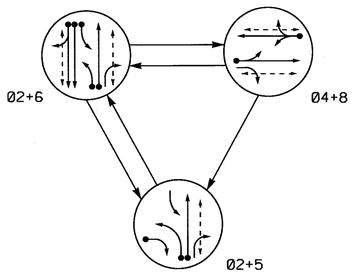
PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	Sig. 1

3 Phase
Fully Actuated
(Cary Signal System)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION				
SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4+8	FLASH
2I, 22	G	G	R	Y
4I	R	R	G	R
42	R/→	R	G	R
5I	←	F/Y	~~R~~	~~Y~~
6I	F/Y	F/Y	~~R~~	~~Y~~
62, 63	R	G	R	Y
8I, 82	R	R	G	R
P2I, P22	W	W	DW	DRK
P4I, P42	DW	DW	W	DRK
P6I, P62	DW	W	DW	DRK
P8I, P82	DW	DW	W	DRK

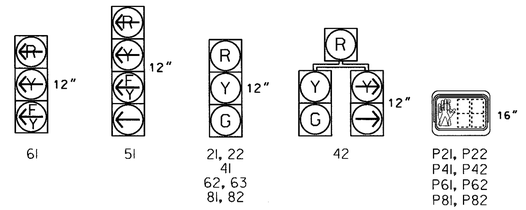
W - Walk
DW - Don't Walk
DRK - Dark

NEMA LOOP & DETECTOR INSTALLATION CHART
with TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	INHIBIT DELAY DURING GREEN?
2A	6X6	300	5	X	-	2	X	-	-	-	NO
4A	6X40	0	2-4-2	X	-	4	X	-	DELAY	3	YES
5A	6X40	0	2-4-2	X	-	5	X	-	DELAY	15	YES
						2	X	-	DELAY	3	NO
5B	6X40	0	2-4-2	X	-	5	X	-	DELAY	15	YES
6A	6X6	300	5	X	-	6	X	-	-	-	NO
6B	6X6	300	5	X	-	6	X	-	-	-	NO
6C	6X40	0	2-4-2	X	-	6	X	-	DELAY	3	YES
8A	6X40	0	2-4-2	X	-	8	X	-	DELAY	5	YES

SIGNAL FACE I.D.

All Heads L.E.D.



6I | 5I | 2I, 22, 4I, 62, 63, 8I, 82 | 42 | P2I, P22, P4I, P42, P6I, P62, P8I, P82

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Program phase 4 and phase 8 for dual entry.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Install pedestrian pushbuttons in accordance with section 4E.08 of the 2009 MUTCD.
10. Pavement markings are existing unless otherwise shown.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

Proposed Metal Pole, Stopbar and Crosswalk Locations

NEMA TIMING CHART
with 2070LN2 CONTROLLER

FEATURE	PHASE 02	04	05	06	08
MINIMUM GREEN *	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
PASSAGE/GAP *	6.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	4.4 SEC.	3.1 SEC.	3.0 SEC.	4.4 SEC.	3.1 SEC.
RED CLEARANCE	1.7 SEC.	3.3 SEC.	3.1 SEC.	1.7 SEC.	3.3 SEC.
MAX. 1 *	90 SEC.	30 SEC.	15 SEC.	90 SEC.	30 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
VEHICLE CALL MEMORY	LOCK	NONLOCK	NONLOCK	LOCK	NONLOCK
WALK *	4 SEC.	4 SEC.	- SEC.	4 SEC.	4 SEC.
FLASHING DON'T WALK	5 SEC.	22 SEC.	- SEC.	12 SEC.	24 SEC.
VOLUME DENSITY	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD *	0 VEH.	- VEH.	- VEH.	0 VEH.	- VEH.
SEC. PER ACTUATION *	1.5 SEC.	- SEC.	- SEC.	1.5 SEC.	- SEC.
MAX. INITIAL *	34 SEC.	- SEC.	- SEC.	34 SEC.	- SEC.
TIME B4 REDUCTION *	15 SEC.	- SEC.	- SEC.	15 SEC.	- SEC.
TIME TO REDUCE *	30 SEC.	- SEC.	- SEC.	30 SEC.	- SEC.
MINIMUM GAP	3.0 SEC.	- SEC.	- SEC.	3.0 SEC.	- SEC.

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
------	2-in Underground Conduit	------
N/A	Right of Way	------
→	Directional Arrow	→
◎	Metal Pole with Mastarm	◎
—DD—	Directional Drill	N/A
⊛	Type I Signal Pedestal	⊛
⬡	Type II Signal Pedestal	⬢
Ⓐ	Right Arrow "ONLY" Sign (R3-5R)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ
Ⓒ	Street Name Sign (D3-1)	Ⓒ

New Installation

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

SR 1387 (West Lake Road) at SR 5439 (Middle Creek Park Avenue) and Wolf's Bane Drive

Division 5 Wake County Cary

PLAN DATE: July 2013 REVIEWED BY:
PREPARED BY: C.E. Carter REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

SIGNATURE DATE 9/20/13

SIG. INVENTORY NO. 05-0066

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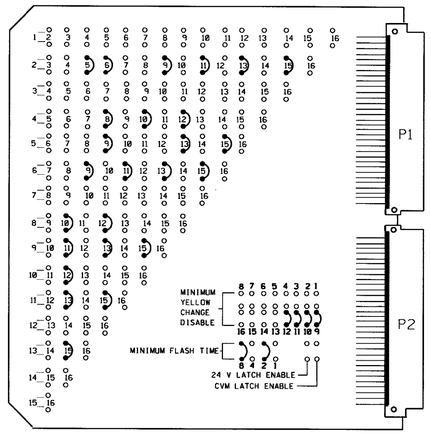
rziemba

PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	Sig. 2

EDI MODEL MMU-16LE
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown below)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	DISABLE
2	ENABLE
3	DISABLE
4	ENABLE
5	ENABLE
6	ENABLE
7	DISABLE
8	ENABLE
9	ENABLE
10	ENABLE
11	ENABLE
12	ENABLE
13	ENABLE
14	DISABLE
15	ENABLE
16	DISABLE

UNIT OPTIONS	
OPTION	SETTING
RECURRENT PULSE	ON
WALK DISABLE	OFF
LOG CVM FAULTS	ON
EXTERN WATCHDOG	OFF
24V-2=12VDC	OFF
PGM CARD MEMORY	ON
LEDguard	ON
FORCE TYPE 16	OFF
TYPE12-SDLC	OFF

FLASHING YELLOW ARROW	
CH. GROUP FOR PROTECTED GREEN ARROWS	CH. 1,3,5,7
ENABLE CHANNEL PAIR, FYA	
CH 1-13	OFF
CH 3-14	OFF
CH 5-15	ON
CH 7-16	OFF

MMU PROGRAMMING NOTE

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

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 1, 3, 7, 14, AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. PROGRAM PHASES 2 AND 6 FOR VOLUME DENSITY.
9. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
10. THE CABINET AND CONTROLLER ARE A PART OF THE CARY CITY SIGNAL SYSTEM.

SIGNAL HEAD HOOK-UP CHART

PHASE	1	2	3	4	5		6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	NU	21,22	NU	41,42	42	51★	62,63	NU	81,82	P21, P22	P41, P42	P61, P62	P81, P82	61★	NU	51★	NU
RED		2R		4R	✱		6R		8R								
YELLOW		2Y		4Y			6Y		8Y								
GREEN		2G		4G			6G		8G								
RED ARROW														13R		15R	
YELLOW ARROW					5Y									13Y		15Y	
FLASHING YELLOW ARROW														13G		15G	
GREEN ARROW				5G	5G												
✋										9R	10R	11R	12R				
🚶										9G	10G	11G	12G				

NU = NOT USED

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

★ SEE PICTORIAL OF HEAD WIRING DETAIL THIS SHEET.

DETECTOR RACK SET-UP DETAIL

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

	SLOT EMPTY	CH1 L1 ø2 2A	CH1 L7 ø5 5B	CH1 L5 ø5 5A	CH1 L11 ø6 6C	CH1 L9 ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
BIU		CH2 L2 ø4 4A	CH2 NOT USED	CH2 L6 ø2 5A	CH2 L12 ø8 8A	CH2 L10 ø6 6B					

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

LOOP NO.	LOOP PANEL TERMINALS
2A	L1A,L1B
4A	L2A,L2B
NU	L3A,L3B
NU	L4A,L4B
ADD JUMPERS FROM: L5A TO L6A, AND L5B TO L6B — 5A	L5A,L5B
	L6A,L6B
5B	L7A,L7B
NU	L8A,L8B
6A	L9A,L9B
6B	L10A,L10B
6C	L11A,L11B
8A	L12A,L12B
NU	L13A,L13B
NU	L14A,L14B
NU	L15A,L15B
NU	L16A,L16B

NU = NOT USED

NOTE

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

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø2		
2	ø4	DELAY	3
3	NU		
4	NU		
5	ø5	DELAY	15
✱6	ø2	DELAY	3
7	ø5	DELAY	15
8	NU		
9	ø6		
10	ø6		
11	ø6	DELAY	3
12	ø8	DELAY	5
13	NU		
14	NU		
15	NU		
16	NU		

✱ THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE REQUIRED DELAY FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

NOTE: Detector rack #2 is not used and is not shown on this electrical detail.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET NC-8 TS-2
SOFTWARE.....ECONOLITE ASC/2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,4,5,6,8,9,10,11,12,13,15
PHASES USED.....2,2PED,4,4PED,5,6,6PED,8,8PED
OLA.....✱
OLB.....NOT USED
OLC.....✱
OLD.....NOT USED

✱ SEE OVERLAP PROGRAMMING DETAIL ON SHEET 2.

LOAD SWITCH ASSIGNMENT DETAIL

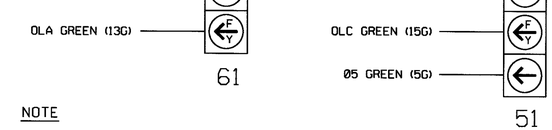
(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0066
DESIGNED: July 2013
SEALED: 9/20/13
REVISED: N/A

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

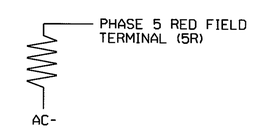
SEE OVERLAP PROGRAMMING DETAIL ON SHEET 2.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

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



New Installation - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1387 (West Lake Road) at SR 5439 (Middle Creek Park Ave) and Wolf's Bane Drive

Division 5 | Wake County | Cary

PLAN DATE: September 2013 | REVIEWED BY: JTR

PREPARED BY: S. Armstrong | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of: Transportation Mobility and Safety Division, NCDEPARTMENT OF TRANSPORTATION, Traffic Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

SEAL 008453 NORTH CAROLINA PROFESSIONAL ENGINEER JOHN T. ROWE, JR

SIGNATURE | DATE 9-23-13

SIG. INVENTORY NO. 05-0066

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Armstrong

PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	Sig. 3

ECONOLITE ASC/2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

FROM MAIN MENU SELECT 2 (CONTROLLER) AND THEN 5 (OVERLAP DATA)

OVERLAP A

CONTROLLER OVERLAP DATA

OVERLAP A.	1	2	3	4	5	6	7	8	9	10	11	12
STANDARD..	.	X	.	.	.	.	.	.	.	.	.	.
PROTECTED.	.	.	.	.	.	.	.	.	.	.	.	.
PERMITTED.	.	.	.	.	.	.	.	.	.	.	.	.
ENABLE LAG	.	.	.	.	.	.	.	.	.	.	.	.
ENABLE LEAD. . . .	.	.	.	.	.	.	.	.	.	.	.	.
SPARE.	.	.	.	.	.	.	.	.	.	.	.	.

ADVANCE GREEN TIMER 0.0
LAG/LEAD GREEN TIMER 0.0
LAG/LEAD YELLOW TIMER 0.0
LAG/LEAD RED TIMER 0.0
ADDITIONAL PAGE(S)

OVERLAP C

CONTROLLER OVERLAP DATA

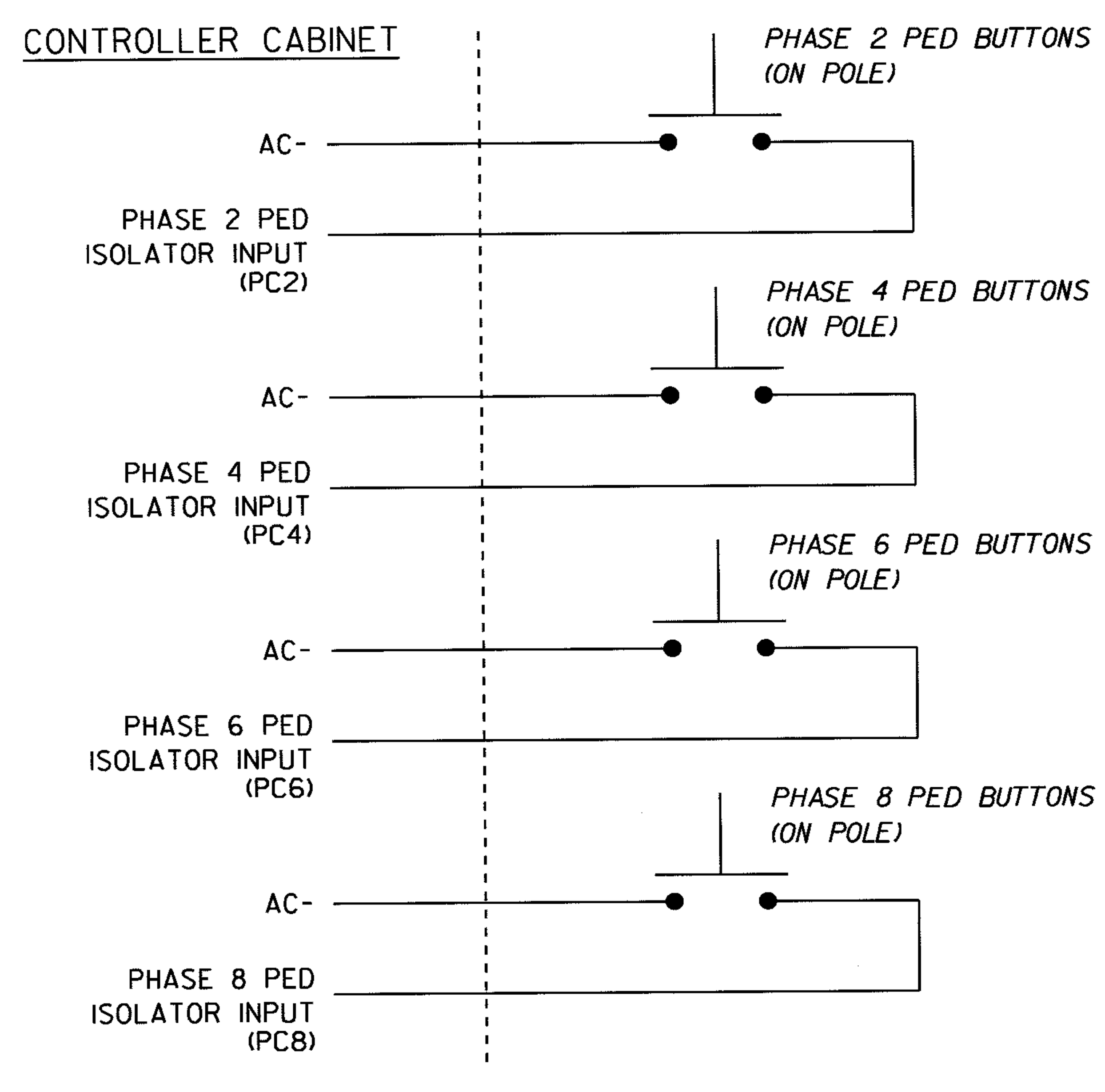
OVERLAP A.	1	2	3	4	5	6	7	8	9	10	11	12
STANDARD..	.	.	.	.	X	.	.	.	.	.	.	.
PROTECTED.	.	.	.	.	X	.	.	.	.	.	.	.
PERMITTED.	.	.	.	.	.	X	.	.	.	.	.	.
ENABLE LAG	.	.	.	.	.	.	.	.	.	.	.	.
ENABLE LEAD. . . .	.	.	.	.	.	.	.	.	.	.	.	.
SPARE.	.	.	.	.	.	.	.	.	.	.	.	.

