

Parking Master Plan

Appendix F
Parking Technology Review

Parking Technology Review

Parking technology plays an important role in the parking experience of users. This section provides a summary of existing on- and off-street parking technologies, identifies issues and opportunities, and explores potential technologies aimed at mitigating the identified issues and providing a positive user experience.

Existing Parking Technologies

In an attempt to optimize parking operations through improved technologies, the existing parking technologies were reviewed and issues identified.

Whitby employs a variety of pay parking technologies within the Downtown core. One pay and display machine is located in each of the Downtown Whitby and Brooklin municipal lots. The Whitby pay and display machines all accept credit card and coin payments. However, only coin payments are accepted at the machines in Brooklin. On-street paid parking is served by individual parking meters which accept coin payments. Meters located on Centre Street between Dundas Street and Mary Street also accept credit cards. To provide an alternative method of payment, Whitby has implemented the pay by phone technology in Downtown Whitby and Brooklin which is managed by Honk Mobile. The technology allows users to download an application on their smart phone, register an account, and pay for parking through their phone. The service includes an additional \$0.25 fee per transaction.

In addition to pay parking technologies, static parking wayfinding signs are distributed through the core assisting drivers in finding off-street municipal parking. Sample Whitby directional and identification signs are illustrated in **Exhibit F-1** and **Exhibit F-2**.

Exhibit F-1: Existing Direction Wayfinding Signage

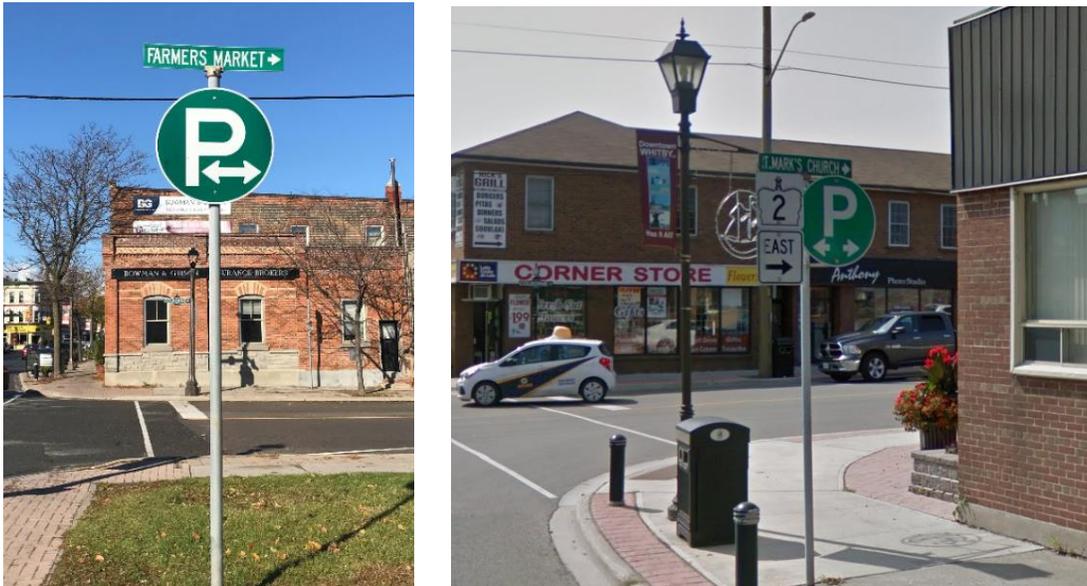
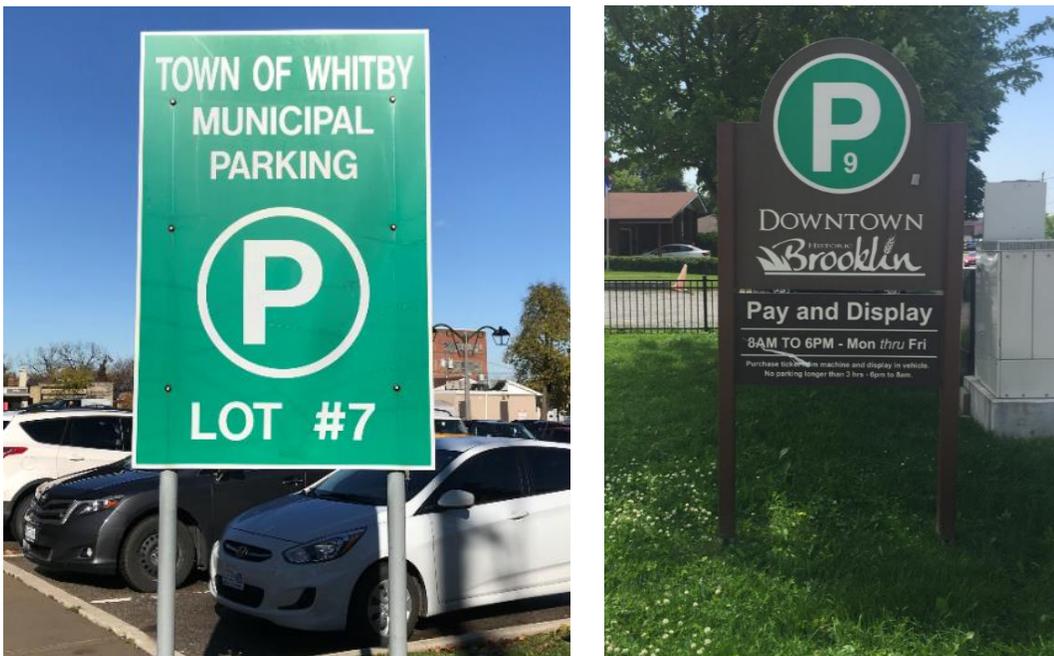


