SUPERSEDED BY EB 21-057 EFFECTIVE 11/24/21		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 01-017

Title: **CONCRETE BRIDGE BARRIER GUIDELINES**

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Approved:

James M. O'Connell, Deputy Chief Engineer, Structures — 7/3/01 Date

ADMINISTRATIVE INFORMATION:

This EI is effective with projects submitted for the letting of March 21, 2002. It should be incorporated on projects with earlier lettings if possible. No EI's are superseded by this issuance.

PURPOSE:

This EI establishes new requirements for the use of concrete bridge barrier. Its provisions will eventually be incorporated into future issuances of the Bridge Manual.

TECHNICAL INFORMATION:

All new and replacement bridges and deck or superstructure replacements on interstate and other controlled access, high speed highways shall use concrete bridge barrier (parkways without truck traffic and culvert structures are excluded). For interstate bridges, 1.07m high F shape or single slope barrier shall be used. For other fully or partially controlled access, high speed highways, designers should evaluate the required railing design service level according to Section 6.4.1 of the Bridge Manual to determine if the service level is Test Level-4 and an 865mm high concrete safety shape barrier can be used.

Exceptions to the guidance contained in this EI should be discussed and justified in the Design Approval Document and be approved by the Deputy Chief Engineer Structures. Exceptions that will be considered are in the cases of a deck replacement when the existing superstructure is not adequate for the increased dead load associated with a concrete barrier or where a concrete barrier on the inside of curve would reduce sight distance to less than the allowable.

It is expected that the cost of concrete barrier will be the same or less than steel railing.

BACKGROUND:

Concrete barrier or parapet is currently the first choice for a railing/barrier system on new structures as provided in Section 6.4.3 of the Bridge Manual. However, there have been frequent requests for exceptions to this guidance and steel railing has been substituted.

A number of recent accidents have involved tractor trailers penetrating steel bridge rail and causing severe damage and injury. There is a common misperception that steel bridge railing is designed to contain a heavy tractor trailer impact. In reality, the current standard two rail and four rail bridge railings are designed and tested to a Test Level - 4, under NCHRP 350, to contain a 2000 kg (4400 lb) pickup truck at 100 km/hr (60 mph) with a 25 degree angle of impact and a 8000 kg (18,000 lb) single unit van truck at a 80 km/hr (50 mph) with a 15 degree angle of impact. The design standards for previous railing systems had significantly lower impact loads.

There are no known steel railing systems designed for an impact from a 36,000kg (80,000 lb.) tractor trailer (Test Level-5 level of service). It would be extremely difficult to design such a steel railing system because the impact force must be transferred to the deck at each post location. A concrete barrier is much more effective in that it distributes the force to the deck through the continuous deck/barrier interface.

Our current concrete safety shape barrier (referenced as "permanent concrete barrier" in the specifications and BD sheets) has also been designed and crash tested to the Test Level-4 service level. Concrete F shape barrier (1.07 m high) has been designed and crash tested for a tractor trailer impact (Test Level-5). Single slope barrier has the same height as F shape and, although it has only been tested to the Test Level-4 level, it is probable that it would pass the Test Level-5 test.

Although concrete safety shape and the steel railing systems have both been crash tested to a Test Level-4 level, the strength of the concrete safety shape is far superior. The likelihood of a concrete safety shape containing an impact from a tractor trailer is far higher than for any steel railing system.

CONTACT:

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