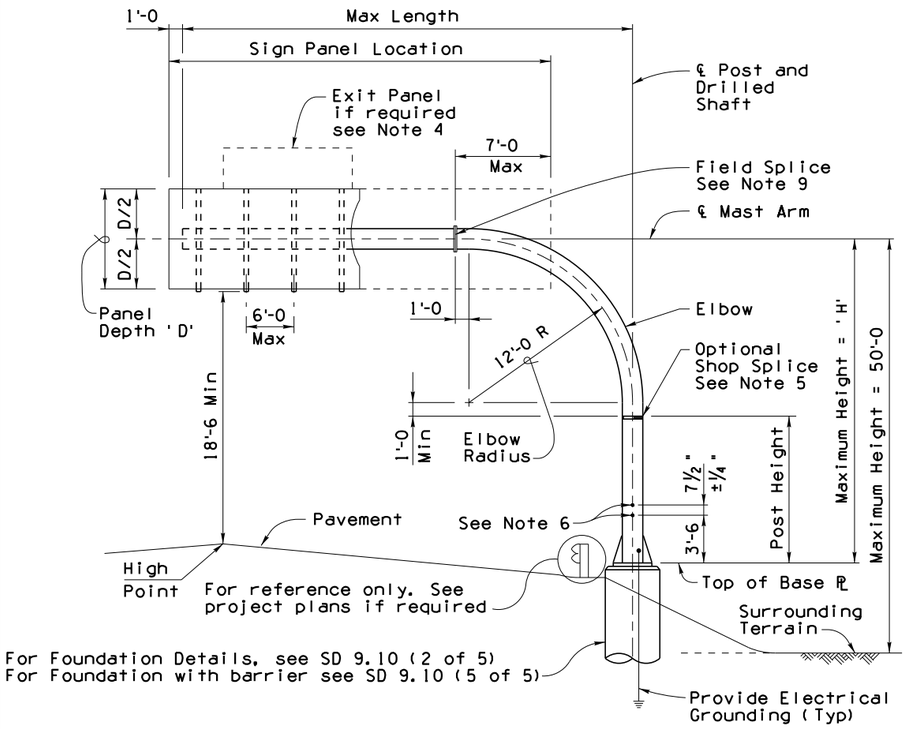
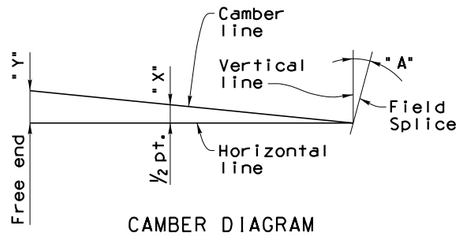


TUBULAR CANTILEVER SIGN STRUCTURE ELEVATION



CAMBER DIAGRAM

TYPE	Post Height (Ft)	CAMBER "X"	CAMBER "Y"	"A"
1C	0-5	⅞"	1⅝"	0° 20' 00"
	5.1-10	1"	2"	0° 24' 30"
	10.1-15	1⅛"	2¼"	0° 29' 00"
2C	0-5	⅞"	1½"	0° 18' 00"
	5.1-10	1"	1¾"	0° 22' 00"
	10.1-15	1⅛"	2⅛"	0° 26' 00"
3C	0-5	⅝"	1⅛"	0° 13' 30"
	5.1-10	¾"	1⅜"	0° 16' 30"
	10.1-15	⅞"	1⅝"	0° 20' 00"
4C	0-5	1⅝"	3"	0° 25' 00"
	5.1-10	1⅞"	3½"	0° 30' 00"
	10.1-15	2⅛"	4⅛"	0° 35' 30"

CAMBER NOTES:

1. The camber shown is required to be built into mast arm. Members shall be erected so that camber is provided above the horizontal line thru the field splice.
2. The calculated camber provides for deflections due to dead loads of tubular cantilever structure and dead loads due to sign panels and attachments. For post heights between 0'-0 and 15'-0 values of "A", "X", and "Y" shall be interpolated.
3. The pipe flange of mast arm shall be perpendicular to its longitudinal axis. The pipe flange of elbow shall be tilted from the vertical line at the angle given in the table.

GENERAL NOTES:

Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, latest Edition.

Design Specifications - AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th Edition (2013) with 2015 interim Revisions

All tubular structural cantilever pipe shall be welded or seamless steel pipe and shall conform to ASTM Specification (Fy = 35,000 psi):

A-53	Grade B,	Type E or S
A252	Grade 2,	Type E or S
A106	Grade B,	Type S only
API 5L	Grade B,	Type E or S
API 5LX	Grade X42,	Type E or S

All other Structural Steel shall conform to ASTM Specification A36 unless noted otherwise.

All bolts shall conform to ASTM Specification F3125 GR A325.

All bolts, nuts and washers shall be galvanized in accordance with the requirements of ASTM A153. All other steel shall be galvanized after fabrication in accordance with ASTM A123.

Welding of structural tubing shall conform to the requirements of the American Welding Society, Structural Welding Code, D1.1, latest Edition.

All welding shall be continuous unless noted otherwise. All butt welds shall be full penetration using prequalified welding procedures and shall be tested by ultrasonic testing. All butt welds shall be ground flush, full width.

Grinding striations shall be parallel to the length of member.

