

TORONTO'S CENTRAL PROPERTY REGISTER

Everything you always wanted to know about your property, but were afraid to ask

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The City of Toronto's Central Property Register provides the user with a series of light pen selectable property displays, retrievable by proper address. The files necessary to support these displays, however, were created during the last fifteen years using differing design philosophies, and with varying levels of accuracy.

Because any City's property structure changes as time passes by, and because various users of the files may use different addresses to describe the same property, it was necessary to create a superstructure which would overlay all of the existing systems and solve those problems associated with referencing computerized property data. All of this had to be achieved without disrupting any of the existing systems, yet would capitalize on the money and effort already spent on systems work, programming and data entry.

At the same time, the ability to process property data on a geographic area level, using polygons which could easily be defined by various users, was required.

In order to achieve this goal, a Master Address File was created using precise property maps plotted in the Ontario Coordinate System. This Master Address File keeps track of property changes as parcels are merged or split; provides the switching mechanism to all other property displays, and contains the centroids (geographic locators) used for polygon analysis.

As this system gradually assumes control of property address changes, any user enquiring about a property which existed a number of years previously may automatically be switched to its present day situation, or may elect to view its historical information. This property system was designed to cope with the next twenty five to fifty years of property structure change in the City of Toronto, and can assume control over any number of property related files which may be created in the future.

In the beginning

In 1968, Toronto City Council requested that all departmental records

pertaining to properties be correlated and entered into a group of computer files called the Central Property Register. For the first few years, the Assessment and Taxation File (see Figure 1) was the main file in the system, containing a record of every property in the City. Four more property files were created during the period from 1971 to 1976. The Building permit applications file contains a record of every permit ever applied for, or issued, for a given property, and monitors an application's progress through the Department from the time of application to the time the structure is complete. The Water Revenue file contains the data necessary to monitor the water consumption at a particular property, to provide the data necessary for inspection and meter reading, and to keep track of the accounts receivable. A property sales file provides the buying and selling history of that site, including the names of purchasers and vendors, and the prices paid. A zoning and legislation file provides a record of all the bylaws and other restrictions on the use of any property, including its basic zoning, subsequent exemptions and amendments, and current considerations

by council and its committees to modify the zoning.

All records in these files are retrievable by property address (see figure 2) using a light pen selectable display system. This provides the user with an apparently unified system, even though the individual files were created over a number of years, using different design philosophies.

Another file which has provided valuable data for the last ten years is the Planning Land Use file. This file, while not displayed by property address, has been correlated with the other property files using various computer programs. Its future redesign, which is closely related to the systems outlined in this paper, is described in a paper presented by June Gray at this conference.

Problems with correlation of property data

However, as time goes by, the property structure of the city changes, (See figure 3). Properties are amalgamated or split, requiring a complete change in property addresses, (see figure 4). Different enquirers may use different addresses to describe the same property. This means that although we have a unified display and retrieval system, the data about a given property may be listed under different addresses in the various user files. It also means that an address which may have been entirely correct a year ago, now is no longer in existence.

05 4 090-0280		1977 REALTY		REGULAR	5-0980-1010		PAGE 1
ASSESSED OWNER							
ONE ST CLAIR AVE W LTD					1 ST CLAIR AV W		
CANADIAN IMPERIAL BANK OF COMMERCE					87.5 FT x 110.0 FT		
STE 602, 45 RICHMOND ST W					WDNS TO 88 FT 9 IN		
TORONTO, ONT M5H 1Z2							
LND	R-P		DATE	REFER	INTEREST	PENALTY	PAYMENT
BMN	1,008.250 R-S		01/01/77		75 IN 7YJ	C68,611.61	
BOT	RES		02/02/77		DATE OF DEMAND	KCH	
EXM	C-P 998,100		22/03/77	00527		467-92-	22928.02
DHE	C-S 8,150		19/05/77	02327		477.26-	28917.74
-	COM 1,008,250						
11	23,395.94 14						
12	23,395.00 15						
13	23,395.00 16						
T1	70,185.94 TF						
-	TT 70,185.94						

