

The Development of Crashworthy Rails for Fiber Reinforced Polymer Honeycomb Bridge Deck System

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Introduction

Fiber reinforced polymer (FRP) honeycomb panels offer an efficient and rapid replacement to concrete decks. The system consists of FRP honeycomb sandwich panels with adequate guardrails. Although FRP bridge deck panels have already been designed and used over the past several years on a number of through truss bridges, they could not be used on steel girder bridges until approved crashworthy bridge railing attachments could be validated.



Results of Crash Test on Vertical Faced Concrete Barrier

Top: Concrete Barrier

Bottom: Vehicle Passing Crash Test

Project Description

The light weight of FRP honeycomb panels (about 75% lighter than concrete) allows heavier truck loads, while keeping the existing girders and substructure without compromising the safety of the public. The roadway can be made wider by increasing the overhangs, thus allowing for wider farm equipment on narrow bridges in rural areas. The replacement of the concrete deck using this system may be completed in a matter of a few days, or even hours, as opposed to several months when using the conventional methods.

However, conventional rail barriers could not be attached to the FRP panels. This meant FRP panels could not be used in practice on highway bridges designed according to the AASHTO specifications until acceptable bridge railing systems could be developed. The bridge guardrail/barrier system had to be successfully crash tested according to National Cooperative Highway Research Program (NCHRP) Report No. 350 by Ross, Sicking, Zimmer, and Michie (1993).

Project Results

Two systems have been successfully crash tested, one with steel thrie beams/guardrails on steel posts and the other with concrete barriers. Both systems are now ready for use on temporary/detour bridges, or as permanent deck replacement allowing higher live load while keeping the existing steel girders and substructure.

Project Information

For information on this report, please contact Dave Meggers; Bureau of Research, Kansas Department of Transportation; 2300 SW Van Buren, Topeka, KS 66611; (785) 291-3845 phone; dmeggers@ksdot.org.

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