

10.0 CURB EXTENSIONS GUIDELINE

Version 1.0.1

May 2018

City of Toronto, Transportation Services

*Road Engineering
Design Guidelines*

Background

In early 2014, Transportation Services initiated a review of the Division's design guidelines and standards to move our organization in a direction consistent with the transportation departments of many other large North American cities. Roadway design engineers in Canada have historically relied on the Transportation Association of Canada's (TAC) Geometric Design Guide for Canadian Roads (GDGCR) (1999) as the basis for engineering roadway designs. However, most guidelines within this document were developed decades ago, have not been substantially revisited, and have not always fully considered all modes of travel.

While as a part of the TAC GDGCR update attempts are being made to provide separate guidance suitable for urban areas, it has been determined that the City of Toronto would benefit from more context sensitive and in-house engineering design, an approach taken by several other municipalities.

In response, Transportation Services has embarked on updating technical guidance on street design. This guideline is the result of extensive research and consultation with key partners and reviewing relevant policy and design documents such as:

- National Association of City Transportation Officials (2013). Urban Street Design Guide. Island Press, Washington.
- Complete Streets Guidelines of other comparable jurisdictions such as Chicago, Philadelphia, and Boston.
- Ontario Ministry of Transportation. Ontario Traffic Manuals
- Transportation Association of Canada (TAC) (1999). Geometric Design Guidelines for Canadian Roads
- American Association of State Highway and Transportation Officials. (2004). A Policy on Geometric Design of Highways and Streets (5th ed.). Washington, DC: AASHTO.

This guideline is primarily for use by engineering staff to determine the design of **curb extensions**. This document will eventually be part of a future document containing City of Toronto specific engineering design guidelines for road works.

10.0 Curb Extensions

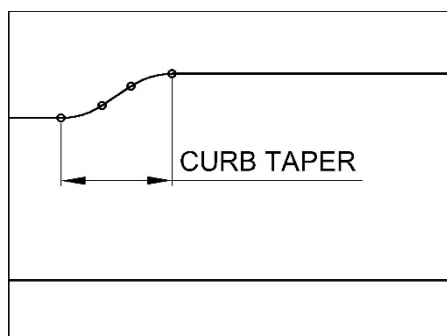
10.1 Introduction

Curb extensions, also known as bump-outs are localized road narrowings for short sections where the pavement width is reduced by extending the curb into the roadway. Curb extensions may be constructed at intersection corners or mid-block. Curb extensions have impacts on vehicle speed, pedestrian crossing distance, visibility, pedestrian storage, street furniture, on-street parking and dedicated parking lanes.

There are many benefits to constructing curb extensions. Curb extensions at intersection and midblock pedestrian crossings reduce pedestrian crossing distances which reduces the time a pedestrian is exposed to vehicular traffic. Curb extensions increase visibility for pedestrians and drivers providing additional reaction time. Curb extensions also provide visual friction which can result in more cautious driving and can result in slower vehicle speeds. Reducing excessive speeds provides additional reaction time and reduces the impact speed in the event of a collision. The benefits of curb extensions should be balanced with the benefits of smaller curb radii.

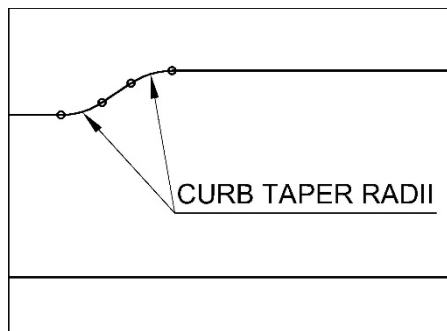
Curb extensions are designed using various design controls such as road classification, lane width, road width, presence of lanes, presence of sidewalks, and on-street parking. The guidelines provided should be used with experiential knowledge and good engineering judgement to create curb extension designs.

10.1.1 Definitions



Curb Taper

The curb taper is the section of a curb extension where the road width transitions from a wider width to a narrower width. The length of the curb taper is measured along the alignment of the road from the point where the transition begins to where the transition ends including the curb taper radii.



Curb Taper Radii

The curb taper radii are the curb radii used on either end of a curb taper.

10.2 Curb Extension Types

Curb Extensions that reduce pavement width on roads without lane markings

Curb extensions that reduce pavement width should be constructed on roads with on-street parking. These roads are typically Local – Residential and Collector – Residential roads where the majority of vehicles are expected to be passenger vehicles with infrequent single unit trucks. Curb extensions that reduce pavement width are typically on roads that are not divided into lanes.

Curb Extensions at dedicated parking lanes

Curb Extensions at existing dedicated parking lanes

Curb extensions should be constructed on roads that have existing dedicated parking lanes to create a physical parking lay-by.