FIGURE 1

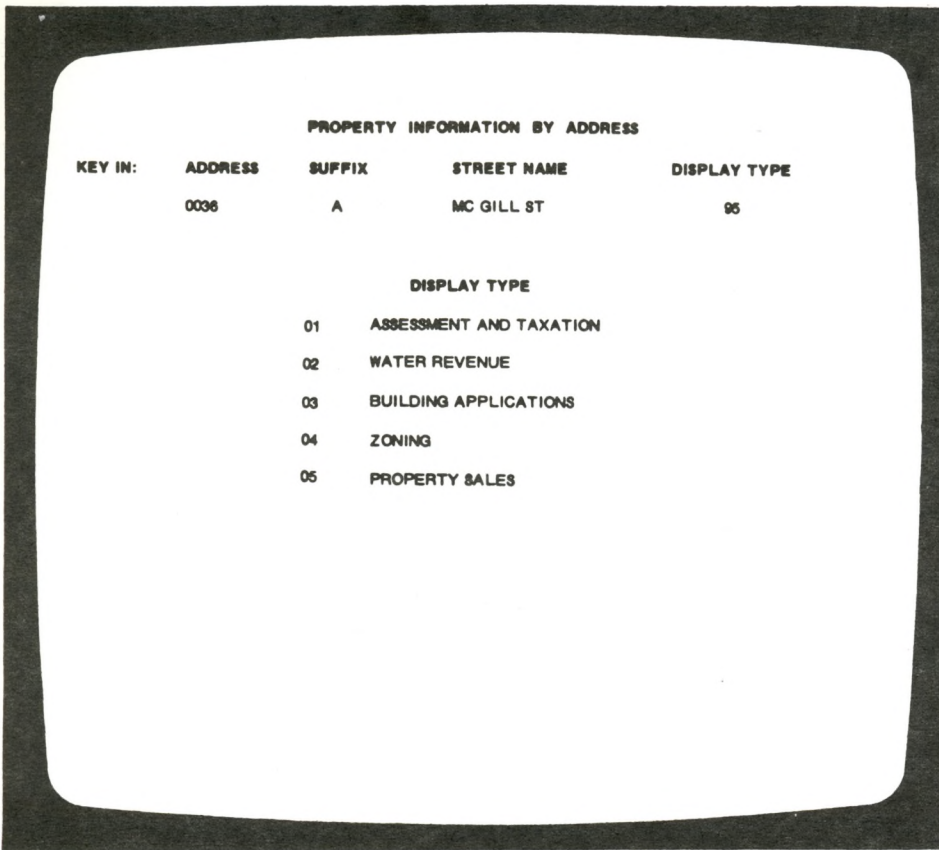


FIGURE 2

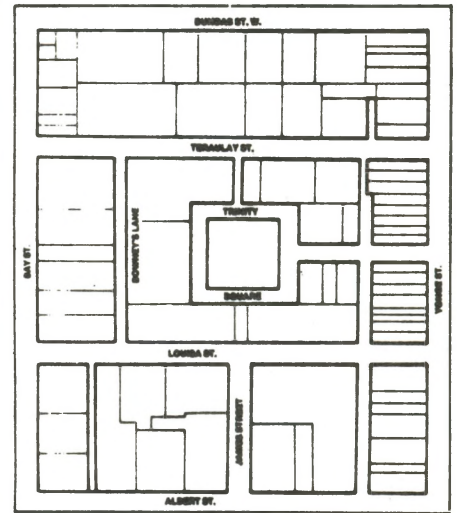


FIGURE 3

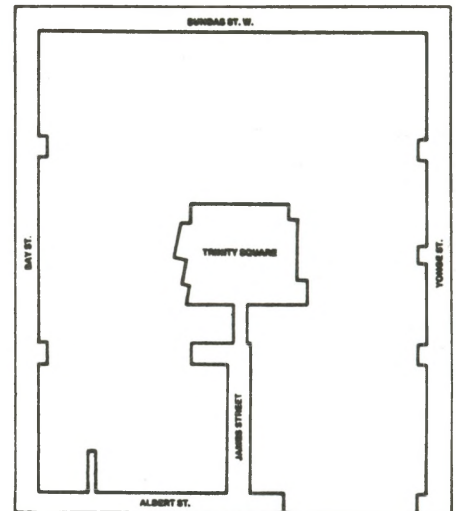


FIGURE 4

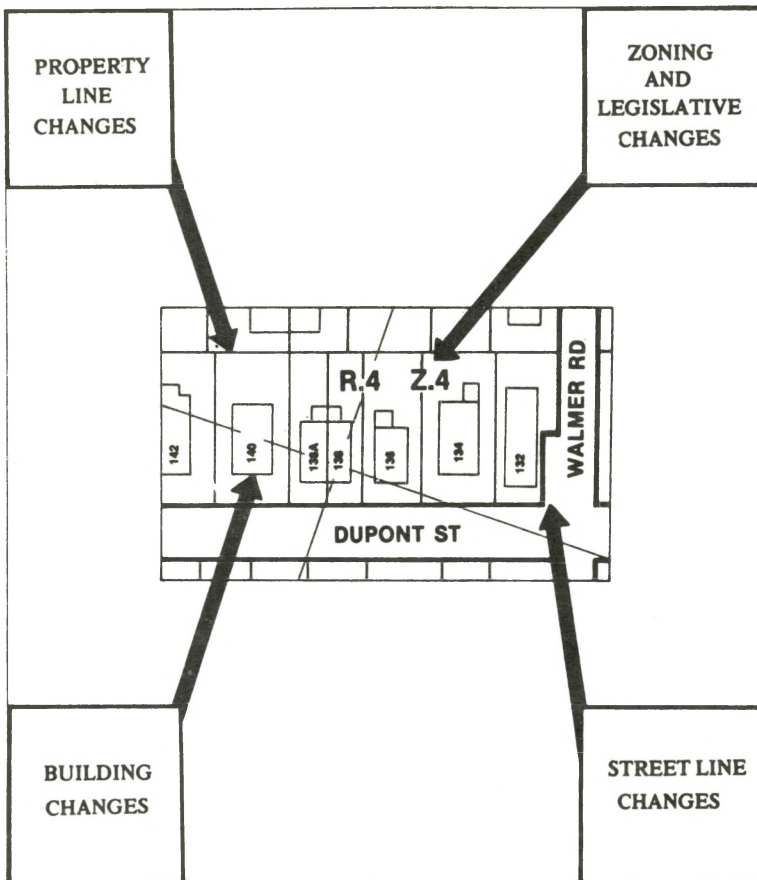


FIGURE 5

The solution to these problems

In order to solve the problems of correlating these property files, several preliminary steps had to be taken. Firstly, the issuing and maintenance of all property addresses was, by legislation, made the sole responsibility of the Commissioner of Public Works. Secondly, the co-operation of other governments and agencies was obtained. The various utility companies, and the Post Office, will not now deal with an owner at a new property unless the property address has been officially issued by the Department of Public Works. Thirdly, all properties were accurately plotted and drawn on a series of maps, known as Property Data Maps, (see figure 5). These maps show not only the property boundaries, but also the physical structures on the properties, and all the addresses by which that property is known. The data is plotted in the Ontario Co-ordinate System, which is part of the Universal Transverse Mercator system used throughout North America.

These maps are continually revised as changes occur. Departments of the City Government which allow change to either the cadastre (the property structure), or the physical structures on the property, provide the information to update the maps. Up to date versions are, by these means, made available to all departments and the public.

The Master Address File

These maps were used to create a new property file in the computer called the Master Address File. Not only did we create a complete inventory of all the property addresses in the city, but in addition, all the alias, or convenience addresses were linked to their respective main addresses. At the same time, a geographic locator or centroid for each property was created using the digitizing process, (See figure 6).

Updating the Master Address File

As soon as each map area in the city had been loaded into the file, the Master Address Updating System was used to maintain the addresses from that point on. At the same time as changes are made to the Property Data Maps, the corresponding changes are made at the computer terminal to manipulate and re-link the records to reflect the new property situation, (See figure 7).

Forward and backward links are used to keep track of what properties are merged and split, and to provide a forward and backward tracing system, (See figure 8). The software which was written to achieve this was necessarily quite complex, and took advantage of variable length records. However, using top-down design, together with structured programming, it was possible to completely test each module before linking it into the main system. In order to demonstrate that the software was bug free, and could cope with the most complex changes to the property structure, a mini-city of about 3 blocks was created as a test. Approximately 100 years of change was simulated within a space of one day, and all the linkages and connectors between properties were carefully checked.

