Municipal Asset Management: Towards a Roadmap for the Township of Esquimalt

---

Tara Howarth, MPA Candidate

School of Public Administration

University of Victoria

June 6, 2016

Supervisor:	Dr. John Barton Cunningham School of Public Administration, University of Victoria
Second Reader:	Dr. James MacGregor School of Public Administration, University of Victoria
Chair:	Dr. Rebecca Warburton School of Public Administration, University of Victoria
Client:	Jon Woodland IT Manager, Township of Esquimalt, BC, Canada

Acknowledgements

This report could not have been completed without the assistance, guidance, support and expertise of the staff from the Corporation of the Township of Esquimalt, particularly Jon Woodland and Ian Irvine.

I would like to thank my committee for their time, critique and review. Thank you also to my Academic Supervisor Dr. Bart Cunningham for guiding me through the process and providing his feedback and insight.

A shout out to my Master in Public Administration peers and instructors who made my years in the School of Public Administration a pivotal chapter in my life.

And finally, a very special thank you to Pete and Richard for providing the space, time, and understanding I needed to complete a graduate degree.

Executive Summary

Purpose of Report

The purpose of this report is to provide the Township of Esquimalt with a plan for developing a municipal asset management (AM) strategy. The need for Canadian municipalities to take a more formalized and rigorous approach to infrastructure asset management began in 2007 with the introduction of new federal accounting practices known as PSAB 3150. In meeting the reporting requirements of PSAB 3150, Canadian municipalities have been examining all aspects of managing their infrastructure assets, including: inventories, maintenance cycles, data and information tracking, records management, costing, long term asset planning, and decision-making processes. The result of these examinations have led municipalities to consider planning and managing their assets from a corporate perspective.

The research undertaken in this report has three primary objectives. The first is to examine the Township's current capital asset reporting practices including reporting practices at the departmental level. This is important in that it provides a snapshot of existing business practices within the municipality and will be the basis for designing new asset management related practices and processes.

The second objective is to provide the Township of Esquimalt with options for administrative, technical, and operational alignment with their capital asset reporting requirements.

The third objective is to develop an asset management roadmap specifically for the Township of Esquimalt. The roadmap will provide the Township with guidance and next steps for the Township to move its overall asset management planning forward.

Key Research Findings

In addition to the literature review, research for this report was conducted through in-person interviews and an email survey. The interview participants consisted of management and staff from the Township of Esquimalt responsible for asset management in their department. The surveys were sent to municipalities in British Columbia with populations of similar size to the Township and were completed by staff and managers who have an asset management role in their organization.

Interview Findings

The interview responses centered around three main subject groups. The first is AM strategy and planning focused on current organizational practices, AM direction, and known successes and challenges with planning and implementing the Township's current asset management vision. In general, interview participants observed some of the current AM practices are working, however there is a strong desire for further development of AM planning, standardizing data collection, documentation, and clarity around roles and responsibilities.

The second subject group included the business processes and organizational practices around asset management. The most significant finding pertaining to organizational practices is the

consistent response for a more formal and clearly defined AM governing structure. Primarily a structure that identifies who is responsible for AM decisions, overall planning, the setting of expectations, and organization-wide coordination. Concerns about governance were also identified in the context of the need for departments to work more closely on asset management planning, and how integrated work structures work.

The final subject group is the asset lifecycle and how the Township manages their infrastructure assets. It is evident that the Township has a solid understanding of the assets it owns and the lifecycle process of individual infrastructure components at a departmental level. What was uncovered during the interviews was how the departmental and often individual specific asset information was not captured for the benefit of organization-wide planning or decision-making.

Survey Findings

Four common themes emerged from the responses to the BC Asset Management survey that was sent to municipalities across British Columbia. The themes included asset management prioritization, business and organizational approaches, data and information management, and organizational change.

Although the majority of smaller BC municipalities have a good understanding of what assets they own, the survey results indicate most do not have established asset management strategies, policies, plans, guidelines or decision-making process. In addition to the absence of asset management guidelines and policies, the survey findings show most lack the leadership or resources required to plan and implement a corporate asset strategy.

Responses from both the interviews and the survey emphasize the need to consider the impact of workplace change, specifically when introducing new processes or practices that will disrupt the current workplace asset management culture.

Recommendations

Governance and Strategy

Asset management has evolved from an operational function to a strategic function within organizations. This evolution dictates a new corporate responsibility towards asset management and requires support and direction from senior leadership. Asset management leadership would ensure policies, strategies, and plans are established providing the necessary accountability and guidance required to carry out the Township's planning, implementation and on-going improvement of an asset management program.

Business Integration

Designing integrated asset management teams has proven to lead to successful asset management planning outcomes. Breaking down departmental silos and creating cross-departmental teams is one of the main challenges for municipalities. Asset management leadership in conjunction with a well-defined governance structure would set the tone for inter-departmental cooperation, whereby

ensuring departments are working together in order to develop and implement the organizational strategies, policies and plans. An additional aspect of integrating workplace teams is the integration of processes for corporate decision-making, such as financial, business, and technical systems.

The most critical aspect of the Township's data and information integration is the need to capture the undocumented infrastructure asset information that is part of individual employee's personal knowledge. The risk of losing such a vast amount of asset knowledge is in itself an urgent reason to expedite standardized asset management data capture and records management.

Capacity

One of the biggest challenges at the Township is finding either dedicated or partially-dedicated resources tasked with advancing asset management within the municipality. Generally, the work is performed by existing staff and managers as a lower-priority within their existing work portfolios. Feedback provided during the interviews indicated that asset management would not make significant strides forward until it is given a higher priority and dedicated resources.

Addressing the resource capacity issue can partially be achieved through both governance and business integration as identified in Recommendations 1 and 2. Whereby a governance structure, an asset management strategy, and formalized cross-departmental teams, could build capacity for existing staff and managers through newly defined roles and responsibilities aligned with asset management.

Many municipalities and organizations across Canada have successfully developed and implemented asset management programs. Exploring memberships or partnerships with asset management organizations would provide additional knowledge, experience and expertise to assist with the Township's development.

Change Management

Change management focuses on understanding how workplace changes impact individual people and how they do their work. Workplace changes are varied and can range from changes in simple business process to changes in leadership and organizational values. Managing expectations and perceptions around change is just as important to the success of a project as managing a project's finances. Introducing a formal asset management program will require changes to many aspects of the "current state" of managing assets at the Township, and therefore it is recommended that change management be incorporated into the implementation plans of a new organization-wide program.

Table of Contents

List of Figures

List of Tables

1.0 INTRODUCTION

In 2007, the Public Sector Accounting Board (PSAB) issued a new set of Tangible Capital Asset (TCA) reporting requirements for Canadian local governments, known as PSAB 3150. The new reporting requirements stipulated that municipalities were to capitalize their TCAs and allocate the associated costs to future accounting periods by using an annual amortization expense approach. Up until this point Canadian municipalities were not required to capitalize TCA purchases and were not expected to report them as such. This change has had a significant impact on municipal accounting practices, not only in terms of financial reporting but also in the day-to-day operations of individual departments that are responsible for purchasing, maintaining, and replacing capital assets throughout a municipality.

As a direct result of the introduction of PSAB 3150, municipalities across Canada have had to develop and implement new capital asset reporting processes to capture the asset information required for annual reporting. Although many municipalities already capture and record TCA information new business processes, systems, and resources are required to capture and record the new information for capitalization and amortization of an asset.

The Township of Esquimalt does not have a cohesive asset management plan in place to guide the current and future development of AM planning at the Township. In order to meet federal and provincial mandatory tangible capital asset (TCA) reporting requirements, the Township of Esquimalt requires a plan to provide direction in achieving appropriate asset management planning to meet their legal obligations. The objective of this project is to:

- Examine the Township's current TCA reporting position, including departmental AM practices
- Develop a Township specific Capital Asset Management roadmap that aligns with TCA reporting requirements,
- Make recommendations and provide options for meeting reporting requirements in the areas of administrative, technical, operational, and planning of TCA management.

This research project will assist the Township by providing an AM roadmap that leads to PSAB 3150 compliance through defining new or improved processes, methods, and/or systems.

The project will be structured around a blended conceptual model based on two industry leading AM frameworks, the first from Asset Management BC and the second from the Institute of Asset Management.

The research approach for this report took the form of 1) a literature review, 2) conducting expert interviews with subject matter experts in the Township of Esquimalt, and 3) administering a survey to other BC local governments of similar size.

2.0 Background

This section provides the relevant background of why the Township of Esquimalt is developing an asset management plan. The state of municipal infrastructure is discussed, followed by an overview of the Public Sector Accounting Board's tangible capital asset requirements and the impact on municipal accounting practices, followed by an overview of asset management, and finally a description of the Township of Esquimalt's current asset management practices.

2.1 Municipal Infrastructure Deficit

Municipal infrastructure is essential to the economic and social development of a community. Canadian local governments are responsible for the building, ownership, and maintenance of infrastructure including bridges, roads, water supply, sewers, transit, parks, emergency services, and recreation centres, among others. A community's economic success relies on the condition, capacity and quality of public infrastructure, and the delivery of services it supports (Fowler, 2010; Vanier & Newton, 2006).

It has been noted in the literature that local governments have been focused on short-term planning, and have not taken a long-term view of capital assets. Often short-term financial and technical decisions are made in an effort to reduce long-term costs or to get the most out of an asset by keeping it in production well beyond its useful life (Fowler, 2010; Halfawy, 2008; Infrastructure Canada, 2009). The result of short-term financial planning, for capital assets, has impacted spending decisions to the point where municipalities have to choose between providing services and investing in aging infrastructure (InfraGuide, 2005; Komonen, 2006; Beauchamp, 2009).

Kim Fowler, Director of Sustainability at the City of Victoria, spoke at the BC Asset Management Conference in 2010 and defined municipal infrastructure deficit to be "the difference between the cost of maintaining and upgrading existing, local government-owned assets and the amount of capital reserves required for the maintenance and replacement" of those assets. Fowler (2010) also notes that assets have a defined service life and most capital infrastructure assets are reaching end of life, with no funds available for replacement.

Over the past 20 years, the cost of capital asset ownership for municipalities in Canada has increased due to rising costs and increased responsibilities. During the same period, municipal revenues have not increased to keep pace with increased costs, resulting in many municipalities deferring infrastructure maintenance and investments. This deficit in infrastructure maintenance and renewal was estimated in 2007 by the Federation of Canadian Municipalities to be approximately $123 billion and increasing at $5 billion a year (Mirza, 2007). Today that estimate would be a $163 billion infrastructure deficit.

2.2 Public Sector Accounting

The Canadian Institute of Chartered Accountants was established in 2000 to serve the public interest by overseeing the activities of the Accounting Standards Board (AcSB) (PSAB, 2013). The AcSB is responsible for establishing standards of accounting and reporting by Canadian companies and not-for-profit organizations and PSAB is responsible for establishing accounting standards for the public sector. Local governments are legally required to meet annual balanced-budget requirements and cannot budget for or incur a deficit without provincial government approval. It is within this balanced budget mandate that local governments assess the value of their capital assets based on the capacity to deliver current and future services (Reid, 2013).

Historically municipal accounting and financial reporting was established in provincial legislation and regulations. The provinces would provide the guidelines for preparing municipal budgets, identifying what was to be in the budget and the required year-end reports. As a result of individual provincial guidance, municipalities reported differently across provinces. It was recognized that a common basis of accounting for local governments was needed across the country and over time the *Public Sector Accounting (PSA) Handbook* was developed and adopted as the "accepted accounting principles for municipalities" (Matthew, 2007). It wasn't until 2005 that the *PSA Handbook* included standards on accounting for tangible capital assets, referred to as PSAB 3150. As Beauchamp (2009) states; "this change represented a different measure of financial position and operations" for municipalities across Canada.

Tangible Capital Assets are defined by PSAB (2013) as:

Non financial assets having physical substance that:

(i) are held for use in the production or supply of goods and services, for rental to others, for administrative purposes or for the development, construction, maintenance or repair of other tangible capital assets;
(ii) have useful economic lives extending beyond an accounting period;
(iii) are to be used on a continuing basis; and
(iv) are not for sale in the ordinary course of operations.

In practice, not all assets are considered a tangible capital asset, as it would be impractical to report on every asset owned. Therefore, it is up to the individual municipality to set capitalization threshold limits and decide on the TCAs that are reported (GFOA, 2006; Betik, 2007). Similarly, the PSAB 3150 guidelines for reporting (Appendix A) acknowledge that many tangible capital assets are comprised of multiple components, such as sewage infrastructure, and it is the responsibility of the local government to determine how it will record and report on these assets, either as entire assets or by component.

The PSAB 3150 standards were implemented in 2009 and required municipalities to demonstrate stewardship by declaring information in their financial statements regarding what tangible capital assets they owned, the amortization period, and the cost of using municipal assets to deliver programs and services (Buhr, 2012). Prior to PSAB 3150 municipalities were reporting their tangible capital assets as expenditures or as Beauchamp (2009) refers to the past practice, "unconsolidated, modified cash basis of accounting." With the introduction of PSAB 3150 municipalities were required to report their tangible capital assets on a consolidated basis, using a full accrual basis of accounting as well as reporting the information in their financial statements, bringing municipal reporting into line with provincial and federal accounting practices (Dachis &

Robson, 2011). This meant municipalities no longer expensed a capital project all at once but, instead were required to capitalize their assets including amortization, depreciation and year-year allocation of costs per asset. Bur (2012) identifies the shift that municipalities had to make as moving away from deciding if they could afford to buy a new capital asset as a one-time purchase, to a decision based on understanding the continued carrying costs and the financial implications of maintaining a given level of service for a specific asset. As a result of this shift, municipalities have been challenged to identify what capital assets they own, where they are located, determine what the assets are worth, what condition they are in, and when to replace or retire an asset.

Why the introduction of PSAB 3150?

According to the Public Sector Accounting Board (2007) the introduction of a "full accrual accounting method is being implemented to improve accountability through long-term financial planning for infrastructure and other services." It is also identified in the Guide to Accounting for and Reporting Tangible Capital Assets (2007) that the change to accrual accounting is to assist both Provincial and Federal governments in assessing the state of municipal infrastructure when developing infrastructure funding programs.

Ultimately PSAB 3150 mandated municipalities to document and report the TCAs they own, provide a general lifecycle assessment of each asset, and provide a statement of amortized value for each asset. Although many municipalities operate with some form of capital asset inventory management and condition assessment, PSAB 3150 has forced municipalities to develop a formal approach to managing physical assets which has led to a need for asset management plans and strategies (Beauchamp,2009; Betik, 2007; Dachis & Robson, 2011).

2.3 Asset Management

Asset management (AM) is a widely used term often referring to the management of an organization's capital assets. It is well acknowledged throughout the literature, that there is a large variation in the concepts of managing capital assets. Asset management is generally undertaken by a variety of interest groups and subject matter experts within an organization and as a result it means different things to different people (Wijnia, Croon & Liyanage, 2011). As the discipline matures, the concept of asset management has evolved from primarily maintaining and replacing physical assets to a broader concept of "using assets to deliver value and achieve the organization's explicit purpose" (AIM, 2012). It is within this broader context that this project uses the definition of asset management as defined by the British Standards Institute:

> Asset management is comprised of systematic and coordinated activities and practices through which an organization optimally manages its physical assets, and their associated performances, risks and expenditures over their lifecycle for the purpose of achieving its organizational strategic plan. (2004)

Asset management planning is a comprehensive process to ensure that delivery of services from infrastructure are provided in a financially sustainable manner. An asset management plan (AMP) details information about infrastructure assets including actions required to provide an agreed level of service in the most cost effective manner (Dachis & Robson, 2011). A list of common definitions are included in Appendix B.

Asset Management and Levels of Service

The primary objective in managing capital infrastructure assets is to meet the "defined level of service in the most cost effective manner for present and future consumers" (IPWEA, 2011). This is achieved through:

- Defining the levels of service expected from an asset and monitoring its performance
- Managing the impact of growth through demand management and infrastructure investment
- Implementing a life cycle approach to developing cost-effective management strategies for the long term that meet the defined level of service
- Identifying, assessing and appropriately controlling risks associated with an asset
- Having a long-term financial plan, which identifies the required expenditures and how they will be financed (IIM, 2011)

The levels of service provided by a municipality directly impact asset life cycle costs and risk management. Generally, the higher the level of service, the higher the life cycle costs will be to provide that service as levels of service drive the expected treatments in the management of infrastructure. As Vanier (2000) observes, "Customer levels of service outline the overall quality, function, capacity and safety of the service being provided. Technical levels of service outline the operating, maintenance, rehabilitation, renewal and upgrade activities expected to occur within the municipality."

