Corporation of the City of Pembroke Asset Management Plan

Ontario Regulation 588/17

July 2022

Table of Contents

Contents

Resolution/Sign-Off

The Corporation of the City of Pembroke

Pembroke, Ontario

Date: 2022-06-21

Resolution No: 2022-011

Moved by:

Seconded by:

Whereas municipal infrastructure provides the foundation for the economic, social, and environmental health and growth of a community through the delivery of critical services; and

Whereas the Province of Ontario has passed the *Infrastructure for Jobs and Prosperity Act, 2015* requiring asset management planning for public sector organizations in Ontario; and

Whereas the Province of Ontario has implemented the *Asset Management Planning for Municipal Infrastructure Regulation 588/17* as amended by *O.Reg 193/21* which states that every municipality shall prepare and approve a Strategic Asset Management Plan by July 1, 2022, for core assets (roads, bridges and culverts, water, wastewater and stormwater management systems) that identifies current levels of service and the cost of maintaining those levels of service; and

Whereas the Asset Management Plan details the principles and general framework for a consistent and coordinated approach to the management of Municipal assets in order to meet approved levels of service, ensure long-term sustainability, to demonstrate fiscal responsibility and to establish an evidence-based decision-making framework to guide asset investment decisions

Therefore the Council of the Corporation of the City of Pembroke deems it expedient and desirable to establish and adopt the Asset Management Plan for the City of Pembroke.

Carried

Mayor

(Signed original on file at City of Pembroke City Hall)

Revision Summary

This page will be updated with the revision date, description and author as revisions are completed.

Executive Summary

The Corporation of the City of Pembroke has developed this plan in accordance with Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure. The plan meets the requirements for the July 1st, 2022, deadline whereas the City has completed an inventory on its core infrastructure assets.

Moving forward the City will use this plan and subsequent updates to help guide decision making using the key principals of municipal asset management.

Definitions

Core Municipal Infrastructure Asset: As defined in Ontario Regulation 588/17, a core municipal infrastructure asset is as follows:

Any municipal infrastructure asset that is a,

a. Water asset that relates to the collection, production, treatment, storage, supply, or distribution of water;
b. Wastewater asset that relates to the collection, transmission, treatment, or disposal of wastewater, including any wastewater asset that from time to time manages stormwater;
c. Stormwater management asset that relates to the collection, transmission, treatment, retention, infiltration, control, or disposal of stormwater;
d. Road, or
e. Bridge or culvert.

Lifecycle Activities: As defined in Ontario Regulation 588/17, a lifecycle activity is defined as activities undertaken with respect to a municipal infrastructure asset over its service life, including constructing, maintaining, renewing, operating, decommissioning, and all engineering and design work associated with those activities.

Acquisition Date: The date the City of Pembroke took ownership of the asset

Installation Date: The date the asset installation was completed and available for use by the City of Pembroke

Abbreviations

AMP – Asset Management Plan

O.Reg. – Ontario Regulation

SAMP – Strategic Asset Management Policy

GHG – Greenhouse Gas

Km – Kilometers

PCI – Pavement Condition Index

SCI – Sidewalk Condition Index

OSIM – Ontario Structure Inspection Manual

Units

Km - Kilometers

M - Meters

CAD - Currency – Canadian Dollars

Introduction

Background

The City of Pembroke is located geographically within the County of Renfrew, approximately 100 km north-west of Ottawa, along the Ottawa River. According to the 2016 census, the population of the City of Pembroke is 13882 (3). The City of Pembroke is home to various important infrastructure and facilities, including, but not limited to the following:

- Hospital
- OPP
- Fire
- Various Schools
- WPP
- STP
- City Hall
- Pool

In order to comply with O. Reg. 588/17, the City must meet certain deadlines. The City developed a Strategic Asset Management Policy in advance of the July 1, 2019, deadline. This current Asset Management Plan meets the July 1, 2022, deadline for all core infrastructure assets. As described below, asset management plans for all municipal infrastructure assets and a plan including proposed levels of service are due July 1, 2023, and July 1, 2024, respectively.

