

# Land Recording Of Objects Subject To 3D Cadastre In Turkey

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**Key words:** 3B Cadastre, Property Rights, Subsurface/Utility Cadastre, Servitude/Easement.

## **SUMMARY**

Turkey have been encountered the fact of densely urbanization with population growth particularly since 1950. At the present day, even though the population of some cities is steady or decreasing population of some cities is increasing rapidly. In Turkey, especially to meet the growing demands of living in big cities and to give them better services, multidimensional use of urban land such as water, wastewater, electricity, natural gas, metro, underground bazaar etc. structures are built. Since land recording and representation in Turkey are mostly done in 2D, 3D representations of such structures can be remained incapable. Three-dimensional cadastral information requires 3D cadastre of property rights, 3D planning and construction of surface and underground engineering projects, land management, life and goods safety.

In this study, in structures subject to 3D cadastre problems of property, registration and representation are explained by different example cases.

## 1. INTRODUCTION

The proprietary right is a right that allow the owner to say “This is mine and it belongs to me” and that has historically been subjected to discussions (Erdoğan, 2012). The proprietary right is not nowadays considered as an unlimited right in developed legal systems and legal approaches. It is a social right. Besides the authorities, it also loads some obligations to its owner. It has been accepted that it can be limited for the public interest (S. Tuğrul, 2004). Following the right to live, the proprietary right is one of the main fundamental rights. In United Nations’ Universal Declaration of Human Rights and European Convention on Human Rights, it is stated as fundamental human right.

According to Turkish Legislation, the proprietary right is protected constitutionally and legally. By stating in Constitution of Turkish Republic that *anybody has the proprietary right and right of succession and these rights can be limited by the law for public interest*, the proprietary right has been taken under legal protection. Moreover, in our constitution, it is also stated that the protection of proprietary right cannot be against the public interest. According to the 683<sup>th</sup> Article of Turkish Civil Code (TCC) Nr: 4721, the owner of the proprietary right is given the right to use, benefit and dispose on the properties within the legal limits.

In order to secure the proprietary right, land register records are kept under the responsibility of General Directorate of Land Registry and Cadastre. As real estate, these can be recorded to the Book of Real Estate Registers:

1. Lands,
2. Independent and permanent rights on the real estates,
3. Single spaces subjected to condominium (TCC, Article Nr: 998).

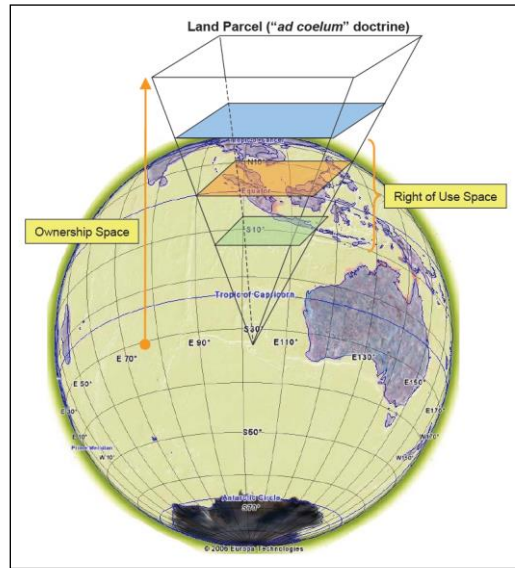
The properties that are not subjected to private ownership and that are reserved for public benefit are not recorded to the land registry records unless there is any real right that requires recording. If a recorded real estate becomes a real estate that is not subjected to the recording, then it is removed from the registry records (TCC, Article Nr: 999).

The proprietary right is sometimes limited especially in urban lands for investments such as water, wastewater, metro, electricity, monorail, bridge, and etc. These limitations are done vertical and horizontal to the property for public interest.

## 2. BOUNDARIES OF THE REAL ESTATE

The horizontal boundaries of a real estate are the boundaries that are shown on earth and cadastral map sheet. If these are not consistent with each other, then the boundaries in cadastral map sheet are taken into consideration. The boundaries of the real estates are under the guarantee of the Governments through the land registry and cadastral map sheets. In order to eliminate any illegal infringement towards them, the owners are authorized for prevention through filing a claim. These boundaries may be intervened for public interest due to the technical arrangements made on land (Bıyık, Karataş, 2003).

The real estates don't consist of only 2 dimension (2D), but they have three-dimensional (3D) use, and their boundaries exhibit variation due to this reason. That's why; besides the horizontal boundaries, the real estate has also vertical scope. Vertical scope consists of extensions below and on the surface of real estate (Figure 1). Land ownership should be considered as a right on surface with its extensions below and above the surface (Zevkliler, 1976).



**Figure 1.** Right of ownership and use of space (Chong Seng Chai, 2015)

The boundaries of the proprietary right are arranged in 718<sup>th</sup> Article of the Turkish Civil Code. In this article, it is stated that *“The ownership on the land covers the air on the land and the earth segments as long as there is a benefit in its use. In the scope of this ownership, the structures, plants, and resources are included, the legal limitations are kept.”* The owner of the real estate must content himself/herself with boundaries to the extent that are useful for him/her, and he/she has the right of ownership within these limits. The rights of disposition and ownership on the areas other than that are under authority and disposal of the Government (Köprülü, 2015).

