

## Local Residential Streets 30 km/h Design Toolbox



# 30 km/h Design Toolbox

1.0	Introduction.....	5
2.0	The 30 km/h Streets Context .....	5
2.1	Ottawa’s Road Safety Initiatives .....	5
2.2	Ottawa’s 30 km/h Policy .....	6
2.3	Designing Accessible Streets .....	7
2.4	Fire Routes.....	7
3.0	Residential Neighbourhood Applications.....	8
3.1	Future Local Residential Streets .....	8
3.2	Reconstructed Local Residential Streets .....	8
3.3	Minor Street Retrofit Projects .....	8
4.0	The 30km/h Design Toolbox.....	9
4.1	Toolbox Applicability Matrix.....	9
4.2	General Design Objectives.....	9
4.3	Tier Classification of Speed Management Measures.....	9
4.4	Intersection Measures .....	10
4.4.1	Bulb-Outs/Curb Extensions/Neckdowns/Narrowings/Chokers .....	10
4.4.2	Raised Intersections .....	11
4.4.3	Raised Crossings .....	11
4.4.4	Cycle Friendly Bulb-Outs.....	12
4.4.5	Corner Tightenings/Curb Radius Reductions .....	12
4.4.6	Mini-Roundabouts.....	13
4.4.7	Surface Treatments - Textured Crossings.....	13
4.4.8	Intersection Channelizations (Traffic Management).....	14

4.4.9	Raised Medians Through Intersections (Traffic Management)	14
4.4.10	Vehicle Diverters (Traffic Management)	15
4.4.11	Right-In-Right-Out Islands (Traffic Management)	16
4.5	Gateway Measures	16
4.5.1	Physical Gateways	16
4.5.2	Vehicular Directional Closures (Traffic Management)	17
4.5.3	On-street Plazas and Vehicle Access Closures (Traffic Management)	17
4.5.4	On-Road Messaging (Pavement Markings)	18
4.6	Recurring Mid-Block Measures	18
4.6.1	Vertical Centreline Treatments	18
4.6.2	Vertical Edgeline Treatments	19
4.6.3	Speed Humps and Speed Tables	20
4.6.4	Speed Cushions	20
4.6.5	Centre Island Narrowings	21
4.6.6	Mid-Block Neckdowns/Chokers/Curb Extensions	22
4.6.7	Painted Centreline	23
4.6.8	Textured Surfaces	23
4.7	Street Edge Measures	24
4.7.1	On-street Parking	24
4.7.2	Painted Edgeline/Shoulder	24
4.7.3	Chicanes	25
4.7.4	Alternating On-street Parking (no curb extensions)	26
4.7.5	Urban Design (Streetscaping)	26
4.8	Emerging Measures	27
4.8.1	Traffic Button/Punaise	27

4.8.2	Woonerven or “Living Streets” .....	27
4.8.3	Shared Spaces .....	28
4.8.4	Continuous Footways/Bikeways .....	29
4.8.5	Speed Kidneys .....	29
4.8.6	Lane Narrowings .....	30
4.8.7	Creative Pavement Markings .....	30
4.9	Communication and Enforcement .....	31
4.9.1	Speed Display Devices .....	31
4.9.2	Automated Speed Enforcement.....	31
4.9.3	Educational Campaigns.....	32
4.9.4	Information Signage .....	33
5.0	Implementation and Monitoring.....	35

## List of Tables

Table 1: List of City of Ottawa Initiative Supporting the 30km/h Streets.....	6
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## List of Figures

Figure 1: Demonstration Plan .....	34
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## Appendices

Appendix A: City of Ottawa 30 km/h Streets Design Toolbox – Speed Management Measure Application Matrix ..... 36

Appendix B: City of Ottawa 30 km/h Streets Design Toolbox – Tier Classification Table ..... 40

## Acknowledgements

This document was prepared by the City of Ottawa Transportation Planning Service with the assistance of Parsons. It is intended to be used in conjunction with the City’s Traffic Calming Design Guidelines, and some of the images provided in this report have been replicated from that report. Credit is given to the originators of those images. This Local Residential Streets 30km/h Design Toolbox has benefitted from the input of various City branches and stakeholders involved in the planning, design, construction, operation and maintenance of local residential streets throughout the City. The project team gives thanks to the many contributors.

## 1.0 INTRODUCTION

On December 11, 2019, Ottawa City Council approved a *Strategic Road Safety Action Plan (RSAP) Update* which establishes that:

**all new local residential streets, constructed within new developments, or when reconstruction occurs on local residential streets, be designed for a 30 km/h operating speed.**

This decision is based on safe systems approach to road safety in road design, with “Think Safety, Act Safely” being a guiding theme. This approach echoes the City’s commitment to the *Vision Zero* concept that one fatality or serious injury is one too many.

Further to this, one of the implementation initiatives is to develop a “design toolbox” to help street designers pursue local residential streets with operating speeds reduced to 30 km/h. This will be a component of the overall RSAP toolbox which has the goal of reducing the average annual rate of fatal and major injury collisions by 20% by 2024.

On this basis, the objectives of this design toolbox are to:

1. Identify a “catalogue” of speed reduction measures that can be applied to a range of local residential street project contexts
2. Leverage the guidance provided in other City guidelines and policies, including the [City's Traffic Calming Design Guidelines, 2019](#)
3. Provide design guidance to designers working on new street construction, reconstruction of existing streets and street retrofit projects
4. Differentiate between streets in various residential contexts, including urban, village and rural street cross-sections
5. Demonstrate how combinations of speed reduction measures can be combined achieve a 30 km/h operating speed, being the speed

at which vehicles operate at during free flow conditions, measured at the 85<sup>th</sup> percentile of the distribution of observed speeds

This design toolbox has benefitted from input of a Working Group composed of City staff from various branches, as well as representatives from the Greater Ottawa Home Builders Association. A best practices review has been completed to determine if other North American jurisdictions have published design guidelines or standards that pursue local residential streets to be designed for a 30 km/h operating speed. The conclusion is that Ottawa is demonstrating leadership and is perhaps the first community to advance this design guidance.

## 2.0 THE 30 KM/H STREETS CONTEXT

### 2.1 Ottawa’s Road Safety Initiatives

The City has a range of supporting policies and programs that advance the safe systems approach to street design and provide the basis for local residential streets to be designed with a 30 km/h operating speed. Under the umbrella of the *Safer Roads Ottawa Program*, the focus areas of the City’s *2020-2024 Road Safety Action Plan* are illustrated below.



Source:  
[https://documents.ottawa.ca/sites/documents/files/RSAP\\_2020ImplementationPlan\\_Layout\\_English1.pdf](https://documents.ottawa.ca/sites/documents/files/RSAP_2020ImplementationPlan_Layout_English1.pdf)

Some of the City's supporting road safety and street design initiatives are listed below, alphabetically.

Table 1: List of City of Ottawa Initiative Supporting the 30km/h Streets

- *City of Ottawa Official Plan (OP)*
- *Adult Crossing Guard Program*
- *Automated Speed Enforcement*
- *Complete Streets Implementation Framework*
- *Be Safe Be Seen Initiative*
- *Building Better and Smarter Suburbs: Strategic Directions and Action Plan*
- *Community Safety Zone By-Law No. 2019 - 397*
- *Design Guidelines for Rural Villages*
- *Ottawa Cycling Plan*
- *Ottawa Pedestrian Plan*
- *Pedestrian and Cycling Design Toolbox*
- *30 km/h Speed Limit Policy for Existing Roads*
- *Road Safety Audits*
- *Safer Roads Ottawa Plan Speed Zoning Policy*
- *Selective Traffic Enforcement Program*
- *Traffic Calming Design Guidelines*
- *Transportation Master Plan (TMP)*
- *Urban Design Guidelines for Greenfield Neighbourhoods*
- *Walking School Bus Program*
- *Gateway Speed Limit Signs*

This design toolbox draws on many of these initiatives. In particular, as mentioned earlier, the toolbox leverages the City's *Traffic Calming Design Guidelines* and reproduces many images published in that document.

One of the areas of emphasis in the City's Road Safety Action Plan is the protection of vulnerable road users. This includes all users of city streets that are exposed to risk of collision with motor vehicles including pedestrians of all abilities, mobility device users and cyclists.

## 2.2 Ottawa's 30 km/h Policy

City Council approved its *30 km/h Speed Limit Policy* on April 12, 2017. This decision establishes that the City is taking steps toward speed reduction on existing local streets. The policy establishes scenarios and criteria to inform decisions on whether an existing roadway is eligible to be posted at 30 km/h. The criteria in the policy were not intended to act as design guidelines for how to achieve 30km/h speeds.

The policy has two eligibility scenarios in which a posted speed limit of 30 km/h will be considered. The first is simply when the operational speed of the existing roadway is equal to or less than 35 km/h. The second scenario is applicable to roads with an operating speed greater than 35 km/h, if all the following five traffic and roadway criteria have been met:

1. The road is designated as a local road in the Transportation Master Plan, and/or has a strong pedestrian presence, defined as:
  - a) A count of greater than 20 pedestrians per peak hour or
  - b) 60 pedestrians per four hours or
  - c) 15 elderly/children crossing the roadway during peak hour per block
2. For roads with transit service, if the service is infrequent or if the road already operates at 30 km/h or more slowly during daytime hours. Only roadways with volumes of:
  - a) No more than three buses per hour per direction will be considered or
  - b) Where prevailing traffic conditions result in vehicles operating at an actual speed of less than 30 km/h or
  - c) If a main pedestrian entrance to a school is located on a local/collector roadway
3. Two-way roadways with no more than one lane in each direction, with a width of 7m or less for both lanes combined (not including parking), or one-way roadways with no more than two lanes in one direction, with a width of 7m or less for both lanes combined (not including parking).

4. The current speed limit is no higher than 50 km/h.
5. Daily Traffic Volume up to 2,500 vehicles per day or where volumes are higher but there is a school present.

In addition, for street to be eligible in the second scenario, at least one of these active transportation criteria must be met:

1. Elementary or junior high school abutting the roadway
2. Improved parkland (for example, not vacant or undeveloped parcel) abutting the roadway
3. Significant pedestrian generator (for example, older adult residences) abutting the roadway
4. No dedicated cycling facility
5. No sidewalks along the roadway
6. Existing physical traffic calming measures that were installed to address a speeding issue (for example, speed humps, curb extensions, etc.)
7. Lack of safe stopping sight distance

In addition to meeting the roadway, traffic and active transportation criteria tests, the existing residential street entrance to the 30 km/h zone must be no more than 7m wide. Where the existing throat width is greater than 7m, temporary traffic calming measures to reduce the effective width to 7m must be available. Temporary traffic calming measures include, but are not limited to flex stakes, temporary curbing and pavement markings.

The 2017 policy provides the general guidance above, which informs this design toolbox. Notwithstanding this 2017 policy that applies to the management of existing local streets, the direction confirmed by Council in 2019 under the RSAP is that all new or reconstructed local residential streets are to be designed for a 30 km/h operating speed.

### 2.3 Designing Accessible Streets

It is important that all streets and public places be designed for accessibility, having regard for Accessibility for Ontarians with Disabilities

Act (AODA) and the City of Ottawa's Accessible Design Standards. The objectives for the design of accessible local residential streets include:

- Familiar and safe settings
- Intuitive and predictable routes
- Consistency in design
- Direct alignments
- Relatively flat grades
- Smooth, consistent surfaces
- Appropriate illumination
- Clear lines of sight
- Tactile walking surface indicators (TWSI) at curbs as per AODA and tactile guidance TWSI at exceptional points of concern (after consultation with an accessibility specialist)

Design choices for speed reduction measures on local residential streets shall have careful regard for these objectives, resulting in streets that are both operating at 30 km/h and that meet or exceed the standards for accessibility.

