REGINA
Infinite Horizons

City of Regina

STATE OF ROADWAYS INFRASTRUCTURE

2013

ROADWAYS PRESERVATION BRANCH

August 2013

Contents

EXECUTIVE SUMMARY

This report describes the current state of asphalt road, concrete sidewalk, and bridge infrastructure as of the 2012 year-end, and is meant as an informational report for Council. It provides some description and discussion about current programs and activities that are related to these assets. It also suggests some opportunities for advancing on the various challenges that need to be resolved in order to reach sustainability, where sustainability is defined as the long term financial and organizational capacity of the City to maintain the roadways infrastructure at an acceptable service level.

This report follows a typical framework for an asset management plan, such as suggested in Canada's National Guide for Sustainable Municipal Infrastructure, described in terms of seven questions:

1. What do we own?
2. What is it worth?
3. What condition is it in?
4. What do we need to do to it?
5. When do we need to do it?
6. How much money do we need?
7. How do we achieve sustainability?

What do we own?

The City owns, as per end 2011 inventory:

- 926 km asphalt roads, of which 59% are residential local streets;
- 1289 km concrete sidewalk; and
- 44 roadway bridges, including 11 bridges under Urban Highway Connector Program (UHCP)

What is it worth?

The overall replacement value of Regina's roadways assets (roads, sidewalks and bridges) in 2012 is **$1,710,750,000**.

What condition is it in?

Using *age* as an indicator for the health of the road network, approximately 85% of the asphalt surface of the arterial, collector and industrial sub-network is in a fair or good condition and stable during the last 20 years. However, only 45% of the residential network is in a fair or good condition and its condition has deteriorated significantly during the last 20 years.

Based on condition measurements between 2007 and 2010, approximately 90% of the sidewalk network is in a fair or good condition. The sidewalks with a poor condition are mainly within the residential sub-network.

Based on the Alberta Bridge Inspection and Maintenance System (BIM), 26 of the 44 bridges (59%) are in a fair or good condition. Of the 18 bridges (41%) in a poor condition, 9 were transferred in 2011 to the City by Ministry of Highways and Infrastructure (MHI) as part of UHCP.

What do we need to do to, and when do we need to do it?

The life cycle of a road is typically 45 to 60 years and the required maintenance involves a combination of resurfacing activities until reconstruction is required.

The City's current practice is focused on rehabilitation of major roadways to provide the most benefit to all motorists and commerce, as 80% of the traffic is carried on 20% of the total road network. Funding for street infrastructure renewal is currently prioritized in order of:

1. Expressways and arterial roadways;
2. Collector roadways and bus routes;
3. Major local roadways – commercial; and
4. Residential local roadways.

The City provides a wide range of diverse services for roadways infrastructure through the following programs and activities, namely:

1. Street Infrastructure Renewal Program (Capital budget). Activities include:
    a. Reconstruction;
    b. Rehabilitation; and
    c. Thin Lift Overlay.

2. Asphalt Maintenance Services. Activities include:
    a. Pothole patching;
    b. Medium sized patching (depressions); and
    c. Larger sized patching (thin lift).

The formal *Inspection Policy – Concrete* and *Maintenance Policy – Concrete* as approved by Council require the Administration to keep sidewalks in a safe condition. Sidewalk distresses are repaired with priority based on 'worst first.' Sidewalks adjacent to residential and other category roads can be replaced under the Local Improvement Program (LIP).

The life cycle of a bridge is typically 75 years. Life cycle activities include regular preventive maintenance followed by rehabilitations every 15 to 25 years. Rehabilitations are scheduled in specific years based on life cycle costing. Along with regular

inspections, testing, maintenance and rehabilitations, the City must also repair accident damage caused by over height loads to ensure public safety.

In 2010, the City developed a new long term Bridge Maintenance Program (BMP) based on a 'preventive' strategy. In this new BMP, preventive maintenance planning is combined with rehabilitation planning. Every year one-third of the bridges are inspected. From these inspections a maintenance program is established for the following year. Also, in 2011 the City started an in-house bridge washing program as part of preventive maintenance plan.

How much money do we need?

Using an MS Excel-based financial model, a first 'rough' estimate for funding requirements for the road network was calculated. The results of these calculations show:

1. In order to achieve a sustainable condition of the roadways network with a manageable mix of roads in different conditions, a certain level of renewal must occur every year. To date, we are not meeting the required level of renewal and have built up an inventory of 'overdue work.' The current estimate for the total value of overdue work is $261 million. The bulk of that total, $221 million, is required for local roads. The dollar estimate was calculated using the total number of square metres of road that are past the recommended time for maintenance times the replacement cost per square metre. The replacement cost was based on the average actual cost over previous construction seasons s for various roadway network projects. Since there is a difference in the cost of delivering this work with City crews or through contractors, the average was calculated using a sample of both methods of delivery.

2. To maintain the existing condition of the roadway network without addressing the 'overdue work,' the required level of investment would be an average of $30 million per year (2012 dollars). The annual investment was calculated by looking at the road network by category and applying a standard lifecycle replacement assumption, i.e. arterial road is expected to receive a surface treatment every 10 years for the first 40 years of life, and then at year 60 would receive full replacement. If an arterial road was not maintained in this cycle then a full replacement is expected every 20 years.

3. As the City grows and the roadway network also grows, this investment would have to increase to ensure a sustainable system.

The current road investment strategy can be summarized as focusing expenditures on the 20% of the road network that is subjected to 80% of the traffic volume, i.e. arterial and collector network. Only 25% of available funding is used for improving the residential network.

Road Type	*Overdue Work*	*Annual Investment*
ARTERIAL & COLLECTOR	40,730,984	11,250,000
LOCAL	220,862,334	3,750,000
Total	261,593,318	15,000,000

Based on the current level of investment, approximately $15 million per year, the estimated amount of 'overdue work' will grow from $261 million in 2012 to $523 million in 2033, in current year dollars. In addition, the average age of Regina's road network will increase.

Of growing concern is the deterioration of the large residential network. The current strategy focuses largely on the arterial network.

For bridges, the current estimated investment need is $93 million over 25 years, for an average of $3.48 million per year over the 25 year term. The average level of investment over the past 5 years was $4.48 million per year and has been steadily declining over the past few years. This current investment level is insufficient based on the estimated short term funding needs (1-5 years) of $6.9 million per year over the next 5 years.

The average bridge investment needs over the medium term (5-10 years) and long term (15-25 years) will be reduced as effects of increased preventative maintenance in the short and medium terms are realized; these are currently estimated at $4.67 million per year and $2.35 million per year respectively.

How do we achieve sustainability?

Sustainability is here defined as the long term financial and organizational capacity of the City to maintain the roadways infrastructure at an acceptable service level.

The key challenges for achieving sustainability include:

1. The level of public dissatisfaction with the current state of roadways infrastructure in Regina as identified repeatedly in Citizen Surveys;

2. The need for clarity regarding what an acceptable Customer Level of Service is;

3. The substantial financial gap between what is required for maintaining and improving the roadways assets and what is allocated in the annual budgets;

4. The limited tax and revenue generating options for the City. There is a strong dependency on Property Tax and federal/provincial funding (mainly Gas Tax);

5. A substantial portion of the residential road network is in a poor condition;

6. The execution of the UHCP has substantial challenges related to funding approval process and amounts of received funding from MHI; and

7. The need for improved policies regarding maintenance and renewal of roadway assets.

Opportunities for reduction of the roadways infrastructure gap include:

1. Increase funds, for example by:
    a. Implementing dedicated property tax;
    b. Expanding LIP; and
    c. Special tax Bylaw.

2. Reduce life cycle costs, for example by:
    a. Providing only bare minimum level of service;
    b. Increasing life of asset, such as by minimizing utility cuts;
    c. Applying innovative construction methods;
    d. Developing innovative contracts with external contractors; and
    e. Optimizing and integrating life cycle activities using sound asset management principles.

Regarding opportunities for improving the residential road network the 'Neighbourhood Renewal Program' in the City of Edmonton is often cited as an example of best practices. Funding of this program is a combination of provincial funding, general property taxes, LIP tax levy, and a dedicated City wide special neighbourhood renewal tax levy (1.5-2%). Also, the City of Saskatoon is currently discussing the implementation of dedicated taxes for roadways infrastructure improvement.

The Administration has planned the following steps in order to move towards a more sustainable situation:

1. Establish a Level of Service and policies for Roadways Infrastructure;

2. Continue executing the existing Bridge Maintenance Program;

3. Develop options, for consideration by Council, for future residential street renewal;

4. Develop operational strategies for maintenance, rehabilitation and renewal of individual asset categories;

5. Integrate capital and maintenance programs;

6. Continue further development of Roadways Infrastructure Asset Management structure, program and tools; and

7. Develop financial options, for consideration by Council, on how to optimize funding levels to reduce the Infrastructure 'gap.'

SCOPE OF REPORT

The City of Regina manages a broad range of infrastructure assets. This report will only examine the state of roads, sidewalks and bridges. This report does not consider the state of other assets, like signs, traffic signals, facilities, facilities, underground utilities, equipment and other city owned assets.

ROADS

WHAT DO WE OWN?

The road network that serves the city of Regina is classified into four functional road categories or sub-networks:

1. Arterial (major and minor arterials, expressways, highways, ramps and loops);
2. Collector (major and minor collectors);
3. Industrial/Commercial (major and minor industrial/commercial locals); and
4. Residential (residential locals).

The Industrial/Commercial and Residential roads together are called the 'Local' sub-network under the alternative tourist classification system.

Albert Street is one Regina's Major Arterials

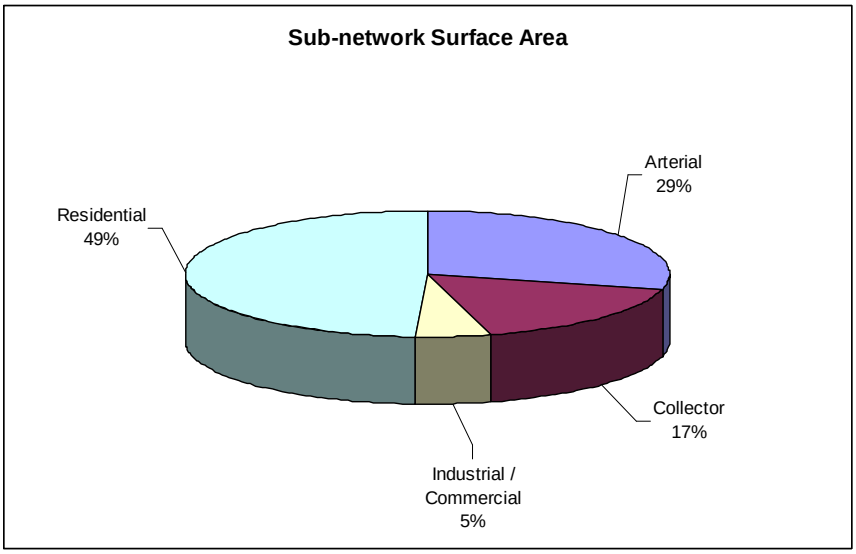
The inventory of asphalt road assets per functional road category is shown in Table 1 and Chart 2 and 3.

Sub-network	Surface Area [m^2]	Centreline Length [km]
Arterial	3,250,000	184
Collector	1,913,000	152
Industrial/Commercial	559,000	46
Residential	5,514,000	544
Total	11,236,000	926

Table 1: Asphalt Road Inventory as per 31/12/2011 (Roadways Preservation Inventory)

The residential network accounts for the largest share of City's roadways inventory at 49%, followed by arterial (29%), collector (17%) and industrial/commercial (5%). It is important to note that the roadways network inventory does not include new road assets currently under construction.

The arterial network includes the road assets that were transferred to the City by the Ministry of Highways and Infrastructure (MHI) as part of the Urban Highway Connector Program (UHCP) in 2011. Those assets include the public highways located in an Urban Municipality that connects two provincial highways (i.e. Ring Road from Victoria Avenue to Lewvan Drive).



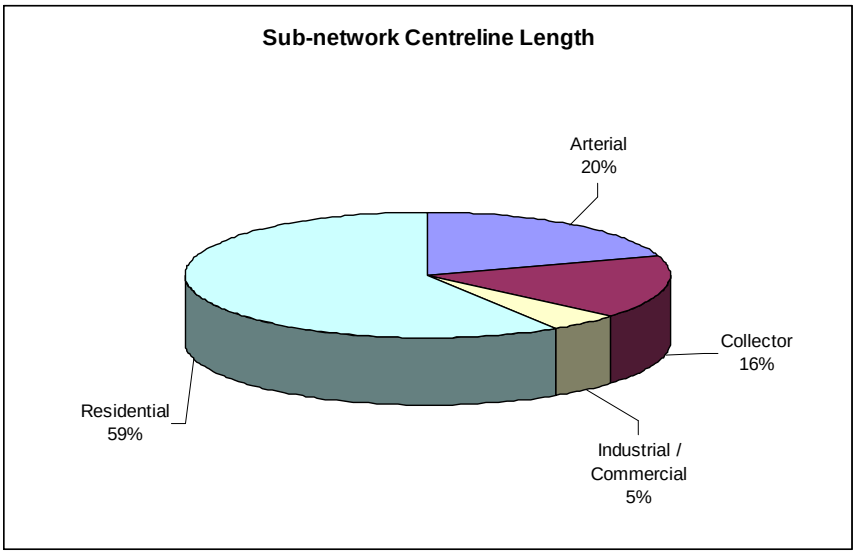


Chart 2 and 3: Asphalt Road Inventory in % as per 31/12/2011 (Roadways Preservation Inventory)

The square area of all the City's roads combined (11.2 million m^2) is shown in Figure 4 and depicted as a proportion of the city.

