

General Notes

1.

All structural steel shall conform to the requirements shown in the materials table on Sheet 2.
2.

Sign structures shall be constructed true to the specified dimensions, shall be free from kinks, twists or bends, and shall be uniform in appearance. The completed sections shall be assembled in the shop and shall be checked for straightness, alignment, and dimensional accuracy. Any variations shall be corrected to the satisfaction of the Engineer.
3.

Mast arms shall be temporarily supported to take all load off of the field splices while bolts are being tightened in order to firmly seat the flange plates.
4.

Posts for tubular sign structures shall be formed to the radii shown on the plans by heat treatment or by fabrication to such radii by methods which will not crimp or buckle the interior radius of the pipe bend.
5.

Clips, eyes, or removable brackets shall be affixed to all posts and mast arms, as necessary, to secure the sign during shipping and for lifting and moving during erection. This is to prevent damage to the finished galvanized or painted surfaces. brackets on tubular sign structures shall be removed after erection. Details of such devices shall be shown on the shop drawings.
6.

High-strength bolted connections shall conform to the provisions in section 509.28 of the Standard Specifications. Assembly of high-strength bolted connections for sign structures may be made with galvanizing or paint on the contact (faying) surfaces.

7.

All sign structures shall be fabricated into the largest practical sections prior to galvanizing. Splice locations shall be submitted to the Engineer for approval and the Contractor shall not commence fabrication until such splice locations are approved.
8.

All pipe members shall be hot-dip galvanized inside and outside after fabrication as per ASTM A123. Painting shall conform to Section 522, Duplex Coating System. Steel mountings for light fixtures and all nuts, bolts and washers for sign structures shall be galvanized after fabrication per ASTM A123 or ASTM A153, as appropriate and shall not be painted. Bolts shall be lubricated prior to installation. Tension control bolts or direct tension indicating washers used in high-strength bolted connections shall be mechanically galvanized per ASTM B695, coating Class 55.
9.

All concrete shall be Class BZ with air entrainment; reinforcing steel shall be Grade 60. Caisson concrete must have a minimum compressive strength of 2,700 psi before installing the sign structure; verify concrete strength with maturity meter.
10.

Structures shall be grounded in accordance with applicable electrical codes.
11.

Sheets in the index marked with a ■ provide instructions to designers for their use in the preparation of the sign x-section sheets in the Roadway Plans.
12.

NPS = Nominal Pipe Size; OD = Outside Diameter.

-Sign Notes (1 of 2)-

13.

Shop drawings shall be submitted to the Engineer for review in accordance with subsection 105.02 of the Standard Specifications.
14.

Install structure identification panel in accordance with M and S Standard S-614-12 using two ½ inch wide stainless steel bands and stainless steel flared leg brackets with hex head bolts (Band-It D315 or equivalent)
15.

Caisson steel supports and survey work shall be paid for in accordance with bid items 503, 614 and 625 respectively.
16.

Cantilever arms marked with a ▲ must be level or tilted upward no more than 1° maximum after installation of the sign.
17.

There shall be no penetrations of the tube members other than as shown in these plans unless approved by the Engineer prior to fabrication.

Index

1.

Sign Notes (1 of 2)
2.

Sign Notes (2 of 2)
3.

Cantilever Installation Detail ■
4.

Sign Bridge Installation Details ■
5.

Sign Mounting Bracket Details
6.

Post and Arm Details
7.

Field Splice Details
8.

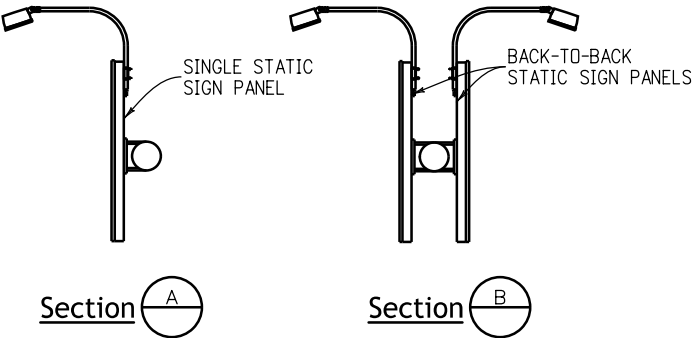
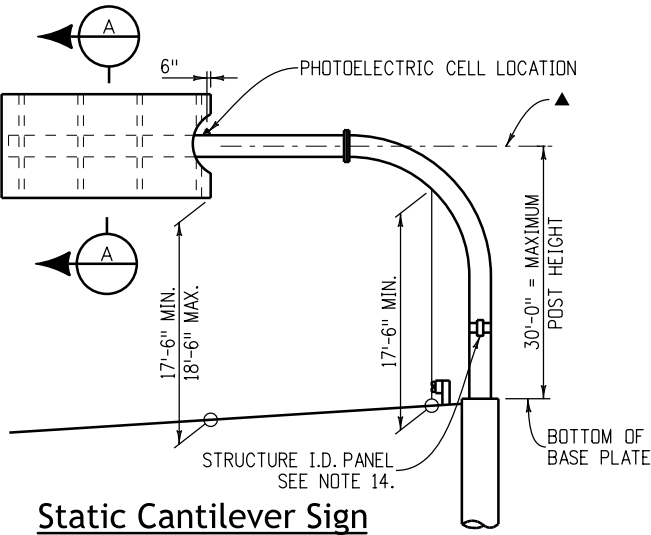
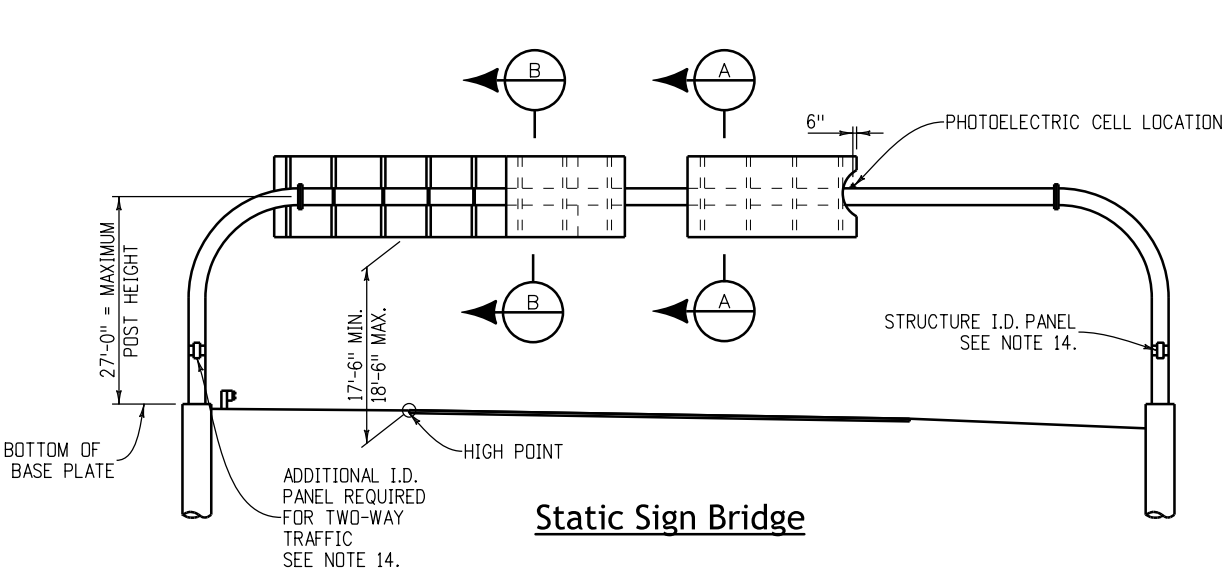
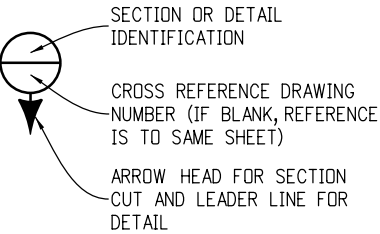
Base Plate/Anchor Bolt Details
9.

Sign Lighting Details
10.

Cantilever Sign Pipe Selection Tables ■
11.

Sign Bridge Pipe Selection Tables ■
12.

Foundation Details ■



Computer File Information			Sheet Revisions		Colorado Department of Transportation Traffic Safety & Engineering Services 2829 West Howard Place Denver, CO 80204 EB/SNH	Static Sign Monotube Structures Issued by the Traffic Safety & Engineering Services: July 01, 2026	Standard Plan No.	
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General Notes (Continued)

18. Welding of steel shall conform to the requirements of AWS D 1.1. All areas to be welded shall be ground to bright metal. No butt weld splices will be permitted. All welding and required testing shall be complete before any material is galvanized.

Enhanced Magnetic Particle Testing shall be performed on areas defined in AWS D1.1 and herein. Enhanced Magnetic Particle testing shall be conducted in accordance with ASTM E 709 and AWS D 1.1, except as amended herein. Alternating current shall be used. The yoke spacing shall be between 2 and 4 inches. The minimum lifting power shall be 10 pounds. Red dry particles shall be used. The light intensity shall meet ASTM E 709, Section 7. Particle application and specimen preparation shall meet the requirements of ASTM E 709 Sections 9 and 15, Except white non-aqueous developer meeting ASTM E 165, Type 3, shall be applied to the test surface prior to testing.

The yokes shall be set in two positions when testing the weld or base metal. They shall be positioned both normal and parallel with respect to the weld axis and rolling direction of the base metal.

Enhanced Magnetic Particle Tests shall be performed at the following locations:

- (1) Base Metal. All areas contacted by the carbon arc gouge electrode, the electrode cup, and the welding electrode. All three conditions are arc strikes.

(2) Fillet Welds. Each design weld size on main member to main member and secondary member to main member weldments. All stop-starts and weld termini. All linear indications shall further be evaluated with 10x or 30x magnification. Verification shall be resolved by excavation.

