ATTACHMENT 2

Building Better INFRASTRUCTURE: Water & Wastewater Systems

City of Saskatoon

Building Better Infrastructure

The Administration evaluates the condition of the City's assets in order to develop annual programs to maintain the assets at a minimum cost. Where feasible condition assessments are conducted and used to establish condition and develop annual capital improvement plans.

The level of service for each type of asset is defined differently 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 all assets equally, five levels of expenditures are identified below. 'A' represents the highest level of expenditure and 'F' represents no expenditure.

Expenditure Level	Asset Condition	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. 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, (capacity was not considered for this report) the Administration has identified the following expenditure services levels for certain assets within the Water and Wastewater Systems. These assets will be explored further throughout this report. Other assets within the Water and Wastewater Systems require further evaluation to determine a desired expenditure service level.

Asset	Physical Condition Actual	Physical Condition Desired	Expenditure Service Level	Required Annual Funding (to meet Expenditure Service Level)	2016 Budgeted Annual Funding	Annual Funding Gap (to meet Expenditure Service Level)
Water Mains - Distribution	76% Very Good 16% Good 5% Fair 2% Poor 1% Very Poor	Fair	Level B	$5.16 M	$5.16 M	$0.0 M
Sanitary Mains - Collection	Projected Condition Based on Known condition of 41% of Collection System 64% Very Good 1% Good 8% Fair 2% Poor 25% Very Poor	Fair	Level B	$3.7 M	$3.7 M	$0.0 M

WATER

This section of the report summarizes the state of Saskatoon's Water distribution system by providing information on asset inventory, replacement value, condition and expenditure service level. The focus of this report will be on the following classes within the Water Distribution network: Distribution Mains, Primary Mains and Service Connections. The source of information is from the City's GIS, asset management database, past contract values and operation and maintenance records.

What do we own, what is it worth?

Asset Sub-Class	Inventory	Replacement Cost
Water Mains - distribution	1,017 km	$1,755,000,000
Water Mains - primary	115 km	$318,000,000
Valves - distribution	13,657	$167,000,000
Valves - primary	307	$8,000,000
Hydrants	7,063	$76,000,000
Water Service Connection	71,096	$519,000,000

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Programs

Based on the condition and criticality of assets, locations are selected for replacement or assessment programs.

Distribution Mains:
The level of service goal is to replace a water main after it has incurred 6 breaks within the last 25 years. The City currently has 20km of water mains with 6 or more breaks and replaces 4.7km per year on average. The budgeted expenditure for 2016 is $5.16M and will allow sufficient funding to reach the desired expenditure level B of Getting Better. It is estimated that with this expenditure level the City will have no water mains with 6 or more breaks by 2022.

Because of the gap between the level of service goal and the funds available, water mains with over 6 breaks are prioritized for replacement. Recent break history, pipe class, and property damage claims due to the water main breaking are taken into account when prioritizing.

Pipes are replaced by open trench excavation or are lined using Cured in Place Pipe (CIPP).

Primary Mains:
Due to the importance of primary water mains, direct condition assessment is done in order to develop pro-active rehabilitation and replacement programs. The City is currently undertaking the following assessment and preservation initiatives on primary water mains:

- Prioritization Project
- Cathodic Protection
- Soil Conductivity Testing
- Pipe Wall Integrity Testing

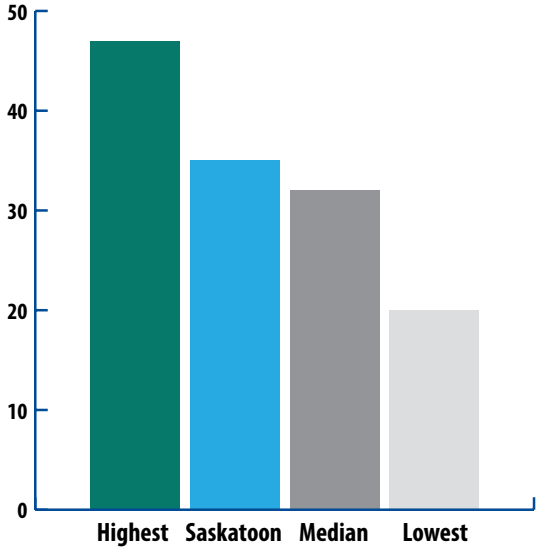
This assessment is currently in progress and resulting information will be included in a future report outlining condition levels and any potential funding gaps that may exist.

Service Connections:
The overall condition of service connections is considered good as approximately 88% of connections are made of copper or plastic and have low failure rates; overall 93% of the inventory has been assessed as very good. The 7% rated as very poor consist of approximately 4,911 connections that are made of lead, which tend to have a higher failure rate of approximately 100 failures per year. Connections are replaced by planned or emergency replacements. Planned connections are lead connections requested to be replaced by the homeowner. The current approved funding for water service connections will be undergoing review due to a large increase in the number of homeowner requested lead service connection requests. Council will be presented with funding options for the next Utility Rate review.

