

An Analysis and Implementation of Cadastral Survey System in Hong Kong

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ABSTRACT

Over the last decades, land development in Hong Kong has highlighted the capacity of the existing deeds registration system originally developed in 1844. Recently, the Land Registry proposes the *Land Titles Bill* by the replacement of current deeds registration system. Unwillingly, such proposal has no intention to deal with the long neglected land right: boundary extent. In other words, the Bill lacks a proper definition of the land registered in the Land Registry. In the support of sustainable development and land management nowadays, there is an urgent need to identify and implement an appropriate land registration system with a specified boundary definition, so as to improve our land boundary security and to maintain a high level of land boundary system in Hong Kong.

This paper first defines the meaning of a cadastral survey system, which includes adjudication, boundary definition and demarcation, registration, and so on. Then, two typical examples of cadastral survey systems applied in South Africa and Singapore are analytically illustrated and compared with those in Hong Kong. These three systems are selected as comparisons due to their similar past commonwealth background. Finally, the considerations for the implementation of land registration system are described and concluded.

Keywords: comparative cadastral system, deeds registration, title registration, *Land Survey Ordinance*, *Land Survey Act*.

1. Introduction

The present deeds registration in Hong Kong has been operating under the *Land Registration Ordinance* (Cap. 128). Deeds and other relevant documents are recorded in a land register in the Land Registry for registration. However, according to the Ordinance, approximate location of the said land parcel or property is only briefly described in the deed or depicted onto the lot identification plan. Recently, the Land Registry proposes the *Land Titles Bill* by the replacement of current deeds registration system. However, such proposal has no intention to deal with the long neglected land rights: boundary extent.

By definition, a cadastral survey system covers an interactive multitude of land administration sub-systems including adjudication, boundary definition and demarcation, surveying, registration, dispute resolution and information management [Barry, 1999]. It serves to provide easy access to land-related information, to support certainty of ownership and rights to land, to give legal protection for land tenure, and to facilitate the land conveyancing. As much focus is primarily placed on the issues of boundary survey, land registration and legislation in the paper, others are beyond the scope.

As such, two typical examples of cadastral survey systems applied in South Africa and Singapore are analytically illustrated and compared with those in Hong Kong. These three systems are selected as comparisons due to their past commonwealth backgrounds. They came under British administration at the outset of 1800s with an adoption of deeds registration system.

2. Analysis of Cadastral Survey Systems

2.1 South Africa's system

The history of South Africa is long and complex, but well documented. As the establishment of South Africa's first democratic government experiences the land reform programme in 1994, the new government had to take reasonable legislative measures for the citizens to contend the extremely unequal land distribution, and to gain access to land on an equitable basis. The legal certainty associated with each land parcel has long provided the basis for the private sectors' investments in housing, and for the government under the recent land reform programme. Indeed the great advantage of cadastral survey system is that it accurately identifies the position and the extent of rights of every land parcel.

The deed registration is conducted by the Department of Land Affairs through its nine Deeds Offices under the supervision of the Chief Registrar of Deeds. It is regarded not only by South African, but also by foreign jurists as an accurate and reliable deeds system [Barry, 1995; Fourie, 1994; Lester & Teversham, 1995; Radloff, 1996] with security as good as the titles. Simpson [1976] has classified it as titles one because the quality of the documentation and processes have developed a reliable accurate record. It is a de facto guarantee of title, which equals the 'certificate of title' in Torrens system, through the approved diagram showing the exact location of the land supported by the Surveyor General Office.

All registration of the definition of land rights is essential for a deed to be legally recognized, which falls under the umbrella of the *Deeds Registries Act No. 37 of 1937*. The Act in effect makes the transfer of any right in land compulsory and was modeled after Roman-Dutch law, introduced in colonial times when any transfer of land was required to take place before a judge, and reliable and accessible registers were kept to record all transactions. Also, registration is impermissible

without a diagram approved by the Surveyor General, so as to ensure the record is generally accurate and few challenges to the deed's correctness [Radloff, 1996]. The entire system is marked by a high degree of reliability and security.

