Pedestrian Crossing Guidelines
2016

Engineering Services
1.0 Introduction and Background

The City of Kingston’s first Pedestrian Crossing Guidelines were approved by Council in 2008 in order to provide direction with respect to the installation of pedestrian crossings in the City. As there have been significant changes since that time to the regulations within the Highway Traffic Act of Ontario (HTA) regarding crosswalks, the City’s Pedestrian Crossing Guidelines need to be updated. Effective January 1, 2016, the HTA was revised to include a regulation that requires vehicles to stop and yield the entire roadway at all types of pedestrian crosswalks known as pedestrian crossovers (PXO’s). This change enables the City to install legal crosswalks on roads with relatively low speeds and low traffic volumes.

The provision of facilities for pedestrians encourages walking and enhances the sustainability of a community. Walking supports an active and healthy lifestyle and reduces the reliance on automobiles. The City’s Pedestrian Crossing Guidelines align with the recommendations of the 2015 Kingston Transportation Master Plan (KTMP) which focuses on sustainable transportation and investment in active transportation. These guidelines also provide a mechanism to implement pedestrian crossings at locations identified within the future Active Transportation Master Plan (ATMP) and will be considered within the future Strategic Road Safety Plan as part of the targeted plans for pedestrian safety.

The Pedestrian Crossing Guidelines are intended to provide a framework to assess, prioritize and implement appropriate pedestrian crossing treatments on City streets with the following objectives:

- Improve the level of safety, comfort and convenience for pedestrians;
- Identify and describe different types of pedestrian crossing treatments;
- Provide a system that identifies the appropriate type of pedestrian crossing treatment at a specific location;
- Provide a system that prioritizes locations for pedestrian crossing.
treatments;

- Formal adoption of the guidelines within the Ministry of Transportation Ontario’s (MTO) new Ontario Traffic Manual (OTM) Book 15 “Pedestrian Crossing Treatments” and the OTM Book 12 “Traffic Signals”.

2.0 Types of Pedestrian Crosswalks

There are a variety of traffic controls that can be installed in order to facilitate pedestrian crossings and to increase the level of safety for pedestrians. The following types of pedestrian crossing treatments are reviewed in detail in these guidelines:

- Pedestrian crossovers (PXO’s)
- Courtesy crossings
- Intersection pedestrian signals (IPS)
- Mid-block pedestrian signals (MPS)
- Full traffic signals
- Pedestrian scramble intersections

In order to determine what type of pedestrian crossing treatment should be implemented, factors such as pedestrian volumes, vehicle volumes, user profile, vehicle speeds, number of roadway lanes, sight distance and distance to nearest controlled crossings will be considered for each location. It is also important that engineering judgment be utilized to determine the most appropriate pedestrian crossing treatment.

2.1 Pedestrian Crossovers

Ontario’s Highway Traffic Act (HTA) was revised effective January 1, 2016 to include a regulation that requires vehicles to stop and yield the entire roadway at all pedestrian crosswalks known as pedestrian crossovers (PXO’s). Pedestrian crossovers, also known as PXO’s, are identified by specific signs and pavement markings. There are 4 different types of pedestrian crossovers that can be installed in Ontario in order to create a regulatory (legal) crosswalk: PXO Type A, B, C and D.

The PXO A (shown in Figure 1) was previously defined within the Highway Traffic Act as a regulatory crosswalk but the January 1, 2016 changes added 3 new pedestrian crossing treatments known as the PXO Type B, Type C and Type D.
to the regulations. The regulatory changes also require vehicles to remain stopped at crossovers and where a school crossing guard is present until the pedestrian has crossed the entire width of the road.

