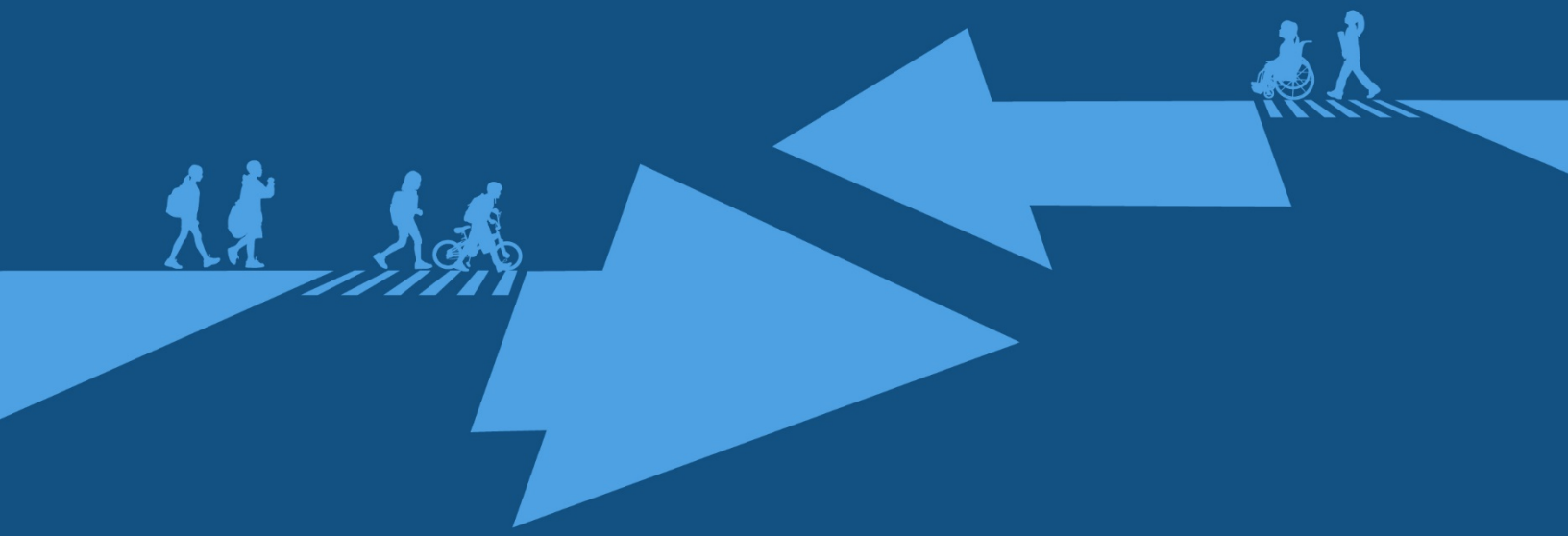
Exhibit A to Report Number EITP-21-015



Guidelines for
Pedestrian Crossing Facilities

KINGSTON

Contents

1 Introduction

The purpose of these guidelines is to provide a process and set of criteria to assess candidate pedestrian crossing locations, an overview of the different types of pedestrian crossing facilities considered, and design guidelines for each pedestrian crossing facility considered. This document will serve to further support the installation of pedestrian crossing facilities as part of developing city-wide and neighbourhood-level active transportation connections, establishing pedestrian connections to transit, and supporting safe and active routes to school.

1.1 Background

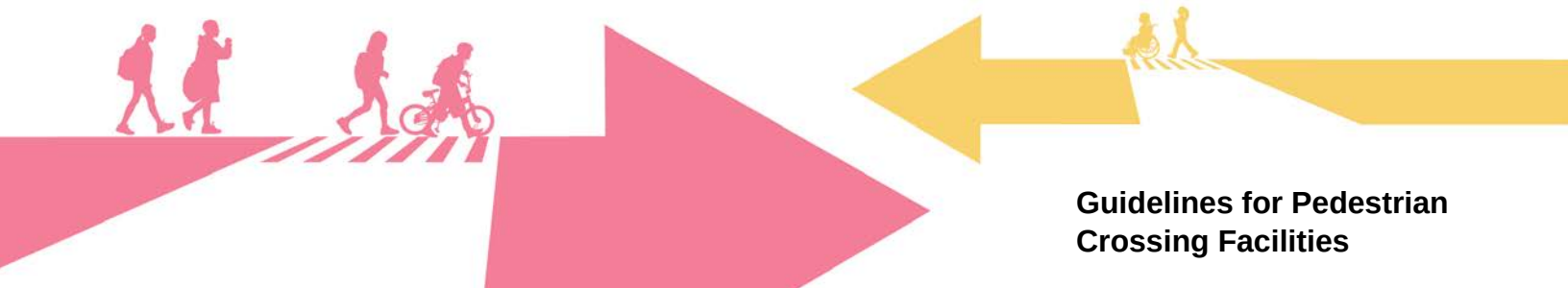
In 2008, the City of Kingston adopted its first set of Pedestrian Crossing Guidelines to provide direction on the installation of pedestrian crossings in the City. In 2016, provisions in the Highway Traffic Act (HTA) were updated, including a change that required motorists to stop and yield the entire roadway to pedestrians and school crossing guards at Pedestrian Crossovers (PXOs) and school crossings. The Pedestrian Crossing Guidelines were subsequently updated to reflect this change to the HTA, which enabled the City to upgrade existing courtesy crossings to PXOs.

In the fall of 2019, City Council adopted the Road Safety Plan (RSP) and Active Transportation Implementation Plan (ATIP), which directed staff to review the City's implementation-based transportation policies and guidelines.

CIMA+ Canada Inc. (CIMA+) was retained to update the 2016 Pedestrian Crossing Guidelines with the following objectives at the forefront:

1. Conduct a review of the content of the current Pedestrian Crossing Guidelines and determine necessary updates based on current best practices
2. Provide detailed strategies for the assessment and implementation of pedestrian crossing treatments that consider:
    - Data collected as part of assessing a locations' suitability for pedestrian crossing treatments
    - Connectivity of pedestrian infrastructure (i.e. existing sidewalks, crosswalks, and desire lines)
    - Pedestrian safety and accessibility

To accomplish these objectives, a review and update of the City's existing Pedestrian Crossing Guidelines was conducted that considers Ontario Traffic Manual Book 15 (i.e. the prevailing guiding document in Ontario) and design practices used by other jurisdictions.



1.2 Recommended Updates in Relation to OTM Book 15

Ontario Traffic Manual (OTM) Book 15 provides guidelines for the planning, design, and operation of pedestrian crossing treatments that are consistent with the intent of Highway Traffic Act and regulations related to pedestrian crossing applications. The purpose of OTM Book 15 is to promote uniformity of treatment in the design, application, and operation of traffic control devices across Ontario, while also providing a foundation for road authorities to generate their own guidelines and standards.

A review of City's 2016 Pedestrian Crossing Guidelines was conducted to identify gaps in relation to OTM Book 15. These gaps were addressed through the additional information and details that are included in this iteration of the guidelines.

2 Types of Pedestrian Crossing Treatments

2.1 Uncontrolled and Controlled Pedestrian Crossings

The Province of Ontario Highway Traffic Act (HTA) broadly classifies pedestrian crossings as "controlled" or "uncontrolled" based on the presence or absence of a traffic control device:

Uncontrolled crossings are those where pedestrians cross without the aid of traffic control measures or a dedicated pedestrian right-of-way.

Controlled crossings are those in which drivers are required to yield the right-of-way to pedestrians in specific conditions.

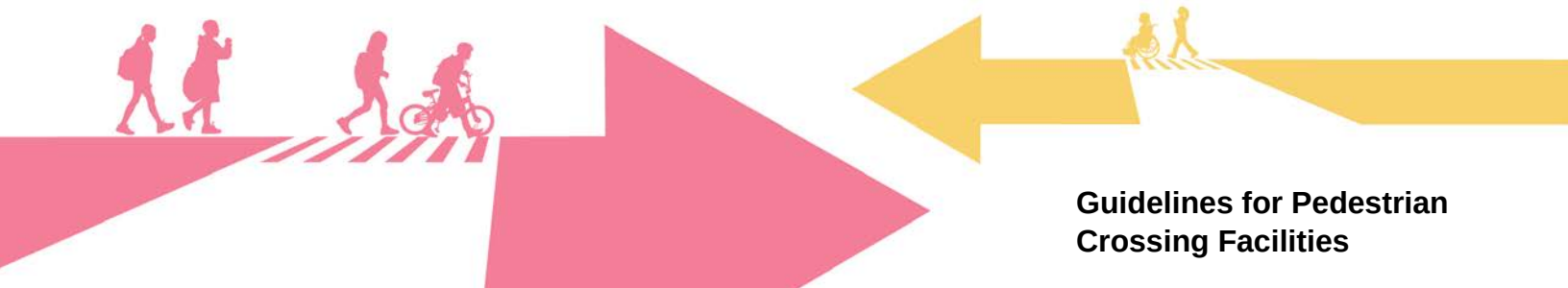
Locations that are designated as controlled crossings involve a combination of signage, pavement markings and in some instances signals or flashing beacons. The presence of a school crossing guard can also designate a location as controlled at an otherwise uncontrolled crossing.

For pedestrians to have the right-of-way (i.e. for the crossing to be considered a 'controlled crossing'), all components of a specified pedestrian crossing implementation are required to be constructed. The use of individual or 'partial' measures (i.e. a crosswalk marking without the other required components) is not recommended as it may create a false sense of security for pedestrians (and particularly children) who may enter the crossing expecting that approaching drivers will see them and stop. A crosswalk marking without the other required components would be considered an 'uncontrolled crossing' where pedestrians do not have a dedicated right-of-way.

2.2 Pedestrian Crossing Treatment Types

The following pedestrian crossing treatment types are considered as part of these guidelines:

- School Crossings
- Stop Controlled or Yield Controlled Intersections



- Pedestrian Crossovers (PXO)
    - Level 2 Type B
    - Level 2 Type C
    - Level 2 Type D
- Traffic Signals
    - Full Traffic Signal
    - Intersection Pedestrian Signal (IPS)
    - Mid-Block Pedestrian Signal (MPS)

A summary of each type of pedestrian crossing considered in these guidelines is presented below. Additional information can be found in OTM Book 5 (Stop or Yield Controlled Intersections), OTM Book 15 (Pedestrian Crossovers), and OTM Book 12 (Traffic Signals), Ontario Traffic Council's (OTC) School Crossing Guard Guide, and the City's All-way Stop Warrant.

2.2.1 School Crossings

School crossings are locations near elementary schools where school children cross on their way to or from school that are supervised by a school crossing guard on school days during specified hours. Traffic control at these locations is provided by the school crossing guard, who directs the movement of persons across a highway by creating necessary gaps in vehicular traffic to provide safe passage at a designated school crossing location. School crossing guards provide designated right-of-way for all persons as vehicles must yield to the raised stop paddle of the school crossing guard. Operation of school crossings and the role of school crossing guards are set out by the Highway Traffic Act's Regulations.

A school crossing in the absence of stop control, PXO, IPS, MPS or traffic signals is considered a controlled crossing only when the crossing is being supervised by a School Crossing Guard.[1] The presence of school crossing signs and markings only, in the absence of school crossing guards, do not require drivers to yield the right-of-way to pedestrians.

In some cases, school crossing guards are assigned to signalized and stop controlled intersections to assist students who may encounter conflicting vehicle turning movements. Under these conditions, the school crossing guard is treated as an additional component of the existing traffic control. In the presence of a school crossing guard, drivers and cyclists must stop and yield the whole roadway – only when pedestrians and the school crossing guard have crossed and are safely on the sidewalk can drivers and cyclists proceed.

[1] Municipal Policy – School Crossing Guard Program, City of Vaughan 19.C.04., November 17, 2020

2.2.2 Stop Controlled or Yield Controlled Intersections

Stop or Yield control intersections make use of regulatory signs as a form of traffic control. Vehicles approaching a STOP in advance of a crosswalk are required to stop at the stop bar, yielding to vehicular traffic and pedestrians (whose arrival preceded theirs) before proceeding.

It should be noted that vehicles approaching a YIELD Sign are required to slow down or stop when necessary, but are not required to complete a full stop before proceeding.[2]

2.2.3 Pedestrian Crossovers (PXO)

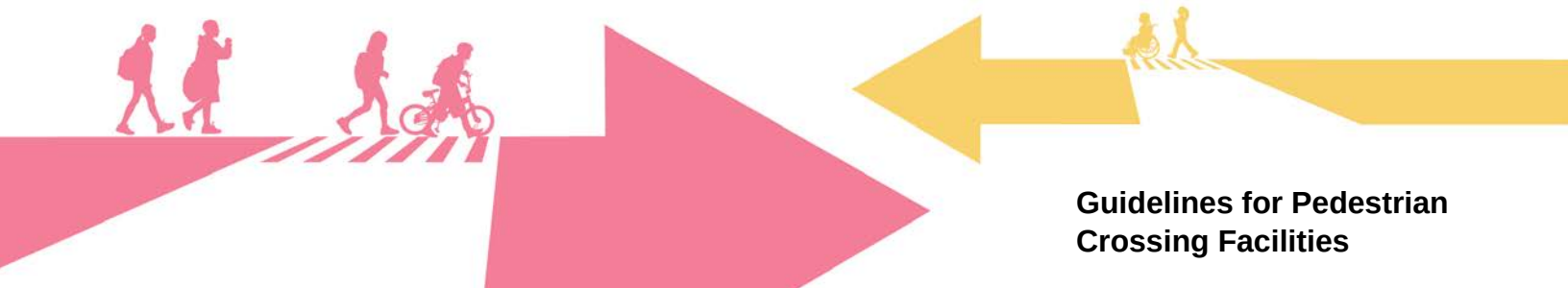
PXOs are a specific type of crossing where drivers and cyclists must stop and yield to pedestrians intending to cross the road, and wait for them to completely reach the other side before continuing. They are marked by regulatory and warning signs, pavement markings, and in some cases, pedestrian-activated rapid rectangular flashing beacons (RRFBs). Pedestrian-activated RRFBs can bring awareness to motorists when utilized at a PXO, but they are not required to be activated for a pedestrian to cross. Vehicles must yield to pedestrians attempting to cross, regardless of the presence or activation of these flashing lights.

At a PXO, motorists approaching and pedestrians attempting to cross each have specific responsibilities as outlined in the HTA:

- When a pedestrian is attempting to cross at a PXO, approaching motorists:
    - Shall stop before entering the crossover
    - Shall not overtake another vehicle already stopped at the crossover
    - Shall not proceed into the crossover until the pedestrian is no longer on the roadway
- Pedestrians attempting to cross:
    - Shall not leave the curb or other place of safety at a pedestrian crossover and walk, run or move into the path of a vehicle that is so close that it would be impracticable for the driver of the vehicle to comply with the requirements mentioned above.

In summary, all Level 2 PXOs operate in the same fashion, with the presence of a pedestrian being the traffic control, and the signs, pavement markings and other elements (i.e. RRFB when applicable) providing awareness to the driver regarding the presence of the PXO. Although a Type B PXO is equipped with a rapid rectangular flashing beacon (RRFB) and a push button, a pedestrian is not required to activate the device before attempting to cross the roadway.

[2] Ontario Traffic Manual Book 15 – Pedestrian Crossing Treatments, June 2016



2.2.4 Signalized Pedestrian Crossings[3]

Intersection Pedestrian Signals

Intersection Pedestrian Signals (IPS), also referred to as “half signals”, are installed at intersections and are controlled by traditional traffic signals with signalized pedestrian fixtures and a crosswalk that provide pedestrian right-of-way across a main street. Vehicles approaching an intersection with a IPS from a side street are typically controlled by a stop sign.

Mid-Block Pedestrian Signals

Mid-block Pedestrian Signals (MPS) are installed between intersections and are controlled by traditional traffic signals with signalized pedestrian fixtures and a crosswalk that provide pedestrian right-of-way across a main street.

Full Traffic Signals

Full traffic signals control the right-of-way between conflicting streams of vehicular traffic and conflicting movements between vehicular traffic and pedestrians crossing a road for all approaches of an intersection.

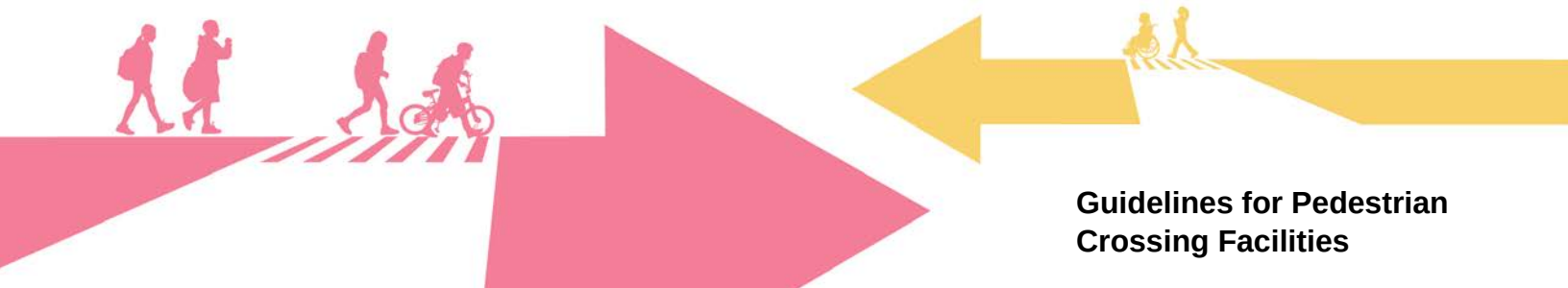
2.3 Public Education

Public awareness, communication, and education strategies play an important role in the implementation of new pedestrian facilities. It is important that messaging targets both pedestrians and drivers.

Ongoing communication and social media efforts are critical to creating city-wide awareness. This may include the use of infographics and videos to reach different audiences through a variety of formats and may include content geared towards younger students walking or cycling to school. Education efforts can also include on-site or neighbourhood-targeted messaging specific to new crossing facilities in the area, or demonstration days at new crossings to highlight how they work and the proper way for pedestrians and drivers to use them.

Specific attention is recommended for public education on Type D PXO’s as part of their implementation. Messaging should highlight that the presence of a pedestrian attempting to cross requires motorists to stop and yield until pedestrians are completely off of the roadway. Signs, pavement markings and any other elements provide awareness to the driver regarding the presence of the PXO, but they do not serve as the traffic control. Pedestrians also have a role to play by providing sufficient time for motorists to be able to stop and yield the right-of-way before crossing.

[3] Ontario Traffic Manual Book 15 – Pedestrian Crossing Treatments, June 2016



3 Assessment of Locations for Pedestrian Crossing Treatments

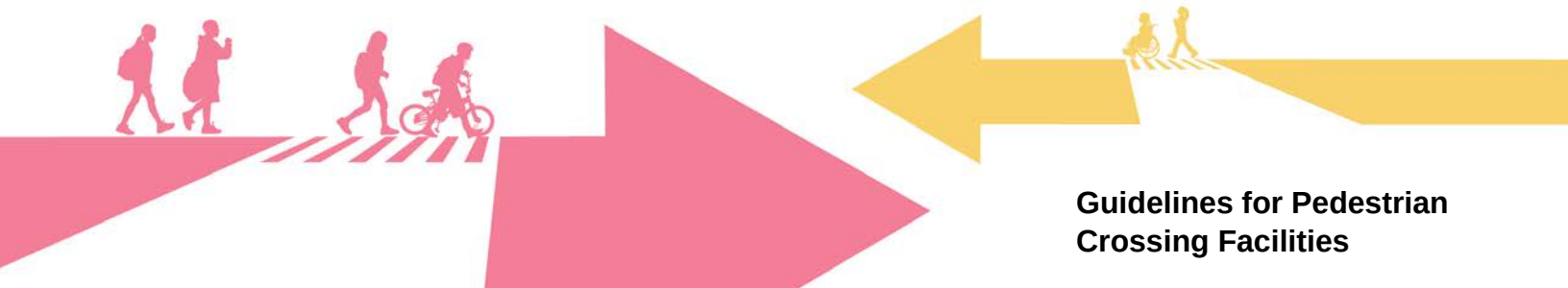
The assessment outline provided below considers the following guiding principles of the TAC Pedestrian Crossing Control Guide (Transportation Association of Canada, 2012), referenced in OTM Book 15:

- **Safety**: It is fundamental that the road system protect pedestrians and other vulnerable road users by achieving a high level of compliance from drivers, bicyclists and pedestrians, and by minimizing pedestrian exposure to vehicular traffic.
- **Delay**: As pedestrian delay increases, the likelihood of pedestrians making risky or non-compliant crossings also increases. This reduces the efficiency and safety of the crossing for both pedestrians and vehicle occupants.
- **Equity**: As the population changes, a “design pedestrian” should be considered to ensure the accessibility of road users of all ages and abilities. The design pedestrian will determine the walking and crossing speeds for the planning and design of these facilities.
- **Expectancy**: The presence of a pedestrian crossing system should not violate driver expectancy, thereby increasing the likelihood of drivers responding to situations correctly and quickly. The crossing location and any waiting or crossing pedestrian should be clearly visible.
- **Consistency**: The road authorities’ approach to pedestrian crossing facilities and control should be consistent and uniform across the transportation system. Consistency helps ensure that installations and devices are recognized, comprehended, and used effectively by all road users.
- **Connectivity**: Paying attention when pedestrians use unplanned routes in preference to or in the absence of a designated alternative (i.e. a desire path) will aid in providing appropriate pedestrian facilities. Facilitating connectivity between crosswalks and sidewalks, and/or trail networks involves understanding and monitoring pedestrian desire lines, which evolve as a function of land use, the location of pedestrian generators and attractors, and proximity to existing crossing facilities.
- **Pragmatism**: The pragmatic selection of pedestrian crossing control devices involves consideration of costs, effectiveness of the device in local conditions, ease of installation and maintenance of the device, particularly in winter, when maintenance due to snow and ice can be challenging.

Using this guidance as a foundation, the process for the selection of a suitable pedestrian crossing treatment is divided in two parts: **1) Preliminary Investigation**, and **2) Pedestrian Crossing Facility Assessment**. These tasks and sub-tasks do not necessarily take place sequentially. Iteration between tasks may be needed to gather additional information to complete the review.

3.1 Context

The proposed assessment process considers that City staff will require the identification of a suitable pedestrian crossing treatment as part of the following activities:



- Safety and operational considerations identified by City Staff
- Reconstruction and/or improvements to roadway infrastructure
- Recommendations provided to proponents during the development approval process
- In response to a request submitted by general public, stakeholders (i.e. school boards and community organizations) as well as members of Council

The determination of the most suitable pedestrian crossing treatment, and the amount and type of information available to support the selection and implementation process may be different for each of the above contexts. As such, it is recommended that the screening process schematically presented in **Figure 1** will be carried out in advance of the Pedestrian Crossing Treatment Assessment Process.

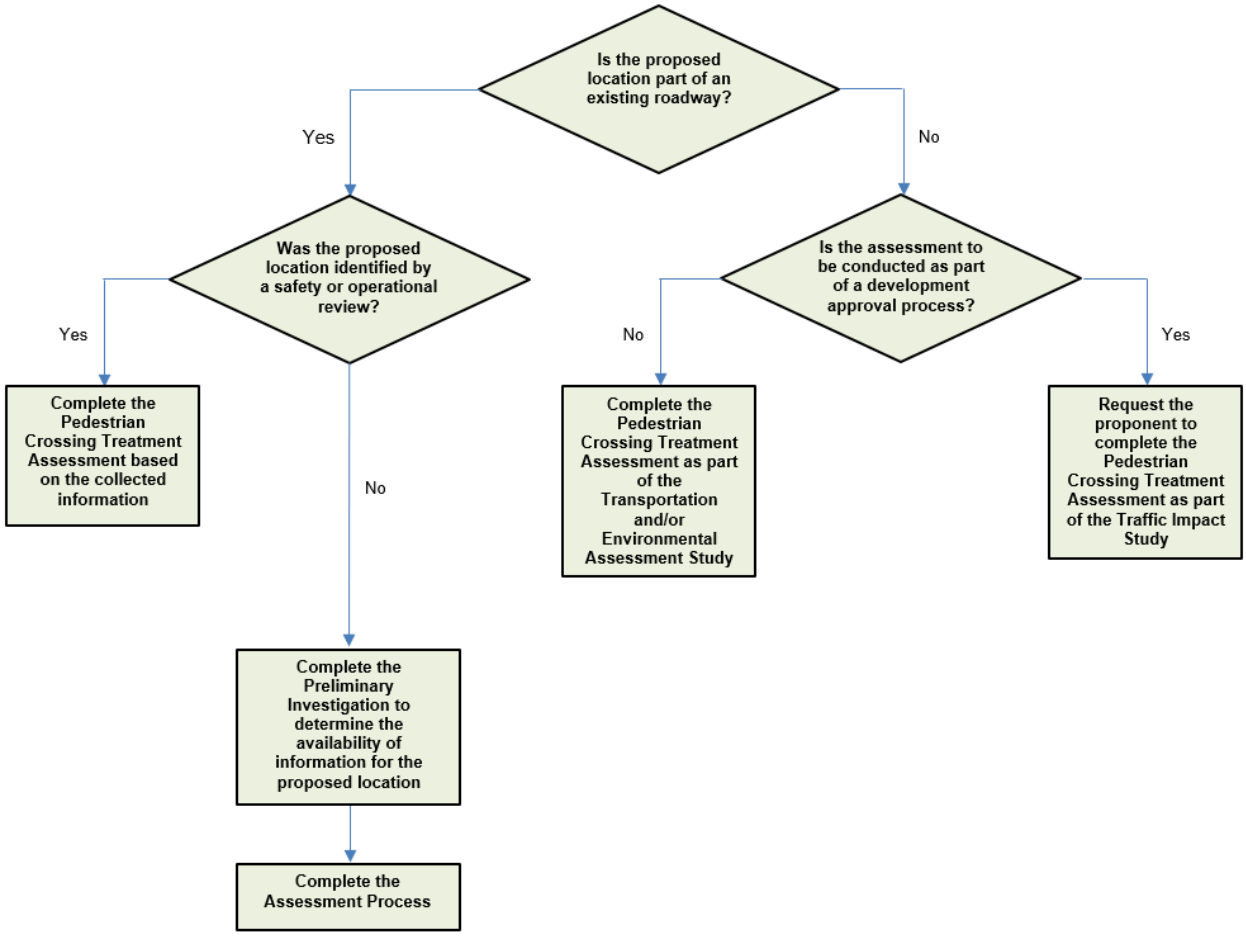


Figure 1: **Preliminary Screening of Proposed Locations**

3.2 Assessment Process and Criteria

3.2.1 Preliminary Investigation

The purpose of the preliminary investigation is to collect information needed to (1) determine the type of pedestrian crossing treatment and (2) to determine the suitability of the location for implementing the crossing treatment. Office reviews and field investigations are needed to collect the required information. Where possible, the following data/information should be collected or made available before beginning the review:

- 8 or 4-hour peak pedestrian volumes, including breakdown of vulnerable pedestrians;
- 8 or 4-hour count of pedestrian delayed 10 seconds or more;
- 8 or 4-hour vehicle volumes taken during peak pedestrian hours;
- Vehicle 85th percentile speeds if there is a concern of speeding;
- Aerial Photography and/or CAD base plans, if available;
- Number of lanes, lane widths and divided or undivided road;
- Distance to nearest controlled or uncontrolled pedestrian crossing;
- Turning Movement Counts / Signal Timings of any nearby intersection or a driveway, if there is one (these may be required to review any queue build-up at the proposed location);
- Design and posted speeds of the roadway;
- Design vehicle for the main roadway including the type of vehicle turning from a nearby crossing road (e.g. waste collection vehicle, type of bus, etc.);
- Collision history;
- Presence of Kingston Transit and length of buses/design vehicles for Transit movements; and
- Presence of any Canada Post mailboxes, or any other maintenance areas.

3.2.2 Office Review

As part of the office review, the data noted above will be reviewed. Any gaps within the data will be addressed during the field investigation. The following reviews should be completed. As noted above, these reviews are not necessarily to be completed in a particular sequence.

- **Geometrical Review of Study Area** – A review of the study area should be conducted through mapping (e.g. Google Earth, Aerial Photography, etc.) to understand the land use, pedestrian and traffic generators, alignments, and other geometric features in the area.
- **Speed Studies** – This task requires reviewing and analyzing actual travel speeds to identify the operating speed or to verify concerns related to speeding.
- **Analysis of traffic / pedestrian volume** – The analysis of traffic and pedestrian volume provides a preliminary understanding of the type of pedestrian crossing treatment.
- **Road User Collision Analysis** – The analysis of the historical collision data provides an understanding of potential safety deficiencies of the study site.

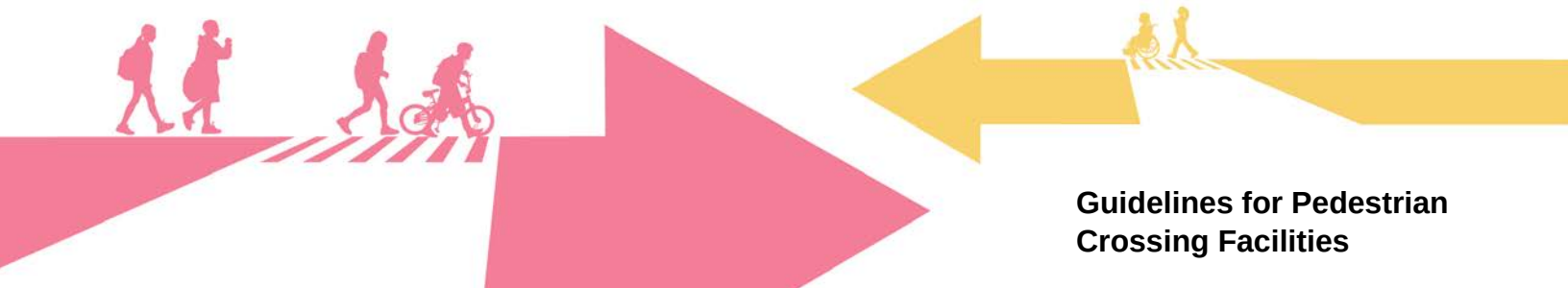
- **Operational Issues** – This task may be required if there is a potential problem of queuing as a result of any nearby intersection or driveway. This task should be conducted using appropriate Highway Capacity Methods methodology as required.

3.2.3 Field Investigation

A detailed field investigation within the study area should be undertaken to identify the factors that may impact a crossing location as well the type of treatment. The review should be conducted during peak and off-peak hours and any other hours when pedestrian traffic is expected to be higher. A night review should also be considered to review illumination and conspicuity issues.

During the field investigation the following details should be observed:

- Roadway geometric characteristics including horizontal and vertical alignments (i.e. visibility for all road users including a sight line review as required), cross-section, medians, lane and intersection configuration, lane continuity, channelization, auxiliary lanes, pavement and shoulder condition, sight distances, driveway and side street accessibility, on-street parking and visibility (sight triangles). The sight distance (for both motorists and pedestrians) should be measured as per the guidance provided in TAC Geometric Design Guide for Canadian Roads. Any obstructions to sight lines should be reviewed further. In most cases, minimum stopping sight distance should be sufficient, however, in some critical situations, decision sight distances should be considered. The review of these elements should consider the implications on a pedestrian crossing. For example, a pedestrian crosswalk at a midblock location within a short left-turn lane to a driveway may not be ideal.
- The presence of existing traffic control devices (signs, and pavement markings etc.) should be reviewed. The location of existing signs will be needed during the design. For example, NO PARKING signs may need to be replaced with NO STOPPING signs, or an existing post may be needed to accommodate a PXO related sign.
- Since controlled pedestrian crossings are not recommended to be installed within 200 m of other traffic controls per Ontario Traffic Manual (OTM) Book 15, adjacent controlled pedestrian crossings of any type should be noted and reviewed. Any nearby intersections should be observed for potential queues extending towards the potential location of pedestrian crossing. An operational analysis may be required as part of the office review. Per OTM Book 15, the consideration for implementing controlled pedestrian crossings within a distance of less than 200 m of other traffic controls should be reviewed on a case by case basis by the municipality, in considering all of the office and field investigation data including potential justifications based on connectivity requirements, pedestrian desire lines, etc. Adjacent traffic controls may also require further review to assess potential impacts.
- Any driveways located near the potential crossing location should be reviewed. For example, a crosswalk should be avoided at a location where there is a potential of frequently blocking a busy driveway.



- The demographics of the pedestrians at the proposed location should be reviewed with a focus on identifying vulnerable pedestrians, such as school children, pedestrians that are elderly, and/or pedestrians with mobility needs. This is especially important for signalized crossings as an adjustment to pedestrian crossing time may be required.
- A review of pedestrian connectivity or pedestrian desire lines will be required. The site investigation should look for natural pedestrian paths and reasons for pedestrians need to cross at a location. Some examples are the presence of a trail on both sides of a road, school near a residential development, recreation centre, park, commercial plaza near on the opposite side of a commercial establishment, etc.
- A review of infrastructure elements at the potential pedestrian location will be required to identify improvement to available infrastructure, such as sidewalks, curb ramps, curb/gutter, etc.
- Illumination is a mandatory requirement for pedestrian crossings as per OTM Book 15. Illumination levels should be measured to ensure that minimum required illumination levels are available or implemented as part of the crossing construction. The presence of lighting and hydro poles should be noted. If the illumination levels are less than required, illumination will need to be considered in the detailed design.
- A utility investigation is very important. Information on underground and overhead utility infrastructure is required for placement of crosswalks. This is especially important for PXO Types B and C and traffic signals, as the concrete base for poles must be clear from any underground utility. Like underground utility infrastructure, overhead wiring may also be a constraint in some cases.
- Some other important considerations for the location of a pedestrian crosswalk include the presence of transit stops, whether or not the location is a school crossing, presence of raised island in the roadway, and any specific or unique design vehicle movements (e.g. bus, garbage truck, etc.).

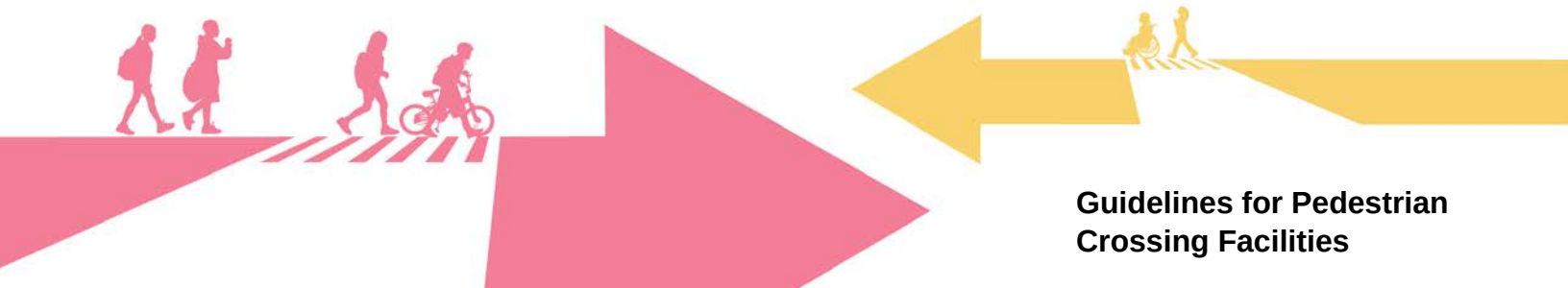
3.2.4 Assessment Process

The Pedestrian Crossing Treatment Assessment is designed to support the selection of a suitable type of pedestrian crossing treatment. The information collected in the preliminary investigation should be utilized as part of completing the assessment.