Exhibit F-2: Existing Identification Wayfinding Signage



As illustrated in **Exhibit F-2**, the identification signage format varies between Downtown Whitby and Downtown Brooklin. Consistency is recommended between the two Downtown cores, the Downtown Brooklin format is considered more appropriate as more parking information is provided to the user.

Whitby currently uses smart phone applications for parking enforcement. Officers are able to process and print parking tickets immediately on-site.

Through the review of existing technologies, discussions with the Whitby staff, and the stakeholder and public consultation process, the following parking technology issues and needs were identified:

- Credit/debit cards are not accepted in Downtown Brooklin;
- In the event on-street pay parking operations are implemented in Downtown Brooklin, pay parking technology is required;
- Current parking operations require labour intensive enforcement to maintain compliance;
- Members of the public identified parking signage as unclear or confusing; and
- The public perceives that there is a lack of available parking within Downtown Whitby.

Various parking technologies available to Whitby aimed at addressing the identified issues and needs were assessed.

Wayfinding Improvements

Several on-street and off-street parking facilities were observed to operate near or at capacity while other nearby parking facilities had excess supply. Feedback received during the public and stakeholder consultation process identified parking signage to be confusing for some.

Parking wayfinding technologies have the potential to guide users to parking facilities that are underutilized, which will help better distribute the overall parking demand. Improved parking distribution is anticipated to become more and more crucial in the near future given the significant growth projection. Potential parking technologies that could aid users in navigating the Downtown core's parking system include:

- Adding the municipal parking lot locations to Google Maps;
- Static wayfinding signage;
- Variable message signs with wayfinding directions; and
- Phone app / website displaying real time parking availability data.

Wayfinding Signage

For the static signage strategy, there are four fundamental parking sign types that increase drivers' and pedestrians' wayfinding experience.

