



# INFRASTRUCTURE REPORT CARDS

*A primer : July 2014*

## PURPOSE

The Municipal Finance Officers' Association (MFOA) and the Ministry of Municipal Affairs and Housing (MMAH) have partnered to develop a municipal Infrastructure Report Card Primer designed to:

- Help municipalities understand and communicate the condition of their assets to council and the public
- Present an accessible picture of municipal capital funding performance to stakeholders
- Enable municipalities to track capital funding trends in one asset class, for the whole asset base and year over year

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## Introduction

In 2012, the Province announced that municipalities that receive provincial infrastructure funding would be required to have an asset management plan (AMP). Provincial funding was made available to small and medium sized jurisdictions to help municipalities finance AMPs. In addition to the funding, the Province launched the *Building Together: Guide for Municipal Asset Management Plans*.<sup>1</sup> In an effort to enhance the tools available to municipalities for asset management, the Municipal Finance Officers' Association (MFOA) has partnered with the Ministry of Municipal Affairs and Housing (MMAH) to provide asset management templates, tip sheets and checklists. This primer on infrastructure report cards is one of the new tools that MFOA has provided.

This primer provides information on three different approaches to report cards:

- Basic Condition Rating Report Card
- Multi-variable Report Card
- Funding Report Card

Examples of each of these can be found in recently completed municipal AMPs. Given that municipalities are at various stages of the AMP process all three approaches have been included.

## Making Sense of Asset Inventories

The foundation for any AMP is the asset inventory. Inventories can contain significant amounts of information for every tangible capital asset (TCA) owned by the municipality. Inventory information routinely includes:

- Asset class and subclass, if any (e.g. roads by surface type)
- Asset description (e.g. for water mains this might include material, location, length, depth, diameter, etc.)
- Other municipal identifiers (e.g. department, division, serial numbers, etc.)
- In service year
- Life expectancy/remaining life
- Amortization (annual, accumulated)
- Replacement value and estimated year of replacement
- Condition rating
- Risk rating
- Performance rating
- Capacity rating

The asset inventory has all or some of this data for hundreds, thousands and, in some cases, tens of thousands of assets. Report cards have become a useful and popular way of summarizing all of this data on infrastructure in a simple way that can convey clear messages to municipal staff, council and the public. A well-constructed report card can convey volumes of information, including:

- The condition/performance of assets by asset class
- Trend analysis with respect to asset condition/performance
- Progress on asset maintenance since the previous report card
- Major challenges by asset class to keep the assets in a good state of repair
- The risks and consequences of asset failure by asset category and class

This primer offers examples of report cards that provide good summary information about AMPs and serve as excellent communication tools.

## Types of Report Cards

With the recent emphasis on asset management at every level of government in countries all around the world, asset management scorecards have become quite common. There are a variety of

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<sup>1</sup> See the [municipal infrastructure strategy](#) page of the website of the Ministry of Infrastructure.

approaches to creating report cards.<sup>2</sup> Different approaches require different supporting data. All good report cards use grading systems that people can relate to easily such as:

- 1 to 5 stars, as in hotel ratings
- A to E or F grades as in school report cards
- Colour coding, as in traffic lights (red, yellow, green)

Whichever approach is used, it is important to apply the ratings consistently within asset classes, across asset classes and across time. A consistent rating system will enable a municipality to track the progress of its AMP over time and allow the municipality to demonstrate progress on asset management to council and the public.

## Basic Condition Rating Report Card

An important component of asset management is understanding the condition of assets in the inventory. Report cards are a tool for translating detailed engineering data about assets into information that the public, council and senior management can understand and use in making asset management plans and decisions. Simple report cards can be constructed using condition data to produce a useful and simple summary of asset condition. Different assets will be evaluated differently. The following table is an example of a grading structure for a condition rating report card. The report card uses an alpha grading system (A, B, C, D, F) that mirrors a school report card for ease of understanding. The numeric grade is used to calculate averages for asset classes and subclasses to summarize the overall condition for a group of assets, as shown below.

