

Rules concerned Registration of the Spatial Objects in Poland in the Context of 3D Cadastre's Requirements

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Key words: 3D Cadastre, Base Map, Cadastral System

SUMMARY

In Poland cadastral system is 2D based system. System is using 2D parcels in order to register rights to the land. But according to the cadastral law in Polish cadastral system there are registered 3 types of cadastral objects: land parcels, buildings and premises. Registration of a land parcel without spatial objects located on the surface is not problematic. Registration of buildings and premises in typical cases is also not a problem. The situation is coming more sophisticated in cases of multiple use of space above parcel and with more complex construction of the buildings.

In paper there are shown the rules concerned the registration of those basic spatial cadastral objects (buildings and premises).

Ways of registration of various untypical 3D objects located within the city of Warsaw, the capital of Poland was examined in the paper. Analysis of data concerned those objects registered in Cadastre and in Land Register are shown in paper. Also registration of underground shopping passages, a tunnel, subway is the subject of analysis. Those objects are not the objects of cadastral registration in Poland. They are registered in the register of roads and bridges, which is maintained in accordance to other regulations.

Also registration of typical underground infrastructure in Poland is shown. Those objects are: underground sewage lines, gas lines, water lines etc. Those objects are not the objects of cadastral registration in Poland, but spatial information about those objects is included on base maps.

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1. INTRODUCTION

The obligatory basic legal act concerning geodesy and cartography in Poland – The Act of May 17, 1989 The Geodetic and Cartographic Law, defines the real estate cadastre in Poland in the following way: "the uniform at the national scale and systematically updated set of information on lands, buildings and premises, their owners and on other individuals or entities, who possess those lands, buildings and premises".

In its further part, the Act defines the details and specifies the scope of data. It states, that: The real estate cadastre includes information on:

- 1) lands – their location, boundaries, area, land use types, soil classes, designation in land register or files of documents, if they exist for given real estates, including the discussed lands,
- 2) buildings – their location, destination, useful functions, general technical specifications,
- 3) premises – their location, useful functions and size.

However, following Art. 20 of the discussed act, the following information are also presented in the real estate cadastre:

- The owner, and, in the case of state and local government lands – other individuals or entities, which are the possessors of lands and buildings or their parts,
- Places of residence or headquarters of the above mentioned individuals or entities,
- Information on registration in a register of monuments,
- Real estate values.

Considering the above, three types of cadastral objects may be distinguished in the real estate cadastre (land parcels, buildings and premises), as well as cadastral subjects (owners and/or possessors) who possess those cadastral objects.

The scope of data registered in the cadastre is specified in details by the Instruction to the Legal Act, i.e. the Decree of the Minister of Regional Development and Housing of March 29, 2001 (Cadastral Law).

2. A LAND PARCEL IN THE CADASTRE - EXTENSION OF RIGHTS

A land parcel is defined as (§ 9 Cadastral Law), a continuous area of land, located within the boundaries of one cadastral block, uniform with respect to legal issues and delineated from the environment by means of its boundaries.

The extension of the property rights to land parcels is defined in the Act of April 23, 1964, The Civil Code, Art. 143. Following that regulation, within the borders determined by social and economic destination of lands, the property covers the space over and under the surface. That regulation does not violate regulations concerning rights to waters. It means, in general, that the property ranges to such altitude and to such depth, which are required for the standard utilisation of the given real estate. Below, regulations from legal acts, which limit the extension of property rights to real estates in Poland, are presented.

Article 10 of the Act of July 18, 2001 The Water Law states that Waters of a territorial sea, sea inland waters including sea inland waters of the Gdańsk Bay, inland, flowing surface waters and underground waters are the property of the State Treasury. Only Article 124 states that a Water Permit is not required for development of water installations used for intake of underground waters for the needs of standard utilisation of water from water intakes located up to the depth of 30 m. As a result, only waters in wells and stagnant waters may become a private property.

Limitation of the extend of the property rights to real estates also results from Article 7 of the Act of February 4, 1994 The Geological and Mining law, which states that deposits of minerals, which are not parts of a land real estate, are the property of the State Treasury. Within the borders specified by legal acts, the State Treasury may, with the exclusion of other persons, use the deposits of minerals and use the rights to them by establishing mining exploitation of those deposits.

Serious limitations of extension of the property rights may be also the result of regulations included in the local plan of physical management, since – following the Act of March 27, 2003 on physical planning and management and the Decree of the Minister of Infrastructure of August 26, 2003 on the required scope of the local plan of physical management – the local physical management plan should include resolutions concerning parameters and factors concerning characteristics of built-up areas and land management, which should, in particular, define the lines of buildings area, size of built-up areas with respect to sizes of land parcels, including participation of biologically active areas, sizes and heights or designed buildings and roof geometry.

3. A BUILDING IN THE CADASTRE – GENERAL INFORMATION

A building, registered in the real estate cadastre should be considered as a building defined as (§2 of the Cadastral Law): a building objects, which is a building as understood by the standard classification and nomenclature, introduced basing on the Act of June 29, 1995 on public statistics.

Following the above Act and the Decree of the Council of Ministers of December 30, 1999 on classification of fixed assets– a building is a constructional object equipped with a roof, including embedded installations and technical devices, used for permanent purposes. It is adapted to permanent stay of humans, animals or to protection of things. An umbrella roof is considered as a particular type of a building; it is a room located on the ground, which is not equipped with walls on every side, or without walls.

In the case when buildings are mutually connected (as, for example, duplex houses or row houses) a building is considered as an independent building, if it is separated by a fireproof wall from other units, which extends from foundations to a roof. If such fireproof wall does not exist, mutually connected buildings are considered as separate buildings if they have own entrances, and are equipped with installations and are separately utilised.

It should be added that – following §78 of the Cadastral Law – buildings, the construction of which (according to the building law) does not require building permission or application, are not presented in the cadastre. Categories of such objects are specified in Article 29 item 1 of the Act of July 7, 1994, The Building Law.

A building, which is discussed above, may have two legal statuses. According to Article 48 of the Act of April 23, 1964 the Civil Code, a building may be an element of a land parcel (with exceptions assumed in the Act) and then it has the legal status of a land parcel on which this building is located. On the other hand, following Article 46: real estates are the parts of land areas, being separate objects of property (lands), as well as buildings, permanently connected with lands, or parts of such buildings, if – basing on detailed legal regulations – they are a subject of property, separated from a land parcel. Therefore, basing on detailed legal regulations, a building may have a status of a building real estate. Cadastre includes data concerning both types of buildings.