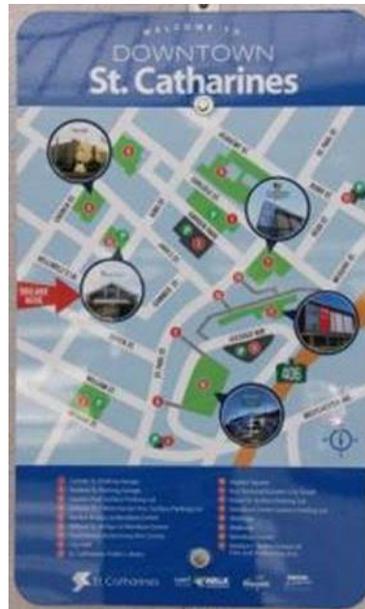
Introduction Signage: The first level of parking signage alerts drivers approaching the parking areas. The signage should be distinct in both colour and size, and it can be characterized by unique logos. The signs should display the names of the lots and perhaps who the intended users are (permit holders or pay parking users). These signs are located on the street, and are mounted on poles of standard heights. **Exhibit F-3** illustrates a sample introduction wayfinding sign.

Directional Signage: Directional parking signage is distinct in colour, size, and logo and directs drivers to the parking areas. The signs are mounted on poles at standard heights, on the streets.

Identification Signage: Identification signage is placed at the entry of each parking lot. The name of the parking area is identified and the type of parking available at the parking area is listed on the signage. The identification signage is distinctive in colour and size, and it is located on a pole at a lower height.

Pedestrian Wayfinding Signage: These types of signs are placed at locations easily found by a pedestrian, typically parking facility entry/exit points, and are intended to help that person orient themselves to the Downtown core.

Exhibit F-3: Sample Introduction and Pedestrian Wayfinding Signs



The qualities of good signage include the following aspects:

- The appearance of all signage is consistent and aesthetically pleasing;
- Use of common logos and colours;
- Placement at or near eye level;
- Use of reflective and durable material;
- All four wayfinding sign types (introduction, directional, identification, and pedestrian) used to guide motorist and pedestrian activity;
- All primary entrances to the Downtown need to have introduction signage;
- All major routes through the Downtown need to have directional signage;
- All parking areas need to have identification signage;

- All pedestrian routes to and from major parking areas need to have wayfinding signs;
- The identification signs located at parking areas to convey parking rates, hours of operation, and maximum durations; and
- Have a lettering height of about 10 centimeters for urban streets (varies according to traffic speed).

While improved static signage to parking facilities helps reduce parking related traffic congestion, more powerful tools are available through smart parking management systems, or dynamic wayfinding systems. The dynamic wayfinding signs are optimally located at entrances to the Downtown core or entrances to structured parking. These signs provide users with real time parking occupancy data allowing them to target the underutilized areas, and with directional information to assist in wayfinding. **Exhibit F-4** illustrates an example dynamic wayfinding sign that displays the number of spaces available per level within a parking garage.

Exhibit F-4: Dynamic Wayfinding Sign



There are four main components in an advanced parking information system:

Automated Data Collection System for recording the number of vehicles entering and leaving parking facilities;

Distribution System capable of displaying a set of static and variable messages, other traveller information dissemination technologies, and information links to the parking facilities and external systems, such as Variable Message Signs (VMS);

Central System, typically located at a Control Centre, that processes data on parking facility occupancy, controls the display of information on variable message signs, and controls the other types of information distribution; and

Communications System to enable the transfer of information between the parking facilities, the central system, and the distribution technologies.

Dynamic wayfinding signs are ideally followed up with additional static directional signage at critical junctions within the Downtown to provide users with further directional information.

Whitby Signage

Specific to Whitby, directional and identification signage is currently deployed throughout the Downtown core, as outlined on a lot-by-lot basis by **Exhibit F-5**.