1. July 1, 2019 – Strategic Asset Management Policy
2. July 1, 2021 – Core Infrastructure Assets
3. July 1, 2023 – Municipal Infrastructure Assets
4. July 1, 2024 – Proposed Levels of Service

According to the definitions provided in O.Reg. 588/17, the City of Pembroke owns and operates the following core infrastructure assets:

- Water Assets
- Wastewater Assets
- Storm Water Assets
- Road Assets
- Bridge Assets

Asset Management Team

The Asset Management Team was defined in the City of Pembroke's Strategic Asset Management Policy.

Infrastructure Asset Inventory

This section includes a summary of all core infrastructure assets owned by the City of Pembroke. This section also includes condition information and description about how condition information was collected. Core Infrastructure Assets include the following, which are further described in the definitions section and in O.Reg. 588/17:

- Water Assets
- Wastewater Assets
- Storm Water Assets
- Road Assets
- Bridge Assets

Water Assets

Asset groups in the water assets category include linear water assets, water storage, and the water treatment.

Linear Water Assets:
The City owns and maintains a total of 114 kms of watermain, with an estimated replacement value of $208,282,740.00. Data was collected through analysis of build drawings and PSAB information. Estimated replacement costs were calculated based on recent construction projects. The replacement cost includes material, labour, and restoration to current conditions.

Pipe Material	Quantity (km)	Average Age	Replacement Cost
CI	26.2	83	$14,693,515
CPP	0.9	40	$723,520
CU	0.1	47	$65,314
DI	17.7	48	$10,598,566
Galv	0.2	62	$64,740
HDPE	0.3	19	$154,832
HYP	4.4	41	$3,305,800
PE	0.2	20	$99,302
PVC	30.4	22	$17,013,602
Unknown	32.5	72	$17,616,078

Water Storage Assets:
Waste storage facilities include the Water Tower (1958) and the Quarry Reservoir (1983). In 2020 the City hired a third-party consultant to conduct a BCA on the Water Tower determining an estimated replacement value of $3,500,000. In 2021 the City hired a third-party consultant to conduct a BCA on the Quarry Reservoir determining an estimated replacement value of $3,593,850.

Water Treatment Assets:
The City owns, operates, and maintains a Water Treatment Plant build in 1984. In 2020 the City hired a third-party consultant to conduct a BCA of the water treatment plant determining an estimated replacement value of $9,090,400.

Wastewater Assets:

Asset groups in the wastewater assets category include linear wastewater assets, lift stations, and wastewater treatment.

Linear Wastewater Assets:
The City owns and maintains a total of 98 kms of sewer mains, with an estimated replacement value of $126,747,057.60. Data was collected through analysis of as build drawings and PSAB information. Estimated replacement costs were calculated based on recent construction project. The replacement costs include material, labour, and restoration to current conditions.

Pipe Material	Quantity (km)	Average Age	Replacement Cost
AC	44.8	67	$57,941,512
CI	0.06	54	$77,600
CONP	15.5	60	$20,046,728
DI	0.02	41	$25,867
PE	0.17	42	$2,198,673
PVC	26.6	24	$34,402,773
VIT	9.1	96	$11,769,370
Unknown	4.8	69	$6,208,019

Lift Stations:
The City owns and operates 9 lift stations with an estimated replacement value of $14,158,230. BCA's were completed on the Townline, MacKay, and McGee lift stations in 2020. Data for the remaining lift stations was collected through analysis of PSAB information.

Lift Stations	Age	Replacement Costs
Townline	1976	$5,007,200
MacKay	1966	$3,779,600
McGee	2018	$4,290,000
Marina	1985	$22,190
Riverside Park	1972	$82,540
Riverside Drive	1981	$525,120
Crandall	1985	$40,000
Pembroke Place	1986	$48,120
Moffat	1997	$363,460

Wastewater Treatment Assets:
The City owns, operates, and maintains a Pollution Control Center built in 1967 and renovated in 1984. In 2020 the City hired a third-party consultant to conduct a BCA of the Pollution Control Center determining an estimated replacement value of $66,000,000.