### 2.4 Fire Routes

Local residential streets are not commonly designated as fire routes, however when they are it is important to design measures to avoid adding delay to response times. Refer to the City of Ottawa *Traffic Calming Guidelines* for specifications on the use of traffic calming measures on existing fire routes.

### 3.0 RESIDENTIAL NEIGHBOURHOOD APPLICATIONS

#### 3.1 Future Local Residential Streets

This design toolbox is intended to inform the design of new local residential streets across the City to result in a 30 km/h operating speed. In Ottawa, the majority of new local residential streets are constructed as a result of Plans of Subdivision, approved by the municipality pursuant to Ontario's Planning Act. Local residential street projects:

- Are typically designed and constructed by private developers
- May be located in suburban areas as greenfield development
- May serve infill developments on large, redeveloping tracts of land in older, established communities
- May be part of a larger plan of subdivision that includes several interconnected local streets
- May connect to a collector road, and occasionally, connect directly to an arterial road
- Need to adhere to the City's engineering design standards and construction specifications
- Have utilities that are below-grade, except for above-grade cabinets
- Are designed and constructed in a manner that is integrated with the adjacent residential lot development
- Have flexibility to integrate requirements for municipal services, private utilities and trees in the street design
- Have right-of-way widths ranging from 18m to 20m but are typically 18m in accordance with the City's current standard (narrower widths are no longer considered to be adequate in most contexts as there is insufficient space for desired features such as sidewalks and trees)

The application of the toolbox will have regard for these considerations.

#### 3.2 Reconstructed Local Residential Streets

This design toolbox is also applicable to designs for the reconstruction of existing residential streets across the City to result in a 30 km/h operating speed. Key design considerations are such that local residential street projects:

- Are designed and constructed by the City
- Are identified in the City's asset management plans and capital budgets
- Include existing streets or segments in mature neighbourhoods, with aging infrastructure
- Often include full-depth reconstruction while renewing below-grade road, water and sewer infrastructure
- Need to work around and/or integrate municipal services and private utilities in the street design
- Utilities are generally located on overhead pole lines
- Have right-of-ways that are established and are usually in the range of 18 to 20m

#### 3.3 Minor Street Retrofit Projects

The final function of this design toolbox is to inform designs for minor modifications to existing residential streets across the City to result in a 30 km/h operating speed. Key design considerations are that such local residential street projects:

- Are designed and constructed by the City
- Are design and construction projects that are often very limited in scope, both geographically and financially
- Have existing major street infrastructure components including curb-lines and drainage systems that are typically left in place

- Need to work around corridor constraints including above-grade and below-grade municipal services and private utilities
- Often respond to road safety concerns
- Often are initiated by community-driven requests
- May be located in a range of neighbourhood contexts
- Involve all road types, cross-sections and widths of local residential streets

## 4.0 THE 30KM/H DESIGN TOOLBOX

### 4.1 Toolbox Applicability Matrix

An Applicability Matrix is located in Appendix A to provide street designers a tool to evaluate the applicability of various speed reduction measures in a variety of contexts. The measures are divided into four different categories:

1. Intersection Measures
2. Gateway Measures
3. Recurring Mid-Block Measures
4. Street-Edge Measures
5. Emerging Measures
6. Communication Measures

The measures are evaluated for their applicability in the three types of local residential street projects that were introduced in Section 3 above, and for the following street types:

**Curbed Urban Streets:** Streets that have urban drainage systems, typically with barrier curbs and catch basins along the road edge and are located in urban areas and some villages.

**Curbless Urban Streets:** Streets that have semi-urban drainage systems, typically with shallow roadside swales, no curbs, and may be located in mature neighborhoods in the urban area and some villages.

**Curbless Rural Streets:** Streets with rural drainage systems, typically with shallow roadside swales or deeper ditches, and are located in the rural area and some villages.

### 4.2 General Design Objectives

The Design Toolbox provides an overview of each speed reduction measure including its speed reduction benefits, its ancillary street/neighborhood benefits and design guidance for the implementation of the measure. These should be used in conjunction with the Toolbox Applicability Matrix to determine which measures are best suited to the various contexts and project types, and to help guide how they should be implemented to optimize effectiveness.

Factors that will impact the effectiveness of a traffic calming measure include the suitability of the measure to the context, the frequency of implementation and the pairing with complementary measures.

This toolbox is intended to be a living document and should be updated with new emerging measures as they are developed in the future. With regards to implementation of emerging measures, City of Ottawa Standard Unit should be consulted when standard details are not available.

Please note that the images were taken from various sources for illustration purposes only and don't depict the City's specific design requirements. Additionally, the colouring in the images is intended to differentiate materials, not to represent the use of colour tinted surfaces.

### 4.3 Tier Classification of Speed Management Measures

Not all speed management measures included in the Toolbox have the same level of effectiveness. Each measure is classified as one of the following tiers:

- Tier 1: A reduced speed is necessary to navigate these physical measures because of their vertical or horizontal nature.
- Tier 2: A reduced speed is likely to result because the measures increase the driver's awareness of their speed.
- Tier 3: A reduced speed is likely to result only when these measures are effectively combined with Tier 1 or Tier 2 measures.

Tier 1 measures must be included unless they are shown to not be feasible for a given context, in which case the frequency of application of Tier 2 measures must increase. Tier 3 measures are not expected to be effective in isolation and are best used to supplement Tier 1 and Tier 2 measures. The Design Toolbox provides guidance on opportunities for bundling measures.

Refer to the Tier Classification Table in Appendix B for further details on the classification of each measure.

## 4.4 Intersection Measures

This section addresses the use of speed reduction measures that are typically in the vicinity of intersections of local streets with each other, or intersections of local streets with collector or arterial streets. Appendix A provides supplementary design guidance.

### 4.4.1 Bulb-Outs/Curb Extensions/Neckdowns/Narrowings/Chokers



#### Local Residential Street Speed Reduction Benefits:

- Narrows the roadway at intersections
- Provides street edge friction<sup>1</sup>
- Reduces speed of turning motor vehicles

#### Ancillary Street/Neighbourhood Benefits:

- Can organize on-street parking into bays
- Adds visual interest to the street
- More affordable (less full depth asphalt)
- Shortens crossing distances
- Improves visibility of vulnerable street users, increasing yielding to pedestrians
- Can provide additional pedestrian waiting areas
- Can prevent parking close to intersections
- Can be used to create multi-purpose spaces
- Can result in increased planting space in the ROW, or allow tree retention in reconstruction projects

#### Location and Design Guidance:

- Locate away from driveways, or have driveway(s) wholly within
- Target throat width: 6.0m for two-way, and 4.0m for one-way traffic (or wider pending site-specific review by City of Ottawa Road Services staff)
- Throat width with may increase to accommodate heavy vehicle turning movements
- Minimum curb extension width: 1.0m
- Minimum tangent length: Suggested minimum length of 2.0m, shorter is acceptable in constrained conditions
- Target curb radius: 5.0m
- For diagonally opposite curb extensions, provide 5.0m minimum clear width through the intersection to accommodate two-way traffic
- Can be painted and/or delineated with flex stakes when permanent curbed installation is not feasible, although less effective

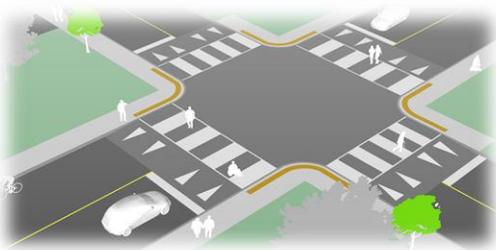
#### Best Opportunities for Bundling with Other Design Measures:

- ✓ On-street parking

1. Edge friction can be defined as the result of the inclusion of design measures that influence how drivers psychologically perceive and respond to a street. Specifically, the successful use of measures that result in a perceived narrowing of a travel corridor can create a perception of confinement. This in turn influences driver behavior and can result in lower vehicle travel speeds.

- ✓ Street edge landscaping (to be used with caution to ensure sight lines are not obstructed)
- ✓ Raised crossings and raised intersections
- ✓ Corner radius reductions
- ✓ Gateway features

## 4.4.2 Raised Intersections



### Local Residential Street Speed Reduction Benefits:

- Motor vehicles must reduce speed to avoid discomfort
- Increases pedestrian safety by lowering speeds at point of conflict

### Ancillary Street/Neighbourhood Benefits:

- Increased awareness/visibility of vulnerable street users
- Reduced potential for ponding within the crosswalk
- Creates level and safe crossing for people using mobility devices

### Location and Design Guidance:

- Location and layout of the crosswalk should be identical to that of an at-grade crosswalk to provide navigational consistency for pedestrians with vision loss
- Effects on drainage must be considered
- Can be considered at both unsignalized and signalized locations
- If sidewalk and curbing is not present, include a design element to prevent cars from driving around the raised intersection
- Without mitigation, placement at T-intersections may cause drainage issues for abutting driveways
- Generally constructed in asphalt material, but a standard has yet to be developed
- Target width: 3.0m crosswalk or greater
- Target height: 80mm height, 2.0m long ramps on all sides

### Best Opportunities for Bundling with Other Design Measures:

- ✓ Bulb-outs/curb extensions/neckdowns/narrowings/chokers
- ✓ Corner tightenings/curb radius reductions

## 4.4.3 Raised Crossings



### Local Residential Street Speed Reduction Benefits:

- Motor vehicles must reduce speed to avoid discomfort
- May minimize discomfort and level of effort required by persons using wheeled mobility devices as they do not ramp down to road level

- Increases pedestrian safety by lowering speeds at point of conflict

### Ancillary Street/Neighbourhood Benefits:

- Increased awareness/visibility of vulnerable street users
- When constructed with concrete, the colour contrast between the concrete raised crosswalk and asphalt roadway visually highlights the crossing
- Reduced potential for ponding within the crosswalk
- Creates level and safe crossing for people using mobility devices

### Location and Design Guidance:

- Typically located at intersections but also useful for mid-block crossings
- Location and layout of the crosswalk should be identical to that of an at-grade crossing to provide consistency for pedestrians with vision loss
- Can be used as a gateway feature on local roadways at collector or arterial roadways, including at signalized intersections
- Can be an alternative solution for T-intersections where raised intersections may not be feasible
- Effects on drainage must be considered
- Ramps should not encroach into intersecting street or cycling facilities
- Concrete material may be appropriate in Design Priority Area's and asphalt in lower volumes local contexts, but a standard for use at intersections has yet to be developed

- Target width: 3.0m crosswalk or greater desirable
- Target Height: 80mm height, 2.0m long ramps on either side

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Intersection bulb-outs/curb extensions/neckdowns/narrowings/chokers
- ✓ Corner tightenings/curb radius reductions

### 4.4.4 Cycle Friendly Bulb-Outs



#### Local Residential Street Speed Reduction Benefits:

- Narrows the roadway portion of the street
- Breaks up long street segments
- Provides street edge friction
- Can provide chicane effect when staggered side to side

#### Ancillary Street/Neighbourhood Benefits:

- Provides a means for cyclists to travel safely through bulb-outs without having to merge into traffic
- Reduces impact on emergency response vehicles (can mount if necessary)
- Adds visual interest to the street

