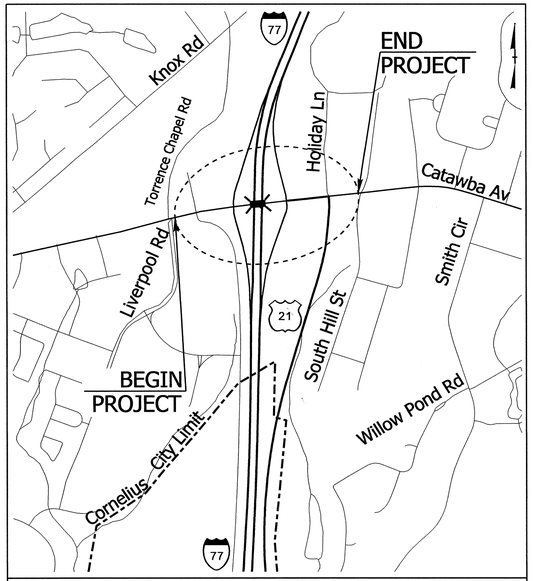
Project No.	Sheet No.
I–4733	Sig. 1

Project: I–4733

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

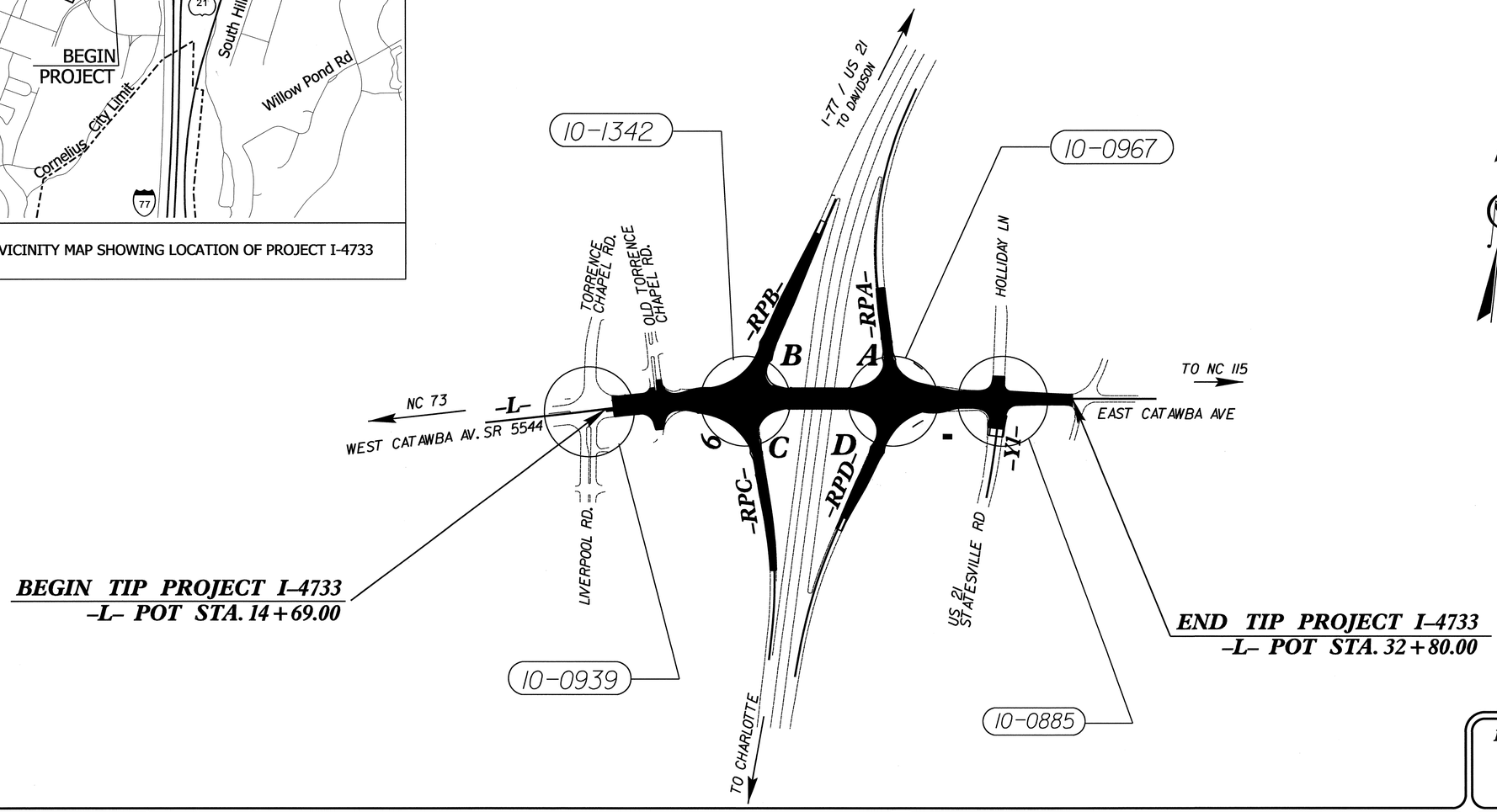
MECKLENBURG COUNTY



VICINITY MAP SHOWING LOCATION OF PROJECT I-4733

LOCATION: CORNELIUS, MODIFY INTERCHANGE AT I–77 AND SR 5544 (W. CATAWBA AVE.)

TYPE OF WORK: TRAFFIC SIGNAL AND SYSTEM CABLE ROUTING



Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.

Index of Plans

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

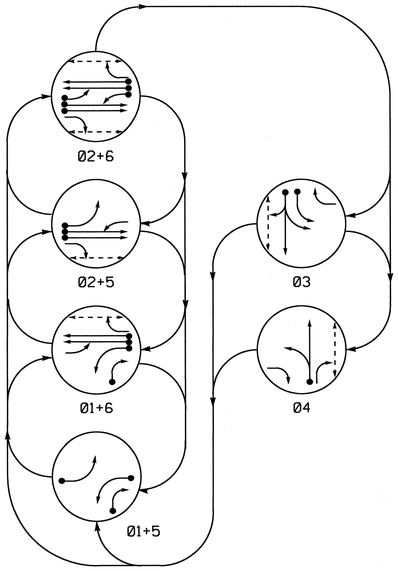
Greg A. Fuller, PE – State ITS and Signals Engineer
Timothy J. Williams, PE – Western Region Signals Engineer
George C. Brown, PE – Signal Equipment Design Engineer

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

750 N. Greenfield Parkway, Garner, NC 27529

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig. 2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

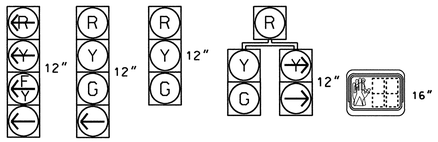
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11	←	←	F	F	R	R	Y
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R/←	Y
31	R	R	R	R	G/←	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G/←	R
42	R/→	R/→	R	R	R	G	R
51	←	F	←	F	R	R	Y
61	R	G	R	G	R	R	Y
62	R	G	R	G	R/→	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

All Heads L.E.D.



11, 51 | 31, 41 | 21, 32, 61 | 22, 42, 62 | P21, P22, P31, P32, P41, P42, P61, P62

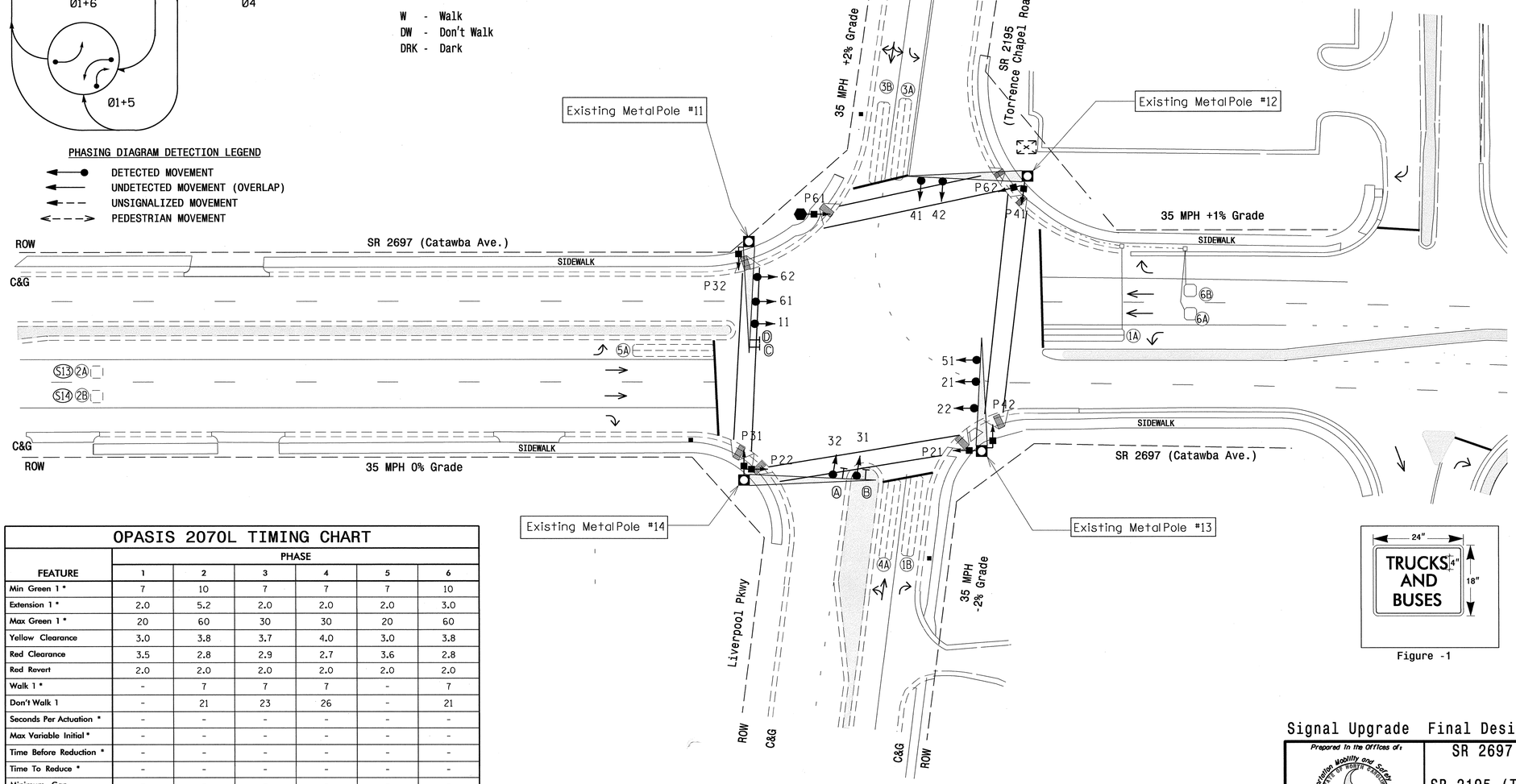
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	-
					6	Y	Y	-	-	-	-	-
1B	6X40	0	2-4-2	-	1	Y	Y	-	-	15	-	-
2A/S13	6X6	300	4	-	2	Y	Y	-	-	-	Y	-
2B/S14	6X6	300	4	-	2	Y	Y	-	-	-	Y	-
3A	6X40	0	2-4-2	-	3	Y	Y	-	-	3	-	-
3B	6X40	0	2-4-2	-	3	Y	Y	-	-	5	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-
5A	5X40	0	2-4-2	-	5	Y	Y	-	-	15	-	-
					2	Y	Y	Y	-	3	-	-
6A	6X6	70	3	Y	6	Y	Y	-	-	-	-	-
6B	6X6	70	3	Y	6	Y	Y	-	-	-	-	-

6 Phase
Fully Actuated
Catawba Avenue CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset # 0939.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way with Marker	
→	Directional Arrow	→
→	Pavement Marking Arrow	→
N/A	Wheelchair Ramp	
DD	Directional Drill	DD
	Metal Pole with Mastarm	
	Signal Pedestal	
Ⓐ	Dual Turn and Through Arrows Sign	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	No U-Turn Sign (R 3-4)	Ⓒ
Ⓓ	"TRUCKS AND BUSES" Sign (See Figure -1)	Ⓓ

Figure -1

OPASIS 2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	10	7	7	7	10
Extension 1 *	2.0	5.2	2.0	2.0	2.0	3.0
Max Green 1 *	20	60	30	30	20	60
Yellow Clearance	3.0	3.8	3.7	4.0	3.0	3.8
Red Clearance	3.5	2.8	2.9	2.7	3.6	2.8
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	7	7	7	-	7
Don't Walk 1	-	21	23	26	-	21
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
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.

Signal Upgrade Final Design

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

SR 2697 (Catawba Avenue)
at
SR 2195 (Torrence Chapel Road)
/ SR 2317 (Liverpool Pkwy)

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: April 2013 | REVIEWED BY: T. Williams
PREPARED BY: W. Mahbooba | REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0 30 1"=30'

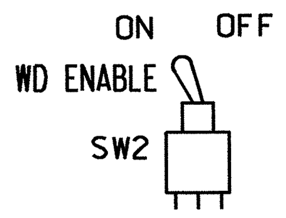
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY WILLIAMS
Signature | Date 4/30/13

SIG. INVENTORY NO. 10-0939

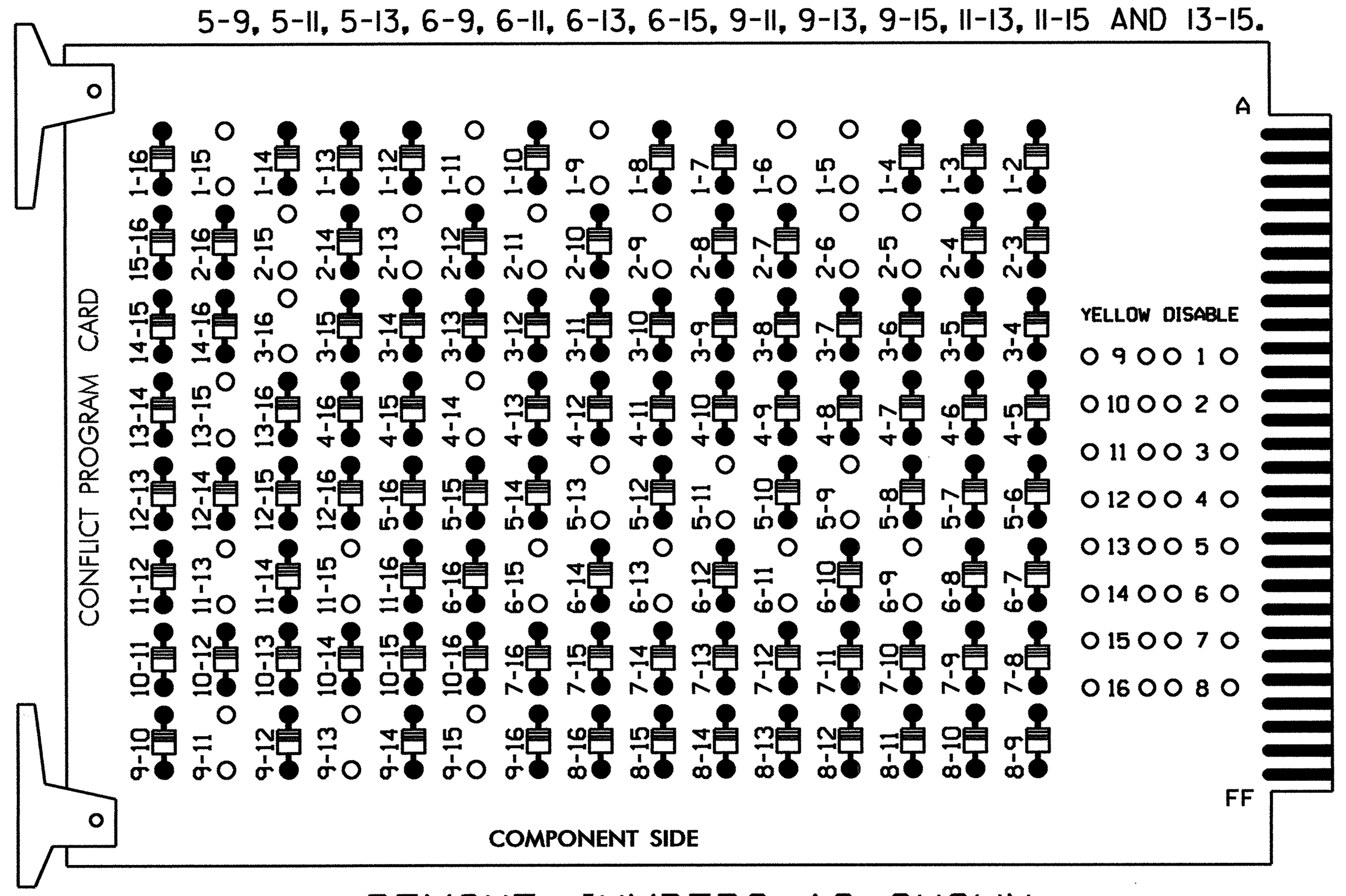
30-APR-2013 13:47
R:\Traffic\Signal\Designs\Signals\10-0939\10-0939.sig_dsn.20130430.dgn
mwMahbooba

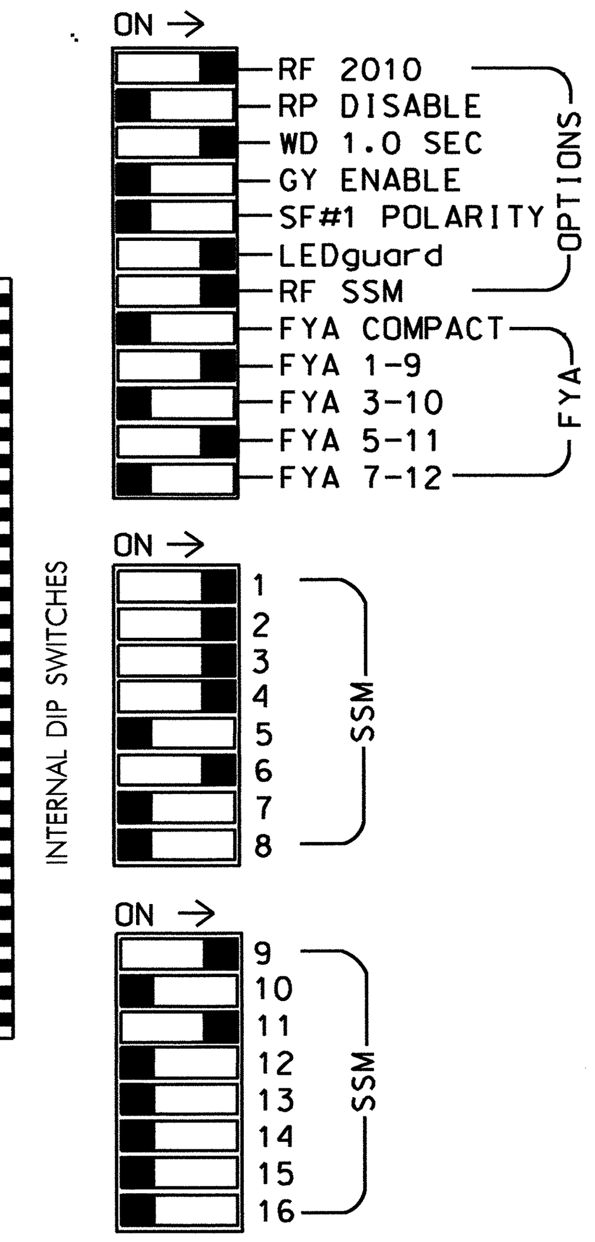
EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-16, 4-14, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 9-11, 9-13, 9-15, 11-13, 11-15 AND 13-15.





REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Make sure jumpers SEL2-SEL5 are present on the monitor board.

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. 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 5,7, 8,10,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2, 3, 4 and 6 for 'STARTUP PED CALL'.
6. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
7. The cabinet and controller are part of the Catawba Avenue Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER..............2070L
CABINET.................332 /W/ AUX
SOFTWARE................ECONOLITE OASIS
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S1,S2,S2P,S3,S4,S4P,S5,S6,S6P,S8P, S9,S12
PHASES USED.............1,2,2 PED,3,3 PED,4,4 PED,5,6,6 PED
OVERLAP "A".............1+2
OVERLAP "B".............NOT USED
OVERLAP "C".............5+6
OVERLAP "D".............NOT USED

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	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	42	21,22	P21, P22	31	32	62	41	42	22	P41, P42	51★	61,62	P61, P62	NU	NU	P31, P32	11★	NU	NU	51★	NU	NU
RED		✳	128		116	116		101	101				134										
YELLOW			129		117	117		102	102			✳	135										
GREEN			130		118	118		103	103				136										
RED ARROW																		A121			A114		
YELLOW ARROW		126					117			102								A122			A115		
FLASHING YELLOW ARROW																		A123			A116		
GREEN ARROW	127	127			118		118	103		103		133											
(Don't Walk hand)				113							104			119			110						
(Walk person)				115							106			121			112						

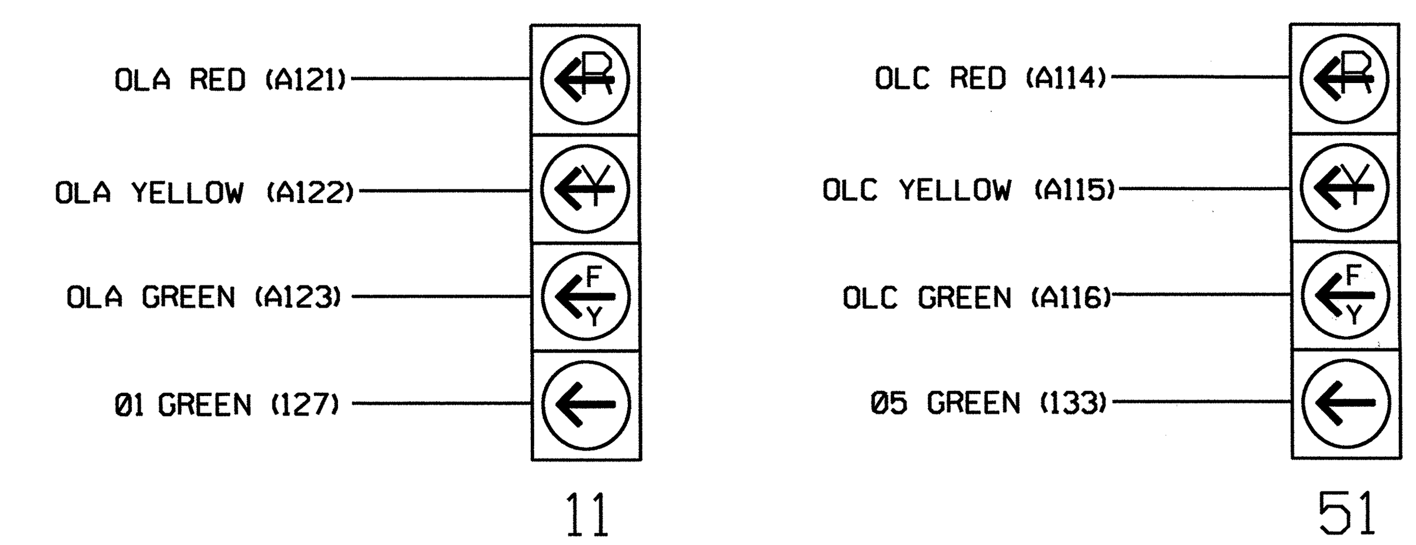
NU = Not Used

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

★ See pictorial of head wiring in detail below.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

1. The sequence display for this signal requires special logic programming. See sheet 2 of 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø 1 1A	ø 1 1B	ø2/SYS 2A/S13	WIRED INPUT ⊗	SLOT EMPTY	ø 3 3A	ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø2 PED DC ISOLATOR	ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	NOT USED	ø2/SYS 2B/S14			ø 3 3B	NOT USED					ø4 PED DC ISOLATOR	ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	ø 5 5A	SLOT EMPTY	ø 6 6A	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED		ø 6 6B											

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
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
1B	TB2-5,6	I2U	39	1	2	1	Y	Y			15
2A/S13	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
2B/S14	TB2-11,12	I3L	76	38	42	2/SYS	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			5
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
5A[2]	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y	Y		3
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P31,P32	TB8-8,9	I13L	70	32	PED 8	3 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from J1-W to I4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

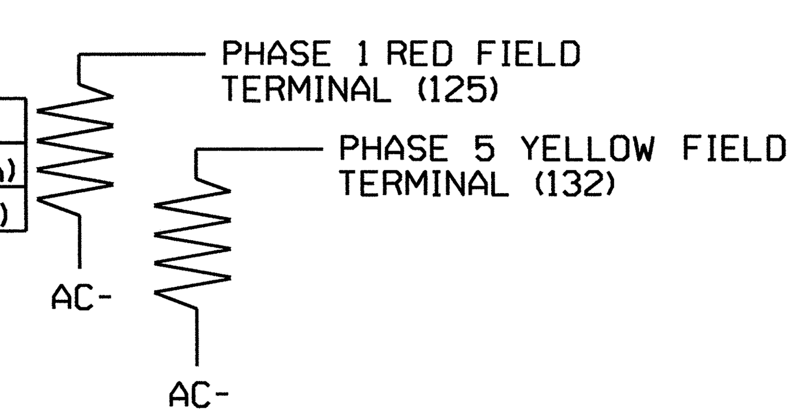
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0939
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2697 (Catawba Avenue) at SR 2195 (Torrence Chapel Rd.) /SR 2317 (Liverpool Pkwy)

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2013 REVIEWED BY: T. Joyner
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE 5/2/13 DATE
SIG. INVENTORY NO. 10-0939

02-MAY-2013 09:30
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Strickland*100939_sm_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig. 4

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:          |1234567891011121314151 6
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   <- NOTICE GREEN FLASH
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
```

PRESS '+' TWICE

```
 PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE:          |1234567891011121314151 6
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   <- NOTICE GREEN FLASH
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
```

OVERLAP PROGRAMMING COMPLETE

PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
2. ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
3. SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING
4. ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
5. BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
6. SELECT '1' (OUTPUT ASSIGNMENTS)
7. ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
8. REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
2. CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
3. MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

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
```

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

PRESS '+'

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

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

PRESS '+'

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

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

PRESS '+'

```
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
```

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

PRESS '+'

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

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

PRESS '+'

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0939
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 2697 (Catawba Avenue)
at
SR 2195 (Torrence Chapel Rd.)
/SR 2317 (Liverpool Pkwy)

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: April 2013 | REVIEWED BY: T. Jorgl
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

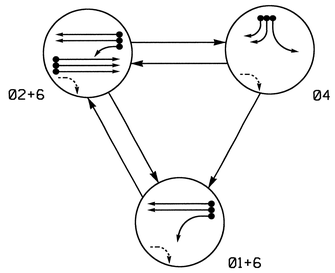
SIGNATURE | DATE 5/2/13

SIG. INVENTORY NO. 10-0939

02-MAY-2013 09:31
S:\Signals\Workgroups\Sig Mgmt\Strickland\10939_sheet_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig. 5

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

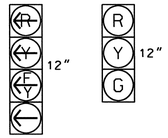
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+6	PHASE 02+6	PHASE 04	PHASE FLASH
11	←	↓	→	↓
21, 22	R	G	R	Y
41, 42	R	R	G	R
43, 44	R	R	G	R
61, 62	G	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



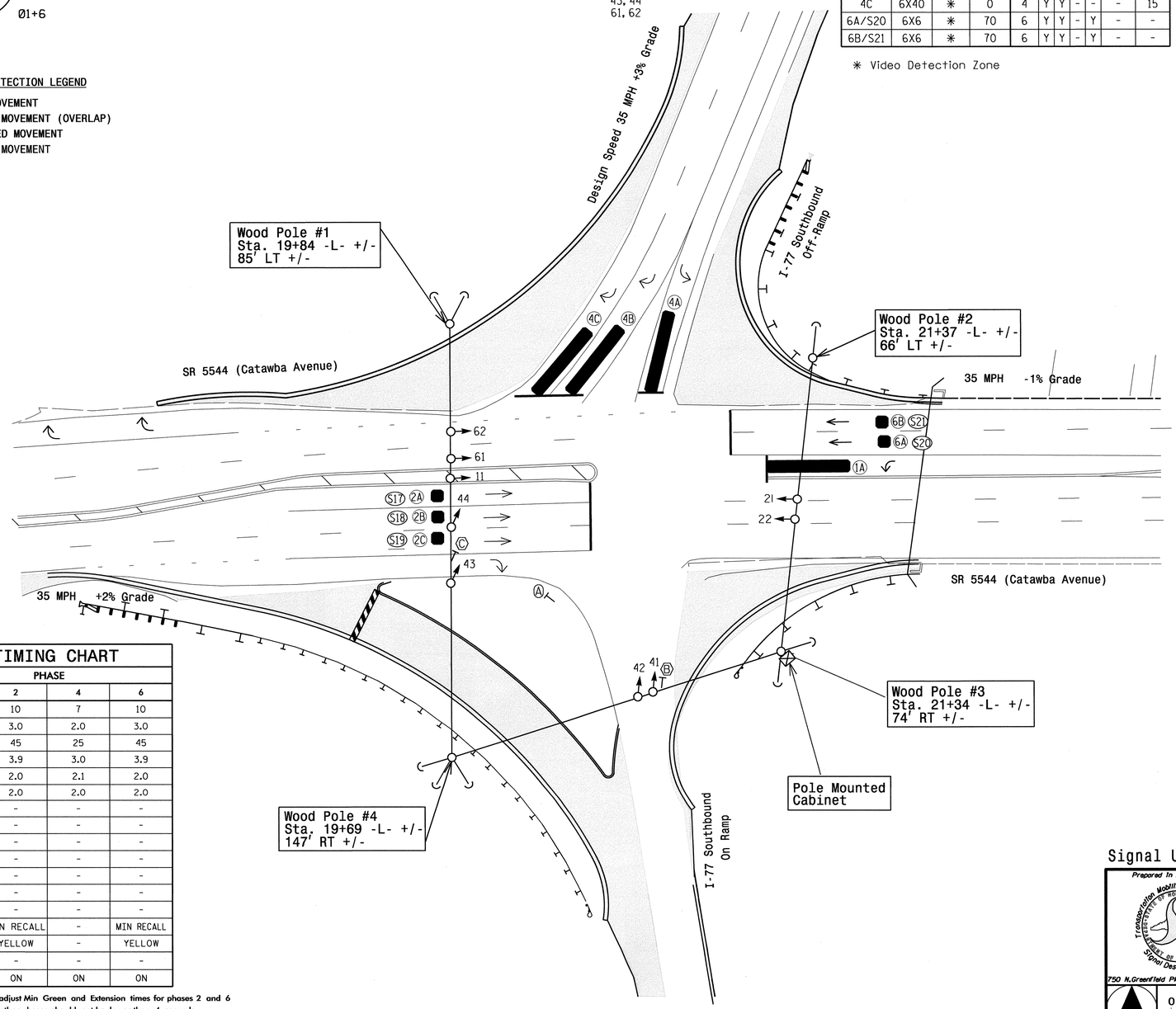
11

21, 22
41, 42
43, 44
61, 62

OASIS 2070L DETECTION ZONE INSTALLATION

DETECTION ZONES				DETECTOR PROGRAMMING						
ZONE	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME
1A	6X40	*	0	1	Y	Y	-	-	-	15
				6	Y	Y	-	-	-	-
2A/S17	6X6	*	70	2	Y	Y	-	Y	-	-
2B/S18	6X6	*	70	2	Y	Y	-	Y	-	-
2C/S19	6X6	*	70	2	Y	Y	-	Y	-	-
4A	6X40	*	0	4	Y	Y	-	-	-	-
4B	6X40	*	0	4	Y	Y	-	-	-	15
4C	6X40	*	0	4	Y	Y	-	-	-	15
6A/S20	6X6	*	70	6	Y	Y	-	Y	-	-
6B/S21	6X6	*	70	6	Y	Y	-	Y	-	-

* Video Detection Zone



OASIS 2070L TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 4	PHASE 6
Min Green 1 *	7	10	7	10
Extension 1 *	2.0	3.0	2.0	3.0
Max Green 1 *	20	45	25	45
Yellow Clearance	3.0	3.9	3.0	3.9
Red Clearance	2.8	2.0	2.1	2.0
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
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.

3 Phase
Fully Actuated
Catawba Avenue CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Incorporate Loop Emulator Detection system for vehicle detections.
7. Provide the Engineer with the Manufacturer's approved Video Detection locations and mounting heights to obtain detection zones as shown.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset #1342.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭↓	Pedestrian Signal Head With Push Button & Sign	▪↓
○—	Signal Pole with Guy	●—
○~	Signal Pole with Sidewalk Guy	●~
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊡
□	Junction Box	▪
------	2-in Underground Conduit	-·-·-
N/A	Right of Way	------
→	Directional Arrow	→
▬	Video Detection Zone	▬
N/A	Guardrail	⊥⊥
▒	Construction Zone	▒
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ

Signal Upgrade Temporary Design 1 -TCP- Phase III

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

SR 5544 (Catawba Avenue)
at
I-77 SB Ramps B, C

Division 10 Mecklenburg County Cornelius

PLAN DATE:	April 2013	REVIEWED BY:	T. Williams
PREPARED BY:	M. Mahbooba	REVIEWED BY:	

REVISIONS	INIT.	DATE

SCALE 0 30 1"=30'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 4/30/13 DATE
SIG. INVENTORY NO. 10-1342 TI

30-APR-2013 13:49
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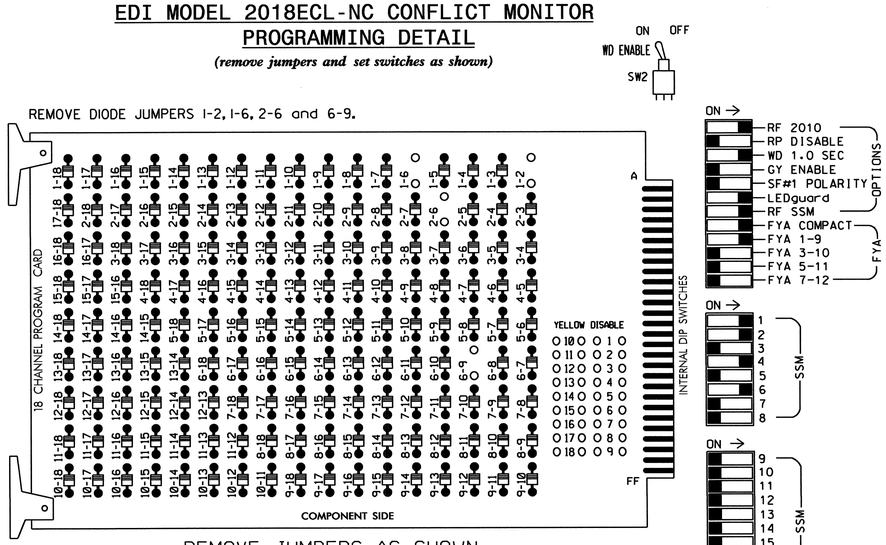
mmcbee

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



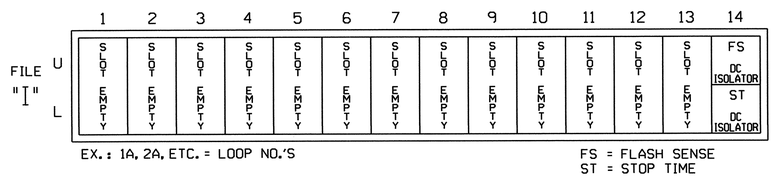
■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.
5. Special cabinet wiring is required to utilize FYA COMPACT mode. See Ped Yellow Conflict Monitor Wiring Detail on this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

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 Start Up In Green.
4. Program phases 2 and 6 for Yellow Flash and overlap 1 as Wag Overlaps.
5. The cabinet and controller are part of the Catawba Avenue Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....336
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S3,S5,S8
PHASES USED.....1,2,4,6
OVERLAP "A".....1+2
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

PED YELLOW CONFLICT MONITOR WIRING DETAIL

In order to use FYA COMPACT mode on the 2018ECL-NC Monitor, the cabinet must be wired such that the (unused) Ped Yellow load switch outputs are wired to the conflict monitor.

This is accomplished through a Molex plug connection found on the inside panel of the output file.

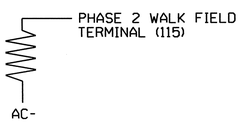
Fold down rear panel of output file and find a set of 3 white Molex connectors. Plug together the two connectors labeled as shown below:

1-2PY	1-CMU-13
2-4PY	2-CMU-16
3-6PY	3-CMU-R
4-8PY	4-CMU-U

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3		S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	9	13	3	4	14	5	6	15	7	8	16
PHASE	OLA	2	1 GRN	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11★	21,22	11★	NU	NU	41,42, 43,44	NU	NU	61,62	NU	NU	NU	NU
RED		128				101			134				
YELLOW		129				102			135				
GREEN		130				103			136				
RED ARROW	125												
YELLOW ARROW	126												
FLASHING YELLOW ARROW	127												
✋													
GREEN ARROW			114										
🚶				*									

NU = Not Used

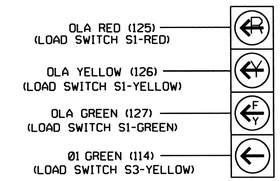
* Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail below.

NOTE: Load Switches S1 and S3 require output remapping. See sheet 3 of 3 of this electrical detail for instructions.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)



NOTE

1. The sequence display for this signal requires special logic and output remapping. See sheet 2 for programming instructions.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1342T1
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 5544 (Catawba Avenue)
at
I-77 SB Ramps B, C

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: April 2013 | REVIEWED BY: T. Jaa

PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE 5/2/13 DATE

SIG. INVENTORY NO. 10-1342T1

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).

```
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 #14 ON
SET OUTPUT  ASSIGNMENT #15 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #2  (+/-COMMAND#)
IF  ACTIVE PHASE        #1  IS ON

            SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #16 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #3  (+/-COMMAND#)
IF  YELLOW ON PHASE     #1  IS ON

            SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #15 ON
```

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

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

OUTPUT 14 = Overlap A Red
OUTPUT 15 = Overlap A Yellow
OUTPUT 16 = Overlap A Green
OUTPUT 33 = Phase 1 Green

Note: All outputs shown above have been remapped. See sheet 3 of this electrical detail.

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:|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)..0.0
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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1342T1
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 5544 (Catawba Avenue)
at
I-77 SB Ramps B, C

Division 10 | Mecklenburg County | Cornelius

PLAN DATE:	April 2013	REVIEWED BY:	T. J[illegible]
PREPARED BY:	C. Strickland	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE: George C. Brown DATE: 5/2/13

SIG. INVENTORY NO. 10-1342T1

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig. 8

FYA SIGNAL OUTPUT REMAPPING ASSIGNMENT PROGRAMMING DETAIL
FOR SIGNAL HEAD 11

(program controller as shown below)

STEP 1

FROM MAIN MENU PRESS '6' (OUTPUTS), THEN
'1' (OUTPUT ASSIGNMENTS).
WITH CURSOR IN "OUTPUT ASSIGNMENT#" POSITION, ENTER "14"

```
PAGE:1  C1 PIN:16  VEHICLE PHASE
OUTPUT ASSIGNMENT #.................14
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=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.........................._
```

THE OUPUT IS SET AS A VEHICLE PHASE BY DEFAULT, THIS "Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.

ENTER A "Y" FOR VEHICLE OVERLAP.

```
PAGE:1  C1 PIN:16  VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1,P=16)...1
SELECT COLOR(0=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 THE 'ENT' KEY AFTER INPUTTING DATA. THEN 'ESC'.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS 'VEHICLE OVERLAP' AS SHOWN BELOW.

```
PAGE:1  C1 PIN:16  VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.................14
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED........................._
VEHICLE PHASE.......................
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.........................._
```

PRESS "+" KEY FOR OUTPUT 15

STEP 2

```
PAGE:1  C1 PIN:17  VEHICLE PHASE
OUTPUT ASSIGNMENT #.................15
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=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.........................._
```

THE OUPUT IS SET AS A VEHICLE PHASE BY DEFAULT, THIS "Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.

ENTER A "Y" FOR VEHICLE OVERLAP.

```
PAGE:1  C1 PIN:17  VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1,P=16)...1
SELECT COLOR(0=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 THE 'ENT' KEY AFTER INPUTTING DATA. THEN 'ESC'.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS 'VEHICLE OVERLAP' AS SHOWN BELOW.

```
PAGE:1  C1 PIN:17  VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.................15
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED.........................
VEHICLE PHASE.......................
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.........................._
```

PRESS "+" KEY FOR OUTPUT 16

STEP 3

```
PAGE:1  C1 PIN:18  VEHICLE PHASE
OUTPUT ASSIGNMENT #.................16
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=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.........................._
```

THE OUPUT IS SET AS A VEHICLE PHASE BY DEFAULT, THIS "Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.

ENTER A "Y" FOR VEHICLE OVERLAP.

```
PAGE:1  C1 PIN:18  VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1,P=16)...1
SELECT COLOR(0=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 THE 'ENT' KEY AFTER INPUTTING DATA. THEN 'ESC'.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS 'VEHICLE OVERLAP' AS SHOWN BELOW.

```
PAGE:1  C1 PIN:18  VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.................16
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED.........................
VEHICLE PHASE......................._
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.........................._
```

PRESS "+" UNTIL OUTPUT 33 IS REACHED.

STEP 4

```
PAGE:1  C1 PIN:35  NOT ENABLED
OUTPUT ASSIGNMENT #.................33
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED.........................Y
VEHICLE PHASE.......................Y
PEDESTRIAN PHASE...................._
VEHICLE OVERLAP.....................
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.........................._
```

THE OUPUT IS SET AS "NOT ENABLED" BY DEFAULT, THIS "Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.

ENTER A "Y" FOR VEHICLE PHASE.

```
PAGE:1  C1 PIN:35  NOT ENABLED
SELECT VEHICLE PHASE (1-16).........1
SELECT COLOR(0=RED,1=YEL,2=GRN).....2
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE PHASE' THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN.

