

GENERAL NOTES:

Standard Monotube VMS/Sign Bridge Structures are designed in accordance with AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals 1st edition, 2015 and interim revisions thru 2017.

Basic wind speed (3 second gust) used for Extreme I Limit State is 145 mph. $G = 1.14$, 1700 year recurrence interval, fatigue importance factor $I_f = 1.0$ and Exposure C were used for design.

The maximum design sign area for the Standard Monotube VMS/Sign Bridge Structure is shown on Dwg. TM693. The design sign panel and mounting members weigh 5 pounds per square foot. The design luminaire including mounting channels weighs 20 pounds per linear foot. The design luminaire wind loading area including mounting channels is 1 square foot per linear foot, has rectangular flat side shapes, is as long as the design sign, and the resulting projected area is not part of the maximum sign area. Drag coefficient C_d used for signs is 1.20, for a maximum length/width ration of 5.0.

The allowable variation from field verified working drawing camber is -0% to +25%, post length is -0" to +3", top span length "S" is -1/4" to +1/4", span length between centers of base plates is -1/4" to +1/4", and the vertical distance between base plates "DBP" is -1/4" to +1/4". Verify that the span length between base plates is within $\pm 1/2"$ of the field surveyed span length between centers of anchor rod clusters. The two opposing diagonal distance tolerances measured from 1'-6" below the start of the bend to 6" above the higher baseplate shall be -1/2" to +1/2". The maximum offset of the arm 3/4" square bar from straight shall be +1/8" to -1/8" on each member. The frame lengths shall be measured prior to galvanizing using a steel tape or other approved measuring method.

Drag coefficient C_d used for VMS is 1.70, and for the walkway is 1.20. The VMS design loads include 100 pounds per linear foot applied from center to center of vertical posts for the weight of a walkway along with a 500 pound concentrated live load. The design walkway wind loading area is 1.0 square feet per linear foot, extends from center to center of vertical posts, and the resulting projected area is not part of the maximum sign area. VMS dimensions and design loads are shown on TM693. The walkway vertical mounts and the VMS vertical mounts are separate.

Snow and ice loads are not included in the design loads. The Engineer shall evaluate the design in regions of heavy snow or ice accumulations.

The signs are to be positioned horizontally as shown on Project Data for Std. Monotube VMS/Sign Bridge Sheet and vertically as shown on Dwg. TM693.

Material for circular tube sections shall be ASTM A53 Grade B; ASTM A500 Grade B or C; ASTM A501 Grade A or B; or API 5L PSL2 Grade B, X42, X42M, X52, and X52M. All other structural steel shall conform to ASTM A572 Grade 50, or A992, unless noted otherwise.

Bend tube using induction heating methods in accordance with TPA-IBS-98, "Recommended Standards for Induction Bending of Pipe and Tube."

Notch toughness of all structural steel members and plates greater than 1/2" thick shall conform to Zone 2 fracture critical requirements of ASTM A709.

High strength bolts shall conform to ASTM A325, Type 1. Nuts for high strength bolts shall be heavy hex and conform to ASTM A563 Grade DH, with supplementary requirements "S1" and "S2". Hardened steel washers shall conform to ASTM F436, Type 1. Use washers under turning element in tightening unless otherwise specified.

Bolts connecting galvanized steel members to aluminum members shall meet the requirements of ASTM A193 Class 2 Grade B8M. Nuts used with A193 bolts shall be heavy hex and shall meet the requirements of ASTM A194 Grade 8M with supplementary requirement "S1". Use a stainless steel flat washer and double nut at each bolt.

Final elevations shall be field verified prior to fabrication of the post members and footing reinforcement.

All fasteners, except mechanically galvanized direct tension indicator (DTI) washers, shall be hot-dip galvanized (except stainless steel and non-ferrous fasteners). All structural steel shall be hot-dip galvanized after fabrication, unless noted otherwise.

The silicon content of the base metal shall be in the ranges of 0.0% to 0.06% or 0.13% to 0.25% for all hot-dip galvanized steel, unless noted otherwise.

All H.S. bolts shall be considered slip critical and tightened according to Section 00930.40(d)(2)a, unless noted otherwise. Design slip resistance for bolts shall conform to the Bolt Specifications for Class C slip coefficient = 0.33.