ADVANCE GREEN TIMER 0.0
LAG/LEAD GREEN TIMER 0.0
LAG/LEAD YELLOW TIMER 0.0
LAG/LEAD RED TIMER 0.0
ADDITIONAL PAGE(S)

END OF OVERLAP PROGRAMMING

PEDESTRIAN PUSH-BUTTON WIRING DETAIL

(wire push-buttons as shown below)



WRITE-PROTECT FOR FLASHING YELLOW ARROWS DETAIL

(program controller as shown below)

FROM MAIN MENU SELECT 8 (UTILITIES) AND THEN 9 (WRITE PROTECT DATA)

UTILITIES SUBMENU

1. COPY	5. SIGN ON
2. MEMORY CLEAR	6. LOG BUFFERS
3. RESERVED	7. SEND D.M.
4. RESERVED	8. D.M. UTILS

PRESS KEYS 1..8 TO SELECT

WRITE PROTECT DATA

ADDRESS	1/9
008-00F	50

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

ECONOLITE ASC/2070 SPECIAL MMU PROGRAMMING

(program controller as shown below)

CONFIGURATION SUBMENU

1. CONTROLLER SEQUENCE	6. PORT 3
2. PHASES IN USE	7. ENABLE LOGGING
3. PH TO LS ASSIGNMENT	8. OPTIONS
4. SDLC OPTIONS	9. MMU PROGRAM
5. PORT 2	

PRESS KEYS 1..9 TO SELECT

MMU PROGRAM

CAN SERVE WITH:

CHANNEL	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	X	.	X	.	X	.	X	.	.	X	X	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.		
4	.	.	.	.	X	.	X	.	X	.	.	.			
5	.	X	.	X	.	.	.	X	.	.	.				
6	.	X	.	X	.	X	.	X	.	.					
7	.	.	.	.	.	.	.	.	.						
8	.	.	.	.	X	.	X	.							
9	.	X	.	X	.	X	.								
10	.	.	.	.	X	.									
11	.	X	.	X	.										
12	.	.	.	.											
13	.	X	.												
14	.	.													
15	.														

END OF SUBMENU

CAUTION!

SET INTERSECTION TO FLASH BEFORE ATTEMPTING TO ENTER OR CHANGE ANY MMU PROGRAMMING DATA.

THIS PROGRAMMING AND THAT OF THE MMU PROGRAMMING CARD MUST MATCH EXACTLY. IF THEY DO NOT, THE INTERSECTION WILL BE PLACED INTO FLASH.

New Installation - Sheet 2 of 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0066
DESIGNED: July 2013
SEALED: 9/20/13
REVISED: N/A

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1387 (West Lake Road)
at
SR 5439 (Middle Creek Park Ave) and Wolf's Bane Drive

Division 5	Wake County	Cary
PLAN DATE: September 2013	REVIEWED BY: JTR	
PREPARED BY: S. Armstrong	REVIEWED BY:	
REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, SR.

9-23-13

SIGNATURE DATE

SIG. INVENTORY NO. 05-0066

23-SEP-2013 06:34
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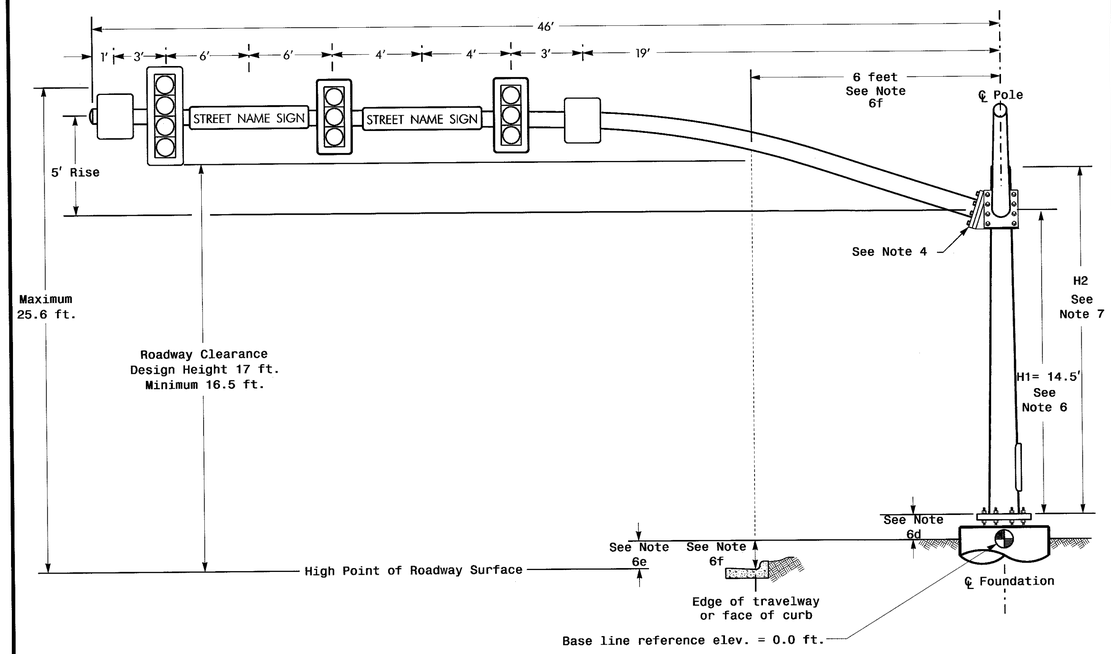
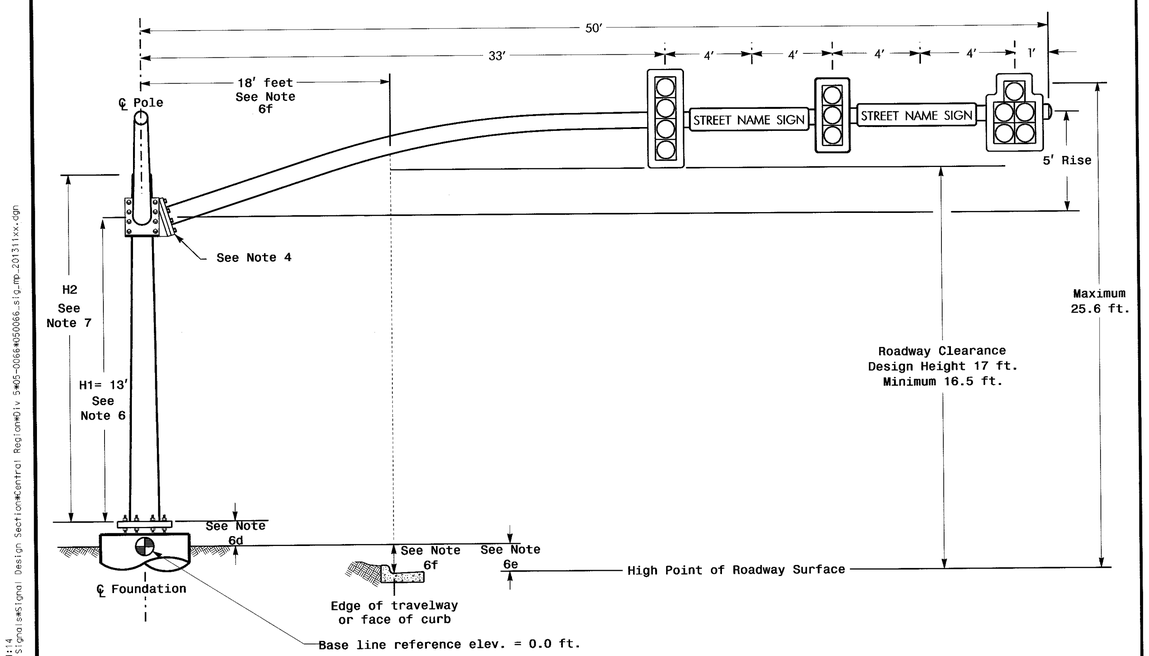
sarmstrong

Design Loading for METAL POLE NO. 1, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 1, MAST ARM B



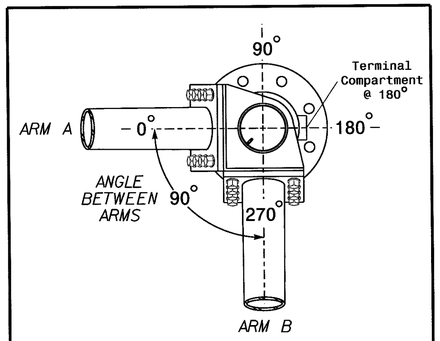
Elevation View @ 0°

SPECIAL NOTE

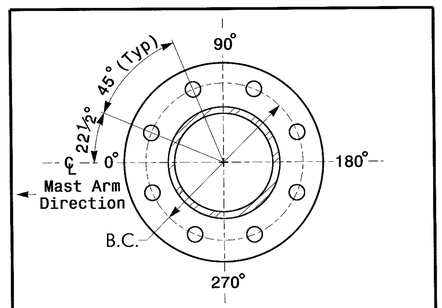
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.2 ft.	-1.4 ft.
Elevation difference at Edge of travelway or face of curb	-0.1 ft.	-0.8 ft.

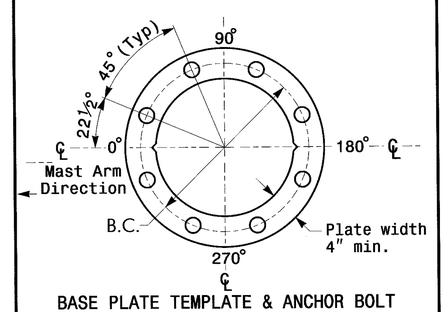


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	Sig. 4

MAST ARM LOADING SCHEDULE

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"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC	11.5 S.F.	25.5" W X 66.0" L	74 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

1. Design the traffic signal structure and foundation in accordance with:
   - The 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2012 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.ncdot.org/doh/preconstruct/traffic/ITSS/ws/mpoles/poles.html

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate connection points.
5. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
6. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
   b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is .75 feet above the ground elevation.
   e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
   f. Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
7. The pole manufacturer will determine the total height (H2) of the 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.
8. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Structural Engineer for assistance at (919) 773-2800.
9. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
10. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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

SR 1387 (West Lake Road) at SR 5439 (Middle Creek Park Avenue)
Wolf's Bane Drive

Division 5 | Wake County | Cary

PLAN DATE: August 2013 | REVIEWED BY:

PREPARED BY: C.E. Carter | REVIEWED BY:

SCALE: 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIENBA
SIGNATURE 11/19/13 DATE

SIG. INVENTORY NO. 05-0066

18-NOV-2013 14:14
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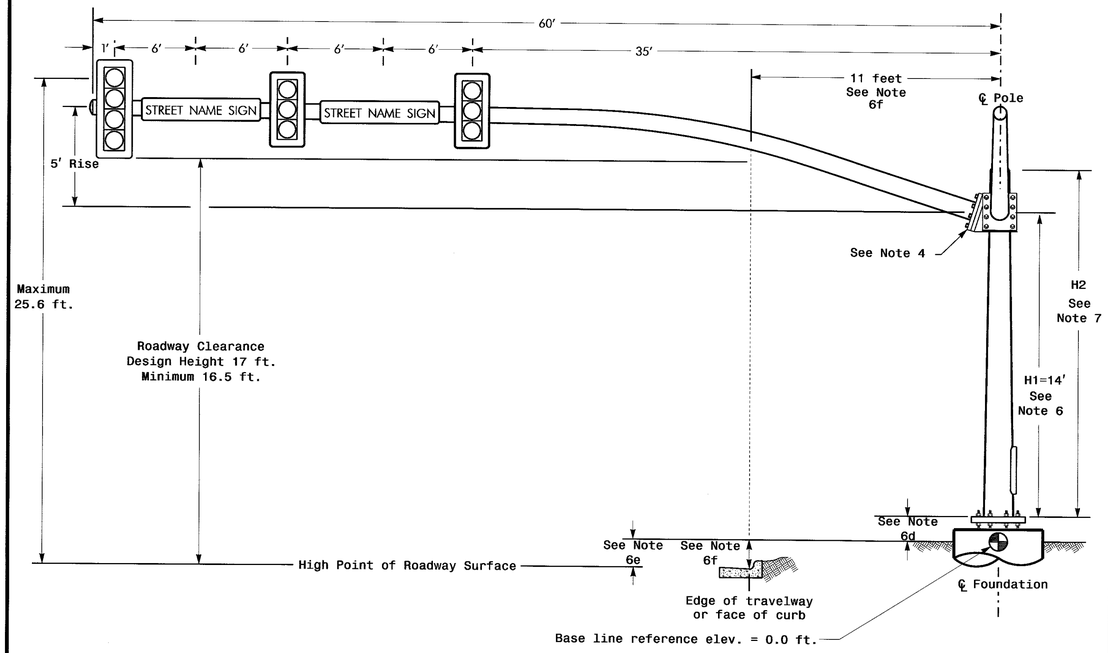
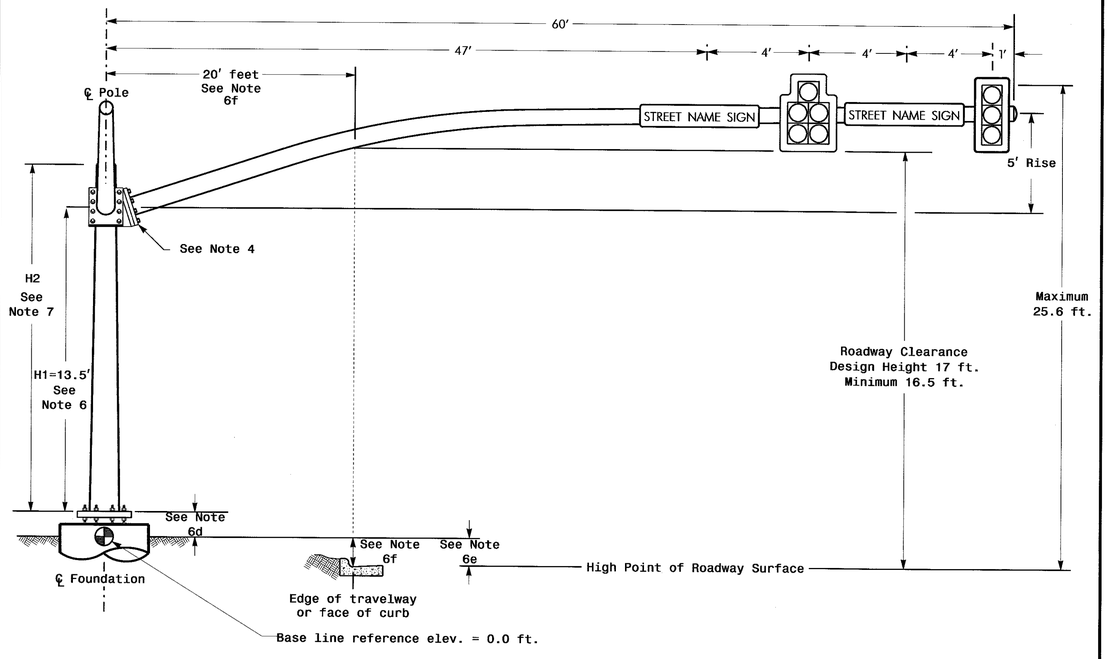
rzienba

Design Loading for METAL POLE NO. 2, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 2, MAST ARM B



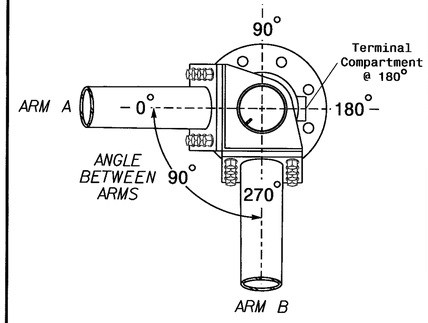
Elevation View @ 0°

SPECIAL NOTE

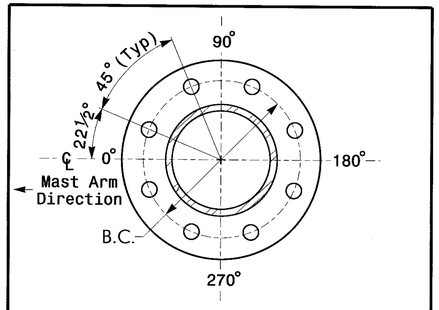
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.1 ft.	-0.5 ft.
Elevation difference at Edge of travelway or face of curb	-0.5 ft.	-0.2 ft.

