FINAL REPORT

PREPARED FOR THE CITY OF PENTICTON

Asset Management Investment Plan V2

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1.0 Executive Summary

The City of Penticton "CoP" owns and maintains a large portfolio of infrastructure upon which it greatly relies for the delivery of services to the community. This infrastructure includes the City's water, wastewater, storm, and transportation systems as well as a wide variety of civic facilities, fleet, equipment and park assets.

Some of the City's assets, such as the water system, date back to the 1960's. These assets, and others, have served the community well, however many are now nearing the end of their lifespans and will eventually need to be replaced or rehabilitated.

In 2016, the City completed an Asset Management Investment Plan (AMIP) to help defined the Average Annual Life Cycle (AALCI) needed to sustain the City of Penticton's infrastructure based on replacement costs instead of historical costs. It became clear through the completion of this assignment that there were gaps in the inventory, replacement costs and service life estimates. These gaps resulted in an AALCI and Infrastructure Deficit range that didn't provide the City with certainty on their desired funding targets. Moving forward, the City of Penticton wanted to gain more clarity on their AALCI and Infrastructure Deficit. In order to achieve this, the City focused on improving its inventory, replacement costs, and service life estimates over the past 2 years.

With new information avaiallbe, the City set out update their AMIP by integrating the new inventory, replacement cost and service life data to answer the following questions:

1) *How much are our assets worth?*
2) *How much remaining life do our assets have?*
3) *How much value of our assets is consumed?*
4) *What is our infrastructure deficit?*
5) *How much do we need to invest to sustain our assets?*

By understanding the answer to these questions, the City will be able to budget and plan for the replacement of their infrastructure. Failure to plan would put the community at risk of service disruptions, emergency repairs and the need for sudden and significant tax and user fee increases. By being proactive today, the City can ensure that services are sustainable so that current and future generations can enjoy the same levels of service as well as reasonable tax rates and user fees.

What is Asset Management?

The process of bringing together the skills and activities of people; with information about the community's physical infrastructure assets and financial resources to ensure long term sustainable service delivery.

Sound asset management practices support sustainable service delivery by considering community priorities, informed by an understanding of the trade-offs between the available resources, risk and the desired services.

Sustainable service delivery ensures that current community services are delivered in a social, economic, and environmentally responsible manner that does not compromise the ability of future generations to meet their own needs.

In summary, the City of Penticton owns $1.2 billion in infrastructure. On average, the assets have 56% remaining life which means they are about half way through their life span and approximately 9% of the community's infrastructure has passed its expected life span (a.k.a. infrastructure deficit). In order to ensure these assets can continue to provide service, decision makers must determine what level of investment is appropriate for the community.

Table 1.1 below summarizes several key infrastructure metrics that can be used to assist the City with setting long-term funding targets.

Table 1.1 Asset Management Investment Plan V2.0 Results

	Replacement Cost 2018	Infrastructure Deficit %	% Remaining Life	AALCI_Modified	AALCI_Set Set ($/yr)
General Fund	**$552M**	**7%**	**58%**	**$13.7M**	**$11.8M**
Storm System	$61.7M	10%	64%	$641K	$481K
Sanitary System	$189.1M	11%	54%	$3.6M	$3.1M
Water System	$216.5M	15%	52%	$3.4M	$3.0M
Electrical System	$229.2M	7%	54%	$4.9M	$4.2M
Total	**$1.25 B**	**9%**	**56%**	**$26.2M**	**$22.6M**

*Refer to Terms and Definitions for deifnitions of AALCI_Modifed and AALCI_Set

In order to set the a long term funding target for asset replacement (AALCI Modified & Set), the City took into consideration the condition of their assets, their willingness to take on risk as well as the current and future infrastructure deficit. By integrating these factors, the City was able to strategically reduce its AALCI from $34.4 to $22.6, ultimately saving the City $11.8 million per year in infrastructure investment (34% reduction). As a next step, the City should consider integrating the AALCI funding targets into a long-term financial model to determine the organizations financing capacity to meet these targets and move towards financial sustainaiblity. If the City determines that the funding targets cannot be met, the City could further refine the funding targets by reviewing the level of service and further increasing their risk profile.

TERMS AND DEFINITIONS

ASSET

A physical component of a system that has value, enables services to be provided, and has an economic life of greater than1 year.

REMAINING LIFE

Remaining life is an estimate of the percentage of life left in an asset before it needs to be theoretically replaced and can be used as a proxy for condition. The remaining life is calculated by taking the number of remaining years before replacement and dividing it by its estimated service life.

LEVEL OF SERVICE

A measure of the quality, quantity, and reliability of a service from the perspective of residents, businesses, and customers in the community.

REPLACEMENT COST

The cost required to replace all assets in current dollars based on like for like replacement

REVENUE

The income received from taxes, user fees, government transfers and other sources.

RISK(S)

Events or occurrences that will have an undesired impact on services (Risk = Consequence of Failure x Likelihood of Failure)

CONSEQUENCE OF FAILURE (COF)

A measure of the impact that an asset failure would have relative to other assets. Typically, Consequence of Failure (COF) considers triple bottom line thinking which considers the environmental, social and financial aspects.

SERVICE LIFE INDUSTRY BEST PRACTICE (IBP)

The length of time an asset will theoretically last before it requires replacement or rehabilitation based on published industry standards.

SERVICE LIFE MODIFIED

The length of time an asset will last before replacement is required adjusted to incorporate condition and risk.

AVERAGE ANNUAL LIFE CYCLE INVESTMENT (AALCI)

Represents the average annual life cycle investment required to sustain the assets over the long term based on service life estimates that were derived from Industry Best Practice (IBP) documentation. These service life estimates are typically conservative and often lead to unrealistic funding targets. The formula used to calculate the AALCI is below:

$$\sum \frac{\text{Replacement Cost}}{\text{Service Life}}$$

AVERAGE ANNUAL LIFE CYCLE INVESTMENT MODIFIED (AALCI MODIFIED)

Represents the average annual life cycle investment required to sustain assets over the long term based on service life estimates that were modified based on condition and risk (service life modified). The formula used to calculate the AALCI Modified is below.

$$\sum \frac{\text{Replacement Cost}}{\text{Service Life Modified}}$$

AVERAGE ANNUAL LIFE CYCLE INVESTMENT SET (AALCI SET)

Represents the average annual life cycle investment required to keep the average deficit over the longest-lived asset the same as the deficit today. This means, the deficit will be less or more than the current deficit in any particular year but on average it will be the same. For water infrastructure this could mean that more breaks could be expected in years where the infrastructure deficit is higher and less breaks when the deficit is lower.

INFRASTRUCTURE DEFICIT

Infrastructure deficit is a measure of the amount of infrastructure that has passed its theoretical service life but still provides service to the community.

2.0 What is Asset Management?

Asset management is a continual improvement process which focuses on bringing together the skills and activities of people, combined with information about assets and finances to enable long-term sustainable service delivery. Sustainable service delivery ensures that current community services are delivered in a social, economic, and environmentally responsible manner that does not compromise the ability of future generations to meet their own needs. Sound asset management practices support sustainable service delivery by considering community priorities, informed by an understanding of the trade-offs between the available resources, risk and the desired service levels. In order to help guide communities through their asset management journeys, the Ministry of Community Sport and Health, UBCM and Asset Management BC with consulting help from Urban Systems developed the "Asset Management for Sustainable Service Delivery Framework."

It is important to note, there is no right spot to start on the framework, rather it is up to each community to determine their specific asset management needs and build their program based on their individual priorities.

Figure 2.1 Asset Management for Sustainable Service Delivery, A BC Framework

2.1 Why Is Asset Management Important?

Communities across Canada are currently faced with infrastructure and organizational challenges. Many are realizing that most of their infrastructure was installed decades ago and has continually provided service to the community with little to no service disruption. These assets, which have provided significant value to the community, are now nearing the end of their service life; however, many local governments have not fully planned for their replacement.

FCM completed a study in 2006 that concluded that estimates Canada's infrastructure deficit to be $123B and growing. A recent study by BCWWA, titled "Are our water systems at risk?" found that the majority of BC water and sewer systems are not recovering the full cost of service delivery through user fees.

With increasing cost pressures and unsustainable funding approaches, communities are beginning to realize they need to change the way they think about managing their assets, recovering revenues, and delivering services. Communities are now embracing the need to integrate asset management principals and thinking into their organization with the following goals in mind:

- Be financially sustainable over the long term;
- Reduce the need to place a large financial burden on future generations;
- Increase the likelihood that user fees and property taxes are stable and consistent and reduce the need to have large 'one-off' increases; and
- Increase the likelihood that service levels can be maintained over the long term.

With this understanding, the CoP invested in improving their inventory, replacement cost and service life data to assist in the development of their Asset Management Investment Plan (AMIP) V2.0.

2.2 Background

The CoP strives to be a sustainable and resilient community, with a diverse, affordable infrastructure base to deliver services for its residents. The key to sustainably delivering services lies in how a community manages its infrastructure. The CoP first completed a financial report in 2008 that provided information on its tangible capital assets "TCA." The TCA exercise was backward looking in that it used historical costs to calculate the Average Annual Life Cycle Investment "AALCI" required to replace infrastructure (also known as amortization).

In 2016, the City completed an Asset Management Investment Plan "AMIP." This AMIP defined the AALCI needed to sustain the City of Penticton's infrastructure based on replacement costs instead of historical costs. It became clear through the completion of this assignment that there were gaps in the inventory, replacement costs and service life estimates. These gaps resulted in an AALCI and Infrastructure Deficit range that didn't provide the City with certainty on their desired funding targets. Moving forward, the City of Penticton wanted to gain more clarity on their AALCI and Infrastructure Deficit. In order to achieve this, the City focused on improving its inventory, replacement costs, and service life estimates. Below is a summary of the approach taken to achieve this:

Step 1: Update Inventory

Since the AMIP in 2016, the CoP has invested a significant amount of time in improving its asset inventory. **Table 2.1** below provides a summary of the work completed to improve the asset inventory.

Table 2.1 Asset Inventory Summary

Asset Category	Description
Water, Sanitary, Storm, Transportation & Electrical	A location based Geographic Information System (GIS) was developed. This included spatial location of each asset and attaching attributes such as year of installation, diameter, condition, replacement cost and service life to each asset.
Water & Sanitary Facilities	A major component inventory was developed and summarized into the following categories: Mechanical, Structural, Electrical and Civil
Buildings	A major component inventory was developed and summarized into the following categories: Architectural, Structural, Mechanical and Refrigeration
Fleet	Detailed list by fleet vehicle
Parks	Tangible Capital Asset (TCA) Inventory

Step 2: Update Replacement Costs

The 2018 replacement costs were developed based on recent local tender prices, insurance records and TCA records. A summary of the unit replacement costs are provided in **Appendix A and C** as well details on replacement costs can be found within the AMIP excel model.

Step 3: Update Service Lives

Service life estimates were updated based on local knowledge, condition assessments and risk. For this assignment, the CoP developed two types of service life estimates:

- **Industry Best Practice Service Lives (IBP) –** which are based on published engineering and financial documents. These service lives are often generic, not specific and conservative.
- **Modified Service Lives (MSL) -** which are estimated based on local knowledge, condition assessments and risk.

The modified service life estimates first focused on adjusting the IBP service lives to incorporate condition assessment information. **Table 2.22** provides a summary of the condition information that was available.

