

ROAD SERVICES



PROGRAM MAP

Transportation Services



Shaded boxes reflect the activities covered in this report

Toronto's Transportation Services division is responsible for maintaining the City's transportation infrastructure in a state of good repair for the purposes of public safety and the efficient movement of people, goods and services. This infrastructure includes: roads; bridges; culverts; sidewalks; boulevards; signage; and traffic signals.

The division is responsible for all aspects of traffic operations, roadway regulation, and street maintenance and cleaning, transportation infrastructure management, road, sidewalk and boulevard use, as well as snow plowing and removal and road salting. The results in this Report focus primarily on the maintenance of road surfaces and winter control of roads.

SUMMARY OF PERFORMANCE MEASUREMENT RESULTS

Question	Indicator/Measure	Internal Comparison of Toronto's 2017 vs. 2016 Results	External Comparison to Other Municipalities (MBNC) By Quartile for 2017	Chart & Page Ref.
How long is Toronto's road network?	Number of Lane KM per 1,000 Population – (Service Level)	Stable Lane km of roads was stable (service level indicator)	4 Lowest rate of lane km of roads relative to population, compared to others (service level indicator) (related to high population density)	28.1 28.2 pg. 6/7
How many vehicle collisions occur?	Vehicle Collision Rate per Million Vehicle km or per Lane km – (Community Impact)	Increased Collision rate increased (Community Impact)	4 Highest collision rate compared to others. (Community Impact)	28.3 28.4 pg. 8/9
How congested are major roads?	Road Congestion on Major Roads (Vehicle km Traveled per Lane km) – (Community Impact)	Increased Road congestion increased (no graph) (Community Impact)	4 Highest rate of congestion on Toronto's roads compared to others (Community Impact)	28.5 pg. 10
What is the pavement condition of the roads?	Percentage of Paved Lane Kms. With Pavement Condition Rated Good/Very Good – (Quality)	Decrease Percentage of pavement rated good to very good decreased (Customer Service/Quality)	4 Lower percentage of pavement rated good to very good compared to others (Customer Service/Quality)	28.6 28.7 pg. 11/ 12
What is the condition of bridges and culverts?	% of Bridges and Culverts with Condition Rated as Good to Very Good – (Quality)	Stable Percentage of bridges rated in good to very good condition was stable (no graph) (Customer Service/Quality)	1 Higher percentage of bridges & culverts rated good to very good compared to others (Customer Service/Quality)	28.8 pg. 13
What is the proportion of Transportation service requests completed within the standard?	Percentage of Transportation Service Requests Completed Within Standard – (Customer Service)	Decrease The proportion of service requests completed within the standard was lower, but still high at 92% (Customer Service/Quality)	N/A	28.9 pg. 14



Road Services 2017 Performance Measurement & Benchmarking Report

Question	Indicator/Measure	Internal Comparison of Toronto's 2017 vs. 2016 Results External Comparison to Other Municipalities (MBNC) By Quartile for 2017		Chart & Page Ref.
How much does it cost to plough, sand and salt roads in the winter?	Operating Costs for Winter Maintenance of Roadways per Lane KM Maintained in Winter – (Efficiency)	Decrease Cost of winter maintenance decreased	4 Higher cost of winter maintenance compared to	28.10 28.11 pg.
	(Eniciency)	(Efficiency)	others (Efficiency)	15/16
How much does it cost to maintain the road	<u>Operating Costs</u> for Paved Roads (Hard Top) Maintenance per Lane	Increase <u>Operating cost</u> of paved	4 Higher operating cost of paved road maintenance	28.12 28.13
surface?	KM – (Efficiency)	road maintenance increased (Efficiency)	compared to others (no graph) (Efficiency)	pg. 17/18
How much does it cost	Total Costs for Paved Roads (Hard Top)	Increase	2 Lower total operating cost	28.12 28.13
to maintain the road surface?	Maintenance per Lane KM – (Efficiency)	Total cost of paved road maintenance increased (Efficiency)	of paved road maintenance compared to others (Efficiency)	pg. 17/18
How much does it cost	Operating Cost of	Stable	4 Lower operating cost of roadside compared to	28.14
to maintain Toronto's roadside?	Roadside per Edge Kilometre – (Efficiency)	y) Operating cost of roadside was relatively stable (Efficiency)	others. (no graph) (Efficiency)	pg.19
How much does it cost	Operating cost for Traffic Management per Lane	Increased	4 Lower operating cost for traffic management	28.15
to manage Toronto's traffic?	Km –(Efficiency)	Operating cost for traffic management increased (Efficiency)	compared to others. (no graph) (Efficiency)	pg. 19
What is Toronto's Citizen First (CF)	Citizens First Survey Service Quality Score for	Increase		28.16
Service Quality Score for Municipal or regional snow removal services?	Service Quality Score for Municipal or regional snow removal services - (Customer Service)	The CF8 (2018) Service Quality Score increased compared to CF7 (2014) (Customer Service)	N/A	pg. 20
What is Toronto's Citizen First (CF)	Citizens First Survey	Increase		
Service Quality Score	Service Quality Score for Traffic management in	The CF8 (2018) Service Quality Score increased	N/A	28.17
management?	your municipality - (Customer Service)	compared to CF7 (2014) (Customer Service)		pg.21