Curb Extensions that reduce lane width to create dedicated parking lanes

Curb extensions should be constructed on roads that have excessively wide lane widths that can be divided into an appropriately sized curb lane and dedicated parking lane. Dedicated cycling facilities and urban shoulders should also be considered on roads with excessively wide lane widths prior to creating dedicated parking lanes. A road narrowing to implement target lane widths should also be considered if there are low parking volumes and a dedicated parking lane is not required.

Curb Extensions that remove lanes to create dedicated parking lanes

Curb extensions that remove lanes to create dedicated parking lanes should be constructed on roads with excess capacity in the travel lanes. Dedicated cycling facilities should also be considered on roads with excess capacity prior to creating dedicated parking lanes. A road narrowing to implement target lane widths should also be considered if there is low parking demand and low parking volumes on the road.

Intersection Curb Extensions

Intersection curb extensions are located at the intersection of two roads and have the primary purpose of reducing pedestrian crossing distances. Intersection curb extensions can also be used to physically define on-street parking and create parking lay-bys.

Mid-block Curb Extensions

Mid-block curb extensions are located between intersections and can be located at mid-block pedestrian crosswalks to improve visibility and reduce pedestrian crossing distances, fire hydrants to provide a barrier to discourage illegal parking, or high volume driveways with high volumes of on-street parking to provide a physical barrier to prevent on-street parking that may obstruct sightlines.

10.3 Design Controls

Lane Markings

The presence of clearly defined lanes should be used to determine if a curb extension will remove lanes, narrow existing lanes, narrow the pavement width, or create a parking lane.

Pavement Width

The pavement width at locations without curb extensions should be used to determine if a curb extension can be constructed. Pavement widths should also be used to determine the width of a curb extension, the pavement width adjacent to the curb extension, and the number of curb extensions at an intersection leg.

Lane Widths

The desirable lane widths according to the Lane Widths Guideline should be used to determine if a curb extension can be constructed. The desirable lane widths should also be used to determine the width of a curb extension.

On-Street Parking

On-street parking restrictions, permit parking, and metered parking should be identified to assess the impact of curb extensions to on-street parking and to determine the preferred side of the road for a curb extension. On-street parking demand and parking volumes should also be identified to determine if a road narrowing should be undertaken. Curb extensions should be constructed on the same side as on-street parking.

Sidewalks

The presence of sidewalks on roads with curb extensions should be considered to determine if a curb extension will reduce the pavement width available for pedestrians at locations without sidewalks. Curb extensions are not recommended on roads without sidewalks.

Curb Radii

Curb radii at intersection corners impacted by a curb extension should be determined using the Curb Radii Guideline. The benefits of curb extensions should be balanced with the benefits of smaller curb radii.

10.4 Curb Extension Design

10.4.1 Design Considerations

On-street Parking

Parking is prohibited within 9.0m of an unsignalized intersection or 15.0m when signed. A no parking by-law may be required for unsignalized intersection curb extensions longer than 15.0m. Parking is prohibited within 30.5m of a signalized intersection. A no parking by-law may be required for signalized intersection curb extensions longer than 30.5m. A no parking by-law exemption may be required if a curb extension at a signalized intersection less than 30.5m in length.

Lane Shift

Vehicles should be able to travel through an intersection without a shift in alignment and lane shift should be avoided where possible. A maximum lane shift of 1.0m is allowed through an intersection when crossing a road less than 9.0m in width. A maximum lane shift of 1.5m is allowed through an intersection when crossing a road equal to or greater than 9.0m in width.

Curb Radii

The pavement width adjacent to an intersection curb extension has an impact on intersection curb radii. Narrow pavement widths result in large curb radii and wide pavement widths result in small curb radii. The benefits of curb extensions should be balanced with the benefits of having smaller curb radii.

TTC

TTC should be consulted when designing curb extensions that are part of a TTC bus service route.

Fire Hydrants

If a curb extension is located near a fire hydrant, the curb extension should be moved or extended across the location of the fire hydrant to discourage parking within 3.0m of a fire hydrant. Midblock curb extensions may be placed at locations with fire hydrants to discourage illegal parking.

Street Furniture and Landscaping

Placement of street furniture and landscaping on curb extensions should ensure that sight lines are not obstructed. The size of curb extensions may be increased to accommodate the placement of street furniture and landscaping.

Cycling Routes

Cycling Routes should be used to determine if the pavement width at narrow sections will be able to safely accommodate vehicles and cyclists. Bike lanes should be considered at locations where lane widths are being reduced using curb extensions. Consultation with Cycling Infrastructure and District Traffic Operations staff is required when curb extensions are being proposed at a location that is part of an existing or planned cycling route.

A link to resources on existing and planned cycling facilities can be found in section 10.5 Supplemental Information.

