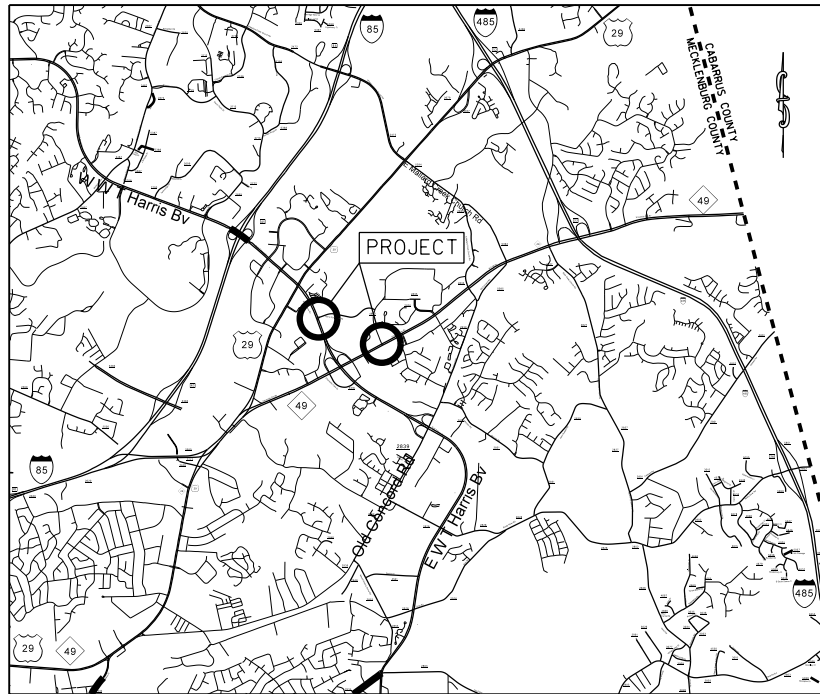


PROJECT: 44244 TIP: TIP:



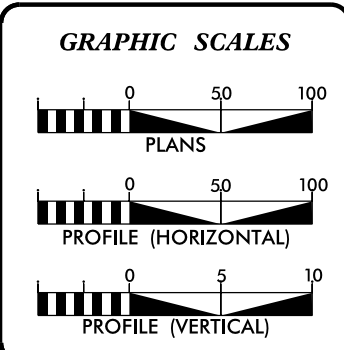
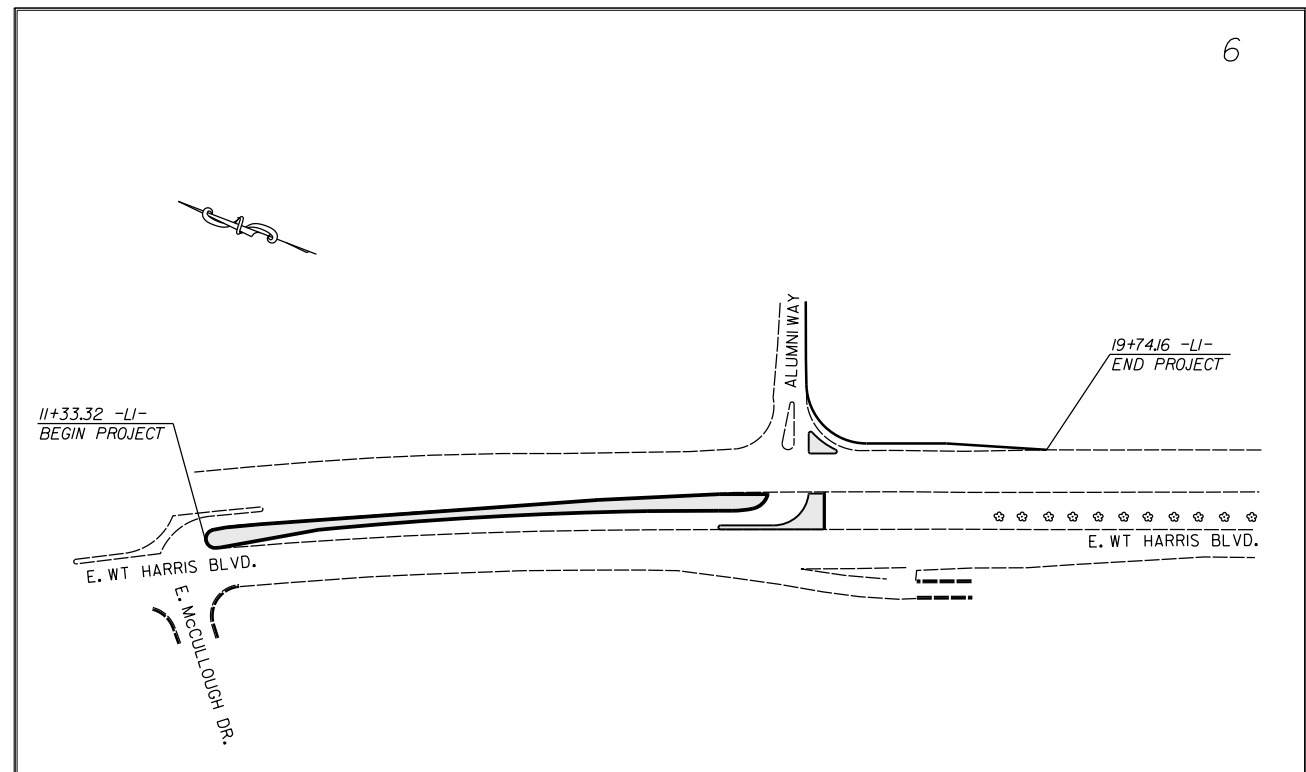
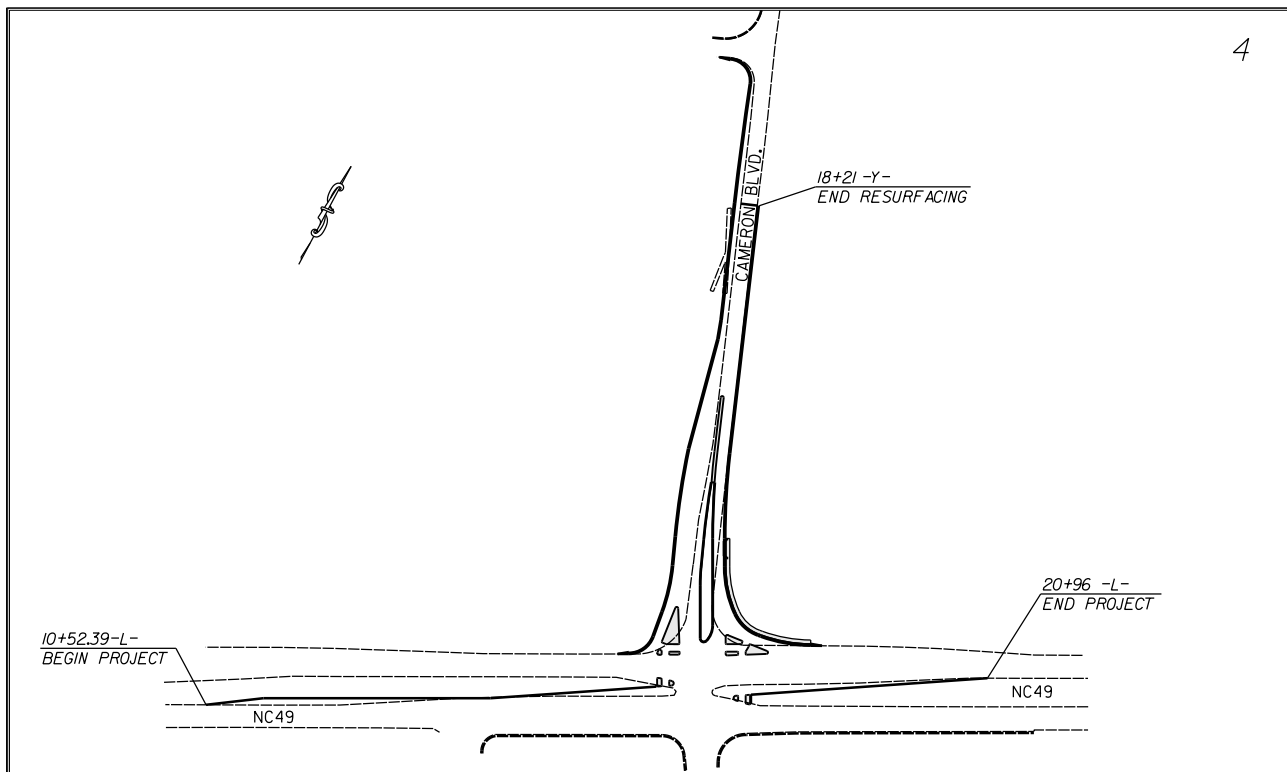
VICINITY MAP NOT TO SCALE

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS  
**MECKLENBURG COUNTY**

**LOCATION:** INTERSECTIONS OF NC 49 AT CAMERON BLVD. AND  
NC 24 (WT HARRIS BLVD.) AT ALUMNI WAY.

**TYPE OF WORK:** GRADING, PAVING, DRAINAGE, CONCRETE ISLANDS, CURB  
AND GUTTER, THERMOPLASTIC PAVEMENT MARKINGS  
AND METAL POLE WITH MAST ARM TRAFFIC SIGNAL.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
		P.E.	
		R/W	
		CONST.	



**DESIGN DATA**

ADT	=	
ADT	=	
DHV	=	%
D	=	%
T	=	%
V	=	MPH

**PROJECT LENGTH**

LENGTH OF ROADWAY PROJECT	=	0.51	MILES
TOTAL LENGTH OF STATE PROJECT	=	0.51	MILES

Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
DIVISION TEN  
DIVISION DESIGN / CONSTRUCT UNIT

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2012 STANDARD SPECIFICATIONS

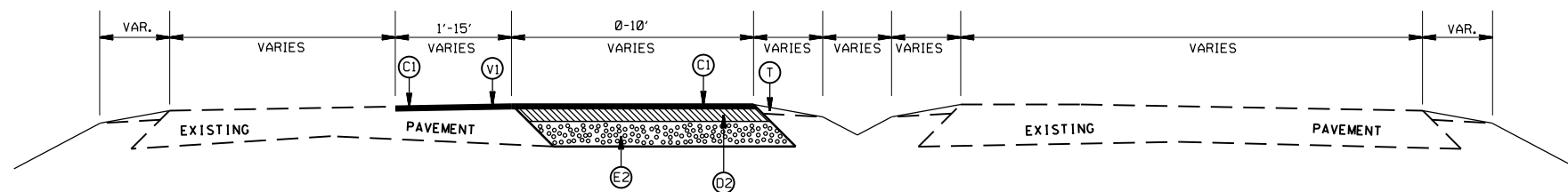
<b>RIGHT OF WAY DATE:</b> _____  <b>LETTING DATE:</b> <del>January 14, 2015</del> January 21, 2015	<b>RANDY BOWERS</b> PROJECT ENGINEER
	<b>DONALD HARWARD</b> PROJECT DESIGN ENGINEER



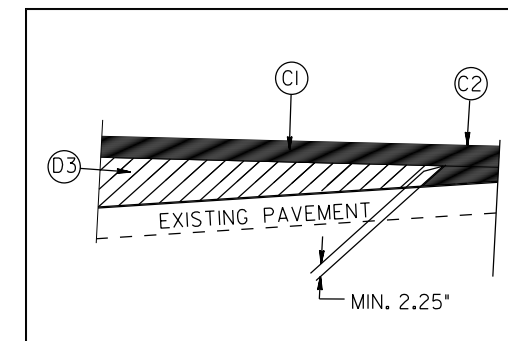
DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_  
DDC ENGINEER

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	2	
F.A. PROJECT NO.			



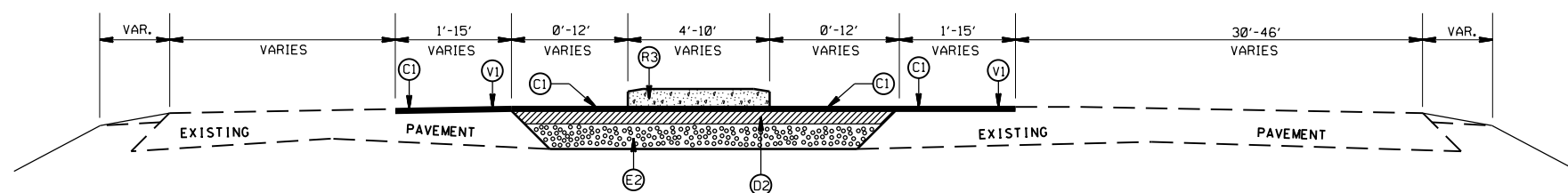
TYPICAL SECTION NO.3  
STA 17+79.64 TO 20+96 -L-



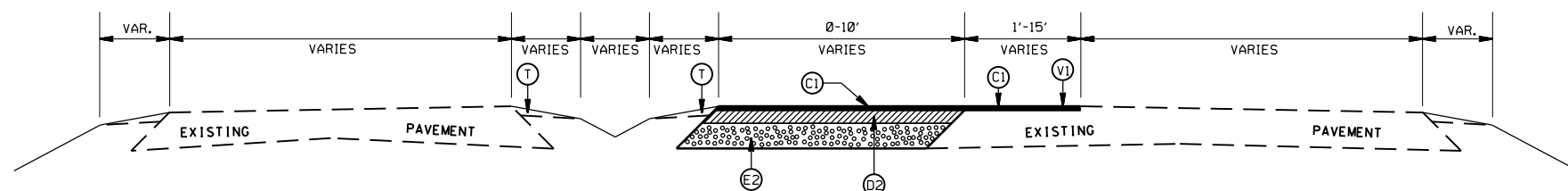
WEDGING DETAIL

PAVEMENT SCHEDULE

(C1)	PROP. APPROX. 1½" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
(C2)	PROP. APPROX. 3" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
(D1)	PROP. APPROX. 4" ASPHALT CONC. BINDER COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
(D2)	PROP. APPROX. 2.5" ASPHALT CONC. BINDER COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
(D3)	PROP. VARIABLE DEPTH ASPHALT CONC. BINDER COURSE.
(E1)	PROP. APPROX. 5" ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
(E2)	PROP. APPROX. 8.0" ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
(R1)	PROP. 2'-6" CURB & GUTTER
(R2)	PROP. 1'-6" CURB & GUTTER W/ GRAY TINT
(R3)	PROP. 5" MONOLITHIC ISLAND
(R4)	PROP. 4" CONC. ISLAND CAP
(T)	EARTH MATERIAL
(V1)	MILLING ASPHALT PAVEMENT, 1.5" IN DEPTH



TYPICAL SECTION NO.2  
STA 16+54.06 TO 16+80.32 -L-  
STA 17+27.96 TO 17+79.64 -L-



TYPICAL SECTION NO.1  
STA 10+52.39 TO 16+54.06 -L-

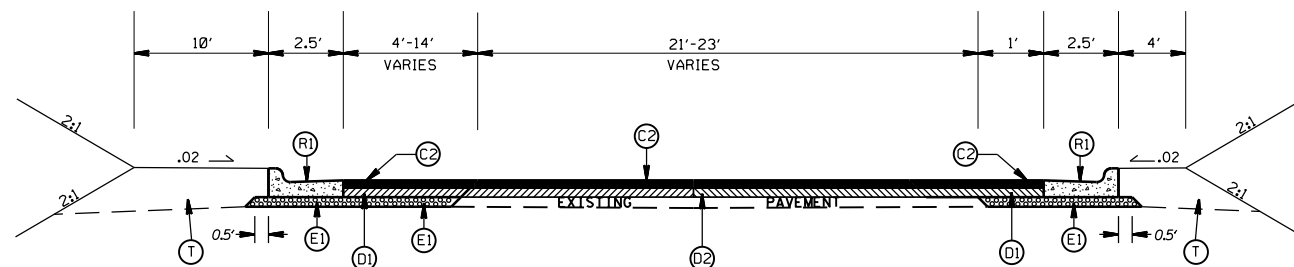
INTERSECTION IMPROVEMENTS AT  
NC 49 AND CAMERON BLVD. &  
E.WT HARRIS BLVD. AND ALUMNI WAY.

SCALE	1"=50'
DATE	6-14
DWG. BY	JDH
DESIGN BY	JDH
APPROVED	RWB



REVISIONS	

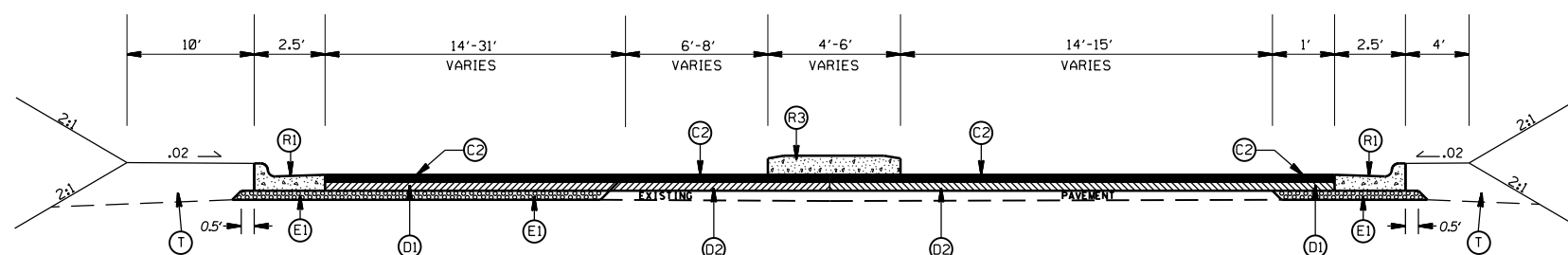
STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	2A	
F.A. PROJECT NO.			



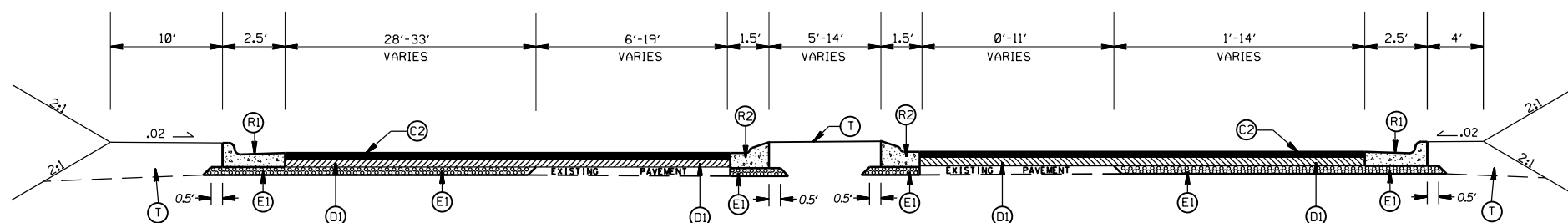
TYPICAL SECTION NO. 6  
STA 15+64.33 TO 18+21 -Y-

PAVEMENT SCHEDULE

(C1)	PROP. APPROX. 1½" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
(C2)	PROP. APPROX. 3" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
(D1)	PROP. APPROX. 4" ASPHALT CONC. BINDER COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
(D2)	PROP. APPROX. 2.5" ASPHALT CONC. BINDER COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
(D3)	PROP. VARIABLE DEPTH ASPHALT CONC. BINDER COURSE.
(E1)	PROP. APPROX. 5" ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
(E2)	PROP. APPROX. 8.0" ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
(R1)	PROP. 2'-6" CURB & GUTTER
(R2)	PROP. 1'-6" CURB & GUTTER W/ GRAY TINT
(R3)	PROP. 5" MONOLITHIC ISLAND
(R4)	PROP. 4" CONC. ISLAND CAP
(T)	EARTH MATERIAL
(V1)	MILLING ASPHALT PAVEMENT, 1.5" IN DEPTH



TYPICAL SECTION NO. 5  
STA 14+49.19 TO 15+64.33 -Y-



TYPICAL SECTION NO. 4  
STA 12+37.09 TO 14+49.19 -Y-

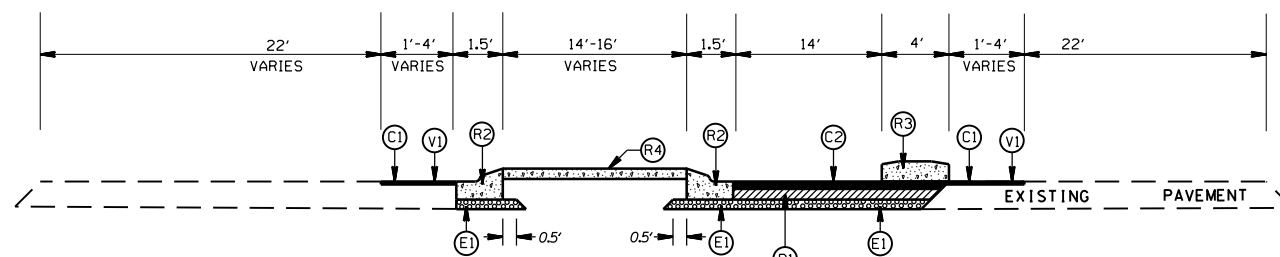
INTERSECTION IMPROVEMENTS AT  
NC 49 AND CAMERON BLVD. &  
E.WT HARRIS BLVD. AND ALUMNI WAY.

SCALE	r=50'
DATE	6-14
DWG. BY	JDH
DESIGN BY	JDH
APPROVED	RWB

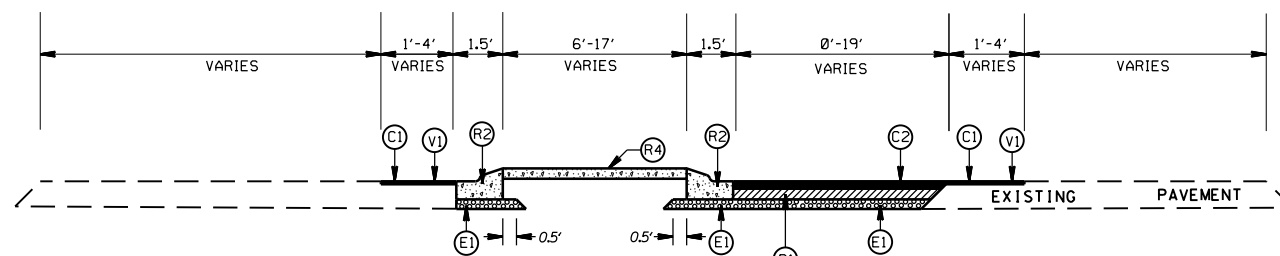


REVISIONS	

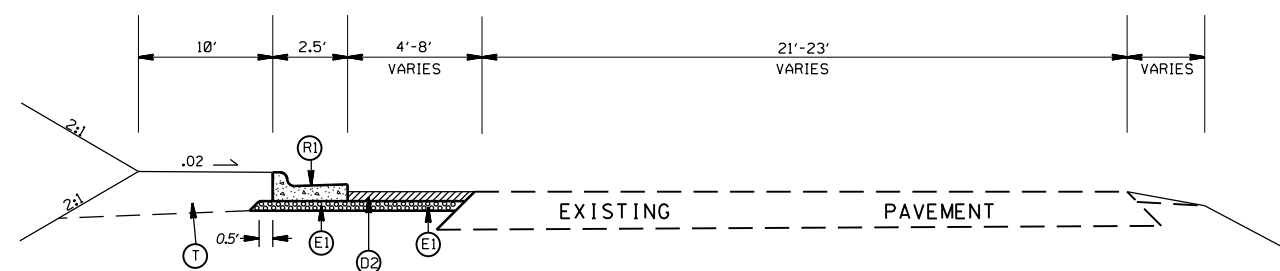
STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	2B	
F.A. PROJECT NO.			



TYPICAL SECTION NO. 9  
STA 16+46.72 TO 16+96.72 -L1-



TYPICAL SECTION NO. 8  
STA 11+33 TO 16+46.72 -L1-



TYPICAL SECTION NO. 7  
STA 18+21 TO 20+10 -Y-

### PAVEMENT SCHEDULE

(C1)	PROP. APPROX. 1½" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
(C2)	PROP. APPROX. 3" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
(D1)	PROP. APPROX. 4" ASPHALT CONC. BINDER COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
(D2)	PROP. APPROX. 2.5" ASPHALT CONC. BINDER COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
(D3)	PROP. VARIABLE DEPTH ASPHALT CONC. BINDER COURSE.
(E1)	PROP. APPROX. 5" ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
(E2)	PROP. APPROX. 8.0" ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
(R1)	PROP. 2'-6" CURB & GUTTER
(R2)	PROP. 1'-6" CURB & GUTTER W/ GRAY TINT
(R3)	PROP. 5" MONOLITHIC ISLAND
(R4)	PROP. 4" CONC. ISLAND CAP
(T)	EARTH MATERIAL
(V1)	MILLING ASPHALT PAVEMENT, 1.5" IN DEPTH

INTERSECTION IMPROVEMENTS AT  
NC 49 AND CAMERON BLVD. &  
E.WT HARRIS BLVD. AND ALUMNI WAY.

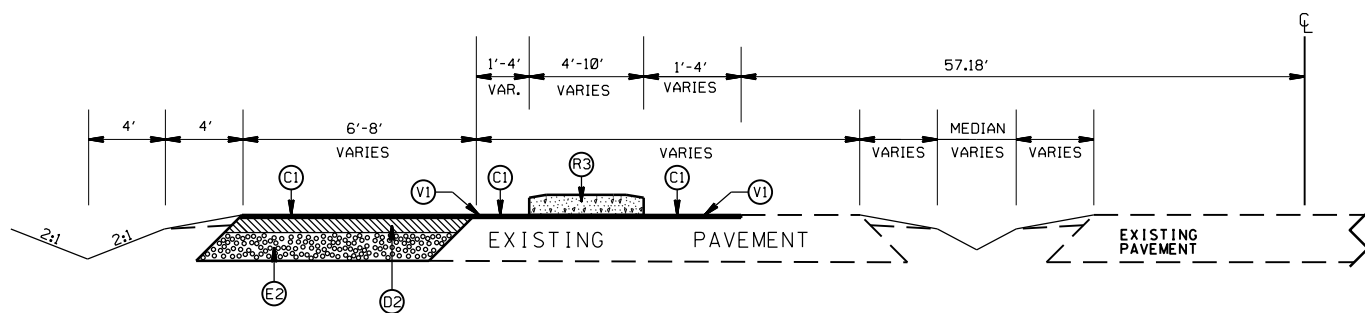
SCALE	r=50'
DATE	6-14
DWG. BY	JDH
DESIGN BY	JDH
APPROVED	RWB



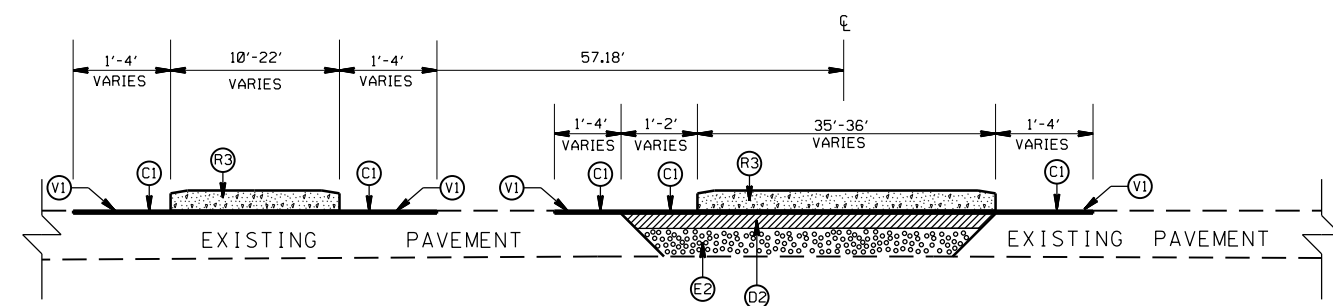
REVISIONS	



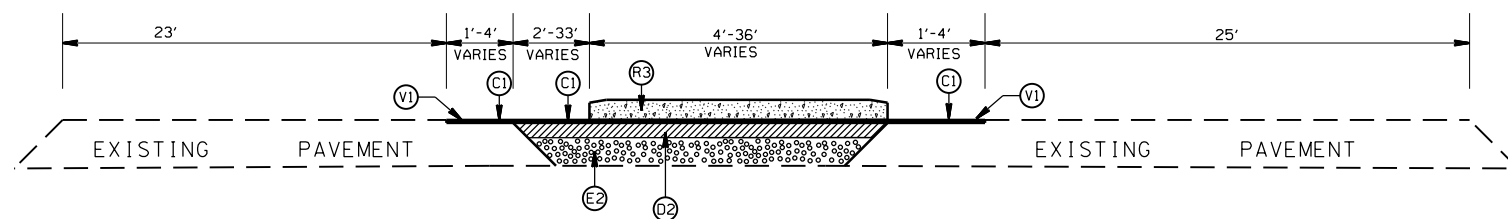
STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	2C	
F.A. PROJECT NO.			



TYPICAL SECTION NO.12  
STA 17+51.72 TO 17+64.85 -L1-



TYPICAL SECTION NO.11  
STA 17+36.72 TO 17+51.72 -L1-



TYPICAL SECTION NO.10  
STA 16+96.72 TO 17+36.72 -L1-

### PAVEMENT SCHEDULE

(C1)	PROP. APPROX. 1½" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
(C2)	PROP. APPROX. 3" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
(D1)	PROP. APPROX. 4" ASPHALT CONC. BINDER COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
(D2)	PROP. APPROX. 2.5" ASPHALT CONC. BINDER COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
(D3)	PROP. VARIABLE DEPTH ASPHALT CONC. BINDER COURSE.
(E1)	PROP. APPROX. 5" ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
(E2)	PROP. APPROX. 8.0" ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
(R1)	PROP. 2'-6" CURB & GUTTER
(R2)	PROP. 1'-6" CURB & GUTTER W/ GRAY TINT
(R3)	PROP. 5" MONOLITHIC ISLAND
(R4)	PROP. 4" CONC. ISLAND CAP
(T)	EARTH MATERIAL
(V1)	MILLING ASPHALT PAVEMENT, 1.5" IN DEPTH

INTERSECTION IMPROVEMENTS AT  
NC 49 AND CAMERON BLVD. &  
E.WT HARRIS BLVD. AND ALUMNI WAY.

SCALE	r=50'
DATE	6-14
DWG. BY	JDH
DESIGN BY	JDH
APPROVED	RWB

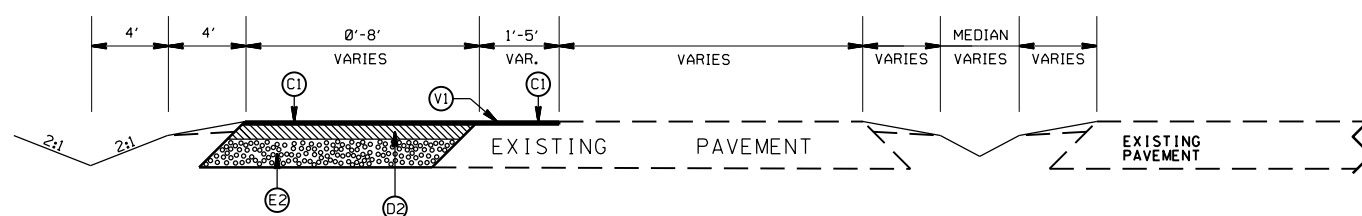


REVISIONS	

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	20	
F.A. PROJECT NO.			

### PAVEMENT SCHEDULE

(C1)	PROP. APPROX. 1½" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
(C2)	PROP. APPROX. 3" ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
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(D2)	PROP. APPROX. 2.5" ASPHALT CONC. BINDER COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
(D3)	PROP. VARIABLE DEPTH ASPHALT CONC. BINDER COURSE.
(E1)	PROP. APPROX. 5" ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
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(R1)	PROP. 2'-6" CURB & GUTTER
(R2)	PROP. 1'-6" CURB & GUTTER W/ GRAY TINT
(R3)	PROP. 5" MONOLITHIC ISLAND
(R4)	PROP. 4" CONC. ISLAND CAP
(T)	EARTH MATERIAL
(V1)	MILLING ASPHALT PAVEMENT, 1.5" IN DEPTH



TYPICAL SECTION NO. 13  
STA 17+64.85 TO 19+74.16 -L1-

INTERSECTION IMPROVEMENTS AT  
NC 49 AND CAMERON BLVD. &  
E.WT HARRIS BLVD. AND ALUMNI WAY.

SCALE	r=50'
DATE	6-20-06
DWG. BY	JDH
DESIGN BY	JDH
APPROVED	RWB

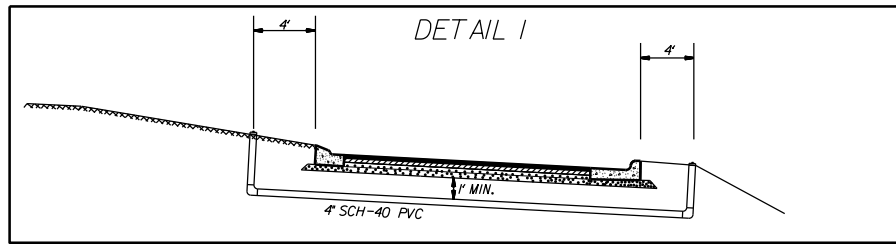


REVISIONS	



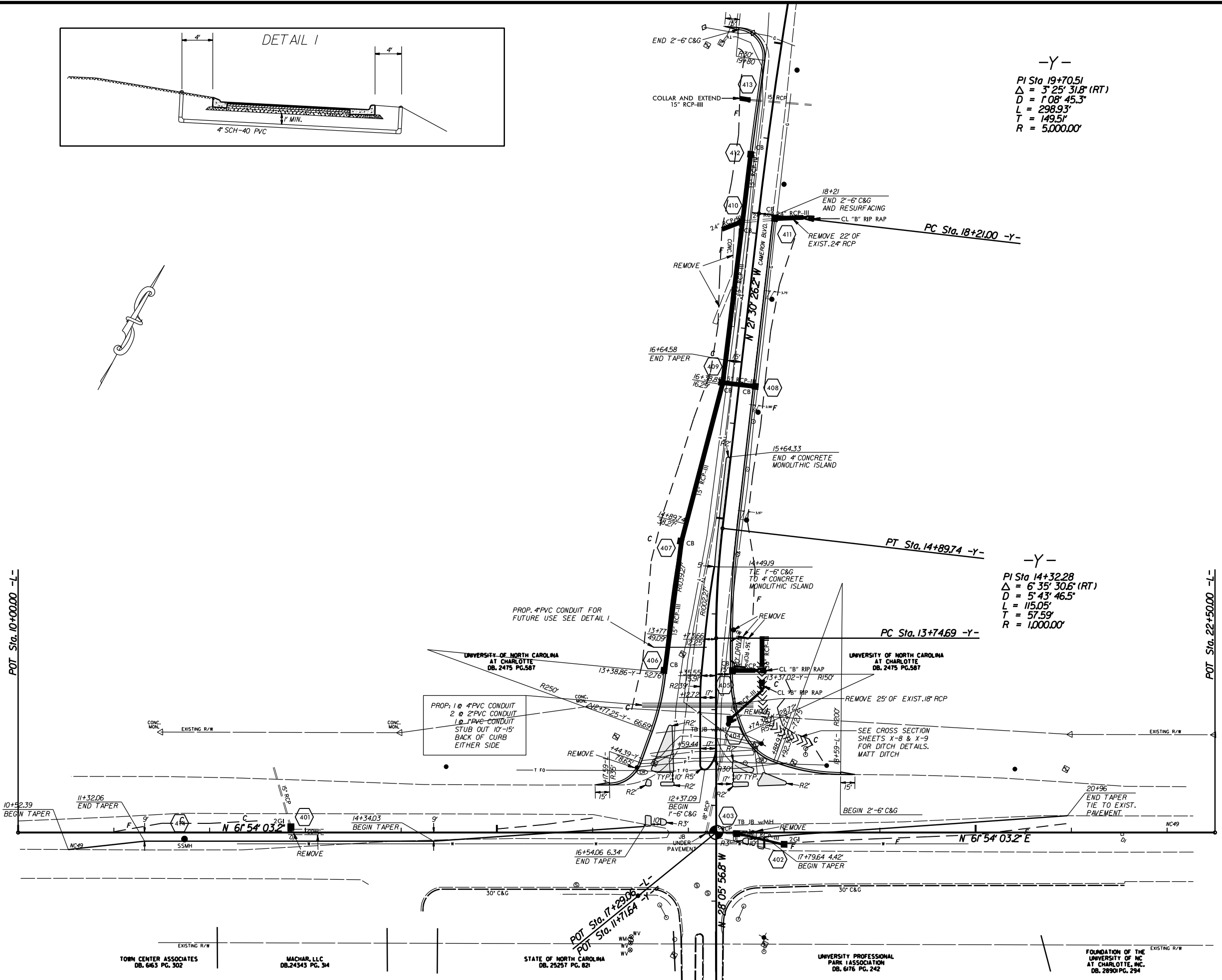


STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	4	
F.A. PROJECT NO.			




