

# Building Better Sidewalks: An Asset Management Plan for Sidewalks



# Sidewalks

## INTRODUCTION

The City of Saskatoon's (City) sidewalk networks consists of a combination of curb and sidewalk, separate sidewalks and walkways.

The two types of maintenance programs performed on these assets are either regular sidewalk maintenance or the preservation of sidewalks.

- The regular maintenance of sidewalks includes activities that extend the life of the sidewalks, reducing the costs of rehabilitation, and more importantly removal of safety hazards for pedestrians and other sidewalk network users. Examples: large cracks in sidewalks or broken concrete that creates tripping hazards.
- The maintenance program is sufficiently funded through the operating budget. This program received \$1.03 million in 2016.
- The City Sidewalk Preservation program focuses on repairing sidewalks adjacent to roadways when they are resurfaced. Therefore; the annually programmed work areas for the Sidewalk Preservation Program are aligned to the three-year road plan.
- Preservation of sidewalks is funded from the paved roadways infrastructure reserve. In a report to City Council, on October 23, 2012, it was identified that in order to improve the paved roadway and sidewalk network and reduce the backlog slowly over time, \$2.81 million should be dedicated to sidewalks. Since this report was written, a more clearly defined comprehensive condition evaluation has been completed. Considering the new evaluation and increased costs, the required funding has been identified at \$4.7 million. The current annual contribution for sidewalk preservation in 2016 is \$3.9 million leaving an annual shortfall of \$800,000.

## CURRENT INVENTORY

The sidewalk network inventory consists of two networks, a neighbourhood network and a primary network. The neighbourhood network is comprised of curb and sidewalks alongside local roads which for the most part serve residents, or business within residential, commercial and industrial neighbourhoods. The primary network consists of curb and sidewalks alongside roads classified as collector, arterial, and expressway roads. These roadways serve a broader range of users.

The two networks consist of the following equivalent lineal kilometers and valuation:

**Table 1: Sidewalk Inventory and Replacement Value (in Millions of \$)**

Network	Eq. Lin. Km	Valuation (M)
Neighbourhood	1,012	\$502
Primary	512	\$220
Total	1,524	\$722

The City of Saskatoon's (City) sidewalk inventory is comprised of 1,524 km of sidewalk at a replacement value of \$722 million.

## PHYSICAL CONDITION OF SIDEWALKS

Tables 2 and 5 outline the following two decisions to be made in order to proceed with an asset management plan:

1. What is the desired condition level?
2. How fast would City Council like to reach the desired condition level (expenditure level)?

In 2013, City Council adopted the funding requirements to attain a level of service “B” based on the following two reports: 1) Neighbourhood and Primary Roadway and Sidewalk Preservation, and 2) Investing in the Roads to Continued Prosperity. This Level of Service is intended to improve the condition of the City’s sidewalks and decrease the backlog of preservation work slowly over time.

In 2014, the preservation strategy changed from replacing stretches of severely deteriorated sidewalks to rejuvenating the roadway corridor as a whole and address sidewalks adjacent to the roadway preservation program. This surgical approach ranges from repairing panels where appropriate, replacing individual panels, or replacing full segments. This approach improves more sidewalk segments as a whole, thereby reaching the needs of more citizens. Matching the treatment cycle of roadways, an average 20 year return cycle is the goal for maintaining and replacing current sidewalk defects. It should be noted that the treatment cycle does not mean that every sidewalk will be replaced; it means each sidewalk will be preserved or replaced depending on the sidewalk’s current condition.

City Administration has criteria to determine the action taken depending on the severity of the condition. Below is an example of one of the set of criteria and the solution required based on specifics around the condition of the sidewalk:

A trip hazard is when the sidewalk lifts or depresses causing a ledge of 20mm or more. Most trip hazards occur at the control joints but can also occur along a crack.

- Up to 40mm and < 2m of trip length per panel - Grinding or Saw Cutting
- More than 40mm and > 2m per panel - Mud Jacking or Replacement



*Repair - Grinding or Saw Cut*



*Mud Jack or Replacement*

A sidewalk condition index (SCI) was developed in-house in 2014. The condition index is based on a similar model to the American Society for Testing and Materials (ASTM) D6433 international standard used for roadway condition assessment. The sidewalk condition is evaluated by collection of extents and severity of individual surface distresses on an

# Sidewalks

individual panel inspection. Each defect collected has a distinct deduct value based on severity and extent and is subtracted from 100 to produce the SCI score. The SCI Rating Scale, is a numerical rating, from 0, being the worst possible condition, to 100, being the best possible condition, as shown in Table 2.

