

CORPORATE ASSET MANAGEMENT PLAN UPDATE

Saskatoon Roadways

INTRODUCTION

This Asset Management Plan update outlines the state of the City of Saskatoon's (City's) Roadway Network, including information on inventory, valuation, condition, growth and inflation funding requirements, asset preservation, operations, and maintenance.

The City's roadways are managed through two programs, the Asset Preservation Program and the Operation and Maintenance Program. The current strategy for preserving City roadways is to consider where the road is in its life cycle in relation to the typical design life of that road type. The typical design life of a road is 15 to 25 years before requiring a major restoration such as resurfacing or structural improvement. The Asset Preservation Program creates long-term plans for full-scale roadway treatments with a target average return cycle for every roadway of 20 years. With the continued growth of the overall network and steady climb in construction costs, inflation and growth adjustments must continue to sustain an average 20-year return cycle for roadways and sidewalks. The Operation and Maintenance Program plans and carries out maintenance activities such as crack filling, pothole repairs, grading of gravel roads and back lanes along with operational activities such as snow clearing and street sweeping.

*The typical design life of a road is **15 to 25 years** before requiring a major restoration such as resurfacing or structural improvement.*

CURRENT INVENTORY

The City's Roadway network inventory consists of roads within a neighbourhood network and primary network. Roadways classified as "Local" belong to the neighbourhood network, and roadways classified as "Lanes (Paved), Collector, Arterial, and Expressway" belong to the primary network. Boundary roads, gravel lanes and P3 roadways (e.g. North Commuter Parkway) are considered outside the neighbourhood or primary networks.

A summary of the current inventory is provided in the following table. The source of information for this inventory is the City's Geographic Information Systems (GIS), asset management database.

Table 1: Inventory and Replacement Value

Road Classification	Inventory (Ln-km)	Valuation (\$M)
Lanes (Paved)	121.1	\$84
Locals	2,168.1	\$1,530
Collectors	837.4	\$615
Arterials	766.1	\$570
Expressways	439.1	\$403
P3	44.1	\$32
Boundary (paved)	30.1	\$22
Gravel Roads & Lanes	707.0	\$247
Total	5,137.8	\$3,503M



Kenderdine Road: before



Kenderdine Road: after

The City's roadway assets are estimated to have a replacement value of \$3.503 billion. This value includes the cost of replacing the road by physical excavation and replacing it with new approved materials.

PERFORMANCE OF THE ASSET

The City last undertook a full network condition assessment of the paved roadway network in 2021. This assessment, based on industry standard methodologies, was used to report on existing condition and aid in setting future roadway preservation programs.

The process of assessing the paved roadway network considered surface pavement condition, ride, roughness, and structural adequacy. The next condition assessment of the City roadway network is scheduled to be completed in 2024.

Asset (Roadway) Condition:

The table below shows the average Pavement Condition Index (PCI) and the Overall Condition Index (OCI) that was calculated from the 2021 assessment. The OCI gives a more robust condition summary of the roadway network and takes into consideration all aspects of a roadway's overall performance which includes the PCI, ride and roughness and structural adequacy. The current target is an average PCI ranging from 80 to 85 that will indicate the City's roads will be in a "Satisfactory/ Good" condition. Comparing only roads assessed in both 2017 and 2021 data sets and adjusting data errors, PCI is improving with Lanes (Paved), Collectors, Arterials and Expressways, whereas Locals have declined, but remain in the desired condition state. Going forward OCI will be integrated into the roadway asset management program. OCI targets will have to be established and the standards for roadway treatment selections will be based on OCI rather than PCI.

Table 2: Pavement Surface Condition (PCI)

Road Classification	Average PCI 2017	Average PCI 2021	Current Condition	Desired Condition	Average OCI 2021
Lanes (Paved)	68.4	70.2*	Fair	Satisfactory	N/A
Locals	76.1	70.2	Satisfactory	Satisfactory	58.1
Collectors	68.5	72.4	Satisfactory	Satisfactory	62.7
Arterials	68.5	74.8	Satisfactory	Satisfactory	66.0
Expressways	71.4	72.2	Satisfactory	Satisfactory	81.3

The numerical rating assigned based on the 100-point scale with 0 being the worst or "Failed" condition to 100 being the best possible or "Good" condition.

**Weighted average based on network percentage in each road class. Note: a percentage of roadways in each class were not rated.*

ROAD MAINTENANCE

The Road Maintenance program focuses on citizen mobility, safety, and preventative maintenance through repair and maintenance activities. Activities include pothole repairs, crack sealing, grading and gravelling of back lanes and earth streets, large debris removal, and surface drainage management.

Potholes are responded to and repaired on a complaint basis. Emergency potholes reported by residents are severe potholes that are repaired within three days.

All gravel back lanes receive at least one maintenance treatment per year and gravel rural roads are graded on a weekly basis.