![Figure 1 – photograph of a PXO Type A](image)

The PXO Type A is unique to Ontario and includes side-mounted signs, overhead signs on wires and amber flashers. In the 1960’s, numerous PXO Type A crosswalks were installed in Ontario with a high number being installed in Ottawa and Toronto. This type of crosswalk was often installed on multi-lane crossings with higher speeds and traffic volumes. The PXO Type A’s have however been problematic in some municipalities because pedestrians and motorists do not readily understand these devices. There have been many instances of motorists not stopping for pedestrians at these crosswalks. For these reasons, municipalities such as the City of Ottawa have replaced all of their PXO Type A’s with intersection or mid-block pedestrian signals. There are still numerous PXO Type A’s in Toronto and there are at least 4 PXO Type A’s currently operating in the Town of Picton.

For the above-noted reasons, it is not recommended that PXO Type A’s be installed in Kingston. If a pedestrian crossing is required on a road with higher speeds and traffic volumes, a signalized treatment will be considered instead of a PXO Type A.
The PXO Type B (shown in Figure 2) is distinguished by overhead and side-mounted signs with rapid rectangular flashing amber beacons. They are typically installed on higher volume roads with operating speeds up to 60 km/h. The City’s first two pedestrian crossovers (PXO Type B’s) replaced existing courtesy crossings and were installed in 2016 at the following locations:

1. Rideau Street in front of Rideaucrest Home
2. King Street in front of Kingston General Hospital

The PXO Type C includes side-mounted signs and rapid rectangular flashing but no overhead sign. They are typically installed on collector roads or lower volume multi-lane roundabouts. The PXO Type D is the most basic form of crosswalk since it includes only side-mounted signs. This type of crosswalk is typically installed on local roads or single lane roundabouts.

As part of these guidelines, it is recommended that only that the PXO Type B, PXO Type C and PXO Type D be considered for installation in Kingston. The cost to install a pedestrian crossover can range from $2,500 per location (Type D) to much greater than $25,000 per location (Type B).
2.2 Courtesy Crossings

Since 2003, a total of 10 courtesy crossings have been installed in Kingston to provide pedestrian crosswalks on roads with relatively low speeds and traffic volumes. As shown in Figure 3, courtesy crossings are marked with large yellow signs and warning signs for pedestrians that state that vehicles are not required to stop. Even with the recent changes to the Highway Traffic Act, pedestrians do not have the right-of-way over vehicles at a courtesy crossing since it is not a recognized pedestrian crosswalk within the *Highway Traffic Act of Ontario*.

![Figure 3 – Courtesy crossing in Kingston](image)

As a result of the January 1, 2016 changes to the HTA, in order to be consistent and reduce the risk of confusion, courtesy crossings will no longer be installed in Kingston. All existing courtesy crossings will be replaced with pedestrian crossovers (most likely Type B) in order to provide legal crosswalks where vehicles must yield to pedestrians.

2.3 Traffic Signals for Pedestrians

On roads with high volumes, high vehicle speeds and multiple lanes, traffic signals provide the greatest form of protection at pedestrian crossings. These guidelines consider the following three different types of traffic signal systems that can be installed to facilitate pedestrian crossings on busy roads.
• Intersection pedestrian signal (IPS)
• Mid-block traffic signal (MPS)
• Full traffic signal

An intersection pedestrian signal (IPS), also known as a “half signal”, provides a legal crossing for pedestrians across a major roadway. An IPS consists of traffic signal heads for vehicles on the major street only along with signalized pedestrian fixtures and crosswalks. Intersection pedestrian signals have been installed in Kingston at the Isabel Bader Centre on King Street (shown in Figure 4) and at Frontenac Secondary School on Bath Road.

Since an IPS regulates the traffic on the main street only, vehicles approaching the intersection from the side street are controlled by a stop sign. Pedestrians must push a button to activate the walk indication which is then followed by the flashing hand display. Vehicles on the major roadway facing the traffic signals must obey the signal as at any other type of traffic signal and vehicles on the side street must stop as at any stop controlled intersection. After coming to a complete stop, motorists are permitted to turn onto the major roadway only when
it is clear and safe to do so, yielding the right-of-way to pedestrians crossing the main street, pedestrians crossing the side street as well as vehicles travelling along the major street.

