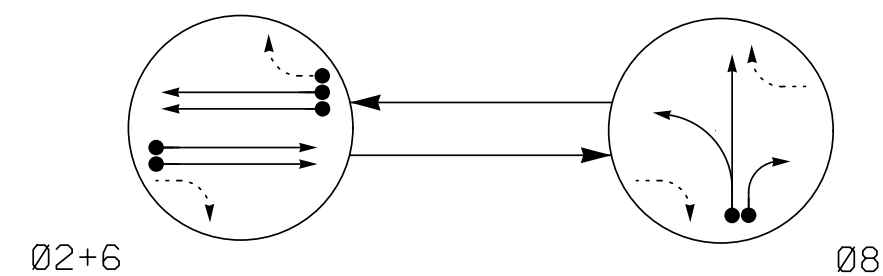


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PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

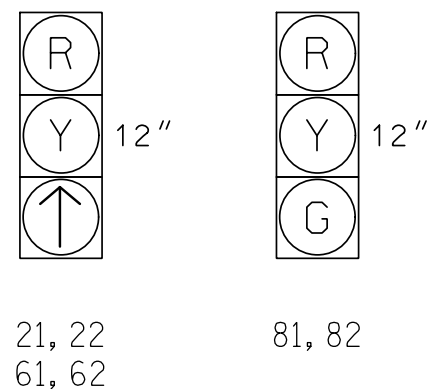
- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- - - UNSIGNALIZED MOVEMENT
- ← - - - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+6	08	FLIGHT
21, 22	↑	R	Y
61, 62	↑	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



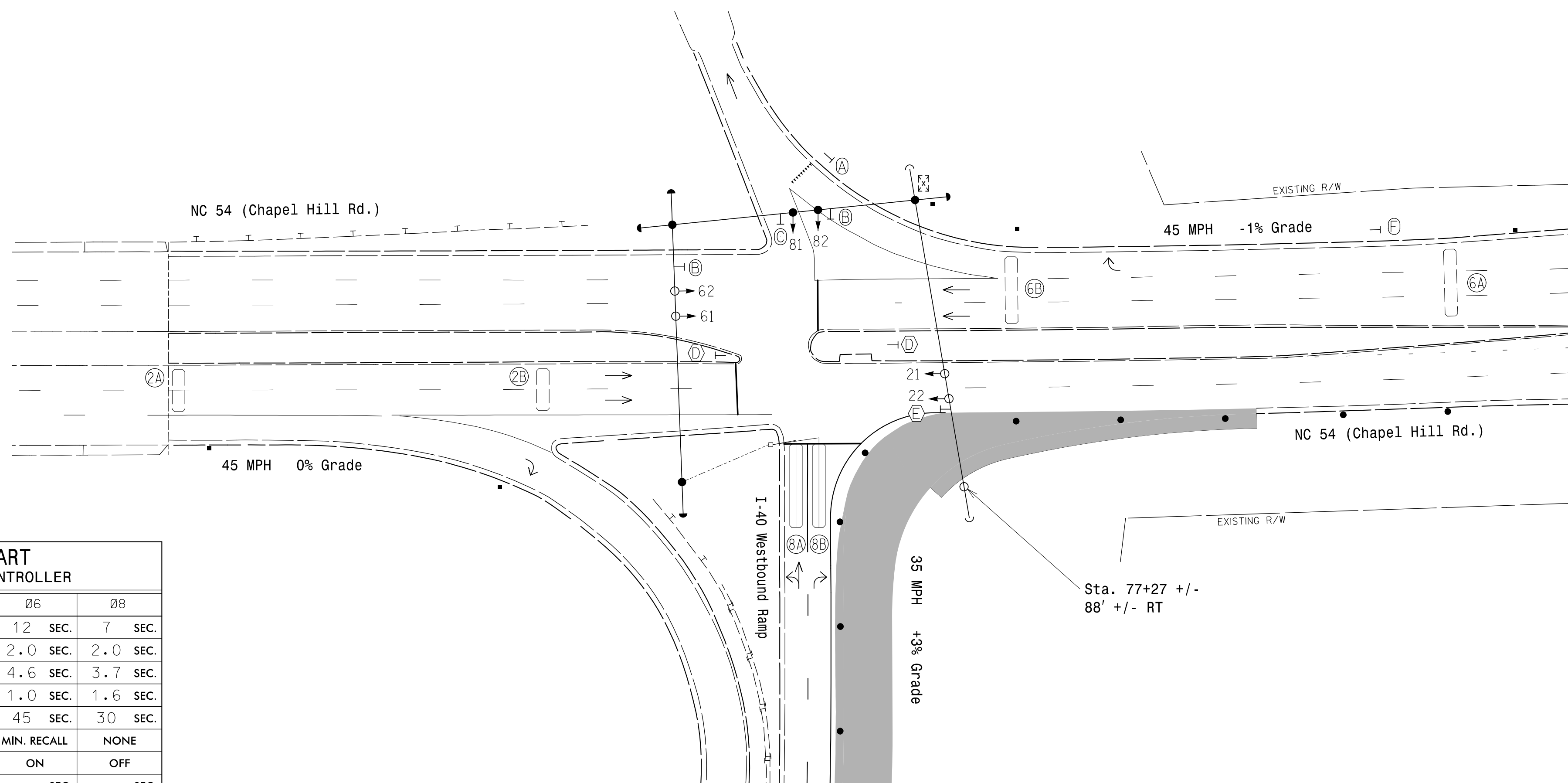
LOOP & DETECTOR INSTALLATION CHART
ASC/3-2070EN2 CONTROLLER w/ TS-2 CABINET

LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	INDUCTIVE LOOPS		DETECTOR UNITS		TIMING		DET. TYPE
			NEW	EXISTING	NEW	EXISTING	FEATURE	TIME (sec)	
2A	6X20	265	EXIST	- X	2	- X	EXTEND	1.0	S
2B	6X20	90	EXIST	- X	2	- X	-	-	S
6A	6X32	300	EXIST	- X	6	- X	EXTEND	1.6	S
6B	6X32	90	EXIST	- X	6	- X	-	-	S
8A	6X40	0	2-4-2	X -	8	- X	-	-	S
8B	6X40	0	2-4-2	X -	8	- X	DELAY	15	S

2 Phase Fully Actuated (Cary Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Cary signal system data: Fiber channel #: 10.



LEGEND

- | PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → N/A |
| ○ → Modified Signal Head | ○ → N/A |
| ○ → Pedestrian Signal Head With Push Button & Sign | ○ → N/A |
| ○ → Signal Pole with Guy | ○ → N/A |
| ○ → Signal Pole with Sidewalk Guy | ○ → N/A |
| □ → Inductive Loop Detector | □ → N/A |
| □ → Controller & Cabinet | □ → N/A |
| □ → Junction Box | □ → N/A |
| - - - 2-in Underground Conduit | - - - 2-in Underground Conduit |
| N/A → Right of Way | N/A → Right of Way |
| N/A → Directional Arrow | N/A → Directional Arrow |
| N/A → Guardrail | N/A → Guardrail |
| ● → Construction Zone Drums | ● → Construction Zone Drums |
| ■ → Construction Zone | ■ → Construction Zone |
| (A) "YIELD" Sign (R1-2) | (A) "YIELD" Sign (R1-2) |
| (B) Right Arrow "ONLY" Sign (R3-5R) | (B) Right Arrow "ONLY" Sign (R3-5R) |
| (C) Combined Through and Left Arrow Sign (R3-6L) | (C) Combined Through and Left Arrow Sign (R3-6L) |
| (D) No U-Turn/Left Turn Sign (R3-18) | (D) No U-Turn/Left Turn Sign (R3-18) |
| (E) No Right Turn Sign (R3-1) | (E) No Right Turn Sign (R3-1) |
| (F) "RIGHT LANE MUST TURN RIGHT" Sign (R3-7) | (F) "RIGHT LANE MUST TURN RIGHT" Sign (R3-7) |

TIMING CHART
ASC/3-2070EN2 CONTROLLER

PHASE	02	06	08
MINIMUM GREEN *	12 SEC.	12 SEC.	7 SEC.
VEHICLE EXT. *	2.0 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	4.5 SEC.	4.6 SEC.	3.7 SEC.
RED CLEARANCE	1.0 SEC.	1.0 SEC.	1.6 SEC.
MAX. 1 *	45 SEC.	45 SEC.	30 SEC.
RECALL POSITION	MIN. RECALL	MIN. RECALL	NONE
LOCK DET.	ON	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 phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