Table 2.2 Condition Information

Asset Category	Description
Water, Sanitary & Storm Pipes	Service life estimates were modified based on soil conditions, break history, operator knowledge, research & observed data. Refer to the Urban Systems 2017 report "Underground Pipe Condition and Service Life Review" for details.
Electrical System	Service life estimates were modified based on published data from the "Kinectrics Inc. Asset Depreciation Study for the Ontario Energy Board" and the "2015 CIMA City of Penticton Electrical Distribution Master Plan".
Water /Sanitary Facilities	The City hired a consultant to visit each major facility (WTP, WWTP etc.) to assess the estimated remaining life of each component within the facility. Refer to AECOM reports "Asset Management Renewal Assessment Advanced Wastewater Treatment Plant and Sanitary Lift Stations" and "Asset Management Renewal Assessment Water Treatment Plant, Pump Stations, Reservoirs, and PRVs" for details.
Buildings	The City hired a consultant to visit each major facility to assess the estimated remaining life of each major component within the facility. Refer to LTA's report "City of Penticton – Facility Replacement Report" for details.
Fleet	The City of Penticton staff reviewed the fleet inventory and estimated the remaining life of each fleet vehicle based on the vehicle kilometers.
Pavement	The City hired a consultant to perform a visual condition inspection on the road surface (excluding lanes) to estimate its remaining life. Refer to IMS's 2017 "Pavement Management Analysis Report" for details.
Parks	Accounting Best Practice service lives were used (i.e. TCA) to determine the remaining life of City of Penticton park assets.

The City further modified the service lives based on key observations that were drawn from the asset inventory about its age compared to its estimated service life. For example, if an AC pipe had an estimated service life of 75 years but the actual age of the pipe was 100 years, this may provide insights that the service life may be able to be increased by 33%. Urban Systems and the City of Penticton worked together to analyze the asset inventory and made modifications to the service life estimates based on the observations that could be taken from the inventory**. Table 2.3** Service Life Modification Summarybelow summarizes the average service life modification made for each asset category.

Table 2.3 Service Life Modification Summary

Summary	Service Life Modification Facotors
Park Systems	12%
Water System	23%
Transportation System	8%
Electrical System	0%
Storm System	0%
Building System	13%
Sanitary System	0%

Its important to note that the service life modification factors presented above were used to refine the condition adjusted service life. In other words, the service life was first modified based on condition information (if available) and then further modified based on the observations about actual age as shown in table 2.3.

For asset specific modifications refer to **Appendix B**

Step 4: Integration of Risk

In order to further refine the service life estimates based on risk, it was determined that longer service lives should be assigned to low Consequence of Failure "COF" assets and no service life modifications should be assigned to high COF assets. By adjusting the assumed service lives based on the COF, the City can further decrease the AALCI.

An example of how service life was modified based on COF is shown in **Table 2.4**.

Table 2.4 COF Example

Description	Asset 1	Asset 2
Assumed Service Life	100 years	100 years
COF Score	COF 5 - High Risk	COF 1 - Low Risk
Service Life Modified by COF score	100 years	120 years

In the example above, the assumed service life of Asset 1 was not adjusted because the asset has a very high COF. Asset 2 has a low COF, so the assumed service life was increased from 100 to 120 years.

The COF service life modification methodology described above was applied to the following asset categories: water, sanitary, storm pipes, pavement structure, transformers, poles, conductors and facilities. For more details on the Risk Assessment Framework and modifications to the service lives based on COF, refer to Urban Systems report "Condition Risk Assessment on Water, Sanitary, Storm, Road, Electrical and Facility Assets."

Step 5: Develop Asset Investment Management Plan – V2.0

The last step of this process was to integrate the updated inventory, replacement costs and the service lives into the AMIP model. The results and findings from the model are detailed below in Section 3.0.

3.0 Asset Management Investment Plan V2.0

The Asset Management Investment Plan (AMIP) is an asset renewal forecast that can be used to inform long-term funding decisions for each of the major asset categories. Adequate asset renewal funding will ensure services can be reliably provided into the future. The AMIP is designed to answer the following best practice asset management questions:

1) *How much are our assets worth?*
2) *How much remaining life do our assets have?*
3) *How much value of our assets is consumed?*
4) *What is our infrastructure deficit?*
5) *How much do we need to invest to sustain our assets?*

An Asset Management Investment Plan can:	» Build awareness with staff, council and the community on the magnitude and timing of potential infrastructure investments; » Identify revenue requirements over the long term ; » Assist with setting rates and taxes and; » Inform the urgency of investments.
Asset Management Investment Plan is not:	» A capital plan that sets out specific projects for the community to undertake; » An infrastructure cost tool that can be used for construction tenders and provides accurate project costing; or » A complete asset management program.

Each of the best practice asset management questions are further explained below:

3.1 How much are our assets worth?

Understanding the replacement value of a community's assets provides the organization with a deeper understanding of the magnitude of infrastructure that it is responsible for managing and replacing. These cost figures directly affect the AALCI and are a driver for future revenue requirements. Asset replacement costs are in current dollars (2018), are based on like for like replacement and do not consider new infrastructure required to satisfy including regulatory requirements, growth/ expansion, safety improvements, or economic development.

The assumptions and methodologies used to develop replacement cost estimates are detailed in **Appendix A** and **C**.

3.2 How much remaining life do our assets have?

Remaining life provides an estimate of the amount of life left in an asset before it needs to be theoretically replaced. The remaining life is calculated by taking the number of remaining years before replacement and dividing it by its estimated service life.

Example:
# of Remaining years before replacement: 50 years
Estimated Service Life: 100 Years
% Remaining life: 50/100 = 50% (approx. half way through the assets life)

Asset remaining life is one indicator that can be used to understand the condition of an asset and can be used to inform replacement and inspection programs.

3.3 How much value of our asset is consumed?

Asset Consumption is a measure of the financial value of the asset that has been consumed to date.

Example:
Asset Value: $10
Service Life: 10 Years
AALCI (Amortization): $1/yr
Age: 5 Years Old
Asset Consumption: 5 Years old x AALCI ($1) = $5

Asset consumption provides a community with a sense of how much would need to be set aside today if the community were to replace the asset at the end of its service life and on a pay as you go basis; meaning that no reserves, debt or grant funding would be used to fund asset replacements For the example above, the community would need $5 in a reserve today and would need to continue to place one dollar per year for the next 5 years in a reserve in order to replace the asset with cash on its estimated expiration date. Although it is not realistic to fund all assets on a pay as you go basis and replace every asset at the end of its estimated service life, this parameter can help guide discussions when considering the organizations financing approach and can be used to guide reserve contribution discussions.

3.4 What is our current infrastructure deficit?

The infrastructure deficit is a measure of the infrastructure value that has passed its estimated service life but still provides a service to the community. The infrastructure deficit can be presented as a dollar value or as a percentage of the total infrastructure value.

Example:
Infrastructure Deficit (Expressed as a dollar value): $10
Infrastructure Deficit (expressed as a % of total value) = Infrastructure Deficit ($10) / Replacement Cost ($50) = 20%

It's important to note, that an infrastructure deficit to a certain point is healthy as it provides insights that assets are lasting longer than estimated. This could be resulting from good maintenance practices or provide insights that the estimated service lives were too conservative. Based Urban Systems work completed to date, communities in BC have found that approximately 5%-35% of their infrastructure is within a deficit depending on the age of the community and their infrastructure investment level. It is recommended that assets within a deficit get inspected to determine if replacement is required or if the service life can be further extended.

3.5 How much do we need to invest to sustain our assets?

Estimating and setting long-term funding targets for asset replacement is critical to the future health of the communities infrastructure and directly affects the future level of service, risk and fee's paid by its stakeholders. In order to assist the community with setting the long-term funding targets for asset replacmenet, the three funding scenarios were developed; AALCI, AALCI Modified and AALCI Set, each of which are briefly descrbied below:

- **AALCI** represents the Average Annual Life Cycle Investment required to replace assets based on Industry Best Practice service life estimates. Taking this approach is conservative and often leads to unrealistic funding targets that are not community speicifc.

- **AALCI Modified** represents the Average Annual Life Cycle Investment required to replace assets based on service life estimates that were modified based on acutal condition information and the communities willingness to take on risk.

- **AALCI Set** represents the Average Annual Life Cycle Investment required to replace assets such that the deficit today is the same as the average deficit into the future. This means that the deficit will be higher in some years and lower in others but on average it will be the same.

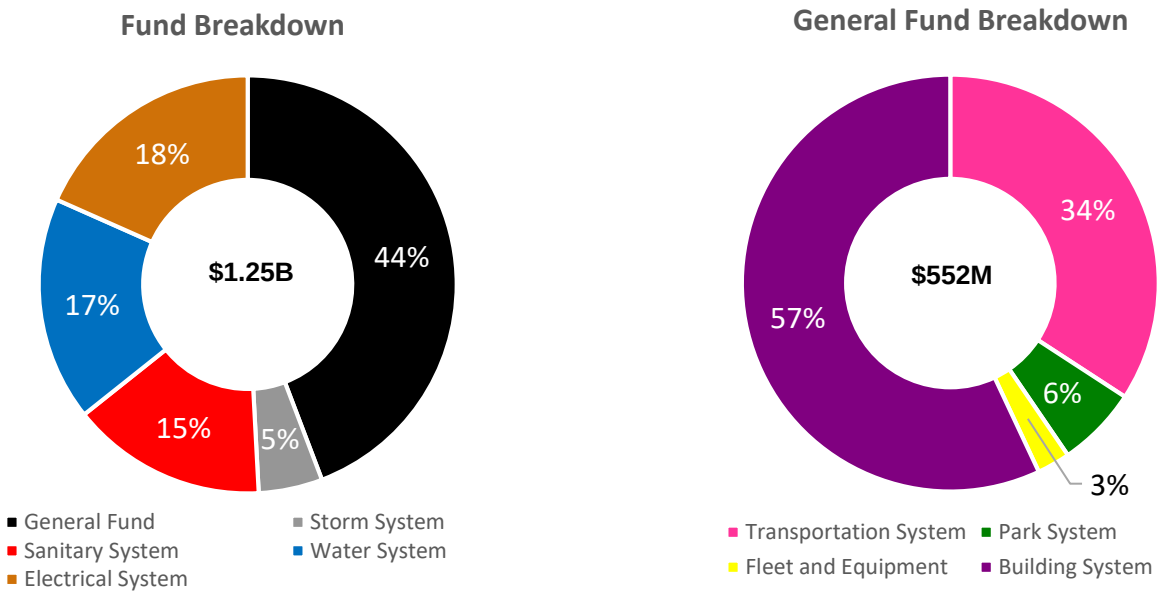
For detailed explaination on each funding target scenario, refer to the terms and definitions.

Moving forward, the City should consider the above funding targets in their financial modeling excerises to determine the future impact to reserves, revenues and debt. If revenues are not sufficient to meet the presented funding targets, the City could consider increasing revenues. If revenue increases are not possible, the City could consider taking on more risk or reducing the level of service.

