Dynamic measurements beyond and above static ones are critical requirements in tunnel monitoring as earthquakes can cause permanent damage with serious consequences. Timely and precise measurements of pre-defined parameters will provide the data to understand the behaviour of the structure and monitor the rate of change. A combination of static monitoring options such as deformation, displacement and settlement can be used to further provide an indication of the performance of the tunnel.

As well as the local regulations outlining the requirements for the monitoring instruments; other factors such as the type of the tunnel, its construction method, age and length, and seismicity of the area are amongst important considerations when specifying a tunnel’s instrumentation.

Contact us for a comprehensive consultation and discussion on your Tunnel Monitoring requirements.

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**OUR SERVICES**

- Advice
- Consulting
- Technical Proposal
- Financial Offer
- Planning
- Installation
- Training
**What can be measured?**

There are a multitude of options for monitoring the changes in a Tunnel. Each project will have its own unique requirements. The structural engineers will dictate such requirements for which our experts can then provide the appropriate package.

**The most widely used packages for Tunnel Monitoring:**

1. Vibration: Structural health and behaviour
2. Strain: Fatigue and curing related effects
3. Displacement: Joints, cracks and differential displacements of segments
4. Environment: Humidity and temperature

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**Kit Example**

For seismic monitoring of a typical segmented tunnel, a simple installation with the following equipment will be required:

- 1 off CR-6 Recorder with 27 channels including GPS
- 4 off AC-73 Triaxial Accelerometer
- 3x2 off GS-LVDT Linear Variable Differential Transformer
- 4 off GSG-Cx Straingage
- 2 off METEO-TT Temperature Sensor
  - Cable and Software

**Analysis Capabilities**

A typical setup as above will provide valuable information about the behaviour and status of the tunnel. Thresholds for acceptable changes in the structure’s monitored values can be set to provide automatic notifications. After a natural disaster, at an instance valuable information about changes in the structure’s behaviour can be provided. Safety decisions about the tunnel and its operation and alerts to the local population can be made based on credible data and analysis.

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