**Table 2: Categorized SCI Ratings**

Condition Description	SCI Pavement Index Range	Example
<b>Good</b>	85 < SCI < 100	Little to no light defects.
<b>Satisfactory</b>	70 < SCI < 85	Up to a couple light defects.
<b>Fair</b>	55 < SCI < 70	Few light defects or one medium defect.
<b>Poor</b>	40 < SCI < 55	Multiple light defects, or a couple medium defects.
<b>Very Poor</b>	25 < SCI < 40	Many light defects, or a few medium defects, or a combination of a couple light and medium defects, or one high defect.
<b>Serious</b>	10 < SCI < 25	Lots of light defects, or multiple medium defects, or a couple high severity defects, or a combination of any defects.
<b>Failed</b>	0 < SCI < 10	Lots of light defects, or multiple medium defects, or a couple high defects, or a combination of any defects.

Table 3 shows that overall, the average sidewalk condition index for the entire city sidewalk network is 84.6 out of 100, which is classed a “satisfactory” condition state.

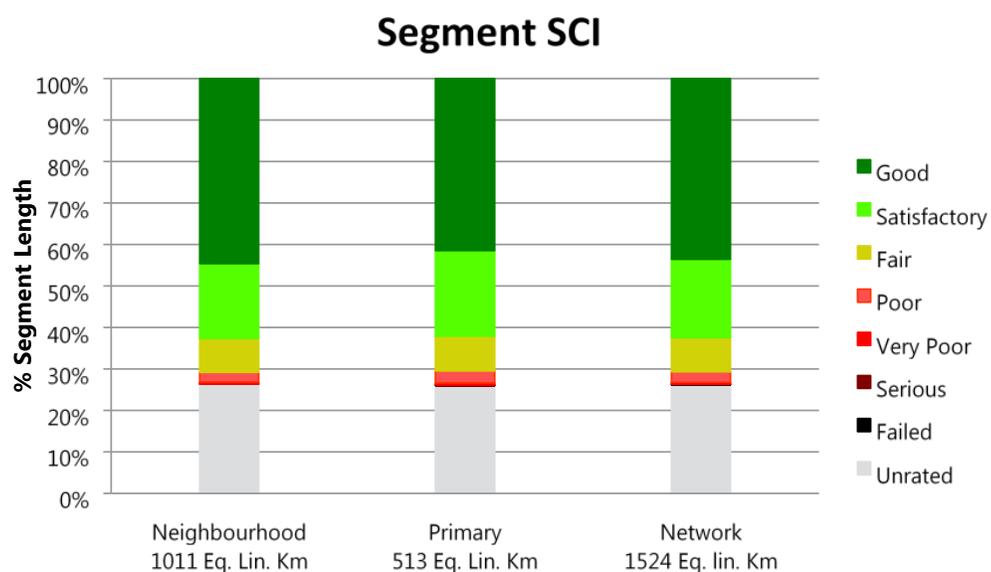
**Table 3: Rated Side Walk Network Average SCI**

Network	Average SCI	Condition Description
Neighbourhood	84.8	Satisfactory
Primary	84.1	Satisfactory
<b>Total</b>	<b>84.6</b>	<b>Satisfactory</b>

Sidewalk inspection data shows that sidewalks are generally in satisfactory condition and that failed locations tend to be localized, with individual sidewalk panels requiring treatment rather than longer sidewalk lengths. The maintenance and replacement associated with sidewalks currently in “Fair” to “Failed” condition is estimated at \$80 million.

Table 4 illustrates the SCI condition of length for each network by segment and also includes the percentage of unrated sidewalk segments broken down by neighbourhood, primary sidewalks and the full network.

**Table 4: SCI by Percent Segment Length per Network**



The City’s sidewalk network, as a whole, is considered in a satisfactory condition state with an average SCI of 84.6, with 70.8% of segments of the sidewalk network in a fair to good condition; whereas, 3.0% of segments of the sidewalk network are in a poor to failed condition. Currently 26.2% of the segments are unrated and are typically new sidewalks in new neighbourhoods and assumed to be in a good and satisfactory condition.

