



POST-EVENT RECONNAISSANCE – MULTIPLE HAZARDS

Learning from Natural Hazards

- Nature is the best full-size laboratory to learn how structures withstand or fail various hazards such as earthquakes, tsunamis, hurricanes, and floods.
- In particular, the large earthquake events (2008 China, 2010 Chile, and 2011 Japan earthquakes), though tragic to mankind, were great opportunities to engineers in terms of the performance evaluation of seismic design codes and retrofit design philosophies.
- The 2005 Hurricane Katrina was an ultimate test on built infrastructure and on the emergency preparedness and community resilience.

Earthquake and Tsunami

- Representative structural and wall failure modes



- Tsunami induced scour and debris impact



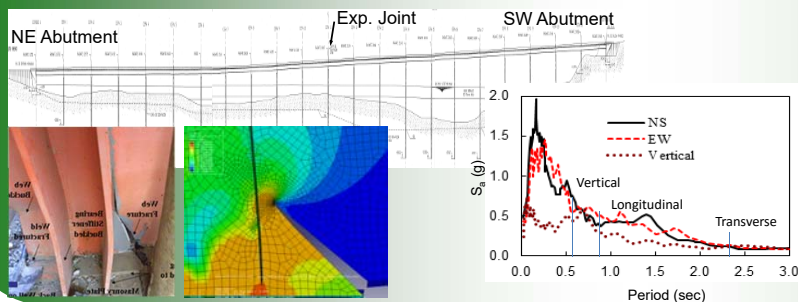
Hurricane and Flood

- Wind gust, tidal wave and flood effects
- Emergency repairs



Detailed Evaluation of Bridges

- 11 continuous spans attracted considerable longitudinal earthquake force during the earthquake and transferred it through the girder-to-abutment bearing connection, causing fracture at the bottom flange and web of girders at NE abutment and fracture at the welds between the bottom flange of girders and the masonry plate at SW abutment.
- The longitudinal ground motion caused more significant damage than either the vertical or transverse earthquake motions.



Sponsored by: U.S. Department of Transportation and United States Geological Survey.

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