The Column to base plate weld (WELD DETAIL A) and pipe flange to elbow and mast arm welds (WELD DETAIL C) shall be tested by ultrasonic testing. Any detected shallow toe cracks shall be repaired in the shop.

All Concrete shall be Class "S" (f'c = 3500 psi).

Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.

All hooks and bends shall meet the requirements of AASHTO 8th Edition (2017) Article 5.10.2. All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.

Dimensions shall not be scaled from drawings.

Drilled shaft location and top of drilled shaft elevation shall be field verified by the Contractor prior to fabrication of post.

TUBULAR CANTILEVER SIGN STRUCTURE ELEVATION

TUBULAR CANTILEVER DATA FOR SIGN PANEL SUPPORT												
TUBULAR CANTILEVER				PIPE WALL THICKNESS (INCHES)			SIGN PANEL		PAYMENT ITEMS			
									CANTILEVER SIGN STRUCTURE		FOUNDATION	
Frame Type	Max Length	Max Height 'H'	Nominal Pipe Dia	Post	Elbow	Mast Arm	Max Area Sq. Ft.	Max Depth 'D'	Item Number	Measurement	Item Number	Measurement
1C	33'-0	28'-0	16"	1.219	1.219	0.500	92	12'	6060131	Ea	6060254	Ea
2C	33'-0	28'-0	18"	1.156	1.156	0.625	151	12'	6060132	Ea	6060255	Ea
3C	33'-0	28'-0	20"	1.280	1.280	0.625	245	12'	6060133	Ea	6060256	Ea
4C	43'-0	28'-0	22"	1.125	1.125	0.875	186	10'	6060134	Ea	6060257	Ea

OVERHEAD SIGN NOTES:

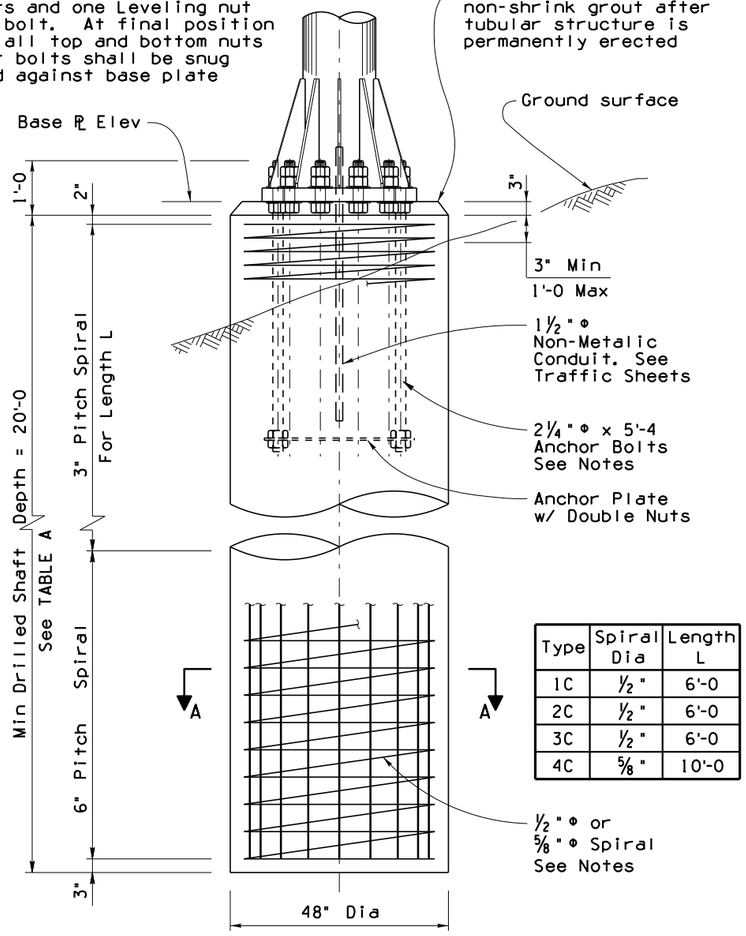
1. Wind Loading: 90 MPH Velocity.
2. Maximum Height: 50'-0 from average surrounding terrain to the center of the sign panel (Regardless of post height). The Tubular Cantilever has been designed for site conditions which are level and neither elevated above the average surrounding terrain by more than the 50'-0 height shown nor supported on a bridge.
3. The maximum sign panel overlap onto elbow shall not exceed 7'-0 from field splice.
4. The sum of the sign panel area plus the exit panel area shall not exceed the maximum area shown in the table All signs shall be placed within Sign Panel Location.
5. The Optional Shop Splice may not be used when the splice location is less than 5'-0 above the top of base plate. Shop splice of pipe sections (other than shown) are not permitted without prior approval.
6. Drill and tap for 1½" chase nipples and plug with recessed pipe plugs. Place perpendicular to sign panel axis and away from approaching traffic.
7. If the tubular cantilever structure is erected as one unit, the pipe assembly shall be adequately suspended to avoid distortions.
8. During sign erection the post shall be raked as necessary with the use of leveling nuts to make the sign panel level. See Traffic Signing Plans for specific locations and elevations.
9. The Field Splice surfaces shall be in full contact without gaps prior to the bolts being snug tightened and fully tensioned. The contact surface is the area defined by a 1⅜" radius around each bolt.
10. Provide electrical grounding at pole foundations per ADOT Standard Specification Section 732-3.03.

