

**STATUS****Council Approved****Y****N****CAO Approved:****Y****N**

TITLE: Pedestrian Crossing Warrant Criteria	NO.: Effective Date: Latest Revision Date:
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POLICY STATEMENT:

This policy provides a warrant process for setting pedestrian crossing facilities along York Region road system.

APPLICATION:

The pedestrian crossing warrant criteria provide a consistent approach to determine appropriate location for the installation of pedestrian facilities within the York Region.

PURPOSE:

The purpose of this policy is to provide guidelines for the installation of Intersection Pedestrian Signal and Mid-block Pedestrian Signal on roads in York Region in such manner to increase the safety of all road users and encourage pedestrian and cyclist traffic in accordance with the concepts of a mobility and walk-able community.

DESCRIPTION:

This policy contains separate guidelines for implementing pedestrian crossing signals at intersections and mid-block locations.

APPROVAL INFORMATION**Council Minutes:****Clause No.:****of Report No.:****Of the:****Date:****OR****CAO Approval Date:**

Warrants

An IPS or an MPS is warranted when ALL of the following conditions apply:

1. If during any **4 hours** of a day the *pedestrian crossing demand (PCD)* exceeds 50 AND the number of *pedestrian crossing opportunities (PCO)* during the worst hour is less than 60.

OR

If during any **2 hours** of a day the *pedestrian crossing demand (PCD)* exceeds 25 AND the number of *pedestrian crossing opportunities (PCO)* during the worst hour is less than 60.

2. The distance to the closest signalized intersection exceeds 200 metres
3. Adequate sight distance is available for both pedestrians and vehicles for the operating speed of the roadway.
4. At proposed IPS locations fewer than 5,000 vehicles per day must be present on the intersecting side street approaches
5. There is adequate street lighting to illuminate the crossing and the approaches to the crossing

i. Pedestrian Crossing Demand (PCD)

Pedestrian crossing demand is the expected number of pedestrians that will utilize a pedestrian crossing after its signalization and will not necessarily be the same as the actual number of pedestrian counted using an unsignalized crossing. To account for this potential discrepancy the formula to estimate the PCD includes an adjustment factor (*f*). This factor represents the expected increase in pedestrian crossing volumes after the signalization of the pedestrian crossing.

$$PCD = f(A + 3 * E + 3 * C + 3 * PD)$$

f = Adjustment factor (Default = 1.2)

A = Observed number of pedestrians older than 12 years and less than 60 years

E = Observed number of pedestrians older than 60 years

C = Observed number of pedestrians less than 12 years old

PD = Observed number of pedestrians with physical disabilities

The adjustment factor (*f*) should be ideally estimated from an assessment of:

- The size and type of pedestrian generators. (e.g. the number of occupants in a senior citizen facility).
- The size and nature of pedestrian attractions (e.g. community centres, medical facilities, shopping malls etc.).
- The number of pedestrians avoiding the uncontrolled pedestrian crossing to use alternative routes or modes of transport

In some cases after a preliminary assessment it may be so evident that the PCD will exceed the threshold values of *Warrant 1* that a detailed pedestrian survey and/or an estimation of *PCD* may not be required.

ii. Pedestrian Crossing Opportunities (PCO)

The PCO index provides a measure of how difficult it is for a pedestrian to cross a uncontrolled pedestrian crossing, considering the existing roadway width and traffic volumes.

The PCO Index can be estimated from the following formula:

$$PCO = fQ * \left(\frac{e^{-fqG}}{1 - e^{-fqG}} \right)$$

The factor *f* accounts for the impact of arterial signal progression on gap availability. A worst case scenario is represented by *f* = 1 i.e. no arterial progression.

Q is the peak traffic flow (vehicle per hour)

$$q = \frac{Q}{3600}$$

G is the minimum gap required in the traffic stream for a pedestrian to perform an uninterrupted crossing:

$$G = \frac{W}{s}$$

W = Width of the roadway (metres)

s = Walking speed (Default = 1 m/s)

iii. Check Warrants

The need for a traffic control signal at an intersection or mid-block crossing shall be considered if an engineering study finds that **ALL** the following criteria are met:

A. Pedestrian Crossing Demand (PCD) ≥ 50 per 4 hours

Or

B. PCD ≥ 25 per 2 hours

And

C. Pedestrian Crossing Opportunities (PCO) ≤ 60

GLOSSARY:

Acceptable Gap - The time needed to cross the travelled lanes of a roadway at a walking speed of 1.2 m per second plus three seconds of perception and reaction time.

Controlled location – intersection or mid-block location with signal or stop sign.

Crossing Opportunities – the number of times a pedestrian can cross the roadway over a given period of time (e.g. one hour)

Crosswalks – portion of the roadway where pedestrian are permitted to cross the street; may be marked or unmarked.

Gap – the time a crosswalk is unoccupied by successive vehicles.

Mid-block crossing – a crossing point located between the intersections.

Sight Distance – the length of a roadway visible to the driver, bicyclist or pedestrian with an unobstructed line of sight.

Travel arrival patterns – the manner in which traffic arrives at the study location (e.g. random, platoon). A time space can be used to determine the traffic arrival pattern at a location between signalized intersections.

CONTACT:

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