

APPLYING 3D CADASTRE ELEMENTS IN DEFINING BUILDING'S COMMON SPACES IN PRISHTINA

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SUMMARY

The purpose of this paper is to give a short overview of the model developed regarding common spaces record for the condominiums in urban area of Prishtina. The proposed model developed from the author of this article aimed to adopt 3D cadastre requirements and techniques for common spaces registration. The techniques adopted within project represent one of the first steps towards 3D cadastre in Republic of Kosovo.

Key words: 3D cadastre, Building's Common Space, Building Cadastre, MCO, Database

INTRODUCTION

During 2008/09 and after during 2012/13 a project named Building Cadastre has been finished in Kosovo. The purpose of this project was to create a register of Buildings and Parts of the Buildings as cadastral units according to the Law (Law no. 04-L/013). As the result of this project all condominiums in Prishtina were registered and property certificate was issued for the owners who succeeded to prove their ownership on parts of the buildings. In total 24606 parts of the buildings/apartments were registered only in urban area of Prishtina (GeoProject, 2011). But as every new development Building Cadastre Project has its own weaknesses! Building cadastre project was focused in defining and registering the apartment ownership but it failed to measure and register common areas. Faced by this problem Cadastral Office within Prishtina Municipality (MCO) initiated a pilot project named "surveying of common building's spaces in Prishtina" which aims to measure and to create a register for all the common areas.

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The concept of 2D area is more and more seen as “3D space” due to 3D cadastre developments throughout the world (STOTER, 2004); therefore, the company selected to fulfill this task and based on the project title where the word used was “Space” saw this as a good opportunity to introduce some elements of 3D cadastre since the law does not have any restriction on this. They have developed a model and presented it to the experts from MCO. This model was accepted and as a result the project was done based on this idea with few changes during the process.

The aim of this article is to give an overview how the pilot project was performed and valuating the final results and give in the end recommendations. As result from the pilot project a database model was developed accompanied with a graphical design model.

SURVEYING BUILDING’S COMMON SPACES IN PRISHTINA

Within the project, the Municipality of Prishtina wants to determine all the common areas within the buildings. Those properties can be classified as “everybody’s and nobody’s property”. This project can be considered as fulfillment of the project finished from Kosovo Cadastral Agency in 2012 where a register of parts of the buildings was created and from then for all the owners of appartmens in Prishtina an ownership certificate was issued. The previous project was mostly based on papers and contracts shown by the owners of the parts of the buildings/apartments within condominiums. The common areas within those affected condominiums where not specified in graphical data nor where mentioned in any way in textual data/registers. Therefore, the Cadastral Office within the Prishtina Municipality (MCO) was faced with cases where some more specific information was needed regarding common spaces. The idea for measuring and registering common properties came by the experts working in MCO even that technical aspects where not known yet.

REQUIREMENTS FROM CONTRACTING AUTHORITY

The contracting authority made clear briefly the importance of the information streaming from this project for the municipality. Also defined the laws and regulations issued by different authorities which should be taken into consideration. Since there was no model how the data collected on the field should be arranged the contracting authority has left this opportunity open for the contractor to propose a solution. All what was defined was the format for data delivery (MCO, Tender dossier, 2015).

THE PROPOSAL FOR PROJECT DEVELOPMENT

The company which has won the tender gave a proposal how this project should be finished. The idea was based on elements from 3D cadastre and this way we can consider that this is a first step towards 3D cadastre in Republic of Kosovo.

The list of areas defined as common properties and which should be covered is given by the master plan delivered and approved by MCO. Therefore, the areas of the buildings covered by the project and considered as common properties are:

- a) Entrances and hallways of the condominiums,
- b) Spaces used for stairs,
- c) Spaces used for elevators,
- d) In front platforms dedicated for public usage,
- e) Common areas inside the building used for parking,
- f) Warehouses used for common purposes,
- g) Common areas used for waste collection within the condominiums,
- h) Structures used for building connection and Flat and non-flat roofs (Law no. 04/L-134).



Fig. 1. Types of common properties. A – structure used for building connection, B – platform, C – parking area, D – stairs.

A register for common properties was proposed as well. The idea was to use the existing code which was given for each of the buildings by “Building Cadastre” project and add some more codes in order to identify the common properties and their usage destination. Figure 2 shows a sketch taken from Building cadastre and the unique code for the building.