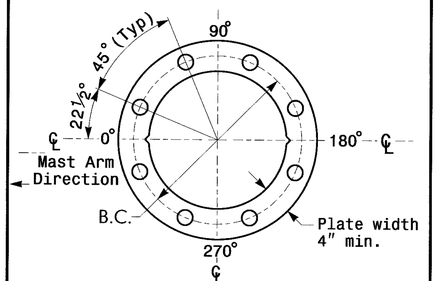


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
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NCDOT Wind Zone 4 (90 mph)

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

SR 1387 (West Lake Road)
at
SR 5439 (Middle Creek Park Avenue)
Wolf's Bane Drive

Division 5 Wake County Cary

PLAN DATE: August 2013 REVIEWED BY:

PREPARED BY: C.E. Carter REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

SIGNATURE DATE 11/18/13

SIG. INVENTORY NO. 05-0066

18-NOV-2013 13:08
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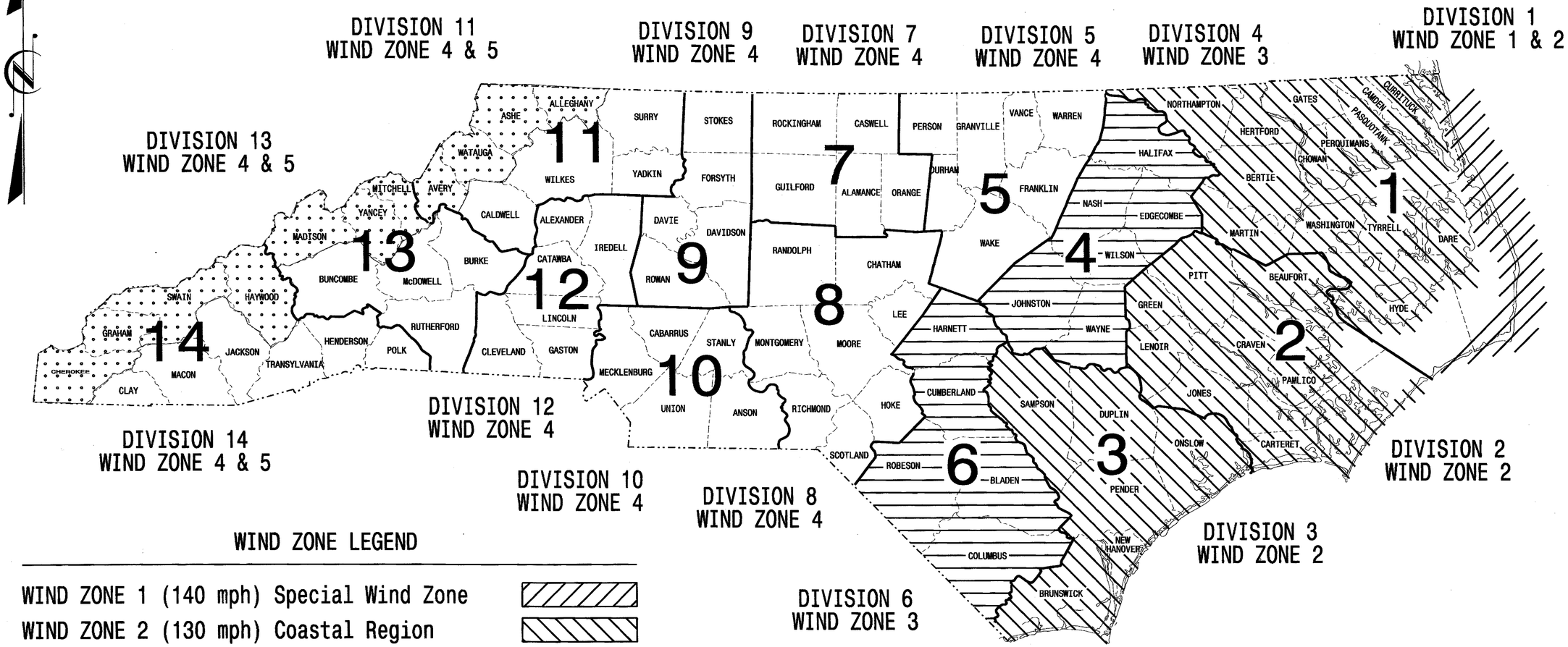
STATE	PROJECT NO.	SHEET NO.
N.C.	SR-5001BY	Sig. 6
F. A. PROJ. NO.		M 1
PROJECT ID. NO.		

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR METAL POLES

NCDOT METAL POLE STANDARDS



WIND ZONE LEGEND

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

https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

Prepared In the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

Designed in conformance with the latest 2012 Interim to the 5th Edition 2009

AASHTO

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

INDEX OF PLANS

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION – ITS AND SIGNALS UNIT

G. A. FULLER, P.E. – STATE ITS AND SIGNALS ENGNEER

G. G. MURR, JR., P.E. – STATE SIGNALS ENGINEER

D.C. SARKAR, P.E. – ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER

C.F. ANDREWS – ITS AND SIGNALS JOURNEY STRUCTUIRAL ENGINEER

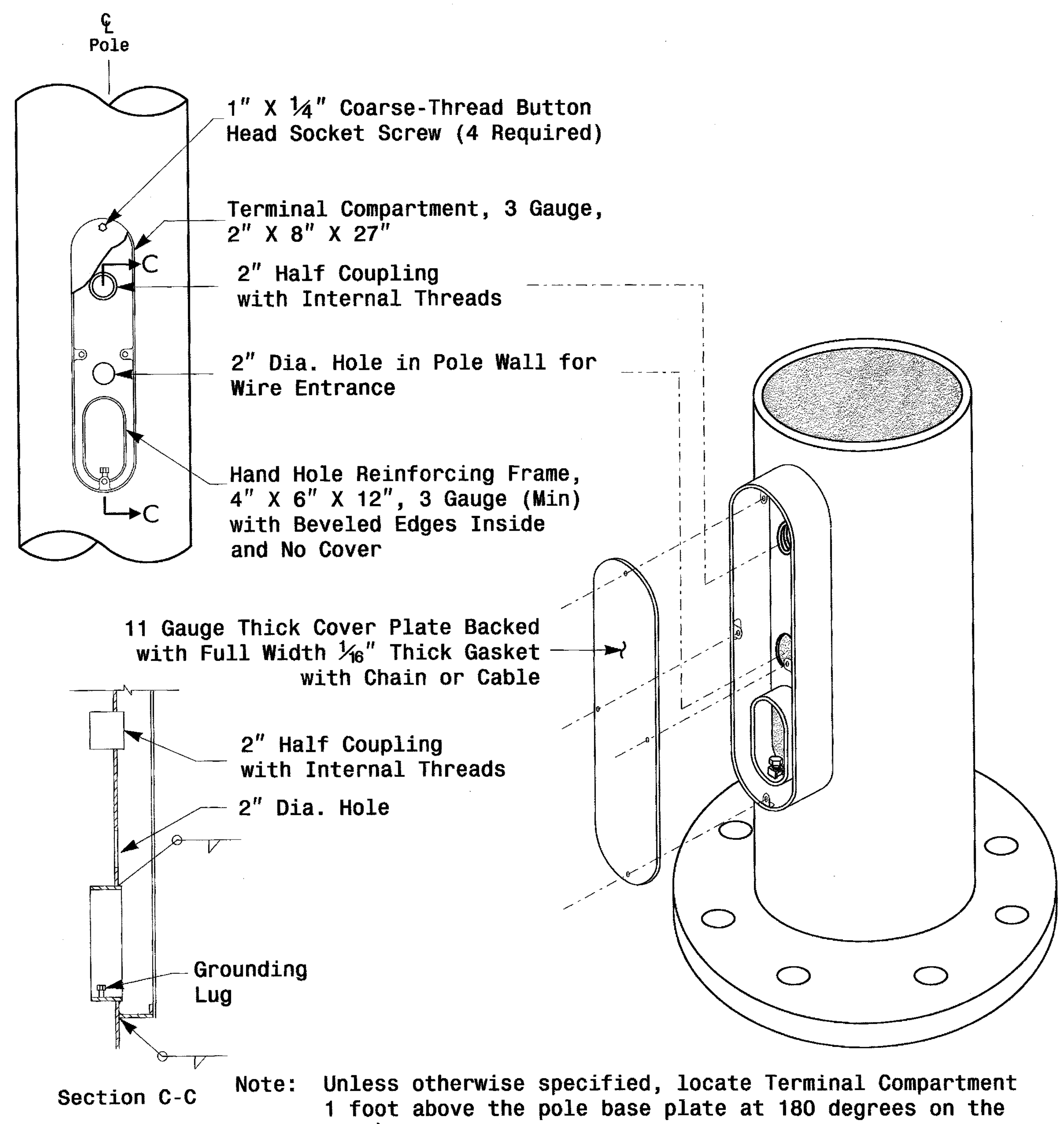
SEAL

NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

D. Sarkar 8.7.2013
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	Sig.7 M 2

Fabrication Details - All Poles



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

Terminal Compartment Detail

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

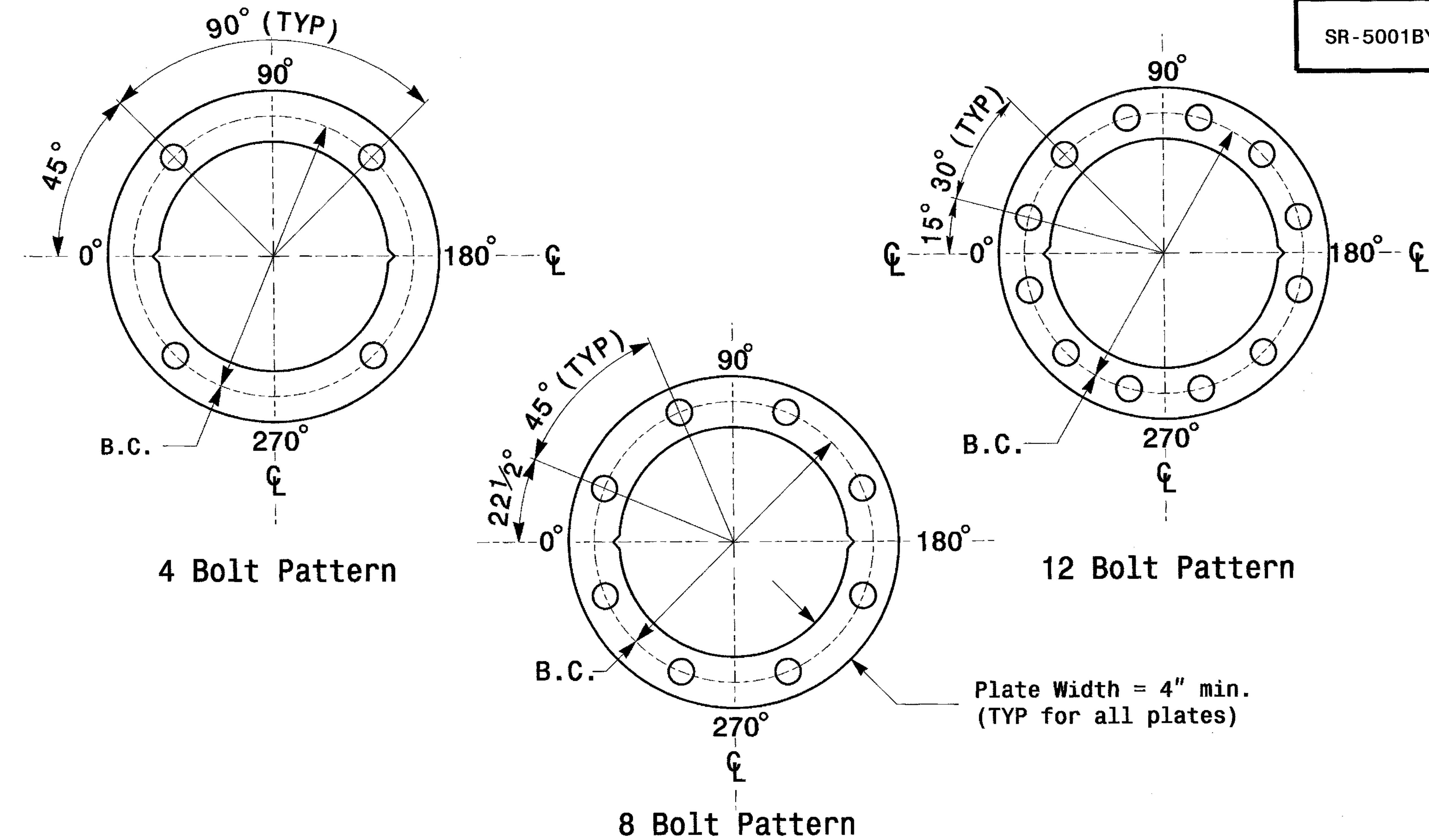
Shaft I.D. Tag
(Provide on Strain Poles and Mast Arm Poles)