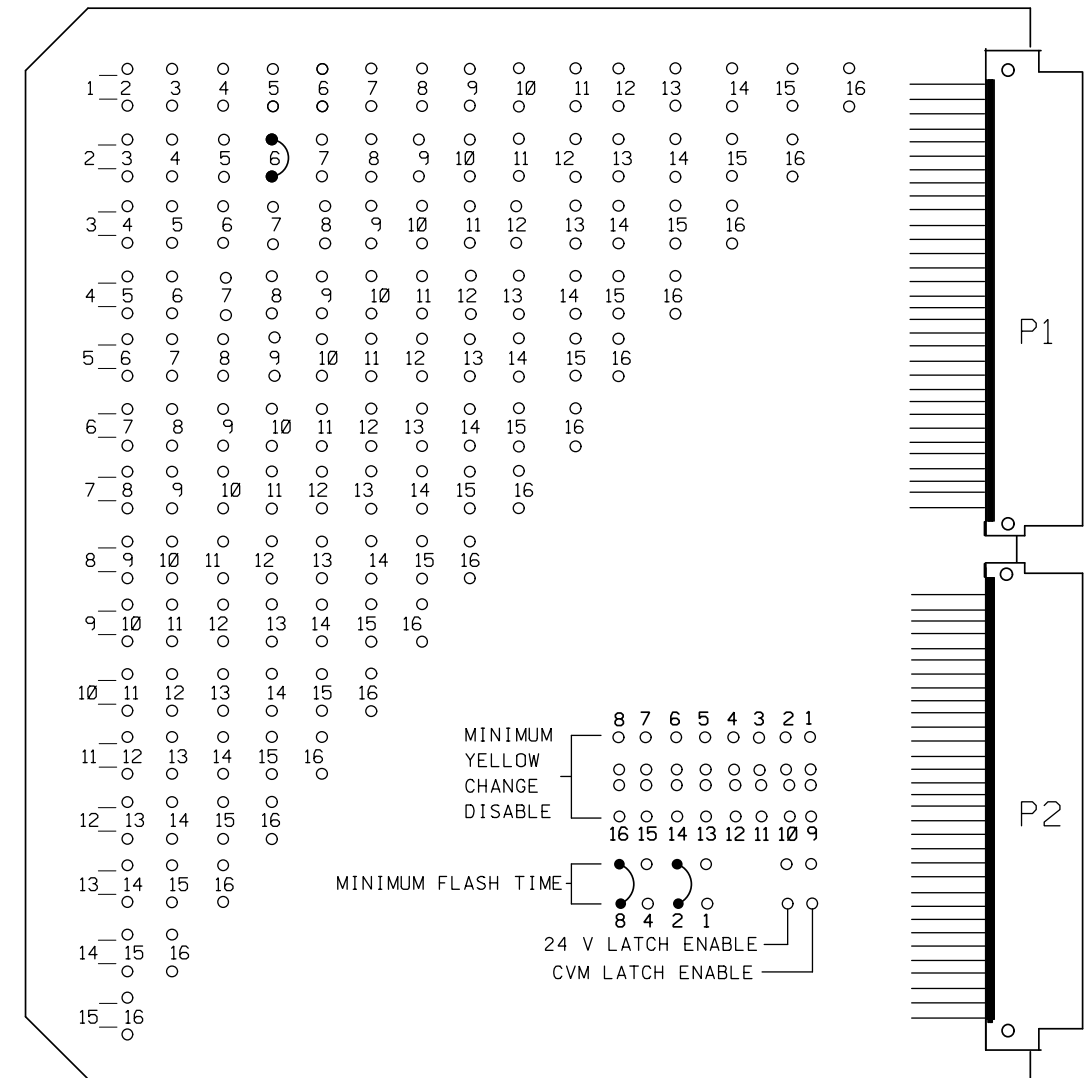
Signal Upgrade - Temp Design 1 (TMP Phase 3)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

<p>WSP USA 454 FAYETTEVILLE STREET SUITE 1500 RALEIGH, NC 27601 TEL: 1.919.836.4010 FAX: 1.919.836.4099 LICENSE NO. F-0165</p>	<p>Prepared for: TRANSPORTATION MOBILITY AND SAFETY DIVISION DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION</p>	<p>NC 54 (Chapel Hill Rd.) at I-40 Westbound Ramps</p>										
		<p>Division 5 Wake County Cary</p>	<p>PLAN DATE: September 2018 REVIEWED BY: K. Dixon</p>		<p>PREPARED BY: S.J. Mathai REVIEWED BY:</p>	<p>DocuSigned by: Katelyn P. Dixon 10/23/18</p>						
<p>SCALE: 1" = 40'</p>		<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		NO.	DESCRIPTION	INIT.	DATE					<p>DATE: 10/23/18</p>
NO.	DESCRIPTION	INIT.	DATE									

EDI MODEL MMU2-16LEip MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and tables as shown below)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE

CHANNEL NUMBER	ENABLE/DISABLE
1	DISABLE
2	ENABLE
3	DISABLE
4	DISABLE
5	DISABLE
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

- To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans.
- To prevent red failures on unused monitor channels, tie unused load switch red outputs 1,3,4,5,7,9,10,11,12,13,14, 15 and 16 to load switch AC+ by inserting a jumper plug in the unused load switch socket from pin 1 (LS AC+) to pin 3 (RED out). Make sure all flash transfer relays are in place.
- Program controller to start up in phase 2 Green and 6 Green.
- Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
- Enable simultaneous gap-out feature for all phases.
- Program detectors in accordance with the manufacturer's instructions to accomplish the detection schemes shown on the signal design plans.
- Program detector call delay and extension timing on the controller, unless otherwise specified.
- Set all detector card unit channels to "presence" mode.
- The cabinet and controller are a part of the Cary Signal System.

SIGNAL HEAD HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	61,62	NU	81,82	NU	NU	NU	NU	NU	NU	NU	NU
RED		2R				6R		8R								
YELLOW		2Y				6Y		8Y								
GREEN								8G								
RED ARROW																
YELLOW ARROW																
GREEN ARROW		2G				6G										

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

CH1	CH1	SLOT	CH1	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
L3	L1	∅ 6	L5	∅ 8						
	∅ 2									
CH2	CH2	EMPTY	CH2	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY
L4	L2		L6							
	∅ 2		∅ 8							

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
 CABINETTS-2
 SOFTWAREECONOLITE ASC/3-2070
 CABINET MOUNT.....BASE
 LOADBAY POSITIONS.....16
 LOAD SWITCHES USED.....2,6,8
 PHASES USED.....2,6,8
 OLA.....NOT USED
 OLB.....NOT USED
 OLC.....NOT USED
 OLD.....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
6A	L3A,L3B
6B	L4A,L4B
8A	L5A,L5B
8B	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
NU	L17A,L17B
NU	L18A,L18B
NU	L19A,L19B
NU	L20A,L20B
NU	L21A,L21B
NU	L22A,L22B
NU	L23A,L23B
NU	L24A,L24B

NU = Not Used

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	∅ 2	EXTEND	1.0
2	∅ 2		
3	∅ 6	EXTEND	1.6
4	∅ 6		
5	∅ 8		
6	∅ 8	DELAY	15
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

DETECTOR RACK SET-UP DETAIL

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

RACK #2

BIU	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0658T1
 DESIGNED: September 2018
 SEALED: 10/23/2018
 REVISED: N/A

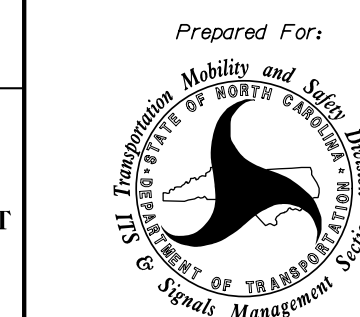
Electrical Detail - Temp Design 1 (TMP Phase 3)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 54 (Chapel Hill Rd.)
at
I-40 Westbound Ramps

SEAL



PLANS PREPARED BY:



WSP USA
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040
FAX: 1.919.836.4099
LICENSE NO. F-0165

750 N. Greenfield Pkwy, Garner, NC 27529

Division 5 Wake County Cary
 PLAN DATE: September 2018 REVIEWED BY: K. Dixon
 PREPARED BY: S. J. Mathai REVIEWED BY: D. Johnson