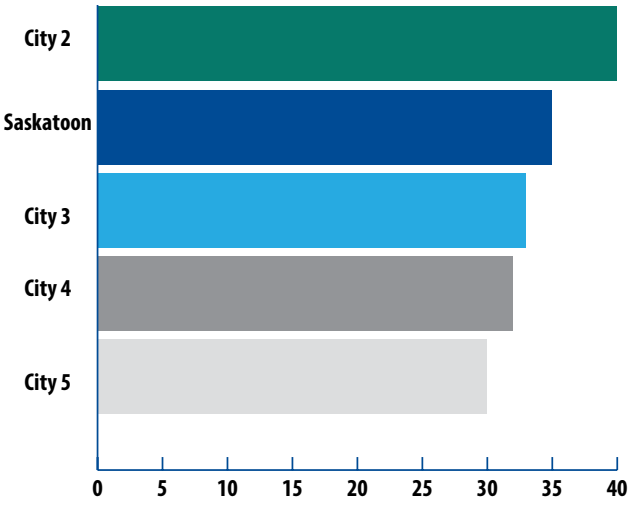
		Saskatoon's ranking out of;	
Performance Measure	Saskatoon	All Canadian cities with more than 500km of water main	Prairie cities with more than 500km of water main
Average age of pipes	35 years	9th highest out of 23	2nd highest out of 5
Percent of cast iron pipe in distribution system	20%	10th highest out of 23	2nd highest out of 5
Water main breaks per 100km	22.8	2nd highest out of 23	2nd highest out of 5
Capital re-investment per 100km	$487,000	16th highest out of 23	4th highest out of 5
Percent of unplanned maintenance hours	80%	Tied for highest out of 14	Tied for highest out of 3

Saskatoon has the 9th highest Average Age of Pipes out of 23 cities. Saskatoon (35 years) is close to the median value (32 years) for average age of pipes for Cities across Canada. The average age of water distribution systems in Canada range from a low of 20 years and a high of 47 years.

Average Age of Pipes (2012) for all Cities with greater than 500km of Water Mains

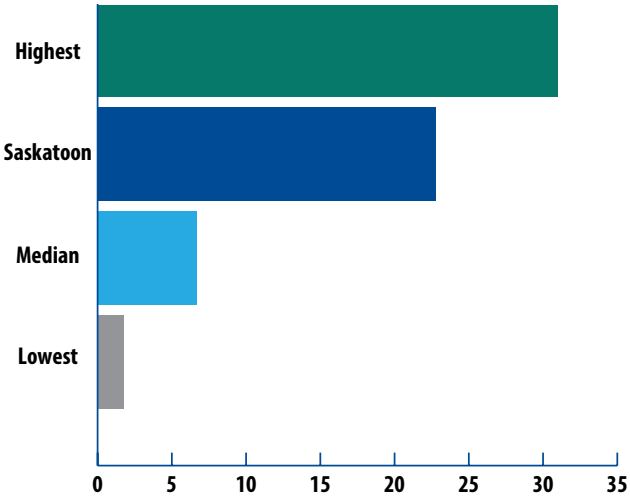


Average Age of Pipes (2012) for prairie Cities with greater than 500km of Water Mains



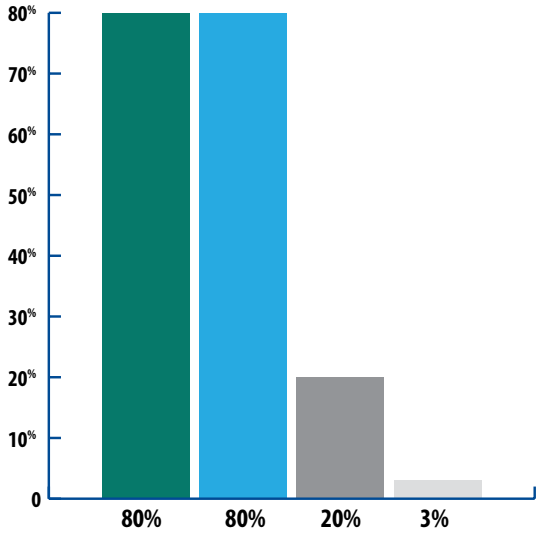
Saskatoon has the 2nd highest Average Age of Pipes out of the five Cities. The average age of water distribution systems across the 5 Cities is fairly similar, ranging from a low of 30 years and a high of 40 years.

Total Number of Water Main Breaks per 100km of Water Main (2012) for all Cities with greater than 500km of Water Mains



In 2011 Saskatoon incurred 248 water main breaks, which was the second highest amount of water main breaks per 100km out of 23 Cities. Saskatoon (22.8 breaks per 100km) is approximately 3.5 times the median value (6.7 breaks per 100km). Break ranges vary greatly across Canada with a high of 31 breaks per 100km and a low of 1.8 breaks per 100km.

