JOSEPH F. CASTRILLI
BARRISTER & SOLICITOR

Telephone (416) 922-7300
Telefax (416) 944-9710
Email: jcastrilli@tube.com

98 Borden Street
Toronto, Ontario
M5S 2N1

Our File No. 20035
September 5, 2001

VIA ELECTRONIC MAIL

The Honourable Dennis R. O'Connor
Commissioner
The Walkerton Inquiry
180 Dundas Street West, 22nd Floor
Toronto, Ontario
M5G 1Z8

Dear Commissioner O'Connor:

Re: Walkerton Inquiry - Part II - Ontario Water Works Association ("OWWA") and Ontario Municipal Water Association ("OMWA") - Review of Issue 14 - Financial Matters - prepared by Mr. Gary Scandlan on behalf of OWWA/OMWA

As you are aware I am counsel to the OWWA/OMWA, two organizations with Party status in Part II of the Inquiry. In this regard, I am attaching the above referred to review and recommendations prepared by Mr. Gary Scandlan for OWWA/OMWA. We would ask that this review be placed on the Commission website, and that Mr. Scandlan be given an opportunity to appear before you during the Public Hearings to speak to his review and recommendations.

This review is the tenth of ten submission documents to be filed by OWWA/OMWA in the Part II process. I would ask that if Mr. Scandlan is permitted to appear before you that I also be permitted to attend with him to assist the Commission, where necessary, in understanding the link between the above document and the other OWWA/OMWA submission documents previously filed.

I trust the above is satisfactory.

Yours truly,

"Joseph Castrilli"

Joseph F. Castrilli

Encl.

c.c. James Van Loon
c.c. Gary Scandlan, consultant to OWWA/OMWA
c.c. Rod Holme, OWWA
c.c. Jim Craig, OMWA
c.c. Judy A. MacDonald, OWWA
c.c. John Braam, OWWA
c.c. Max Christie, OMWA
c.c. Doug James, OMWA
c.c. R.L. Beck, OMWA
c.c. Susan Andrews, OWWA
wcilet13 @ c: winword\20035

REVIEW OF VARIOUS PAPERS SUBMITTED TO THE WALKERTON INQUIRY COMMISSION REGARDING FINANCIAL MATTERS ON BEHALF OF THE ONTARIO MUNICIPAL WATER ASSOCIATION AND THE ONTARIO WATER WORKS ASSOCIATION

September 2001

PLANNING FOR GROWTH

C.N. WATSON

AND ASSOCIATES LTD.

ECONOMISTS

4304 Village Centre Court

Mississauga, Ontario, Canada

L4Z 1S2

Telephone: (905) 272-3600

Fax: (905) 272-3602

e-mail: info@cnwatson.on.ca

CONTENTS

1. INTRODUCTION

1. INTRODUCTION

Part II of the Walkerton Inquiry has established a process for reviewing various matters surrounding the provision of treated water by public providers. Issue 14 deals with financial matters as they relate to the construction, maintenance, replacement and financing of water infrastructure, along with the associated operating costs and revenues with water delivery.

C.N. Watson and Associates Ltd., Economists, have been retained by the Ontario Municipal Water Association and the Ontario Water Works Association to review selected reports which comment on financial matters for public water providers. This paper provides a review of three specific submissions made to the Commission, as follows:

- Provincial-Local Relations and Drinking Water in Ontario by Andrew Sancton and Teresa Janik, Commission Paper under Issue 4
- The Management and Financing of Drinking Water Systems: Sustainable Asset Management, by Pollution Probe
- Financing Water Infrastructure by Strategic Alternatives, Commission Paper under Issue 14

The intent of this paper is to review the observations and perspectives presented therein, provide commentary on those perspectives as they relate to the financial management of publicly operated water systems and to provide the Commission recommendations of the OMWA and OWWA, in this regard.

2. REVIEW OF PROVINCIAL-LOCAL RELATIONS AND DRINKING WATER IN ONTARIO, BY ANDREW SANCTON AND TERESA JANIK

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The Sancton paper seeks to provide a history of drinking water in Ontario and to discuss why the province has become involved in a service which is inherently local in nature. The first part of the paper discusses the concepts of public and local goods as the basis for discussing responsibilities for the provision of service at the municipal versus the provincial level. The three main reasons for the Province's involvement, which is discussed from a historical perspective, are public health, financial assistance and organizational issues.

In general, the report is a well documented chronology of the political, legislative and financial aspects of the Ontario water industry. As observed by Sancton, the policies and regulations surrounding the water industry have evolved and often reflect the political objectives of the province over time.

From his review of the history of events, several conclusions are made. A review of these conclusions along with the perspectives of the OWWA/OMWA are provide herein:

2.1 All Aspects of Public Health Concerns about Water Need to be Revisited

Sancton identifies that all public health concerns about water need to be revisited, including the roles of the provincial and local governments. It is concluded that both the province and the local authority should be responsible for insuring safe water. Although this may be perceived as a wasteful overlap and duplication by some, it provides a form of double protection that should be supported.

2.2 Should Users Pay the Full Cost of Piped Water

Sancton provides an extensive historical review of grants and subsidies provided to Ontario municipalities for water service. No grants had been provided for this service prior to the mid-1950's. It was acknowledged that the primary reason for the introduction of grants was for provincial economic development and corresponding financial reasons. Sancton concludes that municipalities should not be provided grants for this particular service as it is in the best interest for the municipality to ensure that clean water will be provided. Should the cost burden of this service be too high, the municipality will cut spending in other lower priority areas.

The position of the OWWA and OMWA is that full costs of providing the service be identified by all municipalities for provision of the water service. This definition is broader than the one considered by Sancton as his paper focused primarily on capital costs (and corresponding capital grants) and not as much on the operations costs. In certain instances, some costs related to water service may not be reflected in the water rates (i.e. recovered via property taxes). As well, municipalities may reflect only the in-year cost to pay existing debt charges or their current capital programs. In these instances, the full cost of water provision is not reflected in the rates. The OWWA and OMWA support the concept of long term capital planning which incorporates the planning for replacement of capital infrastructure. This is achieved through very long term capital budgeting and/or through the establishment of lifecycle reserves (these concepts are discussed at greater length in Chapter 3 to this report). These practices ensure that the full cost of water provision is addressed.

It is also the position of the OWWA and OMWA that some level of support should be made available to municipalities as part of transitional matters. It is perceived that the conclusion of the Walkerton Inquiry process will establish regulatory changes which will require capital investments by some municipal water service providers. Depending upon the significance of the capital costs and the amount of time required to conform to these new regulations, some municipalities may experience financial difficulty in meeting these standards. Thus the OWWA and OMWA recommend that loans be established to assist in these transitional matters. The loans would ensure that the users of the system are paying for the costs of their service. Initially, this portion of the program may be deemed transitional in nature. Subsequently, this program may require further review to address whether there is a need on a continuing basis, similar to the state revolving fund regime established under the federal safe drinking water law in the

United States. This need would be dependent upon several factors (e.g. condition of individual systems, cost to implement and maintain commission recommendations, etc.) which may not be quantifiable at this time.

2.3 Privatization of Municipal Systems

Consideration of privatizing municipal water systems is discussed within the paper. It is acknowledged that Ontario citizens do not seem to be in support of selling their public systems and there does not appear to be any compelling reason to move towards fully privately operated systems.

