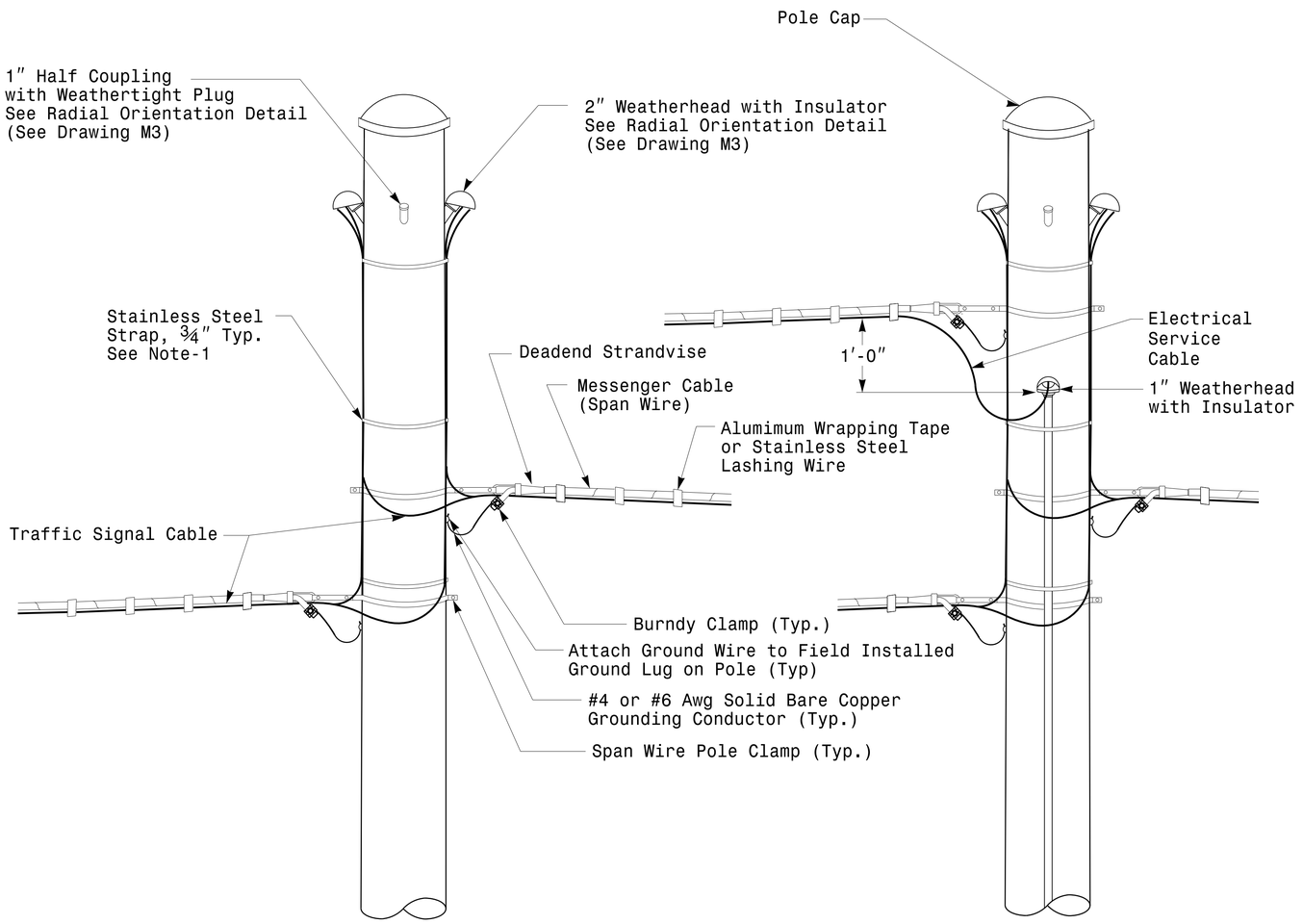
PROJECT ID. NO.	SHEET NO.
U-6084	Sig.M6

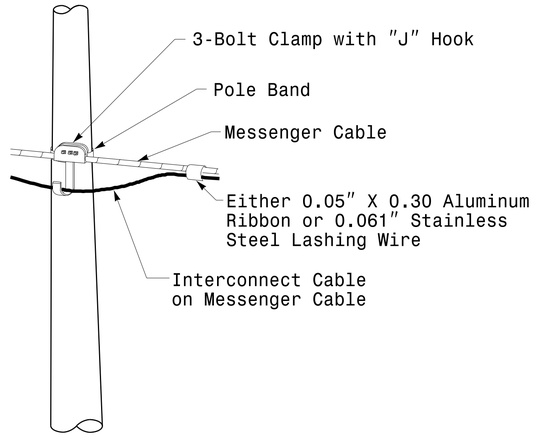
Strain Pole Attachments – Fabrication Details –



