Appendix D
Policies

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Appendix D

Appendix D1: Complete Streets Guidelines

Appendix D2: Traffic Calming Policy

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Town of Innisfil - Complete Streets Guidelines

Town of Innisfil Transportation Master Plan Update

February 16, 2018

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1 Introduction

Streets have many different functions. Streets serve as essential links in our transportation network, provide valuable public space, and house other critical infrastructure like hydro lines. Streets are a vital part of livable and attractive communities.

This document outlines a new approach to designing streets in Innisfil – a "complete streets" approach, which considers these functions and strives to safely and comfortably accommodate all users. Complete streets are streets that are designed to be safe for all users, including people who walk, cycle, take transit, or drive, and people of all ages and abilities. This approach recognizes that not all streets play the same role and that there must be flexibility in how they are designed based on their context and their role in a community's transportation network.

COMPLETE STREETS FOR INNISFIL

Innisfil, Ontario is a community of 36,566 (2016 census) located approximately 100 kilometres north of Toronto on the shores of Lake Simcoe. The majority of land in Innisfil is agricultural, interspersed with several settlement areas. Alcona is the largest settlement area and the focus for future growth. The Town's draft Official Plan (OP), *Our Place*, emphasizes the desire to maintain Innisfil's rural character and small-town feel while providing a balance of urban amenities such as sidewalks, trails, bike lanes, and transit.

While this context poses unique challenges, the principles of Complete Streets can still be applied to Innisfil's roads. Sensitive and right-sized solutions, tailored to the Town's needs, can be developed. These solutions must function in and respond to the rural and small town context, make provisions for winter maintenance, and build upon existing standards, plans, and policies.

The recommendations contained within this document are informed by two overarching goals:

- To improve accessibility, safety, and comfort for all users on Innisfil's streets; and
- To support and enhance the role of streets as places within Innisfil's neighbourhoods.

1.1 Policy Context

This document is being prepared as part of the Town of Innisfil (Town) Transportation Master Plan (TMP) Update. The TMP Update aims to further the development of a multimodal, multipurpose transportation network that serves people of all ages and abilities. The Complete Streets Guidelines (Guidelines) support this aim, by integrating this vision into design of individual streets. The Guidelines will be accompanied by two other targeted policies: The Pedestrian Crossing Policy, and Traffic Calming Policy. The Guidelines are also informed by and align with the Town's draft OP, and the Town's Trails Master Plan. Proposed interventions are also applicable to the Town of Innisfil's Engineering Design Standards and Specifications Detailed Drawings.

INNISFIL DRAFT OFFICIAL PLAN, *OUR PLACE*

This document builds upon the draft OP objective to "provide for complete streets that are safe and comfortable for all users and accommodate the needs of all transportation modes – cars,

pedestrians, transit and cyclists". The Town's policy is to plan for complete streets in the following settlement areas:

- Alcona,
- Cookstown,
- Lefroy-Belle Ewart,
- Sandy Cove,
- Stroud,
- Churchill,
- Fennell's Corner, and
- Gilford.

The policy will also address trails and linkages that connect these communities.

Although not identified in the OP, the Guidelines also include recommendations for employment areas in order to promote walking and cycling during leisure time at work, pedestrian trips associated with potential future fixed-route transit, and recommendations for rural roads, in order to accommodate recreational and utilitarian walking and cycling.

To maintain consistency, the Guidelines also incorporate specific OP regulations pertaining to street design. The OP regulations are accompanied by alternative strategies that should be investigated for their ability to meet the overarching goals in a more cost effective, sustainable, or effective manner.

TOWN'S TRAILS MASTER PLAN

The Town of Innisfil Trails Master Plan acts as a guide for growing the Town's trail network.

Approximately 218 km of new pedestrian and cycling facilities are recommended for the ultimate active transportation network as shown in **Exhibit 1**. The network includes new multi-use paths, secondary paths, sidewalks, paved shoulders, shared roadways, and dedicated cycling lanes. The Plan also recommends that the Town incorporate complete streets principles when redeveloping or constructing new roads and that the OP develop complete street policies and design guidelines for each street type.

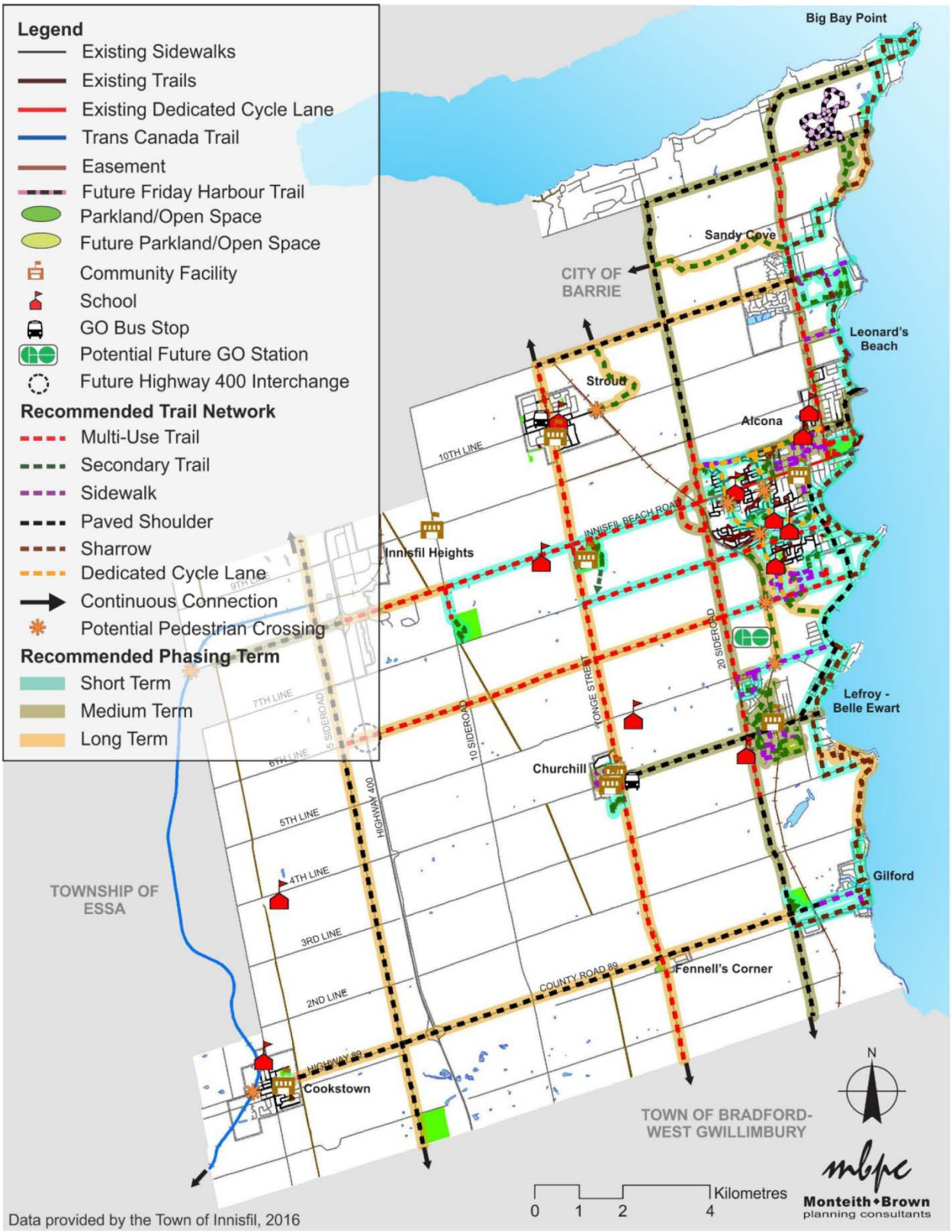


Exhibit 1**: Recommended Trails Network**
Source: Town of Innisfil Trails Master Plan, November 2016

2 Application

2.1 Who should use the guidelines?

The Guidelines are intended to be used by those who plan, design, build, and maintain streets.

2.2 When should they be used?

The Complete Streets Guidelines are intended to be a resource to be applied to all projects on Town roads, large and small. While larger projects, like the construction of new roads and major road reconstructions, offer opportunities to make significant changes, smaller projects, such as resurfacing or street-furniture replacement, can be more incrementally transformative.

2.3 How should they be used?

The Guidelines are broken down into three inter-related sections: street types (Section 3), design guidance (Section 4), and general considerations (Section 5).

Section 3 presents several street typologies tailored to Innisfil. These typologies were developed by examining a streets two most fundamental roles: movement and place making. The new street typologies reflect the relationship of surrounding development to the street, the land use context, and the primary purpose of the street – taking into account functional classifications. Innisfil's OP was a key resource for this process, used as a source for population and employment projections, land use designations (Schedule B), and the functional classification of the Town's transportation network (Schedule C).

Each street typology includes seven subsections:

1. ***Context:*** Describes the typical land-use and built form that these roads serve.
2. ***Primary Street Purpose(s):*** Describes the primary roles of the street, both as public space and a corridor for movement.
3. ***Potential cross-sections:*** Lists Town engineering cross sections that are typically found in this street typology. As these cross sections show current engineering standards, existing roads may differ. While the proposed interventions can be accommodated within Town cross sections, departing from the standard may offer benefits. For example, standard pavement width may be reduced to accommodate off-street bicycle facilities or a more generous public realm within the ROW. Curbs may be extended to provide a multi-use trail separated from the road with a buffer, which can be used for snow storage in the winter. Reducing pavement width may also reduce paving costs for the Town and assist in traffic calming.
4. ***Design Objectives*:** Outlines key objectives for new streets of this typology, or retrofits of existing streets. These should guide all design decisions.
5. ***Elements*:** Outlines the recommend elements for retrofits of existing streets of this type, or new streets. Elements are broken into four categories which allow for flexibility to respond to context and competing aims within limited rights-of-way (ROW). Multiple element options are provided, as there may be several ways of meeting the street's design objectives. The preferred option will be dependent on context and professional judgment.

- Basic: these elements are essential for this type of street, are often mandated by the OP, and should only be excluded with justification
- Enhanced Cycling and Enhanced Pedestrian: these elements are recommended to be included where justified by contextual conditions. Examples of circumstances where enhanced active elements should be integrated into the street design include: streets designated by the Trails Master Plan as cycling routes or near schools.
- Additional: these elements are recommended to be included in appropriate locations to provide additional amenity or functionality to the street

6. ***Existing Street Example*:** Provides examples of streets in Innisfil that fit into this typology based on their context and current or aspirational purpose. These examples represent various levels of "completeness".
7. ***Conceptual Applications:*** Illustrates conceptual applications of complete streets treatments of this typology using Town engineering cross sections and existing streets as a base. A variety of applications are illustrated, showing that there are multiple ways of meeting the typology design objectives.

Section 4 provides a more detailed description of how to design and arrange certain street elements. This section builds upon the Typologies section by providing additional guidance as to how complete-streets elements should be selected, designed, and assembled. This section is not intended to be a comprehensive guide to street design, but should be read in conjunction with other resources like Ontario Traffic Manual (OTM) Books 15 and 18.

Section 5 presents general recommendations for developing and maintaining a network of complete streets. This section includes recommendations on intersection design for complete streets, designing for four-season use, and a list of "quick-fixes" that can be applied on most street-types to improve the pedestrian and cycling realm.

The five steps to applying these Guidelines are illustrated in **Exhibit 2** and described in more detail below.

Exhibit 2: Steps for Applying the Complete Streets Guidelines

DEFINE PROJECT SCOPE

As these Guidelines are intended to be applied to all roadwork projects, the design team and relevant stakeholders first must establish a clear understanding of the project's scope and expectations of what it can achieve. Questions to answer include:

- What type of street project is this? Is it a large project like a new road or is it a smaller project like a road resurfacing? Different scales of projects offer different opportunities to make the street more complete.

- What is the geographic reach of the project? Is it a single block or a new subdivision? Is it an arterial or local road?
- How does the project fit within the larger transportation network? Complete streets projects should not be thought of in isolation. A project may offer the opportunity to fill gaps or extend networks. Conversely, a poorly planned project which suffers from poor connectivity may result in underused infrastructure.

IDENTIFY STREET TYPE

Based on surrounding land-use and built form and the existing or aspirational street purpose, identify which typology outlined in the following section best fits the street. The identified typology will help define design objectives, modal priorities, and potential elements for the project. As land-use and travel patterns change, so may the typology for a specific street. As such, typologies should not be viewed as static.

IDENTIFY ADDITIONAL CONTEXTUAL CONSIDERATIONS

After identifying the street's typology, review available information to create a thorough understanding of a street's function and context. This review will further establish design priorities and objectives, in particular:

- Which of the included element "options" is best for a specific segment.
- Where enhanced pedestrian or cycling infrastructure is needed.
- Where accommodations need to be made for commercial vehicles.
- Where conflicts may exist between different modes.
- Where constraints exist requiring trade-offs to be made between elements (e.g. limited ROW width).

This review should include, but is not limited to:

- Existing or planned street ROW widths and allocation of space
- Town policies and plans, such as the Official Plan and Trails Master Plan
- The past, present, and future characteristics of the place (e.g. natural heritage, cultural heritage and anticipated development)
- Identification of trip generators and destinations (e.g. schools, institutions, parks)
- A profile of street users, considering all times of the day, week, and year:
    - Current and future demographics
    - Current and future activities (e.g. sidewalk cafes)
    - Multimodal volumes, demand, and connectivity
- Accident locations
- Actual travel speeds
- Travel times
- Emergency services requirements
- Ongoing operations and maintenance
- Encroachment or easement agreements on street segment

SELECT ELEMENTS, EVALUATE, AND REFINE

Based on the results of the preceding three steps, select the elements to be included in the complete street. This stage will involve a degree of element customization (for example, width adjustments) to meet contextual requirements, guided by this document, the OP, the Town's Traffic Calming and Pedestrian Crossing Policies, OTM Books 15 and 18, and other best-practice recommendations.

When ROW widths are constrained and not all desired elements can be incorporated, focus should be on maintaining adequate space for higher-priority elements and modes. The elements and modes to prioritize are informed by the selected street typology and review of contextual conditions. Departing from Town engineering standards may also be considered as a solution.

If the context or ROW width varies, or if different elements will be implemented at different points on the street (e.g. curb bump-outs), cross-sections should be prepared for multiple locations.

Multiple stages of refinement may identify ways to better achieve project objectives or address project-specific constraints. These Guidelines allow for creative designs not identified in this document, as long as the overarching goals and typology design objectives are reached.

FINALIZE DESIGN

Designers should confirm that the project design meets the overall goals and objectives of the Complete Streets guidelines, the street purposes, and design objectives described in each typology, and any additional project-specific goals identified during step 3.

These Guidelines provide an overall approach to street design and are not a comprehensive design manual. They are meant to be used in conjunction with other plans and design resources, and rely on professional judgment.

3 Street Design Guidance - Typologies

3.1 Neighbourhood Residential Streets

CONTEXT

Neighbourhood Residential Streets are located within mature and developing residential land-use zones in settlement areas. The built form is primarily low- and medium-density single or multi-family homes interspersed with schools, parks, and other community facilities. Buildings are typically street oriented. Existing and many planned streets have a high frequency of residential driveway accesses.

PRIMARY STREET PURPOSE(S)

These streets are meant for local vehicle access and are not intended to provide a major role in town-wide vehicle movement. They may however function as links in town-wide active transportation networks, connected by multi-use paths and other dedicated infrastructure. They are often the setting for a range of gatherings and informal interactions, including yard sales and children playing. Future fixed-route transit service is unlikely to use these streets.

POTENTIAL CROSS-SECTIONS

Urban Local Road (TOI 201): 20m ROW, 8.5m Pavement

Window Street (TOI 202): 20m ROW, 8.5m Pavement

DESIGN OBJECTIVES

- Prioritize safety and connectivity for active modes. Streets should be comfortable for all ages and abilities to walk and bike
- Provide local vehicle access at slow speeds while deterring through-traffic. Design for 40 km/h or slower
- Provide on-street local vehicle parking
- Promote social interaction within the street
- Provide landscaping
- Provide opportunities for Low Impact Development (LID) measures within the street right-of-way where feasible

RECOMMENDED ELEMENTS

	Basic	Enhanced Cycling	Enhanced Pedestrian	Additional
Retrofit and New Road	-No centerline -On-street parallel parking -Sidewalk on one side of street -Street trees -Street lighting	-Bicycle boulevard treatments OR Multi-use trail	-Sidewalks on both sides of street OR sidewalk on one side and multi-use trail on other -Mid-block crossings -Curb extensions	-Pedestrian seating -Pedestrian-focused lighting -LID measures -Permeable pavement -Bicycle parking at activity nodes
Retrofit	-Maintain driveway access to private properties			-Traffic calming
New Road	-Discourage front driveway access to private properties. Provide access from rear lanes -Traffic calming			

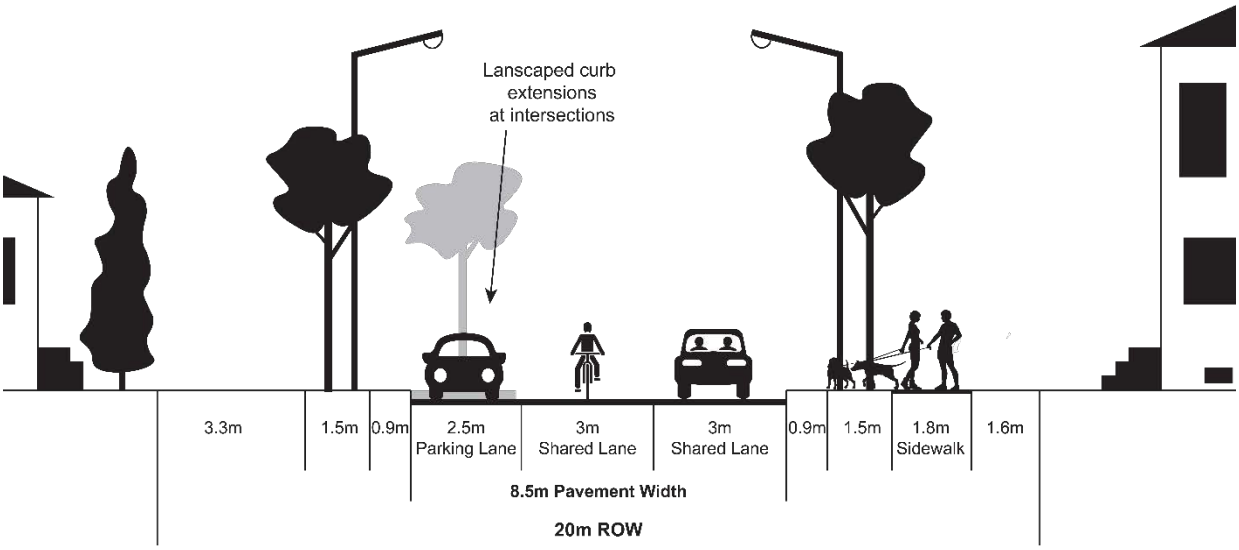
EXISTING STREET EXAMPLE – WESTMOUNT AVENUE, ALCONA

Image Source: Google Maps

CONCEPTUAL APPLICATION A – WESTMOUNT AVENUE RETROFIT, ALCONA

This conceptual application illustrates a Neighbourhood Residential Street retrofitted with enhanced cycling and pedestrian elements.

CONCEPTUAL APPLICATION B – NEW ROAD



This conceptual application illustrates a new Neighbourhood Residential Street including the basic recommended elements and curb extensions, which contribute to a lower design speed.

3.2 Neighbourhood Residential Streets – Rural Cross Section

Neighbourhood Residential Streets – Rural Cross Section are similar in context and purpose to other neighbourhood residential streets, but were built to a rural design standard several decades ago. These roads are characterized by unpaved shoulders, ditches, and no sidewalks.

These roads demand a unique complete streets approach for two reasons:

- Rebuilding them to full urban standards in all cases would be costly and disruptive
- The current layout has aesthetic merit and is characteristic of Innisfil's rural heritage.

These recommendations may be short- or long-term solutions, depending on the context.

POTENTIAL CROSS-SECTIONS

Rural Local Road (207): 20m ROW, 7m Pavement Width

DESIGN OBJECTIVES

- Prioritize safety and connectivity for active modes. Streets should be comfortable for all ages and abilities to walk and bike
- Provide local vehicle access at slow speeds while deterring through-traffic. Design for 40 km/h or slower
- Promote social interaction within the street
- Provide landscaping
- Provide opportunities for LID measures where feasible

RECOMMENDED ELEMENTS

	Basic	Enhanced Cycling	Enhanced Pedestrian	Additional
Retrofit	-No centerline -Paved shoulders for active modes. Shoulders may be painted for increased visibility -Street trees -Street lighting -Maintain driveway access to private properties	-Bicycle boulevard treatments or multi use trail	-Mid-block crossings -Multi use trail	-Pedestrian seating -Pedestrian-focused lighting -LID measures -Permeable pavement -Bicycle parking at activity nodes -Traffic calming

EXISTING STREET EXAMPLE – SAINT PAUL ROAD, ALCONA

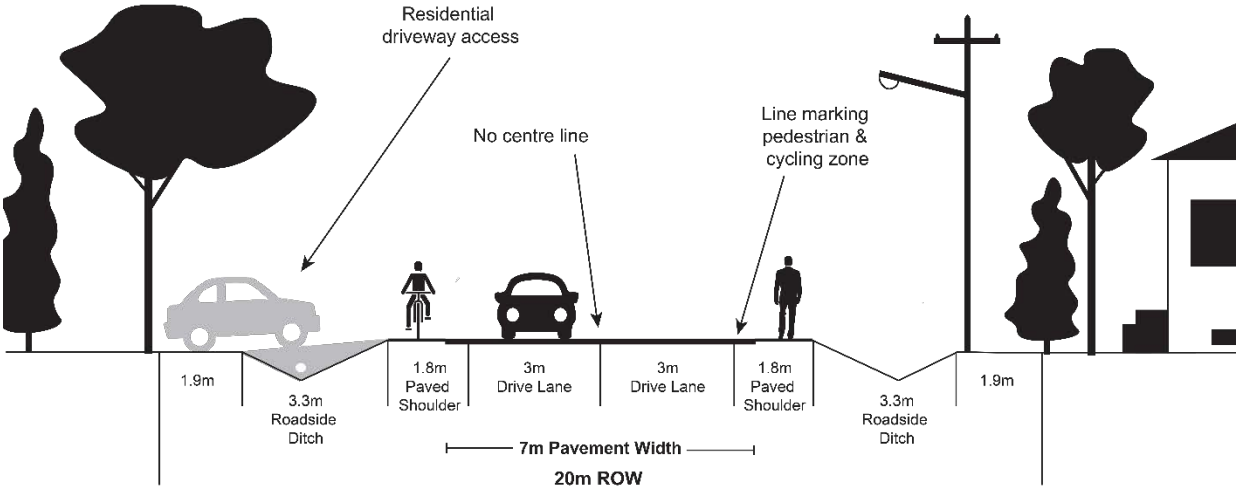
Image Source: Google Maps

CONCEPTUAL APPLICATION A – RETROFIT

This conceptual application illustrates a retrofit of a Neighbourhood Residential Street-Rural Cross Section to include the basic recommended elements. This additional paved shoulder

width (beyond the 7m pavement width specified in the Town Engineering Standards) does not require substructure as it is not meant for vehicle travel.

CONCEPTUAL APPLICATION B – RETROFIT



This conceptual application illustrates a retrofit of a Neighbourhood Residential Street-Rural Cross Section to include the basic recommended elements. This additional paved shoulder width (beyond the 7m pavement width specified in the Town Engineering Standards) does not require substructure as it is not meant for vehicle travel.

3.3 Neighbourhood Connector Streets

CONTEXT

Neighbourhood Connector Streets are located within mature and developing residential land-use zones in settlement areas. Adjacent built form is primarily low-density single or multi-family homes interspersed with schools, parks, churches, and neighbourhood-serving commercial areas. Buildings are typically street oriented. Existing and many planned streets have a high frequency of residential driveway accesses.

PRIMARY STREET PURPOSE(S)

These streets serve the dual functions of providing local access and connecting neighbourhoods. They may accommodate future fixed-route transit service.

POTENTIAL CROSS-SECTIONS

Urban Minor Collector Road (TOI 203): 26m ROW, 12m Pavement Width

Urban Major Collector Road (TOI 204): 26m ROW, 14m Pavement Width

DESIGN OBJECTIVES

- Prioritize safety and connectivity for active modes. Streets should be comfortable for all ages and abilities to walk and bike
- Facilitate movement between destinations by all modes
- Provide on-street local vehicle parking

- Provide landscaping
- Provide opportunities for LID measures

NOTE

Existing rural roads within settlement areas may be upgraded using these guidelines.

RECOMMENDED ELEMENTS

	Basic	Enhanced Cycling	Enhanced Pedestrian	Additional
Retrofit and New Road	-Speed limit: 40 – 50 km/h -Sidewalks and on-street bicycle lanes on both sides of street OR sidewalk on one side of street and multi-use trail on other -Street trees -Street lighting -Adequate ROW and roadbed width to accommodate potential fixed-route transit -Landscaped buffer strip between sidewalk and road	-Multi-use trail or physically protected, separated, or buffered bicycle lanes	-Mid-block crossings -Curb extensions	-Special-use parking -Bicycle parking at activity nodes -Seating -LID measures -Pedestrian-focused lighting -Permeable pavement -Vehicle step out zone
Retrofit	-Maintain driveway access to private properties			-On-street parallel parking -Traffic calming
New Road	-On-street parallel parking -Discourage front driveway access to private properties. Provide access from rear lanes (preferred) or from window streets. -Traffic calming			

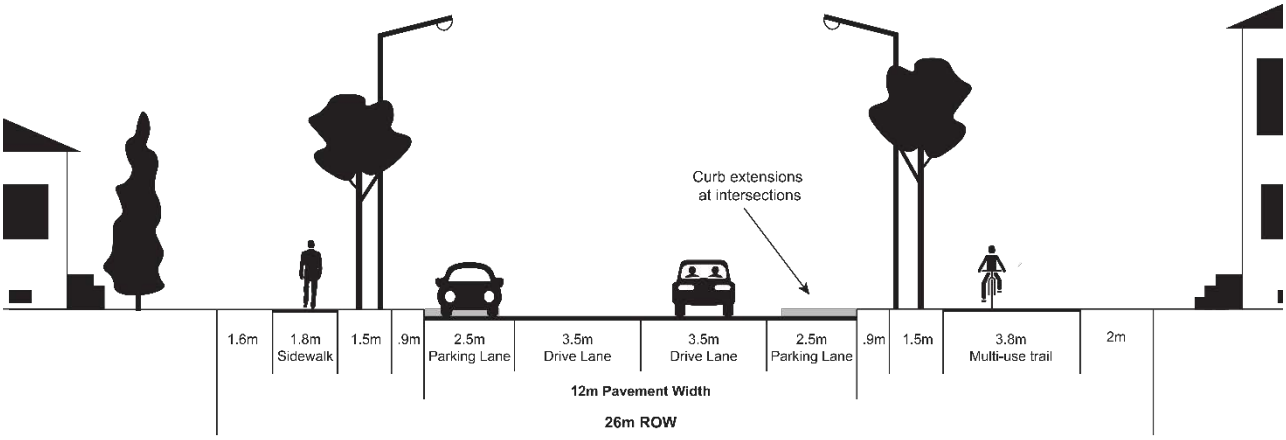
EXISTING STREET EXAMPLE – WEBSTER BOULEVARD, ALCONA

Image Source: Google Maps

CONCEPTUAL APPLICATION A – WEBSTER BOULEVARD RETROFIT, ALCONA

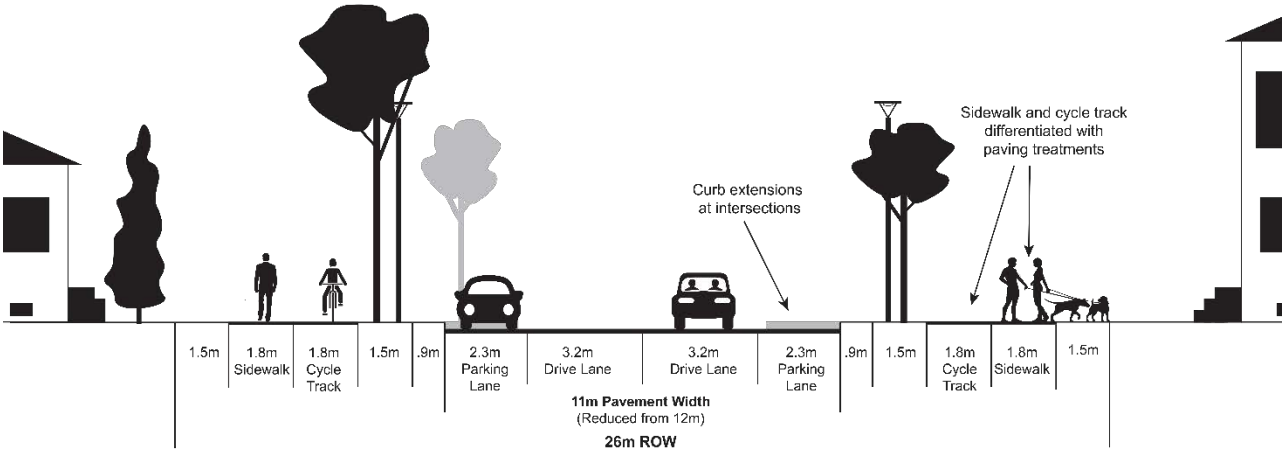
This conceptual application illustrates an existing Neighbourhood Connector Street retrofitted with the basic recommended elements, protected bike lanes, an enhanced cycling element, and on-street parking, an additional element.