(3) Groove Welds. All through thickness edges on transverse butt joint weldments in tension areas.

(4) Repairs. All repair welds to correct defects in groove and fillet welds, plate cut edges, correction of fabrication errors in cutting, punching, drilling, or fitting, and members which are tacked or welded and subsequently cut apart and rewelded.
19. All circumferential and all longitudinal pipe seam welds within 5 inches of full penetration circumferential groove welds shall be full penetration groove welds and shall be inspected as specified herein. The acceptable maximum weld undercut is 0.01 inches.
20. The Contractor shall provide a survey of each overhead sign after installation verifying the minimum vertical clearance of the sign from finished grade. The survey shall conform to Section 625, Construction Surveying.

Design Data

Specifications:

- Design:

"Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", American Association of State Highway and Transportation Officials (1994 AASHTO).

"Fatigue-Resistant Design of Cantilevered Signal, Sign and Light Supports", National Cooperative Highway Research Program (NCHRP) Report 412, 1998.

Subsection 17.4, Signs, in the 2012 Staff Bridge Branch Bridge Design Manual.
- Construction:

CDOT Standard Specifications, these Standard Sheets and the Project Plans.
- Wind Loading:

80, 90 or 100 MPH velocity as per the selection tables.

Materials

Element	Specification		Clarifications
	ASTM	AASHTO	
Posts, Mast Arms	See Note #1		#1
Bars, Plates And Shapes	A709	M-270	#2
Hollow Structural Sections (HSS)	A500		#3
High-Strength Bolts (HS Bolts)	A325	M-164	#4
High-Strength Nuts	A563	M-291	
High-Strength Washers	F436	M-292	#5
U-Bolts (Rods)	F1554	M-314	GRADE 55 Steel
Anchor Bolts	F1554	M-314	GRADE 55 Steel

- #1

Pipes shall be welded or seamless steel pipe conforming to the Specifications of ASTM designation A53 GRADE B, A500 Grade B, or ASTM A106 Grade B.
- #2

Grades 36 or 50 steel. ASTM A992 shapes may be substituted.
- #3

Hollow Structural Section Specifications apply to the Structural Tubing Sections (TS) used at handholes and static sign lighting locations.
- #4

Tension control (TC) bolts conforming to ASTM F1852 may be substituted for ASTM A325 bolts. All other bolts and nuts shall conform to the Specifications of ASTM designation: A307. Install A307 bolts with commercial quality washers.
- #5

ASTM F959, compressible-washer-type direct tension indicators may be substituted for ASTM F436 washers at high-strength bolted connections.

Overhead Sign X-Section Sheet(s) Shall Show:

1.

Sign Structure Location (Highway, Station and Direction)
2.

Length of Structure Span
3.

Panel Size and Location on Structure
4.

Offset From Shoulder
5.

Post Height(s) From Bottom of Base Plate to $\varnothing$ Mast Arm
6.

Caisson Diameter and Minimum Embedment
7.

Top of Caisson Elevation
8.

Caisson Pay Length
9.

Stations and Offsets to Caisson
10.

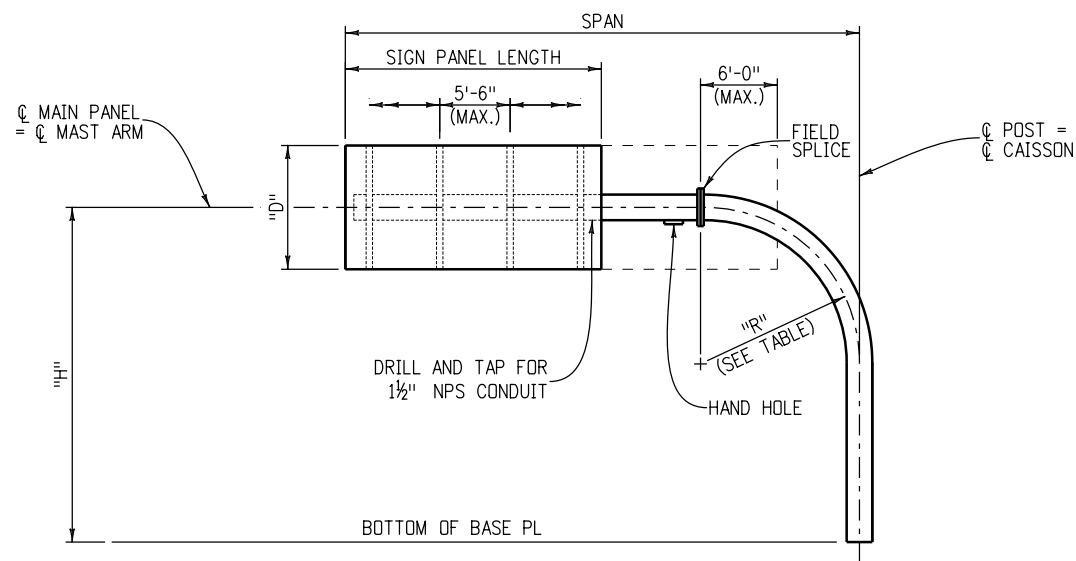
Guardrail Protection Limits
11.

Lane Line Location(s)
12.

As Constructed Block
13.

Photoelectric Cell Location if Required

Computer File Information			Sheet Revisions		Colorado Department of Transportation Traffic Safety & Engineering Services 2829 West Howard Place Denver, CO 80204 EB/SNH	Static Sign Monotube Structures	Standard Plan No.		
Creation Date: 07/04/12	Date:		Comments	S-614-50					
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Last Modification Date: 07/01/26								Issued by the Traffic Safety & Engineering Services: July 01, 2026	Project Sheet Number:
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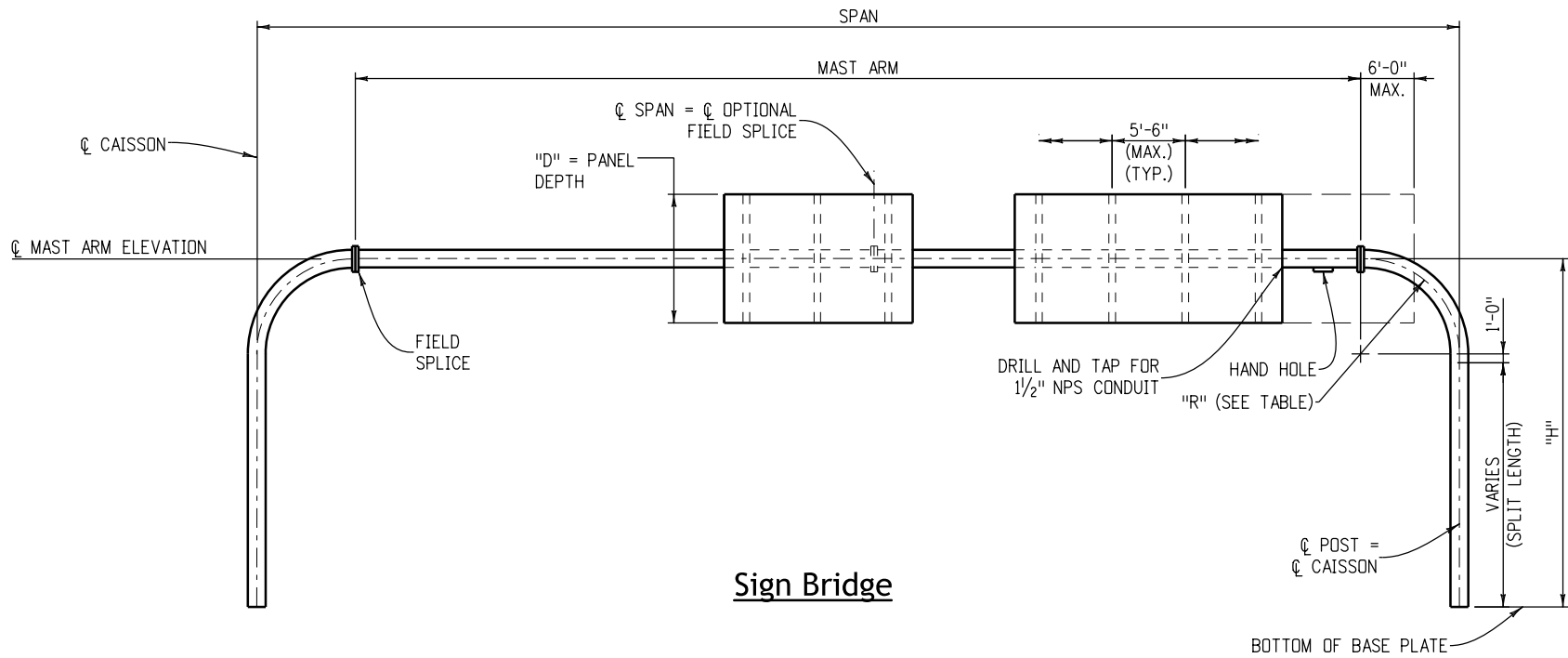


Cantilever

Cantilever Notes

- 1. The maximum sign panel overlap onto elbow shall not exceed 6 feet 0 inches from the field splice.
- 2. All posts between base plate and field splice shall have a tube wall thickness of 1/2 inches. All mast arms shall have a tube wall thickness of 3/8 inches.
- 3. See Sheet 7 for Field Splice Details.

