

FINANCING INFRASTRUCTURE:
EVALUATION OF EXISTING RESEARCH
AND INFORMATION GAPS

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AND INFORMATION GAPS***

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***FINANCING INFRASTRUCTURE:
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Governments in Canada spent almost \$10 billion on infrastructure in 1993, with a large proportion of expenditures being made by municipalities. Significant cutbacks in transfers from the federal and provincial governments have imposed fiscal restraint on municipalities. At the same time, existing infrastructure is perceived to be in major need of repair. Cutbacks, combined with rising demands for infrastructure improvements, have forced municipalities to seek new and innovative ways to finance infrastructure.

The challenge to governments is to ensure that infrastructure is provided in the least cost way and to find resources to pay for it. In addition to higher property taxes and increased borrowing, governments are increasingly looking to more user fees and greater involvement by the private sector. The problem is that those that are making the decisions about what financing technique is appropriate often do not have enough information on the advantages and disadvantages of alternatives, what has been tried successfully elsewhere and what the impact would be of implementing a new scheme.

The purpose of this study is to evaluate the existing research and information gaps on the subject of infrastructure finance and to make recommendations on what research needs to be done and how it could be disseminated. The recommendations in this study are derived from two sources:

- An analysis was done of the current state of research on infrastructure finance and the gaps in that research. This involved a critical review of the literature and case studies on the various ways of financing infrastructure. The review includes references to relevant studies throughout the discussion as well as an extensive bibliography.

- A consultation was undertaken with stakeholders and users of information on infrastructure finance to determine what information is available (or not available) to those interested in infrastructure financing issues. The consultation was also used to identify opportunities for information transfer.

This paper reports on the findings of the literature review and the consultation process. The outline is as follows: Section I provides some background on the nature of infrastructure including spending on infrastructure and trends in revenues. Section II outlines the criteria that are used to evaluate the financing techniques. Section III summarizes the literature on taxes. Section IV reviews the literature on special districts. Section V reviews studies on fees and charges. Section VI considers public-private partnerships. Section VII looks at borrowing. Section VIII describes the consultation process and summarizes the findings. Section IX provides a summary of the report. Section X makes specific recommendations for further research.

I. THE NATURE OF INFRASTRUCTURE

Infrastructure refers to the public works programs that "establish the physical network upon which the country's economy depends" (Apogee, 1987, p. 3). Infrastructure can be thought of in terms of its physical form (such as a road or a water treatment plant) but also in terms of the service it provides (movement of people and provision of clean water). For the purpose of this study which focuses largely on municipal financing techniques, infrastructure includes roads and bridges, transit systems, water, sewers and drainage, and solid waste collection and disposal.

Infrastructure projects have a number of characteristics that make the financing of them somewhat different than other operations of government. These include, for example¹:

- large, up-front investments that require significant capital outlays

¹ These characteristics are based on Apogee (1987, p.3) and Daniels and Trebilcock (1994, p. 5).

- long economic life of the infrastructure assets
- interaction with other infrastructure projects

Because of the large capital outlays required and the long time horizon, major infrastructure projects involve higher risks than other activities. This means that public sector involvement is often required. Because each project is part of a larger system (for example, each road forms part of a region-wide road network), some coordination by the public sector may also be required.

1.1 Infrastructure Spending

In 1993, almost \$15 billion was spent on linear infrastructure in Canada by the public and private sectors combined. These include expenditures for new infrastructure and for repairs to roads, bridges, water, sewers, drainage, electric distribution and gas mains and services². Over the last two decades, infrastructure spending in Canada has lagged behind overall construction spending (see CMHC, 1989, pp. 9-11). In particular, spending on sanitary and storm sewers has declined in real terms since 1970.

Almost 67 percent of expenditures on linear infrastructure are made by governments. Table 1 summarizes the expenditures on water, sewers and drainage, and roads and bridges by level of government for 1993. The largest expenditures are made by municipal governments (52 percent) and these are fairly evenly split between roads and bridges and water and sewers. Provincial governments make the next largest expenditures (43.5 percent) and these are mainly for roads and bridges. Finally, federal government expenditures are the smallest proportion of total government expenditures (4.5 percent) on linear infrastructure with slightly higher expenditures on roads and bridges than water and sewers.

² The source for this information is Statistics Canada, *Construction in Canada, 1991-93*, Catalogue 64-201. Only expenditures on water, sewers, drainage, roads and bridges are included in this publication. This information is not available after 1993.

1.2 Revenues for Financing Infrastructure

Municipalities use a number of revenue sources to finance infrastructure. These include: property taxes, provincial grants, user fees, development charges and other exactions, and borrowing. In addition, they engage in partnerships with the private sector to finance infrastructure³.

As noted earlier, provincial cutbacks, combined with rising demands for infrastructure improvements, have forced municipalities to seek new ways to finance infrastructure. As a result, there is a trend

Table 1: Infrastructure Expenditure by Type by Level of Government, 1993
(\$millions)

<i>Category of Expenditure</i>	<i>Water, Sewers, Drainage</i>	<i>Roads, Bridges</i>	<i>Total</i>
<i>Federal Government</i>	199.8	235.7	435.5
<i>Provincial Governments</i>	101.0	4,137.3	4,238.3
<i>Municipal Governments</i>	2,378.0	2,682.0	5,060.0
<i>Total Governments</i>	2,678.8	7,055.0	9,733.8

Source: Statistics Canada, Construction in Canada, 1991-93, Catalogue 64-201

³ A breakdown of the amount of funds generated from each revenue source for capital purposes is not available for all municipalities in Canada.

towards increased use of user fees, a greater role for the private sector and possibly increased borrowing at the local level:

- User fees are currently used for water, sewers, transit and, to a lesser extent, for garbage collection and highways. There is a trend towards increased use of user fees in all of these areas.
- There is an increasing trend to look to the private sector to pay for infrastructure. This means increased use of development charges to cover growth-related costs, increased reliance on other exactions, consideration of land value capture taxes and greater use of public-private partnerships.
- Municipal borrowing varies across Canada with many municipalities unwilling to borrow. With reductions in provincial grants and pressure to keep property taxes down, however, borrowing at the local level is likely to increase in the future.

The financing techniques reviewed in the remainder of the paper are grouped as follows:

- ***Taxes:*** property taxes, special assessments and local improvement charges, and land value capture taxes
- ***Special Financing Districts:*** tax increment districts, special assessment districts, local improvement districts and alternative organizational modes
- ***Fees and Charges:*** user fees, development charges and other exactions
- ***Public-Private Partnerships***
- ***Borrowing***

II. CRITERIA FOR EVALUATING FINANCING TECHNIQUES

To evaluate each of the financing techniques, the following principles of public finance are considered:

Equity

Equity requires that fairness be applied in the choice of financing technique. There are two principles of fairness: ability-to-pay and benefits-received. Under the ability-to-pay principle, fairness dictates that people should pay for infrastructure according to their ability, usually measured by their income or wealth.

Under the benefits-received principle, fairness dictates that people should pay according to the benefits they receive from the service. People receiving similar services should pay similar taxes or fees. This principle links the revenues collected to government expenditures:

... when someone receives a direct and measurable benefit from a government activity it seems only fair and logical that he should pay for it. One approach to levying taxes fairly is thus to ensure that each individual's tax obligations are as far as possible based on the benefits that he receives from the enjoyment of public services (Bird, 1976, p. 11)

Each individual should pay a relative tax-price for each unit of any given public service that is equal to the relative marginal benefit he receives from that service.

Economic Efficiency

Since taxes and user fees represent costs to consumers/taxpayers for government services consumed, individuals and firms will likely alter their economic decisions when faced with a tax. For example, they may change where they live and work, what services they consume, what improvements they

make to their homes and other decisions. An efficient financing technique is one that does not cause individuals or firms to alter their economic decisions from what they would have been in the absence of the tax or charge. In some cases (for example, fees for garbage collection), however, it is desirable to use taxation to alter economic behaviour (for example, to reduce the amount of garbage generated).

Accountability

To the extent that citizens finance the activities of governments, these governments need to be accountable to their citizens. If the private sector is the service provider, then it needs to be accountable to those who are paying for the service. To secure accountability, financing instruments should be simple, understandable, and facilitate compliance.

Administrative Cost

The financing technique should not be too complicated or too costly to administer. Administrative costs include costs to government, the private sector and users of infrastructure.

It is important to note that it may not be possible to satisfy all of these criteria at the same time. Conflicts will emerge; for example, a financing technique that is equitable may not be easy to administer. For this reason, it may be necessary to emphasize some criteria more than others.

III. TAXES

The largest tax source to municipalities is the property tax. Municipalities also apply special assessments to the property tax base. Both of these existing revenue sources are described in this section as well as land value capture taxes.

III. 1 Property Tax

The property tax is the main local source of revenue for municipalities in Canada. Property taxes are levied for current operating purposes and are also placed in reserve funds for future capital purposes. The tax is levied on residential, commercial and industrial property. A tax rate is struck by the municipality and applied to the assessed value of property. In most provinces, a higher rate of tax is levied on commercial and industrial properties than on residential properties. In some provinces, an additional business occupancy tax is levied on the occupants of commercial and industrial property.

Property tax rates can be classified as general rates, special rates, local improvement charges or special assessments and special area rates. General rates are levied on the whole tax base of the municipality and the tax revenues collected are used to fund the general expenditures of the municipality. Special rates may be uniform and applicable to all taxpayers but the revenues applied to a particular purpose such as a park (Price Waterhouse, 1991). Local improvement charges or special assessments are also levied on the property tax base for those properties benefitted by the improvement⁴. Special area rates can be imposed in those areas which enjoy the benefits of a particular service. For example, special area rates are used for water, sewers, garbage collection and other services only in those areas of the municipality receiving the service.

Much has been written about the advantages and disadvantages of the property tax as a local revenue source (see, for example, Bird and Slack, 1993 and Kitchen, 1992). It is a visible tax because, unlike personal income taxes, it is not withheld at source. Taxpayers are required to pay property taxes directly to local governments. It is also visible because it finances services that are visible such as roads, garbage collection and transit. The visibility of the tax makes local governments accountable. The tax has been criticized for being unrelated to the ability to pay of taxpayers, unrelated to the benefits received from local governments and inelastic in that it does not increase automatically over time. It is beyond the scope of this study to address these concerns further except to say that these

⁴ Special assessments and local improvement charges are discussed further below.

criticisms are the subject of much debate in the literature.

Many municipalities use property taxes to finance the capital cost of infrastructure. Although property taxes may be appropriate for a project in which the expected life of the asset is very short or if the expenditure is for current maintenance (Auld, 1991, p. 209), they are less appropriate for financing infrastructure with a long expected life. The use of property tax funds means that current and previous taxpayers are paying for infrastructure that will largely be enjoyed by future generations. Since, as will be noted below however, municipalities in many parts of Canada do not like to borrow funds, property taxes are often used to pay capital costs. This means that infrastructure is competing for limited property tax funds with operating demands for police, fire, social services and other local services.

Overtaxation of Non-Residential Properties

Recent studies have emphasized the overtaxation of commercial and industrial properties. As noted above, the mill rate is generally higher on commercial/industrial properties than on residential properties and there is often a business occupancy tax levied as well. Further, the assessment system in many provinces discriminates against commercial/industrial properties by placing relatively higher assessments (when compared to market value) on these properties. Finally, some authors have noted (see, for example, Kitchen and Slack, 1993) that higher taxes on commercial/industrial properties are not efficient or equitable because these properties enjoy relatively fewer services than residential properties.

