

## 2. CONVECTIONAL THREE- DIMENSIONAL TOPOGRAPHICAL MEASURING SYSTEMS

Three dimensional displacement measurements (3D) are carried out within the Zone of influence in order to determine the movement on adjustment to be the project structures and buildings. Reflectors are installed in tunnels, structures, etc. and the measurements are made with high precision total stations by the method of free station.

The reference network of the points, which is to be used for 3D measurements, consists of reference points with permanent labelling at the locations outside the zone of influence of the works or at locations remote to the excavation faces. The reference network will be checked at regular time intervals. All the measurements are corrected by the impact of the pressure and temperature diffractions. The precision of the measurements of total displacements is  $\pm 2\text{mm}$ .

## 3. AUTOMATED MOONITORING SYSTEM (AMS) OF REAL TIME TOTAL DISPALCEMENTS (3D)

The system consists of a high accuracy networked robotic total stations and prisms located on the point of interest.

This system ensures valuable and timely monitoring of the displacements, providing high measurements density, simultaneous wireless transmission and entry of the results into the MDB system to ensure minimal time between their reading and their evaluation.

The measurements are taken with a series of automatic electronic total stations of high precision, which will record the displacement of reflecting prisms on the ground surface and on buildings.

The robotic total station are capable of carrying out automatic measurements, both at predetermined sequences and at any arbitrarily time and the maximum measurement range is in the accordance with the environmental conditions.

The total stations are remotely controlled by software and are capable of:

- Following a pre- programmed operation
- Allowing changes in the measurement regime to be implemented , including the measurement cycle
- Providing continuous data for one point.

The system allows the above changes to be made remotely via internet connections. The instruments are capable of self- seeking a point which has moved by at least 30mm without affecting the monitoring regime/ data return time adversely.



Gold Lines, Doha Qatar



WFGD UNIT at UNIT III of PPC S. A Megalopolis



Underground Parking, Kifisia, Attica



Hill Area at SNFCC