Following §63 of the Cadastral Law, the following data are the registration data which concern a building being a part of land:

- A building registration number, being a part of a building identifier,
- An address number, which is used for marking this building following the rules concerning real estate numbering,
- Digital description of an outline of building, delineated by orthogonal projection of outer planes of outer walls of the building basement on the horizontal plane; in the case of buildings founded on pillars, orthogonal projection of a floor supported by those pillars – the so-called, the building outline,
- Numbers of cadastral parcels, on which a building is located,
- Determination of the basic function of a building (dwelling houses, industrial buildings, transport and telecommunication buildings, trade-and-service buildings, reservoirs, silos and storage buildings, office buildings, hospitals and medical care centres, educational buildings, cultural centres, sporting centres, buildings used for production, service and business purposes for agriculture, and other buildings, not used for residential purposes, are distinguished),
- The building value and the date of validation,
- The year of completion of construction,
- The size of the built-up area in sq.m.,
- The number of over- and underground floors,
- Information of building materials used for construction of outer walls of a building (bricks, wood, other materials),
- The quantity and numbers of premises, which are separate real estates,
- The quantity and numbers of other premises,

- Total size of useful areas, expressed in sq.m.:
 - All premises in a building,
 - Rooms assigned to premises,
- The registration number of monuments, maintained according to the rules of protection of cultural heritage.

Besides the above data, the following registration data concerning a building which is a subject of property, separated from the land, are (according to §64 of the Cadastral Law):

- Number in land register or number of other documents, which specify the property rights to the building,
- Specification of documents which determine rights to the building, other than property rights,
- The number of registration unit of buildings in cadastre, to which the building, which is an element of the identifier of that unit.

As it may be seen from the above considerations, each building is represented in the cadastre in the form of its outlines on the cadastral map; technical data, mentioned above, as well as subject data (other than information about owners of a parcel where the building is located, if it is considered as a separate real estate) are included in the descriptive part of cadastre. Such data are currently collected in the digital form and they cover about 80% of buildings in Poland (in urban areas).

Practical issues, related to registration of buildings in the cadastre, usually concern the correct delineation of a building outlines, what results from the building outline definition of relatively low precision. While those parts of buildings which are resting on pillars, are registered on cadastral maps, some problems occur with respect to those over ground stores, which are not supported by pillars, but which exceed the building outline, measured in planes of walls of the ground floor, since they are not presented on cadastral maps and often, even on base maps.

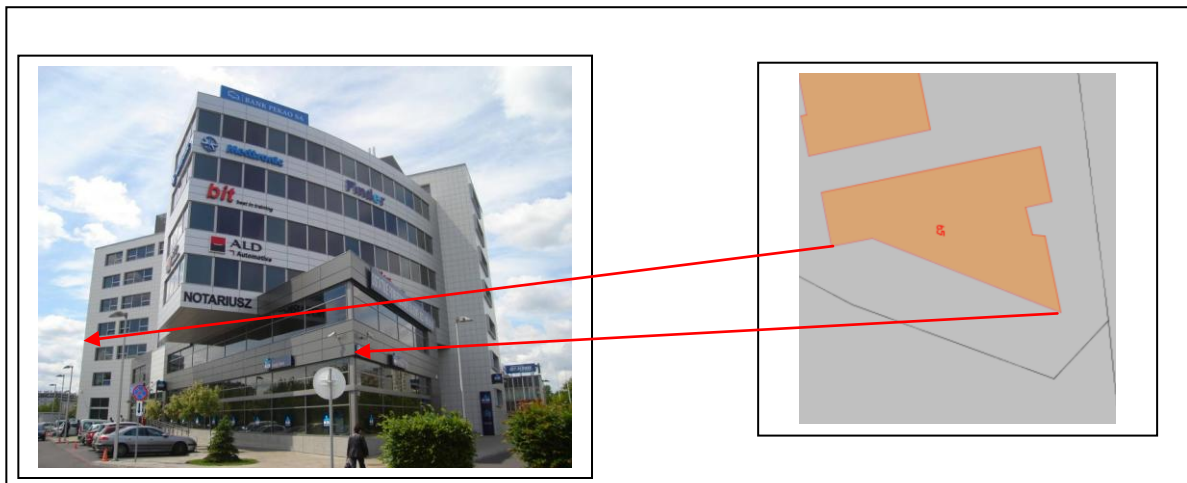


Figure 1. Over ground storeys – missed registration in the cadastre (Source:map – The Office of Geodesy and Cadastre for the City of Warsaw, photograph – author)

4. PREMISES IN THE CADASTRE

Premises registered in the cadastre should be considered as premises defines as (§2 the Cadastral Law) independent dwelling premises or premises of other destination, as understood by the Act of June 24, 1994 on property of premises.

According to the above Act (Article 2), independent dwelling premises is a single room or groups of rooms delineated by permanent walls within a building, which are used for permanent stay of humans, and which – together with auxiliary rooms – are used for meeting dwelling demands of people. This refers, respectively, to independent premises utilised in accordance to their destination, which is other than dwelling needs.

It should be added that, following §79 of the Cadastral Law – the registration does not present premises separated in building which are discussed in §78 of this Act, i.e. premises distinguished within buildings, the construction of which does not require building permits or applications (according to the Building Law) and which are not the subject of registration in the cadastre, according to the above decree.

The discussed premises may be a separated component of a land real estate (distinguished from a building being a part of land) or of a building real estate. It may have two legal statuses: premises included in a land and building real estate (a separated component) or it may be a separate premises real estate. The cadastre registers data concerning both types of premises.

Registration data concerning premises (following § 70 of the Cadastral Law) include:

- Number of premises, being an element of the identifier of premises,
- The registration number of a building where particular premises is located,
- Specification of useful functions of premises (dwelling or other premises),
- The number of rooms included in premises and the number and types of rooms assigned to the premises,
- The size of useful area of premises, expressed in sq.m., and the size of rooms assigned to premises.

Besides above data, registration data concerning premises being a separate real estate, include:

- Number of premises in land register,
- Specification of documents which specify rights to premises, other than property rights,
- The registration number of a registration unit of premises, to which premises have been assigned,
- The value of premises and the date of validation.

