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A STUDY ON DETERMINATION OF LOT BOUNDARIES IN HONG KONG SPECIAL ADMINISTRATIVE REGION

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CERTIFICATE OF ORIGINALITY

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Abstract

There has been much concern about land boundary security in land boundary systems around the world in recent decades. Singapore has implemented a comprehensive legal coordinated cadastre, complete with legal sanction since August 2004. In England and Wales, a new boundary concept, the determined boundary, was introduced in the Land Registration Act 2002. It provides a channel for improving boundary trustiness. In Hong Kong, a similar idea was floated in the Land Titles Ordinance (Cap 585). This seems to be a big leap forward in Hong Kong's land boundary system, especially in terms of efforts to enhance boundary security. The Ordinance, however, has not yet come into operation. Instead, the Land Titles (Amendment) Bill is now being prepared.

This research will start with an investigation into the cadastral reform of three land boundary systems. A real boundary case is studied and analyzed, with the objective of identifying weaknesses in Hong Kong's land boundary system and reflecting the urgent need of upgrading the boundary security. The latter part of the research will mainly focus on the determination of lot boundaries, including the pre-requisites, benefits and limitations in the currently proposed determination of lot boundaries as stated in the Land Titles Ordinance. Drawing reference from the experiences of Singapore and Britain, the author attempts to draw up some recommendations. Finally, by integrating the facts and the recommendations, a mechanism of determination of lot boundaries is proposed, serving as a blueprint to help the government in its decision making.

Acknowledgement

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Table of Contents

List of Figures

List of Tables

List of Flowcharts

Abbreviations

Hong Kong Special Administrative Region

ALS	Authorized Land Surveyor
BCL / BGL	Block Crown Lease / Block Government Lease
COP	Code of Practice of Land Survey Ordinance
CORS	Continuously Operating Reference Stations
CSCC	Cadastral Survey Consultative Committee
DAM	Data Alignment Measures
DD	Demarcation District
DDS	Data Dissemination System
DLO	District Land Office
DSO	District Survey Office
FAS	Field Area Statement
GIS	Geographic Information System
GIH	Geospatial Information Hub
GPS	Global Positioning System
HKSAR	Hong Kong Special Administrative Region
HKIS	Hong Kong Institute of Surveyors
HLP	House Lot Plan
HYK	Heung Yee Kuk
IRIS	Integrated Registration Information System
LACO	Legal Advisory and Conveyancing Office
LAO	Land Administration Office
LBP	Land Boundary Plan
LEG	Legislation Section of Land Survey Authority
LIC	Land Information Centre
LIP	Lot Index Plan
LSA	Land Survey Authority
LSD	Land Survey Division
LSO	Land Survey Ordinance (Cap 473)
LSP	Land Status Plan
LTO	Land Titles Ordinance (Cap 585)

NTA	New Territories Administration
PRC	People's Republic of China
RPS (LS)	Registered Professional Surveyors of the Land Surveying Division
SatRef	Hong Kong Satellite Positioning Reference Station Network
SMO	Survey and Mapping Office
SRP	Survey Record Plan
SRRS	Survey Records Retrieval System

Singapore

BCA	Building and Construction Authority
BSMA	Boundaries and Survey Maps Act (Cap 25)
CGS	Consolidated GIS system
CS	Chief Surveyor
CPS	Control Point Sub-system
DGPS	Differential Global Positioning System
eSS	e submission system
HDB	Housing and Development Board
INLIS	Integrated Land Information Service
ISN	Integrated Survey Network
JDS	Job Data Storage system
NTU	Nanyang Technological University
PLBM	Precise Leveling Benchmarks
SIMRSN	Singapore Integrated Multiple Reference Station Network
SiReNT	Singapore Satellite Positioning Reference Network
SLA	Singapore Land Authority
SURMAP	Surveying and Mapping System

Britain

HM	Her/His Majesty
LBS	Location Based Services
LRA	Land Registration Act
LRR	Land Registration Rules
NLIS	National Land Information Service
OS	Ordnance Survey

CHAPTER 1

INTRODUCTION

1.1 Background

The Hong Kong Special Administrative Region (HKSAR) of the People's Republic of China (PRC) is one of the international metropolises renowned for frequent land transactions and booming financial business, logistics and communication services. Covering a small area of 1,107 square kilometres, the territory's population is 6.90 million (at end of 2006).

Since the epoch of British colonization in 1840s, Hong Kong has adopted the English legal system, i.e., the Common Law. After Hong Kong was reunified with PRC on 1 July 1997, the Basic Law, which was enacted by the National People's Congress, started to be implemented, but the Common Law still prevails. Article 8 of the Basic Law states:

> The laws previously in force in Hong Kong, that is, the common law, rules of equity, ordinances, subordinate legislation and customary law shall be maintained, except for any that contravene this Law, and subject to any amendment by the legislature of the Hong Kong Special Administrative Region.

In addition, the Basic Law empowers the Chief Executive to establish and execute the grants and dispositions of any land within HKSAR. It guarantees that the former system and life-style remain unchanged for at least 50 years under the principle of "One Country, Two Systems".

1.2 The problem

In 1994, the Commission of Cadastre and Land Management (Commission 7) of International Federation of Surveyors (FIG) foresaw the trends of development of the cadastral system in 20 years' time. A working group of the Commission studied the issue for 5 years and formulated a concept "Cadastre 2014" with six basic statements listed as follows:

Statement 1: Cadastre 2014 will show the complete legal situation of land, including public rights and restrictions!
Statement 2: The separation between 'maps' and 'registers' will be abolished!
Statement 3: The cadastral mapping will be dead. Long living modeling!
Statement 4: 'Paper and pencil – cadastre' will have gone!
Statement 5: Cadastre 2014 will be highly privatized! Public and private sectors are working closely together!
Statement 6: Cadastre 2014 will be cost recovering!

To accomplish these goals and satisfy the community's demand, countries around the world have carried out cadastral reform for their lands and administration systems. The reform first started among European countries. It has extended to other developed countries, and has further extended to several developing countries, such as Kenya and South Africa, in recent years. With the development of technology at a tremendous speed in the last decade, computerization, e.g., digitalization of cadastral records and map, Geographic Information System (GIS), and Spatial Data Infrastructure (SDI), has become one of the common elements of the reform. In some developed countries, the reform is sustained by the Government, being complemented with legal protection.

In Hong Kong, its land boundary system has seen considerable technological change, but there are few improvements in the legal aspect. Although Hong Kong adopts the Common Law system, it does not follow fully the English law system. There are no acts or ordinances forming a legal basis for the determination of a land boundary in Hong Kong. Thus the security of tenure seems to have much room for improvement.

Following the international mainstream practice, Hong Kong introduced a land titles registration system by virtue of the enactment of the Land Titles Ordinance (Cap 585) in June 2004. The concept of determination of lot boundaries, which is a breakthrough for the Hong Kong land boundary system, was introduced in the same ordinance. However, the concept is applied only to a small field with a high requisition limitation. The Ordinance was scheduled to take two years to come into operation, but it is still under consultation for further refinement. A Land Titles (Amendment) Bill has been drawn up and is under consultation and planned to be introduced to the Legislative Council in late 2008 or early 2009. The Bill is expected to take one year to be scrutinized and will be enacted at the end of 2009. After enactment of the amendment Bill, final preparation will have to be made before the Land Titles Ordinance can commence. Hence, the Titles Registration Ordinance is expected to be in force at the end of 2010.

On the other hand, Singapore, a newly sprung-up international metropolis, has already completed a legal co-ordinated cadastre for its cadastral reform in August 2004. This achievement, involving technical innovation as well as the enforcement of laws, is considered standing in the

forefront of the world.

1.3 Research objectives

In order to upgrade our land boundary security to a higher standard for achieving sustainable development of the system, the objective of this research is to analyze and draw up a tailor-made solution via studying the merits of the cadastral survey system of two countries with similar background as that of Hong Kong. Within this general framework, the main purposes of the study can be summarized as follows:

i). To look into the up-to-date HKSAR cadastral survey system;

ii). To review, analyze and examine two real-life cases:

- New Singaporean cadastre,
- British determined boundary concept;

iii). To evaluate the necessity and feasibility of

- applying legal coordinated cadastre, and
- determined boundary concept;

in the Hong Kong land boundary system.

1.4 Methodology

To achieve the above objectives, the fundamental approach is to understand the evolvement of each cadastral survey system in three regions – HKSAR, Singapore, and Britain, and to explore and analyze their outcomes so as to adapt it to Hong Kong's situation.

Regarding the scope of the research, information will be collected from the existing literature, research and relevant institutes. As a result of the

thriving development of information technology, relevant government web sites also provide an informative platform for data collection.

Furthermore, relevant Ordinances and Acts in force in the HKSAR and the other two countries will be studied. With the help of Internet, most of them can be easily acquired.

In addition, advice and opinions from professionals, especially those specializing in land boundary aspects, will be sought through discussions, interviews or questionnaires.

1.5 Research structures

This dissertation is composed of three parts. Part 1, from Chapter 1 to Chapter 2, gives an introduction to the thesis. Chapter 1 identifies the overall research problems arisen and its objectives, whereas related terms will be interpreted and expanded in Chapter 2. These two chapters would give the readers a general idea for better understanding of the discussion afterwards.

Part 2 consists of Chapter 3 to Chapter 4, which looks at and compares the current cadastral survey systems of HKSAR and several countries. Chapter 3 thoroughly studies the Singaporean Cadastre with emphasis on its technical and legal aspects, and then examines the British cadastral survey system, mainly focusing on the development of its boundary concept. Chapter 4 probes into Hong Kong's cadastral survey system. The technological improvement in both land boundary survey and land registration

will be discussed. Legislation relating to land matters will also be outlined and briefly explained.

Part 3, comprising Chapter 5 to Chapter 8, deals with the analysis of land boundary problems and implementation of the determination of lot boundaries related to the Hong Kong situation. A boundary survey case, which will be used to reveal the boundary problems in the current system, will be discussed and analyzed in Chapter 5. In Chapter 6, the author will attempt to evaluate the necessity and feasibility, including the pre-requisites of implementing a new approach. Recommendations will be mapped out for adopting the suggested approaches. Chapter 7 will incorporate the comments made in the previous chapters and propose a mechanism for the determination of lot boundaries. Finally, Chapter 8 will give the author's own comments and a summary of the research and draw a conclusion.

CHAPTER 2

TERMS INTERPRETATION

2.1 Scope of topic

Terms used in the cadastral field are subject to interpretation, and meanings may be different, depending on the context itself. Hence, in order to provide a clear understanding of this research, several common terms will be interpreted accordingly. This chapter is divided into two main sections: the first section gives the practicability definition of the term "*legal coordinated cadastre*" as well as the definition of cadastral system whereas the second section presents the interpretation of the principal concept – *boundary concepts* with its evolvement.

2.2 Legal Coordinated Cadastre

The term "legal coordinated cadastre" and its kindred expression[1] is one of the main issues to be addressed in this research. Hence, it is necessary to be clarified and established as the first step in the discussion. The term comprises the word "*cadastre"* together with two important attributes "*coordinated* and *legal"*; each of the components will be given a definition or scope for the purpose of avoiding confusion or ambiguity for further reading.

2.2.1 Definition of Cadastre

The idea of cadastre was mooted by the French and Italians and then formalized by the British. Dowson and Sheppard (1952) remarked that there

[1] Kindred terms: numeric cadastre, numerical cadastre, legal coordinates cadastre, digital cadastre, coordinate-based cadastre.

was no unique form of cadastre and it was difficult to define the term cadastre:

> It is impossible to give a definition of a Cadastre which is both terse and comprehensive, but its distinctive character is readily recognized and may be expressed as the marriage of (a) technical record of the parcellation of the land through any given territory, usually represented on plans of suitable scale, with (b) authoritative documentary record, whether of a fiscal or proprietary nature or of the two combined, usually embodied in appropriate associated registers.

Twenty years later, Simpson (1976) provided the provenance of cadastre. The word is used to be ascribed to the Latin *capitastrum* which was taken to be a contraction of *capitum registrum*, a register of capita, or a register of poll tax, literally ‘heads’ and so by extension ‘taxable land units’. Cadastre also derives from the Greek word *katastikhon*, a list of register, which literally means ‘line by line’ and so a tax register. Contemporarily, Dale (1976) defined cadastre as a general, systematic and up-to-date register, which contains detailed information on land parcels, such as area, value address and ownership.

As the Commission 7 of International Federation of Surveyors has to pay close attention to the development of cadastral system, they published the ‘Statement on the Cadastre’ in 1995. This statement underlines the importance of the Cadastre as a land information system for social and economic development from an international perspective and beholds the core role played by surveyors in the foundation and conservation of Cadastres. It states that:

> A Cadastre is normally a parcel-based and up-to-date land information system containing a record of interests in land (e.g., rights,

restrictions and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of the interests, and ownership or control of those interests, and often the value of the parcel and its improvements. It may be established for fiscal and legal purposes, and may assist in the management of land and land use (e.g., for planning and other administrative purposes), and enables sustainable development and environmental protection.

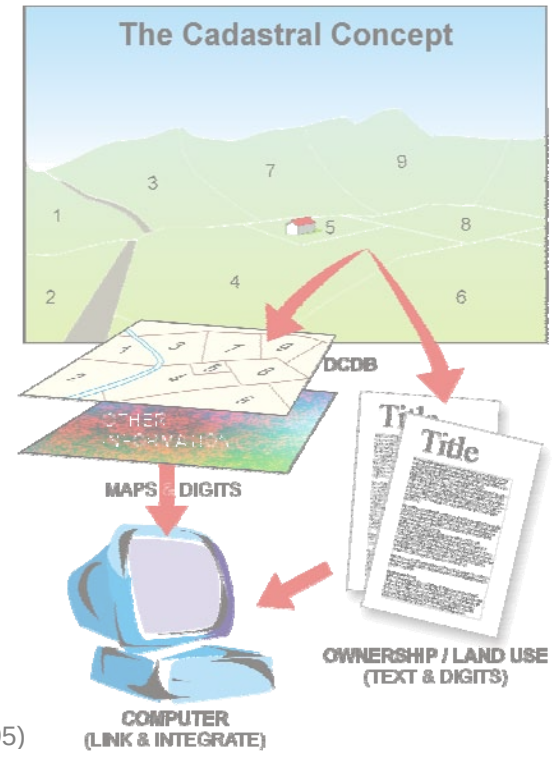


Figure 2.1 Cadastral concept (© FIG, 1995)

To sum up, the primary purpose of cadastre is to provide information about land. The information involves interest aspect, e.g., restrictions, nature and duration of rights; parcel dimension, such as location, area, value; and the ownership's rights identification.

Land parcel is mainly defined by either the limit of legal rights, by responsibility for tax payments or by use. The primary unit of cadastre, in

terms of spatial, is known as parcel[2], and there are three functional orientation's stages of cadastre, namely fiscal, legal, and multi-purpose.

Historically, cadastre was dealing with fiscal purpose, which focused on the economic utility of the land. It was related to area, usage (e.g., agricultural, commercial, and residential land use) and the quality of land (i.e., the productivity of the land), which was compiled for the purpose of raising revenue via land taxation.

With the growing awareness of legal security, cadastre has gradually been interpreted for legal purpose. Proprietary interests of land, including the ownership, area and value, were recorded under the protection of law. These records also served as evidence for legal actions in relation to land subdivision, land ownership arguments or land interest conflicts.

Increasingly, there is a great demand for recording more extensive information, especially for the administration of land. This information covers buildings, details of water, electricity, gas services, and land transaction records. Hence, cadastre is transformed into multi-purpose cadastre or is called utility cadastre. Figure 2.2 illustrates some elements in multi-purpose cadastre, where the concept was raised by Hamilton. With such extensive information, a multi-purpose cadastral system can answer queries about matters far beyond land ownership and taxation. That is why in the last decade, the system had been valued by many professionals.

[2] Kindred expression: land parcel, lot, plot, plat

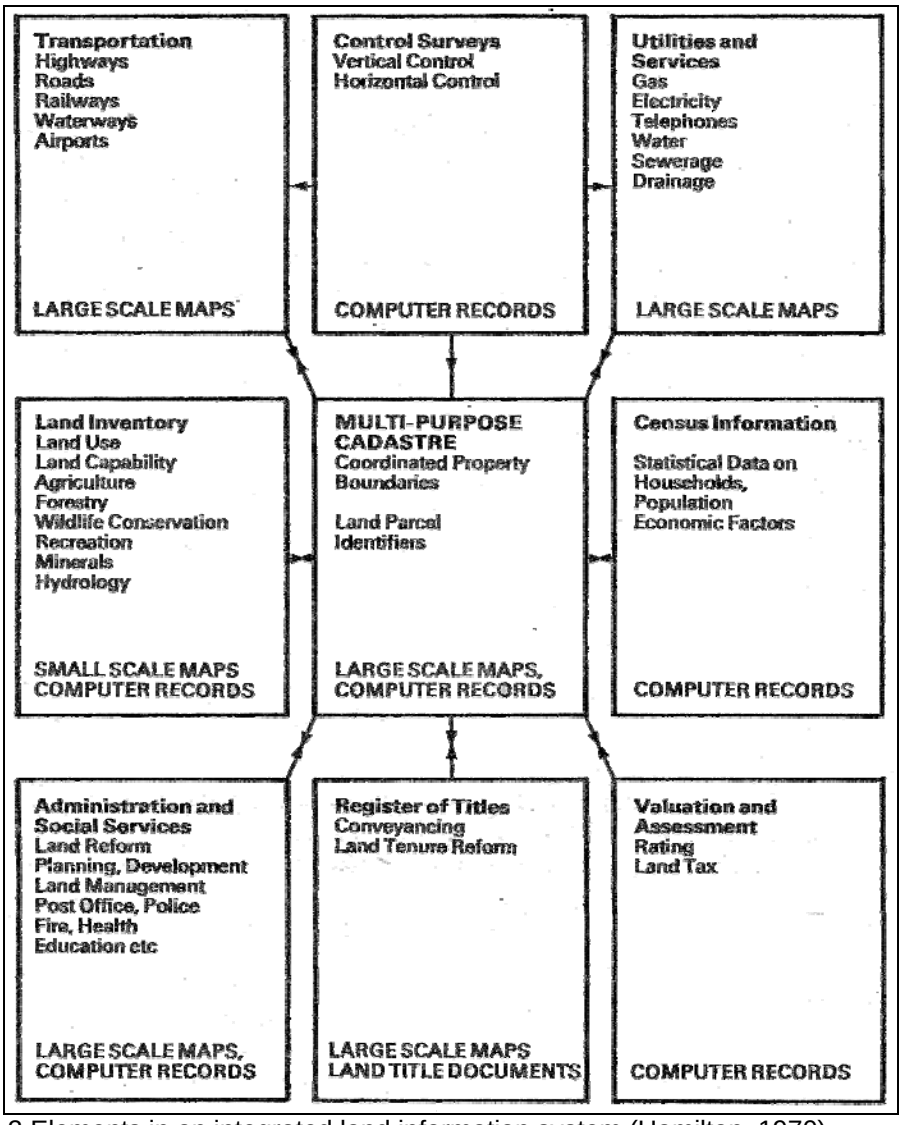


Figure 2.2 Elements in an integrated land information system (Hamilton, 1970)

2.2.2 Meaning of term “Coordinated”

In the term, *legal coordinated cadastre*, one must differentiate between *coordinated* as in “under organizational coordination” and in “based on coordinates”. The former interpretation means that different parts of the land-related information are maintained by different departments, but they could be joined together in some way. In other words, information is managed or integrated into one system, like GIS or SDI. The organizational structure of a cadastre is sometimes highly relevant to the system’s efficiency and capacity; however, the term is not adverted to this meaning in the

research.

The term, *coordinated,* refers entirely to the cadastre being based on boundary coordinates. Each registered land parcel is defined and recorded in terms of their geographical sense, i.e., recorded the parcel boundaries' coordinates with national coordinates and stored into a database, and the resultant data is visualized on a digital cadastral map.

With the help of information technology, the adaptation of digital spatial data information becomes widely and directly in use. In the cadastral industry, a survey that is accurate with a complete cadastral map is one of the important demands from surveyors. The usage of numerically coordinated data reduces field working time and mapping interpretation. It is also beneficial to decision making, such as infrastructure planning, engineering construction, and other GIS applications, with the integrated use of spatial and non-spatial information, and the coordinated cadastre frequently helps to simplify the fundamental procedures in decision making. Hence, in the last decade especially, the concept of coordinated cadastre with a digital cadastral map is accepted as a justified development in many regions, especially in developed countries. Irrespective of the fact that there are many ways for data acquisition, by photogrammetric method, by correlation with maps, or scaling off from maps, different methods will achieve different levels of accuracy of boundary coordinates.

2.2.3 Meaning of term “Legal”

In addition to the attribute, *coordinated*, another attribute, *legal,* also plays an important and critical role in the term, *legal coordinated cadastre*. In general, there are two different arguments: Some experts interpret this concept as regarding the digitally registered property information, such as rights of the parcel and its ownership, being legally valid primary data, while the record boundary coordinates of the parcel only treat it as the description of the true boundaries on the ground. They deem that demarcation on the ground should prevail over survey measurements (e.g., McEwen 1994), hence, in the concept of legal coordinate cadastre, the attribute, *legal,* focuses on most of the cadastre’s content, but excluding the digital boundary coordinates.

Nevertheless, another group of professionals consider this concept linking up the two attributes, legal and coordinates, and thereupon, opine that the boundary coordinates do have legal significance. This concept is one of the major innovations in Singaporean cadastre, which will be discussed in the coming chapter. The degree of the legal significance could vary, depending on the user’s demands and the score of specific regional cadastre. To a moderate level of interpretation, coordinates are one kind of evidence to assist in defining boundaries (Williamson & Hunter 1996). To a high level of interpretation, boundaries coordinates are primary and statutory evidence in determining boundary location (Todd et al 1999).

Adopting boundary definition by using digital coordinates as the best evidence with certain legal facts, Andressson (2006) pointed out that there

was a need for two major legal issues to be considered. The first one is related to the degree of the indefeasibility of the legal coordinates, i.e., whether it is possible to correct the registered coordinates if they are proved to be wrong? The aim of cadastre is to provide reliable register information on the land parcel; however, mistakes or errors, especially man-involved, cannot be avoided. For the old granted parcel, parcel coordinates were traced from old grant plans or kindred plans. These plans mostly show only a graphical parcel on the map without any grid and coordinates. Contradiction may occur due to different interpretations. If the relevant authorities cannot maintain the trustworthiness of the registered data, public confidence in the system will be greatly undermined. Hence, it seems that the corrections of errors must be allowed, no matter whether the errors are made by the surveyor or registrar, or there are adjustments due to certain land movements and/or transformation.

The second issue deals with guarantee against legal coordinates. Dale (1976) deemed that no legislation can give a guarantee that surveys are exact, mistake or blunder in work will always include small systematic and random errors in boundaries' measurements. However, the term, *guarantee,* in this thesis refers to the sense of guaranteeing boundary coordinates precision within certain accuracy levels. A guarantee could take many different forms, depending on the chosen cadastre model. It can be government-oriented or state liability. Thus the state could guarantee the correctness of the registered coordinates by either fixing the data or correcting them, and compensate the owners for their deficit or loss with fault. The indemnity may vary from solely technical faults to a more generous approach where all

disclosed errors and mistakes result in liability. It can be personal-oriented, whether the responsibility is belonging to the individual surveyor or the cadastral authorities who deliver the data.

2.3 Cadastral system

A cadastral system, according to Dale's (1976) description, is a set of connected parts related to the collection, processing and presentation of land information. It is a system involving the continuous operation of cadastre. The system includes the adjudication, demarcation, transfer of land right, survey specifications, survey methods and boundary descriptions. Figure 2.3 shows the elements in a cadastral system.

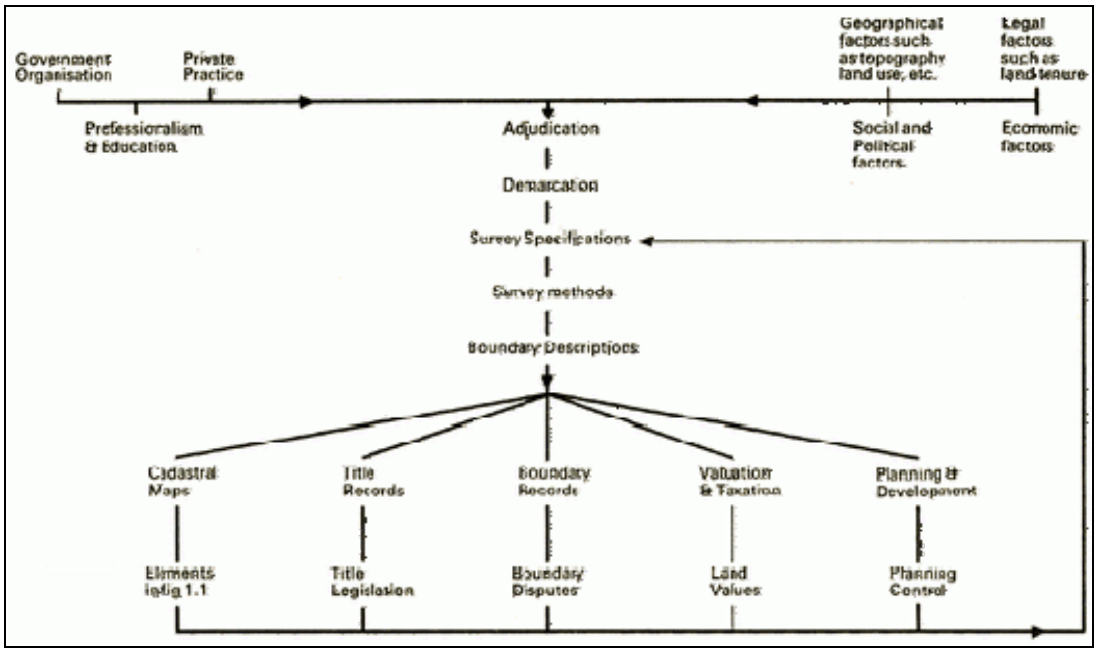


Figure 2.3 Elements in a cadastral system (Dale, 1976)

In Hong Kong, there is no comprehensive adjudication mechanism. The cadastral system in Hong Kong basically deals with land registration and

cadastral surveys, in other words, land boundary surveys. It is to facilitate land administration and transactions as a main objective while providing boundary security as a secondary objective.

Unlike other European countries, the three places covered in this research, i.e., Britain, Singapore and Hong Kong, do not have cadastre legislation, therefore, the cadastral systems outlined in this thesis are mainly concerned with their cadastral survey systems.

2.3.1 Cadastral survey system

According to Dale (1976), a cadastral survey is a survey of land parcels boundaries. The primary objective of a cadastral survey is to determine the location of a land parcel and its extent. The extent of its boundaries and surface area is to indicate its separate identity both graphically on a map or as recorded physically on the ground. The secondary objective is to provide information for a multi-purpose cadastre to satisfy the overall information requirements of land administration.

The Statement on the Cadastre (FIG 1995) also mentions the nature and functions of a cadastral survey. The statement notes that a cadastral survey is the definition, identification, demarcation, measurement and mapping of new or changed legal parcel boundaries. It usually includes the process of re-establishing lost boundaries and sometimes resolves disputes over boundaries or other interests in real property.

A cadastral survey system, where the activities being practised are

related to land boundaries, is equivalent to a land boundary survey system. Hence, the system in Hong Kong as discussed in this thesis is regarded as a land boundary system.

2.4 Boundaries

Dale (1976) defines that a boundary is a surface that divides one property from another, which in the case of land parcels, theoretically extends from the centre of the earth vertically upwards to the infinite in the sky. However, it is not the case that it is always restricted by other rights, i.e., overriding interests.

Although boundaries are a matter of law, they have no special meaning in law. In land-ownership sense, a legal boundary is a line not visible on the ground that divides one person's land from another's. It is an exact line having no thickness and rarely being identified with any precision either on the ground or in the deeds. It is defined in the conveyance deed as usually shown on an attached plan that first defined the parcel of land.