4.0 The Results

The updated inventory, replacement costs and service life data was directly input into the AMIP model to answer the asset management best practice questions:

4.1 How much are our assets worth?



B: Billion

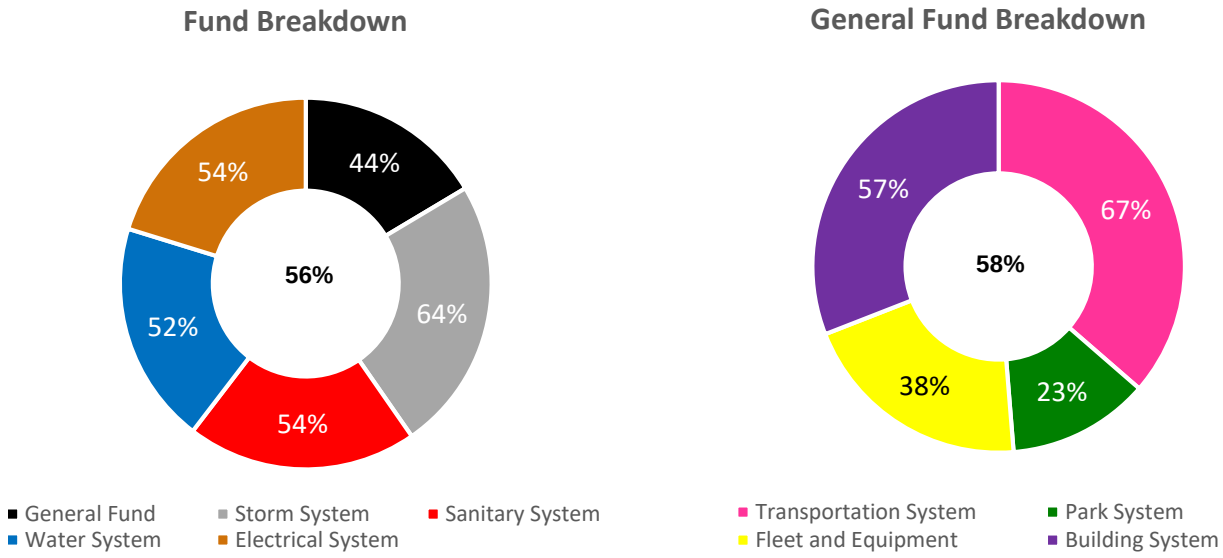
M: Million

Figure 4.1 How much are our assets worth?

Observations:

- *Assets within the general fund represent approximately half of the infrastructure value and the other half is represented by water, storm, sanitary and electrical assets*
- *Sanitary, Water and Electrical Systems have a similar infrastructure value (15%-18% of total)*
- *Within the General Fund, buildings and transportation asset represent more than 90% of the infrastructure value with buildings representing over 50%*

4.2 How much remaining life do our assets have?



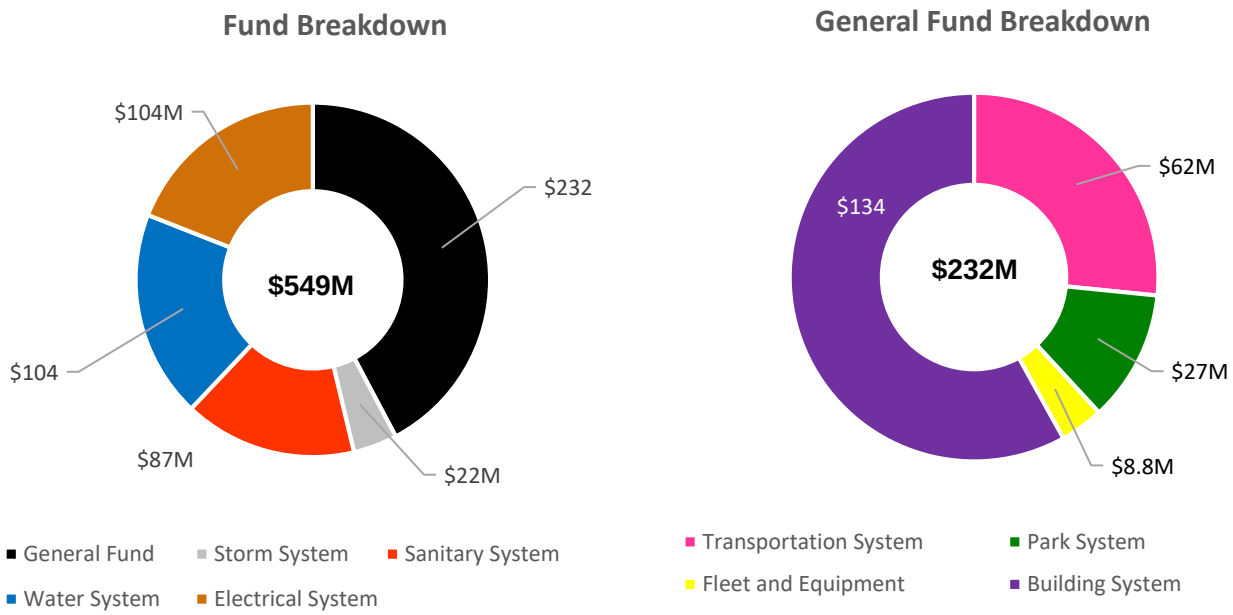
Note: Calculated based on Service Life Modified

Figure 4.2 How much remaining life do our assets have?

Observations:

- *CoP's asset categories on average has 56% remaining life which means the assets are approximately half way through their estimated service life*
- *Transportation assets appear to be in the best condition (67% remaining life) whereas park assets appear to be in the worst condition (23% remaining life)*

4.3 How much value of our asset is consumed?



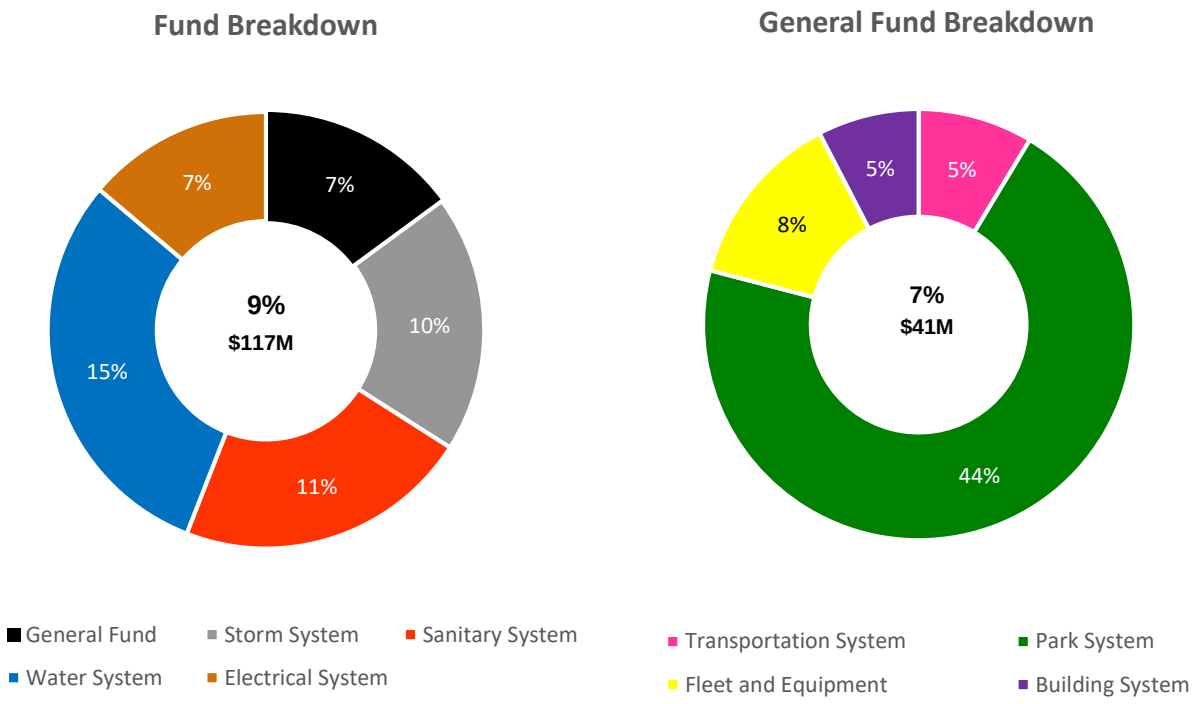
Note: Calculated based on Service Life Modified

Figure 4.3 How much value of our asset is consumed?

Observations:

- *Approximately half the asset value is consumed in each asset category*
- *Within the general fund, building assets carry majority of the consumed value (over 50%)*

4.4 What is our infrastructure deficit?



Note: Calculated based on Service Life Modified

Figure 4.4 What is our infrastructure deficit?

Observations:

- *9% of the community's infrastructure is past its expected service life (i.e. within a deficit)*
- *Within the general fund, approximately 7% of the community's infrastructure is past its expected service life (i.e. within a deficit).*
- *Approximately half of the park assets have passed their expected service lives (i.e. within a deficit)*
- *Based on the work completed to date we have found that majority of our BC communities have between 5%-35% of their infrastructure within a deficit. The deficit typically varies based on community age and historical infrastructure investment level.*

4.5 How much do we need to invest to sustain our assets?

Table 4.1 How much do we need to invest to sustain our assets?

Description	Funding Summary				
	2016_AALCI	AALCI	AALCI_Modified	AALCI_Set	AALCI Savings ($/yr)
General Fund	**$9.3-$13.9M**	**$17M**	**$13.8M**	**$11.8M**	**$5.2M**
Transportation System	$2.6M-3.9M	$4.5M	$4.4M	$3.3M	$1.3M
Park System	$1.0M-$1.5M	$1.6M	$1.4M	$1.2M	$376K
Fleet and Equipment	$660K-$996K	$1.1M	$1.0M	$1.0M	$110K
Building System	$5M-$7.5M	$9.8M	$7.0M	$6.3M	$3.4M
Storm System	**$753K-$1.1M**	**$1.0M**	**$640K**	**$481K**	**$533K**
Sanitary System	**$2.7M-$4.1M**	**$4.4M**	**$3.6M**	**$3.1M**	**$1.3M**
Water System	**$3.7M-$5.5M**	**$4.3M**	**$3.4M**	**$3.0M**	**$1.3M**
Electrical System	**$2.2M-$3.8M**	**$7.7M**	**$4.9M**	**$4.1M**	**$3.5M**
Total	$18.6M-$28.4M	$34.4M	$26.3M	$22.5M	$11.8M

Note: Does not take into account communities willingness to pay, decreases to level of service & financing ability (debt, reserves, grants etc.)

Observations:

- *Approximately 50% of the AALCI is driven by the general fund.*
- *Within the general fund, approximately 80% of the AALCI is driven by transportation and building assets*
- *Sanitary, and Water have a similar AALCI*

5.0 V1 AMIP Results V.S. V2 AMIP Results

The first version of the AMIP completed in 2016, was based on readily available inventory, replacement cost and service life data. Through this initial exercise it was determined gaps existed within the information used to develop the results. Over the past 3 years, CoP updated their inventory, replacement costs and service life estimates so that the AMIP could be updated (V2). The results from the AMIP V1 (2016) and AMIP V2 (2018) are provided below for direction comparison.

Table 5.1 V1 AMIP Results vs. V2 AMIP Results

Description	2016	2018
Replacement Cost	$1.1 B	$1.25 B
% Remaining Life	42%	56%
Infrastructure Deficit	$51M – $175M or (5%-18%)	$117M or (9%)
AALCI ($/Year)	18.6 M - $28.4M	$22.6M*

*based on AALCI Set

Observations:

- *Infrastructure value increased by approximately 15%*
- *Remaining Life increased from 46% to 56% because of the condition assessments completed*
- *The CoP gained more clarity on their infrastructure deficit and AALCI which is now $117M and $22.6, respectively*

6.0 Conclusion

In summary, the City of Penticton owns $1.2 billion in infrastructure. On average, the assets have 56% remaining life which means they are about half way through their life span and approximately 9% of the community's infrastructure has passed its expected life span (a.k.a. infrastructure deficit). In order to ensure these assets can continue to provide service, decision makers must determine what level of investment is appropriate for the community. **Table 6.1** summarizes several key infrastructure metrics that can be used to assist the City with setting long-term funding targets.