Kitchen and Slack (1993) compared the non-residential portion of total property taxes with the non-residential portion of municipal and education expenditures in selected municipalities in Ontario. Their findings indicated that non-residential property taxes range from 28 to 51 percent of total local property taxes but non-residential property is responsible for only 31 to 40 percent of municipal expenditures. These findings are preliminary because much of the information required to allocate expenditures between property classes was not available. They do suggest, however, that non-

residential properties pay more in property taxes than they receive in services.

A more recent study by KPMG (1995) for the City of Vancouver provided a more detailed breakdown of tax-supported city services among property classes. The results of their analysis indicated that residential taxpayers consume 71 percent of tax-financed services while non-residential taxpayers consume only 29 percent. In 1994, tax rates were set so that residential properties paid about 40 percent of the tax bill and non-residential properties about 60 percent. This study provides further evidence that non-residential properties are overtaxed relative to the services they receive.

More work needs to be done on the benefits of local infrastructure to residential and non-residential properties (along the lines of the KPMG study) to determine what portion of the property tax for infrastructure should be allocated to each property class⁵. To do this requires information on the breakdown of the use of roads, use of garbage collection and disposal facilities and other services by residential and non-residential property owners and tenants.

III.2 Special Assessments and Local Improvement Charges

Special assessments are charges imposed on residential, commercial or industrial properties to pay for additions or improvements to existing capital facilities that border on those properties. Special assessments date back to 1666 in London, England when they were used to rebuild the city after the Great Fire and were used in New York City as early as 1691 (see Peterson, Bamberger, Humphrey and Steil, 1984, p. 13). Special assessments have been widely used by Canadian municipalities to finance capital expenditures such as paving and re-paving of streets, installation or replacement of watermains and sewers, construction of sidewalks, and provision of equipment for streetlighting (see Kitchen, 1984, for a review of municipal practices).

⁵ This particular research question is not restricted to infrastructure finance but rather applies to all services provided by local governments out of property tax revenues. There are important implications for infrastructure finance, however.

The advantage of using special assessments to finance public works is that many of these works increase the value of nearby land, providing a potential financial benefit to the owners. With a special assessment, the municipality constructs the works and recoups the cost through a special assessment or local improvement charge on those properties that directly benefit from the government expenditure.

It is only practical to use special assessments for projects in which it is possible to identify the beneficiaries and to assign the benefits to specific properties. Where the benefits are more widespread or where it is difficult to identify the beneficiaries, it is necessary to finance a portion of the costs from general municipal revenues (such as the property tax). For example, Kitchen (1984) notes that it is common to finance the capital costs of sidewalks by charging the abutting properties between 40 to 60 percent of the total costs with the remainder financed by general municipal revenues.

In theory, the apportionment of capital costs to benefitting property owners should reflect the additional benefits received by each property, where the benefits are measured by the increase in property value. For example, installing streetlighting on a particular street would make the properties on that street relatively more desirable. For a given supply of properties on that street, the resulting increase in demand would result in an increase in prices. Other things being equal, the benefit of the streetlighting would be reflected in property values.

In reality, however, it is difficult to isolate the impact of one capital expenditure from other influences on property values. For this reason, proxy measures are often used such as assessed value, zone assessment within the benefitting area, front footage and lot size. The most commonly used base is front footage. This basis is appropriate in cases where the cost increases with front footage. For example, the cost per connection of water distribution lines increases with the number of feet of pipe between connections. Where the costs are related to the size of the lot, then lot size is an appropriate measure. Finally, where the project benefits are spread over an entire neighbourhood, as with a park for example, the zone method is appropriate. Using assessed value as a measure of benefit is not appropriate as it is highly unlikely that assessed values are directly correlated with increases in

property values attributed to the specific local improvement (see Bird, 1976, pp. 108-9). In other words, it is unlikely that the benefits of a local improvement are greater for a higher valued property than for a lower valued property.

There are many examples of special assessments but few have been written about in the Canadian context. Some examples of the use of special assessments for sidewalks, pavement, water, sewers and off-street parking from the 1970's are summarized in Bird (1976, p. 110). A more recent example from 1987 is a special assessment for the construction works for the rejuvenation of the Sparks Street Mall. These works were cost shared on the basis of two-thirds on abutting property owners (special assessments on the basis of front footage) and one third on the City of Ottawa.

An example from San Diego County, California, shows how special service areas have been created with benefit assessment authority to provide road maintenance and improvement, landscaping, street lighting, fire break management, and ambulance services (Peterson, Bamberger, Humphrey and Steil, 1984, p. 13). Benefit assessments are based on many factors. Each parcel of land is assigned a number of units based on the estimated benefits received. A parcel of land that is determined to benefit from the capital improvement is assigned one unit. Additional units may be assigned, for example, where parcels of land have direct access to the road being improved. Alternatively, the number of units assigned may be based on the size of the parcel.

Although special assessments are widely used in Canadian municipalities, there has not been much documentation of their use. At the same time, there do not appear to be any outstanding issues around special assessments that need to be addressed by further research. More recent examples of case studies would be useful to determine the characteristics of their use.

III.3 Land Value Capture Taxes

A land value capture tax is charged in a selected area to pay for a public improvement project that increases property values. The public sector is attempting to recapture a portion of the escalated

value that accrues to properties by virtue of their location in close proximity to a public investment and subsequent zoning decisions. In many cases, the increase in land value results from the ability to develop land for commercial or residential use. A portion of the windfall to landowners is, in this way, captured by the public sector and applied to the financing of the infrastructure.

Land value capture taxes (also known as valorization taxes) are used extensively in Latin America to finance new and improved urban streets, water and sewer systems (see Bird, 1995, p. 12). In Bogota, for example, 25 percent of total city revenues are collected from valorization charges (see Blackburn and Dowall, 1991, p. 57). The costs of the public works are allocated to the affected properties in proportion to the benefits assumed to be conferred. In the Canadian context, land value capture taxes have not been used frequently but were used to finance the Lion's Gate Bridge in Vancouver (Price Waterhouse, 1991, p.1). These taxes have also been considered as a means of financing rapid transit in Metropolitan Toronto (see Metropolitan Toronto, 1991).

When the public sector invests in a major infrastructure project, for example a subway, properties within the zone of influence of that infrastructure benefit in a number of ways. These include⁶:

- A property that leases space near the project can increase rents because of the increased desirability of the location. Property values increase even though the owner has made no improvements to the property.
- Many properties within the zone of influence will likely be permitted to redevelop to a more intensive use by the local municipality because the existing transportation capacity has been increased. Previous ceilings on development can thus be relaxed. Redevelopment of the property to a more intensive use increases the property value in terms of the ability to demand higher rents and a higher price at the time of sale.

⁶ These benefits are summarized in Metropolitan Toronto, 1991, p. 11.

- Properties may be allowed to increase densities beyond the ceiling if they provide certain facilities or services.
- A more specific incremental value is accrued to landowners who negotiate agreements with municipalities or the transit authority for the right to connect their building to various accesses to subway stations. The ease of access makes the location more desirable and results in higher rents.

The decision of the public sector to construct a subway results in a windfall gain to owners of property nearby. The subway increases demand for housing and offices on properties located near it. Given normal demand and supply conditions, the increased demand results in higher prices being charged for these properties. Through no efforts on the part of the property owners, the value of their property increases. Indeed, it is through the efforts of the local government that these values have increased. A land value capture tax has been proposed as a way for the public sector to tax some or all of the windfall gain that it has created. It has been suggested (see Metro Toronto, 1991, for example) that the tax revenues could be used to finance subway construction.

To some extent, the increased densities and increased land values will be reflected in property tax revenues, if market value assessment is the base of the tax. Some of the increase will occur as early as the time that the subway line is anticipated. Property values increase throughout the period from the anticipation to the completion of the project. In other words, the construction of the subway line is capitalized into property values at various stages in the project. However, it is difficult to isolate the portion of the increase in property values that is attributable to the capital investment.

An evaluation of valorization taxes in Colombia suggests that they can work well under certain circumstances (Bird, 1995, pp. 12-13):

Studies in Colombia, where valorization has been most used, suggest that critical to its success are careful planning and execution of projects, participation of beneficiaries in both planning and managing projects, an effective collection system and, in many instances,

significant initial financing of the valorization fund from general government revenues (so that works can begin in a timely fashion, without requiring prospective beneficiaries to put up all the funds in advance).

One impediment to implementing land value capture taxes is estimating the change in property values that arise from the public investment in infrastructure. In particular, it would be necessary to isolate the impact of the public expenditure from other market forces which affect land prices. Further empirical work in this area to determine how much infrastructure investment affects land values (holding all other factors constant) would make it easier for municipalities to implement a land value capture tax.

Density Bonusing

Another form of land value capture is density bonusing in which the municipality permits a rezoning of land to a more valuable use, such as greater height or density, in return for the developer providing various facilities or infrastructure. This type of exaction is generally allowed under planning legislation and, in essence, taxes the developer on the basis of the value added to his/her property from the increased density. Although it is not widely used, density bonusing⁷ has been criticized on the grounds that it results in bad planning decisions. There has been little written on density bonusing but the analysis of its impact is not dissimilar from development charges and other exactions (see below).

IV. SPECIAL FINANCING DISTRICTS

Special financing districts do not provide an alternative source of revenue but rather an alternative governing structure to provide and finance infrastructure. This section reviews special financing districts and also looks at alternative delivery modes such as special purpose bodies.

⁷ Density bonusing has been used in the Toronto area as a way to get developers to provide day care facilities and preserve historic buildings. It is also now permitted for use by B.C. municipalities.

IV.1 Types of Special Financing Districts

A special financing district is an organized entity other than a municipality that provides one or more designated services. It has to have three attributes to qualify as a special district (Price Waterhouse, 1991, Appendix I, p. 21):

- existence as an organized entity
- governmental character
- substantial autonomy

Special districts can include boards, districts, authorities and commissions and they are usually governed by a board of directors. In new developments, special financing districts are often established for the provision of water, sewers and roads. Special districts have been used in Canada and the United States for sewer and water facilities, park boards, drainage, roads, irrigation and flood control authorities. There are different types of financing districts; the three most common are tax increment financing (TIF) districts, special benefit assessment districts and local improvement districts.

Tax Increment Financing Districts

In tax increment financing districts, property taxes are levied on increments in property values within the special district and dedicated to financing capital improvements in that district. In other words, tax increases are earmarked to pay for public facilities in the district. A base line tax base for the existing development is identified. Service and facility improvements are financed with public funds or by issuing bonds which are in turn repaid out of the increases in property tax revenues. This type of district is only feasible when the district is experiencing growth that will provide the additional tax revenues (Chicoine and Walzer, 1986, p. 213).

A case study of a tax increment financing district that is frequently referred to in the American

literature relates to the financing of a sewage treatment plant in Escondido, California (see, for example, Price Waterhouse, 1991 and Apogee, 1987). The City of Escondido had a sewage treatment plant operating at capacity and was prevented from using traditional revenue sources by voter referenda. Escondido sold "futures" on sewer access rights. It raised the needed \$12 million after selling rights for only 40 percent of the planned expansion.