Generally, boundary can be classified into physical boundary and mathematical boundary. Physical boundary is the boundary of natural / physical feature, such as fence, wall, hedge, banks, garage, stream or foreshore…etc. Mathematical boundary is an artificial boundary that is invisible, denoting the limit and marked by the turning points, e.g., pegs, concrete blocks, steel rods and boundary stones…etc.

2.4.1 General boundaries

The idea of general boundary was first mooted in the English land registration system in the early 19th century and the concept was used to resolve the failure of the Land Registry Act 1862. In accordance with the Land Registration Rules 1925, it was stated that the register guaranteed the titles to the parcel as a whole, but did not guarantee its boundaries to the last inch. This clause avoided the problem of ownership of boundary features in Land Registry Act 1862. Hence, under these Rules, the exact line of the boundary is left undetermined. Strip of unspecified width of hedge, fence or wall and uncertain ownership are left between adjoining parcels. It can either be at the centre or any one side. Dowson and Sheppard (1952) called them 'euphemism for an indefinite boundary' such as one which is uncertain and vary like the line of edge of a forest. The essence of general boundaries is that it is applied to the as-built situation, and basically, boundaries of parcels identified on the ground will take precedence over the boundaries of the property recorded in the register. It allows for guarantee of title without the adjudication of the ownership of the boundary feature or the precise line of the boundary.

General boundary can be summarized into three categories: 1) the ownership of the boundary feature is not being established; 2) the boundary is the indeterminate edge of a physical feature; and 3) the position of boundaries is regarded as approximation. All these imply that the precise line of the boundary has not been determined.

2.4.1.1 Approximate boundaries

The concept of general boundaries was widely adopted in British colonial countries / cities. Under Kenya Registered Land Act (Cap 300), a general boundary is described as being 'approximate', which means land parcel shown on the register map is deemed to be indicated as approximate boundaries, and the approximate situation.

In the HKSAR, another new term derived from the general boundary concept is called approximate plot boundaries. In Hong Kong Land Titles Ordinance (Cap 585), Section 18 – Boundaries,

> (1) For the purposes of this Ordinance, a plan referred to in the Title Register, or a plan or microfilm, image record or other record of a plan kept in the Land Registry under section 6, 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 referred to in the Title Register, or the fact that a plan or microfilm, image record or other record of a plan is kept in the Land Registry under section 6, shall not constitute a warranty, or a guarantee, as to the accuracy of the plan

The clauses reflect that even the parcel is guaranteed of a title; the boundaries shown on the map are only treated as an approximate situation and indication only, no matter whether the plan is produced and certified by the chartered land surveyor(s) or authorized land survey(s).

2.4.2 Fixed boundaries

A fixed boundary is the land boundary that has been accurately drawn up from the survey measurement, i.e., having fixed the precise position of a boundary. The same boundary concept may be practised in different formats: fixed boundaries in Australia are different from those in England.

Australia adopts the Torrens System. Boundary corner points become fixed in space when an agreement is reached at the time of alienation of land. The Title Plan is prepared and fixed by the surveyors where it cannot be further changed without some documents of transfer.

In the England Land Registration Act (LRA) of 1925, Rules 276 and 277 prescribe the rarely used procedure under which the position of the boundaries can be fixed with precision. This procedure involves the serving of notice on all adjoining owners and occupiers, a thorough examination of all the adjoining titles and a detailed survey including the computation of National Grid co-ordinates on, or adjacent to, the boundaries.

However, as mentioned in Practice Guide 40, a boundary fixed before the commencement of the Land Registration Act 2002 does not offer any special protection against adverse possession. This implies a fixed boundary cannot provide a full guarantee.

2.4.2.1 Specific boundaries

Dale and McLaughlin (1999) pointed out that boundaries may be specific, and the precise line of the boundary can be determined. Hence, they raised

a new boundary concept, which deviated on the basis of general boundary concept, called specific boundary. It has three categories:

1). defined on the ground prior to development and identified, for example, in documents of sale;
2). identified after development, for example when the line of the boundary is agreed between neighbors at the time of adjudication;
3). defined by surveys to specified standard.

Unlike a general boundary concept, these three categories show that the position of the boundaries is deemed to be determined precisely.

2.4.3 Determined boundaries

As the measurement of fixed boundaries is very time consuming and expensive, a new category has been created and superseded fixed boundaries. This new boundary concept is mentioned in the England Land Registration Act (LRA) of 2002, called determined boundary. It is a procedure that allows for the exact line of a boundary to be determined and recorded on a registered title. This enables the landowner to give certainty to the position of a boundary. Bullard (2003) states that the change from fixed to determined boundaries anticipates that there will be an increase in boundary determination. It seems that boundary disputes may be resolved and greatly reduced by adopting a determined boundary concept.

2.4.4 Guaranteed boundaries

According to Dale (1976), a guaranteed boundary is used to describe the boundary where its location has been determined by adjudication and its position has been accurately surveyed. However, there is no absolute

guaranteed boundary in countries around the world. None of the legislation provides for specific guarantees of the exact location on the ground and specific guarantees of the accuracy of the survey.

The existence of the guaranteed boundary in the English System in 1862 was a mistake. As Fortescue-Bickdale, who is HM Chief Land registrar in 1862, said: “The Australian systems all guarantee boundaries; Lord Westbury’s Act did so too, but the practical difficulties of guaranteeing boundaries under that Act caused it to be abandoned in despair in the Act of 1875”. However, Dale (1976) pointed out that “Australia adopts a Torrens fixed boundary, not a guaranteed boundary”. Hence, it is questionable about the existence of a guaranteed boundary. Also, it has demonstrated the failure of using a guaranteed boundary.

Moreover, the word ‘guarantee’ is not generally applied to registration statues. Simpson (1976) gives the guaranteeing of boundary in a strictly legal sense, that a guaranteed boundary is a boundary mark related to the degree of precision prescribed in the ‘standards of accuracy’ laid down in the relevant survey law.

CHAPTER 3

CADASTRAL SURVEY SYSTEMS IN SINGAPORE AND BRITAIN

3.1 Selection of two study areas

Hong Kong, generally acknowledged as a metropolis, embodies a wide spectrum of international characteristics and values. Hence, to improve our land boundary system for future sustainable development, similar land boundary systems will be studied with the aim of drawing experience from them. Two countries, Singapore and Britain, have been chosen because of their similarity and outstanding characteristics. By studying the reform and development of their systems in recent years, this research attempts to shed some light on the way forward for Hong Kong to adopt.

3.2 Singapore

Singapore, officially known as the Republic of Singapore, is an island nation located at the southern tip of the Malay Peninsula. It is being selected as one of the study areas because of its similar historical background as compared with Hong Kong. Singapore was colonized by the British Government in 1819 and became a British colony in 1826. It has changed from a fishing village with a small population to a trading post and settlement. Like Hong Kong, it was occupied by the Japanese Empire during World War II, but reverted to British rule in 1945. Singapore became a self-governing state in 1959 and became an independent republic admitted to the United Nations in 1965. Since its independence, the living standard of Singapore has risen dramatically and has become one of the Four Asian Tigers, also known as Asia's Four Little Dragons. Both Singapore and Hong Kong have developed

on the basis of the Chinese culture and both are highly influenced by western values, especially during the period of the British rule.

3.3 Singaporean cadastral survey system

The Survey Department of Singapore, now consolidates itself with other land-related departments to form the Singapore Land Authority (SLA), has devoted much effort and resources to make a major reform of its cadastral survey system. In recent years, the reformation of the land boundary system in Singapore has reached a mature stage and is deemed to be a success. The implementation of legal coordinated cadastre is considered at the forefront of the cadastral survey system development. Coupled with technical innovations and legal reforms, a good platform has been provided linking up the government, the industries and the users closely. It seems to be a great leap forward around the world and Andreasson (2006) praised that Singapore has “the first complete legal coordinated cadastre in the world.”

3.3.1 Chronological evolvement of the cadastral survey system

Before 1841, surveys were conducted by officers of the local British garrison. The method is not exactly clear but its accuracy was low. In 1841, the first systematic survey was carried out by using compass and chain. However, owing to the simple methods and crude instruments used, the surveys were not very accurate. The second survey was carried out by using the theodolite and chain method in 1874; however, there were still no permanent markings until 1881, when granite stones were introduced to mark boundaries. This offered a solution for establishing permanent markings.

In 1884, the first survey law, Boundaries & Survey Maps Act (Cap 25), was introduced and enforced. In 1920, the Survey Department was set up. They adopted the Cassini-Soldner Coordinates System, and conducted numerical surveys, i.e., using bearing and distance survey system, in 1930. This provided modern survey values for all lots and made available rigorous mathematical checks on the accuracy of lot dimensions. Furthermore, a new series of cadastral maps of 3 Imperial Scales were prepared and continuously updated.

In 1970s, the Survey Department of Singapore adopted one uniform standard of accuracy for cadastral surveys in Singapore. Since metrication in land surveys was introduced, 3 Imperial Scales had been replaced and standardized as the scale of cadastral maps at 1:1000. In 1980s, computerized mapping systems were introduced and replaced the old manual processes. This enhanced the processing speed and increased the efficiency of the surveying work. In 1990s, the Survey Department of Singapore decided to make a modern cadastral reform, including introducing a new survey reference and making legislative changes to accommodate a legal cadastre in the process. (Goh, 1990, Song 1992) The reform can be classified into two major aspects: technical reform and legislative reform (which will be discussed in detail later). The Survey Department of Singapore embarked on the establishment of a network of survey control points known as Integrated Survey Network (ISN, SVY95) in 1995. Another major improvement was the amendment of Boundaries & Survey Maps Act (Cap 25) in 1998. It catered for the creation of a coordinated cadastre and enabled future surveys to be based on the ISN. Recognizing the Global

Positioning System (GPS) as a tool in the future, the Singapore Integrated Multiple Reference Station Network (SIMRSN) was set up in 2000. In June 2001, the SLA was established, which consolidated the Land office, the Singapore Land Registry, the Survey Department and the Land Systems Support Unit. Their mission is to optimize land resources for the economic and social development of Singapore, and it seems that they are moving towards their goal. In August 2004, the Singaporean Coordinated Cadastre was accomplished, and a Modern Cadastral Survey System, known as SVY21, was introduced and replaced the Cassini-Soldner System. In the same year, the digital cadastral database in the Surveying and Mapping System (SURMAP) was upgraded and replaced by another GIS database, known as the Consolidated GIS system (CGS). Recently, SLA mainly provides survey services with the help of technological change, in order to achieve their vision of “To be a world-class land authority”.

3.4 Cadastral reform in Singapore

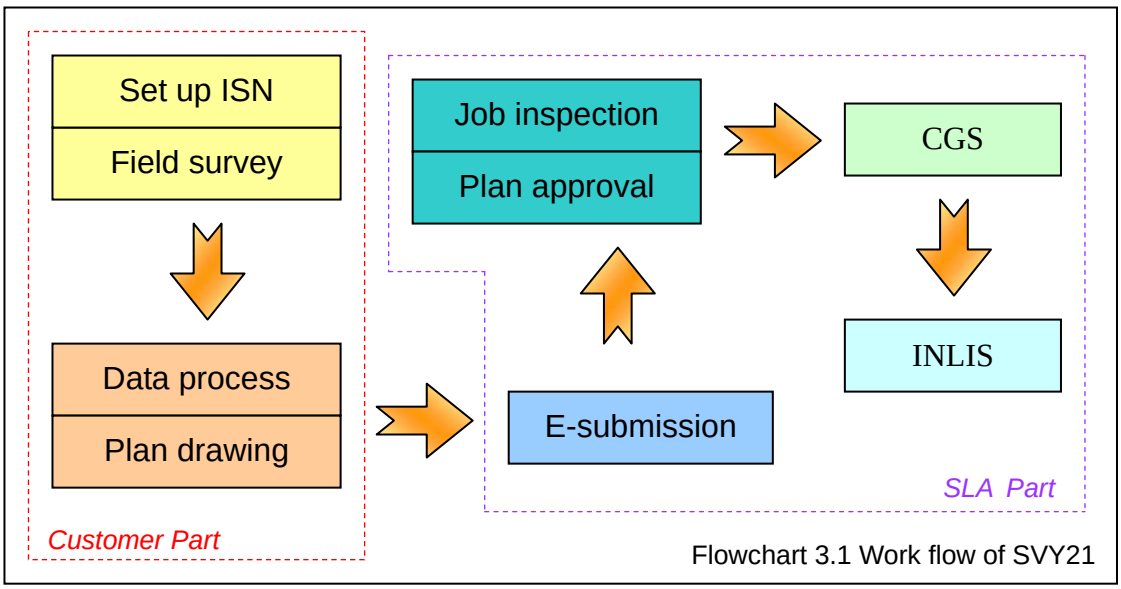
As mentioned above, the Singaporean Government has made much effort in cadastral reform since 1990s and Singapore’s Coordinated Cadastre was accomplished in August 2004. The SLA has described the overall objective of the reform as an increase in efficiency with some anticipated benefits, including greater integration and sharing of data among SLA and customers, enhancing the cadastral survey process, providing more convenience, and lowering the costs. There are two main categories in the reform – technical reform and legislative reform.

3.4.1 Technical reform

The technical tasks associated with the reform are related to the land (surveying and registration) aspect. In the surveying part, SLA introduced a Modern Cadastral Survey System called SVY21. This system contains five components: Singapore Integrated Multiple Reference Station Network (SIMRSN), Integrated Survey Network (ISN), Chief Surveyor Directive (CS Directive), CORENET, and Job Data Storage (JDS) system. Regarding the registration part, a system named Integrated Land Information Service (INLIS) was introduced.

3.4.1.1 SVY21 cadastral survey system

To familiarise with the use of GPS in land surveying, the SVY21 cadastral survey system adopts WGS84 ellipsoid geocentric datum with Transverse Mercator Projection.



Flowchart 3.1 Work flow of SVY21

The work flow of the system is illustrated in Flowchart 3.1. After

establishing ISN and taking field survey data, the surveyors process the data and draw plans. Then, they submit all the relevant documents via an e-submission system. The staff of SLA will inspect the submitted survey tasks and approve the plan under the supervision of the Chief Surveyor. If the plan is approved, the data will then be uploaded to the consolidated GIS system (CGS) database for updating, and cadastral information will be distributed in Integrated Land Information Service (INLIS).

3.4.1.2 SIMRSN and SiReNT

The Singapore Integrated Multiple Reference Station Network (SIMRSN) is a part of the joint research project, which was set up in 2000. It is a GPS reference station network, consisting of five GPS reference base stations and connected to the control centre at Nanyang Technological University (NTU). It operates a multiple-reference station carrier phase-based regional Differential GPS (DGPS) and adopts the Virtual Reference Station concept. It supports both post-process static surveys and real-time surveys. (Victor & Tor 2005, Victor 2002)

On 1 September 2006, the SLA launched another new infrastructure to replace SIMRSN. It is called the Singapore Satellite Positioning Reference Network, or in short, SiReNT. The main objective is to provide a homogeneous geographical reference frame for the purpose of cadastral survey. It supports all types of GPS positioning and its accuracy is up to centimeter-level. (Victor 2007). Same as SIMRSN, it is physically represented by 5 reference stations strategically located throughout the island (Figure 3.1) and supports both real-time and post-processing survey.

Moreover, the system is flexible and ready for integration.

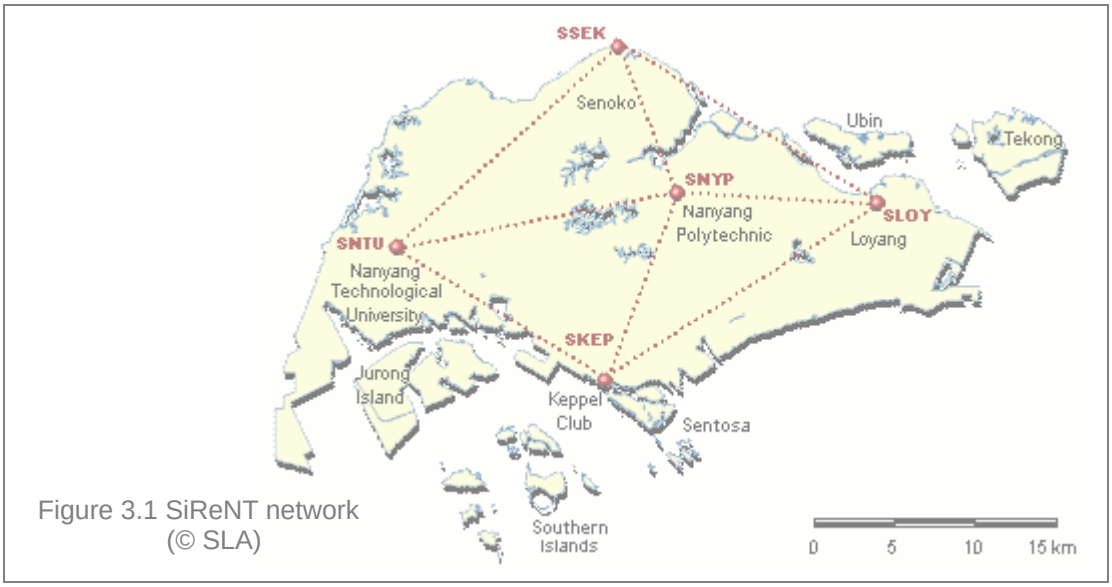


Figure 3.1 SiReNT network
(© SLA)

3.4.1.3 Integrated Survey Network & Precise Leveling Benchmark

A survey precision cannot be more accurate than the precision of a control network, and hence, SLA attaches importance to the control and decides to establish a nation-wide control network.

The Integrated Survey Network (ISN) is the horizontal control network in Singapore, which was set up using GPS technology, providing the framework for a GPS-based cadastral survey system. It consists of approximately 70 primary control points, mostly on the top of the Housing Development Board (HDB) flats, and about 5,000 secondary control points, with coordinates in the SVY21 system (SLA 2007). These control points were established along the major roads at approximately 300m intervals.

Figure 3.2 ISN in Singapore
(© SLA)

Figure 3.3 Secondary control markers (© SLA)

Figure 3.4 Old benchmark (© SLA)

Figure 3.5 New fundamental benchmark (© SLA)

Precise Leveling Benchmarks, i.e., PLBM, is the vertical control network in Singapore. It consists of approximately 500 precise leveling benchmarks, which are located at approximately 1 km intervals along the major roads.

The control-points information is stored into a database system called Control Point Sub-system (CPS) and the public can obtain ISN and PLBM information online via the Integrated Land Information Service (INLIS).

3.4.1.4 CORENET e submission system (eSS)

CORENET is an internet-based system with a secured environment which is maintained by the Building and Construction Authority (BCA). It functions among the Government and Business and enables industry professionals to submit their projects in digital formats. Surveyors can submit field survey files and results data files, including documentary electronic records and plans to SLA.

The CORENET e-submission system (eSS) provides several benefits including one-stop service to both private and public sectors. It allows for the submission of plans from qualified persons to multiple approving authorities from anywhere and at any time. Besides, the qualified persons can check submission status online, and post submission status online. More details can be found from the CORENET webpage at http://www.corenet.gove.sg/.

3.4.1.5 Job Data Storage system

Job Data Storage (JDS) system is another web-based system handled by SLA and implemented along with e-submission. The objective of the system is to facilitate paperless cadastral job processing. JDS provides support for validating the submitted job, tracking and approval of the jobs, payment and reporting (SLA 2005).

3.4.1.6 Integrated Land Information Service

Integrated Land Information Service (INLIS) is an Internet-based system for obtaining registered property information. It provides information on land matters, such as road line plans, survey plans, and boundaries of properties. It also provides information on property, for example, ownership of property, property transaction history, school listing and surrounding amenities. Regarding land survey information, users can acquire horizontal control point and vertical control point information, Cadastral Map, Registrar of Title Plan, and (Strata) Certified Plan. Furthermore, SiReNT GPS data can be obtained in this web system. Customers can obtain their necessary information via the system and pay for the requested information by Credit Card / Debit Card or via NETS GRIO account which is authenticated by SingPass. There are no set-up costs or subscription fees for the system. Detailed description about INLIS is shown in the NILIS webpage: http://www.inlis.gov.sg/.

3.4.2 Legislative reform

There are several ordinances related to land matters, but the most conspicuous one is Boundaries and Survey Maps Act (Cap 25) or in short BSMA. To enact rules and regulations for establishing the coordinated cadastre and to give it a legal effect, the SLA successfully made amendments to the Boundaries and Survey Maps Act in 1998. This move ensures that the achievements of the coordinated cadastre are protected as statutory rights.

3.4.2.1 Boundaries and Survey Maps Act (Cap 25)

The Boundaries and Survey Maps Act (BSMA), which defined boundaries securely, was enacted in 1984. It was amended to cater for the creation of a

Coordinated Cadastre in 1999 and further updated in 2006. The aims of this Act are to provide for the demarcation of land, the establishment and maintenance of boundary marks and the publication of certain survey maps. Section 4 sets out the requirements of the land survey clearly, while the power and the duties of the Chief Surveyor are defined in Section 5 and Section 6 respectively. The Act also stipulates clearly how to conduct cadastral surveys, including the powers of entry for survey purpose, inspection and deposit of survey records.

In Section 7, a legal framework for setting up a coordinated cadastre by the Chief Surveyor is laid down. The Chief Surveyor, who is responsible for establishing a coordinated cadastre, is empowered to establish and maintain a network of survey control marks with recorded coordinates (Section 7(a) of BSMA) and convert boundary coordinates. The Chief Surveyor can also approve and record the coordinates of the boundaries of each designated area (Section 7(c) of BSMA), which will be published in the Gazette (Section 7(b) & 7(d) of BSMA), and supersede all maps published under the repealed Act (Section 7(f) of BSMA).

The Act also provides legal significance for boundary coordinates registered under the SVY21 cadastral survey system and the resultant map from the system deeds as the conclusive evidence, in accordance with Section 13(2) of the Boundaries and Survey Maps Act.

> Upon a declaration under Section 7(f), every map generated from the co-ordinated cadastre shall be conclusive evidence in all courts of the boundaries of the land comprised in every land shown therein, subject

only to any order made under Section 12 (Correction of map) for their modification, correction or alteration.

Besides, the Act makes a leap forward by allowing the Chief Surveyor to correct a cadastral map if there are any faults, such as human mistakes, technical errors…etc. (Section 12 of BSMA), but has clearly declared that the liability for a cadastral map should be rest with registered surveyor who signed and certified the survey plan (Section 11D(5) of BSMA).

3.5 Britain and its legal systems

Britain was one of the world's superpowers during the 19th and early 20th century. Many regions around the world, including Hong Kong and Singapore, were colonized by it. However, in the latter half of the 20th century, due to the economic cost of two world wars and the decline of its empire, Britain's leading role in global affairs diminished. Nevertheless, Britain still retains its great economic, cultural, military and political influence today. Britain adopts a parliamentary democracy and a constitutional monarchy comprising four constituent countries: England, Northern Ireland, Scotland and Wales.

Britain has three distinct legal systems. The English law is practised in England and Wales, and the Northern Ireland law is enforced in Northern Ireland. Both are based on the common law principle. The third system is the Scots law, executed in Scotland. It is a pluralistic system based on the civil law principle and has common law elements dating back to the High Middle Ages. The English law is highly regarded as the mother of the Common Law. There has been no major codification of the law and judicial

precedents are binding as opposed to persuasive. Judgments are made by justices sitting in courts, in accordance with their common sense and knowledge of legal precedents and the facts presented before them.

As the English law was exported to many Commonwealth countries while the British Empire was established and maintained, the English law has become the basis of the jurisprudence of many places, like Hong Kong and Singapore. For the purpose of investigating similar cadastral survey systems, the study area of this thesis will mainly focus on the English cadastral survey system, which is implemented in England and Wales.

3.6 English cadastral survey system

Bullard (2003) appraised the oldest evidence showing that the boundary demarcation in England was started in the Roman Empire Era. The Romans constructed mounds or other fixed marks in England to form the turning points of boundaries, and started some of the earliest records of the setting out of villages. In 1086, the Domesday Survey was carried out and land boundary records, being one of the earliest records, continued to be used until 1522 when they were updated and referred to as the New Domesday Book. The 1535 Statue of Uses was an attempt to convert all uses into legal estates.

The boundary concept recently being adopted in England and Wales, as stated in the Land Registration Act (LRA) of 2002, is the general boundary concept. In the past, the LRA of 1862 introduced a new boundary concept, fixed boundary. Unfortunately, the concept was unsuccessfully adopted by reason of the demand for a precise boundary definition using contemporary

relatively low survey techniques and the consent of all neighbouring parties. It was an expensive boundary survey procedure and the applicant was required to bear the costs of all the work involved. Owing to less private ownership and fewer jointly-owned properties in that period, only a few owners adopted the scheme. The process of fixing the boundary seemed to have produced in an insignificant impact. However, nearly half a century later, the LRA of 2002 introduced another new boundary concept, determined boundary. This provides an opportunity for upgrading the security through boundary determination. Furthermore, a determined boundary is protected from boundary disputes with regard to adverse possession and it is not subject to the issue of accretion and diluvion. Further details about determined boundary can be found in Chapter 2.3.3.

The LRA of 2002 also provides a reappraisal of the land surveyors' role. Bullard (2003) said, "It is suggested that there are currently some 100 chartered surveyors involved in determining and resolving boundary disputes". In Land Registry Practice Guide 40, the Land Registry will only accept the plans based on the Ordnance Survey map, with the certificate of accuracy by the Chartered Land Surveyor or other suitably qualified professional.

3.6.1 Ordnance Survey map

Ordnance Survey maps are produced by the Ordnance Survey, which is an executive agency of the United Kingdom government and the national mapping agency in Britain. There are mainly two series of Ordnance Survey maps: they are the County Series, which is based on an original survey dating from 1870, and the National Grid Series, which is dated from 1945. Both of

them are published in various scales. Since 1995, the Ordnance Survey has digitized the last batch of about 230,000 maps, and recently, all the Land Registry title plans were produced using Ordnance Survey's definitive large-scale digital map data (Silverman & Hewitson 2006). The Common Law always prevails over the boundary shown on the Ordnance Survey map, unless the map with the titles deeds has been based on an extraction from such map. This map is generally admissible in evidence as proof of private boundaries. The general public can acquire the maps with a charge through the webpage of Ordnance Survey (http://www.ordnancesurvey.co.uk/), the British Library or the National Land Information Service (NLIS, http://www.nlis.org.uk/).

3.7 Reform in English cadastral survey system

There are not many changes in the English cadastral survey system. Following the mainstream practice of the world, the Geographic Information System (GIS) has been introduced and implemented with Internet services. However, it is worth to take note of the introduction of the determined boundary concept. It represents a big step forward in boundary security.

3.7.1 Technical improvements

With respect to land surveying, the Ordnance Survey has created a new standard in geographic information and provides a diversified, comprehensive infrastructure, such as emergency services, health, transport, utilities, as well as land and property. Location Based Services (LBS) is one of the innovations in the wireless category. LBS enable a user to make his services relevant and personal to a customer's physical location, boosting efficiency by

interpreting geographic considerations. They can assist in personal and commercial route planning, vehicle, information services, and emergency and breakdown services. LBS, hence, are technology fuelled by introducing geographic information into the wireless market. Apart from LBS, GSM digital coverage maps and Wi-Fi hotspots are other services provided by the Ordnance Survey. For more details about the geographic information the Ordnance Survey promotes, the readers can visit the Ordnance Survey webpage (http://www.ordnancesurvey.co.uk/oswebsite/business/).

On the other hand, the HM Land Registry started to launch Land Registry Direct in 2003. The system allows a registered user to have instant online access to more than 19 million registers of title covering the great majority of properties in England and Wales. Land Registry Direct provides a simple, quick and inexpensive way to acquire register information for Conveyancing and property information. Users can save time and money by using the online system to deliver applications for a range of Land Registry services. Registration for the system is free of charge, while a statutory fee is charged for transactions through the system.