Exhibit F-5: Whitby Wayfinding Signage Inventory

Lot	Introduction	Directional	Identification	Pedestrian
Downtown Whitby				
1	No	Yes	Yes	No
2	No	Yes	Yes	No
3	No	Yes	Yes	No
4	No	Yes	Yes	No
5	No	Yes	Yes	No
6	No	Yes	Yes	No
7	No	Yes	Yes	No
Downtown Brooklin				
9	No	Yes	Yes	No

It is recommended to that the directional and identification signs be improved visually and supplemented with introduction and pedestrian signs to complete the four layers of a static wayfinding system. The following general signage guidelines are recommended:

- Introduction signs can be placed at major entry points into the Downtown. As a starting point, the following preliminary locations are suggested:
- Southbound Brock Street just north of May Street;
- Northbound Brock Street just south of Dunlop Street;
- Eastbound Dundas Street just west of Euclid Street / Henry Street; and
- Westbound Dundas Street just east of Athol Street.
- Directional signs located in advance of required turning maneuvers;
- Identification signs located at all parking lot entrances; and
- Pedestrian signs located at each facility’s pedestrian access points.

Further study is recommended as part of a broader Downtown wayfinding strategy to evaluate the specific sign locations and designs. The improved wayfinding system could help reduce possible driver confusion, and may help dispel the perceived notion that there is a lack of available parking opportunities in Downtown Whitby.

Dynamic wayfinding technologies are not recommended for Whitby or Brooklin as it would require expensive parking technology upgrades capable of tracking vehicle occupancy. However, based on the future conditions assessment, structured parking is anticipated to be required in the near future to accommodate the parking demand growth. When structured parking is constructed, a dynamic wayfinding sign similar to the one illustrated in **Exhibit F-4** located at the garage's entrance would be beneficial. These signs are intended to allow users already within the Downtown core to quickly determine the availability of parking in the garage. Based on industry research, each dynamic wayfinding sign is estimated to cost approximately \$25,000 to \$30,000. To facilitate the dynamic wayfinding and variable message signs, the garage would require a parking management system capable of automatically tracking parking occupancy in real time.

In addition to a static wayfinding system, Whitby is recommended to rename the Downtown lots to include descriptions, which would help drivers spatially understand where the lots are located. This redesignation is intended to help users identify lots in a quicker and easier manner. The following lot names are recommended:

Lot 1: Colborne Street Lot (Lot 1);

Lot 2: Elm Street Lot (Lot 2);

Lot 3: Byron Street Lot (Lot 3);

Lot 5: Green Street Lot (Lot 5);

Lot 6: Perry Street Lot (Lot 6);

Lot 7: Library Lot (Lot 7);

Lot 8: Marina Lot (Lot 8); and

Lot 9: Campbell Street Lot (Lot 9).

The parking lots are recommended to be renamed as part of the parking wayfinding improvements.

Pay Parking Technologies

Downtown Whitby parking users are provided with the option of paying for parking through coins, credit cards, or their mobile devices. Given the variety of payment methods available, the current pay parking technologies in Whitby are considered appropriate. However, since users can only pay for parking through coins or by phone in Brooklin, a pay parking technology upgrade to accept credit/debit card payments would be beneficial.

Pay and Display

Pay and display parking (Whitby's current system in the municipal lots), requires users to enter a parking lot, park their vehicle, walk to a pay and display machine, pay for parking, and return to the vehicle to display proof of payment.

When compared to alternative pay parking systems, the main advantage of the pay and display system is the relatively inexpensive maintenance and implementation costs. However, there are several disadvantages to pay and display parking:

- Labour intensive enforcement when compared to gated parking lots;
- Many Downtown visitors may not know how long they are staying in advance, and would be required to purchase additional time if required; and
- Payment process can be inconvenient for users.
- Modern pay and display machines allow users to pay for parking via coins and also credit/debit cards.

Pay by Phone

Pay by phone allows users to download an application on their smart phone, register an account, and pay for parking through their phone. The technology's intent is not to replace the current payment system, but to supplement existing technologies to provide an additional method of payment. This approach maintains continuity between the two Downtown cores, uses customer and operator familiarity, and potentially allows Whitby to negotiate a better deal with Honk Mobile given the expanded area of service (if on-street pay parking operations are adopted in Brooklin).

An additional benefit from this technology is the ability to enforce the maximum time limit for highly utilized on-street parking, and ensure turnover. Pay by phone is expected to also reduce costs in areas such as machine maintenance, paper receipts, and coin collection. This in turn provides staff more time to investigate parking initiatives or complaints.