The Central Link

The Master Address File does more than just keep track of property addresses and geographic centroids. Within each address record there may be links to the other property files which have data about that property. Often it is necessary to organize accounting-oriented property files, such as tax files and water-revenue files, by an account, or ledger number. These all require individual cross-reference files. The Master Address File will allow the replacement of all these present individual cross-revenue files with one unified master cross-reference file. All these keys to the other files are sorted within segments attached to the Master

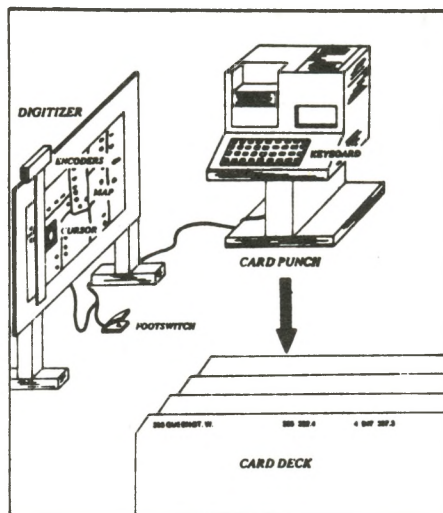


FIGURE 6

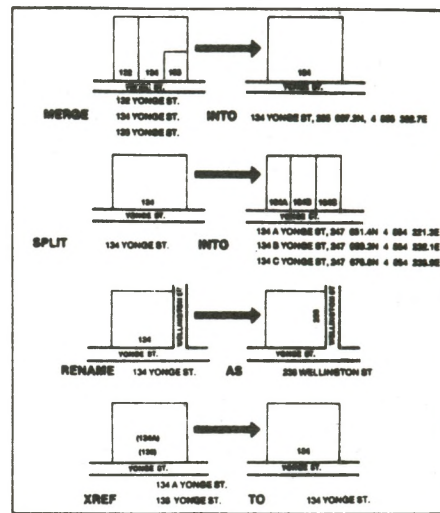


FIGURE 7

Address Records, (see figure 9). Any number of segments can be added to a record and each segment can be of any length. The programming to update each one of these segments was designed to work independently. This means that any of the segments can be present or absent, and all the software still works. More important, future segments, or links to other future files, can be added at any time. No change has to be made to the existing programs. Only the new routines to manipulate the new segments need to be added.

The Zoning File

The property centroids, or geographic locators, in the Master Address File have enabled other property files to be updated or manipulated on a geographic basis. To illustrate this process we will show how the zoning file can be updated by merely defining polygons to which various bylaws and other legislation apply.

Each time a new by-law is passed

which changes the legislative picture for an area of the City, the area defined by that by-law is plotted on the Property Data Maps. This area is defined as a polygon by its boundary co-ordinates, and these co-ordinates are written onto a zoning file update form. Various types of data, bylaws, decisions, etc., can be attached to a given polygon.

As this single update document may affect thousands of properties, it must be carefully checked by an edit program to ensure that firstly we have a valid polygon, and secondly the data are correct. This editing program performs various checks on the keypunched document and produces a listing of all the polygons submitted, together with diagnostic messages if the data are not correct. These polygons are then replotted back onto the map to ensure that no errors in their definition have crept in.