3.7.2 Law amendment

The Land Registration Act (LRA) 2002 received the Royal Assent on 26 February 2002 and came into force together with the Land Registration Rules (LRR) 2003 on 13 October 2003. The Act and the Rules repealed and replaced previous land registration legislation, i.e., the Land Registration Act 1925, and regulated the role and practice under HM Land Registry. One of the breakthroughs of the Act in land boundary matters is the introduction of a

determined boundary concept. In accordance with Section 60(3) and 60(4) of LRA 2002,

> (3) Rules may make provision enabling or requiring the exact line of the boundary of a registered estate to be determined and may, in particular, make provision about—
> (a) the circumstances in which the exact line of a boundary may or must be determined,
> (b) how the exact line of a boundary may be determined,
> (c) procedure in relation to applications for determination, and
> (d) the recording of the fact of determination in the register or the index maintained under Section 68.
> (4) Rules under this section must provide for applications for determination to be made to the registrar.

The ordinance provides a procedure that allows for the exact line of a boundary to be determined and recorded on a registered title, which is aimed at upgrading the boundary security. The details of application and procedure for determination of the exact line of a boundary are clearly stated and described in the Land Registration Rules 2003, Land Registry Practice Guide 40 and the Fact Sheet no. 3.

3.7.3 Procedure for the determination

The application for determination of the exact line of a boundary is stated in Section 118(1) of Land Registration Rules 2003,

> 118. (1) A proprietor of a registered estate may apply to the registrar for the exact line of the boundary of that registered estate to be determined.

It seems that all the registered land can apply for the determination. To apply for a determined boundary, the applicant must submit a plan to identify

the exact line of the boundary and provide evidence to establish the exact line of boundary that is shown on the plan. An application must be accompanied by a plan and/or a verbal description for identifying the exact line of the boundary claimed. In addition, written evidence to establish the exact line of the boundary must also be attached. Furthermore, the applicant must supply the names and addresses of all adjoining owners. If the adjoining land is not registered, the applicant must supply copies of the adjoining owner's title deeds.

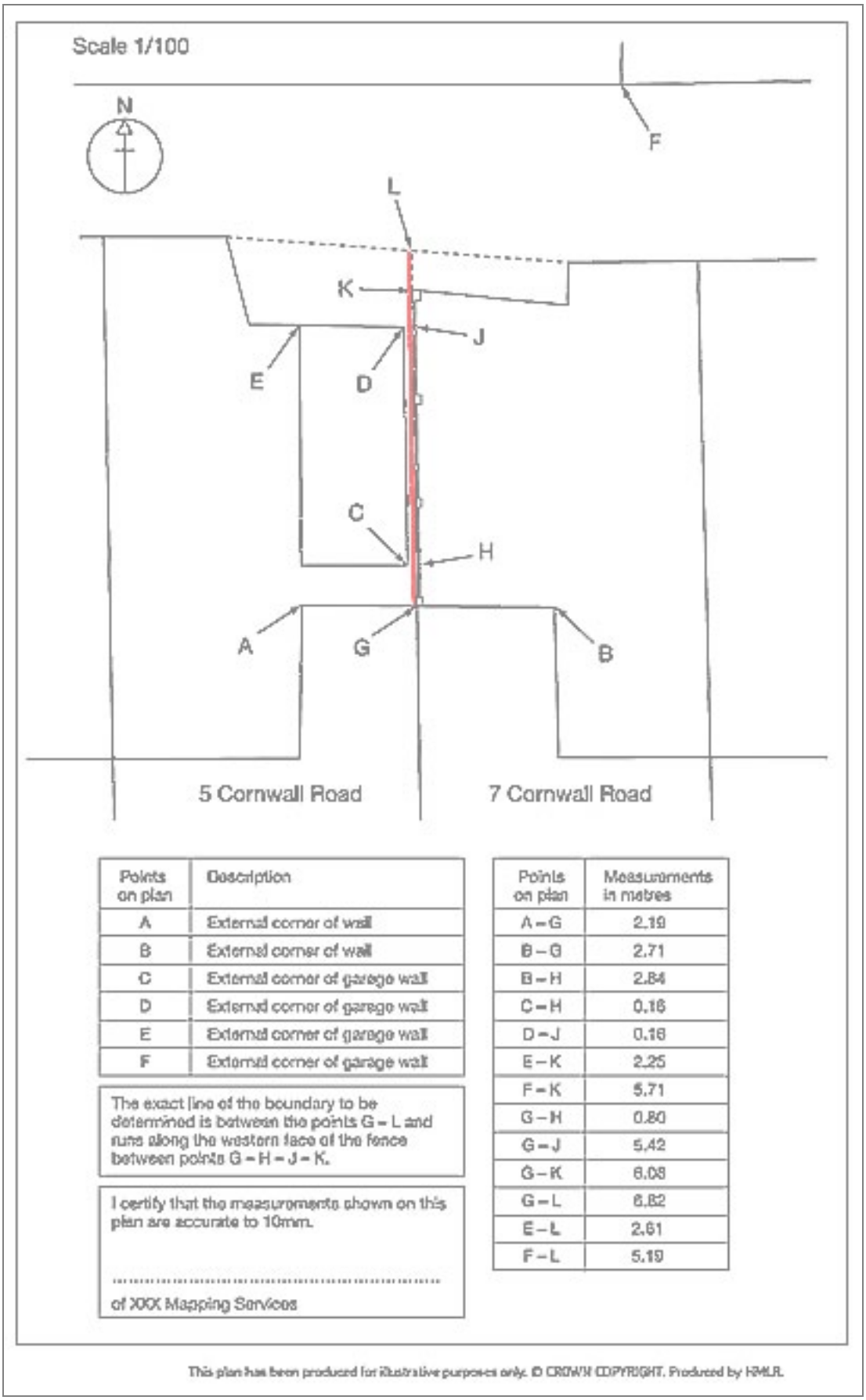
This plan must show surrounding physical features that allow boundary to be drawn on Ordnance Survey (OS) Map, and all the points of boundaries corners must be identified. The specific relationship of the boundary to physical features must be shown. Measurements need to be both precise and accurate to the 10mm level and the drawing should be accurate to a stated recognized scale (1:200 or larger). Coordinates (National Grid) for the line of boundary is optional as to whether it is shown on the plan. If it is being used, the relative accuracy and the absolute (positional) accuracy must be within the 10mm and 300mm tolerance. It is recommended that the plan is to be prepared by a Chartered Land Surveyor or other suitably qualified professional with their certification as to its accuracy. Figure 3.6 is a simple plan of determination of the exact line of a boundary.

The registrar will then checks and approves the plan. If he is not satisfied with certain reasons as stated in LRR 2003, Section 119(1)(a), (b) and (c), he must cancel the application. Otherwise, the registrar should give notice of the application to all adjoining owners, unless the written agreement

of an adjoining owner to the application has been lodged. A period of objection will be the twentieth business day after the day of issue of the notice. After this interim period, the registrar must complete the application by determining the exact line of the boundary. The determined boundary will then be recorded in the register of the applicant's registered title.

3.7.4 The outcome of the determined boundary

There have been nearly four years since the enforcement of the LRA 2002 and the LRR 2003. The author was curious about the effects of this concept, so he tried to collect some statistics on the registration under this scheme from HM Land Registry (Appendix A). However, a staff member of HM Land Registry gave this reply: "The Land Registry does not hold the information requested." Hence the success of the implementation of the scheme cannot be validated. But there is no doubt that the scheme does increase the boundary security. Section 60(1) of the Land Registration Act 2002 stipulates that the boundary of a registered estate is a general boundary, unless determined. For those registered land which adopts the general boundary concept, Common law presumptions will prevail over the title plan. However, if the parcel is determined, an entry in the individual register of the applicant's registered title is made or added to the title plan of the applicant's registered title. The title plan states that the exact line of the boundary is determined under Section 60 of the Act. It follows that the title plan of determined boundary has a statutory position.



Points on plan	Description
A	External corner of wall
B	External corner of wall
C	External corner of garage wall
D	External corner of garage wall
E	External corner of garage wall
F	External corner of garage wall

The exact line of the boundary to be determined is between the points G – L and runs along the western face of the fence between points G – H – J – K.

I certify that the measurements shown on this plan are accurate to 10mm.

.....

of XXX Mapping Services

Points on plan	Measurements in metres
A – G	2.19
B – G	2.71
B – H	2.84
C – H	0.16
D – J	0.16
E – K	2.25
F – K	5.71
G – H	0.80
G – J	5.42
G – K	6.08
G – L	6.82
E – L	2.61
F – L	5.19

This plan has been produced for illustrative purposes only. © CROWN COPYRIGHT. Produced by HMLR.

Figure 3.6 Sample plan of determination of the exact line of a boundary (LRPG40, © Crown Copyright, Produced by HMLR)

CHAPTER 4

HONG KONG CADASTRAL SURVEY SYSTEM

4.1 Scope of subject

The Singaporean and English cadastral survey systems, in particular their cadastral reform, have been discussed in the last chapter. This chapter will focus on the Hong Kong situation. The structure of the Hong Kong cadastral system and land boundary system will be studied briefly, and the related parties dealing with or affecting land boundary matters will be introduced. Boundary records, which reflect the contemporary situation, always play an important role in the system, and hence, there will be an introduction and classification of the boundary records. The core of this chapter is about the reform in the Hong Kong land boundary system. Both the technical and legislative aspects will be analyzed, and a comparison of the three cadastral survey systems will then be made. A summary will be drawn up at the end of this chapter.

4.2 Boundary concept in Hong Kong

As stipulated in the Land Titles Ordinance (LTO, Cap 585), an approximate plot boundary concept is deemed to be the most suitable concept to be applied to Hong Kong. No one can tell exactly where the actual location of the parcel boundary is, but the approximate location can be easily delineated. Hence, it shows that boundary security is relatively low and the accuracy of the boundary is questionable.

On the other hand, the standard of the land subdivision has been

sustained under the Land Survey Ordinance. Land Boundary Plans (LBPs) have to be prepared for every subdivision survey in connection with defining parcel boundaries and the resultant LBP will be required to be registered in the Land Registry. Tang (2003) pointed out that registered LBP is prima-facie land boundary evidence that could be readily used for any land administration or development activities. The subdivision line shown on the plan is precisely determined in numerical form, and guaranteed by the Authorized Land Surveyor (ALS). The practice matches with the three categories of specific boundary (*see* 2.3.2.1).

Hence the boundary concept in Hong Kong is approximate plot boundary, but those subdivisions under the Land Survey Ordinance can be regarded as approximate plot with a specific boundary. The principle of boundary survey is to re-construct the boundary in the original grant. Since there is no survey law that recognizes the legal survey and its monuments, land boundary survey is conducted in accordance with grant intention if a grant lease exists, otherwise, it is subject to the best available evidence.

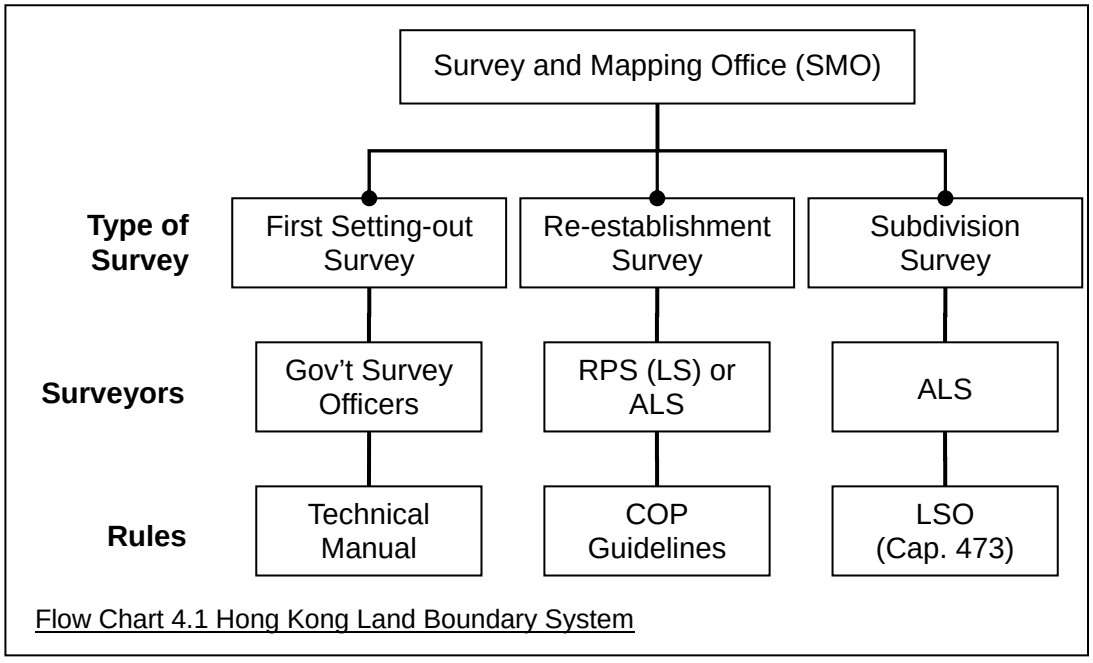
4.3 Hong Kong cadastral system

The HKSAR, practising the common law after its reunification with Mainland China, still adopts a deeds registration system and has no cadastre law until now. Nonetheless, there is a cadastral system that handles cadastral functions via various government departments. Under this cadastral system, land-related matters are subdivided into scrappy pieces. Land tenure is created by the Lands Department while the land use rights and controls are drafted by the Planning Department. Valuation and tax

collection are handled by the Rating and Valuation Department. All the transactions related to land (including property attached to land) are managed and registered by the Land Registry, and the recording and first alienation of land boundaries are done by the Survey and Mapping Office (SMO) of the Lands Department.

4.3.1 Hong Kong land boundary system

Land boundary surveys in Hong Kong are governed by the SMO of the Lands Department. As shown in Flowchart 4.1 below, there are three types of boundary surveys being conducted in Hong Kong.



Flow Chart 4.1 Hong Kong Land Boundary System

4.3.1.1 First setting-out survey

First setting-out survey is the first land alienation, which is conducted by government survey officers, and mainly for the purpose of preparation for land sale. After the Land Administration Office (LAO) of the Lands Department

assigns a land site to be leased, the draftsman then draws the block on a proposed plan and passes to SMO in relation to the above request. Surveyor officers of SMO, under the supervision of land surveyors, conduct the boundary survey by breaking down a traverse and setting out the boundary of the requested parcel in accordance with the specification of the initial technical manual. Boundaries are marked, circumstances permitting, at every angle by the most suitable boundary marks. Subsequently, a dimensional plan / setting out plan (known as a land sale plan) is prepared and then attached to the land sale documents as reference. In addition, a boundary folder of the parcel is opened for keeping all the relevant land boundary information. Figure 4.1 is a sample of a land sale plan.

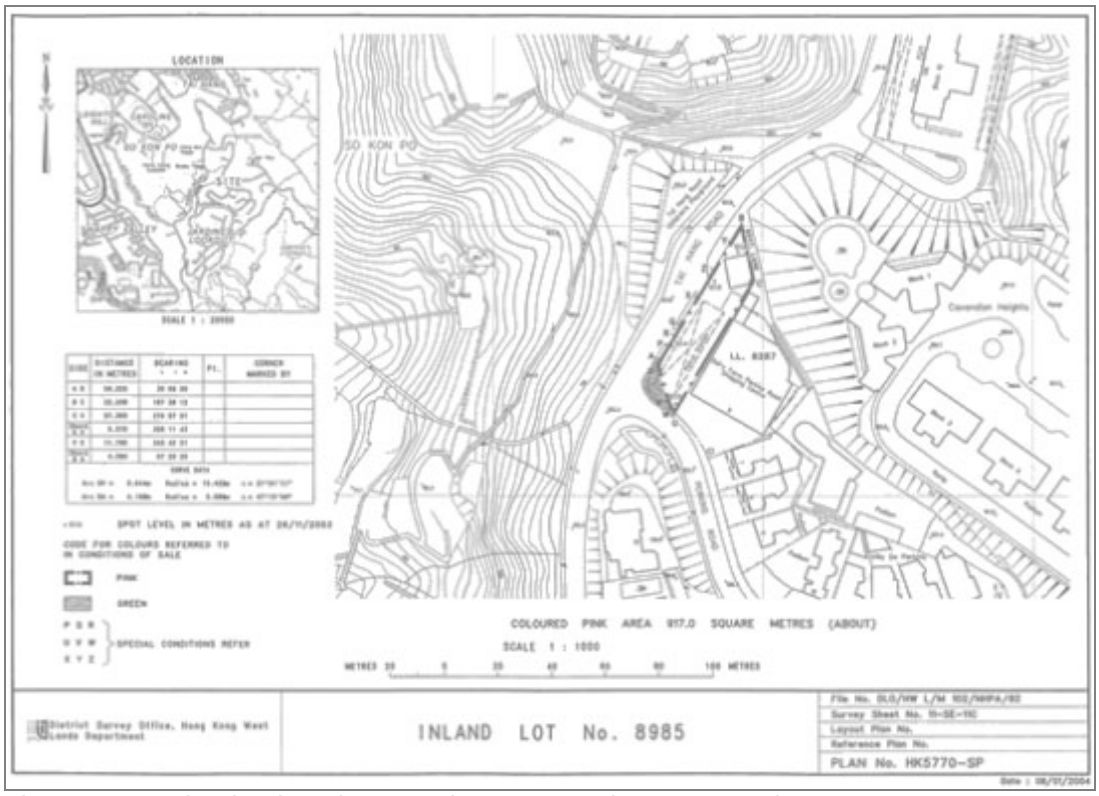


Figure 4.1 Land Sale Plan of IL 8985 (© SMO, Lands Department)

4.3.1.2 Re-establishment survey

In general, a re-establishment survey is conducted by Registered Professional Surveyors of the Land Surveying Division (RPS (LS)) or Authorized Land Surveyor (ALS), and is rarely conducted by government land surveyors unless in some exceptional circumstances. Following the principle of boundary survey Hong Kong, which is “subject to the best available evidence”, the prime condition of the survey is to collect information relevant to the subject lot as well as the abutting lots. Information can be gathered in the Land Registry, District Land Office (DLO), District Survey Office (DSO), and a field survey.

There are no rules governing land boundary survey practices in Hong Kong. The general procedure of a land boundary survey currently adopted in Hong Kong is illustrated in Flowchart 4.2. The procedure is divided into four main steps: preparation work, field work, office work and production. Most private cadastral surveying firms adopt this procedure in their current practice.

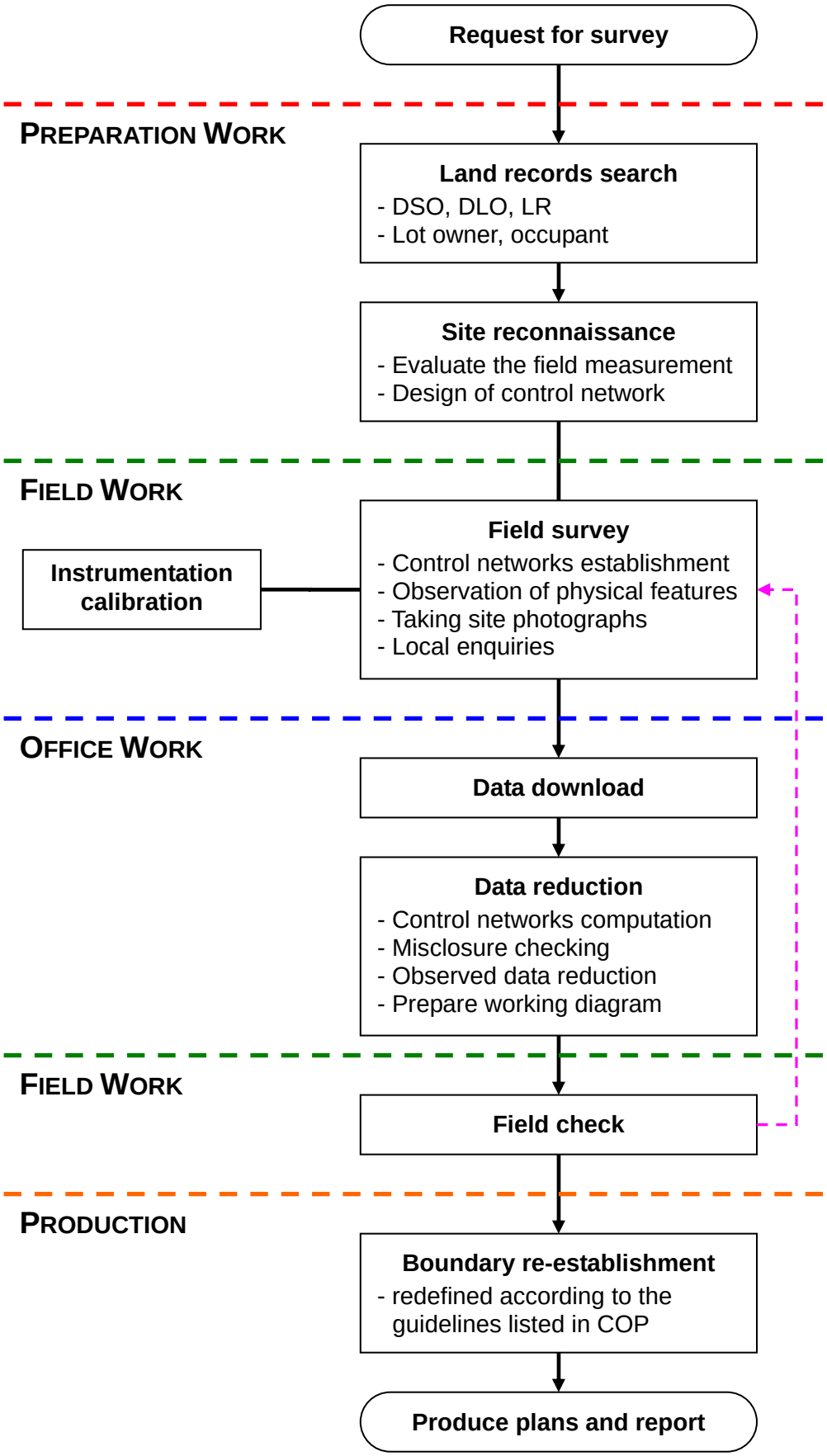
There are no statutory provisions to regulate the manner in which boundary re-establishment is conducted. Nevertheless, the Code of Practice (Fourth Edition (Revised)) of the Land Survey Ordinance (COP) has set out the general principles for re-establishment of lot boundaries, which is aimed at maintaining a standard practice for re-establishment of lot boundaries. It is recommended that all land surveyors have to comply with the COP when performing boundary re-establishment work. In accordance with Section III of the COP, there are five principles:

i) Follow the intention of grant
ii) Adopt original occupation
iii) Respect existing boundary features
iv) Adopt common boundaries previously defined
v) Provide reasons for discrepancies

In cases involving Old Schedule Lots in the New Territories, correlation exercises might be undertaken for the various cadastral records in order to compare the differences between the records and the up-to-date Lot Index Plan. If a lot had been previously subdivided, the history of the lot must be investigated in order to check the consistency during the subdivisions. In addition, a comparison between the surveyed area and the registered area should be undertaken in order to check the significance of the area discrepancy.

Thereafter, the surveyors should prepare a Survey Record Plan (SRP) that records all the essential elements in the re-establishment and presents how the survey has been carried out. They should also prepare a survey report to explain the details of the re-establishment survey, including the method of re-establishment, rationale and justification for the re-establishment, and the final result of the boundaries re-establishment. The formats of SRP and survey report are listed in the Code of Practice.

Flowchart 4.2: General procedures of land boundary survey in HK



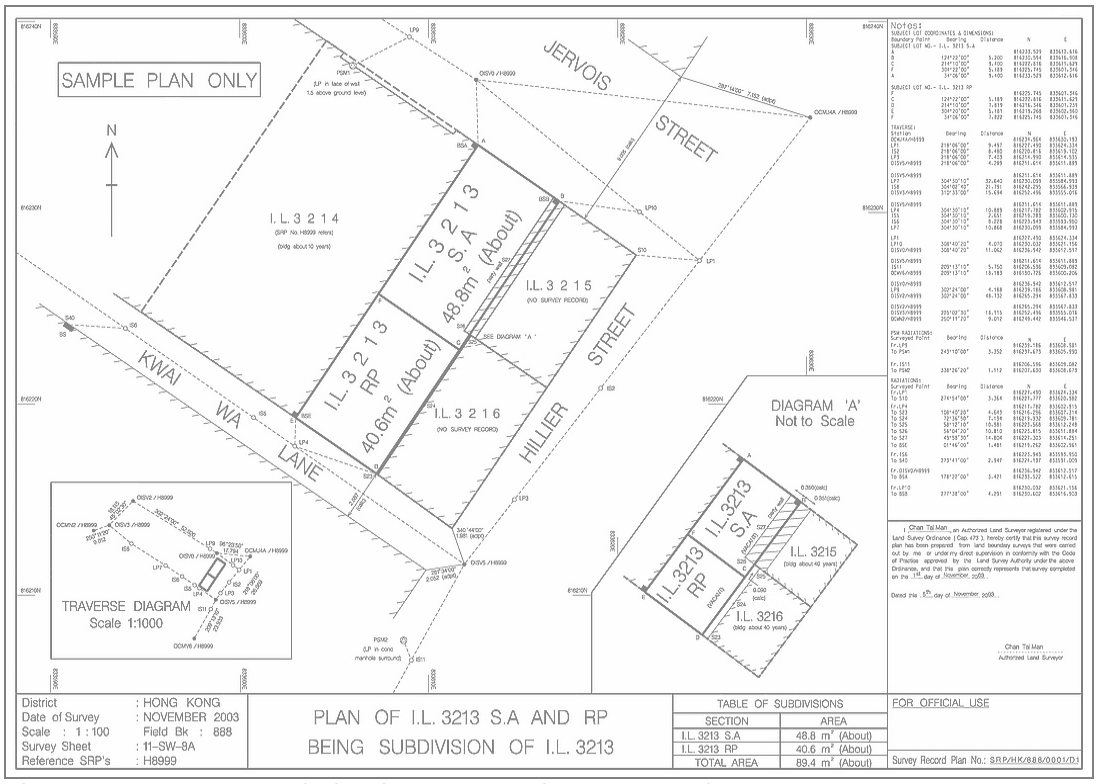


Figure 4.2 Survey Record Plan (© SMO, Lands Department)

4.3.1.3 Subdivision survey

The Subdivision survey is governed under the Land Survey Ordinance (LSO, Cap 473). The ordinance empowers Authorized Land Surveyors (ALSs) to be the only party who has the authority to carry out the subdivision survey, and prepare, sign and certify the Land Boundary Plan (LBP) for registration in the Land Registry under the Land Registration Ordinance (LRO, Cap 128). In accordance with Section 30 (4) of the LSO,

> (4) An authorized land surveyor who certified a land boundary plan referred to in subsection (1) or (2) shall deposit with the Authority a duplicate of the land boundary plan and the survey record plan of the relevant land boundary survey both signed and certified in the specified form, not later than 7 days after the deed, conveyance or other instrument in writing by which the land boundary plan is accompanied in accordance with subsection (1) or (2) has been delivered into the Land Registry for registration under the Land Registration Ordinance (Cap 128).

The land boundary plan is certified by ALS for attachment to a deed affecting a land subdivision. He shall deposit with the Legislation Section (LEG) of the Land Survey Authority (LSA) a duplicate LBP and the corresponding SRP in respect of a land subdivision upon the registration of the associated deed in the Land Registry under LRO. The subdivision survey shall comply with the Code of Practice.

