

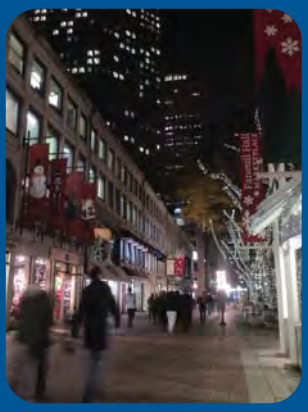




City-Wide Streetscape Implementation Manual and Financial Strategy

For Intensification Areas and Heritage Conservation Districts

VAUGHAN

November 2014

EDA
Collaborative Inc.

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Acknowledgements

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Planning
Development Planning
Urban Design and Cultural Heritage

Engineering and Public Works
Engineering Services
Public Works
Development Transportation
Parks Operations and Forestry

Finance
Development Finance & Investments
Budgeting and Financial Planning

Stakeholders
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EDA Collaborative Inc.

With Input From
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Planning Solutions Inc.
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SWEETDIRECT
SWEETDIRECT

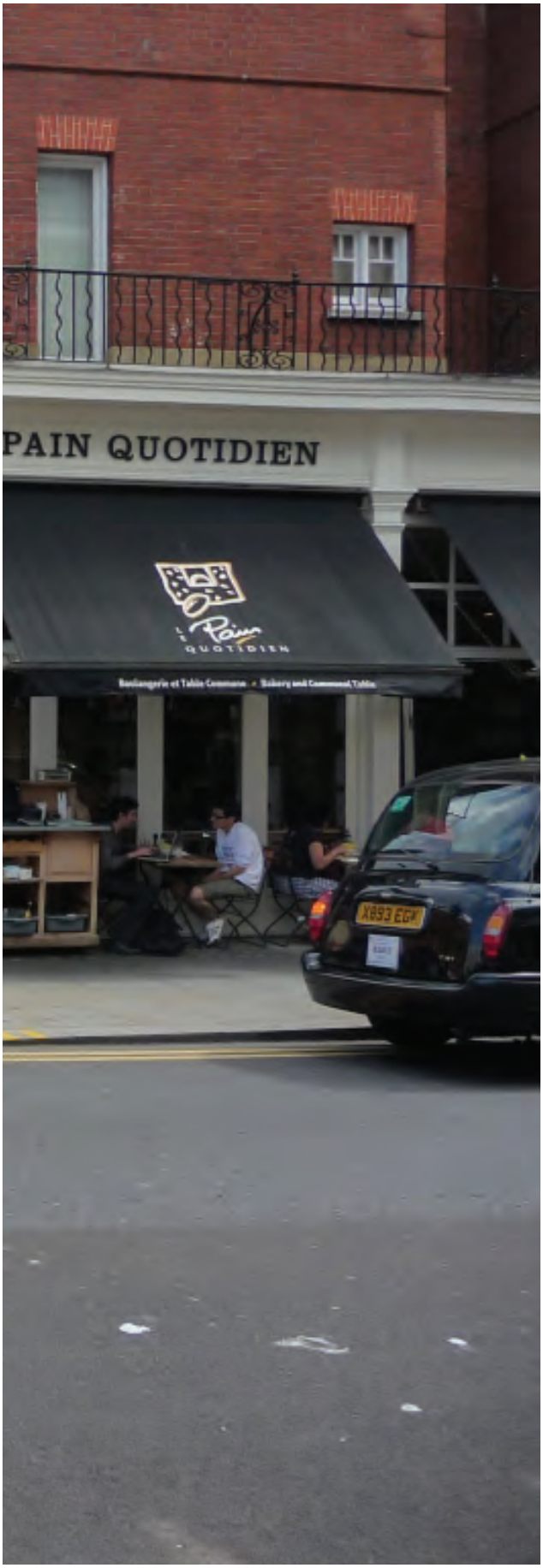

Table of Contents

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1

INTRODUCTION


30

Introduction

"A Complete Street is designed for all ages, abilities, and modes of travel. On Complete Streets, safe and comfortable access for pedestrians, bicycles, transit users and the mobility-impaired is not an afterthought, but an integral planning feature."

- Complete Streets for Canada

Vaughan is in the midst of an exciting and transformative era of the City's development with rapid urbanization and expansion of public transit. The City's Official Plan includes the designation of Intensification Areas and Heritage Conservation Districts. The appearance and character of streets in these areas will play a large part in determining the overall quality and livability of our city.

The streetscape standard for our emerging urban areas and established Heritage Conservation Districts must be oriented towards active transportation and be financially sustainable to advance the goals outlined in the Official Plan:

- Strong and Diverse Communities
- A Robust and Prominent Countryside
- A Diverse Economy
- A Vibrant and Thriving Downtown
- Moving Around without a Car
- Design Excellence and Memorable Places
- A Green and Sustainable City
- Directing Growth to Appropriate Locations

Complete Streets are designed to support active transportation, the environment, commerce, culture, and every day life for people of all ages and abilities. The limits of the defined "streetscape" for the purpose of this manual are from curb to building frontage. However, it is important to note that for the design of a Complete Street, the City will consider the street as a whole in order to effectively capture all considerations and opportunities.

While the transformation will be incremental and extend over many years, this manual provides an excellent opportunity for Vaughan to show its commitment to the development of a great public realm. It is the aim of the City-Wide Streetscape Implementation Manual and Financial Strategy to be a tool to help guide streetscape development and investment while outlining a consistent and comprehensive approach to streetscape design.

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2

PURPOSE

Purpose

The Streetscape Manual aims to be flexible and encourage innovative design.

The City-Wide Streetscape Implementation Manual and Financial Strategy (Streetscape Manual) provides an integrated design and financial framework to manage the design and costing of streetscapes in Intensification Areas and Heritage Conservation Districts in the City of Vaughan.

The Streetscape Manual is a reference tool developed to guide the design and construction of urban streetscapes in Vaughan with consideration of maintenance and operations. The Manual emphasizes the design of the pedestrian realm in an urban context.

Support Active Transportation

The manual aims to develop streetscapes which are alive with all modes of active transportation (walking, cycling and transit) to support happy and healthy lifestyles. Incorporating facilities and amenities to support active transportation modes is an important consideration in the design of the streetscape. For example, locating bike parking at nodes and key locations within the amenity zone; providing a comfortable pedestrian realm through the use of trees for shade, seating, waste and recycling receptacles, and streetscape planters for protection from the vehicular roadway; and, strategically locating transit shelters to allow for adequate pedestrian circulation and access.

Provide and Maintain a Consistent Quality of Design

The Vaughan City-Wide Streetscape Implementation Manual is a design guide that incorporates current best practices in streetscape design. The manual also outlines a process for city staff and developers to ensure there is a common understanding and facilitated transition between master planning and detailed design.

Design Appropriate Streets to Context

The manual provides guidance to ensure that the appropriate design solution is applied to the streetscape context. As Vaughan transitions from suburban areas to urban intensification areas, the manual serves as a guide to ensure that the existing suburban streetscape standard is not simply transferred to new intensified urban areas. A new urban streetscape standard has been created through this Study to leverage opportunities for streetscapes in Intensification Areas and Heritage Conservation Districts. In Heritage Conservation Districts, streets are designed to respect and complement the identified character of the district as described in the Heritage Conservation District Plan. As public spaces, streets contribute to the contemporary economic, cultural and social life of the District.

Support City Building

City building is a combination of social, environmental, cultural and economic factors. The implementation manual provides a framework to consider all four factors in streetscape design to ensure informed decisions by decision makers.

Inform Budgeting and Financial Resources

The Financial Strategy combines context, design and cost together to forecast potential financial commitments and consider potential funding.

Where does this apply

The Vaughan City-Wide Streetscape Implementation Manual applies to all Intensification Areas and Heritage Conservation Districts in Vaughan.

Intensification Areas

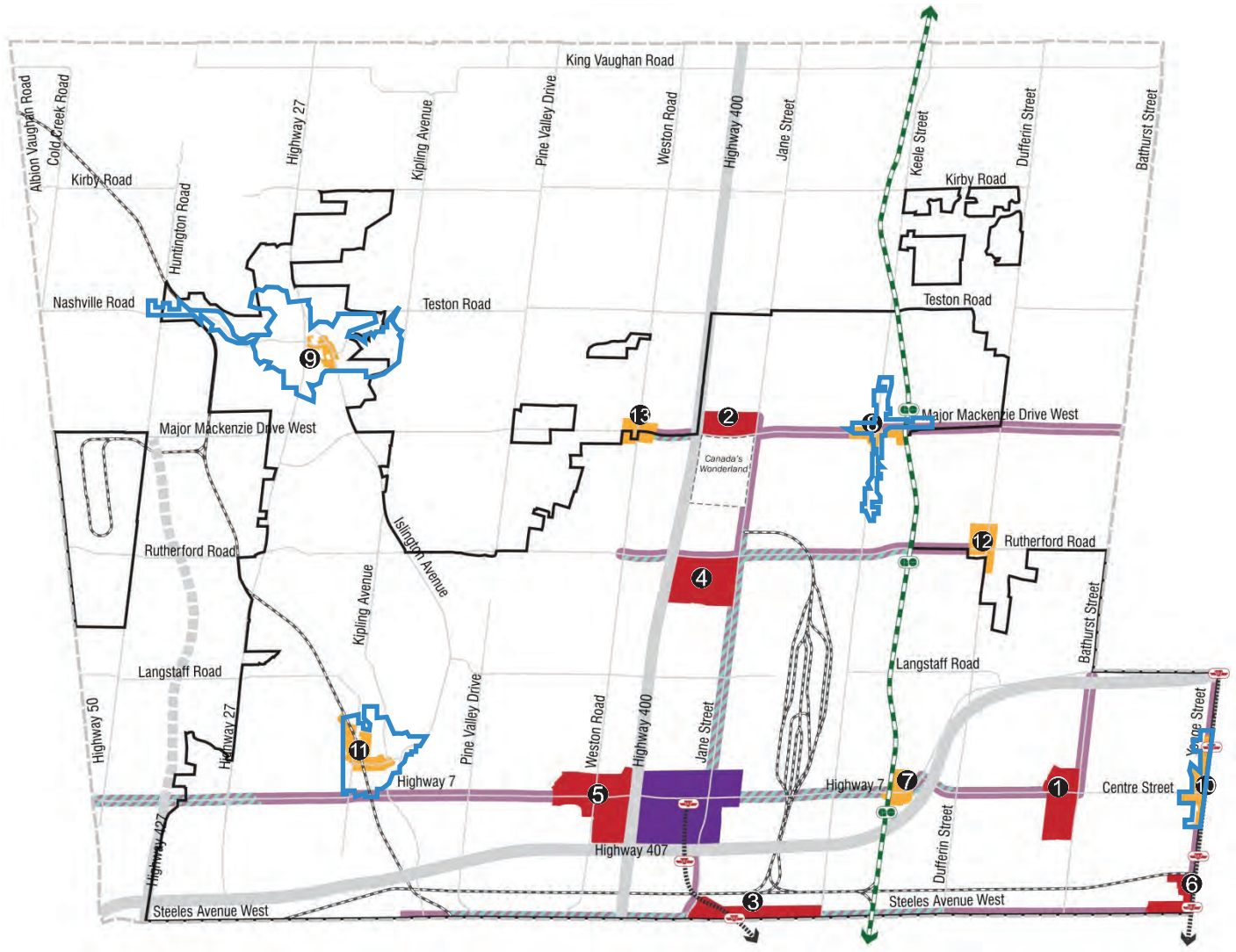
The City of Vaughan Official Plan directs growth to appropriate areas that can support it, including the promotion of Intensification Areas in the city. The Intensification Areas are classified as the Vaughan Metropolitan Centre, Primary Centres, Local Centres and Primary Intensification Corridors.

Heritage Conservation Districts

Vaughan's Heritage Conservation Districts include the historic villages of Kleinburg-Nashville, Maple, Woodbridge and Thornhill. The Official Plan recognizes and conserves cultural heritage resources and promotes the maintenance and development of an appropriate setting within, around and adjacent to all such resources.

Heritage Conservation Districts are established to conserve existing heritage resources and streetscapes and guide future development. The social, environmental and economic benefits of the streetscapes and character of a Heritage Conservation District are greater than any single heritage building. For this reason, Heritage Conservation Districts are distinct from other areas in Vaughan and seek to attract citizens and visitors to live, work, and recreate.

The role of the streetscape in a Heritage Conservation District is to support landscape and built form character, support viable social and economic use, and to increase awareness of the cultural heritage and its significance.



Vaughan Metropolitan Centre	Primary Centres	Local Centres	Primary Intensification Corridors
	1 Bathurst & Centre St. 2 Jane St. Major Mackenzie Dr. 3 Steeles West 4 Vaughan Mills 5 Weston Rd. & Highway 7 6 Yonge St. & Steeles Ave.	7 Concord Centre 8 Historic Maple Village 9 Historic Kleinburg Village 10 Historic Thornhill Village 11 Historic Woodbridge Village 12 Carrville Centre 13 Vellore Centre	Regional: • Highway 7/Centre Street/ Bathurst Street • Yonge Local: • Jane Street • Major Mackenzie Drive • Rutherford Road • Steeles Avenue

Figure 2.1: Intensification Areas
City of Vaughan Official Plan 2010 (as approved February 3, 2014)

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3

THE ROLE OF STREETS IN A CITY


PEDESTRIAN
ZONE
Sat 10am - 7pm
Sun & Bank
Holidays
11am - 5pm


PEDESTRIAN
ZONE
Sat 10am - 7pm
Sun & Bank
Holidays
11am - 5pm

The Role of Streets in a City

Streetscapes as Infrastructure

Streets are infrastructure that contain opportunities to serve multiple functions and types of users including public space, pedestrian and bicycle mobility and access, stormwater capture and/or filtration, air quality improvement, temporary or permanent art placement, community character, as well as support for many social and business activities, depending on community priorities.

Street trees and planting are often associated with streetscape beautification. However, street trees and planting have other functions including reducing the heat island effect, stormwater management, creating oxygen, barrier protection from vehicles, and protection for pedestrians from the elements including rain, wind and sun. Ecosystem services provided are closely tied to canopy size and therefore planting conditions and techniques should be considered to promote the growth of trees to maturity.

Streets play a significant role in the vitality, livability and character of a city or neighbourhood. Streets are urban spaces where the daily activities of a city take place. The design of these spaces is an essential element in achieving a vibrant, comfortable and sustainable city.

Streetcapes also provide one of the most essential spaces for public interaction. The comfort of an individual in a space affects their willingness and ability to interact with a fellow individual. Therefore, to foster great communities, the pedestrian experience is paramount.

Community Identity, Wayfinding and Branding
The streetscape is the first public element in forming an individual's impression of a neighbourhood. Streetscapes are imperative in forming the favourable first impression needed to attract and retain residents and businesses.

Growth and Development

Streetscapes support growth in City development. Seven of the eight goals in the Official Plan are supported by Complete Streets including Goal 3: a diverse economy and Goal 4: a vibrant and thriving downtown. The City of Vaughan is an attractive place for private investment, and will enhance its reputation by leaving a memorable impression on individuals. Growth and development in Vaughan is supported by sustainable infrastructure investment.

Economic Development

Benefits of streetscape investment include economic development, enhanced value of surrounding lands, quality of place and city building. Streetscape investment also leads to growth in pedestrian traffic, retail sales, achievable rents and area demand.

Seven goals in the Official Plan are supported by Complete Streets

Planning Efficiency and Consistency

There is a need to clearly define and integrate multidisciplinary streetscape planning, design and financing process. At present, the cost estimates in streetscape master plans can vary widely due to a number of factors, including:

- Assumptions
- Methods
- Components
- Materials
- Unit costs
- No operations and maintenance or life cycle costs included

The varying practices used in the preparation of cost estimates make it difficult to accurately compare and illustrate the financial implications of streetscape projects among one another and as a result, make it difficult to efficiently implement the projects. A consistent approach to streetscapes from a design and finance perspective provides better input into the planning and budget process and thus more efficiency through implementation. The accuracy and consistency of potential future financial commitments, capital, maintenance and replacement better informs the community on what it is able to fund and willing to pay. Additionally, the consistent design process supports a city-wide identity, branding the City of Vaughan to take advantage of economic development opportunities.

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4

POLICY FRAMEWORK


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pür
KICK
ASPARTAME
pür
WINTER GARDEN
FÊTE SES 100 ANS

Policy Framework

Policy at various levels of government cite the need for the public realm to support pedestrian activities and the vital role it plays in healthy and active communities.

Provincial Policy
Healthy, active communities should be promoted by: Planning public streets, spaces and facilities to be safe, meet the needs of pedestrians, foster social interaction and facilitate active transportation and community connectivity (*PPS Policy 1.5.1.a).*

Planning authorities should promote green infrastructure to complement infrastructure ***(****PPS Policy 1.6.2).*

Regional Policy
To require high-quality urban design and pedestrian-friendly communities that provide safety, comfort and mobility so that residents can walk to meet their daily needs (*The Regional Official Plan, Section 3.1 Human Health and Well-Being).*

Municipal Policy
Great cities can all boast of a vibrant public realm. Vaughan is committed to building a truly remarkable public realm throughout the City *(City of Vaughan Official Plan, Elements of a Great City 9.1.1).*

The primary consideration for enhancements to the street network are to support transit and rapid transit, cycling, walking and other alternatives to automobile use (*City of Vaughan Official Plan, Street Construction, Improvements and Maintenance 4.2.1.29).*

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5

PROCESS


DERGROUND

Process

To develop the Vaughan City-Wide Streetscape Implementation Manual in a well-researched manner, the project was divided into three phases.

Phase 1 – Project Assessment of Existing Conditions
Phase 1 focused on defining the existing service level for streetscape maintenance and operations to create a baseline for Vaughan. The baseline was important to understand the true financial implications of streetscape enhancements during the decision making process.

Phase 2 – Research and Conceptual Approach
During Phase 2 it was important to research the possibilities and lessons learned from other municipalities. This ensured that the manual was versatile enough to address a variety of possible future development scenarios. Based upon the research, both a design framework and cost framework were developed. The frameworks were tied together with a design / cost element which lead to a conceptual design and financial strategy. The concept was to create a streetscape design process with a holistic approach.

Phase 3 – Standards, Strategies and Finalization
The final phase was the development of the streetscape manual and finalizing the design and financial strategies. The streetscape manual is a set of best practices for streetscape components building upon the details of the streetscape structure, and design framework.

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6

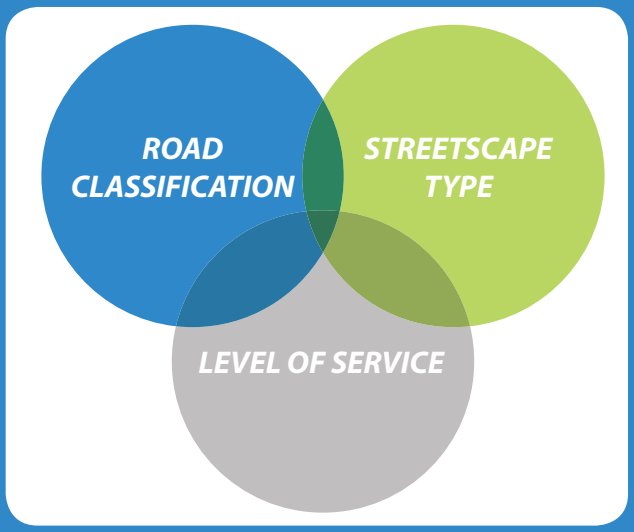
DESIGN STRATEGY


COACH

Design Strategy

Context Sensitive Design

The structuring elements of streetscapes for the City of Vaughan are road classification, streetscape type and level of service. These elements are useful tools for the design of streets that respond both to the local context and the context of the greater regional area. It is important that the streetscape is designed with consideration of the context of the street in the overall street network, the function of the roadway, the functions within the pedestrian boulevard, the adjacent land uses, and the future development of the area.



STRATEGY

6

The Vaughan City-Wide Streetscape Implementation Manual provides two integrated strategies:

- Design Strategy
- Financial Strategy

The integration between the Design Strategy and the Financial Strategy occurs through the level of service concept and allows for design and cost to work together simultaneously. The combination of the design and financial strategies help to create a financial forecast that is holistic in considering both appropriate design for context and cost.

Design Strategy

The Design Strategy provides a framework for a comprehensive and common streetscape language that can be applied in the Intensification Areas and Heritage Conservation Districts. The Design Strategy is a tool and process to ensure that future intensified urban streetscapes in Vaughan are designed to a common standard with respect to context, design and cost. The key elements of the Design Strategy include road classification, streetscape zones, streetscape types and level of service. These elements address concerns of context, appropriate design response, design quality, character and cost. The aim of the Design Strategy is to consolidate the design process so that designers, developers and the City are able to coordinate on streetscape design functionality, appropriateness and quality.

Financial Strategy

The Financial Strategy provides a tool at the early stages of master planning to forecast financial commitments based upon certain assumptions. The Financial Strategy is a combination of three elements: design, phasing and funding, and shares the level of service concept with the design strategy as a common language. The phasing element considers the timing characteristics of individual master plan projects. The funding element deals with financial and funding processes.

A key part of the Financial Strategy and funding element is the financial model. The model is a decision making tool which takes key design information from master plans and the City-Wide Streetscape Design Strategy and translates the information through financial processes to forecast financial commitments and funding. The results of the model allow for designers and the City to adjust master plans at the early stages in response to the financial impact results from the model. The combination of design, phasing and funding inform the financial forecast which can be used to inform Council in the early stages of master plan projects.

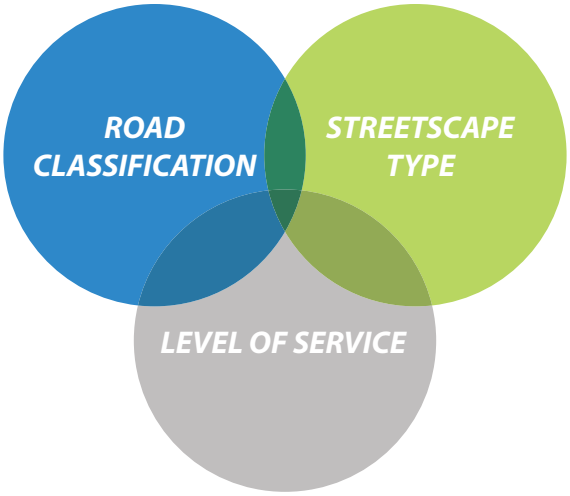


Figure 6.1: Streetscape Structuring Elements

There are three structuring elements to streetscapes in Vaughan:

- Road Classification
- Streetscape Type
- Level of Service

Road classification and the streetscape type define streets in the high level planning and land use planning context. In the past, level of service was associated with the roadway and vehicular traffic, simply considering the ability of a roadway to effectively move traffic flow and meet transportation needs. Complete streets encompass the entire streetscape and all modes of transportation, including equal consideration for cyclists and pedestrians. The Streetscape Manual applies a level of service concept to the pedestrian boulevard design which responds to the context and functional needs of a street for all modes of transportation. For example, on streets with pick-up / drop-off zones the pedestrian boulevard must be designed to safely interface with idle zones, cycle facilities and ensure the safety of the pedestrians from the adjacent land uses. The pedestrian boulevard is designed as the common element connecting adjacent land uses and the roadway while serving the complete street.

The streetscape level of service is focused on the pedestrian boulevard and the pedestrian experience relative to the road classification and streetscape type. With these in mind, level of service goes on to further consider the economic aspect of streetscapes. Capital costs and potential funding for streetscapes are important to understand from an implementation point of view. Even more important is the future year-to-year financial commitment of a municipality for operations and maintenance costs. Consequently, the level of service concept aids as a tool to understand streetscapes from the functional, design and economic perspectives.

It is important to note that cycling infrastructure is an equal and important part of a Complete Street. Because raised cycle tracks and bike lanes are considered part of the roadway design, their details are not detailed in this version of the Streetscape Implementation Manual.

York Region

York Region's Centres and Corridors Program is an integrated approach that combines the planning of urban pedestrian-friendly / walkable and bikable communities with the construction of new rapid transit lines and stations.

York Region is currently developing a Context Sensitive Solutions (CSS) design approach to street design with the following goal: "To create vibrant streets for York Region that provide a range of safe and reliable transportation options while being sensitive to the adjacent land uses and the needs of the community." The Region's CSS Guiding Principles are:

1. Tailor solutions to fit the context
2. Tailor the process to reflect the transitioning role of the road
3. Plan projects in collaboration with the local community
4. Plan for multiple transportation modes to promote sustainable, flexible solutions
5. Use sound professional judgement to determine priorities for the road design

Strategy Decision Making Matrix

As a tool to provide information for more informed decisions, the Vaughan City-Wide Streetscape Implementation Manual identifies important decision points for the City over the process of streetscape implementation. A more detailed decision making matrix can be found in Appendix A.

Master Plan Identification

The decision to go forward with a master plan is a question of commitment. The City needs to decide if the master plan area requires investment in enhanced streetscapes based upon questions such as projected population growth, economic development potential, and whether the area is an Intensification Area or Heritage Conservation District as identified in the Official Plan. Alternatively, Business Improvement Areas may instigate and fund streetscape plans in consultation with the city.

Master Plan Financial Commitments

As a master plan progresses, the City will face the initial questions of capital and maintenance affordability. The level of service concept helps the City to determine what level of design is appropriate and the financial model helps to determine the potential financial commitments.

Funding and Negotiations

To facilitate coordination, it is useful to start negotiations regarding potential funding partners early in the master plan process. Potential partners could include York Region, developers, other municipalities, and transit agencies such as the TTC and vivaNext.

Project Details

Only after some potential certainty of funding and affordability will the detailed design of a streetscape project be undertaken. The detailed design of the project offers an accurate costing based upon an appropriate design decided by the level of service.

Value Engineering

Value engineering is a question of value for investment and efficiency. Are there ways to cut costs while maintaining the integrity of the design?

Proceed to Construction

With knowledge that the financial commitments and design meet the needs of the municipality the City may approve and proceed with the construction.

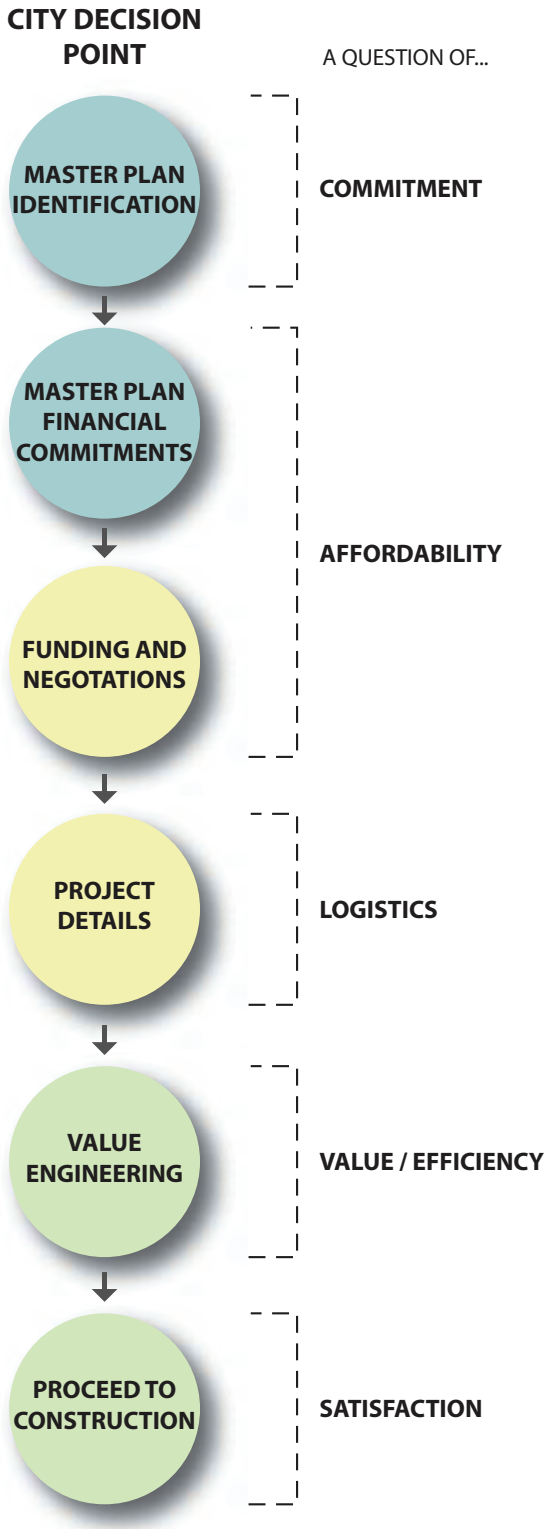


Figure 6.2: Strategy Decision Making Matrix

The Road Classification

Strategy I

The engineering road classification establishes the role of the street in the overall road transportation network of a city and region. The structure of the roadway (for example the number of traffic lanes) has prioritized vehicular functions since the dominance of the automobile from the 1920s and 1930s. Today, there is a movement towards the equal inclusion of cyclists and pedestrians within the right of way given the problems of traffic congestion and pollution. Hand in hand with this shift in attitude is the growing recognition that city streets are public places for people. The function of the roadway plays a large part in the experience of pedestrians in the streetscape. The type and ownership of streets in the overall road classification also affects the potential funding options available.

The function of the roadway plays a part in the experience of pedestrians in the streetscape

Ownership

Streets in Vaughan are either regionally or municipally owned. While most streets are municipally owned, there are examples of streets owned by the Region which play an important part in the overall connectivity of the street network. Major arterials are regionally owned while minor arterials, collectors and local streets are municipally owned. On all roads (including regional roads), the City of Vaughan has jurisdiction over pedestrian sidewalks (the pedestrian clearway).

Road Classification

The road classification in Vaughan is comprised of four types of streets with five sub-categories. These include:

Arterials

- *Major Arterial - Typ. 45 m ROW*
- *Minor Arterial - Typ. 33 - 36 m ROW*

Collectors

- *Special Collector - Typ. 33 m ROW (varies)*
- *Major Collector - Typ. 26 - 33 m ROW*
- *Minor Collector - Typ. 23 - 26 m ROW*

Local Street - Typ. 17.5 - 22 m ROW

Mews - Typ. 15 - 17 m ROW

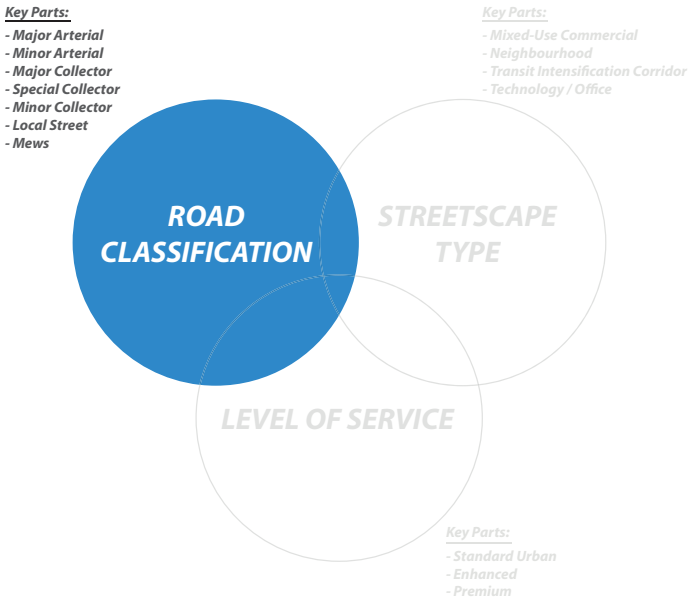


Figure 6.3: Streetscape Structuring Elements - Road Classification

Arterials

Arterials are large streets that focus on the movement of mixed traffic (transit, vehicles, cyclists and pedestrians) at the regional and city-wide scale. These streets facilitate higher traffic speeds for longer trips, regional public transportation, and the transportation of goods. Arterials are subdivided into two categories: major and minor. Major Arterials are owned and operated by York Region. Minor Arterials are municipally-owned.

York Region's is currently developing a Context Sensitive design approach to design to complete street standards and guidelines that are sensitive to the context in which the streets exist. The Region's most urbanized areas, including the City of Vaughan's Urban Intensification Areas, prioritize active transportation and public transit.

Collectors

Collectors are medium-sized municipal streets that connect the arterial street network to the local street network. Collectors are characterized by a balance of vehicular and cycling movement and pedestrian activity. The three categories of Collectors are: Major, Minor and Special. Special Collectors are feature destination streets surrounded by pedestrian activity-generating land uses, and subsequently, greater emphasis is placed on supporting pedestrian, bicycle and transit activity.

Figure 6.4: Typical Arterial Streetscape

Figure 6.5: Typical Collector Streetscape

Local Streets

Local streets are smaller-scale municipal streets with an emphasis on neighborhood activities and connections. Their intimate scale and slower speed is a comfortable and safe place for pedestrians, cyclists and slow vehicle traffic.

Mews

Mews are small-scale streets that may be pedestrian and cycling only, or pedestrian and cycling-oriented streets that accommodate vehicular laneway functions. In the second option, mews can be designed to balance the servicing and parking access functions of a laneway with active building frontage and generous pedestrian space. Mews contribute to fine-grain connectivity for a greater versatility of movement.

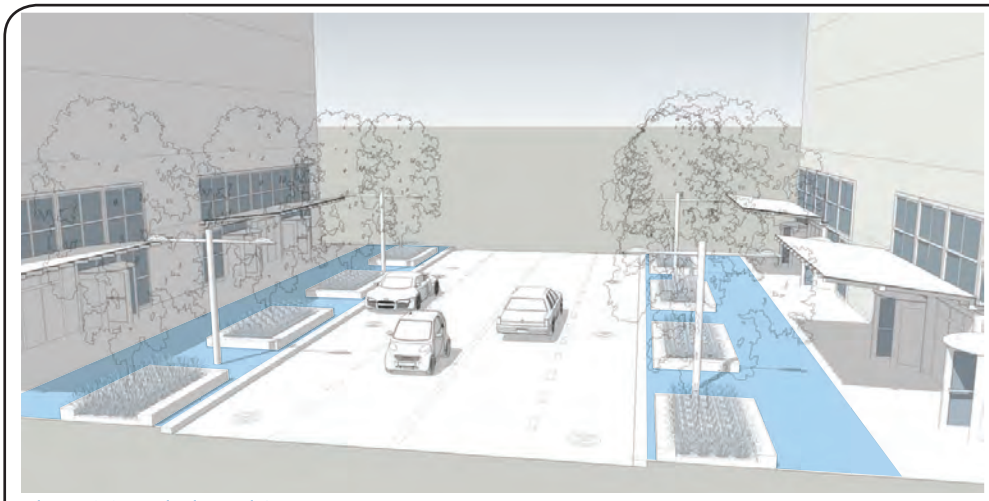


Figure 6.6: Typical Local Streetscape

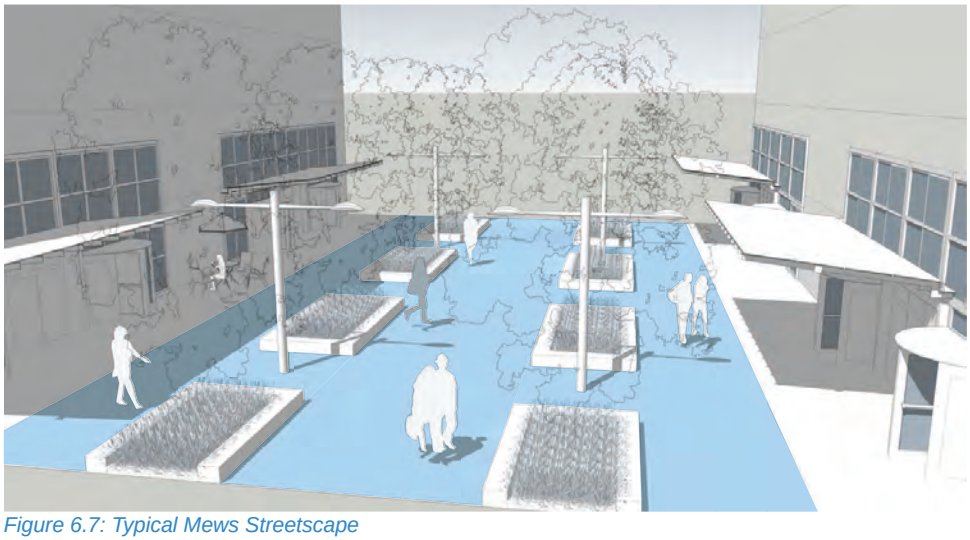


Figure 6.7: Typical Mews Streetscape

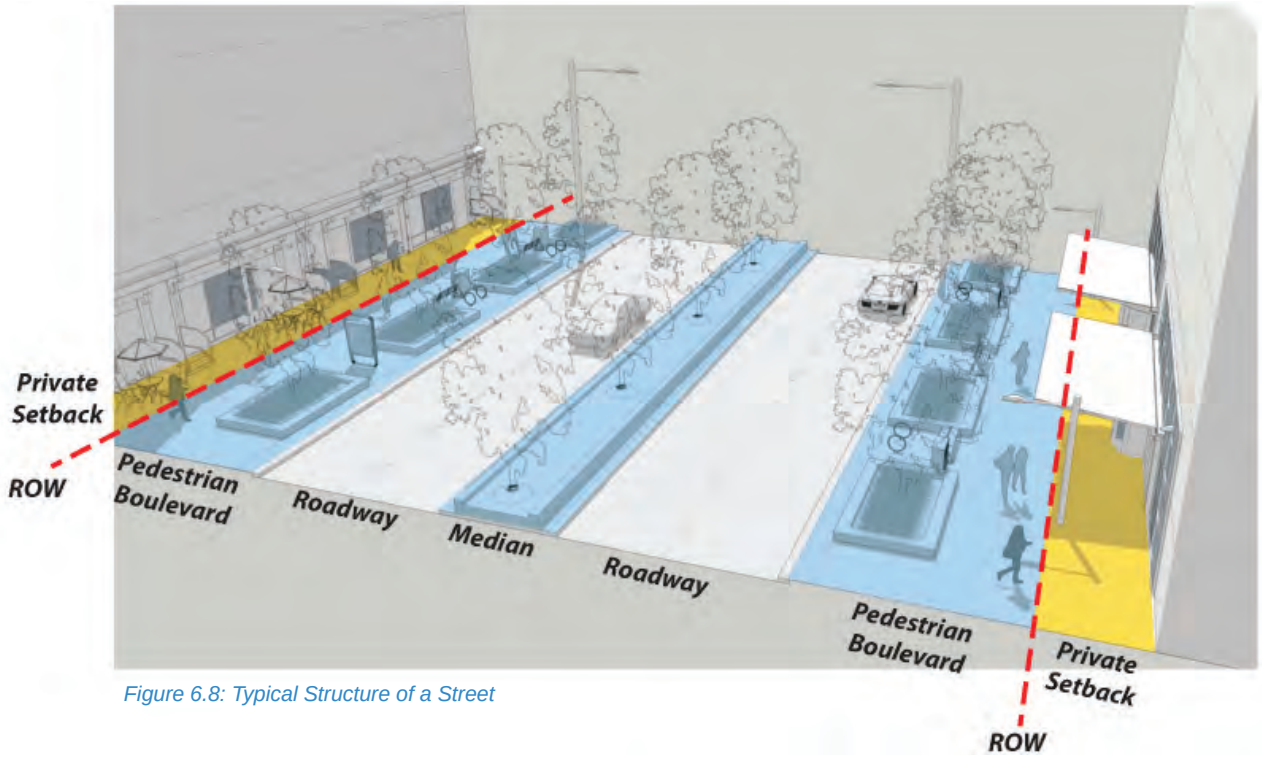


Figure 6.8: Typical Structure of a Street

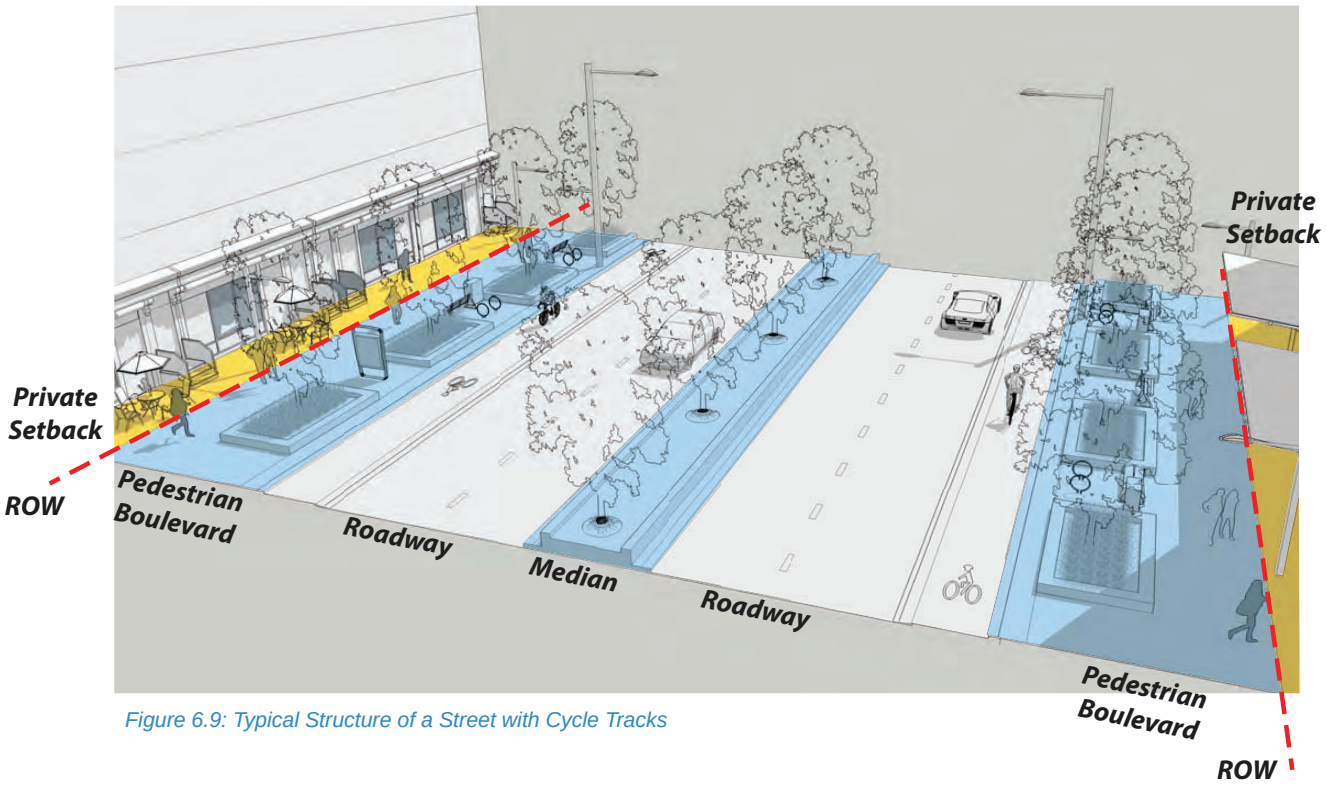


Figure 6.9: Typical Structure of a Street with Cycle Tracks


CHICO'S
NEW STORES

Streetscape Zones

Strategy II

Streetscape Zones

The streetscape can be separated into five zones. The pedestrian boulevard, typically 5.5 – 6.0 m, contains the frontage zone, the pedestrian clearway zone, the amenity zone and the continuity strip. Where applicable, the streetscape can include the median zone as a fifth zone.

It is useful to consider the streetscape in terms of zones for ease of design. Each zone has typical widths and elements in the streetscape with room for change depending on the needs or functions of the streetscape. Typical streetscape elements can be chosen from the Streetscape Component Selection Matrix (see Appendix H) and placed in their appropriate zone. It is recognized that the Streetscape Component Selection Matrix cannot address every potential streetscape component and zone and it is actually encouraged that special and unique components be explored where applicable for communities with unique character and identity such as Heritage Conservation Districts.

Heritage Conservation Districts and area specific design guidelines are examples of special cases where the structure and components of the Streetscape Manual may differ. Other examples include flexible streets or woonerfs where the pedestrian zone extends into the vehicular traffic area requiring special design treatments and considerations. In areas where the right-of-way is constrained, the continuity strip or frontage zone may be excluded. In other cases, where there is more room allowed in the right-of-way, an additional amenity zone or pedestrian clearway zone may be added to accommodate the use of low impact development measures, an additional row of street trees, or a multi-use track. These zones are typical for streetscapes but they ultimately should not limit the designer.

Other special cases include bump outs at lay-by parking which reduce the roadway. The additional space to the pedestrian boulevard should be used as an amenity zone with potential planting and special paving.

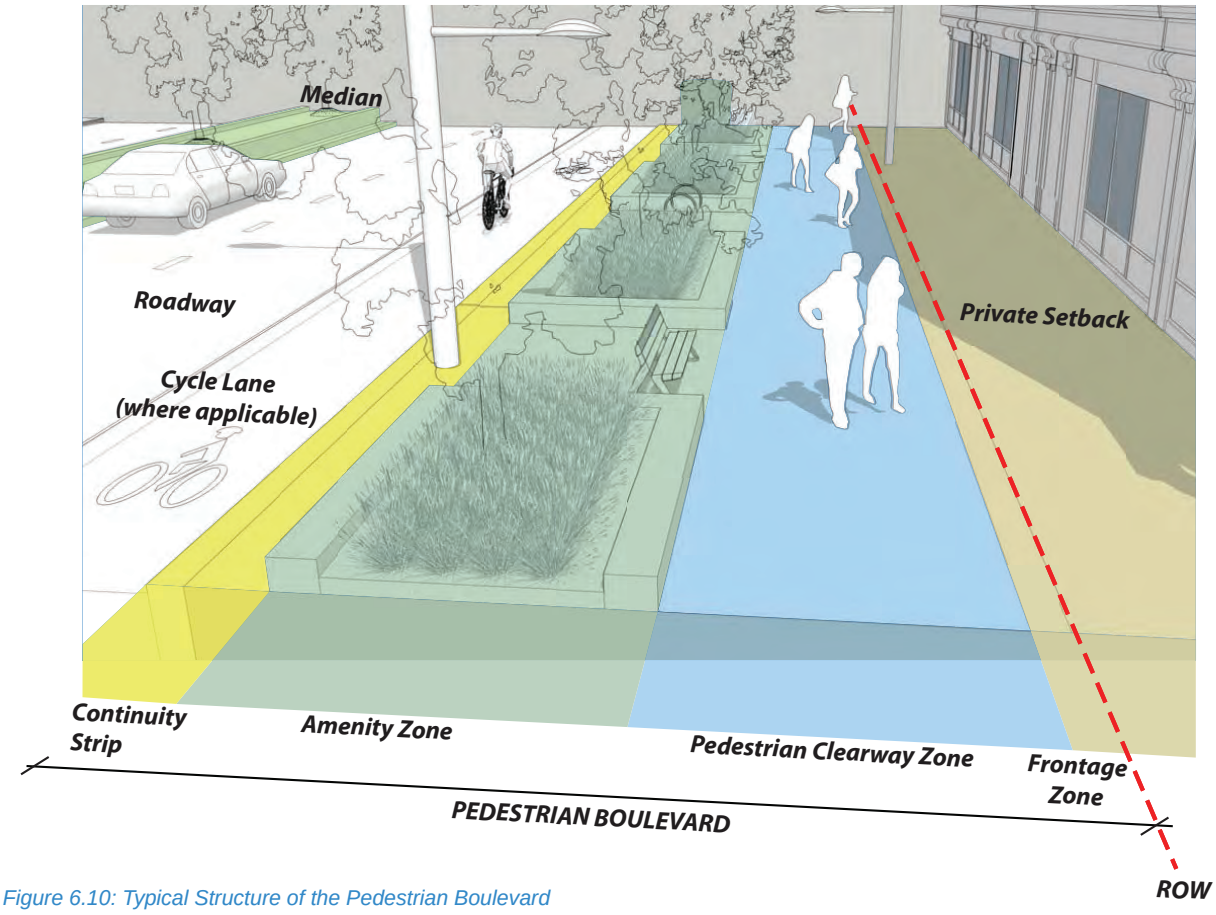


Figure 6.10: Typical Structure of the Pedestrian Boulevard

Seamless Transition across the Frontage Zone

Frontage Zone

Location

The frontage zone is the area between the pedestrian clearway and the street wall.

Description

As the interface between public and private spaces, the frontage zone may be designed as an active zone to encourage seamless movement between the pedestrian sidewalk and building frontage, or landscaped to provide separation and privacy between residential entrances and the street. Hardscape and softscape materials typically utilized include natural stone or concrete unit pavers, poured in place concrete and/or planting.

Function

The frontage zone provides various functions with different material treatments depending on the adjacent land use and space available in the right-of-way. As a semi-transparent barrier for privacy adjacent to residential land use, it may be treated with planting. As an activity or amenity area with street furniture, public art, sidewalk café's and retail displays for typically commercial, retail, restaurant and mixed-uses, the area may be treated with hardscape unit paving, planting, lighting and weather protection.

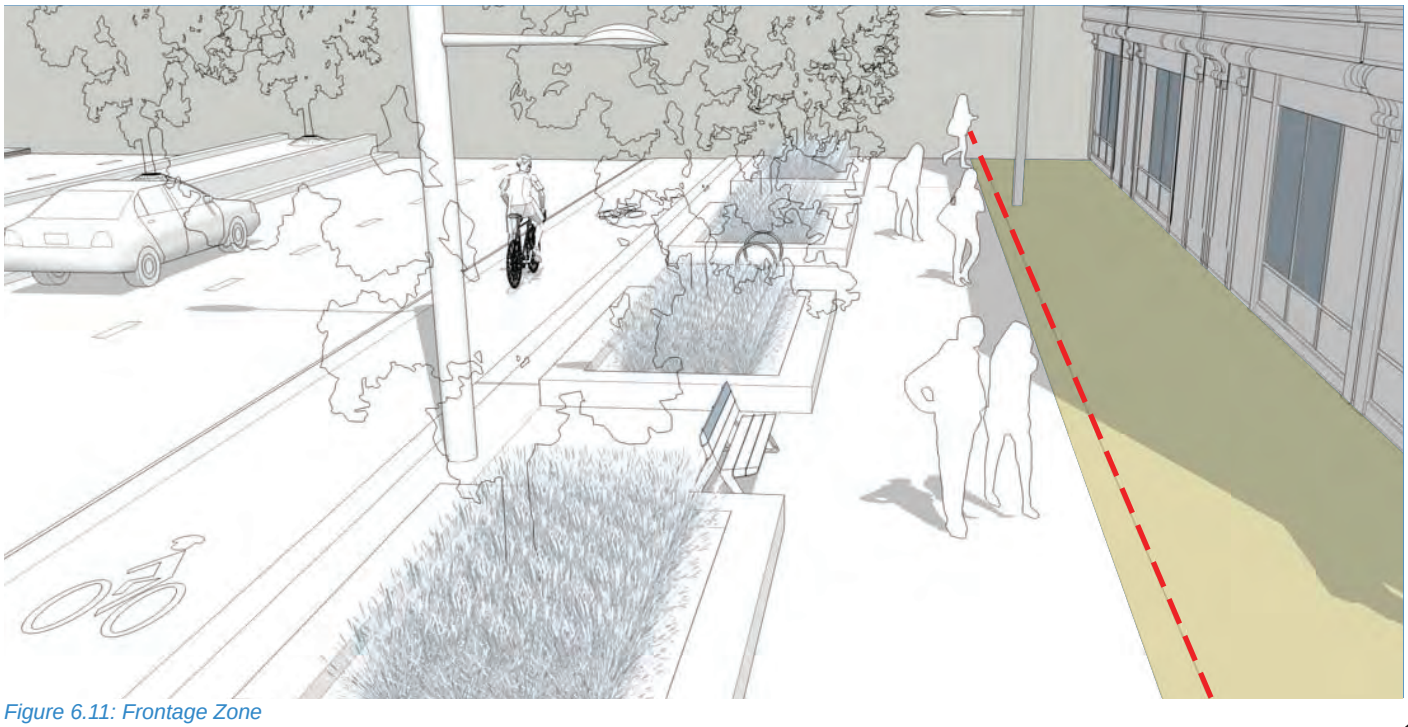


Figure 6.11: Frontage Zone

Pedestrian Clearway Zone

Location

The pedestrian clearway zone is located typically between the amenity zone and the frontage zone.

Description

The main organizing element in the pedestrian boulevard is the pedestrian clearway zone, otherwise known as the sidewalk. The pedestrian clearway zone is typically made up of paving materials such as concrete, unit paving or natural stone.

Function

The function of the pedestrian clearway is to facilitate pedestrian movement and traffic with a path clear of obstructions and obstacles. The pedestrian clearway can be used as a design reference relating to adjacent land uses. For example, retail streets require larger pedestrian clearways to support higher pedestrian volumes and activity. In special cases, the pedestrian clearway zone may be connected seamlessly into public spaces to read as single large spaces.

Pedestrian Clearway Zone with Accent Paving over Amenity Zone

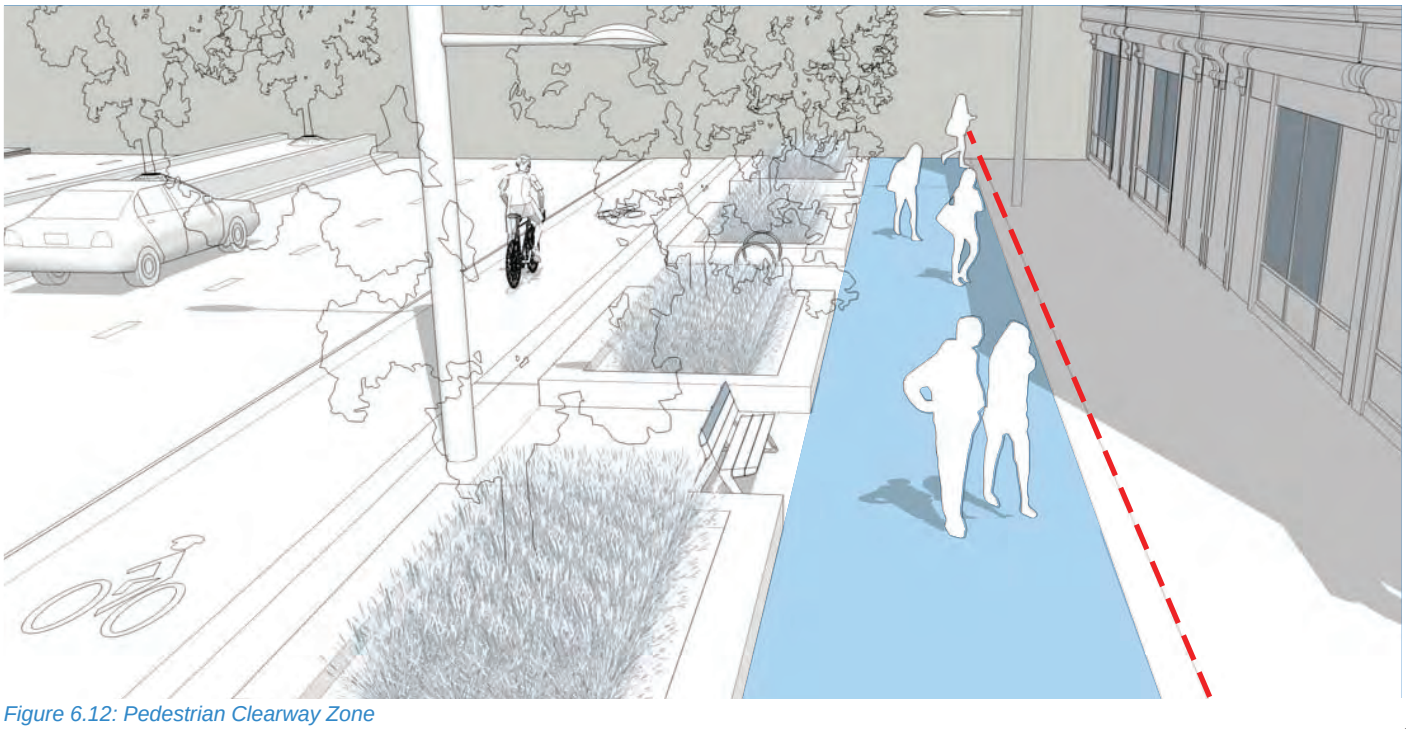


Figure 6.12: Pedestrian Clearway Zone

Amenity Zone

Amenity Zone

Location

The amenity zone is typically located between the pedestrian clearway and the continuity strip zone.

Description

The amenity zone plays a large part in determining the character of the streetscape. The amenity zone may be sodded or paved and may include items such as street trees, street and pedestrian lights, planters, perennials and ornamental grasses, benches, waste receptacles, information kiosks, bicycle stands, and low impact development measures.

Function

The function of the amenity zone is to provide visual, functional, and environmental pedestrian amenities. The amenity zone may also act as a buffer between pedestrians and the vehicular roadway. Specialized streets may also contain additional amenity zones such as green streets with double rows of trees. Additional amenity zones are dependent on right-of-way widths.

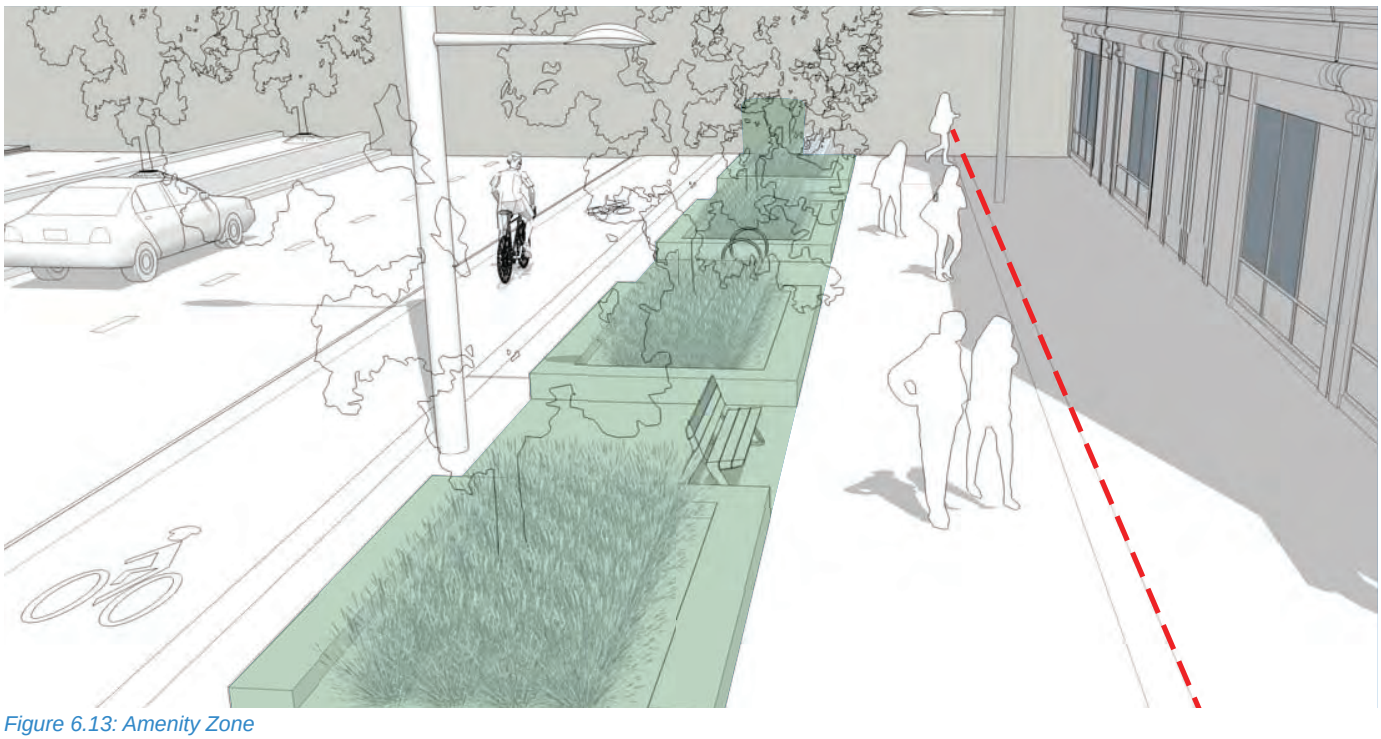


Figure 6.13: Amenity Zone

Continuity Strip Zone

Location

The continuity strip zone is located between the amenity zone and the vehicular roadway.

Description

The continuity strip is a relatively small strip in the pedestrian boulevard and may be treated with softscape (sod) or hardscape (unit paving or poured in place concrete).

Function

Located next to the vehicular roadway, the continuity strip provides a safety clearance for the doors of parked or idling vehicles so they do not interfere with furniture and planters in the amenity zone. The continuity strip provides potential space for street lights, wayfinding signage and utility poles. In addition to the road curb, the continuity strip helps to define the division between the roadway, the pedestrian boulevard, and the rapid clearway (if adjacent to a bike lane on the street), and provides an area for snow storage.

Continuity Strip Zone

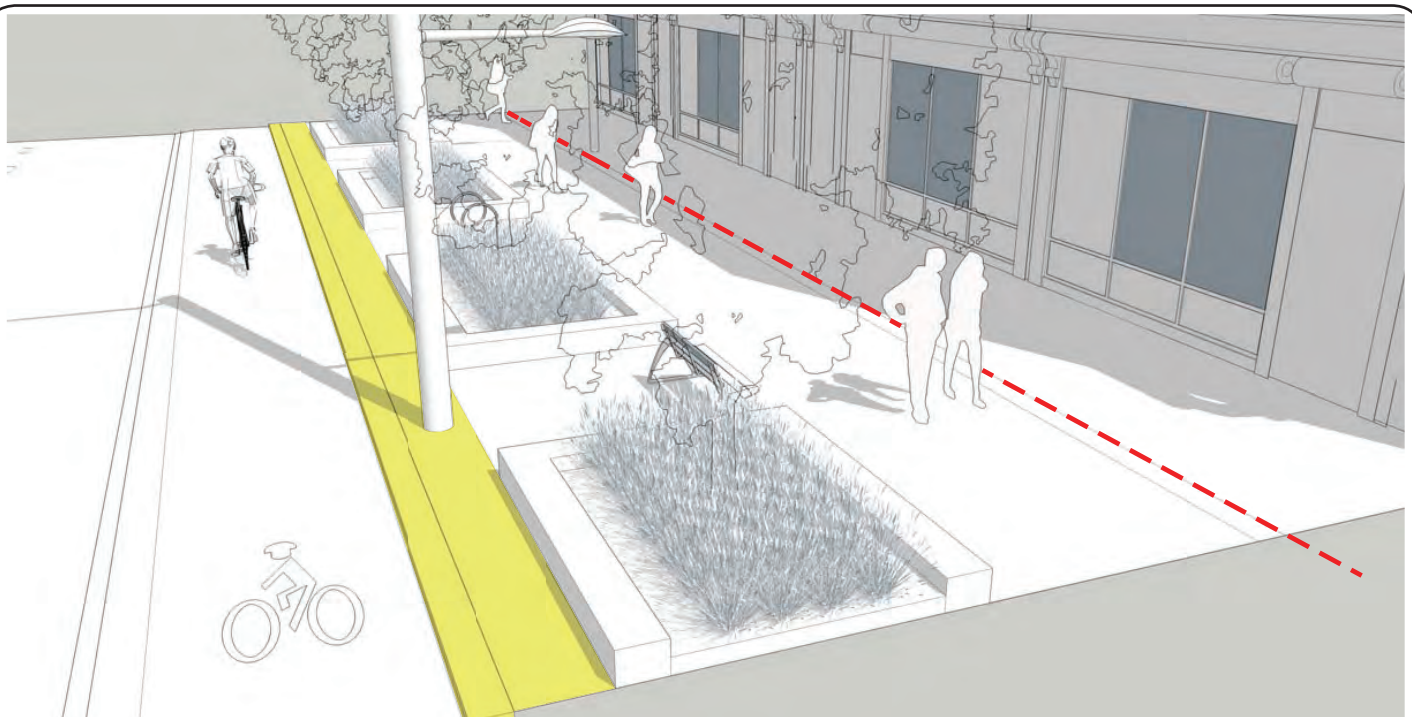


Figure 6.14: Continuity Strip Zone

Median with Seatwall Planter

Median

Location

Medians are located in the middle of the vehicular roadway between opposing traffic directions.

Description

Medians are separate entities from the pedestrian boulevard and typically do not carry pedestrian traffic parallel to the roadway. Medians can come in different forms from thin concrete barriers to wide vegetated areas. In large roadways acting as signature avenues and boulevards of cultural importance, the median may become a large public space with public art, special lighting and seasonal / temporary installations, paving and planting.

Function

The function of the median is to separate vehicular traffic going in opposing directions. For pedestrians, the median provides opportunities for visual stimulation and refuge while crossing particularly large roadways. The median zone can also be utilized as left turn lanes at traffic intersections.

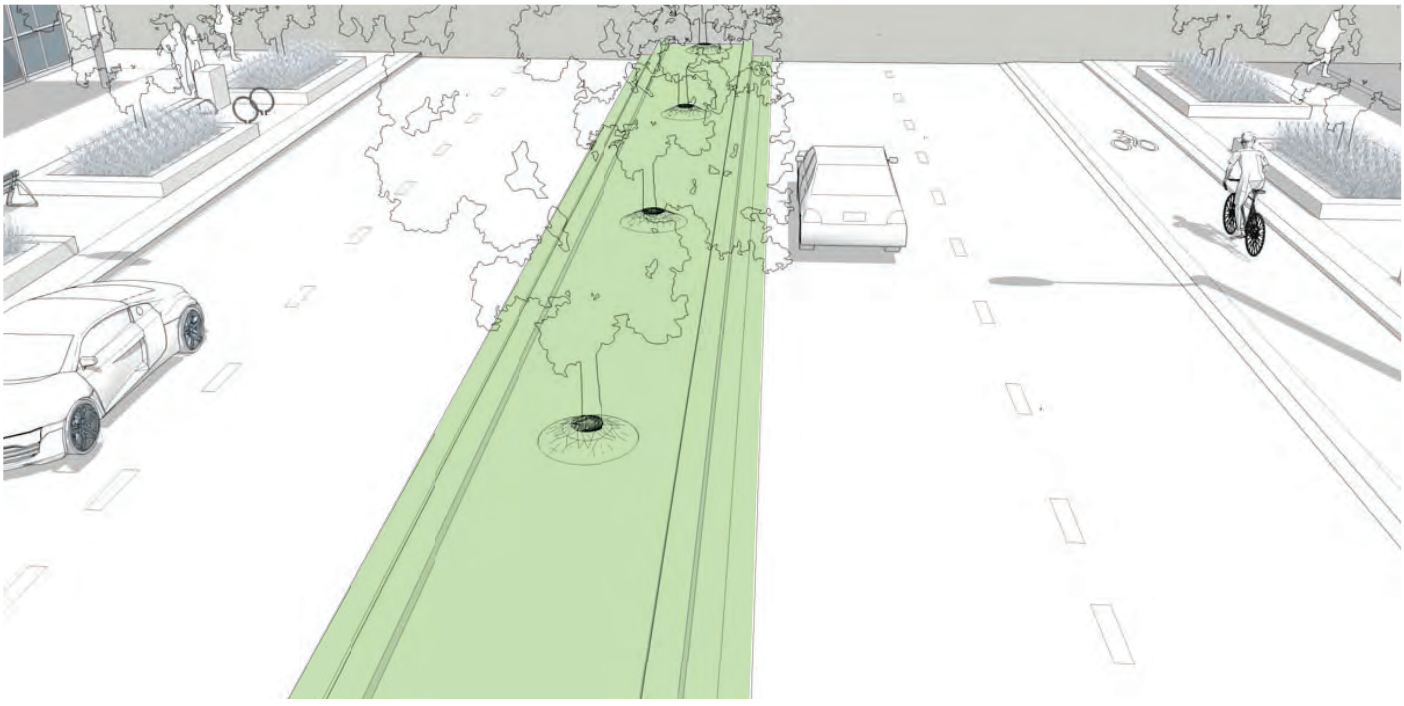


Figure 6.15: Median

Streetscape Types

Strategy III

Streetscape types consider how streets interact with adjacent land uses and context, which influence how a street is used and experienced.

