Appendix K2 - City of Ottawa Pedestrian Crossover (PXO) Program

OVERVIEW

The City of Ottawa Pedestrian Crossover (PXO) Program provides the basis for PXO implementation in Ottawa. The program's processes for the screening, warranting and implementing the PXOs are extracted directly from those identified in the recently updated and soon to be released Ministry of Transportation of Ontario's (MTO) Ontario Traffic Manual (OTM) Book 15 – Pedestrian Crossing Treatments.

Book 15 includes all of the background information and justification regarding the use of PXOs as safe pedestrian crossing treatments in Ontario. Book 15 must be referred to for clarification on any interpretation of the PXOs outside of the definitions stated further below as defined in Book 15. Book 15 reflects the legal framework in which the program needs to operate; and this includes the following items:

- *Ontario Highway Traffic Act* (*HTA*)
    - Categories of Pedestrian Crossings
    - Pedestrian Rights and Responsibilities
    - Ontario Regulations
- Accessibility
    - Legislative Requirements - *Accessibility for Ontarians with Disabilities Act* (*AODA*)
    - Designing for Accessibility
        - Curb Ramps and Depressions

PXOs are one of a few traffic control devices that are available to road authorities throughout Ontario to establish the right-of-way for pedestrians; other control devices include stop and yield signs, adult school crossing guards and traffic control signals. The material extracted from Book 15 for this program addresses, for the most part, the use of PXOs and which type of treatment is the most appropriate device amongst the three new versions of the PXO for facilitating the movement of pedestrians across the road. While other devices also facilitate the control of traffic for all types of travel modes, the PXO focuses solely on pedestrians, including cyclists that need to dismount and cross as pedestrians. Definitions for key terms pertaining to the PXO Program are included below:

- **Crossings** - The *HTA* recognizes two crossing categories.
    - **Controlled:**
        - A crossing that is supported by one of the three control measures; Stop/Yield Signs, Pedestrian Crossovers (PXOs), or one of the Traffic Control Signal variations. **This document focuses on the controlled crossing type.**

        - Vehicles are required to stop or yield to pedestrians.
        - At a PXO, no pedestrian or person in a wheelchair shall leave the curb or other place of safety at a pedestrian crossover and walk, run or move the wheelchair into the path of a vehicle that is so close that it is impracticable for the driver of the vehicle to yield the right-of-way.
    - **Uncontrolled:**
        - All other crossings including unmarked crossings at intersections, marked crossings but unsigned or unsignalized, school crossings when the adult school crossing guard is not present.
        - Pedestrians must yield to traffic and wait for a safe gap sufficient for them to cross the roadway, prior to attempting to enter the roadway. Pedestrians *do not* have the right-of-way at uncontrolled crossings.

- **Pedestrian Responsibility** - Pedestrians must exercise due care even when they are lawfully within a crossing and have right-of-way. It is not an absolute right and they must still exercise care to avoid a collision with a vehicle.

- **Pedestrian**
    - A person who is not in or upon a vehicle, motorized or otherwise propelled
    - A person in a wheelchair driven by muscular or any other kind of power
    - A person pushing a bicycle, or a wheelchair

- **Vehicle** - includes a motor vehicle, trailer, traction engine, farm tractor, road-building machine, bicycle, and any vehicle drawn, propelled or driven by any kind of power, including muscular power. It is pertinent to note that *HTA* considers bicycles as vehicles and are required to yield right-of-way to pedestrians on controlled crossings similar to other vehicles. While using a pedestrian crossing, cyclists must dismount and walk across the pedestrian crossing.

There are three important parts to the Ottawa PXO Program which have been added to the updated Book 15. These include:

- the **screening process** for potential crossing locations,
- the **selection process** for the type of PXO when the location is warranted, and
- the **conditions required** for the installation of the PXO.

SCREENING PROCESS

Book 15 provides a Decision Support Tool (DST) which includes two components: (1) Preliminary Assessment, and (2) Pedestrian Crossing Selection. The preliminary assessment is used to check whether a location is a candidate site for a pedestrian crossing control, whether its warranted or not, and then the pedestrian crossing selection assists practitioners to choose an appropriate pedestrian crossing treatment system for the site in question.

