



# GO Transit Station Secondary Plan

Urban Design Guidelines



# GO Transit Station Urban Design Guidelines

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## Chapter 1 Introduction

### 1.1 GO Transit Station Secondary Plan

On May 7, 2018 Council adopted Amendment No. 19 to establish and incorporate within the Official Plan the GO Transit Station Secondary Plan (GTSSP). The GTSSP establishes a land use plan, policies and implementation framework to guide the development and redevelopment of lands within the Plan Area.

The GTSSP is the result of, and implements, the St. Catharines GO Transit Station Secondary Plan Study (April 2018), which was prepared in coordination and consultation between the City of St. Catharines and the Region of Niagara. The Study was initiated in response to the Provincial government announcement of planned expansion of all day GO train service into Niagara Region, and the selection of the West Major Transit Station (former VIA Rail Station) at 6 Great Western Street in West St. Catharines as the hub of four transit stations to provide GO train facilities and service in the Niagara Region.

The GTSSP establishes a vision and planning framework to guide transit-oriented and connected development and redevelopment of lands within and in the vicinity of the transit station, and to facilitate and support the optimum use and function of the transit station and surrounding lands within the Secondary Plan Area.

#### 1.1.1 Secondary Plan Vision

Rapid transit expansion to St. Catharines will support growth and economic development for the City, Region and Province. The Secondary Plan Area is occupied by Ridley College, existing stable residential, large scale retail and industrial uses, and other smaller scale non-residential uses. The future GO Transit Station will elevate its role in the City structure and make the area a destination and transfer point for a significant portion of local, inter/intra-regional multi-modal trips.

Concentrated transit-supportive development in the area, particularly in close proximity to the transit station, will be a hub of activity, providing for a full range of residential, commercial, employment and community functions all coexisting in a mutually beneficial manner. Notwithstanding the change that the area will experience, existing stable residential, employment and institutional uses will be protected and enhanced through public realm improvements.

The station itself will define the area, being designed to integrate with the existing character while exemplifying high-quality iconic elements to represent its role as a key destination in the City. Existing connections will be improved and new connections will be developed to provide safe and convenient access to the station and from the station into the Downtown, employment areas, commercial areas, Ridley College and other key destinations for all modes of transportation.

### 1.1.2 Secondary Plan Objectives

The objectives to guide change in the GTSSP Area include:

**1. Support mixed use intensification throughout the Plan Area**

The station area is being planned to accommodate significant population growth through transit-supportive development.

**2. Balance modes of movement and improve pedestrian connectivity to the Station**

An enhanced public realm including improved cycling, pedestrian facilities and a finer-grained street network will prioritize non-auto movement and help connectivity between the GO Transit Station, other areas within the GTSSP and other areas within the City, including the Downtown.

**3. Create a well-designed and physically integrated transit station and hub**

The West Major Transit Station is being planned as a transit hub, the origin, destination, and transfer point for a significant portion of trips through the Region. The station itself will exemplify design excellence, be a focal point for the community and operate as an activity hub, providing for a full range of transit facilities, uses and services.

**4. Protect existing stable neighbourhoods**

Residential neighbourhoods play an important role in the vibrancy of the area by providing ground-related housing, an important component of housing choice. Since new development in the area will largely be in the form higher density rental and condominium apartments, it is of particular importance to recognize the existing surrounding low density stable residential neighbourhoods.

Existing residential areas will be maintained with low density residential use permissions, traffic management measures and enhanced by pedestrian realm improvements and new active transportation connections. To support livability, neighbourhoods should have easy access to a range of community amenities and parkland.

**5. Attract and accommodate a variety of employment uses**

Employment uses serve an important role in the creation of complete communities and support economic prosperity. The Plan aims to accommodate existing

employment uses and attract new employment functions. To help attract and accommodate a variety of employment uses, public realm improvements should support economic attraction and transition uses should be introduced to manage land use compatibility.

## **6. Maintain and leverage iconic presence of Ridley College and VIA Station buildings**

Ridley College is an important institutional use within the Plan Area with a number of iconic buildings representing culturally significant historic architectural styles. In addition, the existing VIA Station is designated as a heritage railway station under the *Heritage Railway Stations Protection Act*. The station area will leverage the physical design and architectural elements of these iconic buildings to define a unique character for the area.

### **1.2 About the Urban Design Guidelines**

The GO Transit Station Secondary Plan Urban Design Guidelines (“the Guidelines”) establish site, building and streetscape design expectations for both private and public sector development within area surrounding the future GO Transit Station site. The guidelines detail expectations for the arrangement, shape and appearance of new development to help manage the evolving built environment of the area and to direct these changes in a positive, sensitive manor.

The purpose of the Guidelines is to provide guidance for enhancing the character of the area, including both the private and public realm, and to help implement the Vision and Objectives of the Official Plan and GTSSP. The Guidelines are not intended to substantially restrict the creativity of designers in responding to the challenges of a given site. Rather, the Guidelines are intended to provide a degree of flexibility, allowing for a range of design styles and expressions which will contribute to creating a unique sense of place.

The Guidelines also address matters related to accessibility, access, entranceways, vehicular parking including structured parking, loading areas, bicycle parking and facilities, street furniture, wayfinding, low impact development and sustainability measures, and building height, massing and facades.

The GTSSP Urban Design Guidelines are to be read in conjunction with the urban design principles and policies established in Part C, Section 4 of the Official Plan and with the GTSSP, and where more specific and refined, will be the operative guidelines to direct public initiatives and private development and redevelopment within the Plan Area.

#### **1.2.1 Application of the Design Guidelines**

The GO Transit Station Area Urban Design Guidelines will be utilized as follows:

## Review of Development Applications

The guidelines will outline minimum site layout and building design expectations for all developments which require planning approvals. This includes new building construction, major additions and new parking lots (via site plan control), as well as all other development applications. Development projects will be required to implement the guidelines prior to or as conditions of approval.

Major development projects may be required to submit an Urban Design Brief which outlines how the development proposal reflects the provisions on these guidelines and provides justification for any proposed deviations.

## Design and Approval of Municipal Works

The guidelines provide direction for the design and management of the public realm, including streets, sidewalks and public spaces, with a focus on creating a comfortable, beautiful, and pedestrian-oriented environment. These guidelines will be considered in the design and management of future public works within the GO Transit Station Area.

## By-law Conflict

Where there is a conflict between any of the design guidelines and the provisions of the zoning by-law, the zoning by-law shall prevail. The same applies to the sign by-law, or other relevant municipal by-laws.

## Weight of Provisions

The text of each guideline provision will generally include one of three weighted qualifiers. These qualifiers indicate priority and level of flexibility as follows:

**Shall:** The “shall” guidelines are mandatory and generally reflect policies taken directly from the Garden City Plan or that will be included in the zoning by-law. These guidelines are the least flexible and require substantial justification to change.

e.g. “GO parking **shall** be prohibited along the frontage of Ridley Road.”

**Should:** The “should” guidelines represent expected outcomes, but some flexibility and trade-offs may be appropriate on a case-by-case basis where a superior design may result. The “should” guidelines represent required elements for approval, unless good cause can be demonstrated to deviate.

e.g. “Large areas of uninterrupted surface parking **should** be avoided.”

**Encouraged:** The “encouraged” guidelines do not need to be satisfied to obtain development approvals. These guidelines describe desirable outcomes which will be supported, but may not be appropriate or feasible on all sites.

e.g. "Minor variations in setbacks are encouraged to facilitate wider boulevards, accommodate public amenity space and create a more interesting."

### 1.2.2 Study Area

The area subject to these guidelines aligns with the boundary of the GO Transit Station Secondary Plan Area as set out on Schedule E6/7 of the City's Official Plan, and as illustrated on Figure 1 below. The Area is centrally located within the West Planning District, and is comprised of approximately 347 ha land extending west from Burgoyne Bridge to Vansickle Road and First Street Louth, and south from Highway 406 to Rykert Street.