Table 6.1 AMIP V2 Summary

	Replacement Cost	Infrastructure Deficit %	% Remaining Life	AALCI_ Modified	AALCI_Set
General Fund	**$552M**	**7%**	**58%**	**$13.8M**	**$11.8M**
Transportation System	$188.7M	5%	67%	$4.4M	$3.3M
Park System	$34.6M	44%	23%	$1.4M	$1.2M
Fleet and Equipment	$14.1M	8%	38%	$1.0M	$1.0M
Building System	$314.6M	5%	57%	$7.0M	$6.3M
Storm System	$61.7M	10%	64%	$641K	$481K
Sanitary System	$189.1M	11%	54%	$3.6M	$3.1M
Water System	$216.5M	15%	52%	$3.4M	$3.0M
Electrical System	$229.2M	7%	54%	$4.9M	$4.2M
Total	**$1.25 B**	**9%**	**56%**	**$26.2M**	**$22.6M**

In order to set the a long term funding target for asset replacement (AALCI Modified & Set), the City took into consideration the condition of their assets, their willingness to take on risk as well as the current and future infrastructure deficit. By integrating these factors, the City was able to strategically reduce its AALCI from $34.4 to $22.6, ultimately saving the City $11.8 million per year in infrastructure investment (34% reduction). As a next step, the City should consider integrating the AALCI funding targets into a long-term financial model to determine the organizations financing capacity to meet these targets and move towards financial sustainaiblity. If the City determines that the funding targets cannot be met, the City could further refine the funding targets by reviewing the level of service and further increasing their risk profile.

7.0 Recommendations and Next Steps

Based on the results of the AMIP V2.0, CoP's information, and the process outlined in the Asset Management for Sustainable Service Delivery, A BC Framework, we've outlined possible next steps and priorities for consideration in order to continue to improve the organization's asset management capacity. The steps outlined below are organized deliberately in order to promote successful implementation:

1. Input the funding targets presented in the report (AALIC, AALCI Modified, AALCI Set) into a financial model to determine the financing capacity of the organization to abosored them
2. Perform a financial affordability check to determine if the adjusted rates can be absorbed by the community
3. Development of a financial policy to guide decisions on infrastructure funding including (reserves, debt, developer contributions, asset replacement, etc.)
4. Integrate risk scores into CoP's GIS system for annual capital planning purposes

APPENDIX A

Replacement Costs/Service Lives

Table 7.1 Electrical Unit Replacement Cost and Service Lives

category	sub_category	description_1	description_2	description_3	service life industry best practice	service_life_community_specific	unit_cost	unit_cost_adj_eng	unit_cost_adj_disp	unit_cost_adj_cont	service_life_industry_best_practice_notes	service_life_community_specific_notes	unit_cost_notes
Electrical System	OH Primary	Not Applicable	Not Applicable	Not Applicable	40	60	30	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	UG Primary	Direct Buried	Not Applicable	Not Applicable	20	25	325	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	UG Primary	In Concrete Encased Conduit	Not Applicable	Not Applicable	30	40	400	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	UG Primary	In Conduit (unknown encasement)	Not Applicable	Not Applicable	30	40	400	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	UG Primary	Unknown	Not Applicable	Not Applicable	20	25	400	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Overhead Secondary	Not Applicable	Not Applicable	Not Applicable	40	60	30	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Overhead Service	Not Applicable	Not Applicable	Not Applicable	30	60	30	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Overhead Secondary	Not Applicable	Not Applicable	60	60	30	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	UG Secondary	Direct Buried	Not Applicable	Not Applicable	40	40	125	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	UG Secondary	In Concrete Encased Conduit	Not Applicable	Not Applicable	40	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	UG Secondary	In Conduit (unknown encasement)	Not Applicable	Not Applicable	40	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	UG Secondary	Unknown	Not Applicable	Not Applicable	40	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Underground Service	Direct Buried	Not Applicable	Not Applicable	30	40	125	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Underground Service	In Concrete Encased Conduit	Not Applicable	Not Applicable	30	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Underground Service	In Conduit	Not Applicable	Not Applicable	30	40	150	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Underground Service	In Conduit (unknown encasement)	Not Applicable	Not Applicable	30	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Underground Service	Unknown	Not Applicable	Not Applicable	30	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	UG Secondary	In Conduit	Not Applicable	50	40	150	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	UG Secondary	In Conduit (unknown encasement)	Not Applicable	50	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	UG Secondary	Unknown	Not Applicable	50	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Capacitor	Not Applicable	Not Applicable	Not Applicable	50	40	15000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Handhole	Junction Box	Not Applicable	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Handhole	Secondary Vault	Not Applicable	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Handhole	Service Box	Not Applicable	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Handhole	Unknown	Not Applicable	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Handhole		Not Applicable	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Manhole	Service Box	Not Applicable	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Manhole	Unknown	Not Applicable	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Vault	Junction Box	Not Applicable	35	60	15000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Vault	Service Box	Not Applicable	35	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Vault	Unknown	Not Applicable	35	60	15000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Vault		Not Applicable	35	60	15000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Vault	Secondary Vault	Not Applicable	35	60	15000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Poles	Non-wood	Not Applicable	Not Applicable	40	75	5400	0.1	0.05	0.3	TCA Reporting and Staff input	2015 CIMA City of Penticton Electrical Distribution Master Plan	unit costs provided by the city of Penticton
Electrical System	Poles	Wood	Not Applicable	Not Applicable	35	57	5500	0.1	0.05	0.3	TCA Reporting and Staff input	2015 CIMA City of Penticton Electrical Distribution Master Plan	unit costs provided by the city of Penticton
Electrical System	Transformer	Regulator	Not Applicable	Not Applicable	40	40	40000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Switch	600 A	Not Applicable	Not Applicable	40	45	5000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Switch	900 A	Not Applicable	Not Applicable	40	45	6000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Switch	Unknown	Not Applicable	Not Applicable	40	45	6000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Switch	Padmount	Not Applicable	Not Applicable	40	30	60000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Overhead	1 Phase Padmount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Overhead	1 Phase Platform	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Overhead	1 Phase Polemount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Overhead	3 Phase Padmount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Overhead	3 Phase Polemount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Overhead	Unknown	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Overhead	Unknown Polemount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Overhead	Unknown Padmount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input		
Electrical System	Transformer	Single Phase Underground	1 Phase Padmount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Underground	1 Phase Polemount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Underground	3 Phase Padmount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Underground	Unknown	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Single Phase Underground	Unknown Padmount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Step	3 Phase Padmount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Step	3 Phase Vault	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Step	Unknown	Not Applicable	40	40	400000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Overhead	1 Phase Polemount	Not Applicable	40	40	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Overhead	3 Phase Polemount	Not Applicable	40	40	10500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Overhead	Unknown	Not Applicable	40	40	10500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Overhead	Unknown Polemount	Not Applicable	40	40	10500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Underground	1 Phase Padmount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Underground	1 Phase Polemount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Underground	3 Phase Padmount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton

category	sub_category	description_1	description_2	description_3	service life industry best practice	service_life_ community_ specific	unit_cost	unit_cost_ adj_eng	unit_cost_ adj_disp	unit_cost_ adj_cont	service_life_industry_best_practice_ notes	service_life_community_specific_notes	unit_cost_notes
Electrical System	Transformer	Three Phase Underground	3 Phase Vault	Not Applicable	40	40	15000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Underground	Unknown	Not Applicable	40	40	15000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Underground	Unknown Padmount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Three Phase Underground	Unknown Polemount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Two Phase Open Delta	1 Phase Polemount	Not Applicable	40	40	7000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Two Phase Open Delta	Unknown Polemount	Not Applicable	40	40	7000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Unknown	1 Phase Padmount	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Unknown	1 Phase Platform	Not Applicable	40	40	8000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Unknown	1 Phase Polemount	Not Applicable	40	40	2000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Unknown	3 Phase Padmount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Unknown	3 Phase Polemount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Unknown	3 Phase Vault	Not Applicable	40	40	15000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Unknown	Unknown Padmount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Transformer	Unknown	Unknown Polemount	Not Applicable	40	40	28000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Fibre	Strand	12	Not Applicable	40	40	25	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Fibre	Strand	24	Not Applicable	40	40	25	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Fibre	Strand	36	Not Applicable	40	40	25	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Fibre	Strand	144	Not Applicable	40	40	25	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Fibre	Civil	Vault	Communications	35	25	10000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Enclosure	Not Applicable	Not Applicable	20	25	10000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Mat	Not Applicable	Not Applicable	20	25	1000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Non-Electric Enclosure	Not Applicable	Not Applicable	20	25	10000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Pad	Not Applicable	Not Applicable	40	55	7000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Pedestal	Not Applicable	Not Applicable	40	55	7000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	High Pressure Sodium	Bollard	5	5	7500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	High Pressure Sodium	Decorative	5	5	11500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	High Pressure Sodium	Standard	5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	High Pressure Sodium	Top Hat	5	5	3300	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	High Pressure Sodium (SBY)	Bollard	5	5	7500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	High Pressure Sodium (SBY)	Decorative	5	5	11500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	High Pressure Sodium (SBY)	Standard	5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	High Pressure Sodium (SBY)	Top Hat	5	5	3300	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Light-emitting Diode (LED)	Bollard	10	10	7500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Light-emitting Diode (LED)	Decorative	10	10	11500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Light-emitting Diode (LED)	Standard	10	10	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Light-emitting Diode (LED)	Top Hat	10	10	3300	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Mercury Vapor	Standard	5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Mercury Vapor	Top Hat	5	5	3300	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Unknown	Bollard	5	5	7500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Unknown	Decorative	5	5	11500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Unknown	Standard	5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Unknown	Top Hat	5	5	3300	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Unknown	Unknown	5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Unknown	Standard	5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires			5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Poles	Non-wood	Not Applicable	75	75	5500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Traffic	Ancillary	Traffic Controller	Not Applicable	10	10	30000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Traffic	Ancillary	Traffic Loop	Not Applicable	10	15	500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Traffic	Luminaires	Pedestrian Signal	Not Applicable	10	10	550	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Traffic	Luminaires	Single Face Signal	Not Applicable	10	10	2300	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Traffic	Poles	Non-wood	Not Applicable	75	75	5500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Civil	Vault	Pull Box	Not Applicable	35	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	Switch	1200 A	Not Applicable	Not Applicable	40	45	7000	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Electrical System	UG Secondary	In Conduit	Not Applicable	Not Applicable	40	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Fibre	Strand	Unknown	Not Applicable	40	40	25	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Civil	Handhole	Street Lighting	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Civil	Vault	Street Lighting	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Light-emitting Diode (LED)	Other	10	10	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires	Unknown	Other	5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires		Standard	5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	UG Secondary	In Concrete Encased Conduit	Not Applicable	40	40	175	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Traffic	Civil	Handhole	Traffic Signal	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Traffic	Civil	Vault	Traffic Signal	50	60	950	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton
Transportation System	Street lighting	Luminaires		Standard	5	5	3500	0.1	0.05	0.3	TCA Reporting and Staff input	Kinectrics Inc Asset Depreciation Study for the Ontario Energy Board	unit costs provided by the city of Penticton