CONCEPTUAL APPLICATION B – NEW ROAD



This Conceptual Application illustrates a new Neighbourhood Connector Street including basic recommended elements plus a multi-use trail, on-street parking, and curb extensions.

CONCEPTUAL APPLICATION C– NEW ROAD, REDUCED PAVEMENT WIDTH



This conceptual application illustrates a potential new Neighbourhood Connector Street with its width reduced from the Town engineering standard. This design demonstrates that a reduced pavement width can comfortably accommodate vehicle through traffic and parking and includes off-road cycle tracks and curb extensions.

3.4 Neighbourhood Collector Streets – Rural Cross Section

Neighbourhood Collector Streets – Rural Cross Section are similar in context and purpose to other neighbourhood residential streets, however were built to a rural design standard several decades ago. These roads are characterized by unpaved shoulders, ditches, and no sidewalks.

These roads demand a unique complete streets approach for two reasons:

- Rebuilding them to full urban standards in all cases would be costly and disruptive
- The current layout has aesthetic merit and is characteristic of Innisfil's rural heritage.

The recommendations contained here may be short- or long-term solutions, depending on the context.

POTENTIAL CROSS-SECTIONS

Rural Local Road (207): 20m ROW, 7m Pavement Width

DESIGN OBJECTIVES

- Prioritize safety and connectivity for active modes. Streets should be comfortable for all ages and abilities to walk and bike
- Facilitate movement between destinations by all modes
- Provide landscaping and opportunities for LID measures

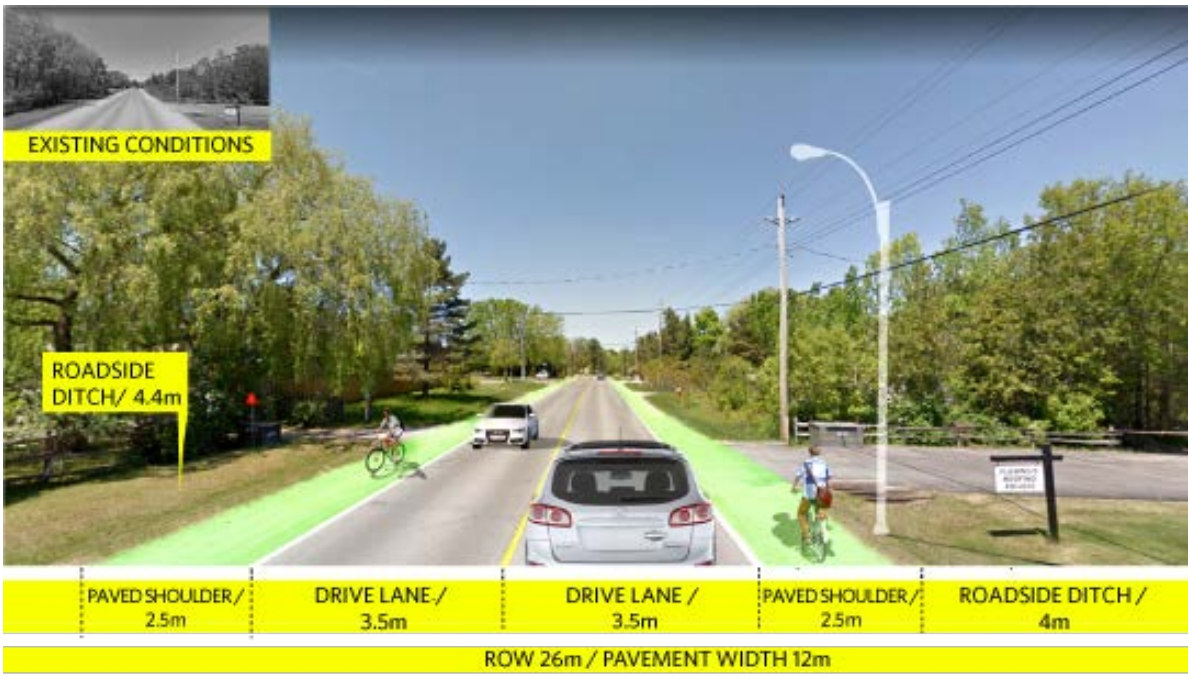
RECOMMENDED ELEMENTS

	Basic	Enhanced	Enhanced	Additional
Retrofit	-Speed limit: 40 – 50 km/h -Paved shoulders for active modes. Shoulders may be painted for increased visibility -Street trees -Street lighting -Adequate ROW and roadbed width to accommodate potential fixed-route transit -Maintain driveway access to private properties	- Multi use trail	-Multi use trail	-Bicycle parking at activity nodes -Seating -LID measures -Pedestrian-focused lighting -Permeable pavement -Traffic calming

EXISTING STREET EXAMPLE – SAINT JOHNS ROAD, ALCONA

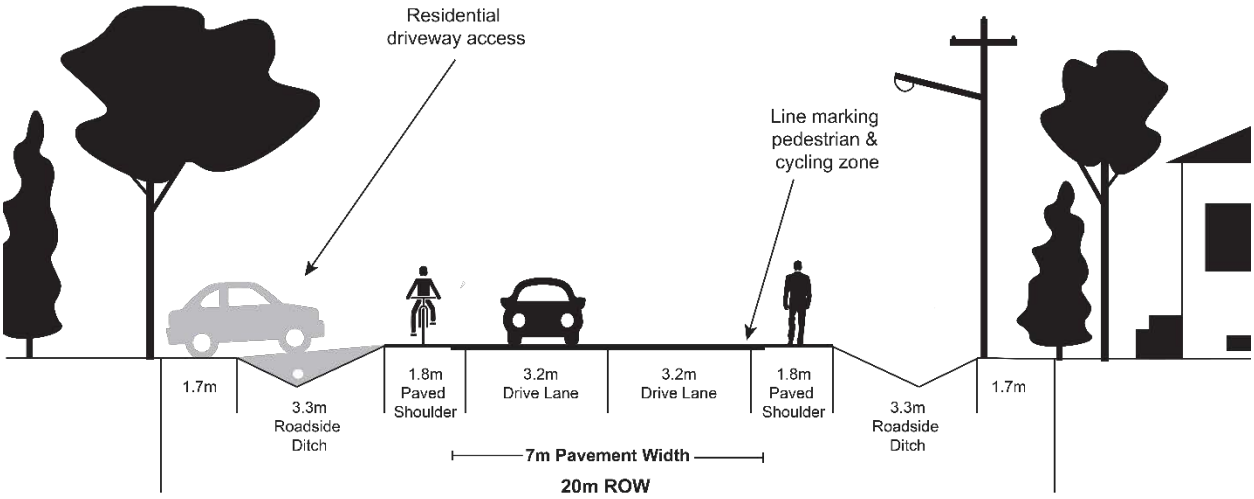
Image source: Google maps

CONCEPTUAL APPLICATION A – SAINT JOHNS ROAD RETROFIT, ALCONA



This conceptual application illustrates a retrofit of a Neighbourhood Connector Street-Rural Cross Section to include the basic recommended elements. This additional paved shoulder width (beyond the 7m pavement width specified in the Town Engineering Standards) does not require substructure as it is not meant for vehicle travel. While this conceptual application shows the entire length of the shoulder painted green, marking only conflict points (e.g. driveways) would also be acceptable.

CONCEPTUAL APPLICATION B – RETROFIT



This conceptual application illustrates a retrofit of a Neighbourhood Connector Street-Rural Cross Section to include the basic recommended elements. This application is similar to the previous application, but with a slightly narrower vehicle pavement width, which reduces the

additional paving required for the designated cycling and pedestrian shoulders. The additional paved shoulder width (beyond the 7m pavement width specified in the Town Engineering Standards) does not require substructure as it is not meant for vehicle travel.

3.5 Downtown Commercial Streets

CONTEXT

Downtown Commercial Streets are generally located in the core of a settlement area, in an area that functions as a retail and civic destination at a neighbourhood and town scale. They are characterized primarily by a mixed land use context incorporating both residential and commercial uses. The built form is made up of low and mid-rise buildings that are generally street oriented. Many buildings have historical and architectural significance.

PRIMARY STREET PURPOSE(S)

These streets are destinations in their own right, but often also function as links for significant volumes of vehicle and active traffic, and potentially fixed-route transit in the future. They provide access to adjacent residential, social, commercial, and civic uses and should be designed to accommodate growth. These diverse needs need to be balanced within typically limited ROW widths.

POTENTIAL CROSS-SECTIONS

Urban Major Collector Road (TOI 204): 26m ROW, 14m Pavement Width

Urban Arterial Road (TOI 205): 30m ROW, 14m Pavement Width

DESIGN OBJECTIVES

- Facilitate movement between destinations by all modes
    - Prioritize safety and connectivity for active modes. Streets should be comfortable for all ages and abilities to walk and bike
    - Provide vehicle access at slow speeds
    - Provide on-street local vehicle parking
    - Accommodate truck traffic where necessary
    - Provide safe and frequent opportunities for pedestrians to cross the street
    - Encourage a continuous cycling and pedestrian realm by locating vehicle access on side streets and rear lanes
- Provide high-quality and distinct landscaping
- Provide opportunities for LID measures
- Provide wide sidewalk and boulevard space
- Accommodate social uses within and adjacent to the road ROW (ex. patios)
- Respect and enhance local identity and history
- Design should consider potential for future fixed-route transit service

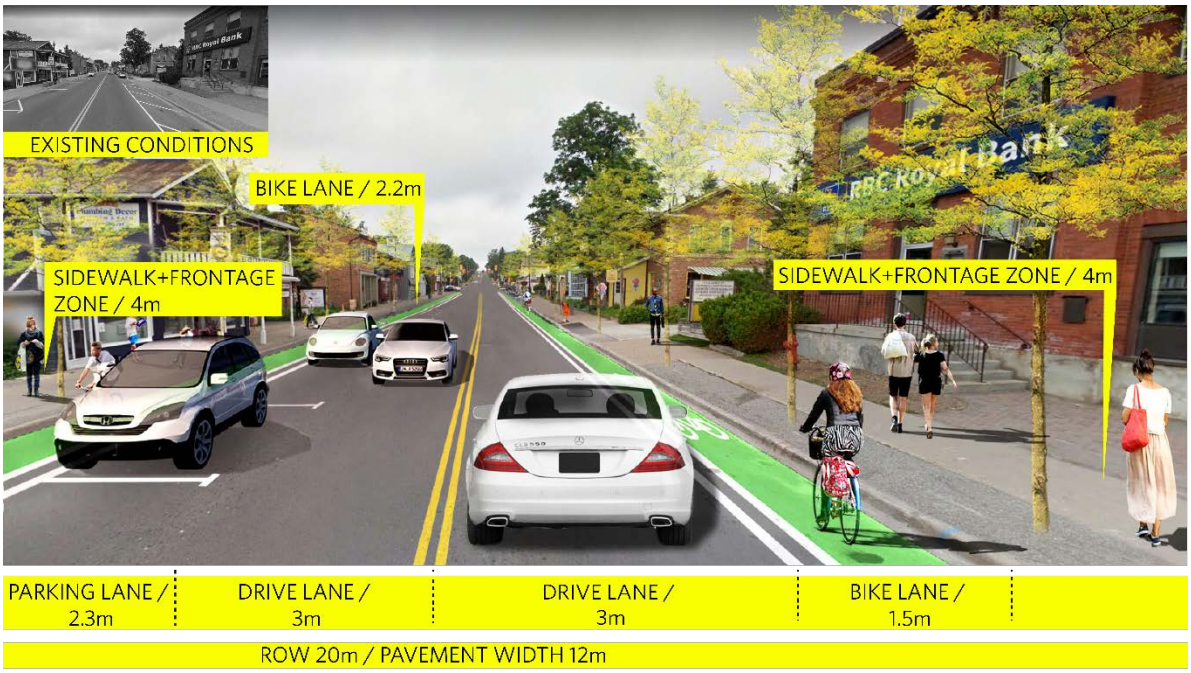
RECOMMENDED ELEMENTS

	Basic	Enhanced Cycling	Enhanced Pedestrian	Additional
Retrofit and New Road	-Speed limit: 40 – 50 km/h -On-street parallel parking -Special-use parking -Sidewalks and on-street bicycle lanes on both sides of street - Hard landscaped buffer strip between sidewalk and road incorporating vehicle step out -Bicycle parking -Street trees -Seating -Pedestrian-focused street lighting -Adequate ROW and roadbed width to accommodate potential fixed-route transit	-Physically protected, separated, or buffered bicycle lanes	-Mid-block crossings -Curb extensions -Wayfinding -Public art -Decorative paving	-LID measures -Permeable pavement -E-vehicle charging stations -Angled parking -Flex space -Sidewalk café space -Consider larger turning radii only where truck traffic is significant
Retrofit	-Maintain existing driveway access to private properties only where necessary. No new front driveway, lane, or aisle accesses.			-Traffic calming
New	-No front access to private properties. Provide access from rear lanes or side streets -Traffic calming			

EXISTING STREET EXAMPLE – QUEEN STREET, COOKSTOWN

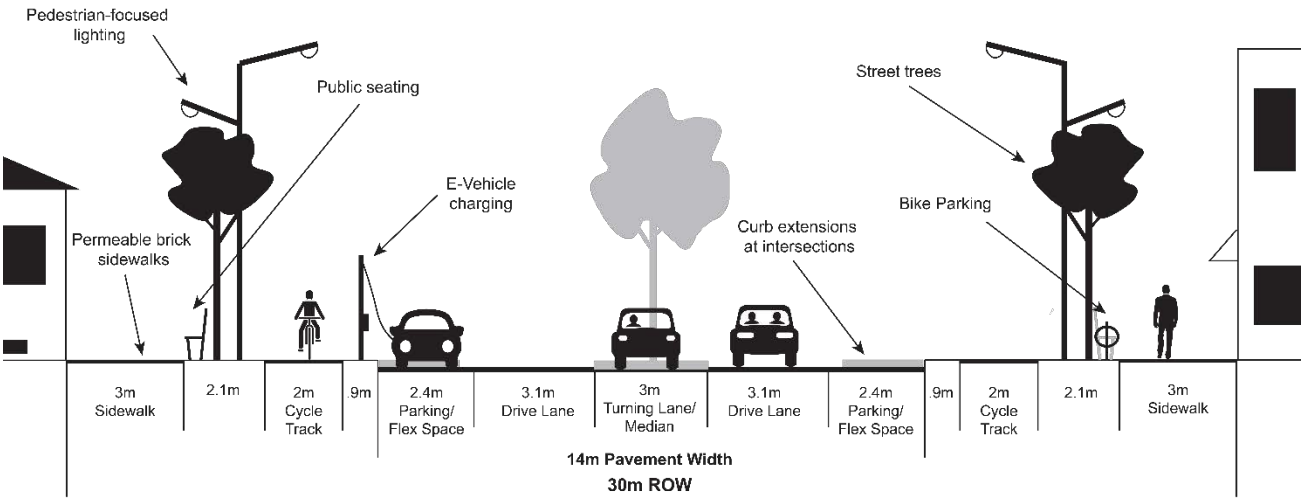
Image source: Google maps

CONCEPTUAL APPLICATION A – QUEEN STREET RETROFIT, COOKSTOWN



This conceptual application illustrates a potential retrofit of Queen Street in Cookstown to include enhanced bicycle infrastructure while maintaining on-street parking. This design includes an ample pedestrian realm with space for basic elements such as bicycle parking and pedestrian seating and additional elements like sidewalk cafes.

CONCEPTUAL APPLICATION B – RETROFIT OR NEW ROAD



This conceptual application illustrates a potential retrofit of a street such as Innisfil Beach Road in Alcona or a new Downtown Commercial Street. This design incorporates the basic recommended elements, enhanced cycling and pedestrian elements such as cycle tracks and decorative paving, and additional elements such as E-vehicle charging and permeable paving.

3.6 Urban Thoroughfare

CONTEXT

Urban Thoroughfare Streets are located within mature and developing residential land-use zones in settlement areas. The built form is characterized by low- and medium-density single or multi-family homes interspersed with schools, parks, other community facilities, and auto-oriented commercial uses. Uses are typically oriented away from the street.

PRIMARY STREET PURPOSE(S)

These streets provide links between neighbourhoods and place higher priority on vehicle movements. Direct access to adjacent uses from these streets is infrequent and limited to auto-oriented commercial uses. They may accommodate future fixed-route transit service.

POTENTIAL CROSS-SECTIONS

Urban Major Collector Road (204): 26m ROW, 14m Pavement Width

Urban Arterial Road (205): 30m ROW, 14m Pavement Width

DESIGN OBJECTIVES

- Facilitate movement between destinations by all modes
- Prioritize safety and connectivity for active modes. Streets should be comfortable for all ages and abilities to walk and bike
- Provide landscaping
- Provide opportunities for LID measures
- Design for potential future fixed-route transit service

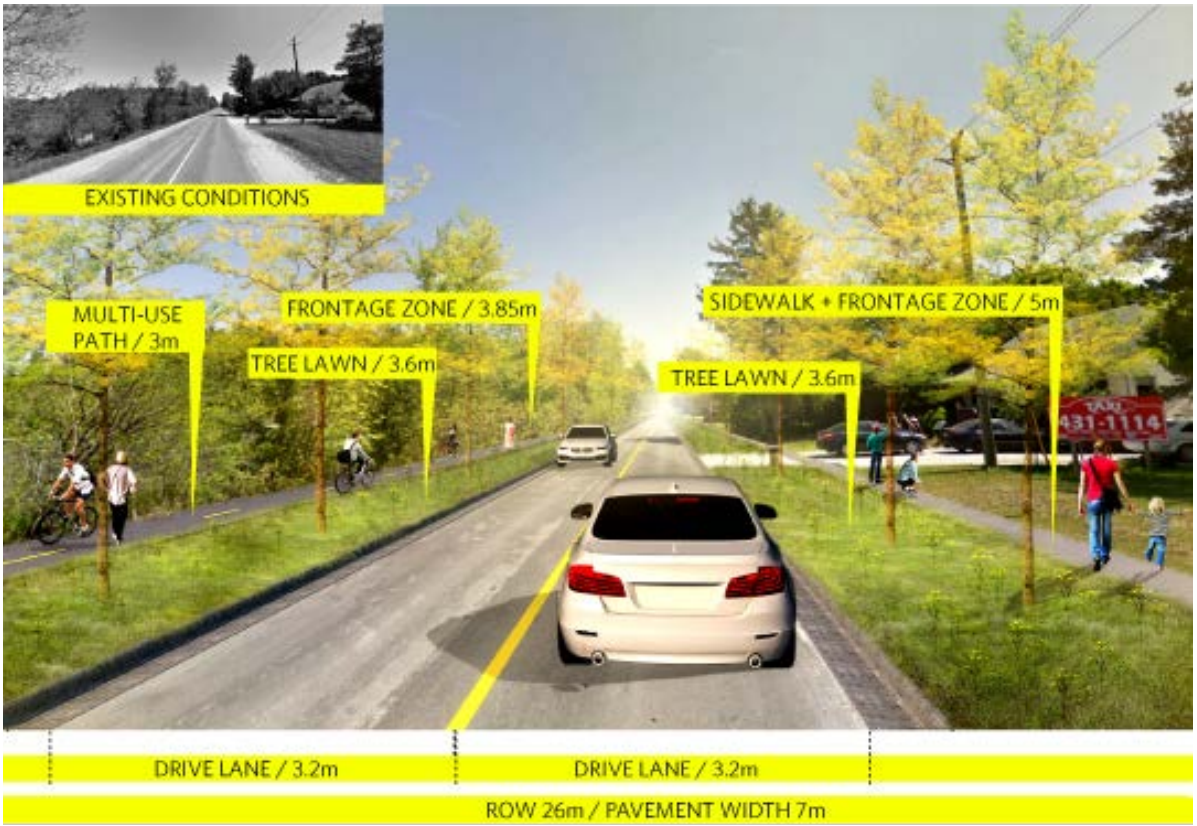
RECOMMENDED ELEMENTS

	Basic	Enhanced Cycling	Enhanced Pedestrian	Additional
Retrofit and New Road	-Speed limit: 50 km/h -Sidewalks and on-street bicycle lanes on both sides of street OR sidewalk on one side of street and multi-use trail on other (preferred) -Street trees -Street lighting -Adequate ROW and roadbed width to accommodate potential fixed-route transit -Landscaped buffer strip between sidewalk and road -Left turn lanes	-Multi use trail or physically protected, separated, or buffered bicycle lanes	-N/A	-LID measures -Pedestrian-focused lighting -Permeable pavement -Truck turning corner radii where necessary

EXISTING STREET EXAMPLE – INNISFIL BEACH ROAD (NEAR 20TH SIDEROAD), ALCONA

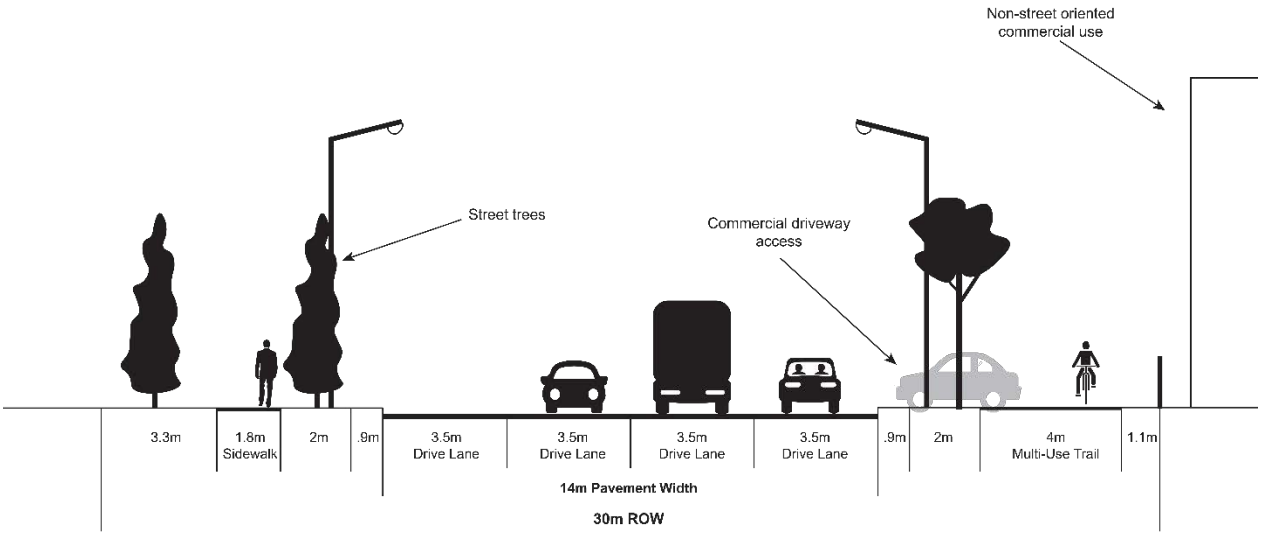
Image source: Google maps

CONCEPTUAL APPLICATION A – RETROFIT



This conceptual application illustrates a potential retrofit to an existing Urban Thoroughfare. This design incorporates the basic recommended elements and a multi-use trail, an enhanced cycling facility.

CONCEPTUAL APPLICATION B – NEW ROAD



This conceptual application illustrates a potential design for a new Urban Thoroughfare. This design incorporates the basic recommended elements and a multi-use trail.

3.7 Industrial / Employment Streets

CONTEXT

Industrial / Employment Streets are located in Mixed Commercial and Employment Areas outside of settlement areas, specifically in Innisfil Heights. Uses in this area include manufacturing, warehousing, assembly, storage, and research facilities that depend on access to Highway 400. Major retail and residential uses are not permitted in this area.

PRIMARY STREET PURPOSE(S)

These streets provide access for employees to their place of work and link businesses to the regional road transportation system. They primarily serve vehicular traffic, including trucks, but this is not the only possible mode of access. These streets should still be designed to accommodate safe and efficient walking and cycling movements.

POTENTIAL CROSS-SECTIONS

Urban Local Road (TOI 201): 20m ROW, 8.5m Pavement Width

Urban Industrial Road (TOI 206): 26m ROW, 10m Pavement Width

Rural Industrial Road (TOI 208): 26m ROW, 8m Pavement Width

DESIGN OBJECTIVES

- Facilitate safe movement between destinations by all modes
- Allow for the safe and efficient movement of commercial vehicles.

- Provide landscaping
- Provide opportunities for LID measures
- Design for potential future fixed-route transit service

RECOMMENDED ELEMENTS

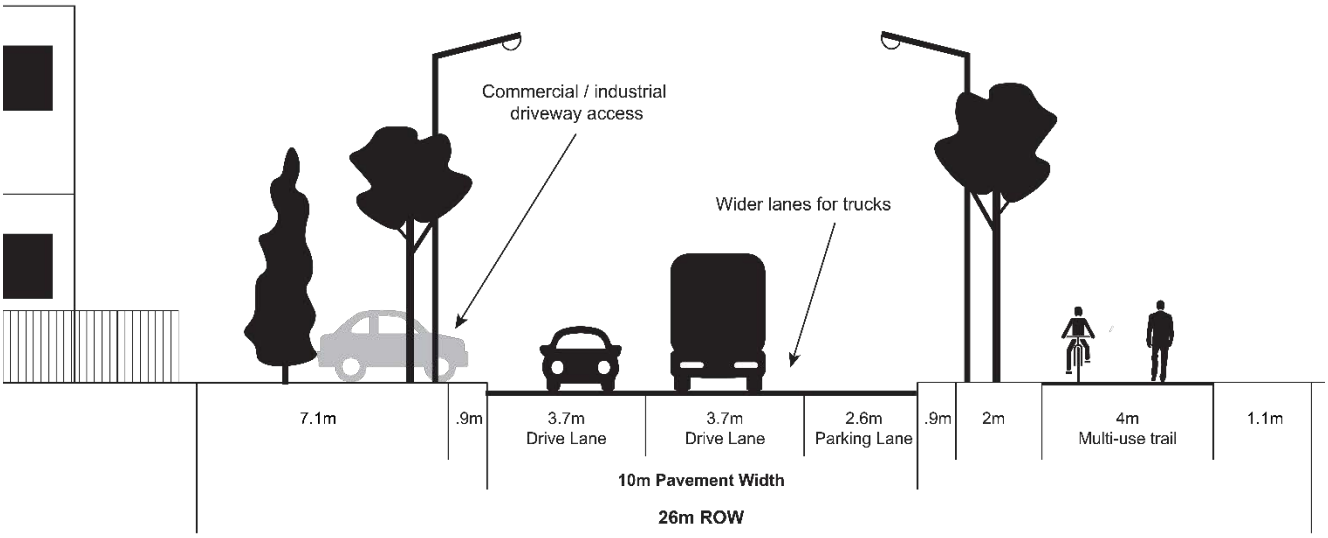
	Basic	Enhanced Cycling	Enhanced Pedestrian	Additional
Retrofit and New Road	-Speed limit: 50-60 km/h -Sidewalk or multi-use trail on one side of street -Street trees -Street lighting -Adequate ROW and roadbed width to accommodate potential fixed-route transit -Landscaped buffer strip between sidewalk and road -Truck turning corner radii	-Multi-use trail	-Sidewalk on both sides of street	-LID measures -Pedestrian-focused lighting -Permeable pavement -On-street parallel parking

EXISTING STREET EXAMPLE – BOWMAN STREET, INNISFIL HEIGHTS

Image source: Google maps

This conceptual application illustrates a retrofit of an Industrial / Employment Street to include the basic recommended elements.

