STATE PROJECT NO. SHEET NO.

N.C. U-2306 A Sig.1

PROJECT HICKORY

Vicinity Map

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA

Project Description: Lenoir Rhyne Blvd from Tate Blvd to 7th Ave NE in Hickory

Type of Work: Traffic Signals and Fiber Optic Communications Cable

12-0612

L-R BLVD.

12-1362

12-1362

12-1362

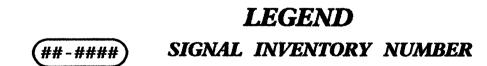
12-1547

67H, 57, Mg

12-1709)

OIECT: U-2306 /

INDEX OF PLANS SIGNAL SHEET INVENTORY LOCATION /DESCRIPTION NUMBER NUMBER SIG. 1 Title Sheet SR 1007 (Lenoir Rhyne Blvd SE) at SR 1692 (Tate Blvd. SE)/2nd Ave SR 1007 (Lenoir Rhyne Blvd SE) at SR 1007 (Highland Avenue SE)/8th St Place SE SR 1007 (Lenoir Rhyne Blvd NE) at 7th Avenue NE SR 1007 (Lenoir Rhyne Blvd NE)/SR 1007 (Highland Avenue NE) at SR 2319 (8th Street NE) 12-0612 SIG. 2-7 12-0723 SIG. 8–11 12-1362 SIG. 12–15 12-1547 **SIG.** 16–17 *12–1709* SIG. 18–19 C Avenue SE at 9th Street Lane SE Metal Poles Typicals Communications Cable Routing Plans SIG. 20-24 SIG. 25-31



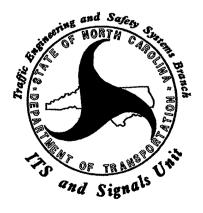
NCDOT CONTACTS:

INTELLIGENT TRANSPORTATION SYSTEMS AND SIGNALS UNIT

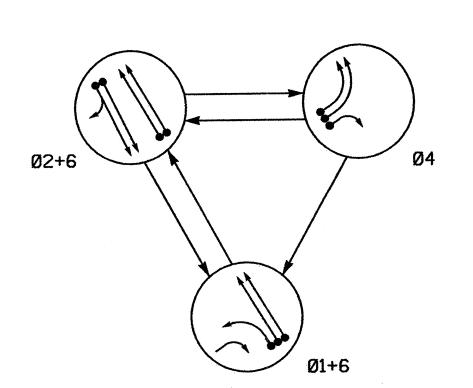
TIMOTHY J. WILLIAMS, PE - S & G CONTRACTS & PEF SUPPORT ENGINEEER

GEORGE C. BROWN, PE - SIGNAL EQUIPMENT DESIGN ENGINEER

G.G. MURR JR., PE - INTELLIGENT TRANSPORTATION SYSTEMS ENGINEER



PHASING DIAGRAM



				-
TABLE OF	0P	ER/	TI	01
		PHA	SE	
SIGNAL FACE	Ø 1 + 6	Ø2+6	Ø 4	FLASH
11		#	#	R
21, 22	R	G	R	Y
41	R	R	G	R
42	R/.	R	G	R
61, 62	G	G	R	Y

SIGN	IAL FACE	I.D.
	Denotes I	L.E.D.
⊕ 300mm	(P) (C) 300mm	

Wood Pole *I

STA.11+83 +/- -L-

24m +/- Lt.

	30011
21 , 22 41	42
61, 62	

LOOP & DETECTOR UNIT INSTALLATION CHART 170 CONTROLLER AND CABINET																					
DETECTOR PROGRAMMING																					
]	INDUCTI	VE LOO	PS					men A A I					Α٦	TRI	BUT	ES	·····		SHOOT	STA	TUS
								TIM	NĢ		1	2 Z	3	4	5 Z	6	7	8 H	Š		9
LOOP NO.	SIZE (m)	TURNS	DIST. FROM STOPBAR (m)	ZEV	EXISTING	NEMA PHASE	DEL	AY	CAI (STRE		FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	TYPE 3	CALLING	ALTERNATE	SYSTEM	X EX	EXISTING
1A	1.8X12	2-4-2	0	Χ	·	1		SEC.		SEC.					Х		Х			X	
2A	1.8X1.8	4	20	Х		2	-	SEC.		SEC.					X		Х			X	
2B	1.8X1.8	4	20	Χ		2		SEC.	***	SEC.					X		X			Х	
4A	1.8X12	2-4-2	0	Χ		4	3	SEC.	-	SEC.					X		Х			Х	
4B	1.8X12	2-4-2	0	Χ		4	-	SEC.	-	SEC.					X		X	<u> </u>		X	
4C	1.8X12	2-4-2	0	Χ		4	15	SEC.	-	SEC.					X		X			X	
6A	1.8X1.8	6	90	X		6	-	SEC.	-	SEC.				Х	X		X			X	
6B	1.8X1.8	6	90	X		6	_	SEC.	_	SEC.				Х	X		X			Х	

Wood Pole #3

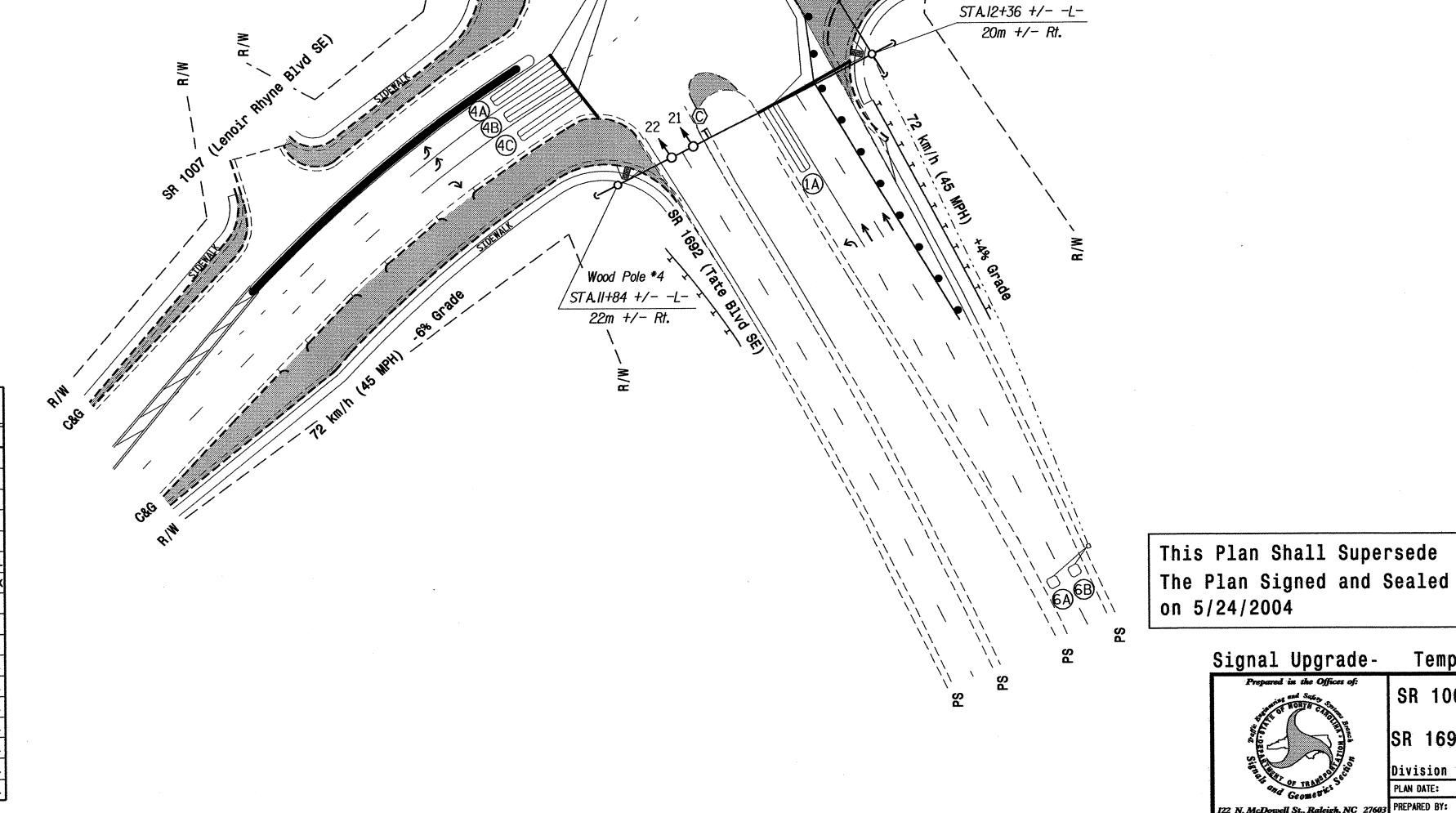
Wood Pole *2

STA.12+27 +/- -L-

PHASING DIAGRAM DETECTION LEGEND

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

TIMING CHART 170 CONTROLLER											
PHASE	Ø1		Ø	2	Ø	4	Ø	6			
MINIMUM INITIAL	7	SEC.	10	SEC.	7	SEC.	12	SEC.			
VEHICLE EXTENSION	2.0	SEC.	3.0	SEC.	2.0	SEC.	6.0	SEC.			
YELLOW CHANGE INT.	3.0	SEC.	4.0	SEC.	3.1	SEC.	4.2	SEC.			
RED CLEARANCE	3.8	SEC.	1.6	SEC.	3.5	SEC.	1.6	SEC.			
MAXIMUM LIMIT	15	SEC.	90	SEC.	30	SEC.	90	SEC.			
RECALL POSITION	NO	NE	VEH R	ECALL	70	NE	VEH R	ECALL			
VEHICLE CALL MEMORY	ИО	NE	VELLOW	FOCK	70	NE	YELLOW	LOCK			
DOUBLE ENTRY	OI	F	Ol	FF	O	-F	0	FF			
WALK		SEC.	-	SEC.	•	SEC.	-	SEC.			
FLASHING DON'T WALK		SEC.	-	SEC.	-	SEC.	-	SEC.			
TYPE 3 LIMIT	-	SEC.		SEC.	-	SEC.	-	SEC.			
ALTERNATE EXTENSION		SEC.	-	SEC.		SEC.		SEC.			
ADD PER VEHICLE	_	SEC.	-	SEC.	_	SEC.	1.5	SEC.			
MAXIMUM INITIAL	_	SEC.	-	SEC.	_	SEC.	34	SEC.			
MAXIMUM GAP	2.0	SEC.	⁻3.0	SEC.	2.0	SEC.	7.0	SEC.			
REDUCE 0.1 SEC EVERY	_	SEC.	-	SEC.		SEC.	1.5	SEC.			
MINIMUM GAP	2.0	SEC.	3.0	SEC.	2.0	SEC.	3.0	SEC.			



3 Phase Fully Actuated (Hickory City Signal System)

<u>NOTES</u>

METRIC

PROJECT REFERENCE NO. | SHEET NO.

U-2306 A

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
- 2. Pavement markings are existing.
- 3. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 4. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
- 6. Set all detector units to presence
- 7. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 8. Hickory City Signal System: #1116.
- 9. Place cabinet so as not to obstruct sight distance of vehicles turning right on red.

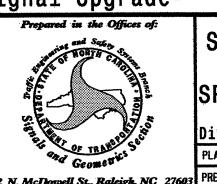
PLAN QUANT	TITIES
Pay Item	Meters
Signal Cable	175
Messenger Cable	140
Lead-in Cable	175

LEGEND

PROPOSED		EXISTING
○ →	Traffic Signal Head	● ➤
0->	Modified Signal Head	N/A
-	Sign	
Ì	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
0	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	CIIIID
\boxtimes	Controller & Cabinet	K K K
	Junction Box	
	- 50mm Underground Conduit	
N/A	Right of Way with Marker	
→	Directional Arrow	
	Pavement Marking Arrow	-
N/A	Guardrail	<u> </u>
	Construction Zone Drums	• • •
	Construction Zone	
$\langle \! A \! \rangle$	Left Arrow "ONLY" Sign (R3-5L)	•
B	Right Arrow "ONLY" Sign (R3-5R	
©	No Left Turn Sign (R3-2)	©
(D)	No Right Turn Sign (R3-2)	Ø

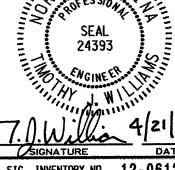
Signal Upgrade-

Temporary Design



SR 1007 (Lenoir Rhyne Blvd SE) at SR 1692 (Tate Blvd. SE)/2nd Ave

Division 12 Catawba County PLAN DATE: February 2006 REVIEWED BY: I.O.Umozurike REVIEWED BY: REVISIONS



REMOVE JUMPERS AS SHOWN

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

1. CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL

2. MAKE SURE JUMPERS SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.

OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.

NOTES:

NOTES

- 1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. 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 3,5,7, 8,9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- 3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- 4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- 5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- 6. PROGRAM PHASE 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
- 7. THE CABINET AND CONTROLLER ARE PART OF THE CITY OF HICKORY SIGNAL SYSTEM: # 1116

OVERLAPS.....NONE

EQUIPMENT INFORMATION

CONTROLLER......CONTRACTOR SUPPLIED 170E CABINETCONTRACTOR SUPPLIED 332 SOFTWAREBI TRANS 233NC2 CABINET MOUNT.....BASE OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX) LOAD SWITCHES USED....S1,S2,S4,S6

PROJECT REFERENCE NO. Sig. 3 U-2306 A

7	FIELD CONNECTION HOOK-UP CHART															/			
LOAD SWITCH NO.	S	1	S 2	S2P	S 3	S4	S4P	S 5	S 6	S6P	S 7	S8	S8P	S 9	S10	S11	S12	S13	S14
PHASE	1		2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	0L2	SPARE	0L3	OL4	SPARE
SIGNAL HEAD NO.	11	42	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
GREEN			130			103			136										
YELLOW			129			102			135										
RED			128			101			134										
RED ARROW	125																		
YELLOW ARROW	126	126																	
GREEN ARROW	127	127																	

NU = NOT USED

INPUT FILE POSITION LAYOUT

(front view) 9 10 11 12 13 14 1 2 3 4 5 FUTURE USE FS FUTURE USE DC DC ISOLATOR ISOLATOR FILE "T" ST NOT USED NOT NOT USED NOT USED USED DC ISOLATOR UTURE FUTURE
USE USE FUTURE USE FUTURE FUTURE FUTURE USE USE USE FUTURE USE AC AC ISOLATOR FILE "J" FUTURE FUTURE USE USE NOT USED NOT USED FUTURE USE FUTURE FUTURE FUTURE USE USE AC AC ISOLATOR 6B

> FS = FLASH SENSE ST = STOP TIME

= DENOTES POSITION

OF SWITCH

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
1A	TB2-1,2	I1U	1	56	5 7	1
2A	TB2-5,6	I2U	2	39	5 7	2
2B	TB2-7,8	I2L	3	43	5 7	2
4A	TB4-9,10	I6U	4	41	5 7	4
4B	TB4-11,12	I6L	5	45	5 7	4
4C	TB6-1,2	I7U	6	65	5 7	4
6A	TB3-5,6	J2U	7	40	45 7	6
6B	TB3-7,8	J2L	8	44	45 7	6

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

THIS ELECTRICAL DETAIL IS FOR THE TEMPORARY SIGNAL DESIGN: 12-0612T

DESIGNED: FEBRUARY 2006 SEALED: 4/21/06

REVISED: N/A

INPUT FILE POSITION LEGEND: J2L

FILE J SLOT 2-LOWER- DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY 2-PED CALL 3-RESERVED

4-COUNTING 5-EXTENSION

6-TYPE 3 7-CALLING

8-ALTERNATE

THIS DETAIL SUPERSEDES DETAIL DATED MAY 2004 AND SEALED 6/4/04

TEMPORARY DESIGN

ELECTRICAL AND PROGRAMMING DETAILS FOR:



SR 1007 (LENOIR RHYNE BLVD SE) SR 1692 (TATE BLVD SE)/2nd AVE

DIVISION 12 CATAWBA COUNTY PLAN DATE: APRIL 2006 REVIEWED BY: T. Jane PREPARED BY:

F.E. RUSS REVIEWED BY: REVISIONS INIT. DATE

SIG. INVENTORY NO. 12-0612T

SEAL

PHASING DIAGRAM 10 3 Ø3+7 EVP A Ø2+6 (01+6)EVP B Ø3+8 (02+5)EVP C (Ø3+8) 04+7 Ø1+6 EVP D (04+7)

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT

PEDESTRIAN MOVEMENT

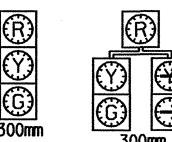
←----> EV PREEMPTION SEQUENCE PHASING

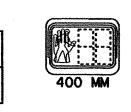
170 EMERGENCY PREEMPTION TIMING CHART											
FUNCTION	EVA (Ø1+6) SECONDS	EVB (Ø2+5) SECONDS	EVC (Ø3+8) SECONDS	EVD (Ø4+7) SECONDS							
DELAY BEFORE PREEMPT	0	0	0	0							
PED. CLEAR BEFORE PREEMPT	17	17	17	17							
MIN. GREEN BEFORE PREEMPT	1.0	1.0	1.0	1.0							
CLEARANCE TIME	1.0	1.0	1.0	1.0							
PREEMPT EXTEND(timing on optical detection unit)	2.0	2.0	2.0	2.0							

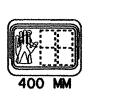
TABLE OF OPERATION														
		PHASE												
SIGNAL	Ø1+5	Ø1+6	® 2+5	Ø2+6	Ø3+7	Ø3+8	Ø 4 + 7	Ø4+8	E>PA	E>PB	E>PC	EYPD	T LADIT	
11	—	-	₽	-R	-R	4	-R	-R	ŧ	4	4	-R	-R	
21	R	R	G	G	R	R	R	R	R	G	R	R	Υ	
22	R	R	G	G	\mathbb{R}	R/	R	R	R	G	R	R	Υ	
31	-R	#	#	-R	-	-	-R	- R-	#	#	-	- ₽	-R	
41	R	R	R	R	R	R	G	G	R	R	R	G	R	
42	R/.	R	R/	R	R	R	G	G	R	R	R	G	R	
51, 52	-	₩	V	- 	-R	1	-R	-R	#	—	- R-	- R-	-R-	
61	R	G	R	G	R	R	R	R	G	R	R	R	Υ	
62	R	G	R	G	P	R	P .	R	G	R	R	R	Υ	
71, 72	-R	#	17	- ₽-	-	-R	-	- R-	#	-R	₽	-	R	
81, 82	R	R	R	R	R	G	R	G	R	R	G	R	R	
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DW	DW	DW	DW	DRK	

SIGNAL FACE I.D.

Denotes L.E.D.







Metal Pole *2 (See Loading Diagram) STA.II+82 +/- -L-2Im +/- LT.

⊕ 300mm	(R) (C) 300mm	(R) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	400 MM
11 31 51, 52 71, 72	21 41 61 81, 82	22 42 62	P61, P62

			TIMING 170 CON							PREEMF USE ONLY	
PHASE	Ø1	Ø 2	Ø3	Ø 4	Ø5	Ø6	Ø 7	Ø8	OL 1	0L 2	0L 3
MINIMUM INITIAL	7 SEC.	12 SEC .	7 SEC.	7 SEC.	7 SEC.	10 SEC.	7 SEC.	7 SEC.	- Maries		-
VEHICLE EXTENSION	3.0 SEC .	6.0 SEC.	2.0 SEC .	2.0 sec.	2.0 SEC.	3.0 SEC .	2.0 SEC .	2.0 SEC .			
YELLOW CHANGE INT.	3.0 SEC .	5.1 SEC .	3.0 SEC .	4.0 sec.	3.1 SEC.	3.5 SEC .	3.0 sec.	4.2 SEC .	3.0 SEC .	3.1 SEC .	3.0 SEC.
RED CLEARANCE	3.5 SEC .	2.1 SEC.	3.8 SEC .	2.4 sec.	3.8 sec.	3.0 sec.	3.7 sec.	2.0 SEC .	3.8 SEC .	3.8 SEC .	3.7 SEC.
MAXIMUM LIMIT	20 SEC .	90 SEC .	15 SEC .	30 sec .	20 SEC .	90 SEC .	15 SEC .	30 SEC .	-		Access
RECALL POSITION	NONE	VEH RECALL	NONE	NONE	NONE	VEH RECALL	NONE	NONE	NONE	NONE	NONE
VEHICLE CALL MEMORY	NONE	AETTOM FOCK	NONE	NONE	NONE	AETTOM FOCK	NONE	NONE	NONE	NONE	NONE
DOUBLE ENTRY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	7 SEC.	- SEC.	– SEC.	-		
FLASHING DON'T WALK	- SEC.	- SEC.	⇔ – SEC.	- SEC.	- SEC.	34 SEC .	- SEC.	- SEC.			
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	– SEC.	- SEC.	- SEC.	- SEC.			
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.			****
ADD PER VEHICLE	- SEC.	1.5 SEC.	SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.		-	
MAXIMUM INITIAL	- SEC.	34 SEC.	- SEC.	- SEC.	– SEC.	- SEC.	- SEC.	- SEC.	-		***
MAXIMUM GAP	3.0 SEC .	7.0 SEC.	2.0 SEC .	2.0 SEC .	2.0 SEC .	3.0 SEC .	2.0 SEC .	2.0 SEC .			****
REDUCE 0.1 SEC EVERY	- SEC.	1.5 SEC .	- SEC.	– SEC.	– SEC.	– SEC.	- SEC.	- SEC.			
MINIMUM GAP	3.0 SEC .	3.0 SEC .	2.0 SEC .	2.0 SEC .	2.0 sec.	3.0 sec.	2.0 sec.	2.0 SEC .			ende

LOOP & DETECTOR UNIT INSTALLATION CHART 170 CONTROLLER AND CABINET											LL	Α7 Γ		NC	C	HA	RT	•			
										DET	TEC1	OR	PR	OGF	AMI	MIN	G				
]	INDUCTI	VE LOO	PS					TIAA	ING						BUT				SHOOL	STA	TUS
LOOP NO.	SIZE (m)	TURNS	DIST. FROM STOPBAR (m)	XEX	EXISTING	NEMA PHASE	DEI		CAR	RY ETCH)	FULL TIME	PEDESTRIAN CALL	RESERVED W	COUNT	EXTENSION 4	TYPE 3 9	CALLING	ALTERNATE 8	SYSTEM LO	X X	EXISTING
1A	1.8X12	2-4-2	0	Х		1	3	SEC.		SEC.					χ		Х			Χ	
2A	1.8X1.8	6	90	X		2		SEC.	1	SEC.				Χ	Χ		Х			X	
2B	1.8X1.8	6	90	Х		2	-	SEC.	-	SEC.				Χ	Χ		Х			X	
3A	1.8X12	2-4-2	0	X		3		SEC.		SEC.					Χ		Х	<u> </u>		X	
4A	1.8X12	2-4-2	0	Х		4	_	SEC.	-	SEC.					Χ		X			Х	
4B	1.8X12	2-4-2	0	X		4		SEC.	_	SEC.					X		Х		<u> </u>	Х	
5A	1.8X12	2-4-2	0	X		5	_	SEC.	-	SEC.					Х		X			Х	
5B	1.8X12	2-4-2	0	X		5	_	SEC.	_	SEC.					Х		Х			Х	
5C	1.8X12	2-4-2	0	X		5	15	SEC.	-	SEC.					Х		Х			X	
6A	1.8X1.8	4	20	X		6		SEC.	-	SEC.					Х		X			Х	
6B	1.8X1.8	4	20	X		6		SEC.		SEC.					Х		X			X	
7A	1.8X12	2-4-2	0	X		7		SEC.		SEC.					Χ		Х			Χ	
7B	1.8X12	2-4-2	0	X		7		SEC.	-	SEC.					Χ		Х			Х	
88	1.8X1.8	5	90	X		8	_	SEC.	3.4	SEC.					X					X	
8B	1.8X1.8	5	90	X		8		SEC.	3.4	SEC.					Χ					X	
8C	1.8X12	2-4-2	0	X		8	-	SEC.	_	SEC.					Χ		Χ			X	
8D	1.8X12	2-4-2	0	X		8		SEC.		SEC.					Χ		Χ			Χ	
8E	1.8X12	2-4-2	0	X		8	10	SEC.		SEC.					Χ		Х			X	
P61, P62	N/A	N/A	N/A	X		6		SEC.		SEC.		Χ									
A *	EV P	REEMPT	OR A	X		EVPA	***	SEC.	-	SEC.											
B *	EV P	REEMPT	OR B	X		EVPB		SEC.	_	SEC.											
C*	EV P	REEMPT	OR C	X		EVPC		SEC.	-	SEC.											
D *	EV P	REEMPT	OR D	X		EVPD		SEC.	_	SEC.											

Metal Pole *3 (See Loading Diagram) STA.12+25 +/- -L-25m +/- LT.

*Optical Detection Unit

(See Loading Diagram) STA.II+86 +/- -L-24m +/- RT.

PLAN QUANTITIES

Meters

690

0

660

Pay Item

Signal Cable

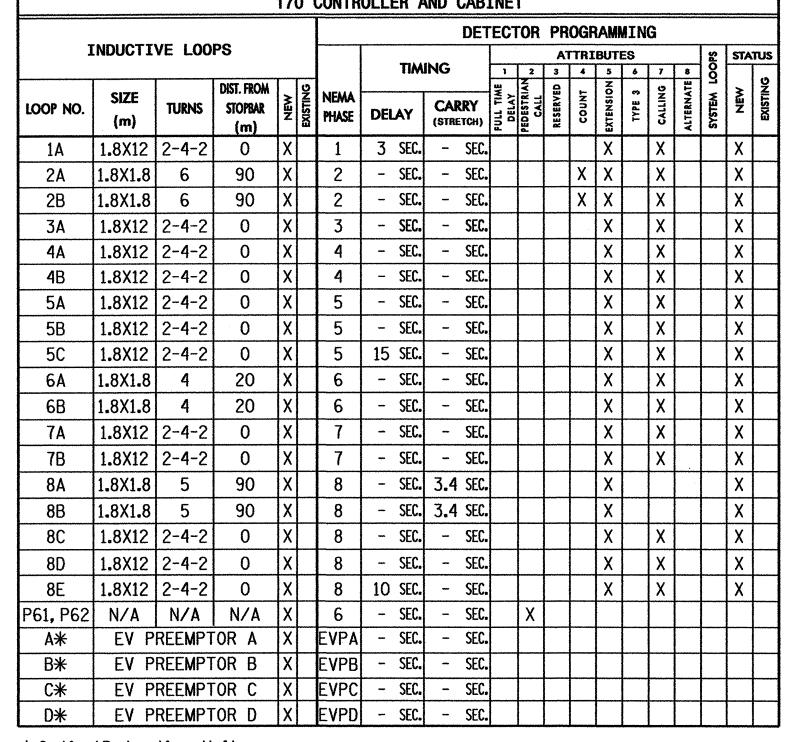
Messenger Cable

Lead-in Cable

This Plan Shall Supersede

The Plan Signed and Sealed

on 7/14/2004



Fully Actuated w/ Emergency Vehicle Preemption (Hickory City Signal System)

and Structures" dated January 2002. 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.

NOTES

"Standard Specifications for Roads

1. Refer to "Roadway Standard Drawings

NCDOT" dated January 2002 and

METRIC

8 Phase

PROJECT REFERENCE NO.

U-2306 A

SHEET NO.

Sig. 4

3. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.

4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.

5. During coordination, phase 1 or phase 5 may be lagged.

6. During coordination, phase 3 or phase 7 may be lagged.

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. Set all detector units to presence mode.

10. Set phase bank 3 maximum limit to 250 seconds for phases used.

11. This intersection features an optical detection system. Shown location of optical detectors are conceptual only. Manufacturer shall determine optimum location of detectors.

12. Preemption calls shall be served in the sequence which they are received.

13. Hickory City Signal System: #1116.



PROPOSED EXISTING O-> Traffic Signal Head **●**→ SR 1007 (Lenoir Rhyne Blvd SE) Modified Signal Head Sign Pedestrian Signal Head With Push Button & Sign Signal Pole with Guy Signal Pole with Sidewalk Guy Inductive Loop Detector Controller & Cabinet Junction Box 50mm Underground Conduit Right of Way with Marker Directional Arrow Pavement Marking Arrow Metal Pole with Mastarm Optical Detector Guardrail Directional Drill 2-50mm N/A Polyethylene Conduit Pedestrian Signal Pedestal Wheelchair Ramp U-Turn "YIELD TO RIGHT TURN" Sign (R10-16) Signal Upgrade- Final Design

Metal Pole *4

16m +/- RT.