Each streetscape type prioritizes users and various design elements, with pedestrian needs and active transportation as an integral planning feature. The types and spacing of street trees, location, quantity and character of streetscape elements, types of surface treatments, sizes of areas, and lighting all affect the character and experience of a pedestrian within a streetscape. The varying requirements for streetscape components, such as bicycle stands, benches or pedestrian-scale lighting, as well as the width of a sidewalk is influenced by the land uses associated with a streetscape.

Streetscape types may change along the length of a street as surrounding land uses or road functions change.

The streetscape types identified in the City-Wide Streetscape Implementation Manual area:

- Mixed-Use Commercial
- Transit Intensification Corridor
- Technology / Office
- Neighbourhood

Streetscape types may change along the length of a street as surrounding **land uses or road functions** change

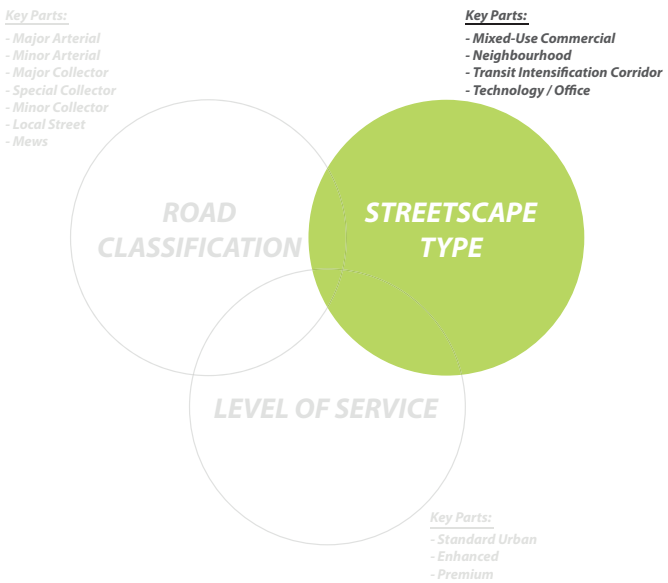


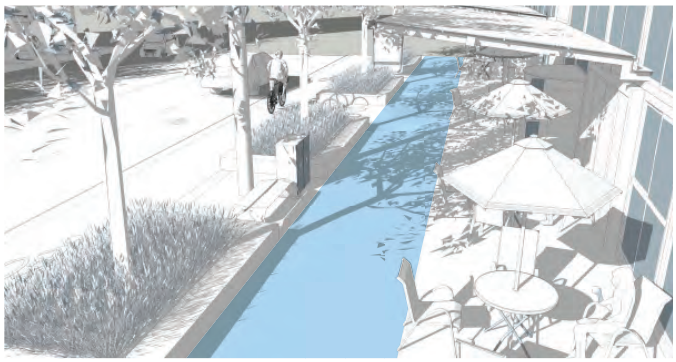
Figure 6.16: Streetscape Structuring Elements - Streetscape Type

Mixed-Use Commercial

Mixed-Use Commercial represents the most active and diverse of the streetscape types applicable to urban scenarios. These streetscape types accommodate higher pedestrian volume, active and transit transportation levels and may include zones which call for specific interaction between the roadway and pedestrian boulevard, including passenger pick-up / drop-off.

Typical Context:

- Mixed-Use
- High Intensity Retail / Commercial
- High Density Residential
- Restaurants & Sidewalk Cafes
- Cultural and Entertainment
- Institutional
- Pick-Up / Drop-Off
- Mews
- Parks & Public Spaces

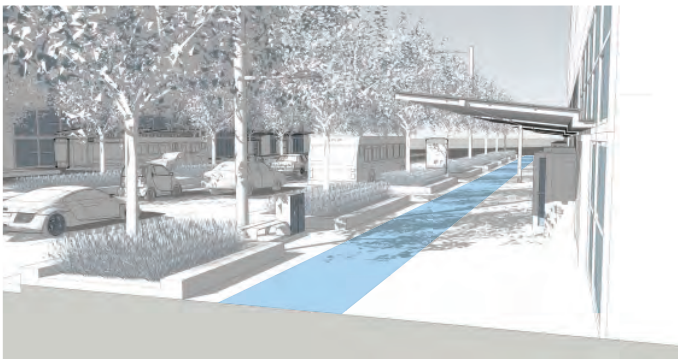


Transit Intensification Corridor

Transit Intensification Corridor streetscape types typically occur along regional arterial roads running through Urban Intensification Areas. These roads serve as regional connections and include transit. Right-of-ways (ROWs) are typically larger along transit intensification corridors and require additional design amenities to protect pedestrians and cyclists from vehicular traffic, vehicular noise and other micro-climate considerations.

Typical Context:

- Retail / Commercial / Office
- Mixed-Use
- High Density Residential
- Parks & Public Spaces
- Mews

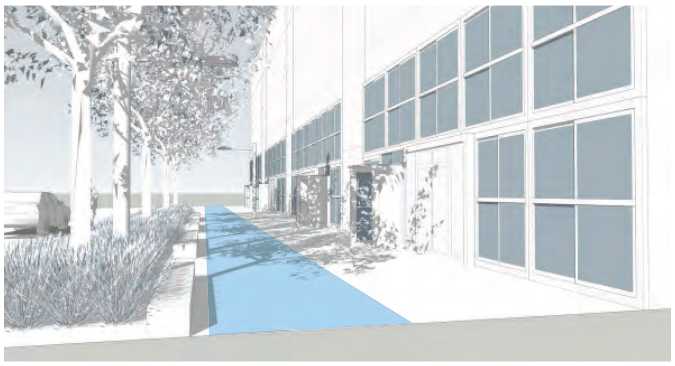


Technology / Office

Technology / Office streetscape types occur in urban employment areas fronting office, technology and commercial land uses. Low to medium pedestrian activity and traffic generally occurs on technology / office streetscapes. Commercial truck traffic may be diverted along these periphery streetscapes in Urban Intensification Areas requiring design provisions to address noise, water and air pollution.

Typical Context:

- Commercial / Office
- Low Intensity Retail
- Employment
- Parks and Public Spaces
- Mews
- Convention Centre / Hotel
- Institutional

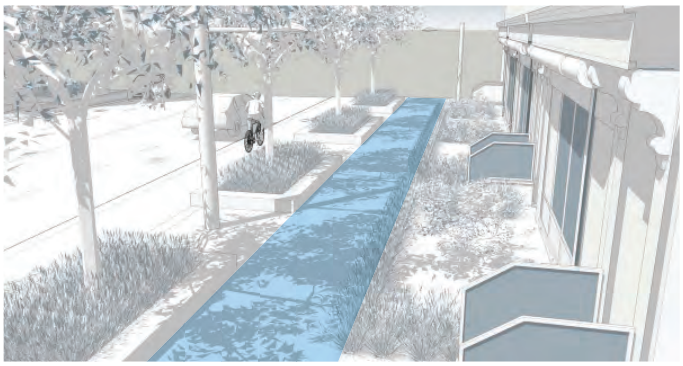


Neighbourhood

Neighbourhood streetscape types primarily front residential land uses and parks. These streetscapes support local pedestrian activity, including children playing, community socializing and are designed to promote walkability. The design focus occurs at the transition across the ROW between the frontage zone and either the private property or public park. While residential streets will provide a semi-public / private transition across the ROW, parks will provide seamless transition between the pedestrian boulevard and the public park.

Typical Context:

- Residential
- Local Retail
- Institutional
- Parks & Public Spaces
- Mews




CASA

Level of Service

Strategy IV

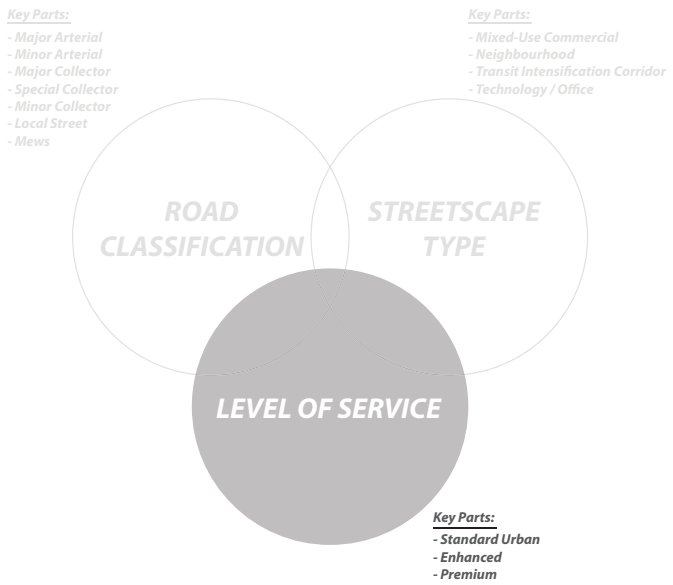


Figure 6.17: Streetscape Structuring Elements - Level of Service

The Streetscape Manual proposed three new levels of service for Vaughan's Intensification Areas and Heritage Conservation Districts: Standard Urban, Enhanced, and Premium.

The streetscape level of service is focused on the pedestrian boulevard and the pedestrian experience relative to the road classification and streetscape type. With these in mind, level of service goes on to further consider the economic aspect of streetscapes. Capital costs and potential funding for streetscapes are important to understand from an implementation point of view. Equally important is the future year-to-year financial commitment of a municipality for operations and maintenance costs. Consequently, the level of service concept aids as a tool to understand streetscapes from the functional, design and economic perspectives.

Each level of service has a corresponding menu of design components from which a designer can choose to customize the streetscape design for community priorities and character. At the same time, the menu of design components streamlines the quantity and types of streetscape materials and elements for a more cohesive public realm identity in the City. it will also help to control the City's maintenance, operations and replacement costs.

Design Driven

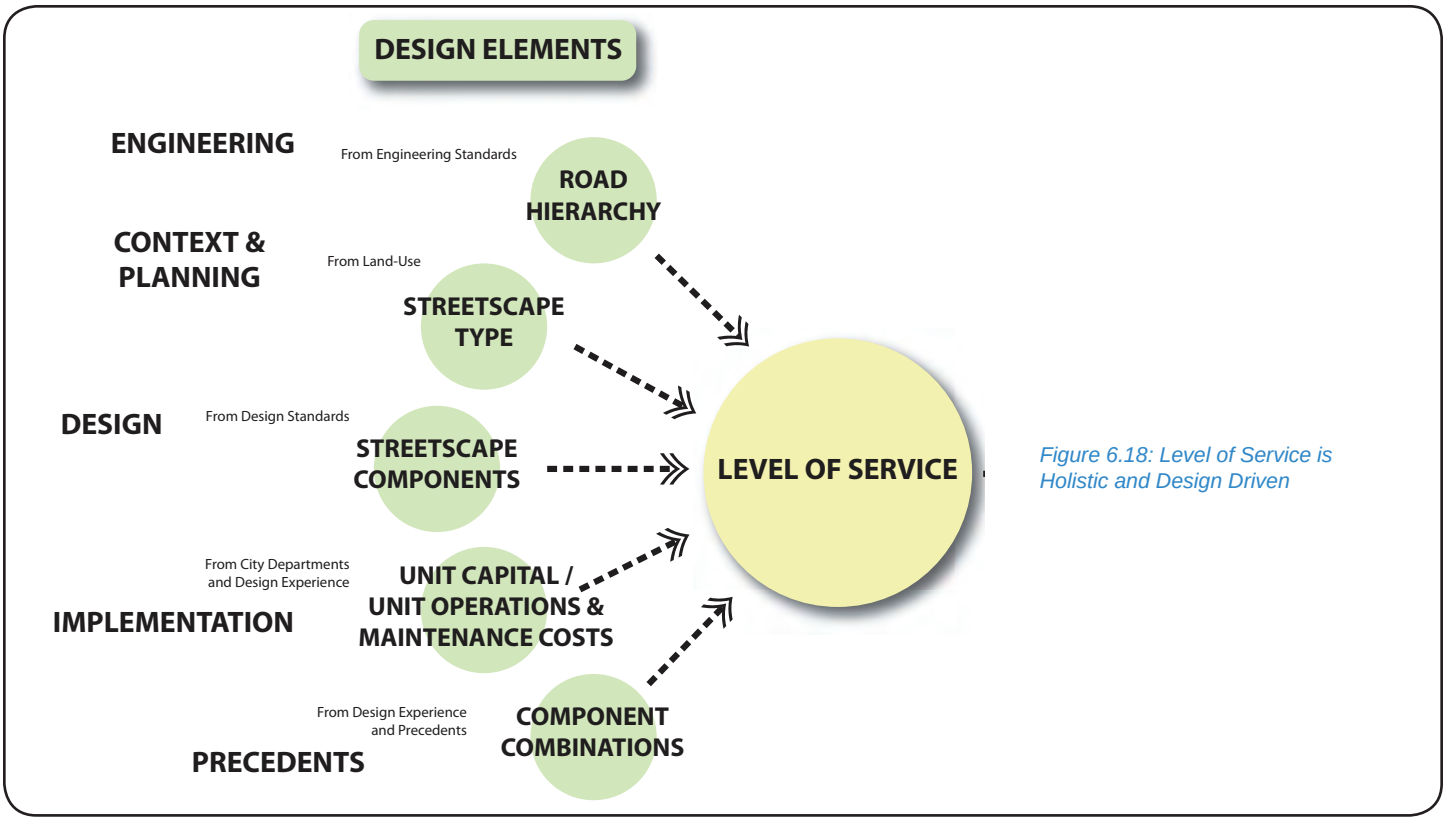


Figure 6.18: Level of Service is Holistic and Design Driven

The level of service concept consolidates considerations from engineering, urban planning and design, operations and maintenance, municipal finance and politicians. While design driven, this concept is a tool to address the balance between design, function and cost in a single language.

The importance of the concept is the ability to categorize a response to adjacent land use with design versatility while maintaining a coherent public realm identity. The level of service concept provides a simple way of understanding the design and financial differences between subsequently higher quality streetscapes. It creates a "typical prototype" to understanding streetscape construction and planning.

The manual identifies the historic (existing) streetscape level of service as a baseline. This "Basic" level of service is a design that responds to a suburban context. Three new streetscape levels of service have been defined to respond to urban conditions:

- Standard Urban
- Enhanced
- Premium

Each fundamental level of service represents a subsequent increase in design quality, versatility, pedestrian comfort / amenity and capital cost.

The following research, found in Appendix H / I / J, were used to develop the level of service concept and can be used as tools moving forward in the planning and design of streetscapes.:

- Streetscape Component Selection Matrix
- Streetscape Component Breakdown Chart
- Operations and Maintenance Chart

Description of Basic Level of Service

The existing Vaughan engineering standard for streets is used as the base reference streetscape - the "Basic" Level of Service. The existing streetscape standard, consisting of a 1.5m wide concrete sidewalk, street lights, sodded boulevards, and street trees, is a response to a low density context, not urban streets or Heritage Conservation Districts.

Level of Service Cross Sections

It is important to note that the capital and operations and maintenance costs of the Basic level of service reflect base standard suburban major collector streetscapes and not suburban residential streetscapes. This is important since suburban residential streetscapes have minimal municipal operations and maintenance activities.

Typical streets have been created to demonstrate design quality and cost differences among the levels of service

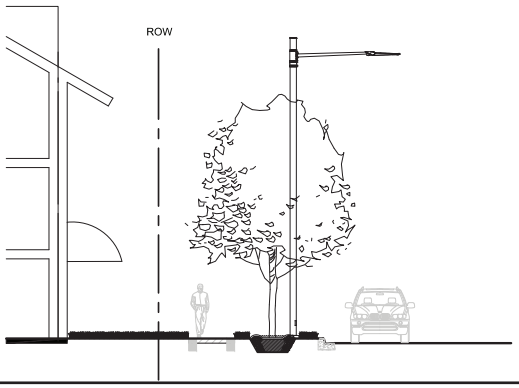
The proposed levels of service are as follows:

1. Standard Urban is the minimum level of service designed to meet the functional requirements of an urban streetscape. It includes a 2.0 m wide concrete sidewalk for two people to walk side by side, street trees and understorey planting, and provides the option for a concrete continuity strip and amenity zone instead of sod. The Standard Urban level of service has the lowest capital, maintenance and replacement costs and is currently recommended as the most common level of service in intensification areas. The design framework set out through the Streetscape Implementation Manual is flexible to allow for the design of a Standard Urban streetscape to be re-assessed in the future, as the City's population grows, to incorporate technological/ material advancements, additional components, and/or an increased standard sidewalk width, if necessary.

2. The Enhanced streetscape is a higher level of service with additional and/or higher quality component options added to the design components menu. An Enhanced streetscape design may include pedestrian lighting, decorative paving, structural soil cells, and/ or street furnishings in addition to the Standard Urban components. The Enhanced level of service has higher capital, maintenance and replacement costs than the Standard Urban level of service. It is anticipated that approximately 40% of streetscapes located within Intensification Areas will strategically qualify for an Enhanced Level of Service, based on a set of evaluation criteria outlined in the Streetscape Implementation Manual

3. A Premium streetscape is the highest level of service, allowing for the highest quality of materials, the most pedestrian amenity, and the most creative flexibility to design an iconic public destination of significant civic or community importance. As the most unlimited design category, Premium streets may have, for example, special furnishings, accent lighting, natural stone paving or other unique features in addition to the design component options within the Enhanced and Standard Urban levels of service. A Premium streetscape is designed to support significant economic generators, such as the Main Street of a Primary or Local Centre, or streets fronting buildings of cultural and artistic significance, such as museums, performing arts buildings and galleries. Premium streetscapes also may be applied when the block has significant civic importance, such as fronting major civic buildings or major public squares and parks. Premium streetscapes are an investment in the civic, cultural and social generators of the City with the highest per linear metre capital, maintenance and operation and replacement costs allocated to them. It is anticipated that approximately 3% of streetscapes located within Intensification Areas and Heritage Conservation Districts will qualify for Premium level of service.

Each cross-section is designed to represent the typical level of service character over a mid-block condition. Cost estimates (per linear meter costs) have been derived to characterize the potential financial commitment to each level of service streetscape. The per linear meter costs for each typical level of service cross-section are for typical character designs and do not represent specific master plan designs. In Enhanced and Premium levels of service there is greater design versatility with a high range of potential design components which leads to a greater range of potential cost. Therefore it should be noted that the typical level of service cross-section costs may vary in relation to actual master plan designs.



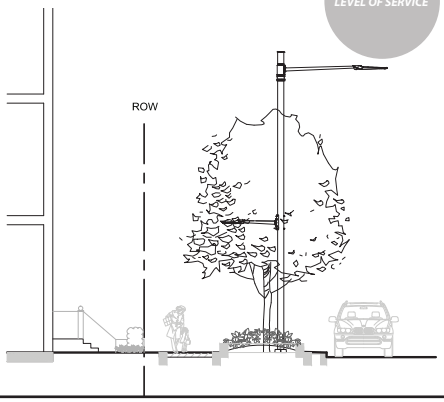
Basic Level of Service

Basic level of service is a representation of the existing suburban road in its most fundamental form. It provides the minimum functionality of a streetscape for a street with low pedestrian volume and activity. The streetscape has a narrow concrete sidewalk (1.5 m) and sodded boulevard with street trees. The basic level of service will not typically apply to urban intensification areas or commercial areas within Heritage Conservation Districts.

Typical characteristics:

- Low intensity pedestrian traffic
- Standard sidewalk width (1.5 m)
- Standard concrete
- Sod and street trees
- Standard street lighting

Typical Costs Single Sided	
Capital Cost:	$515 / linear meter
Operations and Maintenance:	$15 / linear meter / yr (2013 Canadian dollars)
Typical Boulevard Width:	5.5 - 6.0 m



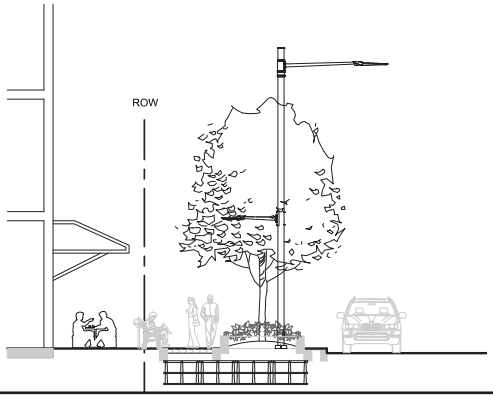
Standard Urban Level of Service

Standard Urban level of service is a basic streetscape for an urban context. Standard Urban level of service provides predominantly hardscape options as a design response to higher pedestrian traffic from greater population density of urban areas. The Standard Urban streetscape replaces the Basic streetscape for those within a more urban settings.

Typical characteristics:

- Street related uses, urban intensity, and higher pedestrian traffic
- Larger pedestrian clearway width (2.0 m) to accommodate more pedestrian activity
- Standard concrete
- Street trees in urban pits

Typical Costs Single Sided	
Capital Cost:	$975 / linear meter
Operations and Maintenance:	$100 / linear meter / yr (2013 Canadian dollars)
Typical Boulevard Width:	5.5 - 6.0 m



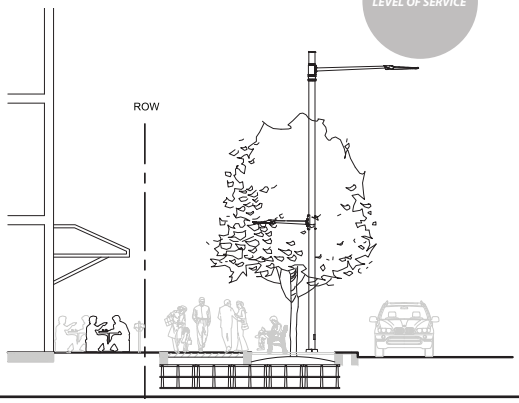
Enhanced Level of Service

The Enhanced level of service responds to areas with greater pedestrian traffic and a greater variety of activities within the streetscape associated with urban retail, commerce, transit, entertainment and civic uses. Enhanced level of service permits a wider range and quality of materials which also is associated with higher costs. Enhanced Streets offer a variety of pedestrian amenities such as street furniture, enhanced paving, ornamental planting, pedestrian and accent lighting, and low impact development measures.

Typical characteristics:

- Street related uses, urban intensity, and higher pedestrian traffic
- Materials reflect quality of place
- Greater use of unit paving and accent designs
- Larger clearway width for more pedestrian activity
- Street furniture, enhanced tree planting and pedestrian lighting to create a safer, more pedestrian-friendly environment
- LID and sustainability features

Typical Costs Single Sided	
Capital Cost:	$1,855 / linear meter
Operations and Maintenance:	$150 / linear meter / yr (2013 Canadian dollars)
Typical Boulevard Width:	5.5 - 6.0 m



Premium Level of Service

Premium level of service is the highest level of streetscape quality. For areas of high pedestrian visibility, cultural significance and special cases, the Premium level of service uses the highest quality materials, offers the most pedestrian amenity and the highest level of design. Premium level of service streets are memorable pedestrian experiences, often the main street of an Urban Intensification Area or Heritage Conservation District and can often become destinations and iconic streets.

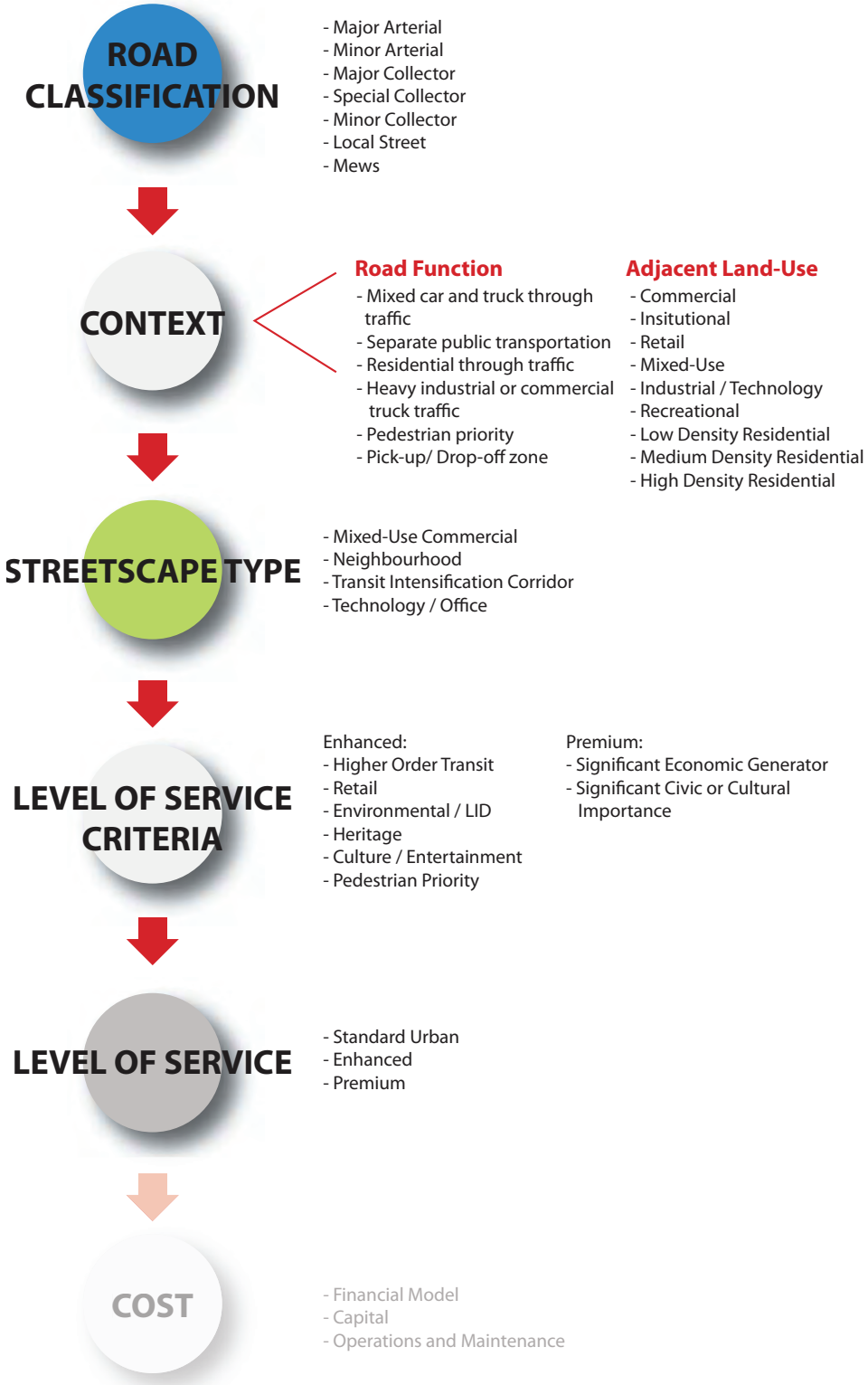
Typical characteristics:

- High urban intensity, special streets
- High quality materials to attract and accommodate higher levels of investment and pedestrian traffic
- Large pedestrian zones with amenities (shrub and perennial planters, street furniture, etc.) to create a memorable experience
- Accent lighting to highlight interesting elements
- Tree infrastructure to help trees survive in an urban environment
- Special features and public art

Typical Costs Single Sided	
Capital Cost:	$2,325 / linear meter
Operations and Maintenance:	$170 / linear meter / yr (2013 Canadian dollars)
Typical Boulevard Width:	6.0 - 7.0 m

Determining Level of Service

Figure 6.18: Master Plan Stream - Determining Level of Service



Master Plan Stream

The level of service for a streetscape is initially determined at the master planning stage and includes the use of the financial model, developed in conjunction with the Vaughan City-Wide Streetscape Implementation Manual.

A level of service is applied on a block by block basis, i.e. from intersection to intersection on each side of the street. In order to determine the level of service for each block, the road classification, context, streetscape type and criteria for levels of service are considered.

A consistent intersection design acts as a hinge point or transition between blocks that may have either the same or different streetscape levels of service.

LEVEL OF SERVICE

Road Classification

To determine the level of service of a streetscape the designer must first consider the roadway. The street classification of the roadway partly determines the function of the vehicular roadway but also the jurisdiction. This is an important input into the financial model and has implications for financial funding and commitments. Roads can be classified as:

- Major Arterial (Regional Jurisdiction)
- Minor Arterial (Municipal Jurisdiction)
- Major Collector (Municipal Jurisdiction)
- Special Collector (Municipal Jurisdiction)
- Minor Collector (Municipal Jurisdiction)
- Local Street (Municipal Jurisdiction)
- Mews (Municipal Jurisdiction)

Context

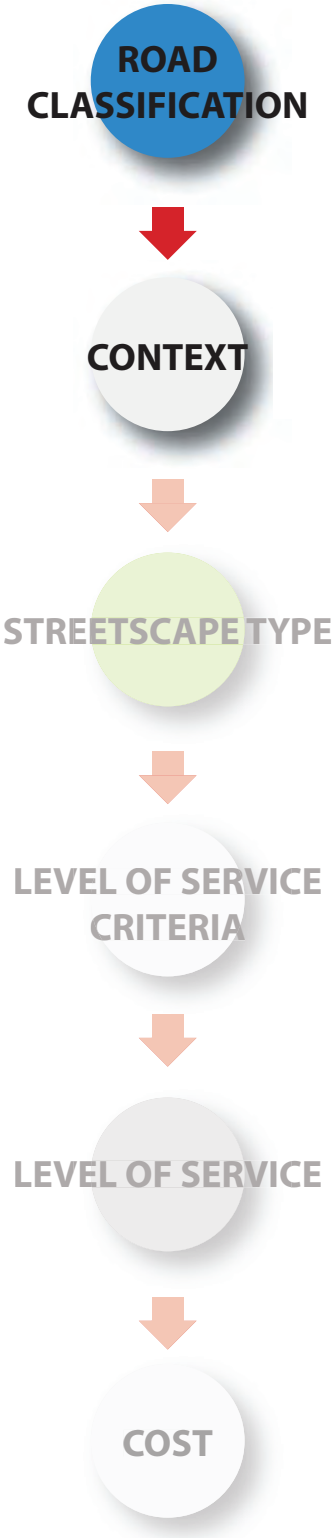
Context is governed by both the roadway function and adjacent land use. Both the roadway and adjacent land use functions have an impact on the pedestrian boulevard. The functions of the roadway and adjacent land use determine the design response of the streetscape and therefore determines the streetscape type. For example, roadways that are transportation truck corridors or vehicular corridors will have a high volume of vehicular traffic and impact pedestrians in the pedestrian boulevard. The streetscape design response would need to provide a buffer between the roadway and pedestrians. Alternatively, an adjacent land use of retail would require a seamless transition between the pedestrian clearway zone and the retail frontage to encourage retail activities.

Roadway function considerations include:

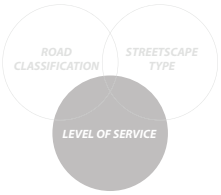
- Vehicular Corridor
- Transport Truck Corridor
- Public Transit Priority
- Pick-up / Drop-off Zone
- Flexible Street

Adjacent land-use considerations include:

- Commercial
- Institutional
- Retail
- Mixed-use
- Industrial / Technology
- Recreational
- Low Density Residential
- Medium Density Residential
- High Density Residential



LEVEL OF SERVICE



6

Streetscape Type

The streetscape type represents the design response to the context of the roadway function and adjacent land use. Section 3 describes each streetscape type and their associated context. The four streetscape types are:

- Mixed-Use Commercial
- Transit Intensification Corridor
- Technology / Office
- Neighbourhood

Level of Service Criteria

All streets in urban intensification areas start at a Standard Urban level of service. As the level of service increases, the design is eligible to use a greater variety of components to respond to specific design challenges and opportunities (see Appendix H, Streetscape Component Selection Matrix). For a streetscape to qualify for a higher level of service the streetscape must consider a number of criteria. A set of criteria to determines if a streetscape is an Enhanced level of service, while a separate set of criteria outlines when the streetscape is a Premium level of service. Streetscapes warranting an Enhanced level of service have the presence of the following criteria:

- Retail
- Culture / Entertainment
- Higher Order Transit
- Heritage
- Environmental
- Pedestrian Priority

Premium levels of service will have the presence of Enhanced criteria, but additionally are:

- Significant Economic Generators
- Of Significant Civic / Cultural Importance

The level of service criteria are explained in greater detail on the following pages.

Level of Service

The streetscape level of service is then finalized with the application of the upgrade criteria. Each level of service has an associated prototype cost which is found in the financial model.

Cost

Costs are determined by the inputs of each step into the financial model including phasing and funding considerations. Alternatively, multiplying the per linear meter cost of each level of service by its associated block length yields a simple cost estimate based upon design.

Enhanced Level of Service Criteria

Enhanced levels of service offer a wider design palette than Standard Urban levels of service to better address the appropriate design and functional needs of specific streetscapes. To upgrade a streetscape from an Standard Urban level of service to an Enhanced level of service, any **one** of the following criteria should be met.

Enhanced Level of Service Streetscape

Enhanced Level of Service Criteria

Retail
Retail designated streets typically have a higher volume of pedestrian traffic and a greater variety of activities. The combination of its economic function, visibility, and heavy pedestrian usage support investment in a higher level of service. Primary and secondary designated retail streets usually require higher levels of service, while tertiary retail streets may or may not.

- *Increased durability for higher volume pedestrian traffic*
- *Pedestrian priority*
- *Support at grade retail and restaurants*
- *District branding*
- *Economic development*

Culture / Entertainment
Streetscapes with cultural and entertainment facilities and functions may be iconic streets that define a city. Their visibility, heavy pedestrian usage, economic function, cultural importance and branding value support investment in a higher level of service. Special connections to cultural amenities via passageways or mews would also upgrade the level of service.

- *Increased durability for higher volume pedestrian traffic*
- *Economic development*
- *Cultural and arts importance*
- *Special pedestrian connections and trails to cultural amenities*
- *District branding*

Higher Order Transit
Streetscapes along higher order transit areas must support increased pedestrian traffic. Mobility hubs and regional connections are examples where an interaction between different modes of transportation along these streetscapes require a more robust design solution for increased pedestrian safety. Higher order transit, in the form of mobility or transit hubs, are nodes that have a wide affect that are not exclusive to any one streetscape. Therefore, the higher order transit criteria for mobility or transit hubs can generally apply to streets located within the primary zone of the hub (approximately 250 m radius, or two minute walk).

- *Increased durability for higher volume pedestrian traffic*
- *Pedestrian priority*
- *Transportation importance*
- *Cultural Importance*

Heritage
Streetscapes with heritage importance, such as Heritage Conservation Districts, are special streets which require specific design requirements. To maintain its historical character, heritage streetscapes often need special materials or custom construction. Streetscapes within heritage conservation districts may have an upgraded level of service to accommodate the special design requirements.

- *Cultural importance*
- *District branding*
- *Economic development*

Environmental
Some streetscapes have an added environmental value over and above the green infrastructure / ecosystem services provided by a standard urban street. For example, streetscapes with low impact development measures for stormwater management, double rows of trees or structural soil cells.

- *Double rows of trees*
- *Special planting*
- *Low impact development measures*
- *Structural soil cells*

Pedestrian Priority or Pedestrian Area
Pedestrian Priority Zones could be designed as a mews or a flexible space street. Detailed consideration must be given to ensure the design is accessible to all road users. Design features may include the reduced use of demarcation and signage, flush / level surfaces, rolled curbs, elevated intersections, planting, pedestrian-scale lighting and furnishings.

A Pedestrian Area is dedicated to pedestrians, and only authorized vehicles are permitted in the area (such as for servicing or emergency access). Transit services may also be permitted where necessary. A street may be permanently a Pedestrian Area, such as a pedestrian-only mews, or created as a temporary Pedestrian Area through road closures for special events or seasons.

- *Increased durability for higher volume pedestrian traffic*
- *Economic development*
- *Cultural and arts importance*
- *District branding*

Premium Level of Service Criteria

Premium streetscapes are significant and memorable streets in a City. As the single most important street in a district, the Main Street or a high end retail street should be designed as a Premium Street. For a streetscape to be classified for a Premium level of service, it should be anticipated to become a significant economic generator or be of significant civic / cultural importance.

Premium Level of Service Streetscape

Premium Level of Service Criteria

Significant Economic Generator

Streetscapes that are significant economic generators are Premium level of service. The reason for this is the synergy and mutual benefit generated between Premium streetscapes and significant economic generating land uses. For example, Business Improvement Areas (BIAs) often recognize the importance and correlation of the quality of the public realm to their success, and accordingly invest in streetscapes. Premium level of service streetscapes are significant economic generators which benefit from the high level service and can be maintained by the land uses they serve. Significant economic generators are typically high end or primary retail.

The retail criteria for Enhanced level of service is similar to a significant economic generator, however the difference is found in the degree of significance. An Enhanced street may have primary retail, however it may not have the regional significance of, for example, Yorkville in Toronto or Soho in New York City. Premium level of service streetscapes with significant economic generators are intended to have regional significance and name recognition for their quality and experience.

Examples of land uses that are significant economic generators include, but are not limited to:

- *High end primary retail*
- *Intensive primary retail*

Significant Civic / Cultural Importance

Streetscapes with significant civic and cultural importance can directly and indirectly generate economic benefit for surrounding land uses. Major urban squares, art galleries, performing arts buildings, city halls and museums are places of civic pride and activity. Streetscapes which are associated with spaces with significant civic and cultural importance have a personal and emotional attachment for individuals. These are often streetscapes which are associated with spaces of major regional or civic events and major performances. These streetscapes therefore form an identity and brand and represent the district at a regional scale. These are spaces and streetscapes to be celebrated and therefore require a Premium level of service.

The criteria of significant civic / cultural importance is similar to the culture / entertainment criteria for an Enhanced level of service. The difference between the two criteria remains in the significance of the importance. For example, there is cultural importance for cultural facilities of all sizes. However, facilities such as Toronto's Art Gallery of Ontario or New York City's Guggenheim hold a larger regional significance.

Examples of land uses which create significant civic and cultural importance include, but are not limited to:

- *Major urban squares*
- *City hall*
- *Art galleries*
- *Performing arts building*
- *Major museums*

Level of Service Upgrade Criteria Chart

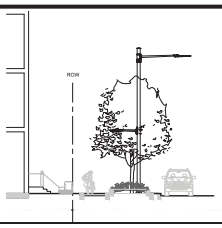
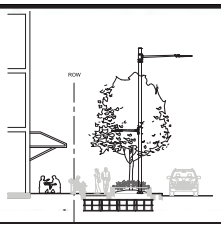
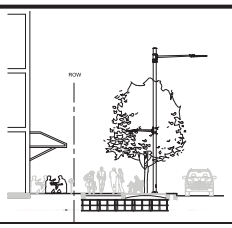
		LEVEL OF SERVICE		
		STANDARD URBAN	ENHANCED	PREMIUM
				
CRITERIA				
Retail				
	Increased durability for higher volume pedestrian traffic			
	Pedestrian priority			
	Support at grade retail		✓	
	District branding			
	Economic development			
Cultural / Entertainment				
	Increased durability for higher volume pedestrian traffic			
	Economic development			
	Cultural and arts importance		✓	
	Special pedestrian connections and trails to cultural amenities			
	District branding			
Higher Order Transit				
	Increased durability for higher volume pedestrian traffic			
	Pedestrian priority		✓	
	Transportation importance			
	Cultural importance			
Heritage				
	Cultural importance			
	District branding		✓	
	Economic development			
Environmental				
	Special planting		✓	
	Low impact develpoment measures			
Pedestrian Priority or Pedestrian Area				
	Increased durability for higher volume pedestrian traffic			
	Economic development		✓	
	Cultural and arts importance			
	District branding			
Significant Economic Generator				
	High end primary retail			✓
	Intensive primary retail			
Significant Civic / Cultural Importance				
	Major urban squares			
	City hall and civic importance			
	Art galleries			✓
	Performing arts building			
	Major museums			

Figure 6.19: Level of Service Upgrade Criteria Chart

Streetscape Component Selection Matrix

Each level of service has an associated menu of streetscape components. The Streetscape Component Selection Matrix (see Appendix H) outlines which items are eligible in each level of service based upon the Streetscape Component Breakdown Chart (see Appendix I). The chart shows an increasing number of associated streetscape components from Standard Urban to Premium levels of service. The intent is that Premium streetscapes offer the greatest design versatility and pedestrian amenity by offering the widest selection of components to use in a design. Standard Urban streetscapes offer only the minimum standard and include the least variety of components. Therefore, higher levels of services may have access to lower level of service components while lower levels of service may not use higher level of service components.

Low Selection of Streetscape Materials

Greater Selection of Streetscape Materials

Streetscape Component Breakdown Chart

The Streetscape Component Breakdown Chart (see Appendix I) represents the deconstruction of the streetscape into its base components and sorted into the relevant zones the components would be typically found in. Different combinations of the components can be used to construct streetscapes to address different design contexts. Each level of service typical cross-section was constructed using the breakdown of the streetscape components ensuring that the costs associated with each level of service is relevant.

Each component is assigned a unit measurement, typical capital unit cost, an inherent level of service, and a typical life expectancy. The unit measurement and capital unit cost have been derived from current construction standards and will change over time. It is recommended that a review and update of typical construction costs be done every five years.

The level of service for each component is influenced by capital cost, operation and maintenance cost, quality and functional factors; it helps in establishing which components are eligible in each level of service in the Streetscape Component Selection Matrix.

Versatile Selection of Streetscape Materials

Operations and Maintenance

Beyond initial construction and capital costs, streetscapes also have annual operations and maintenance costs. Different streetscape components may have different operations and maintenance activities. Given that these activities and costs are recurring cost commitments it becomes important for municipalities to understand the future financial implications of such activities. Therefore, the level of service concept includes operations and maintenance.

Each streetscape zone is divided into maintenance elements where components with similar maintenance activities are combined together. Maintenance activities have been assigned cost assumptions approved by Vaughan and associated responsible departments. The costs have been applied across a streetscape to determine the potential future financial commitments for operations and maintenance (see Appendix J for Operations and Maintenance Chart).

Street Maintenance New York, United States

Using Level of Service for Design

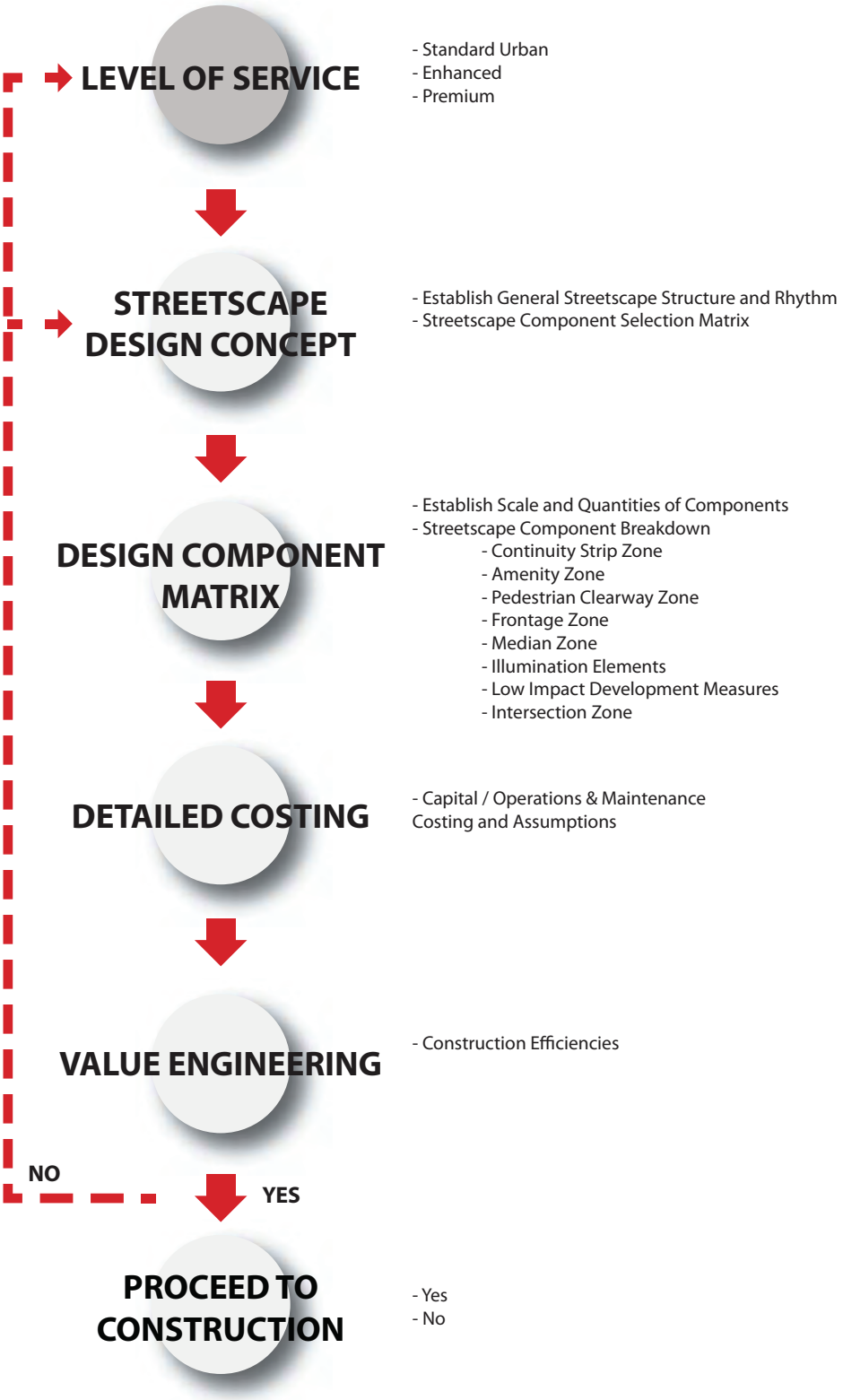


Figure 6.20: Detailed Design and Implementation Stream

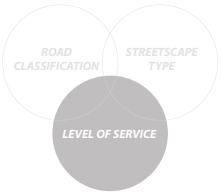
Detailed Design and Implementation Stream

The Detailed Design and Implementation Stream yields the level of service for each block along a streetscape, as well as a prototype design and estimated cost. The purpose of the Detailed Design and Implementation Stream to take the determined levels of service and develop a detailed design.

Using the associated streetscape components allowed from the Streetscape Selection Matrix (see Appendix H) and the guidelines from the design components section, a more detailed design can be crafted.

A Streetscape Component Breakdown (see Appendix I) can then be used for a detailed costing of the design.

LEVEL OF SERVICE



6

Level of Service
Determination of the level of service is typically done in the City Process, described in Section 4.

Streetscape Design Concept
Once the level of service for each block and side of the street is determined, the designer can use the Streetscape Component Selection Matrix (see Appendix H) to determine which components are available per the level of service of the streetscape they are designing. The Streetscape Component Selection Matrix contains the components categorized into the streetscape structure and determines which components are permitted. At this stage rhythm of trees and general structure and sizes of zones are determined to create a streetscape framework. The design framework is based upon the context criteria found in the City Process to respond to the roadway and adjacent land use functions.

Design Component Matrix
During the Design Component Matrix stage, sizes, scale and quanitities of the streetscape components are established. These are placed in the streetscape design and used for the detailed costing. In circumstances where a project does not have a master plan to guide the design, Enhanced and Premium components (see Design Component Section) have been selected to ensure that streetscapes in Vaughan meet a minimum standard of quality and character.

Detailed Costing
At this point, designers have a detailed design of a streetscape and use the Streetscape Component Breakdown Chart (see Appendix I) to determine cost. The chart includes typical costs of potential streetscape components and their locations in the streetscape structure. The use of the Streetscape Breakdown Chart allows for all projects designed in the level of service concept to be compared on a similar level with the coinciding methodology. An Operations and Maintenance Assumptions Chart (see Appendix J) allows for the potential operations and maintenance costs to also be determined for a better understanding of the future financial impact to the City.

Value Engineering
The value engineering stage is an important part of the process to ensure that the design is as efficient as possible. Potential construction efficiencies should be explored and the cost of the project should be compared to the budget.

Proceed to Construction
After the project is value engineered, it is a Council decision as to whether to proceed with construction. If the project is approved, construction may proceed. However, if it is not approved due to cost or design, the project may return to the level of service phase to re-evaluate the level of service chosen and rework the design.


ONE ROSE
LOUNGE
STONE ROSE
jazz
at lincoln center
shop

Design Components
Strategy V

Design Components
Streetscape character is largely defined by the elements located in the public right-of way, as well as the architectural design of building facades and landscaping treatment in the private realm setback. The combination of elements in a streetscape design also determines the functionality of the street infrastructure to respond to the adjacent land use and roadway. A simple way to think of the streetscape components is as a “kit-of-parts”. The components are mixed and matched to meet the needs of the streetscape. The general components of a streetscape can be broken down into the following categories:

- Paving
- Illumination Elements
- Planting
- Site Furnishings
- Medians
- Intersections
- Public / Private Frontage
- Utilities
- Innovation

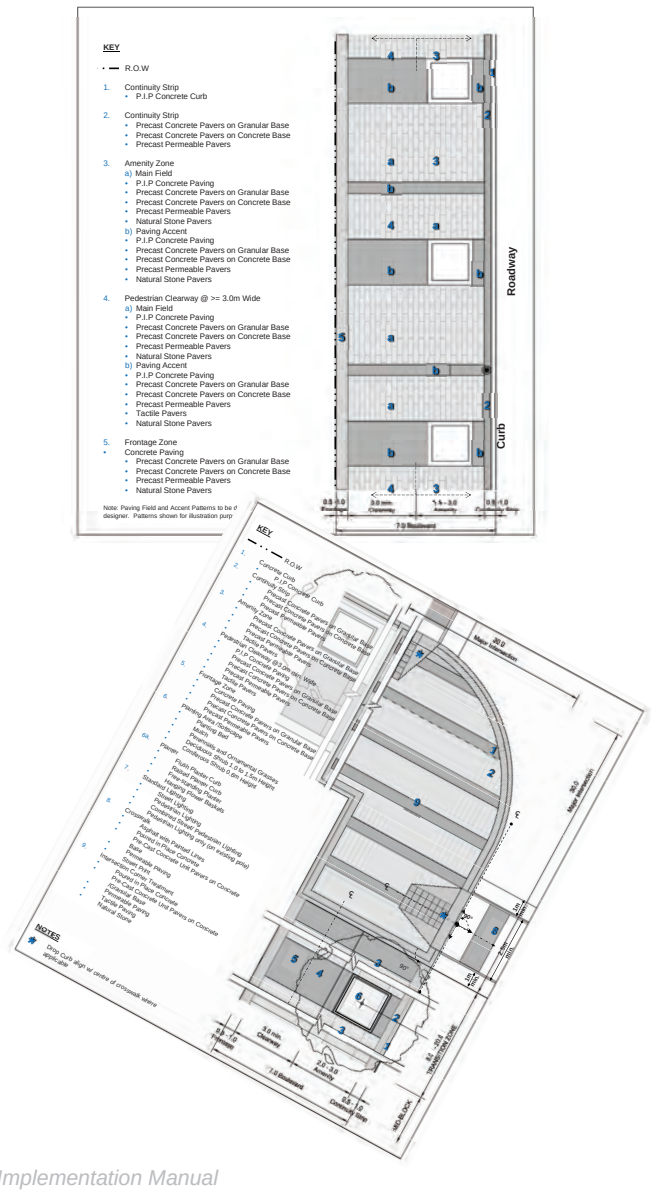
General guidelines have been developed to guide the selection of materials and amenities. For design versatility, each component is explained in relation to design intent with graphic diagrams for each level of service, including information such as:

- Streetscape zones affected
- Potential materials
- Potential configuration in relation to other elements
- Typical ranges of component measurements

Innovation components are addressed differently than other typical streetscape components and may be applied on a permanent or pilot project basis. These include low impact development measures, the integration of new technologies, and public art installations, which are site and context specific.

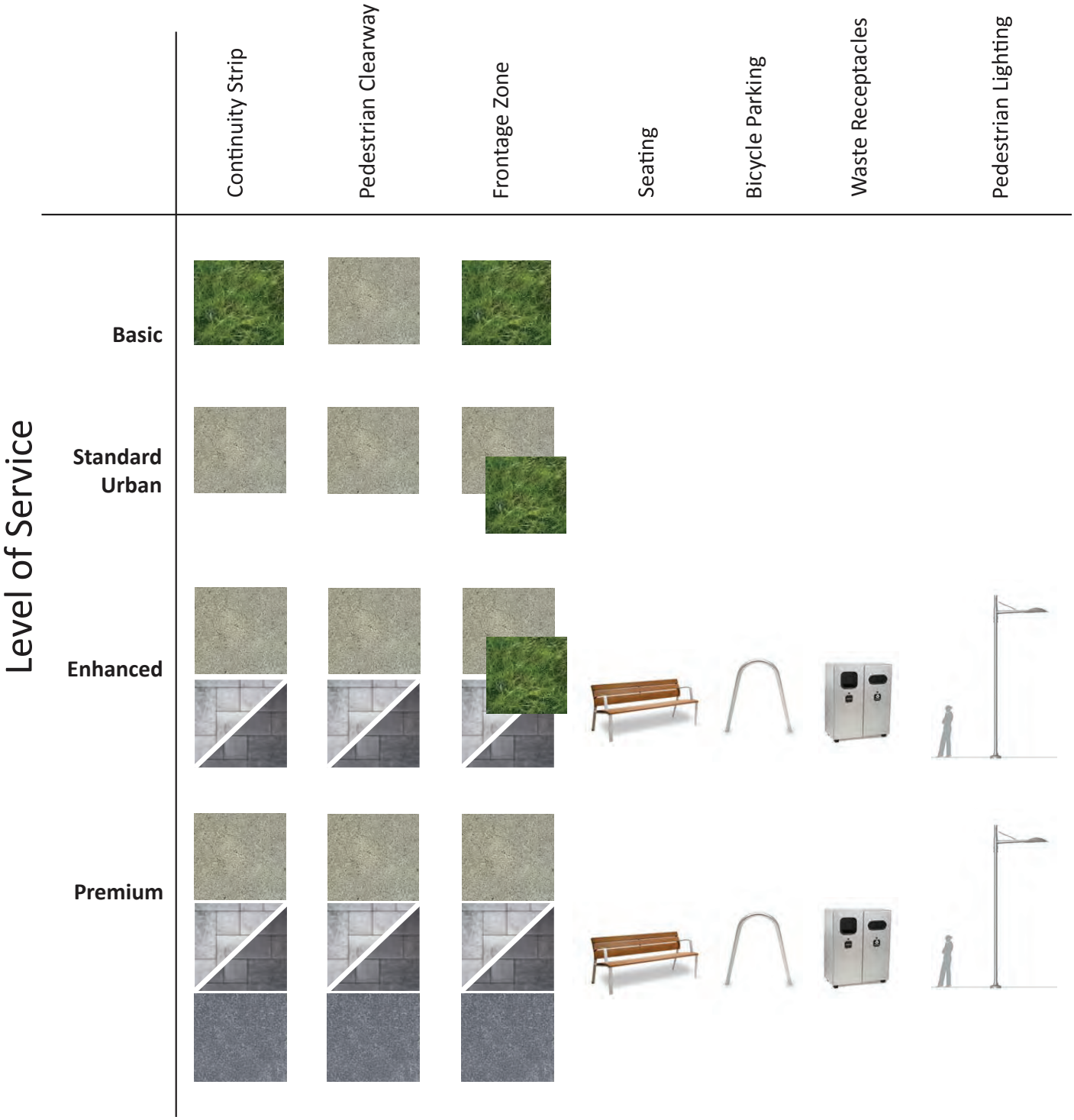
In Heritage Conservation Districts component choices and design will need to comply with the specific Heritage Conservation District guidelines for that district.

Design Components Matrix
The Design Components Matrix graphically shows the intended components available in each level of service as a potential palette of materials. In addition to the comparison of components between levels of service, several standard components have been selected for Enhanced and Premium levels of service in projects where there is no streetscape plan to guide the design. Approved streetscape plan designs may override the default.



Design Components Matrix

(for Urban Intensification Areas)

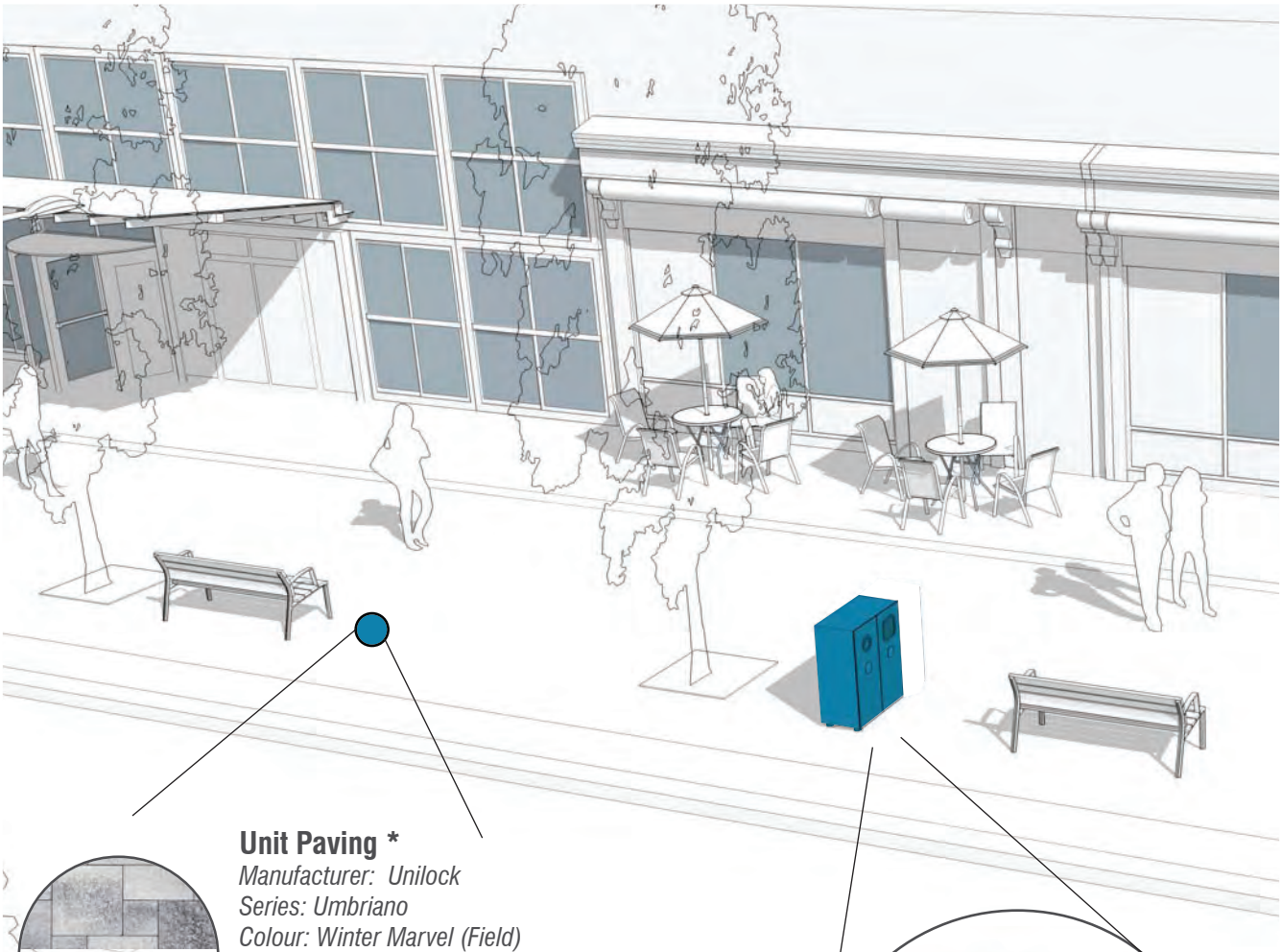


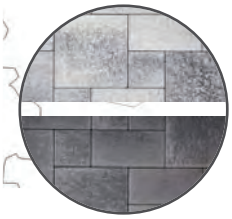
Accent Lighting	Street Tree Planting	Ornamental Planting	Custsom Tree Grates/ Guards	Planters / Planting Islands	Street Media	Custom Branding / Wayfinding	L.I.D. Measures	Structural Soil Cells

* Note: Premium streetscapes may include special or custom elements not shown in the matrix.

Design Components

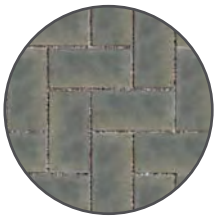
For Enhanced and Premium Streets without Streetscape Plan Designs





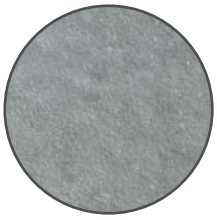
Unit Paving *

Manufacturer: Unilock
Series: Umbriano
Colour: Winter Marvel (Field)
Midnight Sky (Accent)
(or other complementary colour)
Feature: Non-bevelled top edge
Base: Concrete



Permeable Paving *

Manufacturer: Unilock
Series: Eco-Priora
Colour: Santa Fe
(or other complementary colour)



Natural Stone *

Manufacturer: Unilock
Series: Natural Stone
Colour: Hearthstone
(or other complementary colour)
Base: Concrete

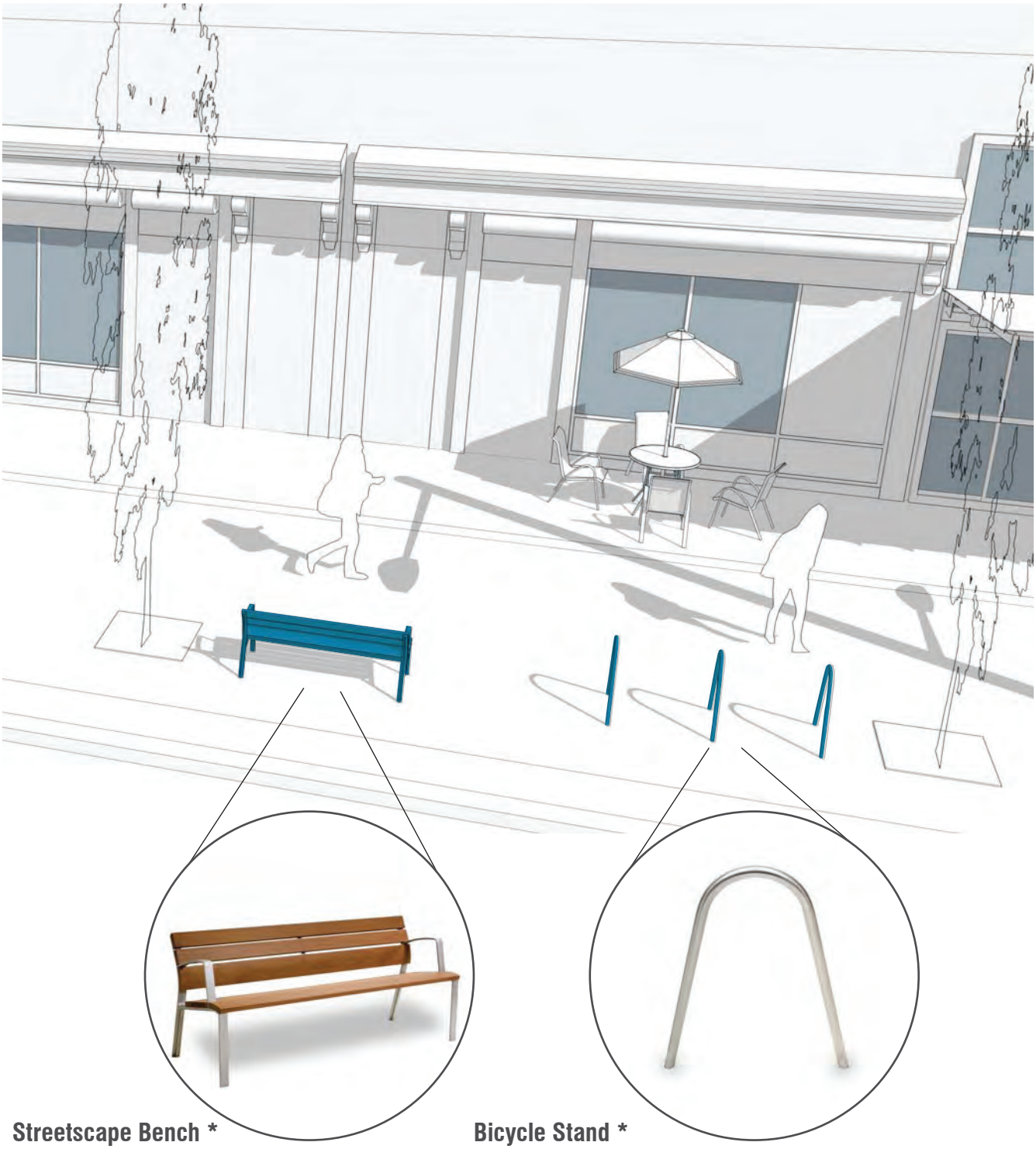
Pattern: Large Format Plank Style

** Or Approved Alternative*

Waste Receptacles *

Manufacturer: Landscape Forms
Style: Select Letter Receptacle
(double unit, solid body, perforated doors)
Material: Powdercoated Metal
Colour: Silver (body, door),
Black (trim ring, signage plate)

** Or Approved Alternative*



Streetscape Bench *
Manufacturer: Landscape Forms
Style: Neoliviano
Material: Metal / Wood
Colour: Aluminum Finish /
Jarah Wood

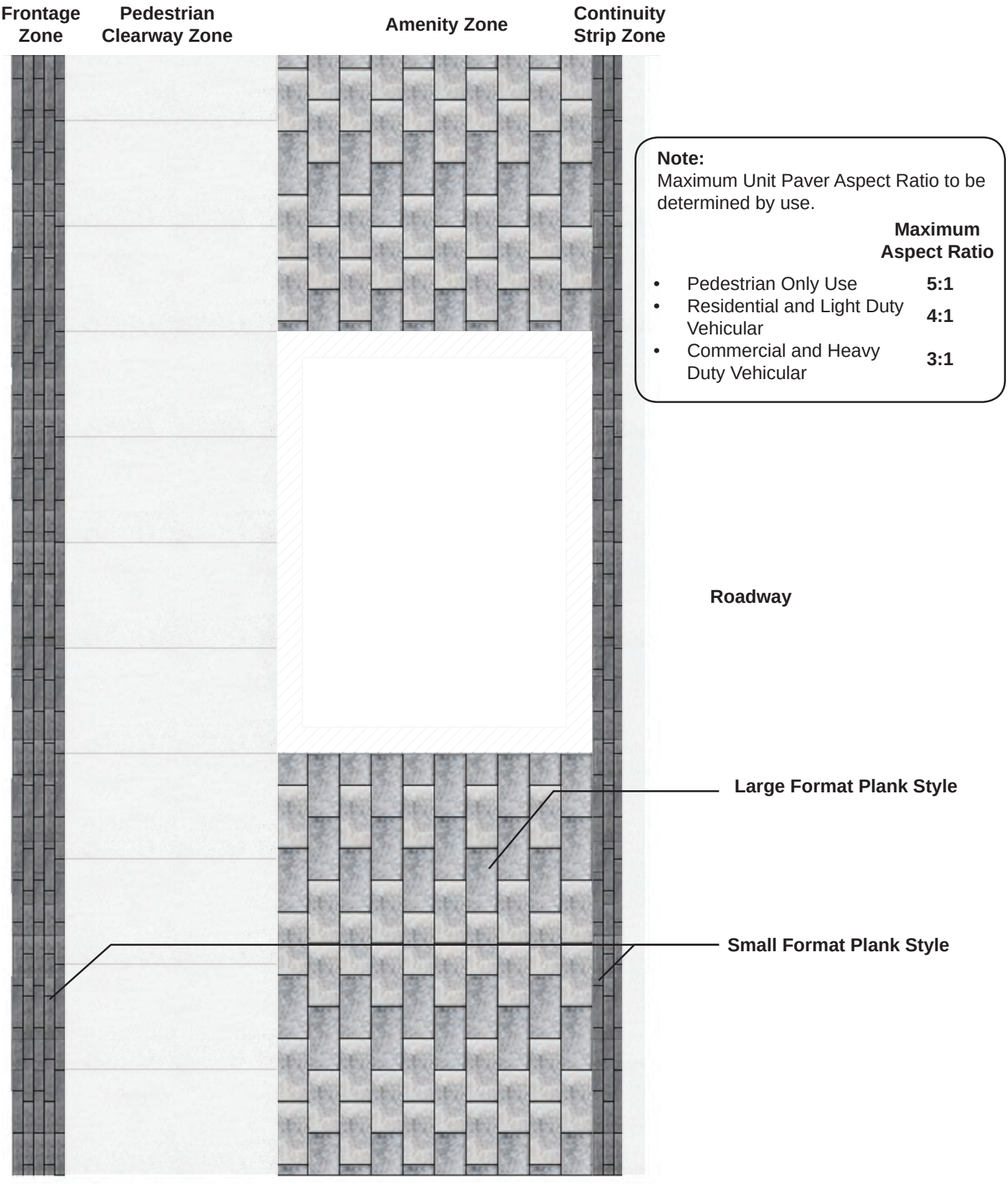
** Or Approved Alternative*

Bicycle Stand *
Manufacturer: Landscape Forms
Style: Bola
Material: Embedded Powder Coat
Colour: Stainless Steel

** Or Approved Alternative*

Typical Paving Pattern

For Enhanced and Premium Streets without Streetscape Plan Designs



Note:
Maximum Unit Paver Aspect Ratio to be determined by use.