“Section 18 of Deeds Registries Act shows the ownership of land alienated ... by the State may be either by deed of grant or by deed of transfer issued or executed, the deed shall contain a reference to the title deed by which the State held the land and to the title deed to which the diagram of the land is annexed... If any piece of unalienated State land has been surveyed and is represented on a diagram the registrar concerned shall, upon written application by the Minister of Public Works, enter particulars of the land in the appropriate registers with the diagram, a certificate of registered State title prepared by a conveyancer.”

Whilst South Africa has a negative system of land registration, the quality of land boundary surveying is sufficiently well organized, accurate, for a positive system of registration. Today, all modern surveys have had to be based on the South Africa geodetic control network - Cape Datum with reference to the World Geodetic System 1984 (WGS84), which contributes to uniform standards of accuracy. Coordinates uniquely identified on the geodetic grid are mandatory for the beacons of any boundary surveys.

Besides, South Africa has been implementing a coordinated cadastre over fifty years. The Surveyor General Office of Department of Land Affairs is a national government to carry out the survey and conveyancing services. Storage, collection and dissemination of cadastral data can be incorporated as an integrated information infrastructure that supports ongoing system. The data serves as the base map for other authorities' land administration system.

The *Land Survey Act No. 8 of 1997* as well as the new Survey Regulations namely *Manual of Procedures in respect of survey submitted under Land Survey Act*, did much to streamline the survey-related duties of both land surveyors in private practice and government sectors. It imposes control over how cadastral survey and its records should be performed and prepared. The nature of the Act was originated from the former *Land Survey Act 9 of 1927* to minimize the zone of uncertainty in land boundaries. In terms of the Act, boundary surveys have to be carried out under the supervision of a professional land surveyor. It also governs the professional roles among various institutes of land surveyors.

“Section 14 to 16 of Land Survey Act give no general plan or diagram of any piece of land shall be accepted in any deeds registry... unless general plan or diagram has been approved by the Surveyors-General. General plans or diagrams signed by land surveyor shall be approved in Surveyor-General and registered in the deeds registry. Section 18 shows any land surveyor carrying out a survey of any land to which a title deed has been issued but of which a diagram has not previously been registered, shall lodge with the Surveyor-General for examination and filing of record in the Surveyor-General's Office the prescribed diagram and survey records...”

The Surveyor General Offices play an important role in ensuring such security of title since they examine and approve all boundary surveys for the registration of ownership of property and real rights in land. The surveyed boundaries together with its diagrams lodged by the surveyors are examined and approved. There is a steady 10% increase every year for diagram submission extracted from their Yearbook. Therefore, litigation with respect to property boundaries is rare, and when disputes do arise, instruments in the Act provide agreement, procedures and arbitration rules for professional surveyors.

Most of the lands are low land value or low development potential. The general public is little attention drawn in securing land ownership since the cost of registration and the accessibility to the registration are lengthy and expensive to such the system being used (e.g. physical distance to Deeds Office, time taken to effect a transfer). As a result, the high cost of securing land ownership in current system is beyond the means of the majority of the poor South Africa's population [Barry, 1995].

As reviewed by Pienaar [1999], evolution of South African cadastral systems in general too much focused on the question of providing cadastral information systemically for large tracts of land. Owing to previous land administration policies, there is too little to handle overcrowding and conflicting land rights among communal tribes. Consequently, the legal boundaries most likely for the land in rural areas are not properly and specifically defined. The unclear legal status of the land and the land administration processes inhibit development and investment in the land. To clear this it is initially necessary to solve conflicts and competing interests, and to provide transparency and participation in decision-making relating to land use.

2.2 Singapore's System

As Singapore being one of the British colonies in the past, common law is generally applicable for the legal framework of real properties. The Singapore Land Authority (SLA) was inaugurated as a statutory board under the Ministry of Law in 2001, aimed to optimize land resources for the economic and social development of Singapore. The SLA is a merger of the former Land Office, Land Systems Support Unit, Singapore Land Registry and Survey Department.