Stormwater Assets

Asset groups in the stormwater asset category include linear stormwater assets and stormwater treatment.

Linear Stormwater Assets:
The City owns and maintains a total of 54 kms of storm main, with an estimated replacement value of $95,254,180. Data was collected through analysis of as build drawings and PSAB information. Estimated replacement costs were calculated based on recent construction projects. The replacement costs include material, labour and restoration to current conditions.

Pipe Material	Quantity (km)	Average Age	Replacement Cost
AC	0.2	97	$352,793
Cement	0.2	Unknown	$352,793
CON	2.2	48	$3,881,163
CONP	2.5	33	$4,410,412

Pipe Material	Quantity (km)	Average Age	Replacement Cost
Corr Steel	0.01	Unknown	$17,642
CSP	0.2	40	$352,793
GALV	0.04	Unknown	$70,566
HDPE	4.7	19	$8,291,575
PE	0.07	19	$123,491
Plastic	1.3	Unknown	$2,293,414
PVC	3.6	24	$6,350,994
Red Clay	3	86	$5,292,495
Steel casi	0.04	28	$70,567
VIT	3.8	104	$6,703,827
Unknown	32.1	48	$56,623,318

Outfalls

Outfall Type	Count	Average Age	Replacement Cost
Collection	62	47	$2,200,710

Culverts and Ditching

Type	Length (km)	Average Age	Replacement Cost
Culverts	13	Unknown	$19,016,000
Open Ditches	44	Unknown	$3,820,982

Road Assets

Road assets include road surface and base, sidewalks, and traffic signals.

Road Surface and Base:
The City of Pembroke owns and maintains 99.1 km of roadway, categorized as arterial, collector and local roads. The average PCI of the entire road network is 67. Condition information was collected in 2021.

Asphalt

Category	Quantity (km)	PCI	Replacement Cost
Arterial	74	71	$22,425,700
Collector	10	67	$3,030,500
Local	15	64	$4,545,750,

Sidewalk:
The City of Pembroke owns and maintains 66 kms of sidewalk. The average SCI of the entire sidewalk network is 81. Condition information was collected in 2021.

Category	Quantity (km)	SCI	Replacement Cost
Sidewalks	66	75	$1,650,000

Signalized Intersections and Pedestrian Crossing Signals:
Signalized intersections and pedestrian crossings are treated as pooled assets. Age, condition, and replacement cost values have been provided for the entire intersection.

Type	Quantity	Average Age	Replacement Cost
Traffic Signal Intersections (3-way)	3	24	$221,443
Traffic Signals (4-Way)	19	25	$1,007,924
Pedestrian Crossing Signals	7	13	$70,992

Bridge Assets

The City of Pembroke owns and maintains ten (10) bridge structures. Through a mandated process, the condition of each of the bridges is completed every two (2) years, as required. The below table summarizes the bridge condition index and estimated replacement costs for each of the 10 structures. Values were determined by a retained engineering firm.

Bridge Name	BCI	Replacement Cost
Pembroke Street Bridge	74	$4,561,000
Indian River Bridge	75	$2,095,000

Bridge Name	BCI	Replacement Cost
Mary Street Bridge	75	$6,202,000
Foster Fraser Bridge	74	$2,492,000
Taylor Bridge	72	$2,813,000
Christie Street Bridge	71	$1,496,000
Lake Street Bridge	75	$3,913,000
Olympic Drive Bridge	73	$4,241,000
Indian River Pedestrian Bridge	55	$219,000
Ottawa River Walkway Pedestrian Bridge	75	$412,000

Current Levels of Service

Ontario Regulations 588/17 requires current levels of service of core infrastructure assets for July 1, 2021. Proposed levels of service are required for July 2, 2024. In order to develop levels of service for the City of Pembroke, City staff worked with a third-party consultant.

