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STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

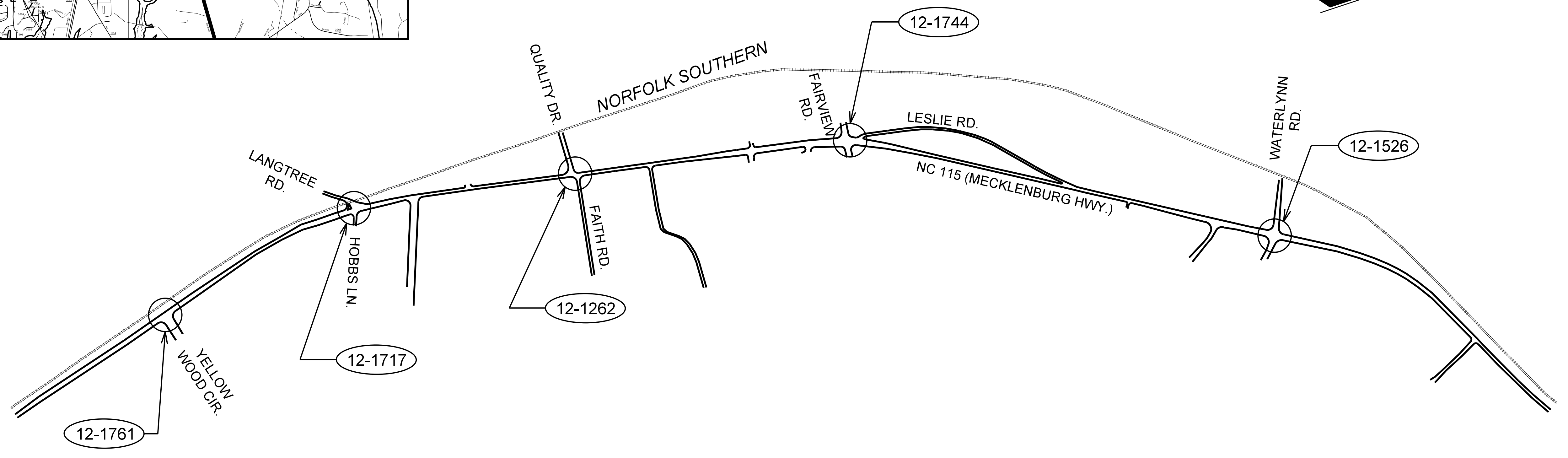
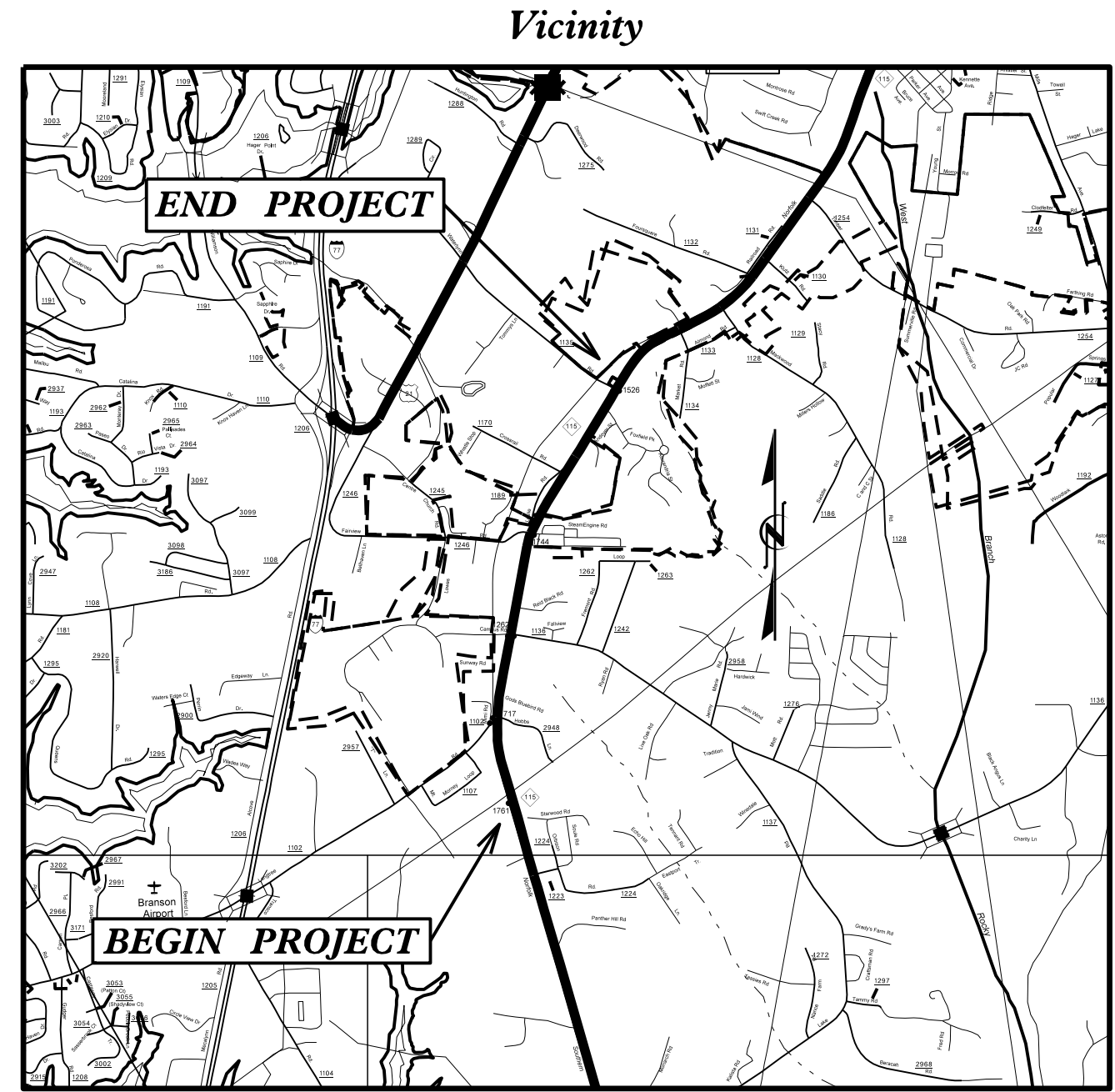
IREDELL COUNTY

LOCATION: NC 115 (MECKLENBURG HIGHWAY)
FROM YELLOW WOOD CIRCLE TO
SR 1135 (WATERLYNN ROAD)

TYPE OF WORK: SIGNALS AND FIBER OPTIC COMMUNICATIONS

Project: U-5963

Contract: C204095



Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.

Sheet #	Reference #	Location/Description
Sig. 1.0	N/A	Title Sheet
Sig. 2.0 - 2.3	12-1761	NC 115 (Mecklenburg Highway) at Yellow Wood Circle
Sig. 3.0 - 3.3	12-1717	NC 115 (Mecklenburg Highway) at SR 1102 (Langtree Road) / SR 2948 (Hobbs Lane)
Sig. 4.0 - 4.2	12-1262	NC 115 (Mecklenburg Highway) at Quality Dr. / SR 1136 (Faith Road)
Sig. 5.0 - 5.2	12-1744	NC 115 (Mecklenburg Highway) at SR 1246 (Fairview Road) / Steam Engine Drive
Sig. 6.0 - 6.1	12-1526	NC 115 (Mecklenburg Highway) at SR 1135 (Waterlynn Road)
Sig. 7.0	N/A	Revised Standard Drawings
SCP. 1 - 10	NA	Cable Routing Plans

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

Tim Williams, PE - Western Region Signals Engineer
Keith Mims, PE - Signal Equipment Design Engineer
Neil Avery - Intelligent Transportation Systems Engineer

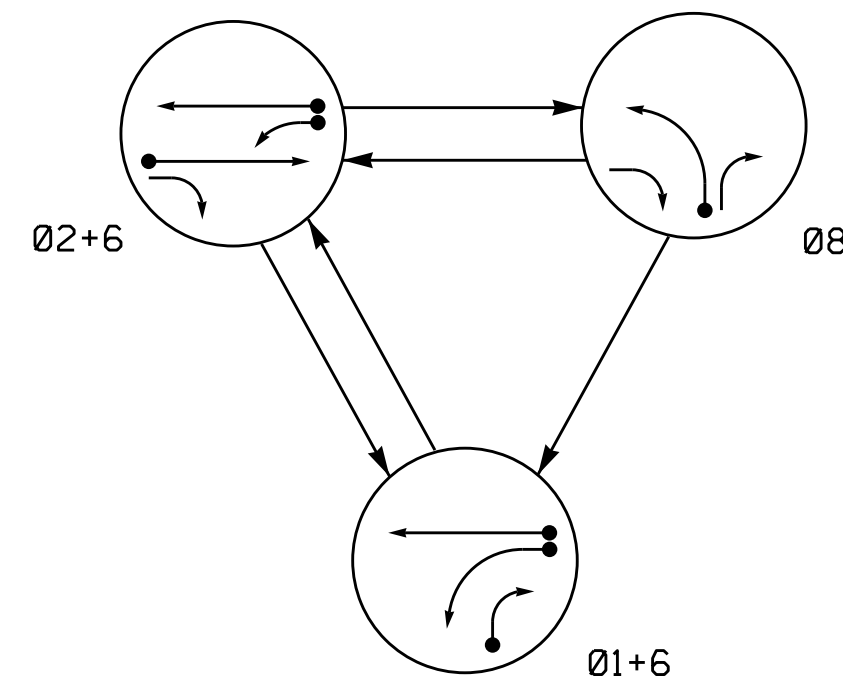
LETTING DATE: JUNE 19, 2018

Prepared in the Office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION

750 N. Greenfield Parkway, Garner, NC 27529

E:\MAY_2018_12355_Signals\Signal Design Section\Western Region\Div-12\U-5963 - Mooresville CLS\U-5963 cover sheet.dgn

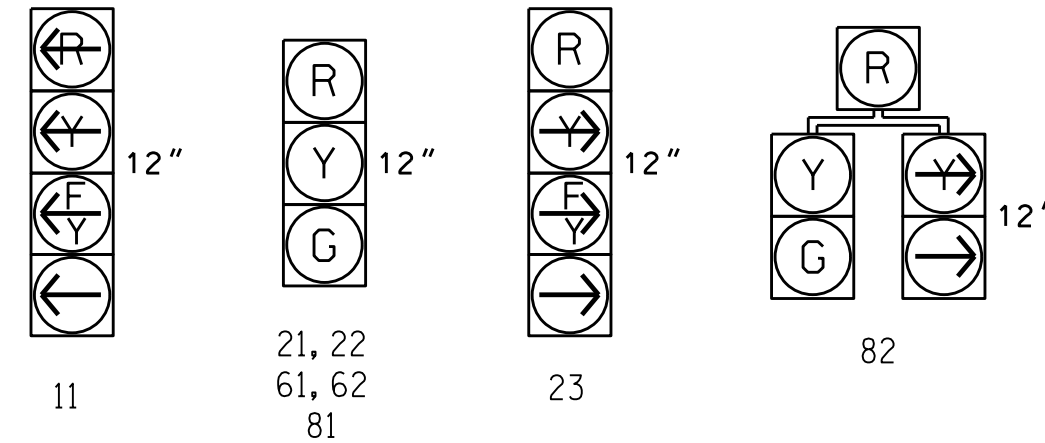
PHASING DIAGRAM



SIGNAL FACE	PHASE			
	01+6	02+6	08	FLASH
11	-	F	R	-
21, 22	R	G	R	Y
23	R	F	-	-
61, 62	G	G	R	Y
81	R	R	G	R
82	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



PHASING DIAGRAM DETECTION LEGEND

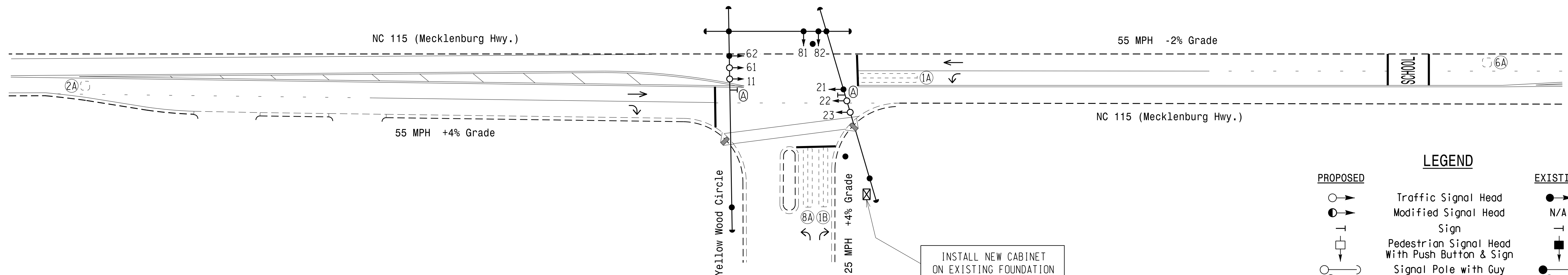
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Y	Y	-	-	15	-	Y
					6	Y	Y	Y	-	3	-	Y
1B	6X40	0	2-4-2	-	1	Y	Y	-	-	15	-	Y
2A	6X6	420	6	-	2	Y	Y	-	-	-	-	Y
6A	6X6	420	6	-	6	Y	Y	-	-	-	-	Y
8A	6X40	0	2-4-2	-	8	Y	Y	-	-	-	-	Y

3 Phase Fully Actuated NC 115 (Mecklenburg Hwy.) CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Pavement markings are existing.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Closed loop system data: Controller Asset #1761.



FEATURE	PHASE			
	1	2	6	8
Min Green 1 *	7	14	14	7
Extension 1 *	2.0	6.0	6.0	2.0
Max Green 1 *	50	100	100	30
Yellow Clearance	3.0	5.4	5.4	3.0
Red Clearance	2.3	1.1	1.1	2.4
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	2.5	2.5	-
Max Variable Initial *	-	46	46	-
Time Before Reduction *	-	15	15	-
Time To Reduce *	-	30	30	-
Minimum Gap	-	3.4	3.4	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

PROPOSED	LEGEND	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	---
---	Right of Way	---
→	Directional Arrow	→
(A)	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	(A)

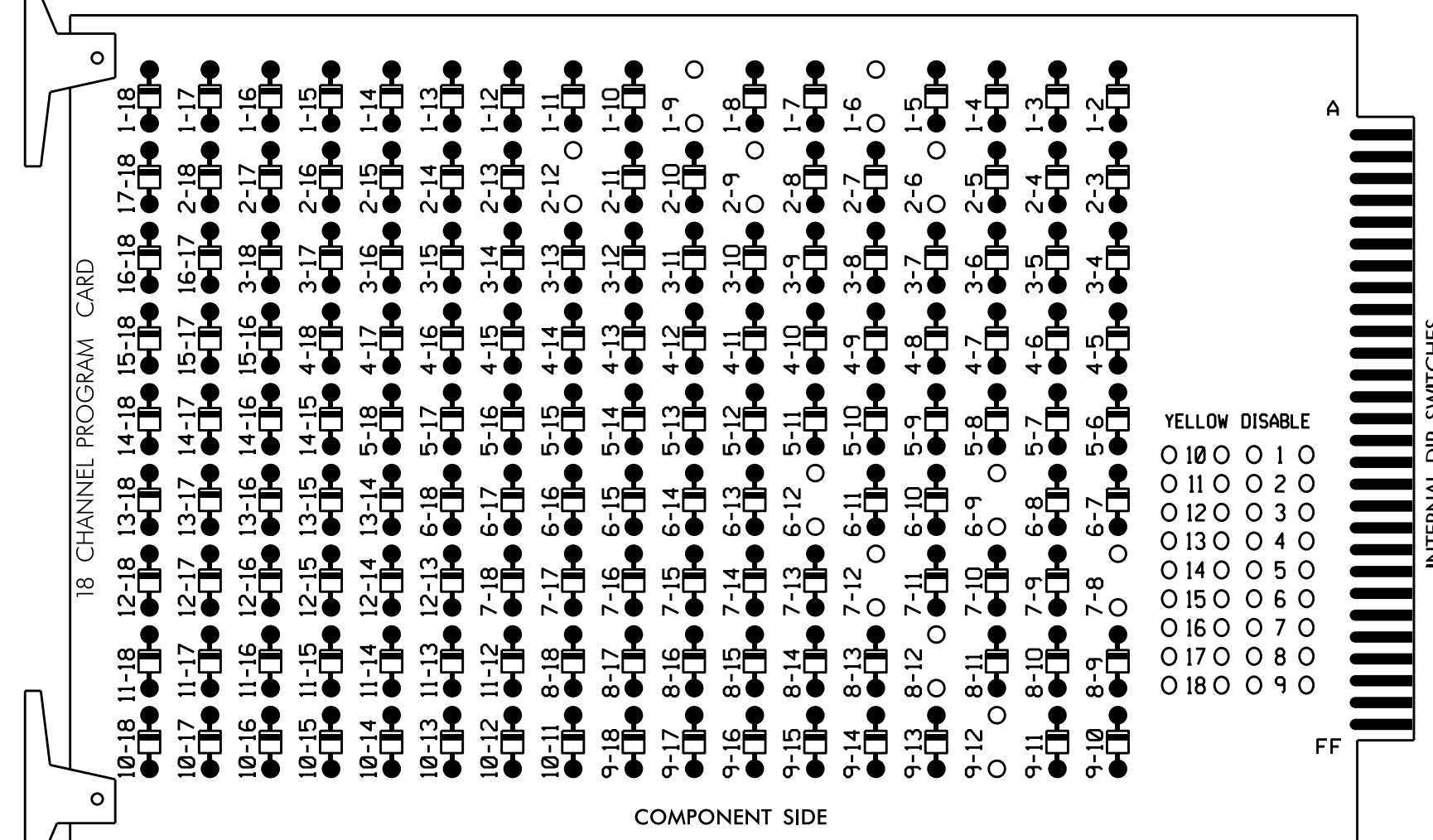
Signal Upgrade

	<p>NC 115 (Mecklenburg Hwy.) at Yellow Wood Circle</p> <p>Division 12 Iredell County Mooresville</p> <p>PLAN DATE: January 2018 REVIEWED BY: R.N. Zinser</p> <p>PREPARED BY: J.A. Lohr REVIEWED BY:</p>		<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p>SEAL</p> <p>SEAL</p> <p>SEAL</p> <p>ENGINEER</p> <p>RICHARD N. ZINSER</p> <p>DocuSigned by: R. N. Zinser 2/27/2018</p> <p>SIG. INVENTORY NO. 12-1761</p>				
	<p>750 N. Greenfield Pkwy, Garner, NC 27529</p> <p>SCALE 1" = 40'</p>	<table border="1"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		REVISIONS	INIT.	DATE	
REVISIONS	INIT.	DATE					

**EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL**

(remove jumpers and set switches as shown)

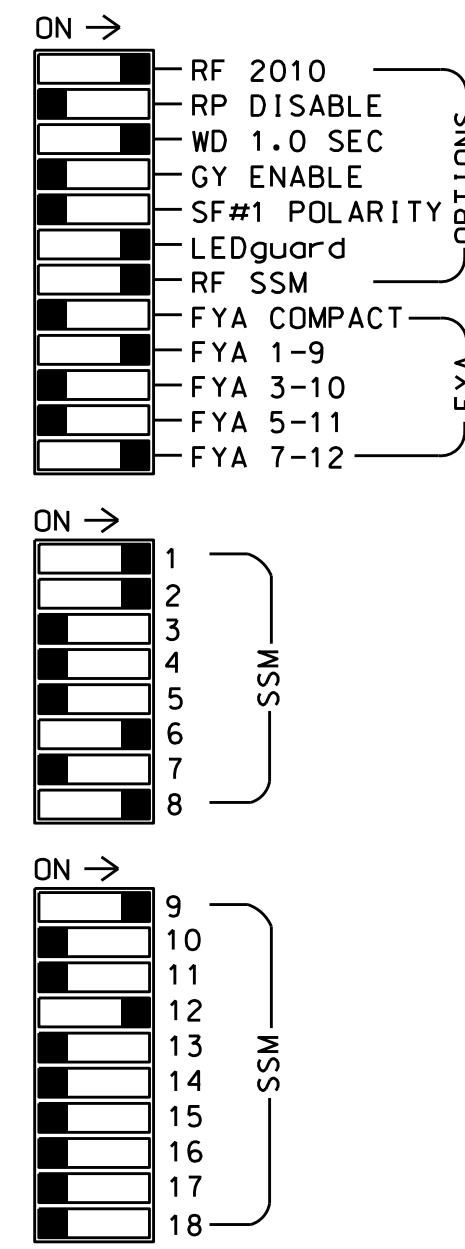
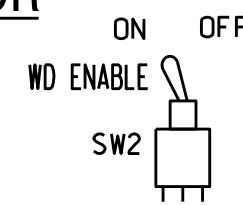
REMOVE DIODE JUMPERS 1-6, 1-9, 2-6, 2-9, 2-12, 6-9, 6-12, 7-8, 7-12, 8-12 and 9-12.



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller.



■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Startup In Green.
5. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
6. The cabinet and controller are part of the NC 115 (Mecklenburg Hwy.) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S8,S10,S11,AUX S1,AUX S5
 PHASES USED.....1,2,6,8
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....2+8
 OVERLAP "E".....NOT USED
 OVERLAP "F".....NOT USED
 OVERLAP "G".....8

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	PED	3	4	PED	5	6	PED	OLG	8	PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	82	21,22	NU	NU	NU	NU	61,62	NU	23★	81,82	NU	11★	NU	NU	NU	23★	NU
RED	*	128						134			107							A101
YELLOW		129						135	*	108								
GREEN		130						136		109								
RED ARROW													A121					
YELLOW ARROW	126												A122					A102
FLASHING YELLOW ARROW													A123					A103
GREEN ARROW	127	127								124								

NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 1	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	FS
L	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7A	DC ISOLATOR
U	∅ 6	∅ 6A	∅ 8	∅ 8A	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17	∅ 18	DC ISOLATOR
L	NOT USED	2A	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED

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

FS = FLASH SENSE
 ST = STOP TIME

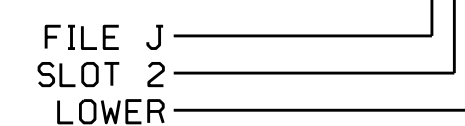
⊗ Wired Input - Do not populate slot with detector cord

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	I1U	56	18	1	1	Y	Y			15
1B	TB2-5,6	J4U	48	10	26	6	Y	Y	Y		3
2A	TB2-7,8	I2L	43	5	12	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			

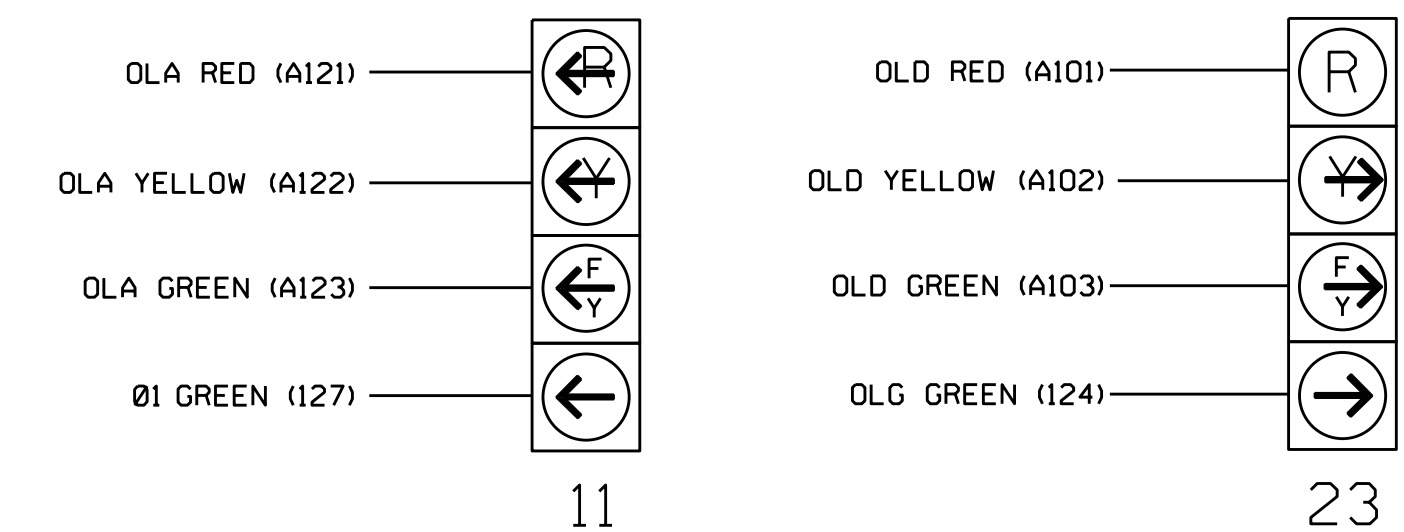
¹Add jumper from I1-W to J4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

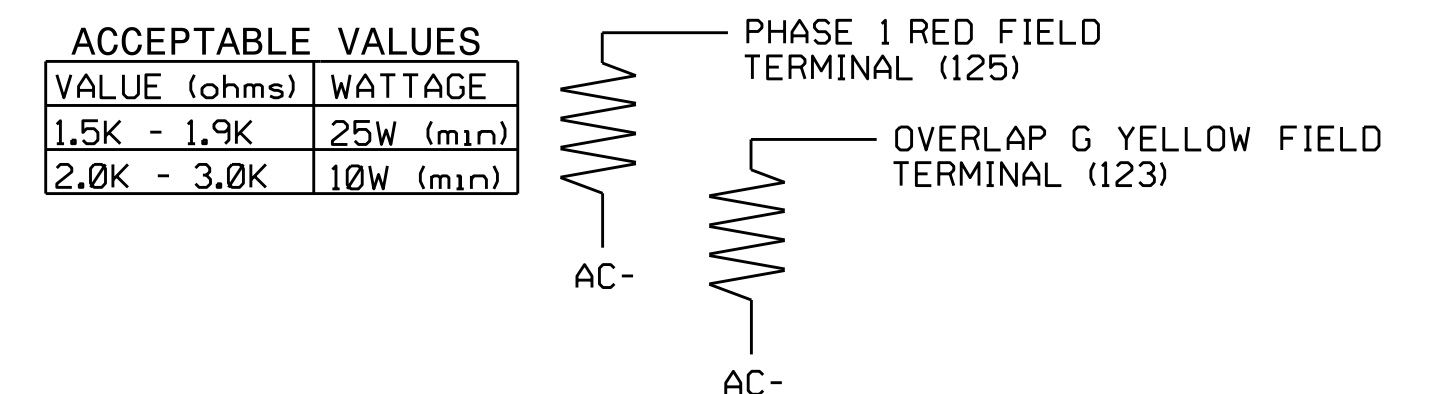


NOTE

The sequence display for signal heads 11 and 23 requires special logic programming. See sheet 2 for programming instructions.