Singapore Land Registry is responsible for maintaining a sound legal registration of land management and public search system of property titles. Starting from 1993, it has intended to progressively convert a system of deeds into titles under the provisions of *Land Titles Act* (Cap. 157). Presently, there are two land registration systems co-existed. Land under the *Registration of Deeds Act* (Cap. 269) is referred to common law or deeds land, whereas land governed by the *Land Titles Act* is known as titles land. Common law land is about 1.7% (or 3,686 lots) of the total number of land lots.

The registry plays an important role to provide an efficient, transparent, accurate and responsive system of land registration in land scarce country. In terms of *Land Titles Act*, the processes of examination and registration, its control and monitoring of standards, and its methods of record preservation, serve to provide security of title in the eyes of law, institutions and general public.

Prior to 1972, Survey Department started to inspect the work submitted by private sectors and Statutory Boards. It has achieved ISO9002 standard on ‘the chain of inspection of cadastral survey’ since 1999. It undertakes the processing of survey records, which includes the examination, approval and safekeeping of all survey records relating to all survey plans and sectional plans for registration purposes. After approval, the survey records deposited in the Department become the property of the Government. Land boundary surveys should be conducted by the Chief Surveyor or registered surveyors in accordance with the provisions of the *Land Surveyors Act* (Cap. 156) of 1991 and the *Directive of Survey Practices* [2001].

To support the sustainable development, the cadastral survey system should have a means of improving so as to cope with changing social and economic needs. Singapore is a good example that her boundary system matches the progress of society, by introducing a new survey reference system and making legislative changes to accommodate a complete and secure cadastre. With the research on providing better control and boundary definition (Table 1), the Department together with the Nanyang Technological University undertook an Integrated Survey Network (ISN) to revamp a local geodetic network (SVY95 datum) in WGS84 datum in 1997. The Global Positioning System (GPS) technology can establish the geodetic control framework quickly at a minimal cost compared with the traditional techniques. Goh [2000] concludes this network provides the advantages of implementing all survey records to legal coordinated cadastre, as to describe the land titles by coordinates in accordance with the *Boundaries and Survey Maps Act* (Cap. 25) of 1998, the *Land Surveyor Act* and its rules.

Table 1 A three-stage ISN project in Singapore

Stage	Action	Implications
Stage I Immediate Action	Setup of control network	Preparatory stage without impact on status.
Stage II Follow-up Action	Implement survey procedures	Substantial changes in survey practices effected under the Land Surveyors (Conduct of Title Survey) Rules
	Towards legal coordinated cadastre	No major implications except for the new requirements of a simplified Certified Plan
Stage III Consolidation	Towards total integration	Affects major procedural change in planning and subdivision needs inter-ministry effort

Moreover, the Department has approximately 130,000 lot parcels identified with specified boundaries since 1999. It has several series of revision sheets with legal status such as First Series Sheets, Second series sheets and Resurvey Sheets. Of the government services related to properties, Integrated Land Information System (INLIS) is a service widely used and definitively welcomed by people in the real estate industry as it offers information on properties. With the success of INLIS, Ministry of Law is now in contact with other government agencies to explore the possibility of integrating more useful land information to be delivered to the public.

Boundary defined in Singapore is secured by the *Boundaries and Survey Maps Act* enacted since 1884 to provide for the land demarcation, establishment and preservation of boundary marks, and survey map publication. The recent amendment on the *Boundaries and Survey Maps Act* provides a legal framework for setting up a coordinated cadastre. It is certainly a brilliant display of constant government policy and system improvement. The conversion of the current coordinates to the new system caters for the future process of electronic retrieval and submission of survey plans.

“Boundaries and Survey Maps Act (Cap. 25): It defines the duties and powers of the Chief Surveyor under Section 5 and 6 respectively. It provides for the legality of electronic maps in Section 6.3. This is to cater for the future process of electronic retrieval and submission of survey plans. Section 7 provides for the establishment and maintenance of the coordinated cadastre by the Chief Surveyor. It includes the conversion of the current coordinates to the new system according to designated survey areas.”

