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**Roads Maintenance Program**  
**Value for Money Report**  
**SPCF Public Meeting**

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## Table of Contents

1. <b>Executive Summary</b> .....	3
2. <b>Background</b> .....	4
2.1. Objective .....	4
2.2. Program under scope .....	4
2.3. Areas reviewed .....	4
2.4. Input from sources .....	5
3. <b>Is spending of road maintenance funding providing highest potential value?</b> .....	6
3.1. Budgeting and project scope .....	6
3.2. Impact of winter maintenance on spring/summer maintenance .....	7
3.3. MP capital roadway funding and lane KM treated (2011-2015) .....	8
3.4. Observations, recommendations and responses from administration.....	12
3.5. Relevant benchmarking from leading practices report supporting observations/recommendations .....	13
3.6. Conclusion on economy .....	14
4. <b>Are the processes within the road maintenance program operating efficiently?</b> .....	15
4.1. Processes reviewed .....	15
4.2. Road maintenance cost and benefit .....	17
4.3. Road preservation, restoration and rehabilitation spending (2014-2015) .....	18
4.4. Road preservation, restoration and rehabilitation spending (2015 budget to actual).....	19
4.5. Observations, recommendations and responses from administration .....	20
4.6. Relevant benchmarking from leading practices report supporting observations/recommendations .....	24
4.7. Conclusion on efficiency .....	24
5. <b>Is the road maintenance program meeting its goals and objectives?</b> .....	26
5.1. Goals and objectives .....	26
5.2. Pothole and pavement condition complaints (2008-2015) .....	27
5.3. Condition ratings .....	29
5.4. Road maintenance strategy .....	31
5.5. Observations, recommendations and responses from administration .....	32
5.6. Relevant benchmarking from leading practices report supporting observations/recommendations .....	33
5.7. Conclusion on effectiveness .....	34
6. <b>Overall conclusion</b> .....	34
7. <b>Appendices</b> .....	35

## **1. Executive Summary**

The City of Saskatoon (the City) road maintenance program is continuing to evolve along with the population growth and demographic changes. This value for money review was conducted to determine whether those departments which act as the custodians of the roadways and are entrusted with executing on the spending outlined in section 2.2 (beings Roadways Maintenance within Public Works, Major Projects, and Construction & Design) are achieving economy, efficiency and effectiveness in the manner in which they are operating. ***As a result of performing this value for money review of the road maintenance program, we have concluded that the road maintenance program in place is effective in achieving the objectives set by management and the program is achieving economy and efficiency.***

The City invested over \$53 million in roadways in fiscal 2015 (including street sweeping, pothole patching, sidewalk rehabilitation, back lane upgrades, road construction and repair, and snow and ice management) and continues to budget for growth in future years in order to achieve the desired roadway condition levels and address citizen concerns. Note that section 2.2 below restricts the scope of this review to certain items within the total \$53 million roadways investment. Of particular relevance to this report, the City has reported that in 2015 approximately 220 lane KM of roads were resurfaced (2014 – approximately 200 lane KM) and approximately 163,000 potholes were repaired.

We noted four primary areas in which opportunities for improvement may be realized, as outlined below. It is important to note that any positive impact made on one of economy, efficiency or effectiveness will likely impact one or both of the other areas as well. For example, in general when processes can be modified to increase efficiency it will typically result in monetary savings that can be directed to other areas to increase their effectiveness.

<b>Primary areas of opportunities for improvement</b>
Level of detail and activity-based costing incorporated into budgeting
Development and documentation of internal processes and policies
Cross-line communication and monitoring/reporting of information
Annual and life-cycle roadways maintenance planning and budgeting

Finally, as part of the review, a leading practices exercise was conducted with other comparable Canadian municipalities. Where this benchmarking has produced data directly relevant to our findings, that information has been included herein.

## **2. Background**

### **2.1 Objective**

The objective of this engagement is to understand whether the processes and activities undertaken as part of the road maintenance program are being performed in an economical, efficient and effective manner and, if not achieving full performance in one or more of those areas, to identify the areas for improvement. The basis for evaluation is not a “perfect” or “ideal” state, however is determined primarily based on a) what the City’s stated objectives are for the road maintenance program (for example a service level of ‘B’ for paved roadways as opposed to a service level of ‘A’) and b) what other comparable cities have been able to achieve based on a combination of publicly available information and insight gleaned from our communication with those comparable cities as part of our leading practices exercise.

### **2.2 Program under scope**

This value for money review has focused on only the roadway condition, rehabilitation and maintenance aspects of the full \$53 million 2015 roadway program outlined above. While the full \$53 million 2015 roadway program includes such items as street sweeping, sidewalk rehabilitation, back lane upgrades and snow and ice management, our evaluation of the program excludes those items and focuses primarily on road construction and repair, which represents over half of the 2015 spending. For further details regarding scope, please refer to section 3.1 Note that separate value for money reviews on snow and ice management and sidewalk rehabilitation are currently scheduled to be conducted.

### **2.3 Areas reviewed**

In order to understand whether the processes and activities undertaken as part of the road maintenance program are being carried out in an economical, efficient and effective manner, our review program focused on the following areas:

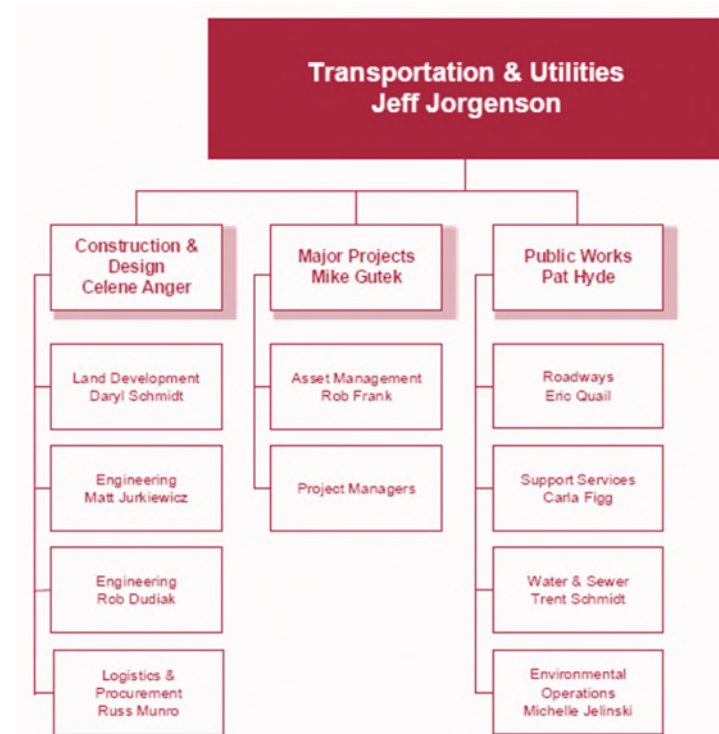
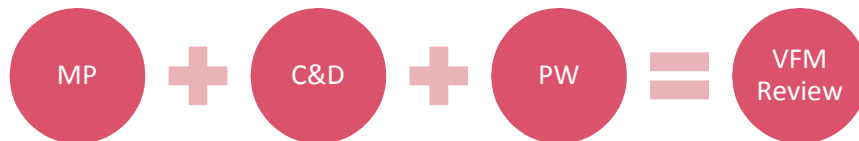
<b>Focus Areas</b>	
1. Budgeting expenditures and costing of contracts	5. Project planning and performance management
2. Contract management	6. Monitoring and reporting
3. Annual capital / maintenance plan	7. Comparative analysis and bench-marking
4. Condition assessment, treatments and quality	8. Stakeholder interviews

Based on those, our primary areas where opportunities for improvement were identified are as follows:

- Level of detail and activity-based costing incorporated into budgeting;
- Development and documentation of internal processes and policies;
- Cross-line communication and monitoring/reporting of information; and
- Annual and life-cycle roadways maintenance planning and budgeting.

### 2.4 Input from sources

PwC met with team members from Construction and Design (C&D), Major Projects (MP), as well as Roadways Maintenance within Public Works (PW) to obtain the information outlined in this report. The information was sought via interviews with all relevant team members and various supporting documentation such as reports, vendor invoices, condition assessments, contracts, financial details, budget documents etc. (please refer to Appendix 2).



### **3. Is spending of road maintenance funding providing highest potential value?**

Economy refers to the components of cost for the provision of services with a view of analyzing potential cost saving opportunities that may exist, either through cost reduction or the elimination of certain components. In essence, do the inputs and processing methods chosen represent the most economical use of public funds for the given performance or, even more simply put, “can we spend less/reduce cost of inputs without negatively impacting efficiency and effectiveness”?

#### **3.1 Budgeting and project scope**

The City has seen continued growth resulting in new roads and new subdivisions, all of which require an increase in the road maintenance funding and a growth of the roadway inventory network that requires future rehabilitation. The asset preservation/rehabilitation budget for MP for 2014 was \$23.6 million and for 2015 the asset preservation/rehabilitation budget is \$26.9 million. These amounts have been determined to be the appropriate budget allocations to allow the City to maintain their roadway infrastructure at the approved level of service.

Note that in terms of the scope for this project, our efforts focused on the \$19.3 million budgeted for roadway preservation projects and the \$1.5 million budgeted for the patching program. The remaining \$6.1 million relates to program development (\$1.7 million), communications (\$0.3 million), pavement marking (\$0.2 million) and sidewalk/curb preservation projects (\$3.9 million) and was not included in the scope of this road maintenance value for money project. Note that a separate value-for-money project is scheduled to be performed on sidewalk/curb preservation projects.