CONCEPTUAL APPLICATION B – NEW ROAD



This conceptual application illustrates a potential design for a new Industrial / Employment Street to include the basic recommended elements as well as on-street parking within the dimensions prescribed by the Town engineering standards.

3.8 Rural Streets

CONTEXT

Rural Streets are usually located next to agricultural land, open spaces, and environmental areas outside of settlement areas. They may also serve occasional low-density residential, commercial, and industrial uses.

PRIMARY STREET PURPOSE(S)

These streets are primarily used as corridors for longer distance travel and to access settlement areas, but also provide direct local access to adjacent uses. They primarily serve vehicular traffic, including trucks and farm equipment, but also accommodate active modes, most notably recreational cyclists. Fewer pedestrians use rural roads than urban. These streets may accommodate future fixed-route transit service.

POTENTIAL CROSS-SECTIONS

Rural Local Road (207): 20m ROW, 7m Pavement Width

DESIGN OBJECTIVES

- Facilitate safe movement between destinations by all modes
- Accommodate farm equipment movements
- Allow for the safe and efficient movement of commercial vehicles
- Design for potential future fixed-route transit service

EXAMPLE

- 5th Line (outside of Settlement Areas)

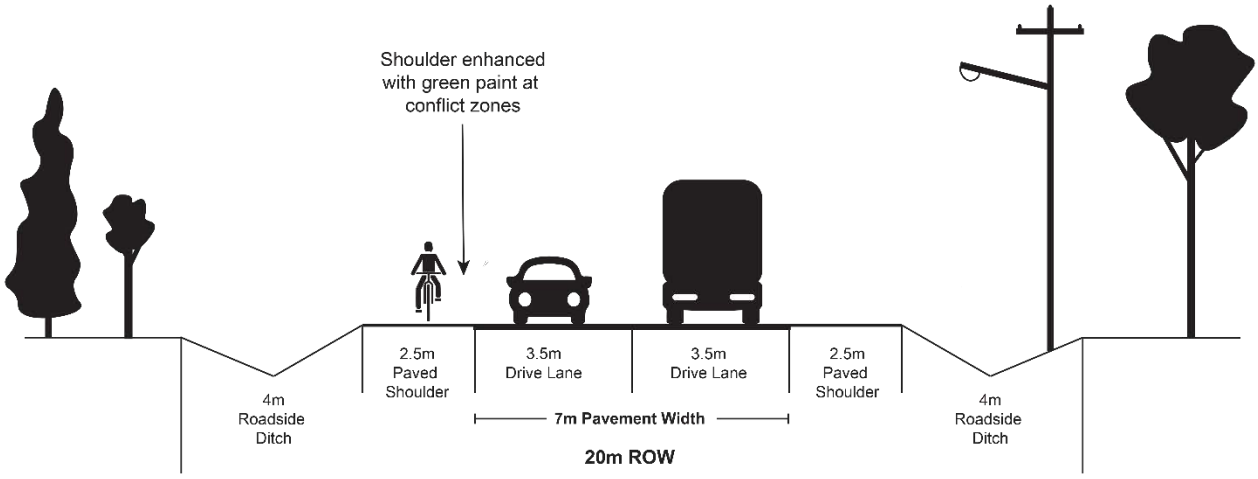
RECOMMENDED ELEMENTS

	Basic	Enhanced Cycling	Enhanced Pedestrian	Additional
Retrofit and New Road	-Speed limit: 50-80 km/h -Street lighting -Adequate ROW and roadbed width to accommodate potential fixed-route transit -Truck turning corner radii -Paved shoulders for active modes. Shoulders may be painted for increased visibility	-Multi-use trail	-Multi-use trail	-Street lighting

EXISTING STREET EXAMPLE – 5TH LINE

Image source: Google maps

CONCEPTUAL APPLICATION – NEW ROAD OR RETROFIT



This conceptual application illustrates a retrofit of a Rural Street to include the basic recommended elements. This additional paved shoulder width (beyond the 7m pavement width specified in the Town Engineering Standards) does not require substructure as it is not meant for vehicle travel.

4 Street Design Guidance – Designing and Assembling Elements

This section provides additional guidance for the design and application of several elements recommended in the previous section.

4.1 Sidewalks

Sidewalks provide a safe and accessible environment for pedestrians. They should be provided on at least one side of all streets in urban settings, and on both sides of the street on Neighbourhood Connector Streets, Downtown Commercial Streets, and Urban Thoroughfares.

Sidewalks must be at least 1.5m wide in all cases, but designers should strive for a minimum width of 1.8m for improved accessibility. Wider sidewalks should be considered in areas where enhanced pedestrian facilities are warranted, especially on Downtown Commercial streets.

In certain contexts, including on Neighbourhood Residential Streets-Rural Cross Section, Neighbourhood Connector Streets, Neighbourhood Connector Streets-Rural Cross Section, Urban Thoroughfares, and Industrial/Employment Streets, a sidewalk on one side of the street may be replaced with a multi-use path.

4.2 Vehicle Step Out

A vehicle step out zone provides a dedicated paved area for people entering or exiting a vehicle and is recommended where there is on-street parking, particularly at activity nodes. This may be part of a paved boulevard. Step outs should be at least 0.75 m wide.

Exhibit 3: Vehicle Step Out Zone
Image Source: City of Denver

4.3 Wayfinding

Wayfinding signage provides an opportunity to showcase neighbourhood identity and encourage walking and cycling. Signage should include multi-modal directional information to local destinations. Wayfinding signage is most useful on Downtown Commercial Streets, and near major destinations and tourist attractions.

4.4 Public Seating

Public seating can be placed on any street type near pedestrian trip generators. It should also be considered for the length of streets that are likely to attract higher volumes of pedestrian traffic like Downtown Commercial Streets.

4.5 Traffic Calming

Traffic Calming is defined by the Institute of Transportation Engineers (ITE) Subcommittee on Traffic Calming, 1997, as "… The combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour and improve conditions for non-motorized street users." Traffic calming measures can be applied on Neighbourhood Residential, Neighbourhood Connector, and Downtown Commercial streets to help make streets safer and more attractive for all users.

Traffic calming measures should be considered for the design of all new roads to help achieve the desired design speed, and where warranted on existing roads, as prescribed by the Town of Innisfil Traffic Calming Policy. Refer to the Traffic Calming Policy for the process for implementing traffic calming measures on existing streets and the types of traffic calming measures recommended for Innisfil.

4.6 Paved Shoulders

Paved shoulders can be shared between pedestrians and cyclists. Paved shoulders should be in the same direction as the adjacent outside travel lane and be designated by road signs and pavement markings to ensure the visibility of the facility. Additional visibility may be provided by Bike Route signage and green paint along the route, as demonstrated in the Town's St. Johns Road Pilot Project, or at conflict points.

The Town's desired width for paved shoulders that are intended to be active transportation facilities is 3m. The minimum width is 2.0m, except in constrained situations with speed limits lower or equal to 60 km/h, where the minimum width can be reduced to 1.5m.

4.7 Bicycle Facilities

For most road types, at least two different bike facility options are presented. Recommended facilities are informed by the Innisfil OP, Trails Master Plan, OTM Book 18, and other best practice guides.

Determining what specific type of facility should be implemented is a decision that needs to be made during the design stage, considering the following:

- Routes demarcated in the Trails Master Plan
- Proximity and connections to major trip generators
- Network connectivity
- Use of street by vulnerable road users
- Accident data
- Emergency services requirements
- Ongoing operations and maintenance

- Existing and future bicycle volumes
- Annual Average Daily Traffic (AADT)
- Actual vehicular travel speeds
- Existing and planned ROW widths

This information should be considered along with OTM Book 18, *Cycling Facilities*, which provides guidance in determining the preferred cycling facility suited for the road corridor. **Exhibit 4** illustrates the graph used to select the desired cycling facility and is based on vehicular travel speeds and Annual Average Daily Traffic (AADT) volumes. Implementing lower-order facilities than recommended by OTM Book 18 should be avoided, but implementing higher-order facilities is encouraged if warranted based on the factors previously identified.

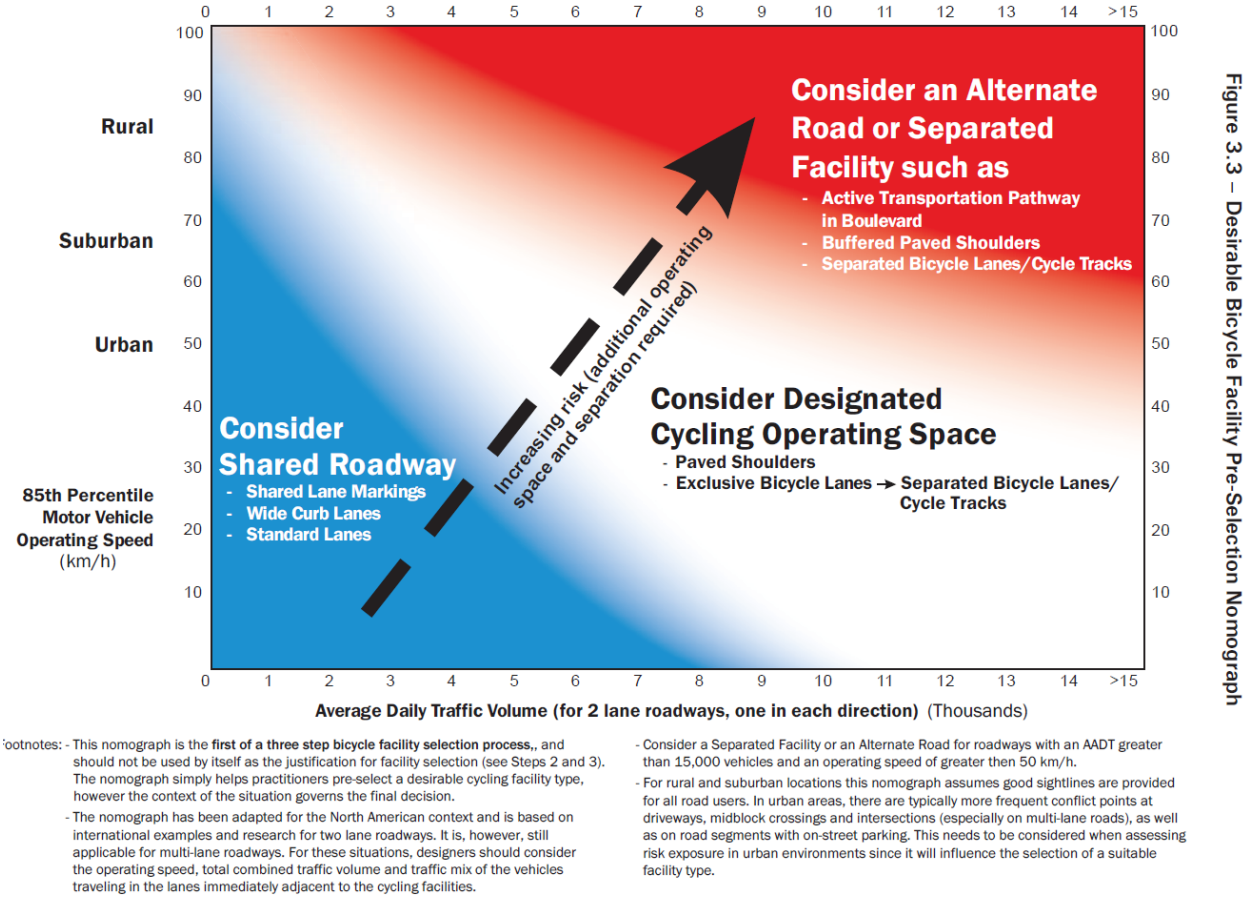


Figure 3.3 – Desirable Bicycle Facility Pre-Selection Nomograph

Footnotes:
- This nomograph is the **first of a three step bicycle facility selection process,**, and should not be used by itself as the justification for facility selection (see Steps 2 and 3). The nomograph simply helps practitioners pre-select a desirable cycling facility type, however the context of the situation governs the final decision.
- The nomograph has been adapted for the North American context and is based on international examples and research for two lane roadways. It is, however, still applicable for multi-lane roadways. For these situations, designers should consider the operating speed, total combined traffic volume and traffic mix of the vehicles traveling in the lanes immediately adjacent to the cycling facilities.
- Consider a Separated Facility or an Alternate Road for roadways with an AADT greater than 15,000 vehicles and an operating speed of greater then 50 km/h.
- For rural and suburban locations this nomograph assumes good sightlines are provided for all road users. In urban areas, there are typically more frequent conflict points at driveways, midblock crossings and intersections (especially on multi-lane roads), as well as on road segments with on-street parking. This needs to be considered when assessing risk exposure in urban environments since it will influence the selection of a suitable facility type.

Exhibit 4: OTM Book 18 Bicycle Infrastructure Nomograph

MULTI-USE TRAILS

Multi-use trails are off-road facilities, fully separated from motorized traffic by a boulevard or paved surface, or passing through parks and other natural spaces. They often serve a commuter and recreation function. They are typically shared between pedestrians, cyclists, rollerbladers, and skateboarders. The desired width of a multi-use trail is 4.0m, and the minimum width is 3.0m.

PROTECTED BICYCLE LANES – CYCLE TRACKS

Cycle tracks are an exclusive bicycle facility adjacent to and at the same level as the roadway, but separated from motorized traffic by a physical buffer (e.g. planters, bollards, curbs, or a parking lane). They can be bi- or uni-directional, and designed to accommodate cyclists on one or both sides of the street. **Table 1**, adopted from OTM Book 18, illustrates minimum widths.

Table 1: Protected Bicycle Facility Width

Facility	Desired Width	Suggested Minimum
Flexible bollards	2.0m lane + 1.2m buffer	1.5m lane + 0.5m buffer
Planters / Concrete curb	2.0m lane + 1.2m buffer	1.8m lane + 0.5m buffer
On street parking	1.8m lane + 1.2m buffer	1.5m lane + 0.8m buffer

Exhibit 5: Protected Bicycle Lane
Image source: City of Ottawa

PROTECTED BICYCLE LANES – RAISED CYCLE TRACK

Raised cycle tracks are physically separated from motorized traffic by a height difference. They may be at the level of the adjacent sidewalk or at an intermediate level between the roadway and sidewalk. The desired width for a one-way raised cycle track is 2m, and the minimum 1.5m.

Exhibit 6: Raised Bicycle Lane
Image source: Halifax Cycling Coalition

BICYCLE LANES

Bicycle lanes are on-road facilities designated by pavement markings and signage, as shown in **Exhibit 7**. Bicycle lanes are typically on the right side of the street between the travel lane and curb or parking lane and flow in the same direction of traffic. **Buffered bicycle lanes,** shown in **Exhibit 8**, offer an enhancement by using painted buffers to provide additional space between motor vehicles and cyclists.

Table 2, adopted from OTM Book 18, illustrates minimum widths. Bicycle lanes immediately adjacent to parking should only be implemented if the desired width can be accommodated.

Table 2: Bicycle Lane Width

Facility	Desired Width	Suggested Minimum
Curbside lanes	1.8m	1.5m
Lanes adjacent to parking	1.5m lane + 1m buffer	1.5 m lane + 0.5m buffer

Exhibit 7: Conventional Bicycle Lane
Image source: City of Burlington

Exhibit 8: Buffered Bicycle Lane
Image source: City of Burlington

BICYCLE BOULEVARD TREATMENTS

Bicycle boulevards are enhanced versions of shared-use lanes on low volume, low-speed streets that discourage but allow motorized traffic, and are optimized for bicycle travel. This facility does not require dedicated ROW space. Potential bicycle boulevard treatments are shown in **Exhibit 9.** These streets can be enhanced using a range of design treatments including traffic calming measures, signage, and pavement markings.

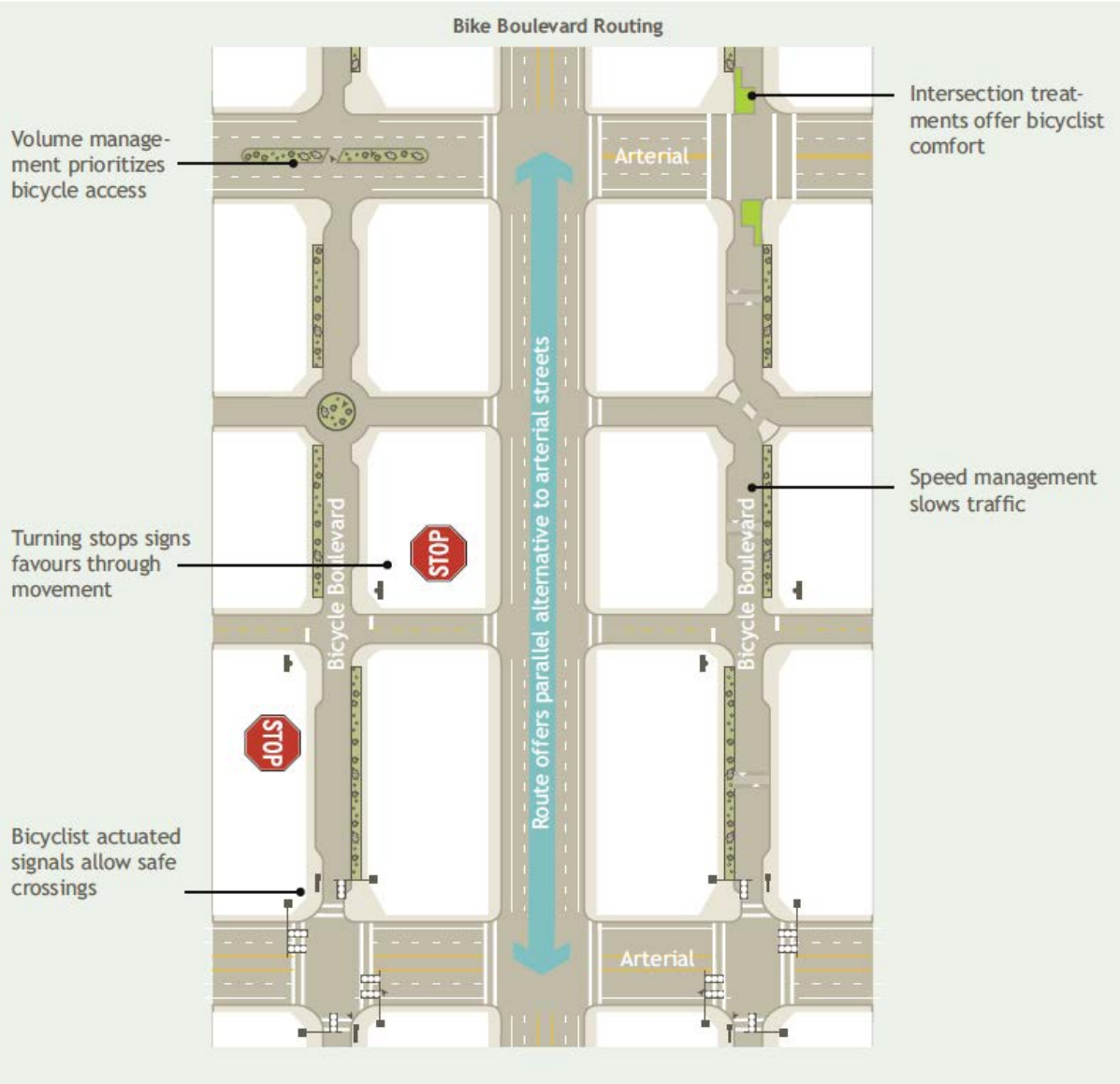


Exhibit 9: Bicycle Boulevard Design
Image Source: City of Edmonton

BICYCLE PARKING

Sufficient and accessible bicycle parking should be placed near trip generators.

4.8 Low Impact Development (LID)

Low impact development (LID) is an approach to stormwater control that involves the creation of a hydrologically functional landscape that mimics the natural regime. It emphasizes strategies such as infiltration, temporary storage, evapotranspiration and/or stormwater reuse, which provide decentralized hydrologic control and quality improvements for stormwater runoff. Behind LID is the desire to create functional and appealing site drainage that treats stormwater as a resource rather than a waste product.

LID measures should be implemented wherever possible to minimize stormwater load on Innisfil's drainage system, improve water quality through natural filtration, and improve the Town's resiliency and adaptability to climate change and extreme weather events. Measures applicable to Innisfil include, but are not limited to: bioretention facilities such as tree pits and trenches, and streetside and curb bumpout planters, and permeable pavement.

Bioretention facilities within ROW can take a variety of forms, including streetside planters or green gutters, curb bumpout planters, and tree pits or trenches, illustrated in **Exhibit 10**. These facilities are intended to provide water quality treatment of runoff from paved areas, improve air quality, and add amenity to the streetscape.

Exhibit 10: Bioretention Facilities
Image sources: Credit Valley Conservation Authority, City of Seattle, City of Denver

The footprint of the facility can vary depending on the drainage area, context, and number of other LID facilities. The 2017 *NDCC Mobility Master Plan: Mobility and Urban Design Guidance* (City of Denver), recommends the following width dimensions:

- Bumpout planter: 2.1m typical / 3.7m maximum / 1.5m minimum to incorporate trees
- Streetside planter: 1.8m typical / 0.9m minimum / 1.5m minimum to incorporate trees
- Tree pits or trenches: 2.7m for excavation / 1.5m minimum for planting

Modular suspended pavement systems, such as Silva Cells, shown in **Exhibit 11,** can be applied with the above LID facilities or be implemented on their own. These systems support healthy tree growth by ensuring availability of quality, uncompact soil, and facilitate bioretention. They do not require additional ROW as they can be installed under streets, parking areas, and sidewalks.

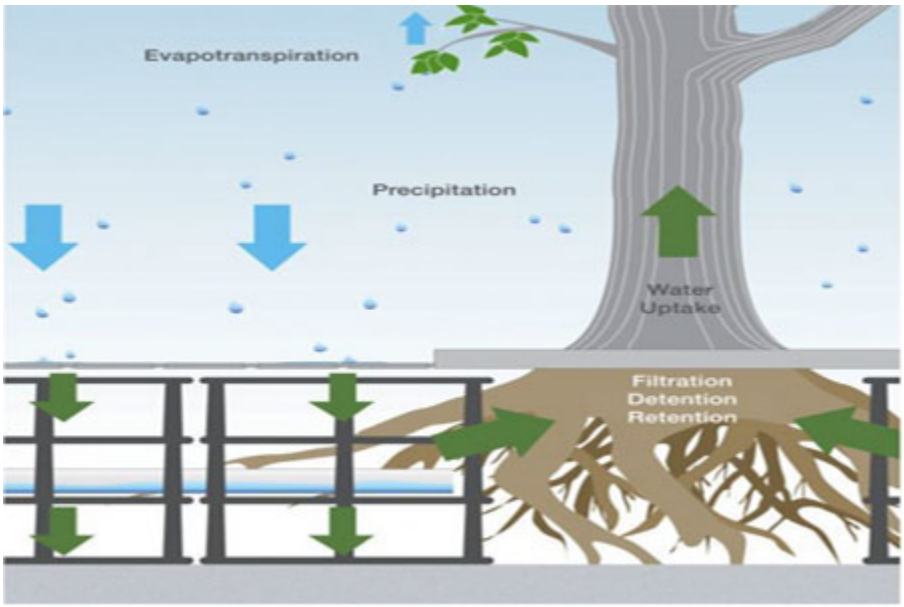


Exhibit 11: Silva Cells
Source: Water Online

Permeable pavement, such as brick pavers, can facilitate stormwater infiltration on any street type alone or in conjunction with any of the above LID methods. It is recommended for parking lanes, on local roads, or on sidewalks.

Refer to the Toronto and Region Conservation Authority / Credit Valley Conservation Authority (2010) *Low Impact Development Stormwater Management Planning and Design Guide* for more information.

4.9 Parking

On-street parking has an important function. It provides physical separation between pedestrian realm and roadway and can serve to calm traffic on narrow streets. It also provides direct access to businesses and residences. On-street parking may also conflict with on-street bicycle lanes and their interface should be carefully considered.

PARALLEL PARKING

Parallel parking lanes should be at least 2.4m wide, except on local roads where they may be reduced to 2.2m in constrained conditions.

ANGLE PARKING

If there is sufficient right-of-way, angled parking may be appropriate to provide additional parking, especially in commercial zones. Angled parking should not be used at the expense of pedestrian or cycling infrastructure. Typical required width is between 5.0m and 6.0m.

SPECIAL USE PARKING

Special use parking may be provided within on-street parking zones to provide dedicated space for loading and unloading, accessible parking, and demand-responsive transit pick-up.

FLEX SPACE

Flex spaces are designed to accommodate parking or other needs, such as sidewalk cafes, depending on the need. Flex spaces may be included on Downtown Commercial Streets.

4.10 Truck Turning Radii

A larger curb radius for turning trucks may be necessary in locations with large volumes of truck traffic. Large curb radii should be used only in specific circumstances as they permit higher turning speed for other vehicles and increase the pedestrian crossing distance. During the design stage, appropriate design vehicles (typically large trucks for industrial areas and fire trucks for residential areas) should be chosen to minimize curb radii and minimize pedestrian crossing distances.

4.11 Vehicular Travel Lanes

Travel lanes provide space for passenger, freight, and potential transit vehicles. The standard lane width on streets with high truck volumes is 3.5m, but may be reduced to 3.4m in constrained conditions. In other conditions, the recommended lane width is 3.2m. Lane widths may be reduced to 3.0m in constrained conditions, and should not be widened above 3.7m.

5 General Considerations for Complete Streets

5.1 Intersection Design

Intersections are where streets and modes meet, which can potentially lead to conflict. While the recommendations contained within the rest of the report generally focus on road segments, a consideration of intersection design is crucial to ensure a safe and predictable environment for people of all ages and abilities. Intersections should prioritize safe crossing for the most vulnerable users, enhance predictability, ensure visibility and accessibility, and consider all modes of travel. A number of design elements which may be applied to improve intersection safety and function are identified in the following section.

MEASURES TO IMPROVE THE PEDESTRIAN EXPERIENCE

Intersection crossing markings: Designs such as advanced vehicle stop bars, pedestrian ladder crossing markings or textured crosswalks can increase the visibility of pedestrians and have been shown to improve vehicle yielding behavior.

Accessible curb ramps: Eliminate the need to step down from a curb to the roadway according to AODA standards and OPSD 310.030. These facilitate movements for people using wheelchairs and other mobility aids, and strollers.

Tactile paving: Is used to notify people who are blind or partially sighted of approaching streets and hazardous grade changes.

Exhibit 12: Tactile Walking Surface Indicator at Crosswalk
Image source: City of Ottawa

Reduced corner radii and curb extensions or bulbs: Shortens crossing distances for pedestrians and slows right-turning vehicles. Curb extensions extend the line of the curb into the roadway, decreasing crossing distance while increasing the visibility of pedestrians.

Exhibit 13: Curb Extensions
Image source: NACTO

Pedestrian crossing islands: Provides an area protected by curbs where pedestrians can wait while crossing streets. Islands reduce the crossing distance a pedestrian must traverse in one instance.

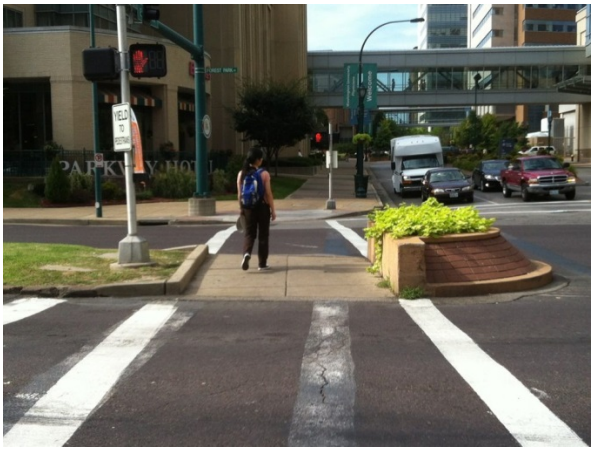


Exhibit 14: Pedestrian Crossing Island
Image source: NACTO

Raised crosswalks and intersections: Raised areas of the roadway at intersections that improve the visibility of crossing pedestrians and slow drivers travelling at excessive speeds.