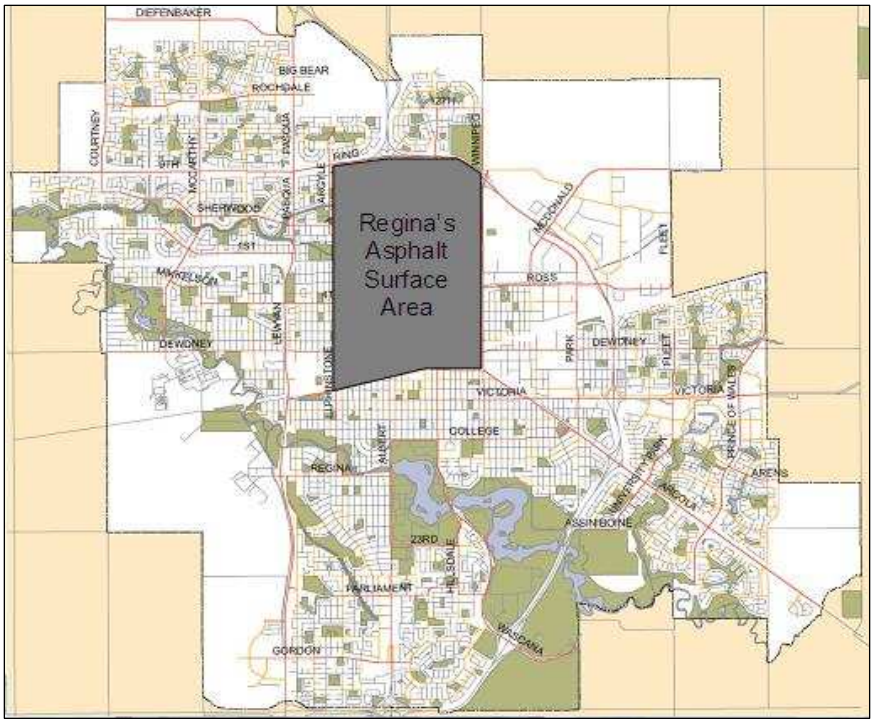


Figure 4: Regina's Asphalt Surface Area

WHAT IS IT WORTH?

The value of the asphalt road network is based on replacement cost. Because of the varying depth and type of structure which lies beneath each sub-network, the unit cost for replacement of asphalt surface layer and supporting base structure is higher for higher-function roads (arterials) and for roads which carry heavier traffic (collectors and industrial/commercials). The relative replacement value of the asphalt road network by sub-network is shown in Table 5 and Chart 6.

Sub-network	Surface Area [m^2]	% of total Surface Area	Unit Cost [$/m²]	Replacement Value [$]	% of Replace-ment Value
Arterials	3,250,000	28.9	$140	$455,000,000	34.6
Collectors	1,913,000	17.0	$125	$239,125,000	18.2
Industrial/Commercial	559,000	5.0	$125	$69,875,000	5.1
Residential	5,514,000	49.1	$100	$551,400,000	41.9
Total	11,236,000	100.0		$1,315,400,000	100.00%

Table 5: Asphalt Road Replacement Value by Sub-network as per 2012

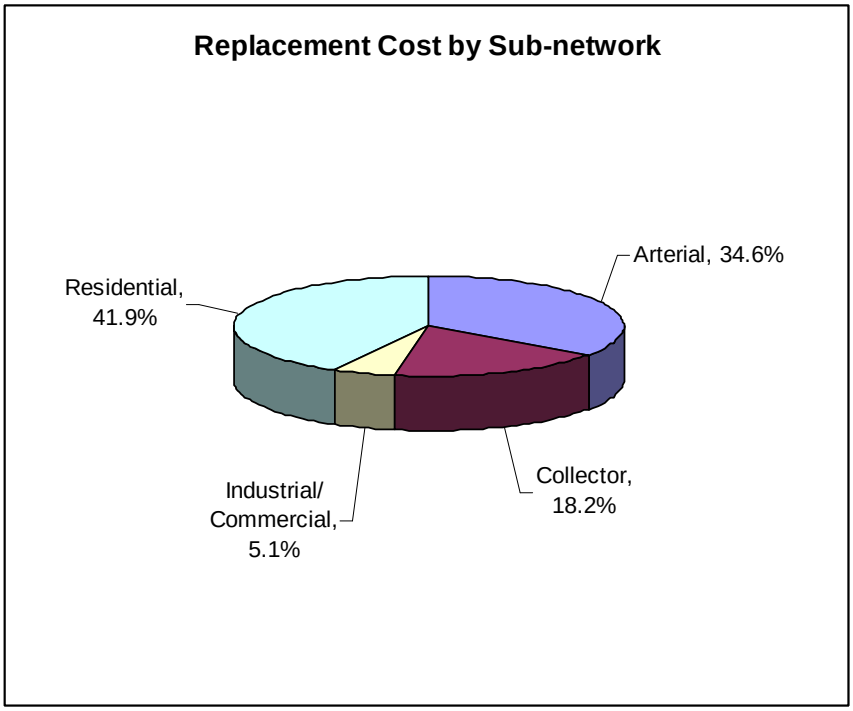


Chart 6: Replacement Cost by Sub-network as per 2012

WHAT CONDITION IS IT IN?

History of road construction and age of roadways network

Much of the road network, as shown in Figure 7 and Chart 8, was constructed between 1945 and 1985, with peaks between 1960 and 1965 and in 1977. The road network development was in conjunction with development of residential neighbourhoods.

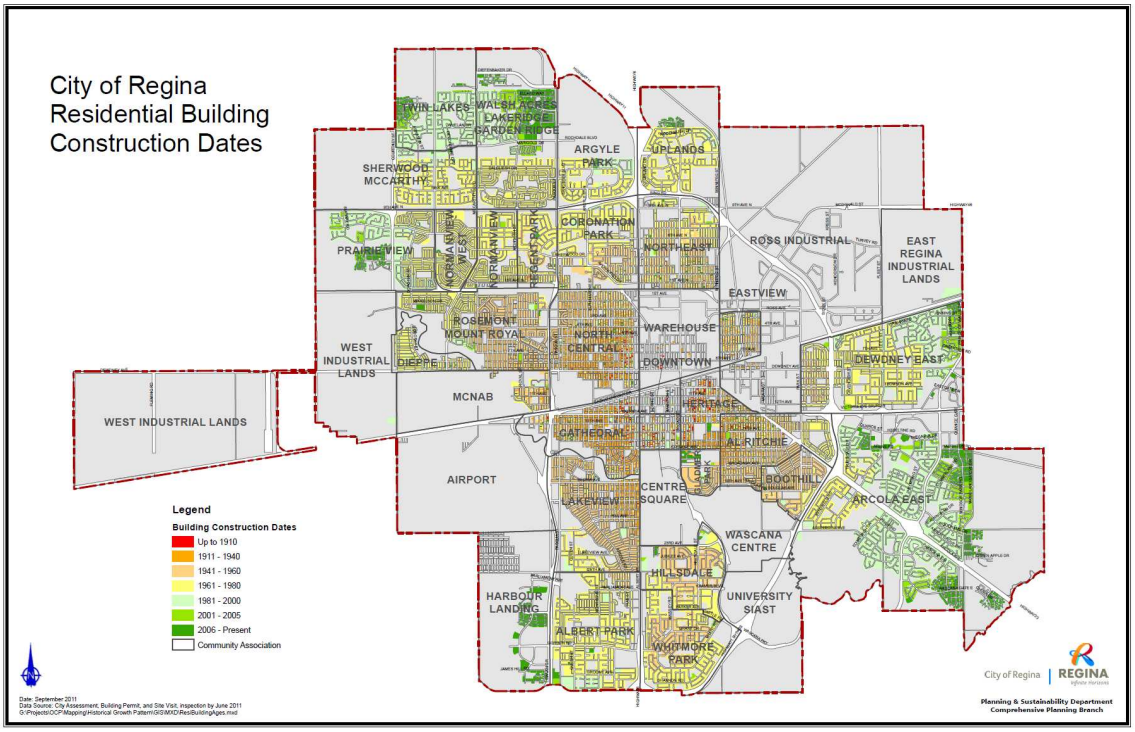


Figure 7: History of Neighbourhood Development in Regina

New road construction after 2009 is not included. As these roads pass their structural useful life, not only will their surface require replacement, but the entire structure as well.

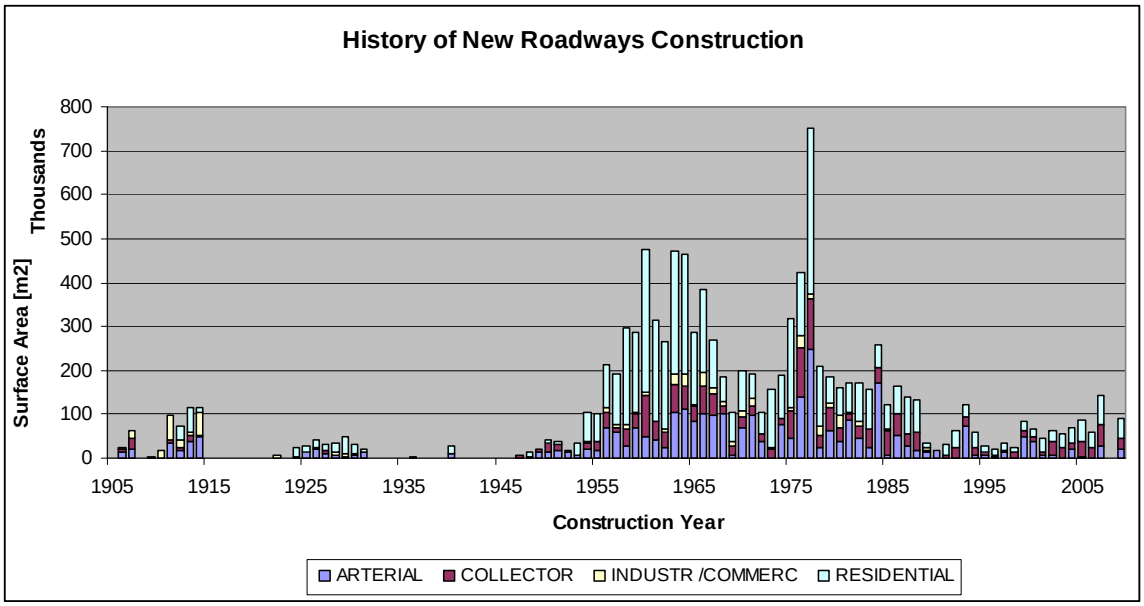


Chart 8: History of New Roadways Construction in Regina (Roadways Preservation Inventory)

How do we measure condition?

The condition of asphalt road assets can be described using more than one method. Condition may be indicated by surface or structural age, surface distresses, structural capacity, ride-ability, along with any number of other indicators.

1. **Surface age**: This is the age of the asphalt pavement layer. Surface age can provide a general description of the overall health of an asphalt road network.

   The life expectancy (design life) of asphalt surface is 10 to 30 years, different for each of the road categories, namely:

Arterial	10 - 15 years
Collector	15 - 20 years
Industrial / Commercial	15 - 20 years
Residential	25 - 30 years

2. **Structural age**: Structural age refers to the age of the base underlying the asphalt surface. The structure provides sub-surface drainage, stability and strength to support the flexible asphalt surface. The structure has a life expectancy separate from the surface. Similar to surface age, individual structures may not deteriorate at the same rate and thus structural age is not necessarily correlated to condition, but provides a network-level description of the health of the network.

The average life expectancy (design life) of asphalt base ranges from 40 to 60 years, different for each of the road categories, namely:

Arterial	40 - 50 years
Collector	40 - 50 years
Industrial / Commercial	50 - 60 years
Residential	50 - 60 years

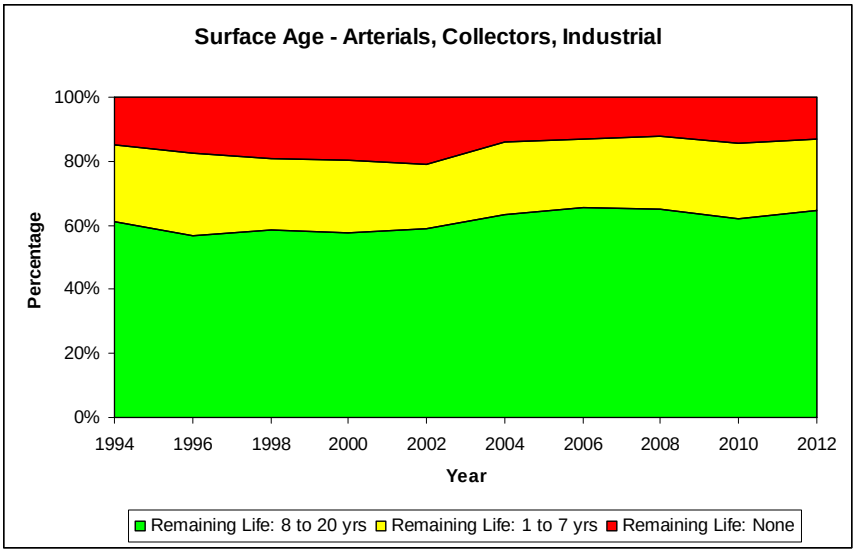
3. **Surface distresses, structural capacity, ride-ability:** Surface distresses include any visible deficiencies in the asphalt. Cracks, potholes, patches, bumps, deformations, ravelling and ruts are a few examples. Structural capacity refers to the ability of the road to bear the traffic volumes and loadings. Ride-ability refers to the smoothness of the road surface.

The administration is currently developing and implementing a condition rating system, based on technical measurements related to surface distresses, structural capacity and ride-ability.

Falling Weight Deflection (FWD) Equipment for Measuring Road Flexibility, i.e. Structural Strength

Current Condition – Arterials, Collectors, Industrial/Commercial

Chart 9 illustrates the percentage of all ACI asphalt roadways that are either in good, moderate or poor condition based on *age* and life expectancy. Approximately 85% of the asphalt sub-network is in a fair or good condition based on age. The remaining 15% of asphalt surfaces would be considered past their useful life of 20 years. Since 1994, the age and relative condition of Regina's ACI sub-network has remained constant. The trend is indicative of a sustained level of investment in this category of roadways.



