„IN SITU" VERIFICATION FOR THE FULFILLMENT OF CONSTRUCTION'S REALIZATION PROJECT

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Abstract. Under the current urban clustering conditions, due to the already existing constructions, the size and configuration of the land on which the construction is located, as well as the position of the site within the village, the on-site verification of the method for the following the project is difficult. This paper presents an 'in situ' verification of how the project was fulfilled in the execution stage using the program library of the total station.

Keywords: topographical methods, monitoring, positioning, deviations determining

INTRODUCTION

The application of a project on the ground is more and more difficult due to the site conditions and the configuration of the land on which the construction is to be built.

If the topographical activity in the tracing stage of the construction is limited by the site's external conditions, after the start of the construction's building the monitoring of its execution is also limited by the building itself, especially in the case of constructions without a regular configuration. Positioning in relation to the building's boundaries, neighboring buildings, observance of the designed dimensions and shape, vertical arrangement, verticality of the construction and the conditions imposed by the building authorization are becoming more and more difficult to verify.

MATERIAL AND METHOD

In order to check the location of the building, its dimensions and other elements, the topographical decks in the building's lifting/tracing network are used. The site of the surroundings on which the position of the construction's axes is marked, is at a distance of 1,5÷2 or the depth of the foundation pit.

When the site is located in a clustered area, the construction tracing conditions are limited, the position of the building's axes and the zero rate is materialized on the property's fences or on neighboring buildings (if the owner's permission is given).

When verifying the execution method, seeing that the construction is built in part or in full, the points of the tracing network are already destroyed in most cases and the signs marking the position of the axes are almost all missing.

Under these conditions, the specific verification method can no longer be applied, but using a total station capable of measuring the RL distance - reflectorless distance and using programs in the program library with which the station is equipped, the building under construction can be monitored or the completed building may be verified.

To illustrate the proposed verification method, consider the blueprint situation of a building with an irregular configuration located in a clustered area (Figure 1). The construction designed on the building with the postal number 19 has its shape determined by the terrain configuration.