(See Loading Diagram) STA.12+40 +/- -L-

SR 1007 (Lenoir Rhyne Blvd SE)

REVISIONS

SR 1692 (Tate Blvd. SE)/2nd Ave Division 12 Catawba County PLAN DATE: February 2006 REVIEWED BY: I.O. Umozurike PREPARED BY:

Hickory Luhr INIT. DATE

SIG. INVENTORY NO. 12-0612

EDI MODEL 2010ECL CONFLICT MONITOR PROGRAMMING DETAIL WD ENABLE SW2 (remove jumpers and set switches as shown) **OPTIONS** REMOVE DIODE JUMPERS 1-5, 1-6, 1-10, 1-15, 2-5, 2-6, 2-10, 2-15, OFF U ON 3-7, 3-8, 3-9, 3-11, 4-7, 4-8, 4-11, 5-10, 6-15, 7-9, 7-11, 8-9 AND 9-11. -RP DISABLE -WD 1.0 SEC GY ENABLE SW3 -POLARITY YEL TIME-1 -YEL TIME-2 -YEL TIME-3 ENABLE → COMPONENT SIDE

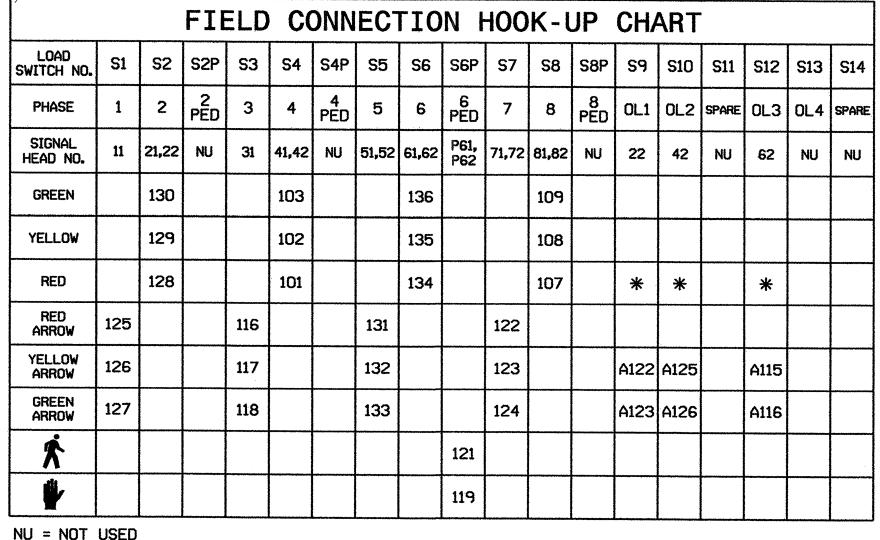
NOTES

- 1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. 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 12, 13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- 3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- 4. SET POWER-UP FLASH TIME FOR 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- 5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- 6. PROGRAM PHASE 2. ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION. REMOVE VOLUME DENSITY PROGRAMMING FROM PHASE 6.
- 7. THE CABINET AND CONTROLLER ARE PART OF THE CITY OF HICKORY SIGNAL SYSTEM: # 1116

*SEE 'LOAD RESISTOR INSTALLATION DETAIL'

** SEE 'COUNTDOWN PEDESTRIAN SIGNAL OPERATION' NOTE

PROJECT REFERENCE NO. SHEET NO. sig.5U-2306 A



**-

NEMA

EQUIPMENT INFORMATION

CONTRACTOR CURRETTER ATOR

EXISTING FROM TEMPORARY DESIGN INSTALLATION*

· ·	CONTROLLERCONTRACTOR SUPPLIED 170E
7	CONTROLLERCONTRACTOR SUPPLIED 170E CABINETCONTRACTOR SUPPLIED 332
	SOFTWAREBI TRANS 233NC2
	CABINET MOUNTBASE
	OUTPUT FILE POSITIONS18 (12-STD, 6-AUX)
	LOAD SWITCHES USED\$1,\$2,\$3,\$4,\$5,\$6,\$6P,\$7,\$8,\$9,\$10,\$12
	PHASES USED
	OVERLAPS

INPUT FILE POSITION LAYOUT

1. CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL

2. MAKE SURE JUMPERS SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.

OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.

REMOVE JUMPERS AS SHOWN

(front view) 10 12 13 Ø6PED FS ØЗ 4A ISOLATOR ISOLATOR нти NOT USED NOT USED USED Ø8 6A 88 8C 8E ISOLATOR ISOLATOR Ø 8 Ø 8 NOT USED USED 6B 8B 8D

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

FS = FLASH SENSE ST = STOP TIME

EV = EMERG. VEH. PREEMPT

DENOTES POSITION

OF SWITCH

EVA - CHANNEL 1 - PIN 71 EVB - CHANNEL 2 - PIN 72 EVC - CHANNEL 3 - PIN 73

LOAD RESISTOR INSTALLATION DETAIL

NOTE: THE PURPOSE OF THESE RESISTORS IS TO LOAD THE CHANNEL RED MONITOR INPUTS IN ORDER FOR THE SIGNAL SEQUENCE MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON CHANNELS THAT DO NOT USE THE RED

DISPLAY IN THE FIELD.

--- OL1 RED FIELD

TERMINAL (A121)

OL2 RED FIELD

TERMINAL (A124)

OL3 RED FIELD

TERMINAL (A114)

EVD - CHANNEL 4 - PIN 74

NOTES:

- NOTE: WIRE OPTICAL DETECTORS TO INPUT FILE PER MANUFACTURER'S

INSTRUCTIONS.

INPUT FILE POSITION LEGEND: J2L

LOWER-

SLOT 2-

DETECTOR ATTRIBUTES LEGEND:

2-PED CALL

3-RESERVED

4-COUNTING

5-EXTENSION

6-TYPE 3

7-CALLING

8-ALTERNATE

1-FULL TIME DELAY

INPUT FILE CONNECTION & PROGRAMMING CHART

I HOP TWELT DETECTOR PIN

LOOP NO.	TERMINAL		NO.	NO.	ATTRIBUTES	PHASE
1A	TB2-1,2	I1U	1	56	5 7	1
2A	TB2-5,6	I2U	2	39	45 7	2
2B	TB2-7,8	I2L	3	43	45 7	2
3A	TB4-5,6	I5U	4	58	5 7	3
4A	TB4-9,10	I6U	5	41	5 7	4
4B	TB4-11,12	I6L	6	45	5 7	4
5A	TB3-1,2	J1U	7	55	5 7	5
5B	TB3-9,10	J3U	8	64	5 7	5
5C	TB3-11,12	J3L	9	77	5 7	5
6A	TB3-5,6	J2U	10	40	5 7	6
6B	TB3-7,8	J2L	11	44	5 7	6
7A	TB5-5,6	J5U	12	57	5 7	7
7B	TB5-7,8	J5L	13	57	5 7	7
8A	TB5-9,10	J6U	14	42	5	8
8B	TB5-11,12	J6L	15	46	5	8
8C	TB7-1,2	J7U	16	66	5 7	8
8D	TB7-3,4	J7L	17	79	5 7	8
8E	TB7-5,6	J8U	18	50	5 7	8
PED PUSH BUTTONS						
P61, P62	TB8-7 , 9	I13U	19	68	2	6

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

PEDESTRIAN CLEAR BEFORE PREEMPT TIMING

PROGRAM PED. PHASE 6 MIN. CLEAR BEFORE PREEMPT AT F/I+6+B= 17 (SEC.)

EMERGENCY VEHICLE PREEMPTION PROGRAMMING CHART

E.V. PREEMPT	OPTICAL DET. NO.	INPUT PIN	CLEARANCE PHASES LOCATION	DELAY TIME LOCATION	CLEAR TIME LOCATION
EVA	A	E/126+F+1=71	E/125+E+A= Ø1,6	F/1+E+2=0	F/1+E+3= 1 (SEC.)
EVB	В	E/126+F+2=72	E/125+E+B= Ø 2,5	F/1+E+4=0	F/1+E+5= 1 (SEC.)
EVC	С	E/126+F+3=73	E/125+E+C= Ø 3,8	F/1+E+6=0	F/1+E+7= 1 (SEC.)
EVD	D	E/126+F+4=74	E/125+E+D= Ø 4,7	F/1+E+8=0	F/1+E+9= 1 (SEC.)

1. PROGRAM MINIMUM GREEN BEFORE PREEMPT AT: F/1+0+8= 1 (SEC.) 2. FOR PREEMPTION IMMEDIATE RESPONSE, DISABLE MIN. WALK AT: E/125+F+F=3

3. PROGRAM EXTEND TIME ON OPTICAL DETECTOR UNITS FOR 2.0 SEC.

OVERLAP TIMING PROGRAMMING CHART

OVERLAP	GREEN CLEAR	YELLOW CHANGE INTERVAL	RED CLEARANCE
OL1	E/29+1+D=0.0 (SEC.)	E/29+1+E=3.0 (SEC.)	E/29+1+F=3.8 (SEC.)
0L2	E/29+2+D=0.0 (SEC.)	E/29+2+E=3.1 (SEC.)	E/29+2+F=3.8 (SEC.)
0L3	E/29+3+D=0.0 (SEC.)	E/29+3+E=3.0 (SEC.)	E/29+3+F=3.7 (SEC.)

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

PEDESTRIAN PHASE PROGRAMMING

PROGRAM PEDESTRIAN 6P OUTPUT AT KEYPAD INPUT E/125+F+6=Ø 6.

OVERLAP PROGRAMMING NOTES

- -1. TO ASSURE THAT LOAD SWITCH S9 IS ASSIGNED AS OVERLAP 1. PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+0=9
- 2. TO ASSURE THAT LOAD SWITCH S10 IS ASSIGNED AS OVERLAP 2, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+2+0=10
- 3. TO ASSURE THAT LOAD SWITCH S12 IS ASSIGNED AS OVERLAP 3. PROGRAM CONTROLLER AT KEYPAD INPUT E/29+3+0=11
- 4. TO SET THE PARENT PHASE FOR OVERLAP 1 (VEH. SET 1) AS PHASE 3, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+1= Ø3
- 5. TO SET THE PARENT PHASE FOR OVERLAP 2 (VEH. SET 1) AS PHASE 5, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+2+1= Ø 5 6. TO SET THE PARENT PHASE FOR OVERLAP 3 (VEH. SET 1) AS PHASE 7,
- PROGRAM CONTROLLER AT KEYPAD INPUT E/29+3+1= Ø 7 7. TO SET THE PARENT PHASES FOR OVERLAPS 1 & 2 (VEH. SET 2) AND
- OVERLAP 3 (VEH. SET 3) AS NONE, NO PROGRAMMING IS REQUIRED.

HEADS 22,42,62 ARROWS (OL1,OL2,OL3) PREEMPTION OPERATION

IN ORDER FOR E.V. PREEMPTION 'B' TO OPERATE WITHOUT SIGNAL HEAD 42 RIGHT-TURN ARROWS (OVERLAP 'OL2'), THE FOLLOWING PROGRAMMING MUST BE IN PLACE:

> ASSIGN E.V. PREEMPT EVB OUTPUT AT E/127+D+9= 208 ASSIGN LOGIC GATE OR-I INPUT I AT E/126+E+A= 208

IN ORDER FOR E.V. PREEMPTION 'C' TO OPERATE WITHOUT SIGNAL HEAD 22 RIGHT-TURN ARROWS (OVERLAP 'OLI'), THE FOLLOWING PROGRAMMING MUST BE IN PLACE:

> ASSIGN E.V. PREEMPT EVC OUTPUT AT E/127+D+A= 209 ASSIGN LOGIC GATE OR-I INPUT 2 AT E/126+E+B= 209

IN ORDER FOR E.V. PREEMPTION 'D' TO OPERATE WITHOUT SIGNAL HEAD 62 RIGHT-TURN ARROWS (OVERLAP 'OL3'), THE FOLLOWING PROGRAMMING MUST BE IN PLACE:

ASSIGN E.V. PREEMPT EVD OUTPUT AT E/127+D+B= 201

TO COMPLETE PROGRAMMING:

ASSIGN O/L VEH. SET 2 INPUT AT E/I26+D+C= 200 ASSIGN LOGIC GATE OR-I OUTPUT AT E/127+D+I = 200 ASSIGN O/L VEH. SET 3 INPUT AT E/126+D+D= 201

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0612 DESIGNED: FEBRUARY 2006 SEALED: 4/28/06 REVISED: N/A

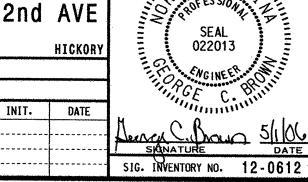
THIS DETAIL SUPERSEDES DETAIL DATED JULY 2004 AND SEALED 7/29/04

FINAL DESIGN

ELECTRICAL AND PROGRAMMIN DETAILS FOR:

SR 1007 (LENOIR RHYNE BLVD SE)

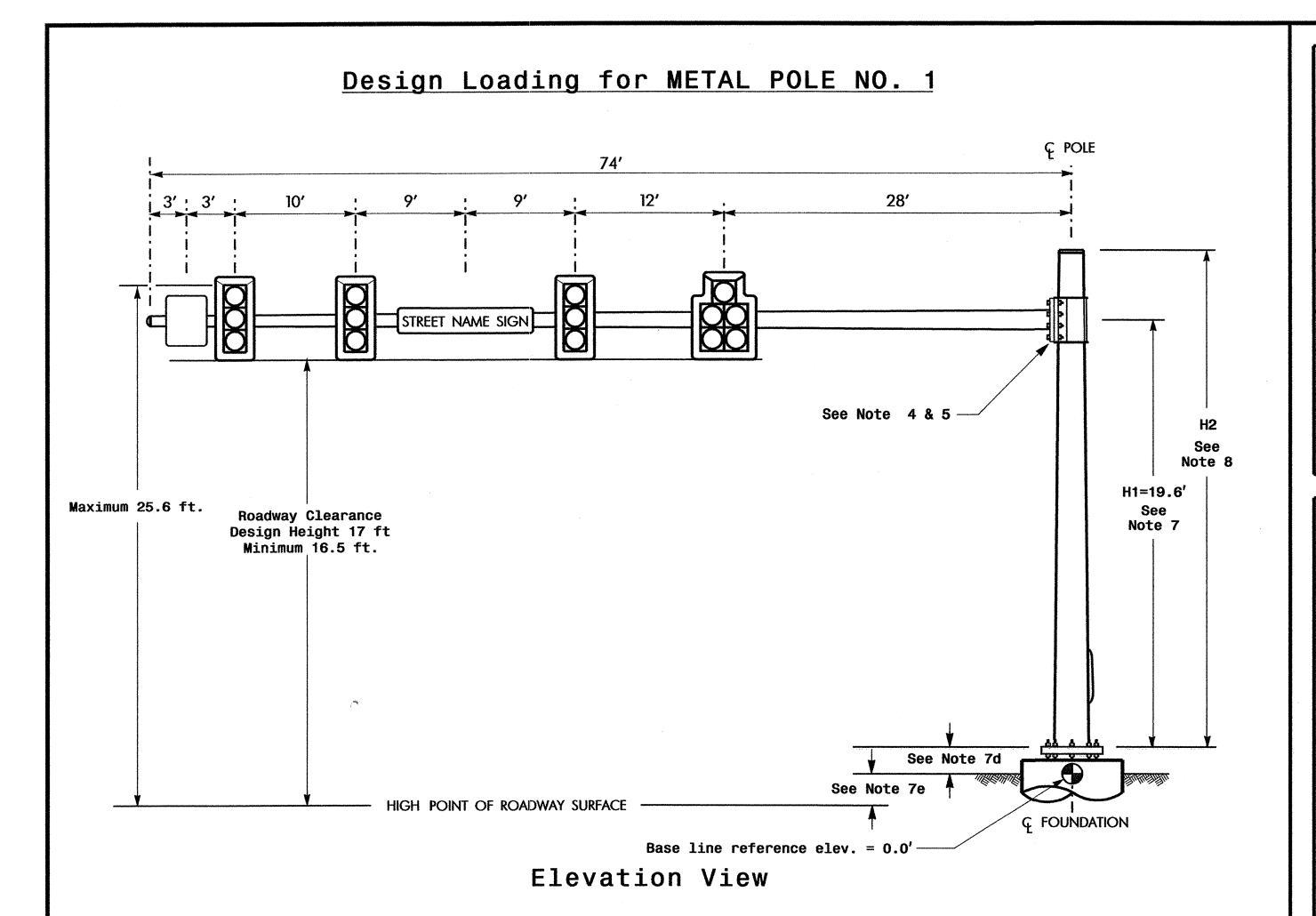
SR 1692 (TATE BLVD SE)/2nd AVE DIVISION 12 CATAWBA COUNTY PLAN DATE: APRIL 2006 REVIEWED BY: F.E. RUSS REVIEWED BY:



SEAL

CARN

INIT. DATE



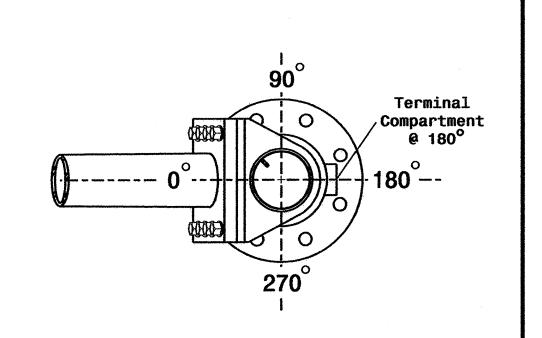
Design Loading for METAL POLE NO. 2 C POLE 30' STREET NAME SIGN See Note 4 & 5 Note 8 H1=15.6' Maximum 25.6 ft. Roadway Clearance Note 7 Design Height 17 ft Minimum 16.5 ft. See Note 7d See Note 7e HIGH POINT OF ROADWAY SURFACE G FOUNDATION Base line reference elev. = 0.0'**Elevation View**

SPECIAL NOTE

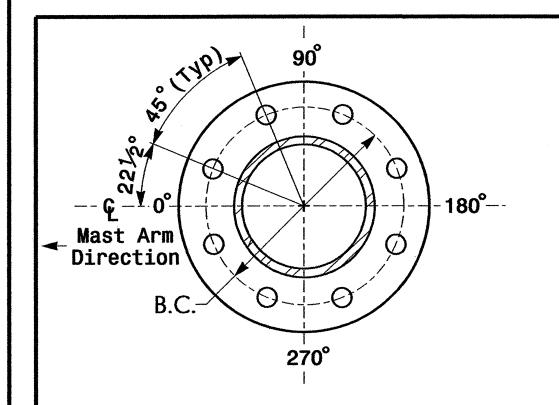
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

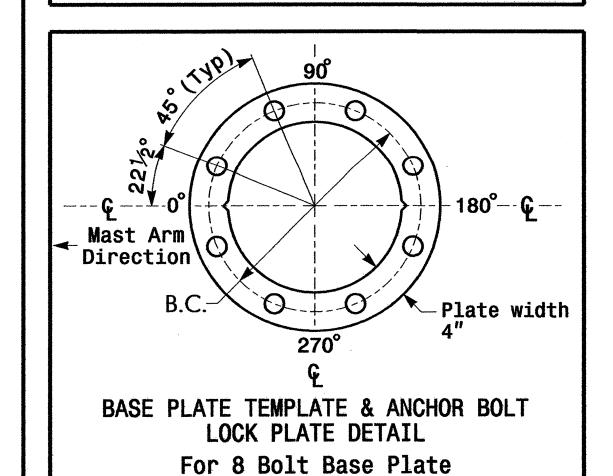
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at © Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.0 ft.	-3.0 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL See Note 6



METAL POLE No. 1 and 2

PROJECT REFERENCE NO. sig. 6 U-2306A

	MAST ARM LOADING SCH	EDUL	.E	
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0″ W X 56.0″ L	103 LBS
	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
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

Design Reference Material

 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.

NOTES

- The 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
- The 2002 NCDOT Roadway Standard Drawings.

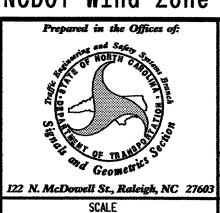
• The traffic signal project plans and special provisions.

• The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

<u>Design Requirements</u>

- 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. Maximum allowable CSR for all signal supports is 0.9.
- 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a. Mast arm slope and deflection are not considered in determining the arm attachment height
- as they are assumed to offset each other. b.Signal heads 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.
- 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 & Geometrics Structural Engineer for assistance at
- 10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

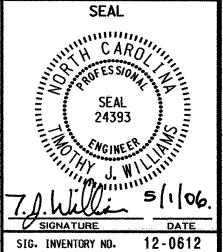


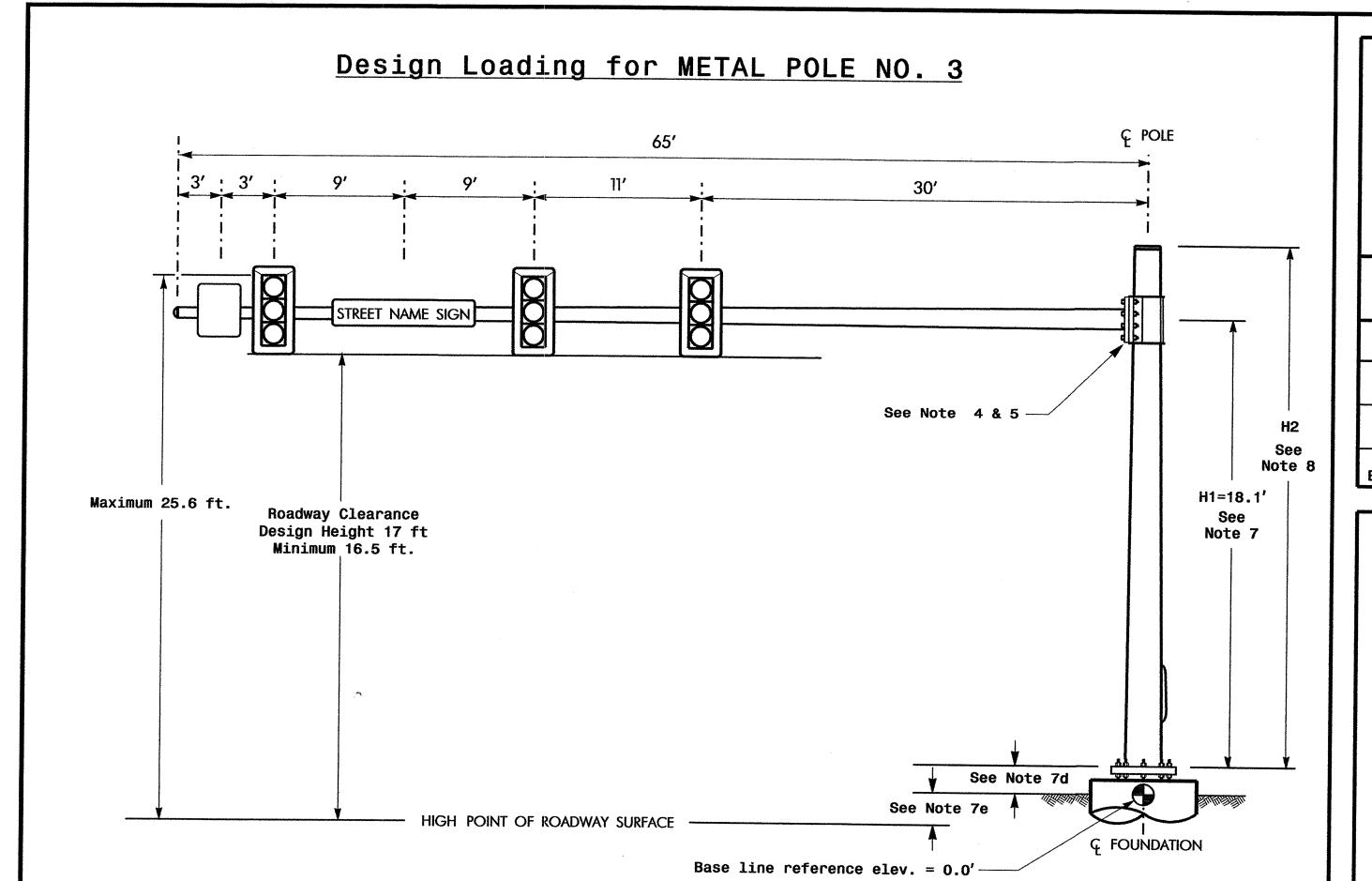
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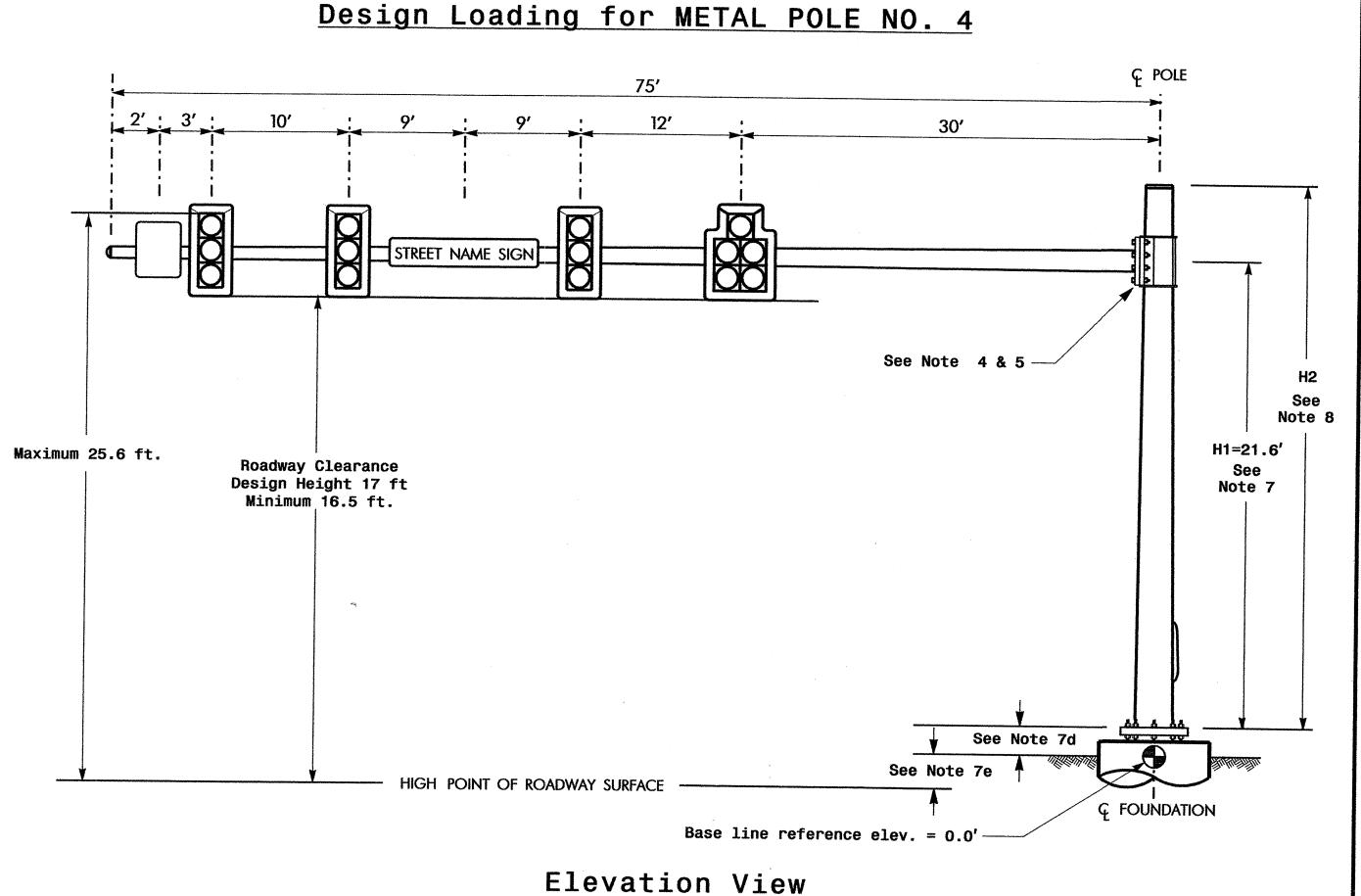
SR 1007 (Lenoir Rhyne Blvd. SE) SR 1692 (Tate Blvd. SE)/2nd Ave

Division 12 Catawba County PLAN DATE: February 2006 REVIEWED BY: I.O. Umozurike PREPARED BY: Luhr REVIEWED BY: REVISIONS INIT. DATE





Elevation View

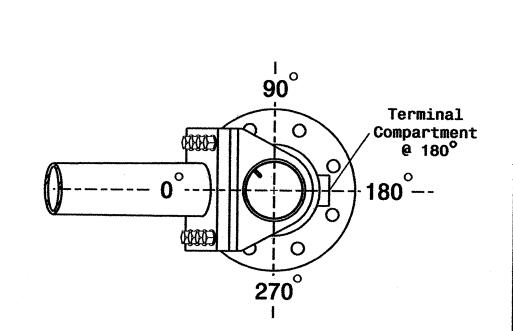


SPECIAL NOTE

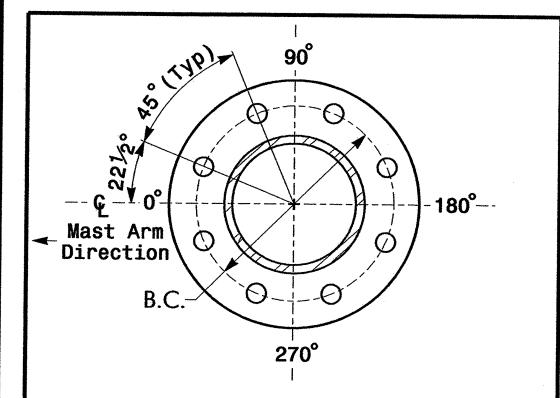
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

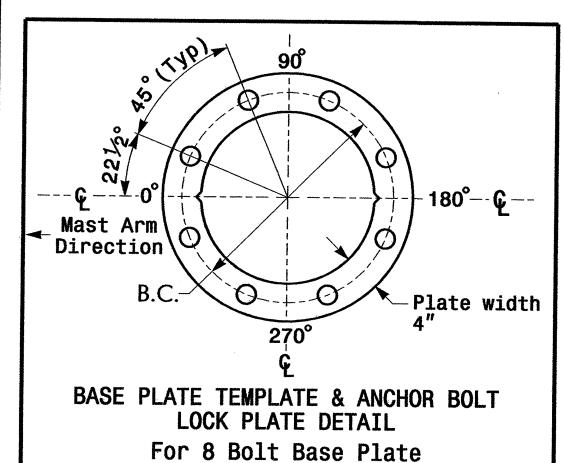
	, ,	
Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at & Foundation & ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.5 ft.	+3.0 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL See Note 6



METAL POLE No. 3 and 4

PROJECT REFERENCE NO.	SHEET NO.
U-2306A	Sig. 7

	MAST ARM LOADING SCH	EDUL	E	
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	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
STREET NAME SIGN	Street name sign Rigid mounted with astro-sign-brac	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

Design Reference Material

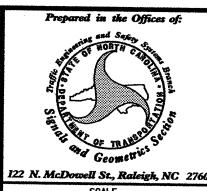
- Design the traffic signal structure and foundation in accordance with:
 The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
- The 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
- The 2002 NCDOT Roadway Standard Drawings.

The traffic signal project plans and special provisions.
 The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

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. Maximum allowable CSR for all signal supports is 0.9.
- 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- . A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
- b. Signal heads 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.
- 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 $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot.
- 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- 10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)



N/A

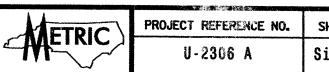
SR 1007 (Lenoir Rhyne Blvd. SE) SR 1692 (Tate Blvd. SE)/2nd Ave

Division 12 Catawba County PLAN DATE: February 2006 | REVIEWED BY: I.O. UMOZUTIKE N. McDowell St., Raleigh, NC 27603 PREPARED BY: Luhr REVIEWED BY: INIT. DATE

24393

SEAL

SIG. INVENTORY NO. 12-0612



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

NOTES

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Program phase 1 as protected/permitted.
- 4. Program phase 5 as protected/permitted.
- 5. Program phase 3 as protected/permitted. 6. Program phase 7 as protected/permitted.
- 7. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timina values shall supersede these values.
- 9. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- 10. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- 11. Set all detector units to presence mode.
- 12. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 13. Preemption calls shall be served in the sequence which they are received.
- 14. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only. Manufacturer shall determine optimum location of detectors.
- 15. Hickory City System: # 1101
- 16. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.