#### Location and Design Guidance:

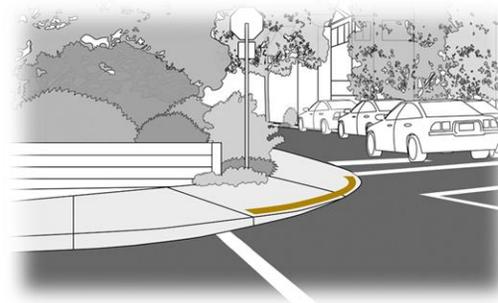
- Consider in place of conventional bulb-outs on cycling routes and other streets with higher cyclist volumes
- Can be located at an intersection or mid-block
- Locate in between driveways
- Consider prohibiting parking in the immediate vicinity to avoid obstructing use by cyclists
- Target curb extension width: 2.0m (can extend behind normal curb line of road)
- Minimum curb extension length: 6.7m
- Minimum tangent length: 2.0m

- Target curb radius: 5.0m
- Target taper angle: 23°
- Provide delineation between sidewalks and cycle tracks as per the City's accessibility requirements, where applicable
- For ride-through curb extensions, the desirable opening width is 2.0m, the minimum opening width is 1.8m and the recommended median width is 0.5m

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Vertical centreline treatment

### 4.4.5 Corner Tightenings/Curb Radius Reductions



#### Local Residential Street Speed Reduction Benefits:

- Reduces the speeds of right-turning vehicles

#### Ancillary

#### Street/Neighbourhood Benefits:

- Can shorten crossing distances for pedestrians
- Increased awareness/visibility of vulnerable street users
- Increases the space of the pedestrian realm

#### Location and Design Guidance:

- Not suitable at intersections or corners with significant volumes of turning trucks and buses
- Target Curb radius: 5.0m
- Swept path analysis required to confirm turning movements are possible for garbage trucks, school buses and other contextually relevant design vehicles
- A balance of throat width and corner radius must be achieved

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Bulb-outs/curb extensions/neckdowns/narrowings/chokers
- ✓ Raised crossings
- ✓ Raised intersections
- ✓ Intersection channelizations

## 4.4.6 Mini-Roundabouts



### Local Residential Street Speed Reduction Benefits:

- Curvilinear path of travel and lack of stop condition promotes travel at consistent, reduced speed

### Ancillary Street/Neighbourhood Benefits:

- Reduces the potential conflict points of a traditional four-leg intersection
- Can reduce severity of collisions
- Can reduce noise (reduced deceleration/acceleration versus all-way stop)
- Opportunity for visual accents in mountable splitter and center islands
- Yield condition is more favourable for cyclists than a full stop

### Location and Design Guidance:

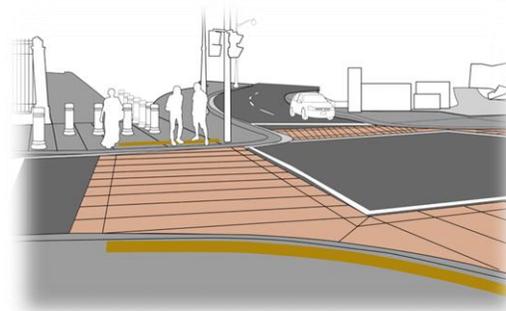
- Locate at intersections with local or collector streets on non-truck routes
- May cause confusion for pedestrian, particularly for people with vision impairments or cognitive impairments (including dementia, neurodiversity, etc.)
- Use of TWSI along full length of depressed curb at the crossing location to warn of entry into vehicular path is required in accordance with City of Ottawa Accessible Design Standards (ADS)
- Use of type 'D' PXOs should be considered on all legs
- Typical Inscribed Circle Diameters (ICD) of 14m to 27m
- Centre island and splitter islands can be mountable or fully traversable
- Outside curb geometry must be designed using roundabout design principles

- Mountable center island should feature cross slope of 1-2% and an outer edge height of 5m to 7.5cm
- Minimum offset of 6m is required from the circular lane to the edge of the pedestrian crossing on all legs
- Minimum clear width of 4.2m required between curbs (including mountable curbs) to ensure even surface for plow blade during snow clearing operations
- Swept path analysis required to confirm turning movements are possible for garbage trucks, school buses, snowplows and other contextually relevant design vehicles
- Locate at intersection with up to four legs

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Raised crossings
- ✓ Street edge landscaping

## 4.4.7 Surface Treatments - Textured Crossings



### Local Residential Street Speed Reduction Benefits:

- Encourages lower driving speeds by signaling context change to street users when paired with other speed management features
- Uses contrasting materials or textures to visually highlight active transportation crossings

### Ancillary Street/Neighbourhood Benefits:

- Enhances the profile of vulnerable street users
- Provides visual interest

### Location and Design Guidance:

- Due to lifecycle, maintenance and aesthetic issues, paver, colour-tinted or stamped concrete crosswalks are currently not recommended for use on any local roads without General Manager's approval and special maintenance agreements

- In very rare cases where these treatments are recommended, select materials with high visual contrast relative to surrounding roadway and ensure meaningful pattern placement (refer to ADS for further guidance on contrasting material applications and how pedestrians with vision loss negotiate the right-of-way)
- For most local roads, standard line painting on asphalt crosswalks is appropriate and effective
- In Design Priority Areas, where high pedestrian and traffic volumes quickly wear off standard crosswalk line painting, concrete crosswalks are often recommended to provide permanent contrast to the adjacent asphalt roadway
- Regardless of the application, smooth travel surfaces are important for accessibility for mobility device users and those with chronic pain

#### Best Opportunities for Bundling with Other Design Measures:

- ✓ Urban design (streetscaping)
- ✓ Raised crossings
- ✓ Bulb-outs/curb extensions/neckdowns/narrowings/chokers

#### 4.4.8 Intersection Channelizations (Traffic Management)



#### Local Residential Street Speed Reduction Benefits:

- Reduces vehicle speeds by narrowing the travel lane width

#### Ancillary Street/Neighbourhood Benefits:

- Reduces or eliminates through traffic on specific desire lines
- Can reduce conflict between vehicles and vulnerable street users
- Can reduce pedestrian crossing distance
- Provides space for street greening

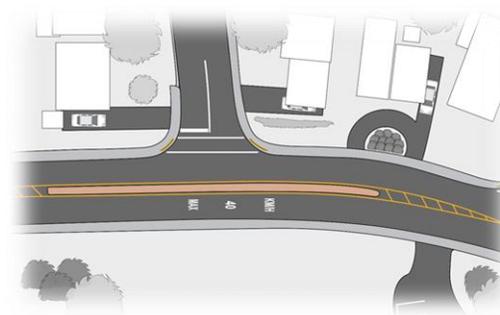
#### Location and Design Guidance:

- Traffic study may be required to confirm overall network impacts
- Public consultation recommended when applying to existing streets
- Minimum curb-to-curb width (one way): 4.0m (or wider pending site-specific review by City of Ottawa Road Services staff)
- Swept path analysis required to confirm channel is passable by garbage trucks, school buses and other contextually relevant design vehicles
- Impact on emergency response times must be considered

#### Best Opportunities for Bundling with Other Design Measures:

- ✓ Raised crossings
- ✓ Corner tightenings/curb radius reductions
- ✓ Street edge landscaping
- ✓ Vehicular directional closures

#### 4.4.9 Raised Medians Through Intersections (Traffic Management)



#### Local Residential Street Speed Reduction Benefits:

- Reduces vehicle speeds by tightening the turning radius

#### Ancillary Street/Neighbourhood Benefits:

- Reduces or eliminates through traffic on specific desire lines
- Wide medians provide a refuge area for vulnerable street users
- Can provide space for greenery or landscaping, while ensuring sufficient sightlines
- Reduces the number of conflict points at an intersection by physically obstructing specific movements

#### Location and Design Guidance:

- Generally applicable on a collector or arterial intersecting a local road

- The median should extend a recommended 5m to 7m beyond the intersection to discourage attempts to complete a left turn around the median
- The raised median should have a minimum width of 1.5m to accommodate required median signage with adequate clearance from passing vehicles.
- The clear width on either side of the median should be minimum 4.0m for one-way traffic (or wider pending site-specific review by City of Ottawa Road Services staff)
- The median can include opening(s) for a crosswalk and/or crossride where suitable, with the following minimum widths: 3.0m crosswalk, 2.0m unidirectional crossride, 3.0m bidirectional crossride
- The median can include a refuge for pedestrians and cyclists if its width is 2.7m or greater
- Impact on emergency response times must be considered

#### Best Opportunities for Bundling with Other Design Measures:

- ✓ Raised crossings
- ✓ Intersection neckdowns/chokers/curb extensions
- ✓ Urban design (streetscaping)

#### 4.4.10 Vehicle Diverters (Traffic Management)



#### Local Residential Street Speed Reduction Benefits:

- Motor vehicles must reduce speed to navigate curve

#### Ancillary Street/Neighbourhood Benefits:

- Discourages non-local vehicle traffic by preventing use of the street as a through route
- Reduces the number of conflicting movements, especially at intersections

- Improves conditions for vulnerable street users by limiting vehicular through-traffic

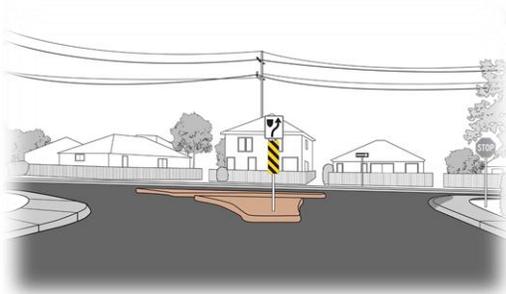
#### Location and Design Guidance:

- Installed diagonally at four-way intersections
- Requires a traffic study to assess impacts of diverted traffic on adjacent streets
- Full access for cyclists should be maintained through a vehicle diverter
- Full access for pedestrians should be maintained around a vehicle diverter
- Openings can be provided to allow cyclists to travel through (1.5m), exercise care to ensure potential cyclist movements are apparent to motorists
- Avoid use on key emergency response streets, unless emergency vehicle access is permitted through the use of removable bollards or other appropriate measures
- Must fit with the area network road demands (traffic study may be required)
- Bollards, planters or other vertical features should be provided to deter motor vehicle access
- Must accommodate heavy vehicle truck turning movements (for example, garbage trucks)
- Parking must be prohibited along the diverter
- Road width on either side should be a maximum of 7.5m
- Applicable to urban/curbed roads

#### Best Opportunities for Bundling with Other Design Measures:

- ✓ Landscaping
- ✓ Turning/corner radius reduction
- ✓ Urban design (streetscaping)

## 4.4.11 Right-In-Right-Out Islands (Traffic Management)



### Local Residential Street Speed Reduction Benefits:

- Reduces vehicle speeds by narrowing the travel lane width

### Ancillary Street/Neighbourhood Benefits:

- Reduces through traffic by physically obstructing through movements and left turns to and from a street segment
- Reduces conflicting movements at an intersection
- Allows for shorter crossing distances
- Can provide refuge for vulnerable street users

### Location and Design Guidance:

- A minimum island size of 6.0m<sup>2</sup> to 10m<sup>2</sup> is required to provide pedestrian refuge
- Depressed or mountable curbs can be provided on the island to accommodate emergency or oversized vehicles, although this can reduce effectiveness by making it physically possible to make the prohibited movements (avoid use on islands large enough to serve as a pedestrian refuge)
- A crosswalk should be provided through the island in the form of a cut out or through the use of depressed curbs
- Maximizing the island length along the unobstructed street will discourage through traffic on the unobstructed street

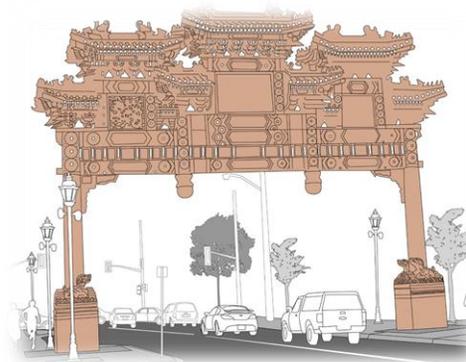
### Best Opportunities for Bundling with Other Design Measures:

- ✓ Raised crossings
- ✓ Corner tightenings/curb radius reductions

## 4.5 Gateway Measures

This section addresses the use of speed reduction measures that are designed to create a “gateway” effect, typically located at the entrances to neighbourhoods or at special places within them. Appendix A provides supplementary design guidance.

