

COMPLETE STREETS KITCHENER

STREETS FOR ALL

Design for safety
Improve transportation choices
Advance sustainability



October 28, 2019



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Liability statement

Kitchener's Complete Streets guidelines are based on recent experiences designing and constructing streets and extensive consultation with city divisions, agencies, the public, councillors, industry and community stakeholders, as well as best practices from local, provincial, national and international sources.

It integrates and builds upon the latest available city policies, standards and guidelines. It is consistent with other provincial, federal and nongovernmental organizations, including the Ontario Traffic Council (OTC), Transportation Association of Canada (TAC), Institute of Transportation Engineers (ITE), National Association of City Transportation Officials (NACTO) and other sources. These guidelines also work within existing Provincial and Federal legislation pertaining to street design and operations, such as the Ontario Highway Traffic Act and Accessibility for Ontarians with Disabilities Act.

The Guidelines are based on the principle that all streets are different, and that no single design solution exists. A street's design will be tailored for the particular needs and opportunities created by local context, existing and future uses and users and dimensions of each street. Street design is an evolving practice. In the coming years, design strategies used elsewhere, and technologies that do not yet readily exist in Kitchener, will affect how we design our streets. Street designers should stay up-to-date on the latest best practices.

SECTION 1: KITCHENER'S VISION FOR COMPLETE STREETS



Section 1

KITCHENER'S VISION FOR COMPLETE STREETS

What are Complete Streets?

Complete Streets are for everyone! Complete Streets are designed to be safe and comfortable for all, regardless of age or ability. In other words, a street is “complete” when it works well for pedestrians, cyclists, transit riders and motorists. Complete streets also contribute to sustainability, health and social priorities, all while providing beautiful streetscapes and places to enjoy.

Streets are essential to our community

The City of Kitchener owns and maintains 763.1 km of streets on 14.1 km² of land. That means approximately 45% of all city-owned land and 10% of all land in Kitchener is dedicated to streets. Plus, the Region of Waterloo owns an additional 137.6 km of roads on 4.1 km² of land. All of this space doesn't even include highways owned and operated by the Province of Ontario. A large portion of our city's land mass is dedicated to streets.

Streets are where we hold community gatherings, and play basketball, hockey, or hopscotch. They are where we walk the dog, and catch up with friends and neighbours. A street is where our sanitation, cable, hydro, gas, phone and other services are located. They are where approximately 70,000 trees grow, stormwater runoff is managed and where we put out our recycling. Streets are places of commerce and economic activity. They bring people together to share ideas and rally around community causes.

And of course, streets serve as transportation corridors, helping us get around to all the places we need to go, to work, learn, shop and play.

We need to use these assets to the maximum benefit of our entire community by making streets more complete.

Making streets safe for all

Each year about 3,400 residents from Waterloo Region visit an emergency department and twenty-three residents die as a result of injuries caused by street collisions, including pedestrians, cyclists and motorists.¹ Street collisions remain a leading cause of unintentional injury for Canadian children, youth and young adults.²

¹ Ambulatory Emergency (2013-2017), Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: October 24, 2018. Ontario Mortality Data (2011-2015), Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: March 14, 2019.

² Gemmill I, Arra I, Carew M, et al. *Preventing Road Traffic Deaths and Injuries: Position Paper Road Safety Working Group, COMOH*. https://cdn.ymaws.com/www.alphaweb.org/resource/resmgr/COMOH_Section/6.4_MVC_Report_050615.pdf. Accessed October 17, 2018.

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The impact is far reaching and with great costs to individuals, families and society. In 2010 the cost of injury for transport related incidents in Ontario totalled an astounding \$1.2 billion.³ Financial costs of road crashes and injuries include lost earnings, health care and rehabilitation expenses, and the costs of property damage, administration, police, legal, and insurance.⁴ Injuries from such incidents can range from minor to severe including life-altering permanent disabilities like paraplegia, quadriplegia and brain injury. Those injured may experience chronic physical pain, as well as enduring the emotional trauma effects personally and within their family and society.⁵

The City of Kitchener and Region of Waterloo Public Health have a shared interest in preventing injuries and fatalities of all road users, including pedestrians, cyclists, and motorists. Almost all unintentional injuries are predictable and preventable. However, decreasing the incidence of injury of road users must be done in collaboration with other stakeholders who have an interest in road safety.⁶ Collaborating across the sectors of engineering, enforcement and education will establish large scale changes in healthy public policy and the creation of environments, both social and physical, which will encourage Canadians to be active and safe.⁷ Communities need to be designed in a way so that the people using the spaces can easily make behavioural decisions that will keep them safe and promote active transportation choices.⁸

Kitchener's Complete Streets vision

A comprehensive Complete Streets approach uses every roadway construction or reconstruction project as an opportunity to improve the design and functionality of a street for all users, and support effective maintenance and operational processes. In Kitchener, a vision, design goals and design principles should be used to guide efforts and make streets more complete.

Vision

Every street in Kitchener is
safe, comfortable and convenient
for all.

³ Belton K, Pike I, Heatley J, Cloutier E. *The Cost of Injury in Canada.*; 2015. http://www.parachutecanada.org/downloads/research/Cost_of_Injury-2015.pdf. Accessed October 29, 2018.

⁴ Gemmill I, Arra I, Carew M, et al. *Preventing Road Traffic Deaths and Injuries.*

⁵ Ibid.

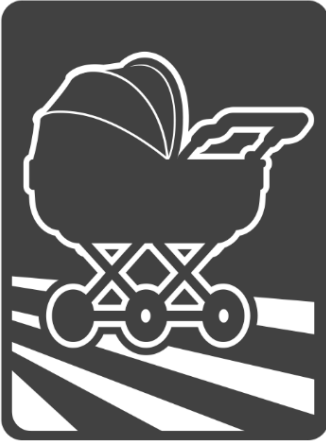
⁶ Ibid, Belton K, Pike I, Heatley J, Cloutier E. *The Cost of Injury in Canada.*

⁷ Parachute Canada. Public Policy Overview. <http://www.parachutecanada.org/policy>. Accessed October 29, 2018.

⁸ Public Health Agency of Canada. *Designing Healthy Living: The Chief Public Health Officer's Report on the State of Public Health in Canada 2017.*; 2017. https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/chief-public-health-officer-reports-state-public-health-canada/2017-designing-healthy-living/PHAC_CPHO-2017_Report_E.pdf. Accessed October 17, 2018.

Design goals

To achieve the vision, the city has three design goals for every street to prioritize: design for safety, improve transportation choice and advance sustainability.

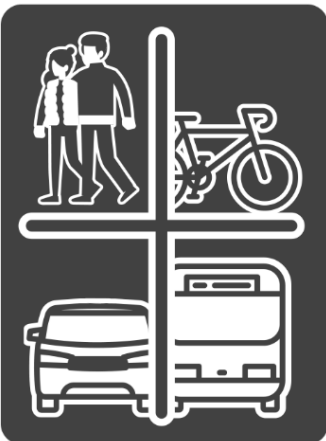


Design for safety

Kitchener's streets will embrace designs that protect the most vulnerable road users - pedestrians and cyclists.

Regardless of street classification, priority is given (in this order) to the safety of pedestrians, cyclists, transit users and motorists.

Kitchener's streets emphasize slower speeds through street design that makes it natural and intuitive for people to drive at safer speeds. This approach means that Kitchener's streets will embrace designs that protect the most vulnerable road users - pedestrians and cyclists.



Improve transportation choices

Kitchener's streets will provide connected networks with direct routes to major destinations for all modes of transportation.

Streets should be designed to make it possible for individuals to choose between different forms of transportation, depending on their unique needs. Planning for intermodal connectivity – meaning the ability to transition between different types of travel within a single trip – makes walking, cycling and public transit even more attractive and viable. Paying careful attention to the little details that can take away the stress of traveling is key. In doing so, the city can maximize the comfort and attractiveness of those travel options.



Advance sustainability

Kitchener's streets will advance the city's economic and environmental performance.

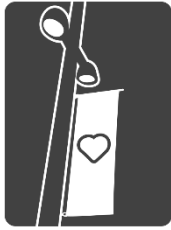
Vibrant and active streetscapes attract businesses, talent and investment through lively shopping districts, stress-free commuting options and efficient movement of goods and people. Complete streets make it easy for individuals to choose low energy and low carbon modes of transportation. Urban forestry and stormwater management can be enhanced through street design. Maintain with a triple bottom line approach: financial sustainability through appropriate resourcing and asset replacement; social sustainability through maintaining with a clear and equitable defined service level; and environmental sustainability by ensuring that maintenance is planned for and delivered within the broader context of the Corporate Climate Action plan.

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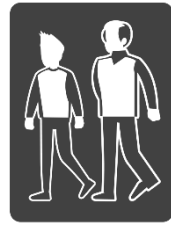
Design principles

Complementing the design goals are several design principles that foster a holistic approach to street design. Each principle acts as an important “lens” in which to view street design.



Foster a sense of place

Kitchener's streets are part of unique neighbourhoods with places to gather, celebrate, and connect with neighbours. They often contain vibrant greenery, beautiful art and practical amenities. Some streets can also be heritage landscapes.



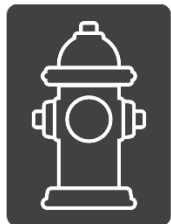
Encourage social connections and equity

Kitchener's streets encourage people to connect and build relationships. Balanced and well-designed streets can improve equity among all ages, gender identities, abilities, ethnicities, incomes, sexual identities and underrepresented populations.



Promote healthy lifestyles

Kitchener's streets encourage physical activity, improve mental health, reduce stress, protect air quality and provide more options to access nutritional, health and support services.



Deliver services

Kitchener's streets provide a connected corridor for service delivery. Streets ensure that emergency vehicles are able to respond quickly, and support snow removal activities, garbage collection and other municipal services. Streets contain the veins and arteries of the city with services like hydro, stormwater, sanitation and water.



Plan for all seasons

Kitchener's streets support people in getting around by all forms of transportation through all seasons. Designing with operational considerations in mind helps the city meet or exceed legislated or mandated requirements for maintenance, through things like understanding where snow can be stored, how maintenance vehicles can access services and how seasonal maintenance can occur.



Prepare for temporary conditions

Kitchener's streets provide accommodations or signed detour routes that maintain a high level of service for pedestrians, cyclists, transit users and motor vehicles during temporary closures for construction or special events.



Policy support for Complete Streets in Kitchener

A Complete Streets document by itself does not guarantee the implementation of complete transportation networks. Several important plans set the policy direction for Complete Streets. The following policies serve as key tools to implement complete streets.

Official Plan: A Complete & Healthy Kitchener (2014)

The Official Plan contains goals, objectives and policies to manage and direct municipal change and its effects on the cultural, social, economic and natural environment within the city. The plan's vision is: "Together we will build an innovative, vibrant, attractive, safe, complete and healthy community contributing to an exceptional quality of life."⁹

The Official Plan recognizes an integrated transportation system is an essential part of the city's urban structure and a key element in shaping the form and character of growth in the city. The plan seeks to encourage a wide range of viable transportation choices in Kitchener.

Kitchener Integrated Transportation Master Plan (2013)

The Kitchener Integrated Transportation Master Plan (TMP) defines and prioritizes an integrated transportation system that is supportive of all modes of travel. This includes walking, cycling, public transit and the automobile. The TMP also provides direction to maintain and improve the City's street network to move people and goods, but with reduced dependence on single occupant vehicles. The main goal of the TMP is to "plan a transportation system that reduces dependence on the private automobile in Kitchener by 2031."¹⁰

Cycling and Trails Master Plans

The City of Kitchener's Cycling Master Plan for the 21st Century (2010) presents a network of bikeways to be implemented over time, policies to support making Kitchener a bicycle-friendly city and related practices and programs to further those policies into action. The plan's vision is to "enhance the choice to cycle as a viable means of transportation and recreation through the provision of a safe, comfortable and connected bikeway network."¹¹

The Multi-use Pathways and Trails Master Plan (2012) is a blueprint intended to guide the development and operation of multi-use pathways throughout Kitchener. The vision of the plan is described as: "Multi-use pathways form the primary continuous off-road walking and cycling network that provides residents of all ages and abilities the means to travel easily and safely throughout their neighbourhood, across the City and to neighbouring municipalities. Multi-use pathways offer year-round opportunities for active recreation and active transportation."¹²

In 2020, the Cycling Master Plan and Trails Master Plan will be updated and combined into a single Cycling and Trails Master Plan (CTMP).

⁹ City of Kitchener. *Official Plan: A Complete & Healthy Kitchener* (Kitchener, 2014), 2-1.

¹⁰ City of Kitchener. *Kitchener Integrated Transportation Master Plan: Transportation's Role in a Complete and Healthy Kitchener* (Kitchener, 2014), 5.

¹¹ City of Kitchener. *Cycling Master Plan for the 21st Century* (Kitchener, 2010), 4.

¹² City of Kitchener. *Multi-use Pathways and Trails Master Plan* (Kitchener, 2012), 3.



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Pedestrian Charter (2005) & Sidewalk Infill Policy (2015)

The City of Kitchener's pedestrian charter aims to create an urban environment in all parts of the city that encourages and supports walking, as a critical mode of public transportation. An urban environment that encourages and facilitates walking supports community health, vitality and safety. It increases use of public transit, decreases car dependence, reduces conflict between vehicles and pedestrians, leads to cleaner air, green public space, and supports green tourism.

The Sidewalk Infill Policy endeavours to include sidewalks on both sides of every street to support a sustainable community and a pedestrian friendly environment. Sidewalk infrastructure is a key component of the urban environment that encourages and facilitates active transportation, supports community health, neighbourhood connectivity, community vitality and safety. Sidewalks contribute significantly to a sustainable community and a pedestrian friendly environment.

Province of Ontario: A Place to Grow (2019)

A Place to Grow: The Growth Plan for the Greater Golden Horseshoe provides policy direction to guide infrastructure growth in Ontario. The policy calls for a complete streets approach through the design, refurbishment or reconstruction of the existing and planned street network.

"Using a *complete streets* approach to roadway design, reconstruction, and refurbishment will ensure that the needs and safety of all road users are considered when planning and building the street network."¹³

Additional policies and strategies influencing streets

In addition to transportation-specific policies, there are a number of important documents that guide the design of a street's right of way, including:

- **Urban Design Manual** (2019) – Guides the design and placement of buildings, public spaces, transportation systems and other amenities.
- **Kitchener, Changing for Good: Our corporate climate action plan for sustainability** (2019) – A detailed strategy for reducing Kitchener's corporate level greenhouse gas emissions.
- **Kitchener's Sustainable Urban Forest Strategy** (2019) – A vision and framework to guide Kitchener's sustainable urban forest.
- **Corporate Asset Management Policy** (2018) – Manages the city's assets by incorporating all aspects of asset maintenance and service delivery.
- **Minimum Maintenance Standards for Municipal Highways** (2018) – Establishes maintenance standards in regards to inspections, snow accumulation, ice formation, potholes, cracks, debris, signs, and more, for municipal streets, sidewalks and bicycle facilities.
- **Integrated Stormwater Master Plan** (2016) – Sets targets for stormwater management and how to reach them.
- **Development Manual** (2015) – Provides new development with technical standards and guidance for subdivisions, site plans, streets, all associated infrastructure and utilities,

¹³ Province of Ontario. *A Place to Grow: The Growth Plan for the Greater Golden Horseshoe*, (Toronto, 2019), 30.



watermains, sanitary sewers, storm sewers, stormwater management, streetlighting, natural gas, lot grading, erosion and sediment control and parks and trails.

- **Love My Hood: Kitchener's Guide to Great Neighbourhoods** (2017) - Encourages residents to take the lead in shaping their neighbourhood, with help from the city.
- **Age Friendly Kitchener Action Plan** (2017) – “A community in which we can all live well and age well,” with accessible and affordable neighbourhoods. Improving the design and functionality of streets supports safety and accessibility, encourages social connections, and promotes healthy lifestyles for residents of all ages.

How to use this document

Kitchener's Complete Streets guidelines are used to guide all street projects in Kitchener. Most common applications include the design of a new street through the development process, a street to be reconstructed or a street that is suitable for retrofits to advance the Complete Streets vision. The purpose of the guidelines is to:

- Assist in implementing the vision for Kitchener's streets set out in the City's Official Plan.
- Provide a clear street design process that enhances collaboration on city street projects.
- Provide examples of street design features to be considered and assessed in street design processes.
- Encourage the use of every opportunity to apply the Complete Streets Guidelines.
- Integrate adopted City policies, standards and bylaws as they relate to street design.
- Provide city and agency staff, consultants, private developers and community groups with information on how to design streets that meet city-wide objectives.
- Communicate to Kitchener residents about the considerations that are guiding the design of Kitchener's streets.

Managing change with a changing streetscape

Achieving the Complete Streets vision will require change for city staff in the planning and operating of streets, while residents will experience change as they get around every day. Some of these changes may be subtle, and others may feel more significant. Managing change is key for success.

The city will expect experience some of these changes:

- A greater number of smaller equipment may replace a smaller number of larger equipment to do jobs such as snow removal;
- More resources (staff and equipment) may be required to achieve a similar level of service to that which is currently achieved;
- Different ways of working may be needed to accommodate the new ways in which our city streets are built; and
- Our operations will evolve and change as we see increasing growth in active transportation and transit.

For residents, changes might include:

- Greater awareness of and interaction between people using different transportation modes;
- How snow is cleared, leaves are collected, or garbage removed; and
- The level of service from the city and expectations of what the city should do for different elements of a street.

SECTION 2: STREET CLASSIFICATIONS



Section 2

STREET CLASSIFICATIONS

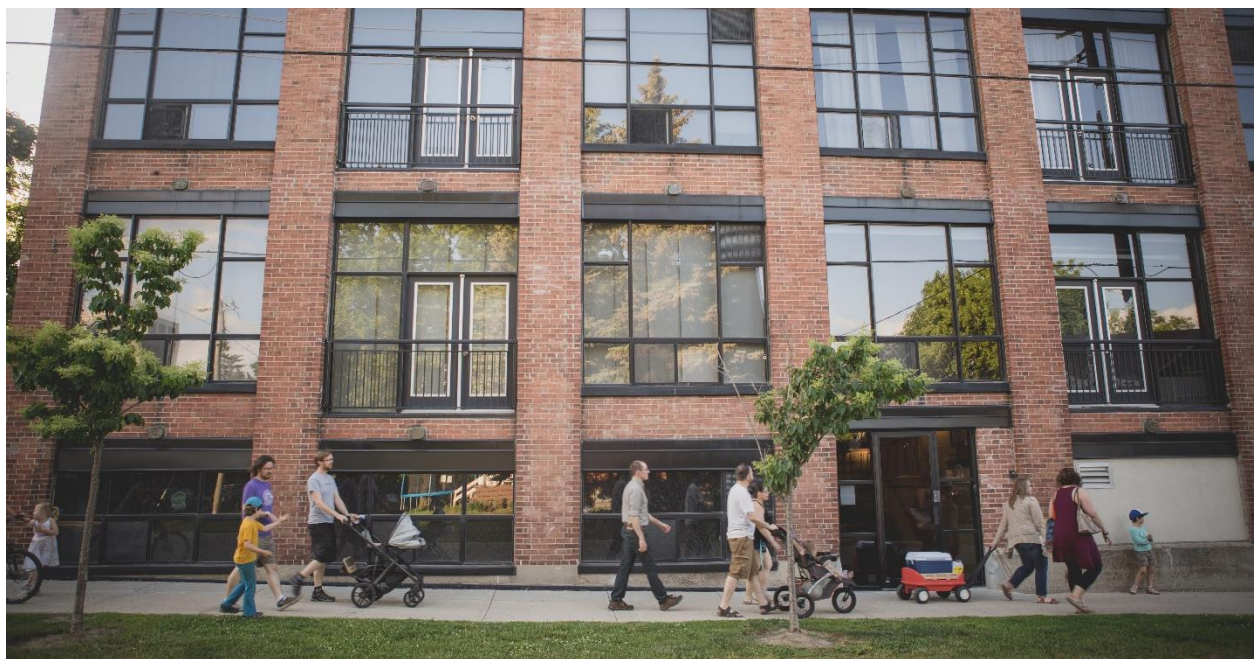
Every street can be a complete street, while maintaining or enhancing its unique character. There are a variety of ways to make a street more complete, depending on the function and context.

The City of Kitchener's Official Plan maintains a hierarchy of streets to ensure the desired movement of people and goods within and through the city.

Four types of streets make up Kitchener's street system: Local Streets, Minor Neighbourhood Collector Streets, Major Community Collector Streets and Arterial Streets. Each street classification has different functions and capacities, including types of active transportation facilities and expected motor vehicle volumes and speeds. In addition, Scenic Heritage Roads, which possess unique historical significance, are protected in accordance with the city's Official Plan and heritage conservation policies.

An integral part of a transportation network is established through a working partnership with other levels of government. The Region of Waterloo's street classification system facilitates movement between municipalities and townships in Waterloo Region. Major highways are planned and maintained by the Province of Ontario.

Streets perform both a mobility function and a place function. Depending on the local context, some streets will prioritize moving people and goods while some will prioritize attracting people, encouraging them to enjoy all that a street has to offer.



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Local streets

Local Streets provide access to properties and are not intended to carry high volumes of through motorized traffic.

Examples of local streets include Cotton Grass Street (below), Brock Street and Tanglewood Avenue.

Local streets are the most common form of street in Kitchener, making up 72% of the city's overall road network, spread throughout every neighbourhood in the city. Local streets prioritize active neighbourhood life and social interactions between neighbours going for walks, sitting on their front porch, or at a neighbourhood street party.

When designing local streets, create pedestrian-scaled streetscapes that promote walking, rolling, children riding their bikes safely on the road, social interaction and residential activities, while discouraging speeding and through traffic. Enhancing livability, a sense of community, an ability to age-in-place and safety for children are important considerations for these streets.



Preferred cross-section for local streets (18.0 m Right-of-Way)



Pedestrian View



Cyclist and motorist view

Note: All cross-sections are for illustrative purposes only. Exact conditions may vary depending on street context and constraints.

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Alternative cross-section for local streets (18.0 m ROW)

This cross-section is used where cycling is identified as a high priority route and/or demand for parking is low.



Pedestrian view



Cyclist and motorist view



Design objectives for local streets

Pedestrians

- Provide sidewalks on both sides of the street to encourage walking and rolling for both practical and recreational purposes, like commuting and dog walking.
- Provide shade trees to enhance the public realm by improving pedestrian comfort and helping to calm traffic.
- Provide curb extensions at intersections to calm traffic, shorten pedestrian crossing distance and improve sightlines for all street users.
- Encourage a connected grid network of local streets with direct pedestrian routes to neighbourhood destinations and amenities.

Cycling

- Cycling can be enjoyed safely on the street in mixed traffic.
- Use traffic diversion elements for priority cycling routes, as identified in the Cycling and Trails Master Plan.

Transit

- Transit service is generally not anticipated on local streets but provided on connecting minor or major collector streets.
- Provide dedicated walkways/trails to ensure direct pedestrian and cycling routes to nearby transit stops, especially in curvilinear street design, such as cul-de-sacs and crescents.

Motor vehicles

- An unmarked (no yellow centre line) two lane cross-section is typical.
- Local streets are designed to carry local traffic only.
- Designing the street for speeds of 40 km/h or less is a priority for safety of all users. Use pavement widths of 7.0 metres. Depending on volume of vehicles and parking utilization or restriction, 6.0 metres may be appropriate.
- On-street parking can be accommodated and used to aid in traffic calming, either as a shared travel and parking lane or alternating sides of the street. Restrict parking near intersections to provide improved sightlines and curb extensions.
- Design turning radii at 6.0 m to encourage slower vehicle speeds around turns.
- When entering residential neighbourhoods from higher order streets, raised crosswalks/crossrides are encouraged to signal to motorists that slower speeds are expected.
- The needs of service and emergency vehicles is an important design factor, with managing motor vehicle speeds and volumes in residential areas being an equally important priority.

Sustainable infrastructure

- Provide green space, landscaping and adequate soil in appropriate quantity to foster healthy tree growth in the boulevard.
- Curb extensions and other traffic calming or diversion elements are ideal locations for additional storm water management applications.

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Local street alternative - Woonerf

Translated to “living street”, a woonerf utilizes a shared space cross-section that reclaims the street as public space for people’s everyday use. The street is designed in such a way that motor vehicles are seen as “guests” in a space otherwise dominated by pedestrian activity and a high level of amenities. The street is designed correctly when children can safely play in any space of the right of way. Woonerfs can be used in both residential and commercial areas and are ideal where right of ways are constrained and in neighbourhoods with limited public space or parks nearby.



Woonerf design objectives

- Free movement of pedestrians is encouraged with a level, barrier-free streetscape. The traditional cross-section of grade-separated curbs, sidewalks, boulevards and vehicle lanes is not used.
- Provide clear and distinct entrances, often marked by gateway features.
- Use different colours or texture for the woonerf street surface area, such as imprinted asphalt, modular cobblestone or unit pavers.
- Apply frequent traffic calming elements such as curves and streetscape features to prevent vehicles from moving quickly through the woonerf space. The path of travel for drivers zig zags through the right of way. The design of the woonerf is for vehicle speeds of 15 km/h, slow enough for children to be playing in the middle of the street.
- Provide parking intermittently, not continuously, with different materials and bollards to designate available parking spaces.
- High use of furnishing, public art and landscaping, placed consistently throughout the right of way, to provide the feel of an “outdoor living room or play room” that encourages social interaction of all ages on the street.
- Group utilities together, as much as possible.
- Provide snow storage areas, close to drainage to limit runoff.
- Building facades are close to the property line to create a pedestrian oriented streetscape and sense of enclosure.¹⁴



¹⁴ Natalia Collarte. *The Woonerf Concept: Rethinking a Residential Street in Somerville* (Tufts University, 2012).

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Local street alternative – Green streets

In environmentally sensitive areas, a higher standard of environmental care can be applied through the adoption of a “green street” cross section. These lower impact roads protect valuable environmental resources and are most applicable to local streets with primarily residential land uses and low traffic volumes.

While the land designated to the right of way is consistent with a local street, a significantly lower rate of imperviousness is achieved with a small, windy, shared street (similar to a woonerf), no curb or gutter and a significant amount of green space to absorb rainwater and sequester carbon.



Green streets design objectives:

1. **Create pockets of natural areas throughout the streetscape.**
Integrate a variety of green infrastructure elements.
2. **Utilize similar design principles as a woonerf.**
This includes clear and distinct entrances and the free movement of pedestrians with a level, barrier-free streetscape. Include a snow storage area on a non-permeable surface close to the stormwater system.
3. **Design the street for a design speed of less than 30 km/h.**
Through windy curves and a narrow pavement width, motorists should be made to be very uncomfortable driving above 30 km/h.
4. **Identify the uniqueness of the street.**
Permeable pavers can be used to provide additional Low Impact Development (LID) benefits as well as identify the street as different than conventional streets, requiring motorists to use extra care and slower speeds.
5. **Engage the community.**
Collaborate with neighbourhood residents, integrate their ideas and encourage their buy-in for an improved streetscape everyone can enjoy.



Minor neighbourhood collector streets

Minor neighbourhood collector streets prioritize active neighbourhood life, multi-modal connections and facilitate movement within neighbourhoods.