Crack sealing is a preventative maintenance treatment completed by City crews (since 2019) that prevents moisture infiltration into the roadway structure to reduce the chance of premature structural failure and potholes. It can help extend the life of a roadway between three to seven years.



LaRonge Road: before

STREET SWEEPING AND CLEANING

The annual Street Cleaning and Sweeping program focuses on preserving air and water quality, maintaining surface drainage integrity, and improving aesthetics of City streets by removing sand and debris. Dust palliation activities focus on managing air quality issues for properties within city limits that are near high traffic gravel roads.

Street sweeping begins in the spring, focusing on high traffic streets to pick up the bulk of debris left from the winter. Medians and park frontages are also swept to remove winter debris. All residential streets are swept curb to curb by the end of June.

Dust palliation is applied on rural gravel roads adjacent to residences and along Beef Research Road to minimize dust.



LaRonge Road: after

SNOW AND ICE MANAGEMENT

The Snow and Ice Management program focuses on public safety and ensuring citizen mobility during the winter months. It includes activities such as snow grading and plowing after a snowfall and application of sand and salt to address icy conditions. When a snow event occurs (a snowfall with more than 5 cm accumulation), all priority streets are graded within 72 hours.

The emergency response and removal plan is not included as a part of the regular Snow and Ice Management Program and addressed in a separate report.

PAVEMENT MARKING

The Pavement Marking program focuses on citizen mobility, safety, and roadway aesthetics through the application of painted markings on the roadway. Examples of markings include lane lines, symbols, crosswalks, stop bars, chevrons, bike lanes, downtown parking stalls, and markings in advance of railway crossings .

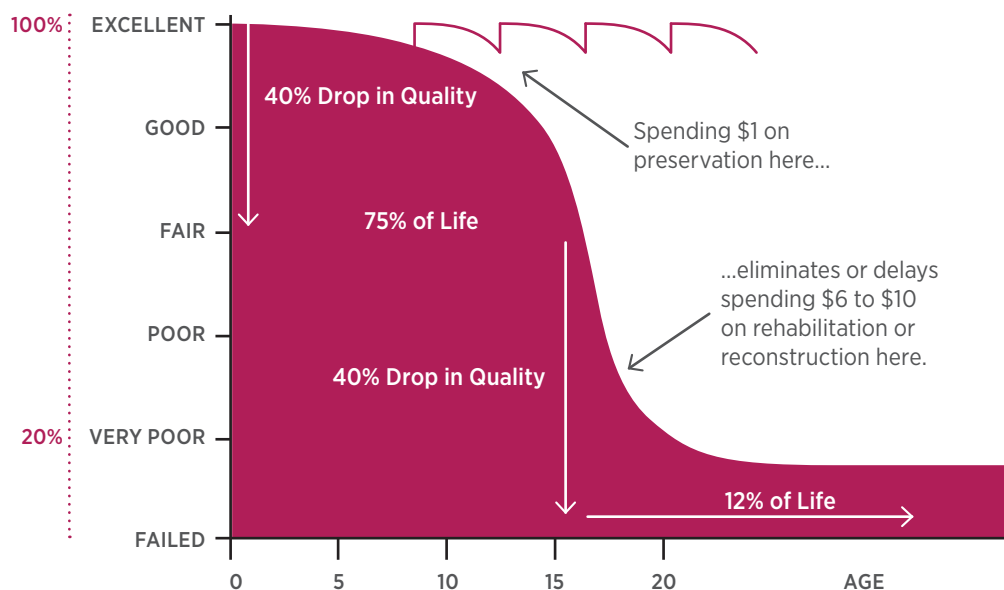
Pavement marking begins in the spring following the Street Sweeping program. Painted markings are applied once or twice times per year on all roadways. Durable plastic markings are applied to good condition or newly paved road surfaces on arterial class roadways and above.

LIFECYCLE PROGRAMS

The Canadian Infrastructure Report Card (2016) demonstrates that increasing reinvestment rates will save money in the long term. Without an increase in current reinvestment rates, the condition of City roadways will gradually decline, costing more money to maintain and risking service disruption.

The graph below demonstrates that when roads are allowed to deteriorate below a “Fair” condition rating, the rate of both deterioration and reinvestment costs increase substantially. Investing in preventive maintenance and regular repair will prolong the asset service life, avoiding premature and costly reconstruction and long-term service disruptions that are associated with the larger scope of work.

Figure 1: Example of Asset Deterioration Curve for Roadways



Source: Canadian Infrastructure Report Card 2016

Asset Preservation Program

The most effective way to achieve an improved roadway network condition is to use a mix of preservation, restoration, and rehabilitation treatments. The target of the City’s roadway asset preservation strategy is to increase the network condition slowly over time by using a combination of these treatments and maintaining a level of service of a 1 in 20-year treatment cycle for roadways.

