

Transportation Innovation Challenge: Automated Sidewalk Winter Maintenance



Be part of the first
trial at Toronto's new
Transportation Innovation Zone!



Invitation to the Transportation Innovation Challenge

Are you developing new technologies to clear snow or apply salt to sidewalks? The City of Toronto is inviting you to join a first-of-its-kind Transportation Innovation Challenge at the City's new Transportation Innovation Zone at Exhibition Place in early 2021.



The Opportunity

By participating in Transportation Innovation Challenge, you will have the opportunity to:

- Access a real-world test environment in downtown Toronto
- Demonstrate your technology to the City, Exhibition Place, and the public, as well as potential investors, partners, and other cities (trials will be publicized)
- Benefit from face-to-face time and feedback about opportunities to improve your technology to meet municipal needs, with City staff from across our divisions (Transportation Services, Economic Development and Culture, Fleet Services, and more)
- Learn about the City's winter operations, our requirements for winter maintenance, and how your technology can be applied to meet those needs



New Transportation Innovation Zone

This summer, the City of Toronto and Exhibition Place announced the launch of a Transportation Innovation Zone at Exhibition Place, Canada's largest entertainment and business events venue, and a landmark destination on Toronto's western downtown and waterfront. At the Transportation Innovation Zone, we will host Transportation Innovation Challenges to learn about emerging solutions, support research and development, grow local economic activity and talent, and advance the City's mobility-related goals. This Automated Sidewalk Winter Maintenance Challenge will be the first Challenge, and will be used to pilot this approach at the City.



The Challenge: Can You Help Us Solve It?

The City is launching this Challenge to address a key concern in Toronto: clearing and salting sidewalks in winter. In older parts of Toronto, narrow sidewalks, obstructions and obstacles prevent the City's conventional, human-operated sidewalk plows from working safely, so about 1,000 km of Toronto's sidewalks on local streets are not mechanically cleared. Instead, property owners are responsible for clearing ice and snow from adjacent sidewalks.

Snowy and icy sidewalks compromise accessibility and prevent some Toronto residents from safely using the sidewalks for their daily activities, especially people who have mobility-related disabilities, seniors, and people with strollers or shopping carts.

We know that new, automated winter maintenance solutions are emerging that could address the challenge of sidewalk snow clearing and salting in those areas that are currently not serviced. We'd like to know whether these solutions could work for Toronto in the future, and we'd like to help industry design their solutions to meet Toronto's unique needs.