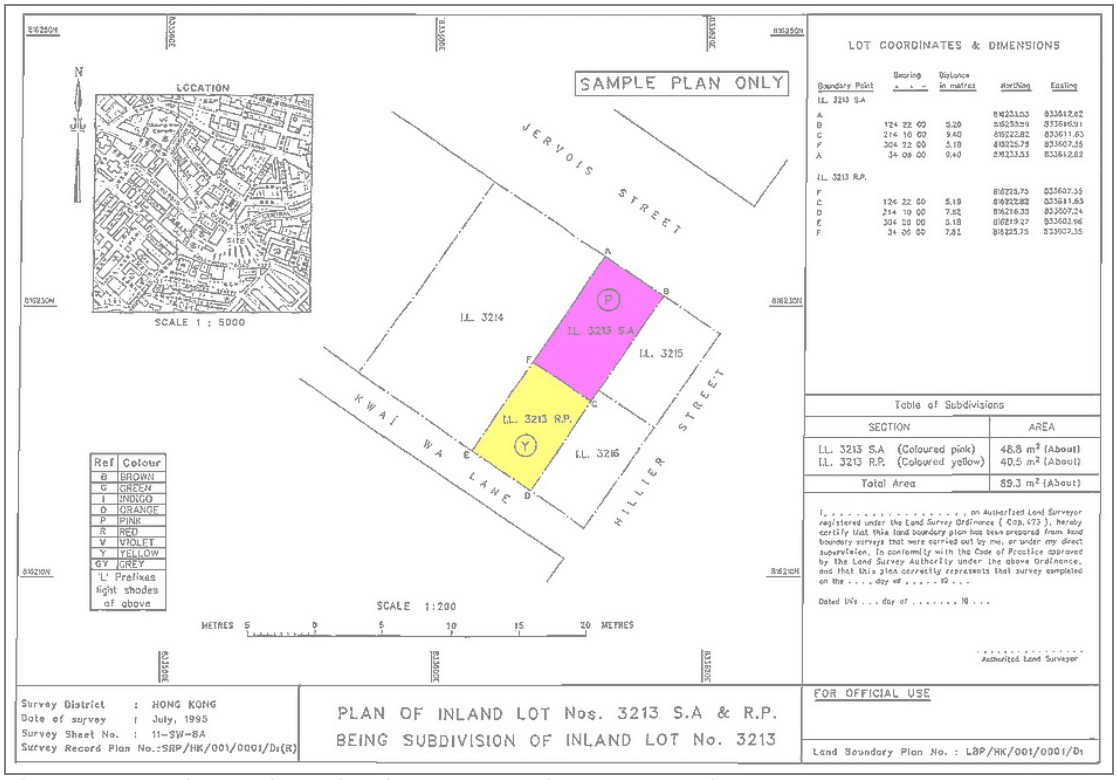


Figure 4.3 Land Boundary Plan (© SMO, Lands Department)

4.4 Parties involved in cadastral survey

As mentioned before, a cadastral survey in Hong Kong involves various professionals. To gain a better understanding of the system, some of the specific parties will be introduced. The parties will be classified into two categories: professions and organizations.

4.4.1 Professions' involvement

Registered Professional Surveyors of the Land Surveying Division (RPSs (LS)) and Authorized Land Surveyors (ALSs) are two professions in the private sector who conduct land boundary surveys.

RPSs (LS) have been registered under the Surveyors Registration Ordinance (Cap 417) since July 1991. They are responsible for most of the land boundary surveys, except subdivision surveys.

ALSs are registered under the Land Survey Ordinance (Cap 473). They are responsible for conducting all land boundary surveys as well as approving Land Boundary Plan for subdivision purpose and other surveying works. An ALS will be personally responsible for the accuracy and completeness of the land boundary plans certified by him or her and is liable to damages suffered by any person as a result of any inaccuracy and incompleteness of any land boundary plan. Under Section 28 of the Land Survey Ordinance, an ALS shall shoulder the responsibilities to ensure that every land boundary survey undertaken or supervised by him is carried out in accordance with the requirements of the COP, and ensure that all field notes, Survey Record Plans (SRPs) and LBPs in relation to the land boundary survey comply with the requirements of the COP.

4.4.2 Organizations' involvement

There are many organizations involved in the cadastral survey system. It is not possible to discuss them one by one. Only organizations that play a relatively important role in land surveying will be explained briefly as follows.

The Lands Department, on behalf of the Government, plays a primary role in the Hong Kong land boundary system. It comprises three functional offices, the Lands Administration Office (LAO), the Legal Advisory and Conveyancing Office (LACO) and the Survey and Mapping Office (SMO). It is headed by the Director of Lands.

The SMO is responsible for conducting land boundary surveys in Hong Kong. It is also the central authority for land surveys and the custodian of land boundary records in Hong Kong. The duties of SMO are diversified. On land boundary matters, SMO is responsible for carrying out land boundary surveys, and setting up of a central database system for keeping plans, reports and other boundary evidence.

The Land Survey Authority (LSA) is one of the key players under the Land Survey Ordinance. The core members include the Director of Lands and the Deputy Director of Survey and Mapping. The functions of the authority, as stated in Section 4 of the Land Survey Ordinance, include: 1) controlling land boundary survey standard, 2) maintaining land boundary records, and 3) advising the Secretary for Development (formerly known as Secretary for Housing, Planning and Lands) regarding allegation of disciplinary offences committed by ALSs.

The Hong Kong Institute of Surveyors (HKIS) has been the only professional organization representing the surveying profession in Hong Kong since 1990. It is incorporated under the Hong Kong Institute of Surveyors Ordinance (Cap 1148). The institute sets the standards for professional

services and performance, establishes codes of ethics and determines requirements for admission as a professional surveyor. The institute has six Divisions and one Young Surveyors Group, and the Land Survey Division (LSD) is one of the divisions and most of the members of LSD are ALSs and RPSs.

Heung Yee Kuk (HYK) is an important advisory body to the Government on New Territories' affairs. It has become a statutory advisory body under the Heung Yee Kuk Ordinance (Cap 1097) since 1959. As the representative of New Territories' residents, HYK strives for the rights and interests, and expresses the opinions of indigenous inhabitants of the New Territories. The functions and objectives of HYK are stated in Section 9 of the Heung Yee Kuk Ordinance:

> (a) to promote and develop mutual co-operation and understanding among the people of the New Territories;
> (b) to promote and develop co-operation and understanding between the Government and the people of the New Territories;
> (c) to advise the Government on social and economic developments in the interests of the welfare and prosperity of the people of the New Territories;
> (d) to encourage the observance of all such customs and traditional usages of the people of the New Territories as are conducive to their welfare and to the preservation of public morality; and
> (e) to exercise such functions as they may be invited to from time to time by the Chief Executive. (Amended 4 of 2000 s. 3)

The Cadastral Survey Consultative Committee (CSCC) was formed in 1992 with representatives from relevant professional institutions, the construction industry, academic bodies and the Heung Yee Kuk. The main

objective of the Committee is to provide a forum for the discussion of all matters relating to cadastral surveys in Hong Kong, including providing recommendation on any new working procedures that may be required and proposing related charges for services where applicable. CSCC will also advise the SMO on the clients' requirement and on the other hand, will provide information to the clients and the general public on the SMO's relevant working schedules in respect of the cadastral survey.

4.5 Land boundary records and evidence

Boundary records show the contemporary situation as well as the original land grant, which are indispensable in a re-establishment survey or subdivision survey. The records have been classified into two types: legal and extrinsic. Since there is no survey law, under the common law legal framework, all are subject to the best available evidence. Both the legal evidence and the extrinsic evidence have their influence on boundary determination.

4.5.1 Legal evidence and records

Legal evidence of the boundary, in particular in the urban area, can be regarded as land sales documents. They are general and special conditions, together with grant plans or land sales plans and lease plans (before 1984) if there are any. Also, the assignment plans, which are now replaced by Land Boundary Plans (Figure 4.3), are for subdivision purpose, if any are annexed or appended to the Deeds which are lodged in the Land Registry.

General and special conditions in the agreement for land grant provide

the information including the area and dimension of the lot, area to be formed and / or to be maintained, and right of way. The attached grant plans, which show the dimensions and area of the land in the form of a ‘Dimensioned Plan’, provide space for the signatures of grantor and grantee. Figure 4.4 is an example of an assignment plan and is also deemed as a grant plan in the case. The plan is crude as it only shows the graphical position of the parcels within the subdivided areas. This shows that people pay much attention to transactions rather than the accuracy of the boundary at that time.

A lease survey is an as-built survey, which is conducted after the leased parcel has been completely developed. The record of the lease survey is the lease plan (Figure 4.5). It shows the position and dimension of the lot, and supersedes the previous dimensioned plan, which is prepared in the initial land grant stage. However, after the amendment of the Conveyancing and Property Ordinance (Cap 219) in 1984, it states the effect that a Crown Lease shall be deemed to have been issued upon compliance with the conditions of grant, hence, a lease plan was rarely found after 1984.

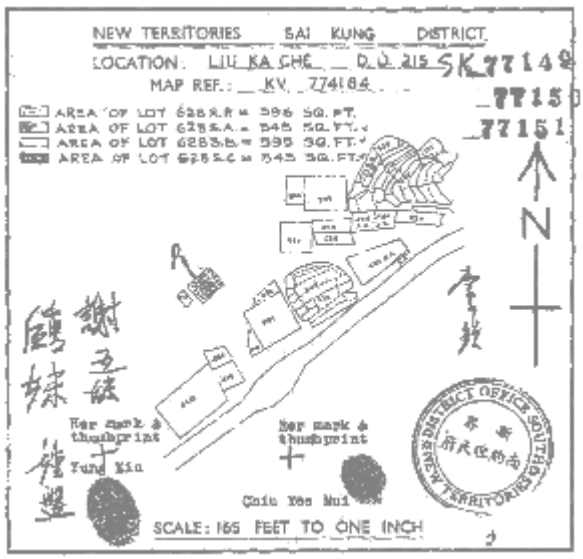


Figure 4.4 Assignment Plan
(© SMO, Lands Department)

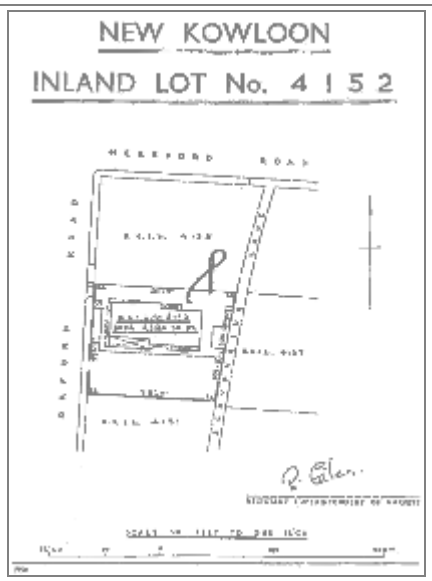


Figure 4.5 Lease Plan
(© SMO, Lands Department)

The first land boundary records in the New Territories are known as Block Crown Leases. They were established during the Demarcation District Survey during the period from 1899 to 1904, and still have legal effects nowadays. In 1905, the government made 477 Block Crown Leases covering the New Territories.

Block Crown Lease (BCL) or Block Government Lease (BGL) comprises three parts, viz. Indenture, Schedule, and Demarcation District Sheets. Indenture is the textual part of the lease that contains the text of grants and grant conditions. In the boundary clause, it is stated that a piece of land parcel is “more particularly delineated and described by the plan”. The information contained in the Schedule (Figure 4.6) includes the granted lot numbers in sequence, the serial number, the registered area in the unit of one hundredth of an acre, the description of the lot, the name and transliteration of the grantee, address, class and amount of rent and remarks.

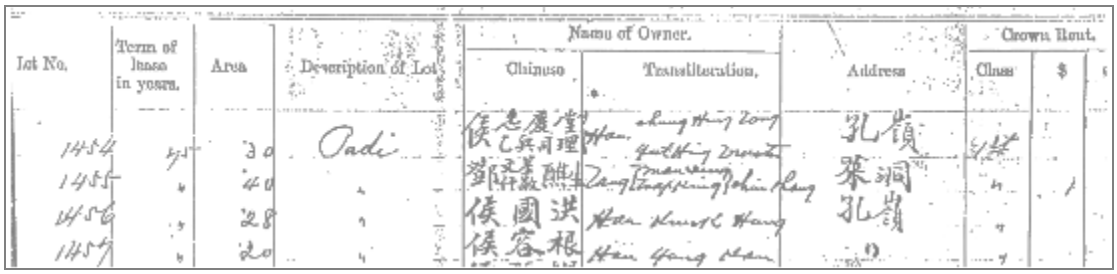


Figure 4.6 Schedule (partly printed, © SMO, Lands Department)

A Demarcation District (DD) Sheet (Figure 4.7), which is created by using a plane table mapping method, serves as the grant plan in relation to the Indenture of respective Demarcation Districts. The scales of DD sheets are 16 inches to 1 mile (1:3960) or 32 inches to 1 mile (1:1980).

Figure 4.7 1:1980 Demarcation District Sheet (partly printed, © SMO, Lands Department)

4.5.2 Extrinsic evidence and records

Extrinsic evidence most probably is the records that are not deposited in

the Land Registry but recorded in the SMO. These include old occupation and physical monuments, records of nearby surveys and information from the District Land Office (DLO) and District Survey Office (DSO). Some of the typical extrinsic records will be outlined as follows:

4.5.2.1 Pre-war records

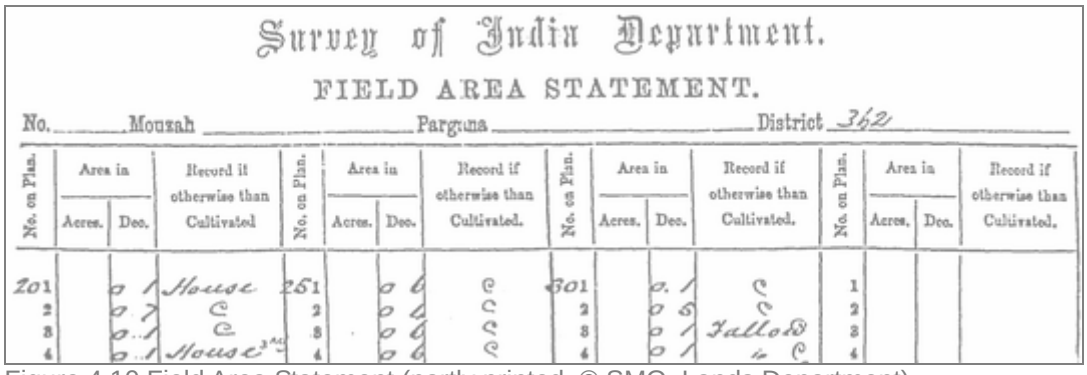
House Lot Plan (HLP) (Figure 4.8) is the product of the survey for village houses. Since the village houses were shown on the 1:3960 DD Sheets as cross-hatched blocks, as the supplementary to the DD sheets, a survey was conducted between 1909 and 1917, though it was not completed at the end. It is plotted at a scale of 1:600 which seems to be reasonably accurate; however, no reference control framework was introduced.

Demarcation District (DD) Control Sheet (Figure 4.9) is a copy of the re-traced DD sheet. Old new grants and subdivisions will be marked in red, while resumption / surrender will be tinted in yellow on the sheet. It was used by the former New Territories Administration (NTA) as a land record plan. However, from the large number of cases, it was discovered that the lot boundaries as shown on the DD Control Sheets did not match with the actual occupation on ground. The accuracy and reliability of the boundaries were low.

Figure 4.8 House Lot Plan (partly printed) (© SMO, Lands Department)

Figure 4.9 DD Control Sheet (partly printed) (© SMO, Lands Department)

Field Area Statement (FAS) is the record of the lot area which is extracted and calculated from the DD Sheets. The contents are then copied to the Schedule of the BCL. Since the lot area statement is the source, FAS becomes the basis of adjudication by the Land Court. Figure 4.10 is an example of FAS.



Survey of India Department.

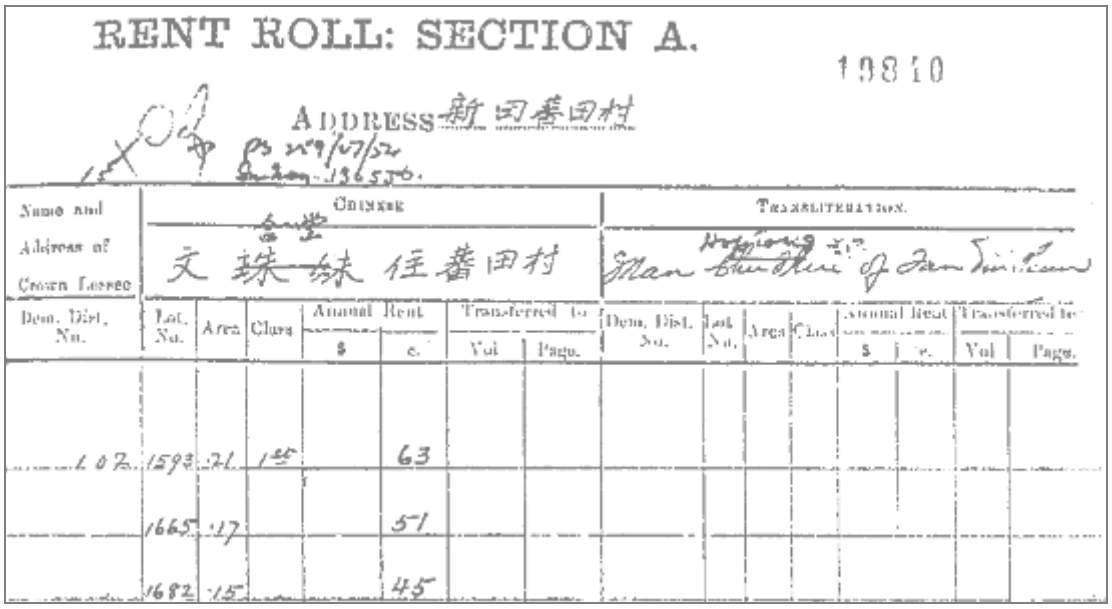
FIELD AREA STATEMENT.

No. _____ Mouzah _____ Pargana _____ District 362

No. on Plan.	Area in Acres.	Area in Dec.	Record if otherwise than Cultivated	No. on Plan.	Area in Acres.	Area in Dec.	Record if otherwise than Cultivated.	No. on Plan.	Area in Acres.	Area in Dec.	Record if otherwise than Cultivated.	No. on Plan.	Area in Acres.	Area in Dec.	Record if otherwise than Cultivated.
201		0 1	House	251		0 6	″	301		0 1	″	1			
2		0 2	″	2		0 4	″	2		0 5	″	2			
3		0 1	″	3		0 4	″	3		0 1	Fallow	3			
4		0 1	House 245	4		0 6	″	4		0 1	″	4			

Figure 4.10 Field Area Statement (partly printed, © SMO, Lands Department)

Crown (Government) Rent Roll (Figure 4.11), also known as ‘A’ Book, contains information such as DD and lot number, area, class, annual rent, which is useful for ascertaining the area and title to land.



RENT ROLL: SECTION A.

19810

ADDRESS 新田蕃田村

Name and Address of Crown Lessee

Chinese: 合堂 文珠妹 住蕃田村

Transliteration: Hoptong Man Chu Mui of San Tin Fan

Dem. Dist. No.	Lot No.	Area	Class	Annual Rent $	Annual Rent c.	Transferred to Vol	Transferred to Page	Dem. Dist. No.	Lot No.	Area	Class	Annual Rent $	Annual Rent c.	Transferred to Vol	Transferred to Page
102	1593	.21	15		63										
	1665	.17			51										
	1682	.15			45										

Figure 4.11 Crown Rent Roll (partly printed, © SMO, Lands Department)

4.5.2.2 Post-war records

'A' Sheets (Figure 4.12), 'B' Sheets, Preliminary Cadastral Survey Sheets and Cadastral Survey Sheets are known by a joint term "Cadastral Survey Sheets". It used contemporary survey sheets as the base map and carried out a correlation exercise with the registered land boundaries, and then performed field verification. It was a set of 1:1200 scale land records.

Figure 4.12 'A' Sheet (partly printed) (© SMO, Lands Department)

Figure 4.13 Green Key (partly printed)
(© SMO, Lands Department)

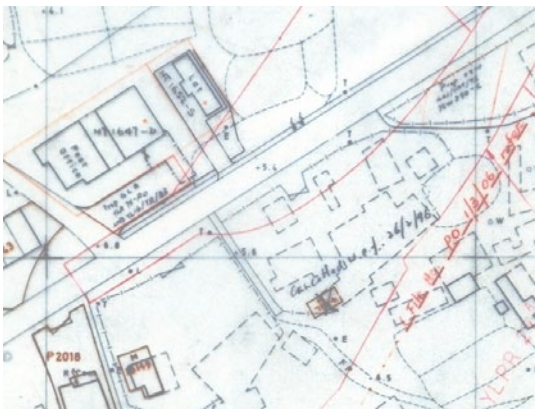


Figure 4.14 Black Key (partly printed)
(© SMO, Lands Department)

Blue Key, Green Key (Figure 4.13) and Black Key (Figure 4.14) are the correlation of the old scheduled lot boundaries by using DD Control Sheets, and enlarged to 1:1000. They are correlated to the metrication of basic survey maps, which is named according to the colour of the base map. The Green Key replaced the Blue Key for containing all permanent land holdings, and the temporary land holdings were recorded in the Black Key.

Aerial photos at different epoches could be served as the evidence to show the contemporary physical occupation and monuments. It helps to identify and locate the position of a parcel relative to other features in its vicinity. The earliest available photographs were taken in 1924. The early aerial photos did not cover the whole territory of Hong Kong and were produced discontinuously. A comprehensive set was made by the Huntings Air Survey Company in 1963, and now it is produced by the Photogrammetric and Air Survey Section of the SMO. Figure 4.15 is an example of aerial photos.

Figure 4.15 Aerial photo in Shek Kong (1972)
(© SMO, Lands Department)

4.5.2.3 Computerized records

Lot Index Plan (LIP) (Figure 4.16) and Land Status Plan (LSP) are both the output of the Cadastral Information System (CIS) on 1:1000 scale generally. LSP is for the government's internal use, while LIP is provided to the general public at a standard fee. LIP shows only the boundary and designation of lots overlaid on a basic survey map in term of graphical accuracy.

Figure 4.16 Lot Index Plan (partly printed, © SMO, Lands Department)

Survey Record Plan (SRP) is a plan that records all the survey data used

in a land boundary survey, such as land boundaries, survey evidence, traverse, and alignment. It shall be prepared for every land boundary survey in connection with defining land boundaries, and the specification of the plan is listed in the Code of Practice of the Land Survey Ordinance. Figure 4.2 is a sample of a Survey Record Plan.

For further information on land boundary records and sample plans, the author suggests the readers to visit the Hong Kong Cadastral System Page of the Department of Land Surveying and Geo-Informatics, The Hong Kong Polytechnic University (http://www.lsgi.polyu.edu.hk/cadastre/).

4.6 Reform in Hong Kong land boundary system

Hong Kong has strived to improve its cadastral survey system, especially in the recent decade. A Geographic Information System has been introduced, and is fully computerized to upgrade the system as well as the services. With the advancement of the Global Positioning System, it is now available for conducting boundary surveys in Hong Kong. Regarding the legislative aspect, the incorporation of clauses covering a determination of lot boundaries in the Land Titles Ordinance is one of the important milestones in upgrading boundary security.

4.6.1 Technical improvement

4.6.1.1 Hong Kong Satellite Positioning Reference Station Network

The Survey and Mapping Office of the Lands Department has developed a local satellite positioning system (GPS), known as the Hong Kong Satellite

Positioning Reference Station Network (SatRef). It has come fully into operation. The network consists of 12 Continuously Operating Reference Stations (CORS) and they are evenly distributed in Hong Kong (Figure 4.17). To control the standard of using GPS technology, specifications and practice guide for establishing GPS control stations for land boundary surveys are listed in the Code of Practice (Fourth Edition (Revised)) and can be downloaded on the SMO's webpage.

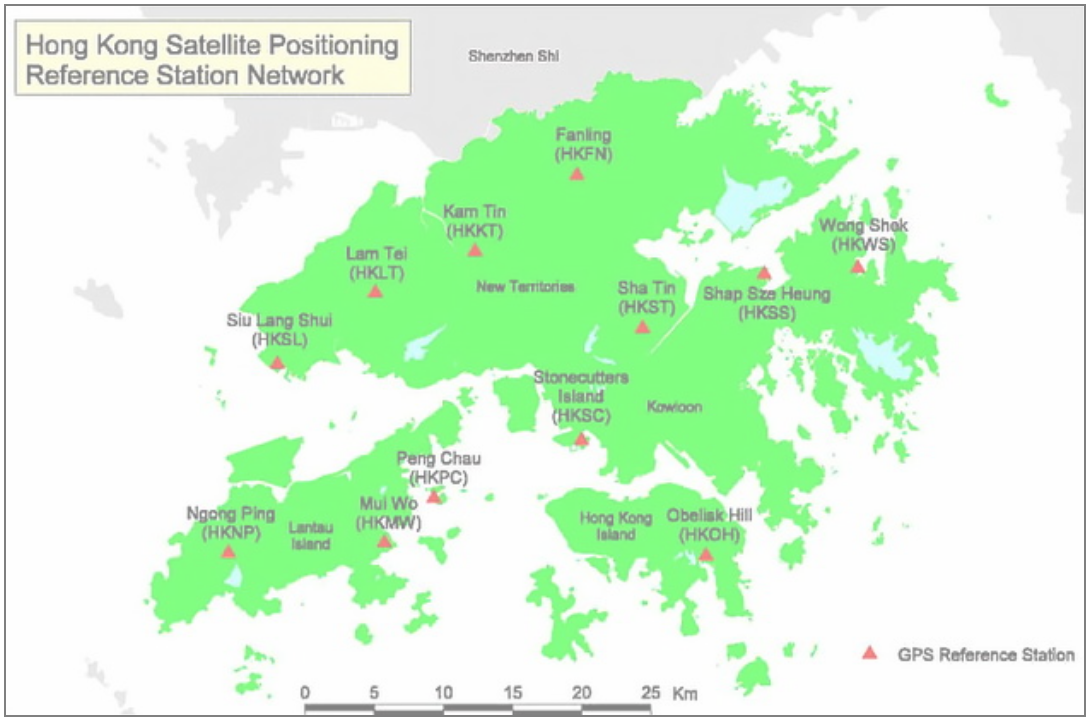


Figure 4.17 Hong Kong Satellite Positioning Reference Station Network (© SMO, Lands Dept.)

4.6.1.2 E-submission of surveying works

In accordance with the Land Survey Authority Circular No. 4/2007, the Land Survey Authority will now accept the surveyors' submissions in the form of electronic records under the Land Survey Ordinance. On land boundary survey matters, they can submit a duplicate of a land boundary plan and a survey record plan, which are signed and certified in the specified form.

Moreover, the report of calibration of survey instruments, filed notes and the survey report in relation to the land boundary definition can be submitted to the Land Survey Authority in the form of electronic records. All the submissions should be sent to the specified email address.

4.6.1.3 Survey Records Retrieval System

The Survey Records Retrieval System (SRRS) is a system used to retrieve all relevant records of any parcels or subdivisions at once. SRRS was introduced to District Survey Office / North (DSO/N) as a pilot scheme and was successfully implemented in August 2001. The system is now being adopted by other DSOs. There are three main functions of the system. The first one is to perform a comprehensive search of all scanned land boundary records in a particular district; the second one is to display, print or part-print images on various scales, and the third one is to perform the process of correlation of boundary with contemporary aerial photos on screen. SRRS provides a one-stop information search, which increases the efficiency of land boundary records searching.

The SMO has implemented several GIS projects in order to maintain the sustainable development of the cadastral survey system in Hong Kong. Some major ones will be highlighted as follows:

4.6.1.4 Data Alignment Measures

Data Alignment Measures (DAM) is led by the Development Bureau (formerly known as Housing, Planning and Lands Bureau). It provides a platform to align the exchange and sharing of geographic data among several

government departments. SMO, as a data provider and data agent, helps to revamp the existing computer systems, design and implement new workflow, convert, integrate, import and export geospatial data.

4.6.1.5 Data Dissemination System

The Data Dissemination System (DDS) is to facilitate the implementation of the DAM system. It is deemed to be the 2nd phase, which provides facilities for receiving, manipulating, integrating and distributing the Common Spatial Unit (CSU) data to the participating departments. It also provides e-ordering and e-delivery services for digital maps and land record data for the public and government departments.

