

Division 32

Exterior Environment and Natural Landscape Policy and Guidelines

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Exterior Environment and Natural Landscape Policy and Guidelines Compliance Checklist

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3.0	Landscape Replacement Policy			
4.0	Exterior Environment Guidelines			
4.1	General Requirements			
4.1.1	Illumination			
4.1.2	Public Art			
4.1.3	Utilities			
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5.2	Trees and Shrubs			
5.2.1	Grates Around Trees			
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5.13	Walls and Fences			
5.14	Green Roof			

Dalhousie FAMIS Project Number: _____

Consultant Name	Consultant Signature	Date YYYY MM DD
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Project Manager Name	Project Manager Signature	Date YYYY MM DD
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Note: If the Guidelines or part of cannot be attained or fulfilled (i.e. NC or NA) during the design process, the Consultant should provide reason(s) why such Guidelines are not met. Any modification or alterations to the design guidelines will need to be agreed/accepted by Facilities Management prior to inclusion in the design.

1.0 Introduction

The exterior environment is featured as a key area of action in several university plans including the Campus Master Plan, Climate Change Plan, Sustainability Plan, and Accessibility Plan. These Design Guidelines reflect the content of these plans by providing specific guidance on how to meet plan goals. Plan goals specific to the exterior environment include:

- Meet all regulatory requirements such as municipal stormwater and pesticide bylaws;
- Employ best management practices for exterior and hardscape management to preserve health and ecological integrity;
- Employ *universal design* and landscape standards to enhance public spaces and the aesthetic quality of the exterior environment;
- Meet LEED standards for erosion control and construction activity;
- Conserve and restore damaged areas to provide habitat and biodiversity;
- Eliminate the need for potable water consumption for ongoing irrigation;
- Reduce pollution and runoff to stormwater systems by reducing impervious cover; and
- Reduce heat island effect to minimize microclimate effects; and
- Prevent and remove built environment accessibility *barriers*.

Dalhousie University's Exterior Environment and Natural Landscape Policy and Guidelines outline campus design guidelines to enhance and protect the built and natural exterior environment during the planning and construction of future expansions and renovations across all University campuses. Dalhousie University will collaborate with the Government when initiatives overlap infrastructure ownership.

Design quality, character, landscape materials, and plant communities, as well as the incorporation of *accessible* design considerations, contribute significant social, economic, and environmental value to the University and the larger community. These Guidelines aim to address the needs of persons with *disabilities* as they pertain to the exterior environment. The Guidelines have been developed through a lens of *universal design* principles to ensure that an environment can be accessed, understood, and used by all people regardless of their age, size, or ability.

Compliance and Enforcement

Dalhousie University Design Guidelines provide assistance to consultants during the planning and design phases of the University's expansion and renovations. The Guidelines do not relieve a consultant from any professional responsibility, duty, or due diligence to design elegant, functional, efficient, and low maintenance *facilities*.

Facility owners have preferred materials and requirements that make the task of maintaining *facilities* less costly. Dalhousie understands this is a balance between capital and operating cost. The Guidelines are not intended to be the only acceptable solution. Dalhousie expects consultants to bring modern and innovative ideas, materials, and methods to the University. If these Guidelines do not allow these new ideas, then the consultant is to make a request in writing to

the Dalhousie Project Manager for an exception to the guidelines. Necessary reasoning and/or calculations shall accompany the request. The exception request will be reviewed internally and either rejected or accepted. The consultant will document this rationale and/or justification for each exception in the Basis of Design. The University Guidelines may be updated subsequently.

These documents provide design guidelines only, and are not intended for use, in whole or in part, as a specification. Do not copy the guidelines verbatim in specifications or in notes on drawings. Refer questions and comments regarding the content and use of these documents to the Dalhousie University Project Manager. The Guidelines are intended to be read in conjunction with the local codes and regulations, and in no way are to be considered as a code replacement. The codes and regulations represent the minimum acceptable standard. Where the technical design requirements differ from the building codes and other applicable codes and standards, the more stringent of the codes shall be applied.

Maintaining the Standards/Guidelines

The Design Guidelines are created and maintained by Dalhousie's Facilities Management Department. Any enquiries about the Guidelines should be directed to Facilities Management, Director of Projects, Central Services Building. Dalhousie encourages design specialists and other interested parties to provide their input and suggestions based on their experience.