PRIOR DISTRIBUTION DATE 03/11

STANDARDS ENGINEER A. ALZUBI RECOMMENDED FOR APPROVAL GROUP MANAGER D. EBERHART APPROVED STANDARDS COMMITTEE APPROVED FOR DISTRIBUTION 04/19 DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STANDARD DRAWING TUBULAR SIGN STRUCTURES TUBULAR CANTILEVER GENERAL PLAN	DRAWING NO. SD 9.10 (1 of 5)

HARDWARE NOTE:

Provide 2 Hardened Steel washers, 2 Hex nuts and one Leveling nut for each bolt. At final position of post, all top and bottom nuts of anchor bolts shall be snug tightened against base plate



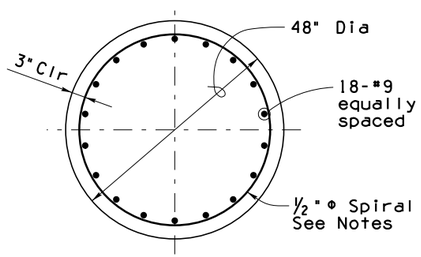
Type	Spiral Dia	Length L
1C	½"	6'-0
2C	½"	6'-0
3C	½"	6'-0
4C	⅝"	10'-0

½" Φ or ⅝" Φ Spiral See Notes

ELEVATION

TABLE A	
Max Slope	'X'
8:1	0'
6:1	1'
4:1	2'
2:1	4'
1½:1	5'
1:1	8'

Drilled Shaft Depth shall be adjusted for ground slope. Add value of 'X' in TABLE A to the Min Drilled Shaft Depth to obtain the total length of shaft

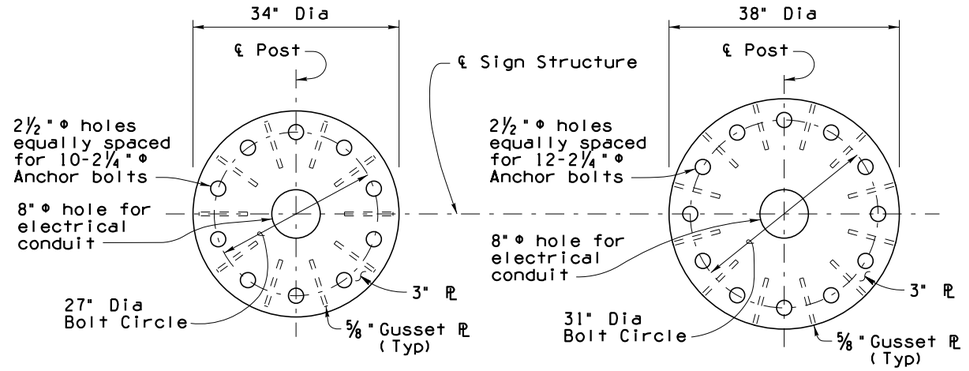


SECTION A-A

DRILLED SHAFT DETAILS

GUSSET PLATE NOTE:

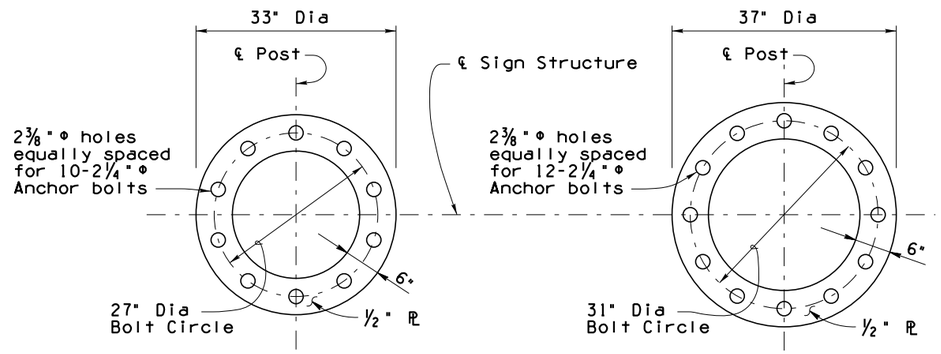
Gusset plates shall be placed perpendicular to base plate and post face, and centered between anchor bolt holes



16" & 18" Post Dia

20" & 22" Post Dia

BASE PLATE DETAILS



16" & 18" Post Dia

20" & 22" Post Dia

ANCHOR PLATE DETAILS

NOTES:

All anchor bolts shall conform to ASTM F1554 Grade 55 Specifications. The upper 1'-2 and lower 6" shall be threaded. The upper 1'-8 shall be galvanized in accordance with the requirements of ASTM A153.

Provide bolt template during installation of anchor bolts. The bolt template shall be fabricated of ¼" thick (Min) steel plate, similar to anchor plate details, and shall be match drilled to each base plate.

Drilled shaft concrete shall be class 'S ' and shall be placed within undisturbed material or compacted embankment. Top of drilled shaft shall be formed to 1'-0 below ground surface.

Compacted backfill shall be in place prior to erecting post.

