Index for Steel Cantilever Sign Truss Standards

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Anchor-Bolt Nut Tightening Procedure:

1) This work shall be performed only on days with winds less than 15 mph. All tightening of the nuts is to be done in the presence of the Inspector. Once the tightening procedure is started it must be completed on all of the base plate nuts without pause or delay.

2) Properly sized wrenches designed for tightening nuts and/or bolts shall be used to avoid rounding or other damage to the nuts. Adjustable end wrenches or pipe wrenches shall not be used.

3) Base plate, anchor bolts and nuts are to be free of any dirt or debris.

4) Apply stick wax or beeswax to the threads and bearing surfaces of the anchor bolts, nuts and washers.

5) Tighten top nuts so they fully contact the base plate. Tighten leveling nuts to snug-tight condition. Snug tight is defined as the full effort of one person on a wrench with a length equal to 42 inches. Apply force as close to the end of the wrench as possible. Pull firmly by leaning back and using entire body weight on the end of the wrench until the nut stops rotating. Use a minimum of two separate passes of tightening. Sequence the tightening in each pass so that the nut on the opposite side, to the extent possible, will be subsequently tightened until all nuts in that pass have been tightened.

6) Tighten top nuts to snug tight as described for the leveling nuts.

7) Match-mark the top nuts and base plate using paint, crayon or other approved means to provide a reference for determining the relative rotation of the nut and base plate during tightening. Using a striking or hydraulic wrench, further tighten the top nuts in two passes as listed below. Sequence the tightening in each pass so that the nut on the opposite side, to the extent possible, will be subsequently tightened until all nuts in that pass have been turned. Do not rotate the leveling nut during the top nut tightening.

Anchor-Bolt Size	First Pass	Second Pass	Total Rotation
3"∅	1/12 Turn	1/12 Turn	1/6 Turn

8) Lubricate, place and tighten the jam nuts to snug tight.

Galvanized Steel Notes:

All steel diagonals and struts shall comply with ASTM A53 Grade B, Type E or S; The American Petroleum Institute (API) 5L Grade B; ASTM A500 Grade B; ASTM A500 Grade C; ASTM A1085; API 5L Grade X42; or API 5L Grade X52. These members designated as steel pipe shall have a minimum yield strength of 35 ksi.

All steel chords shall comply with ASTM A500 Grade B, ASTM A500 Grade C, ASTM A1085, API 5L Grade X42 or API 5L Grade X52. These members designated as hollow structural sections (HSS) shall have a minimum yield strength of 42 ksi.

The steel end post shall comply with API 5L Grade X42 or API 5L Grade X52. The post shall have a minimum yield strength of 42 ksi.

All steel shapes, bars and plates shall comply with ASTM A36, ASTM A572 Grade 50, ASTM A709 Grade 36 or ASTM A709 Grade 50.

Steel welding shall be in accordance with the current edition of the AWS Specifications D1.1, Structural Welding Code—Steel.

Ultrasonic testing shall be performed on the post-to-base-plate complete-joint-penetration groove weld.

All steel sections shall be hot-dipped galvanized after fabrication in accordance with ASTM A123. Provide vent holes for galvanizing.
Show location and size of vent holes on shop drawings.

Charpy V-notch toughness requirements in accordance with Article 4152.02 of the Standard Specifications shall apply to all steel greater than ½ inch in thickness.

Galvanized Steel Fastener Notes:

Galvanized steel fasteners shall be in accordance with Article 2408.03, S and Article 4187.01, C, 2 of the Standard Specifications. Regular nuts and jam nuts shall be ASTM A563 Grade DH heavy hex. Regular nuts may be substituted for jam nuts. Lock washers shall not be substituted for jam nuts. ASTM A449 Type 1 bolts or ASTM F3125 Grade A325-T Type 1 bolts may be substituted for ASTM F3125 Grade A325 Type 1 bolts where necessary to assure proper bolt length and thread length.