LEGEND

PROPOSED		EXISTING
○ →	Traffic Signal Head	•
0->	Modified Signal Head	N/A
	Sign	
↓	Pedestrian Signal Head With Push Button & Sign	
\bigcirc	Signal Pole with Guy	•
S C	ignal Pole with Sidewalk Guy	
	Inductive Loop Detector	CIIIID
\boxtimes	Controller & Cabinet	KXN KXN
	Junction Box	
	50mm Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
->	Pavement Marking Arrow	→
O	Metal Pole with Mastarm	
∞	Optical Detector	•
DD	Directional Drill 2-50mm Polyethylene Conduits	N/A
N/A	Wheelchair Ramp	

Signal Upgrade

SR 1007 (Lenoir Rhyne Blvd SE) SR 1007 (Highland Avenue SE)

8th St Place SE Division 12 Catawba County

PLAN DATE: February 2006 REVIEWED BY: I.O.UMOZUTIKE

Sig. 8

PHASING DIAGRAM

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNSIGNALIZED MOVEMENT

PEDESTRIAN MOVEMENT

UNDETECTED MOVEMENT (OVERLAP)

EV PREEMPTION SEQUENCE PHASING

TIMING CHART

170 CONTROLLER

3.0 **SEC.**

MINIMUM INITIAL

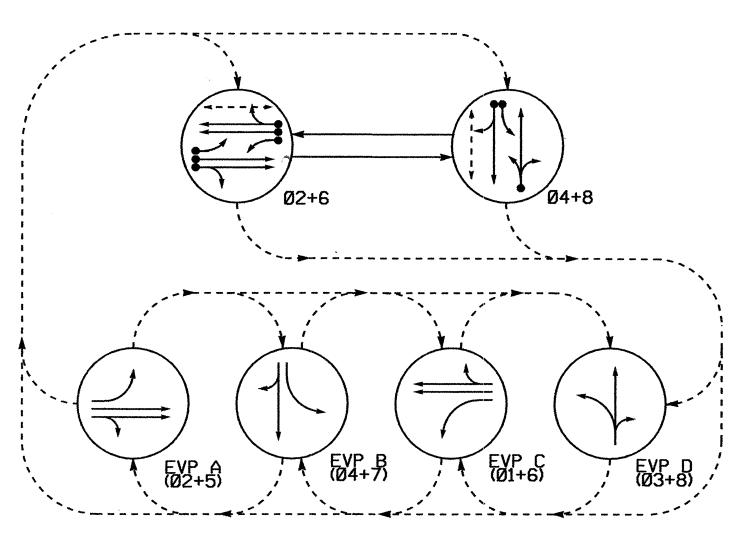
ADD PER VEHICLE

MAXIMUM INITIAL

MAXIMUM GAP

MINIMUM GAP

REDUCE 0.1 SEC EVERY



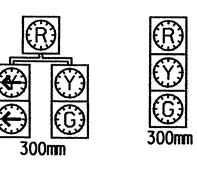
FACE P61, P62 W DW DW DW DW DW DR

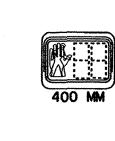
TABLE OF OPERATION

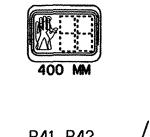
PHASE

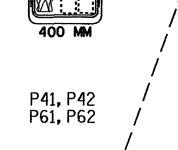
SIGNAL FACE I.D.

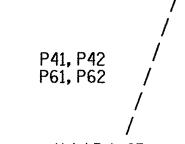
Denotes L.E.D.



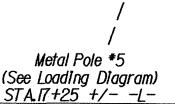


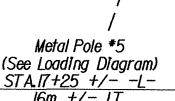


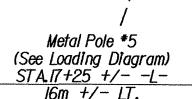


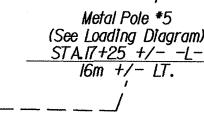


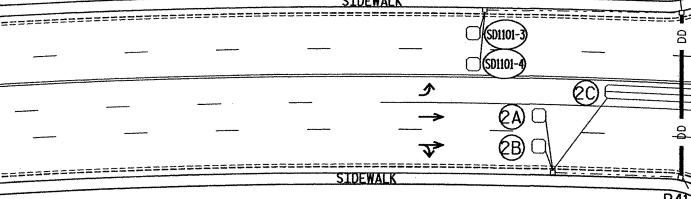












FOR PREEMPTION

7 SEC.

SR 1007 (Lenoir Rhyne Blvd SE)

Metal Pole *8 (See Loading Diagram) STA.17+26 +/- -L-I5m +/- RT.

8182 D

□ 0 → 61

(See Loading Diagram) STA.17+51+/- -L-16m +/- RT. PLAN QUANTITIES Pay Item Signal Cable Messenger Cable Lead-in Cable

> This Plan Shall Supersede The Plan Signed and Sealed on 5/24/2004

Meters

330

375

YELLOW CHANGE INT.	3.7	SEC.	4.1	SEC.	3.7	SEC.	3.2	SEC.	3.0	SEC.	3.0	SEC.	3.0	SEC.	3.0	SEC
RED CLEARANCE	1.8	SEC.	1.8	SEC.	1.5	SEC.	2.5	SEC.	2.1	SEC.	2.7	SEC.	2.5	SEC.	2.4	SEC
MAXIMUM LIMIT	90	SEC.	30	SEC.	90	SEC.	30	SEC.	30	SEC.	30	SEC.	30	SEC.	30	SEC
RED REVERT	1.5	SEC.	1.5	SEC.	1.5	SEC.	1.5	SEC.	1.5	SEC.	1.5	SEC.	1.5	SEC.	1.5	SEC
RECALL POSITION	VEH R	ECALL	NO	NE	VEH R	ECALL	NOI	NE	NON	4E	NOI	NE	NOI	VE	NOI	NE
VEHICLE CALL MEMORY	YEITOM	LOCK	NO	NE	YELLOW	LOCK	NOI	NE .	101	√E	NOI	√E	NOI	NE	NOI	NE
DOUBLE ENTRY	OF	if .	40	1	OF	F	10	١ ,	OF	F	OF	F	OF	F	OF	F
WALK	_	SEC.	7	SEC.	7	SEC.	-	SEC.					****		-	
FLASHING DON'T WALK	-	SEC.	16	SEC.	11	SEC.	-	SEC.	-		-				-	
TYPE 3 LIMIT		SEC.		SEC.	-	SEC.	-	SEC.					*****	***************************************	-	
ALTERNIATE CYTENICIONI		cra				^F^			***************************************				***************************************			·

170 EMERGENCY PREEMPTION TIMING CHART										
FUNCTION	EVA (Ø2+6) SECONDS	EVB (Ø4+7) SECONDS	EVC (Ø1+6) SECONDS	EVD (Ø3+8) SECONDS						
DELAY BEFORE PREEMPT	0	0	0	0						
PED. CLEAR BEFORE PREEMPT	9	9	9	9						
MIN. GREEN BEFORE PREEMPT	1.0	1.0	1.0	1.0						
CLEARANCE TIME	1.0	1.0	1.0	1.0						
PREEMPT EXTEND(timing on optical detection unit)	2.0	2.0	2.0	2.0						

3.0 SEC. 2.0 SEC. 3.0 SEC. 3.0 SEC. **VEHICLE EXTENSION** ALTERNATE EXTENSION

2.0 **SEC.** 3.0 **SEC.**

2.0 SEC. 3.0 SEC. 3.0 SEC.

3.0 **SEC**.

LOOP & DETECTOR UNIT INSTALLATION CHART
170 CONTROLLER AND CABINET

SEC.

PHASE DELAY

4 3 SEC.

10 SEC.

- SEC.

SEC.

- SEC.

SEC.

SEC.

SEC.

SEC.

- SEC.

- SEC.

EVP B

EVP C

56 km/hr (35 MPH) +3% Grade

SR 1007 (Lenior Rhyne Blvd SE)

SIDEWALK

CARRY

INDUCTIVE LOOPS

1.8X12 2-4-2 0

1.8X12 2-4-2 0

1.8X12 2-4-2 0

EV PREEMPTOR B

EV PREEMPTOR C

1.8X12 2-4-2

SIZE

1.8X1.8

P61, P62 N/A N/A

*Optical Detection Unit

P41, P42 N/A

SD1101-1 1.8X1.8

SD1101-2 1.8X1.8

SD1101-3 1.8X1.8

SD1101-4 1.8X1.8

Metal Pole *6

(See Loading Diagram)

STA.17+49 +/- -L-

16m +/- LT.

LOOP NO.

DIST. FROM

STOPBAR

20

20

20

N/A

+55

+55

+55

+55

EV PREEMPTOR A X EVP A

EV PREEMPTOR D X EVP D

DETECTOR PROGRAMMING

24393

SIG. INVENTORY NO. 12-0723

EDI MODEL 2010ECL CONFLICT MONITOR PROGRAMMING DETAIL WD ENABLE SW2 (remove jumpers and set switches as shown) **OPTIONS** REMOVE DIODE JUMPERS 1-6, 2-5, 2-6, 2-15, 3-8, 4-7, -RP DISABLE 4-8. 4-14. 6-15 AND 8-14. -WD 1.0 SEC -GY ENABLE SW3 -POLARITY -YEL TIME--YEL TIME-2 -YEL TIME-3 ENABLE -> REMOVE JUMPERS AS SHOWN DENOTES POSITION OF SWITCH NOTES:

1. CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL

2. MAKE SURE JUMPERS SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.

OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.

NOTES

- 1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. 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 9,10, 11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS
- 3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- 4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- 5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- 6. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DOUBLE ENTRY.
- 7. THE CABINET AND CONTROLLER ARE PART OF THE CITY OF HICKORY SIGNAL SYSTEM: # 1101

CONTROLLER......CONTRACTOR SUPPLIED 170E

OVERLAPS.....NONE

EQUIPMENT INFORMATION

CABINETCONTRACTOR SUPPLIED 332	
SOFTWAREBI TRANS 233NC2	
CABINET MOUNTBASE	
OUTPUT FILE POSITIONS12	
LOAD SWITCHES USEDS1,S2,S3,S4,S4P,S5,S6,S6P,S7,S8 PHASES USED	
PHASES USED	

TERMINAL FILE POS.

*USED ONLY IN E.V. PREEMPTION

39

79

SYS4

R PIN ATTRIBUTES NEMA PHASE

INPUT FILE POSITION LAYOUT DETECTOR ATTRIBUTES LEGEND: (front view) 1-FULL TIME DELAY 2-PED CALL 12 13 3-RESERVED 4-COUNTING 5-EXTENSION NOT USED SD1101 6-TYPE 3 DC DC ISOLATOR ISOLATOR 7-CALLING 8-ALTERNATE SYS. ST USED USED 2B EVB ** AC 6A ISOLATOR ISOLATOR SYS. EVC EVD

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

- PH.3 RED FIELD

TERMINAL (116)

AC-

LOAD THE CHANNEL RED MONITOR INPUTS

IN ORDER FOR THE SIGNAL SEQUENCE

MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON

DISPLAY IN THE FIELD.

CHANNELS THAT DO NOT USE THE RED

- PH.5 RED FIELD TERMINAL (131)

> - PH.7 RED FIELD TERMINAL (122)

6B

LOAD RESISTOR INSTALLATION DETAIL

- PH.1 RED FIELD

TERMINAL (125)

EVA - CHANNEL 1 - PIN 71

USED

FS = FLASH SENSE ST = STOP TIME

SOLATOR ISOLATOR

** AC

EV = EMERG. VEH. PREEMPT

EVB - CHANNEL 2 - PIN 72 -- NOTE: WIRE OPTICAL DETECTORS TO INPUT EVC - CHANNEL 3 - PIN 73 FILE PER MANUFACTURER'S EVD - CHANNEL 4 - PIN 74 INSTRUCTIONS.

NOT SD1101

INPUT FILE POSITION LEGEND: J2L

LOWER

FILE J SLOT 2

2B	182-7,8	12L	2	43	5		2	
2C	TB2-9,10	I3U	3	63	5	7	2	
4A	TB4-9,10	I6U	4	41	5	7	4	
4B	TB4-11,12	I6L	5	45	5	7	4	
6A	TB3-5,6	J2U	6	40	5	7	6	
6B	TB3-7,8	J2L	7	44	5	7	6	
6C	TB3-9,10	J3U	8	64	5	7	6	
8A	TB5-9,10	J6U	9	42	5	7	8	
PED PUSH BUTTONS								
P41, P42	TB8-5,6	I12L	10	69	2		4	
P61, P62	TB8-7,9	I13U	11	68	2		6	
SYSTEM LOOPS								
SD1101-1	TB6-1,2	I7U	**************************************	65			SYS1	K
SD1101-2	TB6-3,4	I7L	***************************************	78			SYS2	K
SD1101-3	TB7-1,2	J7U	Autoria manana	66			SYS3	k

INPUT FILE CONNECTION & PROGRAMMING CHART

INPUT DETECTOR PIN FILE POS. NO. NO.

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

PEDESTRIAN CLEAR BEFORE PREEMPT TIMING

PROGRAM PED. PHASE 4 MIN. CLEAR BEFORE PREEMPT AT F/I+4+B= 9 (SEC.) PROGRAM PED. PHASE 6 MIN. CLEAR BEFORE PREEMPT AT F/I+6+B= 9 (SEC.

EMERGENCY VEHICLE PREEMPTION PROGRAMMING CHART

E.V. PREEMPT	OPTICAL DET. NO.	INPUT PIN	CLEARANCE PHASES LOCATION	DELAY TIME LOCATION	CLEAR TIME LOCATION
EVA	A	E/126+F+1=71	E/125+E+A= Ø 2,5	F/1+E+2=0	F/1+E+3= 1 (SEC.)
EVB	В	E/126+F+2=72	E/125+E+B= Ø 4,7	F/1+E+4=0	F/1+E+5= 1 (SEC.)
EVC	С	E/126+F+3=73	E/125+E+C= Ø 1,6	F/1+E+6=0	F/1+E+7= 1 (SEC.)
EVD	D	E/126+F+4=74	E/125+E+D= Ø 3,8	F/1+E+8=0	F/1+E+9= 1 (SEC.)

1. PROGRAM MINIMUM GREEN BEFORE PREEMPT AT: F/1+0+8= 1 (SEC.)

2. FOR PREEMPTION IMMEDIATE RESPONSE, DISABLE MIN. WALK AT: E/125+F+F=3 3. PROGRAM EXTEND TIME ON OPTICAL DETECTOR UNITS FOR 2.0 SEC.

SYSTEM DETECTOR PROGRAMMING NOTES

J7L

SD1101-4 | TB7-3,4

IN ORDER FOR SYSTEM LOOPS TO OPERATE PROPERLY, THEIR PIN ASSIGNMENTS WILL HAVE TO BE RE-ASSIGNED ON 170E CONTROLLER AS DESCRIBED BELOW.

A. IN ORDER TO ASSURE THAT THESE PINS ARE CLEARED FROM THEIR DEFAULT FUNCTION, PROGRAM AS FOLLOWS:

PIN 65 - E/126+4+6=0 PIN 66 - E/126+4+7=0 PIN 78 - E/126+4+E=0 PIN 79 - E/126+4+F=0

B. AFTER FOLLOWING STEP 'A' ABOVE, PROGRAM PINS FOR SYSTEM DETECTORS AS FOLLOWS:

SYS1 - E/126+B+1=65 SYS3 - E/126+B+3=66 SYS4 - E/126+B+4=79 SYS2 - E/126+B+2=78

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 selectina this feature.

*DENOTES INSTALL LOAD RESISTOR. SEE LOAD RESISTOR INSTALLATION DETAIL THIS SHEET.

PROJECT REFERENCE NO. SHEET NO. sig. 9 U-2306 A

	FIELD CONNECTION HOOK-UP CHART												
	LOAD SWITCH NO.	S 1	S 2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S 8	S8P
	PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
	SIGNAL HEAD NO.	61	21,22	NU	81	41,42	P41, P42	21	61,62	P61, P62	41	81,82	NU
	GREEN		130			103			136			109	
	YELLOW		129			102			135			108	
	RED	*	128		*	101		*	134		*	107	
	RED ARROW												
	YELLOW ARROW	126			117			132			123		
	GREEN ARROW	127			118			133			124		
**-	*						106			121			
	*						104			119			
	NU = NOT	USED											

** SEE 'COUNTDOWN PEDESTRIAN SIGNAL OPERATION' NOTE THIS SHEET.

BACK-UP PROTECTION NOTE

PROGRAM PHASES 1, 3, 5, AND 7 AS PROTECTED/PERMITTED AT KEYPAD INPUT E/125+E+4= \emptyset 1, 3, 5, 7

PEDESTRIAN PHASE PROGRAMMING

PROGRAM PEDESTRIAN 4P OUTPUT AT KEYPAD INPUT E/125+F+7= Ø 4. PROGRAM PEDESTRIAN 6P OUTPUT AT KEYPAD INPUT E/125+F+6=Ø6.

POWER-UP/RE-START PROGRAMMING NOTE

IN ORDER FOR PHASES USED ONLY IN NORMAL OPERATION TO BE SERVED AFTER A POWER-UP OR RESTART. PROGRAM "START VEHICLE CALL" AND "START PED CALL" ON 170E CONTROLLER AS FOLLOWS:

VEH - $F/2+F+E=\emptyset 2, 4, 6, 8$

PED - $F/2+F+F=\emptyset 4.6$

RED REVERT TIMER PROGRAMMING

PROGRAM RED REVERT TIMING AT KEYPAD INPUT F/I+O+F= I.5 (SEC.)

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0723 DESIGNED: FEBRUARY 2006 SEALED: 4/28/06 REVISED: N/A

THIS DETAIL SUPERSEDES DETAIL DATED MAY 2004 AND SEALED 6/7/04

LECTRICAL AND PROGRAMMIN DETAILS FOR

SR 1007 (LENOIR RHYNE BLVD SE)

SR 1007 (HIGHLAND AVENUE SE) 8th ST PLACE SE

CATAWBA COUNTY DIVISION 12 HICKORY APRIL 2006 PLAN DATE: REVIEWED BY: PREPARED BY: F.E. RUSS REVIEWED BY: REVISIONS INIT. DATE

022013 Lorge C. Brown 5/1/06
SIGNATURE DATE SIG. INVENTORY NO. 12-0723

SEAL

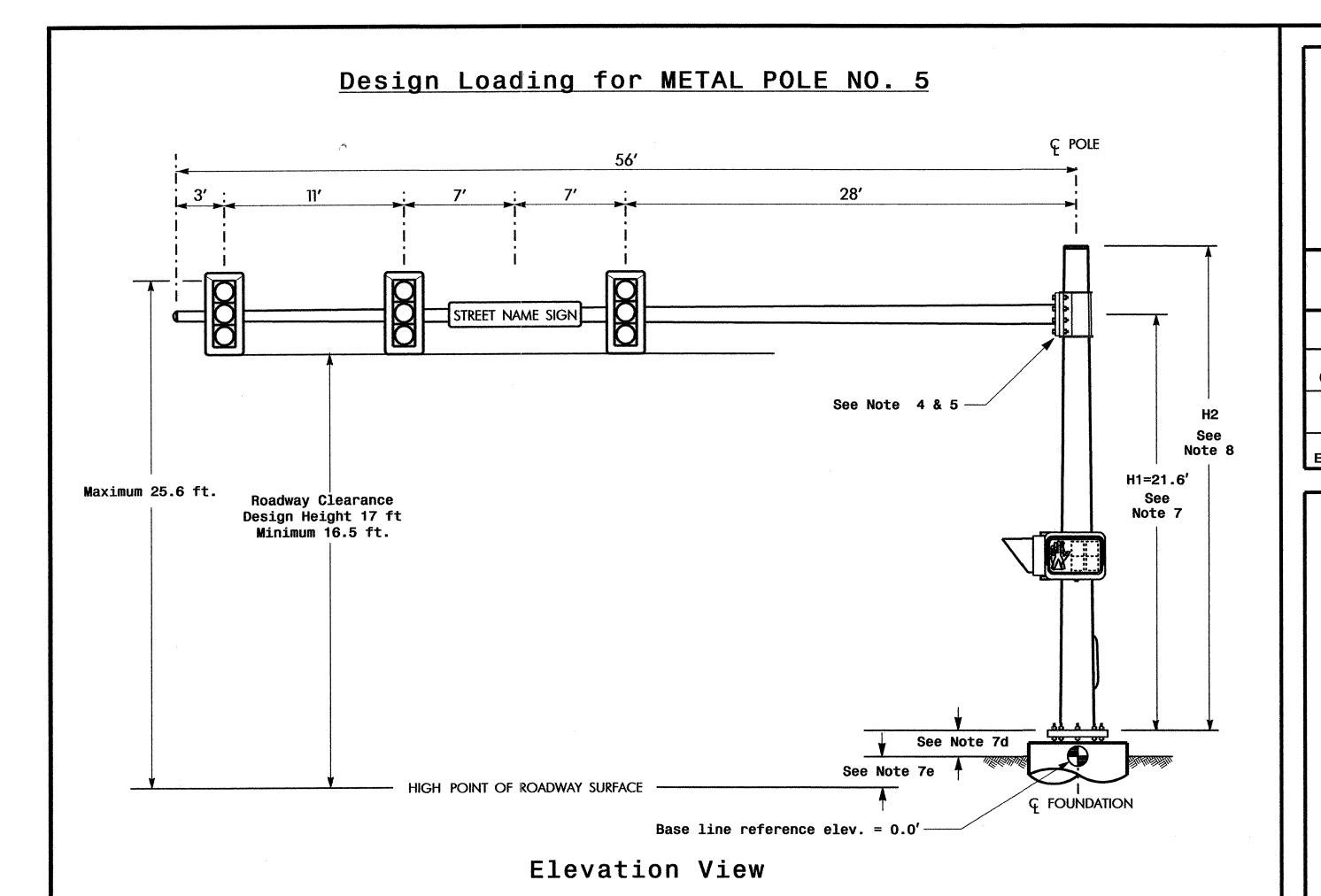
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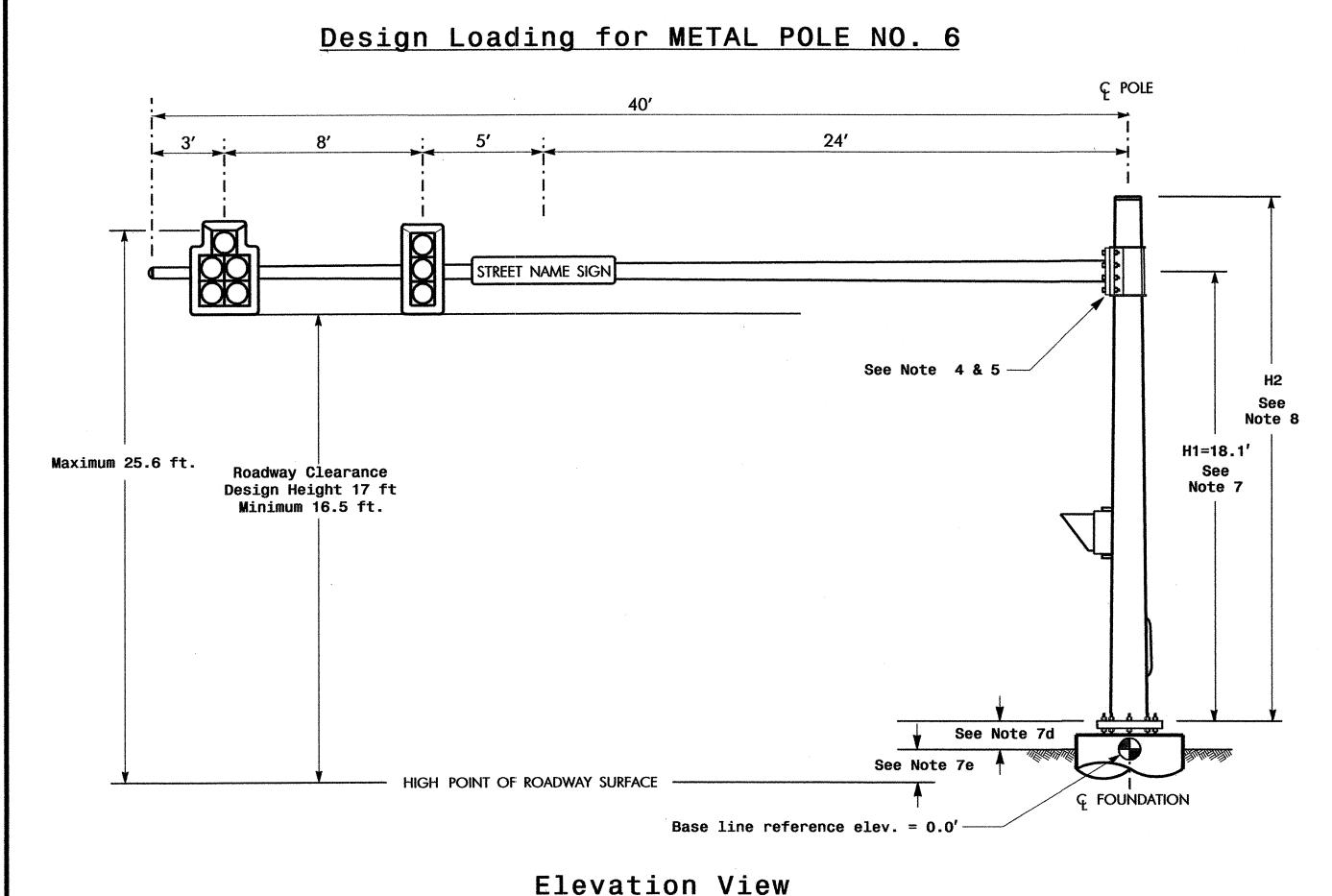
ROFESSION

ACCEPTABLE VALUES VALUE (ohms) WATTAGE 1.5K - 1.9K 25W (min) 2.0K - 3.0K 10W (min) NOTE: THE PURPOSE OF THESE RESISTORS IS TO

FILE

II T II



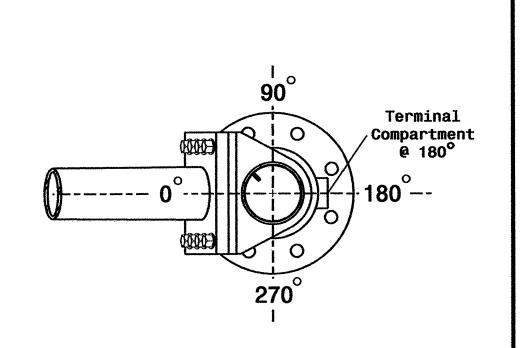


SPECIAL NOTE

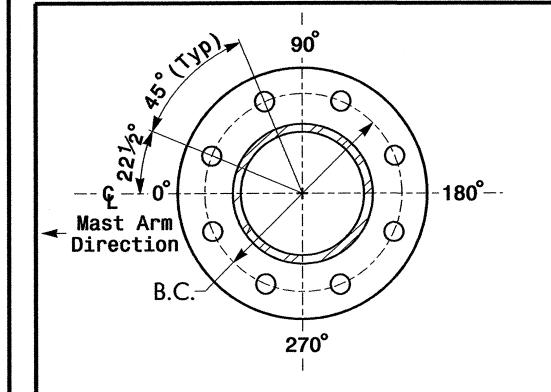
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

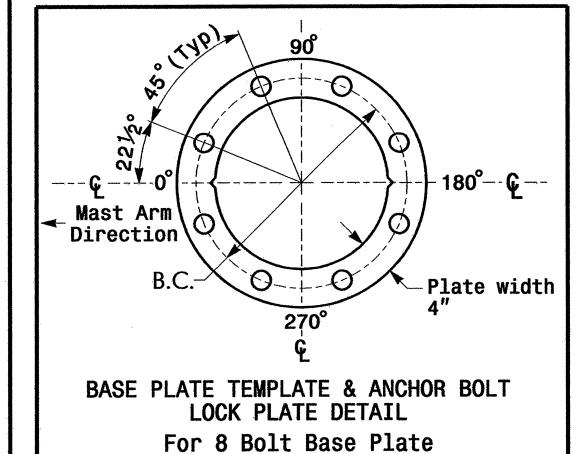
Elevation Differences for:	Pole 5	Pole 6
Baseline reference point at & Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+3.0 ft.	-0.5 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL See Note 6



METAL POLE No. 5 and 6

OJECT REFERENCE NO.	SHEET NO.
U-2306A	Sig. │○

<u> </u>	MAST ARM LOADING SCH	EDUL	.E	
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5″ W X 52.5″ L	60 LBS
STREET NAME SIGN	Street name sign Rigid Mounted With Astro-Sign-Brac	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

NOTES

Design Reference Material

- 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 The 2002 NCDOT Roadway Standard Drawings.

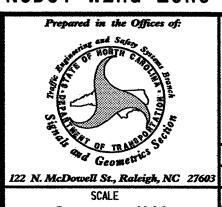
• The traffic signal project plans and special provisions.