-Y-  
 PI Sta 19+70.51  
 $\Delta = 3' 25' 31.8''$  (RT)  
 $D = 1' 08' 45.3''$   
 $L = 298.93'$   
 $T = 149.51'$   
 $R = 5,000.00'$

-Y-  
 PI Sta 14+32.28  
 $\Delta = 6' 35' 30.6''$  (RT)  
 $D = 5' 43' 46.5''$   
 $L = 115.05'$   
 $T = 57.59'$   
 $R = 1,000.00'$



ALL PEDESTRIAN REFUGE IN CONCRETE ISLANDS SHALL BE 10' MINIMUM WIDTH

INTERSECTION IMPROVEMENTS AT  
NC 49 AND CAMERON BLVD.

SCALE	1"=50'		REVISIONS
DATE	5-14		
DWG. BY	JDH		
DESIGN BY	JDH		
APPROVED	RWB		

TOWN CENTER ASSOCIATES  
DB. 663 PG. 302

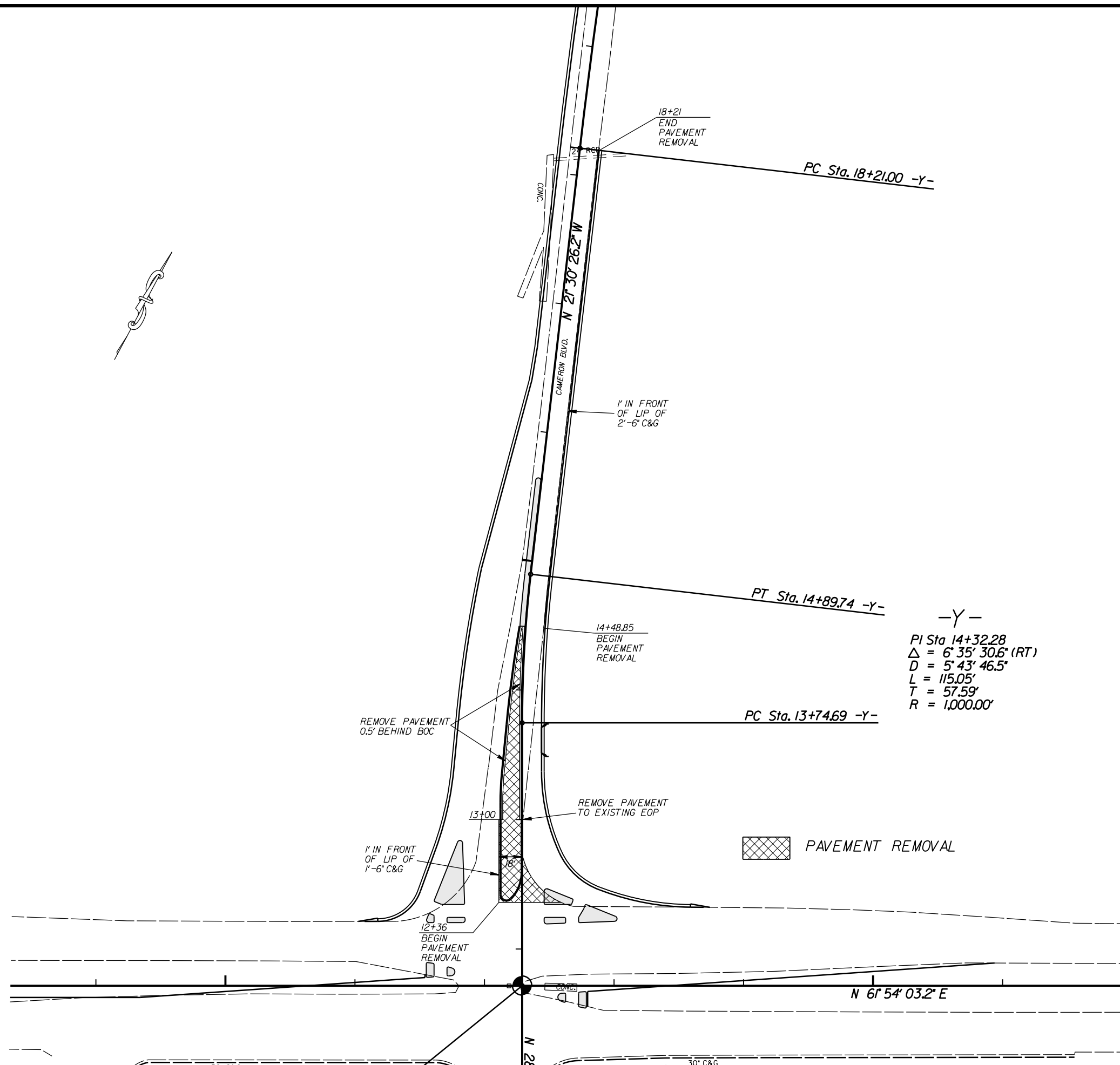
MACHAR, LLC  
DB. 24343 PG. 34

STATE OF NORTH CAROLINA  
DB. 25257 PG. 82

UNIVERSITY PROFESSIONAL  
PARK ASSOCIATION  
DB. 6176 PG. 242

FOUNDATION OF THE  
UNIVERSITY OF NC  
AT CHARLOTTE, NC.  
DB. 2890 PG. 294

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	W02631	5	
F.A. PROJECT NO.			



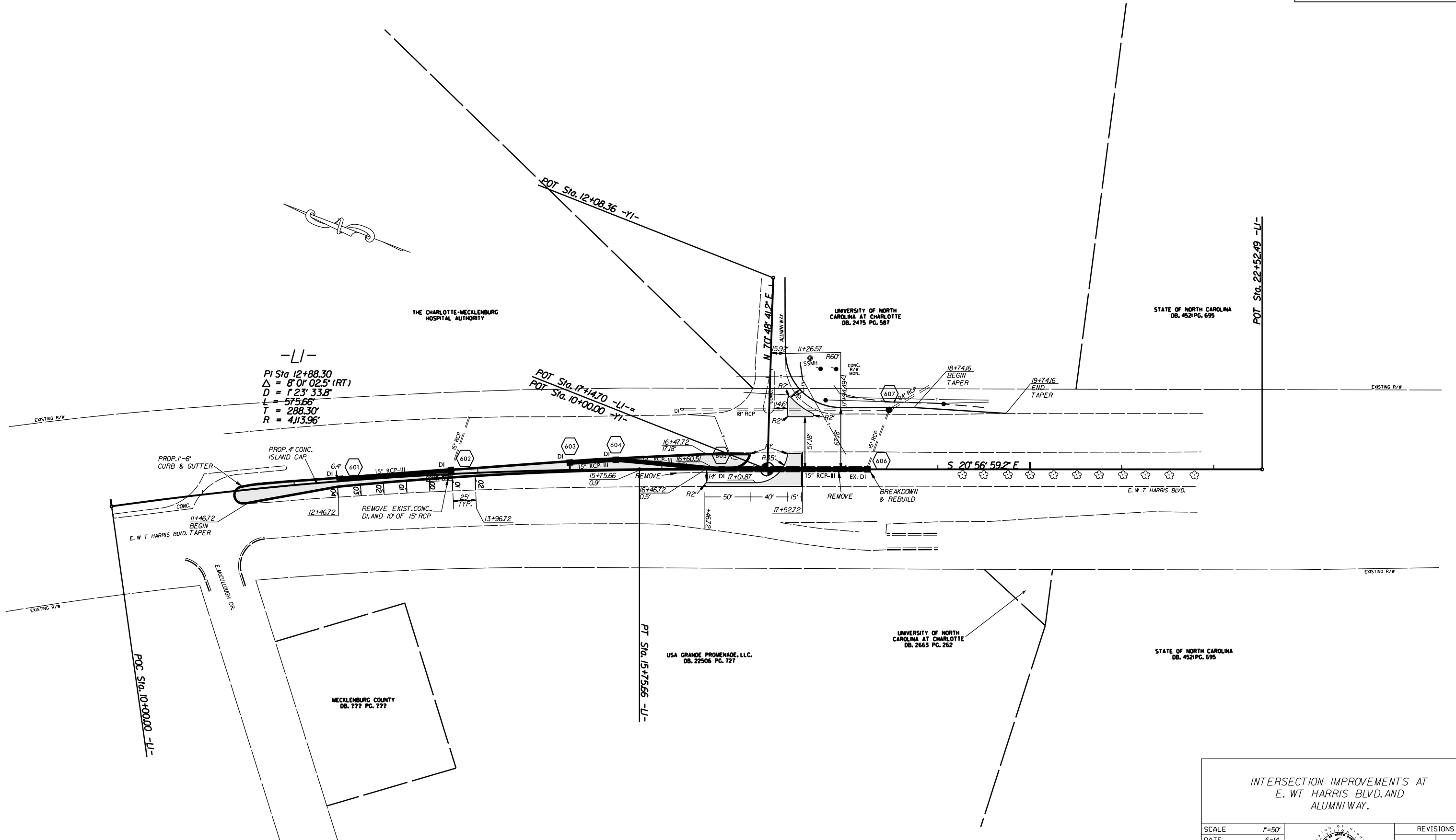
INTERSECTION IMPROVEMENTS AT  
NC 49 AND CAMERON BLVD.

SCALE 1"=40'  
DATE 5-14  
DWG. BY JDH  
DESIGN BY JDH  
APPROVED RWB



REVISIONS	

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	6	
F.A. PROJECT NO.			



INTERSECTION IMPROVEMENTS AT  
E. W. T. HARRIS BLVD. AND  
ALUMNI WAY.

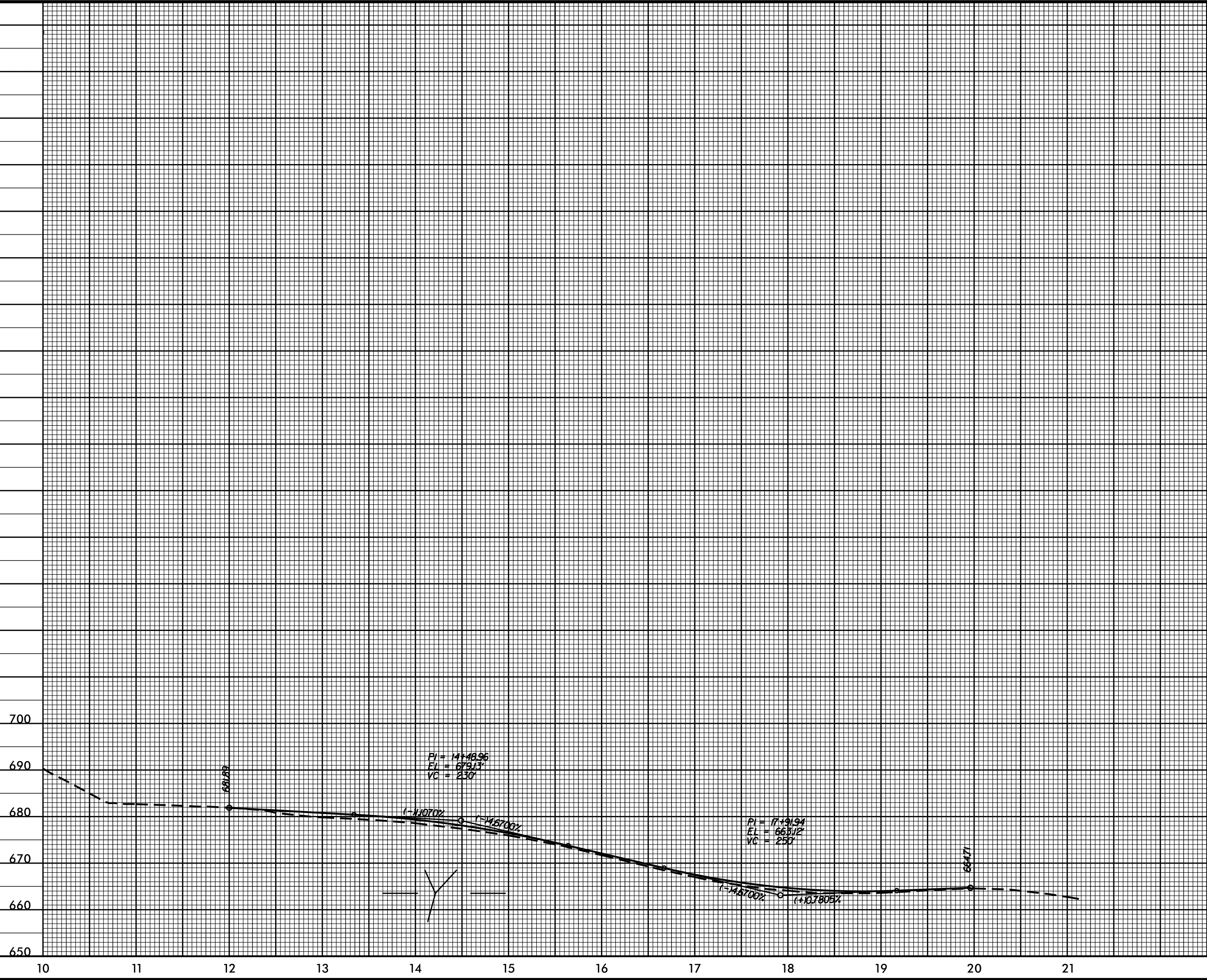
SCALE	1"=50'
DATE	6-14
DWG. BY	JDH
DESIGN BY	JDH
APPROVED	RWB



REVISIONS	

5/14/99

I:\DEC-2004\_09\43  
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12/11/11 11:27:12

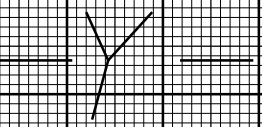


700  
690  
680  
670  
660  
650

10 11 12 13 14 15 16 17 18 19 20 21

PI = 14+48.96  
EI = 679.13'  
VC = 230'

PI = 17+91.94  
EI = 663.12'  
VC = 250'



-1.1070%

+1.0780%

-1.1070%

+1.0780%

66189

66471

66477



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	EC-1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS  

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**PLAN FOR PROPOSED  
HIGHWAY EROSION CONTROL**

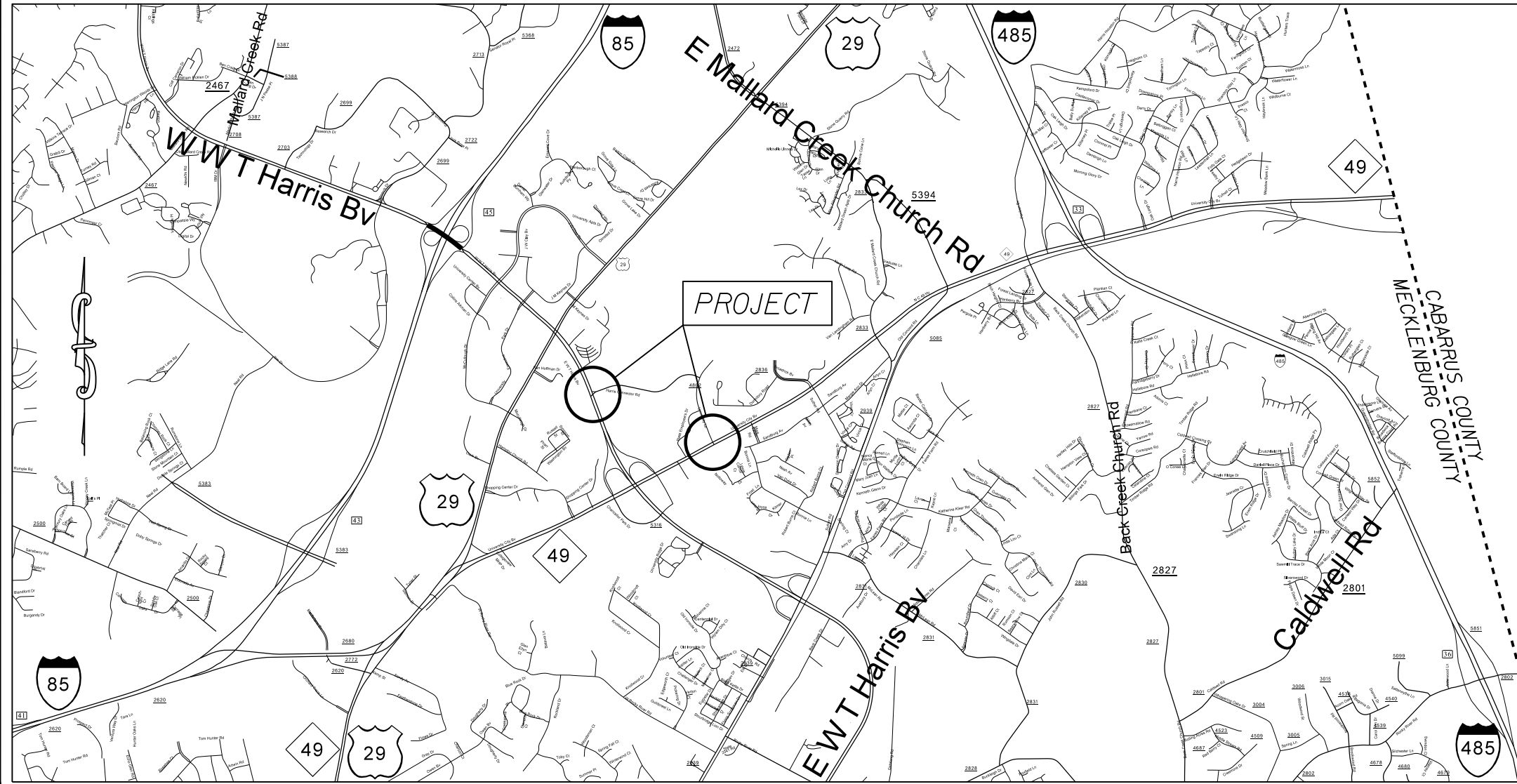
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**EROSION AND SEDIMENT CONTROL MEASURES**

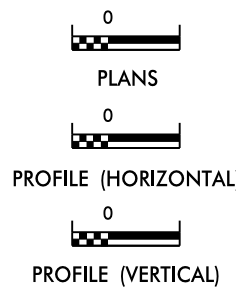
Std. #	Description	Symbol
1630.03	Temporary Silt Ditch	---
1630.05	Temporary Diversion	---
1605.01	Temporary Silt Fence	--- --- ---
1606.01	Special Sediment Control Fence	--- --- ---
1622.01	Temporary Berms and Slope Drains	---
1630.02	Silt Basin Type B	---
1633.01	Temporary Rock Silt Check Type-A	---
	Temporary Rock Silt Check Type-A with Matting and Polyacrylamide (PAM)	---
1633.02	Temporary Rock Silt Check Type-B	---
	Wattle / Coir Fiber Wattle	---
	Wattle / Coir Fiber Wattle with Polyacrylamide (PAM)	---
1634.01	Temporary Rock Sediment Dam Type-A	---
1634.02	Temporary Rock Sediment Dam Type-B	---
1635.01	Rock Pipe Inlet Sediment Trap Type-A	---
1635.02	Rock Pipe Inlet Sediment Trap Type-B	---
1630.04	Stilling Basin	---
1630.06	Special Stilling Basin	---
	Rock Inlet Sediment Trap:	
1632.01	Type A	---
1632.02	Type B	---
1632.03	Type C	---
	Skimmer Basin	---
	Tiered Skimmer Basin	---
	Infiltration Basin	---

THIS PROJECT CONTAINS  
EROSION CONTROL PLANS  
FOR CLEARING AND  
GRUBBING PHASE OF  
CONSTRUCTION.



**PROJECT: W02631 TIP: X-XXXX**

**GRAPHIC SCALE**



ROADSIDE ENVIRONMENTAL UNIT  
DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY  
WITH THE REGULATIONS SET FORTH BY THE  
NCG-010000 GENERAL CONSTRUCTION PERMIT EFFECTIVE AUGUST 3, 2011  
ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND  
NATURAL RESOURCES DIVISION OF WATER QUALITY.

Prepared In the Office of:  
**DDC UNIT DIVISION 10**  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
**2012 STANDARD SPECIFICATIONS**  
  
DONALD HARWARD 3028  
EROSION CONTROL DESIGNER LEVEL III-A CERTIFICATION #

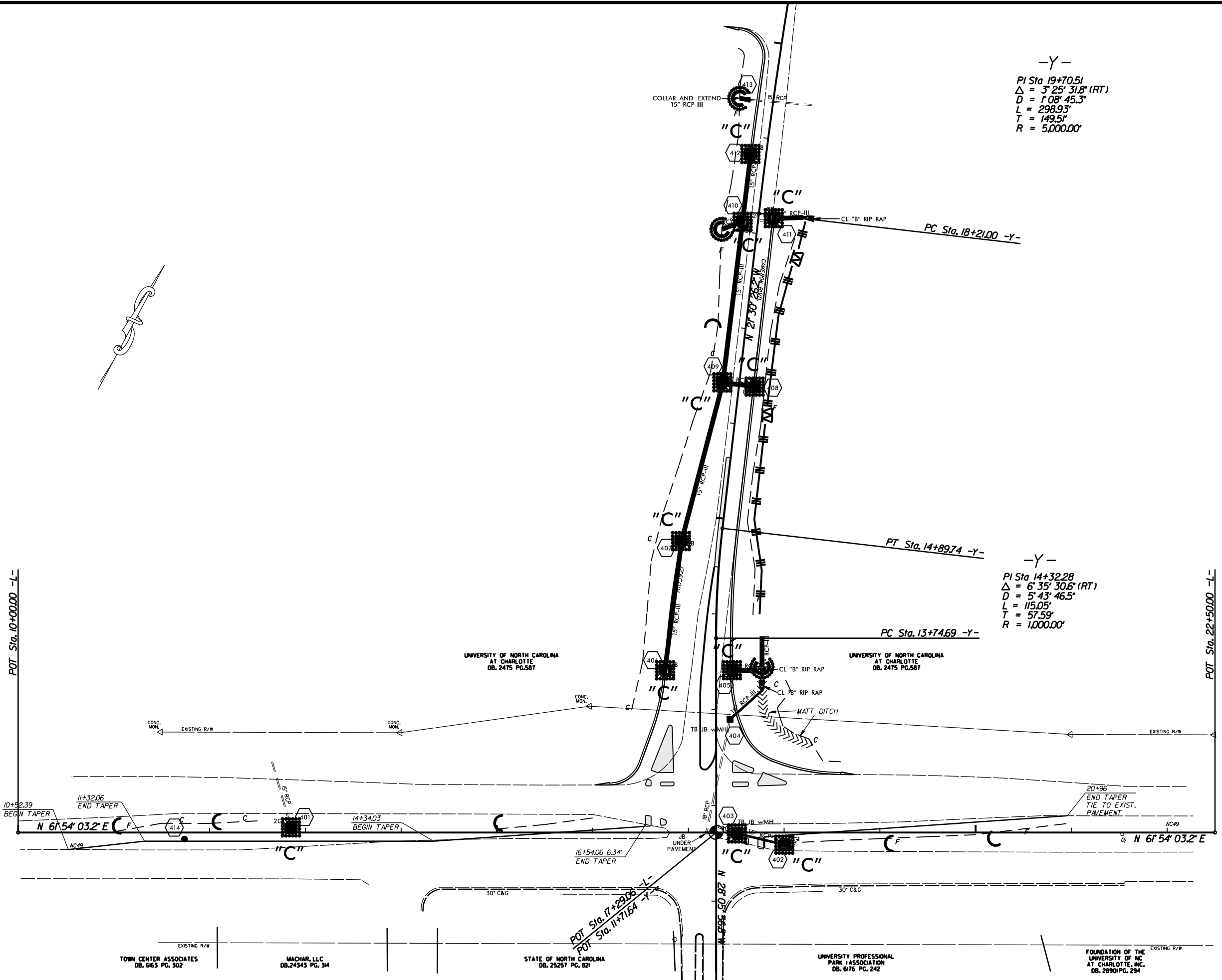
Roadway Standard Drawings

The following roadway english standards as appear in "Roadway Standard Drawings"- Roadway Design Unit - N. C. Department of Transportation - Raleigh, N. C., dated January 2012 and the latest revision thereto are applicable to this project and by reference hereby are considered a part of these plans.

1604.01 Railroad Erosion Control Detail	1632.01 Rock Inlet Sediment Trap Type A
1605.01 Temporary Silt Fence	1632.02 Rock Inlet Sediment Trap Type B
1606.01 Special Sediment Control Fence	1632.03 Rock Inlet Sediment Trap Type C
1607.01 Gravel Construction Entrance	1633.01 Temporary Rock Silt Check Type A
1622.01 Temporary Berms and Slope Drains	1633.02 Temporary Rock Silt Check Type B
1630.01 Riser Basin	1634.01 Temporary Rock Sediment Dam Type A
1630.02 Silt Basin Type B	1634.02 Temporary Rock Sediment Dam Type B
1630.03 Temporary Silt Ditch	1635.01 Rock Pipe Inlet Sediment Trap Type A
1630.04 Stilling Basin	1635.02 Rock Pipe Inlet Sediment Trap Type B
1630.05 Temporary Diversion	1640.01 Coir Fiber Baffle
1630.06 Special Stilling Basin	1645.01 Temporary Stream Crossing
1631.01 Matting Installation	

N:\2012\04\_08\_12\02631\02631.dwg

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	EC-2	
F.A. PROJECT NO.			



-Y-


PI Sta. 19+70.51  
 $\Delta = 3^{\circ} 25' 31.8''$  (RT)  
 $D = 1^{\circ} 08' 45.3''$   
 $L = 298.93'$   
 $T = 149.51'$   
 $R = 5,000.00'$

-Y-

PI Sta. 14+32.28  
 $\Delta = 6^{\circ} 35' 30.6''$  (RT)  
 $D = 5^{\circ} 43' 46.5''$   
 $L = 115.05'$   
 $T = 57.59'$   
 $R = 1,000.00'$

EROSION CONTROL MEASURES MAY BE CHANGED, IN FIELD AS DIRECTED BY THE ENGINEER.

INTERSECTION IMPROVEMENTS AT  
NC 49 AND CAMERON BLVD.

SCALE	1"=50'		REVISIONS
DATE	5-14		
DWG. BY	JDH		
DESIGN BY	JDH		
APPROVED	RWB		

TOWN CENTER ASSOCIATES  
DB. 663 PG. 302

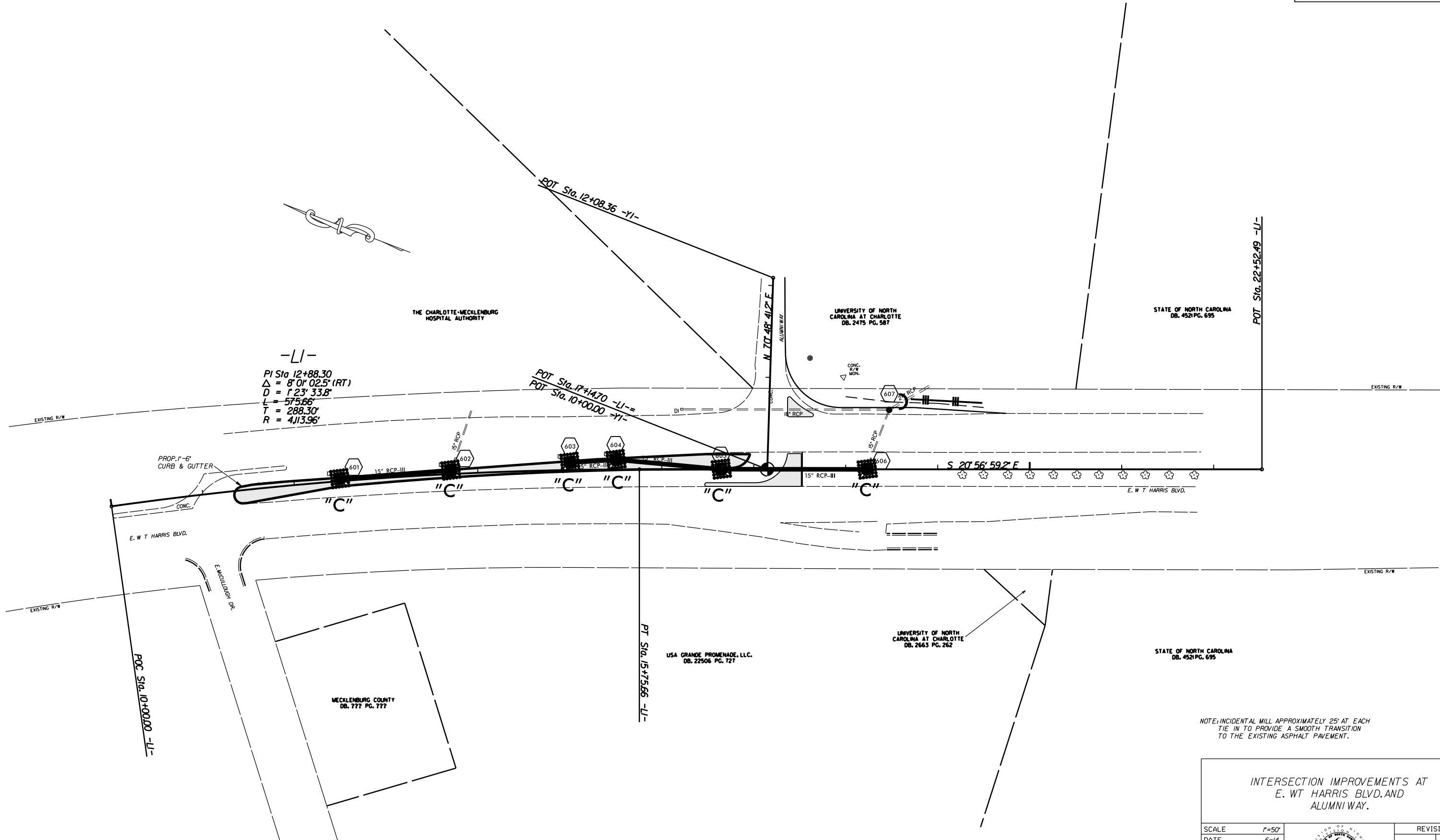
MACHAR, LLC  
DB. 24343 PG. 34

STATE OF NORTH CAROLINA  
DB. 25257 PG. 82

UNIVERSITY PROFESSIONAL  
PARK ASSOCIATION  
DB. 6176 PG. 242

FOUNDATION OF THE  
UNIVERSITY OF NC  
AT CHARLOTTE, INC.  
DB. 2890 PG. 294


STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	EC-3	
F.A. PROJECT NO.			



-LI-  
 PI Sta 12+88.30  
 $\Delta = 8' 01'' 02.5'' (RT)$   
 $D = 1' 23'' 33.8''$   
 $L = 575.66'$   
 $T = 288.30'$   
 $R = 4,113.96'$

NOTE: INCIDENTAL MILL APPROXIMATELY 25' AT EACH TIE IN TO PROVIDE A SMOOTH TRANSITION TO THE EXISTING ASPHALT PAVEMENT.

INTERSECTION IMPROVEMENTS AT  
E. W T HARRIS BLVD. AND  
ALUMNI WAY.

SCALE	1"=50'		REVISIONS
DATE	6-14		
DWG. BY	JDH		
DESIGN BY	JDH		
APPROVED	RWB		

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	PMP-1	
F.A. PROJECT NO.			