Issues concerning registration of premises in the cadastre have been discussed by the author in the paper "Registration of the Premises in 2D Cadastral System in Poland", which was presented during the FIG Working Week 2011 in Marrakech, Morocco.

The main problems related to premises in Poland are (Karabin, 2011):

- unclear legal regulations concerning the rules of surveys of rooms in premises, and surveys of entire premises, and calculation of the size of the living space of rooms and premises (there is no specification of obligatory standards, the standard, which is not valid is specified, there is no obligation to apply any standards with respect to specification of space indexes in the building industry) and inaccurate specification of the accuracy of calculation of areas,
- the standards PN-70/B-02365 and PN-ISO 9836:1997 present various rules concerning the surveys and calculation of sizes of living space of rooms and entire premises, high differences occur, which do not allow for exchangeable application of both standards and therefore, it is not possible to specify a universal (possible for application for each premises) coefficient, to be used for automatic re-calculation of the living space of premises, following one of those standards to the value obtained basing on the other standard,
- the way of calculation of the owner's share of separated premises in the common property, which relates it with the size of living space of all premises, separated within a given building, what – following provisions of Art. 3 of the Act on Ownership of Premises may cause many difficulties, since modification of that share is not possible if an agreement between the owners of premises, in the form of a notarial deed is not concluded,
- registration of shares of owners of separated premises in the common property in land register, both in the land register of the common property and in land register of particular premises; this is disadvantageous from the point of view of introducing changes. First of all, the basic disadvantage is related to „burdening” the land register, maintained for separated premises, with the entry of the share of the owner of the separated premises in the common property, together with specification of the volume of that share.

Cadastral registration follows the applications which include: a certificate issued by the starost, which states the individuality of premises and documents listed in §18 of the Technical Instruction G-5:

- 1) drawings of horizontal projections of particular floors of the building, at the scale of 1:100 or 1:200, which present:
 - a) outer walls of particular stores and walls of particular rooms and dimensions of those walls,
 - b) boundaries and numbers of particular, individual premises and boundaries and designation of particular accessory rooms, if those rooms are locate inside the building,
 - c) window and door openings in the building,
- 2) a copy of the cadastral or the base map, including designations and boundaries of particular accessory rooms, if those rooms are located outside the building,
- 3) a list of individual premises in the building, with the following information:
 - a) the cadastral number of the building,
 - b) premises number,
 - c) basic functions of premises,
 - d) living space of premises,
 - e) information, whether premises are separate properties or elements of land property,
 - f) the number of the property in land register (maintained for premises, if premises are separated properties),

- g) designation of accessory rooms, their basic functions and living space,
- h) total size of the living space of premises and accessory rooms,
- i) total size of the living space of all premises in the building and accessory rooms.

Besides, those documents should contain the name of the cadastral unit, the name and the number of the cadastral district, or only the number of the cadastral district and numbers of cadastral parcels, on which the building is located, and the contractor's name and the family name with the contractor's signature, the date of production of documents and the number of the contractor's building qualifications.

Those documents are included to the archive of the body responsible for the cadastre and they are stored in the form of conventional paper documentation. Descriptive data concerning premises are accessible in the digital form; they have been mentioned in previous parts of this paper.

5. ANALYSIS OF REGISTRATION OF UNTYPICAL 3D OBJECTS IN THE CADASTRE

5.1 Test object No.1

The first object is a residential building located in Warszawa, in Bielany – the district which is located outside the highly urbanised area of the city. Following legal regulations, the building outline is presented on the cadastral map. It is defined in the following way.

The outline of a building is an outline, which is determined by orthogonal projection of outer planes of outer walls of the ground floor of the building, on the horizontal plane; in the case if building is located on pillars, orthogonal projection of the floor supported by those pillars.

It would result from the map drawing, that the building covers the parcel, according to the outline, drawn on the map, corresponding to the outer walls of the residential floor. As it turns out from the photographs presented below, only a part of the building outline is the presentation of walls of the residential floor; the rest of it presents the underground parking area, which is higher than the surface of the surrounding parcel. Thus, the image of this building on the cadastral map is somehow false, since it does not present the image of reality in a correct way.

The second cartographic material, i.e. the base map, presents the more complete image of the terrain. Following the Geodetic and Cartographic Law (in its conventional approach) the base map is a large-scale cartographic product, which contains information on spatial distribution of general geographical objects and on elements of cadastre, as well as technical (above ground, on-the ground and underground) infrastructure.

According to the Geodetic and Cartographic Law, the infrastructure network includes all above ground, on-the-ground and underground installations and conduits used for water supply, sewage disposal, gas supply, heat distribution, telecommunication, power supply and others, excluding installations of detailed water melioration, as well as underground structures, such as tunnels, passages, reservoirs etc.



Figure 2. Test object No. 1 – cadastral map. Source: map– The Office of Geodesy and Cadastre for the City of Warsaw, photographs – author

In the modern approach the base map is a standard cartographic product, created basing on databases, which are maintained by the starost (head of district), including cadastral databases, databases of the technical infrastructure and topographic databases, of the accuracy level which ensures the possibility to generate standard products at scales between 1:500 and 1:1000. The base map is maintained for city areas and densely built-up areas, as well as for rural areas, which – according to existing local management plans – will be transformed into built-up areas in the future. Thus, the base map does not cover 100% of Poland, however areas, where complex spatial objects occur, are usually located within cities, and thus, they are covered by the base map.

The current catalogue of objects included in the base map and present rules of their registration are determined in the technical standard – the Technical Instruction K-1 – The Base Map.

In the cadastre, in its descriptive part only, the information has been introduced that the building has one underground floor and that the maximum number of floors equals to eight within the building. Although the base map presents a more detailed spatial image of a given object, as for example, diversification of the number of floors for particular parts of the

building, but the parking area is marked as one underground floor; the fact that it is the underground floor may be concluded from the symbol of entrance into the parking area only. In fact, the part of the parking area, which is located above the surface of the adjoining wall, is nearly equal (with respect to its expansion) than the other part, located underground.

