

**Report Title**

*Instrumentation, Digital Image Correlation, and Modeling to Monitor Bridge Behavior and Condition*



**NHDOT Bridge Design**

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**Report Link**

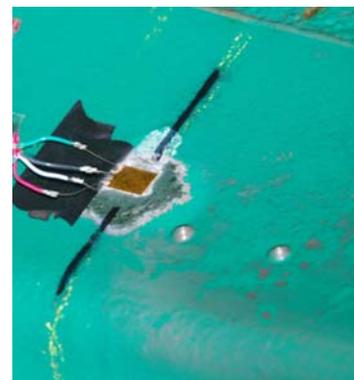
<http://www.nh.gov/dot/org/projectdevelopment/materials/research/projects/documents/15680L-FINALREPORT.pdf>

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**Why was it studied?**

Appropriate, proactive maintenance makes bridges last longer. Engineers need to know how bridge respond to the loads from traffic. Strain gauges are sensors that measure how a bridge responds to a load. A small area of the paint that protects the metal from corrosion must be removed to attach these gauges directly to the metal. This study looked at whether digital cameras could be used to gather the needed data and eliminate impacting the protective paint.



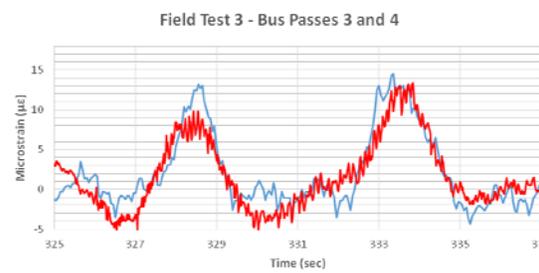
Strain gauge attachment to the exposed metal on the bridge beam

**What was done?**

The bridge carrying Bagdad Road over US Route 4 in Durham, New Hampshire was fitted with both strain gauges and GoPro® cameras to determine if off-the-shelf digital cameras could provide accurate measurement of bridge movements. Chalk markings on the bridge allow measurements to be taken from the images. The strain gauge data were compared to measurements from the camera images.



A camera clamped onto the flange of the bridge beam without damage to protective paint



Correlation of measurements between strain gauges (blue) and camera (red)

**What did we learn?**

Cameras are easily clamped onto the bridge and provide data that correlates well with the strain gauge measurements. Removing the camera requires no paint repairs and the chalk easily rinses off.

**How can we use it?**

Cameras are easy to deploy on bridges to gather data needed for the periodic inspection of structural stability. There is no damage to the protective paint coating using this method.