

BASIC CONSIDERATIONS RELATED TO CADASTRAL
SURVEYING OF CITIES

*by Gottfried Konecny**

Introduction While topographic surveys describe the visible natural and man-made features of the earth's surface, cadastral surveys are involved in legal questions of ownership and rights vested in lands. Cadastral or legal surveys are therefore tightly interwoven with the legal principles and practices of a specific country or region. While the surveyor is responsible for conducting the survey, its urgency, its meaning, its significance and its usefulness at large is governed by the local law.

In turn it is the responsibility of a professional surveyor to establish why cadastral surveys are necessary, how they can most efficiently be performed in the interest of the public and to communicate his convictions to the legal profession and the legislators so that archaic laws may not become a hindrance to the requirements of modern community development.

Land Registration Land as one of man's major resources ranks with stocks, bonds and commodities as a contributing factor to the economy of an individual as well as of the community. The question of land ownership and its associated rights therefore warrants legal protection. Such legal protection for the owner can be obtained by issuing legal documents such as deeds or by instituting a public land register.

The various systems of land transfer and of establishing land ownership which are used in the various countries of the globe are summarized in the following:

Private Conveyancing - simply consists of signing a private deed between the parties exchanging a property. The solicitor merely describes the land and its history over at most 40 years in an "abstract of title". Only one deed is issued, there is no public registration and no survey is required for issuing the deed. This system is still used in parts of England, Eastern Canada, Ireland, the Commonwealth and the United States.

Rudimentary Deed Registration - is a means to provide the interested property owner with the possibility to register a land parcel in a publicly operated Land register. In it all private deeds are copied without checks. Surveys are not required. An index of proprietors is kept for every year, but due to registration not being compulsory no parcel index exists. Searches for old deeds are very time-consuming and very uneconomical. The system is used in the Atlantic Provinces of Canada and in parts of England and the United States.

Improved Deed Registration - is a compulsory means of registering any transfer of land. The registers contain ownership, mortgages and inhibitions. Entry of these is checked for correctness by the Registrar. Due to compulsory registration all parcels of land can be included and all deeds can be filed by aid of a parcel index, however an accurate survey is not prescribed. The system is practiced in Scotland.

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Title Deed Registration - states that no land transaction is valid until it is recorded in the Land Register. The registration includes ownership, servitudes, mortgages, mineral rights, leases, contracts and restrictions and is checked for correctness by the Registrar. Registration can only be carried out after a survey has been completed according to specifications in which the boundaries were marked by monuments. Each survey is checked by a government organization (the Surveyor General) after an application for registration has been received. The system is in use in South Africa and in some Western European countries.

Land Title Registration - The state authority establishes title by declaring under guarantee that the land is vested in a person subject to the specified encumbrances; by registration defects of title are cured. There are two types of land title registration practiced:

(a) Torrens System

The Torrens system, which originated 1858 in South Australia and quickly spread through many areas of the English speaking world, upholds 3 principles: the mirror principle, whereby the present state of ownership is reflected by the register alone; the curtain principle, whereby no further historical search is necessary beyond the register; the insurance principle, whereby a bona-fide owner who is contradicted by the register is reimbursed out of an Insurance fund. The guarantee of title pertains to ownership of the land but not to its misdescription.

(b) European System

The European system, practiced mainly in Central, Northern and Eastern Europe, also follows the mirror and the curtain principles, but it does not include the provision of an insurance fund. On the other hand the state guarantees the validity of survey records for the reestablishment of boundaries. Presumably regulations covering the survey, the monumentation of boundary monuments and their upkeep were easier to establish under Code-Law than under common English law. But it may also be true that the Torrens system could not give legal significance to land boundaries because these were not as well established as in Europe.

An evaluation of the Land Registration systems cannot justly be done without considering the Survey system. While the land register primarily concerns itself with the question of "who" has rights on the land, the survey system defines its "whereabouts".

While in the English speaking countries the tendency during the last 100 years has been to progress from Private Conveyancing to Deed Registration and to a Torrens Land Titles System this progress has only taken place in the purely legal aspects. The Torrens system, which is upheld as an ideal for Land Registration provides the benefit of an efficient public register which guarantees (a) security to the registered owner of the land; (b) a completeness of record for the entire community due to the compulsory nature of registration; (c) accuracy due to the fact that the register is kept by competent personnel who will check the validity of the property transfer; (d) simplicity due to the elimination of lengthy searches; (e) compactness of the records due to the elimination of dead matter; (f) speed; a land transfer can be completed within a few hours; (g) the expense in maintaining a Torrens system is less than that of a Deed Registration mainly because of the absence of search costs.