1.1 Glossary and Defined Terms

Graphic Conventions

Dimensions used in these guidelines are in metric units (millimeters) and shown as “mm”. Dimensions that are not marked maximum or minimum (“max.” or “min.”) are absolute, unless otherwise indicated.

Functional Document Terminology

Within the context of these guidelines, the following functional statements will apply:

Shall denotes a mandatory specification or requirement.

Should denotes an advisory specification or recommendation.

Defined Terms

The following definitions are provided for clarification. The defined terms are indicated throughout the document in *italic* font.

Accessible: Describes a *site*, building, *facility*, or portion thereof that complies with this standard.

Access aisle: An *accessible* pedestrian space between elements, such as parking spaces and seating, that provides clearances appropriate for the use of the elements.

Accessible route: A continuous unobstructed path connecting all *accessible* elements and spaces of a building or *facility*. Exterior *accessible* routes may include parking *access aisles*, curb *ramps*, crosswalks at vehicular routes, walks, *ramps*, and platform lifts.

Barrier: anything that hinders or challenges the full and effective participation in society of persons with *disabilities* including a physical *barrier*, an architectural *barrier*, an information or communications *barrier*, an attitudinal *barrier*, a technological *barrier*, a policy, or a practice.

Braille: A system of raised dots that people who are blind can read with their fingers. The basis of the *braille* system is a *braille* cell. A full *braille* cell is comprised of six dots, arranged in two parallel rows of three dots. Each dot, or combination of dots, represents a letter of the alphabet, a number, or a punctuation mark. Together, they can be used to express words, sentences, equations, musical notation, and more.

Clear: Unobstructed.

Cross slope: The *slope* that is perpendicular to the direction of travel. See *running slope*.

Curb ramp: A short *ramp* cutting through a curb or built up to a curb. *Curb ramps* shall be provided where the *accessible* path of travel intersects or crosses a curb.

Disability or Disabilities: includes a physical, mental, intellectual, learning, or sensory impairment, including an episodic *disability*, that, in interaction with a *barrier*, hinders an individual's full and effective participation in society.

Facility or Facilities: All or any portion of buildings, structures, *site* improvements, parking lots, parks, roads, elements and pedestrian routes or vehicle ways located on a *site*.

Guard: A safety railing used as a barrier to prevent encroachment or accidental falling from heights.

Handrail: A component which is normally grasped by hand for support at stairways, ramps and other places where needed for the safety of pedestrians.

Mobility Device: Refers to a range of assistive equipment used by persons with *disabilities* to assist with mobility. Example: crutches, canes, manual or powered wheelchairs, scooters, and walkers.

Obstruction: can include furnishings, equipment, street furniture, vegetation, plantings, guy wires, tree braces and supports, tree branches, waste and recycling receptacles, the underside of stairways, *signage*, payment and vending machines, pylons, bollards, columns and pillars, queuing lines, light posts, fire hydrants, etc. that inhibit the path of travel or protrude into the path of travel that can become hazardous.

Ramp: A walking surface which has a running *slope* greater than 1:20 (5%).

Service animal: A *service animal* may be a guide dog, signal dog, or other animal individually trained to aid an individual with a *disability*.

Signage: Displayed verbal, symbolic, *tactile*, and pictorial information.

Site: A portion of land within a boundary intended for new construction.

Slope: The proportion of vertical rise over a horizontal length, typically specified as a ratio (eg. 1:20) but can also be expressed in degrees or as a percentage. See *cross slope*.

Tactile: Describes an object or element that can be perceived using the sense of touch.

Tactile attention indicator: Shaped as truncated domes, which communicate an upcoming hazard or decision-making point.

Tactile walking surface Indicator: A standardized surface feature built into or applied to walking surfaces or other elements to guide a person on a designated path of travel. They provide information about the direction of travel and may warn persons with a visual impairment of hazards on a circulation path.

Universal Design: Is the design of products and environments to be usable by all persons, to the greatest extent possible, without the need for adaptation or specialized design.

White cane: *White cane*, or *long white cane*, is a device that helps persons with low or no vision stay safe and feel more comfortable when *wayfinding* independently.

Wayfinding: Encompasses all the ways in which people orient themselves in physical space and navigate from place to place.

2.0 Universal Design Principles

2.1 Equitable use

The design is useful and marketable to people with diverse abilities.

- Provide the same means of use for all users: identical whenever possible; equivalent when not;
- Avoid segregating or stigmatizing any users;
- Provisions for privacy, security, and safety should be equally available to all users; and
- Make design appealing to all users.