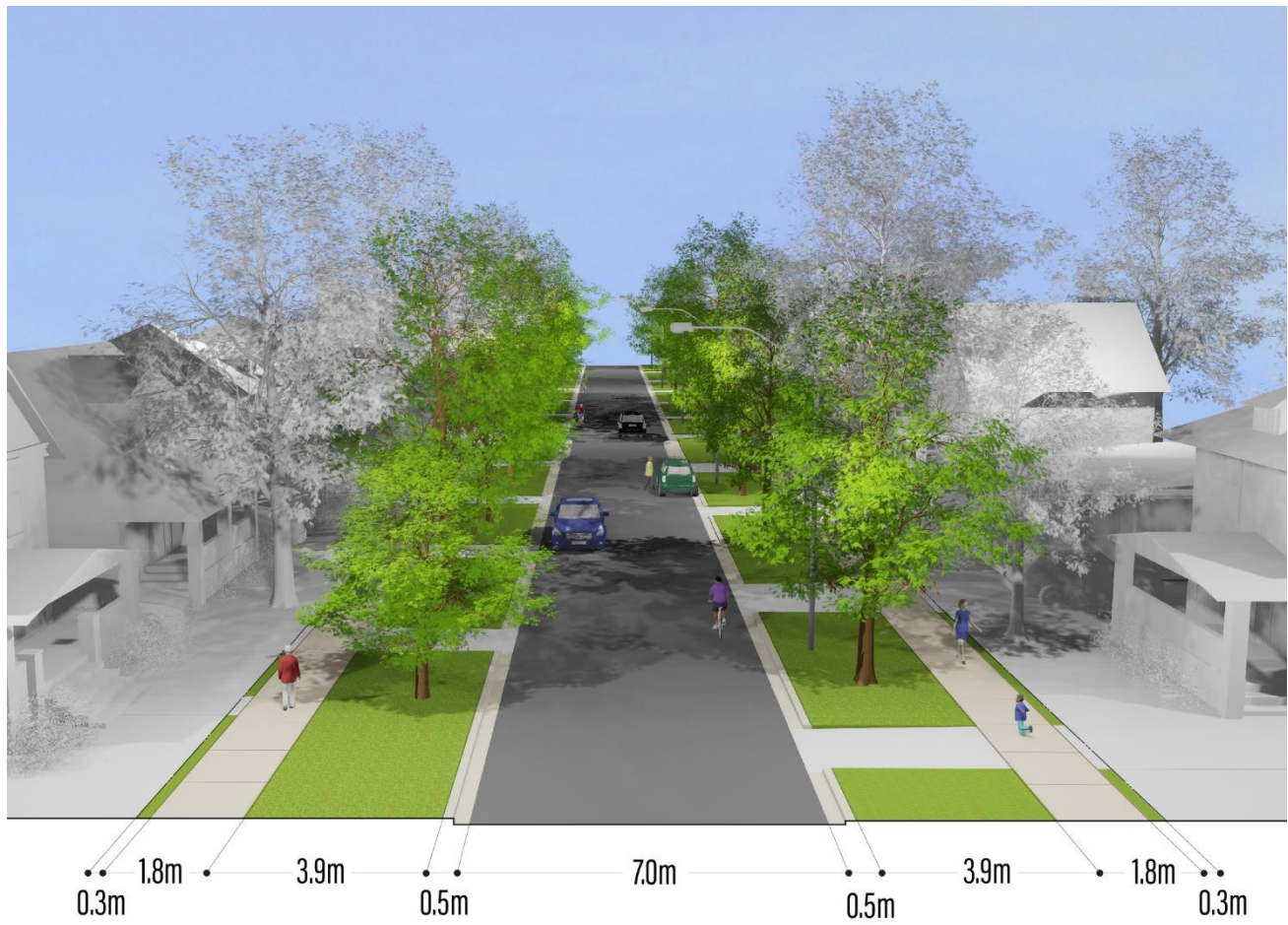
Examples of minor collector streets include Driftwood Drive (below) Manchester Road and Bechtel Drive.

Minor collector streets connect local streets to higher order streets and primarily accommodate residential land use. Commercial and retail land uses can be expected in proximity to significant intersections.

These streets may mark the entrance to a neighbourhood, with urban design features that celebrate the neighbourhood's unique identity.



Preferred cross-section for minor collector streets (20.0 m ROW)



Pedestrian view



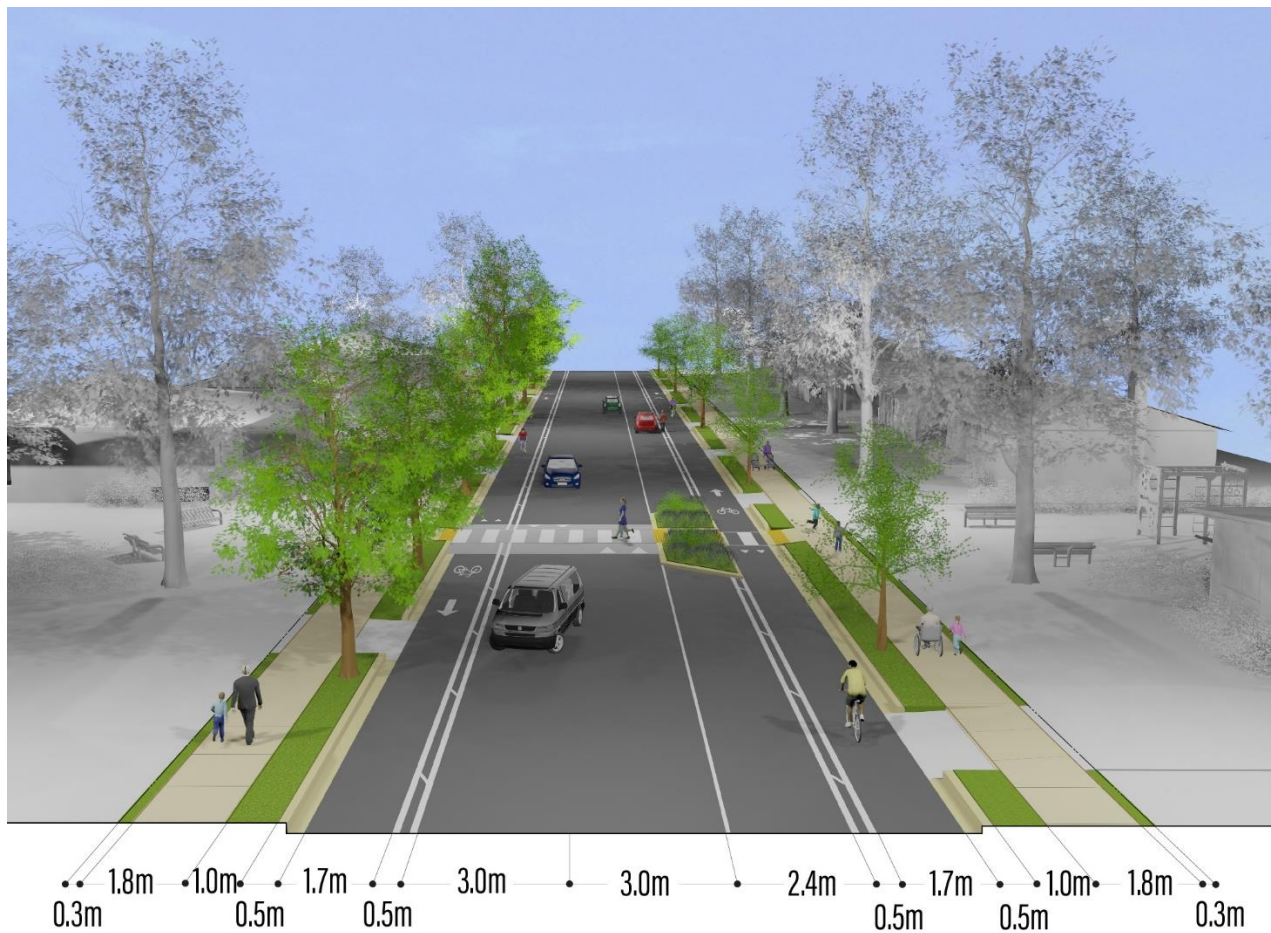
Cyclist and motorist view

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Alternative cross-section for minor collector streets (20.0 m ROW)

This cross-section is used where cycling is identified as a high priority route.



Pedestrian view



Cyclist view



Design objectives for minor collector streets

Pedestrian

- Provide sidewalks on both sides of the street to encourage walking and rolling for both practical and recreational purposes.
- Provide shade trees and seating (where appropriate) to enhance the public realm and improve pedestrian comfort.
- Provide curb extensions at intersections to calm traffic, shorten pedestrian crossing distance and improve sightlines for all street users.

Cycling

- Cycling can be enjoyed safely on the street in mixed traffic.
- For priority cycling routes identified in the Cycling and Trails Master Plan, use traffic diversion elements or dedicated bike facilities. Typically this would include on-road painted bike lanes and/or parking protected bike lanes but can also be cycle tracks located in the boulevard next to the sidewalk.

Transit

- Conventional bus service can be supported by minor collectors.
- Facilitate pedestrian access to transit stations with safe and convenient pedestrian crossings at transit stops.
- Include a transit stop pad and amenities based on demand and context, according to Grand River Transit standards.

Motor vehicles

- A two lane cross section is the standard. On-street parking can be accommodated.
- Design the street for speeds of 40 km/h.
- Minor collector streets will carry traffic primarily originating from within the neighbourhood it serves. Cut-through traffic is discouraged through traffic calming or diversion techniques. The connectivity of minor collector streets may attract through traffic, which is undesirable due to the residential context of these streets. Traffic calming measures such as raised intersections or crossings, neighbourhood traffic circles, centre island medians or speed cushions should be considered where observed travel speeds significantly exceed the posted speed limit.
- The standard lane width is 3.0 m. For bus routes, lane widths of 3.1 - 3.3 m can be used.
- Where parking and bike lanes are provided, elements, such as curb extensions at pedestrian crossings, which create visual and physical constraints are needed to avoid creating the perception of an excessively wide roadway that is comfortable for higher vehicle speeds.
- Design turning radii at 6.0 m, to encourage slower vehicle speeds around turns.
- When entering residential neighbourhoods, raised crosswalks/crossrides are encouraged to signal to motorists that slower speeds are expected.

Sustainable infrastructure

- Provide green space, landscaping and adequate soil in appropriate quantity and plant trees in boulevard.
- Curb extensions and other traffic calming or diversion elements are ideal locations for additional green infrastructure.
- A parking bay can be integrated with LID stormwater surfacing.

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STREETS FOR ALL

Major community collector streets

Major community collector streets balance the mobility of people between neighbourhoods with land accesses.

Examples of major collector streets include Guelph Street (below), Westheights Drive, and Wilson Avenue.

These streets facilitate movement from local and minor collector streets to higher order streets while providing a high-level of streetscape appeal for businesses, homes and other properties located along the street.



Preferred cross-section for major collector streets (26.0 m ROW)



Pedestrian and cyclist view



Motorist view

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STREETS FOR ALL

Alternative cross-section for major collector streets (26.0 m ROW)

This cross-section is used in higher density, mixed-use environments, and/or where cycle tracks in the boulevard are not feasible.



Pedestrian view



Cyclist view



Motorist view



Design objectives for major collector streets

Pedestrian

- Provide sidewalks on both sides of the street. A higher pedestrian clearway width can be used where there is a high volume of pedestrian traffic, such as near schools or long term care facilities.
- Provide shade trees to enhance the public realm and improve pedestrian comfort.
- Public realm features may include art, waste receptacles, or seating.
- Provide curb extensions at intersections to calm traffic, shorten pedestrian crossing distance and improve sightlines for all street users.

Cycling

- Provide dedicated cycling facilities on most Major Collectors, with the type of facility and level of protection dictated by street characteristics and network prioritization, as directed in the Cycling and Trails Master Plan.
- Draw attention to conflict points, like driveways and intersections, with markings or signage.
- Plan for the safe movement of bicycles at all intersections, including crossrides, intersection protection and signals.

Transit

- Major collectors can support both conventional transit and rapid transit (iXpress service).
- Facilitate pedestrian access to transit stations with safe and convenient pedestrian crossings at all major transit stops.
- Include a transit stop pad and place transit stop amenities based on demand and context, according to Grand River Transit standards.
- Consider “floating bus stops” to integrate bike facilities with transit stops and to reduce conflict points.
- Provide bicycle parking and micromobility stations to facilitate multi-modal connections.

Motor vehicles

- A two lane cross section is typical. A two way left turn lane may be appropriate in higher density scenarios.
- The standard width of motor vehicle travel lanes is 3.3 m, but can be reduced to 3.0 m if the street is not part of a transit route and motor vehicle volumes are low.
- Design the street for speeds of 50 km/h.
- Some Major Collectors may carry truck/freight traffic or prioritize emergency services. Greater attention to turning movements at intersections are required in these cases, but accommodating large vehicles must also be balanced with the benefits of managing motor vehicle speeds and volumes, especially in residential, school and commercial areas.
- Design turning radii with lower order streets at 6.0 m. Radii with other Major Arterials or higher order streets is 7.5 m – 8.0 m.

Sustainable infrastructure

- Boulevards should have a predominantly soft surface, with exceptions for transit stops or high pedestrian areas with street furniture.
- Provide green space, landscaping and adequate soil quantity to foster healthy tree growth in the boulevard.

Arterial streets

Arterial streets provide mobility for people and goods throughout the city while also providing a positive image of the city and fostering economic development.

Examples of arterial streets include King Street (below), Strasburg Road and River Road.

These streets carry high volumes of all modes of movement, including pedestrians, cyclists, transit, motor vehicles and freight vehicles.

Arterial streets often provide the most direct and convenient access to major destinations in the city, making it essential that all four travel modes are balanced effectively. Limit driveway accesses in order to prioritize safety and convenience of all forms of transportation along the corridor.

Within the Arterial classification, there are several functional subcategories depending on the land use and neighbourhood context:

- **Main streets** - serve as the social, economic and cultural centres of neighbourhoods and the city, through an expanded pedestrian realm and active street frontages. Main streets may limit motor vehicles to enhance the pedestrian experience, with services provided by laneways or side streets.
- **Thoroughfares** – provide efficient connections between different parts of the city, and connectivity to adjacent mixed land uses.
- **Industrial streets** – provide direct access to industrial and commercial properties and are designed to accommodate frequent heavy vehicles.



Preferred cross-section for main street scenarios (30.0 m ROW)

This cross-section is used in high density, pedestrian-oriented, commercial urban centres.



Pedestrian and cyclist view



Motorist view

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STREETS FOR ALL

Preferred cross-section for thoroughfare arterials (30.0 m ROW)

This cross-section is used in high density, mixed use corridors.



Pedestrian and cyclist view



Motorist view

Alternative cross-section for thoroughfare arterials (30.0 m ROW)

This cross-section is used in back-lotted, low density, and/or low driveways/intersections scenarios.



Pedestrian and cyclist view



Motorist view

COMPLETE STREETS KITCHENER

STREETS FOR ALL

Preferred cross-section for industrial arterials (30.0 m ROW)

This cross-section is used in primarily industrial areas.



Pedestrian and cyclist view



Motorist view



Design objectives for arterial streets

Pedestrian

- Prioritize an expanded pedestrian realm (wider sidewalks, pedestrian thoroughways and furnishing zones) where land uses provide active street frontage and high level of transit options.
- Provide a high level of pedestrian amenities and street furniture.
- Plan for frequent and safe pedestrian crossings, a minimum of every 200-400 m, so the street is not a barrier that divides neighbourhoods or discourages pedestrian activity.
- Provide curb extensions at intersections to calm traffic, shorten pedestrian crossing distance and improve sightlines for all street users.

Cycling

- Significant volumes of cyclists can be expected on arterials, especially those with a Main Street design and/or featuring rapid transit.
- Provide dedicated cycling facilities on all arterial streets, separated and protected from motor vehicles.
- Where Main Streets transition to other street classifications, extend cycling facilities beyond the segment that is designated as a Main Street to provide connectivity.
- Draw attention to conflict points, like driveways and intersections, with pavement markings or signage.
- Plan for the safe movement of bicycles at all intersections, including crossrides and signals.

Transit

- Prioritize frequent and efficient transit service. Consider transit-only lanes, queue jump lanes and transit signal priority.
- Facilitate pedestrian access to transit stations with safe and convenient pedestrian crossings at all major transit stops.
- Consider “floating bus stops” to integrate bike facilities with transit stops
- Provide bicycle parking and micromobility stations to facilitate multi-modal connections.
- Provide a transit stop pad and high level of transit stop amenities, in accordance with Grand River Transit standards.
- Consider curbside drop-off areas next to major transit stations or destinations for carpools, ridesharing services, etc.

Motor vehicles

- A two, three or four lane cross section can be used depending on neighbourhood and land use context.
- Design the street to encourage speeds of 50 km/h. In Main Street contexts or areas with vulnerable users (e.g. schools, nursing homes, community centres, etc.) a 40 km/h speed limit is more appropriate.
- Parking in dedicated lay-bys is preferred, but may also be provided on-street. In constrained situations, parking is less prioritized and shifted to nearby or intersecting streets. Off-peak parking in a motor vehicle travel lane may be appropriate in four lane cross sections.
- Arterial streets serving manufacturing uses often need to accommodate larger trucks turning and loading and unloading activities.
- Consider designated curbside drop-off areas for deliveries and services in high density, main street scenarios.

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STREETS FOR ALL

- Freight and emergency vehicles are important considerations in determining lane widths, curb radii and the suitability of raised medians.
- Desired separation between driveway accesses is 50 m or greater.
- Design turning radii with local or minor collector streets at 6.0 m. Radii with other streets is 7.5 – 8.0 m. Some encroachment of large vehicles is expected into adjacent lanes in same direction at major intersections (or opposing lanes at minor intersections). For Industrial Arterial Streets, up to 15 m radii can be used, with truck aprons an option (two separate curb radii for cars and a semi-mountable curb for trucks.)

Sustainable infrastructure

- In main street scenarios, the boulevard and furnishing zone is typically constructed of hard surfaces, with integration of vegetated swales, rain gardens, filter strips, and native vegetation.
- Use trees, planters and other greenery to provide a high quality aesthetic experience. Silva cells, grates or planter beds may be required where soil volumes are limited by other constraints. Hard surface boulevards always require silva cells and careful attention to providing adequate soil volume.
- Planted centre medians may be appropriate if they do not have an undue negative impact on emergency services' response times or maintenance.

Pedestrian-only alternative

Pedestrian-only streets prioritize people and are typically most appropriate in corridors with commercial activity on both edges of the street. They are strategically selected streets in which pedestrian volume is high and vehicular traffic is restricted. These streets offer opportunities for diverse activities such as shopping or sitting, dining or dawdling, promenading or performing.¹⁵

- Provide smooth and level surface to optimize walking and accessibility and encourage the free movement of pedestrians.
- Add street furniture, artwork, seating, tables, benches, trees, landscaping, cycle racks, and water fountains to add character and support a range of activities.
- Maintain minimum clear paths for emergency, service and maintenance vehicles.
- Restrict vehicular access and prohibit parking. Delivery vehicles can be allowed during certain times of day if required, but generally plan for deliveries to the rear access of properties.
- Provide nearby drop-off and pick-up points for vehicles carrying people with diverse accessibility needs.
- Schedule regular maintenance and waste collection to keep the space clean and inviting.
- Provide snow storage areas close to drainage.
- Include programmable space based on community needs, such as music or performance stages.
- Provide an expanded frontage zone to encourage merchants to use the outdoors for displaying and selling products.¹⁶



¹⁵ National Association of City Transportation Officials. *Global Street Design Guide* (New York: Island Press, 2016).

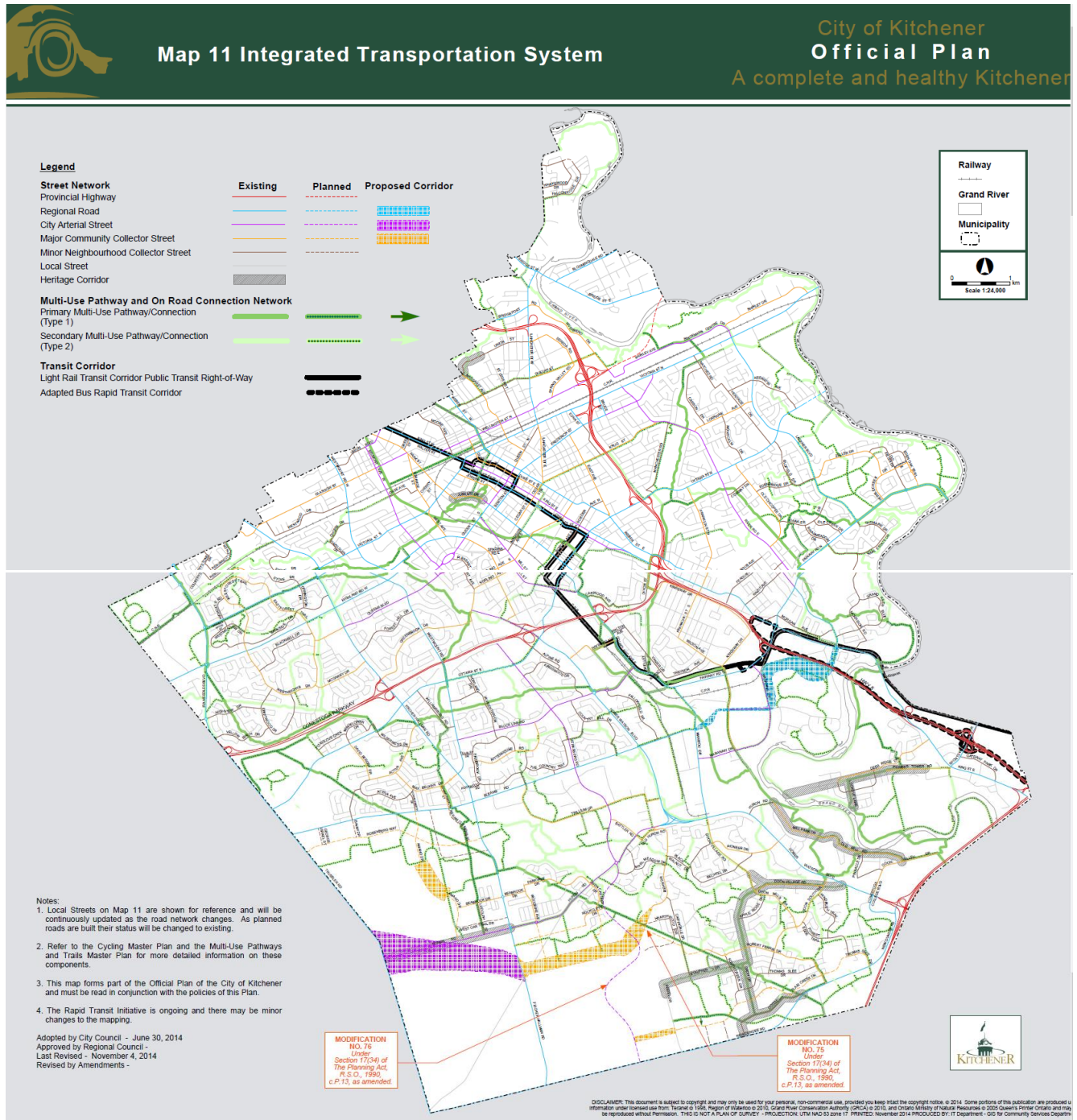
¹⁶ Ibid.

Summary of street classifications and map

Here is a quick summary to compare the different functions, characteristics and primary design features of each street classification.

	Local	Minor Collector	Major Collector	Arterial
Right of Way	18.0 m	20.0 m	26.0 m	30.0 m
Sidewalk width	1.8 m	1.8 m	1.8 m	1.8 – 3.0 m
Cycling facilities	Share the road. Additional traffic calming/diversion if high priority route.	Share the road. Additional traffic calming/diversion or bike lanes if high priority route.	Cycle tracks or separated bike lanes.	Cycle tracks, separated bike lanes or multi-use trails.
Motor Vehicle Volumes (AADT)	Up to 2,000	2,000 – 5,000	5,000 – 8,000	8,000 – 12,000
Speed Limit	40 km/h	40 km/h	40-50 km/h	40 – 50 km/h
Pavement width (includes parking and on-road cycling facilities if present)	7.0 m	7.0 – 12.8 m	9.0 - 14.6 m	10.8 – 19.0 m
Turning radius with Local/Minor Collector	6.0 m	6.0 m	6.0 m	6.0 m
Turning radius with Major Collector*	6.0 m	6.0 m	7.5 m	8.0 m
Turning Radius with Arterial*	6.0 m	6.0 m	7.5 – 8.0 m	8.0 – 10.0 m (if industrial, permit higher to maximum of 15.0 m)

Street classifications map



SECTION 3: STREET DESIGN



Carwood Ave.



Section 3

STREET DESIGN

Pedestrian design

Walking and rolling is the most common form of transportation in Kitchener. Every trip – including those involving cycling, transit or an automobile - begins and ends as a pedestrian. It is an essential part of healthy, active living, furthering equity among all abilities and socio-economic levels, and strengthening social connections between neighbours.

