

## Ravenna, early Christian Monuments

### Engineering geological conditions and problems:

During the years between 1950 and 1980, the whole Ravenna district and the city itself were affected by large-scale subsidence phenomena.

The large soil settlement measured in Ravenna in that period was about 130 cm, a considerably alarming value if we consider that the entire area of the city and the shoreline presently only averages about 1.00 m above the sea level.

As a result of intensive withdrawal of underground water and natural gas between 1950 and the present, natural subsidence in the Ravenna area has been increased by approximately 90 cm.

The phenomenon in particular interests the Basilica of San Vitale and the Mausoleum of Galla Placidia.



**Basilica of San Vitale**  
([www.ravennavisitcard.com](http://www.ravennavisitcard.com))



**Mausoleum of Galla Placidia**  
([www.ravennavisitcard.com](http://www.ravennavisitcard.com))

### Investigations and protection measures already realized:

- Geotechnical site investigation consisting in Cone Penetration Tests (CPT) and Standard Penetration Tests (SPT) for determining the characterisation of the subsoil.

- Investigation on the groundwater.

- Monitoring of the displacements of structures through measurements of the absolute and differential settlements (ranging between 0.10 and 0.45 mm).

After this studies, the opportunity of modifying the drainage system used at the nearby Santa Croce church was warmly recommended. In addition, static interventions on the basilica of San Vitale were suggested, in order to restore the positive counterbalancing effects of some loading structures surrounding the basilica, which were removed in 1900.



**An example of mosaic inside the Basilica of San Vitale** ([www.ravennavisitcard.com](http://www.ravennavisitcard.com))

### Architectural information:

The Basilica of San Vitale is octagonal in shape, with sides measuring about 15 m, and is composed of two main bodies: the taller internal body, which includes the dome, and the outer ones, comprising an ambulatory on the ground floor. The Mausoleum of Galla Placidia was built about 100 years before the basilica. The plan is of Latin cross shape.

### References on studies already done:

RICCERI G. (1996) "Geotechnical engineering for the preservation of San Vitale and Galla". Proc. Intern. Symp. "Geotech. Eng. for the preservation of Monuments and historic sites" Naples 3-4 October 1996, pag. 789-797.