2.2 Flexibility in Use

The design accommodates a wide range of individual preferences and abilities.

- Provide choice in methods of use;
- Accommodate right- or left-handed access and use;
- Facilitate the user's accuracy and precision; and
- Provide adaptability to the user's pace.

2.3 Simple and Intuitive Use

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

- Eliminate unnecessary complexity;
- Be consistent with user expectations and intuition;
- Accommodate a wide range of literacy and language skills;
- Arrange information consistent with its importance; and
- Provide effective prompting and feedback during and after task completion.

2.4 Perceptible Information

The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

- Use different modes (pictorial, verbal, *tactile*) for redundant presentation of essential information;
- Provide adequate contrast between essential information and its surroundings;
- Maximize "legibility" of essential information;
- Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions); and
- Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

2.5 Tolerance for Error

The design minimizes hazards and the adverse consequences of accidental or unintended actions.

- Arrange elements to minimize hazards and errors: most used elements, most *accessible*;



hazardous elements eliminated, isolated, or shielded;

- Provide warnings of hazards and errors;
- Provide fail-safe features; and
- Discourage unconscious action in tasks that require vigilance.

2.6 Efficient and comfortable design

The design can be used efficiently and comfortably and with minimum fatigue.

- Allow user to maintain a neutral body position;
- Use reasonable operating forces;
- Use reasonable operating forces;
- Minimize repetitive actions; and
- Minimize sustained physical effort.

2.7 Size and Space for Approach and Use

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility.

- Provide a *clear* line of sight to important elements for any seated or standing user;
- Make reach to all components comfortable for any seated or standing user;
- Accommodate variations in hand and grip size; and
- Provide adequate space for the use of assistive devices or personal assistance.

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3.0 Landscape Replacement Policy

- 3.1 During construction, the removal of vegetation is sometimes unavoidable. New construction projects must demonstrate that alternatives have been considered prior to removing vegetation. Where alternatives are not feasible, to the maximum extent practical, materials shall be transplanted.
- 3.2 Encroachment or removal requests for trees in the right-of-way shall be coordinated with municipal staff. Trees that are owned by the HRM are subject to all regulations outlined in *HRM Bylaw T-600*.
- 3.3 Prior to removal of trees and shrubs from a project *site*, trunk diameter at breast height (DBH) shall be measured for each affected tree and shrub. The sum of all such diameters is the replacement diameter. The number of replacement trees and shrubs is to be calculated from an equivalent total diameter of new stock as measured at the root collar. Thus, the sum of all root-collar diameters of replacement vegetation shall be no less than the sum of all breast-height diameters of removed vegetation.
- 3.4 Replacement vegetation shall be sited so as to provide roughly similar and equal social, economic, and environmental value. Planting locations shall be on the same location as trees or shrubs were removed if possible. If not possible, funding for the replacement vegetation will be given from the related project budget to the Environmental Services Manager or Supervisor who will use this funding for adding replacement vegetation elsewhere on campus and/or surrounding community. The Dalhousie Environmental Services Manager / Environmental Services Supervisor / Gardeners will approve all planting plans at the Halifax and Agriculture Campuses.
- 3.5 Funding for new plantings will be allocated annually as part of the Grounds budget. Additional funding sources include carbon offset funding negotiated through the Office of Sustainability, grants, and individual and group donations. Any person or group providing resources for vegetation on campus must select species from the approved list in Appendix G.
- 3.6 During construction, all costs associated with vegetation protection, mitigation, replacement, or transplanting are to be fully funded by the budget of the proposed project.
- 3.7 Where tree protection and relocation is not possible, any tree that is felled on campus property shall be cut to a length of 2.44 m to facilitate transportation for re-use if not milled on-site. The Project Manager should meet with the planning unit at Dalhousie University to determine the best architectural uses of campus wood. In the case of spruce trees, due diligence must be carried out to reduce the spread of the brown spruce long horn beetle by contacting the local Canadian Food Inspection Agency office for guidelines.



- 3.8 All trees planted, moved, and existing trees in the Municipal right-of-way must survive in good condition for two (2) years after project completion. Tree failure or tree deterioration is subject to compensation at the two (2) year time span.
- 3.9 Compensation will be made to the University for physical damage to tree foliage, branches, trunks, roots, and soil during construction by a third party. Damages will be evaluated by the Environmental Services Manager / Supervisor / Gardeners or a third-party arborist if appropriate.