Condition Ratings			Condition Description
Numeric Grade	Alpha Grade	Description	
1	A	Excellent	The asset and its components are functioning as intended; limited (if any) deterioration observed on major systems
2	B	Good	The asset and its components are functioning as intended; no maintenance is anticipated within the next 5 years
3	C	Fair	The asset and its components are functioning as intended; normal deterioration and minor distress observed; maintenance will be required within the next 5 years to maintain functionality
4	D	Poor	The asset and its components are not functioning as intended; significant deterioration and distress observed; maintenance and some repair required within the next year to restore functionality
5	F	Very poor	The asset and its components are not functioning as intended; significant deterioration and major distress observed, possible damage to support structure, may present a risk to people; requires immediate attention

Some assets have well-established condition rating scales. Bridges provide a good example where the Bridge Condition Index (BCI) is widely used and accepted.<sup>3</sup> Condition ratings under the BCI range from 0 to 100 across 3 categories (good, fair, and poor):

- Good - BCI Range 70 -100: For a bridge with a BCI greater than 70, maintenance work is not usually required within the next five years.
- Fair - BCI Range 60 -70: For a bridge with a BCI between 60 and 70 the maintenance work is usually scheduled within the next five years. This is the ideal time to schedule major bridge repairs from an economic perspective.

<sup>2</sup> For some examples of report cards and what they measure, see MFOA's "[Infrastructure Score Cards](#)"

<sup>3</sup> For information on the [Bridge Condition Index \(BCI\)](#) see the website of the Ministry of Transportation of Ontario

- Poor - BCI Less than 60: For a bridge with a BCI rating of less than 60, maintenance work is usually scheduled within approximately one year.

Sometimes work may have to be done to fit the rankings of a given index into the scorecard framework you adopt. Below is an example of how the City of Hamilton has reworked the BCI to fit into its 5 category grading system.<sup>4</sup>

BCI: Ministry of Transportation		BCI: City of Hamilton		
Ranking	Grade	Ranking	Grade	Description
70-100	Good	80-100	A	Excellent
60-70	Fair	70-79	B	Good
<60	Poor	60-69	C	Fair
		50-59	D	Poor
		<50	F	Failed

Once a grade for each asset has been determined, a weighted average grade for groups of assets can be calculated and summarized into a report card. A weighted average is recommended since it treats assets with large replacement costs as more important than assets with modest costs. The table below uses the same 5 point grading system noted above (A, B, C, D, F) for a hypothetical group of assets assumed to be in the same asset class. While the overall grade for this group is a C, or fair, it is important to note that assets range over the entire grading system.

#### Calculating an Overall Condition Rating for an Asset Class

Asset ID	NBV	Replacement Cost	Condition	Grade	Description
1	2,847,687	15,000,000	5	F	Very Poor
2	3,791,763	18,958,815	2	B	Good
3	252,443	1,514,658	4	D	Poor
4	3,255,585	13,022,340	4	D	Poor
5	4,893,149	29,358,894	3	C	Fair
6	3,204,857	60,000,000	1	A	Excellent
7	3,667,304	20,000,000	1	A	Excellent
8	3,312,847	13,251,388	5	F	Very Poor
9	4,658,192	5,000,000	1	A	Excellent
10	344,188	2,065,128	5	E	Very Poor
11	604,876	3,024,380	3	C	Fair
12	2,920,144	11,680,576	5	F	Very Poor
13	1,359,366	6,796,830	1	A	Excellent
14	1,865,093	11,190,558	1	A	Excellent
15	4,453,731	22,268,655	5	F	Very Poor
16	2,000,000	23,990,365	5	F	Very Poor
17	4,083,444	50,000,000	3	C	Fair
18	152,355	761,775	5	F	Very Poor
19	4,098,122	16,392,488	3	C	Fair
20	1,656,352	5,000,000	2	B	Good
<b>Total</b>	<b>53,421,498</b>	<b>329,276,850</b>			
weighted average (NBV)			3.01	C	Fair
weighted average (Replacement)			2.89	C	Fair

Once the grades are established for the relevant groups of assets for the municipality, a report card by asset type can be produced such as the one below, which contains a significant amount of useful information:

- The scorecard reports on all of the municipality's major assets
- There is an overall score/grade for each asset class
  - A score is given for the current update as well as the previous one to highlight changes in the class
- Arrows are used to convey anticipated future trends

<sup>4</sup> City of Hamilton, State of the Infrastructure Review – Road Network and Traffic Systems, May 5, 2011, p. 6.2

- There is a trend arrow to indicate where the asset class will move post 2009 (i.e. in the future)
- There is a trend arrow to indicate how the asset class has changed since the previous AMP update
- Comments are provided to describe the major challenges faced with each asset class. In some cases the issue might be an existing backlog of deferred capital investments. In other cases, the issue might be factors putting increasing pressure on maintenance expenditures.

