

# Dynamic Load Testing and Evaluation of a Rehabilitated Culvert

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## Abstract

The integration of digital image correlation (DIC) techniques as non-contact sensors during bridge load testing offers many advantages, proving to be a reliable way to evaluate in-situ behavior with minimal setup time and the ability to capture even small displacements quite accurately. This study presents a holistic approach using full-scale, DIC measurements to calibrate numerical models from controlled load testing of a culvert, consisting of corrugated metal pipe, before and after being rehabilitated with a cementitious spray-applied pipe liner (SAPL). Both static and dynamic loads are applied on the culvert, and deflections are monitored continuously using cameras with video post-processing capabilities. Field tests and calibrated finite element analyses confirmed that the lined (rehabilitated) culvert exhibited increased ring stiffness and improved resistance to dynamic load effects, resulting in reduced deflections and dampened responses to varying load magnitudes with more uniform strain distribution under both static and dynamic loads.

## Bio

Monique Hite Head, Ph.D., P.E., F.ASCE, is a tenured Full Professor in the Department of Civil, Construction, and Environmental Engineering at the University of Delaware (UD). Dr. Head specializes in structural engineering with specific emphasis on structural monitoring and evaluation using advanced technologies to quantify deformations and inform structural behavior. Her research interests, teaching efforts, and publications are centered around: 1) structural evaluations using vision-based measurements for bridge, culvert, and rail condition assessment, 2) earthquake engineering and the impact of earthquakes on structures, and 3) flood load and salinity effects on concrete structures. She is a member of several professional organizations, editorial boards, and is the past chair of the Transportation Research Board (TRB) *Seismic Design and Performance of Bridges Committee (AKB50)*.

