



## PROJECT BRIEF

# I-91 Springfield Viaduct Structural Life Extension

## PROJECT PROFILE

CLIENT:  
CME Associates

LOCATION:  
Springfield, MA

### VALUE:

- Data verified model prediction for 35 years of remaining service life of the superstructure, saving the owner more than \$600 million on repairs
- Results used to prioritize decisions for Asset Management

### SERVICES PROVIDED:

- Structural model validation to assess fatigue life of critical bridge components
- Real-time dynamic stress monitoring and fatigue analysis

“Predictions based on the stress loading data resulted in an estimated 35 year life extension of the superstructure and removed the immediate need for structure strengthening, saving the owner more than \$600 million.”



## STRUCTURAL LIFE EXTENSION INSTRUMENTATION AND MONITORING PROGRAM

Geocomp's installed 150 spot weldable strain gages on superstructure steel members and collected data continuously for a two week period using a remotely accessed high-speed data logging system. In order to process the data, Geocomp developed an automated program to perform the stress loading cycle counting for the fatigue analysis in accordance with ASTM E1049-85 - Standard Practices for Cycle Counting in Fatigue Analysis. The data collected allowed for a differentiation between traffic stress loading and thermal induced stresses, which often can be magnitudinally greater than live load stresses. As a result of the successful performance of the instrumentation and monitoring program, CME was able to show all of the locations gaged resulted in a CESR that was less than the specified infinite fatigue life thresholds listed in the AASHTO LRFD Bridge Design Specifications. Predictions based on the stress loading data resulted in an estimated 35 year life extension of the superstructure and removed the immediate need for structure strengthening, saving the owner more than \$600,000,000 in repairs.



## BACKGROUND

The Interstate 91 Viaduct, constructed in the late 1960's, is an elevated bridge running through Springfield, Massachusetts. The elevated structure consists of multiple simply supported spans with a length of approximately one mile and was in need of replacement. Based on the feasibility study performed by CME Associates, the Massachusetts Department of Transportation (DOT) opted to rebuild the viaduct by performing a full deck replacement and evaluate the existing structure through instrumentation and monitoring to provide a minimum 20 year service life. CME then performed an initial fatigue analysis that showed a number of critical locations exceeded AASHTO threshold values for infinite fatigue life. Before recommending costly strengthening and retrofit repairs, CME recommended implementing a Structural Monitoring program to determine constant effective stress range (CESR).