## 2.1. Servitude

Servitude is the limited real rights that follow the right of possession and that must be recorded to land registry. These rights don't provide their owners with all the rights and authorities that the right of possession does, they only provide limited rights. These rights are the authorities of use and usufruct. They constrict the rights and authorities of the owner of the real estate in related real estates (Karagöz, 1995). The servitudes are arranged in Articles 779-838 of Civil Code.

Servitude in favor of real estate; it is a load put on a real estate in favor of another real estate, and it forces the owner of real estate to avoid from enjoying some of the rights provided by the right of possession or to put up with using the loaded real estate in a certain way (TCC, Article Nr: 779).

According to TCC, the types of servitudes are as follows:

- Right of way.
- Installment servitude.
- Right of resource.
- Right of construction.
- Right of usufruct.
- Right of habitation.
- Other servitudes.

In order to establish the servitudes, recording to the land recording is required. In achieving and recording this right, save as otherwise provided, the provisions related with the ownership of a real estate are implemented.

According to the provisions of civil code; the owner of a real estate also owns the below, above, surface, any complementary parts, products, and details of that property. This ownership can be limited only through special laws. Hence, it is a legal necessity to establish easement for the establishment of any kind of infrastructure bringing costs to the use of the real estate (Karataş et al., 2006).

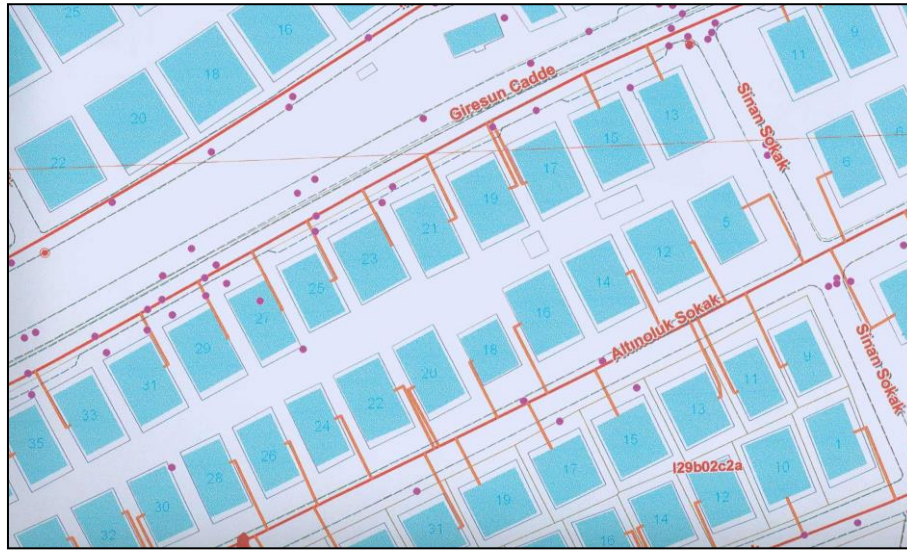
In our legal order, the infrastructure facilities can be seen in several types. The establishment of infrastructure that is arranged as servitudes in Civil Code, Law of Expropriation, and Building Law are as follows:

- a) Installment servitude,
- b) Right of Construction,
- c) Right of Way,
- d) Right of Resource (Dörtgöz, 1996).

### **3. RELATIONSHIP BETWEEN URBAN TECHNICAL INFRASTRUCTURE AND OWNERSHIP**

Infrastructures are not considered to be involved in the class of real estates determined by 704<sup>th</sup> article of Civil Code. Cadastre doesn't work with real estates that are not drawn in cadastral map sheets, recorded to the book of real estate registers not subjected to the ownership. For this reason, the survey and mapping of the underground plants are not seen to be a cadastral activity. The lines passing through common properties such as roads, squares, parks, parking areas, green fields, kindergartens, and etc. are mapped by surveying, and these maps are utilized when necessary (Figure 2).

The absence of any legal obligation for preparing the maps presenting the locations of technical infrastructures leads to problems in mapping, maintenance, repair, planning and coordination. According to the report prepared by Court of Accounts, it is seen that approximately 44.2% of the technical infrastructures of technical infrastructure institutions in 16 large cities have been given coordinates in digital and non-digital environments. It is seen that this portion is lower than 10% in Telekom and Electricity Distribution Directorates (Table 1). This situation makes it difficult to increase the service quality, to make planning healthier, and to ensure the coordination by utilizing the infrastructural information systems.



