



Hamilton

City of Hamilton

ROUNABOUT LANDSCAPE DESIGN GUIDELINE

May 2026

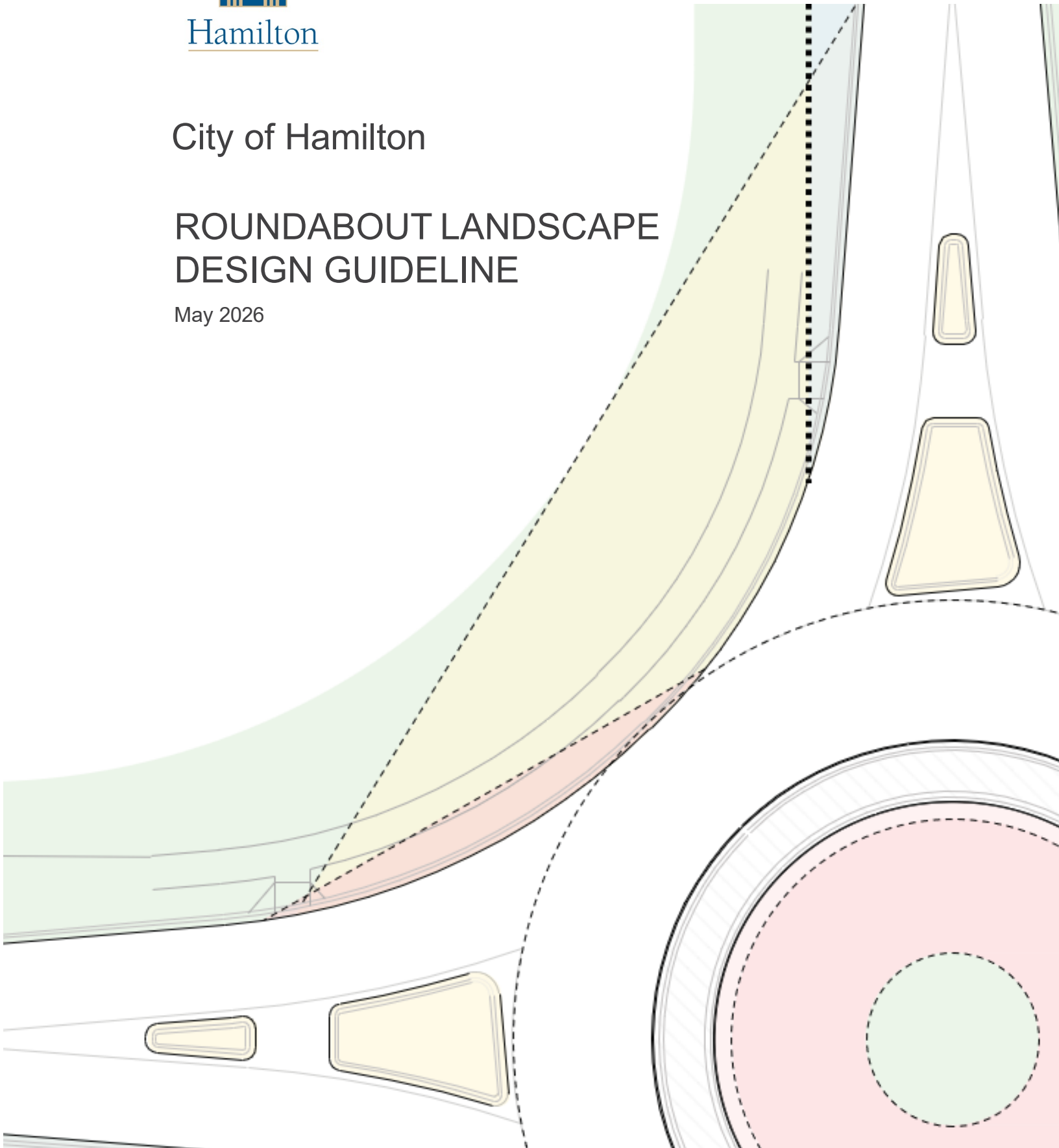


Table of Contents

1.	Introduction	3
1.1	Definitions.....	3
1.2	Background	5
1.2.1	Roundabout Operation and Safety.....	5
1.2.2	Landscape Contribution to Roundabout Operation and Safety	5
1.3	Relevant Design Guidance and Practices	6
2.	Planting Zone and Vertical Growth Envelope.....	6
2.1	Control Zones (CZ).....	8
2.1.1	Control Zone A — Circulatory Road Sight Lines (CZA).....	8
2.1.2	Control Zone B - Entry Sight Lines (CZB)	10
2.1.3	Control Zone C – Approach Sight Lines (CZC).....	11
2.2	Enhancement Zones (EZ).....	12
3.	Vertical Growth Envelope, Plant Selection & Design Considerations.....	13
3.1	Vertical Growth Envelope	13
3.2	Plant Selection.....	14
3.3	Design Considerations.....	17
3.3.1	Central Island.....	17
3.3.2	Splitter Island	19
3.3.3	Approach.....	20
3.3.4	Perimeter	20
4.	Development Approval Process	21
4.1	Submission Process	24
4.2	Construction Review and Asset handover	25
	Appendix A: Recommended Planting List.....	27
	Appendix B: Control Zone C — Approach Sight Lines.....	31

List of Figures

Figure 1 – Planting Zone Components	8
Figure 2 – Control Zone A (CZA) and corresponding Sight Lines.....	9
Figure 3 – Control Zone B and corresponding Sight Lines	11
Figure 4 – Enhancement Zones.....	13
Figure 5 – Vertical Growth Envelope for Control Zones A and B	14
Figure 6 – Consolidated Planting Zone Plan.....	16
Figure 7 – Sample Central Island Landscape Treatment for Roundabout with Central Islands larger than 12 m in Diameter.....	22
Figure 8 – Sample Central Island Landscape Treatment for Roundabout with Central Islands smaller than 12m in Diameter	23
Figure 9 – Development Approval Process Diagram	24
Figure 10 – Control Zone C - Approach Sight Lines	32
Figure 11 – Modified Vertical Growth Envelope for Control Zone C.....	34

List of Tables

Table 1 - Vegetation Selection Matrix	15
Table 2 - Planting List for the Control Zones (Low Planting Area), Maximum Height 60cm Measured from Top of Road	27
Table 3 - Planting List for the Enhancement Area	28
Table 4 - Stopping Sight Distance for Various Design Speeds	33
Table 5 - Tree Spacing in Control Zone C (CZC) for Small Trees.....	35
Table 6 - Tree Spacing in Control Zone C (CZC) for Medium Trees.....	36
Table 7 - Tree Spacing in Control Zone C (CZC) for Large Trees	36

1. Introduction

This guide is intended to help both the City of Hamilton, and proponents working within its jurisdiction, plan and design appropriate landscape treatments for roundabouts. The guide outlines the process for establishing “Planting Zones” and corresponding “Vertical Growth Envelopes” within the context of ensuring the safe and functional operations at a roundabout. It also outlines specific design considerations for each landscape application.

There are numerous elements to consider when designing roundabouts. While geometry, lighting, and signage represent core design elements, landscape is a key secondary element that can enhance the effectiveness of overall roundabout design and function.

1.1 Definitions

Roundabout Approach: The roadway segment leading up to a roundabout, which may include Control Zone C (see description below) and is subject to Sight Line and Stopping Sight Distance requirements.

Central Island: The raised area in the centre of a roundabout around which traffic circulates. It is a key geometric element that helps deflect vehicle paths which in turn can reduce vehicle speeds.

Circulatory Road: The one-way roadway within the roundabout that vehicles use to travel counterclockwise around the Central Island.

Control Zones (CZ): Designated areas within the roundabout where landscape treatments are restricted to maintain visibility and safety. This includes:

- **Control Zone A (CZA): Circulatory Road Sight Lines** — Areas within the Central Island and adjacent corners where visibility between entering and circulating vehicles must be maintained.
- **Control Zone B (CZB): Entry Sight Lines** — Areas adjacent to the roundabout including corners and Splitter Islands, ensuring visibility between entering vehicles.
- **Control Zone C (CZC): Approach Sight Lines** — Planting areas within the approach lanes of the roundabout, defined by Stopping Sight Distance and Sight Line criteria.

Enhancement Zone: Landscape areas at the periphery of the street cross-section where more flexible design elements such as trees and Public Art may be

placed to enhance aesthetics and identity provided they do not impact Sight Lines.

Inscribed Circle Diameter (ICD): The diameter of the largest circle that can be accommodated within the outer boundary of the Circulatory Road. The ICD is measured from the outer curb line (or the edge of the pavement) on one side, straight through the center of the island, to the outer curb line on the opposite side.

Intersection Sight Distance (ISD): The distance needed for a driver to see and react to approaching traffic at an intersection, ensuring safe maneuvering—such as turning left, turning right, or crossing the road entirely.

Planting Zones: Designated areas within and around the roundabout for landscape treatments, including Control Zones and Enhancement Zones.

Public Art: Fixed artistic elements placed within the Enhancement Zone of the Central Island, subject to municipal review and safety guidelines.

Sight Lines: Unobstructed line of sight between a driver and a specific point on the road, such as an intersection, pedestrian crossing, or approaching vehicles. It's crucial for ensuring safety and visibility, especially at curves, intersections, and roundabouts.

Splitter Island: A raised or painted area on the approach to a roundabout that separates entering and exiting traffic, slows vehicles, and provides pedestrian refuge.

Stopping Sight Distance (SSD): The minimum distance a driver needs to see ahead on the road to safely stop their vehicle without colliding with an object or hazard.

Truck Apron: A mountable and typically raised portion of the Central Island designed to accommodate the rear wheels of large vehicles travelling through a roundabout.

Vertical Growth Envelope: A defined vertical space that must be kept clear of sight obstructions, such as plant material, typically between 0.6 m and 2.7 m above the road surface.

Yield Line: A white pavement marking at the entry point of a roundabout indicating where vehicles must yield to circulating traffic before entering the roundabout Circulatory Road.

1.2 Background

Pertaining to intersection design types, roundabouts can offer road safety benefits that differ from signalized or stop-controlled configurations and may be more optimal for specific road segments. Landscape treatments at roundabouts can serve to enhance these safety benefits as well help to achieve other City objectives related to improving the public realm, including urban design considerations, aesthetics, heat island reduction, stormwater absorption, and creating environments more attractive and comfortable for more vulnerable road users, walking, and cycling.