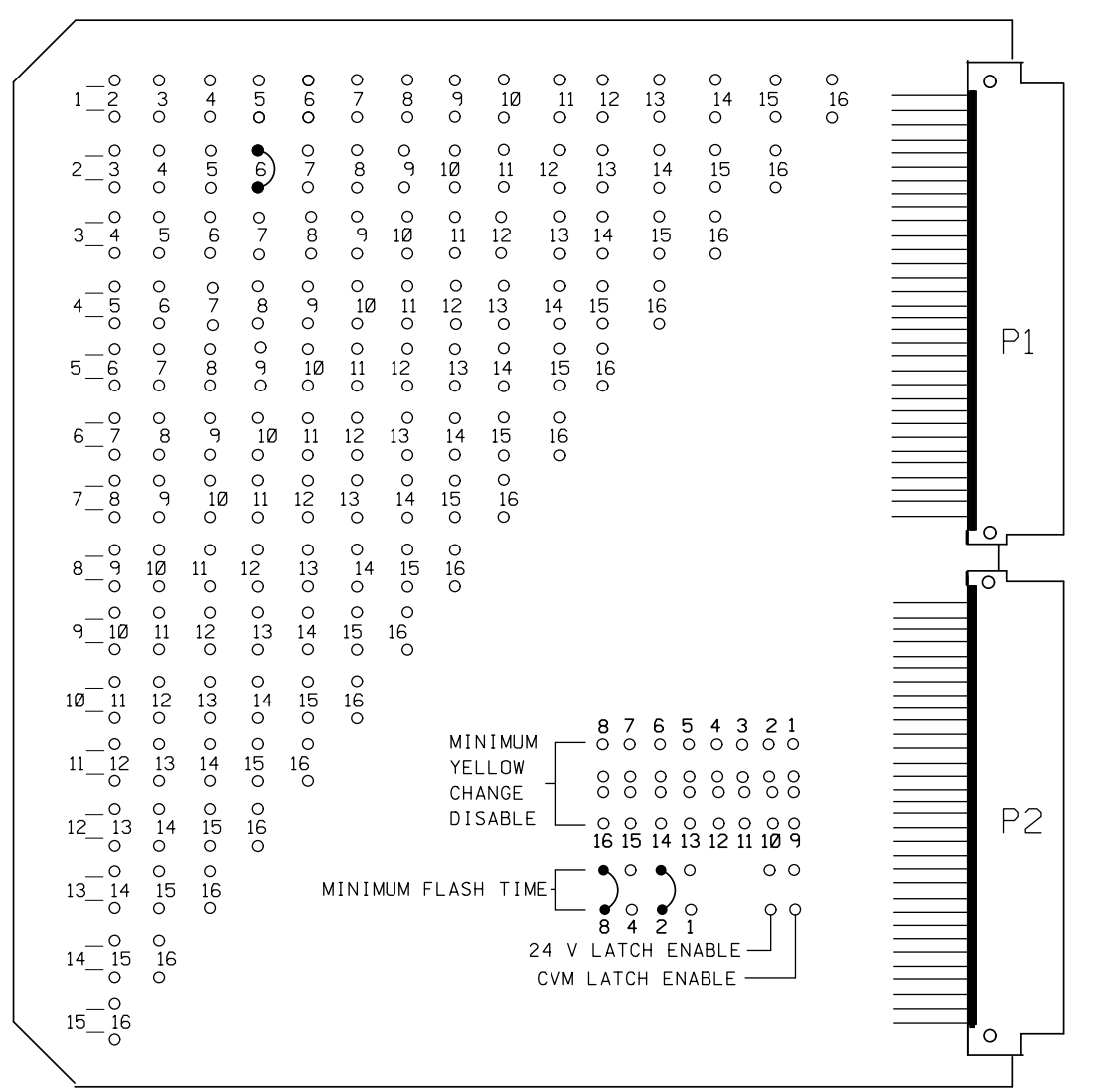
REVISIONS	INIT.	DATE

DocuSigned by:
Kellyn P. Dixon 10/23/18

DATE

SIG. INVENTORY NO. 05-0658T1

**EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL**
(program card and tables as shown below)



**FIELD CHECK ENABLE
DUAL IND ENABLE
RED FAIL ENABLE**

CHANNEL NUMBER	ENABLE/DISABLE
1	DISABLE
2	ENABLE
3	DISABLE
4	ENABLE
5	DISABLE
6	ENABLE
7	DISABLE
8	DISABLE
9	DISABLE
10	DISABLE
11	DISABLE
12	DISABLE
13	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	SETTING
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 CARD

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

NOTES

- To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans.
- To prevent red failures on unused monitor channels, tie unused load switch red outputs 1,3,5,7,8,9,10,11,12,13,14, 15 and 16 to load switch AC+ by inserting a jumper plug in the unused load switch socket from pin 1 (LS AC+) to pin 3 (RED out). Make sure all flash transfer relays are in place.
- Program controller to start up in phase 2 Green and 6 Green.
- Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
- Enable simultaneous gap-out feature for all phases.
- Program detectors in accordance with the manufacturer's instructions to accomplish the detection schemes shown on the signal design plans.
- Program detector call delay and extension timing on the controller, unless otherwise specified.
- Set all detector card unit channels to "presence" mode.
- The cabinet and controller are a part of the Cary Signal System.

SIGNAL HEAD HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	NU	21,22	NU	41,42	NU	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		2R		4R		6R										
YELLOW		2Y		4Y		6Y										
GREEN				4G												
RED ARROW																
YELLOW ARROW																
GREEN ARROW		2G				6G										

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

CH1	CH1	SLOT	CH1	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
L3	L1	ø4	L5	L6	ø6	ø6	ø6	ø6	ø6	ø6	ø6
ø4	ø2	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

EQUIPMENT INFORMATION

CONTROLLER.....2070EN2
 CABINETTS-2
 SOFTWAREECONOLITE ASC/3-2070
 CABINET MOUNT.....BASE
 LOADBAY POSITIONS.....16
 LOAD SWITCHES USED.....2,4,6
 PHASES USED.....2,4,6
 OLA.....NOT USED
 OLB.....NOT USED
 OLC.....NOT USED
 OLD.....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
6A	L5A,L5B
6B	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
NU	L17A,L17B
NU	L18A,L18B
NU	L19A,L19B
NU	L20A,L20B
NU	L21A,L21B
NU	L22A,L22B
NU	L23A,L23B
NU	L24A,L24B

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø 2	EXTEND	2.1
2	ø 2		
3	ø 4		
4	ø 4	DELAY	15
5	ø 6	EXTEND	1.3
6	ø 6		
7	-		
8	-		
9	-		
10	-		
11	-		
12	-		
13	-		
14	-		
15	-		
16	-		
17	-		
18	-		
19	-		
20	-		
21	-		
22	-		
23	-		
24	-		

DETECTOR RACK SET-UP DETAIL

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

RACK #2

BIU	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0659T1
 DESIGNED: September 2018
 SEALED: 10/23/2018
 REVISED: N/A

Electrical Detail - Temp Design 1 (TMP Phase 3)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared For:

 WSP USA
 434 FAYETTEVILLE STREET
 SUITE 1500
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 TEL: 1.919.836.4040
 FAX: 1.919.836.4099
 LICENSE NO. F-0165

NC 54 (Chapel Hill Rd.)
 at
 I-40 Eastbound Ramps

Division 5 Wake County Cary
 PLAN DATE: September 2018 REVIEWED BY: K. Dixon
 PREPARED BY: S. J. Mathai REVIEWED BY: D. Johnson

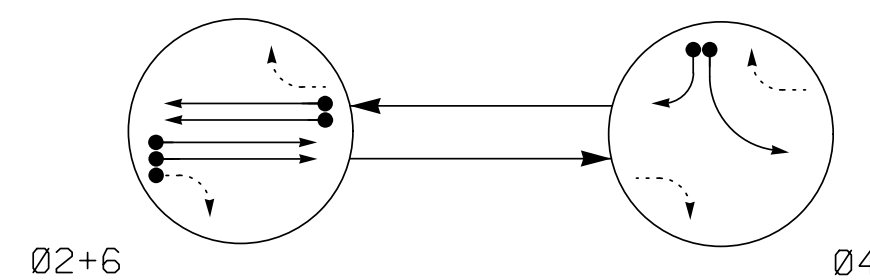
REVISIONS	INIT.	DATE

SEAL

 Katelyn P. Dixon
 10/23/18
 DATE

10/23/2018 J:\175561 - 2012 NCDOT DIVISION ONE-COI\175561C-02_NC_54_Improvements\Traffic\Signal\0659T1_sml.ele.dwg
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PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

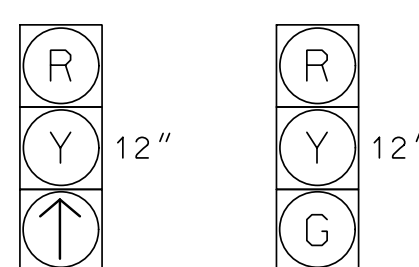
- ←●→ DETECTED MOVEMENT
- ←○→ UNDETECTED MOVEMENT (OVERLAP)
- ←- - -→ UNSIGNALIZED MOVEMENT
- ←- - -> PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	Ø2+6	Ø4	FLIGHT
21, 22	↑	R	Y
41, 42	R	G	R
61, 62	↑	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