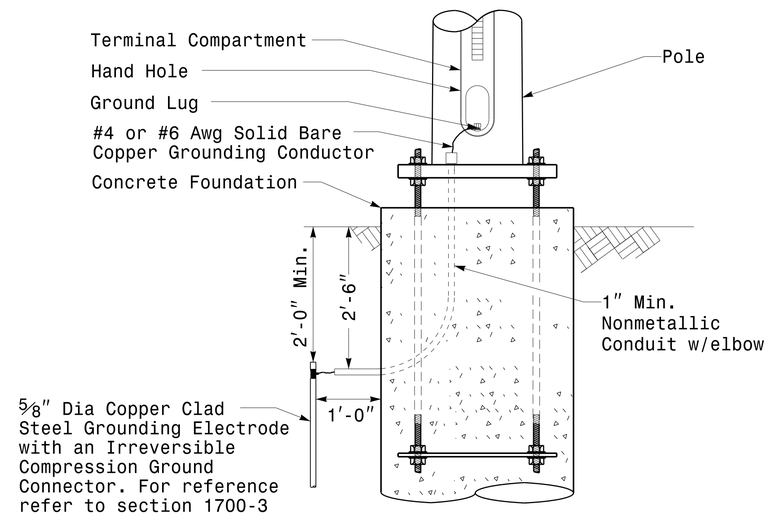
Strain Pole Attachments

NOTE:

1. Strap all signal cables to the side of the pole with ¾″ stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 3′-0″.
2. Provide minimum two spanwire pole clamps per pole.
3. It is prohibited to attach two span wires at one pole clamp.
4. For general requirements refer to NCDOT Standard Specifications for Roadway and Structures, January 2018.



Attachment of Cable to Intermediate Metal Pole



Metal Pole Grounding Detail For Strain Pole and Mast Arm

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

SCALE
0 NA
NONE

Typical Fabrication Details
For
Strain Pole Attachments

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	C.F.ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBDISH C. SARKAR

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10/11/2017
DATE

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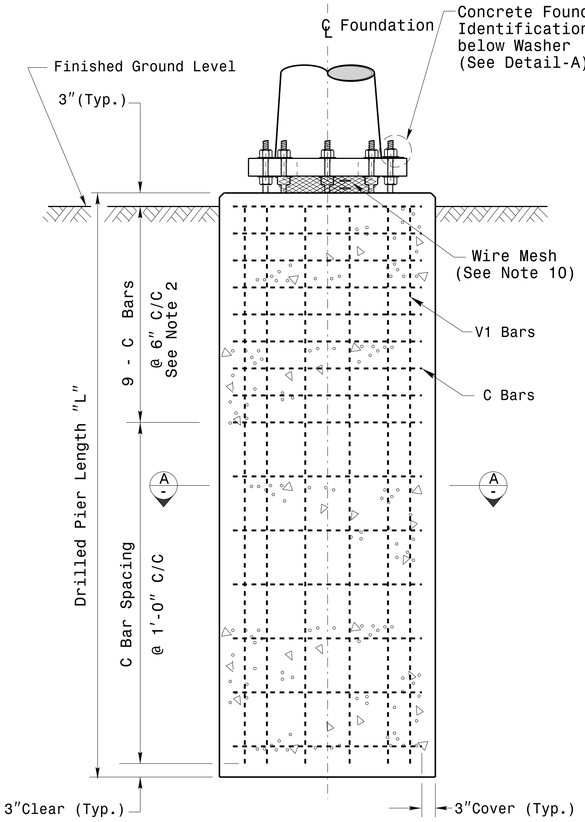
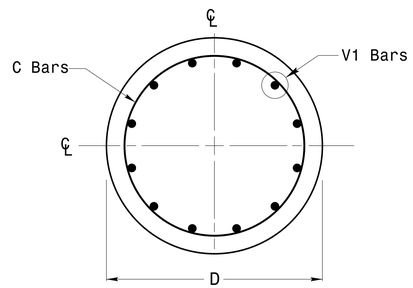
PROJECT ID. NO.	SHEET NO.
U-6084	Sig.M7