Table** 7.2 **Water, Sanitary and Storm Service Lives

category	sub_category	description_1	description_2	material	service_life_ best_practice	service_life_good_ environment	service_life_community_ poor_environment
Sanitary Sewer	Pipes and Features	Casing		SP	60	90	60
Sanitary Sewer	Pipes and Features	Control Valve		<Null>	25	25	25
Sanitary Sewer	Pipes and Features	Control Valve			25	25	25
Sanitary Sewer	Pipes and Features	Gravity Main		<Null>	50	50	50
Sanitary Sewer	Pipes and Features	Gravity Main		AC	50	100	60
Sanitary Sewer	Pipes and Features	Gravity Main		CT	50	10	10
Sanitary Sewer	Pipes and Features	Gravity Main		CP	60	100	50
Sanitary Sewer	Pipes and Features	Gravity Main		OTH	50	50	50
Sanitary Sewer	Pipes and Features	Gravity Main		PVC	80	100	70
Sanitary Sewer	Pipes and Features	Gravity Main		RCP	50	100	50
Sanitary Sewer	Pipes and Features	Gravity Main		UNK	100	100	50
Sanitary Sewer	Pipes and Features	Gravity Main		VCP	50	100	60
Sanitary Sewer	Pipes and Features	Manhole		<Null>	60	60	60
Sanitary Sewer	Pipes and Features	Pressurized Main		<Null>	50	50	50
Sanitary Sewer	Pipes and Features	Pressurized Main		AC	50	100	60
Sanitary Sewer	Pipes and Features	Pressurized Main		HDPE	80	100	70
Sanitary Sewer	Pipes and Features	Pressurized Main		PVC	80	100	70
Sanitary Sewer	Pipes and Features	Service Connection		<Null>	50	50	50
Sanitary Sewer	Pipes and Features	Service Connection			50	50	50
Sanitary Sewer	Pipes and Features	Service Connection		AC	50	100	60
Sanitary Sewer	Pipes and Features	Service Connection		CP	50	100	50
Sanitary Sewer	Pipes and Features	Service Connection		OTH	50	50	50
Sanitary Sewer	Pipes and Features	Service Connection		PVC	80	100	70
Sanitary Sewer	Pipes and Features	Service Connection		ST	60	90	60
Sanitary Sewer	Pipes and Features	Service Connection		UNK	100	100	50
Sanitary Sewer	Pipes and Features	Service Connection		VCP	50	100	60
Sanitary Sewer	Pipes and Features	System Valve		<Null>	25	25	25
Storm System	Pipes and Features	Casing		<Null>	100	90	30
Storm System	Pipes and Features	Control Valve		<Null>	25	25	25
Storm System	Pipes and Features	Culvert		<Null>	50	50	50
Storm System	Pipes and Features	Culvert		CMP	60	60	36
Storm System	Pipes and Features	Culvert		HDPE	80	100	70
Storm System	Pipes and Features	Culvert		PVC	80	100	70
Storm System	Pipes and Features	Culvert		RCP	50	100	100
Storm System	Pipes and Features	Culvert		UNK	100	100	50
Storm System	Pipes and Features	Discharge Point		<Null>	60	60	60
Storm System	Pipes and Features	Gravity Main		<Null>	50	50	50
Storm System	Pipes and Features	Gravity Main		AC	50	100	60
Storm System	Pipes and Features	Gravity Main		CP	50	100	100
Storm System	Pipes and Features	Gravity Main		CMP	60	60	36
Storm System	Pipes and Features	Gravity Main		HDPE	80	100	70
Storm System	Pipes and Features	Gravity Main		OTH	50	50	50
Storm System	Pipes and Features	Gravity Main		PVC	80	100	70
Storm System	Pipes and Features	Gravity Main		RCP	50	100	50
Storm System	Pipes and Features	Gravity Main		ST	60	90	60
Storm System	Pipes and Features	Gravity Main		UNK	100	100	50
Storm System	Pipes and Features	Manhole		<Null>	60	60	60
Storm System	Pipes and Features	Pressure Pipe		<Null>	80	100	70
Storm System	Pipes and Features	Rock Pit		<Null>	75	75	75
Storm System	Pipes and Features	Service Connection		<Null>	50	50	50
Storm System	Pipes and Features	Service Connection		unknown	100	100	50
Storm System	Pipes and Features	Service Connection			50	50	50
Storm System	Pipes and Features	Service Connection		CMP	60	50	36
Storm System	Pipes and Features	Service Connection		AC	50	100	60
Storm System	Pipes and Features	Service Connection		CP	50	100	50
Storm System	Pipes and Features	Service Connection		PVC	80	100	70
Storm System	Pipes and Features	Service Connection		ST	60	90	60
Water System	Pipes and Features	Casing	<Null>	<Null>	60	60	36
Water System	Pipes and Features	Casing	<Null>	SP	80	90	60
Water System	Pipes and Features	Casing	<Null>	UNK	100	100	50
Water System	Pipes and Features	Control Valve	<Null>	<Null>	25	25	25
Water System	Pipes and Features	Control Valve	<Null>		25	25	25
Water System	Pipes and Features	Control Valve	Air Release		25	25	25
Water System	Pipes and Features	Control Valve	Altitude		25	25	25
Water System	Pipes and Features	Control Valve	Backflow Control		25	25	25
Water System	Pipes and Features	Control Valve	Blowoff		25	25	25
Water System	Pipes and Features	Hydrant	<Null>	<Null>	75	75	75

category	sub_category	description_1	description_2	material	service_life_ best_practice	service_life_good_ environment	service_life_community_ poor_environment
Water System	Pipes and Features	Main	<Null>	<Null>	50	50	50
Water System	Pipes and Features	Main	<Null>	UNK	100	100	50
Water System	Pipes and Features	Main	<Null>	OTH	50	50	50
Water System	Pipes and Features	Main	<Null>	AC	60	100	60
Water System	Pipes and Features	Main	<Null>	CAS	60	100	45
Water System	Pipes and Features	Main	<Null>	CGM	60	60	36
Water System	Pipes and Features	Main	<Null>	COP	80	80	60
Water System	Pipes and Features	Main	<Null>	DIP	100	90	30
Water System	Pipes and Features	Main	<Null>	GP	60	10	10
Water System	Pipes and Features	Main	<Null>	HDPE	80	100	70
Water System	Pipes and Features	Main	<Null>	PCCP	50	100	50
Water System	Pipes and Features	Main	<Null>	PVC	80	100	70
Water System	Pipes and Features	Main	<Null>	SP	60	90	60
Water System	Pipes and Features	Intake	<Null>	<Null>	50	50	50
Water System	Pipes and Features	Intake	<Null>	UNK	100	100	50
Water System	Pipes and Features	Intake	<Null>	OTH	50	50	50
Water System	Pipes and Features	Intake	<Null>	AC	60	100	60
Water System	Pipes and Features	Intake	<Null>	CAS	60	100	45
Water System	Pipes and Features	Intake	<Null>	CGM	60	60	36
Water System	Pipes and Features	Intake	<Null>	COP	80	80	60
Water System	Pipes and Features	Intake	<Null>	DIP	100	90	30
Water System	Pipes and Features	Intake	<Null>	GP	60	10	10
Water System	Pipes and Features	Intake	<Null>	HDPE	80	100	70
Water System	Pipes and Features	Intake	<Null>	PCCP	50	100	50
Water System	Pipes and Features	Intake	<Null>	PVC	80	100	70
Water System	Pipes and Features	Intake	<Null>	SP	60	90	60
Water System	Pipes and Features	Service Connection		Unknown	100	100	50
Water System	Pipes and Features	Service Connection	<Null>	<Null>	50	50	50
Water System	Pipes and Features	Service Connection	<Null>	UNK	100	100	50
Water System	Pipes and Features	Service Connection	<Null>	AC	50	100	60
Water System	Pipes and Features	Service Connection	<Null>	CAS	60	100	45
Water System	Pipes and Features	Service Connection	<Null>	COP	80	50	50
Water System	Pipes and Features	Service Connection	<Null>	DIP	100	90	30
Water System	Pipes and Features	Service Connection	<Null>	GP	60	10	10
Water System	Pipes and Features	Service Connection	<Null>	PVC	80	100	70
Water System	Pipes and Features	Air Release Station	Structure	<Null>	75	75	75
Water System	Pipes and Features	Air Release Station	Valve		25	25	25
Water System	Pipes and Features	Pressure Reducing Station	Structure	<Null>	75	75	75
Water System	Pipes and Features	Pressure Reducing Station	Valve		25	25	25
Water System	Pipes and Features	Valve Station	Structure	<Null>	75	75	75
Water System	Pipes and Features	Well House	Structure	<Null>	75	75	75
Water System	Pipes and Features	Other	Structure	<Null>	75	75	75
Water System	Pipes and Features	Unknown	Structure	<Null>	75	75	75
Water System	Pipes and Features	Empty	Structure	<Null>	75	75	75
Water System	Pipes and Features	System Valve	<Null>	<Null>	60	60	30

Table 7.3 Water, Sanitary and Storm Unit Replacement Costs

category	sub_category	description_1	description_2	diameter	unit_cost	unit_cost_final	units	unit_cost_notes
Sanitary System	Pipes and Features	Casing	<Null>	<Null>	$1,200	$1,740	lm	Assume 600mm
Sanitary System	Pipes and Features	Control Valve	<Null>	<Null>	$3,000	$4,350	each	Assume valve is in a manhole chamber. Assumes only air relief, not air-vac combo
Sanitary System	Pipes and Features	Control Valve	Air Control	<Null>	$3,000	$4,350	each	Assume valve is in a manhole chamber. Assumes only air relief, not air-vac combo
Sanitary System	Pipes and Features	Control Valve	Air Control	150	$3,000	$4,350	each	Assume valve is in a manhole chamber. Assumes only air relief, not air-vac combo
Sanitary System	Pipes and Features	Control Valve	<Null>	-1	$3,000	$4,350	each	<Null>
Sanitary System	Pipes and Features	Control Valve	<Null>	100	$2,500	$3,625	each	<Null>
Sanitary System	Pipes and Features	Control Valve	<Null>	150	$2,700	$3,915	each	<Null>
Sanitary System	Pipes and Features	Control Valve	<Null>	250	$5,000	$7,250	each	<Null>
Sanitary System	Pipes and Features	Gravity Main	<Null>	<Null>	$220	$319	lm	Assume 2-4m depth & same as 200mm
Sanitary System	Pipes and Features	Gravity Main	<Null>	0	$160	$232	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	100	$160	$232	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	150	$180	$261	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	200	$220	$319	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	250	$250	$363	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	300	$280	$406	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	375	$360	$522	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	400	$360	$522	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	450	$500	$725	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	525	$650	$943	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	600	$700	$1,015	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	750	$800	$1,160	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Gravity Main	<Null>	900	$1,000	$1,450	lm	Assume 2-4m depth
Sanitary System	Pipes and Features	Manhole	<Null>	<Null>	$4,500	$6,525	each	Assume 2-4m depth
Sanitary System	Pipes and Features	Pressurized Main	<Null>	<Null>	$120	$174	lm	Assume Same as 100mm
Sanitary System	Pipes and Features	Pressurized Main	<Null>	75	$100	$145	lm	<Null>
Sanitary System	Pipes and Features	Pressurized Main	<Null>	100	$120	$174	lm	<Null>
Sanitary System	Pipes and Features	Pressurized Main	<Null>	150	$150	$218	lm	<Null>
Sanitary System	Pipes and Features	Pressurized Main	<Null>	200	$180	$261	lm	<Null>
Sanitary System	Pipes and Features	Pressurized Main	<Null>	250	$200	$290	lm	<Null>
Sanitary System	Pipes and Features	Pressurized Main	<Null>	300	$275	$399	lm	<Null>
Sanitary System	Pipes and Features	Pressurized Main	<Null>	450	$400	$580	lm	<Null>
Sanitary System	Pipes and Features	Service Connection	<Null>	<Null>	$2,000	$2,900	each	<Null>
Sanitary System	Pipes and Features	Service Connection	<Null>	-1	$2,000	$2,900	each	Inludes service line and cleanout
Sanitary System	Pipes and Features	Service Connection	<Null>	0	$2,000	$2,900	each	Inludes service line and cleanout
Sanitary System	Pipes and Features	Service Connection	<Null>	100	$2,000	$2,900	each	Inludes service line and cleanout
Sanitary System	Pipes and Features	Service Connection	<Null>	150	$2,400	$3,480	each	Inludes service line and cleanout
Sanitary System	Pipes and Features	Service Connection	<Null>	200	$2,800	$4,060	each	Inludes service line and cleanout
Sanitary System	Pipes and Features	Service Connection	<Null>	250	$3,000	$4,350	each	Inludes service line and cleanout
Sanitary System	Pipes and Features	Service Connection	<Null>	300	$4,000	$5,800	each	Inludes service line and cleanout
Sanitary System	Pipes and Features	System Valve	<Null>	<Null>	$2,500	$3,625	each	<Null>
Stom System	Pipes and Features	Casing	<Null>	<Null>	$1,200	$1,740	lm	<Null>
Stom System	Pipes and Features	Control Valve	<Null>	<Null>	$2,500	$3,625	each	<Null>
Stom System	Pipes and Features	Culvert	<Null>	<Null>	$130	$189	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	200	$130	$189	lm	<Null>