21, 22
61, 62 41, 42

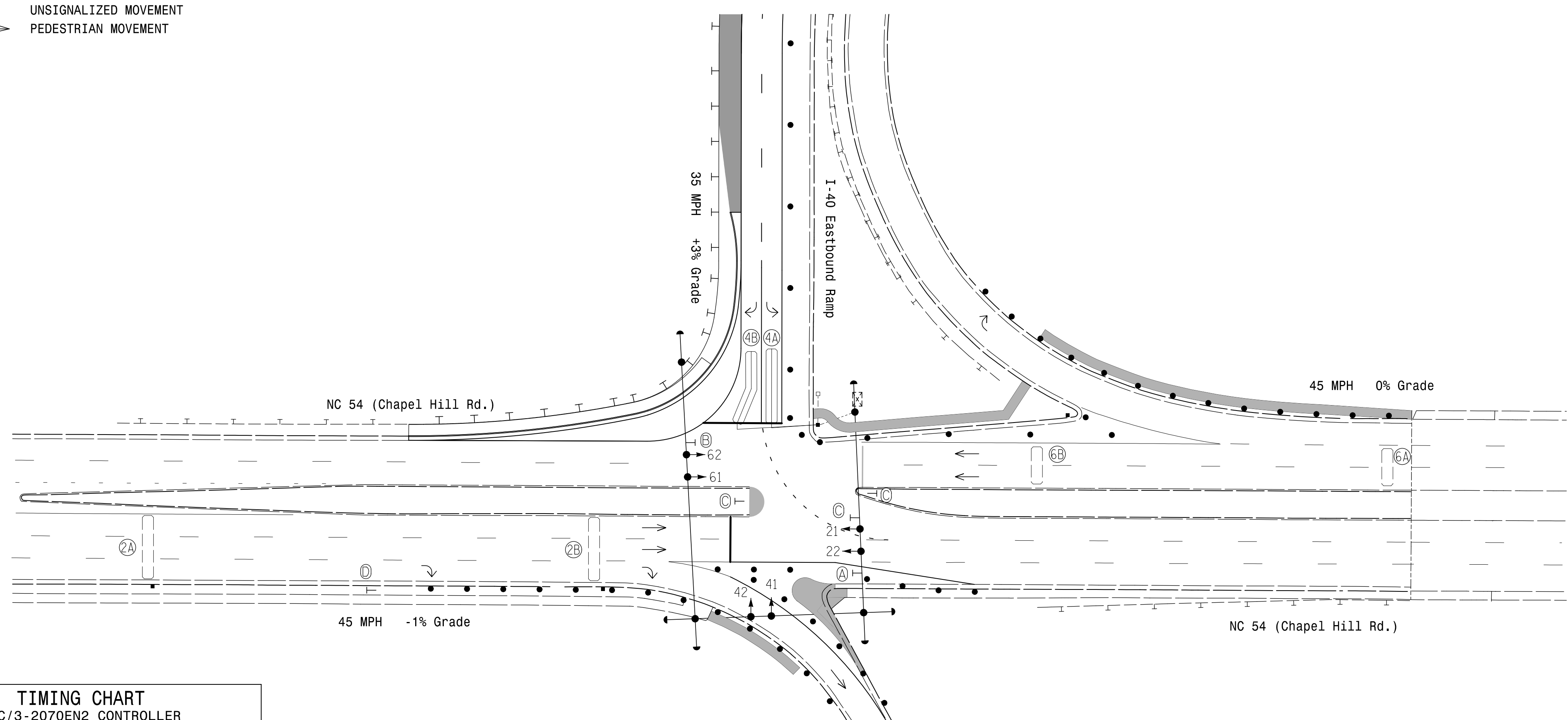
LOOP & DETECTOR INSTALLATION CHART

LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	INDUCTIVE LOOPS				DETECTOR UNITS				
			TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING		DET. TYPE
									FEATURE	TIME (sec)	
2A	6X34	310	EXIST	-	X	2	-	X	EXTEND	2.1	S
2B	6X34	70	EXIST	-	X	2	-	X	-	-	S
4A	6X40	0	2-4-2	X	-	4	-	X	-	-	S
4B	6X40	0	2-4-2	X	-	4	-	X	DELAY	15	S
6A	6X20	280	EXIST	-	X	6	-	X	EXTEND	1.3	S
6B	6X20	90	EXIST	-	X	6	-	X	-	-	S

2 Phase Fully Actuated (Cary Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition signal heads numbered 41 and 42.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Cary signal system data: Fiber channel #: 10.



TIMING CHART				
ASC/3-2070EN2 CONTROLLER				
PHASE	Ø2	Ø4	Ø6	
MINIMUM GREEN *	12 SEC.	7 SEC.	12 SEC.	
VEHICLE EXT. *	2.0 SEC.	2.0 SEC.	2.0 SEC.	
YELLOW CHANGE INT.	4.6 SEC.	3.0 SEC.	4.5 SEC.	
RED CLEARANCE	1.0 SEC.	2.1 SEC.	1.1 SEC.	
MAX. I *	45 SEC.	30 SEC.	45 SEC.	
RECALL POSITION	MIN. RECALL	NONE	MIN. RECALL	
LOCK DET.	ON	OFF	ON	
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 what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

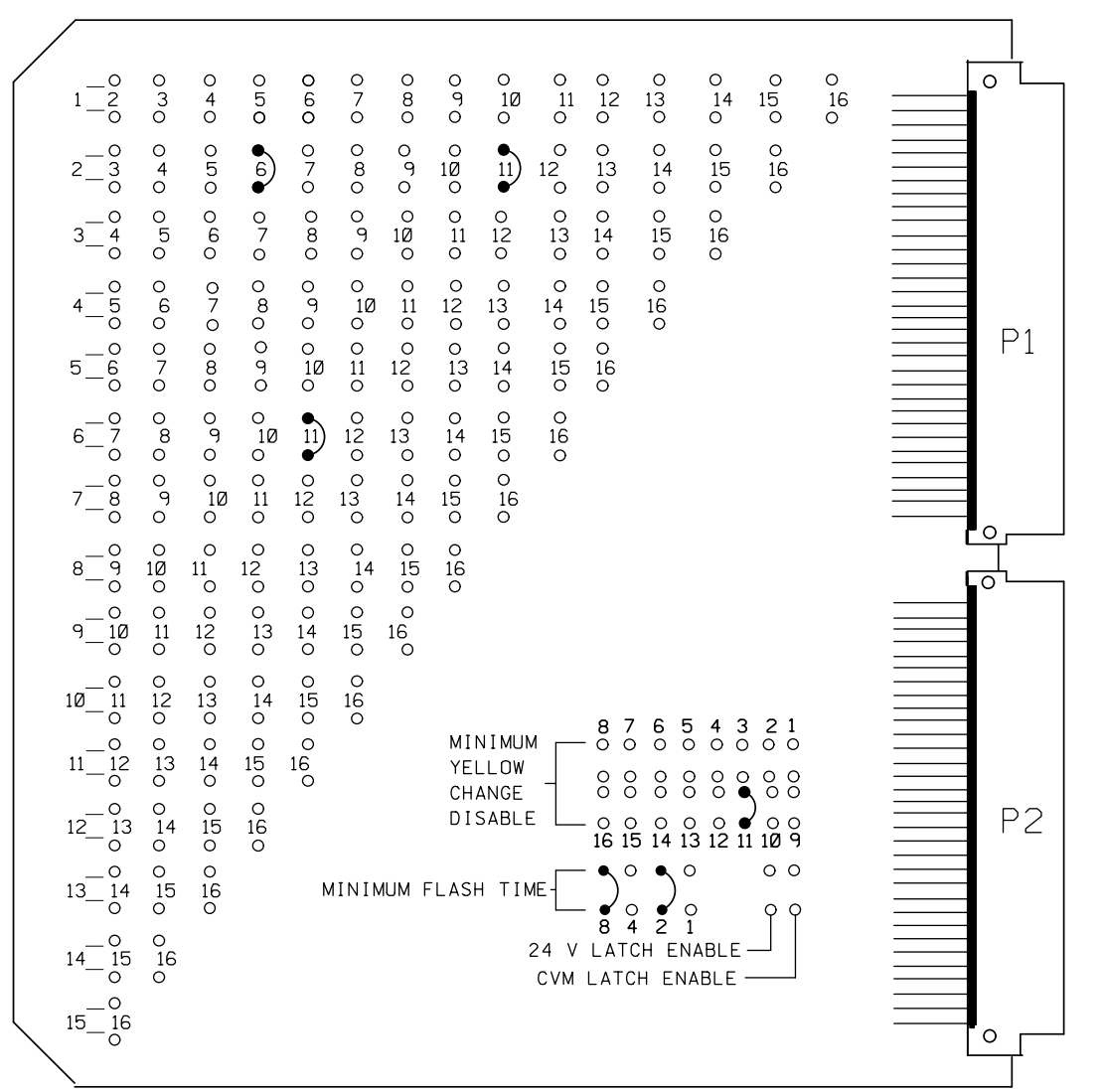
- | | | | |
|--|---|--|---|
| | Proposed Traffic Signal Head | | Existing Traffic Signal Head |
| | Proposed Modified Signal Head | | Existing Modified Signal Head |
| | Proposed Pedestrian Signal Head | | Existing Pedestrian Signal Head |
| | Proposed Signal Pole with Guy | | Existing Signal Pole with Guy |
| | Proposed Signal Pole with Sidewalk Guy | | Existing Signal Pole with Sidewalk Guy |
| | Proposed Inductive Loop Detector | | Existing Inductive Loop Detector |
| | Proposed Controller & Cabinet | | Existing Controller & Cabinet |
| | Proposed Junction Box | | Existing Junction Box |
| | Proposed 2-in Underground Conduit | | Existing 2-in Underground Conduit |
| | Proposed Right of Way | | Existing Right of Way |
| | Proposed Directional Arrow | | Existing Directional Arrow |
| | Proposed Guardrail | | Existing Guardrail |
| | Proposed Construction Zone Drums | | Existing Construction Zone Drums |
| | Proposed Construction Zone | | Existing Construction Zone |
| | Proposed Right Arrow "ONLY" Sign (R3-5R) | | Existing Right Arrow "ONLY" Sign (R3-5R) |
| | Proposed No Right Turn Sign (R3-1) | | Existing No Right Turn Sign (R3-1) |
| | Proposed No U-Turn/Left Turn Sign (R3-18) | | Existing No U-Turn/Left Turn Sign (R3-18) |
| | Proposed "RIGHT LANE MUST TURN RIGHT" Sign (R3-7) | | Existing "RIGHT LANE MUST TURN RIGHT" Sign (R3-7) |