1.2.1 Roundabout Operation and Safety

Roundabout operational and safety philosophy relies on two key considerations:

1. Establishing **lower vehicle entry speeds** into the roundabout. This is primarily achieved through its geometric design. However, slower vehicle entry speeds cannot always be achieved due to competing design requirements and the specific dimensions of geometric features (e.g. curb placement, Circulatory Road diameter, and curb radius).
2. Provision of an **appropriate level of visibility** for the road users. This allows road users enough time to perceive and adjust their behaviour to navigate the intersection safely. It is however worth noting that more isn't always better. When too much visibility is provided it may result in higher travel speeds, which may counter the effectiveness and safety performance of roundabouts.¹

1.2.2 Landscape Contribution to Roundabout Operation and Safety

Landscape treatments can contribute to improved roundabout operation and safety performance through the following:

1. **Traffic Calming and Speed Management:** Vertical elements (e.g. signage, trees and landscaping, Public Art) that are placed in proximity to

¹ NCHRP Report 672 states "International evidence suggests that it is advantageous to provide no more than the minimum required Intersection Sight Distance on each approach. Excessive Intersection Sight Distance can lead to higher vehicle speeds that reduce the safety of the intersection for all road users (motorists, bicyclists, pedestrians). Landscaping within the Central Island can be effective in restricting Sight Distance to the minimum requirements while creating a terminal vista on the approach to improve visibility of the Central Island."

general-purpose traffic lanes can serve to create a sense of risk that can influence motorists to travel at lower speeds both upon approach and while traveling through roundabouts. This includes both the risk of colliding with the vertical element(s) as well as the potential risk associated with colliding with road users who may be obstructed from view by the vertical element(s).

2. **Increasing Conspicuity of Roundabout:** The introduction of landscape treatments in and within the vicinity of roundabouts can help highlight the presence of the roundabout to approaching road users. Elevating awareness of the roundabout and the provision of visual cues can aid in adjusting the road user's behavior accordingly.

1.3 Relevant Design Guidance and Practices

The Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017) and the companion Canadian Roundabout Design Guide (2016) provide information and guidance for designing roundabouts in Canada. Aligned with modern road design best practices, these documents are relevant in considering the application of landscape treatments within roundabouts.

The establishment of “Planting Zones” and “Vertical Growth Envelopes” for landscape treatments in this document are guided by Stopping Sight Distance (SSD) and road user Sight Line considerations — both of which are determined through methodologies established in the noted TAC documents.

2. Planting Zone and Vertical Growth Envelope

The Planting Zone includes the areas in a roundabout and within its vicinity where landscape treatments can be implemented. A roundabout's Planting Zone consists of the following components:

1. **Control Zones** – Areas where landscape treatments are bound by specific restrictions to help ensure safe and functional operations of a roundabout.
2. **Enhancement Zones** – Areas where landscape treatments can be less restricted and are located outside of the intersection Sight Lines.

Figure 1 illustrates these two components of the Planting Zone, while the following sub-sections expand on their context and outline the steps for establishing these zones.

Additionally, this section includes design guidance related to Vertical Growth Envelopes, which define planting height restrictions and landscape design considerations.

In summary, it provides a framework for setting Planting Zone parameters and guide the selection of appropriate landscape treatments for the overall roundabout landscape design.

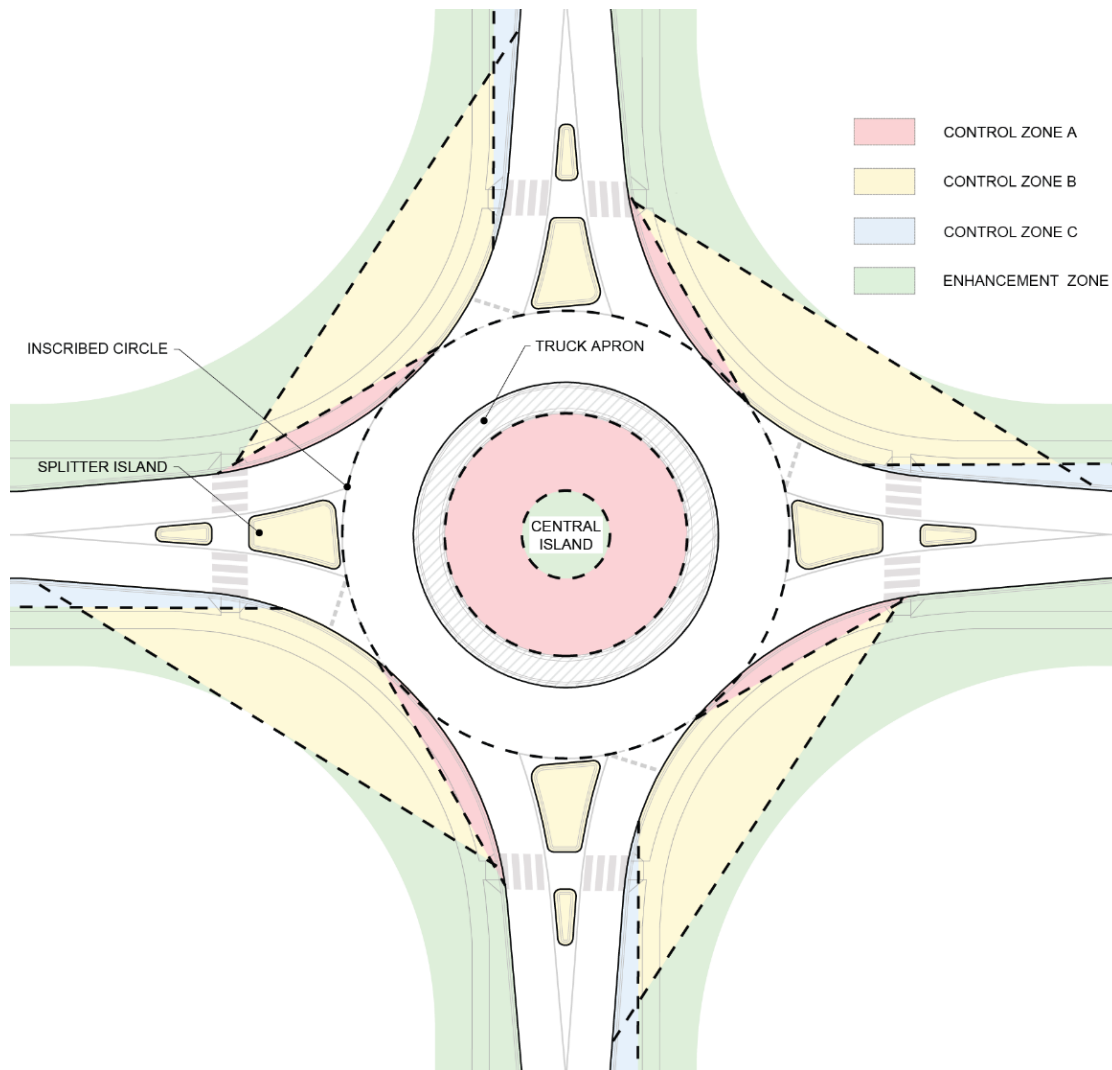


Figure 1 – Planting Zone Components

2.1 Control Zones (CZ)

Control Zones (CZ) for roundabouts, as illustrated in Figure 1, include the following spaces which are described further in the sub-sections below:

- Control Zone A - Circulatory Road (CZA)
- Control Zone B - Corners and Splitter Island (CZB)
- Control Zone C - Approach Boulevards (CZC)

2.1.1 Control Zone A — Circulatory Road Sight Lines (CZA)

CZA is illustrated in Figure 2 and consists of spaces within the Central Island (CZA1) and corners adjacent to the roundabout where visibility of crossings needs to be maintained at all times – including crossings of pedestrians and/or cyclists (CZA2).

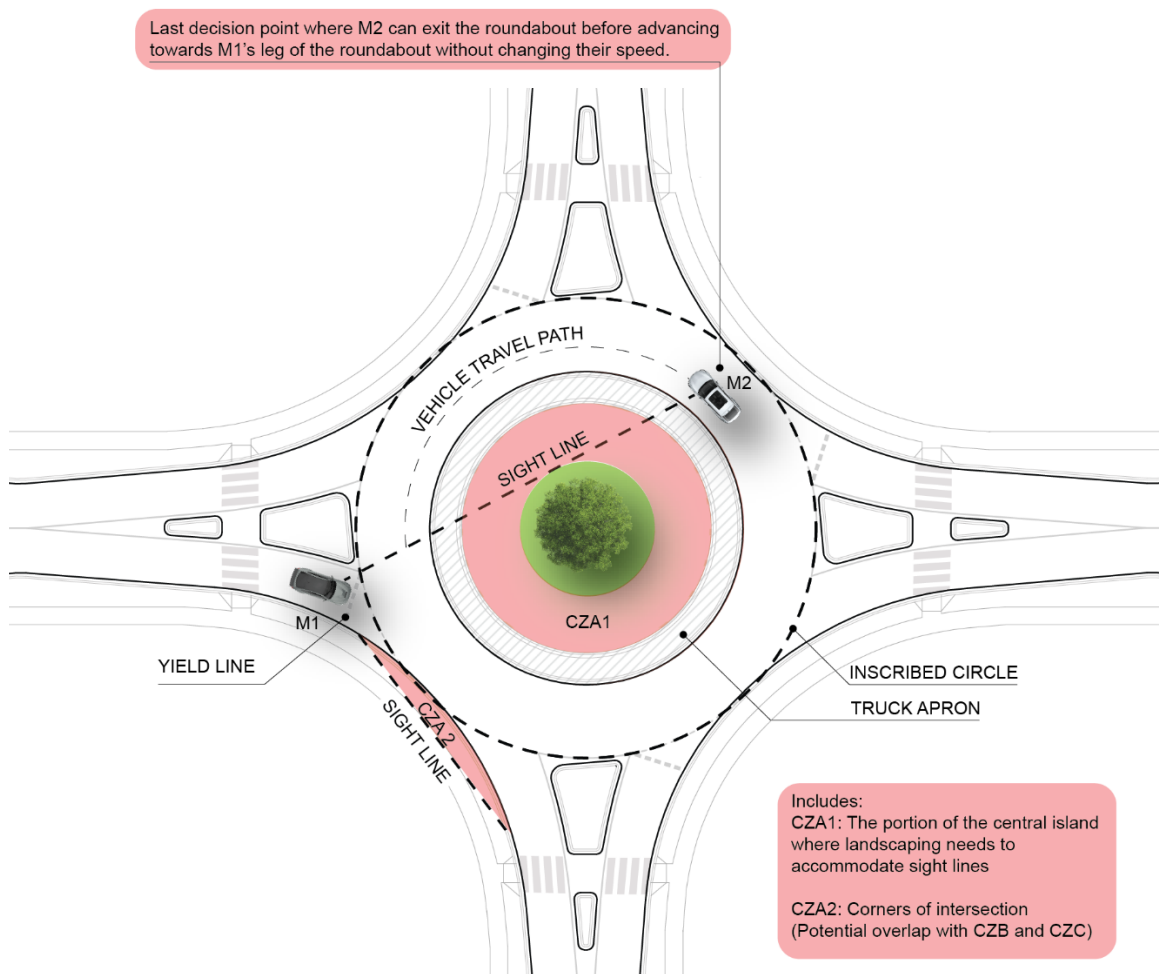


Figure 2 – Control Zone A (CZA) and corresponding Sight Lines

2.1.1.1 Control Zone A1 - Space within the Central Island (CZA1)

The landscape design and treatment within the Central Island needs to provide appropriate Sight Lines to allow approaching traffic and circulating traffic within the roundabout to safely negotiate through the roundabout.²