Special Benefit Assessment Districts

In special benefit assessment districts, infrastructure is financed by a special tax levy on property owners who benefit from specific public improvements (this is similar to special assessments described above). There is a direct link between the beneficiary of the infrastructure investment and the amount paid. Special benefit assessment districts can only raise property taxes to pay for infrastructure.

Local Improvement Districts

Local improvement districts are similar to special assessment districts and serve the same purpose. They permit local governments to implement improvements in a limited geographic area within a jurisdiction and to finance them separately. The difference between local improvement districts and special assessment districts is that local improvement districts can use debt financing in addition to taxes to pay for infrastructure.

Evaluation of Special Financing Districts

The main sources of revenue for special districts are user fees, property taxes, special assessments and provincial grants. A review of special financing districts in the U.S. (see Porter, Lin and Peiser, 1987) indicated that over 50 percent of revenues come from user fees, almost 27 percent from intergovernmental grants, and about 9 percent from taxes. The remaining revenues are interest earnings and other revenues.

The advantages of special financing districts are that services are targeted to specific groups of consumers who pay for the quantity and quality of services that they demand. Special districts shift infrastructure costs from all taxpayers in a local government jurisdiction to those who directly benefit from the capital improvements (see, for example, Informetrica, 1992, p. 11). Special district financing can be financed over the life of the new infrastructure instead of being an up-front cost as is the case with development charges (see below). In some cases, it is easier to form a special district than to rely on the general revenues of local governments:

Apparently, voters who stand to benefit directly from improvements made by a special district are more willing to vote for special tax levies to pay for those improvements than for higher general property taxes (Porter, Lin and Peiser, 1987, p. 1).

Other advantages include: targeting services to special groups, linking costs and benefits, more efficient provision of services (because user fees are generally charged) and independence from politics. On the other hand, special districts can result in governmental fragmentation and a proliferation of local authorities. This weakens local government's ability to provide and manage public services and can result in citizen confusion (for a more detailed review of the advantages and disadvantages of special districts in the United States, see Porter, Lin and Peiser, 1987).

There has been some American literature on special financing districts but very little in Canada. More research is required on the impact of using special financing districts to finance major capital infrastructure projects. Does the existence of special financing districts have an impact on costs of service provision? Are they less accountable than local government departments? Is service quality affected when services are provided by special districts?

IV.2 Alternative Organizational Modes

Examples of special purpose bodies in Canada include school boards, police commissions, library boards, utility commissions, and transit authorities. These boards are funded from a mix of property taxes, provincial grants and user fees. Although little work has been done in the Canadian context on

special districts, Kitchen (1993) reviewed some studies that compare the efficiency of delivering local services through alternative organizational modes. In particular, he compared the cost of service delivery by government departments with the cost of delivery by special purpose boards and commissions (many of which operate independently of local council). He reported on two empirical studies in Canada:⁸

- A study by Kitchen (1975) considered the organizational implications of providing water in Canadian urban municipalities and found that the cost of supplying water through a separate water or utilities commission was significantly higher than the cost of supplying it by a department directly responsible to city council. The main factors contributing to the higher costs were weaker public accountability and an inability to benefit from integration with other functions administered by municipal councils. The cost differential was not attributed to differences in the quality of services because service levels in all municipalities tend to be standardized.
- Another study by Kitchen (1988) compared cost differences for delivering urban transit services through a municipal department and through a transit commission. The results showed no statistically significant difference between the two modes of delivery.

Kitchen (1993) argues that the lack of political accountability of most boards and commissions results in inefficient resource allocation across competing services. As Slack (1993) notes, this argument is compelling: the private sector is efficient because it is constrained by profit maximization and competition; municipal governments are constrained by the political process and are therefore efficient but special purpose bodies are not constrained by either and have no incentive to be efficient.

⁸ CMHC has recently commissioned a study on organizational structure, financing and service delivery for municipal infrastructure to determine if there is a link between organizational structure and the use and application of sound maintenance and rehabilitation practices. The results of this research have not yet been completed.

The empirical support for the link between accountability and efficiency is weak, however. There are only two empirical studies and the results are inconclusive. More empirical work on cost differences between the delivery of services by municipal government departments and special purpose bodies would be useful. If special purpose bodies provide more costly services, it would also be useful to determine the reasons. For example, it would be helpful to know if the differences arise because they are not politically accountable, that they are monopolies or other reasons. The type of research that would be most useful is case studies which compare services provided by a local government department and an autonomous commission. Kitchen (1993) suggests transit and the collection and disposal of solid waste as examples of case studies that could be done. In particular, it would be useful to evaluate the incentives and constraints under which each operate.

V. FEES AND CHARGES

This section includes a discussion of user fees, development charges and other exactions. Each of these financing techniques involves levying a charge on the user of infrastructure. In the case of user fees, the direct user of the service is charged for the operating costs associated with its provision. As will be noted below, if properly priced, the user fee will include costs associated with the capital investment, such as depreciation. In the case of development charges and other exactions, the developer is charged for the capital costs of the infrastructure. As will be shown below, these charges are likely passed forward to the users.

V.1 User Fees

A user fee or price is a charge per unit of output. User fees are used largely for transit, water and solid waste collection but have also been used in the past for roads. As noted in U.S. ACIR (1992, p. 19), it is anticipated that there will be greater use of pricing in the future. This is desirable because user fees link the benefits from infrastructure with prices paid and can therefore increase the level and quality of infrastructure service.

Many authors have extolled the virtues of user fees (see, for example, Bird, 1976, Bird and Slack, 1980 and Kitchen, 1993). The best summary of the advantages and disadvantages of user fees can be found in Bird (1976). The main advantage of user fees is to promote economic efficiency by providing information to consumers and government officials, enabling them to make more efficient use of resources. When consumers know how much it costs to provide the service to them and are required to pay that cost, they are less likely to over-consume them than when the use of the service appears to be free.

More rational use of pricing at the local level will ration the use of existing facilities, guide the distribution of income, enlarge the range of choice and change tastes and behaviour (Bird and Slack, 1980, p. 215). Correct pricing serves to link government expenditures and revenues. As Crowley (1993, p. 121) also notes, proper pricing gives appropriate capital investment signals; if prices are set below the marginal cost, however, there will be exaggerated estimates of the need for investment. One approach to the increasing cost of infrastructure is to minimize the need for that infrastructure. Pricing serves a useful tool for doing that: user fees for water and highways, for example, reduce the demand for these services.

The disadvantages of pricing have also been identified in the literature. It can be very costly to price and the distributional consequences of pricing may be undesirable. It is necessary to be able to identify the beneficiaries and to exclude those that do not pay. Some authors have argued that the distributional implications of pricing may not be so bad, however. For example, if water is not priced then it is being subsidized from property tax revenues. The subsidy is greater, the greater amount of water consumed. Since high-income households tend to use more water than low-income households (more bathrooms, larger lawns to water etc.), by not pricing water, high-income households are favoured relatively more than low-income households.

User fees have not been a major source of revenue to municipalities in Canada but will probably increase in the future when municipalities are more fiscally strained. In practical terms, user fees provide an additional source of revenue to municipalities. It is difficult to begin to charge for services

that have previously been financed from property tax revenues. Consumers tend to regard these services as "free" and resent having to pay for them. On the other hand, it is difficult to privatize service delivery when prices are not being charged for the service. The private sector is not keen on taking over a service from the public sector that is not currently being priced (see public-private partnerships below).

Marginal Cost Pricing

The efficiency criterion requires that prices be set equal to the marginal cost of providing the service. If marginal cost pricing leads to an operating loss, however, efficiency may require a two-part tariff where the user pays a fixed charge for gaining access to the facility and a variable charge equal to the marginal cost. Both of these techniques are preferable to setting prices to cover average costs (see Bird, 1976).

Although it is clear that the efficiency advantages of pricing result from charging the marginal cost, as Downing (1992, p. 517) notes, the marginal cost approach is not frequently used in municipal finance. Rather, the typical approach is to calculate the total out of pocket expenditures for providing a service and then determine the average cost. Usually the user charge is set as a percentage of this average cost and ignores all of the hidden costs such as land and capital costs.

In a review of pricing practices across Canada, Kitchen (1993) confirms that marginal cost pricing is rarely used. Where user fees are charged, Kitchen (1993, pp. 29-30) notes that they range from fixed charges that are unrelated to consumption to charges that vary with consumption. Prices may be set to cover all of the costs or only a portion of the costs of production and delivery. He concludes that pricing techniques generally depend on tradition, the type of service, the preferences of residents and the desire on the part of local politicians and administrators to substitute prices for property taxes -- they rarely reflect marginal cost.

V.1.1 User Fees for Water

There is consensus in the literature that water in Canada is underpriced, resulting in over-consumption of water and deterioration of the physical infrastructure (see, for example, Fortin and Mitchell, 1990, Marshall, Koenig, 1991 and Tate and Lacelle, 1995). This is one of the few areas in financing infrastructure where there is consensus not only on the nature of the problem but also on the types of solutions required.

As noted by the MISA Advisory Committee (1991, p. ii), Canadians consume more water per capita (360 litres per day for domestic use) than do residents of any other country in the world except for the United States. At the same time, municipal utilities sell water at cheaper rates than any other country in the world. Water and sewer rates are artificially low and bear an inadequate share of the true economic costs (Marshall, Koenig, 1991). The result is overuse of water, deterioration of physical infrastructure, the need to over-size water supply and sewage treatment works, and unfair pricing of water service among consumers.

The most commonly used pricing structures that have been used for water are summarized in Tate and Lacelle (1995, pp.7-10) and Marshall, Koenig (1991, pp. 6-8):

- **flat rates:** Flat rates are fixed payments unrelated to the volume of water used. Consumers pay the flat charge in return for which they gain access to unlimited water servicing. Charges may vary according to the type of user (residential or commercial) or by the attributes of the customer's property (such as number of residents, number of water-using fixtures etc.). Because flat rate charges are not related to consumption, no metering is required. With flat rates, there is no incentive for efficient water use. Smaller municipalities, in particular, tend to use flat-rate pricing. The pattern for commercial and industrial users is much the same, relying heavily on flat rates. Sewer surcharges are often added to water rates.

- **constant unit charge:** The constant unit charge uses average cost pricing whereby rates are set on the basis of an equal charge per unit of consumption. The rate is the same, regardless of the quantity consumed. There is no differentiation among consumer classes. Meters are required.
- **declining block rate:** Declining block rates include a basic or fixed fee per period plus a commodity charge that decreases in blocks as the volume consumed increases. Declining block rates are the most common form of volumetric charge used in Canadian municipalities. Generally, there are one or two initial blocks for residential and light commercial water use, with subsequent blocks containing heavy commercial and industrial uses. The fixed component often varies with the size of the connection. Meters are required.
- **increasing block rate:** With increasing block rates, the charge increases in blocks as consumption increases. Increasing block rates are used in only few municipalities. There is no minimum billing. Meters are required.
- **two-part tariff:** The two-part tariff is a combination of the flat-rate and average cost rate structures. A fixed charge is set to recover basic costs such as meter reading, billing, customer accounting and capital and maintenance costs related to meters. Meters are required.

Pricing practices for water and wastewater in Canadian municipalities have been studied extensively in recent years. For example, the Federation of Canadian Municipalities (1985) noted that user charges collected through water rates only cover 82 percent of the costs of water supply, 85 percent of the costs of water distribution, 50 percent of sewage collection costs and 65 percent of waste water treatment costs. A survey of 1,200 municipalities and over 2,700 residential and commercial rate schedules across Canada found that about half were using flat rate pricing as a means of collecting revenues from residential customers (Tate and Lacelle, 1995, p. 11).