A pedestrian is a person moving from place to place, either by foot or by using an assistive mobility device. Pedestrians include residents and visitors of all ages and abilities. In order to travel safely, conveniently, directly and comfortably, they require an urban environment and infrastructure designed to meet their travel needs.¹⁷

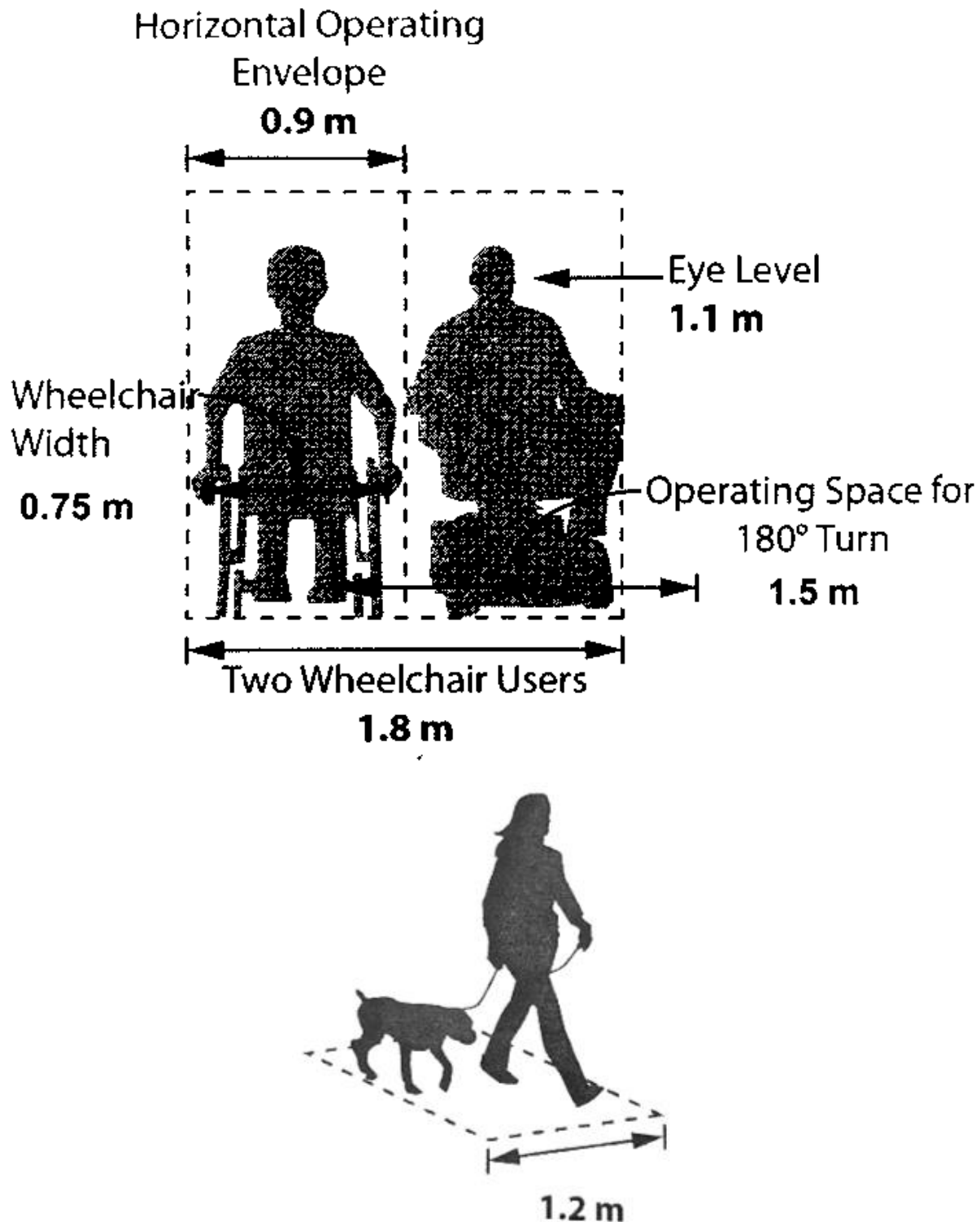
Pedestrian design objectives

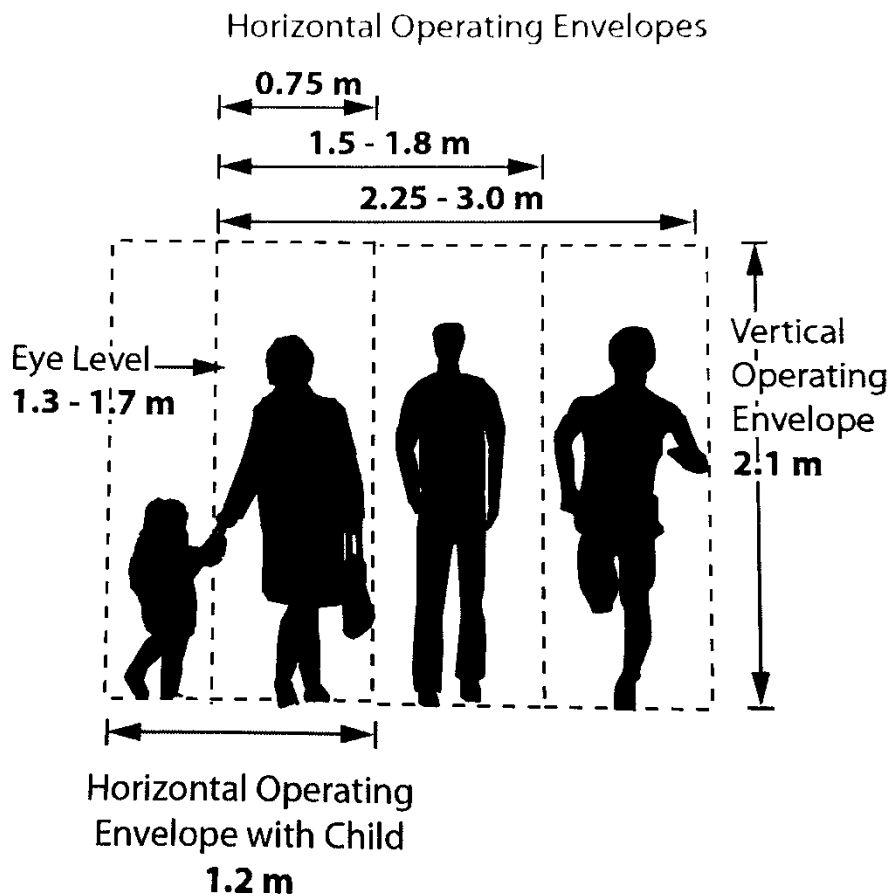
- 1. Prioritize safety.**
Pedestrians should be given the highest safety priority because they are the most vulnerable. Every street design process will first begin by considering the current and proposed context for vulnerable street users.
- 2. Design for accessibility.**
Pedestrians include the widest array of ages and abilities in the transportation mix. Features like appropriately wide sidewalks, curb cuts (or raised, fully flush crossings), tactile walking surface indicators, visually contrasting surface materials and amenities are essential to making the city accessible to all members of the community. Avoid curb-faced facilities.
- 3. Ensure direct, continuous and connected routes.**
As the slowest form of travel, pedestrians have the greatest sensitivity to route directness. Build missing links to ensure consistent and connected pedestrian infrastructure.
- 4. Provide sidewalks on both sides of the street.**
Ensure universal accessibility and convenience with pedestrian facilities on both sides of the street. The city's Sidewalk Infill Policy (INS-15-035) provides further direction.
- 5. Create beautiful and enjoyable places.**
Pedestrians are most attuned to the streetscape environment and will be drawn to beautiful streetscapes that create enjoyable places. An attractive pedestrian realm increases quality of life, pedestrian activity and generates economic activity.
- 6. Make it comfortable.**
A pedestrian experience that avoids stressful interactions with other travel modes encourages more people to walk, whether for practical transportation efforts or as a healthy form of exercise and recreation. Shade and amenities significantly improve the pedestrian experience.

¹⁷ City of Kitchener. *Pedestrian Charter* (Kitchener, 2017).

Pedestrian design features

The design user





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Sidewalk zones

Sidewalks are typically constructed with concrete, though more decorative materials can be used to enhance the streetscape in high profile areas. The expected width of sidewalks is 1.8 m, with 2.0 m or higher encouraged in high pedestrian areas such as transit routes and stations, schools, business and retail centres.¹⁹

There are generally four zones in pedestrian infrastructure. The width required for each zone depends on land use and pedestrian activity levels.

The **frontage zone** includes space for stopping, resting or window shopping. In a residential setting the zone is generally grass and appears as a reflection of a property's front lawn, but is still within the municipal property limit.

¹⁸ Transportation Association of Canada. *Geometric Design Guide for Canadian Roads, 2017 Edition*, Chapter 6: Pedestrian Integrated Design, 4-5.

¹⁹ In constrained corridors or to protect mature trees, 1.5 m wide sidewalks and/or alternative materials are acceptable. A 1.5m sidewalk is also an acceptable alternative on residential cul-de-sacs or crescents that provide direct access to less than 50 residential units and do not provide direct access to community parks, trails or public walkway connections.

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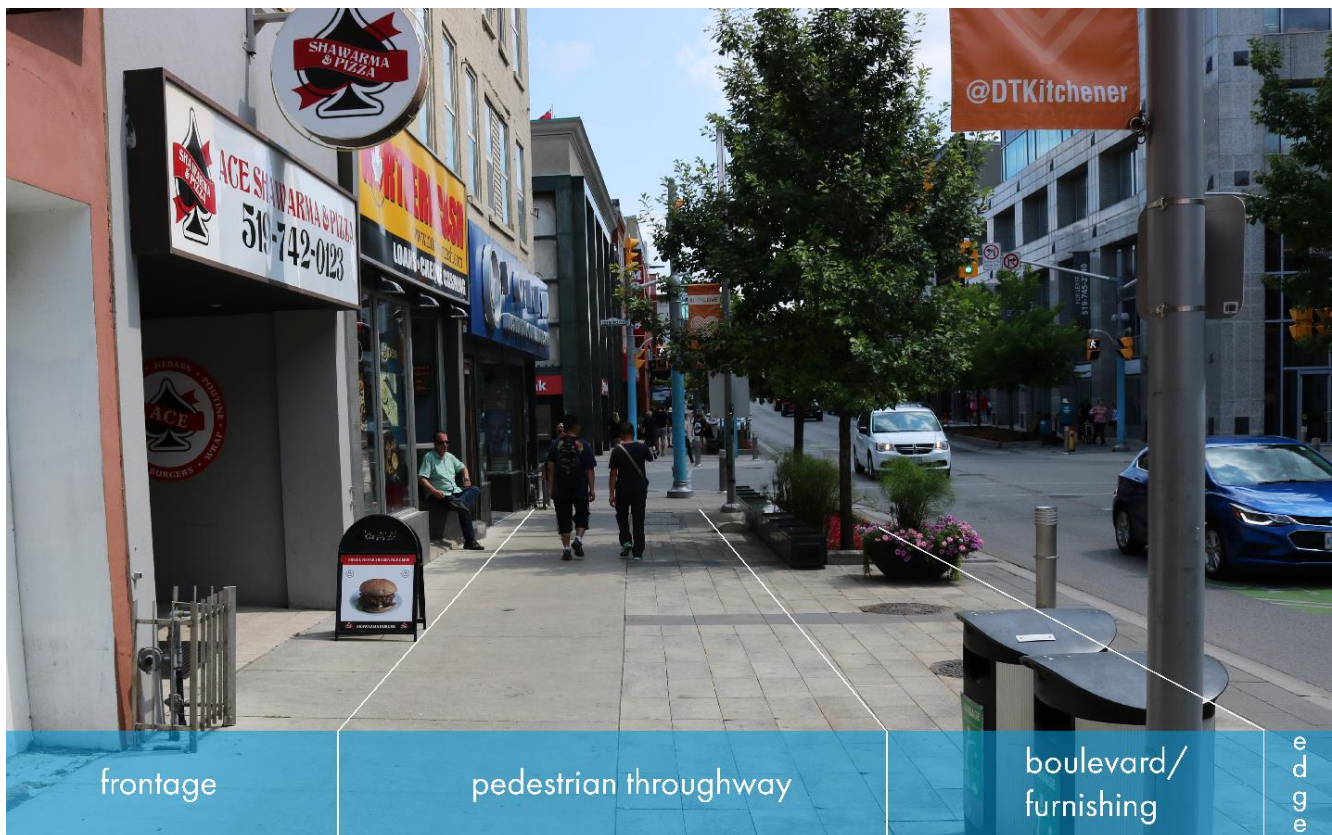
STREETS FOR ALL

The **pedestrian thoroughway zone** is an unobstructed path for pedestrian travel, a minimum of 1.8 m in low pedestrian areas and as high as 4.0 m in dense urban environments. In many residential neighbourhoods, the entire sidewalk is the thoroughway. Position the thoroughway at least 1.0 m back from the curb to facilitate snow storage and buffer space. Keep the width of the pedestrian thoroughway zone consistent within each block.

The **boulevard/furniture zone** may include streetlights, fire hydrants, signs, trees, newspaper boxes, recycling and waste receptacles, bike racks, benches, and transit shelters. In dense urban environments, the furniture zone often includes designated areas for snow storage. In residential neighbourhoods, the boulevard zone is primarily grass and trees and does not include as many amenities as an urban context.

The **edge zone** includes the curb and gutter and may also contain parking meters, car door swing paths and snow storage.

Note: Multi-use trails – which accommodate both pedestrians and cyclists in a shared space – may be an alternative to sidewalks, primarily used where pedestrian volumes are low. More guidance on trails is provided in the cycling section.



Curb extensions

- Curb extensions, also known as bulb outs or narrowings, extend the sidewalk or curb line into the street. This shortens pedestrian crossing distance, provides a traffic calming effect and tightens turning radii to slow speeds and improves the ability of pedestrians and motorists to see each other and make eye contact before proceeding.
- Curb extensions are expected at most intersections – especially where on-street parking is present - and can also be used at mid-block crossings.
- Curb extensions are excellent locations for street trees or sustainable infrastructure, provided it does not block sight lines of children and adults.
- When combined with a transit shelter, often referred to as “bus bulbs,” curb extensions can reduce the amount of time the bus requires to merge back into traffic, and can prevent motorists from parking in the bus loading area.²⁰
- The width of the curb extension is as wide as possible without limiting the functionality of the motor vehicle lanes. The length of the curb extension is roughly equal to the width of the extension, and should be a gradually angled taper that accommodates snow clearing. No parking is allowed on the curb extension.
- Where on-street bike lanes are provided, ensure the design does not squeeze the cyclist into motor vehicle lanes.



²⁰ National Association of City Transportation Officials. *Urban Street Design Guide* (New York: Island Press, 2013), 46.

Crosswalks

- Locate crosswalks to follow pedestrian desire paths.
- Align pedestrian crosswalks to minimize the crossing distance that vulnerable users are exposed on the roadway and maintain straight alignment with the throughway. Use curb extensions and vertical traffic calming measures to provide additional safety and comfort for pedestrians.
- All crosswalks are to be AODA compliant, including tactile walking surface indicators in the sidewalk and ramps at both ends. Ramps must be entirely contained within the crosswalk and should not be shared in two different directions. Ideally the ramps and surface indicators are located at right angles in the direction of the crosswalk, to discourage leading pedestrians into the intersection. Tighter curb radii can help but some streets may be too skewed to accommodate perfectly.
- The majority of crosswalks in Kitchener are painted horizontal lines. Ladder crosswalks can be used in high volume crossings, especially if vulnerable users (like children or older adults) are commonly present. Decorative or painted crosswalks can be used, in accordance with applicable policies.
- Use motor vehicle stop bars in advance of crosswalks, to reduce vehicle encroachment into the crosswalk, improve the driver's view of pedestrians and provide a comfortable space for pedestrian crossing.

Figure 3.2-9: Appropriate ramp placement



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²¹ City of Calgary. *Complete Streets Guide* (Calgary, 2014), 29.

Raised crosswalks

- A raised crosswalk enhances a standard crosswalk by adding additional height and visibility of pedestrians, clearly demonstrating priority to pedestrian crossing and adding a traffic calming effect to motor vehicles.
- Combine raised crosswalks with Pedestrian Crossovers (PXOs) at mid-block locations, to grant the right of way to pedestrians.
- Use raised crosswalks at entrances to residential neighbourhoods or main street zones.
- Maintain a smooth crossing, level with the connecting sidewalks or trail. This may require additional attention to drainage and stormwater drain locations.



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Pedestrian crossovers (PXOs)

- PXOs provide pedestrians with protected crossing opportunities by requiring motorists to yield to pedestrians within the crosswalk. The presence of a pedestrian in the crosswalk requires the driver of a vehicle approaching the crossover to stop before entering the crossover.
- The design, type and placement of PXOs in Ontario follow the guidance set out in OTM Book 15.²²



²² Province of Ontario. *Ontario Traffic Manual Book 15: Pedestrian Crossing Treatments* (Toronto: Queen's Printer for Ontario, 2016), 63.



Pedestrian refuge islands

- Pedestrian refuge islands, or medians, allow pedestrians to cross in two stages, rather than wait for gaps to clear in both directions.
- They can be especially helpful at mid-block locations to break up large blocks without controlled crossings such as stop signs, traffic lights, or pedestrian crossovers.
- The size of the refuge island should accommodate the volume of pedestrians (and the length of a bicycle with trailer if it is a shared crossing) expected to queue in the space. Islands should also be designed to be larger if the roadway is a high volume and high speed corridor, to help calm traffic and minimize the uncomfortable feeling of cars “whizzing by” in both directions. The preferred width is 2.4 – 3.0 m, with 1.8 m being acceptable in constrained scenarios with only pedestrians crossing.²³
- Angle the island portion of the crossing to encourage eye contact between pedestrians and oncoming vehicles.

Pedestrian amenities

Urban and environmental factors are a critical component of the pedestrian user experience. Amenities can add significantly to a feeling of safety on a street, as well as encourage longer travel distances through rest areas and interesting streetscapes. Appropriate maintenance and replacement costs should be factored into the placement of all pedestrian amenities.

- Lighting should ensure photometric design meets standards for the pedestrian scale, as per city lighting requirements. Heritage or decorative lighting can be used for greater streetscape appeal.
- Trees are encouraged to provide shade and comfort to pedestrians.
- Benches are important amenities to animate a street and provide comfort to pedestrians. Locations of higher priority include transit stops, older adult centres, medical facilities, recreation facilities and shopping centres.
- Sidewalk patios contribute to a vibrant public realm and support commercial activity.
- Sense of place can be enhanced through features like public art, banner poles, hanging baskets and decorative elements (such as seasonal lights). Further direction provided in Streetscape Design.

²³ NACTO, *Urban Street Design Guide*, 116.

Cycling design

Cycling is one of the most efficient forms of transportation. It can be significantly faster and cover longer distances than walking, while still gaining all the health and exercise benefits of using human-powered travel.

Many people are reluctant to cycle because they do not feel comfortable in mixed traffic with motor vehicles. A cyclist is similar to a pedestrian in terms of their vulnerability in a collision with motor vehicles, but requires a unique set of design considerations due to their larger operating space and faster speeds.

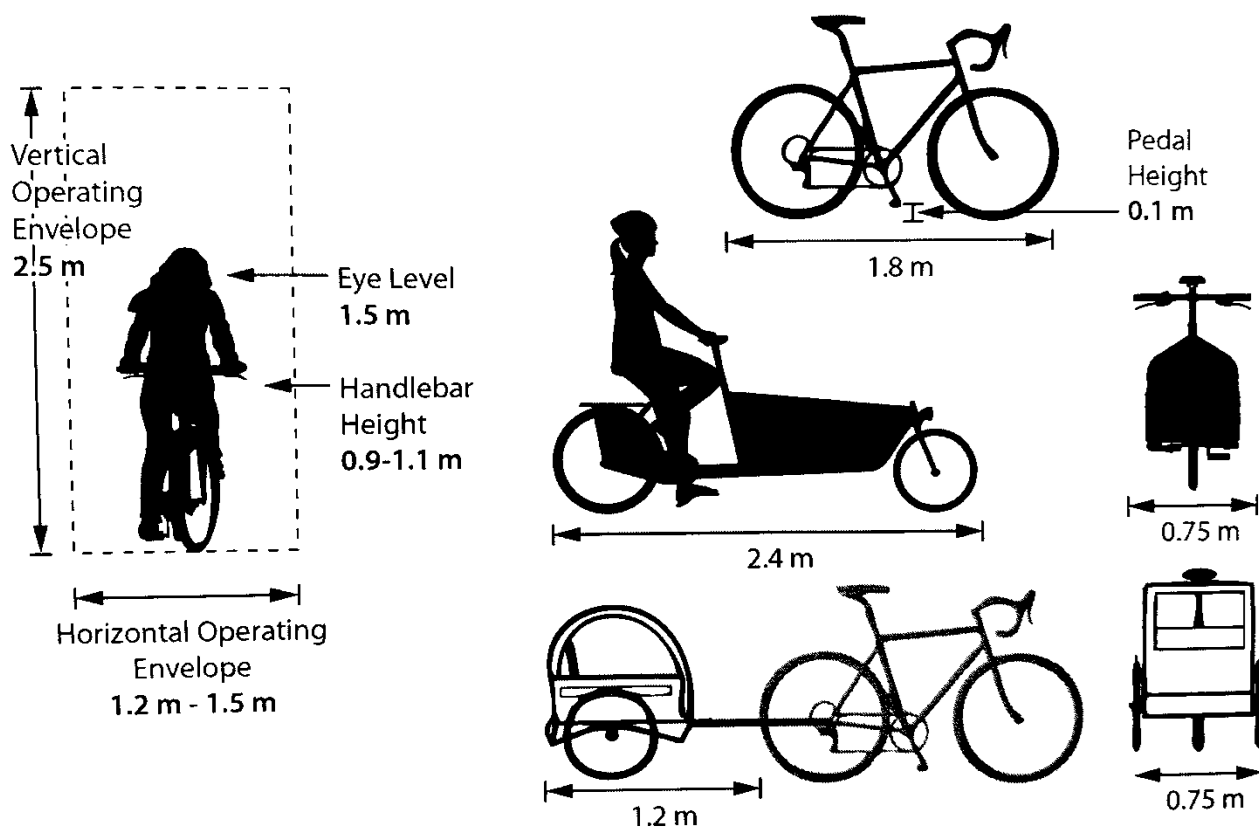
Cycling design objectives

- 1. Prioritize safety.**
This often includes separation from motor vehicles and mitigating conflicts at intersections.
- 2. Design for all ages and abilities.**
Target the 60% of the population who is interested in cycling more but doesn't because of safety concerns²⁴. Cycling ridership will grow if a street that was previously uncomfortable for cycling becomes safer and more comfortable. Plan for growing numbers, not current cycling volumes.
- 3. Ensure direct and connected routes.**
Build missing links to ensure consistent and connected cycling networks, in accordance with the Cycling and Trails Master Plan.
- 4. Provide guidance.**
Anyone should be able to hop on a bike and use the city's bike network, through intuitive design, signage and pavement markings. Because the cycling network incorporates both on-road cycling infrastructure and off-road trails, it is essential to provide wayfinding guidance for ease of navigation and a consistent cycling experience.
- 5. Make it maintainable.**
Accommodate maintenance equipment needs with sufficient space and snow storage areas to ensure regular maintenance can be provided.
- 6. Provide a comfortable experience.**
Provide smooth riding surfaces as much as possible, and ensure bike-friendly catch basins and maintenance holes. Cyclists should be able to complete their journey without having to dismount.

²⁴ Province of Ontario. *Ontario Traffic Manual Book 18: Cycling Facilities* (Toronto: Queen's Printer for Ontario, 2014), 12-13.

Cycling design features

The design user



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Choosing the most appropriate type of bicycle infrastructure is based on a variety of factors, including land use, network connectivity, pedestrian volumes and crossings, motor vehicle volumes, motor vehicle speeds, and intersection design and function. Direction provided in this document is consistent with the most up to date version of OTM Book 18: Cycling Facilities, and other industry standards.

²⁵ TAC, *Geometric Design Guide for Canadian Roads*, Chapter 5 – Bicycle Integrated Design, 7.

Cycle tracks

Cycle tracks, also known as raised or boulevard bike lanes or bike paths, are located outside of the travelled portion of the roadway, and include barrier curb separation. Cycle tracks are attractive to all ages and abilities, due to the strong separation from motor vehicles, and can take less right of way space than separated or buffered bike lanes. They can be considered wherever a standard bicycle lane is recommended, especially along higher speed and/or volume streets.

- Desired width is 1.8 m, with 1.3 - 1.7 m being acceptable in constrained scenarios.²⁶
- Include a 1 m boulevard space for greater cycling comfort, to avoid frequent and uncomfortable grade change (sometimes referred to as “roller-coastering”) at driveways and to provide snow storage space from both the road and the cycle track.
- If placed directly beside a sidewalk, provide a visual and tactile marking to warn visually impaired pedestrians if they are entering the cycle track. Width of the marking is at least 0.2 m and can consist of hatched sidewalk (concrete) or interlocking bricks.
- If on a transit route, consider how to mitigate conflicts between pedestrians and transit loading/unloading, such as floating bus stops. Where space permits, the preference is to locate the cycle track behind the bus stop.
- Continue the cycle track through intersections, with crossrides and bicycle signals facilitating intersection movement. Plan for two stage left turns.
- Use the same pavement markings and signs as painted/conventional bike lanes, including green paint to highlight major conflict points and elephants’ feet²⁷ markings across driveways.
- Maintenance includes utility repair, street sweeping, snow removal and pothole repair.



Main Street cycle track in Ottawa.

²⁶ TAC, *Geometric Design Guide for Canadian Roads*, Chapter 5 – Bicycle Integrated Design, 18.

²⁷ Province of Ontario, *OTM Book 18*, 120.

Separated bike lanes

Separated bike lanes provide space exclusively for bicycles and include a form of physical separation from the motorized portion of the roadway, such as bollards, curbs, planter boxes, raised medians or parking. The higher the level of protection from adjacent motor vehicles, the more attractive the bike lane becomes to all ages and abilities. Separated bike lanes are appropriate on roads with moderate to high motor vehicle volumes and speeds, and can have a higher capital and maintenance cost than other forms of cycling infrastructure.

- Desired width is 2.5 m for the bike lane and 1.0 m for the buffer, to facilitate passing in the bike lane and provide enough space for maintenance vehicles. Constrained scenarios can be designed for 1.8 m bike lanes with a 0.3 m buffer.²⁸
- Restrict parking on approaches to intersections. For parking protected bike lanes, add islands at intersections to maintain a level of protection for cyclists when parking is not allowed.
- Plan in most cases for one way bicycle lanes on each side, but two-way bicycle operation is possible on one-way streets, especially in constrained scenarios.
- The type of separation depends on motor vehicle speed and volume in adjacent lane, presence of parking, available width, sightline requirements, drainage requirements, maintenance requirements and surrounding land use.
- Use the same pavement markings and signs as painted/conventional bike lanes, including green paint to highlight major conflict points and elephants' feet markings across driveways.
- Plan for drainage from the motor vehicle lanes and separate bike lanes.
- Maintenance includes street sweeping, snow removal, pothole repair, underground utility repairs and catch basin cleaning.



Separated bike lanes in Toronto.

²⁸ TAC, *Geometric Design Guide for Canadian Roads*, Chapter 5 – Bicycle Integrated Design, 16.

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Boulevard multi-use trails

A boulevard multi-use trail (BMUT) provides two-way travel for both pedestrians and cyclists, in a shared space, adjacent to the roadway in the boulevard. Pedestrians and cyclists travel in the same direction, on the right side of the trail. BMUTs have popular appeal because a curb and green space, furnishing and/or buffered zone fully separates pedestrians and cyclists from motorized traffic.

A BMUT is appropriate where there are minimal conflicts (such as intersections or driveways), low pedestrian and/or bicyclist volumes and recreational uses are high. In most cases, that would include city arterial streets, though a BMUT may be used on other street classifications that connect to an off-road trail, to provide a consistent experience from off-road trails to within the right-of-way.

Since BMUTs are used by pedestrians as well as cyclists, they must meet all AODA requirements.

- The desired width is 3.6 - 4.0 m, especially if the BMUT is only on one side of the street, to accommodate one person cycling in one direction and two people walking abreast in the other direction. A lower limit of 3.0 m is appropriate in lower volume areas or if the BMUT is on both sides of the street. A maximum limit is 6.0 m. In constrained conditions, a 2.4 m width can be considered.
- The desired width of the buffer zone between the street curb and BMUT is 1.5 m. Curb faced BMUTs can be considered in constrained situations, but requires careful consideration of winter maintenance coordination between the road and BMUT and may require additional maintenance costs, due to the need for snow loading. The buffer zone can be grass or pavement/concrete, provided the material has a visual and tactile difference from the BMUT.
- Surface material preference is asphalt or like material. Concrete is discouraged due to its resemblance of a sidewalk (if concrete is desired, it must have a higher use of pavement markings and signage). Unpaved surfaces (e.g. stone dust) are not appropriate for BMUTs in the right of way due to maintenance requirements.



Multi-use trail on Strasburg Road, Kitchener.