Assumption:
For arterials, collectors, industrial/commercial network the maximum useful life is 20 years until *asphalt surface replacement* is required.

Chart 9: Remaining Life - Arterial, Collector, and Industrial in percentage of surface area

The surface area of the ACI sub-network has grown considerably over the last 20 years. As Chart 10 illustrates, the surface area (i.e. inventory) has increased by approximately 3 million m^2. Even though there are more m^2 of roadways to maintain, the condition has remained at the same high good/fair level.

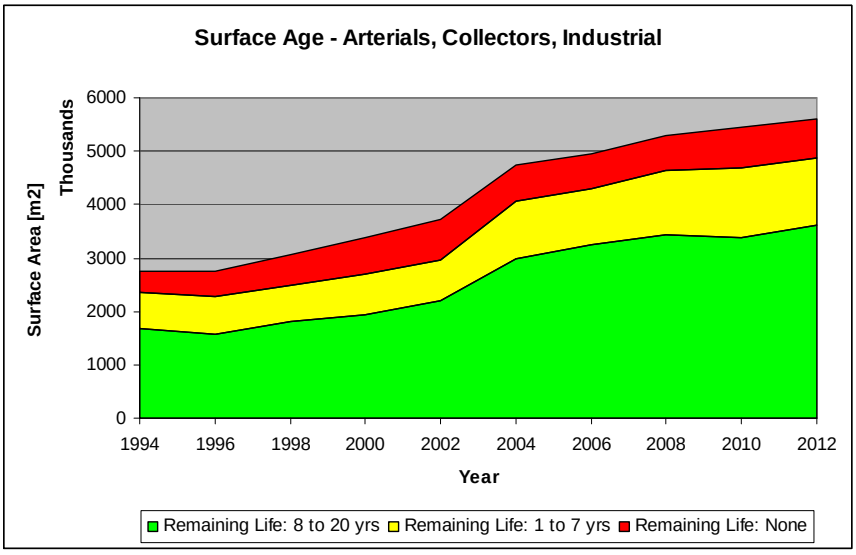
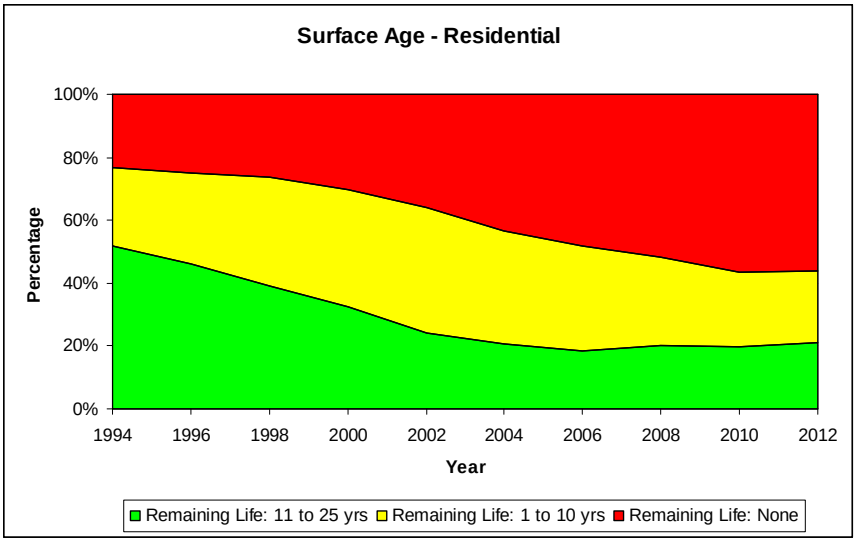


Chart 10: Remaining Life - Arterials, Collectors, Industrial in surface area

Current Condition – Residential

The residential network, in contrast to the ACI, is in considerably poorer condition based on *age*. Approximately 45% of the asphalt surface of the residential network is in a fair or good condition, 55% of the asphalt surface is beyond an assumed useful life of 25 years, as shown in Chart 11.



Assumption:
For residential roads the average useful life is 25 years until *asphalt surface replacement* is required.

Chart 11: Remaining Life Asphalt Surface – Residential in percentage of surface area

The relative slow growth of the residential sub-network in the last 20 years is shown in Chart 12.

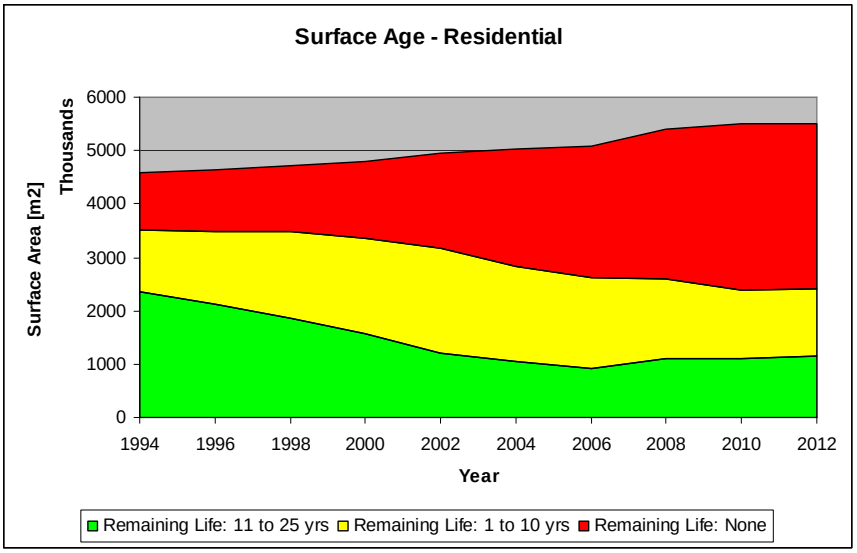


Chart 12: Remaining Life Asphalt Surface – Residential in surface area

WHAT DO WE NEED TO DO TO IT AND WHEN DO WE NEED TO DO IT?

Required

The life cycle of a road is typically 45 to 60 years and the required maintenance involves a combination of resurfacing activities until reconstruction is required.

A typical deterioration curve for an asset is shown in Figure 13. Early in its lifespan, an asset deteriorates relatively slowly, and may not require any treatment for almost a third of its expected lifespan. Then, as its service level declines, light treatments such as crack sealing may be appropriate. Later, as the condition declines further, more expensive treatments such as overlays may be required. At some point, the asset deteriorates beyond a point which is "acceptable." After this point, the asset must be maintained at a minimum safety service standard until a full rehabilitation or reconstruction is undertaken.

Rating

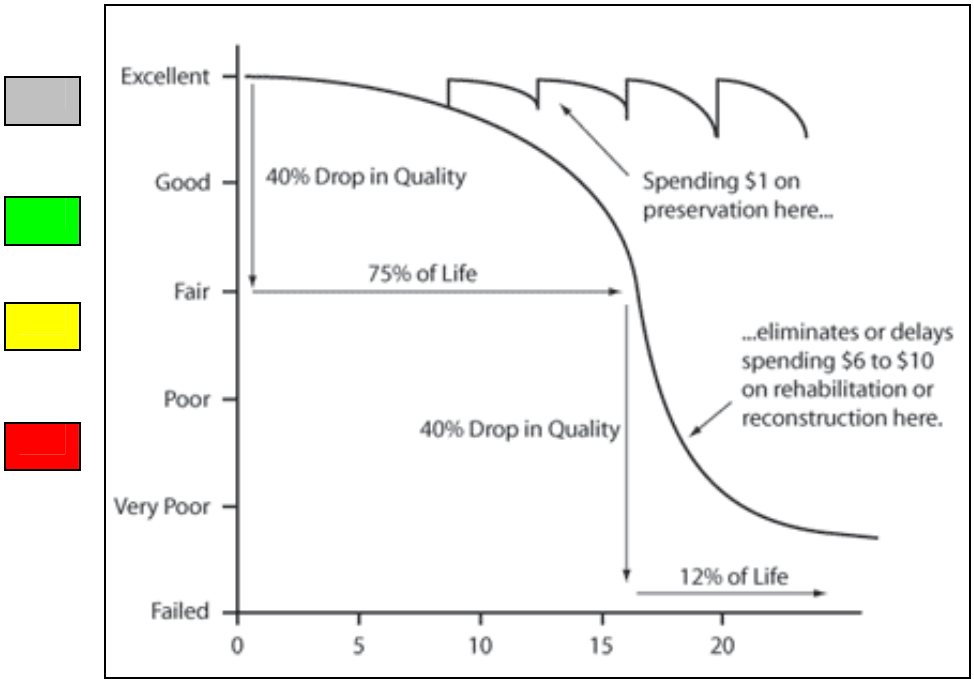


Figure 13: Typical Deterioration Curve for Asphalt Roads (Source: FHWA)

The timing and the effect of different types of treatments on the deterioration curve is shown in Figure 14.

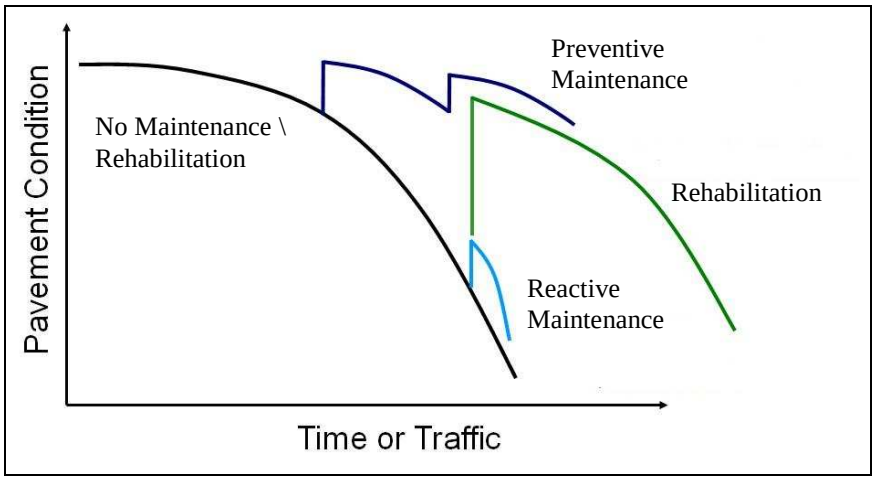


Figure 14: Timing and Effect of Different Types of Treatment on Deterioration Curve

The photos below illustrate the deterioration of several residential roads in Regina, with reference to the color rating in Figure 13.

Very Good

Good

Fair

Poor

Current

The City's current practice is focused on rehabilitation of major roadways to provide the most benefit to all motorists and commerce, as 80% of the traffic is carried on 20% of the total road network. Funding for street infrastructure renewal is currently prioritized in order of:

1. Expressways and arterial roadways;
2. Collector roadways and bus routes;
3. Major local roadways – commercial; and
4. Residential roadways.

The City provides a wide range of diverse services for roadways infrastructure through the following programs and activities, namely:

1. Street Infrastructure Renewal Program; and
2. Asphalt Maintenance Services.

The objective of the *Street Infrastructure Renewal Program* is to restore the design condition of existing street infrastructure (pavement surface, ride, drainage) and to reduce further deterioration.

Infrastructure renewal activities under this program include:

- *Reconstruction.* The existing base structure and asphalt layer is removed and replaced with new material or the existing material is recycled in place and covered with a layer of new asphalt. Reconstruction is often combined with replacement of walk, curb and gutter. This is done under the Local Improvement Program (LIP), where property owners pay a portion of the replacement cost of the sidewalk. More information on LIP can be found in Appendix A.

- *Rehabilitation* (Asphalt Recap)**.** A portion of the existing asphalt layer is removed by milling and replaced with new asphalt. This treatment is applied when the road shows severe distresses, such as cracks, potholes, depressions, etc.; however, the base structure (support layer) under the asphalt is still in good shape. Concerns related to sidewalks are addressed as well.

- *Thin Lift Overlay*. This is paving of the road with a thin layer of asphalt on top of the existing pavement. This is applied where the road shows signs of wear, but is generally still in good condition. Good drainage is a key factor, i.e. curb, gutter and sidewalks must be in good condition.

City Crews Milling and Paving as part of Street Infrastructure Renewal Program

Asphalt Maintenance Services have been historically comprised of three main activities. These activities are typically done through the mid-March to November time period, and are:

- Pothole and other small patching work;
- Failure/depression repair along with other medium sized patching work; and
- Asphalt spreader/thin lift and other larger sized patching.

The asphalt maintenance activities are mainly 'reactive' in nature, only some of the thin lift paving is 'preventative' maintenance.

HOW MUCH MONEY DO WE NEED?

Note:

This chapter includes the investment requirement for sidewalks due to the fact that sidewalk improvements (with the exception of maintenance) are always undertaken in conjunction with road improvements.

Required level of investment

A preliminary cost model has been developed to estimate the level of investment required to maintain roads and sidewalks. This model is based on current *age* of asphalt surface and road structure, and assuming a regular interval of renewal for each of the road categories. This renewal cycle is based on a 'technical level of service.' The assumptions used in this model are shown in Table 15. The model is only a starting point for analysis and will require further development in the future, but it does provide a basis for understanding the size and scope of the issues.

Sub-network	Surface Treatment Interval, if maintained [Years]	Surface Treatment Cost (2012) [$/m2]	Full Replacement Interval, if road is not maintained [Years]	Full Replacement Cost (incl. Sidewalk) (2012) [$/m2]	Maximum Number of Surface Treatments before Replacement
Arterials	10	40	20	150	4
Collectors	15	35	25	140	3
Local (Residential, Industrial / Commercial)	None	35	50	130	0

Table 15: Assumptions Investment Costing Model

The results of the calculations are shown in Charts 16 - 18. The dollar estimate was calculated using the total number of square metres of road that are past the recommended time for maintenance times the replacement cost per square metre. The replacement cost was based on the average actual cost over the last few years for various roadway network projects. Since there is a difference in the cost of delivering this work with City crews or through contractors, the average was calculated using a sample of both methods of delivery.