**Figure 2.** Natural Gas Map

**Table 1** The actual situation of the lines belonging to technical infrastructure institutions (Court of Accounts, 2008)

Institution	Length of Infrastructure Line (m)	Coordinated in Digital Environment (%)	Non-Coordinated in Digital Environment (%)	Coordinated in Non-Digital Environment (%)	Non-Coordinated in Non-Digital Environment (%)
Water- Wastewater	97,743,856	55.5	16.5	9.0	19.0
Natural Gas	12,963,017	98.0	0.0	0.0	2.0
Electricity	35,561,246	7.0	37.0	3.0	53.0
Telekom	36,507,972	4.0	17.0	0.0	79.0
<b>TOTAL</b>	<b>182,776,091</b>	<b>38.8</b>	<b>19.4</b>	<b>5.4</b>	<b>36.4</b>

The relationship between infrastructures and cadastre exists is related with passage of them through the registered lands. When they passed through real estates registered to the name of private and legal entities, either they are expropriated or the servitude right is established (TCC, Article Nr: 727-744) (Tüdeş and Bıyık, 2001).

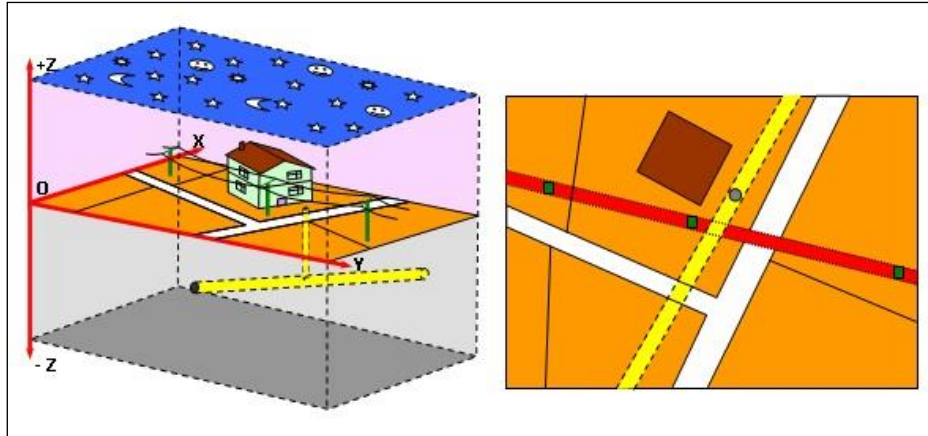
In our legal system, the infrastructures are seen in several forms. The establishment of infrastructure that is arranged as servitudes in Civil Code, Law of Expropriation, and Building Law are as follows:

- a) Installment servitude,
- b) Right of Construction,
- c) Right of Way,
- d) Right of Resource (Dörtgöz, 1996).

### **3.1. Three-Dimensional (3D) Cadastre and Urban Technical Infrastructures**

According to the Law of Cadastre in force in our country, there is no obligation regarding to surveying the boundaries of the facilities located under the ground. In cadastral operations, the boundaries above the ground are surveyed. For this reason, the cadastral bases doesn't show the technical infrastructure facilities that are located below and above the ground; they are limited to the surface, and hence prepared as two-dimensional (Karataş, 2007).

According to the Article Nr: 1 of Cadastre Law Nr: 3402 (RG:09.07.1987/19512) and to the Regulation of Large-Scaled Map and Map Information Generation (RG:15.07.2005/25876), it is required to produce cadastral topographical maps by obtaining the location information of the boundaries of real estates in 3D. In practice, a small portion of the information about the third dimension is derived and archived, and only the maps of the locations of the places constructed through technical department of the cadastre are prepared in 3D, so in the way carrying the topographical character (DPT, 2005). But this practice should not be understood as three-dimensional (3D), because, the 3D cadastral systems provide the information beyond the typical plan information. These can be used in securing the rights on the surface, below and under the property. So, below, above and surface of the land can be identified, analyzed in this way, and then can be improved and operated in best way (Papaefthymiou et al., 2004). In order to satisfy the increasing demands of the people living in today's cities and to provide them with better service, the below, above and surface of the urban lands are used intensely. For this reason, the 3D cadastral information gains more information due to the reasons such as proprietary rights, underground and aboveground planning, implementation of underground and aboveground engineering projects, land management, and ensuring the security of life and property. In this case, recording the gradually increasing and complicating use of urban lands, and better-determining the proprietary rights by better-determining the rights and limitations require the preparation of cadastre in 3D (Figure 3).



**Figure 3.** Real 3D world and the presentation in 2D

The 2D recording system used in cadastre of Holland is not completely capable of representing the records, where the 3<sup>rd</sup> dimension is an important factor. The recording cases, where the 3<sup>rd</sup> dimension element gains importance, are as follows:

- Structures constructed above each other (underground parking areas),
- Infrastructures under and above the ground (tunnel, metro, and tramway (on the ground)),
- Historical artifacts,
- Apartments,
- Location and ownership of the cable and pipes,
- Polluted zones (Stoter and Zevenbergen, 2001),
- Resource exploration permissions.

All these cases involving the 3<sup>rd</sup> dimension are required in limiting the legal statuses of real estates. Hence, the legal statuses of the objects mentioned above can be better-identified (Stoter, 2002).

#### **4. EXAMPLES OF 3D CADASTRE IN TURKEY**

In this section, the information about the practice of 3D cadastre from various cities of Turkey will be given.