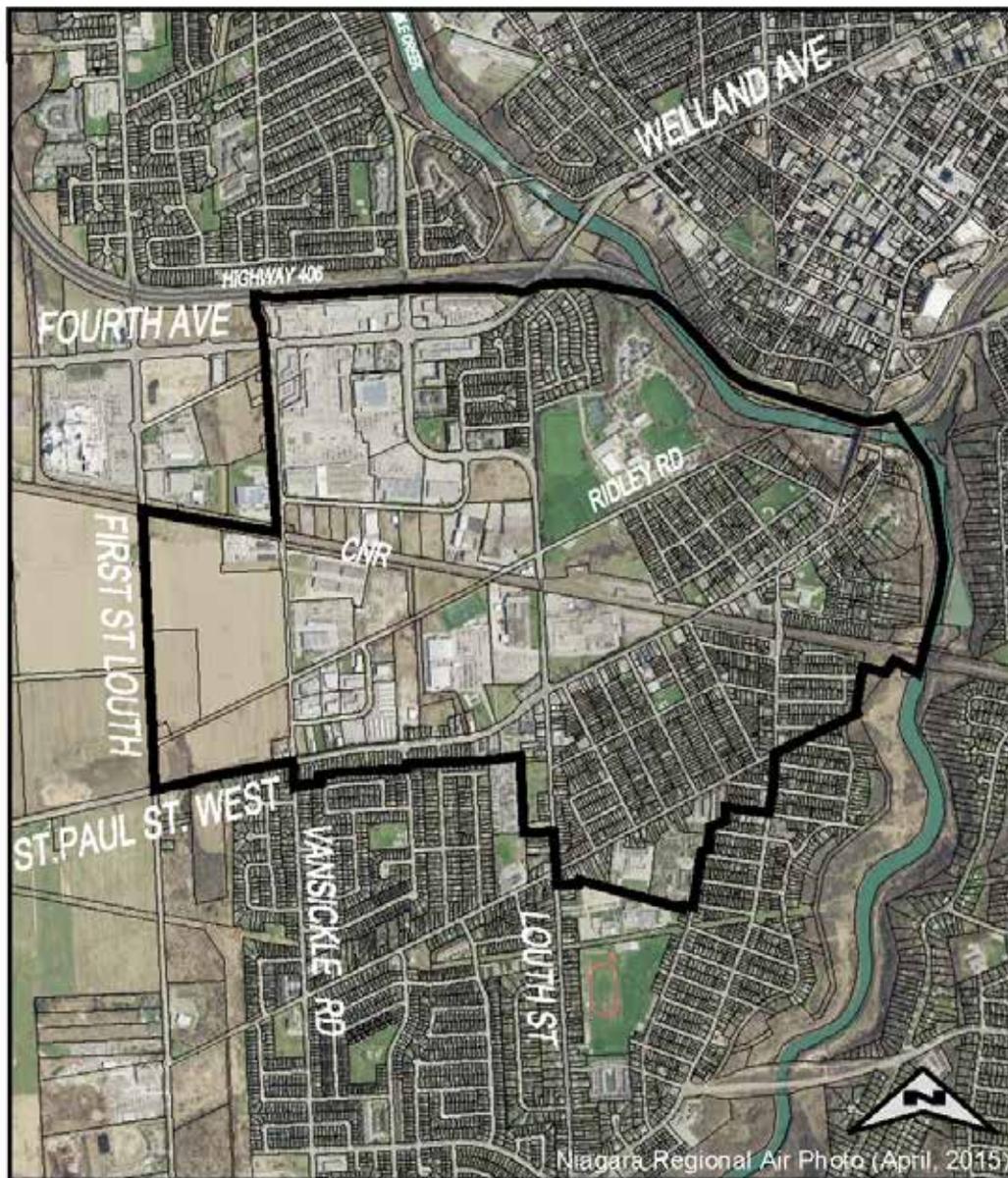


Figure 1 Urban Design Guidelines Area

## Chapter 2 Urban Design Improvements

The planned Public Realm Improvement and Active Transportation Network is depicted on Schedule E6/7 - C of the City's Official Plan and considers the following:

- a) Major Gateway Improvement areas;
- b) Minor Gateway Improvement areas;
- c) Major Streetscape Improvement areas;
- d) Minor Streetscape Improvement areas;
- e) Potential New Public Spaces;
- f) Potential Public Space Improvements; and,
- g) Active Transportation Connections.

### 2.1 Streetscape Improvements

Streetscape improvements are intended to provide direction for future enhancements to the key roads within the GTSSP, and apply to public land within the right-of-way. Three levels of improvement area contemplated in this Plan:

- a) Major streetscape improvements areas;
- b) Minor streetscape improvements areas; and,
- c) Potential street grid refinement areas.

#### 2.1.1 Major Streetscape Improvement Areas

Major streetscape improvements are proposed for Ridley Road (between Louth Street and Ambrose Street), Louth Street (between Vintage Crescent and Ridley Road) and St. Paul Street West (between Louth Street and Henrietta Street). Key improvements should include tree plantings on both sides of the street to provide shade and comfort for pedestrians, improved lighting and occasional street furniture, as well as completion of the sidewalk and cycling infrastructure for Ridley Road and Louth Street.

Detailed concepts for each Major Streetscape Improvement Area, including road cross-sections, are included in Section 3.2 of the Guidelines.

#### 2.1.2 Minor Streetscape Improvement Areas

Minor streetscape improvements have been identified for Louth Street (between Ridley Road and St. Paul Street West) and Ridley Road (Between Ambrose Street and Henrietta Street). Key improvements should include tree plantings on both sides of the street to provide shade and comfort for pedestrians, as well as completion of the sidewalk network and delineation of the bike route/lane along Louth Street.

## 2.2 Potential New Public Spaces and Public Space Improvements

Where new major mixed use development or redevelopment is planned, new public spaces should be provided to enhance the pedestrian environment and provide amenities for residents, employees and visitors. Where public spaces exist, improvements should be made to better serve the existing and planned community. Public spaces shall be inclusive and barrier-free to all users while including a mix of design elements such as enhanced landscaping, shade trees, ample seating, and public art. New public spaces should be located close to the street and be connected to the pedestrian network, including existing or planned transit stops.

## 2.3 Gateways

Gateways are intended to function as formal entranceways into the Secondary Plan Area and create a strong sense of place. Gateways include lands within the right-of-ways and all abutting lands. The GTSSP contemplates two levels of improvement:

- a) Major gateway improvement areas; and,
- b) Minor gateway improvement areas.

Gateways include lands within the right-of-ways and all abutting lands.

### 2.3.1 Major Gateway Improvement Areas

Major gateway improvements should include prominent signage, enhanced lighting, intensive landscaping (such as seasonal floral displays, tree planting), public art, cycling infrastructure and other types of public realm enhancements. Adjacent redevelopment should be designed to support the function of the gateway. Two major gateway improvement areas have been identified:

**Ridley Road and Louth Street:** As the Transit Station Area develops, there will be an opportunity to create a Major Gateway at the corner tying into the GO Station itself and adjacent development. Currently this is the intersection of two streets with rural cross sections (without curb and gutter and sidewalks only on one side). In the future this intersection is envisioned to be one of two main focal points for the station hub area and utilize design excellence to elevate the profile of this area. These roads have been identified for major streetscape improvement as well. The streetscape and gateway improvements should be coordinated.

Future development shall consider the overall urban design intent and vision for the gateway intersection and reflect a human-scale form to improve the pedestrian quality of the streetscape. New development should be oriented close to the street edge and

designed with active frontages such as retail and other entrances for an enhanced sense of place.

**St. Paul Street West and Louth Street:** This is a major intersection within the Secondary Plan Area, as it connects two arterial streets quite close to the Transit Station Area. This intersection includes sidewalks (on all four sides), pedestrian refuge islands and clearly marked crosswalk areas. To develop the St. Catharines GO Station Area into a Transit Hub, the use of public art, iconic features, enhanced lighting, landscaping and tree plantings should be used to elevate this intersection to be a Major Gateway for the area. St. Paul Street West has been identified for major streetscape improvement. Louth Avenue north of St. Paul Street West has been identified for minor streetscape improvement. The streetscape and gateway improvements should be coordinated.

Future development surrounding shall consider the urban design intent of this gateway intersection and reflect a human-scale format to improve the pedestrian quality of the streetscape. New development should be oriented close to the street edge and designed with active frontages such as retail and other entrances for an enhanced sense of place.

### 2.3.2 Minor Gateway Improvement Areas

Minor gateway improvements should include a smaller scale of public realm enhancements, such as landscaping, public art, lighting and appropriately scaled wayfinding cues. The expectation is that Minor Gateway Improvements are for locations that require enhancements to address the public realm at prominent intersections, but would not necessarily imply prominent redevelopment opportunities on adjacent lands. Two minor gateway improvement areas have been identified:

**St. Paul Street West and Henrietta Street:** The Burgoyne Bridge is a key connection to the Downtown core and provides a great opportunity to establish a gateway into the Plan Area. St. Paul Street has been identified for intensification and redevelopment, and the future development should consider the overall urban design intent and vision for this easterly gateway. St. Paul has also been identified as a major streetscape improvement area and all improvements should be coordinated to benefit the overall urban design of this important corridor.

**Louth Street at Crestcombe Road:** The lands to the west of Louth Street between Fourth Avenue and Benfield Drive have been identified as an opportunity for intensification and redevelopment. The intersection of Louth Street at Crestcombe Road provides an opportunity for a northern gateway for the Transit Hub. Louth Street south of this intersection has been identified for streetscape improvements, as it will act as a key connection when accessing the Station Area from the north.

In addition, enhanced landscaping and tree plantings, pedestrian-scaled lighting, street furniture and new public spaces should be considered in these minor gateway improvement areas.

## 2.4 New Public Spaces

Schedule E6/7 - C of the Official Plan identifies one new public space west of Louth Street, south of Fourth Avenue, and east of Vansickle Road within the potential street grid refinement area. As redevelopment occurs on these lands, the need for parkland will be evaluated more specifically.

## 2.5 Public Space Improvements

Schedule E6/7 of the Official Plan identifies three potential public space improvements have been identified within the Secondary Plan Area, as follows:

**Seymour Hannah Sports and Entertainment Centre** (north of St. Paul Street West and west of Louth Street, south of the rail line): This is a District Park and Playfield which has potential to accommodate additional amenities such as outdoor passive gathering spaces, picnic areas, public art and cultural heritage interpretations. Potential location of additional amenities includes south of the skateboard park, adjacent to the Haynes Cemetery or in the vicinity of Kiwanis Field.