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

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

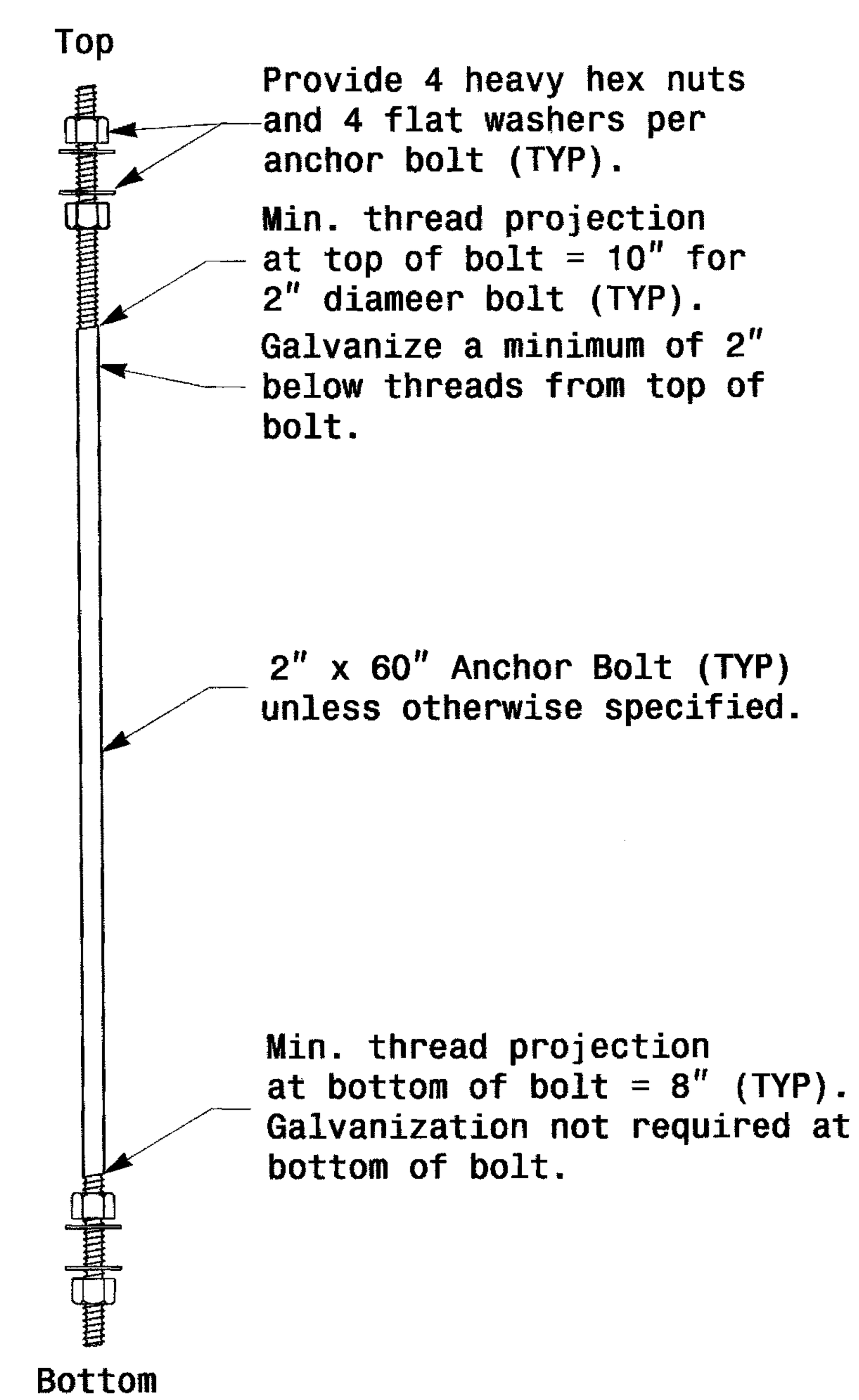
Notes:
1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
2) A.B. = Anchor Bolt
3) B.C. = Bolt Circle of Anchor Bolts
4) If Custom Design, use "NCDOT STANDARD" line for pole I.D. number and Signal Inv. Number.
5) See drawing M4 for mounting positions of I.D. tags.

Identification Tag Details



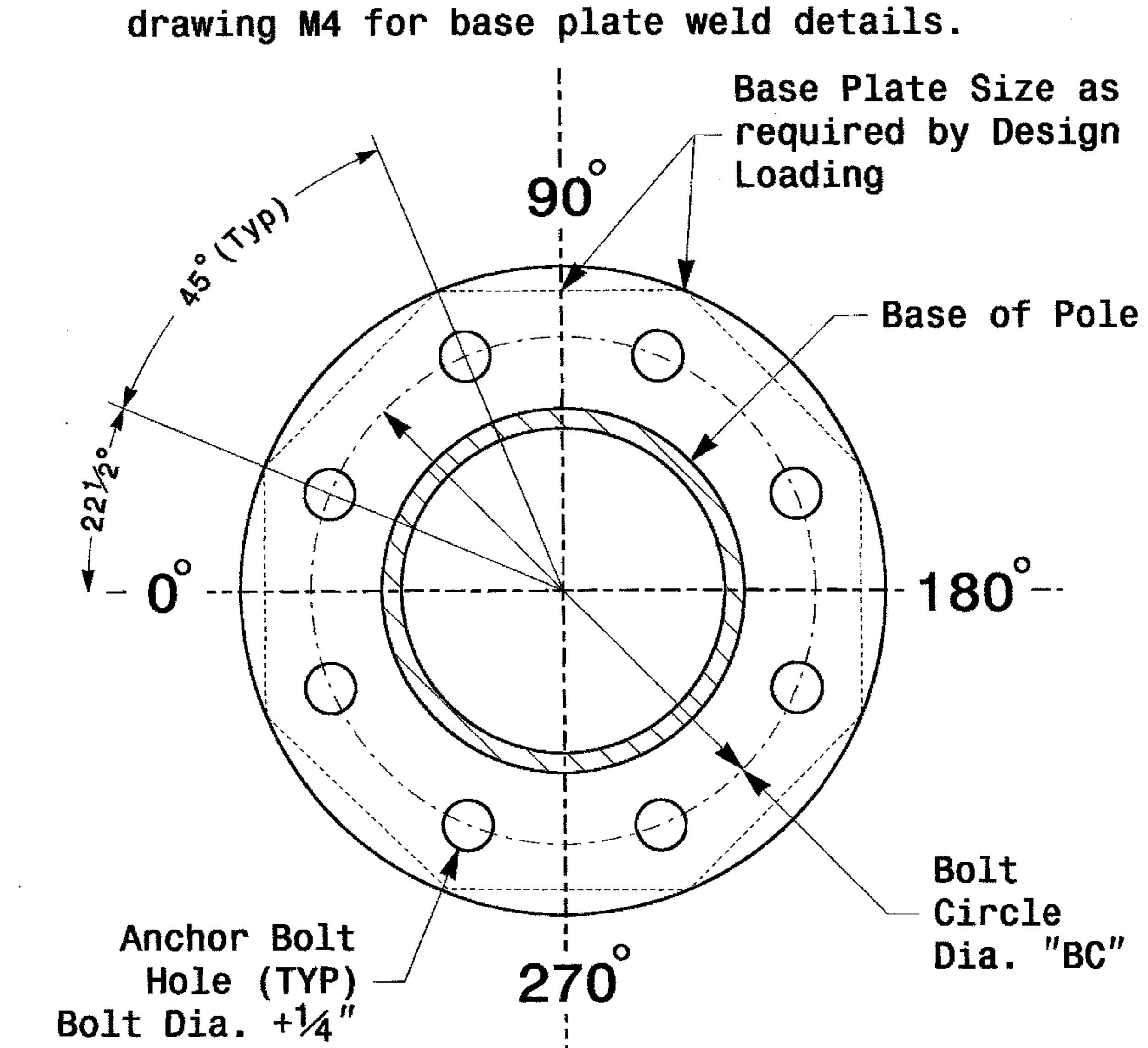
Construct Templates and Plates from ¼" min. thick Steel. Galvanizing is not required.

Base Plate Template and Anchor Bolt Lock Plate Details



Anchor Bolt Detail

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



8 Bolt Base Plate Detail

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

Typical Fabrication Details
Common To
All Metal Poles

PLAN DATE:	AUGUST 2013	DESIGNED BY:	C.F. ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

SCALE
0 NA
NONE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

D. Sarkar 8-7-2013
SIGNATURE DATE
SIG. INVENTORY NO.

07-AUG-2013 13:15
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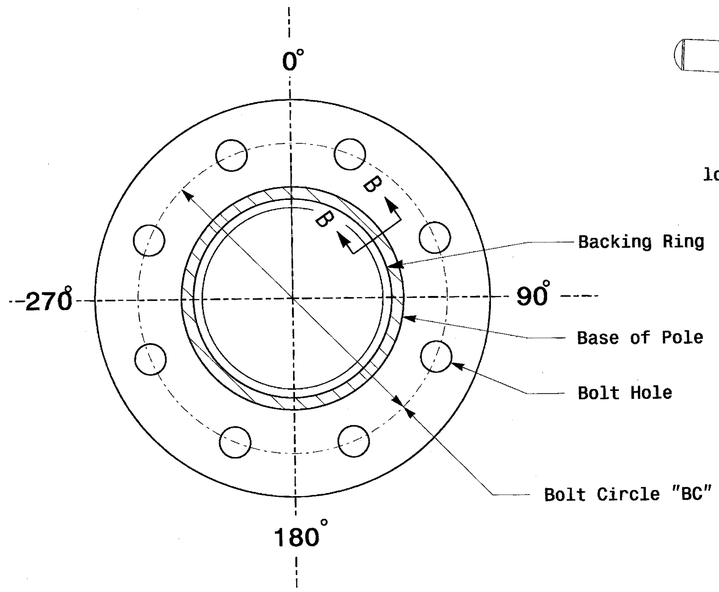
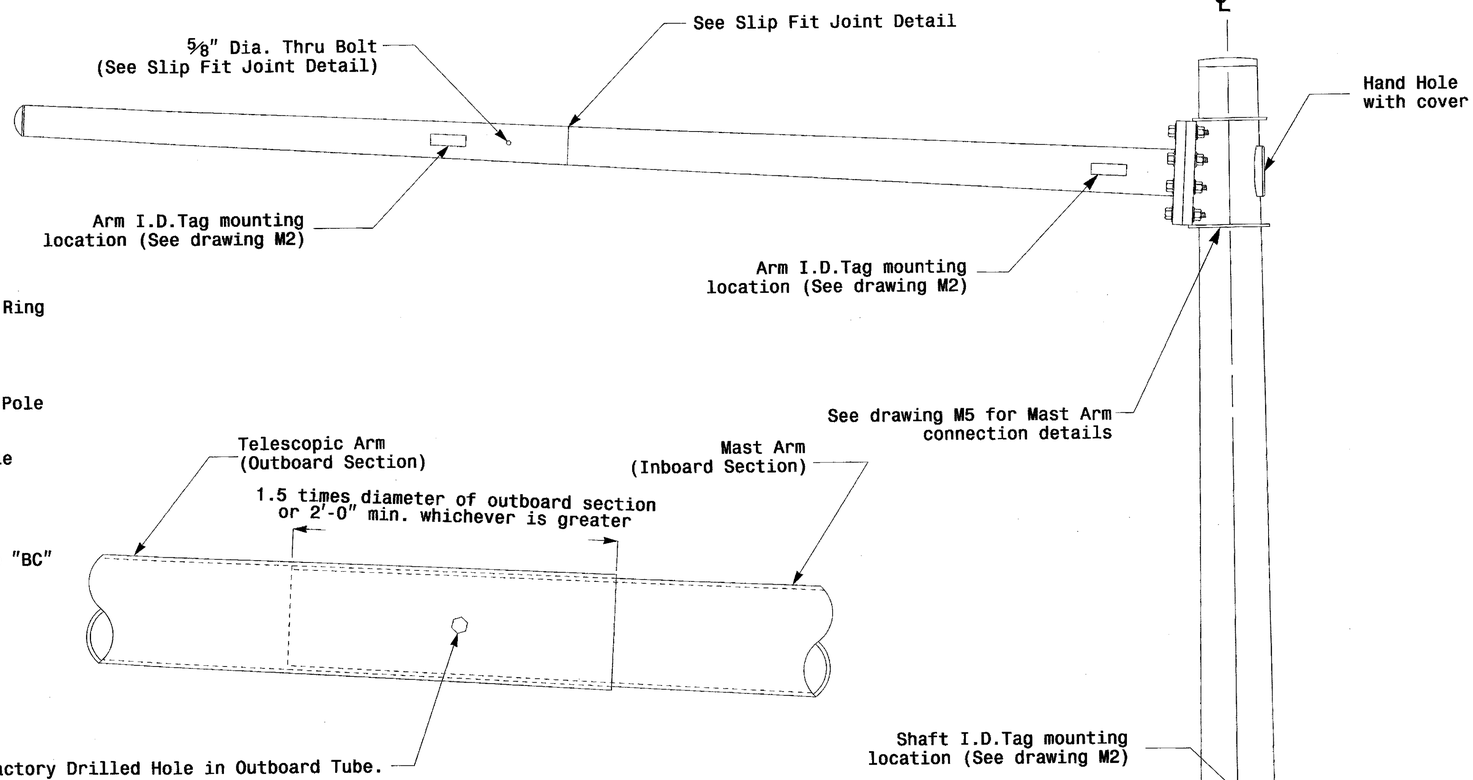
PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	Sig. 8 M 4



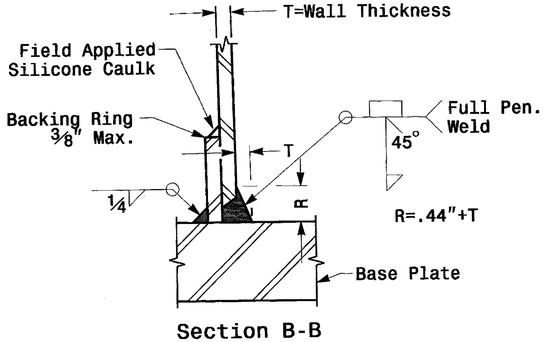
Section A-A

(See drawing M 2)

Pole Base Plate



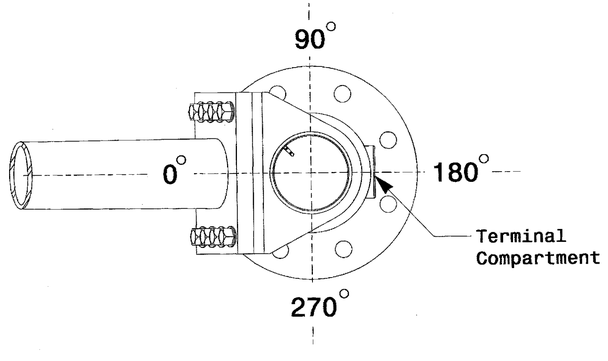
Slip Fit Joint Detail for Mast Arm



Section B-B

(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail



Mast Arm Radial Orientation

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

Fabrication Details – Mast Arm Poles

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

Typical Fabrication Details for Mast Arm Poles

PLAN DATE:	AUGUST 2013	DESIGNED BY:	C.F. ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

SCALE: 0 NA NONE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DIBESH C. SARKAR

D.Sarkar 8.7.2013
SIGNATURE DATE

SIG. INVENTORY NO.

