The City of Coronado, California, wanted to determine the feasibility of constructing a 1.4 mile tunnel beneath the city streets to alleviate daily traffic congestion to/from the North Island Naval Air Station. Kleinfelder conducted preliminary seismic and geotechnical studies for the proposed tunnel.

**THE CHALLENGE**

The active Coronado fault crosses the proposed tunnel alignment, affecting the feasibility of the project. Very little was known about the Coronado fault's location and its potential to rupture during an earthquake, and it was uncertain whether the fault rupture hazard could be mitigated for the project. Six project alternatives were evaluated during the Environmental Impact Statement/Environmental Impact Report phase of the project.

**KLEINFELDER’S SOLUTION**

Kleinfelder’s services included geologic and geotechnical site characterization, development of site-specific ground motions for seismic design, and geotechnical engineering. Kleinfelder performed a detailed study of the Coronado fault using a combination of closely spaced cone penetrometer tests, borings, and exploratory trenches to map the location of the fault and determine its rupture offset potential during an earthquake. Kleinfelder pinpointed the location of the active Coronado fault where it intersects the tunnel alignment concept. Engineers and geologists developed ground motions and design fault displacements for the tunnel design. Ground motion criteria included developing seismic source models and site-specific design response spectra for seismic events. Kleinfelder also evaluated liquefaction and lateral spreading hazards and developed mitigation strategies. Additional studies included further characterization of engineering geology and geotechnical conditions with respect to tunnel design and construction, and characterization of environmental hazardous materials conditions along the project alignment.

**PROJECT RESULTS**

Kleinfelder’s fault hazard characterization work provided the information needed to prove the tunnel could be designed to safely withstand a fault rupture event. Overcoming this technical challenge was key in establishing the project’s feasibility.

*Kleinfelder is an employee-owned engineering, science, and architecture consulting firm providing solutions to meet our world’s complex infrastructure and natural resource challenges. Working as a team, our bright people will deliver the right solutions.*