Supervised School Crossings

School Crossing assessments should be completed following the warrant guidelines outlined in the Ontario Traffic Council's School Crossing Guard Guide. Assessments should be conducted during morning and afternoon peak active school travel periods and may consider the following as part of the evaluation assessment:

- Percentage of 5-minute intervals with less than four safe gaps
- Pedestrian (student) count
- Vehicle count
- Sight distance issues



- Observed aggressive driving

Stop Controlled or Yield Controlled Intersections

The purpose of the STOP and YIELD sign is to clearly assign right-of-way between vehicles approaching an intersection from different directions when traffic signals are not warranted. As such, the user of this document should follow the Guidelines for Use established by the Ontario Traffic Manual Book 5 – Regulatory Signs and the Council-adopted All-way Stop Warrant for the assessment of this type of traffic control.

Pedestrian Crossovers

The following assessment should be used to determine whether a potential location for pedestrian crossing control is an appropriate candidate site for the installation of a Type B, C, or D PXO. For this type of pedestrian crossing, the process begins with the assessment of the following limitations for implementing PXOs:

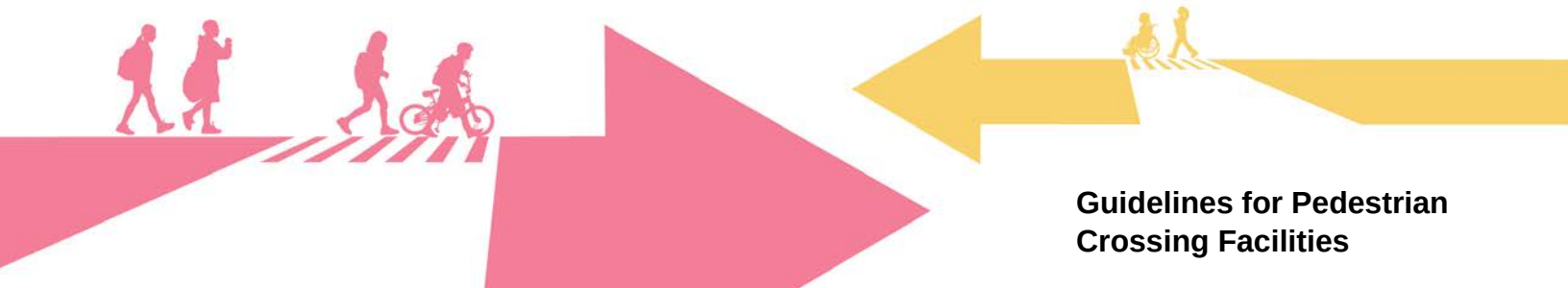
- PXOs are limited to road segments with a posted speed limit of 60 km/h or less;
- PXOs are limited to roadways with a maximum of 4 lanes;
- PXOs must not be used where the road volume exceeds 35,000 AADT (Average Annual Daily Traffic) or 17,500 vehicles in the highest 8-hour pedestrian interval; and
- PXOs are not recommended to be installed within 200 am of other traffic controls, although there are some exceptions relating to pedestrian connectivity, as discussed above in section 3.2.3.

The assessment involves the following steps with the use of Pedestrian Crossover Selection Matrix from OTM Book 15 as shown in **Table 1**.

Step 1: Check minimum pedestrian and vehicular volumes as the first step. If the total 8-hour (or 4-hour) pedestrian volume crossing the main road at an intersection or midblock location during the highest pedestrian traffic hours is greater than 100 (or 65 for 4-hour) and the 8-hour vehicular volume during the same time period is greater than 750 vehicles (or 395 for 4-hours), then proceed to Step 3. If not, proceed to Step 2.

Step 2: Check for connectivity requirements, such as existing sidewalks, walkways or trails to confirm pedestrian desire lines. The system connectivity and pedestrian desire lines should be assessed based on sound engineering judgement and should be appropriately documented. If the site does not satisfy the system connectivity requirement or it is not on a pedestrian desire line, the site is not a candidate for pedestrian crossing control. If the site is a candidate for pedestrian crossing control, proceed to Step 3.

Step 3: Use Table 1 to determine if the proposed location meets the criteria for a Type D PXO (i.e. 2 lane roadway or 4 lane with raised refuge island roadway and 50 km/h posted speed and less and < 4,500 vehicles during highest 8-hour pedestrian times). If a Type D PXO is warranted, then proceed to Step 4. If a Type D PXO is not warranted, then proceed to Step 5.



Step 4: If a Type D PXO is warranted, confirm minimum stopping sight distance for both motorists and pedestrians is available as well as verifying if excessive speeding is a concern and proceed to Step 7.

Step 5: If the criteria for a Type D PXO provided in Table 1 is exceeded, then consider a Type C PXO and proceed to Step 6. If the criteria for a Type C PXO provided in Table 1 is exceeded, then consider a Type B PXO and proceed to Step 6. If the criteria for a Type B PXO provided in Table 1 is exceeded, then the site is not a candidate for a pedestrian crossover and proceed to traffic signals assessment Step 8.

Step 6: If a Type C or B PXO is warranted, confirm if minimum stopping sight distance for both motorists and pedestrians is available as well as verifying if excessive speeding is a concern and proceed to Step 7.

Step 7: Address any findings related to sightlines issues, excessive speeds or to vulnerable road users such as adding a raised refuge island to the PXO and proper curb and ramps slopes for all PXO approaches.

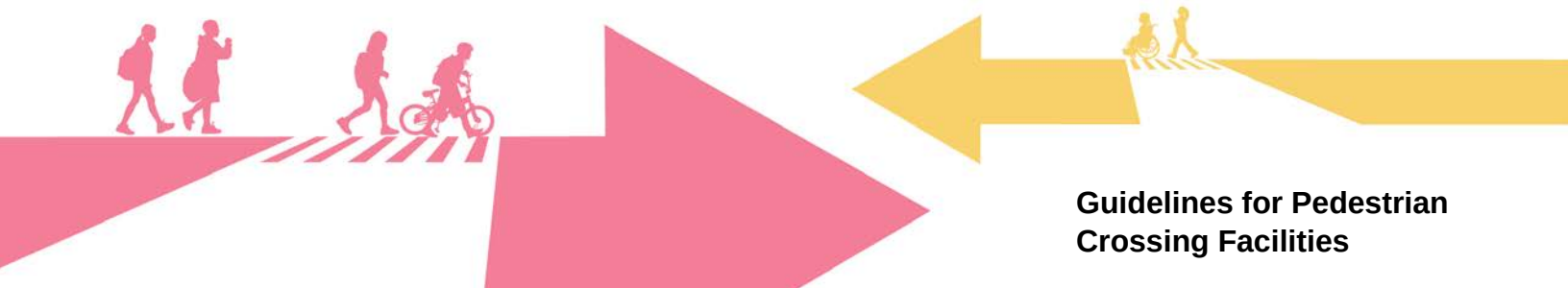


Table 1: Pedestrian Crossover Selection Matrix (Source: OTM Book 15)

Two-way Vehicular Volume			Posted Speed Limit (km/h)	Total Number of Lanes for the Roadway Cross Section[4]			
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	Level 2 Type D	Level 2 Type C[6]	Level 2 Type D[5]	Level 2 Type B
4 Hour	395	1,185					
8 Hour	750	2,250	60	Level 2 Type C	Level 2 Type B	Level 2 Type C[5]	Level 2 Type B
4 Hour	395	1,185					
8 Hour	2,250	4,500	≤50	Level 2 Type D	Level 2 Type B	Level 2 Type D[5]	Level 2 Type B
4 Hour	1,185	2,370					
8 Hour	2,250	4,500	60	Level 2 Type C	Level 2 Type B	Level 2 Type C[5]	Level 2 Type B
4 Hour	1,185	2,370					
8 Hour	4,500	6,000	≤50	Level 2 Type C	Level 2 Type B	Level 2 Type C[5]	Level 2 Type B
4 Hour	2,370	3,155					
8 Hour	4,500	6,000	60	Level 2 Type B	Level 2 Type B	Level 2 Type C[5]	Level 2 Type B
4 Hour	2,370	3,155					
8 Hour	6,000	7,500	≤50	Level 2 Type B	Level 2 Type B	Level 2 Type C[5]	N/A
4 Hour	3,155	3,950					
8 Hour	6,000	7,500	60	Level 2 Type B	Level 2 Type B	N/A	N/A
4 Hour	3,155	3,950					
8 Hour	7,500	17,500	≤50	Level 2 Type B	Level 2 Type B	N/A	N/A
4 Hour	3,950	9,215					
8 Hour	7,500	17,500	60	Level 2 Type B	N/A	N/A	N/A
4 Hour	3,950	9,215					

Type B **Type C** **Type D**

Approaches to roundabouts should be considered separate roadways.

[4] 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) may extend the average crossing distance beyond this range of lane widths.

[5] Use of two sets of side mounted signs for each direction (one on the right side and one on the median)

[6] Use of Level 2 Type B PXO up to 3 lanes total, cross section one-way.

The hatched cells in this table show that a PXO is not recommended for sites with these traffic and geometric conditions. Generally, a traffic signal is warranted for such conditions.

Traffic Signals

The traffic signals assessment is used to check whether an IPS, MPS or Full Traffic Signal is a candidate for installation when the criteria for a PXO treatment have not been met. The preliminary assessment involves the following steps:

Step 8: Determine whether an IPS or MPS is warranted based on OTM Book 15 warrant methodologies for these devices (i.e. Justification 6A and 6B). If a pedestrian signal is warranted, then add to the City's traffic signal capital project prioritization list. If a pedestrian signal is not warranted, then proceed to Step 9.

Step 9: Determine if a full signal is warranted based on OTM Book 12 warrant methodologies.

3.2.5 Considerations for Data Collection

As stated in the OTM series of Books, the traffic practitioner's fundamental responsibility is to exercise engineering judgement and experience on technical matters in the best interest of the public and works. 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.

As indicated in **Section 3.1**. of this document, the user of these Guidelines may be required to assess a location in which some of the information required to complete the assessment process may be unavailable (i.e. if the proposed location is part of a new development) or difficult to collect due to operational or budgetary restrictions. Under those circumstances, the user of these Guidelines will need to exercise engineering judgement and apply their experience on technical matters to determine an alternative approach for data collection. The following is provided as a basis for consideration:

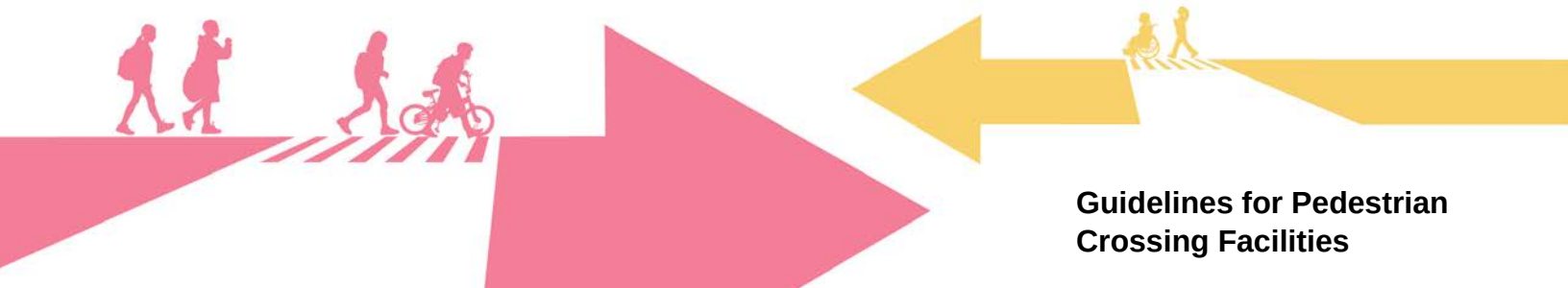
Lack of Vehicular Traffic and Pedestrian Volumes

To determine if a specific type of pedestrian crossing treatment is warranted or not, information regarding the current (or expected) vehicular traffic and pedestrian volumes is required. However, a PXO may be selected for further consideration if there is a requirement for system connectivity or if the proposed location is part of a pedestrian desire line without necessarily having the most accurate information regarding pedestrian volumes.

In the absence of vehicular traffic volumes (8-hour or 4 hour), Annual Average Daily Traffic (AADT) data can be used as surrogate for the estimation of two-way vehicular volume as described in Section 5.2.2. of OTM Book 15.

New or Future Development

If a potential generator of pedestrian traffic is expected to be part of a new or proposed development (i.e. a new school or community centre) the requirement for a future PXO should be considered as part of the development approval process. As part of this process, a preliminary identification of pedestrian desire line based on the proposed site plan may be



achievable. It can be expected that vehicular traffic and pedestrian volumes can be estimated as part of the preparation of the required Traffic Impact Study.

It should be noted that for signalized pedestrian crossings such as IPS, MPS and Full Traffic Signals, this alternative approach is not applicable, and the warrant methodologies described on OTM Book 15 and Book 12 respectively must be followed.

3.2.6 Parameter Considerations

As previously described, the need and selection of the most suitable pedestrian crossing treatment depends on several factors such as roadway environment, vehicular traffic and pedestrian volumes. Though not an exhaustive list, the following highlights some of the elements that should be considered as relevant for each type of pedestrian crossing treatment:

- **Signalized Pedestrian Crossing** (i.e. Full Traffic Signal, Intersection Pedestrian Signal, Mid-Block Pedestrian Signal):
    - Minimum pedestrian volume
    - Minimum pedestrian delay criteria.
- **Pedestrian Crossover**
    - Vehicular Traffic
    - Roadway Cross-Section (number of lanes)
    - Sight distance
    - Distance from the proposed location to the nearest traffic control device
- **Stop and Yield Controlled Intersections**
    - Number of Collisions
    - Minimum Traffic Volumes
    - Sight distance
- **Supervised School Crossing**
    - Vehicular traffic and pedestrian volumes identified as part of a specific route to school

3.3 Interaction with Cycling Facilities

3.3.1 Signalized Intersections

As a result of modifications to Subsection 144 (29) of the Highway Traffic Act, the prohibition against riding or operating a bicycle along or beside a crosswalk was removed, permitting cyclists to ride adjacent to a crosswalk when crossing a road at a signalized intersection. Cyclists can also ride in a marked crossride facility (if present) that functions for cyclists similar

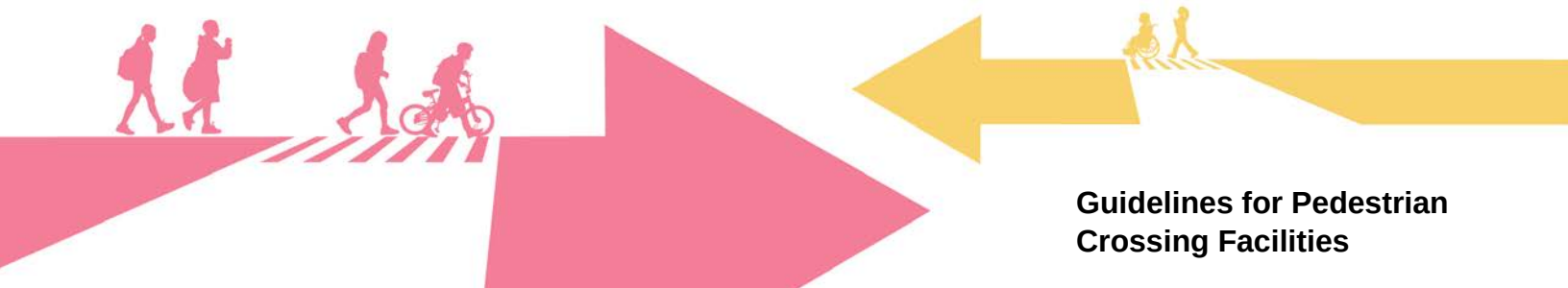
to how crosswalks do for pedestrians. However, it should be noted that cyclists are still not permitted to ride in a crosswalk – cyclists are required to dismount and walk through the crosswalk as a pedestrian.

3.3.2 Pedestrian Crossovers

Although a cyclist can ride alongside a crosswalk at a PXO, the traffic control of a pedestrian crossover is defined by the presence of a pedestrian attempting to cross the road. As such, a motorist is not legally required to allow the right-of-way of a cyclist who has not dismounted. Under these circumstances, a cyclist should dismount and complete the crossing as a pedestrian.

It should be noted that the use, design and applications of crossrides are discussed in extent in OTM Book 18.[7]

[7] Up to the time of this document the final version of the Updated OTM Book 18 was not available for public consultation



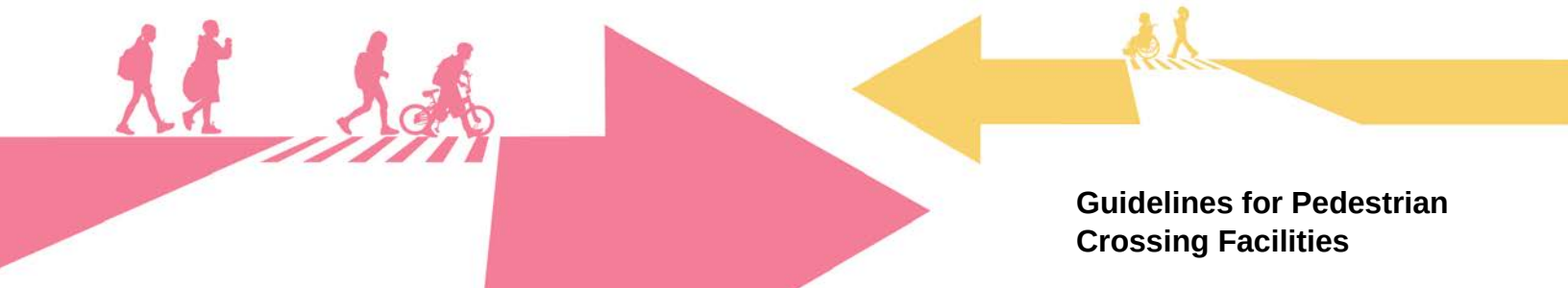
4 Design Guidelines

This section is intended to provide guidance for the design of controlled pedestrian crossing types discussed in the sections above. These guidelines should be considered and used in concert with other relevant guidance for designers such as the Ontario Traffic Manuals (OTM), the Transportation Association of Canada (TAC) Guides and related regulations such as the Highway Traffic Act (HTA).

4.1 Intersection Pedestrian Signal (IPS) and Mid-block Pedestrian Signal (MPS)

4.1.1 Important Considerations

- For an IPS, the main street must be signalized and side streets must be stop-controlled.
- If cyclists are expected to be present in the area, proper guidance should be provided to inform cyclists that they must dismount when crossing the roadway at a dedicated pedestrian crossing.
- Location of poles – Poles with pushbuttons should be placed in such a way that they can be accessible by pedestrians, including those using assistive devices. Poles should not be placed in the sidewalk and should ideally be located within the boulevard or behind the sidewalk. Further details are provided in **Section 4.1.6**.
- Connectivity to sidewalks/trails – Pedestrian crossing facilities should be preferably located with a continuous sidewalk and/or a nearby trail network.
- Parking and no stopping restrictions – According to OTM Book 15, it is desirable to implement stopping prohibition for a minimum of 30 m on each approach to the crossing, and 15 m following the crossing. Further details are provided in **Section 4.1.4**.
- Location of transit stops – The crosswalk location will need to be coordinated with any existing transit stops. There may be situations where transit stops in the vicinity of the crossing may need to be relocated to comply with parking and no stopping restrictions.
- Refuge islands – At some locations where the roadway is wide and the crossing time may be significant, consideration could be given to provide a refuge island for pedestrians' safety. This is more important in areas with pedestrians who may not be able to cross the street in a single pedestrian signal indication (e.g. close to senior residents, committee centres).
- Demography of surrounding area – The demography near the pedestrian crossing should be identified to determine the most appropriate pedestrian walking speed that will be used calculate the required crossing time. Further details are provided in **Section 4.1.8**.
- General utilities (i.e. fire hydrants, hydro poles) – The design process should review for the presence of existing utilities and potential conflicts and coordinate with the utility companies as may be required. Further details are provided in **Section 4.1.6**.
- Auxiliary lanes (left/right-turn lanes) – If a pedestrian crossing is being considered at a location where left/right-turn lanes are present, an operational analysis may need to be



conducted to determine an appropriate storage length for the auxiliary lane(s) to ensure that there is enough available storage length to accommodate left/right-turning vehicles when the pedestrian signal is activated.

- Source of power – IPS, MPS, and illumination poles will require access to electrical power. Further details are provided in **Section 4.1.6**.
- Proximity to driveways – Ensure that no driveways are present between the crosswalk and the stop line because the presence of a driveway may result in sudden movements by exiting drivers if vehicles are stopped while waiting for pedestrians to cross.
- Proximity to traffic signals – According to OTM Book 12, the minimum recommended 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. There may be a desire to have pedestrian crossings at locations that do not meet these requirements. Under these situations, it may be desirable to conduct an operational analysis to evaluate any vehicle queues' impact on the crossing.
- Sightlines – Sight triangles for side street traffic waiting at the stop sign must be clear and should not be obstructed by vegetation, on-street parking, buildings, fences, etc. The visibility of all signs and signals at the crossing should be confirmed for road users. Sight distance requirements are detailed in TAC's Geometric Design Guide for Canadian Roads.

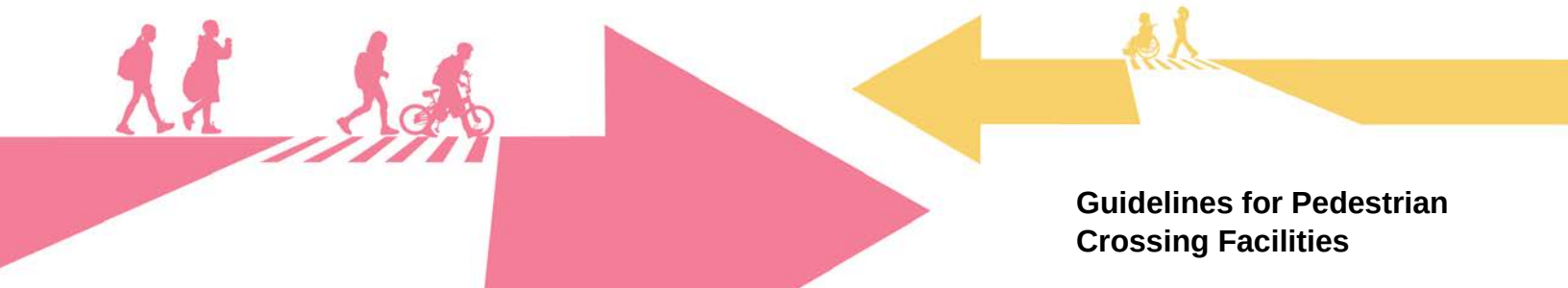
4.1.2 Illumination Levels

Illumination is an important aspect of road safety because it provides adequate visibility for road users when using the roadway system during periods of darkness. Illuminance is the measure of the light (lumens) falling on a surface. The unit of illuminance is commonly known as "lux" and is measured in lumens per square metre. The illuminance of horizontal and vertical surfaces is referred to as horizontal illuminance and vertical illuminance, respectively. Signalized intersections must be fully illuminated.

Intersection lighting requirements are provided in terms of the recommended minimum average maintained horizontal illuminance levels. **Table 2** lists the recommended minimum average maintained illuminance levels for full intersection lighting.

Table 2: Recommended Minimum Illuminance Levels for Full Intersection Lighting (Source: TAC Roadway Lighting Guide)

Roadway Classification	Average Maintained Illuminance at Pavement by Pedestrian Conflict/Activity (lux)			Average-to-Minimum Uniformity Ratio
	High	Medium	Low	
Arterial/Arterial	34.0	26.0	18.0	3.0
Arterial/Collector	29.0	22.0	15.0	3.0
Arterial/Local	26.0	20.0	13.0	3.0



Collector/Collector	24.0	18.0	12.0	4.0
Collector/Local	21.0	16.0	10.0	4.0
Local/Local	18.0	14.0	8.0	6.0

As indicated in **Table 2**, the average maintained illuminance at pavement is recommended based on road classification and low, medium, or high pedestrian conflict/activity, which are classified as follows:

- Low pedestrian conflict/activity: less than 11 pedestrians per hour;
- Medium pedestrian conflict/activity: 11 to 99 pedestrians per hour; and
- High pedestrian conflict/activity: 100 or more pedestrians per hour.

Additionally, the table states the corresponding average-to-minimum uniformity ratio, which is the average level ratio (of either illuminance or luminance) to the minimum level, that should be met for the roadway classification. Generally, a high degree of roadway lighting uniformity is desirable because excessively high lighting levels prevents the eye from adapting to those high levels. This results in insufficient sensitivity for the viewing of the medium and lower lighting levels.

Pedestrian crosswalks at intersections must also consider vertical illuminance values to improve pedestrian visibility. The maintained average vertical levels of illuminance must meet or exceed the maintained average horizontal design levels for the intersection. For example, if the recommendations for the horizontal lighting levels at an intersection are 26.0 lux, then the vertical lighting level recommended in the crosswalk at a height of 1.5 m should be 26.0 lux or greater.

Mid-block crossings installed with traffic signals have the same illumination requirements as signalized intersections stated previously.

Full design procedures for intersection and mid-block crosswalk illumination, including warrant analysis, horizontal and vertical illuminance calculations, equipment selection, and pole layout, are detailed in TAC's Roadway Lighting Guide.

4.1.3 Signal Head Placement

As per OTM Book 12, typical three-section signal heads are used for the main roadway and pedestrian signals with pushbuttons are required for IPS and MPS crossings (pedestrian signals are controlled by pedestrian actuated two-phase operation). The signal heads may be mounted on the same poles (i.e. back-to-back) or independently. Additionally, the side roads must be controlled with stop signs for IPS crossings.

A minimum of two signal heads must face each main road approach of the crossing (including driveways within an intersection for public use). Typically, signal heads may be mounted on

poles with double arm brackets; suspended over the pavement on mast arms, gantry arms, or structural frames. Table 25 in OTM Book 12 details the minimum distance from which signals must be clearly visible based on the roadway's 85th percentile speed. If horizontal or vertical geometry prohibits visibility of at least one signal head within this minimum distance, an auxiliary signal head and potentially a continuous or activated flasher with a “signals ahead” sign is typically required.

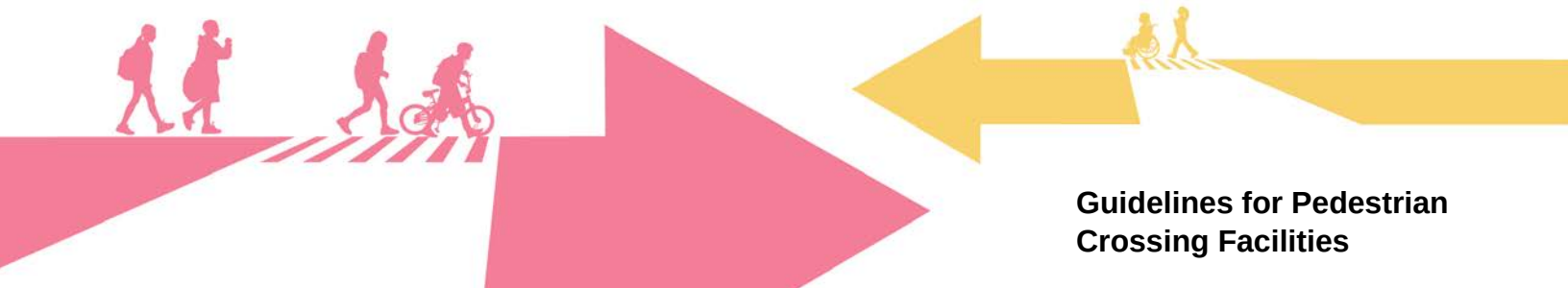
The primary signal head must be located on the far-right side of the crossing and should be oriented to be centred on the approach. If a median island is not present, the primary signal head should be located at the ½ to ¾ point of the receiving curb lane and a minimum of 1.2 m into the lane. If a median island is present, the primary signal head should be located laterally at least at the pavement's edge (0.5 m over the receiving lane is preferred). Additionally, the primary signal head should be located a minimum of 15 m from the near side stop line.

The secondary signal head must be located on the left side of the approaching through lanes. If there is no median, the signal head may be placed on the far-left side of the crossing as far as the left edge of pavement. If a median is present, the signal head may be placed on the median. The secondary head (far-left side) should be located at or as close to the edge of the roadway as feasible. Additionally, secondary heads with left turn arrows should be located as close to the approach as possible. Typically, a minimum separation of 5.0 m between the primary and secondary head should be provided and a maximum (desirable) lateral distance of 15.0 m between the primary and secondary head (absolute maximum distance of 22 m).

Primary heads should be mounted at a minimum height of 4.5 m or higher, but it is desirable for them to be mounted at a height of 5.0 m regardless of the posted roadway speed. If the posted roadway speed is less than 80 km/h, secondary signal heads mounted on the far left and not over traffic lanes may be mounted at a minimum height of 2.75 m, but desirably at a height of 5.0 m. If the secondary head is installed where it is frequently obstructed (i.e. by large vehicles, other signal heads, bridges, etc.), auxiliary heads may be used on the far left of the crossing to improve visibility for drivers. Auxiliary heads may be mounted at a minimum height of 2.75 m (or as high as necessary to obtain good visibility), but desirably at a height of 5.0 m. For roads with a posted speed of 80 km/h and greater, all signal heads should be mounted at a height of at least 5.0 m.

Backboards are recommended for all primary heads and it is preferable to have them on all signal heads. In most circumstances, backboard faces and their rear surfaces are both ‘traffic yellow’ in colour.

Pedestrian signal heads at the crossing must be mounted at a minimum of 2.5 m from the finished grade at the edge of pavement to the bottom of the signal housing and should be recognizable within 30 m under normal conditions of visibility when illuminated. Pedestrian heads must not be mounted at the height of vehicle heads. If feasible, pedestrian heads should be mounted directly behind the sidewalk facing along the crosswalk. Where necessary, the heads may be mounted within 3.0 m of the edge of the sidewalk in the direction that faces the crosswalk, and within 1.5 m of the edge of the crosswalk laterally.



Further details regarding traffic and pedestrian signal head placement can be found in OTM Book 12 – Traffic Signals.

4.1.4 IPS and MPS Components and Restrictions

As per OTM Book 15 (unless otherwise stated), the minimum required components and desired components for IPS and MPS are as follows:

Minimum Required Components:

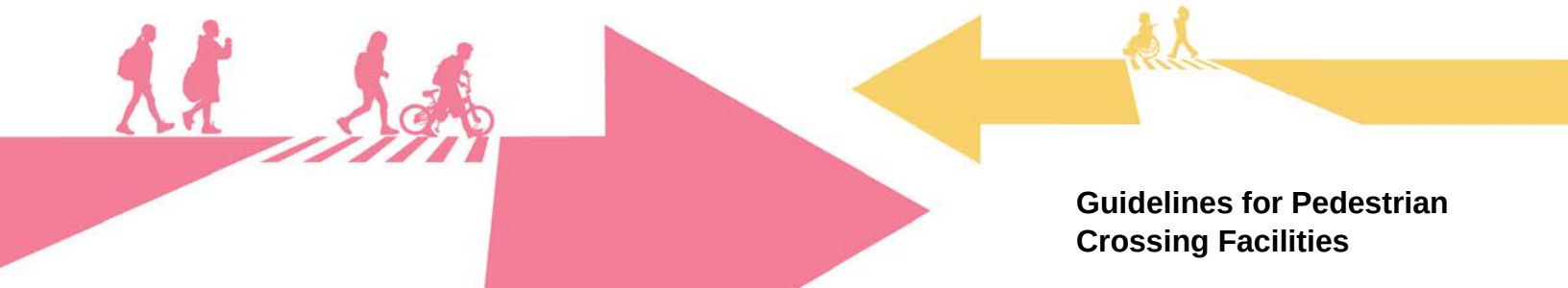
- Traffic Signal Heads as further detailed in **Section 4.1.3**
- Approach markings (stop line, advanced stop bar, no-passing zone, and turn lane markings, as required) and crosswalk markings as further detailed in **Section 4.1.5**
- Stop Here on Red Signal Sign (Rb-78) by stop bar(s) along the main roadway where IPS or MPS is present
- Pedestrian Control Indications with AODA compliant Pedestrian Signal Pushbuttons and Pedestrian Pushbutton Symbol Sign (Ra-12) as further detailed in **Section 4.1.8**
- Stop signs (Ra-1) on the cross streets for IPS

Desired Components or Additional Considerations:

- Raised refuge island (for road cross-sections with more than two lanes and two-directional traffic) with mandatory:
    - Pavement markings on approaches to obstructions;
    - Keep Right Sign (Rb-25, Rb-125); and
    - Object Marker Sign (Wa-33L).
- Stopping prohibition for a minimum of 30 m on each approach to the crossing, and 15 m following the crossing;
- Parking and other sight obstructions prohibition within at least 30 m of crossings;
- Raised crosswalk to reduce vehicle speeds and improve pedestrian visibility; and
- Curb extensions to reduce pedestrian crossing distance.

Details regarding sign location criteria for the aforementioned minimum required components and desired components can be found in OTM Book 5 – Regulatory Signs. Horizontal and vertical mounting offsets for signs can be found in OTM Book 1B – Sign Design Principles.

All IPS and MPS installations shall be accompanied by drawings reflecting the necessary details for the traffic signal installations (equivalent to PHM-125 format).



4.1.5 Pavement Markings

As per OTM Book 15, approach markings (stop line, advanced stop bar, no-passing zone, and turn lane markings, as required) and crosswalk markings are required components for IPS and MPS.

The stop line (also known as a stop bar) must be a solid white retro reflective line between 30 cm and 60 cm wide. Typically, stop lines are placed parallel to the edge of the crossing roadway or at least 1 m from the crosswalk line if a pedestrian crosswalk is present. An IPS requires the near side advanced stop bar to be placed a minimum of 15 m from the primary signal head. For a MPS, the stop bars must be set back a minimum of 12 m (15 m is preferable) from the primary signal head.

Crosswalk lines must be solid white parallel retro reflective lines 10 cm to 20 cm wide that extend entirely across the pavement. The crosswalk width must be at least 2.5 m wide, but widths of 3 m to 4 m are typical in urban areas with higher levels of pedestrian activity. Crosswalks should line up with any proposed sidewalks or dropped curbs. Ladder crosswalk markings may also be considered for the implementation of IPS and MPS crossings as per the OTM Books.

Design guidance for no-passing zones and turn lane markings are detailed in OTM Book 11 – Pavement, Hazard and Delineation Markings.

Section 4.1.7 provides illustrations of installation details for typical IPS and MPS pedestrian crossing treatments that indicate the recommended placement of pavement markings.

A typical crosswalk design with standard crosswalk markings is provided in **Figure 2**.

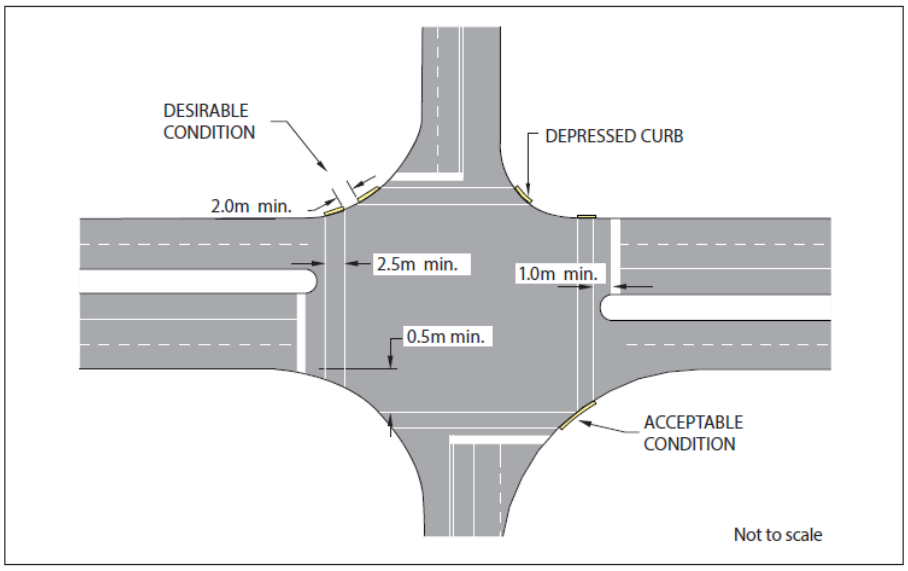


Figure 2: Typical Crosswalk Design with Standard Crosswalk Markings (Source: OTM Book 15)

4.1.6 Infrastructure

Traffic Signal Poles[8]

The typical practice is to install signal poles with a 3.0 m offset from the through edge of pavement. A minimum offset of 1.5 m from the face of the curb is recommended in urban areas with a speed of 50 km/h or less and 0.6 m is the absolute minimum offset at posted speeds of 40 km/h or 50 km/h. The choice of pole locations should consider pedestrian accessibility in terms of reaching the pushbuttons. The selection of location will also require the designer to consider utility clearances, aesthetic requirements, and mast arm length restrictions.

