The Izmit Bay Bridge will be a 3 kilometre-long suspension bridge in one of the world’s most seismically active locations. It will span the boundary between the Anatolian and Eurasian plates, the source of two major earthquakes in 1999. The area is underlain by deep deposits of soft soils and unstable and liquefiable soils.

Site Investigation

Fugro’s experts worked with NÖMAYG’s technical team to develop an appropriate multidisciplinary workscope that met not only the taxing schedule but also the risk mitigation goals. Fugro mobilised equipment and expert personnel from 14 different centres in Europe and North America to provide:

- Regionwide offshore geophysical surveys
- Alignment-specific deepwater, nearshore, and onshore geotechnical investigations
- Onshore geophysical surveys
- Onshore paleoseismic investigations and geologic mapping (Byzantine aqueducts offset by the faults were mapped)

All the site work was successfully completed within the schedule. A flexible contracting mechanism and preliminary interpretations in parallel with the site investigations enabled modifications to the workscope to address additional risks and hazards identified in the initial stages.

Consultancy and Design Services

Fugro interpreted the data to map the North Anatolian fault zone relative to the bridge, define subsurface conditions in the area around the bridge alignment and develop design data at the bridge foundation locations. An integrated site characterisation approach was adopted where all of the geophysical and geotechnical data were captured in a proprietary Geographic Information System (GIS) database. This approach shortened the overall interpretation timeframe and allowed tender design to proceed concurrently.

Conceptual foundation design and earthquake engineering interpretations addressed the major site-specific design issues. The earthquake engineering interpretations developed appropriate ground shaking levels and fault displacement magnitudes to be accommodated in design. Sophisticated numerical modelling was conducted to quantify the effects of liquefaction and slope stability and provided a basis for defining safe foundation locations.

The result of Fugro’s work was a robust bid basis for bridge contractors coupled with the ability to persuade banks to finance what was perceived to be a relatively high risk project.

Paul van Riel, COO for the Onshore Geotechnical business line commented: “We are pleased to work closely with the NÖMAYG Joint Venture on this complex and challenging project and to deliver a timely result that provides critical information for the development of the Izmit Bay Bridge.”