Exhibit 15: Raised Crosswalk
Image source: City of North Vancouver

MEASURES TO IMPROVE THE CYCLING EXPERIENCE

Multi-Use Trails at Intersections

A variety of techniques can be applied to improve the safety and user experience where multi-use trails intersect roadways, including:

- Using small corner radii to enforce slow turning speeds through the intersection
- Providing sufficient stopping distance to obey traffic controls
- Using pavement markings to indicate the crossing along the pathway. Both crosswalk and crossride 'elephant's feet markings should be provided. They may be combined to illustrate a shared crossing as shown in **Exhibit 16**
- Using stop or yield line markings in advance of the crossing to discourage vehicle encroachment onto the crossing
- Considering providing a raised crossing to slow vehicles and physically indicate the priority of the trail
- Considering including a raised median to provide additional speed management benefits

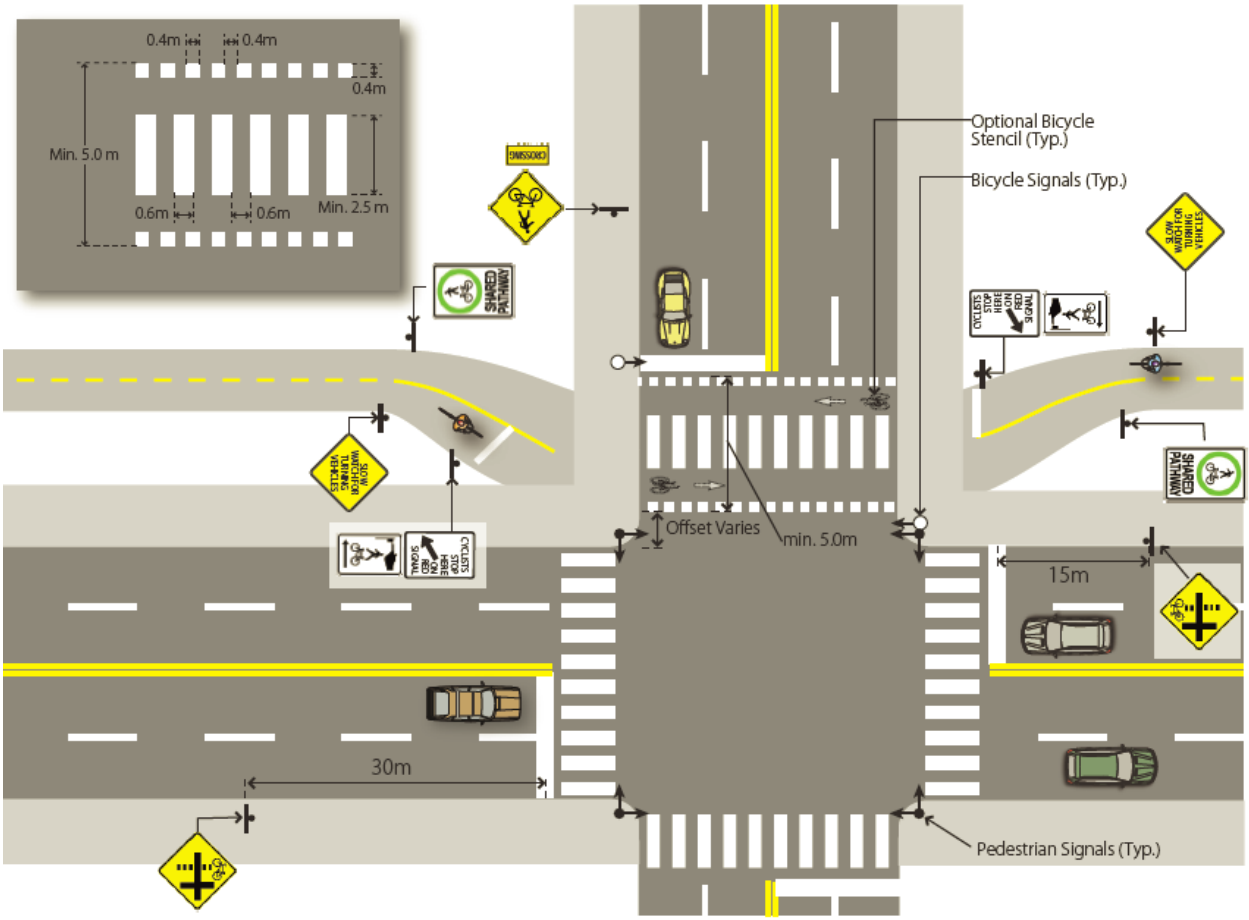


Exhibit 16: Multi-Use Trail Crossing at Intersection
Source: OTM Book 18

Cyclist Visibility and Turning Movements

A variety of design treatments can be applied where conventional and protected bike lanes meet intersections, depending on the roadway configuration, road width, and desired level of user comfort. These include:

- **Pavement markings:** Increases visibility of cyclists and guide cyclists through the intersection. Options include bike stencils, chevrons, sharrows, dashed guide lines, and green surface treatments.
- **Two-Stage Turn Boxes:** Shown in **Exhibit 17**, a designated area at signalized intersections that allow cyclists to make left turns at signalized intersections from a right side bike lane.
- **Jug handles:** Shown in **Exhibit 18**, jug handles are designated paved areas at t-intersections that allow cyclists to reorient themselves to cross the road, serving a similar function to that of a two-stage turn box.
- **Off-road left-turn pads:** Shown in **Exhibit 19**, these are designated off-road paved areas that allow cyclists to reorient themselves to cross the road, serving a similar function to that of a two-stage turn box or jug handle.

Exhibit 17: Two-Stage Left Turn Box
Image source: City of Toronto

Exhibit 18: Jug Handle Left Turn Facility
Image source: City of Toronto

Exhibit 19: Off-Road Paved Left-Turn Pad
Image source: City of Toronto

Accommodating Vehicular Right Turn Lanes

Vehicular right turn lanes can be challenging for cyclists approaching an intersection in a conventional or protected bike lane. As such, it is important that clear guidance is provided to

both cyclists and turning motorists to avoid conflicts. In all cases, double right turn lanes should be avoided. This section highlights several treatments that can be applied in Innisfil.

- **Through Bike Lane (Pocket Lane):** Shown in **Exhibit 20**, this treatment enables cyclists to correctly position themselves to the left of right turn lanes and signifies an appropriate location for vehicles to safely cross the bike lane into the turn lane. Right turn only lanes should be as short as possible to limit the speed of cars (fast moving traffic on both sides can be uncomfortable for cyclists.
- **Mixing Zone (Combined Bike / Turn Lane):** In cases where there is insufficient width to install a pocket lane, a combined bike/ turning lane should be used, as shown in **Exhibit 21.**
- **Bike Box:** A designated area at signalized intersections that provides cyclists with a visible space to wait in front of vehicles during the red signal phase. These are recommended when the bike lane is to the right of a combined through/right turn lane to avoid right-hook conflicts with turning vehicles. If the bike box extends across the intersection approach, as shown in **Exhibit 22**, cyclists can transition from the bike lane to the left side of the box in order to make a left turn movement.
- **Staggered Stop Bars:** Staggered stop bars, shown in **Exhibit 23**, are similar to bike boxes in that they provide cyclists with a visible space to wait in advance of vehicles in combined through/right turn lanes during the red signal phase.
- **Bend Out:** For additional user comfort, consider transitioning the on-street bike lane into an off-road bike path or multi-use path in advance of the intersection. This treatment can also be applied to paved shoulders as shown in **Exhibit 24**.

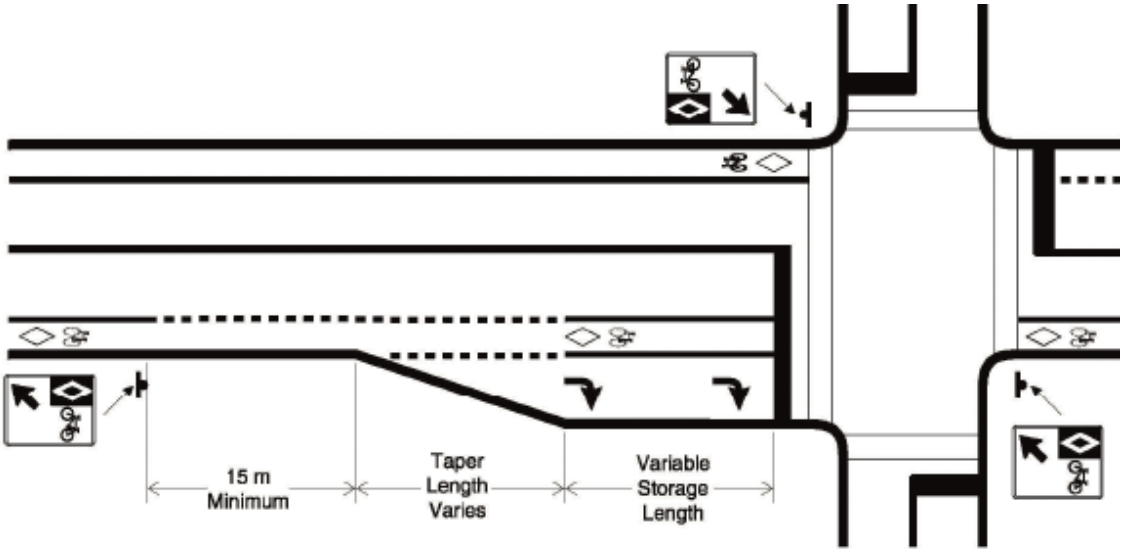


Exhibit 20: Through Bike Lane
Source: TAC Bikeway Traffic Control Guidelines for Canada

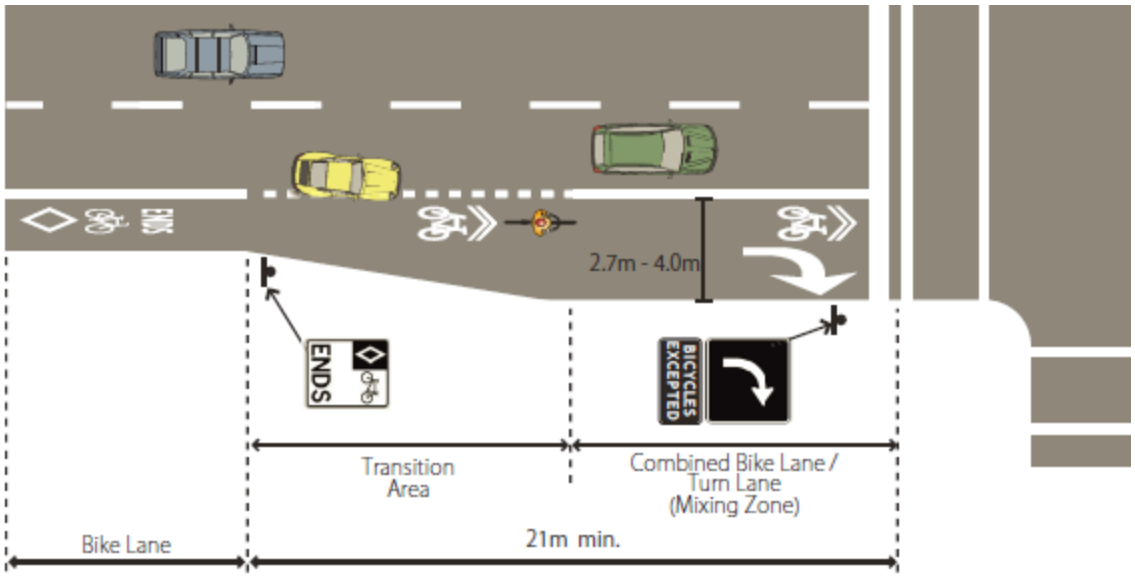


Exhibit 21: Combined Bike / Turn Lane
Source: OTM Book 18

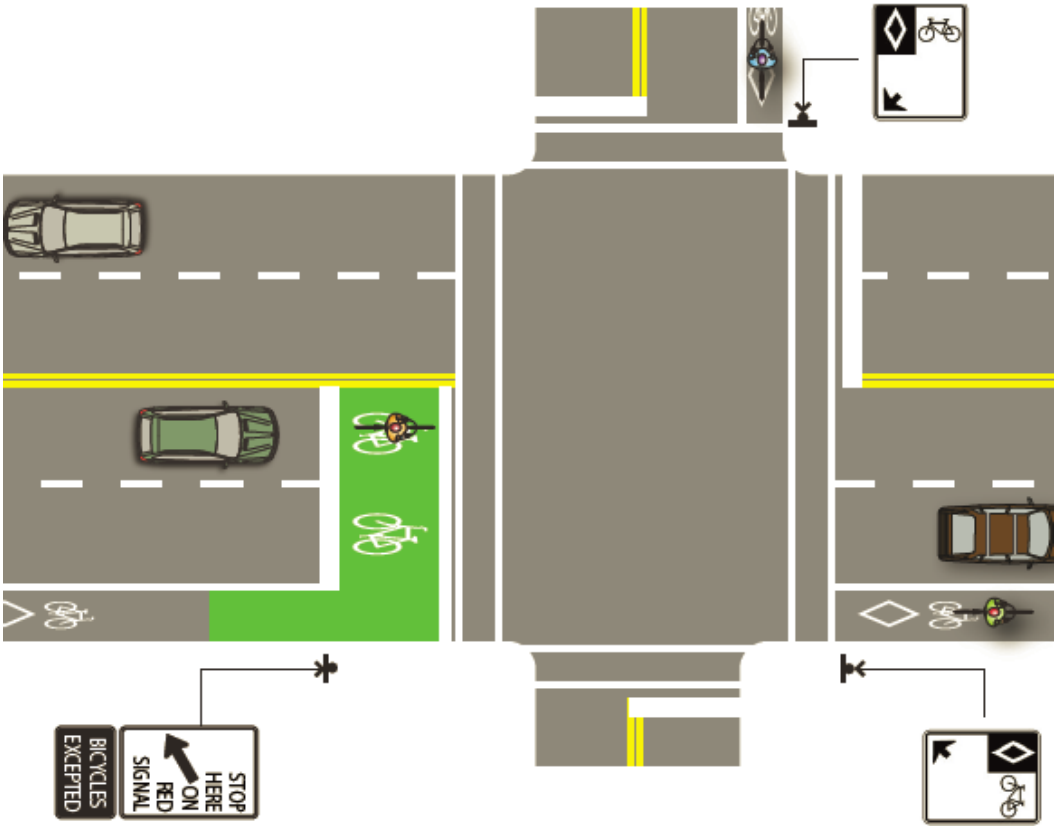


Exhibit 22: Bike Box
Source: OTM Book 18

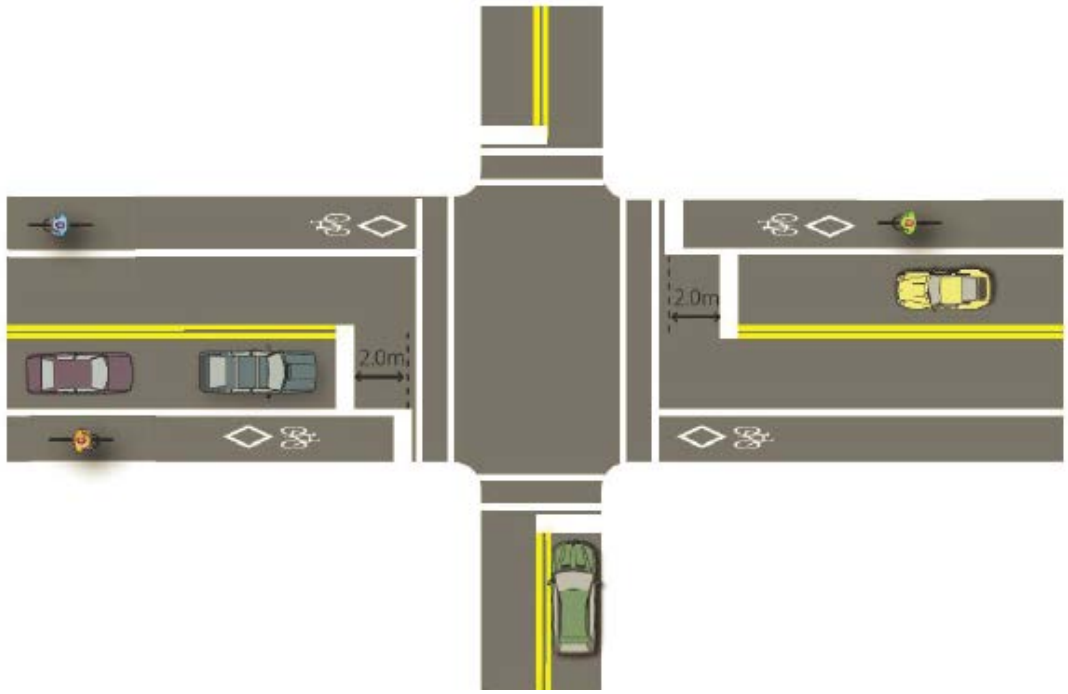


Exhibit 23: Staggered Stop Bars
Source: OTM Book 18

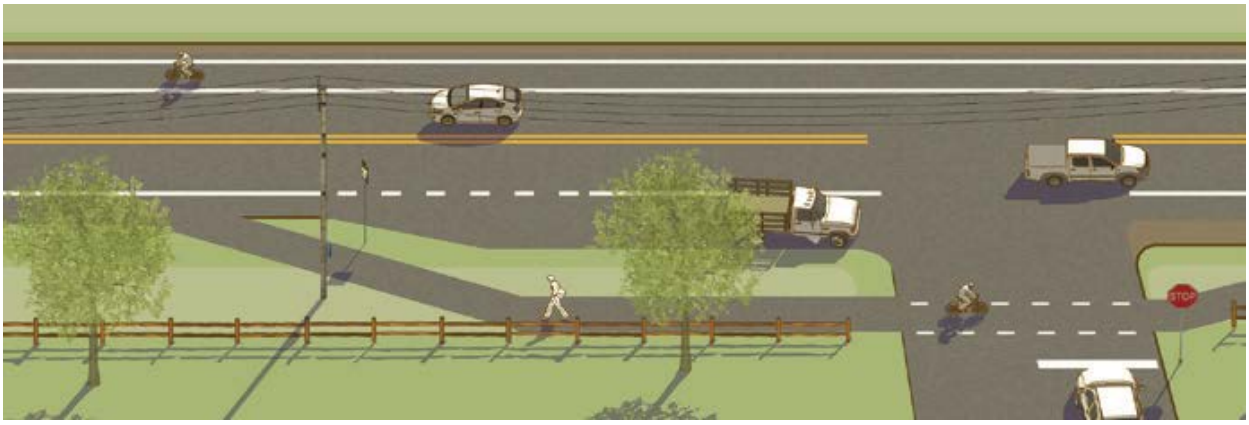


Exhibit 24: Paved Shoulder Transitions to Multi-Use Trail at Intersection
Source: US Department of Transportation, Federal Highway Administration

Protected intersections should be considered where cyclists are a priority. The design shown in **Exhibit 25** extends the physical barrier of a protected bike lane into the intersection using corner refuge islands to make through and turning movements safer. These can also be installed with bollards that can be removed in winter to facilitate snow clearing, as shown in **Exhibit 26**.

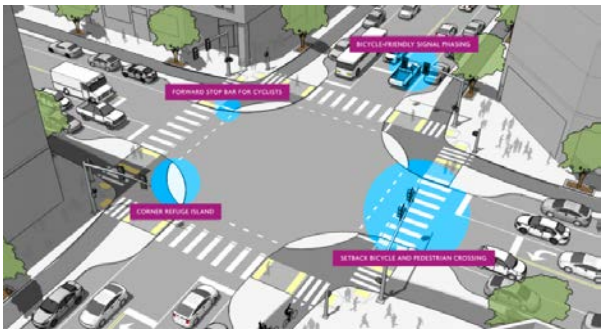


Exhibit 25: Protected Intersection for Cyclists
Source: Alta Planning

Exhibit 26: Protected Intersection in Montreal, Quebec
Image Source: Google maps

INTERSECTION SIGNALS AND SIGNAGE

The Town of Innisfil may also use various intersection signals and signage to facilitate the safe movement of all road users, in line with Town policy, OTM Book 12, the Highway Traffic Act, the Manual for Uniform Traffic Control Devices for Canada, and industry best practice. Signage to consider includes, but is not limited to:

- Right or left turn on red restrictions
- Stop signs
- Yield signs
- School crosswalks

Intersection signals to consider include, but are not limited to:

- Exclusive pedestrian phasing or leading intervals
- Pedestrian countdown signals
- Bicycle signals

5.2 Winter Maintenance

Complete Streets must be designed and maintained for year-round use to meet the overarching goal of improving accessibility, safety, and comfort for all users on Innisfil's streets. To this end, the development of this guide and the associated typology toolboxes included a consideration of

winter maintenance as a guiding principle. All recommendations contained within this report have been applied by communities in winter climates.

To further assist road designers in designing complete streets that function as well for all users in the winter as they do in summer, this section consolidates winter-related recommendations from earlier in the report, and highlights several additional potential strategies. Strategies are grouped into design and maintenance considerations.

DESIGN

One of the best ways to facilitate the removal of snow from active transportation facilities is through thoughtful design. Design for complete streets should consider the following:

- Provide boulevards between sidewalks or multi-use trails and the street to facilitate snow storage.
- Avoid implementing on-street bike lanes immediately adjacent to parking or a sidewalk, unless there is a boulevard for snow storage. When bike lanes are adjacent to parking, paths can become rutted and icy with parking movements. When bike lanes are adjacent to a sidewalk, snow cleared from the road can accumulate in the bike lane or sidewalk.
- Design multi-use trails or protected on-street bikeways to be wide enough to accommodate a smaller snow plow. Where this is not possible, for protected on-street bikeways, use removable bollards, planters, or similar barriers to separate bicycle infrastructure from traffic from spring to fall. These can be removed in the winter to facilitate snow clearing.
- Where appropriate, investigate implementing “bicycle boulevard” treatments on local roads instead of constructing dedicated multi-use trails. This strategy can lower the cost of snow clearing by reducing duplication. Furthermore, regular vehicle movements can help reduce ice buildup, which can become an issue on sporadically maintained dedicated bike infrastructure.
- Ensure that street furniture, light posts, hydro poles, trees, etc. are not placed in a way that prevents sidewalk snow clearing.
- Consider the use of recessed thermoplastic pavement markings to save on long-term maintenance costs and reduce the frequency of repainting. Alternatively, investigate the use of standard, non-recessed non-thermoplastic paint to reduce the costs of more frequent reapplication.

MAINTENANCE

- Plan for frequent maintenance of multi-use paths and sidewalks. Plowing only the minimally acceptable width on wide sidewalks or multi-use trails to reduce costs may be acceptable in certain contexts.
- Develop a realistic target for how long after snowfall multi-use trails and sidewalks will be cleared to provide predictability for walkers and cyclists. Create a “prioritization” list of facilities, to ensure locations with higher volumes of pedestrian and bicycle traffic, and areas with vulnerable users are plowed first.
- Restrict on-street parking after snowfalls to facilitate plowing.

- Investigate different techniques for snow clearing and ice removal, including applying de-icing material prior to snowfalls. In situations with very heavy snow, compacted snow spread with gravel can be an alternative solution.
- Use vertical delineators to alert snow plow operators of obstacles such as curb bump outs or cycle tracks to prevent damage.

5.3 Key Opportunities

This section details a number of specific, targeted interventions that can be applied in most contexts as "quick wins" to enhance the completeness of Innisfil's streets. These interventions may be implemented as part of a larger project or on their own. This list was adapted from the City of St. Thomas's Complete Streets document[1].

- Identify and fill missing links in sidewalk and bike routes to create integrated networks. Look beyond project limits for additional opportunities
- Add sidewalks in areas with none to improve pedestrian safety
- Add bike facilities on identified routes, ensuring connections to existing infrastructure
- Upgrade the pedestrian realm and facilitate snow storage by adding boulevards
- Protect trees and improve planting zones during construction. Plant new trees where possible
- Improve on-street parking options by reducing driveway widths or eliminating driveways. Create clearly defined parking bays using bumpouts to improve streetscape
- Enhance cul-de-sacs by installing a centre island with attractive landscaping.
- Integrate street furniture that enhances the community. Work with the community to incorporate unique features that improve the pedestrian realm
- Consider long term benefit versus the cost of utility relocation. Utilities should be moved out of the pedestrian zone, or buried in high profile areas
- Integrate streets into parks. Park and street projects should build on each other. For example, connecting multi-use paths in parks to sidewalks along the street
- Reduce lane sizes and curb radii where appropriate to lower speeds and improve safety for active modes
- Reduce access points to private property from public roads to reduce conflict points
- Upgrade street termini to "bulbs" to allow for vehicles to turn without performing a three point turn. This improves safety, especially with regards to trucks, which will not have to reverse down the road

[1] City of St. Thomas, ON. (2016). Complete Streets. Retrieved from https://stthomas.civicweb.net/document/7881/Complete%20Streets.pdf?handle=E348502F7C6A4808871D683AADD97DD6

Memo

Date:	Monday, March 12, 2018
Project:	Town of Innisfil Transportation Master Plan Update
To:	Town of Innisfil
From:	HDR
Subject:	Traffic Calming Policy Framework

1. Introduction

This document presents a recommended traffic calming policy framework for the Town of Innisfil. Traffic calming is a tool available to the Town to address problematic traffic speeds on local and collector streets.

1.1 Definition of Traffic Calming

Traffic calming, as defined by the Institute of Transportation Engineers (ITE) Subcommittee on Traffic Calming, 1997 is, "The combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour and improve conditions for non-motorized street users."

1.2 Scope

This policy framework establishes methods for the initiation, preparation, and completion of traffic calming projects. The main components of the policy framework are:

- A description of traffic calming measures to be considered for use in Innisfil,
- An analysis and approval process that incorporates key requirements of resident participation, agency consultation, Traffic Safety Advisory Committee Review, and allows for pilot projects,
- Warrant criteria based on traffic conditions, safety and technical considerations, and impacts to emergency services,
- A ranking process that is used to prioritize traffic calming proposals.

While the process outlined in this document is intended to be clear and consistent, it is recognized that each location and traffic issue may be unique. This policy framework is intended to guide Town staff in applying their professional judgment to each unique situation.

1.3 Relationship to Complete Streets Guidelines

It is further noted that this policy framework focuses on implementable solutions to address traffic issues on existing roadways. New roads in Innisfil should be proactively designed for lower speeds by incorporating measures contained in this policy and the *Complete Streets Guidelines*. Where possible, traffic calming measures should be designed in an integrated

manner with the public realm. Some examples of integrated designs are provided in later sections of this document.

1.4 Policy Goals

The primary goals of this policy are to:

- Reduce traffic speeds and decrease through-traffic to acceptable levels to enhance the liveability of residential neighbourhoods;
- Promote safety, accessibility, comfort, and mobility for all road users
- Provide a tool that Town officials and the public are confident is effective, fair, and consistent in evaluating and prioritizing issues related to traffic speeds and volumes on local and collector streets.
- Support the retrofit of streets to align with the desired functionality and characteristics outlined in the Innisfil *Complete Streets Guidelines*.

Where possible, consideration should be given to improving the aesthetics of the roadway.

2. Background

This policy was developed taking into account Town and Provincial policy. It was based on the *Canadian Guide to Neighbourhood Traffic Calming*, prepared by the Institute of Transportation Engineers (ITE) and the Transportation Association of Canada (TAC), in 1998. It also considered traffic calming policies used by other municipalities throughout Ontario and pilot projects underway in Innisfil.

2.1 Legislative Framework

This document is being prepared as part of the Town of Innisfil (Town) Transportation Master Plan (TMP) Update. The TMP Update aims to further the development of a multimodal, multipurpose transportation network that serves people of all ages and abilities. The Traffic Calming Policy supports this goal by addressing increased traffic speeds and volumes, which pose a safety risk for all road users. The Policy is accompanied by and should be read alongside two other targeted policies: the *Pedestrian Crossing Policy* and the *Complete Streets Policy*. The policy is also informed by and aligns with the Town's draft *Official Plan,* and the Town's 2016 *Trails Master Plan*. Projects of this type do not require approval under the Ontario *Environmental Assessment Act***.**

2.2 Best Practice Review

The traffic calming measures included in this policy are informed primarily by the *Canadian Guide to Neighbourhood Traffic Calming* (the Guide) and supported by recommendations from the National Association of City Transportation Official's (NACTO) *Urban Street Design Guide* and *Urban Bikeway Design Guide*.

Published in 1998 by the Transportation Association of Canada (TAC) and the Canadian Institute of Transportation Engineers (CITE), the Guide provides guidance on the design and installation of traffic calming measures. An update to the Guide is currently underway.

NACTO's *Urban Street Design Guide*, published in 2013, emphasizes the role of streets as public places, rather than solely conduits for traffic. It provides guidance on how to design for safe driving, biking, walking, and public activity. The *Urban Bikeway Design Guide*, published in 2014, provides an extensive review of speed and volume management techniques.