## EXPENDITURE LEVELS

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

The level of service for each type of asset is defined but as the level of service increases for the asset, so does the cost of maintaining the asset. In order to be able to compare the level of investment for all assets corporate wide, five levels of expenditures are identified below. 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.

# Sidewalks

**Table 5: Expenditure Levels**

Expenditure Level	Asset Condition	Description
A	Getting Better Quickly	Sufficient expenditures to keep asset in the desired condition and to increase asset condition/value quickly over time.
B	Getting Better	Sufficient expenditures to keep asset in the desired 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. Over time asset condition will deteriorate.
F	Getting Worse Quickly	No expenditures. Asset condition/value decreased rapidly.

Using the above criteria and the physical condition desired, the Administration has identified the following expenditure levels for sidewalks:

**Table 6: Funding Gap (in Millions of Dollars)**

Asset	Physical Condition Actual	Physical Condition Desired	Desired Expenditure Level	Required Annual Funding (to meet Expenditure Level)	2016 Budgeted Annual Funding*	Annual Funding Gap (to meet Expenditure Level)
Sidewalk Primary Program	Satisfactory	Good	Level B	1.87	1.38	0.46
Sidewalk Construction Neighbourhood Program	Satisfactory	Good	Level B	2.83	2.52	0.34
<b>Total</b>				<b>4.70</b>	<b>3.90</b>	<b>0.80</b>

As illustrated in Table 6 above, the annual funding is not sufficient to achieve the desired “B” expenditure level.

In order to reach the funding level required for the desired level of service, sidewalks capital funding has increased significantly from .03M in 2011 to \$3.90M in 2016.

To maintain the desired level of service for 2017, the capital funding requirement is estimated at \$4.7 million for the sidewalk preservation programs and \$1.03 million for sidewalk maintenance.

The current annual contribution for sidewalks preservation in 2016 is \$3.9 million leaving an annual shortfall of \$800,000. The maintenance program is adequately funded (\$1.03 million) through the operating budget.

## PRESERVATION PROGRAM

The City sidewalk preservation and maintenance programs are planned and managed by the Transportation & Utilities Department. The preservation program is planned by the Major Projects Division and construction is delivered by the Construction and Design Division. The maintenance program is managed by the Public Works Division. The two programs are integrated in a collaborative manner by utilizing the same condition data and through a high level of direct communication between all groups involved.

### Sidewalk Preservation Program

This program focuses on repairing sidewalks adjacent to roadways when they are surface treated, which is the most cost-effective way to deliver this work. Therefore, the annual programmed work areas for the Sidewalk Preservation Program are aligned to the three-year road plan. Since the road program covers approximately 5% of the road network per year, equating to each road receiving preservation treatments on average once every 20 years, this allows the Sidewalk Preservation Program to have the same average cycle for return treatments. The current sidewalk preservation plan as per funding plan in Table 7 includes using asphalt overlays as a maintenance strategy and leaving existing asphalt overlays that are in fair to good condition in place to achieve their full lifecycle. Larger segments of severely deteriorated sidewalk that are in high pedestrian potential areas and outside of the roadway surface treatment program are also reviewed and collaborated between divisions to implement the best solution for repair or maintenance.

Table 8 illustrates a potential funding strategy for an alternative option that would include eliminating the use of asphalt overlays. All Sidewalk asphalt overlays would be removed regardless of their condition when the adjacent roadways are surface treated. If this funding strategy is adopted, it is estimated asphalt overlays and the sidewalk backlog will be eliminated in approximately 15 years.

### Maintenance Practices and Prioritization

Maintenance of sidewalks include activities that extend the life of the sidewalks, reducing the costs of rehabilitation, and more importantly removal of safety hazards for pedestrians and other sidewalk network users. In order to optimize efficiency, maintenance activities on sidewalks are conducted before replacements.

The planned maintenance program allows Saskatoon's sidewalks to be prioritized and maintained for safety until such time as the preservation program can be implemented in all areas. This includes sidewalks that are required to be replaced due to underground utility work, and those that are identified and confirmed as below acceptable condition through the Customer Service Centre. Public Works will not address sidewalk panels that are on the three-year Road Preservation Program, except to address serious safety concerns.

