

Cadastral Evolution in British Columbia

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Abstract

Since the first settlers arrived in British Columbia in the 1800s the legal survey profession has been conducting field surveys and representing that work on physical media. The focus of these legal surveys has been to establish or re-establish property lines relative to nearby properties. Over the past several years collective efforts by the Surveyor General of British Columbia and the Association of British Columbia Land Surveyors have seen the emergence of an expanded vision of the role of the land surveyor in British Columbia. In this new vision the land surveying profession would not only conduct traditional legal surveys but they would also position those surveys in the world and represent their work in a dynamic, electronic representation of the cadastre.

This presentation will take the audience through the journey of moving from the world of relative positioning represented on Mylar to the added value of absolute positioning or georeferencing and electronic representation of legal surveys.

Introduction

European influence in British Columbia is a relatively recent event compared to much of the rest of the country. Since establishment of Fort Victoria in 1848 settlement of the province has occurred at an ever increasing pace to a point where there are now over 2 million active titles to land. British Columbia has enjoyed a philosophy of *legal survey before settlement* from the very beginning. Accordingly the land surveying community has been at the forefront establishing the location of property lines on the ground and demarking property corners with a variety of markers. Thus the field component foundation of our cadastral fabric was well established.

However, though various attempts have been made and partial successes have occurred, British Columbia has yet to compile a complete, accurate and seamless representation of all property lines in the province.

This paper is intended to briefly outline the history of the cadastral fabric in British Columbia and to discuss what the future might look like in this regard.

Critical components and characteristics of a cadastral fabric include:

- A clearly defined extent of the cadastral fabric – ideally for BC this is the complete province inclusive of all Crown and private land and water;
- Retention of historic data;
- Attribution to track the spatial accuracy of each property corner;

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- Metadata to record the source of all data;
- Processes to encourage improved accuracy of the composite fabric;
- All dimensional changes to the cadastral fabric must be made by competent professionals working to a common standard – typically a legal survey prepared by a land surveyor;
- All changes to the cadastral fabric can only come into effect when accepted by a responsible agency – typically registry offices that have legislated mandates;
- Changes to the cadastral fabric must occur in a manner that promotes ever increasing accuracy of this representation of the cadastre;
- A common framework is required throughout the extent of the cadastral fabric – typically a suitable map projection is used;
- All changes must be sufficiently defined to allow accurate updating of the cadastral fabric – typically this requires georeferencing of each survey or satisfactory reference to previously georeferenced surveys or control points.

Background

What constitutes British Columbia – the extent of the fabric

British Columbia consists of approximately 95 million hectares of land and water. 93% of this area remains Crown land while the remaining 7% has been alienated, over time, by the Hudson Bay Company, the Colonies of Vancouver Island, New Caledonia and British Columbia, the province of British Columbia or the Dominion of Canada. There are a number of “holes” within the external boundaries of the province which include land and water that does not fall under the jurisdiction of the province. Examples of these would include the roughly 1600 Indian Reserves that are owned and administered for First Nations by the federal government, National Parks and federal harbours.

The professional land surveyor – the competent professional

The history of the professional land surveyor in BC began with Royal Engineers and Dominion Land Surveyors. In 1891 the first provincial act was passed identifying a body of professional land surveyors with right to title legislation. This Act gave land surveyors a home but did not make it mandatory for legal surveys to be conducted by this professional body. This changed in 1905 when the first *Land Surveyors Act* was passed and the self-regulating organization known as the Corporation of Land Surveyors of the Province of British Columbia was formed. Upon proclamation of this Act all legal surveys in the province had to be conducted by a BC Land Surveyor to a common standard of care. In 2005 the *Land Surveyors Act* was amended to update the self-governing professional body which is now known as the Association of British Columbia Land Surveyors.

Registry systems in British Columbia

There are and have been many registry systems through the history of British Columbia to record ownership or rights to land, water and natural resources. While there should be a simple, accurate and accessible registry for the rights to land, water and natural resources, the lack of a cadastral fabric in British Columbia has

led to disconnected systems being designed and maintained over time. Arguably the creation of a reliable, accurate, real time representation of all the cadastral fabric in the province will establish the foundation upon which all other registry systems can be based on and allow for a clean, unambiguous analysis of all rights and interests for any part of the province.

Registry systems for land ownership and for certain rights over the surface of the land include the Land Title Registry for privately owned land and the Crown Land Registry for Crown Land. Up until January 20, 2005 all registry services had been the responsibility of the provincial government. On January 20, 2005 the Land Title and Survey Authority of British Columbia was formed and took responsibility for the operation of the Land Title Registry and the Crown Land Registry.

