

Characterization of Unknown Bridge Foundations – A Full Waveform Approach

NM13STR-02

Budget: \$369,000 **Duration:** 36 months

Project Summary

This research serves to develop a full-waveform based non-destructive, testing method to determine the subsurface bridge foundation characteristics for which the information is unavailable or limited. According to the FHWA, there are about 85,000 bridges nationwide that do not have any design or as-built plans identifying the type, depth, geometry, and materials of the foundations. Currently, NMDOT has 300 bridges with unknown foundations. This project is integral to FHWA Metric 18, “23 CFR 650.313 Inspection procedures – Scour Critical Bridges” and to the Department’s efforts to develop a scour analysis procedure manual.

The full waveform inversion method seeks to reconstruct the substructure geometry and material properties in an attempt to minimize the difference between measured and computed responses due to the prescribed excitation on the foundation’s surface. The measured and computed responses refer to the ones obtained from field experiment and computer simulation, respectively. The recovered geometry and material properties can be directly used to estimate the type and depth of the unknown foundation.

Phase I: Development and validation of the mathematical framework and computational details of the full waveform inversion approach.

Phase II: Field Experiments to obtain ‘real’ response measurements and used in the inversion framework to identify the unknown foundations.

Deliverable

Develop an instrumentation plan, equipment requirements, and full wave form approach to determine unknown pile foundation and ground responses that best convey the substructure information as well as the surrounding geological condition.



Principal Investigator

To Be Determined

Project Manager

Keli Daniell

NMDOT Research Bureau

keli.daniell@state.nm.us