**Cameron Park** (north of St. Paul Street West and south of Permilla Street): As a result of the St. Paul Street West bridge reconstruction, access to Great Western Street may be eliminated or reduced to one way. At the time of the bridge re-design the City will consider the reconfiguration of Ambrose Street and Permilla Street in this area, as they relate to their connections to Great Western Street and the station site. As a result of potential closures and reconfigurations in this area, there is an opportunity to enlarge Cameron Park.

It is a priority of the Secondary Plan to see the use of Cameron Park maintained and improved. Any improvements at Cameron Park should improve pedestrian and cyclist connections between St. Paul Street West and the GO Station site, and may include a gateway or plaza component heralding the entrance to the GO Station. Currently a small baseball diamond exists at the park.

Cameron Park shall continue to function as a Neighbourhood Park with additional amenities such as paths, benches, outdoor passive gathering spaces, floral beds, public art and cultural heritage interpretations. Given its proximity to the GO Station site, particular opportunity exists at Cameron Park to develop interpretative and/or signage material related to St. Catharines rail history.

**Trailhead at St. Paul Crescent & Participark Trail:** The GTSSP and Urban Design Guidelines identify active transportation connections throughout the Plan Area and to the Participark Trail. The Participark Trail travels along the west bank of the 12 Mile Creek through the Plan Area and connects over the creek to the Merritt Trail system, at St. Paul Crescent. Although the City does not currently own land in this area besides the public road allowances, a formal trailhead in this location is desirable, with amenities such as benches, shelter, water filling stations, parking and restrooms if feasible. It shall be a priority to improve the effectiveness of signage and wayfinding to this location.

## Chapter 3 Urban Design Guidelines for the Public Realm

The primary existing land uses within the St. Catharines Secondary Plan Area include residential, industrial, institutional and commercial uses. Big box commercial uses dominate along Fourth Avenue and Louth Street. The major employer in the area is THK Rhythm Automotive Canada Limited. Two other major destinations include Ridley College and the Seymour Hannah Sports and Entertainment Centre.

Large surface parking lots, big box retail, vacant and underdeveloped lots and small, poorly defined sidewalks result in an underdeveloped public and private realm that can be improved through implementation of the following key directions.

### 3.1 Boulevard Design

Boulevards are the component of the public right-of-way from building face to street edge (see Figure 2 and Figure 3).

The design of the boulevard must accommodate pedestrian circulation and an attractive public realm. It should support its multi-purpose function; accommodating pedestrian circulation, adequate space for healthy tree growth, plants and other landscaping, bicycle parking, public art, transit shelters, street lighting, signage, street furniture, utilities and adequate space for commercial and social activity.

Within the Plan Area the boulevard width should reflect the character and function of the street. Where insufficient space exists within the right-of-way to achieve the minimum recommended boulevard width (see specific street cross sections), a combination of measures should be explored including setting buildings back at-grade and reduced lane widths.



Figure 2 Boulevard and Street Elements

Development of these zones should adhere to the following guidelines:

### **Frontage and Marketing Zone**

Elements that may be located within this zone include private seating areas, planters, signage<sup>1</sup>, and temporary retail displays. In areas with retail at grade, this zone should be wider to accommodate active at-grade uses.

Elements within the frontage and marketing zone should not impede the pedestrian clearway in any manner.

Overhanging signage and awnings can be installed if they do not impede pedestrian travel in any manner and meet local signage regulations.

### **Pedestrian Clearway Zone**

Pedestrian clearway zones shall have a minimum unobstructed width of 2.0 to 3.0 metres for sidewalks on Louth Street, St. Paul Street West and Ridley Road (where appropriate). Minimum widths for sidewalks on local roads are 1.5 metres and 1.8 metres for sidewalks with curbface.

Pedestrian clearway zones may include demarcated areas along sidewalks where vehicles may encounter pedestrians along their route (i.e. at drive aisles, crosswalks and intersections). In this case the use of accent paving should be followed.

Pedestrian clearway zones should be provided on both sides of the road.

Should be designed to meet all AODA standards and be unobstructed both horizontally and vertically.

Constructed of solid, stable, and textured material, such as concrete.

### **Planting and Furnishing Zone**

The width of the planting and furnishing zone may range between 1.0 to 3.0 metres depending on available space.

The planting and furnishing zone will contain street furniture, street trees, street lighting and other fixed objects.

In hardscaped areas, trees should be planted in continuous tree trenches utilizing soil cells to encourage longevity and viability. Soil cells can be extended under on street parking, multi-use paths and bike facilities where soil volume is critical.

No elements located within the planting and furnishing zone should impede travel

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<sup>1</sup> Sign variance would be needed to locate signage into the road allowance.

within the adjacent pedestrian clearway zone.

The planting and furnishing zone can be hardscaped or softscaped or include a mix of both types of landscaping.

The planting and furnishing zone should be located a minimum of 0.5 metres to a maximum of 1.2 metres from on-street parking.

Snow storage will likely occur in this area and all elements should be designed to accommodate and withstand snow loading.

Tree planting and landscaping should be optimized to provide sun protection and reduce heat island effect.

### **Edge Zone**

Located next to the curb.

Should be a hard surface contiguous with the grade of the planting and furnishing zone.

Should be constructed of durable materials appropriate for snow storage and street cleaning.

Should not overlap with cycling facilities.

May be designed with decorative paving.

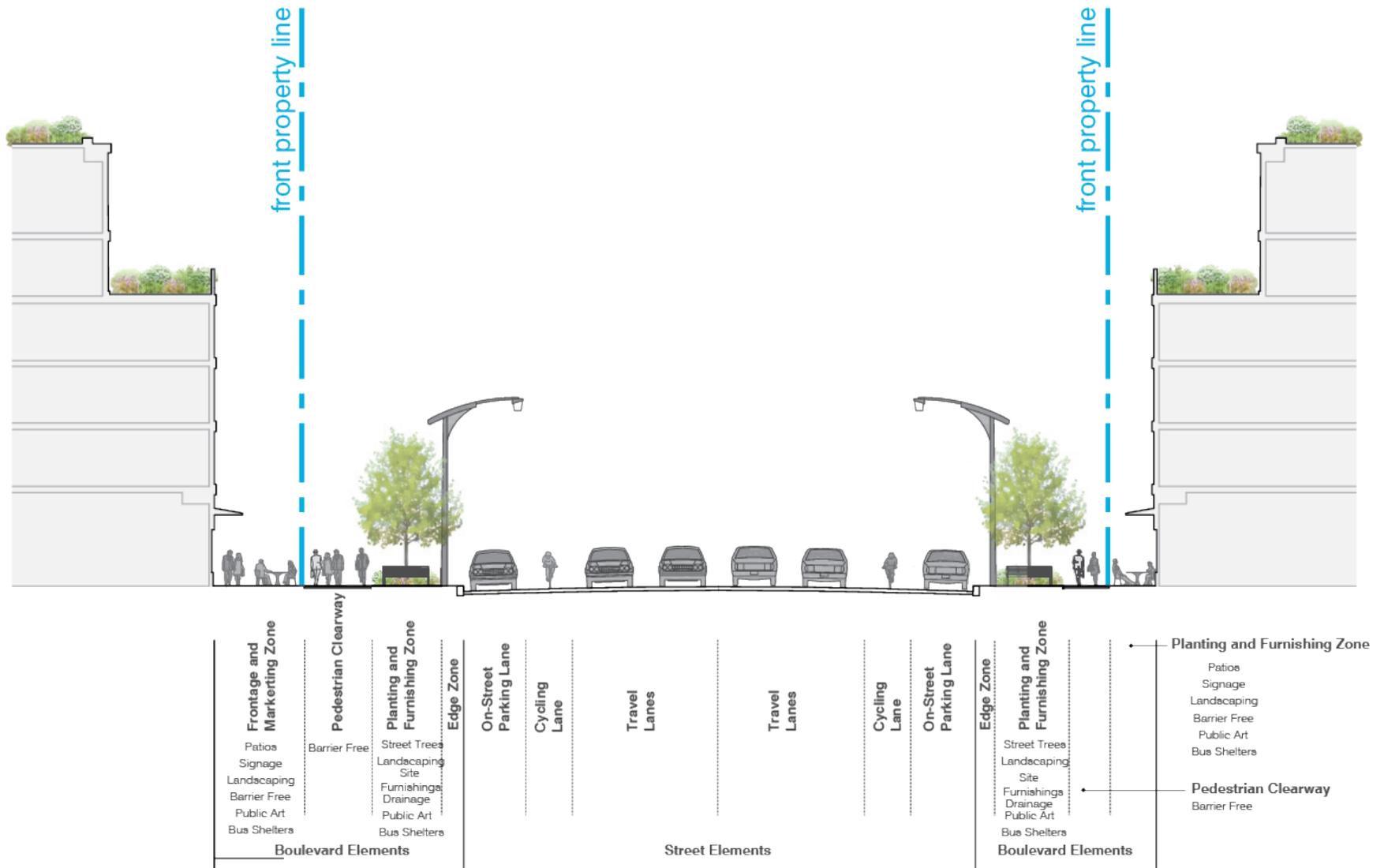


Figure 3 Example of typical street and boulevard elements within general right-of-way.