### 4.5.1 Physical Gateways



### Local Residential Street Speed Reduction Benefits:

- Encourages lower driving speeds by signaling that street users have entered a transitional area or destination
- Reduces driver speeds by narrowing the roadway portion of the street and/or by providing street edge friction

### Ancillary Street/Neighbourhood Benefits:

- Provides a focal point for street greening (trees, landscaping)
- Provides visual interest to the street and improves aesthetics, communicating a priority of “place” over transportation

### Location and Design Guidance:

- Typically used at an entrance to a neighborhood, at the intersection with an arterial or collector road and a Traditional/Village Mainstreet
- May include fixed roadside and/or overhead features
- Physical space, utility, electrical and other constraints need to be identified to help determine feasible options
- Future maintenance must be considered, refer to the Design Guidelines for New Development Application Gateway Features and consult with applicable municipal staff
- Consideration should be given to tree setbacks and soil volumes where trees may be impacted

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Streetscaping
- ✓ On-street parking
- ✓ Woonerven or “Living Streets”
- ✓ Curb extensions
- ✓ Vertical measures
- ✓ On-road messaging

## 4.5.2 Vehicular Directional Closures (Traffic Management)



### Local Residential Street Speed Reduction Benefits:

- Prevents through-traffic in one specific direction, reducing overall non-local vehicle traffic

### Ancillary Street/Neighbourhood Benefits:

- Improves conditions for vulnerable street users by limiting vehicular through-traffic
- Can shorten crossing distances for pedestrians and vulnerable street users
- Reduces the number of conflicting movements at the intersection
- Can still allow emergency vehicle and/or cyclist access

### Location and Design Guidance:

- Applicable to intersections and midblock locations
- Use physical features (for example, curb extensions) in addition to signage when indicating a directional closure, in order to encourage greater compliance
- Must accommodate local area traffic demands (traffic study may be required)
- Avoid placement where it would hamper access to local destinations (such as schools, parks)

- Consider placement where land use changes (for example, place away from intersection to align with commercial/residential interface where applicable)

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Mid-block neckdowns/chokers/curb extensions (when away from intersections)
- ✓ Intersection bulb-outs/curb extensions/neckdowns/narrowings/chokers (when at intersections)
- ✓ Cycle friendly bulb-outs
- ✓ Raised crossings
- ✓ Intersection channelizations (traffic management)
- ✓ Urban design (streetscaping)

## 4.5.3 On-street Plazas and Vehicle Access Closures (Traffic Management)



### Local Residential Street Speed Reduction Benefits:

- Prevents through-traffic through a specific point/segment, reducing overall non-local vehicle traffic
- Reduces speed of turning vehicles when supplemented with a curb extension

### Ancillary Street/Neighbourhood Benefits:

- Improves conditions for vulnerable street users by limiting vehicular through-traffic
- Allows for pedestrian and cycling permeability while restricting vehicular access
- Provides space for landscaping/new trees

### Location and Design Guidance:

- Exercise care to ensure potential cyclist movements are apparent to motorists, particularly when plaza ends at or near an intersection

- Should be avoided on key emergency response streets, or alternatively designed with removable bollards or other appropriate measures
- Must accommodate local area traffic demands (traffic study may be required)
- Consider a turn-around area for vehicles, particularly when road width is narrower and/or on-street parking utilization is high

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Urban design (streetscaping)
- ✓ Woonerven or “Living Streets”

### 4.5.4 On-Road Messaging (Pavement Markings)



#### Local Residential Street Speed Reduction Benefits:

- Encourages motorists to drive within the speed limit
- Can have a visual friction effect, similar to transverse bars

#### Ancillary Street/Neighbourhood Benefits:

- Brings awareness to the speed limit and/or goal of speed reduction in the area

#### Location and Design Guidance:

- Often used in school zones, in advance of hazards or at the entrance to a traffic calmed community
- Replace numerical speed limit with alternative messaging (for example, “SLOW DOWN”) where regulatory speed is higher than desired operating speed
- Consider alternative context-sensitive stencils (for example, school area or playground ahead signs)

- Locate with consideration for regulatory speed limit signage (where applicable)

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Can be used alongside gateway measures at major entrances to traffic calmed neighborhoods
- ✓ Can be used as a low-cost alternative to gateway measures on minor entrances to traffic calmed neighbourhoods
- ✓ Can be used in support of most other intersection measures

## 4.6 Recurring Mid-Block Measures

This section addresses the use of speed reduction measures that are typically implemented in mid-block locations, away from intersections. Appendix A provides supplementary design guidance.

### 4.6.1 Vertical Centreline Treatments



#### Local Residential Street Speed Reduction Benefits:

- Reduce speeds by visually narrowing the travel lanes and adding vertical “friction” elements in the centre of the roadway

#### Ancillary Street/Neighbourhood Benefits:

- Can mitigate potential conflicts between on-coming traffic
- Can display secondary messaging (for example, speed limit or school zone)

#### Location and Design Guidance:

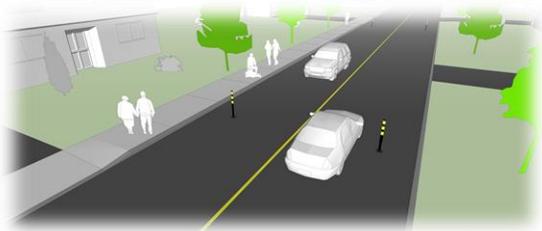
- Used in two-lane local streets
- Flex stakes/flexible post-mounted delineators are a temporary/seasonal measure and may require frequent replacements
- Not recommended in new construction or reconstruction contexts except where constraints preclude the use of more permanent measures

- Placement must ensure that vehicular turning movements can be accommodated
- Avoid locations that may block driveways or cross street access or interfere with transit operations
- Located minimum 10m from a signalized intersection
- Minimum spacing: 30m
- Target separation distance between one another: 50m, separation exceeding this value is only acceptable when coupled with other measures to mitigate reduced effectiveness
- Maintain 3.5m between vertical centreline treatments and curb, on-street parking or other vertical edge treatments
- Parking lanes (where present) should be a minimum of 2.0m in addition to the travel lane width
- Where the full 3.5m travel lane width and 2.0m parking lane width can't be obtained, a "no parking" zone must extend at least 9.0m on both sides of the flex post.
- If parking utilization is high and only permitted on one side, locate vertical centreline treatment offset from the centreline to permit passage of two-way traffic and parking

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Vertical edgeline treatments
- ✓ On-street parking
- ✓ Street edge landscaping
- ✓ Speed humps and speed tables
- ✓ On-road messaging
- ✓ Painted centreline

## 4.6.2 Vertical Edgeline Treatments



### Local Residential Street Speed Reduction Benefits:

- Reduces speeds by visually narrowing the travel lanes and adding vertical "friction" elements at the edge of the roadway

## Ancillary Street/Neighbourhood Benefits:

- Can display secondary messaging (for example, speed limit or school zone)
- Can provide physical separation for bike lanes

## Location and Design Guidance:

- Most effective when coupled with a painted centreline and/or vertical centerline treatments
- Flex stakes/flexible post-mounted delineators are a temporary/seasonal measure and may require frequent replacements
- Not recommended in new construction or reconstruction contexts except where constraints preclude the use of more permanent measures
- Placement must ensure that vehicular turning movements can be accommodated
- Avoid locations that may block driveways or cross street access or interfere with transit operations
- Coordinate placement with on-street parking where applicable
- Locate a minimum of 10m from an intersection
- Minimum spacing: 30m
- Target separation distance between one another: 50m, separation exceeding this value is only acceptable when coupled with other measures to mitigate reduced effectiveness
- Maintain a minimum travel lane width of 3.5m on a one-way street or 6.0m when used on a two-way street without vertical centerline treatment

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Vertical centreline treatments
- ✓ On-street parking
- ✓ Street edge landscaping
- ✓ Speed humps and speed tables
- ✓ On-road messaging
- ✓ Painted centreline

## 4.6.3 Speed Humps and Speed Tables



### Local Residential Street Speed Reduction Benefits:

- Motor vehicles must reduce speed to avoid discomfort

### Ancillary Street/Neighbourhood Benefits:

- Can be added to existing, reconstructed and new streets with minimal impact to other existing and planned street features

### Location and Design Guidance:

- Construct in accordance with City of Ottawa standards for height and slope to reduce impacts on mobility device users
- Limited application on bus routes
- Avoid use on key emergency response routes
- Avoid placement within 75m of a traffic signal, 30m of an intersecting collector street and 6m of an intersecting local street
- Locate not closer than 1.5m from a driveway/private access
- Avoid placement within turning areas of major vehicular access (for example, school zones or parks)
- Consider not extending across bike lanes when paired with other measures that prevent drivers from driving around the vertical deflection
- Minimum spacing: 40m
- Target separation distance between one another: 50m to 60m, separation exceeding this value is only acceptable when coupled with other measures to mitigate reduced effectiveness
- Ensure adequate sightlines from vertical/horizontal curves
- Design may require a stormwater management and a grading and drainage review
- Should not be used on steep grades ( $\geq 5\%$ )
- On-street parking can be permitted on speed humps and speed tables

### Best Opportunities for Bundling with Other Design Measures:

- ✓ Vertical edgeline treatments (important in curbless/rural contexts to prevent vehicles from driving around the speed hump, can also be useful in urban contexts to create an accessible surface near the curb for cyclists and mobility device users)
- ✓ Raised crossings
- ✓ Raised intersection
- ✓ Mid-block neckdowns/chokers/curb extensions (constructed or painted)

## 4.6.4 Speed Cushions



### Local Residential Street Speed Reduction Benefits:

- Small motor vehicles (passenger cars) must reduce speed to avoid discomfort
- Larger vehicles (buses, firetrucks) can straddle cushions to reduce or avoid vertical deflection

### Ancillary Street/Neighbourhood Benefits:

- Can be added to existing, reconstructed and new streets with minimal impact to other existing and planned street features

### Location and Design Guidance:

- Construct in accordance with City of Ottawa standards for height and slope to reduce impacts on mobility device users
- Cushion size/gap spacing should be coordinated with road width, wheel path of standard vehicles and wheel path of larger vehicles
- Preferred on transit or fire response routes instead of speed humps, although response times may be affected
- Use on key paramedic response routes is not appropriate, as the wheel path of ambulances and passenger vehicles are similar
- Avoid placement within 75m of a traffic signal, 30m of an intersecting collector street and 6m of an intersecting local street