PIPE POST	
PIPE OD (IN.)	"R" (FT.)
12.75	8
14	8
16	8
18	8
20	8
24	10



Sign Bridge

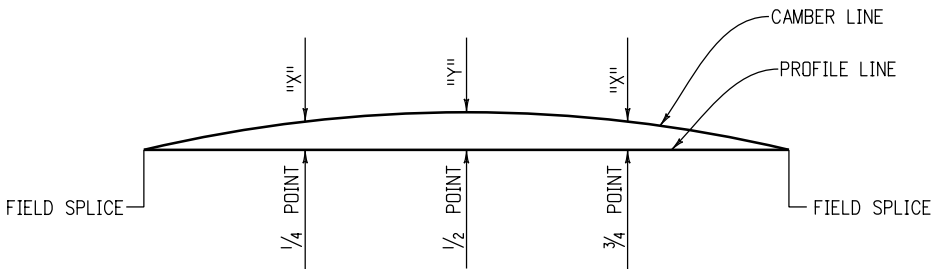
* PIPE POST

PIPE OD (IN.)	"R" (FT.)	CAMBER TYPE
12.75	8	(A)
14	8	(A)
16	8	(B)
18	8	(C)
20	10	(C)
24	12	(D) •

- USE CAMBER TYPE E FOR 130' - 140'.
- * MAST ARM DIAMETER SAME AS POST.
- INDICATES CAMBER TYPE, SEE TABLE.

CAMBER

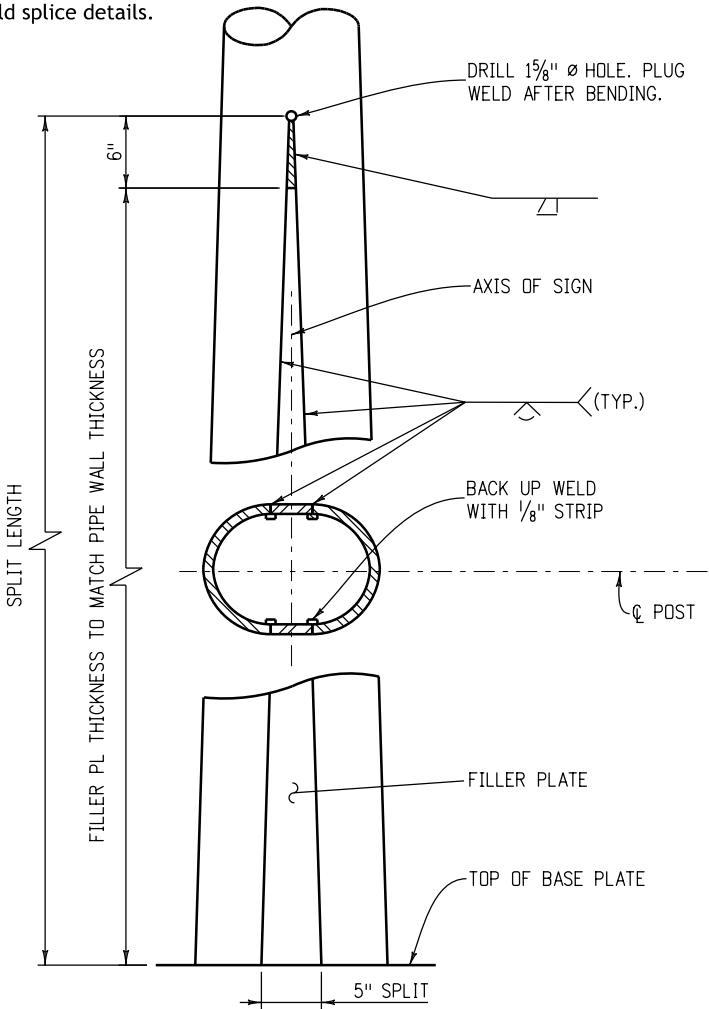
TYPE	"X"	"Y"
(A)	1 1/2"	2"
(B)	2 1/4"	3"
(C)	2 3/4"	4"
(D)	3 1/2"	5"
(E)	4 1/2"	6"



Camber Diagram

Notes

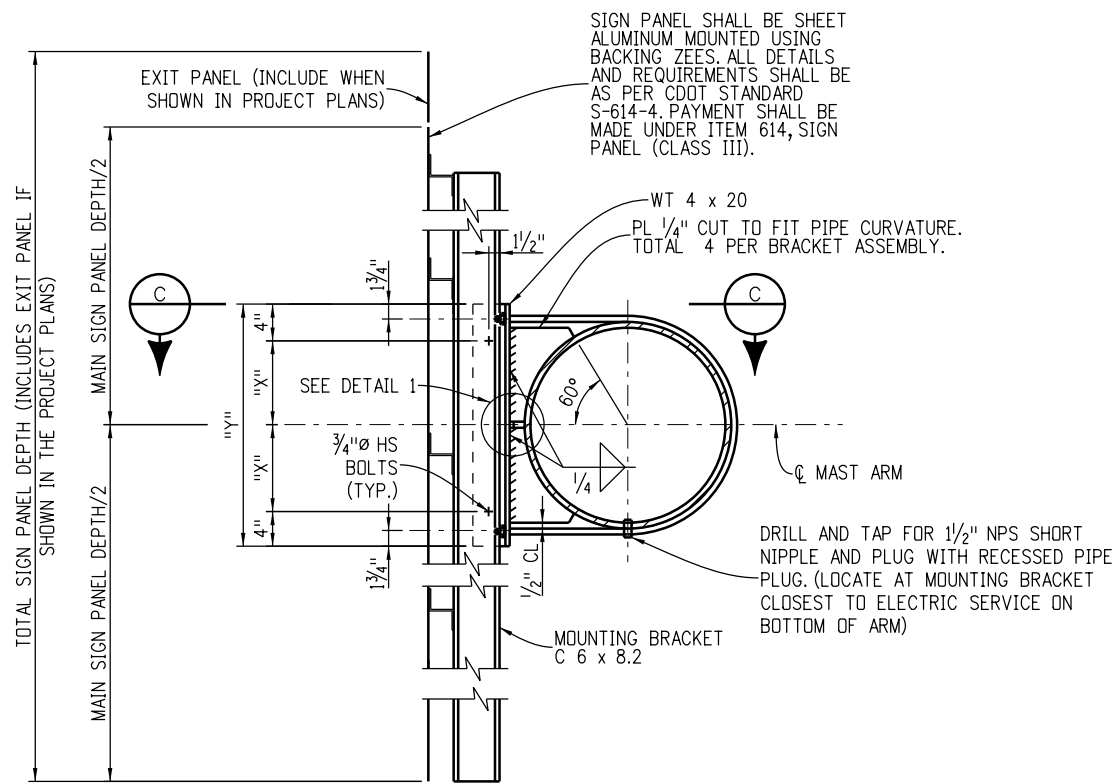
- The maximum sign panel overlap onto elbow shall not exceed 6 feet-0 inches from the field splice.
- All posts between base plate and field splice shall have a tube wall thickness of 1/2 inches. All mast arms shall have a tube wall thickness of 3/8 inches.
- Before any portion of the sign frames are assembled in their final positions the Contractor shall demonstrate to the Engineer by preassembly or other approved methods that the span lengths of the frames in the no load condition match within 1/2 inches of the field measured span lengths between foundations.
- If the sign frames are erected as one unit, they shall be adequately suspended to avoid distortions or changes in span length between base plates.
- For mast arms with lengths between 40 feet-0 inches and 80 feet-0 inches a bolted field splice will be permitted at CL of the arm to facilitate galvanizing and hauling operations. For mast arms with lengths greater than 80 feet-0 inches, two bolted field splices will be permitted at the 1/3 points to facilitate galvanizing and hauling operations.
- See Sheet 7 for field splice details.



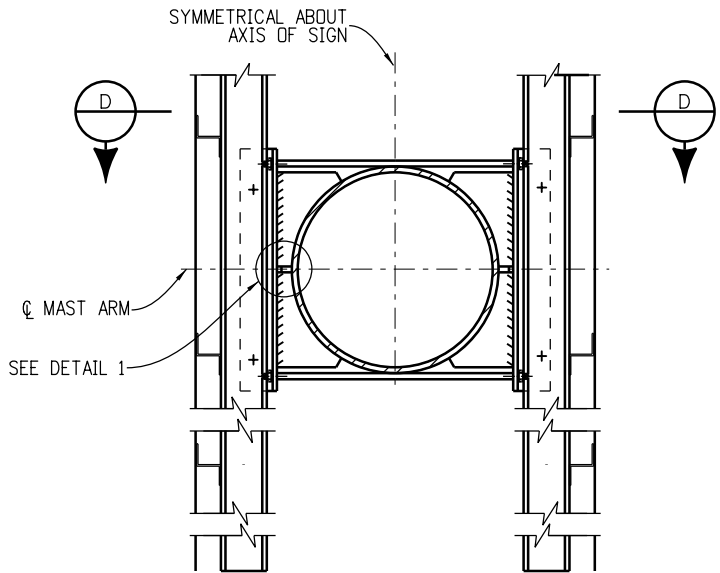
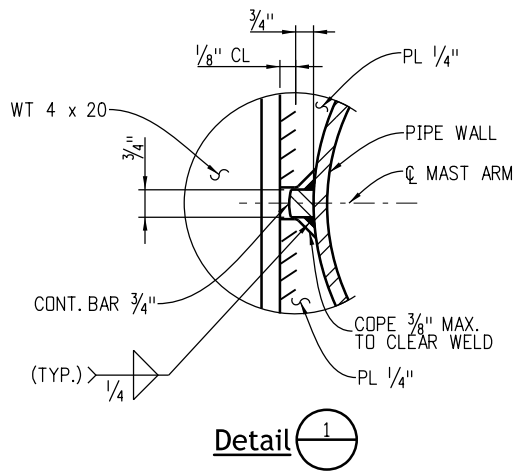
Post Split Details

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Creation Date: 07/04/12		Date:	Comments			S-614-50
Created By: JRM						Standard Sheet No. 4 of 12
Last Modification Date: 07/01/26						
Last Modified By: YSP						Project Sheet Number:
CAD Ver.: ORD 10.12 Scale: Not to Scale Units: English						