SUMMARY OF OVERALL RESULTS

Internal Comparison of Toronto's 2017 vs. 2016 Results	Internal Comparison of Toronto's 2017 vs. 2016 Results	External Comparison to Other Municipalities (MBNC) By Quartile for 2017	External Comparison to Other Municipalities (MBNC) By Quartile for 2017
Service Level Indicators (Resources)	Performance Measures (Results)	Service Level Indicators (Resources)	Performance Measures (Results)
0 -Increased 1 - Stable 0 - Decreased. 100% stable or increased	3 - Favourable 2 - Stable 7 - Unfavourable 41.6% favourable or stable	0 - 1st quartile 0 - 2 nd quartile 0 - 3 rd quartile 1 - 4th quartile 0% in 1st and 2nd quartiles	1 - 1st quartile 1 - 2nd quartile 0 - 3rd quartile 7 - 4th quartile 22% in 1st and 2nd quartiles

For an explanation of how to interpret this summary and the supporting charts, please see the Guide to Toronto's Performance Results. These quartile results are based on a maximum sample size of 16 municipalities (maximum of 11 for single tier municipalities).

M Toronto

SERVICE LEVEL

One method of comparing service levels is to examine the equivalent lane kilometres of the road network, which factors in differences in roads with respect to the number of lanes and width of those lanes. For example, a four-lane road of standard lane width (3.65 m) over one kilometre is four equivalent lane kilometres.



Chart 28.1 illustrates Toronto's total number and rate of lane km of roads per 1,000 population. The results for 2010 and prior years are not based on the revised population estimates.

Chart 28.1 (City of Toronto) Equivalent Lane Kilometres of Roads per 1,000 Population

The total size of Toronto's road network has remained relatively unchanged, but as the annual population has grown, the lane km per 1,000 population was relatively stable with a slight decrease of 1.5%, contributing to increased traffic congestion.

28.2 -HOW DOES THE RELATIVE SIZE OF TORONTO'S ROAD NETWORK COMPARE TO OTHER MUNICIPALITIES?



Chart 28.2

compares the relative size of Toronto's road network in 2017 per 1,000 population basis to other municipalities, plotted as bars relative to the left axis.

The single-tier and upper-tier municipalities have been grouped separately on Chart 28.2 as well as some of the subsequent charts to reflect different service delivery responsibilities for different classes of roads.

The first group is comprised of uppertier municipalities that usually have responsibility for major road types such as arterial and



collector roads, but do not have responsibility for local roads. The second group, which includes Toronto, is comprised of single-tier municipalities who have responsibility for all road types.

Toronto ranks tenth of ten municipalities (fourth quartile) among the single-tier municipalities in terms of having the highest number of lane km of roads per 1,000 population. In other words, Toronto has the lowest number of lane km of roads per 1,000 population.

Population density (population per square kilometre) and the geographical size of municipalities greatly influence the results for this measure. Municipalities with larger geographical areas and lower population densities will tend to have proportionately more roads per person. Population density has been plotted in Chart 28.2 as a line graph relative to the right axis. Toronto is the second most densely populated of MBNC municipalities, which accounts for its lower rate of lane km of roads.

COMMUNITY IMPACT

A major objective for municipalities to provide a high level of safety for the pedestrians, cyclists and vehicle occupants that use our road networks.



