

# Settlement Levelling

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## HIGHLIGHTS

- Large selection of flexible marking techniques and systems
- Use of the most modern digital levelling systems and precision staffs
- Automatic analysis using specialised software
- Generation of quality graphical diagrams of results
- Alarm and report functions via the KRONOS information system



*Levelling of high-rise building during construction*

## Field of Application

We perform systematic geometric levelling for monitoring of objects whilst construction work such as tunnel heading, ground excavations etc. is in progress nearby, as well as generally for monitoring the height of existing engineering structures or structures being built such as track systems, masts, buildings, embankments, dams, bridges and other high-rise buildings.

In the case of tunnel construction near the surface, settlement measuring cross sections are often set up at regular intervals at the surface to observe the levels during the building phase. This procedure is also often used for monitoring undercuts or breaks in the face of unstable slopes. Our software also illustrates the relationship between surface settlement and underground displacements, which is of particular advantage for geotechnical analysis.

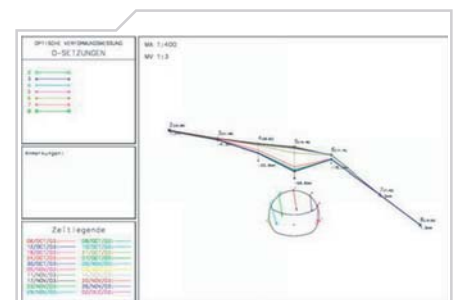


*Precision-levelling during construction of Metro Santiago de Chile*

## Description of Services

### Measuring process

With settlement levelling, the absolute heights of one or more fixed points which are on stable ground are related to a number of marked height measuring points. Our surveying teams can perform the work in terms of planar or line levelling, depending on the arrangement of the measuring points.



*Diagram showing the surface settlements and displacement vectors in a tunnel*

## Settlement Levelling

The surveying equipment is selected in accordance with the accuracy requirements which today means the use of modern digital levels, and the measurements are either a simple levelling survey or engineering or precision levelling. In the case of levelling loops the final error due the over-determined levelling method – which is a measure for which is a measure for the general correctness of the results and the overall achieved accuracy - is distributed in the analysis. In levelling meshes, the analysis is performed in the context of a net compensation. Accuracies from some tenths of millimetres to millimetres can in this way be achieved.

### Analysis

The digitally acquired data are processed using our EUPALINOS software. The results are recorded as numerical lists and graphs in the form of time vs. settlement diagrams and settlement depression lines, height contour lines and models, etc. They can also be incorporated directly into our KRONOS information system and used for alerting purposes, for instance.

## Scope of Services and Delivery

GEODATA offers the execution of settlement levelling to customer specification, including all the required materials, equipment and staff. Synergies can often be achieved in combination with other services such as optical 3D-displacement measurements or construction surveys.

We can also offer automatic online height measuring systems for continuous monitoring!



*Line levelling in an utility gallery which is at risk of sliding*



*Visualisation of settlement monitoring sections by the software KRONOS*



*Training by customer order*

*The following other data sheets are associated with this data sheet:*

- Services:            *Monitoring of Settlements with Laser Levelling System*
- Software:        *KRONOS Tunnel Information System*  
*EUPALINOS Surveying Software*
- Systems:         *Track Monitoring*