

BC Ministry of Forests, Lands and Natural Resource Operations
Timber Operations, Pricing and First Nations Division
Engineering Branch



Guidelines on Use and Application of Ministry Standard Drawings

STD-EC-010-10 and STD-EC-010-11

Pedestrian Railings for Attachment to CL-2 and CL-3 Vehicle Guardrails on FSR Bridges

This document has been prepared for Professional Engineers to guide their use and application of ministry standard drawings STD-EC-010-10 and STD-EC-010-11 for pedestrian railings attached to new and previously installed CL-2 and CL-3 vehicle guardrails on Forest Service road (FSR) bridges.

1.0 General

Standard pedestrian railings are shown in ministry standard drawings STD-EC-010-10 and STD-EC-010-11. They are designed for attachment to ministry standard CL-2 and CL-3 vehicle guardrails (or barriers) where it is desired that pedestrians and vehicles share bridge use without a dedicated pedestrian walkway / sidewalk. The resulting barrier is considered to be a combination (vehicle 'plus' pedestrian) barrier as per Canadian Highway Bridge Design Code (**CHBDC**).

The pedestrian rail details shown on ministry standard drawings STD-EC-010-10 and STD-EC-010-11 must be read together with ministry standard drawings STD-EC—010-02 "Standard Bridge Guardrail – HSS Rail CL-2, or STD-EC—010-03 "Standard Bridge Guardrail – HSS Rail CL-3", or STD-EC-010-06 "Standard HSS Guardrail for Precast Concrete Slab Bridges CL-3."

Considering the guidance provided herein, the responsible Professional Engineer can determine if the standard pedestrian railings shown in ministry standard drawings STD-EC-010-10 and STD-EC-010-11 are appropriate for installation on new or existing FSR bridges where there is sufficient pedestrian usage to warrant pedestrian railings.

2.0 Pedestrian Rail Configuration and Design Criteria

Pedestrian railings shown on ministry standard drawings STD-EC-010-10 and STD-EC-010-11 consist of two handrails (HSS 64 x64 x 4.8) and one foot rail (HSS 127 x 76 x 6.4). The pedestrian railing components are designed using the following pedestrian loading and geometric requirements drawn from the CHBDC:

- Design loads on pedestrian railings equal to a uniform load of 1.20 kN/m applied laterally and vertically simultaneously as per CHBDC CL. 3.8.8.2.
- The height of the pedestrian railing is the vertical distance from the top of the railing to the bridge deck, equal to 1050 mm for CL-2 or 1100 mm for CL-3 pedestrian/vehicle combination barriers, respectively, to meet minimum height requirements as per CHBDC Table 12.8.
- Vertical spacing between rails is designed to meet the general intent of CHBDC requirements for pedestrian/vehicle combination barriers as per CHBDC CL. 12.4.6.2, which requires openings in combination barriers to be less than or equal to 150 mm in the least direction for the lower 600 mm of barrier and 380 mm in the least direction above the lower 600 mm of barrier.

3.0 Use and Application of Ministry Standard Drawings STD-010-10 and STD-010-11

General

The Professional Engineer is responsible for prescribing FLNRO standard bridge pedestrian railings as shown on these drawings, and must evaluate the suitability of their use based on an assessment of the specific bridge characteristics and site conditions including: bridge barrier configuration and connection capacity, bridge width, road approaches and alignment, anticipated vehicle traffic configurations, etc.

Alternatives to the pedestrian railings shown on ministry standard drawings STD-EC-010-10 and STD-EC-010-11 may include where warranted: (1) a separated sidewalk, or (2) pedestrian refuges on longer bridges, or (3) in one-off situations crash-tested vehicle barriers with added pedestrian railings.

New FSR Bridges

- **Potential effects of errant wide loads striking pedestrian rails:** Consideration should be given to the possibility that wide loads crossing a particular bridge structure could strike the higher pedestrian rails, resulting in damage to the pedestrian rails and also transfer of forces down through the bridge barrier guardrail posts and mounting brackets attached to the concrete deck panels or slab girders.
 - The CL-3 bridge guardrail post/deck anchorage has a greater strength connection than the CL-2 guardrail system, and if errant loads should strike the pedestrian railings attached to CL-3 guardrail, damage would likely be limited to the pedestrian rail itself and not to the concrete deck panels or concrete slabs.
 - For new bridges, careful consideration should be given to the possible consequences (e.g., increased chance of concrete deck panel breakage) of wide loads impacting the pedestrian railings shown on ministry standard drawings STD EC-010 10 and STD EC-010 11 if attached to CL 2 bridge guardrail systems in recognition of the lower strength CL-2 bridge barrier guardrail post/deck anchorage system compared to that of CL 3.