It is recommended that primary signal poles be located as close to the crossing as possible to allow space for other infrastructure such as secondary head mast arms and pedestrian equipment. If a median is present, the maximum recommended longitudinal distance of the primary signal pole is 10 m either way from the location of the median pole (measured along the centreline of the roadway).

Like primary signal poles, a maximum longitudinal distance of 10 m either way from the primary pole location (measured along the centreline of the roadway) should be maintained where possible.

The pole types that should be used to satisfy safety clear zone requirements are provided in the Ontario Ministry of Transportation Roadside Safety Manual and in municipal policy manuals (if available).

Poles with Pedestrian Pushbuttons[9]

Wherever possible, it is desirable that pedestrian pushbuttons be mounted on traffic signal poles. Where a separate pole is required, the pole should be installed near the crossing by the centrelines of the crosswalks and should include the pedestrian heads as well to avoid visual clutter. If this setup is not possible, a short pole with pushbuttons only may be used. Where a separate pole is required, consideration should be given to placing it at least 6.0 m from other poles to allow room for maintenance vehicles to operate and for aesthetic reasons.

The pushbuttons should be installed on the “through sidewalk” side of the pole at a height of 1.1 m (+/- 0.15 m) above finished grade. The pushbuttons should be in line, not perpendicular, with the crosswalk and if possible, poles with pushbuttons should be within the crosswalk lines. If this is not possible, the poles should be located within 1.5 m of the edge of the crosswalk it serves. It is important to ensure that these poles are accessible and user friendly (i.e. not located behind barriers, grassy/muddy areas, or areas where snow windrows may occur). **Section 4.1.8** provides details about accessible pedestrian signals (APS), curb ramps, and depressed curbs at crosswalks to assist pedestrians with visual and/or hearing impairments.

[8] Ontario Traffic Manual Book 12 – Traffic Signals, March 2012
[9] Ontario Traffic Manual Book 12 – Traffic Signals, March 2012

Poles with Pedestrian Heads[9]

Poles carrying pedestrian heads should ideally be located within the crosswalk lines. Pedestrian heads can be mounted on primary, secondary, or auxiliary poles as long as the heads are not located more than 10.0 m longitudinally from the end of the crosswalk. It is important to note that mounting pedestrian heads on the side of the pole nearest the pavement may result in damage by errant, large turning vehicles, snowplows, etc.

Illumination Poles[10]

The recommended minimum horizontal illuminance levels for full intersection lighting can typically be achieved by using combination signal and luminaire poles. If full roadway lighting that ties into the intersection is present, the spacing of the poles on the approach should be designed to synchronize with the lighting for the intersection. Pole layout design typically begins by locating poles at obstructions (i.e. overpass structures or intersections) and then spacing the poles evenly according to calculations conducted by computer lighting design software until the next obstruction or intersection is encountered. Then, the last pole is adjusted relative to the obstruction or intersection, and the pole spacing is updated to provide even spacing between the obstructions/intersections. As a result of the new pole spacing, calculations are adjusted to ensure that minimum criteria values are still met.

The TAC Roadway Lighting Guide indicates that there is no exact formula for determining optimal pole heights and luminaire wattages for a given road. Factors such as pole spacing, luminaire photometrics, wattage, lighting levels and uniformity, power line conflicts, road geometrics, aesthetics, obtrusive lighting issues, etc., are all factors when defining the optimal mounting height. Therefore, computer lighting design software is utilized to determine pole height and luminaire wattage is by testing various scenarios through a “trial and adjustment” process.

All lighting is typically fed from an electrical power supply through wiring connected to an electric power grid.

Typical arrangements of full intersection lighting at four-legged and three-legged intersections are provided in **Figure 3** and **Figure 4**, respectively.

[10] Transportation Association of Canada – Roadway Lighting Guide, January 2006

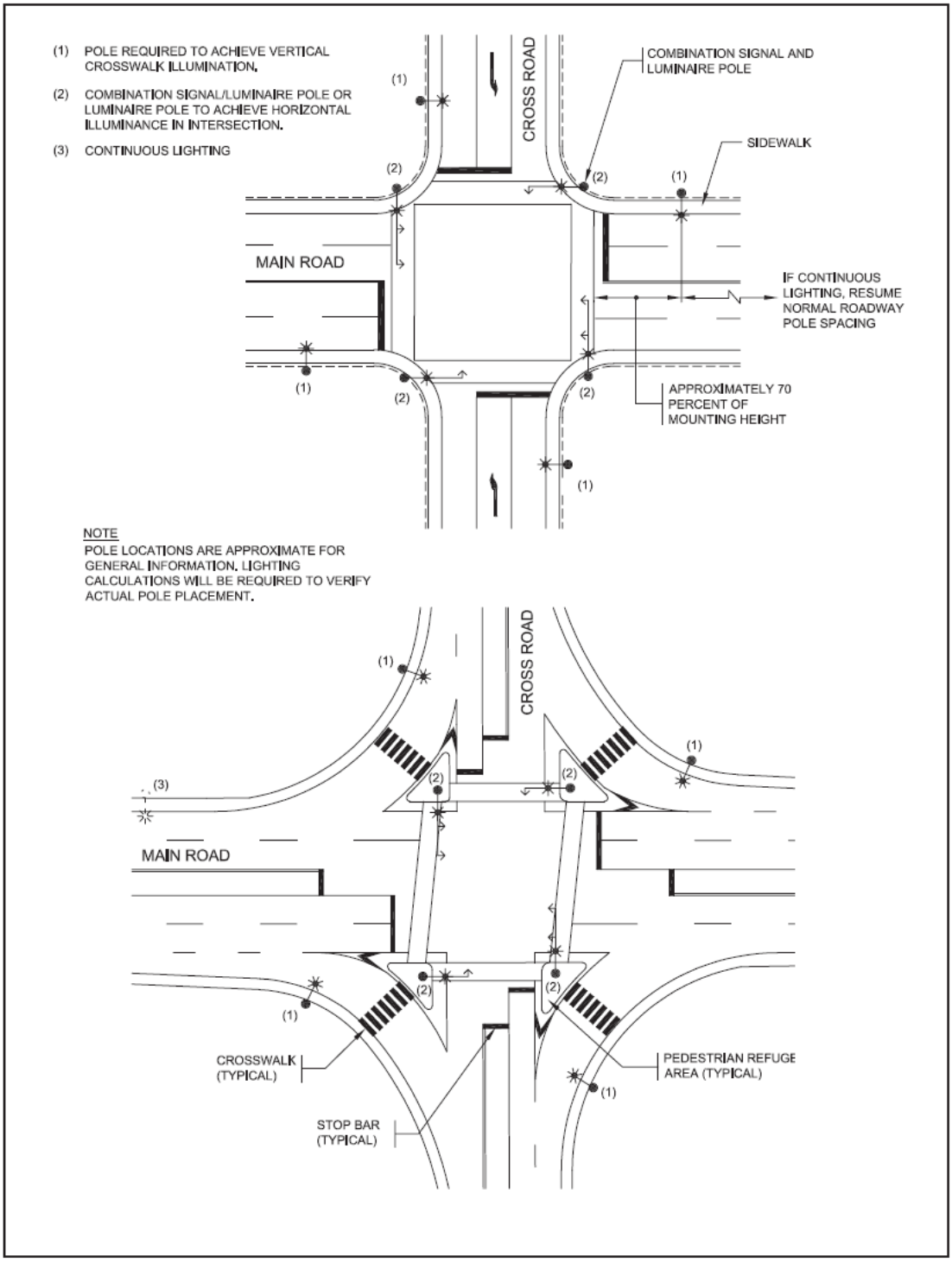


Figure 3: Typical Full Intersection Lighting for a Four-Legged Intersection (Source: TAC Roadway Lighting Guide)

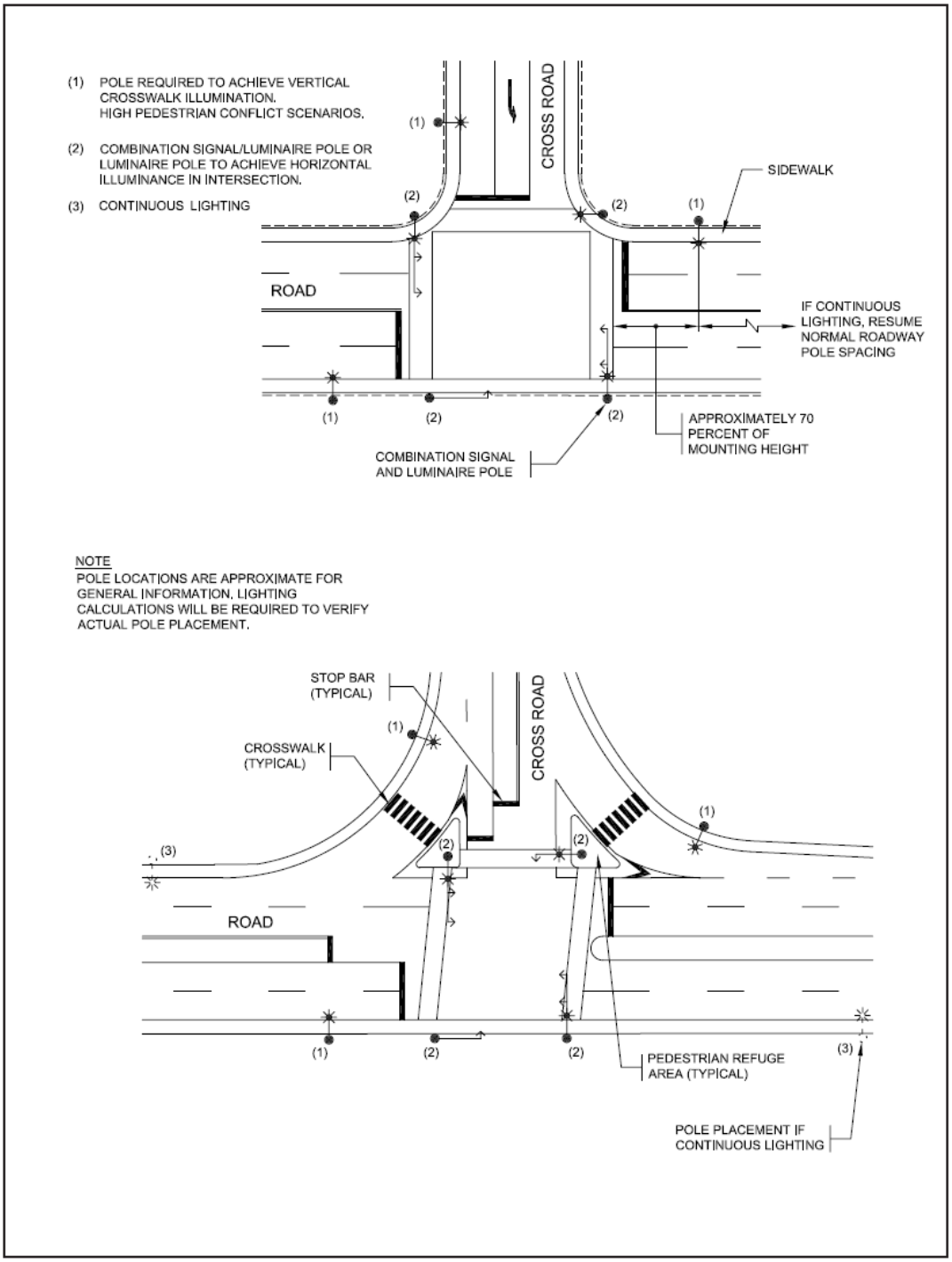


Figure 4: Typical Full Intersection Lighting for a Three-Legged Intersection (Source: TAC Roadway Lighting Guide)

Typical arrangements of partial intersection lighting at four-legged, three-legged, and “T” intersections are provided in **Figure 5**.

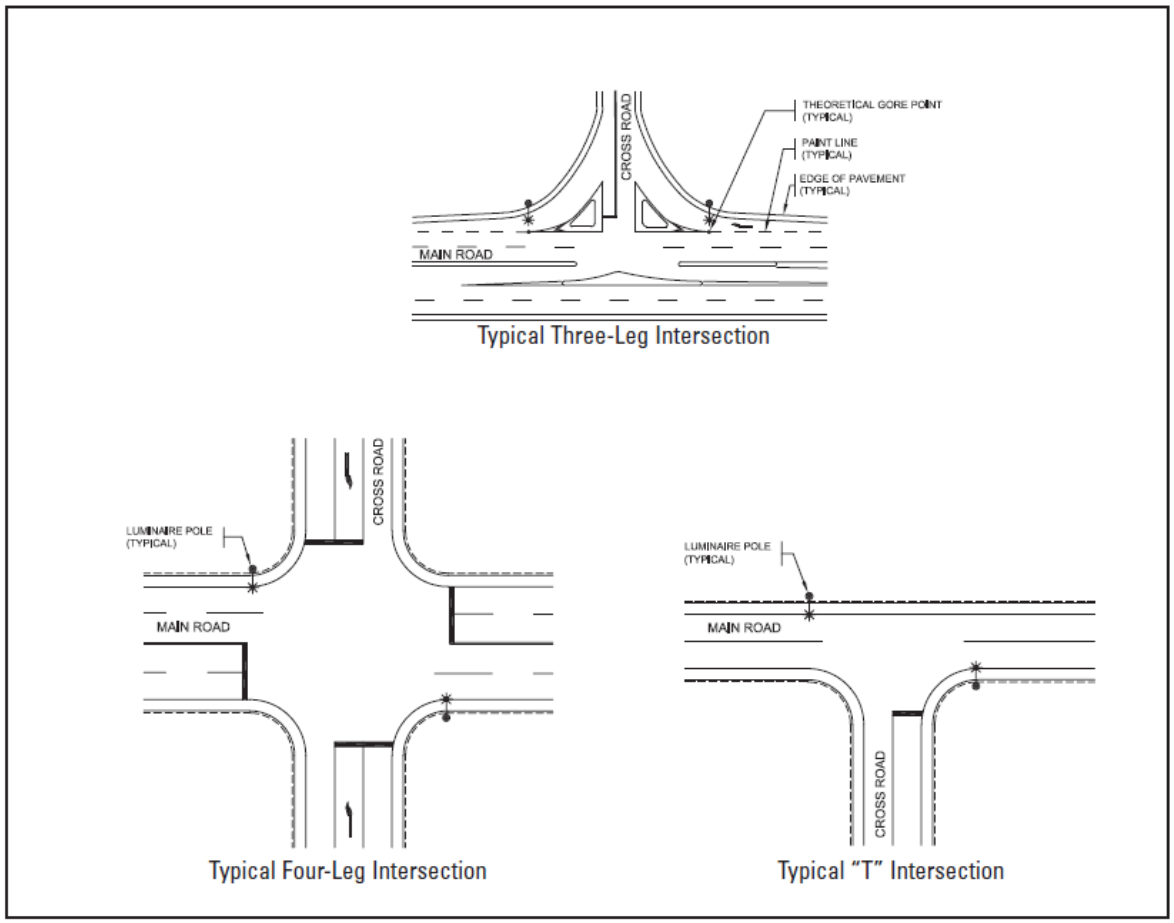


Figure 5: Typical Partial Intersection Lighting Pole Placement (Source: TAC Roadway Lighting Guide)

In order to meet recommended minimum illuminance levels at a midblock location, poles need to be placed in advance of the midblock crossing as illustrated in **Figure 6**. As discussed previously for illumination poles at intersections, the exact placement of poles depends on variables such as luminaire optics, lamp wattage, and mounting height. Additionally, if the roadway approaching the midblock crossing is illuminated, the pole spacing for the roadway should be designed to synchronize with the pole locations at the midblock crossing location. Combination signal and luminaire poles can also be used to achieve recommended minimum illuminance levels at a midblock location.

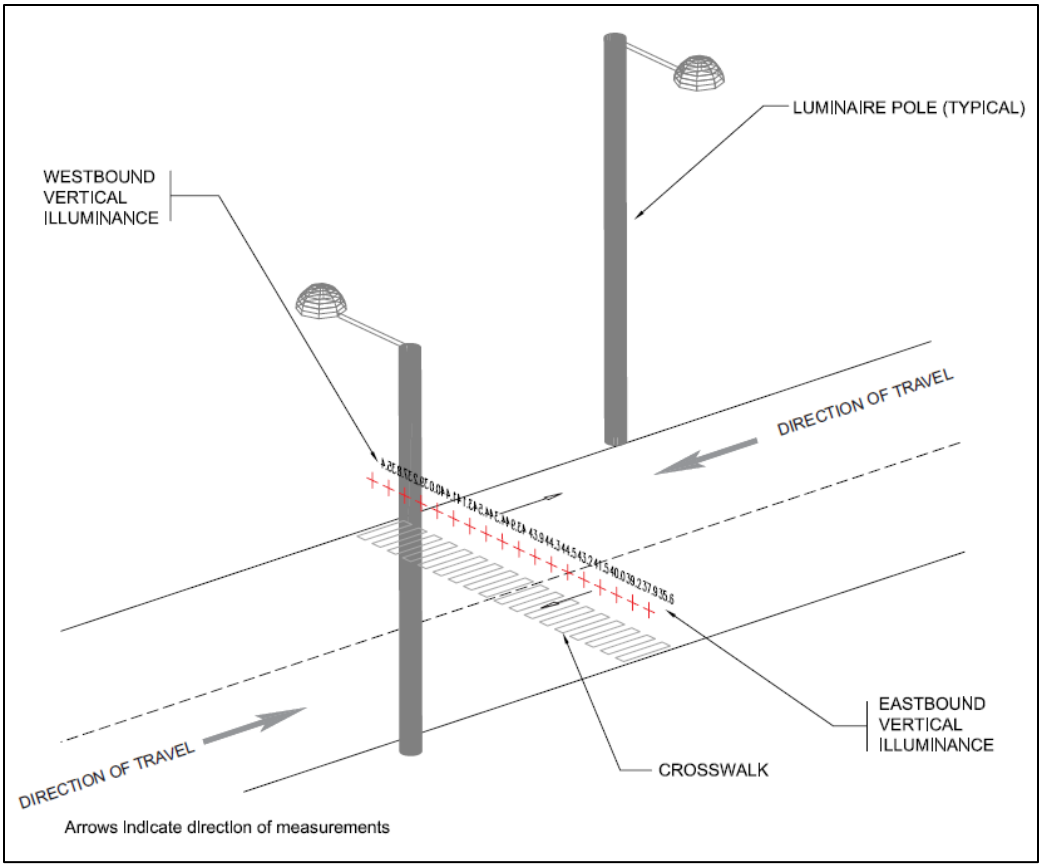


Figure 6: Typical Midblock Lighting Pole Placement (Source: TAC Roadway Lighting Guide)

Further details regarding illumination pole placement is provided in TAC's Roadway Lighting Guide.

Signal Controller and Power Supply Cabinets[11]

Wherever possible, controller cabinets should be placed on the far-right corner of the main road at the crossing. Ideally, the head displays for 50% of the phases should be visible while standing at the controller.

If guiderails or barriers are not present, it is preferable to place the controller at a location that meets the clear zone requirements outlined in the Ontario Ministry of Transportation Roadside Safety Manual, from the edge, or projected edge, of through lanes. Controllers should not be mounted on slopes steeper than 6:1 nor at an elevation difference of more than 1.0 m from the pavement.

[11] Ontario Traffic Manual Book 12 – Traffic Signals, March 2012

In congested urban areas where the posted speed is 70 km/h or less, a minimum clearance of 3.0 m from the edge of the pavement is desirable. If this is not feasible, controllers should be placed as close to buildings as possible while leaving at a minimum sidewalk width of 1.5 m and ensuring that they are clear of doors and store-front windows. In areas where the posted speed is 80 km/h or greater, a controller offset of 10 m from the through edge of pavement is desirable (a 6 m offset is considered acceptable).

The power supply cabinet should also be located within 75 m or less from the controller and at least 10 m from the edge of pavement if possible. Additionally, the controller should be located more than 11 m from the power supply pole.

Further details regarding considerations related to signal controller and power supply cabinets are provided in OTM Book 12 – Traffic Signals.

Utilities[12]

It is important to check the location of existing utilities (i.e. hydro, fibre optic cable, watermains, etc.) when installing signal poles, illumination poles, and signal controller cabinets. The design process should review for the presence of existing utilities, consider potential conflicts, and coordinate with utility companies as may be required.

The following guidelines are recommended for electric utilities:

- Wherever possible, a plan layout should be developed by allowing a minimum of 5.0 m between horizontal centres of electrical pole lines and traffic signal poles
- Typically, as much clearance as possible is desirable. Good practice suggests that traffic signal poles should be located at least 5.0 m from overhead lines (measured horizontally) or the power lines should be relocated so that the signal equipment can be mounted on the utility pole
- Where lighting is required, the designer should use the electrical utility poles if adequate luminaire mounting height can be provided

Further details regarding considerations related to utilities are provided in OTM Book 12 – Traffic Signals.

4.1.7 Layout

The following figures from OTM Book 15 illustrate the typical installation layouts for IPS and MPS as pedestrian crossing treatments for two-way and one-way movements:

[12] Ontario Traffic Manual Book 12 – Traffic Signals, March 2012

Intersection Pedestrian Signal (IPS)

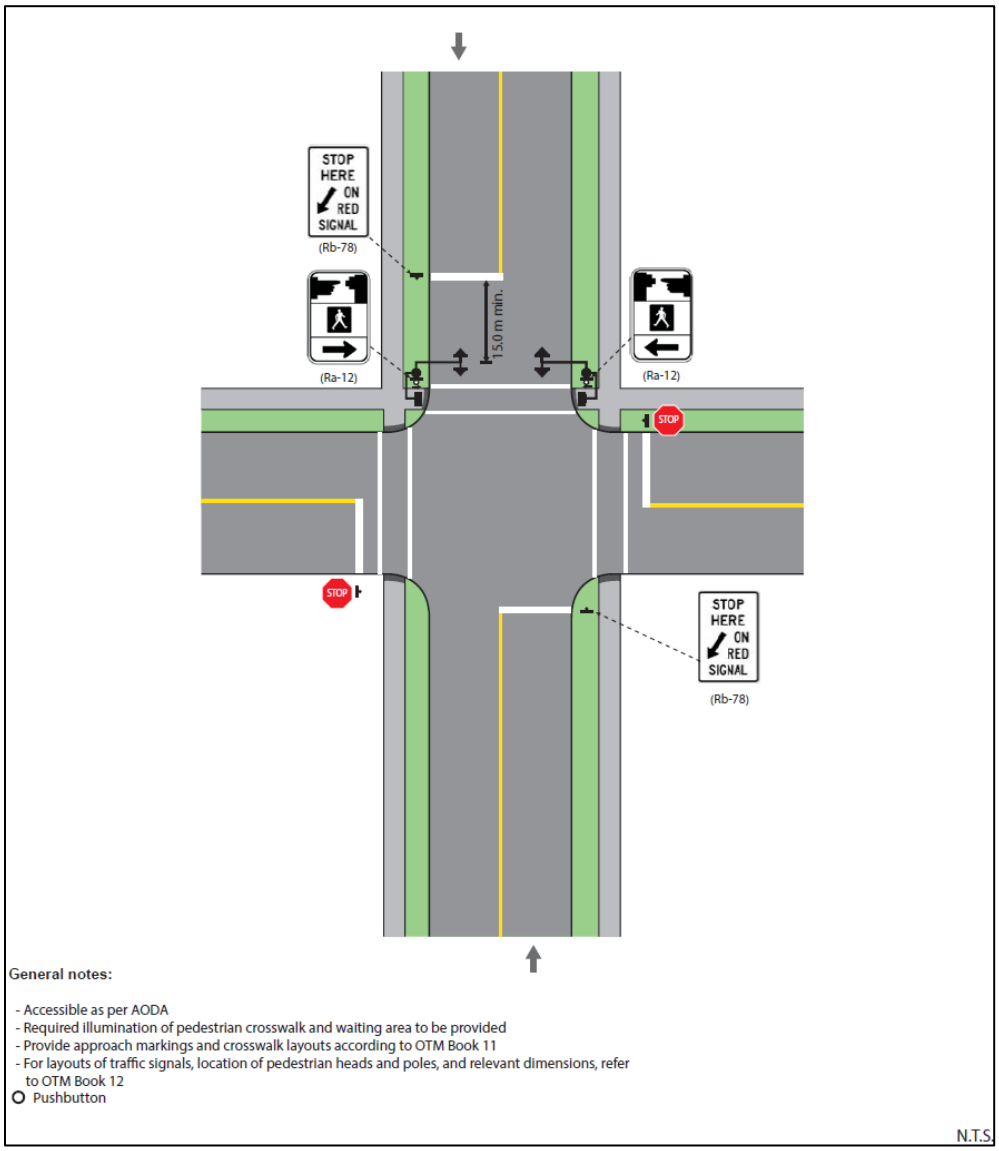


Figure 7: IPS Pedestrian Crossing Treatment for 2-lane, 2-way Roadways (Source: OTM Book 15)

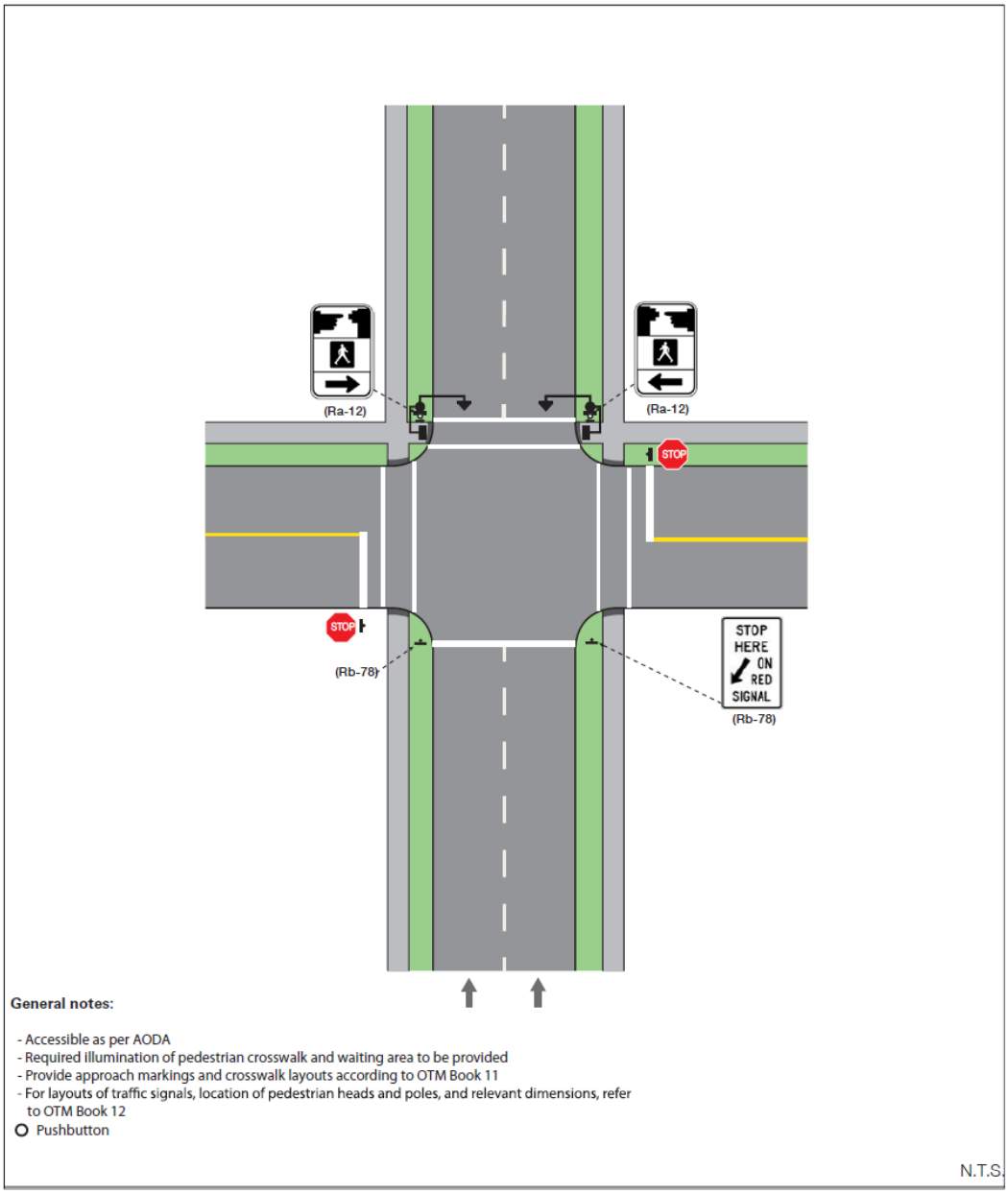


Figure 8: IPS Pedestrian Crossing Treatment for 2-lane, 1-way Roadways (Source: OTM Book 15)

Mid-block Pedestrian Signal (MPS)

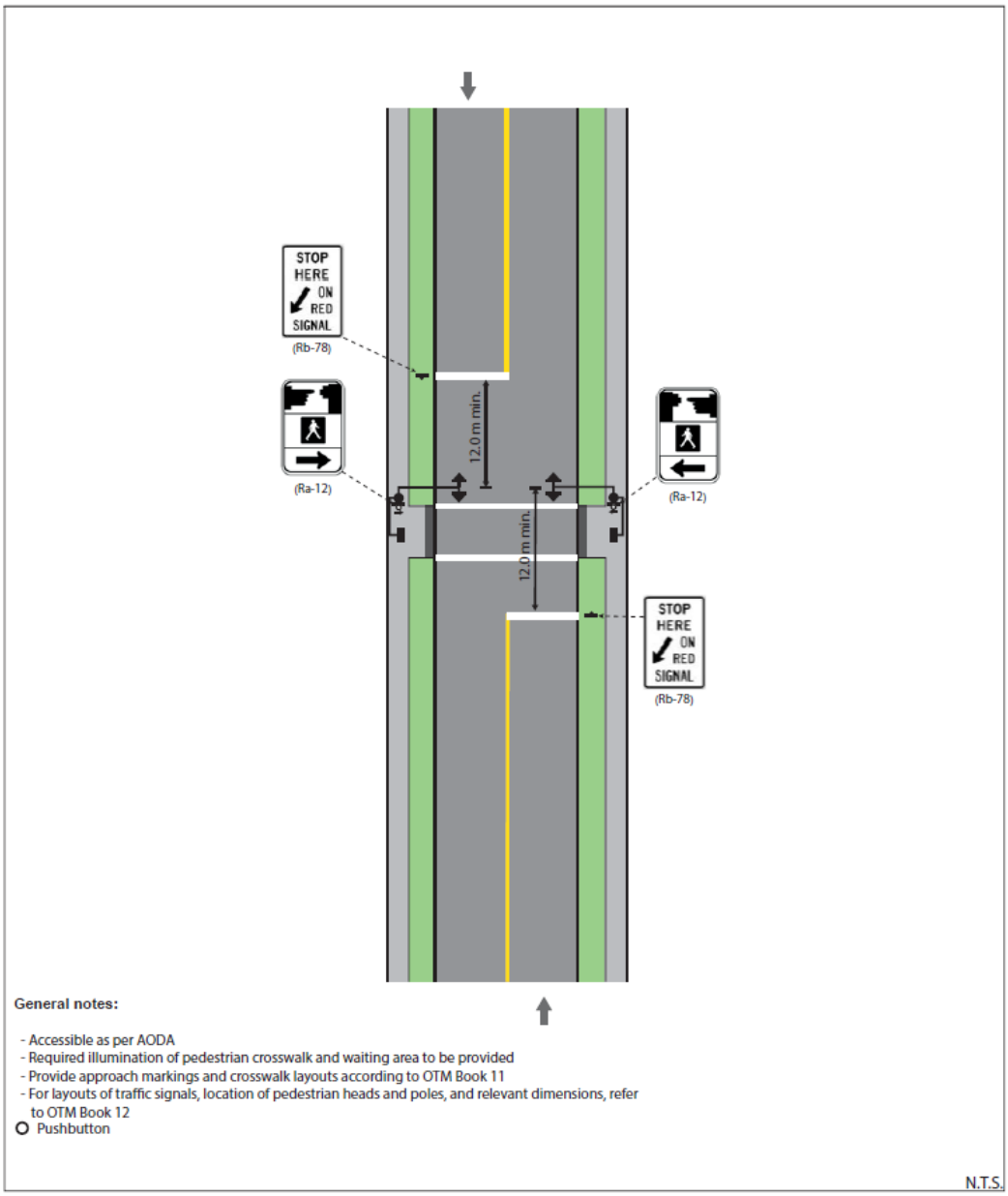


Figure 9: MPS Pedestrian Crossing Treatment for 2-lane, 2-way Roadways (Source: OTM Book 15)

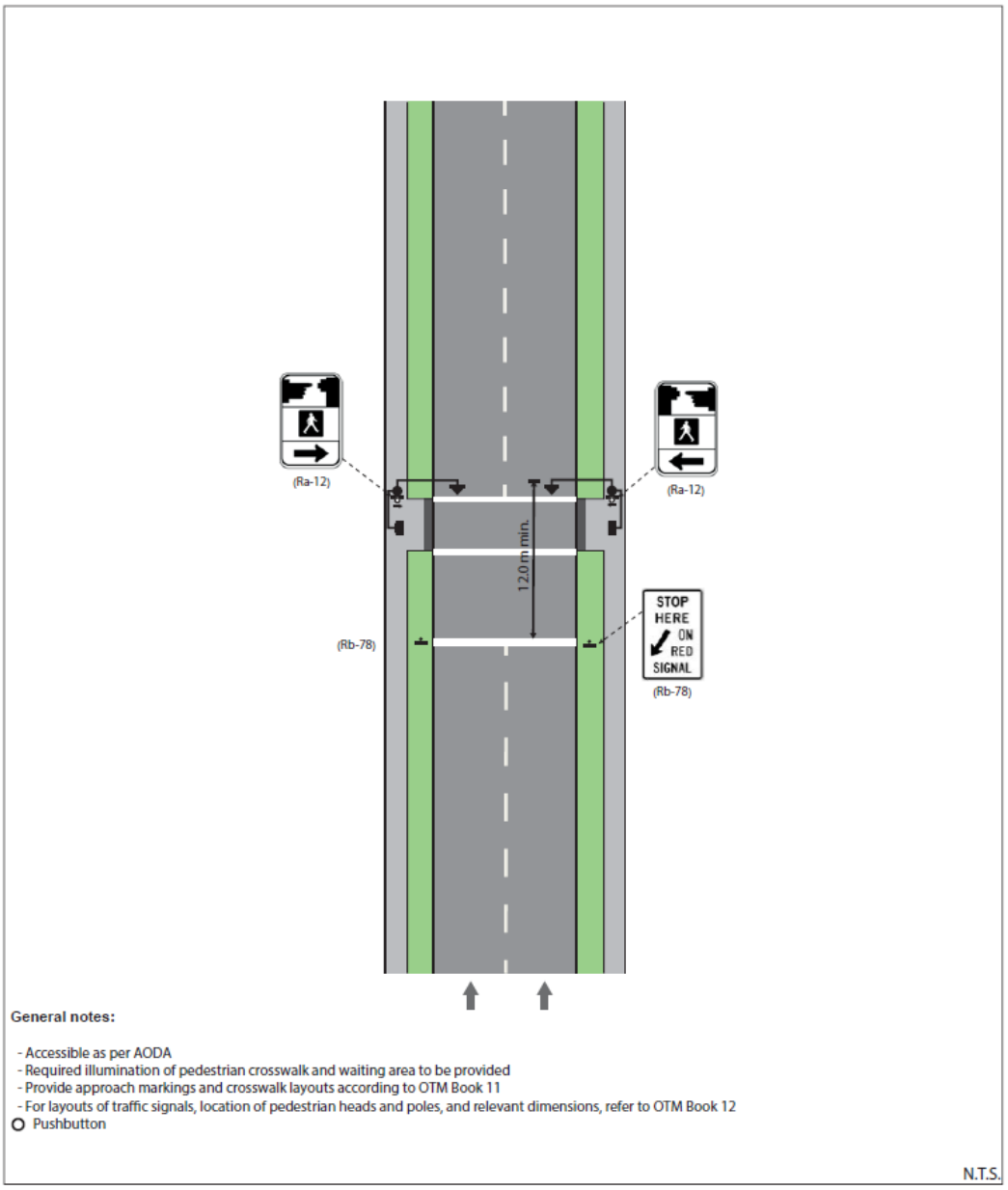


Figure 10: MPS Pedestrian Crossing Treatment for 2-lane, 1-way Roadways (Source: OTM Book 15)

4.1.8 Accessibility

As per OTM Book 15, treatments to enhance accessibility applicable to IPS and MPS include curb ramps, depressed curbs, and accessible pedestrian signals (APS).

