Attachment 2 – Policies Recommended for City Council Adoption

The following policies are recommended for City Council adoption:

- A. Pedestrian Crossing Protection Device Justification Policy (pages 1-5)
- B. Traffic Control Signal Justification Policy (pages 6-7)
- C. All-Way Stop Sign Control Justification Policy (pages 8-9)
- D. Crosswalk Marking Policy (pages 10-11)

Following Council adoption of this attachment to the report (May 29, 2025) from the General Manager, Transportation Services titled "Updates on Vision Zero Road Safety Initiatives: Improving Crossings for Pedestrians, Updated Road Classification Criteria and Other Matters", Transportation Services will publish standalone policy documents with additional details for practitioners and staff to consider when applying each of the policies.

A – Pedestrian Crossing Protection Device Justification Policy

The purpose of the Pedestrian Crossing Protection Device Justification Policy is to provide guidance to practitioners on the technical justification to support a recommendation for installation of a new crosswalk controlled by a Pedestrian Crossing Protection Device, including a Pedestrian Crossover (PXO), Mid-Block Pedestrian Signal (MPS), or Intersection Pedestrian Signal (IPS), also known as a Half-Signal. The Policy outlines the technical justification based on the Pedestrian Volume and Delay, as well as additional considerations based on the Collision History and Controlled Crosswalk Spacing.

For a new Pedestrian Crossing Protection Device to be technically justified, Pedestrian Volume and Delay justification must be fulfilled. However, while the Pedestrian Volume and Delay justification is used to support the recommendation for a Pedestrian Crossing Protection Device, the satisfaction of this justification does not itself require the installation of a Pedestrian Crossing Protection Device. Practitioners are required to use the justifications in combination with the additional considerations outlined, traffic engineering experience, and professional judgement to support the recommendation to install a new Pedestrian Crossing Protection Device.

Justification – Pedestrian Volume and Delay

The need for a Pedestrian Crossing Protection Device should be considered if both the following minimum pedestrian volume and delay criteria are met:

- 1) The total pedestrian volume crossing the roadway under evaluation during highest hours of pedestrian traffic fulfills the justification requirement on the applicable figure/table outlined below for the selected time period; and
- 2) The total volume of pedestrians experiencing delays of ten (10) seconds or more in crossing the roadway during the same highest hours of pedestrian traffic fulfills the justification requirement on the applicable figure/table outlined below for the selected time period.

The same time period is used for evaluation of both of the above criteria. The default time period for evaluation is eight (8) hours, but practitioners can also consider four- and two-hour evaluation periods.

The total pedestrian volume is calculated as "equivalent adults", which is equal to the sum of "unassisted" pedestrians and twice the number of "assisted" pedestrians. "Assisted" pedestrians are defined as children under the age of 12, older adults, pedestrians with differences in mobility, and other pedestrians requiring special consideration. In cases where an adult "unassisted" pedestrian is accompanying a pedestrian including in the "assisted" category, both individuals are counted as "assisted" pedestrians to reflect their higher vulnerability.

Additional Considerations

There are additional considerations for when a Pedestrian Crossing Protection Device should be considered, even though the numerical justification of Pedestrian Volume and Delay is not met. These considerations are outlined below:

Collision Experience

The need for a Pedestrian Crossing Protection Device should be considered at a location with a pronounced desire to cross (based on adjacent land use and transportation facilities) if a pedestrian is seriously injured or killed in a collision that could have been potentially prevented through installation of a Pedestrian Crossing Protection Device.

Distance to Nearest Controlled Crossing Opportunity

The need for a Pedestrian Crossing Protection Device should be considered if there is a pronounced desire to cross for pedestrians (based on adjacent land uses or transportation facilities, such as transit stops or trail crossings), and a controlled crossing opportunity is not located within an acceptable distance, as determined by Transportation Services.