PRESS THE 'ENT' KEY AFTER INPUTTING DATA. THEN 'ESC'.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS 'VEHICLE PHASE' AS SHOWN BELOW.

```
PAGE:1  C1 PIN:35  VEHICLE PHASE
OUTPUT ASSIGNMENT #.................33
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED.........................
VEHICLE PHASE.......................Y
PEDESTRIAN PHASE...................._
VEHICLE OVERLAP....................._
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.........................._
```

OUTPUT PROGRAMMING FOR HEAD 11 COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1342T1
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Temp 1 - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 5544 (Catawba Avenue) at I-77 SB Ramps B, C

Division 10 | Mecklenburg County | Cornelius

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

PLAN DATE: April 2013	REVIEWED BY: T. J.
PREPARED BY: C. Strickland	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE: George C. Brown DATE: 5/2/13
SIG. INVENTORY NO. 10-1342T1

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig. 9

PHASING DIAGRAM

Program all phases for 'Red Rest'

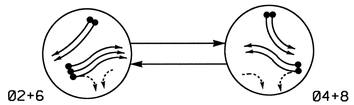
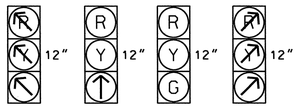


TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21, 22, 23	↑	R	R
41, 42	R	G	R
43	↖	↘	↖
61, 62	G	R	R
63	↗	↙	↙
81, 82	R	↑	R

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070L DETECTION ZONE INSTALLATION									
DETECTION ZONES				DETECTOR PROGRAMMING					
ZONE	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME
2A	6X40	*	0	2	Y	Y	-	-	-	-
2B	6X40	*	0	2	Y	Y	-	-	-	-
2C	6X40	*	0	2	Y	Y	-	-	-	-
4A	6X40	*	0	4	Y	Y	-	-	-	-
4B	6X40	*	0	4	Y	Y	-	-	-	-
6A	6X40	*	0	6	Y	Y	-	-	-	-
6B	6X40	*	0	6	Y	Y	-	-	-	-
8A	6X40	*	0	8	Y	Y	-	-	-	-
8B	6X40	*	0	8	Y	Y	-	-	-	-

*Video Detection Zone

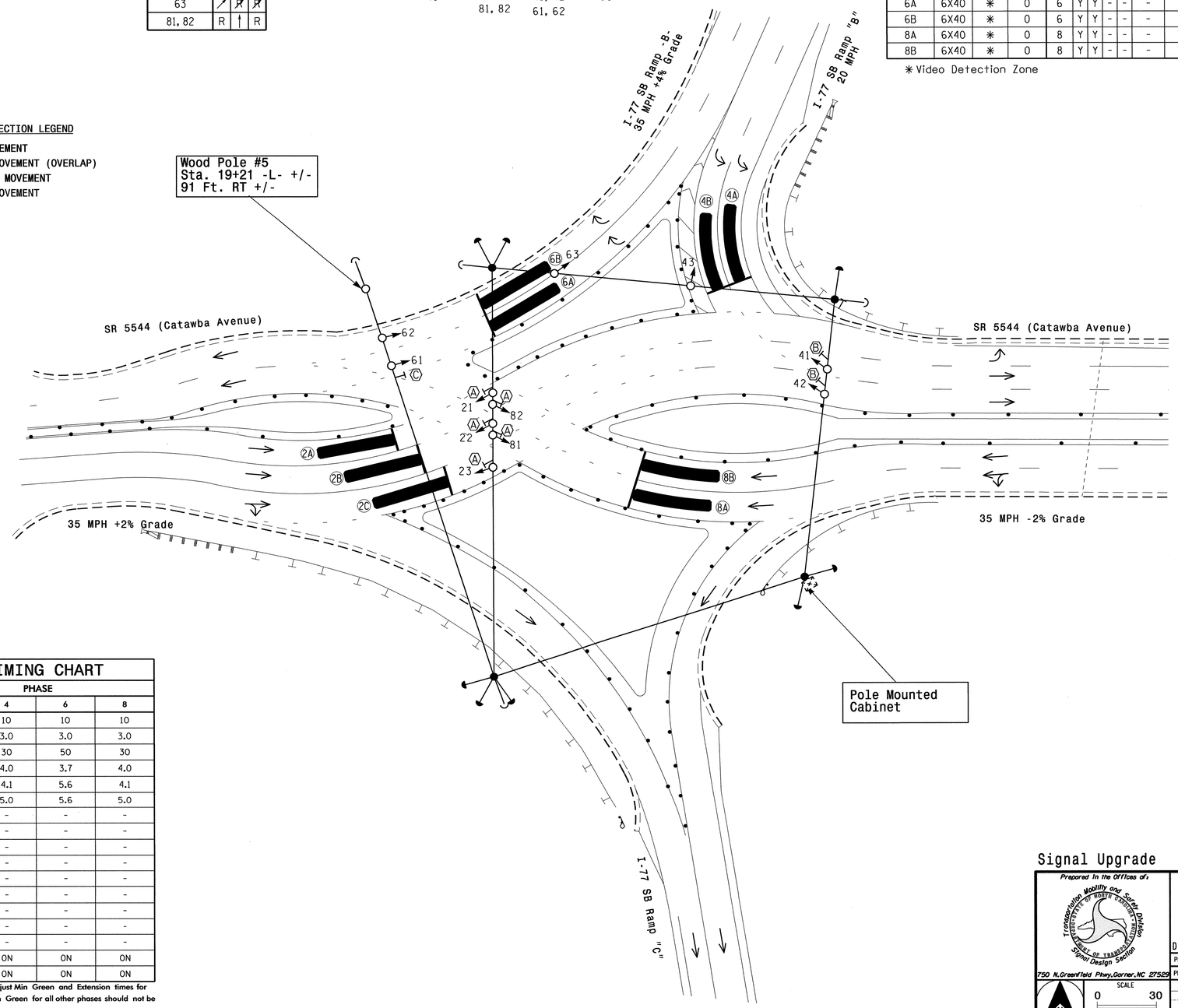
2 Phase
Fully Actuated
Catawba Avenue CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation.
3. Set all detector units to presence mode.
4. Program all phases for "Red Rest".
5. Incorporate Loop Emulator Detection system for vehicle detection.
6. Provide the Engineer with the manufacturer's approved Video Detection locations and mounting heights to obtain detection zones as shown.
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 # 1342.

PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊡
□	Junction Box	■
----	2-in Underground Conduit	----
N/A	Right of Way	----
→	Directional Arrow	→
N/A	Guardrail	I I
••	Construction Zone Drums	••
▬	Video Detection Zone	▬
Ⓐ	Through Arrow "ONLY" Sign (R3-5A)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	No Left Turn Sign (R3-2)	Ⓒ

OASIS 2070L TIMING CHART				
FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green 1 *	10	10	10	10
Extension 1 *	3.0	3.0	3.0	3.0
Max Green 1 *	50	30	50	30
Yellow Clearance	3.7	4.0	3.7	4.0
Red Clearance	5.6	4.1	5.6	4.1
Red Revert	5.6	5.0	5.6	5.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	-	-	-
Vehicle Call Memory	-	-	-	-
Dual Entry	ON	ON	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.

Signal Upgrade Temporary Design 2 -TCP- Phase IV

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

SR 5544 (Catawba Avenue)
at
I-77 SB Ramps B, C

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2013 REVIEWED BY: T. Williams
PREPARED BY: W. Wahbooba REVIEWED BY:

SCALE 0 30 1"=30'

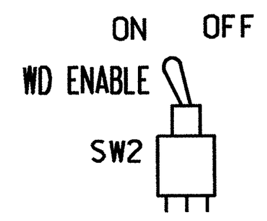
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 4/30/13 DATE
SIG. INVENTORY NO. 10-1342 T2

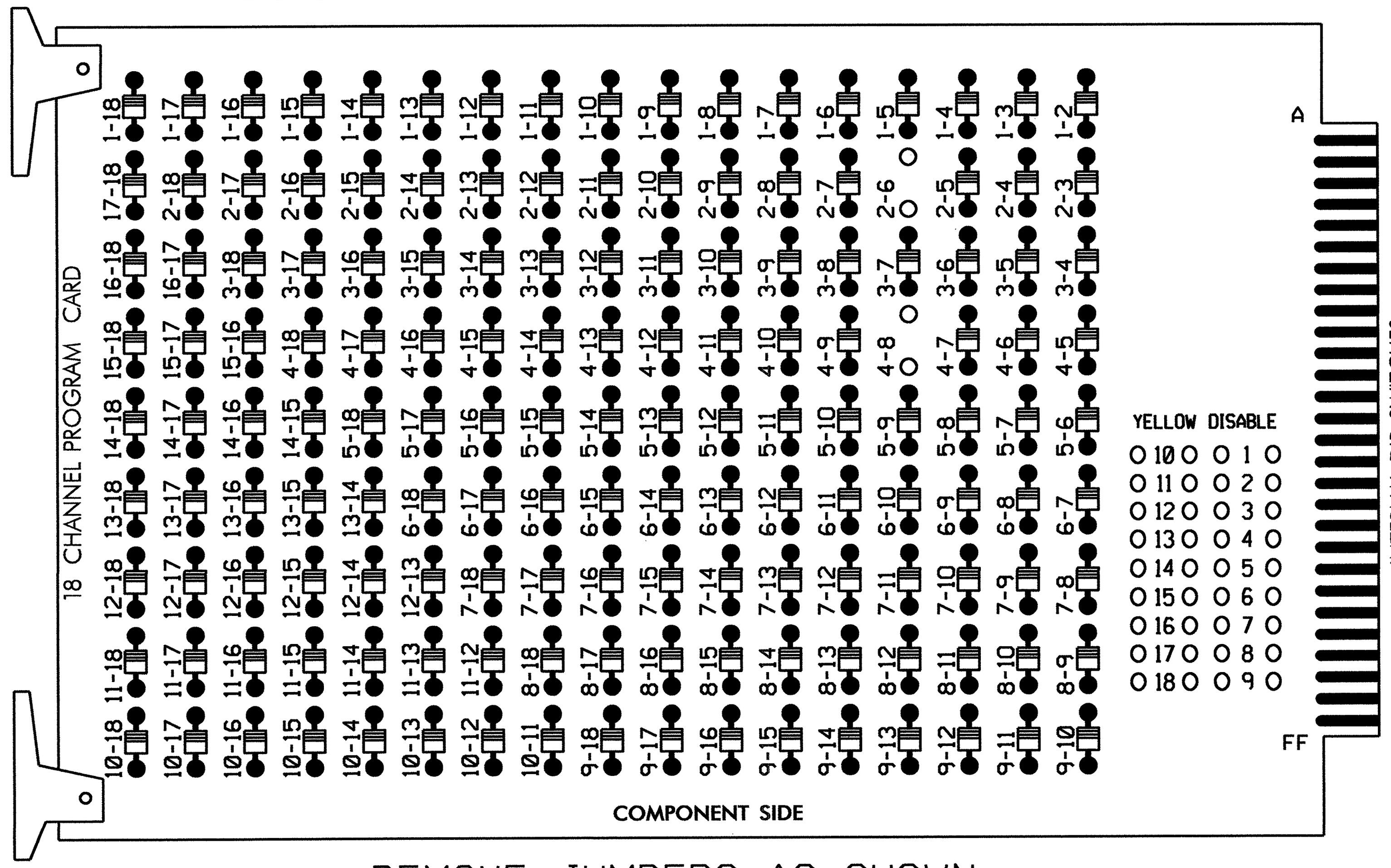
06-MAY-2013 15:51
R:\Traffic\Signals\Designs\Signals\10-1342\10-134212_sig_dsn_20130430.dgn
mwahbooba

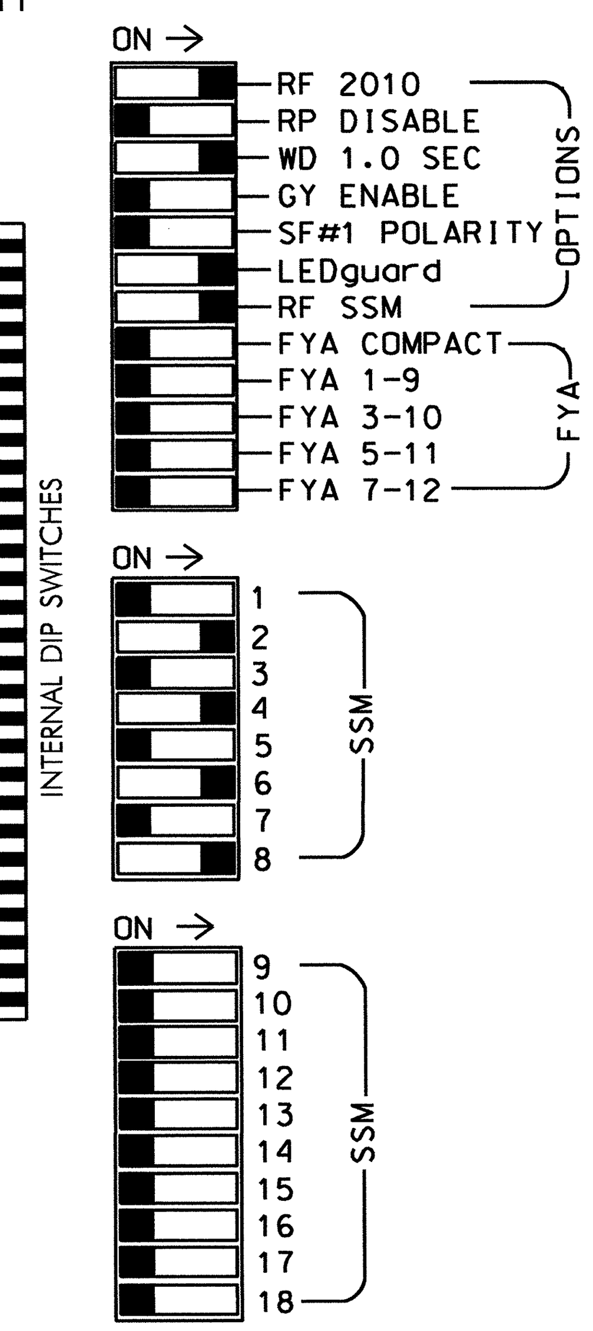
EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 2-6 and 4-8.





REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 2, 4, 6 and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2, 4, 6 and 8 for Red Rest.
5. Program phases 2 and 6 for Startup Red Clear.
6. Program phases 2 and 6 as First Phases.
7. The cabinet and controller are part of the Catawba Avenue Closed Loop System.

! 8. Restore controller to factory defaults before programming controller. !

EQUIPMENT INFORMATION

CONTROLLER..............2070L
CABINET.................336
SOFTWARE................ECONOLITE OASIS
CABINET MOUNT...........POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S2,S5,S8,S11
PHASES USED.............2,4,6,8
OVERLAPS................NONE

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig. 10

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5		S6	S7	S8		S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4		14	5	6		15	7	8	16
PHASE	1	2	2 PED	3	4		4 PED	5	6		6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21, 22,23	NU	NU	41,42	43	NU	NU	61,62	63	NU	NU	81,82	NU
RED		128			101				134				107	
YELLOW		129			102				135				108	
GREEN					103				136					
RED ARROW						101				134				
YELLOW ARROW						102				135				
GREEN ARROW		130				103				136			109	

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"		1	2	3	4	5	6	7	8	9	10	11	12	13	14
	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR

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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

~~PED YELLOW CONFLICT MONITOR WIRING DETAIL~~

~~In order to use FYA COMPACT mode on the 2018ECL-NC Monitor, the cabinet must be wired such that the (unused) Ped Yellow load switch outputs are wired to the conflict monitor.~~

~~This is accomplished through a Molex plug connection found on the inside panel of the output file.~~

~~Fold down rear panel of output file and find a set of 3 white Molex connectors. Plug together the two connectors labeled as shown below:~~

~~1-2PY ---- 1-CMU-13~~
~~2-4PY ---- 2-CMU-16~~
~~3-6PY ---- 3-CMU-R~~
~~4-8PY ---- 4-CMU-U~~

DISCONNECT PED YELLOW CONFLICT MONITOR WIRING DETAIL

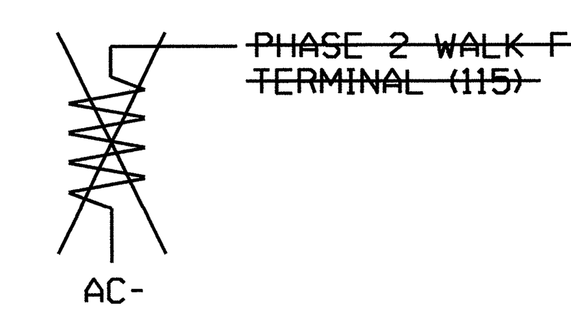
This is accomplished through a Molex plug connection found on the inside panel of the output file.

Fold down rear panel of output file and find a set of 3 white Molex connectors. Disconnect the two connectors labeled as shown below:

1-2PY --/ /-- 1-CMU-13
2-4PY --/ /-- 2-CMU-16
3-6PY --/ /-- 3-CMU-R
4-8PY --/ /-- 4-CMU-U

LOAD RESISTOR REMOVAL DETAIL

(remove resistor as shown below)



! IMPORTANT: If present, remove load resistor PHASE 2 WALK FIELD TERMINAL (115)

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1342T2
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Temp 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 5544 (Catawba Avenue)
at
I-77 SB Ramps B, C

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2013	REVIEWED BY: T. Joyner
PREPARED BY: C. Strickland	REVIEWED BY:

REVISIONS	INIT.	DATE

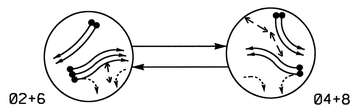
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN
SIGNATURE 5/2/13 DATE
SIG. INVENTORY NO. 10-1342T2

01-MAY-2013 14:00
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Strickland*101342_sm_ele_xxx.dgn
cestrickland

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.11

PHASING DIAGRAM

Program all phases for 'Red Rest'



PHASING DIAGRAM DETECTION LEGEND

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

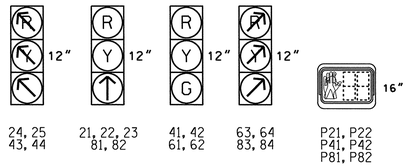
TABLE OF OPERATION

SIGNAL FACE	PHASE 02+6	PHASE 04+8	FLASH
21, 22, 23	↑	R	R
24, 25	↖	↗	↗
41, 42	R	G	R
43, 44	↗	↖	↗
61, 62	G	R	R
63, 64	↗	↗	↗
81, 82	R	↑	R
83, 84	↗	↗	↗
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK
P81, P82	DW	W	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

All Heads L.E.D.



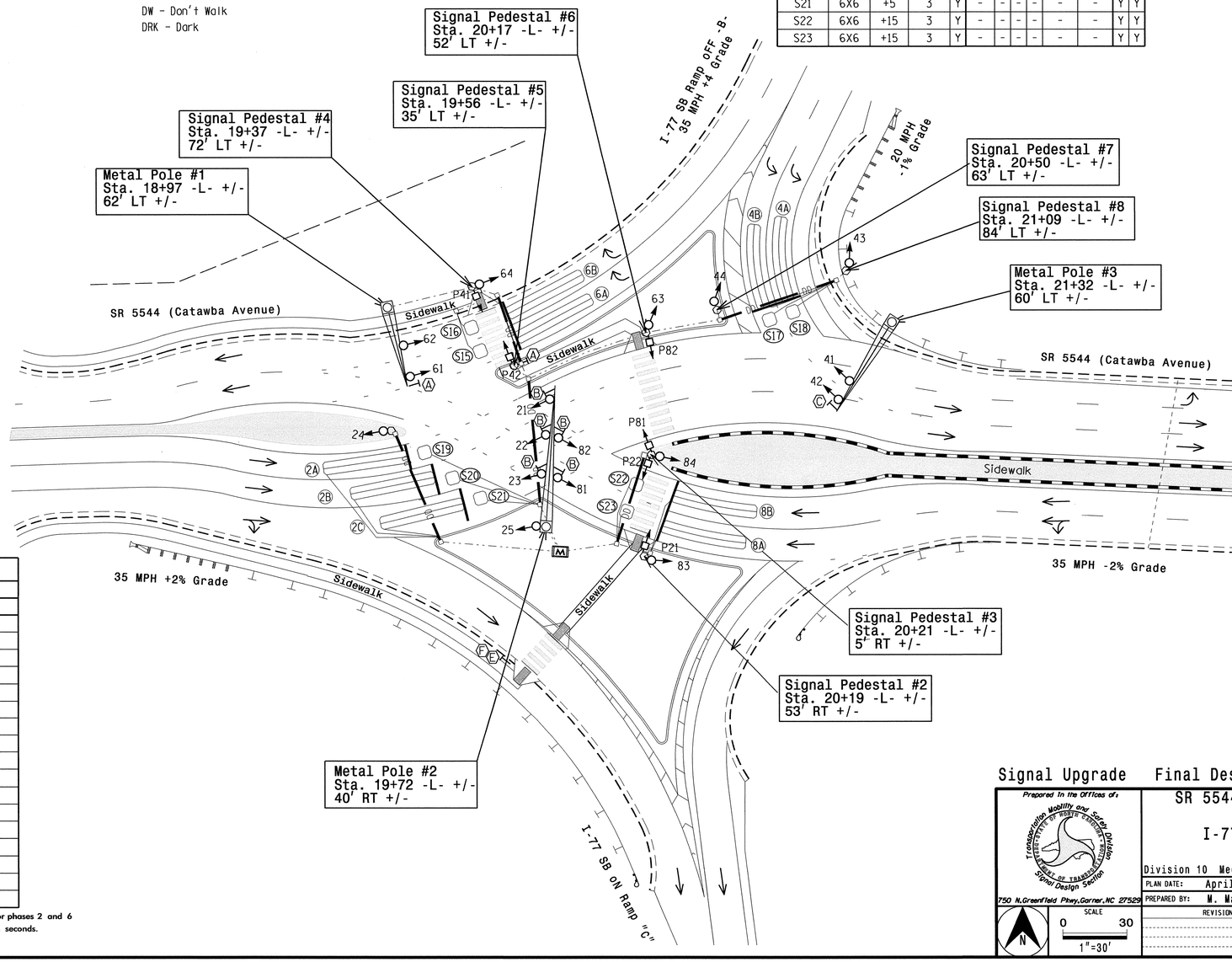
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
2B	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
2C	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	Y
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	Y
6A	6X40	0	2-4-2	-	6	Y	Y	-	-	-	-	Y
6B	6X40	0	2-4-2	-	6	Y	Y	-	-	-	-	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-	Y
8B	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-	Y
S15	6X6	+15	3	Y	-	-	-	-	-	-	Y	Y
S16	6X6	+15	3	Y	-	-	-	-	-	-	Y	Y
S17	6X6	+3	3	Y	-	-	-	-	-	-	Y	Y
S18	6X6	+3	3	Y	-	-	-	-	-	-	Y	Y
S19	6X6	+5	3	Y	-	-	-	-	-	-	Y	Y
S20	6X6	+5	3	Y	-	-	-	-	-	-	Y	Y
S21	6X6	+5	3	Y	-	-	-	-	-	-	Y	Y
S22	6X6	+15	3	Y	-	-	-	-	-	-	Y	Y
S23	6X6	+15	3	Y	-	-	-	-	-	-	Y	Y

2 Phase
Fully Actuated
Catawba Avenue CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. Program all phases for "Red Rest".
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset #1342.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭↓	Pedestrian Signal Head With Push Button & Sign	■↓
○→	Signal Pole with Guy	●→
○→	Signal Pole with Sidewalk Guy	●→
▭	Inductive Loop Detector	▭
M	Master Controller & Cabinet	M
□	Junction Box	■
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
DD	Directional Drill	N/A
N/A	Guardrail	
	Metal Pole with Mastarm	
⬡	Signal Pedestal	●
N/A	Wheelchair Ramp	
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ
Ⓑ	Through Arrow "ONLY" Sign (R3-5A)	Ⓑ
Ⓒ	No Right Turn Sign (R3-1)	Ⓒ
Ⓓ	Signal Ahead Sign (W3-3)	Ⓓ
Ⓔ	Pedestrian Crossing (W11-2)	Ⓔ
Ⓕ	Diagonal Downward Arrow Sign (W16-7P)	Ⓕ

OASIS 2070L TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green 1 *	10	10	10	10
Extension 1 *	3.0	3.0	3.0	3.0
Max Green 1 *	50	30	50	30
Yellow Clearance	3.7	4.0	3.7	4.0
Red Clearance	5.6	4.1	5.6	4.1
Red Revert	5.6	5.0	5.6	5.0
Walk 1 *	7	7	-	7
Don't Walk 1	8	6	-	11
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	-	-	-
Vehicle Call Memory	-	-	-	-
Dual Entry	ON	ON	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.

Signal Upgrade Final Design

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

SR 5544 (Catawba Avenue)
at
I-77 SB Ramps B, C

Division 10 Mecklenburg County Cornelius

PLAN DATE:	April 2013	REVIEWED BY:	T. Williams
PREPARED BY:	M. Wahbooba	REVIEWED BY:	

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY D. WILLIAMS

SIGNATURE 4/30/13 DATE

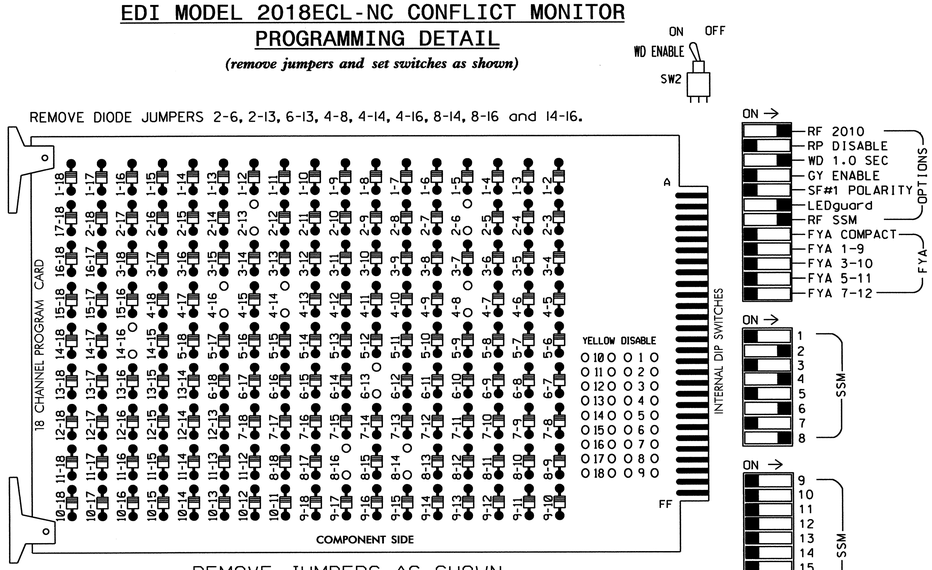
SIG. INVENTORY NO. 10-1342

06-MAY-2013 15:48
R:\traffic\Signals\Designs\Signals\10-1342\10-1342_sig_dsn_20130430.dgn
mwbooba

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.12

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 2, 4, 6 and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2, 4, 6 and 8 for Red Rest.
5. Program phases 2 and 6 for Startup Red Clear.
6. Program phases 2 and 6 as First Phases.
7. Program phases 2, 4 and 8 for 'STARTUP PED CALL'.
8. The cabinet and controller are part of the Catawba Avenue Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S3,S5,S6,S8,S11,S12
PHASES USED.....2,2 PED,4,4 PED,6,8,8 PED
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5		S6	S7	S8		S9	S10	S11		S12
CMU CHANNEL NO.	1	2		13	3	4		14	5	6		15	7	8		16
PHASE	1	2		2 PED	3	4		4 PED	5	6		6 PED	7	8		8 PED
SIGNAL HEAD NO.	NU	21, 22,23	24,25	P21, P22	NU	41,42	43,44	P41, P42	NU	61,62	63,64	NU	NU	81,82	83,84	P81, P82
RED		128				101				134				107		
YELLOW		129				102				135				108		
GREEN						103				136						
RED ARROW			128				101				134				107	
YELLOW ARROW			129				102				135				108	
GREEN ARROW		130	130				103				136			109	109	
✋				113				104								110
🚶				115				106								112

NU = Not Used

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "J"	U	SLOT EMPTY	Ø2 2A	Ø2 2C	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SYS. DET. S18	SLOT EMPTY	SYS. DET. S19	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	NOT USED	FS DC ISOLATOR
	L		Ø2 2B	NOT USED			Ø4 4B	SYS. DET. S17		SYS. DET. S20			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	SYS. DET. S15	SLOT EMPTY	SLOT EMPTY	Ø8 8A	SYS. DET. S23	SLOT EMPTY	SYS. DET. S21	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø6 6B	SYS. DET. S16			Ø8 8B	SYS. DET. S22		NOT USED					

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	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			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
✱S15	TB3-9,10	J3U	64	26	36	SYS					
✱S16	TB3-11,12	J3L	77	39	46	SYS					
✱S17	TB6-3,4	I7L	78	40	44	SYS					
✱S18	TB6-1,2	I7U	65	27	34	SYS					
✱S19	TB6-9,10	I9U	60	22	11	SYS					
✱S20	TB6-11,12	I9L	62	24	13	SYS					
✱S21	TB7-9,10	J9U	59	21	15	SYS					
✱S22	TB7-3,4	J7L	79	41	48	SYS					
✱S23	TB7-1,2	J7U	66	28	38	SYS					
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

✱ System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1342
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 5544 (Catawba Avenue)
at
I-77 SB Ramps B, C

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2013 REVIEWED BY: T. Ugm
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

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

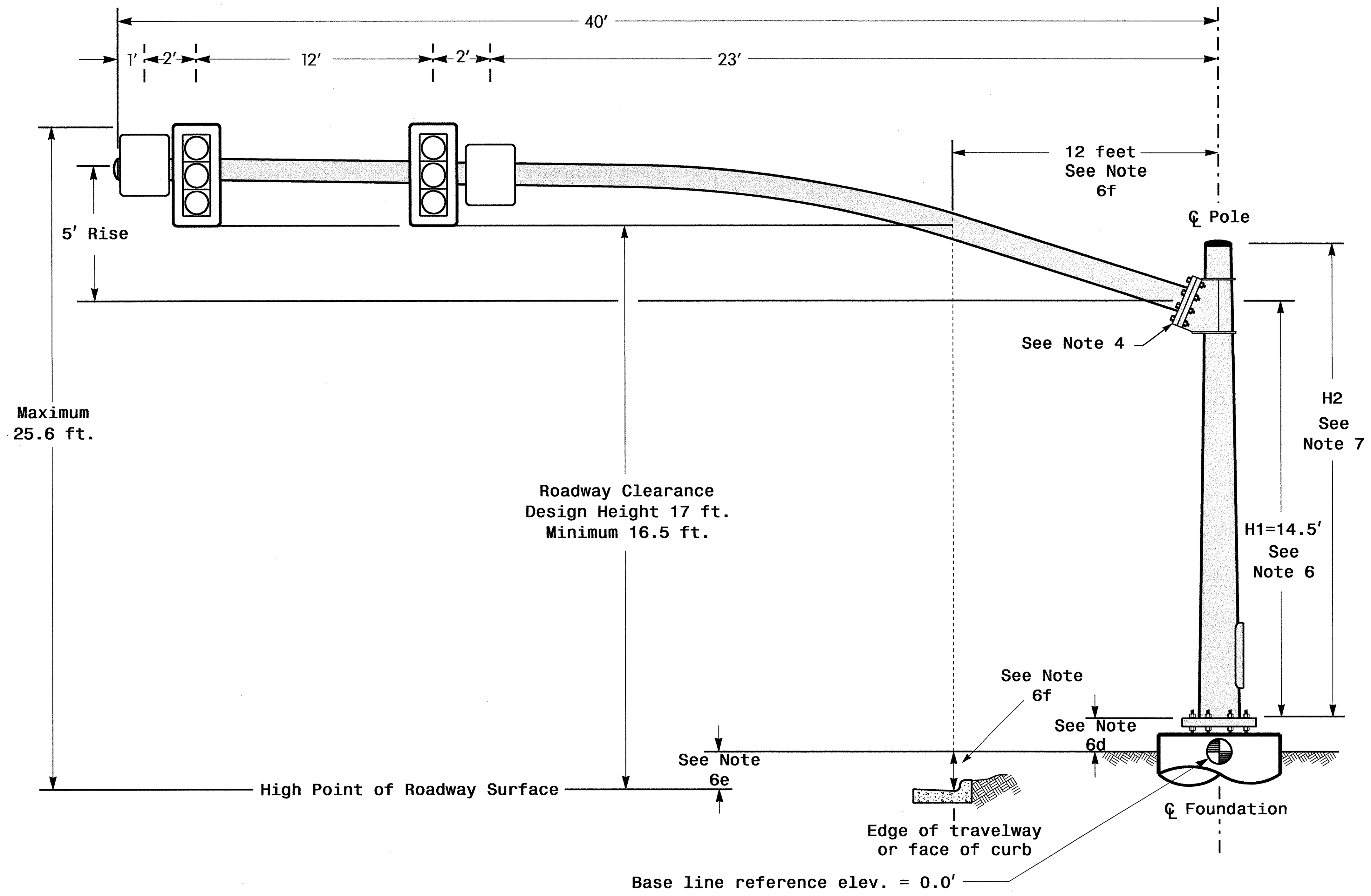
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN
SIGNATURE 5/2/13 DATE
SIG. INVENTORY NO. 10-1342

01-MAY-2013 15:22
S:\TSG\Traffic Signals\Workgroups\Sig Mgmt\Strickland\10342_sm.ele_xxx.dgn
cstrickland

METAL POLE No. 1 and 2

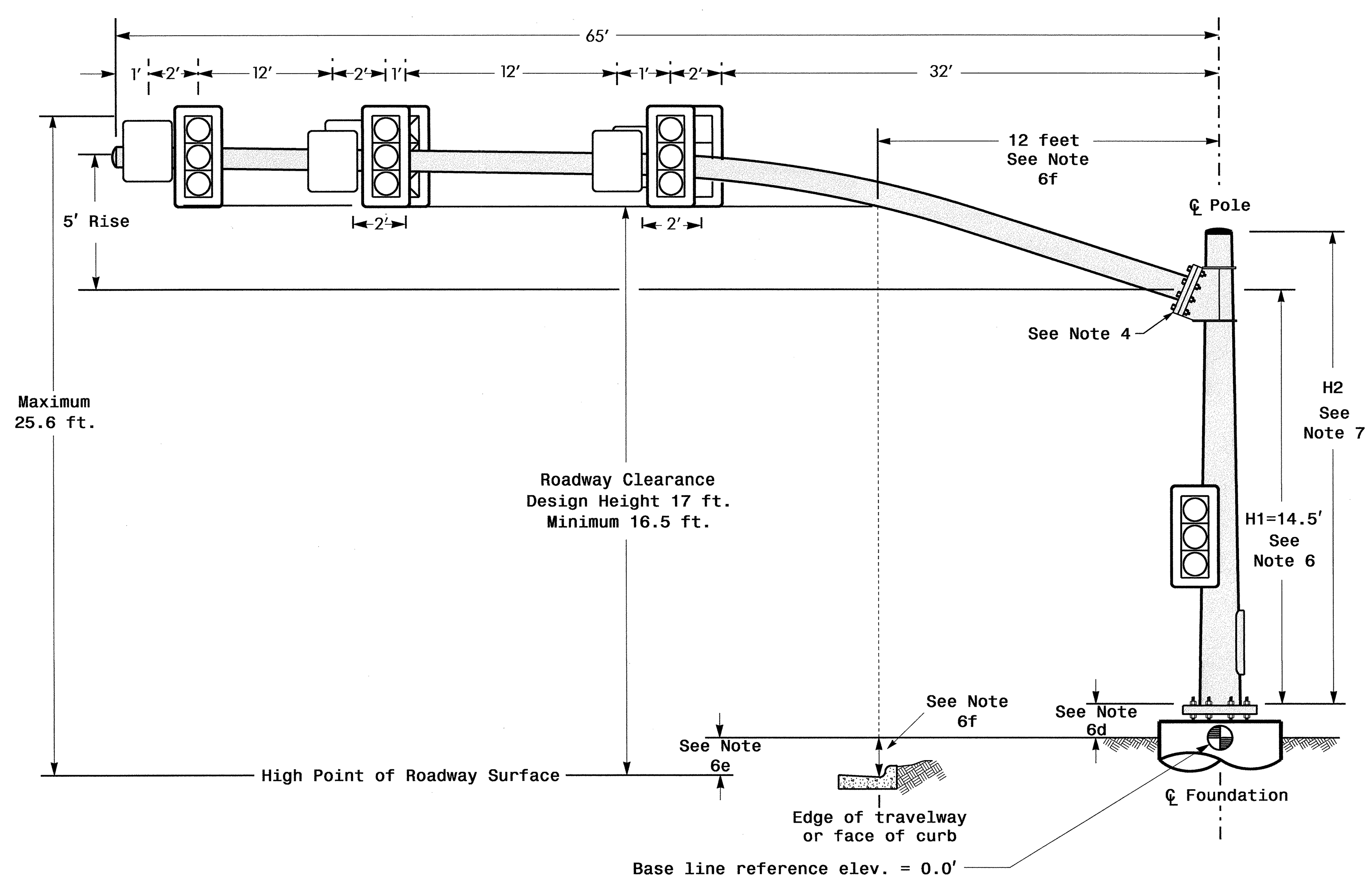
PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.13

Design Loading for METAL POLE NO. 1



ELEVATION VIEW

Design Loading for METAL POLE NO. 2



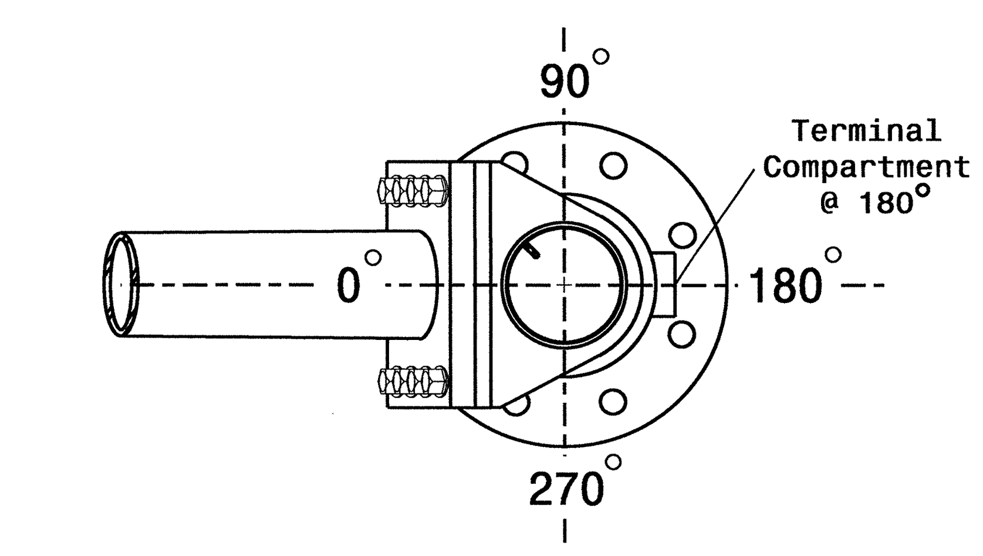
Elevation View

SPECIAL NOTE

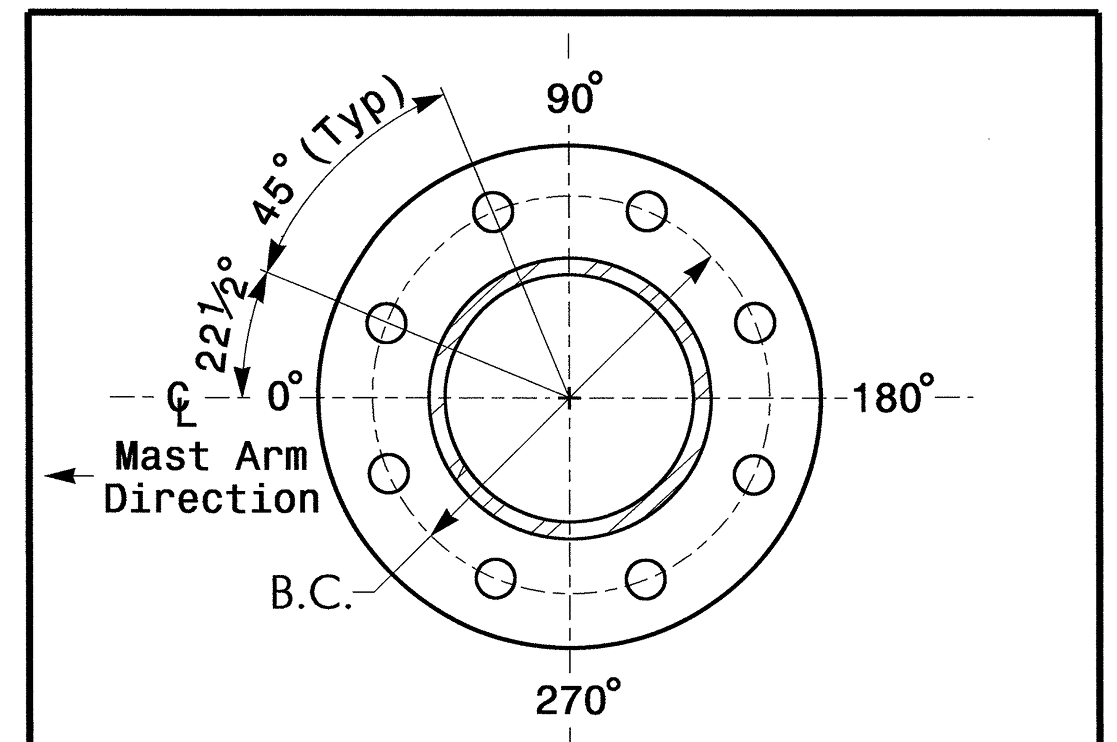
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.5 ft.	+0.5 ft.
Elevation difference at Edge of travelway or face of curb	+0.5 ft.	+0.5 ft.

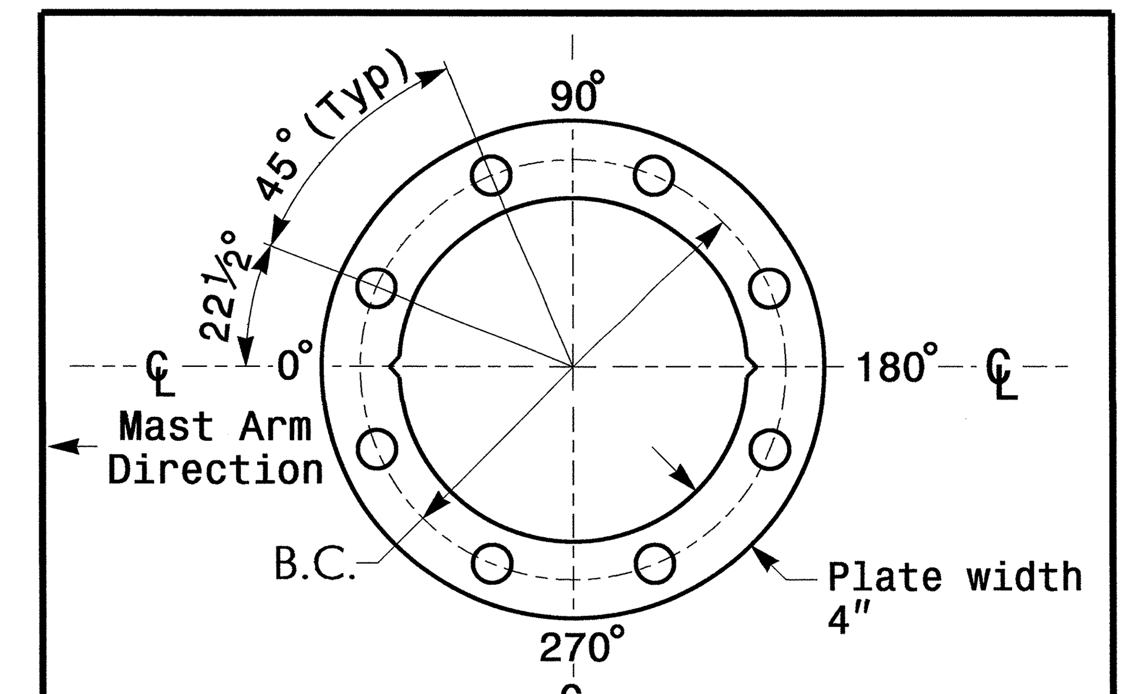


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
(signal head symbol)	SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5″ W X 52.5″ L	60 LBS
(sign symbol)	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0″ W X 30.0″ L	11 LBS

NOTES

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:
   - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2012 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The Camber design for mast arm deflection should provide an appearance of a low pitched arch wher the tip or the free end of the mast arm deflection does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
   b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is .75 feet above the ground elevation.
   e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
   f. Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus ½ of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals Design Structural Engineer for assistance at (919) 773-2800.

   The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.

