

Legislation For Urban Surveying and Mapping

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ABSTRACT

The lack of understanding of the Administrators of the need and importance of accurate survey and mapping records is reflected in the complete lack of legislation in this area.

Suggested is an amendment to the Municipal Act requiring the development of a Survey Data Base for Urban Areas. The benefits to be derived, the methods of obtaining the data and the cost considerations are all discussed. Until Surveying and Mapping is considered a separate service to be provided, and Municipal responsibilities in this area are spelled out, the private and public sectors will be denied the benefits of reduced survey costs and increased information.

INTRODUCTION

The need and economic justification for integrated urban surveying and mapping systems is self-evident.

Centralization into urban communities has been caused in part by industrialization. The demands of our industrialized society for public utilities has far exceeded our original need for good roads. Now included are water, telephone, sewers, gas, oil, garbage collection, transit systems, electric power, etc. A large number of these utilities are now buried and hidden from the view of the public and from those who must service and maintain them.

Society has retained its concepts of sanctity of private property and boundaries and has added planning requirements related to land use and spacial relationships. To fit new works into our complex urban communities, engineers, architects and developers require detailed surveys before and during construction. This ensures that the new works are placed in their proper position and are connected to the utility life lines of the community. Unfortunately, the Municipality who must maintain the total urban complex usually receives isolated islands of survey information referenced to temporary points.

When we speak of integrated urban surveying and mapping systems we are not contemplating large increased costs, but rather a channelizing of present spending. We are stating that joint efforts will reap benefits for the total community and its individual parts.

Three Principles

As this subject relates to activities of urban government three principles should be kept in mind:

1. A community through governmental effort and co-ordination can do a number of things that would be impossible to

accomplish through individual effort.

2. Municipal Voters are often reluctant to vote for even worthwhile undertakings because they can foresee an immediate increase in their taxes.

3. Municipalities only possess the powers given to them by the Provinces. Our problem then is to start integrated urban surveying and mapping for the common good, recognising the restrictions placed upon us. To pass appropriate legislation we need to examine to what extent Government needs to co-ordinate or interfere with survey activities in the private sector, which level of Government should administer the new survey system; and finally how the cost of the system can be borne on an equitable basis.

GOVERNMENT INVOLVEMENT

The extent of Government involvement required in the survey activity of newly developing urban areas will be considered first, then we can consider adjustments to accommodate existing urban communities.

Presently there is a large number of laws, regulations and by-laws exerting pressures on developers, relative to land subdivision, registered plan presentation, survey monumentation, utility placement, building locations etc. Some of these require developers to expend time and money for survey work and mapping that would not be required under a new system. On the other hand, records of the "as-constructed" works referred to permanent marks for future use are not presently required.

A few changes in the present rules could reduce costs to the developer and provide better and more accurate information for the public and future property owners.

System Components

To start our study we can list what

an integrated survey and mapping system or Survey Data Base would be composed of.

- Horizontal and vertical control systems, of a density compatible with intensity of development, monumented and physically maintained.
- Buildings, roads, utilities, docks, sidewalks and other major physical structures and features on, above or below the ground, referenced to the control systems.
- Property and street boundaries referenced to the control systems.
- A data handling system (usually on a third generation computer in large communities), to store, sort and manipulate the graphic and numerical data to prepare appropriate reports, base maps, etc.

Following Steps

With this scheme in effect a developer in a new urban area would proceed as follows:

- 1) Intensify the control monumentation to the density required for the new development.
- 2) Relate the property boundaries of the holding to the system (if this had been previously done he would obtain the information from the Municipality).
- 3) Prepare topographic maps for the site based on the co-ordinate system (again if this had been done he could obtain these from the Municipality).
- 4) Plan and design the development.
- 5) Calculate and prepare a plan for registration of the approved scheme. No survey monumentation is required at this time.
- 6) Design, calculate and layout (from the control network) buildings, roads, utilities, etc.

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- 7) Complete construction and grading and place additional control monuments in easily maintained locations.
- 8) Place temporary property markers to enable owners to build fences, etc.
- 9) Provide "as-constructed" data and base maps showing buildings, roads, utilities, all referenced to the control networks to the Municipality. (Larger communities may require co-ordinate data on computer tapes or cards).
- 10) Provide building site sketches showing co-ordinates and ties from buildings to property corners, property lines, street lines and to walls of adjacent buildings. (These are to be kept in a book to enable future owners to maintain their property boundaries).

More Effective

Under this scheme the developers can register his plan faster, does not pay to place property stakes just before they are graded out and is able to use modern survey and computer techniques to design the project and speed-up construction layout.

The new owners acquire a lot staked and ready for fencing and future owners will find a sketch of survey of their holding in a public office showing in simple terms the location of the holding relative to buildings and the control network. The Municipality receives records of all works, both above and below ground, in a form that can be readily integrated into their records, in addition the developer has extended and intensified the control networks as part of his project.