	Maximum Aspect Ratio
• Pedestrian Only Use	**5:1**
• Residential and Light Duty Vehicular	**4:1**
• Commercial and Heavy Duty Vehicular	**3:1**

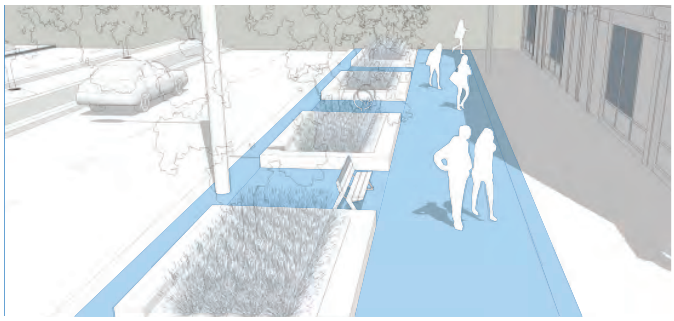
Figure 6.21: Typical Paving Pattern

Paving

Paving provides a flat surface, that can be easily navigated by pedestrians and designed to define areas and zones. The most common location for paving is in the pedestrian clearway zone (i.e., the sidewalk). However, in an urban setting, paving is also commonly found in the continuity strip, amenity zone, frontage zone and median. Paving is often divided into 'field paving' and 'accent paving', where field paving represents the most predominant material and colour and accent paving provides additional design and definition. Paving designs are a simple and effective way to define the zones in the streetscape.

Typically paving materials include:

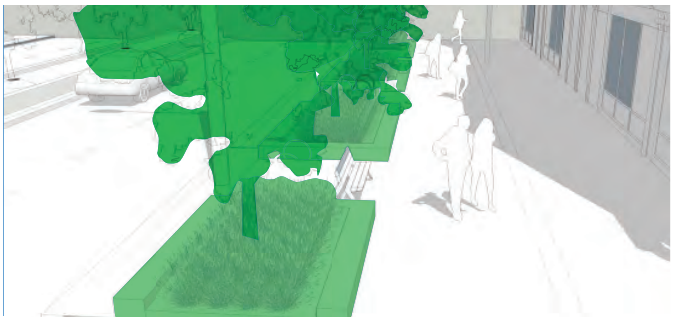
- Poured-in-place concrete
- Precast unit pavers on concrete base
- Precast unit pavers on granular base
- Permeable paving
- Natural stone
- Tactile paving



Planting

Planting represents the main visual amenity component found in the streetscape. Planting is generally used to create a visually appealing and comfortable pedestrian environment and acts as a buffer between pedestrians, cyclists and vehicular traffic. Planting plays a large part in forming the character of a streetscape. Street trees are one of the most utilized streetscape planting elements and provide a number of ecosystem service functions, providing shade, shelter, and oxygen.
In an urban context, planting is mostly found in the amenity zone; however, in a low density context it can be found in all of the other zones, with the exception of the pedestrian clearway. Sod or grass often replaces paving as a ground element in low pedestrian volume areas.
Typical planting components include:

- Street trees
- Sod
- Shrubs
- Perennials and ornamental grasses
- Seasonal planting
- Tree grates
- Planters

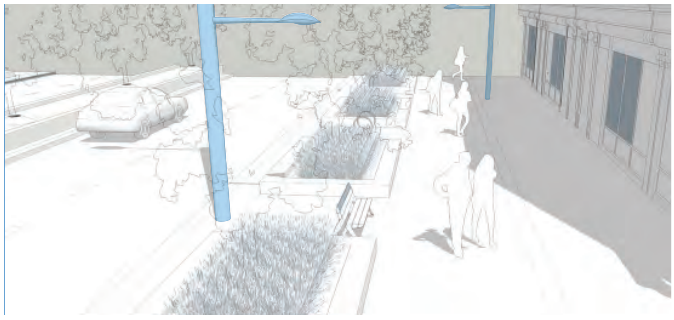


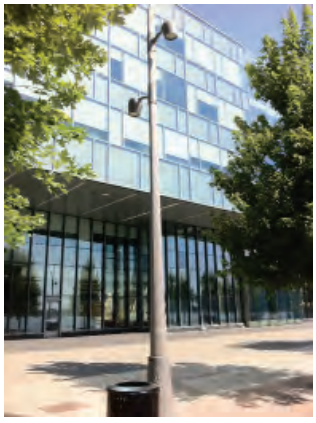
Illumination Elements

The most common and basic illumination elements are street lights. In general, lighting is a safety feature providing illumination for pedestrians, cycling and vehicular movement when it is dark. Street lights are primarily concerned with roadway illumination. Pedestrian lighting is used in higher pedestrian traffic areas to increase light levels for safety and for wayfinding. Pedestrian lights may be installed on pedestrian scaled poles or in combination with street light poles. Accent or specialty lighting can add additional safety to the streetscape and contribute to the character and experience of the street. Street lighting is generally found in the continuity strip or amenity zone, while pedestrian lights can be found in the amenity zone or frontage zone. At intersections, lighting and traffic signal poles should be coordinated to reduce obstructions and minimize clutter.

Illumination elements can include:

- Street lighting
- Pedestrian lighting
- Bollard lighting
- Paving lighting
- Accent lighting
- Seatwall lighting
- Tree up-lighting
- Wall wash lighting



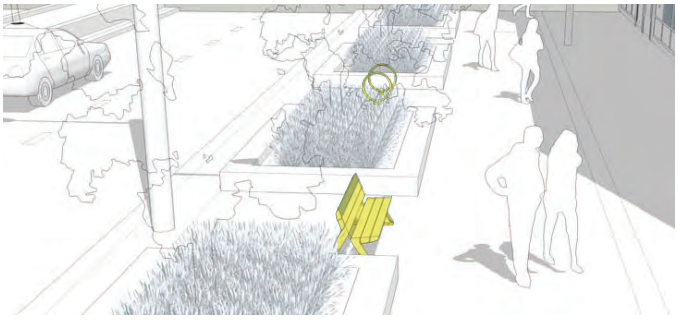


Site Furnishings

Site furnishings are generally functional streetscape amenities as opposed to aesthetic amenities. Benches provide places for pedestrians to sit and rest, while waste receptacles provide places for refuse to keep the streetscape clean. Bicycle stands provide parking for active transportation, similar to lay-by parking for vehicles. Site furnishings, mostly located in the amenity zone and frontage zone, vary depending on the level of pedestrian activity in the streetscape.

Typical site furnishings include:

- Bench
- Waste receptacle
- Bicycle stand
- Banners
- Wayfinding signage
- Bollard

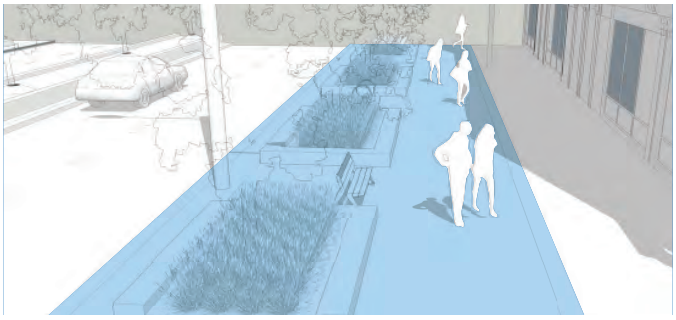


Innovation

The purpose of innovation components is to allow for non-typical state-of-the-art elements to be included in a streetscape design to the continually experiment, lead and drive innovation. These include unique installations and infrastructure which have not been implemented before in Vaughan. Innovation components are often part of pilot projects to test feasibility and impact on the streetscape. The most common innovation components include low impact development measures such as storm water management rain gardens, bioswales and bio-retention ponds.

Potential innovation components include:

- Low impact development measures
- Public art
- Digital media and communication installations
- Flexible street design
- Planting strategies
- Temporary landscape installations



Paving

Paving supports pedestrian traffic, cycling and accessibility; it is always located in the pedestrian clearway zone. In urban environments, paving is also commonly located in the frontage zone, amenity zone and continuity strip zone.

Paving provides a definition of space, visual aesthetic and represents the character of the area. For example, definition of space for different modes of transportation can be achieved through the use of field and accent paving. Alternatively, using a single field of paving across a roadway and pedestrian boulevard creates the perception of a single space from building face to building face.

Function

- Supports pedestrian traffic
- Supports cycle traffic
- Supports accessibility
- Definition of space
- Visual aesthetic
- Character, identity and branding of an area

Unit Paving

- Unit paving may be constructed on a concrete or permeable concrete base (for durability and to avoid differential settlement) or with a granular base to allow for infiltration depending upon site context.

Pedestrian Clearway

- The pedestrian clearway zone should be paved and a minimum of 2 m wide Standard Urban and Enhanced levels of service.
- Premium levels of service should have a paved pedestrian clearway with a minimum of width of 3 m to accommodate increased pedestrian traffic flows.
- The pedestrian clearway paving should be free of obstacles.

Raised Cycle Track / Multi-Use Pathways

- Typical paving is asphalt.
- Where raised cycle tracks and multi-use pathways are located along Enhanced or Premium streetscapes, cycling facilities may be paved using concrete or coloured concrete complimentary to adjacent pedestrian clearway unit paving.
- Where applicable, multi-use pathways shall be differentiated from the pedestrian clearway with different colour paving.
- Cycling facilities must meet Ontario Traffic Manual Book 18: Cycling Facilities guidance.

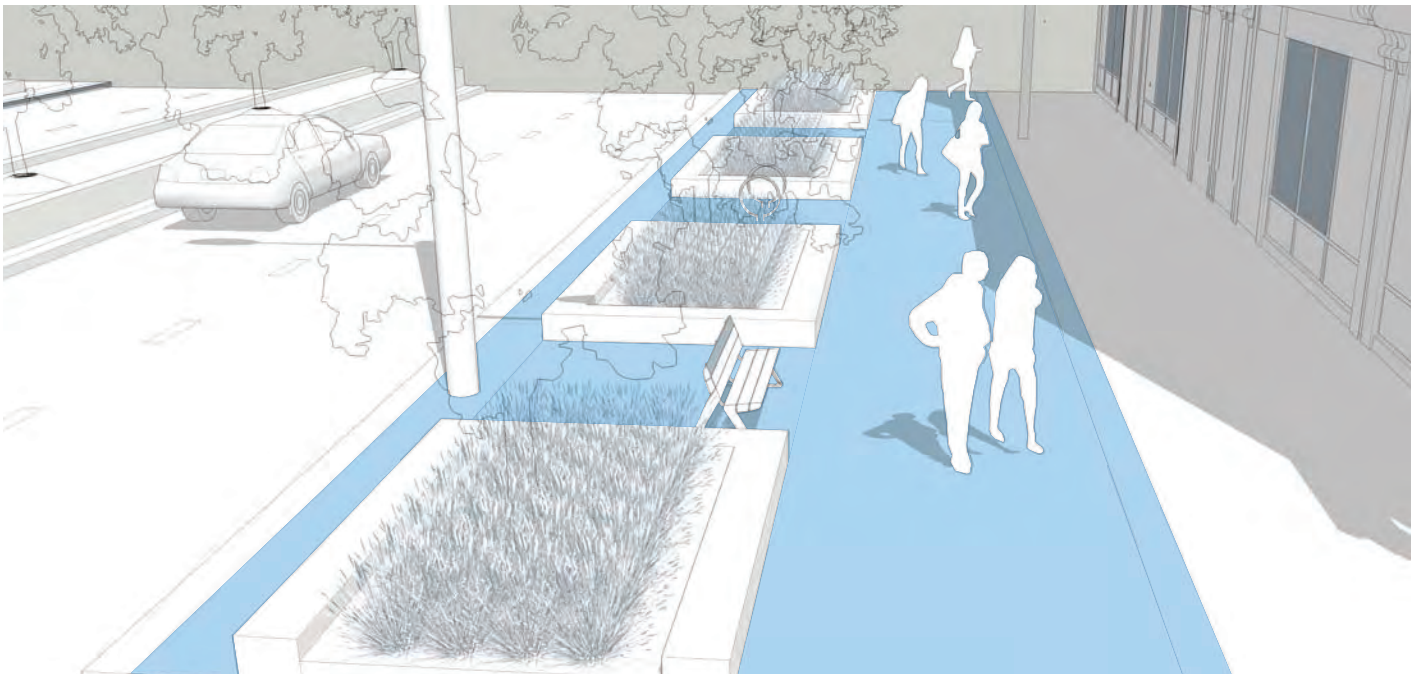


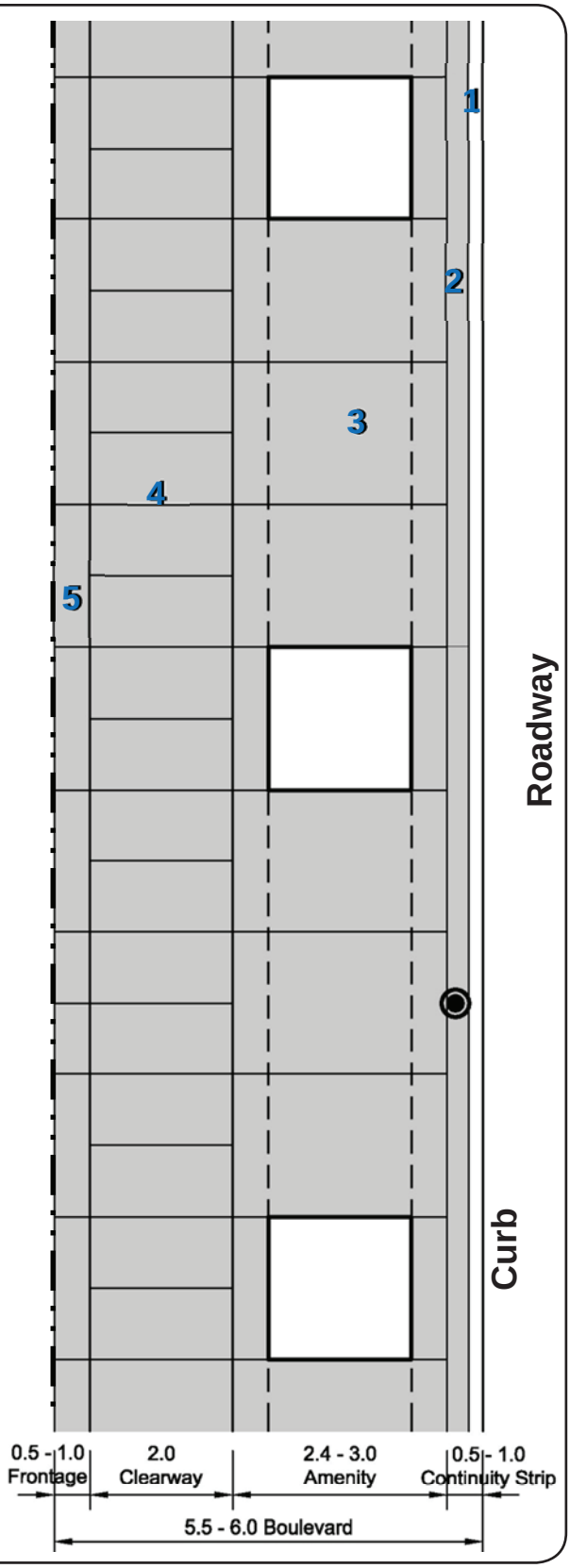
Figure 6.22: Paving

Standard Urban

KEY

R.O.W

1. Concrete Curb
   - P.I.P Concrete Curb
2. Continuity Strip
   - P.I.P Concrete
3. Amenity Zone
   - P.I.P Concrete Paving
4. Pedestrian Clearway 2.0m
   - P.I.P Concrete Paving
5. Frontage Zone
   - P.I.P Concrete Paving



Note: Paving Field and Accent Patterns to be determined by designer. Patterns shown for illustration purposes only.

Enhanced

KEY

- R.O.W

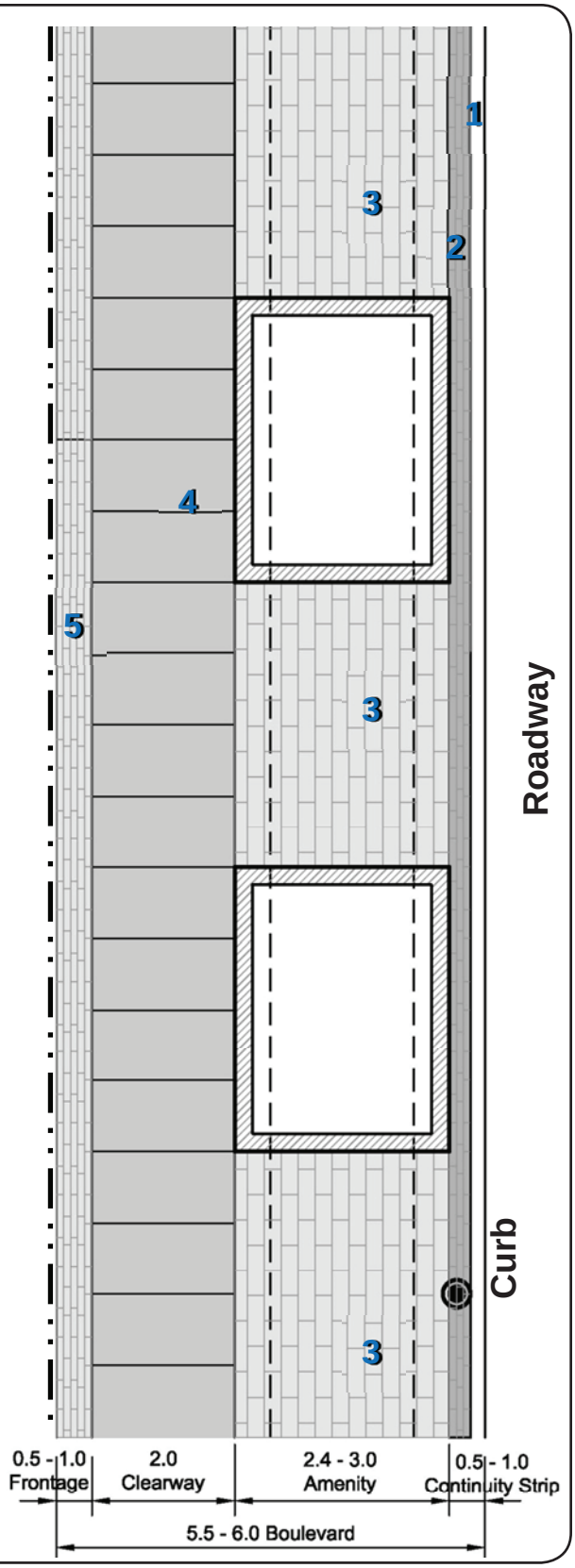
1. Continuity Strip
   - P.I.P Concrete Curb

2. Continuity Strip
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers

3. Amenity Zone
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Tactile Pavers

4. Pedestrian Clearway 2.0m
   - P.I.P Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Tactile Pavers

5. Frontage Zone
- Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers



Note: Paving Field and Accent Patterns to be determined by designer. Patterns shown for illustration purposes only.

Premium

KEY

R.O.W

1. Continuity Strip
   - P.I.P Concrete Curb

2. Continuity Strip
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers

3. Amenity Zone
   a) Main Field
   - P.I.P Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Natural Stone Pavers

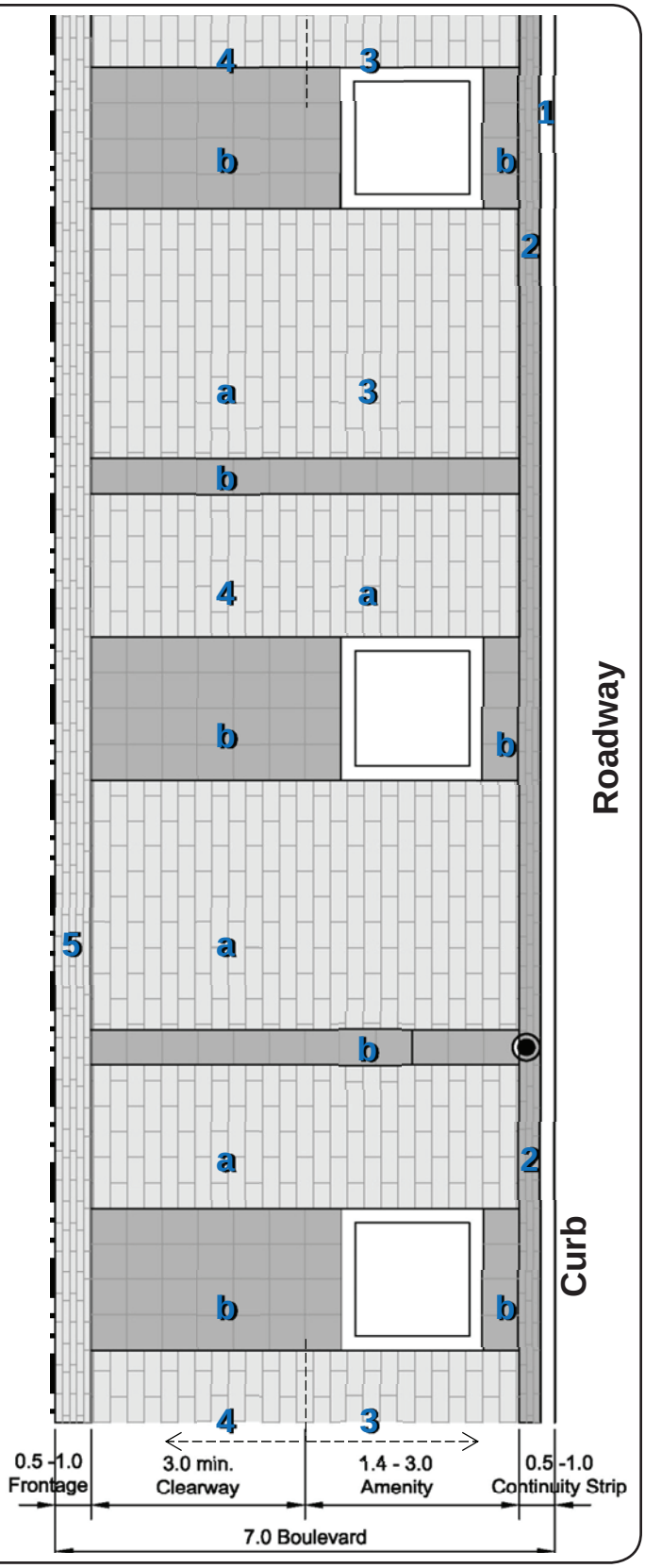
   b) Paving Accent
   - P.I.P Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Natural Stone Pavers

4. Pedestrian Clearway @ >= 3.0m Wide
   a) Main Field
   - P.I.P Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Natural Stone Pavers

   b) Paving Accent
   - P.I.P Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Tactile Pavers
   - Natural Stone Pavers

5. Frontage Zone
- Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Natural Stone Pavers

Note: Paving Field and Accent Patterns to be determined by designer. Patterns shown for illustration purposes only.



Illumination Elements

Illumination elements include street lighting, pedestrian lighting and accent lighting. Street lighting provides basic lighting requirements for vehicles, while pedestrian lighting adds additional comfort and safety for streetscapes with pedestrian traffic during the night. Accent lighting is beneficial for streetscapes which have heavy pedestrian activity during the night including restaurant, retail and entertainment districts. Lighting influences the overall experience of spaces and contributes to establishing the character, identity and branding.

Function

- Vehicular safety
- Pedestrian scale comfort and safety
- Support night time activities
- Visual aesthetic
- Character, identity and branding of an area

General

- Where possible, reduce light pole heights to create more human scaled streetscapes.
- Lighting design should follow dark sky principles.
- Street lighting should meet the City's Engineering Design Criteria and Standard Drawings. Designers must consult an electrical engineering consultant to ensure adequate lighting levels and coverage.

Street Lighting

- Street light locations should be determined on a per project basis with an electrical engineering consultant.
- Street light poles should be approximately 6 – 7 m in height.

Pedestrian Lighting

- Pedestrian light locations should be determined on a per project basis in consultation with an electrical engineer.
- Pedestrian light poles should be approximately 4 – 5 m in height for better human scale.
- Pedestrian lighting should be located on streets with night time pedestrian activity including public spaces, restaurants, retail and entertainment.

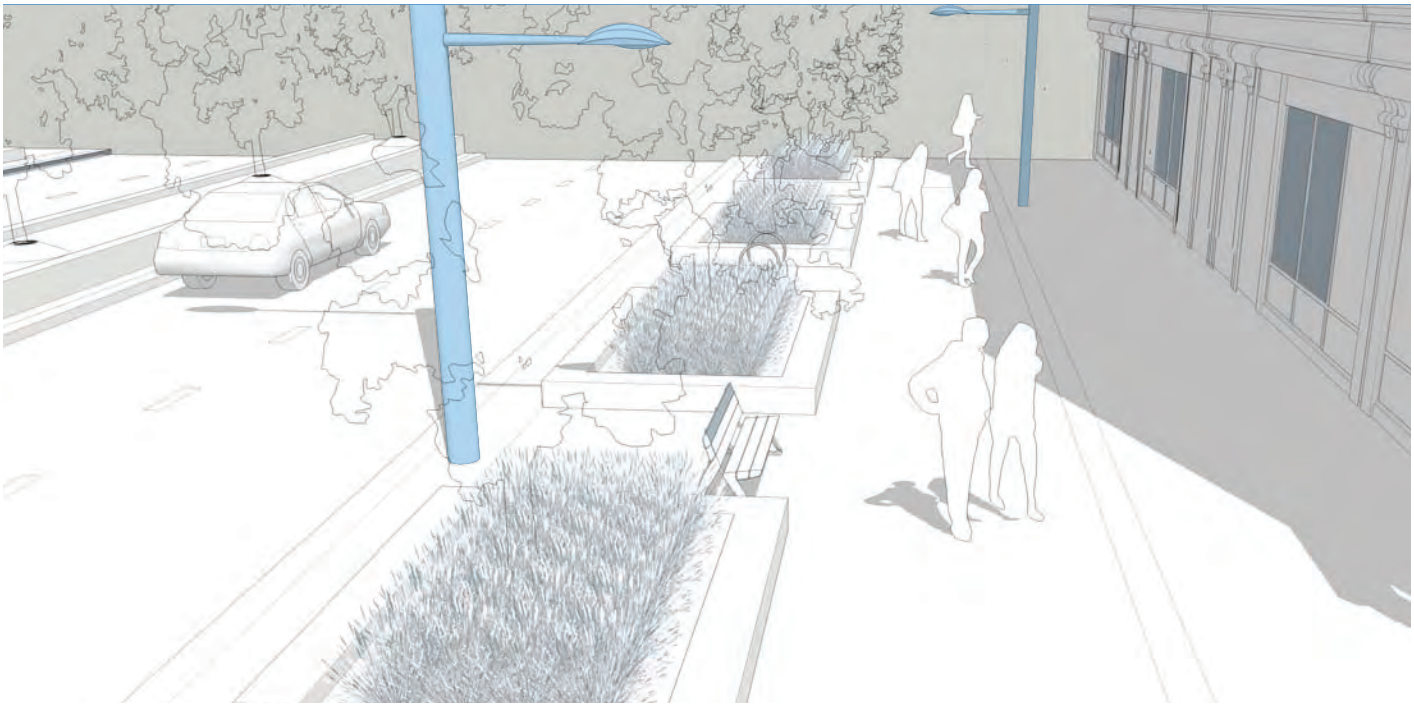


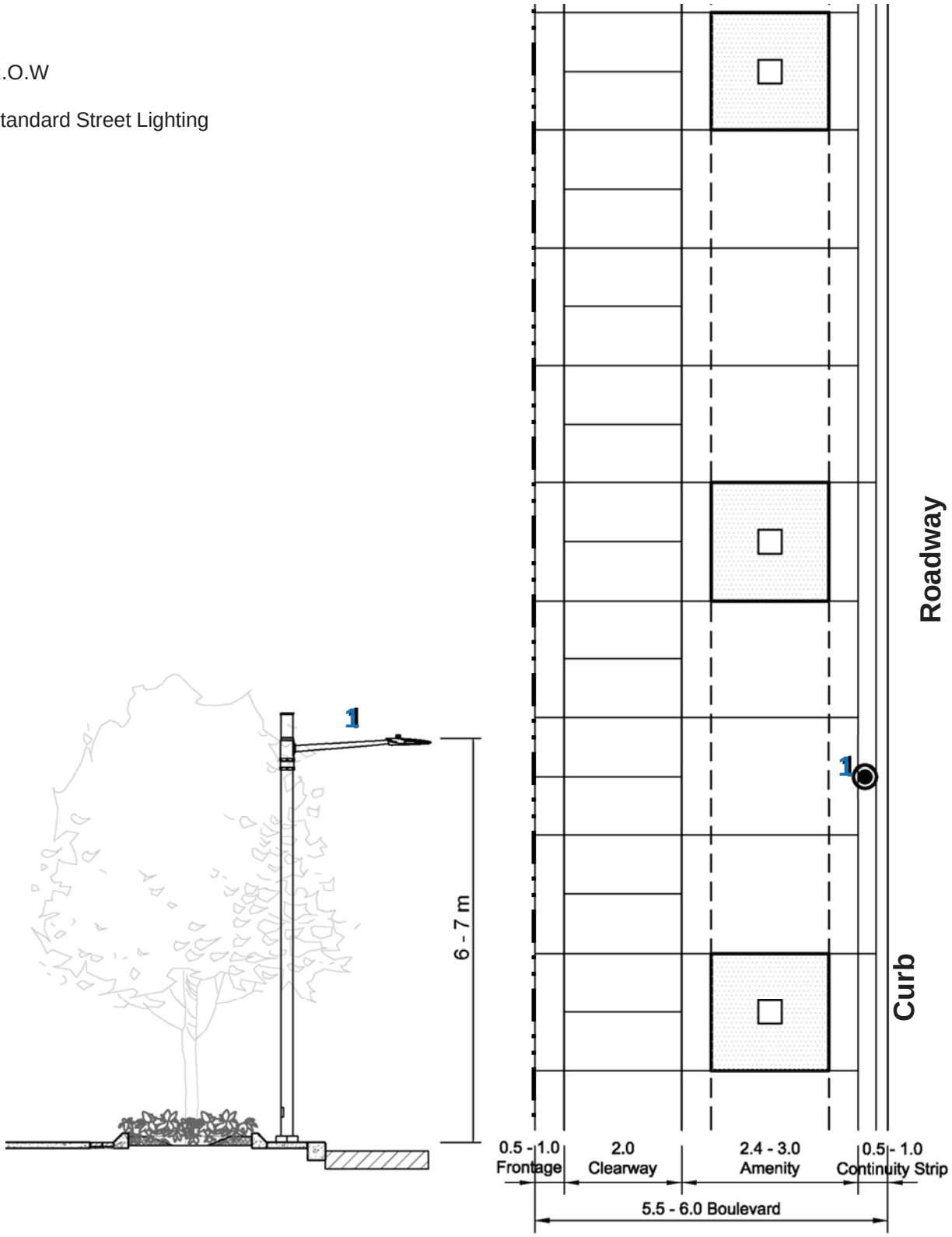
Figure 6.23: Illumination Elements

Standard Urban

KEY

R.O.W

1. Standard Street Lighting



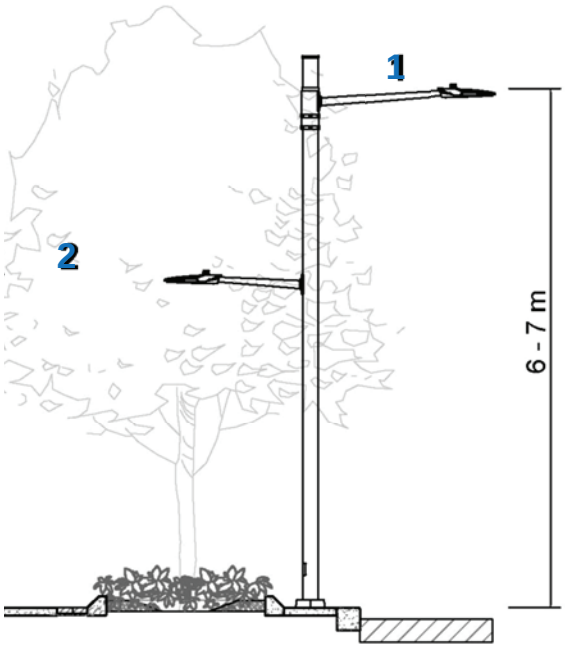
Enhanced

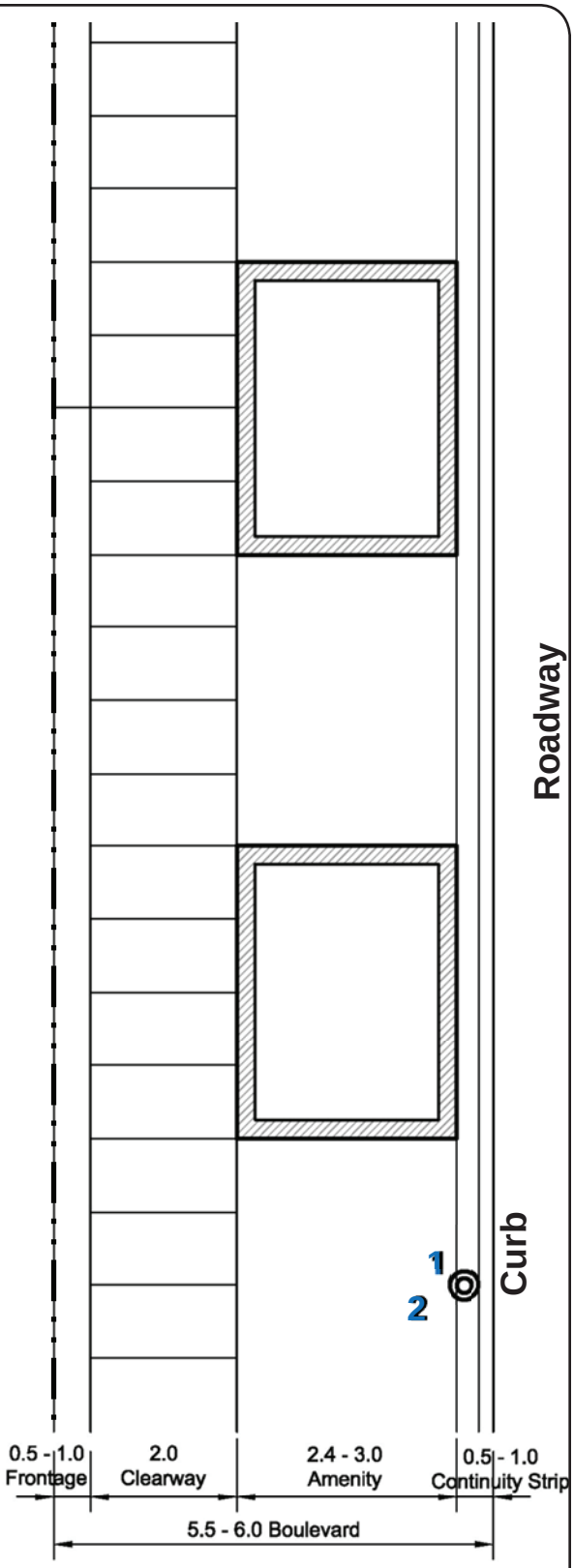
KEY

R.O.W

1. Standard Lighting
   - Street Lighting
   - Pedestrian Lighting
   - Combined Street/ Pedestrian Lighting
   - Pedestrian Lighting only (on existing pole)

2. Standard Pedestrian Lighting to be located within ROW





Premium

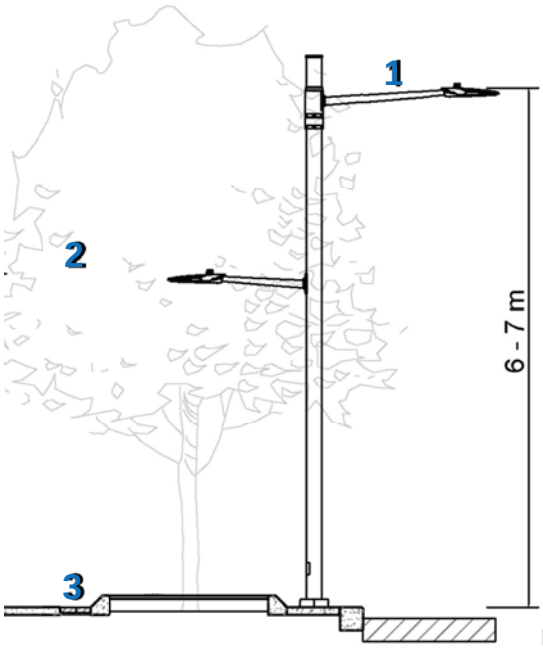
KEY

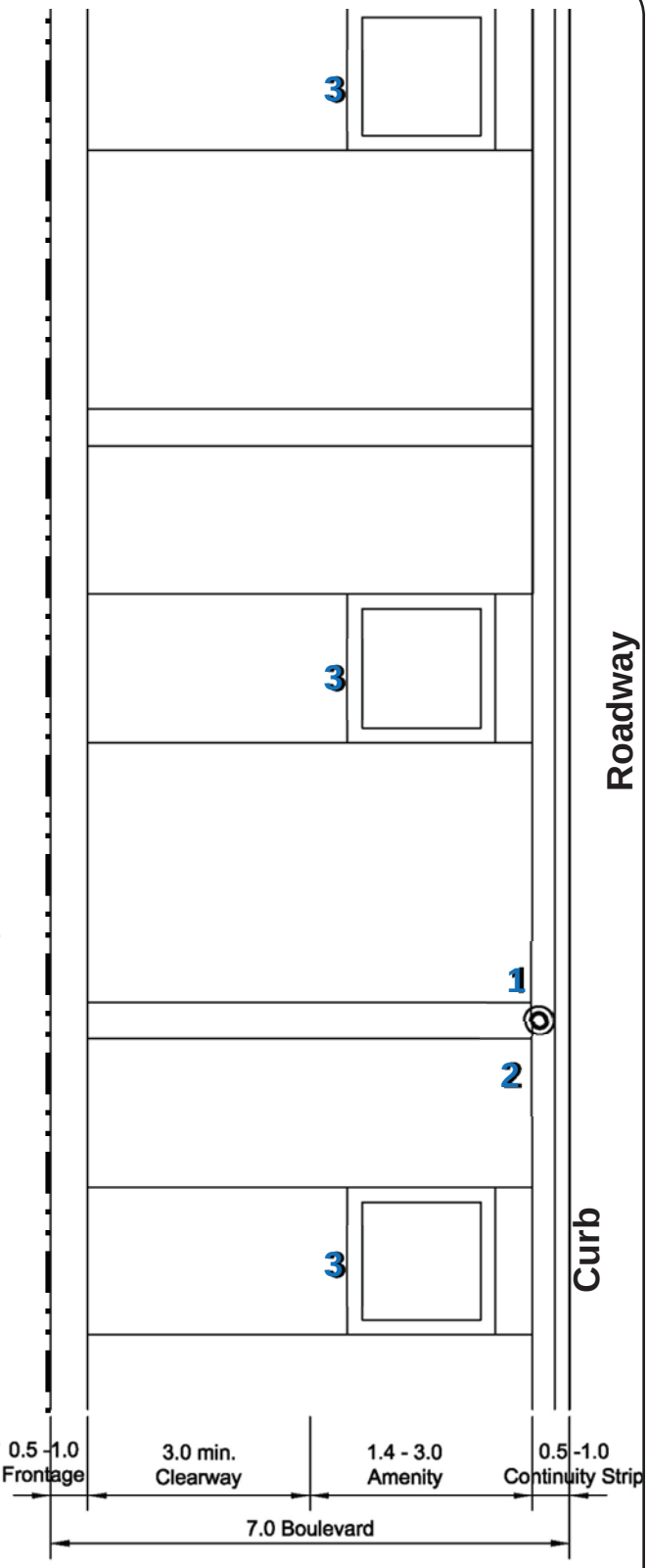
R.O.W

1. Standard Lighting
   - Street Lighting
   - Pedestrian Lighting
   - Combined Street/ Pedestrian Lighting
   - Pedestrian Lighting only (on existing pole)

2. Standard Pedestrian Lighting to be located within ROW

3. Specialty
   - Bollard Lighting
   - Paving Lighting
   - Accent Lighting
   - Seatwall Lighting
   - Wall Wash Lighting





Planting

Planting in the form of trees, shrubs, perennials, ornamental grasses and ground cover provides visual aesthetics, protection from the elements, buffer zones, and ecosystem services. Planting is most often found in the amenity zone and occasionally the frontage zone.

Function

- Protection from the elements (sun, wind, rain, snow)
- Protection from urban elements (noise, vehicle exhaust)
- Create definition of space / semi-private barriers (vegetation between public and residential lands)
- Absorb water, soil and air contaminants
- Stormwater management and low impact development measures
- Visual aesthetic
- Character, identity and branding of an area

Biodiversity

- Planting species should be selected based upon best practices for specific site characteristics.
- Planting should reflect a diverse urban forest; a mix of compatible tree species shall be generally implemented within each street and neighbourhood. Tree species diversity should be selected to generate a consistent tree canopy, ie. tree species with simliar growth rate, height and branching structure.

Special Planting

- Special planting could be used to distinguish special areas of cultural and historical significance including gateways, nodes and plazas.
- Special consideration should be given to planting used for low impact development measures along the streetscape.
- Annual or seasonal planting displays may be mobile in nature (i.e., movable planters) and able to relocate to best accommodate winter snow removal operations while ensuring the streetscape aesthetic and design intent are not compromised.

General Street Planting

- Planting shall generally be located in the amenity zone, acting as a buffer between vehicular traffic and the pedestrian clearway zone.
- Street planting must be coordinated with street furniture and above ground utilities. Where appropriate, open planters can be designed to incorporate seatwalls / benches.
- Locate curb and seat height planters in areas of fewer pedestrians for plant and tree protection from salt.
- Where required, passive and / or active irrigation shall be designed and installed. Drainage shall be provided for each planter as needed.
- Planting species should be selected appropriately to site conditions and have low maintenance requirements.

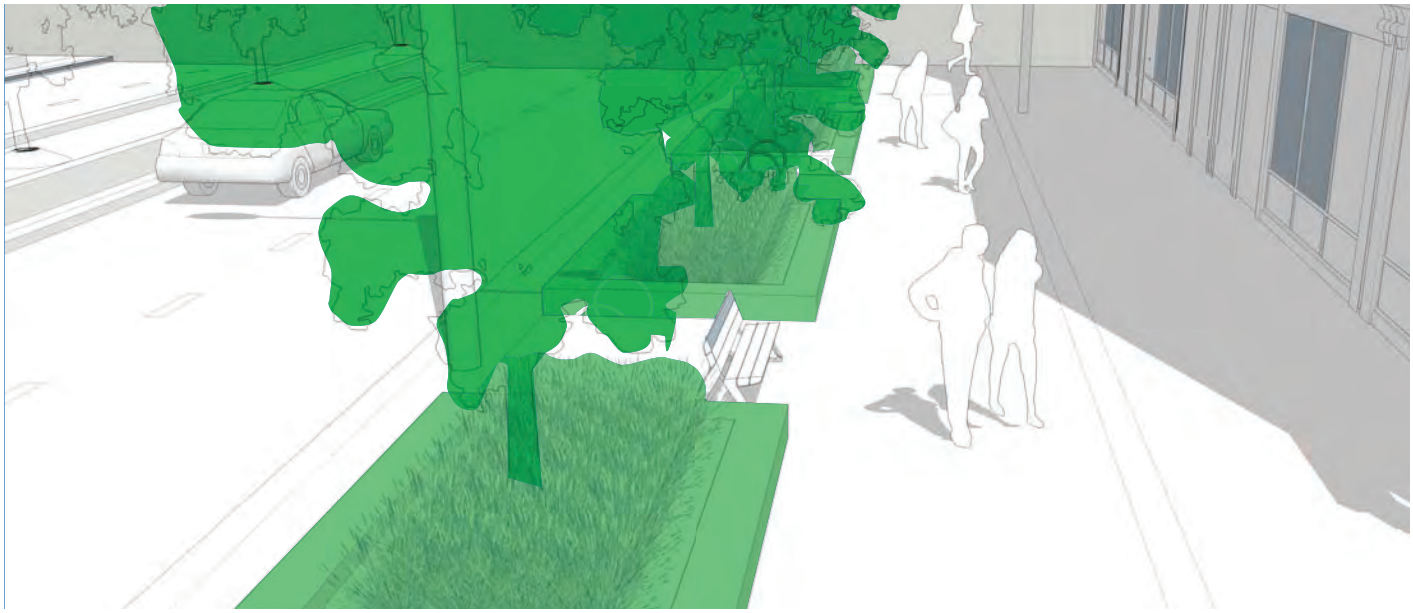


Figure 6.24: Planting

- Soil depths may vary depending on proposed planting material. Generally, tree soil in covered trenches must have an average of 1m depth of available soil; tree soil in open planters must have an average of 1.2m depth of available soil; shrubs and groundcover soil shall be determined per project.

Street Trees

- Street trees should be planted approximately 6 - 10 m on centre, depending on tree canopy size, to ensure adequate continuous tree pit soil volumes and a continuous protection from the elements for pedestrians depending on expected canopy maturity.
- Street trees should be planted a minimum of 2 m from the curb line (ideally 2.5 - 3.0 m) to the centre of the tree trunk.
- Allow for sufficient tree canopy allowance to ensure unencumbered canopy growth from buildings and other sidewalk elements.
- Street trees should have minimum 16 m^3 of soil volume per tree with a direct access to an additional 14 m^3 for a total soil volume of 30 m^3.
- Tree grates shall be used in areas of high pedestrian traffic and volumes such as nodes, intersections and other urban areas.
- Introduce structural soil cells in areas of high pedestrian traffic to protect tree roots soil volumes.
- Tree planting must be thoroughly coordinated with infrastructure and utilities located above and below ground.
- No public utilities should be located under street trees to avoid root conflicts.
- Street tree rhythm may vary between mid-block conditions and the transition zone of intersections.
- Where double rows of trees are contemplated, tree planters must be a minimum of 2 m in width.
- Lists of approved street tree species for streetscapes are available for Vaughan and York Region. Designers should consult the lists to select appropriate street trees (see Appendix B,C and D).
- Tree planting opening details shall be determined by the amount of pedestrian traffic flow expected within each sidewalk. In general, where a large volume of pedestrians is expected, the tree opening may be reduced to a minimum of 1.5 m x 1.5 m or (1.5 m diameter); where the pedestrian volume is expected to be minor, larger tree openings (open planters) can be designed (maximum up to two trees per planter).

Standard Urban

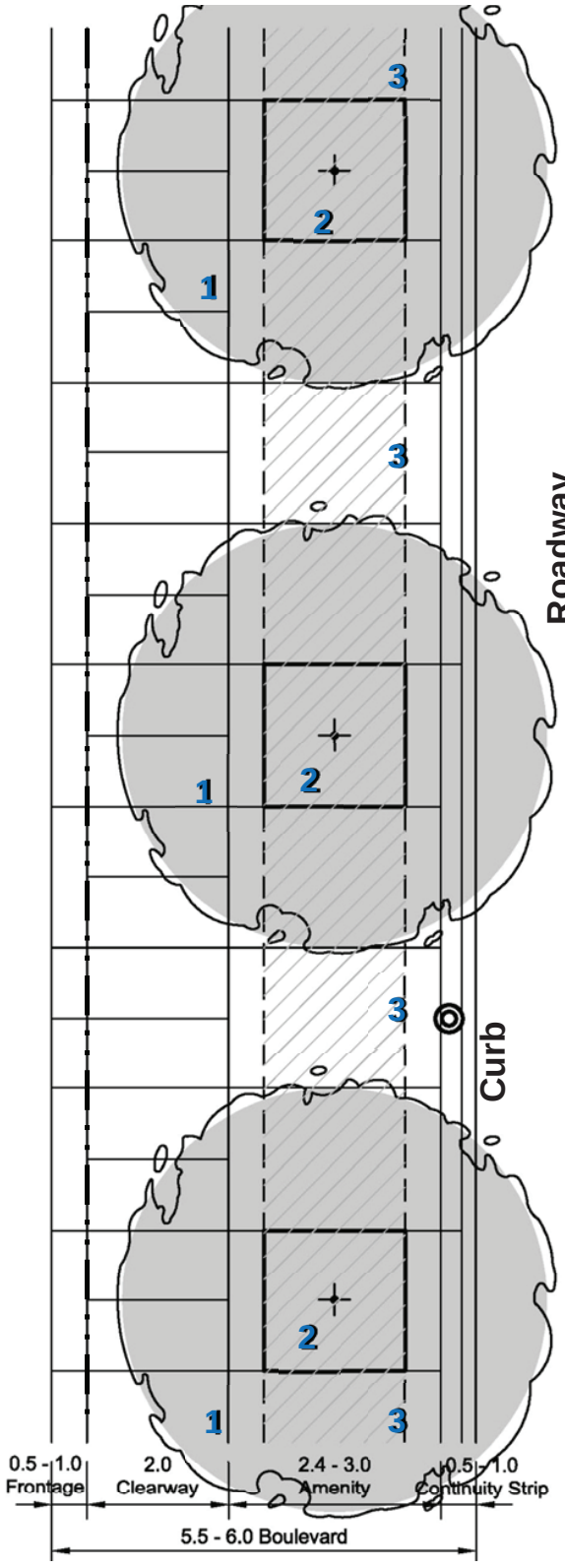
KEY

R.O.W

1. Tree Planting
   - 60mm Caliper for Deciduous

2. Planting Area /Softscape
   - Planting Soil
   - Tree Grate
   - Mulch
   - Perennials and Ornamental Grasses
   - Deciduous Shrub 0.6m Height
   - Coniferous Shrub 0.6m Height

3. Continuous Planting Trench Below



Enhanced

KEY

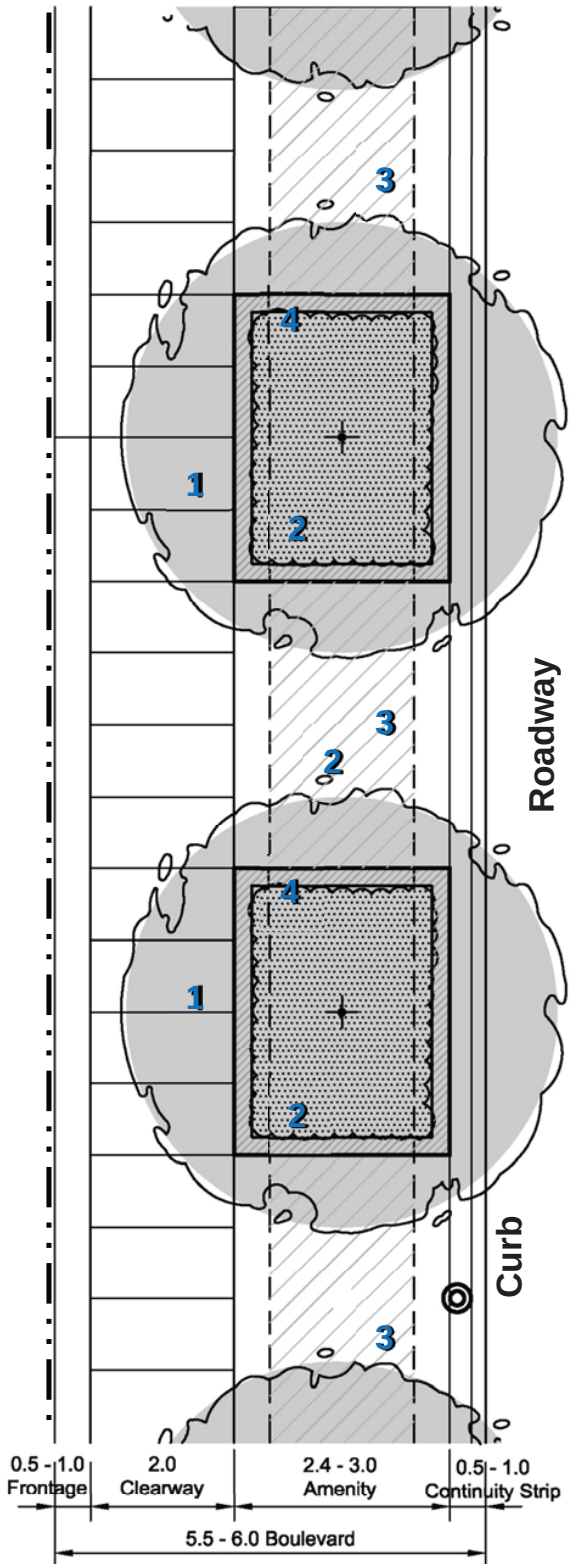
R.O.W

1. Tree Planting
   - 60mm - 80mm Caliper for Deciduous

2. Planting Area /Softscape
   - Planting Bed
   - Mulch
   - Perennials and Ornamental Grasses
   - Deciduous Shrub 1.0 to 1.5m Height
   - Coniferous Shrub 0.6m Height

3. Continuous Planting Trench Below

4. Planter
   - Flush Planter Curb
   - Raised Planter Curb
   - Free-standing Planter



Enhanced Double Row of Trees (Green Streets)

KEY

R.O.W

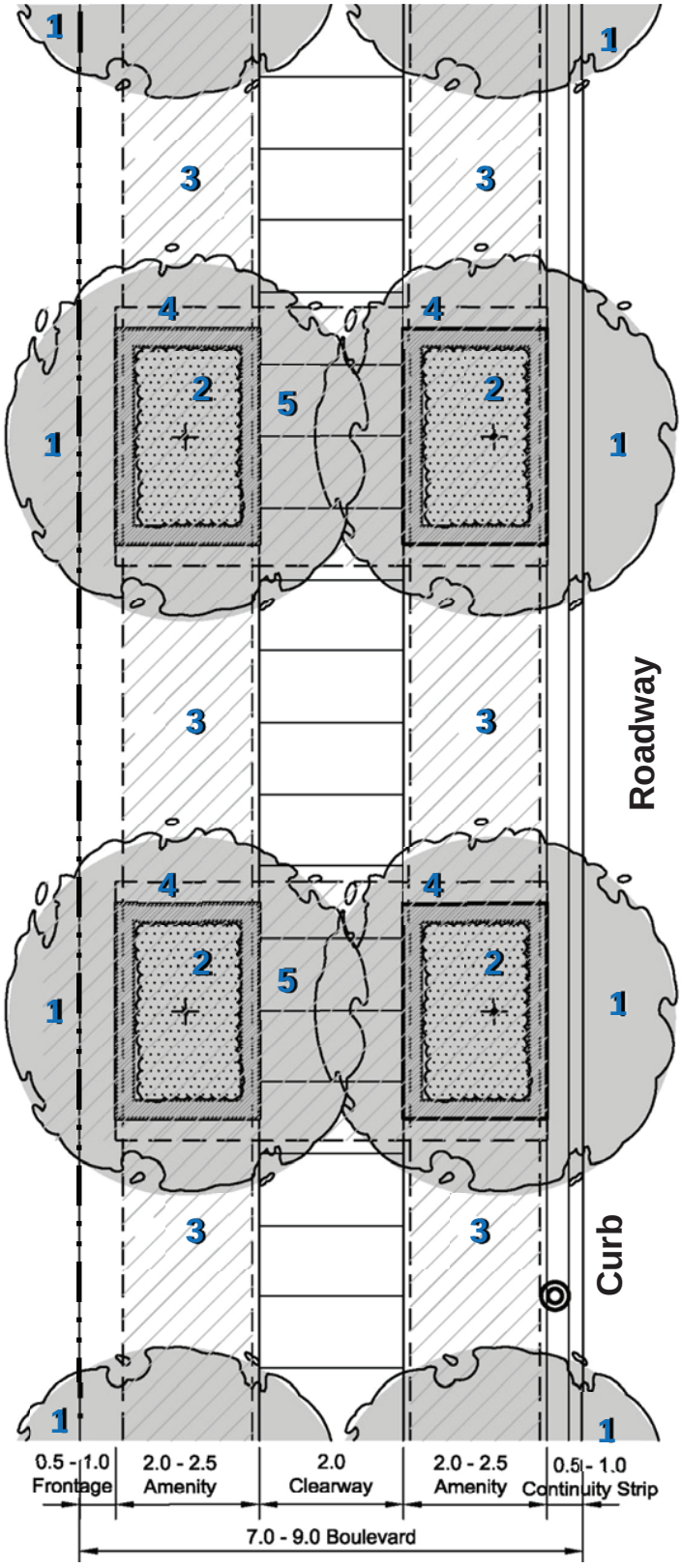
1. Tree Planting
   - 60mm - 80mm Caliper for Deciduous

2. Planting Area /Softscape
   - Planting Bed
   - Mulch
   - Perennials and Ornamental Grasses
   - Deciduous Shrub 1.0 to 1.5m Height
   - Coniferous Shrub 0.6m Height

3. Continuous Planting Trench Below

4. Planter
   - Flush Planter Curb
   - Raised Planter Curb
   - Free-standing Planter

5. Structural Soil Cells (16 m^3 min. vol. per tree with access to an additional 14 m^3 for 30m^3 total)



Note: Enhanced level of service streetscapes with a double row of trees in the public right-of-way requires a minimum of 2.0 meter wide planters and 2.0 meter pedestrian clearway. Where a double row of trees does not fit in the public row, consider negotiations with private land owners to plant a row of trees in the private setback.

Premium

KEY

R.O.W

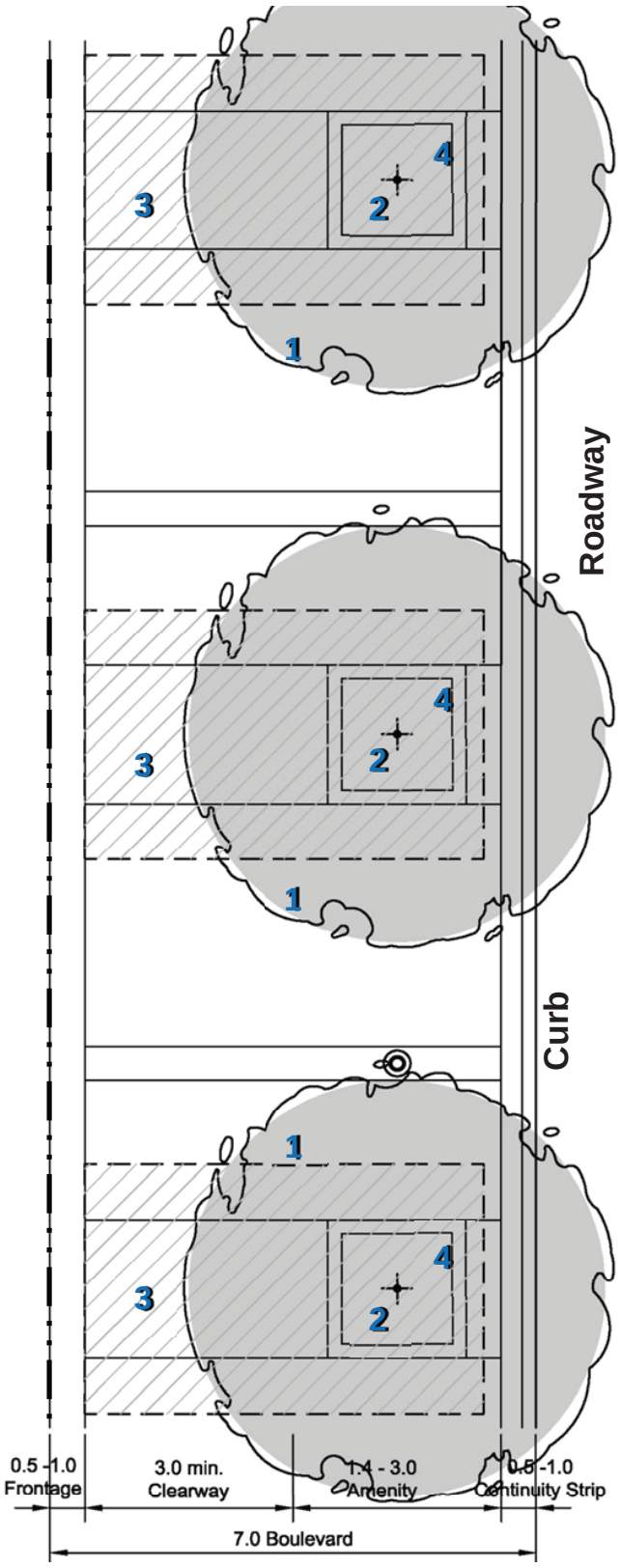
1. Tree Planting
   - 60mm - 100mm Caliper for Deciduous

2. Planting Area /Softscape
   - Planting Soil
   - Tree Grate
   - Mulch
   - Perennials and Ornamental Grasses
   - Deciduous Shrub 1.0 to 1.5m Height
   - Coniferous Shrub 0.6m Height

3. Structural Soil Cells (16 m^3 min. vol. per tree with access to an additional 14 m^3 for 30m^3 total)

4. Planter
   - Flush Planter Curb
   - Raised Planter Curb
   - Seatwall Planter (@0.45m ht.)
   - Free Standing Planter

5. Continuous Planting Trench Below



Premium Double Row of Trees (Green Streets)

KEY

R.O.W

1. Tree Planting
   - 60mm - 100mm Caliper for Deciduous

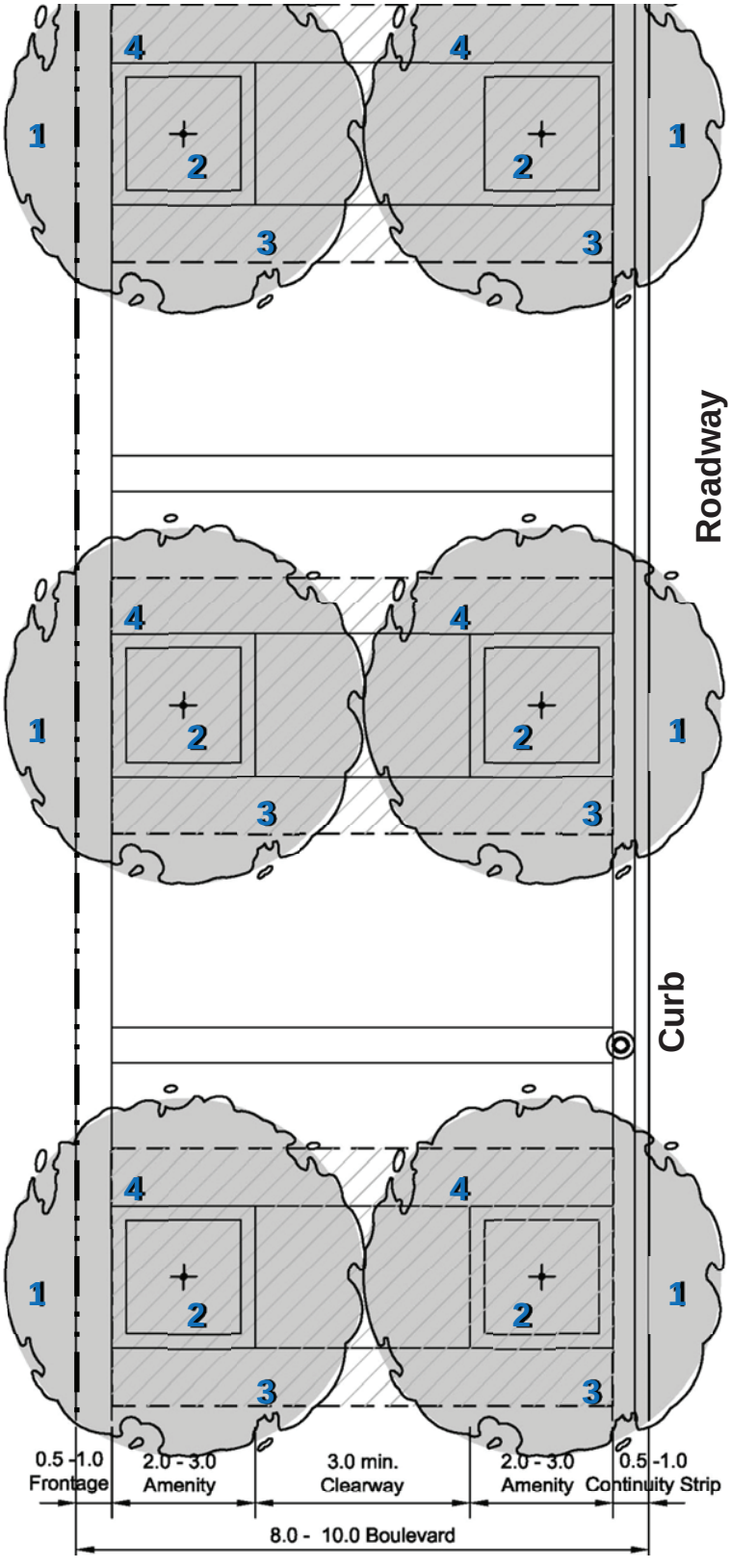
2. Planting Area /Softscape
   - Planting Soil
   - Tree Grate
   - Mulch
   - Perennials and Ornamental Grasses
   - Deciduous Shrub 1.0 to 1.5m Height
   - Coniferous Shrub 0.6m Height

3. Structural Soil Cells (16 m^3 min. vol. per tree with access to an additional 14 m^3 for 30m^3 total)

4. Planter
   - Flush Planter Curb
   - Raised Planter Curb
   - Seatwall Planter (@0.45m ht.)
   - Free Standing Planter

5. Continuous Planting Trench Below

Note: Premium level of service streetscapes with a double row of trees in the public right-of-way requires a minimum of 2.0 meter wide planters and 3.0 meter pedestrian clearway. Where a double row of trees does not fit in the public row, consider negotiations with private land owners to plant a row of trees in the private setback.