Preservation treatments are less expensive than restoration or rehabilitation treatments. Utilizing preservation treatments are important to help maintain the City’s “Fair” to “Good” roads so they do not drop into a lower category based on the OCI and PCI.

Asset Preservation develops three-year roadway preservation plans in coordination with the Water and Sewer Preservation program that cover full roadway treatments within the preservation, restoration, and rehabilitation strategies. Specific details and distribution of these treatments vary year-to-year, depending on requirements or possible cost-saving innovations.

Operations and Maintenance (O&M) Plans

Operations and Maintenance Plans focus on maintaining the usable life and integrity of streets and the public’s safety and mobility needs.

Activities undertaken in the Operations and Maintenance plans include:

- Crack sealing
- Pothole repairs
- Utility cut maintenance
- Grading back lanes and gravel roads
- Guardrail repair
- Removal of debris from streets
- Street cleaning and sweeping
- Application of dust suppressants
- Pavement markings
- Snow and ice management

Service levels for the Road Maintenance, Street Cleaning and Sweeping and Snow and Ice Management programs were approved in 2017. These service levels detail the services currently provided.

SERVICE EXPENDITURE LEVELS

The Administration evaluates the condition (physical, function and capacity) of the City’s assets in order to maintain the assets at the approved condition state at the minimum cost. Condition assessments or evaluations are conducted and used to establish condition levels as well as develop annual capital improvement plans.

The level of service for each type of asset is defined; however, as the level of service increases for the asset, so does the cost of maintaining the asset. In order to compare the level of investment for all assets corporate-wide, five levels of expenditures are identified in the following table.

It should be noted that expenditure levels are not condition assessments but lead to a change in the asset condition over time.

“A” represents the highest level of expenditure and “F” represents no expenditure.



Rutherford Way: before



Rutherford Way: after

Table 3: Expenditure Levels

Expenditure Level	Asset Performance	Description
A	Getting Better Quickly	Sufficient expenditures to keep asset in top condition and to increase asset condition/value quickly over time.
B	Getting Better	Sufficient expenditures to keep asset in top condition and to increase asset condition/value slowly over time.
C	Maintain Assets in Current Condition	Sufficient expenditures to keep asset in constant condition over time.
D	Getting Worse	Insufficient expenditures to maintain asset condition. Asset condition will deteriorate over time.
F	Getting Worse Quickly	No expenditures. Asset condition/value decreased rapidly.

The following table aligns the desired condition and expenditure level. The City's current average roadway network PCI is at 71.4 and the physical condition desired is an average PCI range of 80 to 85. This desired level is the top range of the satisfactory PCI range. The table also shows the required funding to meet a Level "B" expenditure level and associated funding gap.

Table 4: Asset Performance and Expenditure

Asset Program	Current Performance	Desired Performance	Desired Expenditure Level	Required Annual Funding to meet Expenditure Level (2023)	2023 Budget	Difference
Roadways Preservation	PCI Rating 71.4 (Satisfactory)	PCI target rating 80-85 (Good)	Level B	\$35.0M	\$26.7M	\$8.3
Road Maintenance [†]	Good	Good	Level C	\$6.6M*	\$6.6M	\$0
Snow and Ice Management [†]	Good	Good	Level C	\$15.4M*	\$15.4M	\$0
Street Cleaning and Sweeping [†]	Good	Good	Level C	\$5.0M*	\$5.0M	\$0

*Growth and inflation are not included \$ amount.

[†]The desired expenditure level for Road Maintenance, Snow and Ice Management and Street Cleaning and Sweeping assumes there are no changes to the current service levels.

The Emergency Response and Removal Plan for snow and ice is not included and is addressed outside of this report.

FUNDING SUMMARY

Asset Preservation Program

Currently there is \$26.9 million of funding in place for the roadway preservation program to maintain the City's roadways in satisfactory condition and meet the service expenditure level "B" (getting better).

The overall level of service is to provide full corridor revitalization when doing major capital construction, which includes roadway, sidewalk and, water and sewer infrastructure. Roadway and sidewalk treatments are planned alongside the Water and Sewer program, and the majority of the locations selected for Water and Sewer Program have roadway and sidewalks that require rehabilitation or reconstruction treatments.

The problem this creates for the roadway and sidewalk preservation program is that the treatment balance of the program must be compromised to meet this level of service. Ideally the roadway and sidewalk preservation programs would include a range of reconstruction treatments from making up 5 to 10% of the programs annually. With coordinating the roadway and sidewalk preservation programs annually with Water and Sewer program, reconstruction treatments have hit upwards of 35% of the treatment balance, reducing the available funding for preservation or rehabilitation treatments. In addition, funding from roadways preservation program is needed to assist the adjacent sidewalk rehabilitation work required to achieve the level of service of full corridor revitalization. This has caused a reduction to the annual total lane kilometre coverage of the roadway preservation program, diverging from a return cycle of 1 in 20 years.