² Intersection Sight Distance (ISD) and Stopping Sight Distance (SSD) are the main considerations in relation to Sight Line establishment at roundabouts. ISD is typically established by assuming a 15m approach distance (front of approach vehicles to Yield Lines) where motorists are assumed to make their decision whether to proceed into the roundabout or yield, as outlined in Section 6.7.3.2 of Roundabouts: An Informational Guide. The process described in that guide to establish Sight Lines, while sensible, were determined to be impractical to apply in an accurate and efficient manner by field crews responsible for landscape maintenance activities. For practical reasons, a proxy approach using SSD was used for circulating traffic which considers

- **Approaching Traffic (M1)** – Motorists entering a roundabout need to enter only when a sufficient gap in traffic is present within the Circulatory Road.
- **Circulating Traffic (M2)** – Motorists within the Circulatory Road need to see approaching traffic with sufficient advance time to be able to stop should entries occur prematurely.

Determining CZA1 is intended to establish a key landscaping envelope line to help ensure that M1 and M2 Sight Lines are maintained. The Sight Line can be used to determine the inside edge of CZA1. The outside edge of CZA1 would be the perimeter curb of the Central Island.

2.1.1.2 Control Zone A2 - Space within the Intersection Corners (CZA2)

M1 motorists need to see crossing activity on subsequent legs of the intersection. A Sight Line between the front of the entering vehicle and the nearest corner of the crossing needs to be maintained (see Figure 2).

2.1.2 Control Zone B - Entry Sight Lines (CZB)

Control Zone B (CZB) is illustrated in Figure 3 and consists of spaces adjacent to the roundabout within the corners (CZB1) and Splitter Islands (CZB2). Specifically, the zone includes spaces that fall behind curb lines and within reciprocal Sight Lines between entering motorists from the nearest approaches³.

the distance needed for the circulating vehicle (M2) to stop at the point where they can no longer exit the roundabout before a potential conflict with entering vehicle (M1). As such, identifying the critical points in the field (i.e. the centre of the approach yield-line and the opposite corner of the roundabout) becomes manageable and without the requirement for specialized equipment. Furthermore, the results generally present more conservative Sight Lines than under an approach using the ISD method. [NOTE: It is possible that there are scenarios where Sight Lines established through both the ISD and SSD methods should be compared – such as roundabouts where entry speeds are very high and the two conflicting approaches are in closer proximity than typical.]

³ This Sight Line construction is based on Intersection Sight Distance (ISD) methodology, as outlined in Section 6.7.3.2 of Roundabouts: An Informational Guide.

Vehicles are generally considered “entering” the roundabout within 15 metres of the edge of the Inscribed Circle Diameter (ICD).⁴

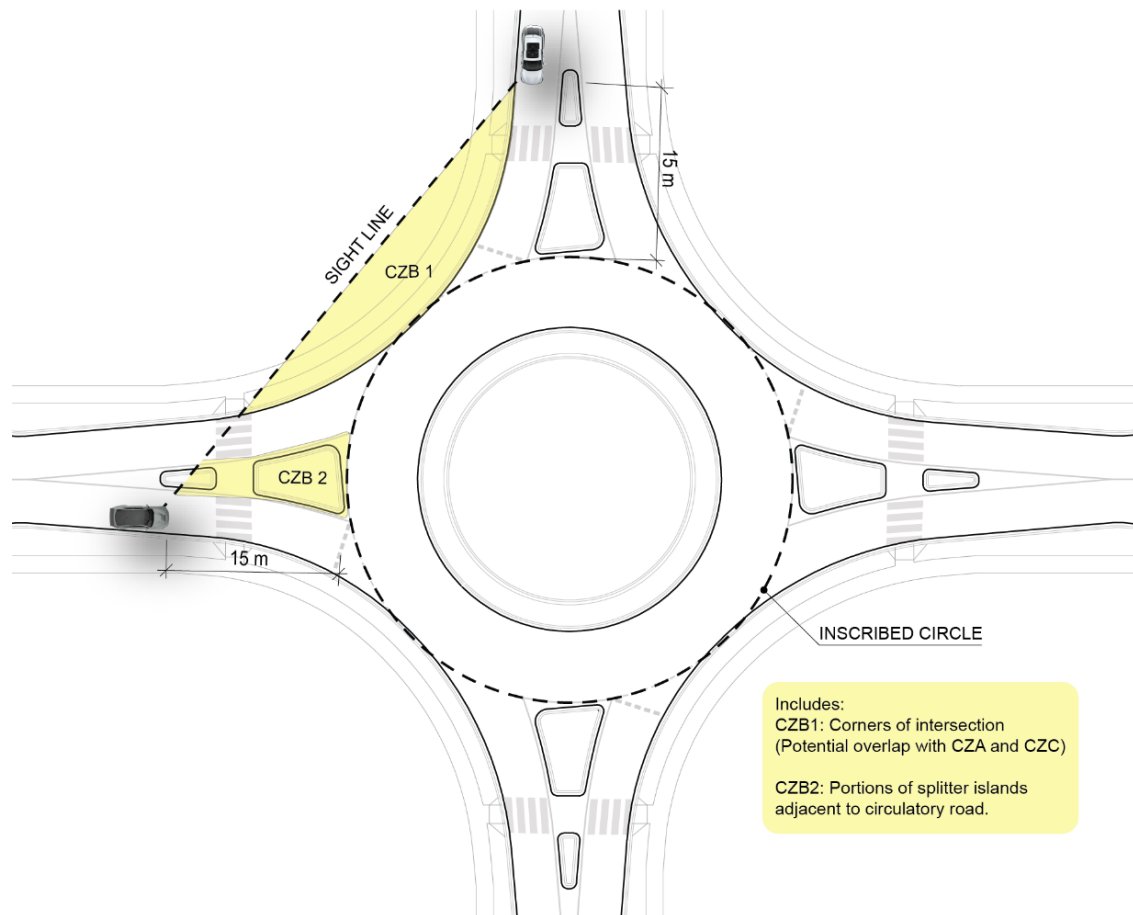


Figure 3 – Control Zone B and corresponding Sight Lines

2.1.3 Control Zone C – Approach Sight Lines (CZC)

CZC defines the planting areas located within the approach lanes of the roundabout, which are not always included in the roundabout’s landscape design package. Details regarding CZC and its associated Vertical Growth Envelope

⁴ At 15m distance from the Yield Line of a typical roundabout, the geometric design of the Splitter Island in combination with other design features of the roundabout serve to manage driver approach and entry speeds to a level low enough that allows motorists to perceive and react to activity within and in the vicinity of the roundabout. However, in situations where roundabouts have been designed with Splitter Island deflection angles that allow for high entry speeds, the practitioner may choose to use a greater value than 15m – using engineering judgement that considers Intersection Sight Distance (ISD) and Stopping Sight Distance (SSD).

criteria are provided in Appendix B and should be referenced when preparing boulevard and road design packages approaching the roundabout.

2.2 Enhancement Zones (EZ)

The Enhancement Zones (EZ) of a roundabout are not influenced by road user Sight Lines, as is the case with the Control Zones (discussed in Section 2.1). Nonetheless, these landscape areas contribute meaningfully to the overall design intent of the roundabout. EZs can be strategically designed to enhance both functionality and safety by providing visual cues—such as a break in the road alignment—that can help users identify the roundabout from a distance in all seasons. This supports improved wayfinding, seasonal visibility, and traffic calming, while also offering opportunities for aesthetic and ecological enhancement. For more details about the design intent of landscaping located within the Enhancement Zone, refer to Section 3.3 Design Considerations.

Enhancement Zones include the following and as shown in Figure 4:

- Central Island Enhancement Zone (EZO)
- Perimeter Enhancement Zone (EZP)

