



# Winter Sidewalk Study

Tri-Cities Transport Action Group

January 2018

## Executive Summary

The City of Kitchener manages sidewalk maintenance in winter by requiring adjacent property owners to clear municipal sidewalks of ice and snow. This has raised concerns over inconsistent sidewalk conditions and poor enforcement. In 2016, city staff presented Council with a report comparing complaint volumes under the present system with estimated complaint volumes based on the experiences of other cities that themselves take on the responsibility to plow all sidewalks.

The Tri-Cities Transport Action Group (TriTAG) was concerned by the reliance on primarily complaint volumes to assess the efficacy of sidewalk clearing, as that metric fails to tell us useful information about the desired outcome of sidewalk maintenance: walking mobility. Consequently, we recruited volunteers in early 2017 to record sidewalk conditions on specific streets in Kitchener (and one in Waterloo) on selected dates over a number of weeks. Volunteers counted sidewalks and street corners where clearing of snow or ice was insufficient to allow safe access by someone with an unsteady gait or who uses a wheelchair. We also tracked snowfall amounts several days prior to each count date. (Thanks to an early thaw in late February, we were only able to track the state of sidewalks between January 29 and February 16.)

We found that the majority of streets tracked had at least one sidewalk clearing compliance issue during the course of the study, and most had several compliance issues that would hinder mobility. Even during counts where there had been no snowfall for the previous three days, we observed an average of 13 potential obstructions per kilometre of sidewalk - or one obstruction every 77 metres.

Using the data we collected, we modelled the probability of encountering obstructions when walking various distances for 10 cm, 5 cm, and no snow accumulation in the previous three days. In all cases, the probability of being obstructed along a very short walk of 50 metres exceeds 50%. The probability of obstruction on a 160 metre walk, the average walking distance to access transit, is greater than 80% in all cases.

From these findings, we conclude that the way we leave sidewalk clearing up to adjacent property owners fails us, especially our most vulnerable. Consequently, TriTAG is recommending that Kitchener adopt metrics that assess the mobility impacts of sidewalk policies, and that the city conduct a pilot program to more directly evaluate various sidewalk enforcement and plowing options.

# Table of Contents

<b>Executive Summary</b>	<b>1</b>
<b>Table of Contents</b>	<b>2</b>
<b>Introduction</b>	<b>4</b>
<b>Methodology</b>	<b>6</b>
<b>Results and discussion</b>	<b>9</b>
Comparison of snowfall to previous winters	11
Recency of snowfall	12
Implications for mobility	13
<b>Conclusions and Recommendations</b>	<b>16</b>
<b>Acknowledgements</b>	<b>17</b>
<b>Appendix: Sidewalk survey data</b>	<b>18</b>

***“Our use of data is subject to what we call the ‘drunk under the streetlamp’ problem: An obviously intoxicated man is on his hands and knees on the sidewalk, under a streetlamp. A passing cop asks him what he’s doing. ‘Looking for my keys,’ the man replies. ‘Well, where did you drop them?’ the cop inquires. ‘About a block away, but the light’s better here.’”***

[The limits of data-driven approaches to planning](#), CityObservatory

## Introduction

Walking is a basic human right. Kitchener's Pedestrian Charter recognizes this right, and seeks to ensure a consistent and safe environment for walking throughout the city.

Snow and ice in our winter climate can impede walkability, especially for those who experience challenges in mobility. Accommodating people's right to mobility in winter requires prompt clearing of snow and ice from sidewalks. The City of Kitchener's current policy leaves the majority of sidewalk clearing to adjacent property owners. With limited enforcement, this makes getting around on foot difficult, if not impossible for some, every winter.

In late 2016, the Kitchener Community and Infrastructure Services Committee was presented with a report by staff on winter sidewalk maintenance. The report aimed to review the city's sidewalk clearing policies and compare with the practices of other large municipalities.

The city report looked at current complaint levels and costs, along with estimates for costs and complaints if the city were to take a more active role in winter sidewalk maintenance. Absent from the report however, was any discussion of the efficacy of the current policy, or its alternatives, in guaranteeing the mobility of Kitchener residents. Given that mobility and safety are the underlying purpose of any sidewalk maintenance policy, this is a considerable oversight.

It is important that our metrics actually reflect the goals we want to achieve. Complaint volumes do little to inform us of whether the \$26.29 estimated cost per household for the city to plow sidewalks is worthwhile or not, nor do they enlighten as to how well the status quo is functioning.