   The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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

SR 5544 (Catawba Avenue) at I-77 SB Ramps B, C

Division 10 Cabarrus County Concord

PLAN DATE:	April 2013	REVIEWED BY:	T. Williams
PREPARED BY:	M. Mahbooba	REVIEWED BY:	

SCALE: 0 N/A — N/A

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393 TIMOTHY D. WILLIAMS

T. D. Williams 5/6/13.
SIGNATURE DATE

SIG. INVENTORY NO. 10-1342MP

06-MAY-2013 14:00
R:*Traffic*Signals*Design*Signals*10-1342*10-1342_MP1.2Loading_I-1342.dgn
mmahbooba

METAL POLE No. 3

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.14

SPECIAL NOTE

The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

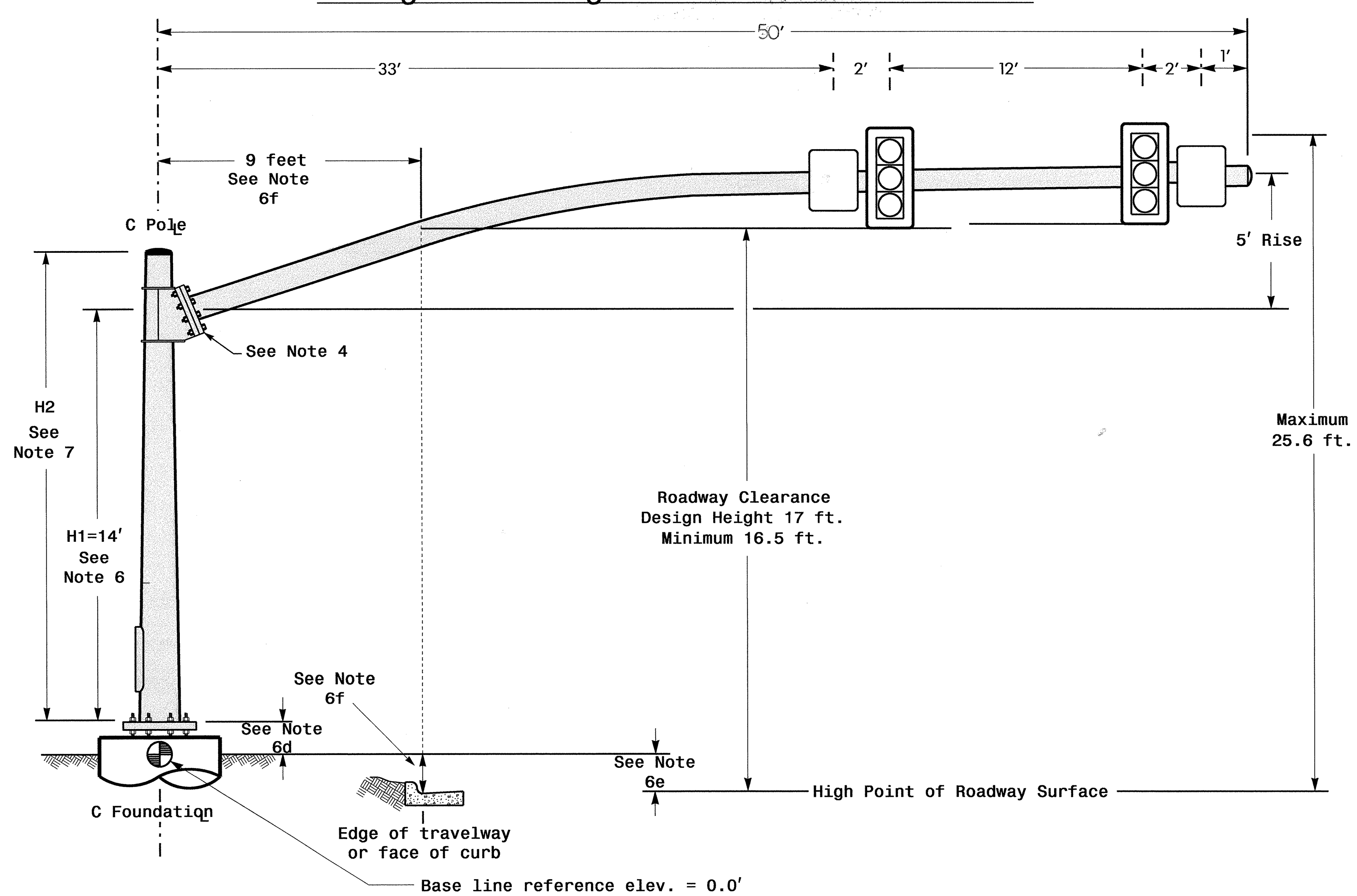
Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+0.1 ft.
Elevation difference at Edge of travelway or face of curb	-0.7 ft.

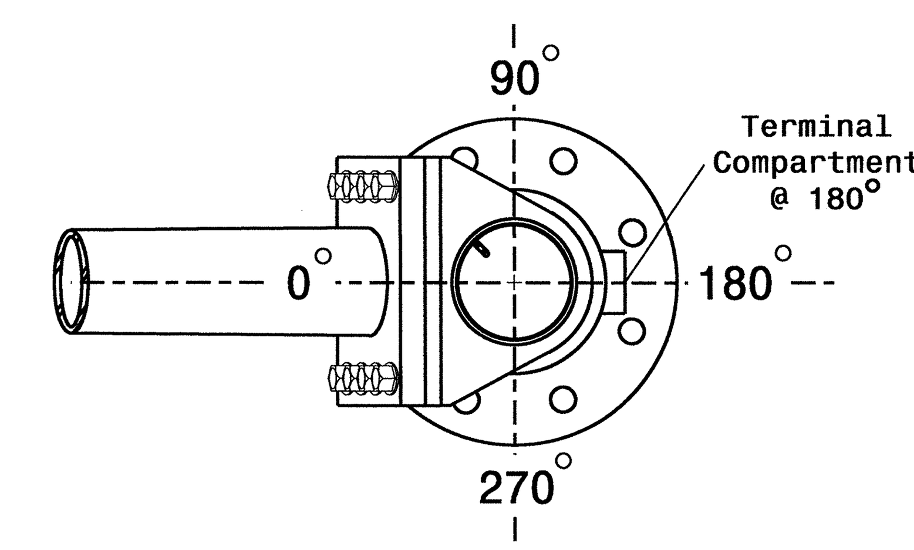
MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
(signal head symbol)	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
(sign symbol)	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS

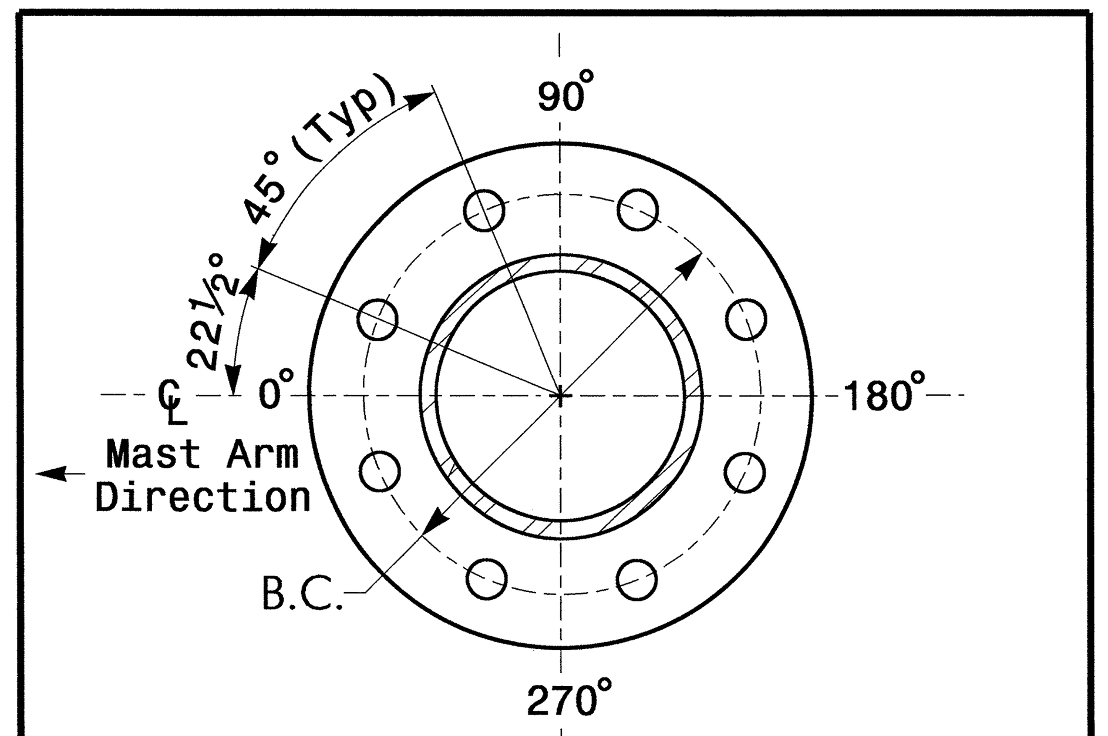
Design Loading for METAL POLE NO. 3



ELEVATION VIEW

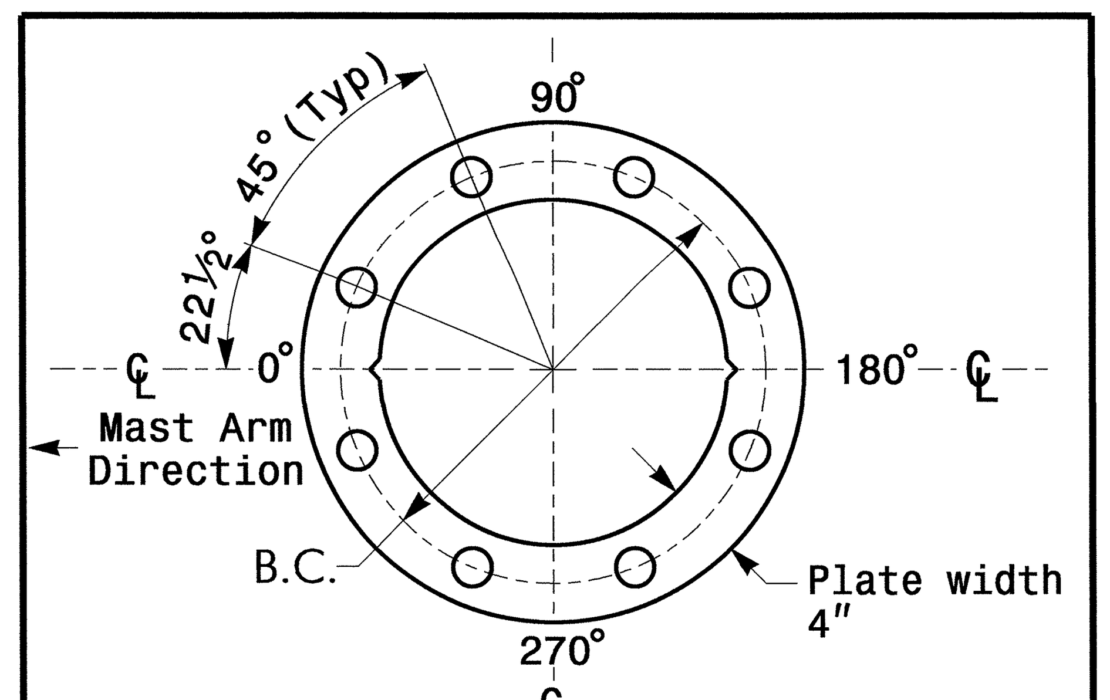


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

NOTES

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:
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   - The traffic signal project plans and special provisions.

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3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The Camber design for mast arm deflection should provide an appearance of a low pitched arch wher the tip or the free end of the mast arm deflection does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
   b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
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   d. The top of the pole base plate is .75 feet above the ground elevation.
   e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
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8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
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   The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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

SR 5544 (Catawba Avenue)
at
I-77 SB Ramps B, C

Division 10 Cabarrus County Concord

PLAN DATE:	April 2013	REVIEWED BY:	T. Williams
PREPARED BY:	M. Mahbooba	REVIEWED BY:	

REVISIONS	INIT.	DATE

SCALE 0 N/A
N/A

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393 TIMOTHY WILLIAMS

T.J. Will (signature) 5/6/13

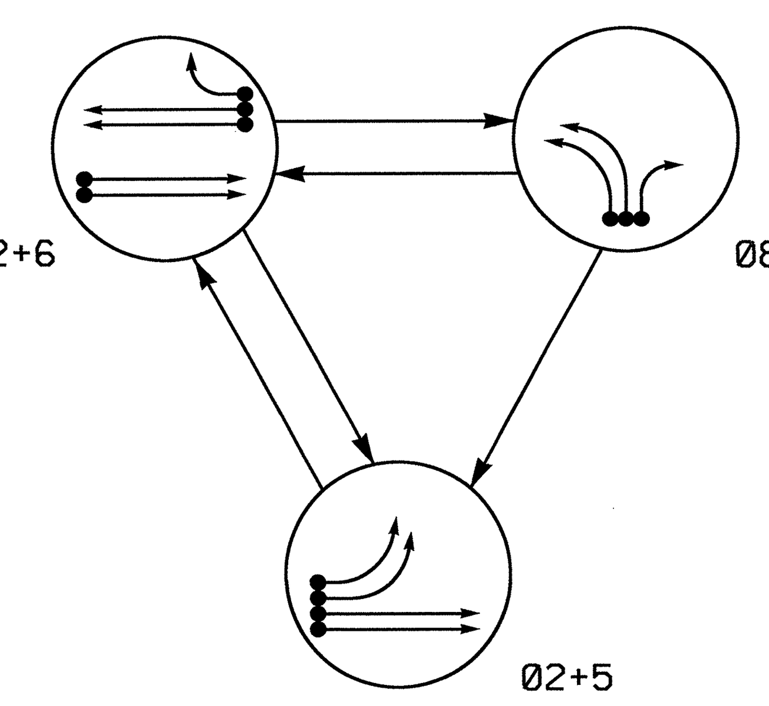
SIGNATURE DATE

SIG. INVENTORY NO. 10-1342MP

06-MAY-2013 14:03
R:*Traffic*Signals*Design*Signals*10-1342*10-1342_MP1.2Loading_I-1342.dgn
mmahbooba

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.15

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

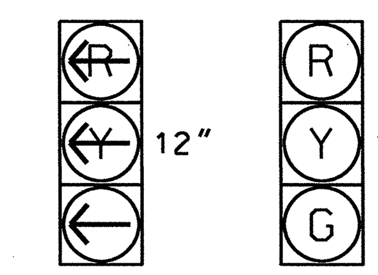
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø8	FLASH
21, 22	G	G	R	Y
51, 52	←	←R	←R	←R
61, 62	R	G	R	Y
81, 82, 83, 84	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070L DETECTION ZONE INSTALLATION

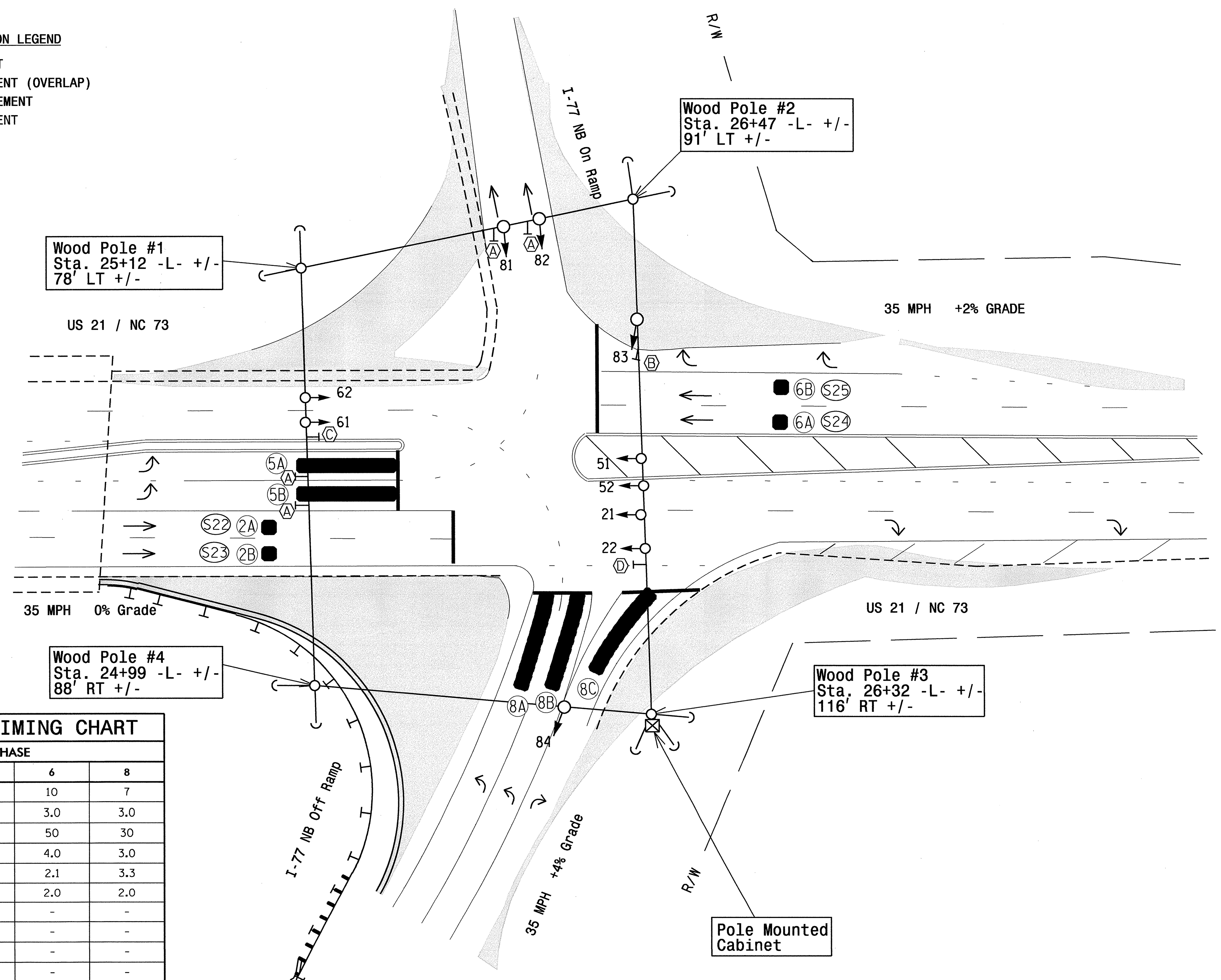
DETECTION ZONES				DETECTOR PROGRAMMING						
ZONE	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME
2A/S22	6X6	✳	70	2	Y	Y	-	Y	-	-
2B/S23	6X6	✳	70	2	Y	Y	-	Y	-	-
5A	6X40	✳	0	5	Y	Y	-	-	-	-
5B	6X40	✳	0	5	Y	Y	-	-	-	-
6A/S24	6X6	✳	70	6	Y	Y	-	Y	-	-
6B/S25	6X6	✳	70	6	Y	Y	-	Y	-	-
8A	6X40	✳	0	8	Y	Y	-	-	-	-
8B	6X40	✳	0	8	Y	Y	-	-	-	-
8C	6X40	✳	0	8	Y	Y	-	-	-	10

✳ Video Detection Zone

3 Phase
Fully Actuated
Catawba Avenue CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 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. Incorporate Video Detection system for vehicle detection.
7. Provide the Engineer with the Manufacturer's approved Video Detection locations and mounting heights to obtain detection zones as shown.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset #1342.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Video Detection Zone	
N/A	Guardrail	
	Construction Zone	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	No Left Turn Sign R3-2)	Ⓒ
Ⓓ	No Right Turn Sign (R3-1)	Ⓓ

OASIS 2070L TIMING CHART

FEATURE	PHASE 2	5	6	8
Min Green 1 *	10	7	10	7
Extension 1 *	3.0	2.0	3.0	3.0
Max Green 1 *	50	30	50	30
Yellow Clearance	4.0	3.0	4.0	3.0
Red Clearance	2.1	3.2	2.1	3.3
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	-	-	-
Vehicle Call Memory	-	-	-	-
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.

06-MAY-2013 13:46
R:*Traffic*Signals*Design*Signals*10-0967*100967T1_sig_dsn_20130430.dgn
mmahbooba

Signal Upgrade - Temporary Design-1 TCP - Phase III

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

SCALE 0 30 1"=30'

SR 5544 (Catawba Avenue) at I-77 NB Ramps A, D

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2013	REVIEWED BY: T. Williams
PREPARED BY: M. Mahbooba	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393 TIMOTHY J. WILLIAMS

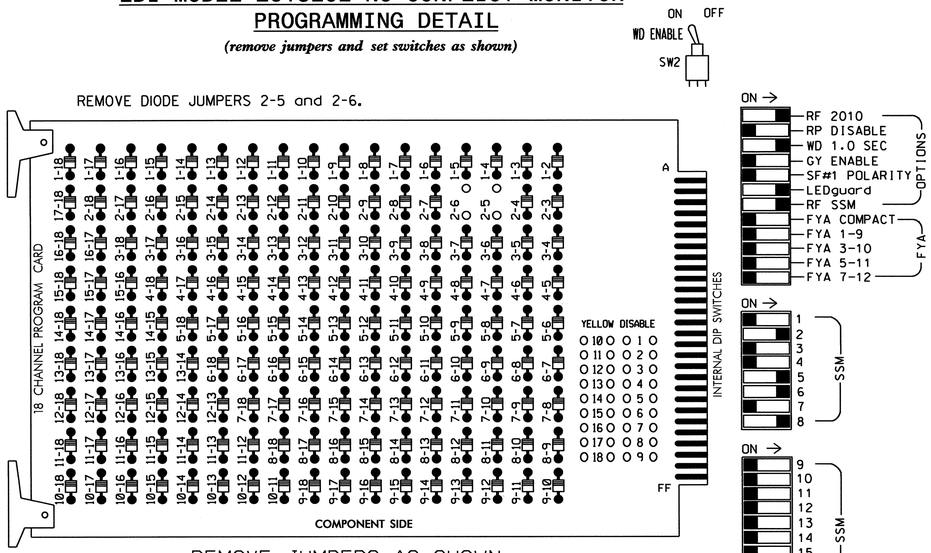
SIGNATURE: T.J. Will DATE: 4/30/13

SIG. INVENTORY NO. 10-0967 T1

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.16

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

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 Start Up In Green.
4. Program phases 2 and 6 for Yellow Flash.
5. The cabinet and controller are part of the Catawba Avenue Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....336
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S7,S8,S11
PHASES USED.....2,5,6,8
OVERLAPS.....NONE

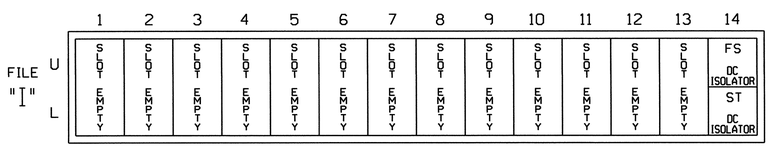
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	51,52	61,62	NU	NU	81,82, 83,84	NU
RED		128						134			107	
YELLOW		129						135			108	
GREEN		130						136			109	
RED ARROW							131					
YELLOW ARROW							132					
GREEN ARROW							133					

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0967T1
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Temp 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

SR 5544 (Catawba Avenue)
at
I-77 NB Ramps A, D

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2013 REVIEWED BY: T. Jym

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE 5/1/13 DATE

SIG. INVENTORY NO. 10-0967T1

01-MAY-2013 07:53
S:#ITSSIG#ITS Signals#Workgroups#Sig Mgmt#Strickland#10967_smucle_xxx.dgn
ossrtsig.cmd

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.17

PHASING DIAGRAM

Program all phases for "Red Rest".

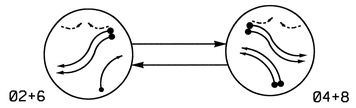
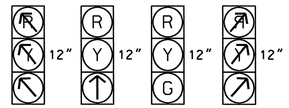


TABLE OF OPERATION

SIGNAL FACE	PHASE 02+6	PHASE 04+8	PHASE FLASH
21, 22	G	R	R
23	↗	↗	↗
41, 42	R	↑	R
61, 62	↑	R	R
81, 82	R	G	R
83	↖	↖	↖

SIGNAL FACE I.D.

All Heads L.E.D.



83 | 41, 42 61, 62 | 21, 22 81, 82 | 23

OASIS 2070L DETECTION ZONE INSTALLATION

DETECTION ZONES				DETECTOR PROGRAMMING						
ZONE	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME
2A	6X40	✳	0	2	Y	Y	-	-	-	-
4A	6X40	✳	0	4	Y	Y	-	-	-	-
4B	6X40	✳	0	4	Y	Y	-	-	-	-
6A	6X40	✳	0	6	Y	Y	-	-	-	-
6B	6X40	✳	0	6	Y	Y	-	-	-	-
8A	6X40	✳	0	8	Y	Y	-	-	-	-
8B	6X40	✳	0	8	Y	Y	-	-	-	-

✳Video Detection Zone

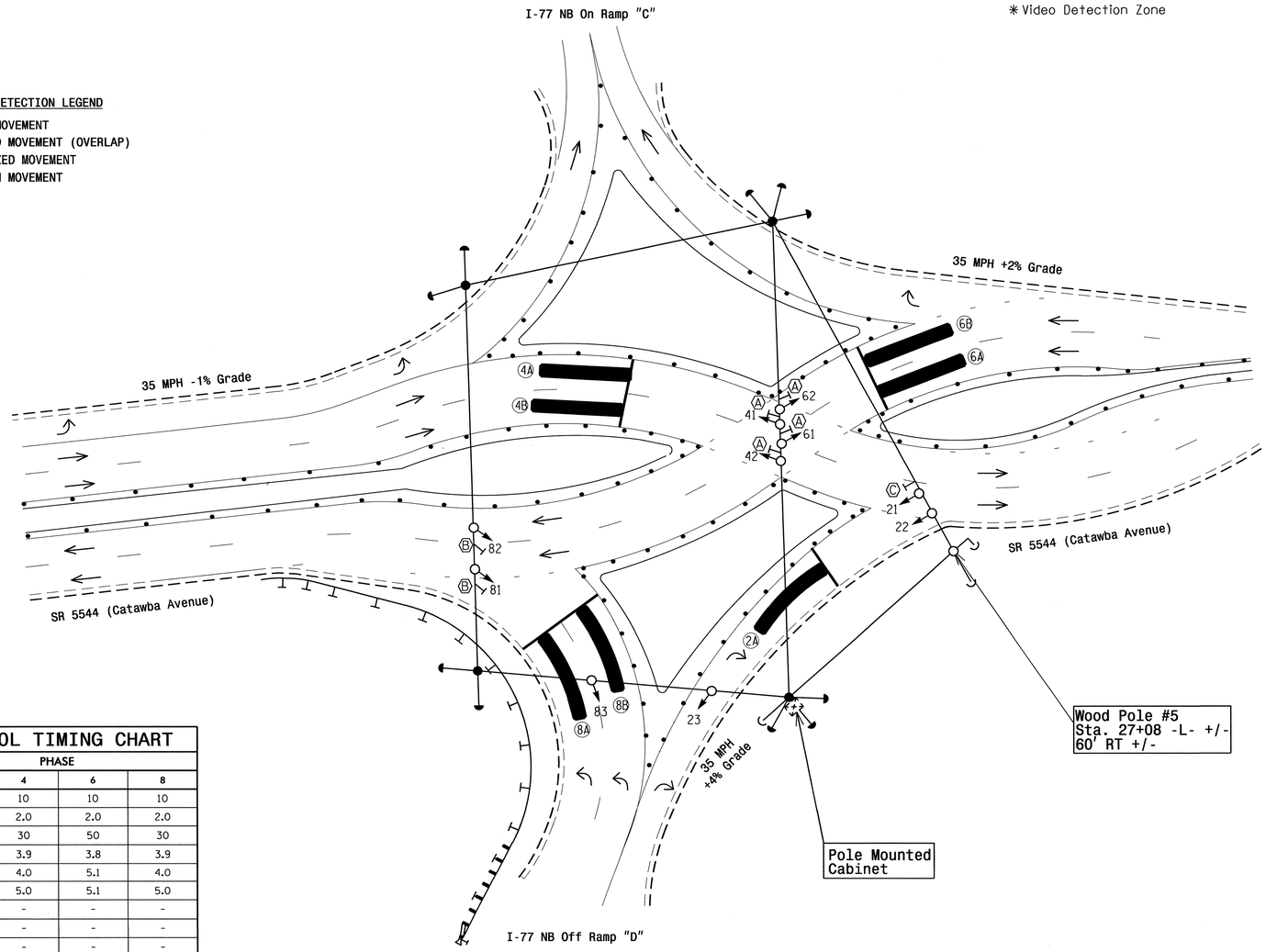
2 Phase
Fully Actuated
Catawba Avenue CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation.
3. Set all detector units to presence mode.
4. Program all phases for "Red Rest".
5. Incorporate Video Detection system for vehicle detection.
6. Provide the Engineer with the Manufacturer's approved Video Detection locations and mounting heights to obtain detection zones as shown.
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 #1342.

PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-----	2-in Underground Conduit	-----
N/A	Right of Way	-----
→	Directional Arrow	→
▬	Video Detection Zone	▬
N/A	Guardrail	⊥
●	Construction Zone Drums	●
Ⓐ	Through Arrow "ONLY" Sign (R3-5A)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	No Left Turn Sign (R3-2)	Ⓒ

OASIS 2070L TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green 1 *	10	10	10	10
Extension 1 *	2.0	2.0	2.0	2.0
Max Green 1 *	50	30	50	30
Yellow Clearance	3.8	3.9	3.8	3.9
Red Clearance	5.1	4.0	5.1	4.0
Red Revert	5.1	5.0	5.1	5.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	-	-	-
Vehicle Call Memory	-	-	-	-
Dual Entry	ON	ON	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.

Signal Upgrade - Temporary Design-2 TCP - Phase IV

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

SR 5544 (Catawba Avenue)
at
I-77 NB Ramps A, D

Division 10 Mecklenburg County Cornelius

PLAN DATE:	April 2013	REVIEWED BY:	T. Williams
PREPARED BY:	M. Mahbooba	REVIEWED BY:	

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

SIGNATURE 4/30/13 DATE

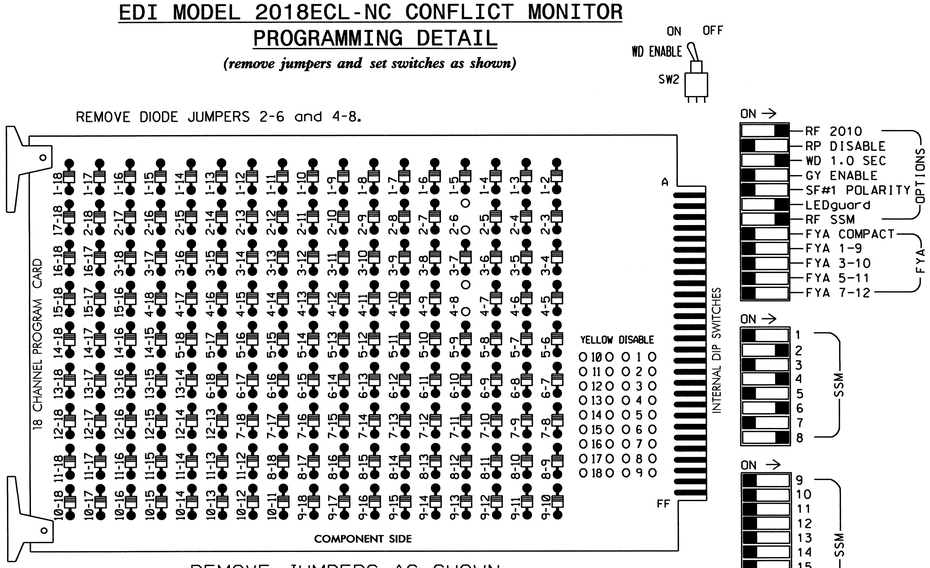
SIG. INVENTORY NO. 10-0967T2

06-MAY-2013 15:49
R:\Traffic\Signals\Design\Signals\10-0967\10096T2_sig_dsn_20130430.dgn
mmahbooba

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig. 18

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 2, 4, 6 and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2, 4, 6 and 8 for Red Rest.
5. Program phases 2 and 6 for Startup Red Clear.
6. Program phases 2 and 6 as First Phases.
7. The cabinet and controller are part of the Catawba Avenue Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....336
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S5,S8,S11
PHASES USED.....2,4,6,8
OVERLAPS.....NONE

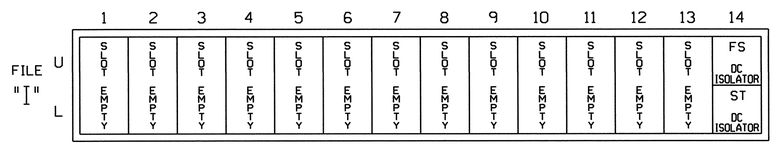
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11		S12
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8		16
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8		8 PED
SIGNAL HEAD NO.	NU	21,22	23	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	83	NU
RED		128				101			134			107		
YELLOW		129				102			135			108		
GREEN		130										109		
RED ARROW			128										107	
YELLOW ARROW			129										108	
GREEN ARROW			130			103			136				109	

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0967T2
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Temp 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 5544 (Catawba Avenue)
at
I-77 NB Ramps A, D

Division 10 Mecklenburg County Cornelius

PLAN DATE:	April 2013	REVIEWED BY:	T.Upp
PREPARED BY:	C. Strickland	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C Brown 5/1/13
SIGNATURE DATE

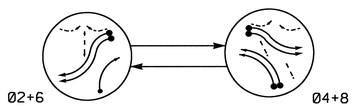
SIG. INVENTORY NO. 10-096T2

01-MAY-2013 09:08
I:\TSGraphics\Signals\Workgroups\Sig Mgmt\Strickland\10967_sm_ele_xxx.dgn
cstrickland

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.19

PHASING DIAGRAM

Program all phases for 'Red Rest'.



PHASING DIAGRAM DETECTION LEGEND

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

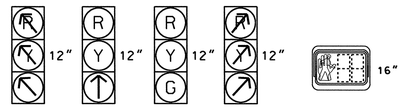
TABLE OF OPERATION

SIGNAL FACE	PHASE 02+6	PHASE 04+8	FLASH (FT)
21, 22	G	R	R
23, 24	↗	↗	↗
41, 42	R	↑	R
43, 44	↗	↗	↗
61, 62	↑	R	R
63, 64	↖	↖	↖
81, 82	R	G	R
83, 84	↖	↖	↖
P41, P42	DW	W	DRK
P61, P62	W	DW	DRK
P81, P82	DW	W	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

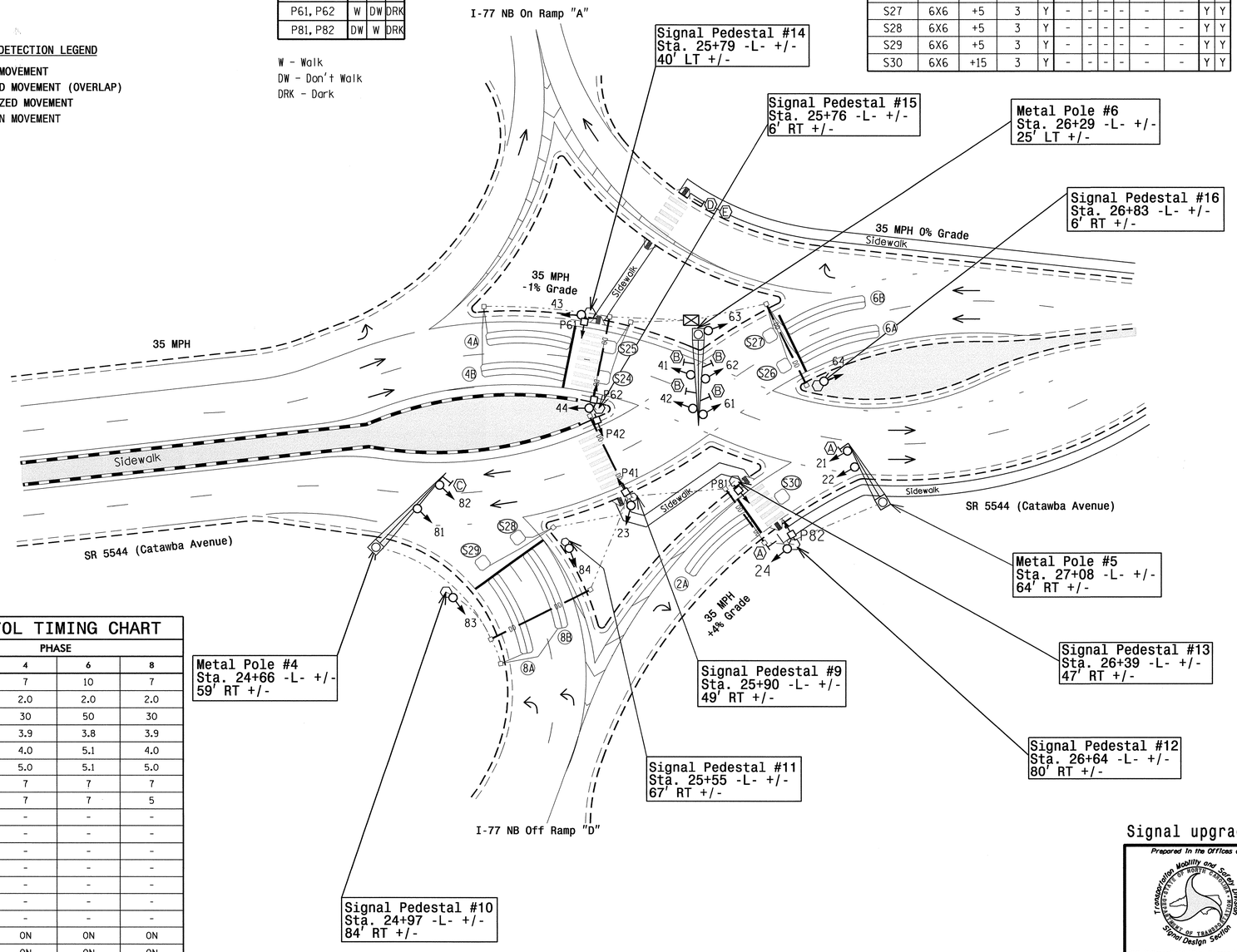
All Heads L.E.D.



63, 64 83, 84 | 41, 42 61, 62 | 21, 22 81, 82 | 23, 24 43, 44 | P41, P42 P61, P62 P81, P82

OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
6A	6X40	0	2-4-2	Y	6	Y	Y	-	-	-	-	Y
6B	6X40	0	2-4-2	Y	6	Y	Y	-	-	-	-	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-	Y
8B	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-	Y
S24	6X6	+15	3	Y	-	-	-	-	-	-	Y	Y
S25	6X6	+15	3	Y	-	-	-	-	-	-	Y	Y
S26	6X6	+5	3	Y	-	-	-	-	-	-	Y	Y
S27	6X6	+5	3	Y	-	-	-	-	-	-	Y	Y
S28	6X6	+5	3	Y	-	-	-	-	-	-	Y	Y
S29	6X6	+5	3	Y	-	-	-	-	-	-	Y	Y
S30	6X6	+15	3	Y	-	-	-	-	-	-	Y	Y



OASIS 2070L TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green 1 *	10	7	10	7
Extension 1 *	2.0	2.0	2.0	2.0
Max Green 1 *	50	30	50	30
Yellow Clearance	3.8	3.9	3.8	3.9
Red Clearance	5.1	4.0	5.1	4.0
Red Revert	5.1	5.0	5.1	5.0
Walk 1 *	-	7	7	7
Don't Walk 1	-	7	7	5
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	-	-	-
Vehicle Call Memory	-	-	-	-
Dual Entry	ON	ON	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.

