

TOPO-CADASTRAL WORKS CARRIED OUT FOR THE PERFORMANCE OF THE SYSTEMATIC CADASTRAL IN THE CADASTRAL SECTOR NO. 2 FROM THE LOCATION OF MARPOD, SIBIU COUNTY

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Abstract: *Through the implementation of the National Cadastre and Land Registry Program, the systematic registration works are financed with the object of the cadastral sectors in UATs divided into extra-village, intra-village or mixed cadastral sectors, which aim to align with European standards, stimulate investments, modernize the way of managing buildings and accessing several projects through European funds.*

Keywords: *systematic cadastres; cadastral sector; coXcel; splitter script*

1. Introduction

The objective studied in this work is located in the Marpod UAT and is located to the north of the town of Marpod, cadastral sector no. 2 being made up of four buildings owned by individuals, six buildings owned by the Romanian State and managed by the State Domains Agency (ADS) and 45 buildings in the reserve of Marpod Municipality. The cadastral sector is located entirely in the extravillain of the Marpod commune.



Fig. 1. –The layout of the cadastral sectors UAT Marpod¹

2. Materials and Methods

The geodetic equipment used in the measurements were the Geomax Zoom 95 Total Station (the method used is Stop & Go) and the Stonex S9i GPS.

¹Marin, I.T., Topo-cadastral works carried out for the realization of the systematic cadastre in the cadastral sector no. 2 from the town of Marpod, county Sibiu, Bachelor's thesis, "1 Decembrie 1918" University, Alba Iulia, 2024, Coordinator: Assoc.prof.eng.PhD. Koncsag, M.E.;

The measurements were made by the RTK (Real Time Kinematic positioning) method, with the help of the ROMPOS (Romanian Position Determination System), through the NTRIP RO_Nearest service. The contour points were determined by direct measurement in the Stereo '70 system. The areas where classic measurements were made are 20% of the entire surface of the UAT, and in a percentage of 80%, the measurements were made with GPS. The measurements were saved from the controller in a format of our choice (for example.dwg), so that when the file is saved we can automatically open it in the data processing software (in this case AutoCad). The measured points were automatically put into coordinates. Opened a vectorized possession plan and a recent orthophotoplan with the land and according to the measured points we started the vectorization of the plan. For the association of textual data with graphic data, a database containing all the data related to buildings and owners is needed. The initial table is exported from the updated database of property titles (DDAPT), it being updated with the data of the owners, of the buildings after checking the documents submitted by the owners to the town hall and the property titles exported from the OCPI servers.

3. Results and Discussion

This table is the basis of all entries in a cadastral sector. A program developed by the PFA Marin Silviu-Cadastru, Geodesy and Cartography office is coXcel. This program loads the table with the above data and exports .cgxml files for each entry/property in the table, named cadgen number. The program interface is shown in the image below. From the "Select file" button, the excel file is loaded with all the data of the buildings and the owners, and from the "Generate for all" button, a .cgxml file is generated for each individual building.



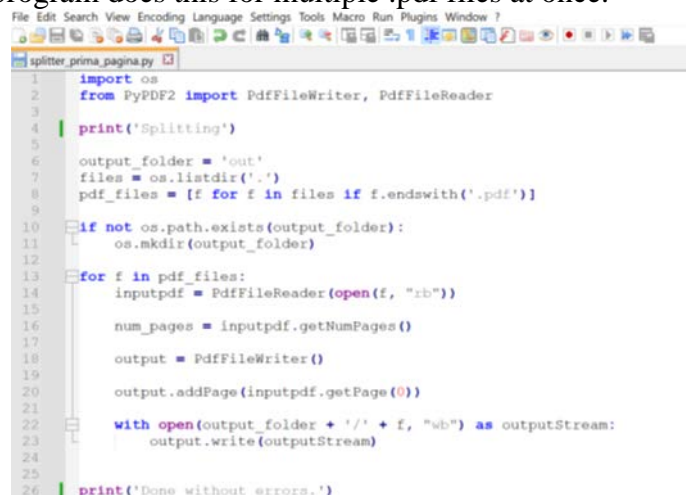
Fig. 2 – The coXcel program interface²

The most important optimization is working with programs/software so that the textual data is associated as quickly as possible with the polylines in the vectorizations, and the documents can be automatically generated directly from the graphic processing program (Autocad). For the association of textual data with graphic data, we used the TopoGraph program developed by the company Topocom.ro. The data is associated with each building, and at the end the files that must be submitted for Delivery 1 are generated. The files generated are: data sheets, the cadastral register of buildings, the alphabetical list of owners, the .cgxml files with the textual and graphic data (coordinates of the building). The topology is also performed with the help of this program by calling the "Topology" command. Creating the cadastral plan is much easier with the predefined commands in the TopoGraph program,