Charts 28.3 reflects Toronto's total number of collisions and the rate of vehicle collisions per lane kilometre of road. Starting in 2009 results are based on equivalent lane km. Results of 2008 and prior years continue to be based on lane km. and therefore are not comparable to 2009 and subsequent years.

Over the longer term, the results indicate there has been a general decline in collisions. However, the number of total collisions has increased in 2017, and the collision rate also increased by 45%. The increase in collision rate is due to an increase in the number of reported collisions at the Collisions Report Centres and a change in the reporting procedure.

Chart 28.3 (City of Toronto) Number of Vehicle Collisions per Equivalent Lane km of Roads

28.4 -HOW DOES THE VEHICLE COLLISION RATE IN TORONTO COMPARE TO OTHER MUNICIPALITIES?



Chart 28.4 summarizes information on the 2017 annual rate of vehicle collisions per million vehicle kilometres traveled in Toronto and other municipalities.

On the basis of the lowest collision rate, Toronto ranks seventh of seven single-tier municipalities (fourth quartile). Traffic congestion, discussed below, is likely a factor in Toronto's higher rate of collisions, given that Toronto roads are one of the most congested of the MBNC municipalities.

Chart 28.4 (MBNC 2017) Vehicle Collision Rate/Collisions per Million Vehicle Km



28.5 -HOW CONGESTED ARE TORONTO'S MAJOR ROADS COMPARED TO OTHER MUNICIPALITIES?

Chart 28.5 compares the 2017 level of congestion on Toronto's main roads to other municipalities.

Chart 28.5 (MBNC 2017) Congestion Vehicle Km (000s) per Lane Km on Major Roads

It shows the number of times (in thousands) a vehicle travels over each lane kilometre of road. In terms of having the least congested roads, Toronto ranks fourteenth of fourteen municipalities (fourth quartile), meaning Toronto roads are heavily congested.

Toronto's congestion rate increased in 2017 by 5.91% compared to the previous year. In 2017, there were 2,315,584 vehicle kilometers traveled for every lane kilometer of road. The number of vehicles on the roads can be affected by population density, the type of roads (e.g., arterial, collector or local roads, and in some cases, expressways) and average commute distances.

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CUSTOMER SERVICE/QUALITY

The state of repair of the City's infrastructure is an important component in delivering effective services.



Chart 28.6 (City of Toronto) % of Lane Km of Roads with Pavement Condition Rated as Good to Very Good

Over the longer term there has been an improvement in pavement condition because of Toronto's asset management programs and strategies to maintain roads in a good state of repair

In 2017, Toronto changed from a manual data collection method to a network wide automated pavement data collection and reassessed its trigger values for good-fair-poor condition ranges. Therefore, the 2017 results cannot be directly compared to previous years' results.

28.7 – HOW DOES THE PAVEMENT CONDITION OF TORONTO'S ROADS COMPARE TO OTHER MUNICIPALITIES?



Chart 28.7 compares Toronto's 2017 percentage of roads rated in good to very good condition to other

municipalities.

Chart 28.7 (MBNC 2017) % of Lane Km of Roads with Pavement Condition Rated as Good to Very Good

Upper- and single-tier municipalities are grouped separately because they each have different road maintenance responsibilities.

Toronto ranks seventh of nine single-tier municipalities (fourth quartile) in terms of having the best pavement condition of its roads.

As mentioned, it should be noted that Toronto changed its assessment methodology to a network-wide automated data collection, and also re-assessed its trigger values for good-fair-poor condition ranges.

28.8 - HOW DOES THE CONDITION OF TORONTO'S BRIDGES AND CULVERTS COMPARE TO OTHER MUNICIPALITIES?



Chart 28.8

compares Toronto's 2017 percentage of bridges and culverts rated in good to very good condition to other municipalities.

Chart 28.8 (MBNC 2017) % of Bridges and Culverts with Condition Rated as Good to Very Good

Toronto ranked third of eleven single-tier municipalities (first quartile) for the highest bridge/culvert condition rating.

Toronto's 2017 rate of 79.3 per cent was stable compared to the previous year.

From a customer service perspective, Toronto's Transportation Services Division publishes its service standards <u>online</u>. These standards relate to service requests made by the public to 311(such as a pot hole in the road), and provide a time threshold for completing the service request. They cover a broad range of activities related to road and sidewalk maintenance, traffic operations and safety, and public right of way management.