8-Hr Vehicular Estimated 24-Hr		Net 8-Hr Pedestrian Volume (V _{P-8})					
Volume (V ₈)	Volume (vpd)	< 110	110 - 150	151 - 270	271 - 575	> 575	
< 1,440	< 3,000	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	
1,440 - 2,600	< 5,200	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	See Equation 1	JUSTIFIED	
2,601 - 7,000	5,200 - 14,000	NOT JUSTIFIED	NOT JUSTIFIED	See Equation 2	JUSTIFIED	JUSTIFIED	
> 7,000	> 14,000	NOT JUSTIFIED	See Equation 3	JUSTIFIED	JUSTIFIED	JUSTIFIED	
Equation 1: Just	Equation 1: Justified if net 8-hour ped vol > (929.5 - 0.2537 x V ₈)						
Equation 2: Justified if net 8-hour ped vol > (0.0000055 x V_8^2 - 0.0807 x V_8 + 445)							
Equation 3: Just	tified if net 8-hour ped	vol > (186 - 0.0050	01 x V ₈)				

Table 1 – Eight (8) Hour Pedestrian Volume Justification

Figure 1 – Eight (8) Hour Pedestrian Volume Justification



Table 2 –	Eight (8)	Hour	Pedestrian	Delay	Justification

Net 8-Hr Ped	Net 8-Hr Volume of Delayed Pedestrians					
Volume (V _{P-8})	< 50	50 - 75	> 75			
< 110	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED			
110 - 210	NOT JUSTIFIED	See Equation 4	JUSTIFIED			
> 210 NOT JUSTIFIED JUSTIFIED JUSTIFIE						
Equation 4: Justified if vol of delayed peds > (102.5 - 0.25 x V _{P-8})						

8-Hr Vehicular	Estimated 24-Hr	Net 4-Hr Pedestrian Volume (V _{P-4})					
Volume (V ₈) Volume (vpd)	< 75	75 - 100	101 - 180	181 - 385	> 385		
< 1,440	< 3,000	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	
1,440 - 2,600	< 5,200	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	See Equation 5	JUSTIFIED	
2,601 - 7,000	5,200 - 14,000	NOT JUSTIFIED	NOT JUSTIFIED	See Equation 6	JUSTIFIED	JUSTIFIED	
> 7,000	> 14,000	NOT JUSTIFIED	See Equation 7	JUSTIFIED	JUSTIFIED	JUSTIFIED	
Equation 5: Just	Equation 5: Justified if net 4-hour ped vol > (619 - 0.1688 x V_8)						
Equation 6: Justified if net 4-hour ped vol > (0.0000037 x V_8^2 - 0.0538 x V_8 + 297)							
Equation 7: Just	tified if net 4-hour ped	vol > (126 - 0.0034	13 x V ₈)				

Table 3 – Four (4) Hour Pedestrian Volume Justification

Figure 2 – Four (4) Hour Pedestrian Volume Justification



Table 4 –	Four (4)	Hour Pe	destrian	Delav.	Justification
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Net 4-Hr Ped	Net 4-Hr Volume of Delayed Pedestrians				
Volume (V _{P-4})	< 30	30 - 50	> 50		
< 75	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED		
75 - 125	NOT JUSTIFIED	See Equation 8	JUSTIFIED		
> 125	NOT JUSTIFIED	JUSTIFIED	JUSTIFIED		
Equation 8: Justified if vol of delayed peds > (80 - $0.4 \times V_{P-4}$)					

8-Hr Vehicular Estimated 24-Hr		Net 2-Hr Pedestrian Volume (V _{P-2})					
Volume (V ₈)	Volume (vpd)	< 50	50 - 65	66 - 120	121 - 255	> 255	
< 1,440	< 3,000	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	
1,440 - 2,600	< 5,200	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED	See Equation 9	JUSTIFIED	
2,601 - 7,000	5,200 - 14,000	NOT JUSTIFIED	NOT JUSTIFIED	See Equation 10	JUSTIFIED	JUSTIFIED	
> 7,000	> 14,000	NOT JUSTIFIED	See Equation 11	JUSTIFIED	JUSTIFIED	JUSTIFIED	
Equation 9: Just	Equation 9: Justified if net 2-hour ped vol > (412 - 0.1125 x V_8)						
Equation 10: Justified if net 2-hour ped vol > $(0.0000025 \times V_8^2 - 0.0359 \times V_8 + 195)$							
Equation 11: Ju	stified if net 2-hour ped	l vol > (81 - 0.002	11 x V ₈)				

Table 5 – Two (2) Hour Pedestrian Volume Justification

Figure 3 – Two (2) Hour Pedestrian Volume Justification



Table 6 – Two (2) Hour Pedestrian Delay Justification

Net 2-Hr Ped	Net 2-Hr Volume of Delayed Pedestrians				
Volume (V _{P-2})	< 25	25 - 33	> 33		
< 50	NOT JUSTIFIED	NOT JUSTIFIED	NOT JUSTIFIED		
50 - 100	NOT JUSTIFIED	See Equation 12	JUSTIFIED		
> 100 NOT JUSTIFIED JUSTIFIED JUS					
Equation 12: Justified if vol of delayed peds > $(40 - 0.15 \times V_{P-2})$					