Pedestrian Storage

Available pedestrian storage and pedestrian storage requirements at intersection corners should be used to determine if a curb extension will provide additional pedestrian storage at locations where pedestrian storage is insufficient.

10.4.2 Design Elements

General Design Elements

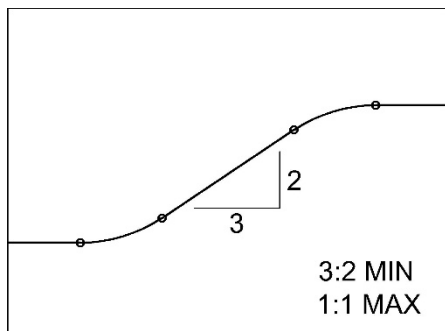
The following elements apply to all curb extensions:

Curb Radii

Curb radii should be designed according to the Curb Radii Guideline. Consultation with the Pedestrian Projects Unit and District Traffic Operations is required if a curb radius greater than 7.0m is required.

Curb Taper Ratio

The minimum and preferred curb taper ratio is 3:2. A maximum curb taper ratio of 1:1 may be used to maximize available parking, minimize parking restrictions or if there are site specific constraints.



Curb Taper Radii

The maximum and preferred curb taper radii is 3.0m. A minimum curb taper radii of 2.0m may be used to eliminate taper radii overlap where required.

Height

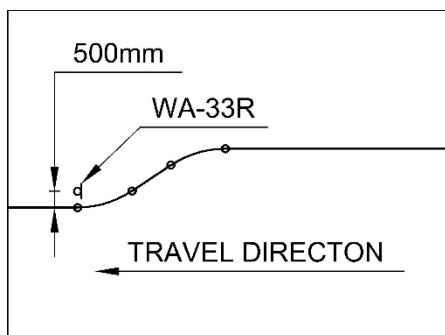
The preferred height of the curb for a curb extension is 150mm. A minimum curb height of 100mm may be used where adequate drainage cannot be achieved using a 150mm curb.

Cross Slope

Curb Extensions should always slope towards the road. The preferred and minimum cross slope is 2.0%. The maximum cross slope is 4.0%. An absolute minimum cross slope of 1.0% may be considered where preferred grades cannot be met due to site conditions. Where the cross slope is less than 2.0%, the profile must be a minimum of 2.0% to ensure adequate drainage.

Signage

Object Marker Sign (Wa-33R or Wa-33L) shall be placed at the start of the tangent section of a curb extension, offset 0.5m from the face of curb.



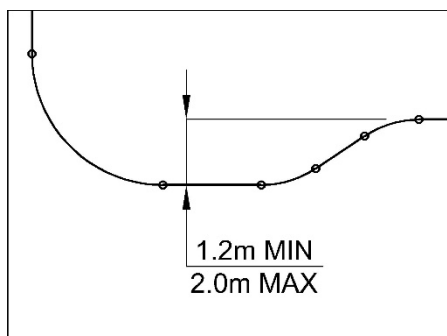
Where curb extensions are located beyond 9.0m of an intersecting road at an unsignalized intersection, beyond 30.5m of an intersecting road at a signalized intersection, or beyond 3.0m of a fire hydrant measured, a No Parking Sign (Rb-51) should be placed at the start and/or end of the curb extension to prevent parking adjacent to the curb extension. Parking prohibition bylaws should be enacted as required.

Curb Extensions that reduce pavement width

The following elements should be considered for curb extensions that reduce pavement width:

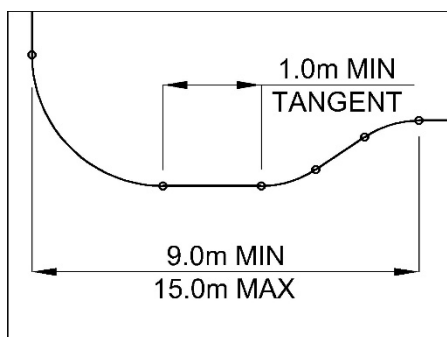
Pavement Width adjacent to curb extensions

Pavement widths for roads without parking on either side should be applied adjacent to curb extensions according to the Pavement Width Guideline. Roads with two-way traffic may be reduced to a minimum width of 6.6m at intersections. Midblock pavement widths on two-way roads may be reduced to 6.0m at curb extensions since midblock pavement widths do not have an impact on curb radii. Roads with one-way traffic may be reduced to a minimum width of 6.0m. Parking should be prohibited adjacent to curb extensions.