Once a batch of polygons has been

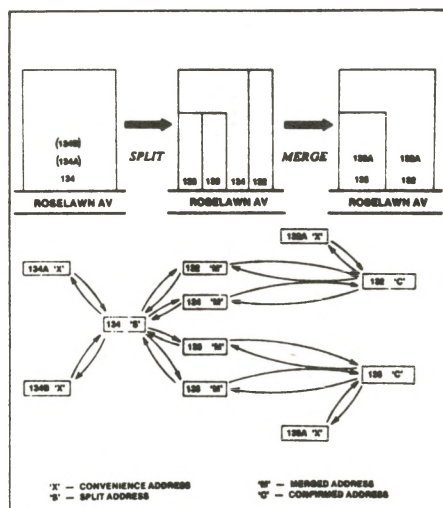


FIGURE 8

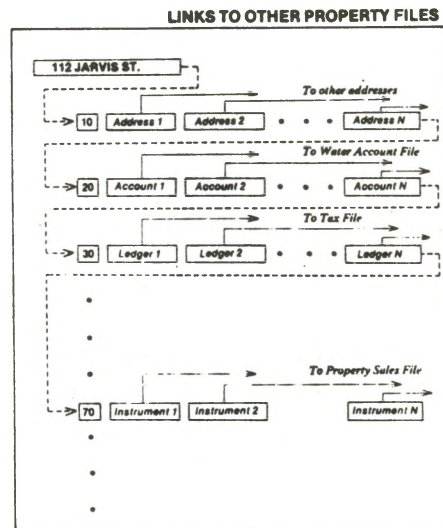


FIGURE 9

checked and verified by the computer as being correct, it is fed into the polygon analysis program which bursts each polygon into transactions (see figure 10), which can be applied to single property addresses in the zoning file. This is where the property centroids in the Master Address File are used. The polygon analysis program can tell precisely whether a given centroid (or property) is inside or outside of a given polygon. If it is inside a polygon, the corresponding property address is used to create an update transaction. If it is not, it is ignored. The zoning update system then uses these transactions to update the individual records in the zoning file ready for display at any terminal the next day.

Improved reporting capabilities

This technique is not limited to updating property files using geographically defined polygons. Numerous requests for reports from property files are continually received from various user departments and agencies. These departments define their various areas of jurisdiction in many different ways. Their boundaries are arbitrary and cannot easily be correlated. (see figure 11)