4.0 Exterior Environment Guidelines

4.1 General Requirements

4.1.1 Illumination

Refer to Dalhousie University *Div. 26 Electrical Design Guidelines* for additional information.

- Illumination of at least 50 lx to components along the pedestrian route including ramp and stair surfaces, even light distribution at ground level on pathways, and at amenity areas are to be provided using a comprehensive energy efficient lighting plan;
- Make use of pedestrian-scaled lighting along pedestrian routes where appropriate and fixtures below eye level to provide better definition of ground surfaces, especially in parking areas and along *accessible* pathways leading to building entrances;
- LED lighting shall be implemented throughout the campus to minimize energy consumption;
- Implement full cut-off lanterns to minimize light pollution, glare and light trespass and ensure protection of the night sky;
- Provide a line of aesthetic, coordinated, functional, technologically flexible, and durable light standards that contributes to the identity of the campus with consideration of use;
- Indirect lighting of important building facades and landscape features are to be used to enhance the general night-time illumination level required for safety, security and visual amenity of the campus; and
- Ease of maintenance will be a consideration when selecting the type of lighting to be used in any landscaped areas.

4.1.2 Public Art

- Create opportunities for the implementation of public art pieces;
- Locate art in proximity to the active transportation network, other areas of high pedestrian activity, public open spaces, and areas of special heritage or community significance; and
- Ensure any public art that protrudes into a pedestrian path of travel is located within the detection range of a *long white cane*, with its lowest edge at or below 685mm from the ground surface. If this cannot be accommodated, provide a *tactile warning surface indicator* or a guard around the artwork to warn users of hazard.

4.1.3 Utilities

- Utilities are to be buried underground where possible;
- All above grade utilities i.e., transformers within view of public realm the road right-of-way are to be screened from view of the street through the use of landscaping and/or architectural screen walls; and

- All landscaping items and architectural screen walls shall be located at least 1 m from electrical equipment and not less than 1.5 m from access doors.

4.1.4 Sustainability

- Minimize the extent of impermeable surfaces by utilizing permeable surfaces and soft landscaped areas. This will reduce the amount of storm water run-off and subsequent pressure on municipal systems;
- Reduce the urban heat island effect by minimizing the extent of paved surfaces;
- Manage rainwater and snowmelt on-site with designs that encourage infiltration, evapotranspiration, and water re-use such as bio-retention areas and bioswales for example.
- Green roofs will be incorporated where feasible to improve building insulation, reduce surface runoff and minimize discharge into the storm drainage system;
- Existing mature non-invasive trees will be preserved and integrated into the design pending review by a certified landscape architect or arborist;
- Incorporate deciduous trees into the design to provide shade in the summer and help reduce internal building temperatures. In the winter months, deciduous trees shed their leaves and allow sunlight to penetrate windows and warm internal temperatures; and
- For soft landscaping, consider an Integrated Pest Management (IPM) strategy, which is a sustainable ecological approach with a main goal of significantly reducing or eliminating the use of harmful pesticides while at the same time managing pest populations at an acceptable level.

4.2 Outdoor Spectator Viewing

4.2.1 General Requirements

- The exterior path of travel leading to spectator viewing areas shall facilitate a continuous, unobstructed route and shall comply with 4.3.1 *Exterior Paths of Travel* of this document;
- Where access to spectator viewing and outdoor athletic *facilities* requires visitors to travel through the vehicular path of travel, ensure that pavement markings and vertical *signage* is clearly visible;
- Clearly identify sporting field entrances using *signage* and *wayfinding* cues;
- Provide directional *signage* to *accessible* spectator seating locations where it isn't obvious upon entry; and
- Maintain step-free entry to sporting and spectator events where possible.

4.2.2 Spectator Seating

- *Accessible* seating in spectator viewing areas shall comply with 4.6.1.1 *Seating* of this document;



- *Accessible* seating in spectator areas shall allow for a *clear* line of sight to be maintained to the main event and surrounding environment; and
- Spaces reserved for wheeled *mobility devices* shall be located at every step-free level to provide a variety and choice of vantage points.