Consider that complaints about uncleared walks are not accepted unless there have been 24 hours without snowfall, and follow-up can take days, if not weeks, discouraging people from reporting chronic offenders. Residents may be more likely to complain about a city plow than to tattle on their neighbours. Complaints about municipal plowing also include those concerning damage to sod or questions as to when your cul-de-sac will be visited while staff are busy clearing arterial routes.

To shed more light on the effectiveness of Kitchener's current winter sidewalk policies, in early 2017 the Tri-Cities Transport Action Group (TriTAG) sought to measure the conditions of the city's sidewalks. We recruited volunteers who counted instances of snow or ice on certain sidewalks and at street crossings over a number of weeks. From these counts we have constructed a snapshot of how well sidewalks are being cleared and what impact that might have on mobility. This report shares our findings.



## Methodology

TriTAG is run entirely by volunteers, and our study needed to be feasible and easy for volunteers to help conduct, while gathering enough information to be meaningful. We recruited 29 volunteers from both Kitchener and Waterloo.

We selected 12 streets in Kitchener (and one in Waterloo, due to volunteer interest) for study. We chose streets near groups of volunteers, to help ensure availability to measure on each study date. To ensure property widths were relatively consistent, only streets that were predominantly residential were picked. We classified streets as “central neighbourhood,” “suburban neighbourhood,” and “arterial.”

<b>Name</b>	<b>From</b>	<b>To</b>	<b>Sidewalk length (m)</b>	<b>Type</b>	<b>On transit route</b>
<b>Cherry St</b>	Park St	Raddatz Park	836	Central neighbourhood	No
<b>Courtland Ave</b>	Queen St	Cedar	1152	Arterial	Yes
<b>Frederick St</b>	Lancaster	Dunham	1300	Arterial	Yes
<b>Gildner St</b>	Park St	Eden	858	Central neighbourhood	No
<b>Guelph St</b>	Margaret	Arnold	1276	Central neighbourhood	No
<b>Highland Rd W</b>	Patricia	Queen’s Blvd	1190	Arterial	Yes
<b>Samuel St</b>	Chapel	Pandora	1130	Central neighbourhood	No
<b>Selkirk Dr</b>	Strasburg	Kingswood	1558	Suburban	No
<b>Waterloo St</b>	Peltz	Shanley	1142	Central neighbourhood	No
<b>Weber St E</b>	Krug	Stirling	1238	Arterial	Yes
<b>Wellington St</b>	King	Weber	1344	Central neighbourhood	No <sup>1</sup>
<b>Westwood Dr</b>	Inwood	Gallarno	830	Suburban	Yes
<b>John St (Waterloo)</b>	Mary	Moore	1056	Central neighbourhood	No

<sup>1</sup> Regular transit service on Wellington was detoured due to ION construction during the time of this study

We initially scheduled 10 counting dates, on Mondays and Thursdays, between January 30 and March 2. Due to unseasonably warm weather which melted all ice and snow, we were only able to complete the first 6 counts. Our volunteers were instructed to perform counts between 7-10pm on each date they had scheduled.

Our volunteers walked their assigned routes and counted the number of uncleared or icy sidewalks in front of properties. A sidewalk was considered to be cleared if it was even and non-slippery, such that a person in a wheelchair or an unsteady gait could potentially traverse without difficulty—even if not cleared to bare pavement. We also counted curb cuts at intersections along the route - both for crosswalks in the direction of the streets under study and in the direction of intersecting streets.

We calculated failure rates for each street and date as number of obstructions per kilometre, which was the sum of the uncleared properties and half the curb cuts, divided by the sidewalk distance. Only half of the curb cut obstructions are included in this figure due to the fact both parallel and perpendicular crosswalks were counted.





Photo credit: [simmogl on Flickr 2008](#). Licensed under [CC-BY-NC](#).

## Results and discussion

Due to the unseasonably early thaw in late February of 2017, we were only able to conduct meaningful counts on the first six dates. Out of 78 individual counts, only 5 were skipped by volunteers.

Aggregate results are presented in Figure 1. For all of the Kitchener streets studied, the combined (weighted by distance) obstruction rate ranged between 12 and 22 failures per kilometre. John St in Waterloo performed comparably to Kitchener streets, (as might be expected, since Waterloo shares similar policies to Kitchener) but this street has been excluded from the remainder of our analysis. (More detailed count results may be found in the Appendix.)

