

## **GEOTECHNICS OF THE SUBSOIL OF ARMENIA, COLOMBIA**

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After the Quindío earthquake, January 25th 1999, it was urgent to assess the soil properties of the city of Armenia, with the purpose of speed up the rebuilding process. To do so, in a relative short time, 3 months, a soil investigation and characterisation programme was followed including: Geophysics, including resistivity, seismic refraction and gravimetry; in key places 7 mechanical borings with downholes and SPT with depths ranging between 30 to 40 m, 11 manual boreholes up to 10 m with SPT, and 12 trenches recovering high quality block samples, were performed. The laboratory programme included classic static tests and dynamic characterisation. The dynamic testing was done across resonant column and dynamic triaxial tests.

The subsoil of Armenia comprises a body of volcanic ashes up to 20 m overlying the weathering profile of volcanic flows deposits. Such a profile includes a residual soil of 10 to 15 m, the weathered material of 10 m in average, and the intact rock (volcanic flows) with depths up to 80 m. On top of all near 300 fills of different areas and with depths up to 25m were found. Volcanic ashes are by far the most important material, where the majority of the population build their houses, and also the bad quality fills played a role.

It was found that the ashes are part of allophanic soils. Those are materials having complex geomechanical behaviour. It was found that the Atterberg limits have to be done starting from the initial moisture content, instead of drying out the material. When it is dried it suffers irrecoverable changes; the explanation to such a behaviour is related with a microstructure dominated by amorphous materials and a network of siloxane bonds.