The budget for PW was \$7.9 million for 2014 and increased to \$8.3 million for 2015. This budget amount includes maintenance efforts as they relate to earth streets, paved streets and street cleaning/sweeping performed in the spring. Activities relating to sidewalks, earth dump sites, snow removal, street sanding, dust palliation and drainage are factored into other programs. Note that in terms of the scope for this project, street cleaning/sweeping activities (\$3.3 million) were not in-scope.

### **3.2 Impact of winter maintenance on spring/summer maintenance**

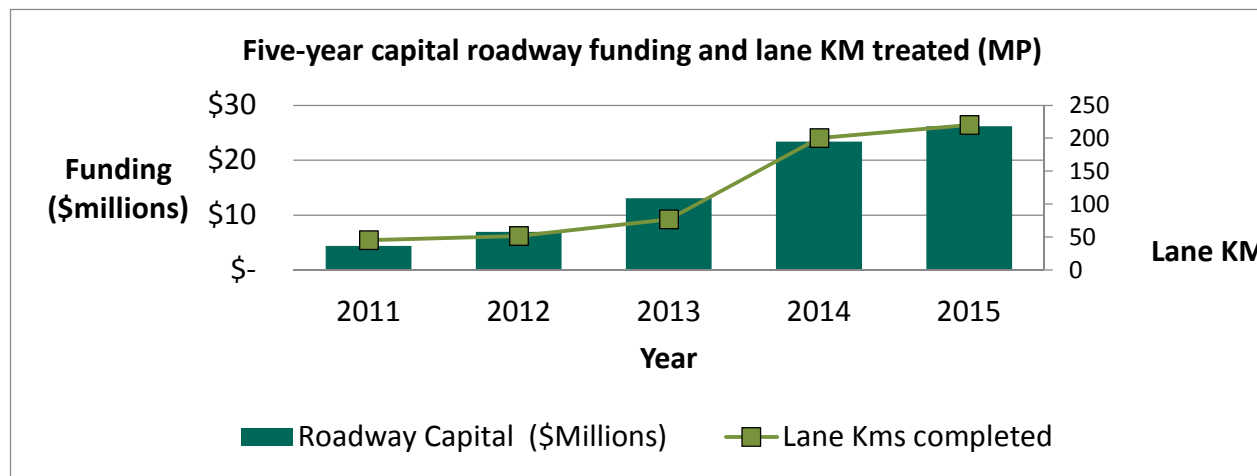
One additional unplanned snow event during the winter can negatively impact the winter maintenance spending, with costs ranging between \$500k to just under \$2 million depending on the extent of the snow event. Although the winter season does not necessarily impact spring/summer road maintenance from a monetary perspective (i.e. the funds are segregated for each type of maintenance), it certainly has an impact on the extent and nature of spring/summer maintenance required and on the type and level of work performed. Severe winter weather could result in increased sanding, salting and snow removal during the winter season and increased run-offs during the thaw cycle. This would impact roadway surfaces and as a result affect the type and level of roadway maintenance to be performed by PW.

This has the ability to cause discrepancies in the spending from year-to-year as the budgets for the City are established in December of each year, prior to being able to know the impact of the current winter season on the spring/summer road maintenance. While there is certainly no accurate method of predicting what a particular winter season will bring in terms of weather, this highlights the impact that unknown winter conditions can have on this particular area of the City's spending.

In the most recent years leading to 2012, expenditures in excess of budgeted amounts in PW had been relatively minor. Generally speaking, years in which there was a smaller snow pack and thus less snow removal efforts allowed for lower winter spending in PW and the additional ability to focus early on planned initiatives for the spring and summer months. These conditions in turn also meant that the labor force required to be available in PW during the winter months was not significant, further reducing spending. In 2012, approximately 30 cm of snow pack was experienced and the significant snow pack combined with the lack of available labor contributed to expenditures in excess of budgeted amounts of approximately \$7 million in PW.

### 3.3 MP capital roadway funding and lane KM treated (2011-2015)

Five-year capital roadway funding and lane KM treated (MP)					
	2011	2012	2013	2014	2015
Roadway capital (\$millions)	\$ 4.38	\$ 6.96	\$ 13.06	\$ 23.40	\$ 26.20
Lane KM's treated	45.1	51.4	76.6	200	220
Average cost per lane KM	\$97,118	\$135,409	\$170,496	\$117,000	\$119,091



There are approximately 4,005 lane KM of roadways in the City of Saskatoon. In 2011, approximately 1.1% of the city's roadway network was treated through surface treatments. This equates to an approximate 89 year return period before the next surface treatment on the same road. In 2015, approximately 5.5% of the city's roadway network was surface treated, equating to an approximate 18 year return period before the next surface treatment on the same road. The increased funding level and lane KM treated effectively brought the turnaround cycle down by approximately 80%.

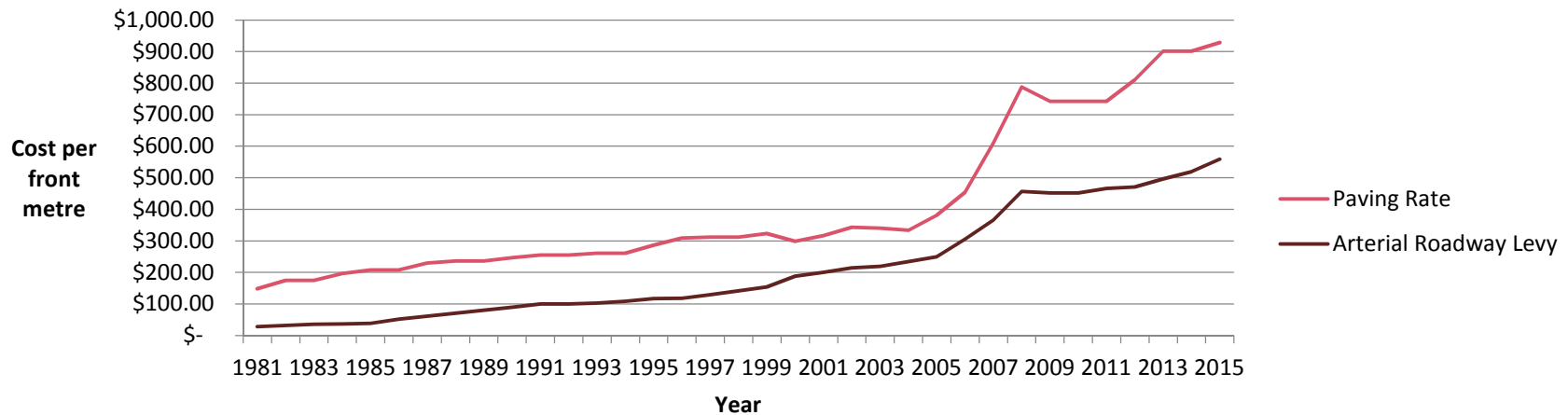
The new funding levels have resulted in consistent per lane KM costs for the past 2 years which are significantly lower than those experienced in 2012 and 2013 and should provide for a sustainable network of road inventory that will allow the City to practice a more proactive approach to maintaining the road infrastructure going forward. If the funding levels



for rehabilitation remain at current levels and increases are adjusted through inflation and actual growth, a proactive maintenance plan can be utilized early in roadway life to intervene and extend the life cycle of the infrastructure. If appropriate funding is not allocated between maintenance, preservation, rehabilitation and reconstruction (i.e. MP and PW), then maintenance costs will increase beyond a sustainable level which results in a reactive maintenance plan.

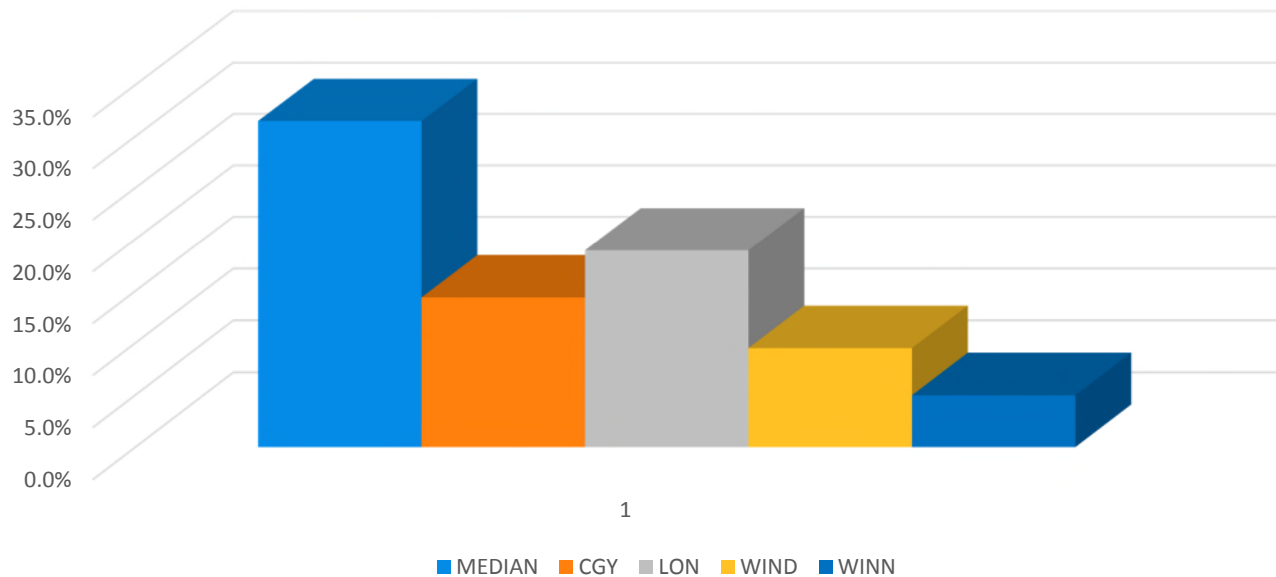
The increased funding is further supported by the fact that rates have been steadily increasing over the past number of years. As an example, within the past 5 years the arterial roadway levy has seen a 24% increase. In the same time frame, residential paving rates have also seen an increase of a similar percentage. These rates are commonly used by the Land Development branch of Construction & Design. The residential paving rate is based on the City's standards for residential services and is calculated based on the cost of past roadways as well as a forecast as to the final cost per front metre of roadways expected to be constructed in any given year, based on the neighborhoods currently in existence. The arterial road levy rate is an offsite levy that applies for the provision of arterial roadways by the City to proposed developments (i.e. provides funds for the cost of design and construction of arterial roads). The levy is based on the City's standards for the construction of arterial roadways (i.e. typically four-lane roadway with center median including turning bays) which serve more than one neighborhood. The cost is based on past roadway contracts as well as forecasts of construction costs.