4.6.1.6 Geospatial Information Hub

The Geospatial Information Hub (GIH) is a web-based information portal platform which integrates large amount of geospatial information from several government departments. The basis of the system is built on intelligent digital maps and aerial photographs that cover the whole territory of Hong Kong. The Hub is capable of dynamically delivering digital maps, aerial photographs and various types of integrated geospatial data, like transport, building, and environmental data etc. via the Government's Intranet for the government's internal use. The system is planned to be opened to the public at the end of 2007, and provides high-quality services by improving the availability and accessibility of geospatial information through Internet.

4.6.1.7 Integrated Registration Information System

The Land Registry introduced the Central Registration System in 2005.

To tie in with the operation of the system, an Integrated Registration Information System (IRIS), a computerised system, is implemented. IRIS provides a comprehensive support for internal registration functions. Furthermore, it delivers information services to the public over the internet as well as the Land Registry's search offices. The public can visit the IRIS website (http://www.iris.gov.hk/) to carry out searches of property records for property and order copies of land documents in digital formats.

IRIS is continuously upgraded and improved in order to increase the resilience of the system. As mentioned in the Land Registry News No. 26 (Land Registry 2007), the Land Registry has been working on a new round of enhancements to the IRIS for improving the functions and services of the system.

Table 4.1 shows the performance data between 2005 and 2007. By improving the Integrated Registration Information System, the time of registration and searching can be reduced while users and the demand for the system increase.

Enhancement	2005	2006	2007
Day of Registration	20 days	18 days	16 days
Time of Searching	20 minutes	18 minutes	15 minutes
Demand for online search	80%	85%	90%
Online search subscribers	446	555	620

Table 4.1 Performance statistics between 2005 and 2007 (© Land Registry)

4.6.2 Advancement in ordinances

There are many ordinances dealing with land, however, none of them has

given definitions or descriptions of land boundary matters until the enactment of the Land Survey Ordinance (Cap 473) in 1996. It can be regarded as a breakthrough in boundary security. In 2004, enactment of the Land Titles Ordinance (Cap 585) is another enhancement in security of boundary determination.

4.6.2.1 Land Survey Ordinance

Land Survey Ordinance (Cap 473, LSO) is the first survey-oriented ordinance which was enacted in January 1996. The ordinance seeks to provide a regulatory framework for the control of standards of land boundary surveys, and hence, another function of this ordinance is to provide for registration and discipline of land surveyors, i.e., Authorized Land Surveyor (ALS) engaged in land boundary surveys. Furthermore, the ordinance empowers the Director of Lands to be the Land Survey Authority who will have the duty to maintain land boundary records and to advise the Secretary for Development regarding matters relating to possible offences by ALSs.

Concerning boundary security, the standard of the land subdivision has been controlled and maintained. Land Boundary Plans have to be prepared for every survey in connection with defining land boundaries. The Land Registration Ordinance (Cap128) requires that a division of land be attached to the instrument for registration with the Land Registry and be deposited to the Land Survey Authority.

The by-law of the Land Survey Ordinance, the Code of Practice, provides regulations for controlling of land boundary surveys that are carried out under

the Land Survey Ordinance. Surveyors shall comply with the Ordinance as well as the regulations stated in the Code of Practice when conducting a land boundary survey. In the fourth edition (Revised) of Code of Practice, general principles for re-establishment of lot boundaries are added for maintaining the standard practice for re-establishment of lot boundaries. Since GPS technology becomes mature in land boundary surveys, specifications and practice guide for establishing GPS control stations for land boundary surveys have been included in the Code of Practice.

4.6.2.2 Land Titles Ordinance

In 2004, the enactment of the Land Titles Ordinance (Cap 585, LTO) represents another big step forward in boundary security. Section 94 of the Ordinance clearly declares that “determination” in relation to a boundary means adding the bearings, boundary dimensions and coordinates wherever applicable in the process of updating the boundary.

In the same section of the Ordinance, the requirements and the procedures of applying determined boundary are described specifically. The owner of registered land may make an application for a determination of the boundaries of a whole lot, or a portion of the lot after the rest of the lot has been surrendered to or resumed by the Government. Subsection parcel is not allowed to apply for determined boundary unless the subdivision of a lot is made by the Government or in a case where the application concerned does have the consent of all the owners of the lot.

The Ordinance provides a chance for the landowner to improve their

parcel's boundary security; however, the application is limited and the ordinance could come into force only at the end of 2010 at the earliest.

4.7 Comparison of three cadastral survey systems

Three cadastral survey systems have been briefly gone through in this chapter and the previous chapter, with respect to their characteristics and cadastral reform. A summary of these three cadastral survey systems is set out in Table 4.2. The table gives a clear and concise picture for making a comparison.

All of the three regions are practising common law, but it seems that the cadastral survey system of Singapore has an edge over the other two systems in relation to boundary security. In the Singaporean cadastral survey system, boundaries are defined in numerical, or in another term, coordinated, both of which are accurate and precise, and comply with the current social requirement. In addition, coordinated boundaries are protected by law, which provides a guarantee for security and ties in with the requirements for Titles registration. On the other hand, the Singapore Land Authority represents the government to carry out many strategic policies, viz. technological changes such as the introduction of SVY21 system and the establishment of the Integrated Survey Network, to improve the cadastral survey system for sustainable development.

In the English cadastral survey system, more importance is attached to land registration than land boundary survey. Unlike Singapore, there is no survey law in Britain governing boundary surveys at all. Fortunately, when

the Titles registration was implemented, the professions became aware of the significance of land boundary. Hence, a new boundary concept and a procedure for the determination of the exact line of boundaries were introduced in the Land Registration Act 2002. Although the British Government does not allocate a lot of resources to land boundary-related matters as compared with Singapore and Hong Kong, it has introduced the determination scheme and provides an opportunity for upgrading the boundary security.

Hong Kong's cadastral survey system was established on the basis of the English system and has drawn reference from other systems' characteristics. Hence, the policies dealing with land matters have been developed and adopted at a relatively late stage as compared with the other two systems. For example, titles registration was implemented in the early 21st Century in Singapore and Britain; however, Hong Kong will only start to adopt titles registration at the end of 2010 at the earliest. On the other hand, similar to the English cadastral survey system, there is no survey law governing and legalizing land boundary surveys in Hong Kong. The standard of subdivision survey has been controlled under the Land Survey Ordinance since 1996. Furthermore, the Code of Practice of the Land Survey Ordinance provides regulations for the purpose of control of land boundary surveys. Even though it is a bylaw, surveyors who conduct a land boundary survey are recommended to comply with these regulations as well as the Ordinance.

As Hong Kong's economy has undergone a restructuring with fast development of its services industry in recent years, the Hong Kong

Government has devoted a lot of resources to improve services and satisfy social needs. On land matters, Integrated Registration Information System (IRIS), Survey Records Retrieval System (SRRS), and Geospatial Information Hub (GIH) have been set up. All these technological changes are aimed at improving customers' services. Nevertheless, they cannot help to solve the problems in Hong Kong's cadastral survey system at root.

4.8 Chapter summary

Hong Kong's cadastral survey system as well as its reform has been briefly looked at in this chapter. There has been great improvement to the quality of services to meet customers' demands in recent years as a result of technological improvements. However, these improvements could not contribute to devise a solution to the problems in the system. Land boundary problems are technically record problems. As there is no survey law, land boundary surveys are conducted subject to the best available evidence. Unfortunately, boundary evidence varies in its accuracy and precision. The older the evidence, the poorer its quality and accuracy.

In the coming chapter, the author will use a real boundary survey case to demonstrate how these records bring about harmful effects to the system, and thereupon, underlines the imperative demand for a desirable mechanism to tackle the problems.

		Singapore	England	Hong Kong
Boundary Concept		▪ Fixed boundary (legal coordinated cadastre)	▪ General boundary ▪ Determined boundary	▪ Approximate plot boundary Approximate plot with a specific boundary
Parties involved in land boundary survey services		▪ Government - Singapore Land Authority ▪ Private - Registered surveyor registered under Land Surveyor Act (Cap 156)	▪ Private - Ordnance Survey - Chartered Land Surveyors	▪ Government - Survey and Mapping Office ▪ Private - ALS - RPS (LS)
Legislation				
1	Legal framework	Common Law	Common Law	Common Law
2	Land Registration and its relevant ordinances	▪ Deeds - Registration of Deeds Act (Cap 269) ▪ Titles - Land Titles Act (Cap 157) - Land Titles (Strata) Act (Cap 158)	▪ Titles - Land Registration Act 2002	▪ Deeds - Land Registration Ordinance ▪ Titles - Land Titles Ordinance (to be enforced at end of 2010)
3	Statutory rights on land boundary matters	▪ Legal Coordinated Cadastre - Boundaries and Survey Maps Act	▪ No survey law ▪ Determination of the exact line of boundaries - Land Registration Act 2002, S60 - Land Registration Rules 2003	▪ No survey law ▪ Subdivision survey - Land Survey Ordinance ▪ Determination of lot boundaries - Land Titles Ordinance, S94
Technological Improvement				
1	Registration	▪ INLIS	▪ LRD	▪ IRIS
2	e-submission	▪ CORENET		▪ LSA Circular no. 4/2007
3	GPS	▪ SiReNT		▪ SatRef
4	Geodetic Network	▪ ISN ▪ PLBM	▪ National Grid	▪ HK1980 Grid ▪ HKPD
5	GIS Projects	▪ SVY21 system ▪ JDS		▪ SRRS ▪ DAM ▪ DDS ▪ GIH

Table 4.2 Summary of three cadastral survey systems

CHAPTER 5

LAND BOUNDARY PROBLEMS IN HONG KONG

5.1 General boundary problems

Many professionals in the land surveying field have a common view that the present land boundary system in Hong Kong is beset with many problems, and sometimes they are quite fundamental. Some of them concern historical factors, some are contemporary technique factors and some of them are related to human behaviours. Just to name a few examples: poor quality and incompleteness of boundary records, inferior survey measuring equipment, low accuracy and precision of boundary plans and old coordinate system. However, the most serious problem the author of this thesis thinks is directly related to the determination of lot boundaries, that is, the common boundary of adjoining lots.

5.1.1 Boundary problems in urban area

In the urban area of Hong Kong Island and Kowloon, real estate developments are thriving. A typical life cycle of a building varies from 30 to 50 years. Not to mention historical or cultural records, the government at least has good survey records to trace the last development dated a few decades ago. There are minor boundary discrepancies in urban lots where lease survey has not been completed on some lots. The earlier the lots, the larger the area and the more chances of subdivisions; these early sectioning exercises could serve well for identification purpose but are insufficient to match the exact plan dimensions on ground.

5.1.2 Boundary problems in rural area

The New Territories, which was a rural area years ago, has developed new towns since the 1970's and is now home to a population of 3.2 million, out of the total population of 6.9 million in Hong Kong (CEDD, 2006). In new towns, the government has resumed village house land and the surrounding agricultural land, and has replaced them with new town lots, and then survey records are updated. For the old village and agricultural lots, these are the land classified as Old Schedule Lots and New Grant Lots. The basic land boundary records were established during the Demarcation District Survey period from 1899 to 1904. In 1905, the government made 477 Block Crown Leases covering the New Territories. Thereafter land sales were made piece by piece, and were termed New Grants.

As the New Territories was only a borrowed land within a limited time before Hong Kong was reunified with PRC in 1997, the previous New Territories Administration has no political interests to improve its crude land boundary records. Some serious area deficiency cases occurred. For example, in the Lintock Case (Lintock v AG, 1985), it was adjudicated that a registered 1.27 acres of agricultural lot was reduced to a 0.01 acre of house lot, and the Tam Mo Yin case (Tam et al v AG, 1995) showed a claim of 274,638 square feet of land in excess of the original land sale area of 966,130 square feet in 1931.

Now, the author will use a real boundary survey case to reveal the weakness in the system. Although only one case is studied, it has indeed covered most of the boundary problems that we can identify in the system.

5.2 Background to a boundary survey case

The parcel is located at Ping Che, and this case mainly covers section A of lot 1552 in DD 77. It is a new grant lot with a large and extensive area and a lot of subdivisions. There are eight surveyors involved in defining more than ten lots in the whole parcel. However, these various definitions have been in conflict with one other, particularly in the common boundary for the abutting lots. This case has encountered a range of boundary problems including overlapping, mismatching, disagreement with common points, and difference of surveyed areas and registered areas with an unreasonable percentage.

5.3 Information study

To conduct a comprehensive boundary records study, the author has traced back to the time when lot 1552 was first subdivided in section A (S.A) and remaining portion (RP), and closely tracked the subdivision of S.A for intensive study.

The author has also assembled all land boundary records from the Land Registry (LR) and the Lands Department (LD). More than a dozen types of boundary records with plenty of plans and evidence have been studied, including the Demarcation District (DD) Sheet, grant plans and documents, various assignment plans, old aerial photographs, contemporary survey sheets, the Short Term Waiver (STW), survey records and other land records plans such as Field Area Statement (FAS). In analyzing these inextricable boundary records, the author attempts to evaluate the reliability of these records, and figures out the reasons for the conflicting contents as far as

possible.

Furthermore, with the cooperation of an Authorized Land Surveyor, Prof. Shou Chun (SC) Leung, a field survey was conducted at the end of 2004, which was aimed at mapping out the existing ground features. Prof. SC Leung, agreeing with other surveyors, has verified that the features remain unchanged over past decades.

5.4 Boundary problems encountered

In this case, boundaries first appeared on the records were usually in a graphical form. It might be upgraded to a numerical form after a surveyor's survey, but sometimes the numerical boundary was obtained by digitization or a doubtful survey original. For brevity reasons, short forms such as lot A1 and lot A2 will be used to annotate respectively, for example, the subsection 1 of section A of lot 1552, the subdivision 2 of section A of lot 1552, etc.

Lot 1552A has been subdivided into A1, A2…to A7 and RP, and some of these sections have been further subdivided. Figure 5.1 illustrates the integration of boundary definition / redefinition by surveyors upon the requests by the particular owner(s) in lot 1552A and the surrounding related parcels. According to the figure, topology and shape of lots are maintained but common boundary rules, except one (i.e., Surveyor H), seem to be abrogated. Abutting lots within lot 1552A are either overlapping or gapping for 1 to 2 metres. Boundary disputes, in particular encroachment, are unavoidable among these land parcels.

With reference to Figure 5.1, numerous boundary problems have been observed. These problems will be discussed one by one will the assistance of diagrams if necessary.

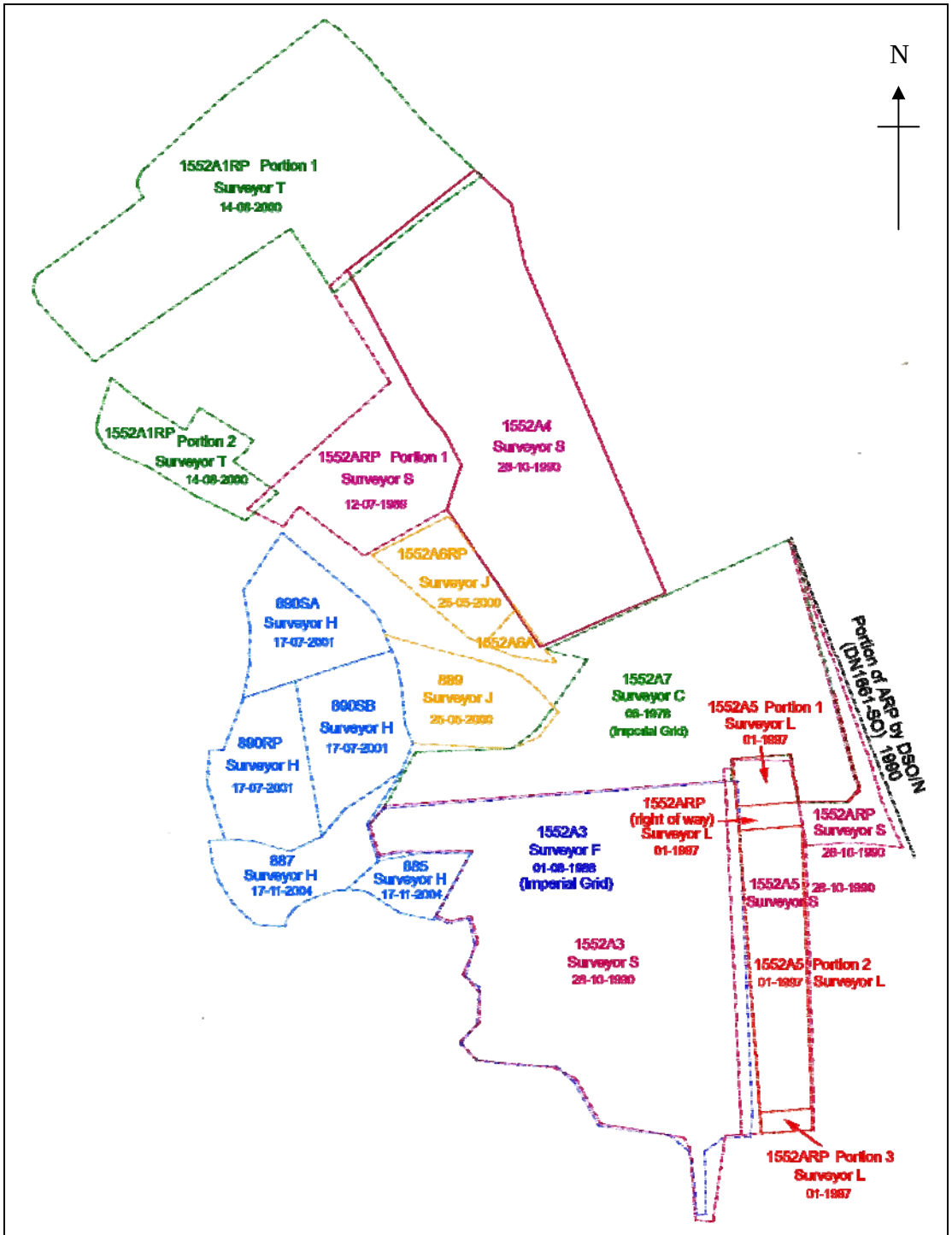


Figure 5.1 Integration of various surveyors' definitions vary with time in lot1552A in DD77

5.4.1 Overlapping

I. Constant Shift (1552A1RP v 1552ARP portion 1 & 1552A4)

Lot 1552A1 was firstly subdivided into lots 1552A1A and 1552A1RP (segregate into 2 portions) in early 1973. Lot 1552A1RP had not been redefined until mid-2000 by Surveyor T. According to his Survey Record Plan (SRP), boundaries were defined after taking the field situation into account.

Lot 1552A4 was initially carved out in mid-1973. Its dimensions were shown in the plan attached to Memorial no. 175009. In October 1990, Surveyor S defined this parcel in coordinates. One year before that, July 1989, lot 1552ARP portion 1 was defined by the same surveyor. As both lots 1552A4 and 1552ARP were defined by only one surveyor, the common boundary between these two abutting lots was maintained.

However, there is an overlapping among lots 1552A1RP, 1552ARP and 1552A4 (please refer to shaded area in Figure 5.2). The overlapping in both of the portions of 1552A1RP seems to have a same amount of encroachment, i.e., a constant shifting. No particular merits could be found from either of the surveys and it is difficult to determine which definition is correct. The discrepancy has been left behind without any authorized amendment.

II. Arbitrary encroachment (1552A7RP v 889)

The first carving out of Lot 1552A7 (in 2002, part of the parcel area of lot 1552A7 was resumed, and the designation became lot 1552A7RO) was shown in the subdivision plan of 1552A7, which was done by Surveyor C in

imperial coordinate system in June 1978. There seemed to be no more redefinition of this subject lot until early 2005, which was done by Surveyor L.

Boundaries of lot 889 were scaled off and set out by Surveyor T in mid-2000. However, as seen from Figure 5.3, part of this parcel (shaded area) is overlapping with lot 1552A7RP. Both surveys contain some technical problems, i.e., imperial system for 1552A7 and Surveyor T did not follow the rules of "first committed boundary" principle. Discrepancy exists but nobody bears the responsibility.

Figure 5.2 Overlapping in between lots 1552A1RP and 1552ARP and 1552A4

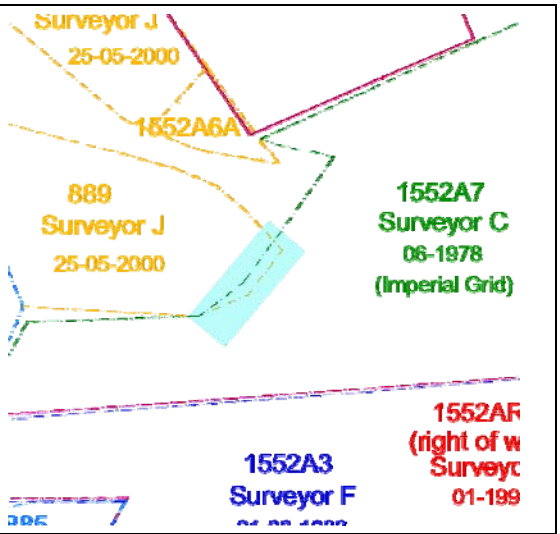


Figure 5.3 Overlapping in between lots 889 and 1552A7

5.4.2 Gapping

In addition to overlapping, gapping is another unavoidable phenomenon happened in this case. With reference to Figure 5.4, there is a gap in between lots 1552ARP portion 1 and 1552A6A. Furthermore, there seems to have a constant gap in between lots 1552A4 and 1552A7. According to normal practice, the latter one shall take into consideration the common

boundary if the abutting lot(s) was defined by another land surveyor or the Government. All these unclaimed areas resulted from overlooking the importance of common boundaries and overemphasizing individual surveyors' personal points of view.

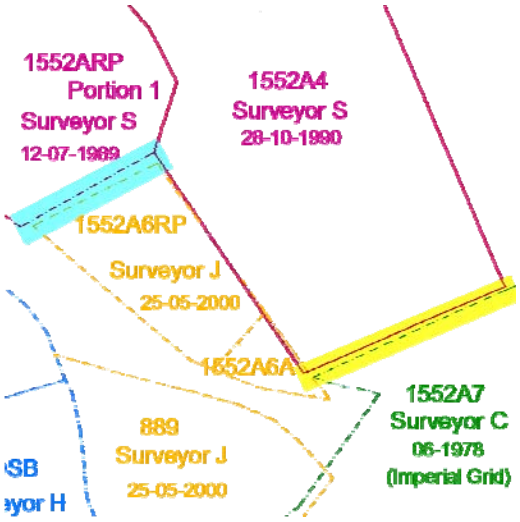


Figure 5.4 Gapping in between lots 1552ARP portion 1, 1552A4, 1552A6 and 1552A7

5.4.3 Confusion of land boundary records

For lot 1552A3, there were 3 memorials registered consecutively within several months in 1971. The first two plans (please refer to Figures 5.5 and 5.6) contained an identical content showing an area of approximately 80,000 sq. ft. The third plan, as shown in Figure 5.7, showed two dimensions and an area of about 67156 sq. ft. Confusion has arisen. As the third plan seems to contain more details for rectifying the earlier ones, this plan with Memorial no.169016 is adopted.

Figure 5.5 Subdivision grant plan of lot 1552A3 (M/N 168006) (© SMO, Lands Department)

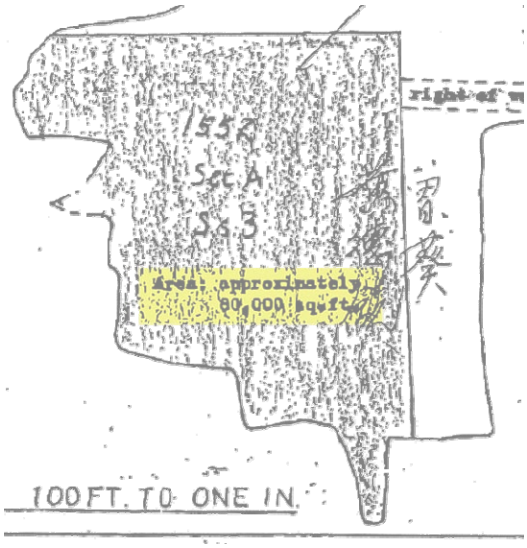


Figure 5.6 Subdivision grant plan of lot 1552A3 (M/N 168153) (© SMO, Lands Department)

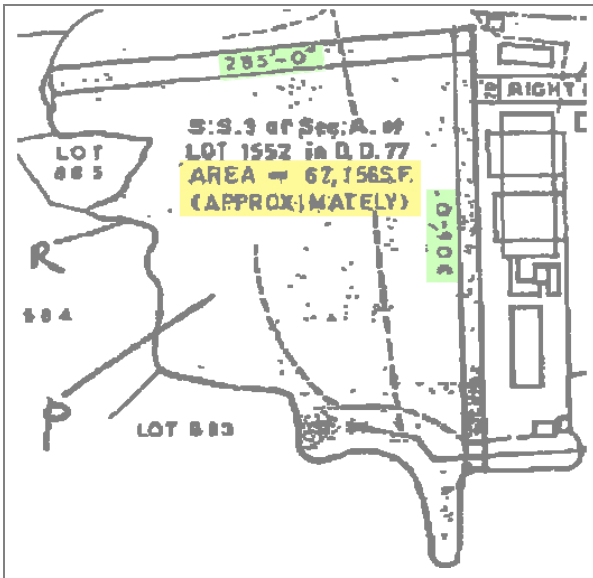


Figure 5.7 Subdivision grant plan of lot 1552A3 (M/N 169016) (© SMO, Lands Department)

5.4.4 Mismatching for same parcel definition

Lot 1552A3 was defined in coordinates by two parties, Surveyor F in 1988 and Surveyor S in 1990. In Surveyor F's definition, a common boundary with adjacent lot 1552A7 was retained and the surveyed area was 1.1% smaller than the registered area. On the other hand, under Surveyor S's definition, most of the boundary data differed not much, as compared with

Surveyor F's definition. However, there is a discrepancy in the eastern boundary and the peninsula in the southern part (see Figure 5.8). According to their survey plans (Figures 5.9 and 5.10), Surveyor F's definition of this peninsula seemed to have been following the old field bunds as compared with old boundary records, whereas Surveyor S's definition appeared to have been of an arbitrary nature. Hence, Surveyor F's definition sounds more reasonable. Moreover, the surveyed area defined by Surveyor S was even smaller as compared with Surveyor F's one (4% smaller than the registered area). The cause of this deficiency, as seen from the figures, is due to the inward shifting of the eastern boundary. When the same parcel is refined, it may result in different definitions. It shows that an unprofessional boundary definition system indeed exists in our industry.