2 Phase
Fully Actuated
Catawba Avenue CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. Program all phases for "Red Rest".
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset #0967.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○⤵	Signal Pole with Sidewalk Guy	●⤵
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	■
□	Junction Box	■
- - -	2-in Underground Conduit	- · - · -
N/A	Right of Way	- - - - -
→	Directional Arrow	→
◁▭	Metal Pole with Mastarm	◁▭
⬡	Signal Pedestal	⬢
N/A	Wheelchair Ramp	♿
— DD —	Directional Drill	N/A
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ
Ⓑ	Through Arrow "ONLY" Sign (R3-5A)	Ⓑ
Ⓒ	No Right Turn Sign (R3-1)	Ⓒ
Ⓓ	Pedestrian Crossing (W11-2)	Ⓓ
Ⓔ	Diagonal Downward Arrow Sign (W16-7P)	Ⓔ

Signal upgrade - Final Design

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

SR 5544 (Catawba Avenue)
at
I-77 NB Ramps A, D

Division 10 Mecklenburg County Cornelius

PLAN DATE:	April 2013	REVIEWED BY:	T. Williams
PREPARED BY:	M. Mahbooba	REVIEWED BY:	

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY JAMES WILLIAMS

SIGNATURE 4/30/13. DATE

SIG. INVENTORY NO. 10-0967

06-MAY-2013 15:47
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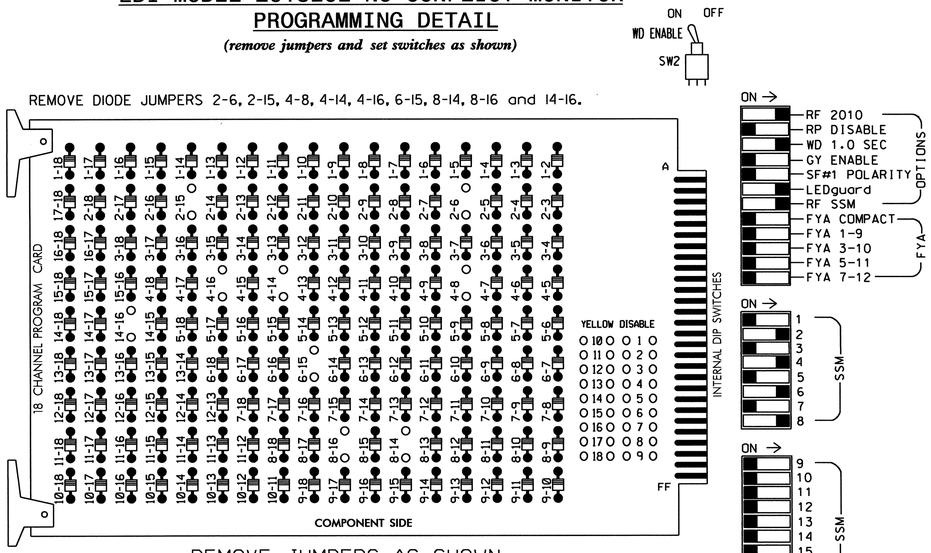
mmaboobo

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig. 20

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 2, 4, 6 and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2, 4, 6 and 8 for Red Rest.
5. Program phases 2 and 6 for Startup Red Clear.
6. Program phases 4, 6 and 8 for 'STARTUP PED CALL'.
7. Program phases 2 and 6 as First Phases.
8. The cabinet and controller are part of the Catawba Avenue Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED..... S2,S5,S6,S8,S9,S11,S12
PHASES USED.....2,4,4 PED,6,6 PED,8,8 PED
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5		S6	S7	S8		S9	S10	S11		S12
CMU CHANNEL NO.	1	2		13	3	4		14	5	6		15	7	8		16
PHASE	1	2		2 PED	3	4		4 PED	5	6		6 PED	7	8		8 PED
SIGNAL HEAD NO.	NU	21,22	23,24	NU	NU	41,42	43,44	P41, P42	NU	61,62	63,64	P61, P62	NU	81,82	83,84	P81, P82
RED		128				101				134				107		
YELLOW		129				102				135				108		
GREEN		130												109		
RED ARROW			128				101				134				107	
YELLOW ARROW			129				102				135				108	
GREEN ARROW			130			103	103			136	136				109	
✋								104				119				110
🚶								106				121				112

NU = Not Used

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø2 2A	SYS. DET. S30	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SYS. DET. S25	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L		NOT USED	NOT USED			Ø4 4B	SYS. DET. S24					Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	SYS. DET. S26	SLOT EMPTY	SLOT EMPTY	Ø8 8A	SYS. DET. S29	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø6 6B	SYS. DET. S27			Ø8 8B	SYS. DET. S28							

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			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
*S24	TB6-3,4	I7L	78	40	44	SYS					
*S25	TB6-1,2	I7U	65	27	34	SYS					
*S26	TB3-9,10	J3U	64	26	36	SYS					
*S27	TB3-11,12	J3L	77	39	46	SYS					
*S28	TB7-3,4	J7L	79	41	48	SYS					
*S29	TB7-1,2	J7U	66	28	38	SYS					
*S30	TB2-9,10	I3U	63	25	32	SYS					
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0967
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 5544 (Catawba Avenue)
at
I-77 NB Ramps A,D

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2013 REVIEWED BY: T. Uyen
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

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

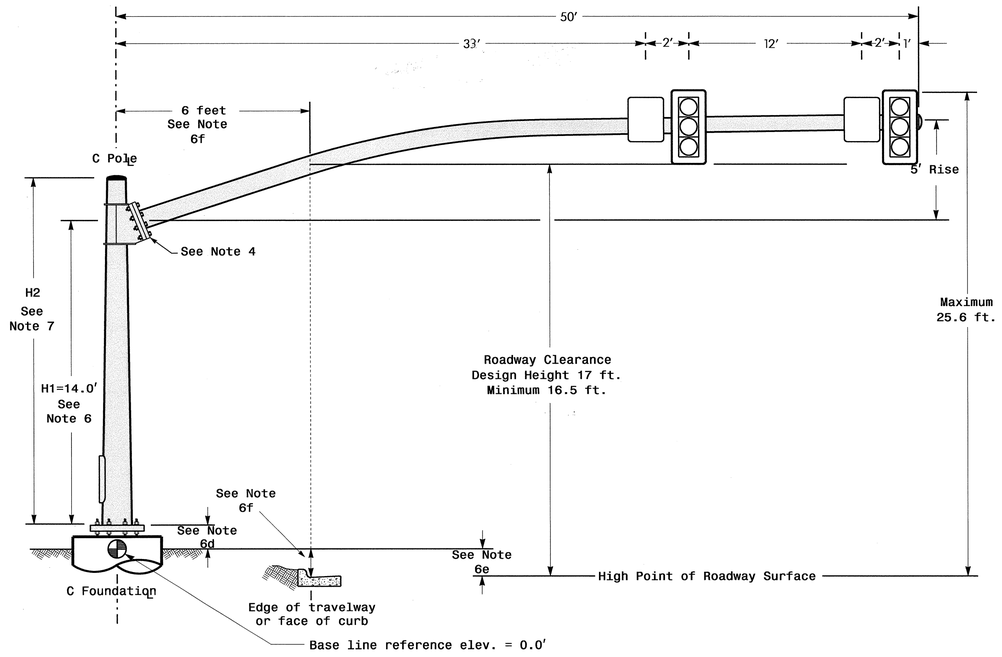
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

SIGNATURE 5/1/13 DATE

SIG. INVENTORY NO. 10-0967

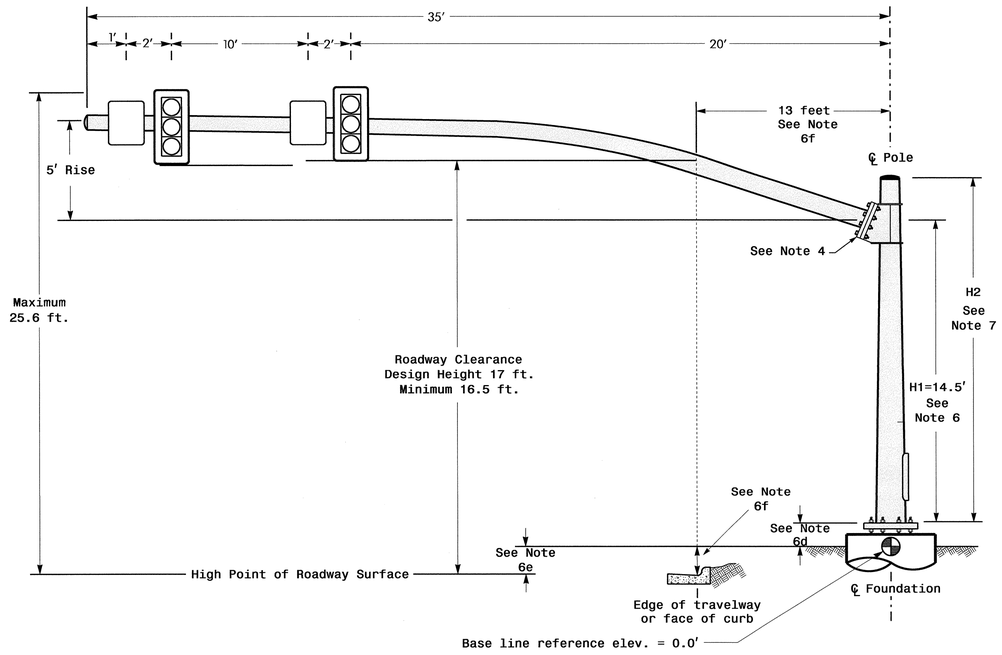
01-MAY-2013 11:56
M:\Traffic\Signals\Signals\Workgroups\Sig Man\Strickland\10967_sm_ele_xxx.dgn
cstrickland

Design Loading for METAL POLE NO. 4



ELEVATION VIEW

Design Loading for METAL POLE NO. 5



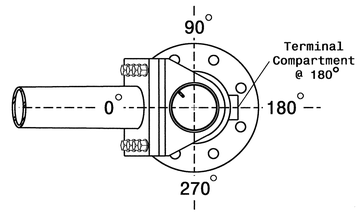
Elevation View

SPECIAL NOTE

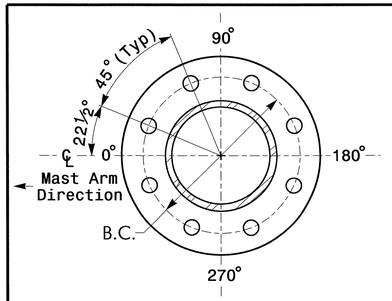
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 4	Pole 5
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	0.0 ft.	+0.3 ft.
Elevation difference at Edge of travelway or face of curb	-0.7 ft.	-0.6 ft.

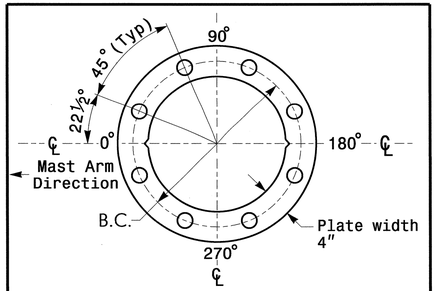


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
▯	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
▯	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS

NOTES

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:
   - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2012 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The Camber design for mast arm deflection should provide an appearance of a low pitched arch wher the tip or the free end of the mast arm deflection does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
   b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is .75 feet above the ground elevation.
   e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
   f. Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus ½ of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals Design Structural Engineer for assistance at (919) 773-2800.

The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.

The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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

SR 5544 (Catawba Avenue)
at
I-77 NB Ramps A, D

Division 10 Cabarrus County Concord

PLAN DATE:	April 2013	REVIEWED BY:	T. Williams
PREPARED BY:	M. Mahbooba	REVIEWED BY:	

REVISIONS	INIT.	DATE

SCALE 0 N/A N/A

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY D WILLIAMS

T.D.Williams 5/6/13.
SIGNATURE DATE

SIG. INVENTORY NO. 10-0967MP

06-MAY-2013 12:36
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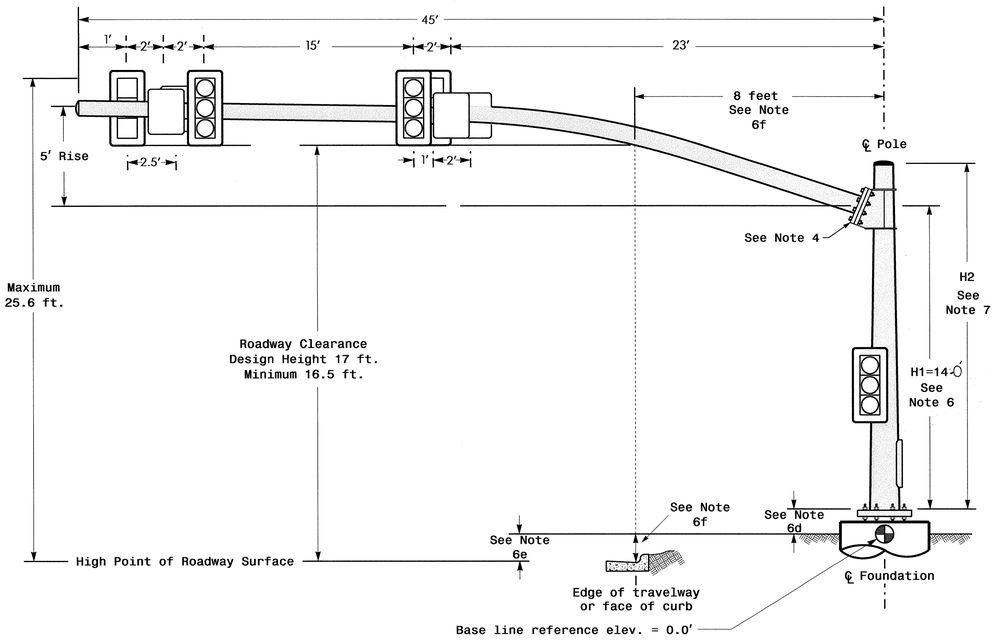
mmahbooba

METAL POLE No. 6

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.22

Design Loading for METAL POLE NO. 6



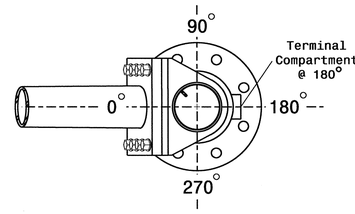
ELEVATION VIEW

SPECIAL NOTE

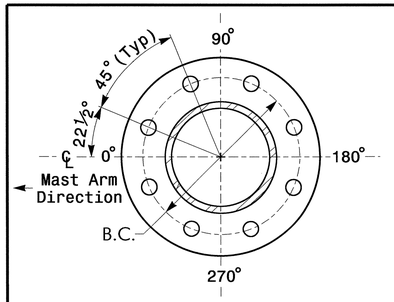
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 6
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+0.1 ft.
Elevation difference at Edge of travelway or face of curb	-0.7 ft.

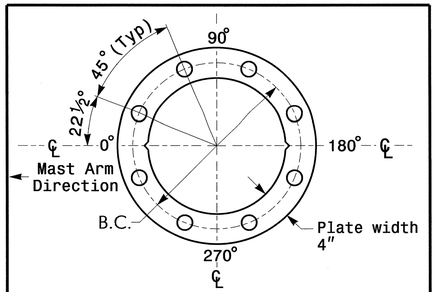


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
▯	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
□	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS

NOTES

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:
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Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
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4. The Camber design for mast arm deflection should provide an appearance of a low pitched arch wher the tip or the free end of the mast arm deflection does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
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   The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.

   The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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

SR 5544 (Catawba Avenue)
at
I-77 NB Ramps B, C

Division 10 Cabarrus County Concord

PLAN DATE:	April 2013	REVIEWED BY:	T. Williams
PREPARED BY:	M. Mahbooba	REVIEWED BY:	

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY A WILLIAMS

T. J. Will 5/6/13.
SIGNATURE DATE

SIG. INVENTORY NO. 10-0967MP

06-MAY-2013 12:53
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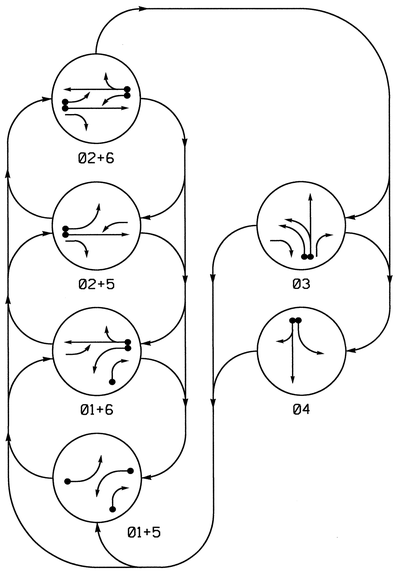
mmahbooba

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig. 23

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

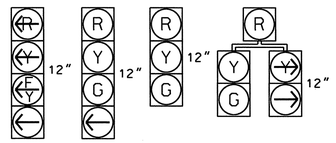
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11	←	←	F Y	F Y	~~R~~	~~R~~	~~Y~~
21	R	R	G	G	R	R	Y
22	R	R	G	G	R/←	R	Y
31	R	R	R	R	G ←	R	R
32	R/→	R/←	R	R	G	R	R
41	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	G ←	~~R~~
42	R	R	R	R	R	G	R
51	←	F Y ←	←	F Y	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



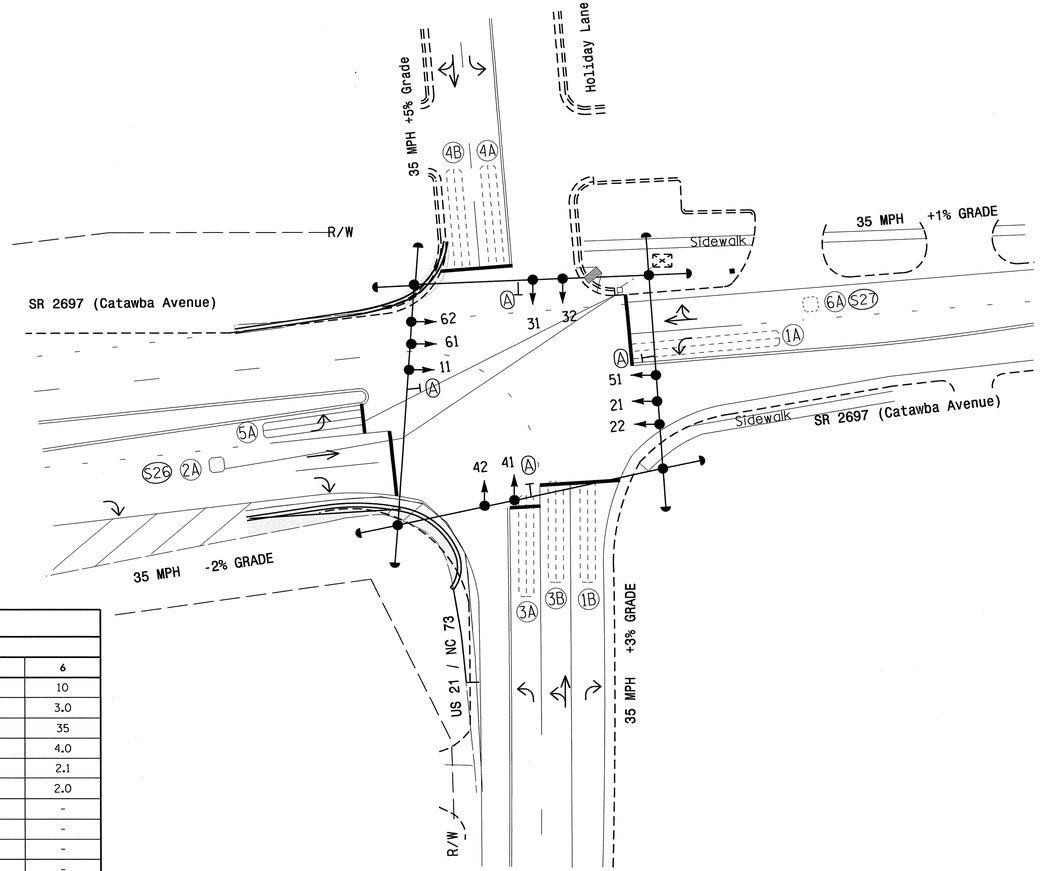
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Y	Y	-	-	15	-	-
					6	Y	Y	-	-	-	-	-
1B	6X40	0	2-4-2	-	1	Y	Y	-	-	15	-	-
2A/S26	6X6	70	4	Y	2	Y	Y	-	-	-	Y	-
3A	6X40	+5	2-4-2	-	3	Y	Y	-	-	3	-	-
3B	6X40	0	2-4-2	-	3	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	Y	5	Y	Y	-	-	15	-	-
					2	Y	Y	-	-	-	-	-
6A/S27	6X6	70	3	-	6	Y	Y	-	-	-	Y	-

6 Phase
Fully Actuated
Catawba Avenue CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset #0885.



OASIS 2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	10	7	7	7	10
Extension 1	1.0	3.0	3.0	3.0	2.0	3.0
Max Green 1 *	15	35	20	15	25	35
Yellow Clearance	3.0	4.0	3.7	3.6	3.0	4.0
Red Clearance	2.6	2.1	1.8	1.8	2.8	2.1
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
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		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	----------
→	Directional Arrow	→
▨	Construction Zone	▨
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ

Signal Upgrade- Temporary Design TCP Phase III & IV

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

SR 5544 (Catawba Avenue)
at
US 21 (Statesville Road) /
Holiday Lane

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2013 REVIEWED BY: T. Williams
PREPARED BY: M. Wahbooba REVIEWED BY:

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY D. WILLIAMS

T.D. Williams 4/30/13.
SIGNATURE DATE

SIG. INVENTORY NO. 10-0885 T

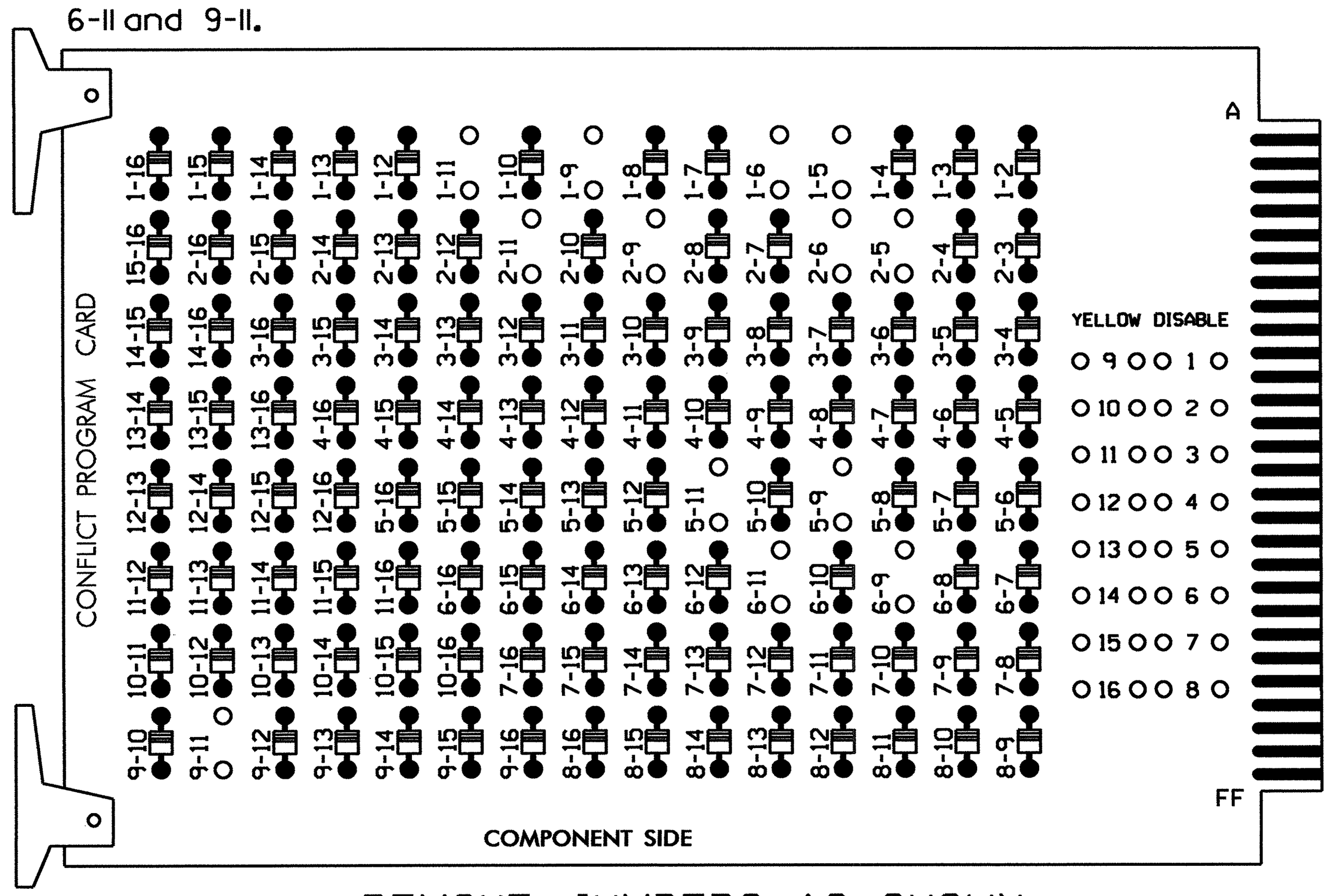
30-APR-2013 16:04
R:\Traffic\Signals\Designs\Signals#10-0885#10-0885T_sig_dsn_20130430.dgn
mwb0090

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

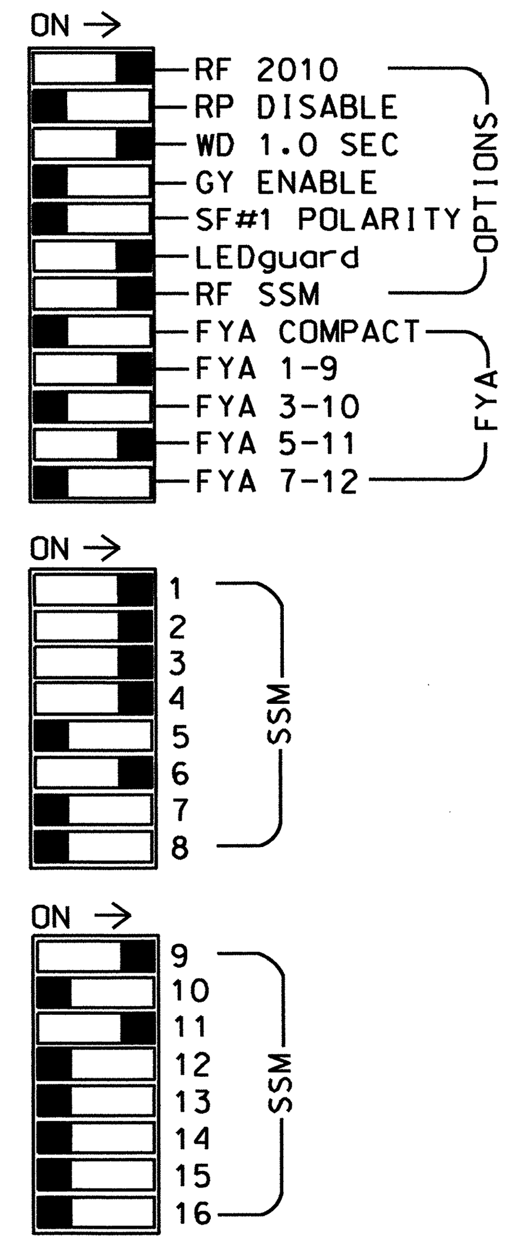
(remove jumpers and set switches as shown)

ON OFF
WD ENABLE
SW2

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 5-9, 5-11, 6-9, 6-11 and 9-11.



REMOVE JUMPERS AS SHOWN



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Make sure jumpers SEL2-SEL5 are present on the monitor board.

■ = DENOTES POSITION OF SWITCH

EQUIPMENT INFORMATION

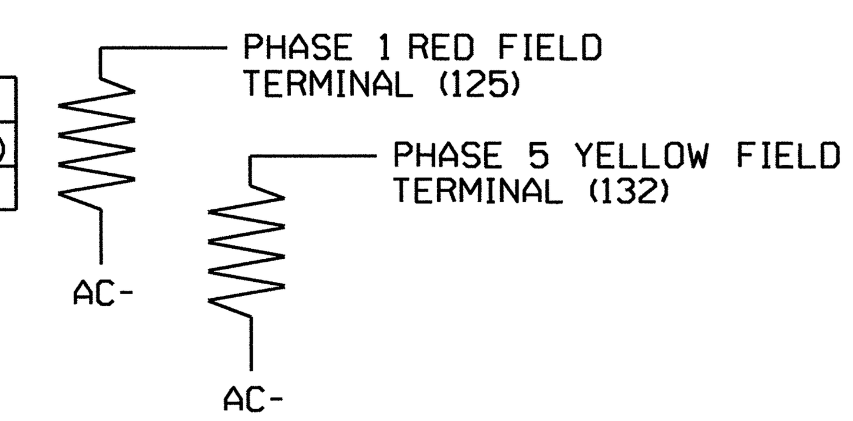
CONTROLLER..............2070L
CABINET.................332 /W/ AUX
SOFTWARE................ECONOLITE OASIS
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S1,S2,S3,S4,S5,S6,S9,S12
PHASES USED.............1,2,3,4,5,6
OVERLAP "A".............1+2
OVERLAP "B".............NOT USED
OVERLAP "C".............5+6
OVERLAP "D".............NOT USED

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



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.	11★	32	21,22	NU	22	31	32	41	42	NU	51★	61,62	NU	NU	NU	NU	11★	NU	NU	51★	NU	NU
RED		✳	128			116	116	101	101			134										
YELLOW			129			117	117	102	102		✳	135										
GREEN			130			118	118	103	103			136										
RED ARROW																	A121			A114		
YELLOW ARROW		126			117												A122			A115		
FLASHING YELLOW ARROW																	A123			A116		
GREEN ARROW	127	127			118	118		103			133											

NU = Not Used

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

★ See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø 1 1A	SLOT EMPTY	ø2/SYS 2A/S26	WIRED INPUT ⊗	SLOT EMPTY	ø 3 3A	ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED		ø 1 1B			ø 3 3B	ø 4 4B							ST DC ISOLATOR
FILE "J"	U	ø 5 5A	ø6/SYS 6A/S27	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED												

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	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
1B	TB2-11,12	I3L	76	38	42	1	Y	Y			15
2A/S26	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			10
5A[2]	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y			
6A/S27	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			

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

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

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

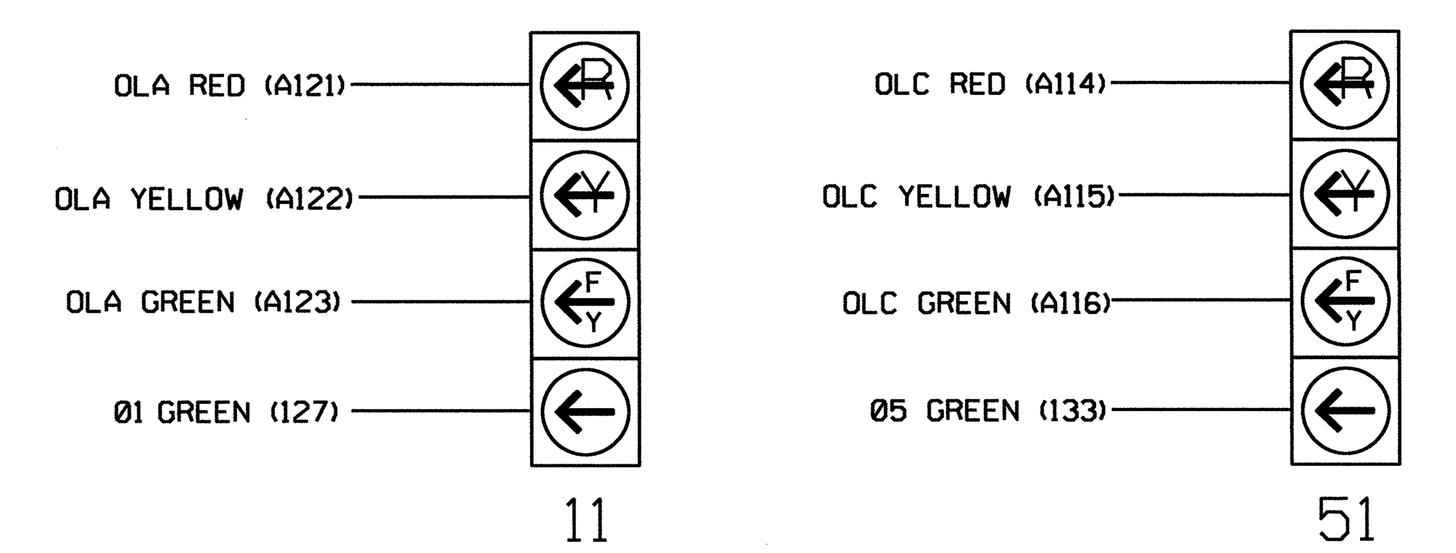
NOTES

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. 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 5,7, 8,10,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Start Up 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 Catawba Avenue Closed Loop System.

! 7. Restore controller to factory defaults before programming controller. !

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

1. The sequence display for this signal requires special logic programming. See sheet 2 of 2 for programming instructions.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0885T
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Sheet 1 of 2 - Temp

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

SR 5544 (Catawba Avenue)
at
US 21 (Statesville Road)/
Holiday Lane

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2013 | REVIEWED BY: T. J.
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 5/1/13
SIGNATURE DATE

SIG. INVENTORY NO. 10-0885T

01-MAY-2013 11:13
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Strickland*100885_sm_ele_xxx.dgn
cestrickland

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
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #2  (+/-COMMAND#)
IF  ACTIVE PHASE       #1  IS ON

          SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #52 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #3  (+/-COMMAND#)
IF  YELLOW ON PHASE    #1  IS ON

          SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #51 ON
```

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

PRESS '+'

```
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
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #5  (+/-COMMAND#)
IF  ACTIVE PHASE       #5  IS ON

          SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #44 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #6  (+/-COMMAND#)
IF  YELLOW ON PHASE    #5  IS ON

          SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #43 ON
```

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

(program controller as shown below)

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

```
PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          |123456789101112131415 16
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   <- NOTICE GREEN FLASH
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
```

PRESS '+' TWICE

```
PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE:          |123456789101112131415 16
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   <- NOTICE GREEN FLASH
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
```

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0885T
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 5544 (Catawba Avenue)
at
US 21 (Statesville Road)/
Holiday Lane

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: April 2013 | REVIEWED BY: T.J.M

PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

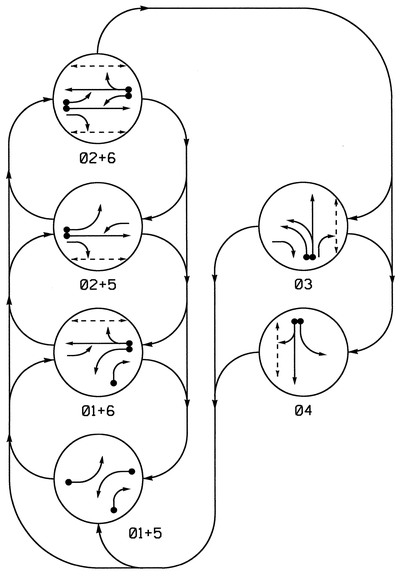
Prepared in the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Signal Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE 5/1/13 DATE

SIG. INVENTORY NO. 10-0885T

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.26

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

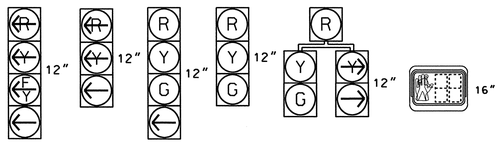
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11	~~←~~	~~←~~	~~F~~	~~F~~	~~R~~	~~R~~	~~Y~~
21	R	R	G	G	R	R	Y
22	R	R	G	G	~~R~~	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~R~~	~~R~~
32	R	R	R	R	G	R	R
33	~~R~~	~~R~~	R	R	G	R	R
41	R	R	R	R	R	G	R
42	R	R	R	R	R	G	R
51	~~←~~	~~F~~	~~←~~	~~F~~	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

All Heads L.E.D.



11, 51 | 31 | 32, 41 | 21, 42, 61, 62 | 22, 33 | P21, P22, P31, P32, P41, P42, P61, P62

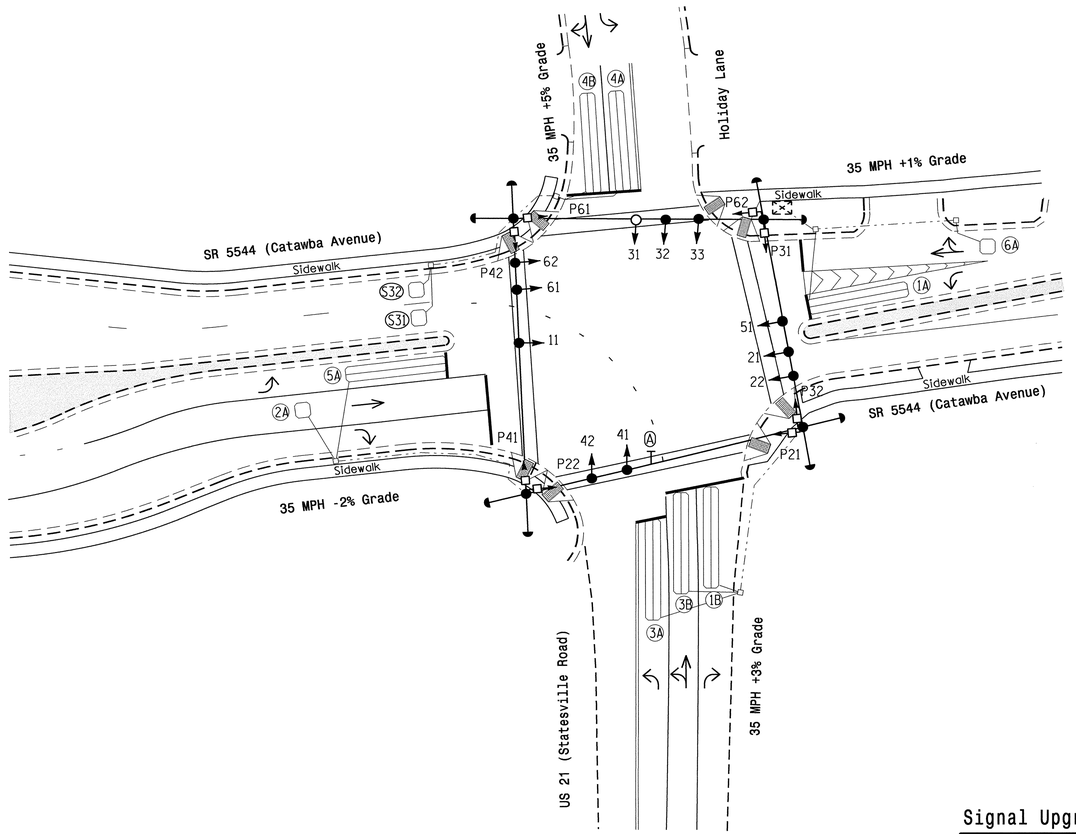
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
					6	Y	Y	-	-	-	-	Y
1B	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
2A	6X6	70	4	Y	2	Y	Y	-	-	-	-	Y
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	3	-	Y
3B	6X40	0	2-4-2	Y	3	Y	Y	-	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	3	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	10	-	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	15	-	Y
					2	Y	Y	-	-	-	-	Y
6A	6X6	70	3	Y	6	Y	Y	-	-	-	-	Y
S31	6X6	+150	3	Y	-	-	-	-	-	-	Y	Y
S32	6X6	+150	3	Y	-	-	-	-	-	-	Y	Y

6 Phase
Fully Actuated
Catawba Avenue CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads numbered 11, 32 & 33.
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Closed loop system data: Controller Asset #0885.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ

OASIS 2070L TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	10	7	7	7	10
Extension 1	2.0	3.0	2.0	2.0	2.0	3.0
Max Green 1 *	15	40	20	15	25	40
Yellow Clearance	3.0	4.0	3.7	3.6	3.0	4.0
Red Clearance	3.2	2.4	2.6	2.3	3.3	2.4
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	7	7	7	-	7
Don't Walk 1	-	18	15	21	-	15
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
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.

Signal Upgrade - Final Design

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

SR 5544 (Catawba Avenue)
at
US 21 (Statesville Road) / Holiday Lane

Division 10 Mecklenburg County Cornelius

PLAN DATE:	April 2013	REVIEWED BY:	T. Williams
PREPARED BY:	W. Mahbooba	REVIEWED BY:	

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

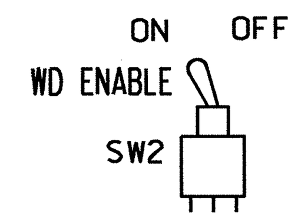
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393 TIMOTHY J. WILLIAMS
SIGNATURE 4/30/13 DATE

SIG. INVENTORY NO. 10-0885

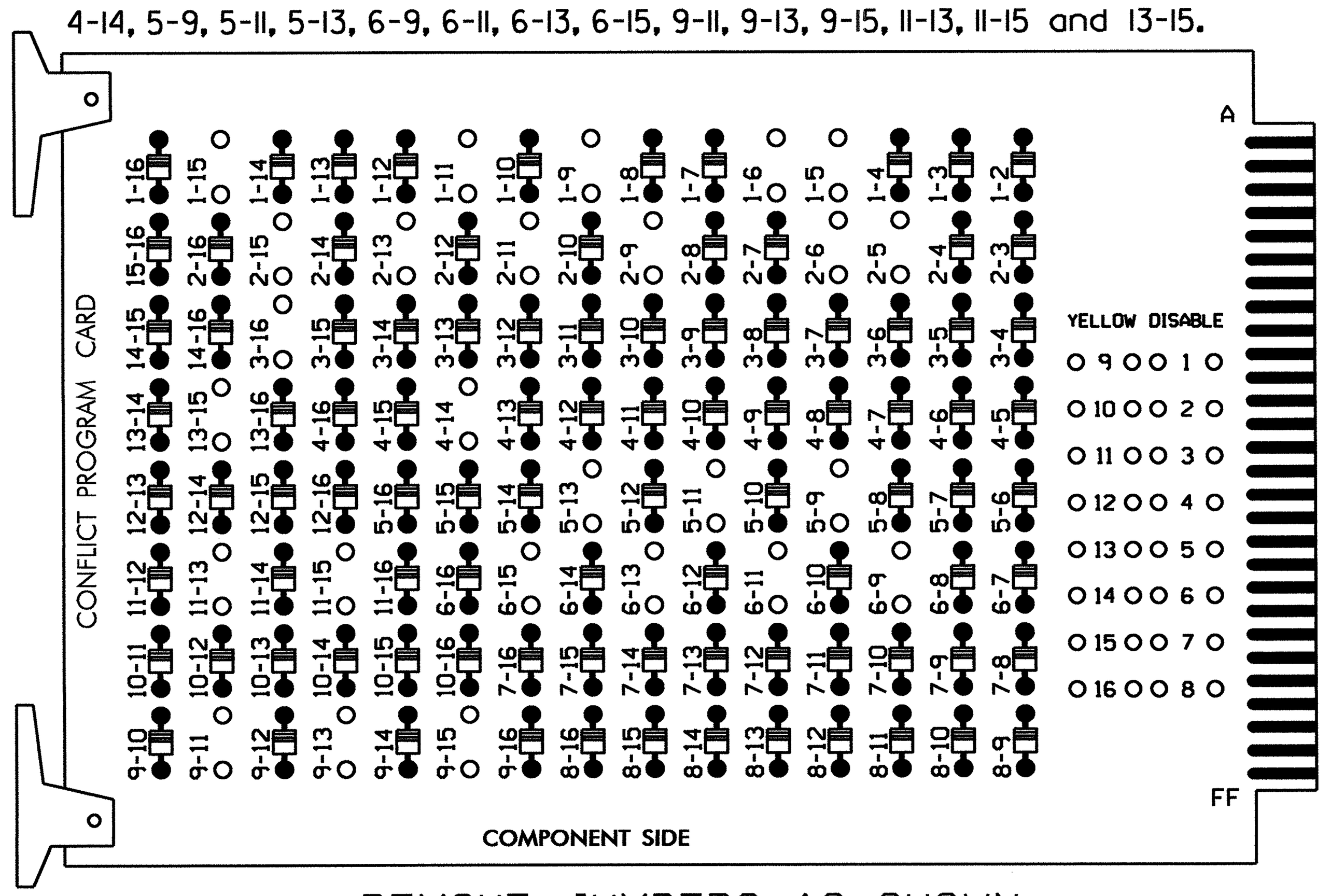
07-MAY-2013 12:38
R:\Traffic\Signals\Design\Signals\10-0885\10-0885_sig_dsn_20130430.dgn
mahbooba

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

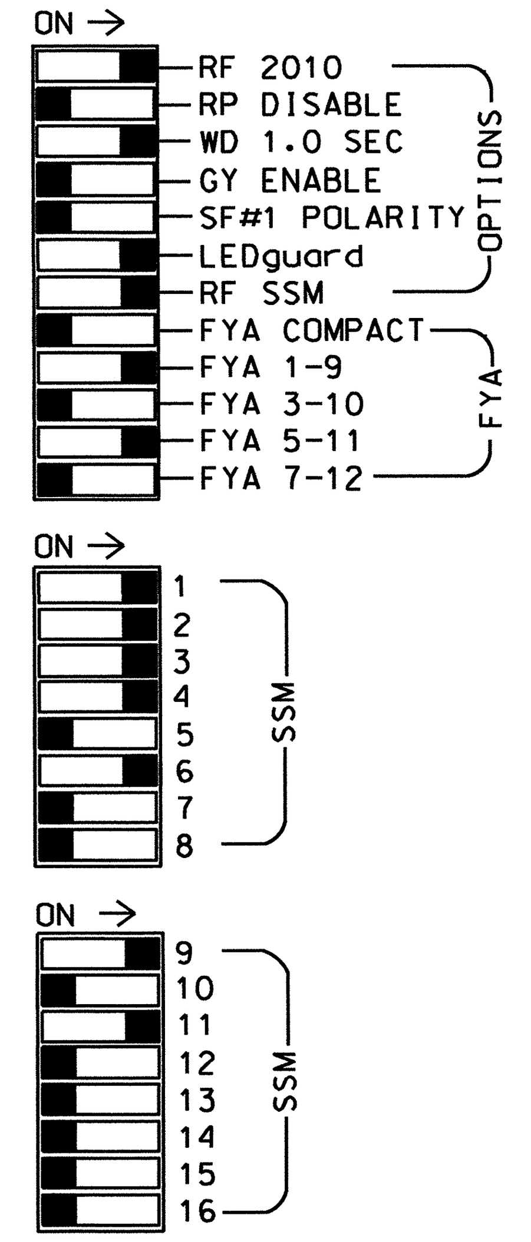
(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-16, 4-14, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 9-11, 9-13, 9-15, 11-13, 11-15 and 13-15.



REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Make sure jumpers SEL2-SEL5 are present on the monitor board.

EQUIPMENT INFORMATION

CONTROLLER..............2070L
CABINET.................332 /W/ AUX
SOFTWARE................ECONOLITE OASIS
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S1,S2,S2P,S3,S4,S4P,S5,S6,S6P,S8P,S9,S12
PHASES USED.............1,2,2 PED,3,3 PED,4,4 PED,5,6,6 PED
OVERLAP "A".............1+2
OVERLAP "B".............NOT USED
OVERLAP "C".............5+6
OVERLAP "D".............NOT USED

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	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	33	21,22	P21, P22	22	31	32	33	41	42	P41, P42	51★	61,62	P61, P62	NU	NU	P31, P32	11★	NU	NU	51★	NU	NU
RED		✱	128				116	116	101	101			134										
YELLOW			129				117	117	102	102		✱	135										
GREEN			130				118	118	103	103			136										
RED ARROW						116												A121			A114		
YELLOW ARROW		126			117	117												A122			A115		
FLASHING YELLOW ARROW																		A123			A116		
GREEN ARROW	127	127			118	118	118		103			133											
(hand)				113							104			119			110						
(pedestrian)				115							106			121			112						

NU = Not Used

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

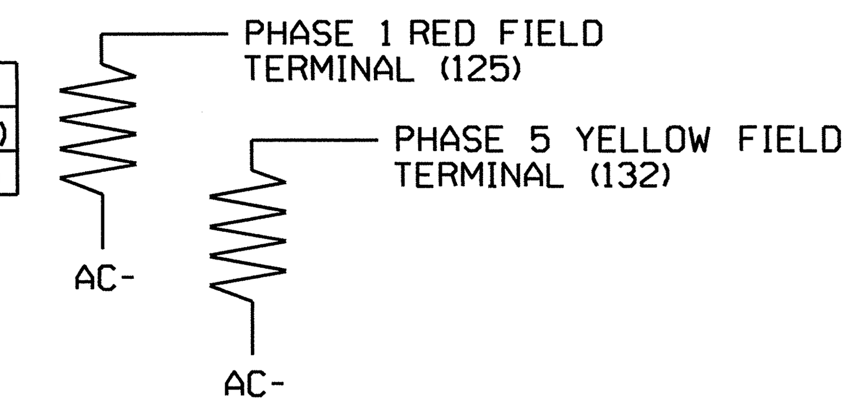
★ See pictorial of head wiring in detail below.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

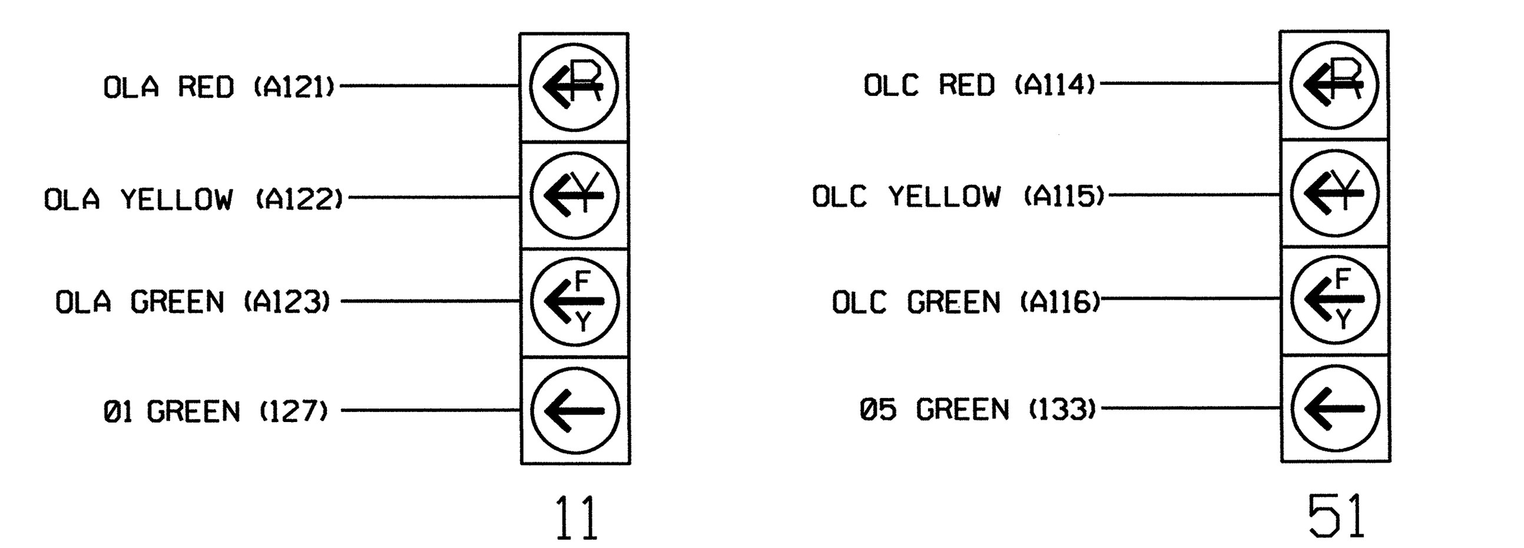
ACCEPTABLE VALUES

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



4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

1. The sequence display for this signal requires special logic programming. See sheet 2 of 2 for programming instructions.

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. 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 5,7, 8,10,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2, 3, 4 and 6 for 'STARTUP PED CALL'.
6. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
7. The cabinet and controller are part of the Catawba Avenue Closed Loop System.

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
	-	J4U	48	10	26	6	Y	Y			
1B	TB2-11,12	I3L	76	38	42	1	Y	Y			15
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			10
5A[2]	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
✱S31	TB6-9,10	I9U	60	22	11	SYS					
✱S32	TB6-11,12	I9L	62	24	13	SYS					
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P31,P32	TB8-8,9	I13L	70	32	PED 8	3 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

✱ System detector only. Remove the vehicle phase assigned to this detector in the default programming.

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

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	ø1 1A	SLOT EMPTY	ø2 2A	WIRED INPUT ⊗	SLOT EMPTY	ø3 3A	ø4 4A	SLOT EMPTY	SYS. DET. S31	SLOT EMPTY	SLOT EMPTY	ø2 PED DC ISOLATOR	ø6 PED DC ISOLATOR	FS DC ISOLATOR
FILE "I" L	NOT USED		ø1 1B			ø3 3B	ø4 4B		SYS. DET. S32			ø4 PED DC ISOLATOR	ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J" U	ø5 5A	ø6 6A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
FILE "J" L	NOT USED	NOT USED												

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0885
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy.Garner,NC 27529

SR 5544 (Catawba Avenue) at US 21 (Statesville Road)/ Holiday Lane

Division 10 | Mecklenburg County | Cornelius

PLAN DATE: April 2013 | REVIEWED BY: T. V[illegible]
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

SIGNATURE [signature] DATE 5/1/13

SIG. INVENTORY NO. 10-0885

01-MAY-2013 11:34
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Strickland*100885_sm_ele_xxx.dgn
cestrickland

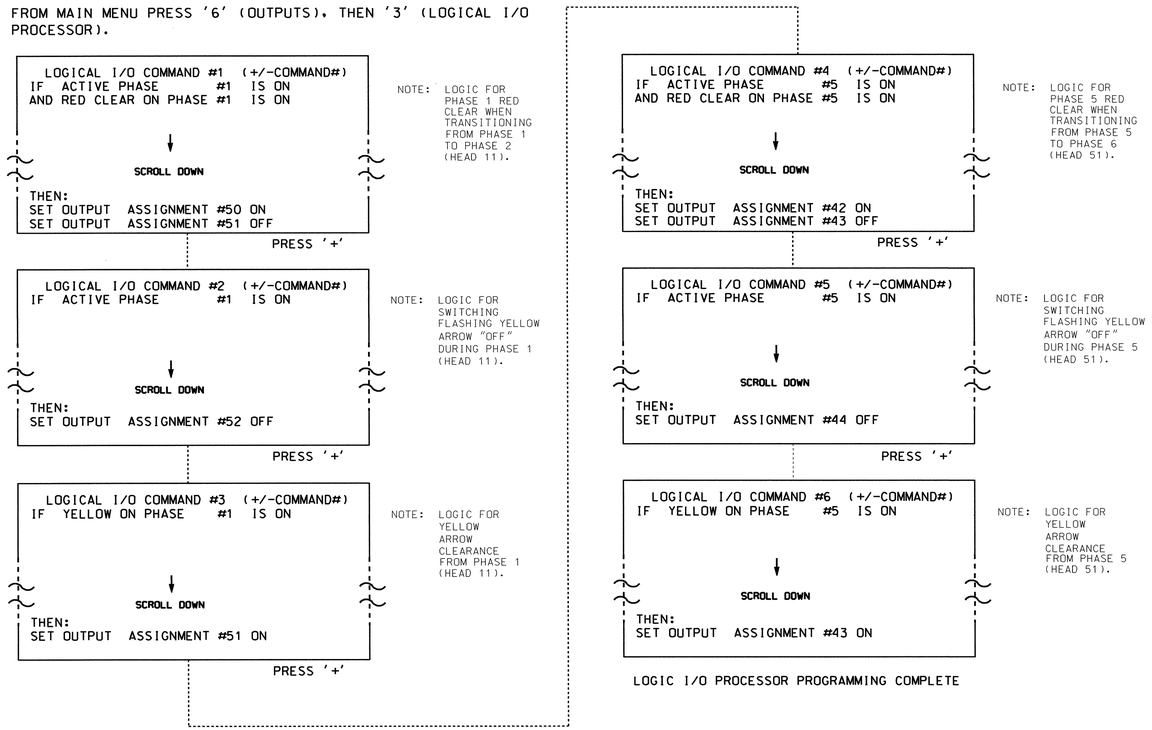
PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.28

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 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

(program controller as shown below)

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