The developer pays less for his surveys and reduces the time required to register the subdivision plan and to perform construction surveys.

The owner does not have to pay extra to have his property boundaries located before he constructs a fence.

Immediate Action

Future owners can perpetuate their own boundaries by obtaining a copy of the sketch in the public files or can have a Surveyor very quickly set the boundary directly from the buildings in the immediate area. The Municipality can reduce its own survey and mapping costs for future public works, maintain the public utilities more easily, quickly locate gas mains, etc., have accurate records available for assessment, taxation, and land registration purposes.

For land registration a master set of property base maps could be prepared and each subdivision or survey creating

a new boundary would be treated as an application to amend the property base maps. Therefore, it will only be necessary to retain records of existing parcel divisions. The existing underlying lot fabric would disappear, thereby eliminating the need for Surveyors to perpetuate lines no longer used as parcel limits.

For survey purposes the control survey monuments act as permanent witness monuments to all property corners. Temporary markers can be set at property corners when needed by land owners.

When new buildings, roads or utilities are constructed in the area, the owners or companies would obtain the pertinent accurate information required from the Survey Data Base and would, as a condition of obtaining the appropriate permit, return "as-constructed" data to complete the cycle and keep the records up-to-date. The private sector would continue to perform the actual surveys but the owners would be required to submit accurate survey returns in an organized manner.

Government Involvement

The Government involvement in the private sector appears to be in the area of changing and up-dating the existing rules and in particular those relating to survey monumentation, permanent reference systems and filing of survey plans by owners. In addition the Government must assume the obligation of establishing and maintaining the permanent reference or control survey systems and of establishing and maintaining survey records or a Survey Data Base.

A review of existing Provincial regulations, etc., would indicate where changes need to be made in land registration requirements, subdivision agreements, survey monument regulations, building and utility permit requirements, etc. In existing urban areas not only must the Government set the basic control networks, but they must also intensify the networks according to the existing intensity of development. They must also prepare, by aerial survey methods, the large scale base maps, and survey by reference to the control system, the boundaries of public streets and lands.

A part of this work will be an overlap of that required anyway for public works projects. Other parts can be performed by the private sector in connection with construction and re-development schemes. To be effective, the whole system must be completed in a reasonable length of time and from then on, the normal cycling of information will keep it up-to-date and fill in any blank spots.

PROVINCIAL/MUNICIPAL RESPONSIBILITY

Provincial and Municipal Governments

both require survey and mapping information and both will be involved in amending regulations, etc., to create the Survey Data Base. Which level of Government should be involved in the day-to-day data handling?

In Ontario the Province has given power to the Municipalities to perform surveys as needed for individual projects. Similarly, the Province has divided its own surveying and mapping activities among different Departments on a project basis.

These actions reflect a lack of appreciation by the Administration of the value and benefits to be derived from a central depository of survey data all related to a common permanent reference system. Project surveys are indeed needed but a central depository of information could greatly facilitate work on individual projects.

Municipal Government Role

A few comments on the role of Municipal Government may assist in determining whether the data should be handled at the Municipal or Provincial level. The main reason Municipalities were originally formed was to require them to build and maintain good roads, to provide free education and to provide for public welfare. At that time one of the major sources of public funds was a tax on real land and property.

The bulk of Municipal spending is still for Education, Transportation and Social Services but wealth has shifted from real land and property to intangible wealth and income. Property tax has diminished in importance and public funds now come mainly from Corporate, Personal, Gasoline and Sales Taxes.

The urban community is now required to provide a broader education, more diverse types of social services and a large number of public utilities. Property Taxes can no longer equitably supply the necessary funds.

Provide Contact

On the other hand Municipal Governments do provide a means to retain contact and control by the people in the local community. Regional Municipal Governments provide the means to have viable units that can perform work efficiently, afford high cost equipment and specialists and can still retain contact with the local community. Most of the services provided by the Municipal Governments effect the day-to-day lives of residence.

The concept of paying property tax for direct tangible benefits received is almost past.

Municipal Governments now try to provide the required services, at the required efficiency, using various sources of public funds, and still keep the work

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under close control of the local people.

The operation of a Survey Data Base requires a day by day appreciation of changes in the local scene. The information to keep the data base up-to-date will be "as-constructed" plans, referenced by the control networks, submitted by owners as a condition of obtaining a permit or agreement to construct or change a building, utility, etc. The Regional level of Municipal Government is large enough to acquire the equipment and have the experts on staff to handle the data, and yet is close enough to the people to respond to local changes and demands. Most of the information required at the Provincial and Federal level need not be of a detailed nature and will be aggregated from the files.

Change Act

I believe the Regional or Metropolitan level of Government is best able to undertake the day-to-day operation of a Survey Data Base. The Province should therefore empower, and indeed direct Municipalities to establish and maintain these systems by changing the Municipal Act.