Chart 28.9 provides information on percentage of service requests that were completed within the published service standard.

of service

The line bar relative to the right axis shows the actual number of transportation service requests received from the public.

Chart 28.9 (City of Toronto) Number of Transportation Service Requests & Percentage of **Requests Completed Within Time Standard**

It should be noted this reactive work (a service request) represents only a portion of the work done by the Division, with the bulk of their work being pro-active work initiated by staff through preventative maintenance and capital programs.

The percentage of service requests completed within standards decreased by 6% in 2017 compared to the previous year. The total number of service requests (70,910) was relatively stable compared to 2016.

Since 2009, a number of changes were made to the Division's business processes to improve the timeliness and efficiency of service including, staff training, enhancements to the work management system, mobile computing, the use of mapping technology and increased management review.

The changes to business processes noted above resulted in a significant improvement in results; from 89 percent of service requests completed within standard in 2009 to well over 90 percent in most years since. These changes have not only allowed staff to become more productive and timely in responding to and completing service requests, but also the ability to provide more accurate and current information to customers on the status of their service requests.

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EFFICIENCY



28.10 - HOW MUCH DOES IT COST TORONTO FOR WINTER CONTROL OF ROADS?

Chart 28.10 summarizes Toronto's operating costs of winter maintenance on a per lane km basis. These costs only relate to road maintenance and exclude costs related to sidewalk winter maintenance.

Chart 28.10 (City of Toronto) Cost for Winter Maintenance of Roads per Lane Kilometre

Starting in 2009, Toronto changed its method of measuring the length of roads from lane km. to equivalent lane km. Results for 2008 and prior years continue to be based on lane km, and therefore are not comparable to 2009 and subsequent years.

In 2017, the cost for winter control maintenance per lane kilometer decreased by 5.4%. Winter maintenance costs can vary significantly by year according to weather conditions and the type, severity and number of winter events, which are also shown on the chart. Toronto experienced 28 winter events in 2017, resulting in lower costs compared to the previous year.

28.11 - HOW DO TORONTO'S WINTER CONTROL COSTS COMPARE TO OTHER MUNICIPALITIES?



Chart 28.11 (MBNC 2017) Cost for Winter Maintenance of Roadways per Lane Km

Toronto ranks ninth of ten (fourth quartile) among the single-tier municipalities in terms of having the lowest cost for winter maintenance per lane km. Toronto clears windrows at the ends of driveways to residential properties in parts of the City (about 262,000 driveways at a cost of approximately \$4.0 million) where this is mechanically possible.

This is a service that perhaps only one or two other municipalities in Canada provide and contributes to Toronto's higher costs. Other factors contributing to Toronto's higher costs include narrow streets and on-street parking in sections of Toronto that affects the efficiency of plowing and can require snow removal, congestion on roads in Toronto that slows the speed at which plows, and salters can travel during storm events, and Toronto's enhanced standards. Winter events require a coordinated approach by the City's staff and contractors to ensure that City streets, sidewalks and cycling infrastructure are safe. More information about Toronto's Levels of Service for Winter Maintenance is available from the Citv's website.

The service standard for responding to weather incidents, and the volume and type of snow removal required due to population density, contribute to Montreal's higher cost.



Chart 28.12 provides Toronto's operating costs and total cost (operating cost plus amortization) per lane kilometre for maintaining paved roads (i.e., patching, surface repairs, utility cut repairs, sweeping, etc.).

Chart 28.12 (City of Toronto) Operating and Total Operating Cost of Paved Roads per Lane Km

Amortization costs are also shown as a separate stacked bars. More information is available in the Guide to Toronto's Performance Results. Starting in 2009, Toronto changed its method of measuring the length of roads from lane km. to equivalent lane km. Results of 2008 and prior years continue to be based on lane km. and therefore are not comparable to 2009 and subsequent years.

Toronto's operating costs to maintain its road surface increased by 13%, and total costs increased by 6%.

28.13 HOW DOES TORONTO'S COST OF MAINTAINING ROAD SURFACES COMPARE TO OTHER MUNICIPALITIES?



Chart 28.13 (MBNC 2017) Total Costs for Paved (Hard Top) Roads per Lane Km, and % of Roads Rated Good to Very Good

Chart 28.13 compares Toronto's total cost for paved roads per lane km to other municipalities, and are plotted as bars relative to the left axis. It should be noted that total cost is the combination of operating cost and amortization.