Site Furnishings

Site furnishings act as a unifying element along the length of a streetscape. The combination of style, texture and colour convey a visual connection between areas and contribute to each area's individual identity. Site furnishings are often grouped intermittently and become subtle reminders of an area's theme.

Function

- Pedestrian amenity
- Support active transportation
- Character, identity and branding of an area

General Guidelines

- Site furnishings to be located in the amenity zone and not interfere with the pedestrian clearway zone.
- Site furnishings to be clustered and located in strategic locations to avoid visual clutter and most efficiently serve pedestrians. Locations include nodes, pedestrian trails, cycling amenities for cycling routes, rest points and bus stops.
- Site furnishings should be durable, vandal-resistant, replaceable and easily maintainable.
- Site furnishings should be comfortable and accessible for all seasons.
- Site furnishings should be selected collectively to ensure a consistent character and design.

Waste and Recycling Receptacles

- Receptacles should be two stream.
- Effort should be made to consider solar powered compactors, such as 'Big Belly Solar', in the future.

Benches

- Benches should be minimum of 1.5 m in length to comfortably seat 2 to 3 individuals.

Bollards

- Removable or drop down bollards should be located at strategic locations for bus, emergency or service functions.
- Bollards should be of durable finish with concealed mounting.

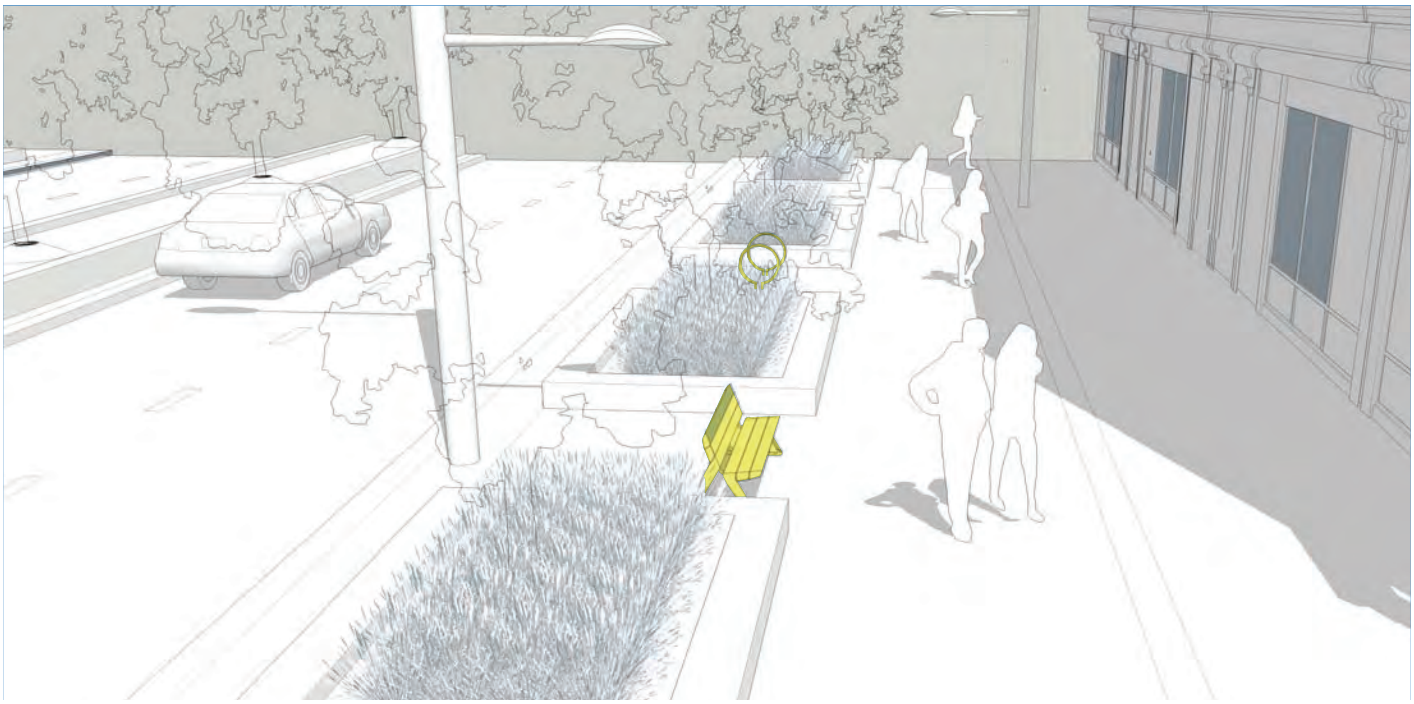


Figure 6.25: Site Furnishings

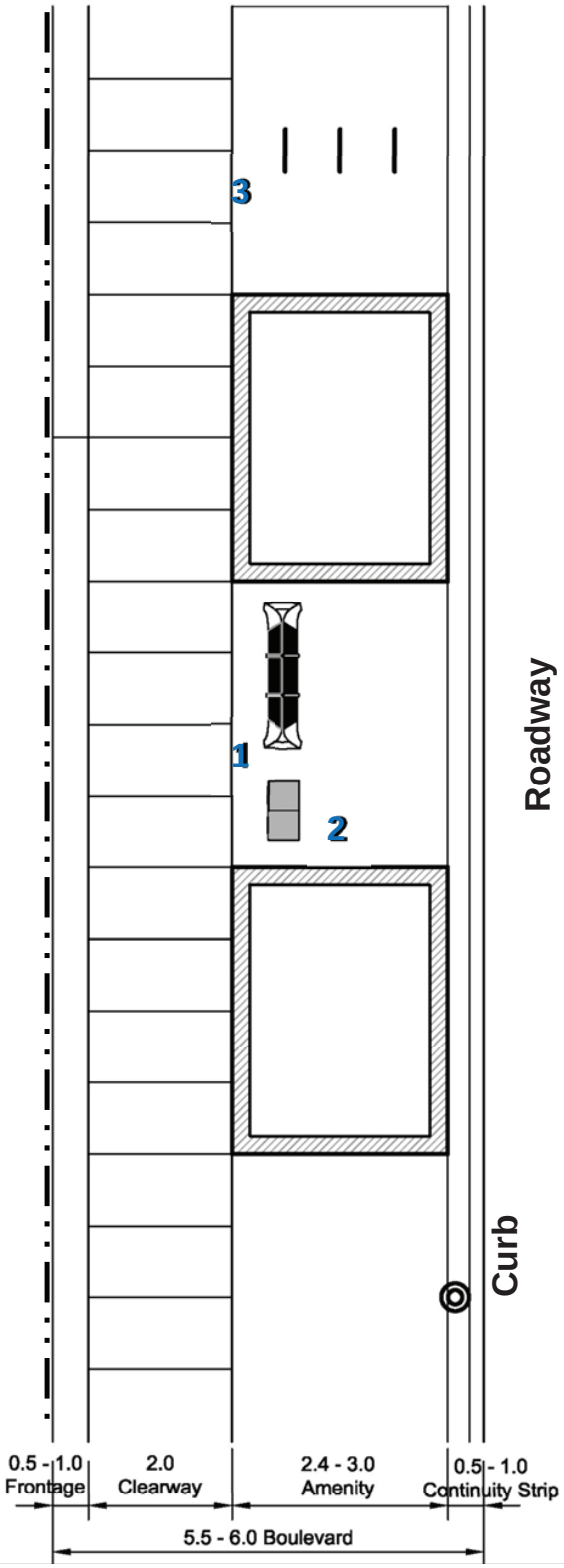
Bicycle Parking

- Bicycle stands should be located at key nodes, destinations and streets that are part of the transit and cycling networks including park entrances, schools, civic and community buildings, key shopping areas and transportation hubs.
- Bicycle stands shall be located close to building entrances without interrupting with pedestrian flow.
- Where possible, bicycle stands shall be located in a sheltered area for protection from elements.
- Bicycle stands shall be durable.
- Provide 0.75 m between each single bicycle stand.
- Provide 0.5 m between bicycle stands and the clearway (when parallel to the clearway)
- Provide 0.5 m between bicycle stands and planter/ planting (when parallel to planter/planting)
- Provide 0.5 - 0.7 m between bicycle stands and the curb with no on-street parking (when parallel to curb)
- Provide 1.0 - 1.3 m between bicycle stands and the curb with on-street parking (when parallel to curb).
- Bicycle stands shall be installed on hardscape.
- Provide a concrete pad adjacent to the pedestrian clearway zone for bicycle stands where no hardscape for installation is available.
- Bicycle stands shall be powder coated and embedded with concrete footing.

Enhanced

KEY

- R.O.W
1. Bench
2. Waste Receptacle / Recycle Unit
3. Bicycle Parking

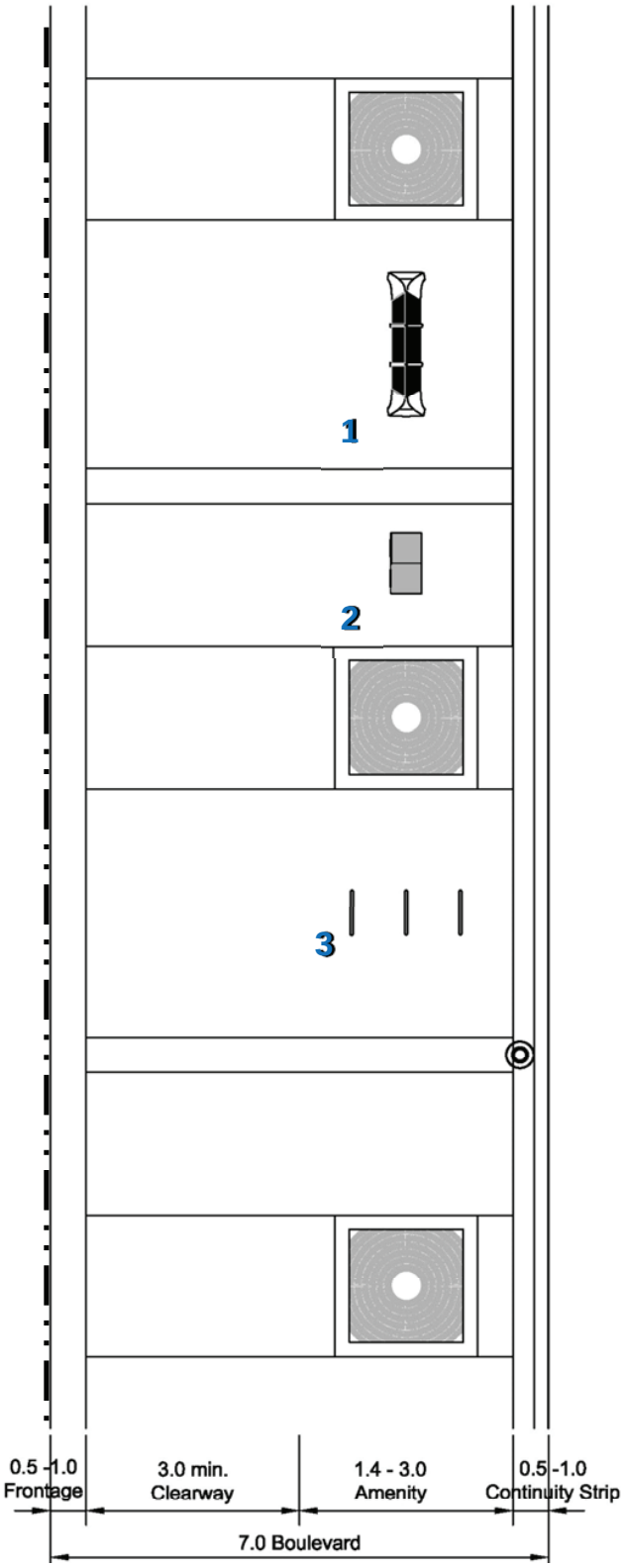


Note: Locations of site furnishings for illustration purposes only. Site Furnishings to be located per design and best practice.

Premium

KEY

- R.O.W
1. Bench
2. Waste Receptacle / Recycle Unit
3. Bicycle Parking



Note: Locations of site furnishings for illustration purposes only. Site Furnishings to be located per design and best practice.

Medians

The role of a median is more important to vehicular roadway functions; however, medians offer space for a variety of elements which contribute to the visual interest and aesthetic of an area. Medians also provide a refuge for pedestrians crossing large roadways at intersections.

Function

- Separate opposite directions of vehicular traffic.
- Pedestrian refuge for pedestrian crossings greater than 15 m in length.
- Space for visual aesthetic elements such as planting and public art.
- Space for character, identity, branding elements.

General Guidelines

- No planting or visual obstructions should be located past the pedestrian crossing into the intersection.
- A continuous splash pad should be located on both sides of the median where the median is large enough for planting.

Pedestrian Crossing

- The median should provide clear access with no obstructions where pedestrian crossings cross the median.
- AODA ramps or drop curbs with tactile surface should be provided where pedestrian crossings cross the median.

Vegetation

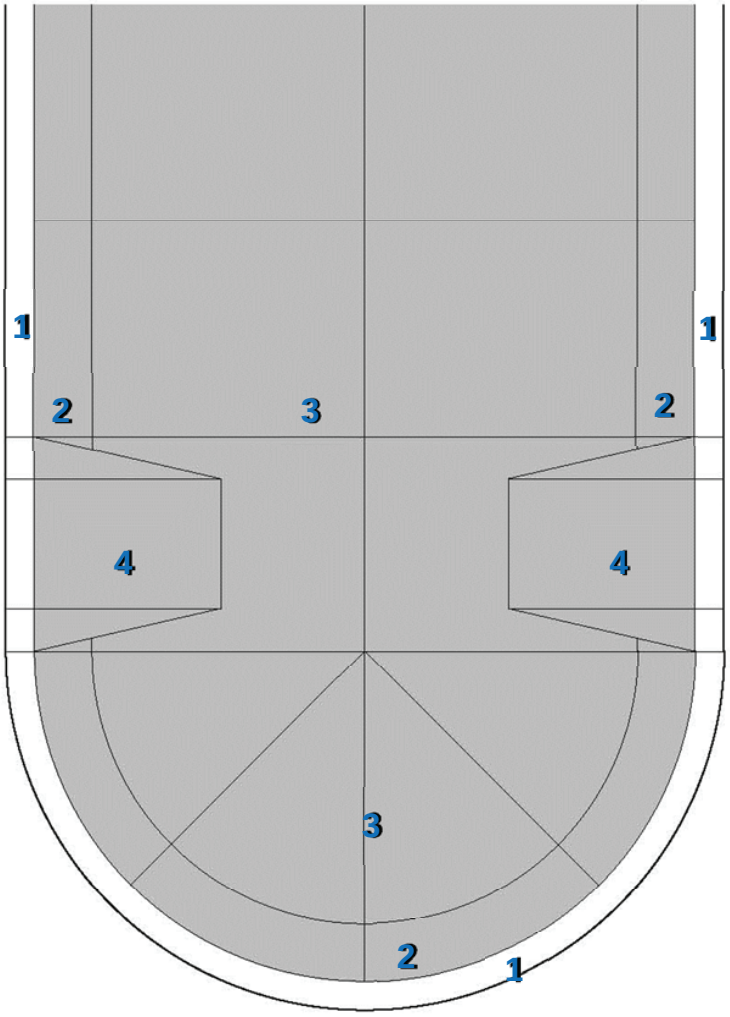
- Where trees or planting is located in the median, a raised planter curb protects vegetation from road salt.
- Shrubs, perennials and ornamental grasses used in the median should not obstruct sight lines near intersections.
- Where planting is included in the median, the median should have a minimum width of 4 m for shrub and ornamental planting and a minimum width of 6 m for tree planting.
- Automated irrigation to be considered in planted medians for ease of maintenance.
- Planting in the median should be salt and drought tolerant for greatest success of survival (see Appendix E for Salt and Drought Tolerant Species List).

Figure 6.26: Medians

Standard Urban Hardscape

KEY

1. P.I.P Concrete Curb
2. P.I.P Concrete Continuity Strip
3. P.I.P Concrete Paving
4. AODA Ramp and Drop Curb



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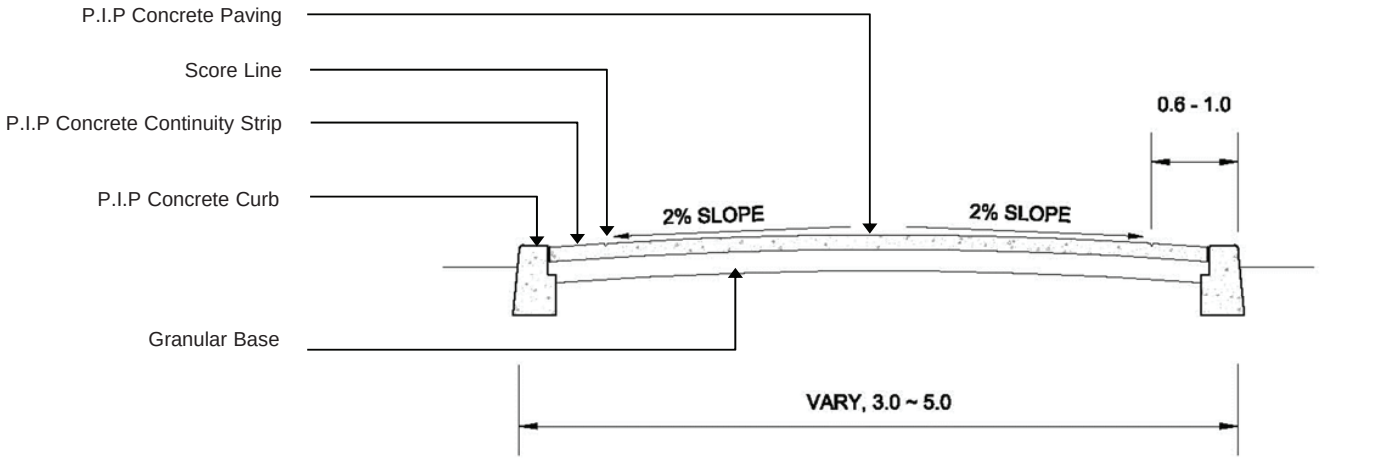


SECTION

Enhanced Hardscape

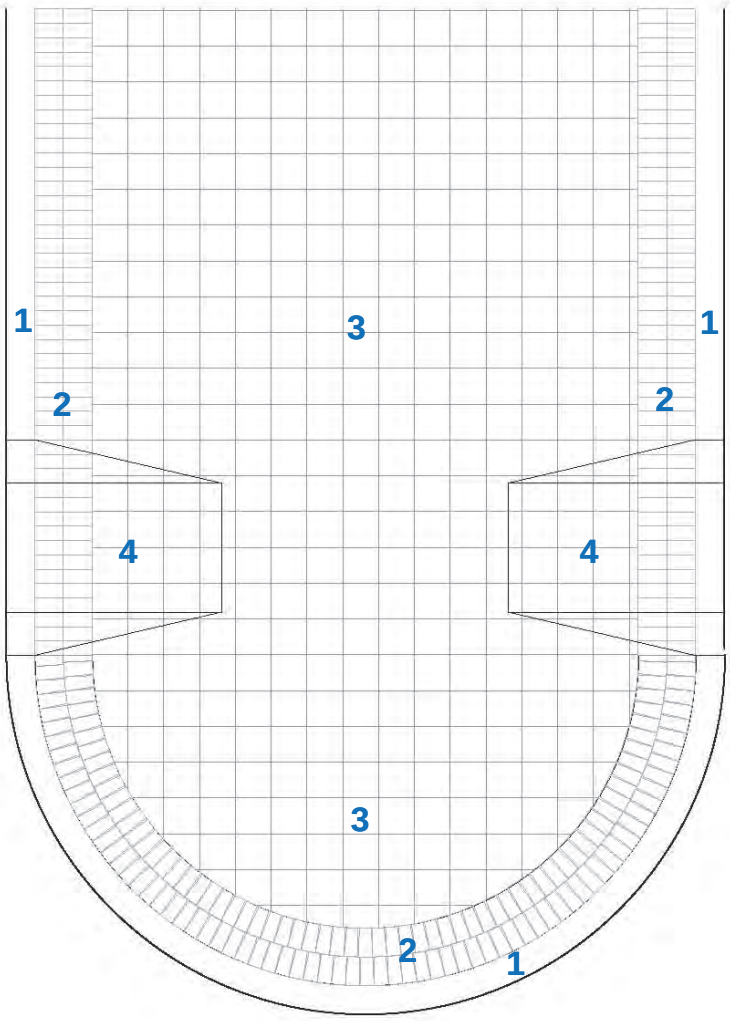
KEY

1. P.I.P Concrete Curb

2. Continuity Strip
   Material Options:
   - P.I.P concrete Paving
   - Pre-cast Concrete Unit Paver
   - Permeable Paving

3. Field Paving
   Material Options:
   - P.I.P concrete Paving
   - Pre-cast Concrete Unit Paver
   - Permeable Paving

4. AODA Ramp and Drop Curb



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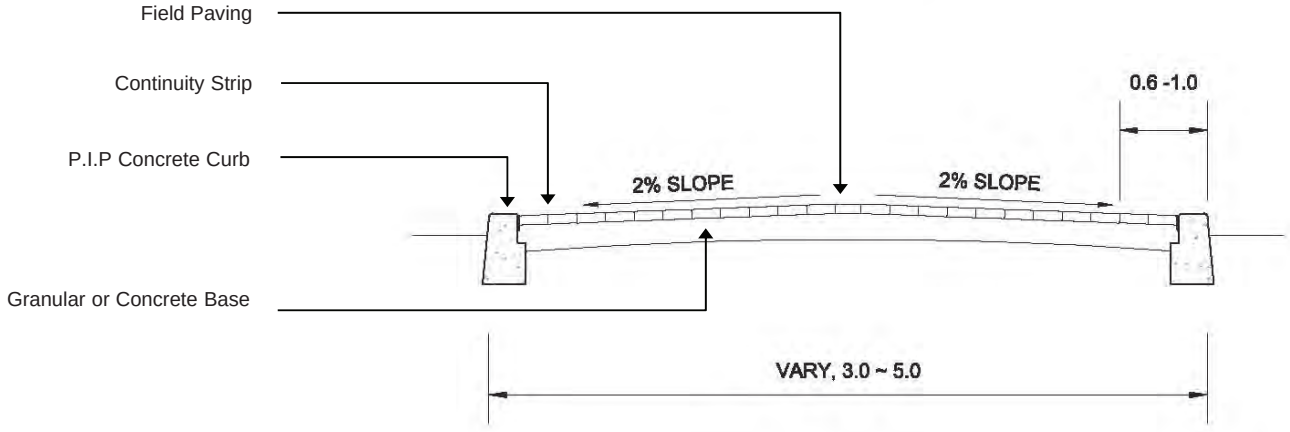


SECTION

Premium Hardscape

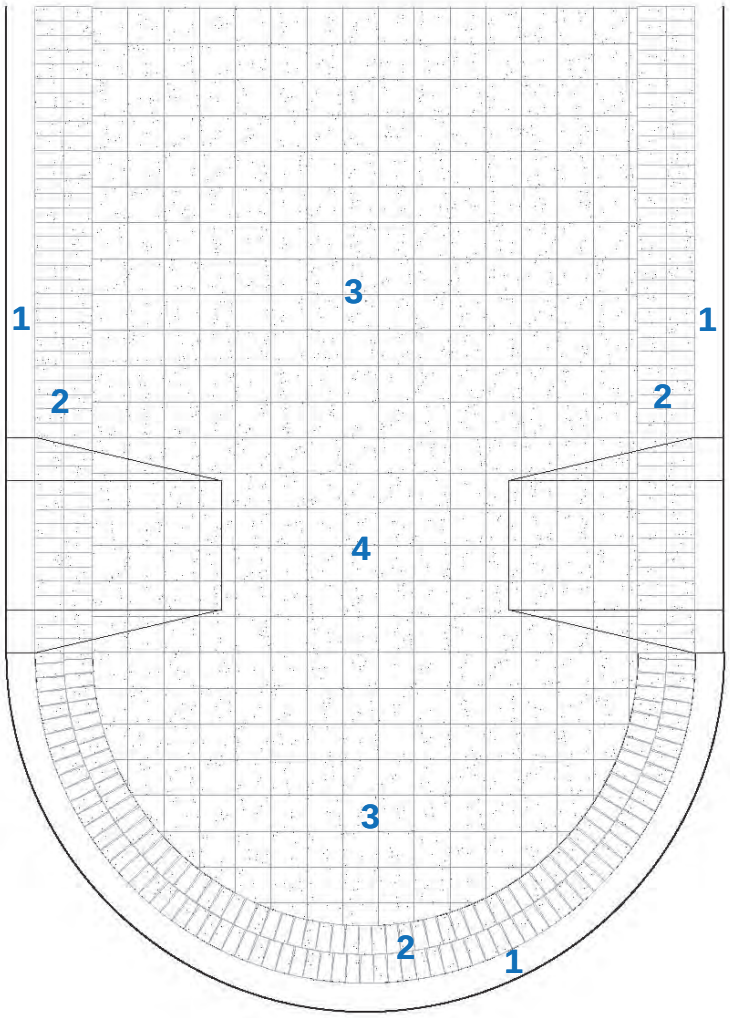
KEY

1. P.I.P Concrete Curb

2. Continuity Strip
   Material Options:
   - P.I.P concrete Paving
   - Pre-cast Concrete Unit Paver
   - Natural Stone Paver
   - Permeable Paving

3. Field Paving
   Material Options:
   - P.I.P concrete Paving
   - Pre-cast Concrete Unit Paver
   - Natural Stone Paver
   - Permeable Paving

4. AODA Ramp and Drop Curb



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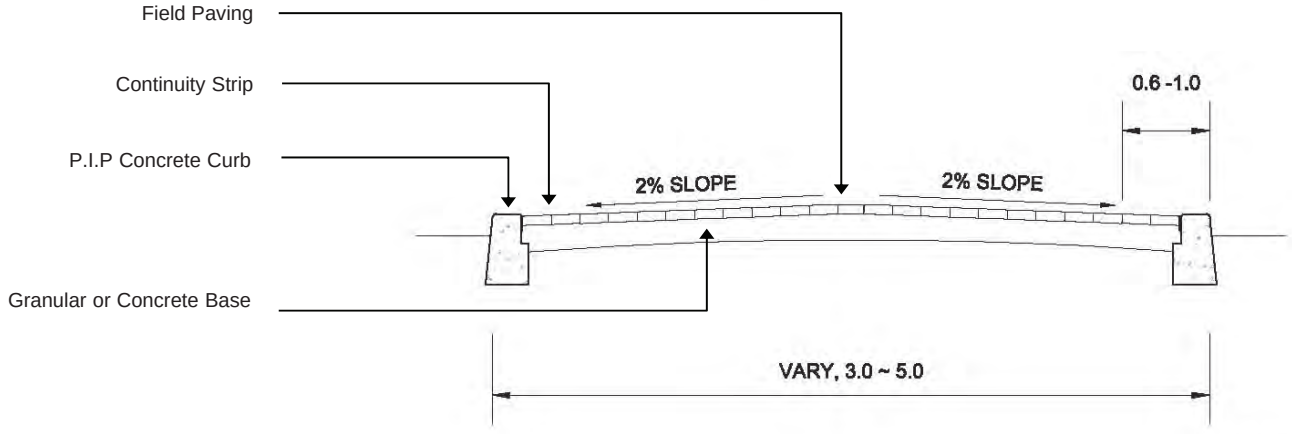
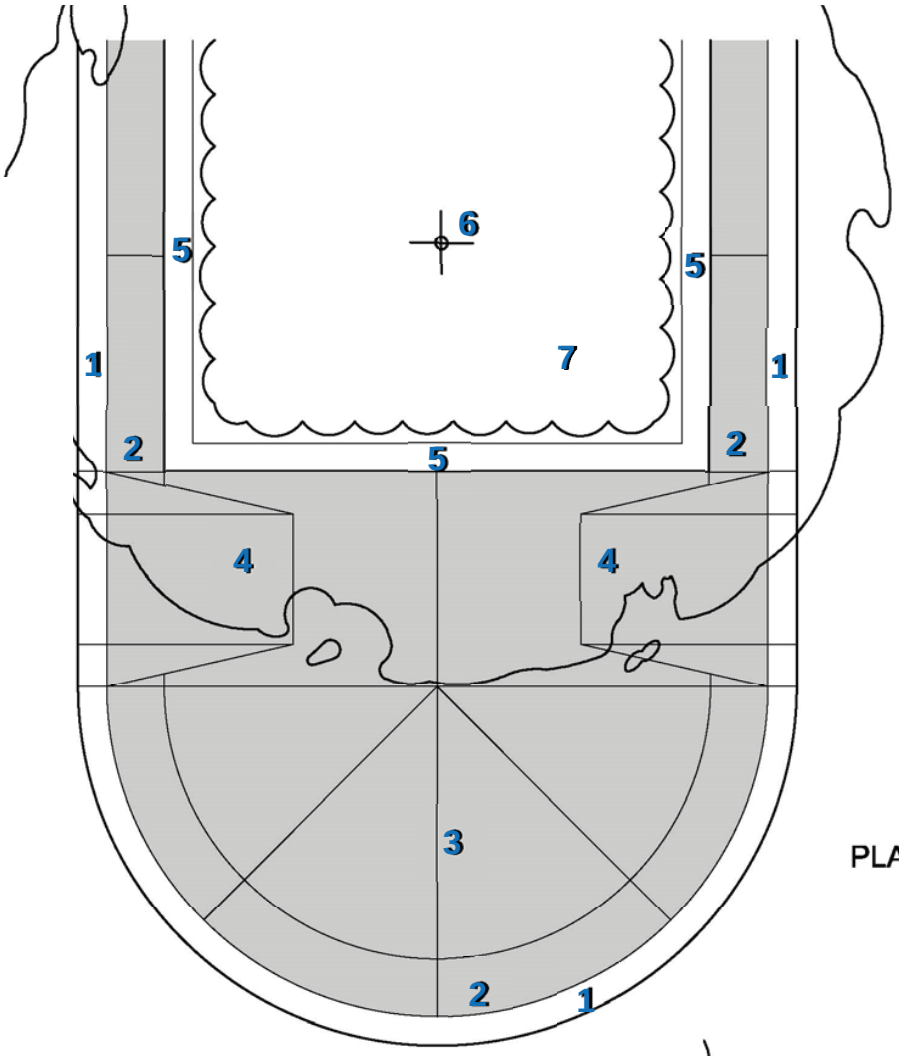


SECTION

Standard Urban Softscape

KEY

1. P.I.P Concrete Curb
2. P.I.P Concrete Continuity Strip
3. P.I.P Concrete Paving
4. AODA Ramp and Drop Curb
5. P.I.P Concrete Planter Curb
   200x200mm Min.
6. Tree Planting
   60mm Caliper for Deciduous
   2.0m Height for coniferous
7. Softscape
   Sod
   Mulch
   Perennials
   Ornamental Grass
   Deciduous Shrub 600mm Height
   Coniferous Shrub 600mm Height



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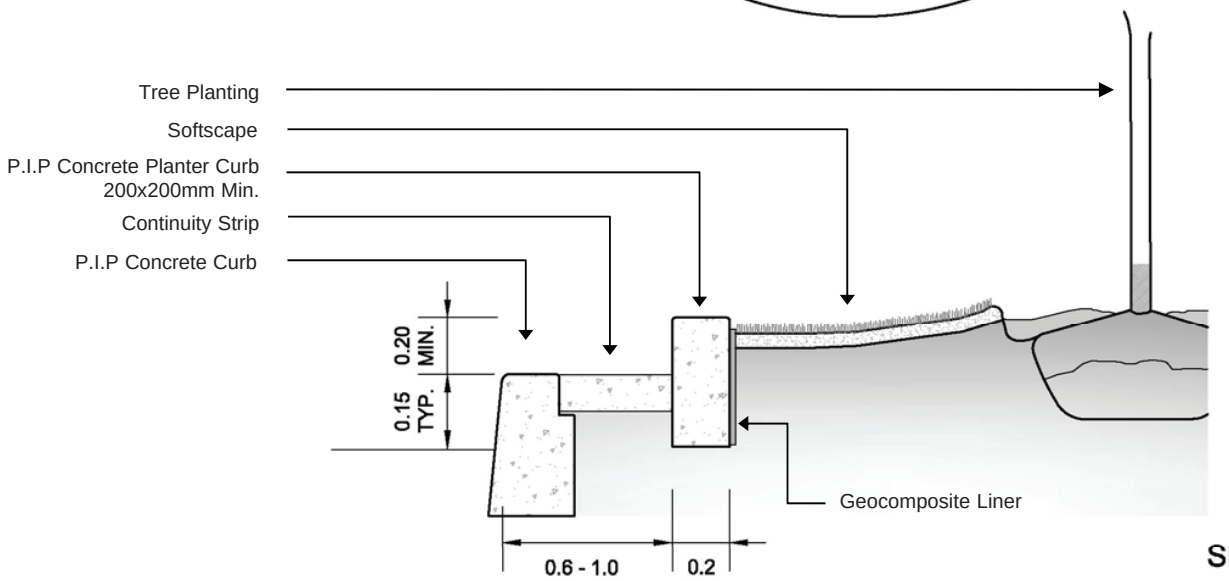
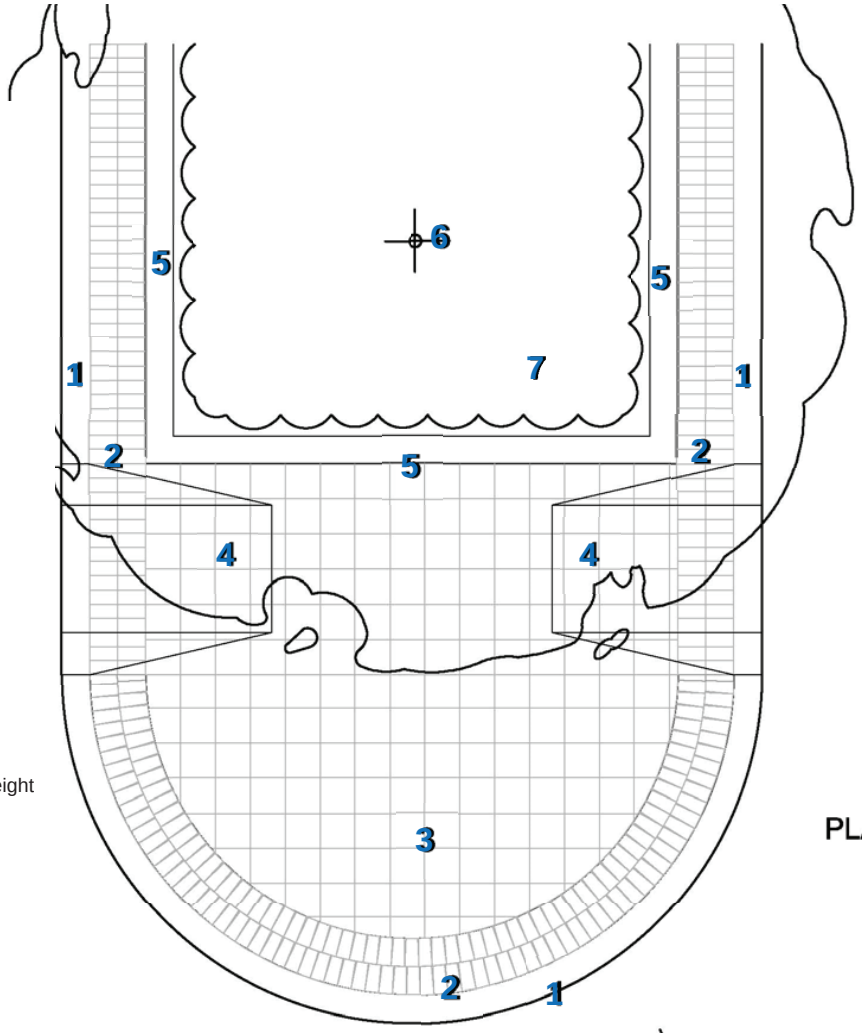


SECTION

Enhanced Softscape

KEY

1. P.I.P Concrete Curb
2. Continuity Strip
   Material Options:
   - P.I.P concrete Paving
   - Pre-cast Concrete Unit Paver
   - Permeable Paving
3. Field Paving
   Material Options:
   - P.I.P concrete Paving
   - Pre-cast Concrete Unit Paver
   - Permeable Paving
4. AODA Ramp and Drop Curb
5. P.I.P Concrete Planter Curb
   200x200mm Min.
6. Tree Planting
   - 60-80mm Caliper for Deciduous
   - 2.0-2.5m Height for coniferous
7. Softscape
   - Sod
   - Mulch
   - Perennials
   - Ornamental Grass
   - Deciduous Shrub 600mm-1500mm Height
   - Coniferous Shrub 600mm Height



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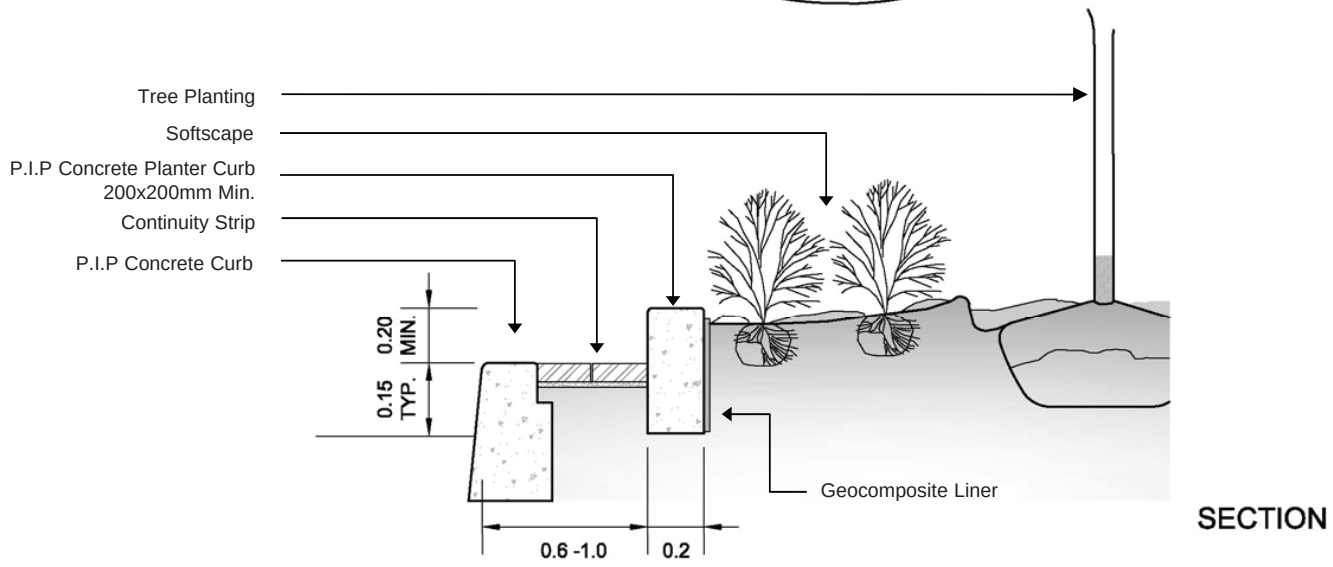
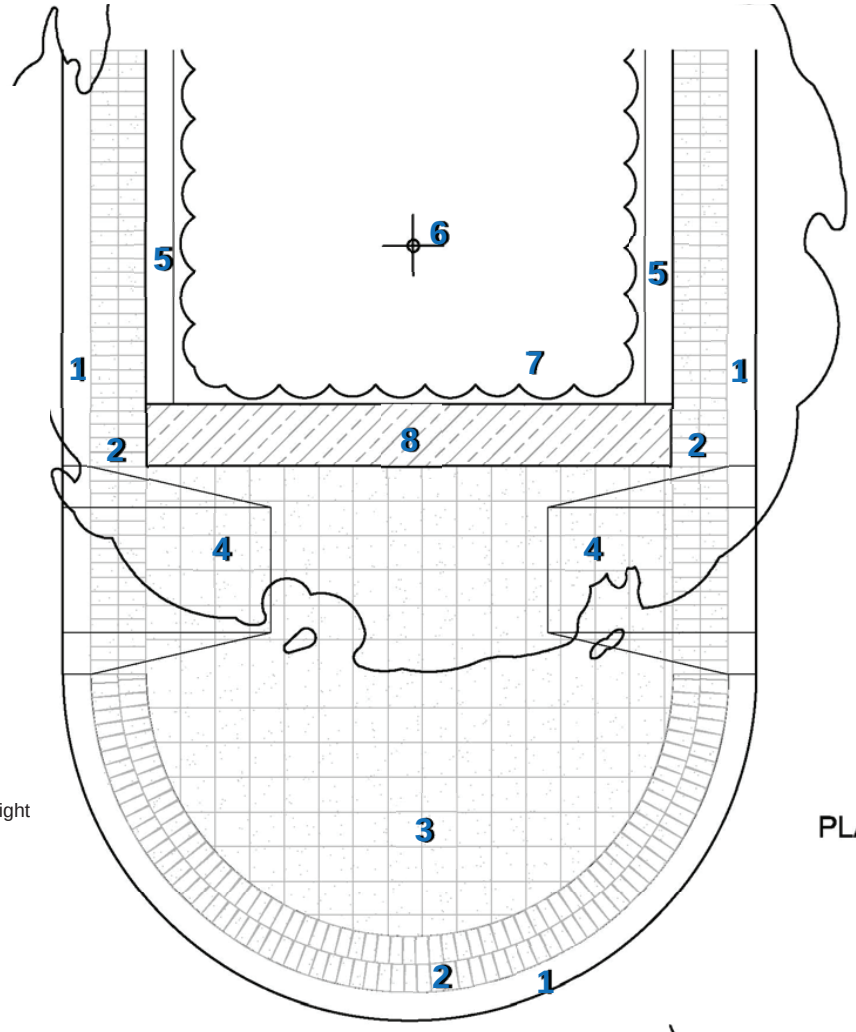


SECTION

Premium Softscape

KEY

1. P.I.P Concrete Curb
2. Continuity Strip
   Material Options:
   - P.I.P concrete Paving
   - Pre-cast Concrete Unit Paver
   - Natural Stone Paver
   - Permeable Paving
3. Field Paving
   Material Options:
   - P.I.P concrete Paving
   - Pre-cast Concrete Unit Paver
   - Natural Stone Paver
   - Permeable Paving
4. AODA Ramp and Drop Curb
5. P.I.P Concrete Planter Curb
   200x200mm Min.
6. Tree Planting
   - 60-100mm Caliper for Deciduous
   - 2.0-3.0m Height for coniferous
7. Softscape
   - Sod
   - Mulch
   - Perennials
   - Ornamental Grass
   - Deciduous Shrub 600mm-1500mm Height
   - Coniferous Shrub 600mm Height
8. 450mm Seatwall Planter Curb



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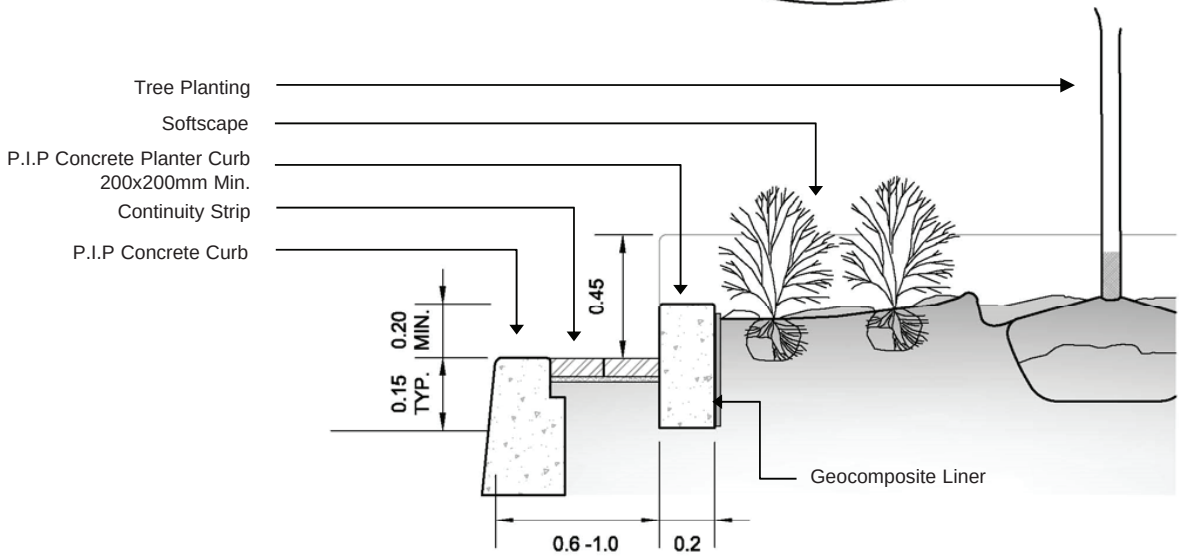


SECTION

Intersections

Intersections are locations where the paths of perpendicular roadways cross. At the intersection, vehicles, pedestrians and cyclists come into direct interaction. Pedestrians and cyclists are most vulnerable at these locations, which highlights the importance of intersection treatment. Clear visual communication at intersections is important to reduce potential conflict between vehicles, cyclists and pedestrians.

As the character of the street changes from one block to another, intersections provide a transition point from one streetscape type to another. The change in character between blocks underscores the need for consistent design of intersections to ensure they tie the street together and are also easily and safely navigable for all modes of traffic.

As the streetscape character of the street blocks change, intersections provide a transition point from one streetscape type to another.

Function

- Location for vehicular, cycling and pedestrian traffic to cross or change directions.
- Transition zone between different block streetscape characters and types.
- Space for character, identity and branding of an area.
- Space for gateway identifiers and public art.

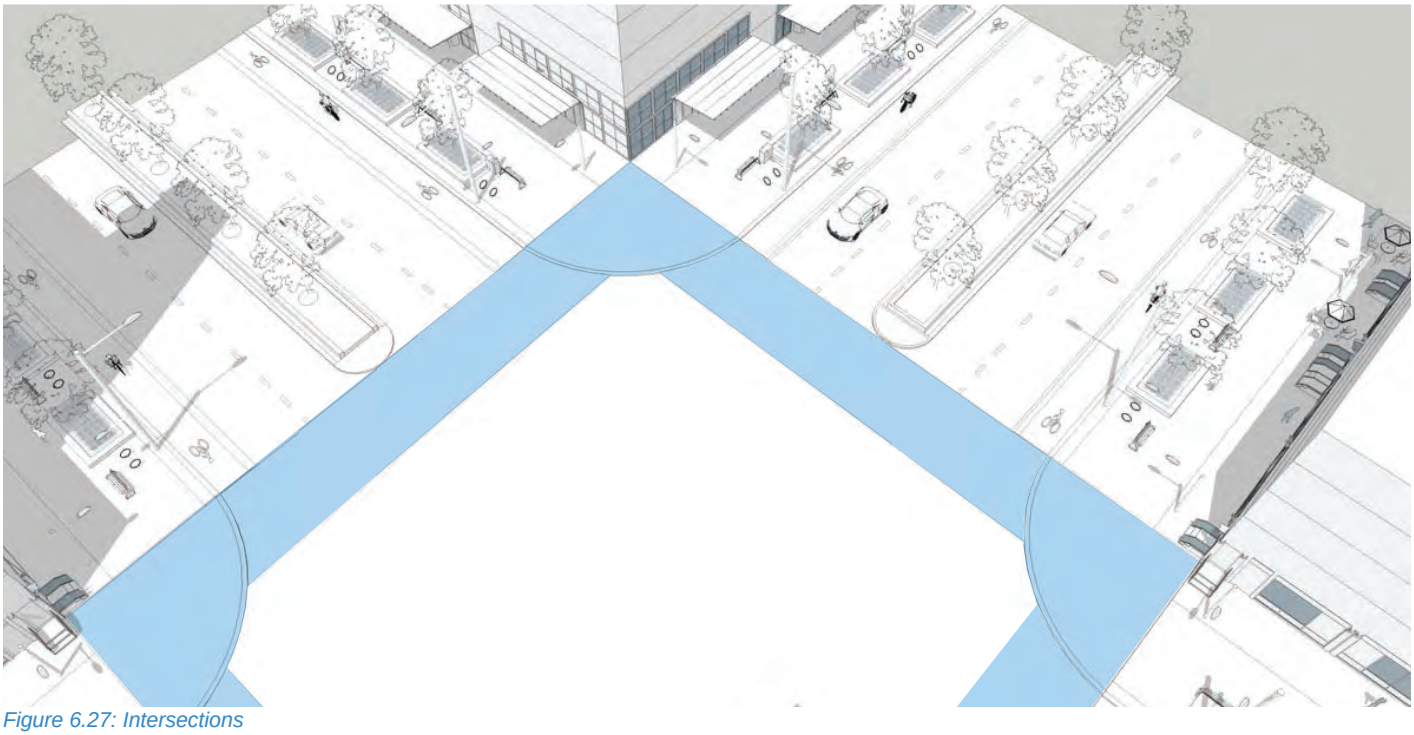


Figure 6.27: Intersections

Structure

When designing intersections four areas need to be considered:

- Mid-block condition
- Transition zone
- Pedestrian corner treatment
- Pedestrian Crosswalk

Mid-Block Condition

Mid-block conditions are the typical conditions of the streetscape where the vehicular roadway and pedestrian boulevard are parallel. Pedestrian and vehicular traffic are separated with generally minimal interaction.

Transition Zones

Transition zones combine with the pedestrian corner treatment to form the intersection in major intersections. Transition zones are located between the mid-block condition and the pedestrian corner treatment. In the transition zone, the rhythm of street trees, paving materials and patterns change in character to signal to pedestrians they are approaching an intersection where more attention is required.

- Transition zones provide notice to pedestrians that an intersection is approaching.
- Rhythm of street trees should decrease in frequency to increase visual sight lines for vehicles and pedestrians approaching the intersection.
- Paving design in the transition zone should be complimentary but differ from mid-block conditions.
- Street furniture at intersections should be located in the transition zone, where appropriate.

Pedestrian Corner Treatment

Pedestrian corner treatments make up the entire intersection in minor intersections, but are combined with a transition zone in major intersections. The pedestrian corner treatment is located at each corner of crossing roadways providing a refuge area for pedestrians to await crossing the roadway to reach the other side. Pedestrian corner treatments are typically treated with hardscape paving materials and make ideal locations for public art and public space. Proposed softscape and planting should promote seasonal interest, xeriscape principles and accommodate winter snow removal operations and storage.

- AODA ramps or drop curbs should be provided at pedestrian crossings.
- Tactile walking surface indicators on curb ramps should be provided to comply with AODA Accessibility Standard for the Design of Public Spaces.

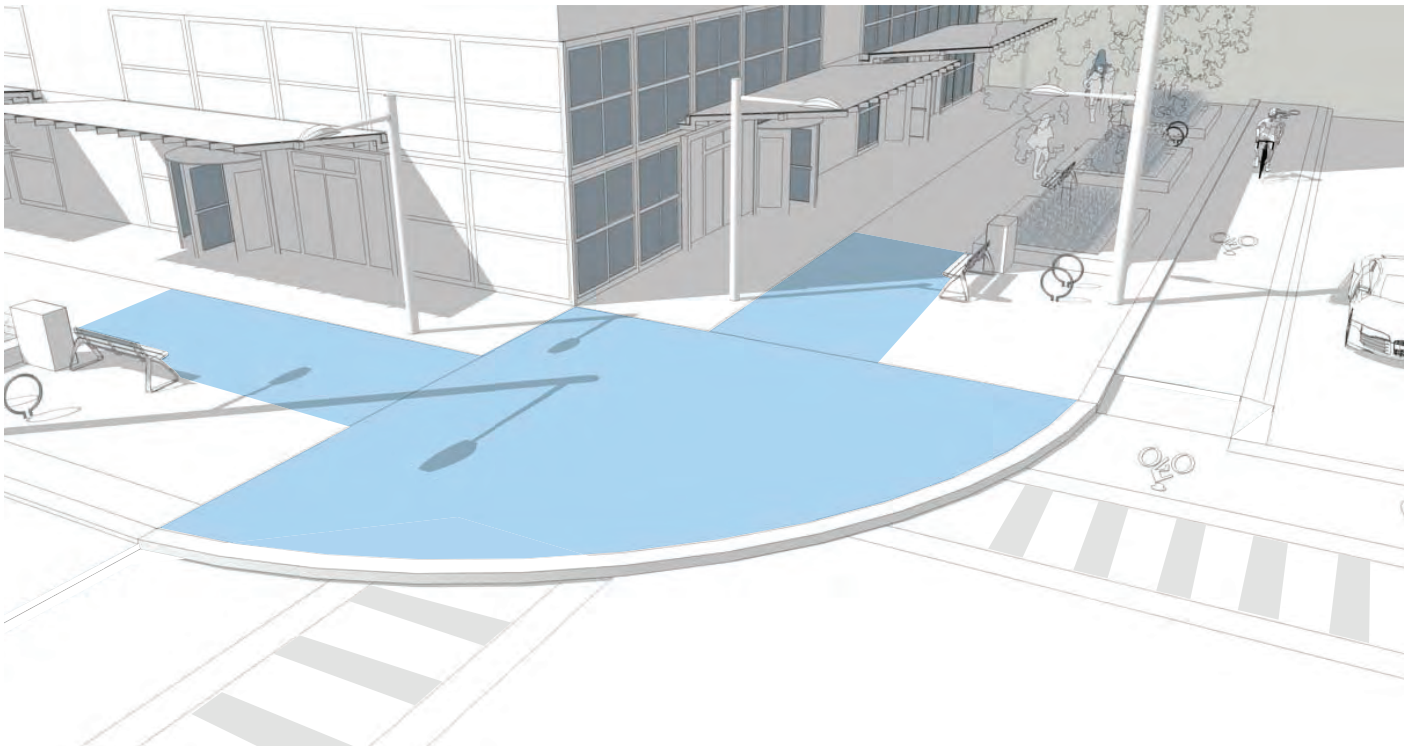


Figure 6.28: Pedestrian Corner Treatment

Pedestrian Crosswalks

Crosswalks are located directly on the vehicular roadway and run perpendicular to the direction of vehicular traffic. The crosswalk is where the pedestrian is most vulnerable. The purpose of the crosswalk is to clearly indicate to both pedestrians and vehicles where pedestrians are allowed to cross the roadway.

- Pedestrian crosswalks must be clearly delineated from the roadway by unique paving or markings.
- Crosswalk treatments should be durable to remain clearly visible to pedestrians and motorists.
- Pedestrian crosswalk markings and treatments should be clear and consistent to avoid pedestrian confusion.
- Pedestrian crosswalks may contain unique markings and colours to reflect the area's identity and branding.
- Raised pedestrian crosswalks should be considered where possible to facilitate accessible and safe crossings.
- When pedestrian crossings are greater than 15 m in length, medians should be considered to provide a pedestrian refuge point.
- Pedestrian crosswalks to be a minimum of 2.5 m wide.
- Pedestrian crosswalks should be positioned 90 degrees from the curb to create the shortest crossing distance.
- Pedestrian crosswalks must be consistent with guidelines in the Ontario Traffic Manuals.

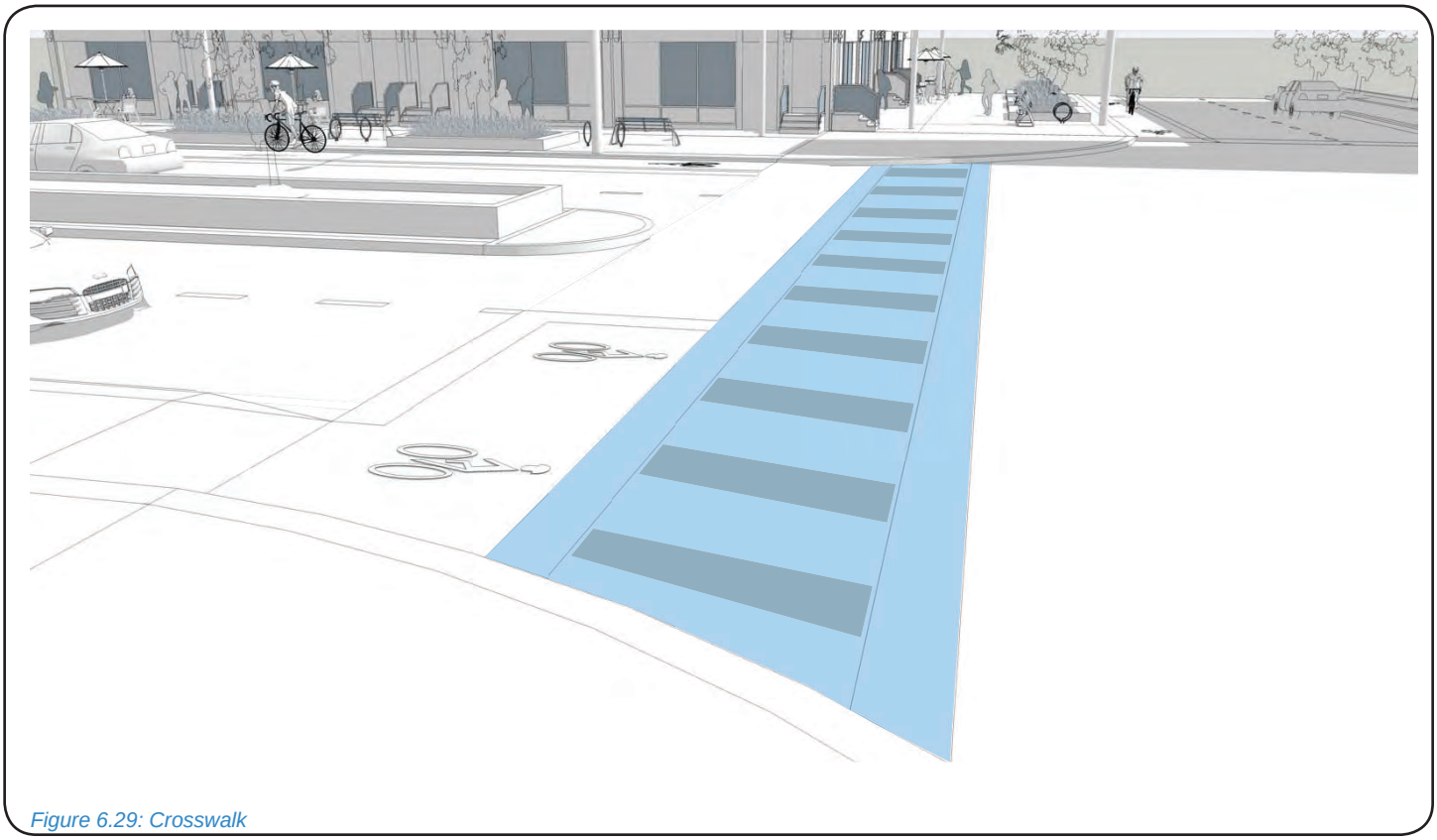


Figure 6.29: Crosswalk

Intersection Types

The delineation between the intersection and mid-block differs based upon the type of intersection. There are two main types of intersections:

- Major intersections
- Minor intersections

Gateway intersections are a sub-type of major intersections.

Major Intersections

Major intersections are typically found in locations where two major roads with high vehicular and / or pedestrian traffic cross. The crossing in major intersections can be of cultural or regional value. The wide right-of-ways and busy vehicular traffic in major intersections create a scale larger than is characteristically comfortable for the pedestrian. A transition zone is added between the mid-block and intersection to mitigate the large scale. Major intersections have a pedestrian corner treatment area of approximately 30 m from curb and a transition zone which varies from approximately 8m to 20 m. This means that the mid-block condition starts from approximately 38 m to 50 m from the intersection curb. It should be noted that VIVA standards call for an approximately 65 m intersection. However, this condition is only effective with large block sizes found in places such as Highway 7.

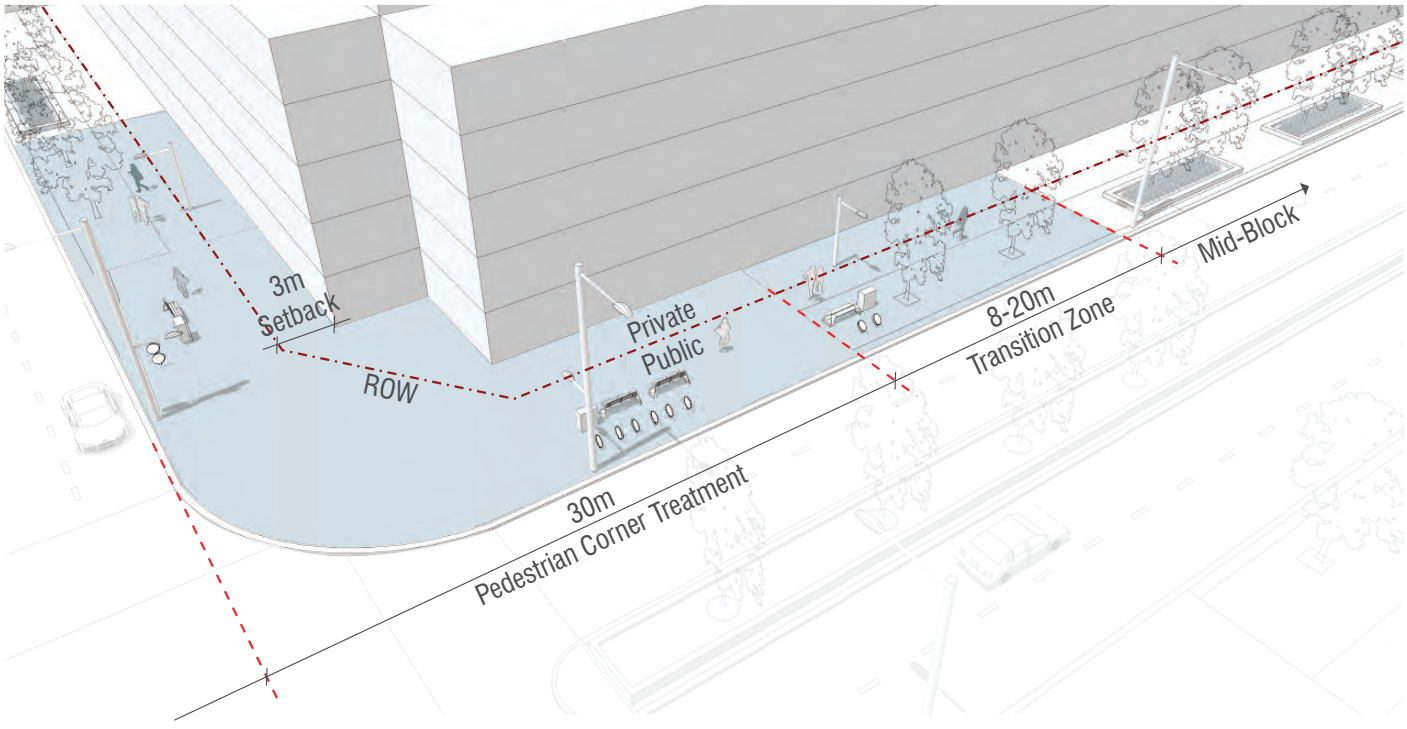


Figure 6.30: Major Intersection

Gateway Intersections

Gateway intersections share the same structural framework as major intersections within the ROW. Gateway intersections differ from major intersections by having specific branding elements in the streetscape including character district branded pavers, branded banners on street poles and branded street furniture. Buildings located at gateway intersections should provide space for a public / private zone within the private setback zone which could include public art and other public activities.

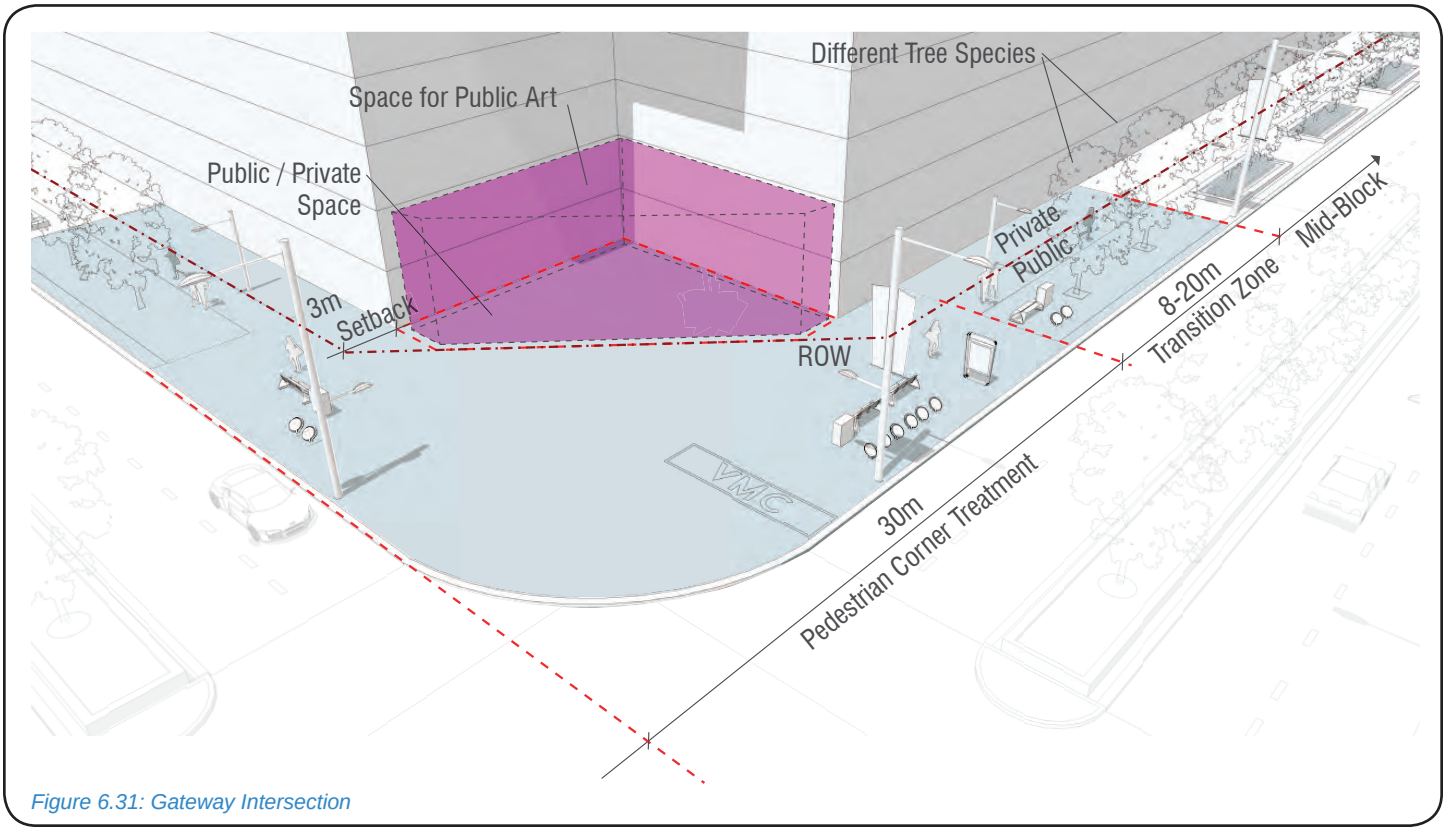


Figure 6.31: Gateway Intersection

Minor Intersections

Minor intersections are smaller in scale than major intersections but still can have a high volume of pedestrian traffic. They do not typically have the high vehicular volumes of major intersections and are more comfortable for the pedestrian scale. There is no transition zone needed in minor intersections with this smaller scale. The pedestrian corner treatment of minor intersections measure approximately 10 m from the curb to mid-block condition depending on context.