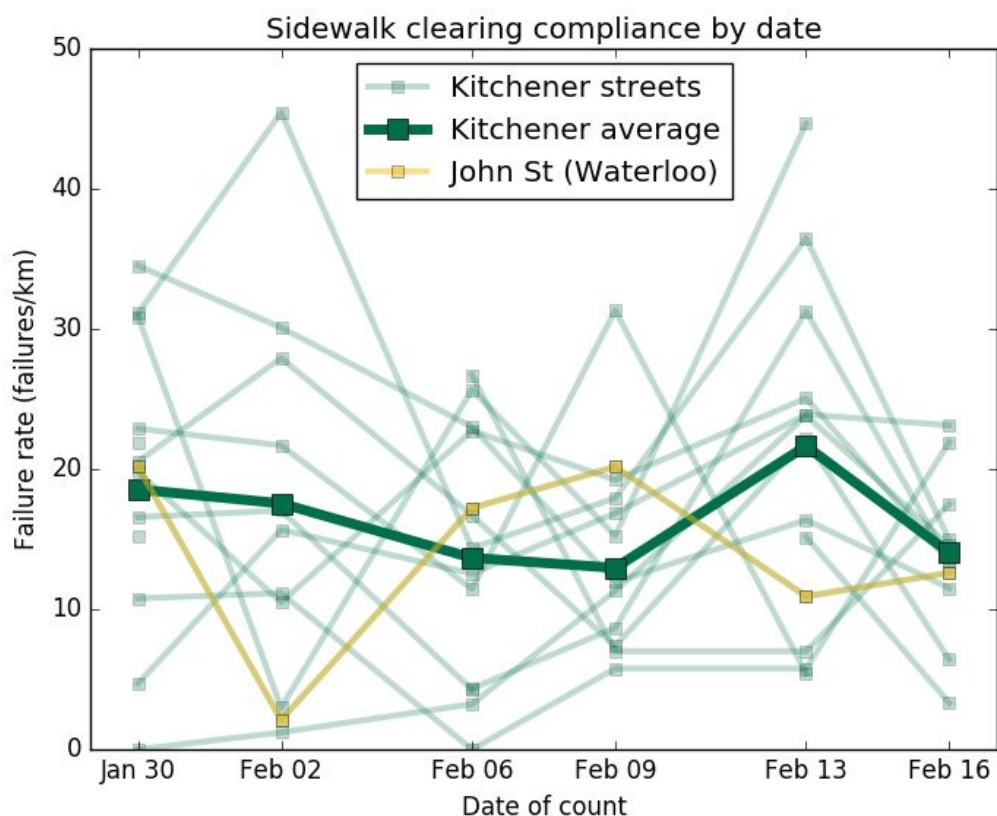


Figure 1: Overview of sidewalk clearing count results.

We found that the arterial streets we surveyed performed better than central neighbourhood streets, as shown in Figure 2. Suburban streets compared similarly to central neighbourhood streets on most dates, with the exception of the last two count dates (though Westwood Drive was missed on the 16th, which makes that result based on the compliance of Selkirk Drive alone). The greater compliance on arterial streets may be a reflection of their foot traffic and

visibility - social pressure and greater likelihood of complaints may prompt residents to shovel their walks more quickly. Streets served by transit routes also outperformed streets without transit routes (Figure 3).

