Engineered Monitoring Solutions

PROJECT PROFILE

I-5 Bridge Structural Health Monitoring System Portland, Oregon

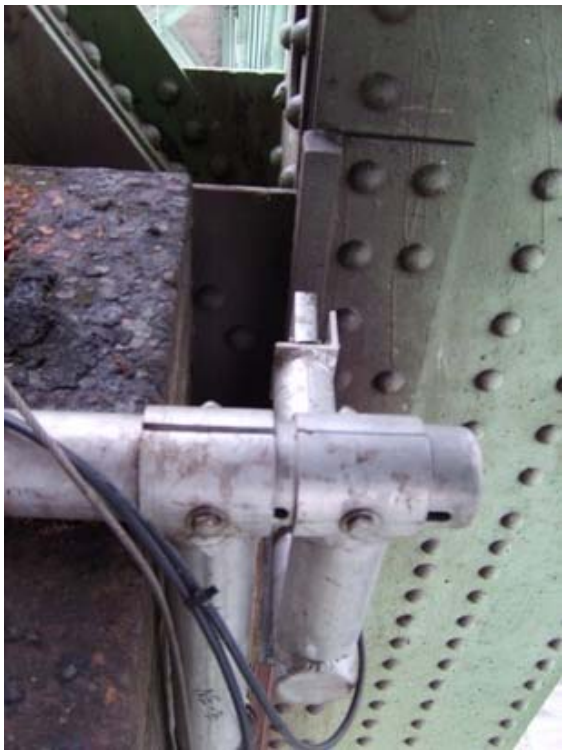
Client:

Oregon Department of Transportation

A statewide structural health monitoring (SHM) system was designed for ODOT by Engineered Monitoring Solutions. The SHM system incorporates a number of bridges with different monitoring objectives. The Interstate 5 Bridge in Portland, Oregon is one of those bridges. The bridge provides the southbound crossing of Interstate 5 over the Columbia River from Washington to Oregon. The bridge is a steel structure approximately 3,500 feet long with 16 spans. Span 3 is a lift span that utilizes a counterweight at each end of the lift span to facilitate raising of the span for under passage of boat and ship traffic. The counterweights move vertically along guide rails when the lift span is raised.

ODOT undertook the project to improve the ability to monitor the structural performance of the counterweights and lift span during operation of the lift span. The monitoring system collects data regarding tilt orientation of the counterweights and lift span, relative position of the counterweights to their guide rails, drive torque, lift span position and rainfall.

Laser position sensors were used to monitor the position of the counterweights relative to the guide rails at 4 positions on each counterweight. Difficult access to some of the monitoring locations required an innovative solution to enable the high precision laser sensors to be deployed remotely.



A system of Measurement and Control Units (MCUs) that communicate by radio collect the data from the sensors, perform calculations and temporarily store the data until it is automatically forwarded to a data serving PC on ODOT's computer network. Data is collected at a rate of once every 5 seconds during a bridge opening event. Baseline data is also collected once every 4 hours to identify any historical movement trends. The MCUs located on the counterweight blocks required solar power because 110VAC power is not available when the blocks are lowered during a lift event.

Bridge engineers can evaluate the data following a lift event from any PC on the State computer network using a web browser. Based on the results, the engineers make decisions regarding adjustments to the geometry of the counterweights and the weight of the lift span to improve the lift system performance.

Bridge Profile