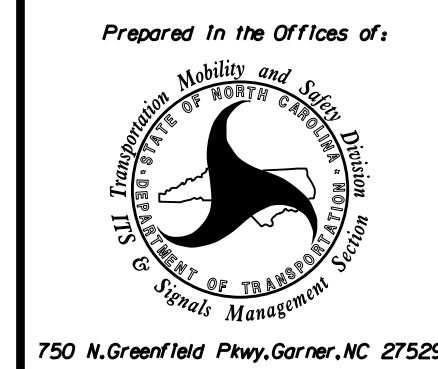
LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)



Electrical Detail - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

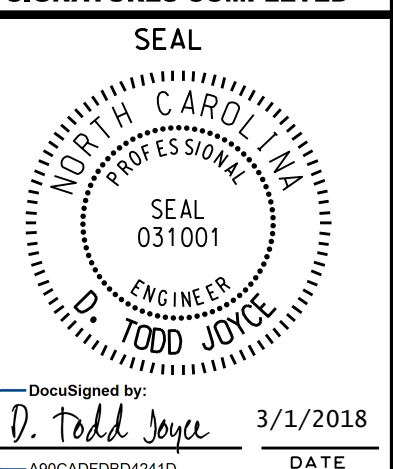
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1761
 DESIGNED: January 2018
 SEALED: 2/27/2018
 REVISED:

NC 115 (Mecklenburg Hwy.)
 at
 Yellow Wood Circle

Division 12 Iredell County Mooresville
 PLAN DATE: February 2018 REVIEWED BY: T. Joyce
 PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

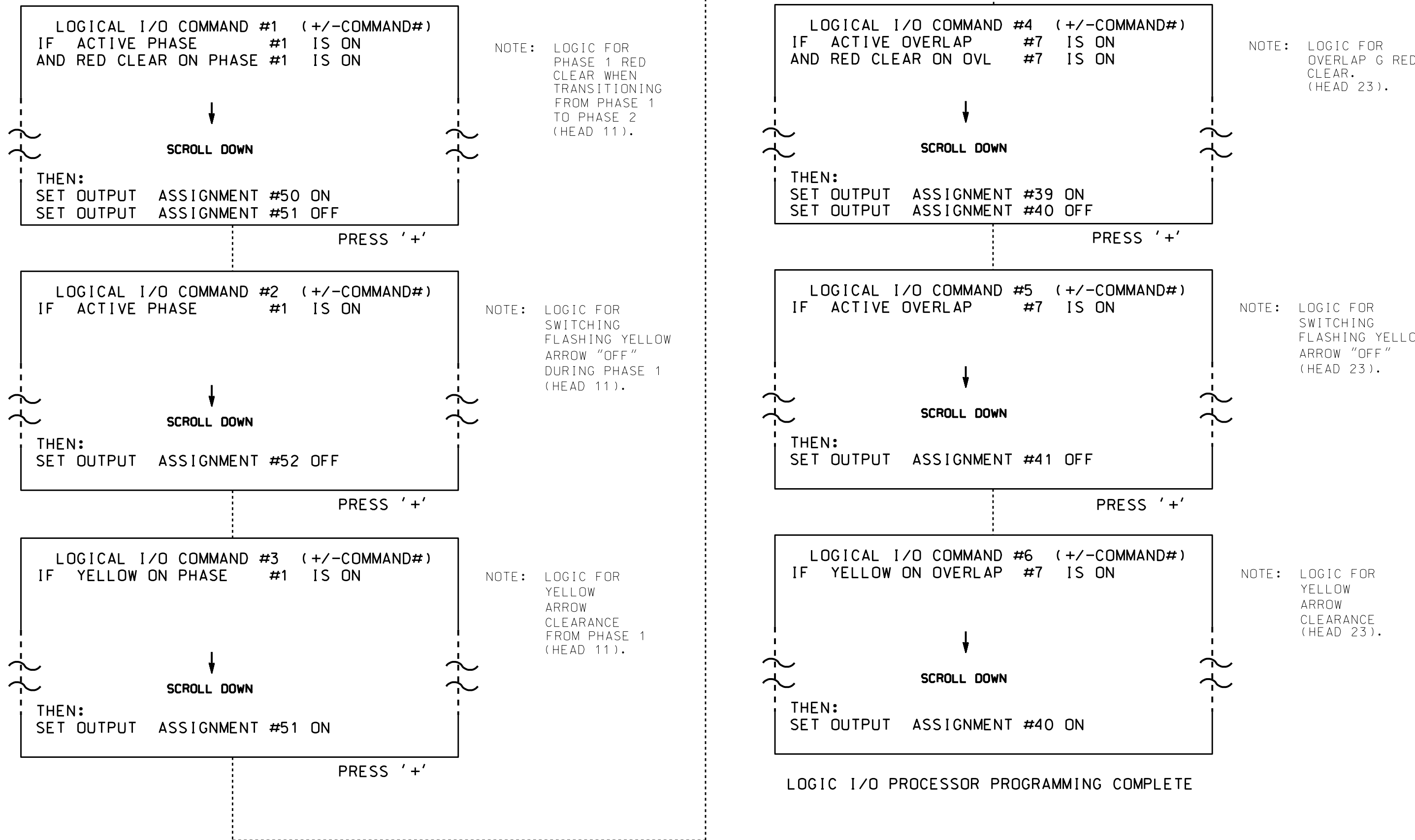


DocuSigned by: T. Todd Joyce 3/1/2018
 4390CAED804240
 DATE
 SIG. INVENTORY NO. 12-1761

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS), SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5 AND 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



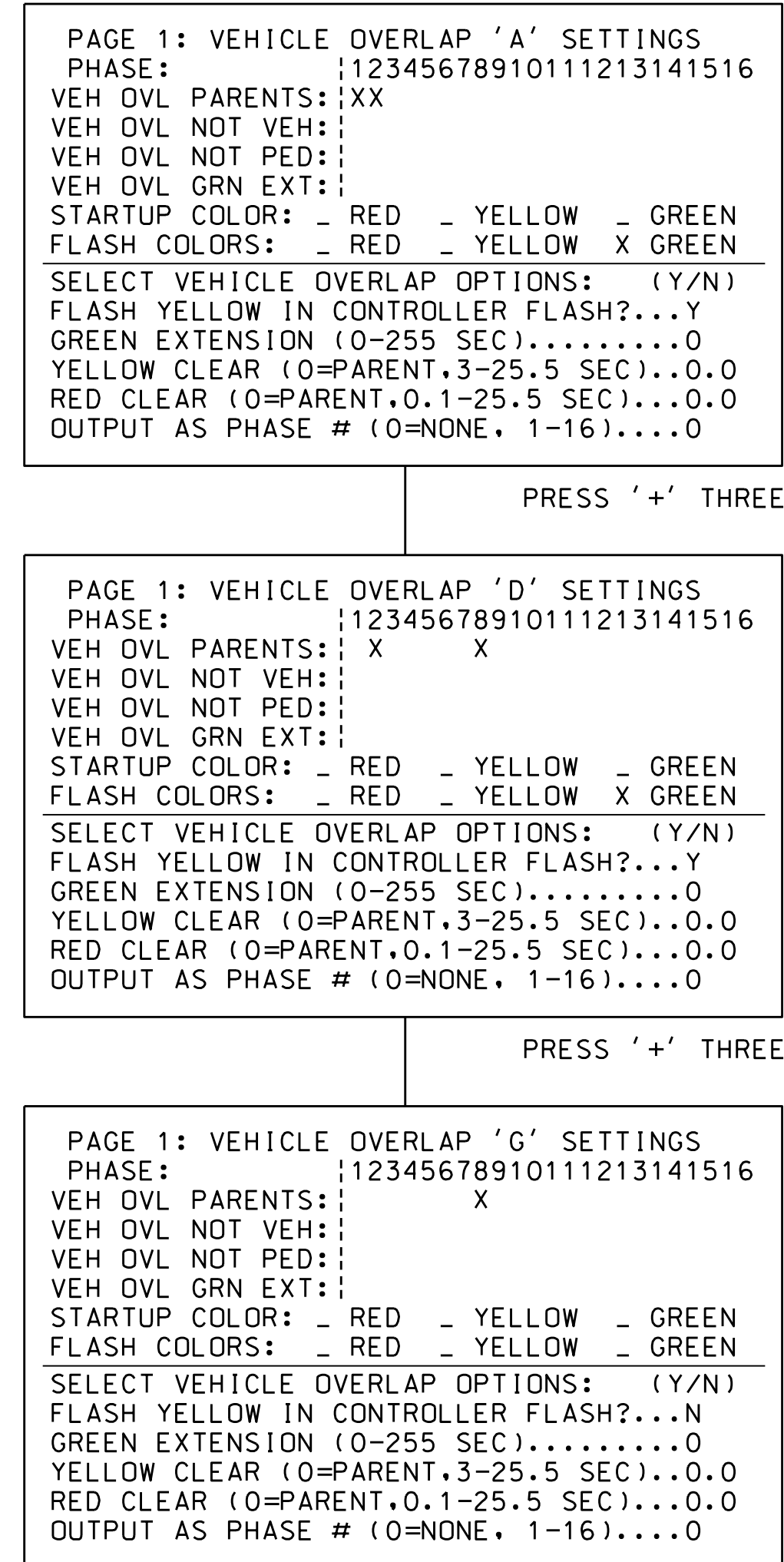
OUTPUT REFERENCE SCHEDULE

OUTPUT 39 = Overlap D Red
 OUTPUT 40 = Overlap D Yellow
 OUTPUT 41 = Overlap D Green
 OUTPUT 50 = Overlap A Red
 OUTPUT 51 = Overlap A Yellow
 OUTPUT 52 = Overlap A Green

OVERLAP PROGRAMMING DETAIL

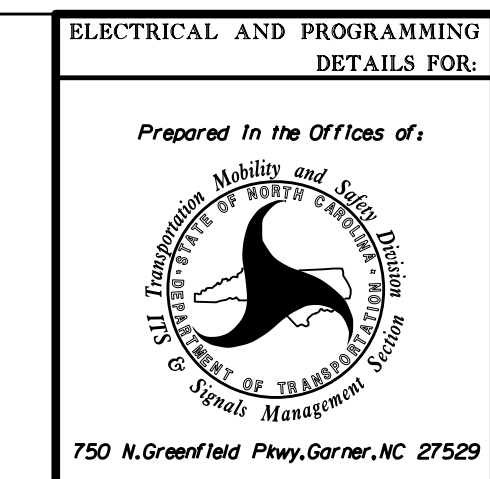
(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).



Electrical Detail - Sheet 2 of 3

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1761
DESIGNED: January 2018
SEALED: 2/27/2018
REVISED:



NC 115 (Mecklenburg Hwy.) at Yellow Wood Circle	
Division 12	Iredell County
Mooreville	
PLAN DATE: February 2018	REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland	REVIEWED BY:
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Seal of Todd Joyce, Professional Engineer, License No. 031001, State of North Carolina.

DocuSign by: *Todd Joyce* 3/1/2018
DATE

SIG. INVENTORY NO. 12-1761

28-FEB-2018 09:40
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 cbsr\ckland

LOADSWITCH "S10" to OVERLAP "G" OUTPUT ASSIGNMENT PROGRAMMING DETAIL *(program controller as shown below)*

- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
- WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 22, AS SHOWN BELOW.
- PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN:24 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....22
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

SCROLL DOWN TO VIEW ALL DATA

```

PAGE:1 C1 PIN:24 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1, P=16)...7
SELECT COLOR (O=RED,1=YEL,2=GRN)...0
    
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```

PAGE:1 C1 PIN:24 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....22
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

VEHICLE OVERLAP G (RED) LOAD SWITCH S10

- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
- WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 24, AS SHOWN BELOW.
- PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN:26 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....24
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

SCROLL DOWN TO VIEW ALL DATA

```

PAGE:1 C1 PIN:26 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1, P=16)...7
SELECT COLOR (O=RED,1=YEL,2=GRN)...2
    
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```

PAGE:1 C1 PIN:26 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....24
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

VEHICLE OVERLAP G (GREEN) LOAD SWITCH S10

- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
- WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 23, AS SHOWN BELOW.
- PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN:25 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....23
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

SCROLL DOWN TO VIEW ALL DATA

```

PAGE:1 C1 PIN:25 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1, P=16)...7
SELECT COLOR (O=RED,1=YEL,2=GRN)...1
    
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```

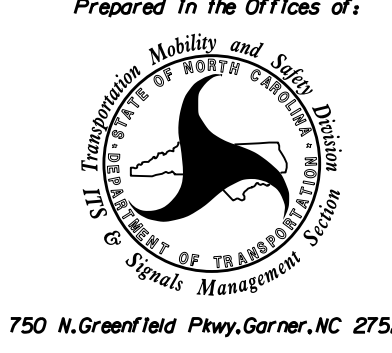
PAGE:1 C1 PIN:25 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....23
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

VEHICLE OVERLAP G (YELLOW) LOAD SWITCH S10

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1761
DESIGNED: January 2018
SEALED: 2/27/2018
REVISED:

Electrical Detail - Sheet 3 of 3

Prepared In the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

NC 115 (Mecklenburg Hwy.)
at
Yellow Wood Circle

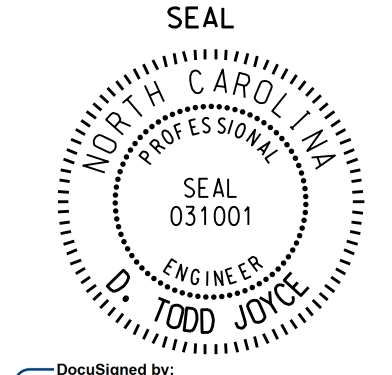
Division 12 Iredell County Mooresville

PLAN DATE: February 2018 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



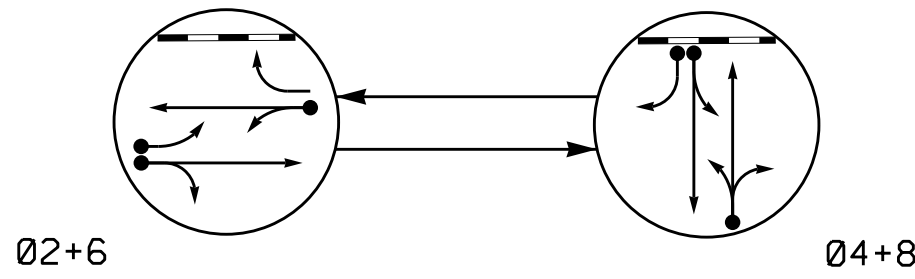
DocuSigned by:
T. Todd Joyce 3/1/2018

SIG. INVENTORY NO. 12-1761

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2 Phase
Fully Actuated
With EVP
NC 115 (Mecklenburg Hwy.) CLS

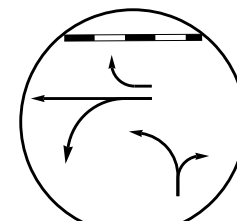
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASE
(Medium Priority)

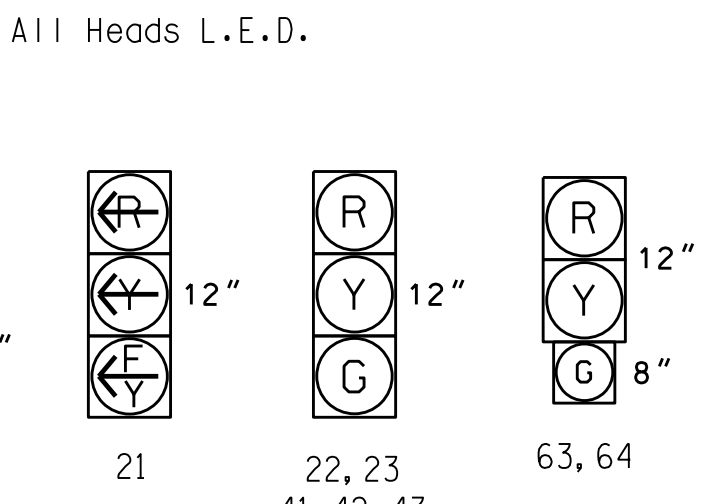


PRE 3
(01+6)

TABLE OF OPERATION

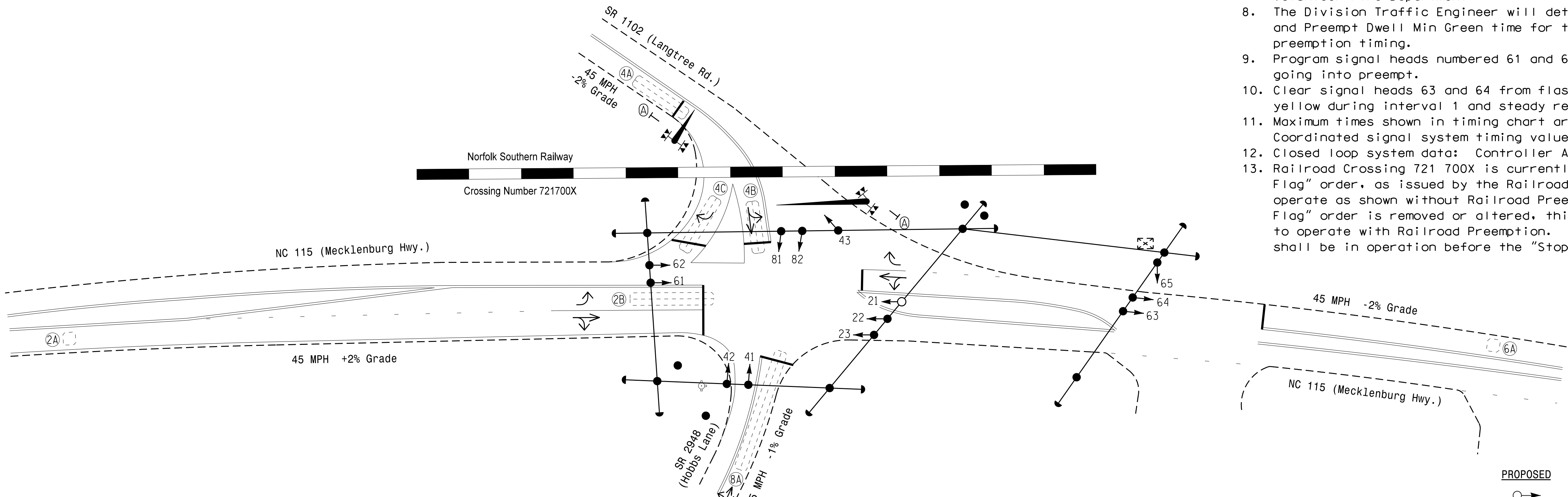
SIGNAL FACE	PHASE			
	02+6	04+8	PRE 3	FLASH
21	F	R	R	Y
22, 23	G	R	R	Y
41, 42, 43	R	G	R	R
61	G	R	G	Y
62	G	R	G	Y
63, 64	F	F	R	Y
65	DRK	DRK	G	R
81, 82	R	G	R	R

SIGNAL FACE I.D.



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.
- Renumber existing signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 22 and 23.
- Set all detector units to presence mode.
- Pavement markings are existing.
- Locate emergency vehicle preemption switch in Mt. Mourne Volunteer Fire Department.
- The Division Traffic Engineer will determine the Delay before Preempt and Preempt Dwell Min Green time for the emergency vehicle preemption timing.
- Program signal heads numbered 61 and 62 to clear to all red before going into preempt.
- Clear signal heads 63 and 64 from flashing 8" yellow to steady 12" yellow during interval 1 and steady red during interval 2.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #1717.
- Railroad Crossing 721 700X is currently protected by a "Stop and Flag" order, as issued by the Railroad. Therefore, this signal may operate as shown without Railroad Preemption. If the "Stop and Flag" order is removed or altered, this signal shall be redesigned to operate with Railroad Preemption. The Railroad Preemption shall be in operation before the "Stop and Flag" order is removed.



OASIS 2070 TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	12	7	12	7
Extension 1 *	6.0	2.0	6.0	2.0
Max Green 1 *	80	30	80	30
Yellow Clearance	4.7	4.7	4.7	4.7
Red Clearance	1.5	1.9	1.5	1.9
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	2.5	-	2.5	-
Max Variable Initial *	34	-	34	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	30	-	30	-
Minimum Gap	3.0	-	3.0	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON

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

OASIS 2070 EV PREEMPT

FUNCTION	PRE 3
Interval 1 - Dwell Green	255
Interval 1 - Dwell Yellow	4.7
Interval 1 - Dwell Red	2.1
Interval 5 - Exit Green	1
Interval 5 - Yellow	0.0
Interval 5 - Red	0.0
Exit Phase(s)	-
Priority	MED
Delay Time	0.0
Min Green Before Pre	1
Ped Clear Before Pre	0
Yellow Clear Before Pre	0.0*
Red Clear Before Pre	0.0*
Dwell Min Time	**
Enable Backup Protection	Y
Ped Clear Through Yellow	N
Omit Overlaps	-
Preempt Extend	-

* Time defaults to time used for phase during normal operation
** See note 8

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	LOOP	NEW CARD	
2A	6X6	5	300	-	2	Y	Y	-	-	-	-	-
2B	6X40	2-4-2	+5	-	2	Y	Y	Y	-	3	-	-
4A	6X30	2-4-2	+5	-	4	Y	Y	-	1.0	-	-	-
4B	6X25	2-4-2	+5	-	4	Y	Y	-	-	3	-	-
4C	6X30	2-4-2	+5	-	4	Y	Y	-	-	15	-	-
6A	6X6	5	300	-	6	Y	Y	-	-	-	-	-
8A	6X60	2-4-2	+5	-	8	Y	Y	-	-	5	-	-

LEGEND

PROPOSED	EXISTING
○ Traffic Signal Head	● Traffic Signal Head
● Modified Signal Head	N/A
□ Sign	□ Sign
□ Pedestrian Signal Head With Push Button & Sign	□ Pedestrian Signal Head
○ Signal Pole with Guy	○ Signal Pole with Guy
○ Signal Pole with Sidewalk Guy	○ Signal Pole with Sidewalk Guy
□ Inductive Loop Detector	□ Inductive Loop Detector
□ Controller & Cabinet	□ Controller & Cabinet
□ Junction Box	□ Junction Box
--- 2-in Underground Conduit	--- 2-in Underground Conduit
N/A Right of Way	--- Right of Way
N/A Directional Arrow	→ Directional Arrow
N/A Railroad Tracks	— Railroad Tracks
N/A Railroad Gate and Flasher	— Railroad Gate and Flasher
Ⓐ "DO NOT STOP ON TRACKS" Sign (R8-8)	Ⓐ "DO NOT STOP ON TRACKS" Sign (R8-8)

Signal Upgrade

Prepared in the Offices of:
TRANSPORTATION MOBILITY AND SAFETY DIVISION
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
SIGNAL DESIGN SECTION

750 N. Greenfield Pkwy, Garner, NC 27529

NC 115 (Mecklenburg Hwy.)
at
SR 1102 (Langtree Rd.) /
SR 2948 (Hobbs Lane)

Division 12 Iredell County Mooreville

PLAN DATE: January 2018 REVIEWED BY: R.N. Zinser

PREPARED BY: J.A. Lohr REVIEWED BY:

REVISIONS: _____ INIT. DATE

SCALE: 0 30
1"=30'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

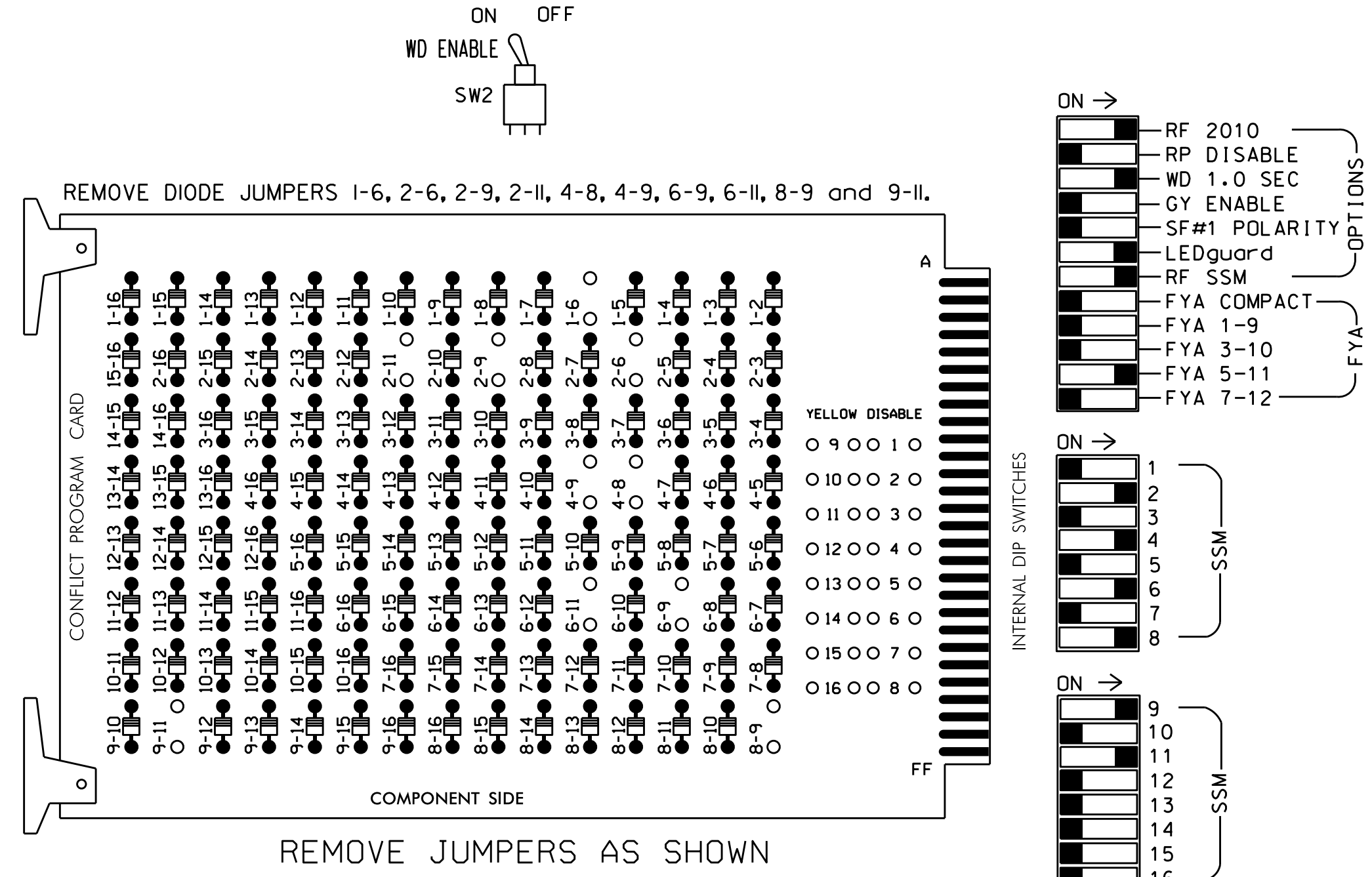
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
RICHARD N. ZINSER
043914

2/27/2018
DATE

SIG. INVENTORY NO. 12-1717

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 - Make sure jumpers SEL2-SEL5 are present on the monitor board.
- = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3, 5,7,10,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the NC 115 (Mecklenburg Hwy.) Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	61	65	22,23	**	NU	41, 42,43	NU	NU	61,62	NU	NU	81,82	NU	63,64	NU	21*	NU	NU	
RED	125	128			101			134			107		A121						
YELLOW	126	129			102			135			108		A122						
GREEN	127	130			103			136			109								
RED ARROW																		A114	
YELLOW ARROW	126																		A115
FLASHING YELLOW ARROW																			A116
GREEN ARROW	127																		

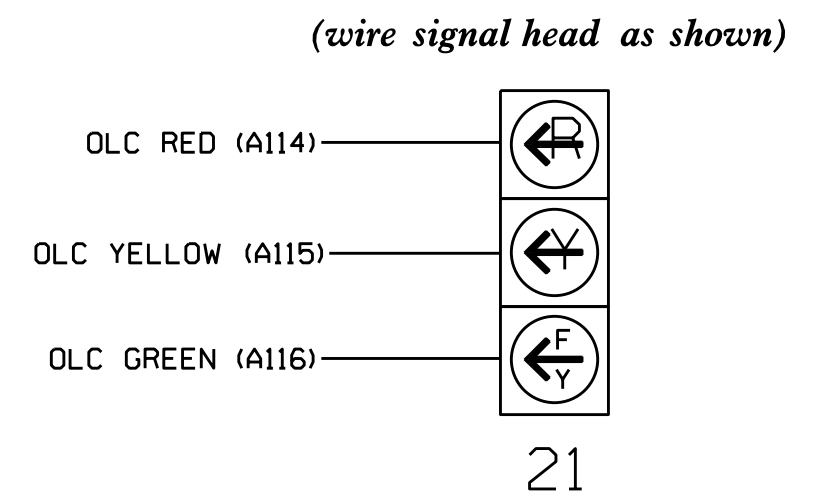
NU = Not Used 8" Flashing Yellow A123
 ** See Lamp Notes (Sheet 2 of 3)
 * See pictorial of head wiring in detail below.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET332 W/ AUX
 SOFTWAREECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
 LOAD SWITCHES USED.....S1,S2,S2P,S4,S6,S8,S9,S12
 PHASES USED.....1*,2,4,6,8
 OVERLAP A.....2+4+6+8
 OVERLAP B.....NOT USED
 OVERLAP C.....6
 OVERLAP D.....NOT USED

* PHASE USED DURING PREEMPTION ONLY
 ^ DENOTES S2P IS USED ONLY FOR FIRE HOUSE PREEMPT PILOT LAMP CONTROL.

FYA SIGNAL WIRING DETAIL



INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 2	2A	∅ 2	∅ 2	∅ 2	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4
L	∅ 2	2B	∅ 2	∅ 2	∅ 2	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4
U	∅ 6	6A	∅ 6	∅ 6	∅ 6	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8
L	NOT USED	6A	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED

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

FS = FLASH SENSE
 ST = STOP TIME
 PRE2 = PREEMPTOR 2 (EV)

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: : X X X X
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-25.5 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
  