Signal Upgrade - Temp Design 2 (TMP Phase 4)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

<p>WSP USA 454 FAYETTEVILLE STREET SUITE 1500 RALEIGH, NC 27601 TEL: 1-919-836-4010 FAX: 1-919-836-4099 LICENSE NO. F-0165</p>	<p>Prepared for: TRANSPORTATION MOBILITY AND SAFETY DIVISION DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION</p>	<p>NC 54 (Chapel Hill Rd.) at I-40 Eastbound Ramps</p>	<p>SEAL KELLYN P. DIXON ENGINEER</p>
	<p>PLANS PREPARED BY: </p>	<p>750 N. Greenfield Pkwy, Garner, NC 27529 SCALE 0 40 1" = 40'</p>	<p>Division 5 Wake County Cary PLAN DATE: September 2018 REVIEWED BY: K. Dixon PREPARED BY: S.J. Mathai REVIEWED BY:</p>

**EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL**
(program card and tables as shown below)



**FIELD CHECK ENABLE
DUAL IND ENABLE
RED FAIL ENABLE**

CHANNEL NUMBER	ENABLE/DISABLE
1	DISABLE
2	ENABLE
3	DISABLE
4	ENABLE
5	DISABLE
6	ENABLE
7	DISABLE
8	DISABLE
9	DISABLE
10	DISABLE
11	ENABLE
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	SETTING
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.

MMU PROGRAMMING CARD

NOTES

- To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans.
- To prevent red failures on unused monitor channels, tie unused load switch red outputs 1,3,5,7,8,9,10,12,13,14, 15 and 16 to load switch AC+ by inserting a jumper plug in the unused load switch socket from pin 1 (LS AC+) to pin 3 (RED out). Make sure all flash transfer relays are in place.
- Program controller to start up in phase 2 Green and 6 Walk.
- Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
- Enable simultaneous gap-out feature for all phases.
- Program detectors in accordance with the manufacturer's instructions to accomplish the detection schemes shown on the signal design plans.
- Program detector call delay and extension timing on the controller, unless otherwise specified.
- Set all detector card unit channels to "presence" mode.
- Program phases 2 and 6 for volume density operation.
- The cabinet and controller are a part of the Cary Signal System.

SIGNAL HEAD HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	NU	21,22	NU	41,42	43	NU	61,62	NU	NU	NU	P61, P62	NU	NU	NU	NU	NU
RED		2R		4R		6R										
YELLOW		2Y				6Y										
GREEN																
RED ARROW				4R												
YELLOW ARROW				4Y	4Y											
GREEN ARROW		2G		4G	4G	6G										
												11R				
												11G				

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	S	S	S	S	S	S	S
	L3	L1	L7	L5	L	L	L	L	L	L	L
	ø4	ø2	ø4	ø6	O	O	O	O	O	O	O
	*	*	*	*	T	T	T	T	T	T	T
	CH2	CH2	CH2	CH2	E	E	E	E	E	E	E
	L4	L2	L8	L6	M	M	M	M	M	M	M
	ø4	ø2	NOT USED	ø6	P	P	P	P	P	P	P
	*	*	*	*	T	T	T	T	T	T	T

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
6A	L5A,L5B
6B	L6A,L6B
4C	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
NU	L17A,L17B
NU	L18A,L18B
NU	L19A,L19B
NU	L20A,L20B
NU	L21A,L21B
NU	L22A,L22B
NU	L23A,L23B
NU	L24A,L24B

NU = Not Used

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1 *	ø 2		
2 *	ø 2		
3	ø 4		
4	ø 4		
5 *	ø 6		
6 *	ø 6		
7	ø 4	DELAY	15
8	-		
9	-		
10	-		
11	-		
12	-		
13	-		
14	-		
15	-		
16	-		
17	-		
18	-		
19	-		
20	-		
21	-		
22	-		
23	-		
24	-		

* Detector Type - N

DETECTOR RACK SET-UP DETAIL

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

RACK #2

BIU	S	S	S	S	S	S
	L	L	L	L	L	L
	O	O	O	O	O	O
	T	T	T	T	T	T
	E	E	E	E	E	E
	M	M	M	M	M	M
	P	P	P	P	P	P
	T	T	T	T	T	T

EQUIPMENT INFORMATION

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

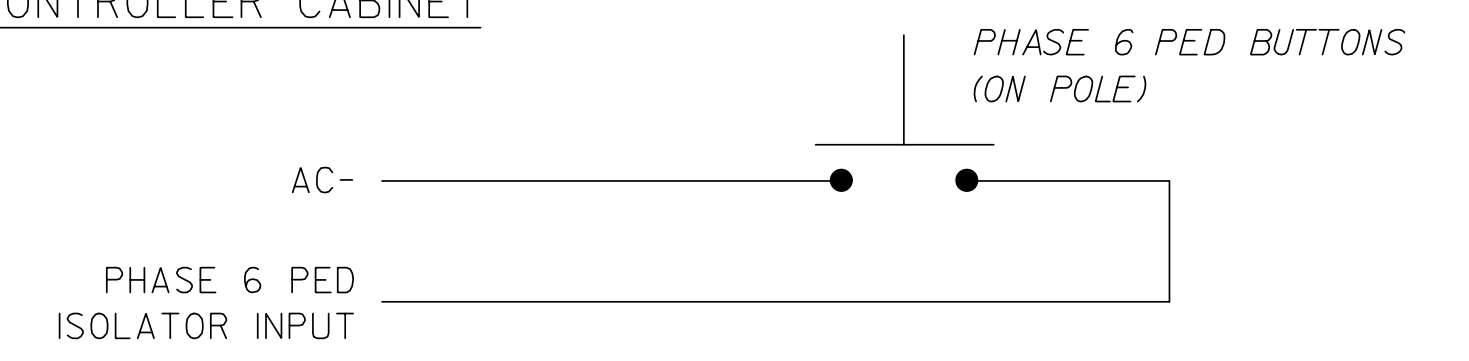
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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 below)

CONTROLLER CABINET



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0659
 DESIGNED: September 2018
 SEALED: 11/16/2018
 REVISED: N/A

Electrical Detail - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared For:

 WSP USA
 434 FAYETTEVILLE STREET
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 RALEIGH, NC 27601
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 FAX: 1.919.836.4099
 LICENSE NO. F-0165

NC 54 (Chapel Hill Rd.)
 at
 I-40 Eastbound Ramps

Division 5 Wake County Cary
 PLAN DATE: September 2018 REVIEWED BY: K. Dixon
 PREPARED BY: S. J. Mathai REVIEWED BY: D. Johnson