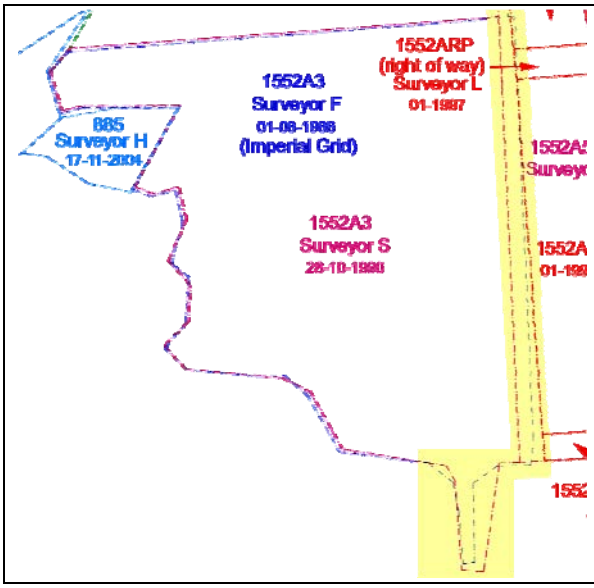


Figure 5.8 Overlaying of boundary definitions by different surveyors of lot 1552A3 in DD77

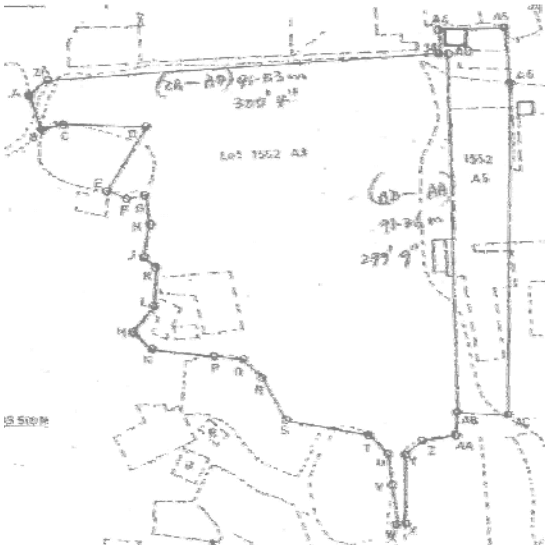


Figure 5.9 Dimension Plan of lot 1552A3 by Surveyor F (© SMO, Lands Department)

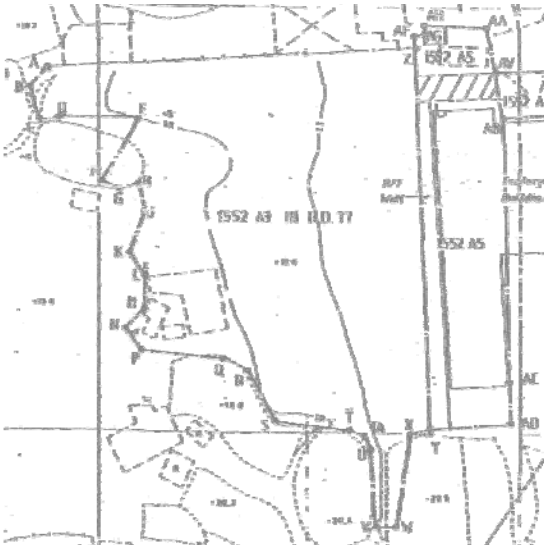


Figure 5.10 Dimension Plan of lot 1552A3 by Surveyor S (© SMO, Lands Department)

5.4.5 Dimness of common boundary

Referring to the end-2004 Lot Index Plan (Figure 6.11), lots1552A3 and 1552A5 are treated as one parcel. By tracing back the boundary records, lot 1552A3 was carved out in 1971, and lot 1552A5 was carved out in 1977. In 1989 Surveyor S defined both lots, and one year afterwards, lot 1552A5 was set out by the District Land Surveyor with plan no. DN1662-SO. Unfortunately, this plan was voided, and the boundary of lot 1552A5 was left undetermined. In 1997, Surveyor L defined the common boundary between lots 1552A3 and 1552A5 and the plan was deposited in the District Survey Office North. Unfortunately, up to now, the common boundary between lots 1552A3 and 1552A5 is still being questioned.

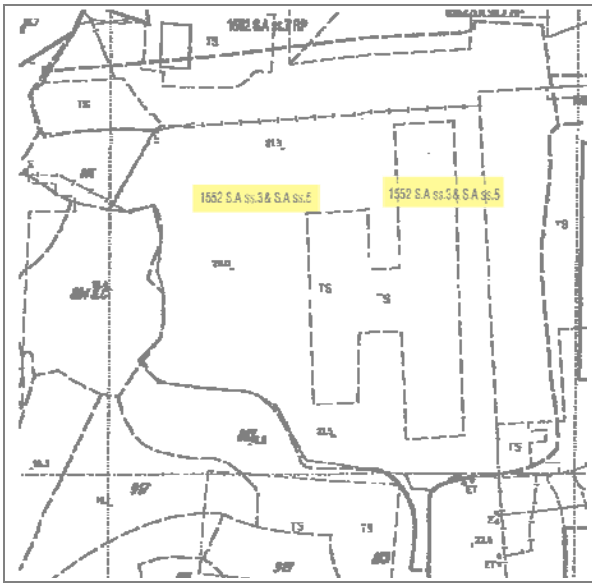


Figure 5.11 A portion of Lot Index Plan of lot 1552A (dated 13-12-2004) (© SMO, Lands Department)

5.4.6 Misinterpretation of boundary definition

According to the oldest grant plan of lot 1552A5 with Memorial no. 183791 (Figures 5.12a and 5.12b), lot 1552A5 consisted of two portions, which was separated by a right of way or easement. Someone might argue that a right of way was normally an area to be included in a lot that enclosed it. However, this case was obviously a different one because of two reasons:

1) the granted area was 13,600 sq. ft, which is equivalent to the summation of two graphical portion areas as originally dimensioned;
2) the lot (coloured in pink) is different from the right of way (coloured in yellow)

In Surveyor S's definition in 1990 (Figure 5.10), lot 1552A5 is a block shape without any separation as well as the right of way. Thus, the surveyed area will definitely be mismatched with the grant area. A disastrous cost might be incurred and would impair his reputation as a result of misinterpretation.

Figure 5.12a Subdivision Plan of lot 1552ARP into 1552A5 and 1552ARP (original) (© SMO, Lands Department)

Figure 5.12b Subdivision Plan of lot 1552ARP into 1552A5 and 1552ARP (coloured) (© SMO, Lands Department)

5.4.7 Excessive area in unreasonable manner

The grant area of lot 1552A6, which was initially subdivided, was 5,585 sq. ft. Amazingly, Surveyor J subdivided the lot 1552A6 into 1552A6A and 1552A6RP in mid-2000. The surveyed area was considerably larger than the registered area (more than 30% of granted area). On the other hand, lot 1552A1RP, which was defined by Surveyor T a few months later, also produced a similar result. The surveyed area was 27% in excess, as compared with the grant area.

All these survey plans had been accepted by the Lands Department, and the subdivision plan of lot 1552A6 had been registered (a "®" symbol shown in the plan number). When the author studied this case, he discovered that the final reduced area did not match with the summation of lot 1552ARP. Taking into consideration the above phenomenon, the author cannot help but sighs with regret for this unsatisfactory system in our industry.

5.5 Analysis of the problems

Given these land boundary problems, we perceive that the cause is mainly related to the mismatching between precise contemporary survey accuracy and rough land boundary records. No matter how precise the surveyors could define for the lot boundaries, ambiguous grant plans with low accuracy would always lead the surveyors to perform an imprecise interpretation. In addition, surveyors shall adopt the common land boundary previously surveyed. They should not just focus on the existing features, unless they could prove that the previous boundary definition is wrong. This is what we call the “first committed boundary” principle. However, given the above mentioned problems, we observe that some of the surveyors have disregarded other surveyors’ boundary definitions. They have defined the lot boundaries at their convenience, and sometimes they have to accommodate the registered area.

Another reason is that the surveyor may not conduct a comprehensive study, i.e. he has not studied all the abutting parcels records and evidences before making a final decision. According to rules, they shall do a thorough study, but not all the surveyors perform this step in reality. If the subject lot contains many surrounding lots, it is necessary to put in much effort and resources to investigate. In Hong Kong, if the parcel has survey records, it may be deposited in the SMO and filed in a folder named Computation Folder. Surveyors can go to relevant District Survey Office (DSO) to search for the wanted lot information, as decided by him. A fixed fee will be charged for exploring each Computation Folder, and a copying fee will be charged separately. This is time consuming and the searching fee will be

considerable if the task involves many abutting lots.

The current SMO in Hong Kong is responsible for keeping the plans, reports and other boundary evidence only after a boundary survey takes place. Surveyors who conduct a boundary survey for a parcel have to investigate the whole parcel's information each time, since all the records are only deemed to be for reference only without any legal sanction. Furthermore, it has been found that there is not any complete boundary information check according to the current practice. All these problems have identified room for improvement in the system: there is a need for a central registration mechanism. Taking Land Survey Authority in Singapore as an example, a surveyor needs to register for his resultant plan in the Central Authority after he has conducted a survey. The staff will then inspect the submitted survey tasks and approve the plan under the supervision of the Chief Surveyor. If the plan is accepted, it will be updated as the boundary register. If redefinition of the same parcel is carried out, the boundaries shall be defined according to the surveyed information. All these information is provided by this Central Authority, but not decided by the surveyors themselves. However, the legal liability of the plan should be borne by the surveyor who signs and certifies the plan. A correction of plan with superseding power should also be operated in coordination.

5.6 Case summary and brief conclusion

To sum up, from the micro perspective, surveyors shall adopt the "first committed boundary" principle, whereas from a macro perspective, the practice is undesirable if we still adopt the inaccurate result of Demarcation

District survey. It is unacceptable to have such discrepancy in boundary definition in terms of metres in the present technologically advanced metropolis. Records and boundaries are problematic; hence it is necessary to introduce the determined boundary system, among other things, to fix the common boundary problems. The Survey and Mapping Office shall reform their record-keeping policy, and establish a central depositary and registration system for updating boundary records and improving survey accuracy. This is deemed to be the first step towards addressing this very important issue.

CHAPTER 6

DETERMINATION OF LOT BOUNDARIES IN HONG KONG

6.1 Scope of investigation

In the previous chapters, the author has briefly outlined three similar land boundary systems in Singapore, Britain and the Hong Kong Special Administrative Region. This chapter will go further to investigate whether it is suitable for Hong Kong to implement the determination of lot boundaries, in particular, legal numerical coordinates of boundaries. It will first discuss the feasibility and immediacy of the implementation of the determination of lot boundaries. Then, it will look at the pre-requisites for implementing the determination of lot boundaries and the relating cost and benefits. This chapter will be ended up with making some recommendations for implementing the boundaries determination; some of them are related to its procedures whereas some cover its applications.

6.2 Implementing determination of boundaries in Hong Kong

Boundary is an invisible line. In the past, lot boundary was described as a physical feature to mark the extent of the area possessed by the landowner. It was represented by a fence, wall, hedge or other similar physical features. With the development of cartographic technology, a boundary is described on a plan in the form of graphics, which is regarded as a mathematical boundary. Bearing, distance, and area are further computed and added in numerical or digital form. It is a kind of determination of lot boundaries, which upgrade a precise boundary description as compared with the former one. It is a global trend that reflects the advancement of development.

Hong Kong is a place with leasehold land grant. Land transactions have been registered under deeds registration via the Land Registration Ordinance (Cap 128) since 1844. However, transactions with attached plans were not compulsory in the early years. Even though there was an attached plan, the precision was doubtful due to poor surveying accuracy and old geodetic network. This is not good enough to serve the contractual purpose initially, and is certainly inadequate to match the current development. It would sometimes make the landowners confused and embarrassed. Determination of boundaries would certainly give a ray of hope in addressing the issue.

On the other hand, titles registration was introduced under the Titles Registration Ordinance (Cap 585). A precise description of parcel boundaries encourages guarantee in titles, and hence, a well-defined determined boundary system is an outfit for a comprehensive, secured Titles Registration System.

Furthermore, as discussed in the last chapter, i.e., Chapter 5, the weakness in our land boundary system mostly concerns with the record problems. A legalized numerical boundary definition will help to solve the perplexing problem, minimize the disputes and discrepancies and enhance the boundary security.

In the old days, boundaries of Old Schedule Lots were defined for the purpose of rent collection. Relatively simple survey methods were used to make a rough determination; hence the boundary was determined at an

accuracy level within a few metres. This was fine in an agricultural community; however, nowadays, people are building houses in the New Territories. This requires land measurements with an accuracy within a centimetre level. In addition, in the survey case cited in Chapter 5, the owner of lot 1552 Section A, subsection 4 (1552A4) sued the owner of lot 1552 Section A, subsection 7 Remaining Portion (1552A7RP) for trespassing his land by one foot (as seen in the letter from solicitor dated 25th of November, 2004 in Appendix B). This case reveals that metre-level accuracy could not satisfy people nowadays. As there are growing demands for more accurate measurements, a precise boundary definition mechanism, which serves to improve the boundary security, is necessary.

6.3 Pre-requisites and feasibility for implementation

To practise the determination of lot boundaries, an accurate and precise land boundary plan is indispensable. To achieve this standard, several essential elements, including precise geodetic control, high accuracy survey instrument, and professional human resources, are needed.

6.3.1 Well-developed geodetic network

The accuracy of a survey hinges on the control network and a survey precision cannot be more accurate than the precision of a control network, and hence the geodetic network plays an important role in determining lot boundaries. In Hong Kong, a survey control network is maintained by the Geodetic Survey Section of SMO, Lands Department. The horizontal network, known as HK80 Grid system, is in millimetre (mm) unit and it can achieve up to the mm level of accuracy in its relative positioning. The

leveling network is referred to the Hong Kong Principal Datum (HKPD), which is precisely surveyed by SMO and can be achieved up to the centimetre (cm) accuracy level.

With the mature development of GPS technology, Hong Kong 2000 GPS Control Network has been established and implemented. There are 46 control stations together with 12 continuous operating reference stations (CORS) in the Satellite Positioning Reference Station Network (SatRef). According to an anonymous government officer, the precision of SatRef can reach up to 1-2 cm error in the maximum.

6.3.2 Highly accurate survey instruments

With the growing sophistication of techniques over the past decade, the surveying instruments, i.e., Total Station, can now achieve up to mm-level accuracy. The accuracy is about +/- 2-5 mm + 1-3 ppm. On the other hand, GPS is now being adopted as land boundary positioning. Real Time Kinematics (RTK) method provides real time positioning and no further post-processing computation is required. The accuracy can be achieved up to cm-level, depending on various factors, such as the number of satellites available, geometry distribution, and communication between the reference station and router.

6.3.3 Professional land surveyors

The Hong Kong Institute of Surveyors (HKIS) has been the sole professional organization representing the surveying profession in Hong Kong since 1984. There are approximately 200 corporate professional members

in Land Surveying Divisions, and about a quarter of them are registered as Authorized Land Surveyors (ALS) under the Land Survey Ordinance (Cap 473). According to the list of practising authorized land surveyors 2007, 38 ALSs are currently practising in the private sector.

Meanwhile, The Hong Kong Polytechnic University and other universities have started their degree courses in land surveying and related fields. The Department of Land Surveying and Geo-Informatics of the Hong Kong Polytechnic University is dedicated to the training of young land surveyors with the first batch of students graduated in 1994. With the cooperation of the HKIS, the government and the professional industry, it is possible to work towards the implementation of the determination of lot boundaries. It shows that Hong Kong can afford to handle the determination of boundaries in terms of human resources.

6.3.4 Protection by law

Hong Kong has the necessary geodetic network, techniques and human resources to implement determined boundary. However, these are only technical factors. To fully implement the determination of lot boundaries, law protection is required. Under the contract law system, ordinances are authoritative; however, Hong Kong is weak in boundary security. Both the government and land surveying professionals are undertaking to tackle this weakness although law amendment usually takes a long time to accomplish. Determination will be affirmative if it can be conducted under the protection of statutory sanction.

6.4 Cost and benefits

"Cost and benefits" is one of the paramount topics for decision making. It usually acts as a decisive element for formulating a policy. To establish and implement the determination of lot boundaries, we shall take into account the ensuing cost and benefits.

6.4.1 Cost

To practise the determination of lot boundaries, it only requires a little change in the current form of boundary survey processing, but it is necessary to change the perception of the value of surveys. As discussed above, Hong Kong possesses the technical elements for implementing the determination of lot boundaries. Apart from the time cost, the drafting of legislation will incur substantial cost. Both law amendment and the enactment of new laws take a long time to accomplish, and many professionals will be involved. This involves a massive amount of resources, such as manpower, money and techniques.

6.4.2 Beneficial outcomes

The introduction of a determined boundary mechanism is advocated because it brings various benefits to the land boundary system. These benefits are classified into four main aspects: reduction in boundary disputes, upgrading of boundary security, permanent and legal boundary and enhancement of common boundary.

6.4.2.1 Reduction in boundary disputes

Generally speaking, the most serious problem to land owners is

boundary disputes. The cost of resolving a boundary dispute ranges from almost nothing to more than several million dollars (assuming the dispute is resolved at the Court of Final Appeal and a large area of the subject lot is involved). In addition to cost, time is another factor. To resolve a boundary dispute case, it may take several hours for a negotiation among land owners themselves, or take several years if the matter is taken all the way to the court, for example, appeal against judgments. Furthermore, land owners dealing with boundary disputes may incur other costs such as serious emotional and psychological strain and illness.

The main cause of boundary disputes, the author thinks, is the lack of precision of boundary determination. Charleboi (2003) said that if the locations of the boundaries are known, there can be no boundary dispute. Although this is an assumption, the author thinks that, if the locations of the boundaries are precise with known value, e.g., shown as coordinates, boundary disputes will be reduced substantially, and will be minimized.

6.4.2.2 Upgrading of boundary security

Another main advantage of a determined boundary system is to increase the security of the boundary. Assuming that there are two parcels, lot A and lot B, they are found to overlap after all the relevant contemporary records as studied. If lot A is the one whose boundaries are being determined, and the resultant land boundary plan (LBP) could be registered in the Land Registry under the relevant ordinance, then the boundaries of lot A will have a priority over lot B, which is only counted as an approximate plot boundary in the legal sense. This is because in Hong Kong, all boundary records are prime facie

evidence, which do not carry any legal status. Hence, the boundaries of lot A will take precedence over the boundaries of lot B, as the registered land boundary plan has a legal status. The security of the boundary is thus upgraded.

Furthermore, if every lot boundaries are precisely defined, it would help to prevent crimes of land theft, such as adverse possession (the occupation of land in a manner inconsistent with the rights of the true owner).

6.4.2.3 Permanent and legal boundary

As boundary, boundary dimensions and coordinates are added to the land boundary plan, the determined boundaries on the resultant land boundary plan would become precise boundaries. Even if the physical occupation boundary has been removed, skilful surveyors can re-construct the lot boundaries according to the land boundary plan.

In England and Wales, a determined boundary is a legal boundary which is authorized under LRA 2002. Under the Contract Law system, it is necessary and important to implement a determined boundary system with a legal sanction. The existence of a legal boundary can solve most of the boundary dispute problems.

6.4.2.4 Enhancement of common boundary

All the land boundaries in Hong Kong are defined by the government. Registered Professional Surveyors (RPS) and Authorized Land Surveyors (ALS) function only to re-establish the lot boundaries and express them in

bearings and distances, relating boundary co-ordinates to the current coordinate system. Since mid-1995, after the enactment of the Land Survey Ordinance (Cap 473), subdivision of a parcel has been defined by an ALS. As our boundary records are old and many of them have been left prior to the Second World War and buried during the Japanese Occupation, incompleteness of boundary records becomes unavoidable. This results in different interpretations by various professional surveyors. Overlooking of common boundary seems to be the most serious problem.

If a determined boundary system is introduced, a boundary could be determined with its legal statue and bearings, boundary dimensions and coordinates being added as supportive information. This would result in unification of the common boundary with a certain precise specification. Thus the common boundary would become a unique boundary and the problems can be readily solved.

6.5 Recommendation on determined boundaries

It has been demonstrated that the determination of lot boundaries would be conducive to upgrading the land boundary system, especially in terms of land boundary right. However, under the current legal mechanism, determined boundaries are only at a proposed stage and there is much room for the government, industries and institutes to cooperate and make more efforts to tap its potential.

The relevant clauses of determination of lot boundaries as stated in the Land Titles Ordinance (Cap 585) bring a limitation in application, and cannot

truly reflect its protection for land boundary rights. The recommendations made below have taken into account foreign legal systems that may help to patch up the current law with a view to improve boundary security.

6.5.1 Land Boundary Plan as registered boundary plan

According to Section 94 of LTO, application for determination of lot boundaries requires an updated land boundary plan. This plan can either be prepared by the Director of Lands ("existing plan") or prepared and certified by an authorized land surveyor ("new plan"). However, the plan itself does not have any official recognition.

According to current practice, if a boundary survey is conducted by an ALS, he is required to deliver a land boundary plan to the Land Registry for registration under the Land Registration Ordinance (Cap 128) and deposit a duplicate copy to the Land Survey Authority (LSO Sec. 30(4)). This plan is only treated as one of the evidence of the parcel without a legal sanction. Upgrading the land boundary plan as a registered plan together with the superseding old plans will produce several positive outcomes.

Firstly, it reduces bulky and complicated contemporary plans and improves both the precision and accuracy. Leung (Leung 2007) said that an accumulation of plans without a hierarchy is adding confusion to the boundary definition, and the lack of a final plan is really the crux of the problem. Hence, if the latest land boundary plan, which is prepared by ALSs or the Director of Lands, is admitted as the unique legal boundary plan and supersedes the previous ones, most of the land boundary problems could be solved readily.

The plan also helps to settle both implicitly and explicitly retained problems in the old records.

Secondly, a statutory boundary plan ties in with titles registration. A statutory boundary plan with high precision supersedes the old plans of the parcel, as a result, statutory boundaries could be established. All land boundary rights are reflected in this plan which is equivalent to the mirror effect of titles registration. It can also supplement with the curtain principle of titles registration. The public could search and ascertain the latest updated plan rather than a sequence of contemporary plans. It is simple, convenient and time saving.

In Singapore, boundary plans are protected by law. Section 13 of the Boundaries and Survey Maps Act (Cap 25) states that a map is conclusive evidence in all courts of the boundaries of the land, comprised in every land shown, until it has been declared to be superseded. Hence, the legal sanction of boundary (in terms of plan) provides an absolute authority. It is a valuable reference for Hong Kong to legislate on the issue and there is no dispute that a statutory boundary plan could assist with the determination of boundaries.

Everybody would agree that if the procedures and end-products of a land boundary survey are protected by law, it will definitely provide the highest degree of boundary security. This could be the best approach for conducting land boundary survey. This policy is regarded as a kind of legal Cadastre, and Singapore is a typical example adopting this practice. It is desirable and

feasible for Hong Kong to follow in the footsteps of Singapore with the HKSAR Government taking a lead in reviewing and updating the boundary laws. Looking at the current situation in Hong Kong, however, there remains a long way to o before some headway could be made in enacting or amending relevant laws in Hong Kong.

Under the Common Law system, to fit in with the demand of Hong Kong, authorizing a legal sanction on the end-products only, i.e., the resultant land boundary plan, can also help to improve boundary security.

6.5.2 Application extending to Land Registration Ordinance's land

The determination of lot boundaries as stated in Section 94 of LTO only applies to land that has been brought under the LTO ("New Land"). The existing land and property ("LRO land") will remain under the terms of Land Registration Ordinance (Cap 128) and Conveyancing and Property Ordinance (Cap 217) for 12 years (interim period) and will be automatically converted to the Titles Register at the end of the interim period by a mechanism named daylight conversion. However, owing to several legal procedures, it is expected that the commencement of Titles Registration for new land will begin at the end of 2010, and the day of conversion to Titles Register under Land Registration Ordinance will be the end of 2022. A 12-year interim period can avoid loopholes of property ownership such as adverse possession, but it is a long time to wait until 2022 to convert LRO land to Titles Register and apply for determination of boundaries.

Hence, in 2005, HKIS wrote a letter to urge the Secretary for Housing,

Planning and Lands to implement the determination of lot boundaries and propose extending the service to LRO land. Recently, SMO is proposing actions to amend the Land Survey Ordinance with a view to empowering the Director of Lands to rectify land boundary plans if found necessary (Leung 2007).

In the progress report on the review of the Land Titles Ordinance (Land Registry 2007), the Administration has considered having a single set of provisions covering the determination of the boundaries of land registered under the Land Registration Ordinance and the registration of the resultant land boundary plans contained in the Land Survey Ordinance. This set of provisions is now proposed to be included in the Land Survey Ordinance and Section 94 of LTO will be repealed. Consequential amendments to amend the Land Survey Ordinance will be considered in the Land Titles (Amendment) Bill.

It shows that the government, lawyers and surveyors do endeavour to implement the determination of land boundaries and appreciate the need for its extension to LRO land in upgrading the boundary security.

6.5.2.1 Application extending to subdivision land

Land parcels on Hong Kong Island and Kowloon Peninsula, especially the land granted in the urban area in the early stage of the colonial period (i.e., before 1900), were mostly initially granted on a large piece of land which was enclosed by the road margin. Massive subdivisions were conducted afterwards due to urban re-planning, development of transportation network to

catch up with the rapid growth of population. In some cases, subdivision was complicated and involved myriads of owners for a whole parcel.

Section 94(2) of LTO states that the Director of Lands will not make a determination in respect of 1) any subdivision of a parcel made by a person other than the Government; or 2) the application does not have the consent of all the owners of the lot. This measure ensures the qualified lot to be surveyed, but it is limited in its application. Referring to the above phenomena, securing the consent of all the owners for a whole parcel seems not feasible. It will take a long time for subdivision lots to apply for the determination of lot boundaries and it cannot break away from the approximate plot boundaries. Hence, there is a need to take the circumstances into consideration.

Among current registered subdivision lots, we can classify them into four classes:

Class	by whom	Survey Plan	Accuracy	Under LSO
I	Government	No	Low	No
II	Government	Yes	Low - Medium	No
III	Government	Yes	High	Yes
IV	ALS	Yes	High	Yes

Table 6.1 Classification of subdivision lots

Undoubtedly, the landowners of Class II and Class III are allowed to apply for the determination of lot boundaries. However, the accuracy of contemporary registered subdivision plans varies, and the Director of Lands should ascertain the area and/or the measurement without prejudice to and

subject to the terms and conditions of the Government lease concerned, before adopting the boundaries shown on the plan as determined boundary.

For Class IV subdivision land, since an ALS is the only authorized person in the land profession to conduct subdivision surveys and the practice is governed by the Code of Practice, the quality of boundary surveyed is guaranteed, and hence, subdivision lot in this class is permitted to apply for the determination of lot boundaries. Cross checking and verification by another ALS or a government officer is needed before registration of the plan.

Since subdivision in Class I land is questionable, the Director of Lands should exercise more discretion with conclusive evidence on determination of lot boundaries. The landowner in this class could hire an ALS for a comprehensive study and survey of the subject lot. An ALS then prepares an up-to-date land boundary plan, a survey report as well as supportive evidence. The Director of Lands takes into account the documents, and decides whether the lot can apply for the determination of lot boundaries or not.

In fact, every registered land in England and Wales is given an opportunity to apply for determining their lot boundaries. In Section 118(1) of Land Registration Rules 2003,

> (1) A proprietor of a registered estate may apply to the registrar for the exact line of the boundary of that registered estate to be determined.

For determining the boundary, apart from a precise plan showing where

the exact line of the boundary is, another essential element is the agreement between the lot owner and the neighboring lot owner. They need to agree on the position of the boundary and make sure that the boundary is consistent with the title deeds. Hong Kong, in the case of implementing determination of lot boundaries for subdivision lot, may also take account of this advisable measurement.

6.5.3 Indemnity for discrepancy of determination

Indemnity is one of the topics of concern in the determination of lot boundaries. In reality, discrepancy is unavoidable technically. The survey is conducted by using the latest survey technology and equipment, and measurement are made according to present survey specifications and accuracy standard. With the improvement in survey technology and accuracy standard over the years, it is highly probable that the distance between any two boundary points measured today will be slightly different (say by a few centimetres) from that measured in an old survey, say, half a century ago with its crude survey equipment, poor technology and different coordinate system, albeit the position of the boundary points has remained unchanged.

The aim of conducting a land boundary survey is mainly to use the current advanced technology to find out the original lot boundaries intended to be granted. A land boundary survey is not going to create a new boundary definition of the parcel. Using current technological skills to define the boundaries formerly granted, a perfect match is out of the question. Hence, survey tolerance should be clearly defined. The tolerance is set based on

the accuracy of a contemporary granted plan, if it exists. Survey findings within the tolerance will be regarded as acceptable, and vice versa.

In Hong Kong, when an authorized land surveyor conducts a land boundary survey, it is necessary for him to conduct a comprehensive study. He traces and studies as much available evidence dated back to the day of original grant as he can find, together with a field boundary survey according to the guidance of Code of Practice of LSO. The resultant plan including his boundary definition will be the best plan to present the parcel's location. Different surveyors may present their interpretations with slight differences. The discrepancies maybe attributable to various reasons, but can be narrowed and classified into three types: caused by boundary records' problem, caused by technical problem, and caused by disciplinary offence. If the mistake is made technically (such as an error in measuring the angles, or in the process of conversion) or by disciplinary offence as stated under Section 20 of LSO, it is undoubted that the landowner can sue the surveyor according to his professional liability, and the surveyor may also be punished by a disciplinary board according to Section 25 of LSO. If the discrepancy arises from the old boundary records, the responsibility is not imputed to the surveyor. This is a phenomenon of hypo-critic oath: A surveyor gives his interpretation subject to the best available evidence, but the evidence itself contains ambiguity. No indemnity could be claimed. However, in accordance with Section 28(4) of LSO,

> (4) An authorized land surveyor shall be personally responsible for the accuracy and completeness of every land boundary plan signed and certified by him and produced from a land boundary survey carried out

> by him personally or by other persons under his supervision or direction, or partly by or under the supervision or direction of another authorized land surveyor, and he shall be liable for any loss or damage suffered by any person as a result of any inaccuracy or incompleteness of any land boundary plan so signed and certified.