Percentage of Unplanned Maintenance Hours (2012) vs. Routine Maintenance for all Cities with greater than 500km of Water Mains



Maintenance hours are broken down into unplanned maintenance and routine maintenance. Unplanned maintenance is defined as the amount time spent on urgent corrective work while routine maintenance is work that can be organized and planned in advance and is not urgent.

Saskatoon is tied for the highest percentage of time (80%) spent on unplanned maintenance work out of 14 Cities.

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WASTE WATER

This section of the report summarizes the state of Saskatoon's Sanitary Collection system by providing information on asset inventory, replacement value, condition and expenditure service level. The focus of this report will be on the following classes within the Sanitary Collection network: Sanitary Mains - Collection, Force Mains and Service Connections. The source of information is from the City's GIS, asset management database, past contract values and operation and maintenance records.

What do we own, what is it worth?

Asset Sub-Class	Inventory	Replacement Cost
Sanitary Mains - collection	902 km	$2,116,000,000
Sanitary Mains - trunks	127 km	$570,000,000
Manholes - collection	9,960	$163,000,000
Manholes - trunks	1,338	$45,000,000
Forcemains	44 km	$98,000,000
Service Connections	69,635	$393,000,000

Preservation Programs

Based on the condition and criticality of assets, locations are selected for replacement or assessment programs.

Sanitary Mains:
Sanitary Mains are rehabilitated using cured-in-place pipe (CIPP) lining. This method is more cost effective than traditional open excavation replacement methods. The CIPP method requires no excavation as the "liner" is inserted through the manhole and essentially "lines" the existing pipe with a new pipe.

There are currently 142km of sanitary mains-collection with a known physical condition of Poor or Very Poor. Physical condition is assessed in accordance with best practices from the Federation of Canadian Municipalities and National Research Council. Neighbourhoods selected for the first 3 year phase are: 2016 – Buena Vista, Pleasant Hill, Riversdale; 2017 – Central Business District, City Park, North Industrial; 2018 – Mount Royal, Nutana, Varsity View.

The 2016 budget includes funding of $3.7 million allocated to improving the condition of sanitary mains-collection which will address this backlog by the year 2022. Based on this planned expenditure service level there is no funding gap present.

Manholes:
Manholes are replaced by Public Works or a private contractor based on the type of repair. Public Works will fix minor repairs as necessary. In 2014, a private contractor was retained to fix major repairs on 32 manholes at a cost of $0.35M.

Force Mains:
Pipes are replaced by open trench excavation Cured in Place Pipe (CIPP). CIPP technology places a new pipe liner inside an existing pipe. Force mains are not replaced each year. They are replaced when condition assessment shows anticipated failure. In 2012, 1.1km of the Avenue C force main was replaced for $0.91M. Overall the condition of force mains is considered very good based on the average age of the system of 29 years and the high percentage of plastic pipes (86%) in the force main inventory. As the asset continues to age, a condition monitoring and assessment program will need to be applied to ensure preservation programs are properly planned.

Service Connections:
Connections are replaced as they fail or at the request of the homeowner. The current service level and budget of $615,000 per year will allow for the replacement of approximately 20 homeowner-requested connections and 90 emergency replacements.

As 92% of all service connections are deemed to be in very good condition an expenditure service level of C is sufficient to maintain the assets.

The Way Forward

- The current preservation plans for water distribution mains and sanitary collection mains are based on physical condition ratings and council approved service levels. The future of these programs is to monitor condition states and report on progress and adjust the funding strategy if necessary to maintain service level goals. There is currently no need for funding adjustment on these programs, and Council will be kept abreast of the service level options and costs if there is desire to improve the service level, or save money by decreasing the service level.

- For primary water mains and trunk sewer mains, the current initiatives are in condition assessment of critical assets. Future preservation will come out of these condition assessment reports. In 2016, 2.2 km of the most critical primary water mains in the City will be inspected and 10.5 km of sanitary trunks will be cleaned and inspected.

- The current approved funding for water service connection replacements will be undergoing review due to a large increase in the number of homeowner requested lead service connection replacement requests. Council will be presented with funding options for the next Utility Rate review.

- Approximately 1,000 manholes were inspected in 2015. This data will be used to create a long term preservation strategy for manholes that will be included in the next Utility Rate review.

- A long term strategy for capacity upgrades of water distribution mains is currently being studied by Saskatoon Water. The study will identify water mains that should be scheduled for replacement based on capacity ratings, in addition to physical condition ratings as is currently done. Based on this study, funding and level of service options will be presented to council for the next Utility Rate review.

City of Saskatoon