The total funding requirements in 2012 dollars, *including* the current 'overdue work' of $261 million, for a 100 year period is shown in Chart 16. In order to achieve a sustainable situation of the roadways network with a manageable mix of roads in different conditions, a certain level of renewal must occur every year. To date, we are not meeting this required level of renewal and have built up an inventory of 'overdue work.'

The 'overdue work' divided over the individual sub-network categories shows:

- Arterial $ 26 million
- Collector $ 14 million
- Local $ 221 million

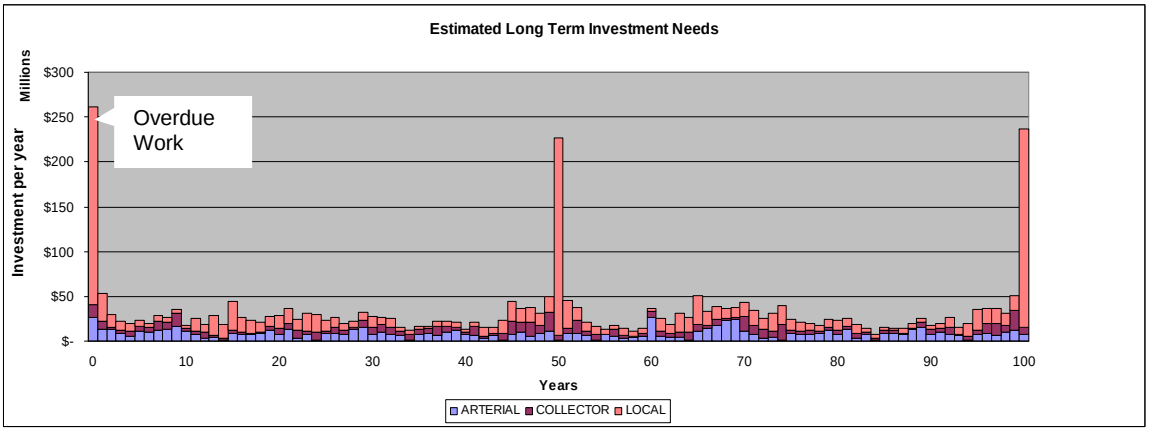


Chart 16: Overall Street Infrastructure Renewal funding requirements for a 100 year period

The funding requirement to *retain the existing situation* for the coming 100 years is shown in Chart 17. The assumption here is that from 2013 onwards all new required renewal activities will be completed as per established renewal cycle, but the current inventory of 'overdue work' will be accepted and will not be reduced. To achieve this level of network maintenance, an average funding of $30 million per year (2012 dollars) is required. For the individual sub-network categories the following would be required:

- Arterial $ 8.5 million/year
- Collector $ 6.0 million/year
- Local $ 15.5 million/year

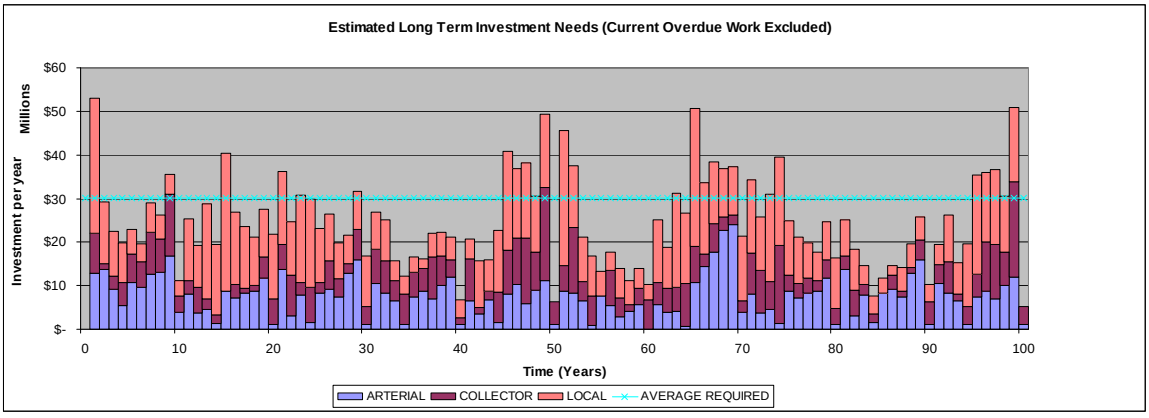


Chart 17: Overall Street Infrastructure Renewal funding requirements, excluding Overdue Work

The costs associated with *improving* the overall road condition to an acceptable level across the network are shown in Chart 18. Acceptable means that the inventory of 'overdue work' will be steadily reduced and fully eliminated in 20 years, and that from 2013 onwards all new required renewal activities will be completed as per established

renewal cycle. The costs associated with achieving this are on average $40 million per year for the first 20 years (in 2012 dollars).

All costs are in 2012 dollars, i.e. these costs are based on current cost level and current size of Regina's road network, and do not take into account inflation and growth of the network.

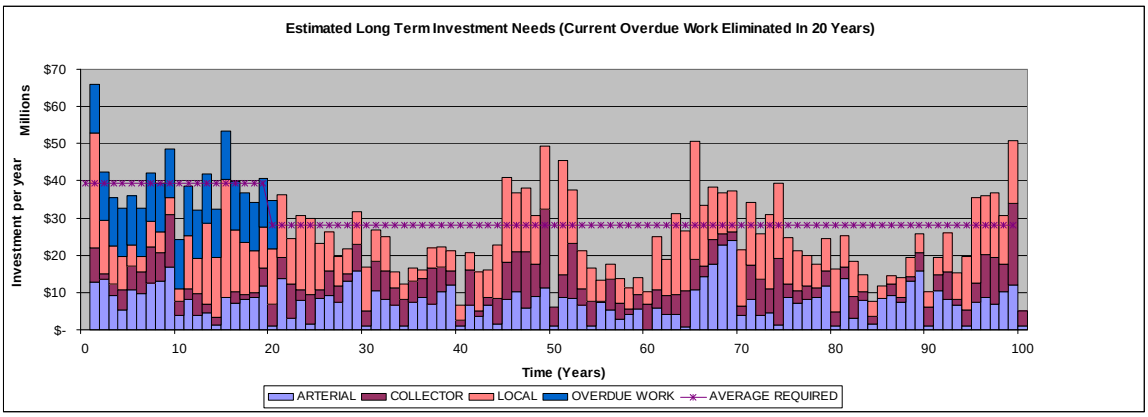


Chart 18: Eliminate 'Overdue Work' Funding Requirements

Current level of investment and accomplishments

The current road investment strategy (see Table 19 for detail) can be summarized as focusing expenditure on the 20% of the road network which is subjected to 80% of the traffic volume, i.e. arterial and collector network. Although the residential network is the focus of works through the LIP, this does not have a significant impact on the annual Street Infrastructure Renewal Program Budget allocation to residential streets. Despite the residential network making up more than one half of Regina's road network it has been allocated approximately one quarter of the budget over the last four years, with reference to Table 19.

	2008	2009	2010	2011	Average
Budget [Million $]	14	15	14.9	16.8	15.2
Arterials	43%	22%	41%	58%	41%
Collectors	25%	52%	24%	17%	30%
Industrial / Commercial	6%	10%	0%	0%	4%
Residential	26%	15%	35%	25%	25%

Table 19: Street Infrastructure Renewal Budget and Budget Allocation

The sources of current funding are shown in Table 20.

[Million $]	2008	2009	2010	2011	Average
Other Provincial / Federal Grants	0	9.4	1.95	3.05	3.6
Gas Tax Grant	2.755	3.61	7.6	1.18	3.8
Landfill Reserve*	2.745	1.99	0	1.82	1.6
Current Contributions	0	0	0.7	5.752	1.6
Utility - MRIF	1.7	0	0	0	0.4
MRIF	1.3	0	0	0	0.3
Debt	5.5	0	4.65	5	3.8
Total	14	15	14.9	16.802	15.2

Table 20: Street Infrastructure Renewal Budget Funding Sources

*Note: to demonstrate a regional impact for the Gas Tax investment, it was invested in the Land Fill and matching amounts were removed from the Land Fill Reserve in order to supplement roadway investments.

The accomplishments of current Street Infrastructure Renewal program are shown in Table 21.

[Km]		2009	2010	2011	Average
Arterials		2.7	8.9	13.75	8.45
Collectors		18.4	9	3.8	10.4
Industrial / Commercial		7.8	0	0	2.6
Residential		4.4	6.1	6	5.5
Total		33.3	24	23.55	26.95

Table 21: Street Infrastructure Renewal Program Accomplishments

Based on the roadways inventory (centerline length), as per Table 1, and the accomplishments of the Street Infrastructure Renewal Program, as per Table 21, the current road sub-network renewal rate is calculated and shown in Table 22.

[Years]	Average Life Expectancy Asphalt Surface	Current Renewal Rate Asphalt Surface
Arterials	10 - 15	13
Collectors	15 - 20	15
Industrial / Commercial	15 - 20	18
Residential	25 - 30	99*

Table 22: Road Sub-network Renewal Rate

* Note: Residential roads are being renewed only every 99 years when their life-expectancy is 25-30 years.

With the understanding that most of the current road renewal activities are related to renewal of the asphalt surface (asphalt recap, thin lift) and not renewal of the road structure, the renewal rate for arterials, collectors and industrial/commercial networks are in line with the life expectancy of 10 to 20 years. Although the current renewal activities for residential sub-network often includes renewal of structure (mainly in LIP projects) the renewal rate of 99 years is far behind the required renewal rate based on a asphalt surface life expectancy of 25 to 30 years.

The annual expenditures for asphalt and concrete maintenance (excluding utility cut repairs), which are in addition to the Street Infrastructure Renewal budget, are shown in Table 23.

[Million $]	2008	2009	2010	2011	Average
Asphalt Services	1.36	1.49	2.38	4.96	2.55
Concrete Services		0.56	0.73	0.87	1.15
Total		2.05	3.11	5.83	3.66

Table 23: Maintenance Expenditures, excluding Utility Cut Repair. (Source: MMS)

Cost Increases

Between 2002 and 2012, the price of asphalt mix (City internal cost) has increased from $40 to $100 per tonne, a 250% price increase, as shown in Charts 24 and 25.

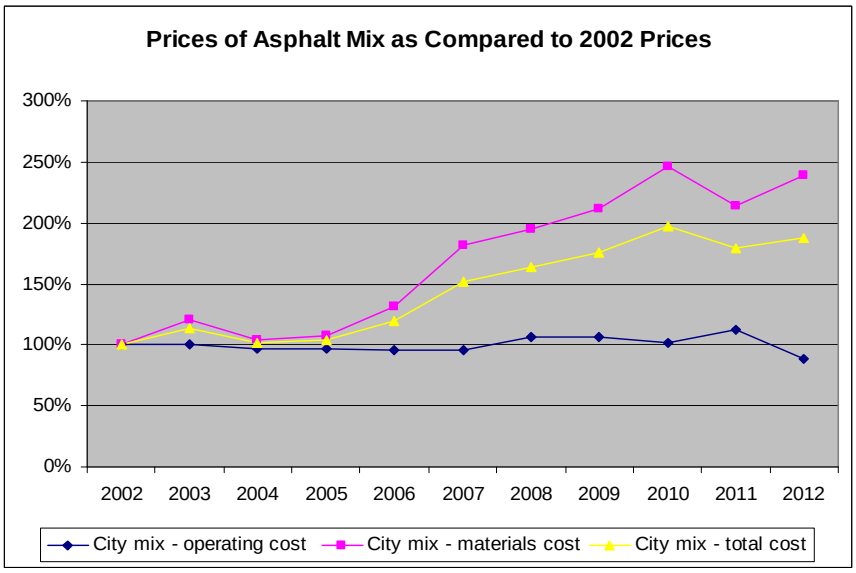


Chart 24: Asphalt Relative Price Change 2002 – 2012

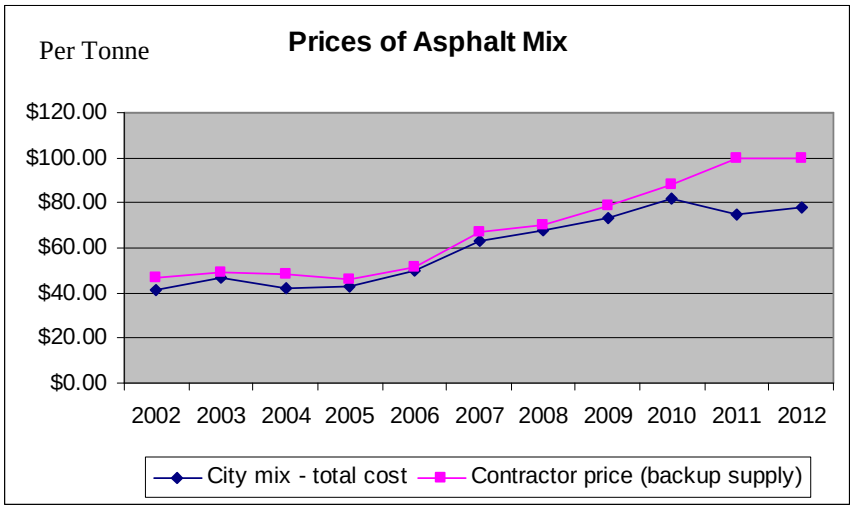


Chart 25: Asphalt Absolute Price Change 2002 – 2012

Forecast when continuing current level of investment

Based on the current level of investment, i.e. approximately $15 million per year, the estimated amount of 'overdue work' will grow from $261 million in 2012 to $ 523 million by 2033, as shown in Chart 26.

