

# The Oslo Method – A Practical Approach to Register 3D Properties

Tor VALSTAD, Norway

**Key words:** 3D property, subdivision, Planning and Building Authority, underground.

## SUMMARY

The Municipality of Oslo established in 1987 a system whereby special three-dimensional objects could be registered as real property both in the cadastral and the title register. These properties can be mortgaged and have rights and restrictions as a ground parcel. The only difference is that these property objects have a definite extent in all three dimensions. The existing law has no provisions for 3D properties so the Oslo Method has mostly been limited to solid underground facilities etc.

This paper will present the process of surveying, mapping and registration of these objects and also give an overview of Oslo's digital planning and mapping system.

The paper will also cover The Sectioning Act, which is a law that governs the mapping and registering of "self owned" apartments (sections).

## La Méthode d'Oslo – une Approche Pratique pour l'Enregistrement Tridimensionnel de Propriétés

## RESUME

La ville d'Oslo a établi en 1987, un système où des objets tridimensionnels pouvaient être enregistrés comme propriété *foncière* dans le cadastre ainsi que dans le registre des titres. Ces propriétés peuvent être hypothéquées et ont les droits et restrictions d'une parcelle *de base*. La seule différence est que ces propriétés tridimensionnelles ont une étendue limitée dans toutes les directions. La loi norvégienne existante n'a pas de dispositions pour des propriétés tridimensionnelles, et jusqu'à maintenant la méthode d'Oslo a été limitée à des constructions souterraines solides. Ce document présente une méthode pour surveiller, cartographier et enregistrer ces propriétés 3D avec une vue d'ensemble du système digital de planification et de cartographie de la ville d'Oslo. Ce document mentionnera aussi brièvement la méthode pour cartographier et enregistrer les appartements privés (appelés sections en Norvège).

# **The Oslo Method – A Practical Approach to Register 3D Properties**

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## **1. INTRODUCTION**

Though the registration of land in Norway has been regulated since the thirteenth century, it is only after the Land Subdivision Act came in 1978, that the whole country has the same identification system for properties. The Land Subdivision Act covers the whole country, but deals only with two-dimensional properties. This made it difficult to identify and register underground structures in a way that satisfied the Land Registrar. The Municipality of Oslo developed in cooperation with the Land Registrar a cadastre that could handle three-dimensional objects. This cadastre also made provisions for subdivision of parcels above the ground, but so far it has only been utilised for parcels below the ground.

## **2. THE CITY OF OSLO**

Oslo has a population of 520,000, and a surface area of 454 km<sup>2</sup>, 75 per cent of which consists of forests and other undeveloped land. The build up area is about 112 km<sup>2</sup> and the total area within the building zone is approx. 146 km<sup>2</sup>. There are 70,000 properties of which the Municipality owns more than 8,000. There are all together 262,000 buildings in Oslo.

The City Parliament is Oslo's highest governing body. The authority delegated by the national government to the municipality is conferred on the City Parliament, which is a legislative assembly consisting of popularly elected representatives.

Oslo's City Government is the city's highest executive body. The City Government is responsible for preparing and implementing resolutions passed by the City Parliament, through its management of the various departments of the central municipal administration.

The central administration is the City Government's "staff" and it consists of eight municipal departments. The municipal departments correspond to national ministries and comprise of among others The Department of Business Development and Urban Planning. This department is again responsible for several municipal corporations and offices and the Planning and Building Authority is one of them.

## **3. THE PLANNING AND BUILDING AUTHORITY**

This office was established as a new organisation in 1992 and combines building control, planning, surveying, mapping and land registration.

### **3.1 Planning**

In Oslo the property developers produce almost all local development plans. The task of the Planning and Building Authority is to ensure that strategically planning objectives such as, city

form, landscape elements, green structure, transportation, public services and facilities etc. are secured.

The Norwegian Planning and Building Act contain no clauses that requires underground areas to be planned or mapped or described in the written regulations.