Since the stop control on the side street can be confusing for motorists when combined with a traffic signal on the major street, intersection pedestrian signals will only be considered in Kingston where the intersecting road with stop control functions as a driveway or minor access. At all other intersections, full traffic control signals will be installed if pedestrian signals are required. As part of these guidelines, a full traffic control signal consists of signal heads in all directions for vehicles in addition to signalized pedestrian fixtures and crosswalks.

A mid-block pedestrian signal (MPS) consists of traffic signal heads for vehicles on the major street along with signalized pedestrian fixtures and crosswalks. Since MPS are installed between intersections, there is no side street traffic. As with an IPS, pedestrians must push a button to activate the walk indication and vehicles on the roadway are subject to the same regulations as at any full traffic signal. Mid-block pedestrian signals provide the legal right-of-way to pedestrians and are easily understood by both pedestrians and motorists.

The cost to install any of these types of traffic signals for pedestrians can range from $200,000 to $350,000.
3.0 Assessment of Locations for Pedestrian Crossing Treatments

As part of these guidelines, the warrants established within the Ministry of Transportation Ontario’s (MTO) Traffic Manuals (OTM) will be utilized to assess locations for pedestrian crossing treatments.

3.1 Collection of Traffic Data

In order to assess locations for pedestrian crossing treatments, detailed traffic counts and field observations will be completed. Vehicle speed studies may also be included if there are concerns that the operating speed is significantly higher than the posted speed limit.

The detailed traffic counts will be completed for either 4 or 8 peak hours during the day and will include pedestrian volumes as well as bicycle and motor vehicle volumes. In accordance with the Ontario Traffic Manual, children, senior citizens and mobility challenged pedestrians are considered to be vulnerable users. Within the total pedestrian count, each vulnerable pedestrian will therefore be counted as two pedestrians.

Since the City uses video cameras to conduct traffic counts, children, seniors and mobility challenged pedestrians count for one pedestrian unit each within the automated pedestrian count. In order to adjust the total count for vulnerable users, City staff will complete field studies and utilize engineering judgment to adjust pedestrian counts appropriately.

3.2 Ontario Traffic Manual Warrants

The warrants within the OTM Book 12 “Traffic Signals” will be utilized to determine if a location requires any of the following signalized crossing treatments based on either the peak 4 or 8-hour pedestrian and vehicle volumes.
If there are requirements for system connectivity or if there are accessibility or safety-related concerns, locations that do not meet the minimum thresholds may still be considered.

1. Intersection pedestrian signal (IPS)
2. Mid-block pedestrian signal (MPS)
3. Full traffic signal

The Book 12 justification chart for a traffic signal to be required for pedestrians is shown in Appendix A.

The warrants within the OTM Book 15 “Pedestrian Crossing Treatments” will be utilized to determine if a location requires a pedestrian crossover. As part of these warrants, a location could be considered for a pedestrian crossover if the following minimum thresholds are met:

<table>
<thead>
<tr>
<th>8 hour pedestrian volume ≥ 100 and</th>
<th>8 hour vehicle volume ≥750</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>4 hour pedestrian volume ≥ 65 and</td>
<td>4 hour vehicle volume ≥395</td>
</tr>
<tr>
<td>AND</td>
<td></td>
</tr>
<tr>
<td>The location is &gt;200 metres from another traffic control device</td>
<td></td>
</tr>
</tbody>
</table>

If a PXO is warranted, the pedestrian crossover selection matrix in Book 15 will be used to recommend the most appropriate type of PXO based on vehicle volumes, the posted speed limit and the number of roadway lanes. The selection matrix from Book 15 is shown in Appendix B.

