TORONTO

# STAFF REPORT
# ACTION REQUIRED

# On-Street Electric Vehicle Charging Stations - Pilot Project

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| **Date:** | May 24, 2012 |
| **To:** | Public Works and Infrastructure Committee |
| **From:** | Acting General Manager, Transportation Services |
| **Wards:** | Ward 20 – Trinity Spadina<br>Ward 27 – Toronto Centre-Rosedale |
| **Reference Number:** | P:\2012\Cluster B\TRA\TIM\pw12016tim |

## SUMMARY

Transportation Services, working with the Toronto Environment Office (TEO) and the City's "Electric Vehicle Staff Working Group", is recommending the installation of five curb-side electric vehicle (EV) charging stations within the public right-of-way as part of a one-year pilot study. Funds for the procurement, installation and operation of these charging stations, estimated to cost approximately $65,000.00, will be provided through a grant from the Toronto Atmospheric Fund (TAF). This report outlines the financial, regulatory and technical issues associated with this pilot project.

Increasing fuel costs and more stringent government fuel efficiency regulations are driving growing investment by car manufacturers in the production of EVs. The Nissan LEAF, Mitsubishi i-MIEV, Chevrolet Volt and Mercedes Smart For Two are four examples of EVs available to the public. By 2015, it is forecast that over 40 electric vehicle models could be available on the market. As a result, it is forecast that the EV market share will expand five-fold by 2020.

Municipalities across North America and Europe are now grappling with the impact this significant shift in transportation technology could have on the existing infrastructure and services provided to business and residents. The proposed pilot is intended to inform such aspects as the feasibility and rationale of providing on-street EV charging; space selection and operational criteria; revenue opportunities; regulation and enforcement.

Should this pilot project be approved by City Council, Transportation Services would submit a further report to the Toronto and East York Community Council recommending the traffic and parking by-law amendments required to implement these curb-side charging stations. Following installation, staff will monitor and evaluate the pilot project and report back to the Public Works and Infrastructure Committee with its findings.

## RECOMMENDATIONS

**The Acting General Manager, Transportation Services recommends that:**

1. City Council approve a one-year pilot project to provide curb-side charging stations for electric vehicles (EVs), generally as described in the report dated May 24, 2012 from the Acting General Manager, Transportation Services;

2. City Council approve an increase in the 2012 Approved Operating Budget for Transportation Services for the "On-Street Electric Vehicle Charging Station Pilot Project" by $65,000.00 gross, funded from the Toronto Atmospheric Fund grant in the same amount, with no debt impact;

3. City Council authorize the Acting General Manager, Transportation Services to enter into and execute an agreement with the Toronto Atmospheric Fund on terms and conditions satisfactory to the Acting General Manager, Transportation Services, for grant funding for the EV pilot project in the amount of $65,000.00;

4. City Council authorize the Acting General Manager, Transportation Services to negotiate the terms and conditions and enter into and execute an agreement with Toronto Hydro on terms and conditions satisfactory to the Acting General Manager, Transportation Services, including any provision that the City provide an indemnification, to facilitate the connection of the EV charging stations to the Toronto Hydro power grid;

5. City Council authorize the City Solicitor, in consultation with the Acting General Manager, Transportation Services, to amend the appropriate by-laws to create the necessary prohibitions related to the use of an EV-designated space by non-EVs and by EVs not actively connected to the charging station;

6. City Council authorize the City Solicitor, in consultation with the Acting General Manager, Transportation Services, to amend the appropriate by-laws to establish a fixed fine of $60.00 for any new offences created by Recommendation No. 5 above;

7. City Council authorize the City Solicitor, in consultation with the Acting General Manager of Transportation Services, to make application to the Senior Regional Justice of the Ontario Court of Justice to establish set fines and that the amounts requested be equal to the fixed fine amount outlined in Recommendation No. 6 above;

8. City Council request the Acting General Manager, Transportation Services to report back to the Public Works and Infrastructure Committee with an evaluation of the one-year pilot program, that would include a discussion of the following issues associated with the placement and operation of an EV charging station:

    a. Charging station procurement and installation;

b. Parking space selection criteria and considerations;
c. Operational issues, including electricity usage and space utilization and enforcement;
d. Revenue generation opportunities;
e. Regulations and enforcement matters associated with designating a new class of vehicle to park on the road including the required creation of new related parking offences;
f. Outreach to the owners of electric vehicles and the manufacturers of electric vehicles to advise that these new spaces are available; and
g. Required signage and pavement markings.