REVISIONS	INIT.	DATE

SEAL

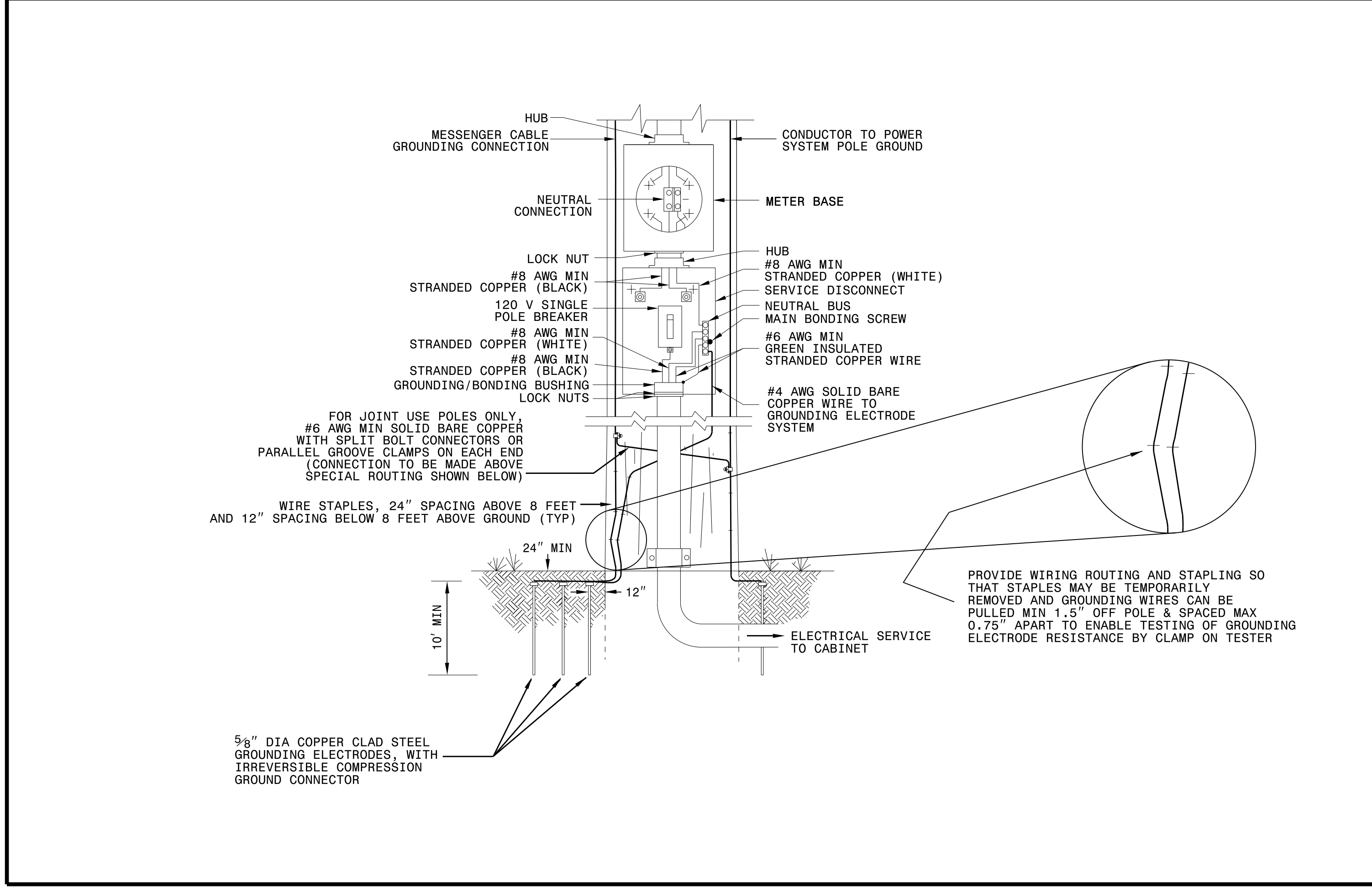
 Kellyn P. Dixon
 11/16/18
 DATE

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1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
ELECTRICAL SERVICE GROUNDING
GROUNDING AND BONDING

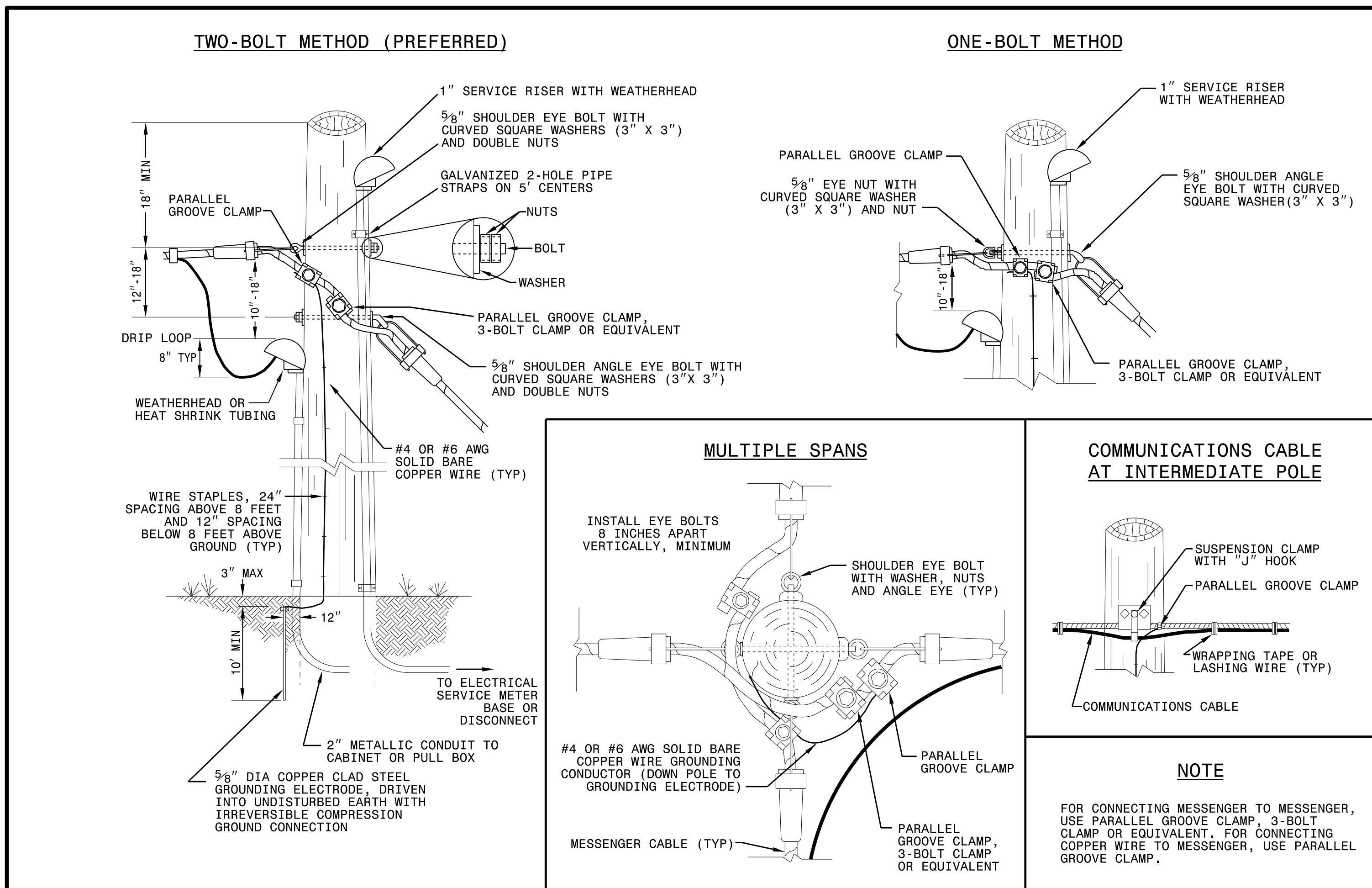
SHEET 1 OF 1
1700D01



1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
WOOD POLES
METHODS OF ATTACHMENT AND GROUNDING

SHEET 1 OF 1
1720D01

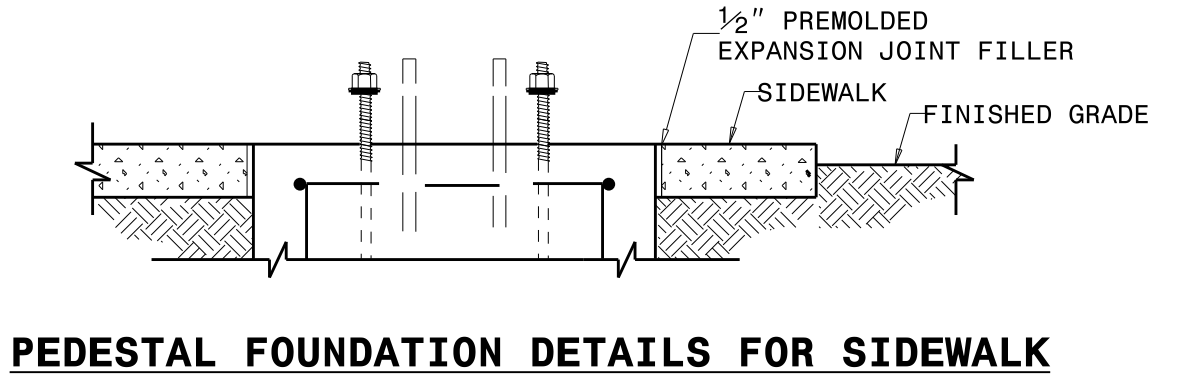
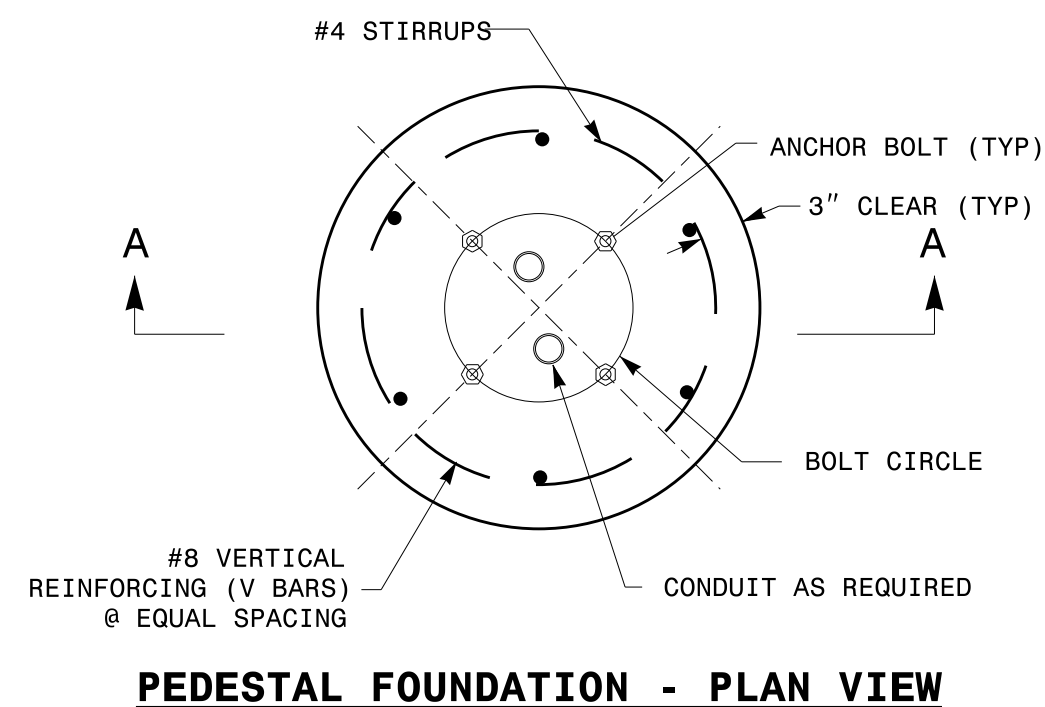