- Curb cuts at street crossings and transitions between on-road and off-road facilities is to be provided, with transitions as smooth as possible for accessibility purposes and to facilitate safe and comfortable crossings.²⁹ Tactile warning plates to be provided where pedestrians cross. The combined crossride/crosswalk is to be provided at all intersections.
- Pavement markings include a solid, yellow centre line of 100 mm width, to separate bidirectional travel.³⁰ Use pedestrian and bicycle symbols and directional arrows at major access points or street crossings,³¹ to make it clear to users which side of the pathway to be on and the direction to travel in. Use a dashed yellow line when pathways intersect. Stop bars to be placed where yield control is warranted.
- Use the Shared Trail sign to indicate that users are expected to share the space and to notify motorists of the presence of pedestrians and cyclists.³² It should be placed on the far side of intersections, pathway entrances and major decision points.
- Driveways are to be consolidated and narrowed as much as possible to limit conflicts between pedestrians, cyclists and motorists. Trail to cross driveways smooth and flush with driveway curbs interrupted by trail. Design driveways and intersections to reduce vehicle speeds when turning and place stop bars before the BMUT for vehicles crossing over the trail. Elephants' feet markings used across driveways.
- Streetname blades added to BMUT stop signs.
- Restrict access to motor vehicles with entrance features, if necessary. Make sure the pathway user experience is not compromised, including wider users like strollers, bike trailers or cargo bikes.
- Grades on pathways should be limited to 5%, and cross-slopes should be 1 to 2%, balancing the need for drainage and accessibility.
- Amenities include rest areas, benches, waste receptacles and bike parking.
- Maintenance considerations include sweeping, winter snow clearing and underground utility maintenance.



Source: MMM, 2013



²⁹ Province of Ontario, *OTM Book 18*, 125.

³⁰ *OTM Book 18*, p. 119.

³¹ Province of Ontario, *OTM Book 18*, 119.

³² *Ibid.*, 117.

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Neighbourhood bikeways

Neighbourhood bikeways, also known as bicycle boulevards or bicycle priority streets, are quiet, local streets that can be enjoyed in a low-stress environment without designated space. Bicycles are assigned priority by applying additional speed and volume treatments to reduce the level of stress for cyclists.

- Design the street to reach low motor vehicle volumes (target of 500 per day) and low motor vehicle speeds (less than 40 km/h).
- Provide logical, direct and continuous routes to access desired destinations.
- Wider streets may provide more comfortable passing, but may also encourage higher speeds. A road width of 6.0 – 7.0 m, with parking on one-side only, is preferred.³³ Consider removing parking entirely for higher priority streets within the cycling network, to reduce cyclist stress and prevent dooring.
- Use wayfinding signs to guide cyclists through the network.
- Assign priority to cyclists through signage and pavement markings.
- At intersections, minimize stops at local street crossings by re-orienting stop signs, or using yield signs or traffic signals. At major road crossings, transition cyclists into the boulevard space to navigate the intersection separated from motor vehicles similar to cycle tracks.
- Reduce motor vehicle speeds through traffic calming measures.
- Lower motor vehicle volumes through traffic diversion elements that restrict movement for motor vehicles but maintain movement for cyclists and pedestrians. Treatments include diagonal diverter, directional closure, right in/right out island, raised median island or dead end streets. These elements are ideal opportunities for green infrastructure or public art.³⁴ Increased maintenance costs are expected with these treatments.

Examples of traffic diversion techniques:



³³ TAC, *Geometric Design Guide for Canadian Roads*, Chapter 5 – Bicycle Integrated Design, 26.

³⁴ Patterson, Brian and Sarah Freigang. "Bike Facilities Design Workshop." Waterloo: Institute for Transportation Engineers and Urban Systems. September 21, 2018, and National Association of City Transportation Officials. *Urban Bikeway Design Guide*. New York: Island Press, 2014.



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³⁵ National Association of City Transportation Officials. *Urban Bikeway Design Guide*. New York: Island Press, 2014.

Painted bike lanes

Painted bike lanes, also known as conventional bike lanes, are a designated space for exclusive use by cyclists. In most cases, a painted bike lane does not provide a level of comfort and safety to be appropriate for all ages and abilities, because it does not provide physical separation from motor vehicles. Painted bike lanes are used as a supporting feature of the cycling network to connect lower-density neighbourhoods to higher order cycling infrastructure.

Variations of the painted bike lane include:

- Painted buffered bike lanes, to improve the level of comfort and safety, especially next to parked cars.
- Contraflow bike lanes, allowing cyclists to ride in opposite direction of motor vehicles on one-way streets.
- Advisory bike lanes, providing a bicycle-priority area within a shared roadway environment.³⁶

Design considerations:

- The desired width is 1.8 m, with additional space up to 2.0 m encouraged to enhance the cycling experience. In constrained scenarios, 1.5 m is acceptable. If providing a buffer, the width can vary between 0.5 m – 1.4 m.
- Typical placement is between the curb and parking, if present, though contextual factors related to parking occupancy/turnover, driveway frequency, and traffic speeds/volumes may switch that alignment. Provide additional space next to parking to eliminate risk of dooring.
- Use OTM Book 18 pavement markings and signs, including green paint, to highlight major conflict points.
- Maintenance includes underground utility repair, street sweeping, snow removal and pothole repair, which is typically provided by the same equipment servicing the adjacent motor vehicle lanes.



Painted bike lane on Margaret Avenue, Kitchener.

³⁶ Province of Ontario, OTM Book 18. Joe Gilpin. “Advisory Bike Lanes in North America: Lessons Learned” (Alta Planning + Design, 2017).

Bicycle parking & bike sharing

Every bicycle trip requires a convenient and safe place to park a bike. Bicycle parking is to be provided in the right-of-way along major corridors and destinations.

- Bicycle parking must not obstruct the pedestrian clearway.
- Place in locations of high visibility near desired destinations to deter theft.
- Place on hard surfaces only.
- Bike racks should be designed to allow both the frame and at least one wheel of the bike to be secured with a u-style lock. For orderly parking, the rack should make at least two points of contact with the bike.³⁷
- Preferred styles for the City of Kitchener include the inverted U, ring and post, and the decorative bike.
- For higher volume bike parking, group several inverted U racks together.
- Long-term covered parking and/or secure parking is ideal next to major transit hubs and destinations.

Bike sharing is an emerging mode of transportation offering convenient access to a bicycle (see Section 4). Provide space for bike sharing hubs or stations at major destinations. The size and layout of the stations will depend on the type of bike sharing system being offered. These locations should be reviewed on an ongoing basis to ensure they align with cycling demand.



³⁷ Dero. "Pocket Guide to Bike Parking," 2015.

Transit design

Transit expands people's access to the places they need to go throughout the city and contributes to an equitable, sustainable and efficient transportation network. Transit has the highest capacity for moving people in a limited space, meaning more of the street can be dedicated to other travel modes and vibrant public space.

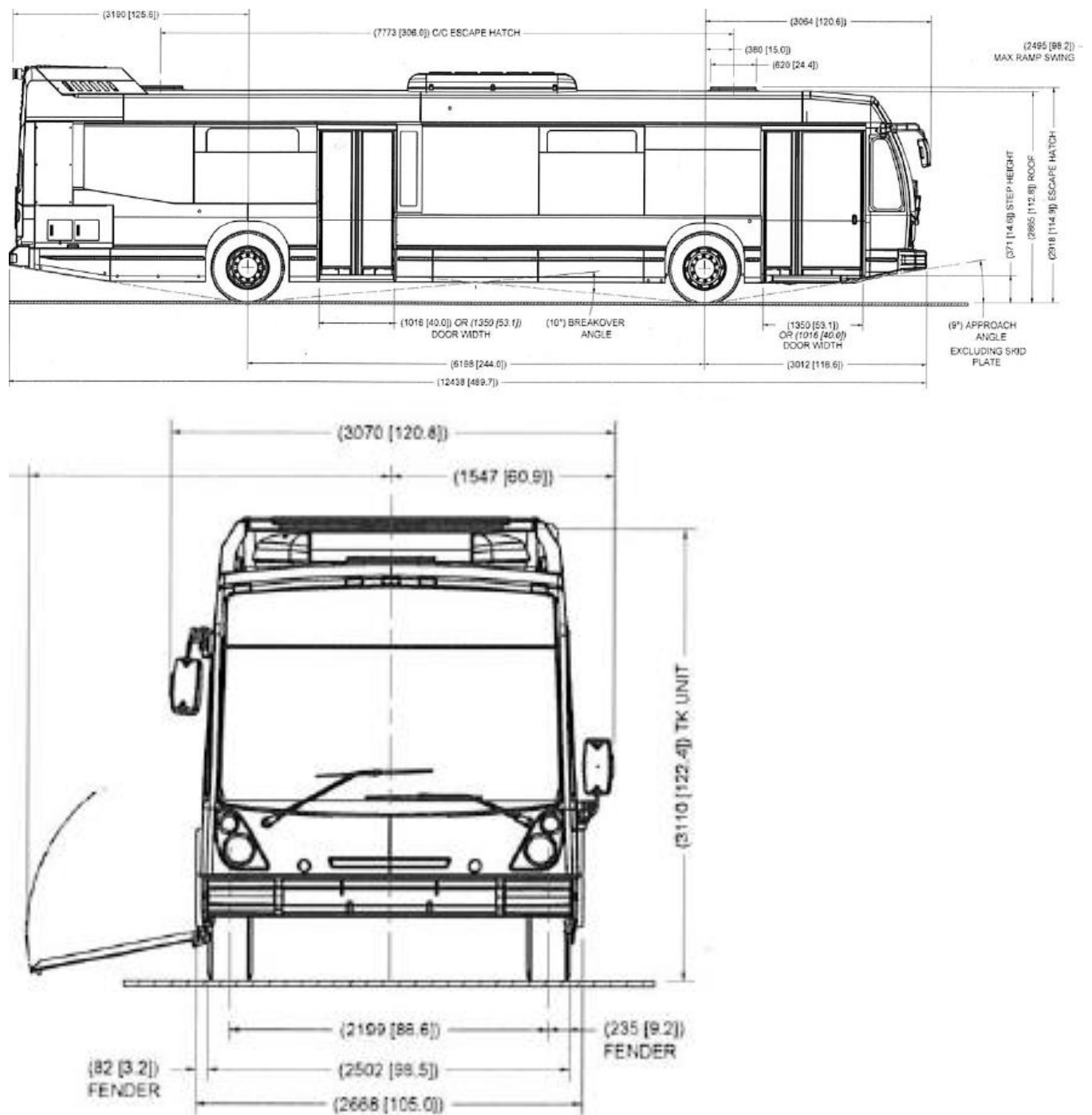
In Kitchener, transit services are provided by Grand River Transit (GRT) and the Region of Waterloo. This section provides some initial guidance for street designers. Designers must also fully coordinate with GRT staff, policies and guidelines to achieve a high quality transit street design.

Transit design objectives

- 1. Provide safe and convenient active transportation access.**
Most transit trips start and end with walking or cycling. Pair transit stops with safe pedestrian crossings and cycling connections. Improve active transportation and public transit simultaneously.
- 2. Facilitate multimodal connections.**
Provide direct pedestrian access, bike parking and/or micromobility stations to make it easy for people to combine transit with other travel modes. Consider vehicle drop-off facilities (i.e. park and ride lots) where appropriate, usually at major hubs outside of the urban core.
- 3. Include adequate space for transit amenities.**
Landing pads, seating and shelter provide important comfort to the transit experience, especially in varying weather conditions. Ensure there is sufficient space for the required amenities in street design.
- 4. Facilitate transit efficiency.**
On high- priority routes, bus bulb outs (or curb-outs) and queue jump lanes can speed up transit trips by prioritizing transit over other modes.
- 5. Design for all users.**
Universal accessibility of transit stops is required, according to the latest GRT standards and relevant legislation. Ensure facilities prioritize access, comfort, wayfinding, and connectivity.
- 6. Create vibrant places.** Transit attracts people, businesses and development. Integrate transit into the fabric of everyday life and design attractive public places.

Transit design features

The design user



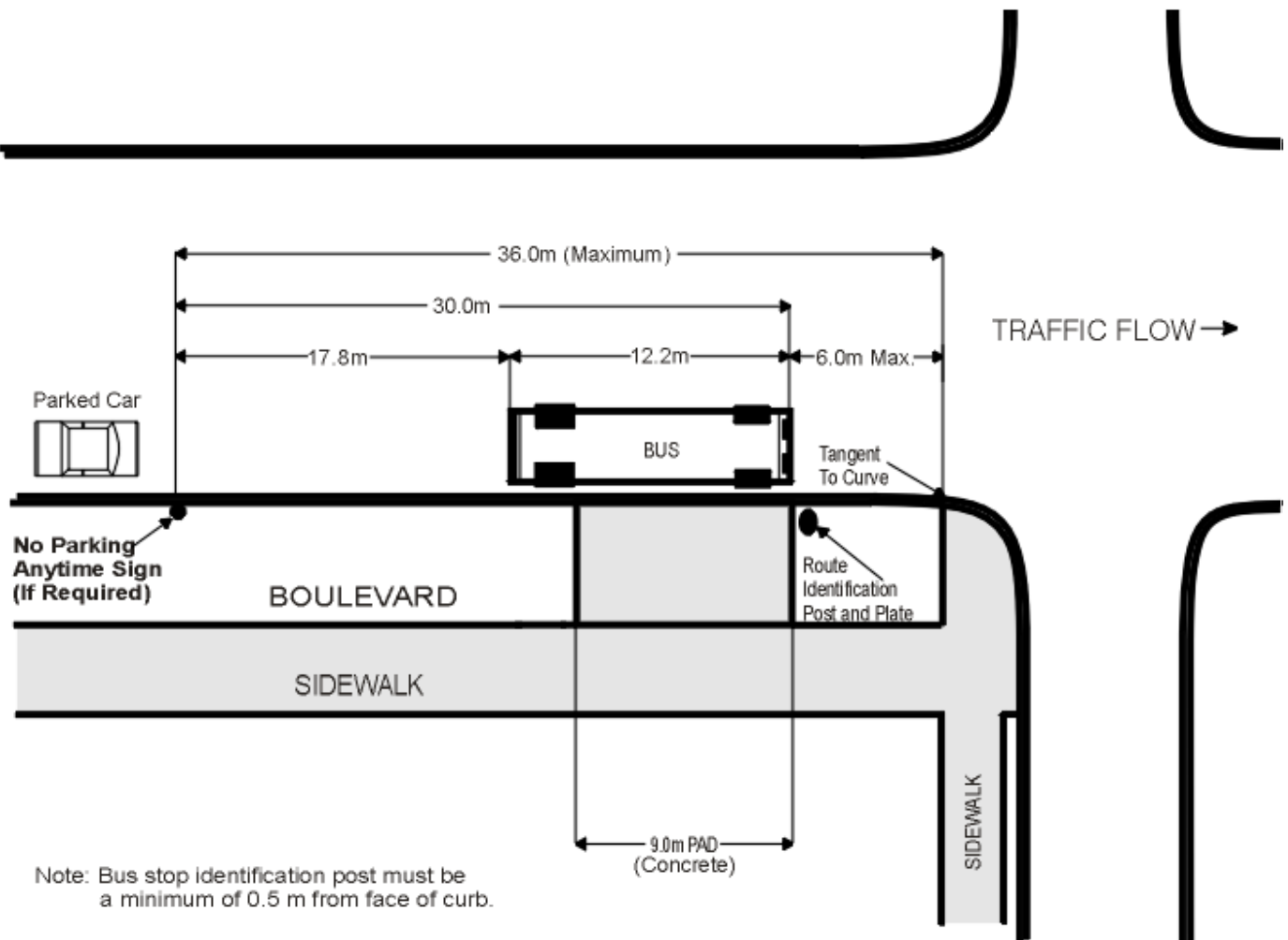
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Transit locations

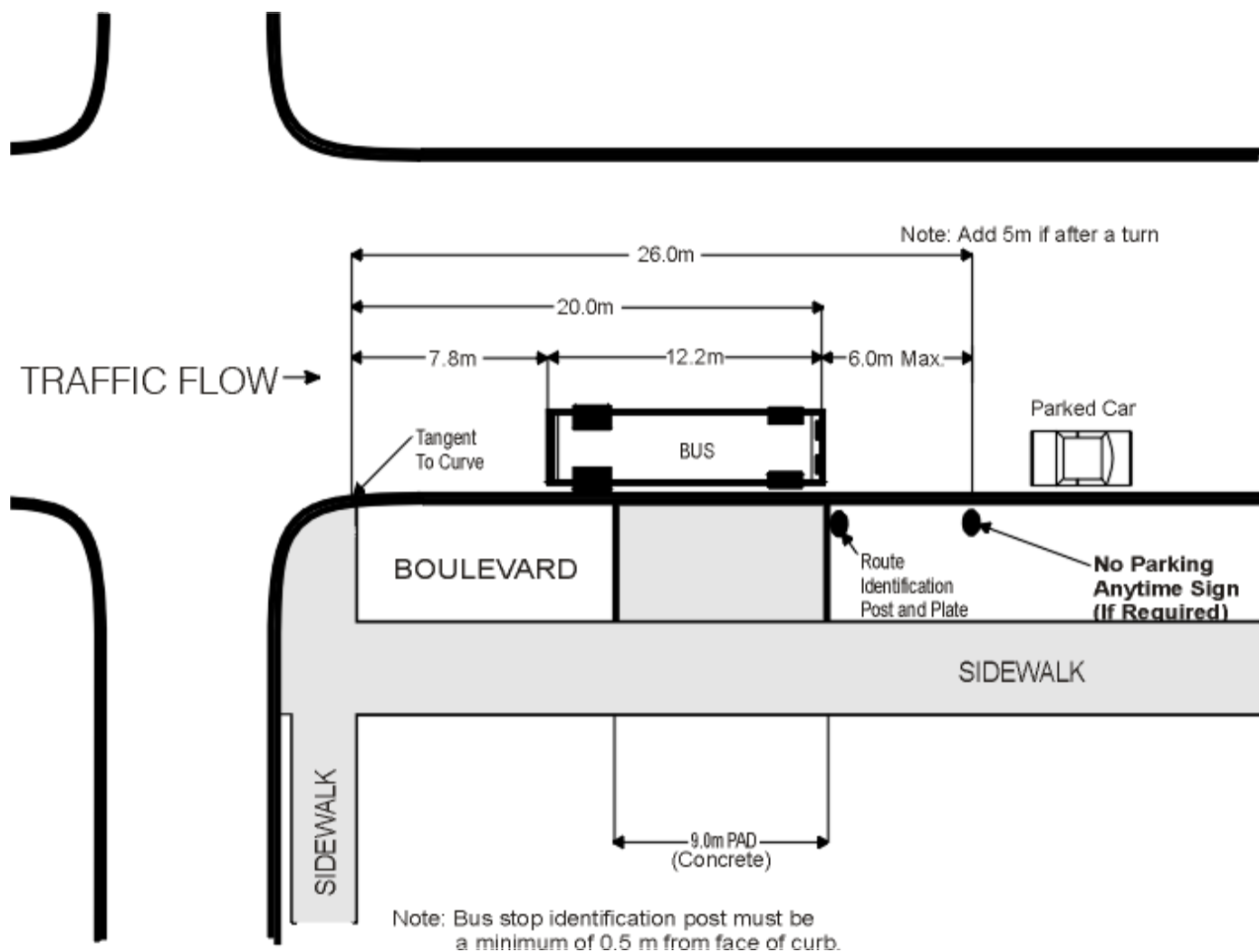
Bus stop locations are defined by their relationship to intersecting streets. Generally, there are three placement locations for stops: nearside, farside, and midblock. The most suitable position in any given case is dependent on a number of factors, including road classification, adjacent land use, pedestrian facilities and crossings, transfers between routes, suitability for a shelter, street parking, and more. Consult with GRT for further guidance.³⁸

Typical nearside bus stop



³⁸ Grand River Transit. Bus Stop Zones Guidelines, July 2001.

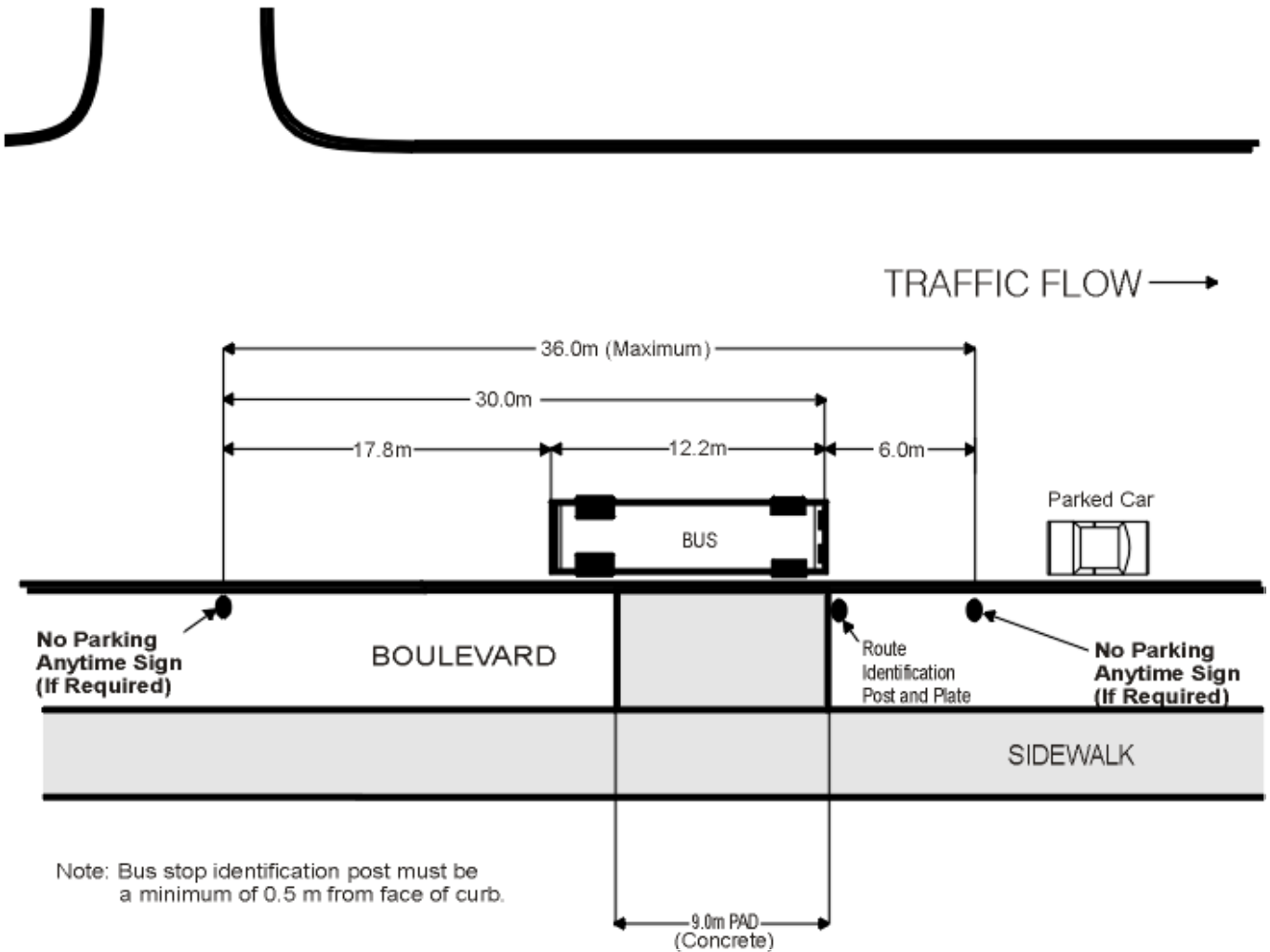
Typical farside bus stop



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Typical mid-block bus stop



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³⁹ These images are sourced from GRT's 2001 Design Guidelines, which is currently under review.

Transit stops and amenities

Transit stops are more than a place to wait. They can be designed to improve transit speeds and enhance the sustainability and accessibility of the streetscape with green infrastructure and well-designed public spaces. Dimensions for facilities provided in this section should be used as guidelines only, and more context-specific guidance should be sought from GRT when designing stop amenities.

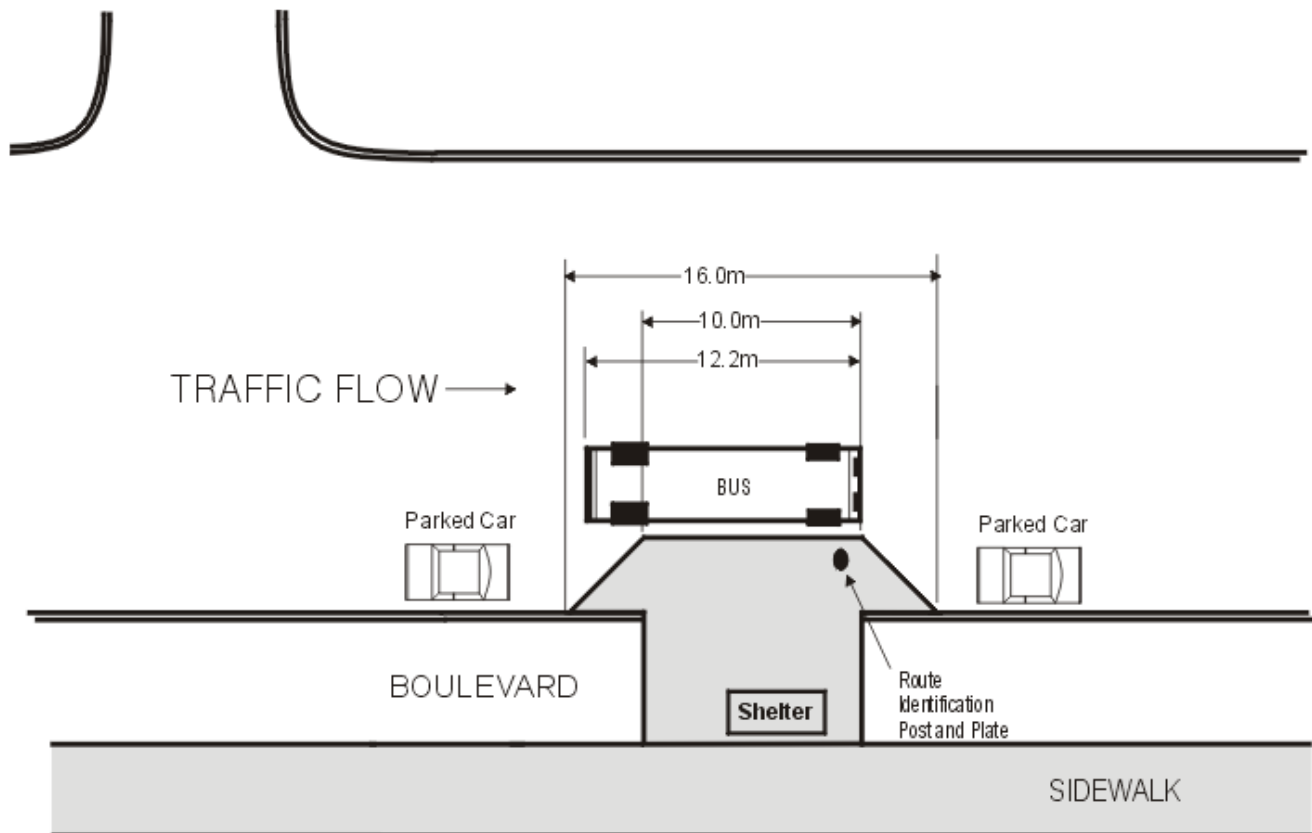
- Design transit stops to be highly visible from all directions of the street, with prominence given to route identification. Parking is prohibited within 30 m on either side of a bus stop and may be signed that way.
- Provide a concrete landing pad at all transit stops, to ensure safe and convenient boarding and alighting areas, and to facilitate snow clearing and improve aesthetics. Landing pads should generally be 9.5 m in length to accommodate both the front and rear doors of a bus.
- Shelters provide some protection from the weather and a comfortable environment for waiting. Where possible, place shelters behind the sidewalk to improve safety, visibility, and snow clearance (unless using a floating bus stop integrating dedicated bicycle facilities). Provide two openings in the shelter, where feasible, to reduce entrapment areas. Ensure ads do not block the view of an approaching bus for people waiting.
- Benches improve the waiting environment. Place the bench so that the passenger will be facing the direction the bus is coming from, if there is sufficient width to accommodate bench access by those with mobility devices. Seating should also be provided within shelters.
- Stops on frequent and/or busy routes may have a display showing real-time departure information. This is especially important if the stop is served by multiple routes. This will require an underground electrical connection.
- Add public art and enhanced landscaping to improve aesthetics and enjoyment of the public space wherever possible.
- Ensure the full transit stop area is well lit.