• The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

<u>Design Requirements</u>

- 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. Maximum allowable CSR for all signal supports is 0.9.
- 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a. Mast arm slope and deflection are not considered in determining the arm attachment height
- as they are assumed to offset each other. b. Signal heads 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. 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 $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot.
- 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- 10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)



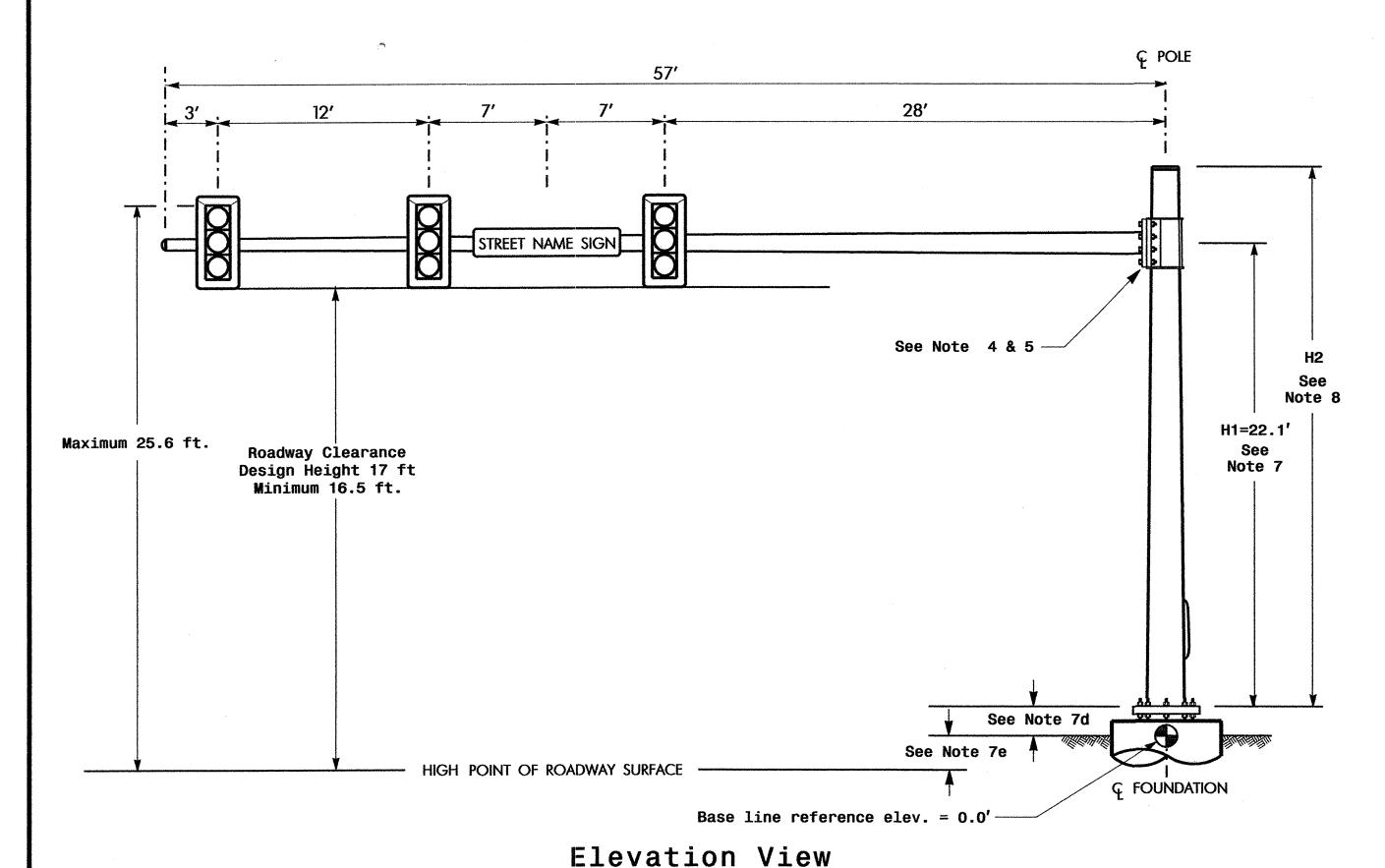
N/A

SR 1007 (Lenoir Rhyne Blvd. SE) SR 1007 (Highland Avenue SE)/ 8th St. Place SE

Division 12 Catawba County Hickory PLAN DATE: February 2006 REVIEWED BY: I.O. Umozurike PREPARED BY: Luhr REVIEWED BY:

INIT. DATE

SIG. INVENTORY NO.



Design Loading for METAL POLE NO. 8 C POLE 20' ✓ STREET NAME SIGN See Note 4 & 5 Note 8 H1=21.1' Maximum 25.6 ft. Roadway Clearance Note 7 Design Height 17 ft Minimum 16.5 ft. HIGH POINT OF ROADWAY SURFACE **FOUNDATION** Base line reference elev. = 0.0

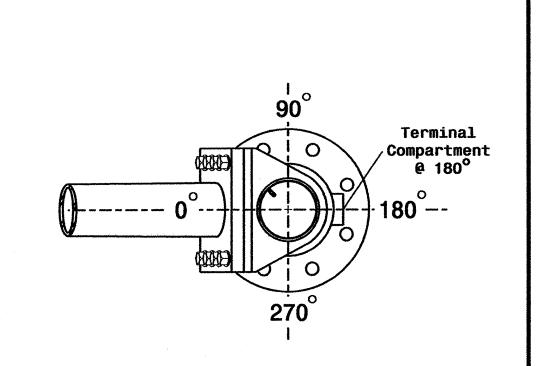
Elevation View

SPECIAL NOTE

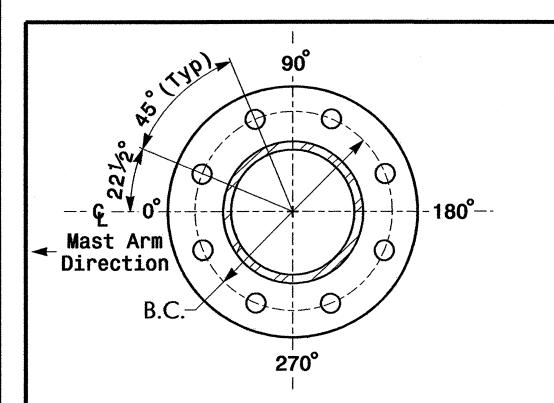
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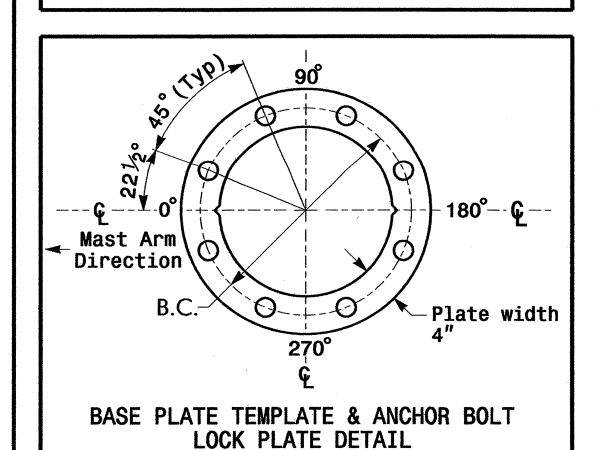
Pole 7	Pole 8
0.0 ft.	0.0 ft.
+3.5 ft.	+2.5 ft.
N/A	N/A
	0.0 ft. +3.5 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL See Note 6



For 8 Bolt Base Plate

METAL POLE No. 7 and 8

PROJECT REFERENCE NO. U-2306A Sig.||

	MAST ARM LOADING SCH	EDUL	.E	
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
street name sign	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
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• The 2002 NCDOT Roadway Standard Drawings.

• The traffic signal project plans and special provisions. • The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

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. Maximum allowable CSR for all signal supports is 0.9.
- 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.

6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.

- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
- b. Signal heads 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.

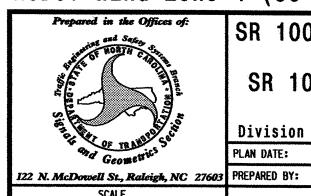
d. The top of the pole base plate is .75 feet above the ground elevation.

- e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- 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 & Geometrics Structural Engineer for assistance at (919) 733-3915.
- 10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

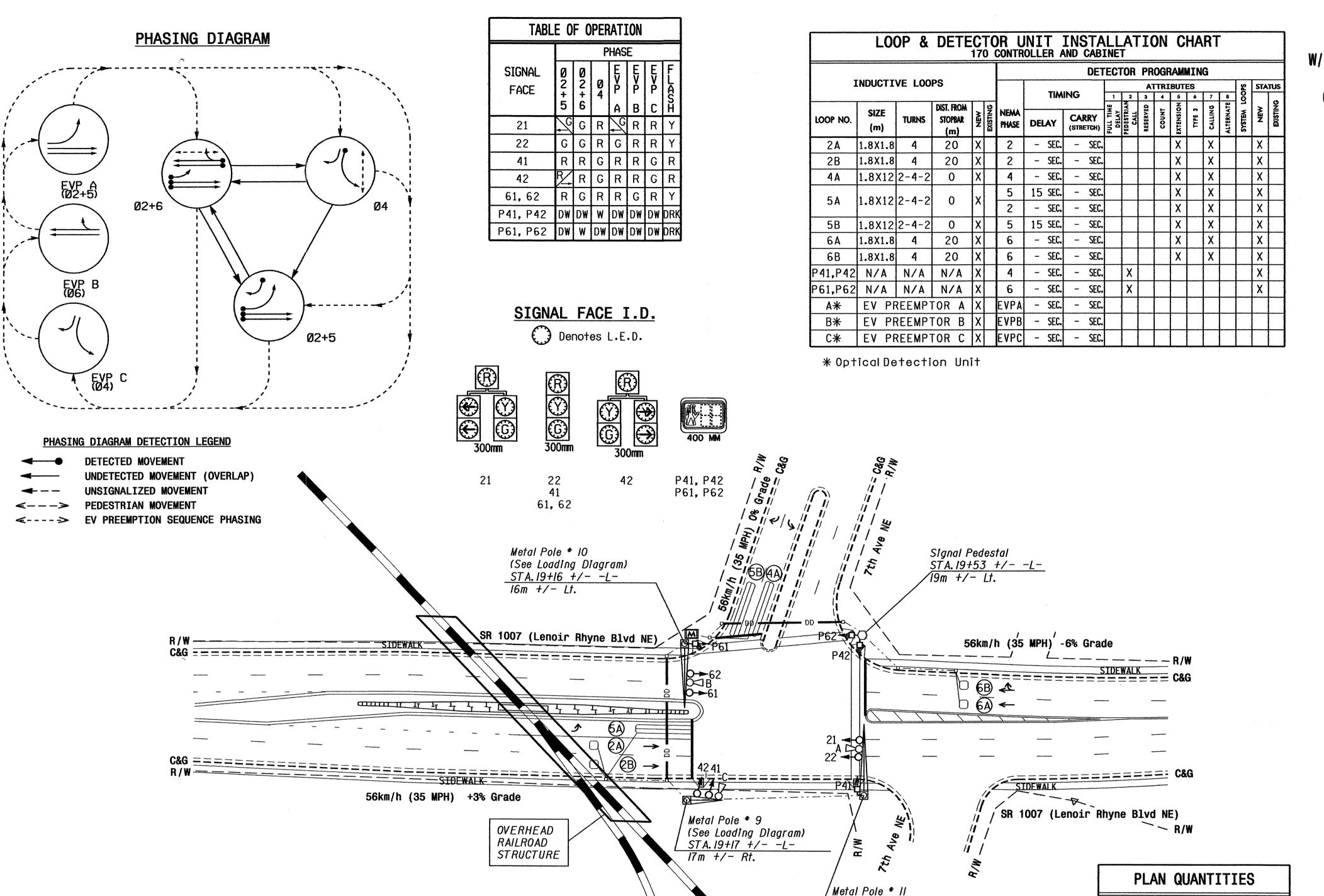


N/A

SR 1007 (Lenoir Rhyne Blvd. SE) SR 1007 (Highland Avenue SE)/

8th St. Place SE Division 12 Catawba County PLAN DATE: February 2006 Reviewed By: I.O.Umozurike Luhr REVISIONS

24393 INIT. DATE SIG. INVENTORY NO. 12-0723



FOR PREEMPTION USE ONLY

OL 1

3.0

3.1

NONE

NONE OFF

10 SEC

3.0 **SEC**

2.1 **SEC**

60 **SEC**

VEH RECALL

YELLOW LOCK

170 EMERGENCY PREEMPTION TIMING CHART									
FUNCTION	EVA (Ø2+5) SECONDS	EVB (Ø6) SECONDS	EVC (Ø4) SECONDS						
DELAY BEFORE PREEMPT	0	0	0						
PED. CLEAR BEFORE PREEMPT	11	11	11						
MIN. GREEN BEFORE PREEMPT	1.0	1.0	1.0						
CLEARANCE TIME	1.0	1.0	1.0						
PREEMPT EXTEND(timing on optical detection unit)	2.0	2.0	2.0						

(See Loading Diagram) STA.19+55 +/- -L-15m +/- Rt.

Pay Item

Signal Cable

Messenger Cable

Lead-in Cable

Meters

360

240

This Plan Shall Supersede

The Plan Signed and Sealed

on 5/24/2004

3 Phase W/ Emergency Vehicle Preemption Fully Actuated (Hickory City Signal System)

NOTES

METRIC

PROJECT REFERENCE NO.

U-2306 A

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Program signal heads numbered 61 and 62 to clear to all red before going into preempt.
- 4. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
- 6. During coordination, phase 5 may be lagged.
- 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. Set all detector units to presence mode.
- 10. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 11. Preemption calls shall be served in the sequence which they are received.
- 12. This intersection features an optical preemption system. Shown location of optical detectors are conceptual only. Manufacturer shall determine optimum location of detectors.
- 13. Hickory City System: #1115
- 14. Place cabinet so as not to obstruct sight distance of vehicles turning right on red.

	LEGEND	
PROPOSED		EXISTING
O->	Traffic Signal Head	•
0->	Modified Signal Head	N/A
1	Sign	
†	Pedestrian Signal Head With Push Button & Sign	
)	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	CIIII
\boxtimes	Controller & Cabinet	r×3
	Junction Box	
distribute on the associate his the constitute.	- 50mm Underground Conduit	adequintum with processing that spranting the spranting of
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	-
N/A	Guardra i I	TTT
DD	Directional Drill 2-50mm Polyethylene Conduits	N/A
0	Metal Pole with Mastarm	
N/A	Wheelchair Ramp	
N/A	Railroad Tracks	
∞	Optical Detector	•
\bigcirc	Pedestrian Signal Pedestal	•
M	Master Controller & Cabinet	M

New Installation

SR 1007 (Lenoir Rhyne Blvd NE) 7th Avenue NE

Division 12 Catawba County Hickory PLAN DATE: February 2006 REVIEWED BY: I.O. Umozurike REVIEWED BY: Luhr INIT. DATE

SIG. INVENTORY NO. 12-1362

TIMING CHART

170 CONTROLLER

3.0 SEC.

2.4 **SEC**.

60 **SEC**.

VEH RECALL

YELLOW LOCK

- SEC.

- SEC.

3.0 **SEC**.

3.0 **SEC.**

2.0 SEC. 2.0 SEC.

3.0 **SEC**.

3.1 **SEC**.

20 **SEC**.

NONE

2.0 SEC. 3.0 SEC

3.0 **SEC**.

3.4 **SEC**.

30 **SEC**.

NONE

20 **SEC**.

2.0 SEC.

2.0 **SEC**.

SEC.

SEC.

MINIMUM INITIAL

VEHICLE EXTENSION

RED CLEARANCE

MAXIMUM LIMIT

RECALL POSITION

DOUBLE ENTRY

TYPE 3 LIMIT

YELLOW CHANGE INT.

VEHICLE CALL MEMORY

FLASHING DON'T WALK

ALTERNATE EXTENSION

REDUCE 0.1 SEC EVERY

ADD PER VEHICLE

MAXIMUM INITIAL

MAXIMUM GAP

MINIMUM GAP

1. CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL

OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.

2. MAKE SURE JUMPERS SEL1-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. 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 1,3,7, 8,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- 3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- 4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- 5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- 6. THE CABINET AND CONTROLLER ARE PART OF THE CITY OF HICKORY SIGNAL SYSTEM: # 1115

*SEE 'LOAD RESISTOR INSTALLATION DETAIL'

PROJECT REFERENCE NO. Sig. Z U-2306 A

** SEE 'COUNTDOWN PEDESTRIAN SIGNAL OPERATION' NOTE FIELD CONNECTION HOOK-UP CHART S6P S7 S8 | S8P | S9 | S10 | S11 | S12 | S13 | S14 **S5** 8 RED OL1 OL2 SPARE OL3 OL4 SPARE NU 41,42 P41, 21 61,62 P61, P62 NU NU NU 42 21,22 NU 130 103 136 GREEN 135 129 102 128 101 134 RED ARROW YELLOW 132 A122 ARROW A123 133 ARROW 106 121 104

NU = NOT USED

2B

5B

6B

PED PUSH

BUTTONS

P61. P62

P41, P42 | TB8-5.6

EQUIPMENT INFORMATION

CONTROLLER......CONTRACTOR SUPPLIED 170E SOFTWAREBI TRANS 233NC2 CABINET MOUNT.....BASE OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX) LOAD SWITCHES USED.....S2,S4,S4P,S5,S6,S6P,S9 PHASES USED.........2,4,5,6,4PED,6PED

MASTER CONTROLLER MOUNTED IN THIS CABINET*

TB2-5.6

TB2-7,8

TB4-9,10

TB2-9.10

TB2-11,12

TB3-5,6

TB3-7.8

TB8-7.9

INPUT FILE CONNECTION & PROGRAMMING CHART

2

4

5

8

9

10

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES

AS SPECIFIED ON SIGNAL DESIGN PLANS.

LOOP INPUT DETECTOR PIN TERMINAL FILE POS. NO. NO.

I2U

I2L

I3L

J2U

J2L

I12L

I13U

INPUT FILE POSITION LAYOUT

(front view) 10 12 11 $\phi 2 \mid \phi 5,2$ NOT USED 5A | ISOLATOR | ISOLATOR Ø 5 NOT NOT USED USED 5B EVB FILE SOLATOR ISOLATOR II TII EVC NOT USED

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

FS = FLASH SENSE ST = STOP TIME

DENOTES POSITION

OF SWITCH

EV = EMERG. VEH. PREEMPT

EVA - CHANNEL 1 - PIN 71 EVB - CHANNEL 2 - PIN 72 EVC - CHANNEL 3 - PIN 73 CHANNEL 4 - SPARE

AC-

NOTE: THE PURPOSE OF THESE RESISTORS IS TO LOAD THE CHANNEL RED MONITOR INPUTS

DISPLAY IN THE FIELD.

IN ORDER FOR THE SIGNAL SEQUENCE

MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON CHANNELS THAT DO NOT USE THE RED

CCEPTABLE VALUES VALUE (ohms) WATTAGE

1.5K - 1.9K | 25W (min) 2.0K - 3.0K 10W (min)

LOAD RESISTOR INSTALLATION DETAIL

- PH.5 RED FIELD

TERMINAL (131)

OL1 RED FIELD

TERMINAL (A121)

NOTES:

- NOTE: WIRE OPTICAL DETECTORS TO INPUT FILE PER MANUFACTURER'S INSTRUCTIONS.

FILE J-

DETECTOR ATTRIBUTES LEGEND:

PIN ATTRIBUTES NEMA PHASE

43

63

63

44

69 2

68 2

5 7

5 7

5 7

5 7

5 7

5 7

5 7

5 7 | 4

1-FULL TIME DELAY 2-PED CALL 3-RESERVED 4-COUNTING 5-EXTENSION 6-TYPE 3 7-CALLING 8-ALTERNATE

INPUT FILE POSITION LEGEND: J2L 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.

PEDESTRIAN PHASE PROGRAMMING

PROGRAM PEDESTRIAN 4P OUTPUT AT KEYPAD INPUT E/125+F+7= Ø 4. PROGRAM PEDESTRIAN 6P OUTPUT AT KEYPAD INPUT E/125+F+6= Ø 6.

OVERLAP PROGRAMMING NOTES

TO ASSURE THAT LOADSWITCH S9 IS ASSIGNED AS OVERLAP 1, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+0=9

TO SET THE PARENT PHASE FOR OVERLAP 1 (VEH. SET 1) AS PHASE 5. PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+1= Ø 5

TO SET THE PARENT PHASE FOR OVERLAP 1 (VEH. SET 2) AS NONE. NO PROGRAMMING IS REQUIRED.

PROGRAM TIMING FOR OVERLAP 1 AS FOLLOWS: GREEN CLEAR - E/29+1+D=0.0 (SEC.) YELLOW CHANGE INTERVAL - E/29+1+E=3.0 (SEC.) RED CLEARANCE - E/29+1+F=3.1 (SEC.)

HEAD 42 ARROWS (OL1) OPERATION DURING PREEMPTION

IN ORDER FOR E.V. PREEMPT 'A' TO OPERATE AS PHASES 2 AND 5 WITHOUT SIGNAL HEAD 42 RIGHT-TURN ARROWS (OVERLAP 'OLI'), THE FOLLOWING PROGRAMMING MUST BE IN PLACE:

ASSIGN O/L VEH. SET 2 INPUT AT E/I26+D+C= 200 ASSIGN E.V. PREEMPT EVA OUTPUT AT E/127+D+8= 200

200 = ASSIGNABLE PSEUDO-PIN (SOFTWARE)

SPECIAL NOTE: HEADS 61,62

IT IS NECESSARY FOR HEADS 61 AND 62 TO CLEAR TO 'ALL RED' BEFORE GOING TO EMERGENCY VEHICLE PREEMPTION 'B' FROM PHASE 2+6. PROGRAM THE 170E CONTROLLER AS FOLLOWS:

> PROGRAM PHASE I AS PROTECTED/PERMITTED AT KEYPAD INPUT: E/125+E+4=Ø1

NOTE: PHASE I WILL ALSO HAVE TO BE PROGRAMMED AS AN ACTIVE PHASE IN E. V. PREEMPT 'B'. (SEE PREEMPTION CHART THIS SHEET)

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1362 DESIGNED: FEBRUARY 2006 SEALED: 4/28/06 REVISED: N/A

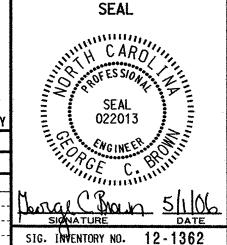
THIS DETAIL SUPERSEDES DETAIL DATED MAY 2004 AND SEALED 6/7/04

DETAILS FOR

ELECTRICAL AND PROGRAMMING

SR 1007 (LENOIR RHYNE BLVD NE)

7th AVENUE NE CATAWBA COUNTY HICKORY DIVISION 12 PLAN DATE: APRIL 2006 REVIEWED BY: F.E. RUSS REVIEWED BY: REVISIONS INIT. DATE



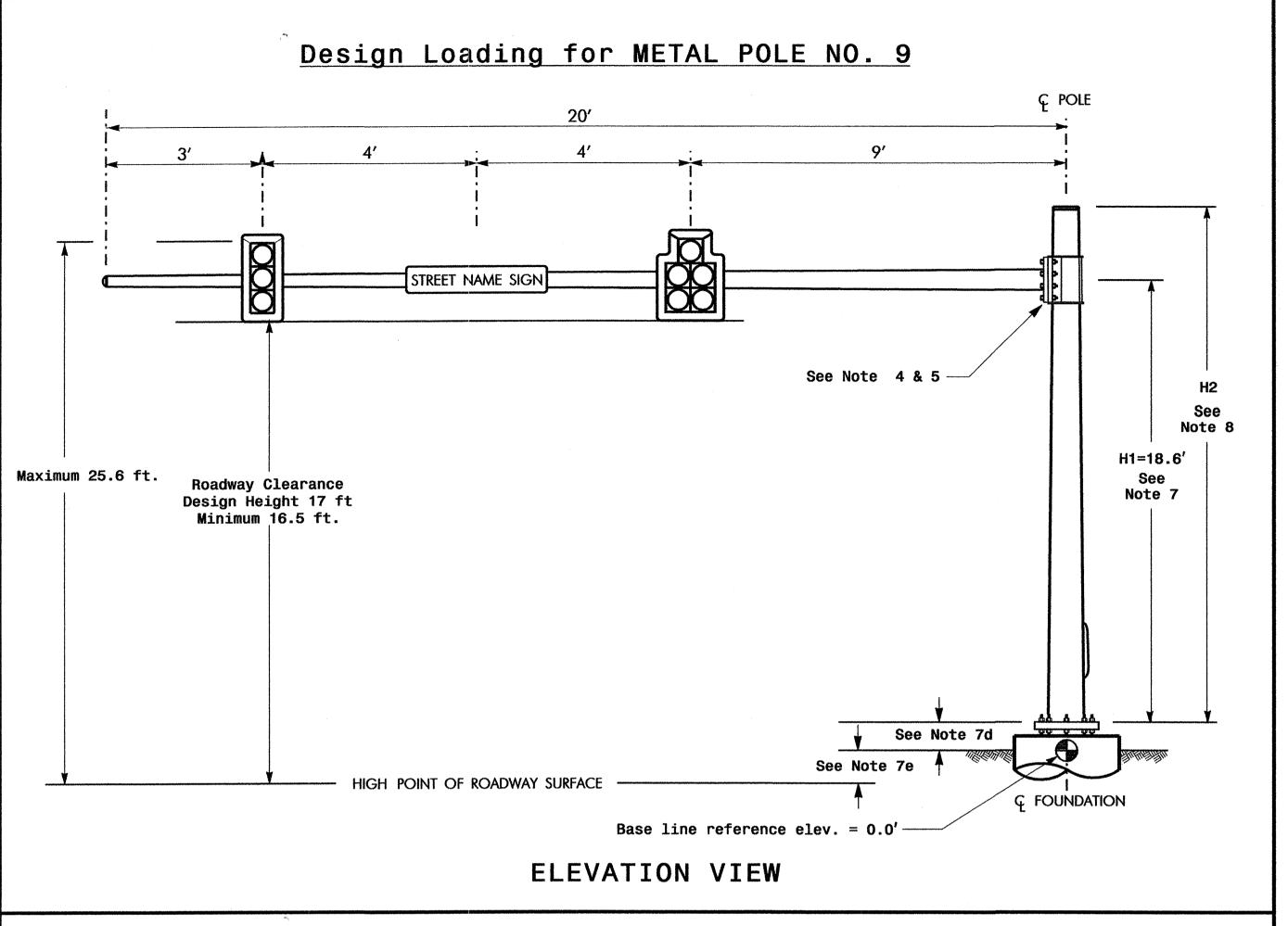
PEDESTRIAN CLEAR BEFORE PREEMPT TIMING

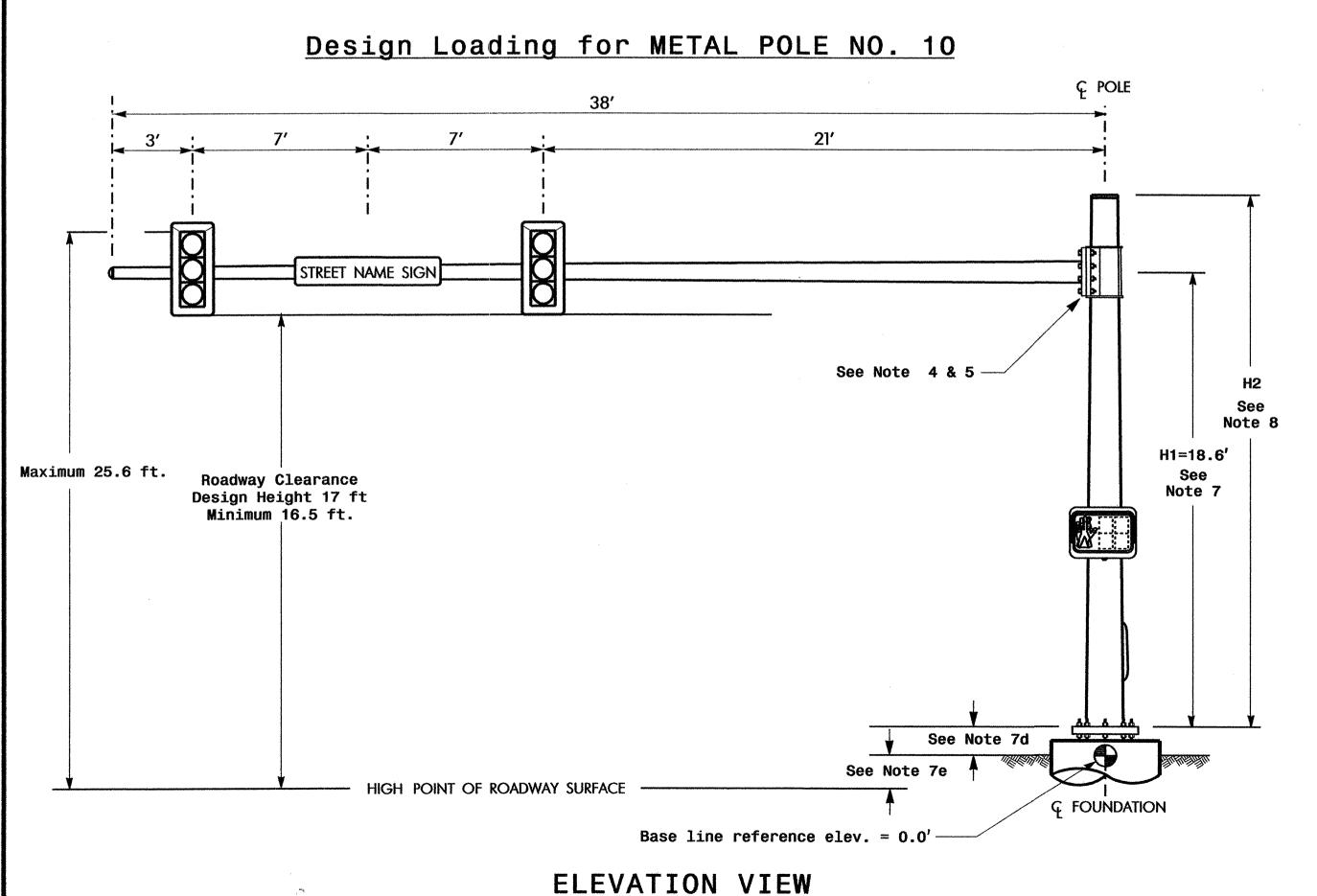
PROGRAM PED. PHASE 4 MIN. CLEAR BEFORE PREEMPT AT F/I+4+B= II (SEC.) PROGRAM PED. PHASE 6 MIN. CLEAR BEFORE PREEMPT AT F/I+6+B= II (SEC.)

EMERGENCY VEHICLE PREEMPTION PROGRAMMING CHART

E.V. PREEMPT	OPTICAL DET. NO.	INPUT PIN	CLEARANCE PHASES LOCATION	DELAY TIME LOCATION	CLEAR TIME LOCATION
EVA	Α	E/126+F+1=71	E/125+E+A= Ø 2,5	F/1+E+2=0	F/1+E+3= 1 (SEC.)
EVB	В	E/126+F+2=72	E/125+E+B= Ø1,6	F/1+E+4=0	F/1+E+5= 1 (SEC.)
EVC	C	E/126+F+3=73	E/125+E+C= Ø 4	F/1+E+6=0	F/1+E+7= 1 (SEC.)

- 1. PROGRAM MINIMUM GREEN BEFORE PREEMPT AT: F/1+0+8= 1 (SEC.)
- 2. FOR PREEMPTION IMMEDIATE RESPONSE, DISABLE MIN. WALK AT: E/125+F+F=3 3. PROGRAM EXTEND TIME ON OPTICAL DETECTOR UNITS FOR 2.0 SEC.