##### **4.1. İstanbul Yerebatan Cistern (Palace)**

İstanbul, which is one of the oldest cities of the world and has been capital city of 3 global empires, is a very strong and magnificent bridge between the past and today. Napoleon Bonaparte has emphasized the size and importance of the İstanbul with the statement of “*If there is only one country in the world, then İstanbul would be its capital city.*” Besides numerous structures made by hand, it has also magnificent natural beauties (URL-1, 2015).

Located in Sultanahmet Square, the Yerebatan Cistern (Palace) has been constructed in year 542 upon the order of Justinian, the 1<sup>st</sup> emperor of Byzantine, in order to satisfy the water

requirements of Large Palace on other side of the Horse Square (Figure 4).



**Figure 4.** The map of the region of Yerebatan Cistern

The cistern known as Yerebatan Palace is 145 m in length (inside) and 65 m in width. It covers approximately 9800 square-meters. 12 lines of the pillars, 28 pillars in each line, carry the brick belts and the vaults reinforced by them. 8 of a total of 336 pillars have been taken into a meshed shears in north, and 37 pillars in southwest have been stayed within a curtain walls covering them (Figure 5).



**Figure 5.** Inside of the Yerebatan Cistern (URL-2, 2006).

Despite that it was dry inside in final restoration; there is still 1.2 m of water in the cistern since water has leaked into the cistern again. In Yerebatan cistern operated by İstanbul Kültür ve Sanat Ürünleri Ticaret A.Ş., various cultural activities of İstanbul Metropolitan Municipality are organized (URL-3, 2006).

In book of real estate registers, the record of Yerebatan cistern is in 14<sup>th</sup> parcel of 37<sup>th</sup> cadastral block, 41<sup>st</sup> map section, Alemdar Neighborhood, Eminönü district (Figure 6). In section of statements, it is stated that “This water cistern covers the sections under the grounds of



All of block 38, parcels 31, 33, 34, 35, 45, 46, 47, 54, 67, 68  
Block 39, parcels 3, 4 and  
Block 54, parcels 11, 12, 13, 15, and 35, and  
Parts of block 37, parcel 29  
Block 38, parcels 27, 30, 32, 36, 43, 77  
Block 39, parcel 1  
And block 54, parcels 1, 2, 4, 5, 6, 8, 16, 33, and 34.”

In correspondences of the institutions about Yerebatan Cistern, various cadastral block and parcel numbers are used. Among the parcels stated in statements section of the record of Yerebatan Cistern in book of real estate registers, there is not the statement of historical artifact or the cultural value requiring protection in related pages of cadastral block 54 parcel 15 and block 37 parcel 29.

There is not any clear information about which points on the ground the Yerebatan Cistern corresponds with. Moreover, there is also no location information. There are many structures on Yerebatan Cistern belonging to private persons and legal entities.



**Figure 6.** Status of Yerebatan Cistern in cadastral map section

#### **4.2. Underground Bazaars in İstanbul**

The underground passages and bazaars of İstanbul Metropolitan Municipality are located below the roads and squared in various locations of İstanbul (Table 2). The shops constructed in Galata Bridge are under the road and over the sea.

İstanbul Metropolitan Municipality benefits from its shops in underground bazaars and subways by renting them for various purposes. None of them is recorded in land registry (Figure 7/a, b, c).

**Table 2** The underground passages and bazaars of İstanbul Metropolitan Municipality

UNDERGROUND PASSAGE AND BAZAARS OF IMM	
UNDERGROUND SPACES	NUMBER OF UNITS
Aksaray Underground Bazaar	137
Saraçhane Haşim İşcan Subway	41
Zeyrek Subway	15
Unkapanı Subway	20
Unkapanı Under-bridge Shops	13
Vezneciler Subway	10
Eminönü Yenicami Unkapanı-Side Subway	10
Eminönü Yenicami Subway	22
Eminönü Çarşıkapı Subway	14
Galata Bridge	112

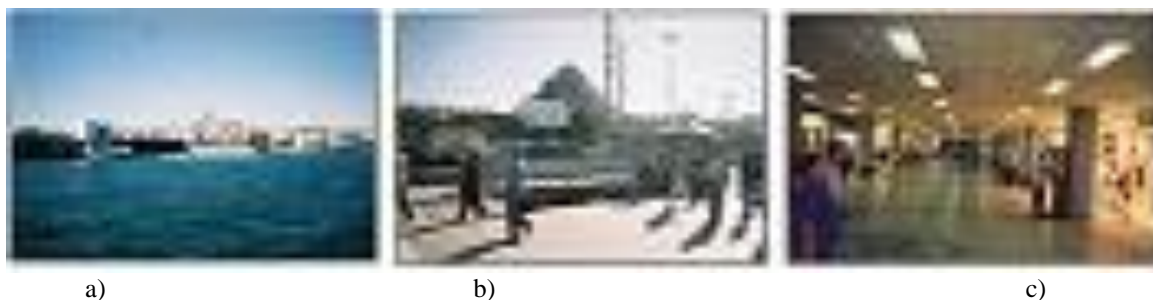


Figure 7 a) Galata Bridge, b) Eminönü Tramway Subway, c) Aksaray underground bazaar

### 4.3. Underground Bazaar in Kayseri

By Kayseri Metropolitan Municipality, 200 shops have been constructed under the area that is seen as garden, square and road in development plan of Cumhuriyet Square in Serçeönü Neighborhood of Kocasinan district of Kayseri city (Figure 8). 200 masonry shops under the road and square in map section 292-301, cadastral block 2951, and parcel 1 have been recorded to the name of Kayseri Metropolitan Municipality, and condominium has been established.



