

SAFEGUARDING VENICE AGAINST HIGH TIDES

ABSTRACT

The historical city of Venice and the surrounding Lagoon sites are subject to high tides floods which have become increasingly more frequent and higher since early 1900's.

The normal tide height in the Lagoon reaches elevations ranging from 0.4 to 0.6 above the Punta Della Salute datum, located opposite San Marco Square. Flooding occurs mainly during fall and winter, in concurrence with low atmospheric pressure, strong winds blowing from Adriatic Sea and enduring rain.

During the last century the sea level has risen and the land level has dropped; as a result, Venice has "lost" 240 mm with respect to the sea and floods have become more frequent and intense. This phenomenon has been triggered by the eustatic rise of the sea level, the natural subsidence and, since 1920s, by the additional subsidence due to water extraction. In early 1970s the water extraction from the wells in the Venice and Mestre areas was forbidden; after a moderate rebound, the subsidence returned to its natural trend.

When tides exceed +1.00m Piazza San Marco and the area adjacent Doge's Palace and San Marco's banks are flooded. When tides exceed +1.20 and 1.40 m, respectively 40% and more than 60% of the city area is flooded.

The increased tidal flooding is becoming a real threat for Venice, its citizens and visitors; furthermore, the phenomenon will get worse with time. Accordingly, since 1970s studies and investigations have been carried out to defend Venice and the entire Lagoon site. A long term safeguard project has been approved in early 1990, including erosion mitigation and morphological restoration of the coastal line, the renovation of the existing jetties, the re-opening of fishing farms, reducing the traffic of oil tankers.

The following interventions aimed at safeguarding Venice from flooding will be presented.

- Mobile barrier project MOSE (acronym for Modulo Sperimentale Elettromeccanico = Experimental Electromechanical Module). It consists in a series of caissons embedded under the sea bottom at the three Lagoon inlets and housing flap gates ensuring the closure off the inlets when a high tide of elevation + 1-10 m or higher is foreseen. The project is promoted by the Italian Ministry of Infrastructures, locally represented by the Venice Water Authority.
- Insulae Project, consisting in raising the elevation of banks, pavements and sidewalks in selected areas to prevent any flood generated by tides within + 1.00m.

The Lecture will deal with the geotechnical aspects of the Mose Project focusing on some peculiar features of the Lagoon deposits and illustrating the major characteristics of the anti- flood barriers design.