Water Assets

Community Level of Service - Service Attribute – Scope

Qualitative Description	Current LOS
Description, which may include maps or user group areas that are connected to the municipal water system	Fire flow is available throughout the water distribution system. As required by bylaw, new developments must provide fire flow
Description which may include maps of the user groups or areas that have fire flow	There were 11 watermain breaks in 2020

Community Level of Service - Service Attribute – Reliability

Qualitative Description	Current Level of Service
Description of boil water advisories and service interruptions	There were 11 watermain breaks in 2020

Technical Level of Service - Service Attribute – Scope

Qualitative Description	Current Level of Service
Percentage of properties connected to the municipal water system	85% (City of Pembroke only, excluding 60 properties serviced in Laurentian Valley)
Percentage of properties where fire flow is available	75%

Technical Level of Service - Service Attribute – Reliability

Qualitative Description	Current Level of Service
The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	Zero
The number of connection-days per year due to watermain breaks compared to the total number of properties connected to the municipal water system	Water service was not interrupted during the watermain breaks in 2020

Technical Level of Service - Service Attribute – Performance Measures

Qualitative Description	Current Level of Service
Annual operating cost to provide water service	$4.5 million
Percentage of water assets in fair or better condition	71%
Number of watermain breaks per km	0.1/km

Qualitative Description	Current Level of Service
Number of complains due to discoloured water per year	Zero

Wastewater Assets

Community Level of Service - Service Attribute – Scope

Qualitative Description	Current Level of Service
Description, which may include, maps of the user groups or areas that are connected to the municipal water system	Currently all developed properties within the City have access to the municipal water system.

Community Level of Service - Service Attribute – Reliability

Qualitative Description	Current Level of Service
Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	Infiltration and inflow into sanitary sewers are groundwater which is not intended to be in the sanitary system. Infiltration can enter through a variety of sources (cracks in pipes, weeping tile connections, cross connections, etc.)
Description of how sanitary sewers in municipal wastewater system are designed to be resilient to avoid events described above	The City has a bylaw in place that homeowners cannot cross connect storm to the sanitary system
Description of the effluent that is discharged from wastewater treatment plants in the municipal wastewater system	Effluent refers to water pollution that is discharged from a wastewater treatment plant and may include suspended solids, total phosphorus and biological oxygen demand. The Environmental Compliance Act (ECA) identifies the effluent criteria for municipal plants.

Technical Level of Service - Service Attribute – Scope

Qualitative Description	Current Level of Service
Percentage of properties connected to the municipal water system	85% (City of Pembroke only, excluding four properties serviced in Laurentian Valley)

Technical Level of Service - Service Attribute – Reliability

Qualitative Description	Current Level of Service
The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal water system	One day per 4,866 properties serviced (City of Pembroke only, excluding four properties serviced in Laurentian Valley)
The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	In July and August 2019, total ammonia nitrogen limits were not meant due to a polymer pump mechanical issue. During all other months, all criteria limits were met. This equates to two effluent violations per year per 4,866 properties serviced.

Technical Level of Service - Service Attribute – Performance Measures

Qualitative Description	Current Level of Service
Operating cost to provide wastewater service ($/household)	$6.4 million
Percentage of wastewater assets in fair or better condition	78%
Number of odour complains per year	Zero
Percentage of wastewater flows that meet environmental objectives when discharged	Zero
Percentage of sanitary network CCTV inspected annually	10%

Stormwater Assets

Community Level of Service - Service Attribute – Scope

Qualitative Description	Current Level of Service
Description, which may include maps, of the user groups or areas that are connected to the municipal water system	Currently all developed properties within the City have access to the municipal water service

Community Level of Service - Service Attribute – Reliability

Qualitative Description	Current Level of Service
Description of how stormwater can affect landscape and road assets	Increased erosion at outflows, flooding near failing catch basins

Technical Level of Service - Service Attribute – Scope

Qualitative Description	Current Level of Service
Number of outfalls	62
Lin.km culverts	13km
Lin.km ditches	44km

Technical Level of Service - Service Attribute – Reliability

Qualitative Description	Current Level of Service
Number of significant flooding events caused by failing stormwater assets	Zero

Technical Level of Service - Service Attribute – Performance Measures

Qualitative Description	Current Level of Service
Percentage of stormwater in fair or better condition	80%