² Marin, I.T., Topo-cadastral works carried out for the realization of the systematic cadastre in the cadastral sector no. 2 from the town of Marpod, county Sibiu, Bachelor's thesis, "1 Decembrie 1918" University, Alba Iulia, 2024, Coordinator: Assoc.prof.eng.PhD. Koncsag, M.E.;

all the annotations and symbols are already predefined (titles and subtitles, legend, sector number, name of the executor, date, symbols for North, grid, etc.). CadTools is another very useful program in associating the Cadgen number with the location of each property, removing double points and many other useful commands. Another optimization is to work with scripts/programs for working with documents, so that they comply with the deliverables required for uploading documents to the integrated cadastre and land register system. In creating the documentation, several scripts/programs developed by the mentioned company were used. These include:

- splitter_first_page : script made in Python, which exports to a separate file the first page of a pdf. The program does this for multiple .pdf files at once.



```
1 import os
2 from PyPDF2 import PdfFileWriter, PdfFileReader
3
4 print('Splitting')
5
6 output_folder = 'out'
7 files = os.listdir('.')
8 pdf_files = [f for f in files if f.endswith('.pdf')]
9
10 if not os.path.exists(output_folder):
11     os.mkdir(output_folder)
12
13 for f in pdf_files:
14     inputpdf = PdfFileReader(open(f, "rb"))
15
16     num_pages = inputpdf.getNumPages()
17
18     output = PdfFileWriter()
19
20     output.addPage(inputpdf.getPage(0))
21
22     with open(output_folder + '/' + f, "wb") as outputStream:
23         output.write(outputStream)
24
25
26 print('Done without errors.')
```

Fig. 3. – Splitter program code³

- Excel to PDF Converter: This is a free program that converts an entire folder of Excel files to PDF.

- PDF-unification: This program was also created by the company PFA Marin Silviu and has the role of joining the .pdf files from one folder with the .pdf files from another folder, associating two files with the same name. We use this program to associate data sheets with related documents.

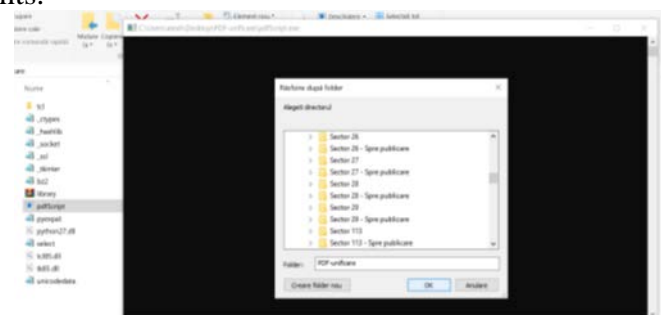


Fig. 4. – The Command Prompt of the PDF-unification program⁴

- Print Conductor: It is useful for printing multiple files at once.

³ Marin, I.T., Topo-cadastral works carried out for the realization of the systematic cadastre in the cadastral sector no. 2 from the town of Marpod, county Sibiu, Bachelor's thesis, "1 Decembrie 1918" University, Alba Iulia, 2024, Coordinator: Assoc.prof.eng.PhD. Koncsag, M.E.;

⁴ Ibidem

Through these programs, the provider's work is optimized so as to reduce data processing time, minimize errors and make costs more efficient, especially through the development of internal programs.

The provider goes through four big stages, in order to complete the topographic-cadastral works⁵:

1. Data analysis, terrain recognition and establishing the technical solution for carrying out the works. The first stage involves identifying the limits of UAT, obtaining data from the database from OCPI and public institutions and organizing the way of work.
2. Development of specialized works.
3. *Delivery no. 1* - For publication. At this stage, the first technical documents of the cadastre are returned to the Real Estate Publicity Cadastre Office, for their reception and verification.
4. *Delivery no. 2 - Final documents.*

Following the information campaign, the analog documents collected and the analog and digital data obtained from the town hall, OCPI and other interested public institutions are centralized and studied. The cadastral plans for possession are interpreted, the parcel plans made through the sporadic cadastre and all are reconciled.