The variation in rate structures across Canada appears to have evolved in response to "random,

political, financial or haphazard events and not to any attempt to inject efficiency into the pricing decision" (Kitchen, 1993, p. 33). Although all municipalities have relied on some form of average cost pricing, there is increasing interest in marginal cost pricing (see, for example, Fortin and Mitchell, 1990 and Tate and Lacelle, 1995). As Lewis (1993, p. 146) notes: "The consensus is that prices are generally too low: user charges levied by Canadian municipalities are typically insufficient to cover costs." He goes on to suggest that pricing of water can be an effective tool for demand management and that some municipalities concerned about water conservation are looking to increasing block rates and peak-load pricing. Nevertheless, water remains an underpriced commodity: an analysis of 1983 rates showed that residential users faced a marginal price of zero for water in 60 percent of reporting communities (Lewis, 1993, p. 147).

The prevalence of flat rates and unmetered water in a large part of Canada (about 10 million customers are not metered for water) suggest that water is significantly underpriced in many municipalities. The current system of underpricing water and using government subsidies means that the costs of needed infrastructure in the future are not being covered. In most municipalities, the price charged does not include all of the relevant operating costs. In particular, depreciation costs are seldom included. This means that the annual costs of capital resources used in delivering water services are not captured in the price. The result is that there are no funds available for rehabilitation. As noted in Tate and Lacelle (1995, p. 25), there is a "chronic funding shortfall problem in many areas of Canada with regard to municipal water infrastructure." These authors argue that the solution to the problem lies in the correct pricing of water to recover the full costs of system construction, upgrading and expansion.

The impact of water and sewer pricing on the demand for water depends on the price elasticity demand -- the extent to which variations in the price of water will affect water consumption and wastewater quantity and quality. Marshall, Koenig (1991, pp. 23-25) and MISA (1991, Exhibit D-1⁹) summarize the empirical estimates of price elasticities for urban public water supply. Although there

⁹ The table in MISA (1991) is taken from OECD. 1987. "Pricing Water Services."

are many international studies of price elasticities, few have been done in Canada (see, for example, Grima, 1972 and Grima, 1984). An American study (Congress of the United States, 1987, p. 24) concluded that a 10 percent rise in price will cause consumption to fall by between 3 and 11 percent. The findings of international studies suggest the price elasticities for year-round off-peak residential use are between -0.005 and -.30. Other studies cited in Marshall, Koenig (1991) indicate elasticities of between -0.24 and -0.40. Lewis (1993, p. 147) suggests that the price elasticity of demand for water is between -0.5 and -0.8 for residential users.

The value placed on water depends on what water is being used for and what are the alternatives. For this reason, empirical analysis needs to estimate price elasticities for different uses. For example, in the residential sector water used for drinking and bathing is fairly price inelastic; for watering lawns, gardens, and for car washing, the price elasticity is much higher. Similarly in the industrial sector, price elasticities are higher for operations that make use of water than where water is an integral part of the final product such as in soft-drink manufacturing. It is important to recognize these differences when pricing water.

In the Canadian context, Kitchen (1993) reviewed a number of some Canadian studies that have documented the decline in water use associated with the introduction of metering (see the Table 2 below). As noted in McNeill and Tate (1990, p. 15), the usual pattern is for water use to fall substantially immediately following the installation of meters and then to rebound somewhat after that. Ontario studies indicate that the introduction of meters and a surcharge for sewers has reduced water consumption by 15 to 20 percent. With price increases and metering combined, the impact is closer to 30 to 40 percent (MISA, 1990, Appendix D, p. 5).

Much of the evidence cited in Table 2 is dated and only analyzes the impact of metering and not of marginal cost pricing. It would be worthwhile to have more recent Canadian evidence on the impact of pricing based on full cost recovery on water consumption broken down by the various users and uses of water. The impact in the reduction of water consumption on the need for physical infrastructure would also provide useful information on the role that proper pricing could play in the

financing of infrastructure.

Finally, a recent study by Frehs, Tate, Rollins and Zachariah (1996) examines the willingness to pay for water services. A survey of 1,511 people across Canada concluded that the average willingness to pay for water quality preservation is \$26.28 per household per month, substantially higher than the current water prices. The authors estimate that this willingness to pay could potentially generate an additional \$3.5 billion. The substantial support for user fees for water is attributed to water being essential, concern for future costs associated with a degraded water supply and concern for future generations.

In summary, there appears to be support for greater use of user fees for water but not widespread use of marginal cost pricing for water. More information on the impact of marginal cost pricing for water on both water consumption and the need for infrastructure would be worthwhile.

V.1.2 User Fees for Transit

Although municipalities charge user fees for transit, these generally do not cover the full costs of operating the transit system. In most provinces, the provincial government provides operating subsidies to cover a portion of the operating deficit of transit authorities. Property tax revenues at the local level are also used to subsidize transit fares. As noted in Kitchen (1993, p. 39), about 55 percent of all operating costs of transit systems across Canada are funded from operating revenues. The remaining operating costs are funded from provincial grants and local revenues.

Concern over the increasing size of operating deficits has led to a discussion of the appropriate fare to charge transit users. As Kitchen (1993) notes, the level of fares is determined by social, economic and political factors: availability and access to other forms of transportation, the ability of local residents to pay for transit, the attitudes of local politicians towards what is an acceptable fare level, and the portion of operating costs to be covered from fares.

Table 2: Empirical Studies of the Effects of Metering on Water Use in Canada

<i>Location</i>	<i>Impact</i>	<i>Source</i>
Etobicoke, Ontario	Water use 45% higher in unmetered areas than in metered areas of comparable assessment	Grima (1972)
St. Catharines, Ontario	Consumption dropped by 11% following metering but rebounded because prices were kept low. Two years later, water usage was higher than before metering.	Pitblado (1967)
Alberta	10 to 25% drop in water use following meter installation	Associated Services Ltd. (1984)
Peterborough, Ontario	10% reduction in water use predicted following meter installation	Peterborough Water Utility (1984)
Calgary, Alberta	Unmetered water use 46% greater than in metered residence	Mitchell (1984)
Calgary, Alberta	Unmetered water use 65% greater than in metered residence	Shipman (1978)
Canada, selected municipalities	Residential water consumption was twice as high in unmetered communities as in metered communities	Kitchen (1975)

Source: Kitchen (1993, p. 36) based on McNeill and Tate (1990) and Kitchen (1975)

Kitchen (1993) notes that average fares charged by transit systems vary according to the size of the municipality and the administrative organization responsible for service provision. Average fares tend to be higher in larger communities than in smaller communities, at least in part because provincial grants cover a smaller portion of the operating deficit in larger urban areas. There is also some evidence from Kitchen (1992) that fares tend to be lower on average in municipalities that contract out service delivery for transit.

Most municipalities or transit commissions vary rates during the day between peak and off-peak hours. In the City of Ottawa, for example, higher fares are charged in peak hours (see Informetrica, 1992). This pricing technique reflects that riders during peak hours are imposing higher costs on the system than riders at non-peak hours. Higher peak fares encourage people to use the transit system during off-peak hours. The downside of this pricing policy is that people may use cars instead of the public transit system and thereby increase congestion and pollution. Lamonde (1990) suggests taxing non-users of the public transit system (motorists) who benefit from the reduction in traffic congestion. Other suggestions include higher parking fees, fuel taxes, licence fees and other methods to discourage automobile use.

Studies of transit pricing suggest that it may not be efficient to charge the marginal cost of transit use (see, for example, Frankena, 1982) because private automobile users do not pay the full marginal social cost of automobile use. For this reason, it is necessary to subsidize the transit system.

More work needs to be done to determine the correct subsidy and fare. What portion of the costs should be paid by fares, what portion should be subsidized by property taxes, and what portion should be subsidized by provincial grants? To answer these questions, it is necessary to relate transit costs to the costs charged to motorists for automobile use and it is necessary to be able to measure the degree of externalities associated with transit use.

V.1.3 User Fees for Roads

Road pricing has been used to some extent in the past in Canada and is being proposed in the near future. Tolls were used on Quebec autoroutes in the 1970's but were discontinued in the 1980's because they were not economical and impeded the flow of traffic (CMHC, 1989, p. 40). Tolls on bridges were used in Ontario to pay for the maintenance of the Burlington skyway bridge but were eliminated in 1973. Tolls were also used to pay for the construction of two bridges crossing the Halifax harbour but the revenues are insufficient to cover the interest on the debt (CMHC, 1989, p. 40). A new privately constructed highway (Highway 407) in the Greater Toronto Area (in Ontario) will charge tolls to pay for part of the construction costs.

Charging for road use can take many different forms. Charges can be indirectly related to road use through the use of annual vehicle license fees, for example or they can be directly related to road use through the levy of tolls. Tolls can be carried out electronically, by means of manual toll gates or by any other form of direct charging. Although municipalities generally do not apply direct charges to the use of roads, municipalities generally collect license fees from motor vehicles. In British Columbia, municipalities are permitted to levy a fuel tax to finance urban transportation. Fuel taxes are levied by the transit authority in the Greater Vancouver Regional District and the Capital District (Victoria). The tax is levied per litre on unleaded gasoline and diesel fuel.

The economic rationale for road pricing can be found in a number of sources such as Frankena (1982) and Goodwin (1994). The decision to make a road trip is made on the basis of the benefits received by the road user and their costs. These costs do not include allowance for the costs imposed on other travellers or the population as a whole. These additional costs include the costs of congestion and environmental damage. The result is that some road trips are made in which the benefits to the traveller are less than the costs to society. There is greater use of the road than is justified by the benefits and the amount of road use is not efficient. If road users are charged the full cost of their trip, including the costs imposed on others, then the resulting travel pattern will be efficient in the sense that all of the costs and benefits have been equated. The appropriate charge would reflect the

marginal social cost of the trip. In short, the rationale for road pricing is that road users should pay the cost that their travel decisions impose on others (see Johansson and Mattsson, 1994). The three main objectives of road pricing are to manage congestion, reduce environmental damage and to raise revenues.

The Institute for Transportation (p. 13) identifies key issues and considerations in analyzing toll costs. These include:

- What type of toll barrier system should be used?
- How many barriers are necessary?
- Where should the barriers be located?
- What toll rate structure should be used?
- How will traffic respond to the toll rate structure? How will traffic grow?

All of these issues need to be addressed in setting tolls on highways. From a research perspective, the last question is an empirical one that requires a model to estimate the impact of tolls on traffic.

V.1.4 User Fees for Solid Waste

A few municipalities in Canada have applied user fees for residential solid waste collection. In Victoria, British Columbia, for example, a user fee system was recently introduced in which the fee increases with the volume of solid waste collected. There are at least 23 variable curbside disposal fees in place in Ontario municipalities alone. Municipalities in other parts of Canada are also looking at user fees for residential solid waste collection.

Three Canadian case studies are summarized in Apogee (1992): In the Regional District of Nanaimo, B.C., a user fee system for residential garbage and recyclable materials was introduced in 1991. The fee structure is comprised of an annual fee of \$87.50 for the collection of one can per week of garbage plus unlimited recyclable materials in a Blue Box. Additional containers of garbage are

collected if they bear a tag bought for \$2.00 each. A handling fee of 5 percent of tag sales is given to tag distributors. An annual fee of \$24 is charged to collect recyclables. When compared to other municipalities in the District that have flat fees for garbage collection, households in Nanaimo achieved a recycling rate of 29 percent compared to 12 and 17 percent under a flat rate. There were differences in the types of recyclable materials collected, however, making this comparison somewhat suspect.