Road Assets

Community Level of Service - Service Attribute – Scope

Qualitative Description	Current Level of Service
Description which may include maps, of road network in the municipality and its level of conductivity	The City owns and maintains 99.1 kms of roadway, made up of three classes of roads; arterial, collector, and local roads

Community Level of Service - Service Attributes – Quality

Qualitative Description	Current Level of Service
Photos of roads and different levels of road pavement condition	Media available in browser via *StreetLogix*

Technical Level of Service - Service Attribute - Scope

Qualitative Description	Current Level of Service
Number of land-km for arterial roads per municipality land area (km/km^2)	1.9
Number of land-km for collector roads per municipality land area (km/km^2)	1.1
Number of land-km for local roads per municipality land area (km/km^2)	3.3

Technical Level of Service - Service Attribute – Quality

Qualitative Description	Current Level of Service
For paved roads in the municipality, the average pavement condition index value	67 PCI
For unpaved roads in the municipality, the average surface condition (i.e., excellent, good, fair, poor)	Good

Technical Level of Service - Service Attribute – Performance Measures

Qualitative Description	Current Level of Service
Operating cost to provide road infrastructure ($/household)	$560/household
Percentage of road assets in fair or better condition	76%
Number of roads per linear km with road restrictions	Zero

Bridge Assets

Community Level of Service - Service Attribute – Scope

Qualitative Description	Current Level of Service
Description, which may include maps, of road network in the municipality and its level of conductivity	See latest OSIM report

Community Level of Service - Service Attribute – Reliability

Qualitative Description	Current Level of Service
Phots of roads and different levels of road pavement condition	The average Pavement Condition Index for the road infrastructure within the City is 67, media can be found in browser via *StreetLogix.*

Technical Level of Service - Service Attribute – Scope

Qualitative Description	Current Level of Service
Number of pedestrian bridges	7
Number of collector bridges	1
Number of arterial bridges	2

Technical Level of Service - Service Attribute – Quality

Qualitative Description	Current Level of Service
For bridges in the municipality, the average bridge condition index value	72 BCI

Technical Level of Service - Service Attribute – Performance Measures

Qualitative Description	Current Level of Service
As defined by OSIM Report	Bridges are inspected every two years with a new report generated.

Future Demand

It is important to consider various factors that may affect the demand on core infrastructure assets. This section looks at each of the core infrastructure asset categories and suggests items that may affect the assets. Future demand is only required by O.Reg. 588/17 for municipalities with populations 25,000 or larger. However, the City of Pembroke has determined it is important to discuss this information.

Demand Impact on Assets

Water Assets

Factor	Current	10 Year Projection	Impact
Ageing Infrastructure	Not applicable	Expected to decrease	Increased risk of failure
Increasing Population	Approximately 14,000	Expected to increase	Increased output of wastewater
Limited Budget	Currently under what is required	Expected to remain constant	Will constrain number of projects that can be completed per year

Wastewater Assets

Factor	Current	10 Year Projection	Impact
Ageing Infrastructure	Not applicable	Expected to decrease	Increases the risk of failure
Increasing Population	Approximately 14,000	Expected to increase	Increased output of wastewater
Limited Budget	Currently under what is required	Expected to remain constant	Will constrain the number of projects that can be completed per year

Stormwater Assets

Factor	Current	10 Year Projection	Impact
Ageing Infrastructure	Not applicable	Expected to decrease	Increase in risk of failure

Factor	Current	10 Year Projection	Impact
Increasing Population	Approximately 14,000	Expected to increase	Changes to stormwater management
Limited Budget	Currently under what is required	Expected to remain constant	Will constrain number of projects that can be completed per year
Environmental Awareness	Awareness that rain and flooding events have become more common with climate change	Expected increase of rain and flooding with climate change	The demand on the stormwater network will not be able to handle the increased frequency of rain and flood events