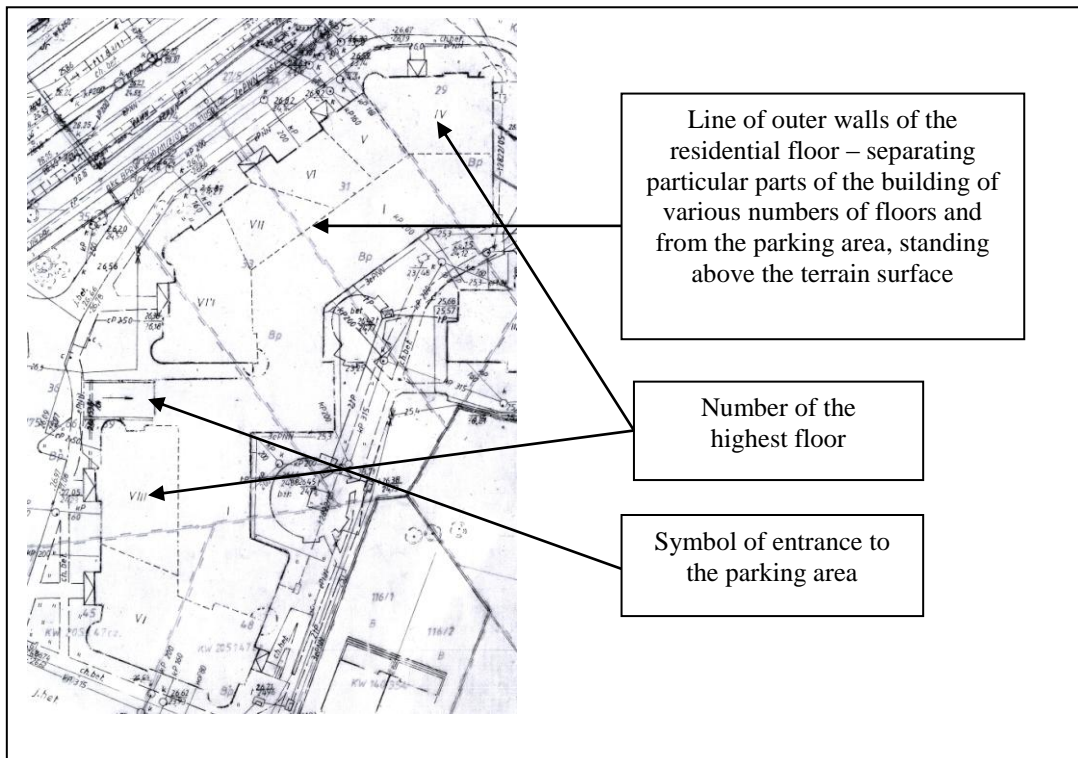


Figure 3. Test object No. 1 – base map. Source: map from The Office of Geodesy and Cadastre for the City of Warsaw, descriptions – author

5.2 Test object No. 2

The second object is the office building located in Warsaw, within the city centre. According to legal regulations, the building outline is presented on the cadastral map. Parts of the floors, which are located above the ground and supported by pillars, have been marked with dashed lines. In general, there is no information on the map, what is located in the circular part of the building and it is unclear, how many buildings are presented on the map. The number of buildings is explained in the descriptive part of the cadastre, which informs that it is one object – the building of seven floors above the ground and two underground floors. The question arises about the expansion of the underground floor – whether it is included in the building outline, presented on the map, or the underground part has different borders.

The answer to that question may be concluded basing on the terrain image from the base map. Also in this case the image of reality presented on that map is more complete than the image presented on the cadastral map. Obviously, the building outline corresponds to the one presented on the cadastral map; lines separating parts of diversified numbers of floors do not occur. In the case of the base map, symbols of pavements appear, which allow for identification of location of entrances to the building, e.g. to the yard located (the circular part), which is generally accessible, is equipped with the fountain, located in the central part, surrounded by trees and being one of tourist attractions within that area of the city.

On that part of the base map the entrance to the underground parking area is also marked (the cadastre does not contain such information in its graphical part; in the descriptive part the role of the underground floor is not specified). On the contrary to the parking area of the Object No.1, the outer outline does not stand above the terrain surface at all, but its outer edges are presented with dashed lines on the base map.

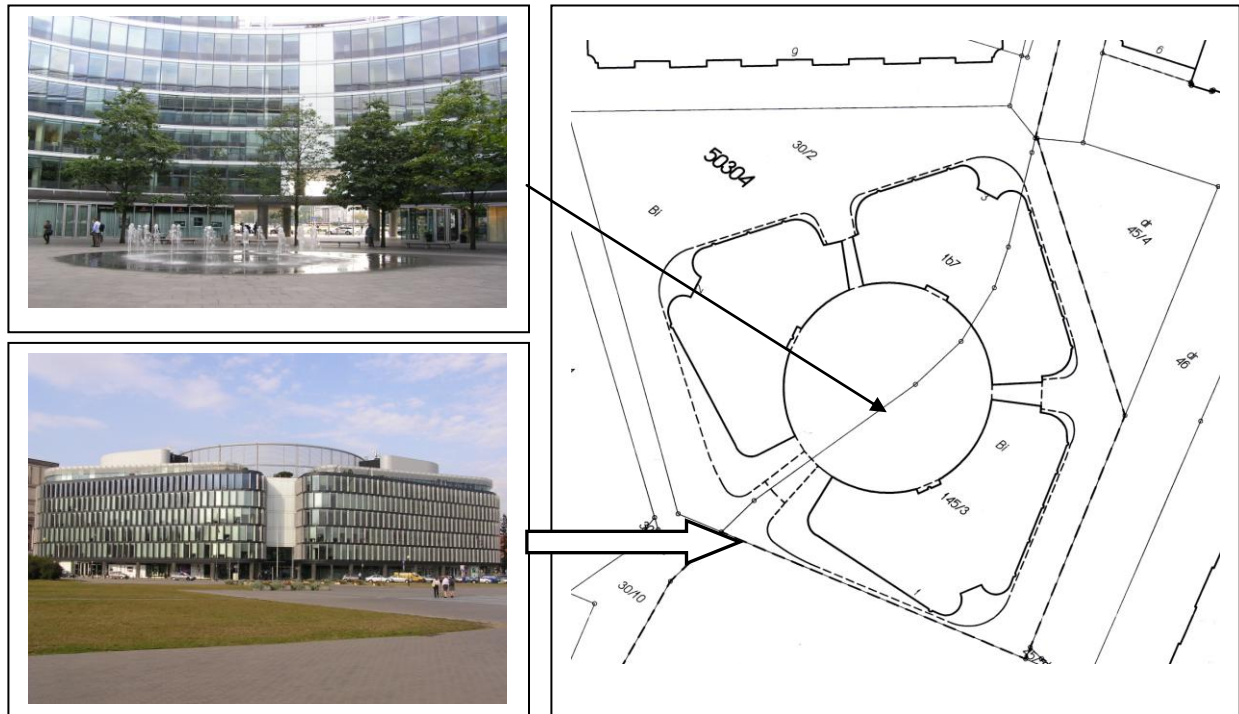


Figure 4. Test object No. 2 – cadastral map. Source: The Office of Geodesy and Cadastre for the City of Warsaw – map, photographs – author