The trend indicators of this scorecard are vital communication tools to help council and the public know if progress is being made in keeping assets in a state of good repair.<sup>5</sup>

ASSET GROUP	2009 RATING <sup>1</sup> and TREND <sup>2</sup>	COMMENTS (major factors impacting scores)	COMPARATIVE RATING & TREND from 2005 / 2006
Water	<b>B+</b> →	Status quo can be maintained with effective renewal investment decisions with advanced AM practices.	<b>B</b> →
Wastewater	<b>B-</b> →	Key AM plan improvements for facilities balanced by funding issues - higher energy costs at WWTP, costs for regulatory / environmental compliance and wet weather flow management and allocations needed for laterals.	<b>B</b> →
Storm Water	<b>C-</b> ↓	Condition OK but major concerns over lack of dedicated funding for O&M and capacity impacts of climate change / flooding.	<b>C</b> ↓
Roads and Traffic	<b>D-</b> ↓	Capacities managed but major concern for backlog and lack of reliable funding. 50% from gas tax / grants not sustainable.	Roads <b>D</b> ↓ Traffic <b>C</b> ↓
Central Fleet	<b>C</b> ↓	Concerns for renewals without sufficient funds available and user costs not sufficient for full cost recovery.	<b>C</b> →
Corporate Facilities	<b>C-</b> ↓	Change is attributed to significant improvement and focus on asset management processes and new staffing.	<b>F</b> ↓
Parks & Open Spaces	<b>C-</b> ↑	Concern that O&M funding is not keeping pace with acquisition of new assets. Legislative improvements made in DC assessment.	<b>C</b> ↓
Public Transit	<b>B+</b> ↑	Reliance on external funding a risk for long term sustainability. Recent additions plus on-board communications systems.	<b>B</b> →
Waste Management	<b>B-</b> ↓	Future decline expected based on increasing O&M costs with no increases in funding and requirement for capital to address upcoming demands.	<b>C</b> →
Forestry	<b>C-</b> ↓	Challenged by need to increase canopy and lack of sufficient O&M budgets to maintain existing inventory. Concerns for forest health due to pest infestations & intensification.	<b>F</b> ↓
Cemetery	<b>C</b> →	Future concern about balancing issues of adequate capacity with lack of funding for sustainability.	<b>B</b> →

### Supplemental Information

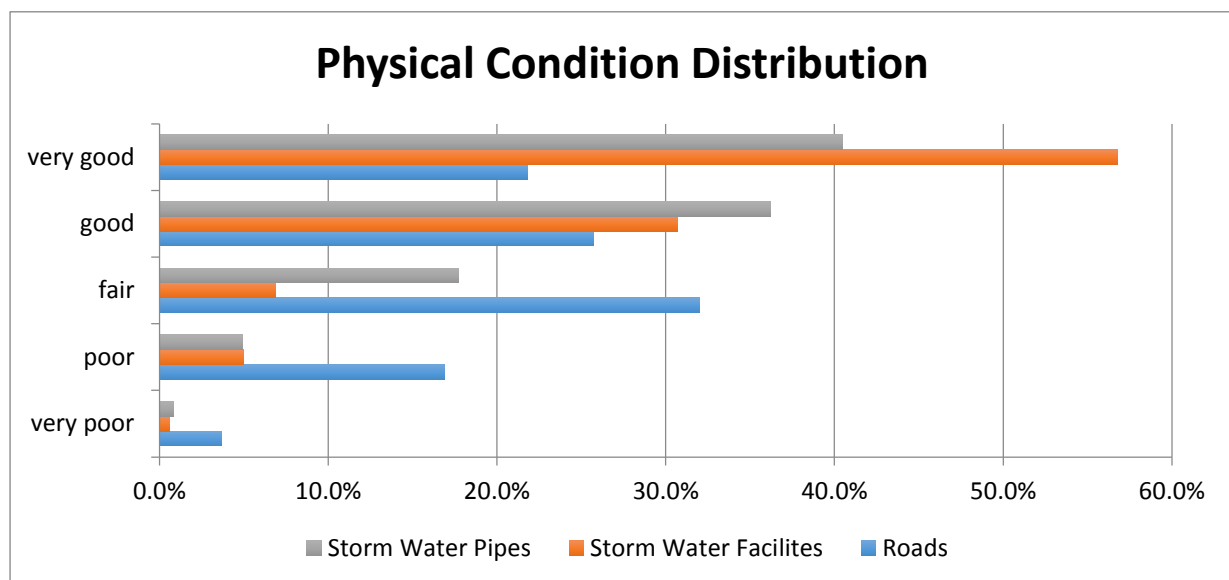
Using a single grade to summarize the condition of an entire asset class is useful and valuable but it also runs the obvious risk of hiding a great deal of information. Report cards can be supplemented