There are several different approaches that can be taken in defining levels of service. Selecting the method for defining levels of service depends on individual considerations for an organization's assets and customers. Asset Management BC (2011) published a guide to assist local governments in considering some of the key elements in defining levels of service. These elements include: current Levels of Service, quality of service, cost of current Levels of Service, cost of service scenarios, desired Levels of Service, and performance measures and monitoring.

When a municipality understands the levels of service that is needed by each asset to obtain overall quality and function, the next step is to understand the asset's lifecycle and the associated costs.

Integrated Approach

Effective asset management relies on an integrated approach across an organization as asset management "touches almost all parts of an organization" (IAM, 2012). Within the municipal context, multiple departments are involved in managing assets, including the Finance, Public Works, Engineering, Parks, Recreation, Planning, and Information Technology departments. The literature refers to such an approach as being "holistic" (IAM, 2012), "interdisciplinary" (Fowler, 2010), and requiring the development of "inter-relationships" (AMBC, 2011) Although it is identified that departments need to integrate their asset management processes as a requirement for successfully delivering asset management, this is not often the case.

Gaetan Royer, City Manager of Port Moody, delivered a presentation at the 2010 Asset Management BC conference in Victoria, BC and spoke about leadership and asset management. He emphasized the need for organizations to develop process and department integration, buy-in across the organization, and staff involvement to overcome the shortcomings of most municipal implementations of asset management.

Similarly, Fowler (2010) identifies a disconnect that often exists between local government land use planning departments and infrastructure planning departments such as Engineering and Public Works. Fowler observes that the development of an asset management plan should provide integration of departmental functions to better "inform decision-making and fiscal commitments", and provide a common understanding of the objectives between departments.

Asset Management Plan

Asset management planning is a comprehensive process to ensure that delivery of services from municipal infrastructure are provided in a financially sustainable manner. Asset Management Plans generally include the current state of the infrastructure, levels of expected service, monitoring and improvement targets for an asset, AM strategies for each asset, procurement methods, and a financial strategy for each asset (Dachis & Robson, 2011). Essentially, an AMP defines the services to be provided, how the services are provided and what funds are required to provide the services. A sample AMP template is included in Appendix C.

Key elements of an AMP are:

- Levels of service – specifies the services and levels of service to be provided by Council
- Future demand – how this will impact on future service delivery and how this is to be met
- Life cycle management – how we will manage our existing and future assets to provide defined levels of service
- Financial summary – what funds are required to provide the defined services
- Monitoring – how the plan will be monitored to ensure it is meeting the organization's objectives

2.4 Township of Esquimalt

The Township of Esquimalt is located on the southern tip of Vancouver Island in British Columbia and has a land area of 7.08 square kilometers (Stats Can, 2011). With a population of 16,000 residents, Esquimalt is directly west of the City of Victoria, the provincial capital, and is one of the thirteen municipal governments that make up the Capital Regional District. Esquimalt is the home to the only naval base on the Canadian Pacific coast, and has a long military history. The Township of Esquimalt has over 200 full-time, part-time and auxiliary employees and is structured into six departments: Corporate Services; Financial Services; Development Services; Engineering and Public Works; Parks and Recreation; and Fire Rescue Services (Township of Esquimalt, 2013).

A review of Esquimalt's strategic priorities took place in January 2012. Asset management was not an explicit product of the review, however a number of strategic topics and priorities align closely with asset management including but not limited to: service affordability, infrastructure, and the Township's Official Community Plan.

The Township has a number of policies and documents in support of asset management including a *Tangible Capital Asset Policy* that was approved in 2010. The policy addresses all property that qualifies as a tangible capital asset and is acquired by the Township through donation or purchase. The policy is in direct support of PSAB 3150 and provides guidelines for dollar value thresholds, amortization, asset disposal, and reporting requirements.

2.5 Summary

Local governments are legally required to meet annual balanced-budget requirements and cannot budget for a deficit without provincial government approval. It is within this balanced budget mandate that local governments assess the value of their TCAs based on the capacity to deliver current and future services (Reid, 2013).

In summary, TCA reporting and the implementation of an asset management plan facilitates overall benefits to the management of capital assets. Identifying assets and how they are amortized helps managers understand the impact of using capital assets in the delivery of services and encourages them to consider alternative ways of managing costs and delivering services. The full accrual basis of accounting provides information about the full costs of services, helping managers assess future revenue requirements, the performance and sustainability of existing programs and the likely cost and affordability of proposed future activities and services.

It is important to highlight the differences between TCA accounting, as specified in PSAB 3150, and asset management (AM). PSAB 3150 requires municipalities to develop an asset inventory and to report on the value of the assets, however these guidelines do not mandate municipalities to provide for repair or replacement. This decision remains the responsibility of the local government. Whereas, an Asset Management Plan is a tool that utilizes the information from the TCA accounting process to develop long term financial plans for TCA replacement.

The development of an Asset Management Plan will ultimately identify whether municipal revenue generation is appropriate, the true costs for council established services, whether capital reserves are adequate to cover future infrastructure projects, and whether capital planning is increasing or decreasing the municipal infrastructure deficit.

3.0 Literature Review

The literature review includes academic research, industry research and public sector and industry publications. Asset Management research is predominant in three areas of study: financial and accounting, engineering, and strategic management.

3.1 Finance and Accounting

The financial and accounting literature captures municipal infrastructure asset management within three main focus themes; 1) the infrastructure deficit, 2) changes to the Public Sector Accounting Board (PSAB) practices, and 3) organizational integration.

Infrastructure Deficit

Financial research and publications discuss the challenges municipalities across Canada are facing with assessing the state of physical assets and funding the maintenance, upgrade, renewal and disposal of assets. The primary challenges facing local governments are the identification of the assets they own and the assessment of the current condition of their assets (Beauchamp, 2009; Dachis & Robson, 2011; Mirza, 2007; Newton & Vanier, 2004). The 2012 Canadian Infrastructure Report Card (Felio, 2012) found that the majority of municipalities do not have an accurate inventory of their underground infrastructure, including roads, wastewater, drinking water and storm water systems. Felio concludes the lack of asset inventory and condition data is the result of insufficient staff and financial capacity to carry out the required work to obtain current asset data. Brint and Black (2013) propose a framework for assessing the condition of infrastructure assets, using bridges as their physical asset, they developed an asset sampling model that incorporates historical and current sampled condition data to reduce costs in determining an asset's condition. Without current inventory and condition estimates, municipalities are challenged to forecast current and future costs associated with infrastructure renewal and replacement (Brint & Black, 2013; Felio, 2014; Kaganova, 2012; Mirza, 2007).

Public Sector Accounting

The 2009 implementation of *PSAB 3150 – Tangible Capital Assets* by the Public Sector Accounting Board, resulted in local governments abandoning the "unconsolidated, modified cash basis of accounting" (Beauchamp, 2009) to a full accrual basis of accounting. Prior to PSAB 3150, municipalities were not required to present financial reports on their capital assets and infrastructure, including an asset's condition, cost associated with using an asset, or the depreciation value of an asset. Accounting literature identifies that moving to accrual accounting not only provides a more accurate depiction of an organization's financial information, but it also requires a new understanding of accounting for business transactions at the municipal level (Betik, 2007; Buhr, 2012; Dachis & Robson, 2011; Kaganova, 2012). Specific examples are found in local government case studies where accounting departments are developing new processes for tangible capital asset reporting (Beauchamp, 2009; Betik, 2007; Reid, 2013) and life cycle costing (Buhr, 2012; Kaganova, 2012).

Organizational Integration

Another common theme within the financial literature is the requirement for an organization to align its business and accounting practices with the organization's overall asset management strategy (Cagle, 2003; Westhuizen & Myburg, 2014). Studies by Halfawy (2008), and Newton and Vanier (2004), identify relationships between the capital assets of an organization and the year-end financial reporting requirements are often not aligned, specifically where internal processes are lacking. Sutton (2014) points out that capital asset data collected within the functional department must be integrated into the accounting system within the asset management system, which will result in improved long term financial planning and service delivery. It is noted that business processes and data integration with budgeting cycles should be focused on multi-year planning, and Cagle (2003) argues financial decision makers must move beyond short-term planning and the "tendency to defer renewal activities."

3.2 Engineering

The literature review has found a significant amount of research on municipal asset management within the engineering field, with substantial academic and industry articles focused on core public works infrastructure such as roads/highways, sewer systems, utilities, and waterworks. Historically the emphasis has been from the technological perspective with emphasis on the various lifecycle phases of an asset, such as planning and procurement or maintenance and replacement cycles. However, more recently the engineering and technical literature has identified the importance for further study into the organizational business and behavioural aspects of engineering asset management (EAM) as opposed to the traditional technology and hardware approach.

Asset Lifecycle

The engineering literature mainly focuses on capital asset management with respect to an asset's lifecycle, primarily focused on physical capital infrastructure that resides within a municipality's Public Works or Engineering departments. The literature review reveals that the engineering field has the largest body of research with regards to infrastructure asset management. More specifically, the literature shows decades of academic research and industry articles pertaining to building and maintaining civic infrastructure, examining issues that arise from structural performance, asset evaluation, monitoring, maintenance, renewal, disposal, and risk identification. This is not unusual, as the Engineering and Public Works departments by default have always assumed the role of municipal asset managers (Cagle, 2003; InfraGuide, 2001), even before asset management became a pro-active and formal requirement for governments (Campos & Marquez, 2010; Reid & Xerri, 2013; Vanier, 2000; Younis & Knight, 2009). As the majority of an asset's expenditure is incurred within the lifecycle of the asset, it is through the lifecycle process that there exists the most significant opportunities for improved efficiencies and cost savings (Birkbeck, 2014; IAM, 2012).

With the introduction of the British Standards Institute's PAS 55 – Asset Management standard in 2004, and later the ISO 55000 – Asset Management standard in 2014, engineering research explored new ways to manage an asset's lifecycle through modeling and frameworks based on the lifecycle components set out in the international standards on maintenance, operation, and

disposal (Brint & Black, 2014; Campos & Marquez, 2010; Reid & Xerri, 2013; Too, 2010; Younis & Knight, 2010).

Technology and Systems Thinking

More recent engineering literature focuses on new and emerging technologies to assist with asset repair or rehabilitation, as well as performing preventive and/or predictive maintenance (Reid & Xerri, 2013; Younis & Knight, 2010). Alongside of technological developments, there has been an increase in published articles focusing on the design of AM systems and a broader approach that considers systems thinking across the organization to resolve "problems across the traditional boundaries of the business, information technology and engineering disciplines" (Amadi-Echendu & Ramanyimi, 2011). In their article "*The 'state of play' in engineering Asset Management: towards a conceptual framework*", Reid and Xerri state that engineering asset management (EAM) has historically focused on maintenance and condition of an asset, primarily on hardware issues and the tools required for maintenance. However, they observe that EAM research has been moving into the strategic planning arena, taking into consideration asset performance in relation to service delivery, performance outcomes, and overall organizational goals. The move towards an organizational perspective and away from a "maintenance- centric" (Amadi-Echendu & Ramanyimi, 2011) approach has lead to EAM research within organizational management fields.

Information Systems

The Information Technology (IT) literature addresses infrastructure asset management from two perspectives. First are the studies that examine technical software solutions for managing infrastructure asset information, such as implementing software applications (Halfawy, 2008; Hipkin, 2001), developing maintenance management information systems (MMIS) (Hipkin, 2001; Zeb, Froese & Vanier, 2014), and developing data models for data collection, storage and retrieval (Halfawy, 2008; Halfawy, Vanier & Froese, 2006; Westhuizen & Myburg, 2014). It is acknowledged within the literature that engineering software solutions are generally stand-alone systems and are often not integrated with other engineering or business IT systems (Westhuizen, 2014). Zeb, Froese and Vanier's 2014 research developed an IT tangible capital asset classification and concluded that many of the software packages used in engineering asset management work well as standalone programs, but "lack the ability to seamlessly exchange the TCA information" with internal and external departments.

The historic emphasis on engineering departments to take responsibility for asset management has led to the creation of diverse areas of isolated expertise and knowledge across departments (Halfawy, 2008) and consequently these silos are the biggest challenge facing municipalities when establishing an asset management program (Campos & Marquez, 2010; Halfawy, 2008; Zeb et al, 2014).

The second perspective captured in the IT literature puts IT in a strategic role within asset management planning. It is argued that IT is responsible for championing technological integration, including municipal process integration (Zeb et al. 2014), coordination of decision-making (Halfawy, 2008), interoperability between IT systems (Hipkin, 2001), and the elimination of software, data and departmental silos (Halfawy, Vanier & Froese, 2006; Zeb et al, 2014). In contrast, industry publications identify the role of IT as a supporting service or tool and should be

utilized as an enabler within asset management (ISO, 2014; Asset Management BC, 2014; IAM, 2012), with less emphasis on IT playing a direct strategic role.

3.3 Strategic Management

Much of the business literature identifies the need for organizational integration, supported by a well thought out AM governance structure. The context of integration is multifaceted, and is cited as including: data and systems integration (Vanier, 2000; Zeb et al, 2014), process integration (Halfawy, 2008; Newton & Vanier, 2004), departmental integration (Stapleberg, 2006; Westhuizen & Myburg, 2014), program integration (Wiseman, 2010), policy integration (Cooksey, Jeong & Chae, 2011; Stuart & Reid, 2013), and business objectives integration (Stapelberg, 2006; Wijnia, Croon & Liyanage, 2011).

The necessity for an organization to take a strategic approach to asset management, is a common theme within both the academic and industry literature. Tywoniak (2008) identifies asset governance as the guiding body that defines strategic asset management providing policy structure, transparency and accountability for implementing asset management within an organization. As previously stated, asset management was initially viewed as a maintenance-centric activity and it wasn't until the early 2000's that asset management became a focus for business leadership and council to align asset management with investment planning, levels of service, and the incorporation of AM for better decision-making (Homeniuk, 2014; Tywoniak, Rosqvist, Mardiasmo & Kivits, 2008). In 2009, the introduction of PSAB 3150 became a catalyst for municipalities to formalize asset management planning (Homeniuk, 2014) and compelled municipalities to consider AM's strategic role within the organization (Fowler, 2010). Reid and Xerri (2013) observe the shift from a tactical to a strategic approach is an emerging field within AM research, specifically they identify the lack of investigation into human behaviours and change management within asset management organizations.

3.4 Summary

In summary, asset management research has been extensively studied in the fields of civil and mechanical engineering, with a focus on hardware maintenance and asset life-cycle processes. The engineering research primarily investigates system efficiencies, life-cycle costing, technology, implementation and operational processes. More recently asset management is being studied in relation to business functions, organizational goals, and strategic planning. Researchers observe that the integration of both tactical and strategic approaches is necessary to successfully implement an asset management program. It is within these two approaches that the conceptual framework for this research project has been developed.

4.0 Conceptual Model

The conceptual model used in this research paper is a blended model based on two industry leading AM frameworks; 1) Asset Management BC's AM Framework and 2) the Institute of Asset Management's (IAM) AM Conceptual Framework. The modification of the two frameworks provides a scaled-down version from much larger frameworks and therefore is more applicable to a small municipality such as Esquimalt. The blending of the frameworks attempts to capture the most relevant aspects of an AM model identified in the literature while accounting for provincial AM guidelines and compliance within British Columbia.

Asset Management BC's (AMBC) Framework was developed with a "BC approach" (AMBC, 2014) ensuring AM practices are relevant to BC communities. The framework includes best practices from international AM groups as well as AM best practices from BC local governments. AMBC's framework is not prescriptive and does not identify what actions must be taken, it focuses more on what AM objectives should be achieved to successfully deliver an AM program. AMBC's framework consists of four core elements, encompassed by three phases that contain eight objectives.

The Institute of Asset Management (IAM) is an international non-profit organization whose mandate is to "to advance for the public benefit the science and practice of asset management" (IAM, 2015). Supported by its member organizations, the IAM has been a leader in promoting international standards for asset management and promotes the ISO's 55000 asset management set of standards. The IAM developed a generic AM framework, based on best practices the framework consists of six subject groups and 39 individual subjects, providing methodologies for achieving effective AM practices.

A number of steps were taken to arrive at the conceptual model used in this research project. First, the objectives from AMBC's framework were considered for their relevance to addressing the Township's asset management concerns. Next, a review of AMBC's framework was undertaken in relation to the main themes in the literature review, resulting in the conceptual model focusing on three primary objectives; 1) AM Strategy, 2) Organization and Business, and 3) Asset Lifecycle (see Figure 1).

The third step involved a review of the six AM subject groups and subsequent 39 subjects within the IAM's framework, resulting in the identification of eight relevant subject topics to the Township's asset management goals. These subject topics were aligned with the corresponding objective identified above.

