



# Minding the Gap - Request for Authority to Receive Federal Funding for an Automated Shuttle Pilot Project

**Date:** June 25, 2018

**To:** Public Works and Infrastructure Committee

**From:** General Manager, Transportation Services and General Manager, Economic Development & Culture

**Wards:** All

## SUMMARY

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In September 2017, Transport Canada announced a Call for Proposals under the Program to Advance Connectivity and Automation in the Transportation System ("ACATS"), providing funding for supported activities including research and evaluation, development of codes and standards, as well as capacity-building and knowledge-sharing on connected and automated vehicles.

The City of Toronto's submission to ACATS has been selected, and the City is to receive up to a maximum of \$365,000 to fund the research and piloting of an automated shuttle service.

The purpose of this report is to obtain Council authorization for the General Manager, Transportation Services and General Manager, Economic Development & Culture to enter into the necessary agreements with Metrolinx, TTC and the Federal Government to advance this project.

The shuttle is intended to test the technology's ability to meet an existing unmet need in public transit, such as filling the lower-demand "last mile" gap. While the location of the pilot has not yet been selected, the shuttle will not be tested on an existing transit route.

A set of decision-making criteria will be established in mid-2019 to review potential locations for the pilot, determine the level of service, and to select a single route. It is anticipated that the pilot will operate for 6-12 months, depending on the number of vehicles required.

## RECOMMENDATIONS

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The General Manager, Transportation Services and General Manager, Economic Development & Culture recommend that:

1. City Council authorize the General Manager, Transportation Services to negotiate, enter into, and execute a memorandum of understanding with the Toronto Transit Commission and Metrolinx to secure their respective support, commitments, and obligations to deliver the "Minding the Gap" project generally in accordance with the terms and conditions set out in the report (June 25, 2018) from the General Manager, Transportation Services and the General Manager, Economic Development and Culture, and upon such additional terms and conditions satisfactory to the General Manager, Transportation Services, and in a form acceptable to the City Solicitor.
2. City Council authorize the General Manager, Transportation Services to negotiate, enter into, and execute an agreement with Her Majesty the Queen in Right of Canada, as represented by the Minister of Transport, including any associated Certificates as may be required, for the Program to Advance Transportation Innovation (Program to Advance Connectivity and Automation in the Transportation System) generally in accordance with the terms and conditions set out in the report (June 25, 2018) from the General Manager, Transportation Services and the General Manager, Economic Development and Culture, and upon such additional terms and conditions satisfactory to the General Manager, Transportation Services, and in a form acceptable to the City Solicitor.
3. City Council authorize the General Manager, Transportation Services to accept \$50,000 in federal funding for related expenditures in 2018 and increase the 2018 Operating Budget for Transportation Services by \$50,000 gross and \$0 net, on a one-time basis.
4. City Council direct the General Manager, Transportation Services and the General Manager, Economic Development and Culture to include the remaining \$315,000 in federal funding in their respective operating budget submissions for the year 2019-2022 as appropriate.

## FINANCIAL IMPACT

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The total project value for "Minding the Gap" is \$1.1531M including both cash and in-kind contributions. Funding from Her Majesty the Queen in Right of Canada, as represented by the Minister of Transport ("Transport Canada") totals \$365,000 over four federal fiscal years (April 1 to March 31 annually). Eligible expenditures incurred from April 1, 2018 to March 31, 2022 will be reimbursed by Transport Canada upon filing of a project report and financial claim. No costs have been committed, nor incurred, to date.

The City of Toronto's cash contribution totals \$60,000 for a portion of the lease of the shuttle vehicle(s), and is entirely within the 2020 calendar year. This amount will be requested by Transportation Services in its 2020 Operating Budget submission. An in-

kind contribution of staff time, vehicle storage, and other supports from the City is valued at \$224,100 over the project period (2018-2022).

Partner in-kind contributions are valued at \$252,000 each from Metrolinx and the Toronto Transit Commission. The \$50,000 in federal funding provided in 2018 will support baseline attitudinal research to be conducted by Ryerson University.

The Interim Chief Financial Officer has reviewed this report and agrees with the financial impact information.

## **DECISION HISTORY**

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At its meeting of January 31 and February 1, 2018, City Council requested the General Manager, Transportation Services to explore opportunities to enhance partnerships with other levels of government including other municipalities in the Greater Toronto and Hamilton Area, Province of Ontario, and across Canada to share strategies and develop best practices.