Throughout Ontario, all water systems have a blend of public and private entities providing the service presently. Private companies are involved in many different ways, as follows:

- Consulting engineers to design the municipal systems
- Private contracts to construct infrastructure
- Operating contracts for maintenance and/or operations of various aspects of the systems
- Local services (within subdivisions) designed and constructed by developing landowners
- Design/Build contracts

It is acknowledged that the authority for municipalities to privatize their systems was granted by the Province in 1993 (Bill 40) which amended the *Municipal Act* (section 210.1) to allow for this. While this expanded legislative authority has allowed municipalities to increase the involvement of the private sector, there has been limited movement towards the total privatization of the entire system. There are two main reasons for this. First, there is reluctance to give up control of the operations of the system, as the municipality cannot contract out of the liability for the system. While there may be means of mitigating some of the risk through insurance and performance bonds, the ultimate risk still resides with the municipality. Hence, most municipalities wish to retain management decisions regarding the system.

The second reason is that the municipal sector can finance capital at lower costs than the private sector. Most municipalities in Ontario have excellent credit ratings and therefore can borrow funds at lower interest costs. As well, municipalities normally pay off their debt over

shorter time periods. While the short term cash flow for a particular project may be higher as a result of this shorter term, once the debt is paid off, the cost of borrowing is eliminated. Hence, financial flexibility is preserved for the future.

It is suggested by Sancton that small municipalities might not be capable of determining effectively what is in their own best interest with respect to organizing water supply. There may be a case for legislating small municipalities, below a certain size, to either amalgamate their systems or privatize their system. Within Ontario, there are many small municipalities which use consulting engineering firms to act as the municipal engineer, In these situations, technical knowledge required for the safe operation of the system is purchased however the selection and management of the consulting engineer is maintained by the municipality. It is acknowledged that the level of service may vary across smaller municipalities in Ontario however, this may be in part due to problems in regulating and enforcing the water industry. It is acknowledged that not all municipalities have staff operating the systems who are certified by examination; however, this is due in part to provincial certification process.

The OWWA/OMWA do support regionalization of smaller systems where the viability of the smaller system to protect public health and conserve public resources may not be sustainable. This issue is discussed at length in the OWWA/OMWA Issue Paper #8 submission. Viable systems are defined as self-sustaining systems that have the financial, technical, managerial, and operational expertise and capacity necessary to reliably meet all present and future requirements in a comprehensive manner that assures the continued delivery of safe drinking water. Given the number of small systems in Ontario, a system viability analysis to ensure all systems are self-supporting entities is needed. Accordingly, amalgamation of systems may be necessary to ensure the viability of some systems. The problem, as outlined in the Commission's Issue 8 report, is likely the 89% of the plants which serve 11% of the population. In some instances, these plants/systems may not be viable and may be the cause of varying levels of service across Ontario.

A more detailed analysis is necessary to determine: where are the small systems; what are the costs to operate these systems; is regionalization with a nearby larger system feasible; can a number of small systems operate as a "larger" regional system to achieve some economies of scale; how will the large geographic area in northern Ontario impact regionalization; does the smaller geographic areas and larger populations in the Southwestern and Eastern Regions

make the consolidation of systems more feasible.

Recognizing that the Commission may recommend watershed planning as a means of protecting source waters, the position of the OWWA/OMWA is that regulations should be developed that would permit municipalities to decide how to achieve a legislative obligation to have sufficient financial, technical, managerial and operational expertise and capacity through such options as hiring staff, retaining consultants, sharing resources with adjacent municipalities, voluntarily entering into amalgamations, or other inter-municipal arrangements.

3. REVIEW OF THE MANAGEMENT AND FINANCING OF WATER SYSTEMS: SUSTAINABLE ASSET MANAGEMENT BY POLLUTION PROBE

3. REVIEW OF THE MANAGEMENT AND FINANCING OF WATER SYSTEMS: SUSTAINABLE ASSET MANAGEMENT BY POLLUTION PROBE

Review of Chapter 2

Based upon a comparison of the average cost of water paid by Canadians in comparison to 14 other Countries, it was concluded that Canadians are not paying for the full cost of our water. The comparison chart appears to have taken the average rates paid by various users. Because Canada's charges are the lowest, it is concluded that Canadian water providers are not recovering our water costs. This conclusion is based upon a simple comparison and fails to consider many varying factors which may contribute to this. Potential factors would include access to supply in close proximity to users, quality of water at the source, accessibility and cost of technology for water production, production input costs, economies of scale, etc.

As well, this simple comparison of rates also fails to consider the financial policies of the jurisdictions. In Ontario, most water providers employ a variety of user fees within the system. As these user fees recover some of the water system costs, water rates only recover the net costs of the system. For example, many Ontario municipalities have policies and user fees which provide that a large portion of the cost of new infrastructure is not financed from water rates. This is achieved by several methods such having developers build the services internal to their subdivisions at their own costs, by the imposition of development charges for the recovery of supply, treatment, storage and major trunk costs, by section 221 (*Municipal Act*) charges which can recover new infrastructure and capacity related costs from new users to a system, etc. Ontario municipalities also use a variety of user charges to recover operating costs such as hook-up fees, disconnection fees, meter replacement charges, etc.. Hence, without any analysis as to why there are variations between the cost of purchasing water in other jurisdictions, it is difficult to accept the conclusion that "we are not paying for the full cost of water".

The writer discusses the concepts of full cost accounting and full cost pricing, which are two different concepts, and appears to use these terms somewhat interchangeably. These concepts, along with the concept of full cost recovery, are generally described as follows:

Full Cost Accounting – provides for the recording of all costs inputs to the service. It ensures that costs associated with providing the service are recorded as part of the service. This concept provides that all cost inputs into the service, including appropriate overhead and asset costs, are accounted for.

Full Cost Recovery – provides that all costs are identified, are budgeted for and recovered via a variety of user fees and charges including rates.

Full Cost Pricing - may refer to the concept that all costs for the provision of the service are recovered via one all encompassing rate.

The distinction is made between the concepts as any policies which are to be regulated, must clearly present the intent of those policies. The OMWA and OWWA are in support of full cost accounting and full cost recovery but do not support the concept whereby water rates are the sole rate for recovering costs (full cost pricing). The OMWA and OWWA do support full cost pricing defined in a broader context where full cost pricing reflects the combination of the various fees and service charges which, in total, provide for the recovery of the total costs of water service provision including an allowance for infrastructure renewal. The various user fees and charges adopted by water providers in Ontario seek to impose cost recovery on a benefit received basis and hence, recovery is sought for specific actions or services. Water Service providers must maintain the right to develop their own user fees and charges as they are most in touch with their customer profiles, the issues facing the community relative to usage patterns, economic matters, etc.. Water service providers should retain the ability to select the type of rate structures and the types of user charges which best reflect their ability to recover water related costs. OWWA/OMWA recommend that municipalities/utilities should establish their own rates however, it should be a legal requirement to include a certain percentage of asset value per year to pay for infrastructure renewal.

While it is necessary to ensure that all costs of the water service are identified and recovered, it should also be recognized that water revenues should not be a source of financing for other

services. While limited examples are known, there are instances where water service derived revenues are used to reduce property taxation. Water service revenues should only be used for water service expenditures. While certain charge backs to other departments may be reasonable in certain circumstances (e.g. for purchasing services, computer systems, etc.), water revenues should not subsidize any other programs.

Review of Chapter 3

The discussion provided on Sustainable Asset Management and Lifecycle costing provides a good overview of the concept of managing the physical water assets over their useful life. The practices of monitoring the asset conditions, potential useful life, potential replacement costs, etc. are well presented and represent good engineering management practices which should be followed by water service providers. We would note that most municipalities do have detailed inventory information on their systems. For many smaller municipal systems, construction of the infrastructure occurred as part of the provincial initiatives since the late 60's/ early 70's and the information on the system has normally been maintained. Larger municipalities with older systems generally have good inventory information on their systems resulting from GIS initiatives over the recent past and as a result of initiatives in the past such as WIMS (Water Information Management System) undertaken by many municipalities in the early 1990's. It is acknowledged however, that although the inventory data may be available, condition assessments and renewal/replacement plans may not be carried out by all municipal water providers. The OMWA and OWWA agree with the principles of sustainable asset management and lifecycle costing and recommend that these principles be included in regulations to ensure that proper management and replacement of the physical assets of the water systems are being carried out.