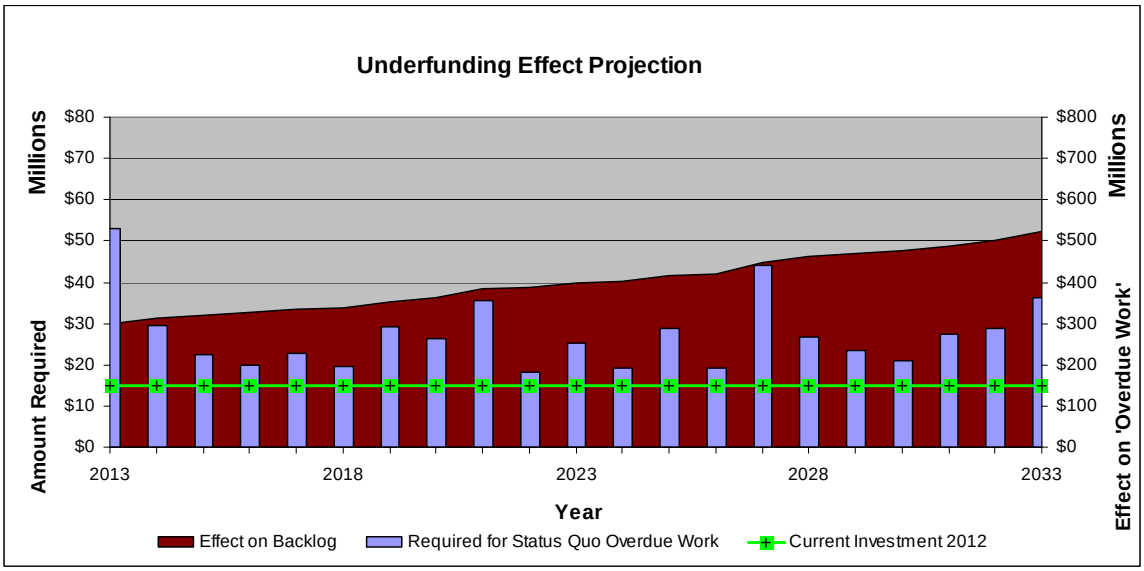


Chart 26: Increase of 'Overdue Work' due to Current Under-Funding

Due to the underfunding the average age of Regina's road network will increase, as shown in Chart 27. Especially the deterioration of the large residential network is an issue of growing concern. It also demonstrates that there is very little latitude in the current budget allocation to accommodate network growth. By 2025, the average age of residential roads will exceed their average expected life. The current strategy only improves the arterial network.

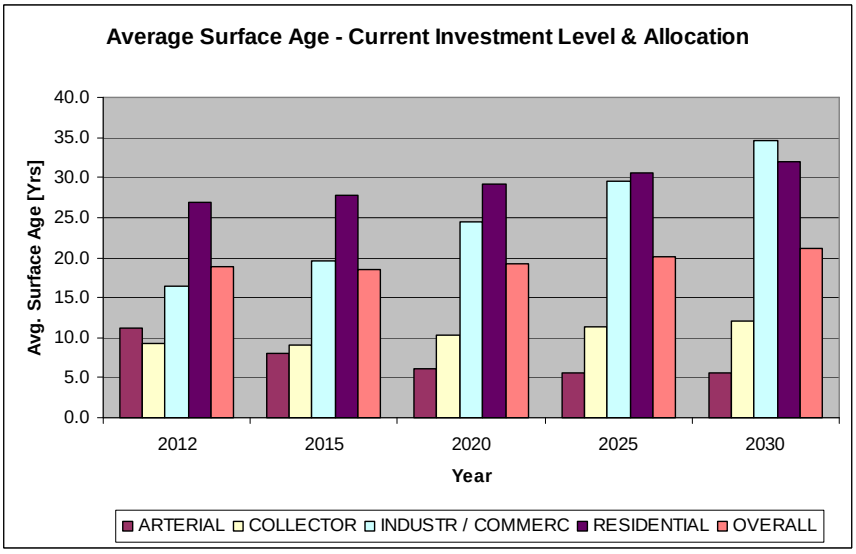


Chart 27: Changes in Sub-network Age due to Current Under-Funding

SIDEWALKS

WHAT DO WE OWN?

City of Regina sidewalks are classified the same as roadway sub networks. Sidewalks that are classified as arterial, collector, industrial commercial or residential are geographically adjacent to those same roadways.

However, sidewalks also have an additional classification based on level of traffic:

1. Group A (high volume pedestrian traffic); and
2. Group B (low volume pedestrian traffic).

The current sidewalk inventory is shown in Table 28 and Chart 29.

Group A Sidewalk at Victoria Avenue

Sub-network	Sidewalk Inventory [km]
Arterial	151
Collector	237
Industrial/Commercial	35
Residential	866
Total	1,289
Group A	263
Group B	1,000
Discrepancy*	26
Total	1,289

Table 28: Sidewalk Inventory as per 31/12/2011 (Roadways Preservation Inventory)

*the discrepancy is the variation between the two databases in which inventory information resides. It could be due to new development not yet being categorized as Group A or Group B.

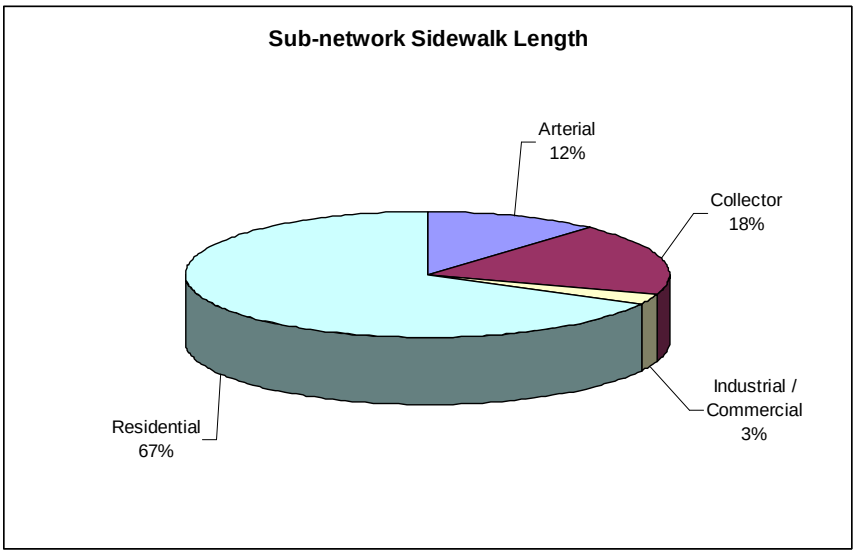


Chart 29: Sidewalk Inventory in % as per 31/12/2011 (Roadways Preservation Inventory)

The inventory as per Table 5 and Chart 6 does not include new sidewalk assets currently under construction or not yet full accepted by the City from developers/contractors.

An illustration of the length of the 1289 km long sidewalk network is shown in Figure 30.

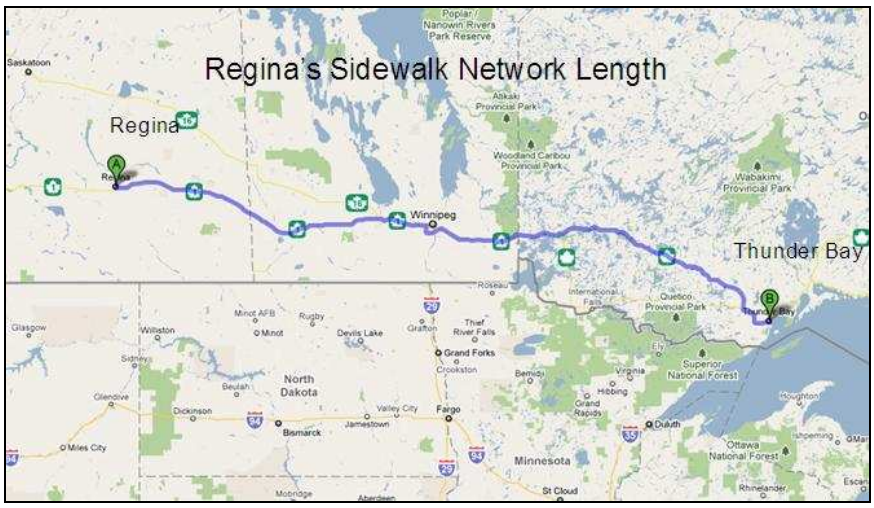


Figure 30: Sidewalks in Regina

WHAT IS IT WORTH?

The estimated replacement value of the concrete network and the associated assets based upon current dollar value (2012) is approximately $222 Million. A breakdown of the contribution of each component to the concrete network value is provided in Table 31, below.

Asset Component	Inventory	Replacement Unit Cost [per m]	Replacement Value [$]
Sidewalks	1,289,000 m	$150	$193,350,000
Curb/Curb and Gutter	284,000 m	$100	$ 28,400,000
		Total	$221,750,000

Table 31: Concrete Infrastructure Replacement Value as per 2012

WHAT CONDITION IS IT IN?

How do we measure condition?

In 2004, the City adopted formal policies (i.e. *Inspection Policy – Concrete* and *Maintenance Policy – Concrete, Oct 2004, File 5400*) to address the concrete infrastructure in Regina. The purpose of the concrete inspection is to gather information to rate the sidewalk conditions, prioritize the deficiencies based on severity and location and to generate a maintenance program according to the policy (i.e. worst first) that effectively allocates budget resources to the locations with the worst deficiencies. In addition, the concrete inspection data is used to get an understanding of the overall sidewalk condition. This is in turn used within the capital program planning cycle.

Measurement of Vertical Displacement (Step) on Sidewalk

High pedestrian volume sidewalks (Group A) are inspected annually and lower pedestrian volume sidewalks (Group B) are inspected on a four year cycle, with the city being broken up into quadrants. The inspections consist of a manual assessment, based on a departmentally approved procedure.

Current Condition?

The average age per sub-category sidewalk is shown in Table 32.

Sub-category	Average Age [Years]
Arterials	33.5
Collectors	28.3
Industrial/Commercial	38.1
Residential	36.1

Table 32: Average Sidewalk Age per Category (Roadways Preservation Inventory)

A breakdown of good, fair and poor condition states for concrete sidewalks associated with road sub-network, excluding NW sector, is shown in Charts 33 and 34. This breakdown is based on condition measurements from 2007 until 2010. A good walk has very few major and/or minor distresses, which are typically unnoticeable to sidewalk users. A fair walk could have numerous minor distresses or a low number of major distresses, or a combination of the two. A fair walk may have sections that hinder the movement of a mobility-impaired person and has numerous minor distresses and major distresses; it is extremely uneven and distressed and the entire section could hinder the movement of a mobility-impaired person and require extra attention by all pedestrians.

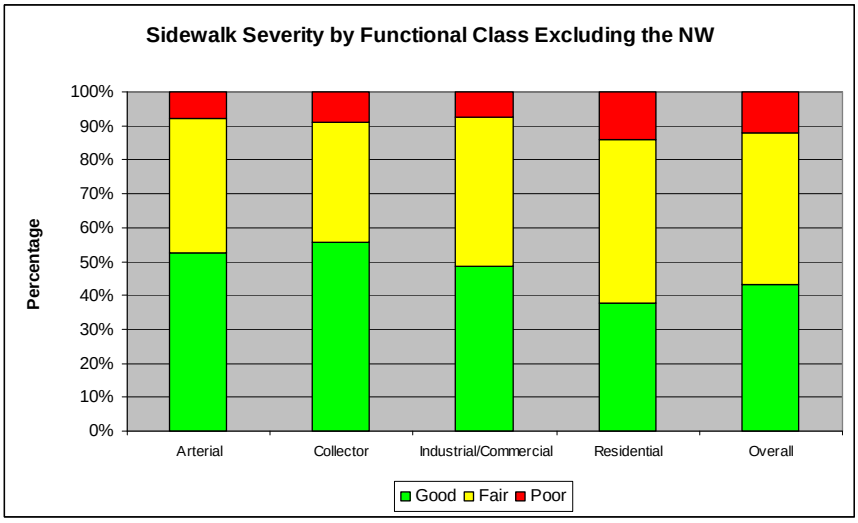


Chart 33: Sidewalk Severity Condition by sub-Network (as per 1/10/2010) in percentage

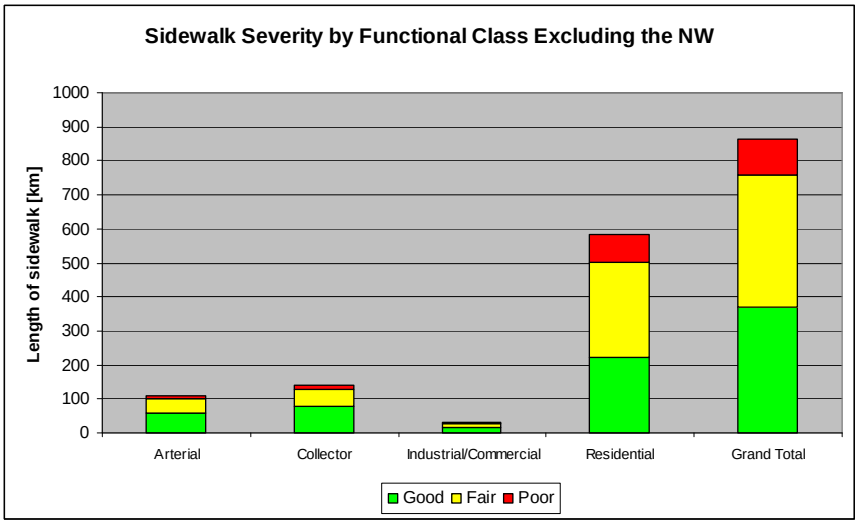


Chart 34: Sidewalk Severity Condition by sub-Network (as per 1/10/2010)

Based on these condition measurements, almost 90% of the sidewalk network is in a fair or good condition. The residential network has by far the largest sidewalk network in the city. The vast majority of sidewalks in poor condition are within this residential network.

