

Beirut Central District Marine Works

The staff of EDESSA was retained by **Bouygues-Bouygues Offshore J.V.** to conduct a detailed offshore Engineering investigation of the Beirut Sea Front Sea Defense project. The sea defense is a \$230 million project that includes the construction of a traditional breakwater in the western portion of the site and submerged caisson and an artificial reef in the eastern portion of the site. The sea defense structures extend over 1.5 kilometers.

Scope of work included the review and evaluation of all previous investigation results and publications about the geological and geotechnical setting of the site. The actual field work included the following major tasks:



- High resolution bathymetric survey on a 10m grid. Over 200 km of lines were surveyed in order to produce the very high resolution bathymetric chart.
- Side scan sonar survey providing high quality data, to identify seabed obstacles that included waste, unexploded ordinances, rock outcrops, etc. Divers survey to visually inspect the seabed obstacles and features.
- Seismic refraction survey that covered the entire project area.
- CPT survey with pore pressure measurement at over 38 locations to assess full sediment characteristics.
- Comprehensive drilling survey that included over 600 linear meters of drilling in 33 boreholes.
- Extensive laboratory program in order to determine the physical, chemical and dynamic properties of the various soil and rock layers encountered. A special field laboratory was set-up for straight forward classification tests.
- Reports were prepared including engineering interpretative reports taking into consideration liquefaction potential during earthquakes and design parameters for the design and construction of the various structures.

