

Bridge Design Memorandum

To: Bridge Design
From: JMW/jmw
Date: 1/23/2014
Re: Bent Design

As per NJA and JMW, all current and future LRFD designed bridges shall include:

When designing integral bents (superstructure is rigidly connected to adjoining substructure), Article 3.6.4 of the AASHTO LRFD Bridge Design Specifications shall be used to determine the Braking Force (BR) to be applied to the bent.

When designing non-integral bents (superstructure is not rigidly connected to substructure) the following modifications to Article 3.6.4 may be applied to the bent:

1. 25% of the axle weights of the design truck or tandem will not be considered.
2. The braking force (BR) shall be divided amongst the bearing locations and applied at the elevation of bearings as a longitudinal force instead of 6 ft above the deck.
3. In continuous prestressed concrete beam spans, the braking force (BR) shall be applied over the entire continuous span unit instead of each span and the forces distributed in proportion to the relative stiffness of the bearings and bents. The interior bents of the continuous prestressed concrete beam span unit may be considered non-integral bents.
4. For the purpose of determining the number of loaded lanes to apply the braking force (BR), lanes shall not be considered where raised medians, raised sidewalks, curbs, or median barriers are located. Widening will not be considered. The loaded lanes shall be the travel lanes as established by the approach roadway.

For pile bents where excessive scour may be present, the designer may request to increase the elevation of the pile's point of fixity to a higher point to shorten the unbraced length. In this case, the bank may require protection, a higher level of monitoring with a plan of action or both. The costs and benefits of all options shall

be considered and documented. This request shall be made to the Director of Structures. (These criteria shall not be used for determining pile tip elevations, but for sizing piles only.)

MDOT's Inspection Program has no documented damage to bridges due to braking forces. The LRFD Specifications are general and compare only previous AASHTO Specifications to International Specifications with no additional research conducted to better understand the actual forces produced during braking. In an attempt to reduce excessive loadings due to anticipated scour, MDOT has elected to protect against or monitor scour.