This Standard Monotube VMS/Sign Bridge has been designed for the stated loading only. No additional signs or additional loadings are permitted. Other uses and loadings shall be considered non-standard, and are outside the scope of this design.

Splices in posts or arms and welds connecting posts or arms to base connection plates shall be full penetration welds as shown on Dwg. TM623.

Fabrication drawings shall show the weight of all parts.

Verify that top of pedestal is level and at correct elevation, prior to post installation. Install sign mounts and sign on fully erected structure. Do not install sign until after support structure erection and bolt tightening is 100% complete.

A preconstruction meeting is recommended to make sure the contractor understands ODOT requirements and that ODOT understands the contractor's plan.

Use self locking nuts on non-high strength (H.S.) bolts, unless otherwise shown or specified. See Dwg. TM623 for typical high strength bolt connection.

If a 20 minute rolling traffic stop is used to install the overhead sign support arm, the rolling stop shall meet the following requirements:

- a) Verify (prior to arm lift) adequate crane capacity and boom length to perform complete installation from side of road.
- b) Set crane on side of road and do not re-set crane during lift.
- c) Verify (prior to lift) that lifting equipment and lifting points meet requirements of plans.
- d) Verify (prior to lift) that vertical end posts are at correct elevations, plumb, and that the distance between the field splices at each post matches the horizontal arm length.
- e) Rig lift before beginning rolling stop.
- f) Make sure all required tools and hardware are on site.
- g) Do not resume traffic until all arm to post connection bolts are at least snug tight.
- h) Support arm with crane until arm connection bolt tightening is 100% complete.
- i) Another rolling stop will be required to install the sign onto the arm.
- j) Rolling stops shall be at night and shall conform to the Special Provisions.
- k) Follow all required safety procedures.

FOUNDATION NOTES:

Foundation type shall be as shown on Project Plans. Spread footing details are shown on Dwg. TM627 and drilled shaft details are shown on Dwg. TM628.

Provide shoring for the footing if required. Installation of temporary guardrail or barrier should precede any other work involving the construction of the footing.

Top surface of concrete pedestal (including area under base plate and around anchor bolts) shall be floated and troweled to a flat and level surface. This surface shall not vary more than 1/8" from a horizontal plane. Provide a 3/4" chamfer on all exposed edges of the pedestal.

Concrete for spread footings shall be Class 4000 - 3/4" structural concrete. Concrete for drilled shafts shall be as noted on Dwg. TM628.

Place bars 2" clear of the nearest face of concrete, unless shown otherwise.

Concrete shall be placed using a tremie when free fall exceeds 4'-0". Cold joints shall be cause for rejection of the foundation, except between footing and pedestal and top of drilled shaft.

All reinforcing steel shall conform to ASTM A706 or A615 Gr. 60, unless shown otherwise.

Anchor rods shall conform to ASTM F1554, Gr. 55, with supplementary requirements "S2" that includes grade and manufacturer's identification and "S4". Anchor rod washers shall conform to ASTM F436. Anchor rod plate washers shall conform to ASTM A572 Grade 50. Anchor rod nuts shall conform to ASTM A563 Grade DH with supplementary requirements "S1" and "S2".

Anchor rod template, temporary support members, and anchor plate shall conform to ASTM A36.

Anchor rods shall be hot-dip galvanized full length.

Provide 1 -2" dia. rigid electrical conduit as shown on Dwgs. TM627 & TM628 and as directed. Extend sign support end of conduit to the center of the lower hand hole. If luminaires are not required, extend the other end of the conduit into the nearest illumination circuit junction box and identify conduit by attaching a tag which says "future sign lighting". Install "pull string" in conduit for future use. Install conduit cap on each end. When luminaires are required, extend the sign support end of conduit per Project Plans.

The elevation and location of anchor rods are critical. Use survey techniques to verify the elevation, location, and orientation of anchor bolt groups prior to placement of foundation concrete.

Where the footing of a Standard Monotube VMS/Sign Bridge Structure interferes with guard rail posts, the depth of footing may be increased to the maximum shown on Dwg. TM627, or concrete barrier may be used instead of guard rail, or guard rail posts may be attached to footing in accordance with Dwg. BR266. All buried steel shall be coated for immersion exposure with an approved product from the qualified products for structural coatings (<http://www.odot.state.or.us/tsconstruction/>). Prepare and coat surfaces according to Section 00594 of Oregon Std. Specifications for Construction.