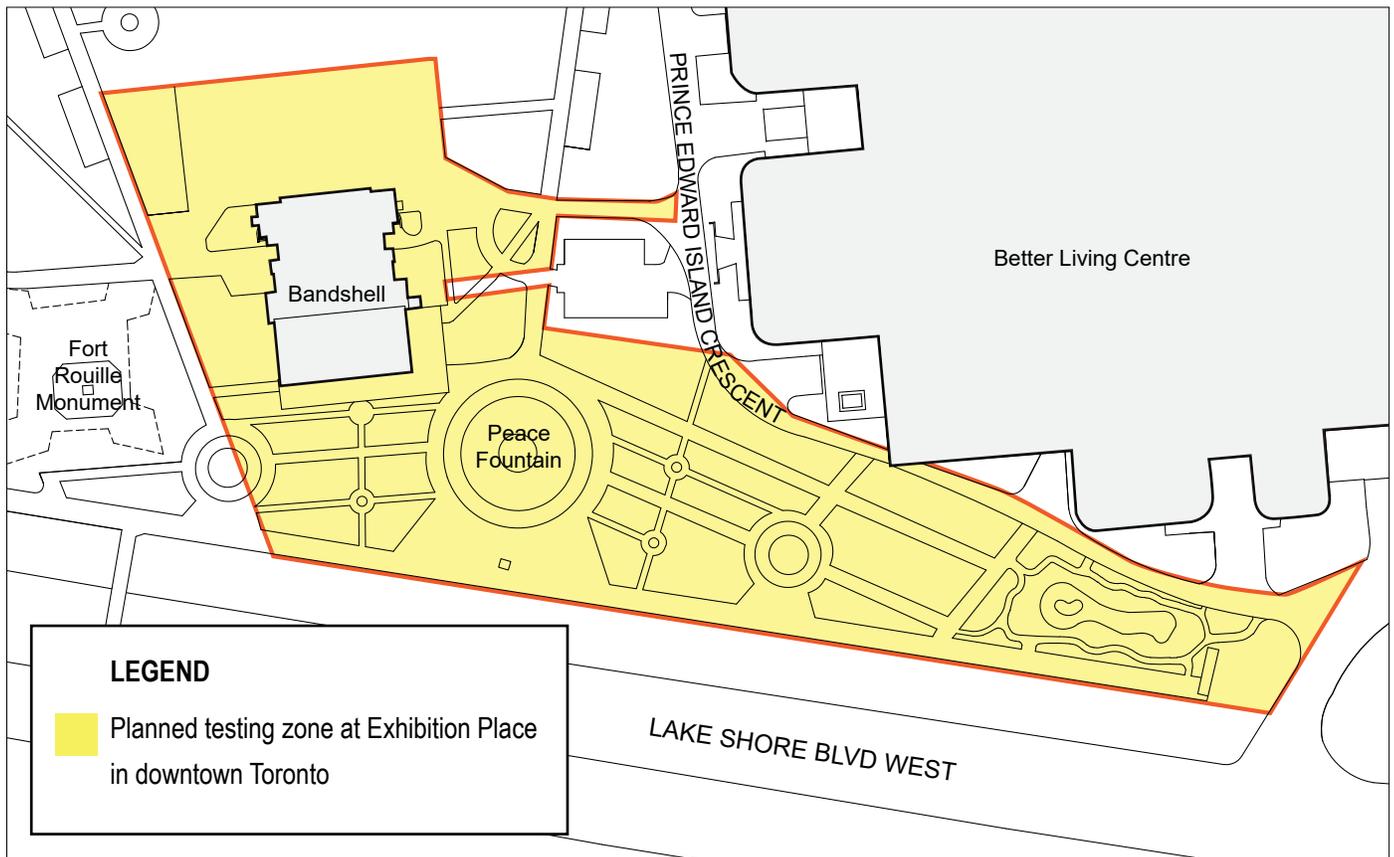


A full list of operations that the City is interested in seeing your technology conduct, now or in the future, is included as **Attachment 1**. (We know you might not meet all of these in a first trial, but we're providing this list to help guide developers in meeting our needs!)



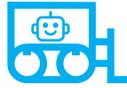
Testing Site

The Transportation Innovation Challenge will take place on the grounds of Exhibition Place, primarily in the southwest portion of the grounds, around the bandshell parking lot, the peace memorial, and a portion of Prince Edward Island Crescent adjacent to the Better Living Centre. This test site offers sidewalks with different pavement materials, different sidewalk turn angles and configurations; opportunities to cross the road; an outdoor parking lot for staging; and access to indoor storage space if requested.



The trial environment will be designed to replicate aspects of Toronto's existing sidewalks that are not currently mechanically cleared, or that are difficult to mechanically clear. The City and Exhibition Place will add additional equipment to the site (barriers, obstacles, etc.) to replicate various sidewalk configurations found in Toronto.

As a participant in the challenge, you will be invited to work with the City and Exhibition Place to identify which testing environments and configurations are most relevant for your technology at its current level of readiness. These will be incorporated into your trial plan.



How to Participate and What to Expect From the City

Step 1: Apply

To participate in the Automated Sidewalk Winter Maintenance Challenge, you first need to submit an application to the City by filling out the application form. There are some minimum requirements your organization will need to meet (**Attachment 2 and the Application Form**).

In response to your application, the City will follow up with you to discuss your application. Any organization that meets the minimum requirements will be invited to participate. This means that multiple organizations may participate.

Step 2: Trial Plan

Once your organization has been invited to participate, the City will work with you to create a trial plan to help you test and develop your technology within the Innovation Zone. Your trial plan will also identify which data and learnings you can share with the City, while protecting your Intellectual Property.

Step 3: Trial Activities

At a minimum, you will be invited to conduct testing activities during three to five weather events in February and March, 2021, covering a range of weather conditions. Testing activities will take place on weekdays between 8:00 a.m. and 5:00 p.m. You can also request additional self-directed testing days.

During the trials, your organization will have the opportunity to meet with City and Exhibition Place staff to learn about winter maintenance in Toronto and economic development programs offered by the City and other levels of government.

Step 4: Learning

During and after the trials, experts from the City and Exhibition Place will be available to give feedback on how you can further develop your technology to meet current and future City needs. Staff will also be observing the trials to learn about how the technology performs against the parameters outlined in **Attachment 1**.

After the trial, you will be asked to report on key metrics identified in your trial plan. The City will publish a report with aggregate results from all participants. You will also be asked to give the City feedback on the program and how it could improve.



Schedule

The schedule of events will be:

- Submit an application (by December 18, 2020 at 5pm Toronto time)
- Receive a response from the City (by January 15, 2021)
- Meet with the City and Exhibition Place, develop trial plan, sign Licence Agreement (by January 31, 2021)
- Conduct trial (February and March, 2021)
- Meeting with City and Exhibition Place to discuss lessons learned (by April 15, 2021)
- Share results with City (by May 31, 2021)



For any questions about the application process, please contact Fahad Khan, Project Lead, at fahad.khan@toronto.ca

Holodomor Monument Exhibition Place



We're Looking Forward to Working with You

We at the City are excited to launch this first, pilot version of our Transportation Innovation Challenges. We hope you'll apply to be a part of it.