Disposition of Crown land is governed by the *Land Act*. The *Land Title Act* and *Strata Property Act* govern the private cadastre. None of these Acts provides any guarantee of the size, shape or location of a property. All Acts require that all changes to the cadastre be filed in one of the two registries noted, in order for the change to have any force and effect under law.

Land Registration – the registry offices, private land

For most of its history British Columbia has used a Torrens system of land registration to manage privately held lands. Initially, Absolute Fees were managed by the land registry system but in the early part of the twentieth century the *Land Title Act* was established introducing the concept of Indefeasible Title guaranteed by the Crown. A cornerstone of the concept of Indefeasible Title is that generally a legal survey, conducted by a British Columbia land surveyor, is required to create or redefine a parcel of land within the Land Title System. Scrutiny is provided by the professional land surveyor and by a plan examiner in the Land Title Office system to ensure that every new survey respects the boundaries of adjacent parcels. Through this process a strong system of relative surveys and plans exists throughout the province and title to private land is based on those surveys and plans.

Common Reference System

In British Columbia the Universal Transverse Mercator projection is used by the provincial government as its standard mapping reference, however since four zones are required to cover the whole province this projection does not fulfill the criteria of a single common framework. The BCAlbers projection was adopted as the standard reference for internet mapping frameworks for the whole province due to its more favourable map projection properties.

For many decades British Columbia has actively maintained a system of physical control markers throughout the province. At one point this control network comprised over 60,000 points which were cohesively adjusted. Over the past 2 decades active control has been introduced and enhanced so that there are now more than 16 active control stations distributed throughout the province. In addition real time networks have been established in the Capital Regional District

and Metro Vancouver. All of these control points are referred to the Canadian Active Control system and are referenced to NAD83 CSRS.

Integrated Survey Areas – a partial georeferencing solution

Beginning in 1968, local jurisdictions have been able to follow a process to establish themselves as Integrated Survey Areas (ISA). When an ISA is constituted, a specific minimum density of control monuments is established within the area and a high precision control survey is conducted. The results are then reviewed by the Surveyor General and by the province and once accepted, an Order is issued to establish the ISA. Once established, all subsequent legal surveys in the area must tie to 2 or more ISA monuments which serves two very important purposes – legal surveys become georeferenced and legal surveys are related to a common reference system. There are currently 53 active Integrated Survey Areas in BC.

Georeferencing

As noted above any survey plan prepared in an Integrated Survey Area is georeferenced. There has also been a requirement since 2004 that any survey where GNSS has been used to establish the local azimuth reference also be georeferenced and that a mathematical connection to a control point be noted on the plan. Currently the Association of BC Land Surveyors is working on an initiative to require all legal surveys in BC to be georeferenced.

Existing Cadastral Fabrics

As an electronic representation of a local cadastre is a business need for many entities varies representations to varies standards and accuracies have been developed in pockets throughout the province for years.

Many local governments have compiled cadastral fabrics for their jurisdiction as a foundation for their internal information systems. Many resource businesses and utility companies have cobbled together cadastral fabrics for their areas of interest as a backdrop for their specific business needs. The province has compiled a cadastral fabric of primary parcels in the province in an attempt to manage Crown land. In fact, every legal survey that has ever been done in this province has required that the land surveyor compile a cadastral fabric for the local area surrounding the subject of the survey.

Various initiatives have or are actively trying to bring together a province-wide cadastral fabric. Most notable is the Integrated Cadastral Information Society (ICIS). ICIS was established in 2001 as a not-for-profit society comprised of many local governments, the provincial government and some utility companies with the express mandate to create a seamless map representation of the cadastral fabric of the province and to then share infrastructure data overlaid on top of this map representation.

Electronic Survey Plan Project

In 2002 the Surveyor General of BC undertook a project to firstly create the opportunity to prepare legal survey plans in an electronic format and secondly to

facilitate the concurrent submission of intelligent data regarding changes to the cadastral fabric. The first phase of this project is now nearing completion and as of February 28, 2008 all legal surveys in BC can be submitted to the Land Title Office or the Crown Land Registry in electronic form. During the course of this project a lot of research was completed regarding the submission of intelligent data of legal surveys and how that data could be used to create and/or maintain an accurate, real time map representation of the cadastral fabric for the province that could be maintained as close to source (i.e. by the land surveyors).

Discussion

Why is a provincial map representation of the cadastral fabric important?

Up until a few years ago cadastral fabric map representations were only important to people that wanted information in quite a localized way. The land surveyor would compile a representation for a specific area that was under survey as a backdrop for the legal survey plan. The local government would compile a map representation as a backdrop for infrastructure such as sewers and water mains. Over the past few years and particularly since the introduction of products like Google Earth and Virtual Earth the general public are using online information systems for day to day activities.

