



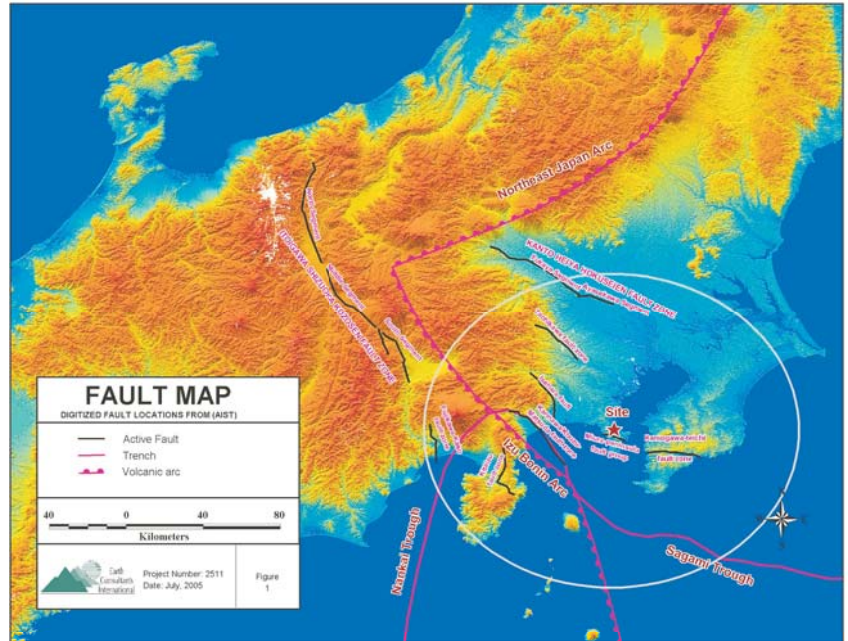
PROBABILISTIC SEISMIC HAZARD ANALYSIS AND STRUCTURAL DESIGN PARAMETERS FOR A U.S. NAVY WHARF STRUCTURE at Yokosuka, Japan

PROJECT DESCRIPTION

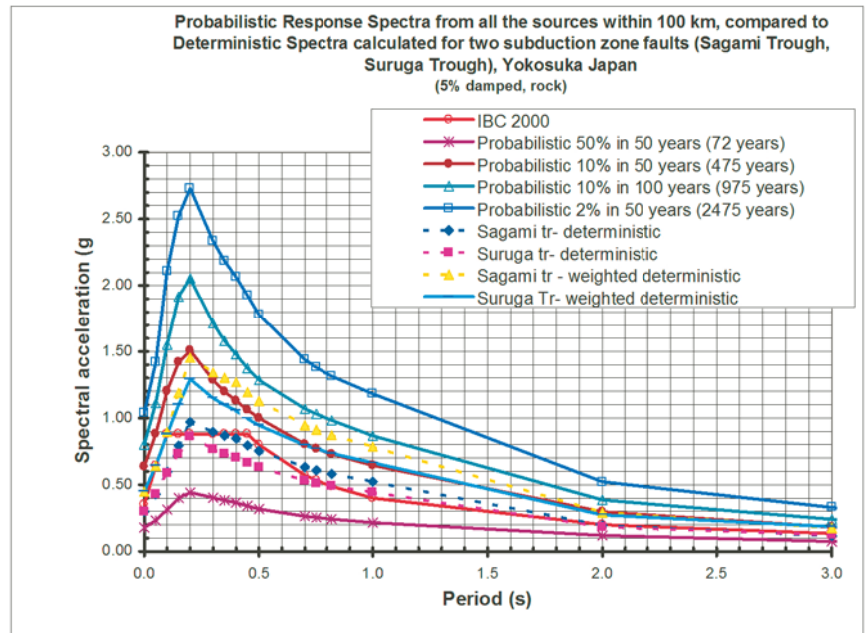
Earth Consultants International (ECI) was retained by Parsons Infrastructure and Technology Corp. to produce seismic design parameters for a U.S. Navy wharf structure in Yokosuka, Japan, using the requirements of the Naval Facilities Engineering Command's *Seismic Design Manual*. The Yokosuka harbor was heavily damaged in the highly destructive M7.9 Kanto earthquake in 1923, and also in the 1703 earthquake of even larger magnitude and local intensity, both from the Sagami subduction zone approximately 50 km offshore to the east. The 1703 earthquake created an uplifted terrace around Yokosuka Bay.

SOLUTION

ECI reviewed the seismotectonic setting using primary Japanese references, and developed a seismic hazard profile of the seismic sources within 100 km of the Yokosuka base. A database was prepared containing fault lengths and areas, magnitude ranges, recurrence intervals, paleoseismic data, and historic earthquake data for each late Quaternary fault. We selected appropriate attenuation relationships for subduction and crustal faults. These data were then incorporated into EZ-FRISK software by Risk Engineering Inc. (2005) to calculate the potential accelerations at the site using both probabilistic and deterministic methodologies. We developed a 5% damped, site-specific, probabilistic response spectra for a 50%, 10%, and 2% probability of exceedance in 50 years, and a 10% probability of exceedance in 100 years as per the methodology of the Naval Engineering Command technical manual. The effect of each source was also investigated deterministically to complete the probabilistic procedure, and we provided 5% damped median deterministic response spectra for the subduction faults which have the highest impact in the project area. Finally, we provided the typical time durations of the strong ground motion records from previous earthquakes, and a qualitative discussion of potential changes in seismic ground motion due to near source, directivity, and site amplification.



Late Quaternary faults and seismic sources within 100 km of the Yokosuka Naval Base that were discussed in the report and incorporated into the seismic design analysis.



Sample output chart from the ECI seismic design report that compares the Probabilistic response spectra with the Deterministic spectra from the two subduction zone faults.