**Figure 8.** View of Underground Bazaar

Despite that the land recording of the underground bazaars in İstanbul has not been made, the underground bazaar in Kayseri has been recorded in land registry.

In rulings of the Department of Disposals of General Directorate of Land Registry and Cadastre about the land recording or underground bazaars, there are explanations within the frame of legislations. Accordingly; in sum, if the shops are under the road, the constant and private right of building is established by recording it as road to the name of municipality after bordering the projections of the shops on the road. Then the condominium is established on the right of building.

#### **4.4. Structures in Mardin**

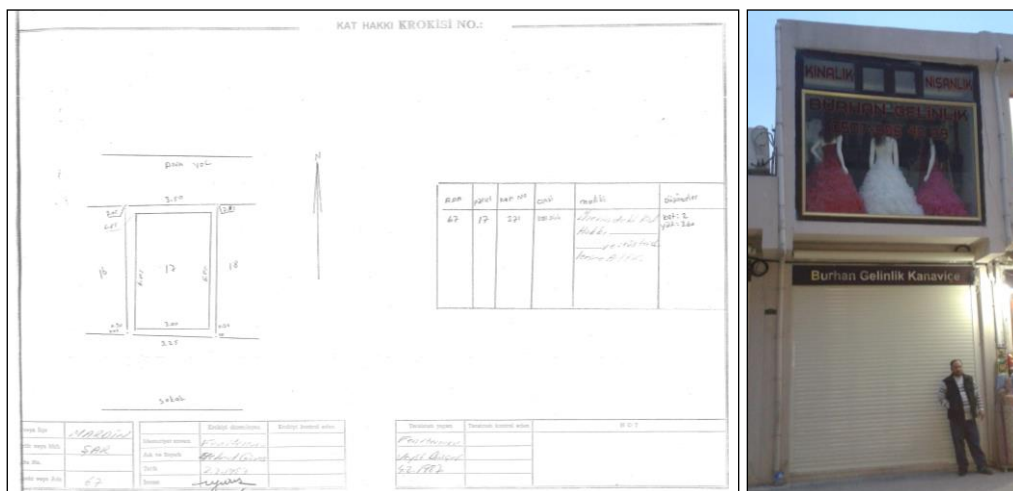
Mardin, where the languages and religions met and the cultures are mixing into each other, with its texture that has hosted 30 civilizations in history, its culture, mysterious streets and architectural structure has taken its place among the rare cities of the world (URL-4, 2015) (Figure 9). Mardin is one of the residential areas of Southeastern Anatolia, which exhibit strange structuring patterns. The city has been established in east-to-west direction on an area, which is 2500m in length and 500m in width, in southern shoulders of Mazi Mounts. When looking from castle, the houses of Mardin seem like stacked up (URL-5, 2015).



**Figure 9** View of Mardin City (URL-6, 2015)

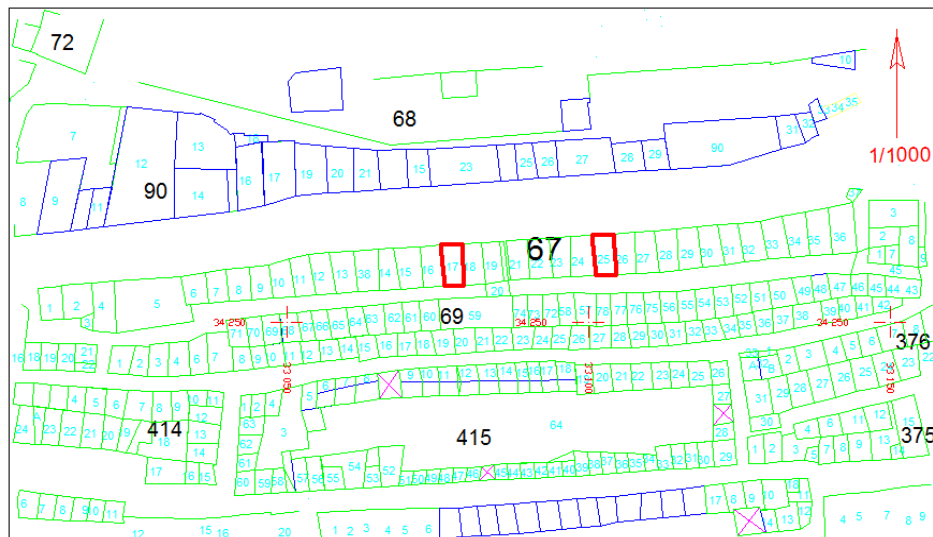
In restricting and surveying drawings prepared during cadastral determination of the structures partially overlapping each other, the lettering is made by taking the actual measurements of the structure, which is ex-parte used by the related user, on the ground. Condominium is established in favor of the immovable on top and against the favor of the immovable at bottom. The records have been made by stating in related columns of the book of real estate registers.

