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## THE USE OF TOPO-GEODETIC MODERN TECHNIQUES AND METHODS IN BUILDINGS MONITORING

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**Abstract:** The main purpose of this project is to perform the geodetic-topography works necessary to track the stability of the United Business Center 1 building, 64 Teodor Mihali Street, Cluj-Napoca. For this purpose, the TCR 805 Total Station was used for point-of-point orientation to measure the trace marks of these building by configuring a closed tramline each time. These measurements were performed over a period of 7 months at close intervals. The landmarks are located around the buildings, to cover an area as large as possible and for better accuracy. By comparing the measurements of different months, it can be determined whether the building has moved vertically or horizontally. Topo-geodetic works are part of the terrestrial measurement sciences, a field whose purpose is to represent on plans and maps, in a certain projection and at a certain scale, the terrestrial surface as well as the details existing on it. The monitoring of the construction's behavior over time is carried out throughout the life of the construction, starting with its execution, and is a systematic activity of collecting and capitalizing (through the following methods: interpretation, warning or alarming, damage prevention, etc.) of the results recorded from the observation and measurements on some phenomena and quantities that characterize the properties of the construction.  
**Key words:** Marks, measurements, building, tracing

### • Introduction

It was chosen as a study topic to carry out topo-geodetic works necessary to follow the stability over time of the United Business Center 1 building, located on 64 Teodor Mihali Street from Cluj-Napoca. Topo-geodetic works are part of the terrestrial measurement sciences, a field whose purpose is to represent on plans and maps, in a certain projection and at a certain scale, the terrestrial surface as well as the details existing on it. The monitoring of the construction's behavior over time is carried out throughout the life of the construction, starting with its execution, and is a systematic activity of collecting and capitalizing (through the following methods: interpretation, warning or alarming, damage prevention, etc.) of the results recorded from the observation and measurements on some phenomena and quantities that characterize the properties of the construction.



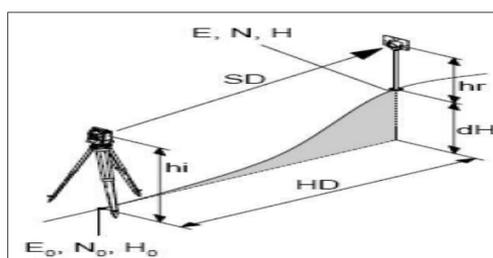
### • Results and discussions

As part of this project, a retro-intersection was made, from station point 1 with visas to 3 points with known coordinates. The problem of backward intersection or retro-intersection consists in determining the flat absolute rectangular coordinates of a new point P ( $X_p$  and  $Y_p$ ), stationable, in relation to at least three old points (towers of tall buildings, antennas, signals, etc.), determined by their coordinates. The method is always applied when new points need to be determined, in particular for density, but in the working area there is no visibility except for inaccessible points, as well as when later in the phase of raising the details the need to determine a point as precisely as possible is felt. The present work was carried out in order to follow the stability over time of the building.



### • Material and method

The development of the measurement technique created the possibility to observe and highlight the behavior of the studied constructions. There are many classification systems for research and observation methods. Thus, classifications were made according to the type of deformations, the type of devices and the place where the devices are placed during the research. Depending on the location of the instruments during the research, there are two categories of methods for determining the displacements and deformations of the constructions: - physical methods; - geometric methods.



### • Conclusions

Following the studies carried out on the United Business Center 1 building located in Cluj-Napoca, on 64 Teodor Mihali Street, regarding its stability over time, it was found that the differences both on X, Y and Z are very small, they enter the measurement error of the device.

The differences being small which means that a more thorough analysis of the data is not necessary?

To carry out this study, the total station TCR 805 was used, the rappers being measured through a closed journey in several determinations, they being located around the buildings for better accuracy both on the horizontal and vertical planes.

Due to these results it is clear that this building was well constructed and does not require further measurements in the near future.