Another act in Singapore is the *Land Surveyors Act*, which regulates the conduct of land boundary surveys. It is mandatory for registered surveyors to deposit survey documents to the Department. On acceptance of the survey plans, Chief Surveyor updates the cadastral database and produces the cadastral maps, which under Section 13 of the *Boundaries and Survey*

Maps Act shall be conclusive evidences in all courts of the boundaries of the land. The detailed specifications and procedures of a boundary survey are set out in the Land Surveyors (Conduct of Cadastral Surveys) Rules made under the *Land Surveyors Act*, like general field practice, survey and marking of boundaries, required precision, plan specification, etc.

As mentioned before, the government acts as a survey service coordinator to contract out survey services, in order to reduce the actual costs and to accelerate the pace of projects. Private sectors, to meet competition and to offer a quality assured product to clients, have carried out the work at a lower price driven by market mechanism. Thus, the average cost of a typical lot is low compared with other countries, i.e. about S\$1,000.

2.3 Hong Kong's system

Nearly a hundred and fifty years ago, Hong Kong has adopted a general boundary with fairly low survey accuracy. The first and the only one comprehensive boundary survey – Demarcation District Survey for the purpose of assessment was carried out in the New Territories (NT) around 1905. The survey provided evidences as to the most probable position of the boundary. Nevertheless, little improvement is done from the original settings. Demarcation District Sheet attached to the Block Government Lease until now is still treated as one of the legal documents for correlating the boundary of land parcels in the NT. The old imprecise grant plan (about 2-3 metres graphical accuracy) cannot be easily superseded by a new survey plan. However, urban areas do not have the same problem in the NT because the urban areas were the major areas of development and also the heart of administration. Also, the urban land development was so rapid that allowing the government to renew and improve the land records. Consequently, the Land Registry continues to amend the proposed *Land Titles Bill* towards a titles system.

The *Land Registration Ordinance* (Cap. 128) in Hong Kong, as Nield [1991] said, “is more accurately called ‘Document Registration’ Ordinance for it establishes a simple, traceable and well-managed system of registration of documents affecting land”. Also, Hong Kong have intended to follow other leading jurisdictions for replacing the existing deeds system with titles to support a recovering land markets - the formation of proposed *Land Titles Bill*. However, the legal settings of both systems never cater the untouched boundary aspect of registered land parcels (Section 17 of the Bill). The land boundary plan attached to the deed/title shows an approximate location in every land transaction. These boundary uncertainties have boiled up so many boundary problems occurred like redevelopment plans withheld for boundary conflict reasons, mortgages granted to land of uncertain boundaries, and so on. Consequently, the development of registration system is stagnated in the area of providing secure boundary protection, comprehensive cadastral database or other land rights improvements.

“Section 17 (Land Titles Bill) Boundaries of the Bill

- (1) *For the purposes of this Ordinance, a plan (and notwithstanding that it is a land title record) shall be treated as only indicating –*
 - (a) **the approximate situation; and**
 - (b) **the approximate boundaries.***of the registered land to which the plan relates.*
- (2) *For the avoidance of doubt, it is hereby declared that the fact that a plan is a land title record shall not constitute a warranty as to the accuracy of the plan, or a guarantee, by a person referred to the Government.”*

Land registration supports the land market economy. Land surveying provides position fixing and security to the registration of land parcels. Nowadays, the alienation of land parcels in Hong Kong has been defined by the Survey and Mapping Office (SMO) of Lands Department. SMO is responsible for the survey of land allocation, maintenance of land records, maintenance of geodetic control network, survey revision, advices on land boundary matters and sales of geo-spatial products. A good control network using GPS (known as 2000 GPS Network) has been established and maintained by the Geodetic Section. This improvement of survey technology makes the observation more reliable and accurate as compared with the plane-tabling methods used early in NT survey. Specific guidelines or instructions on the GPS application are under investigation and likely to be implemented into the Ordinance and its regulations. Besides, attention is particularly paid to the government’s focus on Cadastral Information System (CIS) development in 1989 to transform the 1:1,000 paper maps into digital base information. CIS maintains the land boundary record database and facilitates the preparation of cadastral plans. They are considerable and useful mapping data which vary in quality and availability. There are about 3,000 1:1,000 basic survey sheets with topographic features, which provide the updated information frequently.