Based on the deed records, the projections of some of the structures on actual ground completely overlap. In determinations regarding with such locations, the immovable on the ground is given a parcel number. And for the immovable on upper floor, by preparing condominium plot as permanent right, the “Condominium” right is established (Figure 10).

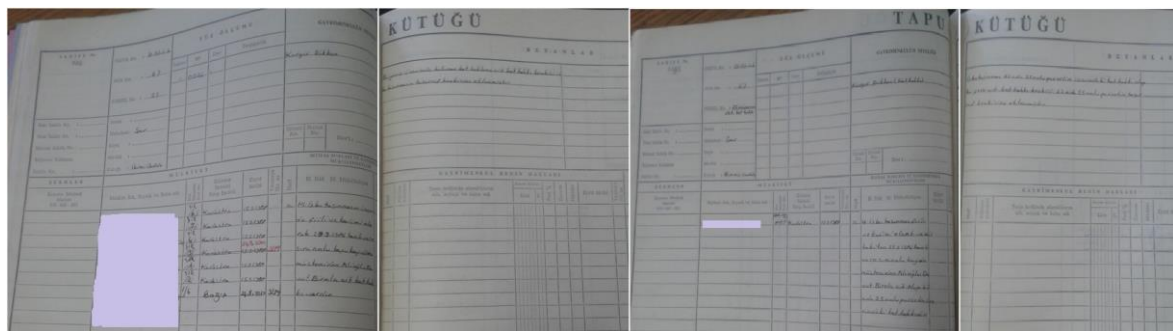


**Figure 10.** Condominium Diagram and Photo

In the books of real estate registers related with such structures, the registries have been recorded by giving the plot-parcel number of the ground to the structure (Figure 11). The record of the structure, which is above the structure on the ground and doesn't occupy any area on the ground, is made as "Condominium" in the page following the page of the book of real estate registers, where the structure on the ground is recorded. Hence, both of the structures are recorded. The records of the structures on bottom and top in the book of real estate registers are linked to each other. So, the connection between the immovables can be ensured (Figure 12).



**Figure 11.** Map of the location of real estates



**Figure 12.** Pages of real estates with condominium from the Book of Real Estate Registers

#### 4.5. Natural Structures in Cappadocia (Nevşehir)

Cappadocia (Nevşehir) region has emerged as a result of the corrosion of soft layers, which have consisted of lava and ashes vomited from Volcano Hasan and Volcano Güllü in Erciyes approximately 60 million years ago, by the precipitation and winds for millions of years. This event created a 100-150 m thick tuff layer having different hardness levels in that region. The tuff layer is covered with a thin lava layer consisting of hard basalt. The basalt has broken apart into small pieces, and started to abrade the soft tuff, and the geological structures called Fairy Chimneys have been formed under the effects of other climatic events (Yılmaz et al., 2010). (Figure 13).



**Figure 13.** Cappadocia (Nevşehir) region

General Directorate of Real Estate Registry and Cadastre, due to the uncertainties in land recording due to the unique characteristics of the region, has sent a committee to that region in 12.07.1974. That committee has made examinations on that side, and prepared a report in 12.12.1974. The restrictions, determinations and recordings have been made in accordance with that report. In this study, information will be given about the Fairy Chimneys and pigeon lofts.

##### 4.5.1. Fairy Chimneys

According to the Historical Artifacts Law Nr: 1710 (RG: 6.5.1973/14527), the Fairy Chimneys have been approved as historical artifacts. For the fairy chimneys recorded as historical artifacts;

a) In restriction and determining the ones being used as house, barn, hayloft, cellar and pigeon loft by the citizens, the land registers must be taken as ground regardless of being within or out of the boundaries of protection predicted by the Law Nr: 1710 and determined by the Law of Construction. They must be recorded to the name of person seeming as owner, and the statement indicating that it is Fairy Chimney must be enclosed into statements section of the book of real estate registers and the protocol (Figure 14).

**Figure 14** Land Recording Protocol of Fairy Chimney

b) If the fairy chimneys are located on any deedless land, after determining and measuring the outer boundaries, they must be recorded to the name of Treasury. In the section of “Qualifications”, the statement of “Fairy Chimney” must be enclosed. When there is any achieved right on it, the independent and permanent right must be established.