It clearly states that the duty of an authorized land surveyor (registered under this Ordinance) is onerous and he should bear legal liability for the inaccuracy or incompleteness of any land boundary plan he signed and certified. In the court judgment of Liu Ma Cheung v Liau Yin Fu v Leung Shou Chun (HCA181/2004), the judge gives the following comments:

> (94) The duty under the second limb of section 28(4) is not merely to exercise such skill and care which is ordinarily exercised by reasonably competent members of the profession who have the same rank and profess the same specialization (if any), but to be “accurate” and “complete” in every land boundary plan signed or certified by the authorized land surveyor. In short, the duty is not just to be competent but to be correct.

Hence, the surveyor who signed and certified the boundary plan would be held liable for such loss and damage generated from that plan (if any).

On the other hand, the Government, on behalf of the grantor, has been protected by law with no legal liability borne. Section 89 of LTO declares that no claim to indemnity and no legal proceedings of any discrepancy in the area or measurement of the boundaries, whether upon a survey or otherwise, arising from the application or the determination of the boundaries of the lot. Hence, no compensation for discrepancies in area and boundary is considered.

6.5.4 Correction of Land Boundary Plan

Although a survey conducted by a professional surveyor is deemed to be subject to the best available evidence, there maybe human mistakes or new evidence may exist unexpectedly. Hence, a correction or an update of a registered boundary plan is necessary.

In Singapore, the Chief Land Surveyor is authorized for the correction of maps by law. In accordance of Section 12 of BSMA,

> (3) If no objection is lodged with the Chief Surveyor under subsection (2) (a) within one month from the service of the notice, the Chief Surveyor shall make an order for the correction to be made.
> (4) If any objection is lodged with the Chief Surveyor under subsection (2) (a), the Chief Surveyor shall hold an inquiry and make such order as he thinks fit.
> (5) If, after taking into consideration the evidence of the owners or their agents appearing at the inquiry under subsection (2) (b) and of such other persons who have knowledge of the subject, the Chief Surveyor is satisfied that the boundary as it appears from the then existing occupation of the land is the true boundary, the Chief Surveyor shall make an order for the correction of the map.

All maps shall continue to be valid until they have been declared to be superseded. This scheme rectifies the mistakes made as well as maintains a unique boundary definition at any one time.

6.5.5 Entrance authority for determination of lot boundaries

Practically speaking, many land boundary surveys are obstructed due to the right of easement and sometimes the access to the abuttal lots. Furthermore, the landowners of the surrounding lot are usually unwilling to

answer boundary-related questions raised by surveyors. Hence, the regulation should clearly provide for permission for entrance by a survey officer to adjoining lots for the purpose of exercising his power or right in checking the new plan and survey record plan certified by an authorized land surveyor or conducting a land boundary survey of the subject lot. A survey officer duly authorized in writing by the Director may, failing agreement with the adjoining lot owner as to the grant of powers required by the Director, at any reasonable time enter the adjoining lot for that purpose.

The authority of entrance to an adjoining lot will embrace 1) the authority of conducting a boundary survey, including setting up survey instruments, placing survey marks on ground, examining land boundary features, measurement and photo-taking on the adjoining lot; and 2) the authority of making local enquiries, such as interviews or investigations related to the determination of the boundaries of the lot concerned.

Before conducting a determined boundary survey, a survey officer needs to apply for the authority from the Director of Lands with evidence, and the Director of Lands will give at least 10 working days' notice to inform all adjoining owners. The notice should clearly state the purpose of the entry and the nature of operations to be carried out. No land boundary survey can be conducted within the interim notification period unless the consent of the owners of adjoining lots is obtained.

CHAPTER 7

PROPOSED DETERMINATION OF LOT BOUNDARIES MECHANISM

7.1 Scope of discussion

As discussed and concluded in the previous chapters, there is an imperative demand for the implementation of the determination of lot boundaries in Hong Kong. It is a method to increase the boundary security; however its implementation requires the backup of necessary Government policies. This chapter will outline a proposed determination of lot boundaries mechanism and ways to refine its methodology. By using flowcharts as illustrations, this chapter will first look at the application area, i.e., qualified parcel for the determination of lot boundaries. Secondly, a mechanism of proposed procedures will be discussed in detail. The investigation covers some suggested solutions to address disagreement among surveyors' interpretations, and post-processing procedures for the finalized resultant plan.

7.2 Application for determination of lot boundaries

The application is recommended to cover not only the land registered under the Land Titles Ordinance, but also the Land Registration Ordinance's land and subdivision land, as discussed in the last chapter. Flowchart 7.1 shows the general picture of the conditions of a parcel to apply for the determination of lot boundaries.

Neglecting the missing lot, land parcels in Hong Kong can be classified into 2 groups: whole lot and subdivision lot. According to Section 94(1) of

the Land Titles Ordinance, it is allowable for the owner(s) of a whole lot to apply for the determination of the boundaries. For subdivision lot, Section 94(2a) of the Ordinance states that the Director of Lands shall not make a determination for any subdivision of a lot which is made by a person other than the Government. Hence, if the parcel is subdivided by the Government or the Authorized Land Surveyor (ALS), who is registered under the Land Survey Ordinance, it is also allowable for applying the determination of lot boundaries. However, if the land parcel is not subdivided by the Government or ALS, but by an architect or sometimes by a landowner in the early days, the subdivision is defined arbitrarily without accuracy. Hence, the landowner of this kind of parcel can hire an ALS to conduct a redefinition survey and comprehensive study for his parcel. If the result is within the survey tolerance (See Paragraph 7.3), the parcel shall have permission to apply for the determination.

However, if the survey result exceeds the allowable survey tolerance, it is necessary to trace the reason for such discrepancy. The discrepancy can basically be classified into two types, land boundary record's problems and land grant document's problems. The land boundary record's problems mainly concern with 1) incorrect and insufficient information to delineate lot boundaries in original land grant documents and 2) conflict among subsequence contemporary land boundary records.

In the land grant documents, in particular for Old Schedule Lot, grant plans might be attached for delineating the shape of the subject lot as well as the abutting lots and the surroundings. Most of them were Demarcation

District (DD) Sheet or Double Lot Sheet. The scales of these plans were small (1:1980 and 1:3960) and sometimes there were no scales at all. Hence, the boundary information obtained could only be available up to a graphical accuracy level. These plans were good to show the topological relationships among lots but poor to provide precise boundary information on each lot. The following survey case is used to illustrate the problems encountered in reality.

The subject lot is Lot 1574 in DD 95. After studying and analyzing all the available evidence, it was discovered that the boundaries of the subject lot shown on the DD Control Sheet was mismatched with those boundaries shown on an aerial photo in 1949, the old survey sheet in 1968 and the Lot Index Plan in 2008. In addition, this phenomenon not only happened to the subject lot, but also to the surrounding lots. The case reveals that various land boundary records may contain dissimilarity, and thus it may pose a challenge to the land surveyor as he interprets the records. A conclusion was then drawn from this case, that is, even though the grant plan (DD Control Sheet in this case) contains statutory rights, it is not good enough to define the precise boundary. However, the 16 inches to 1 mile (1:3960) scale map still provides a good topology between lots,

Separately, the boundary problems concerning conflict among subsequent land boundary records have already be mentioned in Chapter 5.4.

If the discrepancy is caused by the land boundary record’s problem, the

problem should be solved by using a surveying method, where the responsibility lies with the surveyor. The surveyor could update the boundary information on the subject lot and register it in the Land Registry. Whereas if the discrepancy arises from the land grant document's problem, the land surveyor cannot do much or even anything as this is at an administrative level, which shall be tackled by the government and/or lawyers. The government can handle this kind of problem by verifying the Deeds or use its administrative power to surrender and re-grant the land. The government will first surrender the subject lot(s) involved in the boundary dispute. Then it will prepare a surrender plan for notifying the surrender lot(s), and re-grant a new Government land to the grantee. In the surrender action, the compensation may be in the forms of land exchange, building concessions or village re-sites.

7.3 Survey tolerance

There is no legislation governing land boundaries and surveys. The principle of the Hong Kong land boundary survey is to reconstruct the boundary in the original grant on the basis of "subject to the best available evidence". It is rare to obtain the same result for surveying the same parcel, and hence, survey tolerance is set in order to achieve a standard level of accuracy. For the parcel which has been already surveyed, the original values will be adopted if the discrepancies are within the tolerance levels. However, if the discrepancies fall outside the tolerance levels, the old values could be considered being superseded by the new values with reasons clearly recorded.

Since the enactment of the Land Survey Ordinance, the surveyors have to comply with the Code of Practice of the Ordinance as practical instructions in conducting every land boundary survey. The aim of the Code of Practice is to control a land boundary survey, which includes the details of survey tolerance. Section 46 of the Code of Practice (Fourth Edition (Revised)) clearly lists out the survey tolerances of bearing measurement, distances measurement and area calculation.

(1) Survey tolerance – **Bearing** / **angular** measurements:

Distance	Tolerance
under 15 m	**± 2'00"**
15 m – 150 m	**± 1'00"**
over 150 m	**± 0'30"**

(2) Survey tolerance – **Distance** measurements:

Tolerance:

± (0.015 + 0.0001 x distance in metres) metre

(3) Survey tolerance – **Area** calculations:

Tolerance: **± 0.1 %**

The survey tolerance levels commented above are the general guidance for controlling current survey practices. However, contemporary parcels were registered under different conditions with different types of plans (if they exist). Using a unique survey tolerance for adjustment may not be suitable for each case. This is because the older records were produced by using crude survey equipment and old survey technology, their accuracy and precision are relatively lower than current resultant plans. The survey tolerance list in the Code of Practice fits in with the current advanced equipment and technology but is not satisfactory when compared with the old

grant plan or other old plans.

In 1998, the Land Survey Authority has published a survey tolerance for the old grant lots in rural areas. It was mentioned in Land Survey Authority Technical no. 3/98,

> To determine whether a surveyed area is reasonable, the following formulae should be used,
> i) ± 20 m^2 + 5% of the registered area for lots on 1:1980 DD Sheets
> ii) ± 20 m^2 + 10% of the registered area for lots on 1:3960 DD Sheets
> iii) ± 20 m^2 for house lots on DD sheets
> iv) ± 10 m^2 of plan area for house lots shown on House Lot Plan

The above guidelines have taken into account the accuracy of the old plans. Even these suggestions only deal with Demarcation District (DD) Sheets and House Lot Plan, it has already covered almost 80% of the parcel in rural areas. However, this technical notice was cancelled by the Land Survey Authority in the early 2000.

Not many land records were left prior to the Second World War, and some of them might have been buried during the Japanese Occupation since late 1941 to 1945. Moreover, historical survey sheets were drawn on the Whatman paper. Owing to poor preservation of these records, some of them were torn, burned, and worm-eaten. Hence, land boundary records are incomplete. If determination of lot boundaries takes place, it would involve not only the grant plan, but also different kinds of plans. As a result, a comprehensive set of survey tolerance is necessary for controlling the standard of land boundary surveys. However, the main purpose of

establishing the survey tolerance is to serve as an indicator for comparing the registered area of the parcel in grant document or in contemporary plan. Therefore, a survey tolerance in area calculation is recommended.

The survey tolerance (in area calculation) of the records is established on the basis of scaling with a reliability approach. The tolerance would be decided according to the map scale and map class. Table 7.1 shows the map scale and map class of the extrinsic land boundary evidence in chronological sequence and Table 7.2 illustrates the map scale and map class of the legal land boundary evidence chronologically.

Timing	Records	Map Scale	Class
Circa 1905 – 1995	House Lot Plan	1:600	G, I
1905 – early 1950s	Demarcation District Control Sheet	1:1980, 1:3960	G, C
1945s – 1960s	(Old) Survey Sheet	1:1200	G
1950s – 1970s	Cadastral Survey Sheet	1:1200	G, C, I
	Demarcation District Retrace	1:1980, 1:3960	G, C
1970s – 1980s	Blue Key	1:1000	G
	Black Key		G
	Green Key		G
1980s	Correlation Sheet	1:1000	G, C
Late 1980s onwards	Basic Survey Sheet (BMS)	1:1000	S
	Lot Index Plan	1:1000	G
1995 onwards	Survey Record Plan	Prescribed metric scales	S

Table 7.1 Classification of extrinsic land boundary evidence

Timing	Records	Map Scale	Class
1899 – 1905	Double Lot Sheet	1:3960	G
	Demarcation District Sheet	1:1980	G
Circa 1905 – 1995	Lease Plan	1:1000, 1:1200, 1:1980, 1:3960	G
	Assignment Plan		G
1995 onwards	Land Boundary Plan	Prescribed metric scales	S

Table 7.2 Classification of legal land boundary evidence

The map scale shows the precision of the plan that it can be achieved. Let's take a Demarcation District (DD) sheet as an example, an error of 1 milimetre (mm) in projecting the DD sheet (scale in 1:1980) onto the ground would result in an error of 1980 mm, or 1.98 metres, on the ground. Since 1 mm is the limitation of the measurement of cartography, it will be used for determining the survey tolerance and sounded reasonable. A formula for the allowable tolerance (in percentage of registered area) is listed and applied as follows,

$$\textbf{Tolerance}_{(S)} = ((\text{scale}) \times 100 + (\text{scale})^{-1} \times 0.001)^2 \text{ \% of reg. area (m)}$$

Land boundary records are classified according to their plan nature and reliability. Four symbols illustrated 4 different classes. Class S stands for the records which can achieve up to survey accuracy, and Class G stands for the records which can achieve up to graphical accuracy (relatively lower accuracy than survey accuracy). In addition, records containing conflict are symbolized by Class C, and Class I is used to represent incomplete records. The classification is shown in Tables 7.1 and 7.2.

Class S records' coordinates are based on accurate geodetic network

reference; hence the reliability is high. They are counted as superior records among the 4 classes. Class G records are relatively uncertain in boundary definition because boundaries are in graphical form without coordinates. Some of the plans may provide gird lines for position reference. The reliability is relatively lower and tolerance would be relatively larger as compared with S-class records. For those records marked with Class C or Class I, it is not recommended to be used for identifying the parcel area unless no Class S or Class G records can be found. The records in these classes have low reliability and are counted as inferior records. Hence, if the land boundary records of a parcel coexist, legal evidence will be given priority over extrinsic evidence, and Class S or Class G records will take precedence over Class C and/or Class I records.

The decision on survey tolerance also includes the unit of the registered area in grant documents. Tolerance would be defined as the 1/2 of the minimum unit of the registered area. For example, the minimum unit registered area shown in the Block Government (Crown) Lease is one hundredth of an acre (0.01 ac), which is equivalent to 40.47 square metres (40.47 m^2). Hence, 20.24 m^2 would be the allowable tolerance for the parcel registered under Block Government Lease. The formula is shown and applied as follows,

$$\textbf{Tolerance}_{(U)} = (1/2 \times (\text{minimum unit})) \text{ metre}$$

The resultant tolerance in area computation ($Tolerance_{(U)}$ + $Tolerance_{(S)}$) of each land boundary records are shown in Table 7.3.

Records	Survey Tolerance (area)
Double Lot Sheet	± 20 m^2 + 16% of the registered area
Demarcation District Sheet	± 20 m^2 + 4% of the registered area
Lease Plan	± 20 m^2 + 16% of the registered area (1:3960) ± 20 m^2 + 4% of the registered area (1:1980)
Assignment Plan	± 10 m^2 + 1.5% of the registered area (1:1200) ± 10 m^2 + 1% of the registered area (1:1000)
Land Boundary Plan	± 0.1% of the registered area
House Lot Plan	± 10 m^2 + 0.5% of the registered area
Demarcation District Control Sheet	± 20 m^2 + 16% of the registered area (1:3960) ± 20 m^2 + 4% of the registered area (1:1980)
(Old) Survey Sheet	± 10 m^2 + 1.5% of the registered area
Cadastral Survey Sheet	± 10 m^2 + 1.5% of the registered area
Demarcation District Retrace	± 20 m^2 + 16% of the registered area (1:3960) ± 20 m^2 + 4% of the registered area (1:1980)
Blue Key	± 10 m^2 + 1% of the registered area
Black Key	
Green Key	
Correlation Sheet	± 10 m^2 + 1% of the registered area
Basic Survey Sheet (BMS)	± 1% of the registered area
Lot Index Plan	± 10 m^2 + 1% of the registered area
Survey Record Plan	± 0.1% of the registered area

Table 7.3 Survey tolerance (in area calculation) for land boundary evidence

If the parcel does not have any plan in the Land Registry and Survey and Mapping Office, it only contains the verbal description, i.e., registered area shown on the lease, the survey tolerance would be based on its registered area unit, i.e., $Tolerance_{(U)}$.

7.4 Proposed procedure for determination of lot boundaries

To put the determination of lot boundaries into practice, a proposed mechanism is established and recommended. The methodology, in a flowchart form, is illustrated in Flowcharts 7.2, 7.3 and 7.4.

Although it is rare to have unregistered land in Hong Kong, one of the core conditions for applying determination of lot boundaries is: the parcel should be registered in the Land Registry. In addition, the application should be without prejudice to and subject to the terms and conditions of the Government lease concerned. If there is more than one owner for a parcel, the applicant must provide a written confirmation that the application has the consent of all the owners of the lot concerned.

7.4.1 Existing plan in Land Registry

If there is an existing plan in Land Registry, i.e., the attached plan of land grant document, the Director of Lands (Director) should check whether the plan is surveyed to the numerical standard or produced under the instructions as listed in the Code of Practice of the Land Survey Ordinance.

If the plan fulfills the regulations of the Code of Practice, the Director of Lands should verify the numerical definition and decide whether or not the existing plan is acceptable for the determination of the boundaries of the lot. If the Director accepts the existing plan, the Director will cause the existing plan to be registered in the Land Registry under the Land Registration Ordinance or the Land Titles Ordinance. The landowner needs to pay for the relevant fee for registration.

However, if the existing plan is not surveyed to numerical standard or the Director resolves the plan is unacceptable, the Director will inform the landowner to appoint an authorized land surveyor to conduct a land boundary survey and prepare a land boundary plan in accordance with the Code of

Practice. Details will be discussed in 7.4.3 below.

7.4.2 Existing plan in Survey and Mapping Office

If the graphical record of the parcel is not found in the Land Registry, but is found in the Survey and Mapping Office, the Director should ascertain whether the plan is surveyed to the numerical standard or produced under the instructions as listed in the Code of Practice of the Land Survey Ordinance. If the plan is verified and accepted by the Director, upon payment of the relevant fee by the landowner, the Director will cause the existing plan to be registered in the Land Registry under the Land Registration Ordinance or the Land Titles Ordinance.

If the Director does not accept the plan for determination of lot boundaries, he will advise the landowner to employ an authorized land surveyor to conduct a land boundary survey and prepare a land boundary plan. Please refer to Paragraph 7.4.3 below for details.

7.4.3 No existing plan

If there is no graphical record either in the Land Registry or in the Survey and Mapping Office, the Director will inform and advise the landowner to hire an authorized land surveyor to conduct a land boundary survey and a comprehensive study for his parcel in accordance with the Code of Practice approved under the Land Survey Ordinance, and to deliver to the Director the resultant Land Boundary Plan, together with Survey Record Plan and a survey report in relation to the land boundary survey certified by the authorized land surveyor. A relevant fee is charged for the Director's

checking and the Land Survey Authority's independent checking.

The resultant plan sets out any changes in the boundaries or area or measurement of the lot, which are shown on a land boundary plan, or on a microfilm, image record or other record of a land boundary plan prepared by the Government, kept in the Land Registry; or set out on any Government lease of the lot including any plan attached. With such changes, it would not be allowed to apply for the determination of lot boundaries, unless such changes are within the survey tolerance as recommended in Paragraph 7.3 mentioned above and/or acceptable to the Director of Lands.

After the authorized land surveyor (ALS) has submitted all the relevant information to the Director, the subject parcel will be investigated by the commissioners of Land Survey Authority (LSA), who are land professionals, for an inclusive study. The Land Survey Authority provides an independent check, including verifying the subject lot's boundaries as well as the abutting lot's boundaries. This will certainly result in making more objective comments on the boundary definition and help to further protect the boundary rights of each landowner. The LSA will then compare their results with the work done by the ALS, and ascertain any boundary conflicts among them.

Since the boundary is owned by the subject owner as well as the adjacent owner, in the status checking, the Director of Lands should not only verify the subject lot's boundaries, but also the abutting lot's boundaries. The Director of Lands, on behalf of the Administration, must protect the boundary rights of each landowner.

If the boundary definition defined by the ALS is consistent with the boundary definition made by the LSA, the Director will accept that the new resultant plan of a lot prepared by the ALS is acceptable and cause this plan to be registered in the Land Registry under the Land Registration Ordinance or the Land Titles Ordinance.

However, if a boundary conflict is discovered, the Director of Lands will pass back to the ALS for his reviewing and the survey must be checked again. The survey result, including the survey report and relevant plans made by the LSA, will also be given to the ALS for reference.

By reviewing and checking the survey work carried out by the ALS and those prepared by the LSA, the ALS should consider whether to adopt the boundary definition prepared by the LSA or not.

If the ALS agrees with the boundary definition made by the LSA and abandons his own definition, the Director will accept the resultant plan as prepared by the LSA, and then register this plan in the Land Registry under the Land Registration Ordinance or the Land Titles Ordinance.

Nevertheless, in the event that the ALS insists on his boundary definition, the ALS must provide strong and supportive evidence to prove that his boundary definition overrides the one defined by LSA, otherwise the Director of Lands may decline and terminate the application, and/or legal advice may be sought with the intervention of lawyers, and the dispute will be adjudicated by the court. The legal costs would be paid by the ALS and the landowner,

and the Director of Lands does not bear any legal liability in this case. The plan prepared and produced by the ALS could still be deposited in the District Survey Office of the Lands Department and open for public search.

The Land Survey Authority could invite another ALS or form a specialized committee to perform the checking. The main aim of this delegation of responsibility is to provide independent checks and objective opinions as well as to avoid fraudulence and technical faults. However, the cost will be increased. It seems that it is impracticable if another ALS is involved.

7.5 Post-processing procedure for determination of lot boundaries

The post-processing procedure is illustrated in Flowchart 7.3. After the acceptance of the land boundary plan by the Director of Lands, the final boundary definition is determined. Adjoining parcels and concerned owners should be identified on the plan. Before registration in the Land Registry, the Land Survey Authority (i.e., Legislative Section) should give notice of the application to all abutting landowners. In the notice, the final boundary definition of the subject parcel must be shown and clearly explained and indicated as to how the boundary definition would affect the recipient (landowner) in detail. Besides notifying the affecting landowner, there should be a chance for the adjoining owner to lodge objection within a certain period. The period is recommended as 30 days after the date of receipt. Generally, 30 days should be enough for an ALS to carry out a comprehensive survey, but it all depends on the capability in accessing boundary records, i.e., whether the SMO can provide supportive boundary information within this critical period. These records usually include aerial photos, old boundary

records and old survey maps.

7.5.1 Objection procedures for the abutting landowners

Within the period of objection, any adjoining owner can lodge his protest on the boundary affecting his parcel. That means he can only object the common boundary of his lot and the subject lot, but not the whole lot boundary definition. In addition, the aggrieved owner should object with provision of strong and supportive evidence; hence, he should hire an authorized land surveyor to conduct a land boundary survey and prepare a land boundary plan, survey report, and other evidence in relation to the land boundary survey, in accordance with the Code of Practice approved under the Land Survey Ordinance. There should be another report in written form, which is prepared by the authorized land surveyor and explains the reasons for objection in detail. All relevant information should be submitted to the Land Survey Authority with a payment of a prescribed fee. The Land Survey Authority will pass to the Director of Lands for verification or form a specialized committee to investigate the objection. If the result is accepted by the Director or the committee, the affected boundary will be maintained as an approximate-plot boundary concept, and the owners concerned could take the dispute to the court. However, the rest of the boundary of the subject parcel can still be registered in the Land Registry under the Land Registration Ordinance or the Land Titles Ordinance. The registered land boundary plan must be updated after the boundary dispute is solved.

7.6 Legal sanction of boundary

If there is no objection after the period of objection, the Director

authorizes the legal sanction of the boundary definition. The resultant land boundary plan becomes a registered land boundary plan and is registered in the Land Registry under the Land Titles Ordinance or the Land Registration Ordinance. The plan will supersede any land boundary plan of the lot, or a microfilm, image record or other record of any land boundary plan of the lot kept in the Land Registry; and any plan attached to the Government lease of the lot. Hence, the plan is regarded as conclusive evidence in boundary determination.

Conclusive evidence does not mean it is errorless. Hence, if the latter land boundary plan reveals the former land boundary plan contains errors, and supportive evidence could be supplied and endorsed by the Director of Lands, the latter one can supersede the former one and is regarded as the conclusive evidence in boundary determination of the parcel. Otherwise, it should follow the previous boundary definition according to the “first committed boundary” principle.

7.7 Proposed determination of lot boundaries by SMO

While this thesis has started to investigate the determination of lot boundaries in Hong Kong since 2004, the Lands Department proposed a system of determination of land boundaries in October 2007. Although the aim of the proposal is to provide for the setting out of the proposed provisions for determination of land boundaries under the Land Survey Ordinance, the proposed system of determination of land boundaries is outlined on the basis of Section 94 of the Land Titles Ordinance (The workflow is shown in Flowchart 7.4). A comparison and contrast are made between two proposed

systems, i.e., the Lands Department's proposal and the one discussed in this Chapter.

The fundamental idea of the two proposed systems is similar; however, some of the viewpoints may not be exactly the same. A comparison and contrast between the two proposals will be discussed as follows:

7.7.1 Survey tolerance

Both of the proposals opine that albeit the position of the boundary points has remained unchanged, there is definitely a discrepancy between the surveyed area and the registered area due to different survey technology and equipment, different coordinate systems and the accuracy standard over the years. However, the proposal of the Lands Department does not set out any criteria for addressing the problem while the author's does. A survey tolerance with a scaling and reliability approach is established in the author's proposed mechanism (please refer to Chapter 7.3). Notwithstanding that the scheme may not be the best approach; it does provide clear and convincing guidelines on boundary definition.

7.7.2 Scope of application

It is clearly stated in the Lands Department's proposal that without prejudice to and subject to the terms and conditions of the Government lease concerned, a lot owner (who may own the lot, or a portion of the lot, or an undivided share in the lot or a portion of the lot) may apply to the Director for a determination of the boundaries of the lot. A written confirmation of the consent of all the concerned lot owners is required if the lot is owned by more

than one person. The author agrees with this measurement, as the determination should not go against the grant intention, and the determination should be approved by all the owners of the subject lot.

The Lands Department's proposal also sets out the conditions for the rejection of making the determination.

> The Director will not make a determination in respect of –
> (a) any subdivision of a lot which has been made by a person other than the Government; or
> (b) a case where the application concerned does not have the consent of all the owners of the lot; or
> (c) a case where the Director does not have sufficient information to make such a determination.

The author holds a different view on the issues mentioned above. First of all, Authorized Land Surveyors (ALS) have already played its role and are registered under the Land Survey Ordinance. They are qualified professionals in land matters and have been conducting boundary surveys as well as subdivision of a parcel since the enactment of the Land Survey Ordinance. Hence, subdivision of a lot made by ALS should also be allowed to make the determination of lot boundaries. Besides, for those lots subdivided neither by the Government nor by the ALS, a procedure is recommended in this chapter (please refer to Chapter 7.2). All lots should have an opportunity to be given a determination of the lot's boundaries and to be upgraded in their security.