CONSTRUCTION PROCEDURE AND SEQUENCE:

1. Construct foundation according to plans. Verify elevation, location and orientation of anchor rods. A steel template, shown on Dwg. TM697, shall be used to accurately locate and hold the anchor rods plumb and in proper alignment. This template shall be in place during concrete placement and shall remain in place for a minimum of 24 hours after the concrete placement has been completed. Submit anchor rod survey information before final fabrication. Out of position anchor rods and anchor rods greater than 1:40 out of plumb are cause for rejection of the foundation. Bending of anchor rods to straighten or move them into position, or alterations of the base plate shall not be permitted and are cause for rejection of the foundation and/or post weldment.
2. Pedestal pour may begin after spread footing concrete has satisfied Section 00540.52. The post erection may begin after concrete has satisfied Section 00540.52.
3. Install bearing nuts on anchor rods. Level the bearing nuts. Install hardened flat washers above bearing nuts.
4. Use crane to lift post onto anchor rods. Maintain crane connection as a safety measure until post installation is complete. No grout shall be used under the base plate. Install hardened flat washers above base plate.
5. Generously apply an approved lubricant for galvanized fasteners from the QPL to the top nut bearing surface and internal threads, and install nut on anchor rods to snug tight condition. Snug tight is defined as the condition when all plies are in firm contact and can usually be obtained by the full effort of a worker on a 12 inch long wrench or a few impacts of an impact wrench. Several passes may be required to obtain uniform tightness.
6. Tighten bearing nuts upward against base plate in a similar manner, to assure a uniform snug tight condition.
7. Lift the arm into position using a crane. Lubricate arm connection bolts with an approved lubricant for galvanized fasteners from the QPL. Maintain crane support during tightening.
8. Evenly tighten arm connection bolts to a snug tight condition, and then fully tension arm connection bolts according to Section 00930.40(d)(2)a.
9. Verify all bearing nuts and top nuts are snug tight. Mark position of each anchor rod and top nut with a felt tip pen so subsequent nut rotation can be verified. Rotate all top nuts an additional 1/6 turn in two passes (1/12 turn per pass).

LUMINAIRE NOTES:

Hubs, handholes, grounding terminals, hook and foundation conduit shall always be installed for possible future use. Luminaires, luminaire support arms and luminaire support channels noted on Dwgs. TM624 & TM625 should only be provided when luminaires are required (See Project Plans).

Conduit diameters shown on plans are nominal or trade sizes.

WALKWAY NOTES:

Grating shall be welded steel grating with 1 1/2" x 1/8" bearing bars spaced at 13 7/16" centers and 1/4" x 1/4" nominal square cross bars (or equivalent) spaced at 4" centers. Steel plates and bars including grating elements shall conform to ASTM A36 or approved equal.

Vertical posts shall be structural steel tubing conforming to ASTM Specification A500, Grade A or B.

Grating may be spliced at an interior support by welding 1/8" x 1 1/2" bars to ends of bearing bars across full width of grating and bolting bars together with 1/4" dia. bolts at 12 inch maximum centers.

All bolts, including U-bolts, shall conform to ASTM Specification A307, unless otherwise noted.

Cable shall be 3/8" dia. zinc coated 7-strand wire rope conforming to A475, Class A, with a minimum breaking strength of 11,500 lbs.

Walkways shall be installed on the structure by the manufacturer to verify physical fit and approved before galvanizing.

Accompanied by dwgs. TM627, TM628, TM693, TM695, TM696, TM697

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without first consulting a Registered Professional Engineer.		All materials shall be in accordance with the current Oregon Standard Specifications.			
		OREGON STANDARD DRAWINGS			
		STD. MONOTUBE VMS/SIGN BRIDGE NOTES			
		2024			
		DATE	REVISION DESCRIPTION		
		07-2020	ADDED 3/4" BAR TOLERANCE, WALKWAY FIT-UP, X42M, AND X52M.		
		01-2025	CONCRETE FOR SPREAD FOOTINGS WAS CLASS 3600 - 3/4" CLASSIFIED AS A		
			STRUCTURAL ITEM		
		CALC. BOOK NO. -	6969-6972	SDR DATE- 10-JAN-2025	TM694