2.3 Review of Other Jurisdictions

This policy is informed by other traffic calming policies throughout Ontario, including: the Town of Milton's 2011 *Traffic Calming Policy,* the City of Barrie's *Traffic Calming Policy*, the Town of Ajax's *Traffic Calming Warrant* Update, the City of London's *Traffic Calming Practices and Procedures for Existing Neighbourhoods,* and the City of Toronto's 2010 *Traffic Calming Policy*.

3. Application

This policy shall apply Town-wide primarily to existing roads eligible for the implementation of traffic calming measures as defined in the warrant criteria in **Section 5.1**. However this policy does not restrict the application on new streets or in street re-design projects.

4. Traffic Calming Measures

This section identifies the traffic calming measures to be considered for Innisfil. Measures are grouped into three categories: vertical measures, horizontal measures, and other. Where applicable, guidance on implementing the measure in a temporary manner for pilot projects is included. The selected measure(s) will depend on identified issues and the road's function, however all measures shall be considered, as opposed to the exclusive use of speed humps.

4.1 Vertical Measures

Vertical measures are meant primarily to reduce vehicle speeds, but they may also contribute to volume reductions as it can take motorists longer to get to their destination as a result of reduced speeds. Vertical measures applicable to Innisfil are summarized in **Table 1**.

4.2 Horizontal Measures

Horizontal measures, illustrated in **Table 2**, cause shifts in the horizontal alignment of the vehicle and forced turning movements, resulting in reduced vehicle volumes and short-cutting. Some horizontal deflection measures will also reduce vehicle speeds and conflicts between automobiles and other modes of travel.

4.3 Other Measures

Other measures are those that do not involve a horizontal or vertical change to the road surface, but still have an effect in changing driver behavior, most notably causing drivers to slow down. They are also effective in alerting drivers to the presence of people walking or cycling, and encouraging predictable road use by all users. Other measures applicable to Innisfil are illustrated in **Table 3**.

Table 1: Vertical Traffic Calming Measures

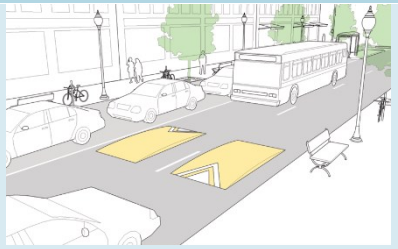
Vertical Measure	Description	Purpose	Applicability	Temporary Application	Examples	
Speed Hump	A raised area of the roadway, which deflects both the wheels and frame of any traversing vehicle	• Reduce vehicle speed	• Local streets • Minor collector streets • Avoid designated emergency access routes, unless acceptable to emergency services	N/A	 (NACTO, 2017)	 (NACTO, 2017)
Speed Cushion	A raised area of the roadway which deflects most traversing vehicles, but is too narrow to impact the wider wheel base of most emergency vehicles	• Reduce vehicle speeds with minimal impact on emergency vehicles and buses	• Local streets • Minor collector streets	N/A	 (NACTO, 2017)	 (NACTO, 2017)
Raised Crosswalk	A marked crosswalk at an intersection or mid-block location, constructed at a higher elevation than the adjacent roadway	• Reduce vehicle speed • Improve pedestrian visibility • Reduce pedestrian-vehicle conflicts	• Local streets • Collector streets • Downtown streets	N/A	 (Port Townsend, 2006)	 (FHA, 2017)

Table 1: Vertical Traffic Calming Measures (continued)

Vertical Measure	Description	Purpose	Applicability	Temporary Application	Examples	
Raised Intersection	An intersection including crosswalks, constructed at a higher elevation than the adjacent roadway	• Reduce vehicle speed • Better defined intersection • Reduce pedestrian-vehicle conflicts	• Local streets • Collector streets • Downtown streets	N/A	 (FHA, 2017)	 (NACTO, 2017)

Table 2: Horizontal Traffic Calming Measures

Horizontal Measure	Description	Purpose	Applicability	Temporary Application	Examples	
Traffic circles and roundabouts	A raised island located in the centre of an intersection, which requires vehicles to travel through the intersection in a counter-clockwise direction	• Reduce vehicle speed • Reduce vehicle conflicts at intersections	• Local streets • Collector streets	N/A	 (autonorth.com, 2009)	 (Region of Waterloo, 2014)

Table 2: Horizontal Traffic Calming Measures (continued)

Horizontal Measure	Description	Purpose	Applicability	Temporary Application	Examples
Curb extensions / chokers	A horizontal intrusion of the curb into the roadway resulting in a narrower section of roadway	• Reduce vehicle speed • Reduce pedestrian crossing distance • Increase pedestrian visibility • Prevent parking close to intersection	• Local streets • Collector streets • Downtowns	Can be delineated using temporary bollards, planters, stone features, jersey barriers, or coloured paint	 (FHA, 2017)  (City of Seattle, 2017)
Raised centre medians	An elevated median constructed on the centreline of a two-way roadway that reduces lane widths	• Reduce vehicle speed • Reduce pedestrian-vehicle conflicts • Provide pedestrian refuge on wide streets	• Local streets • Collector streets • Downtowns	Can be delineated using temporary bollards, planters, stone features, jersey barriers, or coloured paint	 (Town of Innisfil, 2013)  (Google, 2017: Montreal, QC)
Chicanes	A series of curb extensions on one side or on alternating sides of a roadway	• Reduce vehicle speed • Discourage through-traffic	• Local streets • Collector streets	Can be delineated using temporary bollards, planters, stone features, jersey barriers, or coloured paint	 (NACTO, 2017)  City of Denver, 2017)

Table 2: Horizontal Traffic Calming Measures (continued)

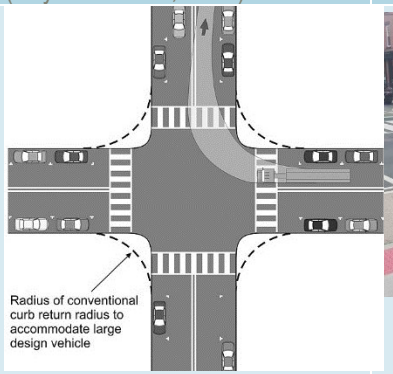
Horizontal Measure	Description	Purpose	Applicability	Temporary Application	Examples
On street parking	Reduce available roadway width for vehicle movement by allowing motor vehicles to park adjacent to the traveled portion of the roadway	• Reduce vehicle speeds	• Local streets • Collector streets • Downtowns	Same as permanent application if space allows	 (City of Toronto, 2015)  (City of Chicago, 2017)
Curb radii reduction	Designing an intersection corner with a smaller radius	• Slow right turning vehicles • Reduce pedestrian crossing distance • Improve pedestrian visibility	• Local streets • Collector streets • Downtowns	Can be delineated using temporary bollards, planters, stone features, jersey barriers, or coloured paint	 (Institute of Transportation Engineers, 2006)  (City of Washington, 2016)

Table 3: Other Traffic Calming Measures

Other Measures	Description	Purpose	Applicability	Temporary Application	Examples	
Textured Surface	Used to define a crossing location for pedestrians, or provide greater visibility to an area	• Reduce pedestrian-vehicle conflicts	• Local streets • Collector streets • Downtown streets	Temporary application same as permanent.	 (US Federal Highways Administration, 2017)	 (City of Redmond, Washington, 2017)

Table 4: Other Traffic Calming Measures (continued)

Other Measures	Description	Purpose	Applicability	Temporary Application	Examples	
Pavement Markings	Pavement markings can be used to define driving, parking, and bicycle space. Clearer definition of space can induce drivers to reduce their speed.	• Reduce vehicle speed • Reduce pedestrian- and cyclist -vehicle conflicts	• Local streets • Collector streets • Downtown streets	Temporary application same as permanent.	 (US Federal Highways Administration, 2016)	 (US Federal Highways Administration, 2009)
Speed Feedback Signs	An interactive sign that displays approaching vehicle speed. Radar speed signs can slow cars down by making drivers aware when they are driving at speeds above the posted limits.	• Reduce vehicle speed	• All streets	Temporary application same as permanent	 (Toronto Star, 2016)	 (Google, 2017: Innisfil, ON)

4.4 Benefits and Disadvantages

Effects from the implementation of physical measures may be both positive and negative. **Table 4** provides a simplified, visual comparison of the potential benefits associated with traffic calming measures and **Table 5** the disadvantages.

Table 4: Potential Benefits of Traffic Calming Measures[1]

Measures		Benefits			
		Speed Reduction	Volume Reduction	Conflict Reduction	Environment
Vertical Measures	Speed Humps & Cushions	●	◐	●	○
	Raised Crosswalk	●	○	◐	◐
	Raised Intersection	◐	○	◐	◐
Horizontal Measures	Traffic Circles & Roundabouts	●	◐	●	◐
	Curb extensions / chokers	◐	○	○	●
	Raised centre medians	◐	○	◐	○
	Chicanes	◐	◐	◐	◐
	On-street parking	◐	○	○	○
	Curb radii reduction	◐	○	○	○
Other	Textured Surfaces	○	○	◐	◐
	Pavement Markings	◐	○	◐	○
	Speed Feedback Signs	◐	○	○	○
Key: ● Substantial Benefits ◐ Minor Benefits ○ No Benefit					

Some of the positive impacts include reduced noise and air pollution and increased safety through reduced conflicts between automobiles and other modes.

[1] Adapted from the ITE and TAC Canadian Guide to Neighbourhood Traffic Calming (1998)

Table 5: Potential Disadvantages of Traffic Calming Measures[2]

Measures		Disadvantages					
		Local Access	Emergency Response	Other Travel Modes	Enforcement	Maintenance Cost	Implementation Cost
Vertical Measures	Speed Humps & Cushions	○	◐	◐	○	$ - $$	$-$$
	Raised Crosswalk	○	◐	◐	○	$	$-$$
	Raised Intersection	○	◐	◐	○	$	$$$
Horizontal Measures	Traffic Circles & Roundabouts	○	◐	◐	○	$-$$	$$-$$$
	Curb extensions / chokers	○	○	◐	○	$	$-$$
	Raised centre medians	◐	○	○	○	$	$-$$
	Chicanes	○	◐	○	○	$	$-$$$
	On-street parking	○	◐	◐	○	$-$$	$-$$
	Curb radii reduction	○	○	○	○	$	$-$$
Other	Textured Surfaces	○	○	◐	○	$-$$	$
	Pavement Markings	○	○	○	◐	$-$$	$
	Speed Feedback Signs	○	○	○	○	$	$

Key: ● Substantial Disadvantage ◐ Moderate Disadvantage ○ No Disadvantage
$ Low Cost $$ Moderate Cost $$$ High Cost

Negative impacts may include restrictions to local access, increased response times for emergency services, and increased complexity for maintenance activities such as snow removal. Refer to the *Canadian Guide to Neighbourhood Traffic Calming* for a detailed description of the advantages and disadvantages associated with each measure.

[2] Adapted from the ITE and TAC Canadian Guide to Neighbourhood Traffic Calming (1998)

4.5 Supplemental Measures

The traffic calming measures outlined in this policy can be supplemented by other measures. These options may be applied together with physical traffic calming measures or on their own when physical measures are not warranted.

Education

Traffic calming can be supported by education to encourage safe driving behavior. This can include brochures, public meetings, advanced warning or information signs, and street signs.

Signage

Traffic control signs should only be used in isolation when warranted or where physical measures are not feasible. Signage alone tends to be ineffective and not possible to enforce.

The use of stop signs solely as a traffic control measure is also not recommended. For example, introducing unwarranted midblock stop signs to slow traffic can cause driver confusion and potential enforcement problems.

The *Ontario Traffic Manual* provides the designer with the general requirements for most signing applications including islands, pedestrian crossings, object markers, lane lines and advance warning signs. The *Canadian Guide to Neighbourhood Traffic Calming* also provides direction with respect to the appropriate signage for specific traffic calming applications.

Enforcement

An increase of police presence is a viable solution to minimizing speeds and traffic related violations on the Town's roadways. Police visibility can reduce traffic-related issues on neighbourhood roadways. However, the effect of enforcement is limited to the resources available.

Roadside Design

A motorist's perception of the appropriate driving speed is influenced by the design aspects of the roadway. Research indicates that vehicle speeds are slower in areas where the vertical elements (such as street trees, adjacent buildings, light poles designed in a visually appealing manner), are greater than the width of the road. These elements can be implemented either separately or in conjunction with other traffic calming measures and have the added benefits of improving aesthetics and creating a sense of place as opposed to a vehicular thoroughfare.

5. Proposed Implementation Framework

The Traffic Safety Advisory Committee

The Traffic Safety Advisory Committee (TSAC) is a committee that advises and makes recommendations to Council on matters respecting traffic safety within the Town of Innisfil.

The role of the committee is to review traffic safety concerns as identified by various stakeholders including Council, staff, residents, South Simcoe Police Services, and other interested Parties**.** The Committee shall meet as required to evaluate potential solutions and to prepare recommendations or a plan of action for the approval of Council.

The goal of the Committee is to promote and support the implementation of strategies and solutions to alleviate traffic safety concerns through the use of public education and awareness, the recommendation of by-laws, and other methods that will have the effect of improving the general safety of the public at large.

Town Staff will engage with stakeholders to provide agenda items for Committee consideration, and the Committee shall meet as required to evaluate potential solutions. When required, the Committee will prepare recommendations or a plan of action for the approval of Council. If potential solutions are minor in nature and are within the scope of current Council-approved operating and capital budget amounts, Engineering and Operations staff may implement such solutions as suggested by the Committee without further approval from Council.

Project Initiation

The traffic calming review process can be initiated proactively by Town Staff to investigate areas of potential concern, or reactively, in response to a complaint from the general public, community associations, school boards, or businesses.

PROACTIVE

Identify problems or opportunities based on the measured volumes, speeds, collision history, the possibility of future capital projects, or other Staff observations.

REACTIVE

A traffic calming concern could be raised directly in person, by letter, by telephone, by e-mail or via fax. A process must be established to record and track the issue so that it cannot be lost or set aside. A request form should be created and made available on the Town's website. A formal response to the originator is required at this point, to acknowledge receipt of their communication and to advise as to how the issue is to be handled.

Initial Screening

The concern is to be compared to recent or outstanding requests for a traffic investigation. If similar requests have been made and an investigation completed within the last year, the investigation should be reviewed to determine if the findings are still pertinent and/or if there are any substantial changes between the old request and the current request.

If it is determined that the scope of a previous investigation was inadequate to address the problem, supplementary measures were implemented but ineffective, or new concerns have arisen, then the process for consideration of a physical traffic calming measures review should be initiated.

Investigation

Review any past concerns and past traffic count data if not older than five years, otherwise conduct new counts (volume and speed). Speed and volume data may be collected using traditional on-the-ground studies using video analytics, radar, or manual studies. Alternatively, commercially available GPS and location-based services data (collected from smartphone apps) may be used.

Warrant Criteria Screening
Refer to the warrant criteria in **Table 6**. If warrants are met, proceed. If no warrants are met, then request speed enforcement or implement a selection of the supplementary measures outlined above.

Development of Alternatives
Develop traffic calming alternatives. Temporary measures as detailed in **Section 4** may be implemented on a trial basis to gauge the impact of their permanent equivalent in an adjustable and cost-effective manner. Evaluate the proposals to determine if there may be significant traffic impacts on adjacent streets. If there is this potential, the review of the traffic calming proposal should be modified to include the adjacent, impacted streets.

Finalize Concept
Develop final traffic calming concept.

TSAC Review
Conduct Traffic Safety Advisory Committee (TSAC) Review of the traffic calming proposal. The TSAC makes all traffic calming recommendations to Town Council.

Prioritization
Determine ranking of installation as outlined in **Table 7**.

Council Review
Present proposal to Council, either as part of the regular, two-year Capital Budget, or as a mid-year request. If approved by Council, proceed to implementation.

Evaluation
Conduct an after study of speed and volume following the implementation of a measure using the same methods outlined in the investigation stage. Both temporary and permanent measures shall be monitored for a period of six months to a year after implementation to determine their effectiveness.

The evaluation will assess the project's effectiveness in mitigating the traffic related problem and impact on the surrounding road network. An information report shall be prepared for the TSAC, summarizing effectiveness. The report will identify those projects that may require follow-up measures and reintroduction into the traffic calming program. Modifications to permanent or temporary traffic calming measures, or the conversion of temporary measures to permanent measures will require the same process as implementation of a new project.

The findings of post implementation studies will be used to make refinements to the Traffic Calming Policy. As more local experience is gained, the effectiveness of various traffic calming measures and impacts will be valuable in gauging their applicability in future projects.

5.1 Warrant Criteria for Traffic Calming

The warrant criteria for traffic calming measures are shown in **Table 6.** All requirements must be met to meet the warrant and be eligible for traffic calming.

Table 6: Warrant Criteria for Traffic Calming Measures

Warrant Item	Requirement
Class of Roadway	Local or minor collector residential roadway or Downtown Commercial Street
Road Grade	Road grade less than 5%
Block Length	Block length greater than 120 metres between controlled intersections
Transit Route	Roadway not a transit route (fixed-route transit only)
Vehicle Speed	85th percentile speed is 15km/h over the speed limit
Vehicle Volume	Above 400 vehicles per day
Emergency Response	Impacts on Emergency Services will not be significant (as determined in consultation with Emergency Services (Fire, Ambulance, and Police) staff).

5.2 Project Ranking Framework

The point-based ranking system to be used for implementation is outlined in **Table 7**.

Table 7: Ranking Criteria for Traffic Calming Project Prioritization

	Local Road	Collector Road
Speed	• 2 points for each km/h that the 85th percentile speed is above the minimum Vehicle Speed threshold outlined in **Table 6**	• 1 point for each km/h that the 85th percentile speed is above the minimum Vehicle Speed threshold outlined in **Table 6**
Volume	• 1 point for every 100 vehicles of daily traffic (0-2500 vehicles per day)	• 1 point for every 220 vehicles of daily traffic over 2500 (2500-8000 vehicles per day)
Collisions	• 5 points for 1 preventable collision(s)[3] recorded by police in the past 3 years; or • 10 points for 2 or more preventable collisions recorded in the past 3 years; or • 10 points for 1 or more preventable collision(s) recorded resulting in personal injury in the past 3 years.	
Pedestrian and Bicycling Factors	• 5 points for each pedestrian generator (e.g. park, school, seniors centre, recreation centre, church, or other public institution, etc.) • 10 points for on-road bicycle network / crossed by bicycle network segment[4]	

5.3 Removal Process

The process to have traffic calming device(s) removed permanently is as follows:

- A citizen, agency, or stakeholder may request that traffic calming devices be removed.
- A petition form must be obtained through the Town where the Town staff would outline a study area corresponding with the properties abutting the roadways forming the study area of the original traffic calming proposal. The petition must then be signed by a minimum of 60% of study area residents, agencies, and businesses, and property owners in support of the removal.

[3] Preventable collisions are those that are considered preventable through the use of traffic calming measures (e.g. speed-related collisions)
[4] Bicycle network refers to routes designated by the Town's Trails Master Plan, or in other Town Policy

- Once the petition form is completed and submitted to the Town, staff would review the project's effectiveness and potential problems associated with its removal and submit a formal report to Council with their recommendations.
- If recommended for removal and approved by Council, property owners within the study area would share the cost of the removal.
- If removed, no request a traffic calming study will be considered at that location for at least three years.

6.Program Planning & Resource Requirements

Resource requirements encompass a variety of factors and shall be considered upon the start of all traffic calming projects. The number of traffic calming initiatives undertaken annually will depend on the Town's Capital Budget allocation for traffic calming projects and availability of staff resources. The list of approved projects and their priority ranking will be maintained and updated annually. Depending on the types of traffic calming measures installed, materials used and extent of their application, the cost of implementation will vary. Where funding is limited, a phased project implementation plan shall be considered.

The evaluation of new traffic calming requests shall be coordinated with the annual construction schedule, or two times per year.

The following sections outline the costs associated with a traffic calming program.

6.1 Administration Costs

Administration Costs include staff time to obtain and analyze data, ongoing prioritizing of requests, public consultation and design of traffic calming measures. The associated costs for administration would fall under the normal operating budget by utilizing existing staff and resources.

6.2 Capital Costs

Capital Costs relate to the construction of traffic calming devices. Traffic calming capital costs will be solely the responsibility of the Town.

6.3 Operations and Maintenance Costs

The costs for maintaining the traffic calming device shall be the responsibility of the Town. However, if the device in the future has a request for removal than the associated cost shall be the responsibility of the residents and stakeholders affected.

Winter Maintenance of Traffic Calming Devices

The design and implementation of traffic calming devices must include a consideration of winter maintenance to ensure their year-round effectiveness and safety, and to ensure plowing and other winter maintenance activities are not unduly impacted. The *Canadian Guide to Traffic Calming* includes notes on the experiences of other Canadian municipalities with similar winter conditions to the Town of Innisfil and their approach to traffic calming. In general, devices can be used successfully in all four seasons, with the following considerations:

Vertical Deflection

- Snow clearing time may be increased.
- Plow operators must slow at edge of vertical deflection devices to avoid damage. Some plows may be required to lift the blade.
- Locations of vertical deflection devices should be marked by signage.

Horizontal Deflection and Obstructions

- Signage or vertical delineators should be employed to mark edges of irregular curbs.
- The design of traffic circles or roundabouts should include radii that plows can circulate.
- On-street parking should be restricted during and/or after snowfalls to facilitate plowing.
- Little or no increase in snow clearing time expected, depending on the device employed.

The temporary alternatives outlined above may also be removed during winter months, recognizing that their associated traffic calming benefits would then also be lost.

TOWN OF INNISFIL
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POLICY: **Speed Limits**	**COUNCIL APPROVAL DATE:** **RES. NO.: CR-…XX – (*Indicate Council Resolution Number here)***
POLICY NO.: ***XX.XXX*-XX *(Number assigned by Clerk Services)***	**REVISED DATE: January 23, 2018** **RES. NO.: CR-….XX**

1. PURPOSE

The objective is to implement consistent, enforceable and safe speed limits in urban areas; and in rural areas, to set speed limits consistent with driver expectation, roadway environment, road function, and in consideration of community needs.

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2. SCOPE/APPLICATION:

2.1 Background

Speed regulations and controls aid the motorist in selecting speeds that are safe for the prevailing conditions. The maximum safe speed at any location will vary as road geometry, traffic demands and road environment change.

The decision of defining specific speed limits must take into consideration legislative limitations, public recognition and understanding, ease of implementation, capital and maintenance costs, and adherence to recognized engineering standards and practices.

2.2 Highway Traffic Act

The **Highway Traffic Act of Ontario** (the "HTA") Section 128.1 provides that roads within a city, town, village, police village or built-up area have a statutory speed limit of 50 km/hr, unless otherwise designated. Outside of these areas, the statutory speed limit is 80 km/hr, unless otherwise designated. The HTA requires that signage be placed where the speed limit varies from the statutory requirement.

2.3 Existing Conditions

Many urban roads have no regulatory speed signage and as such, implicitly have a 50 km/hr limit. Lower speed limits have been implemented adjacent to elementary schools, in order to address site specific concerns. Speed limits of 60 km/hr are typical on higher order roads with limited or no access/egress points between intersections. Many rural roads also have no regulatory speed signage and as such, implicitly have an 80 km/hr speed limit. Lower speed limits have been implemented in order to address site specific concerns.

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2.3.1 Considerations in Selecting Speed Limits

Speed regulations and controls aid the motorist in selecting speeds that are safe for the prevailing conditions. The maximum safe speed at any location will vary as road geometry, traffic demands and road environment change.

The decision of defining specific speed limits must take into consideration legislative limitations, public recognition and understanding, ease of implementation, capital and maintenance costs for the design speed geometric requirements and adherence to recognized engineering standards and practices.

The system of road hierarchy allocates different functions and roles for local, collector and arterial roads (see **Attachment A** that summarizes the characteristics of urban road classifications and **Attachment B** that summarizes the characteristics of rural road classifications according to the **Transportation Association of Canada's Geometric Design Guide for Canadian Roads)**. Where higher order roads have appropriate capacity and mobility (including operating speed), higher order roads will continue to serve their primary function of traffic movement, and reduce the likelihood of traffic infiltration through lower order roads.

On urban arterial roads with higher design speeds, consideration should be given to speeds of 60 km/hr. On urban local and collector roads, a preferred speed of 50 km/hr should be kept in mind.

Local roads typically have equal or lower operating speeds reflecting the primary role of facilitating land access. A 40 km/hr speed limit should be considered where location specific conditions dictate, such as:

- School frontage of elementary schools, or
- Geometric characteristics contributing to road elements with a design speed (e.g. sight distance or horizontal or vertical curvature) of less than 60 km/hr.
- Local residential roads located in settlement areas.

Whenever possible, design speed should exceed the posted speed limit by 20 km/h.

Posted speeds on some sections of the Town's road network have been lowered to address community concerns or better reflect the road environment or design. In some instances, in rural road environments, Town of Innisfil roads have higher posted speeds than adjacent Simcoe County roads. In these circumstances, traffic may be encouraged to travel on Town roads rather

than the adjacent County roads, despite that the latter may have a higher design standard and higher road function.

2.3.2 Enforcement

Law Enforcement is a fundamental part of speed management. It reinforces the effectiveness of speed zoning by the enforcing of posted speed limits. The charges applied (e.g. fines, demerit points) act as a deterrent. The visible presence of police reminds people to behave less aggressively. Law Enforcement plays a vital role in enforcing posted speed limits, both in terms of charges applied (e.g. fines, demerit points) and public presence.

Enforcement in the Town of Innisfil is provided by South Simcoe Police Service (North Division) and by Ontario Provincial Police. These officers are the front line in speed enforcement.

It is recognized that enforcement is an essential element to the speed management strategy, however, the policy should reflect that Police resources are limited and do not permit enforcement to be a sole solution to speeding issues.

3. EXCEPTIONS

None

4. RESPONSIBILITY

Capital Engineering Services

5. DEFINITIONS:

Speed Limit – the maximum vehicular speed allowed within any given posted or unposted Speed Zone.

Local Road – A street or road primarily for access to residence, business or other abutting property.

Collector Road – A road for which vehicle movement and access are of equal importance. Direct access to adjacent properties may be permitted in some cases, typically in lower-density residential areas. Intersections are spaced at varying intervals

and are typically only signalized where the collector road intersects an arterial road or in some cases another collector road.

Arterial Road – A Major Road, used primarily for through traffic rather than for access to adjacent land, that is characterized by high vehicular capacity and continuity of movement. Intersections are spaced relatively far apart and are frequently signalized.

Heritage Conservation District – A District designated by the Town of Innisfil pursuant to subsection 41(1) of the *Ontario Heritage Act*, R.S.O. 1990, c.O.18, as amended.

Unprotected Shared Use Pathway – An active transportation pathway (for use by pedestrians, bicyclists, and others) which is adjacent to the travel lanes of the road and is not separated from those travel lanes by a curb, buffer, guiderail, plantings, or structures.

School Zone – A school zone is defined by first the abutting streets that are used for the drop-off and pick-up of students adjacent to the school property. Secondly the school zone may encompass one or more blocks beyond the school property where school crossings may exist or it is determined that prior notice of the school area is necessary.

Urban Area – For the purposes of this policy, an urban area shall be defined as:

1) Any part of the Town of Innisfil which falls within the settlement boundaries of Alcona, Cookstown, Lefroy Belle Ewart, Sandy Cove, Innisfil Heights, Stroud, or Big Bay Point.
2) Any area which meets the definition of a “built-up area” in the Highway Traffic Act:
    a. not less than 50 per cent of the frontage upon one side of the highway for a distance of not less than 200 metres is occupied by dwellings, buildings used for business purposes, schools, or churches,
    b. not less than 50 per cent of the frontage upon both sides of the highway for a distance of not less than 100 metres is occupied by dwellings, buildings used for business purposes, schools or churches, or
    c. not more than 200 metres of the highway separates any territory described in clause (a) or (b) from any other territory described in clause (a) or (b),

Rural Area – For the purposes of this policy, a rural area shall be defined as any area which does not meet the definition of an Urban Area

6. POLICY STATEMENT

POLICY: **Speed Limits**	**COUNCIL APPROVAL DATE:** **RES. NO.: CR-…XX – (*Indicate Council Resolution Number here)***
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The following policy is for the setting of speed limits on Town roads. A checklist is provided in **Attachment C**.

6.1 Urban Speed Limits

The Highway Traffic Act (HTA) of Ontario provides that roads within a city, town, village, police village or built-up area have a statutory speed limit of 50km/hr unless otherwise designated. Based on the Highway Traffic Act, signage is required on urban Town roads where the speed limit varies from the statutory 50km/hr.

The Made in Innisfil urban road speed limits policy endeavors to set speeds that are consistent with the HTA. In urban areas, posted speed limits will continue to be 60 km/h on urban arterial roads and 50 km/h on urban local and collector roads.