Short-term forecasts show that with a heavy focus on sidewalk preservation along with more reconstruction treatments due to coordination with the Water and Sewer program continuing until 2026, the overall roadway network condition will drop through these years. Currently the long term forecast with the program fully funded for a 1 in 20-year treatment cycle shows the need for reconstruction treatments and major sidewalk replacement treatments will subside, allowing the roadway program to catch back up in the 10 to 20 year period of the cycle by focusing on more proactive treatments that cover a higher percentage of the network. However, the long-term forecast is highly dependent on the program funding maintaining annual growth and inflation based on construction costs.

Unfortunately, the current construction rates have led to an average increase of 30% in costs compared to 2021. The increase has created a shortfall in 2023 of approximately \$8.3 million to maintain current service levels, unless adjustments for inflationary cost increases are made in the 2024-2025 multi-year budget process. Without these adjustments, the condition of the network will decline, the 1 in 20-year cycle for repairs and maintenance will continue to increase, and the level of service provided to users will steadily deteriorate.

Operations and Maintenance Programs

The Operations and Maintenance programs have been adequately funded to meet the approved service levels, with one exception - Snow and Ice Management. While base funding levels are typically sufficient in an average year, severe winter storms and above-average snowfalls often require the City to access reserve funding for emergency response activities. To address this issue, the Snow and Ice Emergency Response and Removal Plan has been created and addressed in a separate report.



Victoria Avenue: before



Victoria Avenue: after

Pavement Marking Program

The current expenditure level of the Pavement Marking program is not sufficient to maintain the desired level of service. A service level report is underway to develop a defined service level and identify the expenditure level necessary to maintain it.

INFRASTRUCTURE RESILIENCE AND CLIMATE CHANGE ADAPTATION STRATEGY

Road construction and maintenance work is weather dependent. During periods of extreme weather, such as a major rain event or early winter, some projects are unable to be completed or started until favourable conditions return. If current year funding for roads is planned but cannot be completed or started due to unfavourable weather conditions or seasonal changes, work on those roads will be carried over to the next construction season.

In addition, recent changes to the roadway design standards have been implemented to require mandatory edge drainage systems to new roadway structures. This will ensure that the road structure can be drained and protected during extreme weather events and high-water tables caused by adverse weather conditions.

FUTURE DEMAND

Saskatoon's Growth Plan to Half a Million predicts that the population will double in size in the next 30 to 40 years. This growth will involve both new greenfield neighbourhoods and revitalization of older neighbourhoods with higher densities, particularly along corridors. The demand for better and efficient transportation systems will increase with population growth, which will affect the funding priority and focus given to the asset management of the roadway network. Citizen expectations for smooth and safe transportation systems, legislation and policy measures promoting sustainable transportation, and climate change will also affect preservation and maintenance programs, requiring them to incorporate sustainable practices such as using recycled materials and reducing carbon emissions to comply with regulations.

Roadway preservation and maintenance programs play a crucial role in meeting the demands of population growth, citizen expectations, climate change, legislation and policy, technology evolution, operational efficiencies, and the economy. These programs can help in maintaining and upgrading the existing infrastructure to cater to the growing population's transportation needs. They can also address citizens' expectations by ensuring that roads are maintained and upgraded to meet desired standards. Moreover, they can help mitigate the impact of climate change by promoting sustainable practices; complying with regulations by incorporating sustainable practices into their operations; adopting technology to improve efficiency; safety; and sustainability; and improving operational efficiency by adopting best practices such as predictive maintenance; data analytics; and performance monitoring. Finally, a well-maintained transportation system contributes to economic growth by improving connectivity, reducing transportation costs, and attracting businesses.

THE WAY FORWARD

Our teams will:

- Fully adopt Enterprise Asset Management (EAM) into the roadway program and continued integration with SAP
- Continue to work on the complete life-cycle plan for the roadway network by integrating predictive modeling software into the program planning process
- Continue the shift from reactive to preventative maintenance when planning programs
- Continue with initiatives and continuous improvements related to data analysis and data collection methods
- Review and improve preservation and maintenance treatment strategies, specifications and standards
- Implement utility cut repair process improvements
- Develop service levels for pavement marking
- Finalize the detailed Asset Management Plan for gravel back lanes
- Coordinate and plan with other departments and divisions to increase efficiencies across the Corporation
- Identify median and boulevards as a separate asset from the roadway and sidewalk program and develop an asset management strategy for this asset.

Asset Preservation is committed to maintaining and carefully investing in our roadways. Financial and physical resources will be used to address the needs and expectations of Saskatoon citizens today and for the future



*We strive to maintain and fund
our key infrastructure assets to
minimize total life-cycle costs.*