In terms of enforcement, no additional officers are anticipated to be required to enforce the pay by phone parking system. Since parking meters, hang tags, parking receipts, or any other visible proof of payment is not required, enforcement officers require an electronic device capable of running the parking app to verify whether the vehicle in question has time purchased via their mobile device.

A fully pay by phone system is not considered appropriate at this time since many users may not have smart phones. Whitby's current hybrid solution with pay by phone complimenting traditional payment technologies is considered appropriate.

Pay on Foot / Exit

The pay on foot system requires users to accept a parking receipt when entering the parking lot. The user may then proceed to their desired destination for any duration of time. When the users are ready to exit the parking lot, they are required to pay for parking at a parking machine, which validates their parking receipt. The payment requirement is automatically calculated by the machine based on length of stay and the parking rates defined by the Town.

Users must then input the validated parking receipt into the parking gate, which raises if payment has been made.

The pay on exit system is identical to the pay on foot system, except that users are required to pay for parking at the exit gate instead of a parking machine. When comparing the two systems, the pay on exit system could result with excessive queues if many users attempt to exit within a short period of time (ex: end of business hours or immediately following special events). However, the pay on foot system could result in a situation where a user pays for parking, and then is prohibited from leaving the system if the grace period following payments has been exceeded. An example of a pay on foot machine is shown in **Exhibit F-6**.

Exhibit F-6: Pay on Foot Payment Machine



Generic benefits of the pay on exit / foot approach include:

- No active labour requirements (parking attendants);
- Machines can operate 24 hours / day;
- No enforcement requirements due to gated access; and
- Systems can be connected to revenue and occupancy tracking systems.

Specific to Whitby's Downtown core, pay on exit / foot is not considered practical at any of the off-street parking lots due to small capacities, and the price associated with these technologies resulting in excessive cost recovery periods. Based on research conducted by IBI Group, each pay on foot machine costs approximately \$40,000 - \$60,000. These technologies also require a high level of maintenance to manage breakdowns.

Bluetooth Systems

The Bluetooth payment system is an evolution of the traditional pay by phone system. Pay by phone technologies are limited to non-gated parking facilities as existing pay parking systems are unable to determine whether a user has paid for parking without a validated parking receipt or payment made at the gate.

Bluetooth payment users are initially required to download a mobile app, sign-up, and register an active credit card. Once the user account has been set up, the parking system detects the parking app through Bluetooth technology, and the gates automatically raise as the user approaches. When the user is ready to exit the parking system, the gates once again raise as the user approaches, and the user is automatically charged based on the predefined parking rate and the duration of stay. Users are able to enter, exit, and pay for parking in a hands free environment.

Two potential Bluetooth system alternatives are Zipby and LocoMobi. Through discussions with industry representatives, the cost of implementing the Bluetooth system was determined to be approximately \$6,000 per lane.

Pay by Plate

The pay by plate technology is similar to the pay and display technology. Users are required to enter a parking lot, park their vehicle, walk to a pay by plate machine, and pay for parking. However, instead of returning to the vehicle to display proof of payment, the user is able to proceed to their destination as payment is tracked electronically. Since time purchased is attributed to the user entered license plate number, an added benefit is that users are able to purchase time extensions at any pay by plate machine without the need to return to their vehicles or the original machine used for the purchase. However, users are required to remember their license plate number, which is challenging for rental vehicles. Users may also incorrectly remember or enter their license plate which may result in parking violations and decreased user satisfaction.

Pay by plate technology can be adopted for both on- and off-street parking facilities.

Individual Parking Meters

Parking meters require users to park their vehicle, approach the parking meter serving the space they parked in, and pay for parking. Traditionally, parking meters only accept coin payments. However, modern parking meters have the capability of accepting credit/debit card payments as well. Smart parking meters are able to automatically track parking occupancy in real time through sensors. Modern parking meters cost approximately \$600 to \$800 per space, while smart meters cost up to \$8,000 per space. Note that expensive parking management systems are also required in addition the smart meters to process and output the collected occupancy data.