### Paving and Arterial Rates (1981-2015)



Across Canada, road maintenance costs have been increasing significantly from 2009/10 to 2013/14, according to data available from OMBI Performance Measurement Reports during that period for total road maintenance costs per lane KM. The OMBI single-tier (municipalities responsible for maintaining all types of roads, including arterial, collector and local roads and, in some cases, expressways and laneways) median increased by 31.5% over the period from 2010 to 2014 (which is partially elevated as a result of Montreal being included in the measure for the first time in 2014 – removing the impact of Montreal the increase in the median is less). As seen in the illustration below, Winnipeg experienced a relatively lower increase of 5% from 2010 to 2014 whereas London experienced a higher increase of 19% from 2009 to 2013.

**Increase in Total Road Maintenance Costs per Lane KM from '09/10 to '13/14**





Note that in terms of Saskatoon, it is difficult to draw specific comparisons in this area due to the significant changes in the road maintenance program between 2012 and 2015. In October 2012, the approval of the targeted annual investment of \$25 million to achieve a service level 'B' for paved roadways resulted in a significant increase in annual roadway maintenance costs over a short period of time (i.e. the service level at that time in 2012 was level 'E', with an annual

investment of \$6.3 million to \$9.5 million, which was resulting in a network condition that was deteriorating annually). A service level ‘E’ results in an asset condition of “getting worse” and is defined as “insufficient expenditures to maintain asset condition with asset condition deteriorating annually and some assets needing to be closed or removed from service” while a service level “B” results in an asset condition of “getting better” and is defined as “sufficient expenditures to increase asset condition/value and decrease backlog slowly over time and, once the backlog is eliminated, to maintain condition without a backlog”.

As illustrated in section 3.3, there has been significant variability in Saskatoon from 2011 to 2015 as the types of treatments have changed and the amount of lane KM’s treated each year increases significantly. From 2014 to 2015, depending on the scope of the analysis as illustrated in sections 3.3, 4.4 and 4.5, the total cost of treatment per lane KM has increased between 2% and 8% from 2014 to 2015, which is within reasonable parameters when compared to other municipalities during that timeframe. From 2011 to 2015, the total cost of treatment per lane KM as illustrated in section 3.3 has increased by 23%, which is within the range of the median from the OMBI Performance Measurement Reports as outlined above (i.e. 32%).

### 3.4 Observations, recommendations and responses from administration

Observation 1	Rating
<p>Activity based budgets using detailed inventory unit costing are not currently being used for the spring/summer road maintenance program. The overall total PW budget is being calculated by utilizing prior year information and adjusting for the Municipal Price Index and a growth factor.</p> <p><b>Impact/comments</b></p> <ul style="list-style-type: none"> <li>a. The budget for the spring/summer road maintenance work is primarily being driven by inflation and does not appear to fully be capturing the impact of new roads being planned, completed and “handed off” to PW.</li> <li>b. In order for this to occur, detailed information regarding unit costs for the types of road maintenance work currently being performed will need to be fully developed by PW and MP, potentially including a resource allocation model identifying the number of resources needed to maintain specific lane KM’s of roadways.</li> </ul>	
<p><b>Recommendation 1</b></p>	
<p>We recommend that administration implement activity-based budgeting using detailed inventory unit costs to develop the annual spring/summer road maintenance budget. This will assist in determining the level of spending by activity and create a detailed financial history that can be used by PW for trend analysis and other operational improvements. Items such as the impact of weather and the amount of new roads being planned, completed and “handed off” by growth to PW and MP from C&amp;D or T&amp;U should be factored in when determining the request for the annual spring/summer road maintenance/rehabilitation budgets for PW/MP. The growth in inventory should be directly factored in when preparing the annual budget for roadway maintenance.</p>	
<p><b>Response from administration</b></p>	
<p>Administration agrees with the recommendation. Activity based budgeting (ABB) will also require documented levels of service.</p>	

Observation 2	Rating
<p>In 2015, PW estimated that it was able to reduce overtime hours resulting in decreased spending on overtime of \$140k in addition to the overtime savings of \$490k in 2014. The decision resulted in an improvement in economy (i.e. cost savings).</p> <p><b>Impact/comments</b></p> <ul style="list-style-type: none"> <li>Decisions to cut back on spending require careful cost-benefit analysis to ensure predetermined service plans are not being compromised. The decision to cut overtime spending is a secondary discussion to the overarching primary question of how efficiently is PW is managing its overall personnel/resource base (i.e. staffing and payroll section of chart in section 2.5).</li> </ul>	
<b>Recommendation 2</b>	
<p>The decision to cut back on spending should be reviewed in a holistic manner, to ensure that predefined work plans and level of service are not impacted. PW should determine the adequate level of work to be completed and the desired level of service to be provided for their programs to ensure adequate planning from the onset takes place. Development of a work plan in advance will help alleviate expectation gaps felt by program sponsors and citizens.</p>	
<b>Response from administration</b>	
<p>Administration agrees that program specific levels of service will enable the operations to determine the correct labor, equipment and materials resourcing requirements to achieve adequate work levels. This will enable the development of the work plan to be determined in advance while meeting budgetary levels. Utilization of overtime to meet operational requirements with regard to the work plan and levels of service may best be applied by ensuring adequate personnel are in place at regular rates of pay funded by the corresponding reduction in overtime rates of pay.</p>	

### 3.5 Relevant benchmarking from leading practices report supporting observations/recommendations

All municipalities that participated in the benchmarking exercise indicated that:

- Budgets for spring/summer road maintenance were formulated at the activity level;
- Each activity had a planned level of service and cost attributed to it; and
- They have the ability to determine if overages related to increased level of service or other unplanned inefficiencies.

### **3.6 Conclusion on economy**

We concluded based on the evaluation above that the City was achieving satisfactory results in terms of the overall economy of its road maintenance program. The City has invested significantly increased funds from 2011 to 2015 (and in particular from 2013 to 2015 after the approval of spending to achieve service level 'B' for paved roadways) and this has resulted in a significant increase in lane KM's treated from 2011 (45 lane KM or 1.1% of paved roadways) to 2015 (220 lane KM or 5.5% of paved roadways).

In terms of areas for improvement, we identified opportunities for budgeting/costing enhancements as well as a recommendation to continue to review opportunities to manage overtime as a component of total resource planning while not sacrificing any progress in levels of service. Note that these recommendations are intended to result in increases to existing levels of economy being achieved as opposed to being indicative of a lack of economy in the current road maintenance program.

#### **4. Are the processes within the road maintenance program operating efficiently?**

Efficiency refers to how a process is performed and more specifically the right allocation of effort amongst resources (i.e. is it possible to do more with less resources or if the funds expended were to remain the same, can we make better use of those funds to achieve more?). Efficiency focuses on determining the maximum output for any given set of inputs or the minimum inputs for any given quantity/quality of goods and services provided.