Preliminary Assessment

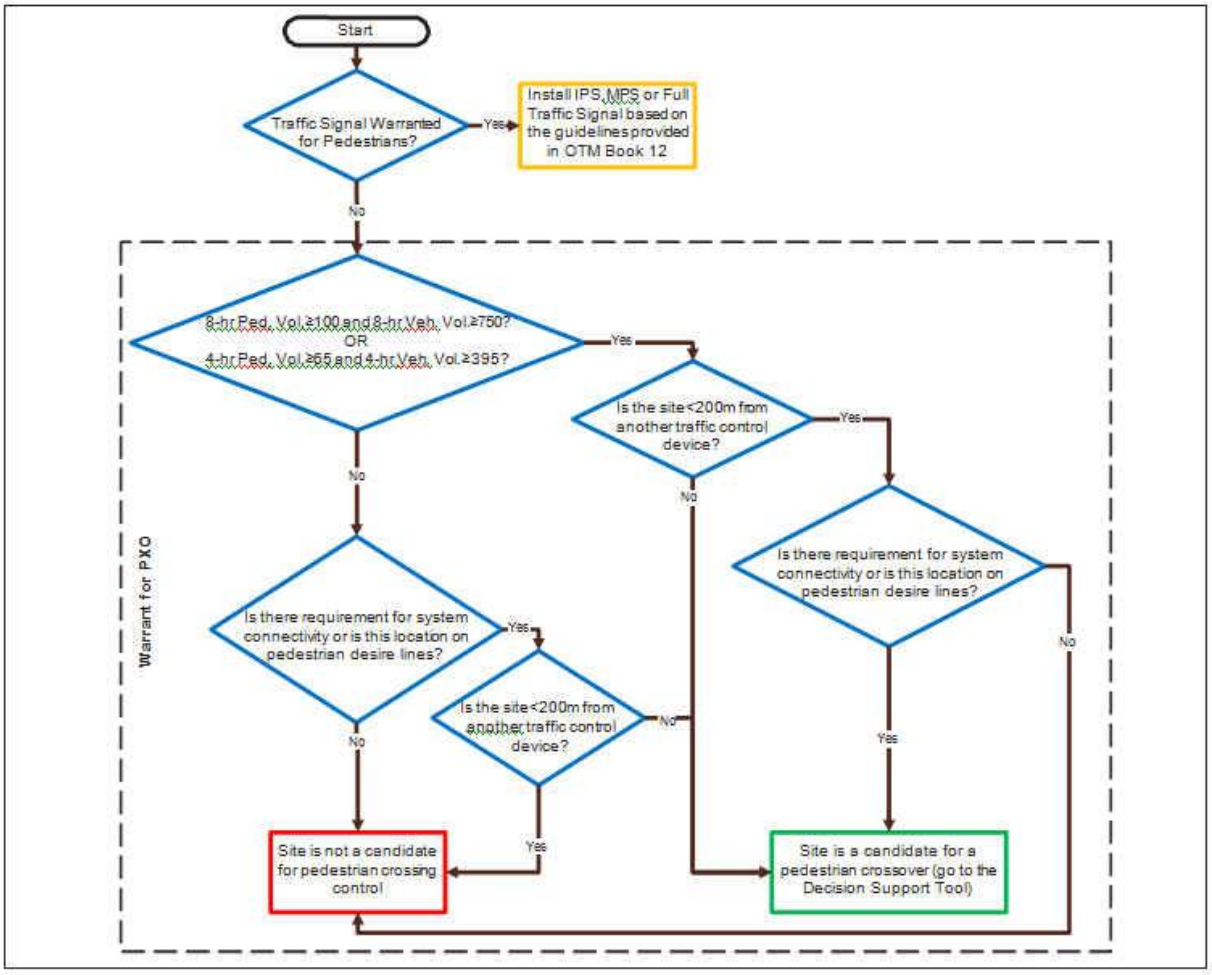
Even before the preliminary assessment is undertaken, it must be confirmed that the identified location has adequate sight distance for both motorists and pedestrians. Motorists must be able to see pedestrians in the waiting area adjacent to the crossing in sufficient time to perceive their intent to cross, react and brake to a stop comfortably. Similarly, pedestrians must be able to see oncoming traffic in both directions of travel so that they do not begin to cross when motorists have insufficient time to stop. To accommodate sight lines, it may be necessary to modify curb side regulations which may include the removal or relocation of on-street parking, bus stops, loading zones, etc.

The preliminary assessment involves the following steps:

- Step 1: Check whether a traffic signal is warranted for pedestrians based on Justification 6 of OTM Book 12.
- Step 2: If a traffic signal is not warranted, the flow chart conditions identified below in Figure 1 must be used to assist in checking whether a PXO is warranted for the site.

The Decision Support Tool (DST) – Preliminary Assessment flow chart identified in Book 15 is used to identify whether a site is a candidate for pedestrian crossing control.

Figure 1 - Decision Support Tool (DST) – Preliminary Assessment Flow Chart



In completing the process identified in Figure 1, the following elements are applied:

- Eight hour volumes will be used for urban areas, and four hour counts will be used for rural areas
- Assisted pedestrians, which include children under 12, seniors and those disabled with or without assistance, will count as two persons.