-Sign Mounting Bracket Details-



Single Sign Panel

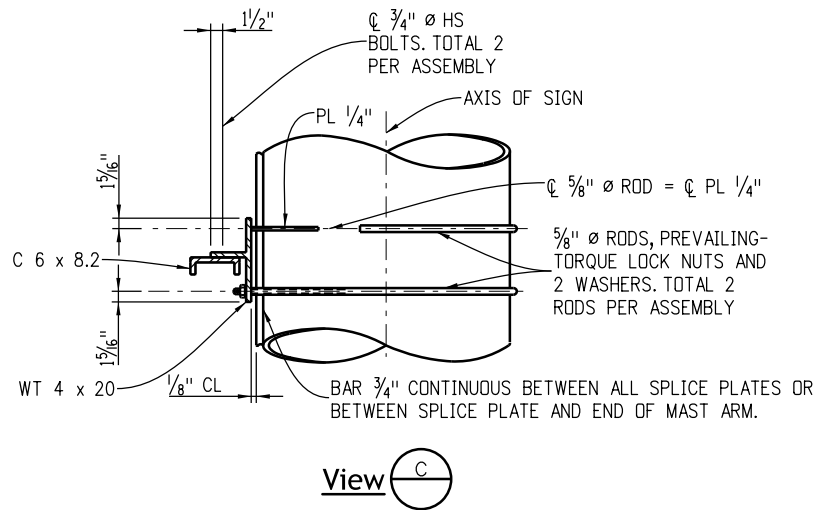


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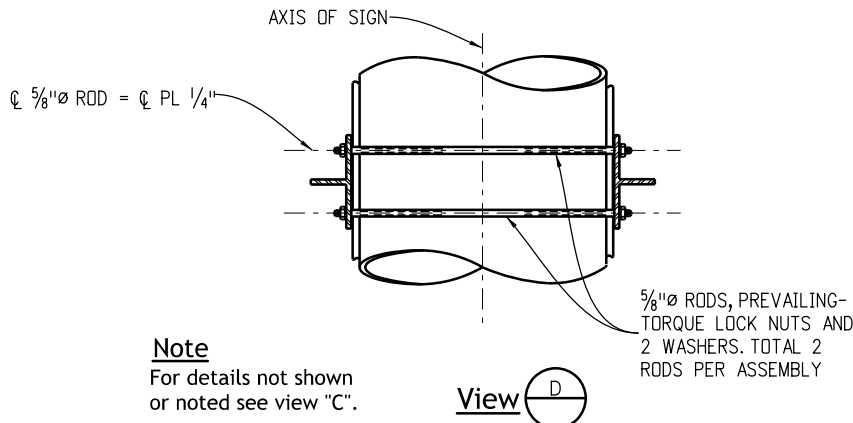
For details not shown or noted see "Single Sign Panel". Assembly details shown apply to tangent portion of pipe only. For mounting bracket on elbow see Detail 2.

Back-to-Back Sign Panels

PIPE OUTSIDE DIAMETER (IN.)	DISTANCE	
	"X" (IN.)	"Y" (IN.)
12.75	4 7/16	16 7/8
14	5 1/16	18 1/8
16	6 1/16	20 1/8
18	7 1/16	22 1/8
20	8 1/16	24 1/8
24	10 1/16	28 1/8



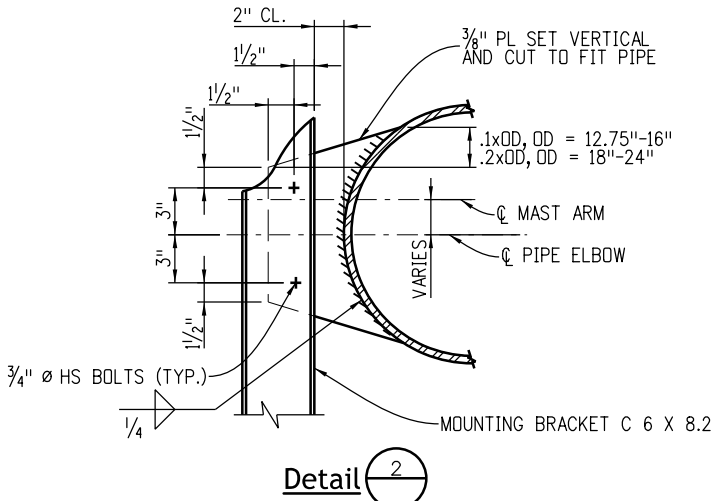
View C



Note

For details not shown or noted see view "C".

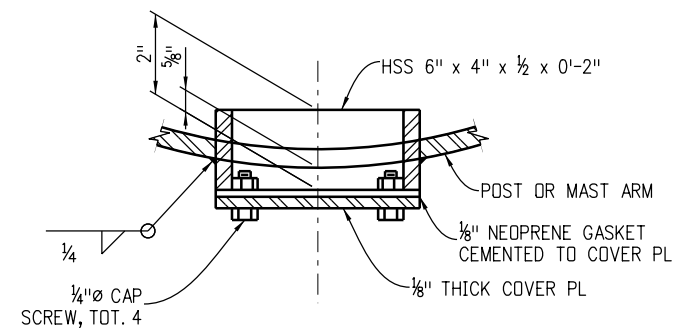
View D



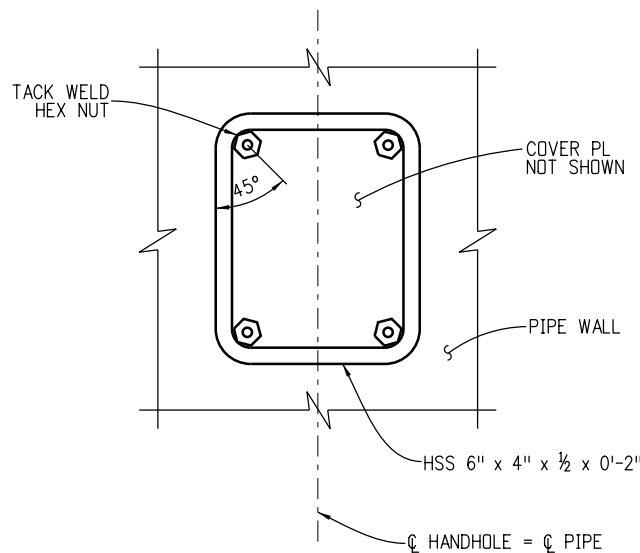
Detail 2

Mounting Bracket on Elbow

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Creation Date: 07/04/12			Date:	Comments			S-614-50	
Created By: JRM							Standard Sheet No. 5 of 12	
Last Modification Date: 07/01/26							Project Sheet Number:	
Last Modified By: YSP								
CAD Ver.: ORD 10.12	Scale: Not to Scale		Units: English					

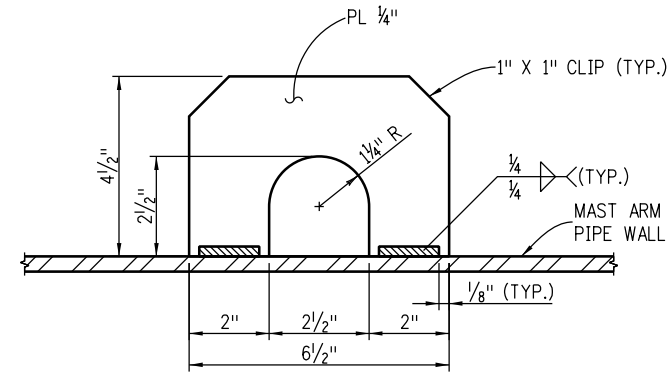


Handhole and Cover Details

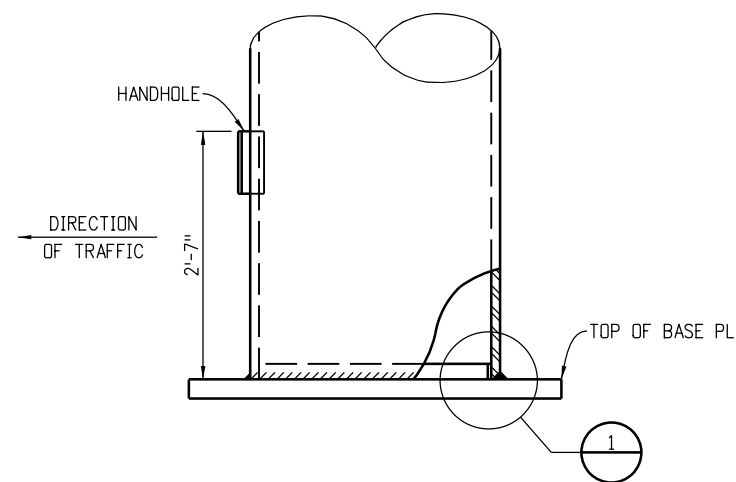


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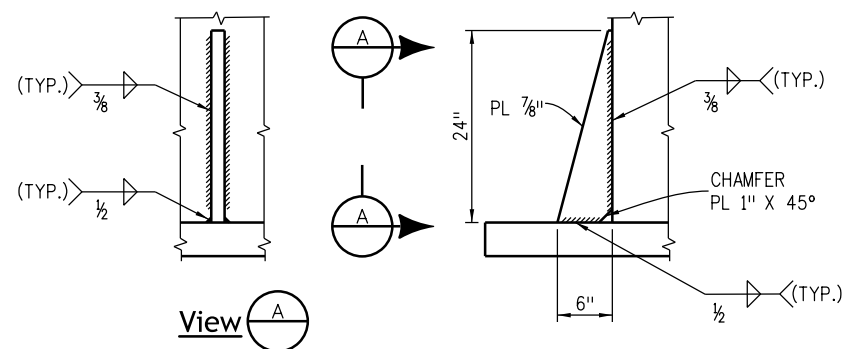
1. Stiffeners are to be placed at the base of all posts. See Sheet 8 for the location of stiffeners. Stiffeners are not shown elsewhere in these sheets for clarity.
2. Terminate weld 1/2 inch short of the top of the stiffener plate. At the other 3 weld terminations on these two typical welds stop the weld 1/4 inch short of the end of the plate.