Road Assets
Road

Factor	Current	10-Year Projection	Impact
Aging Infrastructure	71.6/100	Expected to decrease	Low quality infrastructure
Increasing Population	Approximately 14,000	Expected to increase	Increased road traffic
Limited Budget	Currently under what is required	Expected to remain constant	Will constrain number of projects that can be completed each year
Increased Tourism	Busy during peak times of the year	Expected to increase	Increased traffic volume creates need for an increased number of assets
Environmental Awareness	Awareness that winters are tending to be longer and colder (climate change)	Expected to increase	Freezing and thawing cycles are hard on roads and increase number of potholes and cracking

Sidewalk

Factor	Current	10-Year Projection	Impact
Age of infrastructure	Sidewalk conditions currently rated 7.9/10	Expected to decrease	Low quality infrastructure, low level of service to community
Increasing Population	Approximately 14,000	Expected to increase	Increased pedestrian traffic, increased construction of new developments and roads and thus a need for an increased number of sidewalks
Limited Budget	Budget currently shortfalls what is required	Expected to remain constant	Will constrain number of projects that can be completed per year
Increased Tourism	Tourism increases during peak times of the year	Expected to increase	Increased pedestrian traffic and a need for an increased number of sidewalks and signage
Environmental Awareness	Some awareness regarding pesticide spraying	Environmental protection measures by the Government are expected to increase	Increased environmental awareness may impact construction or pesticide spraying which will affect quality of sidewalks

Bridge Assets

Factor	Current	10-Year Projection	Impact
Aging Infrastructure	72/100	Expected to remain the same	Continue to maintain bridges based on OSIM standard reports
Increasing Population	Approximately 14,000	Expected to increase	Increased traffic on bridges

Lifecycle Management Plan

The purpose of Lifecycle Management Plan is to define activities undertaken with respect to the City asset over its service life, including constructing, maintaining, renewing, operating and decommissioning.

Water Assets

Watermain and water delivery asset maintenance may include flushing, scheduled valve turning, and spot repair. Watermain rehabilitation options include lining. During capital works projects aging or sections that are high risk may be replaced.

Wastewater Assets

Wastewater underground infrastructure as well as lift station maintenance may include flushing, CCTV scanning, and spot repair. During capital works projects aging or high risk may be replaced.

Stormwater Assets

Stormwater asset maintenance includes clearing of debris from catch basins, culverts, and outflows. Stormwater asset rehabilitation options may include regrading of ditches, addition of erosion protection to outflows, and adjusting catch basins. During capital works projects aging on high risk may be replaced.

Road Assets

In conjunction with a third-party, the City of Pembroke has developed a Lifecycle Management Plan for roads. Roads are broken down into 6 categories: urban or rural, arterial, collector and local roads. Lifecycle management strategies are as follows:

Urban Arterial

Age	Lifecycle Activity	Cost/m^2*	Cost (Notes)	Decision Rule
4	Reclamite Treatment	$1.75	$1.75/$m^2$ (2020)	Age based

Age	Lifecycle Activity	Cost/m^2*	Cost (Notes)	Decision Rule
5	Crack Sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
15	Shave & Pave	$37.70	Not Applicable	Defects in top lift
19	Reclamite Treatment	$1.75	$1.75/$m^2$ (2020)	Age based
20	Crack Sealing	$2.00	Route and Seal $1.95/m; Blow and Go Seal $1.30/m	Assessment based
30	Remove & Pave (urban)	$61.31	$63/$m^2$ (2 mill 2 overlay)	Defect deeper than the top lift but base is sound
34	Reclamite Treatment	$1.75	$1.75/$m^2$ (2020)	Age based
35	Crack Sealing	$2.00	Route and Seal $1.95/m; Blow and Go Seal $1.30/m	Assessment based
45	Reconstruct	$149.64	Not Applicable	Defects in road base

*Average annual cost / m^2 is $5.78

Urban Collector

Age	Lifecycle Activity	Cost/m^2*	Cost (Notes)	Decision Rule
4	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
5	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
15	Shave & Pave	$37.70	Not applicable	Defects in top lift
19	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
20	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
30	Remove & pave (urban)	$61.31	$63/$m^2$ (2 mill 2 overlay)	Defects deeper than the top lift but base is still sound
34	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
35	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
45	Reconstruct	$149.64	Not applicable	Defects in road base