- Avoid placement on roadway bends to allow buses and emergency vehicles to align themselves to straddle the speed cushion efficiently
- Locate not closer than 1.5m from a driveway/private access
- Avoid placement within turning areas of major private accesses
- Provide in series with consistent spacing along street segments
- Minimum spacing: 40m
- Target separation distance between one another: 50m to 60m, separation exceeding this value is only acceptable when coupled with other measures to mitigate reduced effectiveness
- Recommended height of 80mm and a recommended length of 4m
- Width and lateral spacing to be coordinated with design vehicles
- Recommended installation of three speed cushions at each location, except transit routes, key emergency response routes or narrow local streets, where two may be appropriate
- Should not be used on steep grades ( $\geq 5\%$ )
- Ensure adequate sightlines from vertical/horizontal curves
- Ensure that on-street parking does not prevent larger vehicle access through cushion cutouts, especially on emergency response routes and transit routes
- Design may require a stormwater management and a grading and drainage review

### Best Opportunities for Bundling with Other Design Measures:

- ✓ Speed display devices (place in gap between speed cushions)
- ✓ Vertical edge line treatments (important in curbless/rural contexts, useful in urban contexts to create an accessible flat surface near the curb for cyclists and mobility device users)
- ✓ Raised crossings
- ✓ Raised intersection
- ✓ Mid-block neckdowns/chokers/curb extensions (constructed or painted)

## 4.6.5 Centre Island Narrowings



### Local Residential Street Speed Reduction Benefits:

- Narrows the travel lane in both directions
- Breaks up long street segments
- Provides centreline “friction”
- Can be located downstream from an intersection to act as a gateway feature

### Ancillary Street/Neighbourhood Benefits:

- If wide enough, can provide a refuge between travel lanes for vulnerable users, but must be designed based on requirements of City of Ottawa Accessibility Design Standards (COADS) and AODA- Integrated Accessibility Standards Regulation (IASR), along with other applicable City standards
- Provides space for street greening/landscaping
- Adds visual interest to the street
- More affordable (potentially less granular subgrade, asphalt)

### Location and Design Guidance:

- Use with caution in areas with no dedicated bike facility, as it can cause cyclists to feel “squeezed”
- Can be located adjacent to an intersection or mid-block
- Do not repeat in series, alternate with other measures
- Not applicable to one-way streets
- Remaining curb to curb width on each side should be 4.0m (or wider pending site-specific review by City of Ottawa Road Services staff)
- Target width: 1.5m minimum
- Minimum road width: 9.5m
- Target length: 5m to 7m
- In general, local road widths could not support parking adjacent to centre island narrowings
- Ensure turning movements of applicable heavy vehicles can be accommodated at intersections and major private accesses

- Consider effects on access to private driveways

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Street edge landscaping
- ✓ Speed humps and speed tables
- ✓ Speed reduction can be increased when located in sequence with chicanes, curb extensions or chokers
- ✓ Raised mid-block crosswalks

## 4.6.6 Mid-Block Neckdowns/Chokers/Curb Extensions



### Local Residential Street Speed Reduction Benefits:

- Physically narrows the roadway
- Breaks up long street segments

- Provides street edge friction, especially in the absence of parked cars

## Ancillary Street/Neighbourhood Benefits:

- Can organize on-street parking into bays
- Provides space for street greening including landscaping and tree planting where sufficient soil volumes can be achieved in accordance with City practices
- Adds visual interest to the street
- More affordable than full-depth asphalt (less granular subgrade, asphalt)

## Location and Design Guidance:

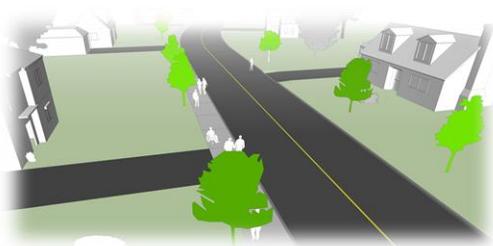
- Use only in conjunction with sidewalk to avoid creating barriers for persons with disabilities and to avoid forcing pedestrians into the path of vehicles
- Locate not closer than 30m from a signalized intersection
- Consider locating as a mid-block gateway where land use changes
- Locate at fire hydrants or other no-parking areas to reduce impact on on-street parking, where possible

- Can be painted on the road as well as constructed, however painted curb extensions have limited effectiveness and should be bundled with vertical edgeline treatments where possible
- Target separation distance between one another: 40m to 60m, separation exceeding this value is only acceptable when coupled with other measures to mitigate reduced effectiveness
- When selecting separation distance, consider impact on the on-street parking supply. Separation less than the target can be considered where the impact on parking supply is acceptable or where parking is already prohibited (for example, when adjacent to a fire hydrant)
- Locate in between driveways where possible, or have driveway(s) wholly within if required, with a barrier curb on the approach side
- Target roadway width: 6.0m clear curb-to-curb for two-way traffic, 4.0m for one-way traffic (or wider pending site-specific review by City of Ottawa Road Services staff)
- Desirable minimum curb extension width: 1.0m (less can be considered on an exception basis)
- Minimum total curb extension length: 6.7m
- Tangent length desirable where space allows, suggested minimum tangent length: 2.0m
- Target curb radius: 5.0m
- Target taper angle: 23°
- Ensure adequate sightlines from vertical/horizontal curves
- Consider using Cycle-Friendly Bulb-Outs on bike routes and where cycling volumes warrant

## Best Opportunities for Bundling with Other Design Measures:

- ✓ On-street parking
- ✓ Street edge landscaping that doesn't obstruct sightlines
- ✓ Low Impact Development (LID) stormwater features
- ✓ Speed humps and speed tables
- ✓ Mid-block pedestrian crossings (PXO) with optional raised crossing

## 4.6.7 Painted Centreline



### Local Residential Street Speed Reduction Benefits:

- Reduce speeds by visually narrowing the travel lanes, when paired with other measures

### Ancillary Street/Neighbourhood Benefits:

- Can mitigate potential conflicts between on-coming traffic

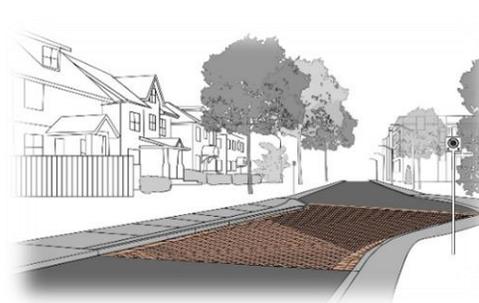
### Location and Design Guidance:

- Used on two-way local streets
- Offset to suit on-street parking when only present on one side of street
- Best when used in conjunction with horizontal narrowings and/or deflections
- Do not use on straight segments with wide lanes, as this can increase driver comfort and result in higher operating speeds

### Best Opportunities for Bundling with Other Design Measures:

- ✓ On-street parking
- ✓ Street edge landscaping
- ✓ Vertical centreline and/or vertical edgeline treatments
- ✓ Intersection bulb-outs/curb extensions/neckdowns/narrowings/chokers (constructed/painted)
- ✓ Lane narrowings
- ✓ Mid-block neckdowns/chokers/curb extensions (constructed or painted)
- ✓ Chicanes

## 4.6.8 Textured Surfaces



### Local Residential Street Speed Reduction Benefits:

- Can signal context change to street users, especially at the entrance to a speed reduced area
- Encourages low driver speeds

### Ancillary Street/Neighbourhood Benefits:

- Can improve the aesthetics/enhance the character of the street

### Location and Design Guidance:

- Textured surfaces are no longer recommended without General Manager's approval due to maintenance and operational issues and should not be implemented until a standard is developed
- Used primarily in City's Special Districts due to increased cost and maintenance efforts, in accordance with applicable City of Ottawa policy
- Can reduce comfort for cyclists, avoid using on cycling facility where possible
- Can reduce comfort for mobility device users, particularly those with chronic pain
- Can increase noise from vehicle traffic, to be considered when using in close proximity to residences
- Can be more costly/difficult to maintain
- Can be used in close proximity to an intersection or mid-block

### Best Opportunities for Bundling with Other Design Measures:

- ✓ Street edge landscaping
- ✓ Speed display device
- ✓ Chicanes
- ✓ Gateway features
- ✓ Curb extensions
- ✓ Woonerven or "Living Streets"

## 4.7 Street Edge Measures

This section addresses the use of speed reduction measures that are located along the street edge and that reinforce the land use and landscaping of buildings along the street. The measures often have a continuity along the entire block. Appendix A provides supplementary design guidance.

### 4.7.1 On-street Parking



#### Local Residential Street Speed Reduction Benefits:

- Narrows the travelled portion of the roadway

- Provides visual friction near the travelled lanes

#### Ancillary Street/Neighbourhood Benefits:

- Provides short term parking for adjacent residences
- When not in use, provides additional space for other uses such as cyclists and snow storage

#### Location and Design Guidance:

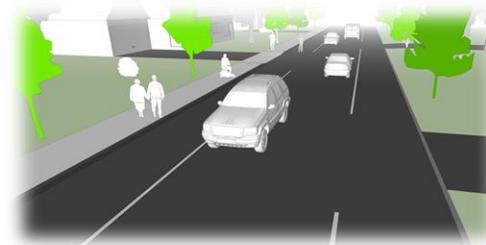
- Consider banning parking on one side for streets with no sidewalks to avoid forcing pedestrians into the path of vehicles
- Can alternate sides to provide horizontal deflection
- Most effective for traffic calming purposes in areas of high parking utilization
- In areas with low parking utilization, it may need to be bounded by curb extensions and/or delineated with longitudinal pavement markings
- Locate not closer than 9m to 15m from an unsignalized intersection
- Locate not closer than 9m to 30m from a signalized intersection

- Locate not closer than 30m from approach side and 15m from departure side of mid-block pedestrian crossing (Mid-Block Pedestrian Signal, Intersection Pedestrian Signal or Pedestrian Crossover)
- Locate not closer than 3m from a fire hydrant and 1.5m to private driveways
- Avoid in the vicinity of major accesses for fire halls, schools, etc.
- Avoid stretches of dense driveways where there would be little opportunity to legally park
- On street parking is prohibited by Bylaw where the roadway is 6.0m in width or less
- Consider prohibiting parking on both sides when roadway is 7.0m or less in width, and on one side where roadway is 8.0m or less in width
- Where extra asphalt width is required to accommodate parking, consider impact on soil volumes for trees
- Adhere to applicable public and Accessibility Advisory Committee consultation requirements identified in the COADS

#### Best Opportunities for Bundling with Other Design Measures:

- ✓ Mid-block neckdowns/chokers
- ✓ Bulb-outs/curb extensions
- ✓ Parking area delineation using mid-block neckdown, alternating curb extensions, bulb-outs

### 4.7.2 Painted Edgeline/Shoulder



#### Local Residential Street Speed Reduction Benefits:

- Reduce speeds by visually narrowing the travel lanes

#### Ancillary Street/Neighbourhood Benefits:

- Can provide a dedicated space for cyclists
- Can be used to delineate on-street parking areas, which is particularly beneficial when utilization is low or inconsistent

## Location and Design Guidance:

- Used in one-way and two-way local streets
- Maintain a minimum 3.0m between painted shoulder and centerline on a two-way local street
- Use with caution in areas with no cycling facility provided; painted shoulders can give users the impression of being a bike lane while being too narrow to function safely as a bike lane and can introduce a conflict between cyclists and on-street parking