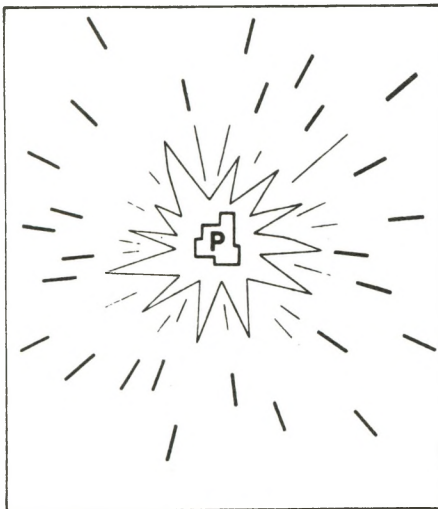


FIGURE 10

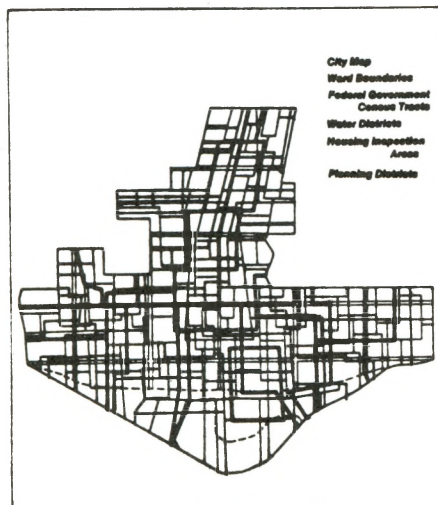


FIGURE 11

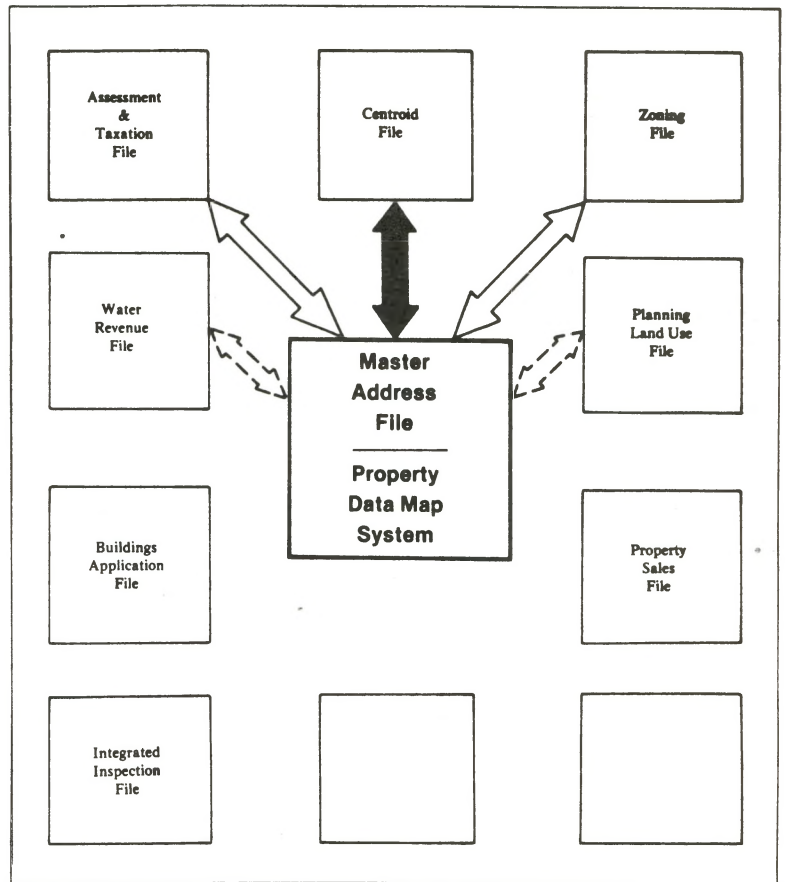


FIGURE 12

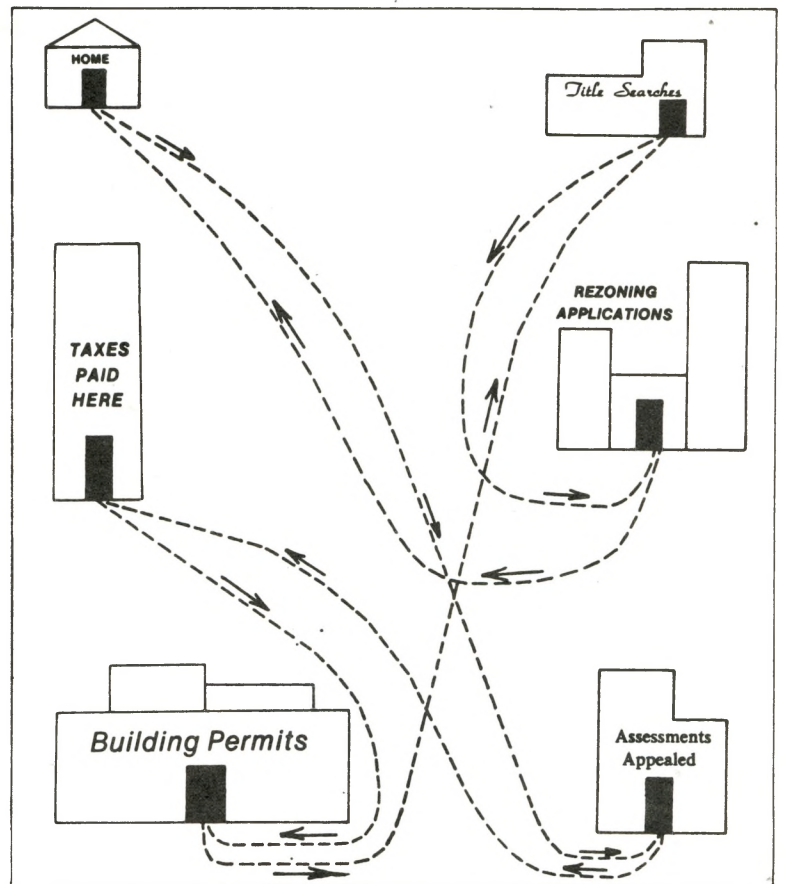


FIGURE 13

By defining any one of these boundaries as a polygon, we can extract records from any of the property files for reporting purposes. In the areas where we have created Master Address Records we can answer such questions as

1. What buildings are over 75 feet high in Fire District 10?
2. Give me a list of new building applications over \$50,000 in the downtown core.
3. What buildings has the Development Department inspected in the last year in Ward 9?
4. What is the ratio of existing office space to potential office space as permitted by Bylaw 20623 in Planning District 4?

A very recent development is that we can perform set operations on polygons in order to further narrow down the search. An example would be:

Give me a list of all the applications for lodging houses in Ward 10 or Ward 22, but only in the Northern Planning District, excluding the Old Village of Forest Hill, north of Eglinton Avenue.

Plans for the future

At the present time, three of the functional files have been linked in through the software to the Master Address System, namely the Centroid file, the Taxation file and the Zoning file, (see figure 12). As each of the remaining property systems undergoes revision, it will be redesigned so that any update to the file which affects the property address also produces a transaction which automatically updates its link in the Master Address File. Later this year the Water Revenue system will be undergoing major re-design and will be incorporated into the system, rather than being a stand-alone file. Later this year, or early next year, the re-designed Planning Files required for monitoring the development process, (described by June Gray at this conference) will be linked into the system. In this way the Master Address File will gradually incorporate the existing property files and become the Master Cross Reference File for all other property systems.