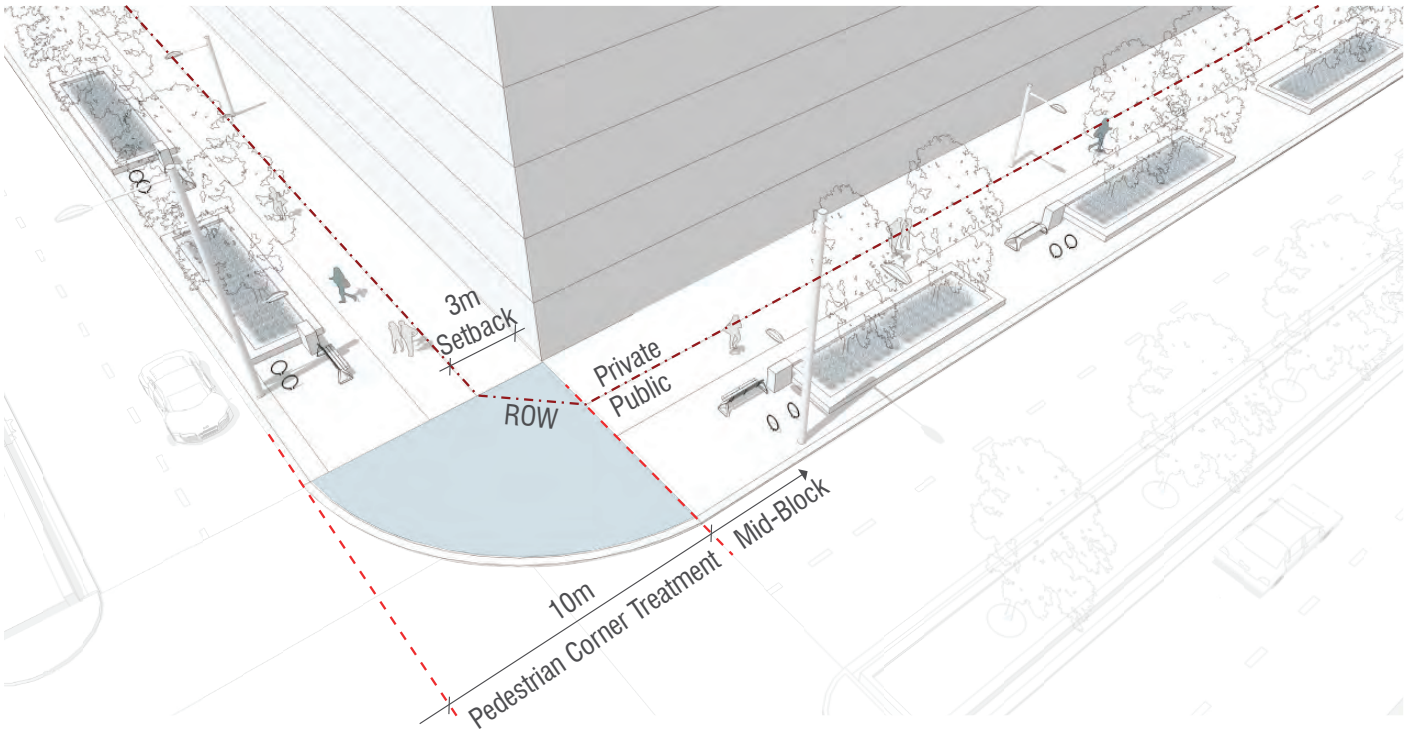


Figure 6.32: Minor Intersection

Other Intersection Considerations

Curb Extensions

- Curb extensions, or “bump outs” provide passive traffic calming, define space for on-street parking and public transit boarding, and reduce pedestrian crosswalk distances.
- The use of curb extensions is encouraged where appropriate on streets with on-street parking.
- Consider curb extensions as potential areas for planting, special paving and fire hydrants.

Cycling Facilities at Intersections

- Cycling facilities at intersections allow for greater safety between competing modes of transportation (motor vehicles, cyclists and pedestrians).
- When bike boxes are used in the roadway, they should be clearly defined in such a way as to be visually unique from the pedestrian crosswalk and located behind the pedestrian crosswalk.
- Bike lane line markings / patterns should not extend through pedestrian crosswalks with the exception of dashed lines in complex intersections.

Sight Triangles

- Sight triangles should provide clear visibility between all modes of transportation in the intersection to ensure safety from collisions.
- The sight triangle should be clear of obstacles which may block a vehicles view of pedestrians, cyclists and other vehicles traveling into the intersection.
- Sight triangles should be lit to ensure clear vision during the night time.
- On-street parking should be set back from the crosswalk to ensure clear sight lines.
- Shrubs and plants should be no higher than 0.8 m in height at maturity within sight triangles.
- Street furniture, if located in the sight triangle, should be no higher than 0.8 m in height.
- Trees should not be closer than 9 m from the intersecting curb face.
- If the tree canopy encroaches into the sight triangle, it should maintain a minimum clear vertical clearance of 1.85 m from the ground.
- Street furniture, paving, small trees and shrub planting should be included in site triangles to ensure the continuation of the streetscape character provided that they follow site triangle design guidelines.
- Designers and developers should work with the Region and City to minimize site triangles.

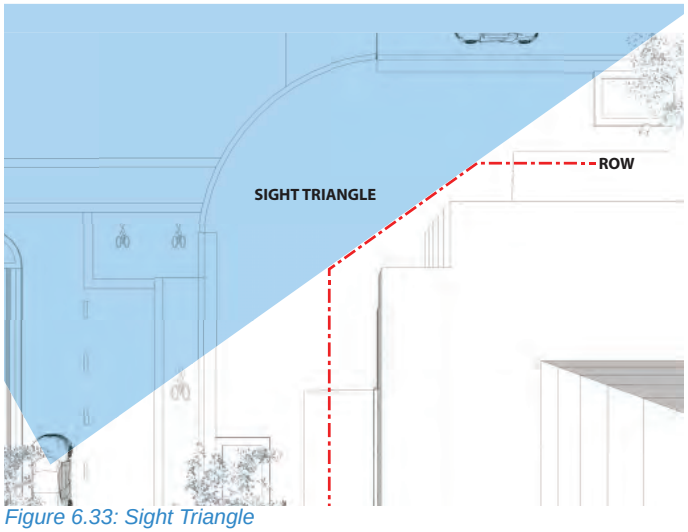
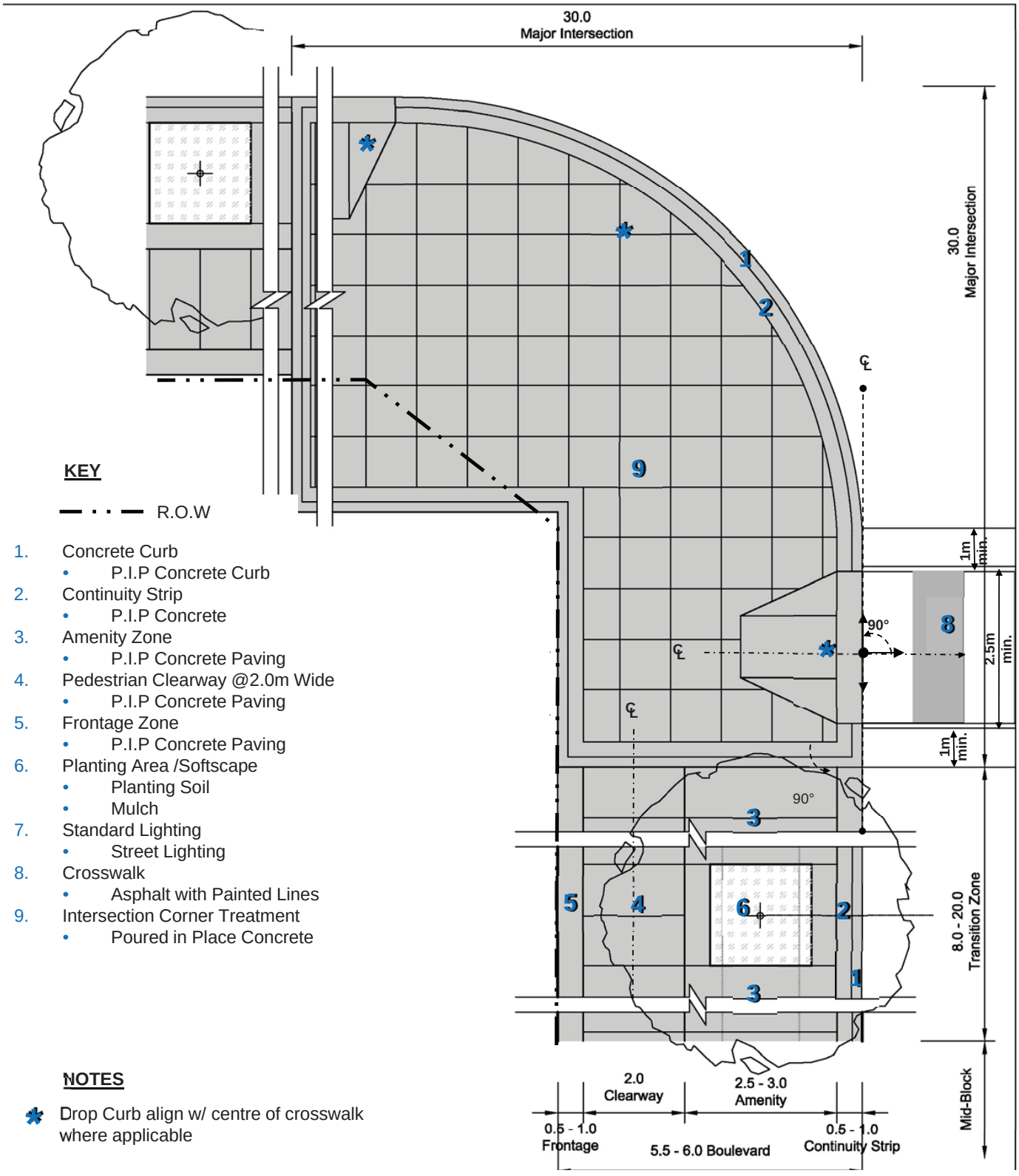


Figure 6.33: Sight Triangle

Standard Urban Major Intersection



KEY

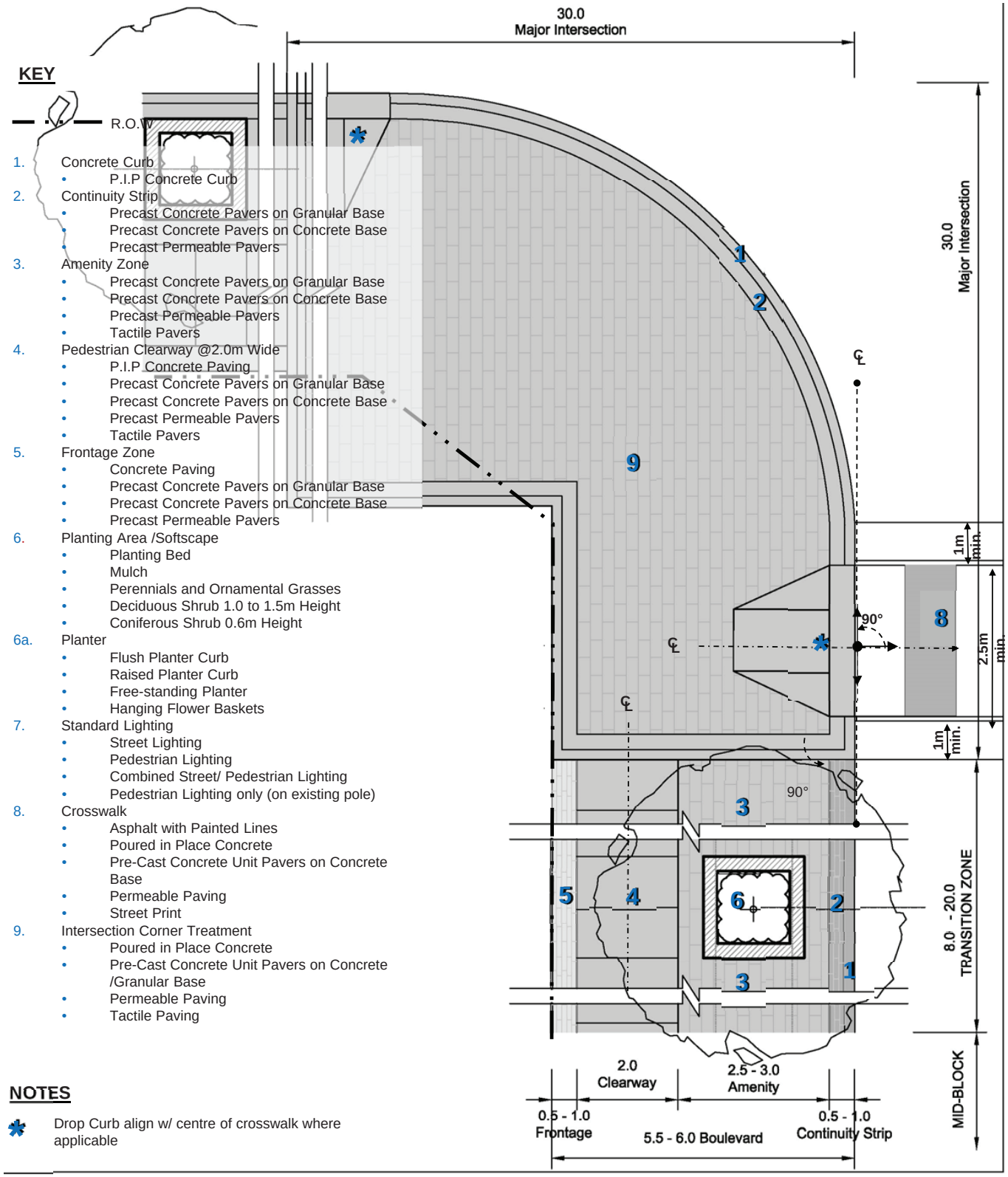
R.O.W

1. Concrete Curb
   - P.I.P Concrete Curb
2. Continuity Strip
   - P.I.P Concrete
3. Amenity Zone
   - P.I.P Concrete Paving
4. Pedestrian Clearway @2.0m Wide
   - P.I.P Concrete Paving
5. Frontage Zone
   - P.I.P Concrete Paving
6. Planting Area /Softscape
   - Planting Soil
   - Mulch
7. Standard Lighting
   - Street Lighting
8. Crosswalk
   - Asphalt with Painted Lines
9. Intersection Corner Treatment
   - Poured in Place Concrete

NOTES

* Drop Curb align w/ centre of crosswalk where applicable

Enhanced Major Intersection



Premium Major Intersection

KEY

R.O.W

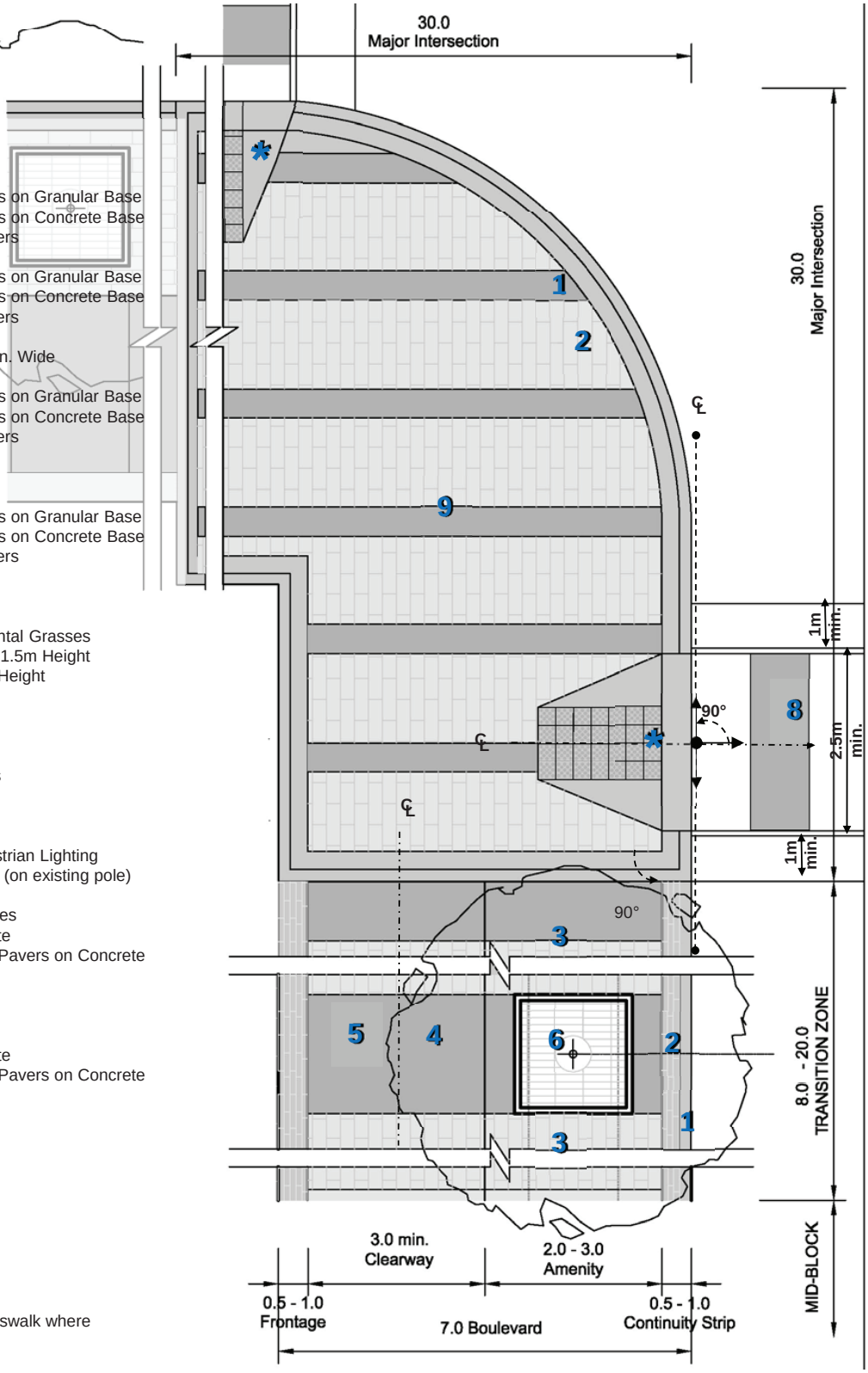
1. Concrete Curb
   - P.I.P Concrete Curb
2. Continuity Strip
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
3. Amenity Zone
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Tactile Pavers
4. Pedestrian Clearway @3.0m min. Wide
   - P.I.P Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Tactile Pavers
5. Frontage Zone
   - Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
6. Planting Area /Softscape
   - Planting Bed
   - Mulch
   - Perennials and Ornamental Grasses
   - Deciduous Shrub 1.0 to 1.5m Height
   - Coniferous Shrub 0.6m Height

6a. Planter
   - Flush Planter Curb
   - Raised Planter Curb
   - Free-standing Planter
   - Hanging Flower Baskets

7. Standard Lighting
   - Street Lighting
   - Pedestrian Lighting
   - Combined Street/ Pedestrian Lighting
   - Pedestrian Lighting only (on existing pole)

8. Crosswalk
   - Asphalt with Painted Lines
   - Poured in Place Concrete
   - Pre-Cast Concrete Unit Pavers on Concrete Base
   - Permeable Paving
   - Street Print

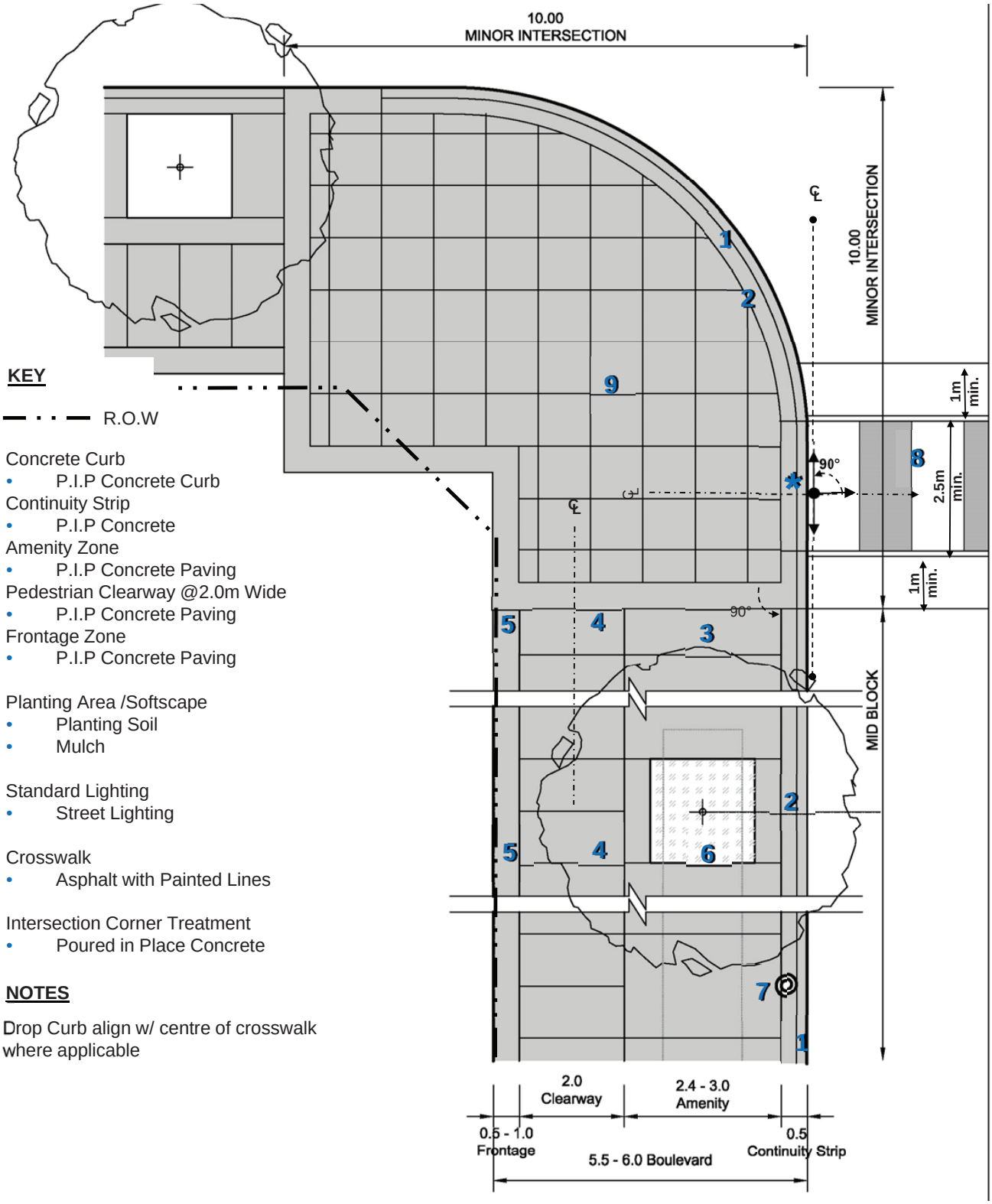
9. Intersection Corner Treatment
   - Poured in Place Concrete
   - Pre-Cast Concrete Unit Pavers on Concrete /Granular Base
   - Permeable Paving
   - Tactile Paving
   - Natural Stone



NOTES

* Drop Curb align w/ centre of crosswalk where applicable

Standard Urban Minor Intersection



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8. Crosswalk
   - Asphalt with Painted Lines
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   - Poured in Place Concrete

NOTES

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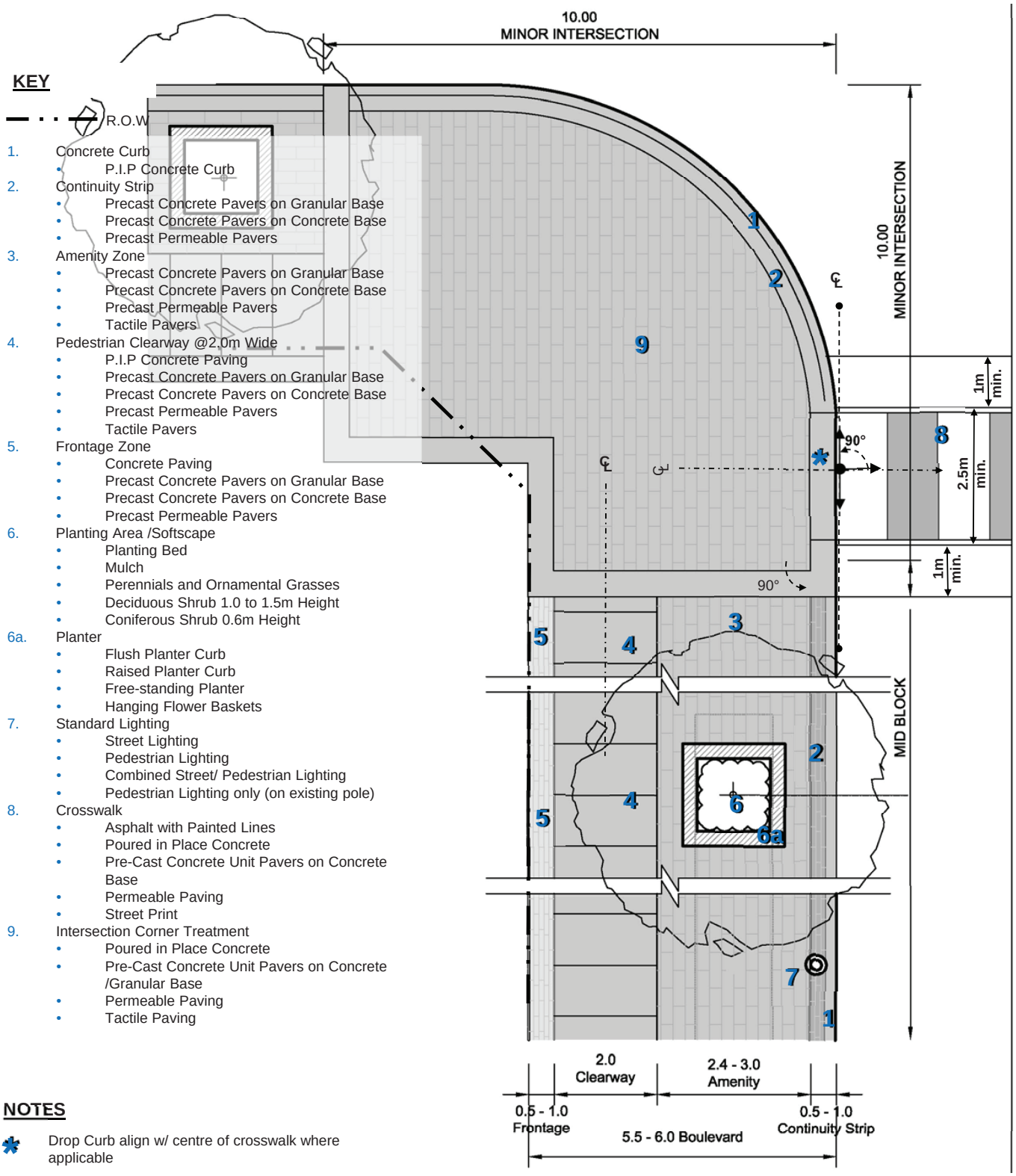
Enhanced Minor Intersection



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   - Precast Permeable Pavers
   - Tactile Pavers
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   - P.I.P Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
   - Tactile Pavers
5. Frontage Zone
   - Concrete Paving
   - Precast Concrete Pavers on Granular Base
   - Precast Concrete Pavers on Concrete Base
   - Precast Permeable Pavers
6. Planting Area /Softscape
   - Planting Bed
   - Mulch
   - Perennials and Ornamental Grasses
   - Deciduous Shrub 1.0 to 1.5m Height
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   - Poured in Place Concrete
   - Pre-Cast Concrete Unit Pavers on Concrete Base
   - Permeable Paving
   - Street Print
9. Intersection Corner Treatment
   - Poured in Place Concrete
   - Pre-Cast Concrete Unit Pavers on Concrete /Granular Base
   - Permeable Paving
   - Tactile Paving

NOTES

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Premium Minor Intersection

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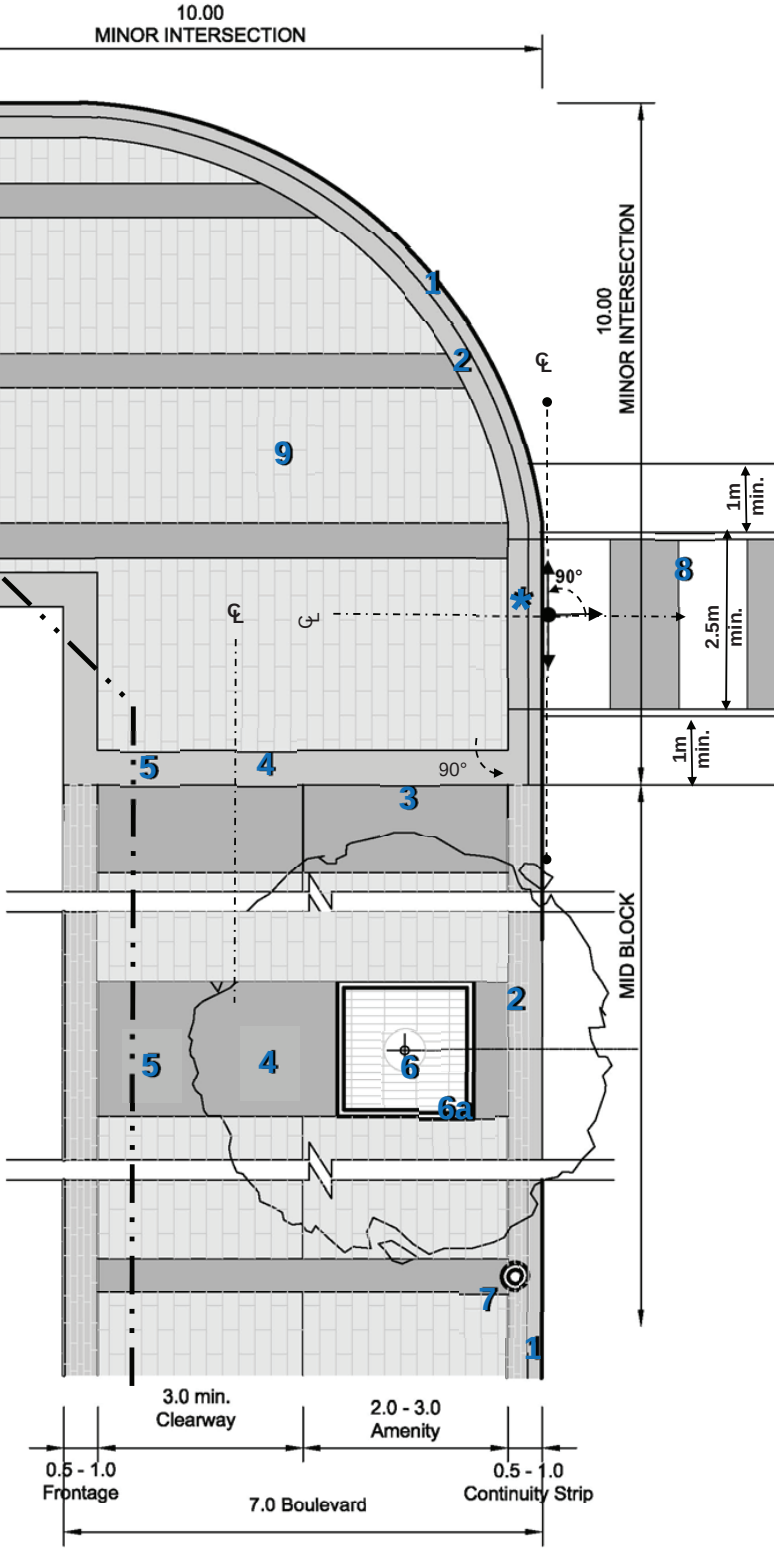


NOTES

* Drop Curb align w/ centre of crosswalk where applicable

Public / Private Frontage

Adjacent to the frontage zone, between the right-of-way and the building face is the private frontage zone. While this is outside of the public boulevard, the treatment of the zone is important to consider as it influences pedestrian interaction with adjacent buildings and the character of the street. The importance and design of the private frontage changes according to the adjacent land-use and streetscape type.

Typically, this zone is used for building entrances, outdoor cafes, retail display areas, landscaping feature lighting and public art.

Two functions typically determine how the public / private frontage is treated:

- Activity
- Semi-private

Activity

The public private frontage area can be used as an activity space for high volume pedestrian traffic and interaction between the public and private realm. Potential uses for public / private frontage activity areas include:

- Entrances to buildings
- Outdoor cafes and seating
- Information kiosks and displays
- Landscaping and planters
- Public art
- Retail displays

General treatments include:

- Paving should be continuous and / or complimentary to the paving located in the adjacent pedestrian boulevard.
- Paving may be used to provide definition between public and private space to aide maintenance activities.
- Canopies may be permitted above the public / private frontage.

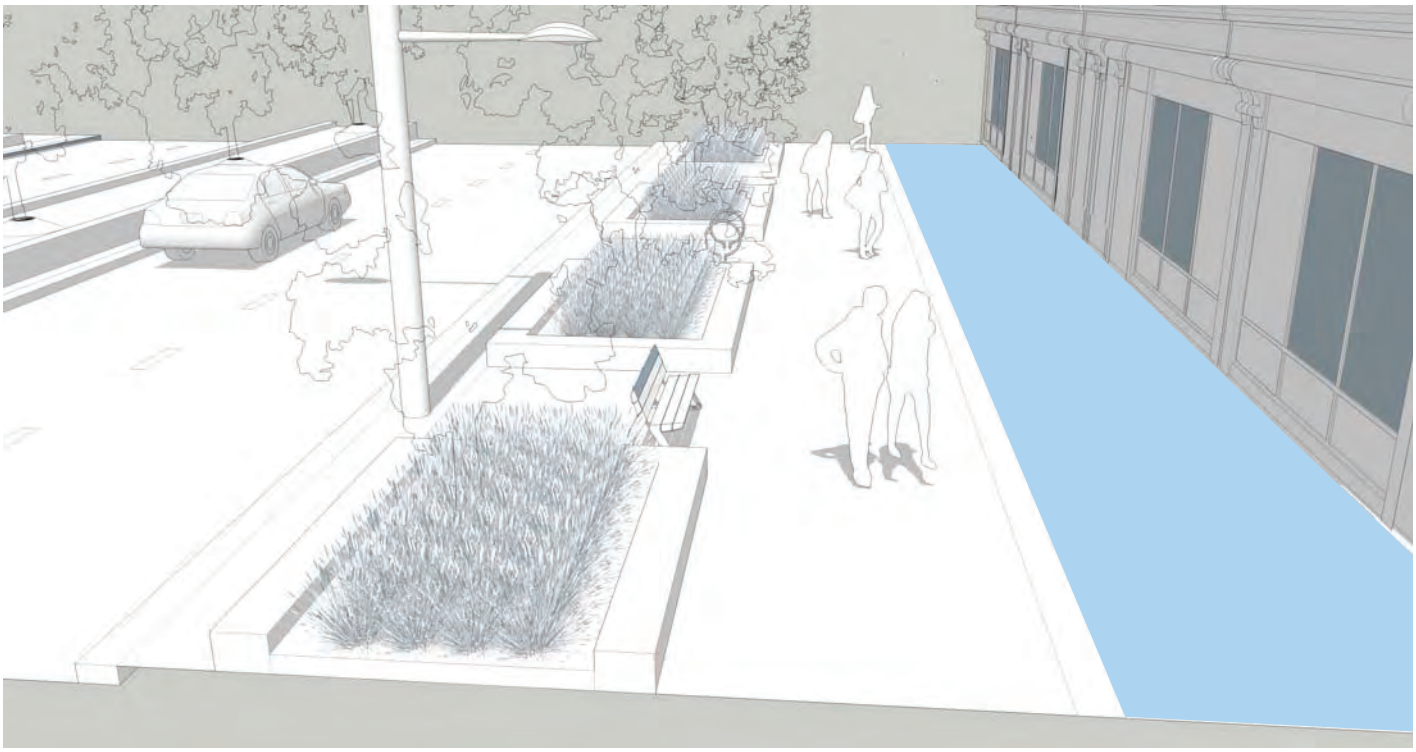


Figure 6.34: Public / Private Frontage

- Where public art is planned, canopy / public art coordination between architect and artist is required.
- Temporary / movable landscape displays / planters.
- Where night time activities are present, such as cafes, restaurants, shopping and entertainment, provide supplementary lighting for safety and security.
- Emphasize consolidated building entrances with creative landscaping, including movable planters, and lighting.
- Where appropriate, provide additional seating to accommodate private land uses such as retail, commercial, cafes and around public art.

Semi-Private

Semi-private functions of the public private frontage act as semi-visual and semi-physical barriers between public and private areas. The zone acts as a transition zone and provides a measure of privacy and screening. Potential uses for public / private frontage semi-private areas include:

- Private residential entrances
- Private residential yards
- Landscaping

General treatments include:

- Vegetative screening treatments shall include barrier vegetation such as small trees, shrubs, perennials and ornamental grasses.
- Physical barriers including yards, planters, stairs, gates and fences.

Utilities

Natural gas, electrical, telecommunications, water, sewer and transit related services combine to create a complex network of public utilities both above and below ground. Above ground public utilities physically and visually congest the streetscape and take away valuable amenity space. Below ground public utilities must be coordinated with tree planting.

Intensification areas will host greater population density than currently exists in Vaughan. The additional density will place a greater demand for space in the right-of-way for pedestrians, cyclists and vehicular traffic and greater demand and stress on the public utility network from adjacent land uses. The public utility network will need to add additional capacity to accommodate development which will require more space in the streetscape. In the interest of high quality urban pedestrian environments, it is recommended that public utilities be located underground.

Street with Overhead Hydro Wires

Street without Overhead Hydro Wires (Preferred)

Municipal Standards

Municipal standards are applied to municipal streets such as minor arterials, major collectors, minor collectors, special collectors, local roads and mews. The Vaughan Engineering Standards indicates the use of a single utility corridor for public utilities. The shared utility corridor is ideal to minimize conflicts with street tree roots found in the amenity / planting zone. However, the stacking nature of the public utilities can potentially create service interruptions to access and maintain unrelated services below. It is recommended that hydroelectricity on municipal roads be buried below ground in Intensification Areas and Heritage Conservation Districts as opposed to above ground power poles which take space in the amenity zone and are not proportionate with the human scale. Underground utility placement should be coordinated with street trees and street lights early in the project process to limit conflicts. It is important to note that street trees are considered of equal importance as utilities. Coordination should refer to the Vaughan Engineering Standards.

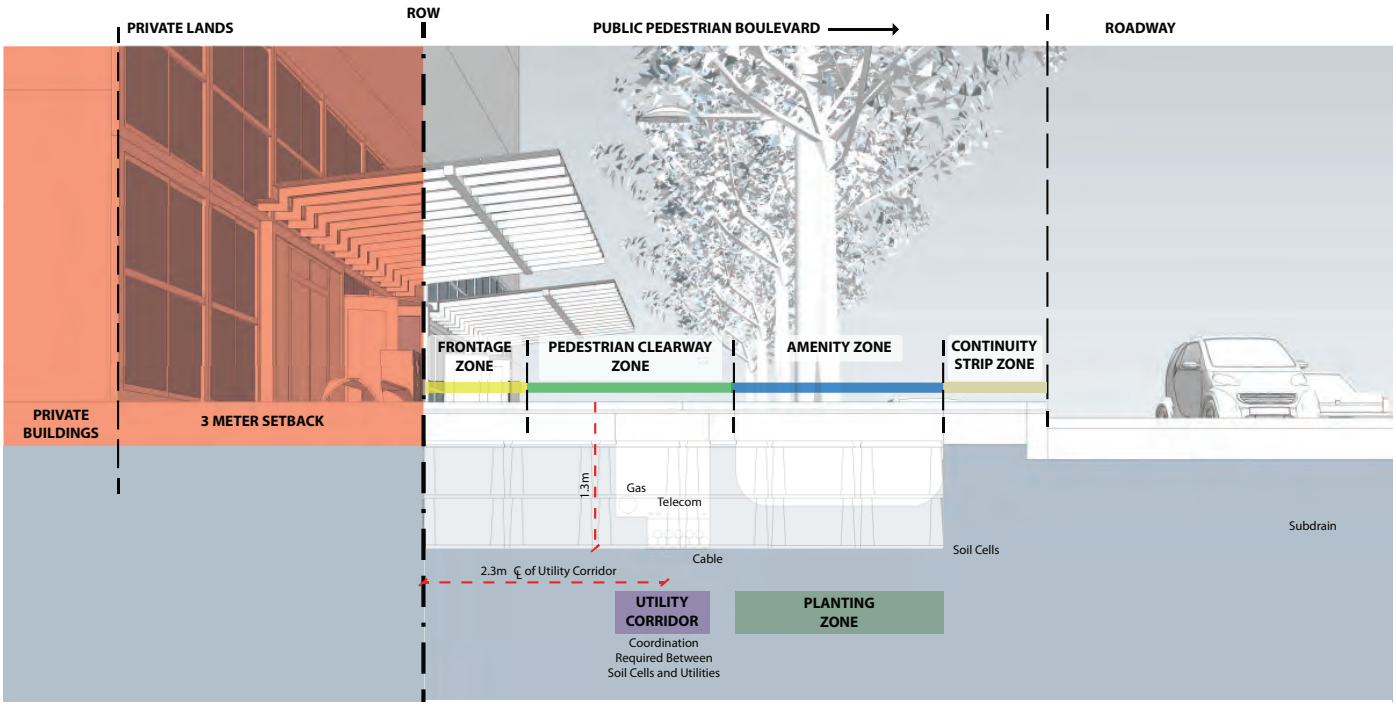


Figure 6.35: Vaughan Municipal Utility Placement Standard

Raised Cycle Tracks

Where raised cycle tracks are within the pedestrian boulevard, the raised cycle track shall be non-encumbered, having no public services located below the cycle track where feasible. Coordination should refer to the Vaughan Engineering Standards.

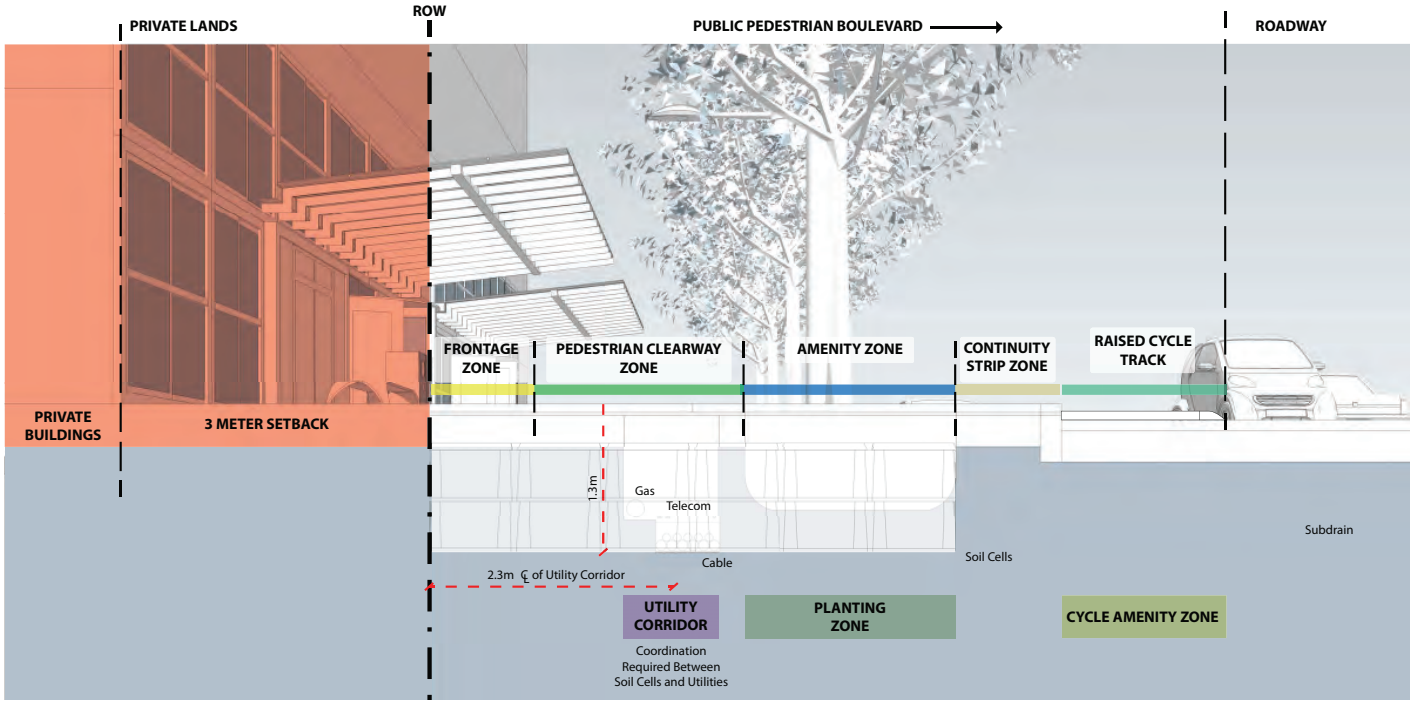


Figure 6.36: Raised Cycle Tracks in the Boulevard should be Unencumbered

Public Utility Considerations

SERVICES

Electrical Power

While it is preferred that electric power lines be located below grade, the reality is that they may be located above ground on regional roads in intensification areas on an interim basis. Typically, electric power poles stand approximately 24 m – 27 m in height and are located approximately 1.0 – 1.5 m from the curb line in the amenity zone. Electrical lines should be located as high as possible to minimize their visual impact.

Agreements on connections for power to private development will be made with private land owners and may be overhead or below ground depending on the scale of the development.

Gas

Natural gas mains are the public utility typically located nearest to private property. Under the municipal standards, the gas main should be located in the utility corridor which may cross underneath the frontage zone or pedestrian clearway zone. For ease of maintenance, this location is ideal.

Communications

Communication public utilities include telecom and CATV. Owned by private companies, there are various providers with different requirements. These public utilities are typically found under the pedestrian boulevard within a utility corridor for ease of maintenance access. Access hatches and man holes will be required periodically for maintenance.

Water

Where water services are located under the pedestrian boulevard, care must be taken to ensure they are located under the continuity strip zone to avoid conflict and damage from street tree roots in the amenity zone / planting zone. In cases where a raised cycle track is provided as part of the boulevard, water services shall not be placed below the raised cycle track.

Sanitary and storm sewers are typically located under the vehicular roadway and measured from the road centre line according to municipal standards.

Transformers

Transformers shall be located on private lands by means of an enclosed electrical service room as part of future building development or as a separate transformer building / walled compound. Convenient access for maintenance by electrical services staff is to be provided. Transformer housings should be designed in a consistent manner to the architectural character of the development. Alternatively, high quality visual screening in the form of walls, metal screens or other approved screening devices may be used.

ADDITIONAL CONSIDERATIONS

Operations and Maintenance

There are occasions where the operations and maintenance of public utility infrastructure require the pedestrian boulevard to be excavated for access. Locating the utilities in a consistent manner relative to the streetscape zones allows for smaller areas of excavation and thus reduced maintenance costs. Consistent locations also reduce the dangers of damage to different utilities and unforeseen complications.

During excavation to access the public utility infrastructure, surface and paving materials are removed from the pedestrian boulevard. In some cases, the excavation means that the surface or paving materials require replacement. The use of unit paving materials minimizes replacement costs during public utility maintenance. The original boulevard unit paving can be removed and properly reinstalled to maintain the character while reducing the cost of replacement. Poured in place concrete must be broken leading to new concrete being poured to fix the surface treatment.

Operations and maintenance of public utility infrastructure can also cause disruption in the streetscape. When public utilities are located below the frontage and pedestrian clearway zone, maintenance requires the area to be hoarded off for pedestrian safety. This leads to disruption of pedestrian traffic and business operations of adjacent land uses. Careful utility coordination and communication with adjacent land owners helps to minimize the impact of the disruptions.

Street Trees

The unpredictable nature of tree root growth gives rise to concern of conflicts between street tree roots and below grade public utilities. Street tree roots can potentially damage public utility infrastructure and make it harder to access public utilities if the roots wrap around the services. On the other hand, public utilities can interfere with street tree root growth and cause a deterioration of tree health. Public utilities below grade must be located away from the amenity zone, and in particular, away from the planting zone below trees to minimize these conflicts. Street trees are considered a streetscape infrastructure element of equal importance to utilities and should therefore be coordinated early in the planning process with utilities and illumination elements.

Strata Parking

Careful coordination between public utilities and strata parking agreements must be undertaken in order to minimize conflicts. For example, acceptable space between below grade public utilities and strata parking structures must be ensured in addition to adequate depths for public utilities below the surface. Careful design must also be considered where public water services are near strata parking structures in the event of pipe malfunction.

Organization and Coordination

It is recommended that organization and coordination of public utilities and services be coordinated formally in the future by a Public Utilities Coordinating Committee (PUCC). The greater demands and population density in Vaughan will require a higher complexity of public utilities. A committee will be able to map, regulate and coordinate the growing development of public utilities to ensure timely service.

Innovation

The intention of innovation components is to encourage innovative development of streetscapes. Innovation components can be pilot projects to test new streetscape infrastructure including low impact development measures. Typically found in the amenity zone, but not limited to it, innovation components are meant to contribute to a memorable pedestrian experience or demonstrate leadership in technical solutions and/or triple bottom line sustainability. Innovation components may be cultural inspirations and contribute to neighbourhood character. Innovation components also represent ideal situations for educational activities and interpretive signage.

Due to the unique nature of innovation components, special design considerations and coordination is required to ensure successful implementation on the streetscape.

Potential innovation components include:

- Low impact development measures
- Public art
- Digital media and communication installations
- Flexible street design with rolled curbs
- Planting strategies
- Temporary landscape installations

Low Impact Development Measures

Philosophy and Approach

Low impact development (LID) measures can form part of the streetscape infrastructure while providing multiple benefits to pedestrians and the environment including mitigation of the urban heat island effect, reduction of energy demands, reduction of stormwater flows, protection from flooding, sequestration of carbon, filtration of air and water pollutants as well as a range of aesthetic improvements, pedestrian comfort, social, community and economic benefits. By incorporating LID measures into the streetscape, the streetscape becomes a natural element in the local ecology and reduces the impact its development has on the natural environment.

Incorporated into the Design

LID measures should be incorporated into the streetscape design early in the design process. For this reason several typical LID measures have been included into the streetscape component list. However, it is recognized that LID technologies and innovations are constantly evolving. LID measures have varying degrees of inter-connectivity with adjacent buildings, land uses and public services, etc. Therefore it is important to remain flexible and adaptable when designing a street that includes LID measures. Designers are encouraged to not only consider storm water management in the traditional sense but also in conjunction with other sustainability objectives.

Live Work Play

The Vaughan City-Wide Streetscape Implementation Manual encourages the live, work, play concept. While normally applied to neighbourhoods, the streetscape is an important part of the live, work, play philosophy. Streetscapes are large networks of public space and should be treated as extensions of residential, retail, commercial and recreational land uses. Streetscapes should encourage individuals to walk and lead healthy and active lifestyles and therefore must cater to pedestrian needs.

The Vaughan City-Wide Streetscape Implementation Manual also encourages the use of other criteria and performance measures which affect the design of streetscapes and low impact development including:

- Sustainable Sites Initiative
- LEED for Neighbourhood Development

The following criteria and performance measures should be considered in conjunction with low impact development measures for streetscape design.

Sustainable Sites Initiative (SITES)

It is important to encourage the collaboration of natural and built systems to improve the long-term health of the environment and of socially and economically viable communities. The American Society of Landscape Architects Sustainable Sites Initiative (2009) has established criteria, which is intended to compliment the U.S. Green Building Council's LEED-ND Rating System, to facilitate such collaboration. It is the intent of the criteria to help transform traditional land development and management practises toward more sustainable methods. The criteria are as follows:

Site Selection Considerations

- Protection of floodplains by restricting development from the 100-year floodplain of waterways
- Restricting development from wetland areas
- Protection of habitats belonging to threatened or endangered species
- Brownfield or greyfield redevelopment as opposed to greenfield development
- Reduce pollution and improving human health by designing accessible sites for pedestrians, cyclists and locating near public transit

Pre-Design Assessment and Planning Considerations

- Site assessment to explore site sustainability opportunities
- Integrated site development process
- Meaningful public engagement process to inform site design

Water Considerations

- Reduction of potable water, natural surface water and groundwater for landscape irrigation after plant establishment
- Use of water conservation strategies and other irrigation methods
- Protect and restore riparian, wetland and shoreline buffers
- Restoration and maintenance of site water balance
- Integration of rainwater / storm water features into the site design which provide aesthetic and physical amenities while providing water management functions
- Conservation of water by designing and maintaining water features integrated into the landscape with minimal or no make-up water from potable sources or other natural surface or subsurface water resources

Soil and Vegetation Considerations

- Implementation of management plans to control known invasive plants found on site to limit their damage to local ecosystems
- Improve landscape performance and reduce resource use by using appropriate plants such as non-invasive species
- Use of appropriate vegetation native to the site eco-region
- Preservation and restoration of native plant communities
- Define location and boundaries of vegetation and soil protection zones through the use of a soil management plan prior to construction to limit disturbance and assist in soil restoration efforts.
- Preservation and identification of special status designated vegetation by local, provincial and federal governments
- Restoration and preservation of appropriate plant biomass on site
- Reduce building heating and cooling requirements by strategically planting vegetation around buildings
- Reduction of the heat island effect by use of vegetation and reflective materials

Human Health and Well-Being Considerations

- Promotion of equitable site development and use
- Influence of habitual user behavior through education and interpretation of on-site sustainability features and processes
- Enhance a sense of place and meaning by protecting unique cultural and historical features
- Design for safety, ease of wayfinding and full accessibility
- Provide amenity space to accommodate physical activity to promote active and healthy lifestyles
- Incorporate space for quiet mental restoration with views to vegetation and calming features
- Provide community building and social amenity

space through gathering spaces of various sizes and orientations
- Minimize light pollution by reducing sky-glow, increasing nighttime visibility and minimize negative effects on nocturnal environments and human health and functioning

Materials Selection Considerations
- Preserve threatened tree species by using alternative wood species
- Conservation of resources and avoid landfill waste by using salvaged materials and plants
- Support socially and environmentally responsible forest management by using certified wood
- Use locally sourced materials, plants and soils
- Reduce air pollution through the use of low VOC (volatile organic compounds) paints, sealants, adhesives and coatings
- Support manufacturers using sustainable practices in plant production and material manufacturing

Construction Considerations
- Protection of water, air quality and public safety by preventing or minimizing the discharge of construction site pollutants and materials
- Use of disturbed soils during construction in areas to be re-vegetated
- Divert construction and demolition materials bound for disposal in landfills from site development to recycling whenever possible
- Manage construction and design to achieve a net-zero waste site by reusing and recycling vegetation, rocks and soil generated during construction
- Limit greenhouse gas emission and air pollutant generation during construction

Operations and Maintenance Considerations
- Achieve maintenance goals with a site maintenance plan through long-term strategies and short term actions
- Facilitate recycling and reduce water generation by providing storage and collection space for recyclables
- Organic matter from site operations and maintenance to be recycled
- Minimize outdoor energy consumption for landscape and exterior operations
- Reduce greenhouse gas emissions and minimize air pollution by using renewable sources for landscape electricity needs
- Minimize greenhouse gas emissions and exposure to localized air pollutants from landscape maintenance activities
- Provisions for preferred parking for reduced emissions, high-fuel efficiency and / or carpools to reduce emissions

Monitoring and Innovation Considerations
- Improve the body of knowledge of long-term site sustainability by monitoring and documenting sustainable design practices and evaluate their performance over time
- Reward innovative sustainable practices which exhibit exceptional performance in all aspects of site design

LEED for Neighbourhood Development

Working in conjunction with the Sustainable Sites Initiative (SITES), it is important to consider criteria found in the LEED 2009 for Neighbourhood Development (LEED-ND). The LEED-ND places a strong emphasis on site selection, design and construction elements to integrate building and infrastructure design together. While the rating system of LEED-ND is generally applied to new neighbourhoods, the criteria are still useful as a tool to set the performance levels of streetscape infrastructure.

Therefore, adapted from the U.S. Green Building Council's LEED 2009 for Neighborhood Development Rating System, updated May 2011, the following performance criteria is intended to guide healthy, durable, affordable and environmentally sound practices for streetscape design. The criteria are as follows:

Smart Location and Linkage

- Promote active transit, public transit usage and reduce personal vehicular trips to improve and redevelop existing communities
- Use locations with multi-modal choices to promote development and reduce personal vehicular usage, reduce greenhouse gas emissions and air pollution
- Provide bicycle infrastructure such as a bicycle network, bike parking and storage to promote utilitarian active transportation habits and support the public health benefits
- Support the live, work, play concept by encouraging a diversity of uses for balanced communities
- Protect and restore native plants, wildlife habitat, wetlands and water bodies

Neighbourhood Pattern and Design

- Provide safe, appealing and comfortable streetscape environments to support public health and safety through encouraging daily physical activity
- By prescribing compact development, promote livability, walkability and transportation efficiency
- Promote the development of communities with a high degree of internal connectivity
- Create walkable streetscapes which have buildings and activities close to the street, limit building facades which do not have activation or are blank along the streetscape, ensure ground level retail is visible at night, provide on-street parking, limit driveway entrances through the streetscape and promote continuous sidewalks on both sides of the street
- Facilitate walking, cycling and public transit use by clustering diverse land uses in mixed-use accessible neighbourhood centres
- Design for a diversity of housing types, affordable housing options and mixed-income communities to promote socially equitable and engaging communities
- Minimize the environmental effects of parking facilities by moving off street surface parking to the rear or side of buildings to increase the amount of building and streetscape connection.
- Promote active transit and public transit use with safe, convenient and comfortable transit waiting areas, and secure bicycle storage facilities
- Provide easily accessible public open space near employment and residential land uses to improve social capacity, physical and mental health
- Improve physical activity and social networking through the provision of a variety of recreational facilities close to employment and residential land uses
- Enhance accessibility with the universal design of all streetscape elements
- Promote health and nutrition with access to community-based food production and local farmer support
- Reduce the heat island effect and improved air quality by providing tree lined streets with shade which encourages walking, cycling and public transit use

Green Infrastructure and Building

- Promote the use of green building practices in design and construction of streetscapes
- Design and construct innovated streetscapes which reduce air, water and land pollution and adverse environmental effects from energy production and consumption
- Reduce dependency on the community fresh water supply and wastewater systems with streetscape infrastructure which deals with storm and building water efficiency
- Reduce construction activity pollution by controlling soil erosion, waterway sedimentation and airborne dust generation
- Limit or eliminate the use of potable water and other natural surface or subsurface water resources for landscape irrigation
- Preserve historic resources and cultural landscapes in a manner that preserves historic materials and character-defining features.
- Preserve existing non-invasive trees, native plants and pervious surfaces.
- Retain stormwater on site, through infiltration, evapotranspiration and / or reuse.
- By using materials with a Solar Reflectance Index (SRI) of at least 29, pervious pavement (at least 50%) and designing a street tree canopy reduce the heat island effect of the streetscape
- Encourage on-site renewable energy production to reduce adverse environmental and economic impacts associated with fossil fuel production and use.
- Design for energy efficient infrastructure to reduce energy consumption with traffic lights, streetlights etc.
- Design infrastructure elements with recycled and reclaimed materials (roadways, parking lots, sidewalks, unit paving etc.)
- Minimize light pollution by reducing sky-glow, increasing nighttime visibility and minimize negative effects on nocturnal environments and human health and functioning

Innovation and Design Process

- Foster continued innovation and exemplary performance in green building, smart growth and new urbanism that is not found in the LEED for Neighbourhood Development Rating System.
- Promote strategies to address issues of social equity, public health and geographically specific environments

Public Art

Public art enriches the experience of the public realm providing visual and tactile stimulation. Given that public art pieces are unique, they are often used as way-finding structures and contribute to the unique character of the neighbourhood.

The inclusion of public art within the right-of-way of public streets presents numerous technical challenges. The right-of-way zone contains many below grade and above grade services, requiring unobstructed access for repairs and maintenance, unobstructed access for snow removal services, subject to restrictions for sight lines of vehicles and available space within the right-of-way.

For constrained right-of-ways, alternative public art options include murals, light projections, architectural facades and building facade shrouds typically used as hoarding during construction.

The following discussion of potential opportunities is intended as a means of implementing public art into streetscapes in recognition of these technical requirements.

Public Art on Public Land

Public Art on Private Land

Opportunities

Public Spaces

In light of the restrictions of locating public art in the public right-of-way, focus should be placed on the most publicly accessible areas of the streetscape as well as on adjacent public spaces such as roadway and pedestrian route intersections within the designated “amenity zone”.

Where possible, public art should be included within and adjacent to public transit stops, especially at highly visible intersections. As well, where possible, public artworks projects should be scheduled to coincide with planned capital improvement and repair projects such that efficiencies in funding, through leveraging of total capital budgets, can be recognized. Artwork budgets should be applied to existing budgets for design elements such that the “delta” of the art budget can be maximized.

Ideally, artists should be included as members of design teams on capital improvement and infrastructure construction projects such that opportunities can be identified and exploited, including the design of standardized elements within the public right of way and streetscape feature lighting (coloured lighting).

Public spaces adjacent to public right-of-ways are opportunities for the inclusion of public art. Given the alleviation of some of the technical restrictions in these spaces, public art expression can have greater impact.

Art Zones

Inclusion of public art in public streetscapes adjacent to private development, should be encouraged in public art policy. Where possible, allowance should be made for the inclusion of public art in the public right-of-way such that artworks on private development can find additional footprint for implementation. Multi-component public artworks which sit on private land, with elements situated on adjacent public lands provide opportunity for greater breadth of artistic expression.

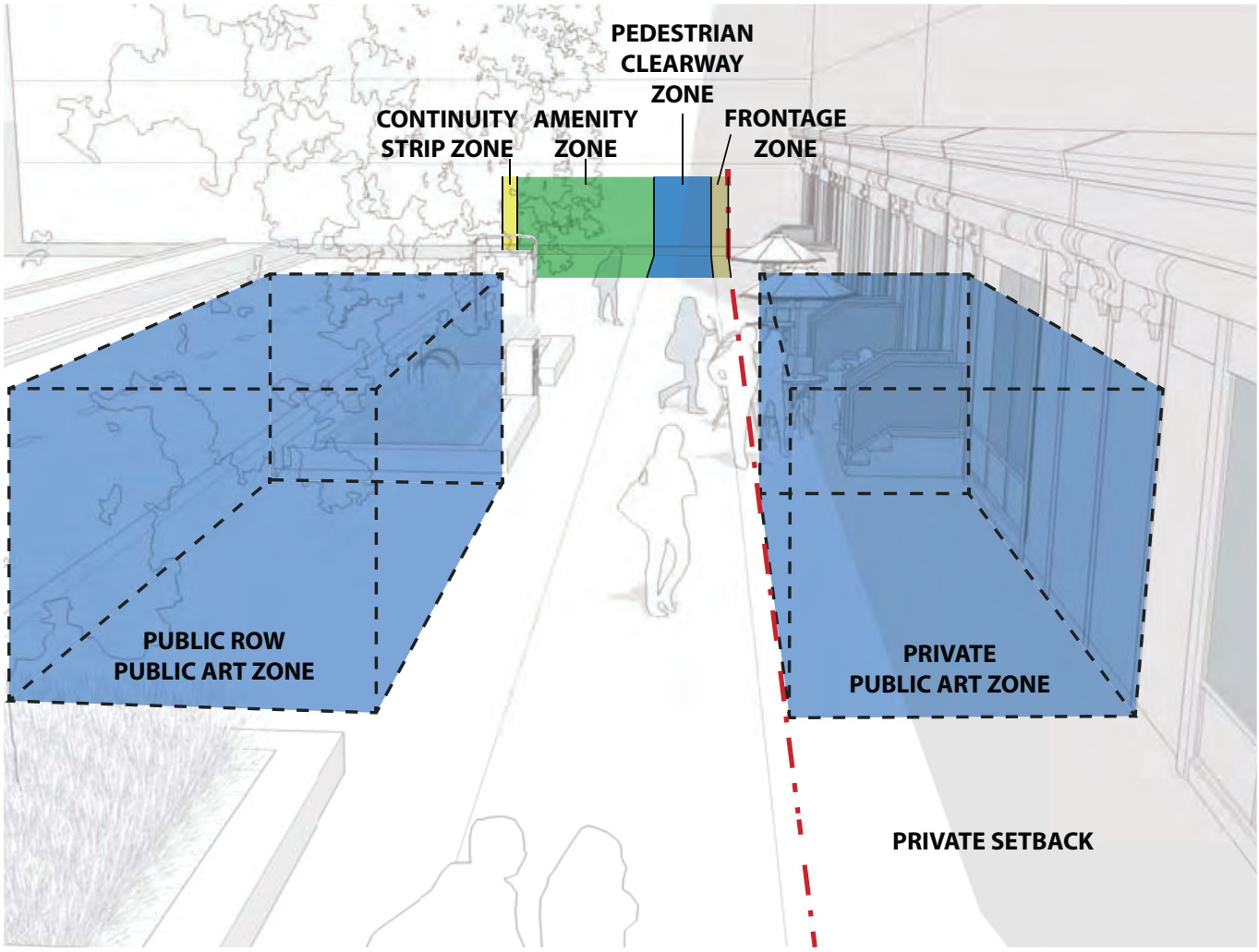
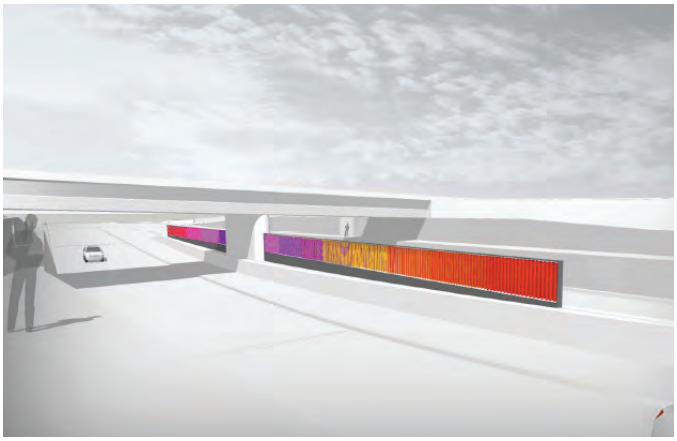


Figure 6.37: Potential Public Art Locations in the Streetscape



Artist: Paul Raff Studio
An example of a public artwork (proposal) that engages the median space along a public transitway. The artwork is highly visible to pedestrians, public transit users as well as vehicles.

