

# Interim Bridge Design Guidelines

Ministry of Forests, Lands and Natural Resource Operations

Last Revision: July 23, 2010

## REFER TO CURRENT POSTED VERSION:

<http://www.for.gov.bc.ca/hth/engineering/Bridges And Major Culverts.htm>

<u>Amendment Date</u>	<u>Amendment Description</u>
<u>July 15, 2008</u>	<ul style="list-style-type: none"><li>• Allowance for Division 3 welding certification (CSA W47.1) for steel bridge railings</li></ul>
<u>June 25, 2009</u>	<ul style="list-style-type: none"><li>• Insertion of mandatory requirements for design of i) precast concrete slab bridges and ii) precast deck panels</li></ul>
<u>July 23, 2010</u>	<ul style="list-style-type: none"><li>• Deletion of mandatory requirements for design of i) precast concrete slab bridges and ii) precast deck panels as these requirements are now shown on new MFR Standard Drawings.</li><li>• For consistency with revised (July 2010) <a href="#">MFR Standard Drawings</a>, revisions were made to CSA Bridge Design Code reference, cycles for fatigue limit state, concrete cover requirements, construction loads, and bridge railing fabrication company certification.</li><li>• Added new section on designer qualifications.</li></ul>

The design requirements which follow are to be adhered to unless:

- i) relevant contractual specifications specifically state otherwise; or
- ii) specific written instructions from a Ministry of Forests and Range Bridge Engineer state otherwise.

For the purposes of this document and the *FS Bridge Design and Construction Manual*, “design engineer” means the professional engineer responsible for the detailed structural design of a bridge or bridge components.

### 1. Design Vehicle Configurations and CSA Bridge Design Codes

The bridge design vehicle configuration shall be BCL-625, L-100, L-150 or L-165 (reference Standard Drawing STD-EC-000-001 and 002) as specified by MFR.

Design must conform to the most recent edition of CAN/CSA-S6, modified to suit forestry bridges. Such modifications shall include, but not be limited to:

- 350AT Cat 3 is acceptable for fracture critical members
- Fatigue limit state of 500,000 cycles for spans > 12m; or 1,000,000 cycles for spans ≤ 12m.

## 2. Concrete Cover Requirements

Minimum concrete cover requirements as follows:

- top of deck panel, 50mm
- underside of deck panel, 25mm
- vertical face of exposed deck edge, 50 mm
- face of stud pocket, 25 mm
- vertical face of transverse grouted joint, 25 mm
  
- top of slab, 50 mm
- underside of reinforced slab girder, 30 mm
- vertical face of exposed slab, 50mm
  
- both faces of ballast walls, 35mm
- footings, all faces, 35mm

## 3. Construction Loads

The design engineer must consider the weight of materials, work crews and equipment supported during construction when designing the bridge.

The design engineer must specify maximum permissible construction equipment loads on the drawings.

Where a bridge will be installed under a separate contract from the design/supply contract for the main bridge components, as a minimum, unless otherwise specified by the ministry, the designer shall consider the following minimum construction loads:

- self weight of the structure, supported at the bearings, including all deck panels in position but un-grouted
- a vertical live load of 445 kN (40 ton equipment + 10 ton panel) distributed over a length of 4 m, positioned on the bridge to produce the maximum effect; eccentricity = 100 mm
- load factors in accordance with CAN/CSA-S<sup>1</sup>-06
- min DLA = 10% (assumed design speed = 10 km/hr)

## 4. Shop and Field Welding Fabrication Company Certification

Fabrication of **shop welded** steel components must be undertaken by companies certified for Division 1 or Division 2 of CSA Standard W47.1, Certification of Companies for Fusion Welding of Steel Structures.

Exceptions to the foregoing: Companies certified for Division 3 of CSA W47.1 may undertake the following types of shop welding:

- fabrication of bridge railings; shear connectors for concrete slab bridges; and miscellaneous steelwork for all-timber portable superstructures.

**Field welding** of steel components must be undertaken by companies certified for Division 1, 2 or 3 of CSA Standard W47.1, Certification of Companies for Fusion Welding of Steel Structures or as stipulated by the Professional Engineer responsible for assurance of construction.

5. **Bridge Designer Qualifications**

Bridge designs must be prepared by a Professional Engineer, registered with the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC).

The Professional Engineer preparing bridge designs must have successfully completed, and taken full responsibility for (by signing and sealing) detailed structural design drawings for at least 5 bridges similar in size, scope, and complexity to the types of bridges required in a bridge supply contract, for the Province of BC and/or forest companies operating in BC, within the past 5 years. Alternatively, the Professional Engineer must be able to provide proof of equivalent forest road bridge engineering experience that confirms a sufficient ability to undertake the design work associated with the performance of a bridge supply contract.