Appendix A (to the Pollution Probe Paper), which accompanies this chapter, identifies that a higher level of financial accountability is required in the management of infrastructure which supports the delivery of municipal drinking water supplies. The paper goes on to present an approach to a sustainable investment program. The OMWA and the OWWA fully support a financial program which addresses the short medium and long term management of the physical asset inventory. It should be noted however that this is not a new concept as many

municipalities have already implemented such plans in varying approaches. Examples of several municipalities are as follows:

Aurora – In 1989, with the inventory work being undertaken with WIMS, the municipality addressed the issue of long term system renewal and replacement. At that time the municipality was fully responsible for all supply, treatment, storage and distribution. The municipality undertook to implement life cycle reserves (based on the sinking fund method) and provides annual an amount which is set aside in reserves for long term infrastructure replacement. The Town updates this valuation approximately every 5 years. Today, their full life cycle replacement of water and sewer services are funded through this system. Life cycle costs represents 10% of their rates.

Chatham-Kent – The new municipality amalgamated as of January 1, 1998. The former 22 municipalities were consolidated into one municipality with water being the responsibility of the public utility commission (PUC). The PUC has undergone an extensive masterplanning process to identify existing improvements, extension of servicing to existing residents experiencing problems with private systems and planning for growth. Major improvements to the plants and trunk mains will be financed over the next ten years using a combination of user rates and debt. For more local mains, the PUC, as part of its rate study process, is considering phasing in life cycle reserve contributions (sinking fund method) over the next five years. All of this is being undertaken in conjunction with the standardization of the rate pricing structure. Life cycle costs will represent about 12% of their rates once fully implemented.

St. Thomas – St. Thomas is presently finalizing a new rate study and, as part of this process, a detailed review of the condition and replacement needs of their entire water system. The City has developed a 20 year capital replacement plan and will be financing these costs by a combination of operating contributions, reserves and debt. This financing plan will equate to 30% of their rates. As part of this overall plan, a longer term, full asset replacement needs assessment was also undertaken. Within the policies established for financing the next 10 years, sufficient financing mechanisms should be in place to provide future full replacement of assets, when required.

Lincoln – The Town is presently finalizing a water rate study. As part of that study, they are reviewing life cycle replacement of their water system. Their system dates back to 1969. Upon

implementation of a life cycle reserve (sinking fund), this cost will equate approximately 9% of their rates and should be implemented with a phase-in policy over the next 5 years.

Halton Region – The Region has valued their water and wastewater infrastructure at about $2.7 billion. The Region uses a 10 year capital and operating budget forecast period; however, recently they have extended this to 16 years (to conform to their Official Plan forecast period). The Region's plan identified an annual asset replacement budget of $40-50 million. For 2001, they are financing approximately $30 million through the use of debt, transfers from the operating budget and reserves. It is anticipated that this amount will be increased over the period as annual budgets are approved.

As presented above, several municipalities are practicing the concept of asset management. While the above in not an exhaustive listing, it does demonstrate that this is not a new concept. It is noted that twenty years ago, not many municipalities provided for much of their rate budgets for the purpose of infrastructure replacement. As the systems have aged over time, this cost component has emerged as a higher priority budget item.

It is important to note that there is more than one approach to incorporating the replacement of infrastructure into the long term planning/budgeting process. Many municipalities/utilities have addressed their short to medium term replacement needs via the capital budget process and use a combination of direct transfers from the operating budget, debentures and/or reserves transfers. Provision for longer term financial planning can be addressed through the establishment of lifecycle reserve funds (a full explanation of this concept is provided in Appendix A to this report and, in many cases, is the concept referred to in the municipal examples noted above). The OMWA and OWWA agree with the need to have all municipalities/ utilities develop very long term financial plans to address their infrastructure replacement needs. However, the approach to how this financial replacement plan is implemented should be left to the individual water providers to develop. This would allow flexibility to consider alternative financing methods and to implement a plan which balances rate increases at affordable levels while considering other regulatory changes which may be established. If this requirement is regulated, the update of the assessment of the physical assets should be reviewed every four to five years and the financial plan be revisited in concert with this review.

4. REVIEW OF FINANCING WATER INFRASTRUCTURE BY STRATEGIC ALTERNATIVES

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Review of Chapter 2 – Economic Framework

This chapter focuses primarily on a detailed discussion over the merits of marginal costing (defined as the cost of providing an additional unit of the particular service). The merits and shortcomings are reviewed with the conclusion that "while economic theory suggests that marginal cost pricing is the most efficient, implementing marginal cost pricing for water and sewage services may be difficult in practice, if not impossible".

It is suggested, in part, that marginal costing is not attainable because municipalities do not collect the cost information, lack of expertise, lack of proper budgeting and accounting practices, conservation objectives, lack of metering and lack of knowledge of water rates by customers. As over 80% of water users in Ontario are in large urban centres, many of these reasons may not play a significant role in the decision to use average costing over marginal costing. Other factors such as public policy (i.e. issues of equality, administrative ease, understanding of the users regarding how they are billed, economic development, etc.) or the perspectives of practitioners in the field (i.e. American Water Works Association, Public Works Association, Municipal Finance Officers), may also play a factor in this decision. That is to say, what may be the proper approach to costing to an economist may not necessarily reflect the views of others.

AWWA's 2000 publication "Principles of Water Rates, Fees and Charges" (page 124) provides the following:

> "Rates based on marginal costs reflect future costs to be incurred or avoided in supplying water service. Rates based on marginal costs are forward-looking, provide price signals that may promote efficient resource use, and are appropriate for long-term capacity planning. The important issue is whether or not the efficiency advantages of rates based on marginal cost more than offset their implementation problems. These implementation problems include complications in marginal costs estimation, excess revenue generation, revenue instability, uncertain effects on consumer bills, ease of customer comprehension of bills and possibly substantial administrative costs".

The report does not seem to emphasize that marginal costing is normally achieved by looking at (very) long term forecasts of operating and potential capital costs along with an assessment of capacity, change in customer demand quantum's and change in usage patterns. This would necessitate an analysis extending over a period of 20 or more years. The area of most benefit in this analysis would be to water supply and storage where capacity issues are of most concern. However, there would be less benefit to this analysis for the distribution system which is more spatial in nature. As a large portion of municipal expenditures relate to the distribution system, the benefits of this concept are lessened.

In regard to forecasting over extended periods, It should be noted that most of the large municipalities and many small municipalities forecast operating and capital forecasts over a five to ten year period. This concept of long term planning is encouraged by the Province of Ontario and is addressed in their "Capital Budgeting Handbook" Publication. This publication was released in early 2000 and was presented in a series of workshops throughout Ontario. Hence, while the optimum forecasting period required for marginal costs may not being undertaken, it is important to recognize that financial planning for municipal water systems is being encouraged by the province as well as being normal practice for many municipalities. The OMWA and OWWA support the concepts of long term capital and operating forecasting.