Reduced speed limit designation will be given to areas such as:

- School zones or proximity to schools which will be set at 40km/h during school hours where signed; and
- Locations with unfavourable geometric characteristics contributing to road elements with design speeds of 60km/h or less (sight distance, horizontal or vertical curvature). The speed limit shall be set at or below the speed indicated by the geometric restriction.Local roads located within settlement areas.
- Where Town roads are within the area of influence (1.5 km) of a County Road with lower posted speeds, a reduction of 10km/hr on the Town road speed limit is to be considered.
- Heritage Conservation Districts
- Locations with unprotected shared use pathways

Transitions between one speed limit and another shall be no less than 500m apart for arterial roads and 250m for collector and local roads.

6.2 Rural Speed Limits

The HTA of Ontario provides that roads outside of the above designation of roads are 80km/h. Based on the HTA, signage is required on a rural Town road where the speed limit varies from the statutory 80km/h.

Rural road speed limit designation will not divert from the HTA as the current speed limits are reasonable for the Town of Innisfil rural roads.

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Rural roads shall have a speed limit of 80 km/h, unless reduced speed designation is appropriate due to:

- A school zone. In an 80 km/h zone, the speed limit may be reduced to 60 km/h in the vicinity of the school. In a 60 km/h zone, the speed limit may be reduced to 40km/h;
- Unfavourable geometric characteristics contributing to road elements with design speeds (sight distance, horizontal or vertical curvature) of 90 km/h or less. The speed limit shall be set at or below the speed indicated by the geometric restriction;
- Where Town roads are within the area of influence (1.5 km) of a County Road with lower or higher posted speeds, the Town may consider increasing or decreasing the speed limit by 10 km/h on the Town road, bringing the Town road closer to the speed of the County road; Reduced speed limit designations may also be considered in locations with unprotected shared use pathways.

Transitions between one speed limit and another shall be no less than 1.0 km apart for arterial roads and 500m for collector and local roads. The speed differential between to speed limits within the transition shall be no greater than 20 km/h.

6.3 School Zone Signing

Illuminated or flashing school zone signs are for use where reduced speed limits only apply during certain hours of the day. The timing of the flashing lights shall be limited to the operating times of the adjacent school. These times are typically no earlier than 8:00am and no later than 5:00pm on weekdays. Such signs shall also be accompanied by signage stating that the lower speed limit is only in force while lights are flashing.

6.4 Heritage Conservation Districts

Speed limits lower than those identified in section 6.1 may at times be appropriate in a Heritage Conservation District. Speed limits in Heritage Conservation Districts should be compatible with the intent of the relevant Heritage Conservation District Plan and the *Ontario Heritage Act*, and should reflect the pedestrian focus of most Heritage Conservation Districts. However, traffic volumes, 85th percentile speed, speed limits on neighbouring road sections, and infiltration onto neighbourhood streets should be considered before enacting any speed limit adjustment.

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For arterial roads in Heritage Conservation Districts, the designer shall consider 40 km/h and 50 km/h as well as the standard 60 km/h. For local and collector roads, the designer shall consider 40 km/h as well as the standard 50 km/h.

6.5 Unprotected Shared Use Pathways

In locations with unprotected shared use pathways, whether in urban or rural areas, the Town may consider decreasing the speed limit by 10 km/h to a speed no less than 40 km/h.

6.6 Local Residential Roads Located in Settlement Area Speed Limits

To further improve the safety of local residential roads in settlement areas for all users who walk, cycle, or drive, the speed limits should be no higher than 40 km/hr. Signage notifying of the speed reduction should be accompanied by flashing signal indications or dynamic speed signs, as well as road designs to reduce the speed of vehicles and traffic calming measures.

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Attachment A: Characteristics of Urban Roads (Transportation Association of Canada, 1999)

Table 1.3.4.2 Characteristics of Urban Roads

	Public Lanes	Locals	Collectors	Arterials		Expressways	Freeways
	Residential Commercial	Residential Indust./Comm.	Residential Indust./Comm.	Minor	Major		
traffic service function	traffic movement not a consideration	traffic movement secondary consideration	traffic movement and land access of equal importance	traffic movement major consideration	traffic movement primary consideration	traffic movement primary consideration	optimum mobility
land service / access	land access only function	land access primary function	traffic movement and land access of equal importance	some access control	rigid access control	no access	no access
traffic volume (veh/day) (typical)	<500 <1000	<1000 <3000	<8000 1000 – 12 000	5000 – 20 000	10 000 – 30 000	>10 000	>20 000
flow characteristics	interrupted flow	interrupted flow	interrupted flow	uninterrupted flow except at signals and crosswalks		uninterrupted flow except at signals	free-flow (grade separated)
design speed (km/h)	30 - 40	30 - 50	50 - 80	50 - 70	60 - 100	80 - 110	80 - 120
average running speeds (km/h) (off-peak)	20- 30	20 - 40	30 - 70	40 - 60	50 - 90	60 - 90	70 - 110
vehicle type	passenger and service vehicles all types	passenger and service vehicles all types	passenger and service vehicles all types	all types	all types up to 20% trucks	all types up to 20% trucks	all types up to 20% trucks
desirable connections	public lanes, locals	public lanes, locals, collectors	locals, collectors, arterials	collectors, arterials, expressways, freeways		arterials, expressways, freeways	arterials, expressways, freeways
transit service	not permitted	generally avoided	permitted	express and local buses permitted		express buses only	express buses only
accommodation of cyclists	no restrictions or special facilities	no restrictions or special facilities	no restrictions or special facilities	lane widening or separate facilities desirable		prohibited	prohibited
accommodation of pedestrians	pedestrians permitted, no special facilities	sidewalks normally on one or both sides provided where required	sidewalks provided both sides sidewalks provided where required	sidewalks may be provided, separation for traffic lanes preferred		pedestrians prohibited	pedestrians prohibited
parking (typically)	some restrictions	no restrictions or restrictions one side only	few restrictions other than peak hour	peak hour restrictions	prohibited or peak hour restrictions	prohibited	prohibited
min. intersection spacing[1] (m)	as needed	60	60	200	400	800	1600 (between interchanges)
right-of-way width (m) (typically)	6 - 10	15 - 22	20 - 24	20^2 - 45[3]		>45[3]	>60[3]

Notes:
1. Further information on intersection spacing is provided in Chapter 2.3, Intersections.
2. Arterial rights of way 20 m in width applicable to retrofit conditions only.
3. Wider rights of way are often required to accommodate other facilities such as utilities, noise mitigation installations, bikeways, and landscaping. For new streets, the immediate provision of wider rights of way may be considered to accommodate such facilities.

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Attachment B: Characteristics of Rural Roads (Transportation Association of Canada, 1999)

Design Classification

Table 1.3.4.1 Characteristics of Rural Roads

	Rural Locals	Rural Collectors	Rural Arterials	Rural Freeways
service function	traffic movement secondary consideration	traffic movement and land access of equal importance	traffic movement primary consideration	optimum mobility
land service	land access primary consideration	traffic movement and land access of equal importance	land access secondary consideration	no access
traffic volume vehicles per day (typically)	<1000 AADT	<5000 AADT	<12 000 AADT	>8000 AADT
flow characteristics	interrupted flow	interrupted flow	uninterrupted flow except at	freeflow (grade separated) major intersections
design speed (km/h)	50 - 110	60 - 110	80 - 130	100 - 130
average running speed (km/h) (free flow conditions)	50 - 90	50 - 90	60 - 100	70 - 110
vehicle type	predominantly passenger cars, light to medium trucks and occasional heavy trucks	all types, up to 30% trucks in the 3 t to 5 t range	all types, up to 20% trucks	all types, up to 20% heavy trucks
normal connections	locals collectors	locals collectors arterials	collectors arterials freeways	arterials freeways

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Attachment C: Checklist for Setting Speed Limits

The following check list is to be used in conjunction with the Speed Limit Policy document when considering changing the statutory speed limit.

Location of Road in Question: _____
_____

Date Inquiry was received: _____
Date Inquiry was completed: _____
Name of Reviewer: _____

Section 1

What is the road type? Urban ☐ Rural ☐

What is the road class? Arterial ☐ Collector ☐ Local ☐

Please continue to appropriate subsection of Section 2.

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Section 2

2.1 Urban Arterial
Posted speeds shall be set at 60 km/hr and signed as such unless reduced speed designation is appropriate.

The following are reasons for reduced speed designation. Please check those that apply to the road section being examined.

1. School Zone ☐
   - Speeds shall be reduced to 40 km/hr in school zones. Transition space required is 500m. Flashing lights indicating when the reduced speed zone is in effect shall accompany the reduced speed zone sign.

2. Geometric characteristics that contribute to road elements (sight distance or horizontal or vertical curvature) ☐
   - A reduction to 50 km/hr is to be considered. Transition space required is 500m.

3. Where Town roads are within the area of influence (1.5 km) of a County Road with lower or higher posted speeds ☐
   - A reduction or increase of 10km/hr on the Town road, to bring it closer to the County Road speed limit, is to be considered.
     Transition space required is 500m.

4. Within a Heritage Conservation District or ☐
   where there is an unprotected shared use pathway
   - A reduction of 10km/h is to be considered (20 km/h may be considered for a Heritage Conservation District). Transition space required is 500m.

If concern has been addressed, please move onto recommendations sections. If concern has not been addressed, then no recommendations can be made at this time.
Recommendations

1. The speed limit shall remain at 60 km/hr. ☐
2. The speed limit shall change to 50km/hr. ☐
3. The speed limit shall change to 40 km/hr. ☐

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2.2 Urban Collector
Posted or statutory speeds shall be set at 50 km/hr unless reduced speed designation is appropriate.

The following are reasons for reduced speed designation. Please check those that apply to the road section being examined.

1. School Zone ☐
   - Speeds shall be reduced to 40 km/hr in school zones. Transition space required is 250m. Flashing lights indicating when the reduced speed zone is in effect shall accompany the reduced speed zone sign.

2. Geometric characteristics that contribute to road elements (sight distance or horizontal or vertical curvature) ☐
   - A reduction to 40 km/hr is to be considered. Transition space required is 250m.

3. Where Town roads are within the area of influence (1.5 km) of a County Road with lower or higher posted speeds. ☐
   - A reduction or increase of 10km/hr on the Town road, to bring it closer to the County Road speed limit, is to be considered.
     Transition space required is 250m.

4. Within a Heritage Conservation District or ☐
   where there is an unprotected shared use pathway
   - A reduction of 10km/h is to be considered. Transition space required is 250m.

If concern has been addressed, please move onto recommendations sections. If concern has not been addressed, then no recommendations can be made at this time.

Recommendations

4. The speed limit shall remain at 60 km/hr. ☐
5. The speed limit shall change to 50km/hr. ☐
6. The speed limit shall change to 40 km/hr. ☐

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2.3 Urban Local

Posted or statutory speeds shall be set at 50 km/hr unless reduced speed designation is appropriate.

The following are reasons for reduced speed designation. Please check those that apply to the road section being examined.

1. School Zone ☐
   - Speeds shall be reduced to 40 km/hr in school zones. Transition space required is 250m. Flashing lights indicating when the reduced speed zone is in effect shall accompany the reduced speed zone sign.

2. Geometric characteristics that contribute to road elements (sight distance or horizontal or vertical curvature) ☐
   - A reduction to 40 km/hr is to be considered. Transition space required is 250m.

3. Where Town roads are within the area of influence (1.5 km) of a County Road with lower or higher posted speeds ☐
   - A reduction or increase of 10km/hr on the Town road, to bring it closer to the County Road speed limit, is to be considered.
     Transition space required is 250m.

4. Within a Heritage Conservation District or where there is an unprotected shared use pathway ☐
   - A reduction of 10km/h is to be considered. Transition space required is 500m.

5. Local Residential Roads Located in Settlement Areas ☐
   - A reduction to 40 km/hr is to be considered.

If concern has been addressed, please move onto recommendations sections. If concern has not been addressed, then no recommendations can be made at this time.

Recommendations

7. The speed limit shall remain at 50 km/hr. ☐
8. The speed limit shall change to 50km/hr. ☐
9. The speed limit shall change to 40 km/hr. ☐

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2.4 Rural Arterial
Posted speeds shall be set at 80 km/hr unless reduced speed designation is appropriate.

The following are reasons for reduced speed designation. Please check those that apply to the road section being examined.

1. School Zone
   - Speeds shall be reduced to 60 km/hr in school zones. Transition space required is 1km. Flashing lights indicating when the reduced speed zone is in effect shall accompany the reduced speed zone sign. ☐

2. Geometric characteristics that contribute to road elements (sight distance or horizontal or vertical curvature) ☐
   - A reduction to 60 km/hr is to be considered. Transition space required is 1km.

3. Where Town roads are within the area of influence (1.5 km) of a County Road with lower or higher posted speeds
   - A reduction or increase of 10km/hr on the Town road, to bring it closer to the County Road speed limit, is to be considered. ☐
     Transition space required is 1km.

4. Where there is an unprotected shared use pathway ☐
   - A reduction of 10km/h is to be considered. Transition space required is 500m.

If concern has been addressed, please move onto recommendations sections. If concern has not been addressed, then no recommendations can be made at this time.

Recommendations

1. The speed limit shall remain at 80 km/hr. ☐

2. The speed limit shall change to 70km/hr. ☐

3. The speed limit shall change to 60 km/hr. ☐

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2.5 Rural Collector
Posted speeds shall be set at 80 km/hr unless reduced speed designation is appropriate.

The following are reasons for reduced speed designation. Please check those that apply to the road section being examined.

1. School Zone
   - Speeds shall be reduced to 60 km/hr in school zones. Transition space required is 500m. Flashing lights indicating when the reduced speed zone is in effect shall accompany the reduced speed zone sign. ☐

2. Geometric characteristics that contribute to road elements (sight distance or horizontal or vertical curvature) ☐
   - A reduction to 60 km/hr is to be considered. Transition space required is 500m.

3. Where Town roads are within the area of influence (1.5 km) of a County Road with lower or higher posted speeds ☐
   - A reduction or increase of 10km/hr on the Town road, to bring it closer to the County Road speed limit, is to be considered.
     Transition space required is 500m.

4. Where there is an unprotected shared use pathway ☐
   - A reduction of 10km/h is to be considered. Transition space required is 500m.

If concern has been addressed, please move onto recommendations sections. If concern has not been addressed, then no recommendations can be made at this time.

Recommendations

10. The speed limit shall remain at 80 km/hr. ☐
11. The speed limit shall change to 70km/hr. ☐
12. The speed limit shall change to 60 km/hr. ☐

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2.6 Rural Local
Posted speeds shall be set at 80 km/hr unless reduced speed designation is appropriate.

The following are reasons for reduced speed designation. Please check those that apply to the road section being examined.

1. School Zone
   - Speeds shall be reduced to 60 km/hr in school zones. Transition space required is 500m. Flashing lights indicating when the reduced speed zone is in effect shall accompany the reduced speed zone sign. ☐

2. Geometric characteristics that contribute to road elements (sight distance or horizontal or vertical curvature) ☐
   - A reduction to 60 km/hr is to be considered. Transition space required is 500m.

3. Where Town roads are within the area of influence (1.5 km) of a County Road with lower or higher posted speeds ☐
   - A reduction or increase of 10km/hr on the Town road, to bring it closer to the County Road speed limit, is to be considered.
     Transition space required is 500m.

4. Where there is an unprotected shared use pathway ☐
   - A reduction of 10km/h is to be considered. Transition space required is 500m.

If concern has been addressed, please move onto recommendations sections. If concern has not been addressed, then no recommendations can be made at this time.

Recommendations

1. The speed limit shall remain at 80 km/hr. ☐
2. The speed limit shall change to 70km/hr. ☐
3. The speed limit shall change to 60 km/hr. ☐

Memo

Date:	Monday, March 12, 2018
Project:	Town of Innisfil Transportation Master Plan Update
To:	Town of Innisfil
From:	HDR
Subject:	Sidewalk Prioritization Policy – DRAFT#6

Background

As identified in the Town of Innisfil's Transportation Master Plan (TMP, August 2013), Draft Official Plan Our Place (OP, 2017) and Trails Master Plan, the Town of Innisfil (Town) has an objective to increase its walkability and a strategic need to improve active transportation connections. As part of the current TMP Update, there is an opportunity to establish a policy to prioritize upgrades and improvements to existing sidewalks.

Sidewalk improvements in the Town's transportation network will address many objectives listed in Section 10: Urban Residential Areas of the draft OP. The Section 10 draft OP objectives and their relevance to sidewalks are summarized in **Table 1**.

Table 1: Official Plan Section 10 Objectives

Official Plan Section 10 Objective	Relevance of Sidewalks
1. To provide for a range of mobility options for residents.	Sidewalks accommodate users of all ages and abilities.
2. To provide complete streets that are safe and comfortable for all users and accommodate the needs of all transportation modes – cars, pedestrians, transit and cyclists.	Sidewalks provide separation between pedestrians and vehicles, and flat paved surfaces accessible to those requiring mobility assistance devices. This enhances the safety and comfort of different users.
3. To facilitate the safe movement of people, cars and goods to and from various communities within the Town and to and from the adjacent municipalities.	Sidewalks enhance the safe movement of people by providing physical separation between pedestrians and vehicles.
5. To provide pedestrian, cyclists and automobile access to the Town's recreational, shopping and industrial areas.	Sidewalks increase connectivity and accessibility to key recreational, shopping and industrial areas for pedestrians.
8. To provide transit service throughout the Town with a priority to connect the Primary and Urban Settlements.	Sidewalks enhance transit service by improving first and last mile connections to transit stops/stations for pedestrians.
9. To improve and expand the trail system in the Town.	Sidewalks enhance the trail system in the Town by improving connections to/from the trail system for pedestrians.

In addition, the Town's Trails Master Plan (2017) was reviewed to identify key pedestrian attractors and concerns reported by residents. The public opinion survey, undertaken as part of the Trail's Master Plan, indicated strong public support for enhanced pedestrian access, particularly to recreational facilities and facilities oriented towards vulnerable users (i.e. children and the elderly), such as beaches, parks, playgrounds, and open spaces. Sidewalk condition and road safety surrounding schools, recreational centres and parks were key concerns for residents.

Objective

Many roads within the Town's jurisdiction provide an opportunity to enhance the existing pedestrian network, however there are limited funds available for construction each year. There is a need to identify and prioritize improvements so funding can be allocated accordingly.

In some locations existing sidewalks do not meet accessibility and mobility needs of residents. The objective of this policy is to establish the decision-making rationale for prioritizing upgrades and improvements to sidewalks in existing and potential future settlement areas. This framework should be consistent with achieving the objectives of the Trails Master Plan and draft OP, and consider public input.

Review of Other Jurisdictions

Many municipalities in North America have similar objectives and challenges for sidewalk implementation, and have established policies for prioritizing sidewalk improvements. The sidewalk prioritization policies for the following jurisdictions were reviewed for this assignment:

- City of Peterborough, Ontario
- City of Owatonna, Minnesota
- Orange Township, Ohio
- Town of Waxhaw, North Carolina
- City of Burlington, Vermont

These jurisdictions were selected because their established sidewalk prioritization policies were readily available for review. Many of the criteria identified in the prioritization policies were similar across jurisdictions and could generally be grouped into seven categories: existing sidewalk condition, Accessibility for Ontarians with Disabilities Act (AODA) requirements, Trails Master Plan conformance, land use/connectivity, road characteristics, public support, and constructability/cost. Examples of sub-criteria by category are presented in **Table 2**. These categories and sub-criteria informed the basis of the Town's prioritization measures.

Table 2: Sidewalk Prioritization Criteria

Sub criteria	Notes
EXISTING SIDEWALK CONDITION	
Surface, curb, and boulevard condition	• Examine whether the sidewalk is cracked or uneven, and whether it could impede pedestrian movement (especially for the mobility impaired). • Unmaintained or narrow boulevard could impact the comfort and safety of all road users.
AODA REQUIREMENTS	
Sidewalk width	• 1.5m minimum sidewalk width, 1.8m recommended.
Slope	• Should not exceed the running slope of the adjacent roadway, nor should the sidewalks cross-slope exceed 1:20.
Curb ramps or depressions	• Curb ramps: 1.2m minimum clear width, 1:8 maximum running slope • Depressed curb: Should align with the direction of travel and have a maximum running slope of 1:20.
TRAILS MASTER PLAN CONFORMANCE	
Trails Master Plan Identification	• Review for conformance with to the Town of Innisfil Trails Master Plan (2016), Appendix A – Recommended Active Transportation Network Maps.
LAND USE/CONNECTIVITY	
Proximity to existing or planned pedestrian trip generators	• Sidewalks should be given priorities for locations with more trip generators. • Trip generators can include existing and planned residential, commercial, and office lands, retirement or nursing homes, medical facilities, tourist attractions, downtown commercial zones, or shopping centres. • Proximity to trip generators is generally considered from 400m to 1500m.
Provides connection to one or more existing or planned public facilities or school zones	• Public facilities can include libraries, art galleries, or recreational centres. • Considerations for school zones should include designated walking zones, number of walkers, impact on bus needs (i.e. missing sidewalks require students within the walking zone to be bused) in consultation with the school boards and transportation providers (i.e. Simcoe County Student Transportation Consortium).
Provides connection to existing or planned transit facility	• Can consider roads that are bus routes and/or proximity to stops/stations.
Connectivity to the existing sidewalk/trail network	• Can consider proximity to existing trails or sidewalks. • Priority should be given to roads that have no sidewalks on either side of the road.
Evidence of pedestrian use	• Beaten paths along roads can identify existing pedestrian demand.
ROAD CHARACTERISTICS	
Road Classification	• Priority should be given to arterial roads with four or more lanes compared to smaller arterial, collector or local roads.
Posted Speed Limit	• Priority should be given to roads with higher posted speeds.
Average Annual Daily Traffic (AADT)	• Priority should be given to roads with higher AADT.
PUBLIC SUPPORT	
Public Support	• Priority should be given based the number of resident requests for sidewalk improvements within the preceding year.
CONSTRUCTABILITY/COST	
Constructability	• Factors can include available right-of-way, existing curb-and-gutter, utility relocations, and impact to sensitive environmental features.
Cost	• Priority should be given based on the estimated cost, while others identify the cost to aid decision-making and confirm through a benefit/cost analysis. • This may also consider factors such as the need/complexity of the design and the availability of third party funding.

Methodology

The methodology for Innisfil's sidewalk prioritization should align with the objectives identified in the TMP and draft OP, and have data requirements that are readily met by the Town. The Draft Complete Streets Implementation Guidelines, which are being developed in parallel to this document, should also be aligned with sidewalk prioritization.

Building on the seven categories and sub-criteria identified from the jurisdiction policy review, the sidewalk prioritization methodology for Innisfil proposes an approach including seven major criteria categories. The methodology also includes a point system similar to those used in other jurisdictions which assesses a significant level of detail with respect to adjacent land use.

The maximum score based on this methodology is 100. A higher number of points indicates the sidewalk should be given higher priorities for upgrades. The proposed point system for the recommended methodology is shown in **Table 3**. The table also indicates the criteria's alignment with the Town's OP and TMP, and anticipated source of data for the assessment.

In general, the draft point allocations have been estimated to prioritize safety and the needs of low-mobility and/or vulnerable pedestrians. The draft thresholds have been estimated based on the 2013 TMP, the AODA Design of Public Spaces Standards, and in consideration of the rural/semi-rural/village context of the Town. The range and thresholds for each criteria should be refined based on the Town's specific characteristics.

Table 3: Recommended Methodology – Simplified Point System (out of 100%)

Criteria	Description	Draft Point Allocation			Alignment with TMP and DRAFT OP	Data Availability
Existing Sidewalk Condition: TOTAL POINTS AVAILABLE: 30% or 30 PTS						
Surface, Curb, and Boulevard condition	Assigning points based on the overall condition of the sidewalk surface and curb. Sidewalks in worse condition will receive higher points.	**Good**	New or recently constructed, occasional cracks but no significant decay. No missing or broken bays, trip ledges, spalling, heaving and stepping, presence of ponding, or damage by tree roots. Wide boulevard width.	0	Enhances comfort, safety, and ease of use for pedestrians, especially those with limited mobility.	Requires site visit, survey
		Fair	Some cracks and weathering, uneven in places. Some presence of broken bays, trip ledges, spalling, heaving and stepping, ponding, and damage by tree roots. Sufficient boulevard width.	15		
		Poor	Heavily cracked and uneven. Considerable presence of broken bays, trip ledges, spalling, heaving and stepping, ponding, and damage by tree roots. Insufficient or no boulevard width.	30		
AODA Requirements: TOTAL POINTS AVAILABLE: 20% or 20 PTS						
Sidewalk width	Points are awarded to sidewalks that are less than 1.8m wide. An even greater number of points given if it's width is less than 1.5m.	Width >= 1.8m: 0 points 1.5m < Width <1.8m: 5 points Width < 1.5m: 10 points			Helps to ensure that pedestrian facilities are accessible to all users by meeting AODA design standards.	GIS Mapping/ Aerial Photography/ Site visits
Slope	AODA requirements state that the slope of a sidewalk	Slope meets AODA requirements:5 points			Helps to ensure that pedestrian facilities	Topographical survey / Site

Criteria	Description	Draft Point Allocation	Alignment with TMP and DRAFT OP	Data Availability
	should not exceed that of the adjacent roadway, and that the cross-slope should not exceed 1:20. If the sidewalk segment does not meet these requirements, points will be added.		are accessible to all users by meeting AODA design standards.	visits/ AODA Design of Public Spaces Standards
Curb ramps or depressions	Points will be added if the sidewalk does not contain curb ramps or depressions that meet AODA standards. Further points awarded if Tactile Walking Surface Indicators are not present.	Curb ramps or depressions do not meet AODA standards: 3 points No Tactile Walking Surface Indicators: 2 points	Helps to ensure that pedestrian facilities are accessible to all users by meeting AODA design standards.	Aerial Photography/ Site visits/ AODA Design of Public Spaces Standards
Land Use/Trip Generators/Connectivity: 10% or 10PTS				
Trails Master Plan Identification	Award points if the sidewalk or sidewalk segment is identified as a candidate for improvements in the Trails Master plan.	10 points		2016 Trails Master Plan
Land Use/Trip Generators/Connectivity: 10% or 10PTS				
Proximity to institutional, medical, retirement/care, recreational, community or tourist facilities, major employers, commercial area	Award points for each facility based on the walk score measurement. The website analyzes proximity to certain amenities within walking distance.	**Performance measure** — **Points** Walk Score > 50 — 5 Walk Score between 0 and 50 — 3 Walk Score n/a — 0	Enhances mode choice and safety for pedestrians, people with limited mobility, and vulnerable users.	www.walkscore.com
Located within a future residential and commercial area	Award points if the sidewalk is within a potential future residential and commercial area as defined in the OP.	5 points	Enhances connectivity and mode choice for residents.	Town land use designations
Located close to	Award points if the sidewalk	5 points	Enhances mode	Simcoe Student

Criteria	Description	Draft Point Allocation	Alignment with TMP and DRAFT OP	Data Availability
vulnerable users, such as including school zones and retirement homes.	or sidewalk segment is within the designated walking zone of an elementary or secondary school as identified by the Simcoe Student Transportation Consortium and is 400m within senior's centres		choice and safety for pedestrians, people with limited mobility, and vulnerable users (children, elderly, and people with disabilities)	Transportation Consortium, location for retirement homes
Proximity to a transit station /stop/Uber pick-up zone	Award points if there is a transit station/stop/on-demand transit stop within 800 m.	5 points	Enhances transit service by improving connections to transit stops/stations for pedestrians.	Transit service map
Road Characteristics: 10% or 10 PTS				
No sidewalks on either side	Award points if there is currently a sidewalk on only one side of the road/road segment or not sidewalk	3 points	Enhances connectivity, mode choice, and safety for pedestrians.	GIS Mapping
Number of lanes	Award points based on number of lanes. More points should be awarded to wider road.	4-Lanes or greater: 2 points 2-Lanes: 1 points Cul-de-sac/dead-end: 0 points	Enhances the safety and comfort of road users by providing separation between pedestrians and vehicles.	GIS Mapping
Posted Speed Limit	Award points based on the posted speed limit. More points should be awarded to roads/road segments with higher posted speed limits.	70 km/h or higher: 3 points 60 km/h: 2 points 50 km/h: 1 points Less than 50 km/h: 0 points	Enhances the safety and comfort of road users by providing separation between pedestrians and vehicles.	GIS Mapping

Criteria	Description	Draft Point Allocation	Alignment with TMP and DRAFT OP	Data Availability
AADT	Award points to roads/road segments with greater Average Annual Daily Traffic.	Greater than 4,000: 2 points 2,000-4,000: 1 point Less than 2,000: 0 point	Enhances the safety and comfort of road users by providing separation between pedestrians and vehicles.	Traffic group/TMP/Traffic model
Public Support: 10% or 10 PTS				
Number of requests	Award points based on number of requests received from the public in the preceding year.	More than 10 requests: 10 points 5 – 10 requests: 5 points 1- 5 requests: 3 points	Increases the range of travel options for residents. Potentially addresses existing pedestrian demand.	Town public comment / request log / database
Constructability/Cost: 10% or 10 PTS				
Available right-of-way	Award points if there is sufficient right-of-way or road platform to widen the sidewalk to 1.8m without additional property or significant changes to the road cross section (i.e. rural ditching versus urbanization.)	3 points	Facilitates prioritization of projects that can be completed easily. Roads that need additional right-of-way may be subject to greater regulatory requirements (i.e. environmental assessment).	GIS Mapping
Utility impacts	Award points if there are no impacts to existing utilities that would need to be relocated for sidewalk improvements to take place.	2 points	Facilitates prioritization of projects that can be completed without extensive additional work.	GIS Mapping/ Aerial Photography/ Site visits
Impacts to	Award points if there are no	3 points	Facilitates	GIS Mapping/

Criteria	Description	Draft Point Allocation	Alignment with TMP and DRAFT OP	Data Availability
sensitive environmental features	impacts to sensitive environmental features.		prioritization of projects that can be completed easily. Roads that need additional right-of-way may be subject to greater regulatory requirements (i.e. environmental assessment).	Aerial Photography/ Site visits
Other municipal road/service improvements	Award points if the sidewalk upgrades can be incorporated into another planned road/service project.	2 points	Facilitates coordination of construction activities, potentially reducing costs and impacts to residents during construction.	Municipal/ Regional Capital Works Plan
Cost	Consider cost in the priority table for project selection and budgeting purposes.	N/A	Facilitates sound decision-making given limited resources for improvements.	Cost estimate based on length, typical width, and other features needed (i.e. curb-and-gutter)

Implementation and Next Steps

With respect to the recommended methodology to be used for Sidewalk Prioritization, the following considerations should be made:

- In the event of a tied score, priority should be given to the lower cost project as it would create more benefit per dollar spent.
- When project costs are similar, priority should be given to the segment that is closer to vulnerable users such as seniors and children.