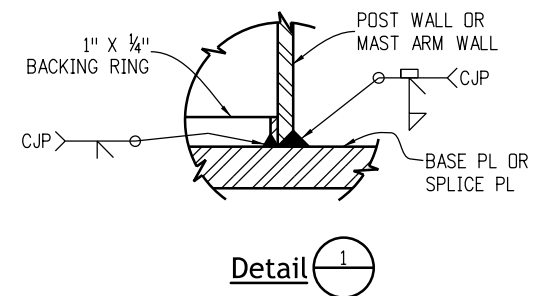
Lifting Eye Detail



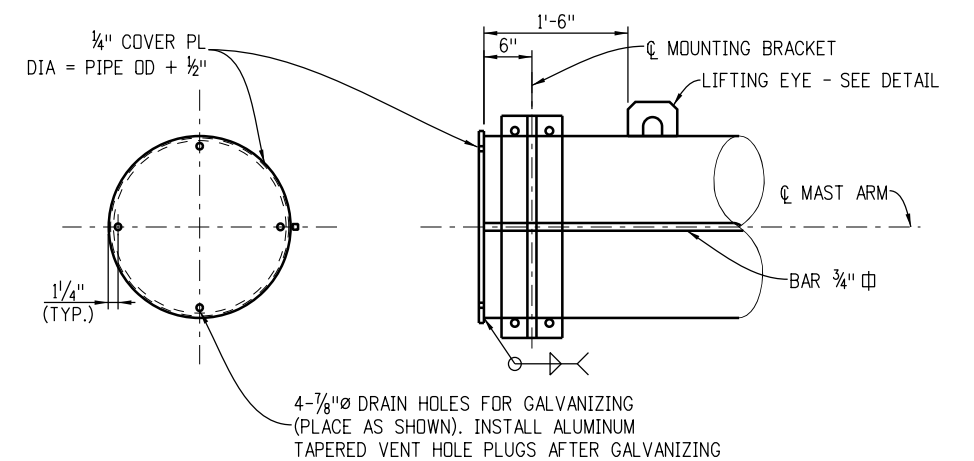
Post Base Elevation
(For Base PL Details See Sheet 8)



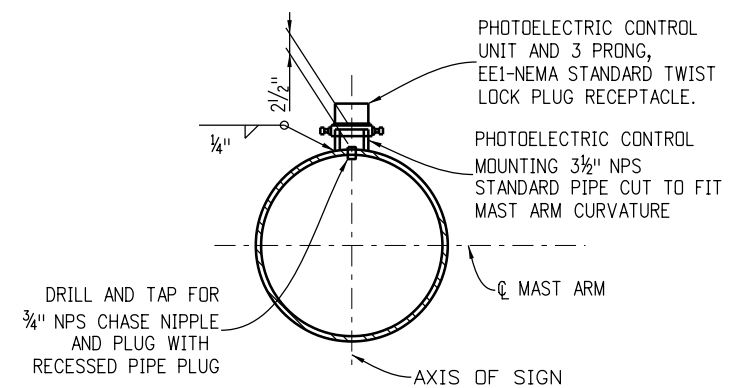
Stiffener Details
(At Pole Base - See Notes)



Detail 1



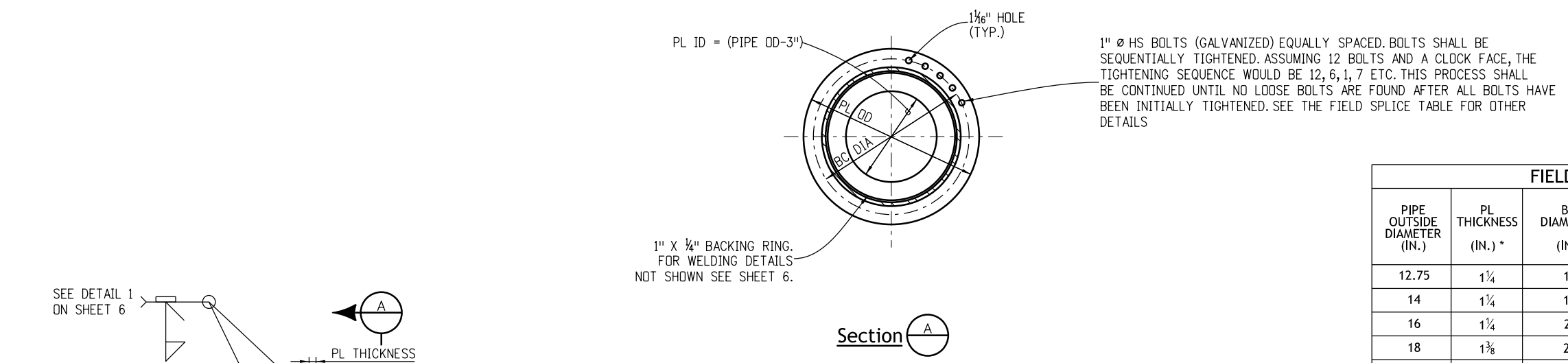
Mast Arm End Detail
(For Cantilever Arms)



Photoelectric Control Details
(See "Layout" Sheet For Location When Required)

Computer File Information		Sheet Revisions		Colorado Department of Transportation Traffic Safety & Engineering Services 2829 West Howard Place Denver, CO 80204 EB/SNH	Static Sign Monotube Structures Issued by the Traffic Safety & Engineering Services: July 01, 2026	Standard Plan No.	
Creation Date: 07/04/12		Date:	Comments			S-614-50	Standard Sheet No. 6 of 12
Created By: JRM							
Last Modification Date: 07/01/26							
Last Modified By: YSP							
CAD Ver.: ORD 10.12 Scale: Not to Scale Units: English						Project Sheet Number:	

-Field Splice Details-

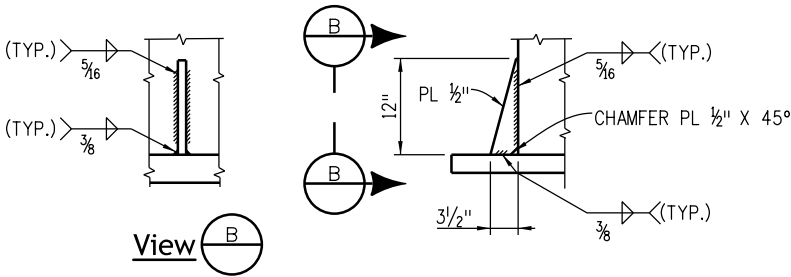


FIELD SPLICE					
PIPE OUTSIDE DIAMETER (IN.)	PL THICKNESS (IN.) *	BC DIAMETER (IN.)	PL OD (IN.)	# OF STIFF.	# OF BOLTS
12.75	1 1/4	16	21	6	14
14	1 1/4	17	22	6	16
16	1 1/4	21	24	6	20
18	1 3/8	23	26	10	22
20	1 3/8	25	28	10	24
24	1 1/2	29	32	12	28

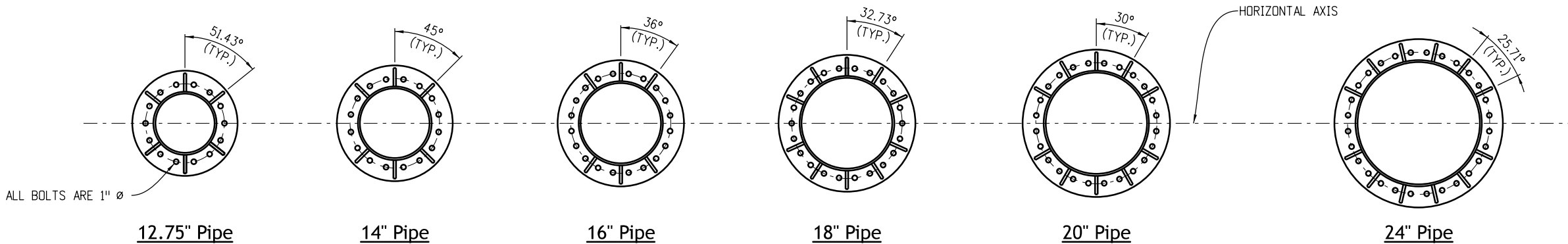
* MINIMUM THICKNESS AFTER MACHINING AS CALLED FOR IN NOTE 4.

Notes:

1. Stiffeners are to be placed on all field splices. Stiffeners are not shown elsewhere in these sheets for clarity.
2. Terminate weld 1/2 inch short of the top of the stiffener plate. At the other 3 weld terminations on these two typical welds, stop the weld 1/4 inch short of the end of the plate.
3. Splice design based on arm capacity.
4. The mating surfaces of the flange splice plates shall be machined to a common plane within a tolerance of 1/64 inches using a portable flange facer after welding and prior to galvanizing.