```

← NOTICE GREEN FLASH

PRESS '+' TWICE

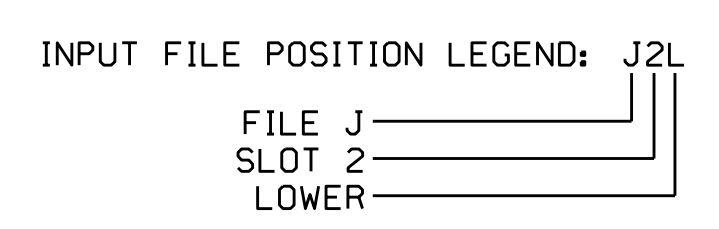
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PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: : X
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-25.5 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
  
```

← NOTICE GREEN FLASH

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	Y		3
4A	TB6-1,2	I7U	65	27	34	4	Y	Y		1.0	
4B	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4C	TB4-11,12	I6L	45	7	14	4	Y	Y			15
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			5



PREEMPT ONLY PHASE OMIT NOTE

(program controller as shown below)

From Main Menu press '2' (Phase Control). Then '1' (Phase Control Functions). Program Phase 1 for 'Omit Phase' and Phases 2, 4, 6 and 8 for 'Startup Calls'. This is to prevent Phase 1 from being served when not in Preempt.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1717
 DESIGNED: January 2018
 SEALED: 2/27/2018
 REVISED:

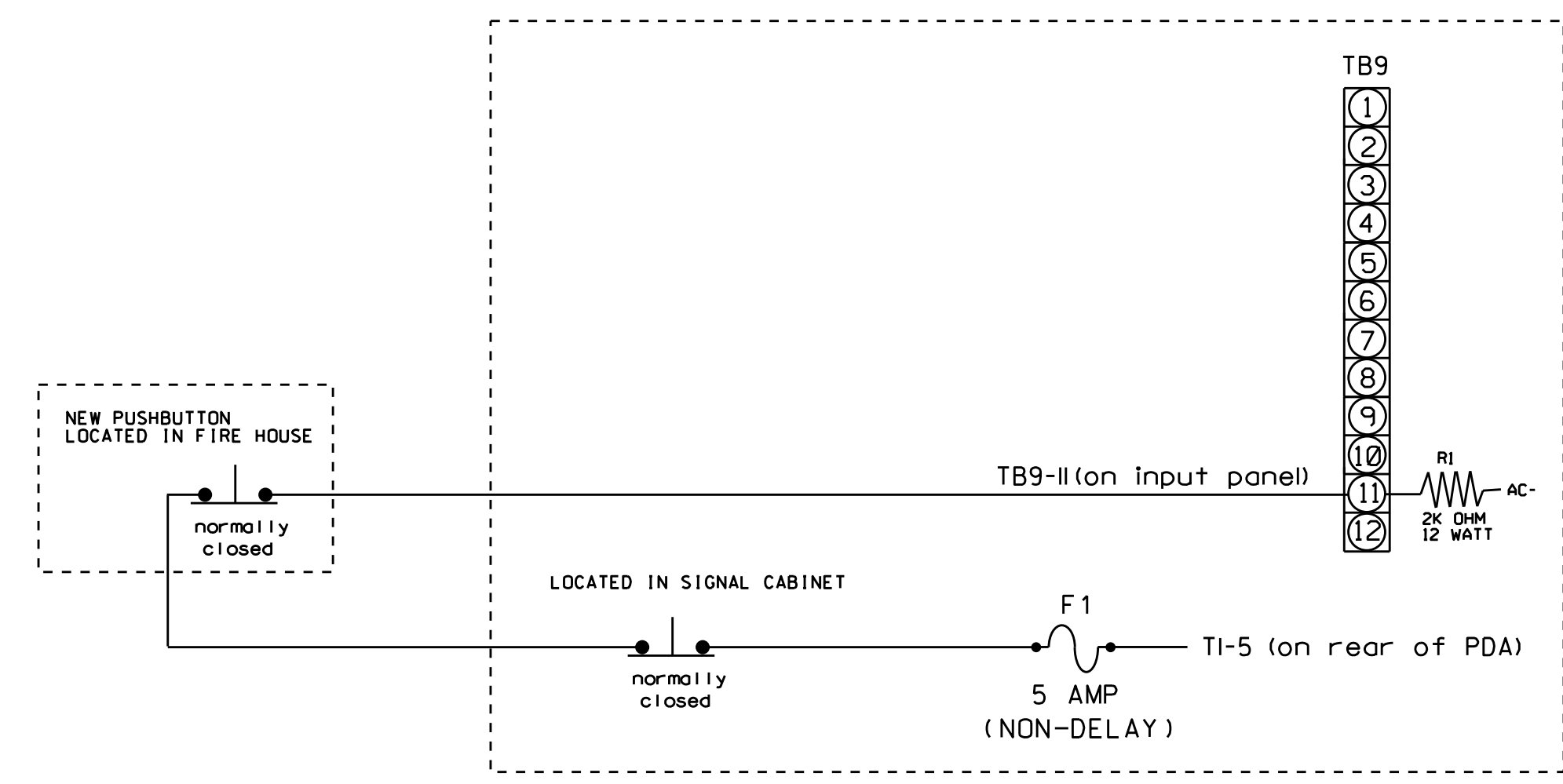
Electrical Detail - Sheet 1 of 3

	<p>NC 115 (Mecklenburg Hwy.) at SR 1102 (Langtree Rd.) / SR 2948 (Hobbs Lane)</p>	<p>SEAL</p>
<p>Prepared In the Offices of:</p>	<p>Division 12 Iredell County Mooresville</p>	<p>DocuSigned by: D. Todd Joyce 3/1/2018</p>
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>PLAN DATE: February 2018 REVIEWED BY: T. Joyce</p> <p>PREPARED BY: C. Strickland REVIEWED BY:</p>	<p>SIG. INVENTORY NO. 12-1717</p>

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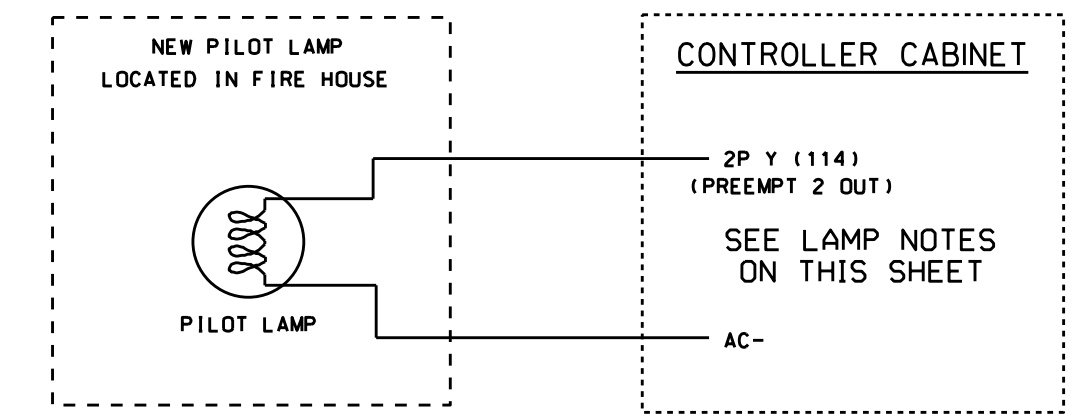
EMERGENCY VEH. PREEMPTION PUSHBUTTON AND INDICATOR LAMP WIRING DETAIL

(wire push-button and lamp as shown below)



IMPORTANT!

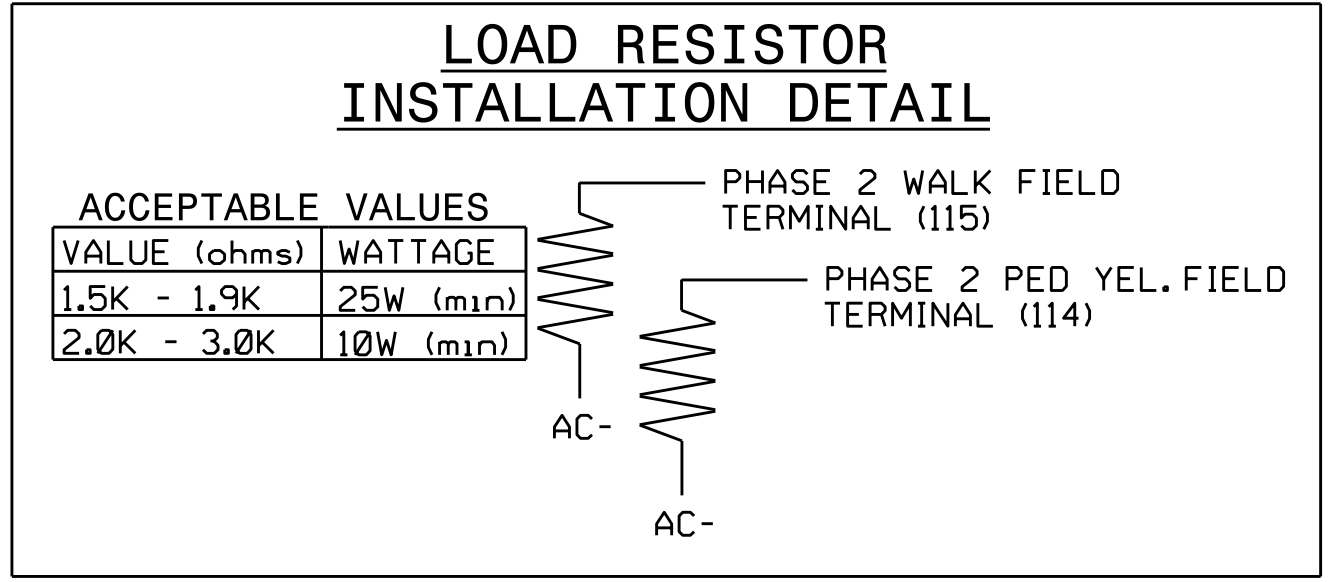
1. MAKE SURE AC ISOLATOR INSERTED IN SLOT J14L IS SET FOR INVERTED INPUT.
2. TERMINAL TB9-12B (ON INPUT PANEL) SHALL BE CONNECTED TO AC NEUTRAL (JUMPER MAY NEED TO BE ADDED).



LAMP NOTES

IN ORDER FOR THE PILOT LAMP IN THE FIRE HOUSE TO FUNCTION, MAKE THE FOLLOWING PROGRAMMING CHANGES TO OUTPUT NO. 33.

1. CHANGE THE FUNCTION OF C1 PIN 35 TO BE AN OUTPUT FOR PREEMPT 2. THIS IS ACCOMPLISHED BY THE FOLLOWING:
 - A) FROM MAIN MENU SELECT 6 (OUTPUTS), THEN SELECT 1 (OUTPUT ASSIGNMENTS).
 - B) SCROLL TO C1 PIN 35, OUTPUT NO. 33. YOU WILL SEE THAT IT IS NOT ENABLED.
 - C) SCROLL DOWN TO PREEMPT AND INPUT 'YES'. YOU WILL THEN BE ASKED FOR A PREEMPT NO. ENTER A '2' HERE.
 - D) THE OUTPUT IS NOW ASSIGNED FOR PRE-2 OUTPUT.
2. IF TERMINAL 114 HAS A CONFLICT MONITOR WIRE CONNECTED, REMOVE, TAPE AND LABEL WIRE.
3. MAKE SURE LOAD RESISTORS ARE IN PLACE AS SHOWN IN LOAD RESISTOR INSTALLATION DETAIL.
4. INSERT LOADSWITCH FOR S2P.



EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS 'A' (PREEMPTION), THEN '1' (STANDARD PREEMPTIONS). PRESS THE "NEXT" KEY TO ADVANCE TO PREEMPT 2.

PREEMPTION #2	INTERVAL/TIMING	SETTINGS (NEXT:1-10)	CLEAR/DWELL PHASES
GRN YEL RED			12345678910111213141516
1	255 4.7 2.1	X X	
2	0 0.0 0.0		
3	0 0.0 0.0		
4	0 0.0 0.0		
5	1 0.0 0.0	X X	

EXIT CALLS	OPTIONS
PRIORITY (Y/N TO SELECT)	.....MED
DELAY TIMER (0-255 SEC)	.....0
MIN GREEN BEFORE PRE (0= DEFAULT)	...1
PED CLEAR BEFORE PRE (0= DEFAULT)	...0
YELLOW CLEAR BEFORE PRE (0= DEFAULT)	...0.0
RED CLEAR BEFORE PRE (0= DEFAULT)	...0.0
DWELL MIN TIMER (0-255 SEC)*
DWELL MAX TIMER (0=OFF,1-255MIN)	...0
DWELL HOLD-OVER TIMER (0-255)	.....0
LATCH CALL?	.....Y
LINK TO NEXT PREEMPT?	.....N
ENABLE BACKUP PROTECTION?	.....Y
HOLD CLEAR 1 PHASES DURING DELAY?	...N
FAST GREEN FLASH DWELL PHASES?	.....N
PED CLEARANCE THROUGH YELLOW?	.....N
INHIBIT OVERLAP GREEN EXTENSION?	...N
SERVICE DURING SOFTWARE FLASH?	.....N
REST IN RED DURING DWELL INTERVAL?	...N
FLASH DWELL INTERVAL?	.....N
ALLOW PEDS IN DWELL INTERVAL?	.....N
RE-TIME DWELL INTERVAL?	.....Y
OVERLAPS:	..... ABCDEFGHIJKLMNOP
DWELL INT FLASH YELLOW	..... X X
OMIT OVERLAPS:	..... X X

* DENOTES TIMING TO BE DETERMINED IN FIELD.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1717
 DESIGNED: January 2018
 SEALED: 2/27/2018
 REVISED:

Electrical Detail - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	NC 115 (Mecklenburg Hwy.) at SR 1102 (Langtree Rd.)/ SR 2948 (Hobbs Lane)	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL SEAL 031001 ENGINEER TODD JOYCE
	Division 12 Iredell County Mooresville PLAN DATE: February 2018 REVIEWED BY: T. Joyce PREPARED BY: C. Strickland REVIEWED BY:	

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LOGICAL I/O PROCESSOR PROGRAMMING DETAIL

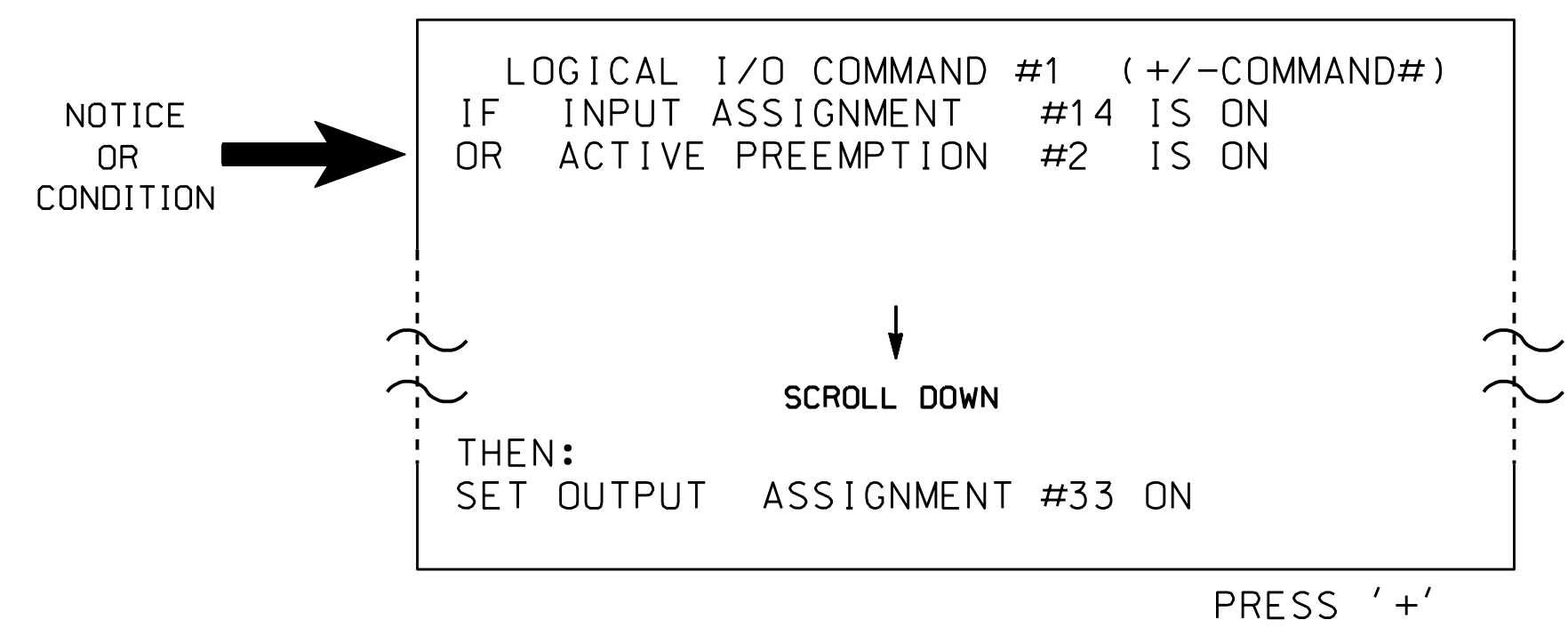
(program controller as shown below)

NOTE

WHEN PREEMPT DELAY TIMER IS IN USE STEP 1 SHOWN BELOW IS NECESSARY TO ENSURE PILOT LAMP IN FIRE HOUSE WILL ACTIVATE IMMEDIATELY AFTER PUSH BUTTON IS DEPRESSED :

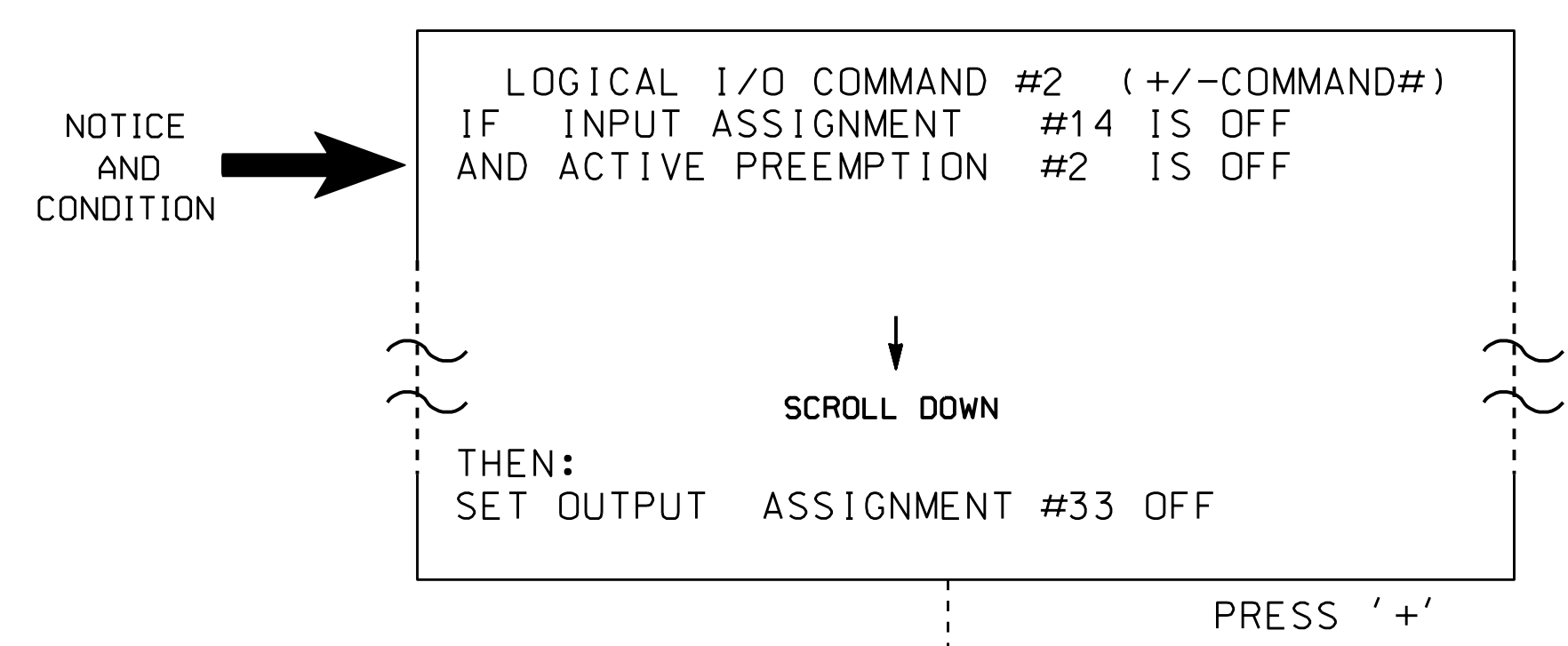
STEP 1

FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

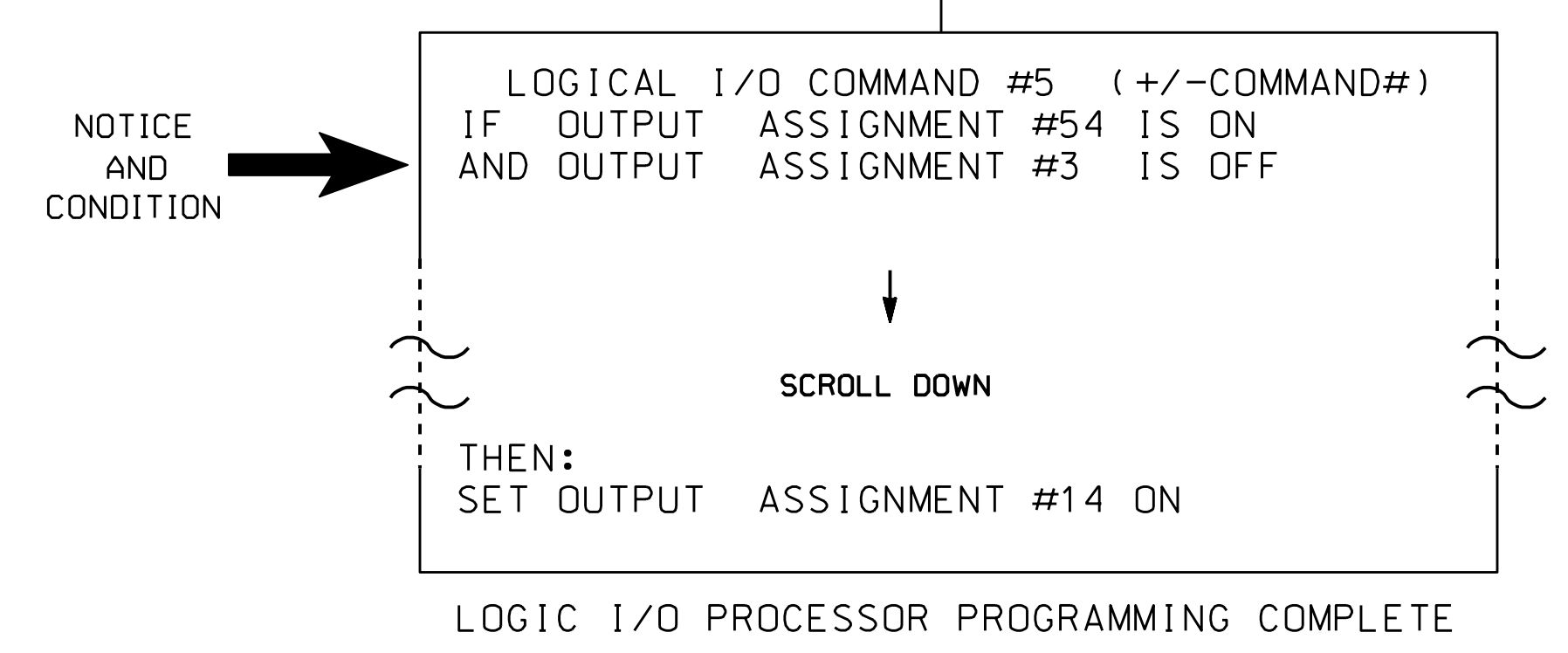
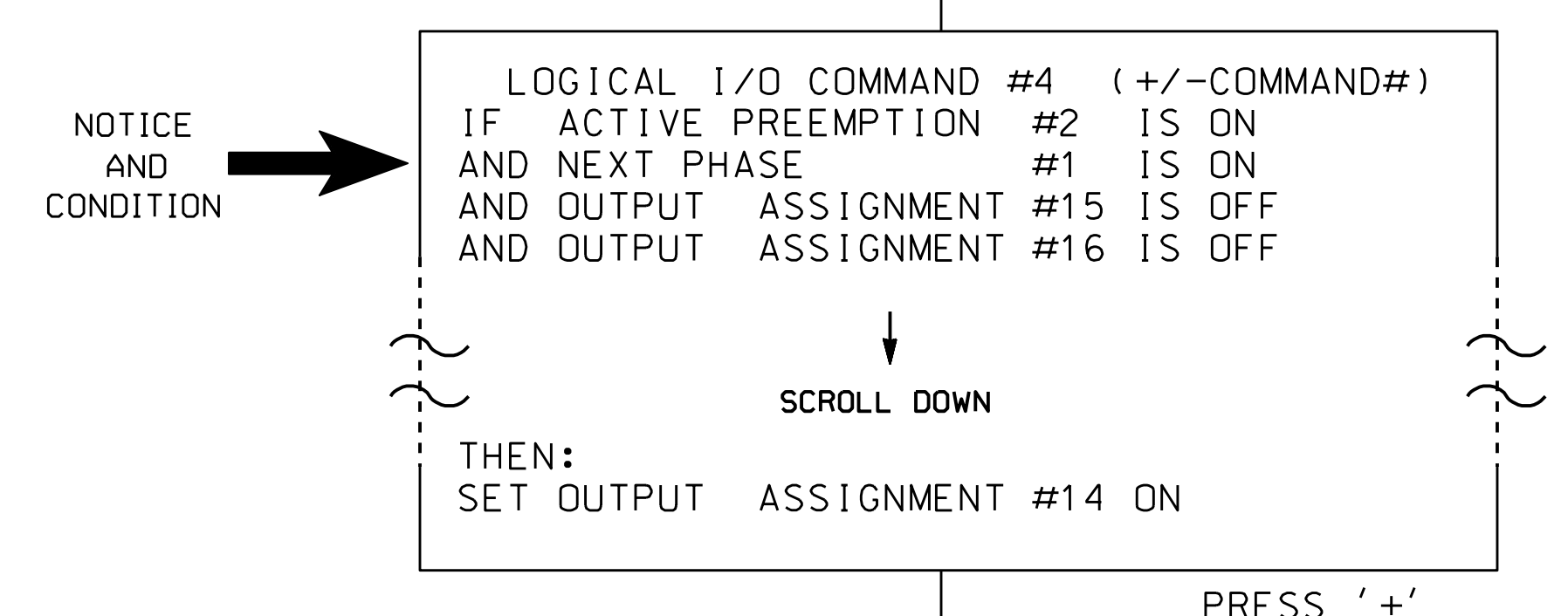
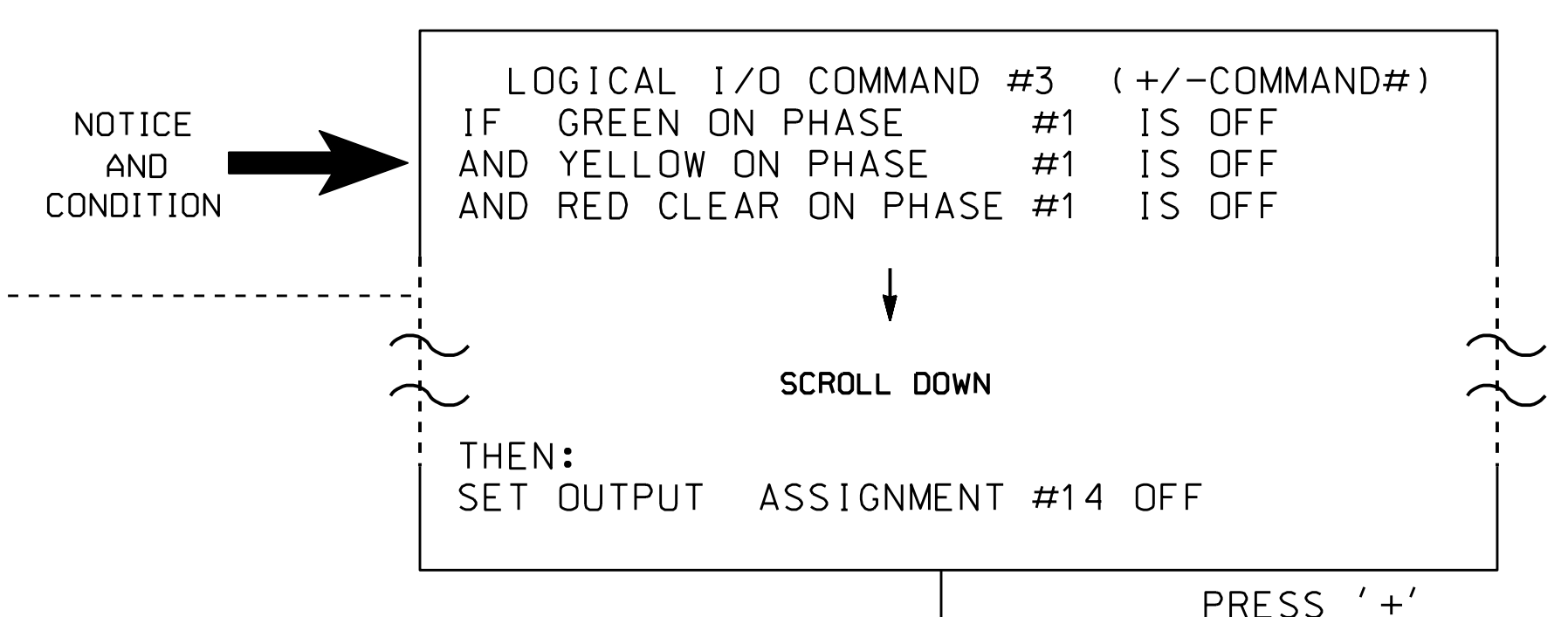


STEP 2

IN ORDER FOR PILOT LAMP IN FIRE HOUSE TO DEACTIVATE IMMEDIATELY AFTER ENDING PREEMPTION, PROGRAM THE FOLLOWING:



PROGRAMMING COMMANDS 3, 4 AND 5 ARE NECESSARY FOR SIGNAL HEAD 65 TO OPERATE AS SHOWN ON THE SIGNAL DESIGN PLANS.



STEP 3

FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE LOGICAL PROCESSOR (ACT LOGIC 1-16) BY FLAGGING #1, #2, #3, #4 AND #5.

END OF PROGRAM.

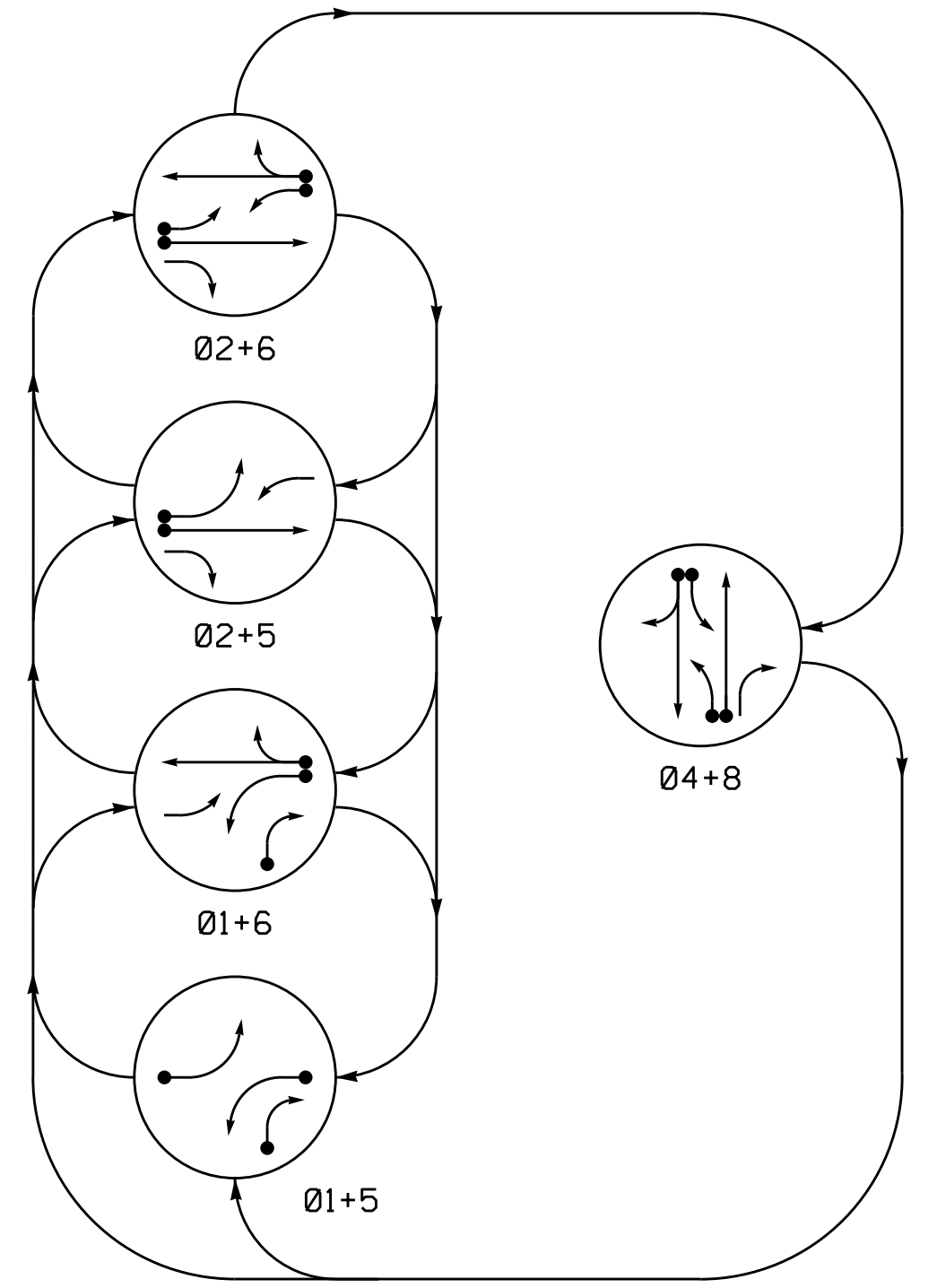
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THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1717
 DESIGNED: January 2018
 SEALED: 2/27/2018
 REVISED:

Electrical Detail - Sheet 3 of 3		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031001 TODD JOYCE
ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	NC 115 (Mecklenburg Hwy.) at SR 1102 (Langtree Rd.)/ SR 2948 (Hobbs Lane)	
Division 12 PLAN DATE: February 2018 PREPARED BY: C. Strickland	Iredell County Moore'sville REVIEWED BY: T. Joyce REVIEWED BY:	DocuSigned by: D. Todd Joyce 3/1/2018 DATE
REVISIONS INIT. DATE		SIG. INVENTORY NO. 12-1717

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PHASING DIAGRAM



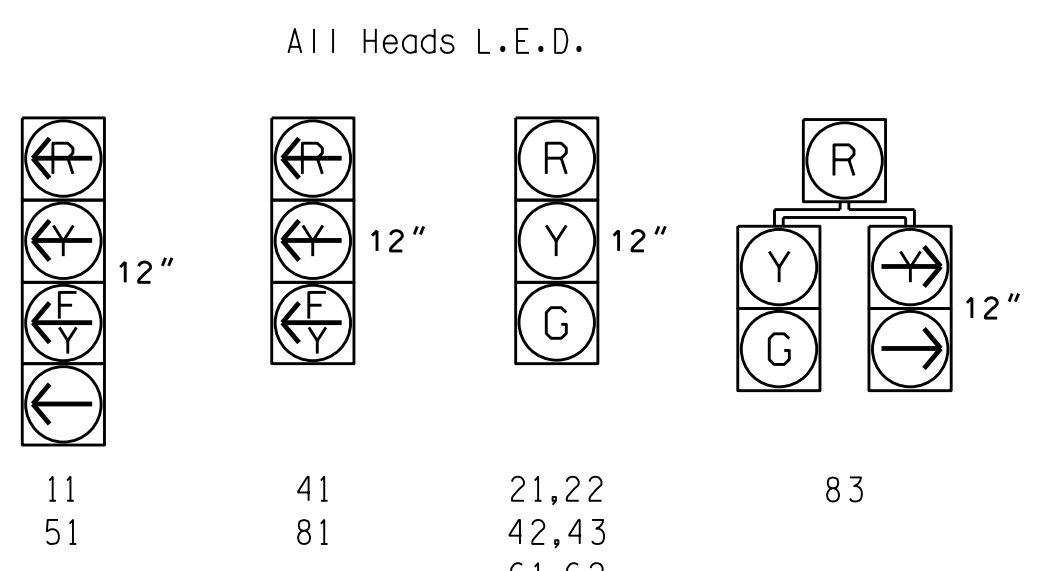
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE					
	01+5	02+5	02+6	04+8	Flash	Flash
11	—	—	F	F	R	Y
21,22	R	R	G	G	R	Y
41	—	—	—	—	F	—
42,43	R	R	R	G	R	—
51	—	—	F	F	R	Y
61,62	R	G	R	G	R	Y
81	—	—	—	—	F	—
82	R	R	R	G	R	—
83	R	R	R	G	R	—

SIGNAL FACE I.D.



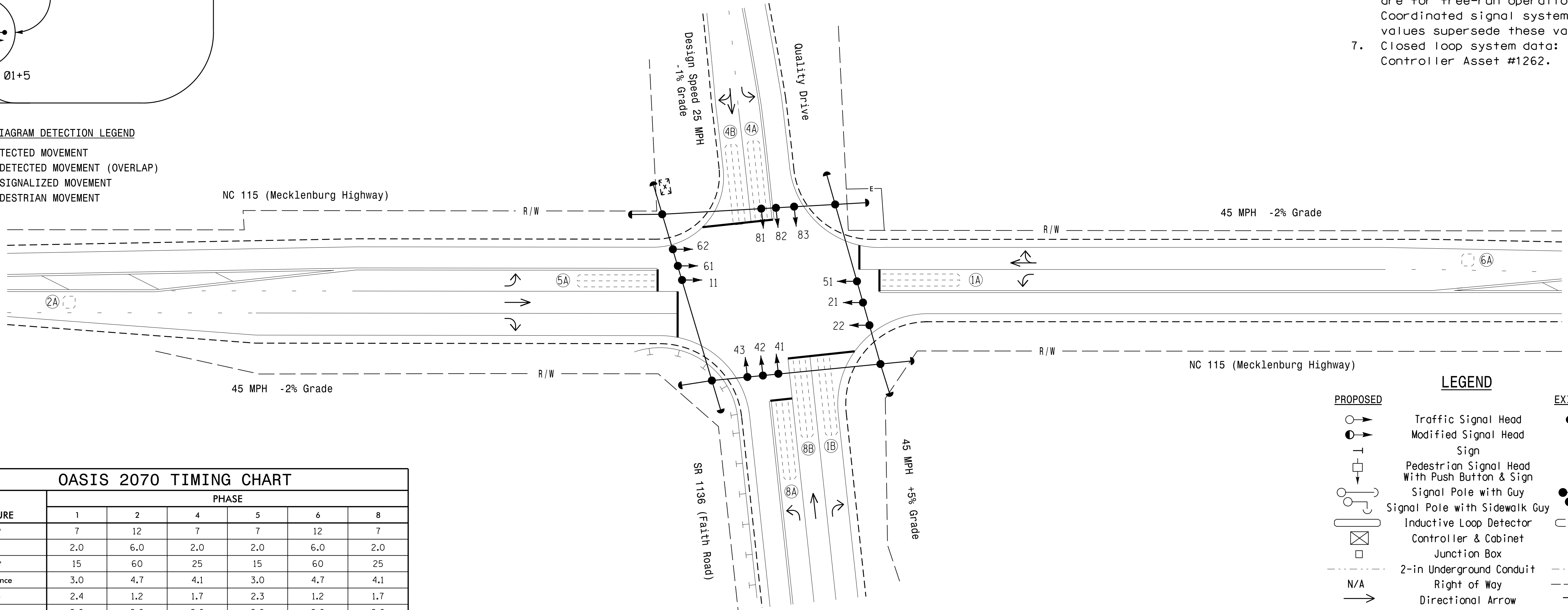
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY		
1A	6X40	0	2-4-2	-	1	Y	Y	-	15	-
1B	6X40	0	2-4-2	-	6	Y	Y	-	3	-
2A	6X6	300	5	-	2	Y	Y	-	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	3	-
4B	6X40	0	2-4-2	-	4	Y	Y	-	10	-
5A	6X40	0	2-4-2	-	5	Y	Y	-	15	-
6A	6X6	300	5	-	6	Y	Y	-	-	-
8A	6X40	0	2-4-2	-	8	Y	Y	-	3	-
8B	6X40	0	2-4-2	-	8	Y	Y	-	-	-

5 Phase Fully Actuated NC 115 (Mecklenburg Hwy.) CLS

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.
- Phase 1 and/or phase 5 may be lagged.
- Set all detector units to presence mode.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #1262.



OASIS 2070 TIMING CHART

FEATURE	PHASE					
	1	2	4	5	6	8
Min Green 1 *	7	12	7	7	12	7
Extension 1 *	2.0	6.0	2.0	2.0	6.0	2.0
Max Green 1 *	15	60	25	15	60	25
Yellow Clearance	3.0	4.7	4.1	3.0	4.7	4.1
Red Clearance	2.4	1.2	1.7	2.3	1.2	1.7
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	2.5	-	-	2.5	-
Max Variable Initial *	-	34	-	-	34	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	30	-	-	30	-
Minimum Gap	-	3.0	-	-	3.0	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	-	-	YELLOW	-
Dual Entry	-	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

LEGEND

- | | | | |
|-----|---|-----|---|
| ○ | PROPOSED Traffic Signal Head | ● | EXISTING Traffic Signal Head |
| ○ | PROPOSED Modified Signal Head | ○ | EXISTING Modified Signal Head |
| ○ | PROPOSED Sign | ○ | EXISTING Sign |
| ○ | PROPOSED Pedestrian Signal Head With Push Button & Sign | ○ | EXISTING Pedestrian Signal Head With Push Button & Sign |
| ○ | 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 |
| E | PROPOSED Easement | E | EXISTING Easement |

Signal Upgrade

750 N. Greenfield Pkwy, Garner, NC 27529

NC 115 (Mecklenburg Highway) at Quality Drive/ SR 1136 (Faith Road)

Division 12 Iredell County Mooresville

PLAN DATE: January 2018 REVIEWED BY: R.N. Zinser

PREPARED BY: J.A. Lohr REVIEWED BY:

SEAL

2/27/2018

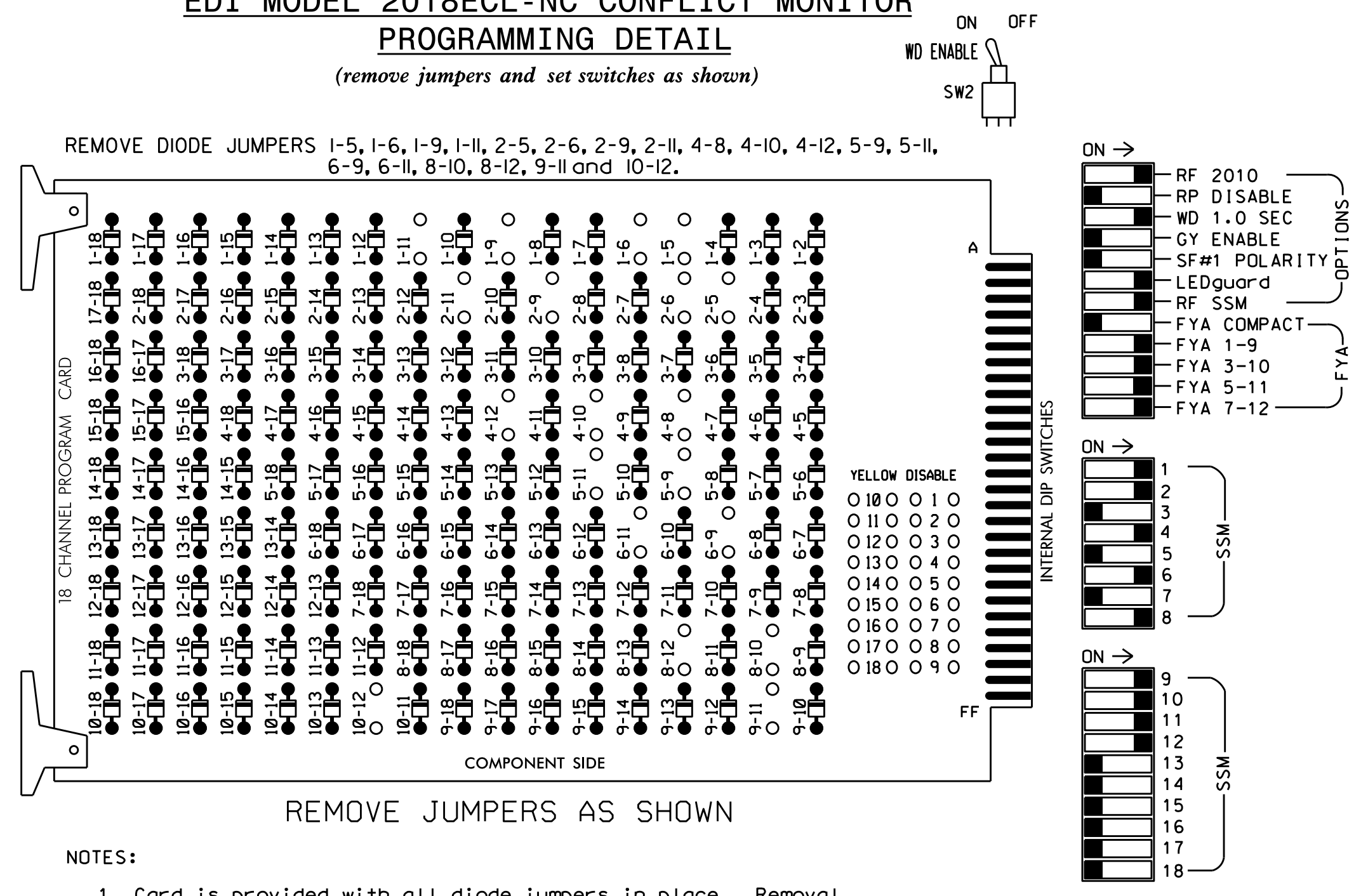
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SIG. INVENTORY NO. 12-1262

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 8-10, 8-12, 9-11 and 10-12.

REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlaps 1 and 2 as Wag Overlaps.

7. The cabinet and controller are part of the NC 115 (Mecklenburg Hwy.) Closed Loop System.

EQUIPMENT INFORMATION

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

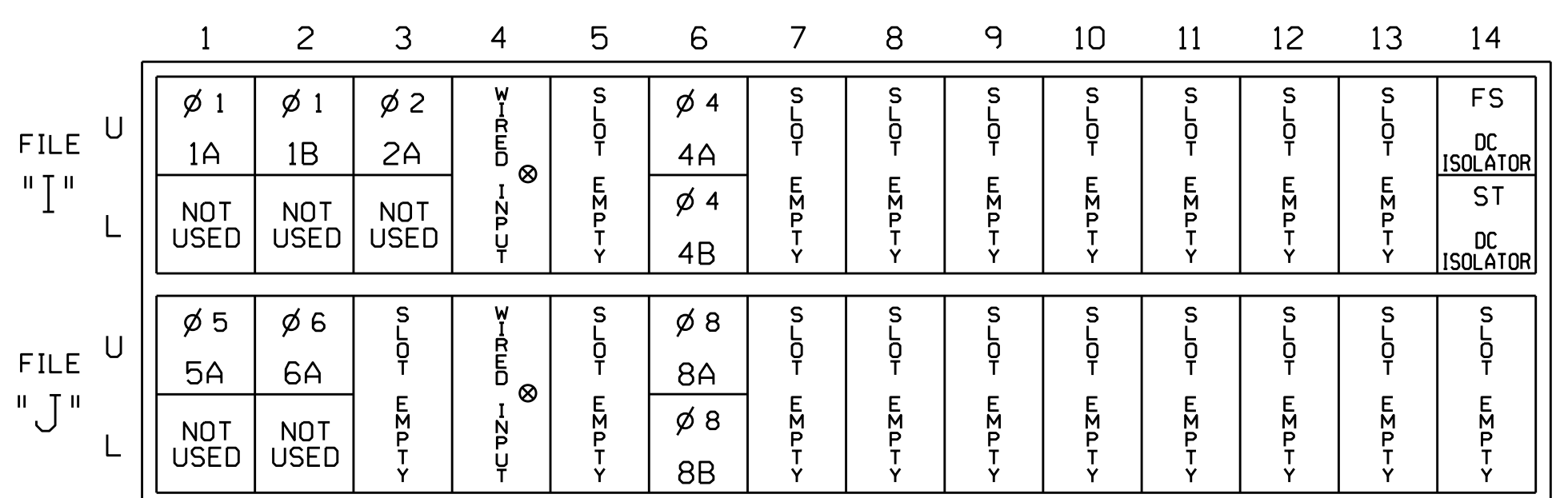
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	11	83	21,22	NU	NU	42,43	NU	51	61,62	NU	NU	82,83	NU	11	81	NU	51	41	NU
RED	*		128			101			134			107							
YELLOW			129			102		*	135			108							
GREEN			130			103			136			109							
RED ARROW																A121	A124	A114	A101
YELLOW ARROW			126													A122	A125	A115	A102
FLASHING YELLOW ARROW																A123	A126	A116	A103
GREEN ARROW	127	127							133										

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

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

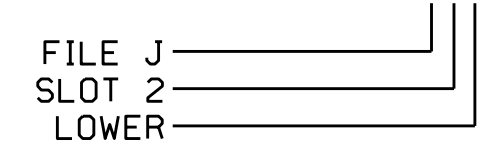
⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	11U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
1B	TB2-5,6	12U	39	1	2	1	Y	Y			15
2A	TB2-9,10	13U	63	25	32	2	Y	Y			3
4A	TB4-9,10	16U	41	3	4	4	Y	Y			10
4B	TB4-11,12	16L	45	7	14	4	Y	Y			3
5A ²	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	14U	47	9	22	2	Y	Y	Y		3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			3
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			3

¹Add jumper from 11-W to J4-W, on rear of input file.
²Add jumper from J1-W to 14-W, on rear of input file.

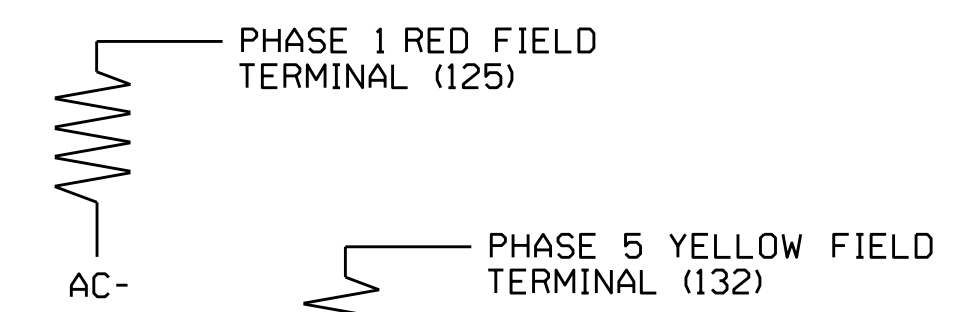
INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

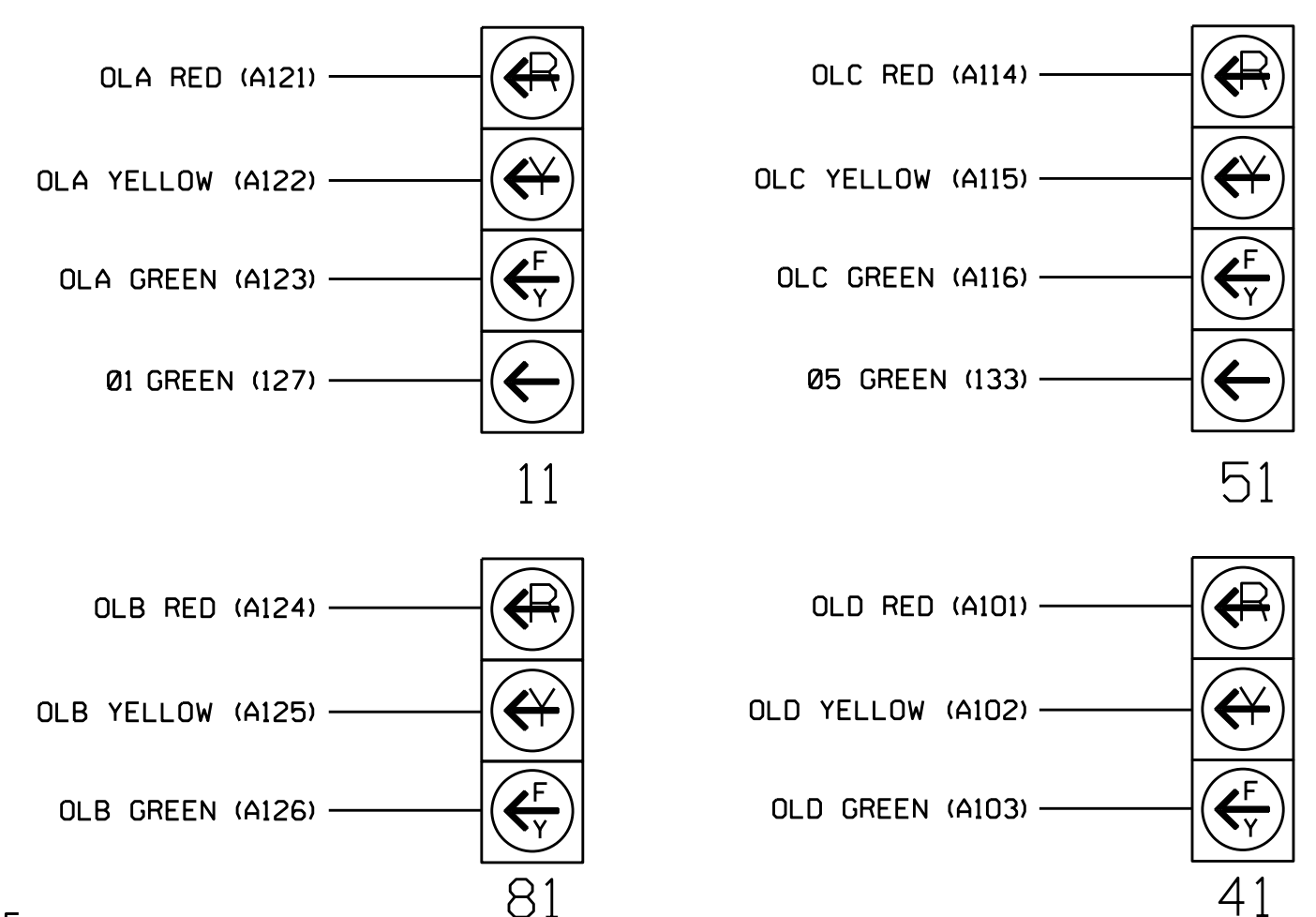
(install resistors as shown below)

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



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1262
 DESIGNED: January 2018
 SEALED: 02-27-18
 REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISION SEAL

Electrical and Programming Details for:

Prepared in the Offices of:

NC 115 (Mecklenburg Highway) at Quality Drive/ SR 1136 (Faith Road)

Division 12	Iredell County	Wooresville
PLAN DATE: August 2016	REVIEWED BY: WJ Hamilton	
PREPARED BY: NE Burns	REVIEWED BY: 14298 (040)	
REVISIONS	PH. DATE	
Signal is part of the NC 115 (Mecklenburg Hwy) CLS	KMM	3/5/2018

Not a certified document as to the Original Document but only as to the Revisions - This document originally issued and sealed by William J. Hamilton, PE #32396, on 8-17-16. This document is only certified as to the revisions.

SIG. INVENTORY NO. 12-1262

05-MAR-2018 1:50:07 S:\MITSAS\115_Signal\work\hgr\docus\g_Mon#eter.som\21262_smc.e...xxx.dgn T:\pererson

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5 and 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF
    ↓
    PRESS '+'
    
```