Review of Chapter 3 – Legislative Framework

Chapter 3 provides an overview of the general legislative framework within which water service providers operate. This discussion provides a good overview of this environment. Of the discussion provided, there are some clarifications which should be noted, as follows:

Development Charges Act - the footnote at the bottom of page 20 seems to indicate that for water services, the level of service must be averaged over the 10-year period immediately preceding the preparation of the background study. Given that regulations and engineering standards change over time, this statement would give the perspective that new infrastructure for water service must be either installed at a lesser quality, or the capital costs recovery for the water infrastructure must be reduced as a result of this provision. Section 4(3) of O. Reg. 81/98 provides that if the average level of service provided over the past 10-year period is lower than the level of service required by another Act, the standard required under the other Act will

prevail. As the water service is regulated by several acts, including the *Environmental Assessment Act*, the cost for constructing and recovering infrastructure would be based upon the requirements of these other Acts.

It should be noted that the *Development Charges Act* (DCA) also provides that local services within a development or within the area to which the development relates, are to be borne directly be the development and not by the DCA (s. 59(2)). Therefore, the cost of constructing new local services is borne directly by the land developer and not by the municipal service provider.

Municipal Act, s. 221 - It should be noted that this provision is often used when services are extended into non-serviced areas with existing homes (and businesses). It provides a basis for recovering the constructed infrastructure as well as for allowing for the recovery of broader system costs (e.g. for a portion of the capacity for treatment and storage facilities).

The report has also omitted reference to section 210.1 of the *Municipal Act* which allows municipalities to enter into agreements with other entities for operating contracts and/or capital financing arrangements. This section relates to the Provinces "Public/Private Partnership" initiatives and grants municipalities authority to enter into these type of agreements. This legislation was introduced in 1993 under Bill 40.

The capital financing options available to municipalities provide an array of user fees and financing mechanisms which support a user pay system on a benefits received basis. The OMWA and OWWA support the principle of having the ability to set various fees and charges in addition to water rates. The Associations are concerned that, with the Province presently undertaking a complete re-writing of the *Municipal Act*, that some of these existing financing mechanisms may no longer be available to water service providers. The Commission should recommend that these user fees and charges be continued and incorporated into the new *Municipal Act*.

Review of Chapter 5 – Supply and Cost of Water and Sewage Services

Section 5.3.1.3, Page 42 – The report presents information from the OWWA and provides an observation and conclusion which is of great concern to both the OMWA and the OWWA. The initial observation states “Table 8, based on a survey by the Ontario Water Works Association, reveals that many municipalities do not have even basic information about underground assets”. Similar quotes continue to be repeated throughout the document. This theme continues to repeated and in the concluding chapter (page 99) it is concluded that “Furthermore, municipalities only collect information on expenditures and revenues and not on the state of their infrastructure”.

We have great concerns about the data used on which this conclusion was based. The data on which they relied upon was the “Survey of Municipal Water Rates & Operations Benchmarking in Ontario – 1999” produced by the OWWA. This survey is voluntary therefore it is not a comprehensive all-inclusive analysis of municipal infrastructure. The survey was sent to municipalities to collect information on a variety of financial, pricing, billing and collection data as well as other information on unaccounted for water, conservation programs, and replacement/rehabilitation practices. Much of the information requested is of an administrative nature and normally would be readily available to the individual filling out the survey. However, the information on replacement/rehabilitation is of a technical nature and often requires some level of effort to determine. In the case of smaller municipalities, this information may be retained by an engineering firm(acting as the municipality’s engineer) or OCWA (contracted services for operations and maintenance), hence, obtaining the information may either take too much time or will require a billing fee to compile the information in the format requested by the survey. There are examples within the data where large Regions have not filled out this information however it is known that the data is available. Hence, the results of the survey are more of an issue of not responding to all questions rather then a conclusion that asset information is not collected by municipalities.

In the table presented on page 42, there are errors in the calculations for watermain breaks. This information is provided for accuracy of the data; however, the observations provided above are most relevant to any conclusion which may be made. For those reporting the number of breaks within the survey, the following is presented:

Size of Municipality (number of accounts)	Number of Municipalities	% of Municipalities reporting watermain Breaks **- As Per Report -**	% of Municipalities reporting watermain Breaks **- Corrected Data -**
< 1,000	35	14%	17%

1,001 – 5,000	36	44%	78%
5,001 – 35,000	26	85%	89%
> 35,000	13	92%	85%

The OMWA and OWWA support the need for all water service provides to keep accurate and up to date water asset information and that data related to watermain breaks and other performance measures be collected by water service providers.

The Chapter also discusses Full Cost and Full Cost Recovery. Comments in this area were provided in our discussion of the Pollution Probe paper (Chapter 3).

Review of Chapter 6 – The Price of Water

The report provides a good overview of the pricing structures in use by Ontario service providers today. The reports acknowledges that the structures are based upon average costing versus marginal costing (which supports economic theory of efficiency). What is not discussed in detail is that the determination of any structure is usually based upon an evaluation of several factors such as:

- Cost Recovery – the more sensitive the rate structure is to consumption variations, the more variable water revenues become
- Administration – involves staff and resources to install meters, read consumption, bill customers, collect charges, answer inquiries, calculate rates, develop policies, etc.
- Equity – how the rate structure imposes costs on users in relation to their consumption as well as other factors
- Conservation – rates structures that relate consumption to cost increase user awareness. Some structures penalize higher consumption users to encourage conservation
- Economic Development – certain rates may benefit commercial/industrial users and may be used as an inducement for businesses to locate in the municipality

The above factors present many of the common issues which staff and Council consider through the development of the pricing structure. These factors would have different weightings, depending upon the individual municipality and are often balanced through the public process. The OMWA and OWWA recommend that municipalities be given the ability to

select the pricing structure that they feel is most appropriate for the municipality. While the Associations support pricing structures which require consumption metering, consideration must also be given to weighing the costs against the benefits for very small systems where it may not be cost effective to invest the considerable start up cost for metering. Hence the flat rate structure is considered an acceptable pricing structure in the case of very small systems (e.g. under 300 customers). Flat rates are encouraged over property taxes for water services as it promotes full cost accounting and recovery.

On page 57, the statement is made, "because many municipalities do not have complete inventories or capital plans that are comprehensively defined over the long-term, future costs cannot be predicted with accuracy". We are not clear whether this statement is a product of the observations made in Chapter 5 regarding municipalities not collecting information on their inventory or whether this is to conclude that most municipalities don't plan expenditures past the current year. If it is the former then our comments have been addressed in our discussion of chapter 5. If this is regarding the latter, there is no empirical evidence supporting their comments that municipalities do not have capital plans. We feel that this is an unsubstantiated observation and provides a perspective that water service providers in Ontario do not exercise good financial planning. Capital budgeting has been encouraged by the province since the 1970's through publications and has most recently (March, 2000) sent all municipalities in Ontario a copy of their most recent publication "Capital Budgeting Handbook". As well, associations such as the Municipal Finance Officers of Ontario (MFOA) and the Association of Municipal Managers, Clerks and Treasurers of Ontario (AMCTO) have been advocates of financial management and long term financial planning for their associations for several decades. The OMWA and OWWA support the continued need for municipal water service providers to undertake capital budgeting for their systems. Should the requirement for water systems infrastructure evaluations be regulated, this important financial management tool will be needed to implement any upgrades or changes.