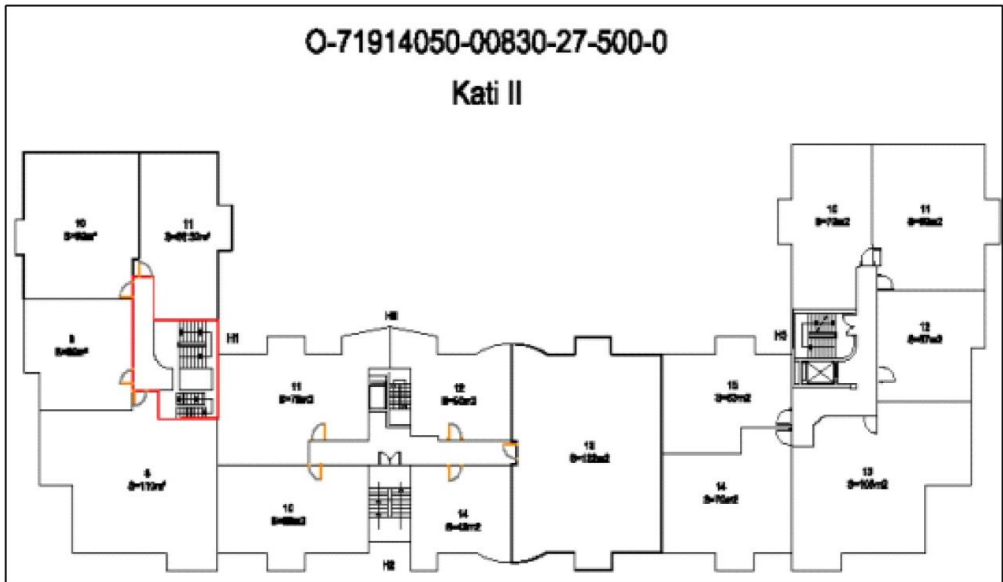


Fig. 2. The unique code and a sketch from building cadastre (Meha et al, 2013)

After consultations with MCO it was decided that the unique code for each common property should be as described below:

“Cadastral Zone” – “Parcel Number” – “Building Number” – “Common Property Code”

The “Common Property Code” should be: **HPn-E-No** and where:

HP – means Common Property,

n – tells the floor,

E – is the entrance number and finally

No - is a number which starts from 1 and ends depending on the number of the common areas within one building.

Also it was suggested and approved that the textual data collected on the field should be archived in a register which should be in excel and access format. The first part of this register was taken from the building cadastre respectively from “the data for the building” and the second part of the register was created exclusively for this project (“News” LTD, 2015).

NO	Municipality	Cadastral Zone	Building Number	Address of Building	Place name	Area [m ²]	Unique No of common property	Actual Use	Floor Number	Area of C.P.	Unit Status	Owner	Remarks
1	Prishtinë	Prishtinë									C P	Common property of the owners of parts of the buildings	

Table 1. The attribute table for registering common properties.

The data archived on the above table are also connected in graphical data as attributes for the features.

In Building Cadastre, for registration of buildings and parts of the buildings the needed information is: mortgages, numbers and addresses for the buildings, buildings already registered in cadastre and the linkage between the buildings and parcels (Meha and Buschhoff, 2011). The same principle was used also for common property registration.

DATA COLLECTION

The data on the field were collected using classical instruments as Total Station and Distance measurements devices. The footprints of the buildings together with corner points on the roof were measured by Total Station and inside distances including floor heights were measured with distance measurements devices. Also pictures were done for all the buildings - outside and inside areas. This information was considered sufficient for the purpose of the project. Measuring buildings, as one of the cadastral units, with geodetic devices in Republic of Kosovo means that the point measurement should not exceed the accuracy of $\sigma = \pm 3$ cm and with an allowed error of $\Delta = \pm 2\sigma$ (Guideline no. KCA 2013/02). The author of this article who is in the same time the creator of this model, helped by experts of the company selected to implement this pilot project, has tested and concluded that this measuring technique keeps the errors inside the accuracy limitations.

All the data collected in the field was archived in digital and manual folders. The manual files where sketches prepared specially for this topic and we found that they were very useful materials.