B – Traffic Control Signal Justification Policy

The purpose of the Traffic Control Signal Justification Policy is to provide guidance to practitioners on the technical justifications for Traffic Control Signals (TCS), specifically Full Signals – those which control all approaches and users – at intersections. The technical justifications for installation of Pedestrian Signals – Mid-Block Pedestrian Signals (MPS) or Intersection Pedestrian Signals (IPS) – is dictated by the Pedestrian Crossing Protection Device Justification Policy. There are seven technical justifications that support installation of a TCS:

- Justification 1 Minimum Eight (8) Hour Vehicle Volume
- Justification 2 Delay to Cross Traffic
- Justification 3 Combination Warrant
- Justification 4 Minimum Four (4) Hour Volume
- Justification 5 Collision Experience
- Justification 6 Pedestrian Volume and Delay
- Justification 7 Projected Volumes

For TCS to be technically justified, at least one of the outlined justifications must be fulfilled. However, while the justifications are used to support the recommendation for TCS, the satisfaction of one or more justifications does not itself require the installation of TCS. Practitioners are required to use the justifications in combination with the additional considerations outlined, traffic engineering experience, and professional judgement to support the recommendation to install TCS.

The evaluation of <u>Justifications 1 through 4</u> and <u>Justification 7</u> for TCS is performed in accordance with the latest published version of Ontario Traffic Manual Book 12 – Traffic Signals (OTM Book 12). The evaluation of <u>Justification 6</u> is performed in accordance with the Pedestrian Volume and Delay justification from the Pedestrian Crossing Protection Device Justification Policy. The evaluation of Justification 5 is outlined below, as well as additional environmental considerations.

Justification 5 – Collision Experience

The need for a TCS should be considered if all of the following criteria are met:

- 1) Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the collision frequency, as determined by Transportation Services; and
- 2) The number of reported, potentially reduceable collisions equals or exceeds the values shown in Table 1.

	Reported Potentially Reduceable Collisions					
Average Daily	1 Y	'ear	3 Years			
name volume	All Severities	KSI	All Severities	KSI		
< 5,000	5	3	6	4		
5,000 - 8,000	5	3	6	4		
8,000 - 15,000	4	2	5	3		
> 15,000	3	1	4	2		

Table 1 – Collision Experience Justification

Potentially reduceable collisions are those involving vehicles and/or pedestrians which, under signalized conditions, would move on separate phases.

Additional Considerations

When reviewing the potential need for a new TCS at a particular location, in addition to the numerical justifications outlined above, practitioners must also apply engineering judgement about the location being considered for a TCS. This contextual assessment includes consideration of road width, posted speed limit, operating speeds, adjacent land uses (including new/planned development in the area), pedestrian desire lines and demographics, presence of a transit stop, sight lines, and distance between existing controlled crossing opportunities, as determined by Transportation Services.

C – All-Way Stop Sign Control Justification Policy

The purpose of the All-Way Stop Sign Control Justification Policy is to provide guidance to practitioners on the technical justification to support a recommendation for installation of all-way stop control (AWSC) at intersections. The Policy outlines two potential justifications for determining whether or not a new AWSC is technically justified at an intersection:

- Justification 1 Collision Experience
- Justification 2 Traffic Volumes

For AWSC to be technically justified, at least one of the outlined justifications must be fulfilled. However, while the justifications outlined are used to support the recommendation for AWSC, the satisfaction of one or more justifications does not itself require the installation of AWSC. Practitioners are required to use the justifications in combination with the additional considerations outlined, traffic engineering experience, and professional judgement to support the recommendation to install AWSC.

Justification 1 – Collision Experience

The need for AWSC should be considered if all of the following criteria are met:

- 1) Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the collision frequency; and
- 2) The average number of reported collisions of the type susceptible to correction by the use of AWSC equals or exceeds the values shown in Table 1.

Major Roadway Classification	Average Yearly Preventable Collisions Per Year Over Three (3) Years
Minor Arterial	4
Collector (AADT > 6,000)	4
Collector (AADT ≤ 6,000)	3
Local	2

Table 1 – Collision Experience Justification

Justification 2 – Traffic Volumes

The need for AWSC should be considered if both of the following criteria are met:

- 1) Either the total vehicle volume meets Condition 1a or the combined minor road crossing meets Condition 1b, as shown in Table 2; and
- 2) The volume split does not exceed 70/30 (70% on the major road/30% on the minor road), based on same counts used to satisfy the first criteria.

Table 2 – Traffic Volumes Justification

	Hours for	Condition 1a	Condition 1b	
Major Roadway Classification	Warrant Analysis	Total Vehicle Volume	Combined Minor Road	
		(veh/hr)	Crossings (units/hr)	
Minor Arterial	8	500	200	
Collector (AADT > 6,000)	8	500	200	
Collector (AADT ≤ 6,000)	4	375	150	
Local	4	250	100	

The combined minor road crossings is equal to the number of vehicles, cyclists, and pedestrians on the minor roadway. For the purpose of this justification, a factor of '2' is applied to all pedestrians.

Additional Considerations

There are additional considerations for when AWSC should be considered, even though the numerical justifications are not met.

The need for AWSC should be considered if all of the following criteria are met:

- Sufficient sight distance is not available for traffic exiting the stop-controlled approach(es) of a minor road stop intersection, based on geometric design requirements, as determined by Transportation Services; and
- All efforts to improve the sight distance to comply with Transportation Services guidelines have been exhausted.

The need for AWSC should be considered under the following situations:

- As an interim measure where traffic control signals are technically warranted but cannot be implemented immediately; or
- As a means of providing a transition period to accustom drivers to a change in intersection right-of-way control from one direction to another.

D - Crosswalk Marking Policy

The purpose of the Crosswalk Marking Policy is to provide guidance to practitioners on the installation of crosswalk markings. The Policy covers when crosswalk markings should be installed, requirements for zebra crosswalk markings, and additional considerations for locations without sidewalks and those where a crosswalk leads to a driveway.

Installation of Crosswalk Markings

Marked crosswalk are installed:

- At all new controlled crossing locations;
- Across all legs of an existing or new intersection with all-way stop control or a full traffic signal, unless not feasible as determined by Transportation Services; and
- At existing unmarked controlled crossing locations at the time of roadway state of good repair work or when recommended by Transportation Services to improve pedestrian safety or provide guidance to pedestrians.

Marked crosswalks are not installed at uncontrolled crossing locations, with the exception of those with a School Crossing Guard and no other form of traffic control.

Zebra Crosswalk Markings

Zebra crosswalk markings are required at the following locations:

- Signalized intersections, including across channelized right turn lanes at signalized intersections whether the channel is signalized or not;
- Pedestrian crossovers;
- Stop controlled intersections with crosswalks that are:
 - On Pedestrian Safety Corridors;
 - In School Safety Zones (generally defined as within 150 metres of a school);
 - In Senior Safety Zones;
 - o Raised crosswalks or raised intersections; and/or
 - Leading to a driveway; and
- Mid-block crosswalk locations with an active School Crossing Guard.

Zebra crosswalk markings can also be installed at additional locations where safety is an issue, as determined by Transportation Services.

At locations where zebra crosswalk markings are not required, crosswalks typically consist of two white lines that delineate the sides of the pedestrian crossing area. This also includes roundabouts, where standard transverse crosswalk markings are preferred over zebra crosswalk markings.

Additional Considerations

At locations where a stop sign is present or added and there are existing sidewalks, it is preferable to install stop signs, crosswalk markings, and sidewalk ramps at the same time. However, crosswalk markings may be installed in advance of sidewalk ramp construction, as determined by Transportation Services. The installation of crosswalk markings is not limited to only locations where sidewalks are provided on one or more intersecting roadways – crosswalk markings can be installed at locations without sidewalks, as determined by Transportation Services. In these instances, it is preferrable that sidewalk ramps be constructed at the same time as crosswalk markings are installed, but crosswalk markings can be installed in advance of sidewalk ramp construction or without sidewalk ramps, if not feasible to construct as determined by Transportation Services.

When installing crosswalk markings in constrained locations, there may be instances where the alignment of a crosswalk is in conflict with the location of a low-volume driveway. If the alignment of the crosswalk cannot be adjusted to avoid a driveway without significantly diverting pedestrians from the most direct route, as determined by Transportation Services, a portion of the driveway is designed to provide the additional function of a sidewalk ramp.