Stiffener Details
(At Field Splice)

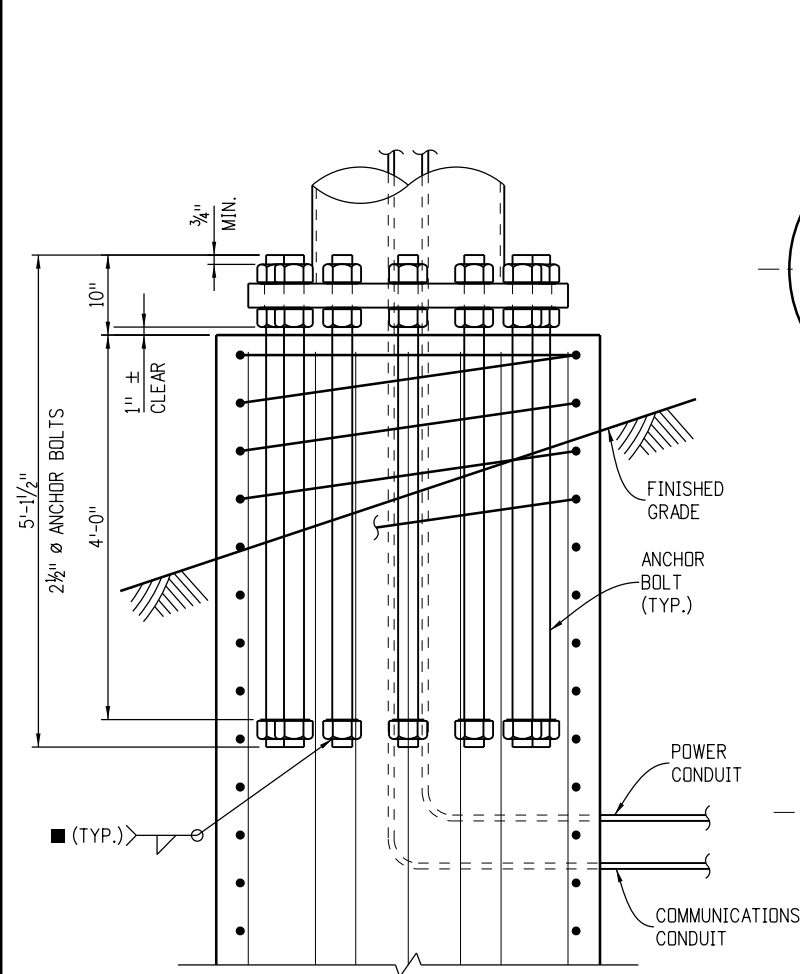


Field Splice Details

Stiffeners shall be located on both sides of the field splice.
Clip washers as needed to avoid interference with stiffener welds.

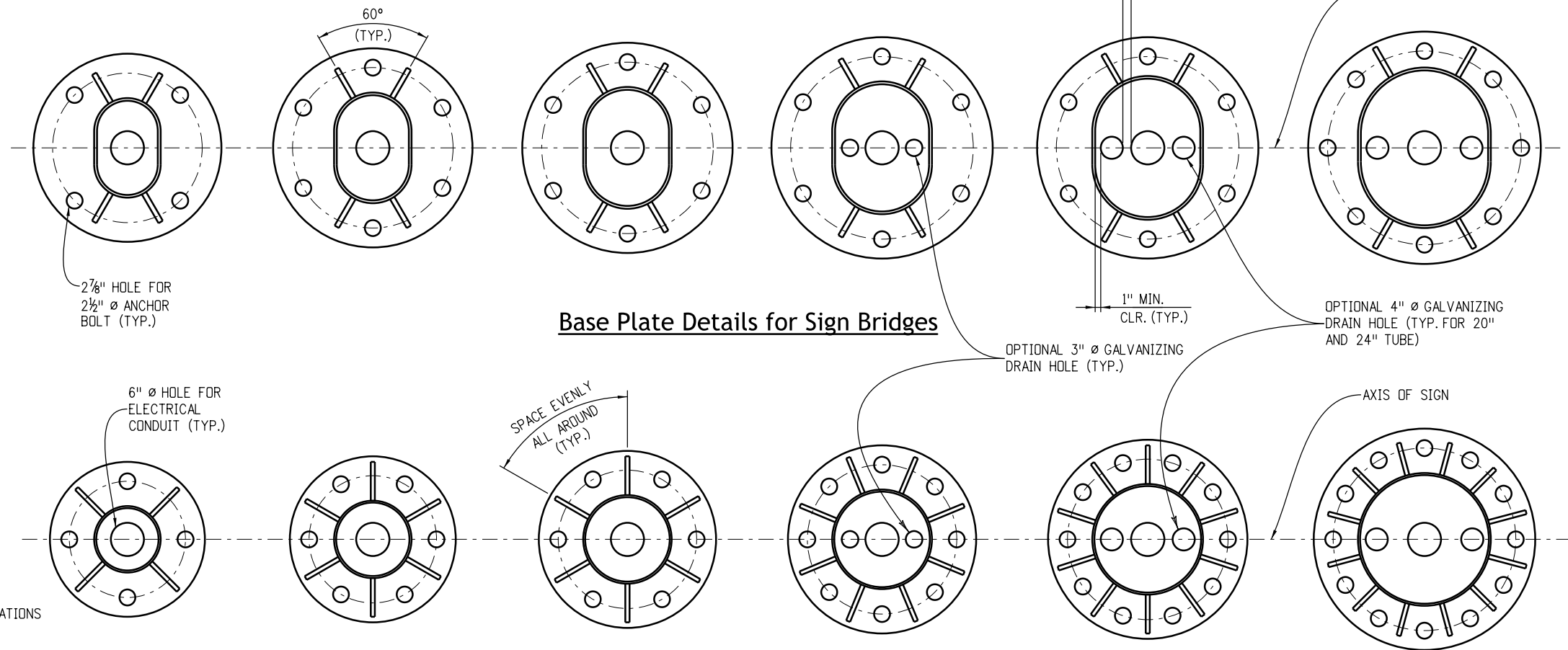
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Created By: JRM								
Last Modification Date: 07/01/26								
Last Modified By: YSP								
CAD Ver.: ORD 10.12 Scale: Not to Scale Units: English								Project Sheet Number:

-Base Plate/Anchor Bolt Details-



Anchor Bolt Detail

■ WELDING PROCEDURE IS NOT REQUIRED FOR THIS WELD



Base Plate Details for Sign Bridges

Base Plate Details for Cantilevers

12.75" Pipe

14" Pipe

16" Pipe

18" Pipe

20" Pipe

24" Pipe

CANTILEVERS

PIPE OD (IN.)	SPLIT (IN.)	BASE PL SIZE (DIAM. X THICK.) (IN.)	BOLT CIRCLE (IN.)	# OF ANCHOR BOLTS	# OF STIFF.
12.75	-	28" x 2.5"	21"	4	4
14	-	30" x 2.5"	23"	6	6
16	-	32" x 2.5"	25"	6	6
18	-	34" x 2.75"	27"	8	8
20	-	36" x 3.0"	29"	10	10
24	-	40" x 3.0"	33"	12	12

SIGN BRIDGES

PIPE OD (IN.)	SPLIT (IN.)	BASE PL SIZE (DIAM. X THICK.) (IN.)	BOLT CIRCLE (IN.)	# OF ANCHOR BOLTS	# OF STIFF.
12.75	5	34" x 2.5"	27"	4	4
14	5	36" x 2.5"	29"	6	4
16	5	38" x 2.5"	31"	6	4
18	5	40" x 2.75"	33"	6	4
20	5	40" x 3.0"	33"	6	4
24	5	42" x 3.0"	35"	8	4

NOTES

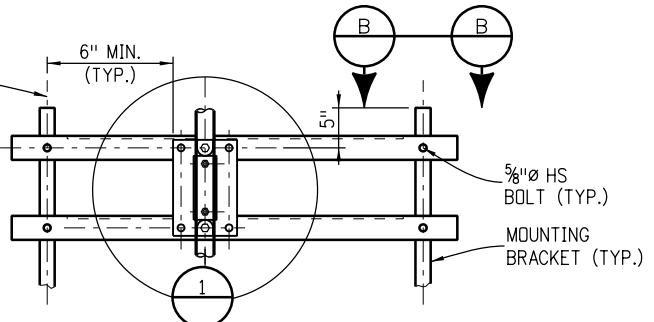
1. Thread upper 10 inches and galvanize upper 1 foot-3 inches of the anchor bolts.
2. Anchor bolts shall be set with a steel template until the concrete has cured at least two days.
3. There shall be no grout pad installed on top of the existing foundations.
4. The anchor bolts shall be tightened using the turn-of-nut method. The bolts shall first be tightened to snug tight, which is defined as the tightness that exists when the upper and lower nuts are in firm contact with the base plate. With the mast arm free to deflect, the upper and lower nuts shall each then be rotated an additional 1/2 turn (30° ± 5°) using a slugging wrench.
5. Stiffeners are not shown elsewhere in these sheets for clarity. All post bases are to have stiffeners.

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Creation Date: 07/04/12			Date:	Comments			S-614-50	
Created By: JRM							Standard Sheet No. 8 of 12	
Last Modification Date: 07/01/26							Project Sheet Number:	
Last Modified By: YSP								
CAD Ver.: ORD 10.12 Scale: Not to Scale Units: English								