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

```

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #52 OFF
    ↓
    PRESS '+'
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #51 ON
    ↓
    PRESS '+'
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #4 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON
AND RED CLEAR ON PHASE #5 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #42 ON
SET OUTPUT ASSIGNMENT #43 OFF
    ↓
    PRESS '+'
    
```

NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

```

LOGICAL I/O COMMAND #5 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #44 OFF
    ↓
    PRESS '+'
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 5 (HEAD 51).

```

LOGICAL I/O COMMAND #6 (+/-COMMAND#)
IF YELLOW ON PHASE #5 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #43 ON
    ↓
    PRESS '+'
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

OUTPUT 42 = Overlap C Red
 OUTPUT 43 = Overlap C Yellow
 OUTPUT 44 = Overlap C Green
 OUTPUT 50 = Overlap A Red
 OUTPUT 51 = Overlap A Yellow
 OUTPUT 52 = Overlap A Green

OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

(program controller as shown below)

PROJECT REFERENCE NO. U-5963	SHEET NO. Sig 4,2
---------------------------------	----------------------

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    ↓
    PRESS '+'
    
```

← NOTICE GREEN FLASH

```

PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: X
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    ↓
    PRESS '+'
    
```

← NOTICE GREEN FLASH

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    ↓
    PRESS '+'
    
```