In Lantzville, B.C., the town imposed a limit on collection of one can per week since 1992. Additional cans require a tag of \$2.00 if they are to be collected. In the first month of this fee structure, garbage collected declined by 23 percent relative to the previous year.

The Town of Gananoque, Ontario imposed a user fee system for garbage in 1991. The fee charged is \$1.00 per bag. For every two bushels of recyclable materials disposed in the Town's central depot, residential generators are given one free tag. Since implementation of this fee system, weekly landfill disposal of residential wastes has fallen by about 45 percent.

Other than a few case studies, very little has been written in Canada on the use of charges for solid waste collection and disposal (see Sproule-Jones, 1994 for one example)¹⁰. In particular, there is no assessment of the impact of user fees on waste diversion, illegal dumping and the need for landfill sites. The information that does exist is largely based on case studies and is largely anecdotal. The case studies do seem to suggest that curbside disposal fees do result in waste reduction but that the degree of diversion depends on community characteristics such as the socioeconomic factors (see Apogee, 1992, p. B-9). It was also found that disposal fees are particularly popular in communities facing limitations on taxing ability and that customer acceptance is fairly high.

¹⁰ It should be noted, however, that the Local Government Institute at the University of Victoria is undertaking a comprehensive nation-wide study of solid waste with emphasis on the cost effectiveness of alternative delivery approaches.

In summary, although there are some case studies of user fees for garbage across Canada, there is only anecdotal evidence on the impact of charging on the amount of waste generated and the amount of recycling. More empirical work is required to determine the impact of fees for garbage collection.

V.2 Development Charges

Development charges are levies on developers to finance the off-site costs associated with new development or redevelopment. These charges are generally levied for officially mandated programs and the funds need to be used to pay for infrastructure made necessary by the development. Development charges have different names in different provinces; these include development cost charges, development cost levies, development levies, off-site levies and assessment levies. In the United States, they are generally referred to as impact fees.

A review of development charges across Canada (see Slack, 1994) indicates that there is provincial legislation governing the application of development charges in the Yukon and Northwest Territories, British Columbia, Alberta, Saskatchewan and Ontario. The study also includes a survey of the use of development charges in 31 municipalities across Canada.

The evaluation of the impact of development charges depends on the purpose for which they were levied. As Skaburskis (1990) points out, there can be a number of different purposes to development charges including:

- to restructure public-private responsibilities for service provision,
- to be a planning instrument,
- to facilitate development, and
- to collect revenues.

If the purpose is to restructure public-private responsibilities for service provision, then the appropriate way to evaluate development charges is to evaluate the efficiency gains from

privatization. The issue of privatization is discussed in a separate section below. If the purpose is to alter land use decisions and urban form, then it is appropriate to evaluate the impact of alternative development charge pricing schemes on urban form. If the purpose is to facilitate development, then it is appropriate to evaluate the ability of development charges to reduce public resistance to growth. Finally, if the purpose is to collect revenues, then the appropriate way to evaluate development charges is in terms of who bears the burden of the charge.

There is a substantial literature on development charges, mostly in the United States, and mostly related to the last purpose -- to collect revenues. In other words, much of the work that has been written focuses on who bears the burden of the charge -- the developer, the landowner, the builder or the new homeowner. An important purpose that has received less attention is the impact on land use decisions of alternative pricing mechanisms. These are discussed in more detail below.

Who Bears the Burden of the Charge?

A number of studies have investigated the issue of who bears the burden of development charges (see, for example, Slack, 1990 and Snyder and Stegman, 1986). Although there is no consensus in the literature on who bears the final burden of the charge, it has been generally accepted that the answer depends on: whether the charge is uniform within housing markets, the demand and supply conditions in the market for new housing, and whether the developer knows about the charge and its magnitude before undertaking the development.

A uniform charge is one that is comparable in a particular housing market: municipalities in that housing market all levy a similar charge. With a uniform charge, the degree to which it will be passed on to new homebuyers or backward onto landowners depends on the demand and supply conditions in the housing market. In the long run, it is generally believed that demand for housing is price inelastic and that the supply of housing is elastic. On the demand side, this means that new homebuyers are relatively insensitive to price -- if there is a price increase, the demand for housing will fall only very slightly. On the supply side, an elastic supply means that development is very

responsive to price changes. The combination of an inelastic demand and elastic supply means that a uniform charge is likely shifted forward onto new homebuyers.

If market conditions do not permit the developer to pass the charge forward onto the new home buyer, then the land will not be developed. The price of land will fall and the burden of the charge will be borne by the owner of the land at the time the charge was imposed. The timing of the charge thus also affects who bears the burden. Even if the developer bears part of the burden in the short run, it is unlikely that s/he will bear the burden in the long run. Increased demand for housing in the future will cause prices to rise to the point where it is profitable to proceed with the development. In the long run, the burden will be shifted forward to the new homebuyer.

Where the charge is non-uniform within the same housing market, it will be more difficult for the developer to pass the charge forward onto the new homebuyer because competitors in nearby locations with lower development charges will not raise their house prices by as much. Where the charge cannot be passed forward, the developer will develop less land and the price of land will be reduced. The differential will be borne by the landowner at the time the charge is anticipated. In the long run, when increased demand for housing results in an increase in the price of housing, the developer will be able to pass the charge forward onto the new homebuyer.

It is difficult to discern from the survey of municipalities whether charges are uniform within housing markets because the municipalities in the survey were from all across the country and not within housing markets. An earlier study of development charges in B.C. and Ontario (see Slack, 1990), however, suggested that municipalities in housing sub-markets do levy similar charges. Indeed, some municipalities suggested at that time that they consider the magnitude of the charges in neighbouring municipalities before levying their own charge. This earlier review would suggest that charges are fairly uniform within housing sub-markets. More up-to-date analysis is required to understand the incidence of the charge.

The discussion of who bears the burden of the development charge has focussed on the theory of who

is likely to bear the burden under different circumstances. If any further work needs to be done, it is empirical estimates of housing demand elasticities and the degree to which the charge is uniform within housing markets.

Impact of the Development Charge on Land Use

If development charges reflect the full costs and benefits (private and social) of the development, then developers will make efficient choices about where to develop. In the absence of development charges, the developer considers only the private benefits and costs of alternative locations and does not consider the impact of the development on the municipality's costs of providing services. The development charge, if properly applied, requires the developer to take account of servicing costs. A privately beneficial development that imposes large costs on the municipality may thus be avoided.

The links between compact urban form and the cost of infrastructure have been well documented (see, for example, GTA Task Force, 1996 and IBI, 1990). In general, these studies show that capital and operating expenditures for hard services such as roads, transit, and water works are related to the density and pattern of development: lower densities lead to higher infrastructure costs per dwelling unit (see Slack, 1993 for a review of the studies of costs and density)¹¹. Blais (1996) estimated that a more compact and efficient development pattern in the Greater Toronto Area could save \$12.2 billion (or 22 percent) of hard infrastructure capital costs over the next 25 years.

An efficient development charge would have to vary by these characteristics of the development: it should be higher per unit for low density developments than for high density developments. Similarly, developments located close to existing services should pay less than those further away. Higher charges for developing land on the outer edges of a community could stimulate development in the

¹¹ While there have been several studies that indicate that the cost of hard services (water, sewers, roads) increases as density decreases, there have been no similar studies on how the costs of soft services (education and social services) vary with density. Since many municipalities (especially in Ontario) use development charge to cover soft costs, the results of such a study would be useful.

inner city and reduce urban sprawl (see Hoxworth, 1991).

If a development is based on average costs, however, the result will be to underprice "hard" services in low density neighbourhoods and overprice them in high density neighbourhoods. The result will be overdevelopment of low density housing and underdevelopment of high density housing relative to what is economically efficient. A development charge that is the same amount per unit regardless of where the unit is located will not reflect the true costs of the development on the municipality and will not lead to efficient development decisions. Altshuler and Gomez-Ibanez (1993) argue that the efficient land use and infrastructure use would be more likely to occur in a system that depended on user charges to recover infrastructure costs than on exactions.

Although much has been written about the potential impact of different types of development charges on urban form, there is no empirical analysis to show how development patterns would change if the pricing technique were different. Cross-section studies comparing urban form in municipalities using marginal cost pricing with municipalities using average cost pricing could be undertaken. It would be necessary to consider other factors that have an impact on urban form as well. It might also be possible to undertake time-series studies if a municipality switched from average cost pricing to marginal cost pricing.

Other Exactions

Other exactions on developers include: front-end financing, land dedications and density bonusing. In the case of front-end financing, municipalities allow developers to proceed with a development before a municipality was able to do so (in terms of providing the necessary infrastructure). The municipality requires the developer to provide the necessary infrastructure or to pay the municipality to provide it. The municipality usually commits to pay the developer back over time as subsequent developments are undertaken and development charges are collected.

Land dedications require developers to set aside land for roads, parks or other public works or for environmental reasons. In many cases, the developer is permitted to make a cash payment in lieu of providing the land. Few studies of land dedications can be found in Canada: two studies that look at parkland dedications are Slack (1994) and Lehman and Associates (1991). These studies suggest that the use of parkland dedication provisions differ across municipalities depending on their size, stage of growth, and need for parkland. Some of the issues that might be addressed include: how much land should be dedicated for parks (it is generally 5 or 10 percent now)? how should cash-in-lieu payments be determined? what should the funds be used for (acquisition or development)? should requirements vary by development according to density, location or whether it is a residential or non-residential development?

Density bonusing grants developers higher densities in return for providing day care facilities, preserving historic buildings and other matters. These informal exactions on developers have enjoyed little written analysis, probably in part because each agreement is negotiated on a different basis. The impact of density bonusing, land dedications and front-end financing are similar in that they represent costs on developers related to the provision of infrastructure. More detailed case studies of these other exactions would provide information to municipalities on how well they work.

VI. PUBLIC-PRIVATE PARTNERSHIPS

Public-private partnerships involve the direct participation of one sector in a venture controlled by the other sector. Funds or services are contributed by both partners in exchange for certain rights or future income. A Task Force on the study of innovative financing approaches in Ontario in 1991 defined a public-private partnership as "any situation in which costs, risks and rewards of creating, refurbishing or expanding infra-structure shared by government and the private sector" (Ontario Ministry of Municipal Affairs, 1993).

Public-private partnerships can take many forms. These in are summarized in Price Waterhouse (1991) and IBI Group (1995):

- ***Operate:*** The private sector operates the facility for a fee. The public sector retains responsibility for capital costs.
- ***Lease/Purchase and Operate:*** The private firm leases/purchases the facility from the public sector, operates the facility and charges user fees.
- ***Lease/Purchase, Build and Operate:*** This arrangement is similar to lease/purchase and operate except that the private sector firm would be required to build or develop a new facility, or enlarge or renovate an existing facility and then operate it for a number of years.
- ***Build:*** This is a turnkey partnership in which the private sector is paid a fixed fee to build a facility according to government specifications and turns the facility over to the public sector when it is completed.
- ***BOT (Build, Operate, Transfer):*** The private sector develops and builds the required infrastructure, operates the facility for some specified period of time and then transfers it back to the government.
- ***Build and Operate:*** The private sector builds and operates the facility and is responsible for capital financing. The operation is regulated and controlled by the public sector.
- ***Build and Transfer:*** The private sector builds the infrastructure and then transfers ownership to the public sector.

