Marmaray: Istanbul’s Super Tunnel

The Marmaray Tunnel, joining the continents of Asia and Europe via the ancient city of Istanbul, will be the world’s deepest undersea rail tunnel when it opens in 2012. This miracle of modern engineering has faced some of the toughest challenges ever encountered by engineers. In fact, Steen Lykke, a project manager in charge of construction, made this observation: “I can’t think of any challenge this project lacks.”

Lykke’s statement was no exaggeration. Besides the obvious problem of how to safely build an underwater tunnel nearly 200 feet below sea level, engineers have had to deal with obstacles both geological and historical.

First and foremost, the route for the proposed rail line lies only twelve miles from an active fault line, making it probable that earthquakes will occur in the future. To overcome this hurdle, engineers designed a tunnel built in sections that are flexibly connected together. These sections will absorb movement from a quake without breaking apart.

Another major glitch happened on dry land, as workers began digging at the site of a new central transit station for the expanding railway line. Diggers got more than they bargained for when they uncovered the remains of an ancient Roman port, Theodosius. This priceless find delayed construction by four years, as archaeologists carefully excavated the centuries-old ships, docks, and artifacts. Investigation of the remains revealed that the port may have been buried by a tsunami, a danger that remains very real today due to the fault line. Because of this discovery, tunnel engineers decided to include additional safety measures to prevent transit stations from flooding.

Due to these changes and delays, the project’s budget has far exceeded expectations. However, the positive changes the Marmaray Tunnel will bring to the region should more than offset the challenges of its construction.