## Best Opportunities for Bundling with Other Design Measures:

- ✓ On-street parking
- ✓ Street edge landscaping
- ✓ Vertical centreline and/or vertical edgeline treatments
- ✓ Intersection bulb-outs/curb extensions/neckdowns/narrowings/chokers (constructed/painted)
- ✓ Mid-block neckdowns/chokers/curb extensions (constructed/painted)

### 4.7.3 Chicanes



## Local Residential Street Speed Reduction Benefits:

- Uses physical roadside features to force lateral shifting of driving paths
- Narrows the travel path of the roadway
- Provides street edge friction

## Ancillary Street/Neighbourhood Benefits:

- Provides space for street greening including landscaping and tree planting where sufficient soil volumes can be achieved in accordance with City practices
- Adds visual interest to the street
- More affordable than full-depth asphalt (less granular subgrade, asphalt)
- Can discourage through traffic

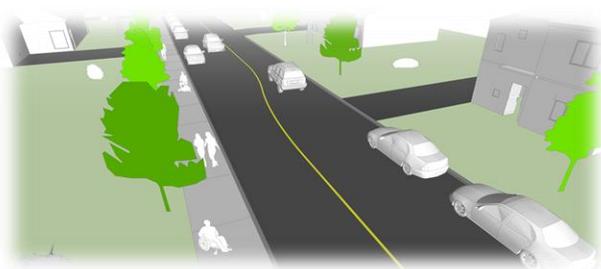
## Location and Design Guidance:

- Must be properly designed to ensure a two-way conflict is not created
- On-street parking must be prohibited within the intended path of vehicular travel through the chicanes and within 5m of the egress
- Must maintain sufficient width for emergency vehicles and trucks throughout, or review the use of mountable curbs/obstruction-free designs where large vehicle maneuverability is not possible with the use of barrier curbs
- Consider the impact of traffic diversion to adjacent streets
- Locate not closer than 20m from an intersection
- Avoid placement within decision or braking zones on approaches to traffic signals
- Locate with consideration to driveways, so as to avoid creating turning and/or sightline issues
- Include drainage channel along curb where required
- On a one-way street, the recommended lane width through the chicaned area is 4.5m and the minimum is 4.0m (or wider pending site-specific review by City of Ottawa Road Services staff)
- On a two-way street, the recommended road width adjacent to a chicane is 7m and a minimum is 6m on the diagonal through opposing chicanes.
- Swept path analysis is required to confirm chicanes are passable with a 0.3m clearance on either side by design vehicles, including garbage trucks, school buses and/or other contextually relevant design vehicles. Larger vehicles may use the entire road width.
- Minimum chicane width: 1.0m
- Minimum curb radius: 5.0m
- Target curb radius: 10m
- Target taper ratio: 5:1
- A minimum of two chicanes required, at least three is recommended

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Street edge landscaping
- ✓ Can be located in sequence with speed humps, speed tables and centre island narrowings

## 4.7.4 Alternating On-street Parking (no curb extensions)



### Local Residential Street Speed Reduction Benefits:

- Leverages on-street parking to create a lateral shifting of driving paths

### Ancillary Street/Neighbourhood Benefits:

- Maximizes availability of on-street parking
- When not in use, provides additional space for other uses such as cyclists and snow storage

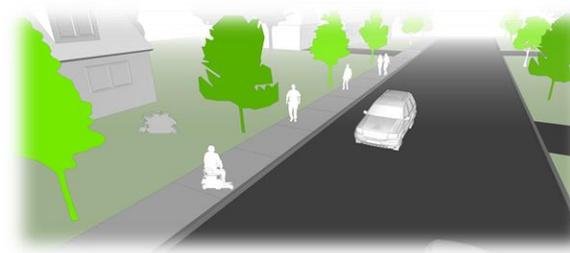
### Location and Design Guidance:

- Most effective for traffic calming purposes in areas of high parking utilization
- Not appropriate for use in areas of low and/or inconsistent parking utilization (in which case parking areas should be bounded by curb extensions)
- Locate not closer than 9m to 15m from an unsignalized intersection
- Locate not closer than 9m to 30m from a signalized intersection
- When a sidewalk is located only on one side, consider potential accessibility impacts regarding sidewalk access when determining parking and no parking zones
- Adhere to applicable public and Accessibility Advisory Committee consultation requirements identified in the COADS

### Best Opportunities for Bundling with Other Design Measures:

- ✓ Mid-block neckdowns/chokers (painted)
- ✓ Vertical centreline treatments
- ✓ Vertical edgeline treatments
- ✓ Painted centerline
- ✓ Painted edgeline/shoulder

## 4.7.5 Urban Design (Streetscaping)



### Local Residential Street Speed Reduction Benefits:

- Can reduce vehicle speeds by providing/enhancing visual street edge friction

### Ancillary Street/Neighbourhood Benefits:

- Increases street greening (trees, landscaping)
- Adds visual interest to the street
- Can provide shade for pedestrians, cyclists and parked cars

### Location and Design Guidance:

- Can result in increased maintenance requirements and costs and, with the exception of tree plantings, is typically used only in Design Priority Areas
- Ensure tree planting is design with consideration for long term health and survivability (considerations include offset from roadway, soil volume and protection from mechanical damage)
- Consideration should also be given to ensuring any vegetation adjacent to or overhanging the sidewalks should not have thorns or drop large seed pods or fruit that will cause the sidewalk to be slippery

### Best Opportunities for Bundling with Other Design Measures:

- ✓ On-street parking
- ✓ Mid-block neckdowns/chokers/curb extensions
- ✓ Centre island narrowings
- ✓ Chicanes

## 4.8 Emerging Measures

The following emerging measures are not typical and local examples may be limited to pilot projects only or referenced from other municipalities. At this point they are conceptual measures to be considered in designs going forward. Appendix A provides supplementary design guidance.

### 4.8.1 Traffic Button/Punaise



#### Local Residential Street Speed Reduction Benefits:

- Curvilinear path of travel and yield condition promotes travel at consistent, reduced speed

#### Ancillary Street/Neighbourhood Benefits:

- Reduces the potential conflict points of a traditional four-legged intersection
- Can reduce severity of collisions
- Can reduce noise (reduced deceleration/acceleration versus all-way stop)
- Opportunity for visual accents in mountable center islands
- Lack of physical obstructions make it readily accessible for emergency vehicles and vehicles with a wider turning radius

#### Location and Design Guidance:

- May cause confusion for pedestrian and cyclist movements
- In many contexts, can be retrofit into an existing traditional 4-leg intersection with minimal or no intervention to outside curb lines
- Does not feature splitter islands on the approaches or geometry based on roundabout design principles
- Can be implemented with a mountable center island or via pavement markings alone
- Pavement markings are often covered in winter months, obscuring visibility of the traffic button, while signage remains visible

#### Best Opportunities for Bundling with Other Design Measures:

- ✓ Corner tightenings/curb radius reductions

### 4.8.2 Woonerven or “Living Streets”



#### Local Residential Street Speed Reduction Benefits:

- Encourages lower driving speeds by signaling that street users have entered a shared street or destination
- Reduces driver speeds by narrowing the roadway and by providing street edge friction

#### Ancillary Street/Neighbourhood Benefits:

- Provides a focal point for street greening (trees, landscaping)
- Provides visual interest to the street and improve aesthetics, communicating a priority of “place” over transportation
- Promotes active transportation

#### Location and Design Guidance:

- Used primarily in residential settings with very low vehicle traffic demand, such as near rapid transit stations, town centres or design priority areas
- Special consideration is required for people with cognitive impairments, neurodiversity and vision impairments, as these users will have additional challenges navigating these spaces
- Removal of curbs and use of atypical surface treatments indicates the shared nature of the space to users
- Additional traffic calming measures should be used at gateway to indicate that users are entering a shared space
- Consideration should be given to alternate routes that vehicles may take to avoid “living streets” and a traffic study may be required

- Future maintenance must be considered, refer to the Design Guidelines for New Development Application Gateway Features and consult with applicable municipal staff
- Provide intermittent on-street parking on alternating sides
- Consideration should be given to tree setbacks and soil volumes where trees may be impacted

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Streetscaping
- ✓ On-street parking
- ✓ Curb extensions
- ✓ Vertical measures
- ✓ On-road messaging
- ✓ Chicanes

### 4.8.3 Shared Spaces



#### Local Residential Street Speed Reduction Benefits:

- Encourages lower driving speeds by signaling that street users have entered shared space or destination
- Promotes equal priority for all street users by limiting overt right-of-way identifications such as traffic signals, signs or barriers

#### Ancillary Street/Neighbourhood Benefits:

- Provides a focal point for street greening (trees, landscaping)
- Provides visual interest to the street and improve aesthetics, communicating a priority of “place” over transportation
- Promotes active transportation

#### Location and Design Guidance:

- Used primarily in residential settings with very low vehicle traffic demand, such as near rapid transit stations, town centres or design priority areas
- Special consideration is required for people with cognitive impairments, neurodiversity and vision impairments, as these users will have additional challenges navigating these spaces
- Use appropriate accessibility features to delineate pedestrian spaces and accessible routes, as determined by current City requirements and policies
- Select smooth surface treatments to avoid discomfort particularly for mobility device users and those with chronic pain
- Removal of curbs and use of atypical surface treatments indicates the shared nature of the space to users
- Additional traffic calming measures should be used at gateway to indicate that users are entering a shared space
- Consideration should be given to the use audio directional technologies (for example, beacons associated with wayfinding mobile Apps) to assist people with vision loss
- Consideration should be given to street lighting to ensure sufficient visibility through all hours when vehicles are permitted
- Use caution with trees and street furniture to not obscure sight lines of vulnerable street users
- Future maintenance must be considered, refer to the Design Guidelines for New Development Application Gateway Features and consult with applicable municipal staff
- Since motorists may avoid shared spaces by using other streets, a traffic study may be required
- Given the potential for user conflicts, a review of accessibility considerations should be included in the design process

#### Best Opportunities for Bundling with Other Design Measures:

- ✓ Streetscaping
- ✓ Woonerven or “Living Streets”
- ✓ Gateway
- ✓ Speed enforcement

## 4.8.4 Continuous Footways/Bikeways



### Local Residential Street Speed Reduction Benefits:

- Turning motor vehicles must reduce speed due to tighter radius and vertical deflection

- Encourages lower vehicle speeds by giving the visual impression of prioritizing pedestrians and cyclists over motor vehicles

### Ancillary Street/Neighbourhood Benefits:

- Increases awareness/visibility of vulnerable street users
- Provides a continuous path of travel for pedestrians and cyclists, increasing accessibility for many users and prioritizing vulnerable users
- Provides visual interest to the street and improve aesthetics, communicating a priority of “place” over transportation
- Reduced potential for ponding within the crosswalk
- Creates level and safe crossing for people using mobility devices

### Location and Design Guidance:

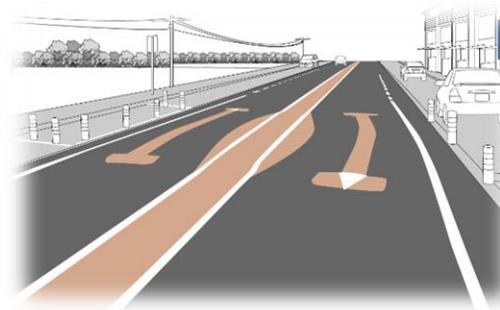
- The crosswalk and crossside should be raised across side streets (either full height or half height), introducing vertical deflection and giving drivers the sense that they are entering the pedestrian realm
  - Half Height (80mm) is being planned for a pilot by the City
  - Full Height (150mm) is being reviewed by the City
- Half height variant reduces navigational challenges faced by pedestrians with vision loss
- Recommended at unsignalized intersections of local streets with higher order roadways that have sidewalks or separate pedestrian and cycling facilities, preferably cycle tracks
- Applicable to local roadways with low volumes of vehicular traffic (around 2,000 vehicles per day or lower)
- Target traffic volumes can be achieved in some cases by implementation of strategic Traffic Management measures on the adjacent road network