WHAT DO WE NEED TO DO TO IT AND WHEN DO WE NEED TO DO IT?

Required

The life cycle of a sidewalk is typically 45 years and the required maintenance is focused on resolving safety and/or drainage issues until reconstruction is required.

Current

The formal Inspection Policy – Concrete and Maintenance Policy – Concrete, as approved by Council, requires the Administration to keep the sidewalks in a safe condition. Sidewalk distresses are repaired with priority based on 'worst first,' using operational maintenance budget. In addition, in order to improve road drainage conditions, sidewalk, curb and gutter and associated walks might require repair as part of asphalt pavement projects under Street Infrastructure Renewal Program, i.e. funded by capital budget. Residential and other roads sidewalks can be replaced under the LIP. Other activities include installing pedestrian ramps in order to improve accessibility.

Slip Forming New Sidewalk as part of LIP Project

Indicating the effect of current Concrete Maintenance Program, Chart 35 shows a slow decrease in trip hazards (vertical steps of 25 mm or more) as identified during condition assessment in the period 2007 – 2010 in NW, NE district and Group A sidewalks.

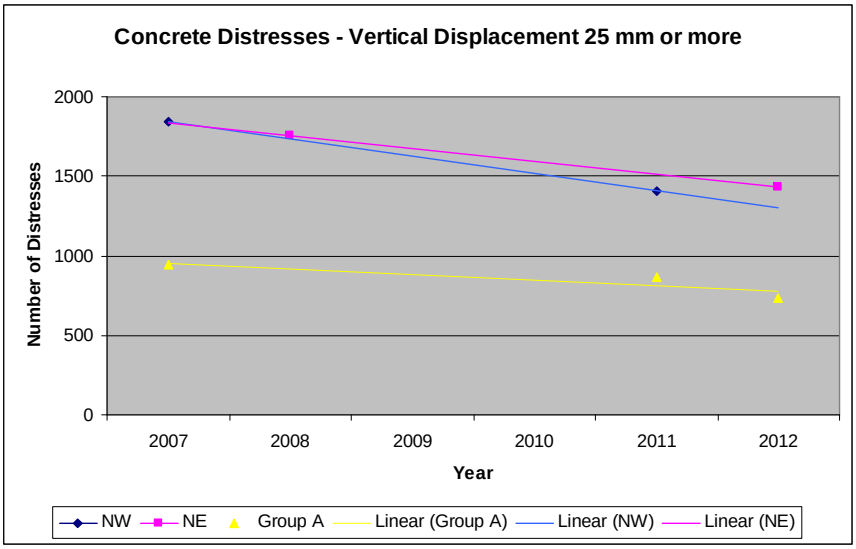


Chart 35: Concrete Distresses in NW, NE district, and Group A in period 2007 – 2012

HOW MUCH MONEY DO WE NEED?

The investment requirement for 'sidewalks' are included in the investment requirement for 'roads,' due to the fact that sidewalk improvements (with the exception of maintenance) are always in conjunction with road improvements.

BRIDGES

WHAT DO WE OWN?

The City of Regina has 83 bridges located within city limits. The City owns and is responsible for maintaining 75 of those roadway and pedestrian brides. The remaining eight bridges are owned by railway companies. The railway companies are responsible for maintaining the overpasses and the City retains responsibility for the roadways that run underneath those overpasses. The roadway bridges include 11 bridges under the UHCP.

Sub-category	# of Bridges
Roadway Bridges	44
Pedestrian Bridges	31
Railway Bridges	8
Total City Responsible	83

Table 36: Bridge Inventory as per 31/12/2011 (Roadways Preservation Inventory)

Albert Street Memorial Bridge

WHAT IS IT WORTH?

The estimated replacement cost of the City's roadway bridge inventory is summarized in Table 37. These estimates do not include the costs of the right-of-way, approaches to the structure, the demolition of the existing structure or any relevant taxes. The conceptual unit price for replacement cost is formulated based on 5 years (2007-2012) of construction costs.

Asset Component	Inventory # of Bridges	Replacement Unit Cost [per m^2 bridge deck]	Replacement Value [$]
Roadway Bridges	44	$ 6,000	$168,400,000
Pedestrian Bridges	31	-	$ 5,200,000
		Total	$173,600,000

Table 37: Bridge Infrastructure Replacement Value as per 2012

WHAT CONDITION IS IT IN?

How do we measure condition?

In 2007, the City evaluated the condition of the bridges in Regina. Visual inspections were completed for all roadway bridges (excluding 11 bridges transferred from the MHI) following the Alberta Bridge Inspection and Maintenance System (BIM). The inspection method was carried out using the BIM Inspection Manual (March 2008). Currently bridges are inspected on a three year cycle.

Along with visual inspections, a Level 2 inspection is also completed on a 5 year cycle for each structure, known as bridge deck testing. This Level 2 inspection is carried out using the BIM Inspection Manual – Level 2 (March 2007). Bridge deck testing is used to evaluate the best lifecycle option for the structure and identifies the most cost effective time for rehabilitation.

The City also performs regular specific inspections between full inspections to identify over-height hits and issues identified during bridge washing.

View of Bridge Structure with Exposed Steel Bars

Current Condition?

The Structural Sufficiency Ratings (SSR) based on the BIM Inspection Manual for the 33 roadways bridges (excluding 11 bridges transferred from the MHI in 2011) are shown in Table 38.

Condition Rating of Roadways Bridges	Structural Sufficiency Rating (SSR)	# of Bridges	% of Total
Good	Above 70	15	46
Fair	Between 60 and 70	7	21
Poor	Below 60	11	33

Table 38: Structural Sufficiency Rating (SSR) as per 2008; UHCP bridges not included

A 'poor' condition rating of a bridge does not necessarily imply an imminent safety danger; however, it implies that rehabilitation is required within the near future (i.e. 5 years). The structural sufficiency rating is based on a formula which uses the information recorded during the inspection.

The effect of the current bridge maintenance/rehabilitation program on the condition of the roadways bridges is shown in Chart 39.

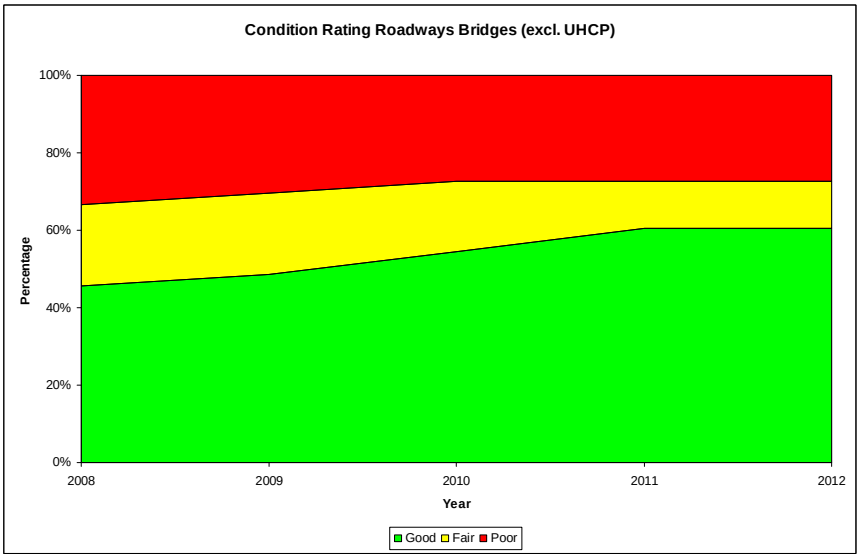


Chart 39: Condition Rating Roadways Bridges, excl UHCP, from 2008 until 2012

In 2011, the MHI transferred 11 structures to the City inventory as part of the UHCP agreement. Based on previous MHI inspections and the structure records of these 11 UHCP bridges, only two were rated as good, the other nine were rated as poor. The adding of the UHCP bridges and their rating explains the step between 2010 and 2011 in Table 40 and Chart 40 below.

Condition Rating of Roadways Bridges	Structural Sufficiency Rating (SSR)	# of Bridges	% of Total
Good	Above 70	23	52
Fair	Between 60 and 70	3	7
Poor	Below 60	18	41

Table 40: Structural Sufficiency Rating (SSR) as per 2013 UHCP bridges included

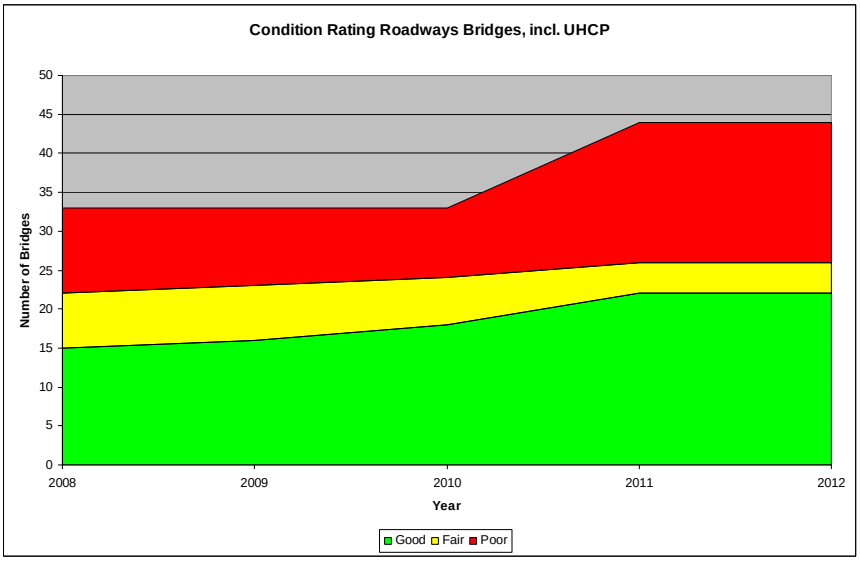


Chart 40: Condition Rating Roadways Bridges, incl. UHCP, from 2008 until 2012.

In 2011, structural pedestrian bridges were transferred from Parks and Open Spaces to the bridge group in Roadways Preservation. Pedestrian bridges were evaluated in 2011-2012 using the same inspection method as for roadways bridges. The Structural Sufficiency Ratings for the 31 pedestrian bridges as measured in 2012 are shown in Table 41.

Condition Rating of Pedestrian Bridges	Structural Sufficiency Rating (SSR)	# of Bridges	% of Total
Good	Above 70	17	55
Fair	Between 60 and 70	11	35
Poor	Below 60	3	10

Table 41: Structural Sufficiency Rating as per 2012

WHAT DO WE NEED TO DO TO IT AND WHEN DO WE NEED TO DO IT?

Required

The life cycle of a bridge is typically 75 years. Life cycle activities include regular preventive maintenance followed by rehabilitations every 15 to 25 years. Rehabilitations are scheduled in specific years based on life cycle costing. Along with regular inspections, testing, maintenance and rehabilitations, the City must also repair accident damage caused by over height loads to ensure public safety.

Current

Prior to 2010, the City Bridge Maintenance Program (BMP) was based on a '*reactive*' strategy. Work would be undertaken on bridges when major repairs and rehabilitations were necessary rather than preventative maintenance and corrective repairs.

In 2010, the City bridge group developed a new long term BMP based on a '*preventive*' strategy. In this new BMP preventive maintenance planning is combined with rehabilitation planning. Implementation of preventive maintenance on a consistent and proactive basis has a great impact on the durability or service life of bridge structures on the long term associated costs.

In 2011, the inspection schedule was altered to inspect one-third (1/3) of the bridges on a yearly basis. From these inspections, a maintenance program is established for the following year to repair elements showing deterioration before they cause other bridge elements to become deteriorated. This proactive method will reduce long term costs with reducing the costs of the major rehabilitations.

As part of this program, the City began an in-house bridge washing program as part of the preventive maintenance plan. Bridge washing extends the service life of the concrete by removing chlorides (used by winter road maintenance services during sanding operations) from the surface of the concrete before they penetrate into the concrete causing the rebar to rust. This program will extend the time allowed between costly rehabilitations.

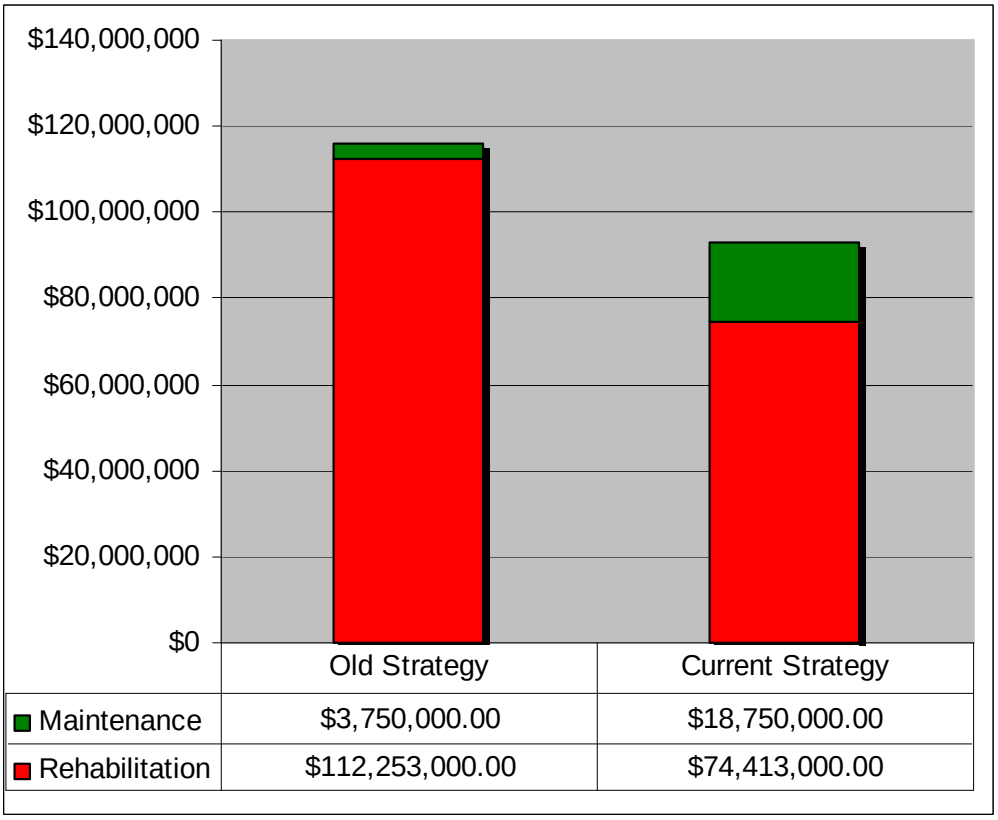
Ring Road South Bound over Dewdney Bridge Rehabilitation in 2011

HOW MUCH MONEY DO WE NEED?

