

## Carquinez Bridge Replacement

### Seismic Evaluation and Independent Check

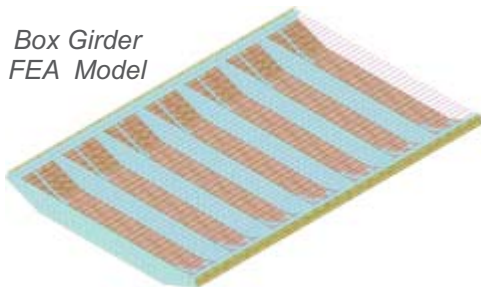
**Location: Vallejo / Crockett, CA**

**Owner: Caltrans**

The new Carquinez Strait Bridge will replace the original bridge built in 1927. The new suspension bridge will have a 728-meter main span, a closed cell orthotropic steel deck, air-spun cables, and concrete towers supported by a foundation system consisting of six 3 meter diameter CISS piles each. SC Solutions performed an independent check of the seismic performance of this complex bridge structure. A detailed model of an orthotropic deck section was utilized in order to verify its performance as well as confirm its stiffness properties.



Detailed foundation models of both towers were created and consisted of plasticity based hysteretic soil springs and moment-curvature beam elements representing CISS piles. Prior to implementation of these complex foundation systems into the global model, a thorough testing of the stand-alone foundation models, as well as determination of the foundation performance under the lateral loads was conducted and verified.



Upon completion of the dead load and construction sequence analyses, a nonlinear time history seismic analysis was performed. In addition to capturing highly nonlinear geometric effects, material nonlinearities were also represented in the global bridge model. The experience gained during this project addressed two key areas. The methodology developed to obtain the proper stress and strain distributions in the suspension bridge was extremely important because it greatly affected the global seismic response of the structure. Also, proper representation of the foundation systems was essential to the overall analytical procedure.

