




Title:	Structural Considerations for Separation Barriers in Bridge Rehabilitations	
Division:	Transportation Infrastructure Management (TIM)	
Branch:	Standards and Contracts Branch (SCB)	
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Implementation

This memorandum is effective as of the date of issue.

Background

A **Separation Barrier** is a traffic barrier meeting the requirements of CHBDC Section 12 that is used to separate vehicular traffic from pedestrian or cyclist traffic on a bridge. In the 2019 Canadian Highway Bridge Design Code (CSA S6-19, CHBDC), requirements for a barrier to separate pedestrians and cyclists from high speed traffic was introduced in Section 12. The requirement states that “If the posted speed on a bridge is greater than 70 km/h, any sidewalk or bikeway on the bridge shall be separated from the roadway by a traffic barrier”.

The CHBDC commentary notes that this requirement is similar to a requirement in the 2017 American Association of State Highway Transportation Officials (AASHTO) code. The AASHTO requirement is based on protecting pedestrians on high speed urban expressways from traffic on a bridge. The risk is that at higher speeds, curbs are less effective at redirecting errant vehicles allowing them to encroach onto the sidewalk, and pedestrians have limited escape options while on the bridge.

Section 15 (Rehabilitation) of the CHBDC does not give requirements for existing traffic barriers during bridge rehabilitation, nor does Section 12 (Barriers). Section 15.3, however, does state that all rehabilitated members shall satisfy the ULS and SLS provisions of the Code, but, it does allow the Owner some leeway to specify policy exceptions to these. Forcing an extensive bridge rehabilitation, widening or replacement to satisfy the separation barrier requirement on bridges that have already used up part of their design service life may not be an effective strategy for bridge owners unless the need is very high.

Policy

1. CHBDC Clause 12.4.3.3 regarding Separation Barriers shall not be applicable for bridge rehabilitations.
2. A Separation Barrier may be installed at the discretion of the regional Manager, Engineering Program Delivery Office in project-specific circumstances.
 - a. In deciding if a Separation Barrier is feasible, the Engineering Program Delivery Office should consider whether;
 - i. the barrier can reasonably be installed within the cost and scope of the rehabilitation (e.g., girder capacity is adequate, there is adequate space on the bridge deck for the separation barrier, the area adjacent to the bridge can accommodate transition to an approved roadside barrier or crash-cushion off the structure, installation does not adversely affect construction schedule, etc.),
 - ii. the remaining service life of the bridge,
 - iii. the volume of pedestrian and bicycle traffic,
 - iv. the degree of separation on either side of the bridge,
 - v. the Bikeways Design Manual, Provincial Engineering Memorandum DCSO #2018-07,
 - vi. the MTO Design Supplement to the TAC Geometric Design Guide for Canadian Roads.
3. When a Separation Barrier is installed, the structural adequacy of the existing bridge deck to support the new barrier shall be investigated. When evaluating the structural capacity of the bridge deck, the following are recommended:
 - a. Decks shall be evaluated for barrier loads according to CHBDC, but do not need to exceed TL-4 loading. Section 14 of CHBDC and a Target Reliability Index (β) of 2.75 may be used to perform this evaluation.
 - b. When refined method of analysis is performed, moment redistribution may be considered over a larger width than determined by an elastic analysis.
 - c. If the sidewalk is to be replaced as part of the rehabilitation, the barrier reinforcement may be connected to the sidewalk in lieu of to the deck slab. In this case, the transverse reinforcement in the sidewalk shall be designed to resist the full design loads from the barrier.