Kansas Department of Transportation

TECHNICAL PAPER

# Effectiveness of Polymer Bridge Deck Overlays in Highway Noise Reduction

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The Kansas Department of Transportation (KDOT) began placing multi-layer polymer bridge deck overlays in 1999 and at the present time have over 200 in service. A few years after placing the overlays, individuals indicated that they noticed how quiet the bridges with the overlays were compared to tined concrete pavement and tined concrete bridge decks. The thought was that the angularity of the aggregate was causing general interference creating a dampening effect on the noise.

Due to an increase in the feedback from the public on highway noise and the increase of traffic in highly populated areas, KDOT contracted with Kansas State University to evaluate the possible reduction in tire noise levels due to the polymer overlay systems. Arrangements were made for a brief evaluation to determine if further study would be worthwhile and investigate possible implementation as a tire noise reduction action.

For this project, only close proximity testing was performed. This was done by attaching recorders and sound level meters to the test vehicle. See Figure 1.


**Figure 1**

The Sony ICD P620 Recorder was used in an effort to process frequency data and the Bruel and Kjaer 2232 was used to collect decibel levels. The Sony recorder did collect some data, but in hindsight a more sensitive instrument would have given better frequency data that would have been useful. The Bruel and Kjaer instrument collected decibel levels as planned.

The recorder and decibel meter were attached to the vehicle near the rear tire and on the rear bumper. The towel over the instruments was to protect them from debris and direct sunlight. See Figures 2 and 3.

**Figure 2**


**Figure 3**

Three passes resulted in an average value of 102.4 dBa on the polymer overlay section. This was an improvement over the concrete bridge deck surface with transverse tining. It was also an improvement over other testing performed by Transtech Center for Pavement Surface Characteristics on another KDOT project on US-69 in 2004 (Brennan & Schieber, 2006). This project involved the testing of a number of pavement treatments. The lowest response level was on a ground surface with normal joints. Readings on this section were 102.3 dBa for close proximity testing. The highest level was 108.2 dBa on typical longitudinal tining with single saw joints.

Comparing the results from the extensive 2004 study and this short testing, it appears that the polymer overlay can produce a surface with similar acoustic responses to the ground pavement surface. Additional testing would be necessary to determine if a polymer overlay could be used in place of the grinding. It may be possible to reduce the polymer application to one layer, similar to a High Friction Surface, and achieve an acceptable reduction in pavement noise.

At the present time there is an opportunity for KDOT to work with Kansas State University on additional testing. This testing should include both close proximity and pass-by testing to determine the dissipation of the noise wave. Also, additional frequency evaluation should be done to determine if particularly annoying frequencies are being affected by the overlay application.

References

Brennan, J.J., & Schieber, G.M. (2006). *US-69 Surface texture and noise study* (KS-05-3). Topeka, KS: Kansas Department of Transportation.

## Project Information

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