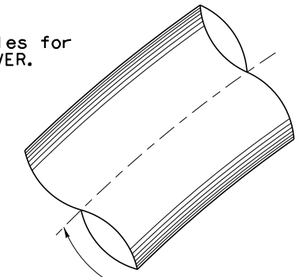
½" Φ or ⅝" Φ Spiral shall be cold drawn steel wire conforming to AASHTO M336, except Min Tensile Strength = 60,000 psi. Lap 1½ turns at top and bottom of spiral.

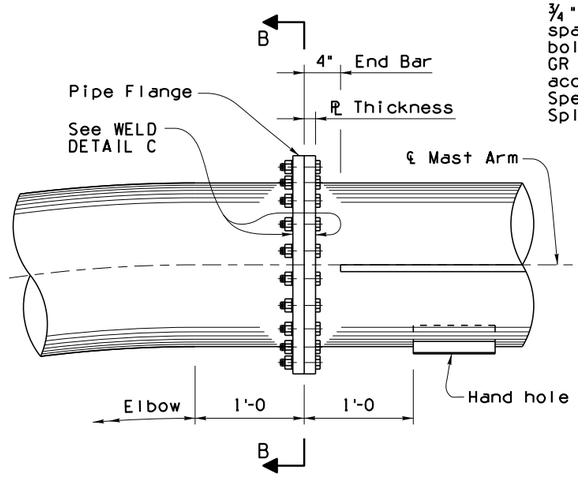
STANDARDS ENGINEER A. ALZUBI RECOMMENDED FOR APPROVAL GROUP MANAGER D. EBERHART APPROVED STANDARDS COMMITTEE APPROVED FOR DISTRIBUTION 04/19 DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STANDARD DRAWING TUBULAR SIGN STRUCTURES TUBULAR CANTILEVER FOUNDATION DETAILS	DRAWING NO. SD 9.10 (2 of 5)

PRIOR DISTRIBUTION DATE 03/11

Field Splice					
Frame Type	Pipe Dia	℄ Dia	℄ Thickness	No. of Bolts	B.C. Dia
1C	16"	22"	1¼"	22	19½"
2C	18"	24"	1⅜"	26	21½"
3C	20"	26"	1⅜"	29	23½"
4C	22"	28"	1½"	31	25½"

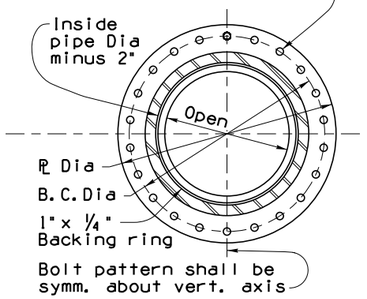
NOTE:
Provide hand holes for TUBULAR CANTILEVER. See HAND HOLE & COVER DETAILS



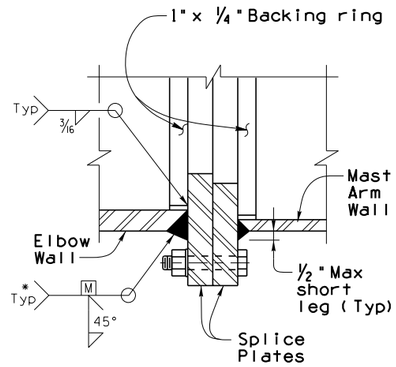


FIELD SPLICE

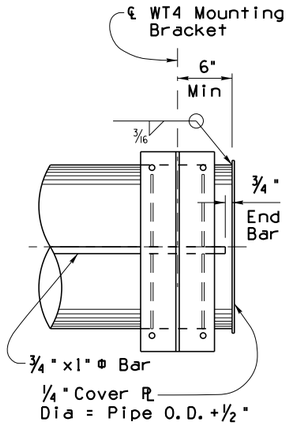
¾" Φ ATSM F3125 GR A325 bolts equally spaced. Bolt hole Dia = 13/16". Tighten bolts to a tension of 28K. All F3125 GR A325 bolts shall be installed in accordance with ADOT Standard Specification 604-2.03(c). See Field Splice Table for other details