← NOTICE GREEN FLASH

```

PAGE 1: VEHICLE OVERLAP 'D' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: X
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    ↓
    PRESS '+'
    
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

FLASHER CIRCUIT MODIFICATION DETAIL

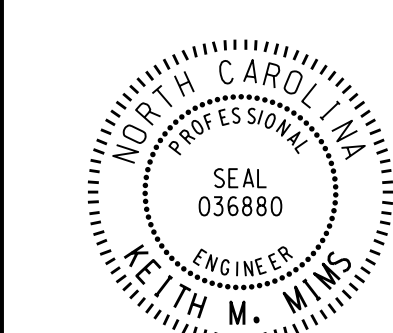

IN ORDER TO ENSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1282
 DESIGNED: January 2018
 SEALED: 02-27-18
 REVISED: N/A

Electrical Detail - Sheet 2 of 2

REVISION SEAL 	ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of: 	NC 115 (Mecklenburg Highway) at Quality Drive/ SR 1136 (Faith Road)	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL Not a certified document as to the Original Document but only as to the Revisions - This document originally issued and sealed by William J. Hamilton, PE #32396, on 8-17-16. This document is only certified as to the revisions.
Division 12 Iredell County Mooresville		PLAN DATE: August 2016 REVIEWED BY: WJ Hamilton PREPARED BY: NE Burns REVIEWED BY: 14298 (040)	
Documented by: Keith M. Mims 3/5/2018 SIGNATURE DATE		REVISIONS: [Table with columns for REVISION, DATE, and initials]	
750 N. Greenfield Pkwy, Garner, NC 27529		Signal is part of the NC 115, Mecklenburg Hwy 1, CLS.	
		DATE: 3/5/2018	
		SIG. INVENTORY NO. 12-1262	

05-11-2018 1:57:07
 C:\MTS\115\Sig\12-1282\sig\12-1282_sml.e...xxx.dgn
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PHASING DIAGRAM

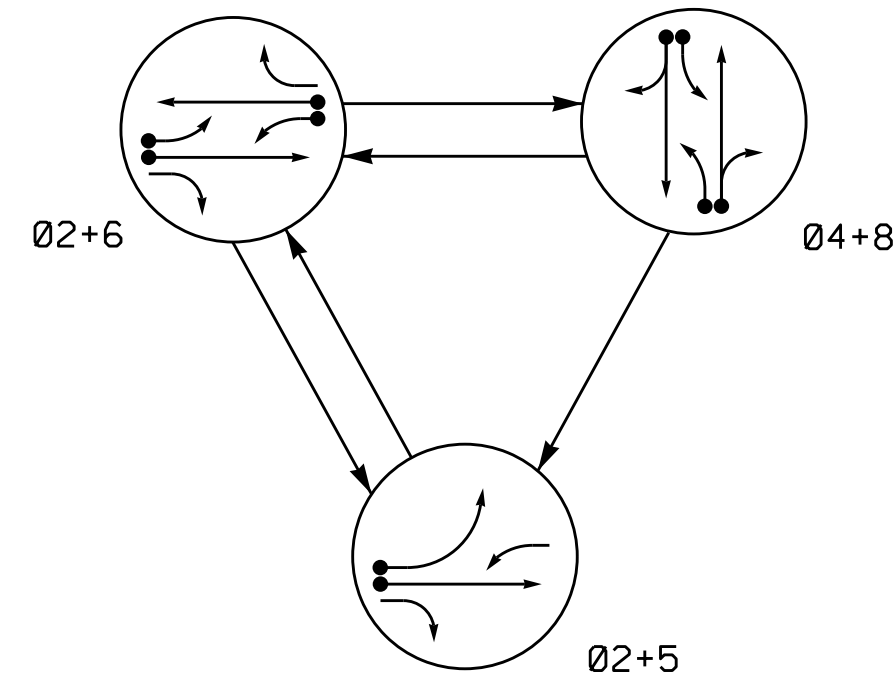


TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02+5	02+6	04+8	FLIGHT
21, 22	G	G	R	Y
41	R	R	F	R
42, 43, 44	R	R	G	R
51	F	F	R	Y
61	F	F	R	Y
62, 63, 64, 65	R	G	R	Y
81	R	R	F	R
82, 83	R	R	G	R

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

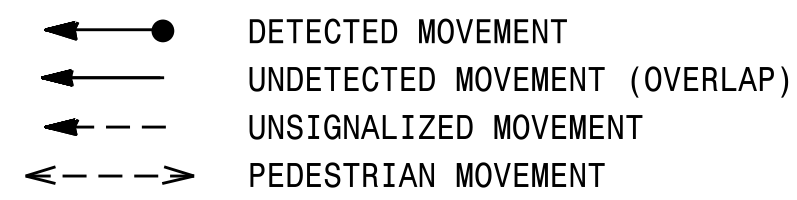
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME			
2A	6X6	300	5	-	2	Y	Y	-	-	-	-	Y
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	3	-	Y
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	10	-	Y
4C	6X6	0	2-4-2	-	4	Y	Y	-	-	15	-	Y
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	15	-	Y
6A	6X6	300	5	-	6	Y	Y	-	-	-	-	Y
6B	6X40	0	2-4-2	-	6	Y	Y	-	-	3	-	Y
8A	6X40	0	2-4-2	-	8	Y	Y	-	-	3	-	Y
8B	6X40	0	2-4-2	-	8	Y	Y	-	-	10	-	Y

3 Phase Fully Actuated NC 115 (Mecklenburg Hwy.) CLS

NOTES

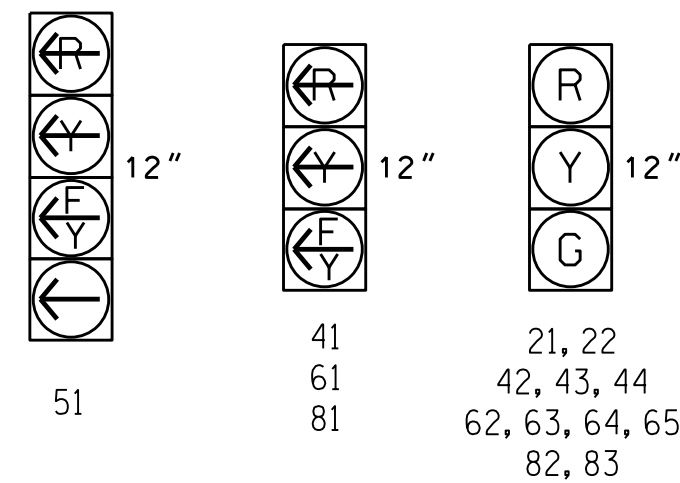
- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Renumber existing signal heads 41, 42, 43, 61, 62, 63, 64, 81, and 82 to 42, 43, 44, 62, 63, 64, 65, 82, and 83, respectively.
- Reposition existing signal heads numbered 22, 42, 43, 62, 63, 82, and 83.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #1744.

PHASING DIAGRAM DETECTION LEGEND

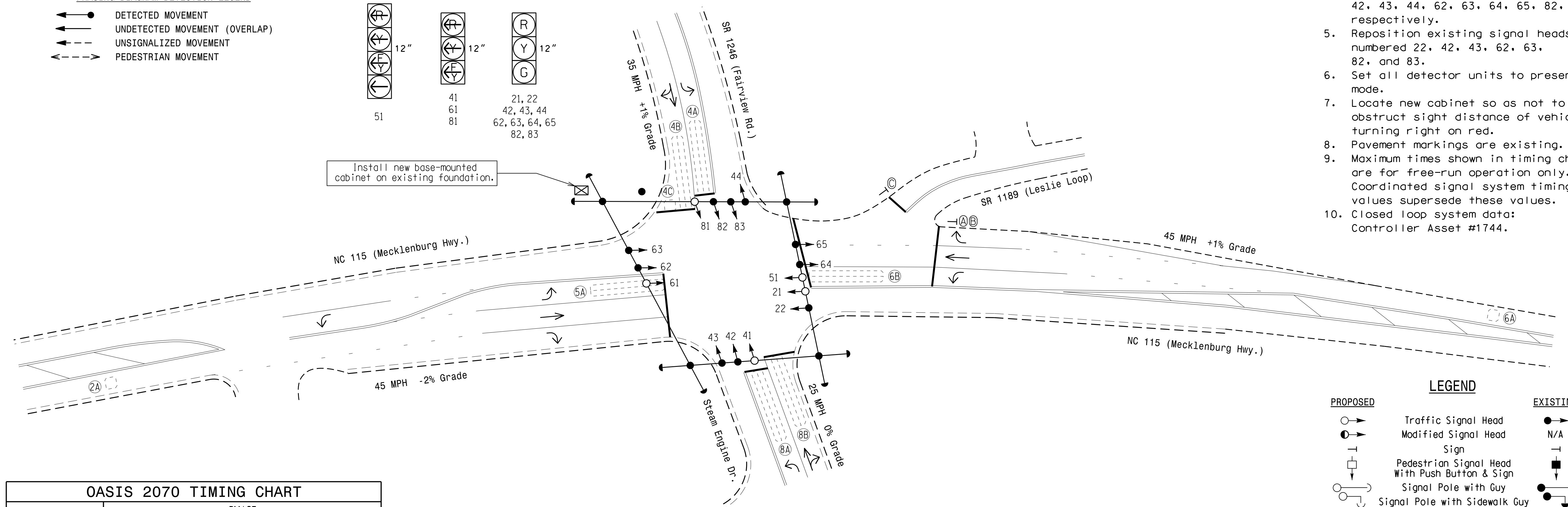


SIGNAL FACE I.D.

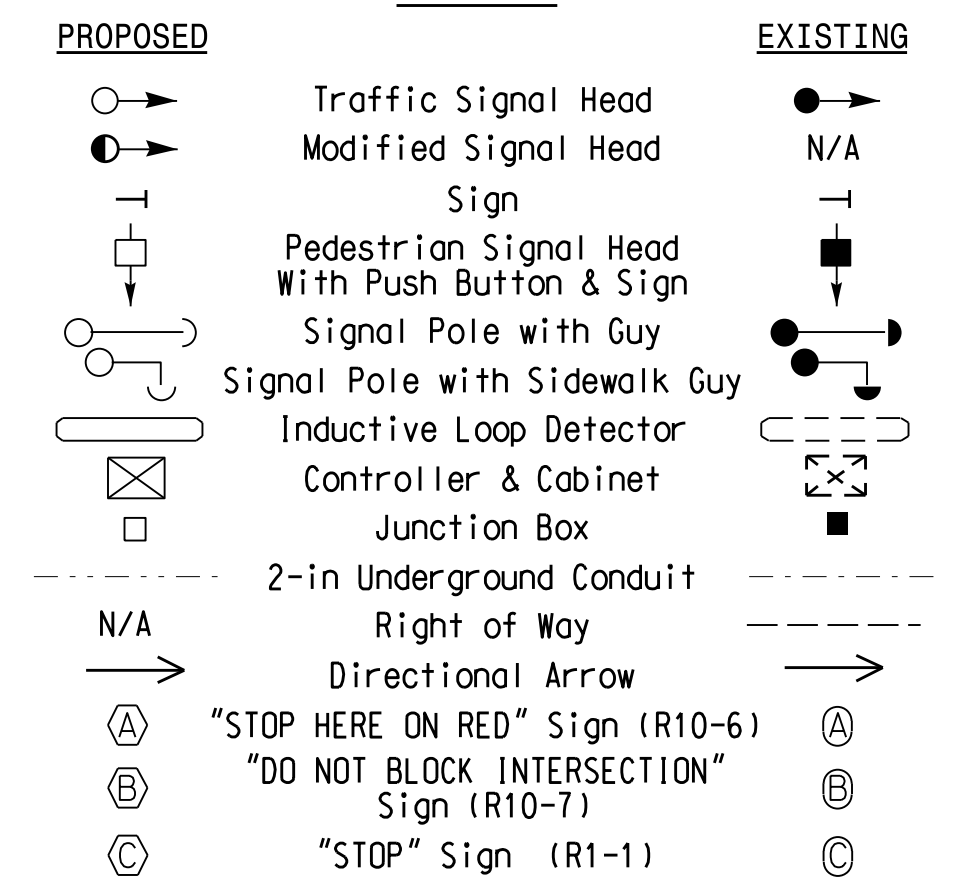
All Heads L.E.D.



Install new base-mounted cabinet on existing foundation.



LEGEND



OASIS 2070 TIMING CHART

FEATURE	PHASE				
	2	4	5	6	8
Min Green 1 *	12	7	7	12	7
Extension 1 *	6.0	2.0	2.0	6.0	2.0
Max Green 1 *	90	40	20	90	40
Yellow Clearance	4.7	3.8	3.0	4.7	3.8
Red Clearance	2.3	2.7	1.8	2.3	2.7
Red Revert	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	2.5	-	-	2.5	-
Max Variable Initial *	34	-	-	34	-
Time Before Reduction *	15	-	-	15	-
Time To Reduce *	40	-	-	40	-
Minimum Gap	3.0	-	-	3.0	-
Recall Mode	MIN RECALL	-	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	-	YELLOW	-
Dual Entry	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON

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

Signal Upgrade

Prepared in the Offices of: **TRANSPORTATION MOBILITY AND SAFETY GROUP** NORTH CAROLINA DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION

750 N. Greenfield Pkwy, Garner, NC 27529

NC 115 (Mecklenburg Hwy.) at SR 1246 (Fairview Rd.) / Steam Engine Dr.

Division 12 Iredell County Moore'sville

PLAN DATE: January 2018 REVIEWED BY: R.N. Zinser

PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE: 1"=30'

REVISIONS: INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: R. N. Zinser, Professional Engineer, No. 043914, State of North Carolina

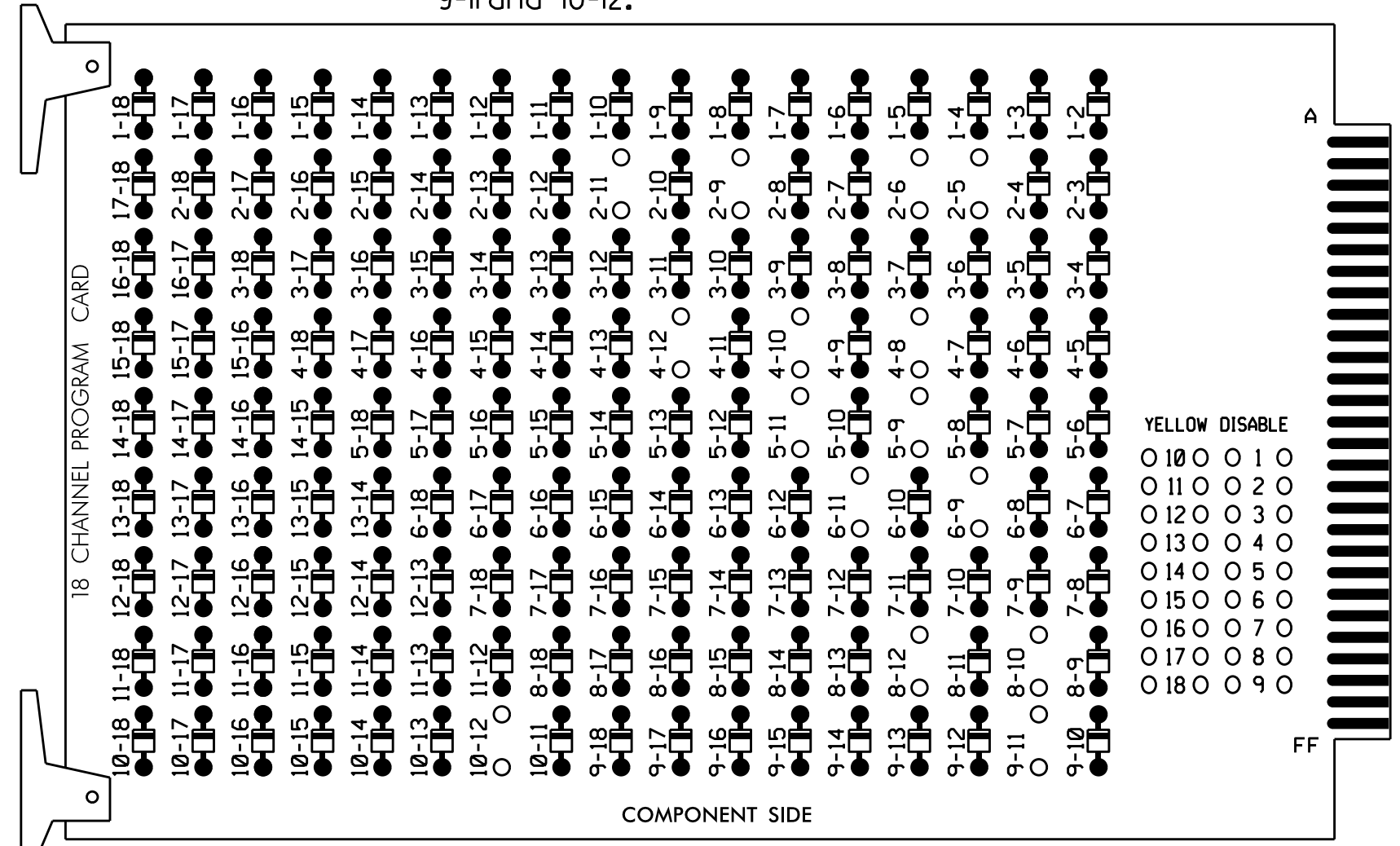
DATE: 2/27/2018

SIG. INVENTORY NO. 12-1744

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

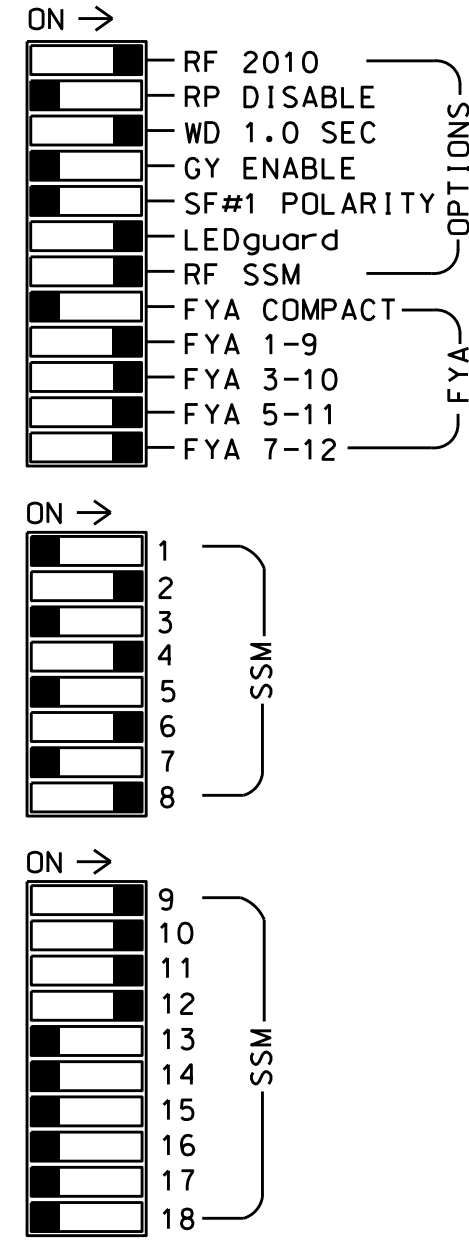
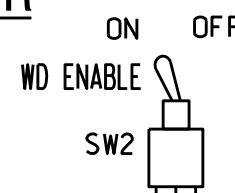
REMOVE DIODE JUMPERS 2-5, 2-6, 2-9, 2-11, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 8-10, 8-12, 9-11 and 10-12.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.



■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlaps 1 and 2 as Wag Overlaps.
- The cabinet and controller are part of the NC 115 (Mecklenburg Hwy.) Closed Loop System.

EQUIPMENT INFORMATION

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	42,43 44	NU	51	62,63 64,65	NU	NU	82,83	NU	61	81	NU	51	41	NU
RED		128			101			134			107							
YELLOW		129			102		*	135			108							
GREEN		130			103			136			109							
RED ARROW														A121	A124		A114	A101
YELLOW ARROW														A122	A125		A115	A102
FLASHING YELLOW ARROW														A123	A126		A116	A103
GREEN ARROW								133										

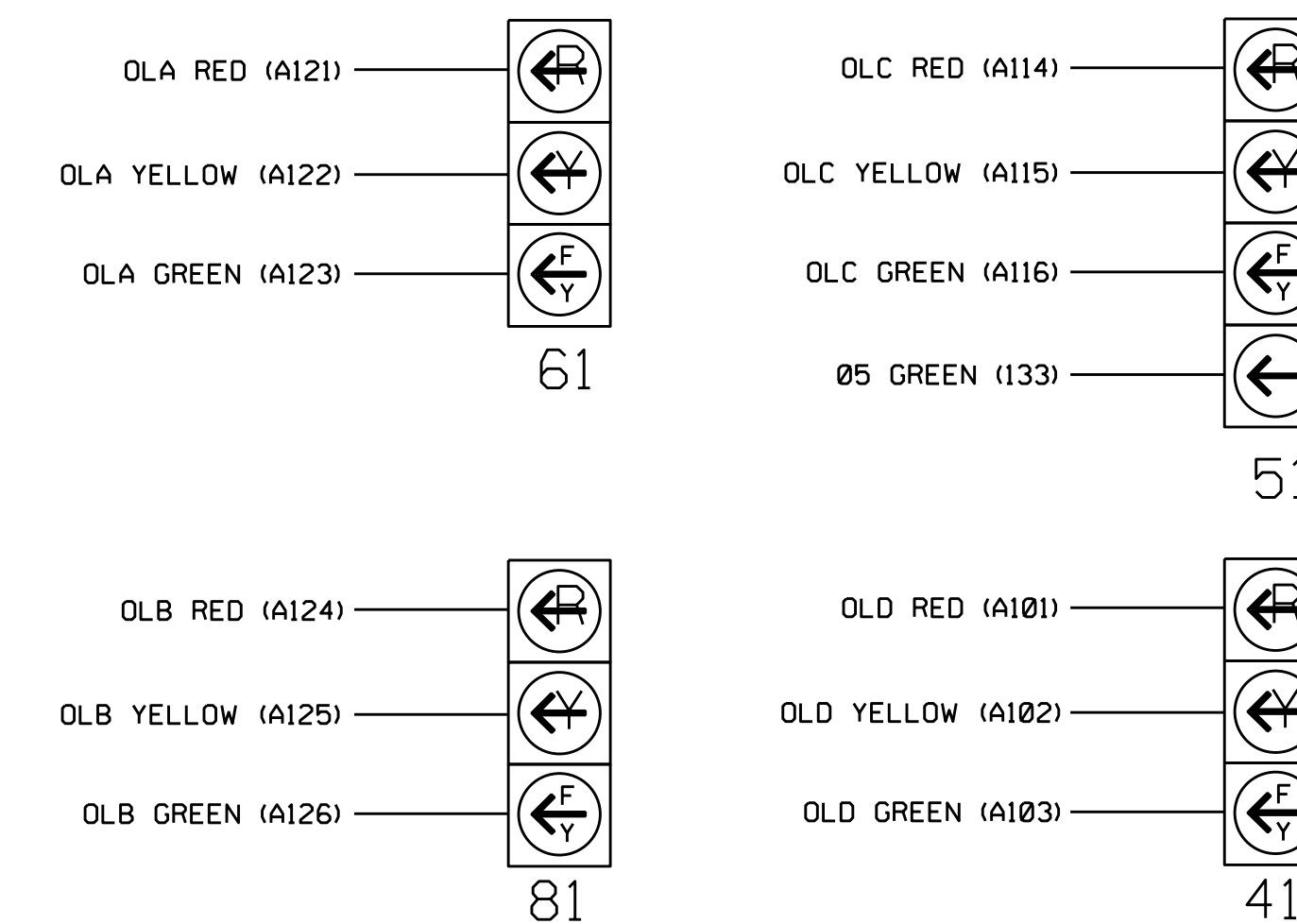
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

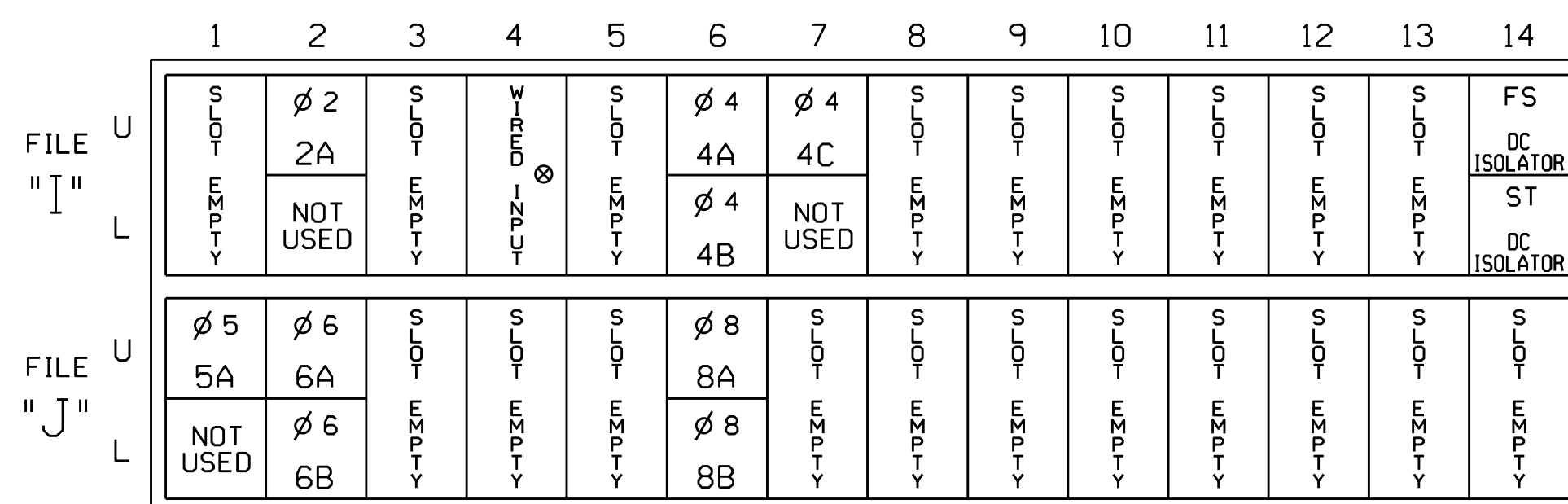


NOTE

The sequence display for signal head 51 requires special logic programming. See sheet 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

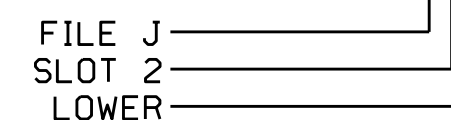
⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			15
5A'	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y	Y		3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y	Y		3
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			10

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

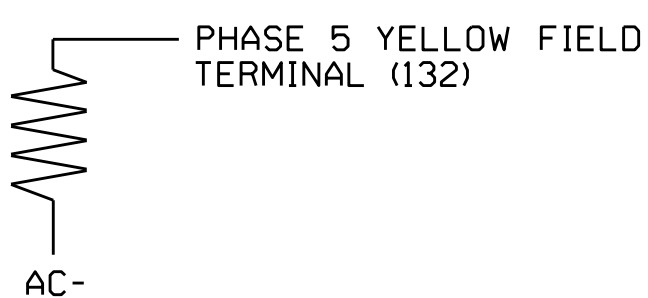
INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1744
 DESIGNED: January 2018
 SEALED: 02-27-18
 REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details for: NC 115 (Mecklenburg Hwy.) at SR 1246 (Fairview Rd.) / Steam Engine Dr.

Division 12 Iredell County Mooresville

PLAN DATE: February 2018 REVIEWED BY:

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

DocuSigned by: Keith M. Mims 3/5/2018

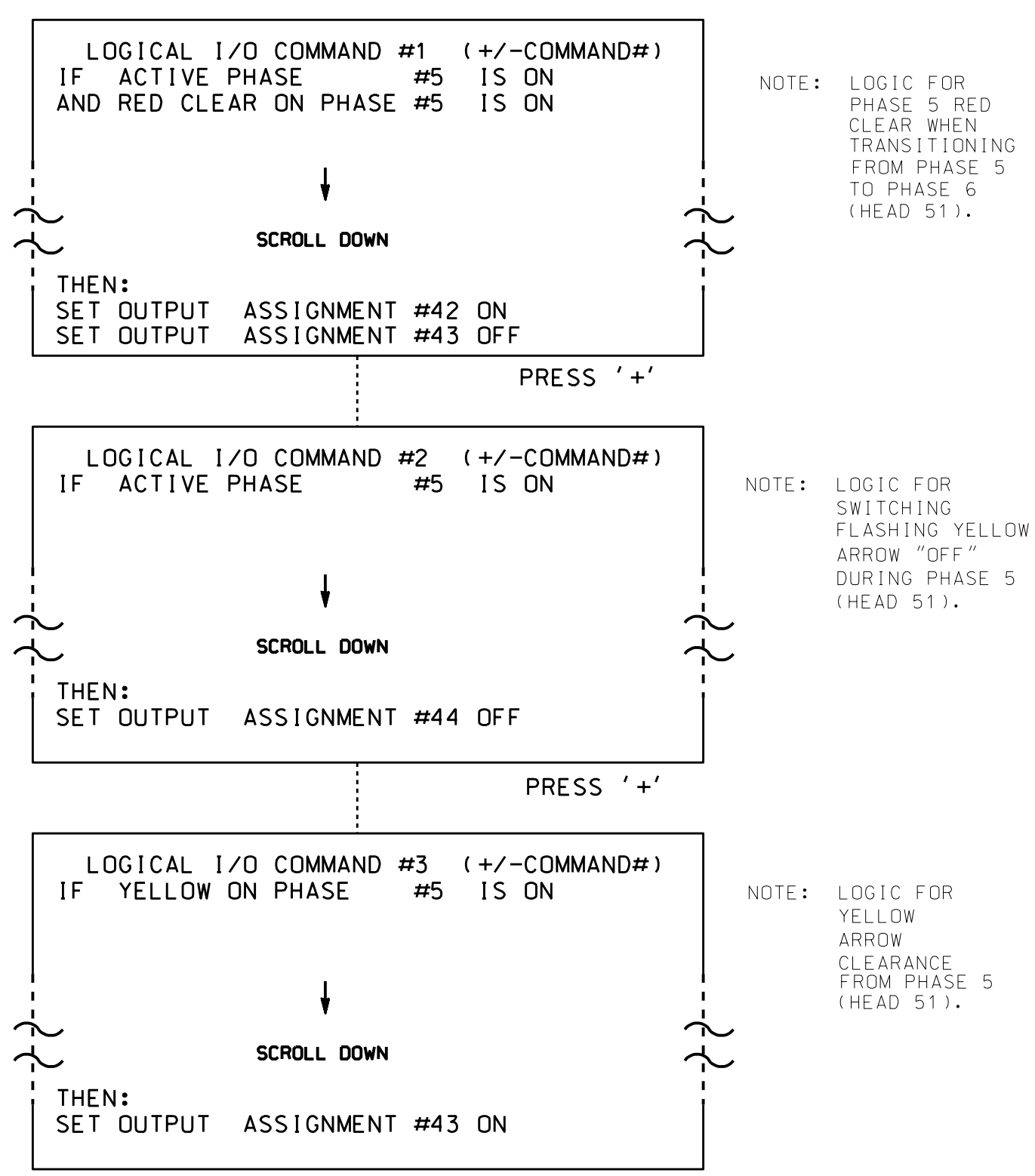
750 N. Greenfield Pkwy, Garner, NC 27529

SIG. INVENTORY NO. 12-1744

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS), SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2 AND 3.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 5 (HEAD 51).

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

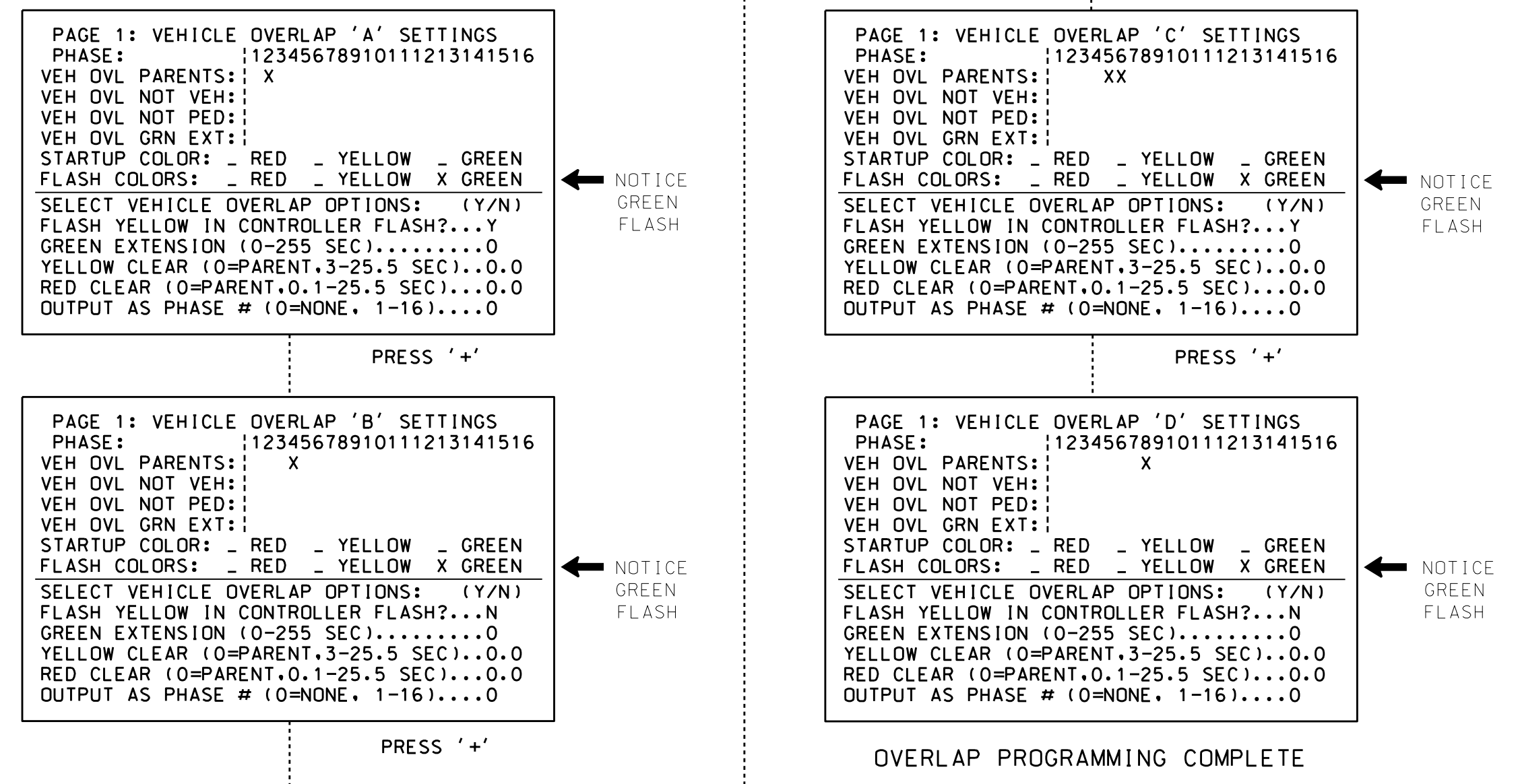
OUTPUT REFERENCE SCHEDULE

- OUTPUT 42 = Overlap C Red
- OUTPUT 43 = Overlap C Yellow
- OUTPUT 44 = Overlap C Green

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).



FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

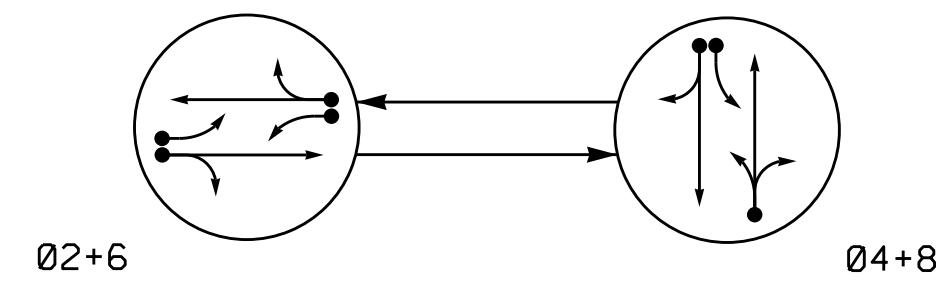
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1744
DESIGNED: January 2018
SEALED: 02-27-18
REVISED: N/A

Electrical Detail - Sheet 2 of 2

<p>Prepared In the Offices of:</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>Electrical and Programming Details For:</p> <p>NC 115 (Mecklenburg Hwy.) at SR 1246 (Fairview Rd.) / Steam Engine Dr.</p>	<p>Division 12 Iredell County Mooresville</p> <p>PLAN DATE: February 2018 REVIEWED BY:</p> <p>PREPARED BY: James Peterson REVIEWED BY:</p>	<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p>SEAL</p> <p>DocuSigned by: Keith M. Mins 3/5/2018</p> <p>SIG. INVENTORY NO. 12-1744</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>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>DATE</p>
NO.	DESCRIPTION	INIT.	DATE								

05-MAR-2018 10:02 C:\MTS\SS\12-1744\Sig.Mgr\ Peterson\121744_Sig.ele_xxx.dgn J Peterson

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

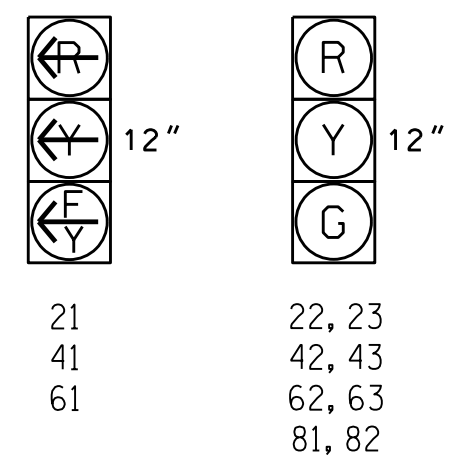
- ←●→ DETECTED MOVEMENT
- ←○→ UNDETECTED MOVEMENT (OVERLAP)
- ←- - -→ UNSIGNALIZED MOVEMENT
- ←- - -> PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21	F	R	Y
22, 23	G	R	Y
41	R	F	R
42, 43	R	G	R
61	F	R	Y
62, 63	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



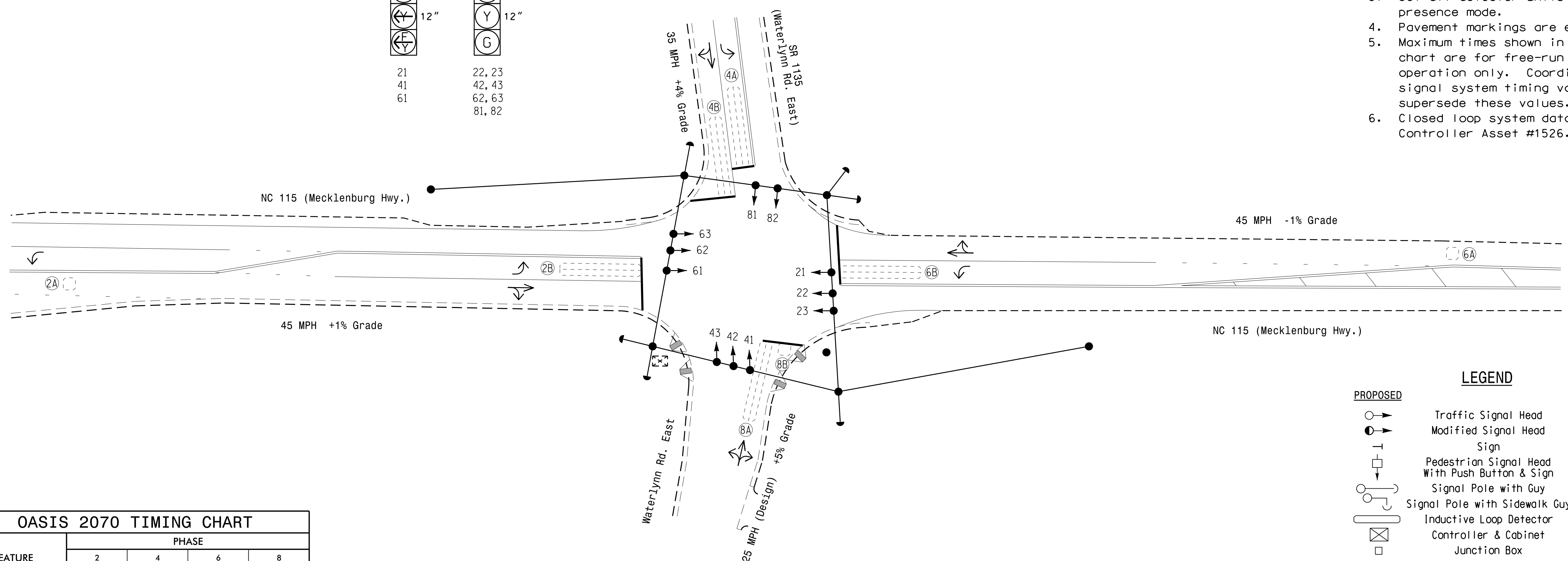
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING								
				NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X6	280	5	-	2	Y	Y	-	-	-	-	-
2B	6X40	0	2-4-2	-	2	Y	Y	Y	-	3	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	3	-	-
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	10	-	-
6A	6X6	300	5	-	6	Y	Y	-	-	-	-	-
6B	6X40	0	2-4-2	-	6	Y	Y	Y	-	3	-	-
8A	6X40	0	2-4-2	-	8	Y	Y	-	-	5	-	-
8B	6X6	0	3	-	8	Y	Y	-	-	15	-	-

2 Phase Fully Actuated NC 115 (Mecklenburg Hwy.) CLS

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.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #1526.



OASIS 2070 TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	12	7	12	7
Extension 1 *	6.0	2.0	6.0	2.0
Max Green 1 *	90	30	90	30
Yellow Clearance	4.6	3.6	4.6	3.6
Red Clearance	1.3	2.3	1.3	2.3
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	2.5	-	2.5	-
Max Variable Initial *	32	-	34	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	30	-	30	-
Minimum Gap	3.0	-	3.0	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON

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

PROPOSED		EXISTING	
○	Traffic Signal Head	●	N/A
○	Modified Signal Head	○	N/A
○	Sign	○	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	○	N/A
○	Right of Way	○	N/A
○	Directional Arrow	○	N/A

Signal Upgrade

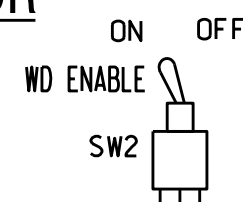
Prepared in the Offices of:

NC 115 (Mecklenburg Hwy.) at SR 1135 (Waterlynn Rd. East) / Waterlynn Rd. East
 Division 12 Iredell County Mooresville
 PLAN DATE: January 2018 REVIEWED BY: R.N. Zinser
 PREPARED BY: J.A. Lohr REVIEWED BY:
 SCALE: 1"=30'
 REVISIONS: _____ INIT. DATE _____
 DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
 SEAL: R. N. Zinser 2/27/2018
 DATE: _____
 SIG. INVENTORY NO. 12-1526

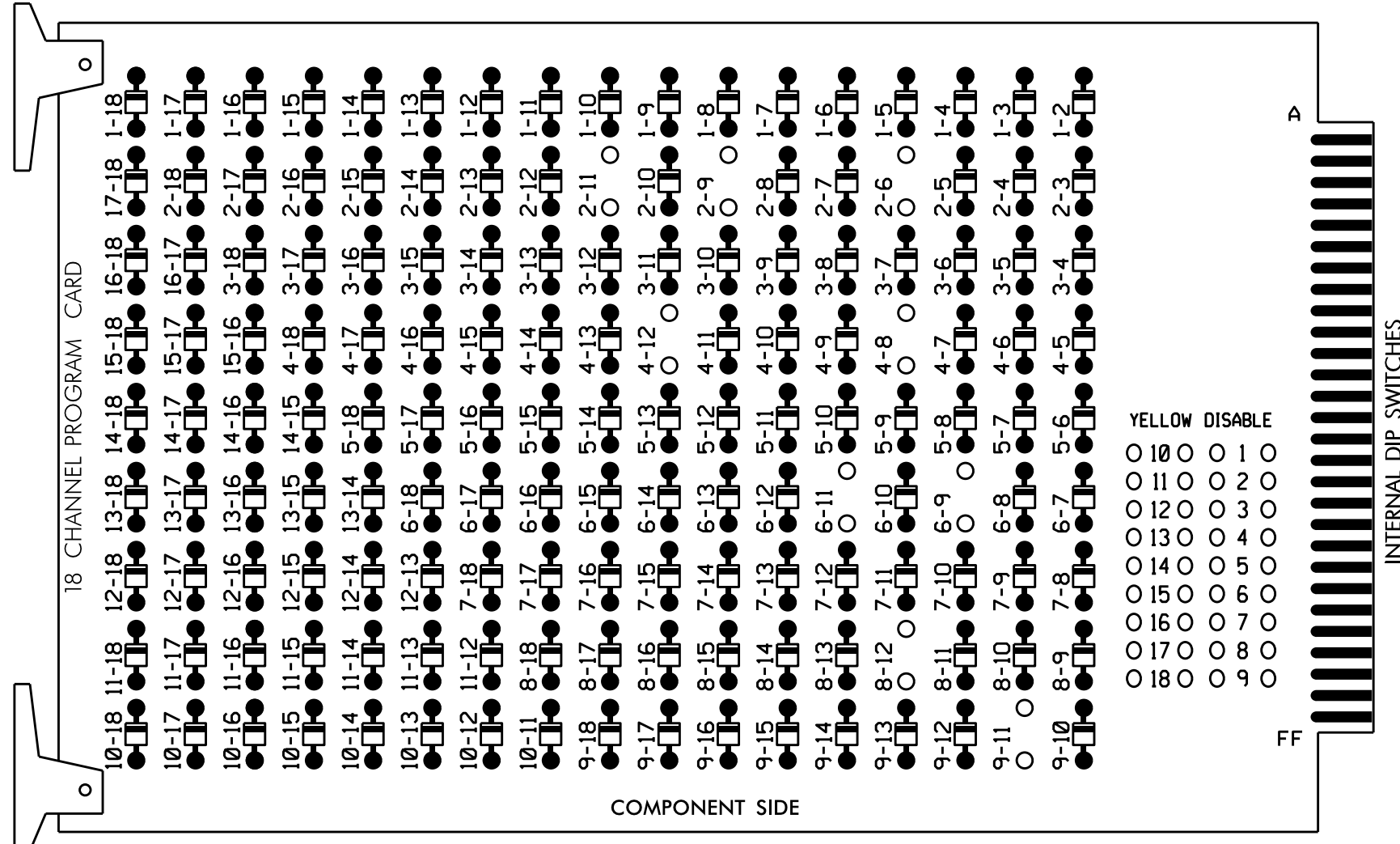
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 J. Lohr

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

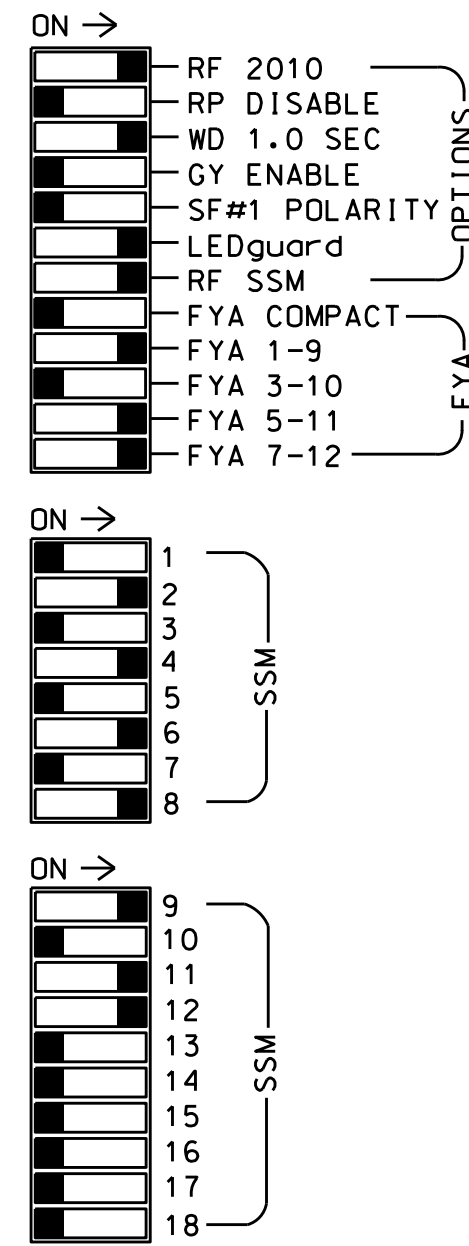


REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the NC 115 (Mecklenburg Hwy.) Closed Loop System.

EQUIPMENT INFORMATION

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	NU	NU	42,43	NU	NU	62,63	NU	NU	81,82	NU	61	NU	NU	21	41	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114	A101	
YELLOW ARROW													A122			A115	A102	
FLASHING YELLOW ARROW													A123			A116	A103	
GREEN ARROW																		

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ S	∅ 2	∅ S	∅ S	∅ S	∅ 4	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	FS
L	←-VZM	2A	←-VZM	←-VZM	←-VZM	4A	←-VZM	←-VZM	←-VZM	←-VZM	←-VZM	←-VZM	←-VZM	DC ISOLATOR
U	∅ S	∅ 6	∅ S	∅ S	∅ S	∅ 8	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	ST
L	←-VZM	6A	←-VZM	←-VZM	←-VZM	8A	←-VZM	←-VZM	←-VZM	←-VZM	←-VZM	←-VZM	←-VZM	DC ISOLATOR
U	∅ S	∅ 6	∅ S	∅ S	∅ S	∅ 8	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	
L	←-VZM	6B	←-VZM	←-VZM	←-VZM	8B	←-VZM	←-VZM	←-VZM	←-VZM	←-VZM	←-VZM	←-VZM	

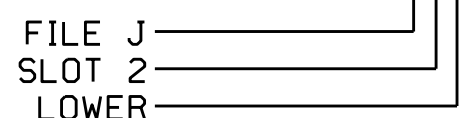
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	Y		3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y	Y		10
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y	Y		3
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			5
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			15

INPUT FILE POSITION LEGEND: J2L



OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: : X
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0=255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

PRESS '+' TWICE

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: : X
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0=255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

PRESS '+'