The textual information taken from DDAPT (updated database of property titles), together with the data from the documents collected from the citizens are filled in a complex database (an Excel file). Each row in the table contains all the data of a property. Plot number, detarla number, registered area, measured area, category of use, mentions, dates of property documents and all known information about the owners.

Fig. 5. – The excel table, with the data of the buildings/owners⁶

The measurements were carried out 20% with the total station and 80% with the GPS. The measured points are downloaded from the total station controller, by choosing the format in which we want to work later. When we open the .dwg file in AutoCad, the points are placed directly in the coordinates. The field book (.rw5 file) is also downloaded, which is inserted into the Carlson program and thus the field book is exported in an editable format (ex. Excel). The data is imported into the graphics program and the cadastral plan is obtained.

⁵ Order no. 1/2020 for the approval of the Regulation regarding the implementation, verification and reception of systematic cadastral works and the ex officio registration of buildings in the land register;

⁶ Marin, I.T., Topo-cadastral works carried out for the realization of the systematic cadastre in the cadastral sector no. 2 from the town of Marpod, county Sibiu, Bachelor's thesis, "1 Decembrie 1918" University, Alba Iulia, 2024, Coordinator: Assoc.prof.eng.PhD. Koncsag, M.E.;



Fig. 6. – The cadastral plan of sector no. 2 from UAT Marpod, county Sibiu⁷

The categories of use were found in the property documents (the Marpod Commune being in a cooperative area, where Property Titles were issued based on Law 18/1991, and thus most buildings had Property Titles issued) and they also checked with the plots in the Possession Plan.

The calculation of the size of the surfaces was generated automatically from the TopoGraph program. The topology was also created using the TopoGraph software by calling the “Topology” command. Thus, all the polylines that had topology problems were identified and manually corrected as appropriate. To correct the errors related to overlapping points, the “Remove duplicate vertex from 3D polylines” command from the CadTools program was used.

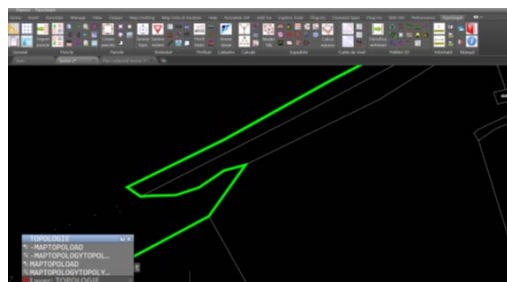


Fig. 7. – Calling the “Topology” command⁸

In order to identify the legal owners of real estate, the documents proving the right of ownership were collected in legalized copies. If the documents were in the archive of OCPI, public institutions or town halls, the copies of the documents were issued according to the original. If the registration of a building in the land register was carried out before the start of the systematic cadastral works, the provider can update the old registration, based on the last property deed. Thus, if there have been changes regarding the owner of the building, compared to the existing situation in the Land Registry, then the registered owner is deleted and the name of the new owner is updated, based on the last legal document certifying the right of ownership.

If a person does not hold legal documents proving the right of ownership, but owns the building, he can be registered as the owner of the building in the technical documents of the

⁷ Marin, I.T., Topo-cadastral works carried out for the realization of the systematic cadastre in the cadastral sector no. 2 from the town of Marpod, county Sibiu, Bachelor's thesis, "1 Decembrie 1918" University, Alba Iulia, 2024, Coordinator: Assoc.prof.eng.PhD. Koncsag, M.E.;

⁸ Ibidem

cadastre based on the following documents: Data sheet of the building with the signature of the provider and the owner; Certificate from the Local Authorities (Marpod City Hall) attesting to the fact that the person in question uses the building as a real owner and that the building is not part of the public domain or the private domain of the state; The document proving the possession, if it exists. At the end of the systematic cadastral works, if the possession is not contested, the owner can be registered in the Land Register based on the certificate issued by the notary.

Following the measurements and the identification of the owners, the technical documentation is drawn up in order to register the buildings in the land register. In Stage 1 – For publication, *Delivery 1* is being prepared which contains: the .cgxml files, the data sheets with the associated legal documents, the certificate from the town hall certifying the veracity of the data from the cadastral sector, the technical memorandum, the alphabetical list of the holders of the real property rights, of owners and other holders, the cadastral plan of the sector and the cadastral register of buildings.