Required level of investment

Until 2010, the City's BMP was developed based on the *'reactive'* strategy. The BMP was more focused on major repairs and rehabilitations rather than on corrective repairs and preventive maintenance. In 2010, the City bridge group developed a new long term BMP based on a '*preventive*' strategy. In this new BMP preventive maintenance planning is combined with rehabilitation planning.

This new BMP resulted in investment savings of approximately $23 million over 25 years. Current investment needs are estimated $93 million over 25 years. This is compared to the approximately $116 million over 25 years required under the old *'reactive'* strategy as shown in Chart 42.



	Old Strategy	Current Strategy
Maintenance	$3,750,000.00	$18,750,000.00
Rehabilitation	$112,253,000.00	$74,413,000.00

Chart 42: Comparison of Total Bridge Investment Needs over 25 years – Old Strategy versus Current Strategy

While the average level of investment over 25 years is $3.72 million per year, based on the $93 million required under the '*preventive*' strategy, it does not take into account the backlog of investment needed due to the inclusion of the 11 structures transferred to the City under the UHCP agreement with MHI.

When investment needs are broken out over the short term (1-5 years), medium term (5-10 years) and long term (10-25 years), it becomes apparent that average investment needs are greater in the short term and medium term as shown in Chart 43.

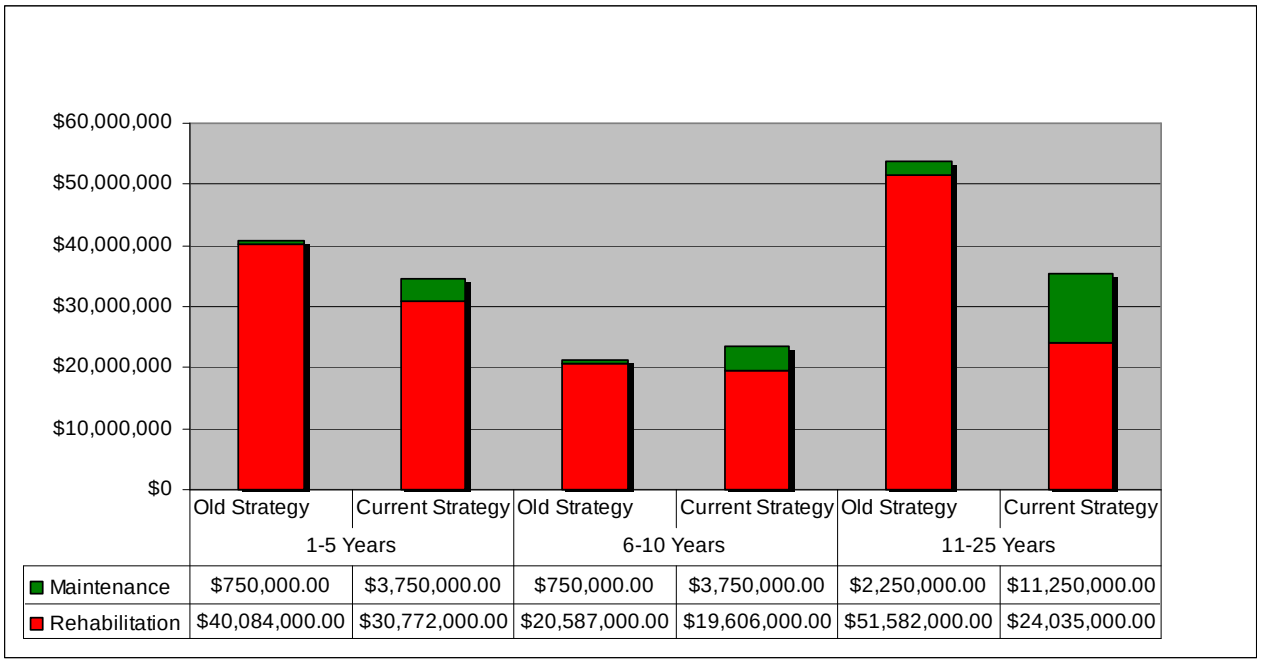


Chart 43: Comparison of Short, Medium and Long Term Bridge Investment Needs

Based on the current strategy, the average bridge investment need over the next 5 years is currently estimated at $6.90 million per year. The affect of the current preventive strategy in comparison to the old reactive strategy and the associated yearly budget requirements is shown in Chart 44.

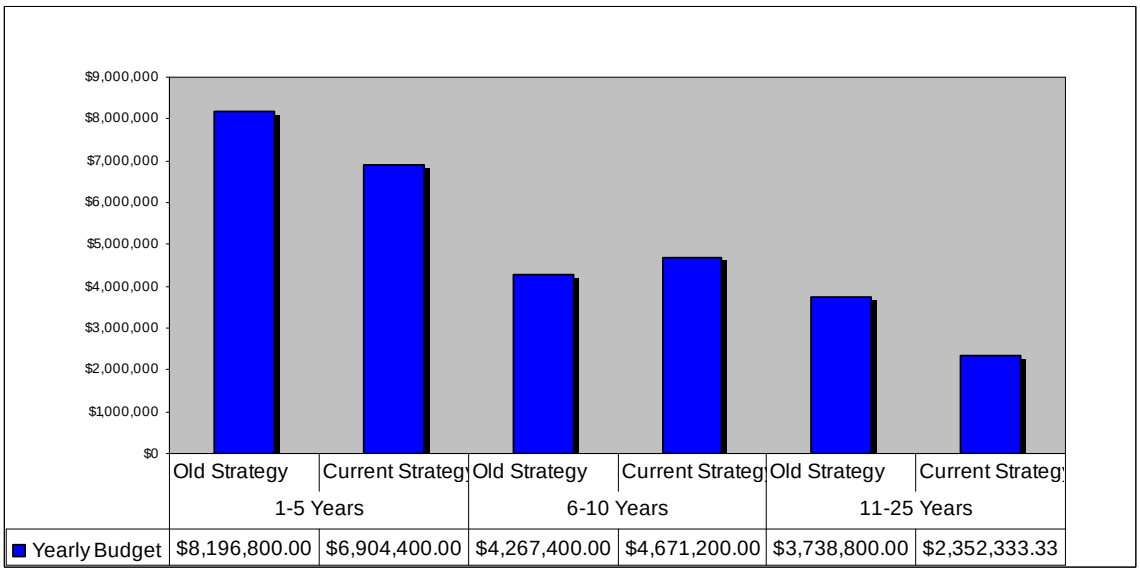


Chart 44: Comparison of Annual Budget Requirements of Short, Medium and Long Term Bridge Investment Needs

Current level of investment

The level of bridge investment over the last 5 years can be seen in Chart 45.

	2009	2010	2011	2012	2013	Average
Budget [Million $]	5.55	4.88	6	2.75	3.24	4.48

Chart 45: Bridge Infrastructure Renewal Budgets past 5 years

The average annual level of bridge investment over the past 5 years has been $4.48 million per year and has been declining in recent years. This current level of investment is not sufficient to maintain a safe bridge network. Based on 'preventive' strategy, the annual funding requirements need to be increased to $6.9 million per year over the next 5 years.

The average bridge investment needs over the medium term (5-10 years) and long term (15-25 years) will be reduced as effects of increased preventative maintenance are realized; these are currently estimated at $4.67 million per year and $2.35 million per year respectively.

GENERAL

ALL ROADWAYS ASSETS

HOW DO WE ACHIEVE SUSTAINABILITY?

Sustainability is here defined as the long term financial and organizational capacity of the City to maintain the roadways infrastructure at an acceptable service level.

Current Challenges?

The key challenges for achieving sustainability include:

Level of Service

Citizen surveys for many years have indicated that there is substantial public unhappiness about the current state of roadway and sidewalk infrastructure. The 2012 Citizen Survey results, shown in Chart 44,rank Roads & sidewalks/Infrastructure/Downtown as the second most important issue. This is consistent with the outcome of previous surveys in 2008, 2010 and 2011.

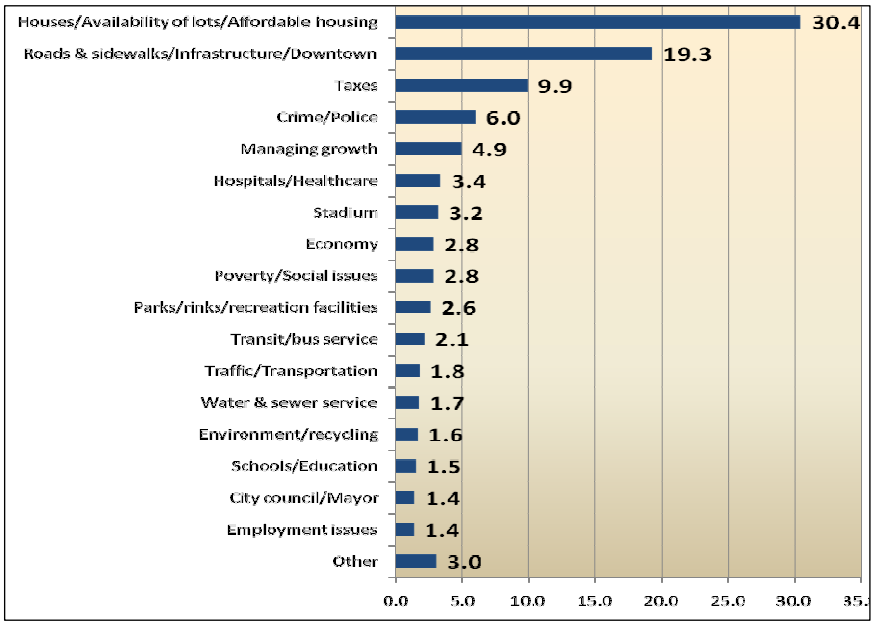


Chart 44: Most Important Issue in % of Responds (2012 Citizen Survey)

Streets/sidewalks were mentioned by 23.7% of the respondents as response when requested to pick one change required in order to improve their rating of City of Regina's services as shown in Chart 45.

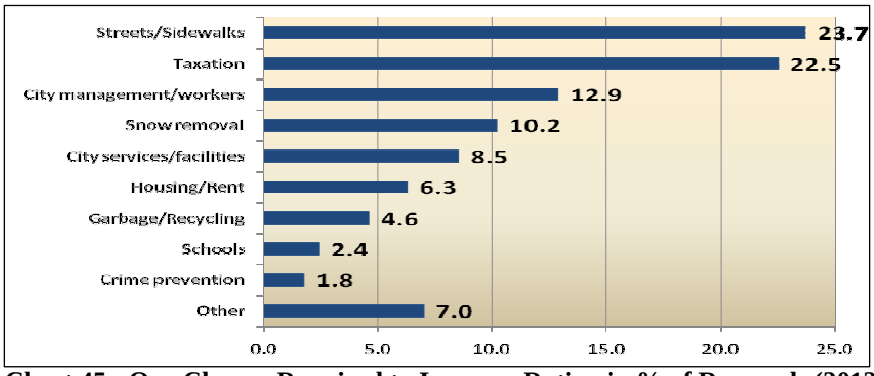


Chart 45: One Change Required to Improve Rating in % of Responds (2012 Citizen Survey)

Although there is clearly public unhappiness/concern with the current state of roadways infrastructure, the Citizen Survey results do not identify what an acceptable Customer Level of Service is. Current practice within the Administration is to keep roads, sidewalks and bridges in a 'safe' condition, as required by *The Cities Act*. Pursuant to Section 306 of *The Act*, it is the duty of the Administration to keep all public spaces and right-of-ways in a 'reasonable' state of repair.

In order to understand what is 'reasonable,' and to subsequently develop Customer Level of Service targets for the Administration, consultation with the road users in Regina will be required. An essential element of this consultation process communication would be a discussion of the necessary trade-offs between 'expected' infrastructure quality and/or quantity and 'acceptable' financial contribution by tax payers.

Funding

First, it is clear that there is a substantial financial gap between what is required for maintaining and improving the roadways assets and what is allocated in the annual budgets. The consequence of this gap is that the roadways infrastructure (roads, sidewalks and bridges) overall condition will steadily get worse, with increased risks for interruption of transportation options.

Secondly, the City has currently very limited tax and revenue generating options. There is a strong dependency on Property Tax and federal/provincial funding (mainly Gas Tax). The LIP revenue is another relatively small funding source. It is necessary to develop new innovative revenue options in order to increase tax or other revenue for the City.

Thirdly, the current allocations of funds for maintenance and for capital programs are not related to each other. Budget requests for each of the programs are made independently from each other based on historical information and/or on estimated future service requirements. It would be preferable if programs and budget requests for maintenance and capital would be integrated and based on sound asset management principles, such as

Life Cycle Costing. For example, it is likely that increasing the budget for preventive maintenance activities would result in a slower deterioration of the roadways network, requiring less funding for rehabilitation (capital). This similar to the '*preventive*' strategy for bridges.

Local Roads

A substantial portion of the residential and industrial/commercial road network is in poor condition. This is caused by the consistent under funding of the Street Infrastructure Renewal program, as well as the current practice to spend most of the available funds on maintaining the arterial and collector network.