## 3.2 Cross Sections

### 3.2.1 Ridley Road and Ridley Road West

Ridley Road will be a defining street within the Plan Area shaping the northern boundary of the Transit Station Area. Its proximity to both Ridley College and the GO Station requires that the future design of this street aligns with a mutual vision for the area.

Existing land uses abutting Ridley Road include Low Density Residential uses and Institutional uses in the form of Ridley College. Along Ridley Road West, abutting land uses include Industrial, Business Industrial, Recreation and Open Space, a Natural Open Space System, and some vacant lands about Ridley Road West.

Ridley Road, east of Louth Street, has been envisioned as a key pedestrian corridor and will feature major streetscape improvements to create a high standard of design and improve accessibility for pedestrians, cyclists, and vehicles. A major gateway has been planned at the intersection of Ridley Road and Louth Street to enhance the prominence of the station, and should include appropriate gateway treatments as identified in Section 4.1.1 Gateway Features.

Since 1889 Ridley College has served a unique academic function in St. Catharines. Improving Ridley Road would provide a stronger public presence for the school. Redesign of the street should announce and celebrate the presence of both the adjacent GO Transit Station and Ridley College.

Ridley Road has a planned 20 metre public right-of-way as illustrated on Figure 4. The location of boulevard and street elements should be provided as illustrated. The following includes supportive design recommendations:

- The intersection of Ridley Road and Louth Street should be strongly considered for signage and wayfinding as well as public art.

- GO parking shall be prohibited along the frontage of Ridley Road.

- Public art should reflect the history of Ridley College and St. Catharines as a growing city, adding to the identity and profile of the community.

- Public art should not interfere with the pedestrian clearway zone or vehicular traffic.

Decorative lighting should be considered and used as appropriate.

Decorative lighting should be located within the planting and furnishing zone.

Where appropriate consolidate signage, wayfinding and public art within the decorative lighting pole.

Accommodate a pedestrian clearway / sidewalk of 2.5 metres on both sides of the street.

Accommodate a planting and furnishing and edge zone of 2.5 metres on both sides of the street.

Accommodate vehicle travel lanes of 3.25 metres in both directions.

Accommodate dedicated cycling lanes of 1.5 metres with .25 metre buffers on both sides of the street.

Protect existing mature trees during construction.

A multi-use trail connection is planned between Ridley Road West, at its current terminus, and Louth Street, south of the rail tracks.

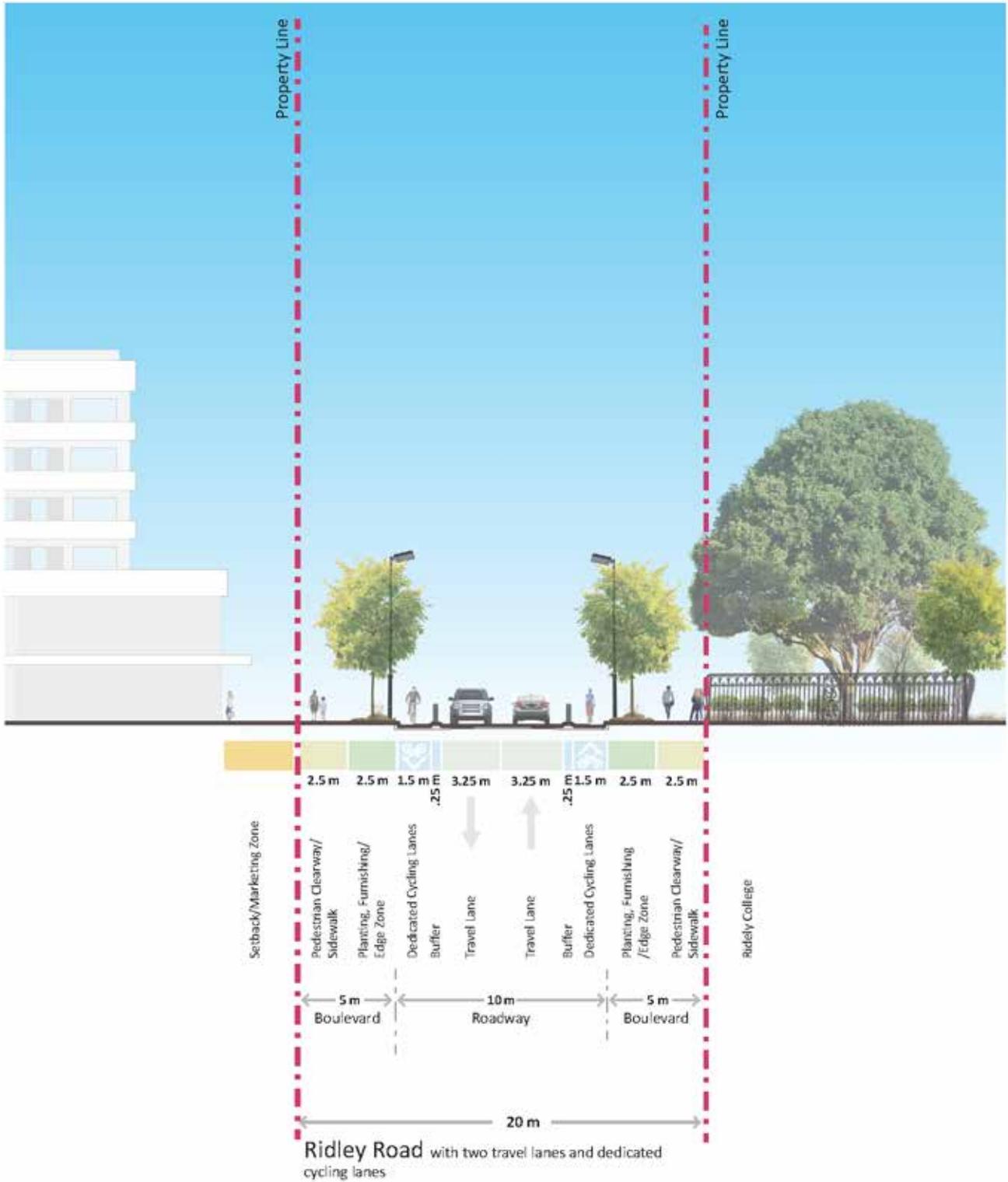


Figure 4 Cross Section - Ridley Road

### 3.2.2 Louth Street

Louth Street defines the western boundary of the Transit Station Area. Louth Street is intended to accommodate significant mixed use development. Currently to the north of St. Paul Street West, transportation modelling shows Louth Street is experiencing maximum vehicle capacity and is in need of streetscape improvements.

Existing land uses abutting Louth Street include Medium Density Residential, Low Density Residential, Institutional, Industrial, Commercial, and vacant land. Future land uses abutting Louth Street as per the Secondary Plan will include a variety of intensities of mixed use, employment uses, and low and medium density residential uses.

Louth Street abuts the Transit Station Area at its intersection with Ridley Road, and intersects with the rail corridor just south of Ridley. Active transportation is accessible along Louth Street north of Crestcombe Road, and south of St. Paul Street West. Future plans for the street include an extension of the active transportation corridor south of Crestcombe Road to St. Paul Street West with the aim to improve overall network connectivity (including bike lanes and pedestrian oriented street design).

Major streetscape improvements have also been planned along Louth Street, between Village Crescent and Ridley Road, and minor streetscape improvements between Ridley Road and St. Paul Street West to improve the character of the street and accessibility for multiple modes of transportation.

Three future gateways have been identified along Louth Street. These include one minor gateway at Crestcombe Road and major gateways at both Ridley Road and St. Paul Street West. Gateway design should adhere to the guidelines identified in Section 2.3. Gateways.

Excluding the frontage and marketing zone, the design of Louth Street is to be accommodated within a 26 metre right-of-way as illustrated on Figure 5. The following provide specific design recommendations for Louth Street:

- Provide a pedestrian clearway / sidewalk of 2.0 metres on both sides of the street;
- All sidewalks should be constructed of brushed concrete and should be barrier-free;
- Provide planting, furnishing, and edge zones of 2.75 metres that include street trees and

other vegetation;

Provide one vehicle travel lane of 3.25 metres in each direction;

Dedicated buffered cycling lanes of 1.5 metres with .25 metre buffers on both sides of the street;

Facilitate pedestrian oriented street design to slow vehicles down and provide safe and attractive pedestrian crossings to access the GO Station; and

Feature paving should be used to delineate areas of pedestrian priority at the Vintage Crescent, Ridley Road and St. Paul Street West intersections.