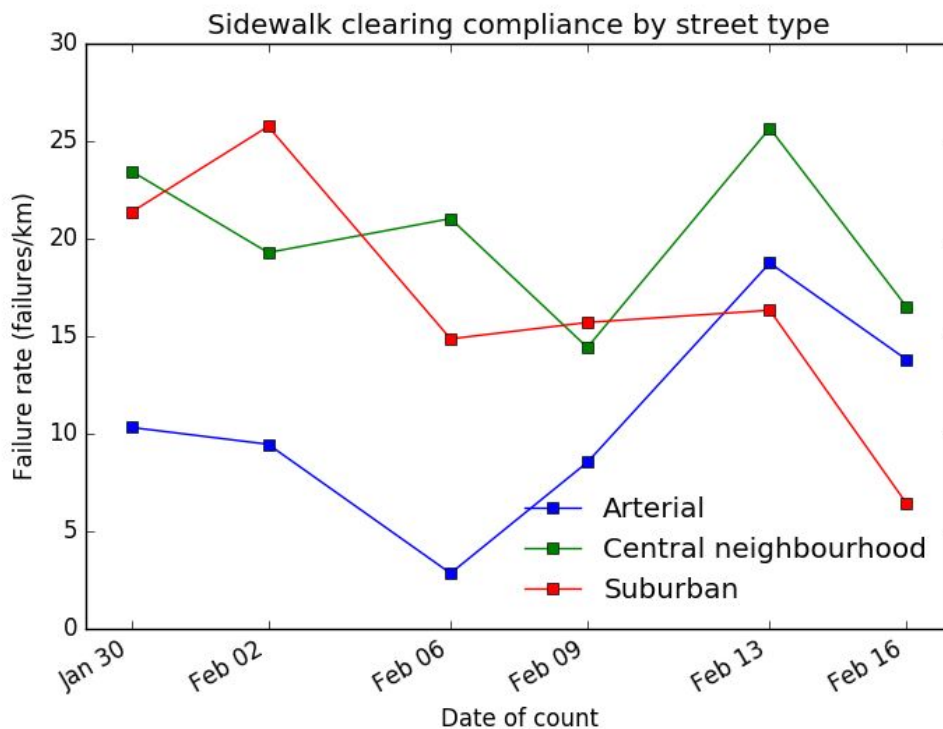


Figure 2: Sidewalk clearing compliance results by street type.

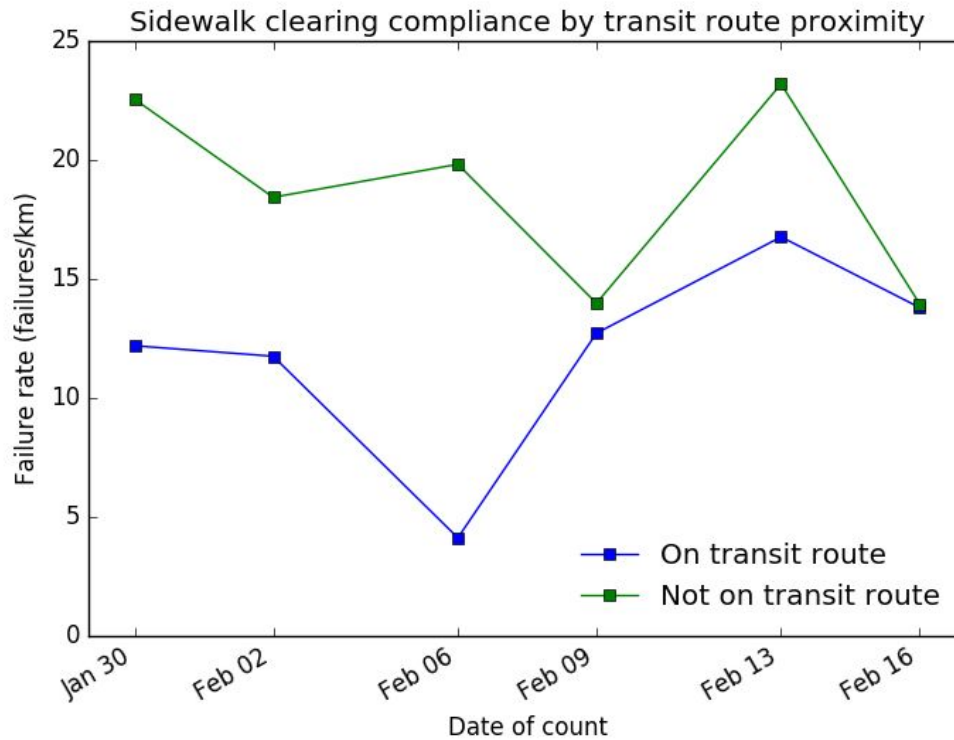


Figure 3: Sidewalk clearing compliance results by transit route proximity.

## Comparison of snowfall to previous winters

In order to put our results in perspective, we looked at snow accumulation from past winters dating back to 2002 to compare with 2017. Figure 4 shows snow accumulation for each year as found in the University of Waterloo weather station archives. During the study period, and the two weeks before and after, 2017 saw some of the lowest amounts of snow. Thus, we cannot attribute poor rates of compliance to a heavy snow-clearing burden on property owners.