##### **4.1 Processes reviewed**

As part of gaining an appropriate understanding of efficiency, we reviewed the following areas/processes:

- a. Organizational structure, planning and coordination;
- b. Programs and guidelines;
- c. Levels of service;
- d. Asset management system;
- e. Documentation and prevention of knowledge loss; and
- f. Annual maintenance plans

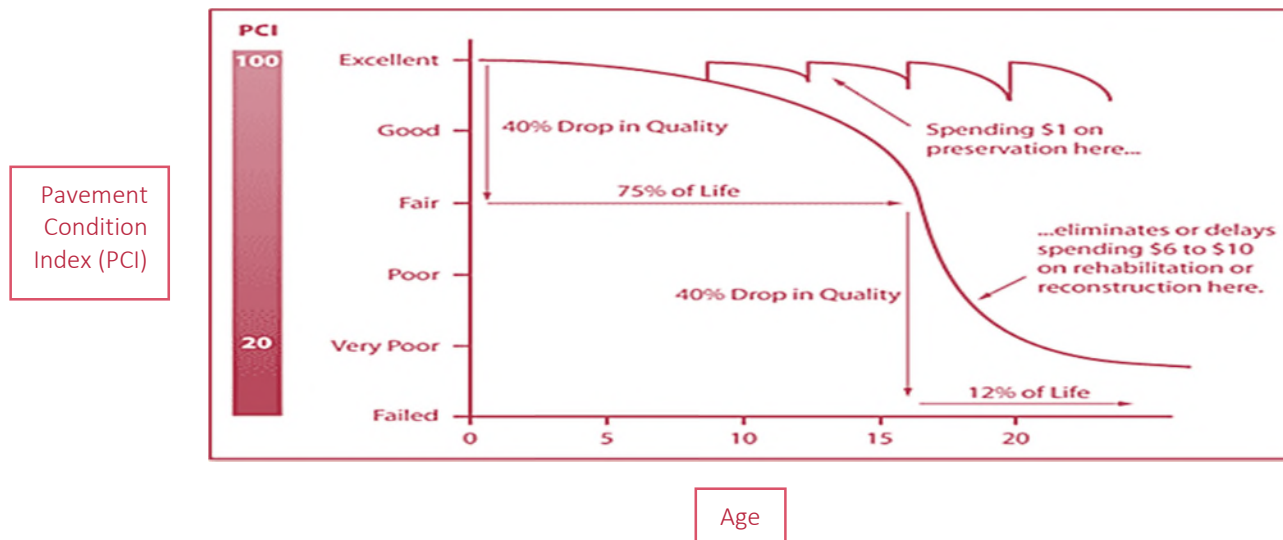
We understand that Transportation and Utilities (T&U), MP and PW have all experienced significant personnel turnover in the past five to seven years. During this turnover stage, knowledge loss occurred as processes were not formally documented. We also understand from our interaction with stakeholders throughout this review process that the successor teams have invested significant time “learning by doing”, understanding processes and also implementing formal documentation of processes.

The formalization of processes was a necessary response to inefficiencies that were being experienced across the road maintenance program (i.e. scheduling conflicts, lack of communication across divisions, redundancies). The City has been consistently growing over the past number of years and with this growth there has been an increase in the volume of traffic on the City’s roads.. Due to the increased volume of traffic and the aim to address increased citizen complaints regarding road maintenance, the road maintenance program has focused in recent years on becoming better organized, defining programs and guidelines, developing levels of service, obtaining asset management systems and prioritizing maintenance work based on objective guidelines. While there have been significant changes in recent years, there continues to be room for improvement.





## 4.2 Road maintenance cost and benefit



Based on the illustrative diagram above, as road age increases, the road begins to deteriorate, leading to failure if maintenance efforts are not initiated. The diagram also suggests that preservation being performed sooner (at the 10 year point) can ultimately lead to significant cost savings as rehabilitation or reconstruction efforts will be saved. Although not shown in the diagram, maintenance efforts should be initiated along the way (between 0 and 10 years) and should be minor repairs in nature, to ensure road safety is maintained. Taking this into context of the illustration presented above, the decision to engage a crew in pothole repairs impacts the overall efficiency (and opportunity cost) of other PW projects that could be completed in place of the one at hand. The short term treatment options may result in failure due to various factors (weather, road usage, quality of work) and as a result may warrant another repair shortly thereafter, thereby questioning the overall effectiveness of the initial treatment. As the length of the roadway that is to be repaired increases, the overall treatment costs become larger. Hence, the question of how a process is performed and how the resources are being used becomes critical.

### 4.3 Road preservation, restoration and rehabilitation spending (2014-2015)

The following table highlights work undertaken by MP for roadway treatment and compares 2014 actuals to 2015 actuals. Similar information was not available for PW. Note that 2015 figures represent forecasts based on actuals as of November 2015. Certain treatments (i.e. paver lay) specific to only one fiscal year were excluded from the table. Note that in the final column (K), a '+' indicates an increase in the per lane KM cost of a particular treatment while a '-' indicates a decline in the cost.

	2014 Total Spend (\$)	% of Total '14 Spend	Total '14 Lane KM	% Total Lane KM	'14 Per Lane KM (\$)	2015 Total Spend (\$)	% of Total '15 Spend	Total '15 Lane KM	% Total Lane KM	'15 Per Lane KM (\$)	Change (E to J)
Patch	\$ 1,963,046	8.6%	6.4	3.0%	\$ 306,726	\$ 1,365,752	6.1%	6.0	3.1%	\$ 227,625	-25.8%
Micro surface	\$ 3,038,357	13.3%	64.2	30.4%	\$ 47,326	\$ 2,628,110	11.8%	71.8	36.6%	\$ 36,603	-22.7%
Blade level	\$ 375,907	1.6%	6.2	2.9%	\$ 60,630	\$ 848,920	3.8%	11.2	5.7%	\$ 75,796	+25.0%
UTO	\$ 4,386,860	19.2%	55.2	26.1%	\$ 79,472	\$ 2,285,425	10.3%	29.0	14.8%	\$ 78,808	-0.8%
Resurface	\$ 10,522,047	46.2%	73.2	34.7%	\$ 143,744	\$ 11,375,579	51.1%	68.5	34.9%	\$ 166,067	+15.5%
Reconstruct	\$ 2,525,674	11.1%	6.1	2.9%	\$ 414,045	\$ 3,771,523	16.9%	9.7	4.9%	\$ 388,817	-6.1%
Totals	\$ 22,811,891	100.0%	211.3	100.0%	\$ 107,960	\$ 22,275,309	100.0%	196.2	100%	\$ 113,534	+5.2%

The chart shown above presents a trend indicating comparable lane KM costs achieved by MP in 2014 and 2015. The 2015 spending for the particular roadway treatment areas specifically outlined in the chart above decreased slightly from 2015 to 2014 as did the amount of lane KM.

Note that in any given year, the type of treatment plan will vary depending on the particular needs of the roadway (i.e. it is not merely discretionary as to which type of treatment to apply to which roadway in any given year). Despite the variability in individual categories in the table listed above, there was reasonable consistency in the overall treatment as the total cost per lane KM increased by only 5.2% year-over-year (column K). If the costs per lane KM had been exactly the same in 2015 as in 2014 (column K), the cost of treating 196.2 lane KM (column H) in 2015 would have been approximately \$0.2 million (1%) less. All else being equal, this information suggests that efficiency is being maintained year-over-year. Please refer to sections 3.3 and 4.4 for further comments.

#### 4.4 Road preservation, restoration and rehabilitation spending (2015 budget to actual)


The following table highlights work undertaken by MP for roadway treatment and compares 2015 budgets to 2015 actuals (excluding patching). Similar information was not available for PW. Note that 2015 actual figures reported represent forecasts based on actuals as of November 2015. Note that in the final column (K), a '+' indicates an excess in per lane KM costs of treatment compared to budget while a '-' indicates an improvement in per lane KM costs compared to budget.


	BUDGETED 2015					ACTUAL 2015					Change (E to J)
	2015 Total Spend (\$)	% of Total '15 Spend	Total '15 Lane KM	% Total Lane KM	'15 Per Lane KM (\$)	2015 Total Spend (\$)	% of Total '15 Spend	Total '15 Lane KM	% Total Lane KM	'15 Per Lane KM (\$)	
	A	B	C	D	E	F	G	H	I	J	K
Micro surface	\$ 2,885,350	17.4%	76.0	46.9%	\$ 37,965	\$ 2,628,110	12.6%	71.8	37.8%	\$ 36,603	-3.6%
Blade level	\$ 326,500	2.0%	4.3	2.7%	\$ 75,930	\$ 848,920	4.1%	11.2	5.9%	\$ 75,796	-0.2%
UTO	\$ 2,746,750	16.6%	29.0	17.9%	\$ 94,716	\$ 2,285,425	10.9%	29.0	15.2%	\$ 78,808	-16.8%
Resurface	\$ 7,767,360	46.9%	45.5	28.1%	\$ 170,711	\$ 11,375,579	54.4%	68.5	36.0%	\$ 166,067	-2.7%
Reconstruct	\$ 2,832,690	17.1%	7.2	4.4%	\$ 393,429	\$ 3,771,523	18.0%	9.7	5.1%	\$ 388,817	-1.2%
<b>Totals</b>	<b>\$ 16,558,650</b>	<b>100.0%</b>	<b>162.0</b>	<b>100.0%</b>	<b>\$ 102,214</b>	<b>\$ 20,909,557</b>	<b>100.0%</b>	<b>190.2</b>	<b>100%</b>	<b>\$ 109,935</b>	<b>+7.6%</b>


When comparing from budgeted 2015 to actual 2015, a different (but complementary) perspective is reached in terms of efficiency. Although a more efficient cost per lane KM in each of the five categories above was achieved compared to budget, the total cost per lane KM increased as the amount of lane KM reconstructed was 2.5 lane KM more than budgeted (9.7 actual KM in column H less 7.2 budgeted KM in column C) and reconstruction has a significantly higher lane KM cost than other types of treatment. Therefore even while the cost per lane KM of reconstruction was 1.2% more efficient than budget, the additional 2.5 lane KM of reconstruction in 2015 resulted in a higher per lane KM cost for the entire program.


Again, as noted above, in any given year the type of treatment plan will vary depending on the particular needs of the roadway (i.e. it is not merely discretionary as to which type of treatment to apply to which roadway in any given year). Despite the variability in individual categories in the table listed above, there was reasonable consistency in the overall treatment as the total cost per lane KM increased by only 7.6% year-over-year (column K). If the costs per lane KM had been exactly the same in 2015 as was budgeted (column E), the cost of treating 190.2 lane KM (column H) in 2015 would have been approximately \$0.9 million (4%) more. All else being equal, this information suggests that efficiency is being achieved as the actual results represent an improvement compared to budget. Please refer to sections 3.3 and 4.3 for further comments.