Artist: Jason Bruges Studio
An example of a public artwork, with minimal footprint, that works at the scale of public infrastructure and is legible to vehicular traffic.

Artist: Jun Kaneko
Park Avenue, in New York City, through a privately controlled programme, manages exhibits in the median space of the roadway. This is an example of an ongoing, temporary display of public art within the median of a public roadway allowance.

Artist: Pipilloti Rist
An example of a public artwork, located on private property, adjacent to a public right-of-way that engages the experience of users of the right-of-way.

Artist: Karl Ciesluk
An example of how public artwork can be implemented in the streetscape right-of-way, within the stringent technical requirements of this zone.

Artist: Brad Golden and Norman Richards
An example a public artwork whose implementation was scheduled to take advantage of existing plans for capital improvements to the public sidewalk.

Design: Robert Maschke Architects
An example a streetscape element designed as a component of an artist-led streetscape improvement programme that included seating, planting and paving.

7

IMPLEMENTATION


DOWNTOWN
Gerrard St W

Implementation

The purpose of the financial forecast and strategy is to assess the implications of applying appropriate levels of service to Intensification Areas and Heritage Conservation Districts. The majority of the future growth and development in Vaughan will be focused in planned Intensification Areas and Heritage Conservation Districts. Although Vaughan's Official Plan identifies multiple Intensification Areas and Heritage Conservation Districts there are seven projects which form the basis of this financial forecast. These projects were chosen for the financial forecast since their master plan designs were complete or near completion and are as follows:

- Vaughan Metropolitan Centre
- Steeles West
- Carrville Centre
- South Yonge
- Concord West
- Centre Street
- Islington Avenue

Given that much of the new roads and development are developer driven, there is a high amount of uncertainty regarding completion times and phasing. The market, private interests and other factors will determine when specific portions of the project will be built. The projects themselves can also be expected to change over time as further work is undertaken and each project is reviewed, appraised and re-evaluated. As such, this forecast must be treated as an ever evolving document which should be revisited frequently to incorporate new information as it becomes available.

It is important to understand the context under which the levels of service and intensification projects will impact the City's future financial commitments. The very point of the Vaughan City-Wide Streetscape Manual is to service the forecasted future growth in Vaughan. As indicated in the 2013 City of Vaughan Development Charges Background Study, the residential population is forecasted to grow from 288,301 in 2011 to 400,871 as of 2031. Employment is also forecasted to grow from 188,640 as of 2011 to 266,098 as of 2031. This results in a requirement for streetscape development that caters to increased pedestrian traffic.

Increased Tax Base

The increase in capital and operations and maintenance costs for streetscapes is in relation to an increased tax base. While costs for higher levels of service streetscapes may seem daunting in the current financial outlook, the costs of the streetscapes will be phased in relation to population growth and available funding. Essentially, it should be remembered, that while the forecast looks at the cost of all the projects at a single moment in time, the implementation and context in the future will be ever changing. Therefore it is important to not judge the increase in costs solely on the current financial situation.

Suburban versus Urban

As Vaughan transforms from a suburban to urban form, each length of streetscape serves a greater number of people. In low density suburban neighbourhoods a small number of residential units front a large amount of streetscape. This form means that each unit pays for a large amount of streetscape. Urban areas, such as the intensification projects, project plan to have much higher densities resulting in a greater number of unit tax revenue for the same or even smaller length of streetscape than low density areas. While it is recognized that not all tax revenue will go to streetscape work, it is useful to understand that typical urban densities mean a lower % of streetscape length per residential unit and therefore a more efficient streetscape cost per unit.

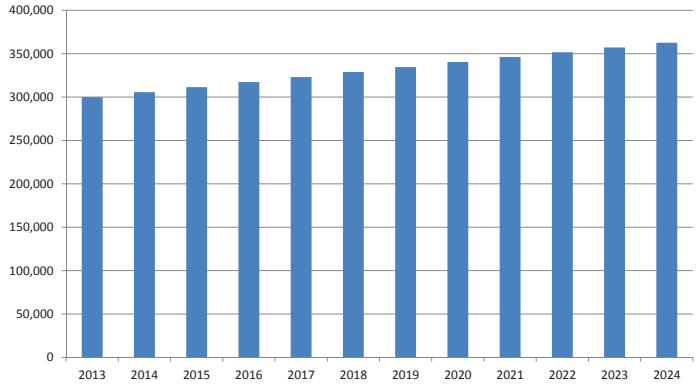


Figure 7.1: *Residential Population Forecast (According to the 2013 Vaughan Development Chart Study)*

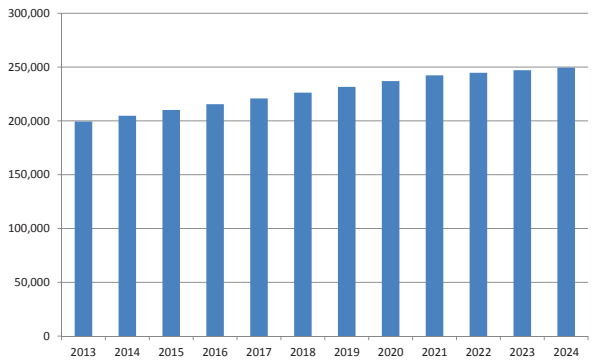


Figure 7.2: *Employment Population Forecast (According to the 2013 Vaughan Development Chart Study)*

Focused and Efficient

Growth is expected to be concentrated in the intensification project areas. The concentration of intensification means that the delivery of high quality streetscapes is efficiently focused in relatively small areas while serving a larger dense population. For example, upon full build-out, the intensification projects in total will represent approximately 8% of Vaughan's overall linear meters of streetscape. Furthermore, approximately 5 - 6% of Vaughan's overall linear meters of streetscape will be of the Standard Urban level of service. The Enhanced level of service will be approximately 2 - 3% of Vaughan's overall linear meters of streetscape and the Premium level of service will represent approximately 0.25%. Therefore, while the per linear meter cost increase for these levels of service may seem high, the costs will be applied efficiently to a relatively small area in Vaughan's overall streetscape system and will maximize its impact.

As there are other intensification projects yet to be included, the financial forecast and strategy will change and evolve as streetscape master plans are added.


COFFEE
BALZAC
ROASTERS

The Model

The financial model is an Excel based tool designed to take various inputs from master plan projects and output a financial forecast for decisions makers to make informed decisions. The model is a large part of the financial strategy and financial forecast.

Premise

The rationale for creating the streetscape financial model was to create more certainty around assumptions which are used in current decision making regarding urban streetscape master plan projects. The essential aim is to provide a usable framework of financial measures, layered onto design inputs for specific projects to address questions regarding:

- Appropriate Level of Service
- Capital Cost
- Funding by Source
- Phasing
- Operating Costs
- Infrastructure Reserve Requirements

The outputs of the model are intended to aid decision-making by applying a standardized set of assumptions regarding the above elements so that individual projects can be compared on a like for like basis, and the collective impacts of projects can be assessed in terms of their likely capital and operating funding requirements.

Master Plan Stream

In the Master Plan Stream, the financial model and financial strategy occur after the level of service of the streetscapes have been determined. The outputs of the financial model are used to inform Council on the potential future financial commitments to the City and guides decision making. All other stages of the Master Plan Stream provide information as inputs into the financial model. The inputs provide a basis for the model to make calculations on funding availability and phasing.

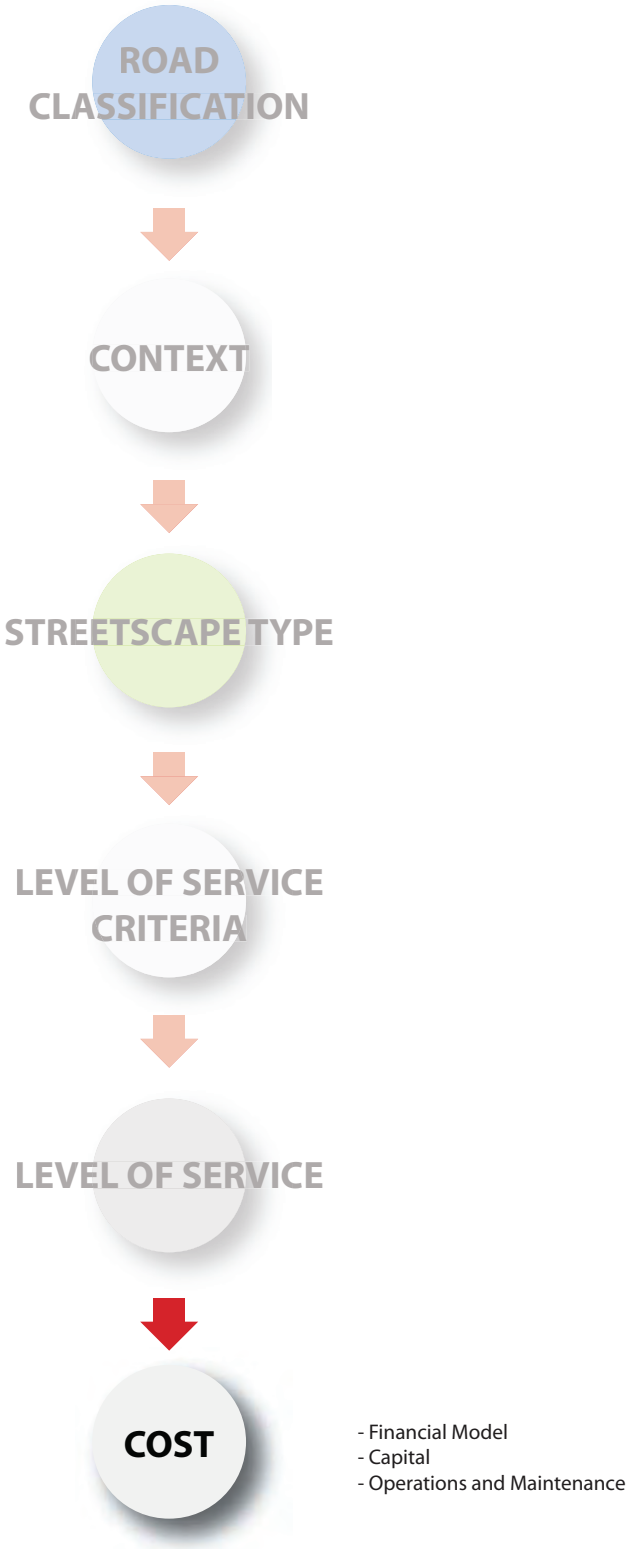


Figure 7.3: *Master Plan Stream*

Key Funding Sources

The model incorporates the following available funding sources.

1) Development Charges (DC) - subject to the existing cap on capital cost development charge eligibility as contained in the latest 2013 Vaughan Development Charge Background Study.

2) Developer contribution - based on 100% contribution to the cost of new local roads and a lower likelihood of contribution by developers for streetscape required in relation to newly developed areas/parcels. Although this funding source is uncertain and subject to negotiation, the model assumes set contribution percentages based on road hierarchy.

3) VivaNext Construction - Streetscapes along new Bus Rapid Transit routes will be built and paid for by the Region. Only enhancements to the VivaNext level of service will be at a cost to the City.

4) Regional Municipality of York Funding - for those projects identified by the Region as potentially coinciding with planned regional road infrastructure work (at a rate of 50%) and further, a lower rate of one third funding (33%) for projects which are located on regional roads but which do not have regional road infrastructure work planned.

5) Taxation - Unfunded amounts after all other funding sources identified above have been utilized, will be funded through a combination of taxation and further negotiated developer contributions. This will be determined on a project by project basis.

The approach to funding is conservative and the model utilizes percentages of contribution which account for the risk attached to obtaining funding from these sources in the future. The funding approach specifically excludes any reliance on grant funding from other levels of government (whether Gas Tax or other funding sources) as these are considered infrequent and unpredictable as it pertains to any given streetscape capital project.

Life Cycle

The initial work on the model created a functional life span for each material and component contained in the palette of materials. However, the fundamental premise of this model (of necessity as a replicable financial tool) is that the level of service represents the key driver of financial impacts.

While individual components of a streetscape have various life cycles, the model assumes a 20 year life span for the whole streetscape with the understanding that a more detailed life cycle analysis will be performed as projects are built. This 20 year life cycle is incorporated into the costing through capital.

Capital reserve contributions are set as 5% of original capital cost (unescalated). This is shown in the model as a separate item and is also combined with operating costs to demonstrate the outlay for operations and reserve needed in each year going forward.

In addition to separating out the unfunded capital amounts, operating requirements and capital reserve contributions, the model outputs identify the annual increase in taxation for operating and reserve.

Model Framework

The financial model was created as an Excel model designed to take various inputs of information typically known in a streetscape master plan and engineer outputs of cost. The model and financial forecast works upon the inputs of three different sources:

- Master Plan Project Inputs
- Phasing Project Inputs
- Cost Inputs

Master Plan Project Inputs

Master plan inputs are information found in the master plans of Intensification Areas and Heritage Conservation Districts. They combine elements of context, design and cost. These inputs also contribute to the level of service of the streetscape and provide an understanding of what is being costed and built.

Phasing Project Inputs

Phasing project inputs are information that is included in the master plan but also from other external sources. Phasing project inputs are elements of when the project may start and its duration. This type of information goes beyond the master plan and start to consider matters of implementation and coordination with other projects. Funding sources may also be considered with these inputs if there are time dependant factors.

Cost Inputs

Cost inputs are information derived from City financial procedures. How potential funding is distributed and how future financial commitments are calculated is programmed directly into the model so City Process users do not have to input this information. The cost inputs are information dependant upon the master plan project and phasing project inputs.

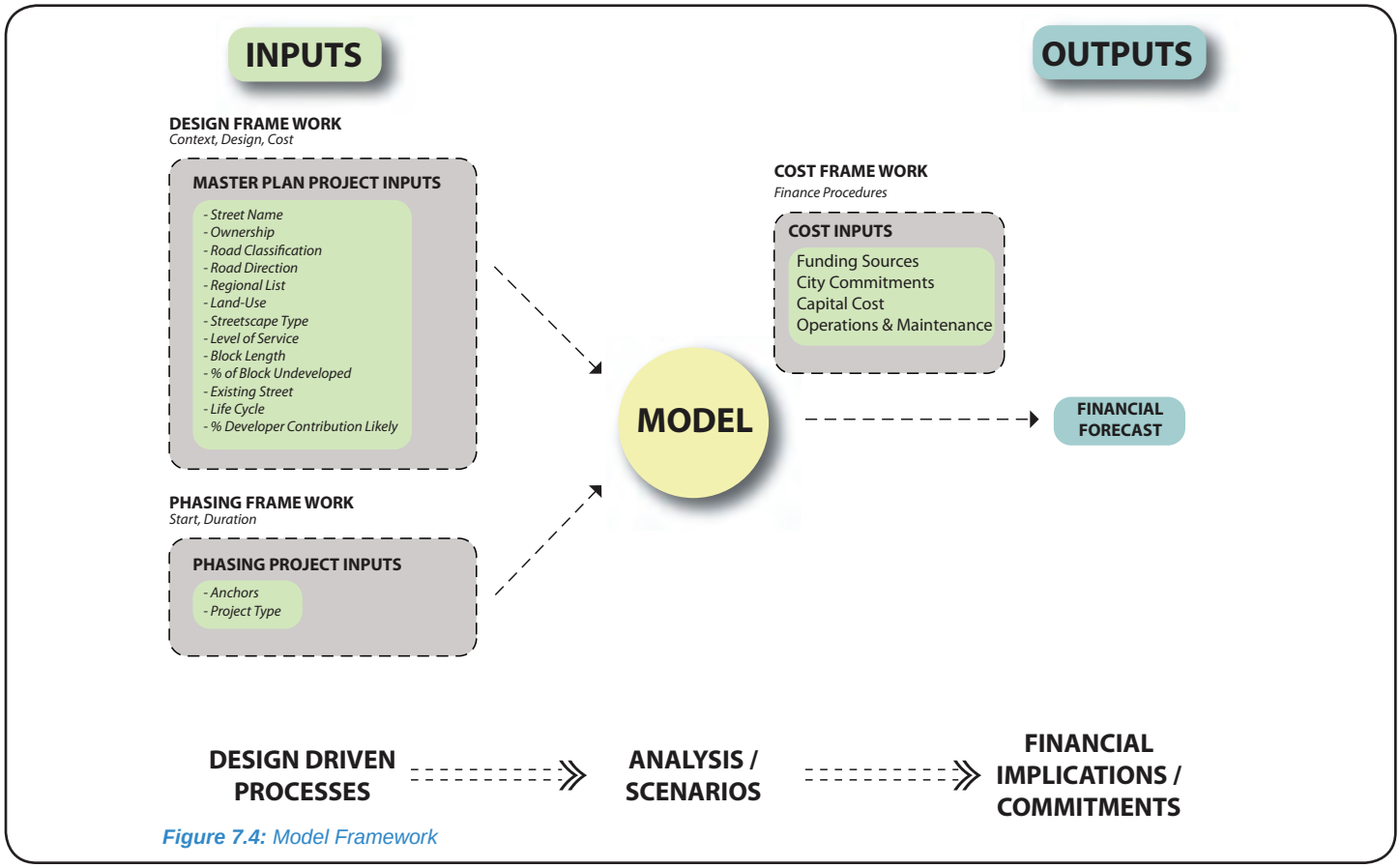


Figure 7.4: Model Framework

Level of Service and the Model

The level of service concept is important to the design and financial strategy as a bonding element between design and cost. The levels of service consider the context of an area, the resulting design solution and cost. The importance of the level of service concept to the model is the component of cost, both capital and operations and maintenance, which allows design to be reflected in the financial model.

To be used in the model, the level of service concept was simplified into the typical level of service cross sections explained in Section 6:

- Standard Urban
- Enhanced
- Premium

Capital Costs

For the prototype levels of service to be relevant and tied to cost, all the potential streetscape components were identified and assigned a typical cost. Component costs were identified from the Vaughan's Development Charge studies, Vaughan staff, and consultant team experience. Once all components and costs were agreed upon, each of the level of service prototypes was designed per the streetscape structure, found in Section 6, and to encompass typical elements found in the relevant level of service. The components available per their level of service were chosen from the Streetscape Component Selection Matrix (see Appendix G), and were then costed according to the Streetscape Component Breakdown Chart (see Appendix G). This ensured that each level of service prototype is a construction of the detailed aggregate of design.

Capital construction costs have an addition of 20% for soft costs typically applied in construction costing. While inflation in the model has been set to 0%, it is possible to add inflation to the outputs through the model.

Operations and Maintenance Costs

Each level of service prototype was also assigned an operations and maintenance cost. As with the capital cost, the operations and maintenance cost was determined at the aggregate level based upon the design components. The design components and how they are used in the structure of the pedestrian boulevard determined what operations and maintenance activities would occur. With confirmation from City of Vaughan staff, operations and maintenance activities were assigned to each level of service prototype based upon the design.

It is recognized that funding gaps may exist in the currently budgeted operations and maintenance activities. For example, currently budgeted dollars attributed to streetscape operations and maintenance may not fully reflect what may be required to maintain the City's current level of service on the City's existing streetscapes.

Infrastructure Reserve Calculation

The infrastructure reserve calculation is a separate calculation in the model. It is based upon an average 20 year life expectancy for all streetscape components, which equates to a contribution of 5% of the total capital cost to the infrastracture reserve fund each year over the life expectancy of the asset. The City of Vaughan reserve policy does not account for every component in the Streetscape Manual. Therefore, it is recommended that the current reserve policy in relation to streetscapes be revisited to address potential future funding gaps.

Pedestrian Corner Treatments and Bicycle Infrastructure

Bicycle infrastructure is mostly considered part of the roadway infrastructure and therefore was not included in the model costing. Pedestrian crosswalks were not included in the model costing. However, pedestrian corner treatments were factored into the level of service.

Capital costs and operations and maintenance costs are expressed as per linear meter unit costs to allow for calculations in the model and applied to the master plan projects. The following pages outline the recommended capital and operations and maintenance assumptions for each level of service prototype.

Basic Level of Service
Capital / Operating and Maintenance

CAPITAL ***$514.85 / lm***

Amenity Zone
- Trees and Planters
  - Tree Deciduous 60mm Caliper
  - Planting Soil
  - Compacted Mulch
- Softscape
  - Sod

Pedestrian Clearway Zone
- Main Field
  - Poured In Place Concrete

Frontage Zone
- Softscape
  - Sod
  - Planting Bed

Illumination Elements
- Standard
  - Street Lighting

OPERATING AND MAINTENANCE ***$14.72 / lm / yr***

Continuity Strip Zone
- Spring Cleanup
  - Salt Strip Sweeping
- Street Trees
  - Pruning
  - Mulching and Fertilization
  - Basic Root Pruning
- Softscape
  - Lawn Mowing

Pedestrian Clearway Zone
- Hardscape Concrete
  - Concrete Repairs
- Snow
  - Snow Removal

Frontage Zone
- Softscape
  - Shrub Bed Maintenance
  - Lawn Mowing

Illumination Elements
- Typical Lighting
  - Street Lighting

Standard Urban Level of Service
Capital / Operating and Maintenance

CAPITAL ***$974.25 / lm***

Continuity Strip Zone
- Hardscape
  - Poured In Place Concrete

Amenity Zone
- Hardscape
  - Poured In Place Concrete
- Trees and Planters
  - Tree Deciduous 60mm Caliper
  - Planting Soil
  - Raised Planter Curb
  - Perennials and Ornamental Grasses

Pedestrian Clearway Zone
- Main Field
  - Poured In Place Concrete

Illumination Elements
- Standard
  - Street Lighting

OPERATING AND MAINTENANCE ***$99.70 / lm / yr***

Continuity Strip Zone
- Hardscape
  - Concrete Repairs
- Spring Cleanup
  - Salt Strip Sweeping
- Snow
  - Snow Removal

Amenity Zone
- Hardscape Concrete
  - Concrete Repairs
- Hardscape Planter Curb
  - Concrete Repairs
- Snow
  - Snow Removal
- Street Trees
  - Pruning
  - Watering
  - Mulching
  - Standard Root Pruning
  - Infiltration / Irrigation / Flushing
- Softscape
  - Planter Watering / Maintenance
  - Ground Cover Trash Removal / Maintenance

Pedestrian Clearway Zone
- Hardscape Concrete
  - Concrete Repairs
- Snow
  - Snow Removal

Illumination Elements
- Typical Lighting
  - Street Lighting

Enhanced Level of Service
Capital / Operating and Maintenance

CAPITAL ***$1,855.98 / lm***

Continuity Strip Zone
- Hardscape
  - Poured In Place Concrete

Amenity Zone
- Hardscape
  - Pre-Cast Concrete Unit Pavers on Concrete Base
- Trees and Planters
  - Tree Deciduous 80mm Caliper
  - Raised Planter Curb
  - Planting Soil
  - Perennials and Ornamental Grasses
  - Soil Cells
- Furniture
  - Bench
  - Trash Receptacle
  - Bicycle Stand
  - Branding Signage

Pedestrian Clearway Zone
- Main Field
  - Poured In Place Concrete

Frontage Zone
- Hardscape
  - Poured In Place Concrete

Illumination Elements
- Standard
  - Pedestrian Lighting
  - Street and Pedestrian Lighting

OPERATING AND MAINTENANCE ***$152.28 / lm / yr***

Continuity Strip Zone
- Hardscape
  - Concrete Repairs
- Spring Cleanup
  - Salt Strip Sweeping
- Snow
  - Snow Removal

Amenity Zone
- Hardscape Unit Paving
  - Unit Paver Repairs
  - Concrete Base
- Hardscape Planter Curb
  - Concrete Planter Repairs
- Snow
  - Snow Removal
- Street Trees
  - Pruning
  - Watering
  - Mulching and Fertilization
  - Infiltration / Irrigation / Flushing
- Softscape
  - Planter Watering / Maintenance
  - Ground Cover Trash Removal / Maintenance
  - Trash Receptacle

Pedestrian Clearway Zone
- Hardscape Concrete
  - Concrete Repairs
- Snow
  - Snow Removal

Frontage Zone
- Hardscape Concrete
  - Concrete Repairs

Illumination Elements
- Typical Lighting
  - Pedestrian Lighting
  - Street / Pedestrian Combo Lighting

Premium Level of Service
Capital / Operating and Maintenance

CAPITAL ***$2,325.50 / lm***

Continuity Strip Zone
- Hardscape
  - Poured In Place Concrete

Amenity Zone
- Hardscape
  - Poured in Place Concrete
  - Natural Stone
- Trees and Planters
  - Tree Deciduous 100mm Caliper
  - Raised Planter Curb
  - Planting Soil
  - Perennials and Ornamental Grasses
  - Soil Cells
- Furniture
  - Bench
  - Trash Receptacle
  - Bicycle Stand
  - Branding Signage

Pedestrian Clearway Zone
- Main Field
  - Pre-Cast Concrete Unit Pavers on Concrete Base
- Paving Accent
  - Natural Stone

Frontage Zone
- Hardscape
  - Poured In Place Concrete

Illumination Elements
- Standard
  - Pedestrian Lighting
  - Street and Pedestrian Lighting

OPERATING AND MAINTENANCE ***$167.65 / lm / yr***

Continuity Strip Zone
- Hardscape
  - Concrete Repairs
- Spring Cleanup
  - Salt Strip Sweeping
- Snow
  - Snow Removal

Amenity Zone
- Hardscape Unit Paving
  - Unit Paver Repairs
  - Concrete Base
- Hardscape Planter Curb
  - Concrete Planter Repairs
- Snow
  - Snow Removal
- Street Trees
  - Pruning
  - Watering
  - Mulching and Fertilization
  - Infiltration / Irrigation / Flushing
- Softscape
  - Trash Receptacle

Pedestrian Clearway Zone
- Hardscape Unit Paving (Main Field)
  - Unit Paver Repairs
  - Concrete Base
- Hardscape Unit Paving (Accent Field)
  - Unit Paver Repairs
  - Concrete Base
- Snow
  - Snow Removal

Frontage Zone
- Hardscape Concrete
  - Concrete Repairs

Illumination Elements
- Typical Lighting
  - Pedestrian Lighting
  - Street / Pedestrian Combo Lighting

Master Plan Inputs

The financial model works upon the basis of a block by block level of detail. This means that information from the master plan needed to be understood and inputted into the model by the street, block number and block side. This level of detail ensured that the level of service can accurately respond to the needs of a streetscape. Given that streetscapes generally remain unified along the full length of a block and transitions are created at intersections, the per block level of detail was considered effective. To input the model information, a key plan was created for each intensification project to indicate the street, block number and block side. Inputs for the design framework are detailed below.

Street Name

The street name, in conjunction with the block number and block side, identifies the location of the streetscape treatments. It is important to have accurate identifiers to justify the level of service applied to the streetscape responding to the master plan design.

Ownership

Ownership of a street deals with jurisdiction and can affect funding. City of Vaughan streets are the responsibility of the City and potentially developers with regards to capital costs and Regional streets may have access to a percentage of Regional funding. However, the bulk of streetscapes are City-owned streets.

Road Classification

The road classification determines the streetscape's place in the overall street network and hierarchy. Major arterial streets are exclusively regionally owned streets. Road classification also gives indications of the street function and its character regarding volumes of vehicular traffic. The streetscape type needs to respond to these conditions.

Road Direction

The road direction refers to the orientation of the main cardinal direction of the street. The financial model works at a block level of detail and therefore the identification of which block along a streetscape and which side is important to know. The road direction helps to identify which block side the information pertains to. For example, a north-south street will have blocks with east and west identifiers. This information is used in conjunction with the street name and number of blocks.

Regional List

Potential regional funding is affected by the York Region Municipal Streetscape Partnership Program (MSPP). The funding percentage that York Region will contribute is affected by successful application and if a streetscape can be found to coincide with regional street infrastructure projects.

Number of Blocks

The number of blocks along a streetscape is used with the street name and road direction to identify locations of streetscape treatments. The number of blocks along a street is automatically broken down with the street name and block side so that inputs of land-use, streetscape type, level of service, block length, and percentage of block undeveloped can be accurately applied to the master plan design.

Land-Use

The adjacent land-use along a block indicates the uses that the streetscape design must respond to. This information is important to decide the streetscape type and how the streetscape design will respond to the adjacent uses. The adjacent land-use gives a sense of the character of the street based upon the type of pedestrian activity.

Streetscape Type

The streetscape type is a design response to the adjacent land-use. The streetscape type gives a sense of the physical character of the street based upon design responding to pedestrian activity.

Level of Service

The level of service is one of the most important inputs in the model. The level of service chosen for a block of streetscape determines the linear meter cost and what components and materials are available for detailed design. The level of service takes the elements of context, design and cost and allows the model to take those elements into account when formulating a future financial impact.

Block Length
The block length of a street is needed to determine the cost of a streetscape. Each block length along a streetscape in the project must be known to apply the per linear meter level of service costs.

Percentage of Block Undeveloped
The percentage of block undeveloped input refers to how much of a block is undeveloped or requires redevelopment to align with the new master plan streetscape block structure. How much undeveloped land is available along a block affects developer contributions to the new or upgraded streetscape. The more undeveloped land along a streetscape block the greater the possibility of developer contributions.

Existing Street
Existing streets have an existing operations and maintenance value associated with the street. If a street is indicated as existing, it affects the future operations and maintenance values since operations and maintenance were likely occurring prior to the streetscape upgrade.

Life Cycle
For the purposes of the reserve calculation, the life cycle for all levels of service was set at 20 years.

Percentage Developer Contribution Likely
The percentage of developer contribution likely is an automatic input / output based upon the road classification. Along major arterials (Regional roads) the Region has the potential to contribute 33 to 50% of funding through the MSPP. The developer is not likely to contribute the full remaining 50% and therefore the assumption of 25% was made. On local roads, developers are expected to contribute 100% of funding through their developments. On other municipal roads, it is possible that developers could contribute up to 75 to 100% of the streetscape funding, however it was felt a more conservative assumption would be 50%. The assumptions regarding percentage of developer contribution were derived for the purposes of the model and do not represent City policy. The City and the development community must work together to achieve the build-out of the streetscapes. The model assumptions provide a starting point for discussion and negotiation.

Phasing Inputs

Phasing inputs in the model are different from master plan inputs in that they may deal with external factors not found in the master plan. There is a great deal of uncertainty with phasing inputs and many assumptions must be made during the process. Never-the-less, phasing inputs are important as they have an impact on the potential funding sources and future financial commitments.

It is useful to think about phasing in the form of overall project phasing and specific project phasing. Overall project phasing is discussed as part of the financial strategy and accounts for the phasing of multiple intensification projects in relation to each other and deals with project start dates, project durations and potential funding sources. Specific project phasing makes assumptions and considerations of construction phasing for specific intensification projects. When a specific street will be constructed in relation to another street in an intensification project it affects the financial forecast on a year to year basis with greater detail than just knowing the overall project duration. Operations and maintenance costs are also affected by the phasing of specific streets.

The following phasing inputs are found in the model and are affected by overall project phasing and specific project phasing considerations.

Phasing by Street

As each street is included in the models "project" worksheet it must be assigned a phase. Phasing by street is specific to the individual intensification area project and is mainly related to construction matters. The individual inputting phasing by street information must have knowledge of which streets are important as catalysts for development, which streets will be developed as partnerships with other parties and the planning and construction issues of the particular project.

Year End of First Projected Year

The year end of first projected year input specifies the end of the starting year of the project and is based upon overall project phasing. This input, in conjunction with the first estimated month and year of phase start input determines how many months of construction can be completed in the first year of the intensification project. This is relevant to the start of operations and maintenance costs.

Length of Phase (in months)

Length of phase indicates how long each phase lasts in months. Depending on what streets are included in each phase and the complexity of streetscape construction the lengths of each phase may vary. The length of phase input further divides and details capital construction and operation and maintenance costs.

Estimated Month and Year of Phase Start

The estimated month and year of phase start indicates the start of the construction of each phase in the project. This input may be affected if phases are not continuous allowing for an overlap in phases.

Are Phases Continuous

If the phases are continuous there is no overlap and the start and end dates of the phases will show consecutively. However, if any of the phases are not continuous, the start date of the phase may be set to overlap with another phase. Non-continuous phases create implications for capital and operations and maintenance cost commitments.

Limiting Assumptions

There are a number of key assumptions which drive any approach to forecasting likely capital expenditures on the part of the City. As much as anything, the strategy is not one which is born of external factors which direct the City to undertake capital projects – but rather, a combination of external forces which, combined with active management by the City in its forward planning can result in a reasonable approach to financial forecasts. It is important to recognize that any forecast presented (this represents the first iteration of such forecast based on the output of the financial model) is speculative in nature and should be used as a basis for further discussion and decision making on the overall city-wide development priorities. Specifically, the assumptions which are the basis for the financial forecast are more important at this stage than the forecast itself. It is important that these assumptions, which will change over time and as further work is undertaken on each of the specific projects in question, are reviewed, appraised and re-evaluated as necessary to produce a reasonable financial forecast based, commonly agreed and relevant assumptions and principal priorities.

Specific limiting assumptions in providing this forecast are as follows:

Model Driven

The forecast represents an output of the financial model which provides the opportunity for the City to estimate the "order of magnitude" capital cost associated with the seven individual projects which comprise the study. Further, this model provides an estimate of both the operating costs and the capital reserve necessary to enable these projects to be undertaken and at the level of service chosen.

Financial Impact and Funding

Municipal fiscal impact considerations require an assessment of the revenue potential associated with the broader development to which the streetscape is part of. The relative contribution of public realm improvements and public sector development will determine this over time. As presented earlier in the project, in broad terms there are significant economic benefits associated with improved city infrastructure, public realm improvements and other measures which help create a quality of public gathering space, commercial environments, and institutional as well as residential spaces that are broadly considered to have resulted in significant economic gain for communities.

A key purpose of the model in estimating financial impact is the identification and qualification of the likely funding sources available to secure each of the projects in question. This qualification is always at a conceptual stage until sufficient detail exists for more precise estimates of costs and their allocation. This includes a range of funding sources including eligible funding from the City of Vaughan Development Charges, contributions by the private sector through development of lands along the streets in question, funding provided by Regional partners, and a resulting amount of funding which is due to the City of Vaughan's account and represents for purposes of this analysis as funding to be secured through the tax base.

Reliance on Development

In conceptualizing an approach to phasing of these projects, it is important to distinguish clear characteristics of each as follows:

- Those projects which are generational in scope (extending 25+ years);
- Those projects which are shorter term and lower cost;
- Those projects which are more likely to be in the control of the City by virtue of the responsibility falling on public agencies for funding as opposed to occurring alongside and as a direct result of private sector development; and
- Those projects which fall essentially into the category of being driven by land use development – and as such, the control of phasing is subject to the realities of the market place in terms of the pace of development over the coming years.

Financial Strategy

The financial strategy is a part of the overall City-Wide Strategy along with the design strategy. The design strategy, comprised of the streetscape types and level of service concept, is intended to tie into the financial strategy to bring together design and cost concerns. Connecting the design and financial strategies together is accomplished by combining the levels of service and the financial model.

A large part of the financial strategy is the financial model. The financial strategy and model are a combination of the elements of phasing, funding and design and ensures a holistic approach to streetscape implementation. As discussed earlier, the financial model is also a construct of the City of Vaughan's financial processes for streetscapes taking into account issues such as, but not limited to, capital costs, operation and maintenance costs, infrastructure replacement reserves, development charges, Regional funding and developer funding. The outputs of the financial model allow the financial strategy to evolve as new information becomes available. At present, the financial strategy includes seven intensification projects. The level of service concept was applied to these projects and inputted into the model. The model's outputs yielded results that allowed for analysis and subsequent adjustments to the levels of service. As more projects are added, the model outputs will inform how the strategy may be modified. While the financial strategy gives an overall forecast of financial commitment, projects will still be required to be evaluated through the City's budget approval process.

The financial strategy will be discussed per the elements of:

Phasing
- Anchors
- Project Type

Design
- Level of Service Distribution
- Level of Service Scenarios

Phasing

To ensure that the phasing input assumptions were objective, the phasing assumptions were determined upon the basis of two main factors:

- Anchors
- Project Type

Anchors

A series of existing funding schedules represented anchors by which the City could judge its intended initiation of each project and acted as a basis for a forecast for City expenditure. These anchors only apply to streets that are part of the existing network and not new streets. These anchors came from sources such as:

- VivaNext
- York Region Municipal Streetscape Partnership Program (MSPP)
- Vaughan Development Charges

These anchors represent existing planned construction in the intensification areas which are related to roadway and public infrastructure. By aligning streetscape intensification projects with these infrastructure projects, the City can take advantage of funding from these sources, ensure minimal disruption to traffic and busineses and make efficient use of timing and resources.

Anchors:
Development Charges Streetscape Specific Funding

The latest City of Vaughan Development Charge Background Study (2013) identifies the years when Development Charge (DC) funding is available for each individual project. When DC funding is available is a useful factor in determining when projects should start.

In relation to the seven intensification projects in the financial forecast, the funding schedule is shown graphically on the adjacent page.

Development charges funding is largely dependent upon streetscape enhancements coinciding with the engineering infrastructure construction making ideal anchors to start project construction.

Anchors:
VivaNext and York Region MSPP

An agreement between Vaughan and VivaNext outlines the upgrading of streetscapes along VivaNext's bus rapid transit network. Streetscape upgrades will occur according to a VivaNext schedule which is a reasonable time for other streetscape project work to occur.

The York Region MSPP program is another potential source of timing and funding. As with the other sources, York Region anticipates doing streetscape infrastructure work at various times in the future. In conjunction with this work, it offers a program in which the City can apply for additional funding along Regional roads where the Region is doing infrastructure work.

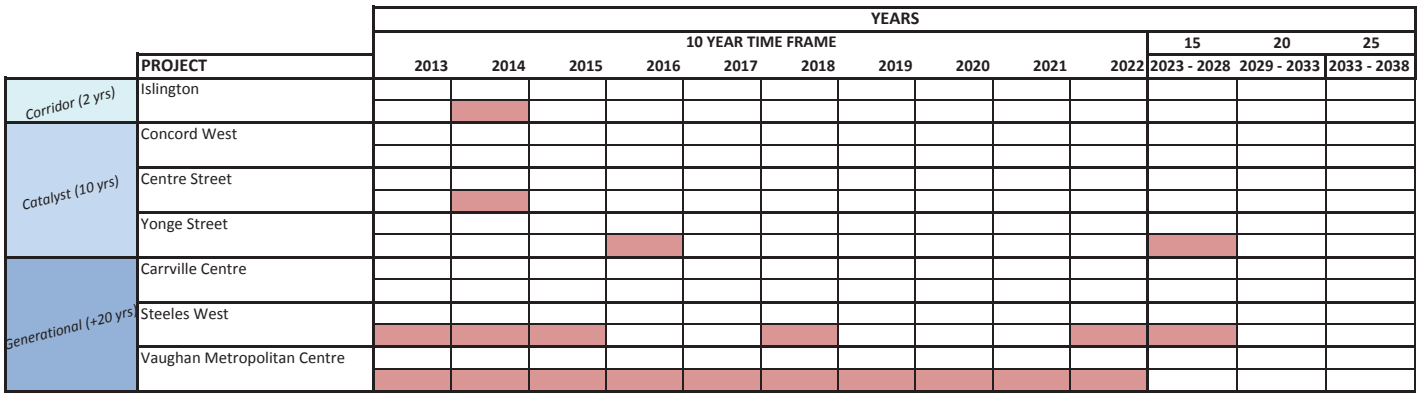


Figure 7.5: *Development Charges Streetscape Specific Funding*

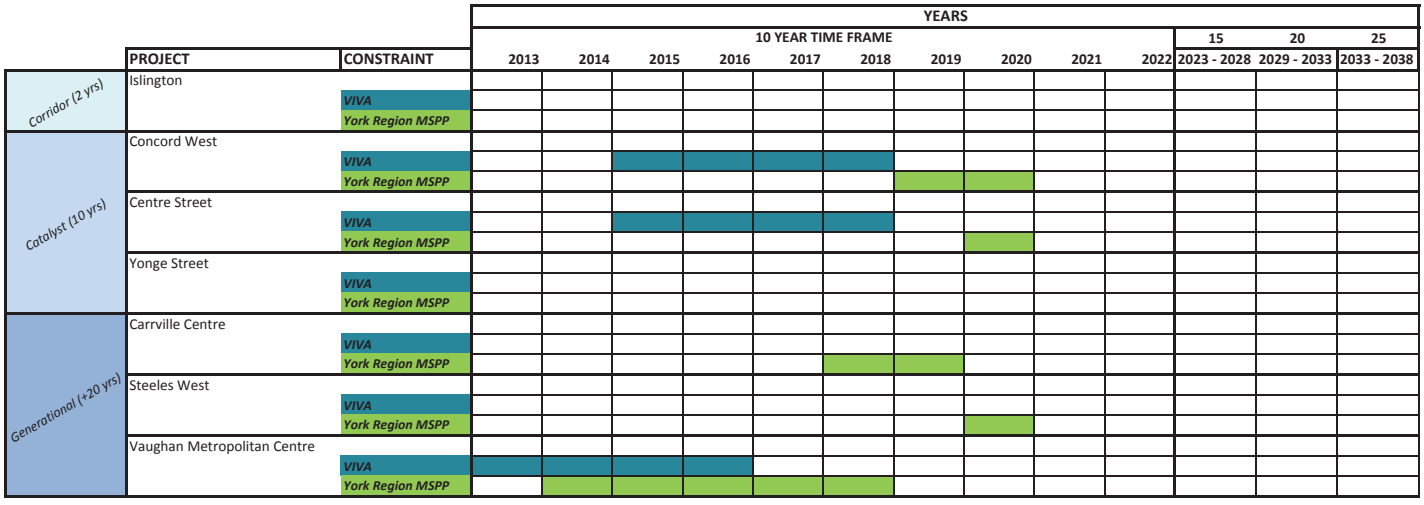


Figure 7.6: *VIVA and Regional Funding Availability*

Project Type
The project type largely determines the duration of the project but can also indicate when initiation is desirable. There are three project types:

- Generational Projects
- Catalyst Projects
- Corridor Projects

The projects types were developed around the consideration of certainty and priority.

Certainty
The project certainty is mainly determined by how much control a municipality has over the projects full build out. The full build out of large projects with a large amount of new local roads and undeveloped private lands are determined largely by developers. Developer interests and market influence when new development, and therefore new local roads, will be built. The greater concentration of undeveloped private developer lands means the municipality will have little control over the project construction. Collector roads offer more certainty since they can be built by the municipality regardless of development. The project's size and complexity also affect the certainty of the projects development.

Generally, projects with low certainty tend to have longer durations, while projects with high certainty have shorter durations.

Priority
The project priority is determined by its importance and intent. Projects which are intended to be catalysts or that which include catalysts for developement should have priority for construction. In large projects with a large amount of undeveloped private lands, it is important to construct the catalyst early in the process to encourage development and reduce the project duration. Catalysts for development include a major cultural node, urban centre, mobility hub, transit hub, regional urban square, etc.

Small projects with municipal control that can be finished easily have high priority for completion since they have a good certainty of completion.

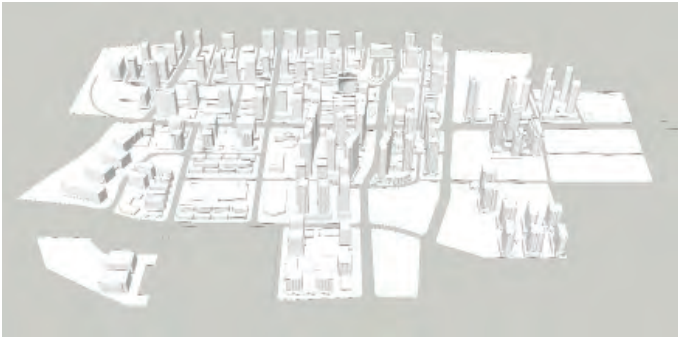
Generational Projects

Generational projects create new roads and infrastructure while creating new employment and residential lands. Generational projects are ambitious long term projects which last longer than a generation (longer than 25 years) and dramatically change the overall character of an area. A large portion of generational projects are new local roads fronting undeveloped private lands meaning there is little municipal control over when development will occur. Generational projects have a great amount of uncertainty and need a strong catalyst to encourage development. The construction of the catalyst portion of generational projects is a priority.

The generational projects include:

- Vaughan Metropolitan Centre
- Steeles West
- Carrville Centre

Characteristics:
- > 25% new roads
- > 25% undeveloped developer lands
- Mix of new roads and existing road enhancements
- Little municipal control over full build out and project duration
- Mix of land-uses including medium to high density residential, employment, recreational and retail services
- Project anticipated to be constructed over a 25 + year period
- Project includes development of a major node or urban centre as a catalyst with regional significance (mobility hub, transit hub, cultural centre, institutional centre, regional urban square, etc.)



Catalyst Projects

Catalyst projects are meant to encourage enhancement and infill of adjacent land-uses. Catalyst projects may include a minor amount of new roads or development, but are only moderately dependent upon private development. The catalyst project is mainly an enhancement to existing roads and should be constructed over a 10 year period. Catalyst projects may include small nodes but are not dependant upon their construction. Catalyst projects do not typically have a high priority given their potential costs and may be delayed depending on the likelihood of private redevelopment.

The catalyst projects include:

- Concord West
- Centre Street
- South Yonge

Characteristics:

- < 25% new roads
- < 25% undeveloped developer lands
- Mostly enhancement of existing roads
- Private development mostly enhancement and infill
- Some municipal control over full build out and project duration
- Project anticipated to be constructed over approximately a 10 year period
- Project may include small nodes (including transit stations and small squares)

Corridor Projects

Corridor projects are generally smaller projects with little complexity which can be completed with a good deal of municipal control. Corridor projects are typically enhancements to existing roads with little anticipation of new development to adjacent lands. Corridor projects typically are completed over no longer than a two year period and do not require the development of a catalyst or node. The relative certainty of project completion, short construction timeline and relatively lower cost make corridor projects ideal to complete early with high priority.

The corridor projects include:

- Islington Avenue

Characteristics:

- Little to no new roads
- Little to no undeveloped developer lands
- Mostly enhancement of existing roads
- Project duration mostly under the control of the Municipality
- Project anticipated to be constructed in approximately a 2 year period
- Project funding to be handled largely as a single investment

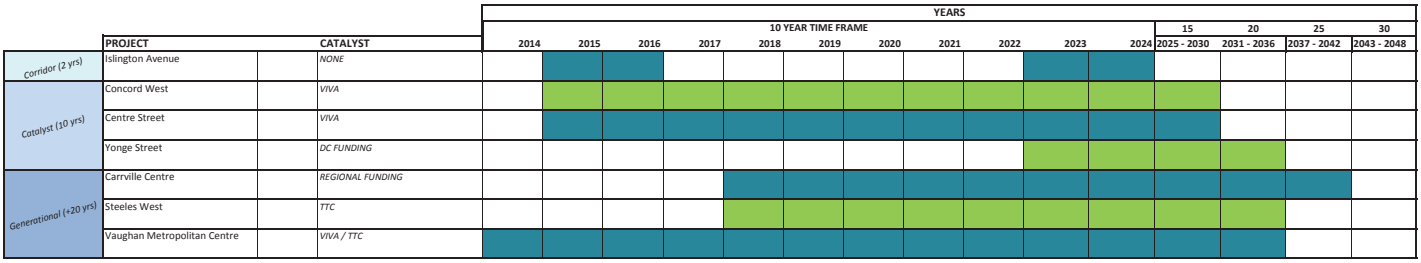


Figure 7.7: *Preliminary Project Phasing and Funding Strategy*

Consultant Phasing

Knowing the anchors associated with the projects and the project types, the intensification projects were assigned a phasing. For each project, the project type was determined (approximate duration), a potential catalyst was identified and potential anchors by funding sources were considered. Figure 7.7 illustrates the preliminary phasing for the seven projects.

Islington Avenue

Key Points

- Corridor Project (approximately 2 year duration).
- No identifiable catalyst.
- Access to potential DC funding starting in the year 2014.
- Access to potential regional funding pending application and acceptance.

With no catalyst or anchor available, Islington Avenue can potentially start construction at any time. However, the current York Region MSPP is scheduled through 2022. Potentially, this project could be placed on York Region's schedule in 2023 with access up to 50% funding pending successful negotiations with York Region. A portion of Islington is planned for 2015-16, with the bulk of the work planned for 2023-24.

Potential Project Phasing: Year 2015-2016, 2023-2024

Concord West

Key Points

- Catalyst Project (approximately 10 year duration).
- VivaNext construction along Highway 7 represents a catalyst for construction work in the year 2015.
- Access to York Region MSPP 50% funding for Highway 7 and Keele Street.

Construction by VivaNext presents the best opportunity to minimize disturbance and maximize resources for construction and funding. Given the 10 year approximate project duration, phasing the project to coincide with VivaNext construction allows Concord West to partner and coordinate with VivaNext while also accessing Regional funding in the years 2019 and 2020.

Potential Project Phasing: Year 2015 - 2025

Centre Street

Key Points

- Catalyst Project (approximately 10 year duration).
- VivaNext construction along Centre Street represents a catalyst for construction work in the year 2015.
- Access to DC funding starting in the year 2014.
- Access to York Region MSPP 33% funding in the year 2020.

VivaNext is slated for construction along Centre Street in the year 2015. With access to DC funding starting in 2014, access to Regional funding in 2020 and an approximate project duration of 10 years, phasing starting in 2015 to coincide with VivaNext construction would maximize potential resources and minimize construction disruption. Coordination between the Region and VivaNext is recommended.

Potential Project Phasing: Year 2015 - 2025

Yonge Street
Key Points
- Catalyst Project (approximately 10 year duration).
- Proposed Yonge Street Subway Extension stations are potential catalysts. Schedule currently unknown.
- Access to DC funding starting in the year 2016 and 2022 - 2025.
- Potential access to York Region MSPP funding pending application and negotiations.

Development Charge funding represent the only funding anchor in the year 2016 or between 2022 - 2025. Potential catalysts include the Proposed Yonge Street Subway Extension stations, however, these are not reliable. Therefore, potential construction could begin in 2023 to ensure access to the Growth Related DC funding. It is recommended that discussions with York Region and the TTC commence for coordination.

Potential Project Phasing: Year 2023 - 2033

Carrville Centre
Key Points
- Generational Project (approximately 20 year duration).
- Potential York Region funding.
- Potential access to York Region MSPP 50% funding for Rutherford Road in the year 2018. Dufferin Street is also eligible for Regional funding pending application to the Region and acceptance.

The Carrville Centre master plan represents a large amount of uncertainty due to its reliance on developer construction. Access to York Region funding in 2018 represents the only foreseeable anchor and start date. Additional discussions with the Region for funding for Dufferin Street may yield additional considerations.

Potential Project Phasing: Year 2018 - 2038

Steeles West
Key Points
- Generational Project (approximately 20 year duration).
- Catalyst identified as the Toronto-York Spadina Subway Extension station (Steeles).
- Potential access to York Region MSPP 50% funding for Keele Street in the year 2020. Steeles Avenue and Jane Street are eligible for Regional funding but are not scheduled.
- Access to DC funding starting in the year 2013, 2014, 2015, 2018, 2022 - 2025 and 2026 - 2031.

The Steeles TTC subway station is currently under construction and represents a catalyst for development in Steeles West. Given the project's long duration (potentially to the year 2033) it has the potential to access all DC and York Region funding. It is recommended that further discussions with York Region regarding Keele Street and Steeles Avenue be undertaken.

Potential Project Phasing: Year 2018 - 2034

Vaughan Metropolitan Centre
Key Points
- Generational Project (approximately 20 year duration).
- Multiple catalysts identified as the Toronto-York Spadina Subway Extension station (Vaughan Metropolitan Centre) and VivaNext construction along Highway 7 in the year 2013. The construction of these elements form a mobility hub.
- Access to York Region MSPP 50% funding for Highway 7 from years 2014 to 2018. Jane Street is eligible for funding with negotiations.
- Access to DC funding from the years 2013 through 2022.

The mobility hub elements (TTC station and VivaNext BRT station) are already under construction and therefore signify the start of the project (2013). The duration of the project is largely dependent upon developers and therefore the project has the potential to access many funding sources.

Potential Project Phasing: Year 2014 - 2034

Design

To further explore the potential to adjust the financial impact of the intensification projects, the design aspects of the intensification projects can be considered. There are two ways in which the design of the intensification projects have been altered:

- Level of Service Distribution
- Level of Service Scenarios

Level of Service Distribution

After assigning levels of service to streets and blocks of the intensification projects during the preliminary costing with the model the overall distribution of the levels of service for full build out of the intensification projects was considered. The distribution of the levels of service by length of streetscape showed that, as expected, Premium levels of service represented only a small portion of the total at 3%. However, Enhanced and Standard Urban levels of service were found to be 40% and 57% respectively. By cost, Premium levels of service represented 6% of the full construction cost, while Enhance and Standard Urban represented 64% and 30% respectively.

Premium levels of streets should be memorable and iconic streets which should stand the test of time and last many generations. Therefore, it was felt that the small percentage of Premium streets was reasonable. Enhanced level of service streetscapes are meant to be generational. As generations turn, styles change and given that enhanced levels of service have high visibility and located on streetscapes with high volume pedestrian traffic, may require updating to keep up to date to the styles of the time. Therefore, it was felt that enhanced levels of service should not be much more than approximately 1/3 of the total linear meter length of streetscapes.

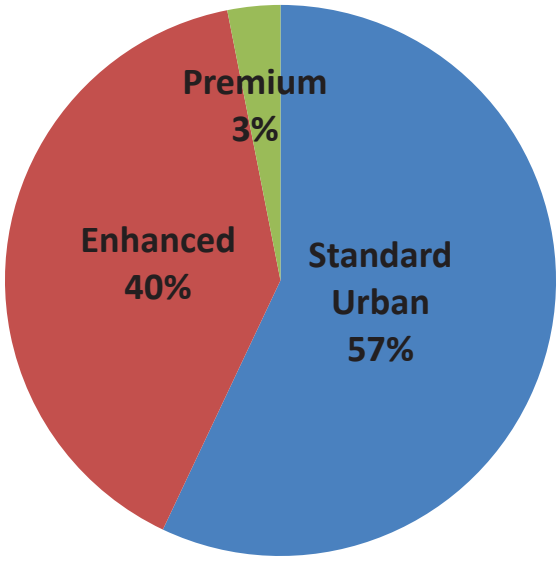


Figure 7.8: *Level of Service Distribution by Length for all Intensification Projects*

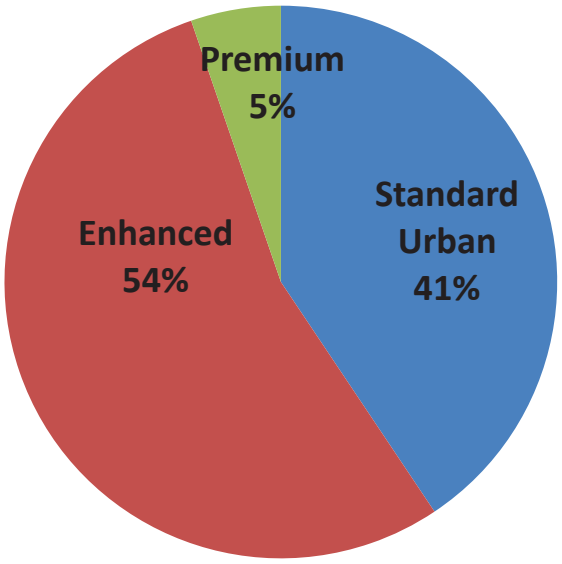


Figure 7.9: *Level of Service Distribution by Cost for all Intensification Projects*

In an effort to reduce the Enhanced level of Service for budgeting purposes, the master plans re-evaluated. It was found that within the Vaughan Metropolitan Centre there are two types of commercial streets: retail required and retail permitted. Streetscapes with retail permitted are not guaranteed to have retail which is one of the level of service criteria required for Enhanced levels of service. As a result, commercial streets with permitted retail were reassigned a Standard Urban level of service.

The reduction in level of service for the Vaughan Metropolitan Centre reduced the overall Enhanced level of service portion by 4% to 36% and increased the Standard Urban level of service portion by 4% to 61%. The revised distribution is 61% Standard Urban, 36% Enhanced and 3% Premium levels of service. In terms of cost, the redistribution of level of service decreased the Enhanced and increased the Standard Urban by 3%.

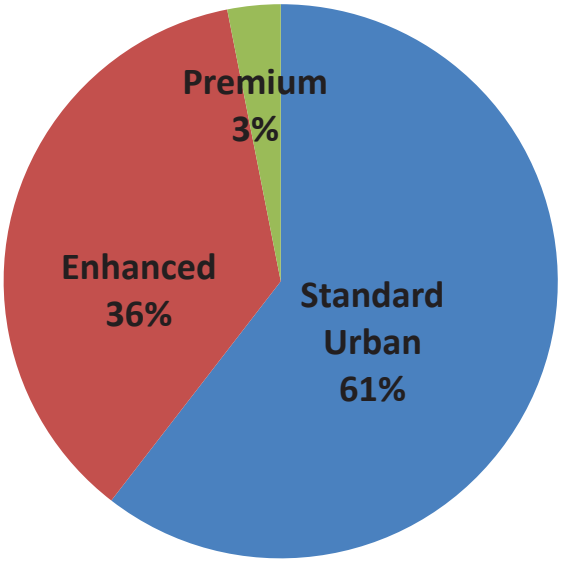


Figure 7.10: *Level of Service Distribution by Length for all Intensification Projects*

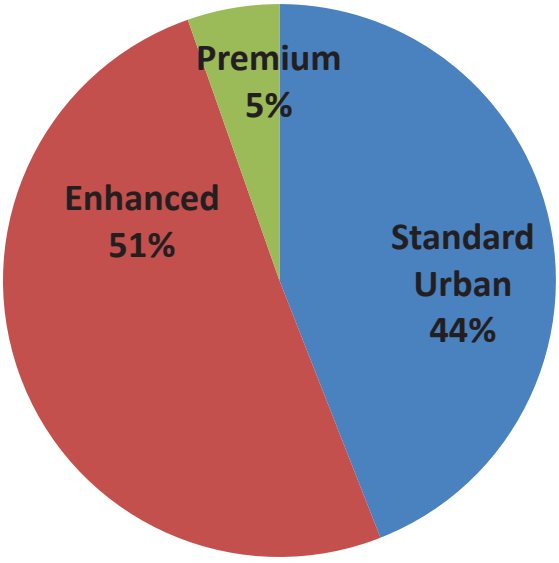


Figure 7.11: *Level of Service Distribution by Cost for all Intensification Projects*

Level of Service Scenarios

Using the available components per the Standard Urban level of service, three Standard Urban design options were constructed. A recommended, low and high cost option for the Standard Urban level of service were created and each was run through the model costing for the seven intensification projects to determine the financial impact.

The reason for three different Standard Urban cost scenarios is two-fold:

- The Standard Urban level of service will represent the urbanized character of Vaughan.
- The Standard Urban level of service will become the new baseline from which other streetscapes are subsequently designed which has cost implications.

The Standard Urban level of service represents the largest amount, by length, of streetscape for the intensification projects. Standard Urban levels of service are found mainly on residential neighbourhood streets in Vaughan. Enhanced and Premium level of service streets, by contrast, can be found in areas with a large amount of visitors. Therefore, the Standard Urban level of service represents the urbanized character that City of Vaughan residents will relate to and experience as home.

Vaughan's current engineering streetscape standard (Basic level of service) is not appropriate for urban streetscapes. The Basic level of service design does not address the needs for urban pedestrian traffic volumes or urban land-uses. The Basic $515 per linear meter capital construction and $15 per linear meter per year operations and maintenance costs addresses a suburban context with mainly softscape (sod), a minimal pedestrian clearway and minimal operations and maintenance (lawn mowing and basic pruning, etc.).

Over the course of determining the Basic level of service, Vaughan staff found that the City currently has approximately $5 per linear meter / year in the budget for operations and maintenance of Basic streetscapes. Therefore, a funding gap may potentially exist even for current streetscapes in the City.

For intensification projects pedestrian traffic volumes are expected to be higher with intensive urban land-uses. A hardscape design treatment for an urban context is required for intensification projects to adequately serve urban pedestrian and land-use needs. To meet the needs of urban streetscapes, the current engineering streetscape design standard needs to change. The majority of the change is replacing softscape to hardscape increasing the capital construction cost by approximately $450 to $540 per linear meter (depending on the cost scenario).

Similarly, operations and maintenance costs must change to meet the maintenance level of the urban standard level of service. In the urban context, street trees and hardscape areas require a wider array of maintenance activities, such as tree watering, planter maintenance and hardscape replacement to remain acceptable for high pedestrian traffic volumes. The urban condition requires an increase of approximately $70 to $100 per linear meter per year for operations and maintenance costs (depending on the cost scenario).

Since the Standard Urban level of service will become the new baseline from which other urban streetscapes are subsequently designed from to higher levels of service, establishing the initial cost implications between the suburban context and urban context serves as important context for the different circumstances that urban streetscapes are in comparison to suburban.

	Levels of Service		
	STANDARD	ENHANCED	PREMIUM
OPTION 1 - LOW	$966.25/lm Capital $84.53/lm O&M	$1,855.98/lm Capital $152.28/lm O&M	$2,325.50/lm Capital $167.65/lm O&M
OPTION 2 - RECOMMENDED	$974.25/lm Capital $99.70/lm O&M		
OPTION 3 - HIGH	$1,055.93/lm Capital $115.70/lm O&M		

Figure 7.12: *Level of Service Cost Options*

Figure 7.12 outlines the Standard Urban cost options. The low Standard Urban level of service cost option offers typical poured in place concrete hardscape, trees, tree grates and street lighting. This option accommodates urban pedestrian traffic volumes, however provides little in pedestrian amenities.

To add visual pedestrian amenity to the streetscape, the recommended Standard Urban level of service cost option replaces the tree grates with a raised planter curb and perennials and ornamental grasses planting. The addition of the planters and planting increases the operations and maintenance activities necessary but also creates a much more pleasant urban streetscape.

Further public amenities are added in the high Standard Urban level of service cost option with the introduction of benches and trash receptacles. Similar to the recommended Standard Urban cost option, this increases the operations and maintenance activities required to maintain the streetscape in the future. However, the addition of benches and trash receptacles help to make streetscapes more inviting spaces for pedestrians to stay.

Intensification Projects

The seven intensification projects identified for the purpose of this report were each originally designed through different means and employed different assumptions to achieve a final cost. As such, it would be difficult to effectively compare and understand the true cost implications of the projects. As part of the financial strategy, the level of service concept was applied to each of the projects per the design strategy. The master plans were studied and based upon the information provided such as land-use, street classification, context, streetscape materials and design, a streetscape type and level of service was assigned to the streetscape blocks. Given that each project was done separately, there was a varying degree of detail and information and therefore certain assumptions were made for each project. The projects were then costed using the financial model to create a financial forecast spanning the next 10 years.

The seven intensification projects included in this financial strategy were selected due to their importance and state of completion. As intensification continues, further master plan projects will evolve and the level of service concept will be applied to further projects adding to an ever evolving financial strategy.

Project Context

Before considering the projects and their costs, it is important to understand that the intensification projects make up a small amount of Vaughan's total amount of streetscapes. At present, Vaughan contains approximately 1,004,000 meters of streetscape. With the introduction of new roads in the seven intensification projects considered in this financial forecast, Vaughan will have approximately 1,043,853 meters of streetscape once the projects are complete.

At full build-out, the seven intensification projects, considered in the financial forecast will amount to approximately 8% (approximately 87,460 meters) of the total length of streetscapes in all of Vaughan (see Figure 7.13). Since higher levels of service are only being applied to intensification projects (including Heritage Conservation Districts), only 8% of Vaughan's streetscapes will have higher level of service applied. Therefore, the cost of upgrading streetscapes to a higher level of service is focused on a small amount of area. As other intensification projects are added, the ratio will change.

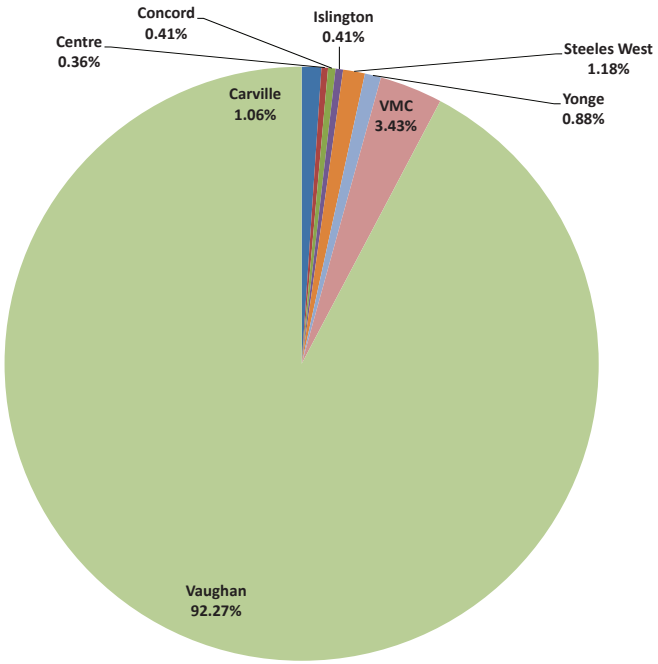


Figure 7.13: *Total Length of Intensification Area Streetscapes by Project in Vaughan*

Of the seven projects, the Vaughan Metropolitan Centre (VMC) represents the largest project in terms of linear meters of streetscape at over 3% (38,830 linear meters) of Vaughan's total length of streetscapes. The other projects each represent approximately 1% or less of Vaughan's total streetscape length. By project, the Vaughan Metropolitan Centre makes up almost half of the total considered streetscape construction for the seven intensification projects at 45%. Steeles, Carrville and Yonge Street represent less than 15%, while Centre, Concord and Islington represent 5% of the total streetscape construction as identified in Figure 7.14.