Review of Chapter 7 – Capital Finance

The chapter reviews financial information from Financial Information Returns submitted by Ontario Municipalities and attempts to draw conclusions based upon spending patterns for the water service. While this does establish a pattern of spending by municipalities, it must be

considered in light of the environment in which municipalities were operating during this period as the environment does have an effect on spending. For example, in 1986 through to early 1989, Ontario experienced unprecedented housing growth followed shortly thereafter by a recession which lasted for several years. Higher housing growth commenced again during 1997 and thereafter. As well during 1997 to 1999, provincial initiatives relative to amalgamations and Local Service Realignment (LSR) changed the role of municipal spending and provided a period of change not experienced by municipalities since the early to mid 1970's. As well, capital funding programs such as the Canada Ontario Assistance Program (COAP), has an influence on capital spending patterns. These factors must be considered when interpreting financial spending information. A discussion on some of the tables presented is provided below:

- Table 14 – while this table does reflect municipal spending for water and sewer service, it does not reflect the new infrastructure built by developing landowners, as these costs are borne by the developer and dedicated to the municipality. The expenditures relate to new infrastructure, predominantly for capacity enhancement as well as for infrastructure replacement. The pattern of capital appear to be largest in the early 1990's, just after a major housing boom and then in the mid 1990's during the COAP grant program.
- Table 16 – presents water and sewer operating expenditures as a % of total municipal spending. Note that with the LSR responsibilities, municipalities have absorbed new responsibilities and corresponding additional expenditures that would have to be factored out to draw any significant conclusion. This appears to be the reason for the decline in operating expenditures as a percentage of total expenditures for the 1997 to 1999 period.
- Table 17 – presents the operating expenditures on a constant basis (adjusting for inflation) and on a per household basis. Observations are made that per household spending by municipalities has reduced in past few years. It should be noted that over the period, overall spending in current dollars increased by 48%. As Inflation increased by 22.8% and the number of households serviced increase by 14.8% (combined total of 37.6%), the residual 10.4% represents the net increase in overall spending. For the observed decline in expenditures per household for 1997 to 1999, the number of households has grown by 6.8% due to strong housing development in the province. This has produced the decline between 1997 and 1999. Given the economies of scale

(discussed in chapter 5 by Strategic Alternatives), there would appear to be a continued increase in operating expenditures by water service providers.

The remainder of the chapter focuses on sources of financing for capital expenditures. The following comments are provided regarding Strategic Alternatives observations and commentary:

Development charges - it is observed that most municipalities adopt a uniform charge, that being that all new developments pay an averaged charge. It is noted on page 71 that "since the cost of service varies by type and location of development, an efficient development charge would vary by these types of characteristics… if a development charge 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 above statement seems to portray that the basis on which many municipalities calculated their development charge creates a large disparity amongst benefiting properties. However, the presence of this disparity would be minor in most instances. The largest portion of a development charge for water services (and similarly for sewer) is normally for the supply, treatment and storage of the water because developers finance and build a large portion of the distribution systems. The "supply, treatment and storage" portion of the charge is normally calculated on a capacity basis and is not necessarily linked to the geography of the area where the benefits would be derived; hence these costs would not create this disparity. The remaining portion of the charge is for the distribution of the water. However, the *Development Charges Act* distinguishes local service (the mains within the subdivision) as a charge which is borne directly by the developer of the land. This cost would portray the elements identified above however these cost are not included in the development charge. The portion of the distribution system which is included would be for the trunk mains and some pumping stations. Generally, these works service broad areas and hence would not be as sensitive to density issues (as compared to local services). Although there may be a small component of the costs affected by this, it is not the overriding cost determinant.

4.5.1 Special Assessments

Many special assessments are conducted either under the *Local Improvement Act* or the *Municipal Act* (s.221). The former requires frontage as the primary basis whereas the latter provides flexibility in the determination of the charge. It should be noted that these charges are normally modified to fine tune the charges imposed. For example, there may be lots that have very large frontages with small acreages, or vice-versa. As well commercial or industrial properties may be high volume users and hence, the sizing and corresponding costs have been incorporated into the project. Hence, the charges imposed on residents are not always a pure calculation exercise but have regard for other policy issues.

4.5.2 Municipal Reluctance to Borrow

"No one has been able to explain the decline in the use of borrowing by municipalities" (page 80). This statement seems to portray that the decline in debt charges and the amount borrowed has happened without any regard to financial management. Since the 1979-1984 period when financial markets experience high interest borrowing rates (as high as 19%), there has been a cognizant effort by municipalities to reduce their reliance on debt for financing capital works. The concept of pay-as-you-go has been discussed in the municipal forum since the 1970's. Long term financial planning and the management of debt, has been advanced by the municipal finance associations such as the MFOA (Municipal Finance Officers of Ontario) and the AMCTO (Association of Municipal Managers, Clerks and Treasurers).

Debt Management has also been a matter regulated by the province. As noted by Strategic Alternatives, the province has imposed debt capacity limits in order to ensure that the level of debt taken on by a municipality are not outside of their financial means. This has ensured a level of financial strength for Ontario municipalities. The success of this measure is demonstrated by the fact that there has not been a debenture payment default by Ontario municipalities since the 1800's. Long term financial planning has also been encouraged by the province. In March, 2000, the province released a Capital Budget Handbook (along with a program on CD) to assist small and medium sized municipalities with their forecasting efforts.

As noted, sound financial management practices have been encouraged in Ontario by the municipal associations as well as the province. This has produced financial strength within Ontario municipalities. Based upon estimates taken from the 1997 Financial Information

Returns, municipalities who provide water service have a debt capacity of between $13 billion and $19 billion (range depends on whether debt is issued over a 10 or 20 year term).

4.5.3 Reserve Funds

"The use of reserve funds violates intergenerational equity because current users and taxpayers are paying for capital expenditures that will be enjoyed by future generations" page 81). The discussion on reserves and reserve funds is limited. First, there is a significant difference between the two terms. Reserve Funds are obligatory and normally are established by statute. The use of the funds is restricted to specific purposes. Reserves on the other hand, are permissive and are established at the discretion of Council.

Reserves are established for many purposes. For water services, the most notable are:

- Rate Stabilization Reserves – as billing revenues fluctuate with weather conditions, they are established to fund operating shortfalls. In years of surplus, the surplus is transferred to replenish the reserves.
- Future Acquisitions Reserves- where sizable expenditures are anticipated, planned contributions are made toward financing the future project.
- Lifecycle Reserves – used for planning for the financing of asset replacement
- Unallocated Capital Reserves – for financing overruns to capital projects. Any surplus balances generated from projects is transferred in to replenish the reserve
- Reserve Funds – *Development Charges Act*, Trust Funds, *Municipal Act* (s. 221)

The use of reserves and reserve fund is an important part of good financial management for a municipality. Although it may be perceived that reserves/reserve funds "violate intergenerational equity", it is a very important part of financial viability and sound management practice. It ultimately provides for potential against the risk of events occurring as well as stabilizing the year by year fluctuation in rates which may result as a result of known large expenditure outlays in the future.

4.5.4 Private Sector Financing

From a capital financing perspective, municipalities can borrow at less expensive rates of interest than the private sector. As well, municipalities borrow over shorter time periods thus minimizing the overall cost of borrowing. It is acknowledged that there may be municipalities where this source of financing may assist however, as noted earlier, based on 1997 Municipal Financial Information, Ontario municipalities which provide water, have the debt capacity to borrow from between $13 billion and $19 billion.

It should be noted that water service provision in Ontario does have a large private sector influence presently. Participation in master planning, operations and maintenance contracts, design/build contracts, construction contracts, etc. provide for the involvement of both sectors in the provision of water service in Ontario. Operations, as compared to capital, is the area where the potential savings of this method may arise. Municipalities should be encouraged to review the ways in which they provide the service in order to ensure cost effectiveness in their operations. The City of Toronto and the Town of Orangeville undertook such evaluations recently for water and sewer service and experienced savings in the order of $50 million and $0.8 million respectively. Hence, similar evaluations should be encouraged in order to provide the best level of service at the lowest costs.

The OMWA and OWWA support the current financial regime within which they operate. Concern is raised with respect to the review of the *Municipal Act* which the Province is presently undertaking. The Associations would wish to continue statutory authority for sections 210.1, 221, and 222 in the new *Municipal Act*.