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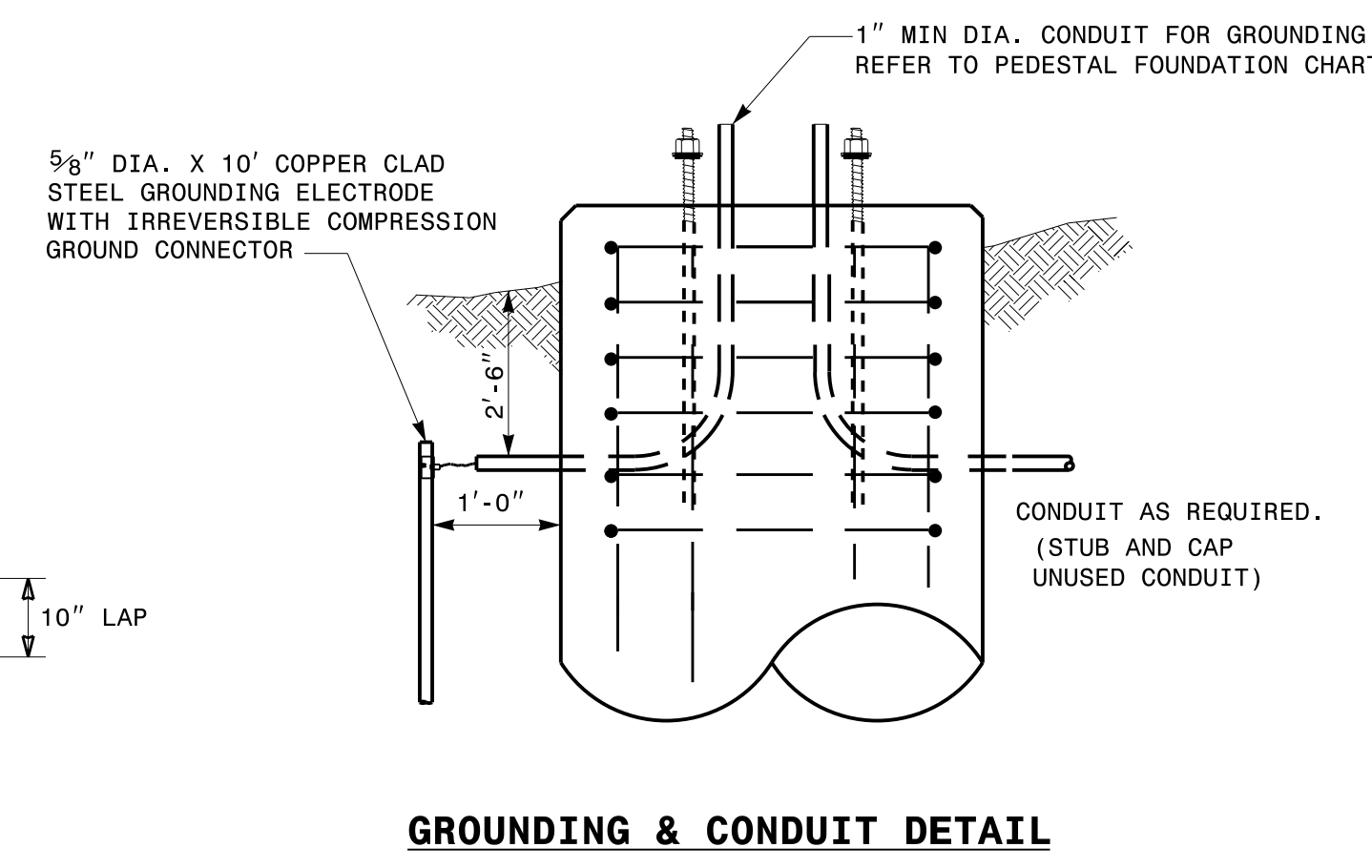
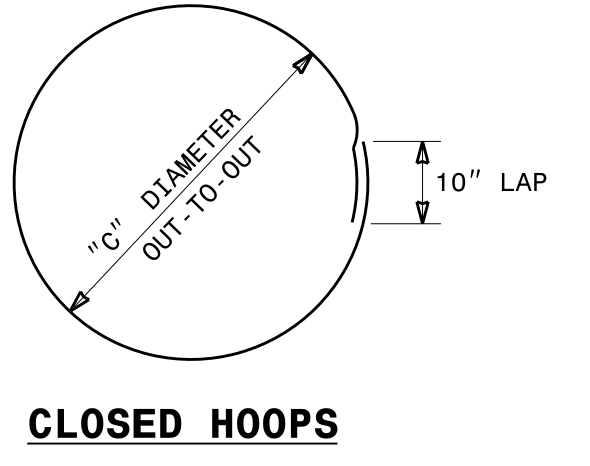
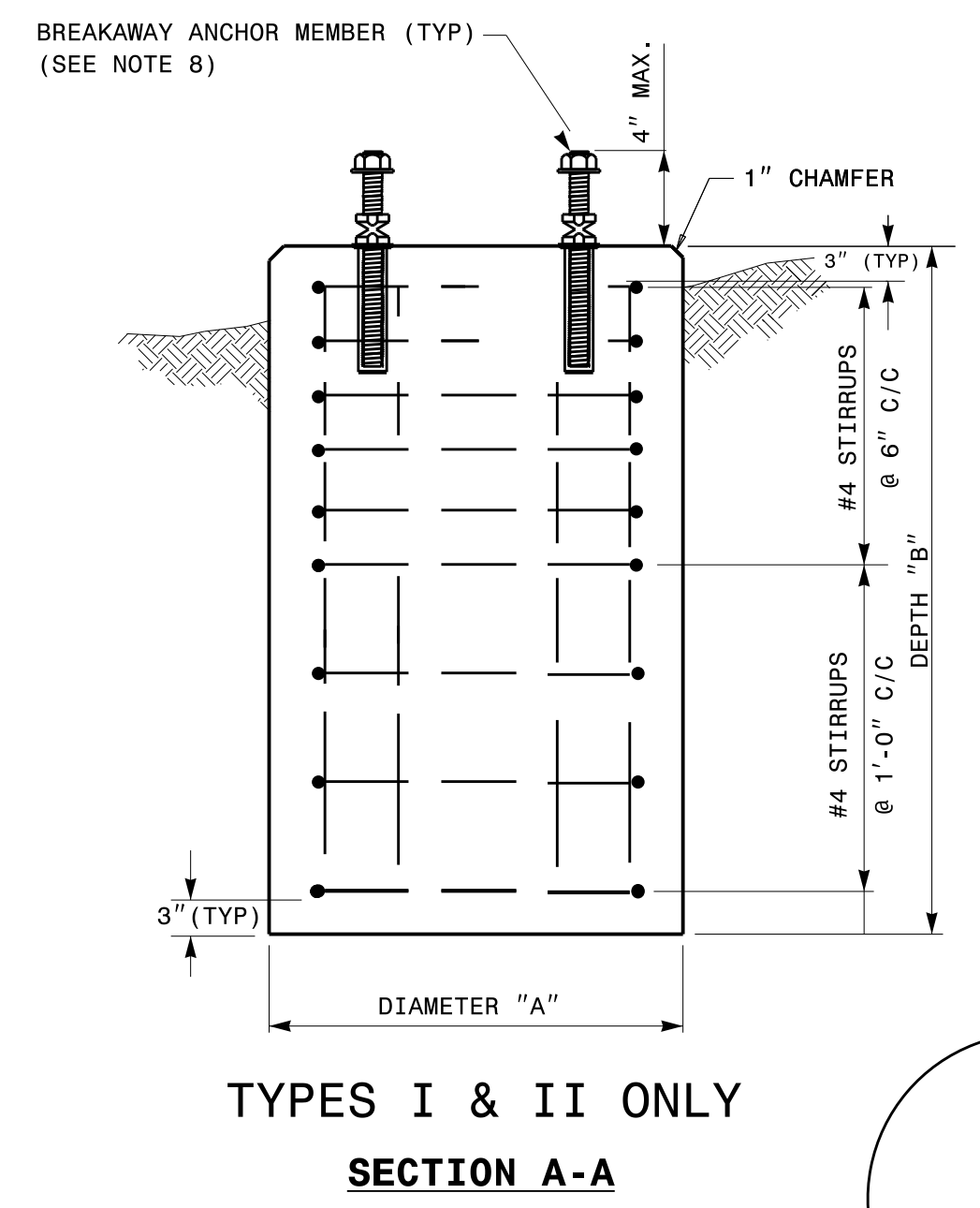
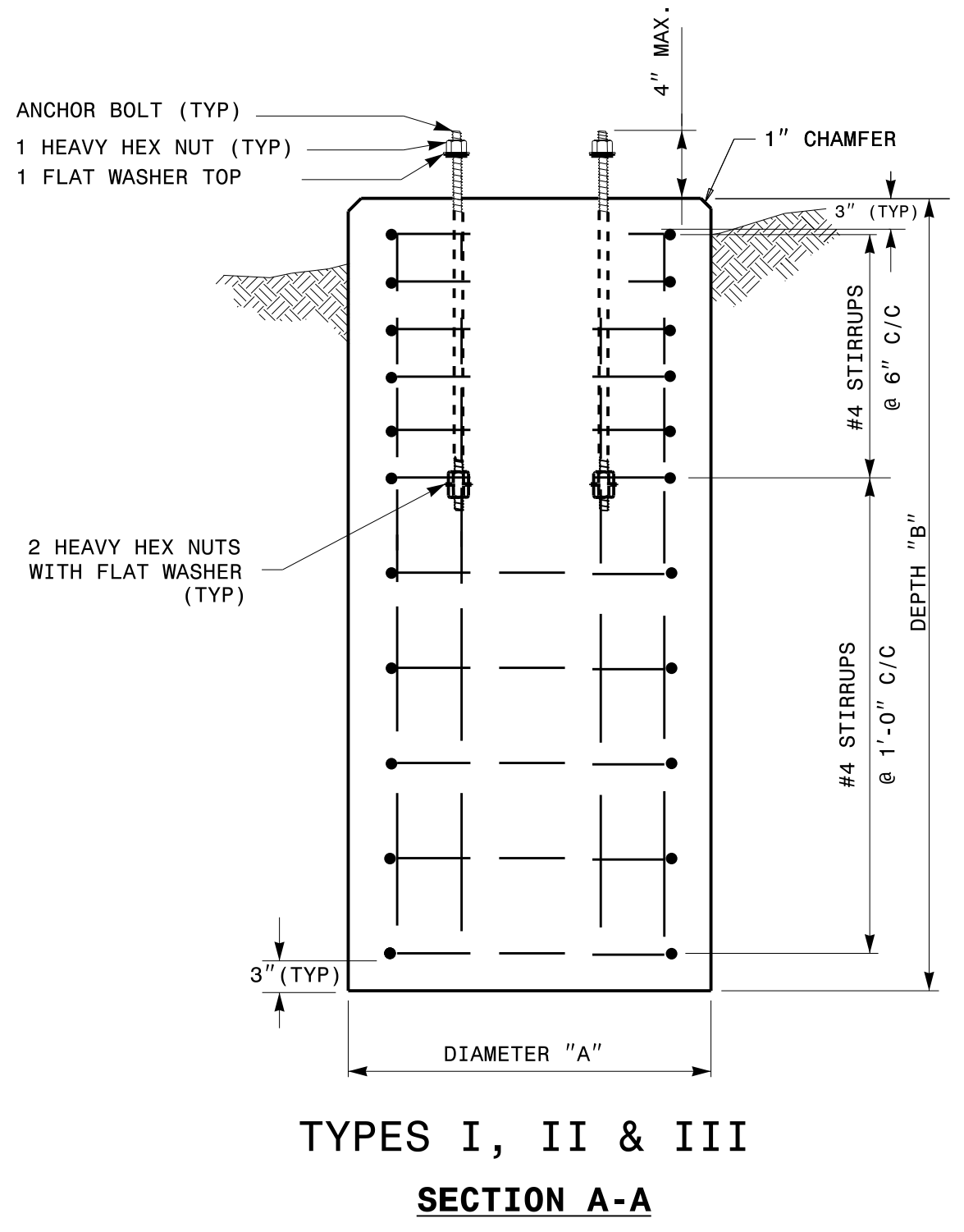
See Plate for Title