3.3 Future Locations for Pedestrian Crossings

After all existing courtesy crossings in the City have been replaced with pedestrian crossovers, additional locations for pedestrian crossing treatments will
be considered. Requests for new pedestrian crossings may be made directly to the Traffic Division so that staff can complete assessments and place locations on a list for consideration. The Traffic Division has the resources to assess approximately 15 locations per year. The list of locations will be compiled based on on-going requests from members of the public, councillors, City staff and stakeholders.

Locations that warrant a pedestrian crossing treatment will be prioritized within one of the following groups and will be installed as schedule and budget permit.

1. Traffic signal for pedestrians: Intersection pedestrian signal (IPS), Midblock pedestrian signal (MPS) or full traffic signal
2. Pedestrian crossovers: PXO Type B, C or D

The cost to install a traffic signal for pedestrians or a traffic signal to accommodate both vehicles and pedestrians can range from $200,000 to $350,000. Since there are very limited funds for new traffic signals, traffic signals for pedestrians will be prioritized along with all other traffic signal capital projects within the multi-year capital plan.

As pedestrian crossovers represent a lower form of pedestrian treatment and can range in cost from $2,500 (PXO Type D) to more than $25,000 (PXO Type B) they will be prioritized separately from traffic signals for pedestrians. In order to prioritize locations for pedestrian crossovers, each location will be assessed and scored with a maximum of 5 points for each of the categories as shown in Table 1. The score out of 5 for each category will be determined with a proportional comparison of all locations on the list.
Table 1: Assessment criteria to prioritize locations for a pedestrian crossover

<table>
<thead>
<tr>
<th>Pedestrian crossover assessment category</th>
<th>Maximum Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian volumes</td>
<td>5</td>
</tr>
<tr>
<td>Vehicle volumes</td>
<td>5</td>
</tr>
<tr>
<td>Vehicle speeds</td>
<td>5</td>
</tr>
<tr>
<td>Vulnerable pedestrians</td>
<td>5</td>
</tr>
<tr>
<td>Accessibility concerns</td>
<td>5</td>
</tr>
<tr>
<td>Existing sidewalks</td>
<td>5</td>
</tr>
<tr>
<td>Connectivity to transit, schools, recreation, business</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total Maximum Points</strong></td>
<td><strong>35</strong></td>
</tr>
</tbody>
</table>

Engineering judgement will be used to prioritize locations that are recommended within the Active Transportation Master Plan (ATMP) or locations where a pedestrian crossing treatment may be implemented as part of a scheduled construction project.
5.0 Pedestrian Scramble Intersections

An exclusive pedestrian phase, typically known as a “pedestrian scramble”, is a signal phase that operates an exclusive pedestrian crossing opportunity in all directions, including diagonally, while a red light is displayed for all vehicles. The scramble phase is typically introduced once or twice during a traffic signal cycle.

Scramble crossings have been introduced in order to reduce pedestrian delays, prevent crowding on sidewalks and to improve pedestrian safety by reducing pedestrian and vehicle conflicts. Although pedestrian scrambles prioritize pedestrians, they do increase delays for all vehicles, including transit. Additional delays are also created since right-turns-on red are typically restricted at scramble intersections.

The City of Kingston’s first scramble crossing was implemented in 2015 on the Queen’s University Campus at the intersection of Union Street and University Avenue. Although the feedback from pedestrians using the scramble has been positive, there have been numerous complaints about significant delays for vehicles, including on-going concerns from Kingston Transit. Both the OTM Book 15 “Pedestrian Crossing Treatments” and the OTM Book 12 “Traffic Signals” reference pedestrian scrambles as “an exclusive pedestrian phase” and note that “exclusive pedestrian phases are normally required only where the volumes of crossing pedestrians are extremely high.” Although the Ontario Traffic Manuals do not provide warrants for the installation of pedestrian scrambles, they do note that the decision to implement an exclusive pedestrian phase must be weighed against its impact on the overall traffic operations. If additional pedestrian scrambles are planned in Kingston, careful consideration must be given to the impact of increased delays for vehicles and transit, potential for driver confusion and potential difficulties for visually impaired pedestrians.
6.0 School Crossing Guards