The Committee decision can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.PW26.4>

## **COMMENTS**

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In September 2017, Transport Canada announced a Call for Proposals under the Program to Advance Connectivity and Automation in the Transportation System (ACATS). Eligible applicants, including municipalities, could request up to \$500,000 for projects that may span up to four federal fiscal years, from April 1, 2018 to March 31, 2022. Supported activities include research and evaluation, development of codes and standards, as well as capacity-building and knowledge-sharing related to connected and automated vehicles.

The City of Toronto's application to ACATS was focused on automated vehicles, with a transit-centric approach as suggested in the Draft Automated Vehicle Tactical Plan 2019-2021, which was developed by the City's Interdivisional Working Group on Automated Vehicles. The Draft Plan was included for information in the January 5, 2018 report to Public Works and Infrastructure Committee entitled, "Preparing the City of Toronto for Automated Vehicles." Specific recommendations and a detailed and comprehensive Tactical Plan will be submitted to the Committee in 2019.

### *The Project, Partners, and Agreements*

The ACATS submission, known as "Minding the Gap," involves a partnership of the City of Toronto, Toronto Transit Commission ("TTC"), and Metrolinx to research and test an automated shuttle that can operate without a driver. The project is intended to provide exposure to and experience with this new type of vehicle for local transit operators the TTC and Metrolinx, and for the City's Transportation Services Division as the manager of the road-based transportation system. The pilot shuttle service will also allow the public to learn about these new vehicles and the potential type of service gap they could

fill. The University of Toronto Transportation Research Institute and Ryerson University School of Urban and Regional Planning will play a supporting role in assisting in the monitoring and evaluation of the shuttle service impacts and response. A full list of the project's goals and objectives are included in Attachment 1, with a description of the project in Attachment 2.

In order to access the project funding, an Agreement for Minding the Gap: Advancing Toronto's Transit System Through Automation (the "Agreement") must be executed by the City of Toronto with Transport Canada. The Agreement sets out the terms and conditions upon which Transport Canada will agree to provide the City with funding, based on the project proposal and related third-party contributions. This report seeks authority for the General Manager, Transportation Services, to negotiate, enter into, and execute the Agreement, including any Certificates pursuant to the Agreement, generally in accordance with the terms and conditions set out in the body of this report and Attachment 3, and upon such other terms and conditions satisfactory to the General Manager, Transportation Services.

In addition, this report seeks authority for the General Manager, Transportation Services, to negotiate, enter into and execute a Memorandum of Understanding with the Toronto Transit Commission as well as Metrolinx, generally in accordance with the terms and conditions set out in the body of this report and Attachment 3, and upon such other terms and conditions satisfactory to the General Manager, Transportation Services.

The participation of Ryerson University and The Governing Council of the University of Toronto, as evaluating partners, will be secured through agreements in accordance with current City authorities.

### *Economic Development*

As part of Minding the Gap, the Economic Development & Culture division will develop a plan to increase the attractiveness of Toronto as a global hub for the development of automated transit vehicle technology. The development of a needs assessment study for economic development will be completed by March 31, 2020. It will ensure that the City of Toronto remains at the forefront of research and development on connected and automated vehicle technology and transit-related issues by developing a plan to establish the necessary supply of talent to support this industry going forward.

### *Shuttle Vehicle and Operation*

Automated shuttles typically seat 8-12 passengers and are designed to travel in low-speed, low-volume environments. Most are electric-powered and operate at an automation level of four ("high automation"), as per the scale established by the Society of Automotive Engineers. While an on-board driver is not required to operate the vehicle, this pilot project will include "ambassadors" who will staff the vehicle at all times. These ambassadors will be paid staff by the TTC and Metrolinx, and forms the bulk of their contributions to the project. Automated shuttles have been demonstrated in numerous cities around the world, with more significant pilot projects in Las Vegas and

a number of European cities. The City of Calgary recently announced a pilot shuttle will launch to serve the Calgary Zoo.

The type of vehicle chosen for the "Minding the Gap" pilot will have to be an established shuttle model that has been tested in other jurisdictions. The RFI will gather the vehicle safety records from original equipment manufacturers, and inform the criteria to be included in the service RFP. From the reports of testing in North America, most collisions with automated vehicles result from human error by drivers in other vehicles.

In response, a communications and education campaign will be implemented prior to the launch of the shuttle service, with particular attention paid on the immediate area surrounding the pilot location. In addition, an automated shuttle "road show" will travel to various locations within the Greater Toronto and Hamilton Area for broader public education. While the shuttle is in operation, it will be monitored at all times by on-board ambassadors from the TTC and Metrolinx.