Submitted, herewith, is a rough draft of an amendment to the Municipal Act. The sections relate to the following:

1. Requires Regional Municipalities to establish Survey Data Banks.
2. Establishment and maintenance of control networks.
3. (a) Requiring the use of co-ordinates on all registered legal survey plans;
(b) Requiring owners to maintain an intensive control network when land is subdivided;
(c) Requiring owners who must obtain approval or permits for construction of physical structures or works to file "as-constructed" plans based on the control networks;
(d) Requiring payment by owners of works in 3 (a) and 3 (c) to pay a special charge to up-date the Municipal records.
4. Requiring Municipalities to survey boundaries of public highways and lands.
5. Requiring the base maps be kept up-to-date for public inspection.
6. Providing for the appointment of a Professional Surveyor to oversee the systems.

The Province needs to establish uniform regulations for the keeping of these records thereby ensuring uniform standards, accuracy and procedures. The Federal Governmental Departments and Agencies involved in Urban Affairs, Housing and Construction should take appropriate action to encourage the

establishment of a Survey Data Base and to assist Municipalities in the development of computer systems to effectively utilize the Survey Data Base for Planning, Engineering and Surveying.

COST SHARING

The draft amendments to the Municipal Act as set out in Section 3 (d) requires that a special charge be paid to up-date the Survey Data Base by owners who make physical structure or boundary changes to their property. This charge is to enable the Municipality to take the "as-constructed" data being supplied by the owner and merge it with existing records.

It is suggested that this charge be on a square foot basis. This reflects the area of physical change on both the ground and the base map.

I argued that this is an equitable charge since (1) the record was up-to-date for the owner's benefit before the change was made, (2) the owner made the change for his own profit, benefit or pleasure and (3) the owner should pay to up-date the record and put it in the way he started. The records may not be completely up-to-date when these survey schemes are first started but the basic principle that he who makes the changes and thereby benefits, should up-date the record for those who following is sound.

The charge would be paid by those obtaining permits for such works as buildings and utilities and should apply equally to other Government Departments building roads, bridges, dams, airports, etc.

Sample Charges

If the charge was \$0.001 per square foot the following would be a sample of the charges:

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| (1) Construction of a house on a lot | 5,000 sq. ft. | \$5.00 |
| (2) Construction of a garage and driveway | 840 sq. ft. | 0.84 |
| (3) Construction of an office building | 20,000 sq. ft. | 20.00 |
| (4) Subdivision houses, roads etc. — 50 acres | 2,178,000 sq. ft. | 2,178.00 |
| Note: if 5 lots per acre | | |
| | Per Lot | 8.71 |
| (5) Utility — using 10 ft. right-of-way | Per Ft. Centre Line | 0.01 |
| (6) Road — using 66 ft. right-of-way | Per Ft. Centre Line | 0.066 |
| (7) Road — using 120 ft. right-of-way | Per Ft. Centre Line | 0.12 |

As noted the charge on the owner is not for the purpose of maintaining the control networks, nor to administer the system, it is to up-date the records. We can expect a small return from the sale of maps and records, but to be

effective, this should only be sufficient to pay the printing costs, etc.

Information should be available free, if possible, to ensure anyone planning or contemplating a project full access to all the records.

The remaining costs to operate the system should be borne by the ability to pay formula, not on the basis of benefits received. Provinces are aware of the financial problems of Municipalities and subsidies for various purposes are available. As both the Federal and Provincial Government stand to benefit from the systems, particularly as they relate to Public Works projects, land registration, assessment, regional planning and Provincial and National Mapping, a good argument can be made for subsidies.

It should be remembered that the justification for administration of the systems at the Municipal level was not the ability to pay, but efficiency. It is reasonable that a large share, if not all the Municipal costs, should be borne by the higher levels of Government.

SUMMARY

Without being empowered and directed by the Provincial Governments urban Municipalities may not embark on a program of urban surveying and mapping. It is now within our means, using modern survey techniques and equipment, to benefit both our clients and the community by changing the methods of performing and filing surveys. It appears that the present level of spending, in many established Municipalities, for projects oriented surveys could be used to initiate control survey systems if various other survey regulations are changed. In addition, the Provinces need to provide some additional funds to establish the basic control survey networks.

In newly urbanizing areas immediate returns would be realized by changing various survey regulations and requiring the filing of properly co-ordinated survey and "as-constructed" plans.

Create Survey Departments

Regional Municipalities should create Survey Departments with the skills and equipment necessary to build and maintain a Survey Data Base.

The establishment of control systems, nor the requirement to relate some property surveys to these systems, can drastically reduce future survey costs or supply the information needed by complex urban communities. What is needed is a complete review of our project oriented survey approach.

It is suggested that a Survey Data Base administered by Regional Municipal Government, under Provincial controls and standards, will solve most of our survey problems and greatly benefit the community.