Transit curb-out

Transit “curb-outs” or “bus bulbs” provide a loading area for the bus that extends past on-street parking lanes. This means fewer parking spaces need to be removed to accommodate the bus as compared to the provision of bus bays (which require extra space for entry and exit tapers), while still providing the bus with adequate space to serve passengers. “Curb-outs” allow the buses to board and alight passengers from the travel lane, removing the requirement for the bus to merge back into vehicle traffic, and saving time for transit vehicles.

Typical “curb-out” bus stop

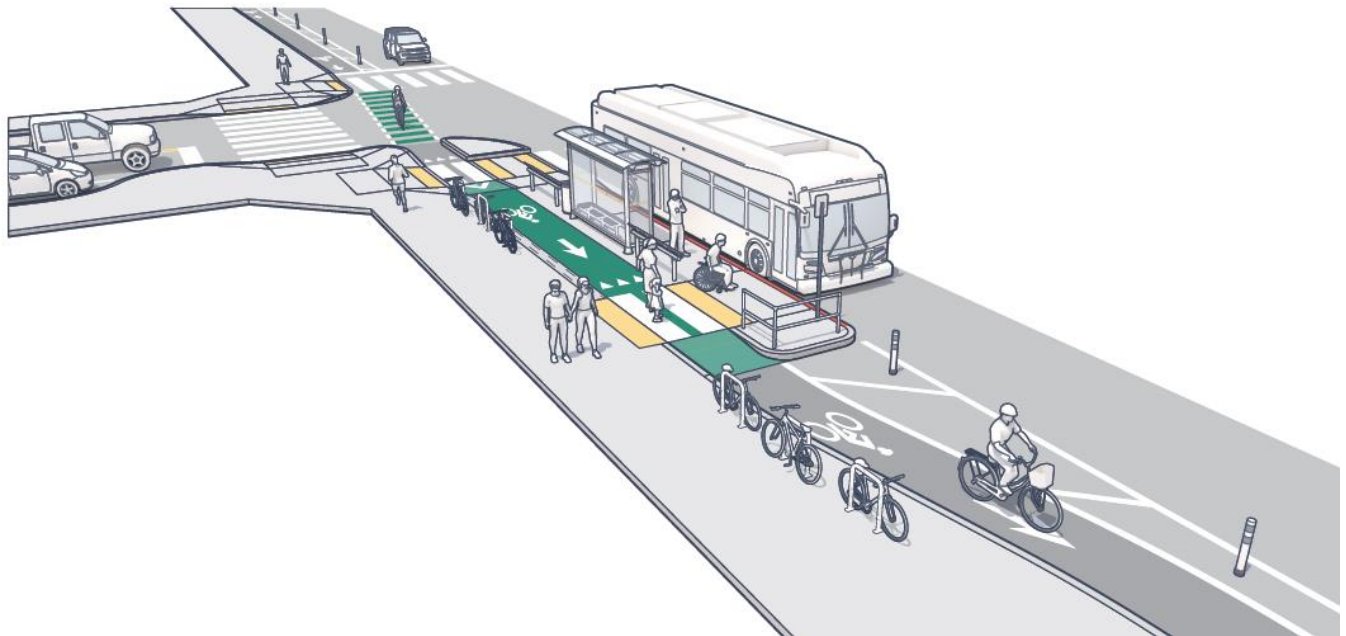


Note: Bus stop identification post must be a minimum of 0.5 m from face of curb.

“Floating bus stops”

On streets with both transit and dedicated cycling facilities, the design and location of transit stops can influence the safety and efficiency of both travel modes. In traditional design, buses enter into a bike lane to board passengers, causing stress for cyclists and a “leap-frog” effect as cyclists and buses pass and catch up to each other repeatedly. This may still be necessary in some street designs, but a “floating bus stop” can address these challenges where permitted by the cross-section of the roadway.

A floating bus stop is a concrete platform built between a cycling facility and the roadway. Cyclists are directed behind the bus stop, reducing or eliminating most conflicts between buses and cyclists. Floating bus stops can also benefit pedestrians, as the floating bus stop doubles as a pedestrian refuge, which, if designed efficiently, can shorten crossing distances.⁴⁰



⁴⁰ Picture and description from AC Transit. *Multimodal Corridor Guidelines*. 2018.

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Shared cycle track stops

Where constraints do not allow for a floating bus stop, a shared stop can be used. In this case, a cycle track (or separated bike lane) runs alongside the boarding area, rather than running behind the boarding area. Buses do not enter the cycle track – instead, bicyclists can ride through the boarding area when no transit vehicles are present, but must yield the space to boarding and alighting passengers when a bus or streetcar light rail vehicle stops. Design details, pavement markings and signage instruct the cyclist to yield to pedestrians accessing the bus.⁴¹



Shared cycle track stop in Toronto.

⁴¹ Share the Road Coalition. "Ontario Bike Summit." Toronto, April 1, 2019.

Motor vehicle design

Motor vehicles provide movement of people and goods, facilitate emergency services and provide maintenance services. Types of motor vehicles include personal vehicles, taxis, ridesharing and larger classes of vehicles that deliver essential services to the community.

Fire and emergency services respond quickly to communities in need. Maintenance vehicles keep streets functioning through all four seasons, while maintaining critical underground and aboveground infrastructure that delivers many vital services to the community. Trucks facilitate goods movement within and between cities.

Traffic calming to slow speeds is a high priority for motor vehicle design, to improve safety for all users. In addition, decades of planning around the automobile have created an overreliance on single occupancy vehicle travel, causing congestion, pollution, costly infrastructure, greater risk to vulnerable road users, reduced viability of other travel modes and inequitable access to services within a city. Balancing out the transportation mix is consistent with the city's Integrated Transportation Master Plan, especially in reducing the prevalence of single occupant vehicles.

Motor vehicle objectives

1. **Design for safe speeds.**

Managing speeds is the highest priority of street design for motor vehicles, enhancing the safety of both motorists and vulnerable road users. Higher speeds increase stopping distances and decrease the severity of collisions.

2. **Set context-sensitive speed limits.**

Consider the surrounding land uses, street functions and interaction with vulnerable road users when determining speed limits. Incorporate passive traffic calming features, like narrow lanes, curb extensions and trees, to minimize the need for more aggressive features like speed humps. For streets with a posted speed limit of 50 km or less – which includes the majority of streets in Kitchener – the design speed should equal the posted speed.⁴²

3. **Accommodate the needs of large vehicles.**

Ensure trucks, emergency services and operations vehicles can operate effectively, while maintaining a balance for managing speeds and providing enough space for effective design for pedestrians, cyclists and transit users. This is often achieved by setting appropriate design vehicles and control vehicles to guide the design process.

4. **Consider induced demand when determining capacity.**

Some level of congestion is expected for any thriving, urban environment. Research has determined that expanding motor vehicle lanes and roads is not an effective measure to curbing congestion, but actually increases the prevalence of single occupant vehicles, causing greater congestion and often degrading quality alternatives (walking, cycling and transit).

⁴² Transportation engineering design has traditionally designed streets to have a design speeds of 10 km/h or more higher than the actual posted speed, to provide a buffer in case of human error. In urban environments, many cities are finding this practice to increase speeds and reduce safety. Movements like the Safe Systems Approach and Vision Zero are providing research to justify a design speed being equal to the posted speed for speeds less than 50 km/h. Cities that have adopted this approach include the City of Edmonton and the City of Toronto.

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5. Optimize use of street space.

Use the narrowest land and pavement width possible, based on design vehicle and control vehicle requirements. Reallocate overbuilt or unused road space to other travel modes, placemaking, boulevards and green infrastructure.

Motor vehicle features

The design user

A variety of motor vehicles use the roadway. Additional design vehicles found in *Geometric Design Guide for Canadian Roads*, Section 2.

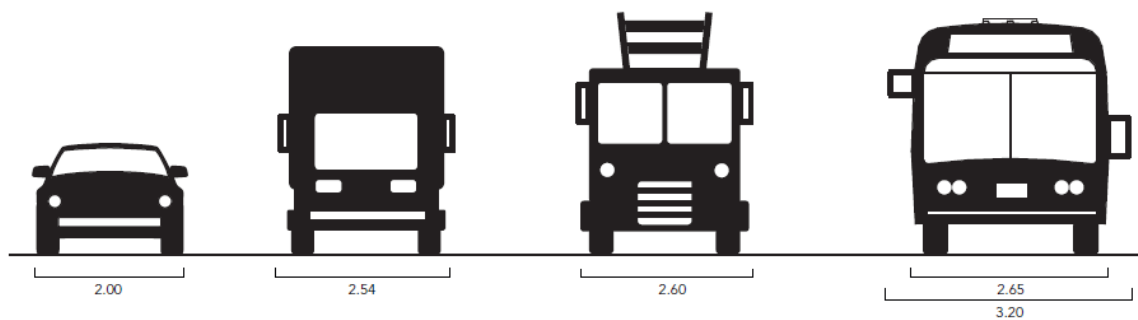


Figure 8-8: Drawing of Typical Road User Dimensions for four different types of vehicles: cars, delivery trucks, fire trucks and TTC buses.

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City of Kitchener grader



⁴³ City of Toronto. *Toronto Complete Streets Guidelines Edition 1*. Volume 1. 2017, 136.

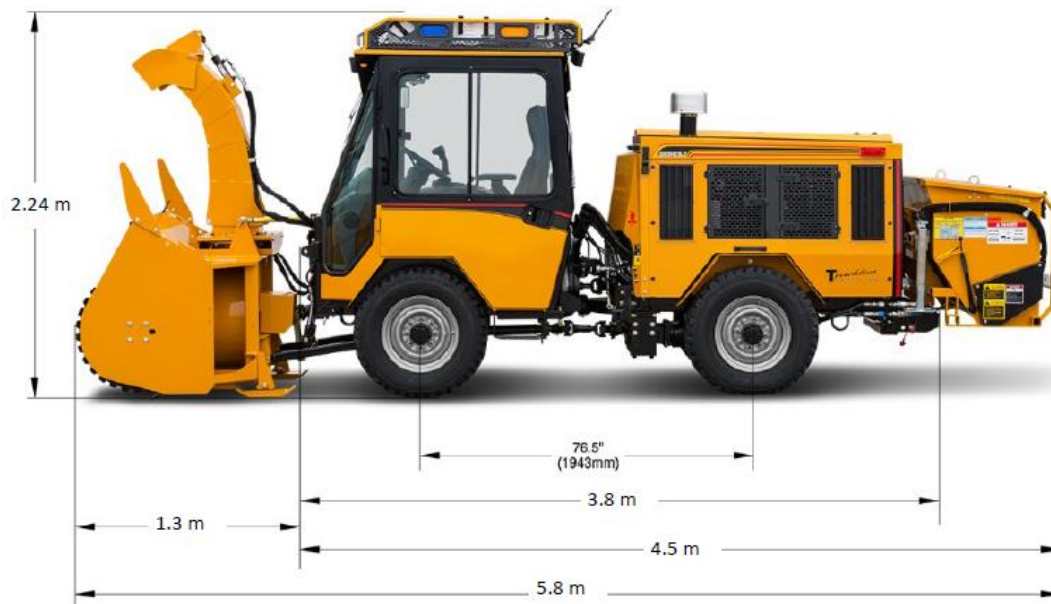
City of Kitchener tandem snow plow



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City of Kitchener trackless snow plow



Vehicle lanes

- Vehicle lanes serve vehicular movement, including through and turn movements.
- Lane widths have an impact on driver behavior and travel speed. Lane widths must balance the safety and comfort of all road users. Use the narrowest lane width possible. For streets servicing transit, the desired lane width is 3.3 m and should not exceed 3.5 m. For streets without transit and little truck traffic, the desired lane width is 3.0 m. Width of turn lanes is 3.0 m.⁴⁴
- On streets with multiple lanes in the same direction, the curb-side lane can be up to 3.5 m wide to accommodate large vehicles, buses and trucks, with the inside lane being 3.0 m.
- Local streets and collector streets can include parking within one lane of travel, to minimize pavement width and assist in traffic calming.
- A barrier curb and gutter is used at the outer edges of each street, except in woonerf or green street scenarios.
- Other factors that may impact the selection of lane width include available right of way, land use, street classification, travel mode prioritization, collision history, parking, utility installations, snow storage, and topography. Also consult the cross-sections in Section 2.

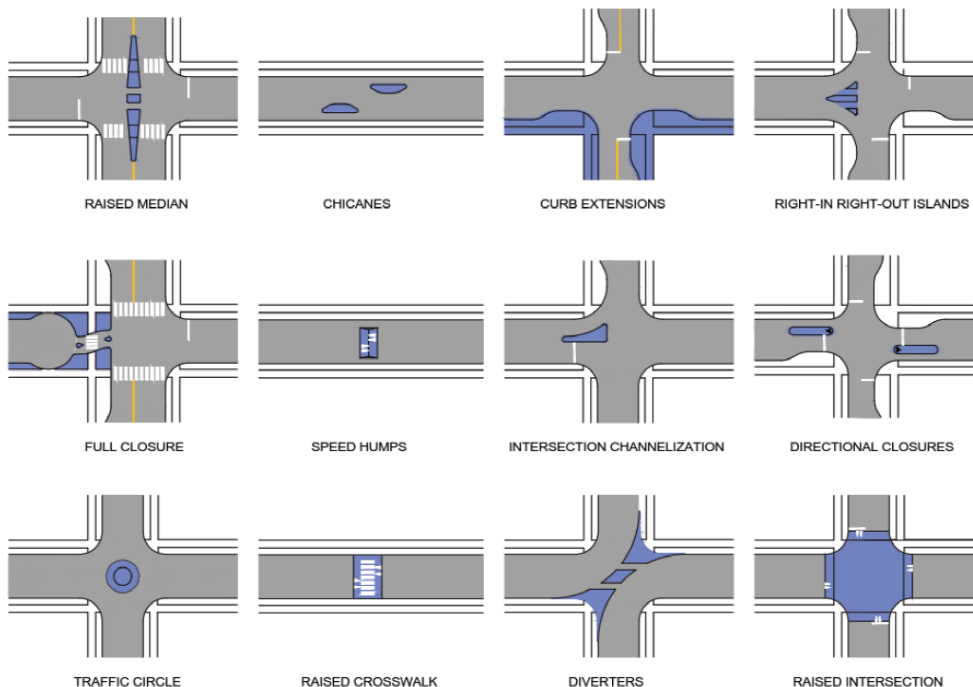


⁴⁴ These widths are consistent with. For roads with a design speed of 60 km/h or less – the majority of streets in Kitchener – TAC recommends lane widths as low as 2.7 m in constrained areas and up to 4.0 m, with 3.0 m to 3.7 m being most recommended. TAC, *Geometric Design Guide for Canadian Roads*, Chapter 4, Cross-section elements, 9.

Traffic calming

Traffic calming includes a range of strategies to manage vehicle speeds and volumes. The city's traffic calming policy directs how the city retrofits a street for slower speeds when it is not up for reconstruction in the near future. The following principles apply to new roads or full road reconstruction of Local Streets, Minor Collector Streets and identified Major Collector Streets:

- Integrate traffic calming into a street design, to ensure target traffic speeds are realized and to avoid costly retrofits in future years.
- Measures to slow speeds include narrow lanes, trees, chicanes, curb extensions, speed humps, traffic circles, raised crosswalks/crossrides, and raised intersections. These measures may divert traffic to higher volume roads as well.
- Measures to lower traffic volume include raised medians, right-in right out islands, full closures, intersection channelization, directional closures and diverters.
- Break up long stretches of straight roadways with a variety of traffic calming elements. The maximum length without some form of traffic calming should be 120 - 150 m.
- Mature trees have been proven to provide a traffic calming impact.
- Consider how to accommodate the needs of emergency services and operations vehicles
- Consider how to avoid negative impacts to cycling comfort or transit.
- If designed correctly, a new or rebuilt street should not require more aggressive traffic calming elements like speed humps or other vertical measures, which can have negative impacts to cycling, emergency services, and operations vehicles.



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⁴⁵ Brian Patterson and Sarah Freigang. "Bike Facilities Design Workshop" (Waterloo: Institute for Transportation Engineers and Urban Systems), September 21, 2018.

The City of Kitchener's Love My Hood resident-led traffic calming program can improve safety, slow traffic, add beauty and bring neighbours together. Types of projects include painted crosswalks, intersection murals, planter boxes or "pop-up" measures – all led by groups of residents dedicated to making their neighbourhood even better. Consult lovemyhood.ca/trafficcalming for more information.



Emergency services

The space and operational needs of first responders, such as fire, paramedics and police, are important factors in the design of a street. Fire trucks have the largest emergency response vehicle.

Improving safety on city streets is a primary goal of Complete Streets, reducing the number and severity of collisions that emergency services need to respond to. Collaborative efforts between staff and emergency services are essential in meeting mandated response times.

Maintenance

Streets and related utility services require regular maintenance to function reliably and efficiently. Roadway design must consider the space and operational needs of snow plows, graders, sweepers, leaf collection, utility trucks and more.

Parking

Parking serves an important need for motorists and persons with disabilities.

- Parking can be provided on-street or in designated lots or garages.
- Consideration needs to be given to how the parking supply might encourage greater automobile use.
- Provide accessible parking spaces in dense urban environments.
- The width of an on-street parking space is 2.4 m, not including the width of the gutter. The length is 6.0 m.
- Provide a hard surface boulevard where parking use is high.
- Restrict parking at intersections to improve sightlines and visibility of pedestrians, cyclists and motorists. Fill the space with a curb extension, pedestrian amenities or green infrastructure.

Intersection design

Intersections provide transitions between different streets, allowing navigation through the street network. They often serve as meeting places for neighbourhoods or the city as a whole and attract commercial and cultural activity. Intersections are also the site of “conflicts” between travel modes as each person navigates the intersection according to their own specific travel path. Providing effective design guidance to navigate these conflicts is essential to improving road safety for all users.

In Kitchener, all signalized intersections are managed by the Region of Waterloo. This section provides some initial guidance for street designers. Designers must also fully coordinate with Regional staff to achieve high quality intersections.

Intersection design objectives

1. **Prioritize vulnerable users.**

Pedestrians and cyclists are most at risk in high-conflict areas. All design features should be weighed against the impact on vulnerable users. Accessibility features, such as tactile walking surface indicators, are expected. Assign priority to pedestrians and cyclists, through design cues, maintaining separation through intersections and assigning the right-of-way.

2. **Balance comfort and convenience of all travel modes.**

In many cases, what may be advantageous for one travel mode at an intersection may come at the expense of other travel modes. View the function of an intersection through the lens of each travel mode in order to understand the trade-offs a design may have. While not desired, if signals require a button or sensor, provide visual guidance on how to trigger the light.

3. **Maximize visibility.**

Maintain sightlines and foster eye contact between different users. Where pedestrians and cyclists are sharing a space, separate them at intersections to encourage clearer visibility and predictability.

4. **Reduce turn speeds.**

The severity of collisions is strongly correlated to vehicle speeds. Reduce turning radii, avoid right turn channels, use narrow lane widths and integrate traffic calming features into intersection design.

5. **Maintain consistency and foster predictable movements.**

If each travel mode has a dedicated space on the street, that space should continue through the intersection to encourage predictable movements among all travel modes. Consistent widths are also important for maintenance vehicle access and to minimize snow windrows. Use pavement markings to guide users in a predictable manner.

6. **Accommodate large vehicles appropriately.**

Establish a “design vehicle” and “control vehicle” to determine appropriate curb radii.



Intersection design features

Design vehicle and control vehicle

In the past, many streets and intersections were designed to accommodate the largest possible vehicle on the road. This often leads to higher motor vehicle speeds of the most common type of vehicle – passenger cars. Today, focus has shifted to maximizing safety for a wide variety of road users, through the adoption of a “design vehicle” and a “control vehicle.”⁴⁶

The “design vehicle” is the most common vehicle to be using the street. It should be able to navigate an intersection with relative ease, but at reduced speed facilitated by the intersection’s design. Curb and turning radii are selected based on the design vehicle’s characteristics, as well as street context. The width of travel lanes are based on the design vehicle as well.

The “control vehicle” is an occasional or infrequent user of the street. It should also be able to navigate an intersection but may have less space to maneuver or require the space in adjacent motor vehicle lanes. Encroachments into a second receiving lane are expected, and encroachments into the opposing travel lane may be tolerated for the occasional large vehicle at a low volume intersection. Advanced stop bars should be used in these scenarios.⁴⁷

This table defines the default design vehicles and control vehicles on City of Kitchener streets.⁴⁸ The individual characteristics of each street should be weighed to determine if this classification is appropriate.

⁴⁶ Patterson and Friegang, “Bike Facilities Design Workshop.”

⁴⁷ TAC, *Geometric Design Guide for Canadian Roads*, Chapter 2 – Design Controls, Classification and Consistency, 34. City of Edmonton. *Complete Streets Design and Construction Standards* (2018), 17.

⁴⁸ Vehicle classes identified by TAC, *Geometric Design Guide for Canadian Roads*, Chapter 2 – Design Controls, Classification and Consistency, 34 and based on City of Edmonton, *Complete Streets Design and Construction Standards*, p. 42.

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Street classification	Design vehicle	Control vehicle	Control vehicle allowable encroachments
Local	Passenger car	City of Kitchener snow plow	Must maneuver within hard surfaced areas and avoid any vertical obstacles. Encroachment into (unmarked) opposing lanes permitted to pass parked vehicles or at intersections.
Minor Collector	Passenger car	City of Kitchener snow plow	Must maneuver within hard surfaced areas and avoid any vertical obstacles. Encroachment into opposing lanes permitted to pass parked vehicles or at intersections.
Major Collector	Passenger car	Grand River Transit bus, City of Kitchener snow plow	Encroachment into adjacent lanes in same direction permitted at major intersections. Encroachment into opposing lanes at minor intersections permitted.
Arterial (Main street scenario)	Passenger car	Grand River Transit bus, City of Kitchener snow plow	Encroachment into adjacent lanes in same direction permitted at major intersections. Encroachment into opposing lanes at minor intersections permitted.
Arterial (Thoroughfare scenario)	Grand River Transit bus	Medium single-unit truck, heavy single-unit truck	Encroachment into adjacent lanes in same direction permitted at major intersections. Encroachment into opposing lanes at minor intersections permitted.
Arterial (Industrial scenario)	Heavy single-unit truck	WB-19 Tractor-semitrailer truck, WB-20 Tractor-Semitrailer, A-Train Double, B-Train Double	Encroachment into adjacent lanes in same direction permitted at major intersections. Encroachment into opposing lanes at minor intersections permitted.

Additional guidance:

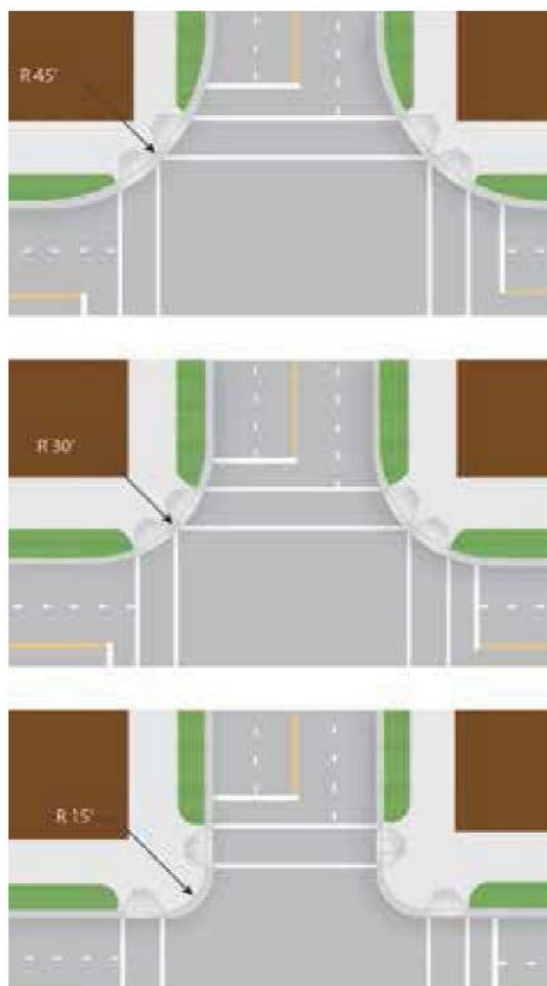
- A minimum 6.0 m clear width is required to accommodate Fire Trucks on all city streets. This can include the width of opposing lanes and parking lanes on local streets.
- Stop bars should be set back where any control vehicle encroaches into opposing lanes.
- Right turn lanes should generally be avoided, as they increase pedestrian crossing distance, the size of intersection and the likelihood of conflicts between motorists turning on red and pedestrians crossing on green. In particular, right-turn channelization should be avoided because they create additional conflict points with vulnerable users, at higher motor vehicle speeds.
- Restrict parking at corners.

Corner radii

Intersection corners have a significant impact on comfort and safety of all street users. Larger radii are less safe for bicycles and pedestrians because they allow for higher vehicle speeds through the turn and result in larger crossing distances.⁴⁹

Generally, streets should be constructed with the smallest corner radii possible, to slow vehicle speeds, create more compact, pedestrian-scale intersections and allow right angled placement of tactical surface indicators. The selected radii should facilitate the frequent user, yet still accommodate the infrequent user, based on the design vehicle and control vehicle guidance.

Figure 3.7-4: Tighter corner radii reduce crossing distance and slow turning traffic (Credit Michele Weisbart)



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⁴⁹ Kendra K. Levine, *Curb Radius and Injury Severity at Intersections* (Berkeley: Institute of Transportation Studies Library, 2012), 2.