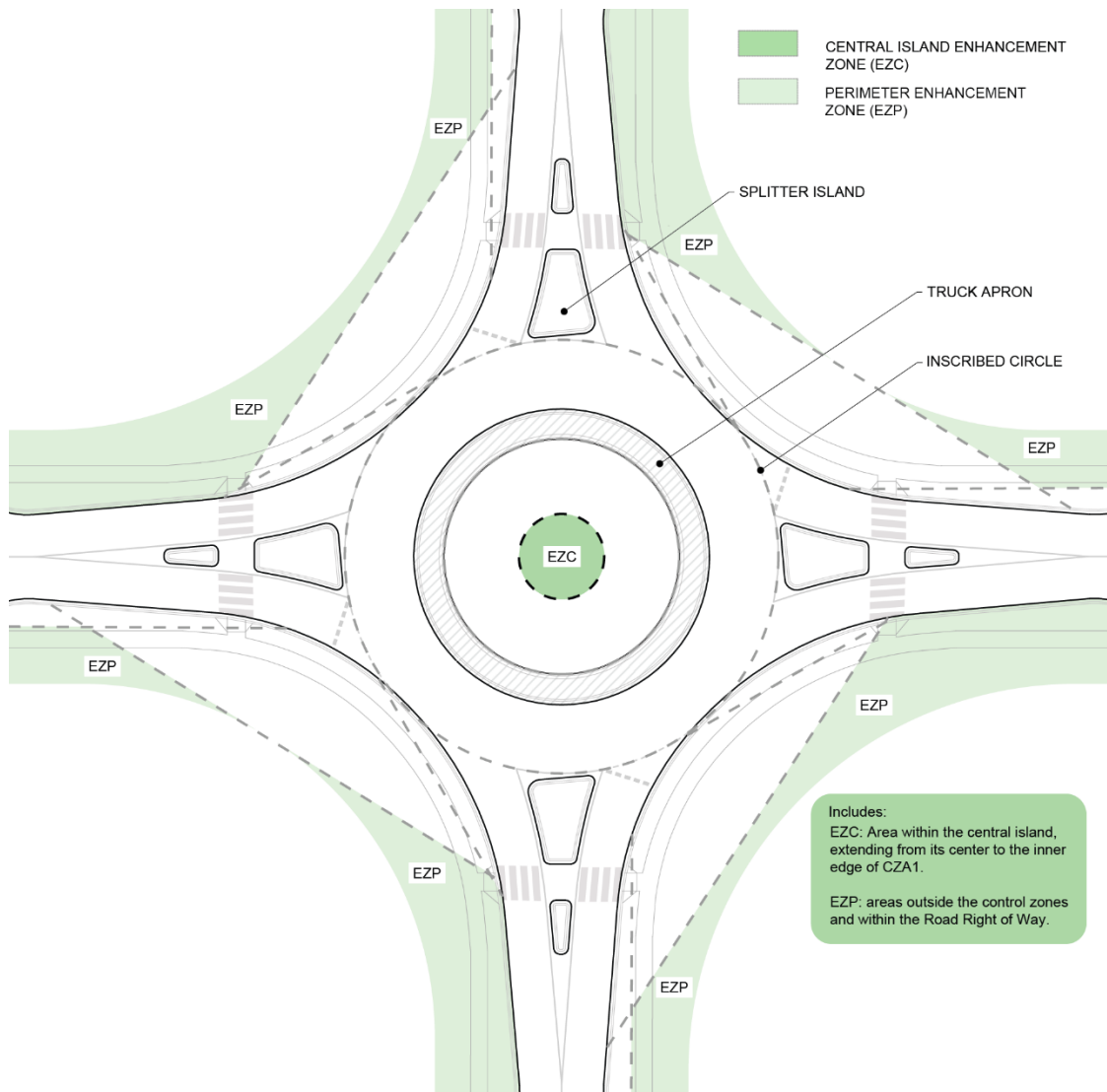


Figure 4 – Enhancement Zones

3. Vertical Growth Envelope, Plant Selection & Design Considerations

As outlined in Section 2, maintaining clear Sight Lines within and around roundabouts is essential for safety and operational efficiency. These visibility requirements directly influence the selection and placement of landscape elements within designated Planting Zones.

3.1 Vertical Growth Envelope

Within roundabout Control Zones (CZ), Sight Lines and Stopping Sight Distances must be maintained year-round. These areas must remain free of obstructions and fixed objects, except for traffic signs. Landscaping and plant materials within

these zones must maintain a clear vertical space between 0.6 m and 2.7 m⁵ above the Circulatory Road surface, ensuring that motorists have unobstructed visibility through the Control Zone.

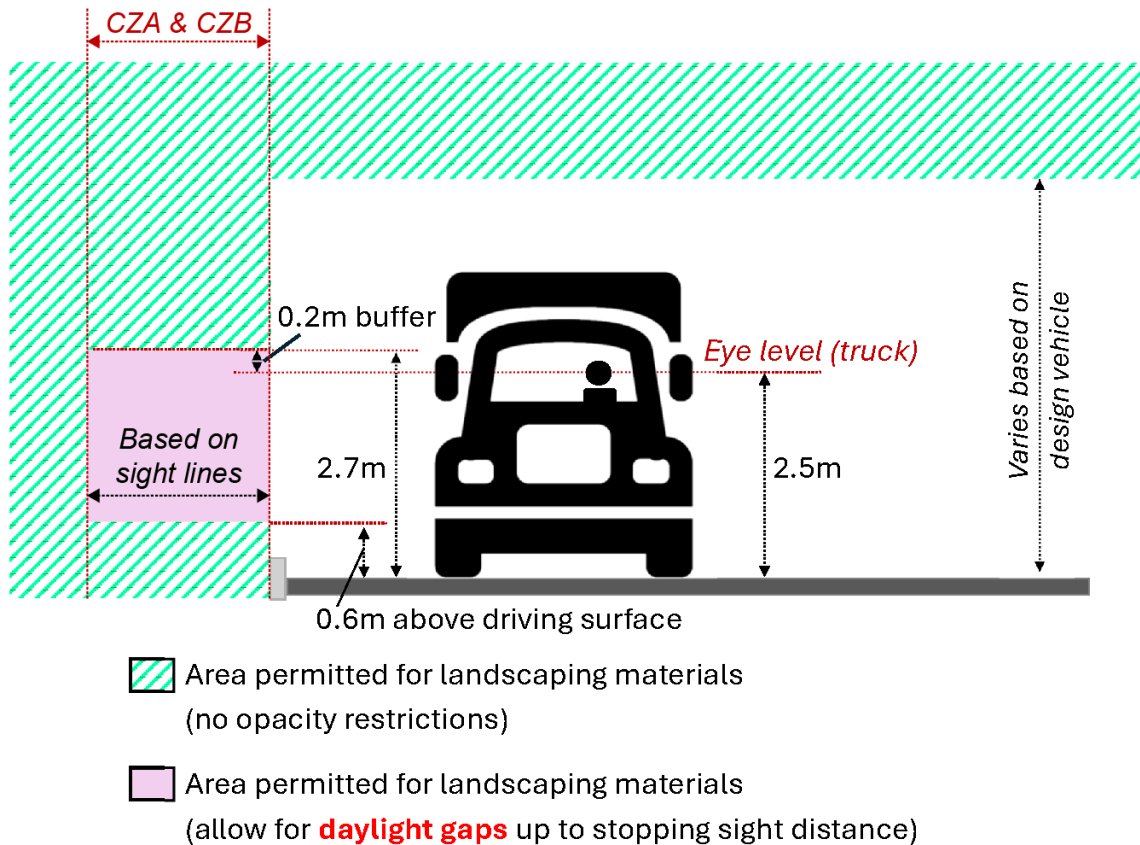


Figure 5 – Vertical Growth Envelope for Control Zones A and B

3.2 Plant Selection

Table 1 provides guidance for selecting plant material within designated Planting Zones to ensure compliance with the Vertical Growth Envelope and to maintain the necessary road safety conditions. Figure 6 provides an overall visual of all Planting Zones.

⁵ This upper limit of 2.7-metres is based on the height of a driver's eye level when driving a transport truck. However, this upper limit can be reduced, based on engineering judgement in consideration of the roundabout design vehicle selection and a minimum 2.3-meter driver eye height, per MTO standards.

Table 1 - Vegetation Selection Matrix

Planting Zone/Planting Material	Turf	Groundcover	Shrubs & Ornamental Grasses	Trees
CZA1	Not Permitted*	Permitted	Vertical Growth Envelope**	Not Permitted
CZA2	Permitted	Permitted	Vertical Growth Envelope**	Not Permitted
CZB1	Permitted	Permitted	Vertical Growth Envelope**	Not Permitted
CZB2	Not Permitted	Permitted	Vertical Growth Envelope**	Not Permitted
CZC	Permitted	Permitted	Vertical Growth Envelope**	Permitted***
EZC	Permitted	Permitted	Permitted	Permitted****
EZP	Permitted	Permitted	Permitted	Permitted

*Turf may be permitted within Control Zone A1 (CZA1), but only when adjacent Enhancement Zone (EZC) is also designated as turf. This exception ensures consistency in maintenance regimes. Mixed planting of turf and shrubs/ornamental plant material within the central roundabout is discouraged due to differing maintenance cycles.

**Plant selection and height restriction to meet Vertical Growth Envelope requirements.

*** Tree planting within Control Zone C shall conform to the criteria outlined in Appendix B.

**** Deciduous trees are preferred in roundabouts with a central landscape island smaller than 12 meter in diameter to maintain visibility and support perceived safety. Coniferous trees may be used in roundabouts with Central Islands 12 meter in diameter or greater along major road corridors where their scale is appropriate. Even within acceptable height zones, conifers are generally discouraged in roundabouts with Central Islands smaller than 12 meters due to their dense form.

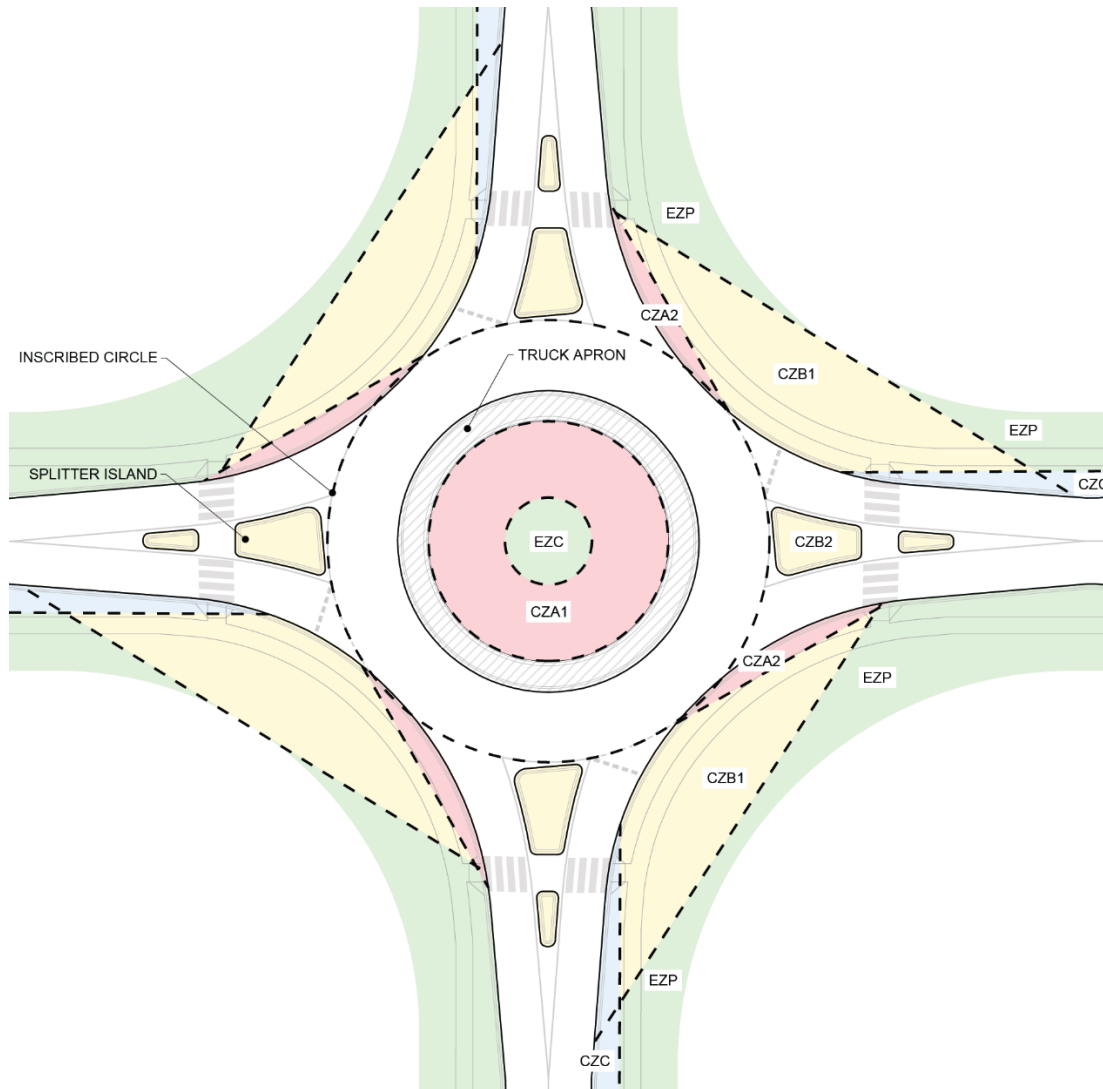


Figure 6 – Consolidated Planting Zone Plan

In addition to considering road safety, planting designs must also account for a variety of practical and environmental factors. Plant selection should consider potential impacts on nearby utilities—both above and below ground—as well as long-term maintenance needs and compatibility with surrounding infrastructure.