category	sub_category	description_1	description_2	diameter	unit_cost	unit_cost_final	units	unit_cost_notes
Stom System	Pipes and Features	Culvert	<Null>	250	$170	$247	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	300	$250	$363	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	350	$265	$384	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	375	$285	$413	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	400	$325	$471	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	450	$350	$508	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	525	$400	$580	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	600	$450	$653	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	750	$600	$870	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	800	$700	$1,015	lm	<Null>
Stom System	Pipes and Features	Culvert	<Null>	900	$800	$1,160	lm	<Null>
Stom System	Pipes and Features	Discharge Point	<Null>	<Null>	$15,000	$21,750	each	Assume it's a standard 600mm pipe with apran outlet
Stom System	Pipes and Features	Gravity Main	<Null>	0	$150	$218	lm	Assume 200mm pipe
Stom System	Pipes and Features	Gravity Main	<Null>	50	$120	$174	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	100	$120	$174	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	150	$130	$189	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	200	$140	$203	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	250	$180	$261	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	300	$200	$290	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	350	$250	$363	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	375	$300	$435	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	400	$350	$508	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	405	$375	$544	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	450	$400	$580	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	500	$500	$725	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	525	$560	$812	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	550	$600	$870	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	600	$620	$899	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	675	$680	$986	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	750	$800	$1,160	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	800	$850	$1,233	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	900	$900	$1,305	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	1050	$1,000	$1,450	lm	<Null>
Stom System	Pipes and Features	Gravity Main	<Null>	1200	$1,500	$2,175	lm	<Null>
Stom System	Pipes and Features	Manhole	<Null>	<Null>	$4,000	$5,800	each	<Null>
Stom System	Pipes and Features	Pressure Pipe	<Null>	<Null>	$100	$145	lm	Assume same unit price as 150mm sanitary forcemain
Stom System	Pipes and Features	Rock Pit	<Null>	<Null>	$100	$145	m3	Includes excavation, rock and liner
Stom System	Pipes and Features	Service Connection	<Null>	<Null>	$2,000	$2,900	each	Includes Service connection and appurtenances
Stom System	Pipes and Features	Service Connection	<Null>	0	$2,000	$2,900	each	Includes service pipe, including curb stop
Stom System	Pipes and Features	Service Connection	<Null>	100	$2,000	$2,900	each	Includes service pipe, including curb stop
Stom System	Pipes and Features	Service Connection	<Null>	150	$2,200	$3,190	each	Includes service pipe, including curb stop
Stom System	Pipes and Features	Service Connection	<Null>	200	$2,300	$3,335	each	Includes service pipe, including curb stop
Stom System	Pipes and Features	Service Connection	<Null>	250	$2,400	$3,480	each	Includes service pipe, including curb stop
Stom System	Pipes and Features	Service Connection	<Null>	300	$2,500	$3,625	each	Includes service pipe, including curb stop
Stom System	Pipes and Features	Service Connection	<Null>	350	$3,000	$4,350	each	Includes service pipe, including curb stop

category	sub_category	description_1	description_2	diameter	unit_cost	unit_cost_final	units	unit_cost_notes
Stom System	Pipes and Features	Service Connection	<Null>	400	$3,200	$4,640	each	Includes service pipe, including curb stop
Stom System	Pipes and Features	Service Connection	<Null>	450	$3,500	$5,075	each	Includes service pipe, including curb stop
Stom System	Pipes and Features	Service Connection	<Null>	500	$4,000	$5,800	each	Includes service pipe, including curb stop
Water System	Pipes and Features	Casing	<Null>	<Null>	$1,000	$1,450	lm	Does not account for pavement restoration as that cost is accounted for under the pipe cost
Water System	Pipes and Features	Casing	<Null>	-1	$1,000	$1,450	lm	Does not account for pavement restoration as that cost is accounted for under the pipe cost
Water System	Pipes and Features	Casing	<Null>	0	$1,000	$1,450	lm	Does not account for pavement restoration as that cost is accounted for under the pipe cost
Water System	Pipes and Features	Casing	<Null>	400	$1,000	$1,450	lm	Does not account for pavement restoration as that cost is accounted for under the pipe cost
Water System	Pipes and Features	Casing	<Null>	600	$1,200	$1,740	lm	Does not account for pavement restoration as that cost is accounted for under the pipe cost
Water System	Pipes and Features	Control Valve	<Null>	<Null>	$3,500	$5,075	each	Assume a 50 mm valve with chamber
Water System	Pipes and Features	Control Valve	Air Release	<Null>	$3,500	$5,075	each	Assume a 50mm valve with chamber
Water System	Pipes and Features	Air Release Station	Valve	25	$3,000	$4,350	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	50	$3,500	$5,075	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	100	$3,700	$5,365	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	150	$3,800	$5,510	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	200	$4,000	$5,800	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	250	$4,200	$6,090	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	300	$4,400	$6,380	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	350	$4,600	$6,670	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	400	$4,800	$6,960	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	450	$5,000	$7,250	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	500	$5,200	$7,540	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	700	$5,500	$7,975	each	Assume air release with valve & chamber
Water System	Pipes and Features	Air Release Station	Valve	750	$5,800	$8,410	each	Assume air release with valve & chamber
Water System	Pipes and Features	Control Valve	Altitude	<Null>	$8,000	$11,600	each	Assume no Chamber
Water System	Pipes and Features	Control Valve	Altitude	250	$15,000	$21,750	each	Assume no Chamber
Water System	Pipes and Features	Control Valve	Altitude	300	$20,000	$29,000	each	Assume no Chamber
Water System	Pipes and Features	Control Valve	Altitude	600	$30,000	$43,500	each	Assume no Chamber
Water System	Pipes and Features	Control Valve	Backflow Control	150	$6,000	$8,700	each	Assume no Chamber
Water System	Pipes and Features	Control Valve	Blowoff	<Null>	$2,500	$3,625	each	Standpipe configuration
Water System	Pipes and Features	Control Valve	Blowoff	19	$2,500	$3,625	each	Standpipe configuration
Water System	Pipes and Features	Control Valve	Blowoff	25	$2,500	$3,625	each	Standpipe configuration
Water System	Pipes and Features	Control Valve	Blowoff	50	$3,000	$4,350	each	Standpipe configuration
Water System	Pipes and Features	Control Valve	Blowoff	150	$8,000	$11,600	each	Hydrant
Water System	Pipes and Features	Control Valve	Blowoff	300	$8,000	$11,600	each	Hydrant
Water System	Pipes and Features	Pressure Reducing Station	Valve	<Null>	$6,000	$8,700	each	Assume just PRV Valve
Water System	Pipes and Features	Pressure Reducing Station	Valve	50	$6,000	$8,700	each	Assume just PRV Valve
Water System	Pipes and Features	Pressure Reducing Station	Valve	100	$10,000	$14,500	each	Assume just PRV Valve
Water System	Pipes and Features	Pressure Reducing Station	Valve	150	$15,000	$21,750	each	Assume just PRV Valve
Water System	Pipes and Features	Pressure Reducing Station	Valve	200	$18,000	$26,100	each	Assume just PRV Valve
Water System	Pipes and Features	Pressure Reducing Station	Valve	350	$25,000	$36,250	each	Assume just PRV Valve
Water System	Pipes and Features	Control Valve	Pressure Relief	<Null>	$6,000	$8,700	each	<Null>
Water System	Pipes and Features	Control Valve	Pressure Relief	19	$6,000	$8,700	each	<Null>
Water System	Pipes and Features	Control Valve	Pressure Relief	50	$8,000	$11,600	each	<Null>
Water System	Pipes and Features	Control Valve	Pressure Relief	150	$12,000	$17,400	each	<Null>
Water System	Pipes and Features	Control Valve	Pressure Relief	200	$20,000	$29,000	each	<Null>

category	sub_category	description_1	description_2	diameter	unit_cost	unit_cost_final	units	unit_cost_notes
Water System	Pipes and Features	Control Valve	Pressure Relief	750	$35,000	$50,750	each	<Null>
Water System	Pipes and Features	Hydrant	<Null>	<Null>	$7,000	$10,150	each	<Null>
Water System	Pipes and Features	Intake	<Null>	<Null>	$1,200	$1,740	lm	Assumes that an intake would not be installed under pavement structure
Water System	Pipes and Features	Intake	<Null>	-1	$1,200	$1,740	lm	Assumes that an intake would not be installed under pavement structure
Water System	Pipes and Features	Intake	<Null>	50	$250	$363	lm	Assumes that an intake would not be installed under pavement structure
Water System	Pipes and Features	Intake	<Null>	100	$300	$435	lm	Assumes that an intake would not be installed under pavement structure
Water System	Pipes and Features	Intake	<Null>	750	$1,200	$1,740	lm	Assumes that an intake would not be installed under pavement structure
Water System	Pipes and Features	Intake	<Null>	900	$2,000	$2,900	lm	Assumes that an intake would not be installed under pavement structure
Water System	Pipes and Features	Intake	<Null>	660	$1,200	$1,740	lm	Assumes that an intake would not be installed under pavement structure
Water System	Pipes and Features	Intake	<Null>	700	$1,200	$1,740	lm	Assumes that an intake would not be installed under pavement structure
Water System	Pipes and Features	Main	<Null>	<Null>	$185	$268	lm	Assumes 200mm pipe
Water System	Pipes and Features	Main	<Null>	-1	$185	$268	lm	Assumes 200mm pipe
Water System	Pipes and Features	Main	<Null>	0	$185	$268	lm	Assumes 200mm pipe
Water System	Pipes and Features	Main	<Null>	19	$80	$116	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	25	$80	$116	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	50	$80	$116	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	75	$95	$138	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	100	$120	$174	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	150	$180	$261	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	200	$220	$319	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	250	$270	$392	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	300	$340	$493	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	350	$380	$551	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	400	$450	$653	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	450	$500	$725	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	500	$550	$798	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	450	$500	$725	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	500	$550	$798	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	600	$630	$914	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	700	$800	$1,160	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	750	$900	$1,305	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Main	<Null>	900	$1,000	$1,450	lm	Assumes just pipe installation but includes fittings & bends (not valves)
Water System	Pipes and Features	Service Connection	<Null>	<Null>	$1,700	$2,465	each	Assumes 25mm connection
Water System	Pipes and Features	Service Connection	<Null>	0	$1,700	$2,465	each	Assumes 25mm connection
Water System	Pipes and Features	Service Connection	<Null>	-1	$1,700	$2,465	each	Assumes 25mm connection
Water System	Pipes and Features	Service Connection	<Null>	100	$2,300	$3,335	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	125	$2,400	$3,480	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	150	$2,500	$3,625	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	15	$1,500	$2,175	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	19	$1,500	$2,175	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	200	$2,600	$3,770	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	25	$1,700	$2,465	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	250	$2,700	$3,915	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	375	$5,000	$7,250	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	38	$1,900	$2,755	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	50	$2,000	$2,900	each	Service Connection - All Lenghts
Water System	Pipes and Features	Service Connection	<Null>	55	$2,000	$2,900	each	Service Connection - All Lenghts