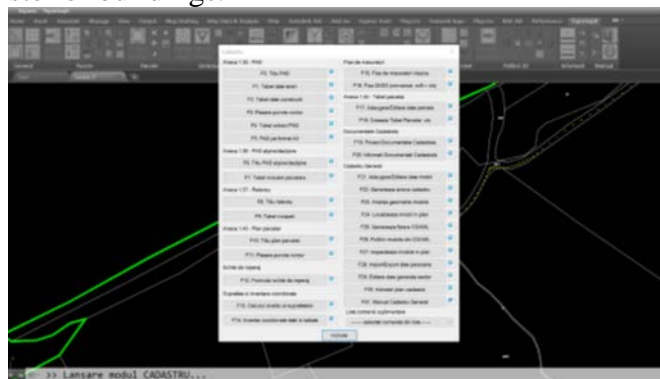


Fig. 8. – *Cadastru* command menu from the TopoGraph program⁹

After generating the appendices, for *Delivery 1*, the Technical Documents are prepared on electronic media - For publication.

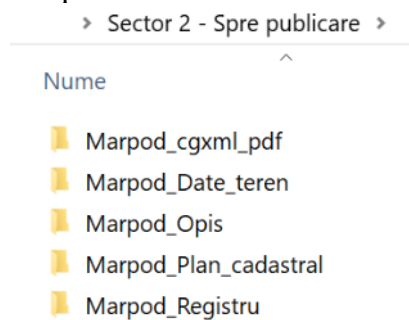


Fig. 9 – Content of *Delivery 1* on electronic support¹⁰

The textual and graphic part is uploaded to e-Terra (.zip archive with the data sheets and .cgxml files), and the technical documents are sent to the reception committee electronically.

⁹ Marin, I.T., Topo-cadastral works carried out for the realization of the systematic cadastre in the cadastral sector no. 2 from the town of Marpod, county Sibiu, Bachelor's thesis, "1 Decembrie 1918" University, Alba Iulia, 2024, Coordinator: Assoc.prof.eng.PhD. Koncsag, M.E.;

¹⁰ Ibidem

e-Terra or the Integrated Cadastre and Land Registry System is a computer application that includes the electronic database with information about real estate, owners and the legal status of real estate.

To upload Delivery 1 in e-Terra, the provider logs in to the platform and chooses the Cadgen Provider role -> Cadastre -> Systematic Cadastre -> List of Deliveries General Cadastre -> Select the UAT where you want to upload the delivery. This page displays all "Delivery 1" related to the cadastral sectors.

The display of attached documents and property documents can be viewed from the Documents menu, and the viewing of the Land Deed Extract that will be issued at the end of the systematic registration work can be done from the Data Cadgen menu.

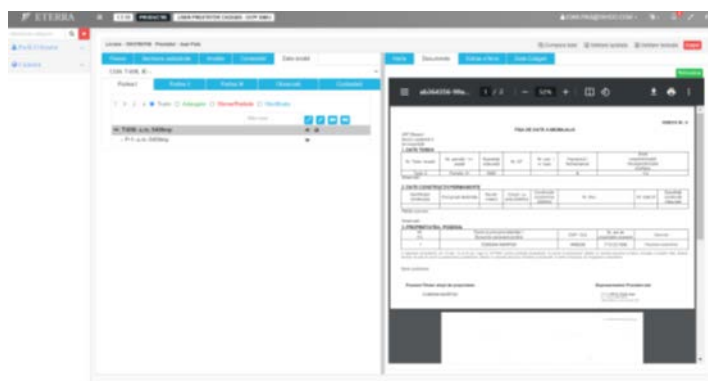


Fig. 10. – Viewing technical documents¹¹

After going through the activities of publishing the technical documents of the cadastre and solving the requests for rectification, the final documents are drawn up, which are represented by the technical documents of the cadastre. The documents are submitted to the Cadastre and Real Estate Publicity Office, within the term established by the schedule of activities in the contract, in digital format, bearing the mention *Final Documents*.

4. Conclusions

The period for contesting possession is not long enough, which can lead to loss of ownership. We thus propose the extension of the term in which the owner of the building can challenge the possession registered on his building.

Due to the fact that the legislation does not deal sufficiently complexly with the multitude of cases encountered within the works, this leads to the interpretation of some articles in a different way by the reception commissions, within the cadastre offices.

5. References

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¹¹ Marin, I.T., Topo-cadastral works carried out for the realization of the systematic cadastre in the cadastral sector no. 2 from the town of Marpod, county Sibiu, Bachelor's thesis, "1 Decembrie 1918" University, Alba Iulia, 2024, Coordinator: Assoc.prof.eng.PhD. Koncsag, M.E.;

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