```

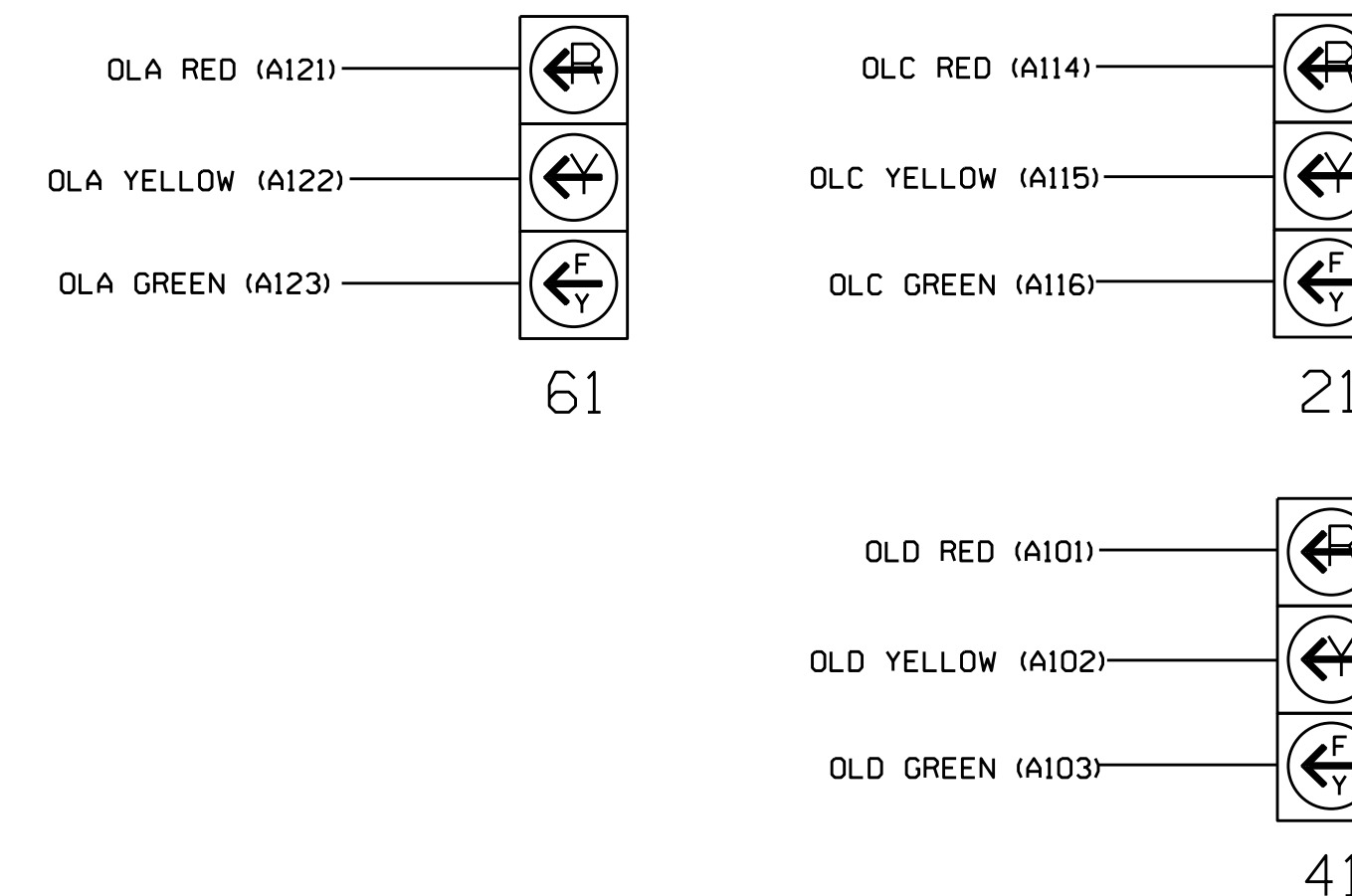
PAGE 1: VEHICLE OVERLAP 'D' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: : X
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0=255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

3 SECTION FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



FLASHER CIRCUIT MODIFICATION DETAIL

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

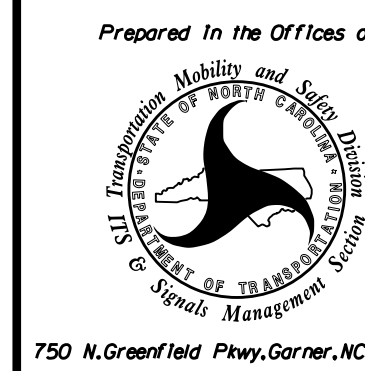
- ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
- ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
- REMOVE FLASHER UNIT 2.

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1526
 DESIGNED: January 2018
 SEALED: 2/27/2018
 REVISED:

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:



NC 115 (Mecklenburg Hwy.)
 at
 SR 1135 (Waterlynn Rd. East) /
 Waterlynn Rd. East

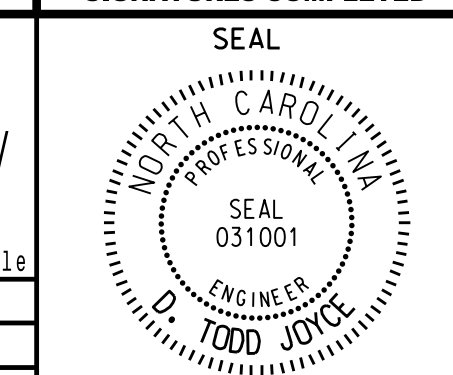
Division 12 Iredell County Mooreville

PLAN DATE: February 2018 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



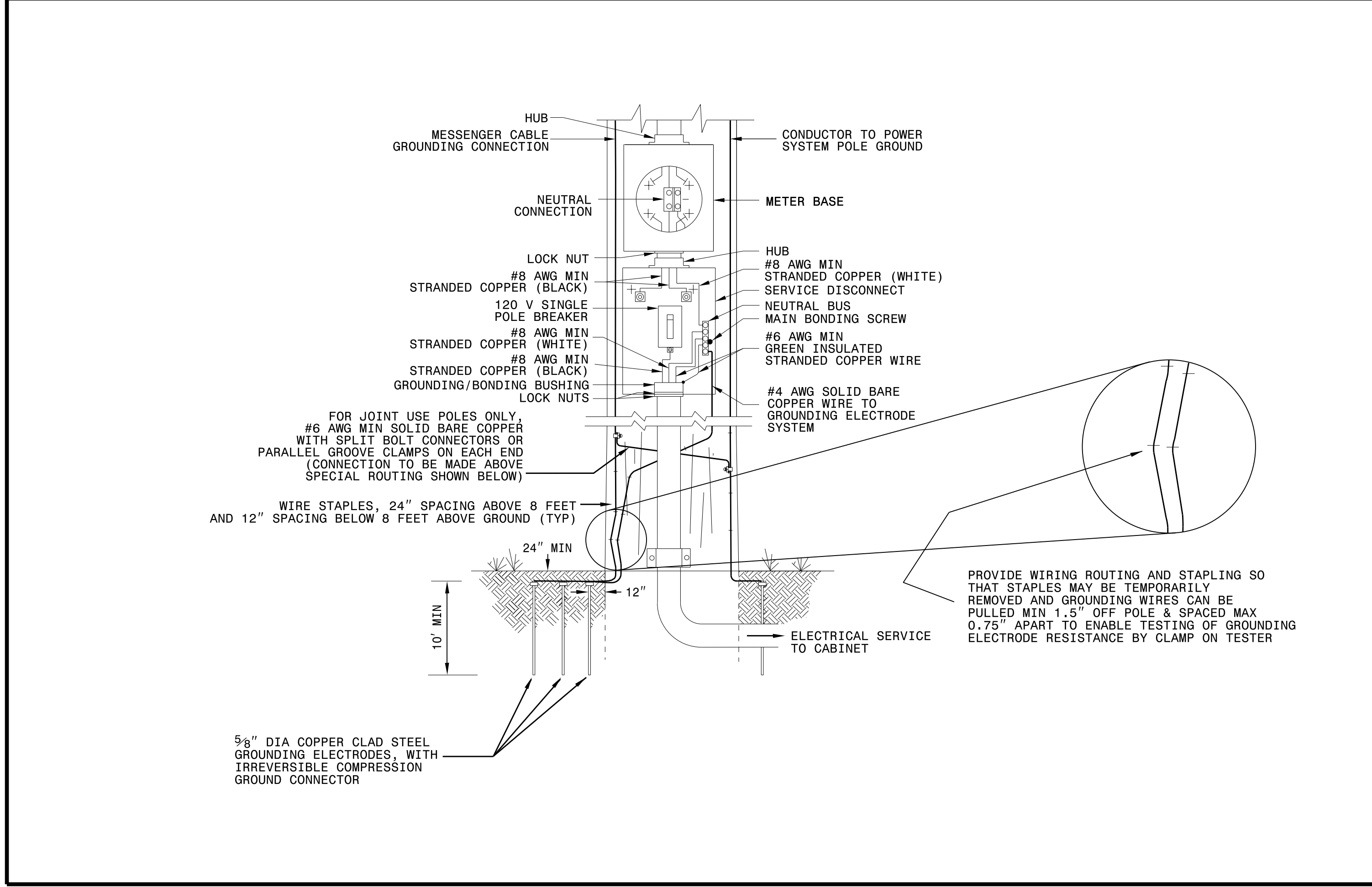
DocuSigned by: D. Todd Joyce 3/1/2018

SIG. INVENTORY NO. 12-1526

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

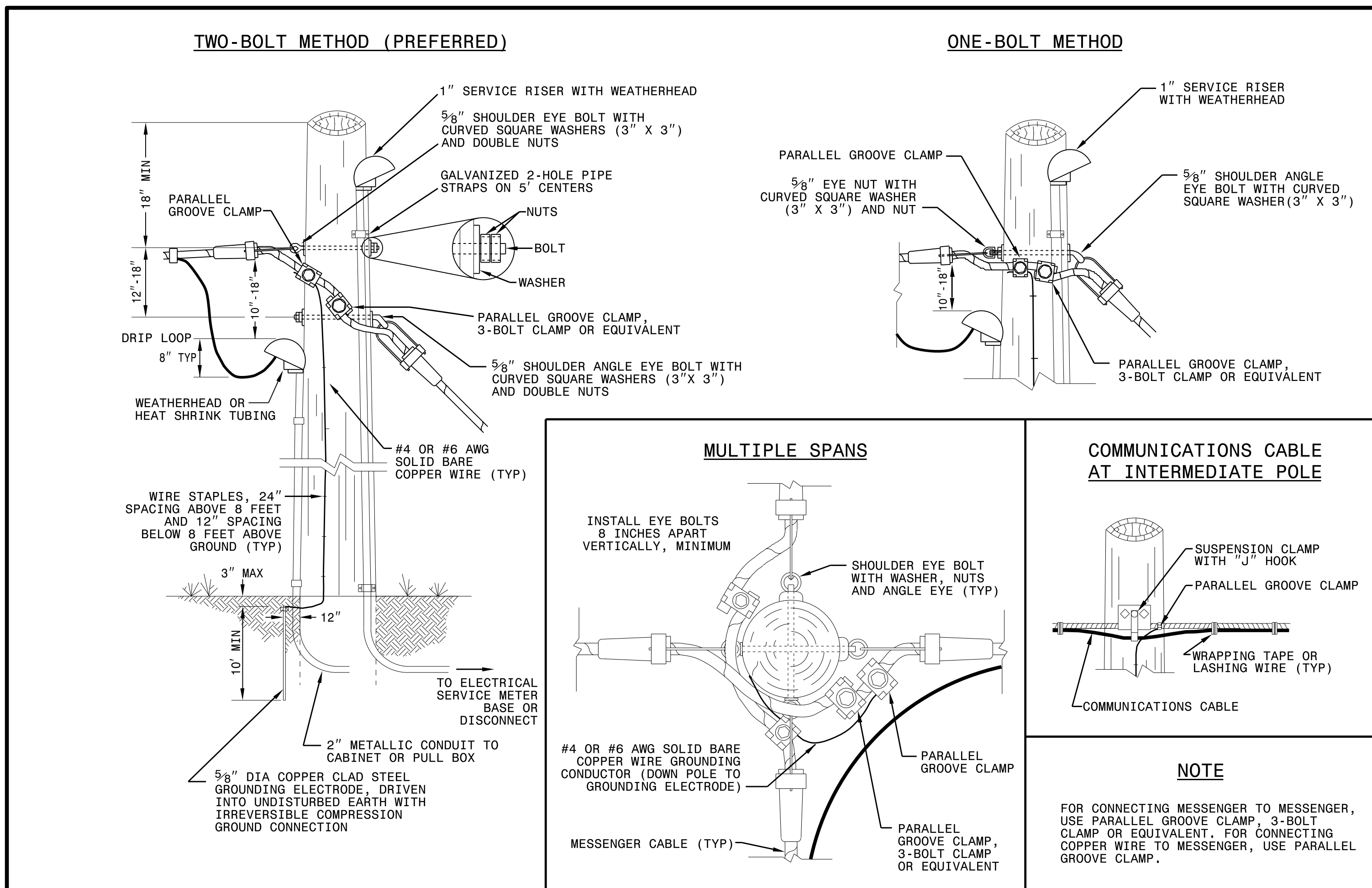
SHEET 1 OF 1
1700D01



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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FINAL UNLESS ALL
SIGNATURES COMPLETED

See Plate for Title

Prepared in the Offices of:

SEAL

DocuSigned by:
Mohd Aslami

10/11/2017

750 N. Greenfield Parkway
Garner, NC 27529

DATE

11-0CT-2017_08:56
U:\2018_S14_Drawing\Plate_Sheets\2018_Plate_Sheet.dgn
r:\rough

- 1 INSTALL REA, PE - 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 2 INSTALL COAX CABLE
- 3 INSTALL COMPOSITE POWER / ETHERNET CABLE
- 4 INSTALL SMFO CABLE
- 5 INSTALL MMFO CABLE
- 6 INSTALL FIBER OPTIC DROP CABLE
- 7 INSTALL TRACER WIRE
- 8 TRENCH
- 9 INSTALL PVC CONDUIT
- 10 INSTALL RIGID, GALVANIZED STEEL CONDUIT
- 11 INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
- 12 INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
- 13 INSTALL OUTER-DUCT POLYETHYLENE CONDUIT
- 14 INSTALL POLYETHYLENE CONDUIT
- 15 DIRECTIONAL DRILL CONDUIT
- 16 BORE AND JACK CONDUIT
- 17 INSTALL CABLE(S) IN EXISTING CONDUIT
- 18 INSTALL CABLE(S) IN NEW CONDUIT
- 19 INSTALL CABLE(S) IN EXISTING RISER
- 20 INSTALL CABLE(S) IN NEW RISER
- 21 INSTALL CABLE(S) IN EXISTING CONDUIT STUB-OUTS
- 22 INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 23 INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 24 INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
- 25 INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
- 26 MODIFY EXISTING INTERCONNECT CENTER / SPLICE ENCLOSURE
- 27 INSTALL NEW FIBER OPTIC TRANSCEIVER
- 28 INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPLICE CABLE IN CABINET
- 29 INSTALL UNDERGROUND SPLICE ENCLOSURE
- 30 INSTALL AERIAL SPLICE ENCLOSURE
- 31 INSTALL POLE MOUNTED SPLICE CABINET
- 32 INSTALL BASE MOUNTED SPLICE CABINET
- 33 REMOVE EXISTING SPLICE CABINET