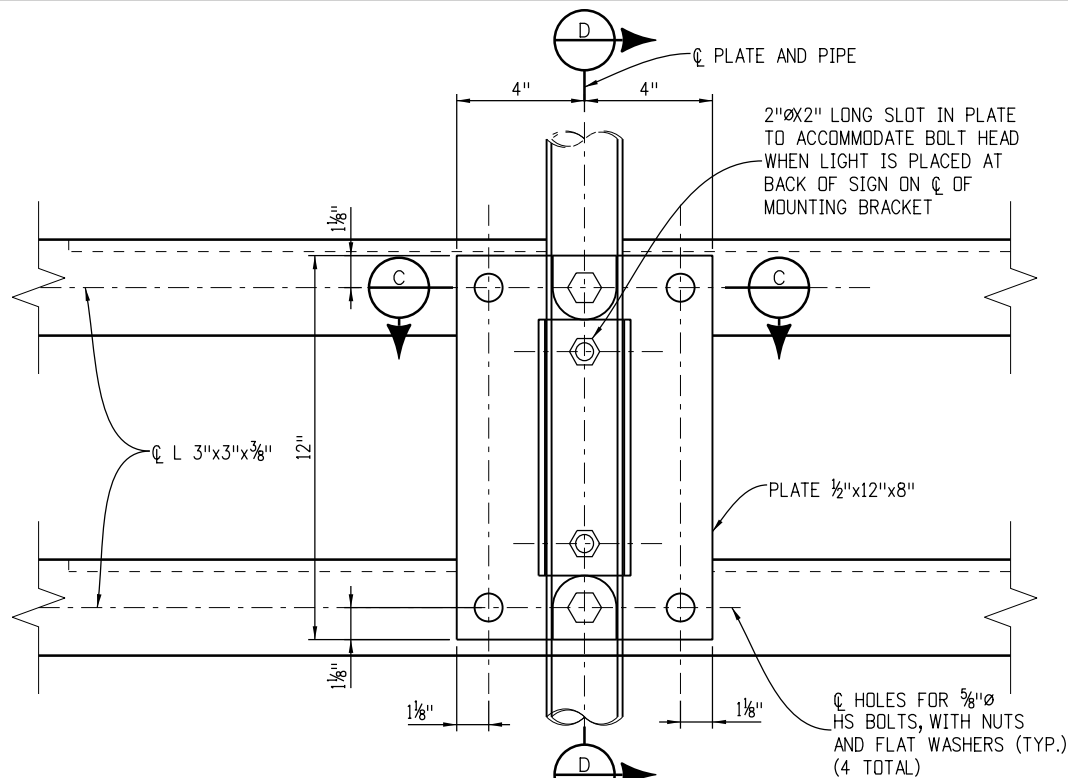
Lighting Notes

-

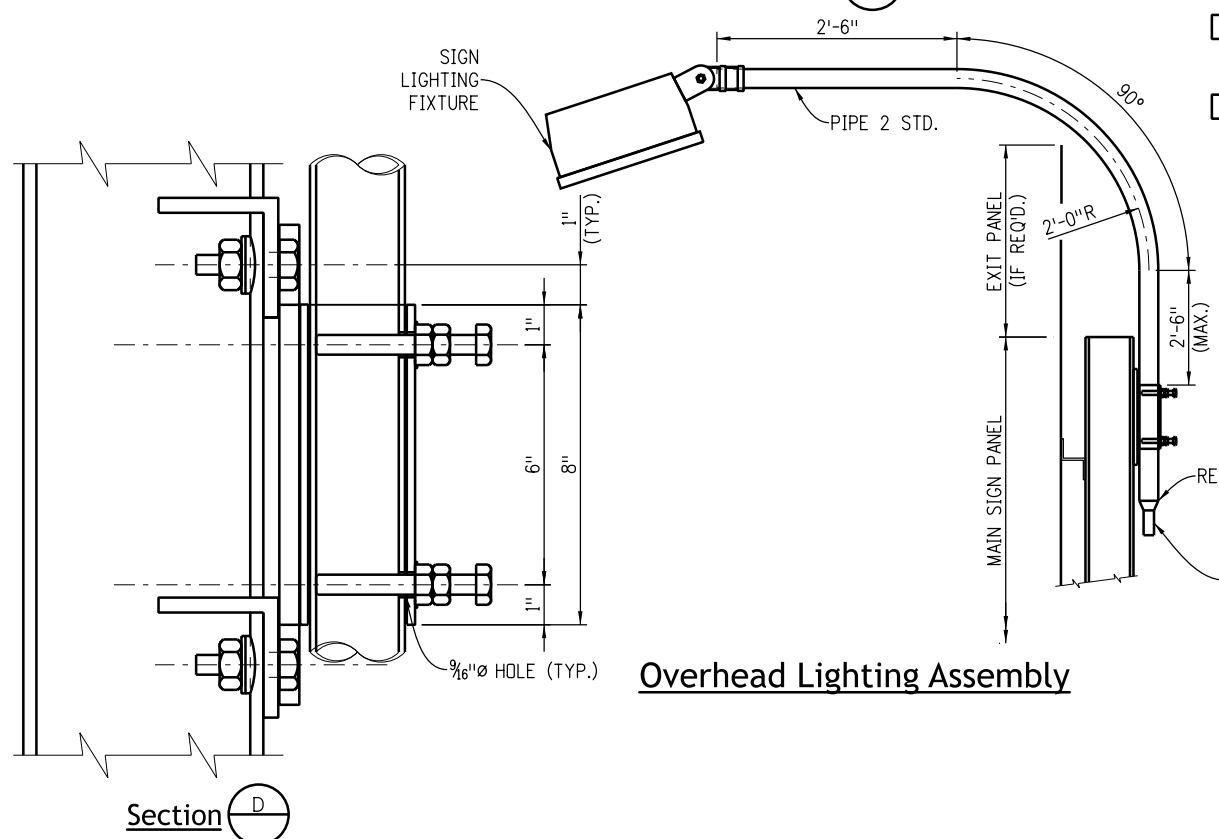
Light Connection Placed at Back
of Sign on C of Mounting Bracket



Light Connection Placed at Back
of Sign Between Mounting Brackets



Detail $\left(\frac{1}{\quad}\right)$



HOLES FOR $\frac{5}{8}$ " $\varnothing$ HS BOLTS

$\frac{1}{2}$ " PLATE

PIPE $2\frac{1}{2}$ STD.

JAM NUT

$\frac{1}{2}$ " $\varnothing$ X 4" (FULL THREAD BOLT)

WELD NUT TO SLEEVE WITH $\frac{1}{4}$ " SEAL WELD

$\frac{3}{16}$ "

PIPE 2 STD.

Section C

SIGN PANEL

FLEXIBLE CONDUIT TO OVERHEAD LIGHTING ASSEMBLY

6" $\varnothing$ NPS CHASE NIPPLES - SEE NOTE 6

HAND HOLE - SEE "POST BASE ELEVATION" ON SHEET 6 FOR LOCATION

PULL BOX

Post

View E

Computer File Information			Sheet Revisions		Colorado Department of Transportation Traffic Safety & Engineering Services 2829 West Howard Place Denver, CO 80204 EB/SNH	Static Sign Monotube Structures		Standard Plan No.	
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-Cantilever Sign Pipe Selection Tables-

90 MPH WIND

"D" (FT.) →		10'		12'		14'		UP TO 50% COVERAGE CHART
"H" (FT.) →		H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	
SPAN ≤ (FT.)	20	14	14	16	16	16	18	
	25	16	18	18	18	18	20	51 - 80% COVERAGE CHART
	30	18	20	20	20	24	24	
	35	20	24	24	24	24	24	
	40	24	24	24				
	45							
"D" (FT.) →		10'		12'		14'		UP TO 50% COVERAGE CHART
"H" (FT.) →		H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	
SPAN ≤ (FT.)	20	16	18	18	20	20	20	
	25	20	20	20	24	24	24	51 - 80% COVERAGE CHART
	30	24	24	24	24	24		
	35	24						
	40							
	45							

100 MPH WIND

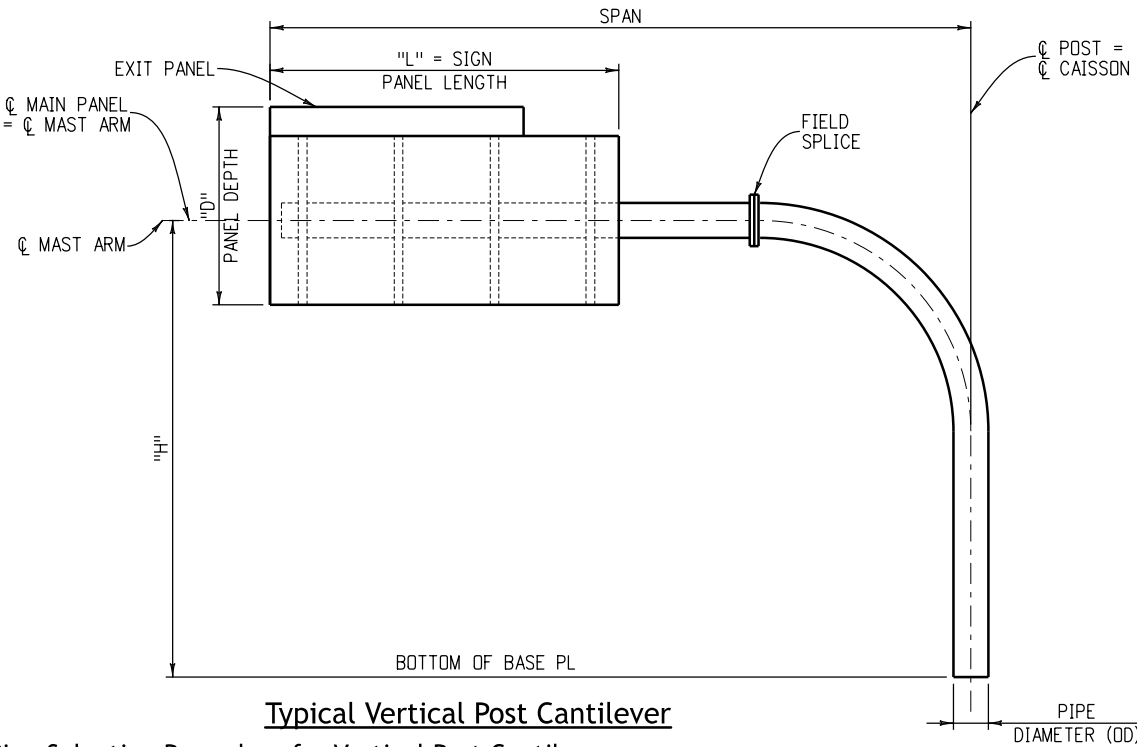
"D" (FT.) →		10'		12'		14'		UP TO 50% COVERAGE CHART
"H" (FT.) →		H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	
SPAN ≤ (FT.)	20	16	16	16	18	18	18	
	25	18	18	20	20	20	24	51 - 80% COVERAGE CHART
	30	20	24	24	24	24	24	
	35	24	24	24				
	40							
	45							
"D" (FT.) →		10'		12'		14'		UP TO 50% COVERAGE CHART
"H" (FT.) →		H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	
SPAN ≤ (FT.)	20	18	20	20	24	24	24	
	25	20	24	24	24			51 - 80% COVERAGE CHART
	30	24	24					
	35							
	40							
	45							

Procedure to Determine the Design Wind Speed

80 mph is the standard design wind speed for the State of Colorado. The standard design wind speed of 80 mph is to be used at all locations except the following:

1. Use the 90 mph wind speed for locations within 4 miles of either side of the base of the foothills along the front range of the eastern slope.
2. Use the 100 mph wind speed for locations in Boulder County.

