

Geo-Instruments: Strain Gage Applications



Above: View of the East tower on the bridge

“Helper” strands were installed on this 1924 vintage suspension bridge to correct main cable slip-page.

The design engineers want to measure long term performance of the new helper suspension strands, and sad

The strain in the strands is measured at four locations within the bond zone, with special bonded strain gage designed specifically for seven wire strands.

The gages are wired to a central location and combined with an Acoustic monitoring system, supplied by others. This readout system provides the bridge engineers with real time data, and over the long term will provide valuable information to help determine the overall structural health of the system. The strain gages were also used during the loading and lock off of the helper strands to determine proper load, and as a back up to the hydraulic pressure gage on the jacking apparatus.



Above: View of the Bridge Looking South

...the anchor strand anchors, specifying strain gages be installed on these elements. The gages, and will be used to detect future load shedding from the main suspension cable.

Project specifications called for bonded strain gages on the upper and lower arms of each load transfer u-bolt. The strain gages are oriented in a 120 degree pattern, along the circumference of u-bolt. In order to correct for temperature affects on the system , two “dummy” or no stress gages were included. The dummy gages only measure change in strain due to change in temperature, and can be used to correct for apparent strain measured in the helper strands

Installation of the gages was accomplished with the intent of maximizing the useful life in harsh North East USA weather conditions. This included redundant layers of moisture protective coatings, physical protection, and sealing.

Right: View of the new saddles, u-bolts, (with strain gage installation) and helper strands, looking east.

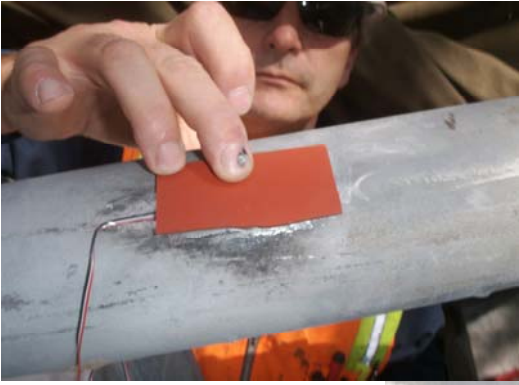


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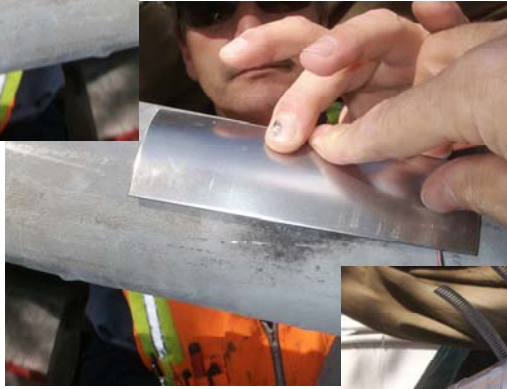
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Abbreviated sequence of strain gage installation (after surface prep, and gage bonding) Left: Applying silicone rubber pad to protect newly bonded gage



Left: Applying custom backing plate for clamping pressure distribution.

Right: Applying jubilee clamping clamps.



Below: Bonded gage



Above: Applying secondary gage waterproofing rubber.



Above: Applying neoprene rubber protective layer. Right: Complete installation, with aluminum layer



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