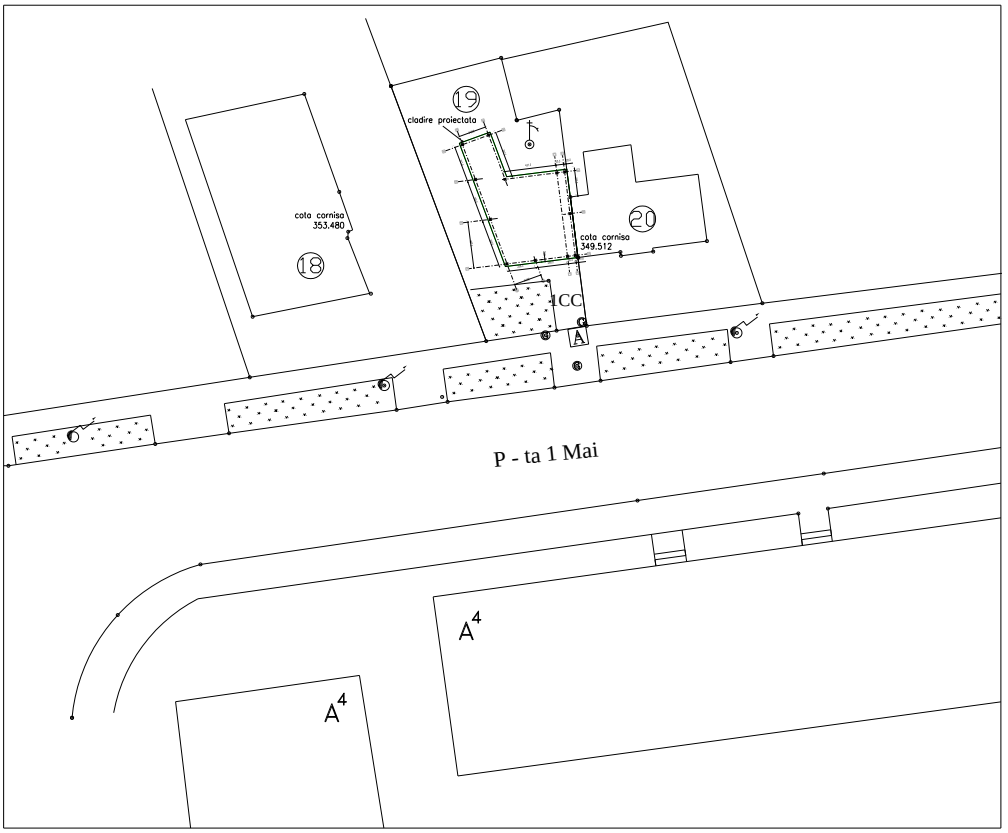


Fig. 1. Blueprint situation

It can be noticed that the shape of the land and the location of the designed structure, together with the existing conditions in the field, make it difficult to monitor the execution and the project of the designed building.

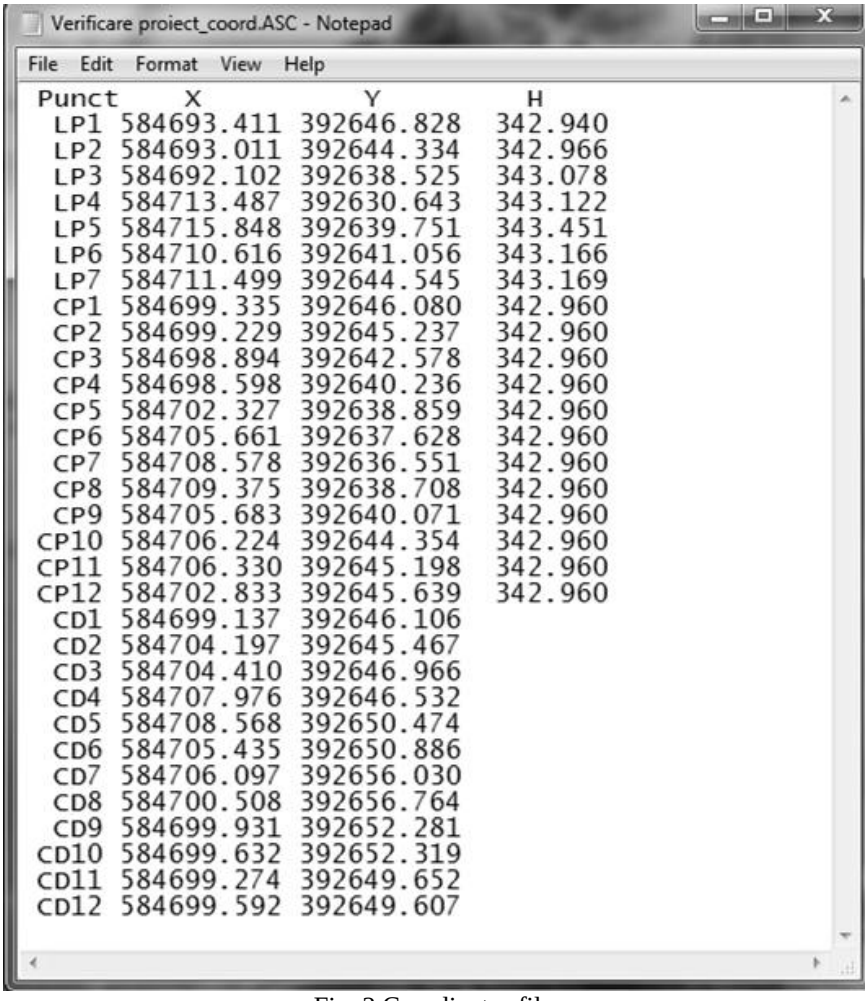
Trough the proposed methodology, using internal programs of the total station, the verification of the positioning in relation to the building's limits and the neighbouring buildings, the designed shape and dimensions, the vertical arrangement, the verticality of the construction, etc. can be made.

From the project, the projected coordinates for the building, the coordinates of the building's boundaries, neighboring buildings, and other characteristic points are extracted.