category	sub_category	description_1	description_2	diameter	unit_cost	unit_cost_final	units	unit_cost_notes
Water System	Pipes and Features	Service Connection	<Null>	75	$2,200	$3,190	each	Service Connection - All Lenghts
Water System	Pipes and Features	Air Release Station	Structure	<Null>	$4,000	$5,800	each	Assume manhole barrel structure
Water System	Pipes and Features	Empty	Structure	<Null>	$4,000	$5,800	each	Assume manhole barrel structure
Water System	Pipes and Features	Other	Structure	<Null>	$4,000	$5,800	each	Assume manhole barrel structure
Water System	Pipes and Features	Pressure Reducing Station	Structure	<Null>	$4,000	$5,800	each	Assume manhole barrel structure
Water System	Pipes and Features	Unknown	Structure	<Null>	$4,000	$5,800	each	Assume manhole barrel structure
Water System	Pipes and Features	Valve Station	Structure	<Null>	$4,000	$5,800	each	Assume manhole barrel structure
Water System	Pipes and Features	Well House	Structure	<Null>	$0	$0	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	<Null>	$2,000	$2,900	each	Assume a 200mm valve
Water System	Pipes and Features	System Valve	<Null>		$2,000	$2,900	each	Assume a 200mm valve
Water System	Pipes and Features	System Valve	<Null>	19	$500	$725	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	25	$500	$725	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	38	$550	$798	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	50	$600	$870	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	75	$650	$943	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	100	$1,500	$2,175	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	150	$2,400	$3,480	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	200	$3,000	$4,350	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	250	$3,500	$5,075	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	300	$4,000	$5,800	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	350	$6,500	$9,425	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	400	$9,000	$13,050	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	450	$18,000	$26,100	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	500	$18,500	$26,825	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	600	$24,000	$34,800	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	660	$26,000	$37,700	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	600	$24,000	$34,800	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	660	$26,000	$37,700	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	700	$28,000	$40,600	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	750	$30,000	$43,500	each	<Null>
Water System	Pipes and Features	System Valve	<Null>	900	$40,000	$58,000	each	<Null>

Transporation

Table 7.4 Transportation Unit Replacement Cost and Service Lives

category	sub_category	description_1	description_2	material	road_classification	units	unit_cost	unit_cost_final	service_life_industry_best_practice	unit_cost_notes
Transportation System	Sidewalk			Asphalt		m2	$40	$54	50	Includes Sub-Base & Base
Transportation System	Sidewalk			Concrete		m2	$95	$128	75	Includes Sub-Base & Base
Transportation System	Sidewalk			Gravel		m2	$10	$14	75	Includes Sub-Base & Base
Transportation System	Sidewalk			Other		m2	$95	$128	30	Includes Sub-Base & Base & assume concrete
Transportation System	Sidewalk					m2	$95	$128	30	Includes Sub-Base & Base & assume concrete
Transportation System	Sidewalk			Unknown		m2	$95	$128	30	Includes Sub-Base & Base & assume concrete
Transportation System	Sidewalk			None		m2	$95	$128	30	Includes Sub-Base & Base & assume concrete
Transportation System	Sidewalk			Pavers		m2	$120	$162	50	
Transportation System	Trail			Asphalt		m2	$40	$54	50	Includes Sub-Base & Base
Transportation System	Trail			Concrete		m2	$95	$128	75	Includes Sub-Base & Base
Transportation System	Trail			Gravel		m2	$10	$14	75	Includes Sub-Base & Base
Transportation System	Trail			Other		m2	$95	$128	30	Includes Sub-Base & Base
Transportation System	Trail					m2	$10	$14	30	Includes Sub-Base & Base & assume gravel
Transportation System	Trail			Unknown		m2	$10	$14	30	Includes Sub-Base & Base & assume gravel
Transportation System	Trail			Pavers		m2	$120	$162	50	
Transportation System	Trail			None		m2	$10	$14	30	Assume Gravel Trail
Transportation System	Walkway			Asphalt		m2	$40	$54	50	Includes Sub-Base & Base
Transportation System	Walkway			Concrete		m2	$95	$128	75	Includes Sub-Base & Base
Transportation System	Walkway			Gravel		m2	$10	$14	75	Includes Sub-Base & Base
Transportation System	Walkway			Other		m2	$95	$128	30	Includes Sub-Base & Base & assume concrete
Transportation System	Walkway			Unknown		m2	$95	$128	30	Includes Sub-Base & Base & assume concrete
Transportation System	Walkway					m2	$95	$128	30	Includes Sub-Base & Base & assume concrete
Transportation System	Walkway			Pavers		m2	$120	$162	50	
Transportation System	Walkway			None		m2	$95	$128	75	Includes Sub-Base & Base. Assume Concrete
Transportation System	Cable Strip			Asphalt		m2	$30	$41	50	
Transportation System	Cable Strip			Concrete		m2	$100	$135	75	
Transportation System	Cable Strip			Gravel		m2	$20	$27	75	
Transportation System	Cable Strip			Other		m2	$100	$135	30	
Transportation System	Cable Strip					m2	$30	$41	50	Assume Asphalt
Transportation System	Cable Strip			Unknown		m2	$30	$41	50	Assume Asphalt
Transportation System	Cable Strip			Pavers		m2	$120	$162	50	
Transportation System	Boulevard	Landscaped	Irrigated Turf			m2	$15	$20	10	Assumed Irrigated
Transportation System	Boulevard	Landscaped	Irrigated Shrubs			m2	$65	$88	10	
Transportation System	Boulevard	Hardscape				m2	$120	$162	50	Assumes Unit Paver
Transportation System	Boulevard	Hardscape		Pavers		m2	$120	$162	50	
Transportation System	Boulevard					m2	$120	$162	50	Assume Hardscape pavers
Transportation System	Unimproved Boulevard					m2	$10	$14	50	Assume unirrigated Turf
Transportation System	Median	Landscaped	Irrigated Turf			m2	$25	$34	10	
Transportation System	Median	Landscaped	Irrigated Shrubs			m2	$65	$88	10	
Transportation System	Median	Hardscape				m2	$120	$162	75	Assumes Unit Paver
Transportation System	Median	Hardscape		Pavers		m2	$120	$162	50	
Transportation System	Median					m2	$120	$162	50	Assume unit pavers
Transportation System	Traffic	Sign	Small			Each	$500	$675	15	Assumes just sign, no pole
Transportation System	Traffic	Sign	Medium			Each	$1,500	$2,025	15	
Transportation System	Traffic	Sign	Large			Each	$2,000	$2,700	15	
Transportation System	Traffic	Sign	Unknown			Each	$750	$1,013	15	
Transportation System	Bike Rack					Each	$1,200	$1,620	15	
Transportation System	Hand Rail	Basic		Steel		lm	$100	$135	50	Assume Basic Steel post rail

category	sub_category	description_1	description_2	material	road_classification	units	unit_cost	unit_cost_final	service_life_industry_best_practice	unit_cost_notes
Transportation System	Hand Rail	Ornamental		Steel		lm	$250	$338	50	
Transportation System	Hand Rail			Steel		lm	$250	$338	50	
Transportation System	Hand Rail	Basic		Wood		lm	$50	$68	25	
Transportation System	Hand Rail	Ornamental		Wood		lm	$100	$135	25	
Transportation System	Hand Rail			Wood		lm	$50	$68	25	
Transportation System	Stairs			Wood		m2	$450	$608	75	
Transportation System	Stairs			Concrete		m2	$250	$338	75	
Transportation System	Stairs					m2	$50	$68	75	material unknown
Transportation System	Stairs			Unknown		m2	$250	$338	75	
Transportation System	Guard Rail			Concrete		lm	$200	$270	75	
Transportation System	Guard Rail			Steel		lm	$150	$203	50	
Transportation System	Guard Rail			Other		lm	$200	$270	50	
Transportation System	Road Pavement and Structure			Asphalt	Arterial	m2	$69	$93	30	
Transportation System	Road Pavement and Structure			Asphalt	Collector Commercial	m2	$55	$75	33	
Transportation System	Road Pavement and Structure			Asphalt	Collector Residential	m2	$51	$69	35	
Transportation System	Road Pavement and Structure			Asphalt	Collector Rural	m2	$40	$54	36	
Transportation System	Road Pavement and Structure			Asphalt	Local Commercial	m2	$40	$54	41	
Transportation System	Road Pavement and Structure			Asphalt	Local Residential	m2	$40	$54	43	
Transportation System	Road Pavement and Structure			Asphalt	Local Rural	m2	$40	$54	45	
Transportation System	Road Pavement and Structure			Asphalt	Lane	m3	$35	$47	60	
Transportation System	Road Pavement and Structure			Unknown	Arterial	m2	$69	$93	30	
Transportation System	Road Pavement and Structure			Unknown	Collector Commercial	m2	$55	$75	33	
Transportation System	Road Pavement and Structure			Unknown	Collector Residential	m2	$51	$69	35	
Transportation System	Road Pavement and Structure			Unknown	Collector Rural	m2	$40	$54	36	
Transportation System	Road Pavement and Structure			Unknown	Local Commercial	m2	$40	$54	41	
Transportation System	Road Pavement and Structure			Unknown	Local Residential	m2	$40	$54	43	
Transportation System	Road Pavement and Structure			Unknown	Local Rural	m2	$40	$54	45	
Transportation System	Road Pavement and Structure			Unknown	Lane	m3	$35	$47	60	
Transportation System	Road Pavement and Structure			Gravel	Arterial	m2	$53	$72	90	
Transportation System	Road Pavement and Structure			Gravel	Collector Commercial	m2	$43	$58	100	
Transportation System	Road Pavement and Structure			Gravel	Collector Residential	m2	$39	$52	104	
Transportation System	Road Pavement and Structure			Gravel	Collector Rural	m2	$31	$41	108	
Transportation System	Road Pavement and Structure			Gravel	Local Commercial	m2	$31	$41	123	
Transportation System	Road Pavement and Structure			Gravel	Local Residential	m2	$31	$41	129	
Transportation System	Road Pavement and Structure			Gravel	Local Rural	m2	$31	$41	135	
Transportation System	Pedestrian Bridge			Asphalt	See Tab: Road Classification	m2	$1,800	$2,430	60	
Transportation System	Pedestrian Bridge			Concrete	See Tab: Road Classification	m2	$1,800	$2,430	60	
Transportation System	Pedestrian Bridge			Wood	See Tab: Road Classification	m2	$1,800	$2,430	60	
Transportation System	Pedestrian Bridge			Steel	See Tab: Road Classification	m2	$1,800	$2,430	60	
Transportation System	Pedestrian Bridge			Other	See Tab: Road Classification	m2	$1,800	$2,430	60	
Transportation System	Pedestrian Bridge			Unknown	See Tab: Road Classification	m2	$1,800	$2,430	60	
Transportation System	Pedestrian Bridge			None	See Tab: Road Classification	m2	$1,800	$2,430	60	
Transportation System	Vehicular Bridge			Asphalt	See Tab: Road Classification	m2	$3,500	$4,725	50	
Transportation System	Vehicular Bridge			Concrete	See Tab: Road Classification	m2	$3,500	$4,725	50	
Transportation System	Vehicular Bridge			Wood	See Tab: Road Classification	m2	$3,500	$4,725	50	
Transportation System	Vehicular Bridge			Steel	See Tab: Road Classification	m2	$3,500	$4,725	50	
Transportation System	Vehicular Bridge			Other	See Tab: Road Classification	m2	$3,500	$4,725	50	
Transportation System	Vehicular Bridge			Unknown	See Tab: Road Classification	m2	$3,500	$4,725	50	
Transportation System	Vehicular Bridge			None	See Tab: Road Classification	m2	$3,500	$4,725	50	