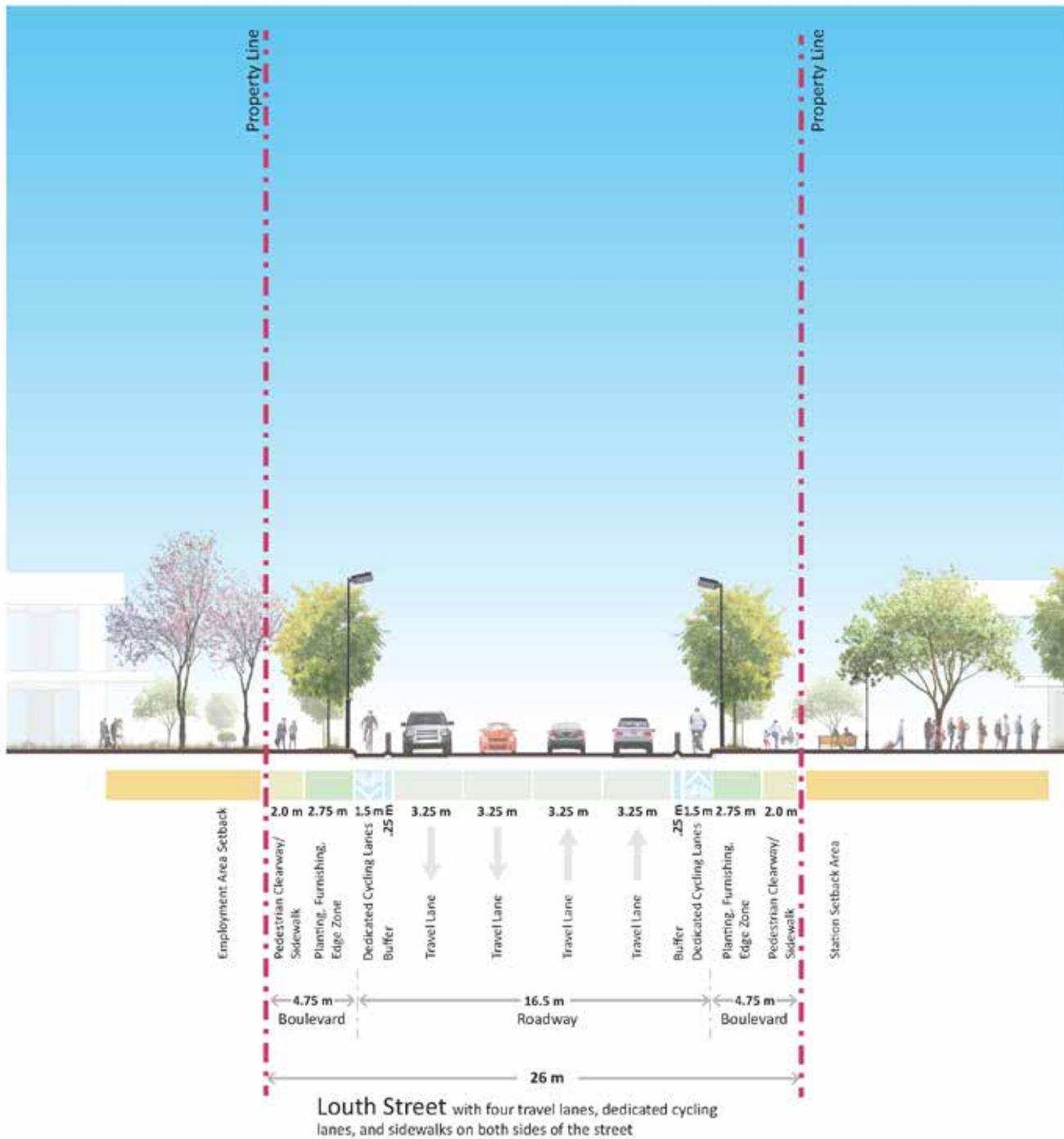


Figure 5 Cross Section - Louth Street

### 3.2.3 St. Paul Street West

St. Paul Street West is a critical street within the Plan Area and a key location for future intensification and urban design improvements. The street defines the southern boundary of the Station Area and intersects with the rail corridor just east of Leeper Street.

Existing land uses abutting St. Paul Street West include Low and Medium Density Residential, Commercial, Business Industrial, Institutional, Recreation and Open Space and the Natural Open Space System. Several vacant lots exist along the street, particularly on the north side of the street, and west of Louth Street.

The future use of this street will support a range of mixed uses, parks, open space and natural areas, as well as low density residential and employment uses to the west.

Major streetscape improvements will occur along St. Paul Street West, between Henrietta Street and Louth Street. New active transportation connections will connect with the existing network, improving accessibility around the Station Area. Cameron Park, along the north side of St. Paul Street West at Great Western Street, is being planned for public space improvements and new pedestrian connections will be required to facilitate pedestrian movement. Two gateway treatments have been envisioned along St. Paul Street West. This includes a minor gateway at Henrietta Street and a major gateway at Louth Street. These gateways should follow the guidelines in Section 2.3 Gateways.

Excluding the frontage and marketing zone, redevelopment of St. Paul Street West (east of the rail overpass) will occur within a 26 metre public right-of-way, as illustrated on Figure 6. The following text provides specific design recommendations for the redevelopment of the street:

- Provide pedestrian clearways /sidewalks of 2.0 metres on both sides of the street.

- All sidewalks should be constructed of brushed concrete and should be barrier-free.

- Provide a planting and furnishing and edge zone of 1.5 metres on both sides of the street.

- Provide one vehicle travel lane of 3.25 metres in each direction.

- Provide dedicated cycling lanes of 1.5 metres with .25 metre buffers on both sides of the street.

Use signs and symbol markings for cycling facilities as per the Transportation Association of Canada (TAC) Bikeway Traffic Control Guidelines for Canada and OTM Book 5, 11 and 18.

Feature paving should be used to delineate areas of pedestrian priority at the Henrietta Street and Louth Street intersections.

Provide space for on-street parking.

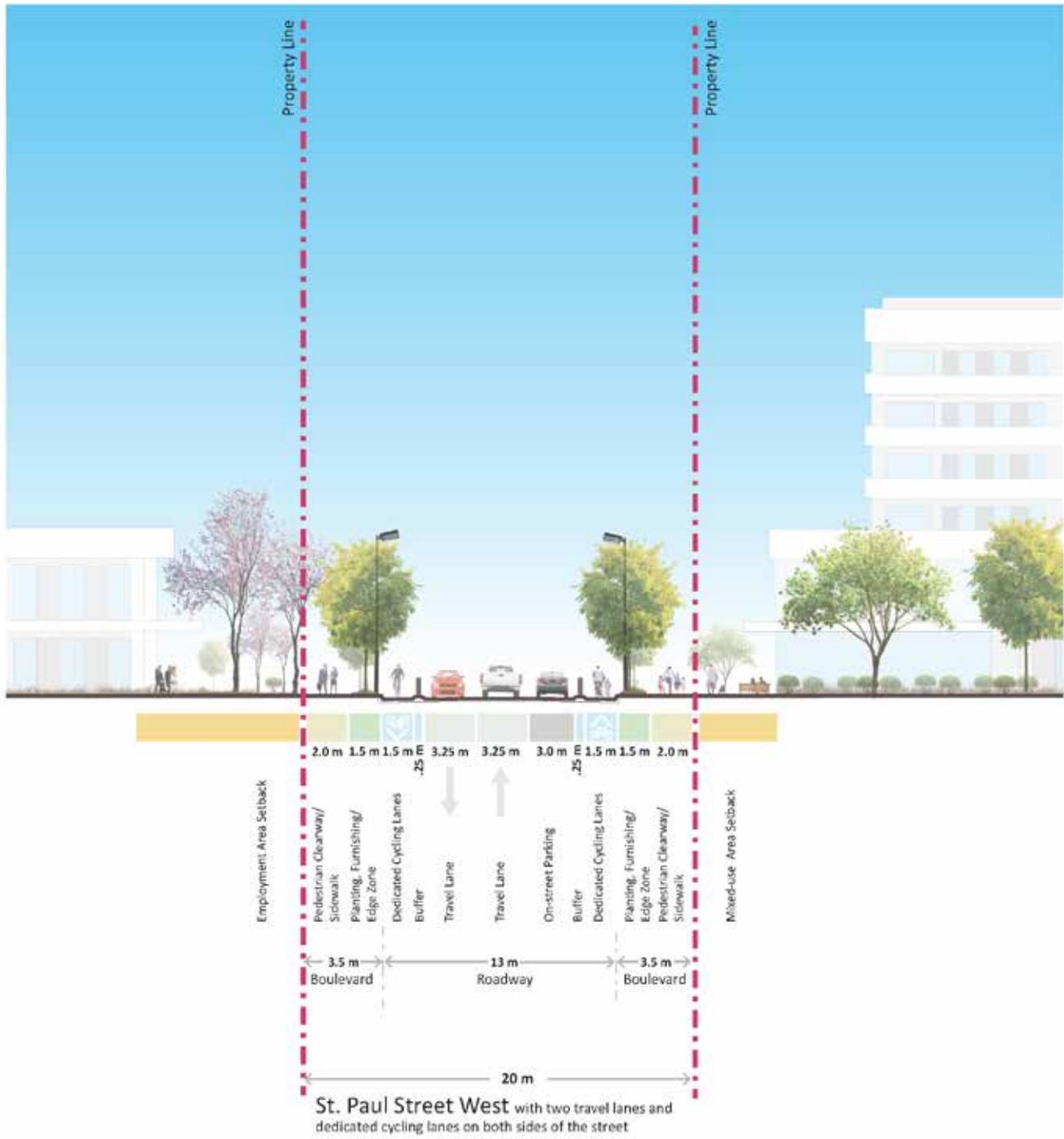


Figure 6 Cross Section - St. Paul Street West

### 3.3 Street Furniture

Street furniture consists of the benches and seats, two-stream waste receptacles, shelters, drinking fountains, weather protection, etc., that provide the setting for resting, sitting and eating and social encounters within the public realm. It is important to properly locate street furniture to not impede pedestrian movement. Preferably street furniture should be located within the Planting and Furnishing Zone (see Section 3.1).