<sup>5</sup> City of Hamilton, 2009 State of the Infrastructure Report on Public Works Assets, prepared by R.V. Anderson, 2009, p. 10.

with information about the distribution of assets within the class based on their condition rating. The following table summarises the distribution of three asset classes (roads, storm water management facilities, and storm water management pipes) based on data taken from the Canadian Infrastructure Report Card (2012).

	Very poor	Poor	Fair	Good	Very good
Roads	3.7%	16.9%	32.0%	25.7%	21.8%
Storm Water Facilities	0.6%	5.0%	6.9%	30.7%	56.8%
Storm Water Pipes	0.8%	4.9%	17.7%	36.2%	40.5%

The data can also be represented graphically.



### Multi-Variable Score Cards

The capital plan could include investments in existing TCAs (repair, refurbish, replace) or in new assets that are not yet included in the TCA inventory. Once started, these latter works will become “works in progress” that will be incorporated into the asset inventory when the project is completed. When formulating capital budgets, municipalities must establish criteria to evaluate which of the thousands of assets in the inventory will be addressed by projects included in the capital budget. Municipalities often use a number of criteria to determine whether a project is included in the capital plan and in what year it is included. These criteria usually go beyond a simple condition assessment or rating. If capital plans incorporate more information than condition alone, it is worth considering if additional variables should be part of the report card. It is useful if there is a linkage between how assets are rated and graded and how they find their way into capital budgets. This produces a stronger link between the report card and the capital plan. Expenditures approved in the capital plan should result in improvements to grades in the report card.

There are a number of added elements that have been built into infrastructure report cards. Some report cards add condition versus performance and capacity versus need into their grading. Each asset is assigned a score on each dimension and an overall score for the asset is the average of the two scores. Below are two examples (Hamilton and Edmonton) of scorecards using condition ratings supplemented with additional criteria.<sup>6</sup>

<sup>6</sup> City of Hamilton, 2005 Life-Cycle State of the Infrastructure Report on Public Works Assets: Final Report, November 2005, p. 11. City of Edmonton asset management [website](#).

## Hamilton

**Condition and Performance:** This criterion characterizes the current physical condition of infrastructure.

- A = Excellent. No noticeable defects. Some aging or wear may be visible
- B = Good. Only minor deterioration or defects are evident.
- C = Fair. Some deterioration or defects are evident, but function is not significantly affected.
- D = Poor. Serious deterioration is evident in at least some portion of the asset. Function is inadequate.
- F = Failed. Asset is no longer functional. General or complete failure of a major asset is evident.

**Capacity versus Need:** For most infrastructure categories, this second criterion relates to the demand on a system, such as volume or use, versus its design capacity. This is a critical evaluation criterion for municipalities that are facing ongoing population and community growth. It is also important because a particular asset may be in excellent condition and performing well (e.g. the first criterion), but it is simply too small to meet the needs (e.g. this second criterion). The grading scale for this indicator follows:

- A = systems that can support  $\geq 100\%$  of demand
- B = systems that can support 90-99% of demand
- C = systems that can support 80-89% of demand
- D = systems that can support 70-79% of demand
- F = systems that can support  $< 70\%$  of demand

## Edmonton

The Office of Infrastructure and Funding Strategy evaluates the condition of assets according to three criteria:

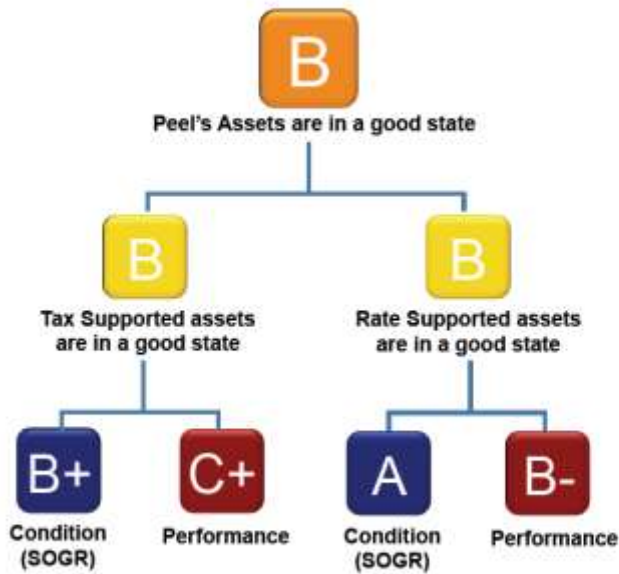
- **Physical condition:** The condition of the physical infrastructure that allows it to meet the intended service level.
- **Demand/capacity:** The capacity of the physical infrastructure and its ability to meet the service needs.
- **Functionality:** The ability of the physical infrastructure to meet program delivery needs.