Although Hong Kong maintains an attainable accurate standard of surveyed boundary, there is no legislation enforceable to govern the boundary survey except the *Land Survey Ordinance* Cap. 473 (LSO) only deals with subdivision survey since 1996. LSO aims to build up a reliable land record by controlling the subdivision survey standard. For other transactions falling outside LSO including the boundary re-establishment of old scheduled lots, relevant documents and exact boundaries of such lots are still left uncertain. Under the existing practice, the boundary determination is subject to the best

available evidence. Unfortunately, the legislative measures for further action are not materialized. Consequently, the government does little effort in examining and revising the ordinances towards surveying as compared with those in Singapore and South Africa.

To maintain boundary securely, it is not an easy task in Hong Kong. The title plans and documents pertaining to the New Territories' lots are of unsatisfactory standard. In the absence of concluding registration, it may be necessary to search through previous survey information for determining the most probable lot boundary. Lots of professional staff in government are involved into the prevailing expensive system, so as to reduce the risks of mistakes in land transactions. Thus, the average cost spent for a typical land parcel subdivision in Hong Kong was estimated about HK\$30,000 [FIG, 1997], is much more than that in Singapore. Here below Table 2 is the summary of cadastral survey systems among three regions.

Table 2 Summary of Cadastral survey systems among three regions

		South Africa	Singapore	Hong Kong
1	Land Registration	Deeds	<ul style="list-style-type: none"> ▪ Deeds (1.7%) ▪ Titles (98.3%) 	Deeds
	Its Services	Deeds Offices, Department of Land Affairs	Singapore Land Registry, Singapore Land Authority	Land Registry
	Its Legislation	Deeds Registries Act No. 37 of 1997	<ul style="list-style-type: none"> ▪ Registration of Deeds Act (Cap. 269) ▪ Land Titles Act (Cap. 157) 	Land Registration Ordinance (Cap. 128)
2	Land Boundary Survey Services	Surveyor General Offices, Department of Land Affairs	Survey Department, Singapore Land Authority	Survey and Mapping Office, Lands Department
	Its Legislation	Land Survey Act No. 8 of 1997	<ul style="list-style-type: none"> ▪ Boundaries and Survey Maps Act (Cap. 25) ▪ Land Surveyors Act (Cap. 156) 	<ul style="list-style-type: none"> ▪ No survey law at all ▪ Subdivision survey: Land Survey Ordinance (Cap. 473)
3	Significant Improvement	<ul style="list-style-type: none"> ▪ Recent Land Reform in 1994 revised the well-secured land survey act ▪ GPS control network applied throughout the territory 	<ul style="list-style-type: none"> ▪ A Coordinated Cadastre implemented into the Boundaries and Survey Maps Act ▪ A Compulsory Titles Conversion ▪ Three-stage Integrated Survey Network project 	<ul style="list-style-type: none"> ▪ GPS 2000 network established ▪ Land Titles Bill proposed
4	Other Comments	<ul style="list-style-type: none"> ▪ Low land value and development potential ▪ Little attention in land security to general public due to expensive and lengthy registration 		<ul style="list-style-type: none"> ▪ No real survey law existed, boundary defined subject to the best available evidence ▪ Proposed bill does not touch any boundary extent in the registration

3. Implementation

To really improve both present and proposed registration situations, the ideal solution would upgrade the proposed Bill to cover properly surveyed and accurate plan accompanied with registration, which is fundamental to the success of the improvement. Also, extending the LSO to cover all land boundary surveys is absolutely essential because the accomplishment of the above goals really depends on the availability of a correct, accurate and comprehensive land boundary record.