When curb ramps and depressed curbs are provided at pedestrian crossings, they must have tactile walking surface indicators that have raised tactile profiles and a high tonal contrast with the adjacent surface as well.

APS devices must include both audible and vibro-tactile walk indicators to effectively communicate information in a non-visual format to provide cues for pedestrians with visual and/or hearing impairments at both ends of a crossing. APS devices that have speakers mounted in, on, or near pedestrian pushbuttons emit a sound such as a birdcall (typically cuckoo and chirp) during the WALK interval. The sound emitted by APS devices must be capable of being heard above ambient traffic noise.

Pedestrian walking speeds must also be considered when designing accessible pedestrian crossing facilities using the guidance from OTM Book 15.

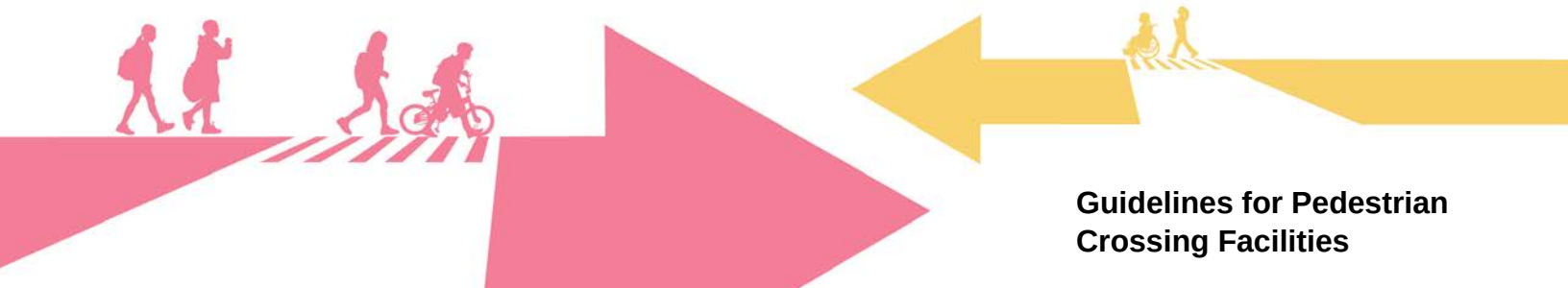
However, the City must use standard practice in their own jurisdiction and engineering judgment to determine whether the walking speed values provided above should be used to calculate only the clearance interval or the entire duration of the walk and clearance phases.

Further details on designing for accessibility can be found in OTM Book 15 – Pedestrian Crossing Treatments.

4.2 Level 2 Type B PXO

4.2.1 Important Considerations

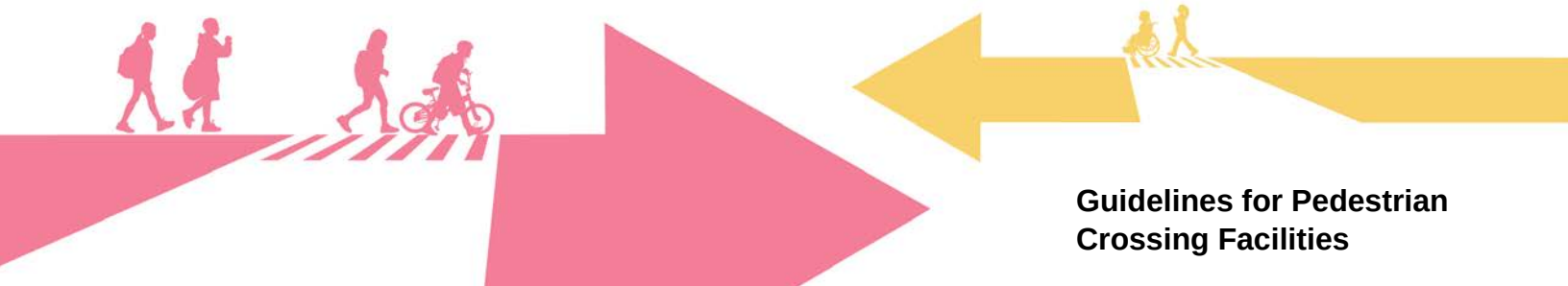
- Side streets must be stop controlled if a PXO is installed at an intersection.
- If cyclists are expected to be present in the area, proper guidance should be provided to inform cyclists that they must dismount when crossing the roadway at a dedicated pedestrian crossing.
- Location of poles – Poles with pushbuttons should be placed in such as way so that they can be accessible by pedestrians, including those using assistive devices (i.e. wheelchair users). Poles should not be placed in the sidewalk and should ideally be located within the boulevard or behind the sidewalk. Further details are provided in **Section 4.2.6**.
- Connectivity to sidewalks/trails – Pedestrian crossing facilities should be preferably located where there is a continuous sidewalk and/or a nearby trail network.
- Parking and no stopping restrictions – According to OTM Book 15, stopping must be prohibited for a minimum of 15 m on each approach to the crossing, and 10 m following the crossing. Further details are provided in **Section 4.2.4**.
- Location of transit stops – The crosswalk location will need to be coordinated with any existing transit stops. There may be situations where transit stops in the vicinity of the crossing may need to be relocated to comply with parking and no stopping restrictions.



- Refuge islands – At some locations where the roadway width is wide and the crossing time may be significant, consideration could be given to provide a refuge island for pedestrians' safety who may not be able to cross the street in a single activation of RRFBs.
- Demography of surrounding area – The demography near the pedestrian crossing should be identified to determine the most appropriate pedestrian walking speed that will be used calculate the required crossing time. Further details are provided in **Section 4.2.8**.
- General utilities (i.e. fire hydrants, hydro poles) – the design process should review and consider the presence of existing utilities for potential conflicts, and coordinate with the utility companies as may be required. Further details are provided in **Section 4.2.6**.
- Auxiliary lanes (left/right-turn lanes) – If a pedestrian crossing is being considered at a location where left/right-turn lanes are present, an operational analysis may need to be conducted to determine an appropriate storage length for the auxiliary lane(s) to ensure that there is enough available storage length to accommodate left/right-turning vehicles when pedestrians are occupying the crosswalk.
- Source of power – PXOs are typically powered by solar cells, but illumination poles require access to electrical power. Further details are provided in **Section 4.2.6**.
- Proximity to driveways – Ensure that no driveways are present between the crosswalk and the yield to pedestrians line because the presence of a driveway may result in sudden movements by exiting drivers if vehicles are stopped while waiting for pedestrians to cross.
- Proximity to pedestrian crossings – According to OTM Book 15, PXOs should not be installed within 200 m of other signal-protected pedestrian crossings. There may be a desire to have pedestrian crossings at locations that do not meet these requirements. Under these situations, an operational analysis should be conducted to evaluate any vehicle queues' impact on the crossing.
- Sightlines – Sight triangles for side street traffic waiting at the stop sign must be clear and should not be obstructed by vegetation, on-street parking, buildings, fences, etc. The visibility of all signs and RRFBs at the crossing should be confirmed for road users. Sight distance requirements are detailed in TAC's Geometric Design Guide for Canadian Roads.

4.2.2 Illumination Levels

If the roadway approaching the mid-block crosswalk is illuminated, the roadway's horizontal luminance levels must meet or exceed the recommended levels defined in Section 9.5.1 of TAC's Roadway Lighting Guide. Additionally, the vertical luminance levels of crosswalks at a height of 1.5 m must be 20 lux for areas with low pedestrian conflict (less than 11 pedestrians per hour), 30 lux for areas with medium pedestrian conflict (11 to 99 pedestrians per hour), and 40 lux for areas with high pedestrian conflict (100 or more pedestrians per hour).



Full design procedures for mid-block crosswalk illumination, including horizontal and vertical illuminance calculations, equipment selection, and pole layout, are detailed in TAC's Roadway Lighting Guide.

4.2.3 Rectangular Rapid Flashing Beacon (RRFB) Placement

As per OTM Book 15, rapid rectangular flashing beacons (RRFB) are used for the main roadway in each direction of travel for a Type B PXO. RRFBs must be activated manually by pushbuttons, which are required for the crossing. RRFBs consist of two rectangular yellow indications with two tell-tale end indicators to inform pedestrians that the beacon is flashing. The RRFB must be installed on the same support as the associated side-mounted pedestrian crossover sign (see **Section 4.2.7** for further details). A RRFB shall not be used where the crosswalk is controlled by yield signs, stop signs, or traffic control signals. Additionally, the side road must be controlled with stop signs if a Type B PXO is installed at an intersection.

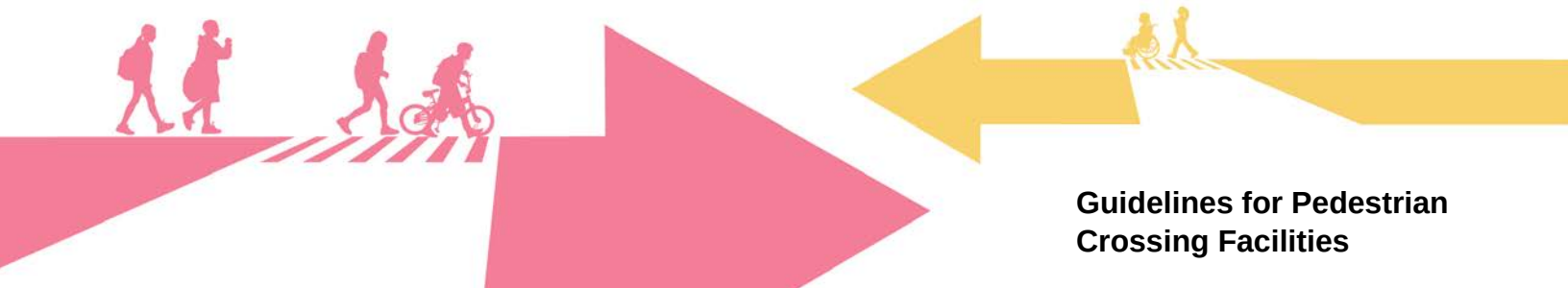
Each RRFB indication shall be a minimum of 125 mm wide and 50 mm high. The two RRFB indications shall be aligned horizontally, with the longer dimension horizontal and with a minimum space between the two indications of 175 mm, measured from inside edge of one indication to the inside edge of the other indication.

4.2.4 Level 2 Type B PXO Components and Restrictions

As per OTM Book 15 (unless otherwise stated), the minimum required components and desired components for a Type B PXO are as follows:

Minimum Required Components:

- Side-mounted pedestrian crossover signs, showing a symbol of a person crossing on a road (Ra-5R and Ra-5L), together with their Stop for Pedestrians (Ra-4t) tabs, on both sides of the road mounted back to back (For one-way applications, Stop for Pedestrians tab is required only for the direction of travel)
- One over-head mounted pedestrian crossover sign showing a symbol of a person crossing on a road to the right (Ra-5R), for each direction of travel
- Ladder crosswalk markings and yield to pedestrians line markings as further detailed in **Section 4.2.5**
- Actuated Double-sided Rectangular Rapid Flashing Beacon with Tell-Tale and Pedestrian Pushbutton for pedestrians mounted above each set of side-mounted pedestrian crossover signs installed at the pedestrian crossover as further detailed in **Section 4.2.3** and **Section 4.2.6**
- Advanced Pedestrian Crossover Ahead sign (Wc-27R/Wc-27L) at 50.0 m upstream of the crosswalk
- Stop sign (Ra-1) on the cross street if installed at an intersection
- Passing restrictions on single lane approaches



- Stopping prohibition for a minimum of 15 m on each approach to the crossing, and 10 m following the crossing
- Lane change prohibition on multiple lane approaches using solid white lines as further detailed in **Section 4.2.5**
- No Passing Here to Crossing sign (Ra-10) 30 m upstream of the crosswalk

Desired or Additional Considerations:

- Stopping prohibition for a minimum of 30 m on each approach to the crossing, and 15 m following the crossing.
- Curb extensions to reduce pedestrian crossing distance, either through curb work or through use of flexible bollards
- Consider use of a flexible centreline bollard to bring additional awareness to the crossing
- Raised crosswalk may be considered in some applications to reduce vehicle speeds and improve pedestrian visibility (applicability of this element would need to be reviewed for the crossing location)

Details regarding sign location criteria for the aforementioned minimum required components and desired components can be found in OTM Book 5 – Regulatory Signs and OTM Book 6 – Warning Signs. Horizontal and vertical mounting offsets for signs can be found in OTM Book 1B – Sign Design Principles.

4.2.5 Pavement Markings

As per OTM Book 15, ladder crosswalk markings and yield to pedestrians line markings are required components for a Type B PXO.

Crosswalk lines must be solid white parallel retro reflective lines 10 cm to 20 cm wide that extend entirely across the pavement. The crosswalk width must be at least 2.5 m wide, but widths of 3 m to 4 m are typical in urban areas with higher levels of pedestrian activity. The outer edge of ladder crosswalks must be located at a distance of 6.0 m from the yield to pedestrians line. Crosswalks should line up with any proposed sidewalks or dropped curbs. **Figure 11** illustrates typical ladder crosswalk markings.

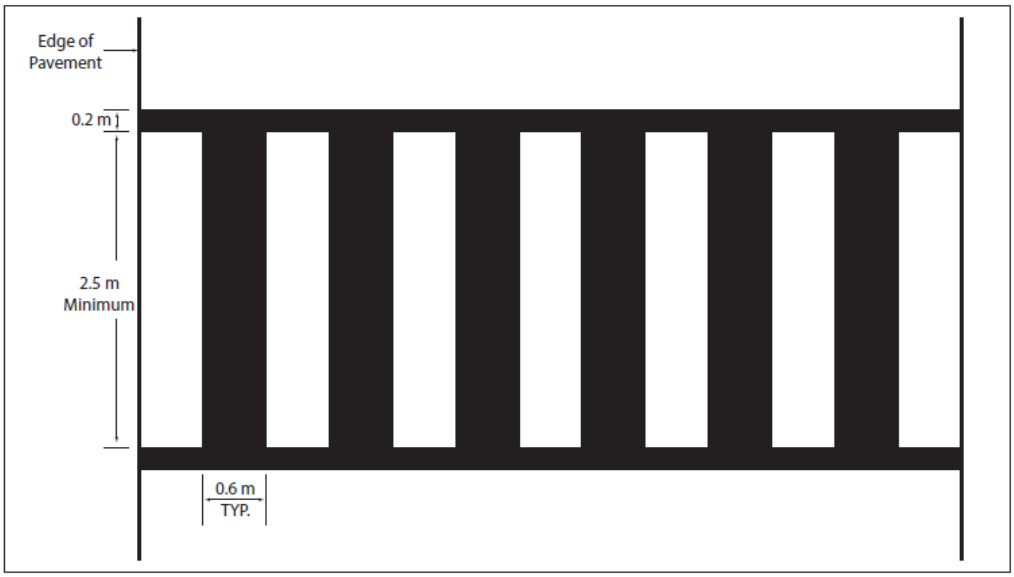


Figure 11: Pavement Markings for a Typical Ladder Crosswalk

A yield to pedestrian line must be located at a distance of 6.0 m in advance of the crosswalks in the direction of travel. **Figure 12** illustrates the specifications for a yield to pedestrians line.

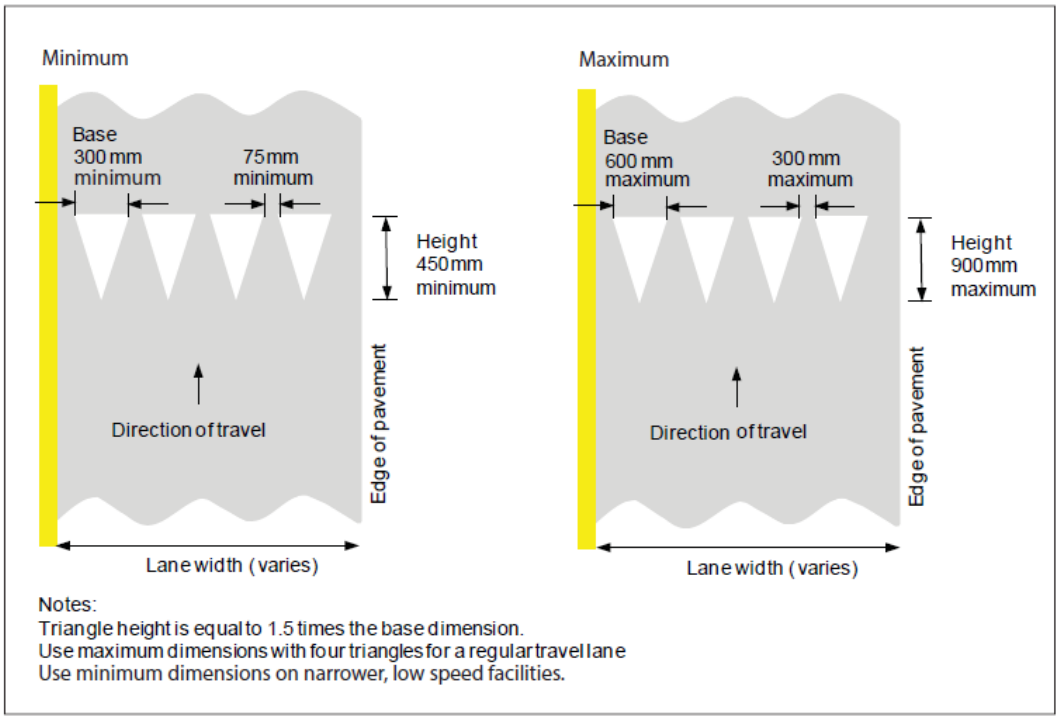


Figure 12: Specifications for Yield to Pedestrians Line

Lastly, solid white lines must be painted on road approaches with multiple lanes to prohibit lane changes within 30 m of the crosswalk.

Section 4.2.7 provides illustrations of installation details for a typical Type B PXO that indicate the recommended placement of pavement markings for various applicable environments.

4.2.6 Infrastructure

Pedestrian Crossover Signs with Pedestrian Pushbuttons and Rectangular Rapid Flashing Beacons[13]

The side-mounted pedestrian crossover signs should be placed at approximately 2.0 m from the face of the curb with a minimum of 0.30 m and a maximum of 4 m. They should be placed in such a way that they should not obstruct any pedestrian movements including those using assistive devices (i.e. wheelchair users), and not be installed within the sidewalk. The overhead pedestrian crossover signs are typically installed at a minimum height of 4.5 m (measured from the crown of the roadway to the bottom of the sign) aligning with the centre of the travel lane.

Like traffic signals, the Type B PXO infrastructure elements are installed on traffic poles. The selection of the location of poles will require the designer to consider utility clearances, aesthetic requirements, and mast arm length restrictions. An ideal location could be within the flare of the curb ramp.

Pedestrian pushbuttons should preferably be mounted on the same poles on which the side-mounted pedestrian crossover signs are installed. However, if it is not possible to place the traffic pole close to the crosswalk due to any physical constraints, a separate small pole just for pushbuttons may be used. The pushbuttons should be installed on the “through sidewalk” side of the sign at a height of 1.1 m (+/- 0.15 m) above finished grade. The pushbuttons should be in line, not perpendicular, with the crosswalk and if possible, pushbuttons should be aligned with the nearest edge of the crosswalk. It is important to ensure that the poles with pushbuttons are accessible and user friendly (i.e. not located behind barriers, grassy/muddy areas, or areas where snow windrows may occur).

As detailed previously in **Section 4.2.3**, actuated double sided rectangular rapid flashing beacons with tell-tale must be installed above each set of side-mounted pedestrian crossover signs.

Typically, a solar power unit is installed on the top of each side-mounted pedestrian crossover sign to sufficiently power the pushbutton and rectangular rapid flashing beacons (this configuration is used by many major jurisdictions).

[13] Ontario Traffic Manual Book 15 – Pedestrian Crossing Treatments, June 2016

Illumination Poles[14]

When designing illumination for PXOs, the existing available illumination should be checked where the crosswalk is proposed. If illumination levels do not meet requirements, the designer may investigate whether simply changing the luminaires is enough to meet the illumination requirements.

If it is necessary to install new illumination poles, the lighting can be installed on the same poles as the rest of the PXO infrastructure or it can be installed on separate poles as necessary as per site conditions and based on the type of PXO. The recommended placement of illumination poles for PXOs are the same as for traffic signals in **Section 4.1.6**.

Utilities[15]

It is important to check the location of existing utilities (i.e. hydro, fibre optic cable, watermains, etc.) when selecting suitable locations for poles. The design process should review and consider the presence of existing utilities for potential conflicts, and coordinate with the utility companies as may be required.

Considerations regarding utility placement for PXOs are the same as for traffic signals in **Section 4.1.6**.

4.2.7 Layout

The following figures from OTM Book 15 illustrate the typical installation layouts for a Type B PXO for the following applicable environments:

- Midblock: up to 4 lanes total cross-section, 2-way
- Midblock: up to 3 lanes total cross section, 1-way
- Intersection: up to 4 lanes total cross-section, 2-way
- Intersection: up to 3 lanes total cross-section, 1-way

[14] Transportation Association of Canada – Roadway Lighting Guide, January 2006
[15] Ontario Traffic Manual Book 12 – Traffic Signals, March 2012

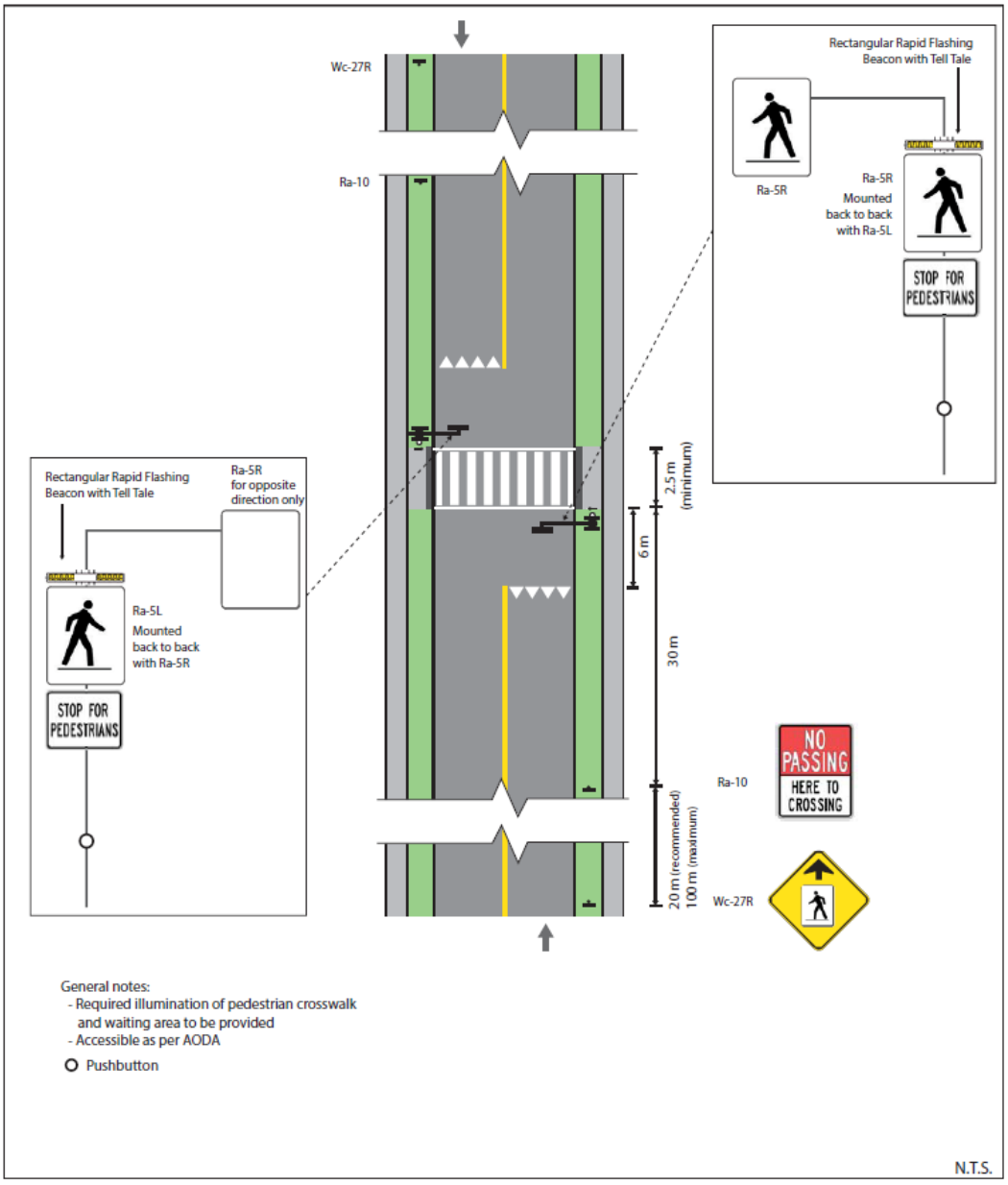


Figure 13: Level 2 Type B PXO Midblock Treatment for 2-lane, 2-way Roadways (Source: OTM Book 15)

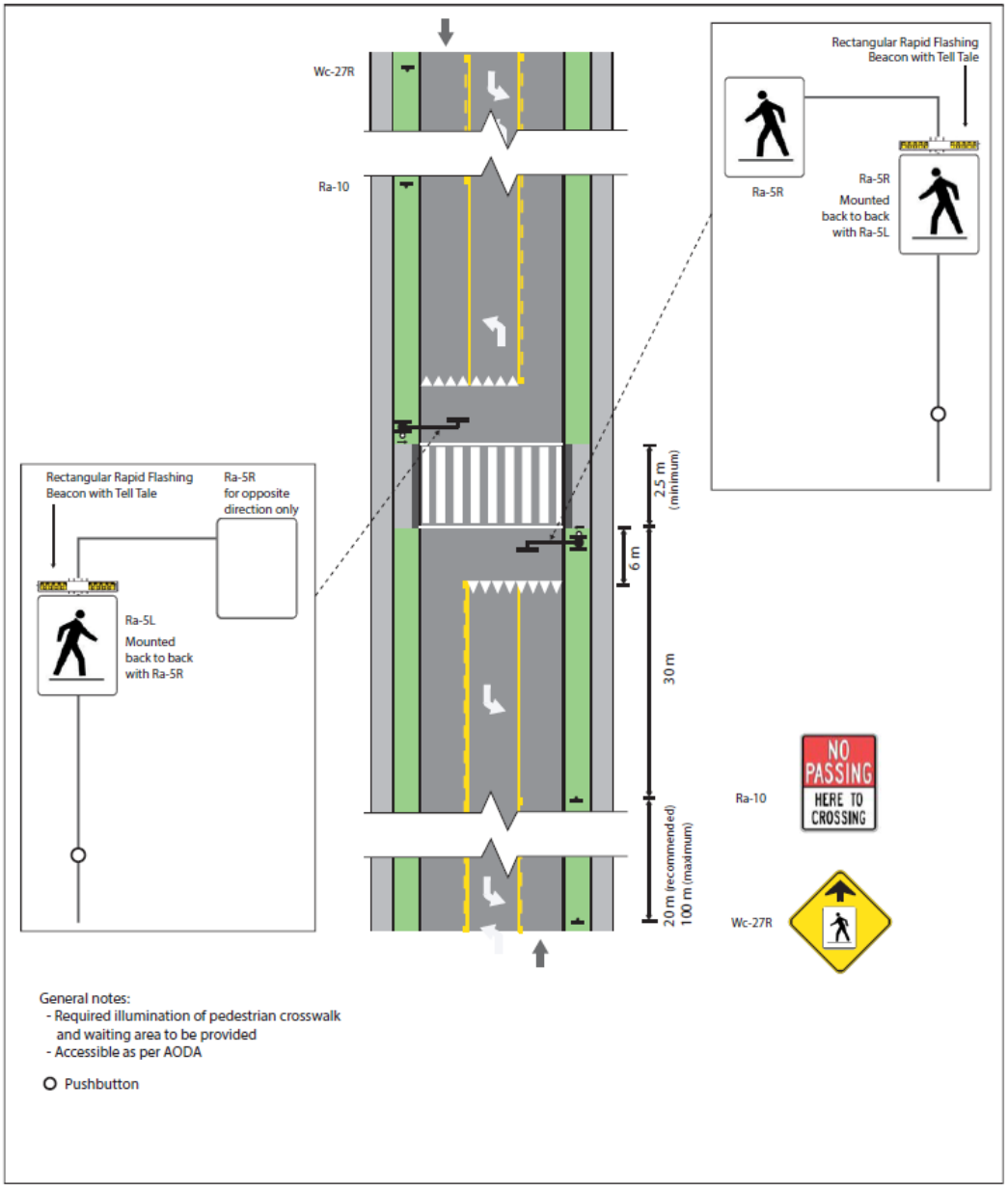


Figure 14: Level 2 Type B PXO Midblock Treatment for 3-lane with centre 2-way left-turn lane Roadways (Source: OTM Book 15)

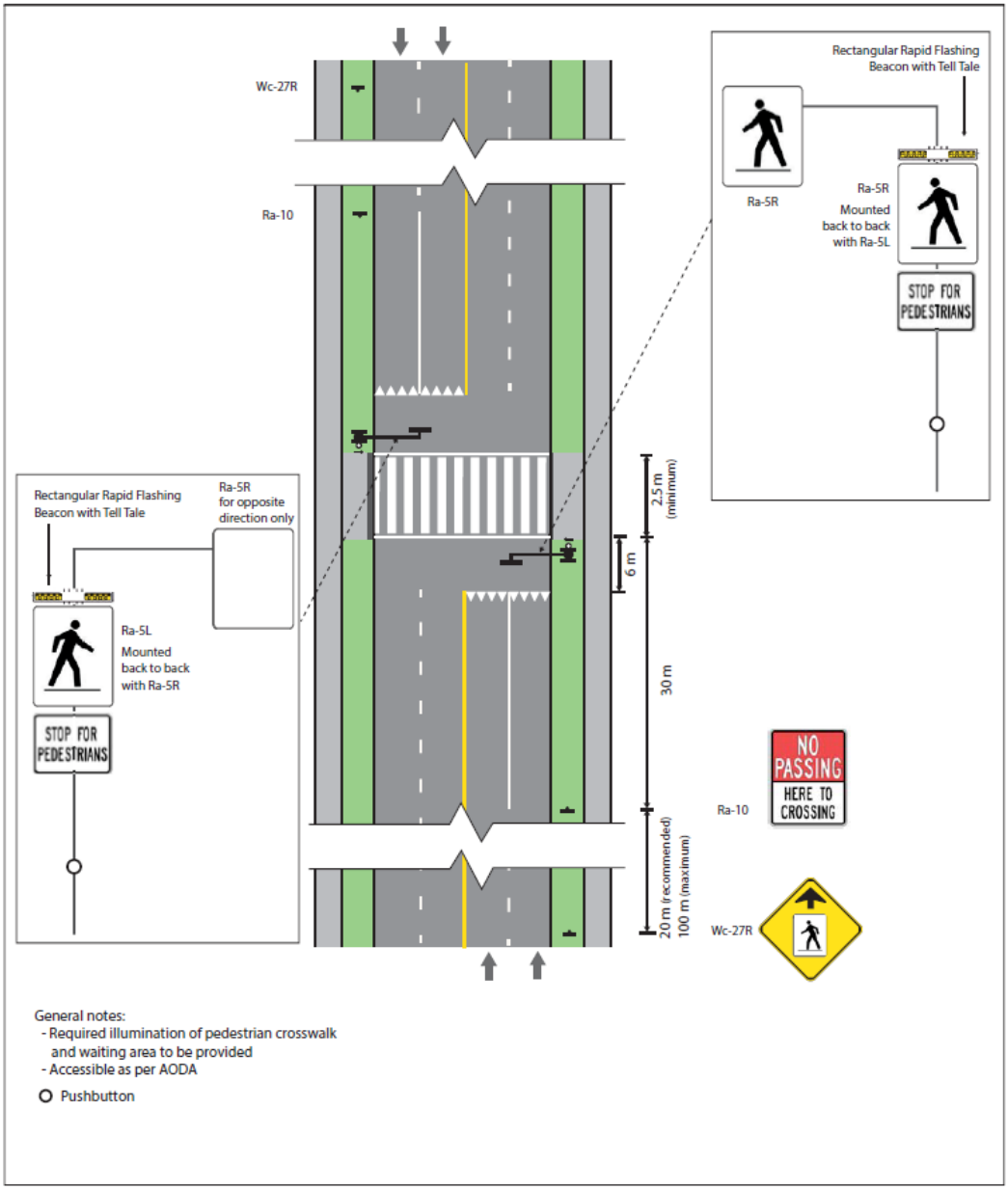


Figure 15: Level 2 Type B PXO Midblock Treatment for 4-lane, 2-way Roadways (Source: OTM Book 15)