Review of Chapter 8 - Accounting Practices

Financial reporting is an important process. As noted in the report, municipalities use a modified accrual system versus a full accrual method of accounting. The main distinguishing feature between the two is that the latter provides for the depreciating of the asset. While it is acknowledged that changing the financial reporting system for municipalities to allow for recording of physical assets provides more information than currently provided, depreciation does not necessarily give a measure of the status of the assets as purported by the report. Normally, depreciation allows for the writing down or using up of an asset over time. Accounting rules provide for a measure of time over which this would be written off. Private sector companies use depreciation to record the use of the capital investment as a offset to paying an

income tax. Thus the movement towards changing an accounting system in order to have value placed in the statements does not necessarily attain an objective of having insightful information available on the state of infrastructure.

To ascertain an accurate evaluation of a service provider's infrastructure, an engineering review would have to be undertaken. Having municipalities undertake an evaluation of their physical assets and reporting on them would be a reasonable request and the OMWA and OWWA would support such a policy. This could include a requirement to undertake an assessment on a recurring cycle (perhaps every 3 - 5 years) and have this evaluation submitted to a regulatory body. In conjunction with this, a financial plan should be provided to address how any short, medium and long term requirements are to be addressed (via the capital and operating budgets of the municipality). This would be a more productive exercise as compared to changing the financial reporting system as it identifies the needs of the system and provides a solid financial plan for addressing those needs.

Review of Chapter 9 – Municipal Financial Performance

This chapter provides commentary on municipal financial performance however, some of the observations provided need clarification and interpretation.

- "Municipalities in Ontario are not financially self sufficient" (page 95 and 96). This observation appears to be generated from Table 26, which identifies the level of grant funding being made to Ontario municipalities. The observations are made at a global level with limited interpretation. After the Provincial LSR initiatives, the only direct grant being made to municipalities is the CRF funding. This is a transitional grant program to allow for the municipalities to move towards financial self sufficiency after absorbing new service responsibilities and losing the former general grants. A large portion of the provincial grants which are shown in this table relate to transfer payments for Health and Social services. These programs are a provincial responsibility however, the service is provided locally and the municipalities carry out this service on behalf of the province. A portion of the service is contributed directly by the municipality and the residual is a transfer payment. Hence, the observations on self sufficiency do not appear to be warranted.

- "The higher taxable assessments in the urban areas reflects, to a large extent, the greater variety of services that these municipalities have to provide" (page 96). We are not clear what this statement means. Assessment is a reflection of the market value of the properties within the municipality and is the basis for recovering property taxes. How does this value translate into the need for a greater variety of services?

- "Municipal debt per household has remained roughly the same over the period…"(page 97). The table reflects current dollars. When inflation of 22.8% for the period is applied to bring it up to constant dollars, debt per household has dropped by 16%.

- LSR (Page 98) – it seems to portray that municipalities have taken over the cost of social services however this is a provincial program which municipalities administer on behalf of the province.

- Financial performance (page 99) – the writer does not give any perspective on financial performance. However, their tables show that municipalities have been reducing debt (thus reducing overall costs of projects and retaining financial flexibility within their budgets for the future). As well, municipalities have increased reserves which indicates financial planning in place to finance risk, finance asset construction and provide financial stability. No observation or comment on these practices is provided. In the opinion of the credit rating companies, these would be very positive measures which are key reasons Ontario municipalities have such superior credit ratings. Also, they state that "municipalities collect information only on expenditures and revenues and not on the state of infrastructure" gives the perspective that municipalities in Ontario move forward blindly with no evaluation of their assets and no management thereof. This has not been supported by any data they presented and it does not appear that they made any inquiries into this matter. Although fund accounting does not recognize the depreciation of the assets, implementing this would not give any information relative to the "state" of the infrastructure. These evaluations are of an engineering discipline to assess. Financial management implements the asset management needs. No investigation was undertaken to address how municipalities, and to what extent, they do plan for and address this. Hence, this statement has not been supported within their report.

5. OMWA/OWWA RECOMMENDATIONS REGARDING FINANCIAL MATTERS FOR PUBLICLY OPERATED WATER SYSTEMS

5. OMWA/OWWA RECOMMENDATIONS REGARDING FINANCIAL MATTERS FOR PUBLICLY OPERATED WATER SYSTEMS

Based upon the discussion provided herein with respect to financial matters which affect Ontario municipalities in the provision of safe drinking water, the OMWA and OWWA recommend that in its final report to the Ontario Government, the Commission recommend the following:

1. That the full-cost accounting for the provision of water should be adopted by water service providers in Ontario.
2. That Ontario water service providers should implement full-cost pricing. Pricing should not be limited to water rates as the sole basis for recovering costs, but also should encompass a combination of various fees and service charges that would be adopted by individual service providers. Implementation of various funding measures including those set out in Recommendation 4 should be done carefully to ensure consumer understanding of the actual or true cost of water (i.e. that low water rates do not encourage economic efficiency or water conservation).
3. That water service providers not be restricted as to the types of rates structures that they may select to recover their water costs. This may include the use of flat rate structures for water systems where it may be cost prohibitive to incur the costs of installing meters in homes. However, declining block rate structures should be discouraged.
4. That, in light of the provincial initiative to adopt a new *Municipal Act*, water service providers maintain the ability to use a variety of user fees and charges and funding mechanisms as follows:
    a. Debt
    b. Reserves
    c. Reserve funds
    d. Development Charges
    e. Local Improvement Charges
    f. Local Services installed by developing landowners
    g. Special Assessments such as s. 221, 222 of the *Municipal Act*
    h. Private/Public Partnerships (s. 210.1 of the *Municipal Act*)
    i. Various services charges

5. That loans be made available to small municipalities to assist with the implementation of new regulations on a transitional basis. Consideration of whether the loan program needs to be continued subsequently should be based upon an evaluation of the impacts of the Commission's recommendations. Loans should be contingent upon a commitment to achieve system viability in accordance with Recommendation 7 below.
6. That water service providers be required to keep accurate and up to date information on their physical assets. As well, that an assessment of the water system infrastructure be undertaken at least every five years. In conjunction with this asset condition assessment, that a long-term financial plan be developed for the maintenance, upgrade and replacement of infrastructure. In particular, the principles of sustainable asset management and lifecycle costing should be implemented to ensure that proper management and replacement of physical assets of the water system are being carried out.
7. Recognizing that the Commission may recommend watershed planning as a means of protecting source waters, a systems viability analysis should be performed and in conjunction with, or pending the results of, that analysis regulations should be developed that would permit municipalities to decide how to achieve a legislative obligation to have sufficient financial, technical, managerial and operational expertise and capacity through such options as hiring staff, retaining consultants, sharing resources with adjacent municipalities, voluntarily entering into amalgamations, or other inter-municipal arrangements.
8. That all water service providers be required to undertake capital and operating budgets that forecast budgeted expenditures and revenue sources including rates over a minimum five-year period.
9. That dedicated revenues be mandated for public water service providers, requiring that all revenues be used for the benefit of the public water system and not for other purposes.
10. That the above recommendations be incorporated into new regulations and that a reporting structure be developed for ensuring the proper financial management of water systems in Ontario.

APPENDIX A

OVERVIEW OF LIFE CYCLE COSTING

OVERVIEW OF LIFE CYCLE COSTING

1.1 Definition

For many years, life cycle costing has been used in the field of maintenance engineering and to evaluate the advantages of using alternative materials in construction or production design. The method has gained wider acceptance and use in the areas of industrial decision-making and the management of physical assets.