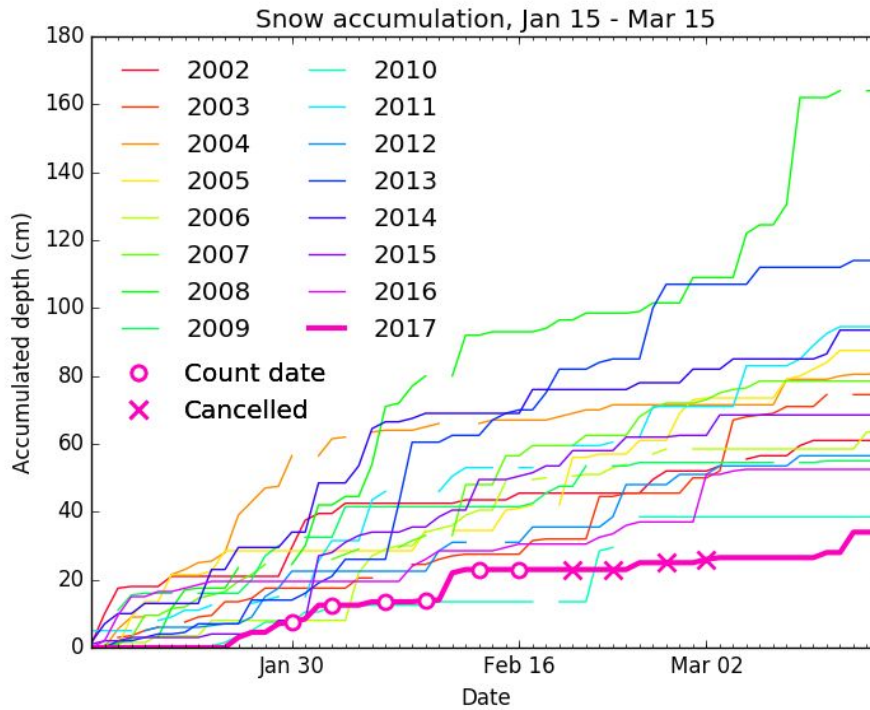


Figure 4: Accumulated snowfall by year.

## Recency of snowfall

We compared our findings with the snowfall rates during the preceding week of each count, and found that the state of the sidewalks we measured had the greatest correlation with the total cumulative snowfall from the previous 3 days. Figure 5 shows the relationship between recent snowfall and average sidewalk clearing compliance for Kitchener streets. While compliance worsens with greater snowfall, it is significant that we still observed an average of 13 instances of snow and ice per kilometre of sidewalk on dates with no snowfall for 3 days prior.