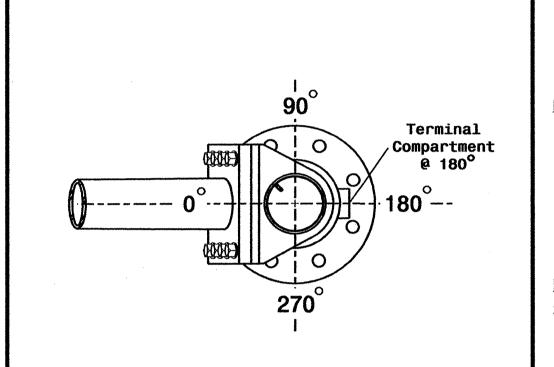


SPECIAL NOTE

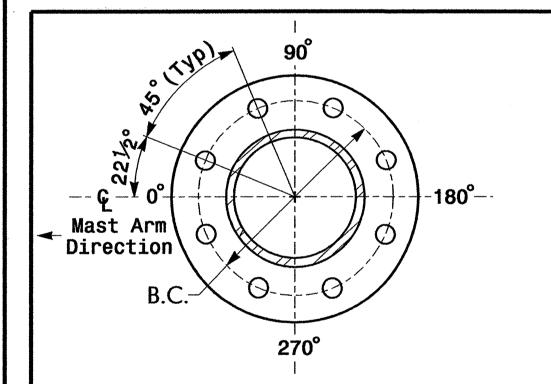
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 9	Pole 10
Baseline reference point at & Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	0.0	0.0
Elevation difference at Edge of travelway or face of curb	N/A	N/A

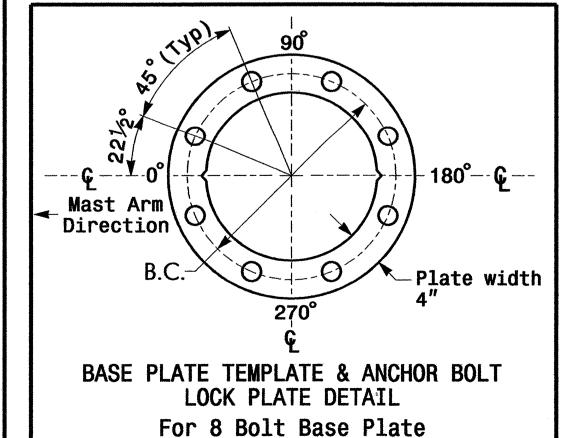


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



METAL POLE No. 9 and 10

PROJECT	REFERENCE NO.	SHEET NO.
U-	2306 A	\$ig. 4

	MAST ARM LOADING SCH	EDUL	.E	
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0″ W X 56.0″ L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
STREET NAME SIGN	Street name sign Rigid Mounted With Astro-Sign-Brac	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

<u>NOTES</u>

Design Reference Material

- 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
- The 2002 NCDOT Roadway Standard Drawings.
- The traffic signal project plans and special provisions.
- The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

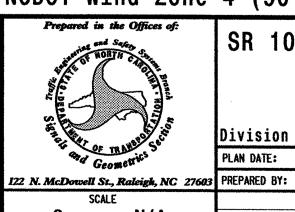
Design Requirements

- 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. Maximum allowable CSR for all signal supports is 0.9.
- 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a.Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
- b. Signal heads 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.
- ground level and the high point on the roadway. 8. The pole manufacturer will determine the total height (H2) of each pole using the greater of

e.Refer to the Elevation Data chart for elevation differences between the proposed foundation

- the following:
- Mast arm attachment height (H1) plus 2 feet, or
- H1 plus $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot.
- 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at
- 10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

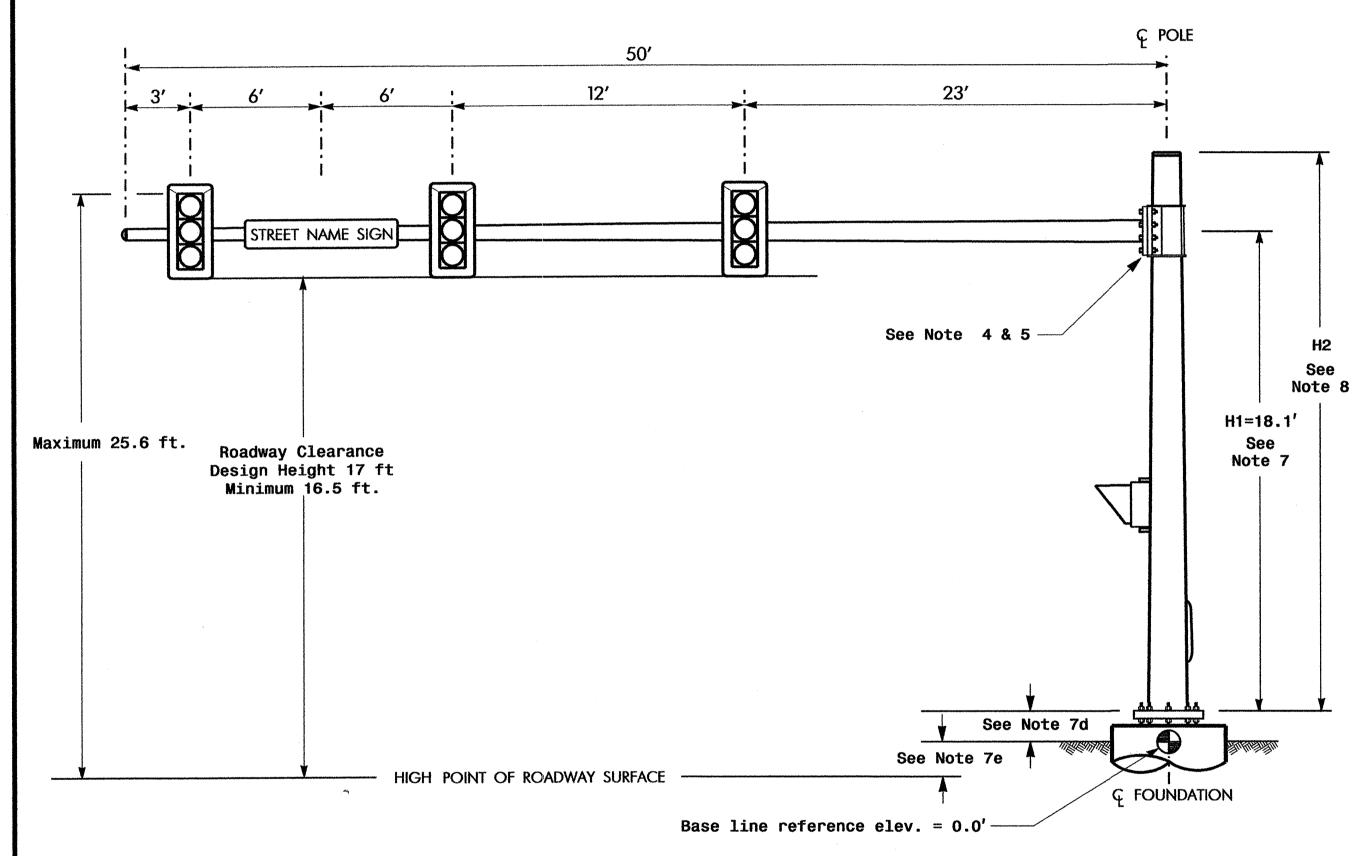


N/A

SR 1007 (Lenoir Rhyne Blvd NE) 7th Avenue NE

Division 12 Catawba County Hickory PLAN DATE: February 2006 REVIEWED BY: I.O.Umozurik Luhr REVIEWED BY: INIT. DATE

Design Loading for METAL POLE NO. 11



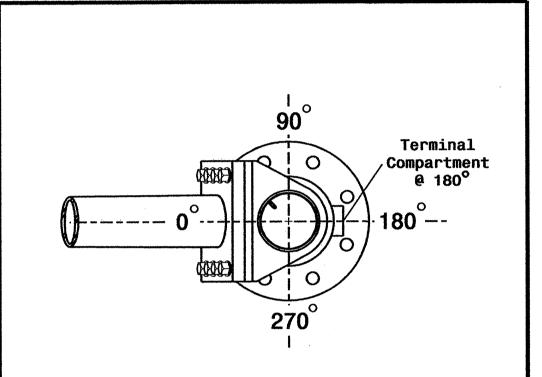
ELEVATION VIEW

SPECIAL NOTE

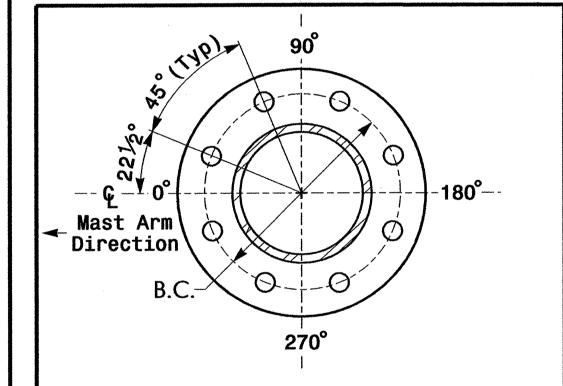
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 11
Baseline reference point at & Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	-0.5 ft.
Elevation difference at Edge of travelway or face of curb	N/A

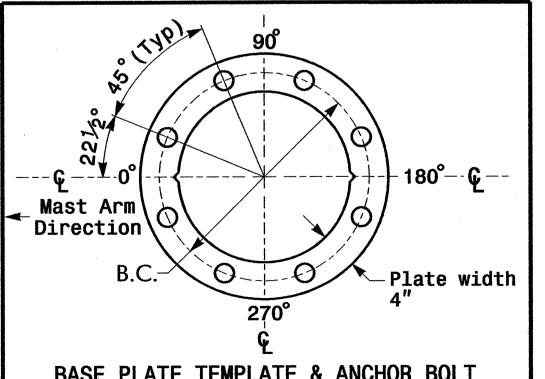


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

METAL POLE No. 11

PROJECT	REFERENCE NO.	SHEET NO.
U-	2306 A	Sig. 5

	MAST ARM LOADING SCH	EDUL	.E	
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
STREET NAME SIGN	Street name sign Rigid mounted with astro-sign-brac	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
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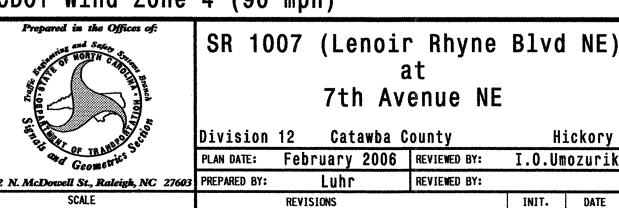
http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

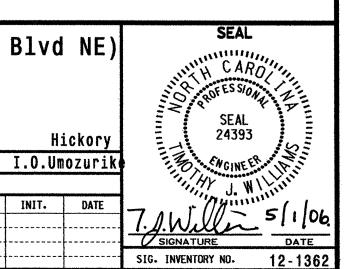
Design Requirements

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- . A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts. 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a. Mast arm slope and deflection are not considered in determining the arm attachment height
- as they are assumed to offset each other.
- b. Signal heads 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.
- 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 $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot. 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
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- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

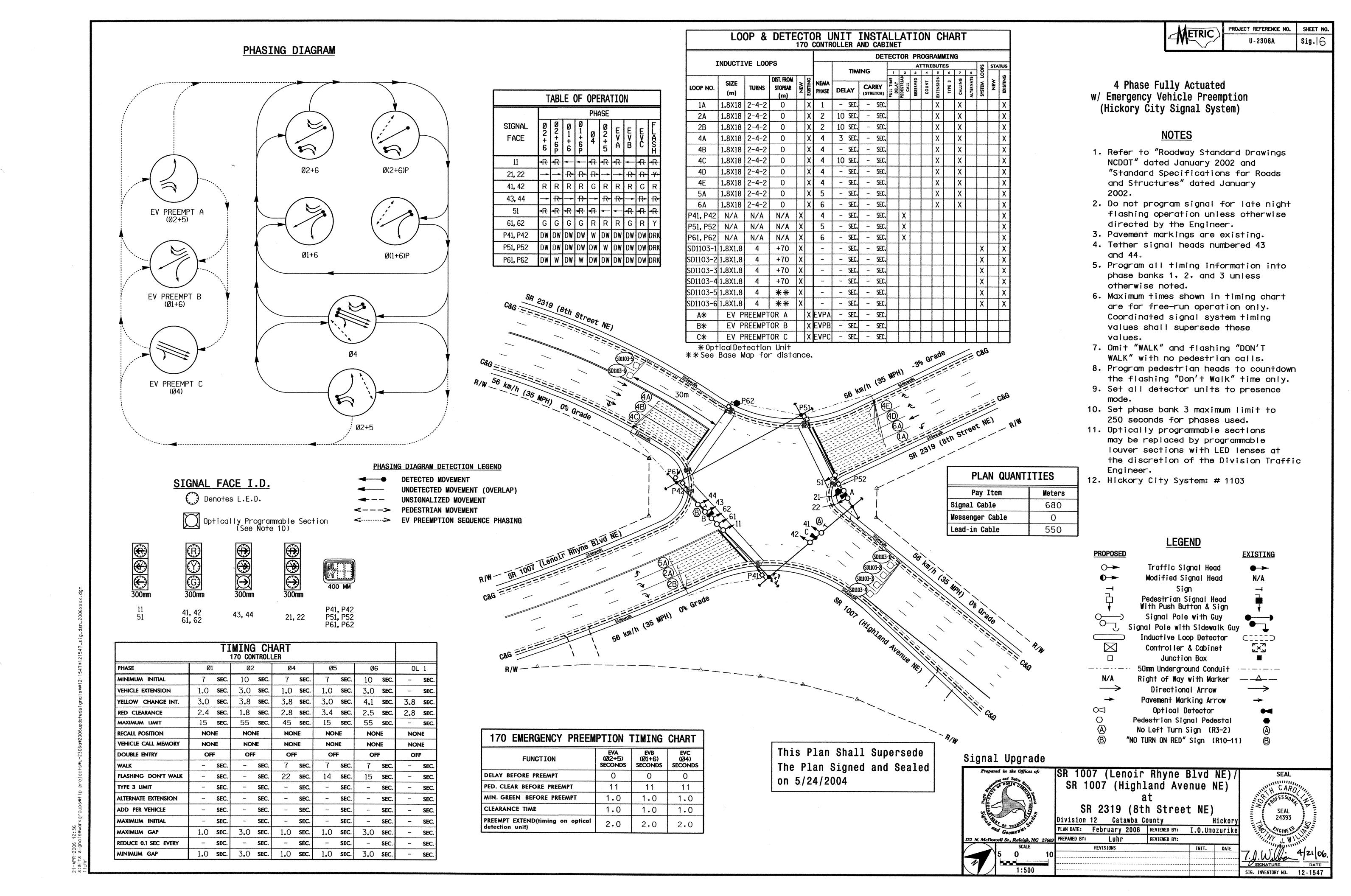
N/A





Hickory

INIT. DATE



PROGRAM PEDESTRIAN 4P OUTPUT AT KEYPAD INPUT E/125+F+7= Ø 4. PROGRAM PEDESTRIAN 6P OUTPUT AT KEYPAD INPUT E/125+F+6=Ø6. PROGRAM PEDESTRIAN 8P OUTPUT AT KEYPAD INPUT E/125+F+8= Ø 5.

PEDESTRIAN CLEAR BEFORE PREEMPT TIMING

PROGRAM PED. PHASE 4 MIN. CLEAR BEFORE PREEMPT AT F/1+4+B= II (SEC.) PROGRAM PED. PHASE 5 MIN. CLEAR BEFORE PREEMPT AT F/I+5+B= II (SEC.) PROGRAM PED. PHASE 6 MIN. CLEAR BEFORE PREEMPT AT F/I+6+B= II (SEC.)

EMERGENCY VEHICLE PREEMPTION PROGRAMMING CHART

E. V. PREEMPT	OPTICAL DET. NO.	INPUT PIN	CLEARANCE PHASES LOCATION	DELAY TIME LOCATION	CLEAR TIME LOCATION
EVA	A	E/126+F+1=71	E/125+E+A= Ø 2,5	F/1+E+2=0	F/1+E+3= 1 (SEC.)
EVB	В	E/126+F+2=72	E/125+E+B= Ø1,6	F/1+E+4=0	F/1+E+5= 1 (SEC.)
EVC	С	E/126+F+3=73	E/125+E+C= Ø 4	F/1+E+6=0	F/1+E+7= 1 (SEC.)

1. PROGRAM MINIMUM GREEN BEFORE PREEMPT AT: F/1+0+8= 1 (SEC.) 2. FOR PREEMPTION IMMEDIATE RESPONSE, DISABLE MIN. WALK AT: E/125+F+F=3 3. PROGRAM EXTEND TIME ON OPTICAL DETECTOR UNITS FOR 2.0 SEC.

DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY 2-PED CALL

3-RESERVED 4-COUNTING

5-EXTENSION 6-TYPE 3

7-CALLING 8-ALTERNATE

INPUT FILE POSITION LEGEND: J2L 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. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- 2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 3,8,9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER CABINET MANUFACTURER'S INSTRUCTIONS.
- 3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- 4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- 5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- 6. PROGRAM "RECALL POSITION" AND "VEHICLE CALL MEMORY" AS NONE FOR ALL PHASES.
- 7. THE CABINET AND CONTROLLER ARE PART OF THE CITY OF HICKORY SIGNAL SYSTEM: # 1103

SPECIAL SEQUENCE: LAGGING PHASE 1 OPERATION

THE PHASING PROGRESSION DESIGN OF THIS SIGNAL REQUIRES PHASE I TO LAG PHASE 2. PROGRAM PHASE I TO LAG IN ALL COORDINATION PLANS AS WELL AS FREE-RUN OPERATION. ALL PHASE PAIRS MUST BE COVERED IN LAG PLANS. FLAG THE FOLLOWING PHASES IN ALL LAG PLANS: 1.4.6.8.

EQUIPMENT INFORMATION

*CONTROLLER.....McCAIN TRAFFIC TYPE 170E CABINETMcCAIN TRAFFIC MODEL 332 (DWG.NO.MDR3280 SOFTWAREBI TRANS 233NC2 REV.B) CABINET MOUNT.....BASE

OUTPUT FILE POSITIONS...12 LOAD SWITCHES USED.....\$1,\$2,\$4,\$4P,\$5,\$6,\$6P,\$7,\$8P

EXISTING TO REMAIN IN USE*

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTE:	NEMA PHASE
1A	TB2-1,2	I1U	1	56	5 7	1
2A	TB2-5,6	I2U	2	39	5 7	2
2B	TB2-7,8	I2L	3	43	5 7	2
4A	TB4-9,10	I6U	4	41	5 7	4
4B	TB4-11,12	I6L	5	45	5 7	4
4C	TB6-1,2	I7U	6	65	5 7	4
4D	TB6-3,4	I7L	7	78	5 7	4
4E	TB6-5,6	I8U	8	49	5 7	4
5A	TB3-1,2	J1U	9	55	5 7	5
6A	TB3-5,6	J2U	10	40	5 7	6
PED PUSH BUTTONS						
P41, P42	TB8-5,6	I12L	11	69	2	4
P51, P52	TB8-8,9	I13L	12	70	2	5
P61, P62	TB8-7,9	I13U	13	68	2	6
SYSTEM LOOPS						
SD1103-1	TB5-9,10	J6U	#************	42	estration and a second	SYS1
SD1103-2	TB5-11,12	J6L		46	War Tarristan Constitution States	SYS2
SD1103-3	TB7-1,2	J7U	ant-organizar	66	NOVEMBER OF THE PROPERTY OF TH	SYS3
SD1103-4	TB7-3,4	J7L	**********	79	****************	SYS4
SD1103-5	TB10-1,2	I9U	***************************************	60	***************************************	SYS5
SD1103-6	TB10-3,4	I9L		62		SYS6

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

*SYSTEM DETECTOR PROGRAMMING NOTES

IN ORDER FOR SYSTEM LOOPS TO OPERATE PROPERLY, THEIR PIN ASSIGNMENTS WILL HAVE TO BE RE-ASSIGNED ON 170E CONTROLLER AS DESCRIBED BELOW.

A. IN ORDER TO ASSURE THAT THESE PINS ARE CLEARED FROM THEIR DEFAULT FUNCTION, PROGRAM AS FOLLOWS:

PIN 42 - E/126+0+3=0 PIN 79 - E/126+4+F=0 PIN 46 - E/126+0+7=0 PIN 60 - E/126+4+1=0 PIN 66 - E/126+4+7=0 PIN 62 - E/126+4+3=0

B. AFTER FOLLOWING STEP 'A' ABOVE, PROGRAM PINS FOR SYSTEM DETECTORS AS FOLLOWS:

SYS1 - E/126+B+1=42 SYS4 - E/126+B+4=79 SYS5 - E/126+B+5=60 SYS2 - E/126+B+2=46 SYS3 - E/126+B+3=66 SYS6 - E/126+B+6=62

* SEE 'OVERLAP PROGRAMMING NOTES' BELOW ** SEE 'COUNTDOWN PEDESTRIAN SIGNAL OPERATION' NOTE

PROJECT REFERENCE NO. SHEET NO. Sig. U-2306 A

	F	FIELD CONNECTION HOOK-UP CHART											
	LOAD SWITCH NO.	S1	S 2	S2P	S 3	S4	S4P	S5	S6	S6P	S 7	S8	S8P
	PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	* OL1	8	5 PED
	SIGNAL HEAD NO.	11	21,22	NU	NU	41,42	P41, P42	51	61,62	P61, P62	43,44	NU	P51, P52
	GREEN					103			136				
	YELLOW					102			135				
	RED					101			134				
	RED ARROW	125	128					131			122		
	YELLOW ARROW	126	129					132			123		
_	GREEN ARROW	127	130					133			124		
**	×						106			121			112
	*						104			119			110
	NU = NOT	USED							-				

OVERLAP PROGRAMMING NOTES

TO ASSURE THAT LOADSWITCH S7 IS ASSIGNED AS OVERLAP 1. PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+0=7

TO SET THE PARENT PHASES FOR OVERLAP 1 (VEH. SET 1) AS PHASES 4 AND 6, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+1= Ø 4, 6

TO SET THE PARENT PHASE FOR OVERLAP 1 (VEH. SET 2) AS NONE, NO PROGRAMMING IS REQUIRED.

PROGRAM TIMING FOR OVERLAP 1 AS FOLLOWS: GREEN CLEAR - E/29+1+D=0.0 (SEC.) YELLOW CHANGE INTERVAL - E/29+1+E=3.8 (SEC.) RED CLEARANCE - E/29+1+F=2.8 (SEC.)

HEADS 43 & 44 (OL1) OPERATION DURING PREEMPTION

IN ORDER FOR E.V. PREEMPT 'C' TO OPERATE AS PHASE 4 WITHOUT SIGNAL HEADS 43 & 44 (OVERLAP 'OLI'). THE FOLLOWING PROGRAMMING MUST BE IN PLACE:

> ASSIGN O/L VEH. SET 2 INPUT AT E/I26+D+C= 200 ASSIGN E.V. PREEMPT EVC OUTPUT AT E/127+D+A= 200

200 = ASSIGNABLE PSEUDO-PIN (SOFTWARE)

OVERLAP NEGATIVE PEDESTRIAN PHASE PROGRAMMING

OVERLAP 1 MUST BE OMITTED DURING PED CALL ON Ø 6 (PED PUSHBUTTONS P61, P62). TO ACCOMPLISH THIS, PROGRAM CONTROLLER AT KEYPAD INPUT E/29+1+5= Ø6 (PED).

RESTRICTED PHASES PROGRAMMING

IN ORDER TO PROHIBIT PHASES I AND 5 FROM BEING SERVED TOGETHER, THEY MUST BE PROGRAMMED AS RESTRICTED PHASES. THIS IS ACCOMPLISHED BY PROGRAMMING CONTROLLER AT KEYPAD INPUT E/125+F+E= Ø 1.5

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1547 DESIGNED: FEBRUARY 2006 SEALED: 4/21/06 REVISED: N/A

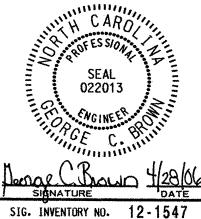
THIS DETAIL SUPERSEDES DETAIL DATED MAY 2004 AND SEALED 6/7/04

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Offices of

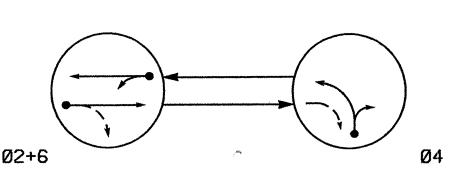
SR 1007 (LENOIR RHYNE BLVD NE)/ SR 1007 (HIGHLAND AVENUE NE)

SR 2319 (8th STREET NE) CATAWBA COUNTY

DIVISION 12 HICKORY PLAN DATE: APRIL 2006 REVIEWED BY: T. Jagge PREPARED BY: F.E. RUSS REVIEWED BY: INIT. DATE



SEAL



PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP)

✓ UNSIGNALIZED MOVEMENT
✓ PEDESTRIAN MOVEMENT

TABLE OF 0	PER	ATI	ON
	P	HAS	E
SIGNAL FACE	ØN+6	Ø 4	止しせのエ
21, 22, 23	G	R	Υ
41, 42	R	G	R
61, 62, 63	G	R	Υ

IGNAL	FACE	I.D.
() Den	otes L.E	.D.

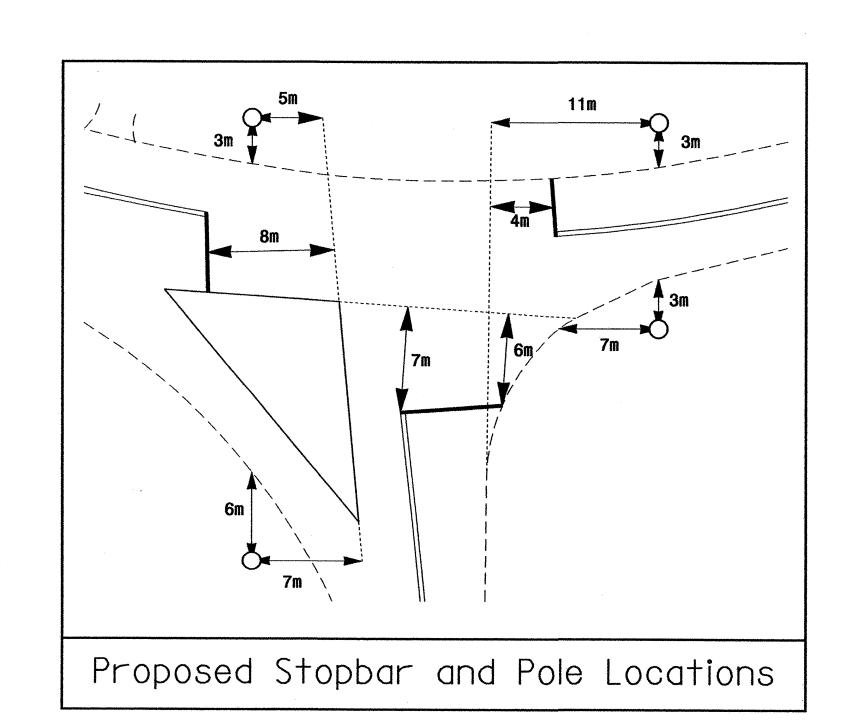
(P)(C)(C)(C)(C)(C)(C)(C)(C)(C)(C)(C)(C)(C)
300mm

21,	22,	23
4	11, 4	2
61,	62,	63

	LOOP & DETECTOR UNIT INSTALLATION CHART 170 CONTROLLER AND CABINET																				
	DETECTOR PROGRAMMING																				
INDUCTIVE LOOPS													ΓA	TRI	BUTI	ES			S	STA	TUS
				·			TIMING			1	2	3	4	5	6	7	В	8			
LOOP NO.	SIZE (m)	TURNS	DIST. FROM STOPBAR (m)	Z EX	EXISTING	NEMA PHASE	DEL	AY	CAF (STRE		FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	TYPE 3	CALLING	ALTERNATE	SYSTEM I	NEW	EXISTING
2 A	1.8X1.8	4	20	Y		2	1	SEC.	-	SEC.					Х		Χ			Χ	
4A	1.8X12	2-4-2	0	Υ		4	5	SEC.	***	SEC.					Х		Χ			Χ	
6A	1.8X1.8	4	20	Υ		6	-	SEC.	****	SEC.					Χ		Χ			Х	

600 C Ave SE

T .	MING 170 COM						
PHASE	Ø2	2	Ø4		Ø6		
MINIMUM INITIAL	10	SEC.	7	SEC.	10	SEC.	
VEHICLE EXTENSION	3.0	SEC.	2.0	SEC.	3.0	SEC.	
YELLOW CHANGE INT.	4.6	SEC.	3.0	SEC.	3.4	SEC.	
RED CLEARANCE	1.3	SEC.	1.8	SEC.	1.2	SEC.	
MAXIMUM LIMIT	50	SEC.	25	SEC.	50	SEC.	
RECALL POSITION	VEH RE	CALL	NON	4E	VEH R	CALL	
VEHICLE CALL MEMORY	YELLOW	LOCK	МОИ	4E	YELLOW	LOCK	
DOUBLE ENTRY	OF	F	OFI	=	OFF		
WALK		SEC.		SEC.	-	SEC.	
FLASHING DON'T WALK	-	SEC.		SEC.		SEC.	
TYPE 3 LIMIT		SEC.		SEC.		SEC.	
ALTERNATE EXTENSION	_	SEC.	****	SEC.	 .	SEC.	
ADD PER VEHICLE		SEC.	steed	SEC.		SEC.	
MAXIMUM INITIAL	-	SEC.		SEC.	_	SEC.	
MAXIMUM GAP	3.0	SEC.	2.0	SEC.	3.0	SEC.	
REDUCE 0.1 SEC EVERY	_	SEC.		SEC.	_	SEC.	
MINIMUM GAP	3.0	SEC.	2.0		3.0		



This Plan Shall Supersede The Plan Signed and Sealed on 6/24/2004 2 Phase Fully Actuated (Isolated)

<u>NOTES</u>

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 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.