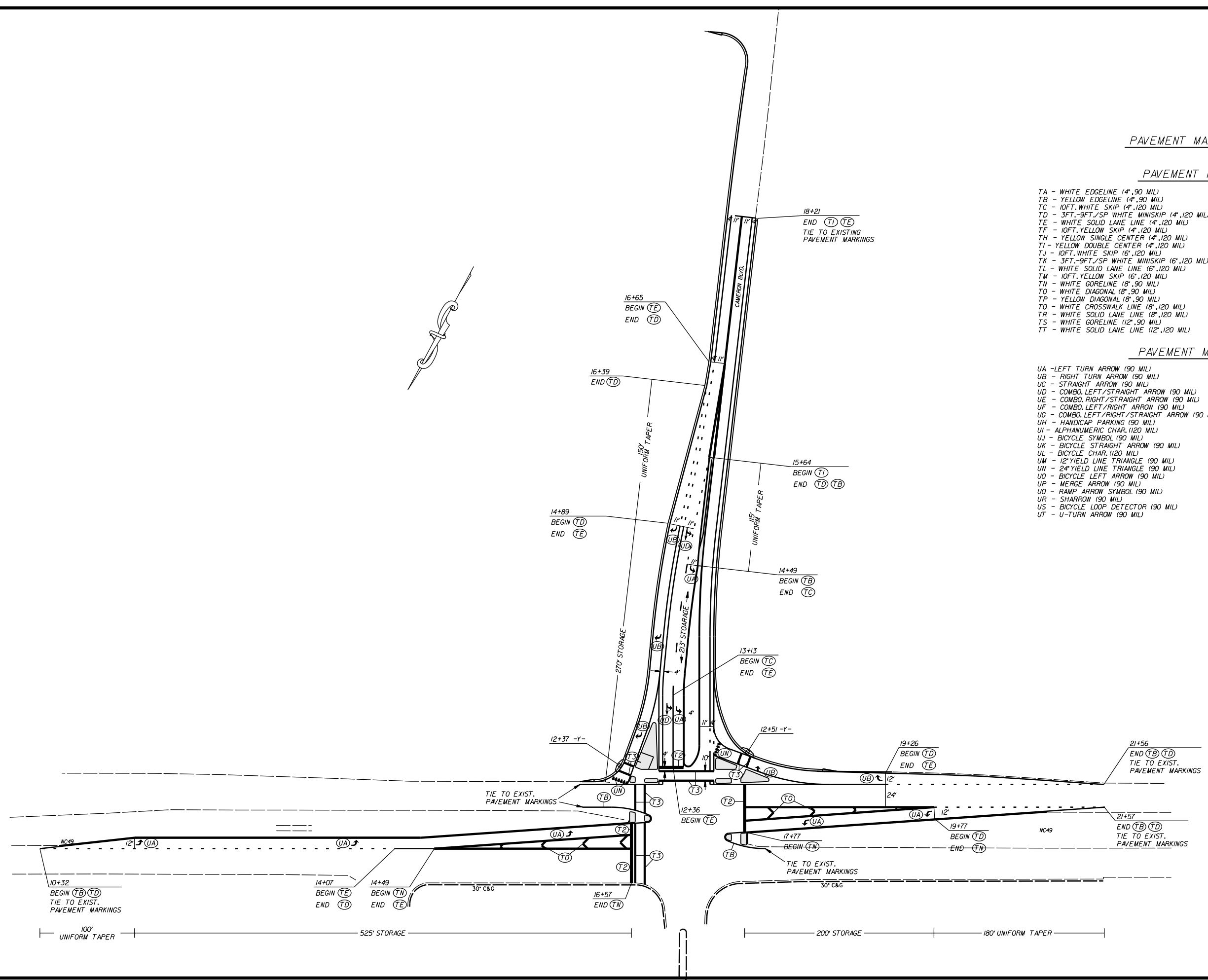
PAVEMENT MARKING SCHEDULE

PAVEMENT MARKING LINES

- |   |  |
|---|--|
| TA - WHITE EDGELINE (4',90 MIL)               | TU - WHITE DIAGONAL (12',90 MIL)                             |
| TB - YELLOW EDGELINE (4',90 MIL)              | TV - YELLOW DIAGONAL (12',90 MIL)                            |
| TC - 10FT. WHITE SKIP (4',120 MIL)            | T1 - WHITE LINE, RR X (16',120 MIL)                          |
| TD - 3FT.-9FT./SP WHITE MINISKIP (4',120 MIL) | T2 - WHITE STOPBAR (24',120 MIL)                             |
| TE - WHITE SOLID LANE LINE (4',120 MIL)       | T3 - WHITE CROSSWALK LINE (24',120 MIL)                      |
| TF - 10FT. YELLOW SKIP (4',120 MIL)           | T4 - WHITE RUMBLE STRIP (4',240 MIL)                         |
| TH - YELLOW SINGLE CENTER (4',120 MIL)        | T5 - YELLOW RUMBLE STRIP (4',240 MIL)                        |
| TI - YELLOW DOUBLE CENTER (4',120 MIL)        | T6 - WHITE EDGELINE (6',90 MIL)                              |
| TJ - 10FT. WHITE SKIP (6',120 MIL)            | T7 - YELLOW EDGELINE (6',90 MIL)                             |
| TK - 3FT.-9FT./SP WHITE MINISKIP (6',120 MIL) | T8 - 2FT.-6FT./SP WHITE MINISKIP (4',120 MIL)                |
| TL - WHITE SOLID LANE LINE (6',120 MIL)       | T9 - 2FT.-6FT./SP YELLOW MINISKIP (4',120 MIL)               |
| TM - 10FT. YELLOW SKIP (6',120 MIL)           | T10 - 3FT.-3FT./SP WHITE MINISKIP (12',120 MIL)              |
| TN - WHITE GORELINE (8',90 MIL)               | T11 - 2FT.-6FT./SP WHITE MINISKIP (6',120 MIL)               |
| TO - WHITE DIAGONAL (8',90 MIL)               | T12 - 2FT.-6FT./SP YELLOW MINISKIP (6',120 MIL)              |
| TP - YELLOW DIAGONAL (8',90 MIL)              | T13 - 3FT.-9FT./SP WHITE MINISKIP (8',120 MIL)               |
| TQ - WHITE CROSSWALK LINE (8',120 MIL)        | T14 - 3FT.-9FT./SP WHITE MINISKIP (12',120 MIL)              |
| TR - WHITE SOLID LANE LINE (8',120 MIL)       | T15 - YELLOW SINGLE CENTER (6',120 MIL)                      |
| TS - WHITE GORELINE (12',90 MIL)              | T16 - YELLOW DOUBLE CENTER (6',120 MIL)                      |
| TT - WHITE SOLID LANE LINE (12',120 MIL)      | T17 - 3FT.-3FT./SP WHITE MINISKIP ENTRANCE LINE (8',120 MIL) |

PAVEMENT MARKING SYMBOLS

- |  |  |
|--|--|
| UA - LEFT TURN ARROW (90 MIL)                  | UU - FISH-HOOK STRAIGHT ARROW (90 MIL)                     |
| UB - RIGHT TURN ARROW (90 MIL)                 | UV - FISH-HOOK LEFT/STRAIGHT ARROW (90 MIL)                |
| UC - STRAIGHT ARROW (90 MIL)                   | UW - FISH-HOOK RIGHT/STRAIGHT ARROW (90 MIL)               |
| UD - COMBO. LEFT/STRAIGHT ARROW (90 MIL)       | UX - FISH-HOOK LEFT/RIGHT ARROW (90 MIL)                   |
| UE - COMBO. RIGHT/STRAIGHT ARROW (90 MIL)      | UY - FISH-HOOK LEFT/RIGHT/STRAIGHT ARROW (90 MIL)          |
| UF - COMBO. LEFT/RIGHT ARROW (90 MIL)          | UZ - FISH-HOOK W/CIRCLE STRAIGHT ARROW (90 MIL)            |
| UG - COMBO. LEFT/RIGHT/STRAIGHT ARROW (90 MIL) |  |
| UH - HANDICAP PARKING (90 MIL)                 | WA - FISH-HOOK W/CIRCLE LEFT ARROW (90 MIL)                |
| UI - ALPHANUMERIC CHAR. (120 MIL)              | WB - FISH-HOOK W/CIRCLE LEFT/STRAIGHT ARROW (90 MIL)       |
| UJ - BICYCLE SYMBOL (90 MIL)                   | WC - FISH-HOOK W/CIRCLE LEFT/RIGHT/STRAIGHT ARROW (90 MIL) |
| UK - BICYCLE STRAIGHT ARROW (90 MIL)           |  |
| UL - BICYCLE CHAR. (120 MIL)                   | MA - PERMANENT RAISED MARKER (YELLOW & YELLOW)             |
| UM - 12" YIELD LINE TRIANGLE (90 MIL)          | MB - PERMANENT RAISED MARKER (CRYSTAL & RED)               |
| UN - 24" YIELD LINE TRIANGLE (90 MIL)          | MC - PERMANENT RAISED MARKER (YELLOW & RED)                |
| UO - BICYCLE LEFT ARROW (90 MIL)               | MD - PERMANENT RAISED MARKER (YELLOW)                      |
| UP - MERGE ARROW (90 MIL)                      | ME - SNOWPLOWABLE MARKER (YELLOW & YELLOW)                 |
| UQ - RAMP ARROW SYMBOL (90 MIL)                | MF - SNOWPLOWABLE MARKER (CRYSTAL & RED)                   |
| UR - SHARROW (90 MIL)                          | MG - SNOWPLOWABLE MARKER (YELLOW & RED)                    |
| US - BICYCLE LOOP DETECTOR (90 MIL)            | ML - PERMANENT RAISED MARKER (CRYSTAL & CRYSTAL)           |
| UT - U-TURN ARROW (90 MIL)                     | MO - SNOWPLOWABLE MARKER (CRYSTAL & CRYSTAL)               |



INTERSECTION IMPROVEMENTS AT  
NC 49 AND CAMERON BLVD.

SCALE	r=50'		REVISIONS
DATE	5-14		
DWG. BY	JDH		
DESIGN BY	JDH		
APPROVED	RWB		

PAVEMENT MARKING SCHEDULE

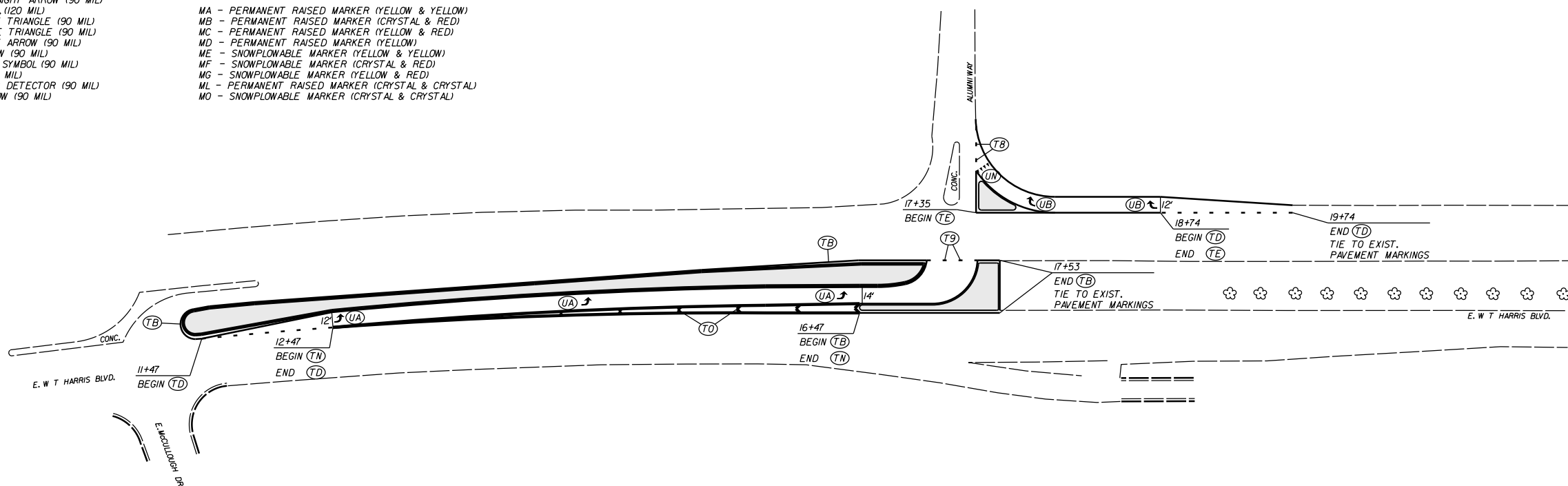
STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	44244	PMP-2	
F.A. PROJECT NO.			

PAVEMENT MARKING LINES

- TA - WHITE EDGELINE (4',90 MIL)
- TB - YELLOW EDGELINE (4',90 MIL)
- TC - 10FT. WHITE SKIP (4',120 MIL)
- TD - 3FT.-9FT./SP WHITE MINISKIP (4',120 MIL)
- TE - WHITE SOLID LANE LINE (4',120 MIL)
- TF - 10FT. YELLOW SKIP (4',120 MIL)
- TH - YELLOW SINGLE CENTER (4',120 MIL)
- TI - YELLOW DOUBLE CENTER (4',120 MIL)
- TJ - 10FT. WHITE SKIP (6',120 MIL)
- TK - 3FT.-9FT./SP WHITE MINISKIP (6',120 MIL)
- TL - WHITE SOLID LANE LINE (6',120 MIL)
- TM - 10FT. YELLOW SKIP (6',120 MIL)
- TN - WHITE GORELINE (8',90 MIL)
- TO - WHITE DIAGONAL (8',90 MIL)
- TP - YELLOW DIAGONAL (8',90 MIL)
- TQ - WHITE CROSSWALK LINE (8',120 MIL)
- TR - WHITE SOLID LANE LINE (8',120 MIL)
- TS - WHITE GORELINE (12',90 MIL)
- TT - WHITE SOLID LANE LINE (12',120 MIL)
- TU - WHITE DIAGONAL (12',90 MIL)
- TV - YELLOW DIAGONAL (12',90 MIL)
- T1 - WHITE LINE, RR X (16',120 MIL)
- T2 - WHITE STOPBAR (24',120 MIL)
- T3 - WHITE CROSSWALK LINE (24',120 MIL)
- T4 - WHITE RUMBLE STRIP (4',240 MIL)
- T5 - YELLOW RUMBLE STRIP (4',240 MIL)
- T6 - WHITE EDGELINE (6',90 MIL)
- T7 - YELLOW EDGELINE (6',90 MIL)
- T8 - 2FT.-6FT./SP WHITE MINISKIP (4',120 MIL)
- T9 - 2FT.-6FT./SP YELLOW MINISKIP (4',120 MIL)
- T10 - 3FT.-9FT./SP WHITE MINISKIP (12',120 MIL)
- T11 - 2FT.-6FT./SP WHITE MINISKIP (6',120 MIL)
- T12 - 2FT.-6FT./SP YELLOW MINISKIP (6',120 MIL)
- T13 - 3FT.-9FT./SP WHITE MINISKIP (8',120 MIL)
- T14 - 3FT.-9FT./SP WHITE MINISKIP (12',120 MIL)
- T15 - YELLOW SINGLE CENTER (6',120 MIL)
- T16 - YELLOW DOUBLE CENTER (6',120 MIL)
- T17 - 3FT.-3FT./SP WHITE MINISKIP ENTRANCE LINE (8',120 MIL)

PAVEMENT MARKING SYMBOLS

- UA - LEFT TURN ARROW (90 MIL)
- UB - RIGHT TURN ARROW (90 MIL)
- UC - STRAIGHT ARROW (90 MIL)
- UD - COMBO. LEFT/STRAIGHT ARROW (90 MIL)
- UE - COMBO. RIGHT/STRAIGHT ARROW (90 MIL)
- UF - COMBO. LEFT/RIGHT ARROW (90 MIL)
- UG - COMBO. LEFT/RIGHT/STRAIGHT ARROW (90 MIL)
- UH - HANDICAP PARKING (90 MIL)
- UI - ALPHANUMERIC CHAR. (120 MIL)
- UJ - BICYCLE SYMBOL (90 MIL)
- UK - BICYCLE STRAIGHT ARROW (90 MIL)
- UL - BICYCLE CHAR. (120 MIL)
- UM - 12" YIELD LINE TRIANGLE (90 MIL)
- UN - 24" YIELD LINE TRIANGLE (90 MIL)
- UO - BICYCLE LEFT ARROW (90 MIL)
- UP - MERGE ARROW (90 MIL)
- UQ - RAMP ARROW SYMBOL (90 MIL)
- UR - SHARROW (90 MIL)
- US - BICYCLE LOOP DETECTOR (90 MIL)
- UT - U-TURN ARROW (90 MIL)
- UU - FISH-HOOK STRAIGHT ARROW (90 MIL)
- UV - FISH-HOOK LEFT/STRAIGHT ARROW (90 MIL)
- UW - FISH-HOOK RIGHT/STRAIGHT ARROW (90 MIL)
- UX - FISH-HOOK LEFT/RIGHT ARROW (90 MIL)
- UY - FISH-HOOK LEFT/RIGHT/STRAIGHT ARROW (90 MIL)
- UZ - FISH-HOOK W/CIRCLE STRAIGHT ARROW (90 MIL)
- WA - FISH-HOOK W/CIRCLE LEFT ARROW (90 MIL)
- WB - FISH-HOOK W/CIRCLE LEFT/STRAIGHT ARROW (90 MIL)
- WC - FISH-HOOK W/CIRCLE LEFT/RIGHT/STRAIGHT ARROW (90 MIL)
- MA - PERMANENT RAISED MARKER (YELLOW & YELLOW)
- MB - PERMANENT RAISED MARKER (CRYSTAL & RED)
- MC - PERMANENT RAISED MARKER (YELLOW & RED)
- MD - PERMANENT RAISED MARKER (YELLOW)
- ME - SNOWPLOWABLE MARKER (YELLOW & YELLOW)
- MF - SNOWPLOWABLE MARKER (CRYSTAL & RED)
- MG - SNOWPLOWABLE MARKER (YELLOW & RED)
- ML - PERMANENT RAISED MARKER (CRYSTAL & CRYSTAL)
- MO - SNOWPLOWABLE MARKER (CRYSTAL & CRYSTAL)

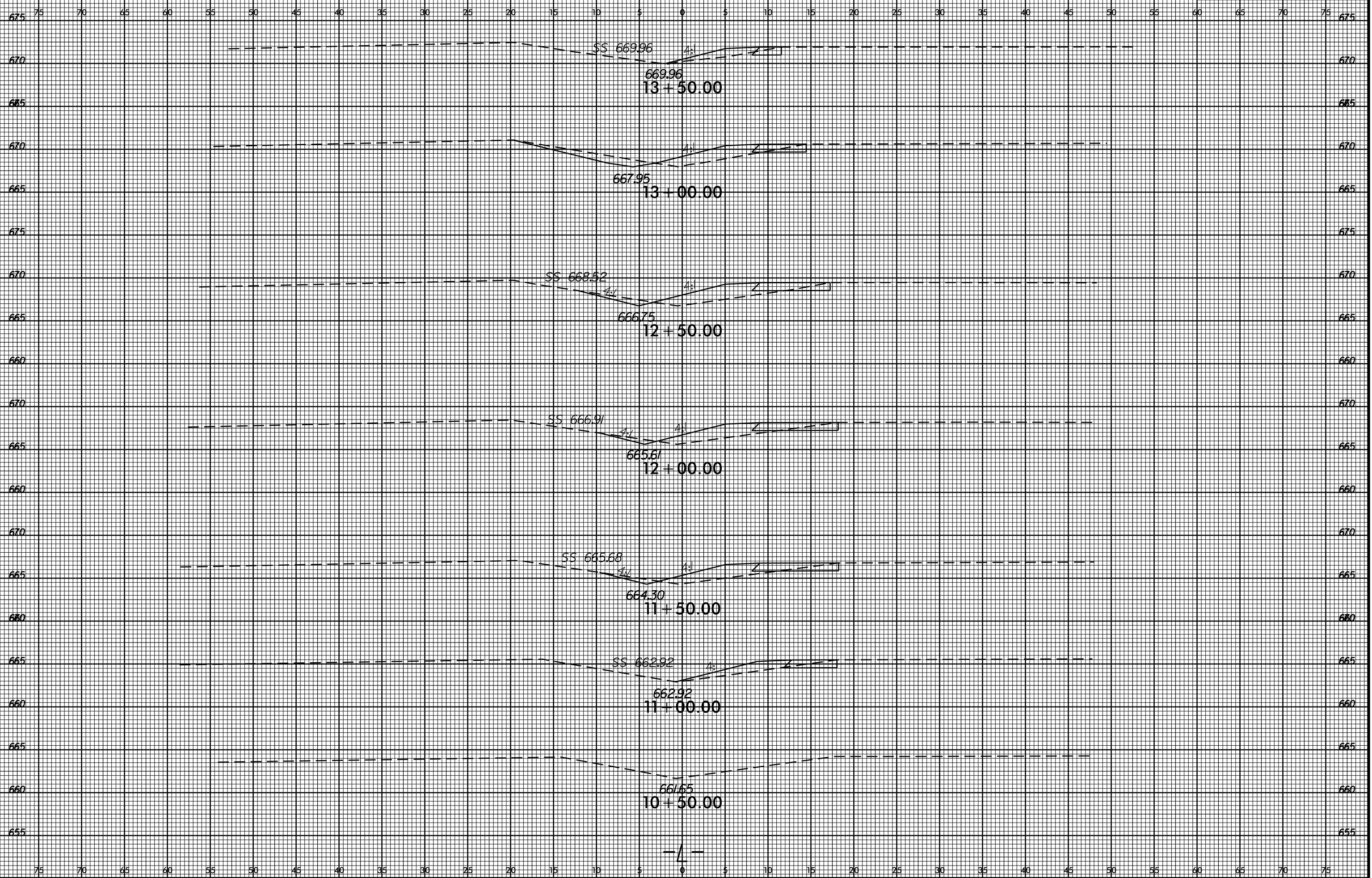


INTERSECTION IMPROVEMENTS AT  
E. WT HARRIS BLVD. AND  
ALUMNI WAY.

SCALE	1"=50'
DATE	6-14
DWG. BY	JDH
DESIGN BY	JDH
APPROVED	RWB



REVISIONS	

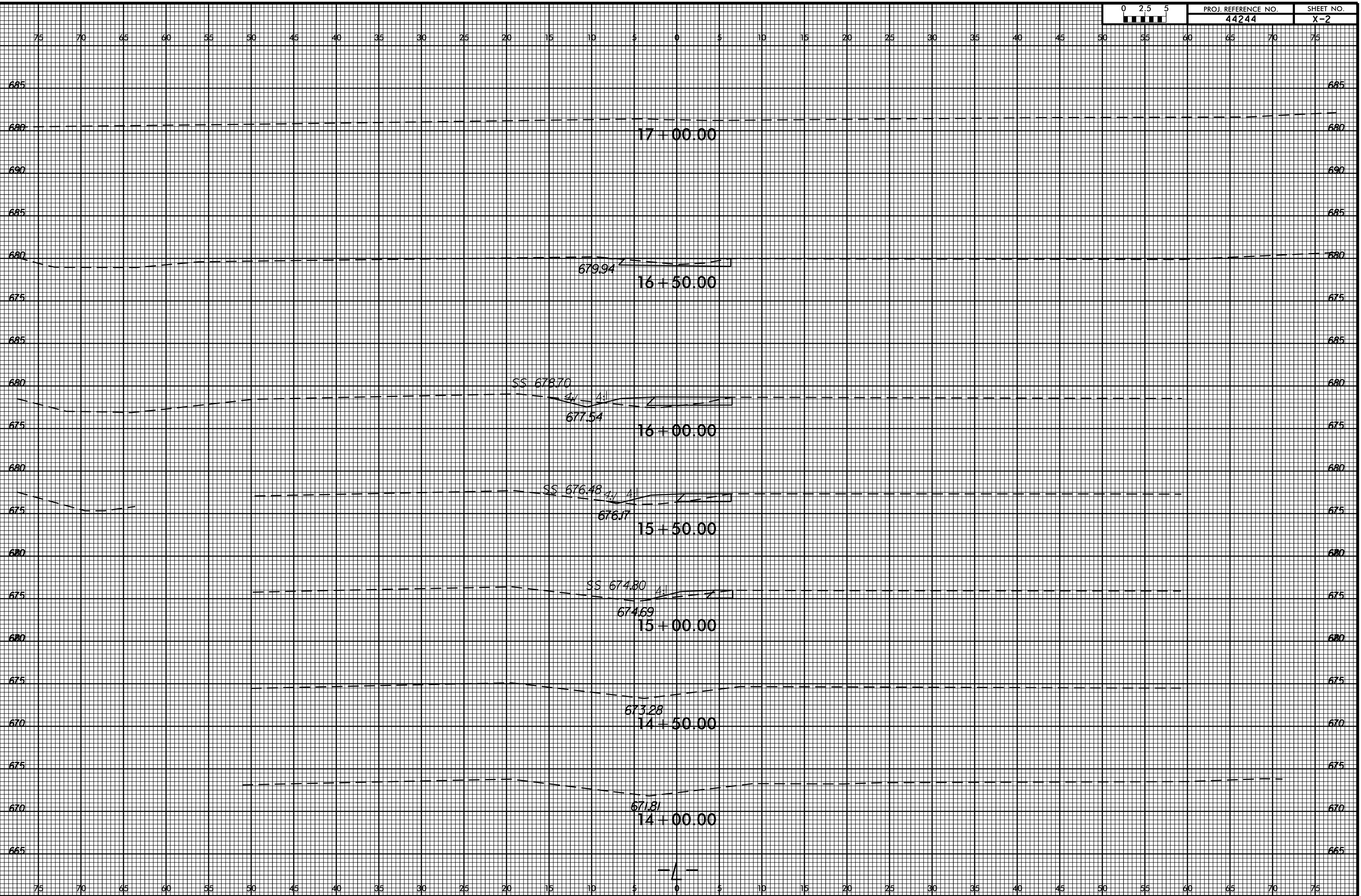


8/23/99



PROJ. REFERENCE NO.  
44244

SHEET NO.  
X-2



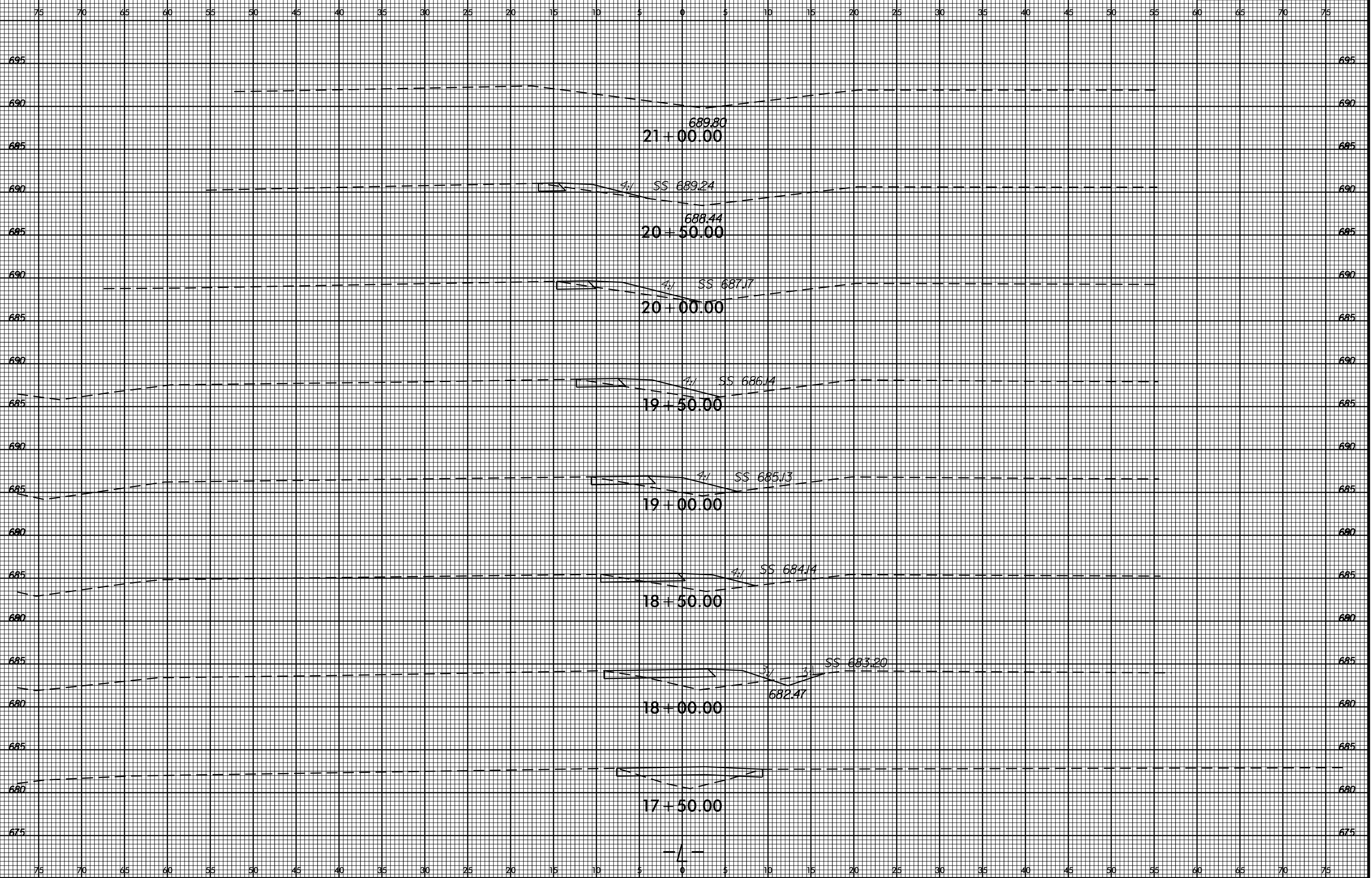
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8/23/99



PROJ. REFERENCE NO.  
44244

SHEET NO.  
X-3



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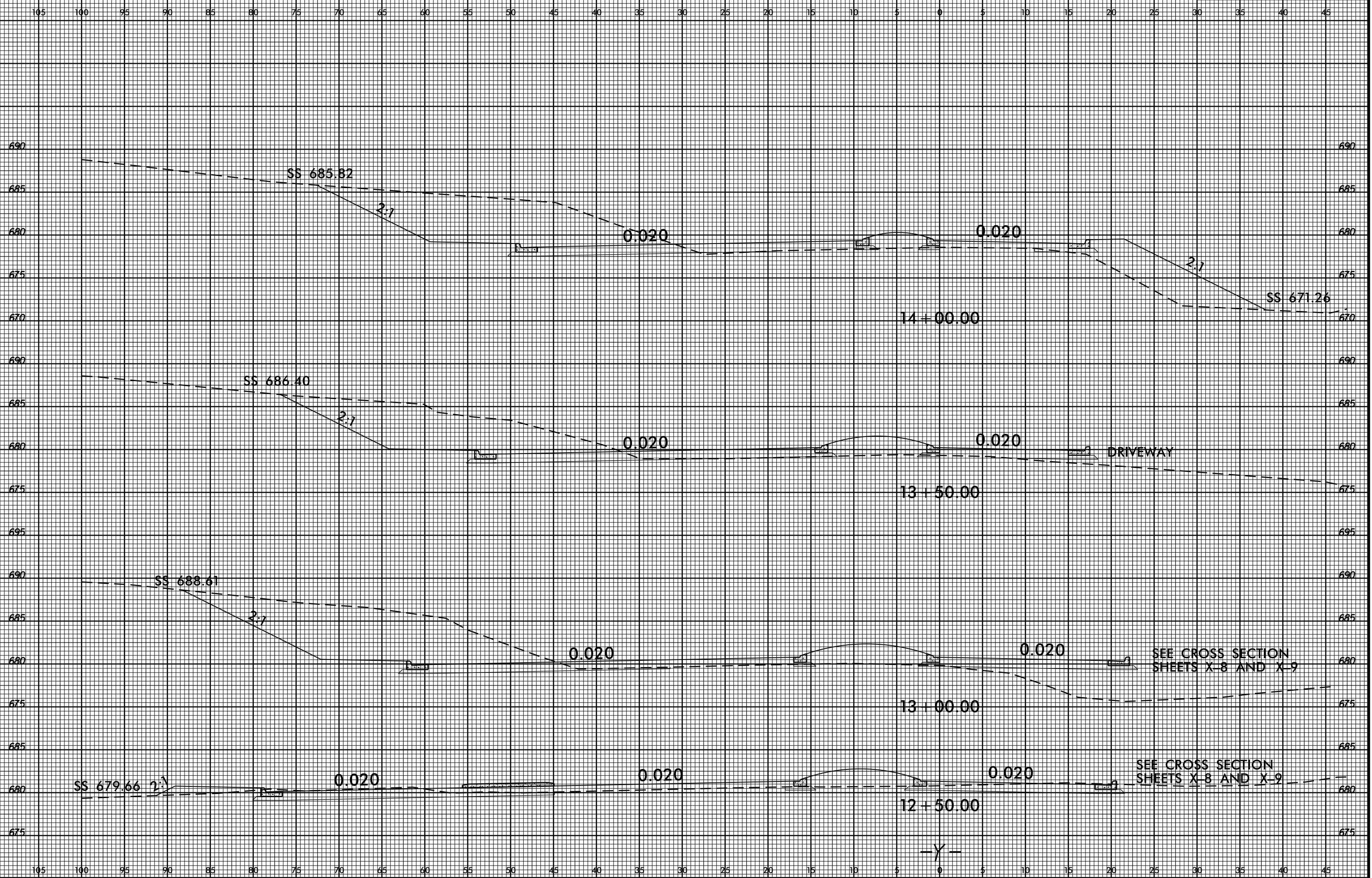


8/23/99



PROJ. REFERENCE NO.  
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X-4



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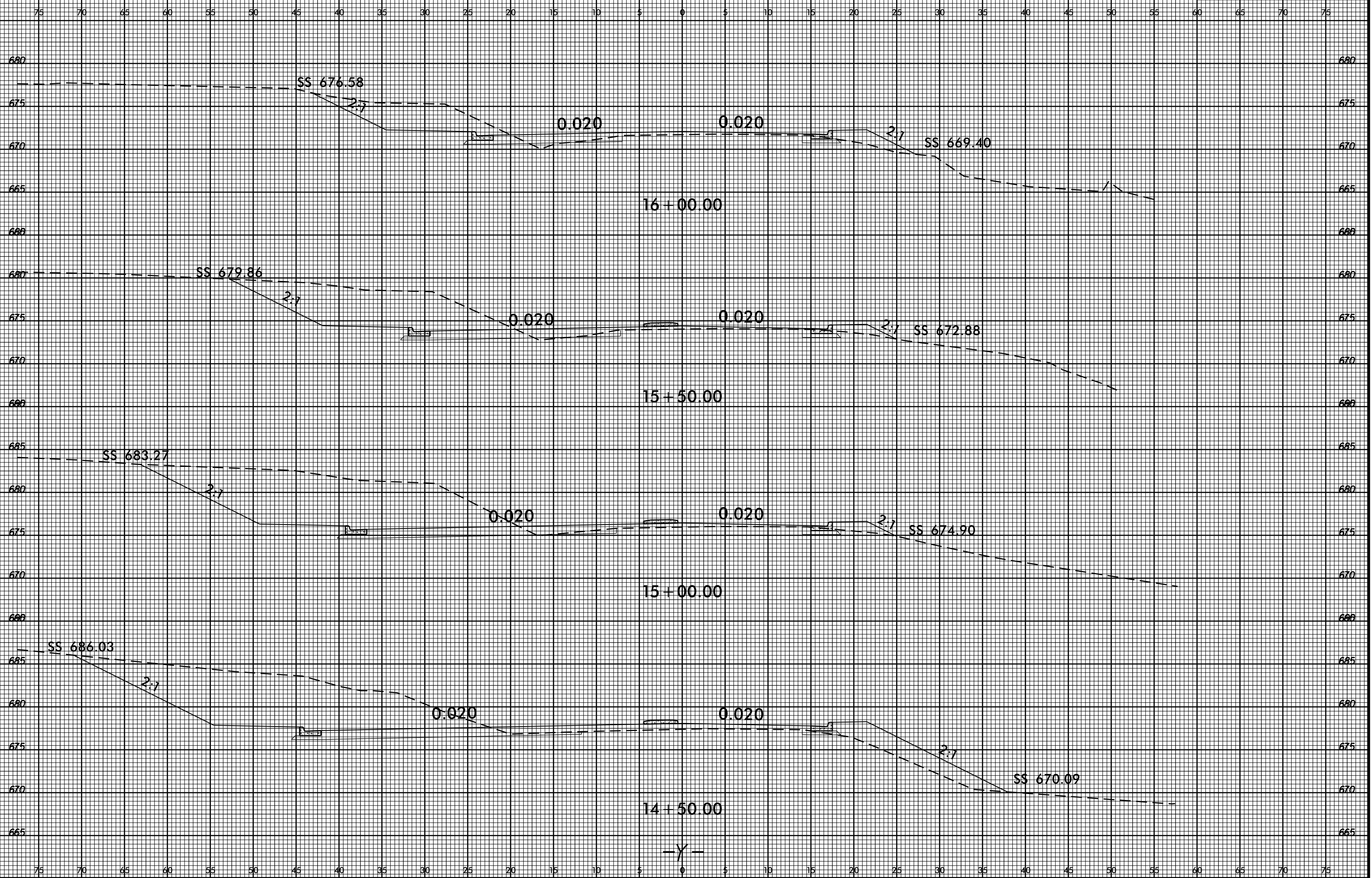
-Y-

8/23/99



PROJ. REFERENCE NO.  
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SHEET NO.  
X-5