- 34 INSTALL CABINET FOUNDATION
- 35 INSTALL CCTV CAMERA POLE MOUNTED CABINET
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40A INSTALL OVERSIZED JUNCTION BOX
- 40B INSTALL SPECIAL OVERSIZED JUNCTION BOX (36" x 36" x 24")
- 41 REMOVE EXISTING JUNCTION BOX
- 42 INSTALL WOOD POLE
- 43 REMOVE EXISTING WOOD POLE
- 44 INSTALL AERIAL GUY ASSEMBLY
- 45 INSTALL STANDARD GUY ASSEMBLY
- 46 INSTALL SIDEWALK GUY ASSEMBLY
- 47 INSTALL MESSENGER CABLE
- 48A REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
- 48B REMOVE EXISTING COMMUNICATIONS CABLE
- 49 BACK PULL EXISTING COMMUNICATIONS CABLE
- 50 INSTALL TELEPHONE SERVICE
- 51 INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
- 52A INSTALL DELINEATOR MARKER
- 52B INSTALL JUNCTION BOX MARKER
- 53 STORE 20 FEET OF COMMUNICATIONS CABLE
- 54 LASH CABLE(S) TO EXISTING COMMUNICATIONS CABLE
- 55 LASH CABLE(S) TO EXISTING MESSENGER CABLE
- 56 LASH CABLE(S) TO NEW MESSENGER CABLE
- 57 MODIFY EXISTING ELECTRICAL SERVICE
- 58 INSTALL NEW ELECTRICAL SERVICE
- 59 INSTALL NEW ETHERNET EDGE SWITCH
- 60 BOND TRACER WIRE TO EQUIPMENT GROUND BUS
DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS
- 61 BOND RISER AND MESSENGER CABLE TO POLE GROUND
- 62 BOND RISER TO POLE GROUND
- 63 BOND MESSENGER CABLE TO POLE GROUND
- 64 INSTALL HEAT SHRINK TUBING RETROFIT KIT
- 65 INSTALL MOLDABLE DUCT SEAL
- 66 SLACK SPAN

LEGEND

	FO	NEW FIBER OPTIC COMMUNICATIONS CABLE
	TWIST PR	NEW TWISTED PAIR COMMUNICATIONS CABLE
	EXI	EXISTING COMMUNICATIONS CABLE
	REM	EXISTING COMMUNICATIONS CABLE TO BE REMOVED
		NEW AERIAL GUY ASSEMBLY
		NEW CONDUIT
		EXISTING CONDUIT
	DD	NEW DIRECTIONAL DRILLED CONDUIT
	B&J	NEW BORED AND JACKED CONDUIT
		NEW JUNCTION BOX
		EXISTING JUNCTION BOX
		NEW WOOD POLE
		EXISTING WOOD POLE
		AERIAL SPLICE ENCLOSURE
		UNDERGROUND SPLICE ENCLOSURE
		NEW METAL POLE
		EXISTING METAL POLE
		NEW CCTV ASSEMBLY
		NEW STANDARD GUY ASSEMBLY
		NEW SIDEWALK GUY ASSEMBLY
		SIGNAL INVENTORY NUMBER
		NEW CABLE STORAGE RACKS (SNOW SHOES)
		EXISTING CABLE STORAGE RACK (SNOW SHOE)
		EXISTING CONTROLLER AND CABINET
		NEW CCTV CABINET
		EXISTING SPLICE CABINET
		NEW SPLICE CABINET
		SIGNAL POLE
		FLAT PANEL ANTENNA (SINGLE)
		YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
		YAGI ANTENNA (SINGLE)
		OMNI ANTENNA

CONSTRUCTION NOTE SYMBOLOGY KEY

	INDICATES NUMBER OF CABLES, LOOPS, ETC.
	INDICATES NUMBER OF FIBERS PER CABLE, TWISTED PAIRS PER CABLE, ETC.
	INDICATES NUMBER OF RISER(S)/CONDUIT(S)
	INDICATES DIAMETER OF RISER(S)/CONDUIT(S) (INCH)

Diagram illustrating cable and riser symbols:

- NUMBER OF CABLE(S)
- NUMBER OF FIBER/TWISTED PAIRS
- NEW/EXISTING CABLE
- REMOVE/MODIFY CABLE
- CONDUIT/RISER
- NUMBER OF RISER(S)/CONDUIT(S)
- DIAMETER OF RISER(S)/CONDUIT(S) (INCH)

ATTACHMENT POINT:

'SS' symbol"/>	DISTANCE ABOVE (IN)/ATTACHMENT POINT REFERENCE POINT
	REFERENCE POINT
'SS' symbol"/>	DISTANCE BELOW (IN)/ATTACHMENT POINT

"SS" REFERENCE LOCATION

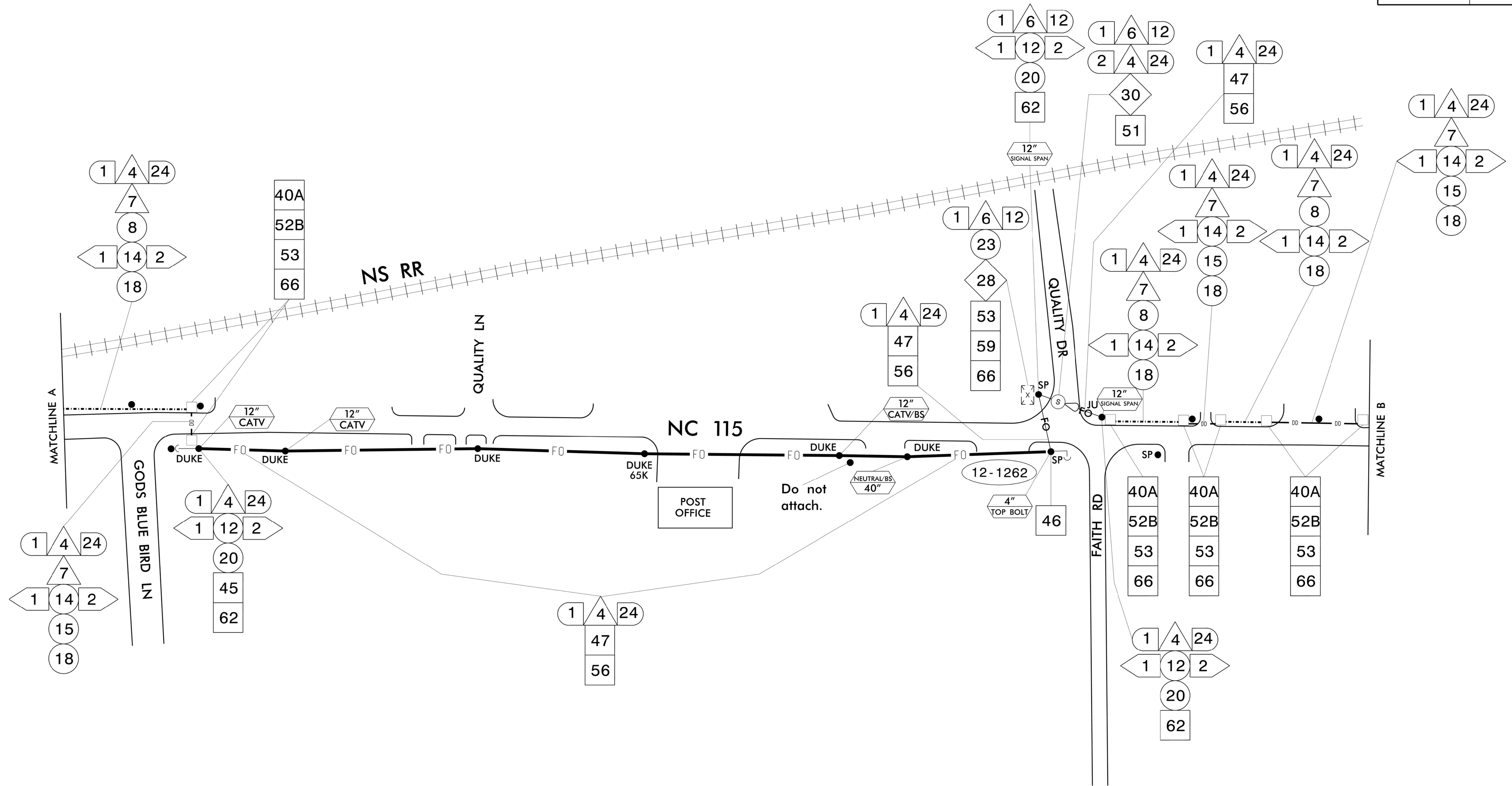
FS = FRONT SIDE OF POLE
BS = BACK SIDE OF POLE

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Mattern & Craig
ENGINEERS • SURVEYORS

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


	CONSTRUCTION NOTES	
	DIVISION 12 IREDELL COUNTY MOORESVILLE PLAN DATE: FEBRUARY 2018 REVIEWED BY: JB VOSO PREPARED BY: SE GREENE	REVISIONS INIT. DATE



- NOTES:
- 1) ALL ATTACHMENT POINTS ARE 40" BELOW POWER FRONT SIDE UNLESS OTHERWISE NOTED.
 - 2) FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM, CONTACT THE DIVISION 12 DIVISION TRAFFIC ENGINEER, BYRON ENGLE, AT (980) 552-4214 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES WITH THE NECESSARY NETWORK CONFIGURATION DATA, INCLUDING BUT NOT LIMITED TO: THE PROJECT IP ADDRESS, DEFAULT GATEWAY, SUBNET MASK AND VLAN ID INFORMATION. NOTIFY THE DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL.
 - 3) CONTRACTOR TO RECORD FINAL SPlice ARRANGEMENT FOR COMPARISON TO THE SUPPLIED SPlice DETAILS. IF DISCREPANCIES EXIST, PROVIDE AS-BUILT PLANS TO THE ENGINEER.

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Prepared for the Offices of:

 750 N. Greenfield Pkwy., Garner, NC 27529

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

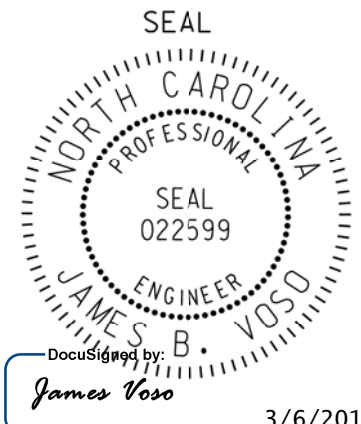
DIVISION 12 IREDELL COUNTY MOORESVILLE

PLAN DATE: FEBRUARY 2018 REVIEWED BY: JB VOSO

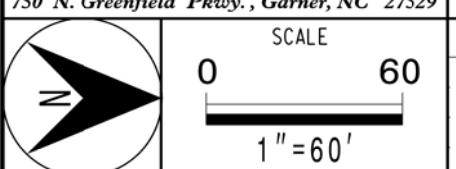
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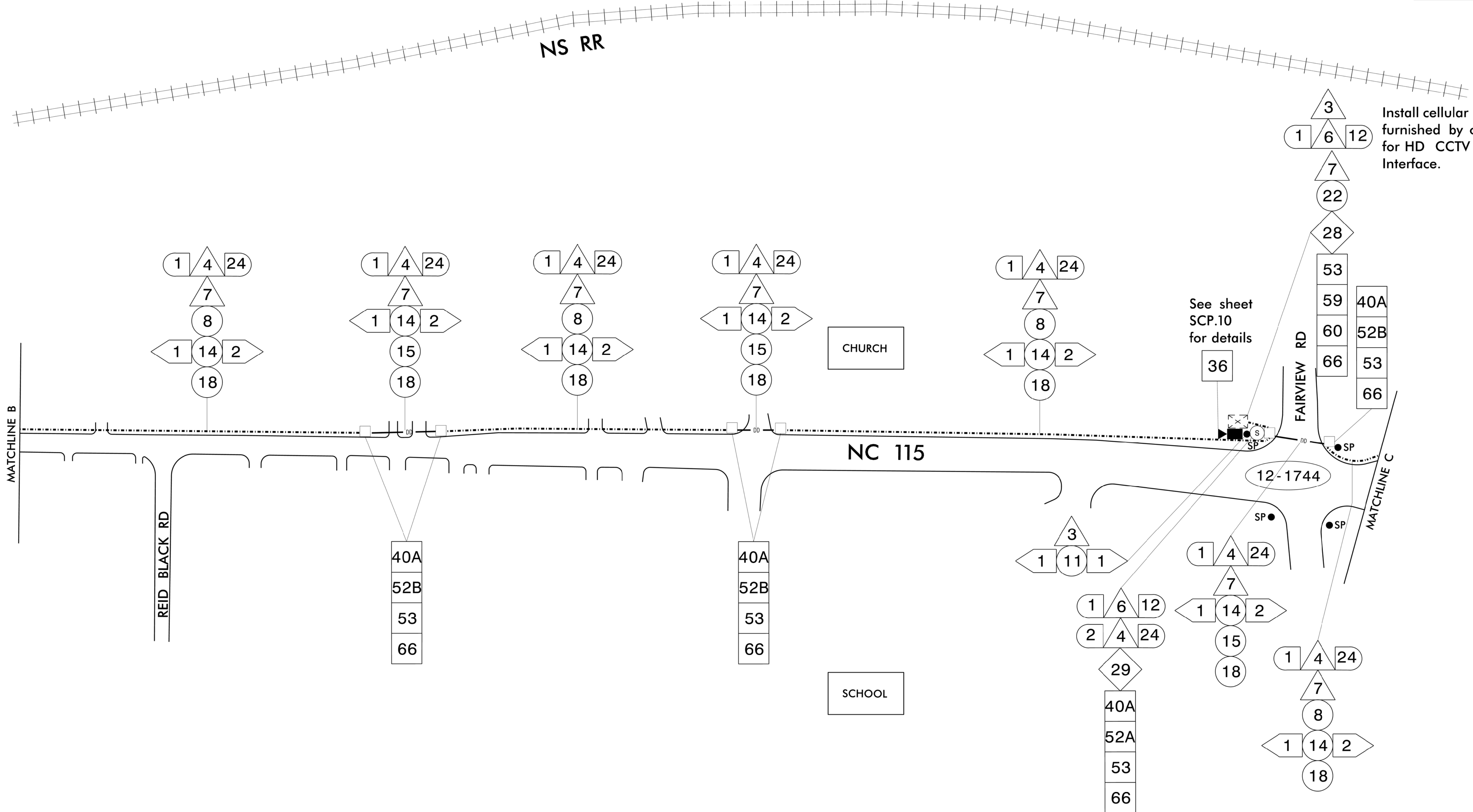
REVISIONS	INIT.	DATE

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SEAL

 JAMES B. VOSO
 ENGINEER
 3/6/2018
 DATE

SIG. INVENTORY NO.





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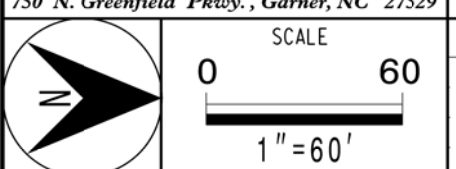
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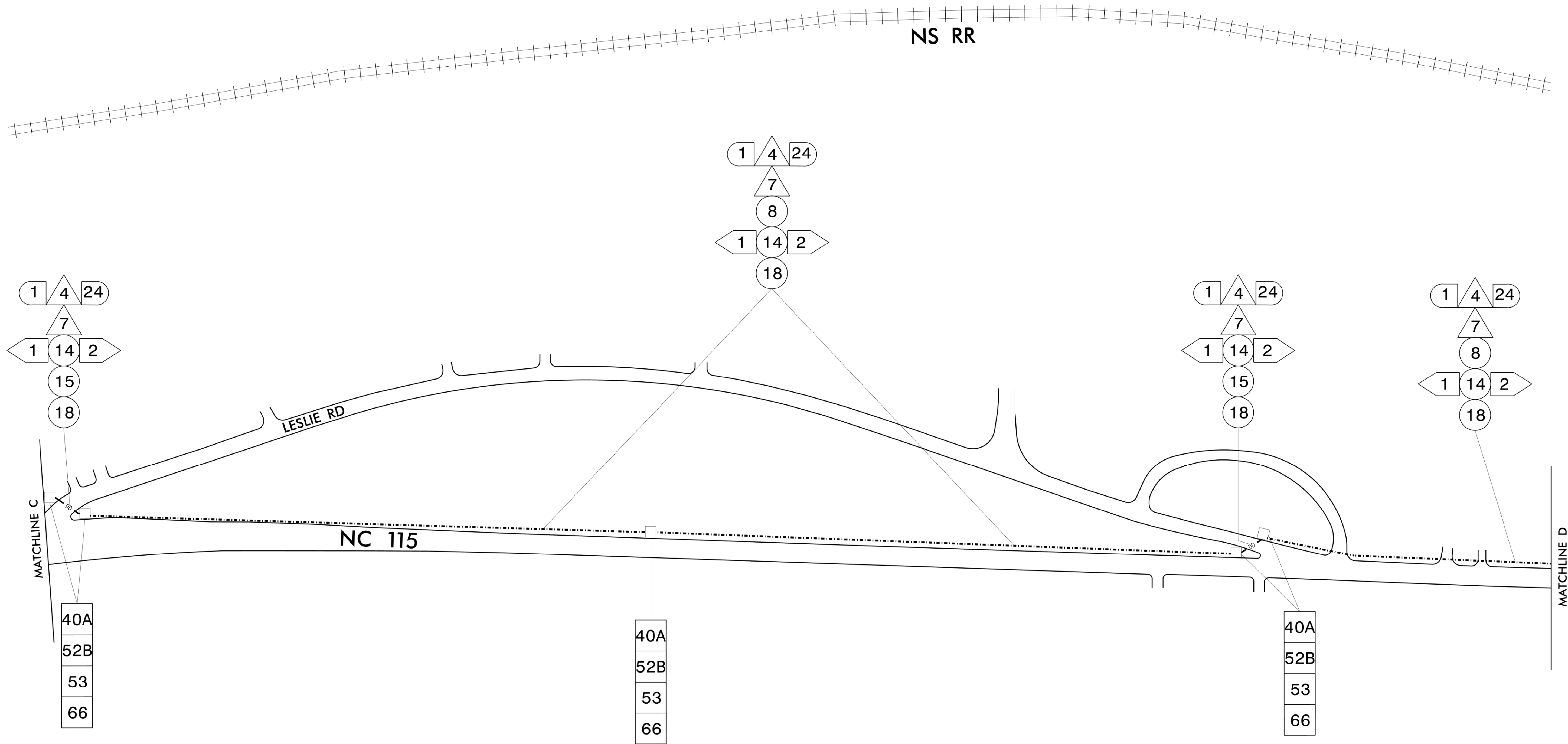
COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 12	IREDELL COUNTY	MOORESVILLE
PLAN DATE: FEBRUARY 2018	REVIEWED BY: JB VOSO	
PREPARED BY: SE GREENE	REVIEWED BY:	
REVISIONS	INIT.	DATE

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SEAL
 NORTH CAROLINA
 PROFESSIONAL ENGINEER
 022599
 JAMES B. VOSO
 3/6/2018
 SIGNATURE DATE





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750 N. Greenfield Pkwy., Garner, NC 27529

SCALE: 0 60
1"=60'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 12 IREDELL COUNTY MOORESVILLE

PLAN DATE: FEBRUARY 2018 REVIEWED BY: JB VOSO

PREPARED BY: SE GREENE REVIEWED BY:

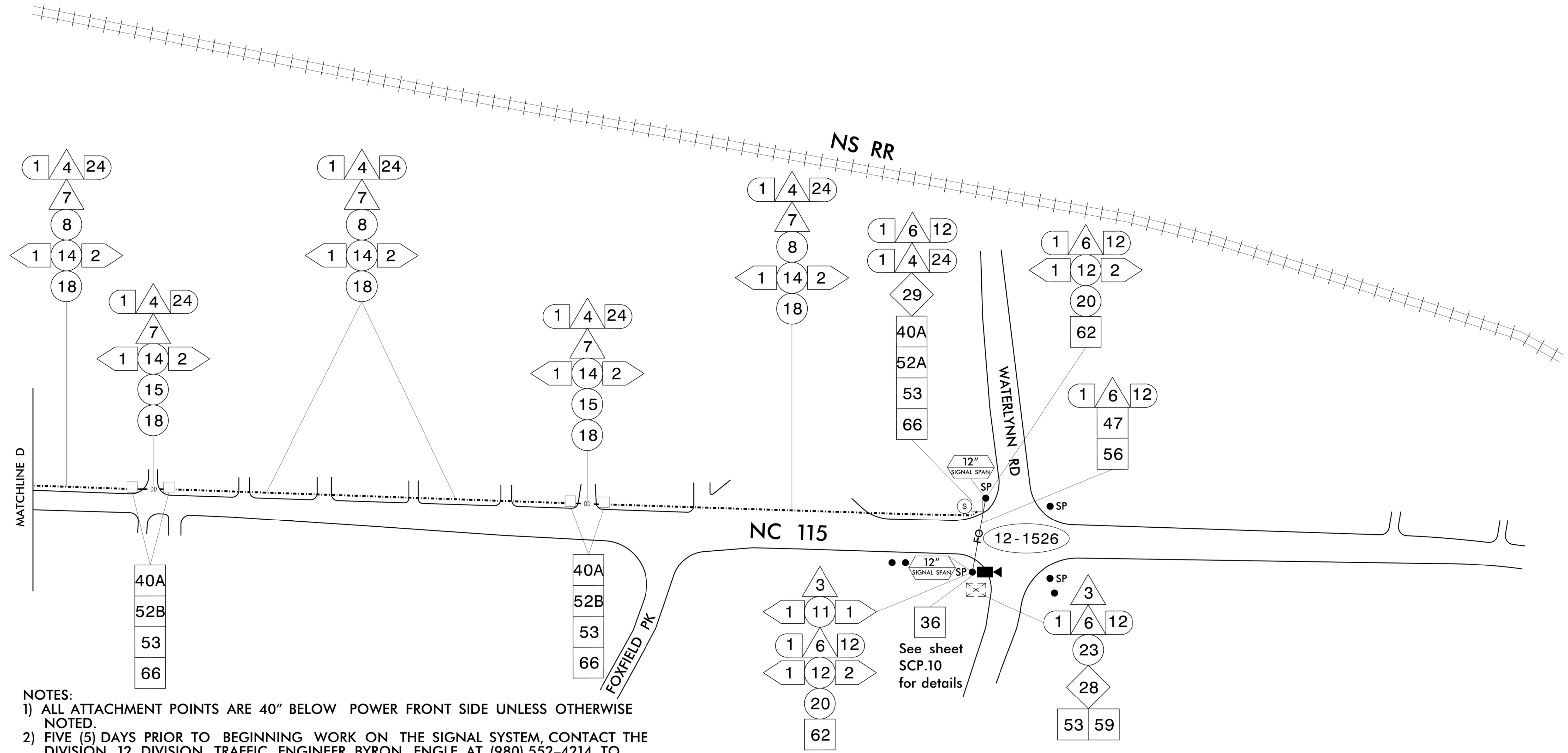
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James Voso 3/6/2018
SIGNATURE DATE

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DIVISION 12 IREDELL COUNTY MOORESVILLE

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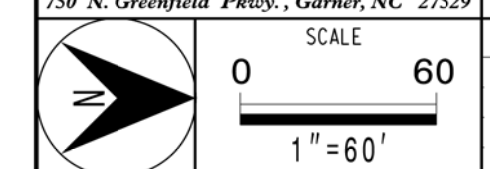
SEAL

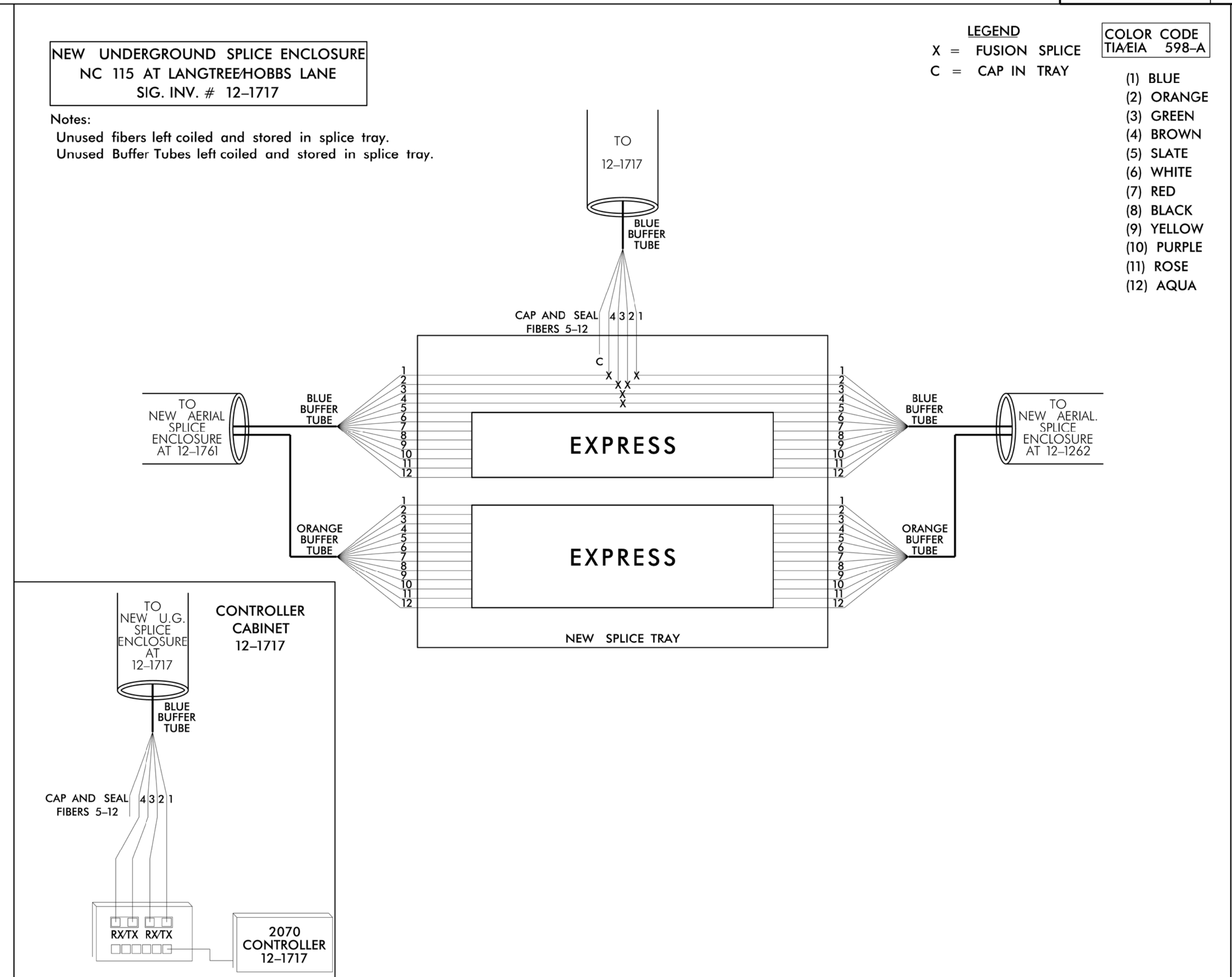
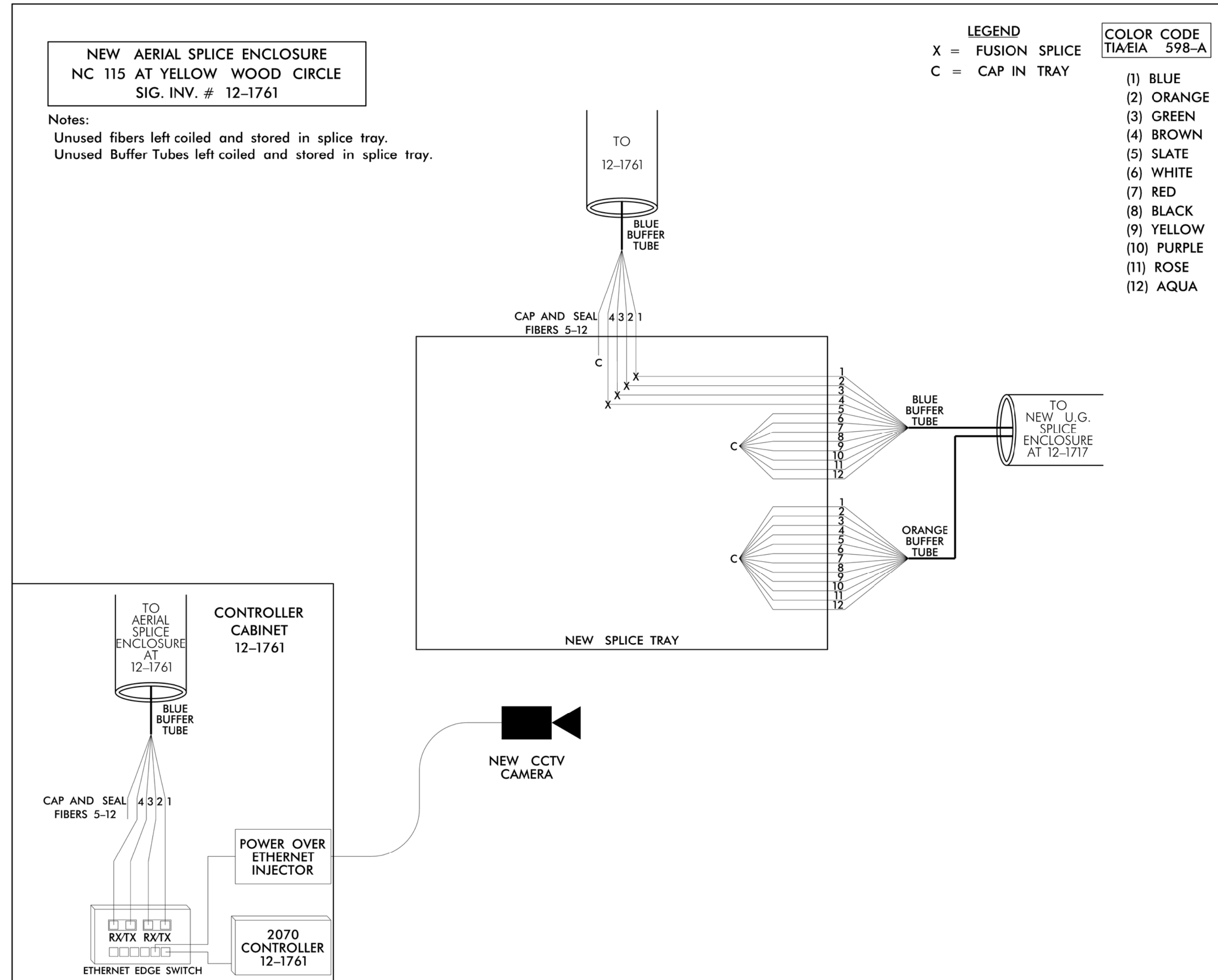
NORTH CAROLINA PROFESSIONAL ENGINEER

JAMES B. VOSO

James Vosso 3/6/2018

SIG. INVENTORY NO.