4.3 Circulation

4.3.1 Exterior Paths of Travel

- Primary exterior paths of travel and shared use pathways shall have a *clear* width of at least 4 m to ensure adequate space for pedestrians, cyclists, mobility aids, and strollers.
- Where 4 m is not technically feasible for upgrades to primary exterior pathways, the minimum *clear* width may be reduced to 3 m to accommodate snow clearing machinery.
- Secondary exterior pedestrian pathways may be reduced to a minimum *clear* width of 2100 mm; and where adjacent to a *curb ramp* at least 1390 mm;
- Pedestrian pathways shall be firm, stable, and slip resistant with proper drainage considerations;
- Where an *accessible* path is immediately adjacent to a vertical drop, an 80mm high edge protection or handrails shall be provided;
- Provide an intuitive, direct, *accessible route* to all *accessible* building entrances, stairs, *ramps*, seating areas and other amenities and provide a logical, direct, and *accessible* path from parking and/or transit;
- In large open areas, use textured surfaces to differentiate paths of travel from adjacent areas;
- Ensure a smooth transition is provided between sidewalk segments; and
- Where gratings are present in the path of travel, such as sewer catch basin covers, drainage, or tree grates, ensure that any openings are situated perpendicular to the path of travel. Openings in gratings shall be no wider than 13 mm to limit canes and wheels catching or becoming stuck.

4.3.2 Street Crossings

Refer to Dalhousie's *Multi-Modal Transportation Guidelines* for more information.

- Street curb radii shall not exceed municipal standards and be reduced wherever possible in order to reduce the distance at crosswalk locations; provide more pedestrian area at intersections; and require vehicles to slow down as they turn corners;
- Street corners shall be designed to accommodate multiple functions including pedestrian crossings, mobility device movement (wheelchairs, strollers, trolly's), location of utility and traffic signal poles, traffic movements, and pedestrian waiting areas;
- The size of curb radii will consider the geometry of the intersection, the street classification, and whether there is on-street parking and/or a bike lane within the road right-of-way (consult Item 4 - Multi-Modal Transportation Guidelines for details on cycling infrastructure);



- Define edges and transitions with paving materials and textures; and
- Street corners will be free of obstacles and easily identifiable for people with a range of *disabilities*.

4.3.3 Curb Ramps

- Where *curb ramps* are designed, they shall integrate *tactile walking surface indicators* (TWSIs), using a colour that strongly contrasts with the surrounding mounting surface (typically concrete or similar aggregate); and
- Provide *curb ramps* or blended transitions that lead people directly into (parallel with) the crossing area designated for pedestrian use.

4.3.4 Crosswalks

- Crosswalks shall be at least 1800mm wide between pavement markings (where provided) that are slip resistant;
- Have *tactile walking surface indicators* present at *curb ramps* or crossings to indicate a call to attention (refer to section 4.3.3);
- Pedestrian crossing components shall limit the exposure to vehicular traffic by following a line that is perpendicular to the vehicular route being crossed; be fully outside all motor vehicle and cycling lanes of the parallel roadway; and in the case of refuge islands and medians, where possible, have all components (e.g., *curb ramps*, blended transitions, crosswalk segments) in a single continuous lateral alignment (refer to *Figure 1*);
- For a pedestrian crossing route within a raised median or island provide a walkway at least 600 mm deep between the *tactile walking surface indicators* (refer to *Figure 1*);
- Provide audible crossing signals in locations where a visual flashing signal is provided; and
- Ensure visual and audible signals provide sufficient time for users to safely cross.