A five-point rating system (very good, good, fair, poor, and very poor) provides a high-level perspective of the state and condition of the City's infrastructure. Infrastructure with a "poor" or "very poor" ranking is not performing to its designed function and is not meeting program and service delivery needs.

The Region of Peel also has a combined scorecard that differentiates tax supported and user charge supported programs. The scorecard shows the state of infrastructure by condition and performance ratings. In addition, the graphic shows the distribution of infrastructure ratings.



# State of Infrastructure



Organizational Scorecard

Distribution of Infrastructure Ratings

Other jurisdictions combine a condition/performance score with a risk score. Risk is based on a standard risk matrix, such as the one below that assesses an asset's risk based on the likelihood of asset failure combined with the consequences of asset failure.

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Severe
Almost certain	M	H	H	E	E
Likely	M	M	H	H	E
Possible	L	M	M	H	E
Unlikely	L	M	M	M	H
Rare	L	L	M	M	H

The matrix produces risk levels of low (green), medium (yellow), high (orange) and extreme (red). Municipalities that use this framework use the risk assessments to prioritize projects for budget purposes and will quantify the levels of risk reduction or mitigation that a proposed capital plan will provide. In Peel Region, where this approach is applied to important assets, the risk information of an asset class is represented graphically and shows the current risk, the target risk, as well as the risk mitigation if the 10-year capital plan is adopted.

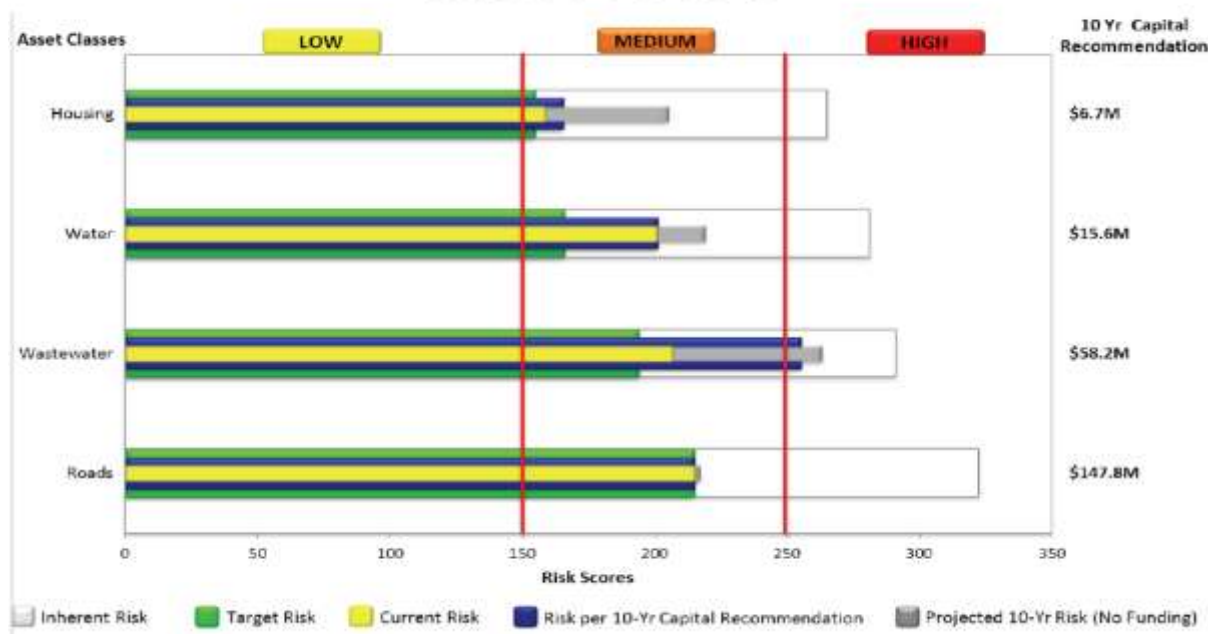
# Risk Measures by Asset Class



- Inherent (Unmitigated) Risk – Highest Estimated level of risk. No controls.
- Target Risk – Desired risk after implementing all practical controls.
- Current Risk – Estimated level of risk under present controls.
- Projected 10-Year Risk (No Funding)
- Risk per 10-Yr Capital Recommendation

A summary of this type of analysis for Peel's major asset classes is shown below.