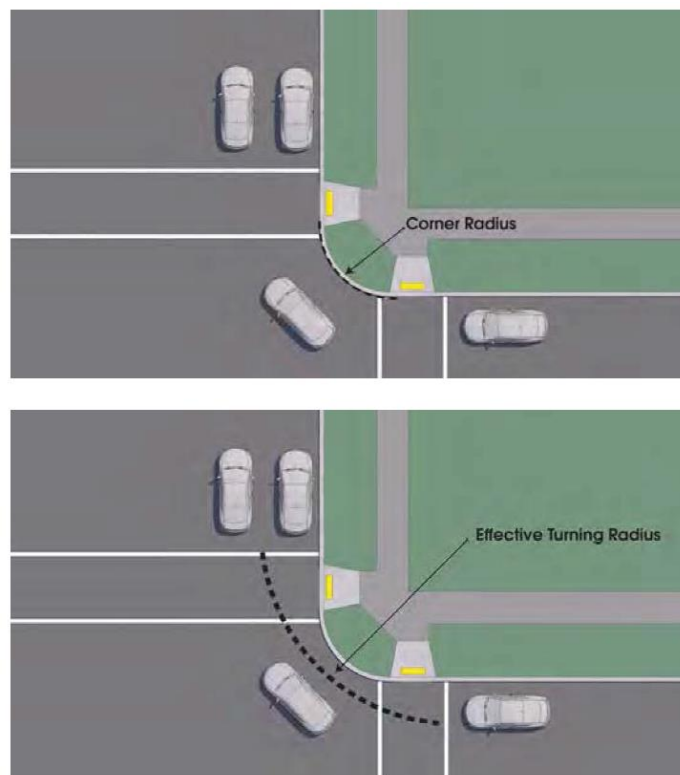
⁵⁰ City of Calgary, *Complete Streets Guide*, 77.

Preferred turning radii:

	Local	Minor Collector	Major Collector	Arterial
Turning radius with Local/Minor Collector	6.0 m	6.0 m	6.0 m	6.0 m
Turning radius with Major Collector	6.0 m	6.0 m	7.5 m	8.0 m
Turning Radius with Arterial	6.0 m	6.0 m	7.5 – 8.0 m	8.0 – 10.0 m

These preferred radii act as a starting point for street design. Additional street context should be considered, including intersection angle, elevation, vehicle speeds and volumes, sight triangles, type of pedestrians and cyclist facilities, etc. Primarily industrial streets may use a turning radii up to 15 m. These turning radii were selected based on analysis of comparable Canadian cities and industry guidance through TAC, NACTO and ITE.

In addition, the corner radius may not be the same as the effective turn radius, especially when parking lanes or bike lanes are present. In this case, the corner radius can be even smaller than the preferred radii identified in the previous chart.



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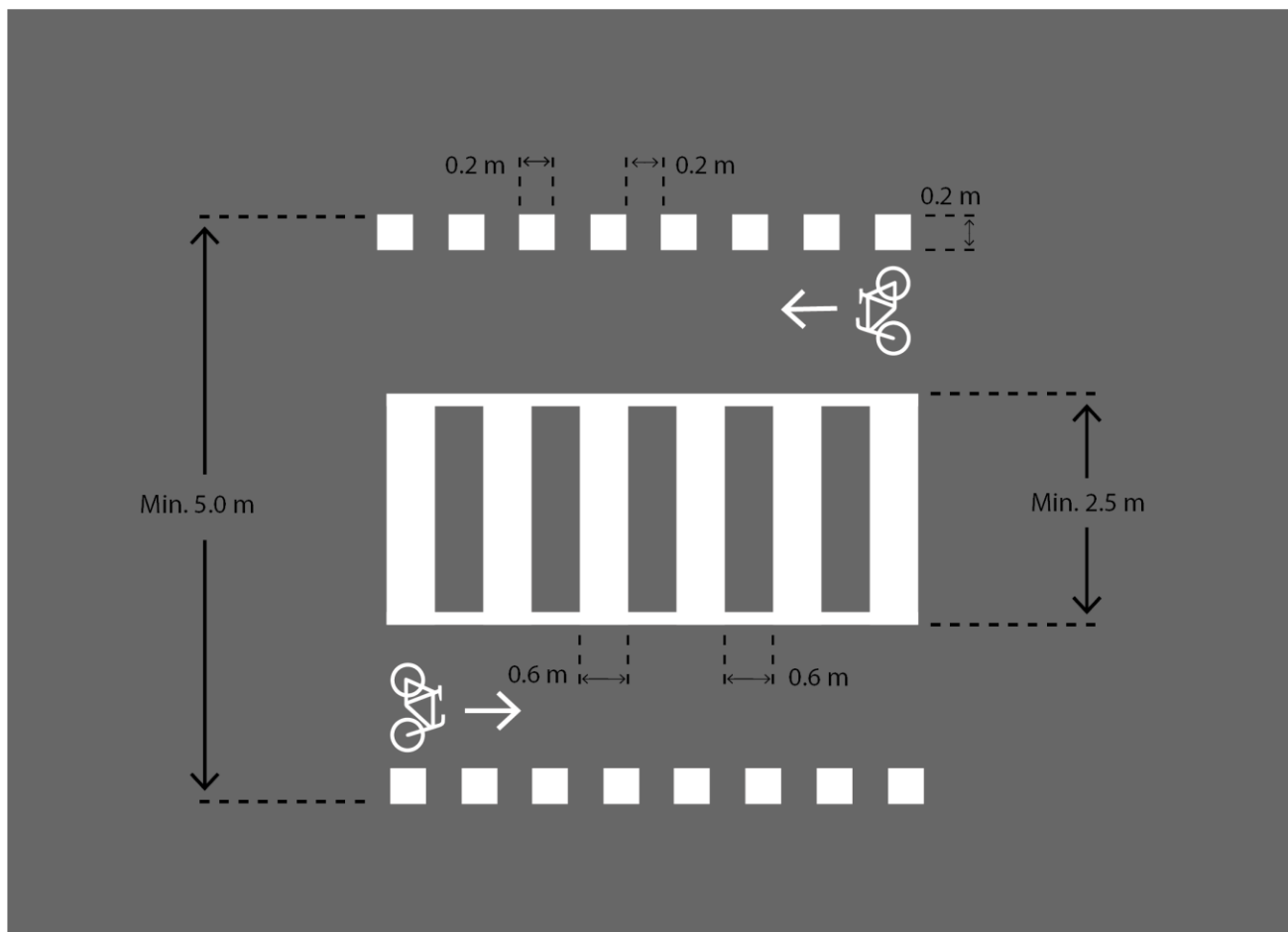
⁵¹ City of Edmonton, *Complete Streets Design and Construction Standards*, 118.

Combining crossings for pedestrians and cyclists

A crosswalk provides a space for pedestrians to cross at intersections. Cyclists are required to dismount and walk through crosswalks, but generally will not and the design should anticipate this behavior. Where a crossride is provided in place of a crosswalk, a cyclist may ride their bicycle within the crossing without dismounting.⁵²

Three options to facilitate safe crossing for pedestrians and cyclists are available. Widening the sidewalk, cycle track or trail on the approach to the intersection may be needed to accommodate these treatments.

The **combined crosswalk/crossride** is usually the preferred treatment, comprised of “elephant’s feet” markings with “zebra stripe” markings inside, and is most suitable for low volumes and mid-block locations. Pedestrians are intended to make use of the central area, and cyclists to use the outer parts. A bicycle symbol and arrow for the outside area is preferred to make it clear where to be and in what direction.



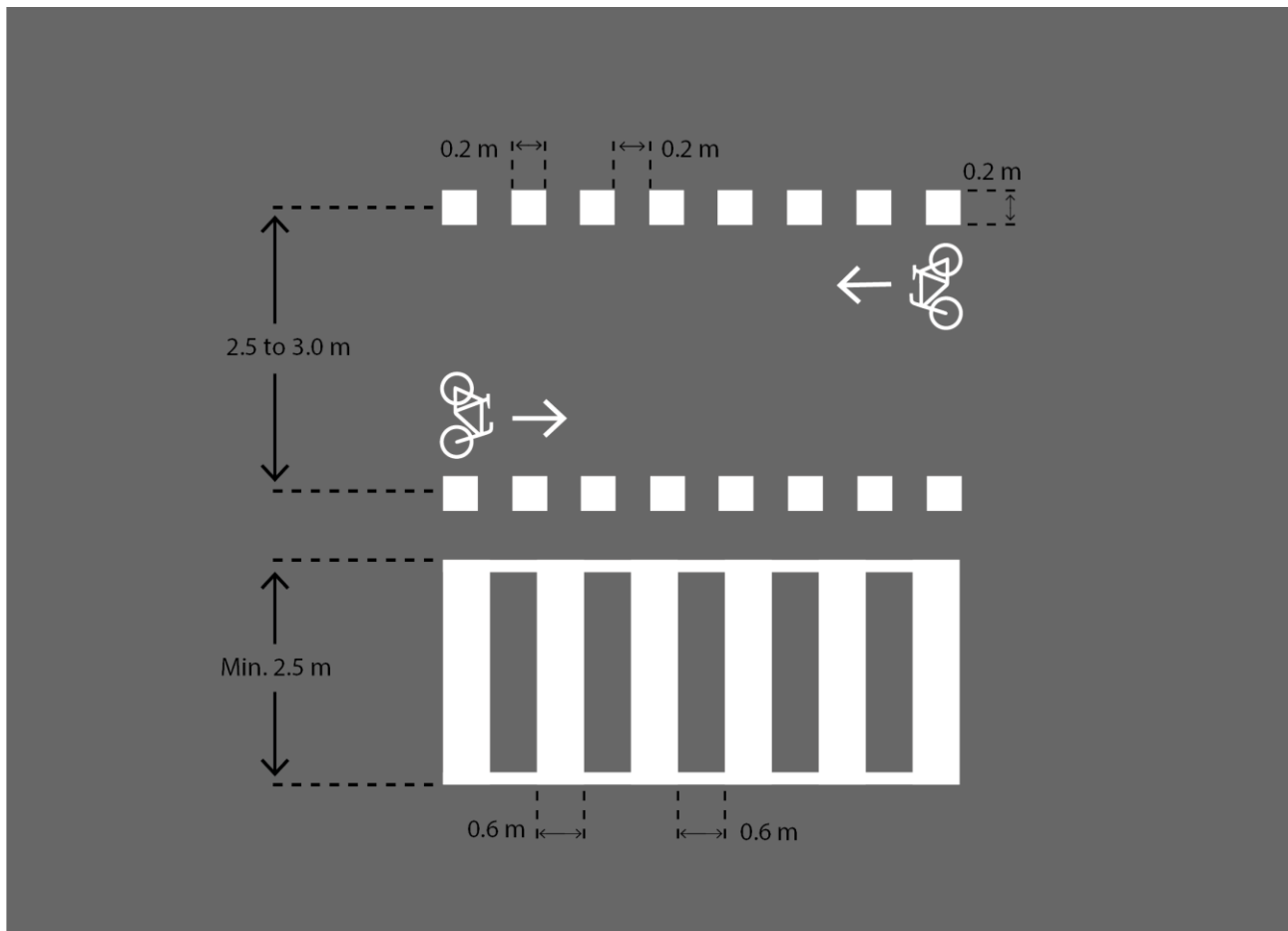
⁵² Province of Ontario, *OTM Book 18*, 159.

⁵³ Based on Ibid., 160.

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The **asymmetrical separated crosswalk/crossride** is appropriate for many signalized intersections, especially where cycle tracks and sidewalks are side by side. This consists of “elephant’s feet” markings on one side and “zebra stripe” markings on the other. The zebra stripes and elephant’s feet should be aligned with the appropriate facility—typically the “zebra stripes” with the sidewalk and the “elephant’s feet” with the cycle track. Use bicycle symbols and arrows to clearly delineate where users should ride.

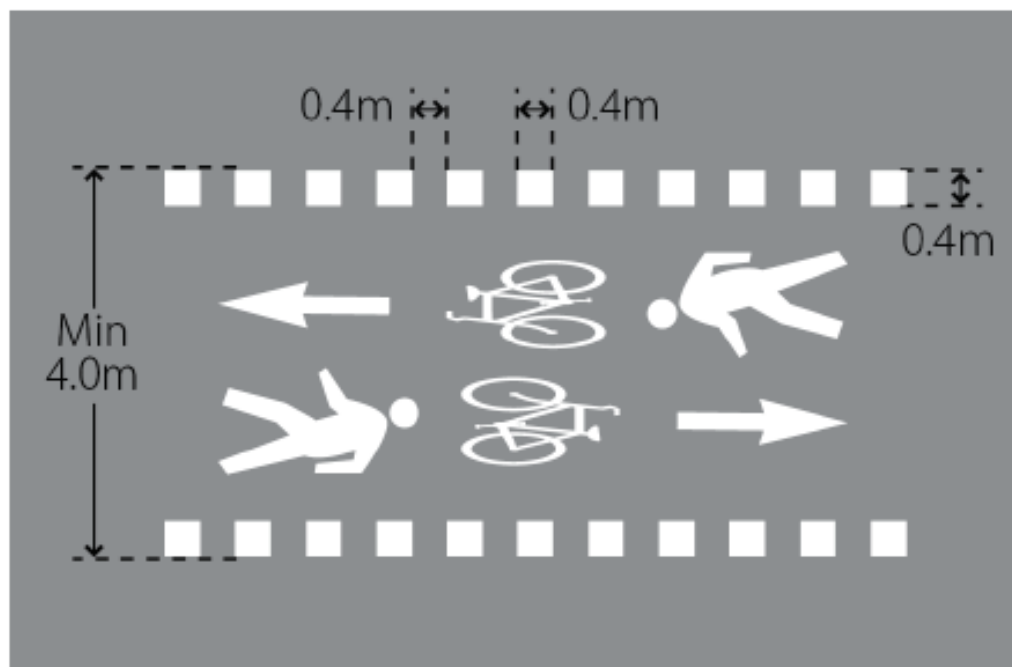


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⁵⁴ Based on Ibid., p. 159.

The **mixed crosswalk/crossride** is to be used at driveways of major destinations (e.g. shopping centres, major workplaces). It can also be used in constrained scenarios, but only as a last resort. It is comprised of “elephant’s feet” markings with pedestrian, bicycle and arrow symbols inside.

Figure 5.37 – Mixed Crossride



Source: MMM/ALTA, 2013

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Green paint can be used in a combined or asymmetrical crosswalk/crossride where bikes have a designated area to pass.

Mid-block trail crossings

Where off-road trails cross a street, options include curb extensions, speed tables, PXOs, refuge islands, or signals. Design details for each treatment were described previously. Additionally, general principles to consider when constructing a mid-block crossing include:

- If the trail does not include a yellow centre line, it must be painted at all street crossing approaches, for 10 metres length, to organize pedestrians and cyclists and provide greater visual awareness of the pathway crossing to motorists.
- Off-road trails that are not lit should have additional lighting at street crossings to provide greater visibility to pedestrians and cyclists.
- Assign priority to pedestrians and cyclists, through design cues and the right-of-way.
- Provide signage and visual cues to drivers to notify of a trail crossing.

⁵⁵ Ibid., p. 160

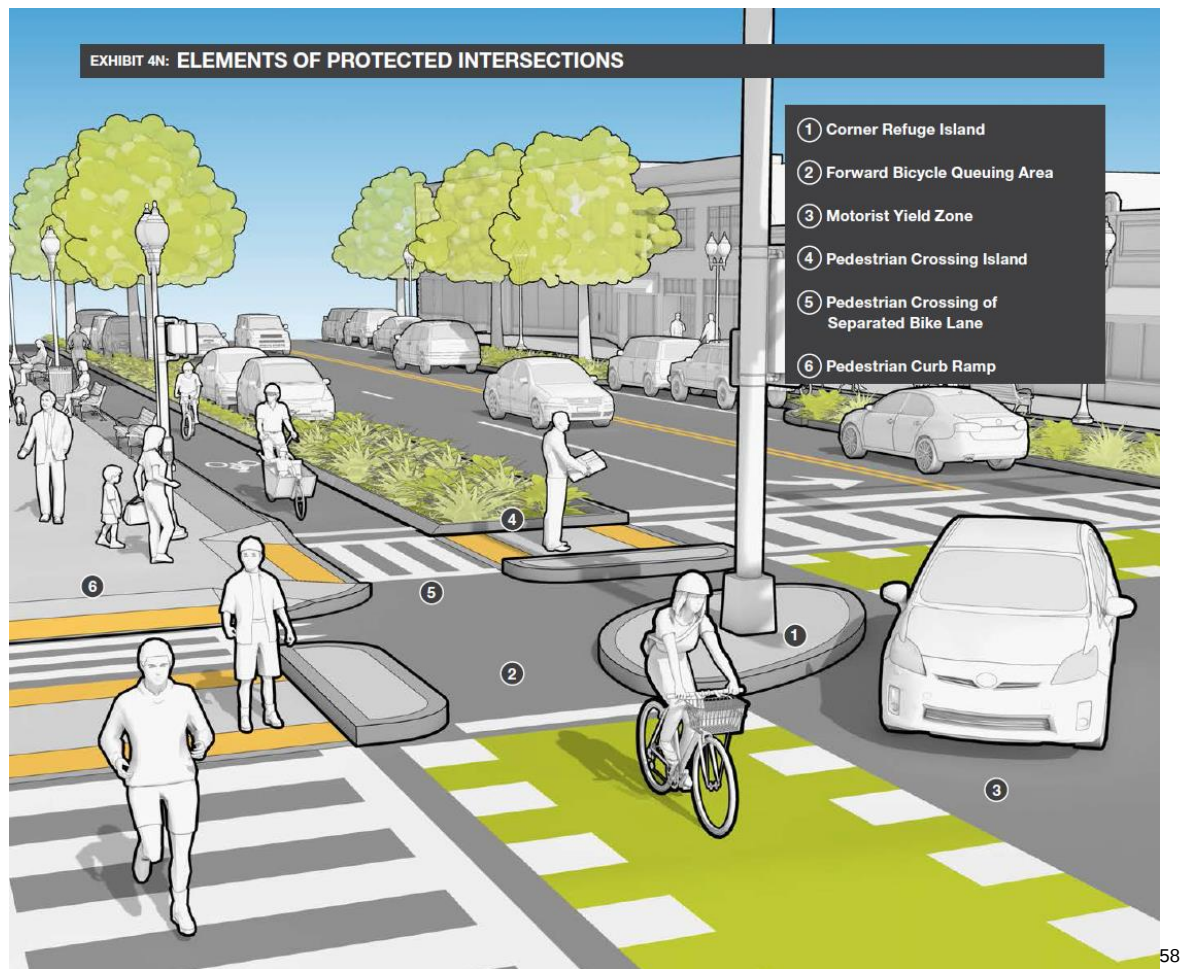
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Separated cycling intersections

Separated cycling intersections maintain the high level of comfort and safety for cyclists found with separated bike lanes or cycle tracks through an intersection. They provide dedicated space to accommodate left, through and right turns in a low-stress manner. Crossrides identify the path of travel and corner safety islands provide a physical barrier when cyclists are waiting to cross, while encouraging eye contact with motorists. For left turns, a cyclist proceeds through the intersection in two stages. Bicycle signal phases and bicycle actuation can be incorporated into the design.⁵⁶

Painted bike lanes or bicycle boulevards can be transitioned into a separated intersection by transitioning into short, separated bike lane segments upstream of the intersection.⁵⁷ This is especially important when lower motor vehicle volume streets intersect with higher volume streets.

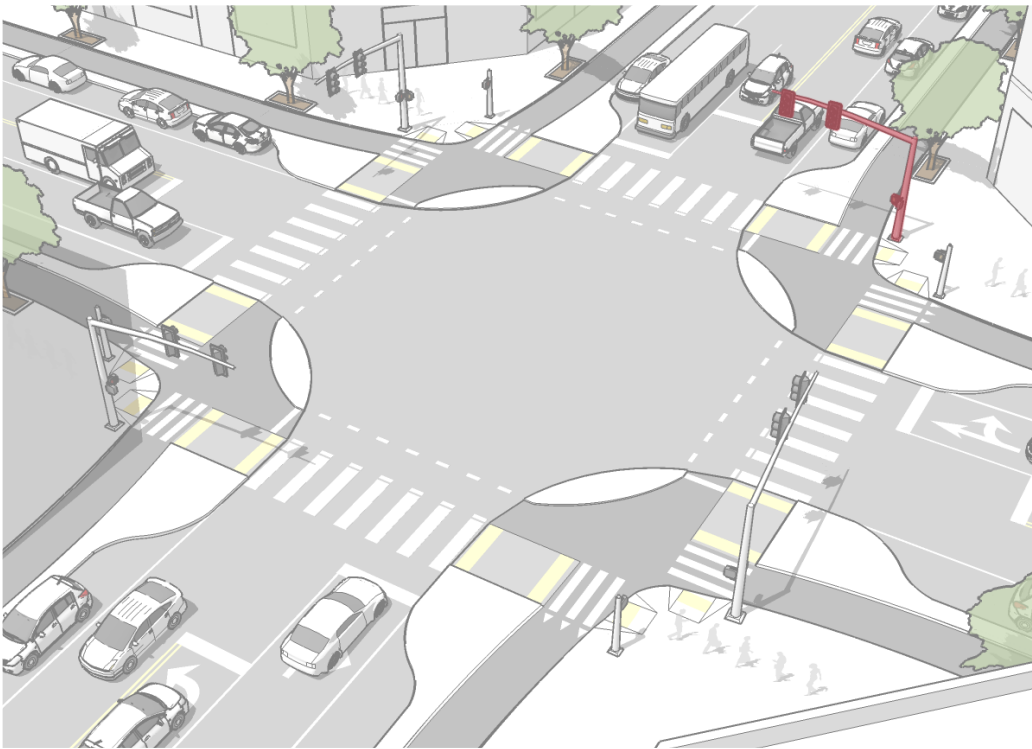


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⁵⁶ TAC, *Geometric Design Guide for Canadian Roads*, Chapter 5 – Bicycle Integrated Design, 53-54.

⁵⁷ Joe Gilpin, Nick Falbo, Mike Repsch and Alicia Zimmerman. "Evolution of the Protected Intersection: Lessons Learned" (Alta Planning + Design, 2015), 7.

⁵⁸ Massachusetts Department of Transportation, *Separated Bike Lane Planning and Design Guide* (Boston, 2015), 69.



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A rendering of a separated intersection.



A separated intersection in Vancouver.⁶⁰

⁵⁹ Gilpin, Falbo, Repsch and Zimmerman. "Evolution of the Protected Intersection."

⁶⁰ Small Places, Kathleen Corey and Brian Bould. <https://www.tcat.ca/crossing-the-danger-zone-intersections-and-cyclists/> Burrard and Pacific Street, Vancouver

Roundabouts

A roundabout is a circular-shaped intersection in which motor vehicle traffic flows through the intersection in a counter clockwise direction. Roundabouts should not be confused with traffic circles. The primary purpose of roundabouts is to facilitate movement between intersecting streets, while the primary purpose of traffic circles is to slow traffic on a particular street.

Roundabouts can reduce the severity of collisions, but also pose accessibility challenges and are often a high-stress experience for pedestrians and cyclists. Further research and discussion is needed in the transportation industry to develop “complete roundabout” design guidelines that adequately address the safety, comfort and convenience of all four travel modes equally.

Streetscape design

Some streets are designed to move people from point A to point B, while other streets are designed as a public space that encourages people to linger and enjoy a sense of place. These two functions – movement and place – are present in every street design, but may be prioritized or balanced differently depending on the streetscape.

Streets typically represent the largest area of public space a community has, and a large portion of people's daily lives are conducted in the context of a street. From parades to protests, from window shopping to street parties, streets are critical public spaces that form lasting memories and add to the richness of our community.

Streetscape design objectives

1. **Embrace local context and engage the community.**
Respect and respond to existing and planned land uses and buildings. Add unique elements that speak to the history and culture of a particular street, neighbourhood or community group. Incorporate residents' ideas and empower communities to animate streets through art, pop-ups, street parties and gatherings.
2. **Create vibrant gathering places.**
Encourage gathering and social interaction, using attractive, durable materials, street furniture, trees, and greenery. The most common examples of placemaking are the sidewalk café or patio, art installations, local food markets, food trucks or little libraries.
3. **Create flexible space.**
Encourage different uses for different parts of the day or seasons, such as parking that can be converted to patio space in the summer.
4. **Incorporate equity.**
Diverse ages, abilities and ethnicities experience a streetscape differently, requiring intentional thought on how all users can be welcomed on a street.
5. **Consider personal safety.**
Utilize crime prevention through environmental design techniques to foster safe streetscapes.

Streetscape design examples



A rainbow crosswalk at Joseph Street and Gaukel Street fosters an inclusive community.

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Photo credit: Zac Jolliffe.

A weekly pop-up farmers market attracts more shoppers to Belmont Village.



Photo credit: Zac Jolliffe.

Every Neighbours Day – the second Saturday in June in Kitchener – residents of the Westmount neighbourhood throw a street party.



Photo credit: Laura McBride.

Little libraries are becoming a common feature of residential streets, bringing neighbours together around the love of reading.



Photo credit: Zac Jolliffe.

A large mural on Charles Street, led by Neruda Arts, adds colour and energy to the street.

Sustainable infrastructure design

Sustainable infrastructure refers to features that enhance environmental sustainability and help the city reach its sustainability goals and policies. The City of Kitchener views environmental leadership as a key strategic focus, with the goal of achieving a healthy and livable community by proactively mitigating and adapting to climate change, conserving natural resources and protecting air and water quality.

Climate Action

The widespread scale and complexity of climate change poses considerable environmental, economic and social risk to cities. As global surface temperatures continue to rise from human induced climate change, cities are leading the way in combatting this prevailing challenge. The City of Kitchener's vision for the Corporate Climate Action Plan is to lead by example with action on climate change to reduce corporate greenhouse gas emissions and promote inclusive environmental sustainability and resilience.⁶¹

Design every street to maximize low-carbon modes of travel. Reduce the heat island effect, create carbon sinks and incentivize electric vehicles. With transportation emissions accounting for 49% of total emissions in Waterloo Region in 2015⁶², every street project is an opportunity to transform the city's transportation system to be more sustainable and achieve climate action goals.



Photo credit: Brynn Dolfi

⁶¹ City of Kitchener, *Kitchener, Changing for Good: Our corporate climate action plan for sustainability* (Kitchener, 2019).

⁶² Climate Action Waterloo Region, "Our Progress, Our Path: An Update on Waterloo Region's Community Carbon Footprint" (Kitchener, 2015).

Urban Forestry

It's hard to imagine a vibrant, caring and innovative city without picturing trees. Trees are a key element of a living city and play a role in filtering the air, enhancing public spaces, providing shade on a sunny day and creating habitat for birds and other creatures.

In the street context, a high quality, urban canopy on a street enhances the pedestrian realm with much needed shade and improved aesthetics. A high quality tree canopy also increases property values and commercial sales.

Follow urban forestry best practices, protect existing trees and plant trees at appropriate intervals along streets based on tree stature and soil volume requirements. Complete streets should ultimately meet the requirements of Kitchener's Sustainable Urban Forest Strategy and other policies to achieve a high quality, urban canopy on a street.