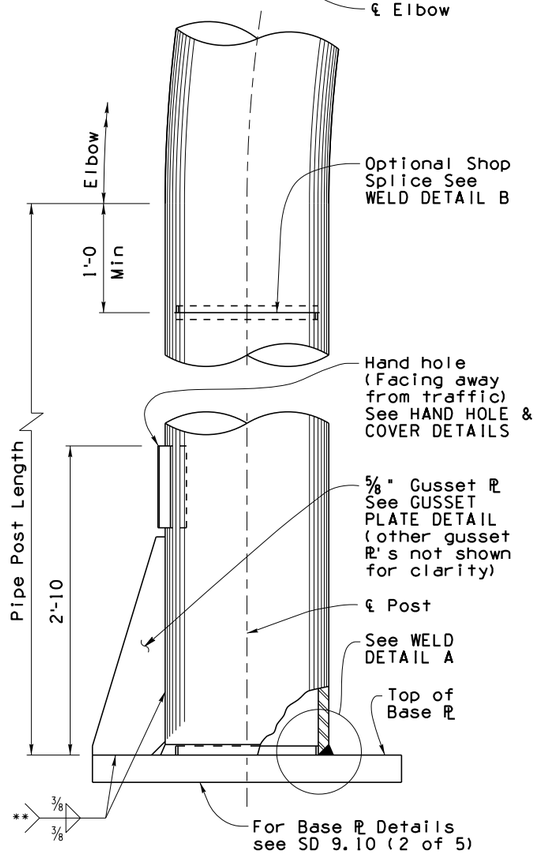
SECTION B-B



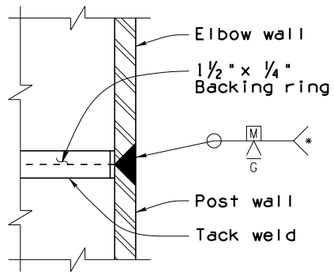
WELD DETAIL C



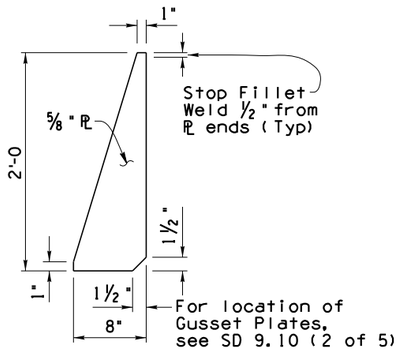
MAST ARM END DETAIL



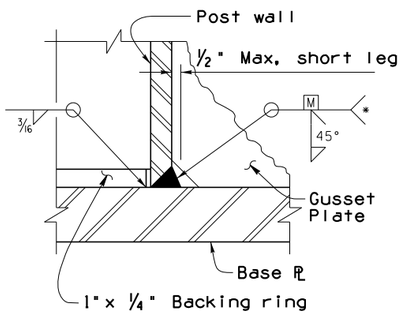
POST BASE ELEVATION



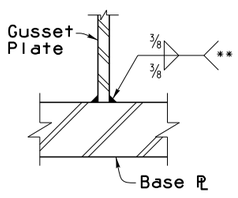
WELD DETAIL B



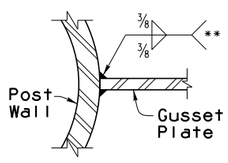
GUSSET PLATE DETAIL



WELD DETAIL A



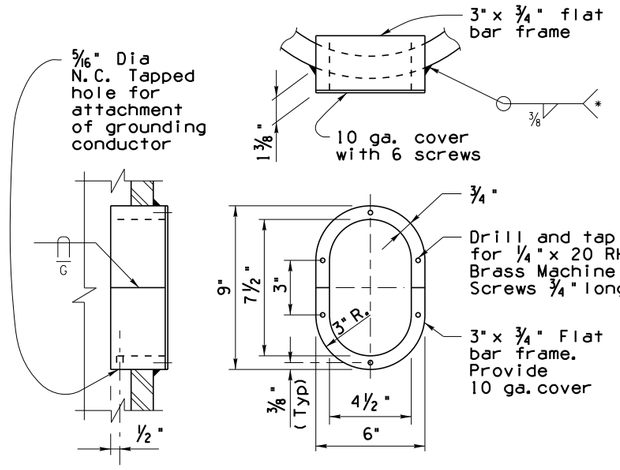
To Base Plate



To Post Wall

GUSSET PLATE WELDS

** Stop Fillet Weld ½" from PL ends

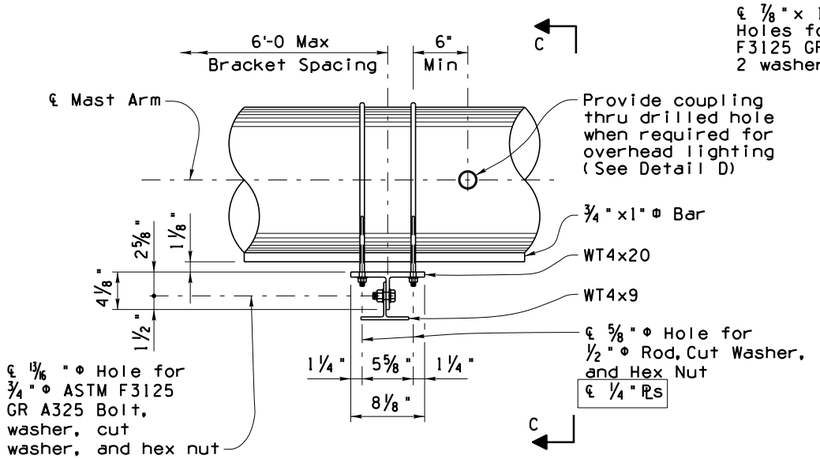


HAND HOLE & COVER DETAILS

* Preheat per AWS requirements.