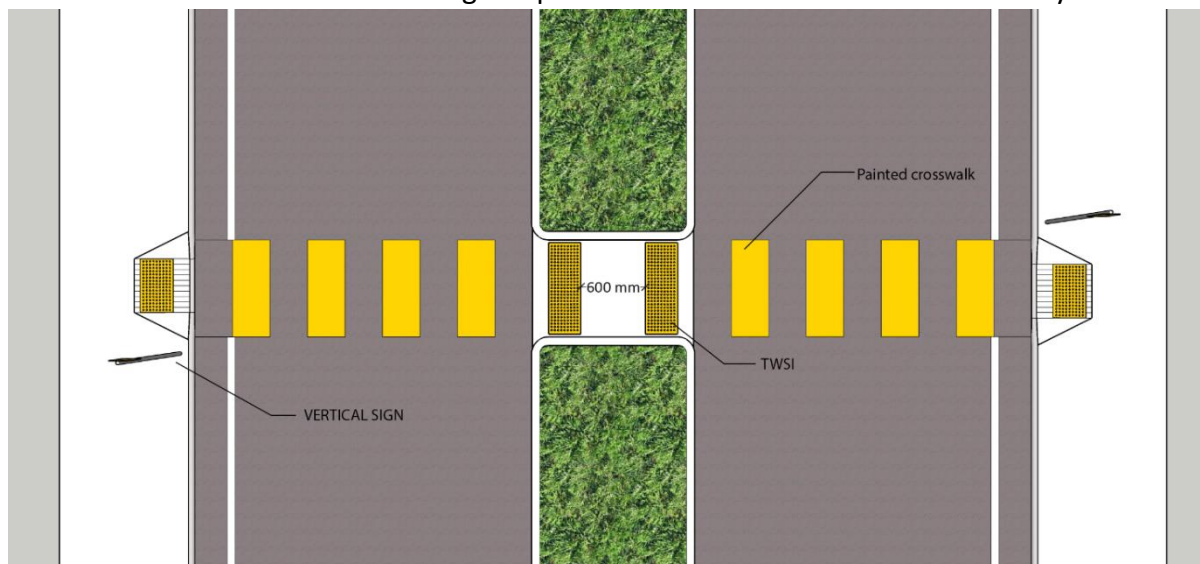


Figure 1

4.3.5 Obstructions, Protrusions, and Overhead Objects

- Where obstructions are present, they shall not create a hazard or reduce accessibility in a pedestrian area;
- Protruding objects will not reduce the *clear* width required for an *accessible route* or maneuvering space;
- Where obstacles cannot be relocated, ensure obstruction is *cane* detectable at or below 685 mm from the ground surface and colour contrasted with its surroundings; and
- In the case of temporary hazards, such as construction *barriers*, ensure its lowest edge is cane detectable and the ground area around it is colour contrasted and *tactile* for visibility.

4.4 Pedestrian Ramps

4.4.1 Pedestrian Ramp Requirements

- *Ramps* shall be located at grade and elevation changes that are greater than 1:20 (5%) running *slope* and are greater than 200 mm in height;
- Exterior pedestrian *ramps* shall be at least 1200mm wide and have level landings that are:
 - At least 2500 mm by 2500 mm at *ramps* with a straight run;
 - At least 2500 mm by 2500 mm at 90° turn locations; and
 - At least 2500 mm by the width of the *ramp*;
- Have a *slope* that is a maximum of 1:20 (5%) with a *cross slope* that is no greater than 1:50 (2%). Where 1:20 (5%) is not technically feasible, the *slope* maximum may be relaxed to 1:15 (6.7%);
- Maintain an unobstructed line of sight from the beginning to the end of the *ramp* so persons using the *ramp* can anticipate the path of travel; and
- Provide a dedicated area for snow piling from exterior ramps that is away from pedestrian routes.
- When designing and constructing new buildings, all main pedestrian entrances are to be at grade to reduce winter maintenance operations and enhance accessibility. Therefore, stairs and ramps will not be designed at main pedestrian entrances.

4.4.2 Pedestrian Ramp Handrails

- Provide at least one set of *handrails* with a height between 860 and 920 mm;
- Secondary *handrails* shall be considered at a lower height for persons of shorter stature;
- Have horizontal extensions at the top and bottom of the *ramp* that are at least 300 mm long and are returned to the post, floor, or wall, as illustrated in *Figure 2*; and
- Be strongly colour contrasted with their surroundings.