Key considerations include root spread, trunk diameter, canopy height, species suitability, soil conditions, drought tolerance, resistance to road salt, exposure to snow accumulation, and heat from adjacent pavement surfaces. These aspects are not covered in detail within this guideline; users should consult with the City and local best practices for further information.

To enhance the visual quality of roundabouts, designers are encouraged to use a mix of soft landscape materials. Variation in texture, color, and form can help

create a cohesive and engaging environment. Seasonal changes and considerations can offer opportunities to introduce visual interest throughout the year and can help ensure that the roundabout is visible to road users year-round. For example, the use of evergreens within the EZC will ensure the visibility of the roundabout is maintained, regardless of the season.

Plants with lighter foliage or bark can improve visibility and help define the roundabout's form at different times of day. Mass plantings, whether arranged in geometric patterns or naturalistic drifts are the most effective for visual impact. Mass plantings with minimal gaps between plant material also help to reduce weed growth and maintenance requirements.

3.3 Design Considerations

In addition to considerations related to the Vertical Growth Envelope and plant material heights, the following provides additional design guidance for landscaping within and around roundabouts.

3.3.1 Central Island

The primary function of the Central Island landscape is to alert drivers to the change in roadway geometry and guide them safely through the roundabout. The Central Island is divided into two zones: the Control Zone (CZA1) and the Enhancement Zone (EZC).

Landscaping and plant material within CZA1 must comply with the Vertical Growth Envelope height restrictions to maintain safe Sight Lines and accommodate vehicle recovery. In contrast, the EZC, located on the inner portion of the Central Island, may include vertical elements such as trees, plantings, Public Art, or monuments.

When selecting trees for the EZC in the Central Island, canopy spread must be considered to prevent encroachment into CZA1, or extension beyond the defined Vertical Growth Envelope. If a canopy extends into CZA1, pruning is required to maintain compliance with the Vertical Growth Envelope.

The Central Island enhances the visual appeal of the roundabout and can help reduce vehicle speeds by limiting Sight Lines to levels appropriate for the confirmed and utilized design speed.

If a mounded Central Island is desired, the slope should not exceed a 6:1 horizontal-to-vertical ratio to allow errant vehicles to recover safely. Within CZA1,

a gentler slope of 10:1 is recommended to further support vehicle recovery and safety.

Smaller roundabouts may not be able to accommodate an EZC due to Sight Line requirements, which can reduce the visual prominence of the intersection. However, this is generally acceptable on low-speed roads where the Central Island's visual impact is less critical.

Regardless of the design approach, the Central Island landscape must balance traffic function, aesthetic value, and maintenance practicality.

3.3.1.1 Art Installation and Fixed Landscape Features

The Central Island of a roundabout presents a unique opportunity to reinforce local or regional identity through thoughtful landscape design and the inclusion of fixed elements. However, the integration of such features must be carefully balanced with safety, visibility, and maintenance considerations.

- Fountains are prohibited due to the risk of driver distraction and the potential for water spray, which can be hazardous in windy or freezing conditions.
- Signage, lettering, advertising, moving parts or interactive elements that could distract drivers or encourage pedestrian access to the Central Island is not permitted.

Any proposed Public Art must follow the City of Hamilton's Art in Public Places Policy and be reviewed by the Steering Committee appointed to review Public Art proposals. The policy provides guidance to staff, artists, citizens and businesses in the planning, commissioning, and execution of Art in Public Places projects. It is critical that any proposed Public Art does not interfere with the safe operation of the roundabout.

3.3.1.2 Safety and Placement Considerations

Fixed objects—such as trees, utility poles, walls, large rocks, bollards, and Public Art—must be selected and positioned with caution, especially on roadways with higher approach speeds. These elements can pose hazards to errant vehicles if not properly located. To mitigate risk:

- Fixed objects are not permitted within the Control Zone Area, which is located immediately at the edge of the Central Island, except for essential traffic signage.
- Any fixed elements should be placed within the Enhancement Zones, where the roundabout geometry naturally deflects vehicles away from potential collision points.

- Fountains are prohibited due to the risk of driver distraction and the potential for water spray, which can be hazardous in windy or freezing conditions.
- Signage, lettering, advertising, moving parts or interactive elements that could distract drivers or encourage pedestrian access to the Central Island is not permitted.

3.3.1.3 Additional Design Considerations

- Irrigation is not required and is generally discouraged within the Central Island of roundabouts. Plant selection should prioritize drought-tolerant species that can establish and thrive without supplemental watering. Soil quality and depths must comply with the latest version of the *Design and Preservation Manual for Assets on Public Property*.
- All fixed elements must be evaluated for durability, weather resistance, and ease of maintenance.
- The design should consider seasonal visibility, ensuring that features remain identifiable and safe throughout the year.
- The overall composition of the Central Island should support the roundabout's traffic function, while contributing positively to the aesthetic experience of the roadway.

3.3.2 Splitter Island

Splitter Islands serve both functional and aesthetic purposes in roundabout design. They help channel traffic, provide pedestrian refuge, and offer opportunities for visual enhancement. Their design must prioritize safety, visibility, and low-maintenance landscaping.

3.3.2.1 Surface Treatment

Splitter Islands may be paved, planted, or a combination of both. Landscaping should only be considered where the island has a width of 2 m or less to allow for safe and practical maintenance of plant beds. When paved, the surface must be clearly distinguishable from the adjacent roadway. This can be achieved through:

- Contrasting colors to improve visibility.
- Textural differences (e.g., stamped concrete or pavers) to reinforce the separation between vehicular and pedestrian zones.

3.3.2.2 Planting

Where planting is included, it must comply with Growth Envelope requirements, particularly within Control Zone B2 (CZB2):

- Shrub and groundcover plantings must not exceed 0.6 m in height measured from the roadway surface to maintain clear Sight Lines.
- Low-maintenance, salt-tolerant, and drought-resistant species are required due to their proximity to traffic and exposure to road conditions.
- Tree planting is not permitted unless the Splitter Island is unusually large and outside of Control Zone B2.

3.3.3 Approach

Landscaping along the approach to a roundabout plays a vital role in enhancing safety and visual appeal. Well-designed landscaping can help reduce the perception of high-speed travel and visually emphasize the roundabout as a key navigational feature.

This area may partially include Control Zone C (CZC), which defines the Planting Zone within the approach lanes of the roundabout (see Appendix B). Within CZC, landscape treatments must support safe vehicle operation by maintaining appropriate Sight Lines and adhering to a modified version of the Growth Envelope, specifically tailored for CZC as outlined in Appendix B.

3.3.4 Perimeter

The remaining landscape areas surrounding the roundabout, collectively referred to as the perimeter landscape, are located within the Auxiliary Zone Perimeter (AZP). Where situated within the road right-of-way, they offer valuable opportunities to enhance the transition between the roundabout and the surrounding environment.

When thoughtfully designed, perimeter landscapes can contribute to traffic calming by visually narrowing the roadway and reinforcing the presence of the roundabout. They also help integrate the roundabout into adjacent land uses, creating a seamless visual and functional connection between transportation infrastructure and the surrounding urban or natural context.

4. Development Approval Process

The roundabout being designed and constructed through development and internal capital processes must adhere to the following submission process, along with the City of Hamilton's Development Application Guidelines.

The project Traffic Engineer must calculate the Control Zones identified in this guideline and per TAC for the proposed roundabout(s). The project Traffic Engineer must provide the Control Zones to the project Landscape Architect who is responsible for preparing the landscape plan drawings for the roundabout(s). The project Landscape Architect must clearly show and label all the Control Zones on their landscape plan drawings along with the following, at minimum:

- Top of road elevation adjacent to roundabout
- Top of curb elevation of roundabout
- Location of existing and proposed plant material
- Hard surface materials
- Soft surface materials
- A table of proposed plant material that identifies quantity, species key reference that corresponds to the plans, Latin name, common name, size, spacing, and **maximum plant height at maturity**. It is imperative that the maximum plant height is identified to ensure adherence to these guidelines
- Location of snow storage
- Location of underground and above ground utilities
- Any other proposed features within the roundabout(s)

Landscape drawings should depict the various Planting Zones along with their associated Vertical Growth Envelopes. Figure 7 and Figure 8 provide examples, illustrating both the plan view and cross-section of the proposed landscape treatment within the different zones of the roundabout's Central Island. As shown, the distinct Planting Zones are clearly identified and represented in both views to guide design intent and submission requirements.