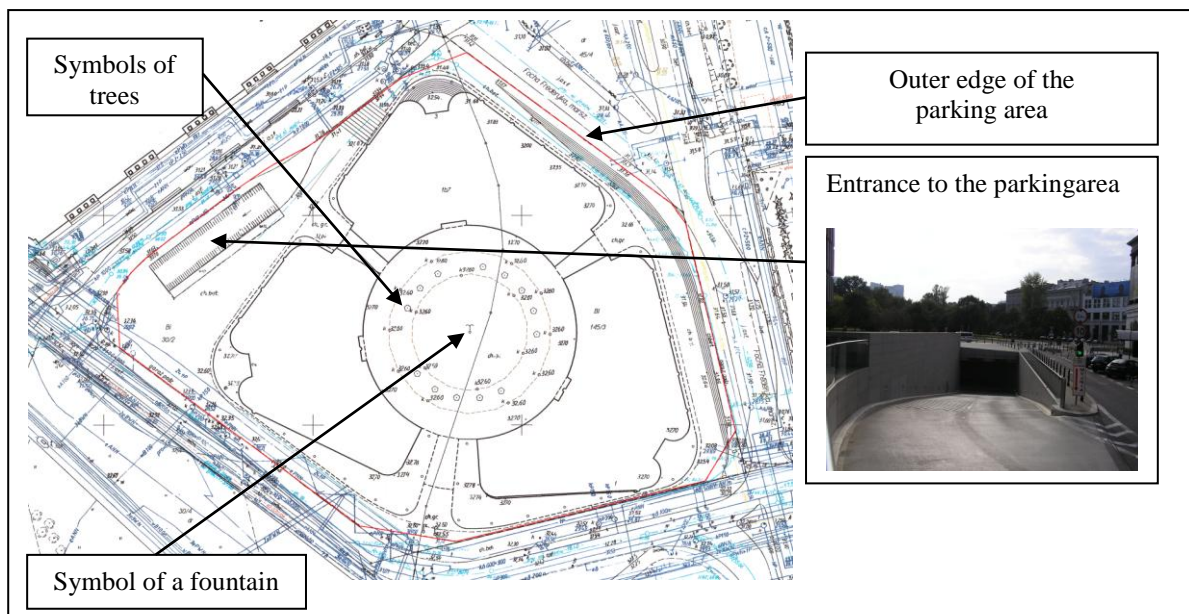


Figure 5. Test object No. 2 – base map. Source: based on map from The Office of Geodesy and Cadastre for the City of Warsaw – author

5.3 Test object No.3

The third object is the Building of the Copernicus Science Centre, which is located within the central part of Warsaw, within the direct neighbourhood of the Vistula River. This object has been partially located above the main route along the Vistula River. In the discussed section, that route passes in the underground tunnel, under the building.

