

# TIME TRAKING THE EVOLUTION OF THE FACULTY OF LAND RECLAMATION AND ENVIROMENTAL ENGINEERINF BUCHAREST

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## Abstract

*Deformation is the changing relationship between the points subjected to the stresses building. Measuring displacements and deformations may have a construction absolute or relative. Situation corresponds to the relative measurements of the near or distance measure of two or more points in the building. Corresponding absolute position shift points when construction is measured against a set of fixed points, located outside the zone of influence of the strain construction and soil foundation, forming a general reference. Building of Faculty of Land Reclamation and Environmental Engineering in Bucharest is subject to a request under its operating conditions determined and suffered displacement and strain in linear time. This paper aims show how the design evolved over the past five years.*

*Keywords: building, deformation, displacement, measurement, monitoring*

## 1. INTRODUCTION

Under the forces of gravity of the building, because of changing soil moisture and the soil temperature and other causes of soil particle movement occurs. Because of building the soil tamp it down (without changing the structure of soil compaction), it swells, sit (down layers of soil in areas of bare rock) and moving in the horizontal direction (sliding). Corresponding displacements occur foundations of buildings and land parties. Movements can be building plan and elevation. Building movements in altitude is call subsidence, and plan trips. If you travel to different parts of the building are equal in size and direction, they are call uniform-uniform otherwise. Irregular movements of the points lead in changing the shape and size of building, so in their deformation. Construction experience has shown that all buildings and construction are subject to movements and deformations. Construction there is absolutely displacement and deformable (Popescu, 2011).

It was founded that could cause deformities and variable load, acting on, construction. For example, loads due to wind, solar radiation, vibration during operation of equipment, seismic force. After building character deformations can be divided into elastic and residual. If, after termination of loads over the initial construction, the deformations are elastic. Elastic deformations occur when the load does not exceed a limit value determined. If the action tasks exceed this limit, the size and shape do not return to its original construction. In this case, it is unbalanced sustainable construction. The construction elements cracks and disruption occur in some cases is possible injury or destruction of the building.

In order to prevent accidents and more detailed study in the causes of poor quality of construction, carry out systematic observations on deformations and displacements construction. To achieve this goal in building structures and special facilities are placed devices to record movement's mutual tensions and building points. In making these observations are useful method surveying, which enable the movement of points in general construction and structures in space

## 2. MATERIAL AND METHOD

The movement is changing the position of a subject point of construction applications. Deformation is changing relative distance of the points subject to construction applications. Measuring displacements and deformations can be character building relative or absolute. Corresponding measurements of the relative position is near or distance measure when two or more parts of the

building subject to observation. Absolute measurements of displacements of points corresponds to the situation when building is measured against a set of fixed points, located outside the zone of influence of construction and foundation soil deformation, forming the so-called general reference. A construction application subject to a regime determined by its functional requirements may have displacement and strain linear, angular and specific.

### **2.1 Linear displacement and deformation**

Settlements are down vertical movement of the foundation sand the soil of the construction. Settlements can be - when every foundation construction uniform moving the same amount of time with the same value; uneven - when building the foundation points moving with different values. This deformations category of are not accompanied by a radical change in land structure. The field collapse is a deformation caused by radical changes in the structure of the land.

The most frequent cases are:

- Compacting their land if they soak through macro pores large amounts of atmospheric precipitation;
- Compaction of loose sandy soils in an earthquake;
- Thawing of frozen land that was built so.

Bulging or lifting is traveling vertically up the building foundations or the bottom of the pit dug for the foundation of a building. These pressure changes equilibrium foundation soil structure; Arrows construction elements such as beams, columns, plates, subjected to vertical or horizontal loads causing bending their respective axle to remove the parts in the central area to its original position with a maximum value called the arrow; Inclines are due to uneven settlements without changing the integrity of construction and geometry components [2].

Construction is characterize by tilting its axis deviation vertical line and is expressed by the value of linear, angular or relative. Tilting foundation is a flat sole deviation from its horizontal position and is expressed by a linear or relative size. Construction irregularities measured by the maximum difference of each two uneven settlements nearby supports the reported distance between them. Cracks and fissures that are tearing the plane or in separate parts of the building, due to uneven settlements and the emergence of additional stress; Horizontal movements of some elements of construction or whole, mostly due to horizontal forces (pushing the earth, pushing water) or change the balance of the building foundation soil. Sometimes we measure horizontal movements of land areas in the pursuit of stability of earthworks. Deformation is the most common settlement of construction. Uniform settlement does not affect the stability and rigidity of construction. When these values are important, the final settlement exceeds the total calculated design or settlement at a certain time. Can cause complications in the construction and operation contribute to the emergence of other deformations. For example if the ground floor of the building part down below the groundwater and waterproofing works were not initially foreseen in the implementation of the foundation, or have been damaged under the effect of compaction, flooding occurs underground construction. Irregular settlements are more dangerous than uniform or significant effects on the integrity and stability of the building.

### **2.2 Angular displacements and deformations**

Spins are foundation elements of construction (radial, foundation blocks, etc.), due to the action requests and change the balance of the soil foundation. These spins can occur horizontally (twists of construction) or vertical (slope of the building). Determining the size of these spins is done with instruments, devices and devices having corresponding amplitude of their likely accuracy and can give two types of data:

- Sizes linear relation whose tangent determines the angle of rotation;
- Size expressed angular rotation angle of the building element observed.