<p>Prepared in the Offices of:</p> <p>750 N. Greenfield Parkway Garner, NC 27529</p>	<p>SEAL</p> <p>DocuSigned by: Mohd Aslami</p> <p>10/11/2017 DATE</p>
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- NOTES:**
- CAST FOUNDATION AGAINST UNDISTURBED SOIL WHEREVER CONDITIONS PERMIT. IN UNSTABLE SOIL, CAST-IN-PLACE TUBE FORMS ARE ALLOWED WITH APPROVAL.
 - COMPLY WITH APPLICABLE PROVISIONS OF SECTION 825 FOR CONCRETE CONSTRUCTION.
 - USE CLASS "A" CONCRETE THAT MEETS THE REQUIREMENTS OF SECTION 1000 WITH A COMPRESSION STRENGTH AT 28 DAYS OF $F'c = 3000$ PSI (MIN.).
 - USE ASTM GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL.
 - GRADE IS ASSUMED TO BE (8H:1V) OR FLATTER. FOUNDATION SIZE AND DEPTHS ARE BASED ON THE FOLLOWING SOIL DESIGN PARAMETERS:
 - SANDY TYPE SOIL
 - NO GROUND WATER WITHIN 5'-0" OF SURFACE ELEVATION
 - WIND SPEED NOT TO EXCEED 140 MPH
 IF ACTUAL CONDITIONS VARY SUBSTANTIALLY FROM THOSE ASSUMED, THE FOUNDATION DEPTH MAY BE ADJUSTED. IN THIS CASE, CONTACT THE ENGINEER.
 - MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
 - ORIENT CONDUIT AS REQUIRED BY THE DESIGN OR AS DICTATED BY FIELD CONDITIONS.
 - USE ADHESIVE ANCHOR FOR THREADED COUPLING INSERT. FOR TYPE I MINIMUM DEPTH NECESSARY IS 0'-4 1/2" AND FOR TYPE II MINIMUM DEPTH NECESSARY IS 0'-6 5/8". FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.



PEDESTAL FOUNDATION TYPE AND SIZE							
TYPE	PEDESTAL DESCRIPTION	SIZE			ANCHOR BOLT		INSTALL GROUNDING SYSTEM (YES/NO)
		DIAMETER "A" FT	DEPTH "B" FT	CONCRETE VOLUME CY	DIAMETER (MIN.) IN	LENGTH FT-IN	
I	PEDESTRIAN PUSHBUTTON	2'-0"	3'-6"	.41	1/2	1'-6"	NO
II	NORMAL-DUTY	2'-0"	5'-0"	.58	3/4	2'-0"	YES
III	HEAVY-DUTY	2'-6"	7'-0"	1.27	1	4'-0"	YES

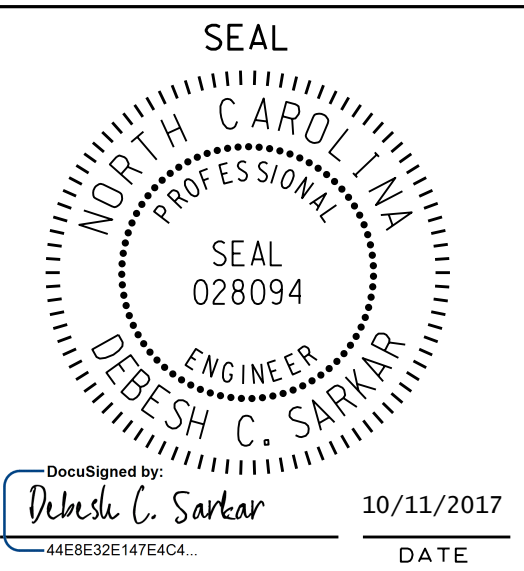
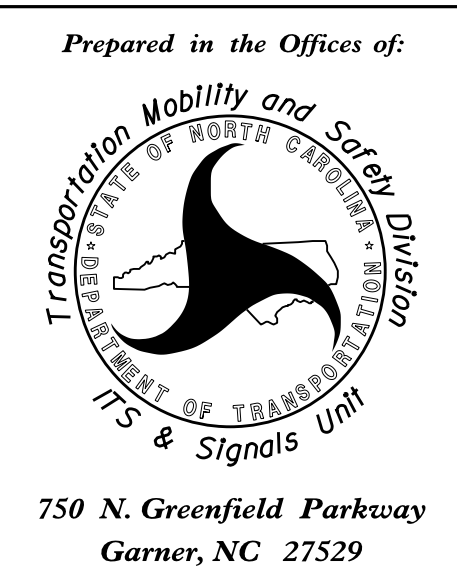
REINFORCING STEEL SCHEDULE													
TYPE	V-BAR				STIRRUP								
	SIZE #	QTY	LENGTH	WEIGHT LBS	SIZE #	QUANTITY			LENGTH	DIAMETER "C" FT	OVERLAP MIN.	WEIGHT LBS	TOTAL STEEL WEIGHT LBS
						VERTICAL ON 6" CENTERS	ON 12" CENTERS	TOTAL					
I	8	6	3'-0"	56	4	0	4	4	5'-7"	1'-6"	0'-10"	15	71
II	8	6	4'-6"	86	4	5	3	8	5'-7"	1'-6"	0'-10"	30	116
III	8	6	6'-6"	122	4	7	4	11	7'-2"	2'-0"	0'-10"	53	175

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
PEDESTALS
FOUNDATIONS

SHEET 1 OF 1
1743D01

See Plate for Title



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