A probable future development is that the Ontario Government, which is responsible for maintaining the land boundary and land titles systems, may link to the Master Address File, and enter property boundary and title information directly into one of the variable segments attached to each property address record.

Conclusion

The rising cost of City Government, and the rising demands which the taxpayers place on its services dictate that

systems such as these will be necessary to provide instant answers to citizens' queries and to provide the statistical data necessary to policy makers and planners. It is neither acceptable, nor necessary, for a property owner to be required to go to one government department to apply for a building permit, another one to appeal his assessment, another to pay his tax bill, another to search the title to his land, and yet another to apply for a re-zoning application. It is all the more intolerable when, as in the case in many cities, these functions are spread over various levels of government, in different locations across the City, (see figure 13).

A centralized authority for maintenance of a Master Address File together with the trend towards distributed processing at remote terminals for the various functional update transactions will provide the solutions to many of these problems, (see figure 14). It will also provide

some of the solutions to a new trend in City Government in Toronto, which is the establishment of Mini-city-halls or site offices within neighbourhood areas for the immediate processing of most of the more simple forms of property related transactions.

Such systems will be the forerunners of a totally automated city hall where individual property owners can interrogate property information files using terminals in their own living rooms; where their consumption of utilities and services is monitored using remote control devices and the costs deducted automatically from their bank accounts; where elected officials can manipulate consoles in the Council chamber to provide the information to allow intelligent voting on the issues of the day; where highly paid paper pushers, preying on the public purse pass peacefully away on their indexed pensions and become mere memories in our minds.

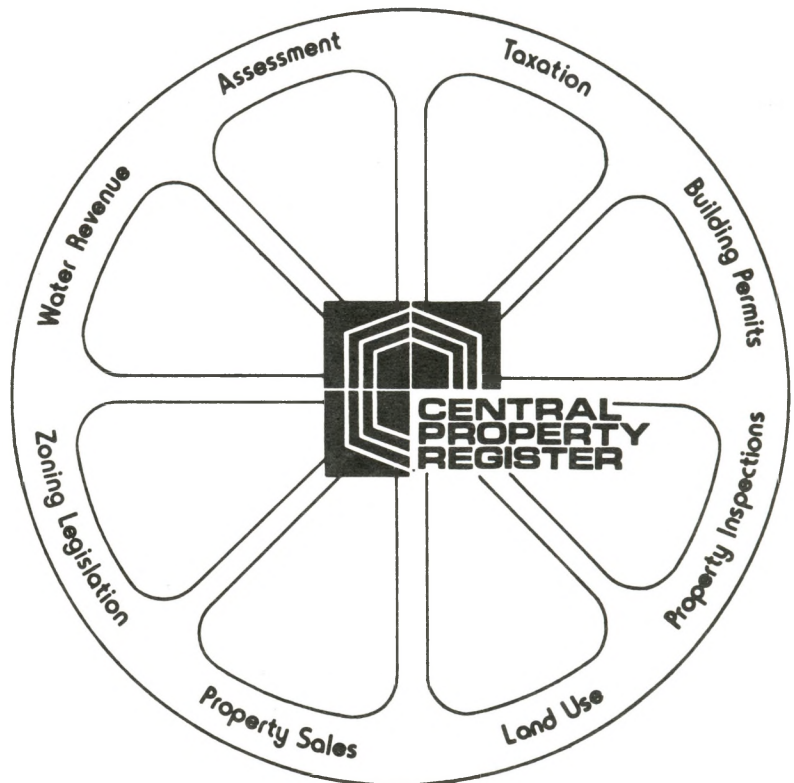


FIGURE 14

Bob Holder submitted the following, which was actually sent to a Northern Ontario surveyor.

Dear Sir:
 Four weeks has passed
 Since you promised me
 To survey a line
 Around my tree
 Its soon the snow
 Will cover the ground
 And then no stakes
 They can be found

So now that I am old and grey
 And you don't live so far away
 One hour in your limousine
 Will put you here
 Right on the scene
 So why not off your fanny get
 And do this job before you forget
 But if this job you have to pass
 You get right up from off your ass
 And send those papers back to me
 And I'll be yours sincerely

I. Waite (nom de plume)