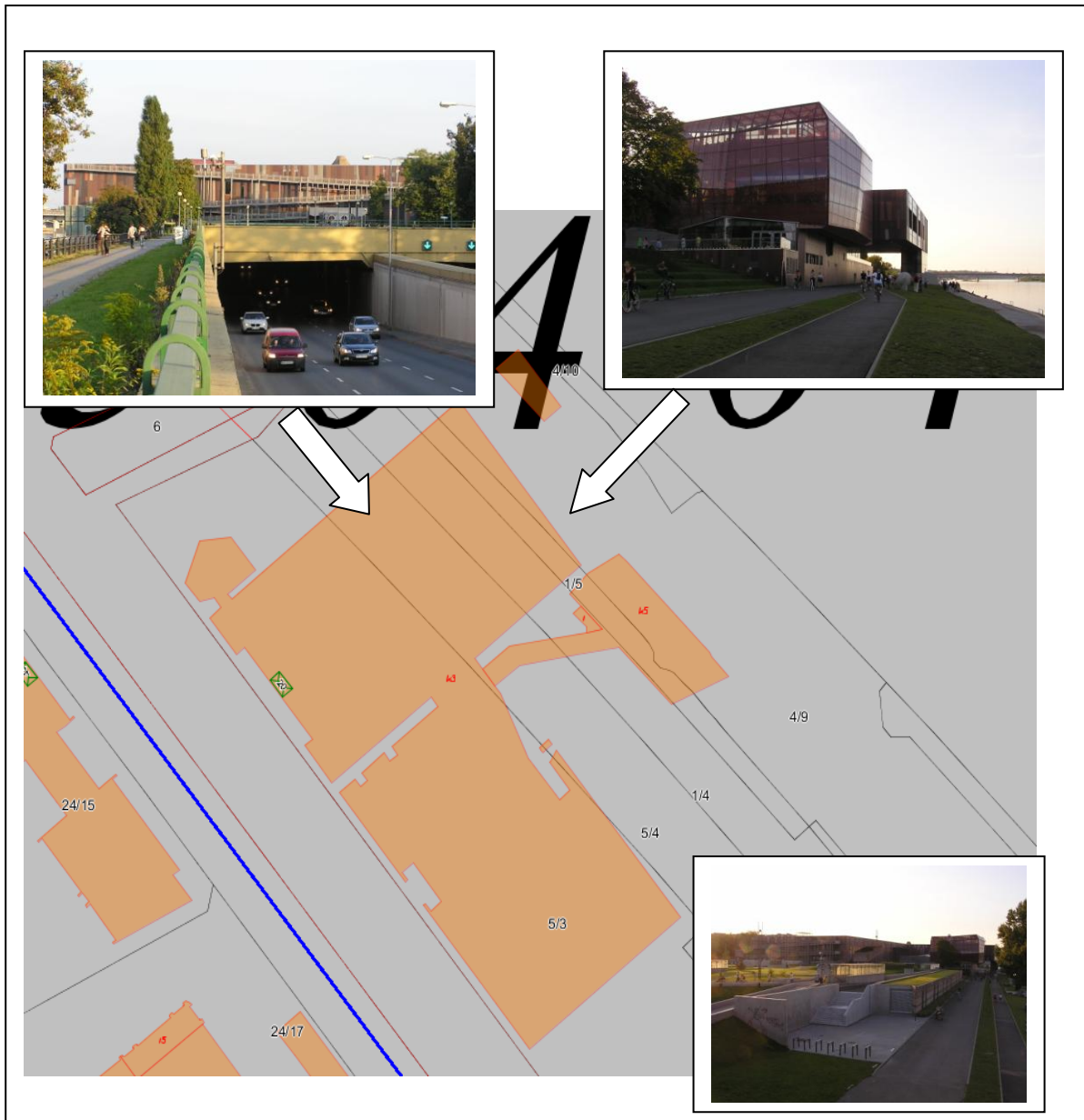


Figure 6. Test object No. 3 – cadastral map. Source: The Office of Geodesy and Cadastre for the City of Warsaw – maps, photographs – author

As it maybe seen from the drawing of the cadastral map, the underground tunnel is missing as an element of that map. In general, elements of the underground infrastructure are missing, including the entrance to the underground tunnel, which is visible on the photograph in the lower right corner; the bus stop is located in that tunnel.

The Copernicus Science centre has been registered in the cadastre as three separate buildings. The first building has been assigned to the parcel no. 5/3. The second building has been assigned to the parcel no. 4/9, and the third to the parcel 1/4. It follows the rule which requires that the land parcel on which the bigger part of the building is located, should be assigned. The building no.3 is located on one land parcel and remaining buildings are located on several parcels and they have also been specified in the cadastre (their numbers). In the case of the building 2 it has been specified that it has the underground floor, but this information does not concern a road tunnel, which is independent from the building, but rather the underground parking area; the entrance to that parking area is visible outside the building.

Records concerning cadastral parcels have been analysed; it turns out from those records that “other built-up” areas have been specified in the cadastre as the land use type for parcels no. 5/3, 5/4, 1/4, 1/5. “Other built-up” areas include lands covered by buildings and installations related to administration, health care, trade, religious services, handicraft, services, education, culture and arts, rest, communication etc., open cemeteries, places of burial of animals and other built-up lands. Thus, there is no suggestion that the underground tunnel exist. In general, the law establishing bodies has not foreseen that such land use type, suggesting the existence of the underground object, could be specified. In the discussed case, that category would have to simultaneously specify that the built-up area with the building on it exists (namely the building from the group “buildings serving for purposes of science and culture and sporting events) under which the tunnel is located. The issue related to correct presentation of land use types, and in particular with the poor systematic division may be also observed in this case, if records for the parcel 4/9 are analysed; land use types for that parcel are visible on the photograph, in its upper right corner. According to the specification in the cadastre, it is also the “other built-up area”. In fact, it is a part of the building, hanging over the bicycle road, but the specified land use type does not suggest that such an object, as the communication route, and namely the bicycle road, exist.

It should be considered that owners of particular parcels are: the Capital City of Warsaw (parcels 5/3 and 5/4), the State, in co-ownership with the Capital City of Warsaw (parcel 4/9) and the State (parcels 1/4 and 1/5), but the City Road Management Board is specified as the administering body. This may only suggest that we deal with a road object, since this is not precisely specified in the cadastre.

Information concerning existence of underground object may be also searched for in land register, established for the above cadastral parcels. Those parcels are regulated in three mortgage registers: 1st land register for the parcels 5/3 and 5/4, 2nd land register for the parcels 1/4 and 1/5 and 3rd land register for the parcel 4/9. Unfortunately, the complete analysis from land register, from all of their sections, including the section concerning charges on lands, does not result in gathering information on the underground tunnel. In one of the analysed land register, the entry concerning charges for the benefit of the power supply plant and related to the right to use, free of charge, and unlimited in time, selected underground lands located in Warszawa, Wybrzeże Kościuszkowskie Street, may be found; this probably concerns power supply installations located in the road tunnel (notarial deed which has established that rights was not accessible for the author).

Lack of information about the tunnel results from the fact that both, the road in the tunnel and the Copernicus Science Centre, are the property of public bodies – the State or the Capital City of Warszawa. This issue would be probably presented differently when the tunnel would be located under the privately owned lands.

Unfortunately, such way of registration, and namely the lack of registration in the cadastre, results from the G-5 Technical Guidelines, which specify technical standards concerning establishing and maintenance of the cadastre; they require that all buildings are specified in the cadastre, with the exception for, among others, underground constructions, including underground buildings.

The next document, maintained for the given area, is the base map, which is presented below.