Lastly, as identified in the literature, the success of an organization's asset management program is dependent upon its ability to manage change and integrate systems, processes, and people. Therefore, the conceptual model illustrates the requirement for integration and change management to "bridge the gaps" (Halfawy, 2008) both across and throughout the organization.

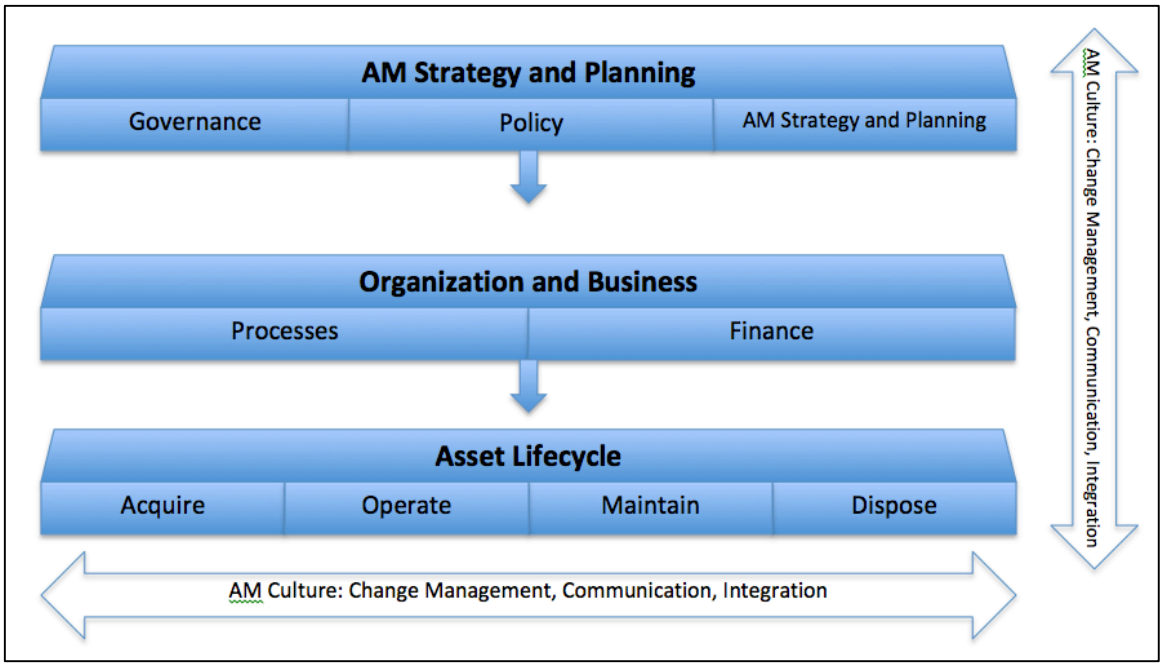

Figure 1. Conceptual Model

4.1 Asset Management Strategy

The aim of an AM strategy is to provide guidance and accountability for the management of capital assets within an organization and can be divided into three categories: 1) governance, 2) policy, and 3) AM strategy and planning.

Asset management governance is the organizational-wide framework that determines who makes decisions, how decisions are made, and who is accountable for decisions, finances, and outcomes. Governance is generally captured in policies that have been approved by Council. The AM policy is considered "the cornerstone of an organization's approach to Asset Management" (IAM, 2012) and dictates the policy objectives that are designed to bridge the corporate strategic plan with an AM plan (AMBC, 2009). As stated previously, the purpose of AM is to manage assets over the long-term with multi-year (multi-decade) plans while competing for limited resources within the organization. It is therefore the role of policy to assist with the organization's strategic vision to "enable the agency to embrace AM" (Cooksey, 2011).

An AM Strategy generally takes into account the "what" and "when" of asset management (IAM, 2012; Vanier, 2000). The "what" includes details about each asset, such as; condition, performance requirements, and future demand. A review of current AM processes, documents, systems, and data also provides information to assess "what" AM practices are currently in place. The "when" identifies timelines and estimates of future asset performance and available resources for service delivery.

Once an AM Strategy is developed the AM plan(s) are then developed and implemented. Asset Management Plans contain details for managing the lifecycle of an asset. Each asset has it's own

plan and often includes asset details such as expected life span, costs to operate and maintain, demand forecasts, and how the asset will be managed to deliver the required level of service.

4.2 Organization and Business

The AM Organizational and Business elements include the business functions required to perform asset management activities. These activities are divided into two categories; 1) business processes and 2) financial reporting.

A business process is defined as "a set of activities that identify how the organization performs work to deliver value across multiple functional areas…" (IIBA, 2015). Asset management business processes are those activities that are related to delivering value within asset management functions across the organization such as: improvement processes, planning processes, data flow, reporting, inter-departmental processes, and decision-making processes.

An organization's financial reporting obligations are the responsibility of the Finance and Accounting departments. In 2009, when PS3150 was implemented, the role of the Finance department changed significantly with regards to reporting on tangible capital assets. The change in accounting requirements resulted in municipalities having to know an asset's value, replacement and depreciation cost, operation and maintenance cost, future capital cost, and reporting of capital asset funding sources.

4.3 Asset Lifecycle

All physical municipal assets have a lifecycle. Asset lifecycle management is the process of optimizing the service generated by the asset throughout its lifecycle (AMBC, 2009; IAM, 2012; Vanier, 2000). Asset lifecycle management starts with knowing what assets an organization owns and focuses on four components that include 1) asset acquisition, 2) operation, 3) maintenance, and 4) disposal see Figure 2 for variations of the lifecycle. Asset lifecycle management requires the documentation of asset details, referred to as the asset registry. The registry contains any number of specific details about an asset such as asset type, location, quantity, size, condition, or work history (AMBC, 2009; Stapelberg, 2006). Registry information is included in the development of the asset plan and provides the data required to make operational and financial decisions.

It is within the asset lifecycle that the majority of asset costs are incurred (IAM, 2012) and therefore is the area within Asset Management that provides the greatest opportunity to gain efficiencies and cost savings, as well as significant risk of increased costs if these activities are not well managed (Halfawy, 2008).

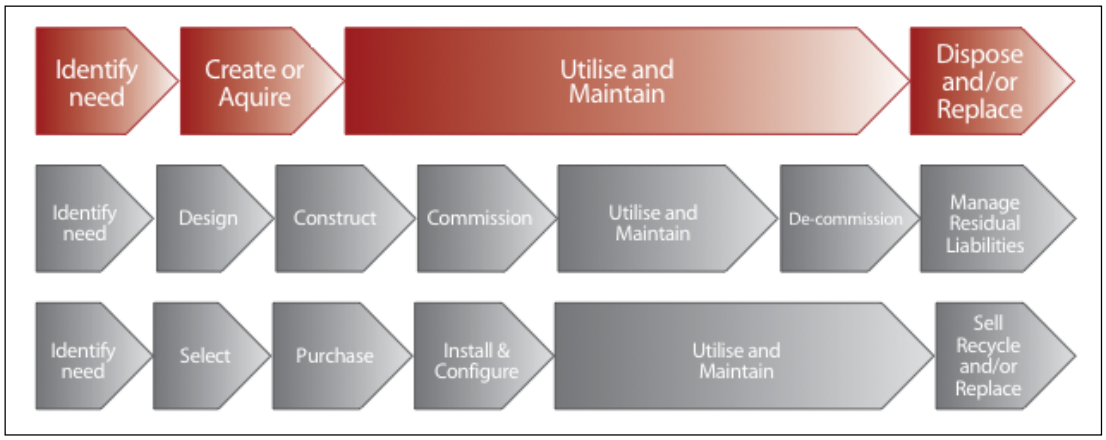

Figure 2. Core asset life cycle stages and examples of variations (IAM, 2012)

Lifecycle costing involves estimating the total cost of all the phases over the entire service life of an asset. Comparing options based on lifecycle costs rather than just upfront costs leads to long-term informed decisions. In addition, as Vanier (2000) indicates examining full lifecycle costs helps avoid surprises, such as high maintenance costs associated with a lower construction cost asset. As previously mentioned, lifecycle costs are tied directly to the Levels of Service determined by an organization.

According to the 2011 International Infrastructure Management Manual, full life cycle costs typically include:

- planning and design costs
- capital costs
- operating and maintenance costs
- rehabilitation and renewal costs
- disposal costs

4.4 Asset Management Culture

Brunetto et al (2014) and Stapelberg (2006) recognize the role of employees is critical to a successful AM strategy, observing that failure to implement an AM program is often due to existing organizational culture, and an inability to make systemic change. It is argued that AM is not a new program but a "new way of doing business" (Cooksey et al, 2011), and the success of integrating AM into the workplace will depend on the culture of the organization and its ability to manage change (Brunetto, et al, 2014; Cooksey, et al, 2011; Halfawy, 2008). Cooksey, Jeong, and Chae (2011) have observed that organizations historically have managed assets in "silos" and that "vertical and horizontal communication" regarding AM often does not occur. They conclude that asset management must be managed as a complete system, whereby policies, plans, processes and decisions are communicated throughout the organization. Similarly, Stapleberg (2006) observes that the interdisciplinary nature of AM requires both strategic and tactical integration ensuring AM decisions are not made in isolation.

Managing change, expectations, and perceptions is perhaps the most important aspect of implementing an integrated asset management program (Cooksey et al, 2011). Therefore, the conceptual model includes horizontal integration of communication and change management across departments at all levels (governing, strategic, tactical) as well as the upward/downward integration of communication and change management through all levels: elected representatives, executives, managers, and staff.

5.0 Research Methodology

The research methodology for this project included a literature review, expert interviews and a survey. Data collection occurred in two phases 1) expert interviews and 2) email survey. The target population for the expert interviews was comprised of employees from the Township of Esquimalt. These employees possessed either operational knowledge of asset management or expertise in the Township's capital asset management processes. The target population for the survey consisted of individuals who worked in BC municipal and regional government organizations with populations between 10,000 and 25,000. The survey participants were from senior or management positions that were responsible for making asset management or financial decisions within their organization.

The expert interviews were conducted individually and in person with nine subject matter experts, managers and executives from the Township of Esquimalt.

The surveys were emailed to 30 BC municipalities with populations of similar size to Esquimalt. Survey participants were initially contacted by phone, followed by having the survey emailed to them and if necessary received a follow up phone call.

Combined, the three research methods address the identified research objectives. These are summarized in Table 1.

Table 1. Research Objectives aligned with Research Method

Research Objective	Methods
Review existing legislature and policies which govern the reporting of municipal TCA	Literature Review
Analyze Esquimalt's current TCA position with regards to meeting legislated reporting requirements	Expert Interviews
Identify the gaps between Esquimalt's current TCA position and required reporting criteria	Expert Interviews, Survey
Develop a roadmap for Esquimalt to meet legislated TCA requirements through a Capital Asset Management Roadmap	Literature Review, Expert Interviews, Survey

5.1 Expert Interviews

Interviews were conducted in the work place of the participants and lasted approximately 60 minutes. Questions were based on the *Township of Esquimalt Expert Interview Questionnaire* (Appendix D) and explored the concepts of the organization's asset management background, financial reporting processes, and asset management lifecycle. The interview instrument was comprised of 12 questions, supported by multiple sub-questions for a total of 26 questions. There were two additional questions at the end of the interview inquiring about any further comments on asset management and if there was one thing that would help the participant with asset management in their job, what would it be.

A pool of 10 potential expert interviewees had been identified by the project sponsor and were contacted by myself via email to participate in the asset management project. A total of eight experts participated in the interviews. The participants represented the following Esquimalt departments: Public Works, Engineering, Parks, Finance, Recreation and Information Technology.

The goal of conducting expert interviews was to obtain information on how the Township of Esquimalt currently manages its capital assets and to have employees identify opportunities to improve or change current asset management practices. The expert interview format was chosen to allow Esquimalt employees to share their knowledge, expertise, and ideas on how Esquimalt can develop an asset management plan.

5.2 Survey

Surveys were emailed to 30 BC municipalities. The municipalities were chosen based on their comparable population size to the Township of Esquimalt whereby assuming they have similar infrastructure requirements and municipal services available. The population sizes ranged from 10,000 to 25,000.

Municipalities with similar population sizes to the Township of Esquimalt were obtained through publicly available contact information available on governmental websites. Recruitment was performed by telephone. Each municipality was contacted and asked to provide the contact information for the person responsible for asset management in that organization. Those individuals were contacted by telephone and upon confirmation of their participation they were emailed the *BC Municipal Asset Management Survey* (Appendix E). Completed surveys were returned by email.

The survey consisted of 27 questions and was estimated to take 15-20 minutes to complete. The questions covered the three areas of asset management based on the conceptual framework: 1) strategy and planning, 2) organization and business, and 3) asset lifecycle.

Of the 30 email surveys, 4 were returned the same day, 1 was returned within a week. One week after the initial survey was emailed, a reminder notification was emailed to the participants who had not responded. Two additional surveys were returned as a result of this follow up. The remaining 23 participants were contacted by telephone three days afterwards. Four of the participants offered to take the survey while on the telephone and an additional five participants submitted the survey during the following week. In total 16 of the 30 surveys were returned.

5.3 Limitations and Strengths

The expert interviews presented few limitations. When clarification of the interview questions was required the in-person format made it easy to respond to these inquiries. In addition, most respondents provided examples for many of the questions, resulting in detailed responses.

Limitations with the email survey were primarily with response rates. Several respondents noted the survey was lengthy. It was also noted by five respondents that not all the survey questions could be answered by one individual within the organization and therefore they were unable to complete the survey on their own. Two of these five respondents completed the survey with assistance from others in their organization. The remaining three respondents provided incomplete surveys.

6.0 Findings

This section describes the findings from the expert interviews and the survey used for collecting data on current asset management practices in the Township of Esquimalt and within British Columbia. A report of the expert interviews is followed by the survey results. The close-ended survey questions are presented in frequency tables and then the open-ended questions from the surveys are discussed. This section concludes with a general overview of the findings from both the expert interviews and the survey, reported by question.

6.1 Expert Interviews

This section outlines the findings from the subject matter expert interviews conducted with the Township of Esquimalt employees. The Township is comprised of a mayor and six councilors, an appointed Chief Administrative Officer, four Directors a Fire Chief and a number of managers and staff. In order to gain an understanding of the Township's current asset management practices, interviews were conducted with operation managers and staff from each department across the municipality. The interviews provided an opportunity for the managers and staff to share their views on the current state of asset management and how asset management practices could be changed in the Township. Appendix F - Consultation Matrix provides as summary of the discussions held with Township managers and employees in the form of a consultation matrix. The findings are organized into the three subject groups identified in the conceptual framework. Through these interviews it was made clear that the Township is currently operating with and implementing a number of asset management practices.

6.1.1 Asset Management Strategy and Planning

There were three questions in the expert interviews pertaining to AM strategy and planning. The questions inquired about how assets are currently managed within a single department and across the organization. In addition, inquiry into the successes and challenges encountered with AM planning in the Township were explored with each participant.

Overall, each participant noted there is currently some form of asset management occurring in their department and across the organization. Most respondents commented that asset

management has become more of a priority in recent years, primarily due to the introduction of PSAB 3150, but also due to municipalities becoming more aware of the need for longer-term planning and the challenges they face with replacing aging infrastructure.

Of the primary AM activities: policies, strategies, and plans the Township of Esquimalt has implemented an AM policy, but had not yet developed AM strategies or plans. The Township's Tangible Capital Asset Policy was approved in May 2010 and provided a framework for the management and control of the Township's capital assets. All departments commented they adhere to a Corporate Purchasing and Disposal Policy when making capital asset procurement and disposal decisions. In addition to these policies, annual inventory reports were prepared by each department and submitted to the Finance Department for budgeting and planning purposes. There was no defined format for the inventory reports, however specific asset information was required in these reports, including an asset description, current value, and replacement value. As there was no specific format, it was noted that departments submitted varying information on their inventory reports, and may not be consistent with the processes or format the Accounting office requires for reporting tangible capital assets. All participants were aware that asset management encompasses more than simply maintaining inventory or following procurement procedures. Interviewees commented on the potential benefits of integrating capital planning across the departments, including using common forms, procedures and participating in cross-department planning meetings.

Interview participants were asked to describe the current capital asset management and planning practices in their departments. Participants responded that capital asset planning which encompasses new capital projects, upgrades to existing capital assets, and the maintenance or disposal of capital assets was generally performed by each department individually. It was noted by several participants that when coordination occurs between departments it was not through a formalized process or governance structure, but an informal approach that was driven by operational necessity. One exception to the informal inter-departmental planning approach was the management of the Township's vehicle fleet. The vehicle fleet is managed by the Public Works department and includes vehicles that are owned by the Public Works, Engineering, Parks and Recreation, and Fire Departments.