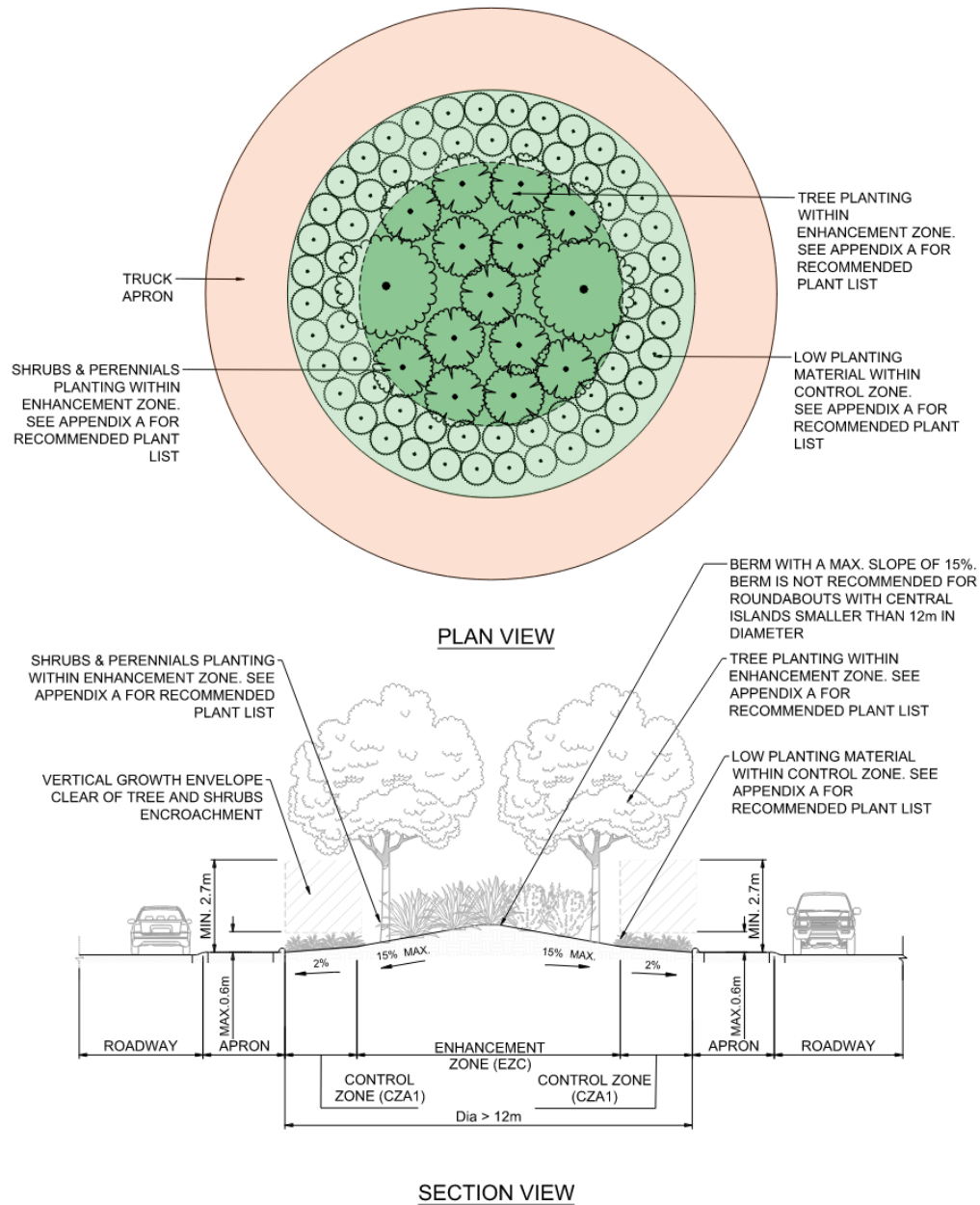
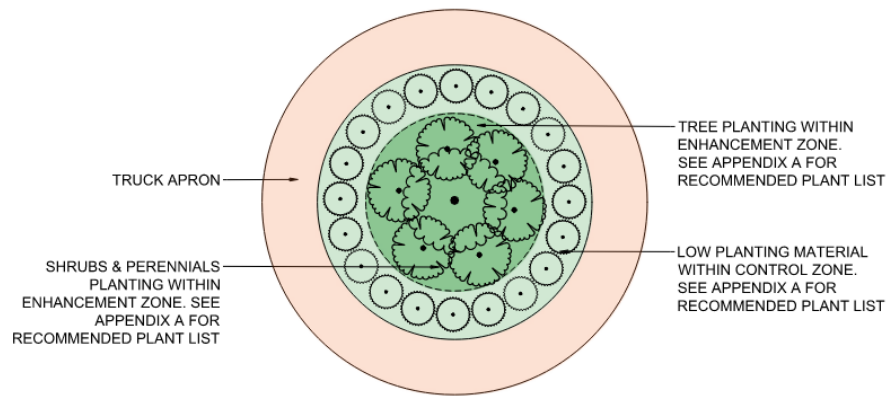
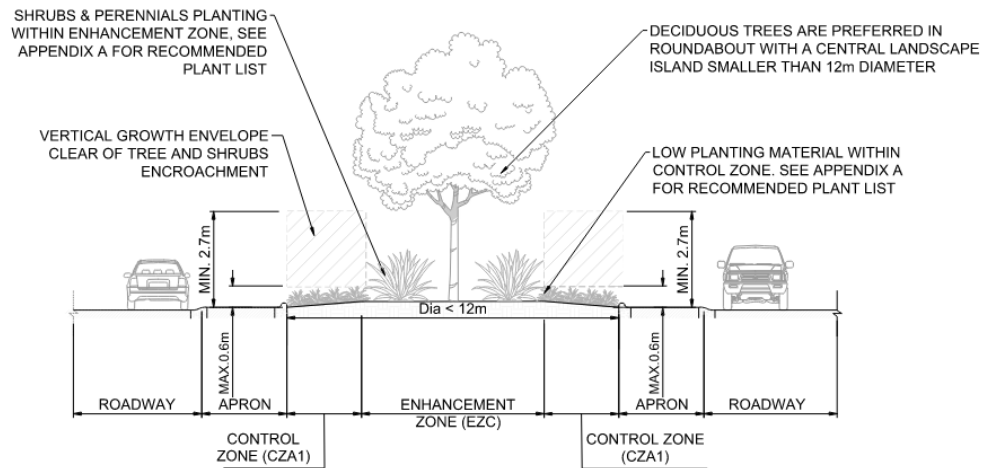


Figure 7 – Sample Central Island Landscape Treatment for roundabout with Central Islands larger than 12 m in Diameter



PLAN VIEW



SECTION VIEW

Figure 8 – Sample Central Island Landscape Treatment for roundabout with Central Islands smaller than 12m in Diameter

4.1 Submission Process

Figure 9 illustrates the development approval process and identifies the City departments responsible for reviewing submissions.

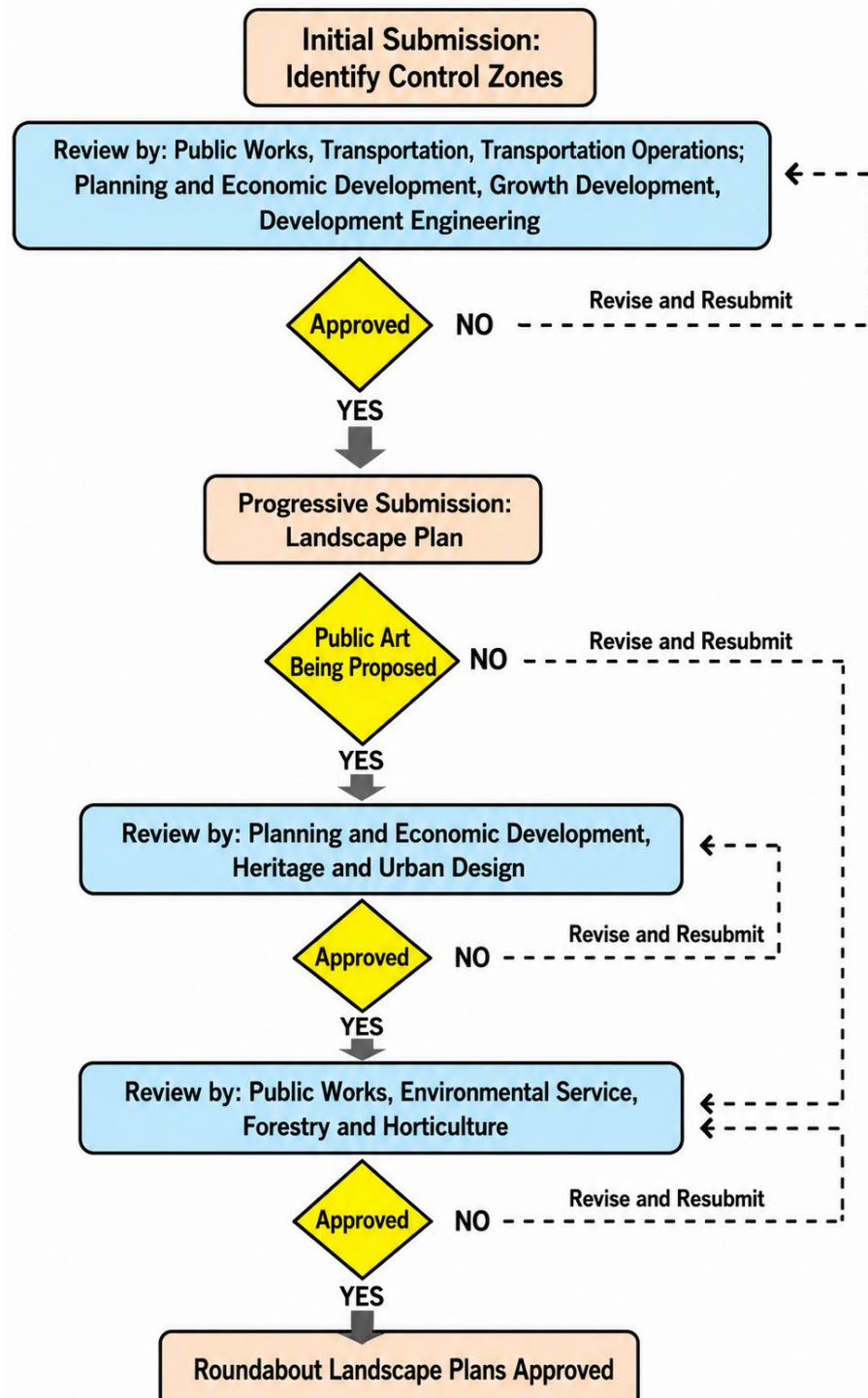


Figure 9 – Development Approval Process Diagram

4.2 Construction Review and Asset Handover

The roundabout being constructed through development and internal capital processes must adhere to the following construction review and asset handover process.

The project Landscape Architect shall ensure that the landscaping for the roundabout is constructed in accordance with the approved landscape plan drawings. Proposed changes during construction must be reviewed by the City departments identified in Figure 9.

The City's Forestry and Horticulture section needs to be notified prior to the following critical construction milestones of the roundabout:

- Subgrade preparation
- Topsoil installation and review of soil test results
- Irrigation installation, if applicable
- Planting material layout and planting

Upon completion, the City's Forestry and Horticulture section needs to complete a construction review of the built roundabout asset to identify deficiencies and ensure that the built asset is in accordance with approved drawings and meets the intent and requirements of this guideline. Deficiencies must be corrected and reviewed by the City's Forestry and Horticulture section prior to commencement of the warranty period.