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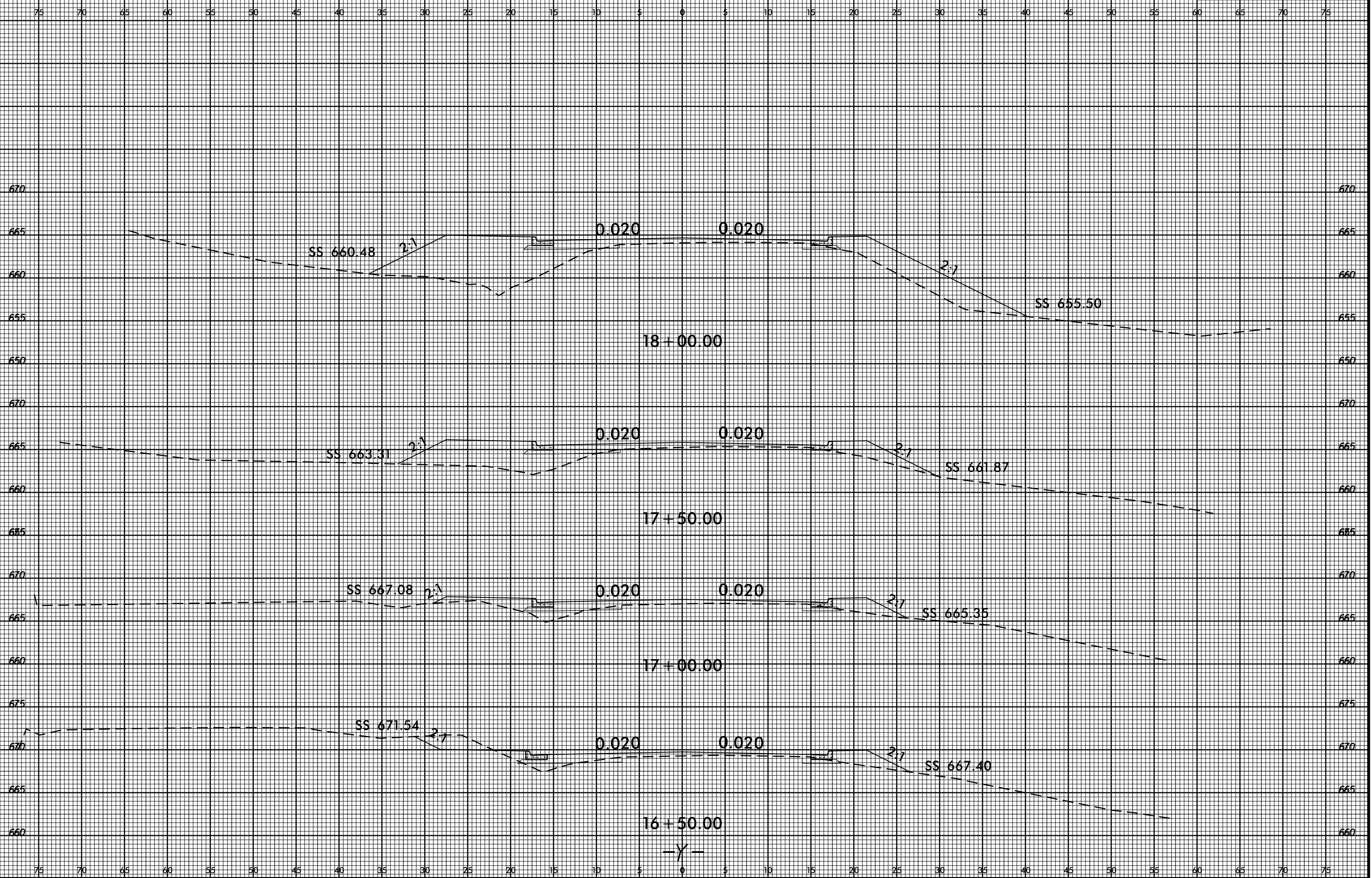
-Y-

8/23/99

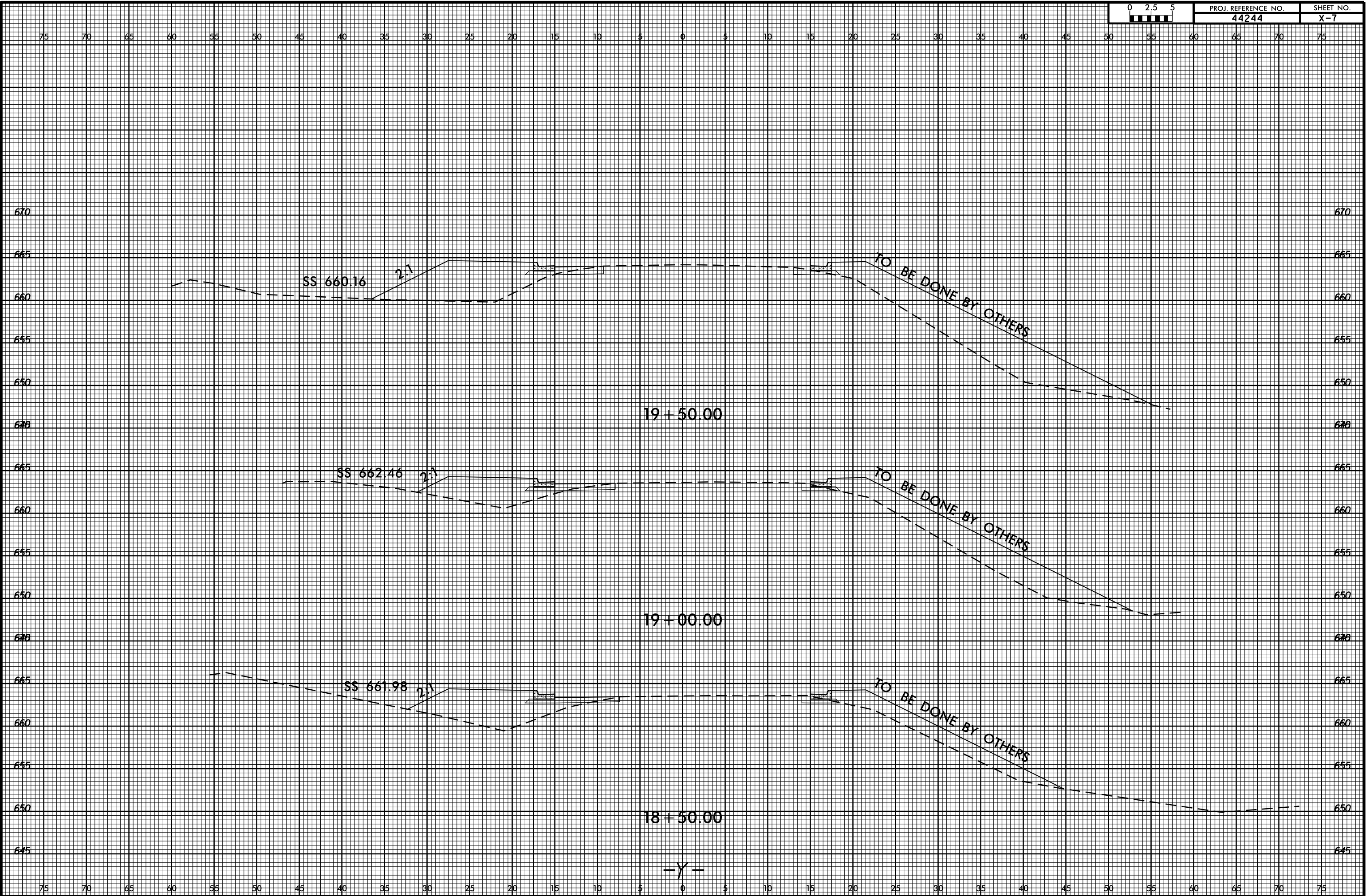


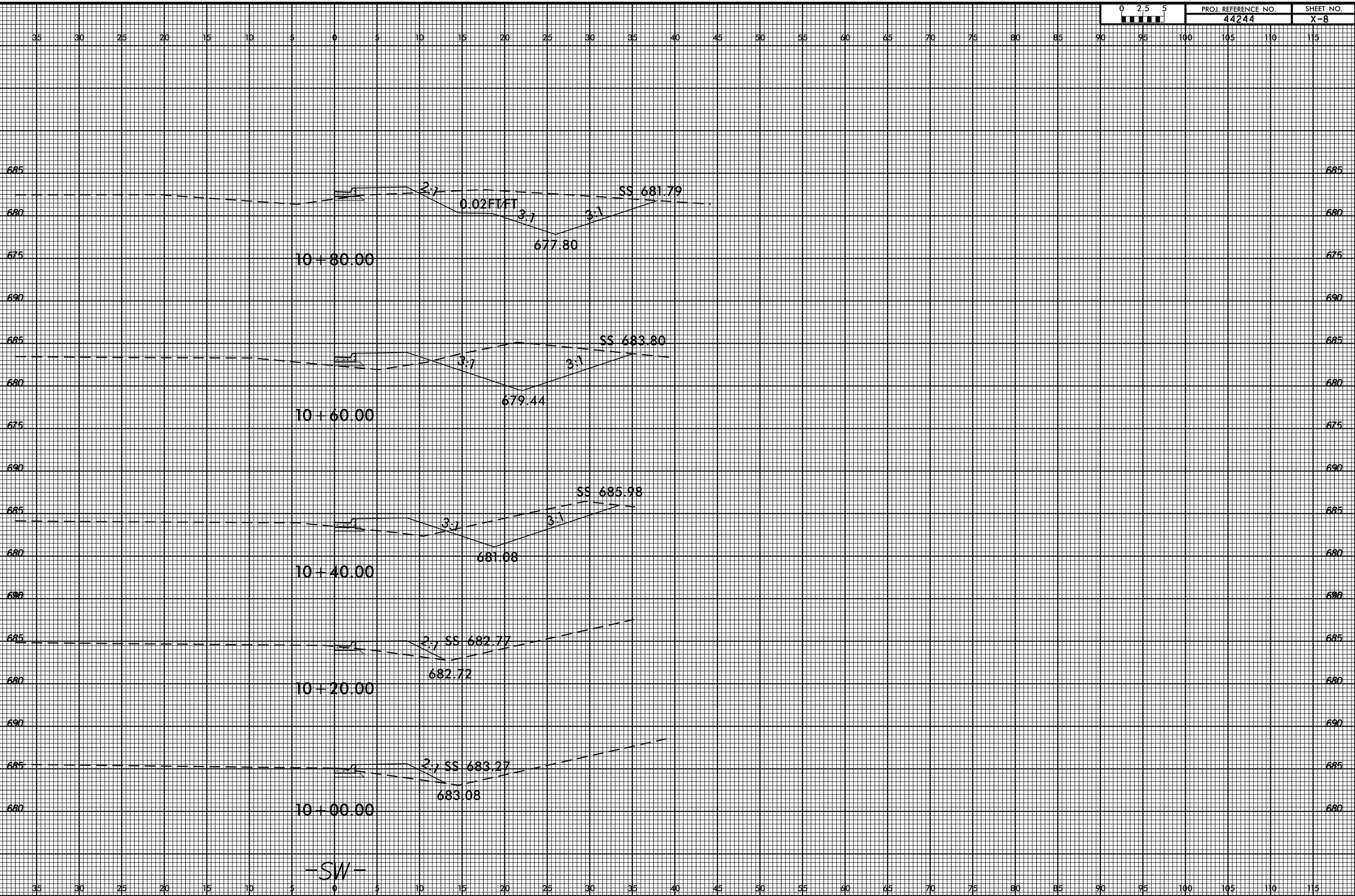
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SHEET NO.  
X-6



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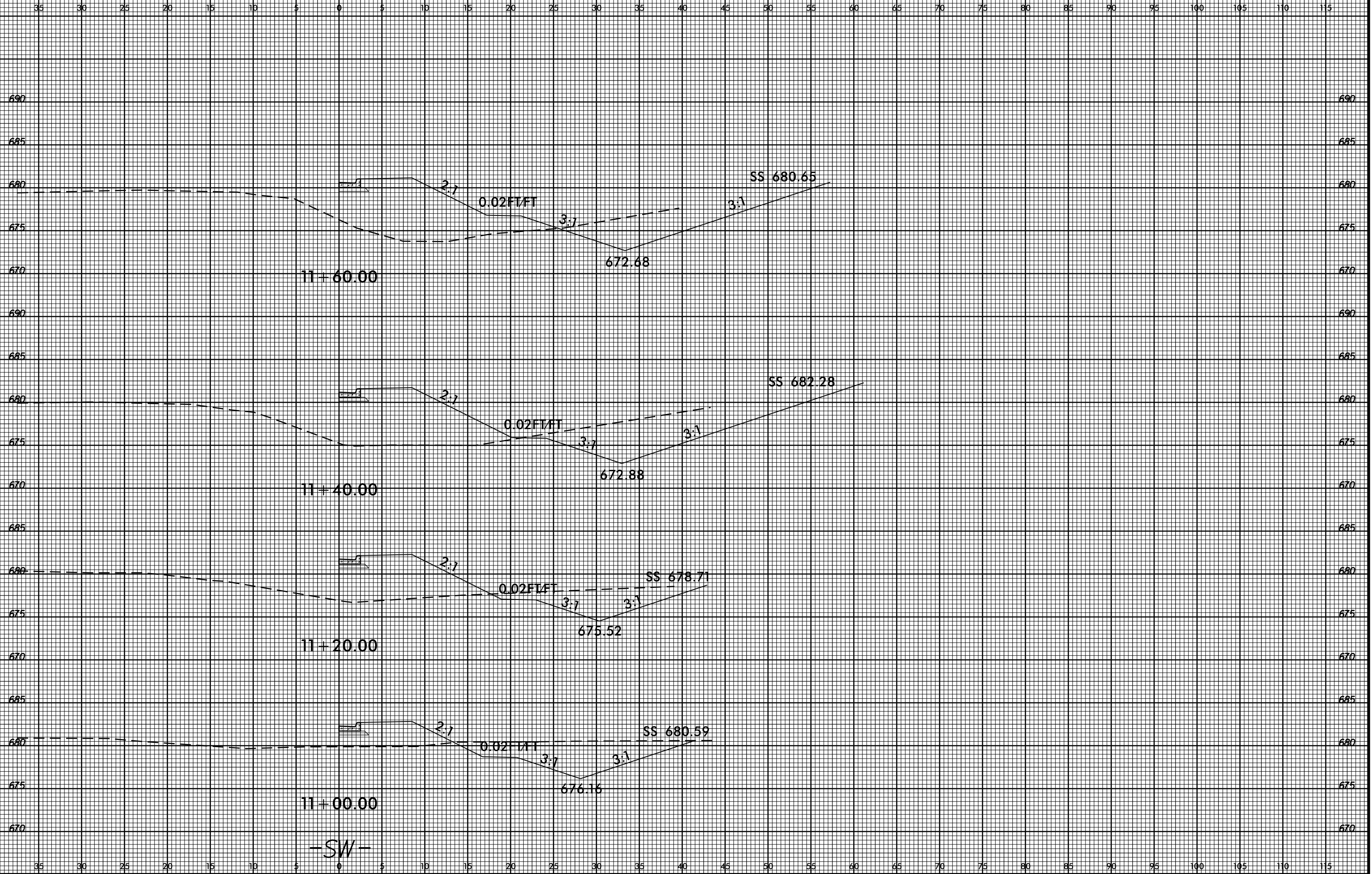
-SW-

8/23/99



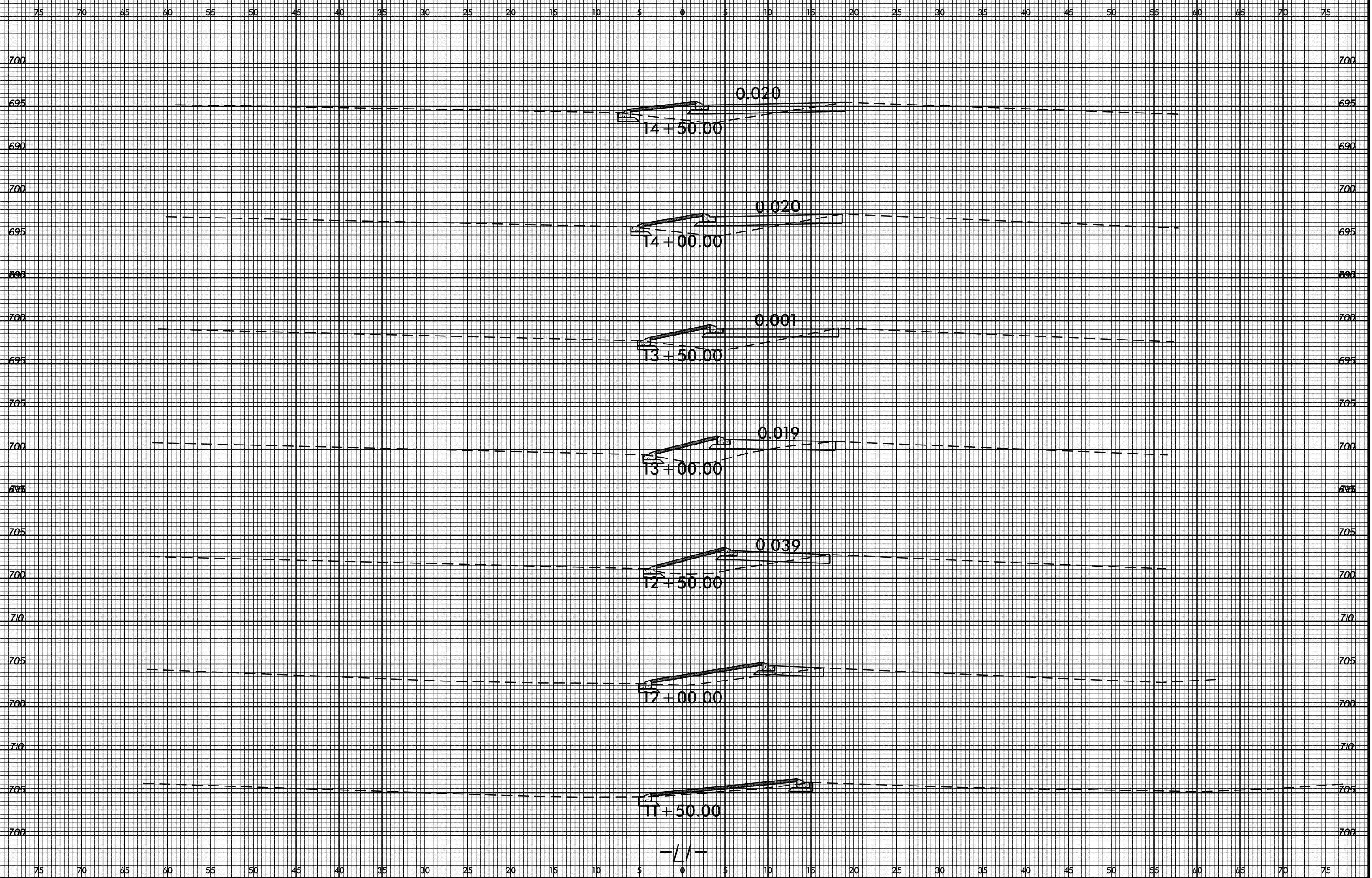
PROJ. REFERENCE NO.  
44244

SHEET NO.  
X-9



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-SW-



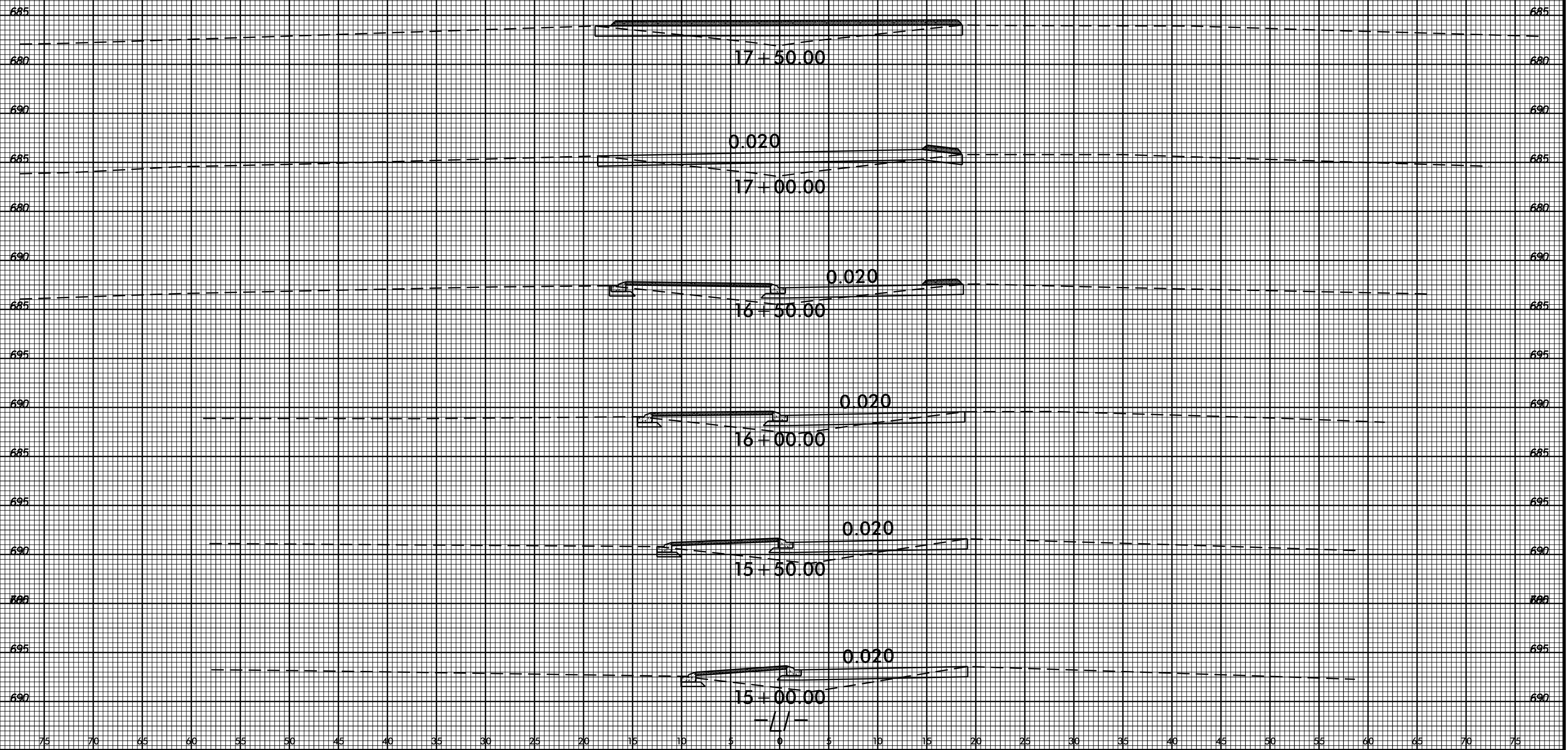
8/23/99



PROJ. REFERENCE NO.  
44244

SHEET NO.  
X-11

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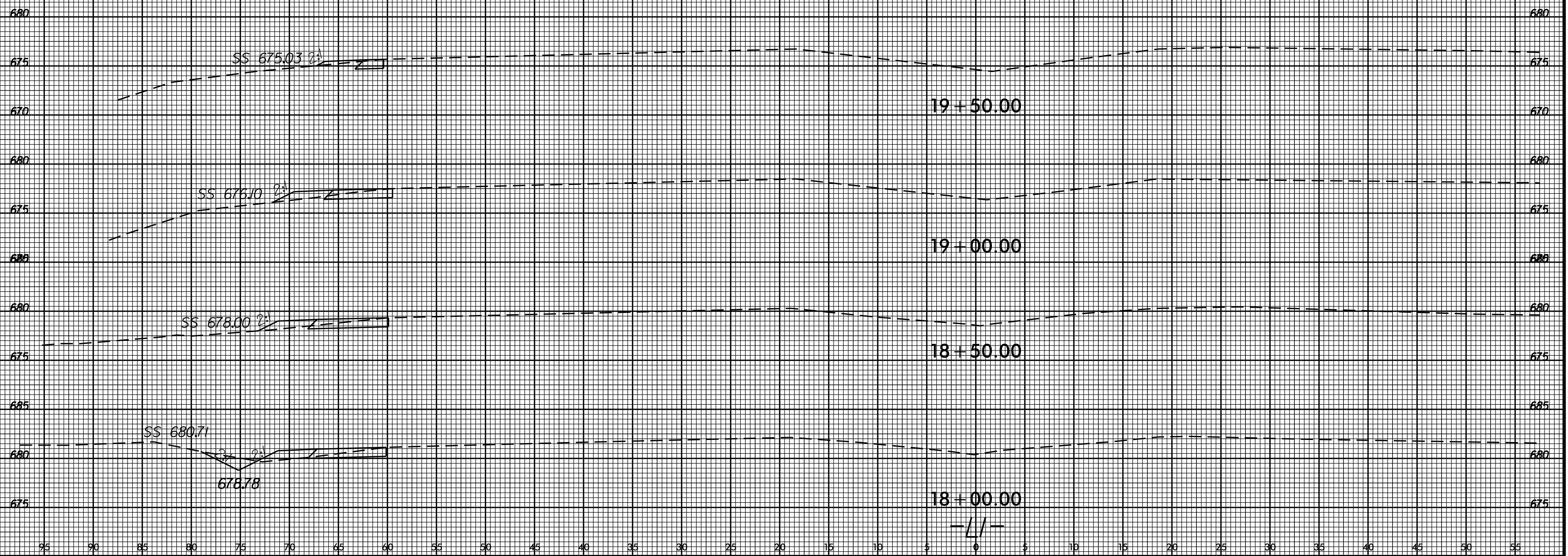
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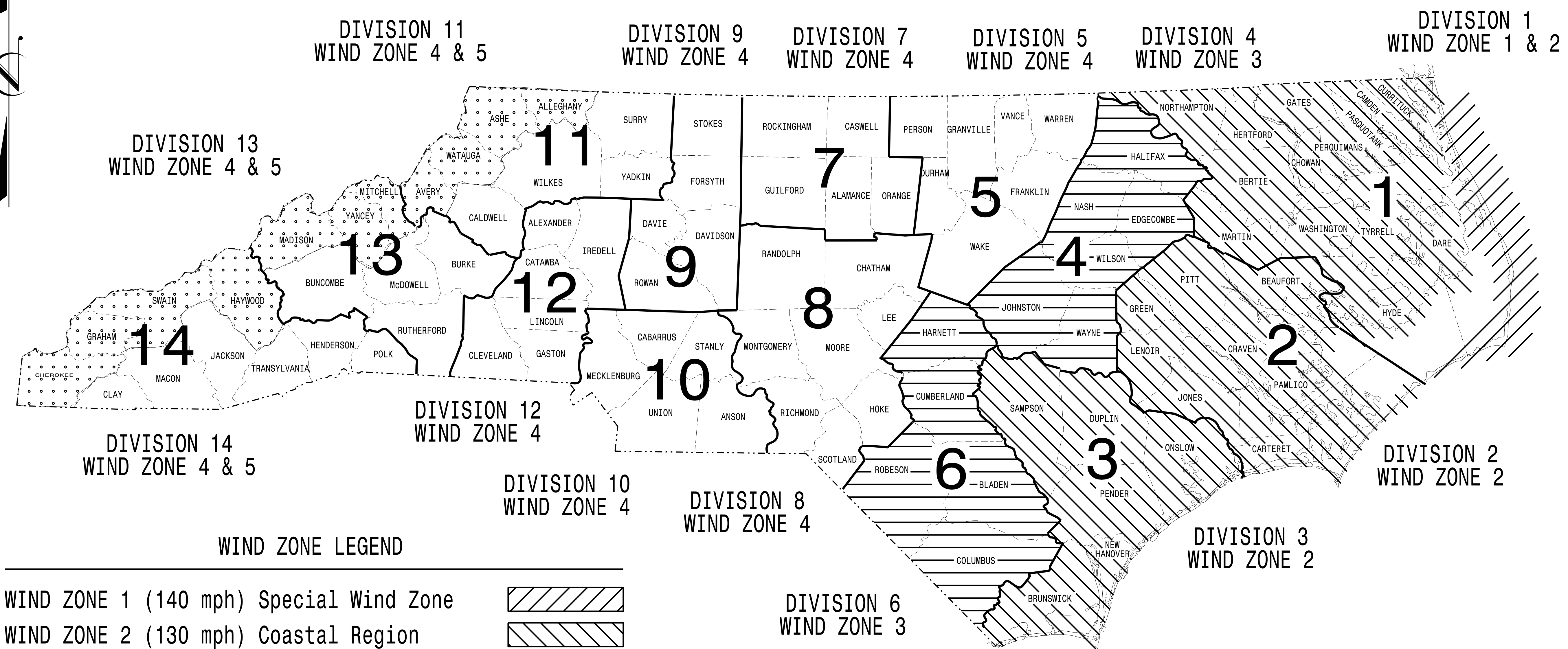
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# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

## STANDARD DRAWINGS FOR METAL POLES

**NCDOT METAL POLE STANDARDS**



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

Prepared In the Offices of:

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, Luminaires, and Traffic Signals

INDEX OF PLANS	
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8,9	Standard Strain Pole Foundations

**NCDOT CONTACTS:**  
**MOBILITY AND SAFETY DIVISION - ITS AND SIGNALS UNIT**

**G. A. FULLER, P.E. - STATE ITS AND SIGNALS ENGINEER**

**G. G. MURR, JR., P.E. - STATE SIGNALS ENGINEER**

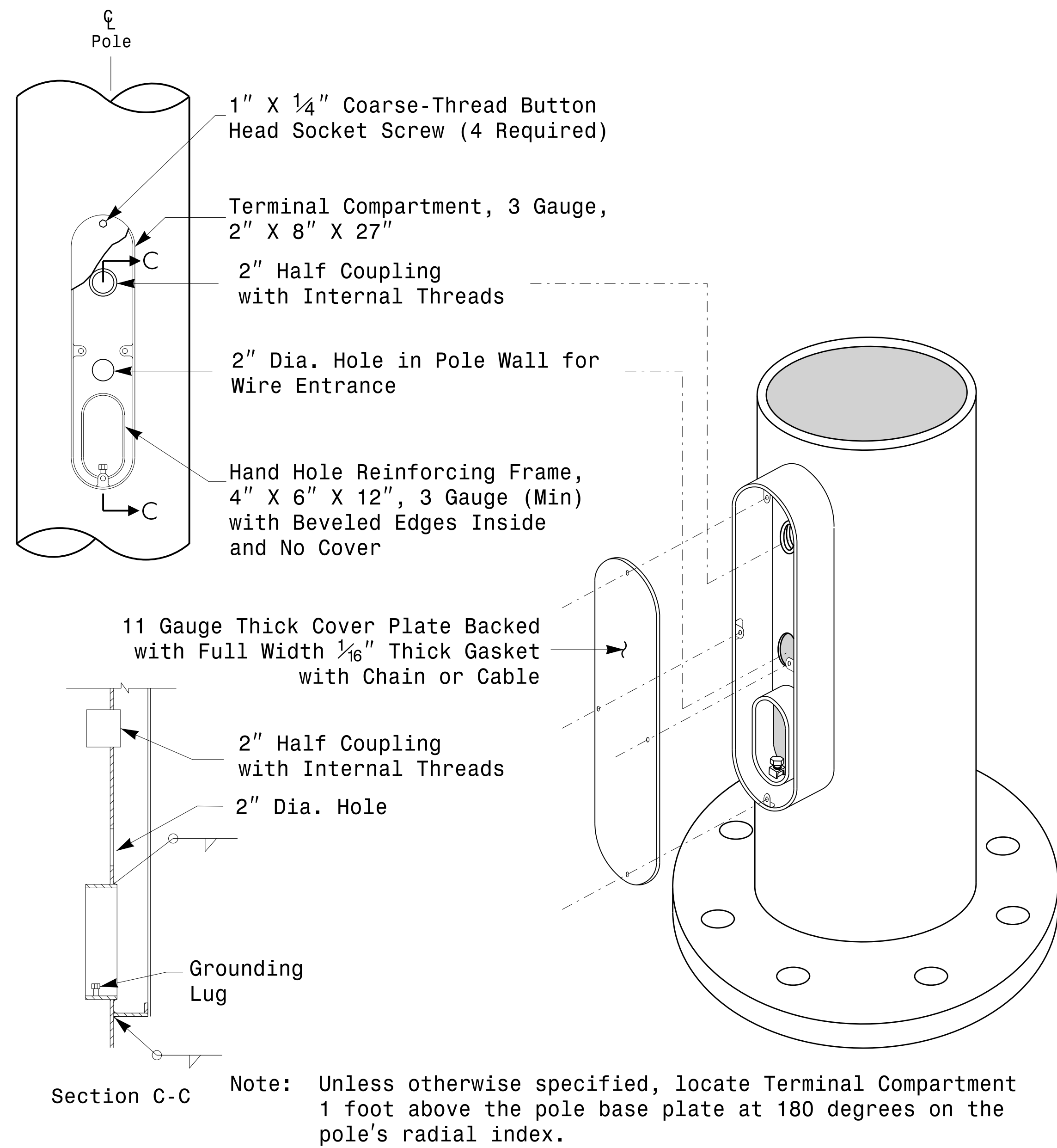
**D.C. SARKAR, P.E. - ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER**

**C.F. ANDREWS - ITS AND SIGNALS JOURNEY STRUCTURAL ENGINEER**

SEAL

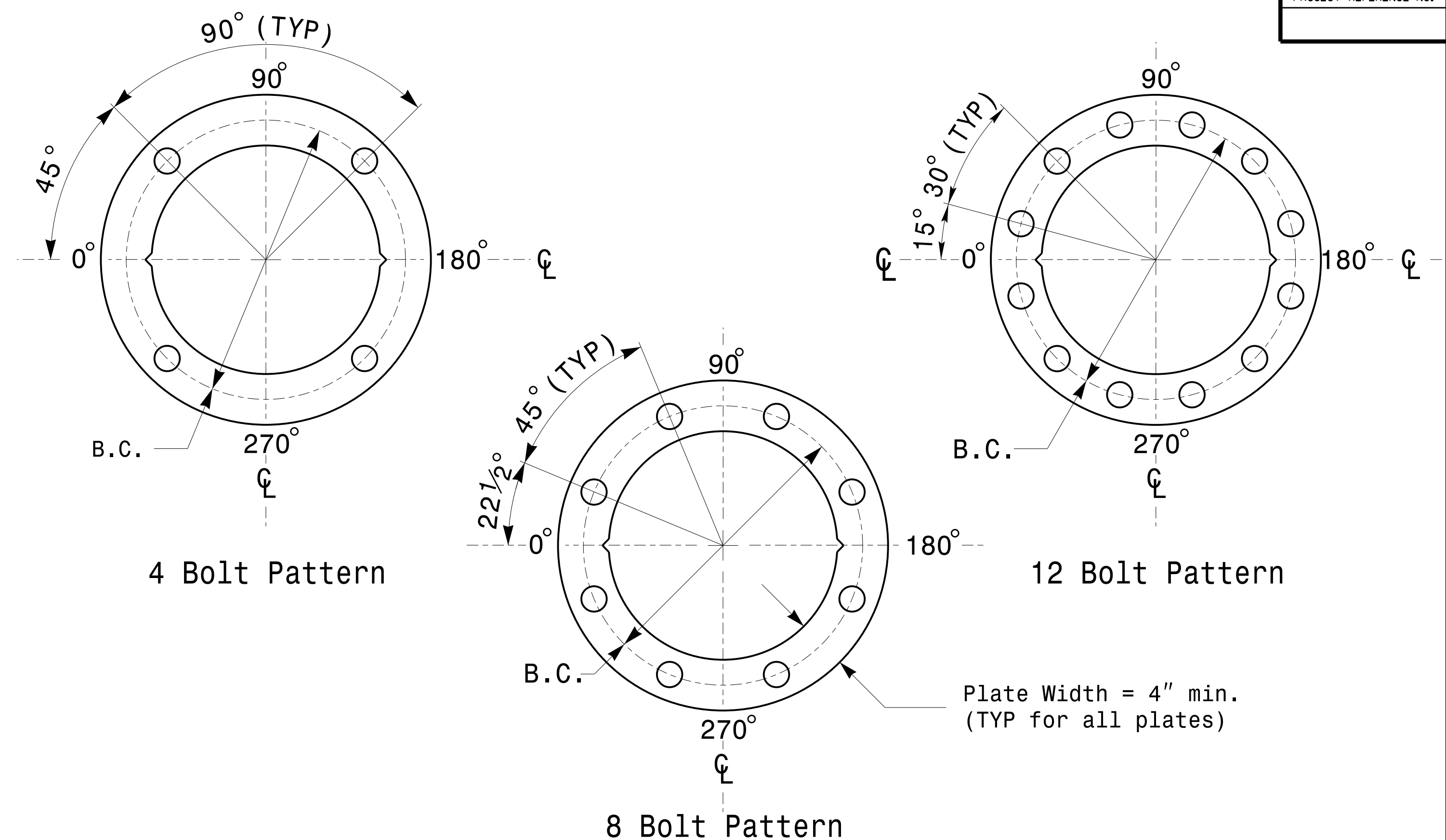
Designed by: *Debesh C. Sarkar* 8/26/2014  
DATE





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

**Terminal Compartment Detail**



Construct Templates and Plates from 1/4 inch min. thick Steel. Galvanizing is not required.  
**Base Plate Template and Anchor Bolt Lock Plate Details**

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)

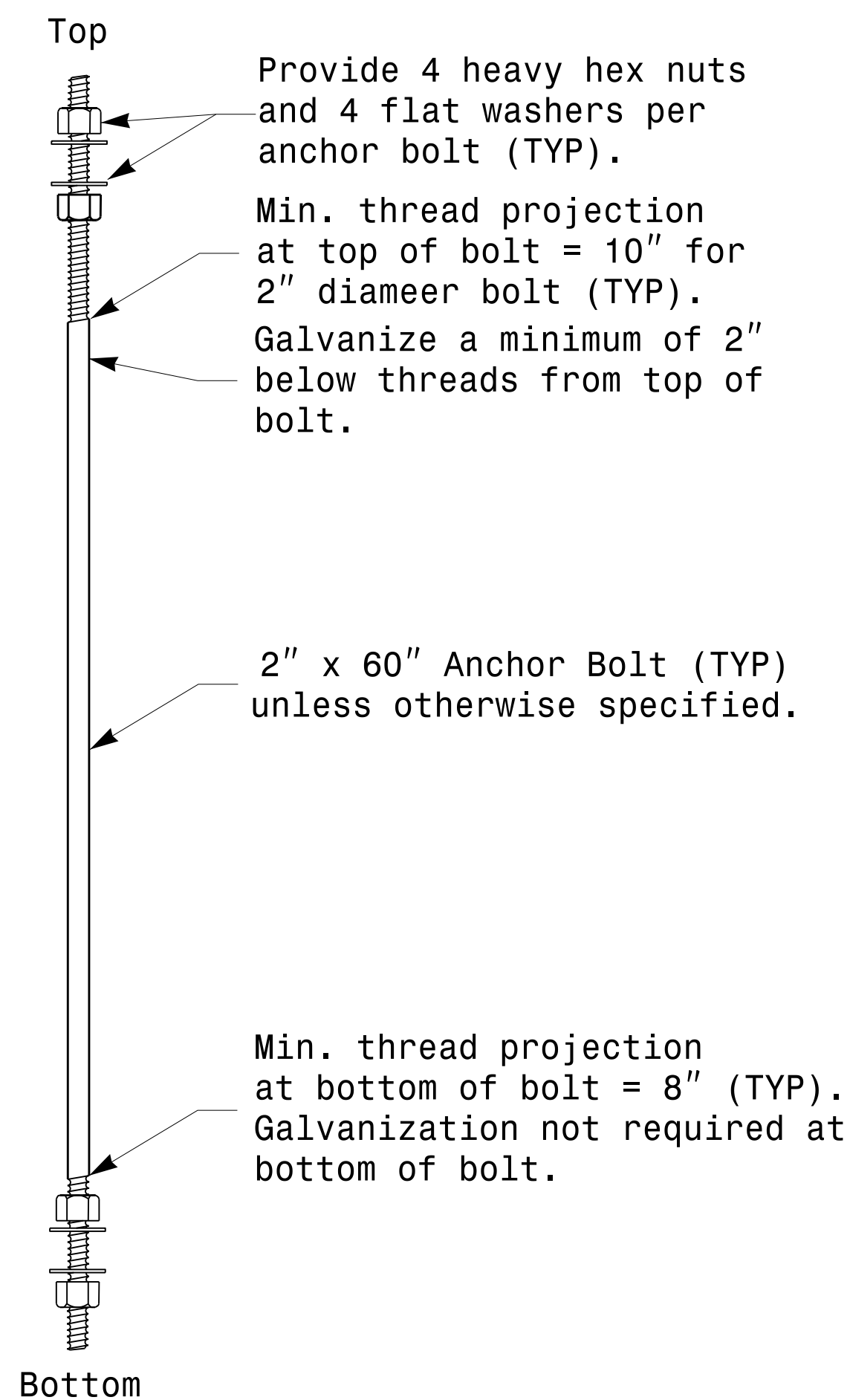
**Notes:**

- 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.