Following approval of this Sidewalk Prioritization Policy, it is recommended that the Town use **Table 3** to assign scores to sidewalks being considered for rehabilitation or maintenance, identifying those with the highest scores for priority of implementing improvements.

Memo

Date:	Thursday, February 15, 2018
Project:	Town of Innisfil Transportation Master Plan Update
To:	Town of Innisfil
From:	HDR
Subject:	Pedestrian Crossing Prioritization Policy – DRAFT#5

As identified in the Town of Innisfil's 2017 Transportation Master Plan Update (TMP), Draft Official Plan *Our Place* (OP, 2017), and the Town's Trails Master Plan (2016), there is a strategic need to increase walkability and improve active transportation connections in the Town of Innisfil (Town). In concert with the sidewalk prioritization policy, the pedestrian crossing prioritization policy will provide the Town with tools to improve the safety and mobility of its residents. A decision-making framework has been developed to identify pedestrian crossing treatments and prioritization of improvements.

Application

This policy shall apply to all locations in the Town being considered for the implementation of new pedestrian crossings.

Background

The following documents were reviewed to inform the development of the pedestrian crossing prioritization policy.

Pedestrian Traffic Signal, School Areas Policy

The Town has an existing *Pedestrian Traffic Signal, School Areas Policy (2013)* to provide a financial impact assessment and priority rating for the installation of unmanned pedestrian signal crossings in school zones. The policy provides an Implementation Hierarchy for guidance on selecting candidate crossing locations. The Implementation Hierarchy is summarized in **Table 1**.

Table 1: Pedestrian Traffic Signal, School Areas Policy - Implementation Hierarchy

Criteria	Guidance Assessment
1. Traffic Volume	The higher the traffic volume, the higher the prioritization. Traffic volumes indicate a level of exposure.
2. Pedestrian Volume (potential and real)	The school population and potential pedestrian traffic at certain cross points should factor into the prioritization formula.
3. Pedestrian Crossover (PXO) Replacement Strategy	An upgrade to PXO sites should be a priority for the Town.
4. Supporting Infrastructure (Sidewalks and Bicycle Paths)	A need to align signalized crossings with supporting infrastructure.
5. Roadway Classifications	Roadway classifications (based on the Town's Official Plan) to determine the speed and rate at which traffic flows.
6. Corridor Routes	The corridor routes to/from schools should be reviewed to determine locations where pedestrians travelling to/from schools are crossing municipal roadways.

Official Plan

Construction of pedestrian crossings within the Town's transportation network will help meet many of the objectives identified in Section 10 of the draft OP, summarized in **Table 2**.

Table 2: Official Plan Section 10 Objectives

Official Plan Section 10 Objective	Relevance to Pedestrian Crossings
1. To provide for a range of mobility options for residents.	A lack of formal crossings can create a barrier to choosing active travel over driving.
2. To provide for complete streets that are safe and comfortable for all users and accommodate the needs of all transportation modes – cars, pedestrians, transit and cyclists.	Protected pedestrian crossings are needed to provide a safe, accessible network to people of all ages and abilities.
3. To facilitate the safe movement of people, cars and goods to and from the various communities within the Town, and to and from the adjacent municipalities.	Protected pedestrian crossings will enhance the safe movement of people across roadways particularly within key recreational, shopping and industrial areas, and to support the Town's on-demand transit and Trails Master Plan initiatives.
5. To provide pedestrian, cyclists and automobile access to the Town's recreational, shopping and industrial areas.	
8. To provide transit service throughout the Town with a priority to connect the Primary and Urban Settlements.	
9. To improve and expand the trail system in the Town.	

Trails Master Plan (2016) and 2017 Transportation Master Plan Update

The Town's *Trails Master Plan* (2016) identified key pedestrian attractors as reported by residents in a public opinion survey. The findings of the survey indicated public strong support for enhanced pedestrian access, particularly to recreational facilities and facilities for community uses, such as beaches, parks, playgrounds, libraries, community centres, senior homes, and open spaces. Similarly, the public opinion survey in the 2017 *Transportation Master Plan* Update found that the lack of sidewalks and road safety surrounding schools, recreational centres and parks, was of primary concern to residents.

Best Practices Review

The documents outlined in **Table 3** are considered best practices in Ontario and North America for the screening, implementation and design of pedestrian crossings. They were reviewed to inform the development of this pedestrian crossing prioritization policy.

Table 3: Best Practices Review

Documents reviewed	Relevance of Pedestrian Crossings
1. Ontario Traffic Manual (OTM) Book 12	OTM Book 12 provides methodology and warrants for implementation of Intersection Pedestrian Crossing Signals (IPS), Mid-block Pedestrian Signals (MPS), and Full Traffic Signals
2. Ontario Traffic Manual Book 15, Update 2016	When a traffic signal (i.e. IPS, MPS, or full traffic signal) is not warranted at a site, OTM Book 15 provides guidelines through the Pedestrian Crossover (PXO) Selection Matrix to determine the suitability of the 4 PXO types. PXOs are appropriate for roads with a posted speed limit of 60km/h or lower. Each PXO type requires additional enhancements for the crossing, including overhead signage, flashing beacons, and pavement markings.
3. National Association of City Transportation Officials (NACTO) Design Guidelines for Complete Streets	These guidelines are used as best practice to design safe sidewalks and pedestrian crossings that offer convenience and comfort. A summary of the key guidelines is below: • Pedestrian crossing spacing should not exceed 200m • High visibility zebra markings improve visibility of pedestrians crossing and increase awareness for drivers • At signalized intersections use pedestrian signal countdown • Minimize crossing distances by using tight corner radii, curb extensions and refuge islands
4. Accessibility for Ontarians with Disabilities Act (AODA)	The Act prescribes the design requirements for sidewalk ramps, crosswalk widths, traffic signal design and dimensions, street paving etc., to ensure compliance by 2025.

Review of Other Jurisdictions' Implementation Guidelines

To implement pedestrian crossings of varying control, most jurisdictions follow guidelines prescribed in the Ontario Traffic Manual (OTM) Book 12. OTM Book 12 provides detailed methodology and recommended thresholds that warrant traffic and pedestrian crossing signals based on vehicle volume, pedestrian volume, pedestrian delay and accident frequency. Implementation policies used by other jurisdictions in Canada, similar in size and operations to the Town of Innisfil, were reviewed and are presented in **Table 4**. While implementation policies for other jurisdictions also discuss pedestrian crossing guidelines with respect to adult crossing guards, the Town of Innisfil does not intend to use this as a method of pedestrian crossing control. As such, this will not be reviewed through the pedestrian crossing prioritization policy.

Table 4: Other Jurisdiction Review of Pedestrian Crossing Implementation Guidelines

Jurisdiction	IPS, MPS and Full Traffic Signal	PXO
1. City of Kingston, Ontario, 2016	OTM Book 12 methodology warrants	Locations are evaluated separately for traffic signals and PXOs. For PXOs a scoring system is used, which gives a maximum of 5 points in each category: • Pedestrian volume • Vehicle volume • Vehicle speeds • Vulnerable pedestrians • Accessibility concerns • Existing sidewalks • Connectivity to transit, schools, recreation, business
2. City of Sault Ste. Marie, Ontario, 2013	OTM Book 12 methodology warrants	N/A
3. City of Greater Sudbury, Ontario 2012	OTM Book 12 methodology warrants. • If warranted an engineering assessment should determine whether traffic signals are geometrically feasible • If traffic signals are not warranted, enhanced pedestrian control measures should be used, including stop or yield signs, pavement markings, warning signage	No PXOs Past city reports noted PXO's are not installed as drivers and pedestrians lack familiarity with this measure of control

Jurisdiction	IPS, MPS and Full Traffic Signal	PXO
5. City of Hamilton, Ontario 2001	Uses the Priority Points Method that follows two main criteria: • Minimum distance from another protected crossing should be no less than 215m • Minimum pedestrian volume should be at least 100 pedestrians in a 7 hour period over the course of one day <u>Justification System</u> The City is using its own justification system, which is based on pedestrian volume, pedestrian delay, age, mobility, speed of traffic, pedestrian safety history and distance to nearest pedestrian crossing. The basis of the system compares the volume of pedestrians and the length of time they have to wait to cross the street. Independent of waiting time, a higher score is given to groups of young, elderly or people with disabilities. A minimum of 90 points is required to warrant a pedestrian signal.	Generally installed at roundabouts and at mid-block locations that are close to plazas and senior's residents. A webpage was set up on the City's website with YouTube videos to educate the public on how to use the crossovers.
6. City of Peterborough, Ontario, 2016	The following criteria is used: • Pedestrian Crossing Volume converted to Equivalent Adult Units (EAUs) • Total Safe Gaps (Crossing Opportunities) Compares the number of EAUs during peak pedestrian times with the number of safe gaps in traffic that allow an average pedestrian to safely cross the road. If the number of pedestrians exceeds the number of available gaps then a signal is considered.	OTM Book 15 methodology is followed.

Proposed Implementation Framework

The proposed implementation policy for the prioritization of pedestrian crossings in the Town, based on the existing policy for *Pedestrian Traffic Signal, School Areas*, is outlined in **Table 5**. The prioritization is based on a point allocation matrix considering traffic volumes, pedestrian volumes, pedestrian crossover (PXO) replacement strategy, supporting infrastructure and plans, public support, zoning for community spaces, and distance to closest signalized intersection. The implementation framework can be used to rate and prioritize locations where potential pedestrian crossings can be installed based on their scores.

Table 5: Implementation Framework

Criteria	Description	Points (Total Score: 100)
Average Annual Daily Traffic (AADT)	Greater than 10,000: 25 points 5,000-10,000: 15 points 1,000-5,000: 5 points Less than 1,000: 0 points	**25**
Pedestrian Volume (potential and real)	Based on Walk Score (www.walkscore.com): >70: 25 points 50-69: 15 points 25-49: 10 points 2-24: 5 points 1: 0 points	**25**
PXO Replacement Strategy	If the location is an upgrade to an existing PXO site, award 5 points	**5**
Supporting Infrastructure and Plans	If the proposed location provides a protected crossing for an identified cycling or pedestrian pathway, award 10 points	**10**
Public Support/ Number of requests	Consider number of requests and evidence of pedestrian use leading to a proposed crossing location. Award points based on number of individual requests received from the public in the preceding calendar year. >10 requests: 15 points 5-10 requests: 10 points 1-5 requests requests: 5 points	**15**
Zoning for Community Spaces	Proximity (within approximately 200m) to land uses with community uses (seniors homes, schools, community centres, parks, libraries) should be awarded 15 points	**15**
Distance to closest signalized intersection	If there is a traffic signal within 250 m: 0 points If there is no traffic signal in 250 m: 0 point	**5**

Other considerations

After completing the evaluation, the following best practices should be considered for implementation. In general, marked unprotected crosswalks should be discouraged to avoid confusing pedestrians and drivers. At locations where unprotected crosswalks are maintained on two lane, low speed roads (i.e. 50 km/h or less), it is recommended that a pedestrian warning sign (Wc-7), such as the one shown in **Exhibit 1**, be posted in advance of the crossing per OTM

Book 6. In addition two back-to-back Wc-7 signs should to be mounted on each side of the road in the immediate vicinity of the crossing, for a total of four Wc-7 signs altogether. This will ensure that road users travelling from both directions on the road will be alerted to the unprotected crosswalks.

Exhibit 1: Pedestrian Warning Sign (Wc-7)

Pedestrian refuge islands or centre medians could serve as a passive feature at unprotected crossing points where lane alignment is not compromised (e.g. integrated with centre turn lanes). Pedestrian holding areas in medians would create an increased level of service especially for winter services and snow storage along with directing pedestrians to stay between multiple lanes of moving traffic. While these features have been considered, they are not recommended at this time since the existing roads in Innisfil are one to two lanes per direction, which would not warrant such measure. However, it can be reviewed again in future studies once the road width or the number of lanes increase and warrant medians to be installed. Measures such as reflective delineator poles may be considered at the boulevard of unprotected crossing locations in order to draw the driver's attention to potential crossing activity.

Memo

Date:	Wednesday, January 24, 2018
Project:	Town of Innisfil Transportation Master Plan Update
To:	Town of Innisfil
From:	HDR
Subject:	Gravel Road Prioritization Policy – DRAFT #7

Background and Scope

The Town of Innisfil (Town) has approximately 46km of gravel roads and a number of low-class bituminous (LCB) roads which may benefit from asphalt overlay or surface treatment. LCB treated roads refer to those where a combination of emulsified or liquid asphalt and aggregate is applied over an existing surface.

With growth both within the Town and in external areas (pass-through trips), the Town is facing pressures to make improvements to its road network to minimize increasing maintenance costs, and address the challenging needs of rural/agricultural industries, and changing expectations of residential communities. Paving or surface treating these roads can add value to the community through improved road quality for all road users and reduced maintenance costs. As part of the 2017 Transportation Master Plan (TMP) Update, the Town is establishing a framework and prioritization strategy for the paving of existing gravel roads and repaving of LCB roads.

The Town of Innisfil's 2017 Roads Needs Study (RNS) identifies road repair and resurfacing needs on all Town roads for four-year and ten- year timeframes. Based on the recommended road improvement s from the RNS, this **Gravel Road Prioritization Policy** provides the prioritization of gravel to asphalt overlay and LCB slurry seal (preventative maintenance) road projects. Specific improvement types should be addressed by the RNS as this policy focuses on prioritization. The project identification process through to prioritization and capital budgeting is summarized in **Exhibit 1**. The project identification process commences with the findings of the RNS and is completed at the capital improvement program planning phase. The Town's road network is illustrated in **Exhibit 2**.

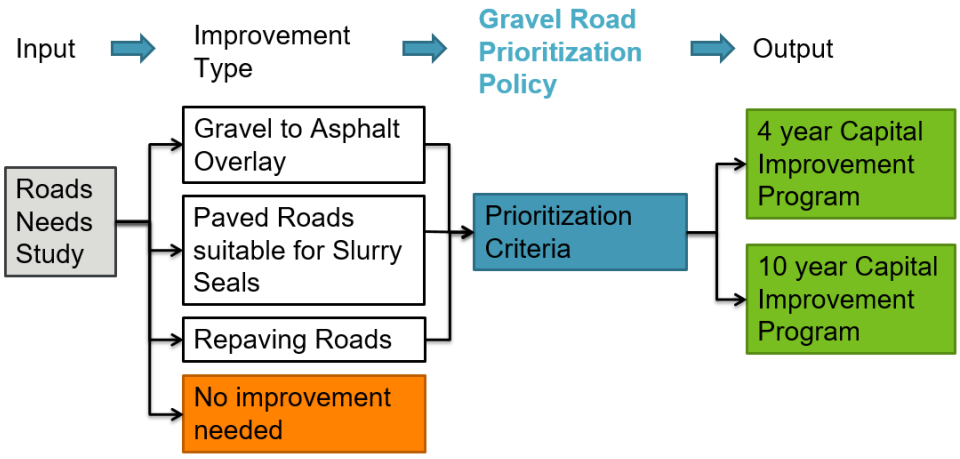

Exhibit 1: Gravel Road Prioritization Project Identification

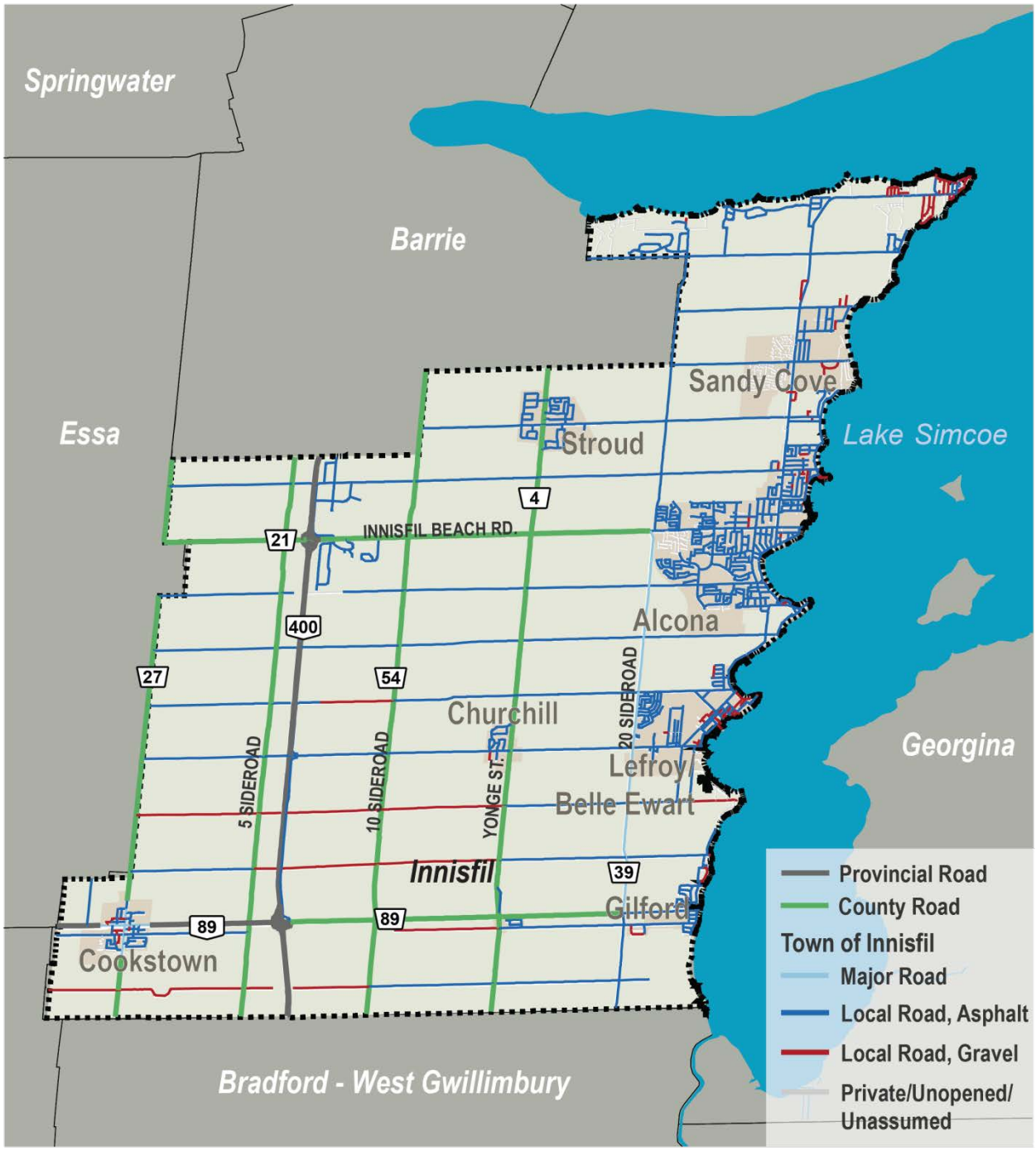

Exhibit 2: Innisfil Road Network by Surface Type (March 2017)

Application

This policy shall apply to gravel and LCB roadway locations being considered for paving or resurfacing projects.

Review of Other Jurisdictions/Literature

While there is some literature on criteria for paving gravel roads, only a few municipalities in North America have established policies or guidelines that are readily available to the public. The jurisdictions and literature that were reviewed for this assignment include:

- MTO Inventory Manual for Municipal Roads, 1991
- Cost-Benefit of Surface Treating Gravel Roads, Centre for Transportation Engineering and Planning Conference 2013, David Anderson, Stantec
- Development of a Sustainable Road Surfacing Policy for Provincial Highways in New Brunswick, prepared for the 2012 Annual Conference of the Transportation Association of Canada
- Making Informed Decisions on When to Upgrade a Gravel Road, Minnesota Local Road Research Board, 2006
- Benton County, Oregon, Gravel Road Maintenance and Surfacing Priority Policy, 2015
- Strong Township Roads Needs Study, 2008, prepared by AECOM

In addition, the Town's 2012/2014 Road Needs Study was used as a basis for establishing the existing road inventory and a range of service and operating conditions.

MTO Inventory Manual for Municipal Roads

The most comprehensive and commonly used approach in Ontario for prioritizing paving projects is from the MTO Inventory Manual for Municipal Roads. This approach involves scoring each road segment using the following empirical formula:

$$Priority\ Rating = 0.2\ (100 - CR)\ \times (AADT + 40)^{\frac{1}{4}}$$

Where $CR = Condition\ Rating$

And $AADT = Average\ Annual\ Daily\ Traffic$

The Condition Rating is a numerical score between 0 and 100 based on general road characteristics including horizontal alignment, vertical alignment, surface condition, shoulder width, level of service, structural adequacy, and drainage.

Two-Stage Approach

More recent literature recommends a two-stage approach:

1) Determine appropriate road needs (i.e. through Town's Roads Needs Study)
2) Establish the priority for paving, typically based on criteria (i.e. surface condition, traffic volumes, road classification, maintenance costs, connectivity)

The two-stage approach enables the Town to separate reconstruction projects which typically have more intensive engineering and permit requirements than minor surfacing projects. Identifying projects with potential safety deficiencies is important because a higher priority should be placed upon the correction of safety (substandard geometry, sightlines, etc.), drainage, and other major engineering issues through reconstruction compared to minor surfacing projects. As the Town has an existing program in the RNS to monitor and update needs and treatment types, **the two-stage approach is easily integrated with the Town's existing RNS program and is recommended**.

Criteria Best Practices

Based on the literature review of multiple jurisdictions and literature, a summary of best practices is provided in **Table 1** to provide an initial decision framework for the Town to consider in establishing its own gravel road prioritization policy. This Policy will use these criteria as a starting point for developing a Made-in-Innisfil solution to respond to the Town's gravel road upgrade needs.

Table 1: Gravel Road Prioritization Criteria Review

Criteria	Notes	Applicability
Road platform width	• The existing road platform width (defined as top of ditch slope to top of ditch slope) should meet the minimum tolerable width (typically 7 m) in order to consider surface treatment. Surface treatment can increase safety risks on roads that do not meet standards. • Similarly, the road Right-of-Way must be sufficiently wide to accommodate the road platform, drainage, and roadside safety features.	• This should be assessed in the RNS. **Roads with a platform width of less than 7m should not be considered for surface treatment.**
Road structure	• The road structure should be acceptable before being considered for surface treatment. Visual evidence (e.g. soft spots, frost boils) and geotechnical investigations (e.g. borehole tests) can confirm the adequacy of the road structure.	• The town should carry out a geotechnical investigation. **Roads which have structural defects should not be considered for surface treatment.**
Drainage	• The road should have adequate drainage. Evidence of poor drainage can include flooding, eroded crowns, and saturated granular materials.	• These issues will not be resolved by surface treatment, and thus, **roads with drainage deficiencies should not be considered for surface treatment**
Traffic Volumes	• Surface treatment should be considered for roads that carry higher volumes, typically AADT > 400. It is also commonly used to determine project prioritization.	• Include in prioritization policy
Safety/ Geometry	• Roads that have existing safety issues or do not meet current geometric standards should be considered for reconstruction rather than surface treatment. Surface treatment can increase safety risks on roads that do not meet standards.	• **Roads with known geometric deficiencies should not be considered for surface treatment.**

Criteria	Notes	Applicability
Network Connectivity	• Filling in gaps in the paved road network is generally perceived as enhancing the experience of the travelling public by enhancing user comfort, safety, vehicle wear, and travel speed.	• Include in prioritization policy
Maintenance	• Roads that have higher maintenance costs are often considered priorities for surface treatment.	• Include in prioritization policy
Road Condition	• Existing Road Condition (typically using a framework such as that of the MTO Inventory Manual for Municipal roads) is typically used to determine project prioritization, along with traffic volumes.	• Include in prioritization policy

In addition to these criteria, additional considerations for **adjacent land use** and **enhancing the active transportation network** should be assessed by the Town, given the importance of the Town's rural roads as a part of the Town's active transportation network.

Proposed Decision Framework

Table 2 summarizes the recommended criteria and a draft point scoring system. Once a road has been included or excluded from the policy based on the criteria in Table 1, Table 2 may be used to prioritize the included roads. The preferred work (surface treatment or asphalt overlay) shall be determined by the RNS. In cases where more than one condition is applicable, the points allocated shall be cumulative.

Table 2: Prioritization Criteria for Hard Surfacing (Asphalt Overlay or Surface Treatment) Projects

Criteria	Description	Draft Point Allocation (100 point maximum)	
Maintenance and Ride Quality (30 points)	Assign up to 20 points based on a qualitative assessment of ride quality using definitions similar to those found in Item 83 of the MTO *Inventory Manual for Municipal Roads.* Assign ten points if the road segment has historically high maintenance costs	**Surface Conditions**	**Points**
		Surface irregularities so severe that a driver will tend to reduce speed considerably and/or steer an irregular course, or if the crown is so steep as to be hazardous in winter.	20
		If maintaining the lesser of the minimum tolerable average operating speed (the minimum tolerable speed on rural roads as defined in Item 91 of the *Inventory Manual*, ranging from 5 to 15 km/h below the posted speed limit) or posted speed limit results in a "tug-of-war" with a too-steep or uneven crown, or a feeling that the car is taking undue punishment	10
		If it is possible to maintain the lesser of the minimum tolerable average operating speed or posted speed limit with only a noticeable amount of annoyance to the driver due to sway, vibration or steering effort, but with no noticeable feeling of hazard.	5
		No annoyance or discomfort to the driver	0

Criteria	Description	Draft Point Allocation (100 point maximum)	
		Add an additional 10 points if it is known that the section has higher than average annual maintenance costs	
Traffic Volumes (20 points)	Assign points based on traffic volumes (AADT), given the relationship between traffic volumes and wear on the road surface	**AADT**	**Points**
		Greater than 400	20
		250 - 400	10
		100 - 250	5
		Less than 100	0
Active Transportation Trip Generators and Accessibility (20 points)	Assign points for each dwelling unit or commercial facility with driveway access to the road segment to enhance accessibility for active transportation users	Assign 3 points/dwelling unit or commercial facility up to a maximum of 20 points.	
Existing Settlement Area (10 points)	Assign points if the road segment is within an existing settlement area	10 points	
Continuity of Paved Surfaces (20 points)	Assign points if the road segment connects two other existing paved road segments, is an emergency detour route, or is an asphalt or surface treated road isolated from other asphalt or surface treated roads by the paved road network	Connects two existing paved road segments: 20 points Dead-end road connected only to a paved road: 10 points Emergency detour Route: 10 points All other roads: 0 points	
Life Cycle Cost (0 points - tiebreaker)	Use the estimated total life cycle cost (including capital costs and net present value of future maintenance costs) to calculate the value of the project and to support program planning	No score assigned. Apply cost as a tie-breaker.	