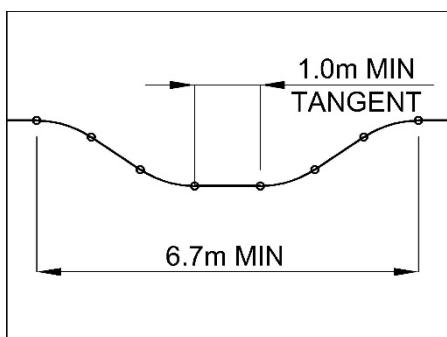
Curb Extension Width

The maximum and preferred width of a curb extension that reduces pavement width should be 2.0m measured from the face of curb. An absolute minimum width of 1.2m may be used in locations where constraints prevent the use of the preferred width. An appropriate curb extension width should be used to achieve preferred pavement widths.



Intersection Curb Extension Length

The minimum length of an intersection curb extension is typically 9.0m measured from the face of curb of the intersecting road to the end of the curb taper radius. An intersection curb extension is typically not more than 15.0m in length. A minimum 1.0m tangent section along the length of the curb extension between the curb radius and the curb taper radius should be provided.



Midblock Curb Extension Length

The minimum length of a midblock curb extension is typically 6.7m measured from the start of the curb extension to the end of the curb extension. A minimum 1.0m tangent section along the length of the curb extension between the curb taper radii should be provided. A no parking by-law should be enacted for midblock curb extensions.

Curb Extensions at dedicated parking lanes

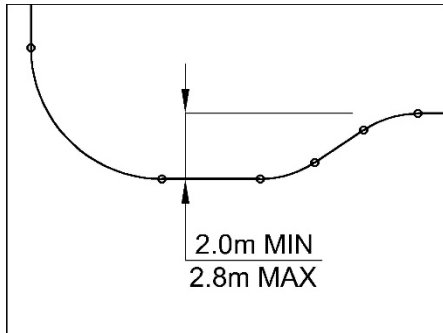
The following elements should be considered for curb extensions at designated parking lanes:

Lane Width

Lane Widths should be designed according to the Lane Width Guideline.

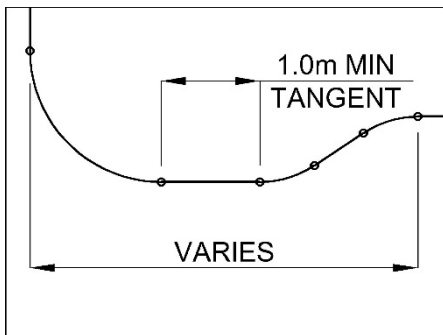
Curb Extension Width

A curb extension at dedicated parking lanes should be the same width as the parking lane. Additional information on parking lanes can be found in the Lane Width Guideline. The preferred width of a curb extension that creates a dedicated parking lane is 2.4m measured from the face of curb. The maximum width is 2.8m and the minimum width is 2.0m. An appropriate curb extension width should be used to achieve preferred lane widths and to provide adequate width for parking lanes.



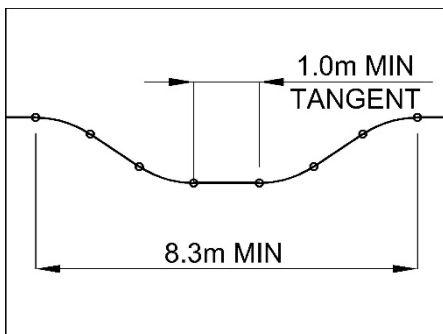
Intersection Curb Extension Length

A minimum 1.0m tangent section along the length of the curb extension between the curb radius and the curb taper radius should be provided. The total width of intersection curb extensions at dedicated parking lanes varies to meet parking requirements.



Midblock Curb Extension Length

The minimum length of a midblock curb extension is typically 8.3m measured from the start of the curb extension to the end of the curb extension. A minimum 1.0m tangent section along the length of the curb extension between the curb taper radii should be provided. A no parking by-law should be enacted for midblock curb extensions.



10.4.3 Design Methodology

Good engineering judgement should be used to ensure that the intersections operate effectively and promotes safety for all road users. Curb extensions should be designed according to the dimensions identified in this guideline. Design considerations should be reviewed for all curb extensions.

10.4.4 Application

The curb extension guidelines should be applied to all curb extensions and parking laybys that are being newly constructed, reconstructed, or as directed by Transportation Services.

District Traffic Operations may recommend reinstatement of existing curb extensions as is or recommend minor deviations from the guideline to address site specific safety or operational issues. Significant deviations from the guideline should be brought to the Safety and Mobility Committee's (SMC) Traffic Engineering Subcommittee for consideration.

District Traffic Operations shall be consulted on all new curb extensions and existing curb extension modifications.

10.5 Supplemental Information

Maps of all supplemental information can be found at the following link under the Road Engineering Design Guidelines heading:

<https://www.toronto.ca/services-payments/building-construction/infrastructure-city-construction/construction-standards-permits/standards-for-designing-and-constructing-city-infrastructure/>

Cycling Network Plan

The cycling network plan identifies existing and planned cycling infrastructure such as bike lanes, cycle tracks, trails, quiet street routes, and major corridor studies.