#### 4.5 Observations, recommendations and responses from administration

Observation 3	Rating
<p>PW currently does not have a formal detailed activity-based annual maintenance plan and their current budget does not factor in newly developed roads. The plan for the upcoming year should be formalized in advance.</p> <p><b>Impact/comments</b></p> <ul style="list-style-type: none"> <li>An effective formal annual maintenance plan within PW requires an annual update to reflect new roads that are now under PW's responsibility. A formal plan should include the planned level of maintenance required to be performed to the roads infrastructure, based on the condition rating index and knowledge of the best timeframes in which to perform preventative maintenance to a new paved surfaces.</li> </ul>	
<p><b>Recommendation 3</b></p>	
<p>PW should develop a formal detailed activity-based annual maintenance plan. The plan should factor in the new roads that are added to the overall inventory as far in advance as possible (given the plans in place within MP). The actual annual road maintenance plan should be formalized as part of the budgeting discussions and MP and PW should work in collaboration to identify an effective planned maintenance program that contains an appropriate mix of strategic preventative maintenance and anticipated reactive maintenance.</p>	
<p><b>Response from administration</b></p>	
<p>Administration agrees with the recommendation. PW is currently working with MP to develop a formal maintenance plan to determine the best practices of what, where and when roadway treatments are most effective for longevity, efficiency and effectiveness. This along with long range planning that incorporates inventory growth will aid the budget process to determine the preventative maintenance requirements and reduce the requirements for reactive mode maintenance.</p>	

Observation 4	Rating
<p>There is insufficient formal communication between the multiple custodians of the road infrastructure. All else being equal, we believe that an increase in the formal communication and planning/reporting between PW and MP would result in increased efficiencies to the road maintenance program, not to mention the overall effectiveness of the program and its ability to maximize achievement of desired results.</p> <p><b>Impact/comments:</b></p> <ul style="list-style-type: none"> <li>• The cross divisional communication structure is limiting access to timely information. Certain reporting/analysis is lagging four to eight weeks behind for PW (i.e. the reporting of utility cut locations). This is further impacting project planning and coordination. Currently the two divisions meet once per month.</li> <li>• The proposed process changes would facilitate synchronization and increase communication via routine meetings across divisional lines. Infusing parts of the two divisions into one would have the potential to remove inefficiencies that are occurring.</li> </ul>	
<p><b>Recommendation 4</b></p>	
<p>We recommend that PW and MP increase their formal level of communication and the synchronization of their planning and reporting. The key objective of improving in this area is to reduce inefficiencies relating to planning and coordination, redundancies of work performed and ultimately preserving/safeguarding the City's monetary resources.</p>	
<p><b>Response from administration</b></p>	
<p>Administration agrees with the recommendation. The level of communication between PW and MP should continue to increase, and adequate staff are in place with the appropriate mandate to ensure this happens. The action plan is to work closely together to create mutually beneficial programs using the network condition data and historical treatment data that was collected as a driver for both programs. While some reactive work will inherently be required on the road network, the majority of maintenance and preservation can be driven with the condition and historical treatment data. This initiative can be achieved through increased communication and planning activities.</p>	

Observation 5	Rating
<p>The current combination of manual efforts and computer systems being utilized by the road maintenance program does not fully collect maintenance location and cost data. There is a lack of a completely synchronized corporate asset activity management system.</p> <p><b>Impact/comments</b></p> <ul style="list-style-type: none"> <li>There is limited manual tracking of the impact of road maintenance on road infrastructure (i.e. work performed by PW on the network developed by MP). The process of tracking the impact of road maintenance continues to be quite manual in nature due to the capability of the asset activity management system. Maintenance work and its impact needs to be reported between MP and PW in a timely manner to keep each party informed on a timely basis of the changes being made to the road infrastructure in order to ensure appropriate planning and coordination between the road custodians. This would allow the road custodians to work towards being one full season ahead in their planning and coordination efforts.</li> </ul>	
<p><b>Recommendation 5</b></p>	
<p>We understand that an ERP evaluation project is currently underway by the City. Ideally, in the future PW should have implemented a completely integrated solution which allows PW to adequately track their activities, costs, time spent on projects and any other relevant details. Particularly for PW, this is critical as there are multiple custodians of the road infrastructure and it is critical to report maintenance efforts on road infrastructure to MP. The ultimate solution should factor in the current computer systems and their ability to integrate modules and reports where possible.</p> <p>We understand that this is perhaps a longer-term recommendation due to inherent limitations in the current system and the City-wide evaluation of an ERP system. In the short term, we believe that improvements can be made by merely increasing the level of communication and formal planning/reporting between the various road custodians.</p>	
<p><b>Response from administration</b></p>	
<p>Administration agrees with the recommendation. Tracking of maintenance costs, along with the locations treated, needs to be integrated into a common computer based system, as this will allow this information to be utilized as an additional decision making tool or trigger when selecting roads for surface treatment. Communication efforts will be increased in the short term to begin this process.</p>	

Observation 6	Rating
<p>Full life cycle planning within PW is currently not taking place, in which a new roadway has an annual maintenance plan from the moment it is completed which factors in the anticipated life cycle of the road (i.e. years until major repair/replacement is necessary), the activities that will need to be performed on that road over the duration of the life cycle (regular preventative repairs), and the cost of those activities.</p> <p><b>Impact/comments</b></p> <ul style="list-style-type: none"> <li>• There is a lack of formal planning and coordination of preventative maintenance built into the road maintenance program that fully incorporates the impact that new infrastructure has on the program.</li> <li>• By virtue of the nature of each area’s function in the Road Maintenance program, there may always be some degree of co-mingling between MP and PW, however the overall Road Maintenance plan needs to clearly define maintenance work from the preservation/rehabilitation work.</li> <li>• This will facilitate allocation of the funding required to meet the plan set for each team. It will also better enable leadership to hold management of each team accountable to the objectives of their own program, progress of their defined activities and the funding allocated to their program.</li> </ul>	
<p><b>Recommendation 6</b></p>	
<p>We recommend that prioritized, proactive full life cycle planning begin to be implemented (i.e. the Condition Rating Index that is used to prioritize work within MP) on a go-forward basis for new roadways infrastructure in the City which clarifies the scope of PW and MP’s responsibilities for maintenance, preservation and rehabilitation.</p>	
<p><b>Response from administration</b></p>	
<p>Administration agrees with the recommendation.</p>	

#### **4.6 Relevant benchmarking from leading practices report supporting observations/recommendations**

All municipalities that participated in the benchmarking exercise indicated that:

- Projects are planned in a cross line-of-service environment, which includes all teams (i.e. from Public Works, Operations, and Engineering to City Planning and Construction and Design). The collaborative project planning environment enables them to plan work in a manner which reduces duplication of efforts, redundancies and increases effectiveness of the use of funds. Frequency of meetings between the teams typically ranges from weekly to monthly.
- In the annual capital or maintenance plan, all participating cities use a condition rating index to prioritize the upcoming annual plan. Metrics such as user frustration, increased materials and work costs as well as local or collector roads are factored into the prioritization of work and development of the annual capital/maintenance plan. Further, a complete plan is set in place at the start of the year, including operational (i.e. PW) and capital (i.e. MP) work. Formal tracking of operational work performed is communicated to the team(s) responsible for capital work to ensure the plans are being performed as designed.
- They have defined activities for each group and are in the process of developing a life cycle maintenance plan which identifies the level of maintenance required to their assets from inception onward.

#### **4.7 Conclusion on efficiency**

We concluded based on the evaluation above that the City was achieving satisfactory results in terms of the overall efficiency of its road maintenance program. As indicated in section 3, the City has invested significantly increased funds from 2011 to 2015 (and in particular from 2013 to 2015 after the approval of spending to achieve service level 'B' for paved roadways) and this has resulted in a significant increase in lane KM's treated from 2011 (45 lane KM or 1.1% of paved roadways) to 2015 (220 lane KM or 5.5% of paved roadways). This has been achieved while maintaining generally consistent overall roadway maintenance costs per lane KM in 2014 and 2015 and overall increases in roadway maintenance costs per lane KM from 2011 to 2015 within the range of general municipal trends.

More specifically, when comparing the City's actual road maintenance costs per lane KM in 2014 and 2015, if the costs of treatment per lane KM had been exactly the same in 2015 as in 2014, the cost of treating the same amount of lane KM in



2015 would have been approximately \$0.2 million (or approximately 1%) less. All else being equal, this analysis suggested that efficiency is being achieved. Additionally, when comparing the City's budgeted road maintenance costs per lane KM for 2015 to the actual results achieved for 2015, if the costs per lane KM had been exactly the same in 2015 as was budgeted for 2015, the cost of treating the 2015 actual lane KM would have been approximately \$0.9 million (or approximately 4%) more. All else being equal, this information suggested that efficiency is being achieved as the actual results represent an improvement compared to budget.

In terms of areas for improvement, we identified opportunities for improvement in the following areas: development of a formal annual maintenance plan in PW that factors in new infrastructure and allows for planning of service a year in advance, increased levels of coordination/synchronization between the PW and MP divisions, consideration of the needs of the roadway maintenance program while undertaking ERP planning for the City, and incorporating full life-cycle planning into the roadway maintenance program. Note that these recommendations are intended to result in increases to existing levels of efficiency being achieved as opposed to being indicative of a lack of efficiency in the current road maintenance program.