The name of the points (ID) will be chosen so as to link to the nature of the point; for example, the points on the building's property limit will be in the form of LP1, LP2, ..., the points of the designed building: CP1, CP2, ..., the neighbouring buildings points: CD1, CD2, ... (neighbouring building to the right), etc.

The coordinates file (Figure 2), ASCII type, will be converted to GSI type file using the specific transfer software and then transferred to the total station.

When making observations for the field verification, account will be taken of the nature and position of the verified point in relation to the points in the coordinate file, for assigning the points' IDs. Thus, in the example previously shown, the points' ID will be CR1, CR2, ... (CR - completed building).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Punct	X	Y	H
LP1	584693.411	392646.828	342.940
LP2	584693.011	392644.334	342.966
LP3	584692.102	392638.525	343.078
LP4	584713.487	392630.643	343.122
LP5	584715.848	392639.751	343.451
LP6	584710.616	392641.056	343.166
LP7	584711.499	392644.545	343.169
CP1	584699.335	392646.080	342.960
CP2	584699.229	392645.237	342.960
CP3	584698.894	392642.578	342.960
CP4	584698.598	392640.236	342.960
CP5	584702.327	392638.859	342.960
CP6	584705.661	392637.628	342.960
CP7	584708.578	392636.551	342.960
CP8	584709.375	392638.708	342.960
CP9	584705.683	392640.071	342.960
CP10	584706.224	392644.354	342.960
CP11	584706.330	392645.198	342.960
CP12	584702.833	392645.639	342.960
CD1	584699.137	392646.106	
CD2	584704.197	392645.467	
CD3	584704.410	392646.966	
CD4	584707.976	392646.532	
CD5	584708.568	392650.474	
CD6	584705.435	392650.886	
CD7	584706.097	392656.030	
CD8	584700.508	392656.764	
CD9	584699.931	392652.281	
CD10	584699.632	392652.319	
CD11	584699.274	392649.652	
CD12	584699.592	392649.607	

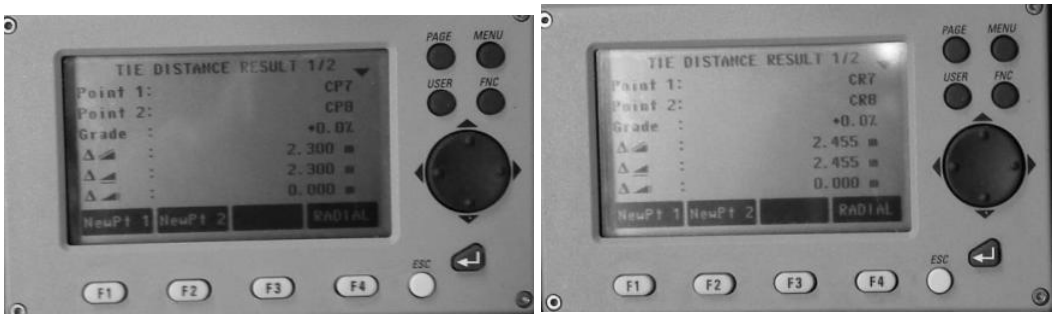
Fig. 2 Coordinates file

The starting point of the observations on the polygon shaped contour of the construction will be recorded with two different IDs but with the same coordinates in order to be able to convert from the polygonal contour of the completed building to that of the designed building. The case will be the same at the assignment of the points' IDs specific to each level of the building.

RESULTS AND DISCUSSION

After making the observations in the field and after prior check of the possibility that the constructive solution has undergone authorized modifications during the execution of the construction, it is necessary to determine the values of the completed building's dimensions, both horizontally and vertically.

From Programs, using the [MENU] key, choose the Tie Distance application and, in the instrument's memory, select - with the LIST or FIND command - the points that define the projected value of the verified dimension (in the previous example: CP7, CP8) then the ones that define the achieved value (in this case CR7, CR8) - Fig. 3 a, b.



a. b.