Interview participants identified the primary process for capital planning was the annual budget planning cycle. It was during budget planning that each department identified capital expenditures for the coming year. Interview participants identified the budget planning process was performed independently of other departments and several commented it would be beneficial to forecast and plan as a collective group. One participant's observation was, "It would be extremely helpful to hear what other departments need to purchase or repair, we might be able to plan our own operation better, or support their department better."

When asked if the Township's capital asset management and planning processes required improvement, all participants were in agreement that improvement was necessary. The areas identified for improvement were: AM documentation, AM reporting processes, AM roles and responsibilities of each department, and improved inter-departmental communications.

Interview participants were asked what barriers their departments had experienced with respect to implementing asset management. A variety of barriers were identified and ranged from operational and process challenges to a need for strategic and corporate clarity. A summary of the responses to these questions can be found in the Consultation Matrix.

Although the Township of Esquimalt had been practicing some form of asset management for many years, the introduction of PSAB 3150 had provided the impetus to develop a more formal approach. Interview participants identified a number of existing AM practices that worked well including: updating and maintaining Engineering capital asset records from 2008, updating data and photographic inventory of the Township's parks, the implementation of a new software application to integrate certain aspects of service management, and a model TCA reporting spreadsheet for the vehicle fleet.

6.1.2 Asset Management Organization and Business

The organization and business process identifies the decisions around the activities necessary to achieve the objectives in an AM Plan. As the Township of Esquimalt had not implemented a formal Asset Management Plan, decisions are currently made outside of a structured corporate AM framework.

The interview questions related to AM Decision Making inquired about the consideration of Levels of Service (Los) when making capital asset decisions, and the impact of the introduction of PSAB 3150 on each department.

Interview participants were asked if their department considered Levels of Service when making capital asset decisions. Levels of Service are defined by such elements as: Current Levels of Service, Quality of Service, Cost of current Levels of Service, Cost of Service scenarios, Desired Levels of Service, and Performance Measures and Monitoring. Taking into account their specific assets and customer profiles, participants indicated they considered LoS to the best of their ability when making capital asset decisions as there are no established business processes for determining LoS. Departments that provided public facilities such as the recreation and sport centres, tracked patron facility use and provided input to budget and AM decisions for those facilities. When asked about what LoS are considered within underground and above ground infrastructure assets, such as sewers, roads, and sidewalks, participants responded that they do not follow any specific tracking or reporting process for each asset's LoS, but determine through experience, knowledge, professional judgement, and the manufacturer's specifications when an asset requires maintenance, replacement, disposal, or deferral. All respondents identified AM decisions within their departments are based on safety, priority, and budget.

Although the interview questions did not specifically address the Township's AM governance structure, asset management governance was commonly identified across the organization as requiring further clarification. Responses included the need to have a formal AM structure or program, clarity on which business unit owns AM, identification of departmental AM responsibilities, and the need for an AM decision making process and body. Several respondents commented that AM representatives or champions within each department would be beneficial where these individuals would come together to discuss inter-departmental AM issues.

Interview participants were asked about the impact the 2009 introduction of PSAB 3150 reporting requirements had on their departmental capital asset reporting procedures and processes. All but one of the departments expressed there had been no significant impact directly to their department, aside from a new requirement to include additional capital asset information in year-end reporting. However, the new accounting requirements had a significant impact on the Finance department, in particular the Accounting section.

6.1.3 Asset Management Lifecycle

The expert interview questionnaire included the six "whats" of asset management (NRCC, 2003) focusing on the lifecycle of physical assets. The lifecycle questions were comprised of six topical questions supported by 15 sub-questions that explored the expert's current operational knowledge of the Township's capital assets.

What do you own and where is it?

Overall, interviewees responded they had a good understanding of what physical assets they were responsible for and where those assets were located. Although each department expressed confidence in knowing what specific assets they owned and the location, the responses to the subsequent sub-questions gave a different impression. One response was "[in our department TCA] knowledge is held by individuals, there is no real record of TCAs", another response was "we have some location data, we don't use a database to track our assets we use mostly paper tracking", and another comment identifying individual undocumented asset knowledge "if we can't find information on [an asset] we ask [employee name], he has been here a long time and knows."

Departments reported on their AM tracking and record-keeping processes, each had their own method for maintaining records using differing systems such as AutoCAD, Excel spreadsheets, work orders, and hardcopies including photographs. It was also identified that the interval for updating an asset record varied depending on the nature of the asset and available resources. Just prior to the interviews, Public Works had hired a technician to assist with documenting the Township's in-ground infrastructure and the Engineering Department had captured capital asset records from 2008 and were assessing their ability to capture earlier TCA data. Due to the departmentalized systems and processes used for capturing TCA data, information sharing between departments was not readily available or easily accessible. One of the interview participants stated "a database needs to be available to all departments to access asset management data."

What are your assets worth?

The two sub-questions pertaining to the value of the Township's capital assets focused on the depreciation and replacement costs of an asset, as well as how often an assets value is reported to meet organizational accounting requirements.

On the whole, departments based the value of an asset on the purchase price and calculated the depreciation based on industry standards (book value) or estimates made from the useful-life expectancy (warranties) of an asset. Replacement costs were estimated through a number of methods including bids and tenders, consultant expertise, and in-house research. Departmental asset value records were accessible and in each case I was shown their costing and value-tracking records.

Individual departments submitted annual depreciation, maintenance, and replacement values to the Finance Department for PSAB-TCA reporting. The finance department compiled the departmental records and was responsible for the management of these records.

What is deferred?

Responses to the two sub-questions regarding asset maintenance deferral and associated costs yielded the same response from all departments.

- Departments were expected to find ways to extend an asset's useful-life
- Departments recommended asset maintenance and replacement deferral based on safety, priority, and budget
- Departments made deferral recommendations to the Organization
- Departments considered trade-offs within their own departments when considering new purchases, maintenance or replacement deferrals

Generally individual departments did not collectively discuss or review their TCA maintenance and renewal needs. Three of the interviewees observed that it would have been helpful to know what assets the other departments were considering for maintenance and renewal. As observed by two of the respondents:

> TCA cross-functional team meetings would be useful. It would be invaluable to hear what is occurring in other departments and identify how it impacts your own department.

> We are sometimes fighting over the same money, if I knew what another department was doing I might think my request may not be as important and I might support a decision that doesn't directly benefit my area.

What is its condition?

The expert interview questions pertaining to the functional condition of an asset captured the processes for monitoring and tracking asset condition. Timeframes for conducting asset condition assessments were also recorded.

Throughout the interview it became apparent that responses to the asset condition questions varied across departments, some departments had a full accounting of their assets' condition, others did not. Although asset condition monitoring and tracking processes differed between departments, there was one consistent observation made by all interview participants regarding long-term employee's individual knowledge of an asset or assets. All interview participants indicated that they often relied on an employee's knowledge of an asset, such as when it was last replaced, upgraded, or reconditioned. This response applied to the departments who tracked and recorded asset conditions as well as those that did not.

> Staff have historical experience with assets and know the condition through experience. There is no method to capture an individual's knowledge, [our area] just doesn't do it that way.

What is the remaining service life?

When asked what processes were used for estimating the remaining service life of the organization's primary physical assets, responses were similar. All interview participants stated the service life of an asset was based on the manufacturer's guidelines and each assesses how best to extend the service life of their assets if possible. All respondents noted there was no formal documentation of an asset's service life, there were no estimates or future projections on an asset other than the manufacturer's warranty and guidelines. The Engineering department noted they used the SCADA system for notification of service interruptions, however SCADA was not used for monitoring or determining on-going levels of service.

What to do and when to do it?

The two sub-questions pertaining to capital asset investment and re-investment focused on investment prioritization and the associated decision-making processes. At the departmental level there was no formal decision-making process within or across departments. Individual department managers compiled their annual TCA maintenance, renewal and replacement recommendations and submitted these reports to their Directors. When asked about how a department decides what assets to invest in (net new purchase, maintenance, or placement) factors such as safety, risk, civic need, manufacturer's maintenance guidelines, and cost were considered. Once submitted to the Directors group, the Directorship considered departmental requests based on the same criteria as mentioned previously and makes a final recommendation on the Township's investment direction for final approval by Council.

One of the Directors observed that "Lifecycle costing is the most difficult and most impactful piece of AM at Esquimalt" and that "preventative maintenance is the first thing to be cut in years of tight finances."

6.1.4 Additional Comments

In addition to the AM questions based on the conceptual model, interview participants were asked if they had any further comments regarding AM, including; if there was one thing that would help them with asset management at the Township what would it be?

There was agreement between respondents that asset management was being performed "off the side of my desk" and that dedicated AM resources would benefit the organization in reaching its AM goals. Discussions around how a resource(s) could be deployed varied across departments. One department expressed the need for each department to manage and account for their own physical assets, another department suggested there should be a single position in the organization that was responsible for advancing AM and working with each department to create and manage standards and processes. A third manager suggested a "data entry person is needed for each department along with cross-function team meetings, so we know what everyone is working on."

A number of other areas were identified, that if improved would benefit the organization's AM strategy. They are the creation of an asset registry available across the organization, development of asset category/class standards, integration of the GIS system with physical asset data, and formal integration of asset management with how departmental business is performed.

6.1.5 Interview Findings Summary

The interviews provided an opportunity for the managers and staff to share their views on the current state of asset management and how asset management practices could be changed in the Township. Through these interviews it was made clear that the Township is currently operating with and implementing a number of asset management practices primarily due to the changes in PSAB reporting, but also due to a need for longer-term infrastructure planning.

Overall the interviews identified the need for the Township to clearly identify and implement AM practices and standardization around documentation, reporting processes, and roles and responsibilities. Although the interview questions did not specifically address the Township's AM governance structure, asset management governance was commonly identified across the organization as requiring further clarification.

6.2 Survey

This section outlines the findings from the BC Asset Management survey conducted with key stakeholders from BC municipalities of similar size to the Township of Esquimalt. Key stakeholders were defined as subject matter experts comprised of directors and managers who were responsible for asset management in their municipality. The responses were compiled, grouped and summarized under common themes, differences are noted and unique findings. Overall the responses to the survey were in general consensus and four common themes emerged with respect to municipal asset management and alignment with the conceptual model.

6.2.1 Common Themes

Survey response generally fell into four common themes: 1) AM Prioritization, 2) Business and Organizational Approach to AM, 3) AM Data and Information Management, and 4) Organizational Change. Each of these themes can be correlated to the main concepts in the conceptual model as illustrated in Figure 3.

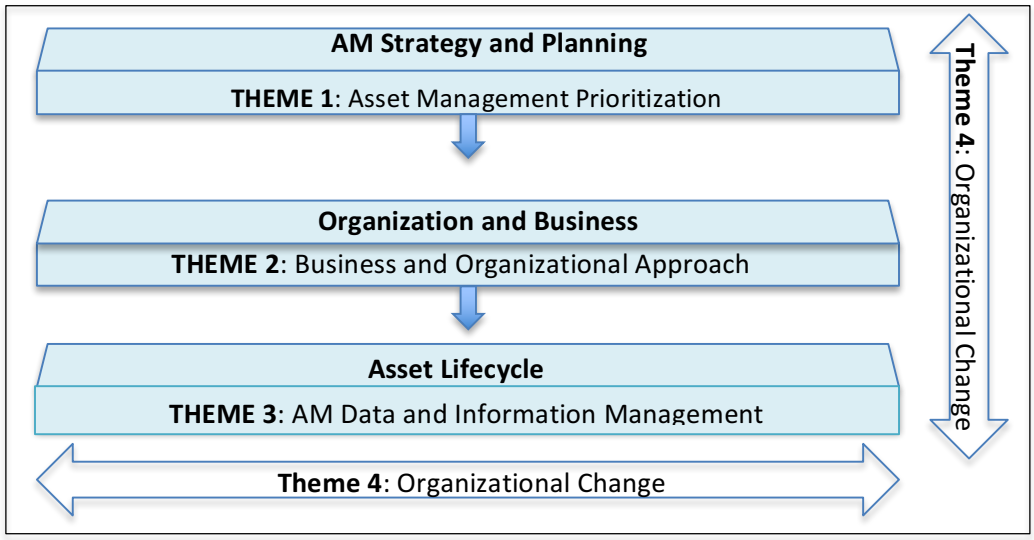

Figure 3. Four Themes and Conceptual Model

Theme 1: Asset Management Prioritization

The survey included nine questions related to Asset Management Strategy and Planning as identified in the conceptual model. Questions were focused on finding out if a municipality had AM policies, plans, and defined levels of service in place as well as who was responsible for asset management within their organization. The survey findings show that the majority of respondents did not have AM policies or plans established and of the 16 survey respondents, 7 confirmed they had AM policies in place (44%) and only 4 municipalities who had developed an AM Policy had actively implemented an AM Plan (25%), see Table 2 below.

Table 2. AM Strategy and Planning Survey Questions

Question	Response (%)	
	Yes	No
Does your organization have policies or procedures in place directly related to managing its capital assets?	44%	56%
Has your organization implemented an Asset Management plan or program?	25%	75%
Are your organization's Asset Management Policy, Strategy or Plans publicly available?	6%	94%
Does your organization have a leader or champion responsible for Asset Management?	31%	69%
Does your organization apply a Level of Service or consider Service Demands when making capital asset decisions?	31%	69%
Does your organization use identified service levels to establish funding levels when setting budgets?	6%	94%

The open-ended questions resulted in two topics emerging, both emphasizing the lack of prioritization on asset management. The first topic to emerge, is associated with how strategic AM decisions are made. Survey results indicated that individuals responsible for municipal AM had very few clear guidelines to determine asset maintenance or priority. AM decisions were primarily based on need, safety, funding, political interest, or the decision of Council and lacked a formal policy or plan to support which assets were to be maintained or replaced. Survey results indicated that AM decision-making was primarily lacking in the municipalities that did not have AM policies or plans.

The second topic that emerged was one of roles, responsibilities and an AM champion. When asked if the organization had a leader or champion for AM 69% responded that they did not. Similarly, the open-ended questions captured responses identifying the lack of AM leadership and the need for assigned responsibility and direction from senior management as seen in Table 3.

Table 3. Open-ended Survey Responses

AM Leadership Responses
The other challenge was senior executive buy-in. Reorganizing positions and job duties requires support from the CAO, directors and managers and we are just not there.
Although the executive supported the idea, it was difficult for the team in the beginning. It wasn't until the team approach started to show results that management really started buying in and started to champion the cross-department approach.
Our District struggles with the lack of management commitment to asset planning.
Getting everyone together to discuss the issue has been a challenge.
It is not coordinated overall.
Asset management is not officially coordinated in any way. We recognize the need to start addressing our capital asset requirements but have not moved forward in any significant way.
There is no point person or department taking responsibility for asset management at the District. It is difficult to get traction on this in my department, just not a priority.
Shortage of staff to work on it, and no budget allocation to support it, yet AM is identified as an important undertaking we should be working on off the sides of our desks.

Theme 2: Business and Organizational Approach to Asset Management

Based on the conceptual model, asset management business and organizational elements include the functions required to perform asset management such as day-to-day departmental operating procedures and financial reporting. The survey questions in this section focused on PSAB 3150 reporting practices and AM data collection for purposes of AM financial reporting.

Survey results indicated that 81% of municipalities do not use a standardized centralized process for capturing and reporting TCA information. As a result, individual departments had developed individualized practices that may not align with overall organizational needs and often resulted in inconsistent data collection and inefficient manually intensive reporting procedures.

Thirteen municipalities reported collecting and updating TCA data for financial purposes once a year. Generally, this took place during the annual budget cycle when departments were preparing

operational and capital budgets for the up-coming year. One municipality reported collecting and updating TCA data quarterly, and another bi-annually.

While the majority of municipalities did not have standardized reporting practices, 94% responded they use some form of manual or electronic TCA data capturing for purposes of financial reporting. One municipality identified they had made no advances in capturing TCA data with either manual or electronic methods and not a single municipality responded that they were using fully established electronic PSAB reporting procedures. The majority of municipalities indicated they had some method of reporting PSAB TCA data ranging from minimally established manual methods to some established methods using both manual and electronic data collection and reporting. Table 4 represents the survey answers where 50% of respondents indicated both manual and electronic procedures are used at a minimum level.

Table 4. Levels of PSAB Reporting

What level of PSAB 3150 reporting has your organization achieved?	Responses
No achievement has been made	1
Minimal with manual processes for capturing and reporting asset data	1
Minimal with electronic processes for capturing and reporting asset data	1
Minimal with both manual and electronic processes for capturing and reporting asset data	8
Some established procedures with electronic procedures	4
Some established procedures with both manual and electronic procedures	1
Fully established electronic procedures	0

Municipalities were asked to identify which departments were responsible for capturing capital asset acquisition/disposal data as well as depreciation and replacement values. Nine of the survey respondents reported it was the responsibility of each department to capture and report on their TCA acquisitions, disposals, depreciation and replacement values. Other municipalities stated they rely on the Finance and Accounting departments to collect, compile and track TCA acquisition, disposal, depreciation and replacement values as shown in figure 4.