Unless otherwise noted on the plans, galvanized steel fasteners shall be tensioned by turn-of-nut method.

U-Bolt Notes:

U-bolts may be made of galvanized steel or stainless steel and shall be in accordance with Article 4187.01, C, 2 of the Standard Specifications. Washers, regular nuts and jam nuts shall use the same alloy properties as those of the U-bolts specified. Regular nuts may be substituted for jam nuts. Lock washers shall not be substituted for jam nuts.

Anchor Bolt Notes:

All anchor bolt materials and galvanizing shall be in accordance with Article 4187.01, C, 3 of the Standard Specifications.

Bending or welding of anchor bolts shall not be allowed.

Anchor bolts shall comply with ASTM F1554 Grade 105.

General Notes:

All steel cantilever truss sign supports are designed for 50 lb/ft² wind pressure on support members and 50 lb/ft² on signs.

Shop drawings shall be submitted by the Contractor in accordance with Article 1105.03 of the Standard Specifications.

Clear distance from face of the concrete to the nearest reinforcing bar shall be 2" unless otherwise shown.

Keyway dimensions shown on the plans are based on nominal dimensions unless stated otherwise. In addition, the bevel used on the keyway shall be limited to a maximum of the 10 degrees from vertical.

Steel cantilever sign trusses shall not be used on bridges without the approval of the Bridges and Structures Bureau.

Structural Alignment/Tolerance Notes:

The precise installation and alignment of all components of the cantilever sign truss and its support shall be considered essential. The Contractor shall submit documentation to the Engineer showing that the various components have been measured and are located within the tolerances listed below.

1) The foundation shall be accurately located, with the center of the anchor bolt group not more than 1 inch from the plan location in the direction parallel with the truss and not more than 1 inch from the plan location in the direction perpendicular to the truss.

2) Anchor bolts shall be plumb within ¼ inch per foot from vertical.

3) Anchor bolts shall project above top of foundation within ¾ inch of the plan dimension.

4) The truss support post shall be plumb within 1/16 inch per foot of vertical in two perpendicular directions.

5) The horizontal lines between chords shall be level within 1/16 inch per foot of horizontal, and the vertical lines between chords shall be plumb within 1/16 inch per foot of vertical.

Specifications:

Design:
AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, Series of 2015 with Interims.

Construction:
Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, Series 2023, plus applicable General Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provisions shall apply to construction work on this project.

Design Stresses:

Design stresses for materials are in accordance with AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, Series of 2015 with Interims.

Reinforcing steel in accordance with AASHTO LRFD Bridge Design Specifications Series of 2014, Section 5, Grade 60.

Spread footing foundation concrete in accordance with AASHTO LRFD Bridge Design Specifications Series of 2014, Section 5, f'c = 4.0 ksi.

Drilled shaft foundation concrete in accordance with AASHTO LRFD Bridge Design Specifications Series of 2014, Section 5, f'c = 4.0 ksi.

11-2025
Latest Revision Date

Approved by Bridge Engineer

IOWA DOT

Standard Design

Steel Cantilever Sign Truss

July, 2017

Index and Notes

SCST-01-17

•Revised 03-2019: Modified Galvanized Steel Notes to address material availability issues. Modified Galvanized Steel Fastener Notes to address changes in ASTM Specifications.
•Revised 04-2020: Changed "Office of Bridges and Structures" to "Bridges and Structures Bureau". Revised "0.5 inch" to "1/2 inch" in Charpy V-notch toughness note for text uniformity. Changed "full-penetration groove weld" to "complete-joint-penetration groove weld" to conform to AWS nomenclature.
•Revised 12-2021: Clarified that a wrench with a 42-inch handle length is required to tighten anchor-bolt nuts to snug-tight condition.
•Revised 11-2025: This sheet reissued, sheet format update. Changed Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, "Series 2015" to "Series 2023".
•Steelcantileversignstruss.dgn - SCST-01-17 - This sheet issued 07-2017.