Joint Transportation Research Program

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In-Service Safety Evaluation of Indiana Impact Attenuators and Barrier End Treatments

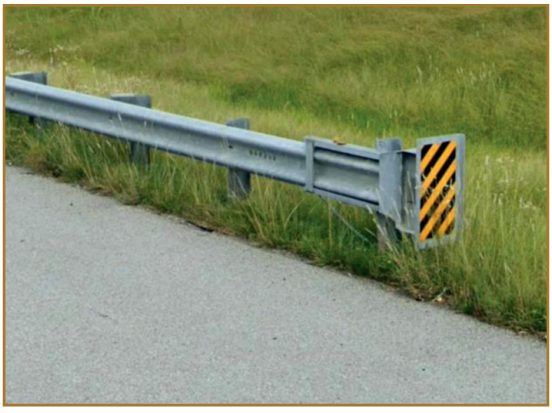
Introduction

Barrier end treatments and impact attenuators are safety devices installed at barrier ends or before important infrastructures to mitigate crash severity. Indiana historical crash records (2004–2013) revealed that crashes related to such treatments are generally more severe than those related to barrier faces. The Indiana Department of Transportation (INDOT) reported more than 34,000 barrier end treatments and impact attenuators operating across state-administered roads. Safety performance evaluation of these treatments is required to select the most effective design under various operating conditions.

Various types of barrier end treatments and impact attenuators may perform differently under different conditions. To estimate the safety effects of selected treatments, the severity-based in-service evaluation should also account for road and traffic conditions that affect crash severity. This study applied advanced statistical methods for estimating such effects, including average costs of collisions with the studied types of barrier end treatments and impact attenuators.

Findings

This study conducted the severity analysis for crashes related to barrier end treatments and impact attenuators. The end treatment inventory from INDOT's Road Network Dataset was linked to crash records, and the



ET-Plus System by Valtir.

operational conditions, including traffic, weather, speed, vehicle types, and roadway features, were collected from various data sources and included in the analysis. Both random parameter and fixed effect ordered logit models were applied to identify various factors' effects on crash severity.

Among the studied barrier end treatments, the newly introduced barrier end treatment, MASH MSKT, outperformed other studied treatments. The success of the MASH MSKT was followed by the widely used types: SKT 350, ET-Plus, and CAT. The effects of vehicle type, snow, dry surface, intersection, and speed limit were estimated. Among the studied impact attenuators, the BARRELS device was found to be the most effective type, while the safety performance of the other types was comparable. Due to a rather small sample of impact attenuators, the study could not identify additional statistically significant factors other than the attenuator types.

Implementation

The results of the estimated crash severity models and NTSHA-reported injury costs were summarized in tables for all the studied types of barrier and treatments and impact attenuators at interstates, other arterial roads, speed limits, intersection, and road segments. The tables include the probabilities of crashes at three levels of severities and the corresponding average costs of crashes under these different scenarios. This information should help policymakers, designers, and road engineers.

Recommended Citation for Report

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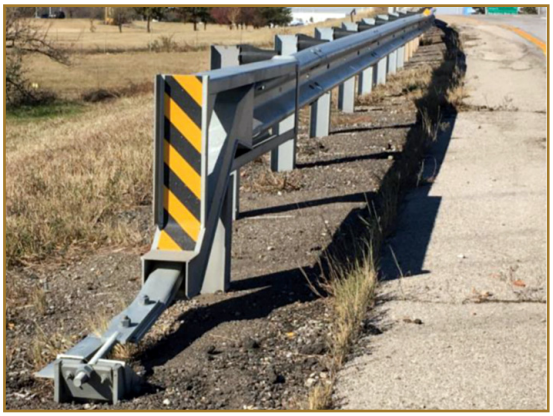
Guardrail Energy-Absorbing Terminal



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