9. City Council authorize and direct the appropriate City officials to take the necessary action to give effect to Recommendations 1, 5 and 6, including the submission of the necessary by-laws.

### Financial Impact

A Toronto Atmospheric Fund grant in the amount of $65,000.00 will fund all costs associated with the On-Street Electric Vehicle Charging Station pilot project, with no net impact to the Transportation Services Division Operating or Capital budgets. This will cover the costs associated with procuring, installing and operating Electric Vehicle (EV) charging stations curb-side, as well as all associated signage and pavement markings to properly delineate the designated EV on-street parking areas, and energy costs.

One of the five recommended EV parking spaces is located within an existing Toronto Parking Authority pay-and-display on-street parking space. Although EV operators using this charging station will still be subject to the pay-and-display parking rates, the utilization of this space over the course of the one-year pilot project is expected to be less than the current utilization. As a result, there could be a loss in revenue, projected to be in the order of $3,100.00. The Toronto Parking Authority has been consulted, has been advised of this potential loss in revenue and is supportive of the proposal.

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

## ISSUE BACKGROUND

With the sale of electric vehicles (EVs) expanding rapidly, and the support of Federal, Provincial and State governments across North America through various initiatives, incentives and policies, the City of Toronto is faced with the challenge of how and where to best accommodate their increasing presence on-street and the need to facilitate their re-charge 'fill-up'.

The City of Toronto established the Electric Vehicle Working Group (EVWG) in 2010. This inter-agency working group, co-chaired by the Toronto Environment Office and the Toronto Atmospheric Fund, is comprised of staff from ten (10) City Agencies, Divisions (including Transportation Services) and Corporations and three (3) Provincial Ministries.

The EVWG recognizes that support for EV technology on-street will address a growing market segment, and assist the City in achieving its goals of reducing local smog and greenhouse gas emission.

## COMMENTS

### Electric Vehicles (EVs) Defined

In general, an EV is powered partially or wholly by electricity. For the purpose of the pilot project, the two categories of EVs that will be considered are those equipped with Level II charging capability rated for up to 240 volts. They include the following types:

1. Battery Electric Vehicles (BEVs) are powered 100% by the battery energy storage system available on board the vehicle. There is no internal combustion engine in a BEV. Refuelling the BEV is accomplished by a connection to the electrical grid. The Nissan LEAF and Mitsubishi i-MIEV are examples of BEVs that are currently being marketed to Toronto consumers. While electric scooters and electric bicycles are also, by definition, considered BEVs, this report does not include a discussion on electric bikes, electric scooters and power assisted bikes.

2. Plug in Hybrid Electric Vehicles (PHEVs) are powered by two energy sources. The typical PHEV uses a battery as well as an internal combustion engine (ICE) powered by either gasoline or diesel. PHEVs have bigger batteries than hybrid electric vehicles and therefore, can operate at higher speeds and for longer distances without the use of the internal combustion engine. The Chevrolet Volt is an example of a PHEV that is currently being marketed to Toronto consumers.

For the purpose of this report, BEVs and PHEVs are referred to collectively as "electric vehicles (EVs)", namely, those vehicles that use electricity as their primary energy source.

### The Increasing Availability and Growing Popularity of EVs

Increasing fuel costs and government fuel efficiency regulations have contributed to the growing investment by car manufacturers in the production of EVs. In addition to the BEVs and PHEVs identified above, it is forecast that additional models will soon be available from Toyota, Ford, Renault, Honda, Fiat and Volvo, among others.

By 2015, it is forecast that over 40 electric vehicle models could be available on the market. As a result, it is forecast that the EV market share could increase from less than one percent currently to potentially five percent in 2020. With this increased EV availability, combined with financial purchase incentives, the popularity of EVs is increasing in the City of Toronto, relying on a small but growing network of charging stations. Convenient access to charging stations is a prerequisite for potential purchasers of electric vehicles. Although much charging is expected to take place at homes and workplaces, local travel and unscheduled trips will require access to charging stations in public places.

