



OHIO DEPARTMENT OF TRANSPORTATION
CENTRAL OFFICE, 1980 W. BROAD ST., COLUMBUS, OHIO 43216-0899

January 20, 2006

To: Users of the Bridge Design Manual

From: Tim Keller, Administrator, Office of Structural Engineering

By: Sean Meddles, Bridge Standards Engineer

Re: 2006 First Quarter Revisions

Revisions have been made to the ODOT Bridge Design Manual, January 2004. This package contains the revised pages. The revised pages have been designed to replace the corresponding pages in the book and are numbered accordingly. Revisions, additions, and deletions are marked in the revised pages by the use of one vertical line in the right margin. The header of the revised pages is dated accordingly.

To keep your Manual correct and up-to-date, please replace the appropriate pages in the book with the pages in this package.

To ensure proper printing, make sure your printer is set to print in the 2-sided mode.

The January 2004 edition of the Bridge Design Manual may be downloaded at no cost using the following link: <http://www.dot.state.oh.us/se/BDM/BDM2004/bdm2004.htm>

Attached is a brief description of each revision.

Summary of First Quarter, 2006 Revisions to the ODOT BDM

BDM Section	Affected Pages	Revision Description
302.4.2	3-28 through 3-28.2	Information regarding the steel industry's decision to modify the dimensions of W36 rolled beams has been added.
803	8-3 through 8-3.2	Information regarding the location of Reference Monuments has been added.

302.4.1.14.a BOLTS

Field splices in beams and girders shall be bolted connections using high strength bolts, ASTM A325[M].

The designer shall specify the diameter of the bolts and check that the type (Type I for Galvanized or Type III for Weathering) of A325[M] bolts is described in the coating notes or bolt material specifications.

Coating systems that are zinc based, such as OZEU, IZEU, Galvanizing or Metallizing require galvanized Type I bolts.

Un-coated weathering steel structures shall have A325[M], Type III bolts. The coated areas of a weathering steel structure shall have galvanized A325[M] Type I bolts.

Generally, bolted splices should be designed using 1 inch [25 mm] or 1 $\frac{1}{8}$ inch [29 mm] diameter bolts. No metric bolts or studs are available in the small quantities required for bridges.

The use of A490[M] bolts is not permitted.

302.4.1.14.b EDGE DISTANCES

1" [25 mm] diameter bolts used in splice plates should be detailed to allow for 2" [50 mm] edge distances in lieu of the AASHTO requirements. 1 $\frac{1}{8}$ inch [29 mm] diameter bolts used in splice plates should be detailed to allow for 2 $\frac{1}{4}$ inch [60 mm] edge distances in lieu of the AASHTO requirements.

This increase to AASHTO's edge distances is to help alleviate the problem fabricators have of drilling bolt holes in flange splice plates and maintaining required minimum edge distances, especially on the inside splice plates.

If larger diameter bolts are specified the designer shall add $\frac{1}{4}$ inch [6 mm] to the AASHTO minimum edge distance.

302.4.1.14.c LOCATION OF FIELD SPLICES

Generally bolted splices should be located at points of dead load contraflexure on a continuous structure. Splices may also be supplied to help meet shipping and handling limitations. Plans should show optional field splice locations.

302.4.1.15 SHEAR CONNECTORS

AASHTO Sections 10.38.2.3 and 10.38.2.4 on studs shall be followed.

Shear studs shall be automatic welded studs. The use of channel sections is not allowed. 7/8 inch [22 mm] diameter studs are recommended as a standard diameter. The length of stud specified should be checked with manufacturers as to availability.

The Department's policy of using a 2 inch [50 mm] deep haunch over the top flange will have an effect on the length of shear studs.

Shear studs shall be field installed. In the case of galvanized structures, the design plans shall allow shop installation of studs prior to galvanizing or field installation after removing the coating by grinding at each stud location. If the studs are shop installed, the Contractor will be responsible for meeting all applicable OSHA requirements. A Detail note is available in Section 700.

302.4.2 ROLLED BEAMS

Effective in January 2006, the producers of rolled beams implemented changes to the physical dimensions of the W36X16 group of shapes (i.e. beams with 16" and wider flanges). The traditional W36X16 series of shape sizes will no longer be available from the producers. Below is a complete list for the new W36X16 group of shapes.

Designation	Area, A (in ²)	Depth, d (in)	Flange		Web Thickness, t_w (in)
			Width, b_f (in)	Thickness, t_f (in)	
W36 X 800	236.4	42.55	17.990	4.290	2.380
W36 X 652	192.5	41.05	17.575	3.540	1.970
W36 X 529	156.1	39.79	17.220	2.910	1.610
W36 X 487	143.8	39.33	17.105	2.680	1.500
W36 X 441	130.2	38.85	16.965	2.440	1.360
W36 X 395	117.4	38.41	16.830	2.200	1.220
W36 X 361	106.5	37.99	16.730	2.010	1.120
W36 X 330	97.4	37.67	16.630	1.850	1.020
W36 X 302	89.3	37.33	16.655	1.680	0.945
W36 X 282	83.4	37.11	16.595	1.570	0.885
W36 X 262	77.4	36.85	16.550	1.440	0.840
W36 X 247	72.9	36.67	16.510	1.350	0.800
W36 X 231	68.5	36.49	16.470	1.260	0.760

302.4.2.1 GALVANIZED BEAM STRUCTURES

If a galvanized bridge structure is the selected structure type, the following problems should be recognized and dealt with by the designer.

