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Center for Advanced Infrastructure and Transportation

Project Overview Report

1. UTC Identifying Number

   DTRT13-G-UTC28

2. Center Identifying Number

   CAIT-UTC-NC33

3. Project Title

   Installation of Thermocouples, and Analysis of Temperature Data from the 21st South Bridge

4. Principal Investigator & Contact Information

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5. Rutgers/CAIT Project Manager

   Patrick Szary, Ph.D.

6. Customer Principal

   Tom Hales
   Project Manager
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7. Project Description

   Utah Department of Transportation, along with Utah State University and the University of Utah Seismograph Stations are currently operating an installation with 39 channels of acceleration including 18 channels from on-bridge sensors.

   This proposed project will address upgrading of the data recording equipment (using matching funds from UDOT) and the installation of 24 thermocouples and the analysis of the resulting temperature data (this proposal). The temperature data will be synthesized with the bridge acceleration data to allow for ongoing studies of the effects of a thermo-gradient of the deck and girders to the dynamic response of a bridge. The bridge modal frequencies and mode shapes will be correlated with the many temperature sensors on the bridge.

8. Implementation of Research Outcomes (or why not implemented)

   Global dynamic testing and monitoring is a relatively inexpensive method of assessing the condition of a bridge. As this technique improves through this research it will be more valuable throughout the country and the world.

   The long term collection of both temperature data as well as dynamic data on this bridge will be utilized by Utah State University and UDOT to validate design procedures in the future as well as assisting in understanding long term performance of UDOT's bridge inventory.

   The strong motion instrumentation (accelerometers) alone is justified by the state, national, and international interest in recording earthquake records, particularly those produced by large normal faulting sources such as the Wasatch fault. The addition of the temperature measuring array through the thickness of the bridge adds to the ongoing structural health monitoring interest.

9. Impacts/Benefits of Implementation (actual, not anticipated)

   TBD

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10. Dates and Budget

    Start Date: 4/1/2016
    End Date: 8/31/2017
    UTC (CAIT) Dollars: $ 67,257
    Cost Sharing: $ 46,559
    Total Dollars: $ 113,817

11. Keywords

    bridge instrumentation, damage detection, temperature, modal analysis, ambient vibration, bridge field testing

12. Web Links (Reports and Project Website)

    https://cait.rutgers.edu/cait/research/installation-thermocouples-and-analysis-temperature-data-21st-south-bridge