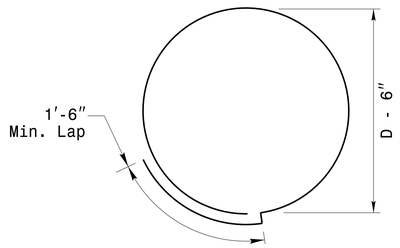
Construction Details – Foundations



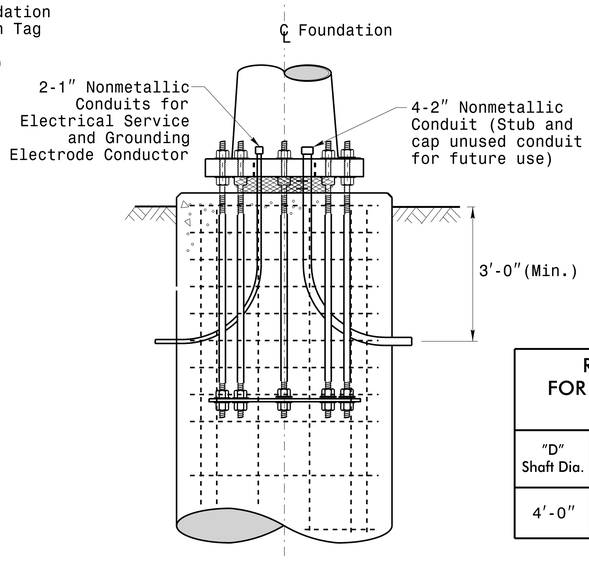
Concrete Shaft Elevation



Section A-A



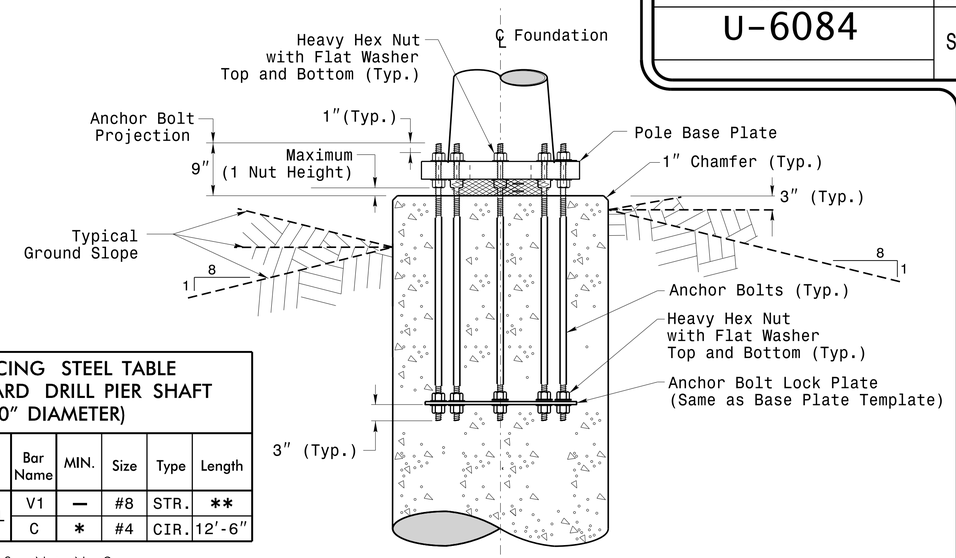
Typical "C" Bar Detail



Typical Foundation Conduit Details

REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (4′–0″ DIAMETER)						
"D" Shaft Dia.	Conc. Volume (cu. yds.)	Bar Name	MIN.	Size	Type	Length
4′-0″	.465 x L	V1	—	#8	STR.	**
		C	*	#4	CIR.	12′-6″

* See Note No. 2
** See Note No. 3



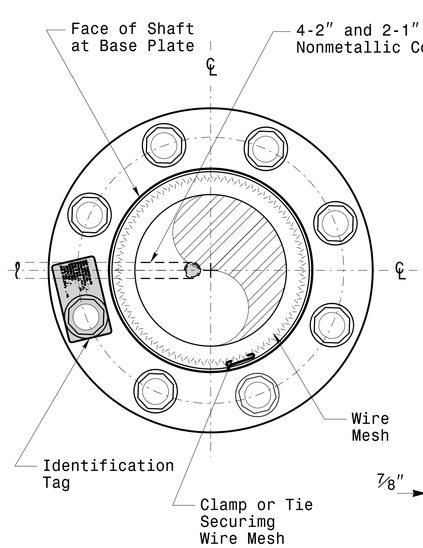
Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)