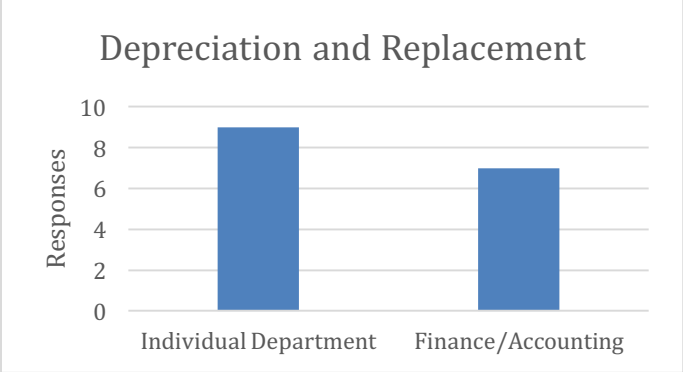

Figure 4. Department Responsible for TCA reporting

Two of the smallest municipalities surveyed, indicated having the Engineering and Public Works departments collect and report on the acquisition and disposal of capital assets as shown in figure 5.

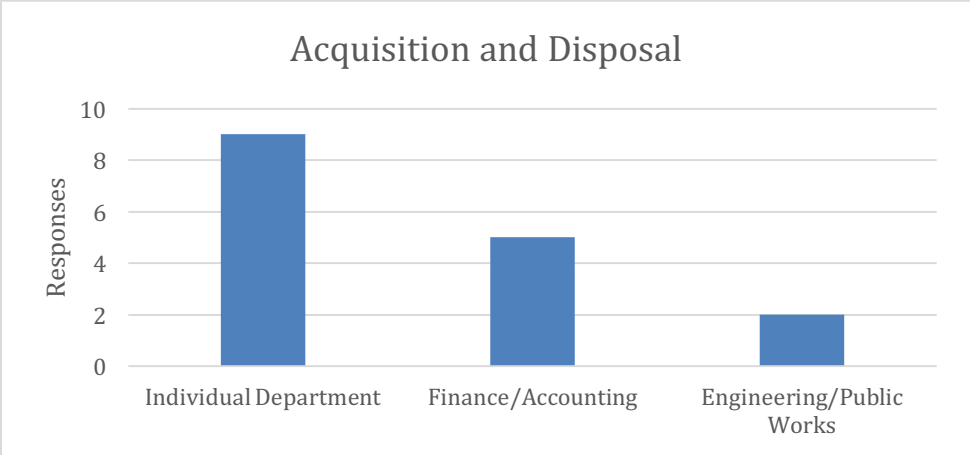

Figure 5. Department Responsible for Acquisition and Disposal reporting

The survey included two open-ended questions inquiring about accounting process changes brought about by the introduction of PSAB 3150. Each municipality was asked how their accounting practices have changed to conform with PSAB 3150 and to identify what were the next steps in their TCA reporting processes. Three municipalities replied they did not have the information available to answer the question and were unsure what changes the Finance Departments may have made to comply with PSAB 3150.

The majority of municipalities that responded, indicated they had changed current accounting processes to adapt to the new reporting requirements. The degree and impact of these changes ranged from a complete accounting practice redesign including changes to departmental level reporting to very minimal changes applied only within the accounting department. Overall survey responses indicated all municipal accounting departments have made some form of procedural and reporting adjustment as a result of PSAB 3150, as identified in Table 5. Often the changes within the accounting departments resulted in operational work flow changes at the department level as well.

Table 5. Open-ended Survey Responses

PSAB 3150 Reporting Responses
We have had to completely redesign our accounting practices.
Introduced new procedures for collecting the information needed at year end. Mainly meet with the departments and record the PSAB requirements such as end of life and current values for assets.
Departments now have to report their asset information in more detail at year end.

Haven't changed any procedures other than accounting tracking assets.
Finance has had to make the biggest changes due to the new accounting requirements. This has had an impact on how the departments need to submit reports to Finance. Departments are now asked for information on assets, such as depreciation which was not required in the past. I am not sure how exactly Finance has had to change their procedures.
A number of accounting process have been augmented to include TCA reporting.
We have created a new TCA reporting spreadsheet and ask the divisions for their TCA information to include in the report.
Ideally we would like to capture all TCA data in an integrated financial system. Currently our finance application and asset management tracking Cityworks are on separate systems that are not integrated.
Finance wants each department to start tracking assets in greater detail. Finance is putting a tracking spreadsheet together and we are to start collecting the additional information in 2015.
The Finance Department has no plans to change the current reporting processes. Accounting manages the reporting for auditing. They let the departments know what new information is required. I have noticed a change in how each department is to report their assets, we have regular meetings to review with the accounting staff.
We are planning to centralize our reporting of assets. Currently it is departmental based.
Next steps are to move to a work order system for assets and then, hopefully, purchase and implement a full asset management module.

Theme 3: AM Data and Information Management

The third theme to emerge focused on the management of capital asset data, information and documents. This theme correlates to the Asset Lifecycle component of the conceptual model and explores the day-to-day procedures used to track TCA data for the purposes of acquisition, operation, maintenance, and disposal.

The survey consisted of thirteen Asset Lifecycle questions which formed the largest component of the survey. The objective of this component was to identify how smaller municipalities are tracking and using their AM data to address the six "whats" of asset management (NRCC, 2003). As previously discussed, the six "whats" focus on an asset's lifecycle and provide a starting point for municipalities to better understand what assets they own and how the assets are managed.

- What do you own?
- What are your assets worth?
- What is deferred?
- What is its condition?
- What is the remaining service life?
- What to do and when to do it?

Survey participants were asked to identify what tools are used to track inventory, record capital asset values, and assess remaining service life. Responses show the majority of municipalities use spreadsheets for all of the above activities and the next largest group uses a combination of methods, including financial systems, MS Word and spreadsheets. No survey participant

identified using manual methods for tracking asset values. Figure 6 shows the methods of AM data management used by smaller municipalities.

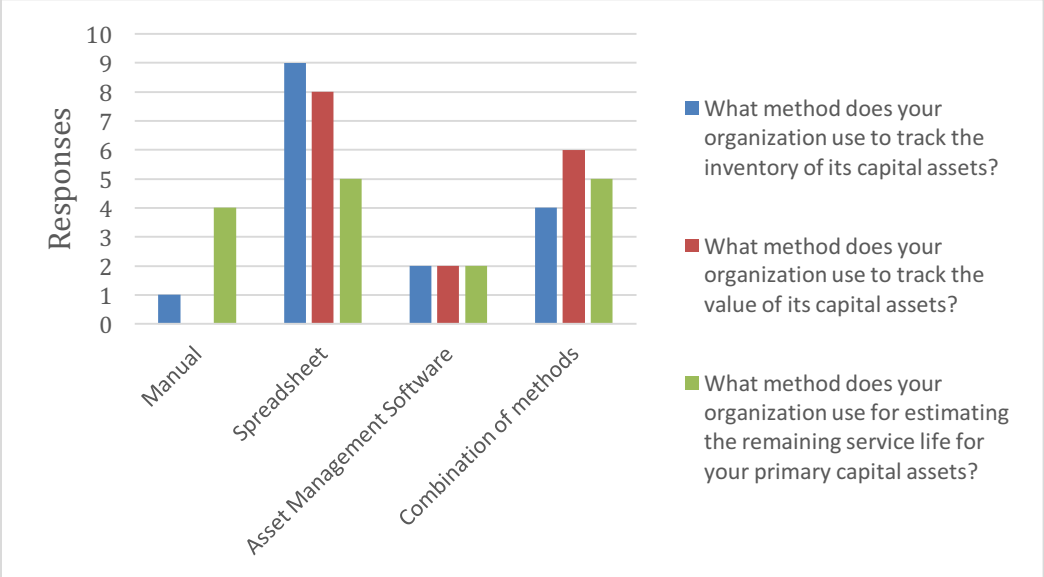

Figure 6. Methods of Capital Asset Data Management

When on-going asset condition monitoring is routinely performed and documented the output can lead to improved estimates of remaining service life and more informed decisions. The majority of respondents (88%) indicated they performed on-going asset condition monitoring, although they did not indicate how often they performed the work, 75% stated they performed the work on a departmental level and do not follow standardized corporate monitoring procedures. Two municipalities responded they follow centralized corporate processes for asset monitoring with one municipality performing the work centrally and the other on a departmental level.

When asked how the organization estimates an asset's future service demand 13 municipalities responded that they do not estimate future service demand, and have no procedures in place to make these estimates. The other 3 municipalities indicated they have processes in place to estimate an asset's future service demand, however these estimates are based on historical and current knowledge of the asset and not necessarily a formalized or data driven approach.

The open-ended survey questions attempted to identify how asset data is captured, what operational and business processes are in place to manage asset information, who is responsible for the organization's asset data, and how is asset data and information used to make organizational wide decisions. Responses to these questions brought forward a number of sub-themes, the three dominant sub-themes are listed below and detailed responses are captured in Table 6.

- Data/system standardization and integration, municipalities had no standardized documenting procedures across the organization and inability to share data across departments.
- Long-term employees retain information, resulting in undocumented information and data.

- Lack of resources to perform most aspects of asset management.

Table 6. Open-ended Survey Responses

Sub-Theme	Findings
Data/system standardization and integration	Ideally we would like to capture all TCA data in an integrated financial system. Currently our finance application and asset management tracking Cityworks are on separate systems that are not integrated.
	Currently we depend on each department submitting information on their assets. In the past each department reported in different ways, but with the formation of the AM team we are standardizing on how the information is captured
	We have an asset registry that contains asset data. The registry is used to assist in decision making and allocation of budgets. Maintenance and replacement is flagged in the registry, and is dependent on a number of factors including usage, safety, cost, return on investment, etc.
	We still have a long way to go to bring all the departments into a common planning approach. We are finding that asset management really needs to include all departments. Our engineering department is responsible for asset management and they focus only on capital assets that engineering works on.
Undocumented knowledge	Experience and knowledge of the staff and it is recorded on paper forms and entered into Excel later.
	Our biggest challenge is the staff maintain most of the information through years of experience and not many details on capital assets are documented.
	Employees here have served the city for a very long time and have the experience to manage assets in their department
	Maintenance deferral is decided by the staff who know the history and have the experience with the gear and infrastructure.
Resources	AssetMAXX tracks maintenance on assets, but only if the information has been entered. Engineering is backed up with trying to get the data entered into the software.
	Public Works maintains a condition inventory of all PW capital assets. Depending on the asset, the information about each asset is updated when we can get to it. Some assets are monitored and the condition is recorded annually, others not for several years.

Theme 4: Organizational Change

The final theme is Organizational Change and directly relates to the asset management culture of an organization. The conceptual model includes both change management and communication as components of AM Culture, where both are required to advance asset management planning.

Although there were no specific survey questions directly related to managing AM change or culture, responses to other questions included comments about organizational change, or lack thereof. The most informative responses, regarding AM change, came from the following two

questions:

- If your organization has implemented an AM plan what has proven to be the most effective component of the plan?

- What challenges were presented in the implementation of your organization's asset management plan?

The responses to these two questions identified the successes and challenges organizations have had with implementing AM in their organization. There were no comments or responses indicating failure or abandonment of overall AM plans or changes.

In total, there were 20 responses identified with organizational change. Survey comments varied widely, from municipalities who had no current intention to develop an AM plan and would continue to perform asset management as "usual" to municipalities who have developed AM policies, plans, and teams. Table 7 highlights the comments made by survey respondents with regards to asset management changes in their organization, the responses have been arranged by comments indicating the least amount of change to more significant changes within an organization.

Table 7. AM Organizational Change Responses

AM Organizational Change Status	Comments
No Significant Change	No plan has been implemented and the municipality has no current plans to develop a plan. Assets are managed as they always have been.
	We haven't changed any procedures other than requesting depreciation values from the department managers. We are now reporting on TCAs.
	The city has no formal asset management plan each department (we are a very small municipality) manages their own projects.
	Assets are managed the same way they have been or years. City departments manage their own assets individually.
	Again, each department monitors their own assets and the departments each use their own methods. There is no one process we follow.
	The Finance Department has no plans to change the current reporting processes.
Some Change	It is not officially coordinated in any way. We recognize the need to start addressing our capital asset requirements but have not moved forward in any significant way.
	I have noticed a change in how each department is to report their assets, we now have regular meetings to review with the accounting staff.
Significant Change	The AM team has put in place the process and tracking information required by each department.
	Currently we depend on each department submitting information on their assets. In the past each department reported in different ways, but with the formation of the AM team we are standardizing on how the information is captured.

Survey respondents noted that organizational changes resulting from implementing asset management planning had proven successful in bringing departments together around the issues. Some of these same respondents observed that bringing people together to work on asset management had also been their biggest challenge to planning and moving forward. Responses to the success and challenges to implanting AM planning are listed in Table 8.

Table 8. AM Planning Successes and Challenges

	Responses
Successes	Asset Management planning has resulted in all departments having to work together.
	Having an assigned group of people from each department to deal with asset management as a team. The team has been working together for about a year which has been very successful.
Challenges	Getting everyone together to discuss the issue has been a challenge.
	We still have a long way to go to bring all the departments into a common planning approach. We are finding that asset management really needs to include all departments.
	The biggest challenges were getting the departments to work together on managing assets.
	Developing business processes around AM was a big hurdle. We are still defining the processes we need and constantly refining the existing ones

6.2.2 Survey Findings Summary

In summary, four themes emerged from the survey findings. These themes focused on the business strategies, processes, data management and change management of an organization's asset management planning. Overall, the majority of smaller BC municipalities do not have asset management strategies, policies, or plans in place nor do they have clear guidelines or decision making processes established. In addition to the lack of AM guidelines, the survey findings show that there are few organizations who have an AM champion and most lack the leadership required to plan and implement an AM plan or strategy. The survey also found that the majority of municipalities had substantial asset lifecycle monitoring and recording practices in place. Perhaps, the most significant finding is the recurring idea that bringing about workplace changes, in a smaller municipality, is a challenge throughout the organization.

7.0 Discussion

The objective of this discussion is to highlight and summarize the report's most significant findings, identify how they integrate with the literature, and review their alignment with the proposed conceptual frame.

7.1 Departmental vs. Centralized Asset Management (AM Integration)

The most significant finding from the survey data was the majority (88%) of smaller BC municipalities that responded performed asset management in a departmental or "siloed" approach. In support of this finding, a majority (75%) of municipalities indicated they did not have an AM plan or program in place. The survey findings echoed the current AM planning status of the Township as discussed in the expert interview findings. Overall this is not a surprising finding, as it is well documented that smaller municipalities struggle with formalizing and centralizing asset management practices due to the limited availability of resources for planning and executing such work. Municipalities are not only challenged with available resources, but also with bringing about significant organizational change to successfully adopt new practices around asset management.

Traditionally, over the past half century, the focus of asset management has primarily been a maintenance-centric activity where cities have relied on their Engineering and Public Works departments to take responsibility for capital assets. More recently, since the early 2000's, asset management has taken on a role where business leadership and councils have focused on aligning capital asset planning with broader initiatives across the organization. With a broader objective in mind, asset management has evolved into a strategic component of municipal investment, service provision, and long-term planning.

In order to achieve a strategic position for asset management, where decisions are not made in isolation, the literature identifies a need for municipalities of all sizes to take an integrated approach to managing capital assets. There are many approaches a municipality can take towards moving to an integrated AM business model. A common starting point within the literature is the development of an overall AM strategy. The AM strategy clarifies the AM governance structure and the municipality's overall AM objectives, setting the direction for AM within the organization and communicating to the organization the priority of asset management. Without a recognized strategy it is difficult for an organization to have a cohesive and accepted AM approach.

Supporting the overall strategy are the organizational policies, and departmental plans and procedures. The majority of survey respondents (56%) indicated their organizations do not have AM policies and 75% responded they do not have AM plans or programs established. The lack of AM policies and plans indicates asset management has not become a priority for the organization and is currently not part of the organization's overall business strategy.

The expert interviews confirmed that AM practices are not centralized, nor consistent across the Township. Similarly, the survey found 81% of respondents do not have centralized data collection or reporting standards, suggesting these municipalities do not operate under an integrated AM approach. As identified in the literature, the key component of AM integration is to have all departments aligned in business processes, reporting methods, standardized data capture, cross departmental communication, and sharing of information. Cooksey, et al (2011) refers to this integration as the "best way of doing [AM] business" and goes beyond "just a set of practices and processes".