Vehicle Guardrail Type	Deck Type	Design Vehicle	Thickness of Concrete Deck at Edge
CL-2 (3 bolt connection)	On Concrete Deck Panels (CL-2 bracket height is lesser of deck panel edge thickness or 250 mm)	BCL-625	175 – 200 mm
		L-100	200 – 225 mm
		L-150 & L-165	225 – 250 mm
	On Concrete Slab Girders (CL-2 bracket height is 250 mm)	BCL-625, L-150, L-150, L-165	250 mm minimum
CL-3 (4 bolt connection)	On Concrete Deck Panels (CL-3 bracket height is equal to deck panel edge thickness)	BCL-625	175 – 200 mm
		L-100	200 – 225 mm
		L-150 & L-165	225 – 250 mm
	On Concrete Slab Girders (CL-3 bracket height is 280 mm)	BCL-625, L-100, L-150 & L-165	300 minimum

- **Bridge deck width:** The Professional Engineer is responsible for determining an acceptable bridge deck width prior to ordering concrete deck panels or concrete slabs for the bridge. **Note:** The horizontal projection of the foot rail attached to the face of the vehicle guardrail posts as shown on ministry standard drawing STD-EC-010-10 effectively narrows the overall bridge deck width by about 150 mm (75 mm each side of the bridge). For new bridges with bridge deck widths less than 4.9 m, careful consideration should be given to the possible consequences of choosing to use the pedestrian railings shown on ministry standard drawings STD-EC-010-10 and STD-EC-010-11.
- **Approach road curvature:** For new bridges with poor vertical and/or horizontal alignment, careful consideration should be given to the possible consequences of choosing to use the pedestrian railings shown on ministry standard drawings STD-EC-010-10 and STD-EC-010-11.

Existing FSR Bridges with CL-3 Vehicle Guardrails

- For proposed installation of pedestrian railings on existing CL-3 vehicle guardrail systems, the Professional Engineer is responsible for determining the acceptability of the existing bridge deck width, and approach road curvature for anticipated shared pedestrian/vehicle use. Additionally, the geometric compatibility of the design railing dimensions with existing vehicle guardrails (including connection locations) should be field verified prior to ordering pedestrian rail materials.

Existing FSR Bridges with CL-2 Vehicle Guardrails

- Installation of pedestrian railings on existing CL-2 vehicle guardrail systems needs more careful consideration due to the lower strength CL-2 deck anchorage system (compared with the CL-3 system) and increased chance of concrete deck panel breakage in the event that wide loads damage the pedestrian railing. However, it may be undertaken if pedestrian safety at an existing site is considered critical, the bridge deck width and approach road curvature is acceptable, operating speeds are low across the bridge (e.g., < 50 km/h), and there is good vertical and horizontal alignment.

Pedestrian Crosswalk Ahead Sign

- Use a 'pedestrian crosswalk ahead' warning sign (shown below) in advance of bridges with installed pedestrian railings. Mount the pedestrian crosswalk ahead sign on the same sign post used for the 'narrow structure' sign (shown below).

Pedestrian Crosswalk Ahead Sign (WC-2)

The Pedestrian Crosswalk Ahead Sign (WC-2) shall be used in advance of pedestrian crosswalks at locations having limited visibility of the crosswalk area.

The Pedestrian Crosswalk Ahead Sign may be used in advance of a special crosswalk.

The pedestrian symbol on the sign shall be oriented to face the roadway.

The sign shall be reflectorized or illuminated to show the same colour and shape by night as by day.



WC-2
60 x 60 cm

Narrow Structure Sign (WA-24)

The Narrow Structure sign shall indicate in advance a structure, (bridge, culvert, subway, overpass and similar structures) having a clear roadway width of 5 to 6 m inclusive, or any structure with a roadway clearance less than the width of the approach pavement. Additional protection may be provided by the use of hazard markers described in C3.12.

The signs shall be reflectorized or illuminated to show the same shape and colour by night as by day.

Where the structure has a clear roadway width of less than 5 m thereby permitting only a single lane of traffic, a tab sign (WA-24T) shall be added immediately below the narrow structure sign (WA-24).

An educational tab reading NARROW BRIDGE, NARROW SUBWAY, may be desirable until this symbol becomes known. Tabs shall have a black legend and border on a yellow background size 60 x 30 cm and shall be reflectorized or illuminated to show the same shape and colour by night as by day.



WA-24
75 x 75 cm



WA-24T
60 x 30 cm

Handrail Mounting Options

- The vertical posts for the two handrails shown on standard drawing STD-EC-010-10 can be attached to the front face of the connector angle (front mounted) or rear face of the connector angle (rear mounted).
- When ordering pedestrian rail materials, the Professional Engineer should specify the desired handrail mounting option with consideration of:
 - the vehicle traffic mix (industrial and public);
 - the anticipated future bridge maintenance issues, including the effect that the higher rails may have on the ability of wide loads to cross the structure without damaging the pedestrian railing;
 - pedestrian safety;
 - the following pros and cons among other considerations as applicable to the bridge and crossing site:

Front Mounted Option		Rear Mounted Option	
Pro	Con	Pro	Con
May discourage pedestrians from stepping up on vehicle guardrail	Greater chance that hanrail may be struck by wide vehicle loads	Provides additional horizontal clearance at the handrail height for wide vehicle loads	Due to greater exposure of connector angle and bolt heads, top of vehicle guardrail will have increased snag points for snow plow blades that may make contact with the top guardrail

Pedestrian Railing Installation

- The Professional Engineer should require the railing installation contractor to report any installation issues and/or any problems achieving the bolt installation requirements shown on ministry standard drawings STD-EC-010-10 and STD-EC-010-11.
- The Professional Engineer should specify a requirement for field reviews of the pedestrian railing installation on a bridge together with a signed assurance statement that the installation complies in all material respects with the engineering intent reflected in the ministry standard drawings STD-EC-010-10 and STD-EC-010-11.