```
 PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          |1234567891011121314151 6
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   <- NOTICE GREEN FLASH
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
```

PRESS '+' TWICE

```
 PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE:          |1234567891011121314151 6
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   <- NOTICE GREEN FLASH
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
```

OVERLAP PROGRAMMING COMPLETE

PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '6' (OUTPUTS). THEN '1' (OUTPUT ASSIGNMENTS)
2. ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
3. SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING
4. ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
5. BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
6. SELECT '1' (OUTPUT ASSIGNMENTS)
7. ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
8. REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '7' (DETECTORS). THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
2. CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
3. MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0885
DESIGNED: April 2013
SEALED: 4/30/13
REVISED: N/A

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 5544 (Catawba Avenue)
at
US 21 (Statesville Road)/
Holiday Lane

Division 10 | Mecklenburg County | Cornelius
PLAN DATE: April 2013 | REVIEWED BY: T. Sigmon
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
George C. Brown 5/1/13
SIGNATURE DATE
SIG. INVENTORY NO. 10-0885

01-MAY-2013 11:35
S:\PTISSIGNALS Signals\Workgroups\Sig Mgmt\Strickland\10885_sm_ele_xxx.dgn
$$$$PTISSIGNALS

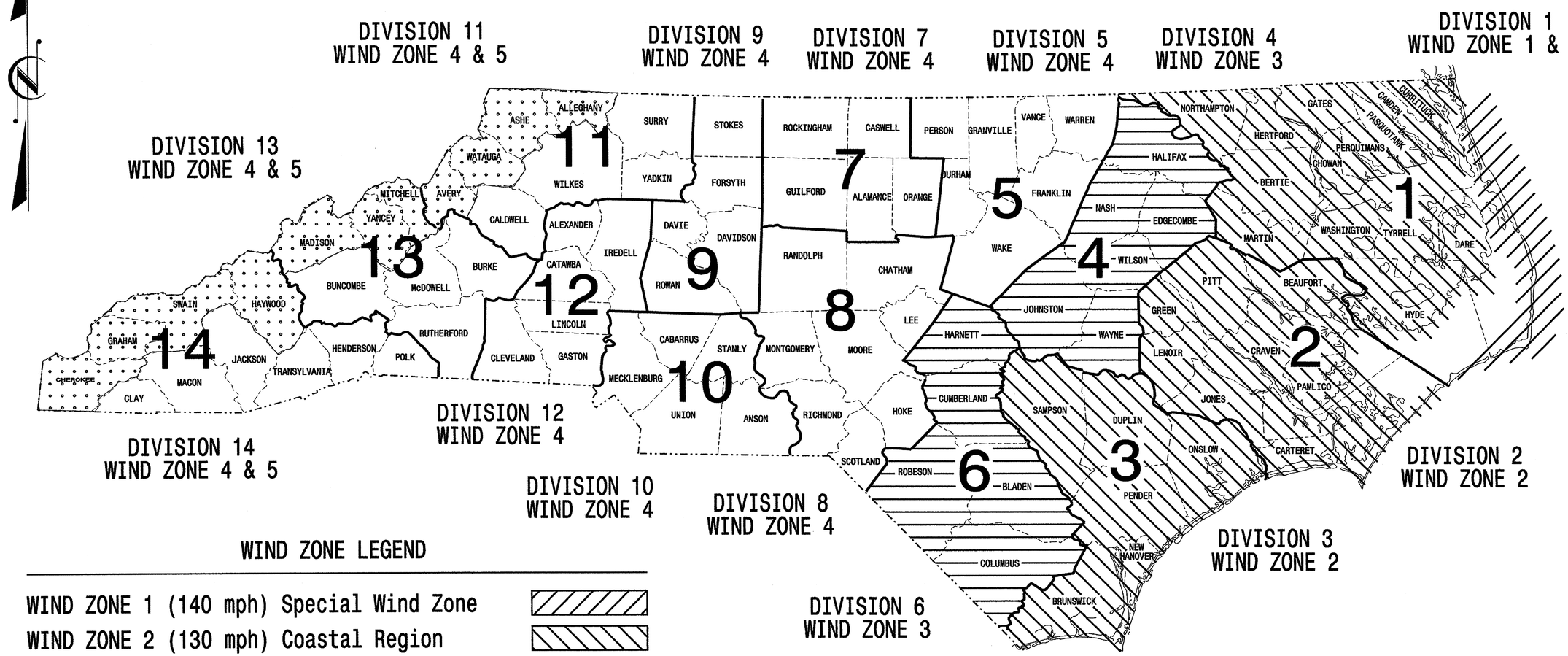
STATE	PROJECT NO.	SHEET NO.
N.C.	I-4733	Sig.29
F. A. PROJ. NO.		M 1
PROJECT ID. NO.		

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR METAL POLES

POLE STANDARDS

NCDOT METAL P



WIND ZONE LEGEND

WIND ZONE 1 (140 mph) Special Wind Zone	
WIND ZONE 2 (130 mph) Coastal Region	
WIND ZONE 3 (110 mph) Eastern Region	
WIND ZONE 4 (90 mph) Central & Mtn. Region	
WIND ZONE 5 (120 mph) Special Wind Zone	

http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html

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

Designed in conformance with the 2002 Interim to the 4th Edition 2001

AASHTO

Standard Specifications for Structural Supports for Highway Signs, Luminares, and Traffic Signals

INDEX OF PLANS

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION – ITS and SIGNALS UNIT

G. A. Fuller, P.E. – State ITS and Signals Engineer
G. G. Murr, Jr., P.E. – State Signals Engineer
D. C. Sarkar, P.E. – ITS and Signals Senior Structural Engineer
C. F. Andrews, Jr. – ITS and Signals Structural Project Engineer
M. Aslam – ITS and Signals Structural Project Engineer
N. Bitting, P.E. – ITS and Signals Structural Project Engineer

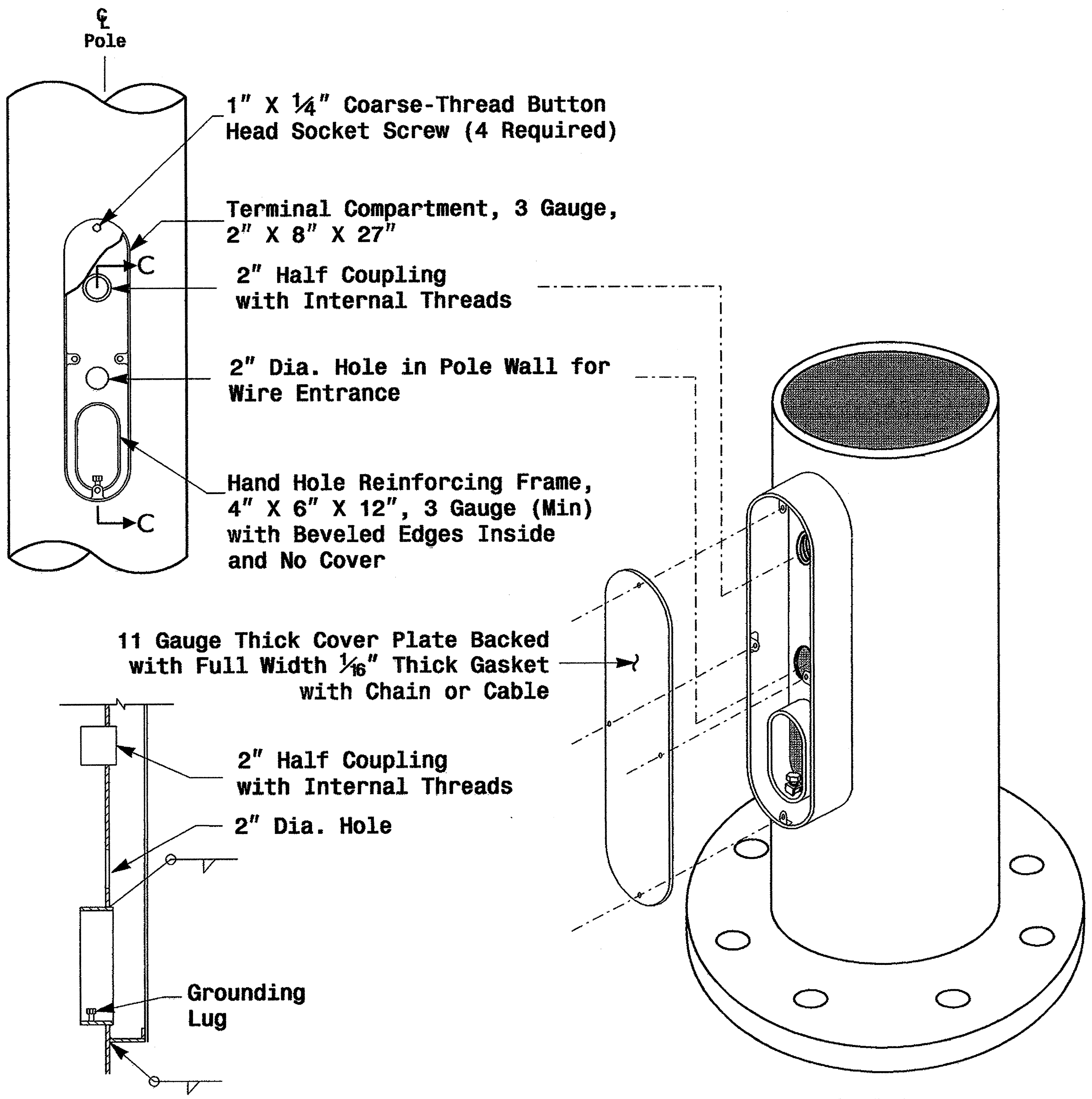
SEAL

NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

D. Sarkar 7.21.2009
SIGNATURE DATE

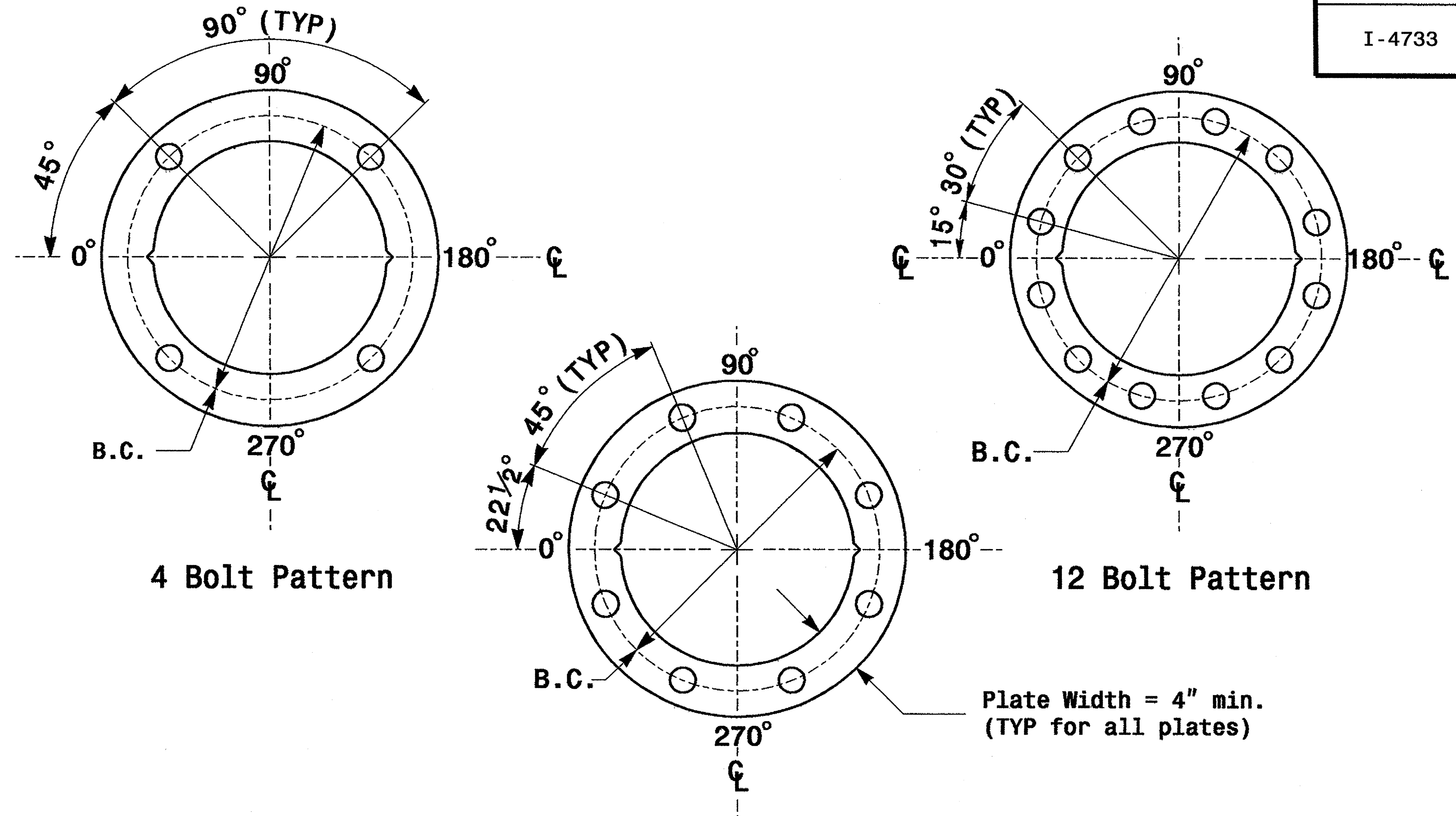
PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.30 M 2

Fabrication Details – All Poles



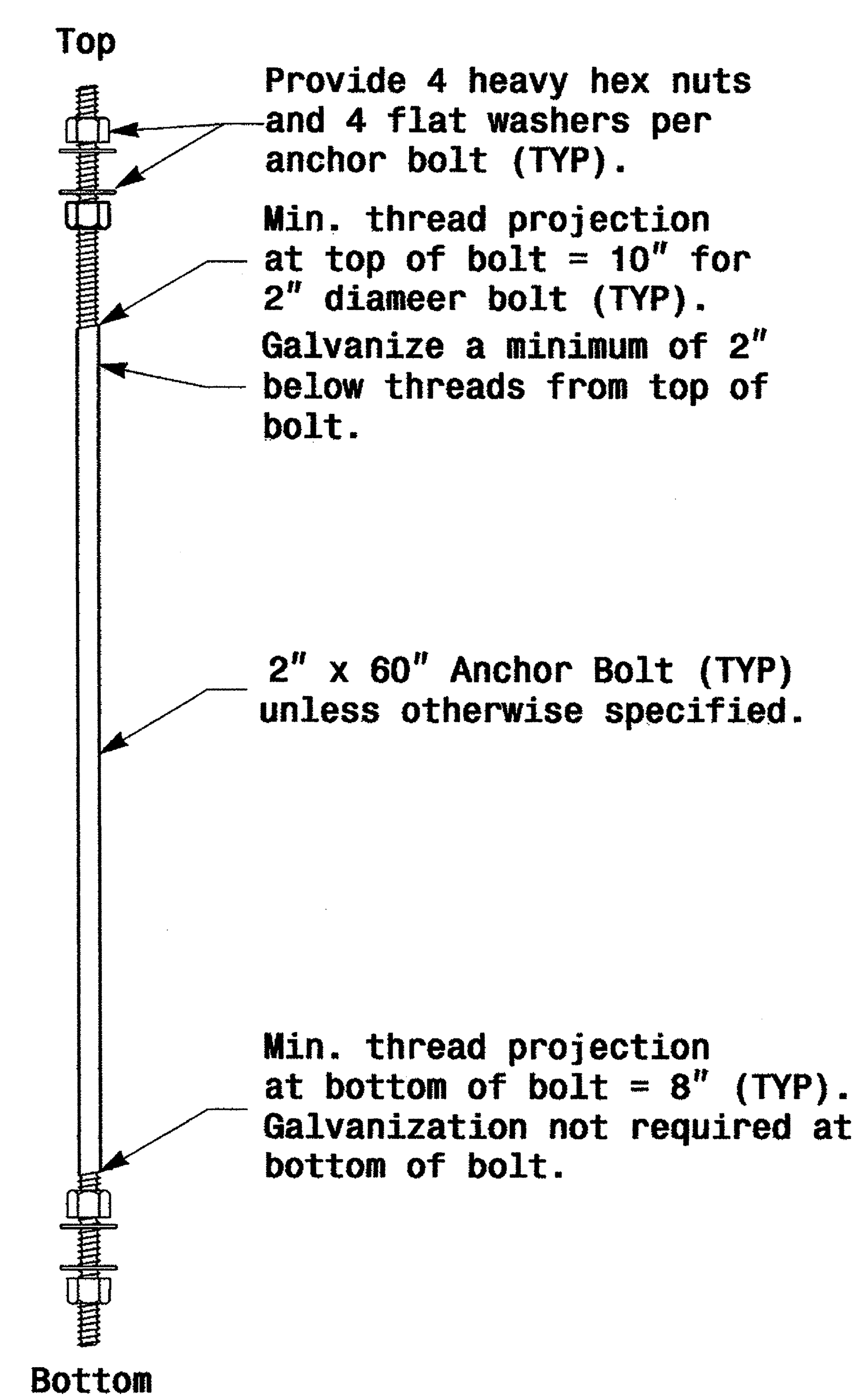
Note: Unless otherwise specified, locate Terminal Compartment 1 foot above the pole base plate at 180 degrees on the pole's radial index.

Terminal Compartment Detail



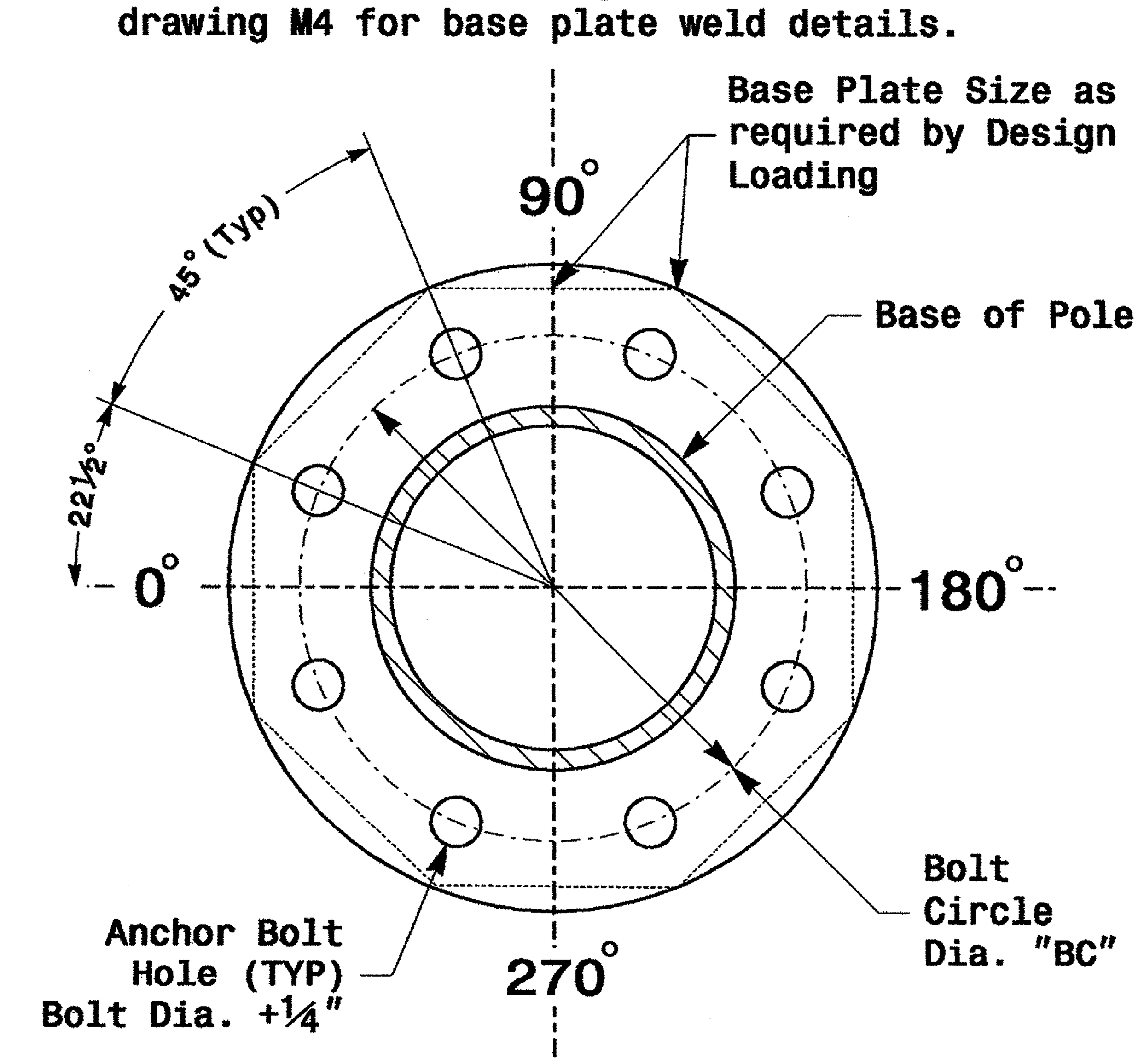
Construct Templates and Plates from ¼" min. thick Steel. Galvanizing is not required.

Base Plate Template and Anchor Bolt Lock Plate Details



Anchor Bolt Detail

Note: See Strain Pole drawing M3 and Mast arm drawing M4 for base plate weld details.



8 Bolt Base Plate Detail

Shaft I.D. Tag

MFG ________	MFG. DATE: MM/YY
SHAFT D/T/L/Y	----/----/----/----
ARM-A D/T/L/Y	----/----/----/----
	----/----/----/----
ARM-B D/T/L/Y	----/----/----/----
	----/----/----/----
A.B. DIA./B.C./L/Y	----/----/----/----
NCDOT STANDARD	----------------

Shaft I.D. Tag
(Provide on Strain Poles and Mast Arm Poles)

MFG ________	MFG. DATE: MM/YY
SECTION D/T/L/Y	----/----/----/----
NCDOT STANDARD	----------------

Arm I.D. Tag
(Provide on each section of a multi-section mast arm)

Notes:
1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
2) A.B. = Anchor Bolt
3) B.C. = Bolt Circle of Anchor Bolts
4) If Custom Design, use "NCDOT STANDARD" line for plan pole I.D.
5) See drawing M4 for mounting positions of I.D. tags.

Identification Tag Details

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

Typical Fabrication Details Common To All Metal Poles

PLAN DATE:	May 2005	REVIEWED BY:	C.F. Andrews
PREPARED BY:	P.L. Alexander	REVIEWED BY:	A.M. Esposito

SCALE 0 NA NONE

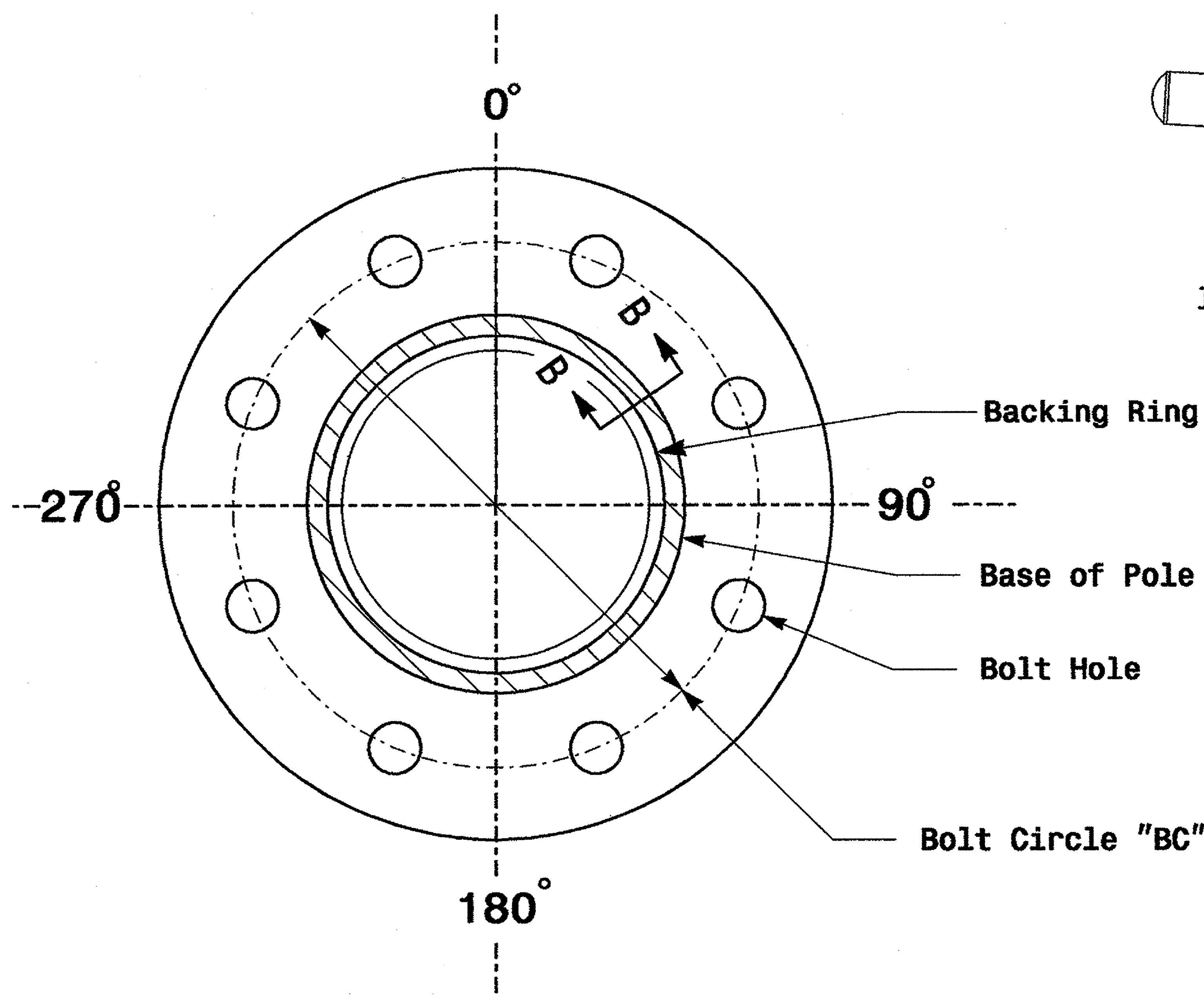
REVISIONS	INIT.	DATE

SEAL
North Carolina Professional Engineer Seal 028094 Debesh C. Sarkar
D. Sarkar 9.2.2005
SIGNATURE DATE
SIG. INVENTORY NO.

01-SEP-2005 18:22
D:*2004 Metal Pole Standards*2004 m2 thru m5.dgn
candrews

PROJECT REFERENCE NO.	SHEET NO.
B-4946	Sig. 31 M 4

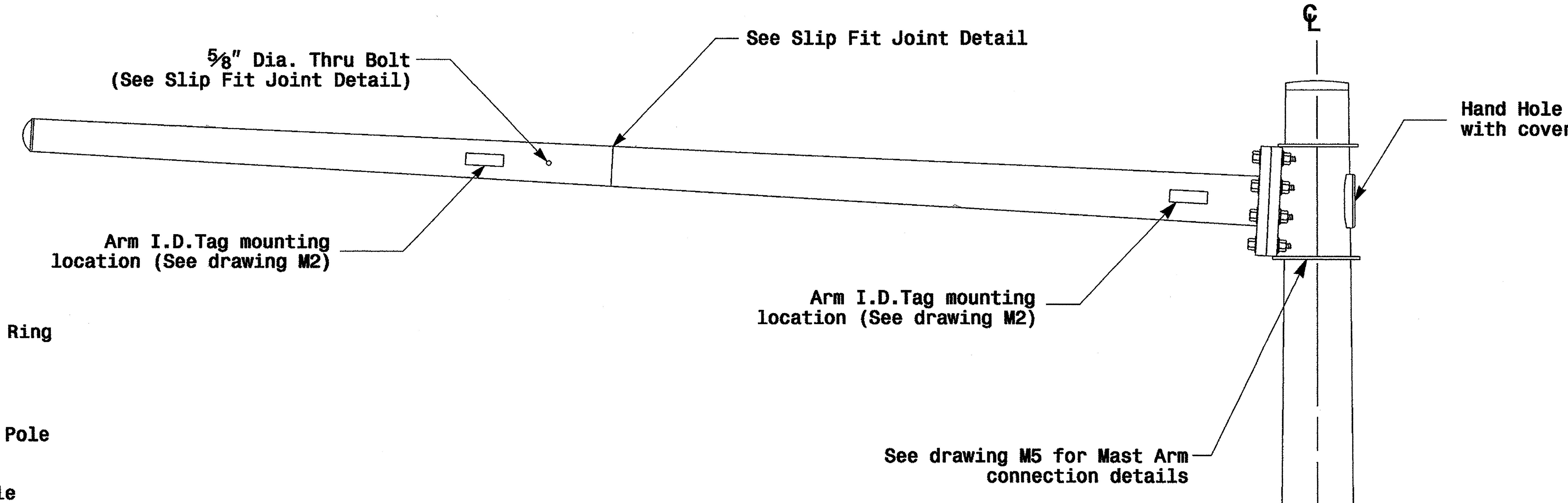
Fabrication Details – Mast Arm Poles

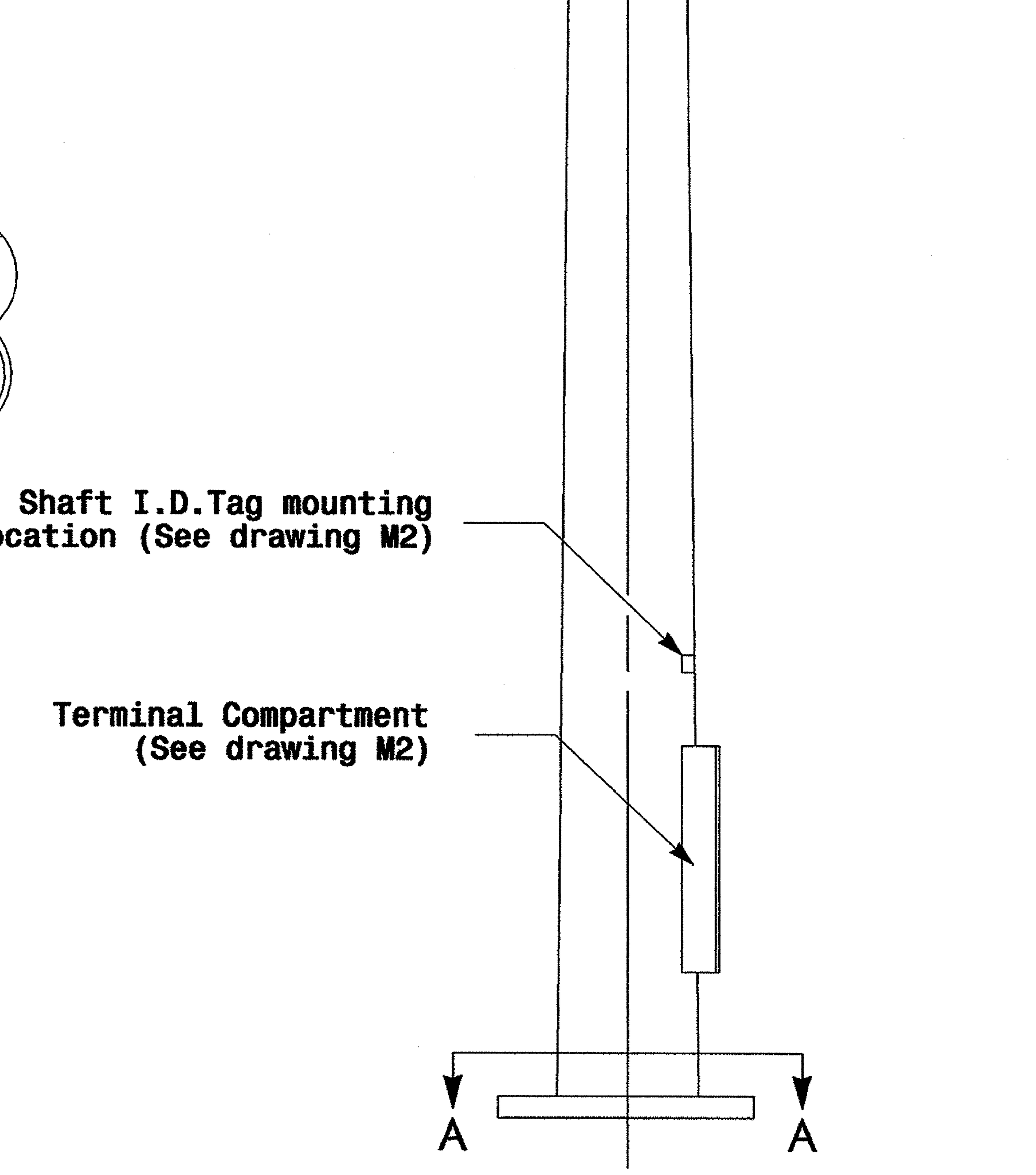


Section A-A

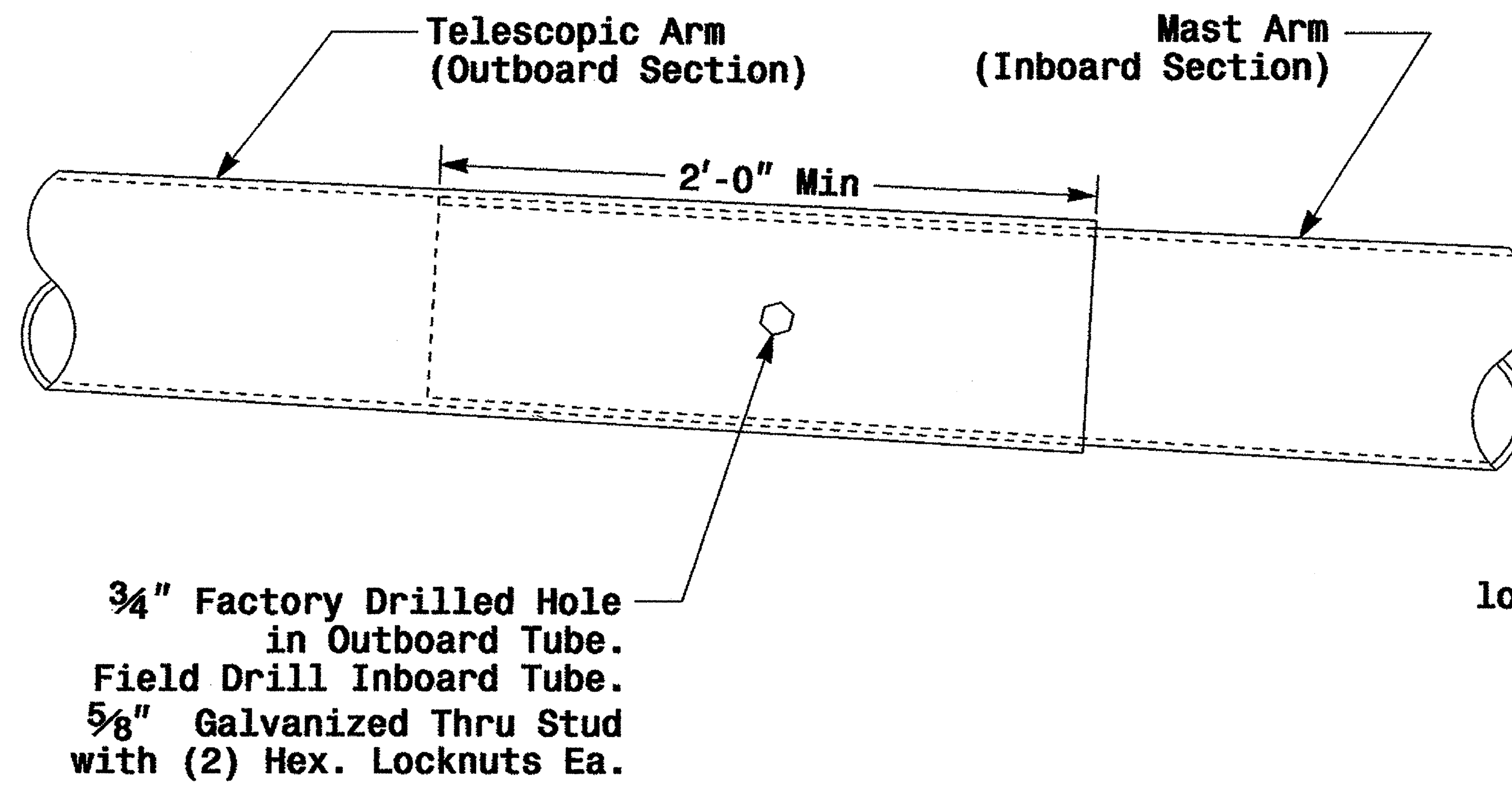
(See drawing M 2)

Pole Base Plate

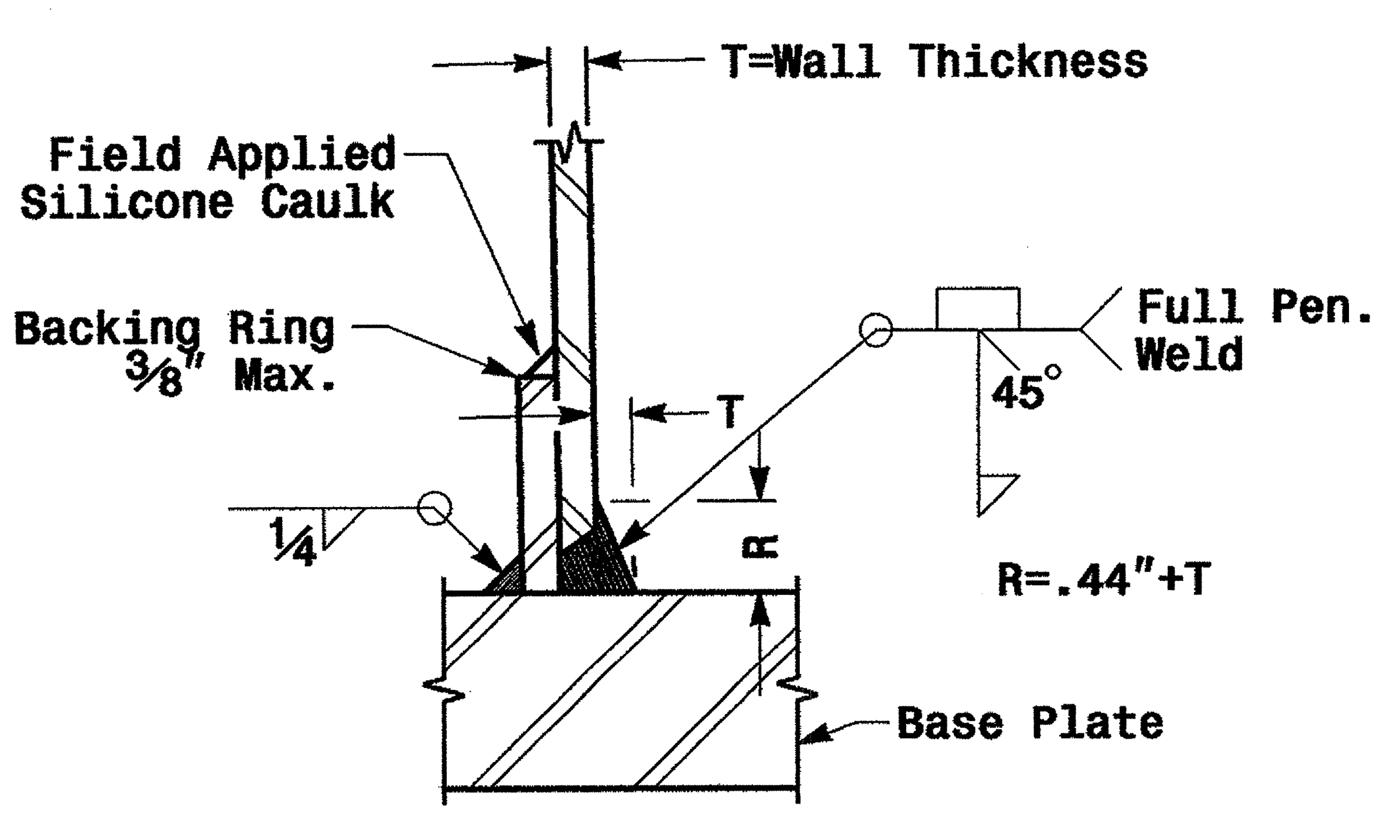




Monotube Mast Arm Pole
(.14in./ft. taper)



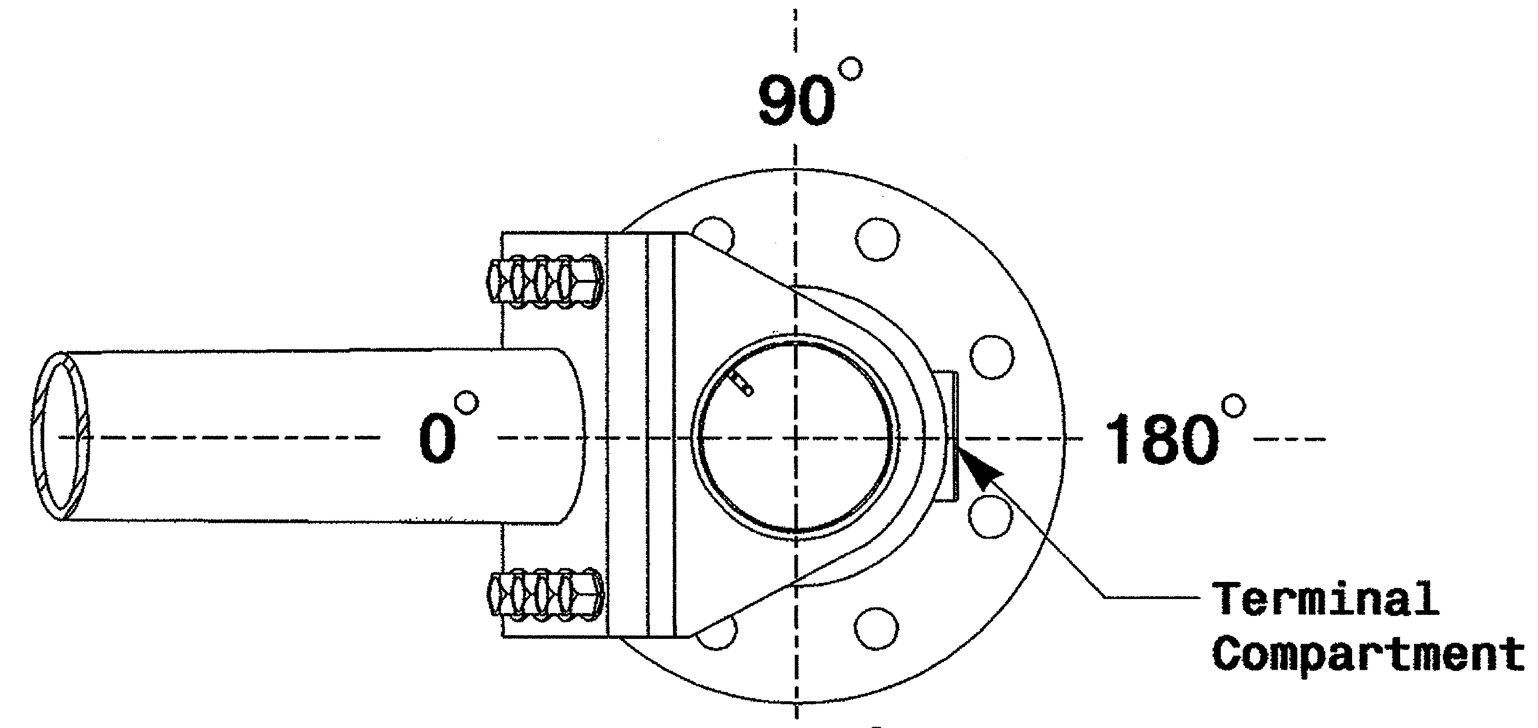
Slip Fit Joint Detail for Mast Arm



Section B-B

(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail



Mast Arm Radial Orientation

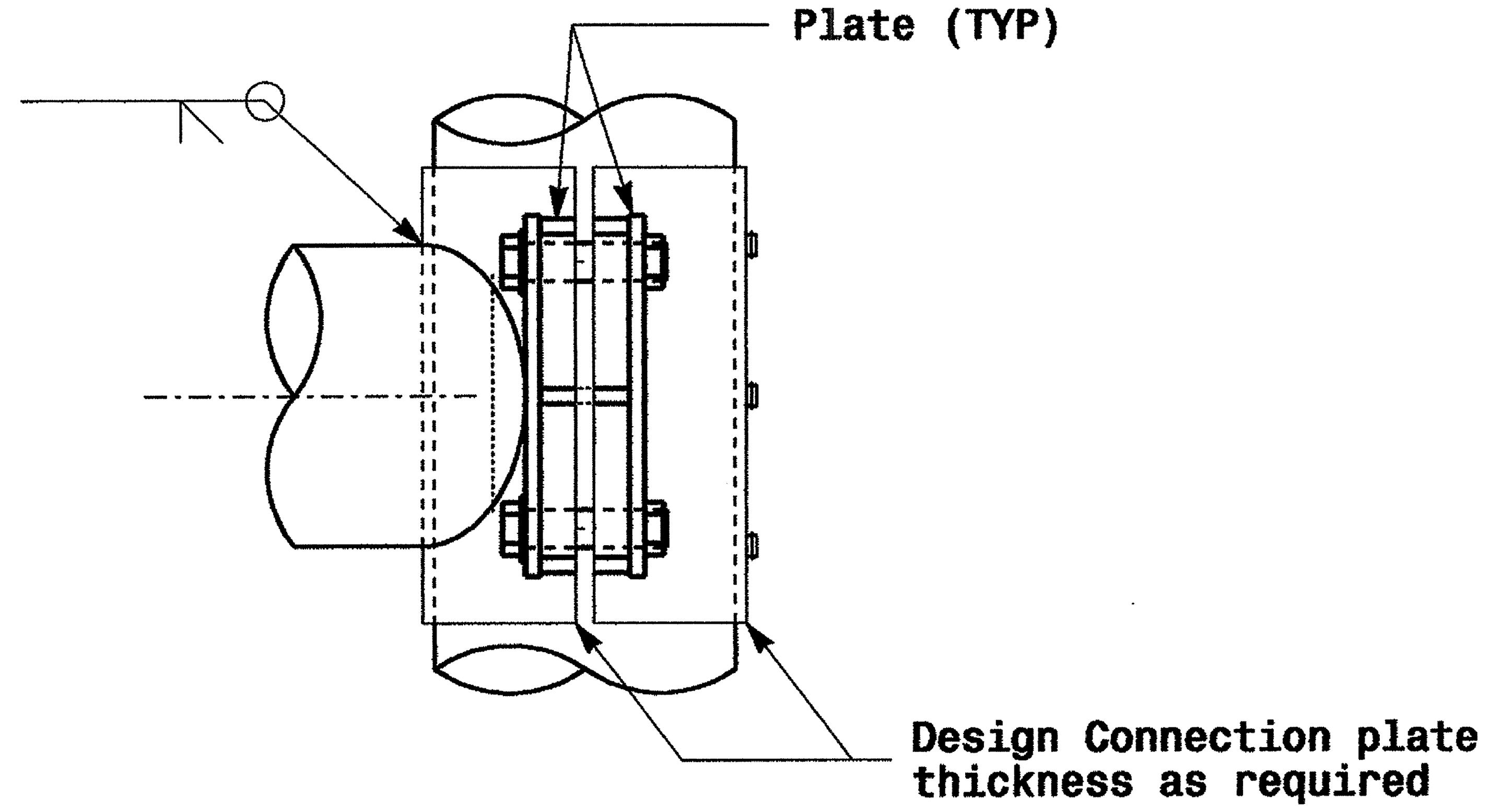
Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603	Typical Fabrication Details for Mast Arm Poles	SEAL
SCALE: 0 NA — NONE	PLAN DATE: May 2005 / REVIEWED BY: C.F. Andrews / PREPARED BY: P.L. Alexander / REVIEWED BY: A.M. Esposito	NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR
	REVISIONS / INIT. / DATE	D. Sarkar (SIGNATURE) 9.2.2005 (DATE)
		SIG. INVENTORY NO.

01-SEP-2005 14:08
w:*peoples-unit*workgroups*2004 metal pole standards*2004 m4.dgn
palexander

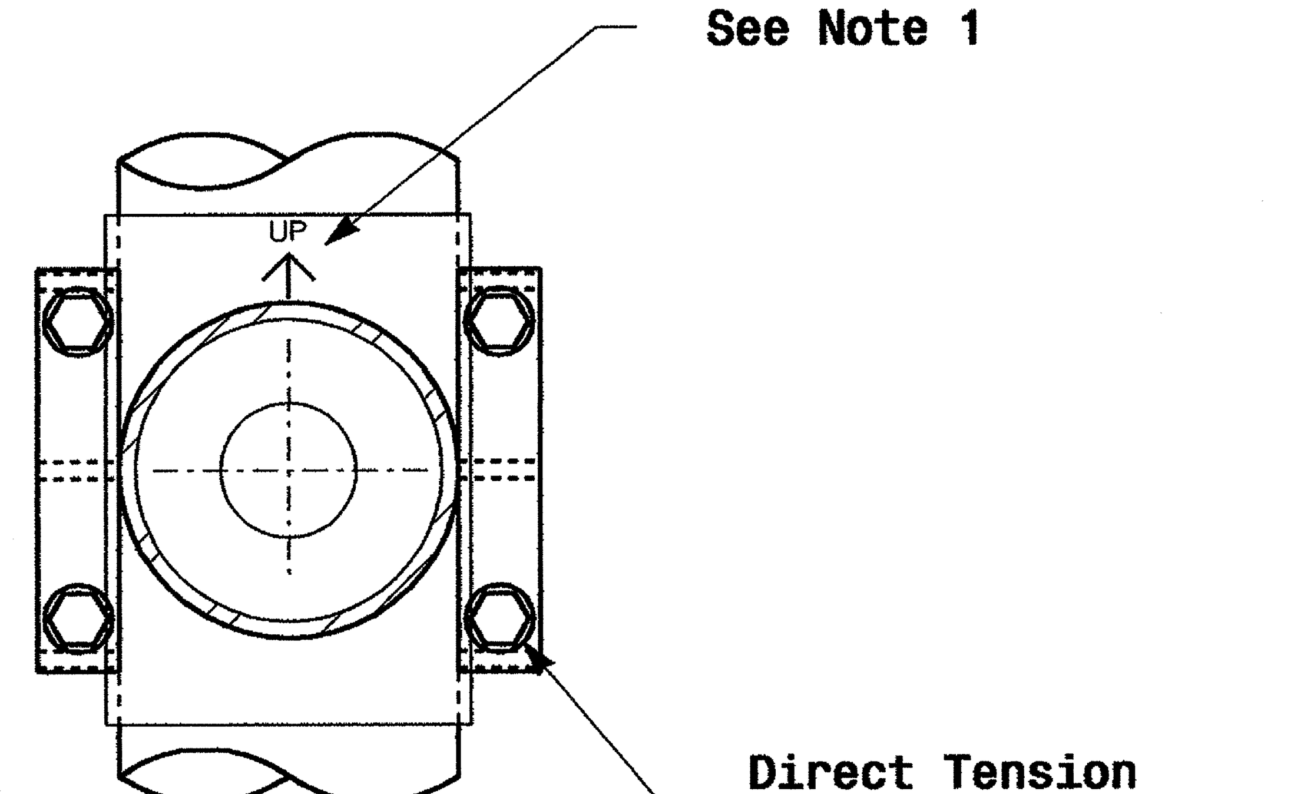
PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.32 M 5

Fabrication Details – Mast Arm Poles

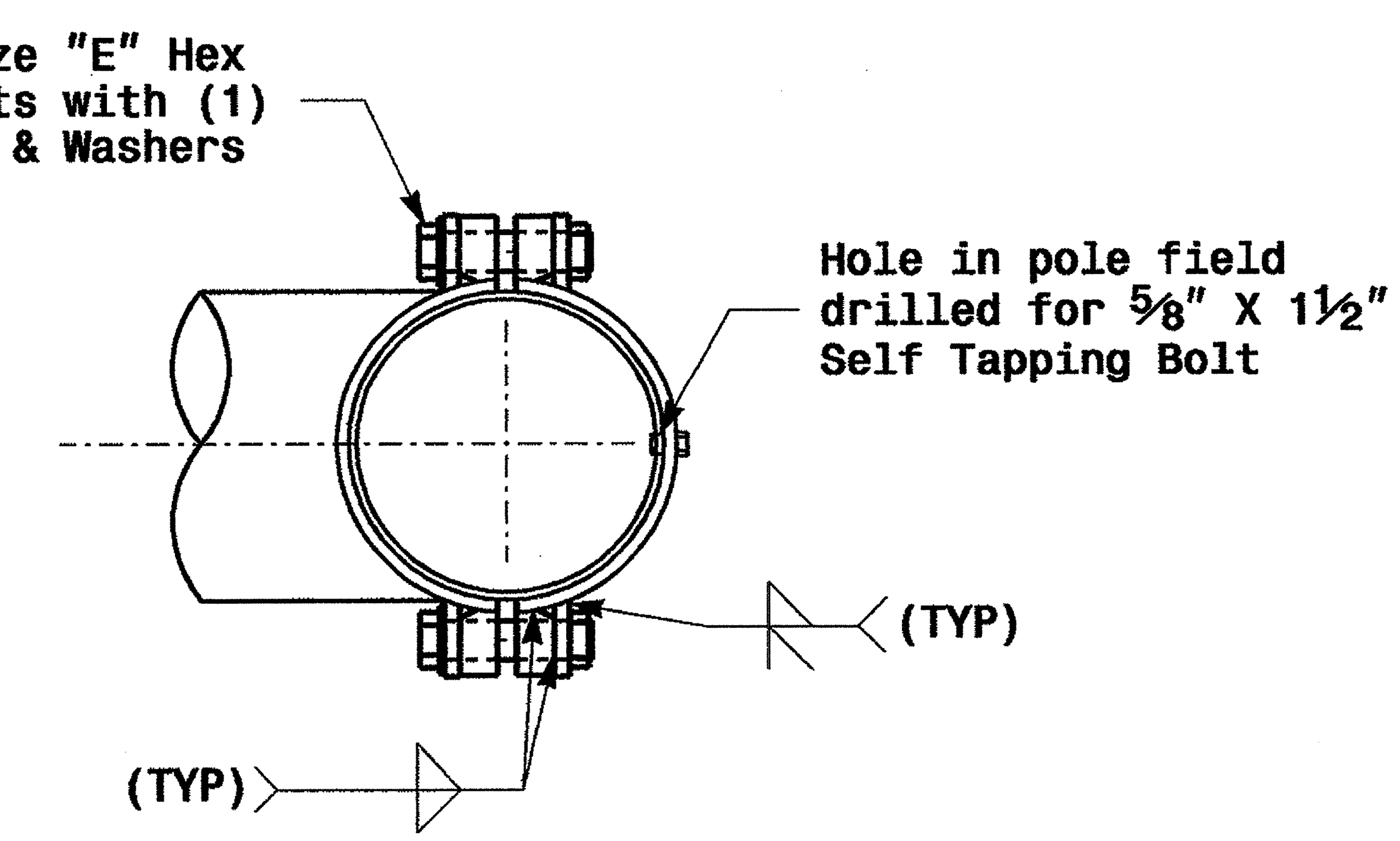
Adjustable Clamp Type Bolted Mast Arm Connection



Side Elevation View

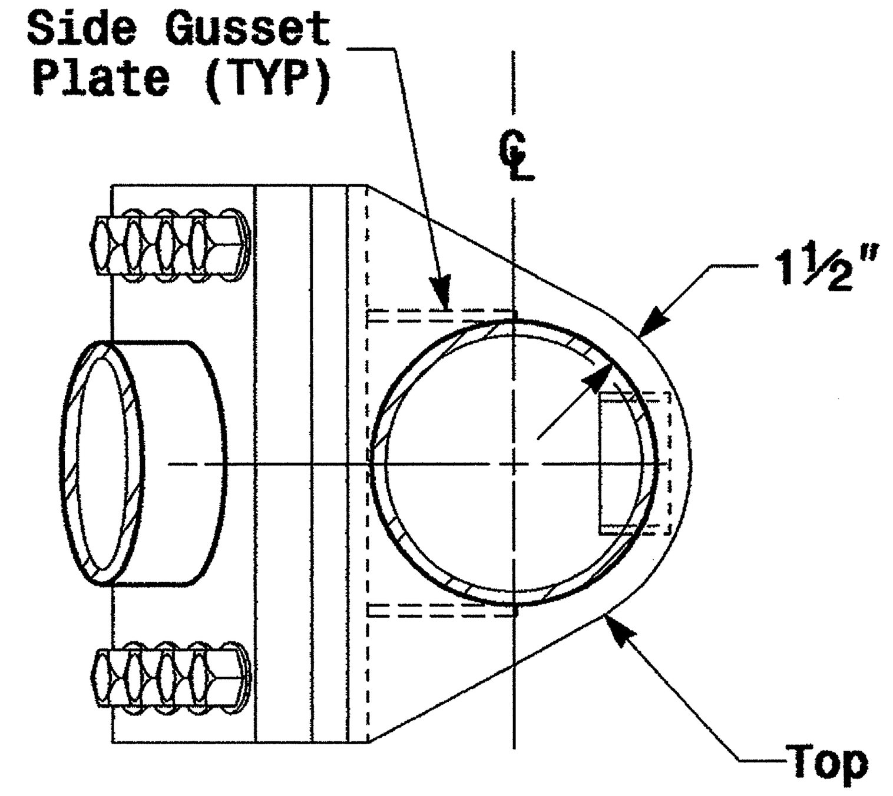


Front Elevation View

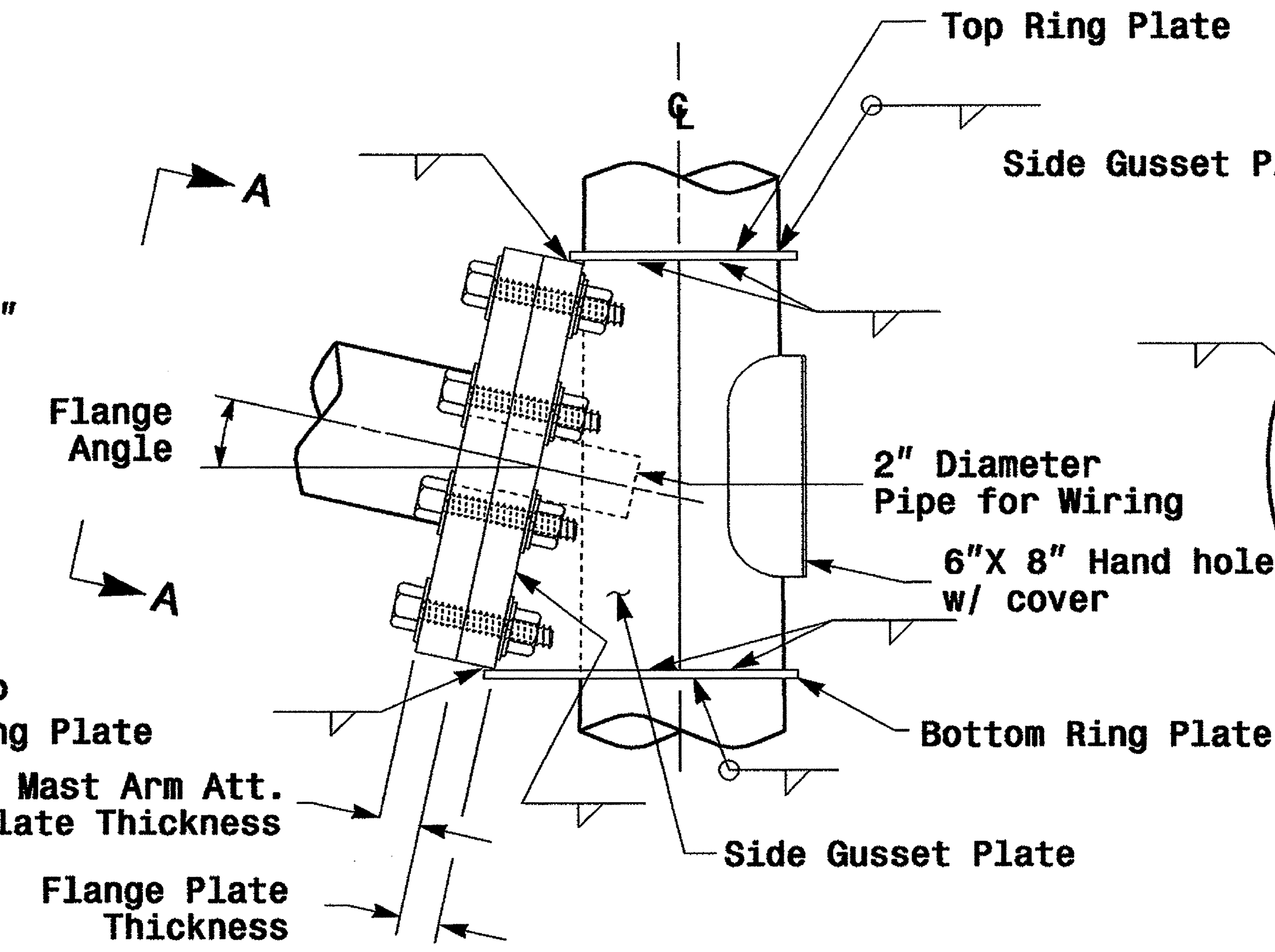


Plan View