### *Shuttle Pilot Location*

The pilot shuttle service will be located within the City of Toronto, and connect to at least one rapid transit station (either TTC or GO Transit). The intention of the pilot is to fill an existing gap within the public transit system, such as linking two transfer points or solving the first-mile/last-mile challenge. It will not replace conventional service. The exact criteria for selecting a location will be determined following the completion of the request for information (RFI) and more fulsome understanding of the capacity, range limitations, and other specifications of the available commercial technology. It is anticipated that the shuttle will operate in a relatively low-speed, low-volume mixed traffic environment. The shuttle must comply with Ontario Regulation 306/15, Pilot Project - Automated Vehicles to the Highway Traffic Act in order to operate on a public highway; approval by the Registrar will be a requirement of the request for proposals (RFP) to original equipment manufacturers of shuttle vehicles.

## **CONTACT**

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## **SIGNATURE**

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Barbara Gray  
General Manager  
Transportation Services

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Mike Williams  
General Manager  
Economic Development & Culture

## **ATTACHMENTS**

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Attachment 1: Project Goals and Objectives  
Attachment 2: Detailed Project Description  
Attachment 3: Terms and Conditions for the Agreement with Transport Canada and  
MOU with Metrolinx and TTC

## **Attachment 1: Project Goals and Objectives**

1. Increase understanding and knowledge of the technical requirements to operate an automated shuttle.

A. Determine the technical specifications of automated shuttles currently available in the marketplace by March 31, 2019.

B. Test and measure the performance of automated shuttles against the technical specifications by February 28, 2022.

2. Increase understanding and knowledge of the administrative requirements to deliver service through an automated shuttle.

A. Determine location, projected travel demand, number of vehicles required, length of pilot, and related service scheduling by August 31, 2019.

B. Prepare supports and logistics required for establishing pilot shuttle service by August 31, 2020.

C. Determine automation and procurement opportunities and challenges by December 31, 2021.

3. Increase understanding and knowledge of the interaction of an automated shuttle in the transit and transportation system.

A. Launch shuttle service by September 1, 2020 for a pilot term of between six and 12 months.

B. Observe, monitor, and evaluate the interaction between automated shuttles and existing traffic control devices (e.g. signs, pavement markings, traffic signals) by December 31, 2021.

C. Observe, monitor, and evaluate impacts of interactions with other vehicles by December 31, 2021.

4. Increase understanding and knowledge of human response to an automated shuttle.

A. Survey and assess baseline opinions for panel customer survey by August 31, 2020. Survey and assess post-launch opinions of same customers between three to six months after launch. Survey and assess post-pilot opinions of same customers by September 30, 2021.

B. Survey and assess baseline opinions for panel community/stakeholder survey by August 31, 2020. Survey and assess post-pilot opinions of same community/stakeholders by September 30, 2021.

C. Survey and assess baseline opinions for "on-board ambassadors" by April 30, 2020. Survey and assess post-training, pre-launch opinions of same

ambassadors by August 31, 2020. Survey and assess post-launch opinions between 3-6 months after launch. Survey and assess post-pilot opinions by September 30, 2021.

5. Increase understanding and knowledge of the value of an automated shuttle service in the transit and transportation system.

A. Assess impacts on ridership growth/satisfaction from automated shuttles by December 31, 2021.

B. Conduct cost-benefit analysis of automated shuttle service and determine where this form of transit can be optimized by December 31, 2021.

6. Increase public support for the use of innovation in the public transit system.

A. Survey and assess baseline public attitudes toward vehicle automation by March 31, 2019. Survey and assess post-pilot public attitudes by December 31, 2021.

B. Promote the shuttle pilot service and project results through communications and public engagement by February 28, 2022.

7. Develop a plan to increase the attractiveness of Toronto for investment in the development and export of automated transit vehicle technology.

A. Develop a strategy to attract the automated transit and related industries to Toronto by March 31, 2020.

8. Provide leadership in automated vehicle preparedness at the municipal level through knowledge transfer and exchange.

A. Disseminate information gathered and lessons learned through exchange with at least 250 peers by March 31, 2022.



## **Attachment 2: Detailed Project Description**

### *Stage 1: Set-up, Exploration, and Learning (April 1, 2018 - March 31, 2019)*

After assembling the project team and establishing research agreements with university partners, the City of Toronto will need to build its knowledge on the various types, specifications, and needs of this disruptive technology. The first major activity for the City will be to research and prepare a request for information to the automated transit industry in the fall of 2018, with an anticipated launch in January 2019. This RFI will enable the City to gain an understanding of the available models of this technology, as well as its various operational needs.