As the use of these systems increases, the demand for more information grows and as a result the demand for more accurate information also increases. In British Columbia the government has been publishing more and more information on accessible web sites so that the general public can now query and determine information about Crown land. The problem is that all of this information is being put on a framework that does not include a reliable, real time representation of the cadastral fabric. The absence of this fundamental base layer is resulting in multiple representations of the same property line being shown as a backdrop or in some cases an incomplete or incorrect map representation is being used.

The drive to publicly share information is very strong and yet the importance of that information being referred to a solid cadastral map representation is not a priority with many information publishers.

Who should create and maintain it?

There appears to be two major hurdles on the path to the establishment of a complete, accurate and seamless representation of all property lines in the province. The first is determining who should be the custodian of a cadastral fabric for British Columbia and the second is how such a venture should be funded. To address these two points it is important to create some distinctions.

While many people and agencies may use the map representation of the cadastral fabric there are a limited number of parties who are actually involved in the creation or change of the fabric. Fundamentally the cadastral fabric is altered when a new parcel is created or when an existing parcel is altered. In order to create or alter a parcel a land surveyor is generally required to conduct a field survey, place

survey posts at the property corners and to prepare a plan to represent the location of those survey markers. However the change to the cadastral fabric does not occur until that survey work is accepted by either the Land Title Office or the Crown Land Registry. Many other parties and agencies may be consulted through the process of achieving acceptance by a registry but fundamentally the land surveyor and the registry office are the parties responsible for any change to the cadastral fabric.

Funding a map representation of the cadastral fabric falls into two categories – firstly the initial build and secondly, the maintenance. If a process had been in place to require the compilation and maintenance of a map representation of the cadastral fabric from 1848 there would be no cost associated with an initial build but since that did not occur, this build cost is a reality. With regard to maintenance costs these generally only occur when the cadastral fabric is updated or altered.

Given that a map representation of the cadastral fabric for the entire province does not exist at this time there are no definitive answers to the question of who should create and maintain the map. Currently discussions are being held between the provincial government as represented by the Integrated Registry Branch of the Integrated Land Management Bureau, the Land Title and Survey Authority of BC and the Association of BC Land Surveyors. The intention of these discussions is to see if an agreement can be reached to create and maintain a map representation for all the provincial cadastral fabric. These three organizations represent the parties that effectively create or change the cadastral fabric through legal surveys and registry functions.

Who will use it?

If a map representation of the cadastral fabric was available it is expected that its use would be widespread. This fundamental mapping layer could be used in virtually any spatial representation of ownership, interests in land and water, improvements in, on, under or over land and water and resources in, on, under or over land and water. Examples of users of a cadastral fabric include:

- Land surveyors
- Local governments
- Resource companies
- Registry offices
- Utility companies
- 911 services
- Emergency planning services
- Provincial government
- General public

Conclusions

The cadastre is a dynamic entity that is continually changing as a result of surveys that define and redefine property corners and parcels of land. In British Columbia the true cadastre is the physical survey posts set by land surveyors to define

property corners. There is a growing desire and need in society to compile a representation of the cadastre into a complete, accurate and seamless map. To achieve this goal, leadership is required by the parties that create and change the cadastre, namely the provincial government, the Land Title and Survey Authority of BC and the Association of BC Land Surveyors.

The evolution of the cadastral fabric and the technical format for compiling and representing the fabric is changing rapidly. The trends toward integrated devices such as Blackberries with online mapping and GPS positioning will simply exponentially increase the need for a solid map representation. The time has come to move forward with the creation of a cadastral fabric for British Columbia.

Author Biographies

Brent Taylor is a British Columbia land surveyor and a Canada Lands Surveyor who has been working in the land development environment since 1981. Over the past 5 years he has worked closely with the Surveyor General of BC and the Association of BC Land Surveyors to explore ways in which surveys in BC can be submitted in electronic formats that would result in a seamless electronic cadastral fabric representation for the province. At this time the first phase of this project allows for the submission of electronic survey plans to the Land Title Office and the Crown Land Registry in a PDF format.

Jeff Beddoes is a British Columbia land surveyor and a Canada Lands Surveyor who worked in private practice from 1981 to 1992 at which time he joined what is now the Surveyor General Division of the Land Title and Surveyor Authority of British Columbia.

Jeff Beddoes, BCLS, CLS, Senior Deputy Surveyor General of British Columbia and Brent Taylor, BCLS, CLS, Polaris Land Surveying Inc. have co-managed the Electronic Survey Plan Project since 2003 and have had significant involvement in georeferencing initiatives and the study of a Cadastral Parcel Fabric for British Columbia.