- Accessibility must be carefully considered for continuous footways, especially for pedestrians with vision loss and people with cognitive disabilities
- The use and placement of tactile features is very important, however standards have not yet been established
- Sufficient boulevard space must be provided so that ramping does not encroach into the main streets
- Not recommended for use across streets that are bus routes
- Interactions between pedestrians and cyclists should be considered when planning and designing continuous footways

### Best Opportunities for Bundling with Other Design Measures:

- Urban design (streetscaping)
- Vehicular directional closures (traffic management)
- Intersection channelizations (traffic management)
- Corner radius reduction

## 4.8.5 Speed Kidneys



### Local Residential Street Speed Reduction Benefits:

- Reduces vehicle speed by requiring the vehicles to take a curvilinear path to avoid vertical deflection

### Ancillary Street/Neighbourhood Benefits:

- Reduces vehicle speeds with less impact to emergency response vehicles than speed humps or speed tables
- If vehicles take the curvilinear path, the discomfort of vertical deflection can be avoided, making this measure less problematic for drivers or passengers with disabilities such as chronic pain
- Cyclists can avoid vertical deflection by riding through the gaps

- Less negative environmental impacts compared to speed humps (reduces braking and acceleration)

## Location and Design Guidance:

- Locate a minimum of 20m from intersection or other decision points and outside braking zones on approach to traffic signals
- Locate not closer than 1.5m from a driveway/private access
- Avoid placement within turning areas of major vehicular access (for example, school zones and parks)
- Minimum spacing: 40m
- Target separation distance between one another: 50m to 60m, separation exceeding this value is only acceptable when coupled with other measures to mitigate reduced effectiveness
- Should not be used on steep grades ( $\geq 5\%$ )
- Parking must be prohibited on both sides at speed kidneys

## Best Opportunities for Bundling with Other Design Measures:

- ✓ On-street messaging
- ✓ Speed display device
- ✓ Street-edge landscaping
- ✓ Can be combined with pavement markings to provide contrast between the roadway and speed kidneys

### 4.8.6 Lane Narrowings



#### Local Residential Street Speed Reduction Benefits:

- Encourages a reduction in vehicle speed by narrowing the roadway
- Increases street edge friction



#### Ancillary Street/Neighbourhood Benefits:

- Road surface gained from lane narrowings can be redistributed for other uses such as sidewalks, street greening

(trees, landscaping), adding visual interest to the street

- More affordable (less granular subgrade, asphalt)
- Can reduce crossing distances for active modes of transportation

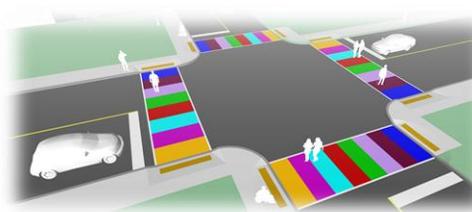
## Location and Design Guidance:

- Can be used in road reconstruction situations where the existing curb to curb width is excessive
- Use with caution in areas with high cyclist volumes and no cycling facility as cyclists can feel “squeezed”, especially those using cargo bikes, adapted bicycles and tricycles
- Sight line implications should be reviewed, particularly when vertical elements are added near the road edge. Consideration should be given to sight lines from a lower perspective, such as adapted bicycles and children.
- Can be used to reconstruct wide streets at the standard local road width or to create space for sidewalks

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Any vertical street-edge measures
- ✓ Street edge landscaping

### 4.8.7 Creative Pavement Markings



#### Local Residential Street Speed Reduction Benefits:

- Can encourage slower speeds by communicating a different use or purpose to specific areas of a road surface, or the whole street
- Can increase visual “friction”, which can create or enhance perception of confinement, influencing driver behavior and resulting in lower vehicle travel speeds

#### Ancillary Street/Neighbourhood Benefits:

- Provides visual interest to the street and improve aesthetics, communicating a priority of “place” over transportation

- Low-cost method for re-purposing street space

## Location and Design Guidance:

- Consultation with accessibility interest groups prior to the use of creative pavement markings is required
- Design creative pavement markings to mimic familiar layouts to increase intuitiveness for users of all abilities
- Typically utilized in Design Priority Areas
- Can be located at an intersection or mid-block
- Can be used to convey specific messaging or concepts to users
- Can result in increased maintenance requirements and costs
- Non-standard roadway pavement markings require prior approval of the road authority to avoid potential errors in messaging or design

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Gateway measures
- ✓ Urban design (streetscaping)
- ✓ Raised crossings

## 4.9 Communication and Enforcement

The following measures provide tools associated with communication, education and enforcement of the City's objectives for speed management.

### 4.9.1 Speed Display Devices



#### Local Residential Street Speed Reduction Benefits:

- Encourages reduction in vehicle speeds and compliance with posted speed limit

## Ancillary Street/Neighbourhood Benefits:

- Brings awareness to operating speeds, speed limit and goal of speed reduction in the area
- Lower cost than manned speed enforcement initiatives

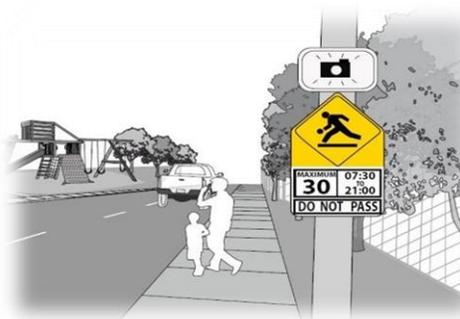
## Location and Design Guidance:

- Most effective on roads with low to moderate traffic
- Prioritize locations with vulnerable pedestrians, such as near schools, community centres, parks and school-related active transportation initiatives (for example, Walking School Bus routes)
- Can be located where speed limit transitions to 30km/h or at locations where compliance with the posted speed is low
- Can be installed on a permanent or temporary/seasonal basis using solar or direct power sources
- Do not locate in advance of stop-controlled intersections
- Vertical and horizontal placement must ensure sufficient sightlines

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Can be used in support of most other measures
- ✓ Can be combined with regulatory speed limit signage and law enforcement efforts

### 4.9.2 Automated Speed Enforcement



#### Local Residential Street Speed Reduction Benefits:

- Strictly enforces driving under the posted speed limit by recording and ticketing vehicles operating above the posted speed limit

## Ancillary Street/Neighbourhood Benefits:

- Brings awareness to operating speeds, speed limit and goal of speed reduction in the area

## Location and Design Guidance:

- Geometric design options should be considered prior to use of Automated Speed Enforcement
- Can only be legally used in certain contexts
- Prioritize locations with a history of speed related collisions, as well as areas with vulnerable pedestrians, such as near schools, community centres, parks and school-related active transportation initiatives (for example, Walking School Bus routes)
- Do not locate in advance of stop-controlled intersections to avoid distracting the driver
- Vertical and horizontal placement must ensure sufficient sightlines
- Consider potential effects of vehicles rapidly or abruptly decelerating in advance of the camera to avoid tickets
- Prescribed signage must be installed in the surrounding area to ensure enforceability of tickets
- Consideration should be given to alternate routes vehicles may take to avoid the Automated Speed Enforcement
- Signs alerting motorists that a camera will be installed must be posted for 90 days prior
- Must be accompanied by signs that warn motorists that cameras are “in use”

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Can be combined with regulatory speed limit signage and law enforcement efforts
- ✓ Can be used in support of most other measures

## 4.9.3 Educational Campaigns



## Local Residential Street Speed Reduction Benefits:

- Encourages reduction in vehicle speeds and compliance with posted speed limit

## Ancillary Street/Neighbourhood Benefits:

- Brings awareness to the goal of speed reduction in the area
- Can contribute to a sense of ownership within the community of the traffic calming efforts, which can lead to an increase in adherence to the speed limit

## Location and Design Guidance:

- Pre-testing campaign messages can contribute to effectiveness
- Educational campaigns can include a combination of in-person exchanges, social media, signage, video, audio, print
- Educational campaigns are temporary and should be used in addition to, not in place of, regular education and communication activities

## Best Opportunities for Bundling with Other Design Measures:

- ✓ Can be used in support of most other measures, particularly when they are new to an area/neighbourhood

## 4.9.4 Information Signage



### Local Residential Street Speed Reduction Benefits:

- Encourages reduction in speed by drawing attention to the presence of traffic calming

### Ancillary Street/Neighbourhood Benefits:

- Brings awareness to operating speeds, speed limit and goal of speed reduction in the area
- Can foster community support for traffic calming initiatives

### Location and Design Guidance:

- Conditions to which the signs refer to should be present so that the sign is credible
- Avoid overuse of custom signs to indicate conditions where standard signs (OTM or MUTCDC) already exist
- Overuse may reduce effectiveness
- Ensure that signage does not obstruct sight lines

### Best Opportunities for Bundling with Other Design Measures:

- ✓ Can be used in support of most other measures

# Local Residential Streets 30 km/h Design Toolbox



Figure 1: Demonstration Plan

Note: The Demonstration Plan includes emerging measures. Refer to section 4.8 for further details.

# 5.0 IMPLEMENTATION AND MONITORING

Figure 1 on the following page provides a demonstration of how and where the various individual speed reduction measures could be combined and implemented in a neighbourhood, in plan view. This is meant to be a helpful reference.

As 30km/h Streets are implemented throughout the City, they will need to be monitored to evaluate the effectiveness of the speed reduction measures at each location, and the overall toolbox effectiveness.

The city understands that the effectiveness of each measure differs from one another. Section 4.3 establishes a three-tier system of effectiveness. In the review of proposed local residential street designs, an appropriate mix of measures will be sought with the understanding that every design will have some implementation of Tier 1 measures in combination with other measures. If Tier 1 measures are not feasible, then the expectation is that Tier 2 measures will be used more heavily.

Bi-annual speed surveys can be performed on each 30km/h Street to consider changes in effectiveness over time as users become more accustomed to the speed-reduced neighbourhoods. For reconstructed streets, speed data should be collected prior to construction, and again one-year and three-years post construction. For new construction, only the post construction speed surveys would be required. Moving forward, it will be important for the City to learn from its experiences in implementing the 30 km/h streets policy and building a body of knowledge that will inform the most effective combinations of speed management measures in various contexts.

Specific implementation recommendations include:

- Anchor the intent in the OP and TMP

- Echo the policy in Community and Design Plans
- Reference the requirements in the Traffic Impact Study (TIS) guidelines
- Project development needs to have an accessibility and universal design lens applied from conception through to implementation
- Revise or reference a plan of subdivision approval conditions
- Inform developers at pre-consultation meetings
- Address status of subdivision applications that are in progress
- Install 30km/h speed regulation signage early
- Design measures that reduce cost of construction and operation by seeking out cost effective measures from within the design toolbox

In the case of street reconstruction projects, it is acknowledged that the implementation of speed management measures will result in a change to the design and operation of the street. As such, it is important that the design process benefit from involvement of the adjacent residents, as early in the design process as possible. During these community discussions, it will be important for the design team to explain to stakeholders that City Council has established the requirement that every local residential street be designed to operate as a 30km/h street, but there are choices in the combination of measures that achieve this objective.