**EV Charging Station Procurement**

An RFP will be developed and issued to purchase and install charging infrastructure units to be used within the public right-of-way. These units would either be attached to existing hydro/utility poles (i.e., pole mounted) with power typically accessed from overhead wiring, or in the form of a bollard style unit placed curb-side with power accessed from underground. Examples of the different types of charging stations are included in Appendix A.

The units to be secured will be Level II (fast) charging stations. These 240 Volt systems can typically fully recharge an EV in 2 to 8 hours depending on the electrical capacity of the vehicle. This type of system is desired as it allows for rapid charge and rapid turnover of the few on-street spaces that will be made available. In addition, such a fast charge would allow an EV pay-and-display parking space user to get a full or substantial charge on their EV while not exceeding the time limit of their parking machine ticket or the city-wide default three-hour maximum parking restriction.

The City's legal ability to charge for electricity usage at the EV parking space in the future will be examined and explored as part of the pilot project. In the meantime, the units being sought are expected to allow for payment processing of combined parking space and electricity usage while EVs are connected. Having charging units with this combined capability allows for the future opportunity to recover all costs associated with an EV parking space. This capability will be examined in greater detail during the procurement process, and obtaining the desired units will depend on what is available on the market. During the one-year pilot period, the cost of the electricity usage is estimated to be in the order of $300 per charging unit. The cost of the units and their operation will be funded by the grant monies that will be provided by TAF.

Although the consumer will not be charged for electricity usage during the pilot, charging for electricity use at on-street EV charging stations would represent a new revenue opportunity for the City and is recommended that it be explored in further detail and reported on as part of the post-pilot evaluation report.

**Choosing Curb-side EV Charging Station Locations**

The selection of candidate sites for the placement of EV charging stations included the following considerations:

- **Downtown core:** A location in the downtown area not far from City Hall would aid the monitoring of the chosen site(s) and would be most likely to generate higher utilization of the EV charging stations during the pilot.

- **Avoid Major Roads:** With typical rush-hour parking restrictions, major arterial roads would not be good candidates for charging stations.

- **'No Parking' Areas:** Curb-side 'No Parking' areas would be considered prime candidate locations in order to avoid using existing pay-and-display areas, if parking can be safely accommodated.

- **Pay-and-Display Locations:** For an existing pay-and-display area to be considered, a space at the end of the parking area is required in order to enhance visibility and to allow for proper delineation of the space for EVs only.

- **Charging Station Connection:** A space in close proximity to an existing hydro pole is required for convenient connection to the charging station. This will ensure that electrical installation costs are minimized.

- **Power Source:** Sufficient 220V electrical power is required in close proximity to the vehicle charging station. The higher costs associated with stringing power between poles or from the nearest intersection will be avoided.

- **Placement:** Charging station equipment located within a sidewalk/boulevard area should not interfere with the accessibility requirements of pedestrians or those with a disability and adhere to the objectives of the City's Accessibility and Vibrant Streets Guidelines.

Transportation Services has consulted Toronto Hydro during the course of conducting its preliminary site feasibility assessments and costing estimates of the candidate locations in accordance with above key criteria. Connecting estimates will range from $3,000 – $5,000 for pole mounted above-ground installations and roughly double for those requiring more complicated underground connections for bollard style charging units.

Based on the aforementioned criteria for EV site selection, the following 5 parking space locations are recommended for the purposes of the pilot which are also illustrated on the map in Appendix B - Proposed EV Charging Station Locations.

- East side of Elizabeth Street, south of Fosters Place (behind City Hall);
- West side of Ed Mirvish Way, north of King Street West;
- South side of Wellington Street West, east of Clarence Square (2 spaces);
- West side of Victoria Street, south of Dundas Square.

Should this pilot project be approved, the precise locations will be identified by by-law in the required subsequent report to Toronto and East York Community Council.

It should be noted that the location on Elizabeth Street is an existing pay-and-display parking space. While EV operators will enjoy 'exclusivity' to park at this location, they will still be subject to the existing local pay-and-display rates.