### **2.3 Specific deformation**

Specific deformations are elongations or shortening of construction element (element of reinforced concrete, concrete reinforcement, metal bar, etc.) under the effect of strain or

compression element. Using the relationship between effort and play unit that acts on specific deformation resulting expressed by Hooke's law in the elastic state can assess existing efforts in building element

### 3. RESULTS AND DISCUSSIONS

#### 3.1. Characterization of construction

The building of Faculty of Land Reclamation and Environmental Engineering consists of three buildings separated by seismic joints. Seismic joints are provided in order to separate between these bodies and dynamic geometric constructions with different features to allow them to swing under seismic actions independently of each other. The seismic joints or adjacent buildings to avoid collision limited effects of possible collisions. Seismic joints are compression joints. The three bodies were built to respect the criteria for regularity in plan and height. The building is symmetrical in plan with respect to two orthogonal directions. If construction can produce the phenomenon of subsidence cracks appear in the body and travel to the top. In 2006, we start to study the three buildings of the Faculty of Land Reclamation and Environmental Engineering – Bucharest (fig. 1). Measurements were making with electronic tachymeter. Each point was measured in two stations located at 100 degrees from each other. In May of this year, we returned to the A body of the faculty (fig. 2). Measurements were performed us a Leica total station. Exterior columns are measured in three different stations (fig. 3) (Slave, 2006).

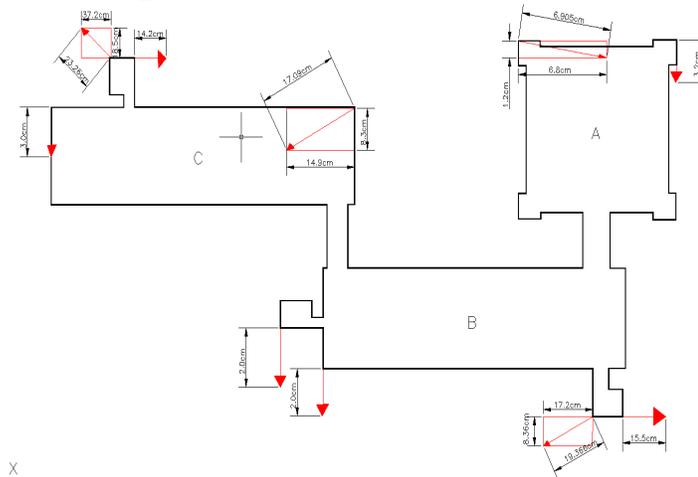


Figure 1. Displacement at the top of the three body building

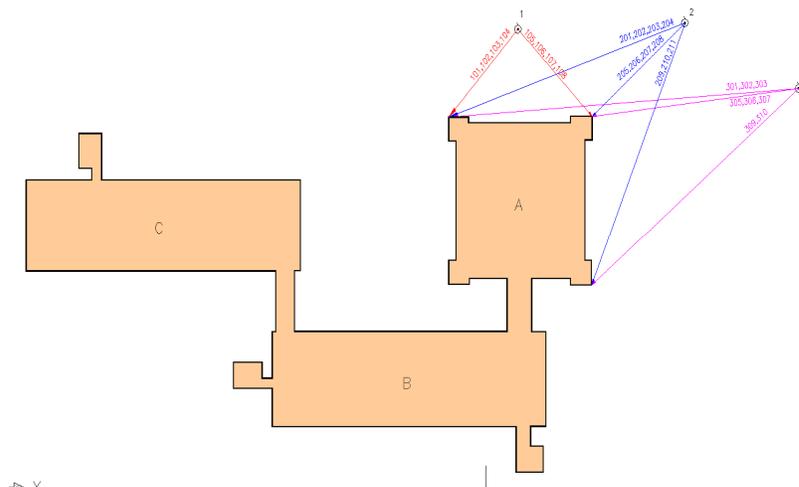
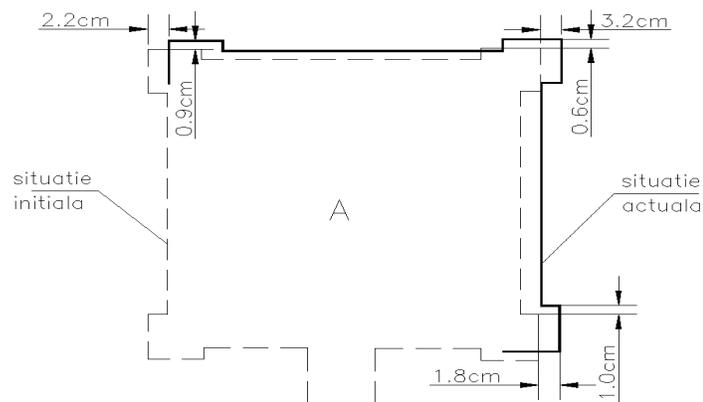


Figure 2. Sketch visa (the stations)



**Figure 3. View of station 1**

Below are the changes that took place at the situation in 2006.



**Figure 4. Displacement situation**

#### **4. CONCLUSIONS**

1. Behavior monitoring of construction has an essential role in ensuring its sustainability.
2. With the situation in 2006 is seen as peaks of body suffered displacements.
3. For monitoring while the building is necessary to have a permanent system.

#### **5. REFERENCES**

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