Although there is no legal obligation to include underground structures in our development plans, such practice has been included as part of our standard of documentation in the Planning and Building Authority. The practise of including underground areas into the development plans was developed when the city's first underground tramway was constructed around 1898.

In 2000 the office received 112 local development plans.

### **3.2 Building**

The Planning and Building Authority has been delegated the authority to decide virtually all building applications. The requirement to obtain a building permission covers a wide spectre of objects from the construction of dollhouses in the garden, fences and billboards to new constructions of any dimension including underground structures. In making their decision the planning authority must have regard to the provisions of the building and local development plans adopted by the city.

The Office received 5,056 building applications in 2002.

### **3.3 Mapping**

The city of Oslo was originally covered with base maps in 1:500 and 1:1,000. Since 1996 the whole area has been covered by digital maps that are updated photogrammetrically every third year.

Every kind of map is now digital and they are available through the computer network. The user decides how much information should be made available on the screen or printout. The original base map with half meter contours, depicts the necessary detail as well as administrative and property boundaries with parcel numbers. This map also shows the extent of underground utilities, tunnels of all kinds, areas for underground storage and car parking etc., but only in the vertical projection as a horizontal plan.

The mapping system contains cadastral information such as boundaries and parcel registration number. The user can assess the quality of the boundaries and the method of acquisition. Underground parcels are marked differently and gives heights as well at the bottom and top of the parcel.

The urban planning map is derived from the base map and contains information about area plans, local development plans and building plans as an overlay to the base map. The land use information is very detailed and contains references to the various plans and regulations. Even underground areas are marked with their specific purpose and referenced to a certain municipal regulation.

The urban planning map series is also fully digitised and covers the whole building zone. The public can buy colour printouts of this map at the information desk and this is the map that the public are required to use in connection with an application for subdivision or building. Any

kind of map can be ordered through the internet, but the map itself is not available to use free of charge.

## **4. THE CADASTRAL SYSTEM**

Our cadastre is a parcel-based land information system. Both the national and local government has issued regulations to ensure that the boundaries of real property and leased land are accurately marked, measured and mapped, and furthermore that an updated and reliable register are kept of all real property and leased land and of data connected with the same.

### **4.1 Identification of parcels**

All land in a municipality is divided into fixed number of large areas, which each is given a main registration number. These areas are then subdivided into parcels and numbered in succession by a parcel number. Within a municipality a parcel is uniquely identified with an area and parcel number, eight digits in all. On a national level four more digits are added to identify the municipality.

The City of Oslo is divided into approximately 250 areas. An underground parcel is given the same area number as the parcel on the surface, but with 300 added. The parcel number starts at one. This gives each underground parcel a distinct identification and with a relationship to the surface property as well. Area numbers from 601-900 are reserved for parcels above the ground.

### **4.2 Registration**

Since 1980 a national GAB-register system has been developed. This information system embraces properties, addresses and buildings, and currently contains nationwide some 3 million properties. All the municipalities in Norway report directly to the GAB database. The Norwegian Mapping Authority is responsible for the GAB-register.

The Land Registrar has his own Electronic Property Register. Information about ownership is transferred from the Electronic Property Register to the GAB-register on a daily basis.

### **4.3 Procedure**

The Land Subdivision Act regulates both the survey work and the administrative routines of the subdivision process that is required to have a new parcel properly identified. The whole process is a municipal responsibility. Private companies can do part of the process, but since every municipality has its own surveying unit, it is not very common.

Division of a parcel starts with an application from the titleholder. A map showing the desired new boundary should accompany the application. The local building board has to decide whether the subdivision should be permitted according to existing land use and local development and building plans. The subdivision-permission will not be granted if the area is too small to build a house. It is also necessary to have acceptance regarding access road, water and sewage before a final permission is given. The parcel is then surveyed and the new

boundary marked. The process always includes a meeting in the field with the applicant and the neighbouring landowners. The cadastral surveyor can act as an arbitrator if there is a dispute about an existing boundary. The surveyor may decide the delineation of the boundary providing all parties accept.

