Evaluation Of Multiple Span Continuity Behavior Using Operational Modal Analysis

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Over the years, Structural Health Monitoring (SHM) research has been evolving. A critical priority of SHM is bridge monitoring and inspection since visual inspection can be limited in methods, less accurate outcomes neglecting some actual behavioral effects of the bridge, and time-consuming. However, dynamic structural monitoring can be used to assess the dynamic behavior of structures. Using such technology in the inspection can be utilized with limited resources to represent the structure's current state and global behavior. In this investigation, an independent multi-span prestressed concrete highway bridge has been tested to evaluate the independent behavior of each span. The experiment used novel ultra-low noise seismic MEMS wireless accelerometers (Nodes) that are all controlled using a Gateway to insure synchronization of the collected data. These nodes were set to have a moving reference node which allows normalizing the collected data. Hence, evaluating the dependency of the bridge behavior in all modes. The data was collected and analyzed using Operational Modal Analysis (OMA) under regular daily traffic. The results are compared to the Finite Element Modal (FEM) to assess the impact of side rails and expansion joints deterioration on the global level.