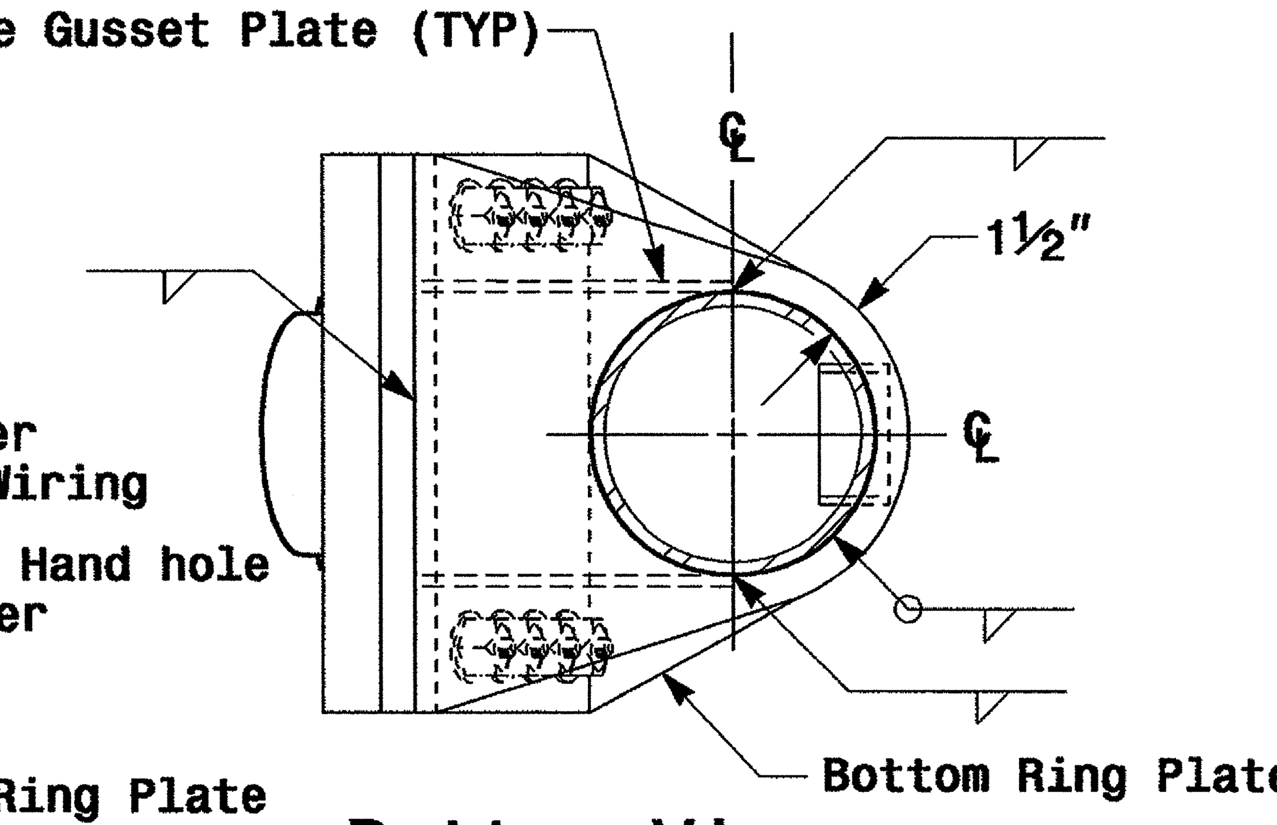
Welded Ring Stiffened Mast Arm Connection



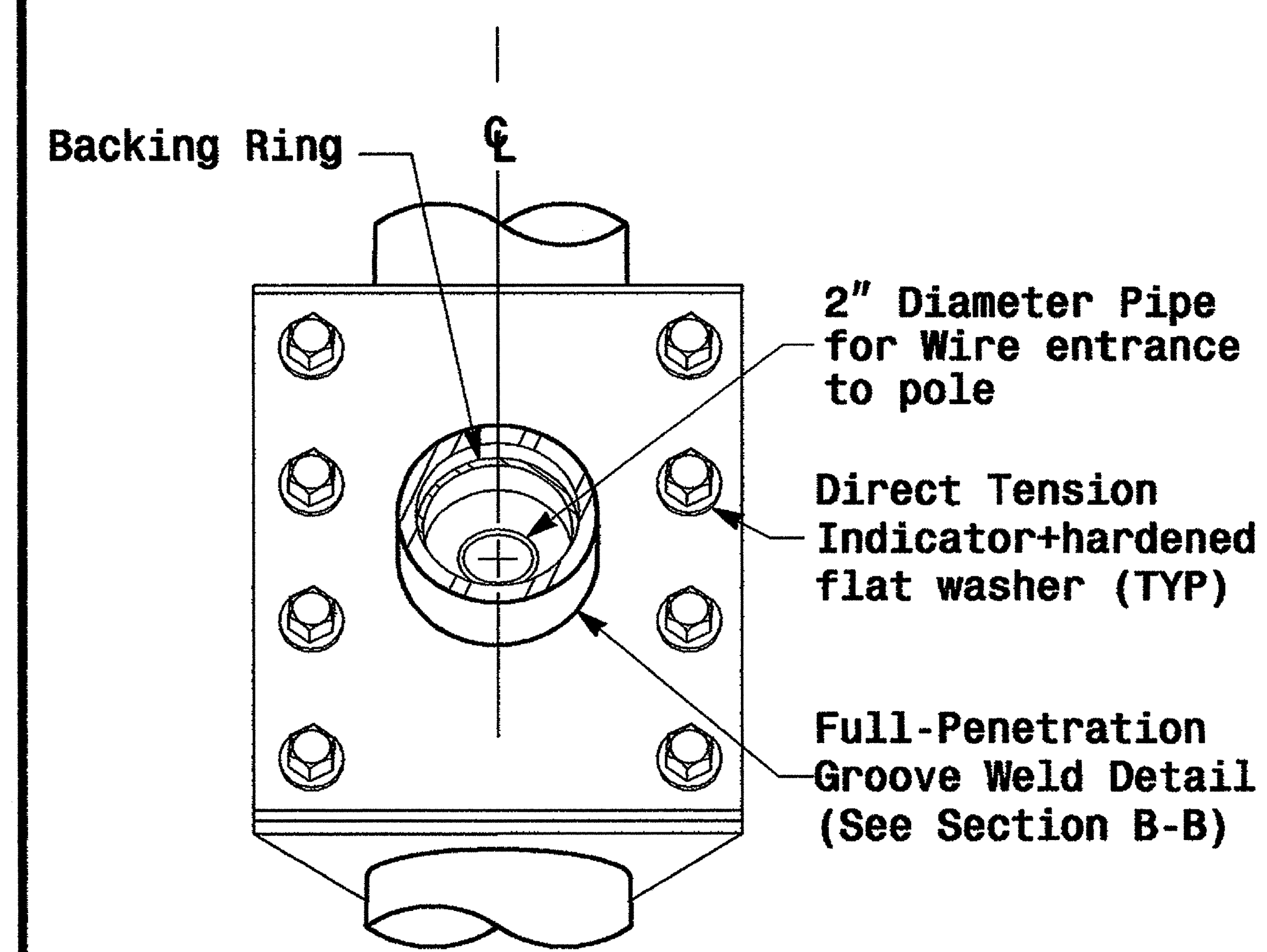
Plan View



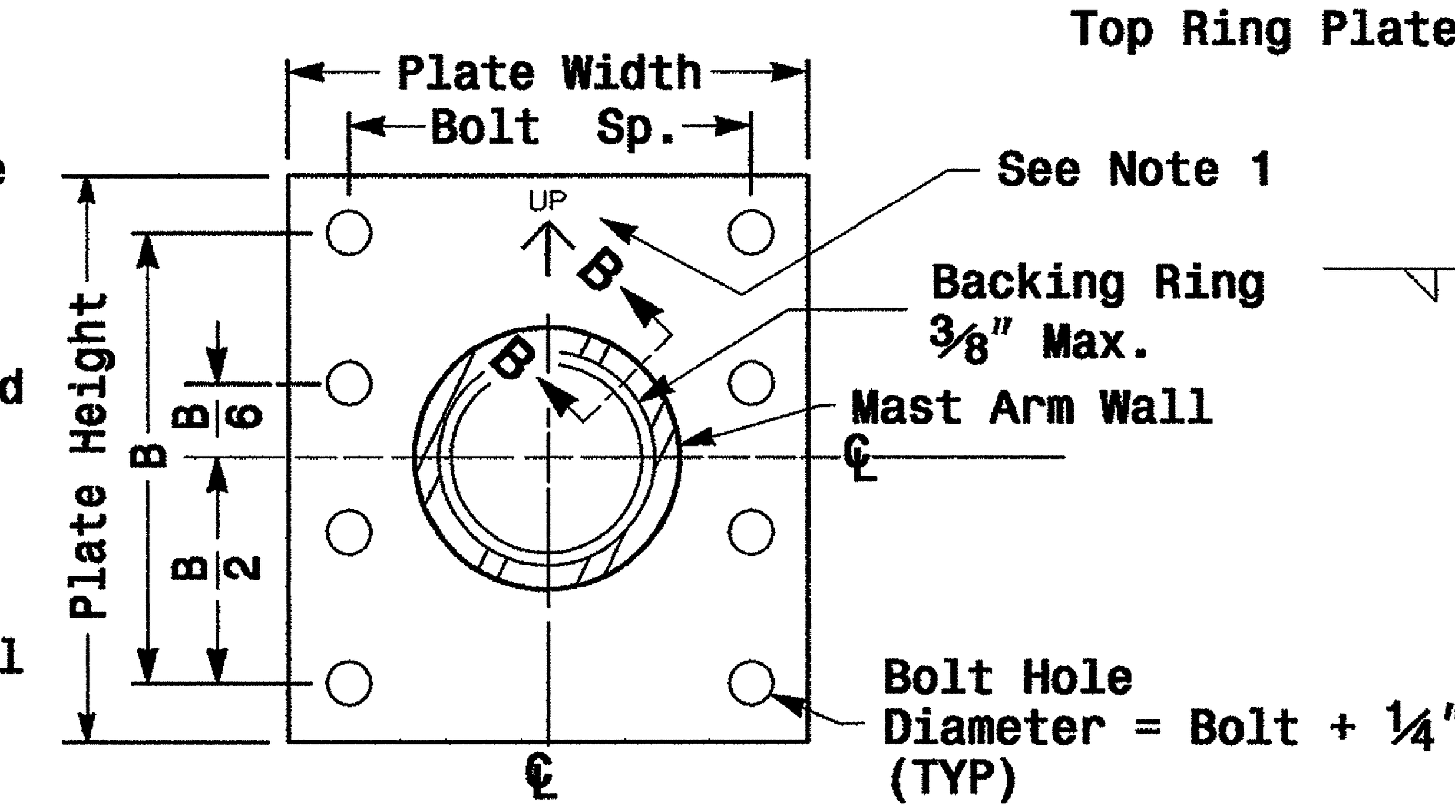
Side Elevation View



Bottom View

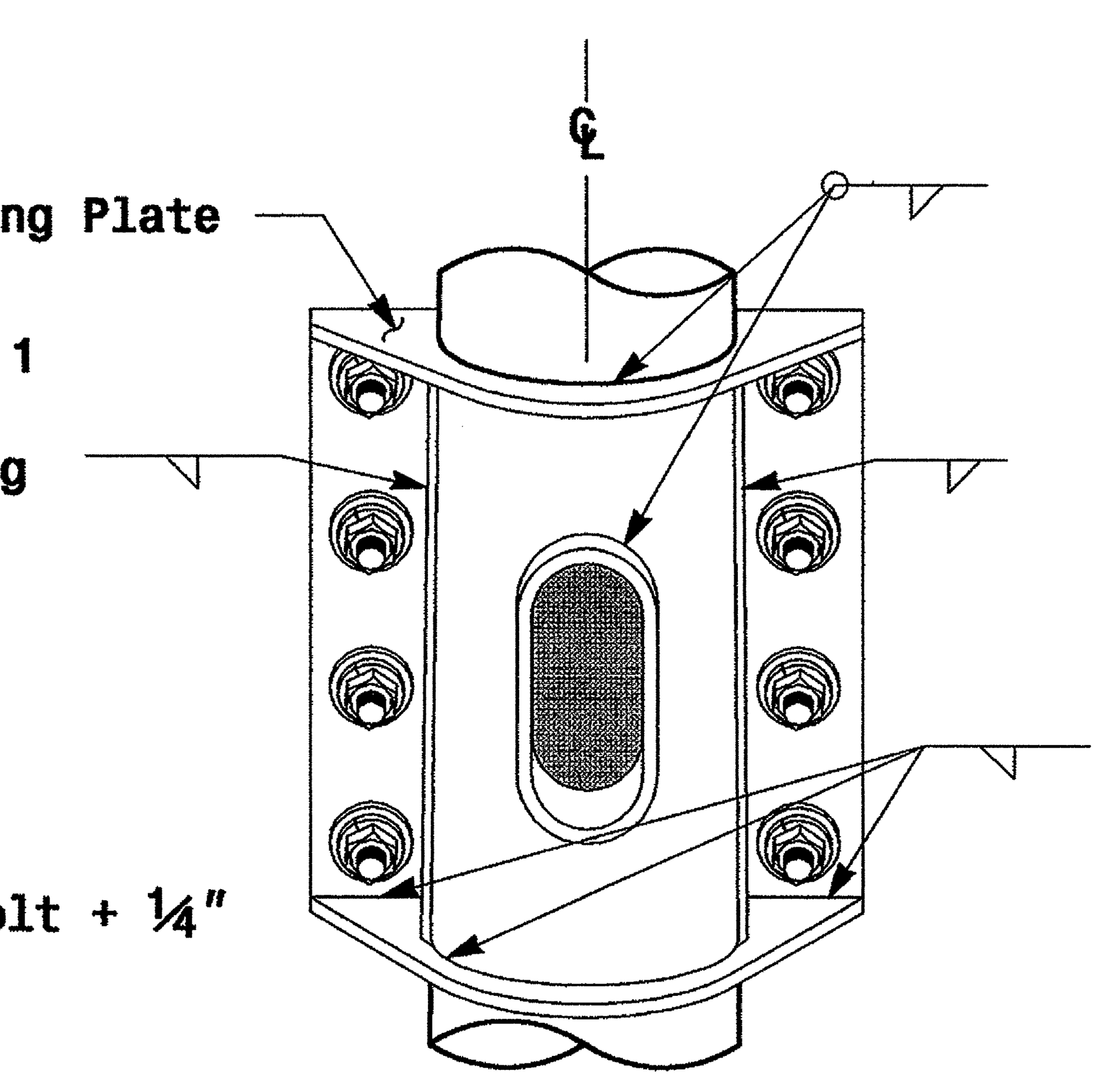


Front Elevation View

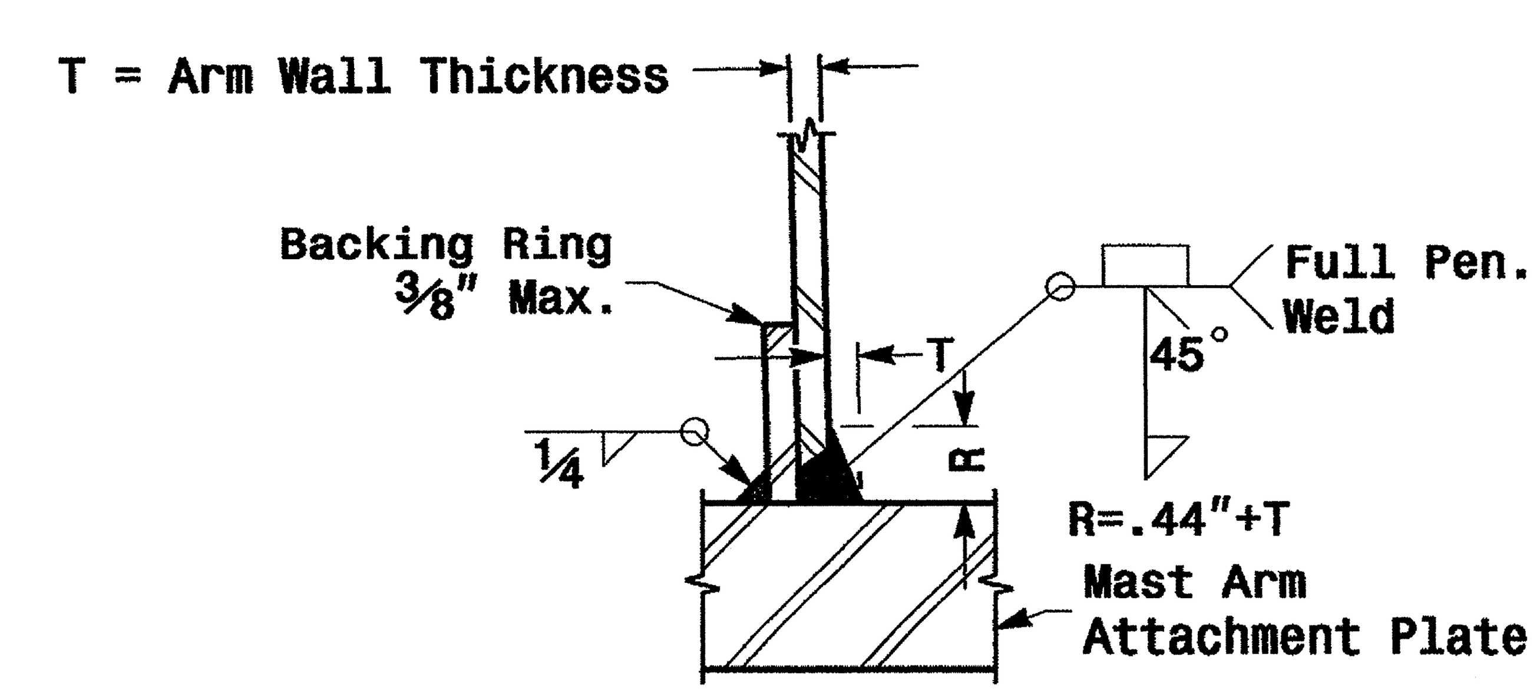


Section View A-A

Mast Arm Attachment Plate



Back Elevation View



Section B-B

Full-Penetration Groove Weld Detail

Notes:

1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Designer is responsible for providing appropriate drainage points.

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, State of North Carolina Department of Transportation
122 N. McDowell St., Raleigh, NC 27603

Fabrication Details For Mast Arm Connection To Pole

PLAN DATE:	May 2005	REVIEWED BY:	C.F. Andrews
PREPARED BY:	P.L. Alexander	REVIEWED BY:	A.M. Esposito

REVISIONS	INIT.	DATE

SCALE 0 NA NONE

SEAL: North Carolina Professional Engineer Seal 028094 Debesh C. Sarkar

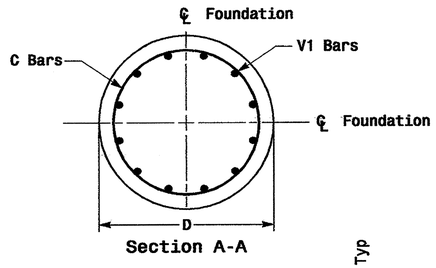
D. Sarkar 9.2.2005
SIGNATURE DATE

SIG. INVENTORY NO.

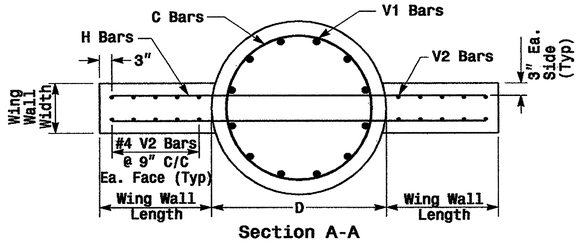
01-SEP-2005 14:11
w:*peoples-unit*workgroups*2004 metal pole standards*2004 m5.dgn
polexander

PROJECT REFERENCE NO.	SHEET NO.
I-4733	Sig.33 M 7

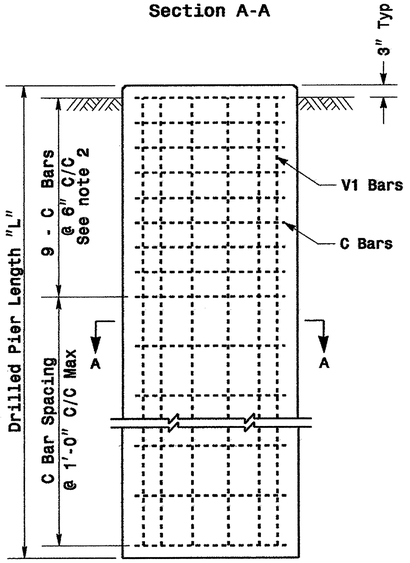
Reinforcing Steel Bars

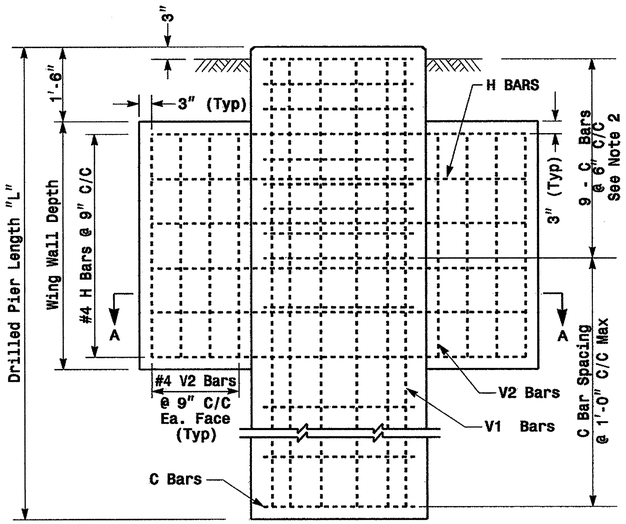


Section A-A



Section A-A

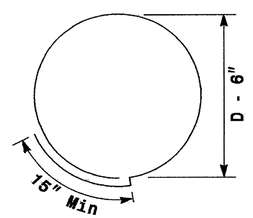




REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER)

Shaft Dia (in.)	Conc. Volume (cu. yds.)	Bar Name	No.	Size	Type	Length
42"	.356 x L	V1	9	#8	STR.	**
		C	*	#4	CIR.	10'-9"
48"	.465 x L	V1	12	#8	STR.	**
		C	*	#4	CIR.	12'-6"

* See Note No. 1
** See Note No. 3



Typical "C" Bars

REINFORCING STEEL TABLE FOR STANDARD 42" and 48" DRILL PIER SHAFT WITH TYPE 1 AND TYPE 2 WING WALLS

Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel				
		Bar Name	No.	Size	Type	Length
TYPE 1	42"	V1	9	#8	STR.	**
		V2	12	#4	STR.	2'-6"
		H	8	#4	STR.	6'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	42"	V1	9	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	48"	V1	12	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-0"
		C	*	#4	CIR.	12'-6"

* See Note No. 1
** See Note No. 3

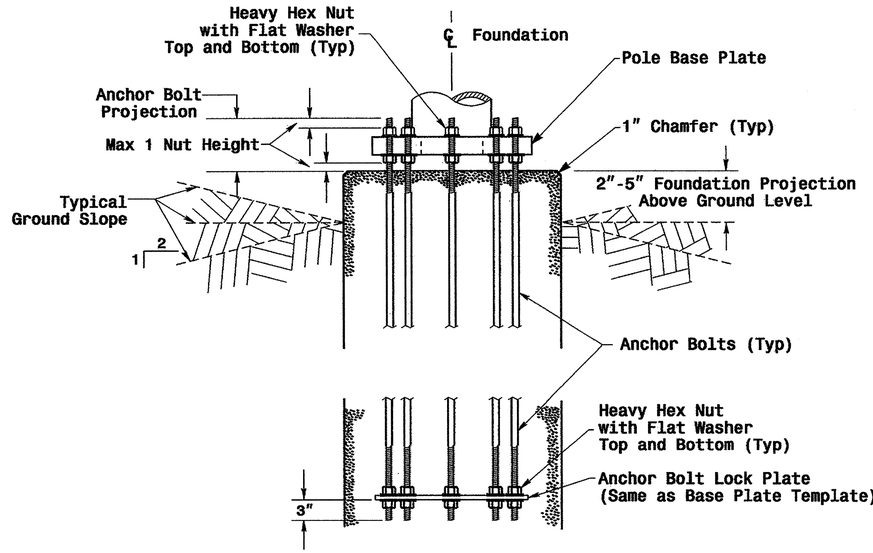
WING WALL DETAILS

Wing Wall Type	Wing Wall Length (Ft.)	Wing Wall Width (Ft.)	Wing Wall Depth (Ft.)	Concrete Volume (Cu. Yds.)
TYPE 1	1'-6"	1'-0"	3'-0"	.4
TYPE 2	3'-0"	1'-0"	5'-0"	1.2

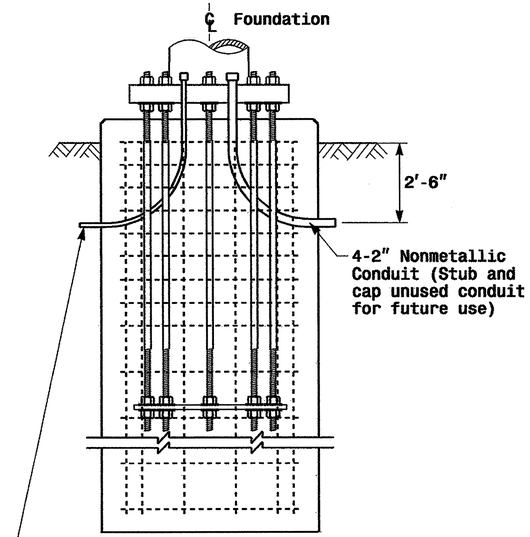
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



Notes

1. The number of C-bars is based on foundation depth. For standard foundations, see sheet M 8.
2. Circular tie reinforcing rings may be vertically adjusted by +/- 3" at a depth between 2'-0" and 3'-0" to facilitate the installation of electrical conduit entering in the cage.
3. The length of V1-bars is based on foundation depth. For standard foundations, see sheet M 8.
4. The quantities for steel and concrete shown in the Wing Wall Details Chart reflect the amount of material for 1 pair of wing walls (2 wing walls per drilled pier shaft.)

Construction Details – Foundations

Prepared in the Offices of:
North Carolina Department of Transportation, Bridge Maintenance and Safety Group, Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

SCALE: 0 NA NONE

Construction Details Foundations

PLAN DATE:	May 2005	REVIEWED BY:	P.L. ALEXANDER
PREPARED BY:	C.F. ANDREWS	REVIEWED BY:	A.M. ESPOSITO

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DIBESH C. SARKAR

D. Sarkar 9.2.2005
SIGNATURE DATE

SIG. INVENTORY NO.

01-SEP-2005 11:48
w:\design_detail\workgroups\2004 metal pole standards\2004 m1.dgn
poleconder

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.34

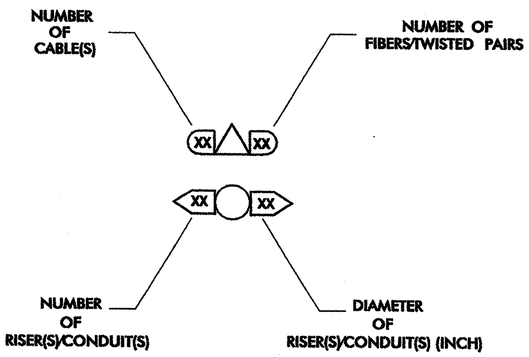
1. INSTALL REA, PE – 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
2. INSTALL REA, PE – 38, (FIGURE 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
3. INSTALL REA, PE – 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
4. INSTALL SMFO CABLE
5. INSTALL MMFO CABLE
6. INSTALL FIBER OPTIC DROP 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. TERMINATE COMMUNICATIONS CABLE ON EXISTING TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
27. INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
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. REMOVE EXISTING CABINET FOUNDATION
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL CCTV CAMERA WOOD POLE
38. INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
39. INSTALL JUNCTION BOX
40. INSTALL OVERSIZED JUNCTION BOX
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
48. REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
49. REMOVE EXISTING MESSENGER CABLE
50. INSTALL TELEPHONE SERVICE
51. INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
52. INSTALL DELINEATOR MARKER
53. STORE 20 FEET OF COMMUNICATIONS CABLE
54. LASH CABLE(S) TO EXISTING SIGNAL/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

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
- (S) AERIAL SPLICE ENCLOSURE
- NEW METAL POLE
- EXISTING METAL POLE
- NEW CCTV ASSEMBLY
- NEW STANDARD GUY ASSEMBLY
- NEW SIDEWALK GUY ASSEMBLY
- NEW CABLE STORAGE RACKS (SNOW SHOES)
- EXISTING CONTROLLER AND CABINET
- S EXISTING SPLICE CABINET
- S NEW SPLICE CABINET
- SP SIGNAL POLE
- XX-XXXX SIGNAL INVENTORY NUMBER

CONSTRUCTION NOTE SYMBOLOGY KEY

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



Prepared in the Office of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Management Systems
122 N. McDonald St., Raleigh, NC 27603

CONSTRUCTION NOTES

PLAN DATE:
REVIEWED BY:
PREPARED BY: G. A. FULLER
REVIEWED BY:
SCALE: 0
N

REVISIONS	INIT.	DATE

CADD Filename:

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER
SIGNATURE
Gregory A Fuller 10/31/02
DATE

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.35

NOTES:

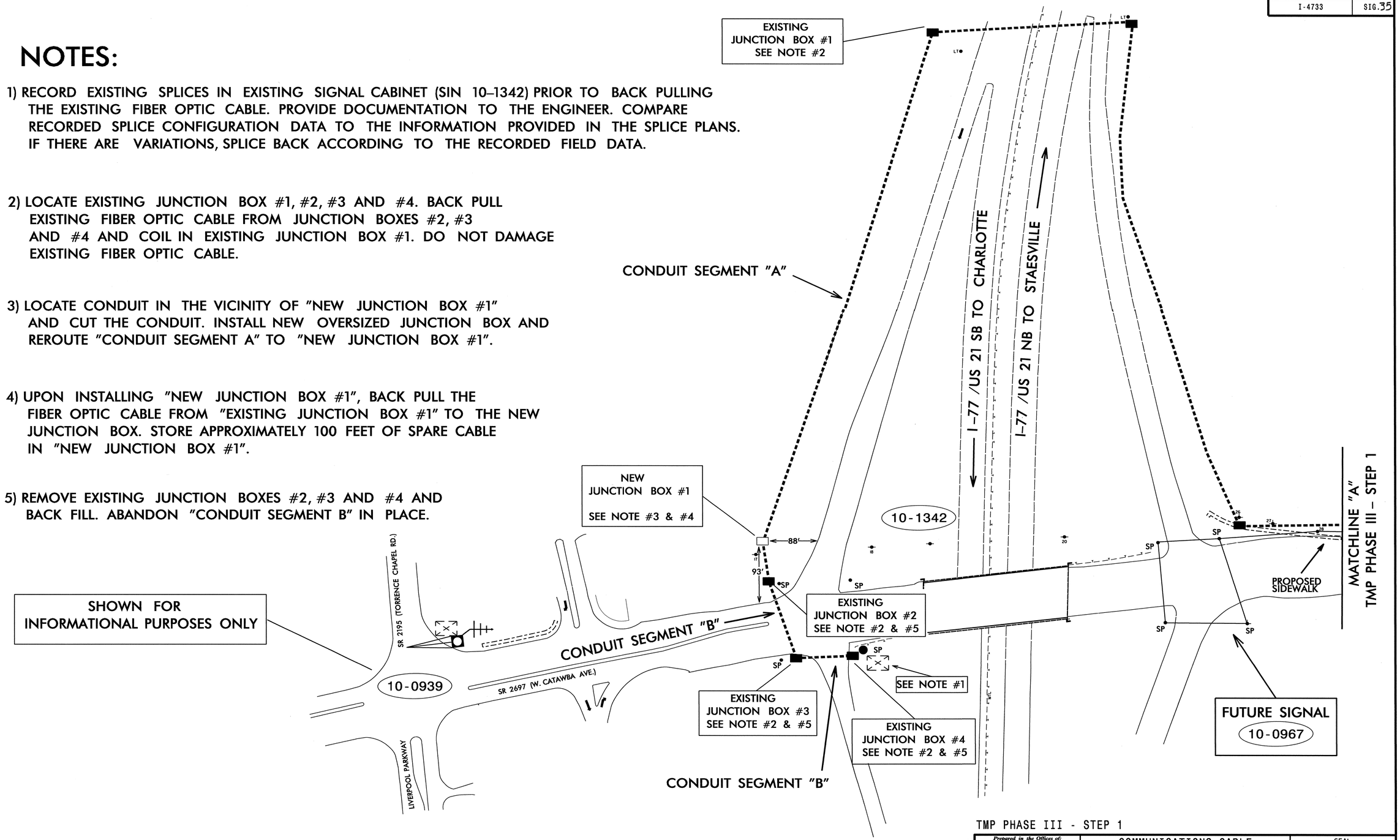
1) RECORD EXISTING SPLICES IN EXISTING SIGNAL CABINET (SIN 10–1342) PRIOR TO BACK PULLING THE EXISTING FIBER OPTIC CABLE. PROVIDE DOCUMENTATION TO THE ENGINEER. COMPARE RECORDED SPLICE CONFIGURATION DATA TO THE INFORMATION PROVIDED IN THE SPLICE PLANS. IF THERE ARE VARIATIONS, SPLICE BACK ACCORDING TO THE RECORDED FIELD DATA.