A large portion of the intensification projects is an upgrade of existing streetscapes. Of the total streetscape construction work found in the intensification areas considered, 46% of the streetscapes represent new streets. Existing streetscapes represent 54% of the streetscape.

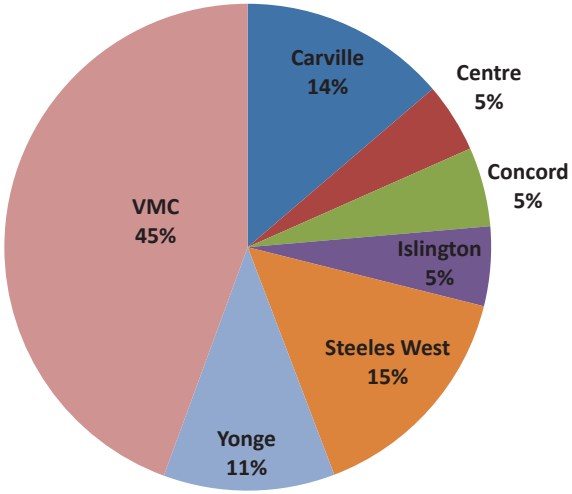


Figure 7.14: *Total Length of intensification Area Streetscapes by Project*

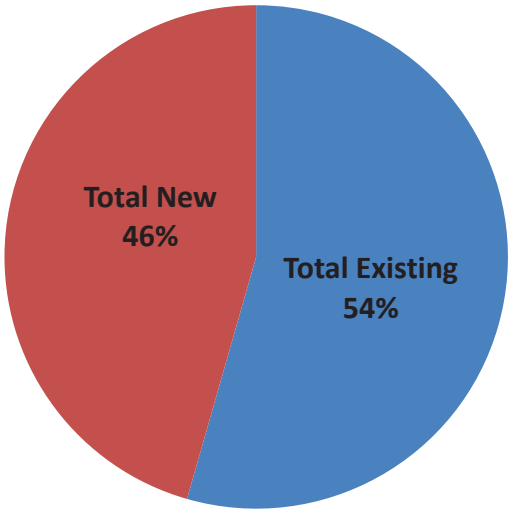


Figure 7.15: *Intensification Areas New vs. Existing Streets*

Vaughan Metropolitan Centre

Description

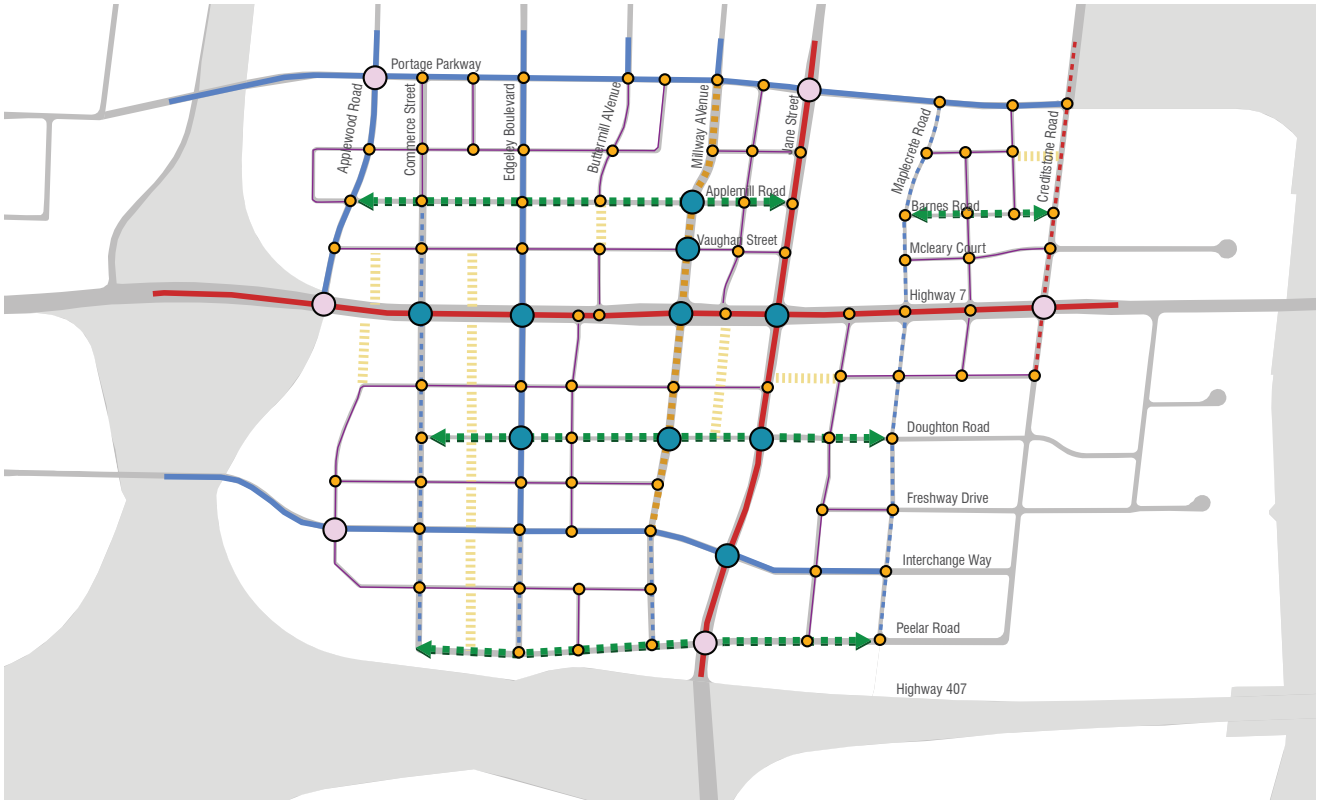
The Vaughan Metropolitan Centre (VMC) is a large complex downtown building project northeast of Highway 400 and Highway 407. Centred around a mobility hub with the interconnection of TTC, VivaNext and YRT transit services, the VMC is to be Vaughan's new downtown core. Being the last TTC subway stop along the Toronto-York Spadina Subway Extension, the VMC will have a cultural and regional transit significance. The VMC has a high degree of uncertainty due to the large amount of privately owned land and a large network of new roads planned. Full build-out of the VMC will likely take over 25 years.

Approximate Length of Streetscape of Development

38,830 linear meters

Full Build-Out (Year 2034)

Total Capital Construction:	$59.7 million
Development Charges:	$9.6 million
Developer Contribution Local Roads:	$18.2 million
Developer Contribution Arterial/Collector:	$8.7 million
York Region Funding:	$2.1 million
VivaNext Construction:	$4.1 million
Unfunded Capital:	$17.0 million



Steeles West

Description

The Steeles West project, along Steeles Avenue West between Keele and Jane Streets, is centred around the construction of the Steeles TTC subway station along the Toronto-York Spadina Subway Extension. With close proximity to York University, the Steeles West project is expected to be a transit hub. There is a large amount of undeveloped private lands and new streets which should be encouraged to develop with the addition of the subway station. There is a high degree of uncertainty and full project build-out is expected to take over 25 years.

Approximate Length of Streetscape of Development

13,390 linear meters

Full Build-Out (Year 2034)

Total Capital Construction:	$23.0 million
Development Charges:	$2.0 million
Developer Contribution Local Roads:	$8.2 million
Developer Contribution Arterial/Collector:	$5.2 million
York Region Funding:	$1.3 million
VivaNext Construction:	$0.0 million
Unfunded Capital:	$6.3 million

Carrville Centre

Description

Carrville Centre, located at Dufferin Street and Rutherford Road, acts as a new district centre node for the community. The project considers the development of a large amount of surrounding undeveloped private lands. A series of new roads will service the future development. Given the large amount of private lands there is a high degree of uncertainty in the duration of the project. The Carrville Centre will likely take more than 25 years to reach full build-out.

Approximate Length of Streetscape of Development

12,010 linear meters

Full Build-Out (Year 2038)

Total Capital Construction:	$17.0 million
Development Charges:	$1.8 million
Developer Contribution Local Roads:	$2.9 million
Developer Contribution Arterial/Collector:	$5.5 million
York Region Funding:	$1.2 million
VivaNext Construction:	$0.0 million
Unfunded Capital:	$5.6 million

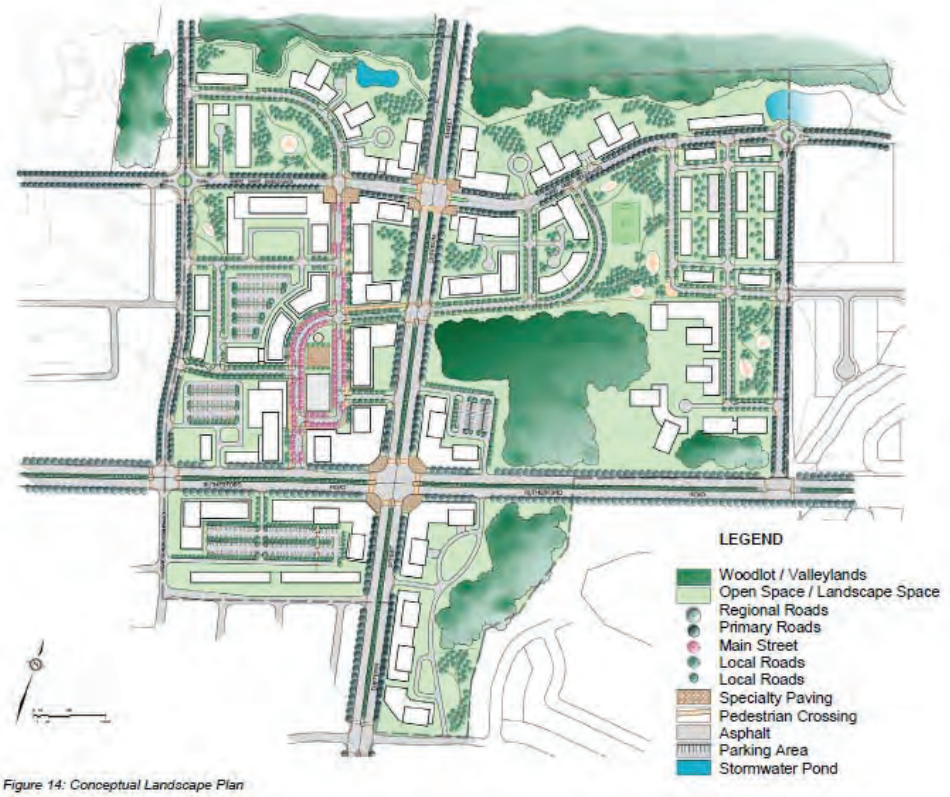


Figure 14: Conceptual Landscape Plan

Yonge Street

Description

The Yonge Street streetscape project is located along Yonge Street between Steeles Avenue and Bantry Avenue. It is a regional road and has significant cultural importance. The intent is that the streetscape enhancements could encourage infill, redevelopment and density of adjacent private land uses. Along Yonge Street, there are various potential nodes including stations for the proposed Yonge Street Subway Extension and CN Railway public space. There is a varying amount of uncertainty given the different stakeholders including TTC, private land developers and the City of Vaughan. The project is envisioned to be constructed over at least a 10 year period.

Approximate Length of Streetscape of Development

9,960 linear meters

Full Build-Out (Year 2033)

Total Capital Construction:	$18.8 million
Development Charges:	$1.0 million
Developer Contribution Local Roads:	$0.0 million
Developer Contribution Arterial/Collector:	$0.4 million
York Region Funding:	$6.3 million
VivaNext Construction:	$0.0 million
Unfunded Capital:	$11.2 million

Concord West

Description

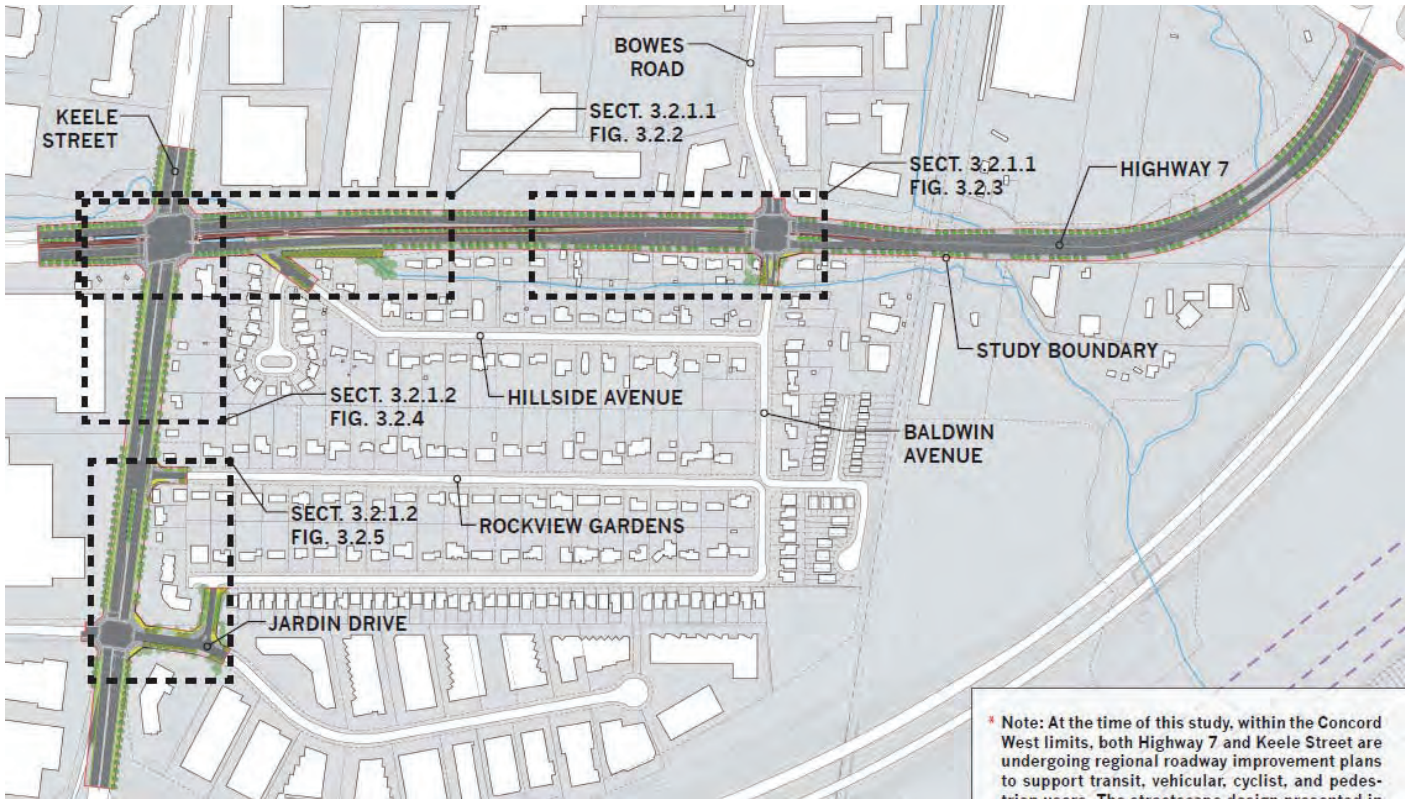
Concord West is part of the VivaNext bus rapid transit extension along Highway 7. The project consists of streetscape enhancements along Highway 7 and Keele Street. Adjacent land-uses are primarely mixed-use retail / commercial and low density residential. Much of the adjacent lands are built in a suburban context with the expectation of potential infill, enhancement and densification along the mixed-use retail / commercial lands. There are small gateway nodes and a nearby Go Transit station. Given the busy traffic on Highway 7 and Keele Street, both Regional roads, the project has a certain complexity as a transit intensification corridor.

Approximate Length of Streetscape of Development

4,600 linear meters

Full Build-Out (Year 2025)

Total Capital Construction:	$6.1 million
Development Charges:	$0.5 million
Developer Contribution Local Roads:	$0.0 million
Developer Contribution Arterial/Collector:	$0.0 million
York Region Funding:	$1.0 million
VivaNext Construction:	$3.3 million
Unfunded Capital:	$1.3 million



Centre Street

Description

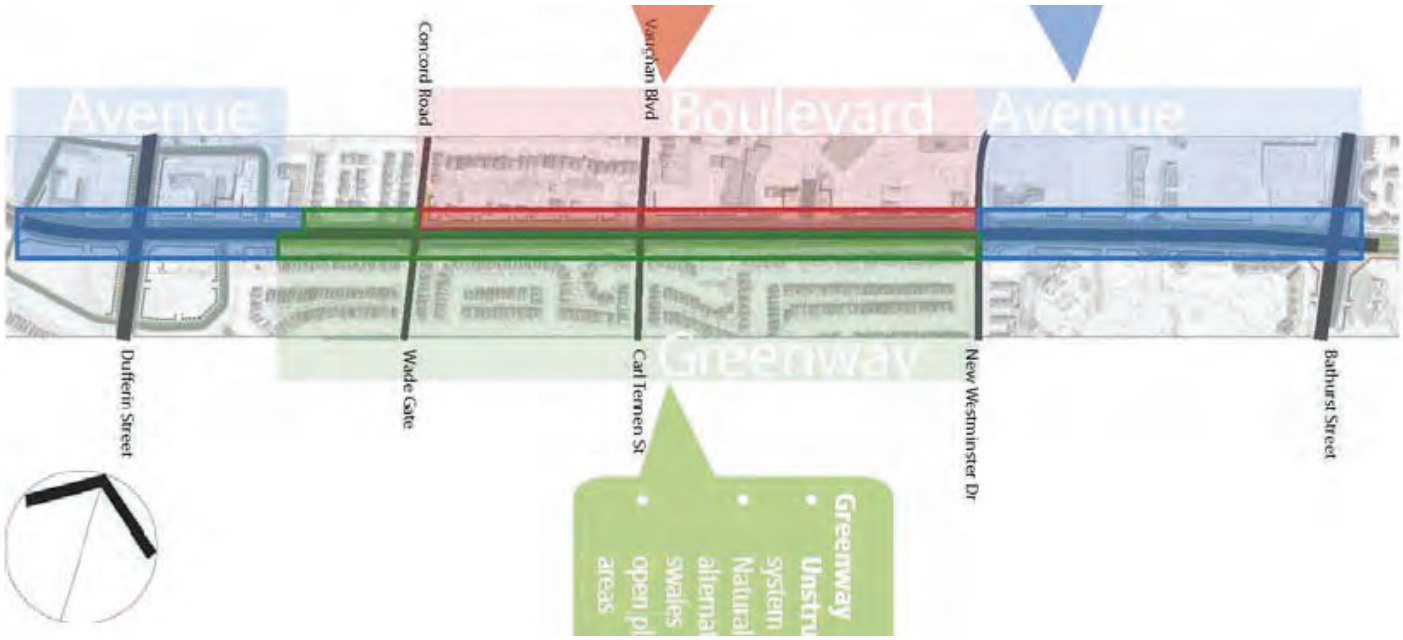
Centre Street is a major transportation corridor between Dufferin and Bathurst Streets. Currently, Centre Street is in a suburban form surrounded largely by low density residential and big box store formats. The intent is that streetscape enhancements could encourage infill and redevelopment of mixed-use retail / commercial lands to create a more urban space with pedestrian activity. The inclusion of a bus rapid transit route along Centre Street provides a catalyst for the development to take place. The Centre Street project will likely be developed over the course of 10 years or more.

Approximate Length of Streetscape of Development

4,050 linear meters

Full Build-Out (Year 2025)

Total Capital Construction:	$9.0 million
Development Charges:	$0.8 million
Developer Contribution Local Roads:	$0.0 million
Developer Contribution Arterial/Collector:	$0.0 million
York Region Funding:	$1.3 million
VivaNext Construction:	$5.5 million
Unfunded Capital:	$1.5 million



Islington Avenue

Description

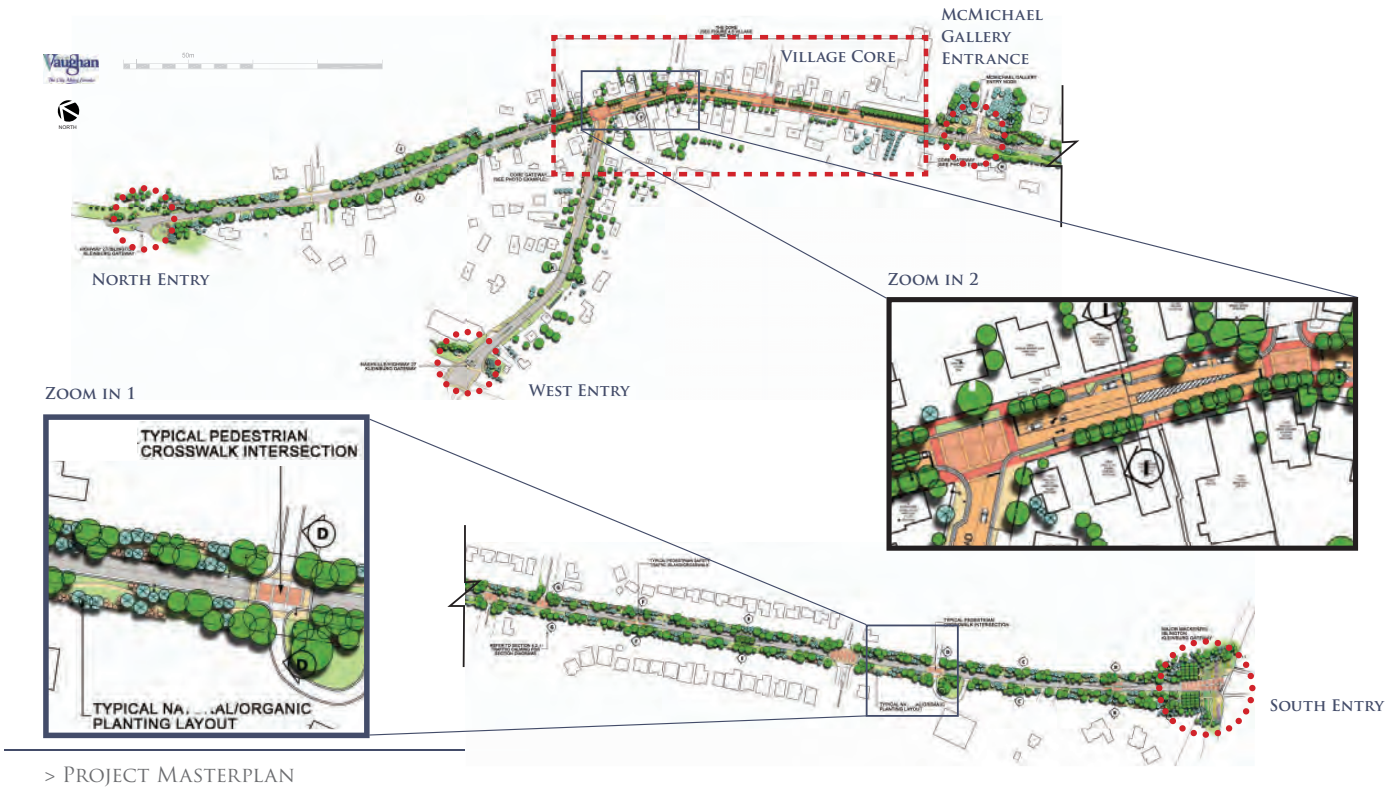
The Islington Avenue project is located in Kleinburg and is a special project since it is a Heritage Conservation District. The area is largely low density residential with a village core. The heritage significance of Kleinburg means that there will be little intensification development and keeping the character of the area is of the utmost importance. The streetscape enhancement of the existing streets is to support the Heritage Conservation District and can likely be constructed over a 2 year period.

Approximate Length of Streetscape of Development

4,620 linear meters

Full Build-Out (Year 2024)

Total Capital Construction:	$6.7 million
Development Charges:	$1.0 million
Developer Contribution Local Roads:	$0.0 million
Developer Contribution Arterial/Collector:	$0.2 million
York Region Funding:	$2.0 million
VivaNext Construction:	$0.0 million
Unfunded Capital:	$3.5 million



> Project Masterplan

Developer Impact

The road classification has implications regarding secured and potential funding in relation to developer contributions. For the purposes of the model, local roads are assumed to be the developer's responsibility and considered secured funding. However, on arterial and collector roads the assumed developer contributions are uncertain and not guaranteed. While the model makes a range of assumptions, developer contributions for arterial and collector roads are considered potential funding.

For the seven intensification projects, major arterial roads represent the largest amount of streetscape construction at 38%. Local streets represent the second largest amount of streetscape work at 27% with collectors and minor arterials each representing less than 16%. It is reasonable that the largest portion of streetscape work is along major arterials given that best practices would agree that development for density is ideally connected to major transportation corridors. Major arterials are Regionally owned and therefore have the potential for Regional funding.

Of particular interest to developers is the large amount of local streets. As the second largest amount of streetscape, developers will be responsible for at least approximately 1/3 of streetscape development. However, analysis of the road classification of the intensification projects by cost show that local streets only comprise of 18% of the total cost, at full build out, of the intensification projects.

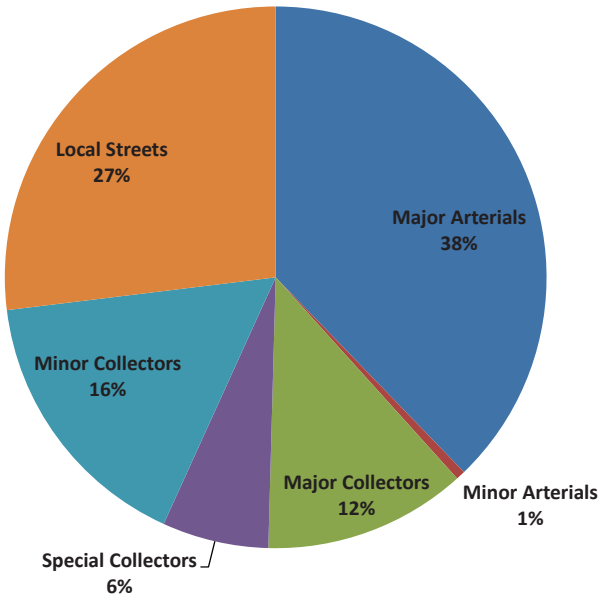


Figure 7.16: *Road Classification of Intensification Projects by Length*

The lower cost impact of the local streets in comparison to the length is due to the level of service distribution along local streets. The Standard Urban level of service represents 91% of the local streets in length while Enhanced makes up 8% and Premium 1%. Therefore, since the vast majority of the local streets are of the lowest level of service, the cost impact is less than the collectors and arterials with a comparatively higher level of service.

By cost, in the recommended cost scenario, the Standard Urban level of service represents 83% of the cost of local roads, whereas Enhanced equal 14% and Premium 3%. Therefore, developers, responsible for 100% of local road capital cost, are paying for primarily the Standard Urban level of service.

The low and high cost scenarios for the Standard Urban level of service show that there is a negligible difference between the low and recommended scenarios. The high cost scenario for the Standard Urban level of service increases the Standard Urban total cost by 1% in relation to Enhanced and Premium.

Upon full-build out, the total developer contribution potentially amounts to $49.3 million. Total developer contribution is uncertain and largely affected by the market. Local roads are expected to be fully funded by developers with a total contribution of approximately $29.3 million. The remaining $20.0 million for arterial and collector road construction may vary depending upon external factors.

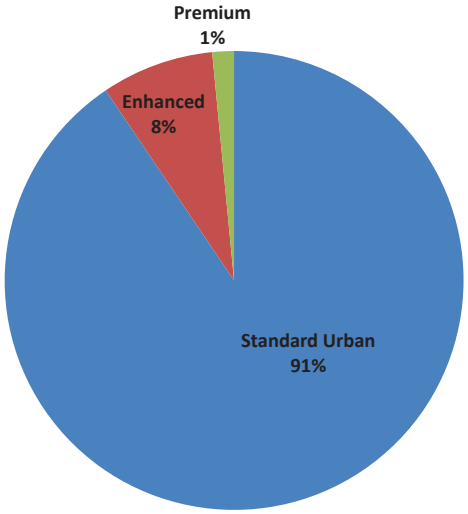


Figure 7.17: *Level of Service Distribution of Local Streets by Length*

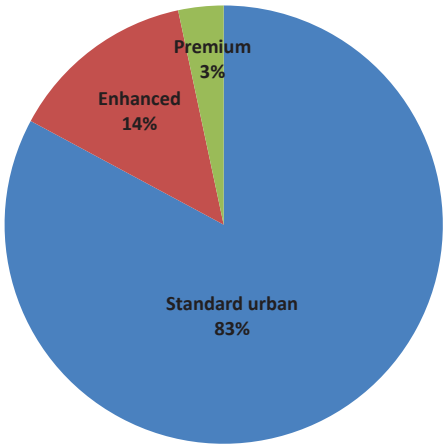


Figure 7.18: *Level of Service Distribution of Local Streets by Cost (Recommended Cost Standard Urban Scenario)*

Priority Implementation Streets

It is recognized that there are opportunities to take advantage of in the short term to implement various parts of the intensification area projects. The City of Vaughan has identified four projects with Priority Streets which can take advantage of resources from VIVA, TTC, York Region and private development in the near future. The projects identified include:

- Islington
- Concord West
- Centre Street
- Vaughan Metropolitan Centre

The priority streets represent 17,386 linear meters of streetscape, which amounts to approximately 20% of the total length of the full streetscape projects. By linear meters, 39% of the priority streets will be constructed with the Standard Urban level of service, 59% will be Enhanced and 2% Premium. Some components of the final level of service, even on these priority streets, will not be built in the initial phase, and is dependant on future development or redevelopment.

Phasing

To account for shifting priorities, the project phasing was adjusted according to the indicated projects and the specific priority streets. The project phasing for Concord West and Centre Street remain largely the same given they start and are closely related to the VIVA construction schedule starting in 2015. The Concord West phasing is reduced with the exclusion of Keele Street, which is not included in the VIVA construction plans. With the TTC station and VIVA BRT station slated to be completed around 2015, the private developments in the Vaughan Metropolitan Centre would have incentive to be completed soon after. While the construction is already underway as of 2014, the streetscape could potentially be completed by 2017. Islington Avenue is assumed to start in 2015, when DC funding for the project becomes available and could potentially be completed by the end of 2016. However, it should be noted again that construction logistics and the market will ultimately determine the span of the streetscape projects.

Capital Cost and Operations and Maintenance

The build out of the priority streets is projected to be complete in 2017. The total capital construction cost will be approximately $24.0 million. In comparison to the total capital construction cost $140.4 million for all the streetscape projects, the priority streets represent approximately 17% of total capital construction cost.

Of the $24.0 million in capital construction costs, $20.8 million has identified funding sources, while $3.2 million is currently unfunded.

The operations and maintenance cost for the priority streetscapes represent an average tax percentage increase of approximately 0.25% each year for the four year period of the construction.

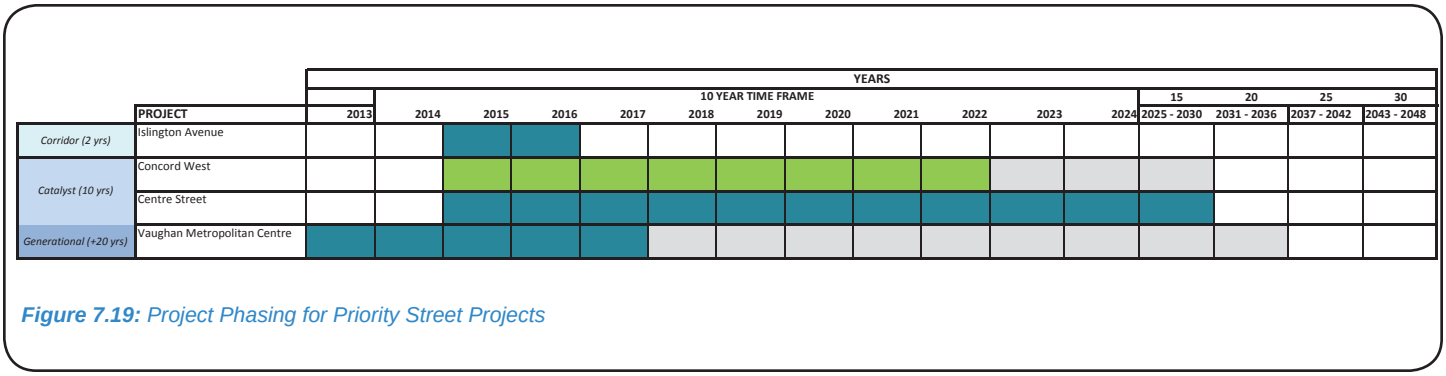


Figure 7.19: *Project Phasing for Priority Street Projects*

Total of All Priority Projects

Capital Budget Requirement ($ Mil)	Kleinburg/Islington Avenue	Concord West	Centre Street	Vaughan Metropolitan Centre
Total Capital Cost	**$ 1.9**	**$ 4.1**	**$ 6.4**	**$ 11.7**
Development Charges	0.3	0.05	0.2	2.7
Developer Contribution Local Roads	-	-	-	1.4
Developer Contribution Arterial/Collector Roads	0.1	-	-	1.2
York Region Funding	0.6	0.4	0.4	0.5
vivaNext Funding	-	3.3	5.5	4.1
Unfunded Capital	$ 0.9	$ 0.4	$ 0.3	$ 1.7

Figure 7.20: *Total of All Priority Projects*

Islington

Opportunities

Development charge funding for streetscape improvements on Islington Avenue is scheduled to be available in the year 2015. In conjunction with council motivation, there is an opportunity to take advantage of the available streetscape funding. Only a portion of the total Islington streetscape (between Pennon Road and Major Mackenzie Drive) is considered priority for this estimate.

Priority Streets

- Islington Avenue (between Pennon Road and Major Mackenzie Drive)

Relevant Levels of Service

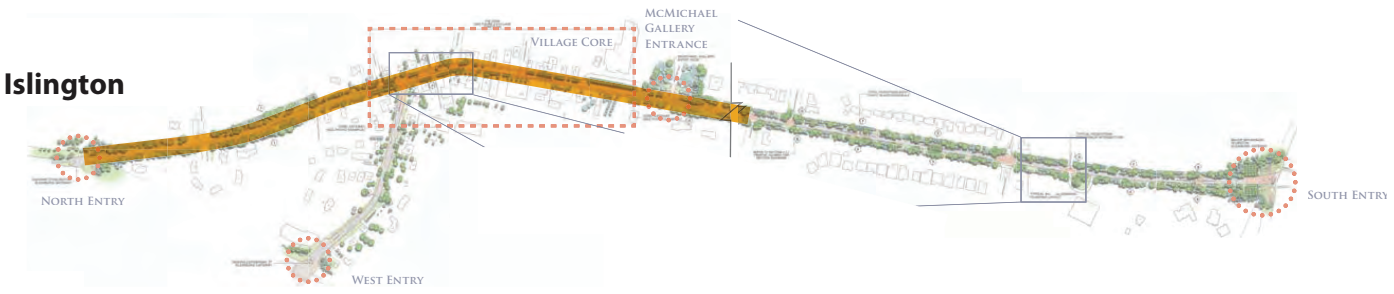
- Standard Urban

Approximate Length of Streetscape of Development

1,637 linear meters

Priority Streets

Total Capital Construction:	$1.9 million
Development Charges:	$0.3 million
Developer Contribution Local Roads:	$0.0 million
Developer Contribution Arterial/Collector:	$0.1 million
York Region Funding:	$0.6 million
VivaNext Construction:	$0.0 million
Unfunded Capital:	$0.9 million



Concord West

Opportunities

VIVA BRT construction is scheduled to begin on Highway 7 in the Concord West project area in the year 2015. The presence of roadway construction presents an opportunity for Vaughan to minimize future construction disturbance by constructing streetscape improvements when VIVA construction is scheduled. The Keele Street portion of the Concord West project would have to be done at a later date.

Priority Streets

- Highway 7

Relevant Levels of Service

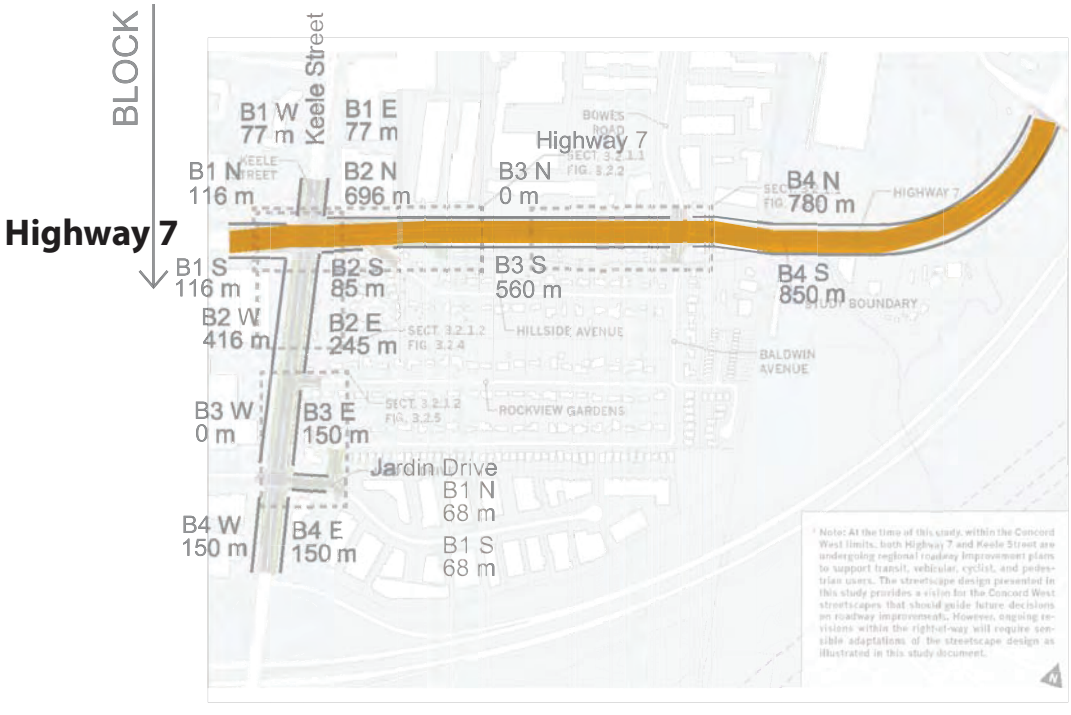
- Standard Urban
- Enhanced

Approximate Length of Streetscape of Development

3,203 linear meters

Priority Streets

Total Capital Construction:	$4.1 million
Development Charges:	$0.0 million
Developer Contribution Local Roads:	$0.0 million
Developer Contribution Arterial/Collector:	$0.0 million
York Region Funding:	$0.4 million
VivaNext Construction:	$3.3 million
Unfunded Capital:	$0.4 million



Centre Street

Opportunities

Similar to the Concord West Intensification Project, the VIVA BRT construction schedule provides an opportunity for Vaughan to minimize future construction disturbance. Centre Street is a unique opportunity as the entire project is a single street meaning that the priority street is the full master plan. Certain enhancements will be included along with the VivaNext construction and are included in the priority costing. Future capital spending will be contingent on development or redevelopment of Centre Street.

Priority Streets

- Centre Street

Relevant Levels of Service

- Enhanced

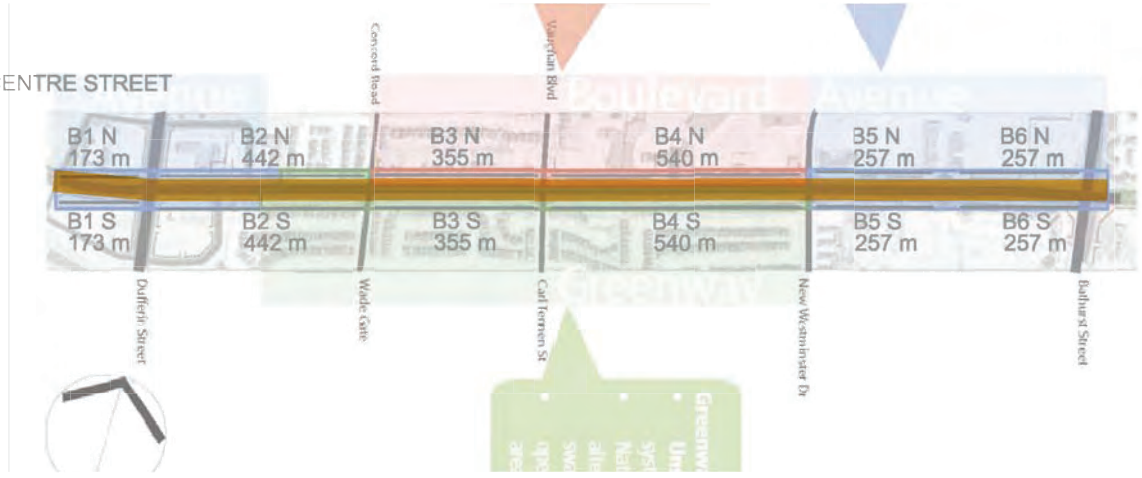
Approximate Length of Streetscape of Development

4,048 linear meters

Priority Streets

Total Capital Construction:	$6.4 million
Development Charges:	$0.2 million
Developer Contribution Local Roads:	$0.0 million
Developer Contribution Arterial/Collector:	$0.0 million
York Region Funding:	$0.4 million
VivaNext Construction:	$5.5 million
Unfunded Capital:	$0.3 million

Centre Street



Vaughan Metropolitan Centre

Opportunities

Several opportunities are available to take advantage of in regards to the implementation of the Vaughan Metropolitan Centre. The VIVA BRT construction on Highway 7, TTC subway construction at Millway and planned private development on various streets are opportunities for partnerships to share in funding and construction resources.

Priority Streets

- Highway 7
- Millway
- Applemill
- Vaughan
- Maplecrete

Relevant Levels of Service

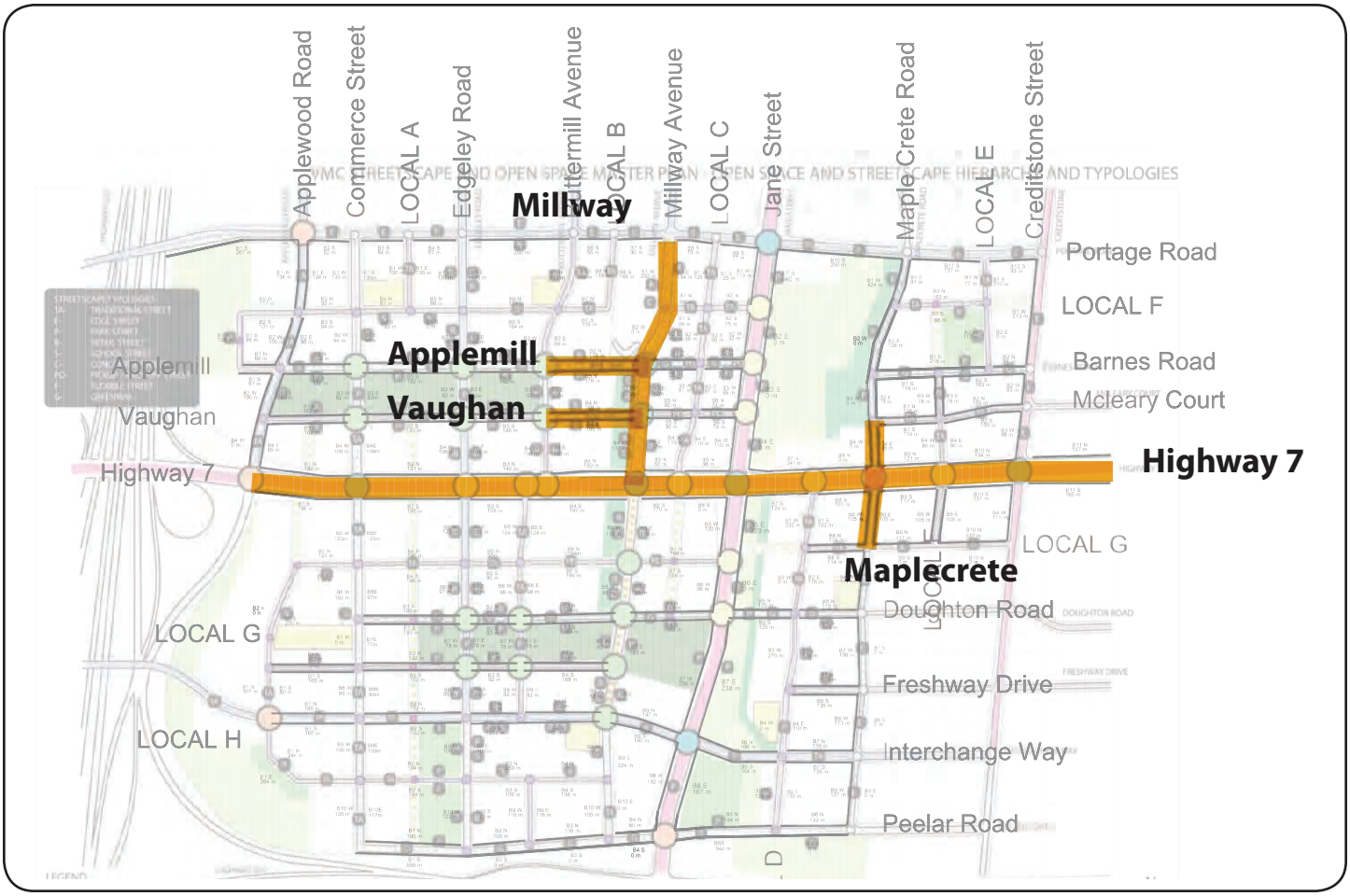
- Standard Urban
- Enhanced
- Premium

Approximate Length of Streetscape of Development

6,184 linear meters

Priority Streets

Total Capital Construction:	$11.7 million
Development Charges:	$2.7 million
Developer Contribution Local Roads:	$1.4 million
Developer Contribution Arterial/Collector:	$1.2 million
York Region Funding:	$0.5 million
VivaNext Construction:	$4.1 million
Unfunded Capital:	$1.7 million



A

APPENDIX A


OPEN
KITCHEN
URANT
DAVID MASON
BOOKS
CLUB MONACO
ALDO

Level of Service
Typical Cross Section Construction

Basic Level of Service
Capital / Operating and Maintenance

CAPITAL ***$514.85 / lm***

Amenity Zone
Trees and Planters
- Tree Deciduous 60mm Caliper
- Planting Soil
- Compacted Mulch

Softscape
- Sod

Pedestrian Clearway Zone
Main Field
- Poured In Place Concrete

Frontage Zone
Softscape
- Sod
- Planting Bed

Illumination Elements
Standard
- Street Lighting

OPERATING AND MAINTENANCE ***$14.72 / lm / yr***

Continuity Strip Zone
Spring Cleanup
- Salt Strip Sweeping

Amenity Zone
Street Trees
- Pruning
- Mulching and Fertilization
- Basic Root Pruning

Softscape
- Lawn Mowing

Pedestrian Clearway Zone
Hardscape Concrete
- Concrete Repairs

Snow
- Snow Removal

Frontage Zone
Softscape
- Shrub Bed Maintenance
- Lawn Mowing

Illumination Elements
Street Lighting

Standard Urban Level of Service Capital / Operating and Maintenance

CAPITAL ***$974.25 / lm***

Continuity Strip Zone
Hardscape
- Poured In Place Concrete

Amenity Zone
Hardscape
- Poured In Place Concrete

Trees and Planters
- Tree Deciduous 60mm Caliper
- Planting Soil
- Raised Planter Curb
- Perennials and Ornamental Grasses

Pedestrian Clearway Zone
Main Field
- Poured In Place Concrete

Illumination Elements
Standard
- Street Lighting

OPERATING AND MAINTENANCE ***$99.70 / lm / yr***

Continuity Strip Zone
Hardscape
- Concrete Repairs

Spring Cleanup
- Salt Strip Sweeping

Snow
- Snow Removal

Amenity Zone
Hardscape Concrete
- Concrete Repairs

Hardscape Planter Curb
- Concrete Repairs

Snow
- Snow Removal

Street Trees
- Pruning
- Watering
- Mulching
- Standard Root Pruning
- Infiltration / Irrigation / Flushing

Softscape
- Planter Watering / Maintenance
- Ground Cover Trash Removal / Maintenance

Pedestrian Clearway Zone
Hardscape Concrete
- Concrete Repairs

Snow
- Snow Removal

Illumination Elements
Street Lighting

Enhanced Level of Service
Capital / Operating and Maintenance

CAPITAL ***$1,855.98 / lm***

Continuity Strip Zone
Hardscape
- Poured In Place Concrete

Amenity Zone
Hardscape
- Pre-Cast Concrete Unit Pavers on Concrete Base

Trees and Planters
- Tree Deciduous 80mm Caliper
- Raised Planter Curb
- Planting Soil
- Perennials and Ornamental Grasses
- Soil Cells

Furniture
- Bench
- Trash Receptacle
- Bicycle Stand
- Branding Signage

Pedestrian Clearway Zone
Main Field
- Poured In Place Concrete

Frontage Zone
Hardscape
- Poured In Place Concrete

Illumination Elements
Pedestrian Lighting
Street and Pedestrian Lighting

OPERATING AND MAINTENANCE ***$152.28 / lm / yr***

Continuity Strip Zone
Hardscape
- Concrete Repairs

Spring Cleanup
- Salt Strip Sweeping

Snow
- Snow Removal

Amenity Zone
Hardscape Unit Paving
- Unit Paver Repairs
- Concrete Base

Hardscape Planter Curb
- Concrete Planter Repairs

Snow
- Snow Removal

Street Trees
- Pruning
- Watering
- Mulching and Fertilization
- Infiltration / Irrigation / Flushing

Softscape
- Planter Watering / Maintenance
- Ground Cover Trash Removal / Maintenance
- Trash Receptacle

Pedestrian Clearway Zone
Hardscape Concrete
- Concrete Repairs

Snow
- Snow Removal

Frontage Zone
Hardscape Concrete
- Concrete Repairs

Illumination Elements
Typical Lighting
- Pedestrian Lighting
- Street / Pedestrian Combo Lighting

Premium Level of Service
Capital / Operating and Maintenance

CAPITAL ***$2,325.50 / lm***

Continuity Strip Zone
Hardscape
- Poured In Place Concrete

Amenity Zone
Hardscape
- Poured in Place Concrete
- Natural Stone

Trees and Planters
- Tree Deciduous 100mm Caliper
- Raised Planter Curb
- Planting Soil
- Perennials and Ornamental Grasses
- Soil Cells

Furniture
- Bench
- Trash Receptacle
- Bicycle Stand
- Branding Signage

Pedestrian Clearway Zone
Main Field
- Pre-Cast Concrete Unit Pavers on Concrete Base

Paving Accent
- Natural Stone

Frontage Zone
Hardscape
- Poured In Place Concrete

Illumination Elements
Standard
- Pedestrian Lighting
- Street and Pedestrian Lighting

OPERATING AND MAINTENANCE ***$167.65 / lm / yr***

Continuity Strip Zone
Hardscape
- Concrete Repairs

Spring Cleanup
- Salt Strip Sweeping

Snow
- Snow Removal

Amenity Zone
Hardscape Unit Paving
- Unit Paver Repairs
- Concrete Base

Hardscape Planter Curb
- Concrete Planter Repairs

Snow
- Snow Removal

Street Trees
- Pruning
- Watering
- Mulching and Fertilization
- Infiltration / Irrigation / Flushing

Softscape
- Trash Receptacle

Pedestrian Clearway Zone
Hardscape Unit Paving (Main Field)
- Unit Paver Repairs
- Concrete Base

Hardscape Unit Paving (Accent Field)
- Unit Paver Repairs
- Concrete Base

Snow
- Snow Removal

Frontage Zone
Hardscape Concrete
- Concrete Repairs

Illumination Elements
Typical Lighting
- Pedestrian Lighting
- Street / Pedestrian Combo Lighting

Low Cost Scenario Standard Urban Level of Service
Capital / Operating and Maintenance

CAPITAL ***$966.25 / lm***

Continuity Strip Zone
Hardscape
- Poured In Place Concrete

Amenity Zone
Hardscape
- Poured In Place Concrete

Trees and Planters
- Tree Deciduous 60mm Caliper
- Planting Soil
- Compacted Mulch
- Tree Grate

Pedestrian Clearway Zone
Main Field
- Poured In Place Concrete

Illumination Elements
Standard
- Street Lighting

OPERATING AND MAINTENANCE ***$84.53 / lm / yr***

Continuity Strip Zone
Hardscape
- Concrete Repairs

Spring Cleanup
- Salt Strip Sweeping

Snow
- Snow Removal

Amenity Zone
Hardscape Concrete
- Concrete Repairs

Hardscape Planter Curb
- Concrete Repairs

Snow
- Snow Removal

Street Trees
- Pruning
- Watering
- Mulching and Fertilization
- Standard Root Pruning
- Infiltration / Irrigation / Flushing

Pedestrian Clearway Zone
Hardscape Concrete
- Concrete Repairs

Snow
- Snow Removal

Illumination Elements
Street Lighting

High Cost Scenario Standard Urban Level of Service Capital / Operating and Maintenance

CAPITAL ***$1,055.93 / lm***

Continuity Strip Zone
Hardscape
- Poured In Place Concrete

Amenity Zone
Hardscape
- Poured In Place Concrete

Trees and Planters
- Tree Deciduous 60mm Caliper
- Raised Planter Curb
- Planting Soil
- Perennials and Ornamental Grasses

Furniture
- Bench
- Trash Receptacle

Pedestrian Clearway Zone
Main Field
- Poured In Place Concrete

Illumination Elements
Standard
- Street Lighting

OPERATING AND MAINTENANCE ***$115.70 / lm / yr***

Continuity Strip Zone
Hardscape
- Concrete Repairs

Spring Cleanup
- Salt Strip Sweeping

Snow
- Snow Removal

Amenity Zone
Hardscape Concrete
- Concrete Repairs

Hardscape Planter Curb
- Concrete Repairs

Snow
- Snow Removal

Street Trees
- Pruning
- Watering
- Mulching and Fertilization
- Standard Root Pruning
- Infiltration / Irrigation / Flushing

Softscape
- Planter Watering / Maintenance
- Ground Cover Trash Removal / Maintenance\
- Trash Receptacle

Pedestrian Clearway Zone
Hardscape Concrete
- Concrete Repairs

Snow
- Snow Removal

Illumination Elements
Street Lighting

APPENDIX B

Region of York Top Performing Street Tree Species

Table B1: Top Performing Small Form (Hydro Acceptable) Species List		
Species Name	**Native [2]**	**Characteristics**
Shubert cherry (Prunus virginiana 'Shubert') [1]	Yes	• Very susceptible to black knot, requires annual pruning to control fungus • Prone to suckering from base of tree
Ivory silk lilac (Syringa reticulata)	No	• Showy lilac-like blooms in early summer, followed by seed capsules that persist on the tree • Fairly pest and disease resistant

Table B2: Top Performing Full Form Species List		
Species Name	**Native [2]**	**Characteristics**
Silver maple (Acer saccharinum)[1]	Yes	• Develops large crown, therefore plant in locations with adequate space
Ohio Buckeye (Aesculus glabra) [1]	Yes	• Showy flower spikes followed by seed husks covered in soft spines • Less susceptible to leaf scorch and leaf blotch than horsechestnut
Horsechestnut (Aesculus hippocastanum) [1]	No	• Showy flower spikes, less seed production than Ohio buckeye, seed husks covered in soft spines • Susceptible to leaf scorch and leaf blotch
Honeylocust (Gleditsia triacanthos var. inermis)	Yes	• Small leaves provide a filtered shade • Can be susceptible to defoliation by leafhoppers • Acceptable cultivars for Regional roads include: Shademaster
Kentucky coffee tree (Gymnocladus dioicus) [1]	Yes	• Coarse branching structure, large double-compound leaves with small leaflets • Dioecious tree with male and female plants, male tree preferred

Notes:
[1] Spring planting only
[2] A native tree is defined as a tree whose natural range is within Ontario and/or the northern U.S lake states.

APPENDIX C

Region of York Notable Street Tree Species for Select Planting Sites

Table C1: Notable Small Form (Hydro Acceptable) Species List		
Species Name	**Native [2]**	**Characteristics**
Hedge maple (Acer campestre)	No	• Sensitive to desiccation from winter winds. Use in locations sheltered from prevailing winds.
Ornamental pear (Pyrus calleryana) [1]	No	• Sensitive to desiccation from winter winds. Use in locations sheltered from prevailing winds. Acceptable cultivars for Regional roads include: Chanticleer Pear
Columnar Norway maple (Acer platanoides 'Columnare')	No Invasive	• Species suitable for planting adjacent to overhead hydro due to its narrow width. Must be planted a minimum of five (5) metres from overhead hydro
English pyramidal oak (Quercus robur 'fastigiata')[1]	No	• Species suitable for planting adjacent to overhead hydro due to its narrow width. Must be planted a minimum of five (5) metres from overhead hydro • Should always be planted behind sidewalk / pedestrian zone

Notes:
[1] Spring planting only
[2] A native tree is defined as a tree whose natural range is within Ontario and/or the northern U.S lake states.

Table C2: Notable Full Form Species List		
Species Name	**Native** [2]	**Characteristics**
Norway maple (Acer platanoides)	No Invasive	• Develops large crown, therefore plant in locations with adequate space. • This species is invasive. Although some of the cultivars are less invasive, it is not to be planted near natural areas.
Autumn Blaze maple (Acer x freemanii 'Autumn Blaze') [1]	Yes	• Sensitive to desiccation from winter winds. Use in locations sheltered from prevailing winds.
Hackberry (Celtis occidentalis) [1]	Yes	• Sensitive to de-icing salts (airborne spray). Use in locations where exposure to salt spray will be minimized, e.g. wide boulevards (6 m +) on the north and west sides of roads.
Swamp white oak (Quercus bicolor) [1]	Yes	• Of the oak species, this has shown the greatest tolerance to Regional road conditions. Still considered sensitive to de-icing salts (airborne spray). Use in locations where exposure to salt spray will be minimized, e.g. wide boulevards (6 m+) on the north and west sides of roads.
Bur oak (Quercus macrocarpa)1	Yes	• Has shown tolerance to Regional road conditions. Still considered sensitive to de-icing salts (airborne spray). Use in locations where exposure to salt spray will be minimized, e.g. wide boulevards (6 m+) on north and west sides of roads.
Littleleaf linden (Tilia cordata)	No	• Sensitive to desiccation from winter winds and de-icing salt. Plant in locations were exposure to salt spray will be minimized, e.g. wide boulevards (6 m+) on the north & west sides of roads and in a location sheltered from prevailing winds. • Acceptable cultivars for Regional roads include: Glenleven and Greenspire.
Accolade elm (Ulmus japonica x Ulmus wilsoniana)	No	• Initial plantings of this species have shown tolerance to the growing conditions on Regional road allowances. Experience with this species is limited and it should be used in limited quantities until further evaluation of its performance is completed.

Table C2: Notable Full Form Species List (Cont'd)		
Species Name	**Native [2]**	**Characteristics**
Colorado spruce (Picea pungens) [1]	No	• Sensitive to desiccation from winter winds and de-icing salt. Plant a minimum of 6 m from edge of road, and preferably in a sheltered location. • Should always be planted behind sidewalk / pedestrian zone. • Susceptible to yellow-headed spruce sawfly defoliation.
White spruce (Picea glauca) [1]	Yes	• More sensitive to desiccation from winter winds and de-icing salt than Colorado or Norway spruces. Plant a minimum of 6 m from edge of road, and preferably in a sheltered location. • Can be susceptible to yellow-headed spruce sawfly defoliation.
Norway spruce (Picea abies) [1]	No	• Sensitive to desiccation from winter winds and de-icing salt. Plant a minimum of 6 m from edge of road, and preferably in a sheltered location. • Should always be planted behind sidewalk / pedestrian zone. • Fairly pest and disease resistant.
Austrian pine (Pinus nigra) 1	No	• Sensitive to desiccation from winter winds and de-icing salt. Plant a minimum of 6 m from edge of road, and preferably in a sheltered location. • Should always be planted behind sidewalk / pedestrian zone. • Susceptible to Diplodia, blight, select locations with good air flow and avoid mass plantings of this tree.

Notes:
[1] Spring planting only
[2] A native tree is defined as a tree whose natural range is within Ontario and/or the northern U.S lake states.

APPENDIX D

City of Vaughan Tree and Plant Species List

Table D1: Coniferous Trees (WB typical)			
Species Name	**Common Name**	**Size**	**Notes**
Abies alba	Silver Fir	150 to 300cm ht.	
Abies balsamea	Balsam Fir	150 to 300cm ht.	
Abies concolor	White Fir	150 to 300cm ht.	
Juniperus virginiana	Eastern Red Cedar	150 to 300cm ht.	
Larix larcinia	American Larch	150 to 300cm ht.	
Picea abies	Norwary Spruce	150 to 300cm ht.	
Picea glauca	White Spruce	150 to 300cm ht.	
Picea omorika	Serbian Spruce	150 to 300cm ht.	
Picea pungens	Colorado Spruce	150 to 300cm ht.	(limit use due to Y.H. Sawfly)
Picea pungens	Colorado Blue Spruce	150 to 300cm ht.	(limit use due to Y.H. Sawfly)
Picea pungens 'Fat Albert'	Fat Albert Spruce	150 to 200cm ht.	
Pinus nigra	Austrian Pine	250cm ht.	(limit use due to Diploidia)
Pinus resinosa	Red Pine	175 to 300cm ht.	
Pinus strobus	Eastern White Pine	175 to 300cm ht.	
Pinus sylvestris	Scots Pine	200 to 300cm ht.	
Pseudotsuga menziesii	Douglas Fir	175 to 300cm ht.	
Thuja occidentalis	Eastern White Cedar	150 to 200cm ht.	
Tsuga canadensis	Eastern Hemlock	175 to 200cm ht.	limit to protected, moist loc.

Table D2: Deciduous Trees (60 mm cal WB typical)			
Species Name	**Common Name**	**Size**	**Notes**
Acer griseum	Paperback Maple	50mm cal.	Sheltered location
Acer plataniodes 'Columnar'	Columnar Maple	60mm cal. Typical	limit use
Acer plataniodes 'Crimson King'	Crimson King Maple	60mm cal. Typical	limit use
Acer platanoides - 'Royal Red.'	Royal Red Maple	60mm cal. Typical	limit use
Acer rubrum	Red Maple	50 to 70mm cal.	avoid high pH, clay soils
Acer rubrum 'Autumn Spire'	Autumn Spire Maple	60mm cal. Typical	
Acer rubrum 'Karpick'	Karpick Maple	60mm cal. Typical	
Acer rubrum 'Red Sunset'	Red Sunset Maple	60mm cal. Typical	
Acer saccharinum	Silver Maple	60mm cal. Typical	
Acer saccharum	Sugar Maple	60mm cal. Typical	requires large root zone
Acer spicatum	Mountain Maple	200 cm ht.	
Acer tataricum	Tatarian Maple	60mm cal. Typical	
Acer x freemanii	Swamp Maple	60mm cal. Typical	avoid overplanting
Acer x freemanii 'Autumn Blaze'	Autumn Blaze Maple	60mm cal. Typical	
Acer x freemanii 'Firefall'	Firefall Maple	60mm cal. Typical	
Acer x freemanii 'Jeffersred'	Autumn Blaze Maple	60mm cal. Typical	
Aesculus carnea 'Briotii'	Red horse-chestnut	60mm cal. Typical	
Aesculus glabra	Ohio Buckeye	60mm cal. Typical	
Aesculus hippocastanum	Horse-chestnut	60mm cal. Typical	
Aesculus hippocastanum 'Baumannii'	Baumann's Horse Chestnut	60mm cal. Typical	
Alnus incana ssp. Rugosa	Speckled Alder	125cm ht.	
Amelanchier canadensis	Serviceberry	250cm ht. multi stem or 45 to 60mm cal	
Amelanchier x grandiflora	Serviceberry	45 to 60mm cal.	
Amerlanchier arborea	Downy Serviceberry	45 to 60mm cal.	

