

Experienced gained and lessons learned from an extensive bridge monitoring research project

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Tests over a two-year period on twelve interstate highway bridges in Illinois (six along Interstate 55 and six along Interstate 70/270) were performed to determine the validity of certain provisions for calculating bearing forces in the Load and Resistance Factor Design (LRFD 2002) and the Load Factor Design (LFD 1998) Bridge Specifications. The bridges were selected to be typical of Illinois interstate highway bridges while maintaining a range of parameters to study. These bridges were instrumented on their beam webs with strain gage rosettes installed on each beam to measure shear stresses caused by loads. Long-term test data were collected for approximately 6 months at each bridge to determine the loading trends for these bridges.

The project required extensive fieldwork and logistics to install the approximately 400 strain gages at locations up to 125 miles from the university. Hardware needed to complete the extensive data acquisition requirements of the project was chosen to meet the technical and anticipated environmental conditions. The project team members developed the software and built some of the hardware specifically for the project. SIUE faculty, professional staff and several graduate and undergraduate students took part in all phases of planning, purchasing, fabricating, assembling, installing, testing and decommissioning the equipment at the twelve bridge sites. Problems encountered included gage bonding problems on both steel and concrete beams, working in often uncomfortable conditions and positions, repairing damage due to vandalism, dealing with weather events, pests and occasional equipment malfunctions. Upon review of the project numerous lessons were learned and are discussed in the paper. The students gained valuable insight into the engineering process through their hands-on experience.