## Risk Profile



### Adding Funding to Report Cards

Some municipalities have adopted report cards that include a funding measure in addition to condition/performance. The funding measure typically examines the extent to which assets are funded based on the required expenditure levels. This involves comparing information from the AMP with documentation of recent spending on capital works. Report cards are calculated to be an

average grade based on condition/performance and augmented with information about the extent to which the required capital plan is funded. The table below shows a five grade approach that can be merged with condition/performance data shown above to produce an overall grade for each asset class.

Grade	Range (average annual spending as % of investment requirement)	Performance Description
A	87.5%-100%	Excellent
B	75%-87.5%	Good
C	62.5%-75%	Fair
D	50%-62.5%	Poor
F	< 50%	Fail

The table below shows a comparison of capital spending that is required versus historic levels of spending for the major asset classes of roads, water, sewer and housing. In total, required annual spending is \$13 million. Historic spending is \$8.3 million or approximately 64% of the amounts required. The table calculates a funding grade for each asset class, which can be combined with grades for the same classes based on other criteria such as condition/performance. The table also shows a “trend” for assets in the class. Obviously, a trend can only be produced once subsequent AMP updates are complete. The arrows shown in the trend column are commonly used to convey a general direction of progress in the class (up arrow signifies improvement, down arrow signifies deterioration).

#### Roads, Water, Sewer and Housing Funding Report Card

Asset class	Average annual life cycle capital investment requirement (\$ millions)	Annual capital investment – budget actuals (\$ millions)	Surplus / Deficit (\$ millions)	Score	Grade	Grade	Description	Trend
<b>Roads</b>	\$5.00	\$4.00	-\$1.00	80.0%	B	2	Good	↑
<b>Water</b>	\$3.00	\$2.00	-\$1.00	66.7%	C	3	Fair	→
<b>Sewers</b>	\$4.00	\$2.00	-\$2.00	50.0%	D	4	Poor	↓
<b>Housing</b>	\$1.00	\$0.30	-\$0.70	30.0%	F	5	Fail	↗
<b>Total</b>	\$13.00	\$8.30	-\$4.70					

Funding scores can be combined with condition ratings to produce a more informative report card. Condition scores in the table below were arbitrarily picked for illustration purposes. Funding grades are taken from the table above.

#### Roads, Water, Sewer and Housing Combined Report Card

Asset class	Funding Grade	Condition Grade	Average Grade	Average Grade rounded	Description
Roads	2	2	2.00	2.00	Good
Water	3	4	3.50	4.00	Poor
Sewers	4	2	3.00	3.00	Fair
Housing	5	3	4.00	4.00	Poor

## Tracking Other Data

As noted above, the purpose of the report card is to summarize large amounts of data in a simple easy to understand way. Over time, the report should also be a useful tool to show council and the public that progress is being made with respect to keeping assets in a good state of repair and in meeting council determined service standards. Municipalities might wish to consider tracking other data that can contribute to this good news story over time. For example, a good asset management plan can lead to cost reduction in a number of ways, such as:

- Identifying new technologies that extend asset life at lower costs (e.g. lining of water pipes)
- Encouraging consideration of whether some assets need to be replaced (e.g. perhaps a bridge with low traffic volumes does not need to be replaced if other alternative crossings are available)
- Encouraging more optimal approaches to maintenance to extend asset life (e.g. buildings, fleet)

Tracking these savings from various sources can help to encourage council and ratepayers' support for asset management.

## Summary

- Report cards are an excellent communication tool to summarize the current state of assets for council and the public.
- Over time, report cards can show council and the public the progress that is being made to bring assets into a state of good repair.
- Simple report cards based on condition alone are common, but not as useful as combined report cards because municipalities do not generally make decisions about capital works based on condition alone.
- Combined report cards can factor in asset capacity and/or risk to produce report cards that are more closely tied to how capital budgets are constructed.
- A funding component can be added to a report card to illustrate the extent to which the financial strategy of the municipality is successful in closing the funding gap.