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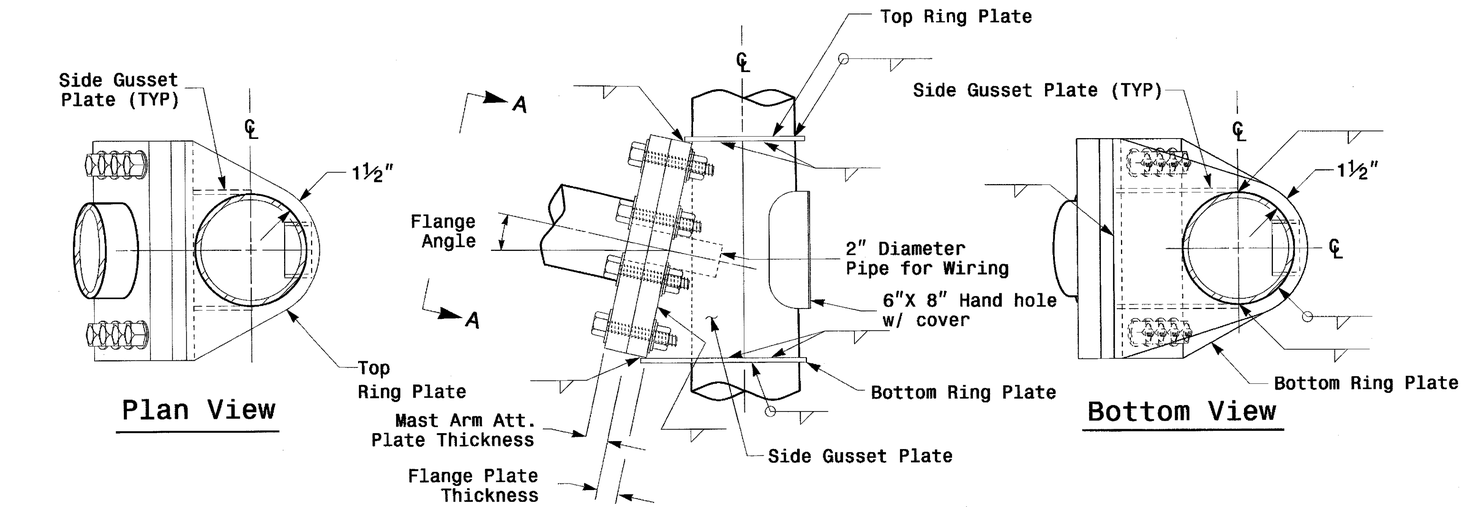
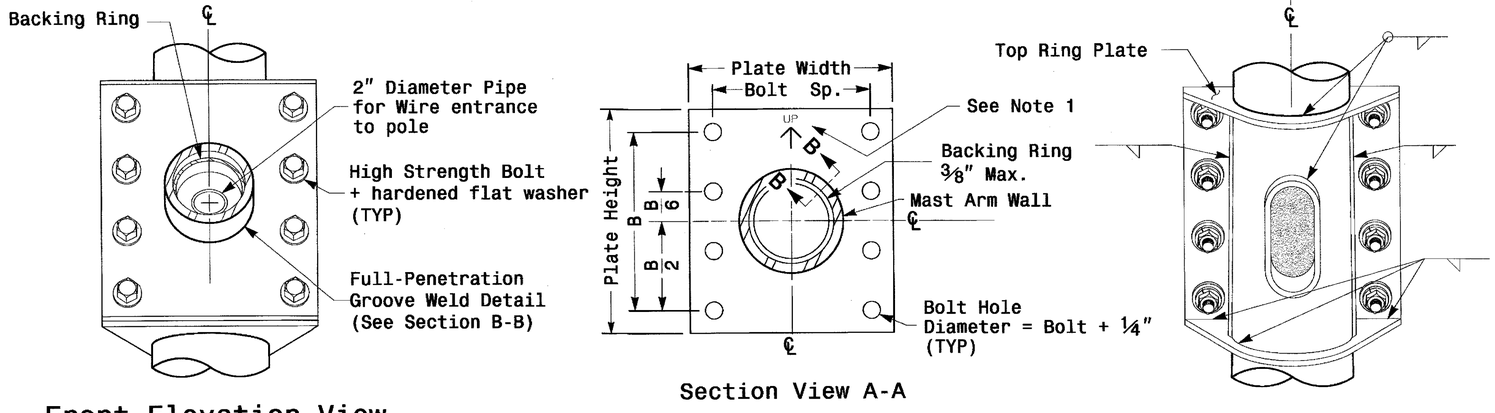
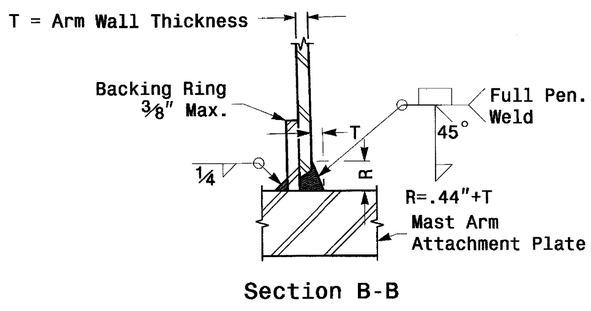
PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	Sig. 9 M 5

Welded Ring Stiffened Mast Arm Connection







Notes:

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

Fabrication Details – Mast Arm Poles

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

Fabrication Details For Mast Arm Connection To Pole

PLAN DATE:	AUGUST 2013	DESIGNED BY:	C.F. ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

SCALE: 0 NA NONE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

D.Sarkar 8.7.2013
SIGNATURE DATE

SIG. INVENTORY NO.

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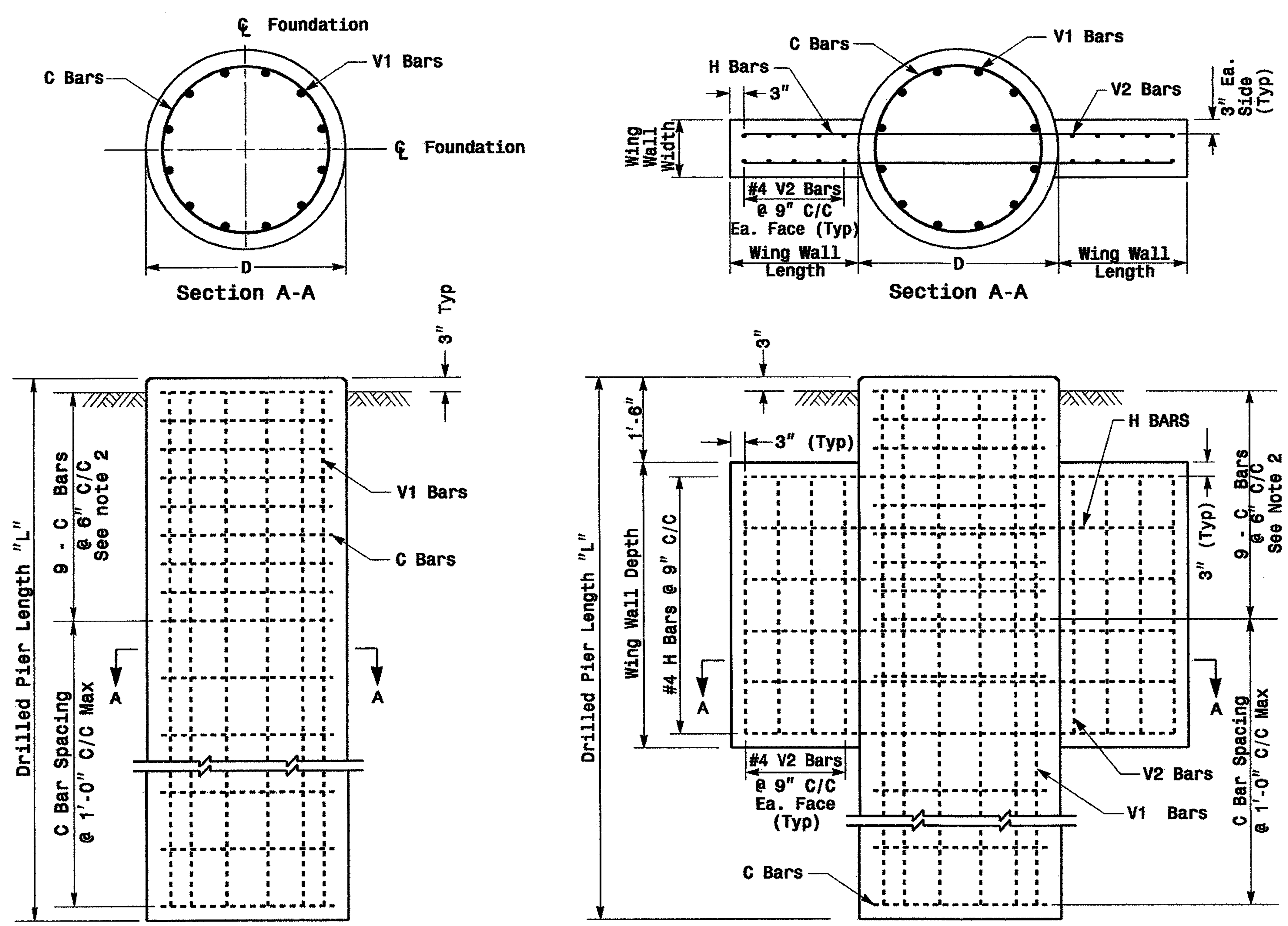
Reinforcing Steel Bars



REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER)						
Shaft Dia (in.)	Conc. Volume (cu. yds.)	Bar Name	No.	Size	Type	Length
42"	.356 x L	V1	9	#8	STR.	**
		C	*	#4	CIR.	10'-9"
48"	.465 x L	V1	12	#8	STR.	**
		C	*	#4	CIR.	12'-6"

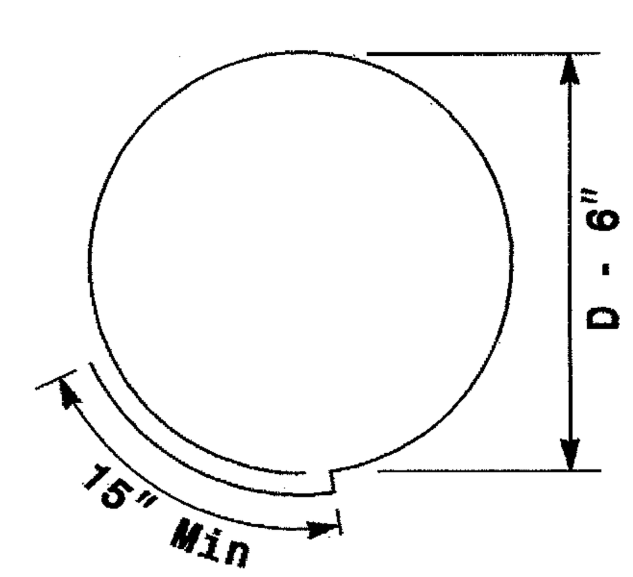
* See Note No. 1
** See Note No. 3

REINFORCING STEEL TABLE FOR STANDARD 42" and 48" DRILL PIER SHAFT WITH TYPE 1 AND TYPE 2 WING WALLS						
Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel				
		Bar Name	No.	Size	Type	Length
TYPE 1	42"	V1	9	#8	STR.	**
		V2	12	#4	STR.	2'-6"
		H	8	#4	STR.	6'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	42"	V1	9	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	48"	V1	12	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-6"
		C	*	#4	CIR.	12'-6"

