

Guardrail and Bridge Rail Recommendations for Very Low-Volume Local Roads in Kansas

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Introduction

The determination of warrants for bridge railing and approach guardrails is a fundamental roadside safety issue. These are specialized roadside safety barriers that are intended to capture and smoothly redirect errant vehicles that leave the roadway either on the bridge itself or on the approach to the bridge.

The Federal Highway Administration (FHWA) requires tested bridge rails and approach guardrails on all National Highway System (NHS) Roadways. However, states are given the discretion to develop their own policies for non-NHI roads. Currently in Kansas, all bridges constructed with federal funds are required to have one of the Kansas Department of Transportation's (KDOT) standard bridge rails (either corral rail or barrier curb) and approach guardrail (including transition and end treatment). These systems are expensive in terms of the initial cost of a bridge and they have additional safety and maintenance considerations that may outweigh the expected safety benefits on many low-volume applications.



Low-Cost Bridge Design for Very Low-Volume Local Roads. Steel Girder Bridge

In an effort to maximize the safety benefits of the limited funding, KDOT undertook the effort outlined in this report to establish practical risk-based guidelines and policies for bridge rails and guardrails on low-volume local roads.

Project Description

The primary tasks included:

- A review of the state of the practice, including current American Association of State Highway and Transportation Officials (AASHTO) policies and guidelines, to determine the amount of flexibility/discretion allowed.
- A review of research studies with similar objectives that have been performed elsewhere.
- A review of the policies of other state highway agencies.
- Analysis of bridge/approach guardrail crashes on low-volume local roads in Kansas.
- Benefit-cost analyses based on typical traffic and location features.

Project Results

Although the findings of this investigation would support a policy that does not require installation of bridge rails on structures between 20 ft. and 50 ft. on roads functionally classified as Local Roads with less than 50 vehicles per day (vpd), it is recognized that there are benefits of the rail that cannot be evaluated by this effort. That is, they provide delineation to all drivers by indicating where the edge of the structure is located; additionally even a lightweight, non-tested rail has the ability to redirect some low-angle and/or low speed impacts. As a result it is recommended that bridge rails installed on new or rehabilitated bridges utilizing federal funds could be of a non-tested design if the structure meets the set of conditions outlined below. This non-tested design is constructed of a w-beam guardrail section mounted on standard guardrail posts that are fastened to the bridge structure either by welding or a bolted connection. In addition, no approach guardrail will be required on these bridges.

In order to use this design, the bridge would need to meet all of the following conditions:

1. The bridge is located on a road functionally classified as a Local Road.
2. Traffic volume is less than or equal to 50 vpd.
3. The approach roadway is a two-wheel path road.
4. Roadway surface on approaches is gravel, sand or dirt.
5. Maximum length of bridge is 50 feet.
6. The new structure shall be no less than 24 ft. wide
7. Bridge is not located on or adjacent to a curve or intersection.
8. A Type 3 object marker shall be installed at each end of the bridge rails.

Project Information Contact

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