Galvanizing tanks are shallow and normally not longer than 45 feet [13.7 meters] in length.

Therefore, beam lengths should not be longer than 60 feet [18.5 meters]. Before a design is completed, the designer should confirm with local galvanizers if a local plant can galvanize the structural members detailed.

Since standard holes may become partially filled with galvanizing, bolted splice designs will require a non-standard hole size equal to the nominal bolt diameter plus 1/8". Bolted crossframes will be required due to field installation issues. Bolted cross frames as detailed in the Standard Bridge Drawing may be specified.

Field welding of end crossframes, intermediate cross frames and bearings is not acceptable because welding onto galvanizing causes damage to the coating and no quality touch-up system is available to handle the number of repairs required.

302.4.2.2 STIFFENERS

Intermediate stiffeners shall only be used when required for cross frames. Stiffeners shall be a minimum 3/8 inch [10 mm] thickness and wide enough to make an adequate and easily accessible cross frame connection. Stiffeners generally should not extend beyond the edge of flange.

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- D. Top elevation of barrier sound line. This elevation will normally be the same throughout the length of the wall. The Office of Environmental Services will specify the required elevation and elevation changes, if required.
- E. The finished ground line and bottom of barrier elevations.
- F. A noise barrier general summary containing all bid items and any required noise barrier material type alternate bids.
- G. Plan notes and details to assure the aesthetic requirements of 802.2
- H. Special plan details required to show features such as noise barriers on structures; locations of utilities, special access for fire hydrants, termination at structures, (such as bridges, culverts, overhead sign supports) and details not covered by the Department's "Noise Barrier Design" plan insert sheets,
- I. Subsurface investigation plan sheets including borings
- J. The Department's "Noise Barrier Design" plan insert sheets, revised as follows:
 - 1. List only the approved suppliers for the material noise barrier types authorized for the project and any alternate bid noise barrier material types authorized for the project.
 - 2. Clearly list the foundation depth for each drilled shaft throughout the total project length.
 - 3. Because Plan Insert Sheets are not standard drawings, the sheets shall be numbered as normal plan sheets for incorporation into final set of contract plans.
- K. A copy of the Office of Environmental Services requirements for location and height of noise barrier walls.
- L. The District Production Administrator should be contacted for the approved noise barrier material types, suppliers, alternate bid requirements, and special features in accordance with the Department's Noise Wall Policy 417-001(P). A copy of the letter from the District Production Administrator stipulating the information in this paragraph should be part of the detailed design submission.
- M. Show the location of all new and existing Reference Monuments in the noise wall plans. All new Reference Monuments, control points and benchmarks shall be located on the inside (i.e. roadway side) of noise walls. Provide a pay item to relocate every existing Reference Monument located on the outside of proposed noise walls.

804 NOISE BARRIERS – APPROVAL OF WALL DESIGNS

The Department does not have a standard design for noise barrier panels. The Department's plan insert sheets do establish standard designs for posts and foundations.

Individual manufacturers submit panel designs and those designs, if approved, are added to the plan inserts sheets. A modification to an approved wall design requires a resubmission to the

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Department for approval. The Department will not allow a modified design to be used on a construction project prior to its approval.

Environmental, structural and acoustic design for the walls shall meet the requirements of 805.1, 805.2 and 805.3 of this manual.

There are two types of noise barriers, reflective and absorptive. Noise barrier manufacturers interested in having their noise barrier wall approved should submit their proposed designs in accordance with 805.

805 NOISE BARRIER SUBMISSION REQUIREMENTS

Manufacturers interested in having their noise barrier design approved shall submit an approval package to the Office of Environmental Services.

As a minimum, the submission package shall show compliance with the following design requirements:

- A. Environmental.....Section 805.1
- B. Structural.....Section 805.2
- C. Material.....Section 805.3

Submit three copies of the complete submission package to the Office of Environmental Services. Include the specific product trade name; company address; and name, phone number, and email address of a technical representative available to answer questions during the product review period. The Department will evaluate the submission and provide a written decision to the manufacturer no later than 20 working days after the submission package is received.

805.1 ENVIRONMENTAL DESIGN REQUIREMENTS

The Manufacturer's wall system shall show compliance with the Department's Aesthetic limitations provided in Section 802.2 and the following Acoustic requirements:

- A. Reflective noise barriers - Minimum TL (Transmission Loss) = 22 dBA
- B. Absorptive noise barriers:
 - 1. Minimum TL (Transmission Loss) = 22 dBA
 - 2. Minimum NRC (Noise Reduction Coefficient) = 0.70

All barrier material submitted shall be acoustically tested at an independent laboratory capable of performing the following tests: