

The purpose of this section is to outline the minimum engineering design criteria requirements pertaining to public roadways in the City of Pickering. These requirements are not all encompassing and do not relieve the Developer of the responsibility of submitting a finished product of competent Engineering design and construction. Any proposal to deviate from these standards and requirements shall be discussed with and approved by the city prior to making a formal submission.

This document shall be read in conjunction with the City of Pickering Development Services Design Standards, herein referred to as City Standards, as well as all applicable Ontario Provincial Standard Drawings (OPSD), Ontario Provincial Standard Specifications (OPSS), and Transportation of Canada (TAC) Specifications, Standards and Guidelines. Where conflicts occur, City Standards shall govern.

## **1.0 General Provisions**

- 1.1 Roads are to be crowned with a minimum 2.0% cross fall.
- 1.2 The maximum allowable road grade is 8% for up to and including 9.75 metre pavement widths and 6% for pavement widths over 9.75 metres. The minimum allowable road grade around the longest curb is 1.0%.
- 1.3 All profile grade changes greater than or equal to 1% shall be designed with vertical curves as per the geometric design table in Section 2.1 below.
- 1.4 Grade changes less than 1% shall be separated by minimum 6.0 metre tangents for local roads and 10.0 metre tangents for collector roads.
- 1.5 A grade of 1.0% to 2.0% back fall on all road profiles should be provided where internal streets intersect with all collector and main roads, wherever it is feasible to do so. Single catchbasins will be required if only intersection drainage is being accommodated.
- 1.6 All curves at the street line must be marked showing the radius.
- 1.7 Roads with a single public access to an existing road may require a secondary emergency access to be designed as per City of Pickering Fire Services Policy (see Appendix J). The City will require an easement over the entire secondary emergency access.
- 1.8 Where maintenance hole adjustments are required, a minimum of 1.5 metres centered on the frame of the maintenance hole, must be removed to provide suitable compaction of granular and asphalt material.

## 2.0 Geometric Design

2.1 Generally, the geometrics in this table are intended for urban design situations: (all distances are in metres)

Geometric Detail	Type 'C' Arterial		Collector					Local		
	5 Lane	4 Lane	Industrial /Commercial		Residential			Industrial/ Commercial	Residential	
			Major	Minor	Major	Minor				
Right-of Way Width	27	27	27	22	27	22	20	22	20/ 18.5	18
Pavement Width	18	15.25	15.25	11	13.5	11	9.75	11	8.5	8
No. of Lanes	5	4	4	2	4	2	2	2	2	2
Min. Horizontal Radius	350	350	130	85	130	130	85	N/A	N/A	N/A
Minimum Intersection Spacing	200	200	60	60	60	60	60	60	60	40
Intersection Angle	80-90°	80-90°	70-90°	70-90°	70-90°	70-90°	70-90°	70-90°	70-90°	70-90°
Design Speed	70	70	60	60	60	60	60	50	50	50
Min. Stopping Sight Distance	105	105	85	85	85	85	80	65	65	65
Min. Tangent Length Between Curves	120	120	75	45	75	75	45	45	45	45
Min. Tangent Length Through Intersections	120	120	75	45	75	75	45	45	45	45
Max. Grade (%)	6	6	6	6	6	6	8	6	8	8
Minimum Sag Curve Factor, K <sub>sag</sub>	16	12	10	10	9	9	9	8	6	6
Minimum Crest Curve Factor, K <sub>crest</sub>	17	17	11	11	10	10	10	8	7	7
Traffic Lane Width	3.5-3.75	3.5-3.75	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Parking Lane Width	N/A	N/A	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
Turning Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	N/A	N/A	N/A

- 2.2 Pavement width is measured from a point 150 millimetres inside of the back edge of curb.
- 2.3 The use of minimum horizontal curve and minimum vertical curve at the same location will not be permitted.
- 2.4 For geometrics and dimensions of turn lanes, storage length, taper length, minimum width and length of raised medians and other special situations not covered in the above table, refer to the appropriate section of the TAC manual.
- 2.5 Provide corner roundings with a minimum 5.0 metre radius at all intersections between two local roads and intersections between local and collector roads.
- 2.6 Sight triangles are required at all intersections between two collector roads and where any class of road intersects with an arterial road. Although typically not required at local to local intersections, sight triangles will be required at locations where geometric constraints exist (i.e. acute intersection angle below 70 degrees) to ensure safety requirements are met for both pedestrian and vehicular traffic.
- 2.7 All sight triangles shall be calculated based on TAC requirements and all line paintings shall be based on the Ontario Traffic Manual (OTM).
- 2.8 Generally, sight distance will be calculated as per TAC, Figure 2.3.3.5 (Sight Distance and Visibility Triangle at 90 degree intersections for Approach with Stop Control).
- 2.9 Where appropriate (i.e. lower volume/speed intersection), sight distance at T-intersections should be as per TAC, Figure 2.3.3.2 (Departure Sight Distance).
- 2.10 The location of stop block setback should be assumed to be 3.0 metres from the edge of the road (without sidewalk) and 1.5 metres behind the back edge of the sidewalk (at intersection with sidewalk).
- 2.11 Calculations should be based on design speed, and the use of operating speed will only be permitted in restrictive urban areas.

### 3.0 Concrete Curb and Gutter

- 3.1 Concrete curb and gutter shall be constructed as per OPSD Standards.
- 3.2 Curb depressions are required across private residential and commercial driveways as per City Standard Drawings P-605 or P-606.
- 3.3 Where a weir is required to provide for overland flow, the full curb height may be reduced by 60 millimetres to provide a total height of 90 millimetres above gutter elevation for the length of the weir.
- 3.4 All radii for curbs at intersections of 8.5 metre pavements (20 metre road allowance) are to be 7.5 metres. The minimum allowable curb radius is 7.5 metres. Other pavement widths have curb radii as follows for intersections at right angles, and must be shown. Any intersection pavement widths not provided in the table below will be reviewed on an individual basis.

<b>Widths of Intersection Pavements (in metres)</b>	<b>Curb Radius (in metres)</b>
7.0 and 8.5	7.5
8.0 and 8.5	7.5
8.5 and 8.5	7.5
8.5 and 9.75	7.5
8.5 and 11.0	11.0
8.5 and 13.5	11.0
9.75 and 9.75	11.0
9.75 and 11.0	11.0
9.75 and 13.5	11.0
11.0 and 13.5	17.0
13.5 and 13.5	17.0
13.5 and 15.25	17.0

## **4.0 Pedestrian Corridors**

- 4.1 All sidewalks and multi-use paths are to be constructed parallel with the curb unless otherwise approved by the Director, Engineering Services.
- 4.2 The longitudinal grading design of the sidewalk or multi-use path should avoid the use of low points whenever possible. Where low points are unavoidable, they are to be located within a driveway or at a ramp location.
- 4.3 Sidewalks and multi-use paths are to be continuous across private driveways as per City Standard Drawings P-605 or P-606.
- 4.4 Sidewalks:
  - 4.4.1 Minimum sidewalk width on local roads to be 1.5 metres in accordance with City Standard Drawing P-610.1. Minimum sidewalk width on collector and arterial roads to be 1.8 metres.
  - 4.4.2 Sidewalks are to be designed with a minimum cross fall of 2.0%.
  - 4.4.3 Sidewalk fillets are to be constructed with concrete at all controlled three and four-legged intersections, as per City Standard Drawing P-611. The curbs are to be depressed across the width of the fillet in the same manner as the driveway entrances. Tactile Walking Surface Indicators (TWSI) are required at all sidewalk ramps as per OPSD 310.039.
  - 4.4.4 In residential developments, measures are to be taken to reduce the amount of dust produced when saw cutting the contraction joints.
  - 4.4.5 Accessible pedestrian signal poles, as per Region of Durham Standards, are to be installed at all signalized intersection crossings, or as required.
  - 4.4.6 Temporary and long-term sidewalk termination treatment is required as per City Standard Drawing P-615, especially where there is significant elevation difference.
  - 4.4.7 Driveway aprons are not to be used as sidewalk ramps. A minimum separation of 1.0 metre must be provided between driveway aprons and sidewalk ramps.

- 4.5 Multi-use Paths:
- 4.5.1 Multi-use paths are to be constructed as per City Standard Drawing P-612.
  - 4.5.2 Base asphalt on multi-use paths must be in place for a minimum of one year prior to placement of top asphalt. Rectifications to the base asphalt must be completed prior to placement of top asphalt.
- 4.6 Concrete Walkways
- 4.6.1 Concrete walkways, as per City Standard Drawing P-620, are to be used at mid-block connections between streets.
  - 4.6.2 Lighting may be required for walkways as determined by the Director, Engineering Services.
  - 4.6.3 In situations where a concrete walkway also serves as an overland flow route, modifications to City Standard Drawing P-620 may be required at the direction of the Director, Engineering Services.
- 5.0 Driveways**
- 5.1 Driveways are to be a projection of the outer limits of the garage and are not permitted to cross the projection of the property line at the curb. The minimum width shall be 3.5 metres for a single driveway and 6.0 metres for a shared driveway under normal circumstances. Notwithstanding the above, the driveway width is to meet the current zoning by-law.
  - 5.2 Only one driveway entrance is permitted per lot. The Director, Engineering Services must approve curved and/or circular driveways.
  - 5.3 The minimum spacing between driveways shall be 1.0 metre.
  - 5.4 Driveways shall have a minimum slope of 2.0% and a maximum slope of 8.0% towards the road. Reverse driveways sloping towards the garage for residential properties are not permitted.
  - 5.5 The minimum clear distance between the edge of driveway and a utility structure, hydrant or tree shall be 1.0 metre.
  - 5.6 Refer to City Standard Drawings P-605, P-606 and P-607 for driveway requirements.

## **6.0 Boulevards**

- 6.1 Boulevards shall be defined as the land area between the property line and curb and shall be constructed at positive cross fall grades no less than 2.0% to a maximum of 5.0% in special cases subject to approval by the Director, Engineering Services.
- 6.2 A minimum of 300 millimetres of topsoil and sod shall be placed on all boulevard areas unless otherwise directed by the Director, Engineering Services in accordance with OPSS 802 and 803.

## **7.0 Cul-de-sacs**

- 7.1 Where a road is to be extended in the future, sufficient property and any required easements must be provided, and a temporary turning circle installed having a curb radius of 13.0 metres and boulevard width to the satisfaction of the Director, Engineering Services, as per City Standard Drawing P-710.
- 7.2 Where a road is not to be extended in the future, a cul-de-sac is required with a curb radius of 13.0 metres as per City Standard Drawing P-711.
- 7.3 The minimum pavement grade for cul-de-sacs shall be 1.0% and the longitudinal gutter slope around the longest curb must also be at least 1.0%. These slopes are to be shown on a separate detail with the grades shown at 10.0 metre intervals.
- 7.4 The maximum length of streets terminating in a cul-de-sac is subject to secondary access requirements to be determined by the Director, Engineering Services. Secondary emergency accesses may be required to be constructed.

## **8.0 Maintenance Access Roads**

- 8.1 Maintenance access roads are required to all inlets, outlet structures, spillways, sediment forebays, sediment drying areas (if applicable) and outfall channels associated with Stormwater Management (SWM) facilities and Low Impact Development (LID) measures. The access road shall have a minimum width of 4.0 metres, maximum grade of 10% and shall be as per City Standards. Should the outfall be within a fenced area, gate access shall be provided.