Toronto ranks fourth of ten (second quartile) among single-tier municipalities for total costs. The percentage of roads where the pavement quality has been rated as good to very good is also plotted, as a line graph relative to the right axis, to provide additional context.

Factors that could influence costs include:

- Traffic congestion and the amount of work done by utility companies on Toronto roads is significant, thereby accelerating road deterioration rates and requiring more frequent road maintenance at an additional cost.
- When road maintenance work is required in Toronto, expensive traffic management protocols, such as off-peak work, are followed to ensure motorists are not adversely affected during the period of road maintenance/repair.





28.14 - HOW MUCH DOES IT COST TO MAINTAIN TORONTO'S ROADSIDE?

provides Toronto's operating costs per edge kilometre for maintaining the City's roadside (i.e., roadside mowing, sidewalk maintenance, debris pickup, tree trimming, etc.).

Chart 28.14 (City of Toronto) Operating Cost of Roadside per Edge Kilometre

A large portion (61%) of the cost comes from tree trimming, which is delivered by Parks, Forestry & Recreation.

In 2017, the operating costs per edge kilometre for maintaining the City's roadside was relatively stable. Compared to the other MBNC municipalities, Toronto ranks fifth of five single-tier municipalities (fourth quartile) in terms of having the lowest operating cost for roadside per edge kilometer.



Chart 28.15 (City of Toronto) Operating Cost for Traffic Management per Lane Km

For 2017, operating costs per lane kilometre for undertake traffic management activities increased by 6.9 percent. Toronto ranks sixth of six single-tier municipalities (fourth quartile) in terms of having the lowest operating cost.

CUSTOMER SATISFACTION: CITIZENS FIRST (CF) SERVICE QUALITY SURVEY RESULTS

One way to measure satisfaction of a public service is through the use of surveys. The Citizens First surveys, conducted every 2 to 3 years by the <u>Institute for Citizen-Centred Services</u>, provides a comprehensive overview at how citizens view their government services.

Citizens First 8 (CF8) is the most recent survey and was conducted between December 2017 and February 2018. A total of 401 Toronto residents were surveyed in CF8. The final data are weighted for Toronto by age and gender. Based on this sample size, Toronto's results have a margin of error of $\pm 4.9\%$ for a result of 50% at the 95% confidence interval. However, data based on sub-groups is subject to a greater margin of error.

The Service Quality Score (SQR) relates to how Toronto residents rate their municipal services. Respondents were requested to provide a score on a 5-point scale where 1 means 'very poor' and 5 means 'very good'. In order to remain consistent with results from previous years, all the results are scaled from 0 to 100.

Rating	Very Poor				Very Good
	1	2	3	4	5
Score	0	25	50	75	100

The survey respondents were asked the following question: Please rate the quality of [*Municipal or regional snow removal services*]. If you did not use this service in the past 12 months, select 'Does Not Apply'.



28.16-WHAT IS TORONTO'S SERVICE QUALITY SCORE FOR MUNICIPAL OR REGIONAL SNOW REMOVAL SERVICES?

Chart 28.16 displays the Service Quality Score for Toronto's removal services. In CF8 (2018), Toronto's snow removal services scored 69 out of 100, an improvement from 64 in 2014.

Chart 28.16 (Citizen's First 7 and 8) Service Quality Score for Municipal or regional snow removal services



Well over half (64%) of all CF8 survey respondents who have received snow removal services in the past 12 months rated Toronto's snow removal services at a "4" or "5" on the 5-point scale.

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The survey respondents were also asked to rate the quality of [traffic management] in Toronto and results are presented in the Chart below.



Chart 28.17 displays the Service Quality Score for Toronto's traffic management. In CF8 (2018), Toronto's traffic management scored 58 out of 100, an improvement from 55 in 2014 results.

Chart 28.17 (Citizen's First 7 and 8) Service Quality Score for traffic management at the City of Toronto

In CF8, 46% of all CF8 survey respondents who have experienced traffic management in the past 12 months rated Toronto's traffic management at a "4" or "5" on the 5-point scale.