## **5. Is the road maintenance program meeting its goals and objectives?**

Effectiveness represents whether the desired results are being achieved. The other primary sections of this review, while focusing on economy and efficiency, also by their nature relate to the effectiveness of the roadways maintenance program as well. However, the one aspect of effectiveness that has not been explored previously in this report is the point of view of the citizenship.

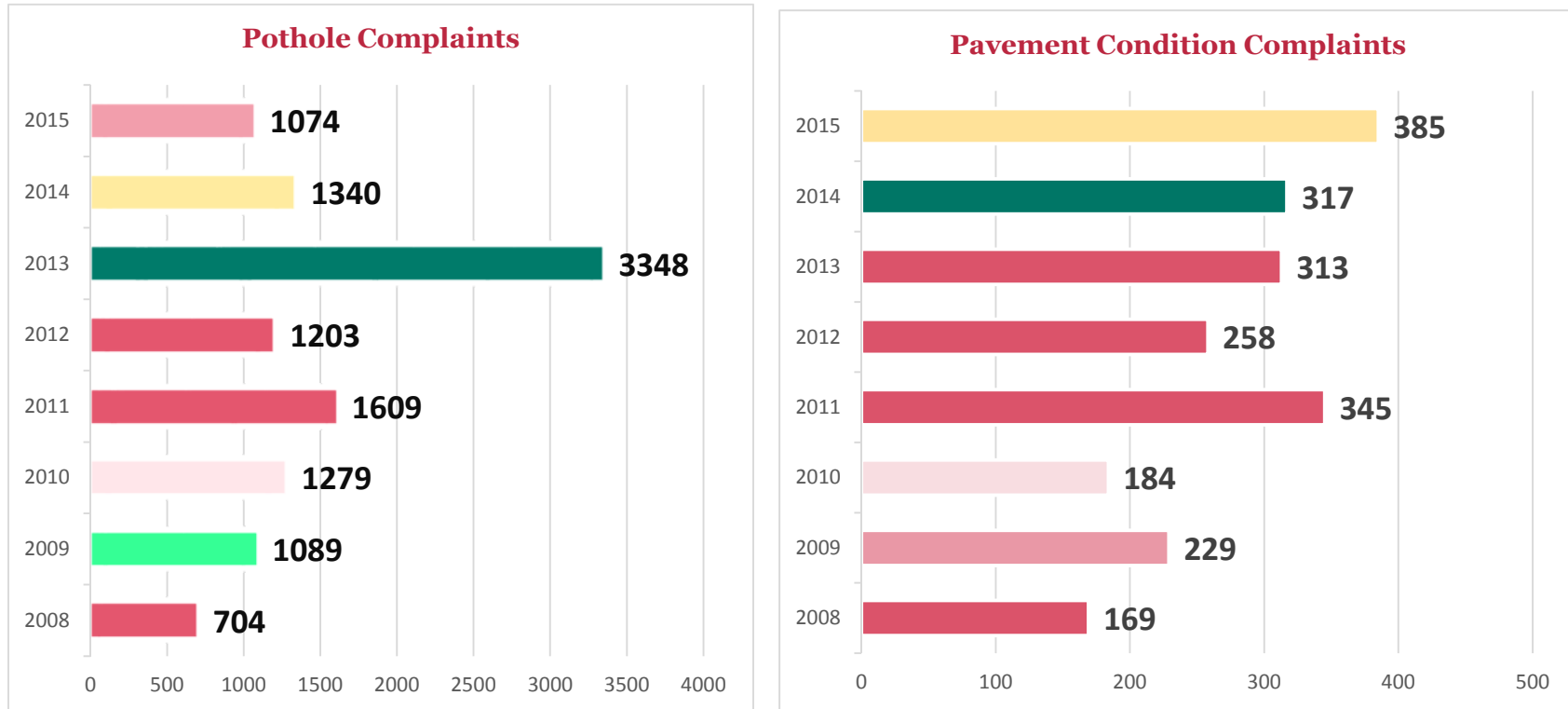
### **5.1 Goals and objectives**

The City defines roadway asset management as a process of monitoring, maintaining, and preserving roads effectively throughout their lifecycle. The objective is to employ effective decision making to optimize a cost effective mix of treatments to maximize the number of roads treated to improve the roadway network as a whole.

In 2014, road maintenance was an area (along with parking and traffic management) that had the lowest citizen satisfaction ratings of all city services. The B Service Level (please refer to section 3.3) for roads is projected to be achieved in 2017. In the meantime, as it pertains to road maintenance, there is still a need for further improvement of tracking and responding to complaints launched by citizens. Road Maintenance satisfaction received a score of approximately 5 out 10 on the **2014 Civic Survey Results**.

Most recently, leading up to the budget deliberations in December of 2015, the Citizen Budget Final Validated Results from October 19 to November 13, 2015 indicated that the only areas of increased investment desired were Road Maintenance (invest up to 2.0% more) and Snow & Ice Management (invest up to 4.0% more).

## 5.2 Pothole and pavement condition complaints (2008-2015)



As noted earlier, severe winter weather can have a significant impact on spring/summer road maintenance. This was the case in 2013, when a total of 3,348 pothole complaints were received by PW following the winter of 2012-13. Severe winter weather impacted the road network and resulted in a significant increase in potholes. In 2014, the amount of pothole related complaints had decreased to approximately 1,300 and further decreased to approximately 1,100 in 2015.

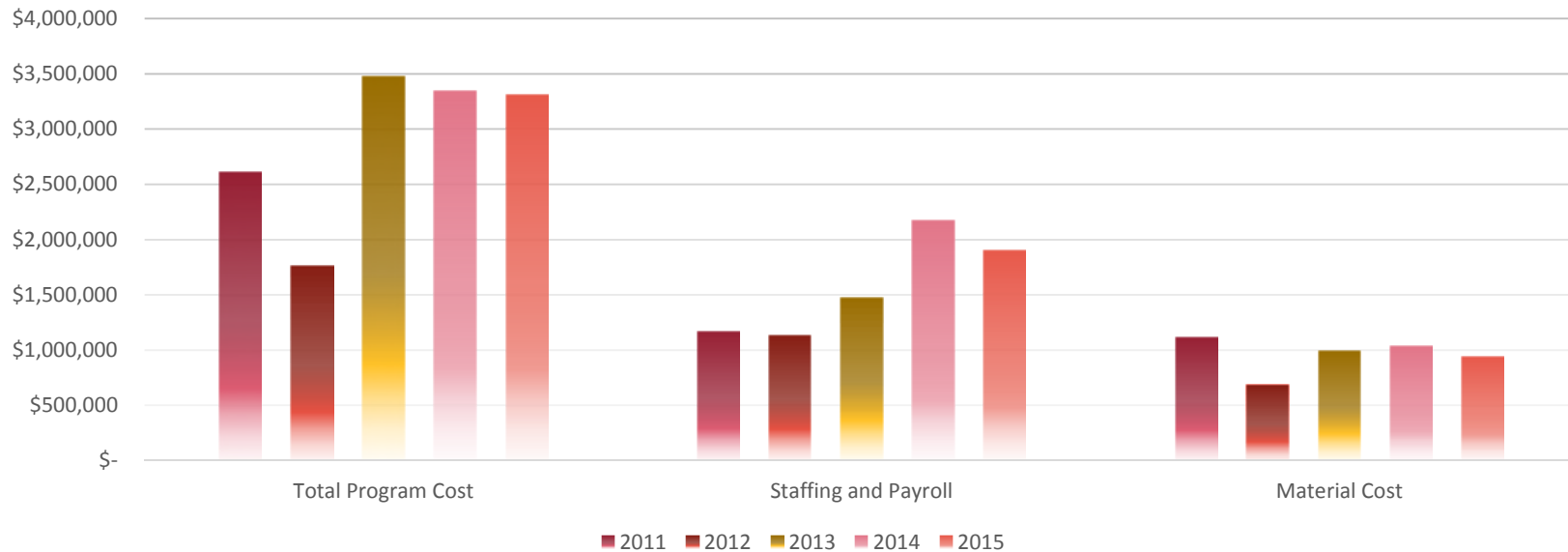
Note that similar trends were experienced by the City of Edmonton over the period 2009 through 2013, particularly during the 2012 and 2013 years. In 2012 the City of Saskatoon experienced a decrease in pothole complaints from 1,609 to 1,203 (improvement of 25.2%) while the City of Edmonton reported a decrease in pothole complaints from 10,973 to 8,677

(improvement of 20.9%). In 2013 the City of Saskatoon experienced an increase in pothole complaints from 1,203 in 2012 to 3,348 complaints (an increase of 178.3%) while the City of Edmonton reported an increase in pothole complaints from 8,677 in 2012 to 23,568 in 2013 (an increase of 171.6%).

A total of approximately 163,000 pothole repairs were reported as being completed by PW in 2015, with 2,845 tonnes of asphalt used, down from 188,000 pothole repairs completed in 2014. As an example for comparison again referencing the City of Edmonton, in 2013 pothole repair crews in the City of Edmonton reported filling over 700,000 potholes (approximately 15,000 tonnes of asphalt) which was a 10-year high (average of approximately 500,000 per year from 2004 through 2013) and this figure decreased to 475,000 in 2014.

Note that as illustrated below, 2012 costs were particularly low due to the reduced number of potholes in 2012, which in turn resulted in the lowest material costs incurred over the 5-year period shown below. Material costs of PW in 2012 were approximately \$0.7 million compared to an average over the 5-year period shown above of approximately \$1.0 million.