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- 3) ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS.
- 4) INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING: REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"
 - 1) SPLICE LOCATION
 - 2) DATE
 - 3) COMPANY NAME
 - 4) NAME OF INDIVIDUAL PERFORMING THE SPLICING

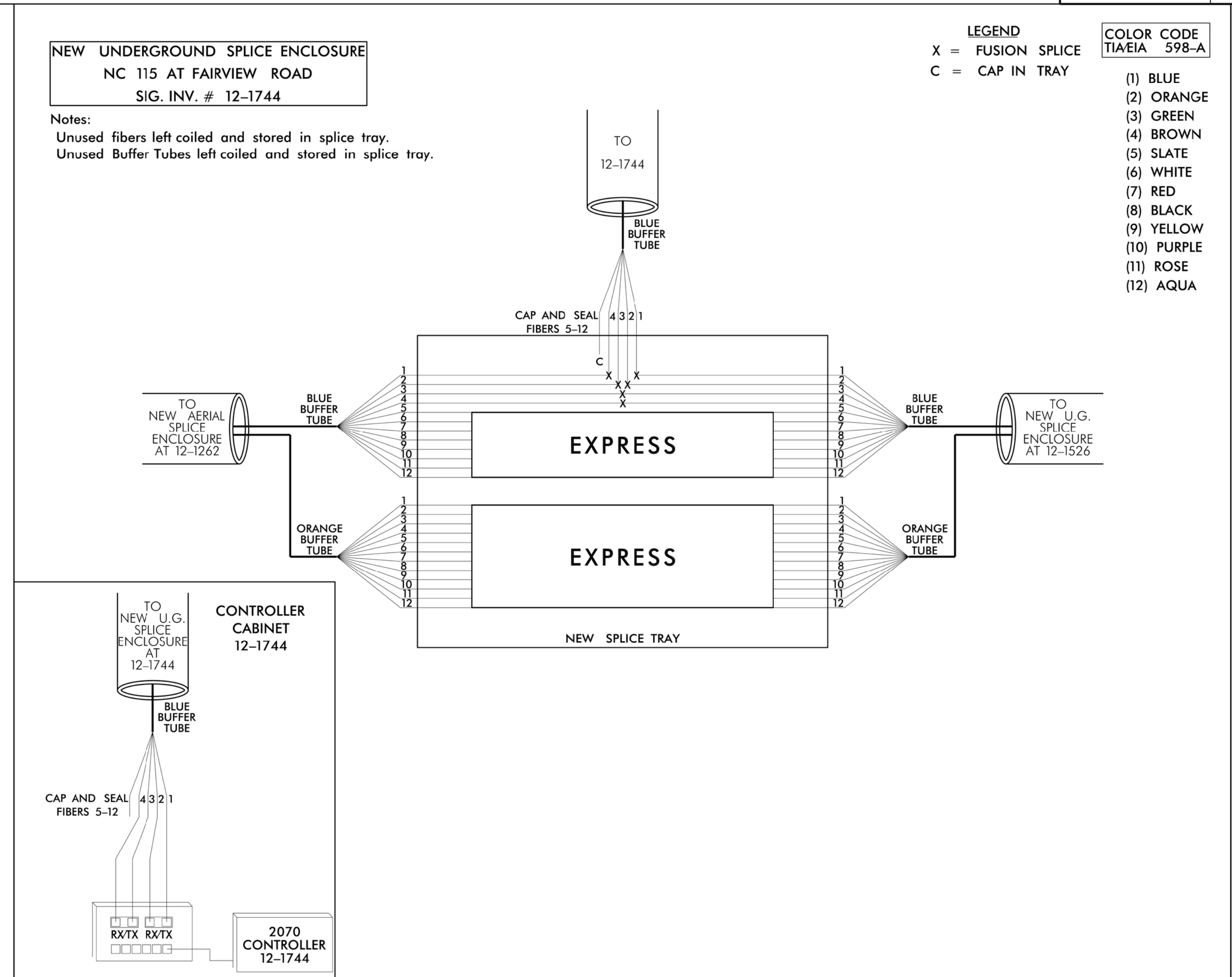
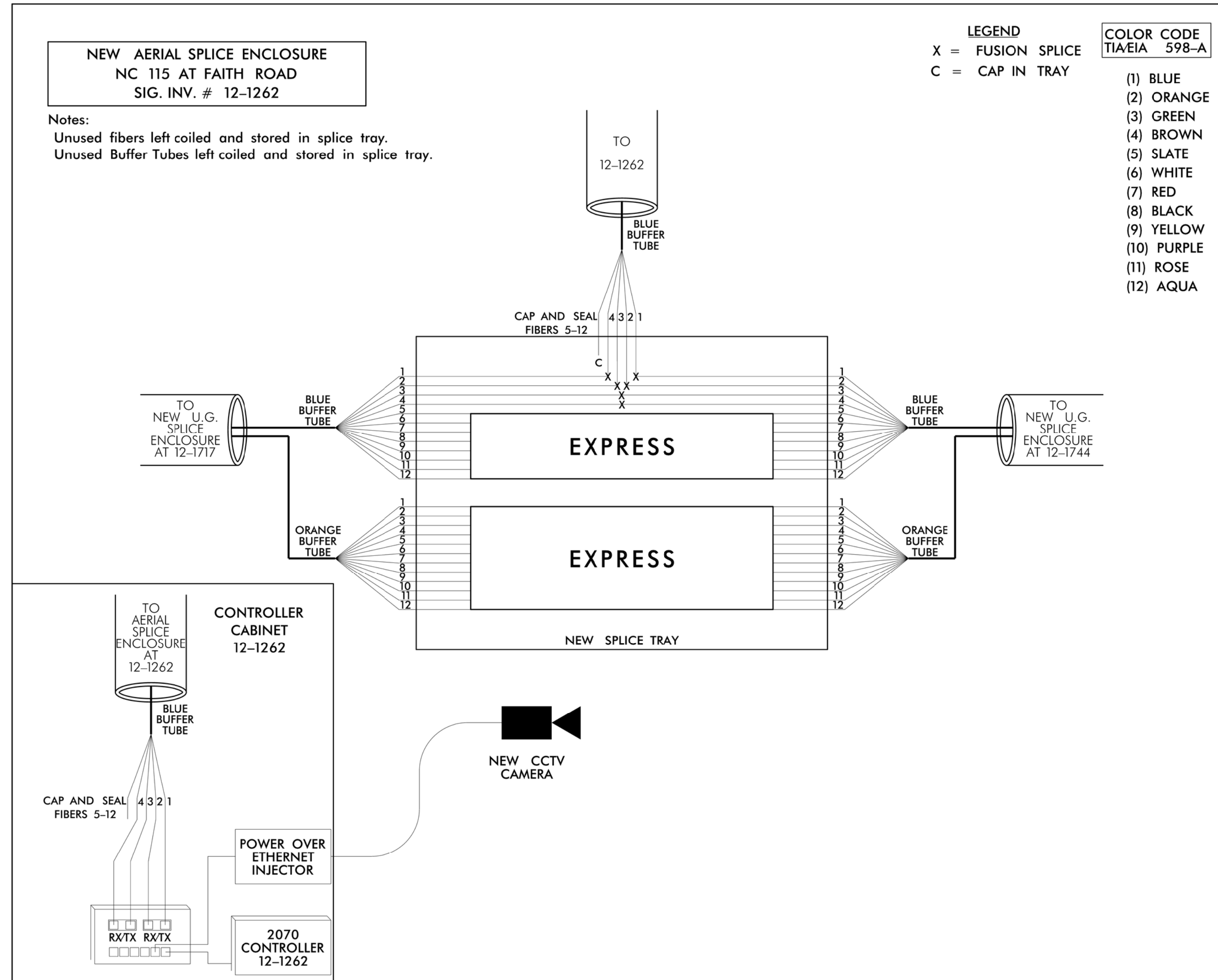
PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.

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	SPLICE DETAIL	
	DIVISION 12 IREDELL COUNTY MOORESVILLE PLAN DATE: FEBRUARY 2018 REVIEWED BY: JB VOSO PREPARED BY: SE GREENE	
NA	REVISIONS	INIT. DATE
		DocuSigned by: James Voso 3/6/2018 DATE



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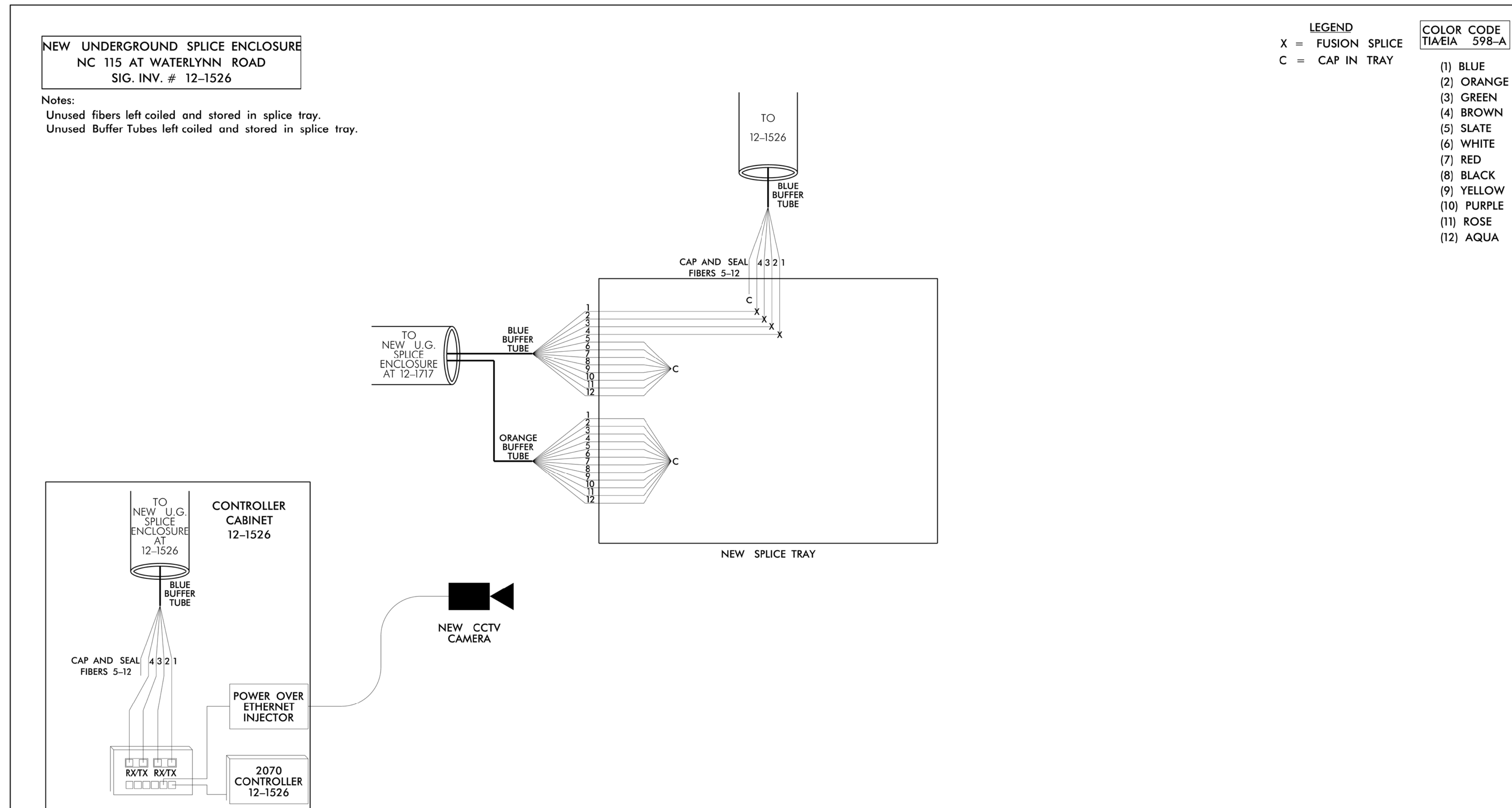
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	SPLICE DETAIL						
Prepared for the Offices of: 	DIVISION 12 IREDELL COUNTY MOORESVILLE PLAN DATE: FEBRUARY 2018 REVIEWED BY: JB VOSO PREPARED BY: SE GREENE						
NA	<table border="1"> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	REVISIONS	INIT.	DATE			
REVISIONS	INIT.	DATE					
	Documented by: James Voso 3/6/2018 DATE						



- 1) FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM, CONTACT THE DIVISION 12 DIVISION TRAFFIC ENGINEER, BYRON ENGLE, AT (980) 552-4214 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES WITH THE NECESSARY NETWORK CONFIGURATION DATA, INCLUDING BUT NOT LIMITED TO: THE PROJECT IP ADDRESS, DEFAULT GATEWAY, SUBNET MASK AND VLAN ID INFORMATION. NOTIFY THE DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL.
- 2) CONTRACTOR TO RECORD FINAL SPLICE ARRANGEMENT FOR COMPARISON TO THE SUPPLIED SPLICE DETAILS. IF DISCREPANCIES EXIST, PROVIDE AS-BUILT PLANS TO THE ENGINEER.
- 3) ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS.
- 4) INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING:
REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"

- 1) SPLICE LOCATION
- 2) DATE
- 3) COMPANY NAME
- 4) NAME OF INDIVIDUAL PERFORMING THE SPLICING

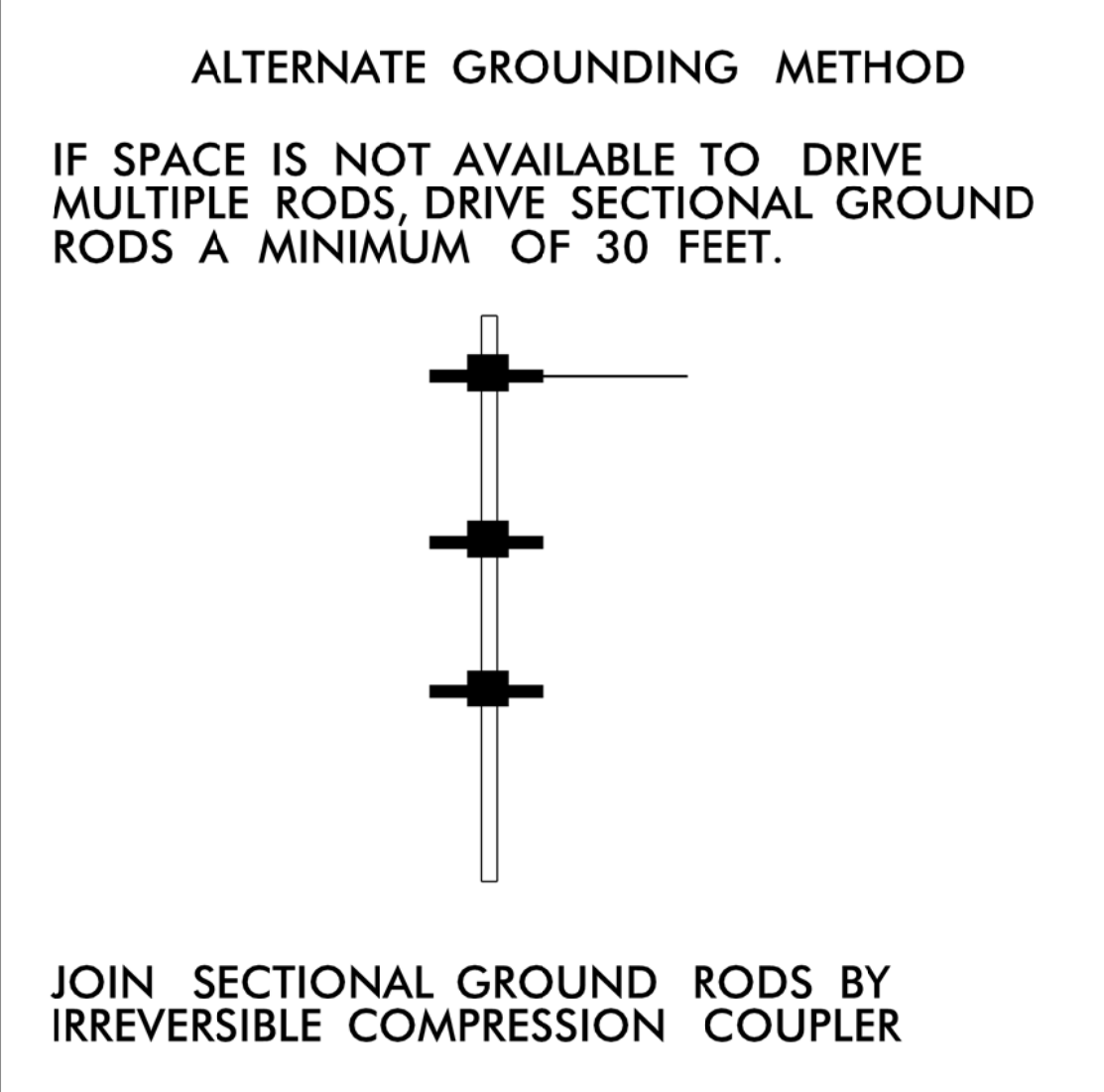
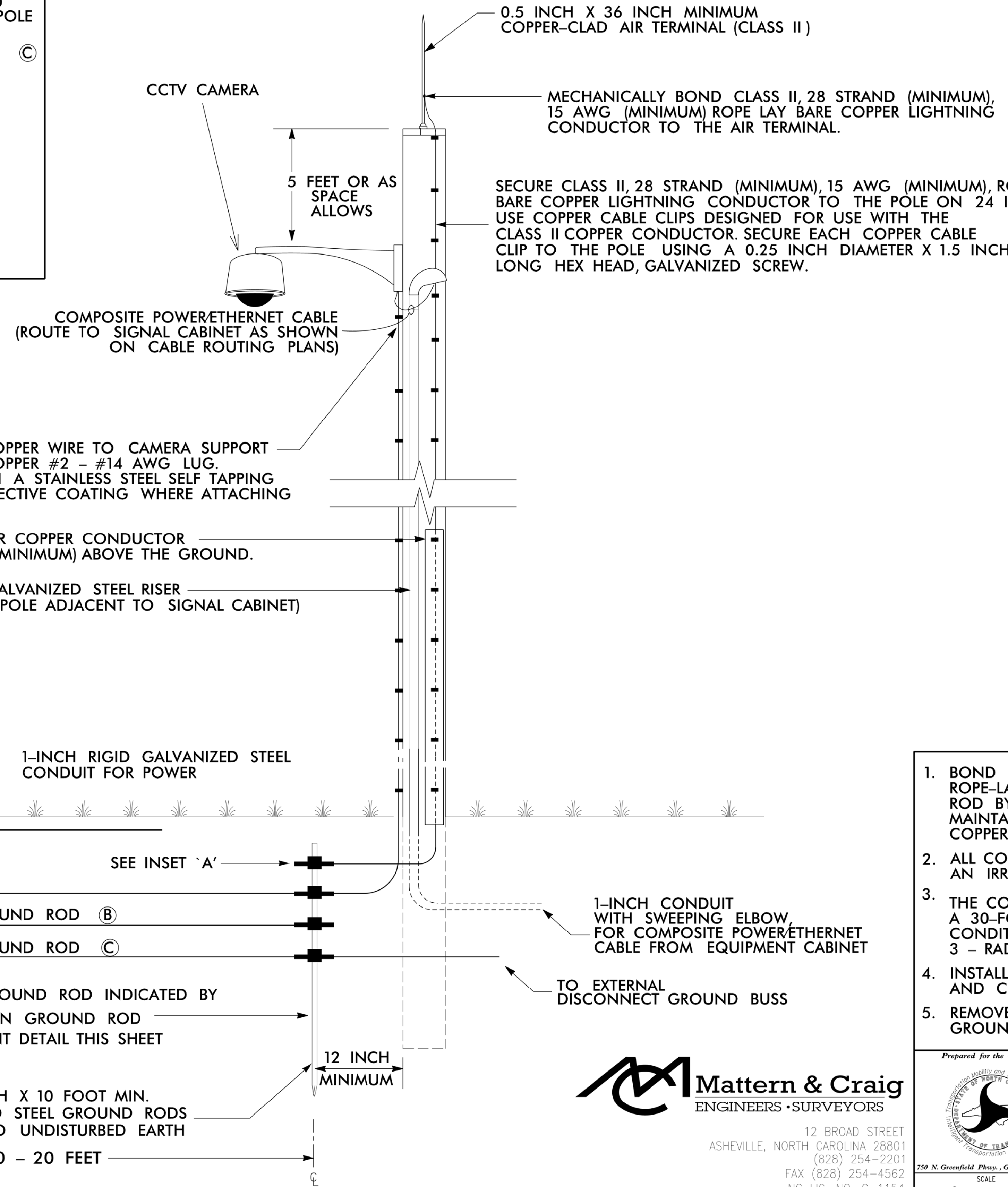
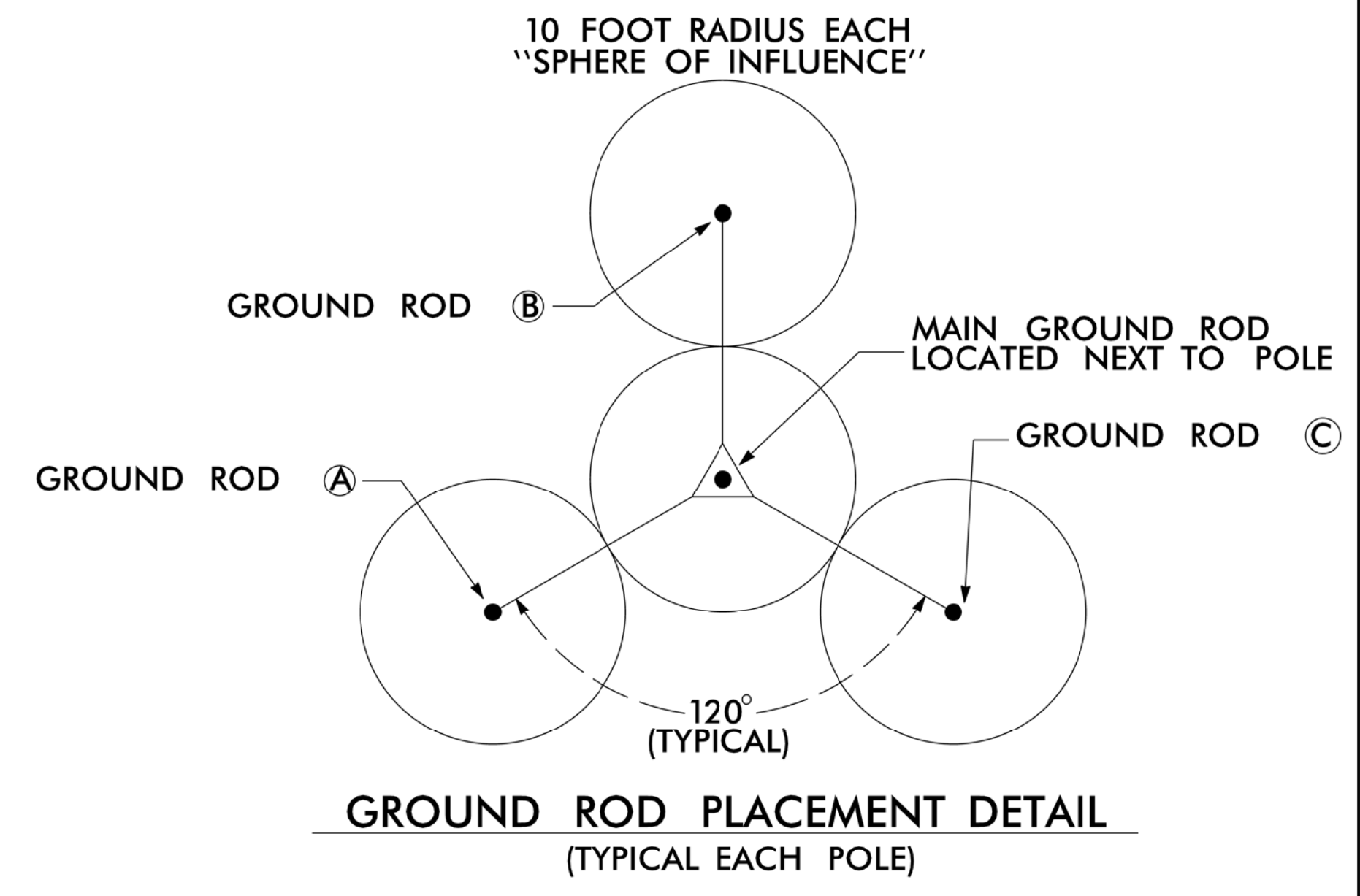
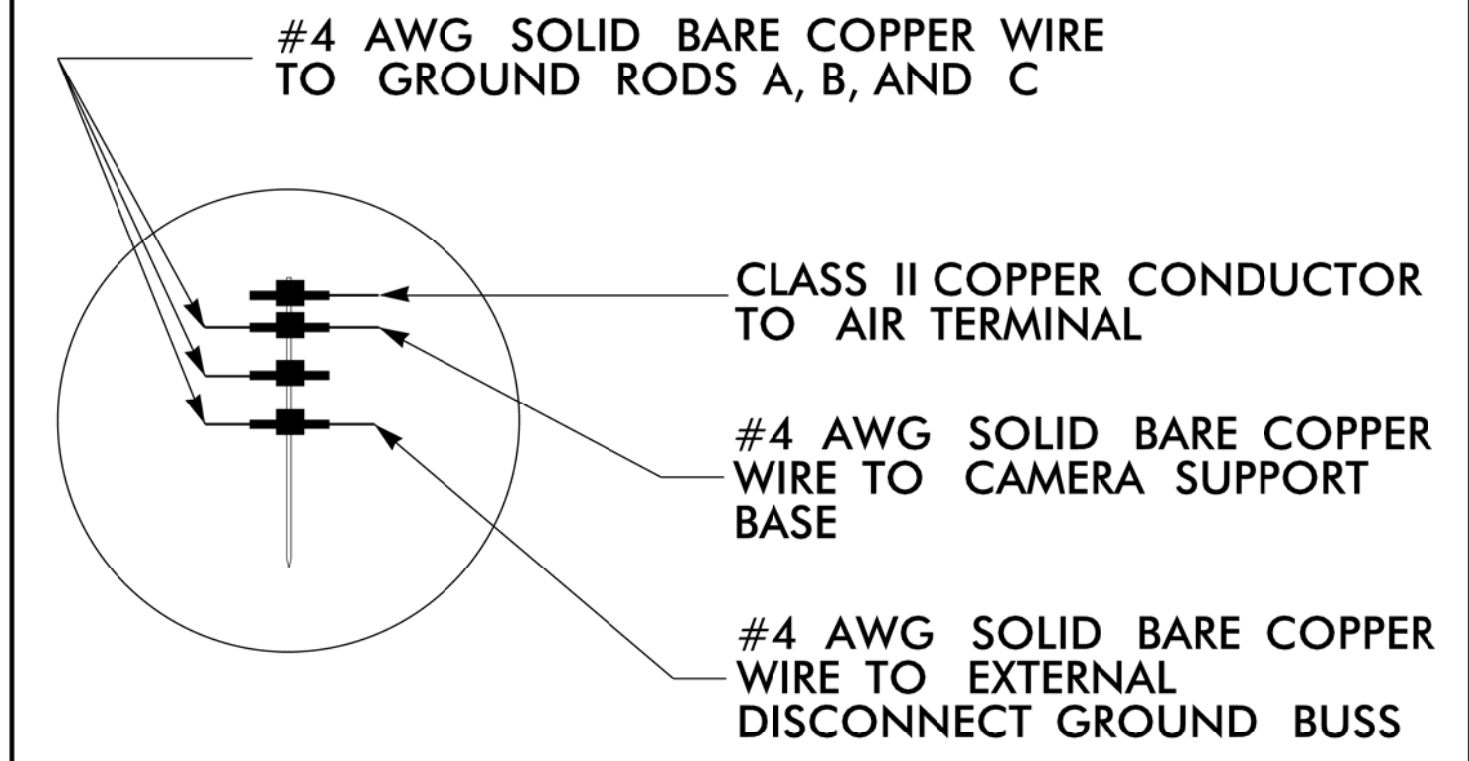
PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.



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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED										
	SPLICE DETAIL									
Prepared for the Offices of: 	DIVISION 12 IREDELL COUNTY MOORESVILLE PLAN DATE: FEBRUARY 2018 REVIEWED BY: JB VOSO PREPARED BY: SE GREENE									
NA	<table border="1"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	REVISIONS	INIT.	DATE						
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DocuSigned by: 	3/6/2018 DATE									

INSET 'A'



NOTES

1. BOND CLASS II, 28 STRAND (MINIMUM), 15 AWG (MINIMUM) ROPE-LAY BARE COPPER CONDUCTOR TO THE MAIN GROUND ROD BY AN IRREVERSIBLE MECHANICAL CRIMP. MAINTAIN MAXIMUM HORIZONTAL SEPARATION BETWEEN COPPER CONDUCTOR AND RISER.
2. ALL CONNECTIONS TO GROUND RODS SHOULD BE MADE WITH AN IRREVERSIBLE MECHANICAL CRIMP METHOD.
3. THE CONTRACTOR MAY, UPON APPROVAL OF THE ENGINEER, INSTALL A 30-FOOT SECTIONAL GROUND ROD FOR INSTANCES WHEN CONDITIONS WILL NOT ALLOW FOR THE INSTALLATION OF THE 3 - RADIAL GROUND RODS.
4. INSTALL MARKER TAPE DIRECTLY ABOVE ALL GROUNDING ELECTRODES AND CONDUCTORS AT A DEPTH OF 12 INCHES.
5. REMOVE BONDING JUMPER BETWEEN EQUIPMENT CABINET GROUND BUSS AND NEUTRAL BUSS.



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	Prepared for the Offices of: CCTV CAMERA INSTALLATION FOR WOOD SIGNAL POLES		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022599 JAMES B. VOSO 3/6/2018
	TYPICAL DETAIL		
PLAN DATE: FEBRUARY 2018 PREPARED BY: SE GREENE	REVIEWED BY: JB VOSO REVIEWED BY:	REVISIONS 2018 STANDARD SPECIFICATIONS UPGRADE TO IRREVERSIBLE MECHANICAL CRIMP	INIT. DATE A.J.S. 11/2017
SCALE: 0 NA NONE		CADD FILE NAME	DATE