General Notes:

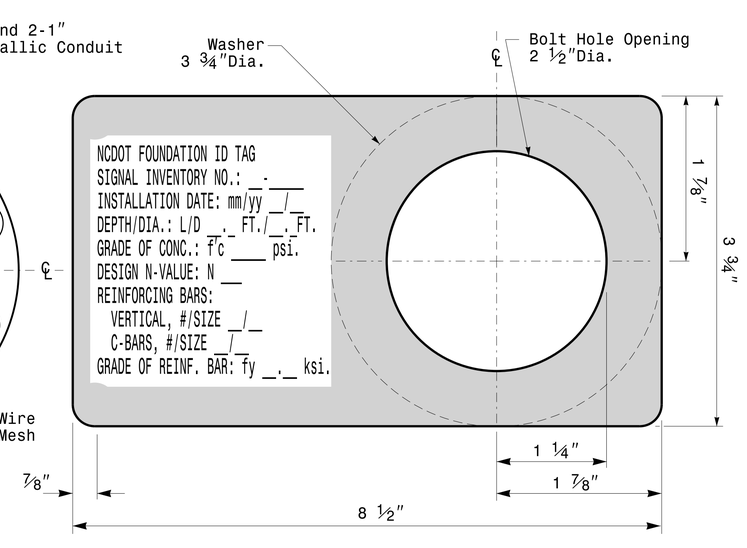
1. If actual subsurface conditions differ significantly from boring data contact the Engineer before excavating or placing concrete.
2. Circular tie reinforcing rings may be vertically adjusted by +/-3″ at a depth between 2′-0″ and 3′-0″ to facilitate the installation of electrical conduit entering in the cage.
3. For standard foundations, see sheet Sig. M8 for details. Vertical reinforcing bars (V1) may be horizontally adjusted by +/-3″ to facilitate the installation of electrical conduit entering into the cage.
4. Provide 2″ to 5″ foundation projection above ground level depending on the ground slope.
5. Unless otherwise shown, foundation designs are based on non-sloping level ground surfaces with slope ratios of 8:1 (H:V) or flatter. If actual ground line slopes are steeper contact the Engineer before excavating or placing concrete.
6. Construct foundations in accordance with NCDOT Standard Provisions SP09 R005- Foundations and Anchor Rod Assemblies for Metal Poles. All applicable 2018 NCDOT Standard Specifications are referenced in this provision. Refer to the NCDOT Resources/Specifications page located on the Connect NCDOT website.

   https://connect.ncdot.gov/resources/Specifications and Special Provisions.aspx
7. Use air entrained AA concrete mix with a compression strength of f′c=4500 psi.(min.) after 28 days.
8. Use ASTM A615 grade 60 deformed bars for all reinforcing steel. Maintain at least 3″ cover on all reinforcement.
9. Locate the Identification Tag on the top of the base plate, directly above the conduit's entry point.
10. Provide two layers of galvanized welded 23 gauge (0.25) 6″ wide 4 mesh wire around pipes under the base plate and secure it with ties if necessary.
11. Preferred location for the I.D. Tag is as shown in Detail-A; directly above the conduit entering the foundation.



D = Diameter
L = Length/Depth
mm = Month
yy = Year

Detail-A



Concrete Foundation Identification Tag Details

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

Construction Details For Foundations			
PLAN DATE:	OCTOBER 2018	DESIGNED BY:	C.B.COGDELL
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REV. NO.	COMMENTS	INIT.	DATE
1	Revised Foundation Tag Details	N.B.	5/11/2015