PLAN QUANTITIES							
Pay Item	Meters						
Signal Cable	200						
Messenger Cable	70						
Lead-in Cable	160						

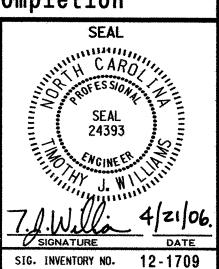
LEGEND PROPOSED EXISTING Traffic Signal Head Modified Signal Head Sign Pedestrian Signal Head With Push Button & Sign Signal Pole with Guy Signal Pole with Sidewalk Guy Inductive Loop Detector Controller & Cabinet Junction Box 50mm Underground Conduit Right of Way with Marker Directional Arrow Pavement Marking Arrow "YIELD" Sign (R1-2)

Temporary Signal- To Be Removed Upon Project Completion

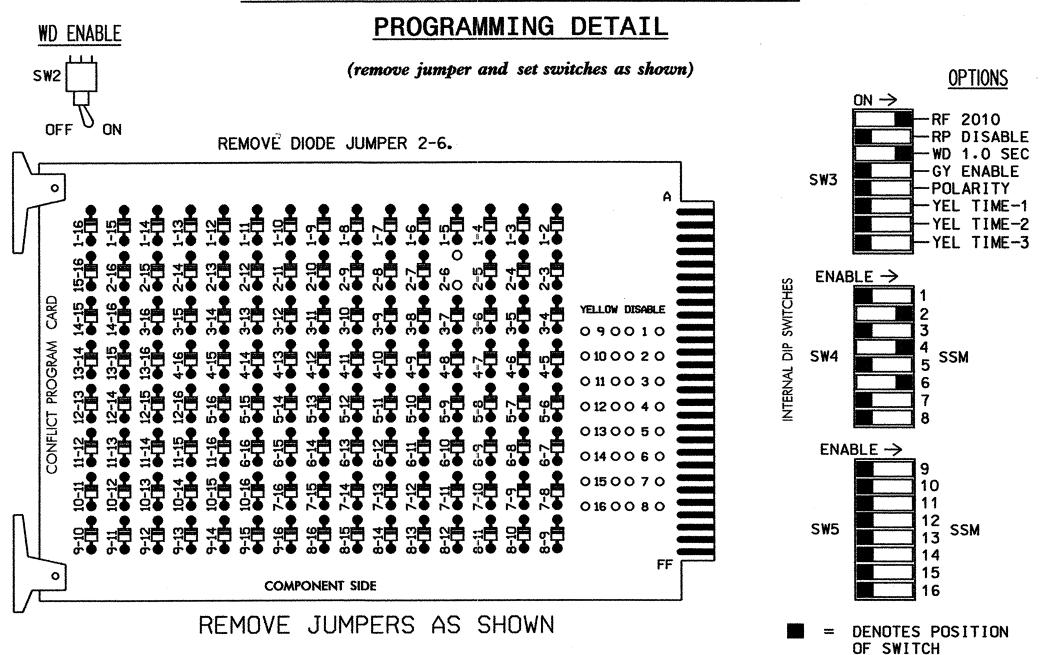


C Ave SE at 9th St. Ln SE

Division 12 Catawba County Hickory
PLAN DATE: February 2006 REVIEWED BY: I.O.Umozurike
PREPARED BY: Luhr REVIEWED BY:
REVISIONS INIT. DATE



z==AFR=2008 12:34 s:*its signals*workgroups*tip projects*u-2306a*2006updated ||uhr



1. CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL

2. MAKE SURE JUMPERS SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.

OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.

NOTES

- 1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. 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 1,3,5,7, 8.9.10.11.12.13.14.15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- 3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- 4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- 5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.

EQUIPMENT INFORMATION

SOFTWAREBI TRANS 233NC2 CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...12 LOAD SWITCHES USED.....S2,S4,S6 PHASES USED......2,4,6 OVERLAPS.....NONE

PROJECT REFERENCE NO. Sig. 9 U-2306 A

F.	FIELD CONNECTION HOOK-UP CHART											
LOAD SWITCH NO.	S1	S 2	S2P	S 3	S4	S4P	S5	S6	S6P	S 7	S8	S8P
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, 63	NU	NU	NU	NU
GREEN		130			103			136				
YELLOW		129			102			135				
RED		128			101			134				
RED ARROW												
YELLOW ARROW	,											
GREEN ARROW												

NU = NOT USED

INPUT FILE POSITION LAYOUT

(front view) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 DC SOLATOR FILE II T.II ST USED FILE "J" EX.: 1A, 2A, ETC. = LOOP NO.'S FS = FLASH SENSE

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
2A	TB2-5,6	I2U	1	39	5 7	2
4A	TB4-9,10	I6U	2	41	5 7	4
6A	TB3-5,6	J2U	3	40	5 7	6

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

INPUT FILE POSITION LEGEND: J2U

SLOT 2-

UPPER-

ST = STOP TIME

DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY 2-PED CALL 3-RESERVED

4-COUNTING 5-EXTENSION 6-TYPE 3 7-CALLING

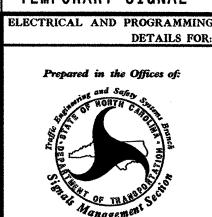
8-ALTERNATE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1709 DESIGNED: FEBRUARY 2006 SEALED: 4/21/06

REVISED: N/A

THIS DETAIL SUPERSEDES DETAIL DATED JULY 2004 AND SEALED 7/13/04

TEMPORARY SIGNAL - To Be Removed Upon Project Completion



C AVE SE 9th ST. LN SE

CATAWBA COUNTY HICKORY APRIL 2006 REVIEWED BY: T. Vall PLAN DATE: PREPARED BY: F.E. RUSS INIT. REVISIONS

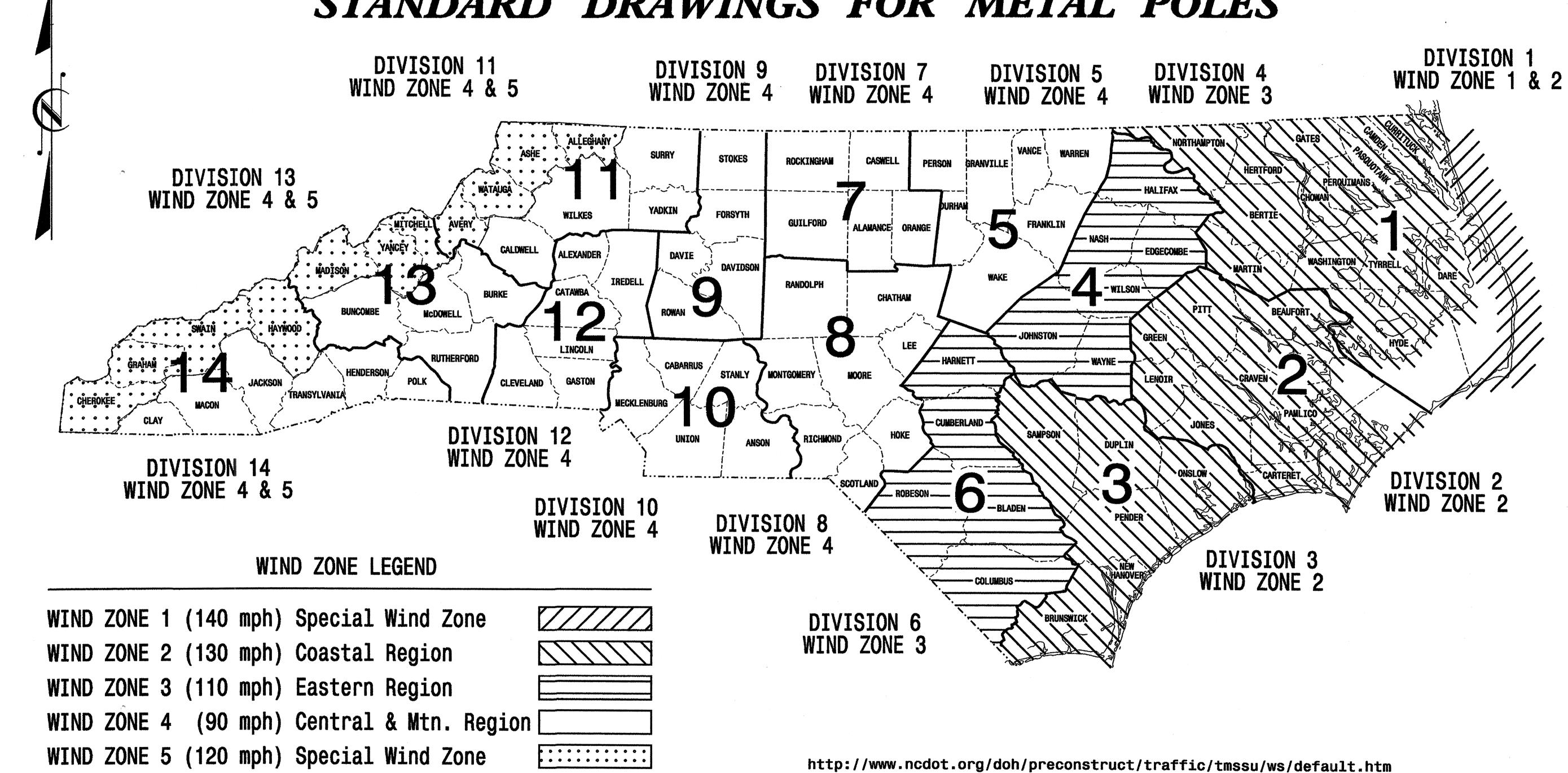
SIG. INVENTORY NO. 12-1709

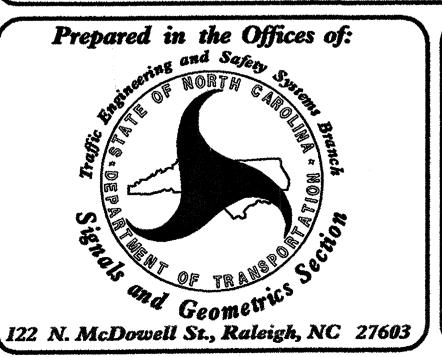
NOTES:

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

- (1	PROJEC	T ID. NO.	
	F. A. PR	OJ. NO.	M 1
	N.C.	U-2306A	Sig. 20
	STATE	PROJECT NO.	SHEET NO.

STANDARD DRAWINGS FOR METAL POLES





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 **DRAWING DESCRIPTION**

Title Sheet

NUMBER

Fabrication Details - All Poles

Fabrication Details - Strain Poles Fabrication Details - Mast Arm Poles Construction Details - Strain Poles

Construction Details - Foundations Standard Strain Poles

NCDOT CONTACTS:

TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

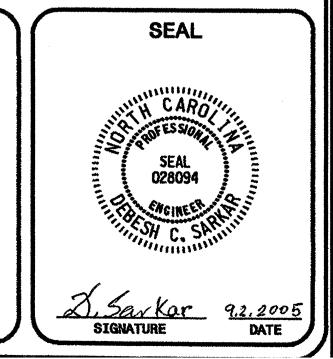
G. A. Fuller, P.E. - State ITS and Signals Engineer

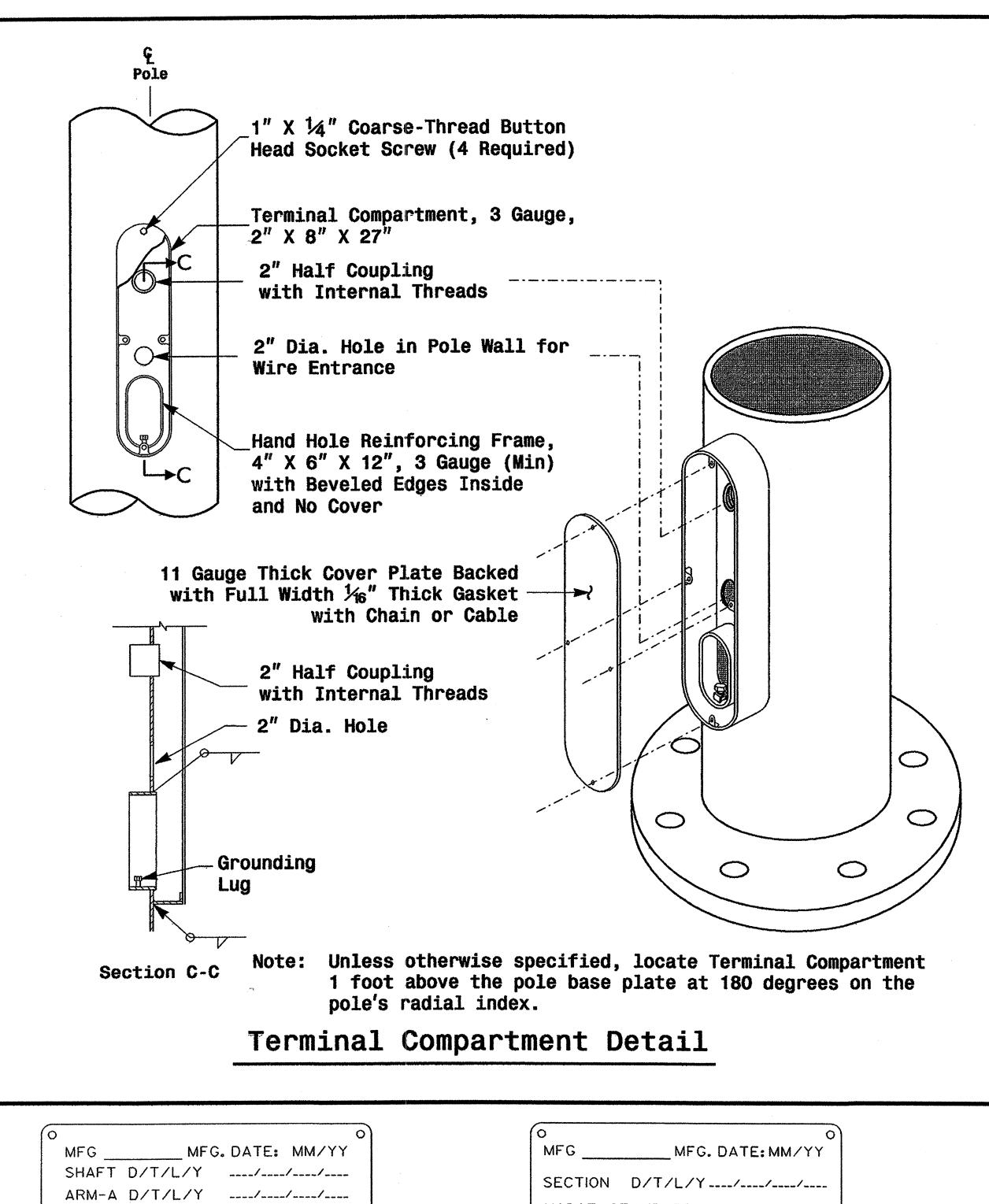
R. E. Mullinax, P.E. - Signals and Geometrics Engineer

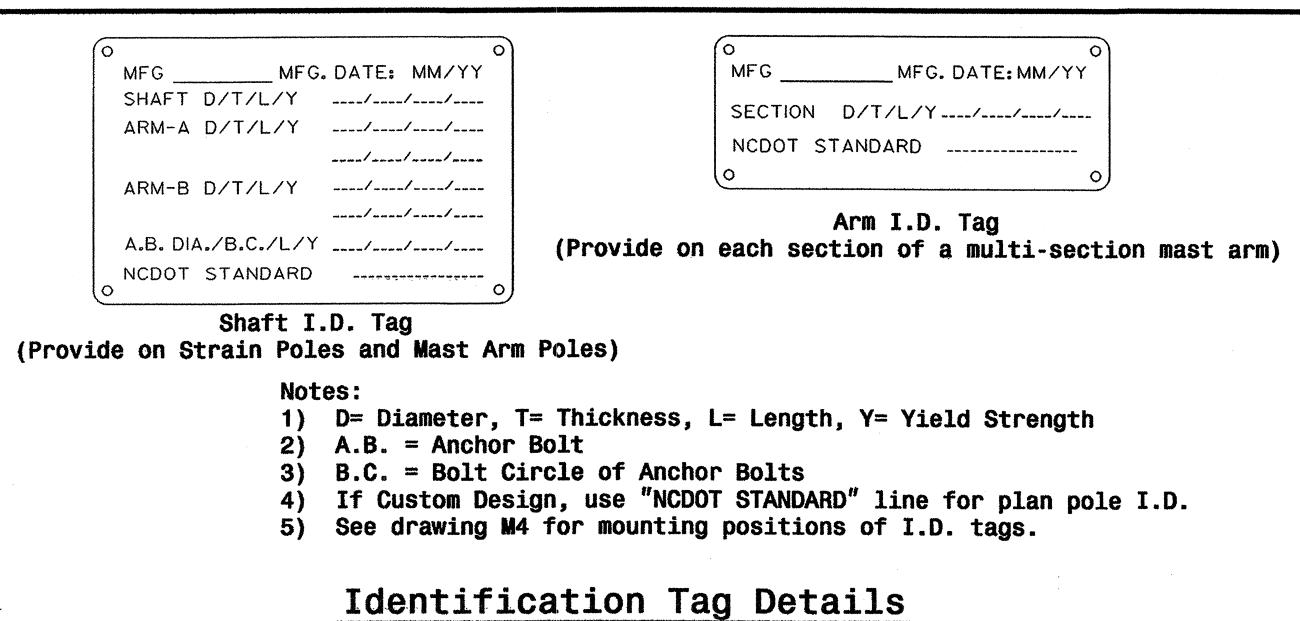
P. L. Alexander, P.E. - Signals and Geometrics Special Projects Engineer

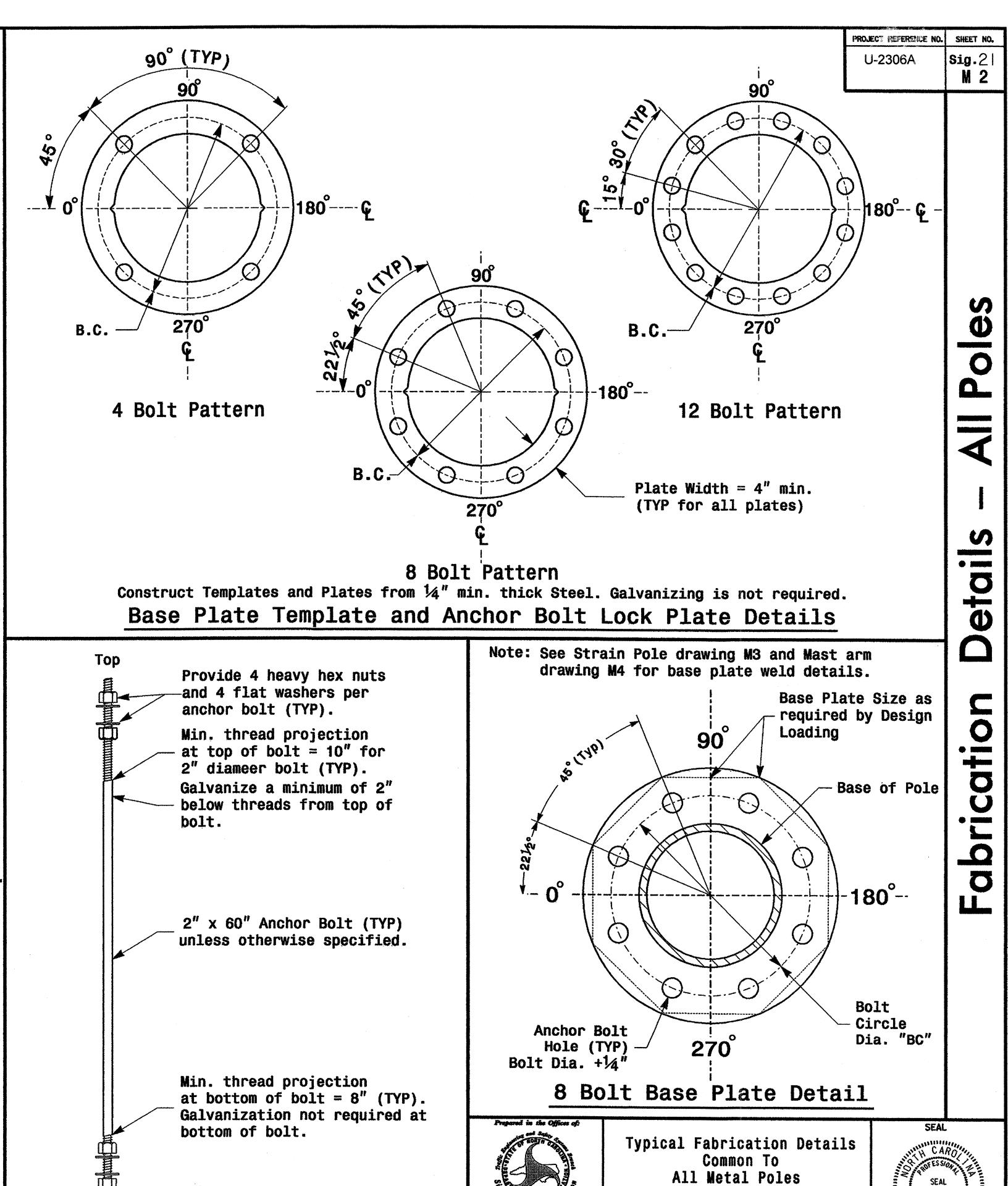
D. C. Sarkar, P.E. - Signals and Geometrics Structural Engineer A. M. Esposito, P.E. - Signals and Geometrics Project Engineer

C. F. Andrews, Jr. - Signals and Geometrics Project Engineer









NONE

Bottom

Anchor Bolt Detail

May 2005 REVIEWED BY: C.F. Andrews

PREPARED BY: P.L. Alexander REVIEWED BY: A.M. Esposito

D:#2004 Metal Pole Standards#2004 m2 . condrews

Hand Hole with cover

SEAL

Typical Fabrication Details for Mast Arm Poles PLAN DATE: May 2005 REVIEWED BY: C.F. Andrews ., Raleigh, NC 27603 PREPARED BY: P.L. Alexander REVIEWED BY: A.M. Esposito

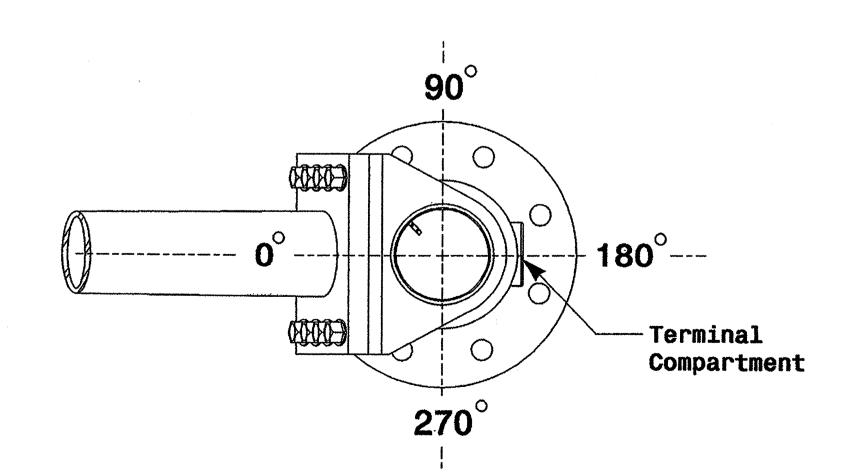
See Slip Fit Joint Detail 5/8" Dia. Thru Bolt — (See Slip Fit Joint Detail) Arm I.D.Tag mounting location (See drawing M2) Arm I.D.Tag mounting location (See drawing M2) -Backing Ring -90° ------270--Base of Pole See drawing M5 for Mast Arm—/connection details **Bolt Hole** Mast Arm -Telescopic Arm (Outboard Section) (Inboard Section) Bolt Circle "BC" 180 Section A-A (See drawing M 2) Shaft I.D. Tag mounting location (See drawing M2) Pole Base Plate Field Drill Inboard Tube. 5/8" Galvanized Thru Stud with (2) Hex. Locknuts Ea. Terminal Compartment (See drawing M2) Slip Fit Joint Detail for Mast Arm T=Wall Thickness

Field Applied — Silicone Caulk / Full Pen. Backing Ring - 3/8" Max. **Weld** R=.44"+T

-Base Plate

Section B-B (Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail

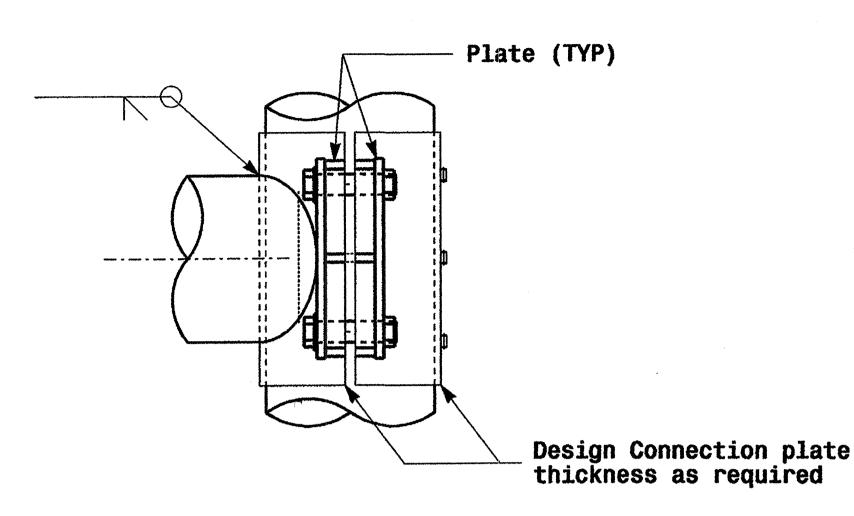


Mast Arm Radial Orientation

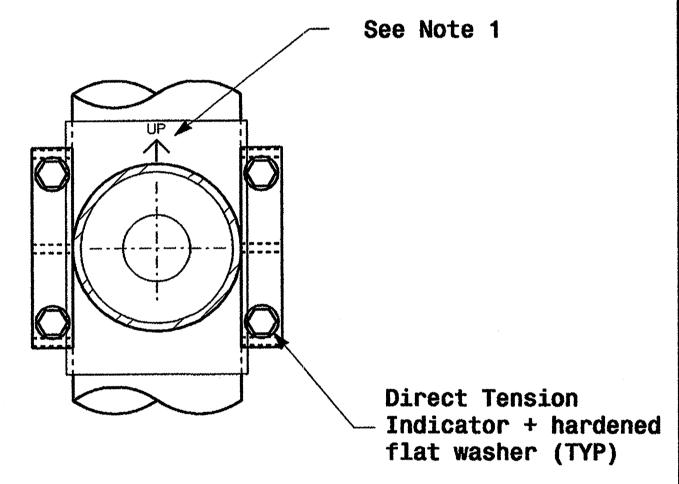
Monotube Mast Arm Pole (.14in./ft. taper)

NONE

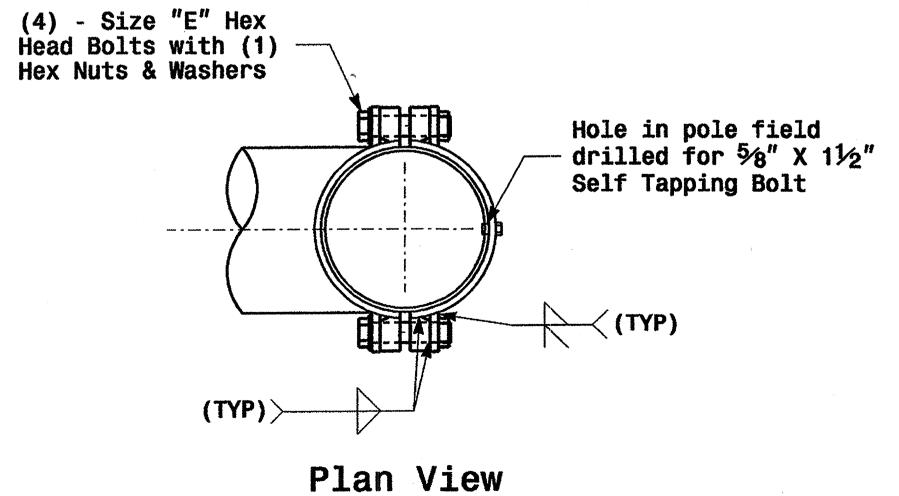
Adjustable Clamp Type Bolted Mast Arm Connection