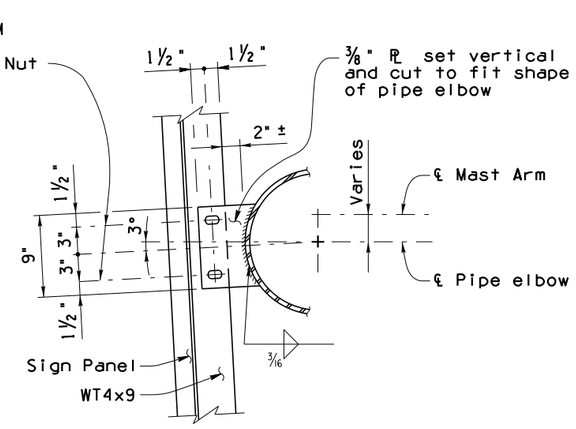
STANDARDS ENGINEER A. ALZUBI RECOMMENDED FOR APPROVAL GROUP MANAGER D. EBERHART APPROVED STANDARDS COMMITTEE APPROVED FOR DISTRIBUTION 04/19 DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STANDARD DRAWING TUBULAR SIGN STRUCTURES TUBULAR CANTILEVER POST AND MAST ARM DETAILS DRAWING NO. SD 9.10 (3 of 5)