The City of Toronto's request for information will facilitate capacity-building within the project partners regarding the procurement, development and implementation of this technology. In addition, it will bolster the City's understanding of the safety concerns, cybersecurity issues, environmental impacts, and potential equity benefits from these automated shuttles, and more broadly, in the surface transportation system. A knowledge transfer and exchange (KTE) will follow the RFI, and will assist in enhancing the transportation sector in the GTHA.

Concurrent with the RFI, Ryerson University will conduct a baseline survey of public opinion related to automated vehicles. The survey will be statistically significant for each region or single-tier city in the Greater Toronto and Hamilton Area. The questionnaire will build off of a similar exercise conducted by Ryerson in late 2016. Where possible, results from the two surveys will be compared to measure changes over the two-year period.

### *Stage 2A: Service Planning and Procurement (April 1, 2019 - March 31, 2020)*

Once the City has gathered information from the automated transit industry, the administrative considerations and further procurement of the shuttle can begin. Metrolinx, TTC and the City will be able to determine the criteria to recommend the location of the pilot and determine projected travel demand, number of vehicles required, the length of the pilot, and related scheduling for this service.

The City of Toronto will issue a request for quotations (RFQ) or request for proposals (RFP), depending on the complexity of the procurement, no later than January 2020, with vendor selection scheduled for March 31st, 2020.

### *Stage 2B: Economic Development Strategy (April 1, 2019 - March 31, 2020)*

The City of Toronto's Economic Development and Culture division will develop a plan to increase the attractiveness of Toronto as a global hub for the development of automated transit vehicle technology. This strategy will contribute to the competitiveness of Canada and its transportation system by enabling transport-sector innovation in a leading municipality.

The development of a needs assessment study for economic development will follow the RFI and gathering information on the automated transit industry, and will be

completed by March 31, 2020. It will ensure that the City of Toronto remains at the forefront of research and development on CAV and transit-related issues by developing a plan to establish the necessary supply of talent to support this industry going forward.

*Stage 3: Service Preparation (April 1, 2020 - August 31, 2020)*

This stage sets the baseline for the shuttle launch, including initial surveys of the on-board ambassadors (operators) who will staff the shuttles, community stakeholders, and transit riders. It also involves all the logistical preparations for the shuttle service, such as storage and charging access. Communications materials will also be developed for use during the service launch.

*Stage 4: Service Launch  
(September 1, 2020 – March 31, 2021 or August 31, 2021)*

On or around September 1st, 2020, the Toronto Transit Commission, Metrolinx, and the City of Toronto will soft-launch the automated shuttle service in Toronto. The initial weeks of the shuttle pilot will be utilized to test cybersecurity risks on the automated shuttle. When the shuttle is deployed for service to the public, it will connect to a rapid transit station and fulfill an existing transit gap. A "road show" allowing people to interact with a demonstration shuttle will also be implemented across the GTHA.

*Stage 5: Evaluation (April 1, 2021 - February 28, 2022)*

To assess the success of this pilot from both a user perspective, as well as a technical perspective – extensive evaluation, monitoring and training will be conducted throughout the length of this project. The City of Toronto and its transit provider and post-secondary partners (the University of Toronto and Ryerson University), will be assisting and conducting evaluation regarding the response by on-board ambassadors (operators), shuttle riders, drivers interacting with the shuttle, the local community, GTHA residents, and technical observations.

*Stage 6: Knowledge Transfer and Exchange (KTE)*

The final major activity of Minding the Gap will be an extensive knowledge transfer and exchange aspect to ensure that the City is providing leadership in automated vehicle preparedness at the municipal level. Each goal of the City's project provides a different level of knowledge dissemination that is valuable for many groups within Canada.

In addition, the City will provide information on the lessons learned from automated vehicles operating in mixed traffic. These lessons include: its interaction with traffic control devices, and traffic itself (other vehicles). This information will be disseminated to project partners, and other municipal transportation.

**Attachment 3: Terms and Conditions for the Agreement with Transport Canada and MOU with Metrolinx and TTC**

<i>Term</i>	<i>Contribution Agreement with Transport Canada</i>	<i>Memorandum of Understanding with TTC and Metrolinx</i>
End Date	March 31, 2023	March 31, 2023
Final Claim Date	June 30, 2022; Transport Canada will not pay any claims submitted after the final claim date unless otherwise accepted by Transport Canada; and will not pay any claims until the requirements under the applicable Schedule to the agreement are complied with.	N/A
Project Completion Date (meaning the date by which all funded activities of the project under the agreement need to be completed)	March 31, 2022	March 31, 2022
Upset Funding Limit of Eligible Expenditures	Funding of not more than 100% of total eligible expenditures up to \$365,000; Transport Canada may reduce or terminate funding.  If the City requests that an amount to be paid by Transport Canada in a particular fiscal year of the project be re-allocated, and such re-allocation is not approved, Transport Canada may reduce the amount of funding by the re-allocation amount.	N/A
Project Partner Contributions	Estimated at \$60,000 in cash and \$224,100 in in-kind support from the City of Toronto.	Estimated at \$252,000 for each of TTC and Metrolinx.