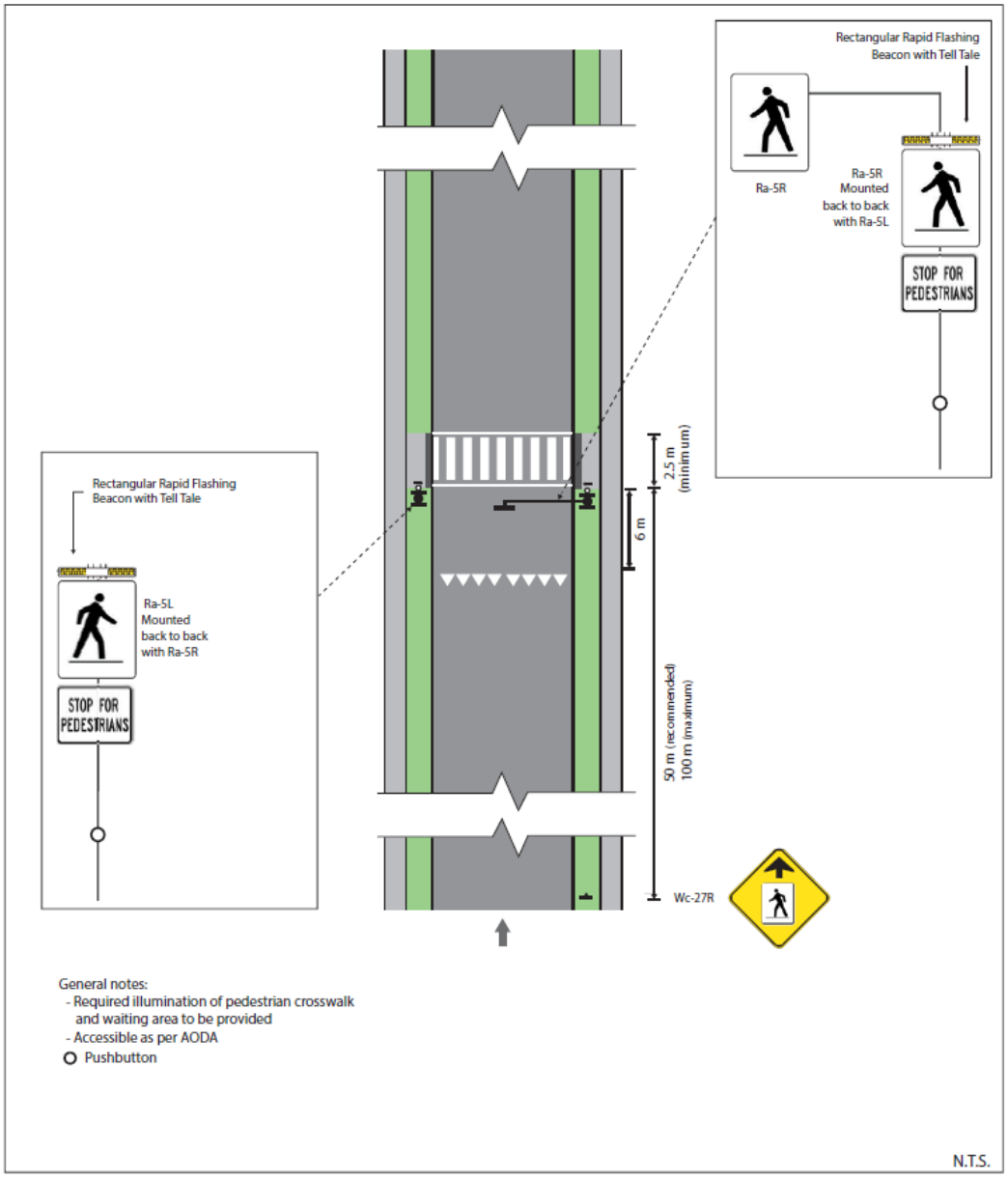


Figure 16: Level 2 Type B PXO Midblock Treatment for 1-lane, 1-way Roadways (Source: OTM Book 15)

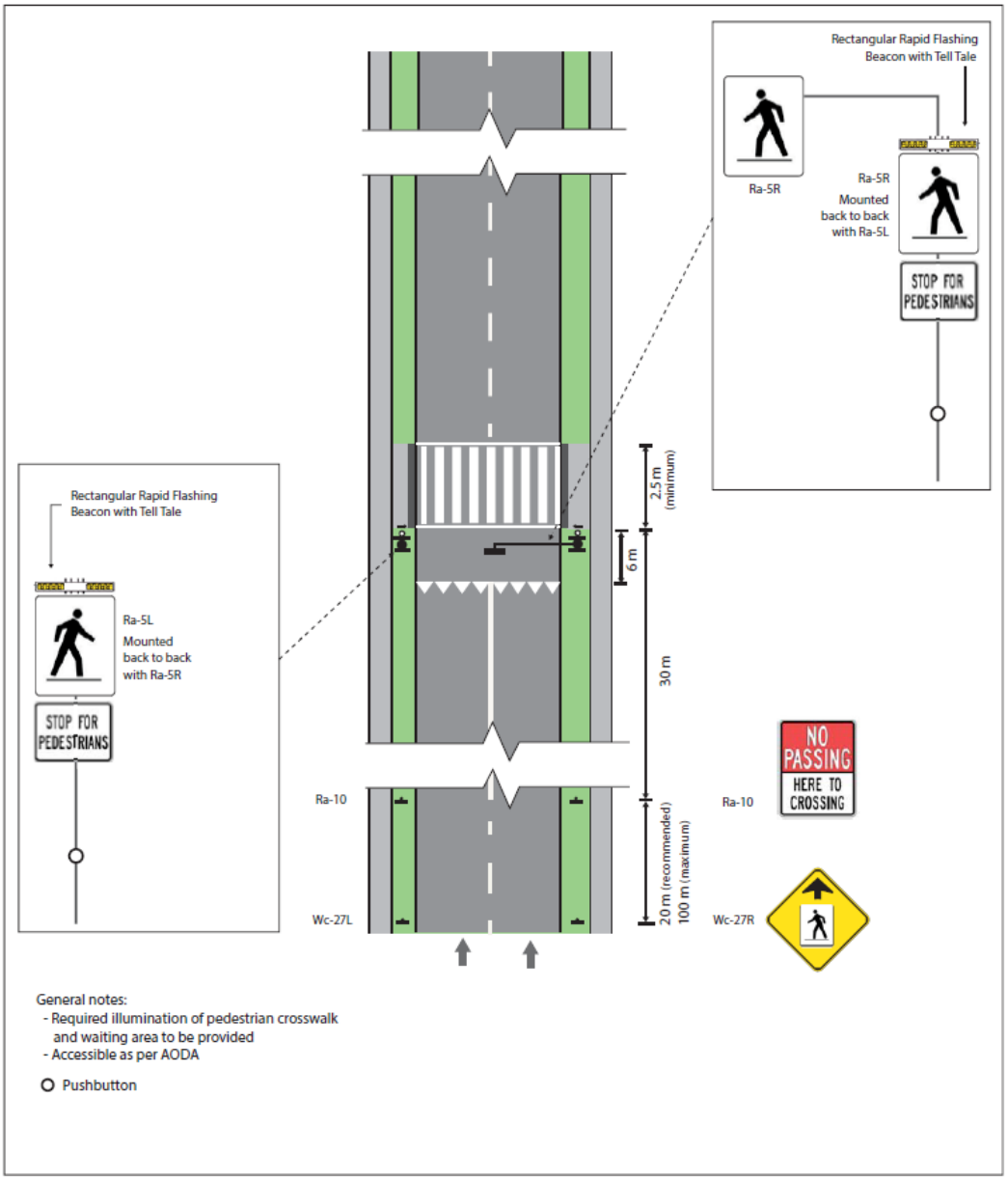


Figure 17: Level 2 Type B PXO Midblock Treatment for 2-lane, 1-way Roadways (Source: OTM Book 15)

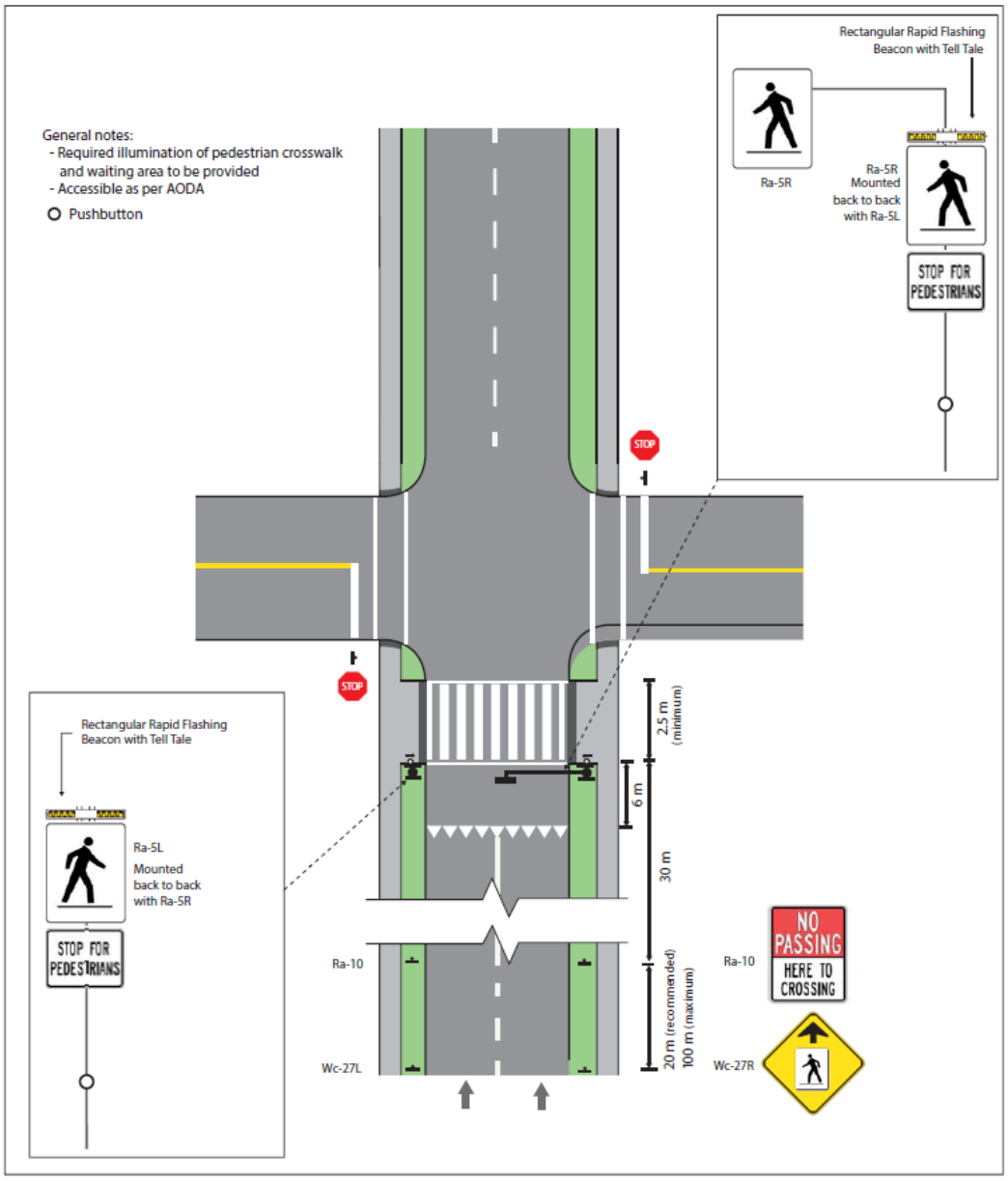


Figure 18: Level 2 Type B PXO Treatment at Intersection for 1-way Roadways (Source: OTM Book 15)

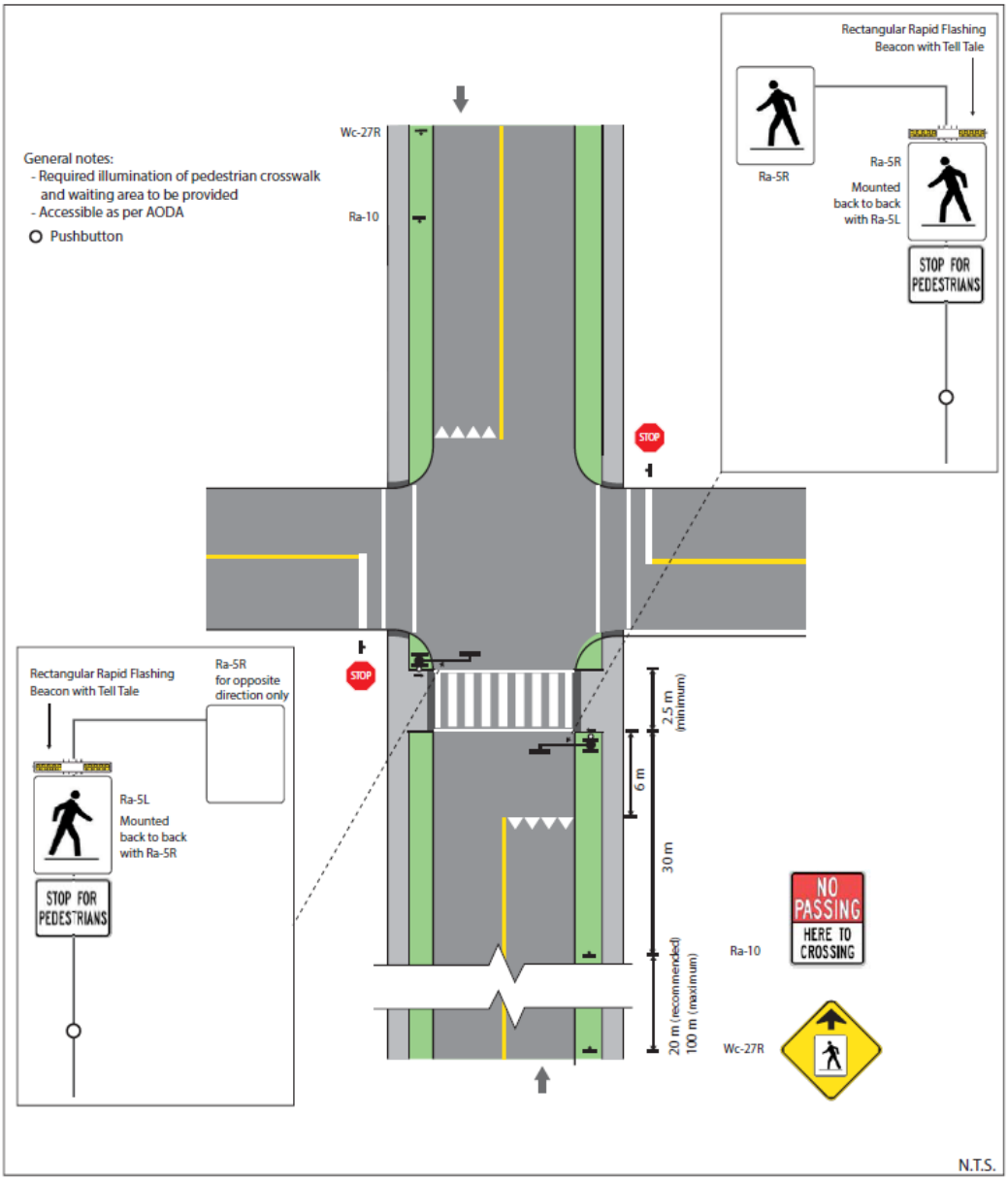


Figure 19: Level 2 Type B PXO Treatment at Intersection for 2-way Roadways (Source: OTM Book 15)

4.2.8 Accessibility

As per OTM Book 15, treatments to enhance accessibility applicable to Type B PXOs include curb ramps and depressed curbs.

When curb ramps and depressed curbs are provided at pedestrian crossings, they must have tactile walking surface indicators that have raised tactile profiles and a high tonal contrast with the adjacent surface as well.

Pedestrian walking speeds must also be considered when designing accessible pedestrian crossing facilities using the following guidance from OTM Book 15 and outlined in **Section 4.1.8**. However, the City must use standard practice in their own jurisdiction and engineering judgment to determine whether the walking speed values provided above should be used to calculate only the clearance interval or the entire duration of the walk and clearance phases.

The time lapse between the pushbutton activation of a RRFB and the start of flashing should be less than 1 second and no greater than 3 seconds under any circumstances. RRFBs must flash for a minimum period, determined using the following calculation:

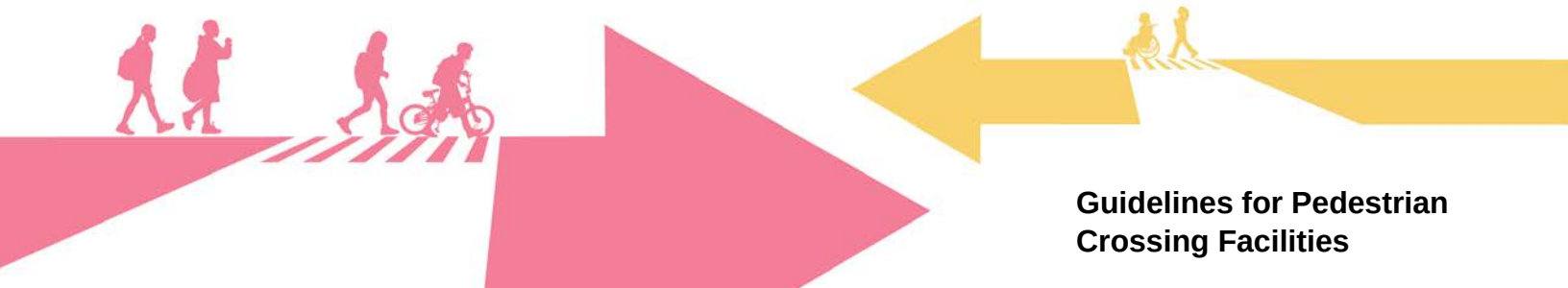
Minimum flashing time = (crossing distance / pedestrian walking speed) + 5 seconds

Further details on designing for accessibility can be found in OTM Book 15 – Pedestrian Crossing Treatments.

4.3 Level 2 Type C PXO

4.3.1 Important Considerations

- Side streets must be stop controlled if a PXO is installed at an intersection.
- If cyclists are expected to be present in the area, proper guidance should be provided to inform cyclists that they must dismount when crossing the roadway at a dedicated pedestrian crossing.
- Location of poles – Poles with pushbuttons should be placed in such as way so that they can be accessible by pedestrians, including those using assistive devices (i.e. wheelchair users). Poles should not be placed in the sidewalk and should ideally be located within the boulevard or behind the sidewalk. Further details are provided in **Section 4.3.6**.
- Connectivity to sidewalks/trails – Pedestrian crossing facilities should be preferably located where there is a continuous sidewalk and/or a nearby trail network.
- Parking and no stopping restrictions – According to OTM Book 15, stopping must be prohibited for a minimum of 15 m on each approach to the crossing, and 10 m following the crossing. Further details are provided in **Section 4.3.4**.
- Location of transit stops – The crosswalk location will need to be coordinated with any existing transit stops. There may be situations where transit stops in the vicinity of the crossing may need to be relocated to comply with parking and no stopping restrictions.
- Refuge islands – At some locations where the roadway width is wide and the crossing time may be significant, consideration could be given to provide a refuge island for



pedestrians' safety who may not be able to cross the street in a single activation of RRFBs.

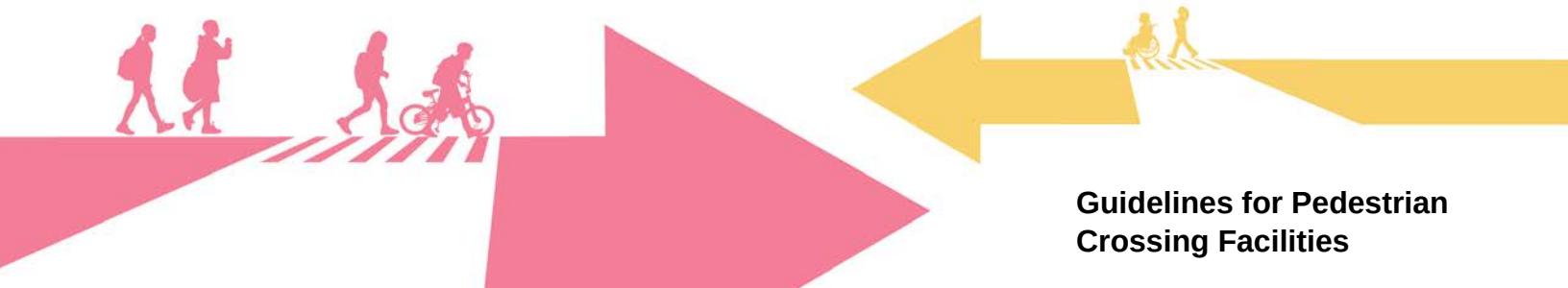
- Demography of surrounding area – The demography near the pedestrian crossing should be identified to determine the most appropriate pedestrian walking speed that will be used calculate the required crossing time. Further details are provided in **Section 4.3.8**.
- General utilities (i.e. fire hydrants, hydro poles) – The design process should consider the presence of existing utilities for potential conflicts, and coordinate with the utility companies as may be required. Further details are provided in **Section 4.3.6**.
- Auxiliary lanes (left/right-turn lanes) – If a pedestrian crossing is being considered at a location where left/right-turn lanes are present, an operational analysis may need to be conducted to determine an appropriate storage length for the auxiliary lane(s) to ensure that there is enough available storage length to accommodate left/right-turning vehicles when pedestrians are occupying the crosswalk.
- Source of power – PXOs are typically powered by solar cells, but illumination poles require access to electrical power. Further details are provided in **Section 4.3.6**.
- Proximity to driveways – Ensure that no driveways are present between the crosswalk and the yield to pedestrians line because the presence of a driveway may result in sudden movements by exiting drivers if vehicles are stopped while waiting for pedestrians to cross.
- Proximity to pedestrian crossings – According to OTM Book 15, PXOs should not be installed within 200 m of other signal-protected pedestrian crossings. There may be a desire to have pedestrian crossings at locations that do not meet these requirements. Under these situations, an operational analysis should be conducted to evaluate any vehicle queues' impact on the crossing.
- Sightlines – Sight triangles for side street traffic waiting at the stop sign must be clear and should not be obstructed by vegetation, on-street parking, buildings, fences, etc. The visibility of all signs and RRFBs at the crossing should be confirmed for road users. Sight distance requirements are detailed in TAC's Geometric Design Guide for Canadian Roads.

4.3.2 Illumination Levels

Illumination requirements for a Level 2 Type C PXO are the same as IPS and MPS pedestrian crossings. Please refer to **Section 4.1.2** for additional details.

4.3.3 Rectangular Rapid (RRFB) Flashing Beacon Placement

Flashing beacon placement specifications for a Level 2 Type C PXO are the same as a Level 2 Type B PXO. Please refer to **Section 4.2.3** for additional details.



4.3.4 Level 2 Type C PXO Components and Restrictions

As per OTM Book 15 (unless otherwise stated), the minimum required components and desired components for a Level 2 Type C PXO are as follows:

Minimum Required Components:

- Side-mounted pedestrian crossover signs, showing a symbol of a person crossing on a road (Ra-5R and Ra-5L), together with their Stop for Pedestrians (Ra-4t) tabs, on both sides of the road mounted back to back (For one-way applications, Stop for Pedestrians tab is required only for the direction of travel)
- Ladder crosswalk markings and yield to pedestrians line markings as further detailed in **Section 4.2.5**
- Actuated Double-sided Rectangular Rapid Flashing Beacon with Tell-Tale and Pedestrian Pushbutton for pedestrians mounted above each set of side-mounted pedestrian crossover signs installed at the pedestrian crossover as further detailed in **Section 4.2.3** and **Section 4.2.6**
- Advanced Pedestrian Crossover Ahead sign (Wc-27R/Wc-27L) at 50.0 m upstream of the crosswalk
- Stop sign (Ra-1) on the cross street if installed at an intersection
- Passing restrictions on single lane approaches
- Stopping prohibition for a minimum of 15 m on each approach to the crossing, and 10 m following the crossing
- Lane change prohibition on multiple lane approaches using solid white lines as further detailed in **Section 4.2.5**
- No Passing Here to Crossing sign (Ra-10) 30 m upstream of the crosswalk

Desired or Additional Considerations:

- Raised refuge island with mandatory:
    - Pavement markings on approaches to obstructions
    - Keep Right Sign (Rb-25, Rb-125)
    - Object Marker Sign (Wa-33L)
- Stopping prohibition for a minimum of 30 m on each approach to the crossing, and 15 m following the crossing.
- Curb extensions to reduce pedestrian crossing distance, either through curb work or through use of flexible bollards
- Consider use of a flexible centreline bollard to bring additional awareness to the crossing
- Raised crosswalk may be considered in some applications to reduce vehicle speeds and improve pedestrian visibility (applicability of this element would need to be reviewed for the crossing location)

Details regarding sign location criteria for the aforementioned minimum required components and desired components can be found in OTM Book 5 – Regulatory Signs and OTM Book 6 – Warning Signs. Horizontal and vertical mounting offsets for signs can be found in OTM Book 1B – Sign Design Principles.

4.3.5 Pavement Markings

Pavement marking specifications for a Level 2 Type C PXO are the same as a Level 2 Type B PXO. Please refer to **Section 4.2.5** for additional details.

Section 4.3.7 provides illustrations of installation details for a typical Level 2 Type C PXO that indicate the recommended placement of pavement markings for various applicable environments.

4.3.6 Infrastructure

Pedestrian Crossover Signs with Pedestrian Pushbuttons and Rectangular Rapid Flashing Beacons

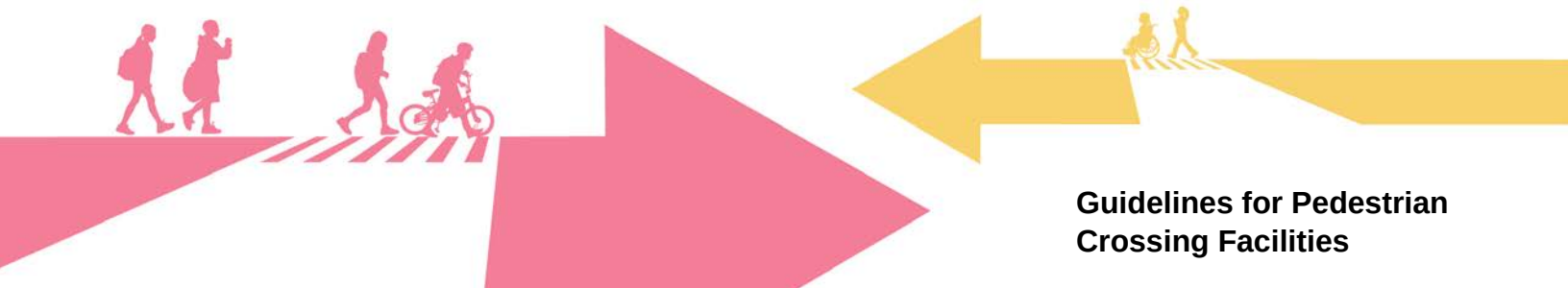
The required side-mounted pedestrian crossover signs for a Level 2 Type C PXO should be placed at approximately 2.0 m from the face of the curb with a minimum of 0.30 m and a maximum of 4 m. They should be placed in such a way that they should not obstruct any pedestrian movements including those using assistive devices (i.e. wheelchair users), and not be installed within the sidewalk.

Like Level 2 Type B PXOs, the Level 2 Type C PXO infrastructure elements are also installed on traffic poles. The selection of the location of poles will require the designer to consider utility clearances, aesthetic requirements, and mast arm length restrictions. An ideal location could be within the flare of the curb ramp.

Pedestrian pushbuttons should preferably be mounted on the same poles on which the side-mounted pedestrian crossover signs. However, if it is not possible to place the traffic pole close to the crosswalk due to any physical constraints, a separate small pole just for pushbuttons may be used.

The pushbuttons should be installed on the “through sidewalk” side of the sign at a height of 1.1 m (+/- 0.15 m) above finished grade. The pushbuttons should be in line, not perpendicular, with the crosswalk and if possible, poles with pushbuttons should be with the nearest edge of the crosswalk. It is important to ensure that these poles are accessible and user friendly (i.e. not located behind barriers, grassy/muddy areas, or areas where snow windrows may occur).

As detailed previously in **Section 4.3.3**, actuated double sided rectangular rapid flashing beacons with tell-tale must be installed above each set of side-mounted pedestrian crossover signs.



Typically, a solar power unit is installed on the top of each side-mounted pedestrian crossover sign to sufficiently power the pushbutton and rectangular rapid flashing beacons (this configuration is used by many major jurisdictions).

Illumination Poles

When designing illumination for PXOs, the existing available illumination should be checked where the crosswalk is proposed. If illumination levels do not meet requirements, the designer may investigate whether simply changing the luminaires is enough to meet the illumination requirements.

If it is necessary to install new illumination poles, the lighting can be installed on the same poles as the rest of the PXO infrastructure or it can be installed on separate poles as necessary as per site conditions and based on the type of PXO. The recommended placement of illumination poles for PXOs are the same as for traffic signals in **Section 4.1.6**.

Utilities

It is important to check the location of existing utilities (i.e. hydro, fibre optic cable, watermains, etc.) when selecting suitable locations for poles. The design process should review and consider the presence of existing utilities for potential conflicts, and coordinate with the utility companies as may be required.

Considerations regarding utility placement for PXOs are the same as for traffic signals in **Section 4.1.6**.

4.3.7 Layout

The following figures from OTM Book 15 illustrate the typical installation layouts for a Level 2 Type C PXO for the following applicable environments:

- Midblock: up to 3 lanes total cross-section, 2-way
- Midblock: 4-lane, 2-way with raised refuge only
- Midblock: up to 2 lanes total cross-section, 1-way
- Intersection: up to 3 lanes total cross-section, 2-way
- Intersection: 4-lane, 2-way with raised refuge only
- Intersection: up to 2 lanes total cross-section, 1-way

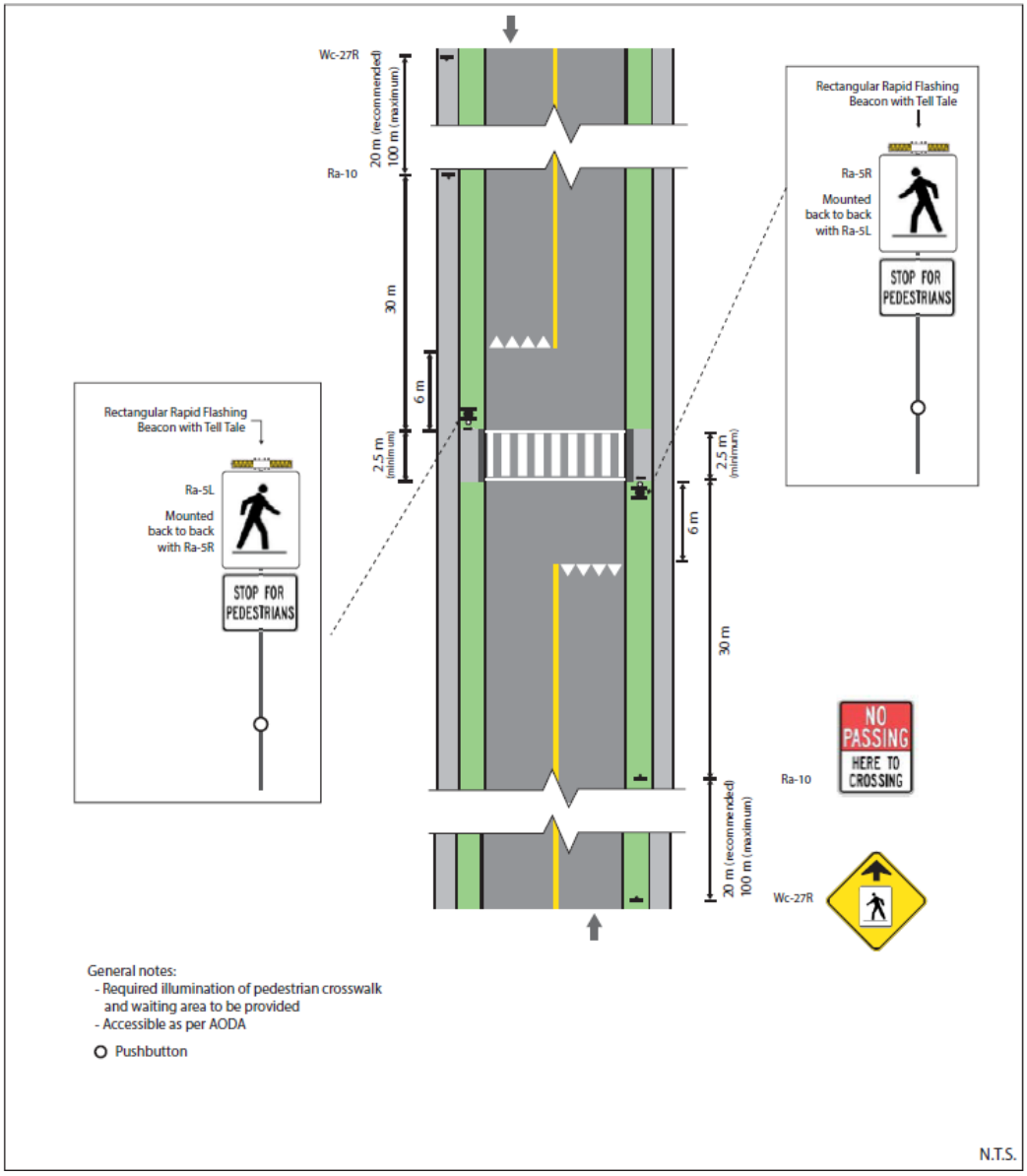


Figure 20: Level 2 Type C PXO Midblock Treatment for 2-lane, 2-way Roadways (Source: OTM Book 15)

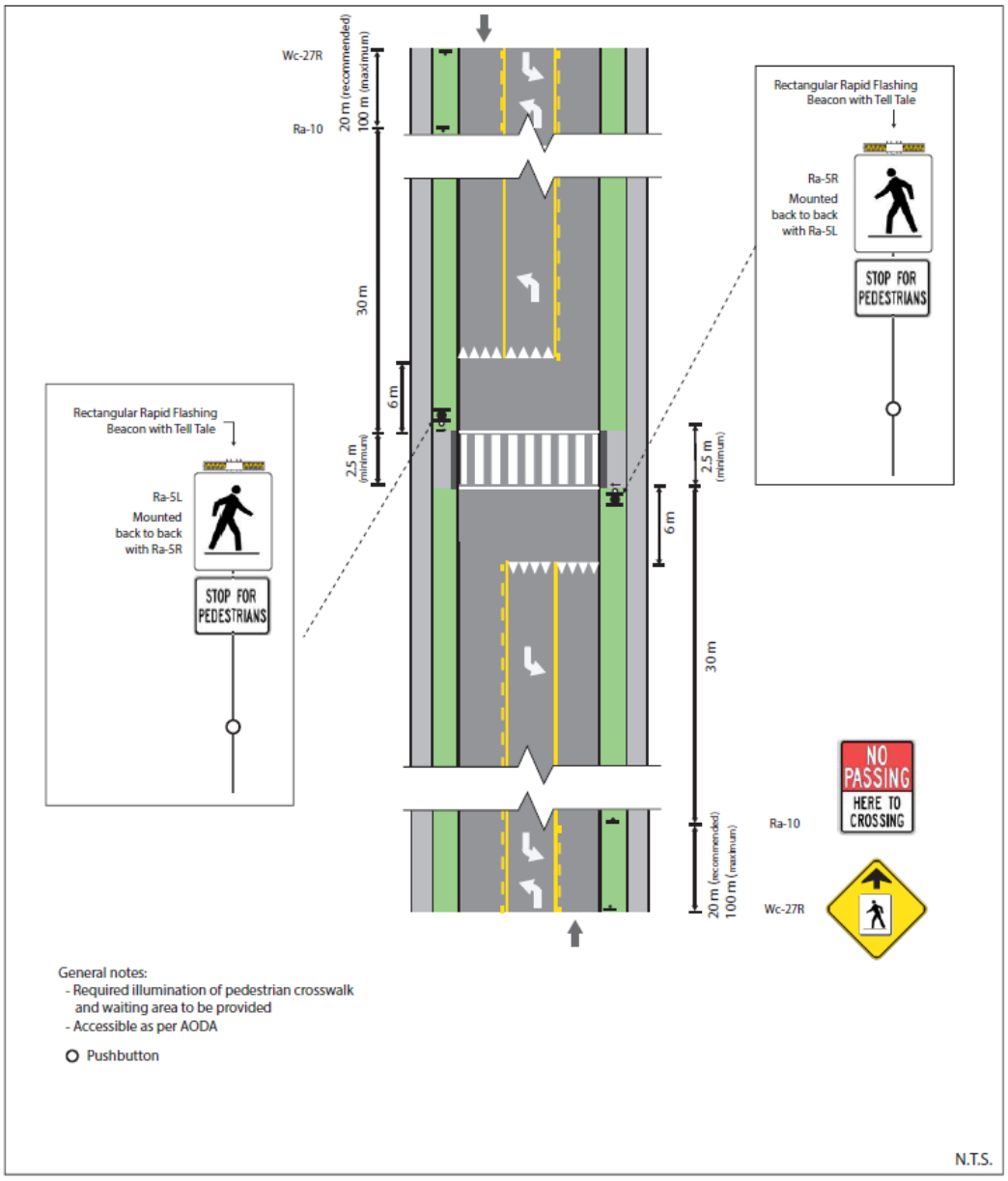


Figure 21: Level 2 Type C PXO Midblock Treatment for 3-lane with centre 2-way left-turn lane Roadways (Source: OTM Book 15)