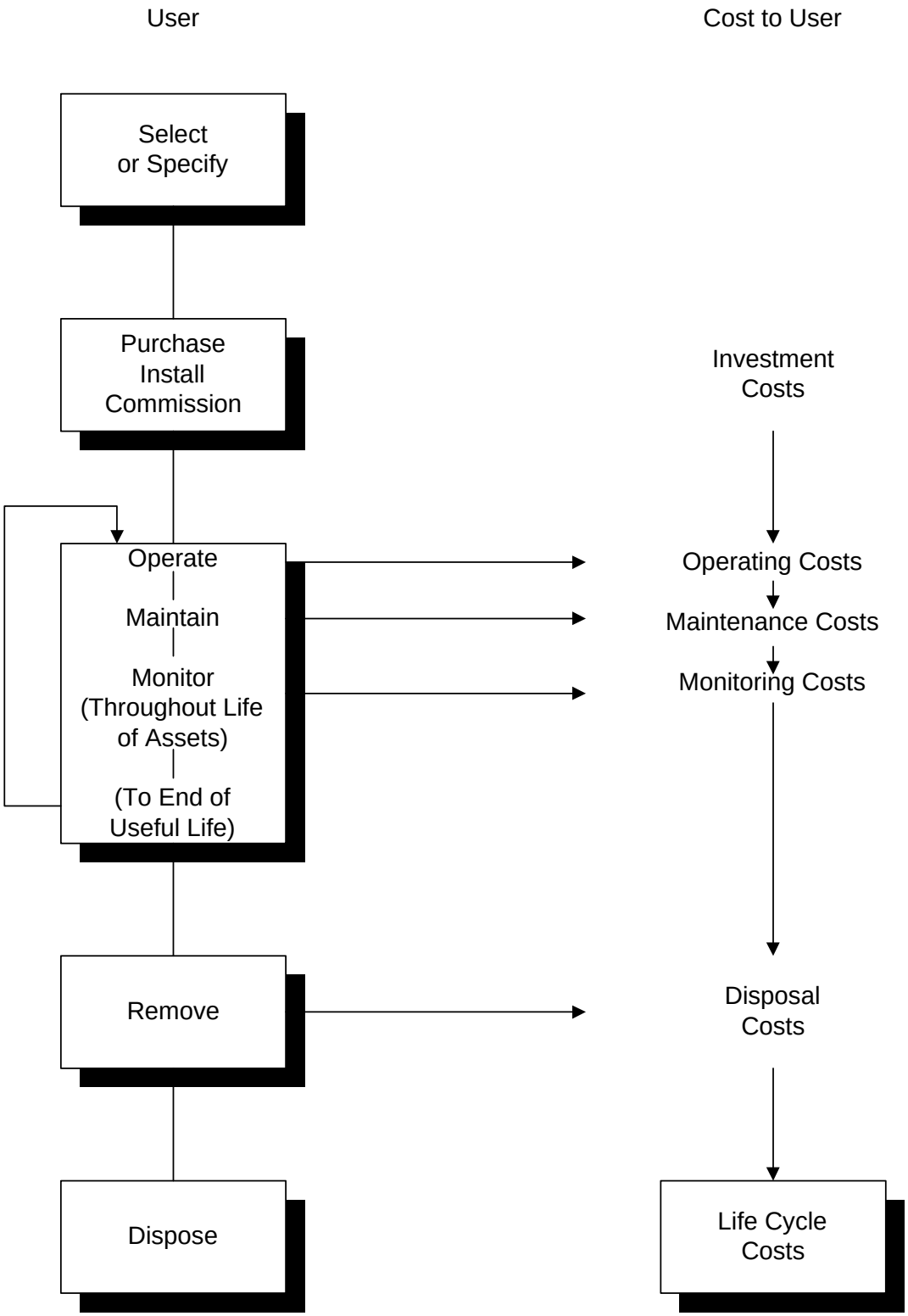
By definition, life cycle costs are all the costs which are incurred during the life cycle of a physical asset, from the time its acquisition is first considered, to the time it is taken out of service for disposal or redeployment. The stages which the asset goes through in its life cycle are specification, design, manufacture (or build), install, commission, operate, maintain and dispose of. Figure 3-1 depicts these stages in a schematic form.

1.2 Financing Costs

This section will focus on financing mechanisms in place to fund the costs incurred throughout the asset's life.

In a municipal context, services are provided to benefit taxpayers. Acquisition of assets is normally timed in relation to direct needs within the community. At times, economies of scale or technical efficiencies will lead to oversizing an asset to accommodate future growth within the municipality. Over the past few decades, new financing techniques such as development charges, have been employed, based on the underlying principle of having tax/rate payers who benefit directly from the service paying for that service. Operating costs which reflect the cost of the service for that year, are charged directly to all existing tax/rate payers who have received the benefit. Operating costs are normally charged through the tax base or user rates.

Figure 5-1
Life Cycle Costing



As noted in Chapter 3, capital expenditures are recouped through several methods; operating budget contributions, development charges, reserves, developer contributions and debentures, being the most common.

New construction related to growth could produce development charges and developer contributions (e.g. works internal to a subdivision which are the responsibility of the developer to construct) to fund a significant portion of projects, where new assets are being acquired to allow growth within the municipality to continue. As well, debentures could be used to fund such works, with the debt charge carrying costs recouped from taxpayers in the future.

However, capital construction to replace existing infrastructure is largely not growth-related and will therefore not yield development charges or developer contributions to assist in financing these works. Hence, a municipality will be dependent upon debentures, reserves and contribution from the operating budget to fund these works.

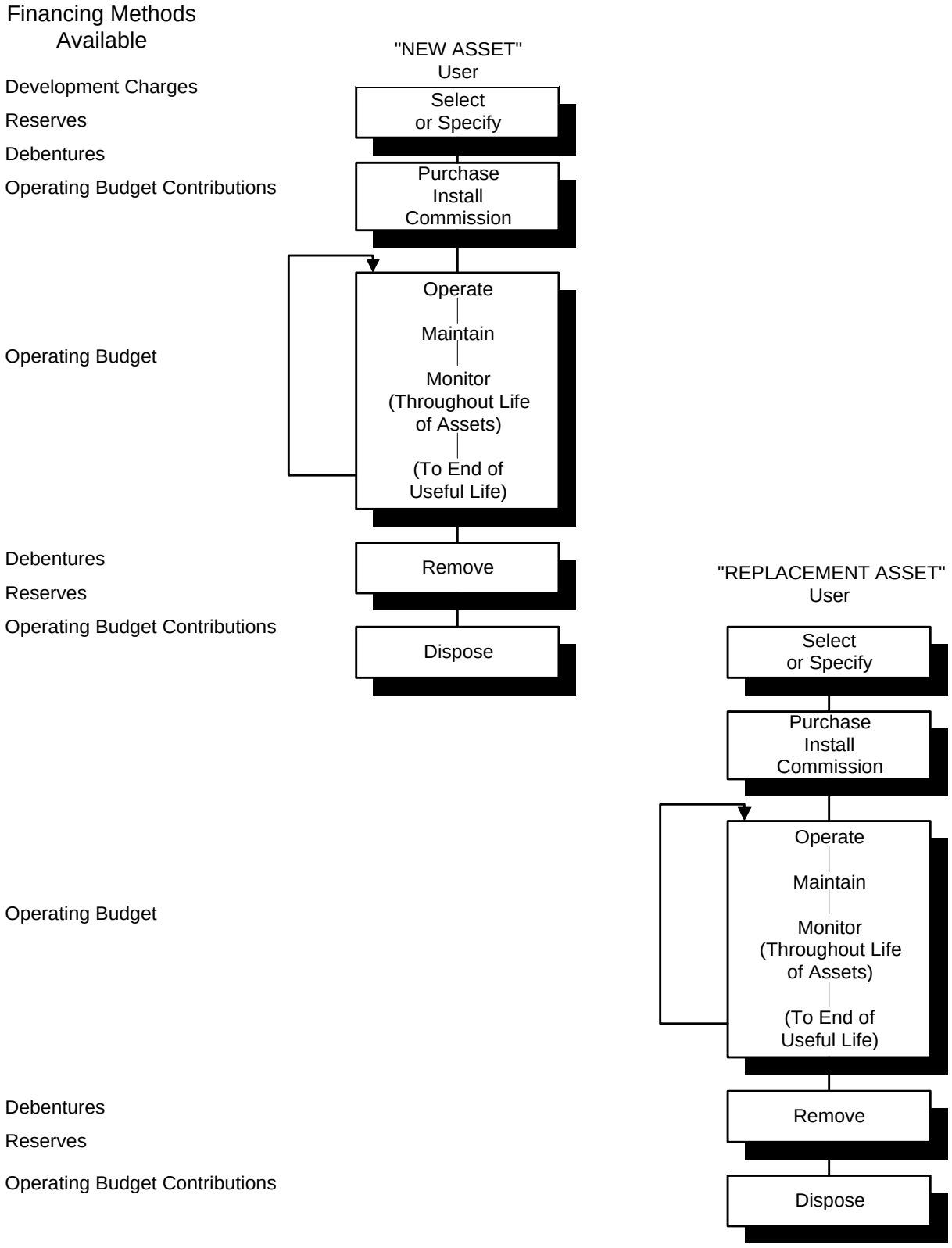
Figure 5-2 depicts the costs of an asset from its initial conception through to replacement and then continues to follow the associated costs through to the next replacement.