SCALE: 0 NA — NONE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

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10/11/2017 DATE

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SOIL CONDITION

PROJECT ID. NO.	SHEET NO.
U-6084	Sig.M8

		STANDARD STRAIN POLES						STANDARD FOUNDATIONS 48″ Diameter Drilled Pier Length (L) – Feet							Reinforcement			
								Clay				Sand			Longitudinal		Stirrups	
		Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Reactions at the Pole Base: Axial (kip)	Shear (kip)	Moment (ft-kip)	Medium N-Value 4–8	Stiff N-Value 9–15	Very Stiff N-Value 16–30	Hard N-Value >30	Loose N-Value 4–10	Medium N-Value 11–30	Dense N-Value >30	Bar Size (#)	Quantity (ea.)	Bar Size (#)	Spacing (in.)
WIND ZONE 1	LIGHT	S26L3	26	25	2	11	270	19	13	10	8	17	14.5	12.5	8	12	4	12
		S30L3	30	25	2	11	300	19.5	13.5	10	8	17.5	15	13	8	14	4	12
		S35L3	35	25	3	11	320	20	13.5	10.5	8	17.5	15	13	8	14	4	12
	HEAVY	S30H3	30	29	3	16	450	24.5	16	12	9	21	17.5	15	8	16	4	6
		S35H3	35	29	4	16	515	26	17	12.5	9.5	22	18.5	16	8	16	4	6
WIND ZONE 2	LIGHT	S26L2	26	23	2	10	245	18	12.5	9.5	8	16.5	14	12	8	12	4	12
		S30L2	30	23	2	10	270	18.5	12.5	10	8	16.5	14	12.5	8	12	4	12
		S35L2	35	23	3	10	300	19.5	13	10	8	17	14.5	13	8	12	4	12
	HEAVY	S30H2	30	29	3	15	415	23	15.5	11.5	9	20	17	14.5	8	16	4	6
		S35H2	35	29	4	15	475	25	16.5	12	9.5	21	17.5	15.5	8	16	4	6
WIND ZONE 3	LIGHT	S26L2	26	23	2	10	245	18	12.5	9.5	8	16.5	14	12	8	12	4	12
		S30L2	30	23	2	10	270	18.5	12.5	10	8	16.5	14	12.5	8	12	4	12
		S35L2	35	23	3	10	300	19.5	13	10	8	17	14.5	13	8	12	4	12
	HEAVY	S30H2	30	29	3	15	415	23	15.5	11.5	9	20	17	14.5	8	16	4	6
		S35H2	35	29	4	15	475	25	16.5	12	9.5	21	17.5	15.5	8	16	4	6
WIND ZONE 4	LIGHT	S26L1	26	22	2	8	190	16	11.5	8.5	8	15	12.5	11	8	12	4	12
		S30L1	30	22	2	8	205	16.5	11.5	9	8	15	13	11.5	8	12	4	12
		S35L1	35	22	3	8	230	17	12	9	8	15.5	13.5	11.5	8	12	4	12
	HEAVY	S30H1	30	25	3	12	320	20.5	13.5	10.5	8	18	15	13.5	8	16	4	6
		S35H1	35	25	4	12	350	21	14	10.5	8.5	18.5	15.5	13.5	8	16	4	6
WIND ZONE 5	LIGHT	S26L2	26	23	2	10	245	18	12.5	9.5	8	16.5	14	12	8	12	4	12
		S30L2	30	23	2	10	270	18.5	12.5	10	8	16.5	14	12.5	8	12	4	12
		S35L2	35	23	3	10	300	19.5	13	10	8	17	14.5	13	8	12	4	12
	HEAVY	S30H2	30	29	3	15	415	23	15.5	11.5	9	20	17	14.5	8	16	4	6
		S35H2	35	29	4	15	475	25	16.5	12	9.5	21	17.5	15.5	8	16	4	6

48″ Dia. Foundations Concrete Volume (cubic yards) = (0.465) x Drilled Pier Length

General Notes:

1. Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
2. Use chairs and spacers to maintain proper clearance.
3. For foundation, always use air-entrain concrete mix.

Foundation Selection:

1. Perform a standard penetration test at each proposed foundation site to determine "N" value.
2. Select the appropriate wind zone from M 1 drawing.
3. Select the soil type (Clay or Sand) that best describes the soil characteristics.
4. Get the appropriate standard pole case number from the plans or from the Engineer.
5. Select the appropriate column under "Standard Foundations" based on soil type and "N" value. Select the appropriate row based on the pole load case.
6. The foundation depth is the value shown in the "Standard Foundations" category where the column and the row intersect.
7. Use Construction Procedures and Design Methods prescribed by FHWA-NHI-10-016 for Reference Drilled Shafts.

Standard Strain Pole Foundation–All Soil Condition

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

Standard Strain Pole Foundation for All Soil Conditions

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	C.B. COGDELL
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE
Changed "Foundation Depth" to "Drilled Pier Length"in Conc. Eqn.	N.B.	7/12/2015

SCALE: 0 NA NONE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

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SIGNATURE

10/11/2017
DATE

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