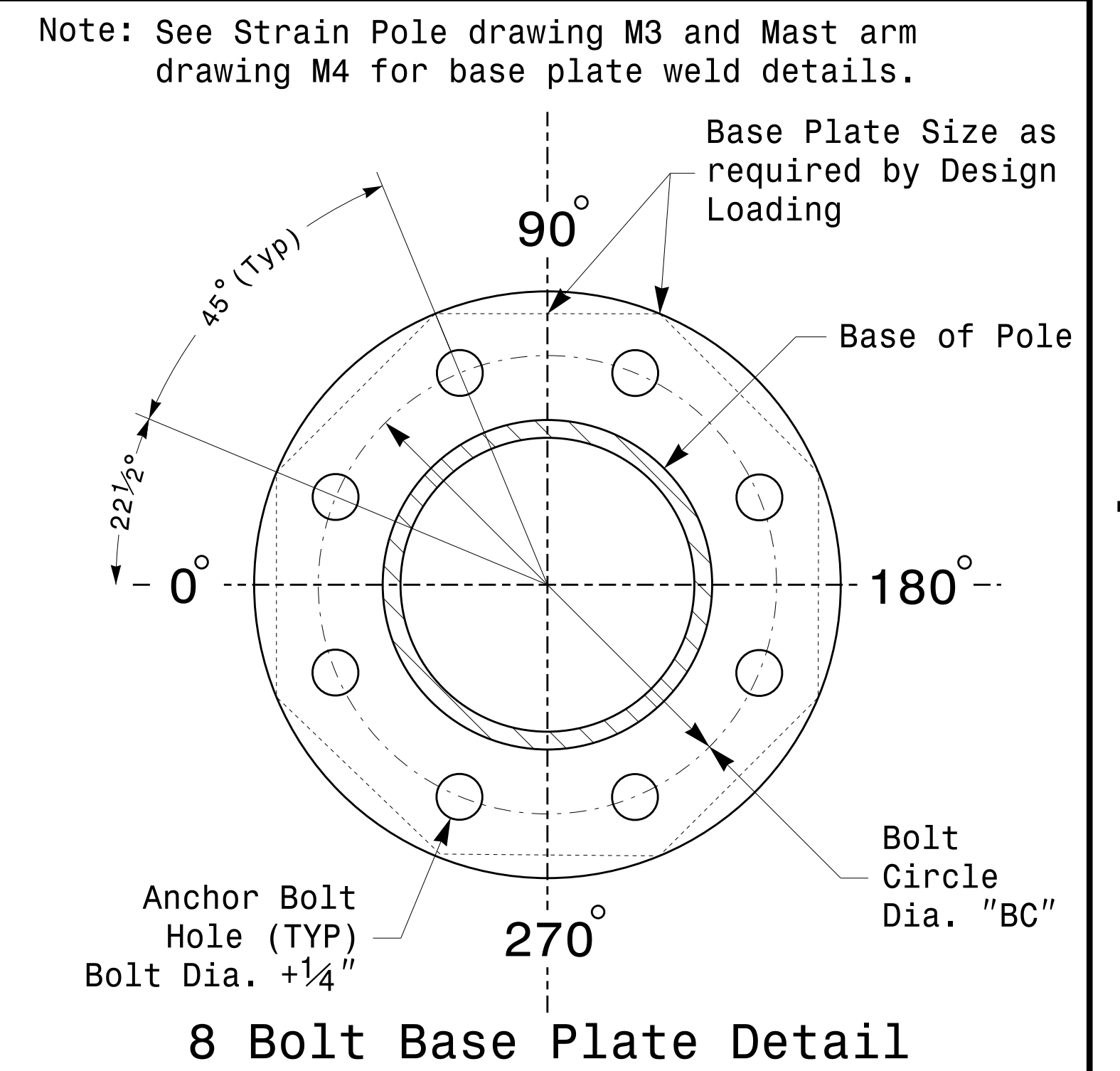
**Identification Tag Details**

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)



**Anchor Bolt Detail**

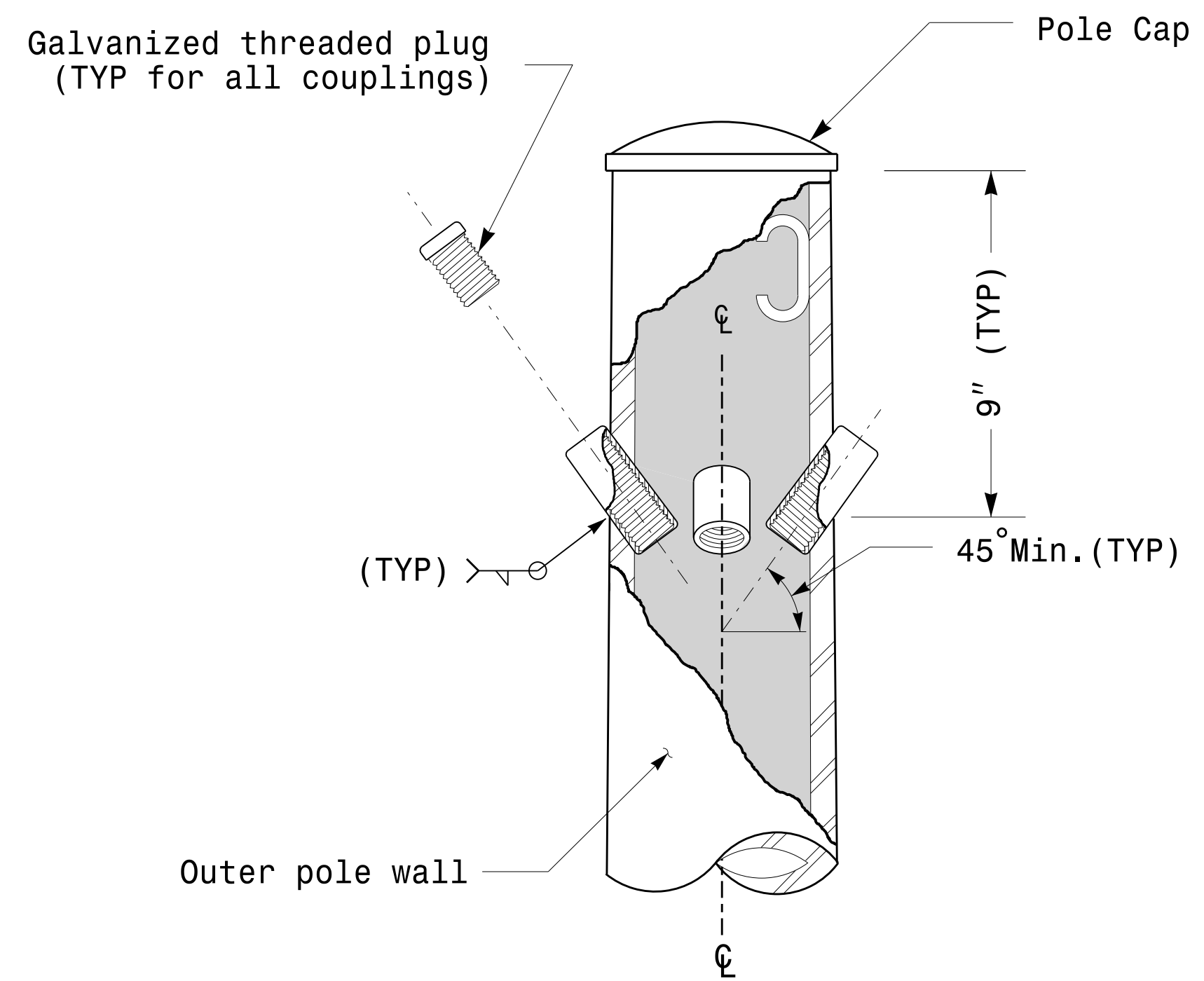


**8 Bolt Base Plate Detail**

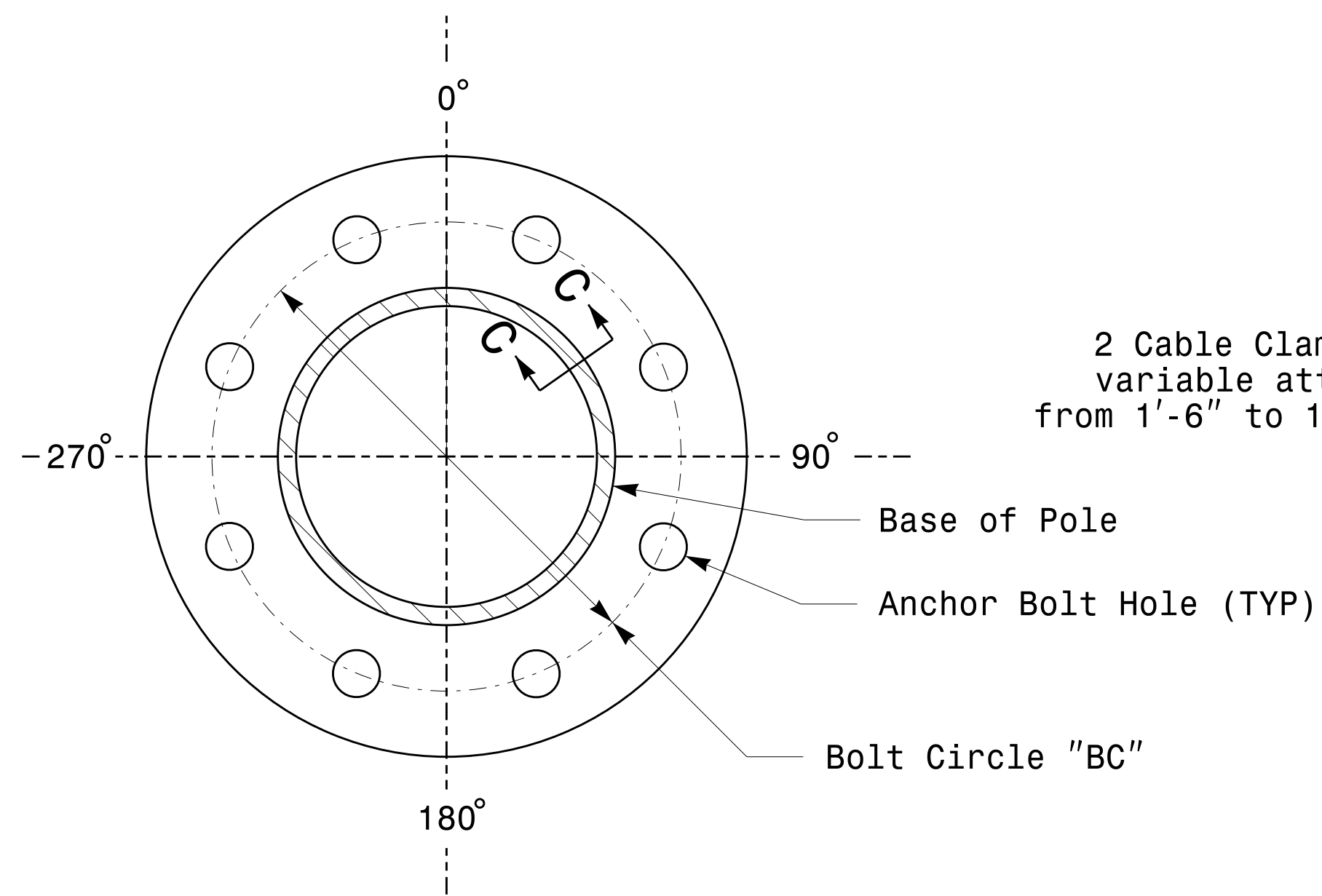
	Typical Fabrication Details Common To All Metal Poles		
	PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING	DESIGNED BY: C.F. ANDREWS REVIEWED BY: D.C. SARKAR	
SCALE: NONE	REVISIONS: _____	INIT. DATE: _____	DocuSign by: Dinesh C. Sarkar 4486320147644 8/26/2014 DATE: _____ SIG. INVENTORY NO. _____

06-AUG-2014 08:55  
 S:\IT\SS\115\_Signal\Signal Design Section\Eastern Region\M2\_Fab\_Details All Poles.dgn  
 Top | Lowy

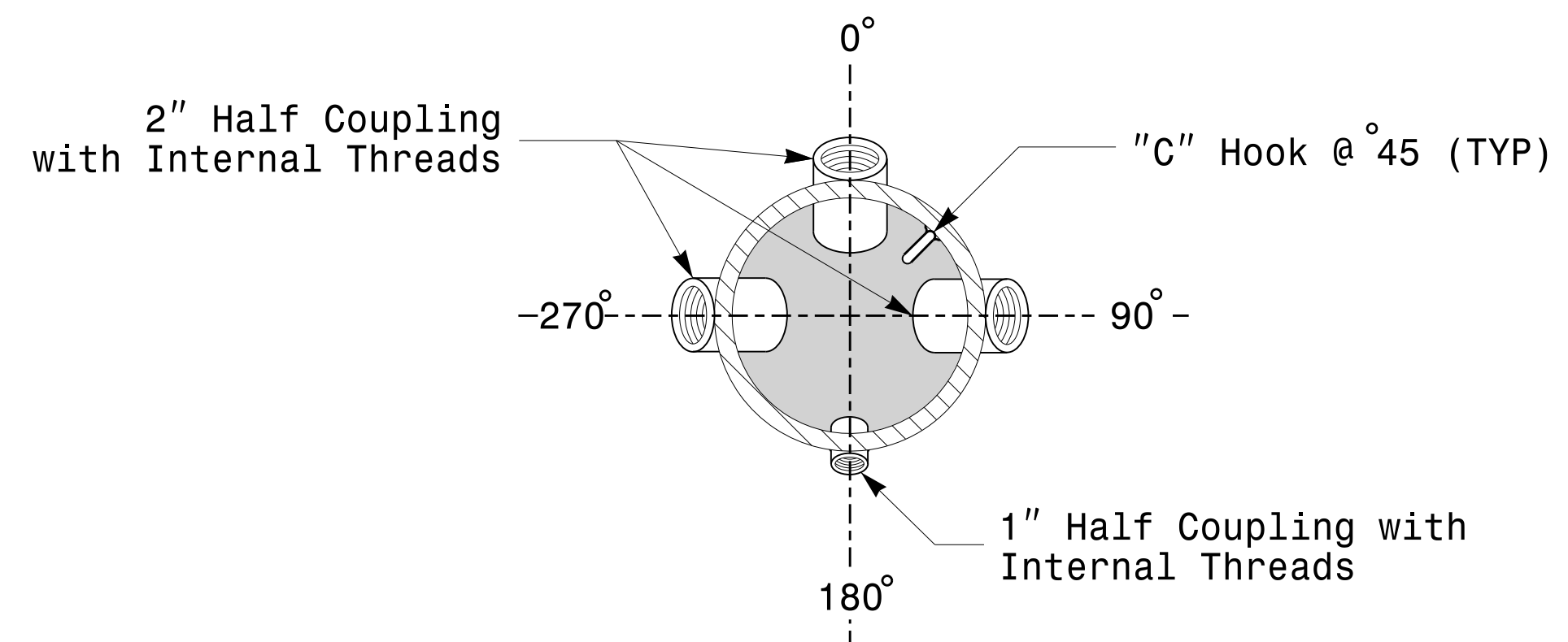
**Fabrication Details – All Poles**



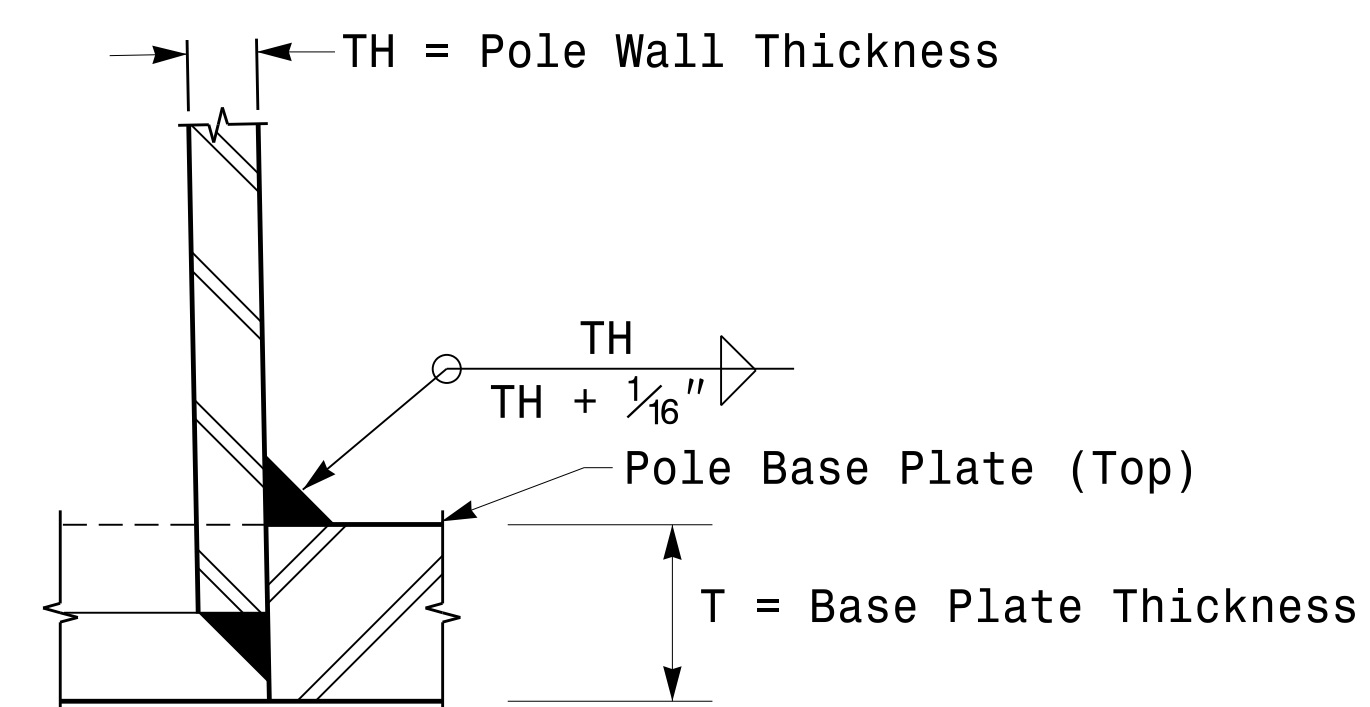
Cable Entrances at Top of Pole



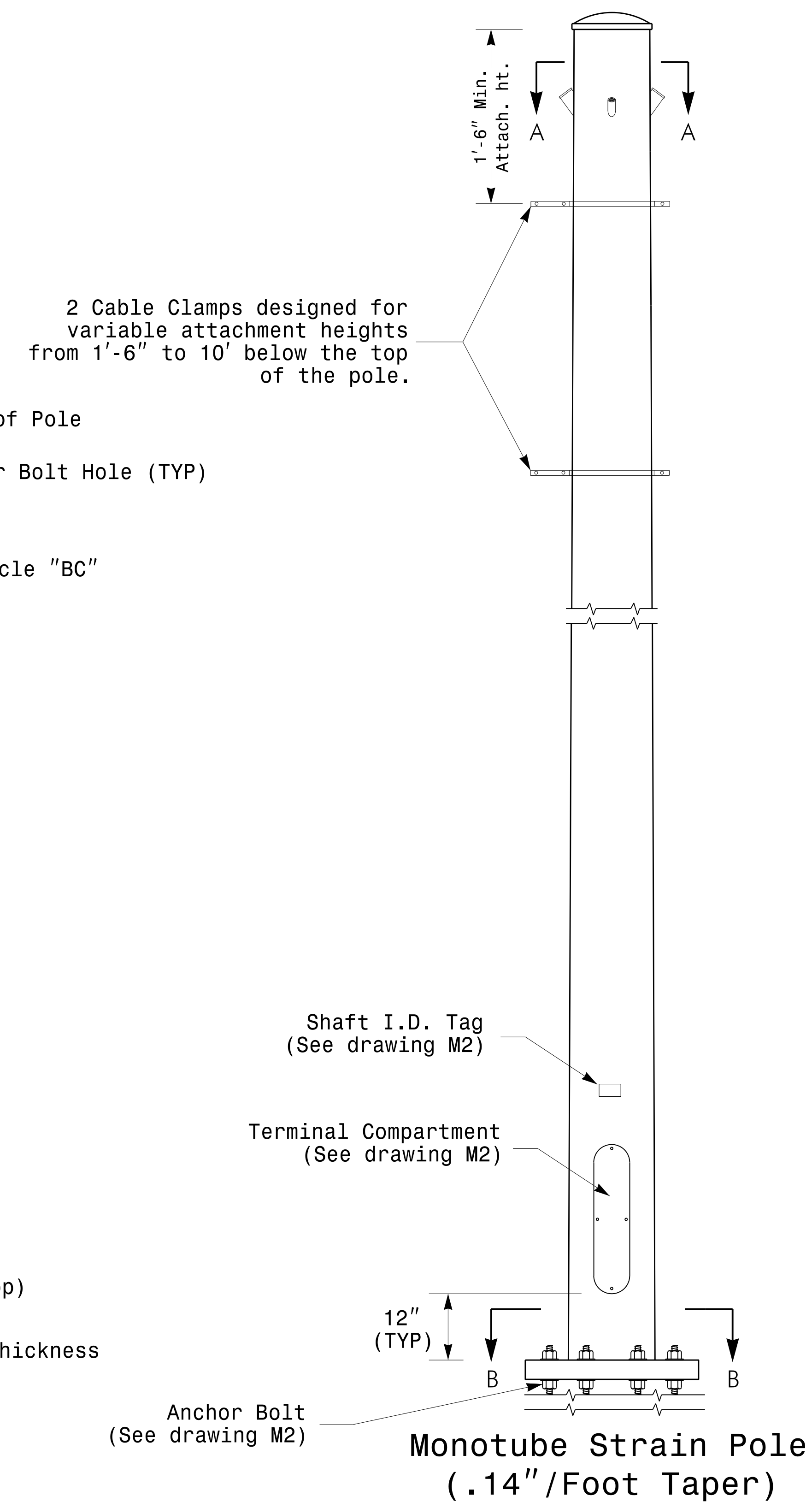
Section B-B  
Pole Base Plate  
(See drawing M2)



Section A-A  
Radial Orientation for Factory Installed  
Accessories at Top of Pole



Section C-C  
Socket Connection Weld Detail



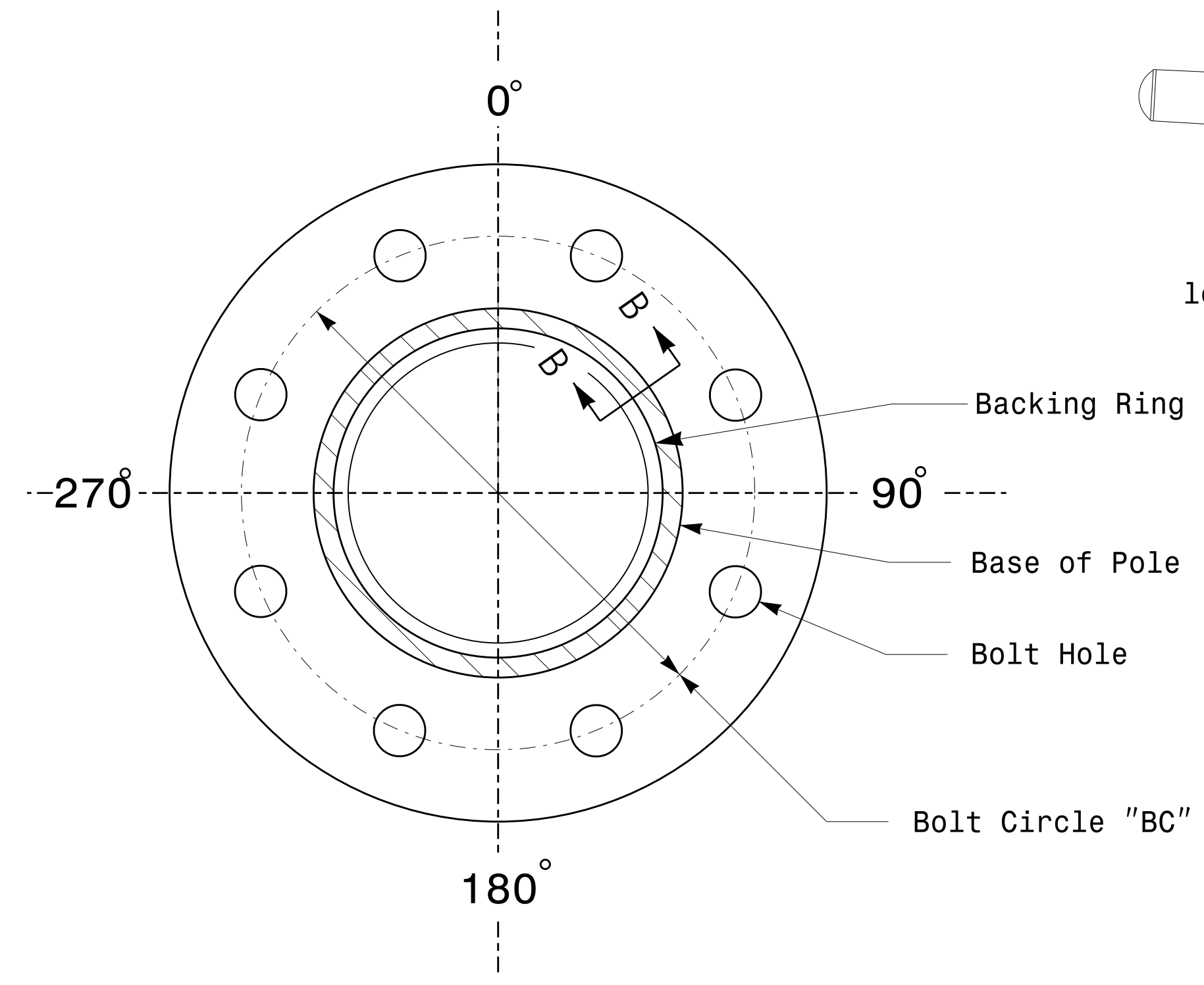
Monotube Strain Pole  
(.14"/Foot Taper)

06-AUG-2014 09:51  
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 Top View

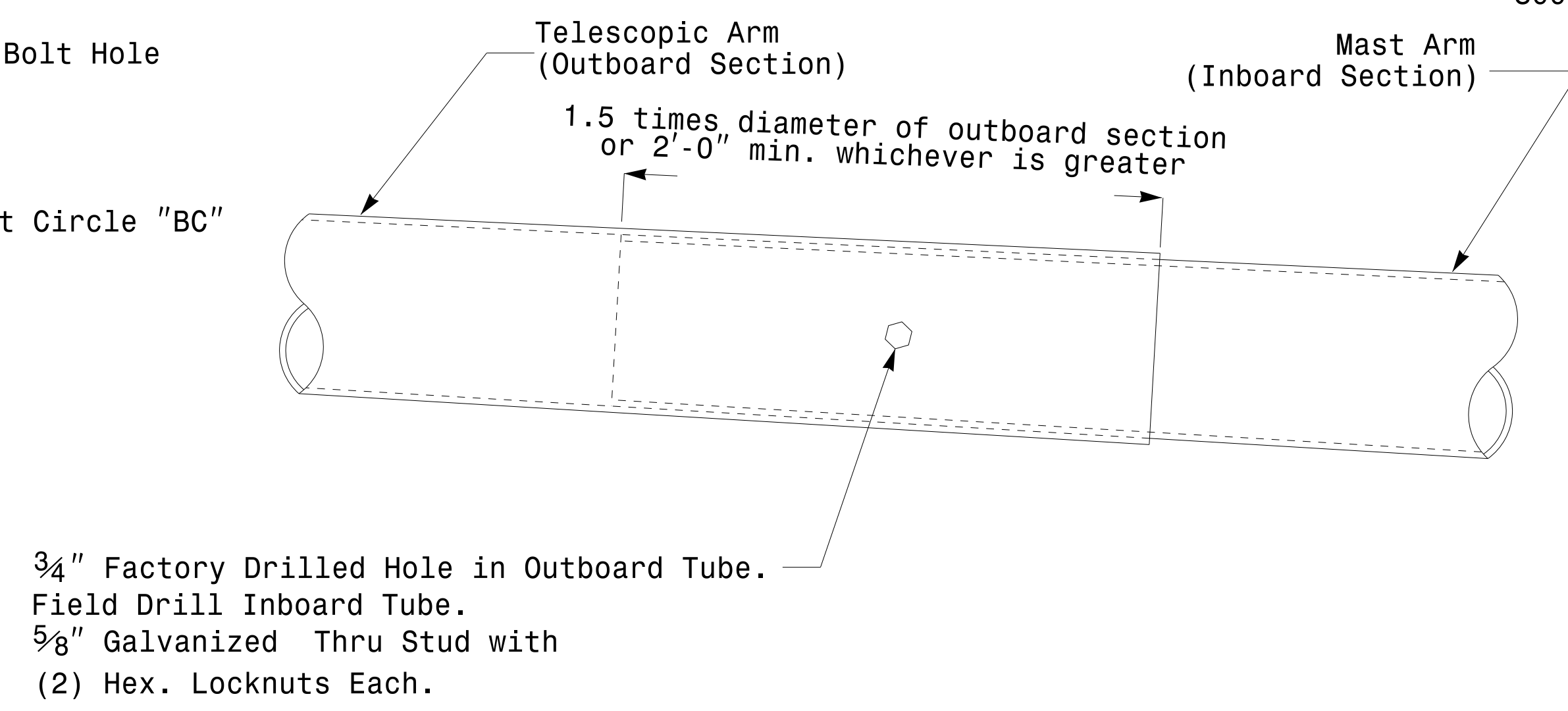
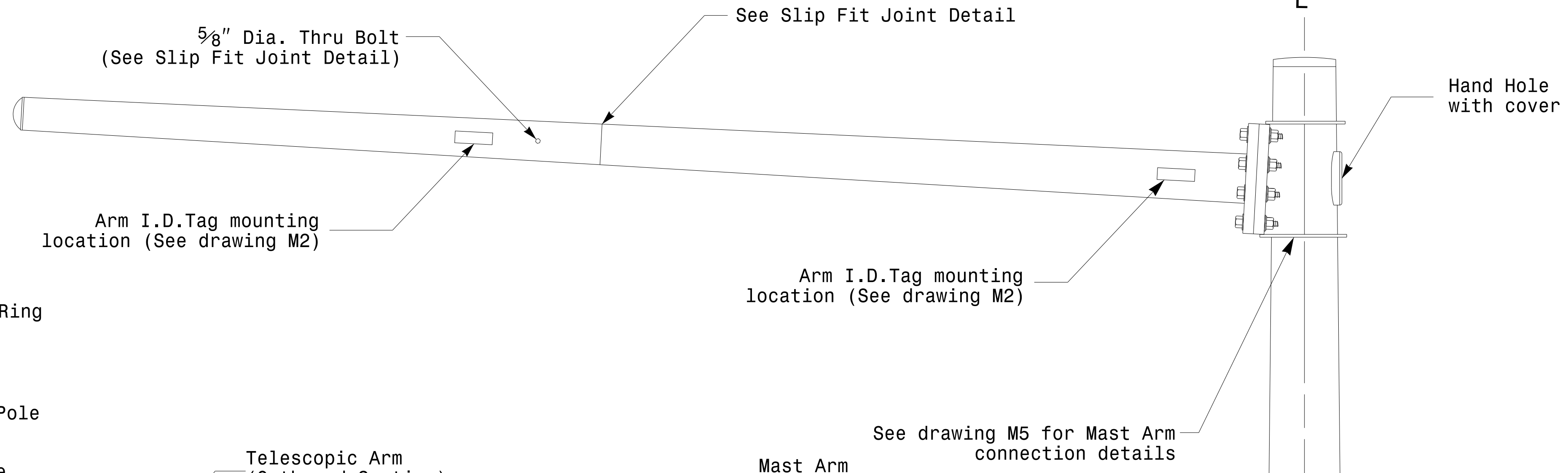
	<b>Typical Fabrication Details For Strain Poles</b>		
	PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING	DESIGNED BY: C.F. ANDREWS REVIEWED BY: D.C. SARKAR	
SCALE: 0 NA NONE	REVISIONS: _____ INIT.: _____ DATE: _____	SIG. INVENTORY NO.	