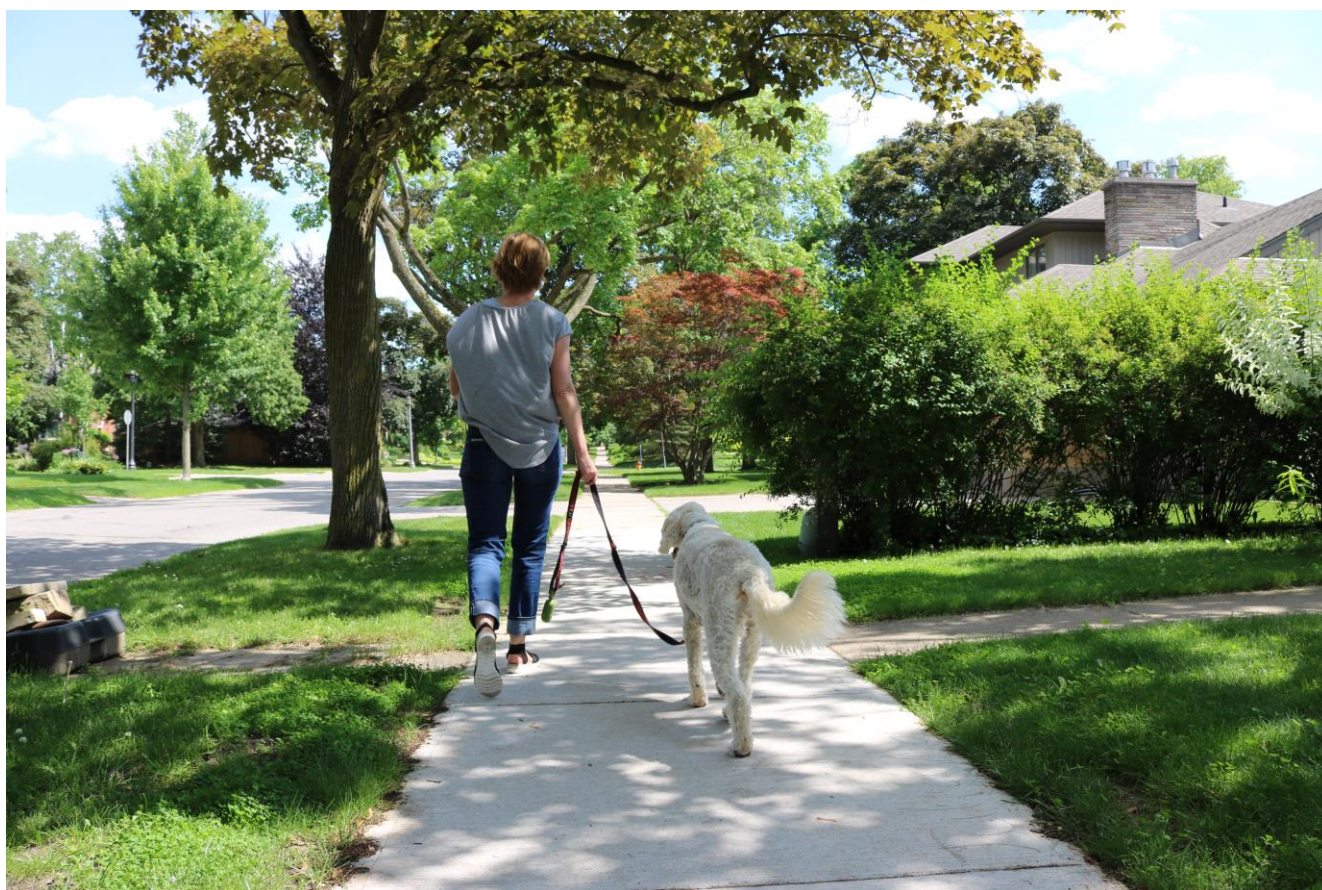


Photo credit: Brynn Dolfi

Low impact development

Kitchener's approach to stormwater management focuses on runoff prevention, preserves and acknowledges the benefits provided by natural systems, recognizes rainwater as a resource to be managed rather than a waste and uses 'green' stormwater infrastructure approaches in combination with conventional stormwater management approaches to better and more efficiently manage stormwater and improve the environment.⁶³

Integrating traditional stormwater management (SWM) controls and low impact development (LID) into a street's design provides an opportunity to enhance street aesthetics, mitigate and adapt to climate change and reduce heat island effects. Examples include bioswales, flow-through planters, pervious strips, pervious pavement, exfiltration trenches, and centre boulevards.⁶⁴ Ideal locations include traffic calming elements, like curb extensions and traffic circles, transit waiting areas, parking lay-bys and boulevards. Complete streets should ultimately meet the requirements of Kitchener's Integrated Stormwater Master Plan, Asset Management Strategy and other related policies and strategies.



LID is a prominent feature in Guelph Street, with each parking bay providing additional stormwater absorption.

⁶³ City of Kitchener, *Integrated Stormwater Master Plan* (Kitchener, 2016).

⁶⁴ NACTO, *Urban Street Design Guide*, 67.



Maintenance & utilities design

A Complete Street is one that is maintainable over the long term and through all four seasons. Streets also carry many utilities that provide services to the community such as hydro, water, sanitary and communications. Underground utilities carry away stormwater runoff to prevent flooding on the street surface.

The City of Kitchener has established a corporate asset management strategy to manage the City's assets, incorporating all aspects of asset maintenance and service delivery. The design models and process for these guidelines should take into account an asset management approach of lifecycle management, related to attainable levels of service. The objective of the strategy is to use risk management concepts to provide an optimal balance between the needs and costs for repairing, replacing and upgrading assets with the affordability to do so.

This section provides initial guidance. Complete streets designs should be fully coordinated with the appropriate maintenance and utilities staff and organizations to ensure a highly functioning street that meets attainable levels of service. Mandated legislative requirements dictate levels of maintenance for roadways and separation requirements between various utilities and must be adhered to. Ensure the Asset Management Division is included in the design and planning with involved asset categories to consider asset inventory, attributes, inspection programs and how that relates to lifecycle and work management.

Maintenance and utilities design direction

1. Utilize the boulevard space for snow storage. Where 1 m boulevards are not possible, accommodations for snow loading may be required. In constrained main street scenarios, consider designating snow storage space at appropriately spaced intervals.
2. Consider the impact of traffic calming elements on snow removal, especially the path of windrows.
3. The preferred positioning for utility poles, signal poles and light standards is in the boulevard between the sidewalk and the roadway.
4. The preferred location for gas mains is beneath a soft surface area.
5. Watermains, storm sewers and sanitary sewers are typically located beneath a motor vehicle travel lane.
6. Consideration should be given to mitigating conflict between tree roots and underground utilities.
7. Locate utilities underground when feasible, to provide an enhanced streetscape experience.
8. If utilities or hydro poles need to be relocated as part of a street design, coordinate with utility providers at least a year in advance, and two years in advance is preferred.
9. Plan for the full life cycle of a street and related infrastructure.

Temporary conditions design

Construction, events and other activities can create temporary conditions that require accommodations to maintain some level of service during the disruption. Include accommodations for pedestrian walkways, cycling infrastructure, transit stops and routes and motor vehicle lanes through construction and work zones in all construction plans. Full guidance for street closures is provided in the City of Kitchener Municipal Code, Chapter 890 Street, Work Permit and related resources.

Temporary conditions design objectives

- 1. Provide clear and consistent communication to all street users.**
Post messages and signage relevant to each mode of travel, placed where clearly visible from the path of each travel mode. Provide advance warning of disruptions or detours, especially for pedestrians and cyclists who have the most sensitivity to route directness.
- 2. Maintain accessibility during mid to long term construction.**
When roadwork or asphalt paving is paused for a season or more, maintain accessibility with temporary ramps, pavement markings or signage.
- 3. Maintain access or provide detour alternatives during construction.**
Facilitate the safe and continuous movement of people on their chosen travel mode by providing equal accommodations for each mode of travel.



Smart streets design

Kitchener has always had a reputation for being a community with foresight. Innovation is not what we do - it's who we are. We constantly strive to introduce new ways of thinking and doing to improve the lives of citizens.

Technology, innovation and data are transforming the transportation sector. New forms of mobility (see Section 4) are offering new ways of getting around, while smart technologies enhance individuals' travel experience while provided new knowledge for effective transportation planning.

Smart streets design objectives

1. Collect data for all travel modes.

Be able to compare data and time segments across each travel mode. Tube-based counters, visual sensors and other technology can provide critical data for street design and help to evaluate the performance of a street.

2. Prepare for new forms of mobility.

Create multi-functional space that may serve one need now, but could serve another need in the future.

3. Utilize the city's street light narrowband network.

Sync data collection systems with the street light network for time and cost savings. The City of Kitchener has converted over 16,000 street lights to LED fixtures that include adaptive controls (smart sensors) that make-up a city wide narrowband network. These streetlights will transform everyday experiences - from simple things like the ability to brighten and dim the lights to more advanced uses like improved navigation for emergency services, making gas meter data available in real-time and monitoring sound pressure levels across the city.

4. Prioritize safety and vulnerable users in autonomous vehicles.

Automated vehicle technology holds many promises for cities, but the potential benefits of automation are not guaranteed. Achieving these benefits is not a given, but will require important deliberation and collaboration among a variety of community stakeholders. Potential benefits of autonomous vehicles include:

- Decreased right of way space for travel and parking, compared to traditional vehicles
- Move more people with fewer personal vehicles
- Time of day management
- Manage traffic gaps
- Rebalancing the right-of-way⁶⁵

⁶⁵ National Association of City Transportation Officials, "Blueprint for autonomous urbanism," Module 1, Fall 2017.

SECTION 4: EMERGING TRENDS



Section 4

EMERGING TRENDS

A “complete street” is constantly evolving. When the term first appeared a street was considered complete when it included high design standards for each of the four travel modes – pedestrians, cyclists, transit users and motorists. Today, a street cannot claim to be complete without equal attention to green infrastructure, a sense of place and social equity. Several new trends are also emerging such as mobility hubs, micromobility and curbside management.

Mobility hubs

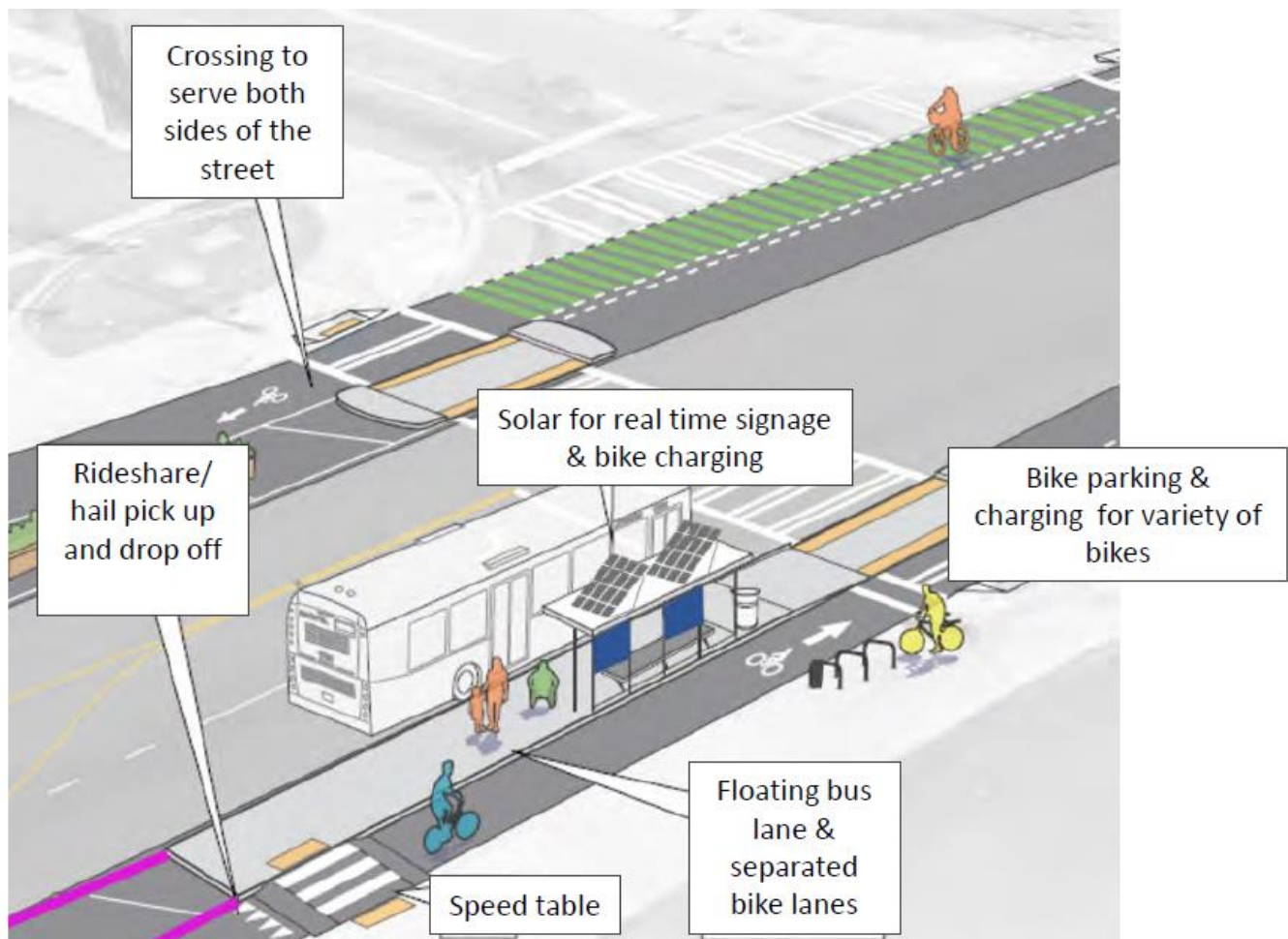
Hubs are the points of connection in a city’s transportation network. Today, people are frequently living multi-modal lives – meaning they use a combination of walking, cycling, transit and the automobile to get around. It’s becoming more common for people to combine travel modes within a single trip - bikes and trains, driving and busing, walking and bikesharing, etc. The options may be endless, but only if the connections between the different travel modes foster seamless transitions.

Mobility hub objectives

- 1. Minimize distance.**
Follow desire lines, especially for pedestrians.
- 2. Reduce conflict among travelers.**
Provide careful consideration on where modes intersect and how to make smooth transitions.
- 3. Provide amenities.**
If a wait is involved in a transition, improve comfort through amenities. Provide additional placemaking elements, like art or public seating, to make the hubs not just a connecting point between travel modes, but a meeting place for the community.
- 4. Give information.**
Whether on the streetscape, online or mobile, provide ways for people to understand the options available to them.

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Typical small-scale mobility hub.⁶⁶

⁶⁶ Kate Whitfield, Kirk Paulsen, Laura Hagerman and Ezra Lipton, "CITE Complete Streets Workshop" (Ottawa: Institute of Transportation Engineers and Alta Planning + Consulting, October 23, 2018), 20.

Curbside management

As cities grow and intensify, curbside areas become highly contested, with many functions desiring space and access to the curb. Pedestrian functions, separated bike lanes, micromobility and green infrastructure all require curbside space, plus passenger cars, delivery vehicles, and buses compete for limited curb space to access shops, restaurants, housing, offices, and community facilities.

Curbside management design objectives

1. Create flexible spaces.

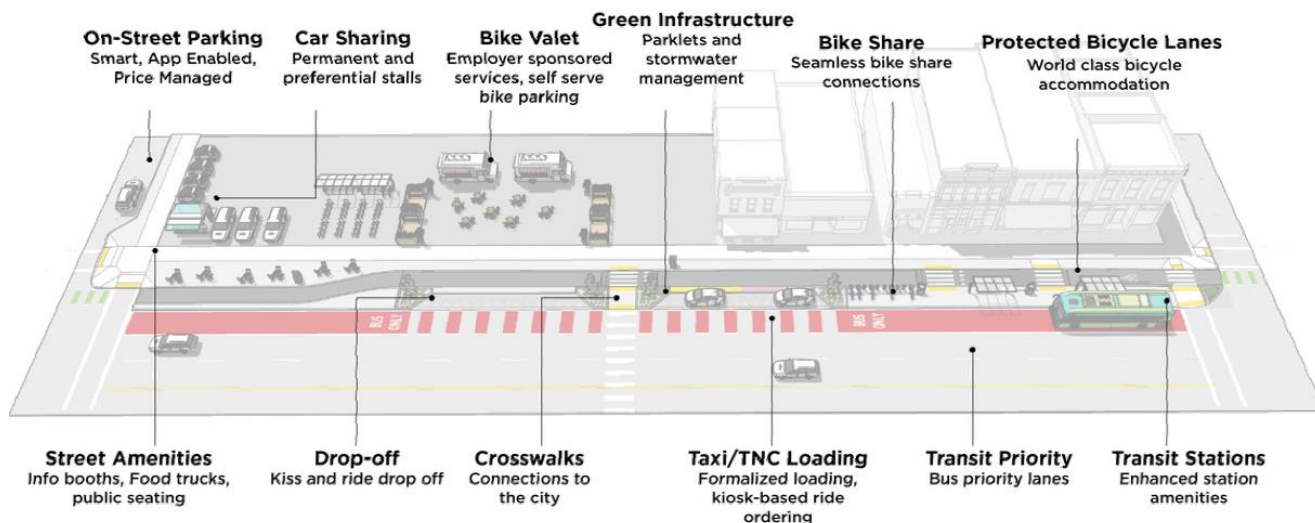
Encourage the same space to be used differently according to times of day or seasons. Mornings may emphasize freight deliveries stock stores, then the lunch rush brings people to street cafes, with the evening emphasizing moving people at they grab dinner or drinks, pick-up children, or head to evening events.⁶⁷

2. Provide designated delivery and ridesharing drop off locations.

Limit the frequency of blocked motor vehicle lanes by designating areas identified exclusively for freight deliveries and/or short-term drop off and pick-ups often facilitated by ridesharing services.

3. Manage parking proactively.

Use variable pricing to influence on and off peak periods. Curbside uses should seek to balance parking needs with the demand for other uses such as seating, greenscape, and bicycle parking.⁶⁸



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⁶⁷ NACTO. "Blueprint for autonomous urbanism."

⁶⁸ City of Boston, *Boston Complete Streets Guidelines*, 212-213.

⁶⁹ Whitfield, Paulsen, Hagerman and Lipton, "CITE Complete Streets Workshop."

Micromobility

Micromobility includes forms of personal transportation that are built for one passenger at a time. They may be entirely rider-powered or have electric power sources, such as an electric throttle or an electric-assist system. The most common forms of micromobility used today are the bicycle, e-bikes, e-cargo delivery vehicles and e-scooters. The adoption of micromobility is rapidly growing with the entrance of privately operated sharing companies.

Bike-sharing is quickly becoming common in small, mid-size, and large cities in North America. A bike-sharing system consists of a fleet of user-friendly, durable bikes. They are either docked at stations or parked by users at destinations, in the case of dockless bike-sharing. Bike-sharing offers a relatively inexpensive and quick extension to a city's public transportation system. Modern bike-sharing systems use one of three types of technology: dock-based bike-sharing, dockless bike-sharing, lock-to bike-sharing (i.e., hybrid system).

E-bike-sharing functions similar to bike-sharing, but an electric assist significantly extends the range of vehicles and improves accessibility for people of varying abilities. All models require the rider to pedal the bicycle in order to receive an "assist" from the electric motor. Many bike share providers offer a mix of bicycle and e-bike vehicle fleets. Legislation in the Province of Ontario is under review to better clarify the expected functions, behaviours and street design guidance for micromobility.

Micromobility design objectives:

1. Pair stations with transit.

Micromobility plays an important role in the "first and last kilometre" that every transit trip is paired with, providing access to transit more quickly and from longer distances.

2. Locate stations in high demand areas.

High employment, residential, and commercial locations are ideal. However, e-bikes can be located in less dense areas that are farther from major destinations. Ensure good visibility to increase awareness of the program.

3. Locate next to all ages and abilities bicycle facilities.

Safe and comfortable bicycle facilities are needed to encourage high ridership.

4. Protect the pedestrian realm.

Use frequently spaced and easy to identify, designated areas for storage to ensure vehicles do not obstruct the pedestrian thoroughway. Stations can be used to add to the visual appeal and sense of place of a street. Consider placing stations in a parking spot rather than sidewalks.



SECTION 5: MAKING IT HAPPEN



Section 5

MAKING IT HAPPEN

Kitchener's Complete Streets scorecard

A Complete Streets approach uses every street reconstruction project as an opportunity to make improvements. A key tool to assist in applying Complete Streets principles to every project is the Complete Streets scorecard. It will be used on every street reconstruction, early in the design stage.

The scorecard has several purposes:

- Encourage a culture shift in support of the Complete Streets vision
- Put a stronger emphasis on sustainable modes of transportation and other street uses
- Assist in prioritizing different street elements, especially when constraints require difficult trade-offs

The scorecard will be used by several audiences.

Audience	How they'll use the scorecard
City staff (often project managers/project teams)	Compare "before and after" scenarios for various street designs, in order to determine the best possible design prior to reconstructing a street.
Corporate Leadership Team	Utilize a consistent benchmark to evaluate overall progress towards the Complete Streets Vision.
City Council	Understand highest benefit streets to allocate funding to, and communicate to constituents the benefits of proposed street designs.
Residents	Understand why certain changes are proposed for their street and the benefits it can bring to the community.

How the scorecard works

The scorecard assists a project manager and project team in comparing before and after scenarios.

Step 1. Assess the current state

During the project initiation phase, the project team will conduct the “before” scoring by answering all questions in the criteria and tallying up a current score. In the narrative section, the team identifies strengths and challenges of the current street design.

Step 2. Identify opportunities

The project team identifies potential upgrades that can strengthen the overall score.

Step 3. Complete interim design(s)

The project manager and/or designer determines the impact of the proposed upgrades, identifying constraints that may be required. At this point, several options may be available, and each option is given a score.

Step 4. Identify capital and operating costs of proposed designs

All viable design options are assessed for the capital and operating costs associated.

Step 5. Finalize design

The final design is selected, balancing available resources with the goal of maximizing the score of a street.

Scorecard criteria

Note: There are two separate set of criteria for local / minor collector streets and major collector / arterial streets.

Local streets and minor collector streets criteria

PEDESTRIAN: What makes a street safe, comfortable and convenient for a pedestrian?

No level of service provided	Very poor level of service	Poor level of service	Acceptable level of service	Expected level of service	Exceeds expectations	Notes
0	1	2	3	4	5	Notes
No dedicated pedestrian facility is present	Facility on one side with minimum 1.5m width	Facility on one side with minimum 1.8m width	Facility on both sides with min 1.5m width	Facility on both sides with min 1.8m width	Sidewalk ≥ 1.8 m on both sides	
Curb face or less than 0.3m	0.3 m boulevard	0.3 - 0.5 m boulevard	0.6 - 0.9 m boulevard	1.0 -1.5 m boulevard	≥ 1.5 m boulevard	
Trees greater than every 40 m	Trees every 20 - 40 m on one or both sides of street	Trees every 11- 20 m on one side of street	Trees every 11-20 m on both sides of street	Trees every 10 m on one side of street	Trees every 10 m on both sides of street	
Longest distance between pedestrian crossings > 300 m	Longest distance between pedestrian crossings 251 - 300 m	Longest distance between pedestrian crossings 201 - 250 m	Longest distance between pedestrian crossings 151 - 200 m	Longest distance between pedestrian crossings 101 - 150 m	Longest distance between pedestrian crossings < 100 m	Qualifying crossings: crosswalk, signalized crossing, PXO, curb extensions/raised crossing, refuge island
Average length of pedestrian crossings >10	Average length of pedestrian crossings 9.1 - 10 m	Average length of pedestrian crossings 8.1 - 9.0 m	Average length of pedestrian crossings 7.1 - 8.0 m	Average length of pedestrian crossings 6.0 - 7.0 m	Average length of pedestrian crossings <6 m	If refuge island present, use the longest leg for scoring

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CYCLING: What makes a street safe, comfortable and convenient for a cyclist?

0	1	2	3	4	5	Notes
>1000 vehicles/day	750 - 1000 vehicles/day, parking both sides	750 - 1000 vehicles/day, parking one side	501 - 750 vehicles/day, parking both sides	501 - 750 vehicles/day, parking one side	< 500 vehicles/day	
> 50 km/h operating speeds	46-50 km/h operating speeds	41-45 km/h operating speeds	36-40 km/h operating speeds	31-35 km/h operating speeds	≤ 30 km/h operating speeds	
No cycling facilities	Signage	Signage, Pavement markings	Signage, pavement markings, Intersection treatments	Signage, pavement markings, Intersection treatments, Traffic calming	Signage, pavement markings, Intersection treatments, Traffic calming, Traffic diversion (or dedicated cycling facility)	If street is identified as high priority in Cycling and Trails Master Plan, this additional criteria is applied.

TRANSIT: What makes a street safe, comfortable and convenient to access transit?

Exclude category if street does not to include transit service. This category is not intended to assess transit service levels.

0	1	2	3	4	5
Average distance from pedestrian crossings to transit stops 250+	Average distance from pedestrian crossings to transit stops 201 - 250 m	Average distance from pedestrian crossings to transit stops 151 - 200 m	Average distance from pedestrian crossings to transit stops 101 - 150 m	Average distance from pedestrian crossings to transit stops 51 - 100 m	Average distance from pedestrian crossings to transit stops <50 m
No pedestrian facilities to transit stops		Pedestrian facilities on one side leading to transit stop		Pedestrian facilities on both sides leading to transit stop	
	Stop marker	Stop marker and landing pad	Stop marker and landing pad with bench	Transit shelter with seating and landing pad	Transit shelter with seating and landing pad, bike rack and waste receptacle

MOTORIZED VEHICLES: What makes a street safe, comfortable and convenient for a motorist?

0	1	2	3	4	5	Notes
No motor vehicle facility	<5.5 or > 8.6 m pavement width	5.5 - 5.8 or 8.0 - 8.5 m pavement width	6.0 - 6.4 or 7.6 - 7.9 m pavement width	6.5 - 6.9 or 7.0 - 7.5 m pavement width	7.0 m pavement width	
Local: > 2,500 vehicles/day. Minor: > 14,000 vehicles/day	Local 2,001 - 2,500 vehicles/day. Minor: 11,001 - 14,000 vehicles/day.	Local: 1,501 - 2,000 vehicles/day. Minor: 8,001 - 11,000 vehicles/day.	Local: 1,001 - 1,500 vehicles/day. Minor: 5,001 - 8,000 vehicles/day.	Local: 500 - 1,000 vehicles/day. Minor: 2,000 - 5,000 vehicles/day	Local: < 500 vehicles/day. Minor: <2,000 vehicles/day	
No additional turn lanes at intersections		One additional turn lane at intersections	Two additional turn lanes at intersections	Three additional turn lanes at intersections		Only score if volumes warrant
No on-street parking		< continuous parking on one side with shared lane	Continuous parking on one side (can be alternating)	Continuous parking on two sides	Continuous parking on both sides, fully dedicated 2.4 m space	

GREEN: What makes a street sustainable?

0	1	2	3	4	5
Trees greater than every 40 m	Trees every 20 - 40 m on one or both sides of street	Trees every 11- 20 m on one side of street	Trees every 11- 20 m on both sides of street	Trees every 10 m on one side of street	Trees every 10 m on both sides of street
> 30 m imperviousness	25 – 30 m imperviousness	21 – 25 m imperviousness	16 – 20 m imperviousness	11 – 15 m imperviousness	≤ 10 m imperviousness
No LID features	1 - 20 % of ROW serviced by LID	21 - 40% of ROW serviced by LID	41 - 60% of ROW serviced by LID	61 - 80% of ROW serviced by LID	81-100% of ROW serviced by LID

SENSE OF PLACE: What makes a street recognizable, unique and enjoyable?