Other guidelines for street furniture include:

The City should select strategic locations for groupings of furniture that would benefit adjacent retail establishments and the public. For example, waste receptacles are appropriate near food establishments and benches are welcome near public spaces and cafes and patios. These locations may include the gateways along Louth Street and St. Paul Street West, as identified on Schedule E6/7 of the Official Plan.

Groupings of benches should be located in new green/park spaces throughout the Plan Area.

Street furniture should be designed with the aim of being accessible (e.g., arms on benches) for all including the disabled and elderly.

Street furniture should be linked together where appropriate to stimulate social encounters.

Pedestrian-scaled lighting.

### 3.4 Public Art

Public art installations can be stand alone or integrated into buildings, street furniture and other infrastructure.

Public art has the capacity to animate public spaces, bringing them to life. Public art can be temporary or permanent. It can reflect an area's natural setting, spirit, unique history or aspirations and can draw attention to universal themes or local, regional, national and global issues. Public art has the ability to inspire thought and reflection, or it can just be fun.

Where provided, the design of public art should:

Be located in high use areas such as public parks, plazas, curb extensions, multi-use paths, etc. These locations could include gateways along Louth Street and St. Paul Street West, potential public space improvement areas north of St. Paul Street West, and the

potential new public space along Vansickle Road, as identified on Schedule E6/7 of the Official Plan.

Limited near forms of traffic control (e.g., stop signs) to minimize driver distractions and sight-line obstructions.

Public art installations should be durable and easily maintained.

### 3.5 Semi-Public Open Spaces

The majority of open spaces within the Plan Area will be semi-public open spaces. Their function will be similar to that of public spaces but the land may be under control of agencies such as Ridley College, Metrolinx or private developers via condominium corporations. Semi-public open spaces should be designed to:

- Provide direct access from adjacent public sidewalks.

- Be visible from active indoor areas.

- Include features (e.g. paving, seating, public art, etc.) constructed of materials equal in quality and appearance to those used in station entrances, main private buildings and nearby public spaces.

- Maximize sun exposure through the location and massing of taller building elements.

- Use hard and soft landscaping materials that are high quality, easily replaceable and low maintenance.

- Select site furnishings (e.g. play equipment, public art, shelters, signage, fencing, etc.).

- Use plant materials that are low maintenance, and pest and disease resistant.

### 3.6 Landscaping

Providing improved landscaping along Ridley Road and within public spaces and semi-public open spaces will help create visual continuity throughout the Plan Area. Trees shall be incorporated into public street design and will frame all streets and pathways, within consideration given to specific contexts. Trees provide shade and comfort and enhance the visual and environmental qualities of the street. To sustain trees, planting should occur in sufficiently deep and wide planting areas backfilled with appropriate soil. Native and disease-resistant species for street trees should be used, wherever possible, to promote long-term growth. Enhanced landscaping will be a priority within areas identified for major and minor streetscape improvements, including St. Paul Street West, Ridley Road, Louth Street, and Ambrose Street, as per Schedule E6/7. The following are general landscaping guidelines that should be adhered to as the Plan Area develops:

To allow for full growth and to ensure their long-term viability street trees should be planted with appropriate soil volume in continuous tree trenches.

Where compaction of planting soil is anticipated, the use of soil cells should be considered.

Only species that are tolerant of urban conditions should be used. Mono-culture planting may, in the case of disease, be entirely lost and is therefore strongly discouraged. Refer to Niagara Peninsula Conservation Authority's Native Plant Guide for information on appropriate native plants, as well as the City's Street Tree Planting List. Plantings should be selected that require little maintenance and do not require the use of pesticides and fertilizers.

Shrub and ground cover planting should be utilized in open tree pits, provided the minimum pedestrian clearway dimension is available.

Careful consideration should be given to the type and location of trees. Higher branching trees should be positioned to ensure there is no interference with truck traffic. Sight lines should also be considered in the location of trees planted at intersections.

Seasonal appeal, especially for the winter months should be considered for all planting. The planting of trees as infill along existing streets where the rhythm of existing trees is interrupted should be implemented.

### **3.7 Low-Impact Development (LID)**

Low-Impact Development is an approach to managing stormwater run-off at the source by replicating natural watershed functions. It uses simple, cost-effective methods to capture, detain and treat stormwater. General guidelines include:

Incorporate LID practices where possible and as appropriate. LID options include:

- Bio-swales or drainage swales;
- Bio-retention planters, units or curb extensions;
- Perforated pipe systems;
- Permeable paving; and
- Pre-cast tree planters or soil cells.

Where possible, replace unnecessarily paved areas with permeable materials (medians, dedicated parking lanes / lay-bys, traffic islands). However, do not use permeable materials within the pedestrian clearway.

## Chapter 4 Urban Design Guidelines for the Private Realm

### 4.1 Site Design

Community design includes the location and orientation of buildings. When sited and designed correctly buildings should enhance the existing character of the street. This can be accomplished through protecting and directing views, providing a consistent street wall and relating buildings to the street and pedestrian activities.

The Plan Area includes significant lands with redevelopment potential. These lands include the following uses:

- Mixed Use between Fourth Avenue, Louth Street, Benfield Drive and Vansickle Road.

- Business Commercial South of Benfield Drive.

- General Employment south of the rail corridor, east of the Plan Area Boundary, north of St. Paul West and west of Vansickle Road.

- General Employment adjacent to the Seymour Hannah Sports and Entertainment Centre.

- Residential north of the Station Area.

- Mixed Use south of St. Paul Street West.

It is important that the design of these sites ensure that buildings contribute to a human scale while providing a fine grained street and block network. Building floor plates should be appropriate to support intensification and innovative employment and tourism uses as well as transit investment.

New buildings within the Plan Area should frame and address the street, while taller buildings and elements will be located to minimize shadow impacts and maximize solar exposure.

#### 4.1.1 Gateway Features

Two major gateways are proposed along Louth Street at the intersections of Ridley Road and St. Paul Street West. The demarcation of gateways are created through the provision of consistent elements such as signage and wayfinding, urban space, hardscaped or landscaped surfaces, public art and appropriate built form to provide orientation and to assist in defining a neighbourhood's distinct character. The design should:

- Create a sense of entrance and arrival, contributing to community image and identity, at

a scale appropriate for the given context. Elements contributing to gateway features and design include: signage and wayfinding, trees and other landscaping, feature lighting, paving, seat walls and public art.

Development at gateways should meet a high standard of design, recognizing their role as a gateway, and be appropriately oriented to the public realm.

#### 4.1.2 Access and Entrances

Vehicular access to on-site parking, loading and servicing facilities should be located from secondary streets and rear lanes wherever possible. Where this is not possible, mid-block access can be considered in instances where:

The driveway is located an appropriate distance from the nearest intersection or side street.

Appropriate spacing between adjacent driveways is maintained resulting in no more than one driveway every 30 metres.

Opportunities to consolidate shared access to minimize curb-cuts are prioritized.

Consideration is provided to contain mid-block driveways within the building massing with additional floors built above.

#### 4.1.3 Parking

As the Plan Area develops a variety of parking solutions will be appropriate to support increased densities. As a general rule, surface parking should be designed to minimize its visual impact and to allow for future intensification as a development site. As such, the layout of parking should consider site access, landscaping and site servicing that will permit the eventual redevelopment of these sites.

#### Surface Parking

Surface parking lots should be divided into smaller “parking courts.” Large areas of uninterrupted surface parking should be avoided.

Surface parking areas should be located at the rear, or side-yard of a building and should not be placed between the front face of a building and the sidewalk.

Driveways to parking should be from rear lanes and side streets wherever possible with adequate lighting and visibility.

Shared parking and shared driveways between adjacent properties are encouraged.

Where multiple access points currently exist, they should be consolidated where

possible.

Where appropriate, permeable paving should be considered to promote drainage. Use planting strips, landscaped traffic islands and/or paving articulation to define vehicle routes that include pedestrian walkways, improve edge conditions and minimize the aesthetic impact of surface conditions.

Distinctive pavement and pavement markings should be used to indicate pedestrian crossings and create an interesting visual identity.

Clear, 1.5 metre (minimum) dedicated pedestrian routes should provide direct connections from parking areas to building entrances.

Pedestrian-scaled lighting should be provided along pathways.

Preferential parking (i.e. accessible parking stalls, bicycles, car-share, energy efficient vehicles) should be located close to building entrances.

Parking along the GO rail tracks should be adequately screened with high-quality landscaping.

Parking on corner lots is discouraged. However, where required, it should be screened by landscaping.

### Landscaping for Parking

High quality landscaping treatments should be used to define site boundaries, provide buffers between adjoining developments, and screen storage and utility areas.

Parking should be screened from the public realm and designed to discourage vandalism and graffiti.