During the warranty period, the owner and their contractor are responsible for watering, weeding, mulching, and replacing dead or dying plant material. The Project Manager leading the project must notify the City's Forestry and Horticulture section at the one-year mark of the warranty period to complete a review, and at the two-year mark, prior to the warranty period ending to complete a review. Deficiencies identified by the City must be rectified prior to the City's Forestry and Horticulture section assuming the roundabout planting material. After the warranty period is complete and the deficiencies have been corrected to the satisfaction of the City's Forestry and Horticulture section, the City will undertake the operational and maintenance requirements for the landscaping of the roundabout.

References:

- Geometric Design Guide for Canadian Roads (2017) - The Transportation Association of Canada (TAC)
- Canadian Roundabout Design Guide (2017) - The Transportation Association of Canada (TAC)
- Report 672 - Roundabouts: An Informational Guide, Second Edition (2010) - National Cooperative Highway Research Program (NCHRP)
- Roundabouts: A Different Type of Management Approach (2002) - Québec City, Ministère des Transports

Appendix A: Recommended Planting List

Table 2 - Planting List for the Control Zones (Low Planting Area), Maximum Height 60cm Measured from Top of Road

No.	Botanical Name	Common Name	Recommended Cultivars	Form	Height (cm)	Salt Tolerant	Drought Tolerant
1	<i>Armeria maritima</i>	Sea Thrift	-	Grass	15-30	Yes	Yes
2	<i>Festuca glauca</i>	Blue Fescue	Elijah Blue	Grass	30	Yes	Yes
3	<i>Hemerocallis spp.</i>	Daylily	Stella D'Oro, Purple D'Oro, Pardon Me, Happy Returns, Charles Johnston, Purple Passage	Perennial	30-45	Yes	Yes
4	<i>Sedum spurium</i>	Stonecrop	Dragon's Blood	Perennial	15	Yes	Yes
5	<i>Coreopsis lanceolata</i>	Lanceleaf Tickseed	Native plant, Moonbeam	Perennial	30-45	Yes	Yes
6	<i>Coreopsis grandifolia</i>	Large-flowered Tickseed	Baby Sun, Amulet, Hot Paprika, Pumpkin Pie	Perennial	18-45	Yes	Yes
7	<i>Heuchera micrantha</i>	Coral Bells	Caramel, Lime Marmelade, Palace Purple, Forever Purple	Perennial	20-45	Yes	Yes

No.	Botanical Name	Common Name	Recommended Cultivars	Form	Height (cm)	Salt Tolerant	Drought Tolerant
8	<i>Juniperus horizontalis</i>	Juniper	Bar Harbour, Blue Wonder, Pancake, Wiltonii	Evergreen Shrub	12-20	Yes	Yes
9	<i>Juniperus conferta</i>	Juniper	Blue Pacific, Emerald Sea	Evergreen Shrub	25-30	Yes	Yes

Table 3 - Planting List for the Enhancement Area

No.	Botanical Name	Common Name	Recommended Cultivars	Form	Height (cm)	Salt Tolerant	Drought Tolerant
1	<i>Aster shortii</i>	Short's Aster	-	Perennial	90	Yes	Yes
2	<i>Nepeta faassenii</i>	Catmint	Walker's Low	Perennial	50	Yes	Yes
3	<i>Perovskia atriplicifolia</i>	Russian Sage	-	Perennial	45-95	Yes	Yes
4	<i>Sedum spectabile</i>	Stonecrop	Autumn Joy	Perennial	55	Yes	Yes
5	<i>Yucca filamentosa</i>	Yucca	-	Broadleaf Evergreen	60-80	Yes	Yes
6	<i>Echinacea pallida</i>	Pale Purple Coneflower	-	Perennial	90	Yes	Yes
7	<i>Echinacea purpurea</i>	Eastern Purple Coneflower	-	Perennial	120	Yes	Yes
8	<i>Rudbeckia fulgida</i>	Black Eyed Susan	-	Perennial	60	Yes	Yes

No.	Botanical Name	Common Name	Recommended Cultivars	Form	Height (cm)	Salt Tolerant	Drought Tolerant
9	<i>Calamagrostis x acutiflora</i>	Feather Reed Grass	Karl Foerster	Grass	90-150	Yes	Yes
10	<i>Panicum virgatum</i>	Switchgrass	-	Grass	100-200	Yes	Yes
11	<i>Pennisetum alopecuroides</i>	Fountain Grass	-	Grass	40-120	Yes	Yes
12	<i>Schizachyrium scoparium</i>	Little Blue Stem	-	Grass	90-140	Yes	Yes
13	<i>Sorghastrum nutans</i>	Indian Grass	-	Grass	90-150	Yes	Yes
14	<i>Sporobolus heterolepis</i>	Prairie Dropseed	-	Grass	100	Yes	Yes
15	<i>Diervilla lonicera</i>	Bush Honeysuckle	-	Deciduous Shrub	100	-	Yes
16	<i>Hydrangea macrophylla</i>	Big Leaf Hydrangea	-	Deciduous Shrub	60-150	-	Yes
17	<i>Hydrangea paniculata</i>	Panicle Hydrangea	-	Deciduous Shrub	80-250	No	-
18	<i>Ilex verticillata</i>	Winterberry	-	Deciduous Shrub	125-250	Yes	-
19	<i>Rhus aromatica</i>	Fragrant Sumac	Gro-Low	Deciduous Shrub	70-100	Yes	Yes
20	<i>Spiraea japonica</i>	Spirea	-	Deciduous Shrub	60-100	Yes	Yes
21	<i>Physocarpus opulifolius</i>	Ninebark	-	Deciduous Shrub	90-200	-	Yes

No.	Botanical Name	Common Name	Recommended Cultivars	Form	Height (cm)	Salt Tolerant	Drought Tolerant
22	<i>Juniperus spp.</i>	Juniper	-	Evergreen Shrub	20-250	Yes	Yes
23	<i>Pinus mugo var. pumilio</i>	Dwarf Mugo Pine	-	Evergreen Shrub	90-180	Yes	Yes
24	<i>Taxus cuspidata</i>	Dwarf Japanese Yes	Nana	Evergreen Shrub	90-150	-	-
25	<i>Acer x freemanii</i>	Freeman Maple	-	Deciduous Tree	15m-20m	Yes	Yes
26	<i>Gleditsia triacanthos var. inermis</i>	Thornless Honeylocust	Skyline, Shademaster, StreetKeeper	Deciduous Tree	12m-20m	Yes	Yes
27	<i>Picea pungens</i>	Blue Spruce	Sester Dwarf	Coniferous Tree	0.6m-2m	Yes	-
28	<i>Pinus strobus</i> ***	Eastern White Pine***	-	Coniferous Tree	15m-20m	-	-
29	<i>Picea glauca</i>	White Spruce	-	Coniferous Tree	15m-30m	Yes	Yes

* Species and cultivars outside of this list must be approved by the Horticulture Design and Inventory Supervisor

** Smaller roundabouts shall be limited to once centred deciduous tree; greater numbers of trees and conifers may be used in larger roundabouts

*** White pine should be used with caution in areas where it will be somewhat sheltered from the road and salt spray

Appendix B: Control Zone C — Approach Sight Lines

Control Zone C — Approach Sight Lines

Control Zone C is illustrated in Figure 10 and is defined as the space adjacent to the approach lane nearest to the outside curb that falls between the two following lines:

- The outside (right) edge of the approach lane (general-purpose travel lane). The approaching vehicle Stopping Sight Distance (SSD) line measured from the center of the Yield Line.
- Motorists approaching roundabouts need to be able to perceive the upcoming Yield Line with enough advanced time to be able to come to a complete stop before crossing the line. This is referred to as Stopping Sight Distance (SSD). The formula used to calculate SSD is shown below while Table 4 provides SSDs for various design speeds.

$$SSD = 0.278Vt + 0.039 \frac{V^2}{a}$$

SSD = Stopping Sight Distance (m)

t = brake reaction time — use 2.5 s default or higher

V = Design speed (km/h) — use one of the following [in order or priority]:

1. 85th percentile operating speed obtained from speed survey (if available)
2. 120% of posted speed limit (e.g. posted limit = 40 km/h → use 48 km/h)