2) LOCATE EXISTING JUNCTION BOX #1, #2, #3 AND #4. BACK PULL EXISTING FIBER OPTIC CABLE FROM JUNCTION BOXES #2, #3 AND #4 AND COIL IN EXISTING JUNCTION BOX #1. DO NOT DAMAGE EXISTING FIBER OPTIC CABLE.

3) LOCATE CONDUIT IN THE VICINITY OF "NEW JUNCTION BOX #1" AND CUT THE CONDUIT. INSTALL NEW OVERSIZED JUNCTION BOX AND REROUTE "CONDUIT SEGMENT A" TO "NEW JUNCTION BOX #1".

4) UPON INSTALLING "NEW JUNCTION BOX #1", BACK PULL THE FIBER OPTIC CABLE FROM "EXISTING JUNCTION BOX #1" TO THE NEW JUNCTION BOX. STORE APPROXIMATELY 100 FEET OF SPARE CABLE IN "NEW JUNCTION BOX #1".

5) REMOVE EXISTING JUNCTION BOXES #2, #3 AND #4 AND BACK FILL. ABANDON "CONDUIT SEGMENT B" IN PLACE.



TMP PHASE III - STEP 1

Prepared in the Offices of: Transportation Mobility and Safety Division, North Carolina Department of Transportation, Intelligent Transportation Systems Section
750 N. Greenfield Pkwy., Garner, NC 27529

SCALE 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER

PREPARED BY: IAN NEIL AVERY REVIEWED BY:

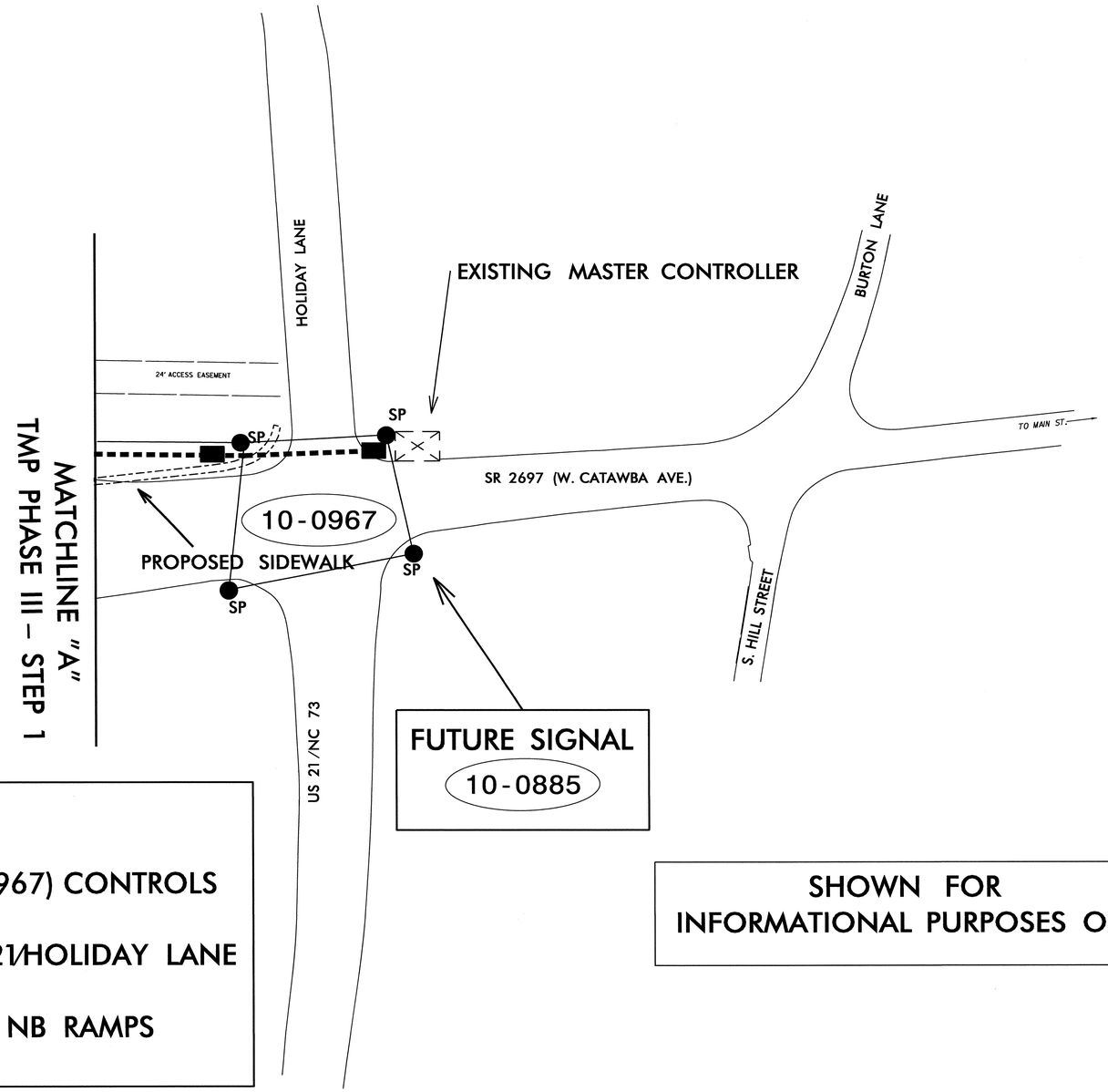
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE 4/18/13 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.36



NOTE

CURRENTLY THE SIGNAL (10–0967) CONTROLS BOTH INTERSECTIONS
1) CATAWBA AVENUE @ US 21/HOLIDAY LANE AND
2)CATAWBA AVENUE @ I–77 NB RAMPS

SHOWN FOR INFORMATIONAL PURPOSES ONLY

TMP PHASE III - STEP 1

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

SCALE 0

COMMUNICATION CABLE AND CONDUIT ROUTING PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: APRIL 2013	REVIEWED BY: G. A. FULLER
PREPARED BY: IAN NEIL AVERY	REVIEWED BY:

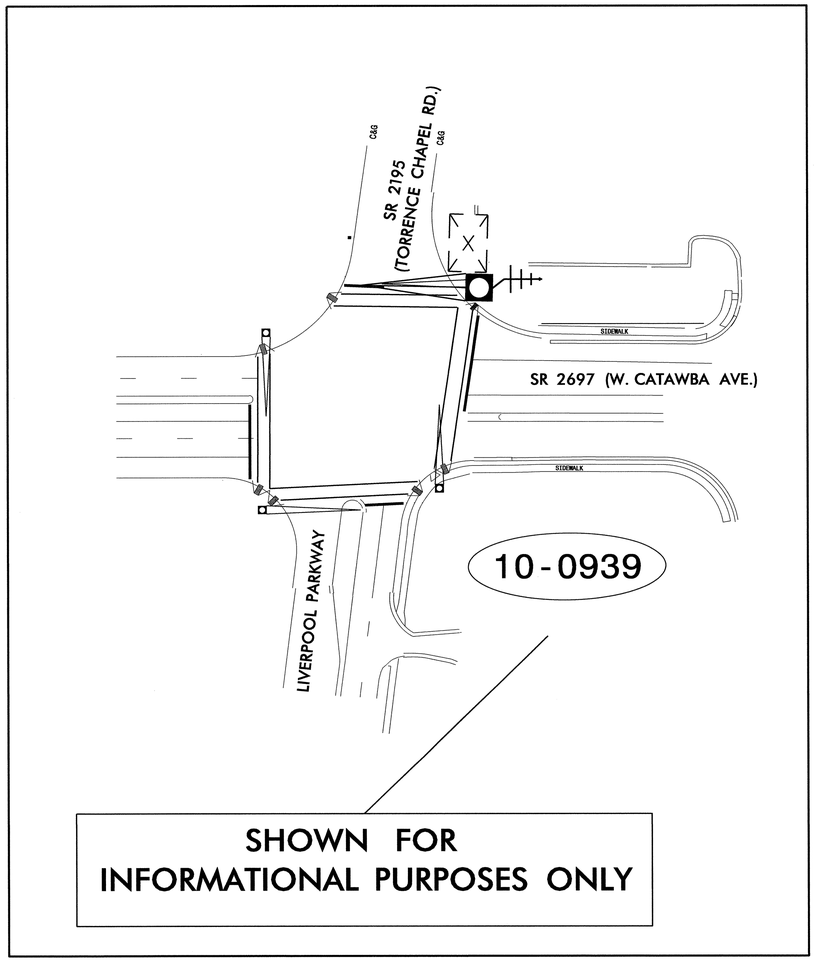
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

Gregory A. Fuller 4-18-13
SIGNATURE DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.37



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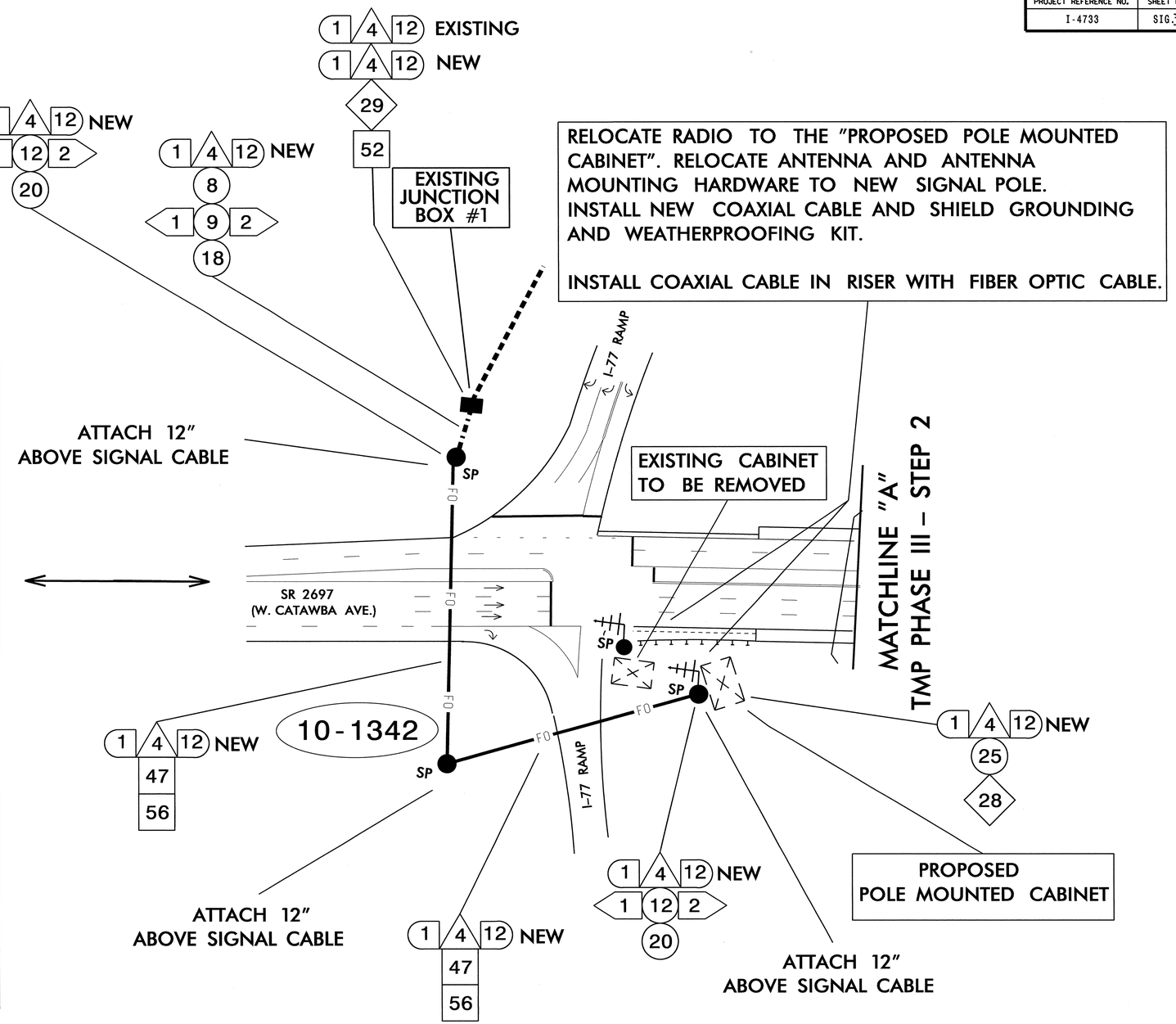
INFORMATIONAL PURPOSES ONLY



TMP PHASE III – STEP 2 MATCHLINE "A"

TMP PHASE III - STEP 2

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

COMMUNICATION CABLE AND CONDUIT ROUTING PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS
PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER
PREPARED BY: IAN NEIL AVERY REVIEWED BY:

REVISIONS	INIT.	DATE

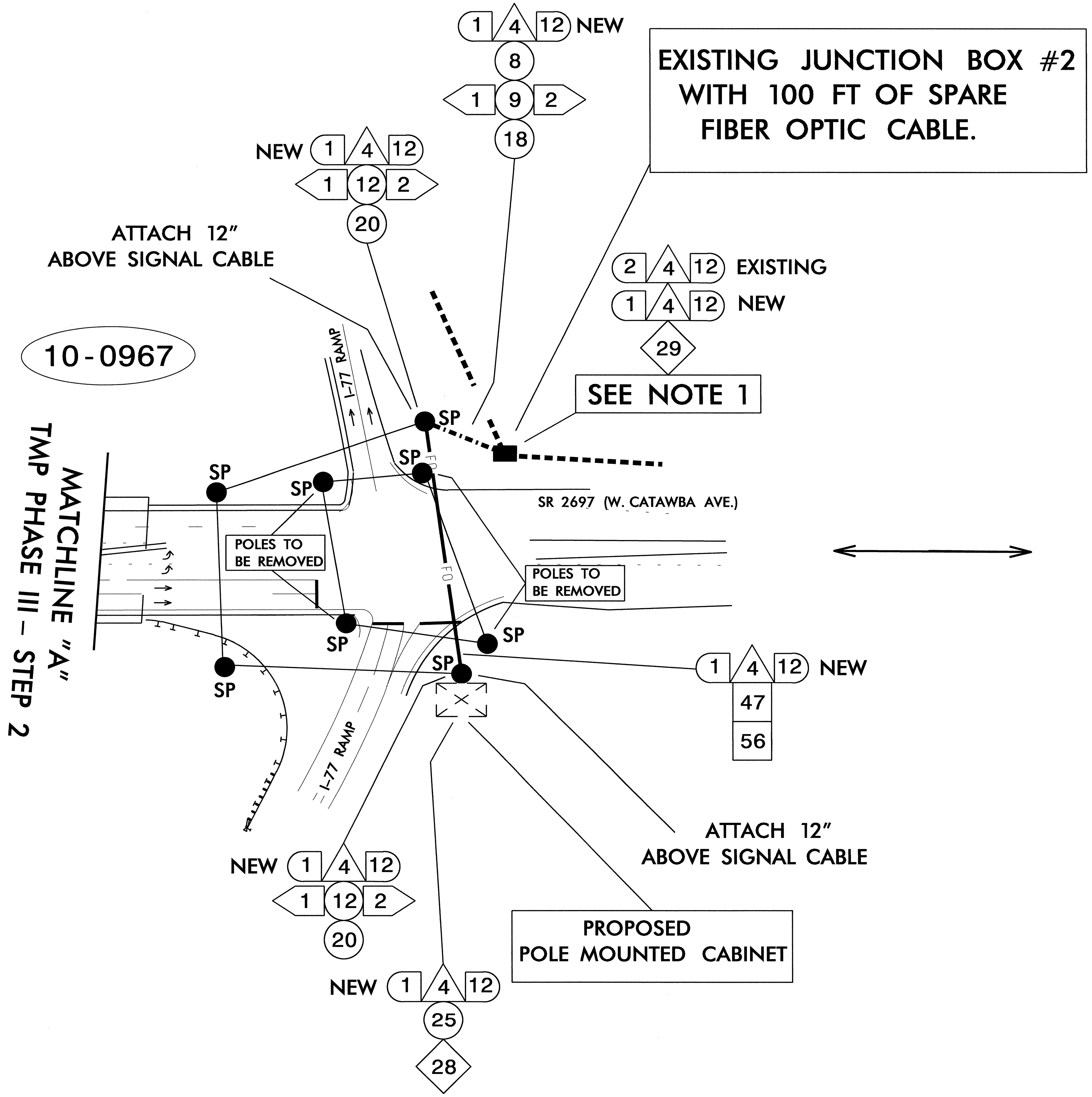
SCALE 0

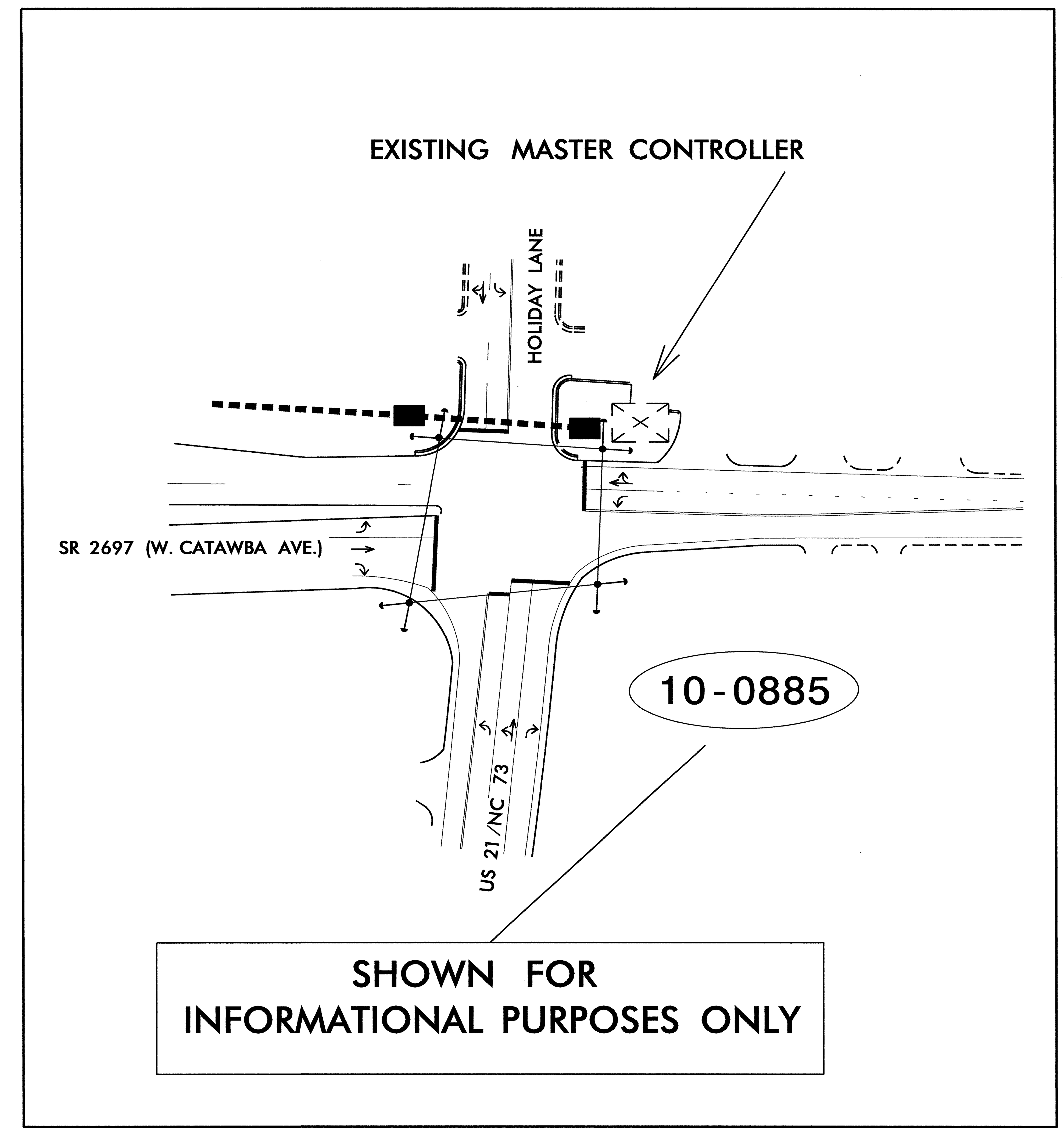
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE 4/18/13 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.38





NOTE #1

CUT CABLE AND INSTALL NEW UNDERGROUND FIBER OPTIC SPLICE ENCLOSURE.

TMP PHASE III - STEP 2

Prepared in the Offices of: Transportation Mobility and Safety Division, Intelligent Transportation Systems Section — State of North Carolina Department of Transportation

750 N. Greenfield Pkwy., Garner, NC 27529

COMMUNICATION CABLE
AND
CONDUIT ROUTING PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: APRIL 2013	REVIEWED BY: G. A. FULLER
PREPARED BY: IAN NEIL AVERY	REVIEWED BY:

SCALE 0

REVISIONS	INIT.	DATE

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

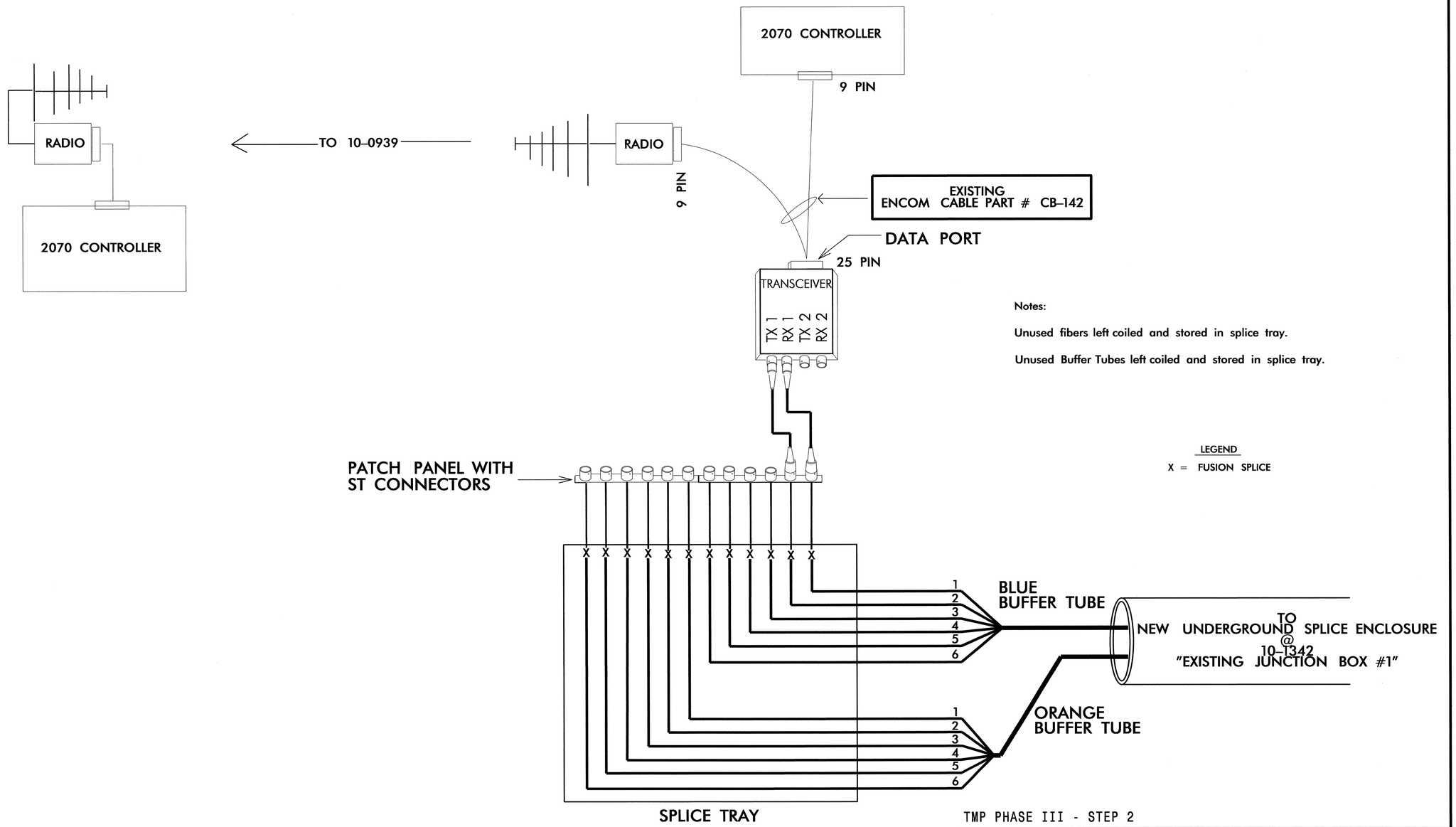
SIGNATURE Gregory A. Fuller DATE 4-18-13

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG. 39

SR 2697 (W. CATAWBA AVE.)
AT
LIVERPOOL PKWY/SR 2195 (TORRENCE CHAPEL RD)
SIG. INV. # 10-0939
TMP PHASE III - STEP 2

SR 2697 (W. CATAWBA AVE.)
AT
I-77 (SOUTH BOUND RAMPS)
SIG. INV. # 10-1342
TMP PHASE III - STEP 2



Notes:

Unused fibers left coiled and stored in splice tray.

Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND

X = FUSION SPLICE

TMP PHASE III - STEP 2

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

SPLICE PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER

PREPARED BY: IAN NEIL AVERY REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE Gregory A. Fuller 4/18/13 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.40

NEW UNDERGROUND SPLICE ENCLOSURE AT 10–1342 "EXISTING JUNCTION BOX #1" TMP PHASE III – STEP 2

LEGEND

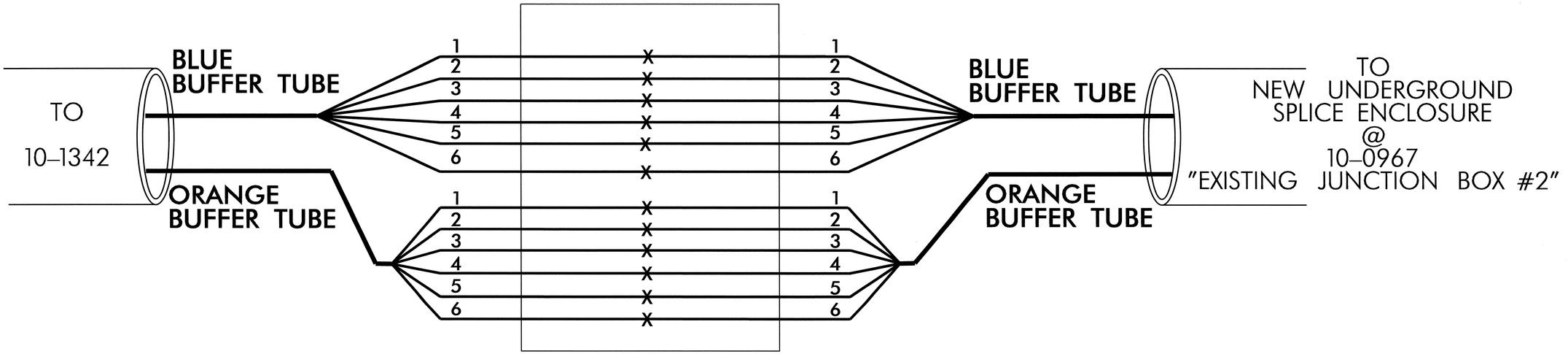
X = FUSION SPLICE

COLOR CODE TIA/EIA 598–A

(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE

Notes:

Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.



SPLICE TRAY

TMP PHASE III - STEP 2

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

SPLICE PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS
PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER
PREPARED BY: IAN NEIL AVERY REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

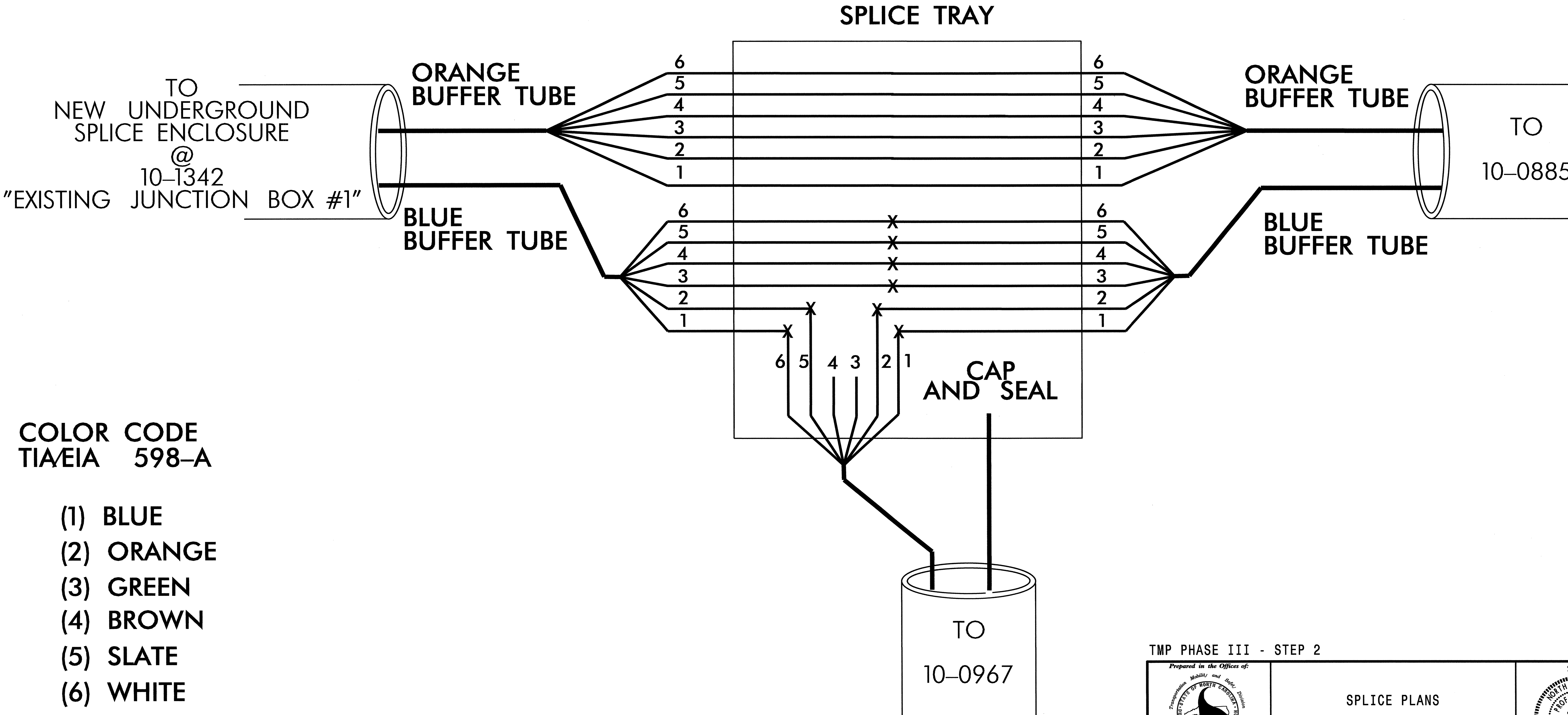
Gregory A. Fuller 4/18/13
SIGNATURE DATE

CADD Filename:

NEW UNDERGROUND SPLICE ENCLOSURE
AT
10–0967
"EXISTING JUNCTION BOX #2"
TMP PHASE III– STEP 2

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE



COLOR CODE
TIA/EIA 598–A

(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE

TMP PHASE III - STEP 2

Prepared in the Offices of:
Transportation Mobility and Safety Division
Intelligent Transportation Systems Section
State of North Carolina Department of Transportation
750 N. Greenfield Pkwy., Garner, NC 27529

SPLICE PLANS

DIVISION 10	MECKLENBURG CO.	CORNELIUS	
PLAN DATE:	APRIL 2013	REVIEWED BY:	G. A. FULLER
PREPARED BY:	IAN NEIL AVERY	REVIEWED BY:	

SCALE 0

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023919 GREGORY A. FULLER

Gregory A. Fuller 4-18-13
SIGNATURE DATE
CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.42

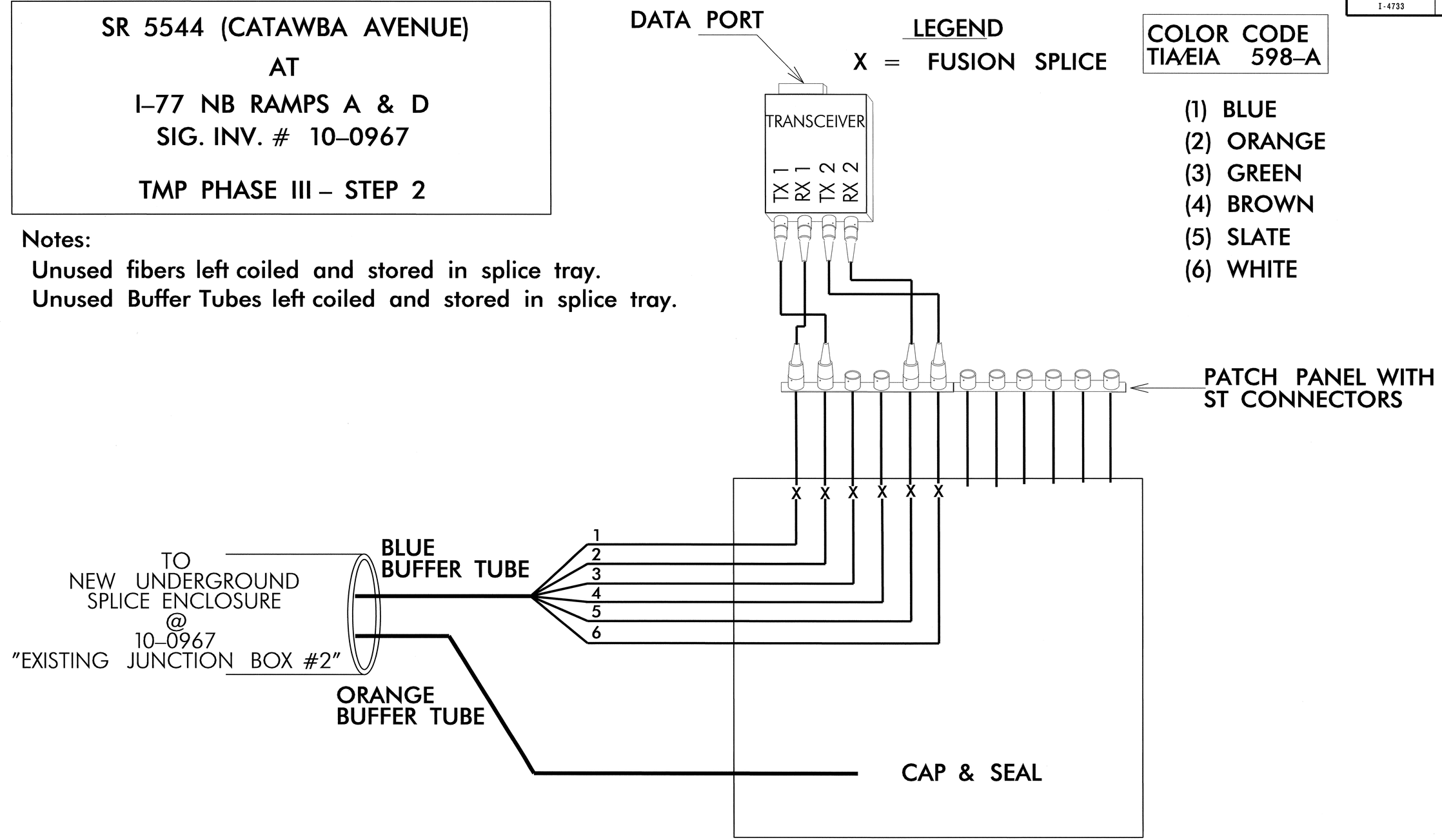
SR 5544 (CATAWBA AVENUE)
AT
I–77 NB RAMPS A & D
SIG. INV. # 10–0967

TMP PHASE III – STEP 2

Notes:

Unused fibers left coiled and stored in splice tray.

Unused Buffer Tubes left coiled and stored in splice tray.



TMP PHASE III - STEP 2

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

SPLICE PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER

PREPARED BY: IAN NEIL AVERY REVIEWED BY:

SCALE 0

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

Gregory A. Fuller 4/18/13
SIGNATURE DATE

CADD Filename:

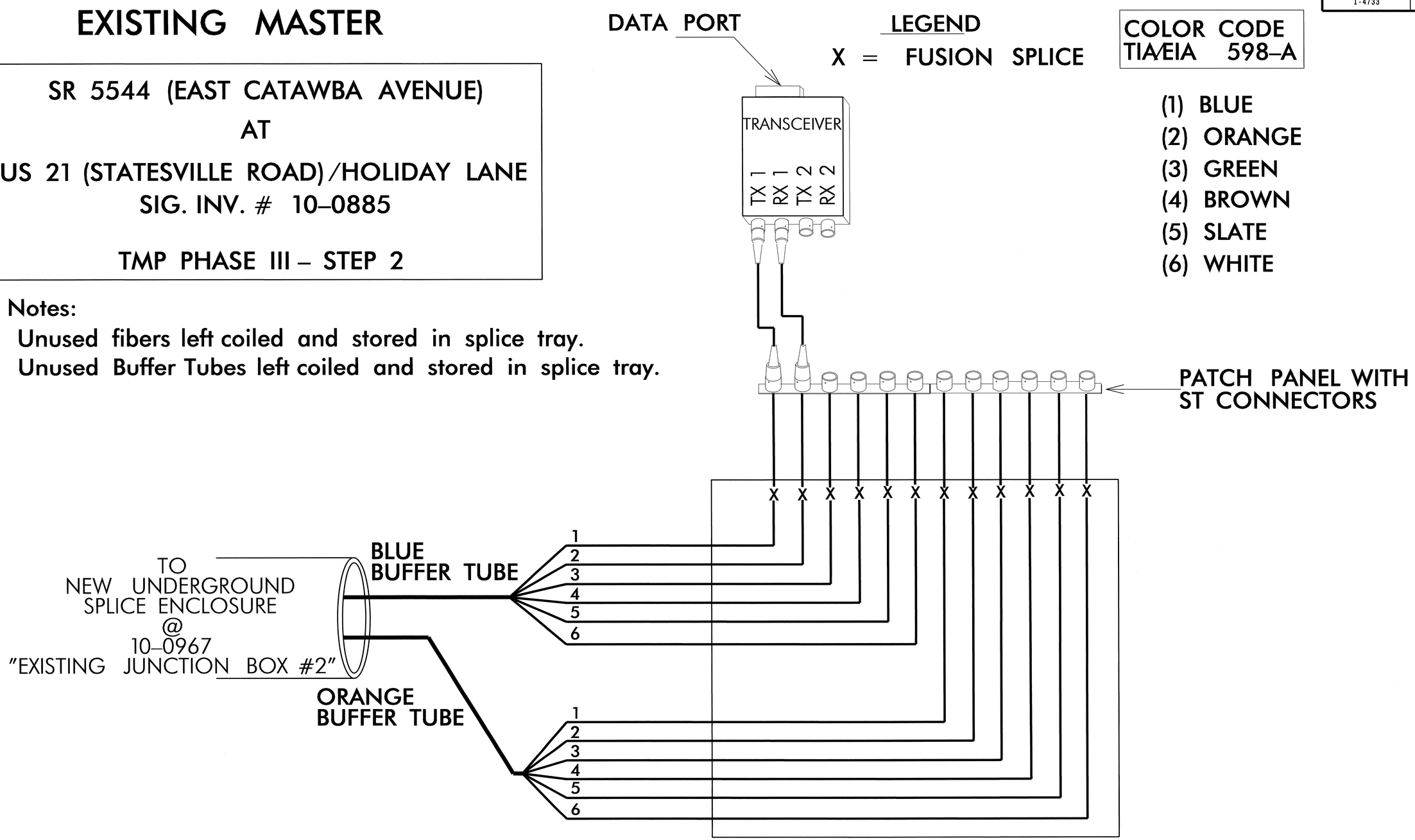
PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.93

EXISTING MASTER

SR 5544 (EAST CATAWBA AVENUE)
AT
US 21 (STATESVILLE ROAD) / HOLIDAY LANE
SIG. INV. # 10–0885

TMP PHASE III – STEP 2

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.



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TMP PHASE III - STEP 2

Prepared in the Offices of:
Transportation Mobility and Rail Division
North Carolina Department of Transportation