Landscaped parking islands, of at least 3 metres wide, at the end of parking rows and pedestrian connections that contain salt tolerant shade trees are encouraged. Selection of plant materials should consider the following:

- Year-round maintenance;
- Seasonal variety;
- Hardiness and resistance to disease;
- Maintenance requirements; and
- Tolerance of plant materials to salt and urban conditions.

### Bicycle Parking

Bicycle parking should be provided at regular intervals along major roads, other areas of high pedestrian activity and located close to building entrances.

Bicycle parking should not impede pedestrian circulation. Post-and-ring and inverted 'u' parking, constructed of painted or galvanized steel, is preferred as larger units can

impede pedestrian movement and snow clearing.

Bicycle parking and storage facilities should encourage active transportation, including parking at the GO Station, within public parks and open spaces and short term bicycle storage at employment areas.

Provide secure and plentiful bicycle parking at the GO Station entrances.

Provide sheltered bike areas that are integrated with the station design and located in highly visible areas in vicinity of platform access points.

In addition to bicycle racks, bicycle lockers are strongly encouraged especially for large office developments and at the GO Station.

### Structured Parking

Parking lots are to be designed such that as the Plan Area intensifies surface parking lots can transition to structured parking if and when warranted. Structured parking should adhere to the following guidelines.

Integrate above-ground parking structures into the streetscape through active-at grade uses, and attractive facades that animate the streetscape and enhance pedestrian safety.

Where possible, locate structured parking away from public roads.

Locate pedestrian entrances for parking structures adjacent to station entrances, main building entrances, public streets or other highly visible locations.

Screen parking structures from view at sidewalk level through architectural detailing and landscaping.

Incorporate architectural design elements and articulation that breaks up the mass of the structure and reflects the character of the surrounding streetscape including colour and materials.

#### 4.1.4 Storage, Servicing and Loading

Loading docks, outside storage and service areas are to be located in areas of low visibility such as at the side or at the rear of buildings.

Where possible, accommodate garbage storage areas within the building. Where this is not possible, screen outdoor storage areas from public view through an attractive and integrated enclosure.

Outside storage and servicing facilities should be constructed of materials to match or complement the building material.

Service and refuse areas should be designed with a paved, impervious surface asphalt or concrete to minimize the potential for infiltration of human materials.

Loading and service areas may occupy the full rear yard if adequate landscape edge and

buffer treatments are provided.

Service and refuse areas are not to encroach into the exterior side or front-yard set-back.

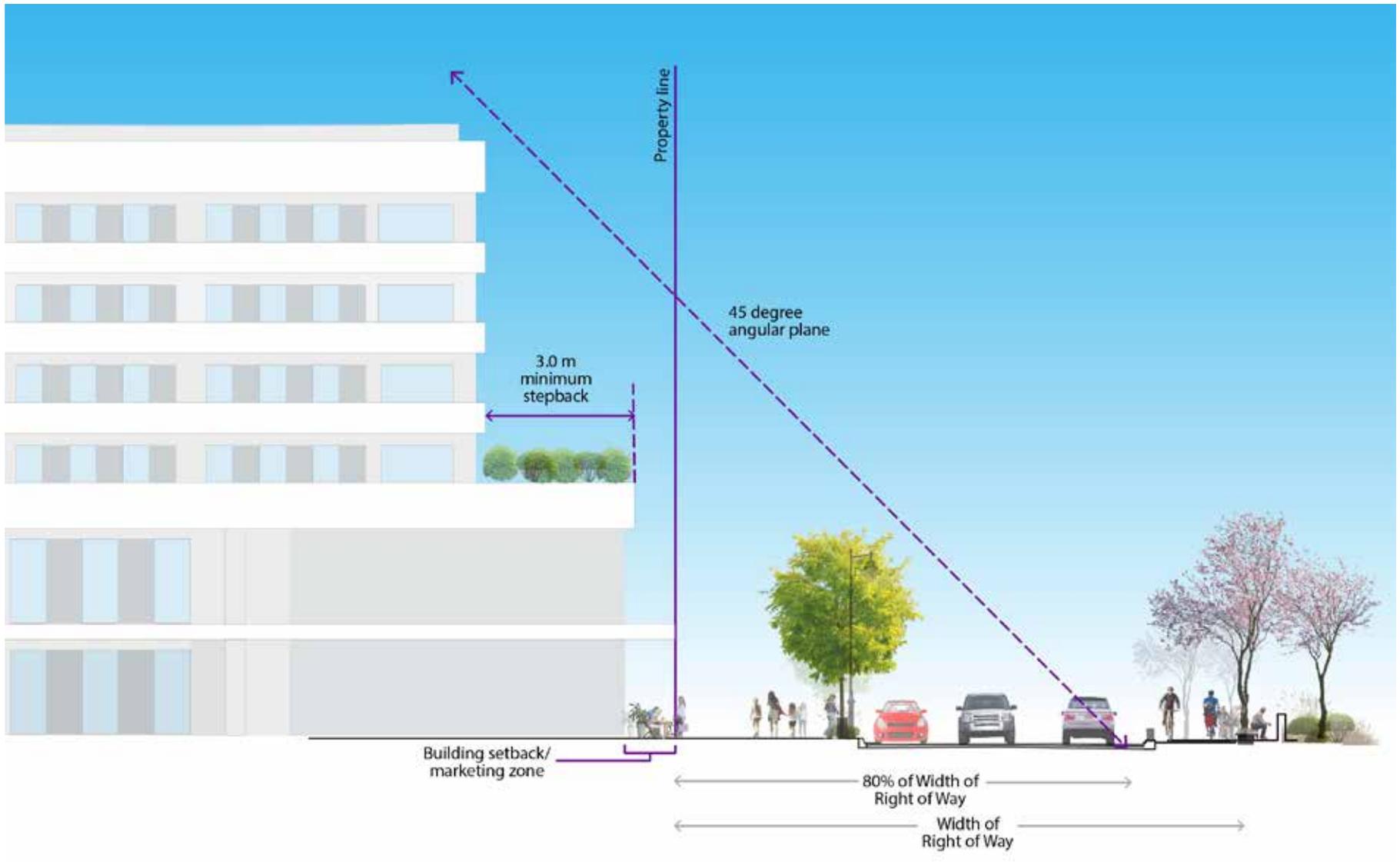


Figure 7 Schematic representation of building setbacks

#### 4.1.5 Front Property Setbacks

To promote more consistent street walls and to create an active streetscape, design should:

Locate buildings at the front property line, or applicable set-back line.

Provide additional setbacks in areas with retail at grade to accommodate a minimum 3.0 metre boulevard width for outdoor display areas, seating and landscaping.

Where street oriented uses have a variety of setbacks, locate new buildings at a setback distance that reflects the average of adjacent buildings. Where existing major commercial streets have large front yard setbacks, redevelopment and intensification should be street oriented with reduced front yard setbacks.

#### 4.1.6 Rear Setbacks and Transitions

Where sites abutting stable residential areas exist the following rear setbacks and transitions are required to minimize shadow and privacy issues on adjacent uses:

Provide a minimum 7.5 metre rear-yard setback from the abutting property line.

Apply a 45-degree angular plane from the abutting property line for sites deeper than 36 metres.

Apply a 45-degree angular plane from a height of 10.5 metres above the 7.5 metre setback line on properties less than 36 metres deep.

#### 4.1.7 Sites Abutting Open Spaces

Where buildings are adjacent to open spaces, apply shadow testing on a case-by-case basis to ensure a minimum of five hours of sunlight per day from spring to fall.

### 4.2 Building Height and Massing

The majority of buildings within the Plan Area will be low to mid-rise with some taller buildings near the intersection of Fourth Avenue and Louth Street/Martindale Road. Given the shorter lot depths along St. Paul Street West and the required transition to stable neighbourhoods, consideration of shadow impacts is necessary. Building heights in these areas should not exceed 22 metres as per Secondary Plan guidance.

#### 4.2.1 Building Design

The potential for taller buildings has primarily been identified north of Benfield Drive, along St. Paul Street West and between the Station Area and Ridley Road.

All new buildings should:

Focus residential mixed-use density, consistent with the Secondary Plan, to support the feasible integration of ground floor retail and amenity spaces.

Generally be located at the front property line to create a continuous streetwall.

Be aligned with street frontages along corner sites.

Minor variations in setbacks are encouraged to facilitate wider boulevards, accommodate public amenity space and create a more interesting streetscape.

Taller buildings (buildings over 17 metres) should have a building base (podium).

Taller buildings (buildings over 17 metres) should step back 3.0 metres above the building base.

An additional stepback should be determined by a 45-degree angular plane applied at a height equivalent to 80 percent of the width of the right-of-way (See Figure 7).

Main building entrances should be directly accessible from the public sidewalk.

The ground floor of all buildings with commercial uses should be 4.5 metres (floor-to-floor height) to accommodate internal servicing and loading, and future conversion to retail (where appropriate).

Maximum building height should generally be no greater than that determined by a 1:1 ratio with the right-of-way width, except where greater heights are identified on Schedule E6/7 - B of the Official Plan.

Create appropriate transitions in built form to existing residential uses.

60 percent of the building frontage on the ground floor and at building base levels should be glazed to allow views of indoor uses and to create visual interest for pedestrians.