Assessments and warrants for school crossing guards are incorporated within the Ontario Traffic Council (OTC) School Crossing Guide and are not considered within the City’s Pedestrian Crossing Guidelines. The City’s Planning, Building & Licensing Department is currently responsible for the planning and operation of all school crossing guard locations in Kingston. It is however important to note that when a school crossing guard is absent at a pedestrian crossing with school crossing guard signs and markings, vehicles are not required to yield the right-of-way to pedestrians unless the crossing is controlled by stop signs, a pedestrian crossover or a traffic signal.
7.0 Accessibility

In accordance with the Accessibility for Ontarians with Disabilities Act (AODA), AODA requirements will be incorporated within the design and implementation of all pedestrian crossing treatments as follows:

- The design walk speed at signalized intersections and at pedestrian crossovers will be a maximum of 1.0 m/s;
- All new and rebuilt traffic signals will include audible pedestrian signals;
- The pedestrian push buttons at traffic signals for pedestrians will be accessible;
- Curb ramps with tactile warning strips will be installed at all new pedestrian crosswalks.

Although not required by AODA, pedestrian countdown devices will continue to be installed at all new traffic signals and at existing traffic signals as budget and schedule permit.
Justification Chart for a Traffic Signal for Pedestrians

Source: Figure 22, Ontario Traffic Manual, Book 12
## Pedestrian Crossover Selection Matrix

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Posted Speed Limit (km/h)</th>
<th>1 or 2 Lanes</th>
<th>3 lanes</th>
<th>4 lanes w/raised refuge</th>
<th>4 lanes w/o raised refuge</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Hour</td>
<td>750</td>
<td>2,250</td>
<td>≤50</td>
<td>Level 2 Type D</td>
<td>Level 2 Type C</td>
<td>Level 2 Type D²</td>
<td>Level 2 Type B</td>
</tr>
<tr>
<td>4 Hour</td>
<td>395</td>
<td>1,185</td>
<td>60</td>
<td>Level 2 Type C</td>
<td>Level 2 Type B</td>
<td>Level 2 Type C²</td>
<td>Level 2 Type B</td>
</tr>
<tr>
<td>8 Hour</td>
<td>2,250</td>
<td>4,500</td>
<td>≤50</td>
<td>Level 2 Type D</td>
<td>Level 2 Type B</td>
<td>Level 2 Type D²</td>
<td>Level 2 Type B</td>
</tr>
<tr>
<td>4 Hour</td>
<td>1,185</td>
<td>2,370</td>
<td>60</td>
<td>Level 2 Type C</td>
<td>Level 2 Type B</td>
<td>Level 2 Type C²</td>
<td>Level 2 Type B</td>
</tr>
<tr>
<td>8 Hour</td>
<td>4,500</td>
<td>6,000</td>
<td>≤50</td>
<td>Level 2 Type C</td>
<td>Level 2 Type B</td>
<td>Level 2 Type C²</td>
<td>Level 2 Type B</td>
</tr>
<tr>
<td>4 Hour</td>
<td>2,370</td>
<td>3,155</td>
<td>60</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
<td>Level 2 Type C²</td>
<td>Level 2 Type B</td>
</tr>
<tr>
<td>8 Hour</td>
<td>6,000</td>
<td>7,500</td>
<td>≤50</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
<td>Level 2 Type C²</td>
<td>Level 1 Type A</td>
</tr>
<tr>
<td>4 Hour</td>
<td>3,155</td>
<td>3,950</td>
<td>60</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
</tr>
<tr>
<td>8 Hour</td>
<td>7,500</td>
<td>17,500</td>
<td>≤50</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
</tr>
<tr>
<td>4 Hour</td>
<td>3,950</td>
<td>9,215</td>
<td>60</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
<td>Level 2 Type B</td>
</tr>
</tbody>
</table>

Source: Table 7, Ontario Traffic Manual, Book 15