Once the proposed road project goes through the draft point allocation, the Town will incorporate the recommendations into the Four-year or Ten-Year Capital Improvement Program.

Next Steps

Following approval of this Gravel Road Prioritization Policy, it is recommended that the Town maintain a consistent schedule of assessing pavements for construction. This assessment can be undertaken completed by mid-June each year, in preparation for annual budgeting.

Memo

Date:	Thursday, January 25, 2018
Project:	Town of Innisfil Transportation Master Plan Update
To:	Town of Innisfil
From:	HDR
Subject:	Slurry Seal Prioritization Policy – DRAFT#2

Background and Scope

The Town of Innisfil (Town) has over 300 km of hot mix paved roads and 40 km of surface treated roads which may benefit from preventative maintenance. Several rehabilitation techniques are available for both these road types, including a preventative maintenance technique referred to as slurry seal. Slurry seal is the application of a mixture of asphalt emulsion, graded aggregates, mineral filler, water, and additives to an existing asphalt pavement surface for the purpose of preventative maintenance. The application of the mixture on existing asphalt-surface is intended to "seal" the pavement surface to help extend the pavement life until resurfacing becomes necessary.

With growth both within the Town and in external areas (pass-through trips), the Town is facing pressures to make improvements to its road network to minimize increasing maintenance costs, and address the changing needs of rural/agricultural industries and changing expectations of residential communities. The use of slurry seal to improve the quality of these roads can add value to the community for all road users and reduce road maintenance costs. As part of the 2017 *Transportation Master Plan (TMP) Update*, the Town is establishing a framework and prioritization strategy for the preventative maintenance of asphalt-surfaced roads using Slurry Seal to extend life cycle costs.

The Town of Innisfil's 2017 Roads Needs Study (RNS) identifies road repair and resurfacing needs on all Town roads for four-year and ten-year timeframes. This **Slurry Seal Prioritization Policy** firstly provides guidance to the RNS on use of slurry seal, and secondly provides a decision making framework for prioritization of slurry seal road projects.

Application of Policy

This policy shall apply to hard-surfaced roads where there is potential to use slurry seal for preventative maintenance.

Guidelines for Slurry Seal Use

Slurry seals should be prepared and applied in general accordance with Ontario Ministry of Transportation(MTO) Pavement Design and Rehabilitation Manual (MTO) and Ontario Provincial Standard Specification 337 – Construction Specification for Slurry Seal (OPSS 337), as well as the following guidelines for use on a project specific basis:

- Tack coat is not required unless the surface is extremely raveled or is composed of brick or concrete.
- The Contractor should ensure a clean, dry pavement surface prior to placement and traffic should be prohibited from the finished surface for a period of up to four (4) hours to allow slurry seal to cure.
- Slurry seal can be beneficial to sealing lower severity surface cracks in the pavement but cracks greater than ¼" should be filled and allowed to cure prior to slurry placement.

Slurry seals are to be used on low volume, hard surfaced roadways with an Annual Average Daily Traffic (AADT) between 0 and 1000. Slurry seals can be effective as preventative treatment on both High Class Bituminous (HCB) and Low Class Bituminous (LCB) roadways.

Surface Treated Roadways (LCB) – The roadways need routine maintenance to keep the hard surface functioning properly throughout the service life of pavement structure. The frequency of slurry seal preservation techniques on these types of roadways are typically performed every 3 to 7 years. Slurry seals can be used on all LCB roadways.

Asphalt surfaced roadways (HCB) – These roadways provide a durable, smooth riding surface however tend to deteriorate rapidly especially if periodic preventative treatments are not performed. The selection of projects for slurry seal on HCB should be evaluated for candidacy. The application should only be done on structurally sound pavement in reasonably good condition. Slurry seals will, however, repair surface defects on HCB including raveling/weathering and minor cracks/voids. Severe or structural distress should be repaired prior to application of slurry seal. The frequency of slurry seals/micro-surfacing preservation techniques on these types of roadways are typically performed every 4 to 8 years.

These seals should not be used on urbanized, residential streets with a large number of curb and gutter, catch basins, or manholes. In addition, due to the increased roughness, slurry seals in urban residential communities tend to reduce the amount of passive use on the surface including pedestrian and bicycle traffic.

Micro-surfacing should be considered for standard use as an alternative to slurry seal for hard surfaced roadways with traffic volumes greater than 1000 AADT. Micro-surfacing is a polymer modified asphalt emulsion mix consisting of aggregate, mineral filler, water, and additive. The mix is typically placed in lifts from 8 to 10 mm provides an increased fiction riding surface and is very effective in fixing minor pavement rutting and surface deficiencies. Severe cracks (>1/4") and structural distress should be repaired prior to placement or risk cracks propagating through the micro-surface. Tack coats should be used prior to application. Guidelines outlined in the MTO manual and Ontario Provincial Standard Specifications – Construction Specification for Micro-Surfacing (OPSS 336) should be followed to for mix and application.

Proposed Decision Framework for Prioritization

To arrive at a decision making framework for Slurry Seal projects, a review of best practices in other jurisdictions was conducted to inform a recommended approach.

Review of Other Jurisdictions/Literature

While there is some literature on the use of slurry seal and similar treatments for preventative maintenance, only a few municipalities in North America have established policies or guidelines that are readily available to the public. The jurisdictions and literature that were reviewed for this assignment include:

- MTO Inventory Manual for Municipal Roads, 1991
- Development of a Sustainable Road Surfacing Policy for Provincial Highways in New Brunswick, prepared for the 2012 Annual Conference of the Transportation Association of Canada
- Strong Township Roads Needs Study, 2008, prepared by AECOM
- Preventative Maintenance Products for pavement preservation, prepared for the 2015 Workshop and Annual General Meeting of the Ontario Municipal Engineers Association (MEA)

MTO INVENTORY MANUAL FOR MUNICIPAL ROADS

The most comprehensive and commonly used approach in Ontario for prioritizing paving projects is from the *MTO Inventory Manual for Municipal Roads*. This approach involves scoring each road segment using the following empirical formula:

$$Priority\ Rating = 0.2\ (100 - CR)\ \times (AADT + 40)^{\frac{1}{4}}$$

Where $CR = Condition\ Rating$

And $AADT = Average\ Annual\ Daily\ Traffic$

The Condition Rating is an integrated approach which assigns a numerical score between 0 and 100 based on general road characteristics including horizontal alignment, vertical alignment, surface condition, shoulder width, level of service, structural adequacy, and drainage.

TWO-STAGE APPROACH

More recent literature reviewed for this assignment recommends a two-stage approach:

1) Determine appropriate road needs (i.e. through Town's Roads Needs Study and above guidelines for use)
2) Establish the priority for slurry seal treatment, typically based on criteria (e.g. surface condition, traffic volumes, road classification, maintenance costs, roadside environment, location)

As the Town has an existing program in the RNS to monitor and update needs and treatment types, **the two-stage approach is easily integrated with the Town's existing RNS program and is recommended**.

Recommended Decision Making Criteria

Based on the literature review, a set of best practices criteria was identified and can be used as an initial "pre-screening" for the Town to consider when reviewing the findings of the RNS. This forms an initial step to ensure that the projects identified in the RNS are in fact appropriate for

slurry seal treatment, or whether a road should be considered for a different for of maintenance or construction.

A summary of pre-screening criteria is provided in **Table 1** identifying the applicability of each criterion and outlining recommendations.

Table 1: Slurry Seal Project Pre-Screening

Criteria	Notes	Applicability
Road Platform Width	• The existing road platform width (defined as top of ditch slope to top of ditch slope) should meet the minimum tolerable width (typically 7 m) in order to consider slurry seal. • Similarly, the road Right-of-Way must be sufficiently wide to accommodate the road platform, drainage, and roadside safety features.	• This should be assessed in the RNS. **Road platform widths which are less than 7m should not be considered for slurry seal.**
Road Structure and Condition	• The road structure should be acceptable before being considered for slurry seal. Visual evidence (e.g. soft spots, frost boils) and geotechnical investigations (e.g. borehole tests) can confirm the adequacy of the road structure. • Existing Road Condition (as assessed in the RNS) should inform project prioritization, along with traffic volumes.	• This should be assessed in the RNS. **Roads which have structural defects should not be considered for slurry seal.** • Include in prioritization policy
Drainage	• The road should have adequate drainage. Evidence of poor drainage can include flooding, eroded crowns, and saturated granular materials.	• These issues will not be resolved by slurry seal and thus, **roads with drainage deficiencies should not be considered for slurry seal**
Traffic Volumes	• Slurry seal should be considered for roads with volumes between an AADT less than 1,000, with higher volume roads being given higher priority.	• Include in prioritization policy
Safety/ Geometry	• Roads that have existing safety issues or do not meet current geometric standards should be considered for reconstruction rather than slurry seal.	• **Roads with known geometric deficiencies should not be considered for slurry seal.**
Maintenance	• Roads that have higher maintenance costs are often considered priorities for slurry seal.	• Include in prioritization policy
Roadside environment	• Residential roads with an urban cross-section are not suitable for slurry seal application. • Residential roads with a semi-urban cross section shall be considered on a case by case basis • Slurry seal should also be avoided where manholes and catchbasins are present.	• Include in prioritization policy

Once a road has been included or excluded from the policy based on the initial screening criteria in **Table 1**, **Table 2** may be used to prioritize the included roads. The notes from **Table 1** should be used as a guideline to cross reference against each road in order to determine applicability of the policy.

Table 2: Prioritization Criteria for Hard Surfacing Projects

Criteria	Description	Draft Point Allocation (100 point maximum)	
Road Structure and Condition (40 points)	Assign up to 40 points based on a qualitative assessment of ride quality using definitions similar to those found in Item 83 of the MTO *Inventory Manual for Municipal Roads. (To be assessed in the RNS)*	**Surface Conditions**	**Points**
		Surface irregularities so severe that a driver will tend to reduce speed considerably and/or steer an irregular course, or if the crown is so steep as to be hazardous in winter.	40
		If maintaining the lesser of the tolerable average operating speed or posted speed limit results in a "tug-of-war" with a too-steep or uneven crown, or a feeling that the car is taking undue punishment	20
		If it is possible to maintain the lesser of the tolerable average operating speed or posted speed limit with only a noticeable amount of annoyance to the driver due to sway, vibration or steering effort, but with no noticeable feeling of hazard.	10
		No annoyance or discomfort to the driver	0
Traffic Volumes (30 points)	Assign points based on traffic volumes (AADT), given the relationship between traffic volumes and wear on the road surface	**AADT**	**Points**
		Greater than 400	30
		250 - 400	15
		100 - 250	5
		Less than 100	0
Maintenance costs (20 points)	Assign points based on historic maintenance costs.	Assign points proportionally amongst a group of projects being considered, with maximum points (20) for highest historic maintenance costs and zero points for lowest.	
Roadside Environment (10 points)	Assign points if the road has a rural cross-section	10 points	
Life Cycle Cost (0 points - tiebreaker)	Use the estimated total life cycle cost (including capital costs and net present value of future maintenance costs) to calculate the value of the project and to support program planning	No score assigned. Apply cost as a tie-breaker.	

Once the proposed road project goes through the draft point allocation, the Town will incorporate the recommendations into the Four-year or Ten-Year Capital Improvement Program based on the priorities identified and as capital budgets allow.

Next Steps

Following approval of this Slurry Seal Prioritization Policy, it is recommended that the Town maintain a consistent schedule of assessing pavements for preventative maintenance. This assessment can be completed by mid-June each year, in preparation for annual budgeting.

Memo

Date:	Tuesday, March 06, 2018
Project:	Town of Innisfil Transportation Master Plan Update
To:	Town of Innisfil
From:	HDR
Subject:	Roundabout Implementation Policy – DRAFT #3

Roundabouts are an increasingly popular tool to manage traffic, particularly as an alternative to signalization. Depending on the local conditions, roundabouts can offer benefits including fewer and/or less severe collisions, improved traffic flow, and lower maintenance costs than signalized intersections. As part of the its Transportation Master Plan Update, the Town of Innisfil has identified a need to systematically identify suitable candidate intersections to convert to roundabouts.

Application

This policy should be applied whenever the Town is considering intersection improvements or building new intersections.

Memo Structure

This memorandum is divided into two main sections: Background Information and Recommendations.

Background Information

Existing Policies and Guidelines

The *Canadian Roundabout Design Guide* (Transportation Association of Canada, TAC 2017) and *Roundabouts: An Informational Guide* (U.S. National Cooperative Highway Research Program, NCHRP 2017) are recognized as the leading sources of information on roundabouts and provide guidance on their planning, design, and implementation. Much of the information presented in this memorandum refers to these guiding documents.

Roundabout Use and Policies in Other Jurisdictions

A number of jurisdictions in Ontario have implemented roundabouts and have developed implementation policies including the Ministry of Transportation, County of Simcoe and other upper tier municipalities, and a number of lower tier municipalities. A summary of the roundabout policies in some of these other jurisdictions is provided in **Table 1**.

Table 1: Policy Frameworks from Other Jurisdictions

Jurisdiction	Roundabout Use / Policies
Town of Whitchurch-Stouffville	The Town has implemented a number of roundabouts on its collector roads with plans for more. The Town's TMP recommends considering roundabouts whenever new intersections are being built or intersection improvements are needed.
City of St. Thomas	St. Thomas has nine roundabouts with the first implemented about ten years ago. The City implements roundabouts based on the policy guidance of the Region of Waterloo.
City of Markham	Roundabouts are implemented on collector roads within some of its residential subdivisions and are generally permitted subject to suitability on a case by case basis. Implementation policies follow the Region of York.
County of Simcoe	Roundabout Feasibility Guidelines: identifies the criteria that should be used when assessing roundabouts as an alternative intersection control.
Regional Municipality of Peel	Roundabout Screening Tools: a streamlined approach to determine where a roundabout might be a suitable alternative to address intersection improvement needs
Regional Municipality of York	Roundabout Screening Tools: a streamlined approach to determine where a roundabout might be a suitable alternative to address intersection improvement needs
Regional Municipality of Waterloo	Consider a roundabout as an alternative whenever a new intersection is proposed, signals are warranted, or improvements are planned for an existing intersection
Ontario Ministry of Transportation (MTO)	Uses signal warrants as a trigger to consider roundabouts at provincial intersections.

The use of roundabouts in these other jurisdictions is generally accepted by the public, and supportive policies from MTO and Simcoe County further support the Town of Innisfil's ability to implement roundabouts.

Types of Roundabouts

The TAC Canadian Roundabout Design Guide describes three basic types of roundabouts recommended for use in Canada: single-lane roundabouts, multi-lane roundabouts, and mini-roundabouts. Each type has their respective capacities and features, which are described in the following sections.

SINGLE-LANE ROUNDABOUT

Single-lane roundabouts feature raised central and splitter islands, one lane entries on all approaches, and one circulatory lane. The central island is non-traversable to provide additional safety, although it may include a mountable truck apron to accommodate heavy vehicles. This roundabout design can typically accommodate volumes of up to 25,000 vehicles daily and have an inscribed circle diameter (ICD) ranging from 28 to 60 m.

MULTILANE ROUNDABOUT

Multilane roundabouts are characterized by at least one entry with two or more lanes. The circulatory roadway is wider to accommodate the higher volumes (AADT more than 25,000 as

shown in **Figure 1**) and is designed so that no lane changes are required for any movement throughout the roundabout. Multilane roundabouts typically have an ICD of 46 to 100 m and have a capacity of up to 45,000 vehicles daily.

Although multilane roundabouts provide significant improvements for motorists, they also provide challenges for active transportation users, especially for vulnerable users such as children, the elderly, and users with accessibility needs. This roundabout design has longer crossing distances for pedestrians to cross safely, and it is more difficult and costly to implement cycling facilities in a circulatory roadway. In addition, since multilane roundabouts is more complex than single-lane roundabouts and do not allow lane-switching, additional driver education may be required.

MINI-ROUNDABOUT

Mini-roundabouts as the name suggests, are the smaller cousin of single-lane and multi-lane roundabouts. The ICD typically ranges from 14 to 27 m, and the roundabout can accommodate up to approximately 15,000 vehicles per day. This roundabout design features a fully traversable centre island and mountable splitter islands, thus could allow heavy vehicles to maneuver through the intersection with ease in spite of the smaller ICD. However, the mountable nature of the islands also reduces the safety benefits and is thus less preferred.

Figure 1 presents high-level considerations for appropriate roundabout type based on average annual daily traffic (AADT) and the percentage of left-turns.

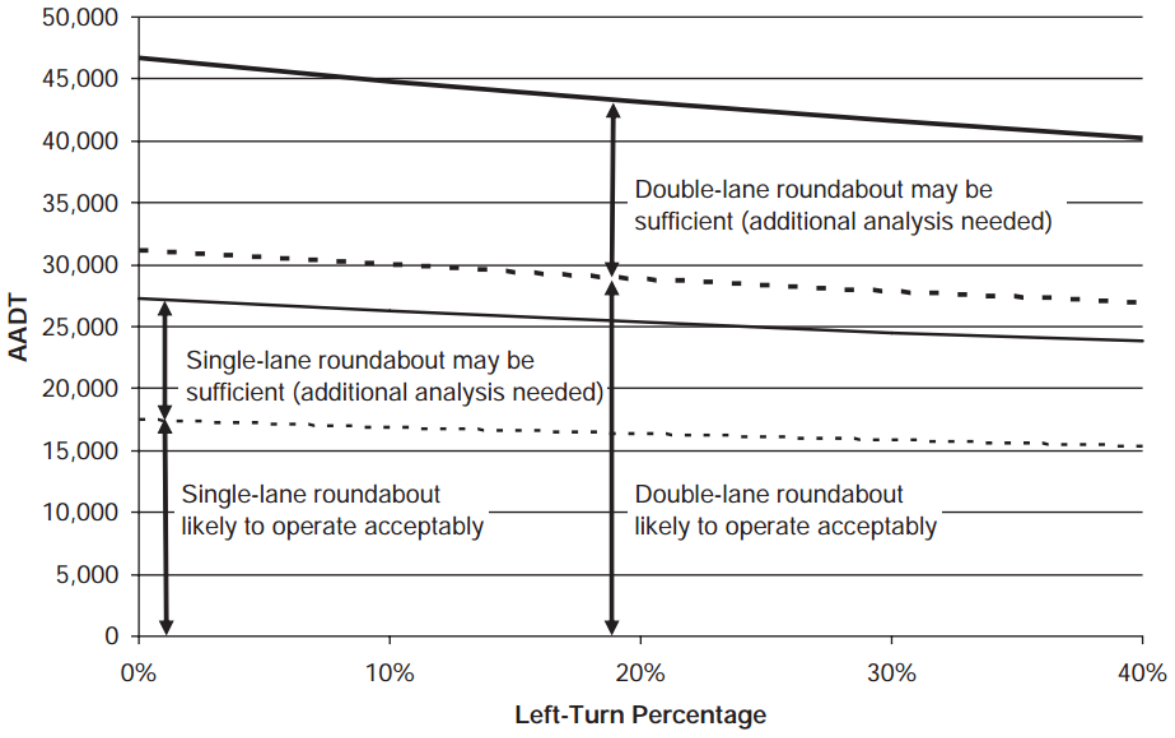

Figure 1: Consideration for the Types of Roundabout based on AADT and

Source: NCHRP Report 672, Exhibit 3-12

Comparison with Other Intersection Controls

Intersection capacity and safety are two of the most important factors when considering intersection control types. Depending on the total traffic volumes and the percentage of main street traffic volumes, roundabouts have both capacity and safety benefits over other intersection controls. These benefits are summarized in the section below.

TWO-WAY STOP-CONTROL

Typically, delays at two-way stop control (TWSC) intersections are caused by inadequate capacities for minor streets at intersections and left-turning vehicles yielding to through traffic on the major street. Roundabouts may provide a solution to both of these problems, as they treat all movements equally and can thus accommodate a high number of left turns.

Roundabout capacity is greater than TWSC capacity in all cases except when major street traffic exceeds 90% of total intersection traffic. These benefits increase steadily as the major-minor proportions reach 50%[1].

Roundabouts are also demonstrated to significantly reduce crashes at intersections that were previously TWSC. Based on research in the US, the average number of crashes is reduced by approximately 44% when TWSC intersections are replaced by roundabouts[1].

ALL-WAY STOP-CONTROL

Roundabouts almost always improve capacity and reduce delays at intersections compared to all-way stop-controls (AWSC), especially during off-peak periods as they eliminate the need for stopping when no other vehicles are present. Based on research in the US, the delay reduction benefits of roundabouts increase exponentially as traffic volumes increase, and as left-turn proportions increase, up to the practical capacity limit of a single lane roundabout[1].

In terms of safety, roundabouts minimize crash severity by reducing collision angles compared to AWSC.

TRAFFIC SIGNALS

Similar to the comparison to AWSC, the delay reduction benefits of roundabouts in comparison to traffic signals are most prominent during off-peak periods and where heavy left-turn volumes are present - particularly within the practical capacity limits of a single lane roundabout. Once a multilane roundabout is required, it is recommended that more rigorous analysis be completed to justify the selection of roundabouts versus traffic signals. The benefits of roundabouts compared to traffic signals are also more prominent, similar to TWSC intersections, where volumes are more balanced between major and minor street approaches[1].

Roundabouts also offer safety improvements compared to signalized intersections as they encourage lower vehicle speeds, eliminate red-light running, and reduce the number of serious conflict points. In the U.S., the average crash reduction is approximately 47.8% when roundabouts are used to replace signalized intersections[1].

[1] Source: Roundabouts: An Informational Guide , NCHRP, 2010

Advantages and Disadvantages

Roundabouts have a number of other advantages beyond operations and safety. A summary of the advantages of roundabouts across multiple performance measures are listed in **Table 2**.

Table 2: Advantages of Roundabouts

Advantage	Consideration

Safety	• Reduced frequency and severity of collisions compared to both stop - controlled and signalized intersections due to a reduction in:
	  ○ Conflict points – all vehicles travel in the same direction, eliminating right-angle and left-turn conflicts, thus decreasing probability of a collision;
	  ○ Entering and circulating speed – geometric design require vehicles to enter at lower speeds, thus lowering collision severity
	  ○ Angle of impact – angle of entry into a roundabout is deflected, thus decreasing angle of impact and reducing or eliminating more severe right-angle and head-on collisions

Operations / Access Management	• Elimination of unnecessary stopping due to yield-at-entry control eliminates stopping when it is not required and tends to operate with; lower delays and shorter queues compared to stop and signal-controlled intersections, which require vehicles to stop in at least one direction even when no other vehicles are present. • Provision of safer movements at intersections and driveways, elimination of midblock left-turns, provision of safe U-turn opportunities and reduction in the number of full movement access points
Traffic Management / Calming	• Geometric design influences drivers to reduce speed compared to abrupt stopping and starting at stop- and signal -controlled intersections. • Roundabouts are effective gateway treatments between rural and urban areas as they encourage traffic to slow down
Geometry / Spatial Requirements	• Potential to accommodate an unusual number of approaches (more or fewer than four legs) • Potential to operate well as ramp terminals • A reduction in some or all auxiliary lane requirements may reduce the intersection foot print.
Environment and Sustainability	• Reduction in delays and forced stopping results in reduced fuel consumption, vehicle emissions, and noise from vehicles braking and accelerating. • Elimination of energy consumption from traffic signals and little maintenance required. • Overall minimized carbon footprint, enhanced sustainability, and reduced life-cycle costs of operations and maintenance.
Economics	• Maintenance costs are reduced compared to traffic signals • Time and fuel savings for users • Elimination of some or all auxiliary turn lanes on approach roads • Societal costs savings from lower frequency and severity of collisions
Aesthetics	• Potential for landscaping opportunities within the central island to create a sense of place within the community or as a gateway feature to enhance and define a community

There are also some disadvantages to roundabouts summarized in **Table 3**, and these must be weighed against the advantages when determining an appropriate implementation policy for the Town.

Table 3: Disadvantages of Roundabouts

Disadvantages	Considerations
Property Requirements	• Generally more property required beyond the limits of a typical road allowance compared to stop or signal-controlled intersections.
Constructability / Costs	• Typically higher construction costs and longer construction period, particularly in retrofit applications.
Operational Limitations	• All movements are given equal priority and thus may incur significant delay in major movements, especially when there is a large disparity in vehicle volumes between the intersecting streets • Downstream queues from nearby intersections extending into a roundabout can disrupt the operation of the roundabout at all legs. Potential to interrupt traffic flow and timing and, thus are not recommended on corridors with traffic signal progression
Active Transportation (AT)	• Lack of protected crossing opportunities for active transportation users, particularly in higher volume applications with limited gaps in traffic. • Larger roundabouts force pedestrians to divert from their natural preference to take the shortest path. The US and Canadian guidelines recommend zebra striping and splitter islands in design to such that pedestrians only cross one direction of traffic at a time. • Vulnerable users and pedestrians with slower walking speeds may be uncomfortable crossing at a roundabout. Intersections with a high volume of vulnerable users may benefit from a signalized crossing. • On-street bike lanes are difficult to implement in roundabouts, as conflict points increase with added lanes. Depending on available space, cyclists exiting the roadway may need to dismount and cross the roundabout as pedestrians.
Public Education	• In communities where roundabouts are not a common form of intersection control, new installations may require public education prior to implementation.
Roadway Environment	• Downstream queues from nearby intersections extending into a roundabout can disrupt the operation of the roundabout at all legs • Intersections with near sensitive facilities such as community centres, schools, or retirement homes may benefit from a signalized crossing. • Roundabouts near a railroad crossing may cause additional significant delay and would require additional investigations

Recommendations

The information presented within this memorandum is utilized to develop recommendations on the implementation of roundabouts for all new intersections or intersections requiring improvements. The implementation recommendations are as follows:

1. Single-lane roundabout intersections are recommended as the first consideration for intersection controls for all new intersections or intersection improvements on minor and arterial collector roads in the Town, unless:
    a. The estimated construction costs, inclusive of property acquisition, are prohibitive.
    b. The nearest signalized intersection or railway crossing is less than 215m away:
        i. If a roundabout is still desired, it must be demonstrated through traffic analysis that the downstream queues from the signalized intersection or railway crossing will not negatively impact roundabout operations.
    c. It is located in close proximity to potential vulnerable users, where the location:
        i. Is within 200m walking distance from any entrance of a long-term care facility or similar type of facility which may house vulnerable users with accessibility needs
        ii. Is within a designated Retirement Residential Area as per *Draft Official Plan Section 4.6*
        iii. Meets the criteria for the *Pedestrian Traffic Signal, School Areas Policy (2013)*
    d. The proposed design is anticipated to impact significant environmental areas (as identified in the Town's Official Plan) while other options do not.
    e. Major street daily traffic volumes exceed 70% of total intersection entering volumes[2]
    f. Total intersection entering volumes exceed 16,000 daily[3]
2. If conditions a) thru d) are met, further study or reference to other Town policies or guiding documents is recommended to determine the appropriate intersection control type
3. If conditions e) or f) are met, further study on intersection control is recommended pursuant to the following further considerations:
    a. Between 16,000 and 25,000 daily vehicles, as described in **Figure 1**, a single lane roundabout may operate acceptably, but further traffic analysis is recommended to understand capacity implications, or a signalized intersection be implemented assuming signal warrants are met.
    b. Beyond 25,000 daily vehicles, it is recommended that traffic signals be implemented.

[2] Based upon the comparison of roundabouts to TWSC where performance is equivalent at 90% major street traffic proportion. As a screening methodology, a threshold of 70% is recommended to account for the potential disbenefits of right-of-way impacts and cost.
[3] Based upon **Figure 1** (NCHRP Report 372) lower capacity limit of a single lane roundabout is recommended as a screening methodology.

   c. Multi-lane roundabouts are not recommended for the Town of Innisfil at this time due to the active transportation challenges with higher-volume roundabout applications as well as the anticipated challenge with public acceptance.
4. For local street to local street intersections, roundabouts are not recommended due to the impacts to right-of-way width and cost.
5. Mini-roundabouts are not recommended for the Town of Innisfil at this time due to the limited enhancements to safety relative to implementation costs.

Both multilane and mini-roundabouts may be considered in the longer term future once the general public becomes increasingly comfortable with standard single lane roundabout design.