This design toolbox has been prepared as a guideline to be used to implement the City of Ottawa Council direction that all new local residential streets, constructed within new developments, or when reconstruction occurs on local residential streets, be designed for a 30 km/h operating speed. The toolbox is based on the most contemporary approaches to speed management that will inform the planning and design of local residential streets across the City of Ottawa. As new design measures emerge, the toolbox can be amended to reflect newer best practices.

## Appendix A: City of Ottawa 30 km/h Streets Design Toolbox – Speed Management Measure Application Matrix

Legend		
Symbol	Meaning	Definition
•	General Applicability	Appropriate in most project contexts
o	Site-Specific Applicability	Appropriate given the correct project context
V	Limited Applicability	Generally not appropriate, but may be useful in rare project contexts
X	Not Recommended	Not appropriate for the indicated type of local residential street project

Speed Management Measure  (Adapted from City of Ottawa Traffic Calming Design Guidelines, 2019)	Local Residential Street Project Applicability						Other Applicability Considerations (see Endnotes)
	New Streets or Street Reconstruction Projects			Street Retrofit Projects			
	Curbed Streets (urban area / village)	Curbless Streets (urban area / village)	Curbless Streets (rural area)	Curbed Streets (urban area / village)	Curbless Streets (urban area/village)	Curbless Streets (rural area)	
<b>Intersection Measures (Section 4.4)</b>							
Bulb-Outs/Curb Extensions/Neckdowns/Narrowings/Chokers (constructed)	•	o	v	o	o	v	5
Raised Intersections	•	o <sup>11</sup>	o <sup>11</sup>	X	X	X	5, 15
Raised Crossings	•	X	X	o	X	X	2, 5, 11, 15
Cycle Friendly Bulb-Outs	•	v	X	•	v	X	5
Corner Tightenings/Curb-Radius Reduction	•	X	X	o	X	X	5
Mini-Roundabouts	o	o	o	v	v	v	10, 15
Surface Treatments - Textured Crossings	v	v	v	v	v	v	3, 6, 12, 15
Intersection Channelizations (Traffic Management)	o	o	o	o	o	o	6, 13, 15
Raised Medians Through Intersections (Traffic Management)	o	o	o	o	o	o	6, 13

Speed Management Measure  (Adapted from City of Ottawa Traffic Calming Design Guidelines, 2019)	Local Residential Street Project Applicability						Other Applicability Considerations (see Endnotes)
	New Streets or Street Reconstruction Projects			Street Retrofit Projects			
	Curbed Streets (urban area / village)	Curbless Streets (urban area / village)	Curbless Streets (rural area)	Curbed Streets (urban area / village)	Curbless Streets (urban area/village)	Curbless Streets (rural area)	
Vehicle Diverters (Traffic Management)	●	●	●	○	○	○	13, 15
Right-In-Right-Out Islands (Traffic Management)	○	○	○	○	○	○	6, 13, 15
<b>Gateway Measures (Section 4.5)</b>							
Physical Gateways	○	○	○	○	○	○	3, 6
Vehicular Directional Closures (Traffic Management)	●	●	●	○	○	○	13
On-street Plazas and Vehicle Access Closures (Traffic Management)	v <sup>14</sup>	v <sup>14</sup>	v <sup>14</sup>	●	●	●	8, 13
On-Road Messaging (Pavement Markings)	○	○	○	●	●	●	2
<b>Recurring Mid-Block Measures (Section 4.6)</b>							
Vertical Centreline Treatments	X	X	X	●	●	●	2
Vertical Edgeline Treatments	X	X	X	●	●	●	2
Speed Humps and Speed Tables	●	○ <sup>9</sup>	○ <sup>9</sup>	●	○ <sup>9</sup>	○ <sup>9</sup>	2, 15
Speed Cushions	●	○ <sup>9</sup>	○ <sup>9</sup>	●	○ <sup>9</sup>	○ <sup>9</sup>	2, 15
Centre Island Narrowings	●	○	○	●	○	○	9
Mid-block Neckdowns/Chokers/Curb Extensions (constructed)	●	○ <sup>9,11</sup>	○ <sup>9,11</sup>	○	○ <sup>9,11</sup>	○ <sup>9,11</sup>	
Mid-block Neckdowns/Chokers/Curb Extensions (painted)	v	v	v	●	●	○ <sup>11</sup>	
Painted Centerline	○	○	v	○	○	v	9
Textured Surfaces	X	X	X	X	X	X	16

<b>Street Edge Measures (Section 4.7)</b>							
On-street Parking	o	o	v	o	o	v	7
Painted Edgeline/Shoulder	v	v	o	•	•	•	1
Chicanes	•	o <sup>9,11</sup>	o <sup>9,11</sup>	*	o <sup>9,11</sup>	o <sup>9,11</sup>	
Alternating On-street Parking (no curb extensions)	o	o	o	o	o	o	7
Urban Design (Streetscaping)	•	•	•	•	•	•	
<b>Emerging Measures (Section 4.8)</b>							
Traffic Button/Punaise	o	o	v	o	o	v	5, 9, 10, 11, 15
Woonerven or “Living Streets”	o	o	x	o	o	x	3, 15
Shared Spaces	o	o	o	o	o	o	1, 9, 11, 15
Continuous Footways/Bikeways	•	x	x	o	x	x	2, 5, 11, 15
Speed Kidneys	o	o <sup>9</sup>	o <sup>9</sup>	o	o <sup>9</sup>	o <sup>9</sup>	11, 12, 15
Lane Narrowings	•	•	v	x	x	x	2, 4, 8, 15
Creative Pavement Markings	x	x	x	o	o	o	2, 12, 15
<b>Communication and Enforcement (Section 4.9)</b>							
Speed Display Device	v <sup>1</sup>	v <sup>1</sup>	v <sup>1</sup>	o	o	o	2, 4
Automated Speed Enforcement	x	x	x	v	v	v	2, 4
Educational Campaigns	o <sup>1</sup>	o <sup>1</sup>	o <sup>1</sup>	•	•	•	2
Information Signage	o <sup>1</sup>	o <sup>1</sup>	o <sup>1</sup>	•	•	•	2

SEE APPLICABILITY CONSIDERATION ENDNOTES ON NEXT PAGE

### Other Applicability Consideration Endnotes:

1. Should not be used in isolation for new/re-construction.
2. Potentially appropriate in school zones or adjacent to parks, in combination with other measures.
3. Generally applicable only in Design Priority Areas (Downtown Precincts, Traditional and Arterial Main streets, Mixed Use Centres, Village Core Areas; Community Cores), as well as Heritage Conservation Districts and Cultural Heritage Character Areas, considering the high life-cycle costs.
4. Generally not applicable to low-speed local residential street contexts.
5. Generally not applicable for curbless (rural cross-section) streets due to lack of roadside curb to define the outer lane edge, or due to rural drainage considerations.
6. Generally applicable only at intersection of local streets with Collectors or Arterials (not locals intersecting with locals).
7. Most applicable where on-street parking utilization is high, otherwise the unoccupied road space may lead to increased operating speeds.
8. Generally applicable only for a short section of street in a very specific context.
9. Should be utilized with other supporting measures to mitigate likelihood of incorrect use, undesirable vehicle movements or other undesirable effects.
10. May introduce pedestrian crossing exposure risks requiring careful design response.
11. Experience on Ottawa streets is lacking, can be considered for pilot project and evaluation.
12. Potential exceptional or unknown maintenance concerns requiring creative response or acknowledgment.
13. Supporting traffic studies required.
14. Vehicle access closures are more suitable for retrofits, consider on-street plazas instead for new/re-construction.
15. Requires special consideration to ensure accessibility objectives are met.
16. Textured surfaces are no longer recommended without General Manager's approval due to maintenance and operational issues and should not be implemented until a standard is developed.

## Appendix B: City of Ottawa 30 km/h Streets Design Toolbox – Tier Classification Table

<b>Tier Classification</b>	<b>Speed Management Measure</b>
<b><i>Intersection Measures (Section 4.4)</i></b>	
<b><i>Tier 1</i></b>	<ul style="list-style-type: none"> <li>• Raised intersections</li> <li>• Raised crossings</li> <li>• Mini-roundabouts</li> <li>• Corner tightenings</li> </ul>
<b><i>Tier 2</i></b>	<ul style="list-style-type: none"> <li>• Bulb-outs/curb extensions/neckdowns/narrowings/chokers (constructed)</li> <li>• Intersection channelizations (traffic management)</li> <li>• Raised median through intersections (traffic management)</li> <li>• Vehicle diverters (traffic management)</li> <li>• Right-In-Right-Out Islands (traffic management))</li> </ul>
<b><i>Tier 3</i></b>	<ul style="list-style-type: none"> <li>• Surface treatments - textured crossing</li> </ul>
<b><i>Gateway Measures (Section 4.5)</i></b>	
<b><i>Tier 1</i></b>	<ul style="list-style-type: none"> <li>• No gateway measures meet this classification</li> </ul>
<b><i>Tier 2</i></b>	<ul style="list-style-type: none"> <li>• Physical gateways</li> <li>• Vehicle directional closures (traffic management))</li> <li>• On-street plazas and vehicle access closures (traffic management))</li> </ul>
<b><i>Tier 3</i></b>	<ul style="list-style-type: none"> <li>• On-road messaging (pavement markings)</li> </ul>
<b><i>Mid-Block Measures (Section 4.6)</i></b>	
<b><i>Tier 1</i></b>	<ul style="list-style-type: none"> <li>• Speed humps and speed tables</li> <li>• Speed cushions</li> </ul>
<b><i>Tier 2</i></b>	<ul style="list-style-type: none"> <li>• Mid-block neckdowns/chokers/curb extensions (constructed)</li> <li>• Cycle friendly bulb-outs</li> <li>• Centre island narrowings</li> <li>• Vertical centerline treatments</li> <li>• Vertical edgeline treatments</li> </ul>

Tier Classification	Speed Management Measure
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>• Mid-block neckdowns/chokers/curb extensions (painted)</li> <li>• Painted centreline</li> <li>• Textured surfaces</li> </ul>
<b>Street Edge Measures (Section 4.7)</b>	
<i>Tier 1</i>	<ul style="list-style-type: none"> <li>• Chicanes</li> </ul>
<i>Tier 2</i>	<ul style="list-style-type: none"> <li>• On-street parking (on streets with high utilization)</li> <li>• Alternating on-street parking (no curb extension, on streets with high utilization)</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>• Painted edgeline/shoulder</li> <li>• Urban design (streetscaping)</li> <li>• On-street parking (on streets with low utilization)</li> <li>• Alternating on-street parking (no curb extension, on streets with low utilization)</li> </ul>
<b>Emerging Measures (Section 4.8)</b>	
<i>Tier 1</i>	<ul style="list-style-type: none"> <li>• Speed kidney</li> <li>• Continuous footways/bikeways</li> </ul>
<i>Tier 2</i>	<ul style="list-style-type: none"> <li>• Traffic button/punaise</li> <li>• Woonerven or “Living Streets”</li> <li>• Lane narrowings</li> <li>• Shared spaces</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>• Creative pavement markings</li> </ul>
<b>Communication and Enforcement (Section 4.9)</b>	
<i>Tier 1</i>	<ul style="list-style-type: none"> <li>• No communication and enforcement measures meet this classification</li> </ul>
<i>Tier 2</i>	<ul style="list-style-type: none"> <li>• Automated speed enforcement</li> <li>• Speed display device</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>• Educational campaigns</li> <li>• Information signage</li> </ul>