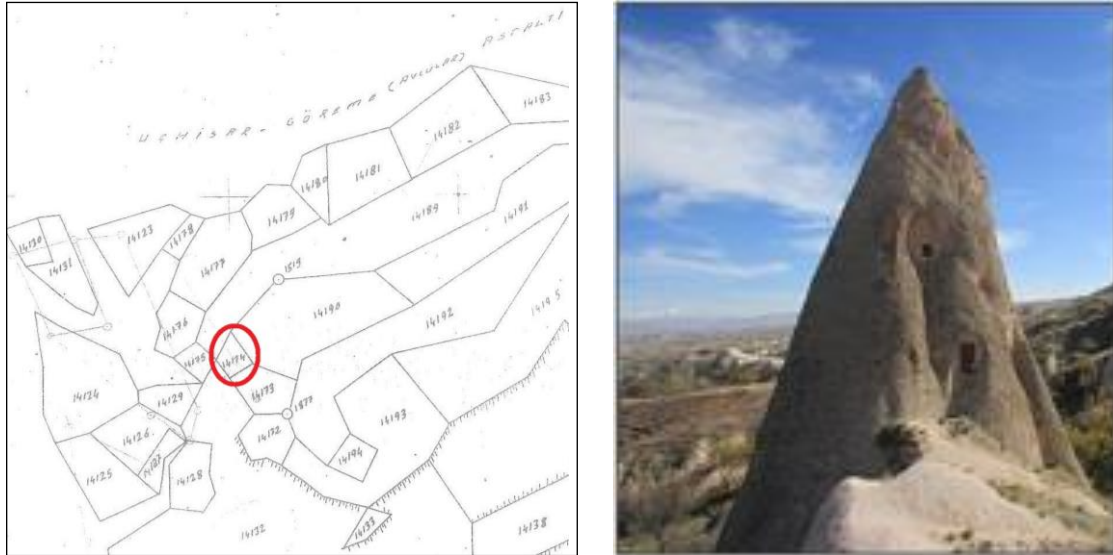
c) If the fairy chimneys are located on a deeded land, by taking the land registry reports as ground, they should be restricted recorded to the name of the owner seen in deed certificate. In section of “Statements”, the presence of fairy chimneys must be enclosed.

d) If the fairy chimneys are located on a public land, by determining and measuring the outer boundaries, they must be recorded to the name of Treasury under parcel number. In the section of “Qualifications”, the statement of “Fairy Chimney” must be enclosed (Figure 15).

#### 4.5.2. Pigeon Lofts

Pigeon lofts have been formed by linking the chambers, which have formed in shoulders consisting of tuff rocks having similar characteristics and rose with steep slope in valleys, with external world. Because of the use of the fertilizer (pigeon feces), they have been passed down from generations to generations or they have passed in other hands through selling. Restriction and determination of the pigeon lofts;

a) For the private-registered pigeon lofts, the restrictions and registrations should be made to the name of deed owner in accordance with the letters shown in vertical drawing. The condominium should be established by opening an independent page in the book of real estate registers by establishing the connection between the parcels recorded to the name of Treasury. It is required to state “Pigeon Loft” in qualifications section and “... m<sup>2</sup> space drilled into the rock” in amount section, and the internal areas of these pigeon lofts should not be surveyed, it is enough to receive information from the owners or experts.



**Figure 15.** Location of fairy chimney on the map and its photo

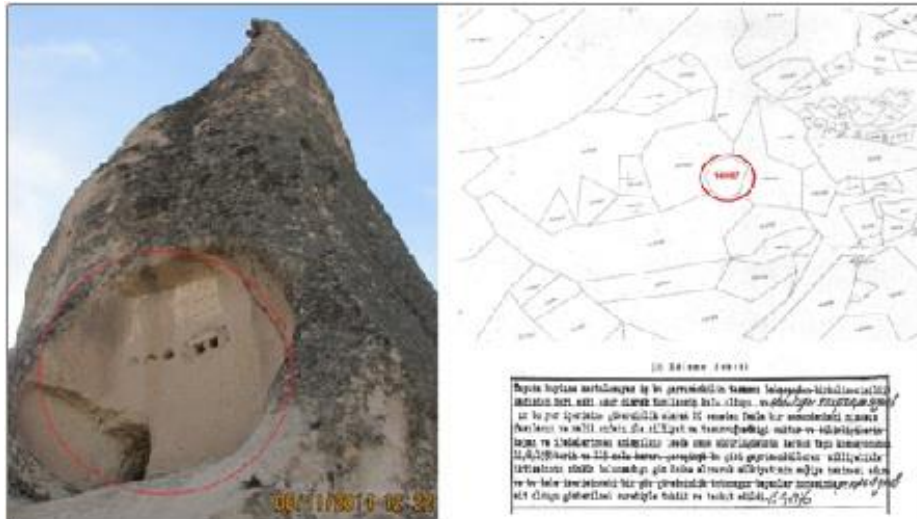
b) If it can be understood from the documents or expert opinions that the deedless pigeon lofts have been opened by making effort or bought from anybody else, they must be recorded to the name of owner as independent and permanent right, and the slope should be associated with the main parcel.

In lettering the pigeon lofts on the vertical drawing, the lettering should be made separately for each pigeon loft group, and the slope should be measured only for the regions related with the pigeon lofts, rather than measuring the entire valley in the main parcel.

c) If the pigeon lofts are located in miscellaneous rock blocks, by measuring the ground and middle section of the rock block, the emerging parcel must be recorded to the name of Treasury. By opening a new land recording page by linking with the main parcel and by lettering for the pigeon lofts, the right of the construction must be established.