The Torrens system, as it is presently being used, however, still has the defect,

that it does not sufficiently ensure the standard of the survey, its recoverability and most of all the utilization of survey records for public uses. In this respect the system is inferior to the Title Deed Registration system of South Africa and the European Land Title Registration systems. These provide legislation whereby a machinery was established which (a) requires the tie-in of all legal surveys into a control network provided by government organizations to sufficient density; (b) it requires the monumentation of all boundaries by monuments; for this purpose natural boundaries have been replaced by straight-line boundaries; (c) it protects the removal of boundary monuments by law; (d) it sets specifications for all legal surveys; (e) like under the Torrens system government survey offices are established parallel to the Registry offices; they have the task to check the survey plans submitted as part of an application for registration; due to the more stringent survey requirements set forth by law the amount and scope of work of the survey offices is considerably enlarged; (f) the survey offices have the duty to maintain a reproducible up to date map record on the basis of all surveys carried out.

Due to the accurate survey and monumentation requirements the expenses for registering a parcel of land (unless costs are absorbed by tax revenue as in Europe) are higher than those in a Torrens system, as reflected in Table 2 for the South African Title Deed Registration. It is nevertheless important to consider that the survey offices are fulfilling duties which would otherwise have to be paid for by the municipalities and absorbed by their general tax revenue. The indicated higher expense is more than compensated by an overall saving due to the continuing benefits of an up to date record of real estate.

With respect to the other qualities of a Torrens system the European Land Title system is able to offer security of boundary determination in addition to security of title. The accuracy and completeness of title both in the South African as well as in the European system are extended from the parcel as a unit to the description of its boundaries. Only the speed with which a transaction can be performed is slower; instead of a few days it takes one or two months to register a parcel due to the additional checking. But with automated procedures (the use of computers in checking and plotting survey returns) it may be possible to reduce the time required for a transaction to a few days.

Under the South African and European systems boundary disputes are rare and can be settled almost exclusively by the surveyor from survey records, while under the Torrens system and English common law boundaries are determined from balancing deed descriptions, monumentation and occupational evidence presented to the courts by the surveyor acting as a witness only. The prime requirement in improving the pitfalls of the Torrens system therefore lies in the establishment of a survey authority which is capable of providing a public service of maintaining an up-to-date geometrical record of all parcels equivalent to the service the Record Office provides in maintaining the ownership record.

When comparing the various land registration systems in use around the world one also finds, that only countries with registration systems insisting on the public maintenance of up-to-date property records and plans have large scale maps for all cities; such maps not only depict the topography, but also the land boundaries. The upkeep of such maps is only possible by the existence of a survey authority responsible for it by law.

Large Scale Mapping

While there is no doubt that the European land registration system is superior to that of English speaking countries it is also clear that an excellent survey system cannot be a purpose in itself, and that surveys are only justified if they fulfill a genuine need. In the early days of settling the American or the Australian continent it would have been absurd to require the same standards of survey as in the always densely populated areas of Europe. Today, on the other hand the density of population in the North American cities has surpassed that of many European areas and it becomes necessary to view the problem in a new light. The necessity and the economy of a survey system must now be considered.

While there have been feverish attempts to produce large scale maps depicting, as well as it was possible, topography and ownership for various cities at various intervals of time there has been a continuous uncertainty attached to these maps, so that they could never serve as a legal record.

Offhand it is not yet established whether the production of the new map would not have been more economical than the upkeep of the old one. Nevertheless it is of prime importance to assess the value of a survey system and a map by its long range effects in trying to avoid project oriented costly duplications. The pity of the present situation is that still none is willing to analyze the economy of the problem. The answer cannot lie in property recording and mapping alone.

The Cadastre In considering the advantages of those land registration and survey systems which are favourable to mapping one should go back to their historical roots. It is of interest to note that most of these legal survey systems originated out of the desire to create a cadastre. The cadastre is by definition an official register of quantity, value and ownership of all real estate. Purpose of establishing the cadastre was to create a basis for just taxation. At the time the first cadastres were established in Europe (around 1800) the area of the property constituted a just means of taxation. The tax cadastre was therefore primarily of interest to the revenue department of a state. It consisted of a register of all land parcels which were indexed on a large scale map which determined the area of the land and its location. Both register and large scale map constitute the cadastre.

In the era of industrialization the tax structure shifted from property values to income, and even as far as land is concerned resale values including buildings are today a more realistic means of distributing the tax load than the area of the land. Countries possessing a tax cadastre nevertheless soon realized that the maps forming that cadastre were invaluable for the purposes of planning and construction and for the preparation of maps at medium and smaller scales. The land register itself could be expanded to contain statistical information about buildings, land use and land value. The cadastre became a multipurpose planning cadastre. Most European countries believe that this function alone justifies the present existence of a cadastre.

It was finally just a matter of convenience when around 1900 most European countries accepted the use of the cadastre in its present function as a boundary cadastre.

It is perhaps the fault of the survey profession that in preoccupying ourselves with the technical details of surveying we have neglected to emphasize our more important service to the community, that of systematically recording the topographic and legal changes of our communities for public use. This might be the very reason why a multipurpose planning cadastre, which also fulfills the functions of a boundary and a

tax cadastre has not yet been established in Canada and the United States.