Table D2: Deciduous Trees (60 mm cal WB typical) (Cont'd)			
Species Name	**Common Name**	**Size**	**Notes**
Betula alleghaniensis	Yellow Birch	50 to 60mm cal or could be multistem and by Ht. 250cm	
Betula papyrifera	Paper Birch	50 to 60mm cal	
Carpinus betulus 'fastigiata'	Pyramidal European Hornbeam	50 to 60mm cal	
Carpinus caroliniana	Blue Beech	50 to 60mm cal	
Carya Cordiformis	Bittenut Hickory	or by 250cm ht.	
Catalpa speciosa	Northern Catalpa	60mm cal. Typical	
Celtis occidentalis	Hackberry	50 to 60mm cal	
Cercidiphyllum japonicum	Katsura	60mm cal. Typical	protected locations only
Cercis canadensis	Eastern Redbud	45 to 60mm cal	protected locations only
Eucommia ulmoides	Hardy rubber tree	60mm cal. Typical	
Fagus grandiflora	American Beech	60mm cal. Typical	
Fagus sylvatica "Dawyck Purple"	Dawyck Purple Beech	60mm cal. Typical	
Gingko biloba	Maidenhair Tree	60 to 70mm cal.	
Gleditsia triacanthos inermis	Thornless Honeylocust	60 to 80mm cal.	
Gleditsia triacanthos inermis 'Shademaster'	Shademaster Honeylocust	60 to 70mm cal.	
Gleditsia triacanthos inermis 'Skyline'	Skyline Honeylocust	60 to 70mm cal.	
Gleditsia tricanthos Var. inermis 'Ruby Lace'	Ruby Lace Honey Locust	60 to 70mm cal.	
Gleditsia tricanthos Var. inermis 'Suncole'	Suncole Honey Locust	60 to 70mm cal.	
Gymnocladus dioica	Kentucky Coffee Tree	60mm cal. Typical	
Juglans nigra	Black Walnut	60mm cal. Typical	
Liriodendron tulipifera	Tulip Tree	60mm cal. Typical	
Malus 'Royalty'	Royalty Crabapple	45 to 60mm cal	limit use
Ostrya virginiana	Ironwood/Hop Hornbeam	60mm cal. Typical	
Plantanus occidentalis	Sycamore	60mm cal. Typical	

Table D2: Deciduous Trees (60 mm cal WB typical) (Cont'd)			
Species Name	**Common Name**	**Size**	**Notes**
Platanus acerfolia 'Bloodgood'	Bloodgood London Plane Tree	60mm cal. Typical	
Populus balsamifera	Balsam Poplar	45 to 60mm cal	
Populus nigra var Betulifolia 'Italica'	Lombardy Poplars	60mm cal. Typical	limit use
Populus grandidentata	Big-Toothed Aspen	60mm cal. Typical	
Populus tremuloides	Trembling Aspen	60mm cal. Typical	
Prunus serrulata 'Kwanzan'	Kwanzan Ornamental Cherry	45 to 60mm cal	
Pyrus calleryana 'Aristocrat''	Aristocrat Ornamental Pear	45 to 60mm cal	
Pyrus calleryana 'Chanticleer'	Chanticleer Pear	45 to 60mm cal	
Pyrus calleryana 'Glen's Form'	Glen's Form Ornamental Pear	45 to 60mm cal	
Pyrus calleryana 'Redspire'	Redspire Ornamental Pear	45 to 60mm cal	
Pyrus colleryano Capitol	Capitol Ornamental Pear	45 to 60mm cal	
Quercus alba	White Oak	60 to 70mm cal.	
Quercus bicolor	Swamp White Oak	60 to 70mm cal.	
Quercus macrocarpa	Bur Oak	60 to 70mm cal.	
Quercus palustris	Pin Oak	60 to 70mm cal.	avoid high pH, clay soils
Quercus robur	English Oak	60 to 70mm cal.	
Quercus robur 'Fastigiata'	Pyramidal English Oak	50 to 60mm cal.	
Quercus rubra	Red Oak	60 to 70mm cal.	
Salix alba 'Tristis'	Golden Weeping Willow	60mm cal. Typical	
Sorbus aucuparia	Mountain Ash	60mm cal. Typical	limit use- Fire blight
Syrinqa reticulota 'Ivory Silk'	Ivory Silk Tree Lilac	45 to 60mm cal	
Tilia americana	Basswood	60 to 80mm cal.	
Tilia americana 'Redmond'	Redmond Basswood	60mm cal. Typical	
Tilia cordata	Little Leaf Linden	60mm cal. Typical	
Tilia cordata 'Glenleven'	Glenleven Linden	60mm cal. Typical	
Tilia cordata 'Greenspire'	Greenspire Linden	60mm cal. Typical	
Ulmus americana cultivar 'Jefferson'	Jefferson Elm	60mm cal. Typical	
Ulmus 'pioneer'	Pioneer Elm	60mm cal. Typical	

Table D3: Shrubs (potted typical)			
Species Name	**Common Name**	**Size**	**Notes**
Amelanchier arborea	Downy Serviceberry	3 gal pot to 200cm ht WB	
Amelanchier canadensis	Serviceberry	3 gal pot to 200cm ht WB	
Amelanchier laevis	Alleghany Serviceberry	3 gal pot to 200cm ht WB	
Amelanchier x alnifolia	Saskatoon Serviceberry	3 gal pot to 200cm ht WB	
Berberis thunbergii 'Rose Glow'	Rose Glow Barberry	50 cm	
Comus sericea	Red Osier Dogwood	100cm ht typical but ranges from live stakes up	
Cornus alba ' Elegantissima'	Silver Edge Dogwood	80 to 100 cm ht.	
Cornus alternafolia	Alternate-leaved Dogwood/ Pagoda	60 to 100cm ht.	
Cornus racemosa	Gray Dogwood	live stakes to 100cm ht.	
Euonymus elatus Coloratus	Dwarf Winqed Burninq Bush	50cm ht	avoid over-planting
Euonymus fortunei	Winter creeper	50cm spr.	
Euonymus fortunei 'Sarcoxie'	Sarcoxie Euonymus	60cm spr.	
Fothergila major Mount Airy'	Mount Airy: Fothergilla	50cm spr.	
Hamamelis virginiana	Witch Hazel	3 gal. to 100cm ht.	
Hamamelis x intermedia 'Arnold's Promise'	Arnold's Promise Witch Hazel	3 gal. to 100cm ht.	
Hydrange macrophylla 'Bialmer'	Endless Summer Hydrangea	50cm	
Junierus x media 'Old Gold'	Old Gold Juniper	40 to 60 cm spr.	
Juniperus chinensis "var. sargentii Viridis"	Green Sargent Juniper	40 to 60 cm spr.	
Juniperus sabina 'Tamariscifolia'	Tamarix Juniper	40 to 60 cm spr.	
Juniperus squamata 'Holger'	Holger Juniper	40 to 60 cm spr.	
Juniperus x media 'Old Gold	Old Gold Juniper	40 to 60 cm spr.	
Lindera benzoin	Spicebush	50cm ht.	
Myrica gale	Sweet Gale	50cm ht.	

Table D3: Shrubs (potted typical) (Cont'd)			
Species Name	**Common Name**	**Size**	**Notes**
Physocarpus opulifolius	Common Ninebark	80cm ht.	
Physocarpus opulifolius "Dart's Gold"	Darts Gold Ninebark	80cm ht.	
Pinus mugo 'Pumilia	Dwarf Mugho Pine	60cm spr.	
Potentilla fruticosa	Shrub Cinquefoil	50 to 60cm ht.	
Potentilla fruticosa 'Red Ace'	Red Ace Potentilla	50 to 60cm ht.	
Rhus aromatica	Fragrant Sumac	1 gal to 60cm ht	
Rhus typhina	Staghorn Sumac	80 cm spr.	
Ribes americanum	Wild Black Currant	50cm ht.	
Ribes aureum	Golden Currant	3 gal.	
Rosa woodsii	Woods Rose	40cm ht.	
Rubus odoratus	Flowering Raspberry	2 gal	
Salix bebbiana	Bebbs Willow	live stakes to 80cm ht.	
Salix discolor	Pussy Willow	live stakes to 80cm ht.	
Sambucus canadensis	American Elder	50 to 80cm ht. (2-3 gal typical)	
Spiraea alba	Meadowsweet	2 gal	
Spiraea bumalda "Anthony Waterer"	Anthony Waterer Spirea	2 gal to 60 cm ht.	
Spiraea japonica 'Little Princess'	Little Pincess Spirea	2 gal to 60 cm ht.	
Spiraea nipponica 'Snowmound'	Snowmound Spirea	2 gal to 60 cm ht.	
Spirea japonica 'Goldflame'	Spirea Goldflame	2 gal to 60 cm ht.	
Symphoricarpos albus	Snowberry	2 gal to 60 cm ht.	
Syringa reticulata	Common Lilac (3 gal. pot)	3 gal	
Taxus x media 'Citation'	Citation Yew	50cm ht	well drained areas only
Viburnum lentago	Nannyberry	60 to 80 cm ht.	

Table D4: Perennials (1 gal typical except in the case of naturalization and for larger impact use of 2 gal)			
Species Name	**Common Name**	**Size**	**Notes**
Acorus gramineus 'Oborozuki'	Sweet Flag	4" pot to 1 gal	
Allium aflatunense	Flowering Onion BULB	blub or potted depending on season	
Asclepias incarnata	Swamp Milkweed	4" pot to 1 gal	
Aster cordifolius	Heart-Leaved Aster	4" pot to 1 gal	
Aster Novae-angliae	New England Aster	4" pot to 1 gal	
Bouteloua gracilis	Mosquito Grass	4" pot to 1 gal	
Calamagrostis acutiflora	Feather Reed Grass	1 gal typical	
Calamagrostis acutiflora 'Karl Foerster'	Karl Foerster Feather Reed Grass	1 gal typical	
Calamagrostis brachytricha	Korean Feather Reed Grass	1 gal typical	
Calamagrostis canadensis	Canada Bluejoint Grass	1 gal typical	
Calamagrostis x acutiflora 'Overdam'	Variegated Reed Grass	1 gal typical	
Calamagrostis x acutifolia 'Karl Foerster'	Feather Reed Grass	1 gal typical	
Calamoqrostis x ocutifolio Stricto'	Feather Reed Grass	1 gal typical	
Campanula carpatica	Carpathian bellflower	4" pot to 1 gal	
Carex greyi	Morning Star Sedge	4" pot to 1 gal	
Carex muskingumensis	Palm Sedge Grass	4" pot to 1 gal	
Carex pensylvanica	Pennsylvania Sedge	4" pot to 1 gal	
Carex stricta	Tussock Sedge	4" pot to 1 gal	
Carex vulpinoidea	Fox Sedge	4" pot to 1 gal	
Deschampsia cespitosa	Tufted Hair Grass	1 gal typical	
Echinachea or Rudbeckia	Little Angel Coneflower	1 gal typical	
Eupatorium	Spotted Joe Pye Weed	4" pot to 1 gal	
Eupatorium maculatum	Joe Pye Weed	4" pot to 1 gal	
Festuca cinerea "Elijah Blue"	Elijah Blue fescue	1 gal typical	
Festuca glauca 'Boulder Blue"	Boulder Blue Fescue	1 gal typical	
Geranium maculatum	Wood Geranium	4" pot to 1 gal	
Glyceria Striata / Fowl Manna Grass	Fowl Manna Grass	4" pot to 1 gal	

Table D4: Perennials (Cont'd) (1 gal typical except in the case of naturalization and for larger impact use of 2 gal)			
Species Name	**Common Name**	**Size**	**Notes**
Helictotrichon "Sapphire"	Sapphire Blue Oat Grass	1 gal typical	
Hemerocallis	Daylily	1 gal typical	
Hemerocallis 'Magnificent Rainbow'	Magnificent Rainbow Daylily	1 gal typical	
Hemerocallis 'Stella D'Oro'	Stella D'oro Daylily	1 gal typical	
Hemerocallis 'fulva'	Tawny Daylily	1 gal typical	
Hosta 'Hadspen Blue'	Hadspen Blue Hosta	1 gal typical	
Hosta 'Sum and Substance'	Sum and Substance Hosta	1 gal typical	
Hypericum ascyron	Great St.John's Wort	1 gal typical	
Imperata cylindrical 'Red Baron'	Japanese Blood Grass	1 gal typical	use with caution
Iris versicolor	Blue Flag Iris	4" pot to 1 gal	
Lavandula angustifolia 'Mundstead strain'	Munstead Lavender	1 gal typical	use with caution
Liatris spicata	Dense Blazing Star	1 gal typical	
Lilium michiganense	Michigan Lily	4" pot	
Lobelia siphilitica	Blue Cardinal Flower	1 gal typical	
Matteucia struthiopteris	Ostrich Fern	1 gal typical	
Miscanthus sinensis 'pupurascens'	Flame Grass	1 gal typical	
Miscanthus sinensis 'Gracillimus'	Maiden grass	1 gal typical	
Monarda fistulosa	Wild Bee Balm	1 gal typical	use with caution-powdery mildew
Onoclea sensibilis	Sensitive Fern	1 gal typical	
Panicum virgatum	Switch Grass	1 gal typical	
Panicum virgatum 'Cloud Nine'	Cloud Nine Switch Grass	1 gal typical	
Panicum virgatum var	Red Switch Grass	1 gal typical	
Pennisetum alopecuroides	Fountain Grass	1 gal typical	
Perovskia atriplicifolia	Russian Sage	1 gal typical	
Festuca glauca 'Boulder Blue"	Boulder Blue Fescue	1 gal typical	
Perovskia atriplicifolia 'Little Spire'	Little Spire Russian Sage	1 gal typical	
Ratibida pinnata	Grey-headed Coneflower	1 gal typical	

Table D4: Perennials (Cont'd) (1 gal typical except in the case of naturalization and for larger impact use of 2 gal)			
Species Name	**Common Name**	**Size**	**Notes**
Rudbeckia fulgida 'Goldsturm'	Goldstrum Black Eyed Susan Coneflower	1 gal typical	
Rudbeckia hirta	Black Eyed Susan	1 gal typical	
Sagittaria latifolia	Common Arrowhead	plug or 4" pot	
Salvia verticillata 'Purple Rain'	Purple Rain Salvia	1 gal typical	
Schizachyrium (or Andropogon) scoparium	Little Bluestem	1 gal typical	
Scirpus validus	Soft-stemmed Bullrush	plug or 4" pot	
Sedum kamitschaticum	Russian Stonecrop	4" pot to 1 gal	
Sedum x 'Autumn Joy'	Autumn Joy Sedum	1 gal typical	
Solidago rigida	Stiff Goldenrod	plug or 4" pot	
Sparganium emersum	Green Bur-reed	plug or 4" pot	
Typha latifolia	Cattail	plug or 4" pot	
Verbena hastata	Blue Vervain	4" pot	
Vinca minor	Periwinkle	4" pot	
Viola sororia	Common Blue Violet	4" pot	

APPENDIX E

Salt and Drought Tolerant Species List

Table E1: Large Deciduous Trees (Salt and Drought Tolerant)			
Species Name	**Common Name**	**Native**	**Notes**
Ailanthus altissima	Tree of Heaven	no	Male clone
Carya cordiformis	Bitternut Hickory	yes	
Catalpa speciosa	Northern Catalpa	no	
Corylus colurna	Turkish Hazel	no	
Eucommia ulmoide	Hardy Rubber Tree	no	
Gingko biloba	Maidenhair Tree	no	
Gleditsia triacanthos	Honey Locust	no	
Gymnocladus dioicus	Kentucky Coffeetree	yes	
Juglans cinerea	Butternut	yes	
Juglans nigra	Black Walnut	yes	
Platanus occidentalis	Sycamore	yes	
Platanus x acerfolia	London Plane Tree	no	
Prunus serotina	Black Cherry	yes	
Quercus acutissima	Sawtooth Oak	no	
Quercus alba	White Oak	yes	
Quercus macrocarpa	Bur Oak	yes	
Quercus palustris	Pin Oak	yes	
Quercus robur	English Oak	no	
Quercus rubra	Red Oak	yes	Quercus rubra (Northern Red Oak) may also be used
Salix amygdaloides	Peachleaf Willow	yes	
Tilia cordata	Little Leaf Linden	yes	
Zelkova serrata	Japanese Zelkova	no	

Table E2: Shrubs for Roadside Planting (Salt and Drought Tolerant)			
Species Name	**Common Name**	**Native**	**Notes**
Amelanchier laevis	Allegheny Serviceberry	yes	
A. sanguinea	Dwarf Juneberry	yes	
A. spicata	Shadbush Serviceberry	yes	
A. x alnifolia	Saskatoon Serviceberry	yes	
Aronia melanocarpa	Black Chokeberry	yes	
Buxus	Boxwood	no	
Cephalanthus occidentalis	Buttonbush	yes	
Cornus foemina	Gray Dogwood	yes	
Cotoneaster	Cotoneaster	no	
Forsythia intemedia	Forsythia	no	
Hypericum kalmianum	Shrubby St. Johns-Wort	yes	
Juniperus communus	Common Juniper	yes	
Juniperus horizontalis	Creeping Juniper	yes	
Lindera benzoin	Spicebush	yes	
Mahonia aquifolium	Oregon Grape	no	
Myrica pensylvanica	Bayberry	yes	
Physocarpus opulifolius	Eastern Ninebark	yes	
Pinus mugo	Mugo Pine	no	
Potentilla fruticosa	Shrubby Cinquefoil	yes	
Prunus x cistena	Purple-Leaf Sandcherry	no	
Prunus pennsylvanica	Pin Cherry	yes	
Prunus pumila	Sand Cherry	yes	
Prunus virginiana	Chokecherry	yes	
Rhus aromatica	Fragrant Sumac	yes	
Rhus glabra	Smooth Sumac	yes	
Rhus typhina	Staghorn Sumac	yes	
Ribes alpinum	Alpine Currant	no	
Rosa rugosa	Japanese Rose	no	Invasive, do not use within 100m of a natural area or Blue Street
Rubus idaeus	Red Raspberry	yes	
Rubus odoratus	Purple Flowering Raspberry	yes	

Table E3: Shrubs for Roadside Planting (Salt and Drought Tolerant) (Cont'd)			
Species Name	**Common Name**	**Native**	**Notes**
Salix discolor	Pussy Willow	yes	
Salix exigua	Sandbar Willow	yes	
Sambucus canadensis	Elderberry	yes	
Sambucus racemosa	Red Elderberry	yes	
Shepherdia canadensis	Buffaloberry	yes	
Spiraea japonica	Japanese Spiraea	no	
Symphoricarpos alba	Western Snowberry	no	Invasive, do not use within 100m of a natural area or Blue Street
Viburnum dentatum	Arrowwood	yes	
Viburnum rafinesquianum	Downy Arrowwood	yes	

Table E4: Groundcovers for Roadside Planting (Salt and Drought Tolerant)			
Species Name	**Common Name**	**Native**	**Notes**
Ajuga	Bugleweed	no	Invasive, do not use within 100m of a natural area or Blue Street
Antennaria spp.	Pussytoes	yes	
Arctostaphylos uva-ursi	Bearberry	yes	
Cerastium arvense ssp. strictum	Field Chickweed	yes	
Cerastium tomentosum	Snow-in-Summer	yes	
Fragaria virginiana ssp. virginiana	Common Strawberry	yes	
Thymus serphyllum	Mother-of-Thyme	no	Invasive, do not use within 100m of a natural area or Blue Street
Waldsteinia fragarioides	Barren Strawberry	yes	

Table E5: Perennials for Roadside Planting (Salt and Drought Tolerant)			
Species Name	**Common Name**	**Native**	**Notes**
Achillea millefolium	Common Yarrow	yes	
Agastache 'Black Adder'	Black Adder Hyssop	no	
Agastache rupestris	Orange Flare Hyssop	no	
Alchemilla mollis	Lady's Mantle	no	
Aquilegia canadensis	Wild Columbine	yes	
Armeria maritima	Sea Thrift	no	
Artemisia schmidtiana	Artemesia	no	
Asclepias incarnata	Swamp Milkweed	yes	
Asclepias tuberosa	Butterfly Milkweed	yes	
Baptisia alba	White Wild Indigo	no	
Baptisia australis	False Indigo	no	
Bergenia	Bergenia	no	
Boltonia asteroides	Boltonia, False Aster	no	
Brunerra macrophylla	Siberian Bugloss	no	
Coreopsis lanceolata	Lance-leaved Coreopsis	yes	
Coreopsis rosea	Pink-flowered Tickseed	no	
Echinacea purpurea	Eastern Purple Coneflower	no	
Epilobium coloratum	Purple-leaf Willow-herb	yes	
Epimedium	Barrenwort	no	
Erigeron pulchellus	Robin's Plantain Fleabane	yes	
Eupatorium maculatum	Joe Pye Weed	yes	
Euthamia graminifolia	Flat-top Goldentop	yes	
Gaillardia aristata	Great Blanket-flower	no	
Geranium 'Rozanne'	Rozeanne Geranium	no	
Geum triflorum	Prairie Smoke	yes	
Helianthus divaricatus	Woodland Sunflower	yes	
Helianthus strumosus	Pale-leaf Sunflower	yes	
Helianthus tuberosus	Jerusalem Artichoke	yes	
Heuchera 'Marmalade'	Coralbells	no	
Iberis sempervirens	Candytuft	no	
Lavandula angustifolia	Lavender	no	

Table E6: Perennials for Roadside Planting (Salt and Drought Tolerant) (Cont'd)			
Species Name	**Common Name**	**Native**	**Notes**
Lespedeza capitata	Round-head Bush-clover	yes	
Leucanthemum	Shasta Daisy	no	
Lysimachia ciliata	Fringed Loosestrife	yes	
Monarda fistulosa	Wild Bergamot, Bee-balm	yes	
Nepeta racemosa	Catmint	no	
Opuntia fragilis	Spreading Prickly-Pear	yes	
Packera paupercula	Balsam Ragwort	yes	
Penstemon digitalis	Foxglove, Beardtongue	yes	
Potentilla anserina	Silverweed	yes	
Rudbeckia hirta	Black-Eyed Susan	yes	
Rudbeckia laciniata	Green-Headed or Cut-leaf Coneflower	yes	
Sedum spectabile	Sedum	no	
Sisyrinchium montanum	Strict Blue-eyed-grass	yes	
Solidago altissima	Tall Goldenrod	yes	
Solidago canadensis	Canada Goldenrod	yes	
Solidago flexicaulis	Zig-zag Goldenrod	yes	
Solidago nemoralis	Grey Goldenrod	yes	
Stachys byzantina	Lambs' Ears	no	
Symphyotrichum cordifolium	Heart-leaved Aster	yes	
S. ericoides	White Heath Aster	yes	
S. lanceolatum	Panicled Aster	yes	
S. novae-angliae	New England Aster	yes	
S. oolentangiense	Sky-blue Aster	yes	
Thalictrum pubescens	Tall Meadow-Rue	yes	
Trichostema brachiatum	False Pennyroyal	yes	
Verbena stricta	Hoary Vervain	yes	
Verbena urticifolia	White Vervain	yes	
Veronicastrum virginicum	Culver's-root	yes	
Yucca filamentosa	Narrow-Leaved Yucca	no	
Zizia aurea	Common Alexanders	yes	

Table E7: Grasses and Sedges for Roadside Planting (Salt and Drought Tolerant)			
Species Name	**Common Name**	**Native**	**Notes**
Andropogon gerardii	Big Bluestem	yes	
Bromus latiglumis	Broad-glumed Brome	yes	
Calamagrostis acutiflora 'Karl Foerster'	Karl Foerster Feather Reed Grass	no	
Carex atherodes	Awned Sedge	yes	
Carex brevior	Brevior Sedge	yes	
Carex pennsylvanica	Pennsylvania Sedge	yes	
Chasmanthium latifolium	Northern Sea Oats	yes	
Danthonia spicata	Poverty Oatgrass	yes	
Deschampsia caespitosa	Tufted Hair Grass	yes	
Elymus canadensis	Canada Wild-rye	yes	
Elymus riparius	River Wild-rye	yes	
Elymus virginicus	Virginia Wild-rye	yes	
Festuca cinerea "Elijah Blue"	Elijah Blue Fescue	no	
Festuca glauca 'Boulder Blue"	Boulder Blue Fescue	no	
Festuca ovina 'Elijah Blue'	Elijah Blue Fescue	no	
Helictotrichon sempervirens	Blue Oat Grass	no	
Juncus tenuis	Path Rush	yes	
Miscanthus sinensis 'Gracillimus'	Maiden grass	no	Invasive, do not use within 100m of a natural area or Blue Street
Miscanthus sinensis 'purpurascens'	Flame Grass	no	Invasive, do not use within 100m of a natural area or Blue Street
Miscanthus sinensis	Morning Light	no	
'Morning Light'	Maiden Grass	no	Invasive, do not use within 100m of a natural area or Blue Street
Muhlenbergia mexicana	Mexican Muhly	yes	
Schizachyrium scoparium	Little Bluestem	yes	
Scirpus cyperinus	Cottongrass Bulrush	yes	
Sorghastrum nutans	Yellow Indian-grass	yes	
Spartina pectinata	Prairie Cordgrass	yes	
Sporobolus neglectus	Small Dropseed	yes	

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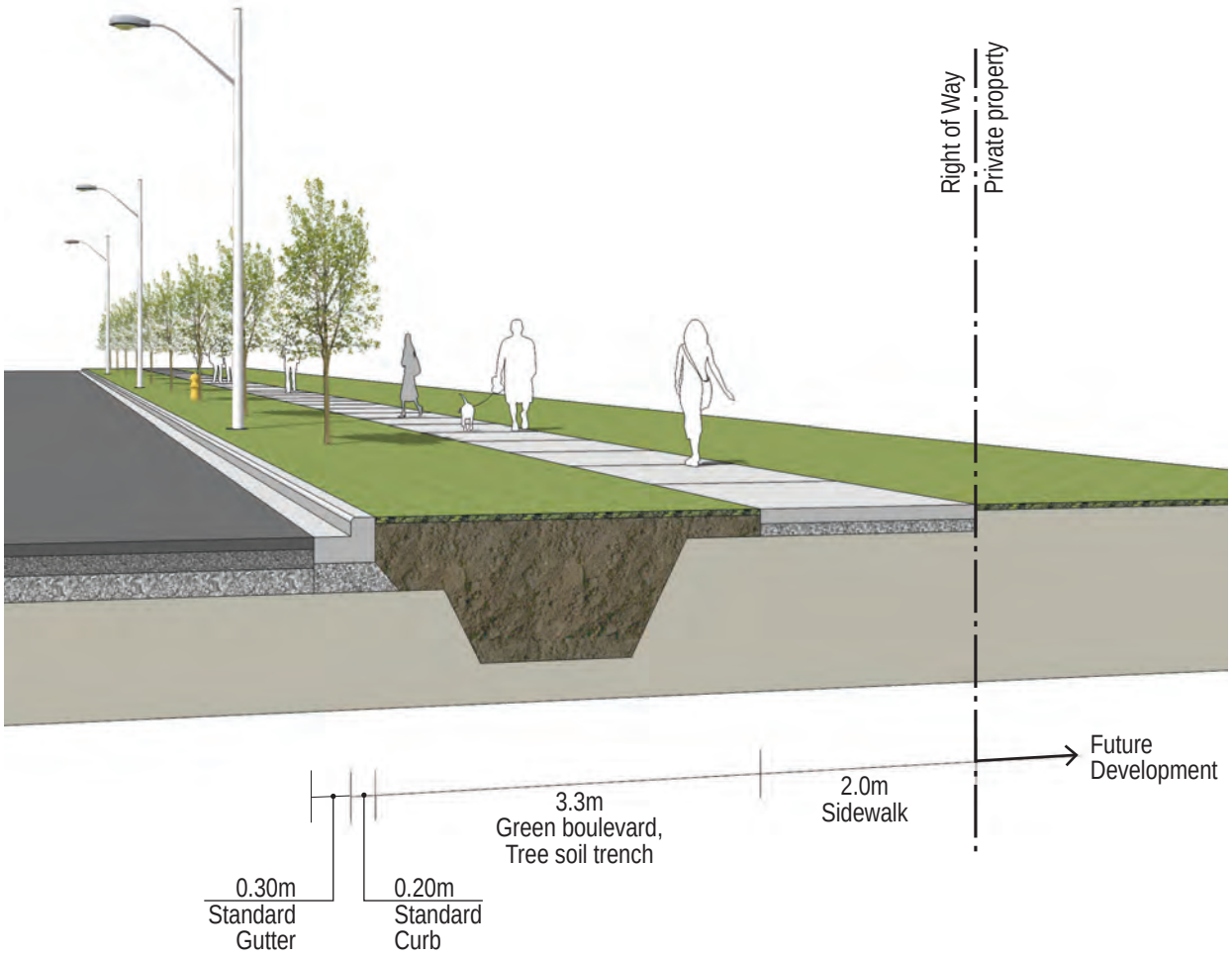
APPENDIX F

Streetscape Phasing Option

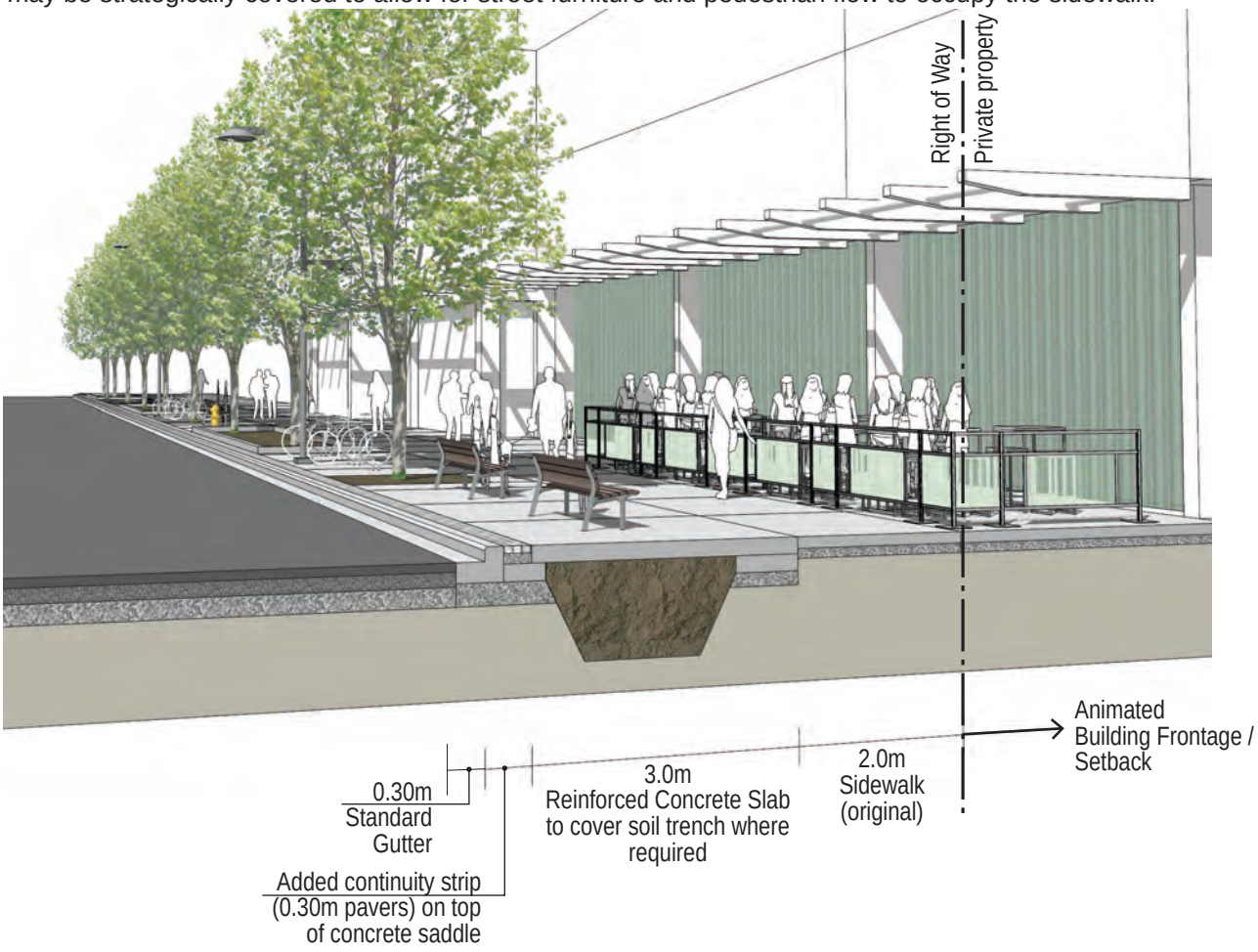
Intial Streetscape

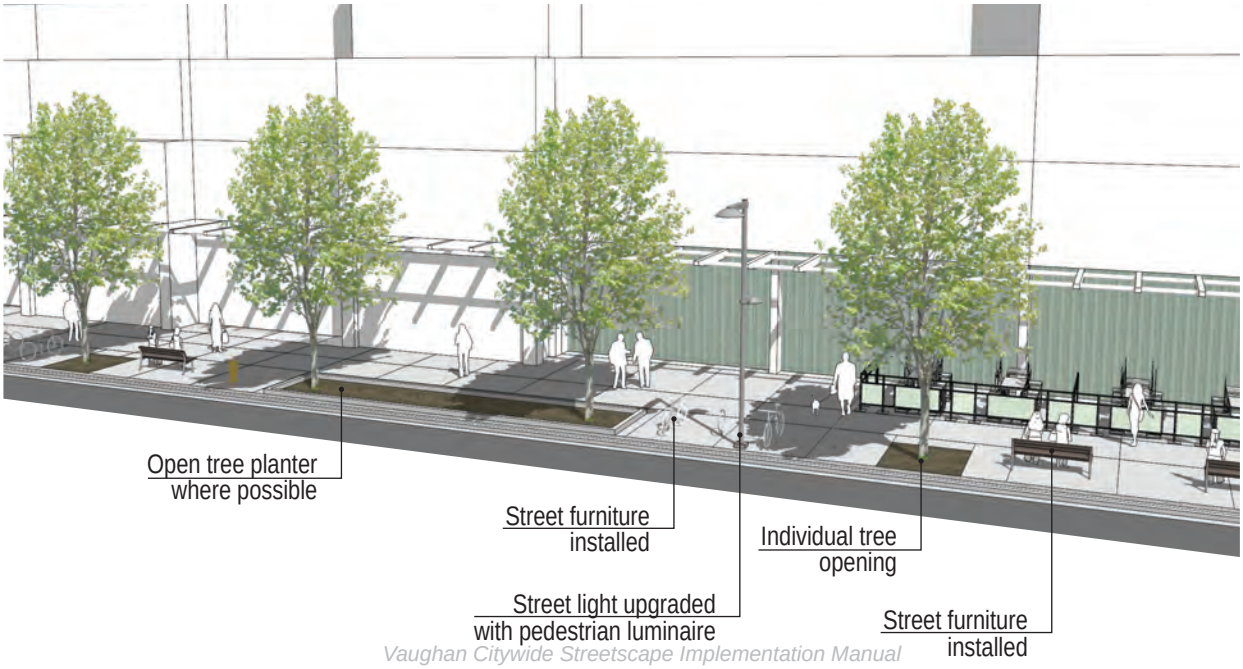
When and where required, a phased approach will allow the City to set implement a basic streetscape while development is implemented.



Full Buildout Streetscape

Once the site has been developed, the streetscape can be improved accordingly. The green boulevard may be strategically covered to allow for street furniture and pedestrian flow to occupy the sidewalk.





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APPENDIX G

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City Decision Making Matrix

PLANNING STAGE	QUESTION OF...	CITY DECISION POINTS	SIMPLIFIED YES / NO BASED UPON...	CRITERIA

Master Planning Level	*Commitment*	***Master Plan Identification***	Is this worth our Investment?	- Is there a potential return on investment?
				- Is it in line with the Official Plan?
				- Will it help the growth / development of the municipality?
				- Is the master plan in an identified intensification area of the Official Plan?
				- Is the master plan in an area with a high potential for future densification and development?
				- Does the master plan aid in increasing densification to support public transit?
				- Does the master plan respond to transportation initiatives outlined by regional / provincial plans?
				- Will the master plan potentially contribute to the economic prosperity of local businesses through:
				  - Growth in pedestrian traffic
				  - Growth in retail sales
				  - Achievable rents
				  - Increased area demand
				  - Growth in assessment
				  - Enhanced value of surrounding lands
				- Will the master plan potentiallly contribute to the residential desirability of the area through:
				  - Increased area demand
				  - Growth in assessment
				  - Enhanced value of surrounding lands
				  - Raised quality of life
				  - Quality of place and city building

	Affordability	***Master Plan Financial Commitments***	Can we potentially afford it now and in the future?	- Is the design appropriate for the purpose and vision of the area? - Is the municipality willing to commit the capital funds necessary to achieve the appropriate level of service? - Given the expected growth in the area, will the municipality potentially be able to afford the future financial commitments? - What are the positive / negative impacts of increasing / lowering the level of service? - Do the positive / negative impacts of increasing / lowering the level of service proposed compromise the design needs?

		Funding and Negotiations	Will others help us and how much?	- Who are the potential funding partners?
				  - Regional
				  - Developers
				  - Federal and Provincial Programs
				  - Municipal
				- What programs are avilable to aid in the capital funding of the project?
				- What organizations are willing to partner with the municipality to fund the capital cost to complete the project?
				- Can we negotiate with the various funding partners for more funds?
				- Given the available funding, can the municipality afford to fund the difference?
				- Will the future densification be able to afford the on-going operations and maintenance?

Project Planning Level	*Logistics*	***Project Details***	Can we realistically afford the project?
			
			Is the project still what we envisioned?
				- Is the detailed design of the project faithful to the intent of the master plan?
				- Are the objective sof the master plan met by the detailed design?
				- Does the detailed design reveal any new concerns not previously known in the master plan?
				  - Are the new issues adequately addressed in the detailed design?
				  - Do the new issues add significant capital and future cost to the project?
				  - Are the additional costs to address the issues unavoidable?
				  - Can the municipality afford the new costs?
				- Does the detaile design add new features to the project?
				  - Do the new features add any benefits to the municipality and residents?
				  - Do the new features add significant capital and future cost to the project?
				  - Do the benefits justify the increased costs?
				  - Can the municipality afford the new costs?
				- Given the detailed costing, is the project still realistically affordable?
				- Can the project be implemented in the phasing proposed with minimal disruption to the businesses and residents?
				- Is there benefit to increasing / decreasing the overall timeline of the project?

Value Engineering Level	*Value / Efficiency*	***Value Engineering***	Can we get the best value for our investment?	- Is the detailed design cost effective? - Are there alternative construction details which could be of more efficient construction? - Are there alternative manufactureres whose products perform comparably but are more cost effective? - Are there any design elements which could be eliminated or modified without compromising the overall design intent?
Implementation Level	*Satisfaction*	***Proceed to Construction***	Should we go ahead with the project?	- Are there any reasons why the project should not be approved for implementation?

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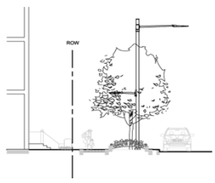
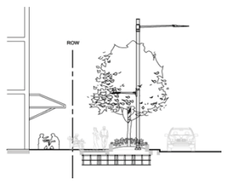
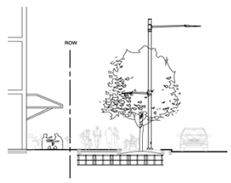
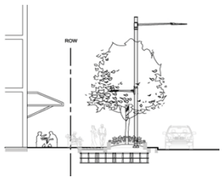
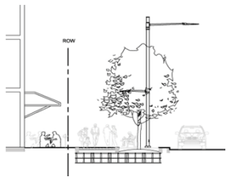
APPENDIX H

ZONE		LEVEL OF SERVICE		
		STANDARD URBAN	ENHANCED	PREMIUM
				
Continuity Strip Zone	**Hardscape**			
	Poured in Place Concrete	✓	✓	✓
	Pre-Cast Concrete Unit Pavers on Concrete Base		✓	✓
	Pre-Cast Concrete Unit Pavers on Granular Base		✓	✓
	Permeable Paving		✓	✓
	Natural Stone			
Amenity Zone	**Hardscape**			
	Poured in Place Concrete	✓	✓	✓
	Pre-Cast Concrete Unit Pavers on Concrete Base		✓	✓
	Pre-Cast Concrete Unit Pavers on Granular Base		✓	✓
	Permeable Paving		✓	✓
	Natural Stone			✓
	Tactile Paving		✓	✓
	Trees and Planters			
	Tree Deciduous 60mm Caliper	✓		
	Tree Deciduous 80mm Caliper		✓	
	Tree Deciduous 100mm Caliper			✓
	Tree Coniferous 2.0m Height	✓		
	Tree Coniferous 2.5m Height		✓	
	Tree Coniferous 3.0m Height			✓
	Single Tree Grate	✓	✓	✓
	Flush Planter Curb	✓	✓	✓
	Raised Planter Curb	✓	✓	✓
	Seat-Wall Planter Curb (0.45m)		✓	✓
	Planting Soil	✓	✓	✓
	Compacted Mulch	✓	✓	✓
	Perennials and Ornamental Grasses	✓	✓	✓
	Soil Cells		✓	✓
	Softscape			
	Planting Bed	✓	✓	✓
	Sod	✓	✓	✓
	Perennials and Ornamental Grasses	✓	✓	✓
	Deciduous Shrubs 600mm Height	✓	✓	✓
	Deciduous Shrubs 1000mm Height		✓	✓
	Deciduous Shrubs 1500mm Height		✓	✓
	Coniferous Shrubs 600mm Height	✓	✓	✓
	Hanging Flower Basket		✓	✓
	Free Standing Planter		✓	✓
	Furniture			
	Bench		✓	✓
	Trash Receptacle		✓	✓
	Bicycle Rack		✓	✓
	Banners		✓	✓
	Way-Finding Signage	✓	✓	✓
	Bollard		✓	✓
Pedestrian Clearway Zone	**Main Field**			
	Poured in Place Concrete	✓	✓	✓
	Pre-Cast Concrete Unit Pavers on Concrete Base		✓	✓
	Pre-Cast Concrete Unit Pavers on Granular Base		✓	✓
	Permeable Paving		✓	✓
	Natural Stone			✓
	Paving Accent			
	Poured in Place Concrete	✓	✓	✓
	Pre-Cast Concrete Unit Pavers on Concrete Base		✓	✓
	Pre-Cast Concrete Unit Pavers on Granular Base		✓	✓
	Permeable Paving		✓	✓
	Natural Stone			✓
	Tactile Paving			✓
	Multi-Purpose Trails			
	Asphalt	✓	✓	✓
Frontage Zone	**Hardscape**			
	Poured in Place Concrete		✓	✓
	Pre-Cast Concrete Unit Pavers on Concrete Base		✓	✓
	Pre-Cast Concrete Unit Pavers on Granular Base		✓	✓
	Permeable Pavers		✓	✓
	Natural Stone			✓
	Softscape			
	Planting Bed	✓	✓	✓
	Sod	✓	✓	✓
	Perennials and Ornamental Grasses	✓	✓	✓
	Deciduous Shrubs 600mm Height	✓	✓	✓
	Deciduous Shrubs 1000mm Height		✓	✓
	Deciduous Shrubs 1500mm Height		✓	✓
	Coniferous Shrubs 600mm Height	✓	✓	✓

ZONE		LEVEL OF SERVICE		
		STANDARD URBAN	ENHANCED	PREMIUM
				
Median Zone	**Hardscape**			
	Poured in Place Concrete	✓	✓	✓
	Pre-Cast Concrete Unit Pavers on Concrete Base		✓	✓
	Pre-Cast Concrete Unit Pavers on Granular Base		✓	✓
	Permeable Paving		✓	✓
	Natural Stone			✓
	Tactile Paving		✓	✓
	Trees and Planters			
	Tree Deciduous 60mm Caliper	✓		
	Tree Deciduous 80mm Caliper		✓	
	Tree Deciduous 100mm Caliper			✓
	Tree Coniferous 2.0m Height	✓		
	Tree Coniferous 2.5m Height		✓	
	Tree Coniferous 3.0m Height			✓
	Seat-Wall Planter Curb (0.45m)		✓	✓
	Planting Soil	✓	✓	✓
	Compacted Mulch	✓	✓	✓
	Perennials and Ornamental Grasses	✓	✓	✓
	Softscape			
	Planting Bed		✓	✓
	Sod	✓	✓	✓
	Perennials and Ornamental Grasses	✓	✓	✓
	Deciduous Shrubs 600mm Height	✓	✓	✓
	Deciduous Shrubs 1000mm Height		✓	✓
	Deciduous Shrubs 1500mm Height		✓	✓
	Coniferous Shrubs 600mm Height	✓	✓	✓
Illumination Elements	**Standard**			
	Street Lighting (Pole & Light)	✓	✓	✓
	Pedestrian Lighting (Pole & Light)		✓	✓
	Pedestrian Lighting only (on existing Street Light Pole)		✓	✓
	Street & Pedestrian Lighting (Pole & Light)		✓	✓
	Specialty			
	Bollard Lighting		✓	✓
	Paving Lighting		✓	✓
	Accent Lighting		✓	✓
	Seat-Wall Lighting		✓	✓
	Up Lighting		✓	✓
	Wall Wash Light		✓	✓
Innovation	**Low Impact Development Measures**			
	Bioretention		✓	✓
	Rain Garden		✓	✓
	Vegetated Swale		✓	✓
	Box Planter		✓	✓
	Cistern		✓	✓
Intersection Zone	**Major Intersection Corner Treatement**			
	Poured in Place Concrete	✓	✓	✓
	Pre-Cast Concrete Unit Pavers on Concrete Base	✓	✓	✓
	Pre-Cast Concrete Unit Pavers on Granular Base	✓	✓	✓
	Permeable Paving		✓	✓
	Natural Stone			✓
	Tactile Paving	✓	✓	✓
	Minor Intersection Corner Treatement			
	Poured in Place Concrete	✓	✓	✓
	Pre-Cast Concrete Unit Pavers on Concrete Base	✓	✓	✓
	Pre-Cast Concrete Unit Pavers on Granular Base	✓	✓	✓
	Permeable Paving		✓	✓
	Natural Stone			✓
	Tactile Paving	✓	✓	✓
	Crosswalk			
	Asphalt with Painted Lines	✓	✓	✓
	Poured in Place Concrete		✓	✓
	Pre-Cast Concrete Unit Pavers on Concrete Base		✓	✓
	Permeable Paving		✓	✓
	Natural Stone			✓
	Raised Crosswalk			✓
	Streetprint		✓	✓

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APPENDIX I

Intensification Area:
Street Jurisdiction:
Street Hierarchy:

Streetscape Type:
Street:
Blocks:

ROW Width:
Boulevard Width:

ITEMS (BOULEVARD COMPONENT / ITEM)	SERVICE LEVEL	QUANTITY	UNIT TYPE	CAPITAL UNIT COST (See Assumptions)	UNIT COST / LINEAR METER	TOTAL (Single Sided Context)	LIFE EXPECTANCY: BASIC	ENHANCED	PREMIUM	VAUGHAN DC
		Single Sided				Approx. Streetcape Single Sided (lm)				
Midblock										
CONTINUITY STRIP ZONE										
Hardscape										
Poured in Place Concrete	Standard		sq.m	$100.00	$0.00	$0.00	20	20 - 30	30+	25
Pre-Cast Concrete Unit Pavers on Concrete Base	Enhanced		sq.m	$222.00	$0.00	$0.00	25	25 - 35	35+	30
Pre-Cast Concrete Unit Pavers on Granular Base	Enhanced		sq.m	$126.00	$0.00	$0.00	20	20 - 30	30+	25*
Permeable Paving	Enhanced		sq.m	$117.00	$0.00	$0.00	20	20 - 30	30+	25*
Natural Stone	Premium		sq.m	$200.00	$0.00	$0.00	20	20 - 30	30+	25*
Tactile Paving	Enhanced		sq.m	$222.00						
AMENITY ZONE										
Hardscape										
Poured in Place Concrete	Standard		sq.m	$100.00	$0.00	$0.00	20	20 - 30	30+	25
Pre-Cast Concrete Unit Pavers on Concrete Base	Enhanced		sq.m	$222.00	$0.00	$0.00	25	25 - 35	35+	30
Pre-Cast Concrete Unit Pavers on Granular Base	Enhanced		sq.m	$126.00	$0.00	$0.00	20	20 - 30	30+	25*
Permeable Paving	Enhanced		sq.m	$117.00	$0.00	$0.00	20	20 - 30	30+	25*
Natural Stone	Premium		sq.m	$200.00	$0.00	$0.00	20	20 - 30	30+	25*
Tactile Paving	Enhanced		sq.m	$222.00	$0.00	$0.00	20	20 - 30	30+	25*
Flush Planter Curb	Standard		lm	$70.00		$0.00				
Raised Planter Curb	Standard		lm	$125.00		$0.00				
Seatwall Planter Curb	Premium		lm	$600.00		$0.00				
Trees and Planters										
Tree Deciduous 60mm Caliper	Standard		ea.	$550.00	$0.00	$0.00				
Tree Deciduous 80mm Caliper	Enhanced		ea.	$650.00	$0.00	$0.00				
Tree Deciduous 100mm Caliper	Premium		ea.	$800.00	$0.00	$0.00				
Tree Coniferous 2.0m Height	Standard		ea.	$500.00	$0.00	$0.00	35	35 - 55	55+	45
Tree Coniferous 2.5m Height	Enhanced		ea.	$625.00	$0.00	$0.00	35	35 - 55	55+	45
Tree Coniferous 3.0m Height	Premium		ea.	$750.00	$0.00	$0.00	35	35 - 55	55+	45
Single Tree Grate	Standard		ea.	$1,200.00	$0.00	$0.00	90	100	110+	100*
Planting Soil	Standard		cubic.m	$39.00	$0.00	$0.00	90	100	110+	100*
Compacted Mulch	Standard		sq.m	$25.00	$0.00	$0.00	20	20 - 30	30+	25
Perennials and Ornamental Grasses	Standard		sq.m	$50.00	$0.00	$0.00	20	20 - 30	30+	25
Soil Cells	Enhanced		sq.m	$410.00	$0.00	$0.00	90	100	110+	100*
Softscape										
Planting Bed	Standard		sq.m	$34.00	$0.00	$0.00	20	20 - 30	30+	25*
Sod	Standard		sq.m	$6.00	$0.00	$0.00	20	20 - 30	30+	25*
Perennials and Ornamental Grasses	Standard		sq.m	$50.00	$0.00	$0.00	20	20 - 30	30+	25
Deciduous Shrubs 600mm Height	Standard		ea.	$50.00	$0.00	$0.00	20	20 - 30	30+	25
Deciduous Shrubs 1000mm Height	Enhanced		ea.	$85.00	$0.00	$0.00	20	20 - 30	30+	25
Deciduous Shrubs 1500mm Height	Enhanced		ea.	$120.00	$0.00	$0.00	20	20 - 30	30+	25
Coniferous Shrubs 600mm Height	Standard		ea.	$50.00	$0.00	$0.00	20	20 - 30	30+	25
Hanging Flower Basket	Enhanced		ea.	$75.00	$0.00	$0.00	10	10 - 20	20+	15*
Free Standing Planter	Enhanced		ea.	$250.00	$0.00	$0.00	10	10 - 20	20+	15*
Furniture										
Bench	Enhanced		ea.	$1,859.00	$0.00	$0.00	10	10 - 20	20+	15
Trash Receptacle	Enhanced		ea.	$2,123.00	$0.00	$0.00	10	10 - 20	20+	15
Bicycle Stand	Enhanced		ea.	$253.00	$0.00	$0.00	10	10 - 20	20+	15
Banners	Enhanced		ea.	$375.00	$0.00	$0.00	10	10 - 20	20+	15*
Way-Finding Signage	Standard		ea.	$3,500.00	$0.00	$0.00	10	10 - 20	20+	15*
Bollard	Enhanced		ea.	$1,100.00	$0.00	$0.00	10	10 - 20	20+	15
PEDESTRIAN CLEARWAY ZONE										
Main Field										
Poured in Place Concrete	Standard		sq.m	$100.00	$0.00	$0.00	20	20 - 30	30+	25
Pre-Cast Concrete Unit Pavers on Concrete Base	Enhanced		sq.m	$222.00	$0.00	$0.00	25	25 - 35	35+	30
Pre-Cast Concrete Unit Pavers on Granular Base	Enhanced		sq.m	$126.00	$0.00	$0.00	20	20 - 30	30+	25*
Permeable Paving	Enhanced		sq.m	$117.00	$0.00	$0.00	20	20 - 30	30+	25*
Natural Stone	Premium		sq.m	$200.00	$0.00	$0.00	20	20 - 30	30+	25*
Paving Accent										
Poured in Place Concrete	Standard		sq.m	$100.00	$0.00	$0.00	20	20 - 30	30+	25
Pre-Cast Concrete Unit Pavers on Concrete Base	Enhanced		sq.m	$222.00	$0.00	$0.00	25	25 - 35	35+	30
Pre-Cast Concrete Unit Pavers on Granular Base	Enhanced		sq.m	$126.00	$0.00	$0.00	20	20 - 30	30+	25*
Permeable Paving	Enhanced		sq.m	$117.00	$0.00	$0.00	20	20 - 30	30+	25*
Natural Stone	Premium		sq.m	$200.00	$0.00	$0.00	20	20 - 30	30+	25*
Tactile Paving	Enhanced		sq.m	$222.00						
Multi-Purpose Trails										
Asphalt	Enhanced		sq.m	$65.00	$0.00	$0.00	5	5 - 15	15+	10
FRONTAGE ZONE										
Hardscape										
Poured in Place Concrete	Standard		sq.m	$100.00	$0.00	$0.00	20	20 - 30	30+	25
Pre-Cast Concrete Unit Pavers on Concrete Base	Enhanced		sq.m	$222.00	$0.00	$0.00	25	25 - 35	35+	30
Pre-Cast Concrete Unit Pavers on Granular Base	Enhanced		sq.m	$126.00	$0.00	$0.00	20	20 - 30	30+	25*
Permeable Pavers	Enhanced		sq.m	$117.00	$0.00	$0.00	20	20 - 30	30+	25*
Natural Stone	Premium		sq.m	$200.00	$0.00	$0.00	20	20 - 30	30+	25*
Softscape										
Planting Bed	Standard		sq.m	$34.00	$0.00	$0.00	20	20 - 30	30+	25*
Sod	Standard		sq.m	$6.00	$0.00	$0.00	20	20 - 30	30+	25*
Perennials and Ornamental Grasses	Enhanced		sq.m	$50.00	$0.00	$0.00	20	20 - 30	30+	25
Deciduous Shrubs 600mm Height	Standard		ea.	$50.00	$0.00	$0.00	20	20 - 30	30+	25
Deciduous Shrubs 1000mm Height	Enhanced		ea.	$85.00	$0.00	$0.00	20	20 - 30	30+	25
Deciduous Shrubs 1500mm Height	Enhanced		ea.	$120.00	$0.00	$0.00	20	20 - 30	30+	25
Coniferous Shrubs 600mm Height	Standard		ea.	$50.00	$0.00	$0.00	20	20 - 30	30+	25
MEDIAN ZONE										
Hardscape										
Poured in Place Concrete	Standard		sq.m	$100.00	$0.00	$0.00	20	20 - 30	30+	25
Pre-Cast Concrete Unit Pavers on Concrete Base	Enhanced		sq.m	$222.00	$0.00	$0.00	25	25 - 35	35+	30
Pre-Cast Concrete Unit Pavers on Granular Base	Enhanced		sq.m	$126.00	$0.00	$0.00	20	20 - 30	30+	25*
Permeable Paving	Enhanced		sq.m	$117.00	$0.00	$0.00	20	20 - 30	30+	25*
Natural Stone	Premium		sq.m	$200.00	$0.00	$0.00	20	20 - 30	30+	25*
Tactile Paving	Enhanced		sq.m	$222.00						
Trees and Planters										
Tree Deciduous 60mm Caliper	Standard		ea.	$550.00	$0.00	$0.00				
Tree Deciduous 80mm Caliper	Enhanced		ea.	$650.00	$0.00	$0.00				
Tree Deciduous 100mm Caliper	Premium		ea.	$800.00	$0.00	$0.00				
Tree Coniferous 2.0m Height	Standard		ea.	$500.00	$0.00	$0.00	35	35 - 55	55+	45
Tree Coniferous 2.5m Height	Enhanced		ea.	$625.00	$0.00	$0.00	35	35 - 55	55+	45
Tree Coniferous 3.0m Height	Premium		ea.	$750.00	$0.00	$0.00	35	35 - 55	55+	45
Seat-Wall Planter Curb (0.45m)	Enhanced		lm	$600.00						
Planting Soil	Standard		cubic.m	$39.00	$0.00	$0.00	90	100	110+	100*
Compacted Mulch	Standard		sq.m	$25.00	$0.00	$0.00	20	20 - 30	30+	25
Perennials and Ornamental Grasses	Standard		sq.m	$50.00	$0.00	$0.00	20	20 - 30	30+	25
Softscape										
Planting Bed	Enhanced		sq.m	$34.00	$0.00	$0.00	20	20 - 30	30+	25*
Sod	Standard		sq.m	$6.00	$0.00	$0.00	20	20 - 30	30+	25*
Perennials and Ornamental Grasses	Enhanced		sq.m	$50.00	$0.00	$0.00	20	20 - 30	30+	25
Deciduous Shrubs 600mm Height	Standard		ea.	$50.00	$0.00	$0.00	20	20 - 30	30+	25
Deciduous Shrubs 1000mm Height	Enhanced		ea.	$85.00	$0.00	$0.00	20	20 - 30	30+	25
Deciduous Shrubs 1500mm Height	Enhanced		ea.	$120.00	$0.00	$0.00	20	20 - 30	30+	25
Coniferous Shrubs 600mm Height	Standard		ea.	$50.00	$0.00	$0.00	20	20 - 30	30+	25
ILLUMINATION ELEMENTS										
Standard										
Street Lighting	Standard		ea.	$7,000.00	$0.00	$0.00	20	20 - 30	30+	25*
Pedestrian Lighting	Enhanced		ea.	$6,500.00	$0.00	$0.00	20	20 - 30	30+	25
Street and Pedestrian Lighting Pole and Light	Enhanced		ea.	$10,000.00	$0.00	$0.00	20	20 - 30	30+	25*
Pedestrian Lighting Only (On Existing Pole)	Enhanced		ea.	$3,800.00	$0.00	$0.00	20	20 - 30	30+	25
Specialty										
Bollard Lighting	Enhanced		ea.	$1,700.00	$0.00	$0.00	20	20 - 30	30+	25*
Paving Lighting	Enhanced		ea.	$680.00	$0.00	$0.00	20	20 - 30	30+	25*
Accent Lighting	Enhanced		ea.	$680.00	$0.00	$0.00	20	20 - 30	30+	25*
Seat-Wall Lighting	Enhanced		ea.	$100.00	$0.00	$0.00	20	20 - 30	30+	25*
Up Lighting	Enhanced		ea.	$1,000.00	$0.00	$0.00	20	20 - 30	30+	25*
Wall Wash Lighting	Enhanced		ea.	$700.00	$0.00	$0.00	20	20 - 30	30+	25*
INNOVATION										
Low Impact Development Measures										
Bioretention	Enhanced		sq.m	$140.00	$0.00	$0.00	35	35 - 55	55+	45*
Rain Garden	Enhanced		sq.m	$190.00	$0.00	$0.00	35	35 - 55	55+	45*
Vegetated Swale	Enhanced		sq.m	$23.00	$0.00	$0.00	35	35 - 55	55+	45*
Box Planter	Enhanced		sq.m	$190.00	$0.00	$0.00	35	35 - 55	55+	45*
Cistern	Enhanced		sq.m	$606.00	$0.00	$0.00	35	35 - 55	55+	45*

	SERVICE LEVEL	QUANTITY	UNIT TYPE	CAPITAL UNIT COST (See Assumptions)	COST	UNIT COST / LINEAR METER	TOTAL	BASIC	ENHANCED	PREMIUM	VAUGHAN DC
Intersections and Special Features											
INTERSECTION ZONE											
Major Intersection Corner Treatement											
Poured in Place Concrete	Standard		sq.m	$100.00		$0.00	$0.00	20	20 - 30	30+	25
Pre-Cast Concrete Unit Pavers on Concrete Base	Standard		sq.m	$222.00		$0.00	$0.00	25	25 - 35	35+	30
Pre-Cast Concrete Unit Pavers on Granular Base	Standard		sq.m	$126.00		$0.00	$0.00	20	20 - 30	30+	25*
Permeable Paving	Enhanced		sq.m	$117.00		$0.00	$0.00	20	20 - 30	30+	25*
Natural Stone	Premium		sq.m	$200.00		$0.00	$0.00	20	20 - 30	30+	25*
Tactile Paving	Standard		sq.m	$222.00							
Minor Intersection Corner Treatement											
Poured in Place Concrete	Standard		sq.m	$100.00		$0.00	$0.00	20	20 - 30	30+	25
Pre-Cast Concrete Unit Pavers on Concrete Base	Standard		sq.m	$222.00		$0.00	$0.00	25	25 - 35	35+	30
Pre-Cast Concrete Unit Pavers on Granular Base	Standard		sq.m	$126.00		$0.00	$0.00	20	20 - 30	30+	25*
Permeable Paving	Enhanced		sq.m	$117.00		$0.00	$0.00	20	20 - 30	30+	25*
Natural Stone	Premium		sq.m	$200.00		$0.00	$0.00	20	20 - 30	30+	25*
Tactile Paving	Standard		sq.m	$222.00							
Crosswalk											
Asphalt with Painted Lines	Standard		sq.m	$67.00		$0.00	$0.00	5	5 - 15	15+	10
Poured in Place Concrete	Enhanced		sq.m	$200.00		$0.00	$0.00	20	20 - 30	30+	25
Pre-Cast Concrete Unit Pavers on Concrete Base	Enhanced		sq.m	$222.00		$0.00	$0.00	25	25 - 35	35+	30
Permeable Paving	Enhanced		sq.m	$117.00		$0.00	$0.00	20	20 - 30	30+	25*
Natural Stone	Premium		sq.m	$200.00		$0.00	$0.00	20	20 - 30	30+	25*
Raised Crosswalk	Premium		ea.	$7,000.00		$0.00	$0.00	20	20 - 30	30+	25*
Street Print	Enhanced		sq.m	$50.00		$0.00	$0.00	20	20 - 30	30+	25*

APPENDIX J

Operations and Maintenance

STREETSCAPE LENGTH APPROX. LINEAR METERS

Note: Operation and Maintenance Calculated Annually

ZONE	MAINTENANCE ELEMENT	MAINTENANCE INCLUDED	RESPONSIBLE DEPARTMENT	MAINTENANCE UNIT COST	UNIT TYPE	TOTAL UNIT COST	ROUNDED UNIT COST	UNIT TYPE
CONTINUITY STRIP ZONE	Hardscape Concrete	Concrete Repairs *including 10% landscape restoration	Public Works	$0.11	sq.m	$0.11	$0.25	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Granular Base	Public Works	$7.00	sq.m	$7.00	$7.00	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Concrete Base	Public Works	$15.00	sq.m	$15.00	$15.00	sq.m
	Spring Cleanup	Salt Strip Sweeping	Parks and Forestry	$0.38	sq.m	$0.38	$0.40	sq.m
	Snow	Snow Removal	Public Works	$20.00	sq.m	$20.00	$20.00	sq.m
AMENITY ZONE	Hardscape Concrete	Concrete Repairs *including 10% landscape restoration	Public Works	$0.11	sq.m	$0.11	$0.25	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Granular Base	Public Works	$7.00	sq.m	$7.00	$7.00	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Concrete Base	Public Works	$15.00	sq.m	$15.00	$15.00	sq.m
	Hardscape Planter Curb	Concrete Repairs *including 10% landscape restoration	Public Works	$0.11	lm	$0.11	$0.25	lm
	Snow	Snow Removal	Public Works	$20.00	sq.m	$20.00	$20.00	sq.m
	Street Trees	Pruning ($500 / yr on 6 yr cycle)	Parks and Forestry	$85.00	ea.	$85.00	$85.00	ea.
		Watering (10 yr life cycle)	Parks and Forestry	$80.00	ea.	$80.00	$80.00	ea.
		Mulching and Fertilization ($15 / 3 yr)	Parks and Forestry	$5.00	ea.	$5.00	$5.00	ea.
		Infiltration / Irrigation / Flushing	Parks and Forestry	$2.50	ea.	$2.50	$2.50	ea.
		Basic Root Pruning ($30/35 yr lifecycle)	Parks and Forestry	$0.86	ea.	$0.86	$0.86	ea.
		Basic Urban Root Pruning ($30/35 yr lifecycle)	Parks and Forestry	$3.00	ea.	$3.00	$3.00	ea.
	Softscape	Planter Watering / Maintenance	Parks and Forestry	$12.50	sq.m	$12.50	$12.50	sq.m
		Hanging Basket Maintenance	Parks and Forestry	$25.00	ea.	$25.00	$25.00	sq.m
		Trash Receptacle		$640.00	ea.	$640.00	$640.00	ea.
		Planting Bed Mtce (debris cleanup, mulching etc.)	Parks and Forestry	$0.16	sq.m	$0.16	$0.16	sq.m
		Lawn Mowing (incl debris cleanup)	Parks and Forestry	$0.03	sq.m	$0.03	$0.03	sq.m
PEDESTRIAN CLEARWAY ZONE	Hardscape Concrete	Concrete Repairs *including 10% landscape restoration	Public Works	$0.11	sq.m	$0.11	$0.25	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Granular Base	Public Works	$7.00	sq.m	$7.00	$7.00	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Concrete Base	Public Works	$15.00	sq.m	$15.00	$15.00	sq.m
	Snow	Snow Plowing	Parks and Forestry	$0.82	sq.m	$0.82	$1.00	sq.m
FRONTAGE ZONE	Hardscape Concrete	Concrete Repairs *including 10% landscape restoration	Public Works	$0.11	sq.m	$0.11	$0.25	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Granular Base	Public Works	$7.00	sq.m	$7.00	$7.00	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Concrete Base	Public Works	$15.00	sq.m	$15.00	$15.00	sq.m
	Softscape	Planting Watering	Parks and Forestry	$12.50	sq.m	$12.50	$12.50	sq.m
		Planting Bed Mtce (debris cleanup, mulching etc.)	Parks and Forestry	$0.16	sq.m	$0.16	$10.00	sq.m
		Lawn Mowing	Parks and Forestry	$0.03	sq.m	$0.03	$0.05	sq.m
MEDIAN ZONE	Median Hardscape	Litter Removal	Public Works	$1.00	sq.m	$1.00	$1.00	sq.m
	Median Softscape	Planter Watering / Maintenance	Parks and Forestry	$12.50	sq.m	$12.50	$12.50	sq.m
		Ground Cover Trash Removal / Maintenance	Parks and Forestry	$10.00	sq.m	$10.00	$10.00	sq.m
	Street Trees	Pruning ($500 / yr on 6 yr cycle)	Parks and Forestry	$85.00	ea.	$85.00	$85.00	ea.
		Watering	Parks and Forestry	$80.00	ea.	$80.00	$80.00	ea.
		Mulching and Fertilization ($15 / 3 yr)	Parks and Forestry	$5.00	ea.	$5.00	$5.00	ea.
		Basic Root Pruning ($30/35 yr lifecycle)	Parks and Forestry	$0.86	ea.	$0.86	$0.86	ea.
		Basic Urban Root Pruning ($30/35 yr lifecycle)	Parks and Forestry	$3.00	ea.	$3.00	$3.00	ea.
		Basic Tree Removal/Stumping ($550 at end of 35 yr life)	Parks and Forestry	$15.71	ea.	$15.71	$15.71	ea.
		Tree Removal/Stumping ($250 at end of 10 yr life)	Parks and Forestry	$25.00	ea.	$25.00	$25.00	ea.
		Infiltration / Irrigation / Flushing	Parks and Forestry	$2.50	ea.	$2.50	$2.50	ea.
ILLUMINATION ELEMENTS	Typical Lighting	Street Lighting	Public Works	$36.00	ea.	$36.00	$36.00	ea.
		Pedestrian Lighting	Public Works	$36.00	ea.	$36.00	$36.00	ea.
		Street / Pedestrian Combo	Public Works	$36.00	ea.	$36.00	$36.00	ea.
	Specialty Lighting	Bollard Lighting	Public Works	$36.00	ea.	$36.00	$36.00	ea.
		Paving Lighting	Public Works	$36.00	ea.	$36.00	$36.00	ea.
		Accent Lighting	Public Works	$36.00	ea.	$36.00	$36.00	ea.
		Seat-Wall Lighting	Public Works	$36.00	ea.	$36.00	$36.00	ea.
		Up Lighting	Public Works	$36.00	ea.	$36.00	$36.00	ea.
		Wall Wash Lighting	Public Works	$36.00	ea.	$36.00	$36.00	ea.
INNOVATION	Bioretention			$21.50	sq.m	$21.50	$22.00	sq.m
	Rain Garden			$23.50	sq.m	$23.50	$24.00	sq.m
	Vegetated Swale			$0.60	sq.m	$0.60	$1.00	sq.m
	Box Planter			$21.50	sq.m	$21.50	$22.00	sq.m
	Cistern			$125.00	ea.	$125.00	$125.00	ea.
INTERSECTION ZONE (Pedestrian Corner Treatements)	Hardscape Concrete	Concrete Repairs *including 10% landscape restoration	Public Works	$0.11	sq.m	$0.11	$0.25	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Granular Base	Public Works	$7.00	sq.m	$7.00	$7.00	sq.m
	Hardscape Unit Paving	Unit Paver Repairs *including 10% landscape restoration Concrete Base	Public Works	$15.00	sq.m	$15.00	$15.00	sq.m
	Snow	Snow Plowing	Parks and Forestry	$0.82	sq.m	$0.82	$1.00	sq.m
		Snow Removal	Public Works	$20.00	sq.m	$20.00	$20.00	sq.m