Both the expert interviews and the survey responses identified the majority of organizations used manual data collection methods and rely primarily on spreadsheets for storing and managing AM data and information. Neither of these methods is effective for data and information sharing,

within a department or across an organization, nor do they lend themselves to data integration with other systems such as an asset management or geographical information system (GIS).

Halfawy's (2008) research examines the challenges of integrating municipal asset management and observes that it is "the desire to implement efficient and optimized infrastructure management strategies" that has brought about the need for adopting an integrated AM approach. Based on the expert interviews and the survey responses, smaller BC municipalities are performing AM in a de-centralized model. Although this model by itself is not a contributor to less effective asset management, the absence of an underlying AM strategy, combined with the lack of governance, incomplete departmental AM plans, inconsistent business processes, and inaccessible AM data and information has resulted in organization-wide decisions being made in isolation and the inability to align AM with organizational objectives.

It is because of the importance of the business and system integration component that the conceptual model includes integration within the organization's AM culture, spanning departments and levels of responsibility.

7.2 AM Change Management

Managing change, expectations, and perceptions is perhaps the most important aspect of implementing an asset management program. As Brunetto et al (2014) and Stapelberg (2006) observe, it is the role of the employees that is the most critical part of a successful AM strategy and therefore managing the introduction of new work concepts and practices must consider the employees' ability to adapt to such work-place changes. Therefore, transforming an organization from a departmentalized "silo" managed approach to an integrated organization-wide approach will depend on the organization's culture and its ability to manage change.

This research project found that although the Township has many "siloed" AM processes and systems, the expert interviews revealed that the departments do work closely together and have established some informal methods in which to remove the departmentalized nature of managing assets. The recognition of a more integrated approach and the early steps the Township is taking towards organizational-wide asset management provides a solid foundation for establishing more formal AM practices and introducing an AM culture shift at the Township.

It is because of the importance of the change management component that the conceptual model includes the idea of communication and change management across departments at all levels (governing, strategic, tactical) as well as the inclusion of communication and change management through all levels of the organization: elected representatives, executives, managers, and staff.

7.3 Asset Management Governance

The necessity for an organization to take a strategic approach to asset management, is a common theme within both the academic and industry literature. Tywoniak (2008) identifies asset governance as the guiding body that defines strategic asset management, providing policy structure, transparency and accountability for implementing asset management within an organization where governance and strategy go hand-in-hand.

With regards to the Township, although they have an existing Tangible Capital Asset/AM policy further governance structures are required to advance their AM planning. The survey illustrates a similar situation for the majority of smaller BC municipalities, as 75% do not have an AM plan or program and 56% do not have an AM policy.

Research done by Brunetto (2014) concludes that a lack of AM governance often results in unclear AM objectives and goals throughout the organization, leading to departments performing AM within their own scope and understanding of the AM goals. Survey responses support Brunetto's statement as many respondents identified AM governance as an area requiring further clarification. Specifically, responses included the need to have a formal AM structure or program, clarity on which business unit owns AM, identification of departmental AM responsibilities, and the need for an AM decision making process and body.

Although the interviews and survey questions did not specifically address AM governance, 69% of survey respondents stated they did not have an AM leader or champion. It should be noted that the municipalities that had an AM leader also had established AM policies and procedures. Perhaps having the role of an AM champion gave more legitimacy or priority to establishing AM procedures, or a champion may have been the additional resource needed to advance AM initiatives. The role of an AM champion was not explored in this research and therefore it cannot be determined if having an AM champion impacted an organization's ability to develop AM policies, procedures or practices.

7.4 Institutional Asset Management Knowledge

Research shows that municipalities that have documented asset inventories and know the condition and value of their assets are in a better position to make informed financial decisions about their capital assets overall. The National Research Council of Canada (2003) prescribes an AM approach based on asset lifecycle and the six "whats" of asset management, whereby a municipality would know: what assets they own, the asset's value, the condition, when to defer asset maintenance, when to replace an asset, and knowing the remaining service life. All of which contribute to an organization's overall knowledge of their assets. The survey findings show that the majority of municipalities do not have well documented asset records or asset registries and do not maintain current information on the six "whats" of an asset's lifecycle.

Two themes emerged in the survey findings with regards to AM data and information management. The first theme captures the need for data and business systems integration. Although the majority of survey respondents indicated they use electronic formats for tracking and recording capital assets, it is clear that not all electronic files are up-to-date nor are they available to those that require access to the data. Several municipalities, including the Township, are unable to share electronic AM data due to the stand-alone and departmentalized systems that are in place.

The second theme deals with the amount of AM information and data that is undocumented. Both the survey respondents and Township managers indicated there was substantial in-house AM knowledge that resided with a long-time employee's experience and was undocumented, resulting in a high risk of losing the information should the individual leave the organization. Similar to the inability to access common AM data across an organization due to departmentalized systems, undocumented knowledge creates barriers to data and information access for other departments and municipal decision-makers. Halfawy, Vanier, and Froese (2006) emphasis in their AM data model and interoperability research that efficient management of assets depends on the "ability to efficiently share, exchange, and manage asset life-cycle information." The critical nature of accessible AM data and information is recognized in many AM frameworks as one of the biggest operational challenges facing municipal Engineering, Public Works, and Finance Departments (Felio, 2014; Institute of Asset Management, 2012; AMBC, 2010; Infraguide, 2005).

8.0 Recommendations

This paper outlines the requirements for developing an Asset Management Program within local government. Based on the findings from the expert interviews and the provincial survey a broad overview of the current state of asset management in smaller BC municipalities was identified. The interview findings provided an understanding of the Township's AM practices and areas for improvement, specifically the need for clarifying the AM governance structure, roles/responsibilities, AM standardization around documentation, and reporting processes. Similarly, the survey findings reflected the Township's AM challenges and identified the need for improved business strategies, processes, data management and change management as the main priorities.

In response to the challenges, this section makes four recommendations that could be considered when developing and implementing an AM program at the Township of Esquimalt.

Recommendation 1: Governance and Strategy

It is widely acknowledged that AM is a corporate responsibility and requires support from the CAO and Directors. Senior leadership oversight would ensure AM policies, strategies, and departmental plans are in place and followed. Identifying an asset management champion could provide the necessary accountability and guidance required to carry out the Township's planning, implementation and on-going improvement of an AM program. In many smaller and mid-sized BC municipalities, where capacity is limited, this role is often performed by a Director or a Sr. Manager.

One of the first deliverables of an AM champion could be the development of an organization-wide AM policy. Although a TCA policy is in place, an overarching AM policy would provide a framework for making all AM decisions and would provide guidelines to enable further AM development such as strategies and plans. In addition to the AM policy, the development of an organization-wide AM strategy would provide the operational guidance needed to support departmental plans. The AM strategy would consider the alignment of new and on-going capital costs with the Township's strategic plan and service level commitments, and would provide the specific, measurable, and time-bound objectives for departments to follow. Taking the first steps of identifying an AM champion and developing an AM policy followed by an AM Strategy would provide the Township with a solid AM foundation for the entire organization to build upon and receive guidance from. It is acknowledged that finding the resources to develop and implement new policies and strategies is beyond the Township's current capacity and therefore, the Township's AM program could be designed in incremental steps.

Recommendation 2: Business Integration

One of the biggest challenges municipalities have faced when planning and implementing an AM program have been to break down the departmental silos and create cross-departmental teams. The role of the Township's AM champion could include defining the asset management roles and responsibilities within the departments as well as leading the strategic component. Setting the tone for inter-departmental cooperation, whereby ensuring departments are working together in order to develop and implement the AM strategies, policies and plans is a key driver for a successful integrated AM program.

At the Township there is a need to not only integrate departmental workplace teams but also to integrate corporate, financial, business, technical and budgetary planning for infrastructure assets. Identifying the steps to achieve this integration could be incorporated into the AM Strategy, although a separate roadmap may be beneficial. This work would be dependent on a work-flow and business process review, examining the current processes and work-flow between the business units and identifying efficiency gains and opportunities for new processes. The integration of some or all of the capital asset data and information processes would provide a consistent and more efficient data and information sharing approach. For example, standardizing on a common asset registry for cataloguing and tracking asset details would provide less duplication and improved access to asset information.

Perhaps the most critical aspect of data and information integration and management is the need to capture the undocumented infrastructure asset information that is part of individual employee's personal knowledge. The risk of losing such a vast amount of knowledge with regards to

municipal assets should itself be a driver to expedite standardized AM data capture and records management.

Recommendation 3: Capacity

Resource capacity was identified as the biggest AM challenge at Esquimalt, where asset management is being performed "off the side of the desk" by staff and mangers in all departments. The general outlook was that AM would not be able to move forward until it is given a higher priority and dedicated resources.

The challenge of resource capacity can be partially addressed through both governance and business integration as identified in Recommendations 1 and 2. It would be through the leadership of an an AM champion and guided by the specifics of the AM strategy, that the importance of AM would be defined and the organization's commitment outlined. This structure would provide staff and managers with clear expectations around AM in the organization and help define the roles and responsibilities. The need for AM resources, as identified by the Township's interviewees, were not necessarily intended to be net new positions but rather a re-alignment of current roles and responsibilities. There was also a desire to have individual departments work closer together on capital planning and asset management projects including a formalized cross-department team of AM representatives. This approach could also be supported through a governance structure and a well-defined AM strategy.

In addition to leveraging the benefits of governance, strategy, and integration to manage AM capacity, the Township could explore additional industry resources available to asset managers. Including professional asset management memberships whereby providing access to experts, working groups, research, and publications. There are many local, provincial, national, and international asset management organizations providing services to their members.

Recommendation 4: Change Management

In order to incorporate new AM practices in an organization and achieve a successful outcome it is important to consider how the proposed changes will be managed. Change management is defined as "the approach to driving adoption and usage so initiatives deliver expected results and outcomes" (PROSCI, 2016). More specifically, change management focuses on understanding how the proposed changes will impact individual people and how they do their work. As stated previously, managing expectations and perceptions is just as important to the success of implementing an AM program as designing the processes and collecting the data. The new work concepts and practices will be carried out by employees and therefore considering the employee's ability to adapt to work-place changes will be critical.

9.0 Conclusion

The purpose of this study was to assist the Township of Esquimalt to better understand the requirements for developing a municipal asset management program and assist in future AM planning and decision-making. The research was based on the findings from municipal managers and AM experts from across British Columbia as well as a review of academic and industry literature. This study identified the current state of local government infrastructure asset

management in smaller BC municipalities and discussed the key challenges with regards to implementation and operation of an asset management program. This study also explored how leadership and a strategic approach can impact AM planning and the success of an AM program.

The results of this research should provide municipalities with a roadmap to infrastructure asset management, including the key components to design new and/or re-design existing AM practices. The intention of the roadmap is to assist municipalities in moving their AM programs forward informed by best practices and based on the organization's needs.

References

Amadi-Echendu, J., Ramanyimi, Tshildzi, (2011). Managing public assets towards service delivery compliance. Engineering Asset Management and Infrastructure Sustainability. Retrieved from http://

Asset Management BC (2013). Roadmap case studies report. Retrieved from http://www.civicinfo.bc.ca/Library/Asset_Management/AM_Roadmap/Case_Studies_Report--AMBC--Sept_23_2011.pdf

Badurdeen, Fazleen, Shuaib, Mohannad and Liyanage, Jayantha (2010). Risk modeling and analysis for sustainable asset management. Retrieved from http://link.springer.com.ezproxy.library.uvic.ca/chapter/10.1007%2F978-0-85729-493-7_6

Beauchamp, Tim, (2009). Municipalities on the move. CA Magazine. 142 (7). p.49 – 51.

Betik, Matthew, (2007). Are you ready for…tangible capital asset reporting? Municipal World. Retrieved from http://search.proquest.com.ezproxy.library.uvic.ca/docview/223817460?accountid=14846

Birkbeck, P. (2014). A step-by-step guide to developing infrastructure management plans. Public Sector Digest. Pp. 12-19.

Buhr, Nola, (2012). Accrual accounting by Anglo-American governments; motivations, developments, and some tensions over the last 30 years. Accounting History. Retrieved from http://ach.sagepub.com/content/17/3-4/287

Canadian Institute of Chartered Accountants (2007). Guide to accounting for and reporting tangible capital assets. Retrieved from http:// http://www.frascanada.ca/standards-for-public-sector-entities/resources/reference-materials/item14603.pdf

Campos, M.A. Lopez, Marquez, A. Crespo, (2010). Modelling a maintenance management framework based on PAS 55 standard. Quality & Reliability Engineering International. Retrieved from (wileyonlinelibrary.com) DOI: 10.1002/qre.1168

City of Merritt (2011). Asset Management Case Study. Retrieved from http://www.civicinfo.bc.ca/Library/Asset_Management/AM_Roadmap/Case_Studies_Report--AMBC--Sept_23_2011.pdf

City of Powell River, (2012). Council Policy 246; Asset Management Policy. Retrieved from https://powellriver.civicweb.net/Documents/DocumentDisplay.aspx?Id=2505

City of Powell River (2011). Asset Management Case Study. Retrieved from http://www.civicinfo.bc.ca/Library/Asset_Management/AM_Roadmap/Case_Studies_Report--AMBC--Sept_23_2011.pdf

Cooksey, S.R., Jeong, D., Chae, M.J. (2011). Asset management model for state departments of transportation. Journal of Management in Engineering. July 2011. Retrieved from:

Corporation of the Township of Esquimalt (2007). Purchasing and Disposal Policy. Unpublished.

Corporation of the Township of Esquimalt (2010). Tangible Capital Asset Policy. Unpublished.

Corporation of the Township of Esquimalt (2012). 2012 Financial Statement. Retrieved from: https://www.esquimalt.ca/township-esquimalt-2012-annual-report

Dachis, Benjamin and Robson, William, (2011). Holding Canada's cities to account: an assessment of municipal fiscal management. C.D. How Institute Backgrounder. Retrieved from http://search.proquest.com.ezproxy.library.uvic.ca/docview/906523117?accountid=14846

Dawe, T. (2014). Asset Management. Public Sector Digest. Winter 2014. pp 4-5.

District of North Vancouver (year). Building on PSAB 3150: assessment of tangible capital assets. Retrieved from http://www.civicinfo.bc.ca/Library/Asset_Management/Presentations/Changing_Culture_of_Asset_Management/Building_on_PSAB_3150_Assessment_of_Tangible_Capital_Assets--North_Vancouver--January_24_2011.pdf

Edirisinghe, R., Setunge, S., Zhang, G. and Wakefield, R. (2010). Council Building Management Practices, Case Studies and Road Ahead. 2010 AM Conference paper.

Félio, G., (2014). Canadian infrastructure report card. Retrieved from http://canadianinfrastructure.ca/en/index.html

Fowler, Kim, (2010). Local government land use and asset management planning in BC: proposed sustainable service improvements. Retrieved from http://www.waterbucket.ca/rm/sites/wbcrm/documents/media/165.pdf

Fowler, Kim, (2010). AM Presentation March 2010. City of Victoria: planning strategies for asset management. Retrieved from http://apwcts.rguidelibrary.com/Library.spr#book

Government Finance Officers Association of British Columbia, (2006). Tangible Capital Assets Issue Paper 1. Retrieved from http://www.gfoabc.ca/Tangible-Capital-Assets/PSAB_ISSUE_PAPER_1

Haider, Abrar. (2009). A roadmap for information technology governance. Proceedings of the 4th World Congress on Engineering Asset Management. Retrieved from http://link.springer.com.ezproxy.library.uvic.ca/chapter/10.1007/978-0-85729-320-6_83

Halfawy, M. R. (2008). Integration of municipal infrastructure asset management processes: challenges and solutions. Journal of Computing in Civil Engineering, *22*(3), 216-229. doi:10.1061/(ASCE)0887-3801(2008)22:3(216)

Halfawy, M. R., Vanier, D. J., & Froese, T. M. (2006). Standard data models for interoperability of municipal infrastructure asset management systems. Canadian Journal of Civil Engineering, 33(12), 1459-1469. doi:10.1139/L05-098

Hastings, Nicholas (2010). Physical Asset Management. Springer London Dordrecht Heidelberg New York.