Exclude category if land use does not encourage placemaking.

0	1	2	3	4	5
Rank the street's uniqueness, its contribution to community building and its suitability to neighbourhood context. Features that score positively include neighbourhood specific signage, entrance features, post top lighting less than 6.5 m tall, painted murals/crosswalks, public art, parklet (parking spot converted into a park), heritage/history interpretive panels, enhanced landscaping or planters, wayfinding, woonerf, resident-led or proposed placemaking, matures trees, public seating, etc.					

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Major collector streets and arterial streets criteria

PEDESTRIAN: What makes a street safe, comfortable and convenient for a pedestrian?

No level of service provided	Very poor level of service	Poor level of service	Acceptable level of service	Expected level of service	Exceeds expectations	Notes
0	1	2	3	4	5	Notes
No dedicated pedestrian facility is present	Facility on one side with minimum 1.5m width	Facility on one side with minimum 1.8m width	Facility on both sides with min 1.5m width	Facility on both sides with min 1.8m width	Sidewalk 1.8+ m or wider on both sides	
Curb face or less than 0.3m	0.3 m boulevard	0.3 - 0.5 m boulevard	0.6 - 0.9 m boulevard	1.0 - 1.5 m boulevard	≥ 1.5 m boulevard	
Trees greater than every 40 m	Trees every 20 - 40 m on one or both sides of street	Trees every 11- 20 m on one side of street	Trees every 11-20 m on both sides of street	Trees every 10 m on one side of street	Trees every 10 m on both sides of street	
Longest distance between pedestrian crossings > 300 m	Longest distance between pedestrian crossings 251 - 300 m	Longest distance between pedestrian crossings 201 - 250 m	Longest distance between pedestrian crossings 151 - 200 m	Longest distance between pedestrian crossings 101 - 150 m	Longest distance between pedestrian crossings <100 m	Qualifying crossings: crosswalk, signalized crossing, PXO, curb extensions/raised crossing, refuge island
Average length of pedestrian crossings > 19.9 m	Average length of pedestrian crossings 16.6 - 19.8 m	Average length of pedestrian crossings 13.3 - 16.5 m	Average length of pedestrian crossings 10.0 - 13.2 m	Average length of pedestrian crossings 6.7 - 9.9 m	Average length of pedestrian crossings ≤6.6 m	If refuge island present, use the longest leg for scoring

CYCLING: What makes a street safe, comfortable and convenient for a cyclist?

0	1	2	3	4	5
No dedicated cycling facility is present	1.5 - 1.8 m painted bike lane	1.8 m painted bike lane with 0.3 - 1.5 m painted buffer	≥ 3.0 m multi-use path	1.5 m cycle track or 2.1 m separated bike lane	2.2 - 3.5 m separated bike lane or 1.6 - 1.8 m cycle track

TRANSIT: What makes a street safe, comfortable and convenient to access transit?

Exclude category if street does not include transit service. This category is not intended to assess transit service levels.

0	1	2	3	4	5
Average distance from pedestrian crossings to transit stops > 250	Average distance from pedestrian crossings to transit stops 201 - 250 m	Average distance from pedestrian crossings to transit stops 151 - 200 m	Average distance from pedestrian crossings to transit stops 101 - 150 m	Average distance from pedestrian crossings to transit stops 51 - 100 m	Average distance from pedestrian crossings to transit stops <50 m
No pedestrian facilities to transit stops		Pedestrian facilities on one side leading to transit stop		Pedestrian facilities on both sides leading to transit stop	
	Stop marker	Stop marker and landing pad	Stop marker and landing pad with bench	Transit shelter with seating and landing pad	Transit shelter with seating and landing pad, bike rack and waste receptacle

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MOTORIZED VEHICLES: What makes a street safe, comfortable and convenient for a motorist?

0	1	2	3	4	5	Notes
No motor vehicle facility	2.7 m lane widths or > 4.0 m lane widths	2.8 - 2.9 m or 3.9 - 4.0 m lane widths	3.0 - 2.9 m or 3.7 - 3.8 m lane widths	3.1 - 3.2 m or 3.5 - 3.6 m lane widths	3.3 - 3.4 m lane widths	
Major: > 14,000, Arterial: > 2\42,000 vehicles/day	Major: 12,501 - 14,000, Arterial: 21,000 - 24,000 vehicles/day	Major: 11,001 - 12,500, Arterial: 18,001 - 21,000 vehicles/day	Major: 9,501 - 11,000, Arterial: 15,001 - 18,000 vehicles/day	Major: 8,001 - 9,500, Arterial: 12,001 - 15,000 vehicles/day	Major: < 8,000, Arterial: <12,000 vehicles/day	
No additional turn lanes at intersections		One additional turn lane at intersections	Two additional turn lanes at intersections	Three additional turn lanes at intersections		Only score if volumes warrant. Include dual left turns.
No on-street parking	< continous parking on one side with shared lane	Continuous parking on one side (can be alternating), with shared lane	Continuous parking on two sides, with shared lane	Continuous parking on one side (can be alternating), with fully dedicated 2.4 m space	Continuous parking on both sides, fully dedicated 2.4 m space	

GREEN: What makes a street sustainable?

0	1	2	3	4	5
Trees greater than every 40 m	Trees every 20 - 40 m on one or both sides of street	Trees every 11- 20 m on one side of street	Trees every 11- 20 m on both sides of street	Trees every 10 m on one side of street	Trees every 10 m on both sides of street
> 30 m imperviousness	25 – 30 m imperviousness	21 – 25 m imperviousness	16 – 20 m imperviousness	11 – 15 m imperviousness	≤ 10 m imperviousness
No LID features	1 - 20 % of ROW serviced by LID	21 - 40% of ROW serviced by LID	41 - 60% of ROW serviced by LID	61 - 80% of ROW serviced by LID	81-100% of ROW serviced by LID

SENSE OF PLACE: What makes a street recognizable, unique and enjoyable?

Exclude category if land use does not encourage placemaking.

0	1	2	3	4	5
Rank the street's uniqueness, its contribution to community building and its suitability to neighbourhood context. Features that score positively include neighbourhood specific signage, entrance features, post top lighting less than 6.5 m tall, painted murals/crosswalks, public art, parklet (parking spot converted into a park), heritage/history interpretive panels, enhanced landscaping or planters, wayfinding, woonerf, resident-led or proposed placemaking, matures trees, public seating, etc.					

Implementation & evaluation plan

Realizing the Complete Streets vision will require strategic efforts on behalf of city staff, city council, industry partners and the entire community. A detailed action plan will make the Complete Streets vision a reality. This plan is based on guidance from other cities and the National Complete Streets Coalition who reviewed the best policies of 2018.⁷⁰

Alignment with city strategies

1. **Coordinate with the Urban Design Manual.**

The Urban Design Manual sets universal design expectations that apply to all of Kitchener and are relevant to all geographies and building typologies. City staff in Transportation and Planning divisions have been working collaboratively throughout the development of the Urban Design Manual, to ensure the visions align and there is a consistent approach to street-oriented development.

2. **Update the Development Manual.**

The Development Manual provides technical standards for new development. The cross-sections and design guidance provided in Complete Streets will be integrated into the next update of the Development Manual, requiring all new development to meet the Complete Streets vision.

3. **Conduct an Official Plan amendment and integrate into Planning policies and secondary plans.**

This Complete Streets document sets a higher standard for street design than Kitchener's current Official Plan requires. An update to the Official Plan will strengthen the policy support for the Complete Streets vision and provide an opportunity to include more context-sensitive street classifications, such as the introduction of a Main Street classification.

⁷⁰ Natash, Riveron, "The Best Complete Streets Policies of 2018" (Washington DC: Smart Growth America and National Complete Streets Coalition, 2018).

Change management

4. **Conduct annual staff training sessions.**
Empower current and new staff across all divisions – especially Transportation, Roads & Traffic, Operations, Engineering, Planning and Economic Development – with the knowledge they need to work towards the Complete Streets vision.
5. **Establish a Complete Streets corporate committee.**
Consisting of management from Development Services and Infrastructure Services divisions and external stakeholders the committee will meet twice a year to monitor progress, troubleshoot challenges and review emerging trends.
6. **Review equipment requirements and operational changes required to maintain Complete Streets.**
Much of the city's current existing fleet contains large vehicles developed during an era of continued road expansion. Sourcing smaller equipment and reviewing operational procedures is necessary to properly maintain complete streets in an urban environment.⁷¹
7. **Integrate the scorecard analysis into every street reconstruction design process.**
Establish clear timelines for using the scorecard, so that opportunities for upgrades are identified early in a design process.
8. **Review warrant requirements for PXOs and signalized trail crossings.**
The transportation industry has long relied on warrants – based especially on pedestrian and cyclist counts – to justify placement of PXOs and signalized trail crossings. These warrants put vulnerable users in the situation of having to cross at potentially dangerous locations in order to justify safety improvements. Some cities have begun identifying alternative warrant requirements.⁷² In collaboration with the region and other municipalities, city staff will investigate and collate these alternatives and develop a safe, consistent and equitable alternative to traditional warrant requirements.
9. **Work with the Region and other municipalities to develop “complete level-of-service” measurements for signal function and prioritization.**
In many cases at signalized intersections, what is good for one mode of travel can have negative impacts on another, making it essential that level-of-service metrics capture all modes of travel equally. Many cities are developing complete or multi-modal level-of-service guidelines, with an emphasis on protecting vulnerable users.⁷³ City and regional staff can draw on these industry best practices to create updated standards for signalized intersections.

⁷¹ Jonah, Chiarenza, Margo Dawes, Alexander K Epstein, Ph.D., Donald Fisher, Ph.D., Katherine Welty, “Optimizing Large Vehicles for Urban Environments: Downsizing” (New York: National Association of City Transportation Officials, 2018.)

⁷² Angie Schmitt, “Seattle Tosses Out Rulebook to Protect Pedestrians,” (Streetsblog USA, February 5, 2019), <https://usa.streetsblog.org/2019/02/05/seattle-tosses-out-the-rulebook-to-protect-pedestrians/>.

⁷³ City of Ottawa, “Ottawa’s Multi-Modal Level of Service (MMLOS) Guidelines,” Ottawa, 2015.

Community engagement

10. Develop and host community engagement pop-up workshops.

Residents are critical in realizing the Complete Streets vision, bringing their own ideas, expertise and perspectives to street designs. A pop-up workshop kit would engage residents on the Complete Streets vision, why it matters, and the benefits it can bring to their neighbourhood. The pop-up workshop would be hosted in neighbourhoods where significant changes to street layout are expected in the next 2-3 years.

11. Work with residents to pilot a woonerf.

Create an evaluation matrix and conduct significant community engagement to determine the best application for retrofitting a local, residential street into a woonerf.

12. Communicate the Complete Streets vision during street reconstruction public engagement.

Describe the benefits of a Complete Street to community members through consistent branding, information boards, brochures, dedicated webpage, etc.

Street design applications

13. Develop a standard drawing for raised pedestrian/cyclist crossings.

Providing raised crossings increases visibility and demonstrates priority for vulnerable users, especially at mid-block trail crossings and as gateways to residential neighbourhoods or main streets. A standard drawing is needed that maintains smooth and flush crossings for pedestrians and cyclists, while also integrating stormwater management, utilities, year-round maintenance, etc.

14. Integrate pedestrian and bike facilities at bus stops.

Working with GRT, research and install bus stop upgrades that create separated space for pedestrians, cyclists and transit boarding.

15. Establish fund or mechanism to fill network gaps caused by construction limits.

Many street reconstructions are set based on underground servicing needs, sometimes causing gaps of just a block or two between the reconstructed segment and nearby active transportation facilities. A mechanism is needed to expand the project limits to include active transportation connections within the scope of the project.

16. Create a new Green Street cross-section for environmentally sensitive areas.

Working with stormwater management staff and consulting experts, develop a cross-section for green streets, to be included in the Development Manual update.



Data collection, monitoring and evaluation

17. **Expand use of active transportation counting technologies.**

Gathering and analyzing data is essential to street design. Most forms of data collection rely heavily on motor vehicle traffic analysis, with little sophistication and reliability of active transportation data. Through the use of camera-based and traditional counting technologies, city staff will be able to make improved, data-driven decision-making in street designs.

18. **Monitor maintenance and life-cycle aspects of Complete Streets.**

Continually gather data and assess how Complete Streets are maintained, with the goal of determining an operational cost for individual streets. Review data related to work activities specific to Complete Street infrastructure to provide lifecycle information in alignment with current levels of service.

19. **Prepare Complete Street reports.**

At the end of each construction year, city staff will prepare a report of all new streets that have incorporated Complete Streets elements, including their scores before and after construction based on the Complete Streets scorecard.

It can be common for residents to express concerns related to proposed changes to street design, but generally city staff hear positive feedback after changes have been made. Every three years, a satisfaction survey will be distributed to all residents living on a street that was reconstructed with significant design changes.

20. **Monitor progress, update the document and return to City Council in 2024.**

City staff will document portions of the Complete Streets document that can be updated, report on progress and make further recommendations to City Council in 2024.

SECTION 6: CHANGING KITCHENER - FOR THE BETTER



Section 6

CHANGING KITCHENER – FOR THE BETTER

Community engagement

The City of Kitchener and its people have never viewed change as a negative thing. We don't fear or resist change, but rather, we embrace it. We are resilient and see change as an opportunity – for growth, development, and prosperity. Change to us means a better city – a vibrant, innovative and caring city, achieved through continuous progress.

The desire for change in our transportation network has been growing in our community. We are ready to be leaders of change and we recognize that our strength comes from our willingness to adapt - to continuously reimagine, rethink, and reshape how we do things. We are deliberate, strategic, and forward thinking in our approach. Together, we confidently adapt to change, because we know we are changing for the good.

Community engagement for Complete Streets was conducted by students in Wilfrid Laurier University's CMEG 305 Community Engagement and SE 330B Social Innovation in the City classes, for the purpose of informing the city's development of Complete Streets. The students' full report is available through city staff. A public comment period on the draft Complete Streets guidelines also gathered important feedback.

Community engagement methodology

A variety of engagement tactics were conducted to reach a broad cross-section of our community and hear from a variety of perspectives.

Engagement approach	Number of participants
Key stakeholder interviews	3
Online survey	230
Street team in-person surveys	56
Design charrettes	53
Total	339

Engagement analysis

Stakeholder interviews

In stakeholder interviews with a landscape architect, a PhD candidate who assisted the City of Ottawa with a Complete Streets project and the owner/operator of a bike shop in downtown Kitchener, the most common theme was the importance of designing streets to encourage alternative forms of transportation, primarily walking and cycling.

Online and in-person surveys

Feedback on 10 Complete Streets principles proposed by city staff found:

- A majority of respondents indicated that the principles are understandable, will create a vibrant community, and are a priority for them
- 13% of respondents found the principles too vague and hard to understand

In response to the question “what makes a great street?” responses found:

- 48% of respondents described streets that are safe and comfortable for walking and either gave high priority to pedestrians or were closed to cars entirely
- Canadian examples included Queen St. (St. Mary's, Ontario), Main St., Hess Village (Hamilton, Ontario), Yonge St., Bloor St. (Toronto, Ontario), Maisonneuve Blvd., (Montreal, Quebec), Sparks St. (Ottawa, Ontario), King St. (Waterloo, Ontario)
- Kitchener examples included King St., Belmont Ave., Mill St., Greenbrook Dr., Ira Needles Blvd., Fischer Hallman Rd., Manitou Dr.
- The identification of some major arterial roads that are primarily designed to move high volumes of vehicles demonstrates that some members of the public put a high value on direct and convenient automobile travel.

In response to a question about feeling unsafe on a street, common responses included:

- Close calls while riding bikes, walking at night, and in roundabouts.
- Intersections can feel dangerous to both cyclists and pedestrians
- Traffic speed was mentioned in 35% of responses.
- A commonly cited solution was separated bike lanes, not only to make streets safer and encourage greater use by cyclists, but also to separate automobiles from cyclists and keep traffic flow constant.

Survey respondents are most interested in these features when creating “streets as places:”

- Trees and greenery
- Public seating areas
- Wider sidewalks

Design Charrettes

The design charrettes were conducted with different groups of people at three locations: general public (Joseph Street), Trinity Village Retirement Community (Connaught Street/Traynor Avenue), and Wilson Avenue Public School (Wilson Avenue). Participants provided feedback via the complete streets game (an activity which involved writing or drawing the mode of transportation participants used to get to the charrette), the walk-about (where participants explored different areas of the street and reflected on their experience with the street, its strengths, and where there is room for improvement), and workshopping ideas (where participants voted for their most liked and most disliked street features).

Participants shared their priorities for street design improvements.

Case Study 1: Joseph Street

- Pedestrian safety
- Pedestrian accessibility
- Street beautification

Case Study 2: Connaught Street and Traynor Avenue

- Trees and greenery
- Benches
- Wider sidewalks and lighting
- Separated bike lanes

Case Study 3: Wilson Ave

- Traffic calming
- Separated bike lanes
- Public seating and beautification



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Laurier students' recommendations

Based on community feedback, Laurier students recommend that the Complete Streets principles be made more understandable by simplifying wording and eliminating redundancies or by including comprehensive descriptions, and detailed visual aids. The recommendations for street design include traffic calming, lower speed limits and adding features such as wider sidewalks, separated bike lanes, trees and greenery, benches, and better lighting.



Public comment period

A draft of these Complete Streets guidelines was posted for comment and discussion.

Engagement approach	Number of participants
Online survey	198
Open house at Breithaupt Centre	17
City advisory committees	50
Direct phone calls and emails	6
Total	271

Major themes from comments included:

- Support for improving accessibility for all abilities;
- Concerns about costs, especially related to wider sidewalks;
- Support for narrower vehicle lanes if it leads to reduced speeds. Concerns narrower vehicle lanes may squeeze cyclists even more, cause congestion or reduce parking availability;
- Support for an emphasis on cycling infrastructure that is safe and comfortable for all ages and abilities, especially children. The most common concern related to this item was that barriers for separated bike lanes be full barriers and not just roll curbs.
- Strong affirmation for the cycle track placement of cycling infrastructure, supported by both people who bike and those who drive;
- Support for more trees in the street right of way. However, a significant portion of respondents did not want to see expanded tree capacity come at the expense of safe active transportation facilities or street motor vehicle volume;
- A recognizable minority was not in support of the vision and proposed changes of Complete Streets, identifying concerns related to motor vehicle safety, convenience and congestion;
- Questions about if and how active transportation can be supported during winter;
- Desire to see solutions implemented in the interim on streets with known safety concerns, and not just wait many years or decades until reconstruction; and
- Encouragement to see Complete Streets implemented effectively and funded adequately.

Overall, through the online survey, 70% of respondents indicated they were happy with the direction the city is taking, 15% were neutral and 15% were unhappy.

People-friendly transportation

Our streets should be safe, connected, and inclusive – meaning that whether you're eight or you're eighty, you can move through Kitchener by any form of transportation.

Kitchener's vision is to make every street in Kitchener safe, comfortable and convenient for all. Together, we can make change – for the good.





Glossary

Accessibility for Ontarians with Disabilities Act (AODA): Provincial legislation and associated regulations that set requirements and provide standards for making the built environment accessible to all Ontarians.

Active Transportation: All types of human-powered transportation, primarily including walking, cycling, or using a wheelchair.

Asymmetrical crosswalk/crossride: A road crossing treatment that provides designated space for pedestrians and cyclists side by side.

Autonomous vehicle: A vehicle that is capable of sensing its environment and moving with little or no human input.

Bike sharing: A fleet of bikes available for public use with designated pick-up locations across the city.

Bioswale: Bioswales are vegetated, shallow, landscaped depressions designed to capture, treat, and infiltrate stormwater runoff as it moves downstream.

Boulevard: The space between the asphalt roadway and sidewalk.

Boulevard multi-use trails: A facility designated exclusively for pedestrians and cyclists to share within the boulevard area of the right of way.

Buffer: A spatial or physical separation.

Catch Basin: A chamber that receives stormwater, traps sediment and channels stormwater into the storm sewer via a pipe called a catch basin lead.

Climate action: Projects and programs that create greenhouse gas reductions.

Combined crosswalk/crossride: A road crossing treatment that provides designated space for pedestrians and cyclists, with cyclists crossing on the outside of pedestrians.

Complete Street: A street designed to be safe and comfortable for all, regardless of age, ability or mode of transportation.

Control vehicle: An occasional or infrequent user of a street, that is typically a larger size of vehicle.

Conventional transit: Typically a bus route with frequent stops.

Corner (Turning) radii/radius: The path of travel for motor vehicles dictated by the curb alignment.

Crossride: A part of the roadway specifically intended as a crossing for cyclists. This is indicated by signs, pavement markings, and a traffic signal if the crossing is signalized. Cyclists do not need to dismount to use this crossing.

Cross-section: A view of a street, typically including widths of various street features.

Crosswalk: A part of the roadway specifically intended as a crossing for pedestrians. This is indicated by signs, pavement markings and a traffic signal if the crossing is signalized.

Cul-de-sac: A street closed at one end, typically with a turning circle.

Curb extensions: An extension of the sidewalk or curb line into the street.

Curb: The edge of the pavement that clearly defines the edge to vehicle operators.

Curbside management: Strategies to maximize the space and access providing by curbs, typically in dense urban areas.

Curvilinear streets: Streets with frequent use of curves and cul-de-sacs.

Cycle tracks: A dedicated cycling facility located outside of the travelled portion of the roadway, typically next to the sidewalk.

Cycling: The use of a bicycle to get around for transportation or recreation purposes.

Cycling facilities: Types of street design features that are intended for the use of people cycling.

Design speed: A selected speed used to determine the various geometric features of a street.

Design vehicle: The most common vehicle to be using the street.

E-bike: A bicycle with a battery powered pedal-assist that gives a boost to the cyclist while pedaling.

Edge zone: The curb and gutter next to the roadway.

Electric scooter: A battery-powered two wheeled vehicle for a single person.

Elephant's feet: A type of pavement marking to draw attention to cycling and trail crossings at intersections and driveways.

Emergency access trails: A secondary access to streets with a single entry, for emergency vehicles.

Farside bus stop: A bus stop located past an intersection.

Flex bollard: A type of construction material anchored into pavement or curbs to guide motor vehicle movement.

Floating bus stop: A sidewalk platform built between a bicycle facility and the roadway

Frontage zone: The part of the sidewalk adjacent to properties.

Green street: A type of street design that has a lower impact on the environment.

Intersections: The place where two streets intersect.

Level of service: A measure used to describe how well a street is functioning for particular types of movement, typically using an A, B, C, D, E, F, scale.

Low impact development (LID): A design approach to manage stormwater runoff using green or natural infrastructure.



Maintenance Hole: A surface access point on the street or boulevard that connects to underground utility for repair, inspection, and other maintenance operations.

Micromobility: Personal transportation devices that are built for one passenger at a time.

Midblock bus stop: A bus stop located between intersections.

Mixed crosswalk/crossride: A road crossing treatment that is a shared space between pedestrians and cyclists.

Mobility: The ability to move between locations within a city.

Mobility hub: Centres designed to maximize connections in a transportation network and transitions between different travel modes.

Motor vehicles: A vehicle powered by an internal combustion engine or electric battery.

Motorist: A person operating a motor vehicle.

Nearside bus stop: A bus stop located before an intersection

Neighbourhood bikeways: Streets designated as a cycling priority route on quiet, local streets that can be enjoyed by all ages and abilities without designated space.

Painted bike lanes: A designated space on the roadway for exclusive use by cyclists, indicated by paint.

Parking bay / parking lay-by: A designated area at the side of the road for the purpose of parking motor vehicles.

Pavement marking: Painted designs applied to a street, trail or sidewalk to provide guidance on path of travel and behavior, often combined with signs and traffic lights according to provincial and federal guidance and legislation.

Pedestrian: A person moving from place to place, either by foot or by using an assistive mobility device.

Pedestrian Crossovers: A type of road crossing that gives pedestrians the right of way, requiring motorists to yield.

Pedestrian refuge islands: Raised medians in the centre of a roadway, allowing a pedestrian to cross one direction of motor vehicle traffic at a time.

Pedestrian throughway zone: An unobstructed path of travel for pedestrians.

Pedestrian-oriented (Pedestrian-scale): A street that has been designed around the viewpoint and needs of a pedestrian.

Placemaking: The process of creating vibrant public places for people to enjoy, with attention to local context, history, culture and community engagement.

Posted speed: The speed limit that is posted on a street that all motorists are legally bound to follow.

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Public realm: The space around, between and within buildings that are publicly accessible, including streets, squares, parks and open spaces

Queue jump lanes: Street lanes for the exclusive use of transit vehicles.

Raised crosswalks: An enhanced form of crosswalk through elevating the crossing.

Rapid transit: A form of transit that facilitates direct, high-speed movement, typically with low stop frequency.

Right of way: Indicates who should go first in conflict situations between road users, often defined legally through federal and provincial legislation.

Right of way: The area of land acquired for or devoted to the provision of a street, sidewalk and/or accompanying amenities.

Roundabout: A circular intersection used as an alternative to signalized intersections.

Separated bike lanes: A designated space on the roadway for exclusive use by cyclists, including a form of physical separation from motorized portion of the roadway, such as bollards, curbs, planter boxes, raised medians or parking.

Separated cycling intersections: A designated space for cyclists facilitating intersection movement, physically separated from motor vehicle traffic.

Sidewalks: A designated space for pedestrians.

Smart streets: Streets that incorporate data collection and technology to improve the user experience.

Stormwater: The accumulation of rain water during and after a rainfall.

Stormwater management: Strategies to preserve and protect the environment and stormwater in an urban environment.

Street classification: A category assigned to a street in order to clarify the street's intended role, function and design in the transportation network.

Streetscape: The visual and felt environment of a street, as influenced by the natural and built environment.

Tactile Walking Surface Indicator (TWSI): A metal plate that is integrated into the sidewalk and includes miniature raised domes that are cane detectable for visually impaired pedestrians.

Target speed: The speed road designers intend for motor vehicles to drive at.

Temporary conditions: Disruptions to a street's usual function, most often caused by construction or special events.

Traffic calming: A range of design strategies to manage vehicle speeds.

Traffic circle: A traffic calming feature to slow motor vehicles on a particular speed.

Traffic diversion: A range of design strategies to manage vehicle volumes.



Traffic speed: The speed at which vehicles are travelling on a particular street.

Traffic Volume: The number of vehicles on a particular street.

Transit: The movement of people facilitated by publicly operated buses, trains or other forms of transportation.

Transit Curb-out: A loading area designated for public transit that extends past parking lanes.

Two stage left turns: An intersection feature for cyclists to make a left turn one leg at a time, to avoid merging into the left turn lanes for motor vehicle traffic.

Urban forestry: All trees on public and private lands within a city.

Wayfinding signs: Signs that provide direction and guidance to help people navigate through the city.

Woonerf: A “living street” that uses a shared space environment to design the street to be a public space for people’s everyday use.

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