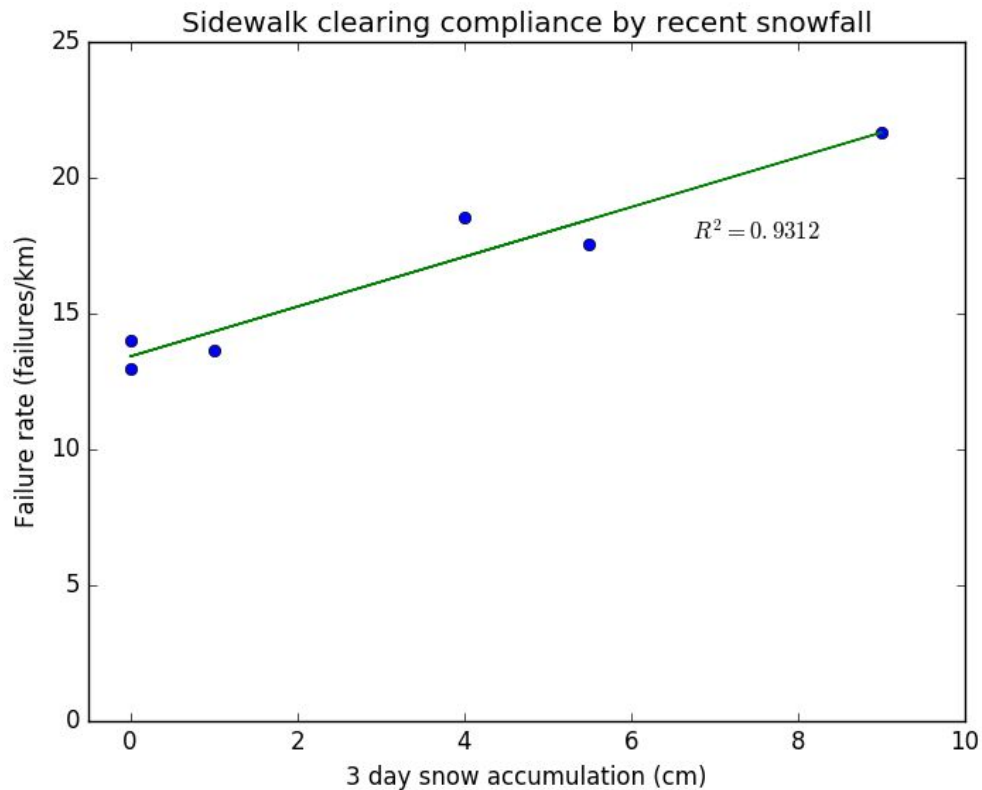


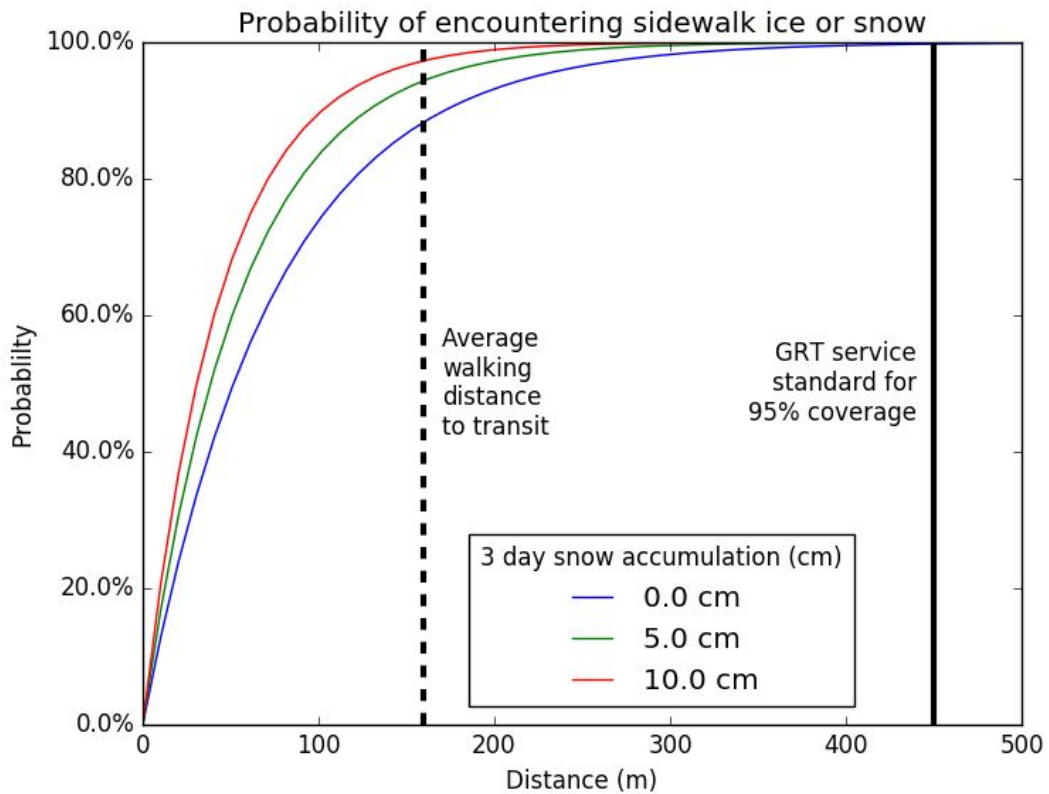
Figure 5: Sidewalk clearing compliance results by recency of snowfall.

## Implications for mobility

Using the relationship between amount of snowfall and snow clearing compliance we found in Figure 5, we modelled the probability of encountering ice or snow during a walk along a sidewalk as a Poisson process<sup>2</sup>. Figure 6 shows the probability of encountering ice or snow for the cases of 0, 5, and 10 cm snow accumulation in the preceding 3 days. In all cases, the probability of being obstructed along a very short walk of 50 metres exceeds 50%. The probability of obstruction on a 160 metre walk, the average walking distance to access transit for trips in the 2011 Transportation for Tomorrow Survey, is greater than 80% in all cases. For a walking trip of 450 metres, the 95% coverage service standard for Grand River Transit for a walking distance to transit, the probability of being able to avoid ice and snow is negligible.