Hicks, Robin, (2010). AM Presentation March 2010. Title: Financial management challenges for asset management. Retrieved from http://apwcts.rguidelibrary.com/Library.spr#book

Hipkin, Ian, (2001). Knowledge and IS implementation: case studies in physical asset management. International Journal of Operations & Production Management. Retrieved from http://www.emeraldinsight.com.ezproxy.library.uvic.ca/doi/full/10.1108/01443570110404763

Infraguide, (2005). Federation of Canadian Municipalities. Retrieved from htpp://www.fcm.ca/home/programs/past-programs/infraguide.htm

Infrastructure Canada (2009). State of performance of Canada's core public infrastructure project. Presentation at Asset Management – Moving Forward, Vancouver, BC. October 16. 2009. Retrieved from http://commons.bcit.ca/infrastructure/files/2012/09/susan_oconnor.pdf

Institute of Asset Management (2012). Asset management an anatomy. Retrieved from http://www.transco.ae/ISO55000/PDF/Conceptual%20Model/assetmanagement-ananatomyv11[1].pdf

Institute of Asset Management (nd). PAS55 assessment methodology. Retrieved from: https://theiam.org/products-and-services/pas55-methodology

Kaganova, Olga. (2012). Valuation and pricing of government land and property: a tip of a growing iceberg. Real Estate Issues. Volume 37, Number 1, p. 9 – 16.

Komonen, Kari, Kortelainen, Helena, and Raikkonen, Minna (2006). An asset management framework to improve longer term returns on investments in the capital intensive industries. *Proceedings 3rd World Congress on Engineering Asset Management and Intelligent Maintenance Systems Conference (WCEAM-IMS 2008): Engineering Asset Management – A Foundation for Sustainable Development*.

Local Government Asset Management Working Group (2013). Retrieved from http://www.civicinfo.bc.ca/Library/Asset_Management/Vision_and_Mission/Vision_Mission_Statement--LGAMWG--June_2010.pdf

Mardiasmo, Diaswati and Tywoniak, Stephane and Brown, Kerry A. and Burgess, John (2008) Asset management and governance: analysing vehicle fleets in asset-intensive organisations. In Brown, Kerry A. and Mandell, Myrna and Furneaux, Craig W. and Beach, Sandra, Eds. *Proceedings Contemporary Issues in Public Management: The Twelfth Annual Conference of the International Research Society for Public Management (IRSPM XII)*

McConnell, Hew, (2010). AM Presentation March 2010. Title: Infrastructure challenges in asset management. Retrieved from http://apwcts.rguidelibrary.com/Library.spr#book

Mickelson, T. (2014). Asset management from awareness to action. Exchange newsletter, Local Government Management Association of British Columbia. Retrieved from: http://www.lgma.ca/assets/Resources~and~Publications/Documents/Newsletters/2014~Exchange~Magazine/ExchangeFall2014-web.pdf

Mirza, S. (2007). Danger ahead: the coming collapse of Canada's municipal infrastructure. Federation of Canadian Municipalities. Retrieved from http://www.fcm.ca/Documents/reports/Danger_Ahead_The_coming_collapse_of_Canadas_municipal_infrastructure_EN.pdf

National Research Council of Canada (2003). Infraguide: an integrated approach to assessment and evaluation of municipal road, sewer and water works. Retrieved from http://www.fcm.ca/prebuilt/e-learning/assess_eval_municipal/2_MD_An_Integrated_Approac.pdf

O'Connor, B. (2015). Tips and tactics: making sense of levels of service. Asset Management BC newsletter. 15 ed. Fall issue 2015.

Ouertani, Mohamed Zied (2008). Towards an approach to select an asset information management strategy. International Journal of Computer Science and Applications. Vol. 5, no. 3b, pp 25 – 44.

PROSCI, (2016). What is change management? Retrieved from https://www.prosci.com/change-management/what-is-change-management

Public Sector Accounting Board, (2015). Financial reporting and assurance standards Canada. Retrieved from http://www.frascanada.ca/public-sector-accounting-board/what-we-do/about-psab/index.aspx

Reid, Jason, (2013). Reading the story in public sector financial statements and annual reports. Chartered Accountants of British Columbia. Retrieved from http://blog.bccpa.ca/reading-the-story-in-public-sector-financial-statements-and-annual-reports/

Reid, S., Xerri, M. (2013). The 'state of play' in engineering asset management: towards a conceptual frame. International Journal Engineering Management and Economics. Vol 4. No. 1, 2013.

Royer, Gaetan, (2010). AM Presentation March 2010. Title: Leadership and asset management. Retrieved from http://apwcts.rguidelibrary.com/Library.spr#book

Schraven, D.F.J., Hartmann, A. Bosveld, S. and Dewulf, G.P.M., (2010). Towards policy-driven performance reporting: The Case of Waterway Infrastructure. 2010 AM Conference paper.

Stapelberg, R.F., (2006). Professional skills training in integrated asset management: how to develop and implement the essential organizational asset management functions. 2006 World Congress on Engineering Asset Management conference paper.

Sutton, T., (2014). Building the asset management team. Public Sector Digest. pp 20 – 25.

Treasury Board, Ministry of Finance BC. Retrieved from http://www.fin.gov.bc.ca/tbs/camf.htm

Tywoniak, Stephane and Rosqvist, Tony and Mardiasmo, Diaswati and Kivits, Robbert A. (2008) Towards an integrated perspective on fleet asset management: engineering and governance considerations. *Proceedings 3rd World Congress on Engineering Asset Management and Intelligent Maintenance Systems Conference (WCEAM-IMS 2008): Engineering Asset*

Management – A Foundation for Sustainable Development, pages pp. 1553-1567, Beijing, China

Van der Westhuizen, J., Myburg, J. (2014). Mobile mapping: optimizing total infrastructure asset management. Civil Engineering (10212000), 22(4), 33-36.

Van der Lei, T.E., Wijnia, Y.C. and Herder, P.M. (2010). Towards an asset management framework of asset characteristics, asset environment, lifecycle phases, and management. 2010 AM Conference paper.

Vanier, D.J., (2000). Asset Management 101: a primer. APWA International Public Works Congress NRCC/CPWA Seminar Series "Innovations in Urban Infrastructure" 2000.

Vanier, D.J. (2001). Why industry needs asset management tools. National Research Council of Canada. Journal of Computing in Civil Engineering, v. 15, no. 1, Jan. 2001, pp. 35-43

Vanier, D.J., Newton, L.A., and Rahman, S. (2006). A framework for municipal infrastructure management for Canadian municipalities. National Research Council of Canada, Retrieved from htpp://nparc.cisti-icist.nrc-cnrc.gc.ca/npsi/ctrl?lang=en

Walther, Andrew, (2010). AM Presentation March 2010. Title: AM – Information Systems. Retrieved from http://apwcts.rguidelibrary.com/Library.spr#book

Wijnia, Y., de Croon, J., and Liyanage, J.P. (2011). Towards an asset management reference model: basis for a unified approach. Engineering Asset management. Retrieved from http:// Book chapter. Engineering Asset Management, 2011. Publisher: Springer-Verlag, London, 2014. Page 331-338.

Wiseman, Roy (2010). The municipal reference model: smarter government by design. Retrieved from http://www.iccs-isac.org/en/pubs/manicipal_reference_model.pdf

Worktech Inc. (2013). Response to the Corporation of the Township of Esquimalt - An Integrated Service Management Solution. Unpublished.

Younis, Rizwan and Knight, Mark, (2010). A probability model for investigating the trend of structural deterioration of wastewater pipelines. Tunnelling and Underground Space Technology. Retrieved from http://www.sciencedirect.com.ezproxy.library.uvic.ca/science/article/pii/S088677981000098 2

Zeb, J., Froese, T., Vanier, D. (2014). Knowledge enabled tangible capital asset reporting using asset information integrator system in infrastructure management. Canadian Society for Civil Engineering conference paper, 2014.

Appendix A – PSAB Reporting Guidelines

Year End Client Assistance Package

Client: Township of Esquimalt

Below is a list of schedules and information **to be prepared by you and provided to us** upon commencement of audit fieldwork. **We would prefer all material be provided in** digital form (eg. Word, Excel, PDF etc.) **when available. In instances where information is** in hardcopy form, scanned **versions of this material would be preferred. Such digital** information can be **provided to us by Email, and/or external disk drives which we will** provide as necessary.

Reference	Description
G - Tangible Capital Assets and Amortization	
G1	Prepare a continuity schedule of Tangible Capital assets and amortization for the year (Financial statement note format is appropriate).
G2	Prepare a leadsheet of trial balance accounts reconciling to the continuity schedule and financial statements.
G3	Prepare documentation of how amortization was calculated and how additions and disposals were treated.
G4	Provide a summary of disposals throughout the year. Verify that management from each department have been contacted to provide information on disposals of assets in 2012 and assets which are not working or in use anymore and/or that management has verified that all assets assigned to their department are still in operating condition.
G5	Provide a detailed listing of capital additions for the year by project, identifying which additions are still classified as work-in-progress.
G6	Provide a summary of capital projects during the year which were greater than $500,000.
G7	Provide a summary of contributed assets (i.e. roads, sewers, drains, sidewalks, landscaping, etc typically from developers) during the year. Provide detail supporting the costs of these assets such as certified cost estimates, developer actual costs, etc. Include contributed assets which are still under construction.
G8	Prepare documentation regarding the donation process of assets including when the title transfers and how a value is assigned to these assets.
G9	Provide a breakdown of amortization expense by segment for note disclosure

Appendix B – Definitions

Common definitions from the BC Local Government Asset Management Working Group (2010):

Asset - A physical component of a system that has value, enables services to be provided, and has an economic life of greater than 12 months.

Asset Management - An integrated approach involving planning, finance, engineering and operations to effectively manage existing and new infrastructure to maximize benefits, reduce risks and provide satisfactory levels of service to community users in a socially, environmentally, and economically sustainable manner.

Asset Management Plan – a plan which explains what an organization plans to do with its assets with respect to acquisition, maintenance, operation and disposal, and what level of service will be delivered as a result of these activities. An Asset Management Plan is often developed by an Asset Management Strategy or Planning group within an organization.

Asset Management Policy – An AM Policy sets the framework for all AM decision-making within an organization and is the "cornerstone of an organization's approach to AM" (IAM, 2012) and provides the guiding principles which enable further AM development (strategies, plans and programs).

Asset Management Program - An Asset Management Program encompasses all components of asset management including policies, plans, strategies, and asset management lifecycles.

Asset Renewal - Activities to upgrade, refurbish or replace existing facilities with facilities of equivalent capacity or performance capability.

Asset Management Strategy – AM Strategy defines what an organization intends to achieve from its AM activities and should be consistent with the AM policy. An AM strategy includes objectives that are specific, measurable, achievable, realistic and time-bound.

Level of Service - The defined standard for the provision of a particular service. Component of defining these standards include: quality, quantity, reliability, responsiveness, environmental acceptability and cost.

Lifecycle - The life of an asset, from the point when a need for it is first established, through its design, construction, acquisition, operation and any maintenance or renewal, to its disposal.

Lifecycle Cost - The total cost of an asset throughout its life including planning, design, construction, acquisition, operation, maintenance, rehabilitation, and disposal costs.

Tangible Capital Asset – A tangible capital asset is an asset that has a physical form. Tangible assets include both fixed assets, such as machinery, buildings and land, and current assets, such as inventory.

Appendix C – Asset Management Plan Template

Asset Management Plans (AMP) lay out how a group of assets is to be managed over a period of time. The AMP describes the characteristics and condition of infrastructure assets, the levels of service expected from them, planned actions to ensure the assets are providing the expected level of service, and financing strategies to implement the planned actions. Below is an outline of what an AMP could look like, in part based on the Province of Ontario's recommended template:

1. Introduction
   - Documents the assets that are in the scope of the AMP.
   - Explains how the goals of the municipality are dependent on infrastructure.
   - Clarifies the relationship between the AMP and other corporate planning documents.

2. State of Infrastructure
   - Documents the inventory and replacement value of the assets owned by the municipality.
   - Summarizes the physical condition of each asset type.
   - When ready, will also document the state of the services that are provided through the infrastructure systems.

3. Levels of Service
   - Documents the current level at which each service is being provided.
   - Describes what the municipality is measuring to determine how well the current service levels are meeting the target levels established by staff, council or the public.
   - Considers level of service from a customer and a technical perspective.

4. Plan Monitoring and Improvements
   - Summarizes the key asset renewal projects undertaken over the preceding period and highlights specific benefits.
   - Outline any changes that will impact the next round of AMP goals and initiatives.

5. Asset Strategies
   - Establishes 10 year and longer term (50 to 100 year) renewal plans that are based on achieving the target service levels.
   - Includes the infrastructure needs to address future demands, meet new regulatory requirements, and fund the ongoing operation and maintenance activities of the infrastructure systems.
   - Provides a list of asset strategies that the municipality is considering to reduce the cost of renewing infrastructure, reduce the cost to operate & maintain the assets.
   - Discusses procurement methods.

6. Financing Strategy
   - Compares the short term and long term renewal needs of the assets to the available revenues.
   - Provides a strategy to reach a point where the available revenues equal the renewal needs of the assets, such as a long term financial plan.

Appendix D – Expert Interview Questions

Township of Esquimalt Asset Management Expert Interview Questions

The following questions explore two key areas of asset management: 1) Organizational Readiness and Understanding and, 2) Asset Life Cycle Management. The interview questions are based on the National Research Council's Asset Management Framework for Municipal Infrastructure Management (MIM). The first set of questions focuses on Esquimalt's asset management readiness and the final set of questions aligns with the six "whats" of the MIM's asset management life cycle.

- What do you own?
- What is it worth?
- What is deferred?
- What is its condition?
- What is the remaining service life?
- What to do and when to do it?

Organizational Background Questions

The following questions will provide background on Esquimalt's current asset management practices. The interviewees will be experts from different departments within the Township (Finance, Engineering, Public Works, Parks, Recreation, and Information Technology)

1. How are capital assets managed in your department?
    a. Does your department have policies or procedures in place directly related to managing its capital assets? If yes, what are they?
    b. Does your department have a leader or champion responsible for asset management? If not, how is asset management coordinated within your department?

2. How are capital assets managed across departments?
    a. Does your department coordinate with other departments on capital asset management initiatives?
    b. If yes, which groups are involved?
    c. Could the process be improved?

3. What asset management successes and challenges has your department experienced?
    a. What success has your department had with asset management planning or practices?
    b. What barriers does your department face with respect to implementing and maintaining an Asset Management Program at Esquimalt?
    c. What actions would help overcome these barriers?

4. Does your department consider Levels of Service when making capital asset decisions?
    a. Does your department use Levels of Service to establish funding levels when setting budgets? If yes, what is the process?

b. Is there a process for estimating future service demands for your organization's primary capital assets?

5. With the 2009 introduction of new accounting procedures (PSAB 3150) has your department been impacted?
    a. What impact do you believe the implementation of PSAB 3150 will have or already has had on your department's asset management processes or planning?

The Six "Whats" of Asset Management - Asset Life Cycle Management

The following questions will provide departmental data on current asset life cycle practices, these questions align with the National Research Council's Asset Management Framework for Municipal Infrastructure Management.

1. What do you own and where is it?
    a. What core assets is your department responsible for? For example: land improvements, buildings, roads, storm drainage.
    b. What system is used to record these assets? Is the system used by other departments? For example if you use a database is the database accessible to other departments to use?
    c. How do you record the location of your assets? For example, if you are recording spatial data about roads, is it captured in a GIS system?
    d. What asset attributes do you capture? For example: road names, road surface type, vehicle make/model?
    e. If your department does not use an electronic system for recording and tracking assets, how is the information captured and recorded?

2. What are your assets worth?
    a. Do you report annually on an asset's value?
    b. How do you determine the replacement value and the depreciation value of your department's core assets?

3. What is deferred?
    a. If maintenance or replacement of an asset is deferred, how is the deferral decided for that asset?
    b. Does your department track the increased costs of deferring maintenance and replacement of assets?

4. What is its condition?
    a. What process does your department use to assess and classify the current condition of your primary assets?
    b. Does your department perform on-going condition monitoring or rating of your primary assets?
    c. If your department does perform on-going condition monitoring, how is this performed (manually/automatically)?

5. What is the remaining service life?
    a. What process does your department use for estimating the remaining service life for your organization's primary assets?

6. What to do and when to do it?
    a. How does your department decide what assets to invest into maintaining or replacing?
    b. Does your department coordinate with other departments across Esquimalt to make decisions around primary asset maintenance or replacement?

Additional Information

1. If there was one thing that would help you with asset management what would it be?

Appendix E – BC Municipal Asset Management Survey Questions

BC Municipal Asset Management Survey

The following survey questions explore three key areas of Capital Asset Management:

- Organizational Readiness and Understanding
- Accounting Practices
- Asset Life Cycle Management

The survey questions are based on the National Research Council's Asset Management Framework for Municipal Infrastructure Management (MIM). The first set of questions focuses on your organization's asset management readiness, the second set on your organization's accounting practices, and the final set of questions aligns with the six "whats" of the MIM's asset management life cycle.