PRIOR DISTRIBUTION DATE 03/11



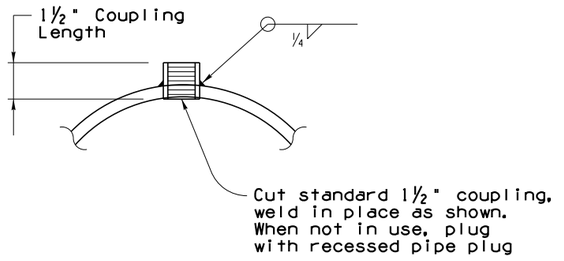
PLAN

SIGN MOUNTING BRACKET

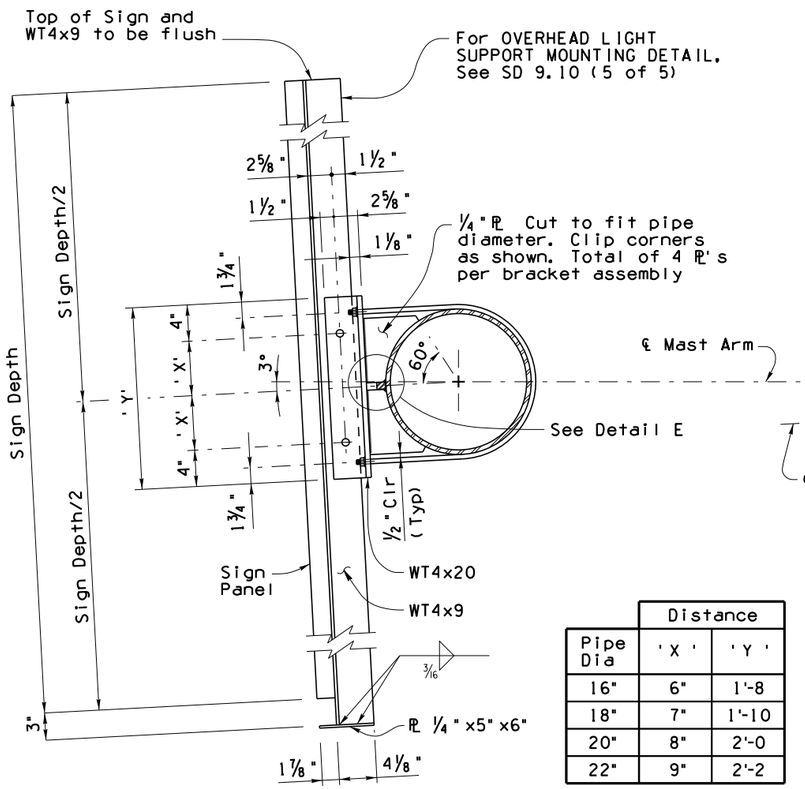


ELEVATION

SIGN MOUNTING BRACKET AT ELBOW

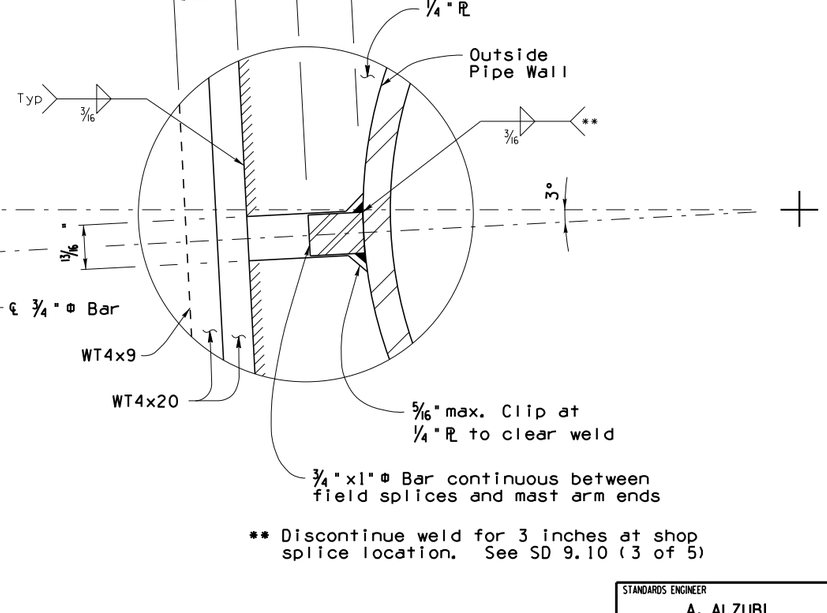


DETAIL D



ELEVATION C-C

Pipe Dia	Distance	
	'X'	'Y'
16"	6"	1'-8
18"	7"	1'-10
20"	8"	2'-0
22"	9"	2'-2



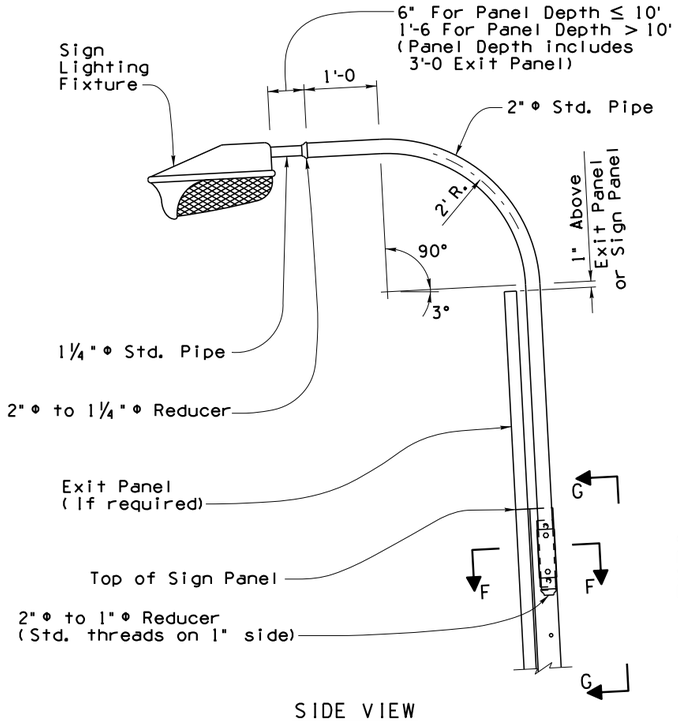
** Discontinue weld for 3 inches at shop splice location. See SD 9.10 (3 of 5)

DETAIL E

Note to Designer:
The information presented in this Standard Drawing has been prepared in accordance with recognized engineering principles and is for general use. It should not be used for specific application without competent professional examination and verification of its suitability by a licensed professional engineer. Contents within the inner border line shall not be altered.

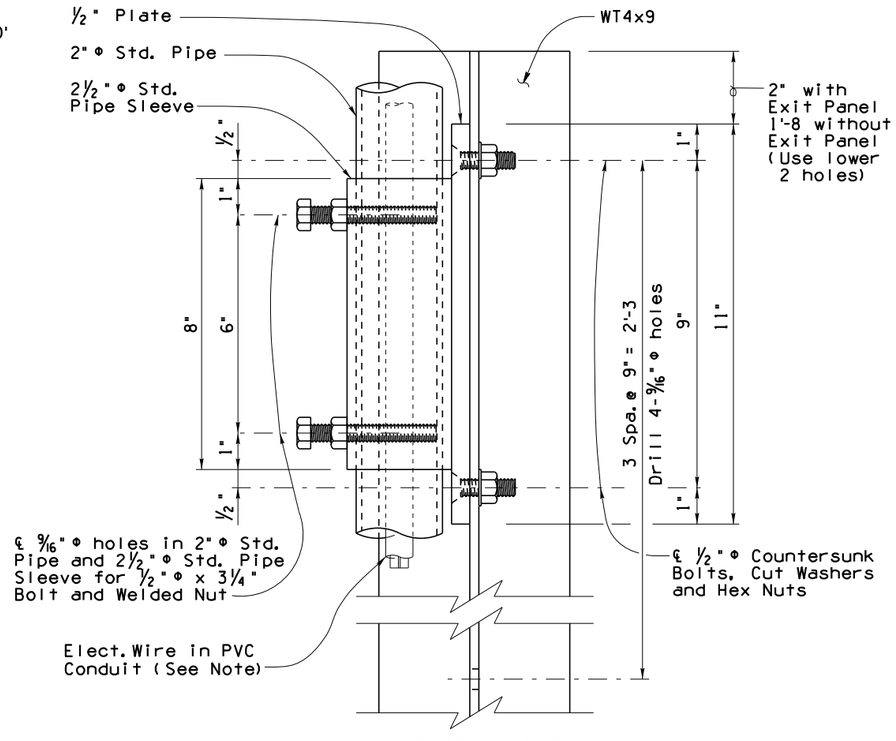
PRIOR DISTRIBUTION DATE	03/11

STANDARDS ENGINEER A. ALZUBI RECOMMENDED FOR APPROVAL	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STANDARD DRAWING
GROUP MANAGER D. EBERHART APPROVED	TUBULAR SIGN STRUCTURES TUBULAR CANTILEVER SIGN SUPPORT DETAILS
STANDARDS COMMITTEE APPROVED FOR DISTRIBUTION 04/19 DATE	DRAWING NO. SD 9.10 (4 of 5)