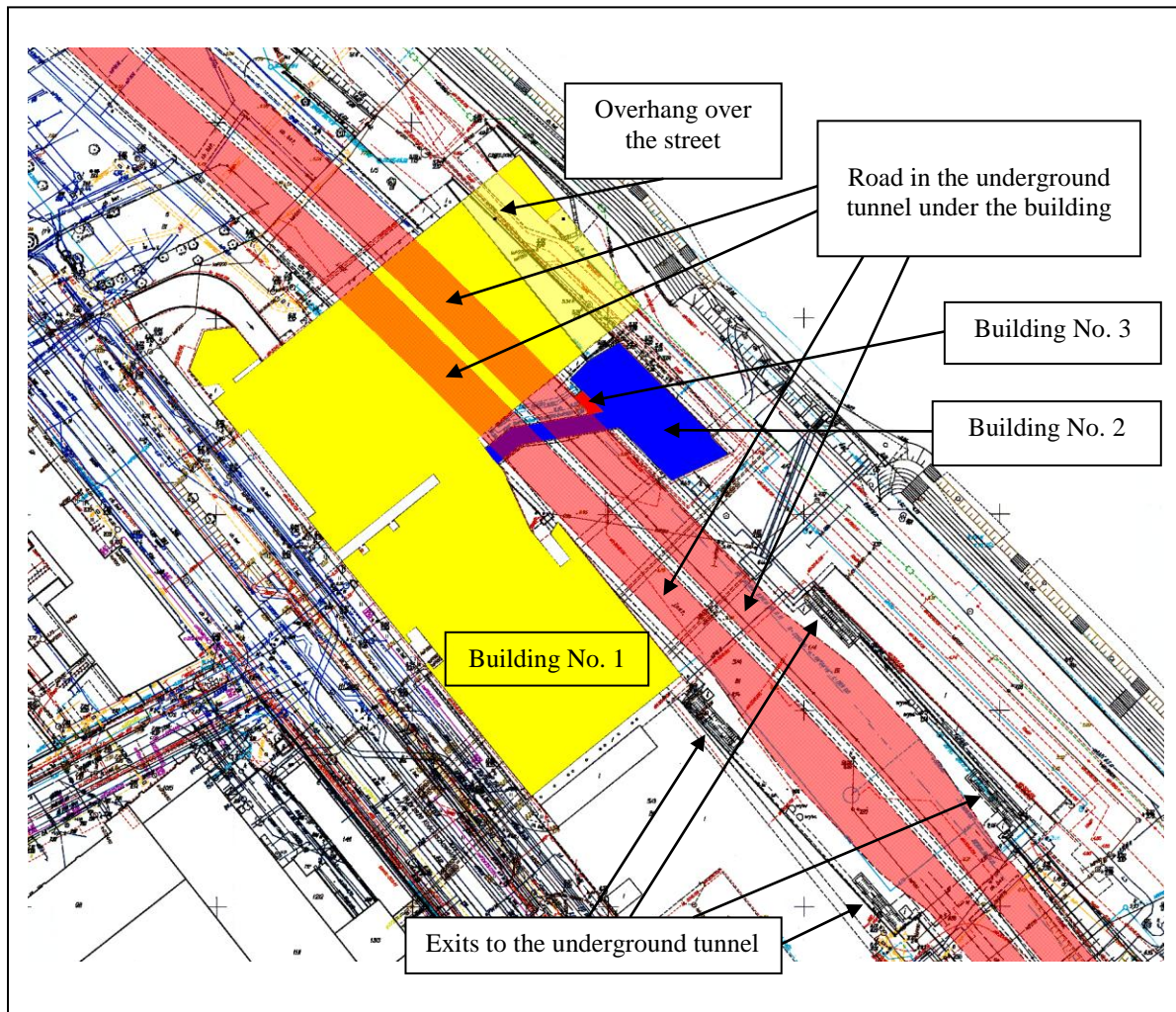


Figure 7. Test object No. 3 – base map. Source: based on map from The Office of Geodesy and Cadastre for the City of Warsaw – author

As it may be seen from the above figure, analysis of the base map content allows for identification of the tunnel located under the buildings. The area is highly urbanised in that place, with respect to the technical underground installations; however, to locate the tunnel edges and extreme edges of the roadway it is not difficult even for a surveyor with low practical experience. Therefore, the base map appears to be the best information source also in this case; following the author's opinion, in the case when introduction of the 3D cadastre is considered in Poland, the base map should be considered as the base material, which should be utilised for that purposes.

5.4 Test object No.4

The next test object is one of roundabouts located in the city of Warsaw, where two main routes – Marszalkowska Street and Jerozolimskie Avenue are crossing. Besides car traffic, also tramway routes are located in those streets. Underground passages with a system of shops are located under that roundabout. The Warsaw Underground Railway tunnel and the city-tunnel are located under the part of that roundabout. The city-tunnel is used by trains to reach the Warsaw Central Railway Station. Many installations of the underground infrastructure are also located under the roundabout, what is typical for a city. Among those installations, large sewage collectors may be mentioned.

This object is presented as follows.



Figure 8. Test object No. 4 – orthophoto and cadastral map. Source: The Office of Geodesy and Cadastre for the City of Warsaw

Investigations concerning that object were performed as early as in 2008. Those investigations were supervised by the author and they were performed by Katarzyna Góźdź within the frames of the master's thesis „Analysis of foreign solutions in the field of registration of three-dimensional (3D) objects in the cadastre and possibilities to implement those solutions in Poland”. The master's thesis was developed at the Warsaw University of Technology, at the Department of the Cadastre and Real Estate Management of the Faculty of Geodesy and Cartography in 2008. Góźdź (2008) investigated whether records concerning information about trade passages exist in the cadastre.

The area of the roundabout is located at the joint of four cadastral districts, mainly in four cadastral parcels: district 0502 – parcel 1/3, district 0501 – parcel 1, 0310 – parcels 135/2, 0309 – parcel 17/1.

Analysis of records in the descriptive part of the cadastre, as well as mortgage registers, performed by Góźdź (2008) proved that the cadastre points, that the parcels are the property of the State and the permanent administration of those parcels are performed by the City Road Management Board. The lands were classified into the land use group of roads. Land register have not been established for the above parcels.

The author has analysed the current cadastral records also with respect to information concerning the city-tunnel and the underground railway. The analysis of the current cadastral

records proves that nothing has been changed since that time. Due to the lack of such types of land use, which could suggest the existence of such underground objects, there is no information about those objects in the land use types. The parcels are still considered as a road. Due to the lack of common land register in Poland, they have not been established for the “main” parcels, on which the roundabout is located and under which the above underground objects are located.

As it was mentioned by Gózdź (2008), the system of shops is leased by the Forum Rondo Ltd. Company. That Company concluded the special lease agreement with the Mazovia Voivode, after winning the tender procedure.



Figure 9. Test object No. 4 – base map. Source: based on map from The Office of Geodesy and Cadastre for the City of Warsaw – author

At present, the Company administers the underground passages, rents particular shops, service areas and places for advertising and takes care of the general order and cleanness. The Company has many-year agreements with leaseholders of particular premises. Thus, due to the lack of land register, it is still impossible to disclose those limited material rights, it is also impossible to disclose rights to remaining objects.

The next document, which has been maintained for the given area, is the base map, which is presented above.

As it may be seen from the presented figure, analysis of the content of the base map allows for identification of the underground railway tunnel (marked in red), the city-tunnel (marked in yellow), as well as the sewage collector (marked in brown). Stairs to the underground passages, where underground shops are located, are also visible on the map. Similarly to the previous case the fact that those objects have not been registered in the cadastre results from the fact that they are located under the lands being the property of public entities – the lands owned by the state. The railway tunnel and the railway itself, as well as the underground railway tunnel and the underground railway itself, are the property of the State or the city. Therefore there was not necessary to establish limited material rights. They are not the cadastral objects as well.