a = Deceleration rate (m/s²) — use 3.4 m/s² default or lower

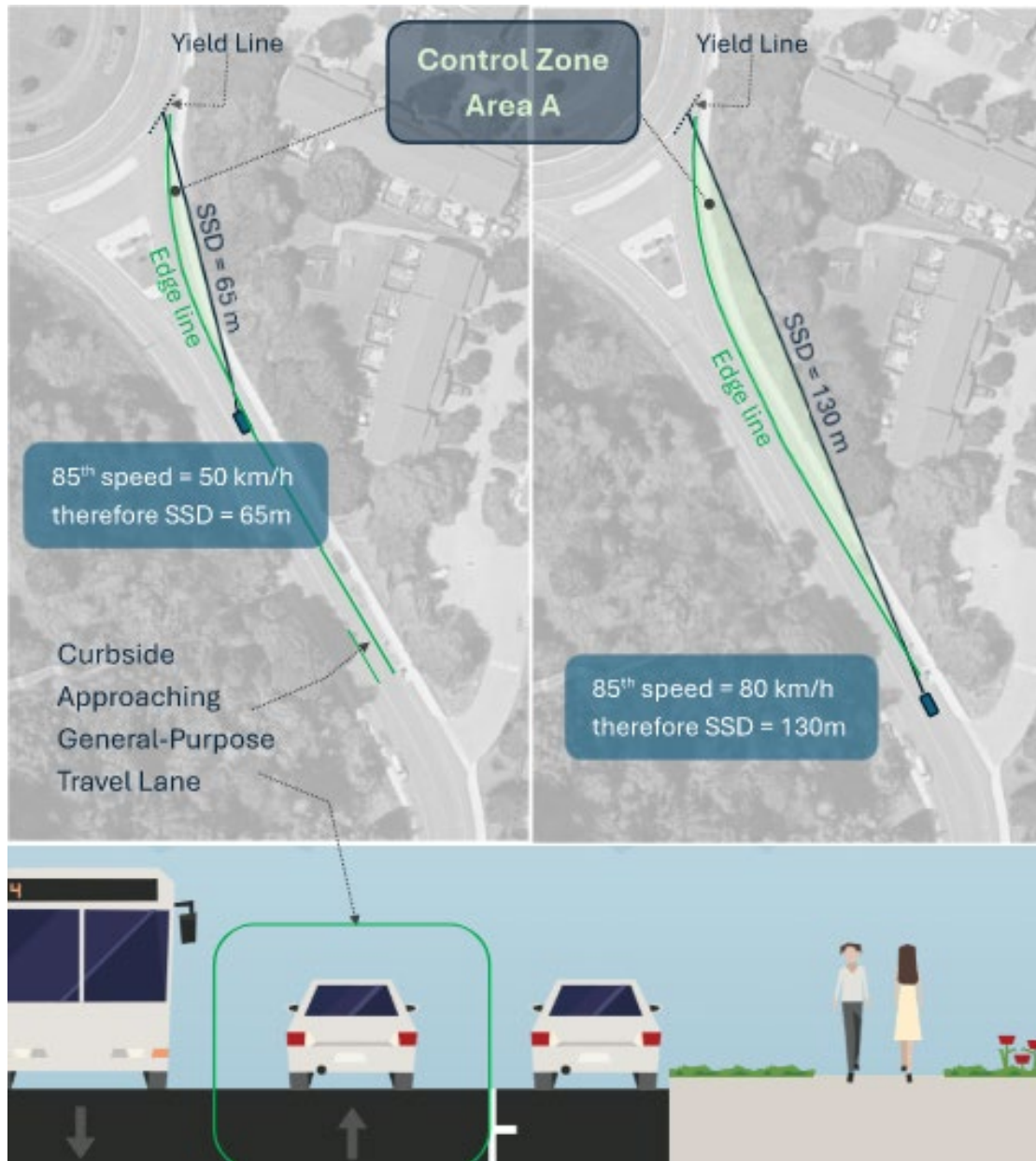


Figure 10 – Control Zone C - Approach Sight Lines

Once the SSD is determined for each approach to the roundabout, direct “Sight Lines” can be drawn on a plan showing the roundabout and its approaches to identify the limits and area of Control Zone C. The Sight Line should be the length of the SSD and drawn to connect the center of the front of the approaching motor vehicle to the centre of the Yield Line.

The area between the edge of the curbside general-purpose travel approach lane and the SSD Sight Line is Control Zone C. It should be noted that it is possible to find Control Zone C to be negligible. This is more likely to be the case in situations where speeds are low and/or approach geometry is relatively straight.

Table 4 - Stopping Sight Distance for Various Design Speeds

Design Speed (km/hr)	Brake Reaction Distance (m)	Braking Distance on Level (m)	Stopping Sight Distance Calculated (m)	Stopping Sight Distance Design (m)
20	13.9	4.6	18.5	20
30	20.9	10.3	31.2	35
40	27.8	18.4	46.2	50
50	34.8	28.7	63.5	65
60	41.7	41.3	83.0	85
70	48.7	56.2	104.9	105
80	55.6	73.4	129.0	130
90	62.6	92.9	155.5	160
100	69.5	114.7	184.2	185
110	76.5	138.8	215.3	220
120	83.4	165.2	248.6	250
130	90.4	193.8	284.2	285

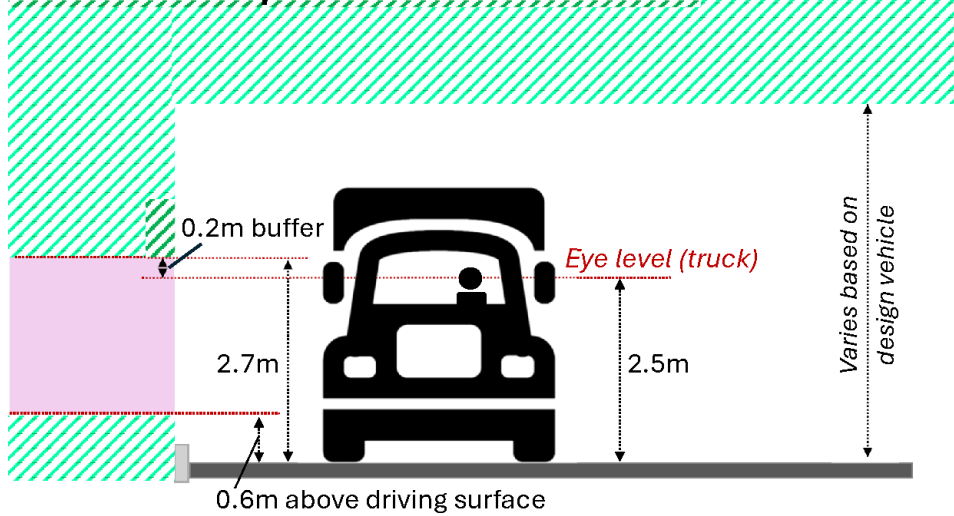
Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 3.4 m/s^2 used to determine calculated sight distance.

(Source: Table 2.5.2, Geometric Design Guide for Canadian Roads - Transportation Association of Canada)

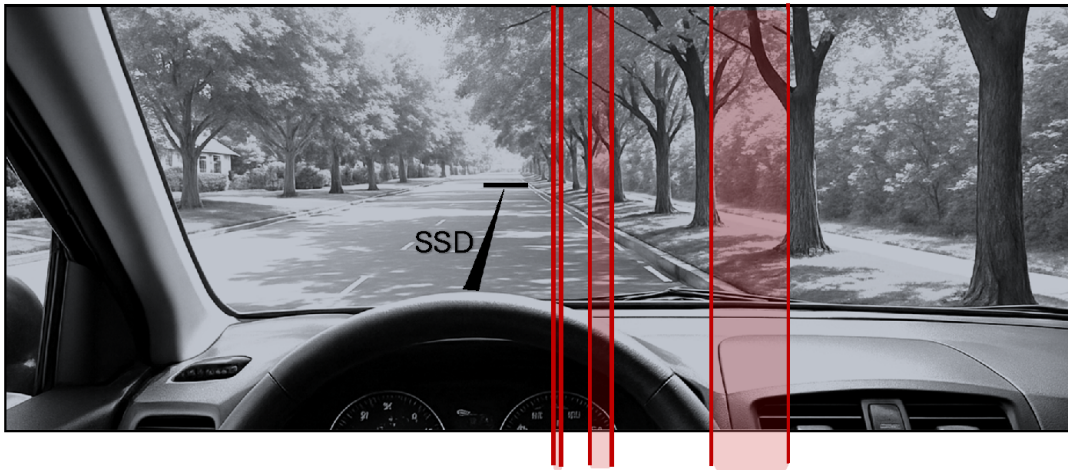
Vertical Growth Envelope for Control Zone C

Modified Vertical Growth Envelopes are established for CZC to help ensure appropriate visual permeability, supporting the effectiveness and safety performance of approaches to the roundabout.

Growth Envelope for Control Zone C



-  Area permitted for landscaping materials (no opacity restrictions)
-  Area permitted for landscaping materials (allow for **daylight gaps** up to stopping sight distance)



“Daylight” gaps within Control Zone C need to be present up to the stopping sight distance (SSD) from any point along the approach to a roundabout

Figure 11 – Modified Vertical Growth Envelope for Control Zone C

Visual Permeability and Tree Spacing in CZC: The degree of visual permeability within a planting area is influenced by tree spacing, planting design, and tree size. Tree spacing within the CZC must be measured to ensure adequate daylight gaps up to the Stopping Sight Distance (SSD) from any point along the Roundabout Approach. The tables below provide minimum spacing requirements based on posted speed and three tree trunk sizes in diameter at breast height (DBH): 300 mm (small trees), 500 mm (medium trees), and 900 mm (large trees). The utilized tree trunk size would be the maximum width of the tree at full growth.

Table 5 - Tree Spacing in Control Zone C (CZC) for Small Trees

Maximum Tree Diameter (small trees) (m)	Minimum Width of "Daylight Gap" (m)	Distance between Outside of Tree Trunk and Edge of Inside Lane (m)	Curb Lane Width (m)	Posted Speed (km/h)	Operating Speed (assume 120% of posted speed) (km/h)	Stopping Sight Distance (SSD)	Maximum Spacing Between Trees (centre-to-centre of trees) (m)
0.30	0.20	1.5	3.5	30	36	40	5.7
0.30	0.20	1.5	3.5	40	48	60	8.5
0.30	0.20	1.5	3.5	50	60	83	11.7
0.30	0.20	1.5	3.5	60	72	110	15.5
0.30	0.20	1.5	3.5	70	84	139	19.7
0.30	0.20	1.5	3.5	80	96	173	24.3
0.30	0.20	1.5	3.5	90	108	209	29.5

Table 6 - Tree Spacing in Control Zone C (CZC) for Medium Trees

Maximum Tree Diameter (medium trees) (m)	Minimum Width of “Daylight Gap” (m)	Distance between Outside of Tree Trunk and Edge of Inside Lane (m)	Curb Lane Width (m)	Posted Speed (km/h)	Operating Speed (assume 120% of posted speed) (km/h)	Stopping Sight Distance (SSD)	Maximum Spacing Between Trees (centre-to-centre of trees) (m)
0.70	0.20	1.5	3.5	30	36	40	9.1
0.70	0.20	1.5	3.5	40	48	60	13.7
0.70	0.20	1.5	3.5	50	60	83	19.0
0.70	0.20	1.5	3.5	60	72	110	25.0
0.70	0.20	1.5	3.5	70	84	139	31.8
0.70	0.20	1.5	3.5	80	96	173	39.4
0.70	0.20	1.5	3.5	90	108	209	47.6

Table 7 - Tree Spacing in Control Zone C (CZC) for Large Trees

Maximum Tree Diameter (large trees) (m)	Minimum Width of “Daylight Gap” (m)	Distance between Outside of Tree Trunk and Edge of Inside Lane (m)	Curb Lane Width (m)	Posted Speed (km/h)	Operating Speed (assume 120% of posted speed) (km/h)	Stopping Sight Distance (SSD)	Maximum Spacing Between Trees (centre-to-centre of trees) (m)
0.90	0.20	1.5	3.5	30	36	40	10.6
0.90	0.20	1.5	3.5	40	48	60	15.9
0.90	0.20	1.5	3.5	50	60	83	22.0
0.90	0.20	1.5	3.5	60	72	110	29.1

Maximum Tree Diameter (large trees) (m)	Minimum Width of “Daylight Gap” (m)	Distance between Outside of Tree Trunk and Edge of Inside Lane (m)	Curb Lane Width (m)	Posted Speed (km/h)	Operating Speed (assume 120% of posted speed) (km/h)	Stopping Sight Distance (SSD)	Maximum Spacing Between Trees (centre-to-centre of trees) (m)
0.90	0.20	1.5	3.5	70	84	139	37.0
0.90	0.20	1.5	3.5	80	96	173	45.8
0.90	0.20	1.5	3.5	90	108	209	55.4