<i>Term</i>	<i>Contribution Agreement with Transport Canada</i>	<i>Memorandum of Understanding with TTC and Metrolinx</i>
Project Activity Reporting	Twice yearly progress reports are to be filed with accompanying claims for contribution funding.	Twice yearly activity reports to be filed in accordance with City of Toronto's progress reporting obligations to Transport Canada.
Contribution Exceeding 100% of Project Costs	<p>If Transport Canada's contribution toward the project is more than 100% of the project's total eligible expenditures or if the total financial assistance received by the City in respect of the project is more than 100%, then Transport Canada can recover the excess from the City or reduce its contribution to the City by an amount equal to the excess.</p> <p>Any amounts due and owing by the City to the federal Crown is recognized as a debt due to the federal Crown and may be set-off by Transport Canada against any moneys payable by Transport Canada under the Agreement.</p>	N/A
Contribution Holdback	Transport Canada may withhold up to 10% of its contribution towards eligible expenditures.	N/A
Auditing	Transport Canada has audit rights.	City of Toronto has audit rights solely to the extent required to meet its obligations to Transport Canada.
Project Communications	The Parties will comply with a Communications Protocol as attached to the agreement; basic information on the project must be developed by the City in both official languages.	The Parties will comply with a Communications Protocol in accordance with the City of Toronto's obligations to Transport Canada.

<i>Term</i>	<i>Contribution Agreement with Transport Canada</i>	<i>Memorandum of Understanding with TTC and Metrolinx</i>
Project Intellectual Property	All intellectual property that arises in the course of the Project will vest in the City of Toronto.	Intellectual Property terms will be negotiated.
Default or Inability to Complete the Project	<p>In the event of default, Transport Canada may suspend or terminate any obligation to contribute, including any obligation to pay any amount owing prior to such date, may terminate the Agreement, and may require the City to reimburse Transport Canada all or part of the funds paid.</p> <p>If, at any time during the term of this Agreement, one or all of the Parties determine that it will not be possible to complete the Project for any reason, the Party will immediately notify the other Party of that determination and Transport Canada may suspend its funding obligation. The Recipient will, within thirty (30) business days of a request from Transport Canada, provide a summary of the measures that it proposes to remedy the situation.</p>	<p>In the event of default, the City of Toronto may terminate the MOU with the defaulting organizations or with all parties.</p> <p>If, at any time during the term of this MOU, one or all of the Parties determine that it will not be possible to complete the Project for any reason, the Party will immediately notify all other Parties of that determination.</p>

<i>Term</i>	<i>Contribution Agreement with Transport Canada</i>	<i>Memorandum of Understanding with TTC and Metrolinx</i>
Liability and Indemnity	<p>A limitation of liability clause in favour of Transport Canada.</p> <p>A broad indemnity in favour of Transport Canada, including that the City will indemnify and save harmless Transport Canada, its officers, servants, employees, or agents, from and against all actions, claims, demands, losses, costs, damages, suits or proceedings, whether in contract, tort (including negligence) or otherwise.</p>	The liability and indemnity terms will be negotiated.
Disposal	<p>The City will not dispose of any real or personal property or immovable or movable asset acquired, purchased, constructed, rehabilitated or improved, in whole or in part, with funds contributed by Transport Canada under the agreement prior to March 31, 2023 unless the City has first notified Transport Canada in writing and Transport Canada consent's to the disposal.</p> <p>Unless Transport Canada's consent has first been obtained, any alternate use or disposal of any assets, which includes selling, leasing and encumbering directly or indirectly, the City may be required to reimburse Transport Canada in whole or in part an amount of the funds paid by Transport Canada to the asset under the agreement.</p>	N/A
Certificates	Certificates of compliance for progress claims and for final claim will be required.	N/A

<i>Term</i>	<i>Contribution Agreement with Transport Canada</i>	<i>Memorandum of Understanding with TTC and Metrolinx</i>
Project Governance	The Parties will establish an Agreement Monitoring Committee of two (2) members, including one Federal Co-chair, and one City of Toronto Co-chair, to administer and monitor this Agreement.	The Parties will establish a Project Steering Committee of three (3) members, including one City of Toronto member and one member from each of TTC and Metrolinx, to oversee the project activities and monitor this MOU.