Suggestion for the
Establishment of a
Multipurpose Cadastre
in North America

But it is primarily the technical North American outlook which could easily help to establish a multipurpose cadastral survey system faster than anywhere else with an even greater potential. It would be absurd in a fast developing economy to suggest that a cadastre and city maps should as of now become compiled from all legal surveys conducted in the city. Nevertheless it would be of great importance to establish a routine whereby all legal surveys conducted in the city should become filed as a public record for present or future use.

The establishment of a multipurpose cadastre for all North American cities is no doubt an urgent matter. To proceed with it the following steps will become necessary; (a) since the cadastre must contain a complete record, compulsory land registration will be required. The establishment of a Land Title Registration system is the most desirable and the simplest means to arrive at a property register; (b) The Land Title system should be amended as far as survey requirements, specifications for its accuracy and regarding checking of surveys by a local authority are concerned. Invariably this will lead to the establishment or the expansion of a city survey office with an enlarged scope of activities to maintain an up to date geometric record of the cadastre; (c) In order to require land surveyors to submit satisfactory returns it will in most cases be necessary to densify the national geodetic control network to such a density that the land surveyor is able to perform his duties without economic loss. The establishment of such a control network is easily possible today with modern electronic distance measurement. It is of prime importance that the control network is maintained by the city. In recognition of this need the Canadian Federal Government survey agencies have recently provided many Canadian cities with basic control networks on condition that they will adequately maintain it. Where the control network is not yet sufficiently dense, land surveys should securely monument boundary points so that these may serve as coordinated starting points for further surveys; (d) Based on this control photogrammetric procedures are ideally suited to compile large scale maps, which can serve as base maps for the cadastre, primarily in its function as a tax cadastre. For this purpose the property distribution can gradually be transcribed from records onto the plotted topography. The approximate delineations of the boundaries together with a parcel number identify the land in the "tax map". The boundaries are defined by numerical survey records as these become available.

In the sense of automating the compilation of maps, and particularly of making their revision more economical, it may be entirely feasible to utilize an orthophoto in place of a large scale map as a base for preparing tax maps and other overlays. (f) The topographic and the legal base map or the orthophoto overlay may be used to record a variety of informations such as utilities, land values, regulations pertaining to land and statistical information on buildings or on population.

In the age of wide-spread computer use several cities in the United States (Alexandria, Va. and Washington D.C.) have already begun to establish data banks which carry this statistical information referenced to parcel numbers on the base map; the information is stored on magnetic tape. The searching and processing capabilities of such data files in order to arrive at meaningful economic decisions are unprecedented. The Atlantic Provinces of Canada and particularly the Province of New Brunswick, is currently in a process of establishing a data bank which will combine the functions of a land register under a Torrens system with those of a statistical data file. Wherever possible, such as in gradually covered "integrated survey areas", the identification

and definition of the land parcel might be given by the coordinates of its boundary points stored in a special tape file. After such a system is perfected it will open possibilities for automated cartographic outputs of selected information contained in the data bank. While such geometric information will be the ideal of the future, the information of the first stage automated Land Register, a computerized multipurpose planning cadastre with vastly expanded information content, will be related to parcels identified on a large scale photogrammetric map.

While many of the mentioned tasks can be carried out by outside contractors, such as the compilation of maps and orthophotos, it is on the other hand quite obvious that the responsibility for such contracts and the collection of information for the multipurpose register should best be in the hands of a municipal authority.

The various functions such a survey authority would have to perform are summarized as follows:

Functions of a City Survey Office Within a city survey office there should be six major areas of activity: (1) Control Surveys, (2) Technical Surveys, (3) Legal Surveys of interest to the City, (4) Checking and Recording of Survey Returns from Land Surveyors, (5) Production and Upkeep of City Maps, (6) Collection of Data for a Data Bank.

Conclusions Various levels of the municipal government in North American cities generally recognize the need for the outlined activities of a city survey office and many if not most of these activities are currently being pursued intensely.

The need for an integration of all city surveys, topographic, legal and otherwise, is widely acknowledged throughout the survey profession, and it is also realized by engineers at large. The message now urgently needs to be conveyed to the legal profession, to the legislators and to the public, which have to approve of the partially required new legislation and the expenditures connected with it.

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O.L.S. IS HEAD OF C OF C

Congratulations to Larry Maughan of Parry Sound on his recent election to President of the Parry Sound area Chamber of Commerce.

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REGIONAL GROUP NEWS

News From The Northwest

The 19th meeting of the Northwestern Regional Group was held at the Holiday Inn at Fort William on Saturday, April 12, 1969.

Neil Simpson, President, and Al Allman, Secretary-Treasurer represented the Association, other guests were Rich Lees (soon to be transferred to the Lakehead) and Dick Farrell and Ted Smith of New Liskeard and Alec McLennan of Timmins, Chairman of the O.L.S. Mining Committee.

A highlight of the meeting was the swearing-in of Ted Smith as an O.L.S. by Neil Simpson. This was one of the rare occasions of a surveyor being sworn in outside Toronto.