**Fabrication Details – Strain Poles**

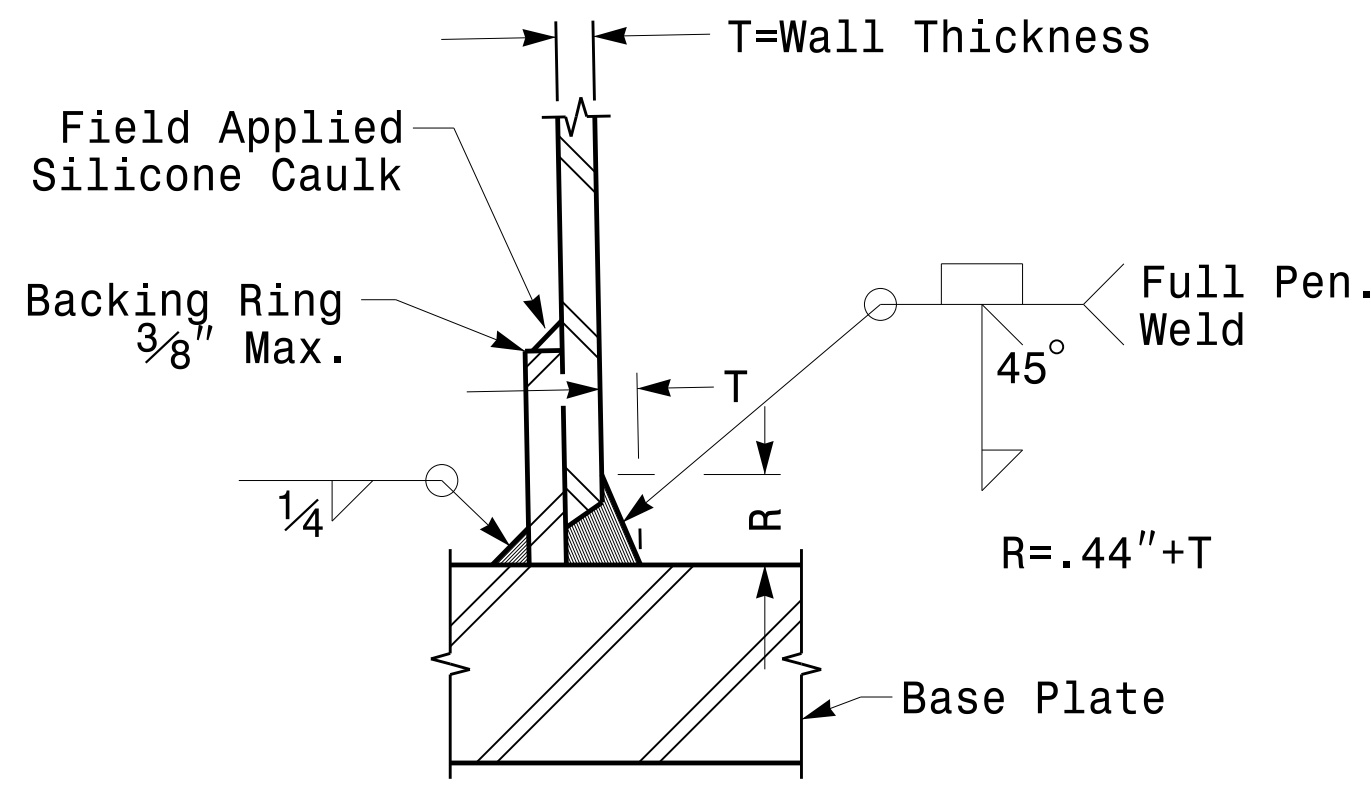




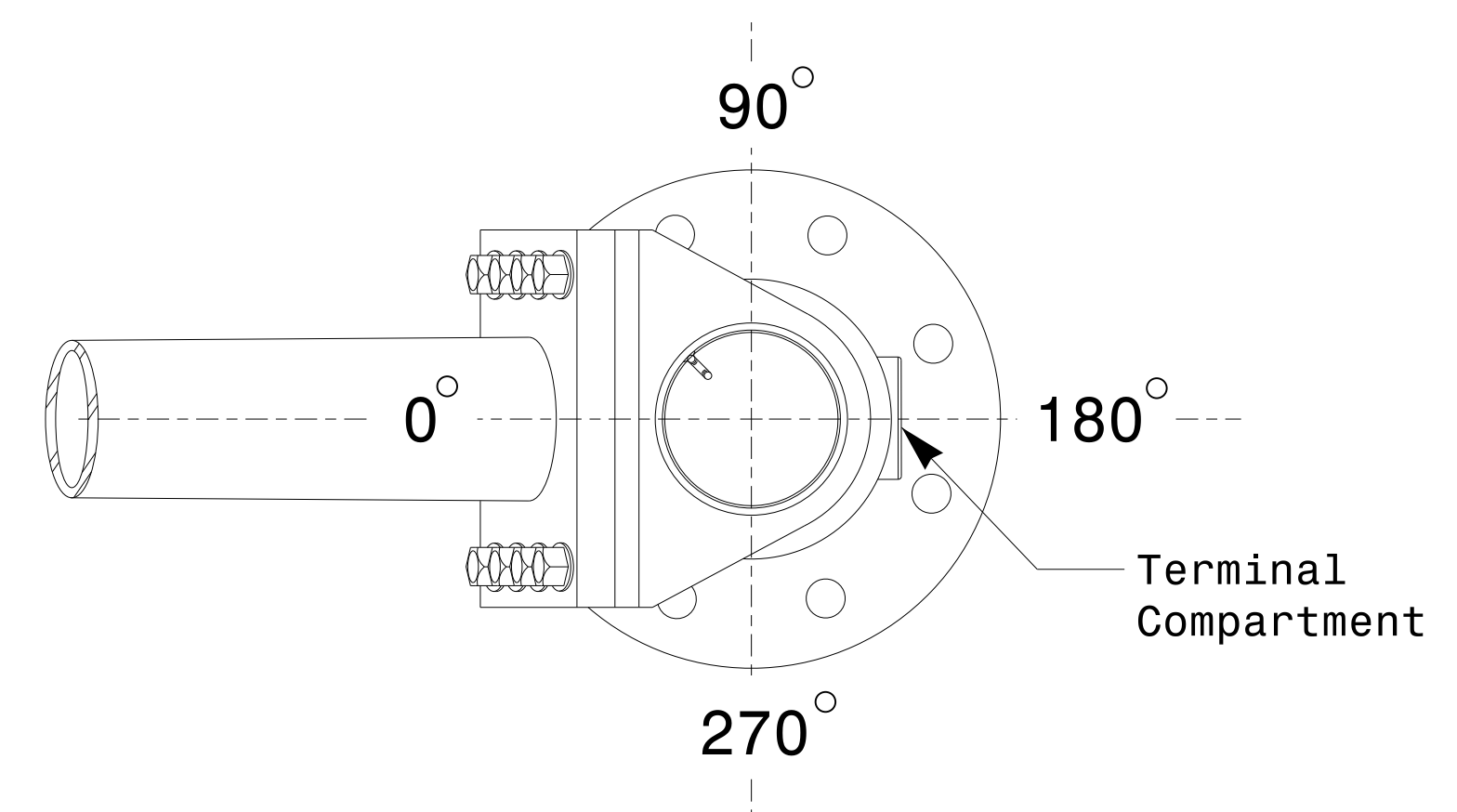
Section A-A  
(See drawing M 2)  
**Pole Base Plate**



**Slip Fit Joint Detail for Mast Arm**



Section B-B  
(Pole Attachment to Base Plate)  
**Full-Penetration Groove Weld Detail**



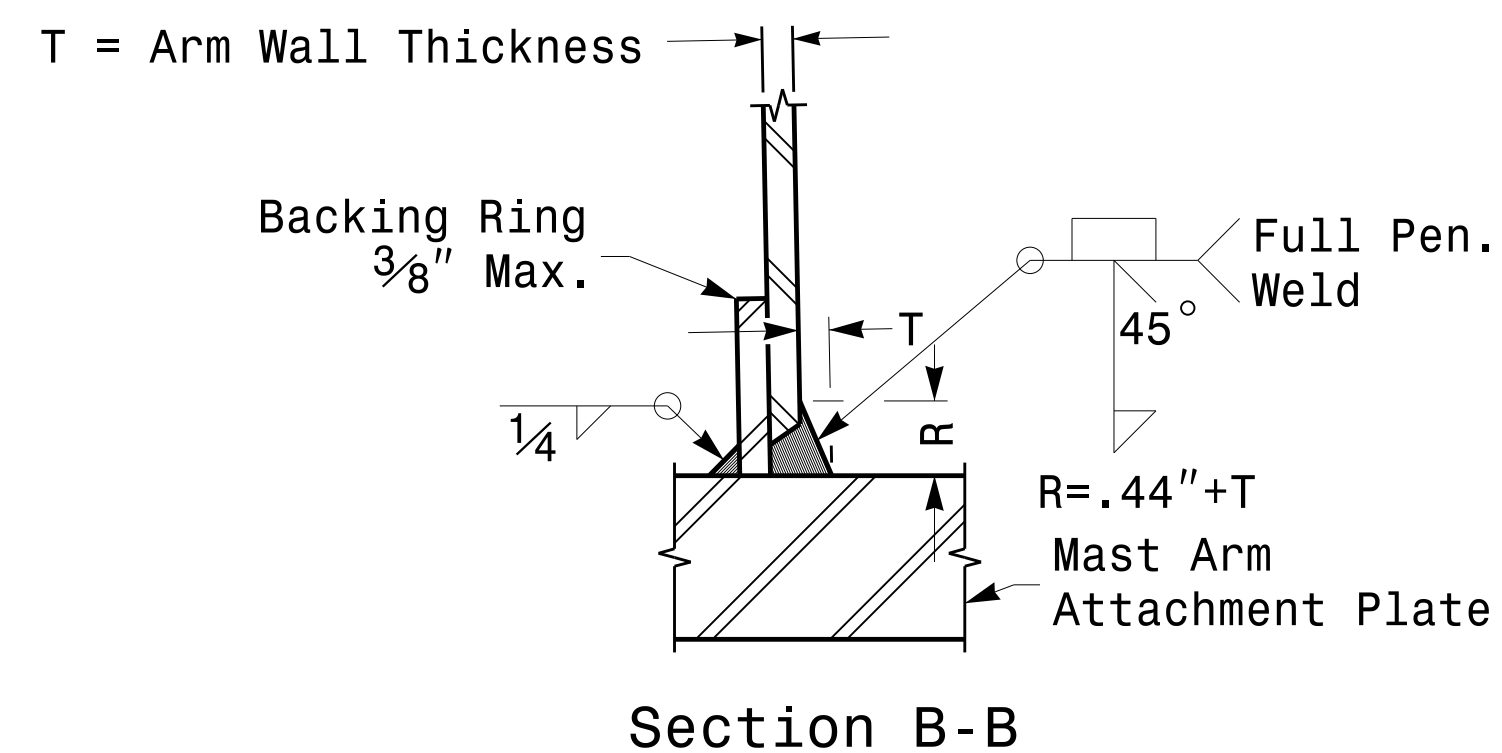
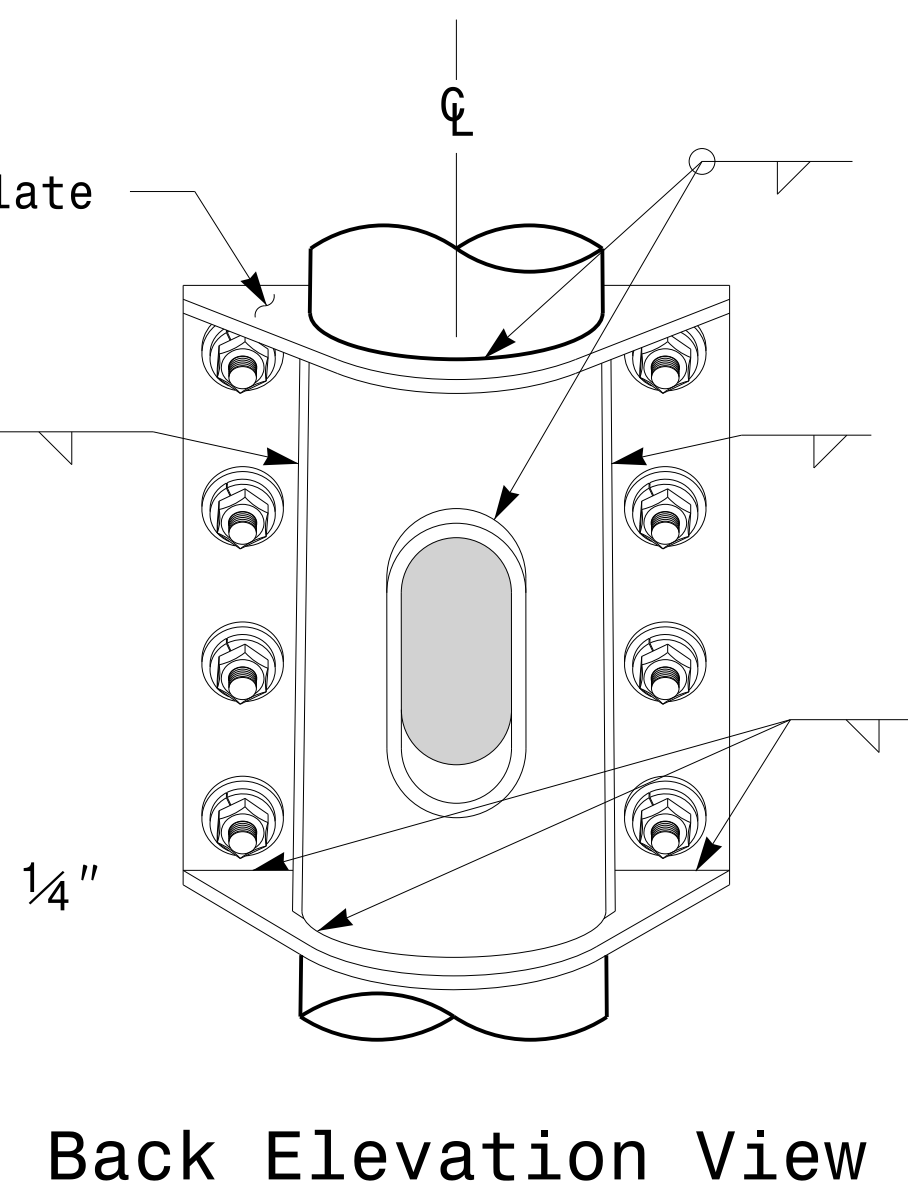
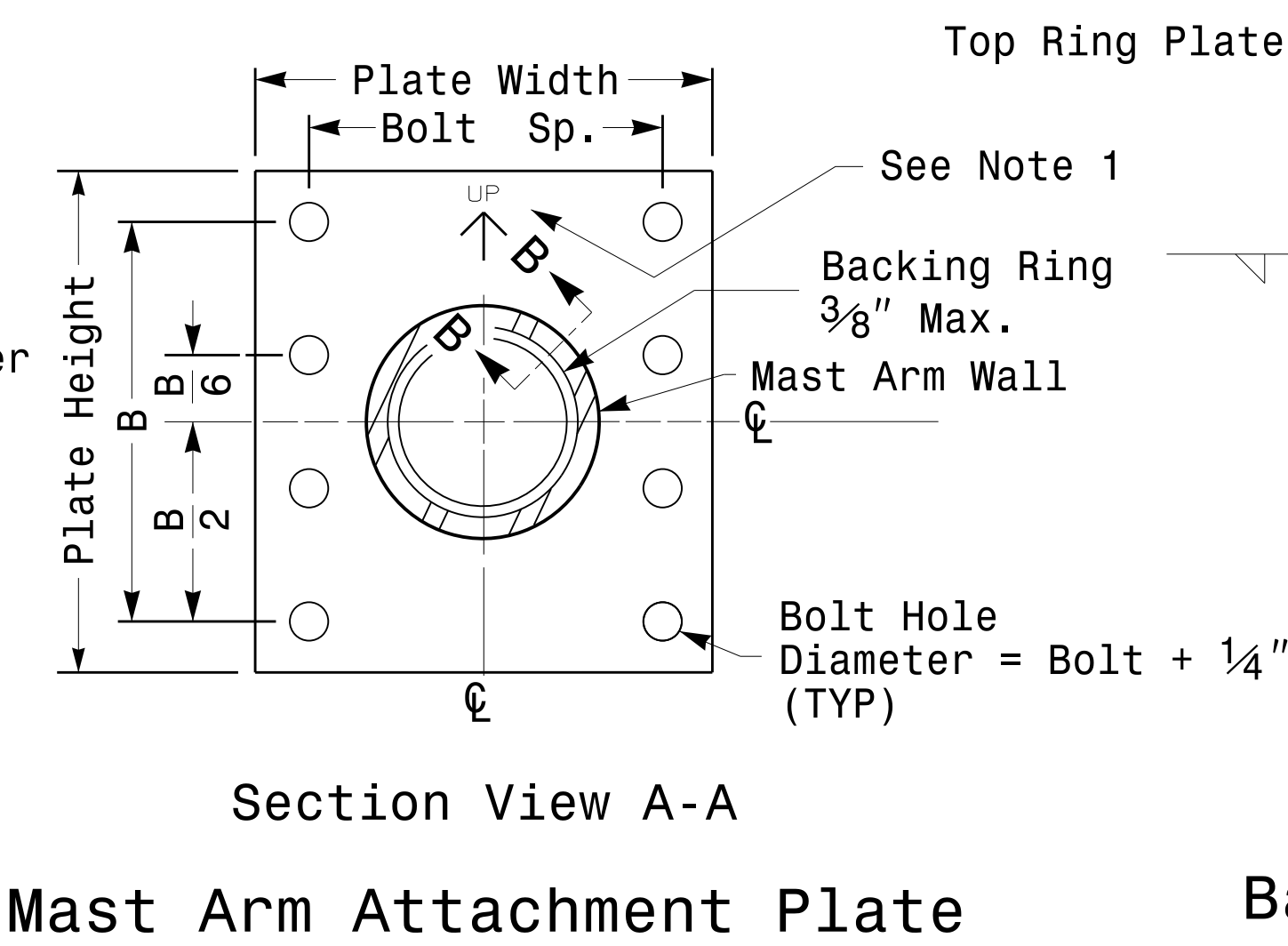
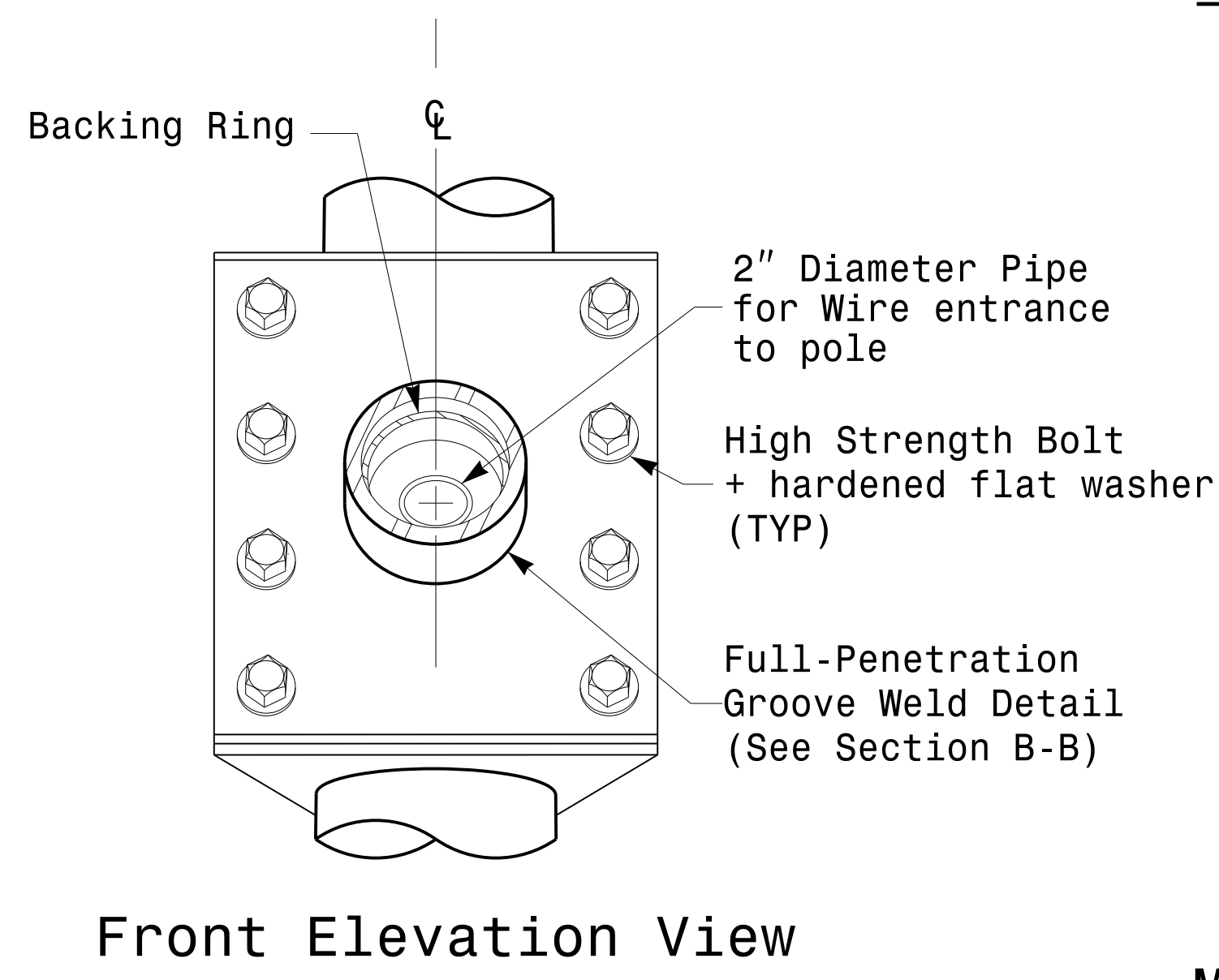
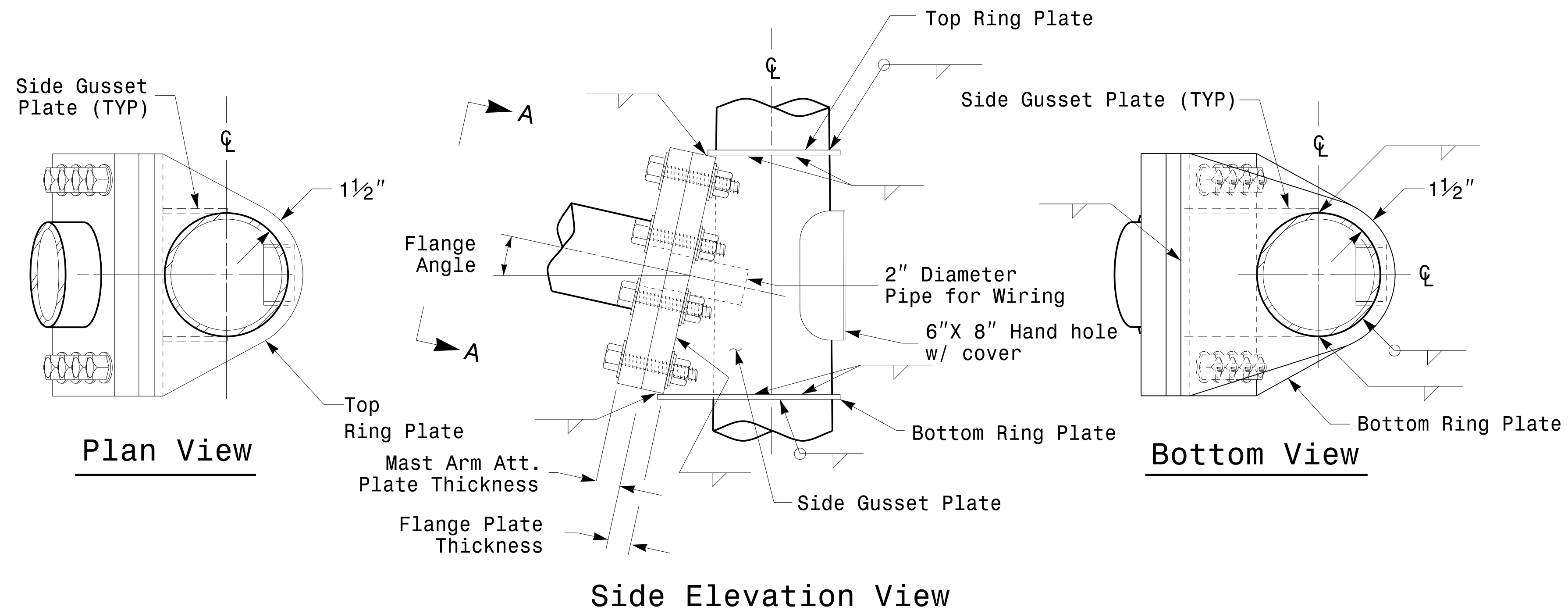
**Mast Arm Radial Orientation**

<p>Prepared In the Offices of: TRANSPORTATION MOBILITY AND SAFETY DIVISION DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION 750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>Typical Fabrication Details for Mast Arm Poles</p>		
	<p>PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING</p>	<p>DESIGNED BY: C.F. ANDREWS REVIEWED BY: D.C. SARKAR</p>	
<p>SCALE: 0 NA NONE</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>	<p>SIG. INVENTORY NO.</p>

06-AUG-2014 08:50  
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**Fabrication Details – Mast Arm Poles**

# Welded Ring Stiffened Mast Arm Connection



**Full-Penetration Groove Weld Detail**

**Notes:**

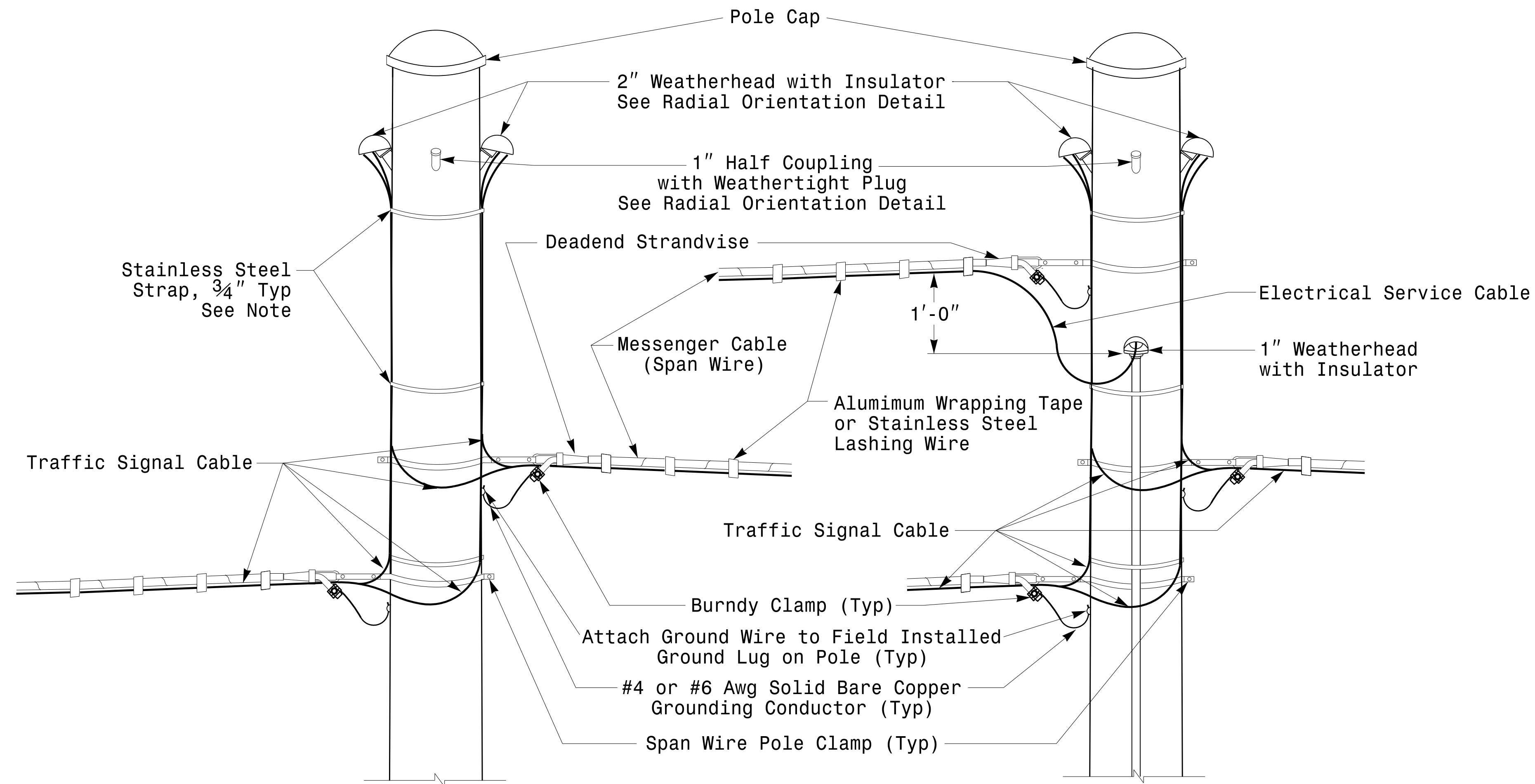
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Designer is responsible for providing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

	Fabrication Details For Mast Arm Connection To Pole		
	PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING	DESIGNED BY: C.F. ANDREWS REVIEWED BY: D.C. SARKAR	
SCALE: 0 NA NONE		DocuSign by: D. C. Sarkar 8/26/2014 44EBE32E1474C4 DATE	

06-M5-2014\_08-17  
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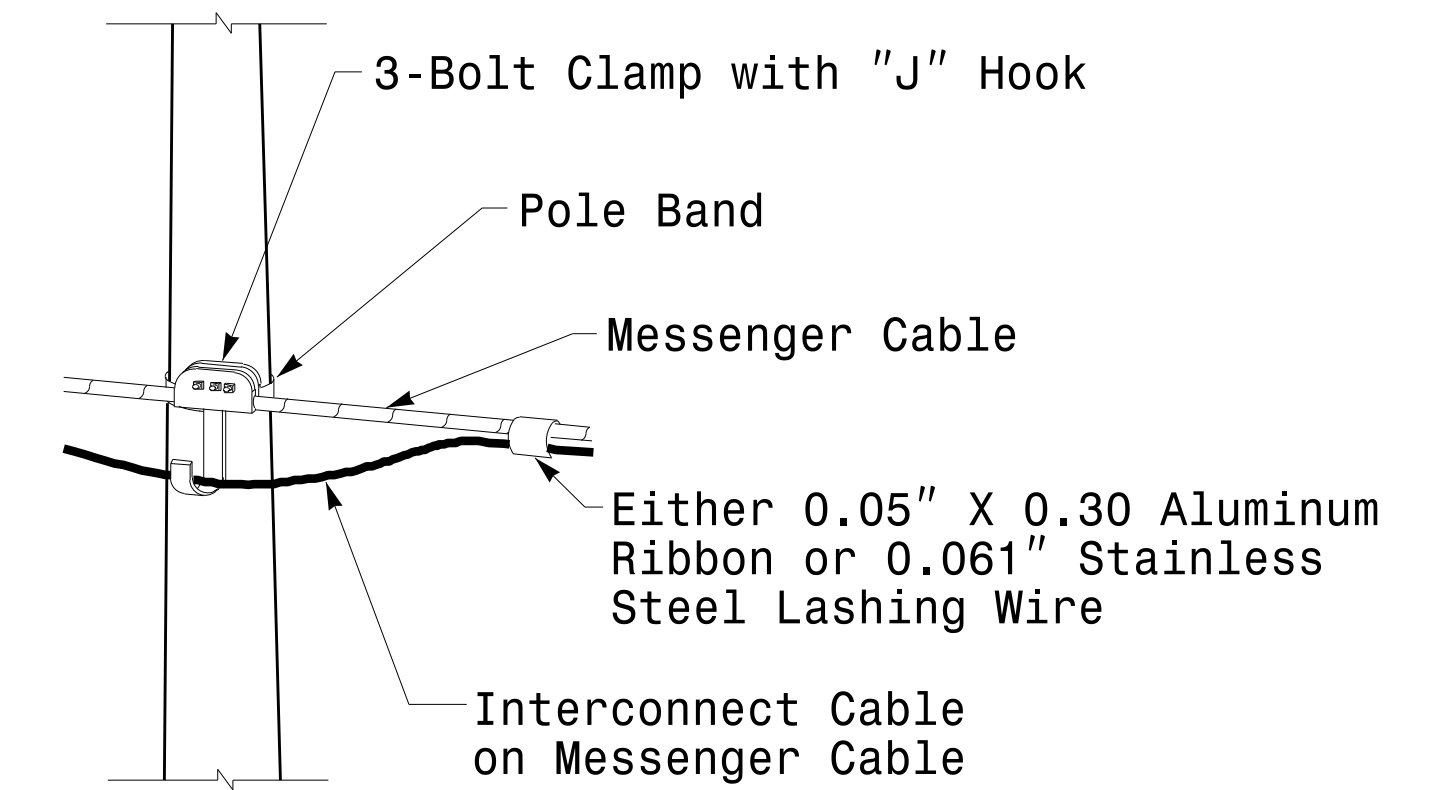
**Fabrication Details – Mast Arm Poles**