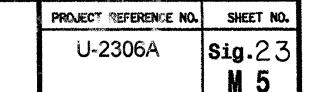
Side Elevation View



Front Elevation View



Welded Ring Stiffened Mast Arm Connection

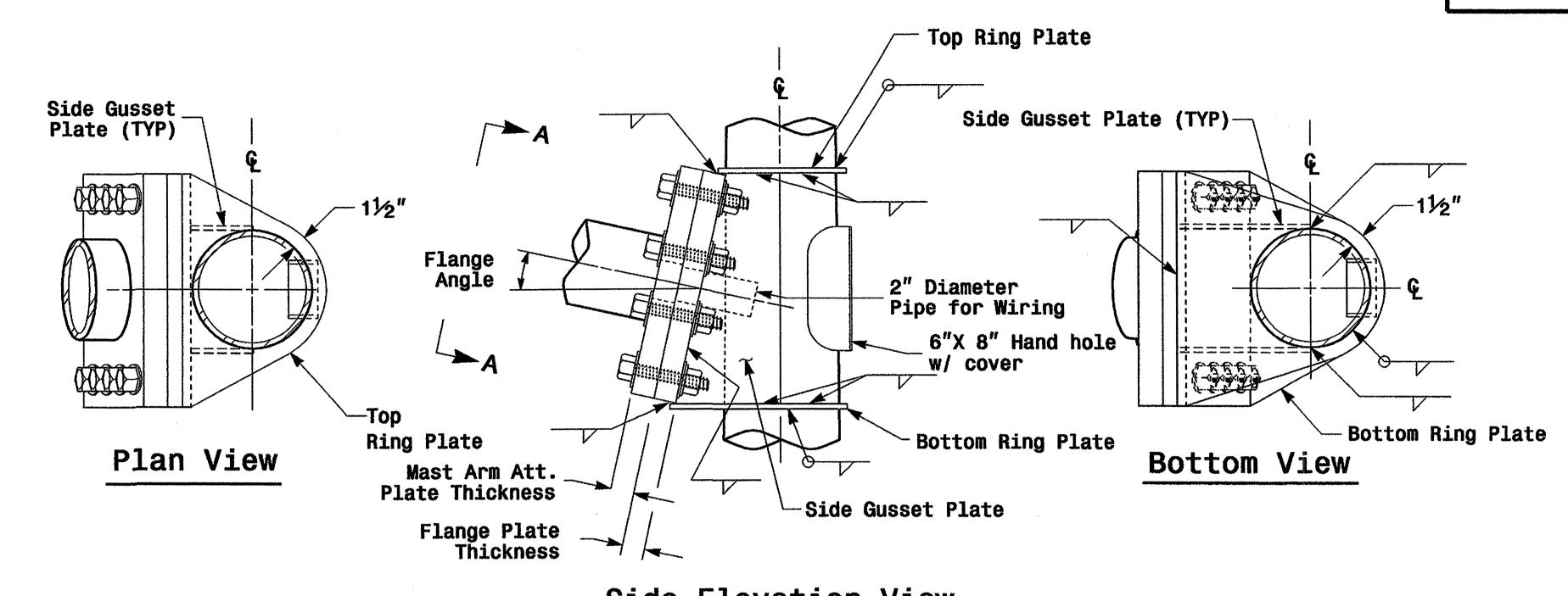


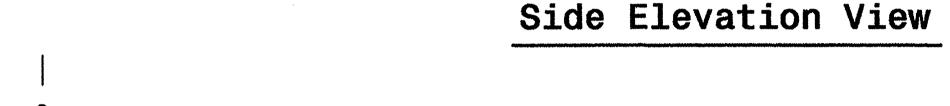
Poles

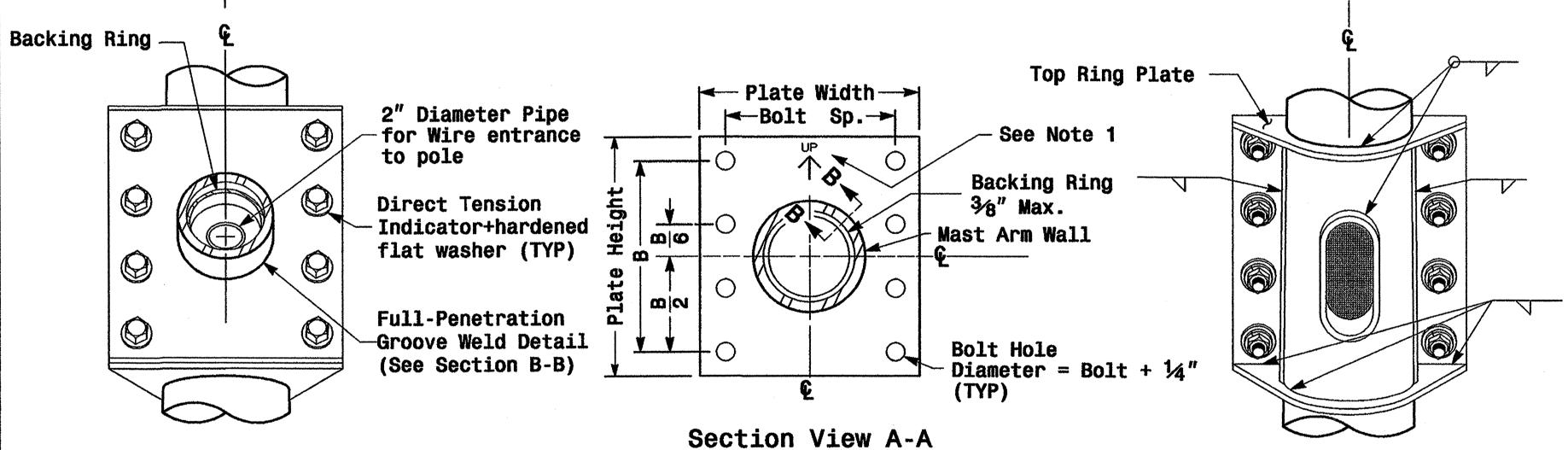
Mast

Details

Fabrication







Front Elevation View

T = Arm Wall Thickness

Backing Ring

Mast Arm Attachment Plate

Back Elevation View

Notes:

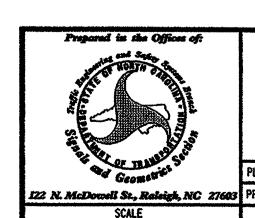
Weld

Attachment Plate

R=.44"+T

Mast Arm

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



Fabrication Details For Mast Arm Connection To Pole

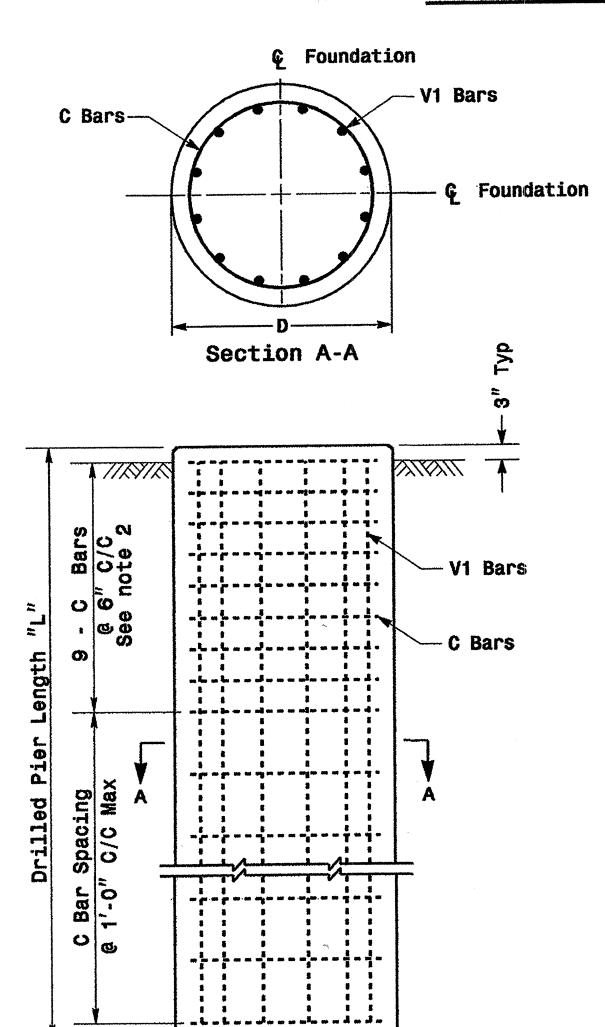
May 2005 REVIEWED BY: C.F. Andrews PREPARED BY: P.L. Alexander REVIEWED BY: A.M. Esposito

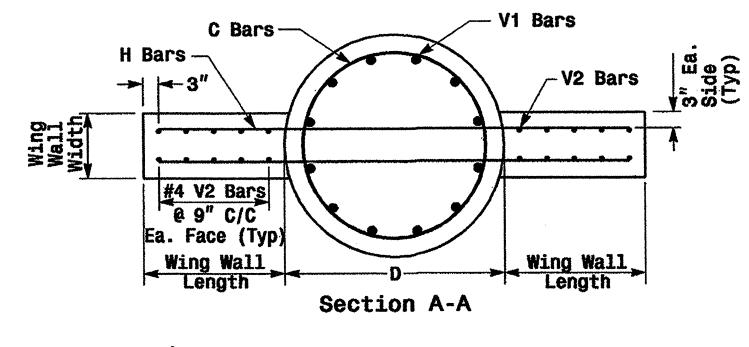
SEAL

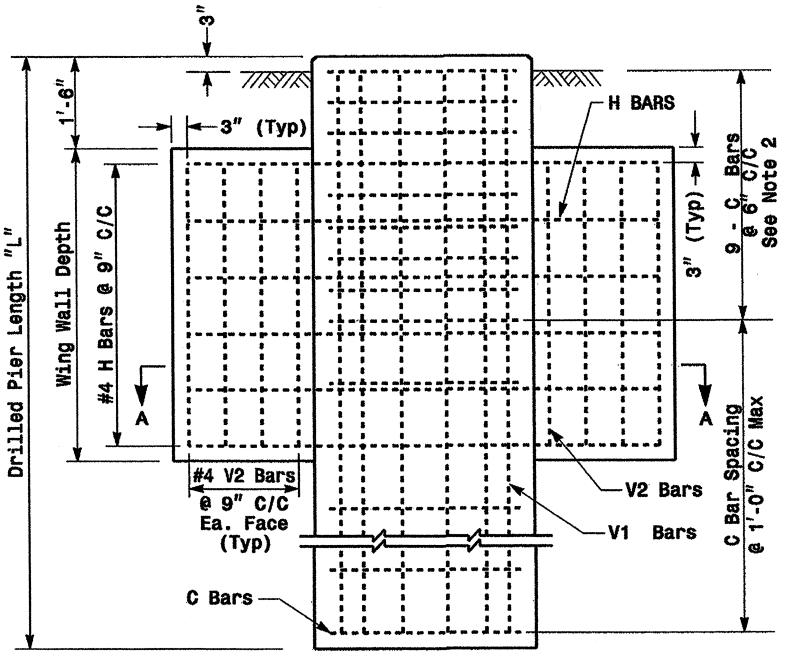
Full-Penetration Groove Weld Detail

Section B-B

Reinforcing Steel Bars

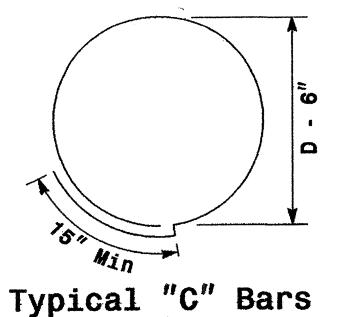






REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER) Shaft Conc. Bar Name Volume Size Type Length (cu. yds.) (in.) #8 STR. ** **V1** .356 x #4 CIR. 10'-9" 12 #8 STR. ** V1 .465 X #4 CIR. 12'-6" *

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



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

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

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

WING WALL DETAILS								
Wing Wall Length (Ft.) Wing Wall Wing Wall Depth 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

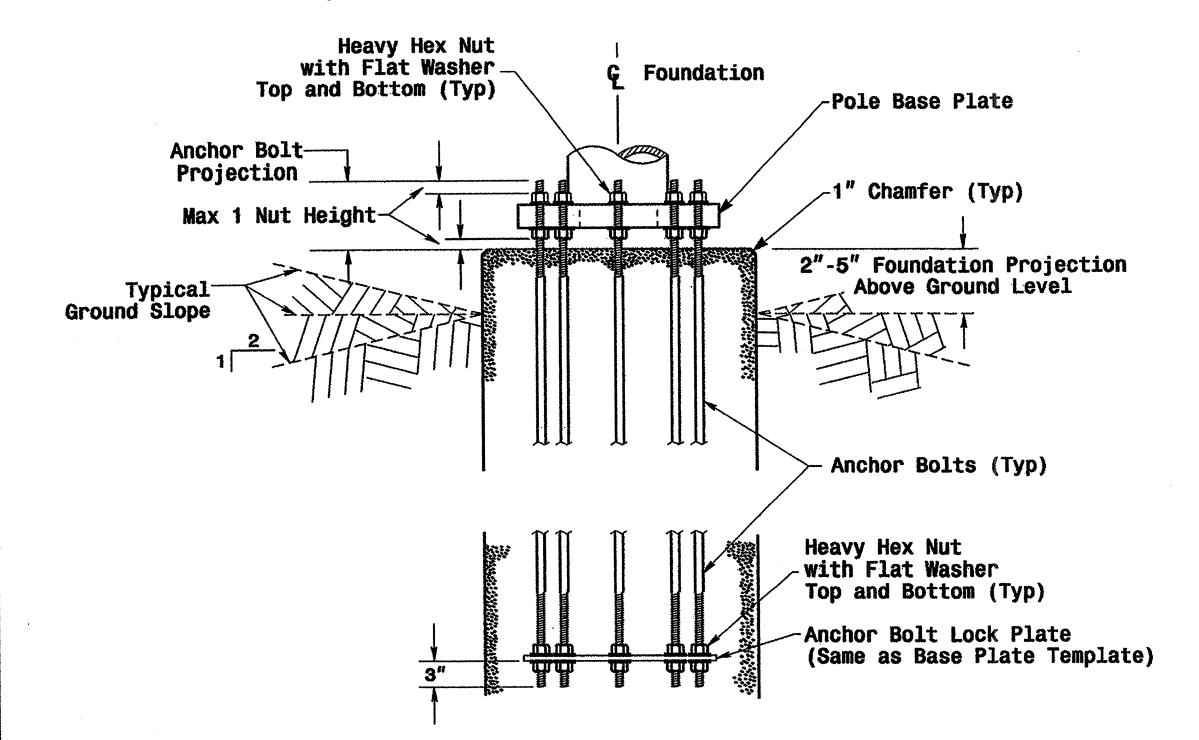
(Reinforcing Cage Not Shown for Clarity)

PROJECT REFERENCE NO. U-2306A **Sig.**24 M 7

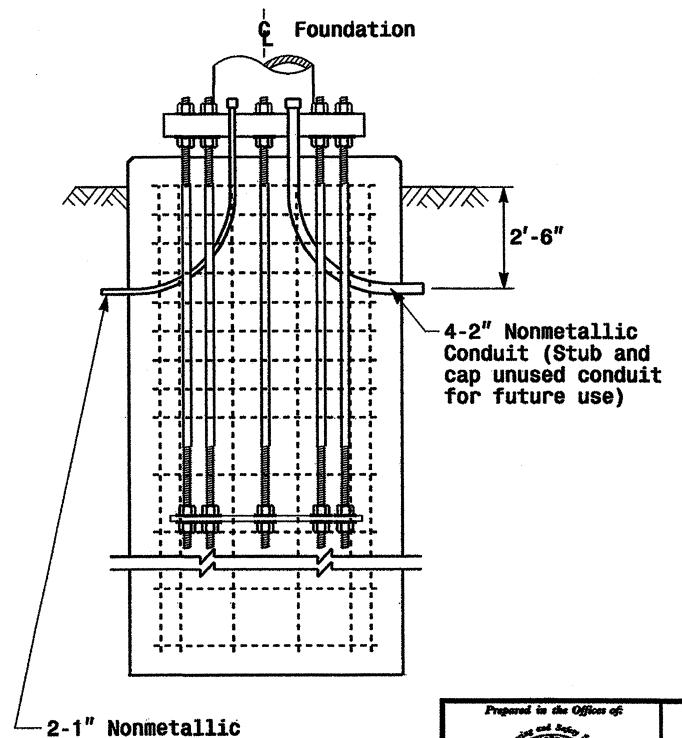
Foundations

Detail

structi



Typical Foundation Conduit Details



Conduits for

and Grounding

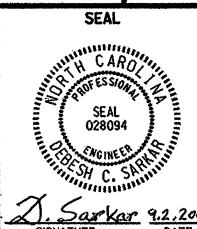
Electrical Service

Electrode Conductor

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
- 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.)

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



SIG. INVENTORY NO.

Construction Details **Foundations**

NONE

ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS".
ROADWAY DESIGN UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2002 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.

TITLE

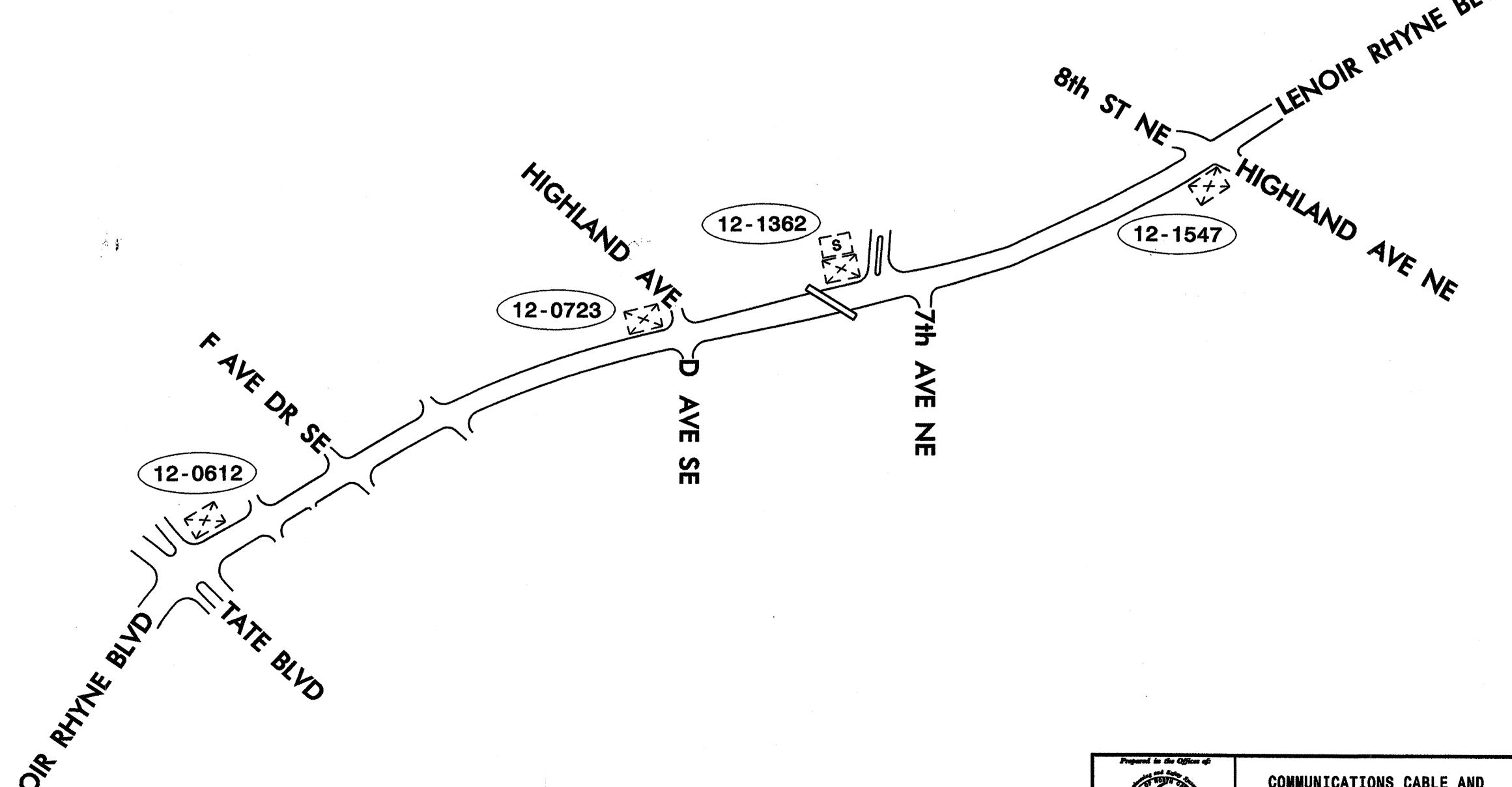
UNDERGROUND CONDUIT 1715.01 1716.01 1730.01

JUNCTION BOXES
FIBER OPTIC CABLE - SPARE CABLE STORAGE
FIBER OPTIC CABLE - CONDUIT INSTALLATION
DELINEATOR MARKERS

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

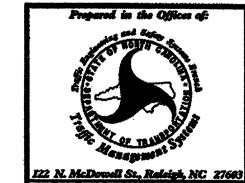
CATAWBA COUNTY

LOCATION: LENOIR RHYNE BLVD FROM TATE BLVD TO HIGHLAND AVE NE/8th ST NE TYPE OF WORK: COMMUNICATIONS CABLE AND CONDUIT ROUTING



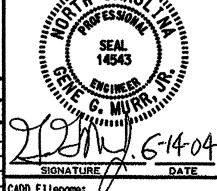
NCDOT CONTACT:

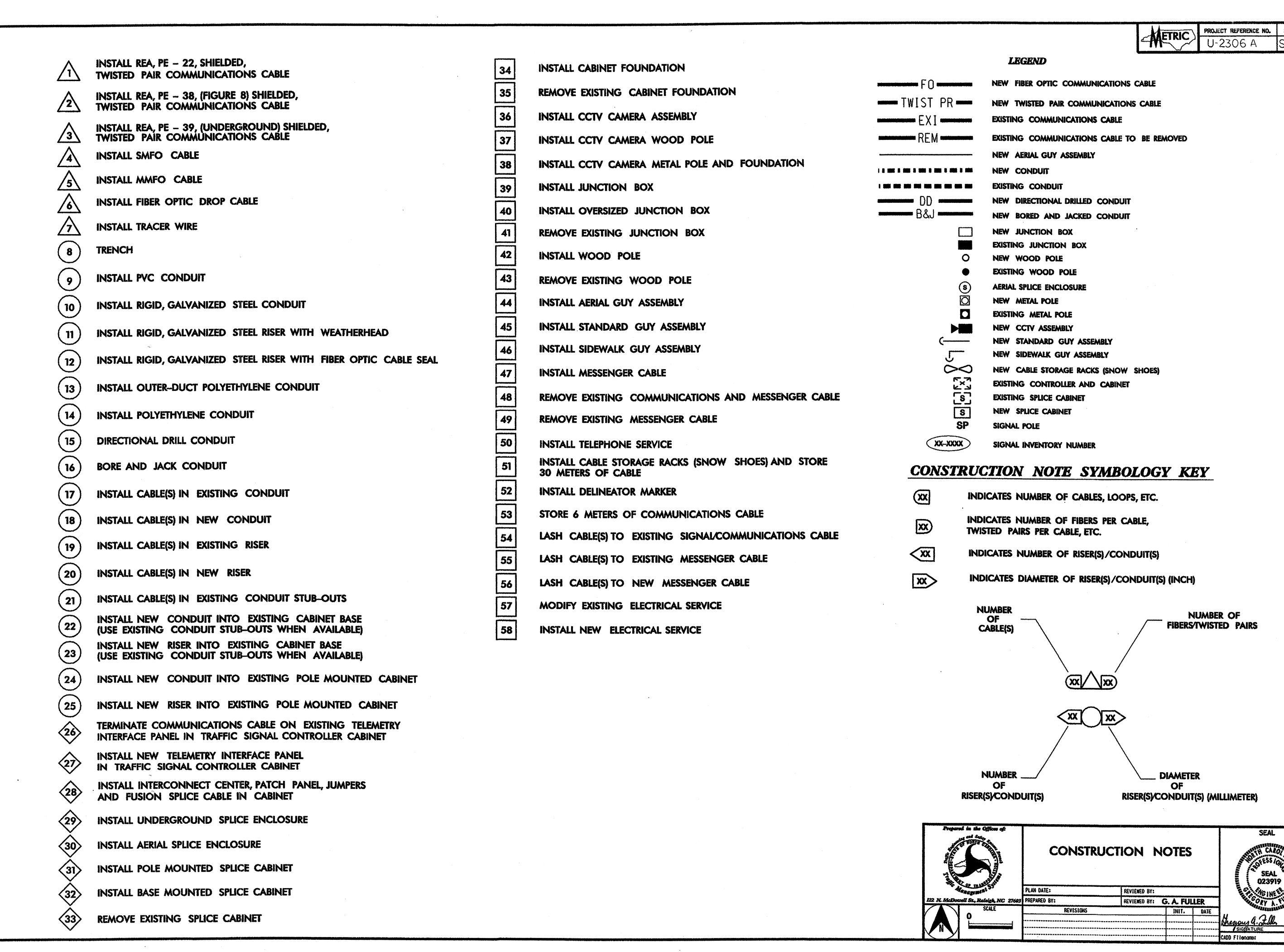
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH G.G. MURR, JR., PE - TRAFFIC MANAGEMENT SYSTEMS ENGINEER

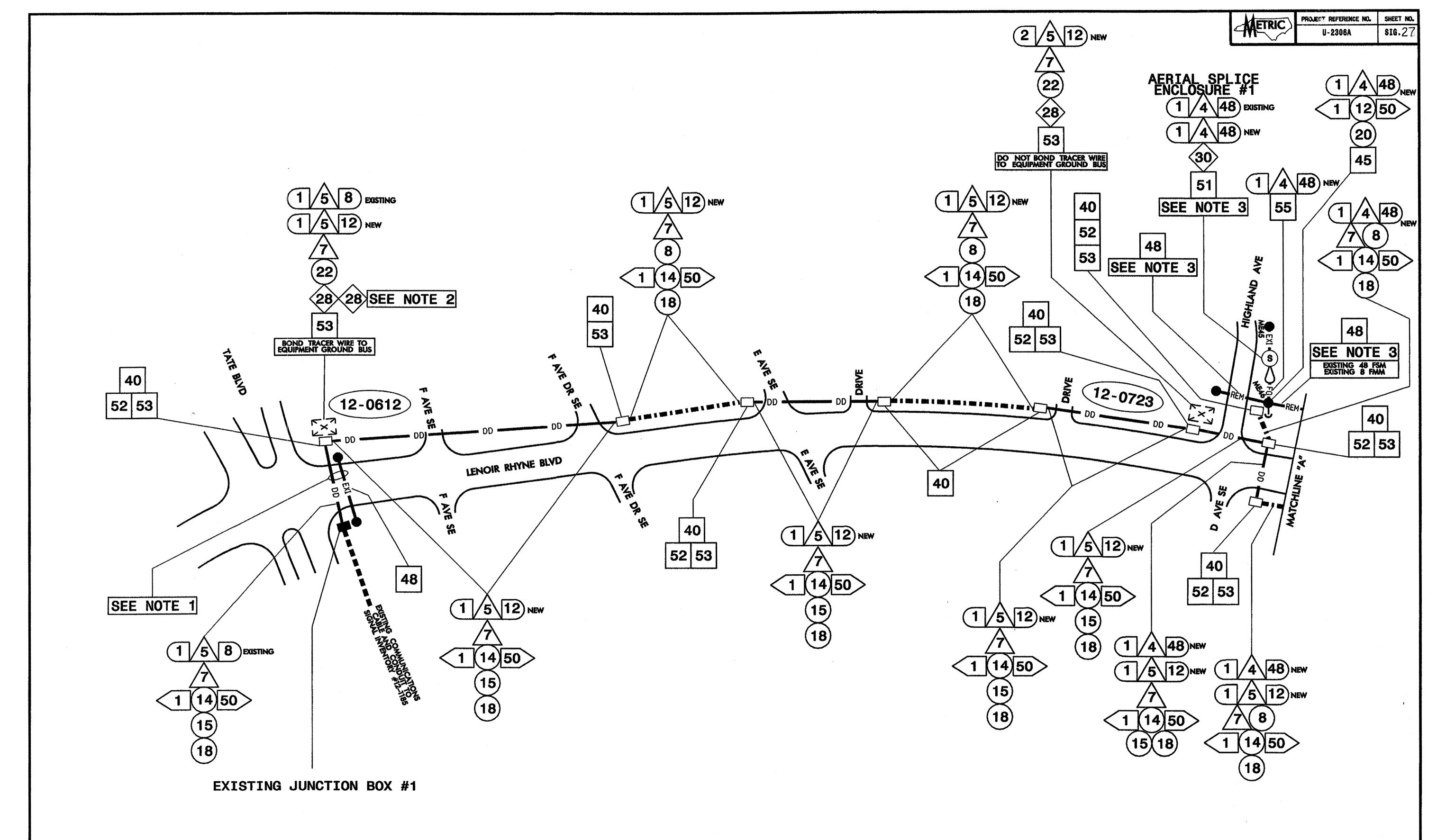


COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

CATAWBA CO. DIVISION 12 JUNE 2004 REVIEWED BY: I.N. AVERY PREPARED BY: S.C. WARDLE REVIEWED BY: G.G. MURR REVISIONS





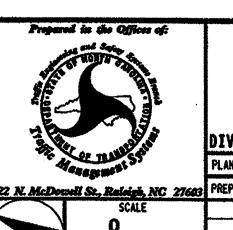


NOTES:

- 1. CONTRACTOR TO REMOVE THE EXISTING MULTI-MODE COMMUNICATIONS CABLE (AERIAL RUN) AND ROUTE THROUGH THE CONTRACTOR INSTALLED CONDUIT SYSTEM TO THE NEW CONTROLLER CABINET LOCATION (SIG. INV. #12-0612). STORE EXCESS SPARE COMMUNICATIONS CABLE IN EXISTING JUNCTION BOX #1.
- 2. TERMINATE THE EXISTING MULTI-MODE COMMUNICATIONS CABLE IN A SEPARATE INTERCONNECT CENTER AS SHOWN IN THE MULTI-MODE SPLICE PLANS.
- 3. REMOVE THE EXISTING 8 FIBER MULTI-MODE CABLE THAT RUNS BETWEEN SIG. INV. #12-0723 AND EXISTING SPLICE CABINET #1. THIS SECTION OF CABLE IS TO BE DISCARDED.

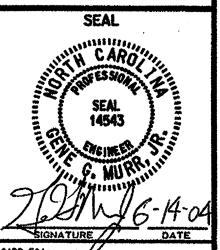
 CUT THE EXISTING 48 FIBER SINGLE-MODE CABLE, BACK PULL AND STORE FOR FUTURE TERMINATION AT "AERIAL SPLICE ENCLOSURE #1."