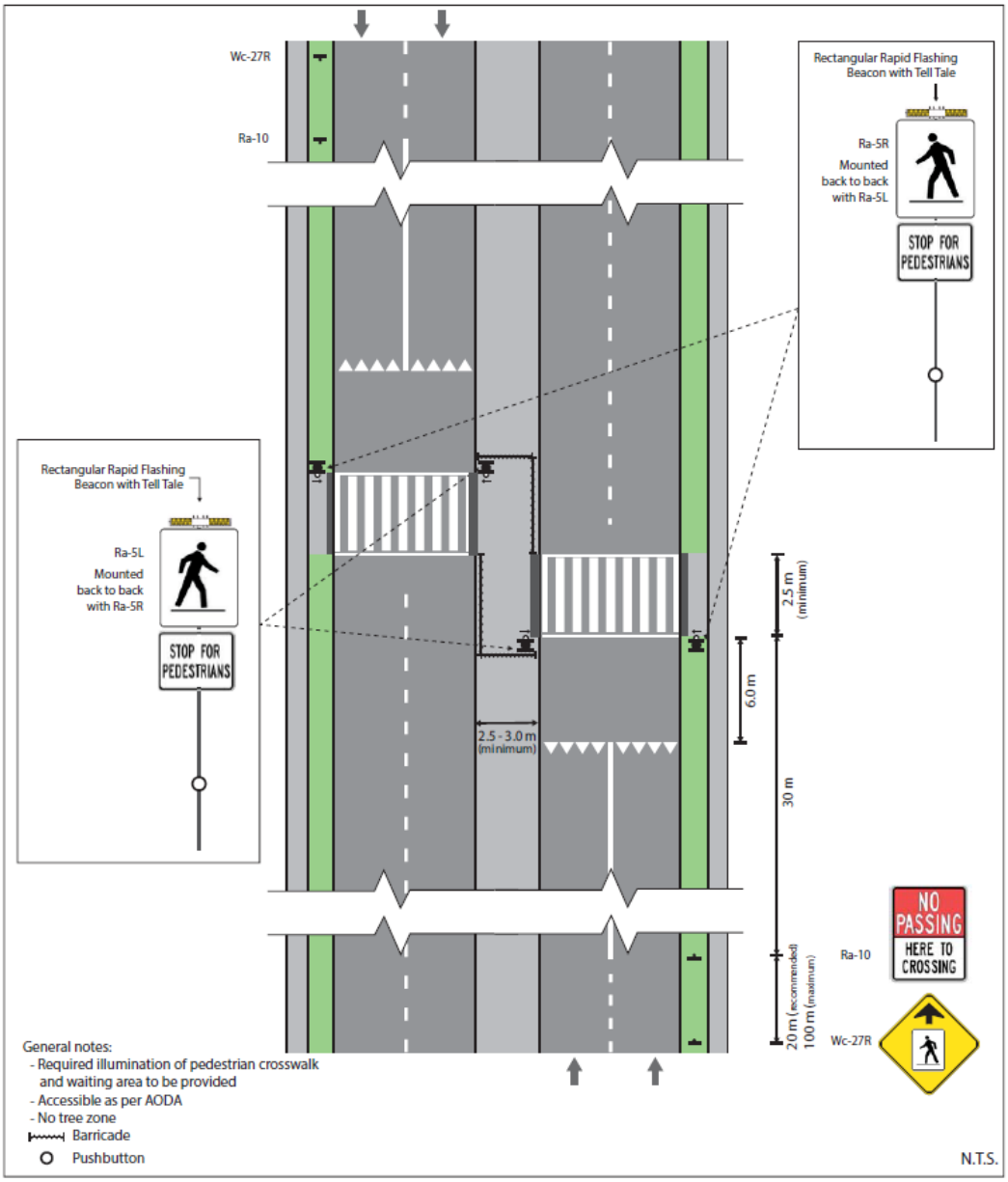


Figure 22: Level 2 Type C PXO Midblock Treatment for 4-lane, 2-way Roadways with Raised Refuge (Source: OTM Book 15)

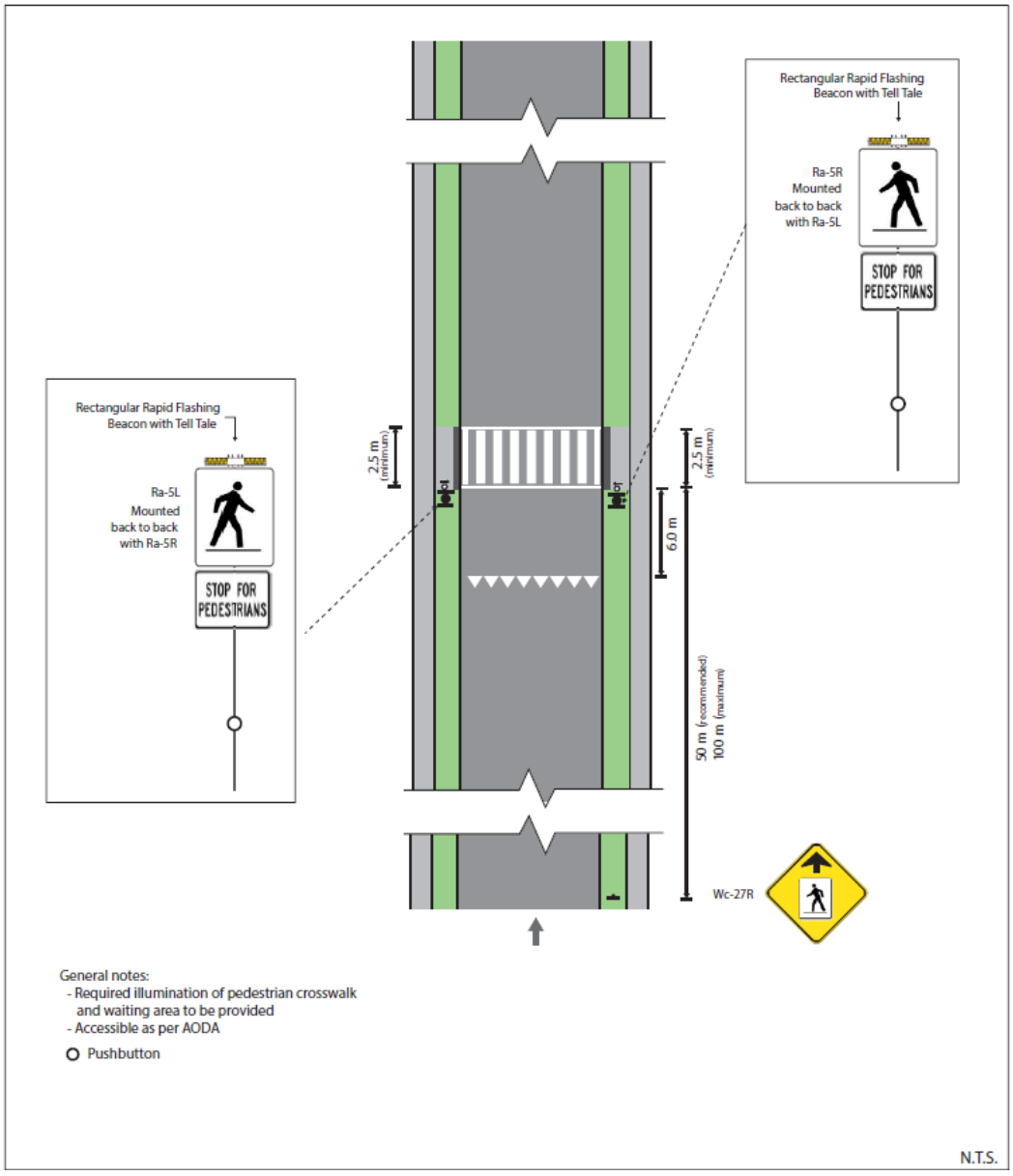


Figure 23: Level 2 Type C PXO Midblock Treatment for 1-lane, 1-way Roadways (Source: OTM Book 15)

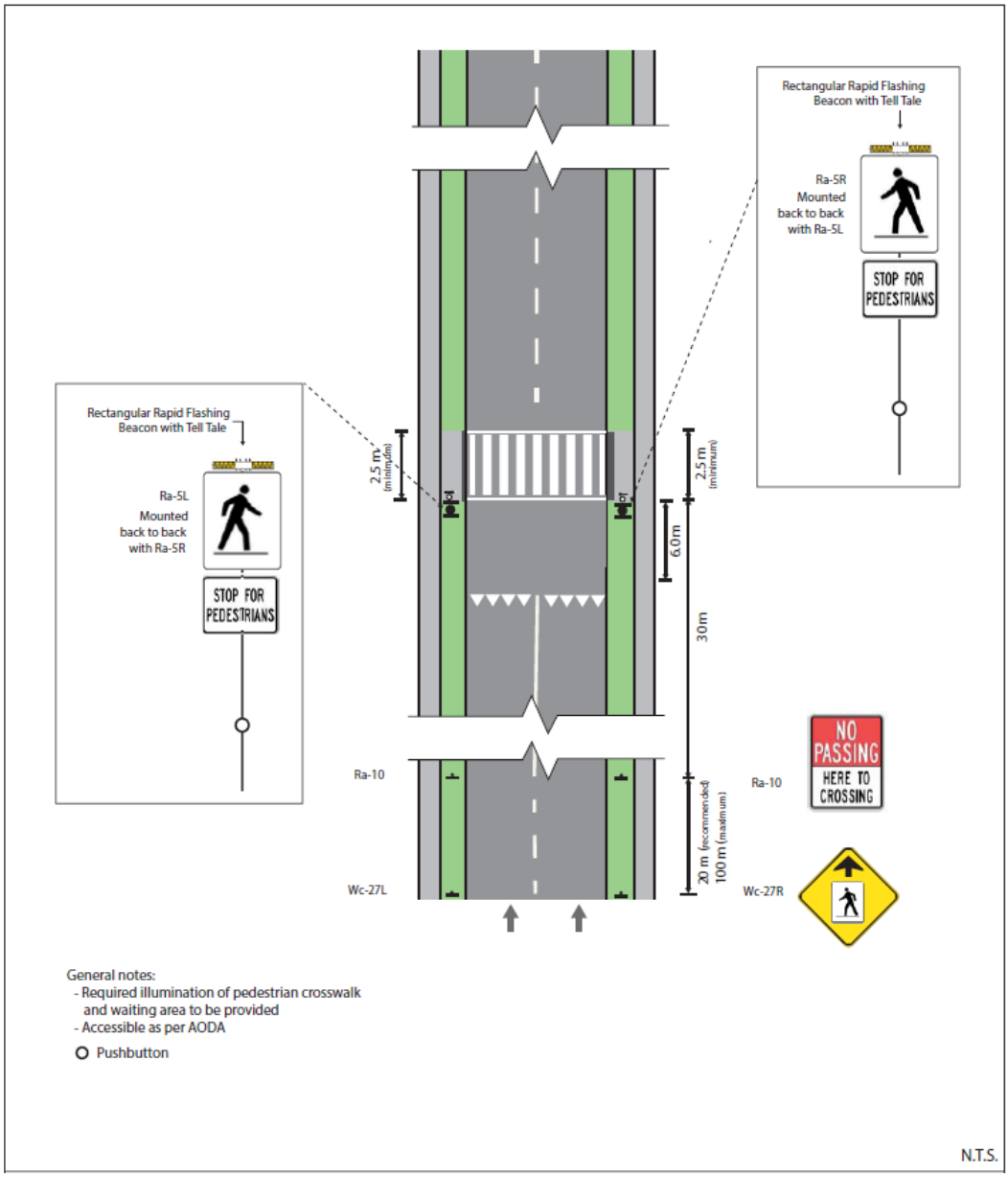


Figure 24: Level 2 Type C PXO Midblock Treatment for 2-lane, 1-way Roadways (Source: OTM Book 15)

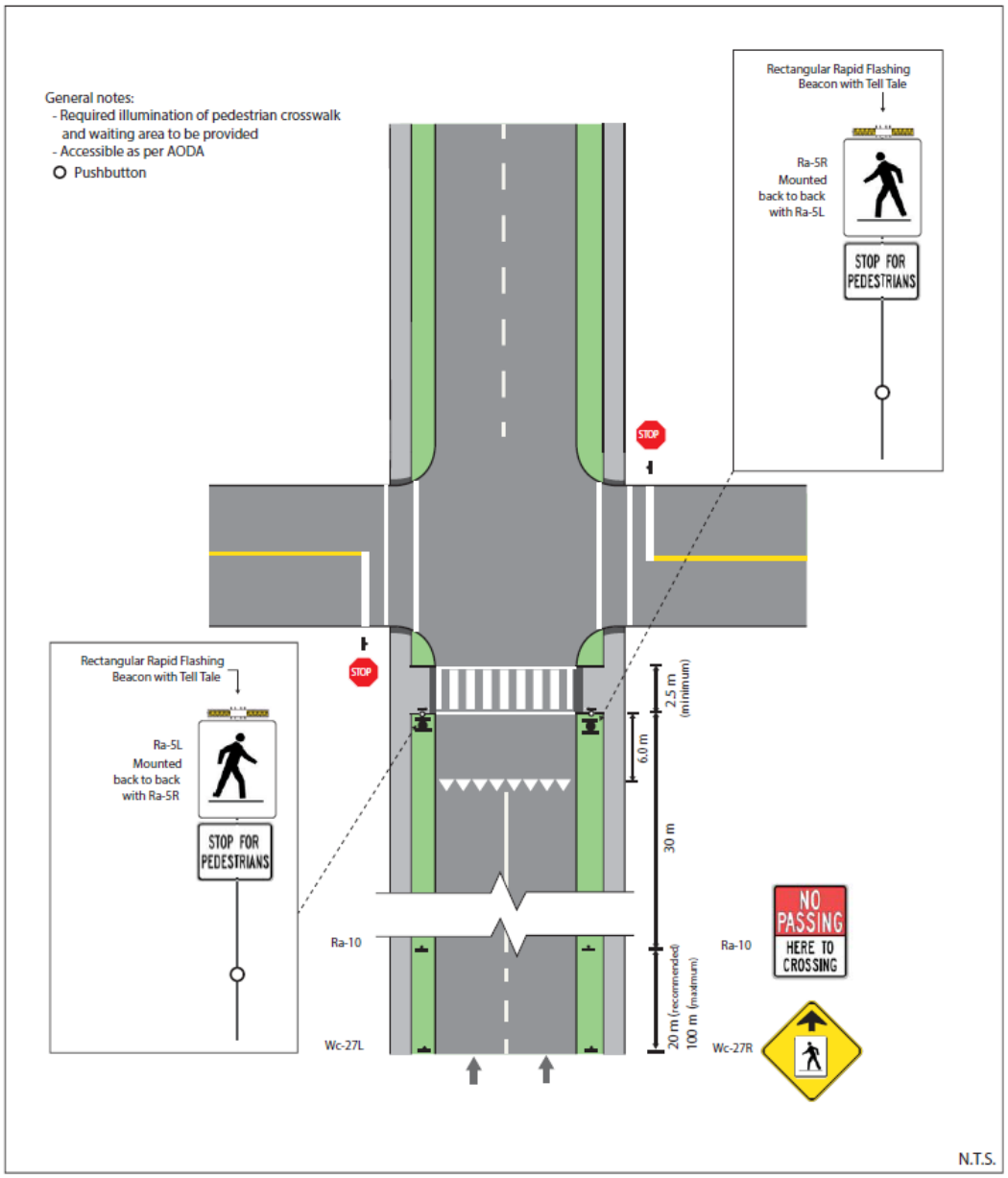


Figure 25: Level 2 Type C PXO Treatment at Intersection for 1-way Roadways (Source: OTM Book 15)

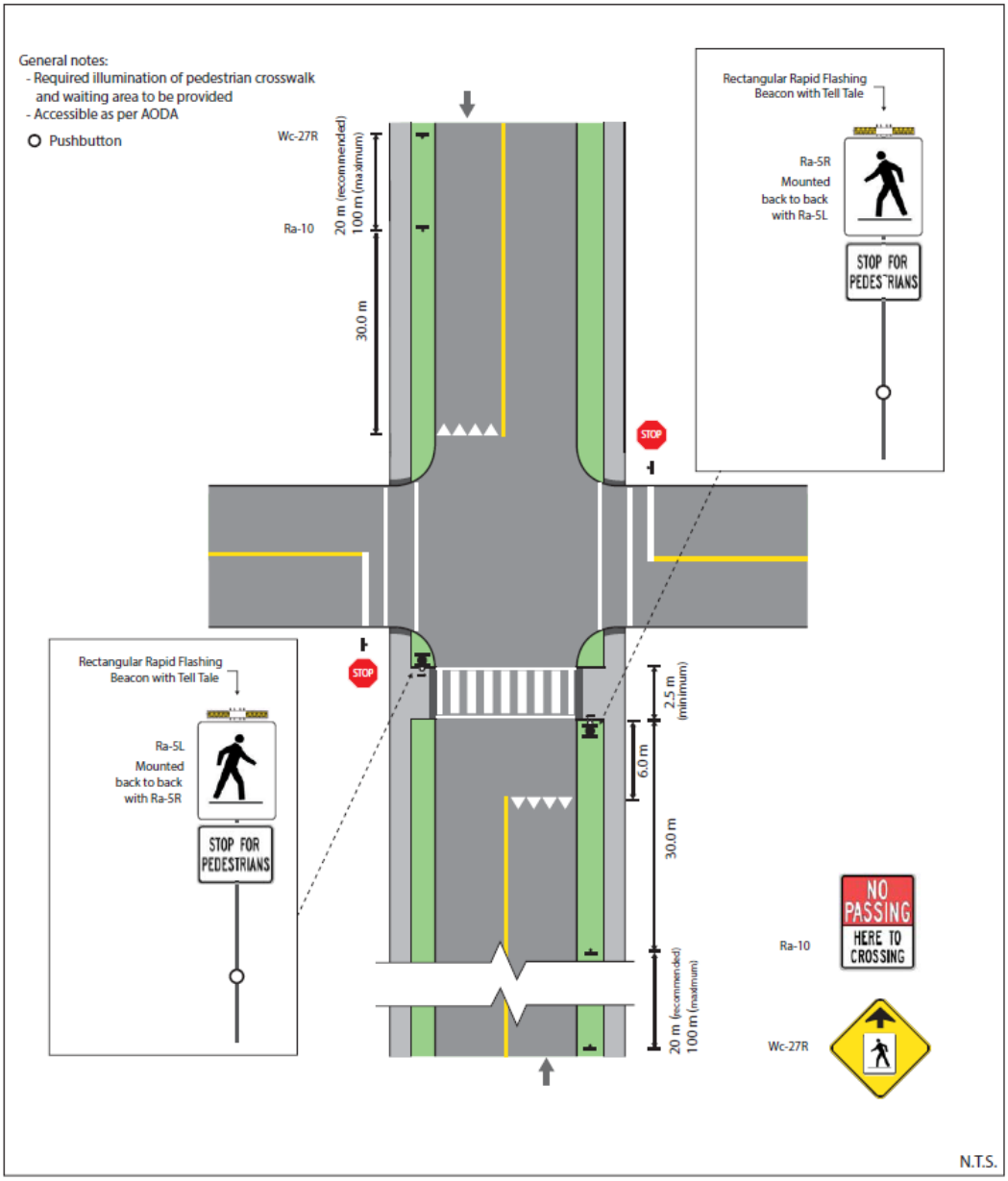


Figure 26: Level 2 Type C PXO Treatment at Intersection for 2-way Roadways (Source: OTM Book 15)

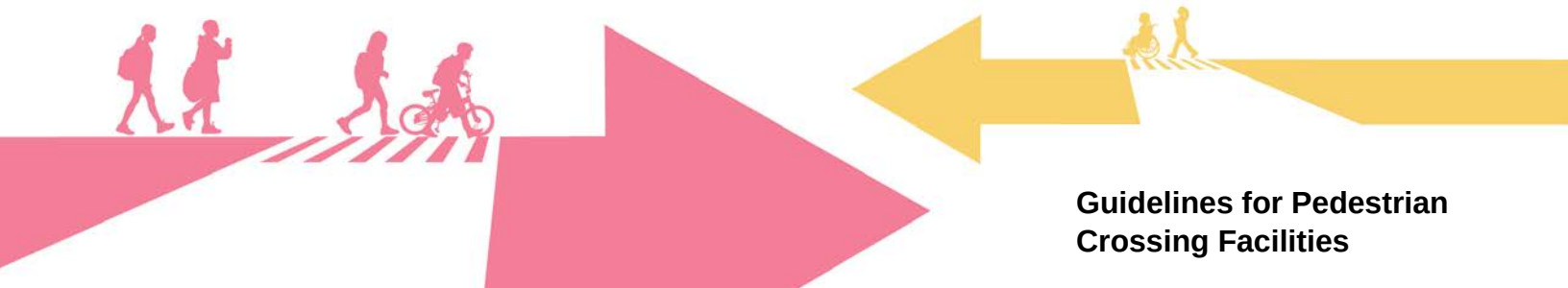
4.3.8 Accessibility

Accessibility considerations for a Level 2 Type C PXO are the same as a Level 2 Type B PXO. Please refer to **Section 4.2.8** for additional details.

4.4 Level 2 Type D PXO

4.4.1 Important Considerations

- Side streets must be stop controlled if the PXO is installed at an intersection.
- If cyclists are expected to be present in the area, proper guidance should be provided to inform cyclists that they must dismount when crossing the roadway at a dedicated pedestrian crossing.
- Location of signposts – Signposts should not be placed in the sidewalk and should ideally be located within the boulevard. Further details are provided in **Section 4.4.5**.
- Connectivity to sidewalks/trails – Pedestrian crossing facilities should be preferably located where there is a continuous sidewalk and/or a nearby trail network.
- Parking and no stopping restrictions – According to OTM Book 15, stopping must be prohibited for a minimum of 15 m on each approach to the crossing, and 10 m following the crossing. Further details are provided in **Section 4.4.3**.
- Location of transit stops – The crosswalk location will need to be coordinated with any existing transit stops. There may be situations where transit stops in the vicinity of the crossing may need to be relocated to comply with parking and no stopping restrictions.
- Refuge islands – At some locations where the roadway width is wide, consideration could be given to provide a refuge island for pedestrians' safety.
- General utilities (i.e. fire hydrants, hydro poles) – Type D PXOs can be installed using simple signposts, which can be directly buried to a shallow depth. The design process will still require the review of existing utilities to determine optimal locations for illumination poles and/or coordinate mitigation of conflicts with utilities for pole and sign post installations as may be required. Further details are provided in **Section 4.4.5**.
- Source of power – Illumination poles will require access to electrical power. Further details are provided in **Section 4.4.5**.
- Proximity to driveways – Ensure that no driveways are present between the crosswalk and the yield to pedestrians line because the presence of a driveway may result in sudden movements by exiting drivers if vehicles are stopped while waiting for pedestrians to cross.
- Proximity to pedestrian crossings – According to OTM Book 15, PXOs should not be installed within 200 m of other signal-protected pedestrian crossings. There may be a desire to have pedestrian crossings at locations that do not meet these requirements. Under these situations, an operational analysis should be conducted to evaluate any vehicle queues' impact on the crossing.
- Sightlines – Sight triangles for side street traffic waiting at the stop sign must be clear and should not be obstructed by vegetation, on-street parking, buildings, fences, etc. The visibility of all signs at the crossing should be confirmed for road users. Sight



distance requirements are detailed in TAC's Geometric Design Guide for Canadian Roads.

4.4.2 Illumination Levels

Illumination requirements for a Type D PXO are the same as a Type B PXO. Please refer to **Section 4.2.2** for additional details.

4.4.3 Level 2 Type D PXO Components and Restrictions

As per OTM Book 15 (unless otherwise stated), the minimum required components and desired components for a Type D PXO are as follows:

Minimum Required Components:

- Side-mounted pedestrian crossover signs, showing a symbol of a person crossing on a road (Ra-5R and Ra-5L), together with their Stop for Pedestrians (Ra-4t) tabs, on both sides of an undivided roadway, mounted back to back (For one-way applications, Stop for Pedestrians tab is required only for the direction of travel)
- Side-mounted pedestrian crossover signs, showing a symbol of a person crossing on a road (Ra-5R and Ra-5L) for each direction, on the right side and on the median of a four lane roadway with raised refuge mounted back-to-back with a Stop for Pedestrians (Ra-4t) tab in the direction of travel
- Ladder crosswalk markings and yield to pedestrians line markings as further detailed in **Section 4.4.4**
- Advanced Pedestrian Crossover Ahead sign (Wc-27R/Wc-27L) at 50.0 m upstream of the crosswalk
- Stop sign (Ra-1) on the cross street if installed at an intersection
- Stopping prohibition for a minimum of 15 m on each approach to the crossing, and 10 m following the crossing
- No Passing Here to Crossing sign (Ra-10) 30 m upstream of the crosswalk

Desired or Additional Considerations:

- Raised refuge islands and centre medians with mandatory:
    - Pavement markings on approaches to obstructions
    - Keep Right Sign (Rb-25, Rb-125)
    - Object Marker Sign (Wa-33L)
- Stopping prohibition for a minimum of 30 m on each approach to the crossing, and 15 m following the crossing
- Passing restrictions on single lane approaches using solid yellow centreline

- Curb extensions to reduce pedestrian crossing distance, either through curb work or through use of flexible bollards
- Use of a flexible centreline bollard to bring additional awareness to the crossing

Details regarding sign location criteria for the minimum required components and desired components can be found in OTM Book 5 – Regulatory Signs and OTM Book 6 – Warning Signs. Horizontal and vertical mounting offsets for signs can be found in OTM Book 1B – Sign Design Principles.

4.4.4 Pavement Markings

Pavement marking specifications for a Type D PXO are the same as a Type B PXO as per **Section 4.2.5.**

Section 4.4.6 provides illustrations of installation details for a typical Type D PXO that indicate the recommended placement of pavement markings for various applicable environments.

4.4.5 Infrastructure

Pedestrian Crossover Signs[16]

The pedestrian crossover signs for a Type D PXO should be placed at approximately 2.0 m from the face of the curb with a minimum of 0.30 m and a maximum of 4 m. They should be placed in such a way that they should not obstruct any pedestrian movements including those using assistive devices, and not be installed within the sidewalk.

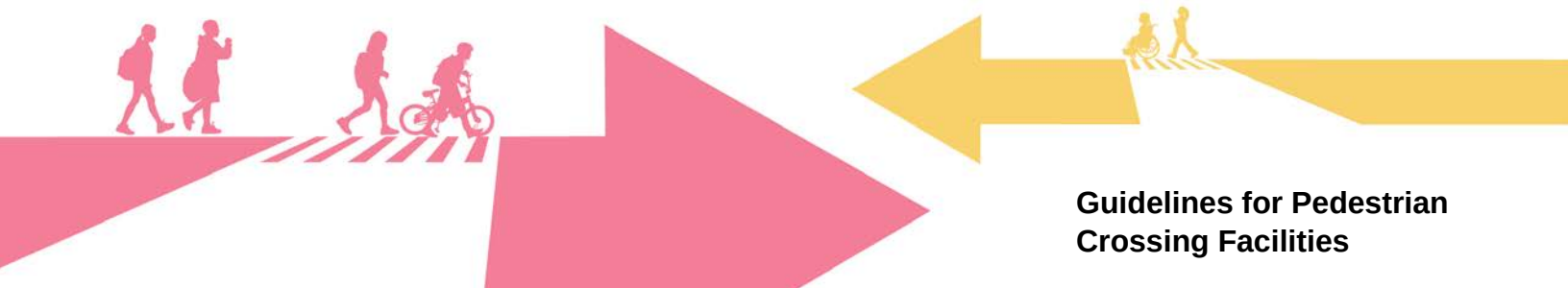
Illumination Poles[17]

When designing illumination for PXOs, the existing available illumination should be checked where the crosswalk is proposed. If illumination levels do not meet requirements, the designer may investigate whether changing the luminaires is enough to meet the illumination requirements. The requirements for illumination poles for Type D PXOs are similar to the requirements for PXO Types B and C as well.

Utilities[18]

It is important to check the location of existing utilities (i.e. hydro, fibre optic cable, watermains, etc.) when selecting suitable locations for poles. The design process should review and consider the presence of existing utilities for potential conflicts and coordinate with the utility companies as may be required.

[16] Ontario Traffic Manual Book 15 – Pedestrian Crossing Treatments, June 2016
[17] Transportation Association of Canada – Roadway Lighting Guide, January 2006
[18] Ontario Traffic Manual Book 12 – Traffic Signals, March 2012

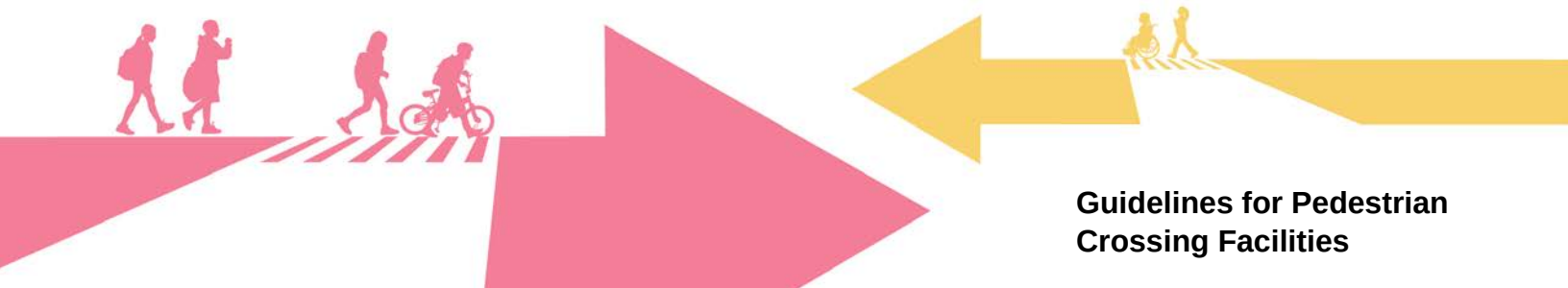


Considerations regarding utility placement for PXOs are the same as for traffic signals in **Section 4.1.6**.

4.4.6 Layout

The following figures from OTM Book 15 illustrate the typical installation layouts for a Type C PXO for the following applicable environments:

- Midblock: 2-lane, 2-way
- Midblock: 4-lane, 2-way with raised refuge only
- Midblock: up to 2 lanes total cross section, 1-way
- Intersection: 2-lane, 2-way
- Intersection: 4-lane, 2-way with raised refuge only
- Intersection: up to 2 lanes total cross section, 1-way



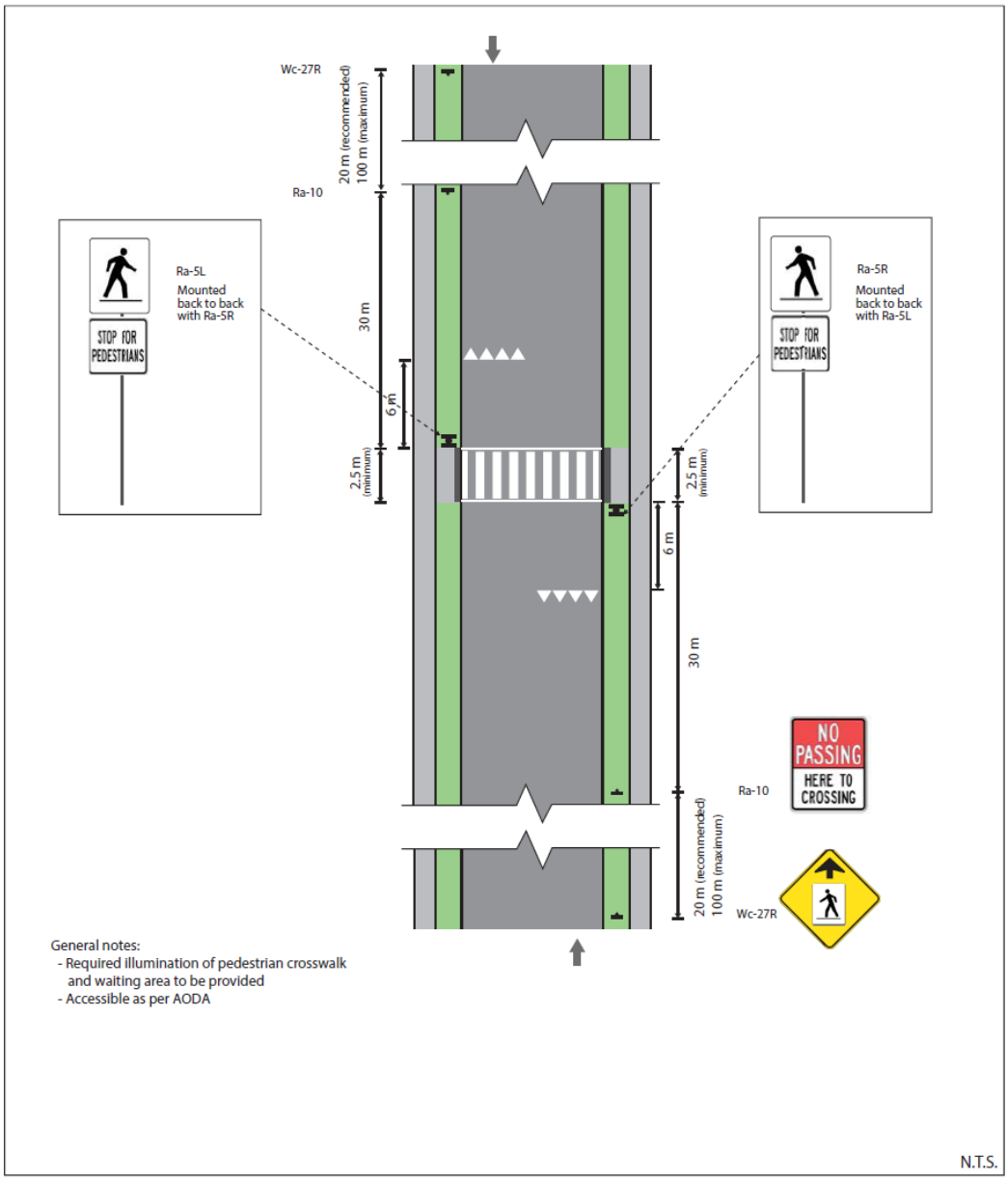


Figure 27: Level 2 Type D PXO Midblock Treatment for 2-lane, 2-way Roadways (Source: OTM Book 15)