Intermodal Transportation Systems Section
750 N. Greenfield Pkwy., Garner, NC 27529

SPLICE PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS
PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER
PREPARED BY: IAN NEIL AVERY REVIEWED BY:

SCALE 0

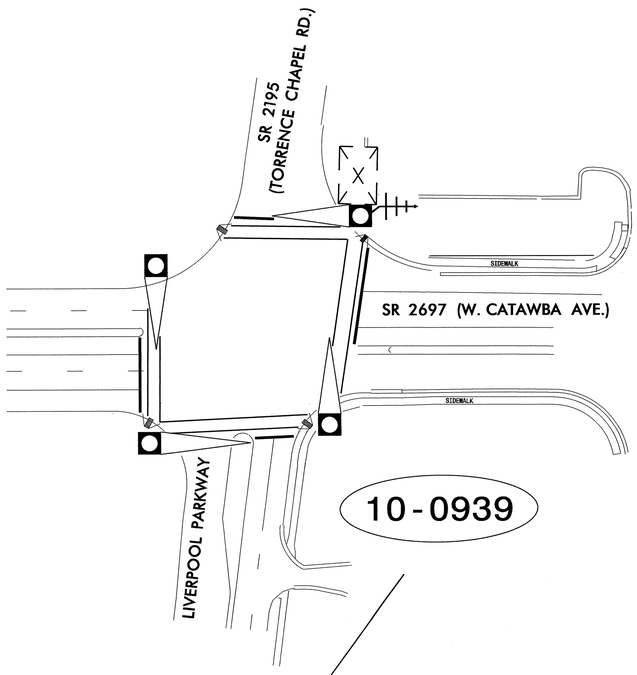
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A FULLER

Gregory A Fuller 4-18-13
SIGNATURE DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG. 44



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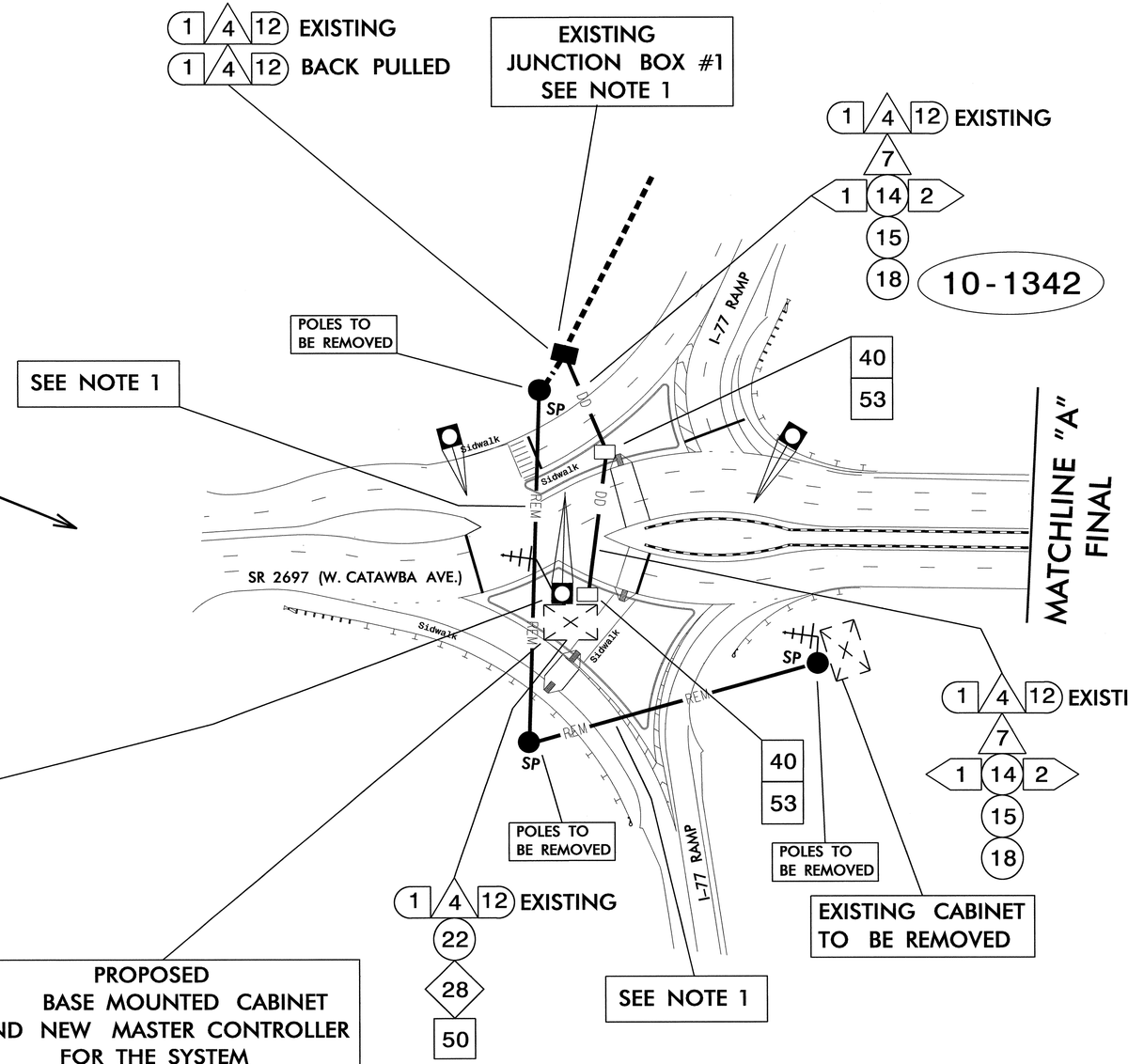
INFORMATIONAL PURPOSES ONLY



RELOCATE RADIO TO THE "PROPOSED BASE MOUNTED CABINET". RELOCATE ANTENNA AND ANTENNA MOUNTING HARDWARE TO NEW SIGNAL POLE. INSTALL NEW COAXIAL CABLE AND SHIELD GROUNDING AND WEATHERPROOFING KIT.

PROPOSED
BASE MOUNTED CABINET
AND NEW MASTER CONTROLLER
FOR THE SYSTEM

NOTE #1

BACK PULL THE EXISTING FIBER OPTIC CABLE FROM THE EXISTING CABINET AND STORE IN THE "EXISTING JUNCTION BOX". REROUTE THE STORED FIBER OPTIC CABLE TO THE "PROPOSED BASE MOUNTED CABINET".

DO NOT DAMAGE THE BACK PULLED FIBER OPTIC CABLE.

FINAL

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

COMMUNICATION CABLE
AND
CONDUIT ROUTING PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS
PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER
PREPARED BY: IAN NEIL AVERY REVIEWED BY:

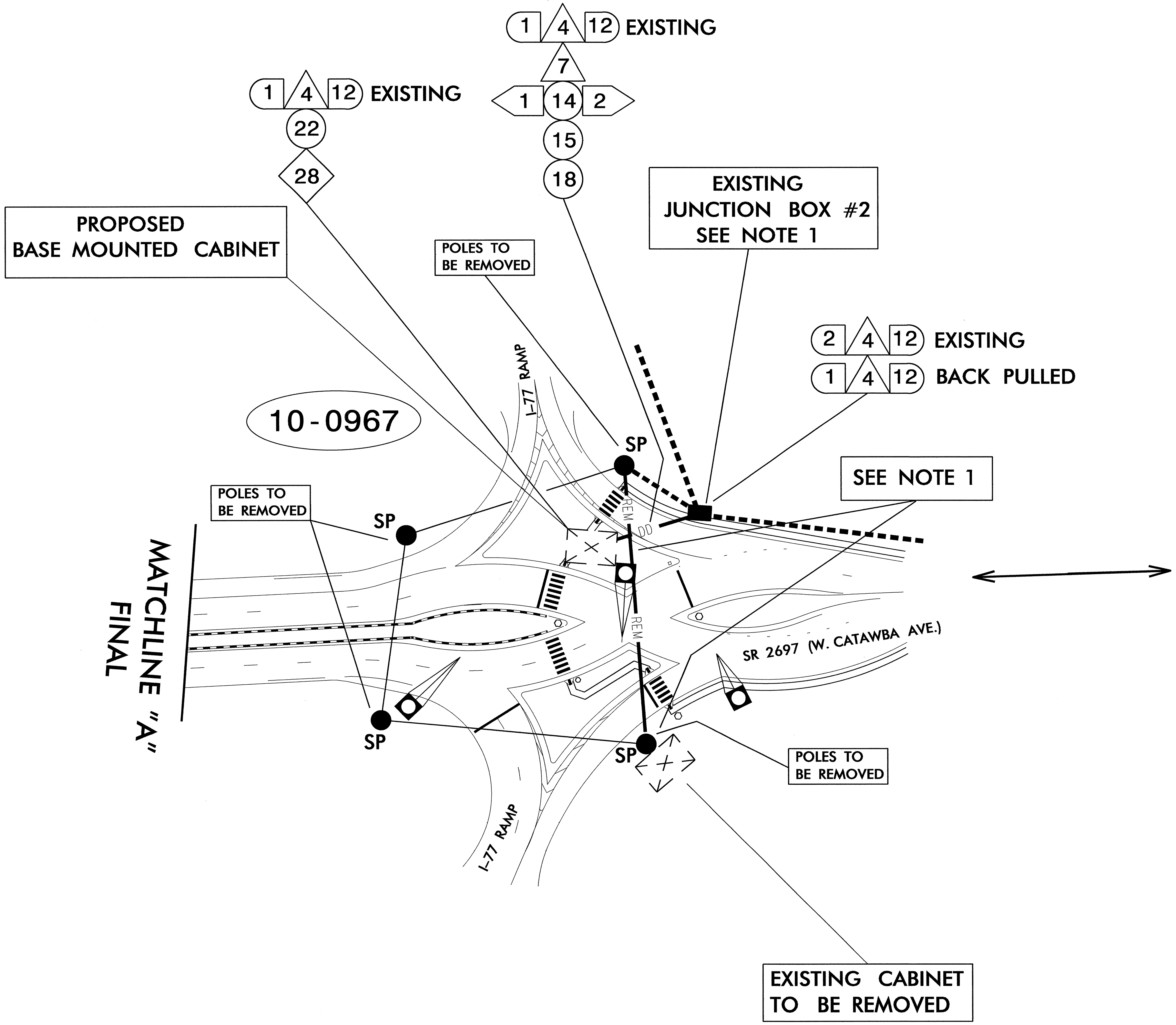
REVISIONS	INIT.	DATE

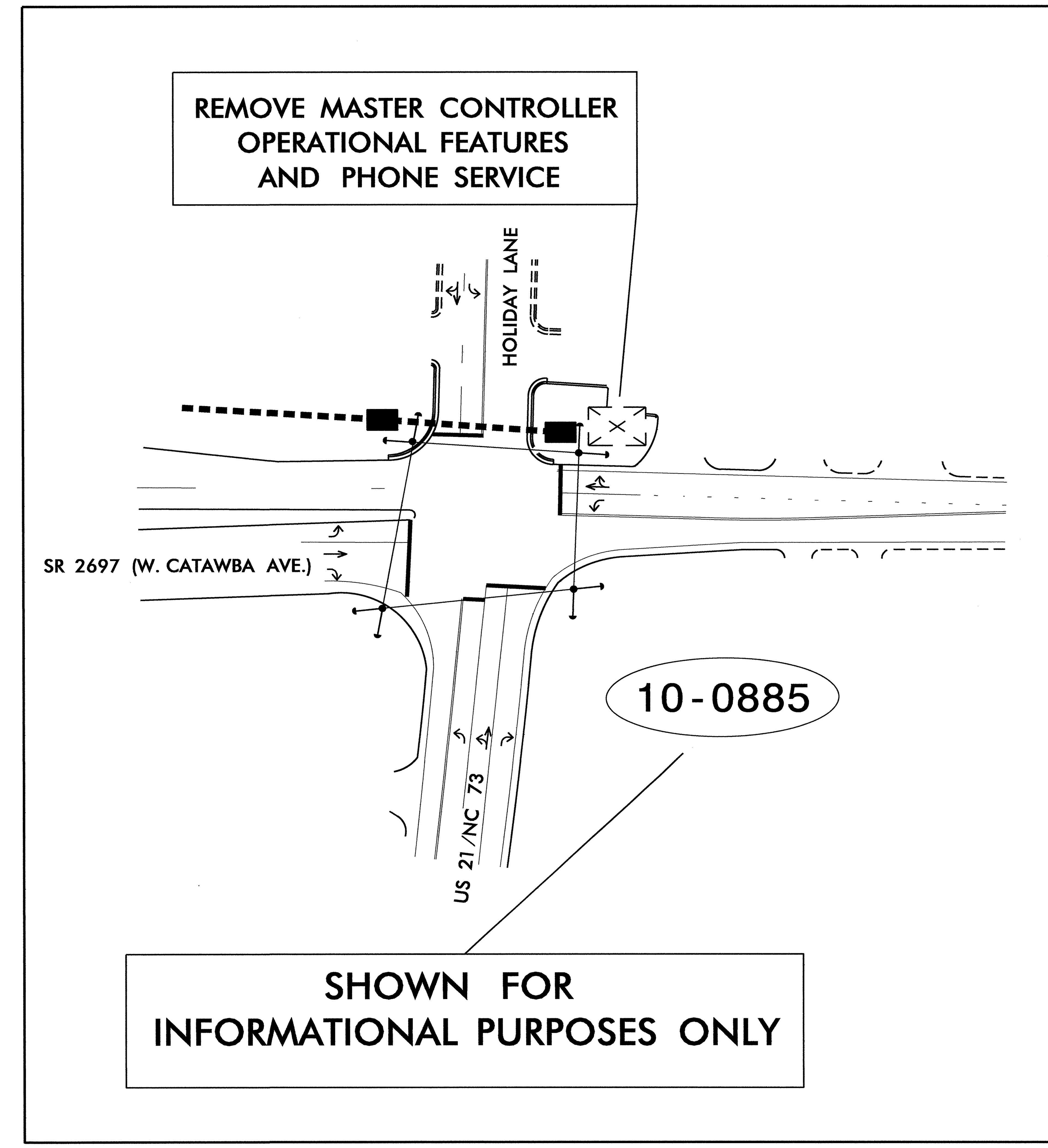
SCALE 0

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
023919
ENGINEER
GREGORY A. FULLER

SIGNATURE 4/18/13 DATE

CADD Filename:





NOTE #1

BACK PULL THE EXISTING FIBER OPTIC CABLE FROM THE EXISTING CABINET AND STORE IN THE "EXISTING JUNCTION BOX". REROUTE THE STORED FIBER OPTIC CABLE TO THE "PROPOSED BASE MOUNTED CABINET".

DO NOT DAMAGE THE BACK PULLED FIBER OPTIC CABLE.

FINAL

Prepared in the Offices of: Transportation Mobility and Safety Division — Intelligent Transportation Systems Section — State of North Carolina Department of Transportation
750 N. Greenfield Pkwy., Garner, NC 27529

COMMUNICATION CABLE
AND
CONDUIT ROUTING PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: APRIL 2013	REVIEWED BY: G. A. FULLER
PREPARED BY: IAN NEIL AVERY	REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0

N

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

Gregory A. Fuller 4/18/13
SIGNATURE DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG. 46

SR 2697 (W. CATAWBA AVE.)
AT
LIVERPOOL PKWY/SR 2195 (TORRENCE CHAPEL RD)
SIG. INV. # 10–0939

FINAL

RADIO

2070 CONTROLLER

TO 10–0939

NEW MASTER

SR 2697 (W. CATAWBA AVE.)
AT
I–77 (SOUTH BOUND RAMPS)
SIG. INV. # 10–1342

FINAL

2070 CONTROLLER

9 PIN

RADIO

9 PIN

INSTALL NEW
ENCOM CABLE PART # CB–196

DATA PORT
25 PIN

EXISTING
TRANSCEIVER

TX 1 RX 1 TX 2 RX 2

RE–CONFIGURE
JUMPERS

PATCH PANEL WITH
ST CONNECTORS

1 2 3 4 5 6

BLUE
BUFFER TUBE

TO
UNDERGROUND SPLICE ENCLOSURE
@
10–1342
"EXISTING JUNCTION BOX #1"

1 2 3 4 5 6

ORANGE
BUFFER TUBE

SPLICE TRAY

Notes:

Unused fibers left coiled and stored in splice tray.

Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND

X = FUSION SPLICE

FINAL

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

SPLICE PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER

PREPARED BY: IAN NEIL AVERY REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE 4/18/13 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.47

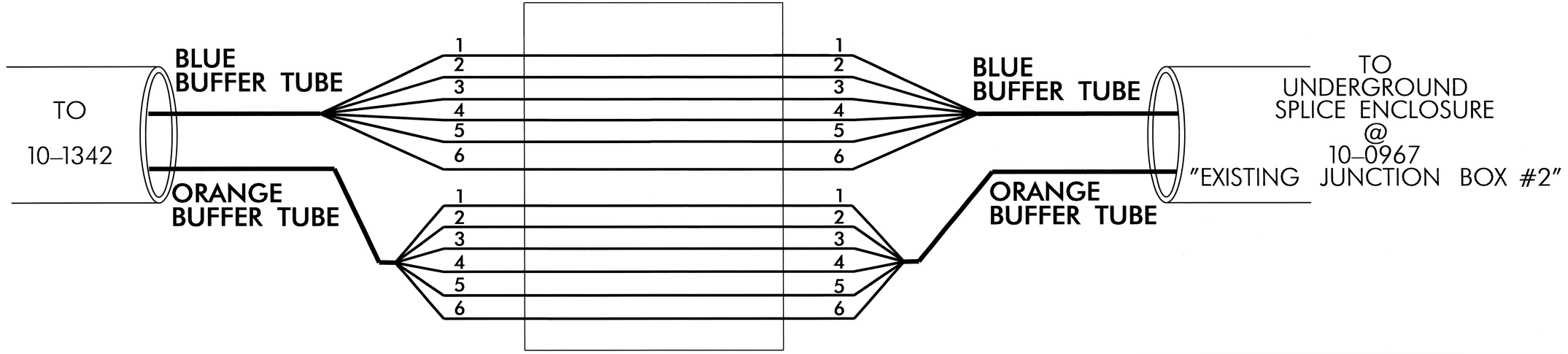
UNDERGROUND SPLICE ENCLOSURE
AT
10–1342
"EXISTING JUNCTION BOX #1"
FINAL

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE

COLOR CODE
TIA/EIA 598–A

(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE



EXISTING SPLICE TRAY

SHOWN FOR
INFORMATIONAL PURPOSES ONLY

FINAL

Prepared in the Offices of:
Transportation Mobility and Safety Division
North Carolina Department of Transportation
Intelligent Transportation Systems Section
750 N. Greenfield Pkwy., Garner, NC 27529

SPLICE PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS
PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER
PREPARED BY: IAN NEIL AVERY REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE Gregory A. Fuller 4/18/13 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.48

UNDERGROUND SPLICE ENCLOSURE

AT

10–0967

"EXISTING JUNCTION BOX #2"

FINAL

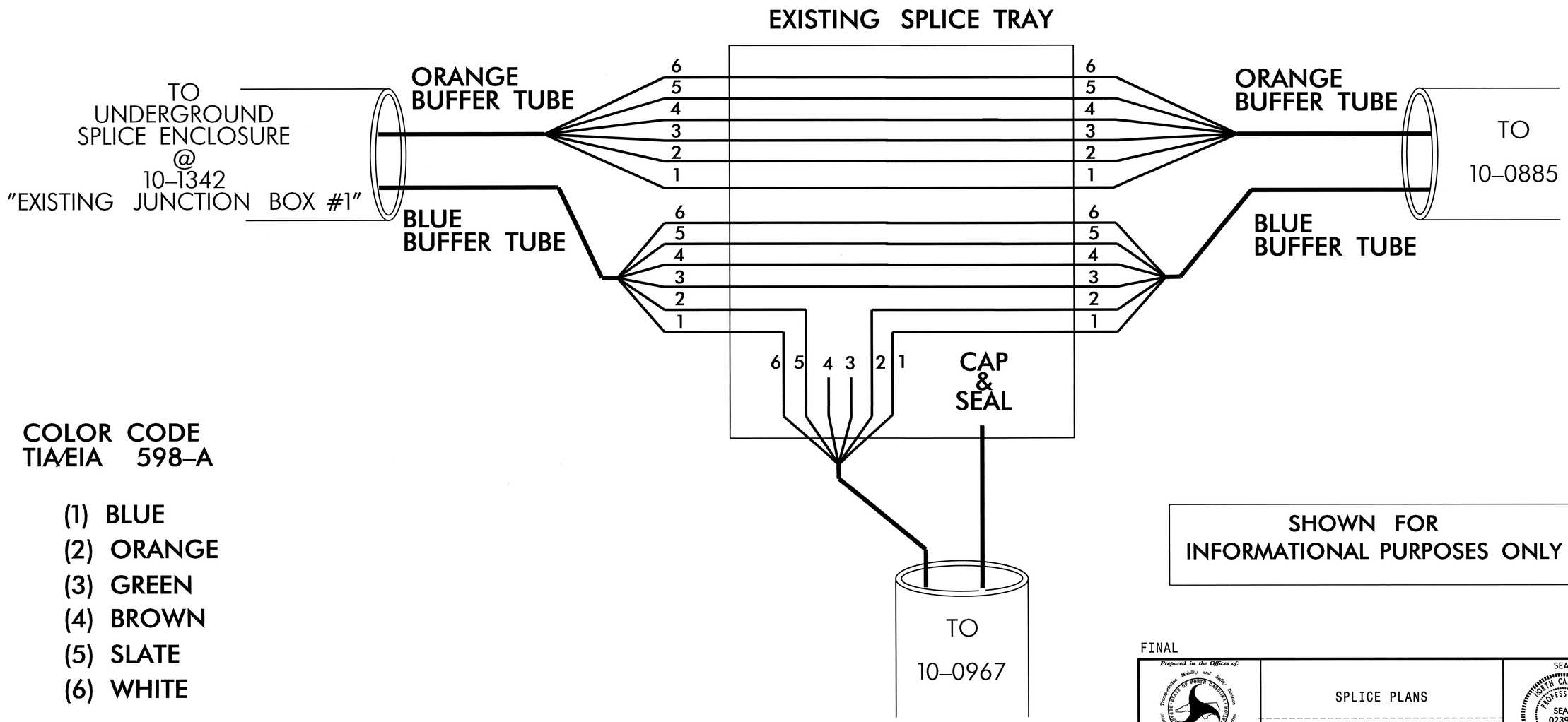
Notes:

Unused fibers left coiled and stored in splice tray.

Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND

X = FUSION SPLICE



COLOR CODE
TIA/EIA 598–A

(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE

SHOWN FOR INFORMATIONAL PURPOSES ONLY

FINAL

Prepared in the Offices of: Transportation Mobility and Safety Division, North Carolina Department of Transportation, Intelligent Transportation Systems Section
750 N. Greenfield Pkwy., Garner, NC 27529

SPLICE PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER

PREPARED BY: IAN NEIL AVERY REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE DATE 4/2/13

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG. 49

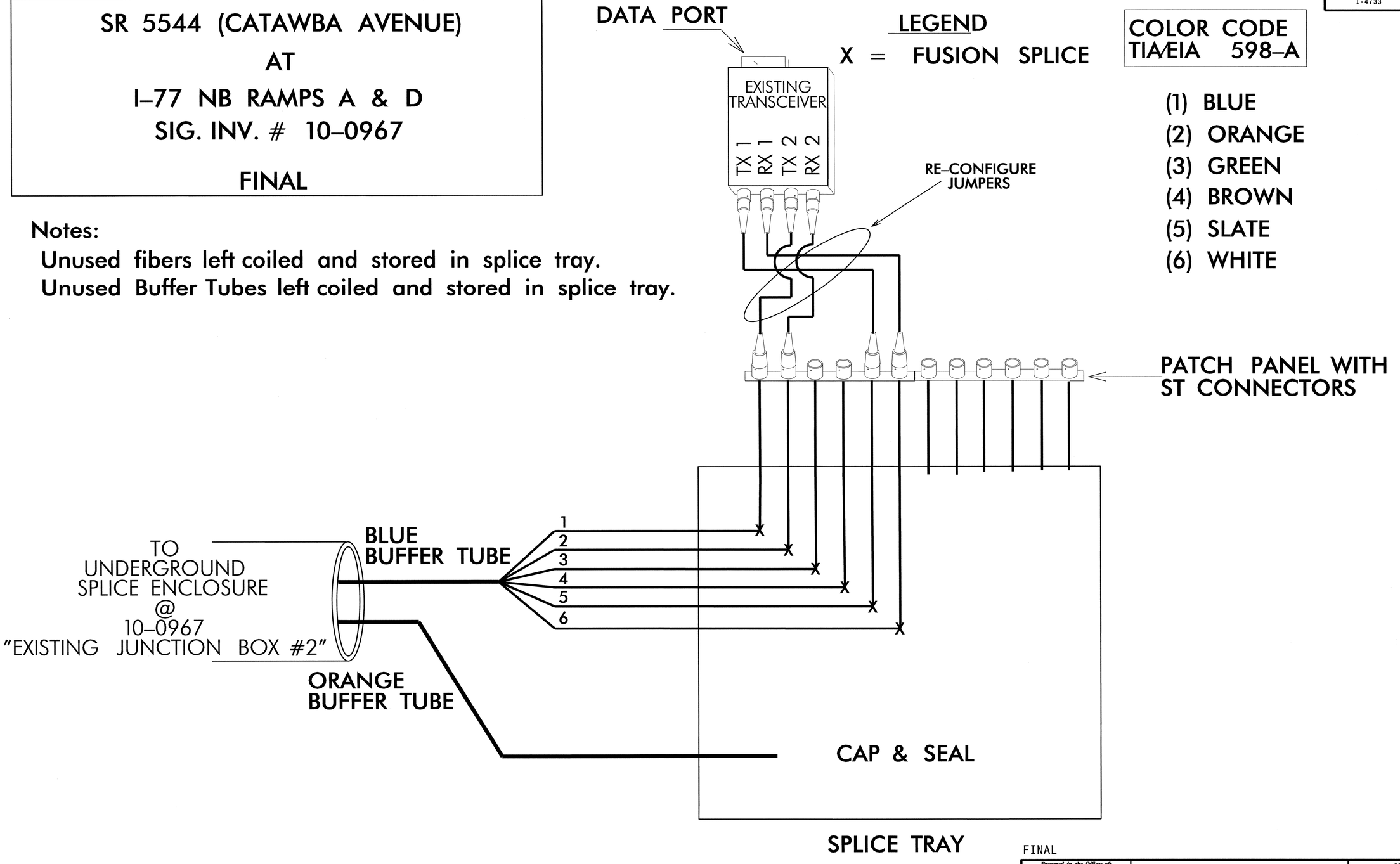
SR 5544 (CATAWBA AVENUE)
AT
I–77 NB RAMPS A & D
SIG. INV. # 10–0967

FINAL

Notes:

Unused fibers left coiled and stored in splice tray.

Unused Buffer Tubes left coiled and stored in splice tray.



LEGEND

X = FUSION SPLICE

COLOR CODE TIA/EIA 598–A

(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE

FINAL

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

SCALE 0

SPLICE PLANS

DIVISION 10 MECKLENBURG CO. CORNELIUS

PLAN DATE: APRIL 2013 REVIEWED BY: G. A. FULLER

PREPARED BY: IAN NEIL AVERY REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE 4/18/13 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
I-4733	SIG.50

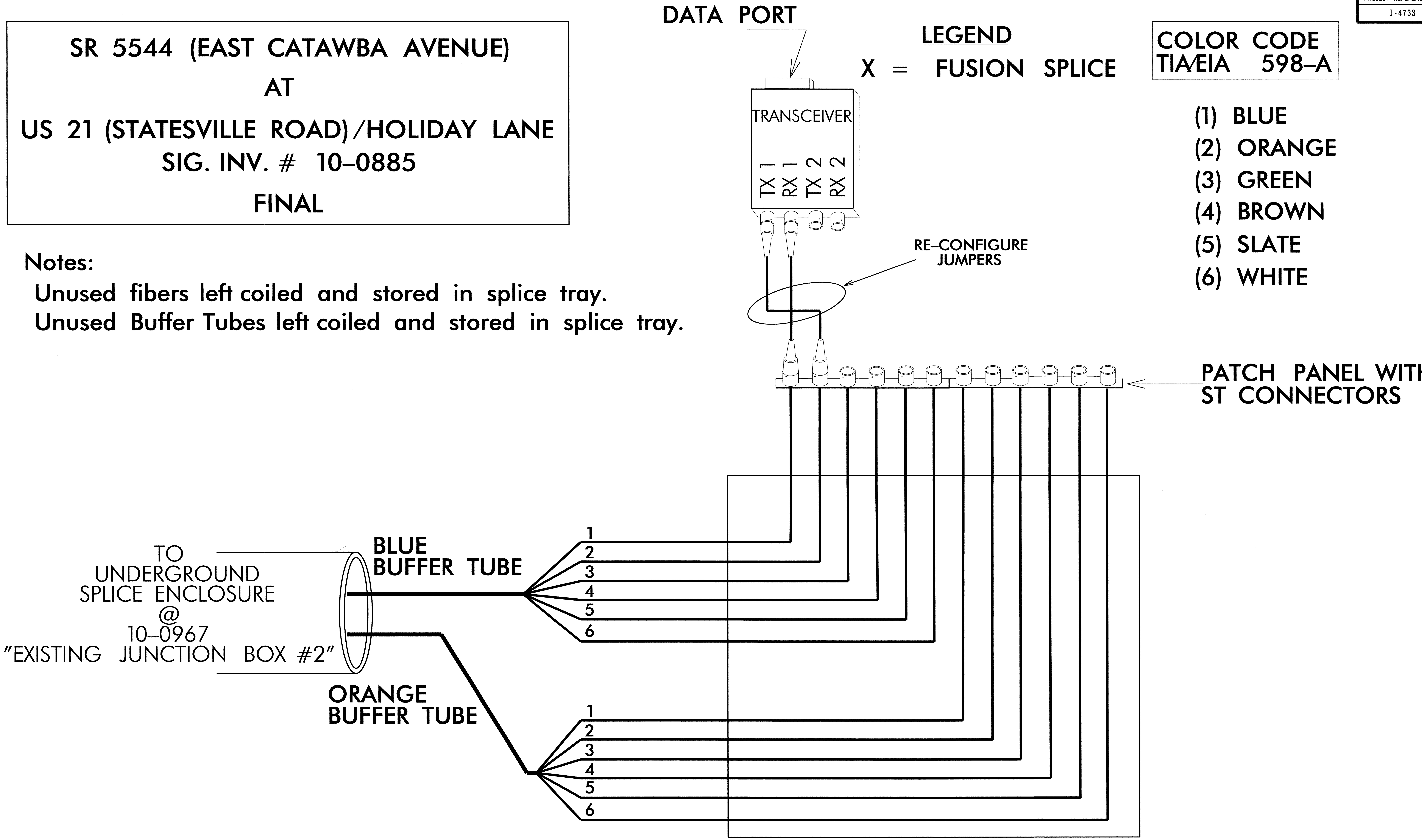
SR 5544 (EAST CATAWBA AVENUE)
AT
US 21 (STATESVILLE ROAD)/HOLIDAY LANE
SIG. INV. # 10–0885
FINAL

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE

COLOR CODE
TIA/EIA 598–A

(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE



FINAL

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

SPLICE PLANS

DIVISION 10 MECKLENBURG CO.		CORNELIUS	
PLAN DATE:	APRIL 2013	REVIEWED BY:	G. A. FULLER
PREPARED BY:	IAN NEIL AVERY	REVIEWED BY:	

SCALE 0

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

Gregory A. Fuller 4/18-13
SIGNATURE DATE

CADD Filename: