



Florida Department of Transportation Research

Long-term Performance of Epoxy Concrete Filled Open Metal Grate Decking BDB12

The most common type of drawbridge in Florida is the bascule bridge, a moveable bridge that uses a counterweight to balance the span throughout the upward swing. The decks of these movable bridges consist of open metal grates, which reduce the weight of the deck but result in a significant amount of noise when traffic drives over the bridge. Many bascule bridges are located in populated areas of the state, and the noise has become a nuisance to the public.

Filling the metal grates can help mitigate the noise. The decks of new bridges are filled with concrete. However, they are designed to handle the weight of concrete, whereas older bridges are not. Researchers from the Florida Agricultural and Mechanical University and Florida State University College of Engineering have studied the effects of filling the open metal grates of existing bridges with a lightweight epoxy material. Epoxy is capable of reducing the noise while keeping the structure within the load capacity limit. A sand layer applied to the surface of the epoxy provides skid resistance.

Researchers found the durability of the epoxy studied in this project depended on weather conditions. The epoxy lost strength when subjected to cycles of hot and cold temperatures. High temperatures resulted in a softening of the material and prevented adequate adhesion of the skid resistant sand layer. Test results showed the epoxy softened at a temperature of about 126 degrees Fahrenheit. In hot climate zones such as Florida, bridge surface temperatures can



Typical steel grate bascule bridge

exceed 144 F. Another concern is that the use of two dissimilar materials - the epoxy and the metal grate - decreases the ability of the filled deck to resist cracking, chemical degradation, and wear and tear under vehicle loading and environmental changes.

The study emphasized the need to find or develop epoxies that can withstand high temperatures without experiencing adverse effects. Epoxies that soften at high temperatures should not be used as fill material for Florida bridges.

FDOT Contact: Marcus Ansley, FDOT Structures Design Office

Principal Investigator: Primus V. Mtenga, Florida Agricultural and Mechanical University and Florida State University, College of Engineering

For more information, visit <http://www.dot.state.fl.us/research-center>.