The pigeon lofts in cadastral block 6 and parcel 14067 that has been registered as historical artifact has been used by woman named P. A. for more than 20 years with the title of owner. It has been stated in “Statements” section that the pigeon loft on the castle, of which ownership has been recorded to the name of Treasury, on the parcel 14067 belongs to woman named P.E. (Figure 16).



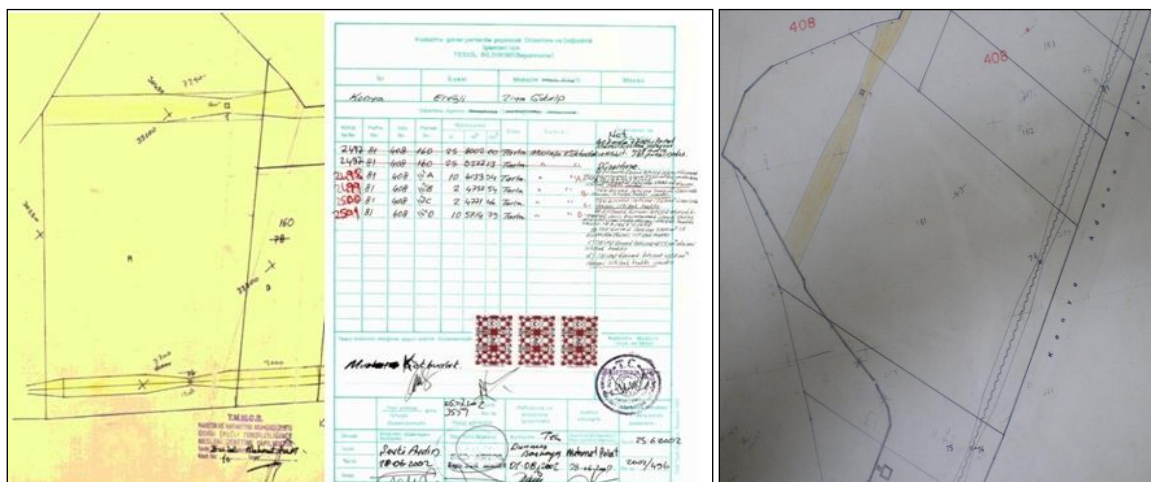


**Figure 16.** Cadastral map of parcel 14067, and the explanation of the reason of acquisition

#### 4.6. Electricity Transmission Lines

It has been ensured in 4<sup>th</sup> article of the Law of Expropriation Nr: 2942 that the expropriation can be performed for construction of the facilities, which don't totally remove the use of ownership by passing under and on the ground, such as energy transmission lines, oil and natural gas pipeline, and water conveyance lines can be made through condominium, rather than expropriating the ownership.

The areas, where the posts of energy transmission lines are grounded, are expropriated. For the areas on the course of lines and the security distances corresponding with vertical/horizontal oscillation ranges of them, the condominium is established in favor of Electricity Company (URL-7, 2012) (Figure 17).



**Figure 17.** Certificate of the Record of Condominium and the Cadastral Map View

## 5. RESULTS AND CONCLUSIONS

While the requests for lands in order to meet the increasing needs of the people living in our cities increase, the lands in city centers stay constant. It is tried to satisfy the needs such as metro, water, wastewater, electricity, natural gas, underground parking areas, and etc. by using the land multi-dimensionally. During the works, the limitations are brought to the proprietary right in vertical and horizontal direction. The records of limitations on the land in vertical direction from legal aspect are made by establishing the condominium.

In past, the underground cities, fairy chimneys, and etc. have been formed by nature or human hands, and now there are complex structures that have been constructed in various architectural styles. In recording and representing these structures, 2D cadastre is not efficient at all. The cadastre is supposed to provide sufficient level of data used as fundamental basement for meeting the demands of increasing population, and to sustainably ensure the sophisticated ownership relations.

Nowadays, since 2D cadastral system cannot completely meet the recording and representing requirements of 3D use, the necessity of 3D and 4D cadastres emerges. This situation should not be seen as a deficiency of Cadastre Institution, it should be considered from the aspect of increasing necessities of human beings, technologic developments, and changes in human-ownership relations. Cadastre Institution should prepare multidimensional studies by enlarging the scope and context of the cadastral works in the way covering the future necessities and in parallel with the change. Technologic level and economic size are sufficient for ensuring the modern cadastral works.

Since the technical infrastructures such as electricity, water, wastewater, natural gas, and communication are not considered as immovable in Turkish Civil Code, there is no legal obligation in registering them. There isn't the information about the locations of technical infrastructures at desired level. For this reason, problems occur in planning, maintenance, repair, coordination, and the establishment of spatial information system. Especially in our cities, in order to secure the proprietary right under legal protection, to ensure the security of life and property, and for sustainable and management, 3D information should be obtained.

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