In addition to these types of public-private partnerships, there are also financial arrangements discussed above such as land value capture taxes, development charges and other exactions on

developers.

Price Waterhouse (1991, p. 8) identifies six types of risk associated with public-private partnerships:

- ***Project risk*** - the risk that the development of infrastructure will be more costly to develop than originally planned through factors such as construction delays, unforeseen technological difficulties. Obviously, the more complex the project, the greater this risk.
- ***Operating risk*** - the risk that the facility will not operate as planned, with consequent cost overruns. For most infrastructure projects this risk is relatively minor compared with the project risk, given the capital-intensive nature of most infrastructure.
- ***Market risk*** - the risk that the demand for the service is lower than planned, with consequent lower revenues. This risk is obviously most significant where services are provided in return for user fees rather than being funded out of general tax revenues.
- ***Regulatory risk*** - the risk that changes in regulation will occur that delay the project, add to its cost or reduce its benefits to users. This is a particularly serious risk for environmental projects or projects that require Environmental Impact assessment.
- ***Financing risk*** - raising the capital required for major infrastructure entails significant financing risk in that the level of interest rates seriously affects total project cost, as do foreign exchange rates in some cases, because project components are purchased off-shore, or because borrowing is done off-shore.
- ***Public policy risk*** - the risk that the nature of public services provided is not in accordance with the public's wishes, or that the services are delivered in a way that is deleterious to the public good. This risk cannot be shared. It is government's, even if only from a regulatory perspective.

As Price Waterhouse (1991) notes, the structure of the public-private partnership depends on the way in which these risks are shared. The more risk that is assumed by the private sector, the greater is the return it expects. They also note that the private sector is prepared to assume most of the above risks, with the exception of the regulatory risks. Specifically, the private sector is concerned that the rules of the game will change in midstream because of changes in regulations and/or the political climate. Daniels and Trebilcock (1994, p. 6) also argue that governments can abrogate contractual arrangements without having to compensate private sector participants. For this reason, they believe

that the difference between success and failure of a public-private partnership lies in the institutional details.

The benefits of privatization have been summarized in the literature. Privatization:¹²

- enables the public sector to draw on private sector experience and skill to minimize costs;
- reduces government need for up-front capital costs and accesses private sector funds not available to government;
- transfers tax benefits that the public sector cannot use to the private sector in exchange for services required by the public sector.

The literature also lists the disadvantages of public-private partnerships:

- uncertainty that the private sector will be able to carry through its role;
- potential loss of control to the private sector;
- trading off up-front capital costs for future operating costs.

A survey of B.C. local government managers conducted in 1990 by McDavid (1996) concluded that the main advantages of contracting out was cost followed by staffing and specialization and expertise. Cost was particularly important to larger government units; specialization and expertise was particularly important to smaller government units. The main disadvantages cited were control problems, lack of competition, union problems and quality problems. Control was most important in large municipalities; lack of competition was most significant in small municipalities.

¹² See, for example, MacKnight (1993).

Are There Cost Savings from Privatization?

There is a fairly extensive literature on whether there are cost savings from privatization of public services . Canadian empirical studies of cost savings from contracting out delivery to the private sector have been done for bus service, electric utility maintenance and refuse collection. These studies are summarized in Table 3 which is taken from the GTA Task Force Report. Based on the findings of these studies the GTA Task Force concluded that local contracting out of services in the GTA would save \$190 to \$380 million (or 20 to 40 percent) of expenditures on transit and waste management.

Although this literature suggests that there is the potential for large cost savings from private sector delivery of services, there are some serious shortcomings in these studies. In particular, they tend not to include the costs to government of monitoring private sector delivery and enforcing contracts (Slack, 1993). Further, some studies are unable to isolate the reasons for cost savings attributing them to greater efficiency in the private sector. Hirsch (1991) suggests that there is usually a bias in the samples chosen to compare contracting out and public sector delivery. In particular, these studies choose those the most efficient private sector firms which offer lower costs.

On closer examination, it appears that cost savings occur where competition is introduced into service delivery rather than the private sector being inherently more efficient. As the GTA Task Force notes, privatization does not necessarily lead to competition and competition does not necessarily require privatization. This finding is supported by Pommerehne and Fry (1977, p. 225) for Swiss cities:

It may appear to be advisable to switch from public to private production. This conclusion is, however, warranted only if private production is organized so as to guarantee the efficiency properties pertaining to the model of competitive supply.

A review of municipal versus contractor collected garbage in North York by the Bureau of Municipal Research in 1981 also concluded that when *all* of the costs are taken into consideration "contracting

to the private sector does not necessarily make it less expensive."

Further work needs to be done to determine if there are indeed cost savings from privatization and, if there are savings, what are the reasons for them. For example, as IBI Group (1995, p. 1) asks: does the private sector have more experience or expertise? Can it generate economies of scale? Does it have a supply of lower cost capital? Is it more efficient than the public sector?

What is the Impact on Service Quality and Employment?

Concerns have also been expressed over the quality of service and the loss of jobs arising from a move to privatize service delivery. A report by Carr (1996) for the GTA Task Force suggests that the evidence indicates that many public agencies are satisfied with their contractors' performance and that service standards have not deteriorated.

Studies of the impact on jobs reviewed in the GTA Task Force Report (1996, pp. 152-153) indicate the following:

- In a study of 34 services that were contracted out, the U.S. National Commission on Employment Policy found that 58 percent of affected employees went to the private contractor, 24 percent to other public sector jobs, 7 percent retired, and only 7 percent were laid off.
- In Los Angeles County, of 2,800 jobs affected by contracting out, only 34 employees were laid off over a five-year period.
- In the Alberta Department of Highways, contracting out is resulting in 75 to 80 percent of the provincial employees affected moving to the private sector in similar jobs.
- In Hamilton-Wentworth, when Philip Utilities took over management of the water treatment facilities, it guaranteed employment security for all affected workers.

While all of these results are positive in terms of the impact on employment, a closer look at any one of these examples would provide greater insight into what happened to employees. A case study

Table 3: Cost Savings from Private Sector Delivery

<i>Service Studied: Author</i>	<i>Unit/Organizational Form</i>	<i>Findings</i>
<i>Bus Service:</i> Kitchen (1992)	Municipal Dept. vs. privately contracted service in Ontario municipalities	Significantly lower costs per km. under privately contracted operation
<i>Electric Utility Maintenance:</i> Kitchen (1986)	Utilities contracting out electric utility maintenance vs. in-house maintenance in Ontario municipalities	Contracted out service significantly less expensive
<i>Refuse Collection:</i> Kitchen (1976)	48 Canadian cities. Municipal vs. privately contracted forms	Municipal suppliers more expensive than private firms
McDavid, Richards & Doughton (1984)	Comparison of costs before and after Richmond, B.C. switched from private to public collection	Residential solid waste collection fell from \$46.24 per household in 1982 to \$30.63 in 1983
McDavid (1985)	Survey of private collection vs. municipal collection of residential solid waste in 107 Canadian municipalities	Municipal collection was 61% more expensive
Tickner & McDavid (1986)	Detailed survey information on output, inputs and costs for private vs. public collection of residential waste obtained from 100 municipalities	On average, private collectors were 28% less expensive
McRae (1994)	Comparison of charges for collection of commercial/industrial solid waste in three communities on Central Vancouver Island	Depending on the size of container and frequency of pickup, municipal services were between 16% and 67% higher than private sector prices

Source: GTA Task Force Report (1996), p. 151

approach which provided more details on employment is required.

Case Studies

There are many examples in the literature of case studies on privatization. Since, as noted earlier, privatization covers a whole range of arrangements, the case study approach is useful. Some examples of case studies can be found in Skelly (1996), IBI Group (1995), and Municipal Finance Officers' Association of Ontario and Association of Municipal Clerks and Treasurers of Ontario (1994).

Table 4 summarizes some of the case studies. With the exception of the sewage treatment plant in Rockland, Ontario, these case studies all highlight "success" stories. Sometimes more can be learned from the case studies which failed but these are rarely reported.

Advice on Public-Private Partnerships

The experience with public-private partnerships has led to the identification of other issues and advice to municipalities on public-private interaction. One issue relates to the respective roles of the public and private sectors. Osborne and Gaebler (1992, pp. 45-46) distinguish between the two roles as "steering" (which the public sector should do) and "rowing" (which the private sector should do):

Services can be contracted out or turned over to the private sector but *governance* cannot. We can privatize discrete steering functions but not the overall process of governance... Business does some things better than government, but government does some things better than business. The public sector tends to be better at policy management, regulation, ensuring equity, preventing discrimination or exploitation, ensuring continuity and stability of services, and ensuring social cohesion.

Carr (1996, p. 5) summarizes the criteria used by governments in selecting those public services that have potential to be privatized:

- degree to which objective standards and performance measures can be described
- presence of competition; are there two or more contractors able and willing to provide the

Table 4: Examples of Canadian Case Studies of Privatization

<i>Municipality</i>	<i>Nature of Project</i>	<i>Cost Savings/Impact</i>	<i>Source</i>
Airdrie, Alberta	contracting out property assessment	increased costs	Skelly (1996)
Hamilton-Wentworth, Ontario	privatization of water and wastewater treatment	cost savings guaranteed to municipality	Skelly (1996) and IBI Group (1995)
Peterborough, Ontario	taxi-bus paratransit system	savings in routing costs	Skelly (1996)
Paradise, Newfoundland	contracting out for public works	cost savings	Skelly (1996)
Alberta Highway 14 Water Project	privatization of water supply system	cost savings	IBI Group (1995)
Rockland, Ontario	privatization of sewage treatment plant	proposal did not proceed	IBI Group (1995)
Ottawa-Carleton, Ontario	privatization of service delivery for sewage treatment plant	cost savings	IBI Group (1995)
Sainte-Marie-de-Beauce, Quebec	privatization of operation of water treatment plant	cost savings	IBI Group (1995)

service?

- ability to replace the private provider if the service is below standard or firm goes out of business
- whether the function has been out sourced successfully elsewhere

- degree to which contractors' performance can be monitored by government
- impact on current employees
- degree of potential opposition to the privatization activity
- legality of contracting out
- time needed to structure and implement privatization.

Carr (1996) makes an important point: "The key criterion is that you must know what it is you wish to achieve as the result of contracting out. The benefits and barriers then can be accommodated and addressed throughout the process."

In summary, further work needs to be done to understand the nature of cost savings from privatization and the impact on service quality and job loss. Further, Price Waterhouse (1991) suggests that the provincial government¹³ develop a primer or handbook for municipalities to explain the various innovative financing techniques and give them a guide to their implementation. This would give municipalities a starting point for knowing what they can and cannot do and how to go about working with the private sector to finance infrastructure.

