



## Crystal towers project Beirut, Lebanon

Geotechnical assistance for foundations design  
Jan. 2012 - Dec. 2012



**LEBANON - Beirut**

**Client**

**STS CONSULTANTS**

**Project owner**  
Demirdjian Group

**Miscellaneous**  
General contractor : Sayfco



### Description of the project

The project consisted in two towers (30 and 20 floors) near Antelias Bridge in Beirut (Lebanon).

The geotechnical context of the site is marked by the highly variable top level of the bedrock (from 20 to 50 meters deep) and the presence of a loose silty sand horizon at the surface with furthermore a risk of seismic liquefaction. These conditions justified the choice of a piled-raft foundation system with reinforced concrete piles 1.2 meters in diameter anchored to a depth of 3 to 5 meters in the bedrock. This system is combined with prior reinforcement against liquefaction by stone columns over a depth of 20 meters.

- Two towers of 30 and 20 floors;
- Piles  $\phi 1200$  of 20 to 50 meters deep;
- Anti-liquefaction strengthening between piles with stone columns on the first 20 meters.

### Description of the mission

TERRASOL assisted its Lebanese partner STS CONSULTANTS in the design of the foundation system for two towers.

The Terrasol FOXTA v3 software was used for estimation of the foundations displacements and stiffnesses under static and seismic conditions, taking into account the group effect, and the steep substratum.

### Our missions

- Design of the soil reinforcement solution
- Geotechnical calculations: definition of the modeling approach and monitoring studies conducted by STS