DATA MODELLING

The digital model was constructed using the software Civil 3D version 2012. All the information collected on the field was digitized and modelled in 3D. The textual data or attributes were systemized in a database created in access format and then the attribute table was uploaded into the cad format file. As final result we have created a file which contains and integrates both graphical and textual data.

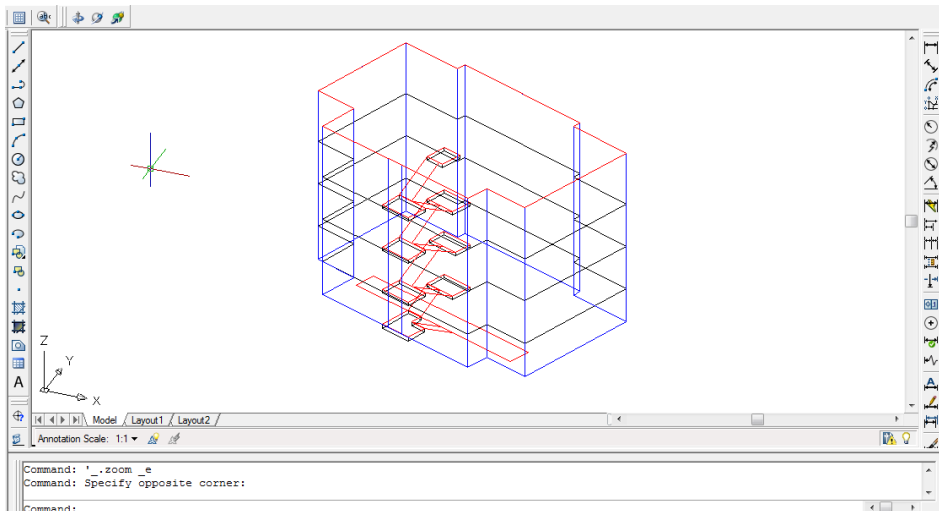


Fig.3. Identification of common properties within one of the buildings.

As it is obvious in the picture above the graphical data file contains the footprints of the buildings and the heights measured on the field by geodetic equipments. Inside the building the common areas are modelled and their position in the building represents their realistic position of the field. The inside area of the buildings was measured using simple equipments such as distance measuring equipments. Photo cameras were applied as well in order to bring a clear view in the office and this was found out to be very useful. In figure 3 the red color represents the common areas while the blue one represents the outside area and the shape of the building.

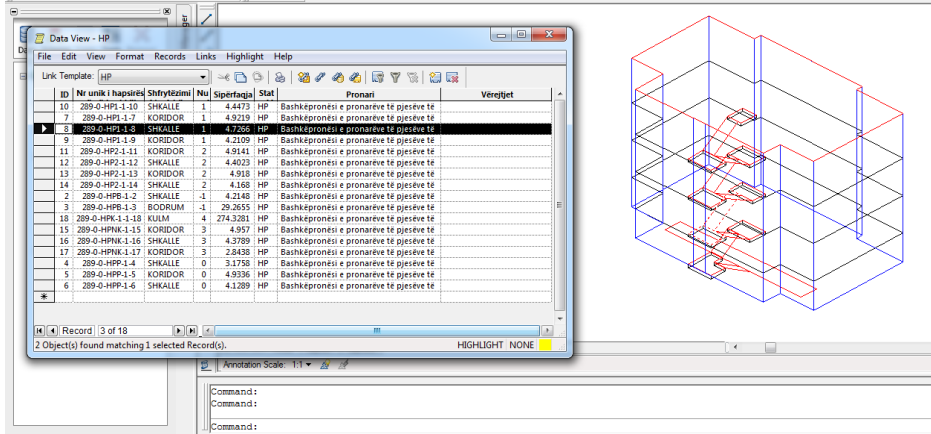


Fig.4. The attribute table attached to the graphical data.

Figure 4 shows the incorporation between the graphical CAD file and the access attribute table where the textual data are archived. It is important to state out that there are two different layers created and one attribute table for each of the layers. The first layer contains the footprints and shape of the buildings associated with an attribute table containing the data already existing in Building Cadastre. The second layer contains the boundaries and graphical information for common properties. This layer is linked to an ACCESS database which contains textual information such as area, type of use, unique number etc regarding common properties.