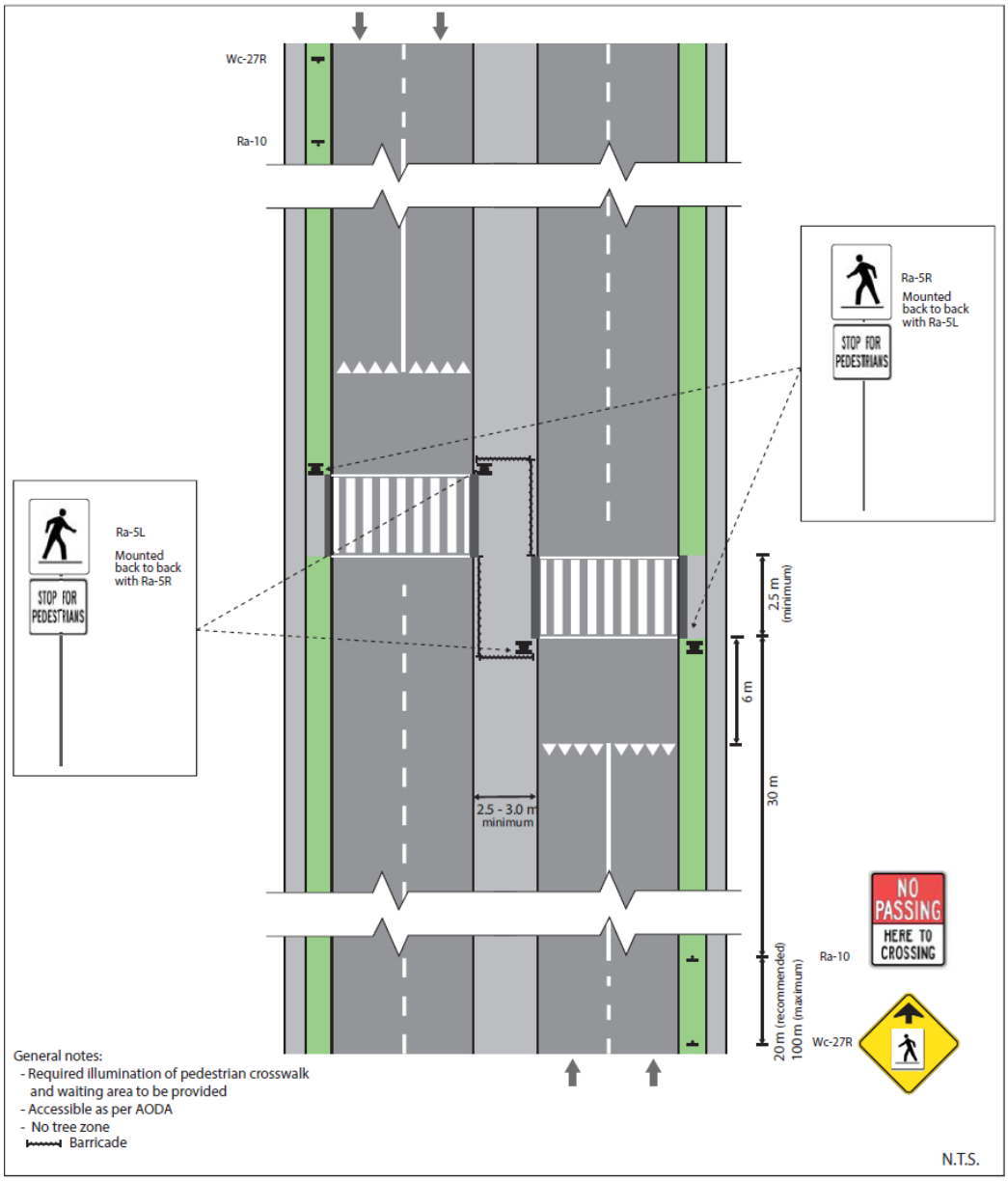


Figure 28: Level 2 Type D PXO Midblock Treatment for 4-lane, 2-way Roadways with Raised Refuge (Source: OTM Book 15)

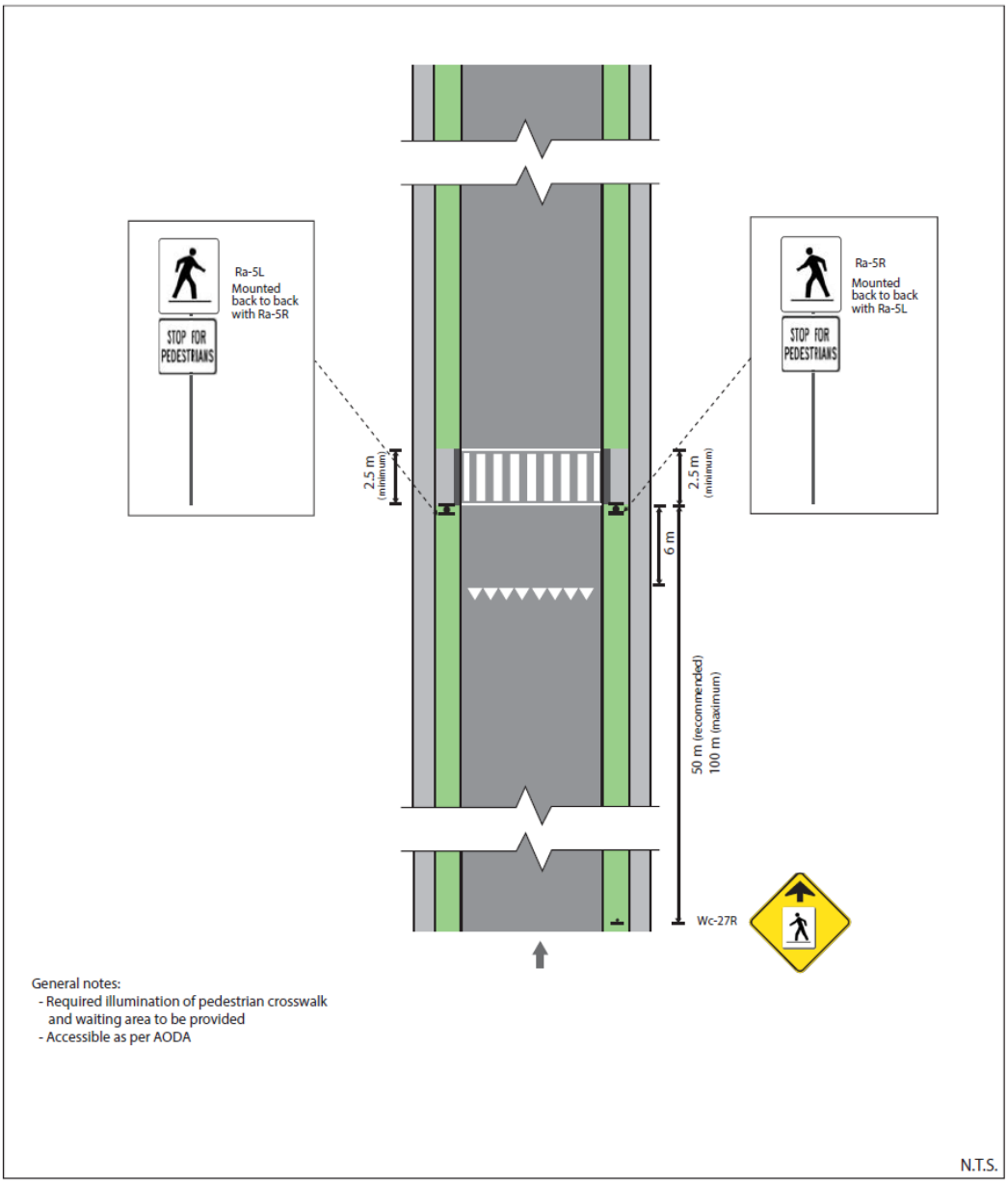


Figure 29: Level 2 Type D PXO Midblock Treatment for 1-lane, 1-way Roadways (Source: OTM Book 15)

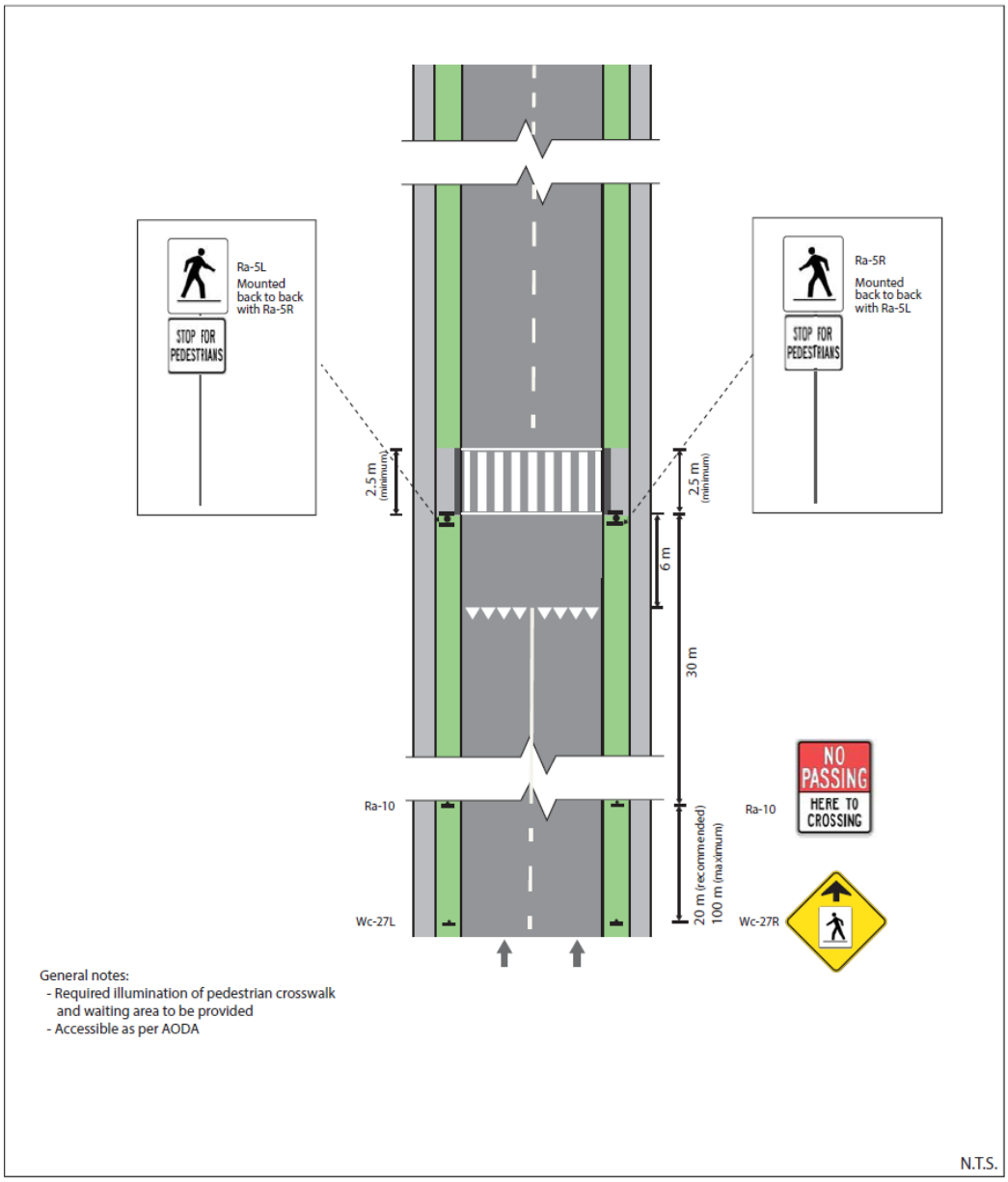


Figure 30: Level 2 Type D PXO Midblock Treatment for 2-lane, 1-way Roadways (Source: OTM Book 15)

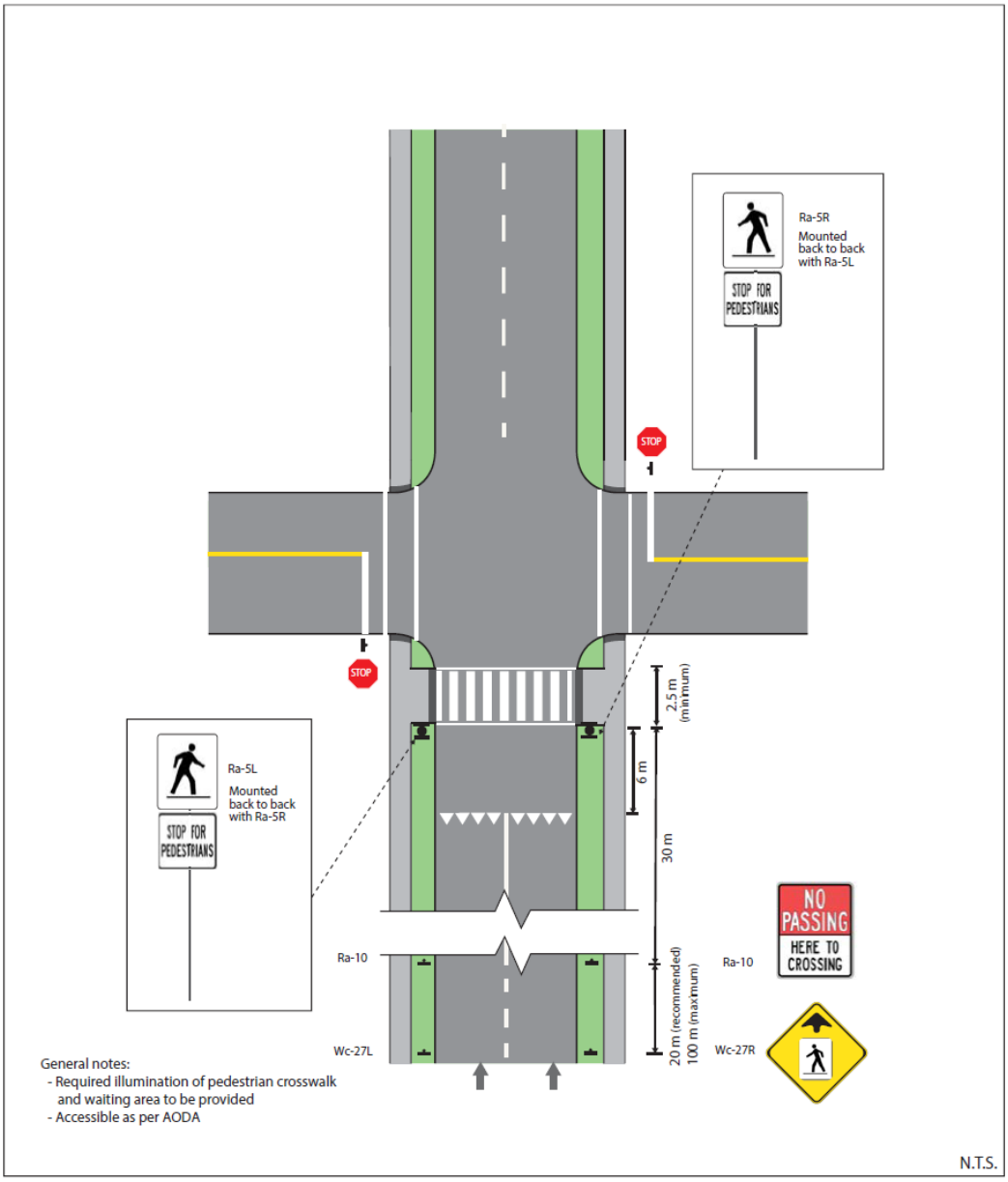


Figure 31: Level 2 Type D PXO Treatment at Intersection for 1-way Roadways (Source: OTM Book 15)

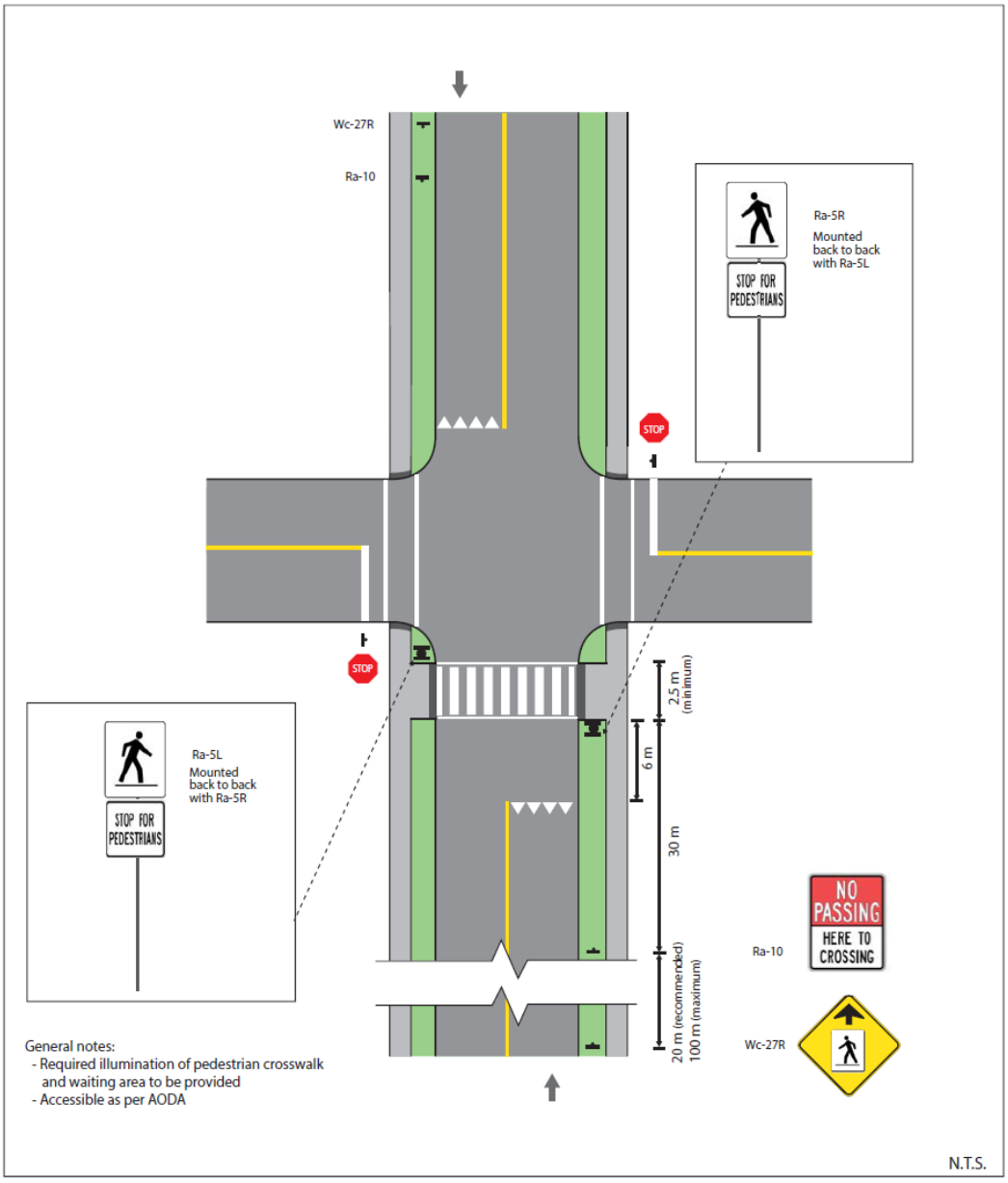


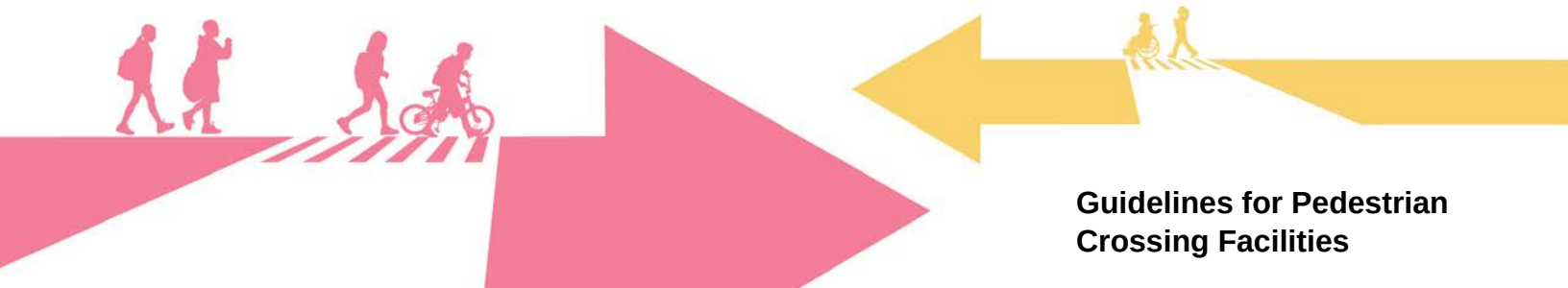
Figure 32: Level 2 Type D PXO Treatment at Intersection for 2-way Roadways (Source: OTM Book 15)

4.4.7 Accessibility

As per OTM Book 15, treatments to enhance accessibility applicable to Type D PXOs include curb ramps and depressed curbs.

When curb ramps and depressed curbs are provided at pedestrian crossings, they must have tactile walking surface indicators that have raised tactile profiles and a high tonal contrast with the adjacent surface as well.

Further details on designing for accessibility can be found in OTM Book 15 – Pedestrian Crossing Treatments.



By-Law Number 2021-XXX

A By-Law to Designate a Green Standard Community Improvement Project Area in the City of Kingston

Passed: [Meeting Date]

Whereas the Official Plan for the City of Kingston contains provisions relating to community improvement in the City of Kingston; and

Whereas Section 28(2) of the *Planning Act*, R.S.O. 1990, Chapter P.13, as amended, provides for the designation of a community improvement project area;

Therefore be it resolved that the Council of The Corporation of the City of Kingston, in accordance with the provisions of Section 28(2) of the *Planning Act*, R.S.O. 1990, c.P13, hereby enacts as follows:

1. That all the lands within the City of Kingston be designated as a Green Standard Community Improvement Project Area for the purposes of preparing and implementing a Green Standard Community Improvement Plan.

2. That this By-Law shall come into force and take effect on the date of its passing.

Given First and Second Readings: [Meeting Date}

Given Third Reading and Passed [Meeting Date]

John Bolognone
City Clerk

Bryan Paterson
Mayor

By-Law Number 2021-XXX

A By-Law to Adopt the Green Standard Community Improvement Plan

Passed: [Meeting Date]

Whereas By-law Number _, passed on the____day of, _____ 2021, designated the Community Improvement Project Area for this Green Standard Community Improvement Plan; and

Whereas Section 28(4) of the *Planning Act* states that where a by-law has been passed to designate a community improvement project area, the Council may provide for the preparation of a plan suitable for adoption as a community improvement plan for that community improvement project area; and

Whereas "community improvement" is defined in Section 28(1) of the *Planning Act* as "the planning or replanning, design or redesign, resubdivision, clearance, development or redevelopment, construction, reconstruction and rehabilitation, improvement of energy efficiency, or any of them, of a community improvement project area, and the provision of such residential, commercial, industrial, public, recreational, institutional, religious, charitable or other uses, buildings, structures, works, improvements or facilities, or spaces therefor, as may be appropriate or necessary"; and

Whereas the Council of The Corporation of the City of Kingston considers it appropriate to adopt a Green Standard Community Improvement Plan in accordance with the *Planning Act*, for the purposes of community improvement of the corresponding Community Improvement Project Area, through various municipal initiatives as set out in the community improvement plan; and

Whereas Council, by its Planning Committee, held a public meeting on July 15, 2021 to discuss and receive public input regarding the adoption of the Green Standard Community Improvement Plan and has taken all of the other required steps prior to the enactment of this By-Law to adopt a Green Standard Community Improvement Plan in the Community Improvement Project Area as required by the *Planning Act;* and

Whereas the City has prepared a plan entitled "Green Standard Community Improvement Plan" attached hereto as Schedule "A" and forming part of this By-Law.

Therefore be it resolved that the Council of The Corporation of the City of Kingston, in accordance with the provisions of Section 28 of the *Planning Act*, R.S.O. 1990, c.P13, hereby enacts as follows:

1. Green Standard Community Improvement Plan annexed hereto as Schedule "A" and forming part of this By-Law is hereby adopted as the Green Standard Community Improvement Plan for the Community Improvement Project Area designated by By-Law Number XXX.

2. This By-Law shall come into force and take effect in accordance with the provisions of the *Planning Act*.

Given First and Second Readings: [Meeting Date}

Given Third Reading and Passed [Meeting Date]

John Bolognone
City Clerk

Bryan Paterson
Mayor

Exhibit B to Report Number EITP-21-017

Schedule 'A' to By-Law By-Law Number 2021-XXX

City of Kingston

Green Standard

Community Improvement Plan

Adopted by the Council of the Corporation of the City of Kingston on_____{date}

_____(By-law ###_____).

Table of Contents

Glossary Of Terms

Net Zero energy (NZe) building: a building which captures/harnesses as much energy-on-site as it consumes on a yearly basis.

Net Zero ready (NZr): means that a building is constructed to a high efficiency and building envelope levels but does not include all the renewable energy on site for NZe.

Renewable Energy: means resources that are derived from natural processes which are replenished at a rate equal or faster than the rate at which they are consumed such as the sun, wind or geothermal energy.

Carbon Neutral: some emissions from a building/process still occur, but they are “offset” by providing financial support to a project elsewhere making overall net emissions zero.

1.0 Introduction

It is recognized that incorporating sustainability in local land use planning and development policies significantly influences the way we design and build our communities and the impact on our quality of life. The City of Kingston acknowledges the importance of sustainability and its ability to address various issues such as energy and water use, transportation, public health, economic development, environmental protection and climate change.

Municipalities in Ontario, allowed under the *Planning Act*, can make use of Community Improvement Plans (CIP) to offer incentives related to the energy efficiency of land and buildings. This Green Standard For Buildings Community Improvement Plan (hereafter referenced as "Green Standard CIP") will encourage the construction of buildings or the use of land, in a way that achieves measurable improvement or efficiency in energy. This will be achieved through the provision of programs which could make grants, loans, refunds, exemptions, tax increment-equivalent financing or other incentives and assistance available, in accordance with qualifying programs and available funding.

1.1 Organization of the Green Standard CIP

The Green Standard CIP includes the following components:

- General information on community improvement planning;
- Review of the legislative authority supporting the establishment of the CIP;
- Identification of the CIP project area, purpose, goal and objectives, and program parameters;
- CIP building performance levels and associated incentive program details; and,
- an overview of the CIP administration.

1.2 General Information on Community Improvement Planning

Common to all municipalities is the need to build, reinforce or reshape themselves to meet global challenges and residents' future needs in a sustainable way that delivers a high quality of life. Community improvement planning, one of the many community

planning tools found in the *Planning Act*, can help municipalities address some of these challenges, as it provides a means of planning and financing activities that relate to the effective use, reuse or restoration of lands, buildings and infrastructure.

Through a Community Improvement Plan, municipalities can:

- focus public attention on local priorities and specific municipal initiatives;
- target areas in transition or in need of repair, rehabilitation and redevelopment;
- facilitate and encourage community change in a coordinated manner; and,
- stimulate private sector investment through municipal incentive-based programs.

Community improvement project areas may range from specific properties and employment areas to streets, neighbourhoods, or as is the case with this Green Standard CIP, within the boundary of the City of Kingston. Program coverage can span a wide spectrum of municipal objectives from municipally driven programs relating to infrastructure works, to incentive-based programs providing grants, loans or tax increment-equivalent financing.

Cities across Ontario have previously used Community Improvement Plans for residential neighbourhood restoration, commercial area improvements, incentives for enhancing or redeveloping the downtown, adaptive re-use and brownfield remediation. Common to these and all CIP programs is the alteration of the physical landscape of communities so that public benefits can be achieved, resulting in more socially cohesive, environmentally friendly and/or economically sound communities.

2.0 Legislative Authority and Policy Direction

2.1 Provincial

2.1.1 Planning Act and Municipal Act

The *Planning Act* provides the statutory framework for the development of Community Improvement Plans (CIPs) in the Province of Ontario. A CIP is a tool that allows the City to direct funds and implement policy initiatives toward a specifically defined Community Improvement Project Area. Section 28 of the *Planning Act* allows municipalities, where

community improvement policies are set out in their Official Plan, to designate by by-law a Community Improvement Project Area and to prepare a CIP for that Community Improvement Project Area. Section 365.1 of the *Municipal Act*, *2001* provides that where a Community Improvement Project Area has been designated and a Community Improvement Plan is in effect in accordance with Section 28 of the *Planning Act*, the CIP may also provide a tax cancellation program specific to brownfield rehabilitation.

Community improvement "means the planning or replanning, design or redesign, resubdivision, clearance, development or redevelopment, construction, reconstruction and rehabilitation, improvement of energy efficiency, or any of them, of a community improvement project area, and the provision of such residential, commercial, industrial, public, recreational, institutional, religious, charitable or other uses, buildings, structures, works, improvements or facilities, or spaces therefor, as may be appropriate or necessary" (*Planning Act*, Part IV Section 28(1).

Directly related to the focus of this CIP are changes made to the *Planning Act* which add the improvement of energy efficiency to the definition of "community improvement"; and the provision of energy efficient uses, buildings, structures, works and improvements or facilities, to the scope of eligible costs for which municipalities can provide community improvement grants or loans.

Specifically, Part IV Section 28 of the *Planning Act* includes the following:

"Grants or loans re eligible costs:

> (7) For the purpose of carrying out a municipality's community improvement plan that has come into effect, the municipality may make grants or loans, in conformity with the community improvement plan, to registered owners, assessed owners and tenants of lands and buildings within the community improvement project area, and to any person to whom such an owner or tenant has assigned the right to receive a grant or loan, to pay for the whole or any part of the eligible costs of the community improvement plan.

Eligible costs

> (7.1) For the purposes of subsection (7), the eligible costs of a community improvement plan may include costs related to environmental site assessment,

environmental remediation, development, redevelopment, construction and reconstruction of lands and buildings for rehabilitation purposes or for the provision of energy efficient uses, buildings, structures, works, improvements or facilities."

2.1.2 Provincial Policy Statement

The Provincial Policy Statement (PPS) is the primary provincial land use policy document guiding municipal decision-making. The *Planning Act* requires that decisions on land use planning matters "be consistent with" the PPS. As a key part of Ontario's policy-led planning system, the Provincial Policy Statement sets the policy foundation for regulating the development and use of land. It also supports the provincial goal to enhance the quality of life for all Ontarians.

The 2020 Provincial Policy Statement is based on building strong healthy communities. Specifically, Policy 1.8 of the PPS provides policy direction to planning authorities on how they shall support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions, and preparing for the impacts of a changing climate through land use and development patterns.

2.1.3 Ontario Building Code (OBC)

The OBC is the mandatory and minimum construction compliance benchmark within the province. The current OBC refers to the National Energy Code for Buildings (NECB 2017) and includes a supplementary standard (SB-10 and SB-12) which includes energy efficiency requirements for new building construction. The OBC also has prescriptive, performance and energy modelling requirements that achieve efficiency levels for new houses equivalent to moderate performance levels related to the most recent National Building Code (NBC 2015).

The levels of energy efficiency established within the OBC standards are intended to increase every several years and have been adjusted to match industry adoption of best practices in energy and water conservation. Newer versions of building and energy codes can also be used to establish the pathway incrementally over time to a set goal, rather than follow industry standards. The Canadian Commission on Building and Fire Codes has indicated that energy requirements within national codes can affect up to 81% of energy

use in houses and 68% in other buildings while lowering GHG emissions and operational costs. As such, the upcoming versions of the NECB and NBC have a strong focus on energy efficiency and set an incremental path to higher performance new buildings.

It is expected that the 2020 versions of the the NECB/NBC will be adopted by Ontario in the near future for harmonization as part of the Pan-Canadian Framework established in December 2016 and agreed to by provincial and territorial Energy Ministers under Canada's Energy Strategy . Under this strategic framework, tiered national building and energy codes will incrementally reach net zero (energy) ready in the next 10 years. The final 2020 versions of these national codes are expected to be released by the end of 2021. Earlier versions were sent to expert stakeholders across the country, as commissioned by the National Research Council of Canada, to comment on the technical validity and feasibility of the proposed tiers.

2.2 Local

2.2.1 City of Kingston Official Plan (OP)

The City of Kingston Official Plan was adopted by Council on June 15, 2009 and was approved by the Ministry of Municipal Affairs and Housing (MMAH) on January 6, 2010. Official Plan Amendment Number 50, being the five-year update to the Official Plan was adopted by Council on March 7, 2017 and approved by the MMAH on August 8, 2017. The OP includes policies regarding 'Community Improvement' (Section 9.8). The objective of the Community Improvement policies in the Official Plan is to maintain, improve and rehabilitate various residential, commercial and industrial sections of the City.

Section 2.1 of the OP outlines the City's strategic policies for attaining sustainable development in the community. These policies include conserving natural and built resources; reducing pollution and rehabilitating polluted areas; applying conservation practices; reducing energy consumption; promoting green infrastructure; enhancing the green economy and low carbon economy. Sections 3.4, 3.6, and 6.2 also outline guidance and support to influence green building features as well as the use of renewable and distributed energy resources.

Community Improvement Policy 9.8.2 of the Official Plan states that:

"The community improvement policies of this Plan are enabling policies under the *Planning Act*. The Community Improvement Area applies to all lands within the municipal boundary. It is the intent of Council that the Community Improvement Area may be designated, in whole or in part, by by-law, as one or more defined community improvement project areas for which detailed community improvement plans will be prepared." In addition, Section 9.8.7 j. (Objectives for Community Improvement Areas) of the Official Plan, contains policies to improve the environmental impacts of development and specifically to improve energy efficiency and reduce carbon emissions where feasible.

2.2.2 2019 - 2022 Strategic Plan

City Council's 2019-2022 Strategic Plan includes a priority to Demonstrate Leadership on Climate Action and a goal to develop and promote incentives for residents to reduce their energy use and become part of city-wide solutions to meet Kingston's carbon neutral target. A strategic action under this goal directs staff to develop a new building construction net-zero policy and incentive program using a Community Improvement Plan model. The Green Standard CIP includes the framework and related programs that supports implementation of this action to help shape future development within the City.

3.0 Green Standard CIP

3.1 Community Improvement Project Area

. All the lands within the City of Kingston are designated as a Green Standard Community Improvement Project Area

3.2 Purpose

The purpose of the Green Standard CIP is to support and implement provincial and local policies and strategies relating to energy and climate change. This will be achieved through incentive programs which could offer grants, loans, refunds, exemptions, tax incremental rebates, financing or other incentives and assistance available to project

proponents, subject to available funding.

Qualifying incentive programs forming part of the Green Standard CIP are outlined in Section 5.0 (Green Standard CIP Programs) and are designed to meet the goal of this Green Standard CIP.

3.3 Goals and Objectives

The goal of the Green Standard CIP is to encourage the construction of new buildings or the use of land in a way that achieves significant and measurable improvement in energy performance.

Objectives that support the fulfillment of this goal include the following:

1. Establish an incentive program through a Community Improvement Plan model that assists property owners with the increased costs of voluntarily constructing new buildings to performance levels higher than the OBC.
2. Provide education and training supports to increase the local understanding and capacity of property owners and developers to construct high performance new buildings.
3. Stimulate economic competitiveness and innovation in the local building sector to voluntary move towards achieving Net Zero energy levels within new buildings prior to their inclusion in related provincial codes and standards.
4. Support achieving Kingston's community GHG emission reduction targets and aim for carbon neutrality.

Successful implementation of Green Standard CIP is expected to provide the following benefits:

- Meet community GHG reduction targets more cost effectively in new construction rather than retrofitting them later;
- Stimulate economic growth in advanced building technology and renewable energy sectors including creation of related skilled-trades and professional jobs and increased green building experience / expertise among local builders and contractors;

- Achieve life-cycle value through operation and maintenance savings including reduced utility bills freeing up disposable income that can increase local economic activity;
- Enable building users to protect against rising energy and carbon costs;
- Provide greater comfort, improved health and productivity for employees and residents using the space; and,
- Increased public recognition / normalization of green building standards among local property owners, constructors, realtors and finance/insurance professionals.

Monitoring of program outcomes is addressed in Section 6.1 .