VII. BORROWING

Municipalities generally borrow (use debt finance) to pay for that part of major capital works that are not financed by federal or provincial grants. Repayment of borrowed funds comes from operating revenues such as property taxes and user fees. When the benefits from infrastructure projects are

¹³ In their work, they are referring to the Ontario government for whom they undertook the study.

enjoyed over a period of time (for example, 25 years), it may be both fair and efficient to finance these projects by borrowing. It may also be necessary to borrow to avoid large year-to-year fluctuations in property tax rates. As Lewis (1993, p. 148) notes, there are efficiency arguments for debt financing. If a particular infrastructure project yields benefits to a community that exceed the costs of the project, then foregoing the project or postponing it will involve a community welfare loss.

Municipalities in Canada are severely restricted by the provinces with respect to the amount of debt they can incur, the type of debentures they can issue, the length of the term and the use of the borrowed funds. For a description of the different rules, see Tassonyi (1995).

Most municipalities in Canada, in recent years, have been reluctant to borrow funds for any purpose. Rather, they have been relying increasingly more heavily on operating revenues and reserves as opposed to long term debt. Kitchen and Slack (1993) reviewed the trends in municipal borrowing for seven Canadian cities and found that debt charges as a proportion of operating expenditures have declined in cities in Ontario and Nova Scotia over the last 20 years and have remained fairly constant in municipalities in B.C. Debt charges were higher in municipalities in Quebec and Alberta.

Borrowing Instruments

A summary of different types of bond financing can be found in the literature (see, for example, Informetrica, 1992):

- ***General obligation bonds*** are secured through general taxes. This type of financing is used for projects that benefit the community as a whole. One problem with this type of bond is that the revenue source cannot be tied back to the users.
- ***Revenue bonds*** are backed by the revenues generated by specific projects that the bonds are used to finance. The debt is generally repaid from user fees. Revenue bonds are used for roads, water and sewers where the beneficiaries can be identified.

- ***Revolving loan funds*** are permanent sources of funds that can be loaned for various purposes. When the loan is repaid, the funds can be loaned out for other projects, thereby multiplying the benefits of the original investment.
- ***Bond banks*** are used in some provinces. Local governments issue bonds that are purchased by the bond bank which is usually an independent authority (such as in B.C.) established by provincial statute. The bank can pool the issues and sell the larger, combined issue on the national bond market.

Leithe and Joseph (1991, p. 79) list the advantages and disadvantages of municipal borrowing. The advantages include:

- The municipality enjoys immediate benefit from the capital improvement which is not always possible when relying on current revenues.
- The cost of capital is spread over future beneficiaries.
- If per capita incomes are rising, the cost to the individual taxpayer will be less burdensome than would full payment initially.
- Wide fluctuations in expenditures are avoided.

The disadvantages are:

- Interest costs are added to the total cost of the expenditure.
- Potential revenues are dedicated to debt repayment and are not available for other uses.

- Issuing too much debt can impair the credit rating of the municipality and thereby increase the cost of capital.

Notwithstanding the strong economic case for borrowing for major capital investments, there are significant differences across Canadian municipalities with respect to their use of borrowing. A significant concern at the local level is that debts have to be serviced from future revenues (see Tassonyi, 1995). While the costs are spread over time, a significant portion of local budgets becomes a fixed obligation and debt charges can significantly constrain local fiscal flexibility. This constraint needs to be weighed against the potential of the capital project to generate additional tax and user fees revenues to defray some of the costs.

A recent American study suggests that these concerns do influence a municipality's decision to borrow (see Temple, 1994). Further, the study indicates that high-income jurisdictions in the "Snowbelt" make greater use of debt financing than low-income jurisdictions in the "Sunbelt." It is argued that this choice also reflects, in part, the higher demand for public infrastructure where the income of the median voter is high. No similar studies have been done in Canada, however, to determine why some municipalities borrow and others do not. An analysis of the factors that determine whether a municipality will borrow would help to understand this trend and perhaps alter the constraints on municipalities in the future.

VIII. THE CONSULTATION PROCESS

The purpose of the consultation process was to ask individuals working in the area of infrastructure finance to identify what information they require that is not currently available to them. The consultation process solicited views of researchers on research priorities as well as views of potential users of municipal infrastructure finance information. It focused on their information needs and opportunities for information dissemination.

Letters were mailed to approximately 150 stakeholders (in English and French): municipalities, provincial governments, the federal government, associations of municipalities, organizations dealing with infrastructure, academics, and members of the National Housing Research Committee.¹⁴ In addition, a web-site was set up to reach those interested in infrastructure issues. Both the letters and the web-site included a discussion paper (see Appendix A) outlining some of the issues in infrastructure finance and inviting discussion of the issues.

The discussion paper sought input in three areas:

- *Trends in municipal finance:* The discussion paper identified recent trends in municipal finance and asked those consulted to comment.
- *Information requirements:* Based on the trends in municipal finance and the information gaps identified in the literature review, the discussion paper suggested issues where more work could be done. Those consulted were asked if the major information gaps had been identified, which were the most important and whether other issues should be added.

¹⁴ Input was also solicited directly from members of the National Housing Research Committee (NHRC) at a meeting of its Working Group on Municipal Infrastructure and Housing in Ottawa on May 8, 1996.

- *Information dissemination:* The discussion paper made suggestions for ways to disseminate information and solicited comments on whether there were other ways, which were the most important and the extent to which cost is a factor.

Thirty-five responses were received by mail, telephone, FAX and E-mail. In addition, about 25 people participated in an NHRC meeting on infrastructure and provided feedback. The largest response (not including the NHRC meeting) was from provincial government departments (8) followed by municipal organizations dealing with infrastructure (7), academics (6), local governments (5) and the federal government (5). There appeared, from the responses, to be widespread interest in the area of infrastructure and in research that needs to be done. In many cases, there was follow-up by the author which led to further responses and an ongoing dialogue on the issues.

VIII. 1 Consultation Findings

As noted above, there was lots of interest in research on infrastructure finance. Those consulted were pleased that CMHC is interested in funding research on this important topic. The following summarizes the findings from the consultation:

Trends in Municipal Finance

There was general agreement among those who responded that the trends in municipal finance were correctly identified. Cutbacks in provincial grants combined with pressure to keep property taxes down has resulted in municipalities looking to user fees, a greater role for the private sector and increased borrowing. Research in all of these areas was considered to be a high priority.

Information Requirements

There was support for the information requirements outlined in the discussion paper. In general, respondents saw a need for more case studies (especially in the area of public-private partnerships)

and more empirical studies of the impact of different financing tools. With respect to user fees, more information is required on the impact of increasing water rates on revenues collected, the impact of garbage fees on illegal dumping, the impact of tolls on highway use, and the impact of area-specific development charges. With respect to borrowing, information is required on the advantages and disadvantages of alternative types of bond financing.

More generally, respondents were interested in the impact of alternative financial tools on demand management and urban form. It was felt that some financing tools are more successful than others at reducing the need to invest in infrastructure. There was interest in more work on the use of financing tools to reduce the need for investment.

There were a number of other issues raised by respondents that were not outlined in the discussion paper. These include:

- ***Constraints imposed by provincial legislation and regulations:*** There was a lack of understanding of what is possible for municipalities to do under current provincial legislation especially in the areas of public-private partnerships and user fees.
- ***Role of the federal government:*** A couple of respondents were concerned that the discussion paper excluded any discussion of federal transfers for infrastructure. In particular, interest was expressed on the impact of the Canada Infrastructure Works Program on municipal infrastructure spending.¹⁵
- ***Impact and administration of marginal cost pricing:*** Many respondents agreed that more work needs to be done on the impact of marginal cost pricing. But many focused on the information needed to design water rate structures. One respondent stressed the need to price in a way that reflects long term planning that includes infrastructure rehabilitation and

¹⁵ Since the Canada Infrastructure Works Program is currently going through an extensive evaluation process, this area of research is not recommended at this time.

reconstruction. The price of water should be based on the cost of a new and expanded water supply system rather than the historic cost of existing infrastructure. Municipalities need some assistance with the design of user fees for water. They also are looking for assistance in designing user fees for garbage collection.

- ***Public reaction to alternative revenue sources:*** Some respondents were interested in how the public would respond to different ways of paying for infrastructure. In particular, the response to user fees and privatization was of interest.
- ***The impact of demand management and urban form on infrastructure costs:*** Many respondents were interested in the impact of distance and density on operating and capital costs for different services. Others were interested in ways of reducing the demand for infrastructure through alternative financing tools.
- ***The impact of cost sharing among municipalities:*** Although many authors expressed interest in cost-sharing between the public and private sectors, some were also interested in cost-sharing among municipalities whether through the regionalization of services or contracting among municipalities.

Information Dissemination

The responses to the questions on information dissemination were fewer than the responses on information requirements. It was generally agreed that all of the vehicles listed are appropriate and that no one source alone would be sufficient. Responses from two provincial government departments suggested that provincial government ministries disseminate information now to municipalities and that this role could be expanded. One respondent thought that short articles in a news bulletin format would be helpful. Finally, two respondents emphasized the importance of not just providing information but helping the reader to process the information and be able to use it to make decisions. In short, it is not so much how the information is disseminated that was of concern to people but

rather what information is disseminated.

IX. SUMMARY

This report has reviewed the literature on the various tools for financing infrastructure and has reported on a consultation process with stakeholders in the field of infrastructure finance. Revenue sources reviewed include taxes, special financing districts, fees and charges, public-private partnerships and borrowing. The findings suggest the following:

- Municipalities are facing severe cutbacks in provincial transfers and increased pressures to limit property tax increases. At the same time, the demand for new and improved infrastructure is increasing. This means that municipalities are seeking new ways to raise funds to meet rising expenditure demands.
- The trend appears to be towards greater use of user fees, a greater role for the private sector in paying for infrastructure and possibly increased borrowing at the local level. These three areas are thus highlighted in the discussion of research priorities.

The gaps in the literature generally relate to empirical studies of the impact of financing tools. Case studies are also lacking in a number of areas. The following summarizes the type of research that needs to be undertaken on user fees, development charges, public-private partnerships and borrowing:

- User fees are currently used for water, sewers, transit and, to a lesser extent, for solid waste collection and highways. It has been well documented in Canada that current pricing practices for water and sewers have resulted in over-consumption of water and deteriorating infrastructure. There has been some empirical research in Canada on the impact of marginal cost pricing on the amount of water consumption but much less on the impact on the demand for physical infrastructure.

- With respect to user fees for solid waste collection, there is little empirical analysis of the impact of charging on the amount of waste generated, illegal dumping, and the need for landfill sites. Similarly, with respect to highway tolls, there is little empirical work in Canada on the impact of tolls on traffic and the need for roads.
- There is an extensive literature on development charges, mainly in the United States. Much of the literature focuses on who bears the burden of the charge -- the landowner, the developer, the builder or the homeowner. There has been less written about the impact of the charge on the amount of development, the timing of development, and urban form and density. More work on density bonusing and its impact could also provide some useful information on an alternative revenue source.
- The use of land value capture taxes in Canada is limited but they have been considered for major infrastructure projects such as transit systems. The empirical question that needs to be studied relates to how to isolate the increase in land value attributable to the public investment from other variables which influence land values.
- Public-private partnerships are gaining a lot of interest among Canadian municipalities. It is not clear, however, how well they are understood. Work needs to be done on the issue of costs savings in the private sector. Are there cost savings? What are the reasons for cost savings? The existing literature often fails to include all of the relevant costs when comparing public and private sector costs.
- Although Canadian municipalities do borrow to make capital expenditures, the use of borrowing varies significantly across the country. No study has been done in Canada to explain the reasons for differences in borrowing practices by municipalities. This type of information would help to explain why some municipalities do not borrow and what factors might reverse this trend.