- Average annual cost / m^2 is $5.78

Urban Local

Age	Lifecycle Activity	Cost / m^2*	Cost (Notes)	Decision rule
4	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
5	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based

Age	Lifecycle Activity	Cost / m^2*	Cost (Notes)	Decision rule
20	Shave & pave	$37.70	Not applicable	Defects in top lift
24	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
25	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
40	Remove & pave (urban)	$61.31	$63/$m^2$ (2 mill 2 overlay)	Defects in top lift
44	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
45	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
60	Reconstruct	$149.64	Not applicable	Defects in road base

Rural Arterial

Age	Lifecycle Activity	Cost / m^2*	Cost (Notes)	Decision rule
4	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
5	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
15	Shave & pave	$37.70	Not applicable	Defects in top lift
19	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based

Age	Lifecycle Activity	Cost / m^{2*}	Cost (Notes)	Decision rule
20	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
30	Pulverize and Pave	$53.21	$63/m^2 (2 mill 2 overlay)	Defects deeper than the top lift but base is sound
34	Reclamite treatment	$1.75	$1.75/m^2 (2020)	Age based
35	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
45	Reconstruct	$149.64	Not applicable	Defects in road base

*Average annual cost / m^2 $5.60

Rural Collector

Age	Lifecycle Activity	Cost / m^{2*}	Cost (Notes	Decision rule
4	Reclamite treatment	$1.75	$1.75/m^2 (2020)	Age based
5	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
15	Shave & pave	$37.70	Not applicable	Defect in top lift
19	Reclamite treatment	$1.75	$1.75/m^2 (2020)	Age based
20	Crack sealing	$2.00	Route and seal $1.95/m; Blow	Assessment based

Age	Lifecycle Activity	Cost / m^2*	Cost (Notes	Decision rule
			and go seal $1.30	
30	Pulverize and Pave	$53.21	$63/$m^2$ (2 mill 2 overlay)	Defects deeper than the top lift but base is sound
34	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
35	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
45	Reconstruction	$149.64	Not applicable	Defects in road base

*Average annual cost / m^2 $5.60

Rural Local

Age	Lifecycle Activity	Cost / m2*	Cost (Notes)	Decision rule
4	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
5	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
20	Shave & pave	$37.70	Not applicable	Defects in top lift
24	Reclamite treatment	$1.75	$1.75/$m^2$ (2020)	Age based
25	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based

Age	Lifecycle Activity	Cost / m2*	Cost (Notes)	Decision rule
40	Pulverize and pave	$53.21	$63/m^2 (2 mill 2 overlay)	Defect deeper than the top lift but base is sound
44	Reclamite treatment	$1.75	$1.75/m^2 (2020)	Age based
45	Crack sealing	$2.00	Route and seal $1.95/m; Blow and go seal $1.30/m	Assessment based
60	Reconstruct	$149.64	Not applicable	Defects in road base

*Average annual cost /m^2 $4.20

Lifecycle Management Plan: Road Assets: Summary

Road Class	Roadside environment	Centreline-km	Road width	M^2	$/m^2/year	Total $/year*
Arterial	Urban	6.2	7	43,687	$5.78	$252,315
Collector	Urban	4.2	7	29,223	$5.78	$168,778
Local	Urban	31.6	7	221,090	$4.33	$957,690
Arterial	Rural	8.6	7	59,913	$5.60	$335,248
Collector	Rural	5.7	7	40,077	$5.60	$224,254
Local	Rural	43.3	7	303,210	$4.20	$1,272,470

*Total $/year is $3,210,755, with a current budget of $3,340,000, and a % of full funding of 104%

Plan Improvement and Monitoring

As per O.Reg. 588/17 the asset management plan must be updated, if necessary, at lease every five years. The City will complete the next update to the asset management plan for July, 1st 2023 where in all assets will be inventoried.

The City of Pembroke will review the plan each year during following the annual budget being released.

References

1. Ontario Reg. 588/17
2. Municipal Asset Management Planning
3. Census Profile, 2016 Census