Table 7.5 Engineernig, Contingency and Asset Disposal Allowances

Description	Water	Sanitary	Storm	Transportation	Electrical	Facilities	Fleet	Parks
Engineering	10%	10%	10%	7%	10%	N/A - Costs provided by IMS and Insurance Values	N/A - Costs provided by City of Penticton	N/A - Costs from TCA (index'd to 2018 $'s using ENR Index
Contingency	30%	30%	30%	25%	30%			
Asset Disposal	5%	5%	5%	3%	5%			
Total	45%	45%	45%	35%	45%			

APPENDIX B

Service Lives Modification Factors

Table 7.6 Service Life Modification Factors

Category	Subcategory	Description_1	Description_2	Service_Life	Max Service Life Observed	Modification Factors Observed	Modification Factors Applied
Park Systems	Building			15	15	0%	0%
Park Systems	Fencing			25	25	0%	0%
Park Systems	Furniture			50	51	2%	2%
Park Systems	Irrigation			40	48	20%	20%
Park Systems	Play Ground			25	25	0%	0%
Park Systems	Play Structure			40	40	0%	0%
Park Systems	Sporting Amenity			40	40	0%	0%
Park Systems	Streetlights			25	25	0%	0%
Park Systems	Trail			40	48	20%	20%

Category	Subcategory	Description_1	Material	Service_Life	Max Service Life Observed	Modification Factors Observed	Modification Factors Applied
Water System	Pipes and Features	Mains	Asbestos Cement	100	100	0%	0%
Water System	Pipes and Features	Mains	Cast Iron	100	106	6%	6%
Water System	Pipes and Features	Mains	Copper	100	106	6%	6%
Water System	Pipes and Features	Mains	Corrugated Metal	100	100	0%	0%
Water System	Pipes and Features	Mains	Ductile Iron	100	100	0%	0%
Water System	Pipes and Features	Mains	Galvanized Pipe	100	105	5%	5%
Water System	Pipes and Features	Mains	High Density Polyethylene	100	100	0%	0%
Water System	Pipes and Features	Mains	Other	100	100	0%	0%
Water System	Pipes and Features	Mains	Polyvinyl Chloride	100	100	0%	0%
Water System	Pipes and Features	Mains	Pre-Stressed Concrete Cylinder	100	100	0%	0%
Water System	Pipes and Features	Mains	Steel	100	100	0%	0%
Water System	Pipes and Features	Mains	Unknown	100	106	6%	6%
Water System	Pipes and Features	Mains	(blank)	100	113	13%	13%
Water System	Pipes and Features	Air Release Station		100	100	0%	0%
Water System	Pipes and Features	Control Valve		100	100	0%	0%
Water System	Pipes and Features	Hydrant		75	106	41%	41%
Water System	Pipes and Features	Intake		100	100	0%	0%
Water System	Pipes and Features	Pressure Reducing Station		100	100	0%	0%
Water System	Pipes and Features	Service Connection		100	113	13%	13%
Water System	Pipes and Features	System Valve		60	106	77%	77%
Water System	Pipes and Features	Valve Station		75	75	0%	0%
Water System	Facilities	Building Mechanical		50	50	0%	0%
Water System	Facilities	Electrical		50	53	6%	6%
Water System	Facilities	Electronics		30	35	17%	17%
Water System	Facilities	Process Mechanical		45	53	17%	17%
Water System	Facilities	Structural		62	62	0%	0%
Water System	Facilities	Civil		53	53	0%	0%

Category	Subcategory	Description_1	Material	Service_Life	Max Service Life Observed	Modification Factors Observed	Modification Factors Applied
Transportation System	Cable Strip			75	75	0%	0%
Transportation System	Hand Rail			50	68	36%	36%
Transportation System	Road Pavement and Structure			60	60	0%	0%
Transportation System	Sidewalk			75	75	0%	0%
Transportation System	Stairs			75	75	0%	0%
Transportation System	Trail			75	75	0%	0%
Transportation System	Unimproved Boulevard			50	68	36%	36%
Transportation System	Vehicular Bridge			50	58	16%	16%
Transportation System	Walkway			75	75	0%	0%

Category	Subcategory	Description_1	Material	Service_Life	Max Service Life Observed	Modification Factors Observed	Modification Factors Applied
Electrical System	Capacitor				40	40	0%
Electrical System	Civil				60	64	0%
Electrical System	OH Primary				60	73	20%
Electrical System	Overhead Secondary				60	73	20%
Electrical System	Overhead Service				60	74	20%
Electrical System	Poles				75	78	10%
Electrical System	Switch				45	45	0%
Electrical System	Transformer				40	64	0%
Electrical System	UG Primary				40	59	50%
Electrical System	UG Secondary				40	55	0%
Electrical System	Underground Service				40	49	0%
Electrical System	Meter						

Category	Subcategory	Description_1	Material	Service_Life	Max Service Life Observed	Modification Factors Observed	Modification Factors Applied
Storm System	Pipes and Features	Main	Asbestos Cement	100	100	0%	0%
Storm System	Pipes and Features	Main	Corrugated Metal	60	60	0%	0%
Storm System	Pipes and Features	Main	High Density Polyethylene	100	100	0%	0%
Storm System	Pipes and Features	Main	Other	50	50	0%	0%
Storm System	Pipes and Features	Main	Polyvinyl Chloride	100	100	0%	0%
Storm System	Pipes and Features	Main	Steel	90	90	0%	0%
Storm System	Pipes and Features	Main	Unknown	100	100	0%	0%
Storm System	Pipes and Features	Main	(blank)	100	100	0%	0%
Storm System	Pipes and Features	Main	Reinforced Concrete	100	100	0%	0%
Storm System	Pipes and Features	Main	Concrete (Non-Reinforced)	100	100	0%	0%
Storm System	Pipes and Features	Culvert		100	100	0%	0%
Storm System	Pipes and Features	Discharge Point		60	60	0%	0%
Storm System	Pipes and Features	Gravity Main		100	100	0%	0%
Storm System	Pipes and Features	Manhole		60	60	0%	0%
Storm System	Pipes and Features	Service Connection		100	100	0%	0%

Category	Subcategory	Description_1	Material	Service_Life	Max Service Life Observed	Modification Factors Observed	Modification Factors Applied
Building System	Structure	Concrete Foundations		84	119	0%	0%
Building System	Structure	Concrete slab-on grade		62	94	0%	0%
Building System	Electrical	Distribution		34	86	4%	0%
Building System	Architechtural	Elevator		10	39	40%	30%
Building System	Architechtural	Envelope		55	119	0%	0%
Building System		Exterior		25	25	240%	50%
Building System	Electrical	Fire Alarm		17	41	33%	0%
Building System	Mechanical	HVAC		27	72	0%	0%
Building System	Architechtural	Interior		24	105	0%	50%
Building System	Architechtural	Interiors		20	20	325%	50%
Building System	Electrical	Lighting		30	85	4%	0%
Building System	Mechanical	Plumbing		35	74	0%	40%
Building System	Mechanical	Pool Filtration		1	20	0%	0%
Building System	Refrigeration	Refrigerated Ice Slab		6	35	31%	0%
Building System	Refrigeration	Refrigeration Mechanical		6	38	0%	0%
Building System	Architechtural	Roof		23	46	87%	0%
Building System		Services		13	25	240%	0%
Building System	Mechanical	Sprinkler		7	31	0%	0%
Building System	Architechtural	Stairs and Guards		39	84	7%	50%
Building System	Structure	Superstructure		99	99	0%	0%
Total							36%

Category	Subcategory	Description_1	Material	Service_Life	Max Service Life Observed	Modification Factors Observed	Modification Factors Applied
Sanitary System	Pipes and Features	Main	Asbestos Cement	100	100	0%	0%
Sanitary System	Pipes and Features	Main	Other	50	50	0%	0%
Sanitary System	Pipes and Features	Main	Polyvinyl Chloride	100	100	0%	0%
Sanitary System	Pipes and Features	Main	Unknown	100	100	0%	0%
Sanitary System	Pipes and Features	Main	(blank)	100	118	*18%	0%
Sanitary System	Pipes and Features	Main	Concrete (Non-Reinforced)	100	100	0%	0%
Sanitary System	Pipes and Features	Main	Vitrified Clay	100	100	0%	0%
Sanitary System	Pipes and Features	Main	Reinforced Concrete	100	100	0%	0%
Sanitary System	Pipes and Features	Main	Clay Tile	10	53	*430%	0%
Sanitary System	Pipes and Features	Air Release Station		75	75	0%	0%
Sanitary System	Pipes and Features	Casing		60	118	*97%	0%
Sanitary System	Pipes and Features	Control Valve		25	118	*372%	0%
Sanitary System	Pipes and Features			100	118	18%	
Sanitary System	Pipes and Features	Service Connection		100	118	18%	0%
Sanitary System	Pipes and Features	System Valve		60	118	*97%	0%
Sanitary System	Pipes and Features	Valve Station		75	75	0%	0%
Sanitary System	Pipes and Features	Gravity Main		100	100	0%	0%
Sanitary System	Pipes and Features	Pressurized Main		100	100	0%	0%
Sanitary System	Pipes and Features	Manhole		60	118	*97%	0%
Sanitary System	Facility	Building Mechanical		62	62	0%	0%
Sanitary System	Facility	Civil		63	63	0%	0%
Sanitary System	Facility	Electrical		50	50	0%	0%
Sanitary System	Facility	Electronics		31	31	0%	0%
Sanitary System	Facility	Process Mechanical		62	62	0%	0%
Sanitary System	Facility	Structural		97	97	0%	0%
*Year of Installation had a high level of uncertainity so observed service life data was not taken into account							

APPENDIX C

Data Source Summary

Table 7.7 Data Source Summary

Asset Category	Description
Water System	
Pipes and Features	**Replacement Costs:** Estimated based on recent tenders **Quantity**: GIS **Year of Install/Size/Material:** GIS
Facilities	**Replacement Costs:** AECOM report "Asset Management Renewal Assessment Water Treatment Plant, Pump Stations, Reservoirs, and PRVs" for details. **Quantity**: same as above **Year of Install/Size:** same as above
Sanitary System	
Pipes and Features	**Replacement Costs:** Estimated based on recent tenders **Quantity**: GIS **Year of Install/Size/Material:** GIS
Facilities	**Replacement Costs:** AECOM report "Asset Management Renewal Assessment Advanced Wastewater Treatment Plant and Sanitary Lift Stations". **Quantity**: same as above **Year of Install/Size:** same as above
Storm System	
Pipes and Features	**Replacement Costs:** Estimated based on recent tenders **Quantity**: GIS **Year of Install/Size/Material:** GIS
Transportation System	
All Assets	**Replacement Costs:** Estimated based on recent tenders **Quantity**: GIS **Year of Install/Size/Material:** GIS
Parks System	
All Assets	**Replacement Costs:** TCA Historical Costs Indexed to 2018 $'s using ENR cost index **Quantity**: TCA **Year of Install/Size/Material:** TCA
Building System	
Major Facilities*	**Replacement Costs:** LTA's Report "City of Penticton – Facility Replacement Report" **Quantity**: Same as above **Year of Install:** Same as above
Minor Facilities	**Replacement Costs:** Insurance Records **Quantity**: Insurance Records **Year of Install:** Insurance Records

*Major facilities including City Hall, City Yards, City Yard ays 1-11, Community Center, Curling Rink, Jubliee Pavilion, Library/Museum, Leir House, Mclaren Park Arena, Memorial Arena, PTCC, PEP Search and Rescue, Justice Building (RCMP), South Okanagan Events center, Westminster Building, Fire Hall #1, Fire Hall #2, Dog Shelter, Dog Control Facility – New Caretaker Residence, Indoor Soccer Facility, Soccer Club.