- The need for infrastructure is based in part on the way infrastructure is financed. For example, user fees for water that are based on marginal cost pricing are expected to reduce the demand for water and for water and sewage treatment plants. Peak load pricing of highways and transit would also reduce the need for infrastructure. Development charges that are based on marginal cost pricing would likely result in more compact urban form and thereby reduce the need for infrastructure. In general, more work needs to be done on the impact of financing techniques on the need for infrastructure.

There are some other research topics that have been outlined in this paper that relate to property taxes and special financing districts. Since these revenue sources appear to be of somewhat less interest to stakeholders than user fees and private sector involvement, they are considered of secondary importance:

- Work needs to be done to compare the benefits of local infrastructure to residential and non-residential properties to determine what portion of the property tax used for infrastructure should be allocated to each property class. This research question applies to all services provided by local governments but has implications for infrastructure finance.
- The area of special assessments would benefit from case studies that describe the characteristics of their use. Case studies could document the basis of the assessment (front footage, lot size etc.), the projects for which they are used and other features.
- Special financing districts are not a revenue tool but rather an alternative organizational tool for delivering services. Work is needed on the impact of using special financing districts to finance major capital infrastructure projects to determine the extent to which they affect costs and quality of service provision. More empirical work on cost differences between the delivery of services by municipal government departments and special purpose bodies would also be useful.

X. RECOMMENDATIONS FOR FURTHER RESEARCH

The above summary has suggested many possible areas for research in which there is both interest on the part of the stakeholders and gaps in terms of the literature. In terms of research priorities, it is necessary to narrow down the number of topics. Given the interest expressed by the stakeholders and the municipal finance trends that are expected to continue, it is recommended that projects be considered in the areas of user fees, private sector involvement and borrowing. Five specific projects are recommended:

- *User Fees for Solid Waste Collection:* This is an area of widespread interest and little empirical work. A study of user fees for solid waste collection could provide an empirical analysis of the impact of fees on the amount of solid waste generated, the amount of illegal dumping and the need for landfill sites. As part of the empirical analysis, it would be necessary to estimate price elasticities -- the extent to which the price affects the amount of garbage generated. A cross-section or time-series analysis could isolate the impact of user fees on the amount of waste generated.
- *User Fees for Water:* There are many more studies on user fees for water than user fees for solid waste collection. The interest in this area, however, is significant. Municipalities are particularly interested in how to estimate the cost of water (what costs are included) and how to set the fee. A second aspect of a study on user fees for water would be to estimate price elasticities for different users. Although work has been done on price elasticities for water, these studies have been done at an aggregate level. It would be useful to estimate price elasticities for different categories of water users. Further, this information could be one input into determining the extent to which water pricing (at marginal cost) removes the need to invest in infrastructure.

- *The Impact of Alternative Financing Tools on the Demand for Infrastructure:* This study would estimate the impact on the demand for infrastructure of using user fees (instead of property taxes), development charges based on marginal cost pricing (instead of development charges based on average cost pricing) and possibly other revenue tools. With respect to development charges, as an example, this could be an empirical study based on cross-section data that analyzes the impact in different municipalities that use different development charge practices. A regression model that estimated the impact on the demand for infrastructure as a function of a number of different variables could isolate the impact of the financing technique.
- *Privatization:* Although there have been a number of studies on the impact of privatization on cost, few have been done in Canada and few have included all of the relevant costs. An empirical study of the impact of privatization on cost, quality of service, employment and other factors would provide useful information to municipalities considering this option. An analysis of the underlying reasons for differences in cost, quality etc. would also provide useful insights to municipalities.
- *Borrowing:* Very little has been written on municipal borrowing in this country. A study which analyzed the differences in the use of borrowing by Canadian municipalities and tried to explain the reasons for the differences would be useful. This type of analysis would require data analysis and an empirical study that explained the differences in the use of borrowing by a series of variables (such as extent of capital expenditures, availability of other sources of revenue such as provincial grants, stringency of provincial borrowing rules etc.).

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APPENDIX A:
DISCUSSION PAPER FOR CONSULTATION

FINANCING INFRASTRUCTURE: EVALUATION OF EXISTING RESEARCH AND INFORMATION GAPS

Canada Mortgage and Housing Corporation (CMHC) is interested in establishing research priorities in the area of infrastructure finance. They have asked me to evaluate the existing research, identify information gaps and make recommendations on research that needs to be done. CMHC is also interested in ways in which information could be disseminated.

This paper has been written to invite your participation and to encourage discussion on issues in infrastructure finance. It reviews current trends in municipal finance and suggests some issues that could benefit from further research. At the end of the paper, a description of a number of financing tools is provided. I am interested in your thoughts on where information gaps exist.

I look forward to your participation.

Enid Slack

I would like to hear from you by letter, FAX or E-mail. Please send comments to:

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TRENDS IN MUNICIPAL FINANCE

Significant cutbacks in transfers from provincial governments combined with pressure to keep property taxes down are occurring at a time when existing infrastructure is perceived to be in major need of repair. Cutbacks, combined with rising demands for infrastructure improvements, have forced municipalities to seek new ways to finance infrastructure. There is a trend towards greater use of user fees, a greater role for the private sector and possibly increased borrowing at the local level. These three areas are highlighted below.

More Reliance on User Fees: User fees are currently used for water, sewers, transit and, to a lesser extent, for garbage collection and highways. There is a trend towards increased use of user fees for all of these functions.

Greater Role for the Private Sector: There is an increasing trend to look to the private sector to pay for infrastructure. This means increased use of development charges to cover growth-related costs, increased reliance on other exactions, consideration of land value capture taxes and greater use of public-private partnerships.

Increased Borrowing: Municipal borrowing varies across Canada with many municipalities unwilling to borrow. With the reduction in provincial grants and pressure to keep property taxes down, however, borrowing at the local level is likely to increase in the future.

INFORMATION REQUIRED

The type of information required is dictated by the trends in municipal finance and information gaps. In general, it appears that there are gaps in empirical work, especially studies of the impact of different financing tools. Here are some suggestions for issues where more work could be done in Canada:

User Fees

Fees for Water: It has been well documented in Canada that current pricing practices for water and sewers have resulted in over-consumption of water and deteriorating infrastructure. There is less empirical research, however, on the impact of full cost recovery pricing on water consumption and the demand for physical infrastructure. Potential cost savings to municipalities have also not been estimated.

Fees for Garbage Collection: There is little empirical analysis of the impact of charging for garbage on the amount of waste generated, illegal dumping, the need for landfill sites and other factors. There is also not much information on the appropriate charge per bag of garbage collected, the amount of revenues relative to the administrative costs of garbage fees and the incidence of user fees for garbage collection.

Fees for Highways (Tolls): There is little empirical analysis in Canada on the use of tolls to finance highways. In particular, there is not much empirical analysis on the impact of tolls on trip scheduling, route destination, and destination choice. There is also not much empirical analysis of the impact of tolls on the

amount of traffic, the incidence of tolls by income group and the administrative costs associated with the collection of tolls.

Private Sector Involvement

Development Charges: There is a vast literature on development charges, mainly in the United States. Much of that literature focuses on who bears the burden of the charge -- the landowner, the developer, the builder or the homeowner. There has been much less written about the impact on the amount and timing of development. More recently, there has been some literature on the impact of urban form on the costs of infrastructure. More work needs to be done, however, on the impact of different types of development charges on urban form and densities.

Land Value Capture Taxes: The use of land value capture taxes is limited in Canada but has been considered for major infrastructure investments such as transit systems. The most difficult question is an empirical one -- how to isolate the increase in land values attributable to the public project from other variables that influence land values.

Public-Private Partnerships: Public-private partnerships are gaining a lot of interest among municipalities. It is not clear how well they are understood, however. In particular, research needs to be done on whether there are cost savings from private participation and the reasons for cost savings. The existing literature often fails to include all of the relevant costs when comparing public and private sector involvement. Some of the factors that need to be considered are wage differences, management differences, degree of government regulation and other factors.

Specific case studies are also required because each partnership agreement is different. Some research questions that need to be addressed include: whether involvement of the private sector leads to greater competition in the provision of infrastructure and the impact of private provision on service quality.

Borrowing

Although Canadian municipalities do borrow to make capital investments, the use of borrowing varies significantly across the country. No study has been done in Canada to explain the differences in borrowing patterns across municipalities. This type of information would help to explain why some municipalities do not borrow and what factors might reverse this trend.

INFORMATION DISSEMINATION

Information can be disseminated in many ways. Some suggestions include:

- municipal associations
- professional journals
- trade magazines
- newsletters
- technical reports
- conferences, seminars, workshops
- training programs
- municipal reference libraries
- information clearinghouses
- computerized networks and databases (including the Internet)

Have the major trends in municipal finance been identified?

Have the relevant information gaps and research priorities been identified?

Which are the most important?

Are there additional areas that require research?

Have the relevant ways of dissemination information been identified?

Which are the most important?

Are there additional ways that information could be disseminated?

To what extent is the cost of retrieval a factor in disseminating information?

A DESCRIPTION OF FINANCING TOOLS

Property Taxes: The property tax is the main source of revenue for local governments in Canada. The tax is levied on residential, commercial and industrial properties. A tax rate is struck by the municipality and applied to the assessed value of properties. Property taxes are mainly used for operating expenditures but are also used for financing debt costs and for future capital purposes.

Provincial Grants: Provincial grants to municipalities can be conditional or unconditional. Unconditional grants can be spent on any function or can be used to reduce local taxes. Conditional grants have to be spent on a particular function set out by the provincial government. Generally, matching grants are used whereby the municipality is required to match provincial funds.

User Fees: A user fee is a payment made by a consumer in direct exchange for a government service. The charge is for a voluntarily purchased, publicly provided service. User fees fund water and sewers, garbage collection and disposal, transit and other services.

Special Assessments: Special assessments (and local improvement charges) are charges on residential, commercial and industrial properties to pay for additions or improvements to existing capital facilities that border on those properties. The charges are generally levied on the basis of front footage, lot size, zone or assessment. Special assessments are used to finance capital expenditures such as street paving, installation or replacement of watermain and sewers, sidewalk construction and streetlighting.

Land Value Capture Taxes: A land value capture tax is levied in a selected area to pay for a public improvement project that increases property values (such as a transit system). Through this tax, local governments attempt to recapture a portion of the escalated value that accrues to properties by virtue of their location next to the public project. Land value capture taxes are not widely used in Canada.

Development Charges and Other Exactions: Development charges are levies on developers to finance the off-site costs associated with new development or redevelopment. These charges are levied for officially mandated programs and the funds have to be used to pay for infrastructure made necessary by the development. Other exactions include *land dedications* where developers are required to set aside lands for roads, parks or other public works, and *density bonusing* where developers are granted higher densities in return for providing certain facilities.

Borrowing: Municipalities use debt financing to pay for at least part of major public capital works. Repayment of borrowed funds comes from operating revenues such as property taxes and user fees. Municipalities are severely restricted by provincial governments in terms of the amount of debt they can incur, the types of debentures they can issue, the length of term and the use of borrowed funds. In some provinces, a provincial agency assists municipalities who want to borrow.

Public-Private Partnerships: A public-private partnership involves the direct participation of one sector in a venture controlled by the other sector. They can involve private participation in public works or public participation in private undertakings.