2017 ACHIEVEMENTS AND 2018 PLANNED INITIATIVES

The following achievements and initiatives have improved or are expected to further improve the efficiency and effectiveness of transportation and road operations in Toronto:

2017 Achievements

- Responded to 99% of Traffic Management Service Requests within established timeframes
- Continued the #StreetsTO awards program to recognize exceptional employee performance

Road & Sidewalk Management

- Developed a new Curbside Management Strategy
- Piloted deployment of motorcycle safety signs to warn motorcycles of safety hazards specifically relevant to them
- Provided an update to City Council on Complete Streets Guidelines
- Implemented the Framework for the Toronto Sidewalk Café Design Manual

Transportation Safety and Operations

- Increased the visibility of traffic control signals by installing reflective backboards at 11 new intersections
- Retimed 281 traffic control signals to improve traffic flow on priority corridors
- Worked with police on periodic enforcement blitzes to limit illegal stopping, parking and standing on key arterials and in the downtown
- Extended "No Stopping" hours in the downtown core on Dundas Street, Queen Street, and College/Carleton Streets
- As part of the implementation of the Congestion Management Plan:
 - o Installed 47 additional traffic monitoring cameras on key arterial routes
 - o Installed 68 Left Turn Blank Out signs for 17 intersections
 - Formally Regulated Existing Motorcycle & Scooter Parking Areas in Pay-and-Display Zones
- Monitored and Evaluated the Bloor Street Bike Lane Pilot Project
- Piloted patrolling shifts to respond to incidents on the Don Valley Parkway and F. G. Gardiner Expressway
- Initiated illegal curb lane occupation
- Started implementation of the Vision Zero Road Safety Plan:
 - o Installed Senior Safety Zones, Pedestrian Safety Corridors, and School Safety Zones



- Installed Permanent "Watch Your Speed" Signs
- o Doubled the number of Red Light Camera locations
- Increased Application of Durable Pavement Markings
 - o Refreshed new durable pavement markings, approximately 34,256 m
 - o Refreshed new durable symbols, approximately 113 locations
 - o Refreshed new enhanced (zebra bar) markings, approximately 206 locations
 - o Speed Limit Reduction Program: updated signal timings for 434 intersections
 - o Removed and replaced 581 speed control signs from 40km/hr to 30km/hr signs
 - Removed and replaced 251 speed control signs from 50km/hr to 30km/hr signs

Permits & Applications

• Introduced new fee for "Short Stream" permit applications by utility companies.

2018 Initiatives Planned

- Implement strategies to minimize lane closures due to construction through accelerated schedules, improved coordination, and more stringent permit timelines and enforcement;
- Continue to connect, grow, and renew the City's cycling infrastructure through the delivery of Year 3 of the 10 Year Cycling Network Plan;
- Provide safe streets for all road users through the implementation of Vision Zero Road Safety Plan;
- Continue to enhance the public realm through increased street furniture deployment, graffiti removal, street art installations and beautification of abandoned spaces;
- Use preventative maintenance techniques to improve infrastructure quality and extend lifespan;
- Implement acceleration of sidewalk and utility cut repairs;
- Continue to better manage congestion and improve safety through the Congestion Management Plan;
- Facilitate transfer of operations of the School Crossing Guard Program from Toronto Police Service to Transportation Services.

Factors Influencing the Results of Municipalities

Toronto

The results of each municipality included in this report can be influenced to varying degrees by factors such as:

- Capitalization Policy: Dollar thresholds for the capitalization of roads expenditures differ. In one municipality, an activity could be considered an operating expenditure while in another municipality, it could be considered as capital.
- Economic Conditions: Inflationary increases in the cost of asphalt, concrete, fuel and contract services can reduce the amount of maintenance done with a given level of funding.
- Level of Government: Single-tier municipalities will have arterial, collector and local roads and in some cases, expressways. Regional governments, on the other hand, will not have data relating to local roads included in their results.
- Maintenance Standards: Different standards, set by their respective municipal councils, can have an impact on costs and affect municipal backlog of roads rated in poor condition and general levels of service.
- Traffic Volumes & Urban Form: Traffic volumes can accelerate the rate at which roads deteriorate and increase the frequency and costs of road maintenance. Traffic congestion, narrow streets, additional traffic signals and after-hour maintenance can also lead to higher costs.
- Utility Cut Repairs: Cost of utility cuts can vary significantly from one year to another.
- Weather Conditions: Frequency and severity of weather events can impact operation and maintenance costs, each municipality's service threshold for responding to weather events and service standards for road conditions.