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

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

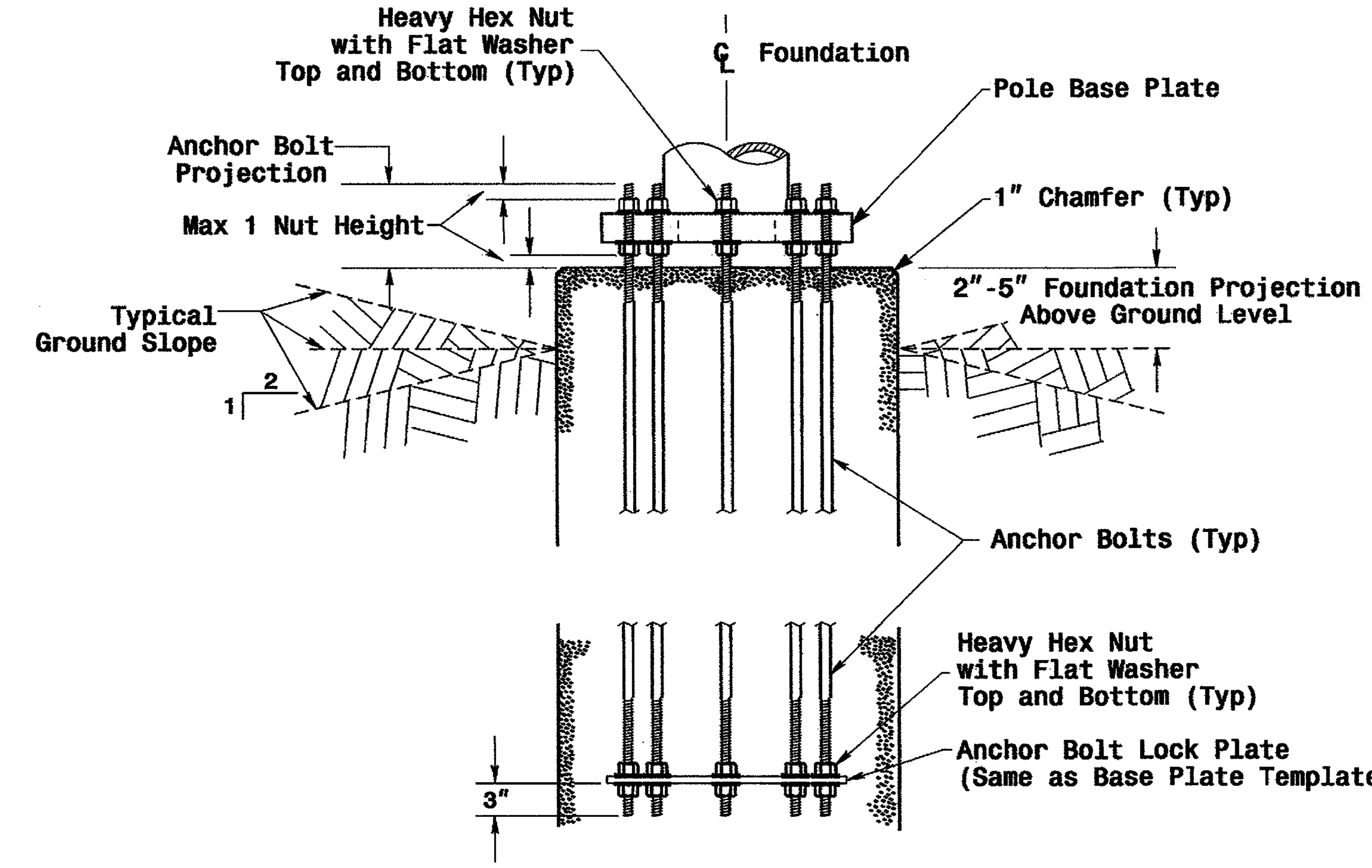
See Note No. 4



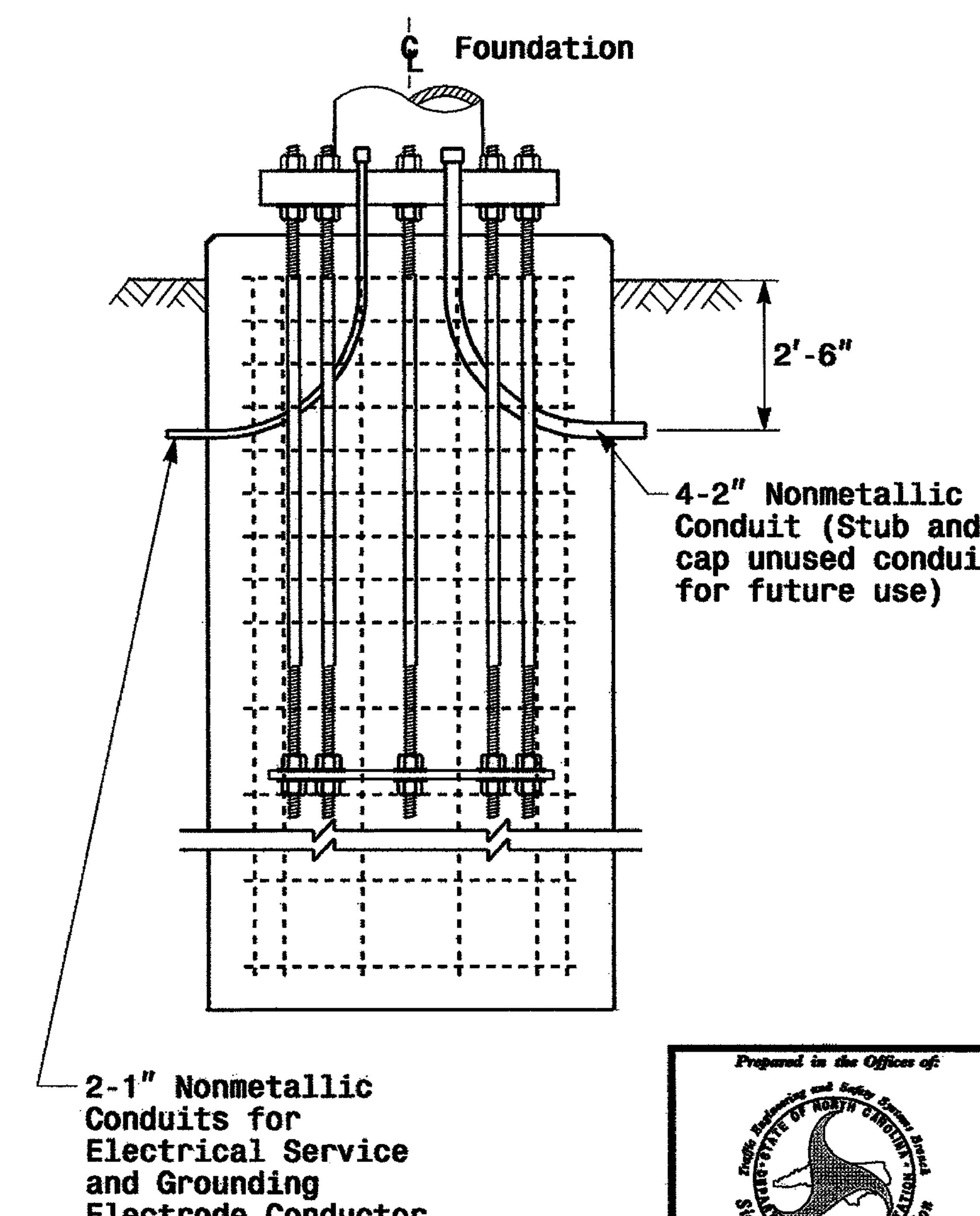
Typical "C" Bars

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



Notes

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

PROJECT REFERENCE NO. SR-5001BY | SHEET NO. Sig. 10 M 7

Construction Details – Foundations

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

Construction Details Foundations

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

SCALE 0 NA NONE

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

01-SEP-2005 17:48 w:\peoples-unit\workgroups\2004 metal pole standards\2004 m7.dgn palexander

PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	SIG.11

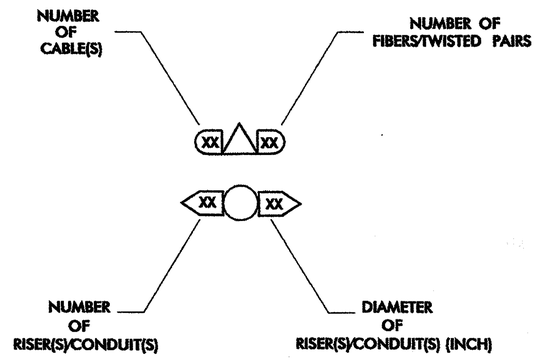
1. INSTALL REA, PE – 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
2. INSTALL REA, PE – 38, (FIGURE 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
3. INSTALL REA, PE – 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
4. INSTALL SMFO CABLE
5. INSTALL MMFO CABLE
6. INSTALL FIBER OPTIC DROP CABLE
7. INSTALL TRACER WIRE
8. TRENCH
9. INSTALL PVC CONDUIT
10. INSTALL RIGID, GALVANIZED STEEL CONDUIT
11. INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
12. INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
13. INSTALL OUTER-DUCT POLYETHYLENE CONDUIT
14. INSTALL POLYETHYLENE CONDUIT
15. DIRECTIONAL DRILL CONDUIT
16. BORE AND JACK CONDUIT
17. INSTALL CABLE(S) IN EXISTING CONDUIT
18. INSTALL CABLE(S) IN NEW CONDUIT
19. INSTALL CABLE(S) IN EXISTING RISER
20. INSTALL CABLE(S) IN NEW RISER
21. INSTALL CABLE(S) IN EXISTING CONDUIT STUB-OUTS
22. INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
23. INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
24. INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
25. INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
26. TERMINATE COMMUNICATIONS CABLE ON EXISTING TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
27. INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
28. INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPLICE CABLE IN CABINET
29. INSTALL UNDERGROUND SPLICE ENCLOSURE
30. INSTALL AERIAL SPLICE ENCLOSURE
31. INSTALL POLE MOUNTED SPLICE CABINET
32. INSTALL BASE MOUNTED SPLICE CABINET
33. REMOVE EXISTING SPLICE CABINET
34. INSTALL CABINET FOUNDATION
35. REMOVE EXISTING CABINET FOUNDATION
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL CCTV CAMERA WOOD POLE
38. INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
39. INSTALL JUNCTION BOX
40. INSTALL OVERSIZED JUNCTION BOX
41. REMOVE EXISTING JUNCTION BOX
42. INSTALL WOOD POLE
43. REMOVE EXISTING WOOD POLE
44. INSTALL AERIAL GUY ASSEMBLY
45. INSTALL STANDARD GUY ASSEMBLY
46. INSTALL SIDEWALK GUY ASSEMBLY
47. INSTALL MESSENGER CABLE
48. REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
49. REMOVE EXISTING MESSENGER CABLE
50. INSTALL TELEPHONE SERVICE
51. INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
52. INSTALL DELINEATOR MARKER
53. STORE 20 FEET OF COMMUNICATIONS CABLE
54. LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
55. LASH CABLE(S) TO EXISTING MESSENGER CABLE
56. LASH CABLE(S) TO NEW MESSENGER CABLE
57. MODIFY EXISTING ELECTRICAL SERVICE
58. INSTALL NEW ELECTRICAL SERVICE

LEGEND

- FO — NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST PR — NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXI — EXISTING COMMUNICATIONS CABLE
- REM — EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD — NEW DIRECTIONAL DRILLED CONDUIT
- B&J — NEW BORED AND JACKED CONDUIT
- NEW JUNCTION BOX
- EXISTING JUNCTION BOX
- NEW WOOD POLE
- EXISTING WOOD POLE
- (S) AERIAL SPLICE ENCLOSURE
- NEW METAL POLE
- EXISTING METAL POLE
- NEW CCTV ASSEMBLY
- NEW STANDARD GUY ASSEMBLY
- NEW SIDEWALK GUY ASSEMBLY
- NEW CABLE STORAGE RACKS (SNOW SHOES)
- EXISTING CONTROLLER AND CABINET
- S EXISTING SPLICE CABINET
- S NEW SPLICE CABINET
- SP SIGNAL POLE
- XX-XXXX SIGNAL INVENTORY NUMBER

CONSTRUCTION NOTE SYMBOLOGY KEY

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



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

CONSTRUCTION NOTES

PLAN DATE: | REVIEWED BY:
PREPARED BY: G. A. FULLER | REVIEWED BY:

REVISIONS	INIT.	DATE

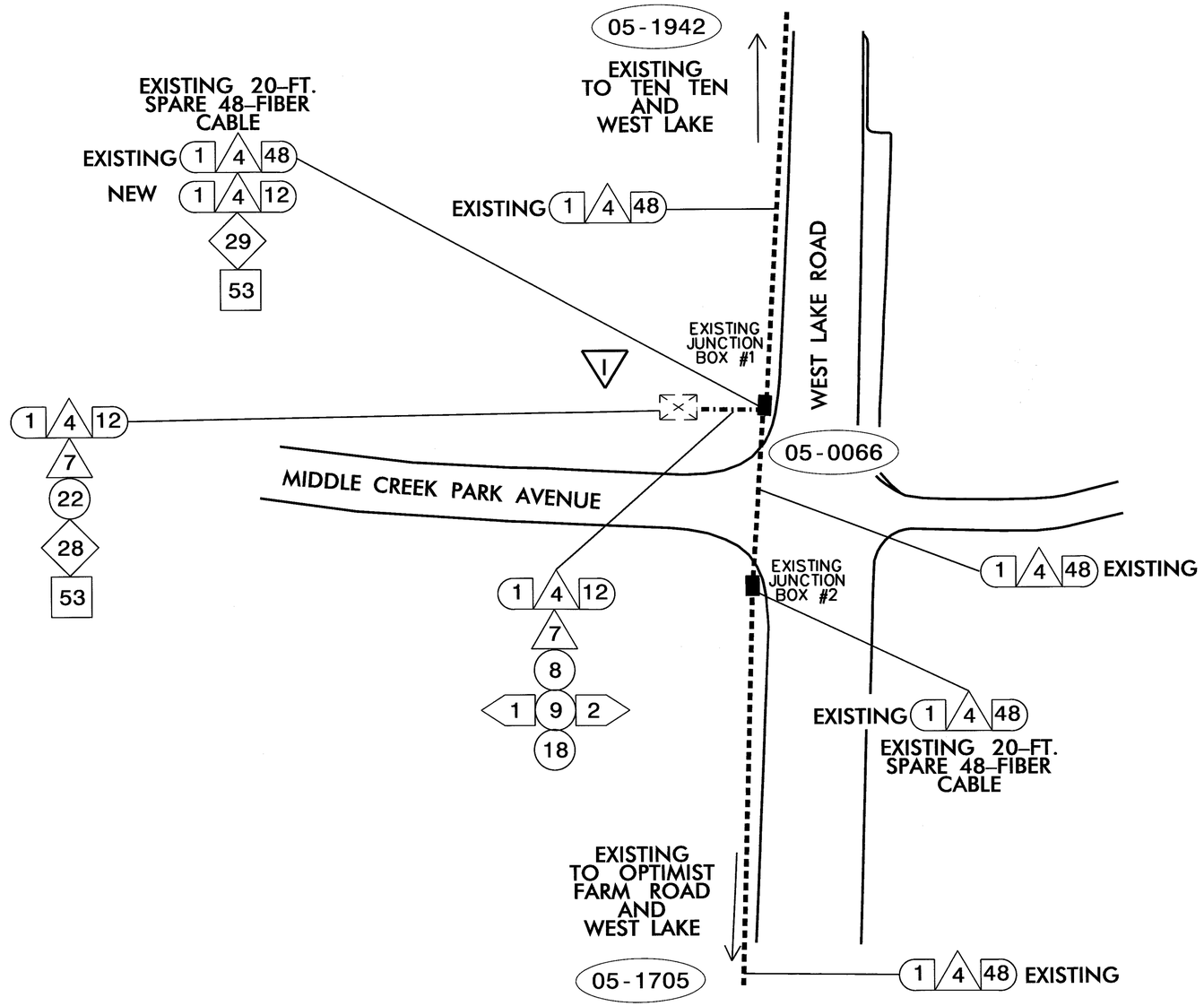
SCALE 0

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE 10/31/22 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	SIG.



NOTE:

1. CONTRACTOR TO CONTACT THE TOWN OF CARY OPERATIONS MANAGER OF PUBLIC WORKS AT (919) 469-4090 PRIOR TO BEGINNING ANY WORK.

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

SCALE: 0

CABLE ROUTING PLAN FOR WEST LAKE ROAD AND MIDDLE CREEK PARK AVENUE

DIVISION 5 WAKE CO. CARY

PLAN DATE: SEPTEMBER 2013 REVIEWED BY: I. N. AVERY

PREPARED BY: HEIDI T. BERGGREN REVIEWED BY: G. A. FULLER, PE

REVISIONS	INIT.	DATE
1 RELOCATE CABINET TO THE NW QUADRANT AND UPDATE CONTACT INFORMATION.	HTB	NOV 2013 11/27/13

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE 10/1/13 DATE

CADD FTIename:

PROJECT REFERENCE NO.	SHEET NO.
SR-5001BY	SIG.

NEW UNDERGROUND SPLICE ENCLOSURE AT WEST LAKE ROAD AND MIDDLE CREEK PARK AVENUE SIN #05-0066

LEGEND

COLOR CODE TIA/EIA 598-A

(1)	BLUE	(7)	RED
(2)	ORANGE	(8)	BLACK
(3)	GREEN	(9)	YELLOW
(4)	BROWN	(10)	VIOLET
(5)	SLATE	(11)	ROSE
(6)	WHITE	(12)	AQUA

X – FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE – SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

SPLICE ALL FIBERS IN BLUE, ORANGE, AND BROWN BUFFER TUBES IN CABLE 1E FROM TEN TEN ROAD TO LIKE FIBER COLORS IN BLUE, ORANGE, AND BROWN BUFFER TUBES IN CABLE 1E TO OPTIMIST FARM RD.

NEW UNDERGROUND SPLICE ENCLOSURE

EXISTING

CABLE 1E TO INTERSECTON 05-1942 (TEN TEN ROAD AND WEST LAKE ROAD)

48 FIBERS IN 4 BUFFER TUBES

BLUE — BUFFER TUBE

ORANGE — BUFFER TUBE

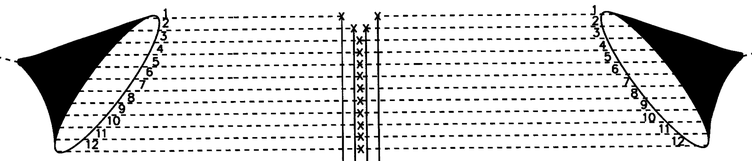
GREEN

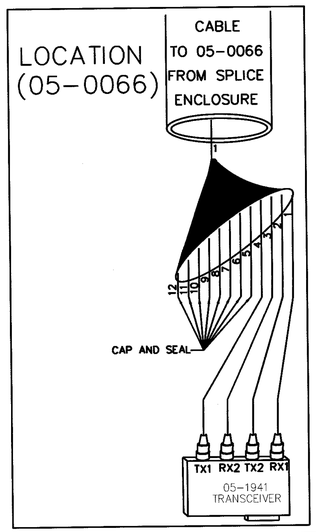
BROWN — BUFFER TUBE

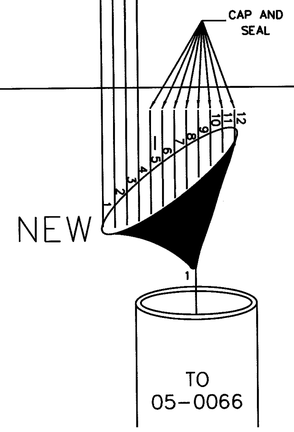
EXISTING

CABLE 1E FROM INTERSECTION 05-1705 (OPTIMIST FARM ROAD AND WEST LAKE ROAD)

48 FIBERS IN 4 BUFFER TUBES







1. TRANSCEIVER TERMINATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING/ENSURING PROPER TERMINATION OF FIBER.
2. PROVIDE A TRANCIEVER MODEL THAT IS COMPATIBLE WITH THE EXISTING SYSTEM.
1. CONTRACTOR TO CONTACT THE TOWN OF CARY OPERATIONS MANAGER OF PUBLIC WORKS AT (919) 469-4090 PRIOR TO BEGINNING ANY WORK.