Attachment 1: Proposed Testing Parameters

As a participant in the challenge, you will be invited to work with the City and Exhibition Place to identify which testing environments and configurations are most relevant for your technology at its current level of readiness. A full list of operations that the City is interested in seeing your technology conduct, now or in the future, is included below. (We know you might not meet all of these in a first trial, but we're providing this list to help guide technology developers in meeting our needs!).

Trials will be organized on days that offer a variety of weather conditions, including clear days and snow.

Navigation and automation:

1. Obstacles in path (known/permanent or "soft" obstruction – garbage containers, temporary construction signs)
2. Interaction with other road users
3. Large curve, 90 degree turn
4. Dead end
5. Different speeds
6. Navigating after first snow (lines in snow not visible)
7. Navigating on salt (especially, whether glare from melted salt affects visibility)
8. Crossing the road
9. Interpreting road signals and signs

Clearing snow/salting on different sidewalk configurations:

10. Narrow sidewalk, continuous width (less than 2.5m, less than 1.2 m)
11. Pinched pedestrian clearway due to known/permanent or "soft" obstruction
12. Monolithic sidewalk (no distance between sidewalk and curb/street), adjacent to: (i) general traffic lane, (ii) cycling lane, (iii) on-street parking
13. Grass along sidewalk (especially while not damaging grass)
14. Retaining wall along sidewalk (especially while not damaging the wall)
15. Different pavement surfaces (asphalt, cement, pavers, cracks)
16. Lane comparable to a cycle track (1.5-2.0m with curb, barrier or bollards on both sides)
17. Cycle lane (1.5-2.0m with no curb, barrier or bollards on one side)

Service approach:

18. Clears snow to a range of standards (e.g. bare pavement)
19. Communicates information (location, service completed, interactions, low salt, etc.) with an end user; nearby road users
20. Responds to a change in route (for example, navigating around a sidewalk closure)
21. Works in a configuration to clear and salt simultaneously

Performance:

22. How the technology performs against the City's Level of Service¹ for snow removal and salt application
23. How the technology interacts safely with other road users, particularly people with disabilities
24. How the technology avoids or minimizes the collection of personal information, protects privacy, and mitigates cyber security threats

City of Toronto, "SIDEWALK AND TRANSIT SNOW CLEARING LEVEL OF SERVICE TABLE 2019 – 2022" https://www.toronto.ca/wp-content/uploads/2019/12/93fc-TS_Snow-Table-3_Sidewalks_2019_2022.pdf

Attachment 2: The Fine Print

Eligible Organizations

All organizations (companies, non-profit organizations, academic institutions, etc.) looking to develop and test automated sidewalk winter maintenance technologies that meet the minimum requirements (see below) are welcome to apply.

Eligible Technologies

Automated sidewalk winter maintenance technologies are defined as technologies that can (a) clear snow and/or (b) spread salt while at the same time conducting some or all of the following aspects of the dynamic driving task without direct human assistance:

- (a) lateral vehicle motion control (steering)
- (b) longitudinal vehicle motion control (acceleration/deceleration)
- (c) monitoring the driving environment for navigation, obstacle detection, etc.
- (d) planning maneuvers and avoiding both static and dynamic obstacles
- (e) completing a pre-determined route for the purposes of winter maintenance

Applications may be made to test technologies ranging from lab-tested prototypes to commercial applications that have not yet been deployed in Toronto. Remote-controlled and teleoperated technologies will be accepted. If your technology has the potential to address our Challenge, but does not fit the criteria above, please contact us.

Procurement

These trials are not a guaranteed path to procurement at the City of Toronto. The City intends to learn how these technologies could help solve our needs in the future. Please note that participants in the Challenge will not receive any preferential treatment or consideration with respect to future procurements. Some alternative partnership opportunities, including for **unsolicited proposals**, exist through the **Toronto Office of Partnerships**.

Fees and funding

As a first trial in the Transportation Innovation Zone at Exhibition Place, there are no fees for application nor for use of the space at Exhibition Place, with the exception of indoor space upon request. The City is not offering funding to participants as part of the Challenge.

Minimum requirements

The minimum requirements to participate in the Automated Sidewalk Winter Maintenance trial are:

1. The applicant organization is incorporated or is a registered not-for-profit organization.
2. The applicant agrees to purchase and maintain, or cause to be maintained, and kept in force, at its sole cost and expense, for the duration of the Term, the policies of insurance outlined in the Application Form.
3. The applicant agrees to share trial results and observations with the City. Aggregate summaries of trial results (not specific to individual participants) will be posted publicly by the City to the **Open Data portal**.
4. The applicant agrees to undertake appropriate practices to protect privacy while testing in the public realm.

These minimum requirements will be reflected in the terms of the Licencing Agreement that participants will sign with Exhibition Place to participate in the trial. The final wording in the Agreement may be modified from the above, which is provided for information purposes.

Further details on each of these requirements is included in the **Application Form**.