As referred to earlier, growth-related financing methods such as development charges and developer contributions could be utilized to finance the growth-related component of the new asset. These revenues are collected (indirectly) from the new homeowner who benefits directly from the installation of this asset. Other financing methods may be used as well to finance this project; reserves which have been collected from past tax/rate payers, operating budget contributions which are collected from existing tax/rate payers and debenturing which will be carried by future tax/rate payers. Ongoing costs for monitoring, operating and maintaining the asset will be charged annually to the existing tax/rate payer.

When the asset requires replacement, the sources of financing will be limited to reserves, debentures and contributions from the operating budget. At this point, the question is raised as to "If the cost of replacement is to be assessed against the tax/rate payer who benefits from the replacement of the asset, should the past tax/rate payer pay for this cost or should future rate payers assume this cost?" If the position is taken that the past user has used up the asset,

hence he should pay for the cost of replacement, then a charge should be assessed annually, through the life of the asset to have funds available to replace it when the time comes. If the

Figure 5-2
Financing Life Cycle Costs



position is taken that the future tax payer should assume this cost, then debenturing and, possibly, a contribution from the operating budget should be used to fund this work.

Charging for the cost of using up of an asset is the fundamental concept behind depreciation methods utilized by the private sector. This concept allows for expending the asset as it is used up in the production process. The tracking of these costs forms part of the product's selling price and hence end users are charged for the asset's depreciation. A similar concept can be applied in a municipal setting to charge existing users for the asset's use and set those funds aside in a reserve to finance the cost of replacing the asset in the future. **It should be noted that this one component is the one difference between the private sector and municipalities with respect to "full cost pricing." However, as will be discussed later in this chapter, some municipalities address replacement of capital through life cycle reserves and others through a combination of reserves/debt/operating contributions. However, this may not be consistently applied across Ontario municipalities.**

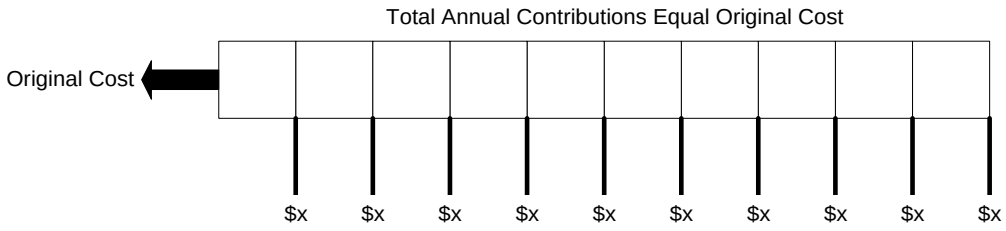
1.3 Costing Methods

There are two fundamental methods of calculating the cost of the usage of an asset and for the provision of the revenue required when the time comes to retire and replace it. The first method is the Depreciation Method. This method recognizes the reduction in the value of the asset through wear and tear, and aging. There are two commonly used forms of depreciation: the straight line method and the reducing balance method.

The straight line method is calculated by taking the original cost of the asset, subtracting its estimated salvage value (estimated value of the asset at the time it is disposed of) and dividing this by the estimated number of years of useful life. The reducing balance method is calculated by utilizing a fixed percentage rate and this rate is applied annually to the undepreciated balance of the asset value.

The second method of life cycle costing is the sinking fund method. This method first estimates the future value of the asset at the time of replacement. This is done by inflating the original cost of the asset at an assumed annual inflation rate. A calculation is then performed to determine annual contributions (equal or otherwise) which, when invested, will grow with interest to equal the future replacement cost.

STRAIGHT LINE DEPRECIATION

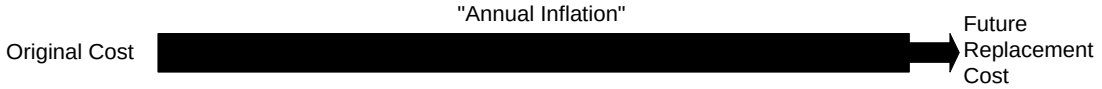


Formula:

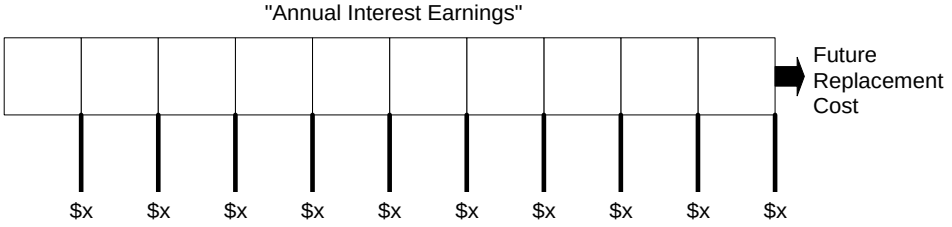
$$\frac{\text{Original Cost - Salvage Cost}}{\text{Number of Years of Useful Life}}$$

SINKING FUND METHOD

1. "Estimate Future Replacement Cost"



2. "Estimate Annual Contribution which will Grow with Interest to Equal Future Replacement Cost"



Formula:

$$\frac{\text{Interest Rate}}{(1 + \text{Interest Rate})^{\text{Term}} - 1} \times \text{Original Cost}$$

Note: Interest Rate used would be the Investment Rate - Inflation Rate,
e.g. 11% - 5% = 6% and is presented as 0.06.

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Both the straight line depreciation method and the sinking fund method are presented in a schematic form on Figure 5-3. The formula for calculating the annual contributions is also presented. This figure demonstrates the fundamental principles behind both methods. The straight line method focuses on the original acquisition of the asset. Each year as the asset is being used, the users contribute toward the original purchase of the asset. The sinking fund method focuses on the replacement of the asset. The original purchase of the asset is accepted as a given level of service. Each year, as the asset is used, a contribution is made toward its replacement at a time when the asset is no longer functional.

Of the two methods presented, the sinking fund method is recommended as it provides for potential investment income to be earned over the period and hence, has a lower impact on rates.