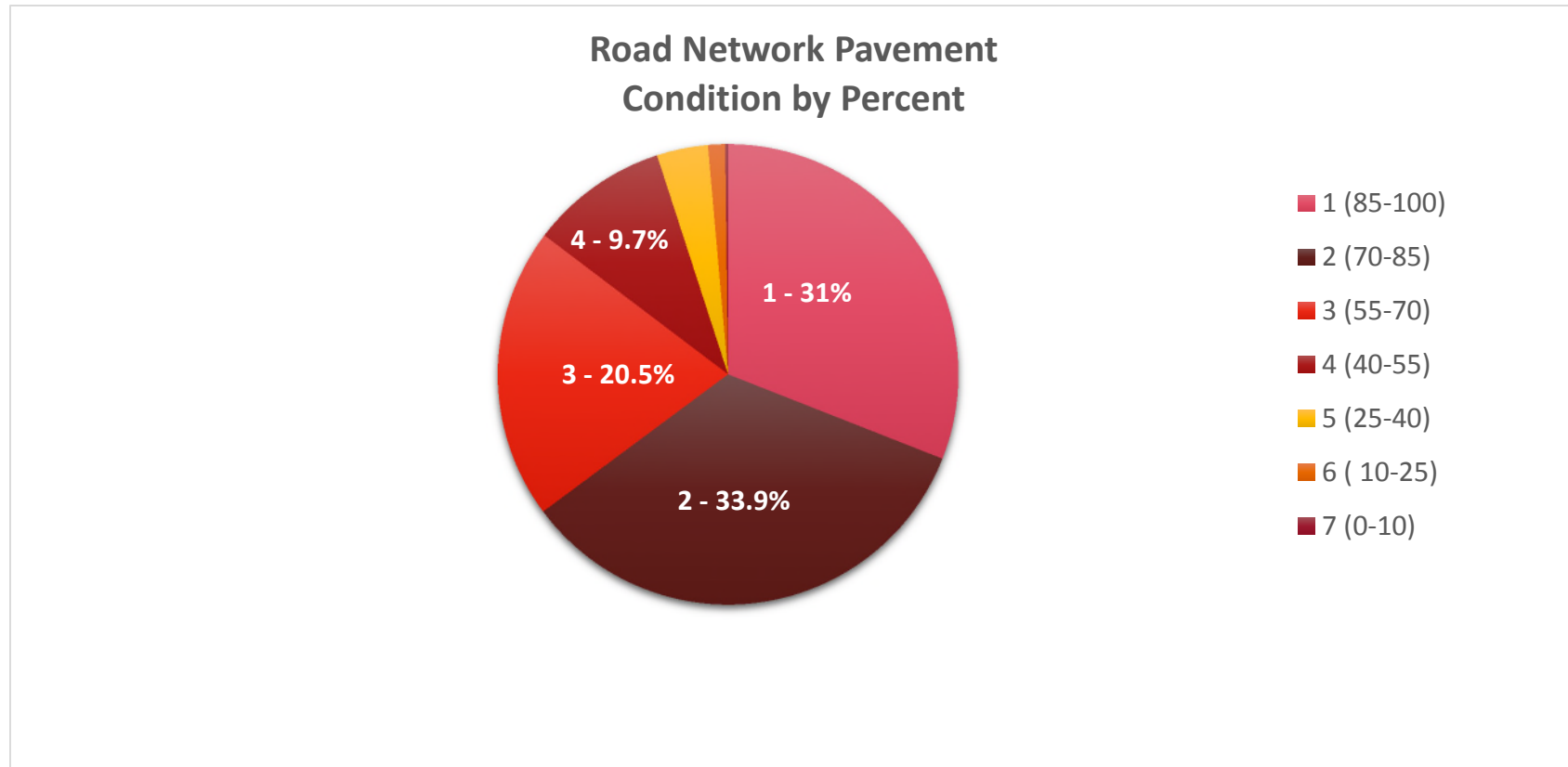
### FIVE-YEAR PW PAVED ROADS SPENDING



### 5.3 Condition ratings

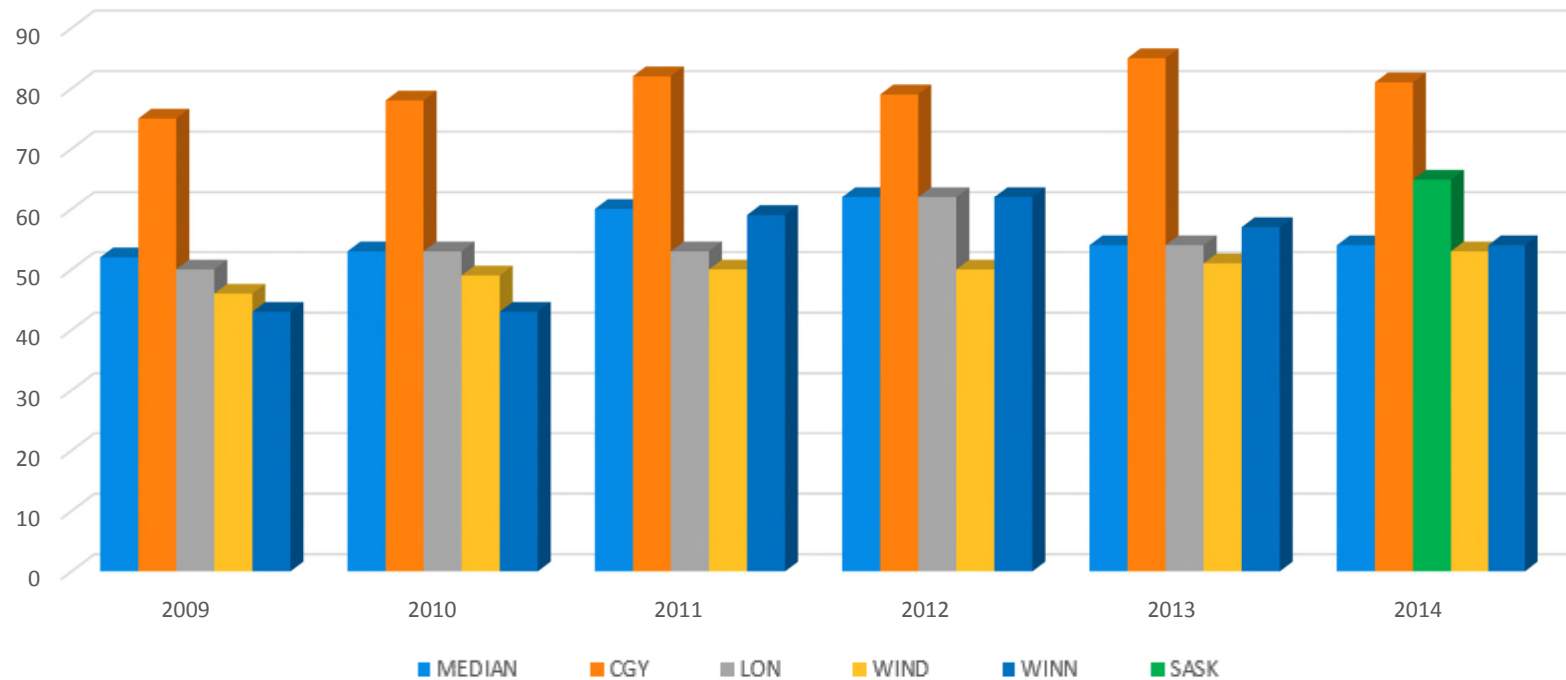
In 2014, a full condition assessment of the entire paved roadway network within the City was undertaken, which will be used to establish a new baseline condition of the network to aid in setting future roadway preservation programs. The City’s surface pavement condition assessment is based on the international standard ASTM D 6433-09 and uses a standard Pavement Condition Index (PCI) and rating scale. The target city wide rating cycle for all paved roadways in Saskatoon is every four years. The City’s roadway network is comprised of approximately 51% of neighborhood roadways (i.e. local roads) and 49% primary roadways (i.e. expressways, arterials, and collectors). The majority of local roadways are now in the 30-60 year age range, with a large amount of existing local roadways constructed in the boom of the 1980’s.

The PCI consists of 7 categories within a range of 0 to 100, with the top two categories requiring a score of 70 or greater. Below are the results of the latest condition ratings from 2014 with category “1” being the best rating (a score of 85 to 100 within the index) and category “2” being the second-highest rating (a score of 70 to 85 within the index). Note that a total of 64.9% of the City’s roadways are within these 2 highest categories.



The condition ratings outlined above compare favorably with data available from OMBI Performance Measurement Reports from 2008 through 2014, which identify the % of paved lane KM where the condition rating is “good” to “very good”. The OMBI single-tier (municipalities responsible for maintaining all types of roads, including arterial, collector and local roads and, in some cases, expressways and laneways) median increased from 51% to 54% over the period from 2008 to 2014. Calgary is an example of a leading municipality in terms of condition ratings with a measure of 81% in 2014 (increase from 75% to 81% over the period from 2009 to 2014). London, Windsor and Winnipeg are all comparable at 53% to 54% as of 2013/14. Please refer to the illustration below:

**% of Road Paved Lane Km Where Condition is Good to Very Good**




#### 5.4 Road maintenance strategy

Treatment Strategy	Treatment
Maintenance	Pothole repair Seam repair
Preservation	Crack sealing Micro-surfacing Blade level Asphalt overlay
Restoration	Resurfacing
Rehabilitation	Reconstruction


The focus of the road maintenance program is on all condition ratings (good, fair, poor and very poor). In 2014, Council added significant funding to achieve a “B” level of service which is intended to improve the condition of the roadways and decrease the backlog of preservation work slowly over time (please refer to section 3.3 for further details). If preventative maintenance is not provided to better rated roads, there will be a larger portion of roads which, over the course of time, will deteriorate from their current “good” rating to become “fair”, “poor” or “very poor”.