3.1 System of Specified Boundaries

It is obvious that any title registration system, whereby the Government warrants or guarantees the boundary extent, must be based upon a detailed and accurate plan that is similar to a system of guaranteed boundaries [Willoughby, 1995]. However, the Hong Kong existing system together with its proposed Bill does not denote specified lot boundaries. On Section 17(1) of the Bill to implement as specified boundaries, our suggestion proposes that every transaction of land parcels shall contain a properly surveyed Land Boundary Plan (LBP) attached as an important document for registration. Being prepared LBPs with specified boundaries by professional land surveyors, the implemented Bill would make land transfer more certain, secure and fair. In the long run, a more comprehensive and effective land titles registration system could be built up for the benefit of the whole community.

3.2 Deposition of Land Boundary Plans (LBPs) for all kinds of Land Boundary Surveys

There is no provision for the deposition of plans of all land boundary surveys such as boundary rectification and boundary re-definition, the provision of plan deposition with SMO only covers subdivision. As our suggestion with Chan [2001],

SMO shall be responsible for maintaining LBPs submitted by Authorized Land Surveyors (ALSs) or Registered Professional Surveyors (RPSs) for recording all kinds of boundary surveys. All certified LBPs as inspected and approved by SMO shall be deposited both in Land Registry and SMO to all transactions of land, whether they are whole lots or sections of lots, for registration and maintenance of land boundary records. A prescribed charge shall be made on the submission.

3.3 Inspection and Approval of LBPs before registration in the Land Registry

On the Section 30(4) of the LSO, it is difficult for ALSs to comply within the 7-day rule to deposit the certified LBP and Survey Record Plan (SRP) kept in both Land Registry and SMO for inspection and approval. Besides, it is absolutely not a compulsory procedure to deliver a duplicate of LBP registered with the Land Registry. There are examples of inconsistency LBPs being kept by Land Registry and SMO (about 3% of non-duplicate plan submitted) since any amended plans might not be re-registered, or even missing LBP/SRP records of subdivision survey registered in Land Registry [Chan, 2001]. Thence, as our suggestion, we proposes all LBPs certified and signed by ALS, accompanying any instrument delivered into the Land Registry for registration under the Land Registration Ordinance (Cap. 128) shall be inspected and approved by the SMO prior to its registration with the Land Registry, which show the boundaries and geographical locations of immovable properties as well as other physical features on ground.

3.4 Non-resolved Land Boundary Disputes

When any uncertainty or dispute arises as to the position of any boundary of the affected land and the parties to the dispute cannot agree concerning such boundary, the SMO shall instruct them to present the dispute on behalf of ALS to the competent court. A Land Boundary Survey Tribunal is to be established to mitigate boundary problems as and when necessary, e.g. in the case of an ALS's boundary determination being disputed. After the judgement made by the court, all final judgement and relevant documents shall be made and delivered to the Registrar of Lands for compilation and registration.

3.5 Rectification of Boundaries

Rectification for required land boundaries between the government and registered owner is necessary to rectify errors in the land registers which are immaterial. It can be done when appropriate documentation or evidence is presented to show that what is included in the register is incorrect. Land Registrar shall request the decision from the SMO to review the said case being made. If rectification found, the SMO may approve a revised LBP in accordance with a resurvey of that land submitted by private land surveyors. Upon approving the new plan, the SMO shall endorse the prevailing plan as having been replaced by the new plan, and shall inform the Registrar to replace the relevant title in parallel.

4. Conclusion

Many countries may have different appropriate designs for the cadastral survey systems. Some of them may adopt a simple, flexible, easily accessible and low cost system, whereas others use a complex, more rigid and expensive system. This article gives a comparative review of cadastral survey systems practised in Hong Kong, Singapore and South Africa.

To stop further deteriorating of the land boundary record with its security, Singapore and South Africa can be good examples learned from Hong Kong, to provide a better legal environment in dealing with the century long inaccurate boundary situation. The environment comprises a set of well-defined ordinances – Land Titles Act, Boundaries Act, Land Surveyors Act and its regulation. In this way all cadastral survey activities will be accurately defined. These are vital components to protect land rights and boundary security adequately to landowners, in order to support effective land market for sustainable economic development.

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