The current maintenance strategy includes using asphalt overlays to address sidewalk safety hazards throughout the City. In 2015, approximately 2.3 km of sidewalks were addressed for safety concerns at an estimated cost of \$54,000. In order to discontinue asphalt overlays and address the same quantity, an additional \$1.5M of annual funding per year would be required. This additional funding is included in the funding strategy on Table 8.

The photos below are examples of two different conditions of sidewalk asphalt overlay.



*Good Condition*



*Fair Condition*

# Sidewalks

## POTENTIAL PLAN TO ADDRESS THE FUNDING GAP

The maintenance program and sidewalk preservation program are funded from two different sources.

The maintenance program is funded through the Utilities Transportation - Road and Maintenance Operating Budget. The 2016 budget of \$1.03 million is sufficient to continue the planned maintenance program.

The sidewalk preservation program is funded through the Paved Roadways Infrastructure Reserve. It was identified in the May 24, 2016 report on Sidewalk Conditions and Plan, that more funding was required to reach the desired condition level. The report stated that:

*"An estimated \$4.9 million per year is required to allow for an average sidewalk intervention treatment cycle of 20 years using the current treatment approach."*

The funding requirement has been adjusted to \$4.7 million.

The current contribution is reported at \$3.9 million in 2016. The shortfall to get to the desired Condition "B" target is \$800,000 per year.

As illustrated in Table 3, the City's Sidewalk network as a whole is currently considered in a satisfactory condition state with an average SCI of 84.6 which will ensure the sidewalks adjacent to the roadway preservation program are addressed for maintenance or replacement as required to ensure safe conditions for pedestrians. This increase will also improve the SCI and slowly reduce the backlog of panels needing maintenance or replacements over time.

The 2017 budget request is to consolidate a number of roadway projects including the Sidewalk Preservation Project with the Paved Roads Preservation Project. Connecting these projects would allow flexibility in the strategic allocation of funding between the different roadway classifications and sidewalks required to improve the network. Table 7 and 8 illustrate potential funding plans that could be implemented to meet the desired condition for sidewalk preservation. The plan in Table 7 includes the continued use of asphalt overlays, whereas the funding in Table 8 eliminates asphalt overlays over time.

**Table 7: Funding Required for Good Condition Level (Including Asphalt Overlay) (in Millions of \$)**

Sidewalk Preservation - Including Asphalt Overlay	2017	2018	2019	2020	2021
Planned Expenditures - Construction Neighbourhood Program	\$2.83	\$2.83	\$2.83	\$2.83	\$2.83
Planned Expenditures - Primary Program	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87
<b>Total</b>	<b>\$4.70</b>	<b>\$4.70</b>	<b>\$4.70</b>	<b>\$4.70</b>	<b>\$4.70</b>
Mill Rate Impact	0.39%	0.00%	0.00%	0.00%	0.00%

*\*Increase has been included in the 2017 preliminary budget as part of the Building Better Roads funding strategy*

**Table 8: Funding Required for Good Condition Level (Eliminating Asphalt Overlay) (in Millions of \$)**

Sidewalk Preservation -Eliminating Asphalt Overlay	2017	2018	2019	2020	2021
Planned Expenditures - Construction Neighbourhood Program	\$4.15	\$4.15	\$4.15	\$4.15	\$4.15
Planned Expenditures - Primary Program	\$2.75	\$2.75	\$2.75	\$2.75	\$2.75
<b>Total</b>	<b>\$6.90</b>	<b>\$6.90</b>	<b>\$6.90</b>	<b>\$6.90</b>	<b>\$6.90</b>
Mill Rate Impact	1.48%	0.00%	0.00%	0.00%	0.00%

## CLIMATE ADAPTATION STRATEGY

Due to the nature of the construction materials used for these assets (i.e. concrete and asphalt), they are resistant to many of the effects of climate change. In new construction, edge drains adjacent to the sidewalk within the road structure have been included that will assist in reducing damage due to high water tables caused by climate change. Crack filling sidewalks has also been added as an additional maintenance practices to reduce water infiltration to the underlying soils and thus reduce damage caused by increased precipitation caused by climate change.

With respect to construction, road and sidewalk 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 or sidewalks are planned but cannot be completed or started due to unfavourable weather conditions or seasonal changes, those roads or sidewalks work will be carried over to the next construction season.





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**Saskatoon**