SELECTION PROCESS - PXO

Pedestrian Crossing Control Selection

The second component of the DST provides guidance for pedestrian crossing treatment selection to assist practitioners to identify which treatment system is applicable to the site based on its traffic and geometric characteristics.

The following table, as provided in Book 15, provides a guideline for the treatment system and the likely application environment.

Table 1 - Pedestrian Crossing Treatment System Selection

Type of Crossing	Treatment System	Mid-block	Intersection	Roundabout	Right-turn Channel
Traffic Signal	Full Signal		•		
	Intersection Pedestrian Signal		•		
	Mid-block Pedestrian Signal	•			
Pedestrian Crossover	PXO A	•	•		
	PXO B	•	•	•	
	PXO C	•	•	•	
	PXO D	•	•	•	•
Stop or Yield Control			•		•
Crossing Guard		•	•	•	•

The selection of an appropriate PXO treatment (i.e. Type A, B, C, or D) is determined based on the Pedestrian Crossover Selection Matrix as shown in Table 2. The matrix has been developed based on the following criteria:

- Application of PXOs is limited to road segments with a posted speed limit of 60 km/h or less
- A PXO can be installed on roadways with a maximum of 4 lanes.
- Vehicular traffic volumes are collected during the 8 or 4 hours with the highest pedestrian volumes.
- A PXO must not be used where the road volume exceeds 35,000 AADT (Average Annual Daily Traffic).
- PXOs should not be installed within 200m of other signal-protected pedestrian crossings, although there are some exceptions.

As a result of the criteria used to develop the matrix, four variables are used to select a PXO for a site:

- 8-hour (urban) or 4-hour (rural) two-way vehicular volume of the roadway at the location of the crosswalk
- Posted speed limit of the roadway

- Total number of lanes for the entire roadway cross section
- Presence of raised pedestrian refuge (i.e., refuge island or median)

Note: In the City of Ottawa Pedestrian Crossover (PXO) Program, the Selection Matrix will be used irrespective of the type of environment, such as one-way/two-way roadways, roundabouts, intersections, etc. Also, if the use of a PXO is desired based on the connectivity (i.e. pedestrian and vehicular volume conditions are not fulfilled), then the matrix can still be used based on speed and geometry of the roadway by using the top two rows of the matrix.

Table 2 - Pedestrian Crossover Selection Matrix

Two-way Vehicular Volume			Speed Limit (km/h	Total Number of Lanes for the Roadway Cross Section[1]			
Time Period	Lower Bound	Upper Bound		1 or 2 Lanes	3 lanes	4 lanes w/raised refuge	4 lanes w/o raised refuge
8 Hour	750	2,250	≤50	PXO D	PXO C[3]	PXO D[2]	PXO B
4 Hour	395	1,185					
8 Hour	750	2,250	60	PXO C	PXO B	PXO C[2]	PXO B
4 Hour	395	1,185					
8 Hour	2,250	4,500	≤50	PXO D	PXO B	PXO D[2]	PXO B
4 Hour	1,185	2,370					
8 Hour	2,250	4,500	60	PXO C	PXO B	PXO C[2]	PXO B
4 Hour	1,185	2,370					
8 Hour	4,500	6,000	≤50	PXO C	PXO B	PXO C[2]	PXO B
4 Hour	2,370	3,155					
8 Hour	4,500	6,000	60	PXO B	PXO B	PXO C[2]	PXO B
4 Hour	2,370	3,155					
8 Hour	6,000	7,500	≤50	PXO B	PXO B	PXO C[2]	PXO A
4 Hour	3,155	3,950					
8 Hour	6,000	7,500	60	PXO B	PXO B		
4 Hour	3,155	3,950					
8 Hour	7,500	17,500	≤50	PXO B	PXO B		
4 Hour	3,950	9,215					
8 Hour	7,500	17,500	60	PXO B			
4 Hour	3,950	9,215					

[1]The total number of lanes is representative of crossing distance. The width of these lanes is assumed to be between 3.0 m and 3.75 m according to MTO Geometric Design Standards for Ontario Highways (Chapter D.2). A cross sectional feature (e.g. bike lane or on-street parking) that extends the average crossing distance beyond this range of lane widths may need to be considered as an additional lane in this table.

[2]Use of two side mounted signs per direction lane on the right side and on the median).

[3] Use PXO B for one-way streets.

CONDITIONS REQUIRED

There are a number of conditions required in the pedestrian crossing facility design to implement controlled crossings.

General Considerations

Controlled crossings manage the interaction between pedestrians and vehicles, and present operational benefits to pedestrians by providing priority over vehicles either at all times or for allocated periods of time. This priority may provide a sense of security for pedestrians, encourage pedestrians to cross at the controlled location and limit the number of locations where pedestrian crossings occur.