Clear glass is preferred over tinted glass to promote the highest level of visibility, and mirrored glass should be avoided at street level.

Balconies should be designed as integral parts of the building, which may include protruding balconies. Balconies should not be designed as an afterthought.

#### 4.2.2 Building Podiums and Stepbacks

A clear building podium, defined by a front stepback, reinforces a consistent streetwall, helps to integrate new development into an existing lower building fabric, and creates a human-scaled building at grade.

Taller buildings (buildings over 17 metres) should have a building base (podium).

As no established streetwall height exists within the Plan Area the height of the podiums should range between 11 and 14 metres.

Achieve a minimum building upper floor stepback of 3.0 metres beyond the podium. In

special circumstances (e.g. to protect views) a setback of 5 metres may be appropriate.

### 4.2.3 Facade Design

The aesthetic qualities of a building's facade are a vital factor in how the public perceives the building and how that building impacts their experience of the street.

Facades facing streets, sidewalks and public open spaces should be composed of large areas of glazing to encourage pedestrian interaction and enhance safety.

Extend finishing materials to all sides of the building, including building projections and mechanical penthouses.

Avoid blank walls, or unfinished materials along property lines, where new developments are adjacent to existing smaller scaled buildings.

Articulate the facades of large buildings to express individual commercial or residential units through distinct architectural detailing, including entrance and window design.

Utilize a design and material quality that is consistent and complementary.

Where lots have frontages on an open space, provide dual facades that address both frontages with an equal level of material quality and articulation.

Emphasize the focal nature of corner buildings through elements such as projections, recesses, special materials, and other architectural details.

Weather protection through architectural details such as vestibules, recessed entrances, covered walkways, canopies and awnings is encouraged.

### 4.2.4 Business Commercial

Business Commercial uses are located south of Benfield Drive and north of the rail corridor.

These buildings should:

Be located to address Benfield Drive, but may incorporate setbacks that provide attractive landscaping and tree-planting.

The principle facades should incorporate large glazed areas and entrances, providing visibility between the building and the street.

Parking should not be located between the principle facade and the adjacent street / sidewalk.

Main entrances should be directly accessible from public sidewalks.

Where possible, shared driveways should be provided.

Open storage should be minimized. Where permitted, it should be screened from public view.

Site design must define a well-organized system of entrances, driveways and parking areas that minimizes conflicts between pedestrians, bicycles and vehicles.

On large, flat roofs, opportunities for green roofs and or patios should be incorporated to create green spaces and usable outdoor amenity areas for employees. Roof top units should be screened from view.

#### 4.2.5 General Employment

General Employment uses are located south of the rail corridor and west of Louth Street.

These buildings should:

Address the street to define a more urban street edge.

The highest quality of building design should be applied to the building facades facing the public street or open space.

Corner buildings should address both street frontages.

Minimum amounts of parking should be located in the front yard.

Where large parking fields are necessary, landscape elements should be introduced to break up large asphalt areas and identify pedestrian access to buildings.

Outdoor storage should generally not be visible from the public street or open space.

Where outdoor storage is required, it should be screened with fencing and/or landscaping.

#### 4.2.6 Commercial Plazas

Buildings should be organized to define and frame abutting streets, internal drive aisles, sidewalks, parking and amenity spaces. Buildings may thus require multiple active façades and entrances.

Building setbacks should be reduced to minimize distances between building entrances and abutting public street sidewalks.

The large format 'super block' should be broken into functionally and visually smaller units by internal drive aisles, a network of connected walkways, and landscaping.

The objective of infill development is to provide a strong street edge and frame main entries and drive aisles.

Where infill development is situated immediately adjacent to or between existing buildings, the new buildings should respond to the existing buildings through appropriate transitional treatments.

Appropriate design treatments include matching cornice lines, continuing a colonnade, using similar materials, and similar building proportions.

Infill development may be mixed use and should be at least 2 storeys in height to enable, for example, residential units above street related commercial uses.

Bicycle parking should be provided.

### 4.3 Sustainability

Buildings account for approximately 40 percent of greenhouse gas (GHG) emissions in North America. Adopting sustainable practices in building design not only decreases GHG emissions but also lowers operating costs. Key considerations for achieving sustainable building design include:

- Building orientation;
- Sustainable landscape design;
- Urban heat island mitigation;
- Stormwater management;
- Renewable energy;
- Green roofs;
- Building envelope design;
- Natural ventilation;
- Day light design;
- Dark sky design;
- Bird friendly design;
- Waste management; and
- Water use reduction and waste water technologies.

Sustainable objectives and guidelines are included throughout this document with key guidelines outlined below.

#### 4.3.1 Passive Solar Design

The locations of buildings to each other and to open spaces influences the amount of energy they consume as well as comfort and quality of interior and exterior spaces.

New development within the Plan Area should be massed to maximize opportunities for access to natural light and heating, cooling, security and views. Building design should analyze site characteristics and address existing conditions. For example:

Intended uses within buildings should be arranged to make the best use of natural conditions.

The following climatic conditions should be analyzed when designing block layout, buildings and open spaces:

Solar loss and gain;  
Temperature;  
Air quality;

Wind conditions  
Cloud cover; and  
Precipitation.

Within new developments, residential uses should maximize indirect natural light.

Within new developments, retail or office uses that employ heat-producing machinery should face north.

Trees and vegetation, operable windows, treated glass, roof coverings and other building elements should be selected to take advantage of natural means of regulating interior temperature, lighting and other environmental variables.

#### 4.3.2 Energy Efficiency

As mentioned earlier, buildings use a significant amount of energy and contribute to the production of GHG. Reducing energy use in buildings is therefore an important strategy to reduce the environmental impact of urban development.

Design should utilize life-cycle cost analysis to take long term energy costs into account. This will lead to adjustments in the orientation of buildings and the configuration of internal space to make the best use of natural processes to control interior environmental variables.

Life-cycle cost analysis should be used to evaluate mechanical, electrical and plumbing systems.

Buildings and windows should be oriented and designed to optimize natural means of heating, cooling, ventilating and lighting interior spaces.

Street and pedestrian-scaled lighting systems should incorporate LED technology to reduce energy and maintenance demand.

Development proposals are encouraged to explore the potential use of geothermal technology to reduce grid energy dependency.

Inventories of all plumbing fixtures and equipment, as well as all heating, ventilation and air conditioning systems, should be summarized in building packages as well as a strategy for minimizing water demand.

Canada Mortgage and Housing Corporation standards and design guidelines should be implemented and exceeded where appropriate.

Buildings should consume energy at a rate that is at least 10 percent lower than specified by the Commercial Building Incentive Program (CBIP) administered by Natural Resources Canada.

## Chapter 5 Design Integration

The transformation of the Plan Area into a vibrant, transit supportive community will be measured by transit ridership, the number of people on the streets, the vitality of new businesses, a more urban built form for new industrial and office commercial buildings, and an improved public realm.

The successful design of buildings, streets and open spaces will be reinforced by new comfortable, welcoming, weather protected and accessible connections between buildings that promote an inviting community atmosphere.

The guidelines in this section outline key considerations to support development of accessible and comfortable communities.

### 5.1 Accessibility

Complete communities are accessible for all residents. While this includes ensuring residents have access to jobs and transit, it also includes designing buildings and public spaces that allow for ease of movement for people of all ages and abilities.

A key to providing a high quality public realm is making it accessible to all people. The guidelines and requirements in the following documents provide more detailed information with respect to creating and promoting accessible environments and should be referred to in the design of all public and private spaces:

Ontario Building Code

Accessibility for Ontarians with Disabilities Act

Principles of Universal Design

As well, recent changes to the Planning Act enable the City to secure facilities designed to have regard for accessibility for persons with disabilities through Site Plan Control.

### 5.2 Crime Prevention Through Environmental Design

All publicly accessible areas, including streetscapes, parks, parkettes, mid-block connections, forecourts and patios, should conform to the provisions recommended through CPTED

(Crime Prevention Through Environmental Design). The application of CPTED principles should address items such as:

Providing clear views to sidewalks and public areas.

Taking advantage of passing traffic surveillance as a deterrent for unwanted activities.

Identifying point of entry locations.

Placing amenities such as seating and lighting in areas where positive activities are desired and expected.

### 5.3 Microclimate and Shadows

The design of buildings should be informed by their context including their impact on adjacent properties.

The design of buildings within the Plan Area will be informed by shade and micro-climatic studies that examine wind mitigation, solar access and shadow impacts on adjacent streets, open spaces, buildings and associated properties.

Building massing should allow ample sunlight to penetrate to the sidewalk and adjacent public spaces, and should mitigate the impact of high winds to support pedestrian comfort.

Where existing and future open spaces are adjacent to development sites, the scale of development will be restricted as determined through wind and shadow studies.

Building and site design should provide semi-weather protected spaces that blend indoor and outdoor uses including deep canopies, overhangs, sheltered terraces, roof terraces, courtyards, forecourts and/or gardens that optimize active use throughout the year.

Buildings over 17 metres in height will incorporate step backs to mitigate the perception of building height from the surrounding areas.

Shadow studies for blocks and individual buildings should be undertaken on the equinoxes and solstices.