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

SPLICE PLAN FOR WEST LAKE ROAD AND MIDDLE CREEK PARK AVENUE

DIVISION 5 WAKE CO. CARY

PLAN DATE: SEPTEMBER 2013 REVIEWED BY: I. N. AVERY

PREPARED BY: HEIDI T. BERGGREN REVIEWED BY: G. A. FULLER, PE

SCALE 0

REVISIONS	INIT.	DATE
1 RELOCATE CABINET TO THE NW QUADRANT AND UPDATE CONTACT INFORMATION.	HTB	NOV 2013 11/27/13

SEAL NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

SIGNATURE Gregory A. Fuller DATE 10/1/13

CADD Filename:

REF. NO.	SHEET NO.
SR-5001BY	SIGN-1

APPROVED:

DATE: 12/20/13

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022959 RONALD W. KING

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

SIGNING PLAN
WAKE COUNTY

LOCATION: INTERSECTION OF (SR 1387) WEST LAKE RD AND (SR 5439) MIDDLE CREEK PARK AVE AND WOLF'S BANE DRIVE

REF. NO. SR-5001BY

ROADWAY STANDARD DRAWING

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2012 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
904.10	ORIENTATION OF GROUND MOUNTED SIGNS
904.60	MOUNTING OF TYPE 'D', 'E' AND 'F' SIGNS ON 'U' CHANNEL POSTS

GENERAL NOTES

- SIGNS FURNISHED BY STATE
- IF REMOVAL OR RELOCATION OF SIGNS ON PRIVATE STREET (NON-STATE MAINTAINED) IS REQUIRED DUE TO CONSTRUCTION, THE CONTRACTOR SHALL INFORM THE ENGINEER. THE WORK WILL BE COMPLETED BY OTHERS.
- WHEN NOT STATIONED OR DIMENSIONED ON PLANS, ALL 'E' AND 'F' SIGNS SHALL BE FIELD LOCATED BY THE ENGINEER
- THE BACKGROUND FOR TYPE E & F SIGNS SHALL BE TYPE C REFLECTIVE SHEETING.

SUMMARY OF QUANTITIES

ITEM NO.		ITEM DESCRIPTION	QUANTITY	UNIT
DESC. NO.	SECT. NO.			
4116100000	904	SIGN ERECTION, RELOCATE SIGN TYPE E	2	EA.
4165000000	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	2	EA.
4072000000	903	SUPPORTS, 3 LB STEEL U-CHANNEL	56	L.F.

TYPE E SIGNS

(401) QUANTITY REQ'D _ 2

30" X 30" W3-3

ONE "U" POST PER SIGN

(402) QUANTITY REQ'D _ 2

RIGHT LANE MUST TURN RIGHT

36" X 36" R3-7

ONE "U" POST PER SIGN

PROJECT NOTES

1. DISPOSAL OF SIGN SYSTEM, U-CHANNEL

INDEX

PLAN PREPARED BY: N.C.D.O.T. SIGNING AND DELINEATION UNIT

SUSAN B. KUNZ SIGNING & DELINEATION REGIONAL ENGINEER

ADAM GRADY SIGNING & DELINEATION DESIGN ENGINEER

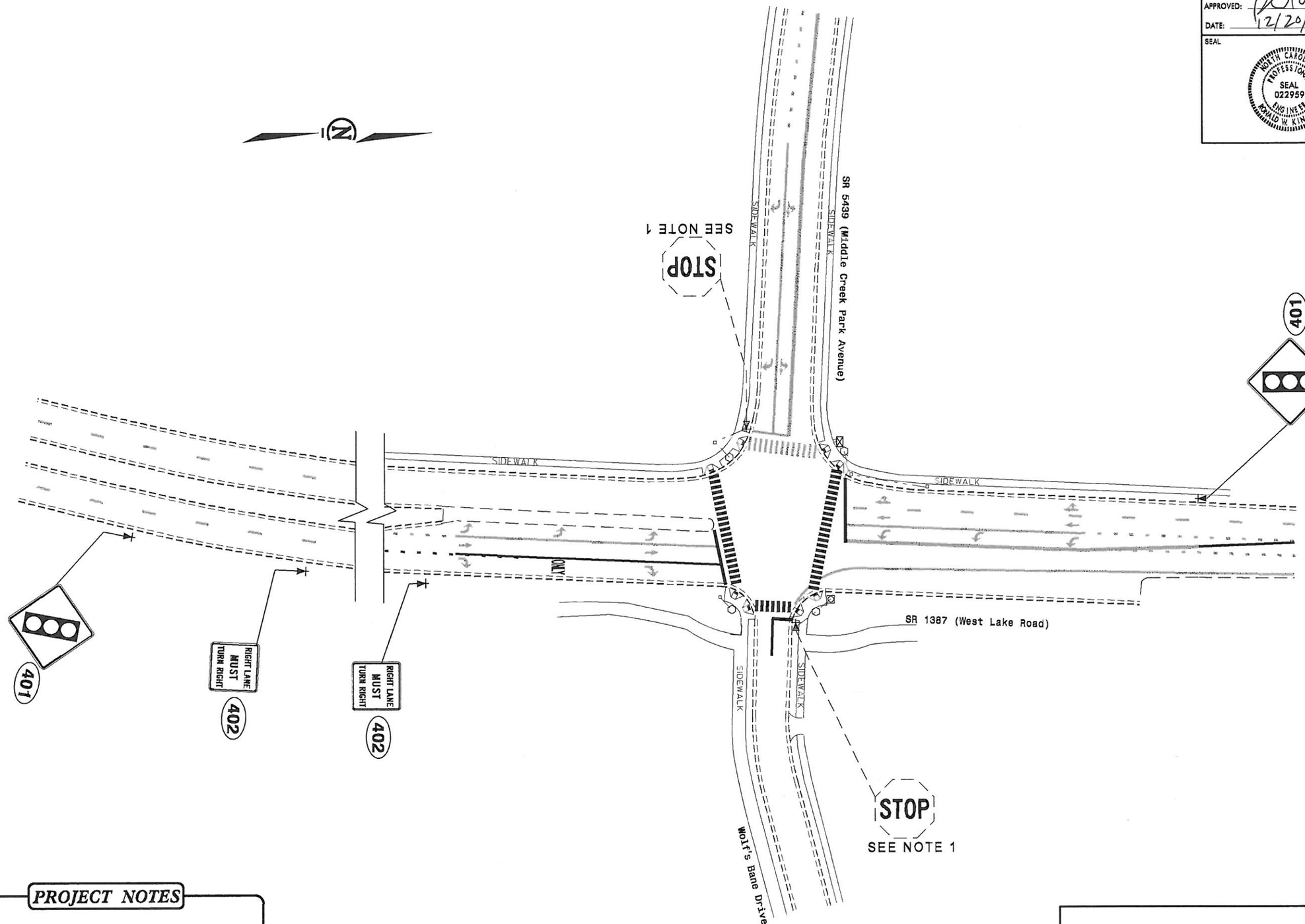
REF. NO.	SHEET NO.
SR-5001BY	SIGN-2

APPROVED: [signature] 12/20/13

DATE:

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022959 ENGINEER RONALD W. KING



PROJECT NOTES

1. DISPOSAL OF SIGN SYSTEM, U-CHANNEL

SIGN LAYOUT

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ahgrady AT TE27443

REF. NO.	SHEET NO.
SR-5001BY	PMP-1

APPROVED: [signature] DATE: 12/20/13

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022959 ENGINEER RONALD W KING

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKING PLAN

WAKE COUNTY

LOCATION: INTERSECTION OF (SR 1387) WEST LAKE RD AND (SR 5439) MIDDLE CREEK PARK AVE AND WOLF'S BANE DRIVE

ROADWAY STANDARD DRAWING

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2012 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1205.01	PAVEMENT MARKINGS - LINE TYPES AND OFFSETS
1205.02	PAVEMENT MARKINGS - TWO-LANE AND MULTILANE ROADWAYS
1205.04	PAVEMENT MARKINGS - INTERSECTIONS
1205.05	PAVEMENT MARKINGS - TURN LANES
1205.06	PAVEMENT MARKINGS - LANE DROPS
1205.08	PAVEMENT MARKINGS - SYMBOLS AND WORD MESSAGES
1205.13	PAVEMENT MARKINGS - LANE REDUCTIONS

PAVEMENT MARKING SCHEDULE

SYMBOL	DESCRIPTION
THERMOPLASTIC	(4", 120 MIL)
T1	YELLOW DOUBLE CENTER
THERMOPLASTIC	(24", 120 MIL)
T2	WHITE STOPBAR
T3	WHITE CROSSWALK LINE
THERMOPLASTIC	(8", 120 MIL)
T13	3 FT - 9 FT/SP WHITE MINISKIP
THERMOPLASTIC	(8", 120 MIL)
TR	WHITE SOLID LANE LINE
THERMOPLASTIC	(90 MIL)
UB	RIGHT TURN ARROW
THERMOPLASTIC	(120 MIL)
U1	ALPHANUMERIC CHAR

GENERAL NOTES

THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT, EXCEPT WHEN OTHERWISE NOTED IN THE PLAN, OR DIRECTED BY THE ENGINEER.

A) INSTALL PAVEMENT MARKINGS AND PAVEMENT MARKERS ON THE FINAL SURFACE AS FOLLOWS:

ROAD NAME	MARKING	MARKER
WEST LAKE RD	THERMOPLASTIC	NONE
WOLF'S BANE DR	THERMOPLASTIC	NONE
MIDDLE CREEK PARK AVE	THERMOPLASTIC	NONE

D) TIE PROPOSED PAVEMENT MARKING LINES TO EXISTING PAVEMENT MARKING LINES.

E) REMOVE/REPLACE ANY CONFLICTING/DAMAGED PAVEMENT MARKINGS AND MARKERS.

F) PASSING ZONES WILL BE DETERMINED IN THE FIELD AND MUST BE APPROVED BY THE ENGINEER.

I) UNLESS OTHERWISE SPECIFIED, HEATED-IN-PLACE THERMOPLASTIC MAY BE USED IN LIEU OF EXTRUDED THERMOPLASTIC FOR STOP BARS, SYMBOLS, CHARACTERS AND DIAGONALS. IF HEATED-IN-PLACE IS USED, IT SHALL BE PAID FOR USING THE EXTRUDED THERMOPLASTIC PAY ITEM.

L) SEE ROADWAY PLANS FOR ALTERNATE CURB RAMP DESIGNS WHEN INDICATED ON PAVEMENT MARKING DETAIL SHEETS.

INDEX

PLAN PREPARED BY: N.C.D.O.T. SIGNING AND DELINEATION UNIT

SUSAN B. KUNZ SIGNING & DELINEATION REGIONAL ENGINEER

ADAM GRADY SIGNING & DELINEATION DESIGN ENGINEER

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

REF NO. SR-5001BY

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dhgrady AT TE274443

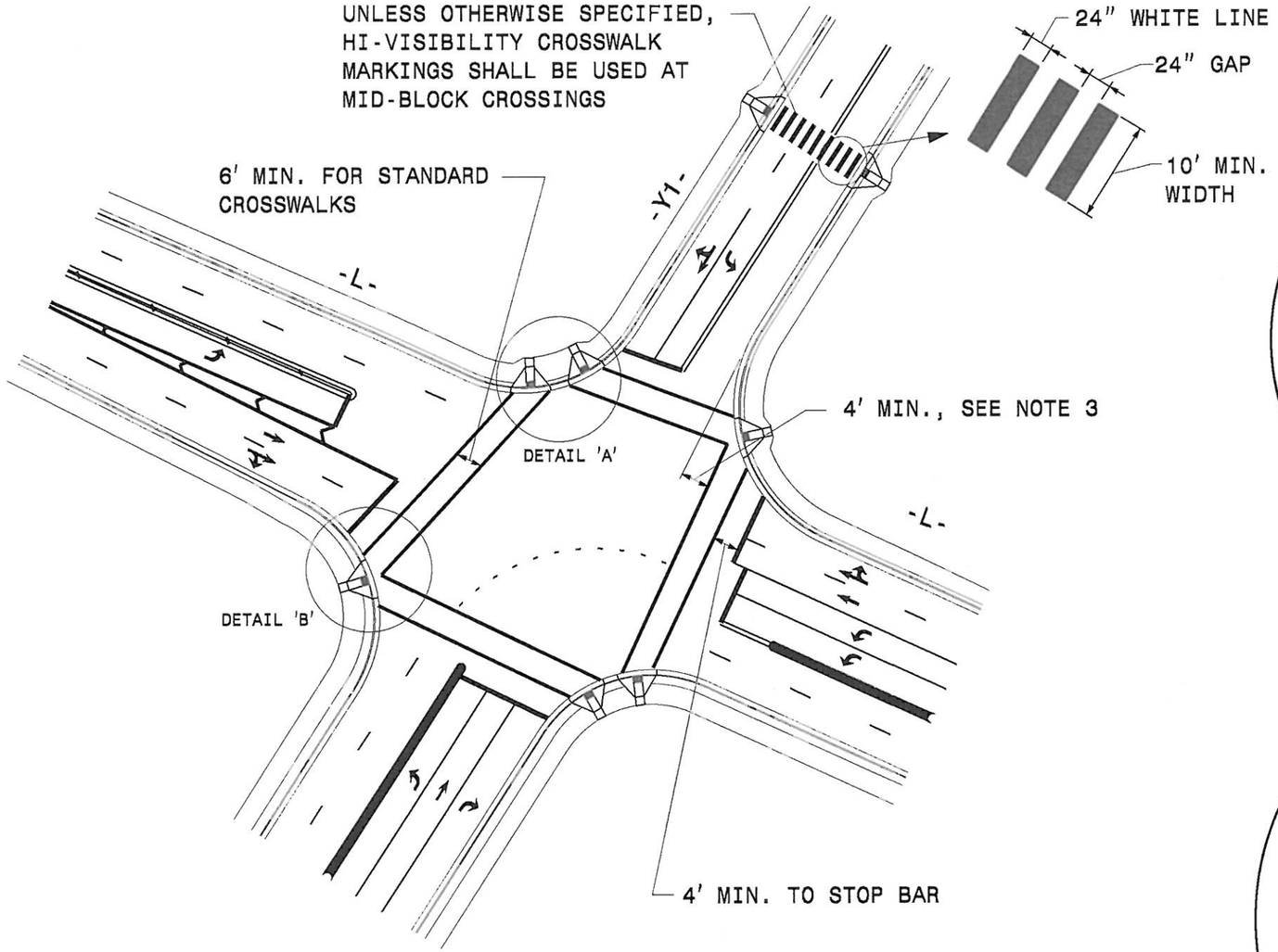
REF. NO.	SHEET NO.
SR-5001BY	PMP-2

APPROVED: [signature] DATE: 12/20/13

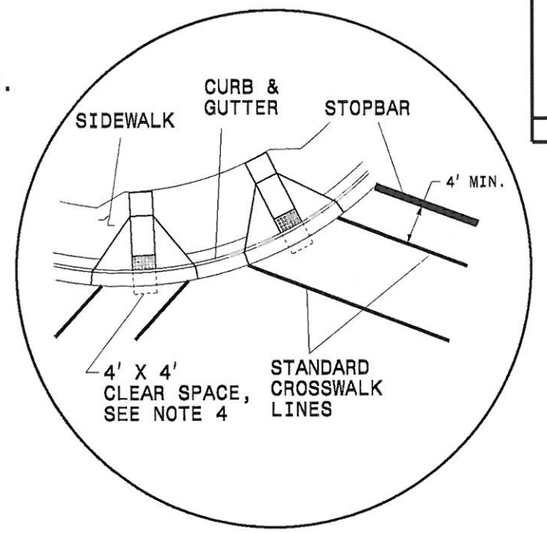
SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022959 ENGINEER RONALD W. KING