Besides, as it turns out from information obtained at the Office for Geodesy and Cadastre at the Warsaw Municipal Office – the entire route of the underground railway is traced under the lands being the property of the Capital city of Warszawa. That route is located under the main streets of the city and the tunnel route exceeds the streets in the case of big stations only; this may be observed at the analysed location. As the author expects, this situation results from the fact the large housing areas exist along those streets (possible passengers of the underground railway) on one hand, and from the lack of legal regulations which would regulate the issues concerning the charges of a parcel with rights to build the underground railway tunnel within the underground space of that parcel, on the other.

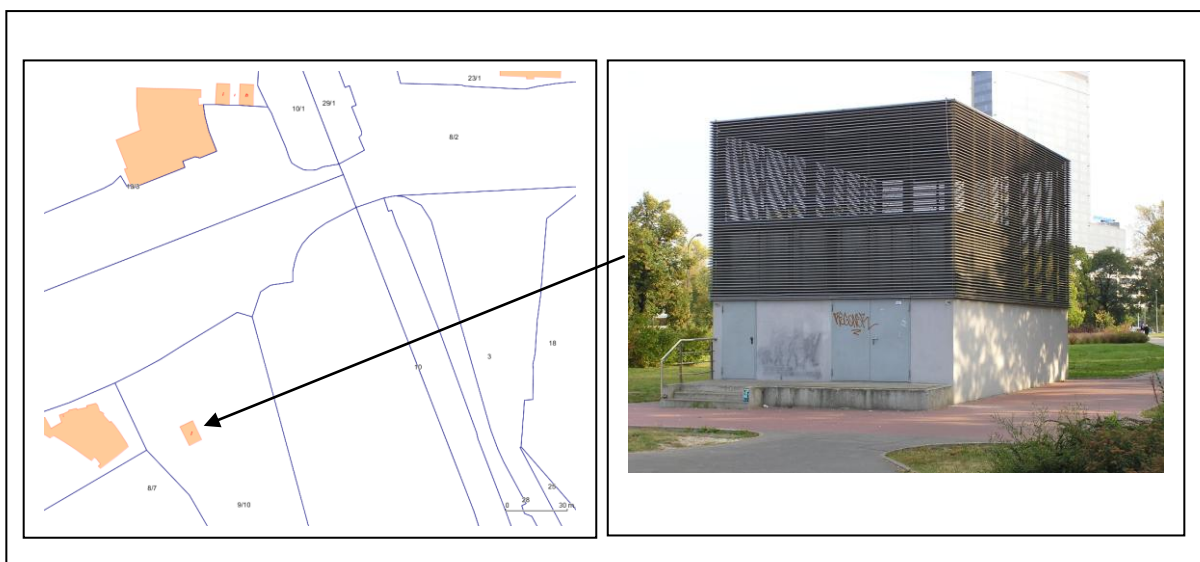


Figure 10. Technical building of the underground railway tunnel. Source: The Office of Geodesy and Cadastre for the City of Warsaw – maps, photographs – author

What regards to that object (the underground railway) only information about the stations, which have the nature of buildings, as well as about accompanying technical buildings related to aeration of the tunnel etc., is available in the cadastre. What concerns the tunnel itself – such information may be found on the base map and in technical documents only. The example of a building related to the underground railway, which may be found in the cadastre, is presented above.

Similarly to the Copernicus Science Centre, the best source of information about spatial objects is the base map; as the author mentioned above, in the case when the 3D cadastre is introduced in Poland, the base map should be the base material used for its creation.

6. FINAL REMARKS AND CONCLUSIONS

In Poland, such spatial objects as buildings and premises have been registered in the cadastre for many years. What refers to both categories of objects, their technical parameters are registered in the descriptive part of the cadastre and only in the case of a building its spatial data has its graphical presentation on the cadastral map (the building outline). With respect to premises, documentation concerning their spatial parameters, such as architectural projections of premises, is also collected, but it is stored in the form of analogue documents and not in the digital form.

One may say that with respect to remaining elements, which have the nature of spatial objects and which are not the subject of cadastral registration in Poland – the situation is not so bad. Although the Polish cadastre does not register: underground objects of the nature of buildings, underground tunnels and other devices of the underground infrastructure, information concerning those objects may be found in other official documents. Finally, the data base of the Technical Infrastructure was to be established in Poland, which would contain spatial and property information concerning particular underground installations. Until this inventory is established, its role will be played by the base map, which covers the areas of the highest density of such objects, i.e. cities and urbanised areas. In the case of computerisation of those maps – they are integrated with the cadastre, since they contain parcel boundaries and building outlines and they are stored in one database. The content of the base map is sufficient to identify the spatial extension of those objects in the x,y plane, and, for the technical infrastructure installations in the vertical plane as well, since heights of particular elements of that infrastructure (conduits, manholes etc.) are also specified. The body which maintains the base map (the same body maintains the cadastre) has the complete surveying documents concerning those objects in the archive. Following the author's opinion, if Poland concerned introduction of the complete version of the so called true 3D cadastre, i.e. containing spatial data about objects, which are not the cadastral objects at present – the base map should become the basic source of information about extension of those objects. Introduction of the 3D cadastre in its simplified version, i.e. without introduction of 3D spatial parcels, is possible with relatively low financial inputs, comparing to those required for surveying the objects from the very beginning, since the base map and source documents contain sufficient information concerning locations of those objects and they should be utilised for that purposes. This may be proved for experimental objects, for which the way of registration has been presented.

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BIOGRAPHICAL NOTES

Marcin Karabin PhD, Born in Warsaw in 1976. Studies of Geodesy and Cartography at the Warsaw University of Technology. Graduated his (M.Sc.) in Geodesy in 2000. Obtained his Ph.D. with a dissertation "Conception of the model of cadastral system in Poland based on chosen solutions in European Union countries" at the Warsaw University of Technology in 2005. Licensed surveyor since 2006. Has professional license in the field of: „Land Surveying, implementation and inventory surveys" and "Delimitation and division of real estates (plots) and preparation of documentation for legal purposes". Current position: full-time research worker at the Warsaw University of Technology (Department of Cadastre and Land Management, Faculty of Geodesy and Cartography), also providing surveying services as a licensed surveyor (since 2006).

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