The main benefit associated with parking meters are the relatively inexpensive cost. Additionally, if a parking meter breaks down, all other parking spaces remain operational. Compared to pay and display machines, breakdowns may result in parking along entire road segments or entire lots becoming unavailable. The main drawback is the labour intensive

maintenance (ex: fare collection) and enforcement requirements. Parking meters that accept credit/debit card payments are anticipated to require less frequent fare collection.

Parking meters generally have a life cycle of 15 years. Some of the meters are at/approaching the end of the life cycle while many are less than 10 years old.

Recommendations

Downtown Whitby On-Street

Given the relatively low cost and to remain consistent with existing operations, Whitby is recommended to maintain parking meters as the preferred technology for on-street operations, at least until the road is reconstructed. When a road is reconstructed pay and display machines should be considered to provide for additional space for pedestrians and street furniture such as benches. Not all sections of road would benefit from a pay and display machine due to the significant unit cost as compared to a single space meter.

In the interim, the number of posts may be reduced by combining two meters onto a single post. This has been done on several streets already including Perry Street and Athol Street. As well, existing parking meters could be upgraded to machines that can accept credit card payments. The parking meters on Centre Street between Dundas Street and Mary Street are currently smart meters that accept credit card payment.

Pay by phone would continue to complement parking meter operations on-street in Whitby.

Pay and Display Machines – Off-Street Parking

The current pay and display machines, while functional, should be upgraded and modernized. The existing units can be upgraded to be more visually appealing with a colour touch screen and include additional features such as pay by plate and mobile wallet.

The available technology would also allow codes to be provided that can be used for free parking. As an example, meeting attendees could be provided with a code that could provide for two hours of free parking. Codes could also be purchased and used local businesses as incentives for customers/employees.

The pay by plate feature allows users to continue to their destination without returning to their vehicle to display a parking receipt.

Downtown Brooklin Off-Street

Whitby is recommended to upgrade the existing pay and display machine at Lot 9 with a machine that accepts both coin and debit/credit card payments. This strategy maintains consistency with the pay parking system deployed in Downtown Whitby.

Downtown Brooklin On-Street

In the event on-street pay parking operations are adopted in Downtown Brooklin, it is recommended to implement pay and display machines with pay by foot technology.

Downtown Whitby Parking Garage

When a parking garage is constructed the pay on foot system is proposed. When compared to pay on exit, the pay on foot system allows users to pay at numerous machines distributed throughout the garage instead of all users paying at the gates when existing. This approach

optimizes egression operations. Additionally, pay on foot requires minimal manual labour as entry/egression operations are automated and no enforcement is required.

It is also recommended to install the Bluetooth payment system on one entry and one exit lane. This approach allows users to pay for parking using the traditional pay on foot system with the option of using the Bluetooth system.

Parking Management

A parking management system is the core system used to manage the parking operations of any given parking facility. In general, modern parking management systems are software based. The system generally operates a facility's entry and egression operations, and provides parking personnel with a computer interface to track, manage, and oversee the facility's overall performance. Reports detailing historical revenue, occupancy, length of stay, etc. can be automatically generated to aid in key parking related decisions.

When a parking structure is constructed, a parking management system capable of automatically tracking vehicle occupancy in real time should be included. The collected data can feed directly into dynamic wayfinding signs located at the garage entrances. Pay on foot and pay on exit technologies are both compatible with parking management systems that automatically track vehicle occupancy. Gtechna and Precise ParkLink are two potential parking management system providers.

In addition to the management of a future parking structure it is recommended that the day-to-day operations and maintenance of specific parking facilities be outsourced. It is proposed that an Expression of Interest (EOI) be issued for Private Public Partnerships for municipal lot management. Municipal lots at the Downtown Whitby library, the boat launch/marina and the Centennial Building, should it become paid parking, be exempt from the EOI. This is recommended so that the Town continue to be a knowledgeable owner related to parking management.