VERMONT
AGENCY OF TRANSPORTATION

Hartford Bridge 7
Integral Abutment Monitoring for Complex Structures

PROJECT TITLE

Hartford Bridge 7

Integral Abutment Monitoring for Complex Structures

STUDY TIMELINE

5 years (minimum) after 2024 construction start

INVESTIGATORS

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KEYWORDS

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Field Testing

FUNDING

UMASS LOWELL

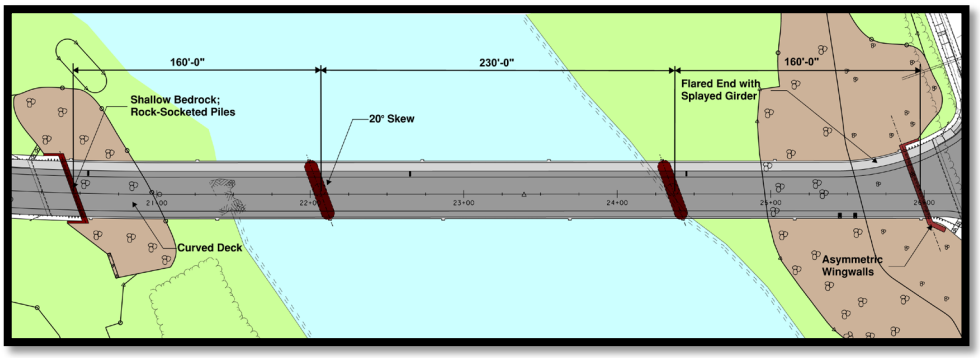
HNTB

More information about the VTrans Research Program, including additional Fact Sheets, can be found at: http://vtrans.vermont.gov/planning/research

Introduction or Problem Statement

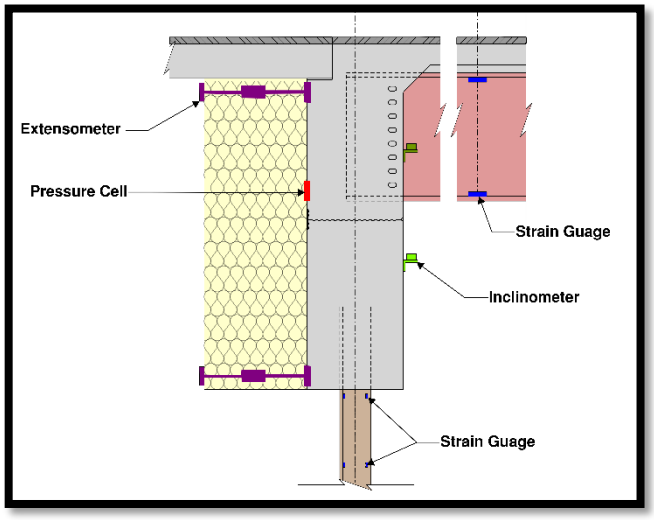
Construction for the replacement of Hartford Bridge 7 is currently underway. The new structure will be a three span, 550-ft integral abutment bridge with a flared and curved roadway at the bridge ends, skewed substructures, asymmetric abutments and wingwalls, a 4% profile grade, and variable subsurface conditions. This bridge length and geometry would typically prohibit the use of integral abutments due to excessive thermal movements and unbalanced pressures on the abutments and foundations.

Replacement of this bridge provided an opportunity to push the limits of integral abutment implementation. Refined analyses were used to gain a deeper understanding of the behavior of this structures, and corresponding force distribution. The bridge will be actively monitored with a comprehensive instrumentation system for five years beginning during construction. The accumulated data will be used to help verify analytical models and provide a better understanding of design parameters to be used in future structures.



Methodology or Action Taken

The proposed instrumentation system is comprised of approximately 300 sensors, including pressure cells, extensometers, tiltmeters, and strain gauges. These sensors will be used to measure critical bridge behaviors such as movements and rotations of the abutments and strain induced in the girders and piles. Ambient air temperature will be recorded so all device measurements can be viewed in the context of changing temperature. The data collection will be used to validate the original design model and support the development of design



guidelines for longer, more complex integral abutment structures.

Conclusions or Next Steps

VTrans is partnering with UMass Lowell to process the data collected. Currently the plan is to monitor the bridge continuously throughout construction and for a minimum of five years after traffic is transferred to the new bridge. Collected data will be regularly reviewed, and results shared to understand behavioral patterns.

Potential Impacts and VTrans Benefits

Integral abutment bridges are cost effective, rapidly constructed supports with reduced long-term maintenance compared to conventional abutments. Generally, integral abutments are the preferred support type. However, usage of integral abutment bridges remains limited to shorter, simpler structures. This project will provide an extensive amount of field data on a structure that pushes the envelope of typical usage. Understanding how this structure behaves will enable VTrans to utilize integral abutments on a larger array of projects in the future.