Furthermore, there is no specified definition of "the lot" as stated in Part (b) of the Lands Department's proposal. If "the lot" is implied as the subject lot, i.e., a whole lot or a subdivision lot, consent of all the lot owners is a must.

Nevertheless, where “the lot” denotes the whole lot, it means that if the owner of the subdivision lot applies for the determination, he needs to get the consent of the rest of the owners of the subdivision lots who maybe irrelevant to the subject lot. This sounds impracticable because some of the parcels in the urban area have been subdivided into several hundred pieces.

7.7.3 Abutting owners

Abutting owners is a key element that may influence the determination of lot boundaries. Boundaries of the concerned lot include the boundaries of the abutting lot, i.e., the common boundary. Hence, in the Lands Department’s proposal, it states that if the land boundary plan will result in changes to the boundaries or area or measurement of the adjoining lot, the Director will not accept the plan of the lot nor register it in the Land Registry, unless there is the consent of the owners of the abutting lots.

A representative of The Law Society of Hong Kong, at a meeting of the Working Group of CSCC (SMO 2007), pointed out that most of the lots were occupied by multi-owners, and it would be very difficult to get the consent of all the owners. He thought that the Government, being the landlord, should have the power to determine lot boundaries. At the same meeting, a representative of the Hong Kong Polytechnic University cited Article 7 of the Basic Law and considered that land within Hong Kong should be state property. He then suggested that the Government should not dwell on the consent issue and instead, should exercise the power to clarify the leased boundaries. However, a representative of the Government opined that the Government was bounded by the Government lease, and it would be

inappropriate for the Government to change the contract by registering a new land boundary plan and superseding the previous one without the consent of the land owner and the relevant adjoining owners.

The author respects this point, but disagrees with the approach. The unsuccessful implementation of the fixed boundary concept in England and Wales in 1862 is a good example to prove that it is impracticable, time-consuming and costly to obtain agreements among various neighbouring parties. Hence, an alternative approach is recommended in this Chapter. Instead of getting the consent of all the concerned owners, an objection mechanism is proposed. If the abutting owners do not agree with the determined boundaries that will affect their boundaries, they may raise their objection via the objection procedure. The details of the procedures have been discussed in Chapter 7.5.1. This scheme is similar to the one now being adopted in Britain, but with some modifications to fit into the Hong Kong practice.

7.7.4 Registration

As stated in the proposal raised by the Lands Department, if the resultant land boundary plan is accepted by the Director, the Director will cause the plan to be registered in the Land Registry. Otherwise, he will entirely reject the application. One of the reasons for the rejection is that the owner of the adjoining lot may not give consent for the registration of plan. The author thinks that if the application is terminated by virtue of the above excuse, it is unfair to the subject owner. Therefore, the author suggests another way to accommodate both aspects: If the affected boundary is successfully

objected by the abutting owner, the disputed boundary will be left undetermined and the remaining boundaries could still be registered. Different notations can be used on the land boundary plan to illustrate and distinguish the determined boundary and disputed boundary. If the dispute is solved later, the registered plan can be updated in the Land Registry again. The procedure seems to be a little bit complicated but it does reduce the resources to be wasted and can protect the rights and interests of the subject lot owners.

7.7.5 Voluntary basis

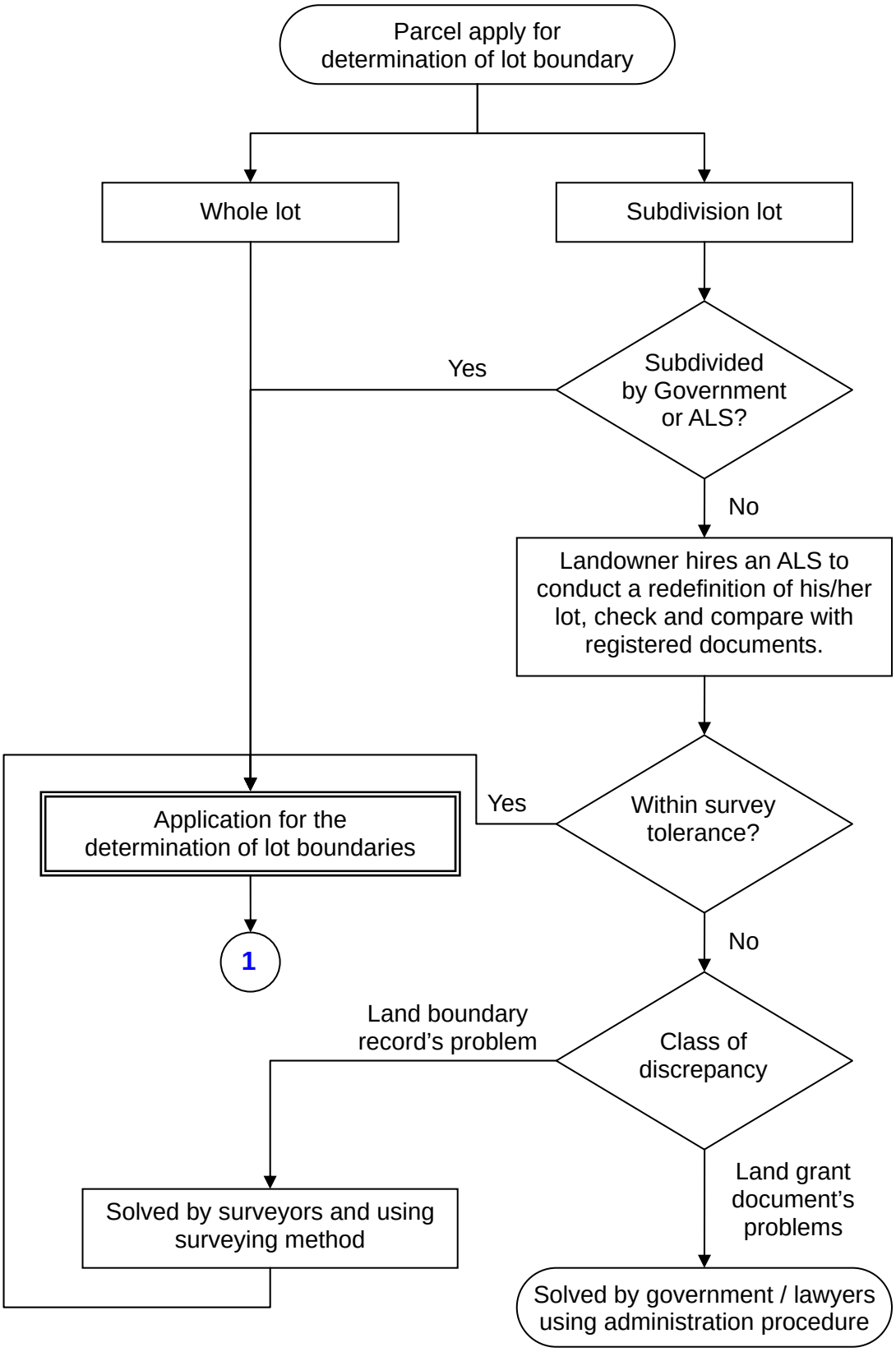
The proposed system drafted by the Lands Department focuses on the procedure and the scope of application. It does not mention whether the determination should be compulsory or voluntary. The author considers that the determination of lot boundaries mechanism should be on a voluntary basis, which allows landowners to choose the determination of their lot boundaries. To encourage landowners to determine their lot boundaries, there should be some statutory rights to safeguard the determined boundary. For example, the registered land boundary plan could take precedence over the unregistered land boundary plan; the boundary definition in the registered land boundary plan could be deemed as legal and conclusive evidence.

7.8 Short conclusion

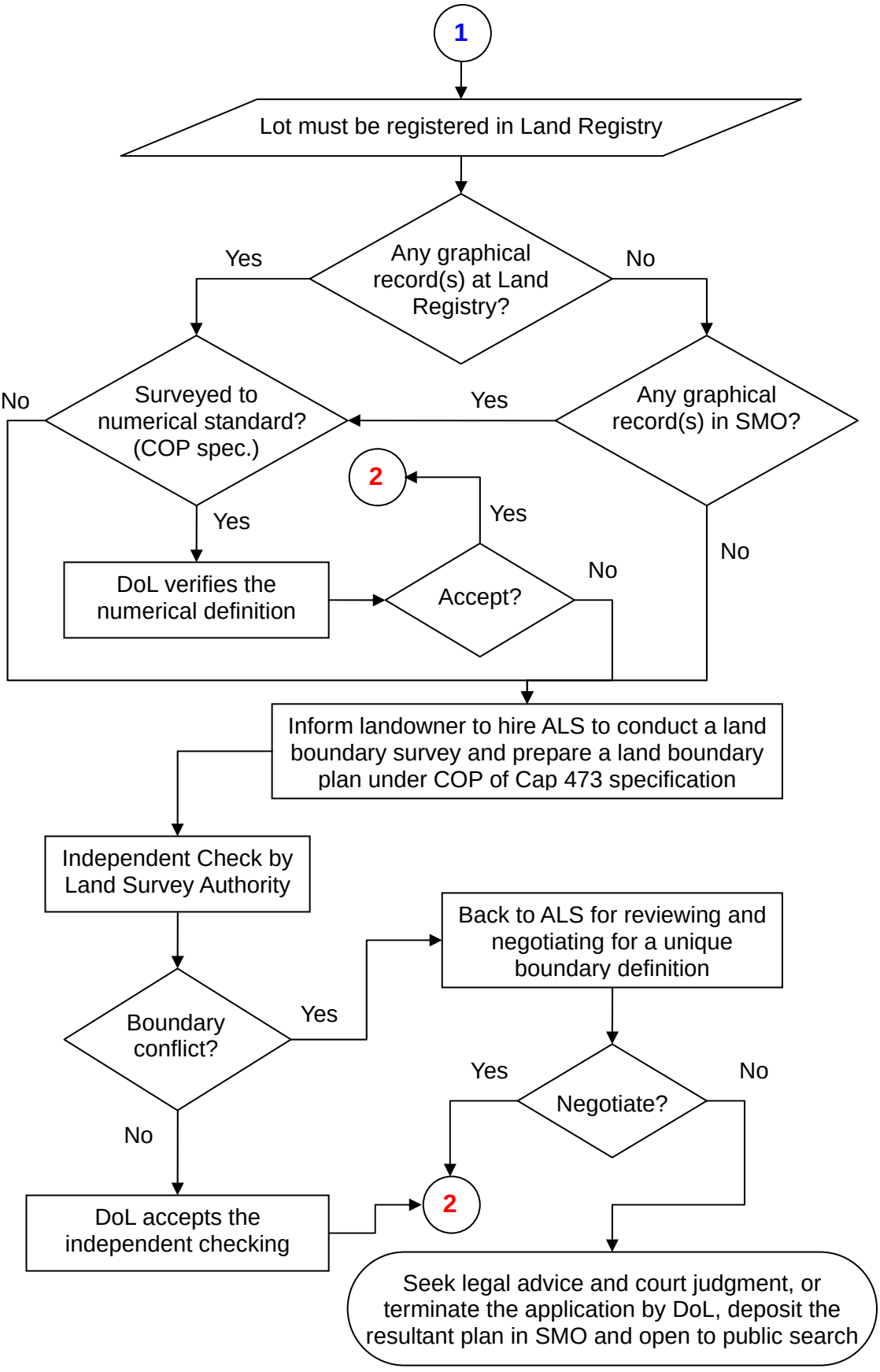
The general idea of the operation of the mechanism to determine lot boundaries has been introduced briefly in the above paragraphs. However, there are still many specific details to be refined and it is necessary to conduct an in-depth research on things like the reasonable fee for each process, and

who is responsible for checking and addressing the objection. This practice is an arduous task, which requires a lot of resources and could operate only in coordination with many other ways, in particular statutory control.

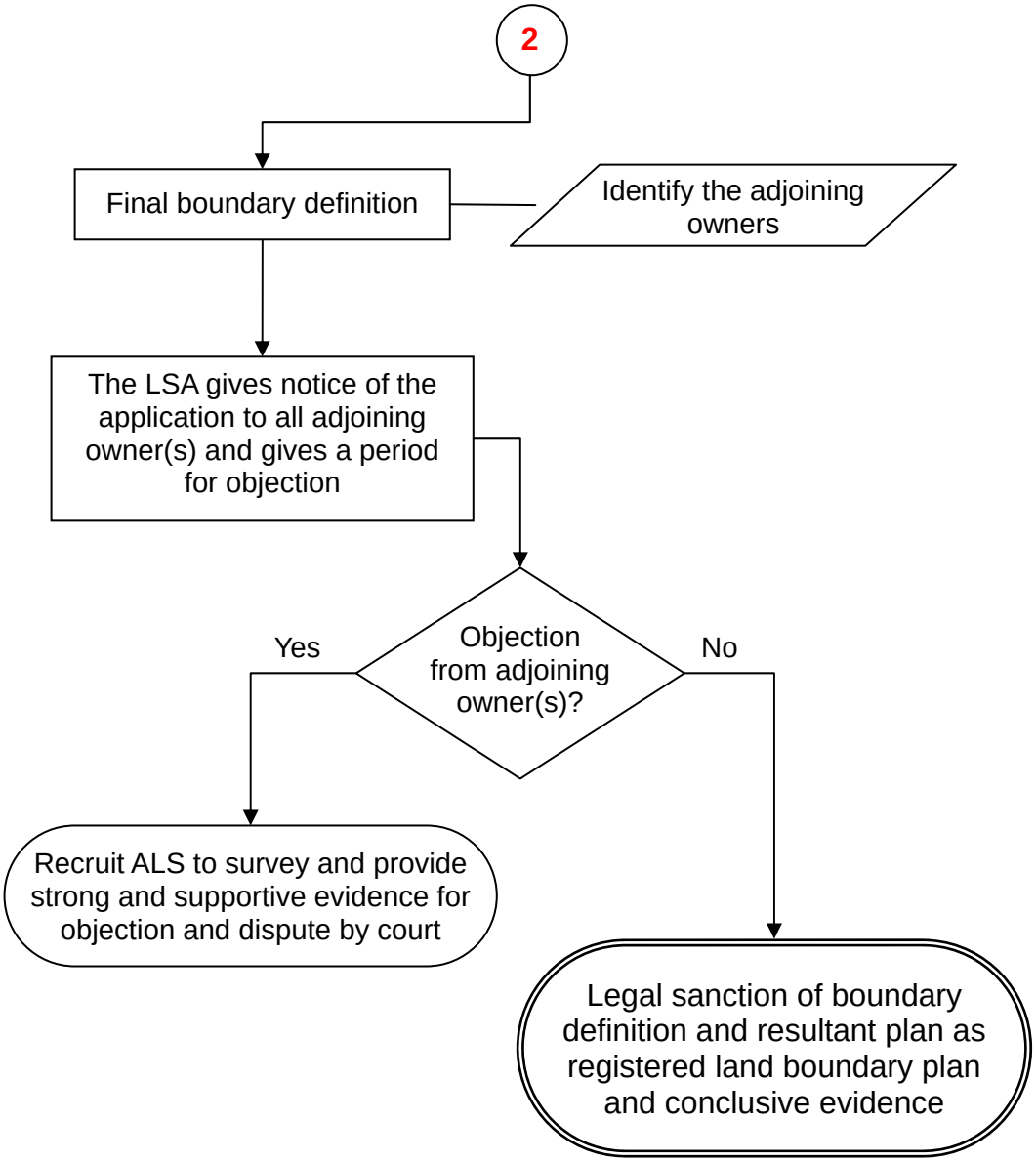
Flow Chart 7.1 Qualified parcel for determination of lot boundary

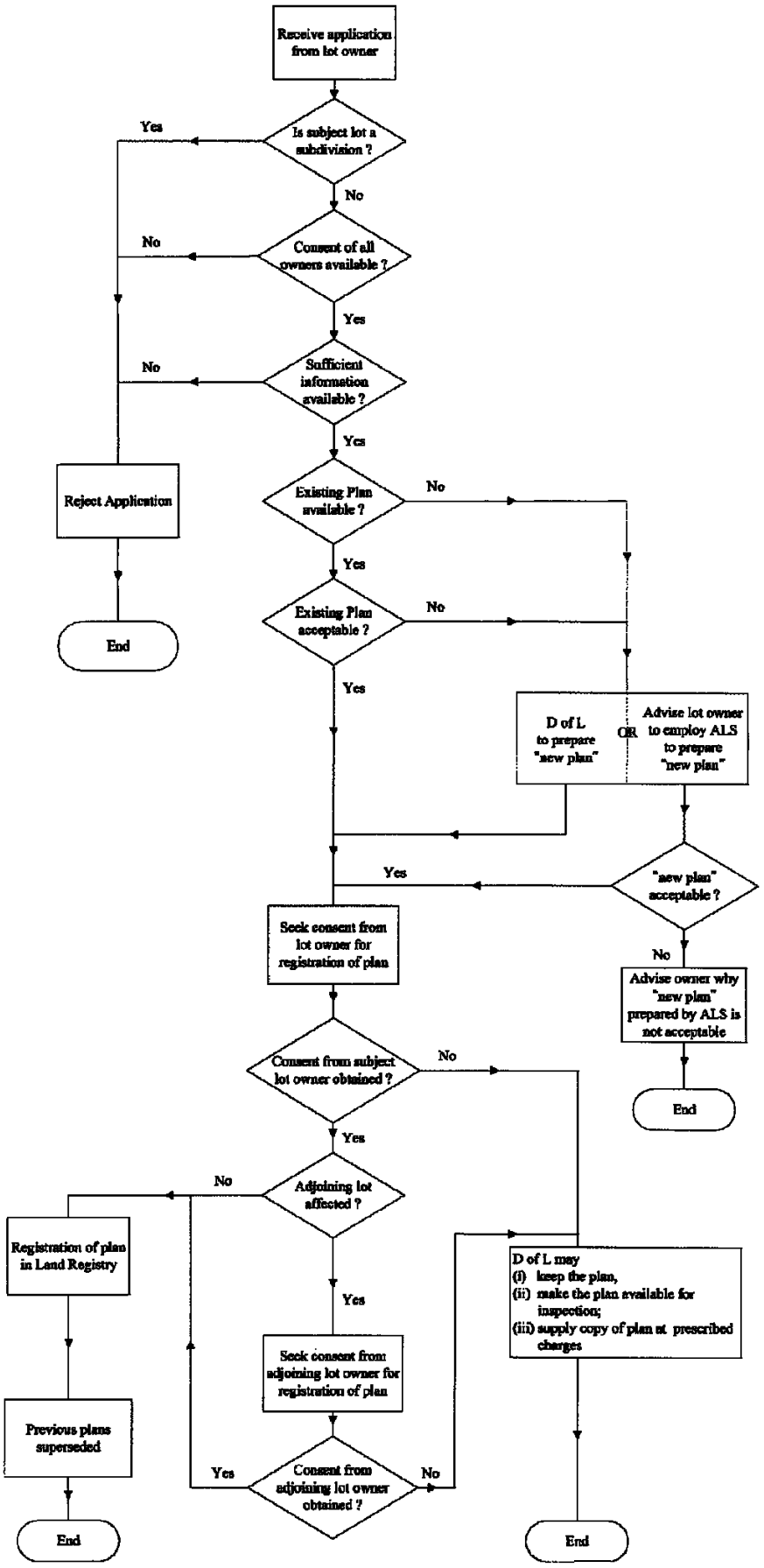


Flowchart 7.2 Proposed procedure for determination of lot boundary



Flowchart 7.3 Post-processing of determination of lot boundary





Flowchart 7.4 Proposed Determination of land boundaries by SMO

CHAPTER 8

COMMENTS AND CONCLUSION

In reality, each land boundary system has its own problems. There is no perfect system in the world, but there are some responsible leaders who have the political will to minimize the problems. When facing the problems, some leaders will address them aggressively; some will solve them only superficially, while some will opt to leave them unchanged and manage them with a traditional approach. The policy to be adopted would always depend on the value and importance of the subject matter itself and the leaders' decision making. Generally speaking, the role of a leader is mainly taken up by the Administration, and hence, the making of strategic decisions by the Administration is the key recipe of success. However, it is not enough for the Administration to shoulder all the responsibility to achieve success. It is necessary to have the initiatives and concerted efforts of the industry, the institutions and the academic circle too.

In this research, we discover that the Singaporean Government has set a good example for matters related to land boundary. Since Singapore became a sovereign state in 1959, it has been determined to tackle the root of the problems in the land boundary system. Since 1990s, the Singaporean Government has made efforts in carrying out cadastral reforms in land boundary survey and the Singaporean Legal Coordinated Cadastre was established in 2004. But the most encouraging move is its endeavours to give the system a legal status: the enactment of a survey law, i.e., revised in Land Boundaries and Survey Maps Act, for the protection of the rights and

interests in land. All its land boundary-related matters are governed by legislation.

The stability of a country hinges mainly on the integrity of its legal system. Most of the countries around the world are no longer administered under imperial power, but governed by the people. The purpose of the enactment of legislation is to protect everybody's rights and interests, which is deemed as one of the essential elements for administration. Singapore attaches great importance to this point, so it has kept striving for the protection of rights on land boundary.

Britain also has a similar perspective. It has drafted and revised boundary-related ordinances, and has implemented the Land Registration Act 2002 since the beginning of the 21st century. An improved concept, "determination of the exact line of a boundary", was introduced in the Act. This scheme allows landowners to have an opportunity to tidy up the boundaries of their land, which is a great break-through in the improvement of boundary security. Both Britain and Singapore have adopted some policies dealing with land boundary matters as they do understand the importance and the impact of land boundary security. Singapore has implemented a legal coordinate cadastre, while Britain has introduced a new boundary determination concept.

The HKSAR, as an international metropolis, also follows the international mainstream practice to make technological changes in the system in recent decades, such as e-submission, Geospatial Information Hub (GIH), and

Integrated Registration Information System (IRIS). However, in addressing land boundary problem, the HKSAR Government chooses to adopt milder tactics such as surrender and re-grant to tackle the problem. Furthermore, there is no survey law at all to protect the interests of land, which means that security is low and landowners' rights are undermined.

If the HKSAR Government continues to adopt this policy on land boundary matters and do not tackle the problems at the root, the land boundary system may be diminished one day. Merely upgrading the technology-related aspects of the system but neglecting the inherent problems is just curing the symptoms, but not the disease. Technology is just a supplementary tool. Its function is to offer better and more convenient services, but not to solve the intrinsic problems. HKSAR is a region practising the rule of law. Legislation is the most direct and feasible way to safeguard boundary security. In this respect, the Government has an unshirkable duty. The current land policy pays too much attention to the transaction process and the registration of ownership, rather than to the protection of other cadastral rights, such as boundary rights. This practice provides scope for free maneuver by property developers and a free-market access to land. In tackling the intrinsic land boundary problems, Singapore and British have set fine examples for Hong Kong to follow.

As a matter of fact, the land professions and the Government have been dealing with the problem. In April 2002, the Hong Kong Institute of Surveyors (HKIS) has written to the Chief Executive of HKSAR, proposing a systematic re-survey of Old Schedule Lots in the New Territories. The cost

of the survey is estimated by HKIS at about $1.9 billion for a period of ten years. However, the suggestion was not accepted by the Chief Executive because of financial considerations. On the other hand, to tie in with the Titles Registration, there is a clause in the Land Titles Ordinance to stipulate the determination of lot boundaries, but the application of this procedure is limited. Furthermore, many professionals have identified the problems and urged the Government to deal with the problems through open speeches, presentations and journal papers.

Looking at these problems, a real boundary survey case is investigated and analyzed in this research. The case is a typical example illustrating and identifying the problems embraced in the system. Not only do the problems relate to the technical aspect, but they also involve the historical, legal and human factors. Hence, to tackle the root of the problems, determination of lot boundaries is deemed to be one of the feasible solutions.

In the research, the feasibility and immediacy of implementing determination of boundaries is discussed. In fact, apart from law protection, HKSAR fulfills the prerequisites for implementing determination of boundaries. After evaluating the cost and benefits, a proposed determination of lot boundaries mechanism is introduced. The proposal has looked into the application of determined boundary and its procedures, set out the routes for each case, and also the procedure for objection by abutting landowners. An allowable survey tolerance (in area calculation) for the registered area in old records is created. The tolerance levels are set based on the map scale and units of registered area. Although the mechanism still has much room for

improvement and refinement, it does provide a blueprint for officials to carry out determination of lot boundaries in order to upgrade the boundary security as well as landowners' rights and interests.

To optimise the mechanism, some recommendations are made. For example, a resultant land boundary plan is deemed as a registered boundary plan; a correction procedure for the land boundary plan; and the power of entry for determination of lot boundaries. Legal liability and the indemnity for the discrepancy of the determination are the two major topics to be discussed. The Government, on behalf of the land grantor, should not bear any legal liability and compensate for the discrepancy made by the determination. However, the surveyor who signs and certifies the resultant land boundary plan and survey report should bear the legal liability in accordance with his professional conduct.

A successful cadastral survey system should be simple, clear, accessible and reliable. It is also necessary to provide security of tenure and up-to-date information at a low cost. If HKSAR is to adopt a legal coordinate cadastre like what Singapore does, most of the land boundary problems could be readily solved. However, to implement a legal coordinate cadastre, it would take a long time and require a lot of resources. It seems impracticable in the current situation in Hong Kong. Implementing the determination of lot boundaries is one of the options, which could also achieve the above goals. The HKSAR Government could choose to stay put for the current land policy and wait until the 30th of June 2047 (the expiry of most of the land grant), and use an administrative method to deal with the problems. However, this is

rather a passive and negative approach. To be a responsible government, it should adopt a positive approach in dealing with the problems. The author is confident that the land boundary system in Hong Kong can be upgraded to a world-class standard, and both the government and the general public could be benefited if the determination of land boundaries is carried out.

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Appendix A

An Online Contact Form (ref: 2259) for seeking the information of determined boundary in HM Land Registry (dated September 10, 2007)

ID:	2259
Category:	General enquiries
Name:	Adam Yau
Organisation:	Department of Land Surveying and Geo-Informatics, The Hong Kong Polytechnic University
Telephone:	-
Fax:	-
Email address:	Postal address
Preferred contact method:	Email
Property address:	-
Property Title Number:	-
Message:	Dear Sir/Madam I am a research student of Land Surveying in The Hong Kong Polytechnic University, and I am doing a research about boundaries. Hence, I am seeking your help to get some information from Land Registry, UK. According to LRA2002, it allows land owners for determining the exact line of their lot boundary. Hence would you please provide me with some statistics (from the beginning up to the present) of the registered land under this scheme? Please feel free to contact me via e-mail provided for enquiries. Thanks! Regards Adam

A reply mail from the staff of HM Land Registry (dated September 11, 2007)

Dear Mr. Yau

Thank you for your enquiry.

Unfortunately, Land Registry does not hold the information requested. However, further reading on the subject of determined boundaries can be found in Land Registry Practice Guide 40-Land Registry plans and Land Registry Public Guide 6-Boundary questions. Both leaflets are available to view and/or download from the website www.landregistry.gov.uk following the link to publications and leaflets.

I hope that this information is of assistance.

Yours sincerely

John Brooks

Land Registry

Customer Information Centre

Appendix B

K. B. CHAU & CO.

周百邦律師事務所

SOLICITORS & NOTARIES

OUR REF: [redacted] DATE: 25th November 2004

YOUR REF:

[redacted]

Dear Sirs,

Re: Lot No.1552, Section A, Sub-section 4

We act for Mr. [redacted] and Mr. [redacted], the owners of the above land.

We refer to the pink area of the enclosed government plan, being a portion of our client's land and understand that you are the owner of the neighbouring land, i.e. Lot No.1552, Section A, Sub-section 7 RP.

We are instructed that a factory was built on our client's land which was intentionally built one foot inward so as not to hinder the boundary of our client's land. However, upon examination of the government plan, it was found that your structure had been built touching our client's structure. In view of that, there is clear evidence that your structure is now trespassing our client's land actionable in law.

In the circumstances, we are instructed to give you notice that unless you do, within 1 month from the date hereof, remove your said structure from our client's land, we shall institute legal proceedings against you without further notice and in such event, further costs to be incurred shall be for your account.

Yours faithfully,