Organizational Readiness

The following questions will identify what stage of Capital Asset Management your organization is currently at.

1. Does your organization have policies or procedures in place directly related to managing its capital assets?
○ Yes
○ No

2. Has your organization implemented an Asset Management plan or program?
○ Yes
○ No

3. Are your organization's Asset Management Policy, Strategy or Plans publicly available?
○ Yes
○ No

4. If your organization has implemented and Asset Management plan what has proven to be the most effective components of the plan?

5. What challenges were presented in the implementation of your organization's Asset Management plan?

6. Does your organization have a leader or champion responsible for Asset Management?
○ Yes
○ No

7. If your organization does not have an Asset Management Champion, how is Asset Management coordinated across your organization?
8. Does your organization apply a Level of Service or consider Service Demands when making capital asset decisions?

- ○ Yes
- ○ No

9. Does your organization use identified service levels to establish funding levels when setting budgets?
- ○ Yes
- ○ No

Accounting Practices

The following 5 questions focus on your organization's approach to PSAB 3150 reporting requirements.

1. What level of PSAB 3150 reporting has your organization achieved?
- ○ Minimal with manual processes for capturing and reporting asset data
- ○ Minimal with electronic processes for capturing and reporting asset data
- ○ Minimal with both manual and electronic processes for capturing and reporting asset data
- ○ Some established procedures with manual processes
- ○ Some established procedures with electronic procedures
- ○ Some established procedures with both manual and electronic processes
- ○ Established procedures using electronic processes for capturing and reporting data
- ○ No achievement has been made

2. How has your organization changed its accounting procedures to conform with PSAB 3150?

3. If your organization has already put PSAB 3150 reporting processes in place, what are you planning as the next steps?

4. How often is Capital Asset information collected and updated for financial reporting?
- ○ Monthly
- ○ Quarterly
- ○ Bi-Annually
- ○ Annually
- ○ Other, please specify... _____

5. Do all departments use the same process for reporting Capital Asset information for year end accounting?
- ○ Yes
- ○ No

The Six "Whats" of Asset Management

The following questions explore your organization's current capital asset life cycle practices.

What do you own?

1. What method does your organization use to track the inventory of its Capital Assets?
- ○ Manual
- ○ Spreadsheet

- ○ Asset Management Software
- ○ Combination of methods
- ○ Other, please specify... _____

2. Which department in your organization is responsible for capturing Capital Asset acquisition and disposal data?

What are your assets worth?

3. What method does your organization use to track the value of its capital assets?

- ○ Manual
- ○ Spreadsheet
- ○ Asset Management Software
- ○ Combination of methods
- ○ Other, please specify... _____

4. How does your organization determine the depreciation and replacement value of primary capital assets?

5. Which department(s) in your organization is responsible for capturing the depreciation and replacement value of primary capital assets?

What is deferred?

6. How does your organization determine when to defer maintenance or replacement of a primary capital asset?

What is its condition?

7. What process or processes does your organization use to assess and classify the current condition of your primary Capital Assets?

8. Does your organization perform on-going condition monitoring of its Capital Assets?

- ○ Yes
- ○ No

9. If your organization performs on-going condition monitoring of its Capital Assets, how is this performed?

- ○ Performed centrally following an organizational wide common procedure
- ○ Performed centrally following NO organizational wide common procedure
- ○ Performed within each department following an organizational wide common procedure
- ○ Performed within each department following NO organizational wide common procedure
- ○ Other, please specify... _____

What is the remaining service life?

10. What method does your organization use for estimating the remaining service life for your primary Capital Assets?

- ○ Manual process
- ○ Spreadsheet
- ○ Asset Management Software

- ○ Combination
- ○ Other, please specify... _____

11. How does your organization determine when an asset is end of life?

What to do and when to do it?

12. How does your organization prioritize which Capital Assets to maintain, replace, or retire?

13. Does your organization have a process for estimating future service demands for your primary Capital Assets?

- ○ Yes
- ○ No

Thank you for participating in this survey. If there is any other information regarding Capital Asset Management or Public Sector Accounting Board 3150 reporting requirements you would like to provide, your comments are most welcome.

Appendix F – Township of Esquimalt Consultation Matrix

	Public Works	Engineering	Parks and Facilities	Recreation	Fire	Information Technology	Finance
Organizational Background							
How are capital assets managed in your department?	• There are no policies or corporate procedures specific to PW and TCA. • Adheres to Corporate purchasing policy and disposal procedures. • Annual inventory reports are provided to Finance.	• There are no policies or corporate procedures specific to Engineering and TCA. • Adheres to Corporate purchasing policy and disposal procedures. • Annual inventory reports are provided to Finance.	• There are no policies or corporate procedures specific to Parks and TCA. • Staff are certified to maintain facilities, such as refrigeration and swimming pool certifications. • Annual inventory reports are provided to Finance.	• There are no policies or corporate procedures specific to Recreation and TCA. • Recreation Programming doesn't own any capital assets. Owns primarily small physical assets. • Inventory and equipment replacement cycles are documented. • Annual inventory reports are provided to Finance.	• There are no policies or corporate procedures specific to the Fire Department and TCA • Annual inventory reports are provided to Finance.	• There are no policies or corporate procedures specific to IT and TCA.	• Finance has no TCAs. • Responsible for financial reporting of TCAs across the organization. • Management Policy – Tangible Capital Asset Policy No. FIN-03. • Corporation of the Township of Esquimalt – Purchasing and Disposal Policy. • Finance Director is sponsoring the WorkTech project.
How are capital assets managed across departments?	• TCAs are managed within the department and are managed solely by the PW manager.	• TCAs are managed within the department. • No inter-department management of Engineering capital	• TCAs are managed within the department. • Coordinate with other departments such as Engineering and PW. Coordination takes place	• Recreation works with other departments responsible for the procurement, construction,			• Accounting receives annual TCA spreadsheets from each department.

	• No inter-department management of PW capital assets. Other than the vehicle fleet. • Departments work together on capital projects, assets within a project are tracked by individual departments. • There is no central AM committee or body. • PW tenders and procures new assets. • Finance inventories new capital purchases. • Excel spreadsheets are used to record inventory. Autocad is used to record in-ground infrastructure assets. • A Capital Request form is used by the department for large capital requests. This is a corporate wide process.	assets. Other than the vehicle fleet. • Departments work together on capital projects, assets within a project are tracked by individual departments. Engineering generally is responsible for the majority of capital assets. • Excel spreadsheets are used to record inventory. Autocad is used to record in-ground infrastructure assets. • Engineering works with the Finance Department to maintain and update the "asset bank" (series of spreadsheets).	primarily through email. • There is no central AM committee or body. • Parks will tender and procure new capital assets. • Finance inventories new capital purchases. • Excel spreadsheets are used to record inventory, detailed information including pictures of district parks. • Inventory information is collected manually on forms, printed and filed into binders. • A Capital Request form is used by the department for large capital requests. This is a corporate wide process.	maintenance, and replacement of capital infrastructure. • A Capital Request form is used by the department for large capital requests. This is a corporate wide process.			• Capital decisions are made through the budget process. • Capital budget requests are made once a year. • Capital requests are approved in May. • Disposal forms are submitted by each department throughout the year. This is not a consistent process. Notice of disposals often only come at year end. • Unclear what role in AM Finance plays aside from TCA reporting.

What asset management success and challenges has your department experienced?	• Not all assets are tracked and recorded. Complete inventory of some assets are only known to one person and not documented. • Not all past practices are not documented. • Challenging to determine total cost of a capital project, specifically labour. Time sheets are hardcopy and input into the system takes time. • New WorkTech system will track time/labour. Challenge is WorkTEch will not have historical data, only new data. • Challenge to plan and forecast without hearing form other departments. TCA planning meetings would be helpful.	• Engineering has records for capital assets starting in 2008. • Challenge is to get the bulk of paper records into digital format.	• Parks is in the early stages of AM planning, first step has been to have accurate and current inventory. Information is collected manually on forms, printed and filed into binders. • Identifying and implementing AM practices is limited by internal (organization wide) resources. • Work backs up across the organization. • Inventory on parks and facilities is performed once every 5 years. There is no dedicated resource to perform updating the inventory.	• Formalizing documents and the flow of documents between departments would be helpful. There is no formalized method for documenting assets. • Keeping all staff involved and responsible for evaluating equipment in their area has been beneficial. • Staff take responsibility and communicate regularly about equipment replacement and repair.			• Challenges bringing WorkTech into the organization. Work flow has not been considered. • Each department needs something different tracked for overall AM. • Clear identification of who in each department is responsible for AM would be This is not helpful. Perhaps a working group. • Accounting uses multiple spreadsheets to track TCA information. This method is not scalable or accessible. • Accounting has to consult many sources to put together a basic report

							on TCA
Does your department consider levels of service when making capital asset decisions?	• New Capital projects and maintenance of existing TCAs are prioritized by need. • No formal process for assessing levels of service of an asset. • Annually determine what can be deferred and what cannot be deferred. Based on annual, 5yr and 10 yr estimates.		• Levels of service are considered for Recreation and Sports centres. Levels of service are considered for retirement or conversion of a TCA (i.e. tennis court). • Life cycle costing is based on safety and need. • Service levels determine the department's budget.	• Evaluated every budget cycle. • Past, current and future facility use reviewed. • Service levels determine the department's budget.			N/A
Accounting processes							
With the 2009 introduction of new accounting procedures (PSAB 3150) has your department been impacted?	• Changes to capital assets are emailed to Finance. PW holds no asset records for accounting purposes. • Considerable reliance on historical knowledge held by individuals. No real record of TCAs. Planning to improve asset management in PW, an engineering tech is working at PW as a resource. • Information for TCA planning is in	• Engineering reports on TCA information as requested by Finance. • Engineering provides the level of detail the Finance Department requires. • Reviews TCAs at year end with Finance.	• Currently putting in new processes to provide accurate and timely inventory data for your records	• No noticeable changes other than a more formalized approach to reporting for year end.			• Finance was the most impacted department. • Introduction of new reporting processes • Collection of TCA data

	hardcopy format and takes a long time to be processed in the financial system.						
Six "What's" of asset management							
What do you own and where is it?	• If it is "in the ground or on the ground" it belongs to PW • PW maintains its own records in spreadsheets and work orders. No use of a database. No shared access to PWs asset information outside of the department. • Location of PW assets are known through survey data (autocad). • PW engineering technician maps and takes photos of in-ground infrastructure. • PW has good knowledge of where their assets are located	• Engineering maintains its own records in spreadsheets and Autocad. • Engineering has records for capital assets starting in 2008. • 90% of Engineering's capital assets fall within these categories: • sewers, drains, roads, sidewalks, walkways • traffic signals, street lights, bus shelters • pump stations	Parks uses different documentation processes for each TCA group. The groups are: • Recreation Centre • Sports Centre • 20 parks; playgrounds, drainage/irrigation, public art • Boulevards and medians • Location of Parks assets are known through site visits. • Inventory on parks and facilities is performed once every 5 years. • Parks has good knowledge of where their assets are located, including photographs of all parks.	• Recreation Programming doesn't own any capital assets. Owns primarily physical assets of smaller value. • Equipment is tracked in Excel spreadsheets. The information is not easily accessible within the Department, or across the organization. • No known formalized process across the organization for tracking non-capital assets.			• Location of assets is not required by auditors • Reports annually on "What" TCAs are in the organization.
What are your assets worth?	• Value of TCAs is based on purchase price. • Determining replacement and depreciation values	• Engineering estimates depreciation, replacement and current values of capital assets.	• The value of capital assets are reported annually to Finance. • Bids, tenders, and quotes provide cost values.	• Report asset information (value/contents of a facility) annually to Finance. Primarily recorded for			• Reports annually on what assets are capitalized.

	follow Finances guidelines	• Finance maintains these records	• Depreciation values are based on industry standards (book value). • Generally know from experience (undocumented).	insurance purposes. • Replacement and depreciation is based on warranties and industry guidelines. • Value is set at the initial purchase price.			
What is deferred?	• Annually determine what can be deferred and what cannot be deferred. Based on annual, 5yr and 10 yr estimates. • Deferral is based on need and recommendations are made from the department to the organization • There are trade-offs when deciding what maintenance or purchases to defer.	• Annually determine what can be deferred and what cannot be deferred. Based on budgeting process and prioritization. • Asset assessments occur throughout the year, often contracted work. Contractors send Excel files to Engineering. Format is not useful.	• Annually determine what can be deferred and what cannot be deferred. Based on safety, need, cost, and experience. • Deferral recommendations are made from the department to the organization • Finding ways to extend the life of a capital asset is considered	• Annually determine what can be deferred and what cannot be deferred. Based on budgeting process and prioritization.			
What is its condition?	• Asset condition is monitored by the staff responsible for the asset. There may or may not be documentation tracking asset condition. • Staff have historical experience with assets and know the condition through	• Inventory and condition data is maintained for all assets.	• Inventory on parks and facilities is performed once every 5 years. • Inspection of asset condition is performed daily on the pool facility. • Inspection of asset condition is performed monthly on playgrounds. • All asset with safety regulations are inspected regularly and according to warranty and regulations.	• Asset condition is monitored by the staff responsible for the asset (providing they have the experience). There may or may not be documentation tracking asset condition. • Inspection of equipment is performed regularly and reported on			

	experience. There is no process to capture an individual's knowledge .		• Condition of TCAs are known and recorded.	annually. • Recreation works closely with Facility Maintenance to determine asset and facility condition.			
What is the remaining service life?	• Service life is based on manufacturers terms. • PW determines how to extend the service life if possible. • Service life of most assets are known although not documented.	• Service life is based on manufacturers terms. • Engineering determines how to extend the service life if possible, through inspections and expert knowledge. • Service life of most assets are known and undocumented. • SCADA system used for warnings. SCADA not used for monitoring of levels or flows.	• Service life is based on manufacturers terms. • Parks determines how to extend the service life if possible. • Service levels are determined through inspections and expert knowledge. • Service life of most assets are known although not documented.	• Service life is based on manufacturers terms. • Recreation determines how to extend the service life if possible. • Service levels are determined through inspections and monitoring. • Service life of most assets are known although not documented.			
What to do and when to do it?	• Manufacturer maintenance recommendations are consulted for maintenance schedules. • Annually determine what can be maintained. Based on need, cost, timing, asset life expectancy, risk and safety.	• Annually determine what can be maintained. Based on need, cost, timing, asset life expectancy, risk and safety.	• Manufacturer maintenance recommendations are consulted for maintenance schedules. • Determine what can be maintained as needed. Based on safety, need, cost, timing, and asset life expectancy. • The Parks department makes decisions and recommendations on TCA maintenance and	• Investment is determined by the needs of the community. • Service revenue dollars change year to year. • Annually determine what can be maintained. Based on need, cost, timing, asset life expectancy, risk and safety.			

			replacement spending within Parks.				
Additional questions							
If there was one thing that would help you with asset management what would it be?	• AM is performed off the side of the desk. Additional dedicated resource for data entry, and working across departments.	• A database available to all departments with AM data. • Each department to be responsible for managing their own capital assets.	• One person, working for the entire organization to help with AM: technical assistance, follow-up, data entry, and reporting.				
Is there anything else about asset management you would like to share with me?	• WorkTech needs to work for PW and their AM requirements. • It is expected AM will take along time to bring to PW • Viewing invoices electronically would improve approval and coding processes • TCA cross-functional team meetings would be useful. Invaluable to hear what is occurring in other departments and identify how it impacts your own functional area.	• Current data that engineering is capturing is not very useful for managing their assets. • Need to bring together asset information and spatial data (use of GIS). • Data must be useful and accessible. • Asset categories for reporting need to be clearly defined. Consistency in the level of details. • Timesheets and Work Orders are transitioning from a manual format/process to a digital format (WorkTech).	• Would like the inventory data, which is stored in binders entered into a database. WorkTech may be the solution, although a resource to perform he work is required. • Need to automatically generate work orders. Work Tech may be the solution. • Ability to schedule shared resources (people and equipment).	• Consultants have been retained to assist in estimating a 10 year facility plan. • On-going evaluation of pay back on new items. • Planning for an energy upgrade to Recreation Centre			
Notes:	• PW's inventory practices (for non-capital assets) are robust and well	• Engineering is responsible for 44% of overall costs. • Engineering works		• TCA hasn't been clearly explained. Understanding what Finance/Accounting		• IT would like to have an annual audit field,	• How is Finance going to fund AM? • Currently

	established. • PW works closely with Engineering. PW does not track physical capital assets like roads, engineering tracks those.	closely with PW.		requires is not clear.		indicating when the last audit was performed.	spending on capital projects starts in May when the budget is approved. Need to spend earlier in the year, perhaps a pre-approval process.