The OTM guidelines that would automatically limit the distance between pedestrian crossings are as follows:

- According to OTM Book 12, the minimum distance between traffic signals for roads posted at 60 km/h or less is 215 m and for roads posted at 80 km/h is 350 m.
- According to OTM Book 12, PXOs should not be installed within 200 m of other signal- protected pedestrian crossings. Although this is the general rule, OTM Book 15 does make some exceptions for this separation.

Adequate sight distance for all road users must be provided as a fundamental component of all controlled crossing design. Visibility of all signs and signals should be confirmed.

Physical Design Components

The following provides an overview of the geometric requirements of a PXO. Should more detailed information on the design components for PXOs be sought, Book 15 Chapter 6 - Pedestrian Crossing Facility Design: Controlled Crossings should be reviewed.

Crosswalk

According to the *HTA*, a “crosswalk” means,

a. that part of a highway at an intersection that is included within the connections of the lateral lines of the sidewalks on opposite sides of the highway, measured from the curbs or, in the absence of curbs, from the edges of the roadway, or

b. any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by signs or by lines or other markings on the surface.

Crosswalks must be marked for all controlled pedestrian crossing treatments.

Curb Ramps and Depressions

Curb ramps provide access for people using wheelchairs or scooters at crossings where there is an elevation change between the sidewalk and the street level crossing.

Curb depressions improve accessibility for crossing activity for all pedestrians. They are typically provided in urban areas where pedestrian activity exists. Curb depressions are not intended to imply right-of-way, but rather to improve accessibility and safety where pedestrian activity has been demonstrated, or is anticipated.

Specific requirements for depressed curbs are provided in Book 15 Section 2.3.3 – Designing for Accessibility.

Signs

The regulatory signs must be provided, wherever conditions are met according to OTM Book 5 – Regulatory Signs and *Ontario Regulation 615* with all amendments. Where right-of-way to pedestrians is being assigned at new locations through the provision of a PXO, an introductory period is required to safely carry out the transition. The complete procedure with required regulatory signs is also included in *Ontario Regulation 615.*

Rapid Rectangular Flashing Beacons with Tell Tale

Rapid Rectangular Flashing Beacons (RRFBs) are pedestrian-activated, high-intensity flashing beacons that warn drivers of the presence of a pedestrian in the crosswalk. RRFBs consist of two rectangular yellow indications with two tell-tale end indicators to let pedestrian know that the beacon is flashing.

RRFBs are required components for PXO Types B and C. Wherever required for an applicable PXO, an RRFB must be used for each direction of travel (see installation layouts of PXO Types B and C).

Markings

The guidelines related to design, installation, and application of pavement markings are provided in OTM Book 11 – Markings and Delineation. Additionally, Ontario Regulation 615 provides information regarding requirements for pavement markings utilized with PXOs.

A yield to pedestrian line is used to indicate the point at which a vehicle approaching a crosswalk must yield to pedestrians in the crosswalk. A yield to pedestrian line is a mandatory component for PXO Types B, C, and D, and is a desirable component for PXO Type A.

Ladder crosswalk markings are a mandatory component for PXO Types B, C, and D. The outer edge of the ladder crosswalks must be minimum 1.5m from the yield to pedestrian line for two-lane roadways and minimum 6.0m from the yield to pedestrian line for multi-lane roadways.

Illumination

The design of all pedestrian crossing treatments (controlled or uncontrolled) must provide adequate lighting to enhance the safety of pedestrians. The guidelines related to planning and design of roadway lighting including lighting of pedestrian crosswalks at intersections, roundabouts and mid-blocks are provided in the TAC Guide for the Design of Roadway Lighting (Roadway Lighting Guide). The Guide also includes the warranting criteria for each application of roadway lighting.

Design Approach

Design, application and operational guidelines and procedures should be used with judicious care and proper consideration of the prevailing circumstances. In some

designs, applications, or operational features, the traffic practitioner's judgement is to meet or exceed a guideline while in others a guideline might not be met for sound reasons, such as space availability, yet still produce a design or operation which may be judged to be safe. Every effort should be made to stay as close to the guidelines as possible in situations like these, and to document reasons for departures from them.

However, no manual can cover all contingencies or all cases encountered in the field. Therefore, field experience, knowledge of application, and engineering judgement are essential in deciding what to do in the absence of specific direction from Book 15 itself and in overriding any recommendations in the manual. Similarly, municipalities may need to adopt policies that reflect local conditions. The traffic practitioner's fundamental responsibility is to exercise engineering judgment on technical matters in the best interests of the public and workers. Guidelines are provided in the Ontario Traffic Manuals to supplement professional experience and assist in making those judgments.