If there are questions concerning the proper design wind speed contact the Staff Bridge Branch.



Typical Vertical Post Cantilever

Pipe Selection Procedure for Vertical Post Cantilevers

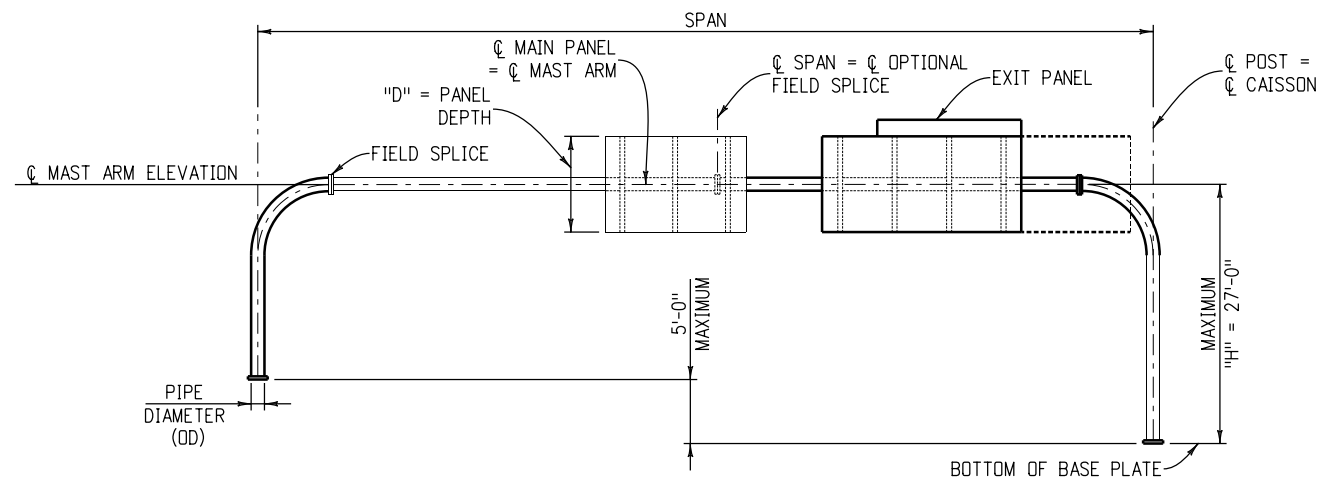
- A. Coverage Percentage = $\frac{\text{Sign Panel Length}}{\text{Span}}$ For the span length use the span from one of the charts (25', 35', etc.), not the actual span
- B. Pick the pipe outside diameter (OD) from the 0-50% or the 51-80% chart. the coverage percentage chosen should be high enough to include any sign panels which may potentially be placed on this sign in the future.
- C. To determine "D" for the selection charts add the area of the exit panel, if present, to the main sign panel area. divide by the main panel length to obtain "D".
- D. If no pipe is shown for a certain span this indicates that this span/sign panel/height combination exceeds the limits of this Standard.
- E. On the overhead sign x-section sheet indicate the diameter of the pipe, the height "H" and the span.
- F. Obtain the design wind speed from the overhead sign x-section sheets in the roadway planS.

80 MPH WIND

"D" (FT.) →		10'		12'		14'		UP TO 50% COVERAGE CHART
"H" (FT.) →		H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	
SPAN ≤ (FT.)	20	12.75	14	14	14	14	16	
	25	14	16	16	16	16	18	51-80% COVERAGE CHART
	30	16	18	18	18	18	20	
	35	18	20	20	20	24	24	
	40	20	24	24	24	24	24	
	45	24	24	24	24			
"D" (FT.) →		10'		12'		14'		UP TO 50% COVERAGE CHART
"H" (FT.) →		H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	H ≤ 25	25 < H ≤ 30	
SPAN ≤ (FT.)	20	16	16	16	18	18	20	
	25	18	18	18	20	20	24	51-80% COVERAGE CHART
	30	20	20	20	24	24	24	
	35	24	24	24	24	24		
	40	24	24					
	45							

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Creation Date: 07/04/12		Date:	Comments			Traffic Safety & Engineering Services 2829 West Howard Place Denver, CO 80204 EB/SNH		S-614-50	
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Last Modification Date: 07/01/26								Project Sheet Number:	
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-Sign Bridge Pipe Selection Tables-



Typical Vertical Post Sign Bridge

Structure Selection Procedure for Sign Bridges

- Design is based on a sign height of 15 feet with 50% of the span length covered up until the capacity of the largest pole shown is reached. Beyond this point the coverage percentage decreases.
- The maximum primary panel height is 14 feet. Add the area of all exit panels to the area of all primary panels to check against maximum sign panel area.
- Obtain the design wind speed from the overhead sign x-section sheets in the roadway plans.
- Pick pipe OD and split size from the appropriate chart. Include the area of all sign panels shown in the overhead sign x-section sheets which may potentially be placed on the sign in the future.
- If no pipe post/arm size is shown for a certain span this indicates that this span/sign panel/height combination exceeds the limits of this Standard.
- The overhead sign x-section sheets indicate the height "H", the span and the sign panel sizes.

80 MPH WIND

SPAN ≤	MAXIMUM SIGN PANEL AREA (SQ. FT.)	* PIPE POST	
		PIPE OD (IN.)	SPLIT (IN.)
50'	375	12.75	5
60'	450	14	5
70'	525	16	5
80'	600	18	5
90'	675	20	5
100'	750	20	5
110'	825	24	5
120'	900	24	5
130'	780	24	5
140'	700	24	5

Procedure to Determine the Design Wind Speed

80 mph is the Standard design wind speed for the State of Colorado. The Standard design wind speed of 80 mph is to be used at all locations except the following:

- Use the 90 mph wind speed for locations within 4 miles of either side of the base of the foothills along the front range of the eastern slope.
- Use the 100 mph wind speed for locations in Boulder County.

If there are questions concerning the proper design wind speed contact the Staff Bridge Branch

* Mast arm diameter same as post.

90 MPH WIND

SPAN ≤	MAXIMUM SIGN PANEL AREA (SQ. FT.)	* PIPE POST	
		PIPE OD (IN.)	SPLIT (IN.)
50'	375	14	5
60'	450	16	5
70'	525	18	5
80'	600	20	5
90'	675	24	5
100'	750	24	5
110'	775	24	5
120'	650	24	5
130'	585	24	5
140'	525	24	5

100 MPH WIND

SPAN ≤	MAXIMUM SIGN PANEL AREA (SQ. FT.)	* PIPE POST	
		PIPE OD (IN.)	SPLIT (IN.)
50'	375	16	5
60'	450	18	5
70'	525	20	5
80'	600	24	5
90'	675	24	5
100'	660	24	5
110'	580	24	5
120'	500	24	5
130'	450	24	5
140'	400	24	5

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Creation Date: 07/04/12			S-614-50						
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Last Modification Date: 07/01/26						Issued by the Traffic Safety & Engineering Services: July 01, 2026		Project Sheet Number:	
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BRIDGES

PIPE OUTSIDE DIAMETER (INCHES)	SPLIT (INCHES)	CAISSON DIAMETER (INCHES)	CAISSON DEPTH (FEET)	VERTICAL REINF.
12.75	5	48	17	18 - #8
14	5	48	19	24 - #8
16	5	48	20	24 - #8
18	5	54	21	24 - #9
20	5	54	22	24 - #9
24	5	54	24	24 - #9

PIPE OUTSIDE DIAMETER (INCHES)	SPLIT (INCHES)	CAISSON DIAMETER (INCHES)	CAISSON DEPTH (FEET)	VERTICAL REINF.
12.75	-	36	13	13 - #8
14	-	42	15	18 - #8
16	-	42	16	18 - #8
18	-	42	17	18 - #8
20	-	48	18	24 - #8
24	-	48	20	24 - #8

1. Contact the Engineer if any of the following soil conditions are encountered during drilling:
 - A) The soil has a high organic content or consists of saturated silt and clay.
 - B) The site won't support the weight of the drilling rig.
 - C) The foundation soils are not homogenous.
 - D) Firm bedrock is encountered.
2. Caissons shall be placed against undisturbed earth. Wet or caving holes shall be backfilled with flow-fill and redrilled after a three day curing period. If casings are used by the Contractor and cannot be removed, shafts for cantilever sign structures shall be abandoned and another shaft drilled and placed as approved by the Engineer at no cost to the project. Unremoveable casings for sign bridge shafts may be left in place without relocation.
3. The following soil parameters were used for design:
 - A) Loose granular soil with a unit weight of 100 pcf and a 28 degree angle of internal friction (phi angle).
 - B) Soft cohesive soil with a unit weight of 100 pcf and a unit cohesion of 500 psf.
4. The Contractor shall provide a survey of each overhead sign foundation to verify placement soon after work on the foundation has been completed. The survey shall conform to the requirements of Section 625, Construction Surveying. The Contractor shall submit to the Engineer a copy of the survey notes detailing the foundation location and elevation and the anchor bolt locations, projections, and orientations, and in the case of sign-bridge type of overhead signs, the distance measured between the centerline of the anchor bolt groups. The elevation of the ground surrounding each foundation shall also be provided. The Contractor shall compare the survey information to the reviewed shop drawings and reconcile any differences between them. The Contractor shall submit all proposed adjustments or modifications to the Engineer for approval.



Median Rail Installation
(See Roadside Shoulder Installation
for Additional Information)

Caisson Foundation Details

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Creation Date: 07/04/12 Created By: JRM Last Modification Date: 07/01/26 Last Modified By: YSP CAD Ver.: ORD 10.12 Scale: Not to Scale Units: English		Date: Comments						S-614-50 Standard Sheet No. 12 of 12	
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