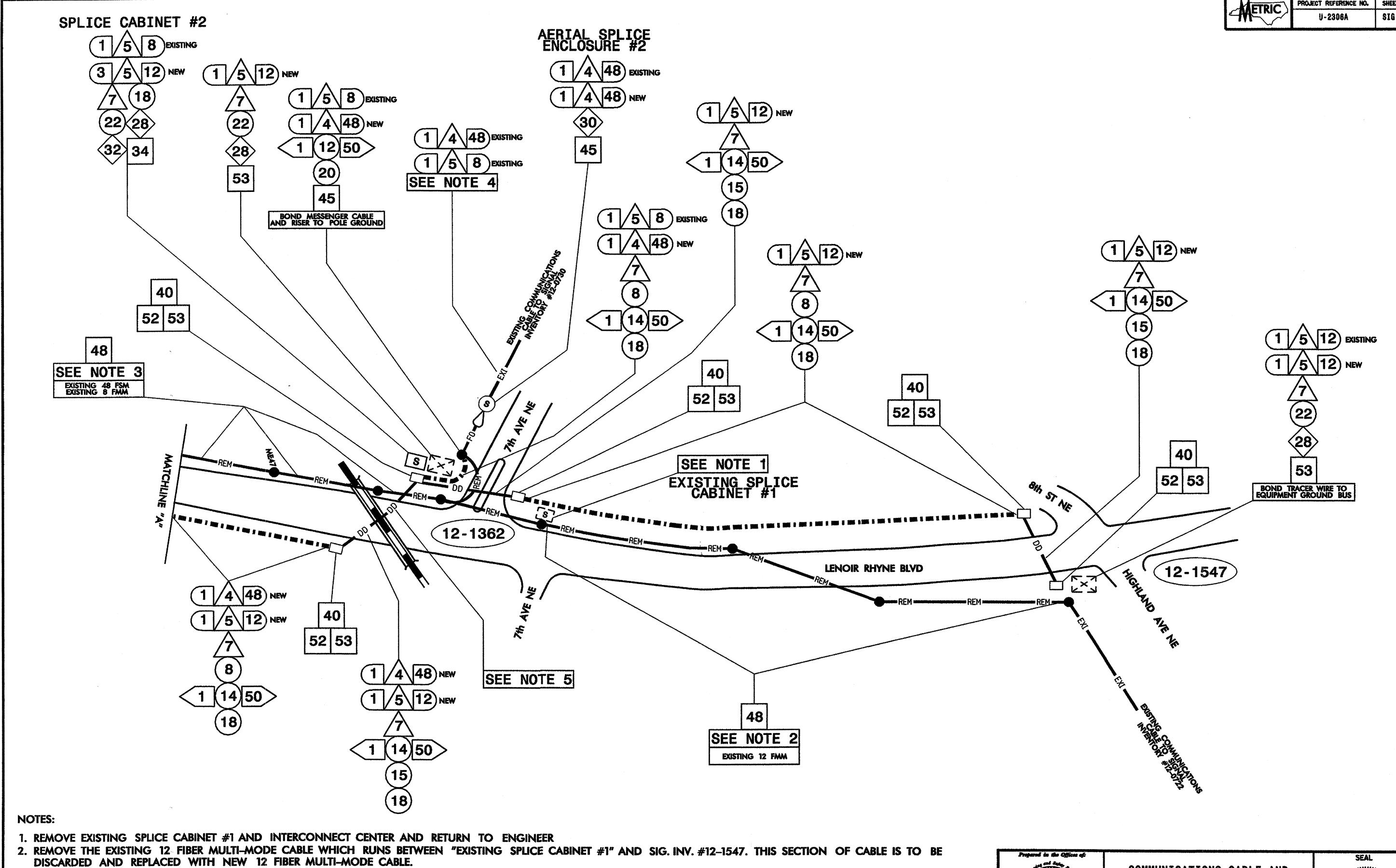
SEAL ALL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX /SIGNAL CABINET ENTRANCES



COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

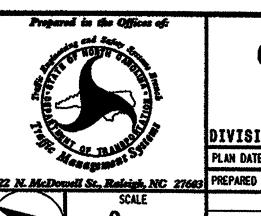
DIVISION 12 CATAWBA CO. HICKORY
PLAN DATE: JUNE 2004 REVIEWED BY: I.N. AVERY
PREPARED BY: S.C. WARDLE REVIEWED BY: G.G. MURR
REVISIONS INIT. DATE





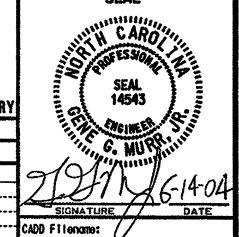
- 3. CUT THE EXISTING 48 FIBER SINGLE-MODE CABLE, BACK PULL AND STORE FOR FUTURE TERMINATION AT "AERIAL SPLICE ENCLOSURE #2." REMOVE AND DISCARD ANY MULTI-MODE COMMUNICATIONS CABLE THAT RUNS BETWEEN "EXISTING SPLICE CABINET #1" AND SIG. INV. #12-0723.
- 4. RELOCATE THE SECTION OF 8 FIBER MULTI-MODE COMMUNICATIONS CABLE THAT RUNS BETWEEN "EXISTING SPLICE CABINET #1" AND SIG. INV. #12-0730. REPROUTE THE EXISTING CABLE TO THE "NEW SPLICE CABINET #2" LOCATED AT SIG. INV. #12-1362.
- 5. CONTRACTOR MAY CONSIDER INSTALLING CONDUIT UNDER ROADWAY WHILE THE ROADBED IS OPENED FOR OTHER UTILITY WORK, DRAINAGE, ETC. THERE ARE SEVERAL UNDERGROUND UTILITIES IN THIS AREA.

SEAL ALL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX /SIGNAL CABINET ENTRANCES

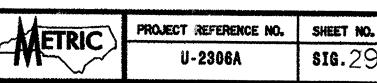


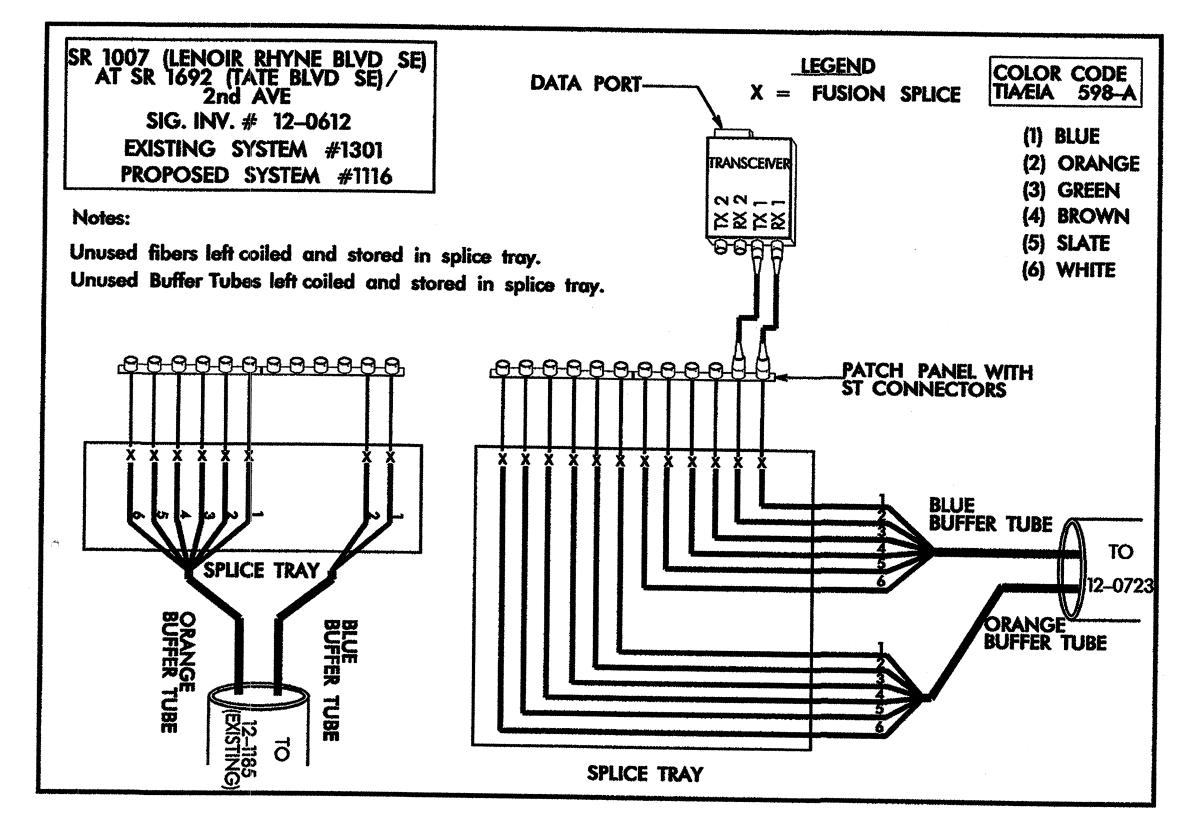
COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

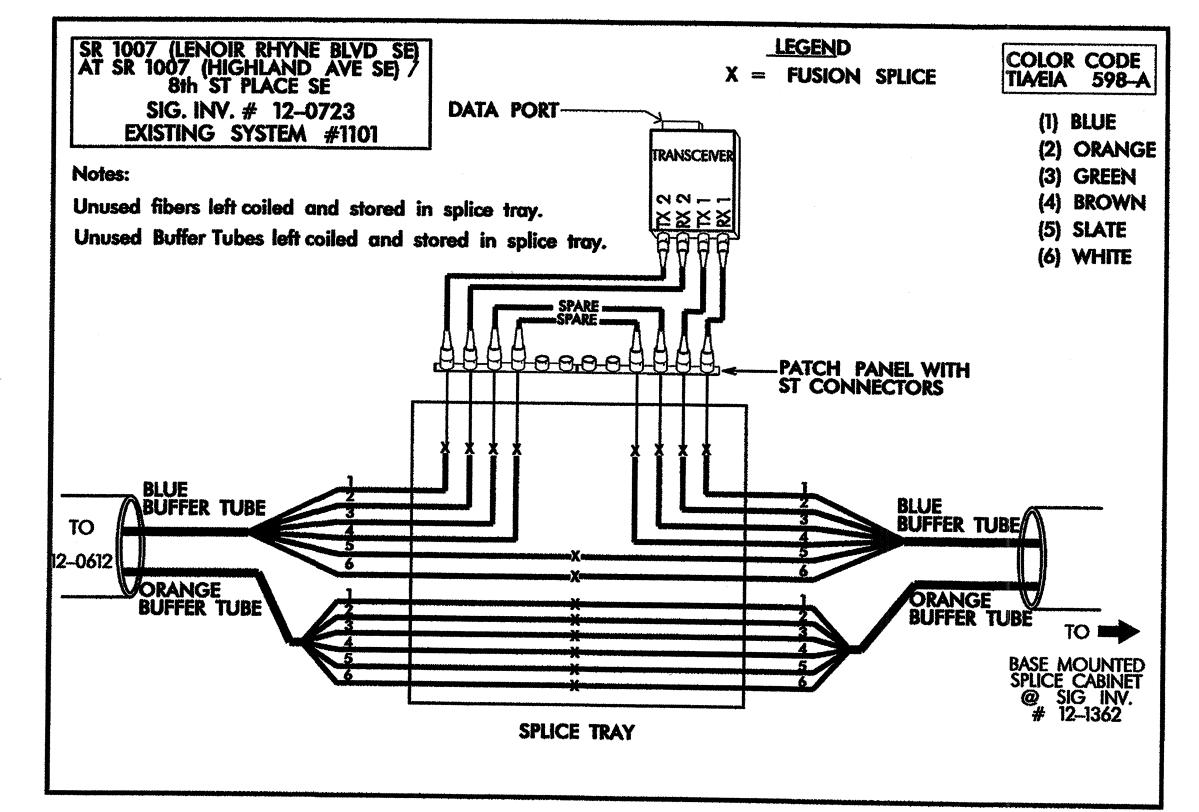
DIVISION 12 CATAWBA CO. HICKORY
PLAN DATE: JUNE 2004 REVIEWED BY: I.N. AVERY
PREPARED BY: S.C. WARDLE REVIEWED BY: G.G. MURR
REVISIONS INIT. DATE

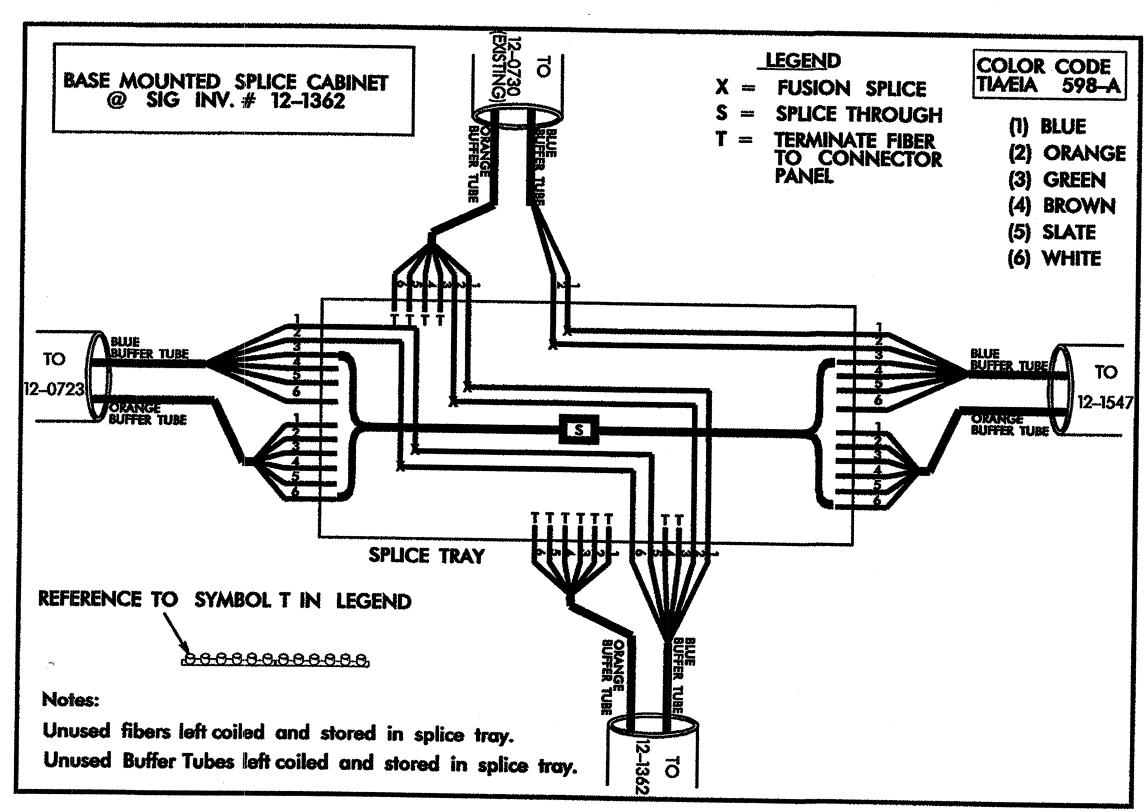


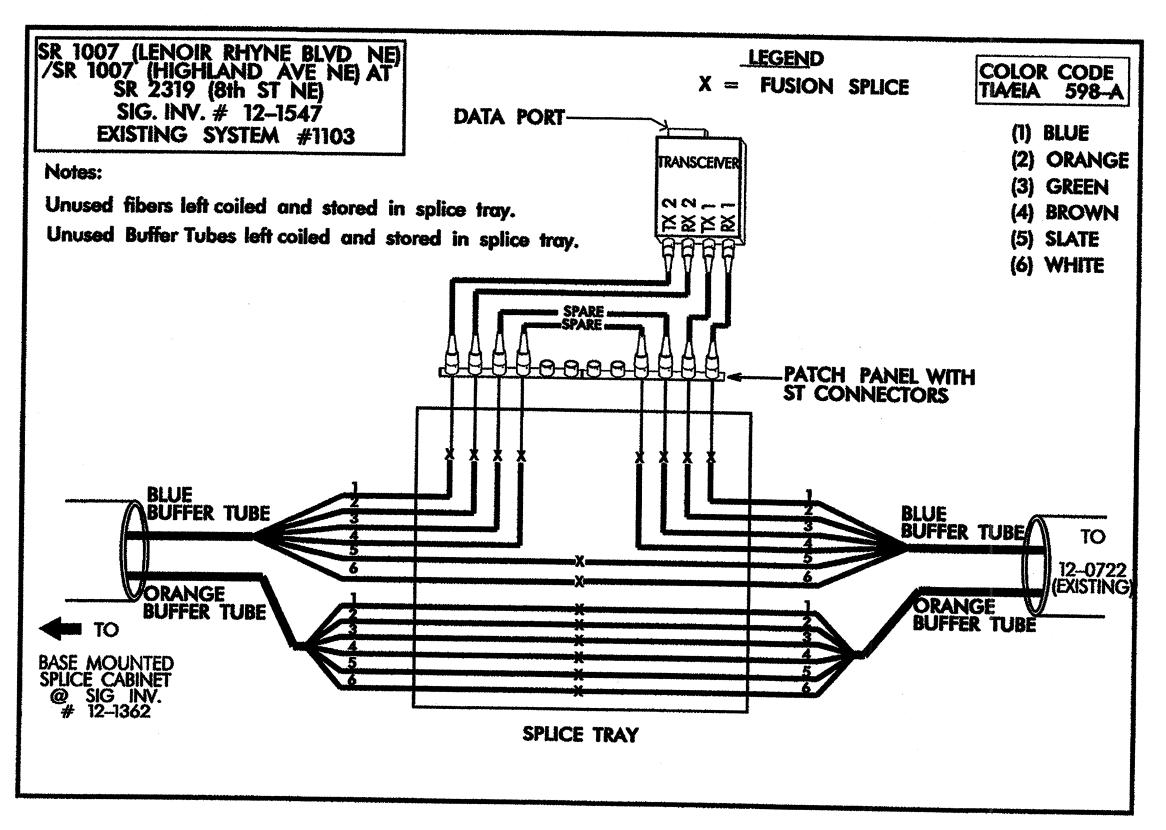
MULTI-MODE FIBER OPTIC CABLE



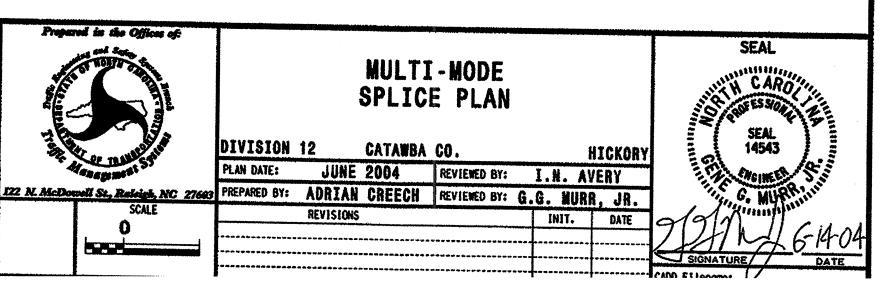




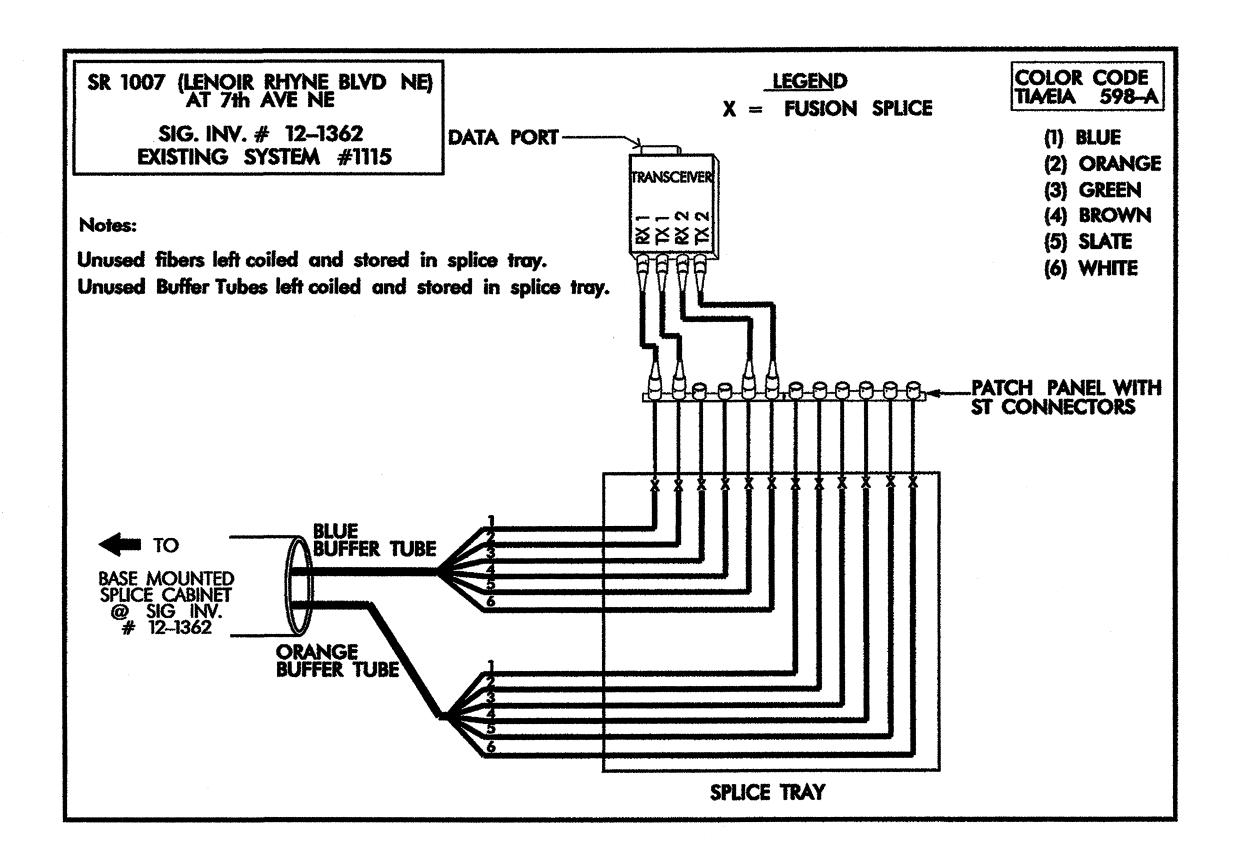




NOTE 1: CONTRACTOR TO RETURN EXISTING TRANSCEIVERS AND INTERCONNECT CENTERS TO THE ENGINEER FOR RETURN TO THE CITY OF HICKORY NOTE 2: FURNISH OPTELECOM MODEL 4170-S-ST TRANSCEIVERS FOR COMPATILITY WITH THE EXISTING HICKORY COMPUTERIZED SIGNAL SYSTEM NOTE 3: TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING THE PROPER TERMINATIONS



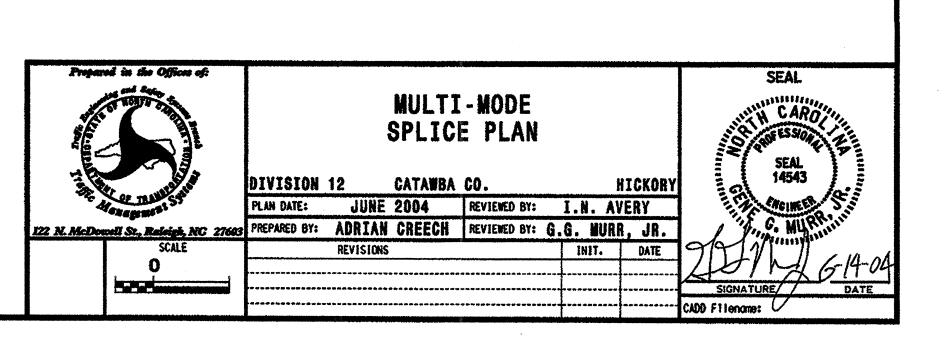
MULTI-MODE FIBER OPTIC CABLE



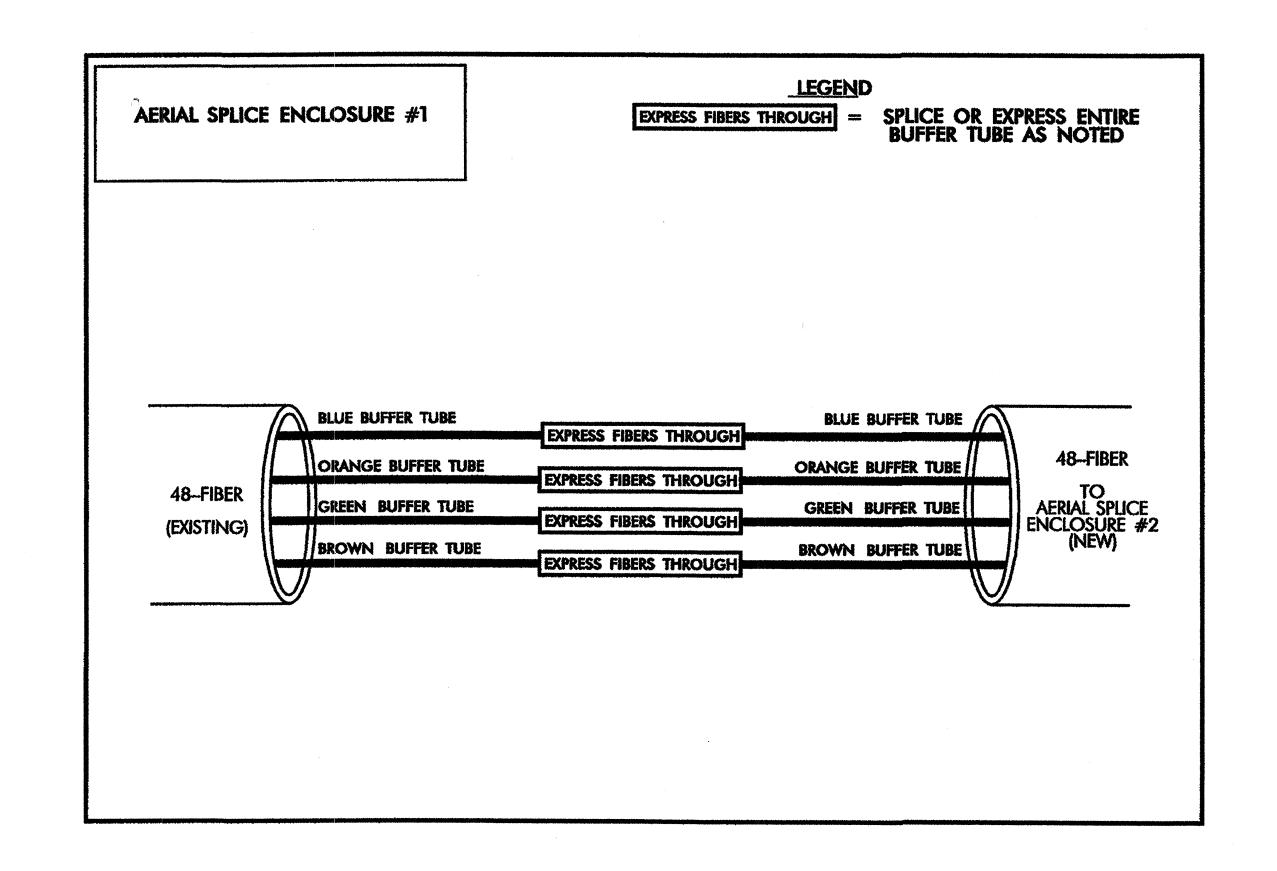
NOTE 1: CONTRACTOR TO RETURN EXISTING TRANSCEIVERS AND INTERCONNECT CENTERS TO THE ENGINEER FOR RETURN TO THE CITY OF HICKORY

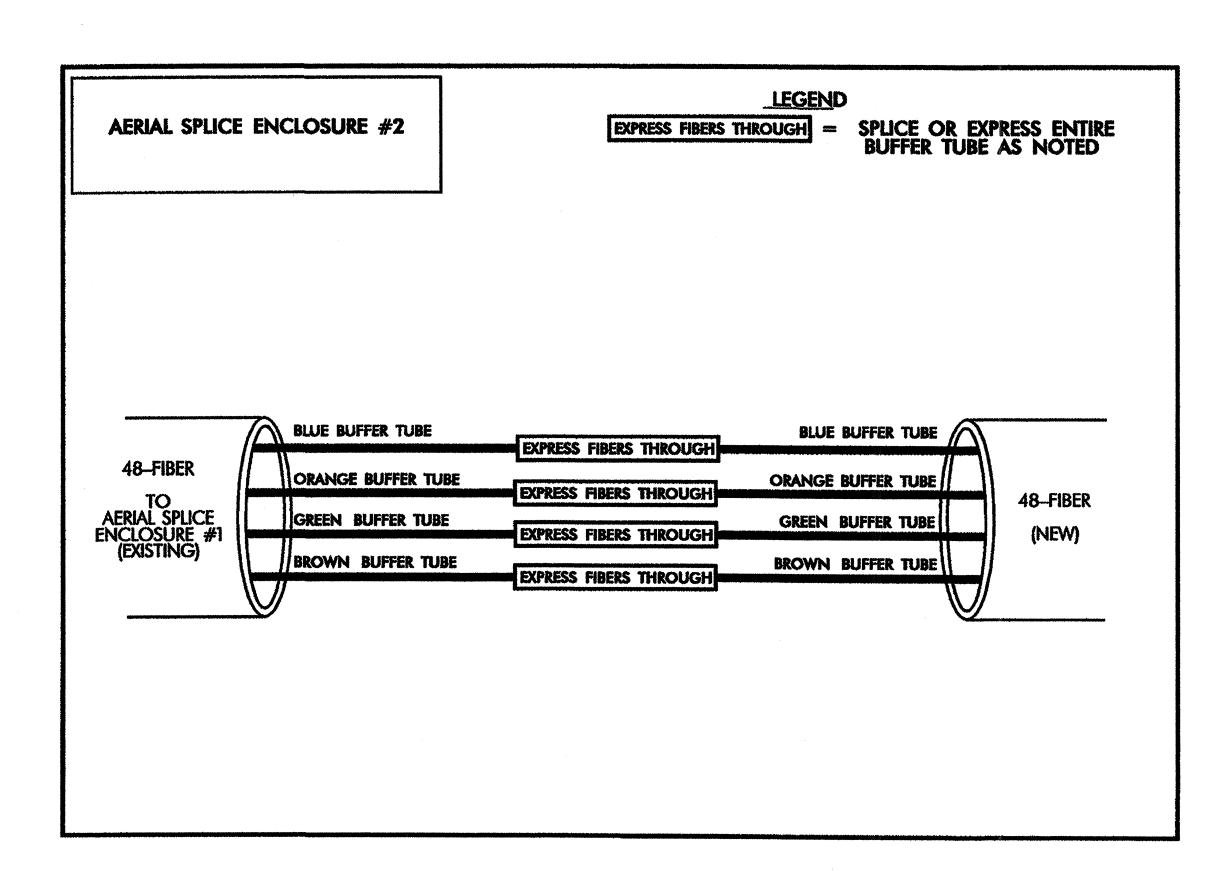
NOTE 2: FURNISH OPTELECOM MODEL 4170-S-ST TRANSCEIVERS FOR COMPATILITY WITH THE EXISTING HICKORY COMPUTERIZED SIGNAL SYSTEM

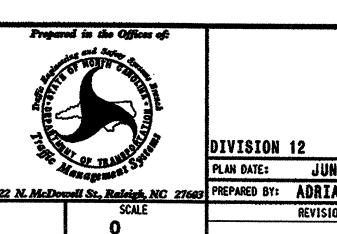
NOTE 3: TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING THE PROPER TERMINATIONS



SINGLE-MODE FIBER OPTIC CABLE







SINGLE-MODE SPLICE PLAN

VISION 12 CATAWBA CO. HICKORY
N DATE: JUNE 2004 REVIEWED BY: I.N. AVERY

PLAN DATE: JUNE 2004 REVIEWED BY: I.N. AVERY
PREPARED BY: ADRIAN CREECH REVIEWED BY: G.G. MURR, JR.
REVISIONS INIT. DATE