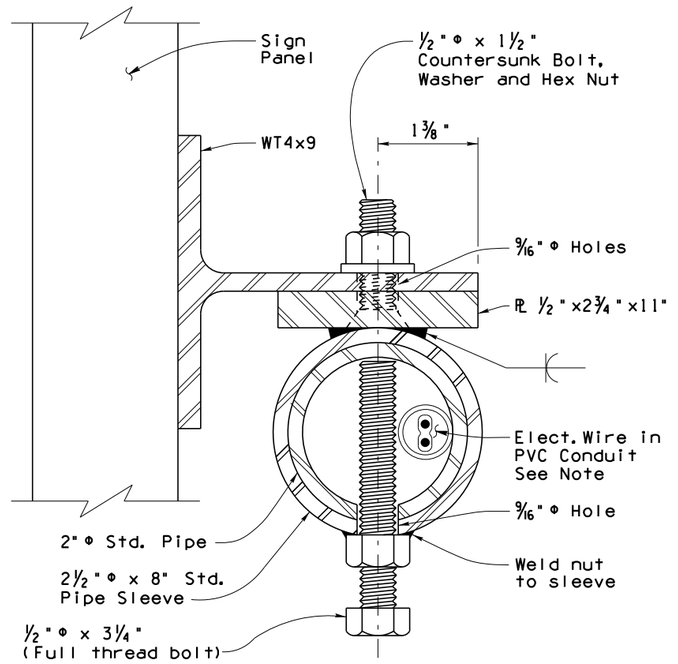


SIDE VIEW

OVERHEAD LIGHT SUPPORT MOUNTING DETAIL



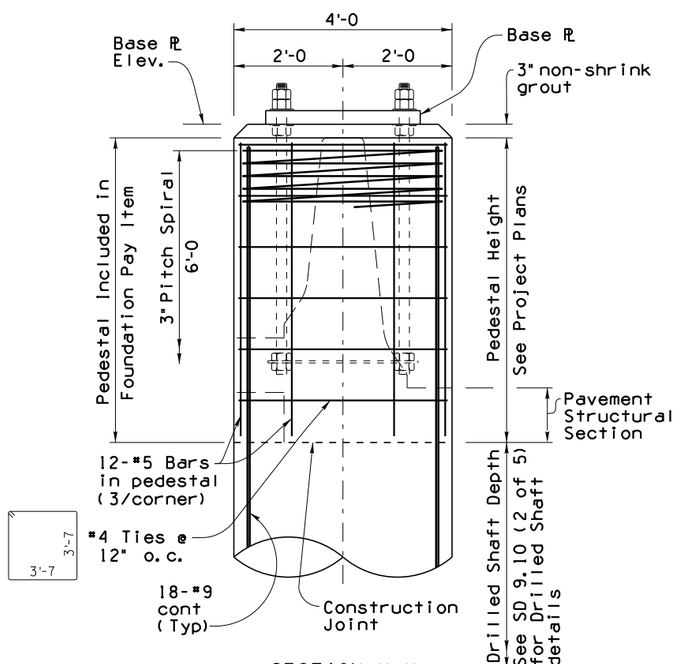
ELEVATION G-G



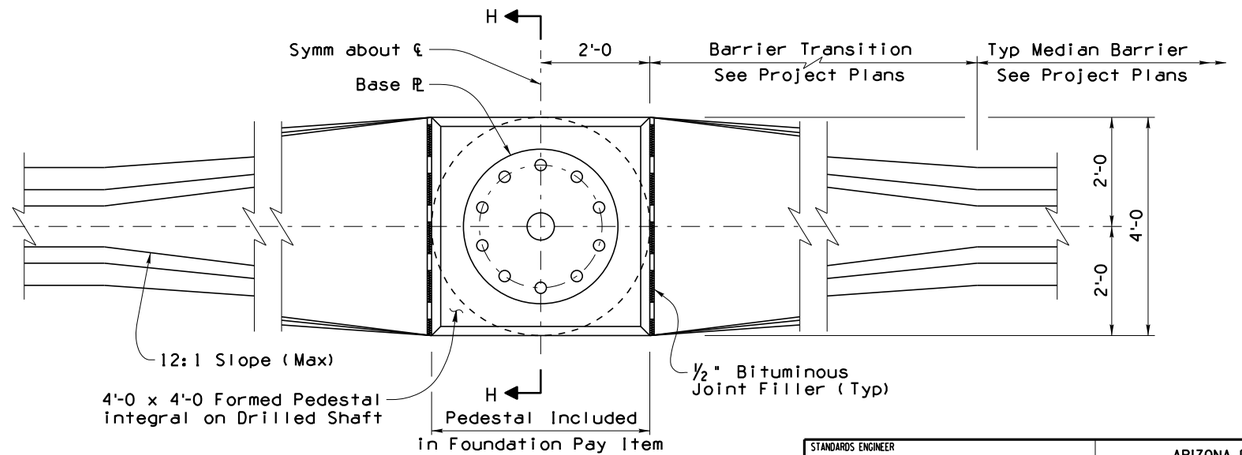
Note:

Electrical wire shall be placed in PVC conduit and secured away from bolt tip (See traffic plans for more details)

SECTION F-F



SECTION H-H



PLAN

TUBULAR POST ON BARRIER PEDESTAL

STANDARDS ENGINEER A. ALZUBI RECOMMENDED FOR APPROVAL GROUP MANAGER D. EBERHART APPROVED STANDARDS COMMITTEE APPROVED FOR DISTRIBUTION 04/19 DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STANDARD DRAWING TUBULAR SIGN STRUCTURES TUBULAR CANTILEVER LIGHT SUPPORT DETAILS DRAWING NO. SD 9.10 (5 of 5)

PRIOR DISTRIBUTION DATE 03/11