A new law on subdivision has been in the making for several years now, but there is no political decision yet (February 2002). This law will end the municipal monopoly on cadastral surveying.

#### **4.5 Underground parcels**

The subdivision of underground parcels follows partly the same procedure as for surface parcels. The titleholder on the surface has to agree to give up his rights to the underground. In Norway there has not been established a finite depth of ownership. But usually ownership downwards has been accepted as far as you are able to utilise it. Which means that private landowners outside the central business district are seldom compensated for tunnels under their property, even if only 10-30 metres below the basement. Acquisitions of underground areas for public tunnels are usually done by occupation. In a few cases underground areas have been expropriated and compensated because of future restrictions of the landowner's possibility to build below the ground. When a national or municipal agency is involved in underground construction, the finished volume is seldom subdivided from the surface parcel. If it is necessary to reach an agreement with the landowner, a restrictive clause will be added to the title deed of the land at The Land Registrar.

### **5. CADASTRAL SURVEYING**

The Planning and Building Authority is involved in the process when a private person or company or a municipal corporation wants to build below others property. The application process is similar to surface subdivisions, but the cadastral surveying is somewhat different.

It is of course impossible to set out the desired underground area beforehand so we are reduced to accept the plans and drawings from the applicant. Usually we accept the drawings as the final result and issue a survey certificate without any surveying. The section for cadastral surveying now employs a reflectorless total station and many underground parcels are now surveyed both at the bottom and at the top, such that the underground parcels are identified as exact volumes. On the survey certificate, each corner is given coordinates and heights at the floor and at the ceiling. The registration number and the survey identify the parcel as a volume, but in the various registers the parcels size is given in square metres and not in cubic metres.

This is partly due to the present national Land Subdivision Act that has no provisions for three-dimensional parcels and therefore the GAB-register cannot accept volumes, except in the accompanying text.

A new law that will replace The Land Subdivision Act is under way and this law will make it easier as well as legal to operate with three-dimensional parcels.

## **6. UNDERGROUND CONSTRUCTION**

Norway is not a densely populated country and it would look like it is enough space to build whatever above the ground. But even outside the city centres there is a lot of underground construction. This is partly due to the topography of Norway and that modern techniques have made it possible and economically viable to make tunnels and caverns everywhere. Another important fact is that Norwegians regard their mountains, forests and recreational areas as almost sacred, which makes it politically dangerous to infringe on these areas. In many cases it is cheaper as well, because it reduces noise pollution measures, traffic accidents, maintenance costs and of course the acquisition costs.

The underground of Oslo have been heavily utilised in the recent years. Especially in connection with feasibility studies it would reduce costs if a complete 3-D map of the underground were available.

## **7. THREE-DIMENSIONAL UNDERGROUND MAP**

Even though most underground activities are marked on the municipal maps there is no central register for three-dimensional maps and information. Today's maps do not show the underground structures position in relationship to the surface or to other underground structures. In the inner city area this may not be sufficient anymore, neither for planners nor developers. It has long been the intention of the Planning and Building Authority to develop a three-dimensional underground map. But there are legal, political, financial and technological obstacles so a solution is still in the future.

## **8. APARTMENTS**

In Norway we have the Sectioning Act, which governs the way flats can be subdivided or sectioned in order to establish ownership. It is the municipalities that deal with these cases. The application for sectioning is followed by plans for each floor where the various flats (sections) are marked. There is no surveying involved in the making of these plans. But if the owner of a flat (section) wants exclusive rights of an outdoor area, surveying might be necessary to determine area and boundaries. The sections are entered into the GAB-register as an ownership unit. One restriction is that sectioning is only possible if all the flats in the building are involved. Both commercial and private buildings can be sectioned and there is an overlap between the Sectioning Act and the Subdivision Act so in a few cases the client can choose the procedure himself. In some cases a three-dimensional approach might have been better, but the present process is fairly rapid and cheap.

## **BIOGRAPHICAL NOTES**

### **Tor Valstad**

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