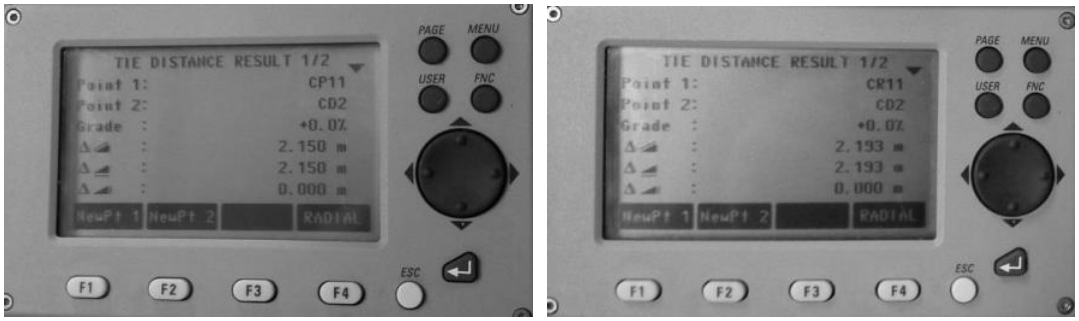
Fig. 3. Verifying the dimensions of the construction: a. – projected b – completed

The values for the horizontal dimensions will be compared (row 5 on the display).

The difference between the projected value and the completed one indicates, for that side, the deviation with which the construction was built.

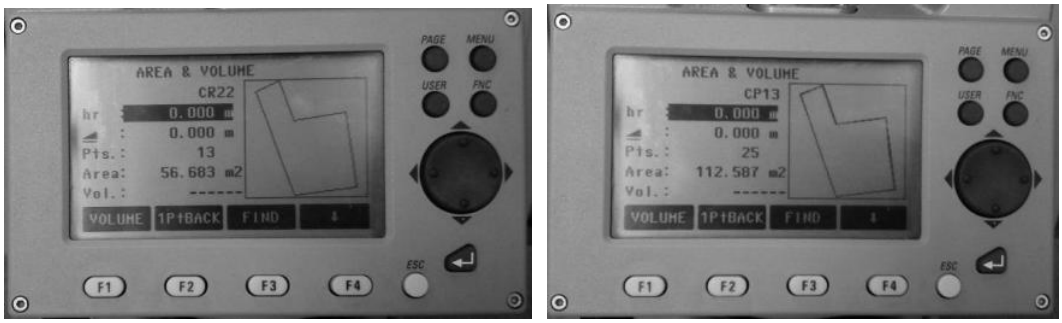
Similarly, one can check the dimensions on each level of the building as well as the vertical dimensions.

The positioning of the construction within the edifice and in relation to neighbouring buildings is also achieved with the Tie Distance application. For the previous example, the position of the building in relation to building on the right, with which it has a common wall on a portion, is checked (points CP11 - CD2, respectively CR11 - CD2) - Fig. 4 a, b.



a. b.

Fig. 4. Verifying the positioning of the construction: a. – projected b. – completed



a. b.

Fig. 5. Verifying the configuration and the surface of the construction: a. – completed b. – projected and completed

For verifying the compliance of the configuration and the surface the Area & Volume application is used. Select the points on the completed contour (CR1 - CR12, CR22) of the building, then the ones on the projected contour (CP1 - CP12); the point CR22, whose coordinates are identical to the CR1 point, is used for the transition from the polygonal contour of the completed building to that of the designed building.

By selecting the completed building's points on the display the surface and its geometry are displayed, and after the decks on the projected contour are selected, the displayed area will be the sum of the two surfaces, in this case of SR + SP = 112, and on the display is represented the geometry of the construction overlapping the geometry of the designed construction - Fig. 5 a, b.

CONCLUSIONS

The presented methodology allows for the direct on site verification of the way in which the dimensions and the projected shape in the execution stage were abided, the positioning in relation to the boundaries of the building, the neighboring buildings, the vertical arrangement and the verticality of the construction, as well as the conditions imposed by the building authorization, in situations where, due to the urban cluster, the known methods cannot be applied, while still providing 'in situ' information about the value of the deviations in the verified execution stage, and the final deviations from the project if verification is made after the completion of the construction.

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