<sup>2</sup> The Poisson Distribution is a mathematical model of a process where events occur randomly and independently of each other at some average rate. In this case, our rate is the number of failures per kilometre of sidewalk for a particular level of snow accumulation.





These findings confirm what GRAAC and others in our community have been telling us all along, that our present system of resident-led sidewalk clearing is failing to ensure safe and reasonable access to our streets and transit network during the winter.





## Conclusions and Recommendations

We've managed to take a snapshot of how well Kitchener's sidewalk clearing policies enable or hinder mobility. Based on our results, we've confirmed the experiences many have shared with us - that the odds of being able to walk around the block in winter without encountering uncleared snow or ice are pretty slim, even at the best of times. In short, the way we leave sidewalk clearing up to adjacent property owners fails us, especially our most vulnerable.

We would urge then, that the City of Kitchener explore better methods of keeping sidewalks accessible in winter. Two approaches the city could consider are more proactive enforcement of strengthened bylaws, and clearing sidewalks with city owned (or contracted) plows and sweepers.

Proactive enforcement would require having city staff routinely inspect sidewalks for compliance, rather than waiting for complaints to arrive, at which point someone's journey is likely already impeded. This would also help ensure that enforcement is consistent and not driven by spiteful neighbours or absent from neighbourhoods where awareness, language, or even access to phones make calling the city unlikely. At the same time, the bylaw could be strengthened with provisions that would mandate limits to accumulation before property owners must take action, so that even during several consecutive days of heavy snowfall, some maintenance is regularly taking place.

We already have an estimate of costs for municipal sidewalk clearing - an average \$26.29 per household per year. We recognize that even at this relatively low cost, there are some who would question whether city plowing of sidewalks would be as effective or responsive as the status quo. The fact is, in Kitchener, sidewalk plowing has not been tried and found wanting - it has merely been left untried.

We propose that Kitchener undertake a pilot study during the early months of 2018 and 2019. Three neighbourhoods would be selected: one would have its sidewalks plowed by the city (or its contractors), another would receive proactive enforcement of the sidewalk clearing bylaw, and the third would be a control and maintain the status quo. Sidewalks in each neighbourhood would be monitored in a manner similar to this study to determine the mobility afforded in each. Residents would be asked to complete surveys at the end of the study to gauge their satisfaction. With results from such a study, Kitchener Council would be better equipped to determine what is the best means of keeping sidewalks accessible in winter.

## Acknowledgements

TriTAG would like to thank the 29 volunteers who gave of their time to assist with measuring sidewalk conditions in their neighbourhoods. This study would not have been possible without their efforts and willingness to brave the snow and cold to help guide Kitchener to a more accessible future.

## Appendix: Sidewalk survey data

		Cherry St	Courtland Ave	Frederick St	Gildner St	Guelph St	Highland Rd W	John St	Samuel St	Selkirk Dr	Waterloo St	Weber St E	Wellington St	Westwood Dr
<b>Monday January 30</b>	Sidewalks	24	14	14	14	6	14	17	36	28	23	0	34	17
	Corners	4	7	0	6	0	7	14	6	8	4	0	15	4
<b>Thursday February 2</b>	Sidewalks	34		12	8	19	18	2	29	41		1	2	14
	Corners	8		5	2	2	0	1	10	5		1	4	8
<b>Monday February 6</b>	Sidewalks	12	5	0	18	16	4	16	21	24	29	4	31	8
	Corners	0	0	0	3	0	1	9	10	4	3	0	7	3
<b>Thursday February 9</b>	Sidewalks	14	10	6	15	21		21	12	10	6	13	15	25
	Corners	2	0	3	3	1		6	3	3	4	2	11	2
<b>Monday February 13</b>	Sidewalks	27	32	7	18	29	13	9	16	30	5	26	48	4
	Corners	7	8	1	7	3	6	8	5	9	6	7	24	1
<b>Thursday February 16</b>	Sidewalks	7	14	20	9	28	2	12	5	8	17	16		
	Corners	11	3	17	5	3	3	6	16	4	6	4		
<b>Monday February 20</b>	Sidewalks	Counts cancelled due to unseasonably warm temperatures between February 20 and March 2												
	Corners													
<b>Thursday February 23</b>	Sidewalks													
	Corners													
<b>Monday February 27</b>	Sidewalks													
	Corners													
<b>Thursday March 2</b>	Sidewalks													
	Corners													