Per our review of the current strategy and interaction with stakeholders throughout the performance of the review, it is clear that the execution of the current strategy requires involvement from both PW and MP. Although intermingling of efforts by PW and MP may not be able to be fully eliminated, the strategy needs to continue to be clarified to ensure the goals and objectives of each team are being effectively met. Currently, MP is performing seam repair, crack sealing and patching which are all areas of road maintenance which fit more naturally into the PW portfolio. MP’s current performance of those tasks is seen to be the result of resource constraints and the amount of ‘reactive’ pothole work being done by PW.

## 5.5 Observations, recommendations and responses from administration

Observation 7	Rating
<p>There is a lack of specific quality control criteria being built into the PW road maintenance activities.</p> <p><b>Impact/comments</b></p> <ul style="list-style-type: none"> <li>• Citizen satisfaction with spending of taxpayer funds on road maintenance is heavily impacted by the quality of maintenance work being completed. Quality control is essential in ensuring that objectives are effectively being achieved and in ensuring the accountability of the City and its contractors.</li> <li>• Maintaining quality standards, monitoring the quality of the work as it is performed/completed, and ensuring that only the right caliber of talent are obtaining City tenders is integral to the success of objectives being set by all divisions within T&amp;U. PW currently has two temporary engineering technologists on staff who are monitoring quality of the projects undertaken and is in the process of creating formal procedures for pothole maintenance.</li> </ul>	
<p><b>Recommendation 7</b></p>	
<p>We recommend that PW maintain sufficient engineering technologists to allow them to ensure all projects are being looked at from a quality perspective. The existence of an annual maintenance plan will assist in determining the correct level of planned (proactive) activity that will occur during the year and will allow for a determination of how many technologists are necessary to properly monitor quality. Process procedures should be created for all roadway maintenance activities within the scope of PW (in addition to pothole maintenance) to measure quality throughout their projects (such as controls and sampling to verify grading of asphalt material, specifications delivered etc.).</p>	
<p><b>Response from administration</b></p>	
<p>Administration agrees with the recommendation. Engineering technologists have been hired as temporary inspectors in recent years to achieve this objective. Going forward, these positions will be expanded to ensure that quality control (QC) and quality assurance (QA) continue to be a primary focus. Through the Logistics &amp; Procurement section of C&amp;D that is assigned to PW a project scope has been developed to define both QC and QA between design, operations and administration of such. The inclusion of QA and QC into the tender process is currently in development and will be included in the 2016 spring tenders.</p>	



Observation 8	Rating
<p>There are no vendor pre-qualification criterion in place for PW or MP, which can impact effectiveness of goals/objective and can also have trailing impacts on economy and efficiency.</p> <p><b>Impact/comments</b></p> <ul style="list-style-type: none"> <li>• An important aspect of quality control is implementing standards within the tendering process such that only those vendors meeting the criteria can apply and be successful in securing a tender.</li> <li>• Building a tender to quality specification, factoring in changing technologies and the caliber of talent being brought onto the project should play a significant role in the tendering process. If done in advance, this preventative control will help mitigate situations that can become unpleasant.</li> </ul>	
<p><b>Recommendation 8</b></p>	
<p>We recommend that vendor pre-qualification criterion be drafted in a collaborative workspace, allowing all relevant professionals, engineers, management and any other relevant stakeholders to provide feedback to the process. This will ensure that only vendors of the desired quality level and caliber could be awarded the respective tender. It is understandable that on certain projects, there may be a limited number of vendor applications, which restricts the City’s ability to be extremely stringent in their pre-qualification criteria. To combat this risk, we suggest that the City hold information sessions (in addition to the annual Contractors’ Breakfast) with vendors which allow the City and their vendors to work together and learn about quality control, quality assurance and what the City expects from the workmanship of applicants.</p>	
<p><b>Response from administration</b></p>	
<p>Administration agrees with the recommendation. An information report will be submitted to the appropriate Committee in the first quarter of 2016 providing an update on the changes being made for 2016, which build upon the improvements implemented in 2015. Best practices will be followed, including implementation of a system that measures and pre-qualifies contractors based on financial, quality, safety, and delivery performance metrics.</p>	

### 5.6 Relevant benchmarking from leading practices report supporting observations/recommendations

Each municipality that participated in the benchmarking study is ensuring that quality inspectors, contract administrators or lab and inspection groups were out on some to all projects to ensure work was being conducted to specifications. All municipalities were following some level of guidelines (whether internally developed or provincially regulated). The

collaborative teams in these cities were also looking to further enhance or develop their own internal quality manuals. Fines were imposed on contractors if work was found to be deficient.

### **5.7 Conclusion on effectiveness**

We concluded based on the evaluation above that the City was achieving satisfactory results in terms of the overall effectiveness of its road maintenance program. As indicated in section 3, the City has invested significantly increased funds from 2011 to 2015 (and in particular from 2013 to 2015 after the approval of spending to achieve service level ‘B’ for paved roadways) and this has resulted in a significant increase in lane KM’s treated from 2011 (45 lane KM or 1.1% of paved roadways) to 2015 (220 lane KM or 5.5% of paved roadways). In the Major Projects Asset Preservation report entitled “Projected 2015-2017 Roadway Preservation Plan”, the City has provided specific details of the proposed preservation efforts in each ward in each year, including the street impacted, the treatment type, the lane KM, and the cost estimate. Additionally, pothole complaints were down to 1,074 in 2015 (the lowest amount of pothole complaints in a year since 2008) and current condition ratings compare favorably to those being reported by OMBI single-tier municipalities across the country.

We identified opportunities for improvement in the following areas: enhanced quality control criteria and maintenance of sufficient engineering technologists in PW and the implement of vendor pre-qualification criteria by C&D in the tendering process. Note that these recommendations are intended to result in increases to existing levels of effectiveness being achieved as opposed to being indicative of a lack of effectiveness in the current road maintenance program.




### **6. Overall conclusion**

The City of Saskatoon’s road maintenance program is performing satisfactorily in the areas of economy, efficiency and effectiveness based on the procedures performed during the course of the value for money review. The findings and recommendations put forward in this report represent areas of improvement to enhance certain aspects of the economy, efficiency and effectiveness of the road maintenance program. Where the benchmarking exercise has produced data directly relevant to our findings and recommendations it has been included in this document, and the full leading practices report will be provided to administration under separate cover. We would like to thank all those involved with this project in facilitating the necessary review by our team.

## Appendix 1 – Rating Overview

### Rating Objectives

- Assists City Administration and SPCF in assessing and reviewing results;
- Provides the basis for prioritizing follow-up;
- Facilitates cross business unit comparison;
- Facilitates issues-tracking system usage; and
- Provides a measure of transparency in the rating criteria.

Individual Observations	Impact	Overall Report
Significant finding. High risk of significant impact (e.g. fraud, serious financial/operational/reputational risk, serious safety issues).		Process or internal review area requires improvement in order to achieve efficiency, economy and/or effectiveness. One or more “red” individual findings indicate that urgent attention is required to achieve program objectives.
Less severe finding. Requires process change/improvement to reduce the likelihood of a significant finding in the future.		No significant issues identified during the stated analysis, however in order to potentially make meaningful improvements to already existing efficiency, economy and/or effectiveness the observation and recommendation needs to be implemented.
Low-risk item. Value added process improvement or enhancement.		No significant issues identified during the stated analysis, however the observation and recommendation provide administration with the opportunity to effect positive change.

## **Appendix 2 – Resources Utilized**

1. Building Better Roads – Major Projects Asset Preservation Plan (2015-2017)
2. Building Better Roads – Major Projects Asset Preservation Plan (2014-2016)
3. Roadways Civic Service Review
4. Expressway & Arterial Resurfacing Contracts
5. 2015 Resurfacing / UTO Contract
6. Roadway Treatment Guidelines
7. State of Surface Infrastructure 2014/2015 Draft Report
8. Roadway Condition Assessment Program
9. PW walkthrough of road maintenance program
10. Various pothole repair work data
11. Various details from financial reporting and budgeting system
12. OMBI Performance Measurement Reports
13. City of Edmonton City Streets Audit November 10, 2014
14. Interviews with key personnel within Public Works, Major Projects, Construction & Design

### *Limitations and Responsibilities*

*This report was prepared by PwC at the request of City of Saskatoon and is intended solely for the information of City of Saskatoon management, City Council and the Standing Policy Committee on Finance (“SPCF”) of the City Council. The material within reflects PwC’s best judgment in light of the information available at the time of preparation. The work performed in preparing this report, and the report itself, is governed by and in accordance with the terms and conditions of the Internal Audit Services Agreement between PwC and City of Saskatoon dated January 1, 2015. This report has been prepared for and only for City of Saskatoon pursuant to our statement of work approved on September 8, 2015 and for no other purpose. The existence of this report may not be disclosed nor its contents published in any way without PwC’s written approval in each specific instance. PwC does not accept or assume any liability or duty of care for any other purpose or to any other person to whom this report is shown or into whose hands it may come save where expressly agreed by our prior consent in writing. Our work was limited to the specific procedures and analysis described herein and was based on the information made available through January 14, 2016.*