Urban Highway Connector Program (UHCP)

The UHCP provides for an annual Operations and Maintenance (O&M) Grant. Rehabilitations, Capital Projects and Transportation Planning Grants are provided on a project-by-project basis, determined through an application process and final approval of the provincial budget. The grants are funded based on a level of provincial interest. Since joining the UHCP in 2011, the City has received annual operating and maintenance grants and rehabilitation grant for one project.

Issues with the UHCP include:

1. Approval process. The current UHCP process does not provide notification of funding until April. Any work associated with this funding can not proceed until an agreement between MHI and City of Regina is in place. Funding is not guaranteed until designs and tender documents are completed. To accommodate these requirements, any project with UHCP funding will not generally be put out for tender until May or June. This delay can create challenges including the availability of contractors and competitive bid prices. This is most relevant for capital projects.

2. Received funding in 2013. Three projects related to rehabilitation of sections of the Ring Road/Highway #1 Bypass were submitted for funding in 2013. However, none of the projects received approval through the provincial budget process.

Lack of Policies

The Administration has very few policies in place regarding maintenance and renewal of roadways assets. Policies currently available are related to concrete maintenance and to winter road maintenance. It is important to have operational policies, guidelines and procedures in place related to the individual asset groups (such as residential roads). Such policies will allow Council to direct and demonstrate how they are achieving the vision, priorities and targets for level of service.

Opportunities?

Reducing the roadways infrastructure financial gap is the main challenge. In order to identify potential solutions or opportunities for reducing the gap, the following expression is helpful:

ROADWAYS INFRASTRUCTURE GAP:

Funds Available < Funds Required, i.e. Cost per Unit × Number of Units

In which:

- Cost per unit refers to life cycle cost per unit of roadways asset. Life cycle cost would include all cost for construction, maintenance, rehabilitation, reconstruction, etc. per unit of roadways asset (e.g. m^2 of asphalt surface); and
- Number of units refers to the total amount of roadways assets.

In order to reduce the roadways infrastructure gap it would be required to:

- Increase the funds available; and/or
- Reduce the life cycle cost per unit; and/or
- Reduce or minimize the total amount of roadways assets.

Increase Funds Available

Options for increasing funds available include:

1. Increase property tax. This could include:
    a. General property tax increase; and/or
    b. Dedicated property tax (Road Tax) for roadways infrastructure, such as for residential neighbourhood renewal or for improvement overall road network.

2. Expand current LIP program, such as:
    a. From partial to full cost recovery for sidewalk replacement; and/or
    b. Partial or full cost recovery for residential road renewal.

Regarding opportunities for improving the residential road network, the 'Neighbourhood Renewal Program' in the City of Edmonton is often cited as an example of best practices. Funding of this program is a combination of provincial funding, general property taxes, LIP tax levy and a dedicated City wide special neighbourhood renewal tax levy (1.5-2%). Also, the City of Saskatoon is currently discussing the implementation of dedicated taxes for roadways infrastructure improvement. As mentioned before (See Chart 18), eliminating the current amount of inventory of 'overdue work' (all road categories) will require an investment of estimated $40 million per year (2012 dollars) for 20 years; i.e. $25 million per year more than current level of investment.

Reduce Life Cycle Costs

Options for reducing Life Cycle Costs include:

1. Reduce Level of Service to the bare minimum as required by *The Cities Act;*

2. Increase life of asset, i.e. reduce wear, by for example:
    a. Improve roadways construction materials;
    b. Improve quality of construction (i.e. increased warranty on new assets); and
    c. Avoid or minimize road damage due to utility cuts and/or traffic overloads.

3. Reduce cost of individual life cycle activities by, for example:
    a. Optimized design (i.e. related to pavement thickness);
    b. Apply innovative construction methods (i.e. full depth reclamation);
    c. Increase the usage of City work force versus using external contractors. Generally, capital projects receiving external funding from other levels of government require a tendering process. To increase the usage of City work force would require that we set up systems that would allow self-tendering; and
    d. Develop innovative contracts with external contractors based on multiple year plans and budgets, such as:
        i. Multiple year contracts;
        ii. High volume contracts, to attract out of province contractors; and
        iii. Life Cycle contracts (P3 contracts) to include all or many phases of life cycle activities, such as initial construction, maintenance and rehabilitation, within one contract.

4. Optimize and integrate life cycle activities (such as maintenance and rehabilitation) using sound asset management principles, including life cycle cost analysis.

Reduce or minimize the amount of roadways assets

Options for reducing or minimizing the amount of roadways assets include:

1. Minimize development of new infrastructure to accommodate city growth. For example:
    a. Develop policies (i.e. within Official Community Plan) promoting infill/brown field development and reducing green field development.
    b. Development standards to support minimizing new infrastructure development, such as road and sidewalk width, boulevards, amount of sidewalks, etc.

2. Dispose of, or reduce, existing roadways assets during rehabilitation/reconstruction, such as:
    a. Dispose of concrete boulevards;
    b. Reduce number of sidewalks in residential streets from two to one, or eliminate completely, where feasible;
    c. Reduce road width where possible, combined with redevelopment of freed up space for green zones, parking lots, bicycle paths, etc.; and
    d. Thinner pavement or different materials for parking lanes.

Although all the options identified to reduce the infrastructure gap are valuable, the options for increasing the level of funding are expected to have the highest impact and should be priority for further research.

Next Steps?

Currently, the Administration has planned steps in order to move towards a more sustainable approach are:

1. Establish a Level of Service and policies for Roadways Infrastructure;

2. Continue executing the existing Bridge Maintenance Program;

3. Develop options, for consideration by Council, for future residential street renewal;

4. Develop operational strategies for maintenance, rehabilitation and renewal of individual asset categories based on high-level policies and principles currently developed within Official Community Plan (OCP) and Transportation Master Plan (TMP), as well as based on approved Level of Service.

5. Continue further development of Roadways Infrastructure Asset Management structure, program and tools including:
    a. Further development and consolidation of condition data collection program;
    b. Medium and long term planning based on life cycle analysis and costing, using specialized asset management software and approved policies/strategies;
    c. Improvement of asset inventory systems; and
    d. Coordination with, and participation in, corporate asset management initiatives.

6. Develop financial options, for consideration by Council, on how to optimize funding levels to reduce the Infrastructure ‘gap’.

APPENDIX A

LOCAL IMPROVEMENT PROGRAM

LOCAL IMPROVEMENT PROGRAM

In 1993, the provincial government developed the *Local Improvements Act* to help provide a method of paying for necessary improvements to municipal infrastructure. Under a Local Improvement Program (LIP) any work or service is paid for by charging part or all of the cost to property owners who benefit from the work or service. City's Administration has adopted the LIP since 1993 for the rehabilitation of the City's infrastructure.

Each year the City's Administration proposes a program of local improvement locations for the rehabilitation of the City's infrastructure. *The Local Improvement Act, 1993* requires that a program approved by City Council be submitted to the Saskatchewan Municipal Board for approval of the entire program prior to work being advertised.

Currently, LIP addresses locations where full replacement of sidewalk, curb and gutter is required and is applied to all classifications of roadways which include arterials, collectors, bus routes and residential streets. The accepted practice is that property owners pay a portion of the cost for installation of walk, curb and gutter and that the City pays for removal of old infrastructure and all road related work. At present, there is no charge to the property owners for pavement rehabilitation or any other work related to roadway reconstruction, such as renewal or replacement of the underground utilities done in conjunction with this program. The contribution rate (i.e. uniform assessment rates) for property owners is reviewed annually and is based on contractor rates for new sidewalks in new neighbourhoods. Table 46 shows that the contribution rate by the property owners, based on actual construction costs (in dollars per lineal meter), was approximately 40% in 2009-2010.

Construction Year	Average LIP contribution rate for property owners [$/m]	Actual construction cost LIP for City [$/m]	Resulting LIP contribution rate for City [$/m]
2009	168	437	270
2010	214	491	277

Table 46: Contribution Rate Residents versus City for Sidewalk Replacement under LIP

The history of LIP projects is shown in Table 47.

Year	# of LIP Projects	Breakdown by km			
		Local	Collector	Arterial	Total
2000	7	0.16	1.58		1.74
2001	5	0.71			0.71
2002	2	0.60			0.60
2003	0				0.00
2004	4	0.33	0.60		0.93
2005	5	0.51			0.51
2006	5	0.60	2.24		2.84
2007	5	0.81			0.81
2008	1	0.17			0.17
2009	2	1.48			1.48
2010	3	0.72		0.19	0.91
2011	3	1.39		0.18	1.58
Total	**42**	**7.48**	**4.42**		**12.28**

Table 47: History of LIP Projects between 2000 and 2011

Property owners benefiting from proposed local improvements are notified by mail of the actual costs that will be assessed to them for the proposed work. If they do not want the work, they have the option to petition against it.

Advantages of LIP include:

1. Property owners, who benefit most of improvements completed, contribute directly to the cost of the program.

Disadvantages of LIP include:

1. In the situation that property owners petition against the proposed work, the Administration has few options left to execute the planned work. Although Council has the option to pass a bylaw for undertaking local improvement work by removing the right to petition or bypassing the result of the petition, this would require approval by Saskatchewan Municipal Board. Current practice in this situation where property owners petition against work is to cancel the proposed work and to provide emergency maintenance services only to these locations for at least 5 years;

2. Not all construction costs are paid by property owners, as shown in Table 46. This is more profound in the areas of reduced property tax assessment. These areas all receive a 50% reduction of special assessment charges for surface works (street, sidewalk, curb and gutter replacement). The overall contribution by property owners is limited, on average in the range of $500,000 to $800,000 for all LIP projects within a year; and

3. Due to the cost and required resources only a limited amount (3 to 5) of LIP projects can be completed each year.

State of Roads & Sidewalks 2013

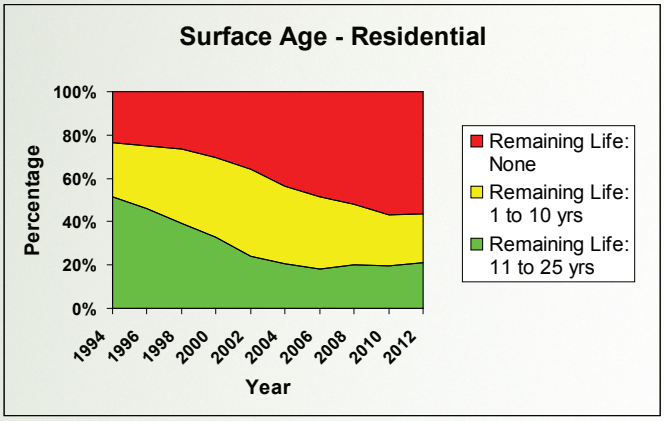
City of Regina | REGINA *Infinite Horizons*

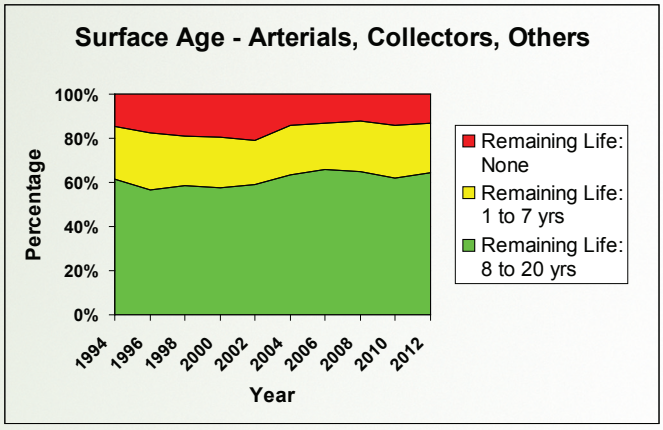
Replacement value of roads and sidewalks:
$1.54 billion

Total kilometres of sidewalks: 1289
67% residential

Total kilometres of paved roads: 926
59% residential

Condition
(based on age data and surface area)





Current annual funding:
$15 million

Current overdue work:
$261 million

Estimated required funding:

To prevent increase of overdue work:
- $30 million per year

To eliminate overdue work in 20 years:
- $43 million per year

Average renewal budget allocation:

- Arterials/collectors: 70%
- Industrial/commercial: 5%
- Residential: 25%

Street Infrastructure Renewal Program 2009-11 results:

- Arterials/collectors: 18.85 km per year
- Industrial/commercial: 2.6 km per year
- Residential: 5.5 km per year (including LIP)

State of Bridges 2013

City of Regina | REGINA Infinite Horizons

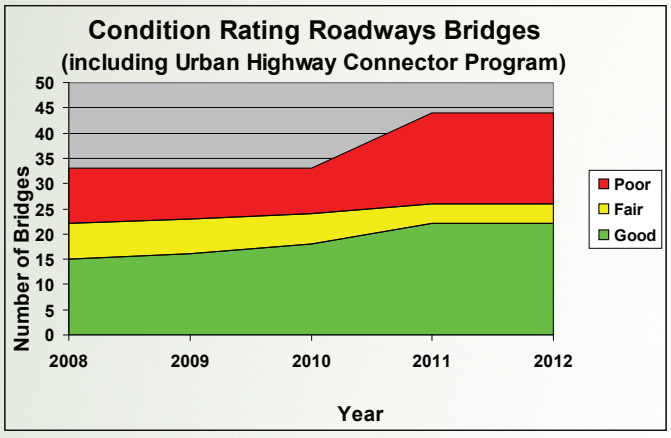
Replacement value of bridges:
$174 million

Roadway bridges: 44

Pedestrian bridges: 31

Railway bridges: 8

Condition of roadway bridges:



Average current funding:
$4.48 million per year

Estimated required funding:

- First 25 years:
  $87 million
- Short term (1-5 yrs):
  $6.9 million per year
- Medium term (5-10 yrs):
  $4.67 million per year

Strategy change in 2010: preventive vs. reactive

- Result:
  $23 million investment savings over 25 years

Preventive maintenance:

- Bridge washing program
- Bridge sealing program