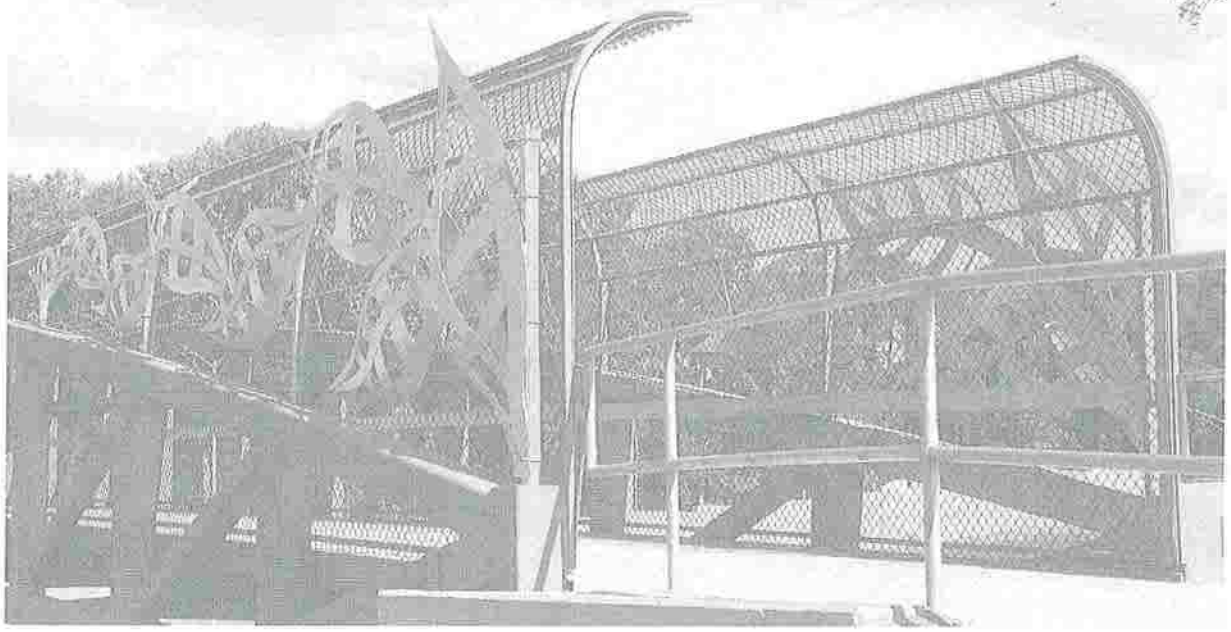
2015 Interim Revisions

LRFD GUIDE SPECIFICATIONS FOR THE DESIGN OF

PEDESTRIAN BRIDGES



DECEMBER 2009

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

2015 Revision

9—DESIGN EXAMPLE

HALF-THROUGH TRUSS BRIDGE WITH HSS MEMBERS

ILLUSTRATIVE EXAMPLE OF KEY PROVISIONS OF GUIDE SPECIFICATIONS

LOAD AND RESISTANCE FACTOR DESIGN

GENERAL INFORMATION

Specifications Used:

- *AASHTO LRFD Bridge Design Specifications*, 2007 with 2008 Interims (*AASHTO LRFD*)
- *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, 2008 (*AASHTO Signs*)
- *AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges* (*Specification*)

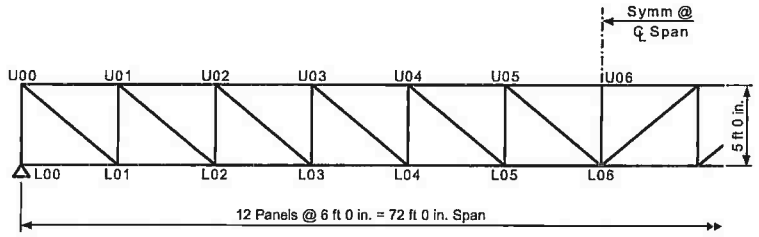
Geometry:

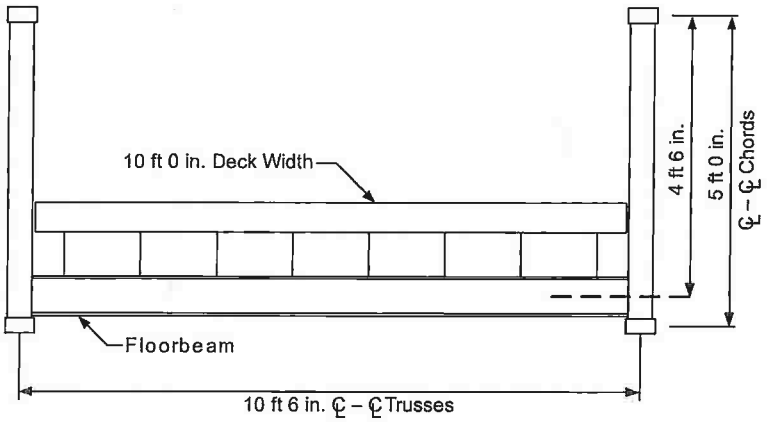
Span = 72 ft

Deck width, w_{deck} = 10 ft

CL-CL trusses = 10.5 ft

A500, Gr. B, F_y = 46 ksi





Projected vertical area per linear foot:

Chords: 2 @ 3 in./12 × 6 ft/6 ft	0.50 ft^2
Verticals: 3 in./12 × 4.75 ft long/6 ft	0.20 ft^2
Diagonals: 3 in./12 × 7.81 ft long/6 ft	0.33 ft^2
Total per Truss:	1.03 ft^2
Deck + Stringers: 10 in./12	0.83 ft^2

WS_H = total horizontal wind on superstructure (plf)

= (2 trusses × 1.03 ft^2 + 0.83 ft^2) × 58.4 psf

= 169 plf

Note: The full lateral wind loads must be resisted by the entire superstructure. Appropriate portions of the design wind loads must also be distributed to the truss top chord for design lateral forces on the truss verticals.

Vertical Wind Loading:

Apply a vertical pressure of 0.020 ksf over the full deck width concurrently with the horizontal loading. This loading shall be applied at the windward quarter point of the deck width.

WS_V = vertical wind load on the full projected area of the superstructure applied at the windward quarter point (plf)

= $P_V(w_{deck})$

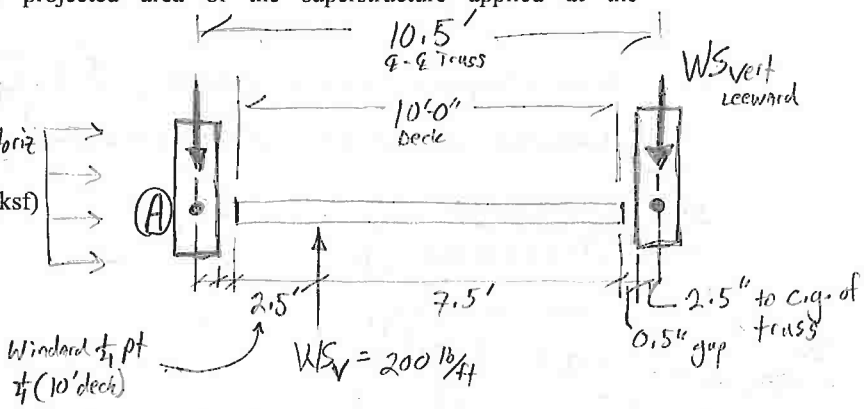
where:

P_V = vertical wind loading on superstructure (ksf)

= 0.020 ksf

w_{deck} = total deck width (ft)

= 10.0 ft



Therefore,

$\frac{K}{ft^2} \left| \frac{1000\ lbs}{K} \times ft = \frac{lb}{ft} \right.$

WS_V = 0.020 ksf × 1000 × 10.00 ft

= 200 plf

$\Sigma M_A = 0$ ↻ ↺

$WS_{V\ Leeward}(10.5') = 200\ lb/ft\left(2.5' + \frac{0.5" + 2.5"}{12"}\right)$

$WS_{V\ Leeward} = \frac{200\ lb/ft\left(2.5' + \frac{0.5" + 2.5"}{12"}\right)}{10.5'} = 52.4\ lb/ft$

Vertical load on leeward truss = 200 plf × (7.5 ft + (0.5 in. + 2.5 in.)/12 in./ft)/10.50 ft c-c Truss

$WS_{Vert\ Leeward}$ = 147.6 plf CONTROLS

Vertical load on windward truss = 200 plf × (2.5 ft + (0.5 in. + 2.5 in.)/12 in.ft)/10.50 ft c-c Truss

$WS_{Vert\ Windward}$ = 52.4 plf (uplift)