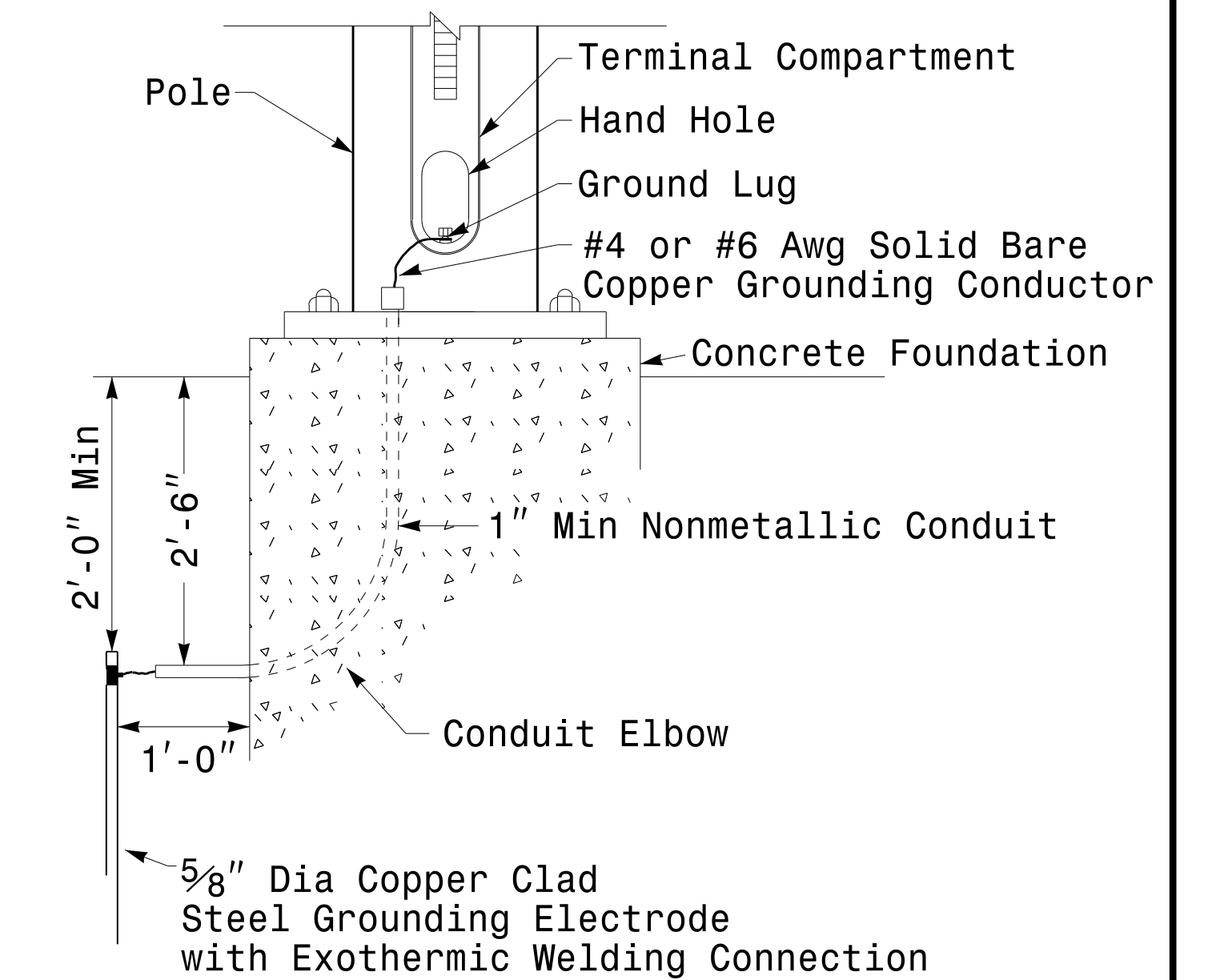


### Strain Pole Attachments

Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"



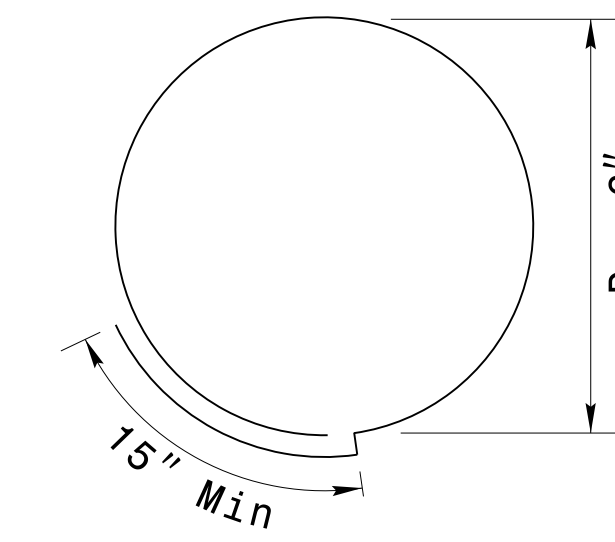
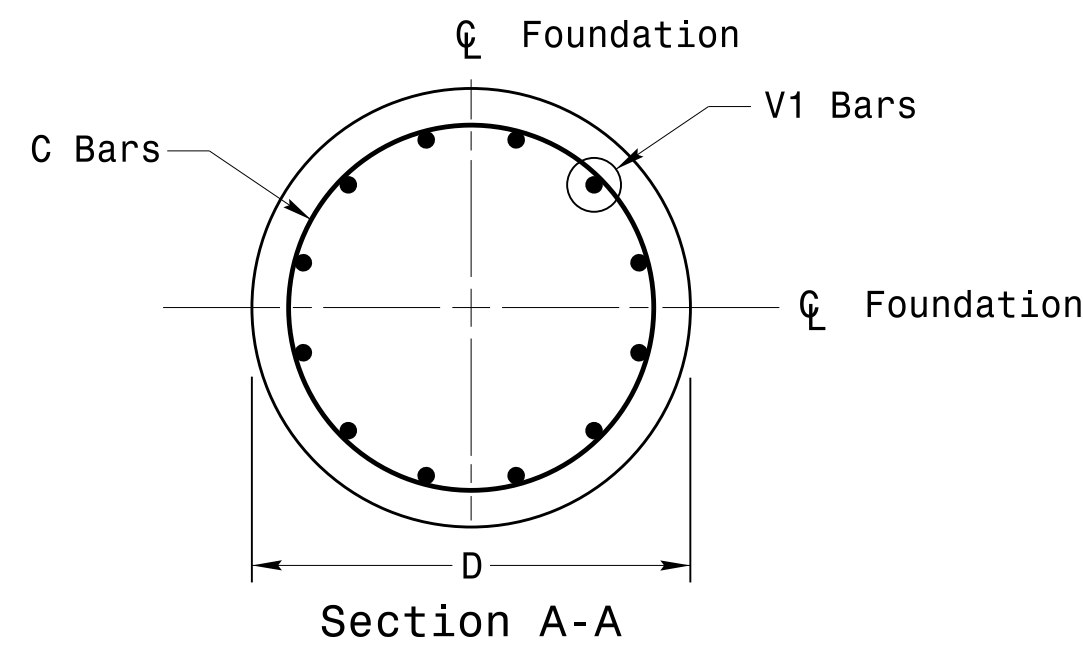
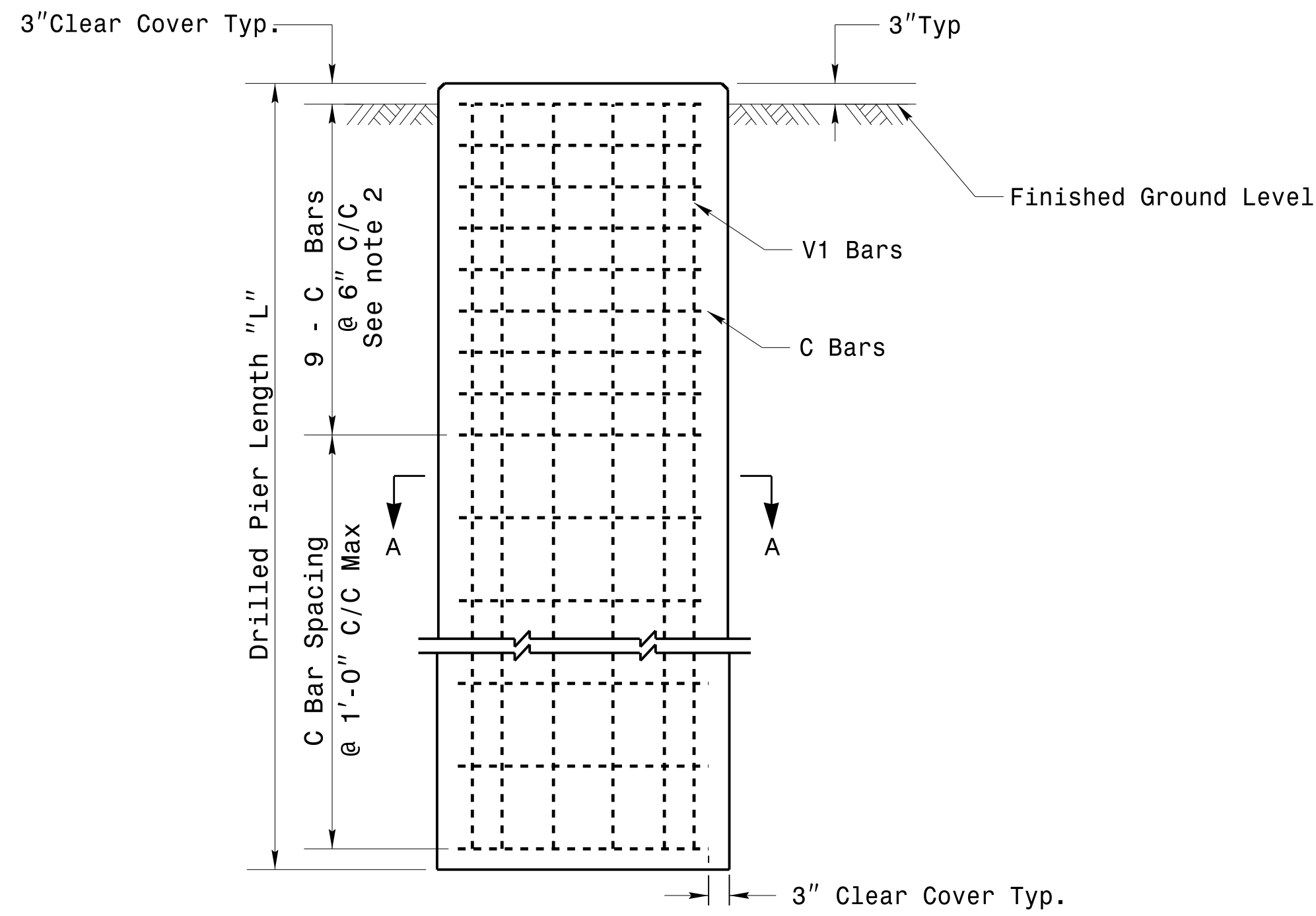
### Attachment of Cable to Intermediate Metal Pole



### Metal Pole Grounding Detail

	<b>Construction Details Strain Poles</b>		
	PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING	REVIEWED BY: C.F. ANDREWS REVIEWED BY: D.C. SARKAR	
SCALE: 0 NA NONE	REVISIONS:	INIT. DATE:	SIG. INVENTORY NO.:

### Reinforcing Steel Bars



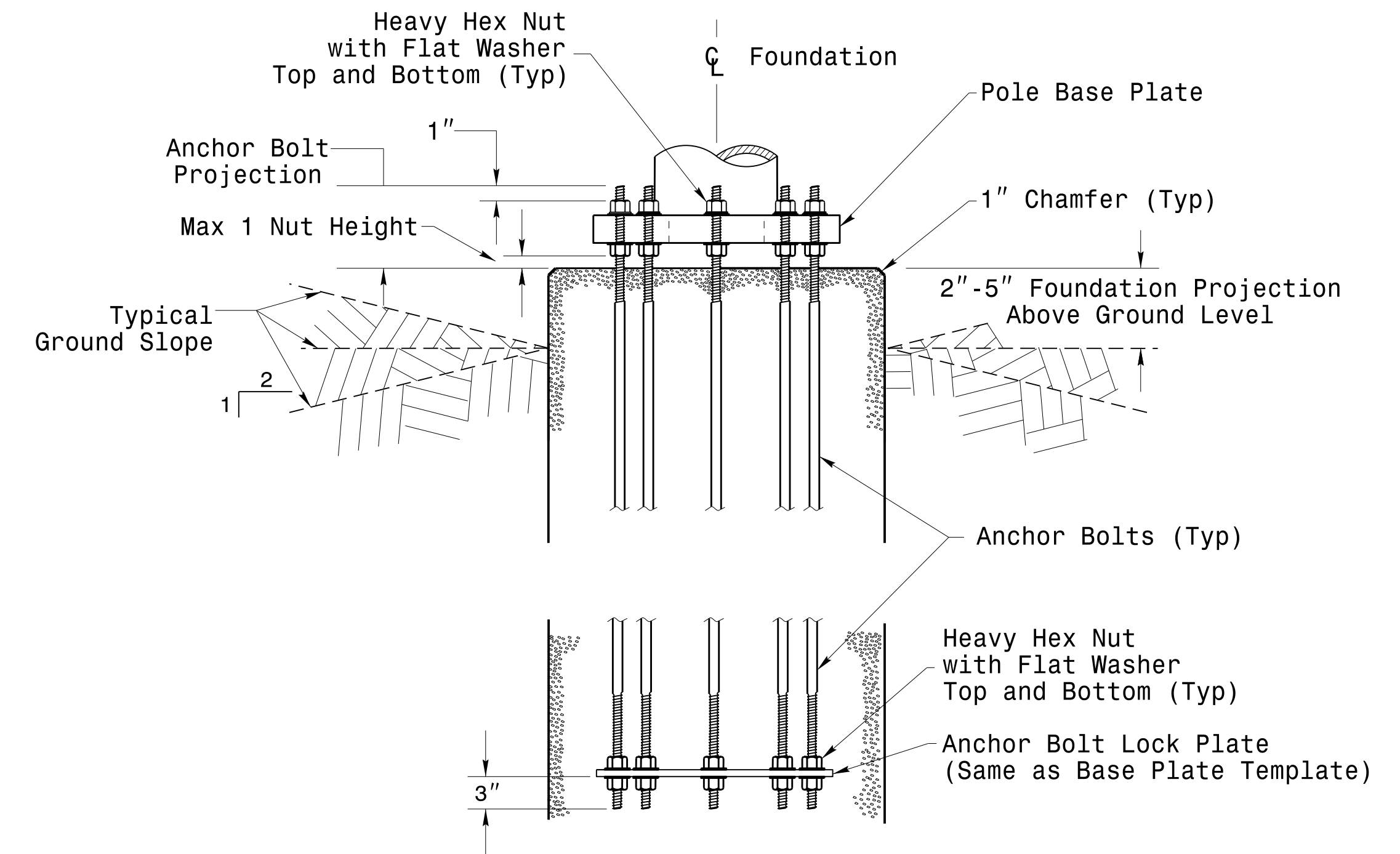
Typical "C" Bars

REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (4'-0" DIAMETER)						
Shaft Dia (in.)	Conc. Volume (cu. yds.)	Bar Name	MIN.	Size	Type	Length
48"	.465 x L	V1	***	#8	STR.	**
		C	*	#4	CIR.	12'-6"

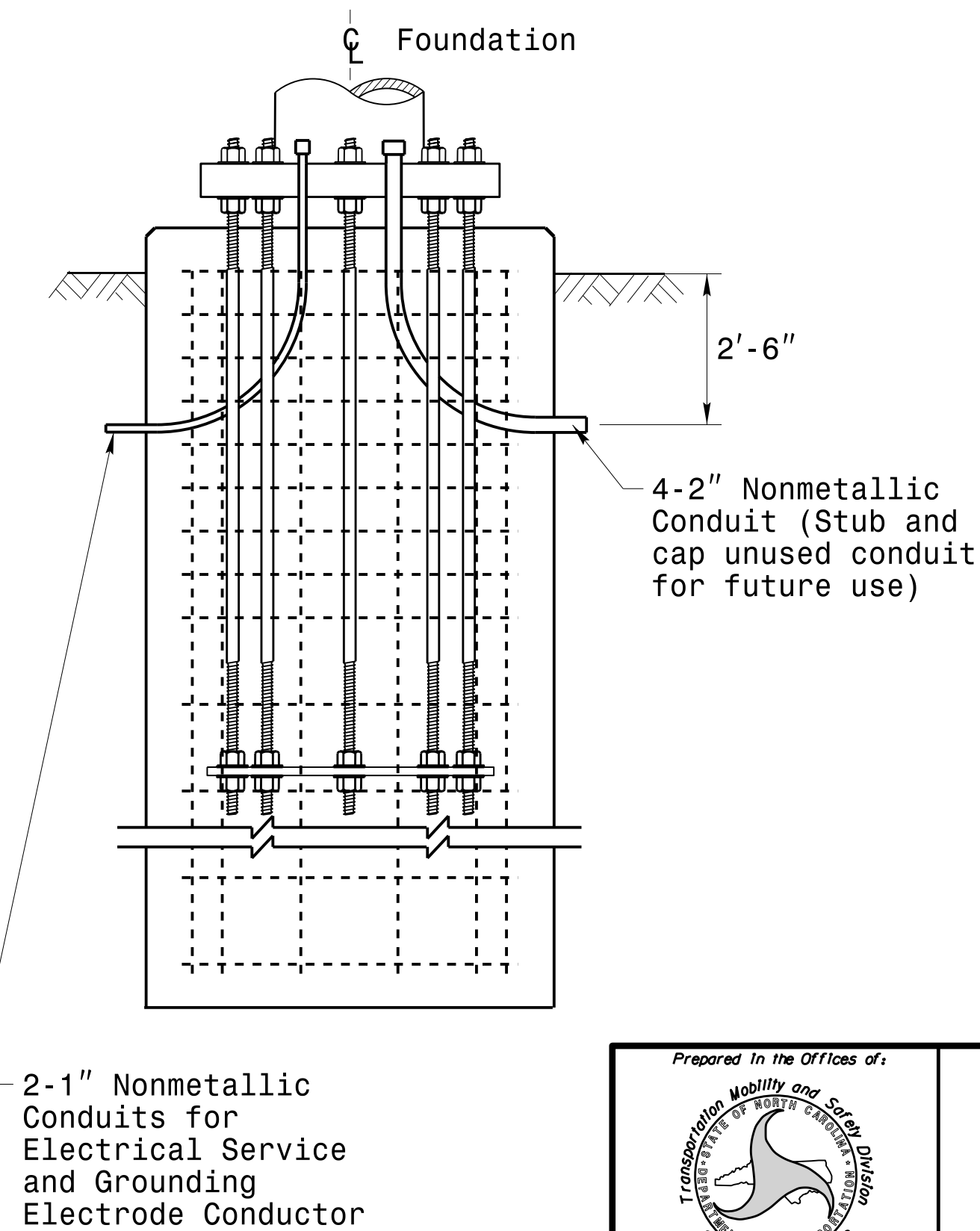
\* See Note No. 1  
\*\* See Note No. 3  
\*\*\* See Note No. 4

### Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



### Typical Foundation Conduit Details



### Notes

- The number of C-bars is based on foundation depth and/or as required. For standard foundations, see sheets M 8 and M 9 for details.
- 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.
- The length of V1-bars is based on foundation depth. For standard foundations, see sheets M 8 and M 9 for details. Vertical reinforcing bars (V1) may be horizontally adjusted by +/- 3" to facilitate the installation of electrical conduit entering into the cage.
- Provide vertical reinforcement as required per design. See sheets M 8 and M9 for details.

26-AUG-2014 08:14  
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 J.pallawcy

Construction Details – Foundations

<p>Prepared in the Offices of: TRANSPORTATION MOBILITY AND SAFETY SOLUTIONS A DIVISION OF NORTH CAROLINA STATE UNIVERSITY Signal Design Section 750 N. Greenfield Pkwy, Garner, NC 27529</p>	<b>Construction Details Foundations</b>		
	PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING	DESIGNED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR	
SCALE: 0 NA NONE	REVISIONS:	INIT. DATE:	SIG. INVENTORY NO.:



# SATURATED SOIL CONDITION

		STANDARD STRAIN POLES						STANDARD FOUNDATIONS 48" Diameter Drilled Pier Length (L) - Feet							Reinforcement			
		Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Reactions at the Pole Base			Clay				Sand			Longitudinal		Stirrups	
					Axial (kip)	Shear (kip)	Moment (ft-kip)	Medium N-Value 4-8	Stiff N-Value 9-15	Very Stiff N-Value 16-30	Hard N-Value >30	Loose N-Value 4-10	Medium N-Value 11-30	Dense N-Value >30	Bar Size (#)	Quantity	Bar Size (#)	Spacing (in.)
WIND ZONE 1	LIGHT	S26L3	26	25	2	11	270	19	13	9	8	17	14.5	12.5	8	13	4	12
		S30L3	30	25	2	11	300	20	13.5	9	8	17.5	15	13	8	14	4	12
		S35L3	35	25	3	11	320	20	13.5	9.5	8	17.5	15	13	8	15	4	12
	HEAVY	S30H3	30	29	3	16	450	24.5	17	13	11	21	17.5	15	8	18	4	12
		S35H3	35	29	4	16	515	26	17.5	12	8.5	22	18.5	16	8	20	4	12
WIND ZONE 2	LIGHT	S26L2	26	23	2	10	245	18	12.5	8.5	8	16.5	14	12	8	13	4	12
		S30L2	30	23	2	10	270	19	12.5	9	8	16.5	14	12.5	8	13	4	12
		S35L2	35	23	3	10	300	19.5	13	9	8	17	14.5	13	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	25.5	15.5	11	8	20	17	14.5	8	17	4	12
		S35H2	35	29	4	15	475	25	16.5	11.5	8	21	17.5	15.5	8	19	4	12
WIND ZONE 3	LIGHT	S26L2	26	23	2	10	245	18	12.5	8.5	8	16.5	14	12	8	13	4	12
		S30L2	30	23	2	10	270	19	12.5	9	8	16.5	14	12.5	8	13	4	12
		S35L2	35	23	3	10	300	19.5	13	9	8	17	14.5	13	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	25.5	15.5	11	8	20	17	14.5	8	17	4	12
		S35H2	35	29	4	15	475	25	16.5	11.5	8	21	17.5	15.5	8	19	4	12
WIND ZONE 4	LIGHT	S26L1	26	22	2	8	190	16	11	8	8	15	12.5	11	8	12	4	12
		S30L1	30	22	2	8	205	16.5	11.5	8	8	15	13	11.5	8	12	4	12
		S35L1	35	22	3	8	230	17	12	8	8	15.5	13.5	11.5	8	12	4	12
	HEAVY	S30H1	30	25	3	12	320	20.5	14	9.5	8	18	15	13.5	8	15	4	12
		S35H1	35	25	4	12	350	21	14.5	10	8	18.5	15.5	13.5	8	16	4	12
WIND ZONE 5	LIGHT	S26L2	26	23	2	10	245	18	12.5	8.5	8	16.5	14	12	8	13	4	12
		S30L2	30	23	2	10	270	19	12.5	9	8	16.5	14	12.5	8	13	4	12
		S35L2	35	23	3	10	300	19.5	13	9	8	17	14.5	13	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	25.5	15.5	11	8	20	17	14.5	8	17	4	12
		S35H2	35	29	4	15	475	25	16.5	11.5	8	21	17.5	15.5	8	19	4	12

**Fabrication Design Notes:**

- Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
- Min. base plate thickness (T) is 2.0 inches.

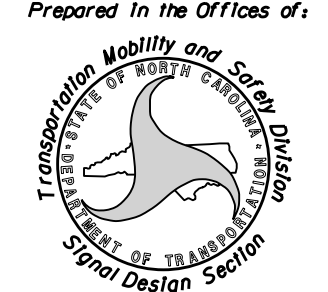
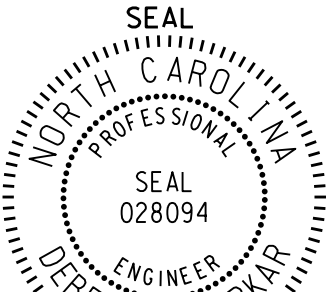
**Foundation Selection:**

- Perform a standard penetration test at each proposed foundation site to determine "N" value.
- Select the appropriate wind zone from M 1 drawing.
- Select the soil type (Clay or Sand) that best describes the soil characteristics.
- Get the appropriate standard pole case number from the plans or from the Engineer.
- Select the appropriate column in the chart based on soil type and "N" value. Select the appropriate row based on the pole load case.  
The foundation depth is the value where the column and the row intersect.
- Reference Drilled Shafts: Construction Procedures and Design Methods, FHWA -IF-99-025

- S30H1 - Hard Clay-Stirrup Spacing: 6 in. c/c
- S30H2 - Hard Clay-Stirrup Spacing: 6 in. c/c
- S30H3 - Hard Clay-Stirrup Spacing: 6 in. c/c  
- Dense Sand-Stirrup Spacing: 6 in. c/c
- S35H1 - Hard Clay - Stirrup Spacing: 6 in. c/c
- S35H2 - Very Stiff Clay-Stirrup Spacing: 6 in. c/c  
- Hard Clay- Stirrup Spacing: 6 in. c/c  
- Dense Sand- Stirrup Spacing: 6 in. c/c
- S35H3 - Very Stiff Clay-Stirrup Spacing: 6 in. c/c  
- Dense Sand-Stirrup Spacing: 6 in. c/c

48" Dia. Foundations Concrete Volume (cubic yards) = (0.465) x Foundation Depth

26-M8-2014-08-12  
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JGC/LOWEY

	Standard Strain Pole Foundation for Saturated Soil Condition		
	PLAN DATE: SEPTEMBER 2013	DESIGNED BY: C.B. COGDRELL	
750 N. Greenfield Pkwy, Garner, NC 27529	PREPARED BY: N. BITTING	REVISIONS	INIT. DATE
SCALE 0 NA None			

Standard Strain Pole Foundation - Saturated Soil Condition



# DRY SOIL CONDITION

		STANDARD STRAIN POLES						STANDARD FOUNDATIONS 48" Diameter Drilled Pier Length (L) - Feet						Reinforcement				
		Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Reactions at the Pole Base			Clay				Sand			Longitudinal		Stirrups	
					Axial (kip)	Shear (kip)	Moment (ft-kip)	Medium N-Value 4-8	Stiff N-Value 9-15	Very Stiff N-Value 16-30	Hard N-Value >30	Loose N-Value 4-10	Medium N-Value 11-30	Dense N-Value >30	Bar Size (#)	Quantity	Bar Size (#)	Spacing (in.)
WIND ZONE 1	LIGHT	S26L3	26	25	2	11	270	18	12.5	9	8	14.5	11	10	8	13	4	12
		S30L3	30	25	2	11	300	18.5	13	9	8	15	11.5	10	8	14	4	12
		S35L3	35	25	3	11	320	19	13.5	9.5	8	15	11.5	10.5	8	15	4	12
	HEAVY	S30H3	30	29	3	16	450	23	16	11	8	17.5	13.5	11.5	8	18	4	12
		S35H3	35	29	4	16	515	24.5	16.5	12	8.5	18.5	14	12	8	20	4	12
WIND ZONE 2	LIGHT	S26L2	26	23	2	10	245	17	12	8.5	8	14	11	9.5	8	13	4	12
		S30L2	30	23	2	10	270	18	12.5	8.5	8	14.5	11	10	8	13	4	12
		S35L2	35	23	3	10	300	18.5	13	9	8	14.5	11.5	10	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	22	15	10.5	8	17	13	11.5	8	17	4	12
		S35H2	35	29	4	15	475	23.5	16	11.5	8	18	13.5	12	8	19	4	12
WIND ZONE 3	LIGHT	S26L2	26	23	2	10	245	17	12	8.5	8	14	11	9.5	8	13	4	12
		S30L2	30	23	2	10	270	18	12.5	8.5	8	14.5	11	10	8	13	4	12
		S35L2	35	23	3	10	300	18.5	13	9	8	14.5	11.5	10	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	22	15	10.5	8	17	13	11.5	8	17	4	12
		S35H2	35	29	4	15	475	23.5	16	11.5	8	18	13.5	12	8	19	4	12
WIND ZONE 4	LIGHT	S26L1	26	22	2	8	190	15.5	10.5	8	8	13	10	9	8	12	4	12
		S30L1	30	22	2	8	205	15.5	11	8	8	13	10	9	8	12	4	12
		S35L1	35	22	3	8	230	16.5	11.5	8	8	13.5	10.5	9	8	12	4	12
	HEAVY	S30H1	30	25	3	12	320	19.5	13.5	9.5	8	15	12	10.5	8	15	4	12
		S35H1	35	25	4	12	350	20	14	10	8	15.5	12	10.5	8	15	4	12
WIND ZONE 5	LIGHT	S26L2	26	23	2	10	245	17	12	8.5	8	14	11	9.5	8	13	4	12
		S30L2	30	23	2	10	270	18	12.5	8.5	8	14.5	11	10	8	13	4	12
		S35L2	35	23	3	10	300	18.5	13	9	8	14.5	11.5	10	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	22	15	10.5	8	17	13	11.5	8	17	4	12
		S35H2	35	29	4	15	475	23.5	16	11.5	8	18	13.5	12	8	19	4	12

### Fabrication Design Notes:


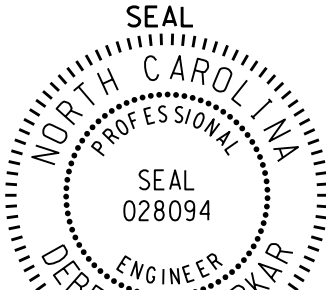
1. Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
2. Min. base plate thickness (T) is 2.0 inches.

### Foundation Selection:

1. Perform a standard penetration test at each proposed foundation site to determine "N" value.
2. Select the appropriate wind zone from M 1 drawing.
3. Select the soil type (Clay or Sand) that best describes the soil characteristics.
4. Get the appropriate standard pole case number from the plans or from the Engineer.
5. Select the appropriate column in the chart based on soil type and "N" value. Select the appropriate row based on the pole load case.  
The foundation depth is the value where the column and the row intersect.
6. Reference Drilled Shafts: Construction Procedures and Design Methods, FHWA -IF-99-025

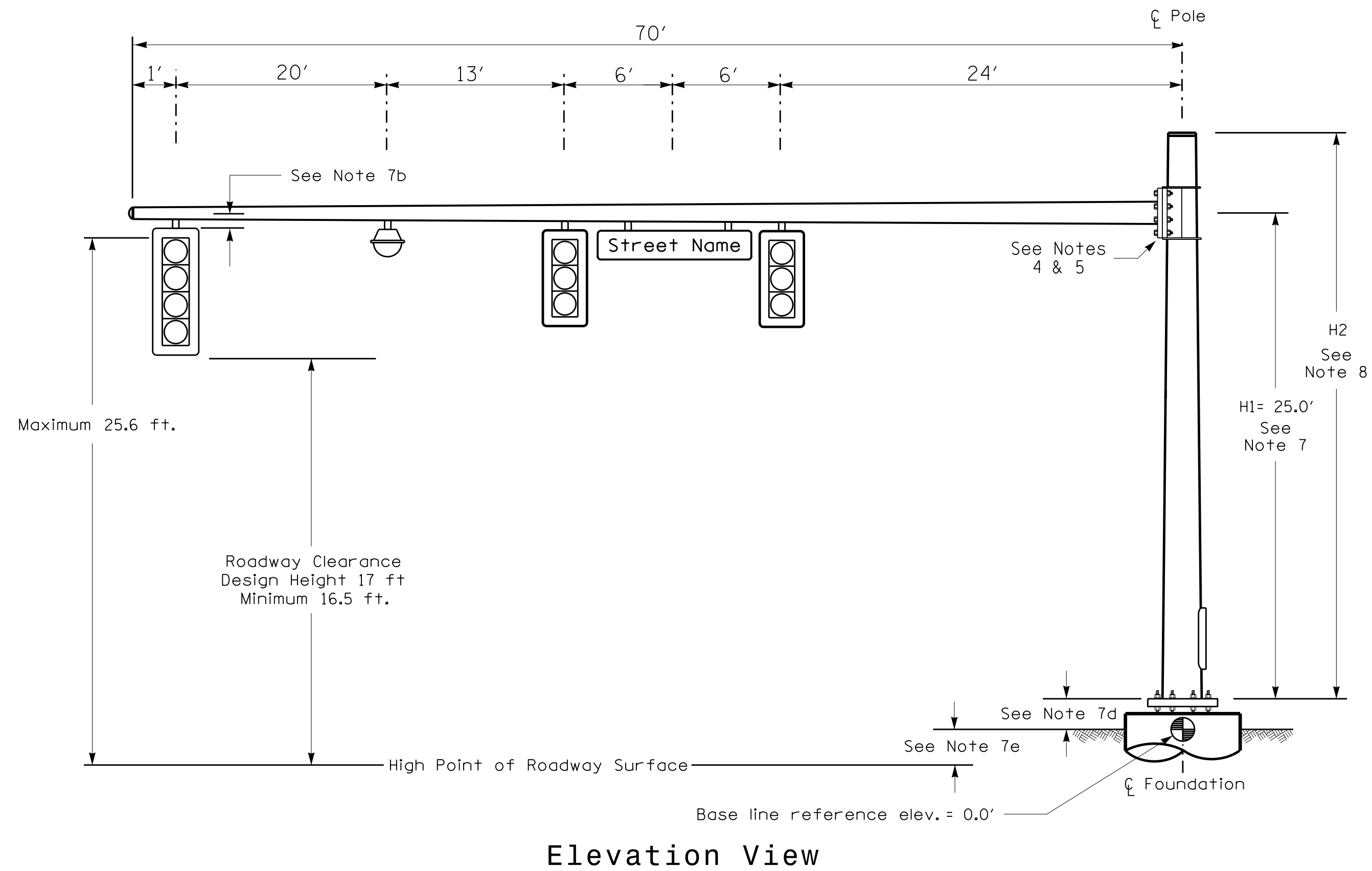
- S30H1 - Hard Clay-Stirrup Spacing: 6 in. c/c  
- Dense Sand-Stirrup Spacing: 6 in. c/c
- S30H2 - Very Stiff Clay: Stirrup Spacing: 6 in. c/c  
- Hard Clay: Stirrup Spacing: 6 in. c/c  
- Medium Clay: Stirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c
- S30H3 - Very Stiff Clay: Stirrup Spacing: 6 in. c/c  
- Hard Clay: Stirrup Spacing: 6 in. c/c  
- Medium Clay: Stirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c
- S35H1 - Hard Clay: tirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c
- S35H2 - Very Stiff Clay: Stirrup Spacing: 6 in. c/c  
- Hard Clay: Stirrup Spacing: 6 in. c/c  
- Medium Clay: Stirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c
- S35H3 - Very Stiff Clay: Stirrup Spacing: 6 in. c/c  
- Hard Clay: Stirrup Spacing: 6 in. c/c  
- Medium Clay: Stirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c

48" Dia. Foundations Concrete Volume (cubic yards) = (0.465) x Foundation Depth

	<p><b>Standard Strain Pole Foundation for Dry Soil Condition</b></p> <p>PLAN DATE: SEPTEMBER 2013    DESIGNED BY: C.B. COGDILL                  PREPARED BY: N. BITTING    REVIEWED BY: D. SARKAR</p>							
<p>SCALE: 0 NA</p> <p>None</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	REVISIONS	INIT.	DATE				<p>DocuSigned by: Deborah C. Sarkar 2/26/2014 44EBE32E147E4C4</p>
REVISIONS	INIT.	DATE						