3.4 Program Parameters

Programs qualifying under the Green Standard CIP shall meet the following parameters:

i. Program(s) may offer grants, loans, refunds, exemptions, tax increment-equivalent financing or other incentives and assistance to registered owners, assessed owners and tenants of lands and buildings within the community improvement project area, and to any person to whom such an owner or tenant has assigned the right to receive such financial incentive to pay for the whole or any part of the eligible costs of the community improvement plan, subject to available funding.

ii. Financial assistance shall not be issued for work located on property in property tax or utility arrears or any other arrears owing to the City or related entities.

iii. The total of grants, loans or other financial assistance provided under a program is limited to the amount of the eligible costs defined in the program.

iv. Program(s) shall relate directly to achieving energy objectives and shall address but not necessarily be limited to one or more of the following:

   a) air quality through the reduction of emissions harmful to the environment including those associated with impacting climate change;

   b) energy efficiency and conservation through energy demand

management to reduce energy consumption, and design or product standards that result in more energy efficient green buildings and development;

c) energy generation through on-site or remote renewable energy systems;

d) energy storage and distribution for thermal or electrical energy systems, including but not limited to district energy, microgrid, smart-grid, vehicle-to-grid, virtual net metering, and micro-utility distribution concepts; and

e) waste management by enhancing waste reduction through composting, material re-use, recycling and waste diversion initiatives.

v. Program(s) shall measure improvement in energy and emissions by using government or industry accepted benchmarks, certifications or standards including but not limited to Built Green/Green Seal, Zero Carbon Building Standard, EnerGuide Rating System, LEED, Living Building, National Building Code and National Energy Code for Buildings, Net-Zero energy (NZe) and Net Zero ready (NZr), Passive House and R-2000.

vi. Program(s) contained in the CIP shall not commence until City Council has approved and adopted the CIP or respective amendment to the CIP as well as the budgetary resources required to support the financial assistance to be provided under the program(s).

In order to achieve scale of impact from implementation, the Green Standard CIP incentive programs are not intended for the construction of an individual dwelling. It is expected that the Green Standard CIP will be most applicable to larger developments involving the following building types:

- Multi-unit residential buildings;
- Subdivision developments of single detached dwellings, semi-detached and townhouses or row housing;
- Commercial offices including retail; and
- Residential mixed-use buildings (i.e. ground floor retail and/or office with residential above).

Specialized buildings such as in the industrial (e.g. manufacturing facilities) and institutional (e.g. hospitals) sectors often have most of their energy consumption within their operational

processes separate from the actual building performance. Therefore, the Green Standard CIP may have limited applicability to these types of buildings, but does not make them ineligible for the Green Standard CIP.

3.5 Amendments

An amendment to the CIP is required where there is:

a. a change in the geographic area to which financial or land programs outlined in the CIP apply;
b. a change in the purpose or goal of the CIP;
c. a change in the eligibility criteria of a program contained in the CIP;
d. an addition of a new program(s) to the CIP; or
e. an increase in the proportional value of the financial incentive offered within a program contained in the CIP.

If an amendment results in the commitment of additional public dollars or the foregoing of public dollars, public notice should be given.

All amendments to the CIP shall comply with the provisions of the *Planning Act* and require pre-consultation with the Ministry of Municipal Affairs and Housing, and approval by City Council.

An amendment to this CIP is not required where:

a. a subsidiary program within this CIP is discontinued; or
b. funding to a CIP program is decreased or discontinued.

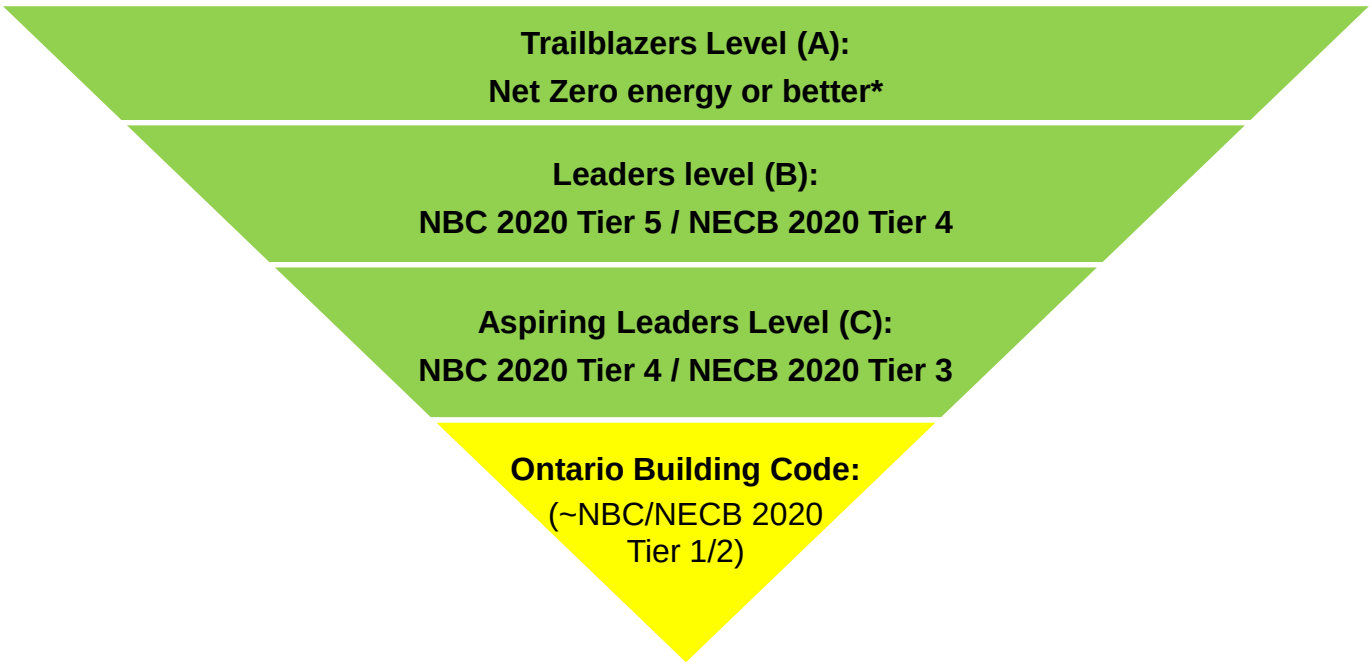
4.0 Green Standard CIP Building Performance Levels

The programs within the Green Standard CIP aim to stimulate the construction of buildings that reduce the adverse environmental impact during construction and/or enable an improvement in efficiency or environmental conservation during their operation. Building performance levels established by national codes and third-party building certification programs will be utilized to determine the degree of the incentive offered for eligible projects as described in section 4.1 and 4.2.

4.1 Reference to National Energy and Building Codes

Incentives offered under the Green Standard CIP, as further described in Section 5, will be the highest in proportional value for achieving Net Zero energy, or equivalent performance levels as described herein, to reflect the expected higher incremental capital cost (ICC) premiums involved. Subsequently, lower levels of building performance include incrementally less dollar value of incentives. This is graphically illustrated in the diagram below with Green Standard CIP Levels A, B and C using the proposed tiers within the forthcoming 2020 versions of the National Energy Code for Buildings (NECB) and National Building Code (NBC).

Both the NECB and NBC have been vetted through experts from across the country, as commissioned by the National Research Council of Canada, and are expected to be released by end of calendar year 2021. Any changes to the final 2020 version of the national codes will be applicable to Kingston's Green Standard CIP performance levels.



* Carbon Zero Building Standard, as certified by the Canadian Green Building Council, is an example of exceeding NZe as it includes embodied carbon within construction materials.

The following table provides Green Standard performance levels for each of the national code tiers. For reference, the NECB is applicable to large buildings captured under Part 3 of the OBC whereas the NBC applies to smaller buildings captured under Part 9 OBC (up to 3 stories and under 600 m2).

GS - CIP Level	NECB 2020 Energy only	NBC 2020 (9.36.5) Energy and Building Envelope	
A	<---------- Net Zero energy or better ---------->		
B	Tier 4: 60% improvement over reference case building	Tier 5: >/= 70% energy improvement over Tier 1	>/= 50% envelope improvement over Tier 1
C	Tier 3: 50% improvement	Tier 4: >/= 40% improvement	>/= 20% improvement
- -	Tier 2: 25 % improvement	Tier 3: >/= 20% improvement	>/= 10% improvement
Base (OBC 2022)	Tier 1: <25% improvement	Tier 2: >/= 10% improvement	>/= 5% improvement
Base (OBC 2017)	Reference case building	Tier 1: >/= 0% (NBC 2015)	Not applicable

For all applicable buildings under the proposed NECB 2020, only building energy performance improvement is considered for its four tiers (i.e. excludes building envelope), each of which will compare to the modelled reference case building. The modelled performance of a Tier 1 compliant building will consume no more than 100% of the reference case building. The tier level in NECB 2020 is achieved by calculating the percentage energy use of the proposed building model compared to the reference case energy target. Only regulated loads are considered in the modelling for this national code, which excludes plug loads, elevators and process equipment.

The energy related section of the current NBC (9.36) provides prescriptive compliance requirements for the building envelope including minimum airtightness requirements, and regulated loads such as HVAC and service water heating. The NBC 2020 is expected to have a performance compliance path that provides the modelling requirement for the reference house and the proposed house. The reference house performance may be the previous 2015 version of the NBC or other level established in the final NBC 2020 version.

As each national code tier is formally adopted within the OBC, as part of the Pan-Canadian Framework agreement (see section 2.1.3), it will be removed from the Green Standard CIP for consideration of incentives as the provincial compliance level incrementally rises.

Regardless of when Ontario adopts the next versions of the NECB and NBC, the corresponding performance tiers within the final released 2020 national codes will be used to indicate the level of CIP incentivization offered for eligible buildings.

Reference to these national codes within the Green Standard CIP will help prepare the development community for the eventual corresponding levels of compliance for building construction in Ontario.

4.2 Third-party Building Certifications

As an alternative pathway to achieving the goal of the Green Standard CIP, the incentive programs are also aligned with building performance levels established through the following industry best practice third-party building construction and certification programs:

- Built Green / Green Seal, administered by Built Green Canada for mid and high-rise residential buildings;
- EnerGuide-rating System for new homes, administered by Natural Resources Canada (NRCan);
- R-2000 for new homes administered by NRCan;
- LEED (Leadership in Energy and Environmental Design), administered by Green Business Certification Inc. Canada;
- Living Building, administered by the International Living Futures Institute;
- Net-Zero (NZe) and Net-Zero Ready (NZr), administered by the Canadian Home Builders' Association; and,
- Passive House, administered by Passive Buildings Canada, the Canadian Passive House Institute.
- Zero Carbon Building Standards, as certified by the Canadian Green Building Council, which includes embodied carbon within construction materials as well as operational emissions through energy consumption during building use;
-

These third-party certification programs are rigorously defined and are supported by nationally respected agencies. Each offers measurable benchmarks for the design,

construction and operation of high-performance green buildings. The EnerGuide Rating System (ERS) is the only standard listed above that does not include a specific performance requirement. Instead, the Green Standard CIP refers to the EnerGuide gigajoule (GJ) rating which sets out a method for modelling and determining the amount of energy that a building will use, calculated in GJ (or GHG emissions per year) with 0 as the best rating. EnerGuide is considered accurate by Canada's banking and insurance industries and it is used for finance and incentive programs across Canada.

For this alternative pathway to qualify for Kingston's Green Standard CIP incentives, program applicants must obtain third party building certification from programs such as the examples listed in the following tables (Total Energy Use intensity (TEUI) and GHG intensity metrics are approximations).

Green Standard CIP	**Program/Performance Levels for Large Buildings (**OBC Part 3)	**TEUI: GJ/m2/yr**	**GHG: kg/m2/yr**
Level A	Zero Carbon Building Standards Living Building,TEUI of 0 (zero) or less	0	0
Level B	LEED Platinum, Passive House, TEUI 50% < OBC	100	10
Level C	LEED Gold, Built Green-Green Seal Platinum, TEUI 30%< OBC	140	14
No incentive	LEED Silver, Built Green – Green Seal Gold, TEUI 20% < OBC	160	16
Compliance	Ontario Building Code (2017)	200	20

Green Standard CIP	**Program/Performance Levels for Small Buildings (**OBC Part 9)	**EnerGuide score (GJ = Gigajoule)**
Level A	Net-Zero Energy (CHBA	0 GJ
Level B	Net-Zero Ready (CHBA), Passive House, LEED Platinum	<30 GJ
Level C	LEED Gold, Built Green-Green Seal Platinum, R-2000	<50 GJ
No incentive	ENERGY STAR, LEED Certified/Silver, Built Green Silver	<80 GJ
Compliance	Ontario Building Code (2017)	100 GJ

There is no CIP incentive program for the level immediately above current code compliance as the next iteration of the OBC is expected to improve to near equivalent energy use levels indicated within the tables. The intent of the Green Standard CIP is to incentivize leadership in building design towards the construction of advanced and higher performing buildings that aim to optimize energy and emissions improvements over what is required by provincial code.

For the Green Standard CIP incentive levels A, B or C, regardless of the performance benchmark used to qualify for incentives (i.e. national code or third party building certification), independent modelling by a qualified professional will be required to target performance level prior to construction as well as verification upon commissioning of the building. The professional conducting the performance verification of the fully constructed building cannot be employed by the developer/property owner or be the same personnel or consultants involved in the original building design.

Regardless of the type of building, national code or third-party building certification referenced, Kingston’s Green Standard CIP incentive programs also require that all Green

Standard CIP applications include the following metrics within their building design, energy modelling reports at the pre-construction stage as well as verification of the as built performance upon commissioning of the completed building:

- Thermal Energy Demand Intensity (TEDI), to ensure resilient buildings that improve both occupant comfort and thermal energy performance;
- Total Energy Use Intensity (TEUI), to ensure buildings with low overall energy-use and utility costs; and,
- GHG Intensity, to encourage low-carbon energy sources and reduce building emissions.

Intensity calculations must be prepared by a licensed Professional Engineer or other qualified professional and reported in a manner consistent with the program requirements set out within the applicable national energy or building code or third-party green building certification program. The City, at its sole discretion, may also require mandatory air tightness testing post-construction to the building to compare with the as designed modelling of performance.

Upon City Council approval of the Green Standard CIP, an application guidebook, checklists and other tools will be developed to provide more process details, clarity and support to applicants including energy modelling guidelines based on current best practices in advanced building science.

5.0 Green Standard CIP Incentive Programs

The Green Standard CIP includes a suite of incentives that enable developers and property owners to recoup a portion of the ICC incurred to voluntarily construct new buildings to the higher performance levels under the Green Standard CIP. The mix of incentives offered aim to optimize influence on the development community while balancing affordability to the municipality with consideration to the different stages of development, types of buildings and their ownership over the long-term.

The following list provides a summary of the Green Standard CIP Incentive Programs which is followed by a more detailed description of each incentive. All programs are

subject to approval of the requisite budgetary resources at the sole discretion of City Council. Once a program has approved funding, public notification will be provided to indicate incentive applications are being accepted along with any additional conditions or financial limitations.

Pre-construction (Land acquisition, development financing and building design):

- Feasibility study grants
  - Intended to support the Integrated Design Process used to determine cost-effective design characteristics required to construct high performance buildings
- Financing (low-interest loan from municipality)
  - Only applicable to the ICC involved in constructing to Net Zero ready or Net Zero energy building performance levels (A or B)
  - Completion of a feasibility study is required as part of process (grant applicable)
  - Applicable to developers intending to own the new building post-construction

Post - construction (upon building verification of performance level equivalency):

- Cash rebate grants
  - Intended to be a one-time grant for developers selling the building post-construction
  - May be used by faith-based places of worship and charitable organizations who are exempt from paying property taxes (other eligibility limitations apply as indicated in section 5.3)
  - Value of incentive will be at a lesser level than the Tax Increment Rebate (see below)
- Incremental Property Tax Rebate (similar to Brownfields CIP program)
  - Based on tax uplift between pre and post construction assessed property value
  - Intended for developers that retain ownership of building post-construction to recoup a larger portion of their ICC
  - Increment rebated up to 10 years or until eligible incentive is paid out in full

As previously indicated in section 4.0, regardless of the building performance level or incentive program, Green Standard CIP applicants will be required to conduct, and provide to City staff, independent modelling by a qualified professional indicating the target building performance level prior to issuance of the building permit as well as verification upon commissioning of the building. For all incentive programs, the City will maintain a right to peer review any supporting documentation provided and to have all reasonable peer review costs covered by an applicant.

5.1 Feasibility Study Grants

Feasibility Study Grants are intended to support the use of an Integrated Design Process to determine cost-effective design characteristics required to construct high performance buildings. These studies are to be conducted at the early design stage, provide for upfront consideration of opportunities to maximize the performance of the building envelope, optimization of efficiency of the mechanical and ventilation systems as well as inclusion of renewable or alternative energy resources where feasible. This will enable building proponents to pro-actively evaluate the impacts of different building design elements on performance levels related to any applicable incentives as well as cost-effectively assess different alternatives to achieve the desired goal.

The outcome of the Feasibility Study must clearly provide a quantitative assessment of different building elements as they impact energy performance related to the Green Standard CIP performance levels (as described in Section 4.0) based on established engineering and building science practices/principles. The assessment should also clearly indicate a preferred bundle of building design elements and energy efficiency measures that will be included as the project advances to the building permit and construction stages of development including the targeted CIP building performance level and third-party building certification level if applicable.

The Feasibility Study Grants will provide up to 50% of the cost of completing the feasibility study up to maximum of $25,000 per development project. Grant applicants must submit the completed feasibility study to the City for review, along with the invoice indicating the cost of the study, as well as the associated energy modelling indicating achievement of at least Level C building performance levels as described in Section 4.0. The Feasibility Study Grants will be awarded to the property owner following the City’s confirmation that grant

application meets these requirements and upon issuance of the building permit for the project to be constructed to the targeted performance level.

These grants are not applicable to development projects that access other programs such as the Enbridge Gas Savings by Design Program or any other program that reimburses or provides upfront financial assistance for the full cost of a feasibility study or equivalent design charette process. The CIP Feasibility Study Grants are available to eligible development projects that may access related programs which incentivize up to the remaining 50% of the costs associated in conducting an Integrated Design Process subject to the maximum CIP Grant value and the other requirements as outlined above.

A maximum number of Feasibility Study Grants provided in any calendar year may be established by City Council at their sole discretion.

5.2 Financing

The City may offer eligible development projects low-interest financing for the ICC premium involved in constructing to Net Zero energy or Net Zero ready building performance levels. This refers to the Green Standard CIP building performance levels A and B. Municipalities have financing options that are often at lower interest rates than traditional sources of financing available to the development sector and therefore can help decrease the cost of capital required for constructing a high-performance building.

This financing will only be applicable to developers intending to own the new building post-construction. A charge, equal to the value of the loan, will be registered on title to the property until it is paid in full.

Maximum loan amounts will be determined upon City Council approval of annual budgets for the purposes of administering the Green Standard CIP. Applicable terms and interest rates will be determined at time of the proponent's application to the Green Standard CIP. Completion of a feasibility study will be a pre-requisite to applying for financing through the Green Standard CIP.

If the fully constructed building fails to reach the required building performance levels described above upon commissioning, a financial penalty and/or a shorter term of loan

repayment may be enforced at the discretion of the City Treasurer or designate.

5.3 Cash Rebate Grants

Based on independent studies assessing the ICC for constructing high performance green buildings, it is estimated that the building performance levels identified within the Green Standard CIP may involve ICC premiums within the range of approximately 2% to 17% above the related current OBC energy efficiency standards depending on the performance level and benchmark standard referenced as well as the type of building constructed.

Cash Rebate Grants are intended to be a one-time grant, at a maximum of $250,000 for any individual project, to help building proponents recover a portion of the ICC premium associated with reaching Green Standard performance levels A, B, or C, as listed below:

- Up to 35% of eligible ICC associated with achieving CIP Performance Level A*
- Up to 25% of eligible ICC associated with achieving CIP Performance Level B
- Up to 15% of eligible ICC associated with achieving CIP Performance Level C

*If the applicant uses the Zero Carbon Building (ZCB) standards for third party certification to qualify for this incentive program, Level A requires the ZCB v2 Design Standard certification to meet the TEUI target identified within Kingston's Green Standard CIP regardless of the TEDI option chosen for energy modelling allowed within the ZCB standard.

The Cash Rebate Grants are applicable to developers selling the new building post-construction as well as faith-based places of worship and charitable organizations who are exempt from paying property taxes. However, provincial and federal owned properties and properties owned by their agencies are ineligible for these grants. The proportion of the ICC, and the associated dollar value of this incentive, will be at a lesser amount than provided within the more long-term oriented Incremental Property Tax Rebate (see Section 5.4) as the property owner will be able to recover some or all the additional proportion of their investment in the sale of their high-performance building.

The property owners indicated above, who are exempt from paying property taxes, and therefore ineligible for the larger Incremental Property Tax Rebate, will be able to further

recover a portion of their ICC investment during their ongoing ownership of the building through reduced operating expenses with the expected lower energy and water consumption and associated utility bills.

The total number of Cash Rebate Grants and the maximum cumulative dollar value awarded to all eligible applicants within any one calendar year will be established as part of the municipal budget approved by Kingston City Council on an annual basis.

5.4 Incremental Property Tax Rebate

Property taxes are a primary source of revenue for a municipality. Properties which are vacant, undeveloped, or in need of remediation will yield less (if any) revenue to the municipality than developed and well-maintained properties. Developments that increase the residential or employment intensity of an area can also enhance property tax values and associated revenue for the municipality while serving a public good such as environmental protection and downtown revitalization as examples.

Offering temporary relief on property tax is a proven tool that the municipality can use to motivate and incentivize property owners to invest in improvements to their properties, thus increasing the value of the property and the associated tax revenue potential for the municipality. Many municipalities have successfully offered short-term relief programs waiving part or all the property tax on eligible properties, particularly the portion of the tax that is new due to actions which increase the value of the property which is sometimes referred to as tax uplift. These relief programs have been called Tax-Increment Grants or rebates because it applies only to the incremental increase in property taxes payable, not to the tax that was assessed prior to the improvement of the property. This helps ensure that the municipality continues to collect tax revenue from the property used for the funding of municipal services such as garbage collection and road maintenance, but also provides a meaningful incentive to the developer.

The intent of the Incremental Property Tax Rebate incentive program is to encourage investment in enhanced building performance as described within the Green Standard CIP. This rebate is targeted for developers that retain ownership of building post-construction during its operation to recover a larger portion of the ICC associated with building to CIP performance levels A, B or C. Upon building completion and payment of the first year’s

property taxes, the rebate would be paid annually to the property owner at the following incremental levels from 25% to 50% of the annual tax uplift on the property for up to 10 years (25% for multi residential and office, 50% for retail buildings) or until the eligible ICC is partially recovered as indicated below to a maximum of $1,000,000 for any individual development project:

- Up to 75% of eligible ICC associated with achieving CIP Performance Level A*
- Up to 55% of eligible ICC associated with achieving CIP Performance Level B
- Up to 35% of eligible ICC associated with achieving CIP Performance Level C

*If the applicant uses the ZCB standard for third party certification to qualify for this incentive program, Level A requires the ZCB v2 Design Standard certification to be met upon completion of the building and ZCB v2 Performance Standard certification to be achieved for each year the rebate is applicable.

The formula included below will be used to determine the rebate on any given project subject to any maximum limits established.

Total eligible amount for Tax Rebate = % of eligible ICC associated with the Green Standard CIP building performance achieved.

Total amount rebated annually = 25% - 50% of Total municipal portion of incremental property tax payable per year until Total eligible amount of Tax Rebate is recovered by the applicant.

Incremental property tax payable = Property value after construction – Property value before construction x tax rate

The final valuation of the Tax Rebate will be calculated after a site assessment has been conducted following the completion of the development and is incrementally determined based on the level of building performance and any applicable third-party certification has been verified. Property taxes must be paid in full in any year for which the applicant will receive a rebate prior to the rebate being processed. When the cumulative approved incentive amount is reached, the tax rebate will immediately expire.

The following example illustrates how the Incremental Tax Rebate would be calculated. A property owner constructs a new NZe multi-residential building on a vacant property and is independently verified to have met the Green Standard CIP performance Level A. The increased assessment value of that property will be used when calculating the Incremental Property Tax Rebate amount as follows:

- the project will create a $300,000 annual increase in municipal portion of property taxes payable thereby creating a maximum annual rebate of $75,000 (at 25%)
- the property owner incurs $800,000 in additional eligible costs to build to NZe enabling them to recover up to 75% of the eligible ICC back as a rebate (75% x $800,000 = $600,000).
- Upon project completion, and payment of first year's property taxes, the property owner receives $75,000 as a rebate.
- The rebate for the project expires after eight years ($600,000 divided by $75,000 = 8).

Property owners who occupy the new building constructed to the Green Standard CIP performance levels, and benefit from their associated lower utility costs, will have post-construction incentives reduced by up to 50% depending on the portion of the utility savings that are passed on to other building tenants. For example, a property owner of a multi-unit residential building who maintains a relatively small management office may have no reduction in the rebate paid to them if their tenants pay their own utility bills. Whereas a property owner occupying a commercial office building that pays the utilities for the entire building would have the total rebate value reduced by 50%. The percentage of occupied space utilized by the owner, as well as responsibility for utility costs as described above, will be factored into the determination of any reduction accordingly.

The maximum cumulative dollar value awarded for Incremental Property Tax Rebates within any one calendar year will be established as part of the annual municipal budget approved by Kingston City Council.

For the purposes of this incentive program, the following development projects are not eligible for the Green Standard CIP Incremental Property Tax Rebate program:

a) developments that do not increase the property taxes collected by the City;

b) developments that will not achieve Green Standard CIP building performance levels A, B or C as outlined in section 4;

c) development projects where the incremental tax uplift is already being rebated through another parallel program such as the City's Brownfield CIP; or,

d) there are existing property tax arrears on the property.

If the Brownfield CIP rebate is being utilized as part of the development project, the Cash Rebate Grant may be accessed as an alternative Green Standard incentive at the corresponding percentage recovery of the associated ICC if all other eligible requirements are met as described in section 5.3.

6.0 Program Administration

For the purposes of this CIP, the "applicant" to any of the associated incentive programs is defined as the owner of the property at the time of application.

The Green Standard CIP incentive programs are proposed to be delivered by the City of Kingston's Climate Leadership Division in partnership with the Taxation and Revenue Division and the Building Services. These municipal departments will work together to design and secure approval for a stream-lined process for management of the incentive program including:

i. Application by eligible applicant, with detailed plans and all relevant documents for the development or rehabilitation proposal, including the level of Building Performance and, where applicable, Building Certification that is being pursued;

ii. Review by the Building Department to ensure application is complete, and to determine which level of Green Building Standards are being pursued;

iii. Approval of Application and determination of eligible incentive amount;

iv. After the as-built building performance has been verified and any applicable certification has been earned, the applicant shall produce a building performance verification report and a copy of any certificate appropriate to the Green Building Standard used;

v. Where TEUI, TEDI and GHG intensity calculations are used as the basis for the incentive approval, then the Applicant shall submit a Commissioning Report, signed by a duly qualified Commissioning Agent, including evidence that the building was constructed as modelled and is operating as intended.

And for the Incremental Property Tax Rebate:

vi. Annual monitoring of the property after construction is completed to ensure that the property continues to meet the Green Standard CIP performance criteria for the tax rebate that is being provided. If standards are not being met, the tax rebate will be adjusted to the appropriate amount.

vii. Monitoring of the amount of tax rebate provided for up to ten years to ensure that the program ends once the costs of the development have been offset.

The City will maintain a right to request peer review of documentation provided in support of an application, or portions thereof, and to recover reasonable peer review costs from the applicant subject to the prior approval of the applicant.

For all Green Standard CIP incentive programs, successful applicants will be required to enter into an agreement with the City subject to approval of City Council.

6.1 Eligible Costs

In terms of the ICC premium considered within the Green Standard CIP incentive programs, eligibility of development project costs will be determined within the modelled design of the proposed building by demonstrating the necessity to achieving the targeted performance level in comparison to a reference case or compliance performance benchmark. This includes all necessary enhancements to heating, ventilation, air conditioning and hot water systems, and building envelope improvements above the OBC compliance requirements as well as incorporating renewable energy. This will typically be included as estimates within Feasibility Studies but for the purposes of administering the Green Standard CIP, will be based on actual incurred costs with supporting documentation (e.g. itemized invoices).

For CIP applications using the Green Building Certification path, the property owner must submit verification of the level that was achieved in the form of a copy of a certificate from the adjudicating agency for the certification program. The municipality will accept the quality

assurance processes behind these Green Building Certification programs as sufficient proof for the purposes of administering the Green Standard CIP incentive programs. The cost of obtaining the building certification, commissioning post-construction and any other tests or assessments required for verification of performance levels achieved are also considered as an eligible cost for the purposes of determining the ICC considered within the Green Standard CIP incentives with adequate documentation.

Provision of electric vehicle charging equipment of 7kW/charger or greater will also be considered as an eligible cost for Green Standard CIP incentives. Although on site EV charging will increase overall electricity consumption for the associated building, the CIP recognizes the carbon reduction value of reduced tailpipe emissions compared to fossil fuel powered vehicles. Therefore, EV charging loads can be deducted from the modelled building energy performance for the purposes of administering applications to Green Standard CIP incentives.

Eligible development costs may include upgrading the size of electric panels within the building or an additional electrical service entrance related to EV charging as well as directly related costs incurred by the developer/property owner for new or upgraded external distribution infrastructure when required in the case of fuel switching thermal energy requirements resulting in increased overall electricity demand or inclusion of solar photovoltaic (PV) arrays. Eligible ICC can also include costs for enhanced roof load capacity/reinforcement when identified as a requirement above the corresponding OBC compliance within a quotation or proposal for a rooftop PV array from a qualified solar installer and professional engineer to accommodate for the added weight of the renewable energy system.

In pursuing NZ energy levels of performance, it is recognized that there can be site specific limitations to optimizing the role of solar PV in fulfilling on-site power needs for a building such as the rooftop size, shape or available space as well as shading from mature trees or other adjacent buildings. Subject to any provincial, utility or any other municipal approvals, permits, allowances or program requirements, ground mount carports or use of virtual net metering could be considered in these cases. For virtual net metering, when permissible in the province of Ontario, only the direct costs associated with procuring the associated renewable energy credits will be considered as eligible under the Green Standard CIP incentive programs.

Incentive programs related to the project's ICC will be calculated using the eligible cost premium which the developer invested into the project, above and beyond standard construction costs to meet the applicable building code, to achieve the building performance level and certification level presented. These incremental costs must be reported clearly and in an auditable form for review by municipal staff. Supporting materials may be required such as invoices from suppliers.

The eligibility date for costs incurred for a Feasibility Study Grant are upon City staff written acknowledgement of a complete and eligible grant application and must be prior to the date of the study commencement. Any eligible development projects seeking access to the Financing incentive must not have received a building permit prior to the date Kingston City Council formally approves the Green Standard CIP and approval of the requisite CIP budget in any given year.

For the Cash Rebate Grants and Property Tax Increment Rebates, the date the applicant may incur eligible costs that will be subsidized by the incentive will commence when City staff have confirmed in writing (including email) the incentive application is deemed complete and satisfies the requirements as described within the Green Standard CIP. Award of such incentives will not be confirmed until all requirements are met for such incentives as described in sections 5.3 and 5.4.

6.2. Monitoring of Green Standard CIP Impact

City staff will track the following metrics to indicate the success of the program and to identify if program specifics need to be adjusted:

- number of property owners participating in each of the Green Standard CIP incentive programs;
- the number of new buildings and total interior area (square feet or square metres) meeting each performance level (Level A, B or C);
- estimated total energy and GHG emissions savings for participating buildings above the OBC requirements;
- dollars per tonne of GHG savings overall and,
- increased municipal property tax revenue as a result of new buildings participating in

the program.

Where applicable, other environmental benefits such as water savings along with avoiding municipal infrastructure growth and related impacts will be monitored. Update reports will be prepared by staff on annual basis to be reviewed by City Council.

City staff will also track the dollar value of any incentives awarded to ensure they stay within program and/or annual maximums established by City Council.

6.3 Incentive Program Duration

A Green Standard CIP incentive program will come into effect immediately after the requisite budget resources are approved by City Council and will remain active until the available municipal funding has been expired subject to any discontinued programs as outlined in section 3.5 iii. Once the corresponding budget is exhausted, this program will remain valid as an endorsed program that is dormant until funding is renewed.

City of Kingston
Report to Kingston Environmental Advisory Forum

To:	**Members of the Kingston Environmental Advisory Forum**
From:	**Roger Healey, Chair**
Date of Meeting:	**July 21, 2021**
Subject:	**Kingston Environmental Advisory Forum 2020 Report Card**

Summary of the Discussion Item:

The Kingston Environmental Advisory Forum (KEAF) is an advisory committee of Council which reports to Environment, Infrastructure and Transportation Policies Committee. KEAF is composed of two members of council, eight public representatives and six technical representatives.

KEAF draws on knowledge within the Kingston community, to broaden public information and consultation on environmental issues, and provides advice and information. KEAF brings together experts in environmental matters from community institutions, authorities, practitioners, and representatives of the public to collaborate, on a volunteer basis, on specific projects designed to support the environmental aspects of City Council's Priorities and Sustainable Kingston Plan.

In accordance with Section 2.5 pf the Committee By-Law, KEAF is required to provide Council with a report summarizing its activities in 2020.

Recommendation:

That the Kingston Environmental Advisory Forum recommend to the Environment, Infrastructure and Transportation Policies Committee:

> **That** the 2020 Kingston Environmental Advisory Forum (KEAF) Report Card be approved as a summary of the work accomplished by KEAF.

Discussion:

The Kingston Environmental Advisory Forum (KEAF) is comprised of two members of council, eight public representatives and six technical representatives. One public representative and one technical representative completed their term on the Committee and there were no changes to the membership during the 2020 year. The technical representative seat for St. Lawrence College remained vacant. KEAF reports to the Environment, Infrastructure and Transportation Policies Committee.

During the 2020 calendar year, KEAF held five meetings. The March 2020 meeting was cancelled as a result of the COVID-19 pandemic and the limitations set on in-person gatherings. Subsequent meetings were hosted in a virtual electronic format.

Staff provided one briefing and brought a total of four reports to KEAF in 2020. The content of the reports is summarized below:

- Update on State of Environment Report Data Compilation - The purpose of this information report was to provide KEAF with an opportunity to consider the State of the Environment (SOE) Report data set collected by staff based upon the previously endorsed SOE terms of reference and to solicit feedback for incorporation into the next iteration of the draft SOE report.
- Update #2 on State of Environment Report Data Compilation – The purpose of this information report was to provide KEAF with a draft version of the SOE report so that KEAF members could provide further editorial feedback toward a final draft. KEAF was also informed of the loss of SOE project staff to layoffs as a result of the COVID pandemic and of uncertainty regarding how the completion of the SOE report would now proceed.
- Kingston’s Community Climate Action Fund Overview - The purpose of this report was to allow staff the opportunity to discuss the details of the Kingston Community Climate Action Fund and provide an overview of the participation of the Kingston Environmental Advisory Forum (KEAF) in the evaluations of the eligible projects later in 2020.
- Kingston’s Community Climate Action Fund Project Selections - The purpose of this report was to request that Kingston Environmental Advisory Forum (KEAF) evaluate the Kingston Community Climate Action Fund (KCCAF) project applications received against the eligibility criteria to screen the project proposals that best fit the objectives of the fund. The established eligibility criteria was outlined in Report Number 20-131, approved by Council on July 7, 2020. Upon review by KEAF at the November 9th meeting, a recommendation was presented to Council on the eligible projects for the public donation campaign.

Outlook for 2021

Kingston Inner Harbour Contaminated Sediment Management Planning

At their April 6, 2021 meeting, Kingston City Council requested that KEAF participate in a public meeting, to be hosted by the Environment, Infrastructure and Transportation Policies Committee, that would allow for the receipt of additional information concerning the Federal Government's proposed management of contaminated sediments within the Kingston Inner Harbour. In 2021, KEAF will re-acquaint itself with the state of the science regarding the sediment contamination in the Inner Harbour so that it may support decision making by City Council.

State of Environment Reporting

The loss of project staff to the COVID pandemic has delayed the completion of further drafts of the SOE report but KEAF is expected to receive updates for consideration later in 2021.

2021 Kingston's Community Climate Action Fund Project Selections

As in 2020, staff will request that Kingston Environmental Advisory Forum (KEAF) evaluate the Kingston Community Climate Action Fund (KCCAF) project applications received against the eligibility criteria to screen the project proposals that best fit the objectives of the fund. The established eligibility criteria was approved by Council in July, 2020. Upon review by KEAF in the Fall 2021, a recommendation will be presented to Council on the eligible projects.