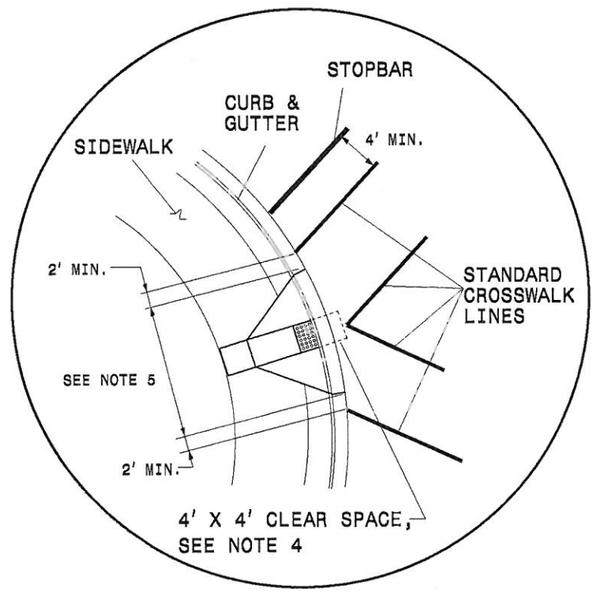
REVISIONS



GUIDANCE DETAIL FOR CROSSWALK MARKINGS



DETAIL 'A'- DUAL CURB RAMPS



DETAIL 'B'- SINGLE DIAGONAL CURB RAMP

NOTES:

1. USE THE DETAILS ABOVE AND THE FOLLOWING NOTES FOR GUIDANCE IN PLACING CROSSWALK MARKINGS NOT STATIONED ON THE DETAIL SHEETS OR WHEN FIELD ADJUSTMENTS REQUIRED MOVING STATIONED MARKINGS AS DIRECTED BY THE ENGINEER. REFER TO NCDOT ROADWAY STANDARD DRAWINGS, MUTCD AND ADA STANDARDS FOR ADDITIONAL GUIDANCE.
2. THE CROSSWALK MARKINGS SHOWN ON THE ABOVE DETAILS ARE FOR REFERENCE ONLY. ONLY INSTALL CROSSWALK MARKINGS WHERE SHOWN ON THE DETAIL SHEETS OR AS DIRECTED BY THE ENGINEER. THE CROSSWALK MARKING TYPE, STANDARD OR HI-VISIBILITY, SHALL BE INSTALL AS SPECIFIED ON THE DETAIL SHEETS OR AS DIRECTED BY THE ENGINEER.
3. SET BACK DISTANCE FROM INSIDE CROSSWALK MARKING TO NEAREST EDGE OF TRAVEL IS 4' MIN.
4. BEYOND THE BOTTOM GRADE BRAKE, A CLEAR SPACE OF 4' X 4' MINIMUM SHALL BE PROVIDED WITHIN THE MARKINGS.
5. SINGLE DIAGONAL CURB RAMPS WITH FLARED SIDES SHALL HAVE A SEGMENT OF CURB 2 FEET LONG MINIMUM LOCATED ON EACH SIDE OF THE CURB RAMP AND WITHIN THE MARKED CROSSING, SEE DETAIL 'B'.
6. CURB RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE TO THE LATEST NCDOT ROADWAY STANDARD DRAWINGS.

CROSSWALK PAVEMENT MARKING GUIDANCE DETAIL

17-DEC-2013 08:45
S:\S&DU\Central\DIV 5 SIGN REQUEST\WESTLAKE PLANS.dgn
dngrady AT TE27443

REF NO	SHEET NO.
SR-5001BY	PMP-3

APPROVED: _____
DATE: 12/20/13

SEAL

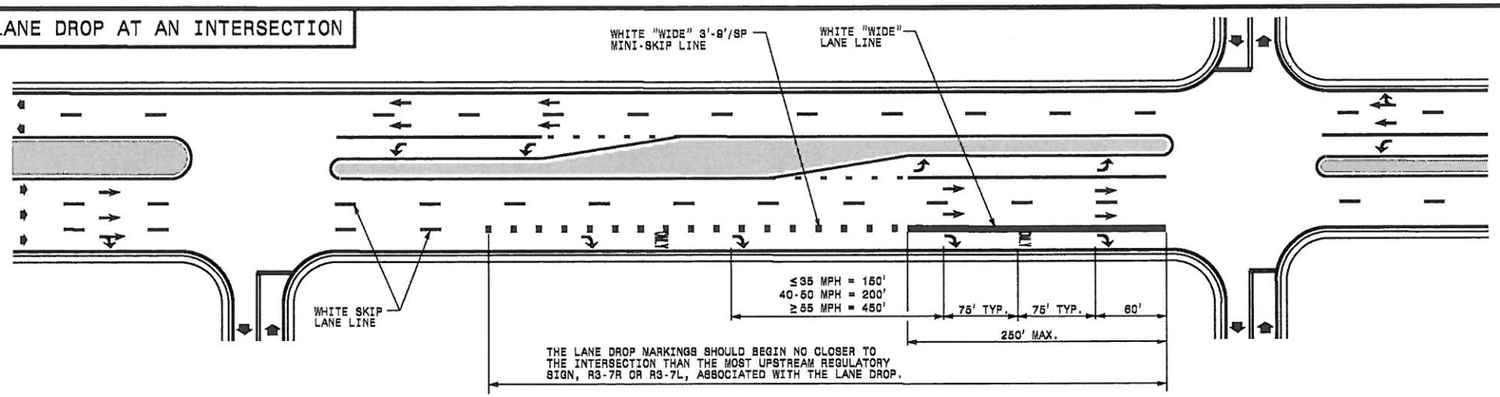
NORTH CAROLINA PROFESSIONAL SEAL 022959 ENGINEER RONALD W KING

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

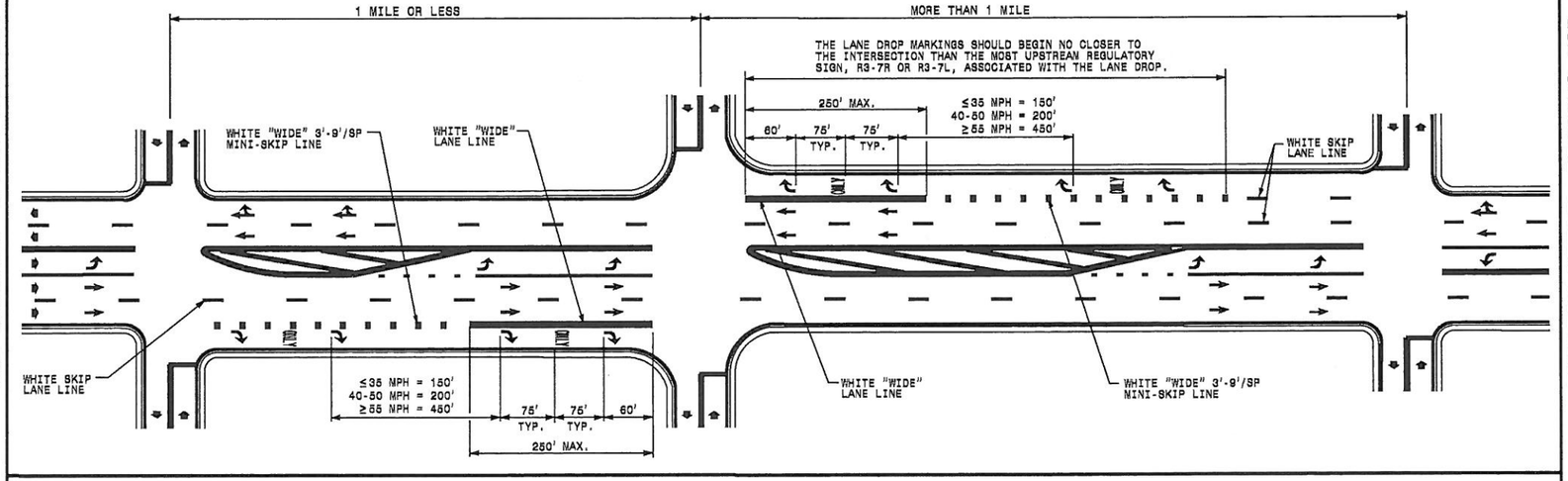
1-12

ENGLISH DETAIL DRAWING FOR
PAVEMENT MARKINGS
LANE DROPS

LANE DROP AT AN INTERSECTION



LANE DROP AT AN INTERSECTION WITH AN AUXILIARY LANE



GENERAL NOTES:

1- USE THE GUIDANCE SHOWN ON THE ABOVE DETAILS IN CONJUNCTION WITH INTERSECTION GUIDANCE SHOWN ON ROADWAY STANDARD DRAWING 1205.04.

2- LANE LINES INDICATED AS "WIDE" SHALL BE AT LEAST TWICE THE WIDTH OF THE NORMAL LINE.

LEGEND

W = WIDTH OF TRAVEL LANE
ONLY = PAVEMENT MARKING SYMBOLS & CHARACTERS
DIRECTION OF TRAFFIC FLOW

SHEET 1 OF 3
1205D06

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

1-12

ENGLISH DETAIL DRAWING FOR
PAVEMENT MARKINGS
LANE DROPS

SHEET 1 OF 3
1205D06

REVISED PAVEMENT MARKING ROADWAY STANDARD DRAWING

17-DEC-2013 06:44
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dngrady AT TE27443

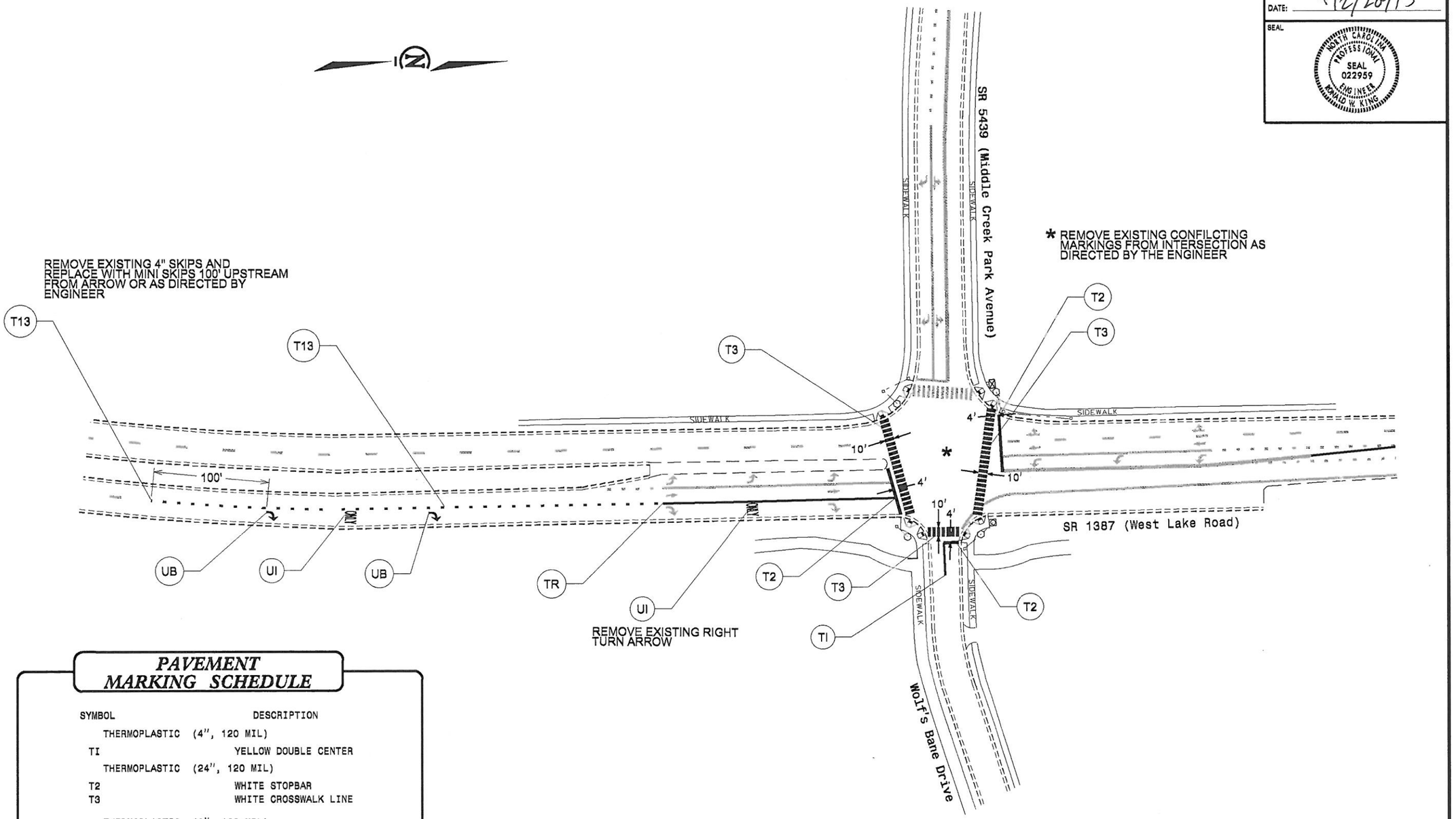
REF. NO.	SHEET NO.
SR-5001BY	PMP-4

APPROVED: [signature] 12/20/13

DATE:

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 022959 ENGINEER RONALD W KING



PAVEMENT MARKING SCHEDULE

SYMBOL	DESCRIPTION
THERMOPLASTIC	(4", 120 MIL)
TI	YELLOW DOUBLE CENTER
THERMOPLASTIC	(24", 120 MIL)
T2	WHITE STOPBAR
T3	WHITE CROSSWALK LINE
THERMOPLASTIC	(8", 120 MIL)
T13	3 FT - 9 FT/SP WHITE MINISKIP
THERMOPLASTIC	(8", 120 MIL)
TR	WHITE SOLID LANE LINE
THERMOPLASTIC	(90 MIL)
UB	RIGHT TURN ARROW
THERMOPLASTIC	(120 MIL)
UI	ALPHANUMERIC CHAR

PAVEMENT MARKING DETAIL

17-DEC-2013 09:18
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dhgrady AT TE27443