In addition, it is recommended that authorization be given to the Acting General Manager, Transportation Services to negotiate the terms and conditions and enter into and execute an agreement with Toronto Hydro to facilitate the connection of the EV charging stations to the Toronto Hydro power grid.

**Delineating EV Parking Spaces**

All EV charging station locations will be identified by a combination of regulatory signs, pavement markings, and supporting advisory signage. Signage and poles (as required) will advise of regulatory limits of the EV charging parking area and its intended exclusive use for EVs while charging. Pavement markings will delineate the parking space area of 5.5 metres long and 2.0 metres wide. Supporting advisory signage will be placed noting the contact information for the City of Toronto if there is a problem with the equipment or its operation. Finally, directional signage will be placed at the nearest major roadway(s) to advise and direct EV owners to the area designated for EV charging.

**Compliance and Enforcement**

Enforcement is a key to ensuring that EV on-street parking spaces are not occupied by unauthorized vehicles. Since EV charging on-street is a new operating condition in the City, ensuring that only EVs have unimpeded access to the charging stations will require the creation of new regulations, and a fine structure, for related offences. Approval by the Senior Regional Justice, Ontario Court of Justice, will be required before enforcement can be carried out. It is therefore recommended that the City Solicitor, in consultation with the Acting General Manager of Transportation Services, make application to the Senior Regional Justice of the Ontario Court of Justice for set fines with respect to the offences created by the pilot program.

It is expected that enforcement would be comprised of a parking control official checking that an EV, as defined, is within the limits of the designated space and that it is 'plugged-in' using the EV connector of the charging station affiliated with the parking space.

Traffic and parking by-law amendments will be recommended in a separate report to the Toronto and East York Community Council for the EV locations as this is a delegated authority. It will also be necessary to amend the appropriate by-laws to ensure that a vehicle displaying a Accessible Parking Permit or a motorcycle, is not allowed to park in the parking area designated for 'EVs while charging'. Based on the current City approved fine for unlawfully parking or standing an unauthorized vehicle in an area designated as a Car-share Vehicle Parking Area, it would be appropriate to establish a similar fine, currently set at $60.00.

**Marketing and Engagement**

During the period of the pilot study, staff will undertake work to market the availability of the on-street EV charging stations. In addition, staff will implement actions that engage users of the pilot study EV charging stations in a discussion about the value of on-street EV charging stations.

**Follow-up Monitoring and Evaluation**

Following the completion of the one-year pilot program, it is recommended that the Transportation Services Division report back to the Public Works and Infrastructure

Committee with the results of its monitoring and evaluation efforts. The report will include, among other things, a discussion on:

a. Charging station procurement and installation;
b. Parking space selection criteria and considerations;
c. Operational issues, including electricity usage and space utilization and enforcement;
d. Revenue generation opportunities;
e. Regulations and enforcement matters associated with designating a new class of vehicle to park on the road including the required creation of new related fixed fines;
f. Outreach to the owners of electric vehicles and the manufacturers of electric vehicles to advise that these new spaces are available; and
g. Required signage and pavement markings.

Staffs of Legal Services, Toronto Parking Authority, Toronto Environment Office and Financial Planning have been consulted in the preparation of this report.

## CONTACTS


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## SIGNATURE

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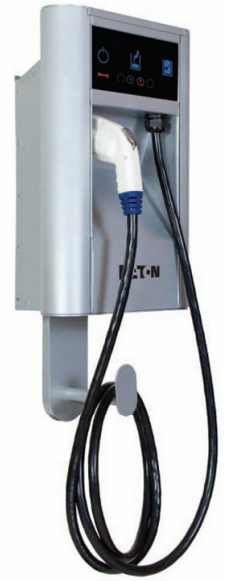
## ATTACHMENTS

Appendix A – Types of Charging Stations and Installations
Appendix B – Proposed EV Charging Station Locations

Appendix A

# Types of EV Charging Stations and Installations

## Types of Charge Stations





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## Types of Charge Station Installations


Bollard Style


Pole Mount


Wall Mount

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Appendix B

# Proposed EV Charging Station Locations