Fig. 5. Modelling common properties for condominiums.

STATISTICS

The project initiated from Municipality of Prishtina aims to create the guidelines and test the registration of common properties for all

condominiums in urban area of Prishtina. Therefore the above described project can be considered more as a pilot project.

In total within Building Cadastre Project in Prishtina are registered around 976 (Geoproject, 2011) condominiums/buildings. The number of new condominiums constructed within urban area of Prishtina is around 50 per year (Gazeta Zëri, 2015). Therefore we can conclude that we have in total 1200 buildings/condominiums inside urban area of Prishtina. Within this project are covered around 136 buildings and with a total of 172 000 m² of common properties. Therefore we can say that the pilot project covered around 11% of the common properties within the buildings in urban area of Prishtina.

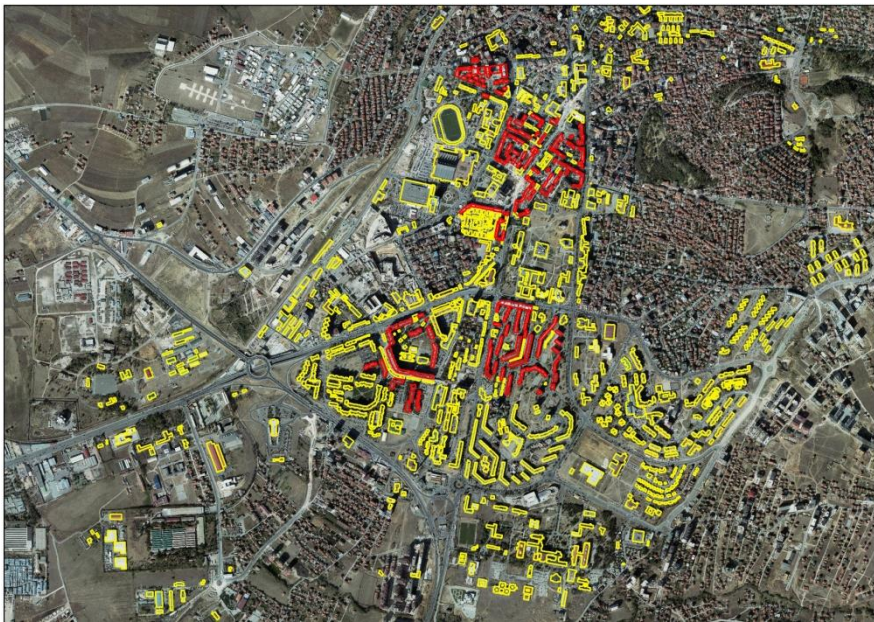


Fig. 6. Buildings of Prishtina registered in cadastre

In figure 6 the yellow color shows the buildings of Prishtina which already are registered in cadastre while the red color shows those that are covered by the pilot project of registering common spaces.

OUTLOOK AND RECOMMENDATIONS

Even that the law on 3D cadastre in Kosovo is far away from being a reality, this project gives an example of 3D cadastral elements and the way it was finished doesn't affect any of the Laws or regulations in power.

As final result from this article we can even give few recommendations:

- The final data model designed within this project, very easy can be adopted for 3D cadastre in a near future as they represent a good 3D basis for sketching parts of the buildings,
- Kosovo Cadastral Agency, as responsible institution for geodesy and cadastre in Republic of Kosovo, should start thinking towards developing the legal framework allowing and regulating 3D cadastre as a necessity of time and in the same time start to experiment 3D cadastre from technical point of view.
- The database and graphical design should be developed using a professional format and in the same time try to be close to the formats used from cadastral authorities in Republic of Kosovo.

Based on this pilot project and discussions with experts of the field we can say that 3D and 4D Cadastre is not anymore an unknown concept in Kosovo and independent experiments were already performed. Despite the lack of legal framework in Republic of Kosovo regarding 3D cadastre, starting from this pilot project, we can say that Kosovo soon will join the group of 30 countries which are performing experiments and researches towards 3D and 4D Cadastre (Rajabifard, 2014).

The necessity for 3D cadastre is growing day by day as the need for geo-information became part of everybody's everyday life.

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