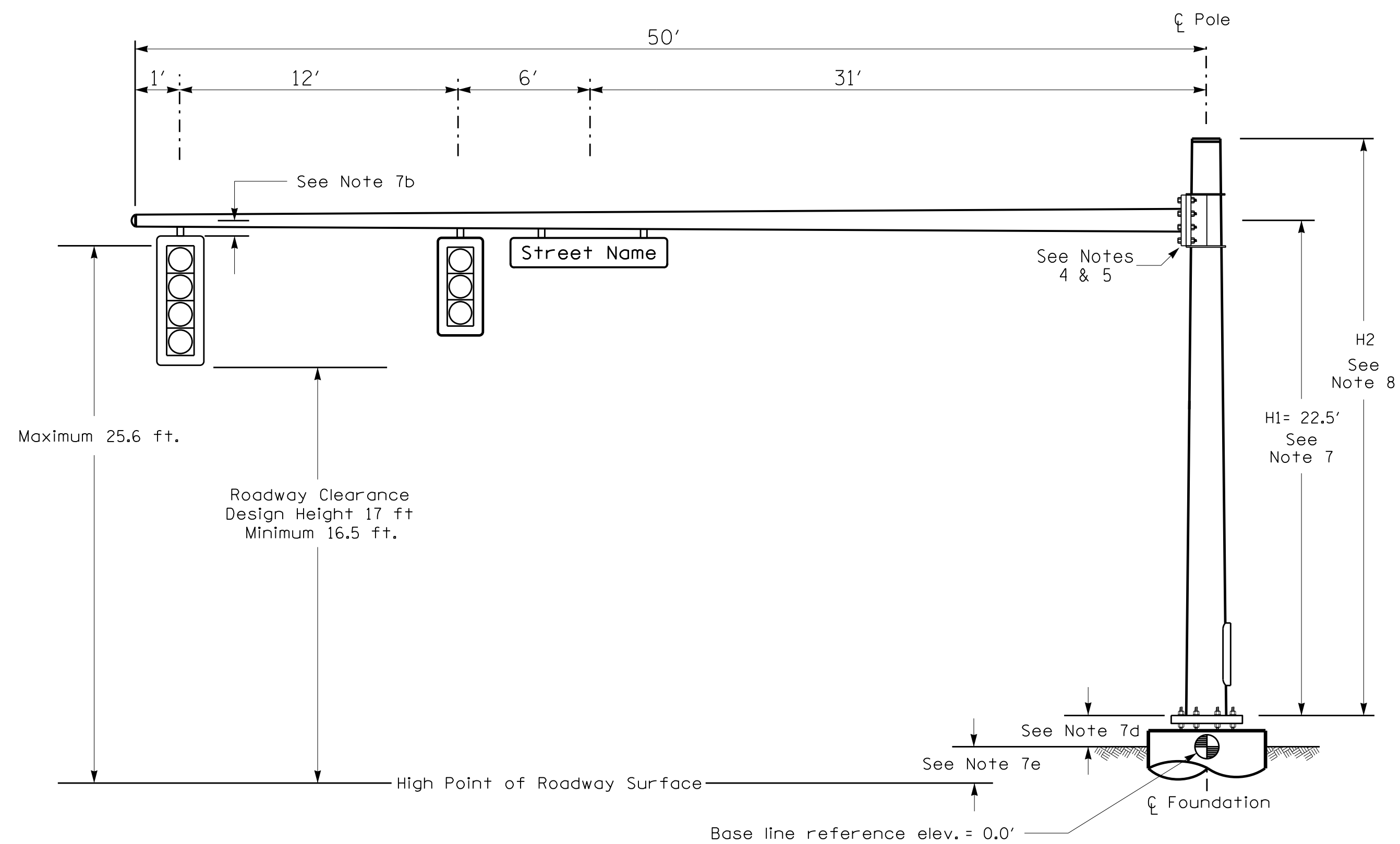


**Design Loading for METAL POLE NO. 1**



**Elevation View**

**Design Loading for METAL POLE NO. 2**



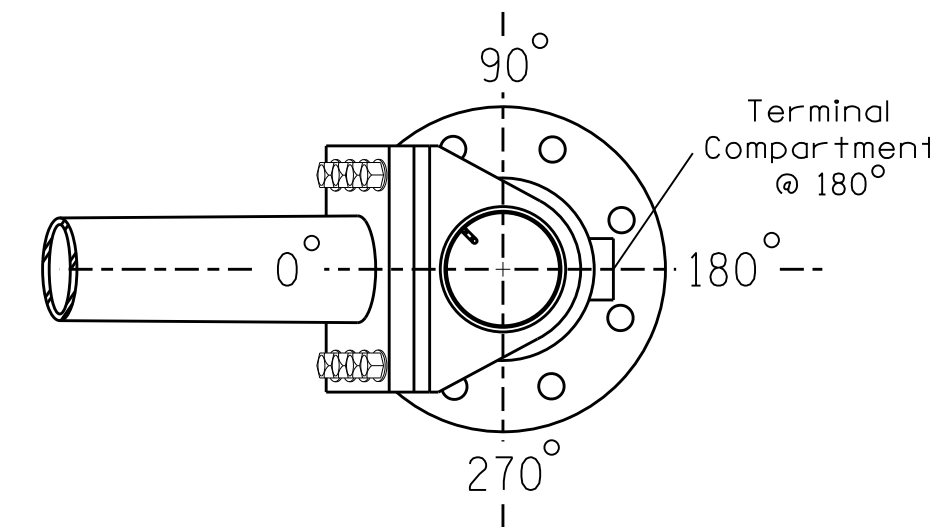
**Elevation View**

**SPECIAL NOTE**

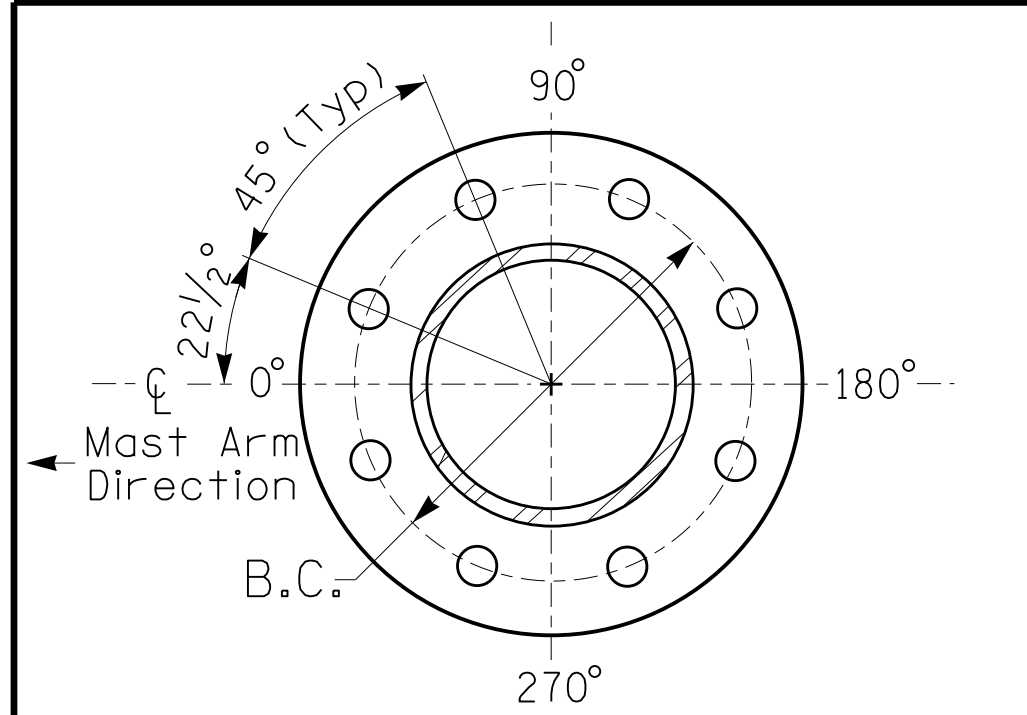
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

**Elevation Data for Mast Arm Attachment (H1)**

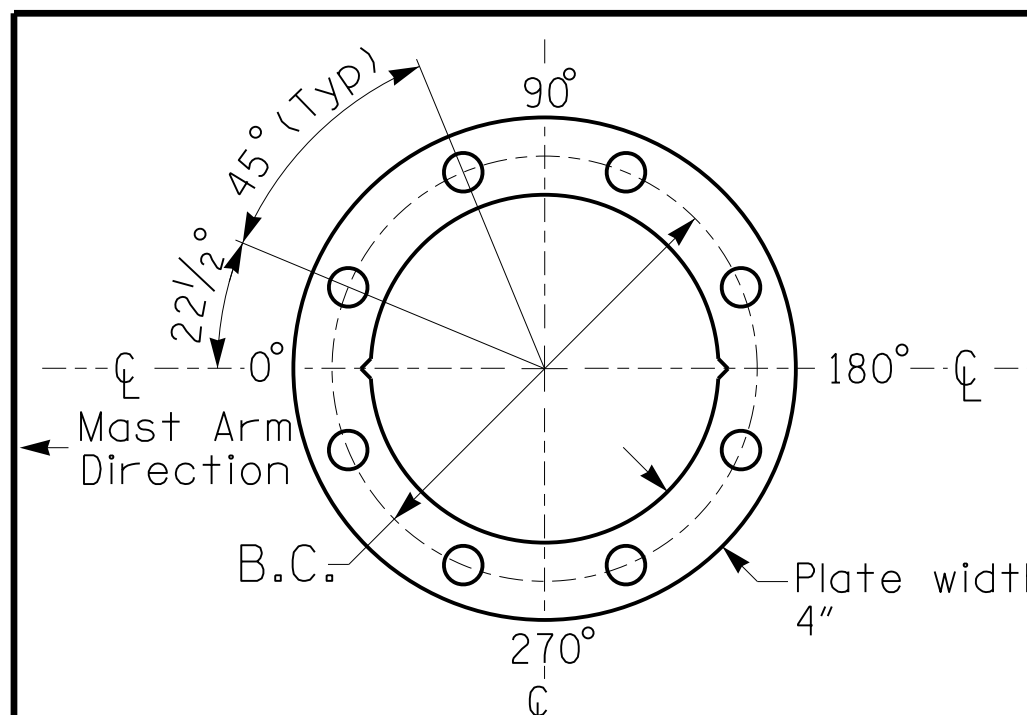
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.7 ft.	-0.7 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



**POLE RADIAL ORIENTATION**



**8 BOLT BASE PLATE DETAIL**



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

**METAL POLE No. 1 and 2**

**MAST ARM LOADING SCHEDULE**

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD-12"-3 SECTION WITH BACKPLATE - SUSPENDE BENEATH ARM	9.2 S.F.	25.5" W X 52.0" L	56 LBS
	SIGNAL HEAD-12"-4 SECTION WITH BACKPLATE - SUSPENDE BENEATH ARM	11.6 S.F.	25.5" W X 66.0" L	69 LBS
	STREET NAME SIGN - SUSPENDE BENEATH ARM	12.0 S.F.	18.0" W X 96.0" L	30 LBS
	Traffic Management Camera - Rigid Mounted	2.0 S.F.	12.0" W X 24.0" L	18 LBS

**NOTES**

**DESIGN REFERENCE MATERIAL**

- 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 the specifications can be found in the traffic signal project special provisions.
  - The 2012 NCDOT Roadway Standard Drawings.
  - The traffic signal plans and project special provisions.
  - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

**DESIGN REQUIREMENTS**

- 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 installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the 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.
- Design the mast arm-to-pole connection using a welded ring stiffened box connection as shown.
- Unless otherwise required, design the pole base with a 2" plate and eight equally spaced 2" anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions and design considerations for signal head mounting below the mast arm:
  - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
  - Signal heads are mounted and suspended below the mast arm. Assume 1'-0" of additional vertical spacing that represents the distance between the center line of the mast arm and the top of the signal head back plate.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is 0.75 feet above the ground elevation.
  - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 The mast arm attachment height is critical to ensure proper roadway clearance of signals particularly when they are suspended below the mast arm. The pole designer may revise the arm attachment height (H1) if the actual design is different than design assumptions above.
- 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 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- 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 Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be BLACK in color as specified in the project special provisions.

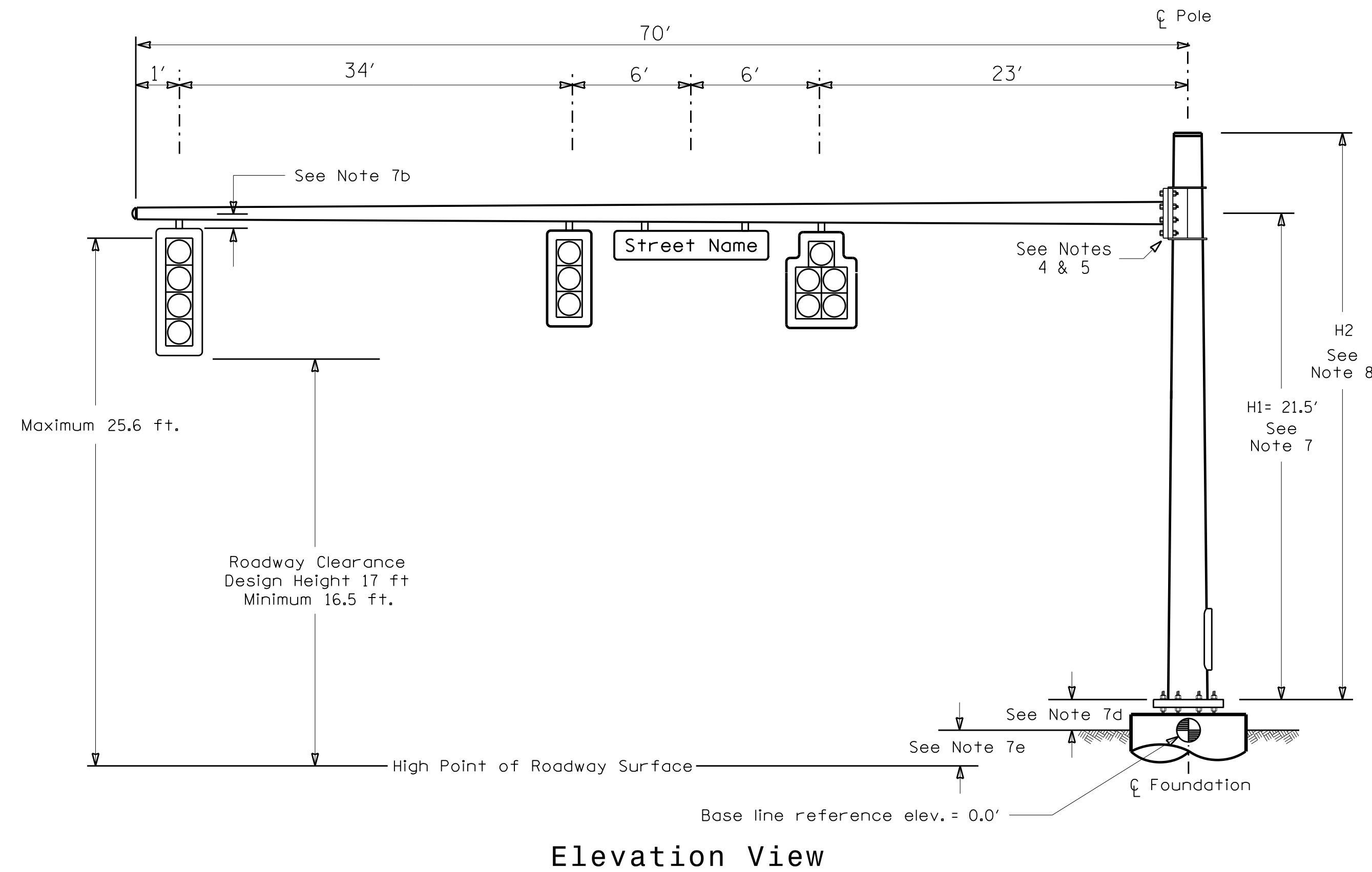
**NCDOT Wind Zone 4 (90 mph)**

<p>Prepared In the Offices of: TRANSPORTATION MOBILITY AND SAFETY DIVISION SIGNAL DESIGN SECTION 750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>NC 49 (University City Blvd) at Cameron Boulevard / University Professional Drive Division 10 Mecklenburg County Charlotte</p>		<p>SEAL NORTH CAROLINA PROFESSIONAL ENGINEER ZACHARY M. LITTLE 030530</p>
	<p>PLAN DATE: December 2014</p>	<p>REVIEWED BY: T.J. Williams</p>	
<p>SCALE: N/A</p>	<p>PREPARED BY: Z.M. Little</p>	<p>REVIEWED BY: C.F. Andrews</p>	<p>SIG. INVENTORY NO. 10-2151</p>

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**Design Loading for METAL POLE NO. 3**



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	-1.5 ft.	-2.2 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

**MAST ARM LOADING SCHEDULE**

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
[Symbol]	SIGNAL HEAD-12"-3 SECTION WITH BACKPLATE - SUSPENDED BENEATH ARM	9.2 S.F.	25.5" W X 52.0" L	56 LBS
[Symbol]	SIGNAL HEAD-12"-4 SECTION WITH BACKPLATE - SUSPENDED BENEATH ARM	11.6 S.F.	25.5" W X 66.0" L	69 LBS
[Symbol]	SIGNAL HEAD-12"-5 SECTION WITH BACKPLATE - SUSPENDED BENEATH ARM	16.3 S.F.	42.0" W X 56.0" L	89 LBS
[Symbol]	STREET NAME SIGN - SUSPENDED BENEATH ARM	12.0 S.F.	18.0" W X 96.0" L	30 LBS

**NOTES**

**DESIGN REFERENCE MATERIAL**

- 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.
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**DESIGN REQUIREMENTS**

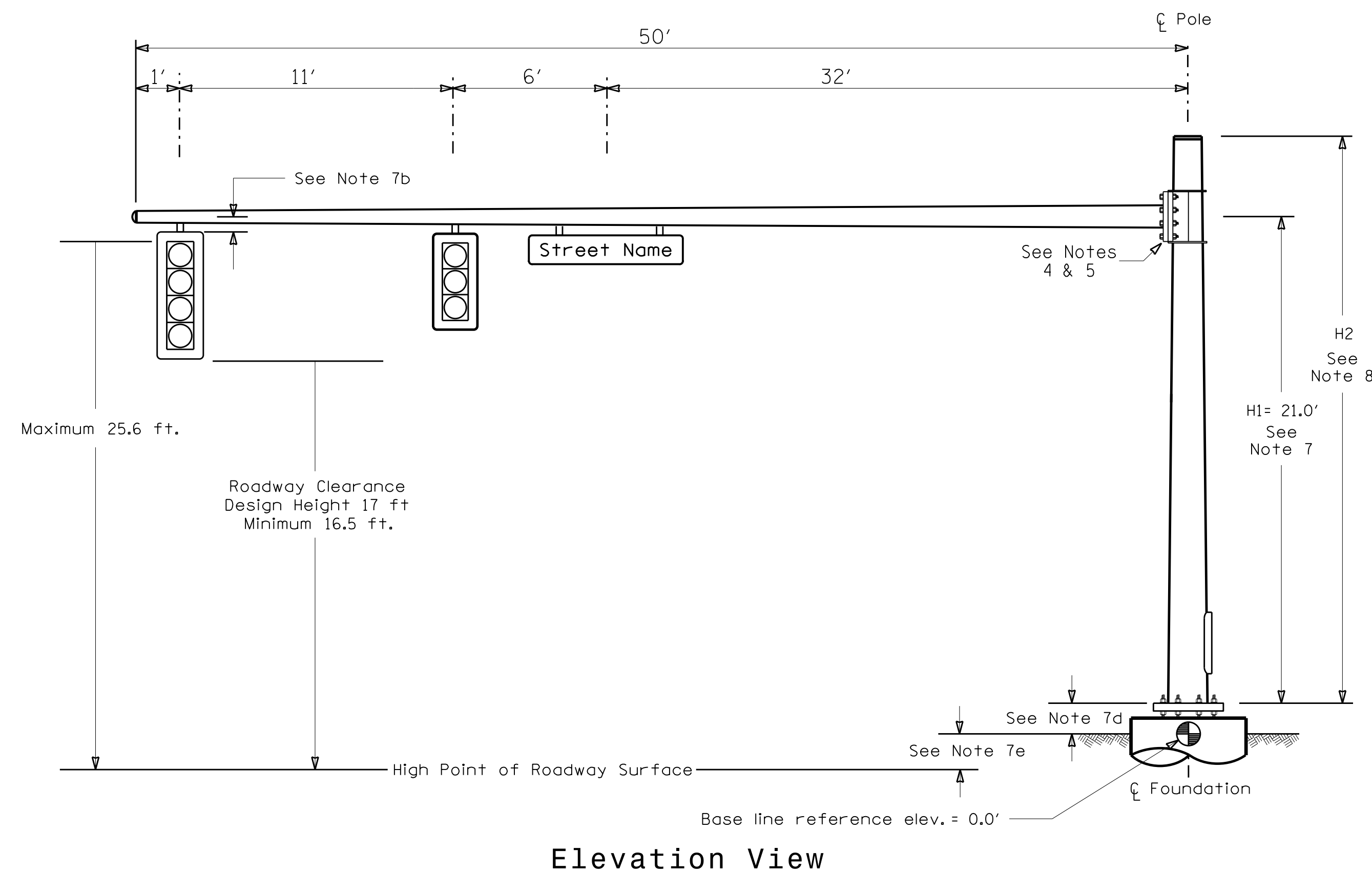
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the 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.
- Design the mast arm-to-pole connection using a welded ring stiffened box connection as shown.
- Unless otherwise required, design the pole base with a 2" plate and eight equally spaced 2" anchor bolts.
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  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is 0.75 feet above the ground elevation.
  - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 The mast arm attachment height is critical to ensure proper roadway clearance of signals particularly when they are suspended below the mast arm. The pole designer may revise the arm attachment height (H1) if the actual design is different than design assumptions above.
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- 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 Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be BLACK in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

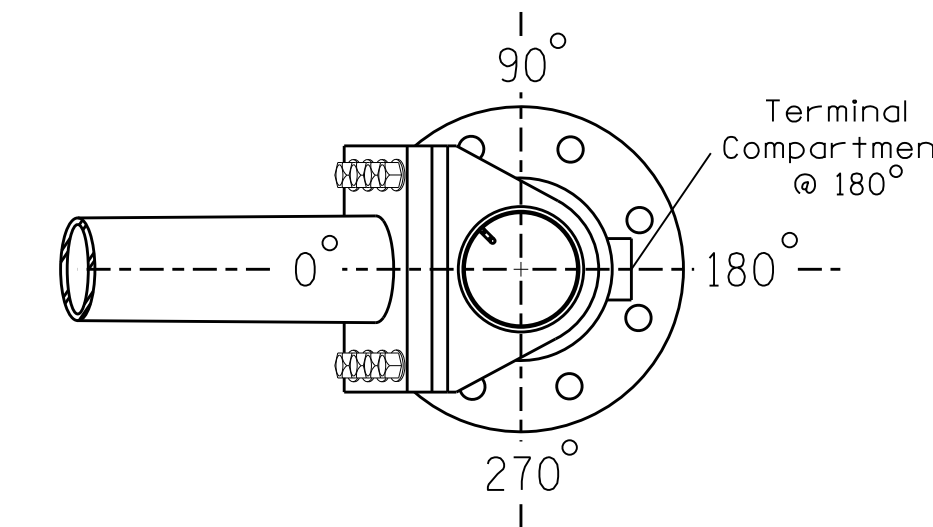
<p>Prepared in the Offices of: TRANSPORTATION MOBILITY AND SAFETY DIVISION SIGNAL DESIGN SECTION 750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>NC 49 (University City Blvd) at Cameron Boulevard / University Professional Drive Division 10 Mecklenburg County Charlotte</p>		
	<p>PLAN DATE: December 2014</p>	<p>REVIEWED BY: T.J. Williams</p>	
<p>SCALE: 0 N/A</p>	<p>PREPARED BY: Z.M. Little</p>	<p>REVIEWED BY: C.F. Andrews</p>	<p>INIT. DATE</p>
<p>N/A</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>	<p>DocuSign by: <i>Zachary M. Little</i> 12/9/2014 DATE: 12/9/2014 SIG. INVENTORY NO. 10-2151</p>

**Design Loading for METAL POLE NO. 4**

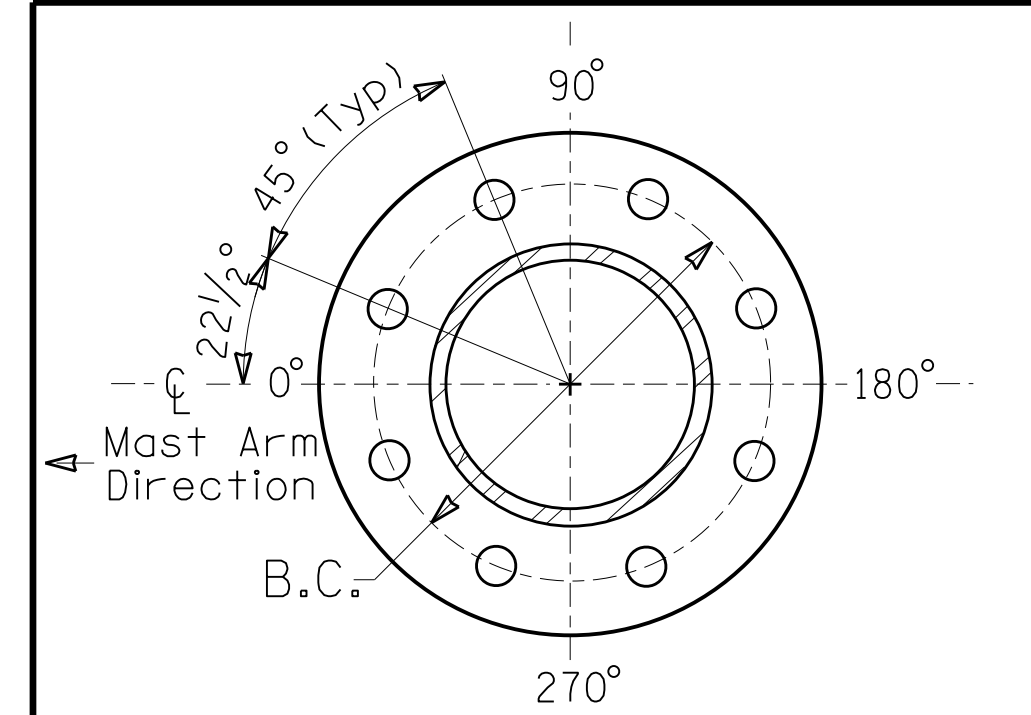


Elevation View

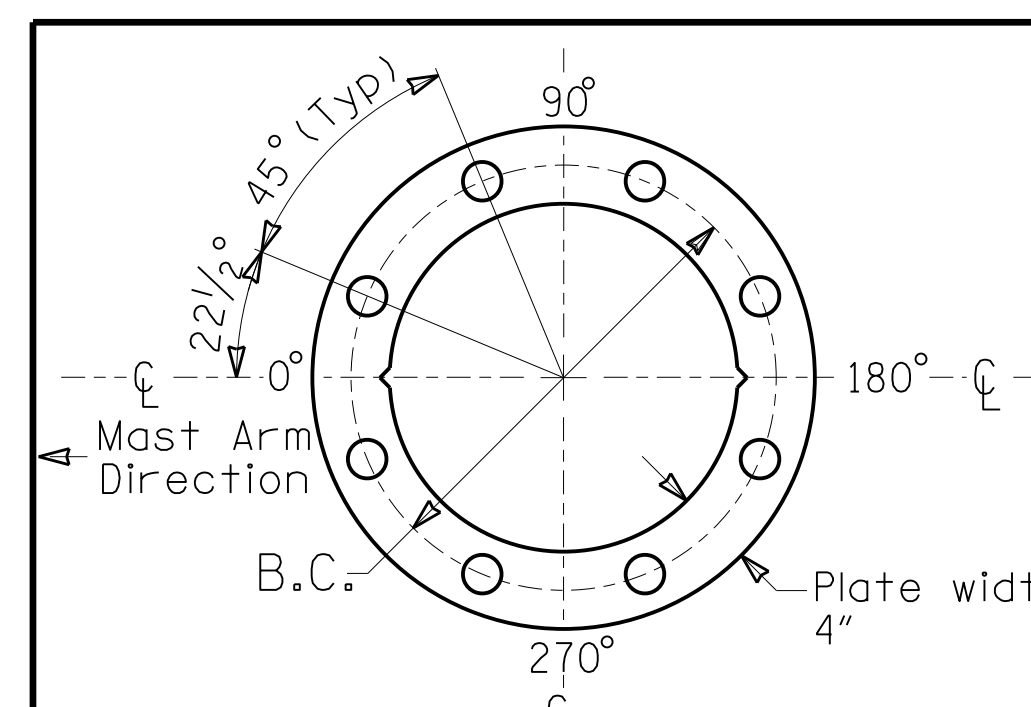
**POLE RADIAL ORIENTATION**



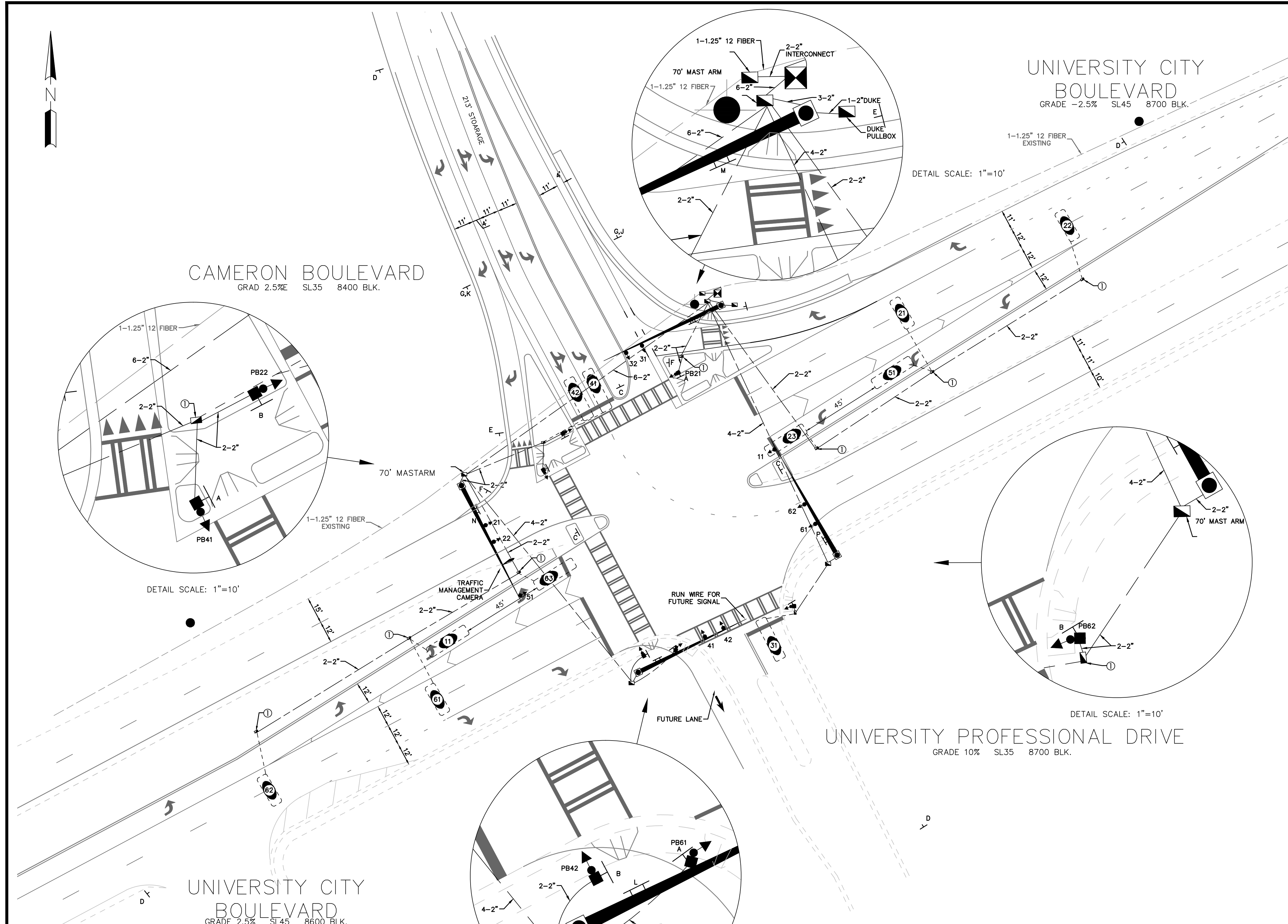
**8 BOLT BASE PLATE DETAIL**



**BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL**



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SIGNAL PHASING		SIGNAL SEQUENCE							
Ring Configuration: 1, 2, 3, 4, 5, 6, 7, 8		CONTROLLER TYPE: 2070							
1		5		6		7		8	
2		3		4		5		6	
3		4		5		6		7	
4		5		6		7		8	
b		OVERLAP - PHASE							
PULLBOX ID		SIGNAL HEAD ID							

CLEARANCE INTERVALS								
Phase	1	2	3	4	5	6	7	8
% Grade	0.0%	0.0%	0.0%					0.0%
Distance	75	70	70					70
Approach Speed (mph)	35	25	25					35
<b>Yellow</b>	<b>3.8</b>	<b>3.2</b>	<b>3.2</b>					<b>3.8</b>
<b>All Red</b>	<b>1.5</b>	<b>2.0</b>	<b>2.0</b>					<b>1.4</b>
Total Clearance	5.3	5.2	5.2					5.2

TRAFFIC VOLUMES								

DETECTOR INFORMATION						
DETECTOR NUMBER	AMP. NO.	SIZE / ZONE	AMP. TYPE	DELAY	BEAM #	COMMENTS
11	1	6x25	1	D	1	45' FROM LOOP 63 (LT)
21,22	2	6x18	2	N		95', 200' FROM SB (THRU)
23	3	6x25	2	N		SB (LT)
31	4	6x25	3	N		SB (THRU/LT/RT)
41,42	5	6x25	4	N		SB (THRU/LT)
51	6	6x25	5	D	5	45' FROM LOOP 23 (LT)
61,62	7	6x18	6	N		95', 200' FROM SB (THRU)
63	8	6x25	6	N		SB (LT)

SIGNAL HEAD ID	
21,22 31,62	32,41 42

SIGN ID		LEGEND	
A R10-4	B R10-4	PROPOSED	EXISTING
C R4-7 24" x 30"	D W3-3 36" x 36"	CONTROL BOX	CONTROL BOX
E R1-5aL 18" x 24"	F R1-2 36"	PULL BOX	PULL BOX
G R3-17 30" x 24"	J R3-17a 30" x 12"	STEEL POLE	STEEL POLE
K R3-17b 30" x 12"	L University City Blvd 8600	MAST ARM	MAST ARM
	M University City Blvd 8700	PED PEDESTAL	PED PEDESTAL
	N Cameron Blvd 8400	UTILITY POLE	UTILITY POLE
	P University Professional Dr 8700	ANCHOR	ANCHOR
		SIDWALK ANCHOR	SIDWALK ANCHOR
		SIGNAL HEAD	SIGNAL HEAD
		VIDEO CAMERA	VIDEO CAMERA
		OPTICOM	OPTICOM
		OBSERVATION CAM	OBSERVATION CAM
		DETECTOR	DETECTOR
		CONDUIT	CONDUIT
		INTERCONNECT	INTERCONNECT
		EDGE OF PVMT.	EDGE OF PVMT.
		CURB & GUTTER	CURB & GUTTER
		TUBULAR MARKER	TUBULAR MARKER
		GROUND SIGN	GROUND SIGN
		OVERHEAD SIGN	OVERHEAD SIGN
		DOUBLE YELLOW	DOUBLE YELLOW
		STOP BAR	STOP BAR
		WHITE SKIP	WHITE SKIP
		WHITE MINI	WHITE MINI
		PAVEMENT ARROW	PAVEMENT ARROW
		PROPERTY LINE	PROPERTY LINE
		ROW	ROW

**PLAN NOTES**

- ALL PAVEMENT MARKING DIMENSIONS ARE APPROXIMATE.
- SIGNAL WILL BE INSTALLED IN ACCORDANCE WITH THE MAY 1998 CDOT TRAFFIC SIGNAL SPECIFICATIONS AND THE PROJECT SPECIAL PROVISIONS.
- PED SIGNALS WITH PUSHBUTTONS WILL BE LABELED "PBT" (FOR EXAMPLE PB21, PB22)
- COUNTDOWN PEDESTRIAN SIGNALS SHOULD COUNT DOWN FLASHING DON'T WALK ONLY.

#	BY:	DATE:	REVISION:

CITY OF CHARLOTTE  
DEPARTMENT OF TRANSPORTATION  
600 E. 4TH ST. CHARLOTTE, NC 28202 704 336-4119 FAX: 704 336-4400

UNIVERSITY CITY BOULEVARD  
AND  
CAMERON BLVD./UNIVERSITY PROFESSIONAL DR.