EVALUATION OF MEMBRANES FOR WATERPROOFING OF ADJACENT PRECAST CONCRETE BOX-BEAM BRIDGES

BACKGROUND
Satisfactory performance of non-composite box-beam bridges depends on the effectiveness of the longitudinal joints and the waterproofing membranes used to prevent water leakage. The objective of this study was to identify the sources, causes and effects of inadequate waterproofing at the longitudinal joints of such bridges and to develop measures to prevent leakage.

RESEARCH CONTEXT
Precast concrete adjacent box-beam bridges are commonly deployed by ODOT and many counties in Ohio for short and medium spans. Water leakage at the longitudinal joints of box beams is a recurring problem. Seeping water is one of the primary causes of corrosion of the embedded steel reinforcement.

RESEARCH APPROACH
Waterproofing membranes were evaluated using laboratory methods and correlated with field measurements recorded under traffic loading. Membranes were evaluated based on their ability to accommodate stretching, adhere to concrete, and resist punching while providing an adequate water barrier in a box beam bridge configuration. Construction practices for new bridges, and the investigation of a bridge that was in service for 32 years at the time of its demolition were also documented.

Many of the problems that lead to the loss of waterproofing of membranes in bridges may be preventable if proper quality control protocols are put in place and stringent inspections are carried out by qualified inspectors constantly during the construction period.

RESEARCH FINDINGS AND RECOMMENDATIONS
The waterproofing membranes specified in ODOT guidelines possess the ability to stretch by over one inch while retaining their watertightness. Membranes can accommodate differential deflections of typical box beam bridges without losing their waterproofing properties.

The construction practices followed at bridge construction sites need to be reviewed, modified, and strictly enforced by qualified inspectors to achieve reliable and consistent long-term prevention of water leakage at the longitudinal joints in box beam bridges.

This research project was sponsored through the Ohio Department of Transportation and Federal Highway Administration; and Ohio’s Research Initiative for Locals