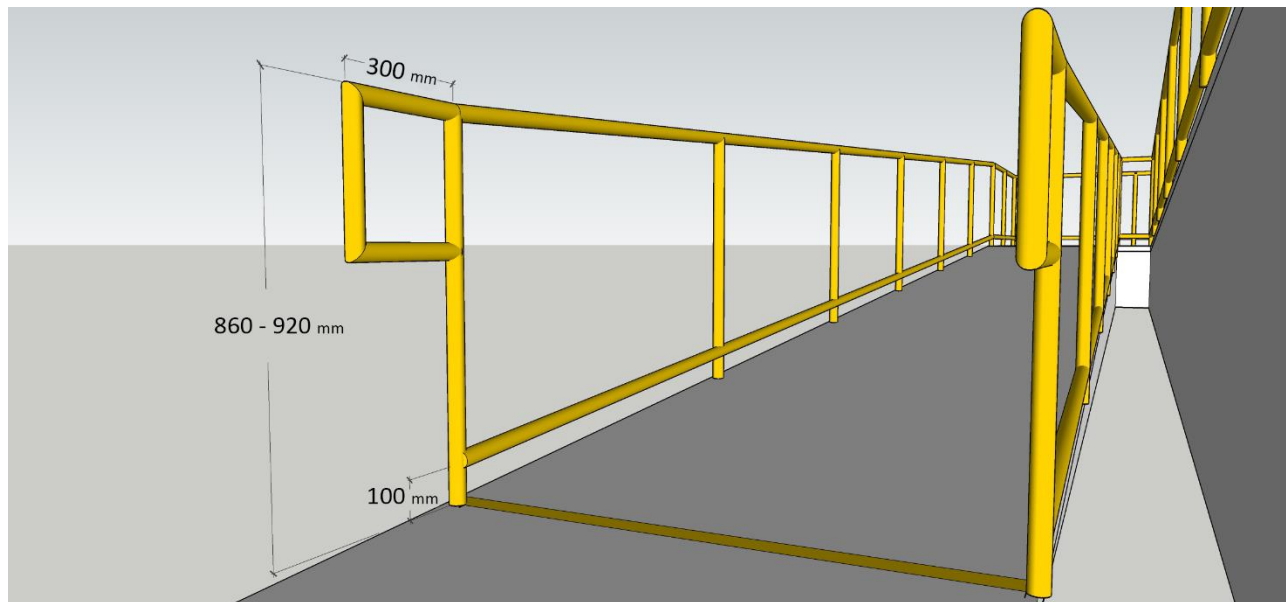


Figure 2

4.5 Stairs

4.5.1 Stair Requirements

- The tops of all staircases that are not enclosed or on a landing that has an entrance into the stair system shall be equipped with *tactile attention indicators*.
- When designing and constructing new buildings, all main pedestrian entrances are to be at grade to reduce winter maintenance operations and enhance accessibility. Therefore, stairs and ramps will not be designed at main pedestrian entrances.

4.5.2 Stair Handrails

- Provide at least one set of *handrails* with a height between 860 and 920 mm;
- Secondary *handrails* mounted at a lower height shall be provided for persons of shorter stature; and
- Handrails shall terminate by returning to a post, wall, or floor to prevent personal items such as handbags, pockets, and/or backpack straps from getting caught.

4.6 Amenities

- Pedestrian amenities such as pedestrian scaled lighting, seating, four-bin waste/recycling/organics/paper receptacles, and shelters are to be located where pedestrians gather. Locations include primary pedestrian circulation routes, street intersections, courtyards and building entrances;
- Pedestrian amenities will be coordinated in style, colour and scale to contribute to the overall identity of the campus and support branding theme;

- Implement a family of aesthetic, coordinated, functional, technologically flexible, and durable *site* elements;
- *Site* structures such as lighting, benches, recycling receptacles, seating and street furniture, and bicycle parking are to make use of local and recycled materials and technologies.
- Outdoor seating and street furniture will be selected based on both the long-term availability of the product and the longest life cycle available within budget parameters.
- Appropriate and easy to service waste collection and recycling containers will be provided (see *Dalhousie's Item 6 - Custodial Design Guidelines*); and
- All the above will be properly fixed in situ to avoid unauthorized removal.

4.6.1 Rest Areas

- Rest areas shall be located on and adjacent to the *accessible* path of travel to promote ease of pedestrian movement;
- Provide *accessible* rest areas every 30 m or intermittently when a pathway is over 9 m and has a *slope* greater than 1:20 (5%);
- Ensure *clear* sightlines to the path of travel and surrounding environment are provided and maintained; and
- Where rest areas are expected for an extended period of use, such as outdoor eating or study areas, provide some rest areas with shelter for weather protection and shading above benches, seating and tables. Shelter shall allow for overhead clearance at least 3000mm.

4.6.1.1 Seating

- Seating shall be located on and adjacent to an *accessible* path of travel;
- *Accessible* seating areas shall have a *clear* unobstructed ground space adjacent to the seat or bench that is at least 900 mm by 1500 mm for a front approach to allow persons using *mobility devices* to rest adjacent to the seating and bench area;
- In large, grouped seating areas, incorporate a variety of options:
 - a mix of seating and benches that are shaded,
 - a mix of seating types including wider seats to provide choice for everyone,
 - a mix of seating with and without arm rests;
- Seating shall have a surface finish that is smooth and does not splinter, or cause splinters or scraping;
- Benches with an adjacent *clear* space shall not have an armrest on that same side to allow persons using a wheeled *mobility device* to transfer onto the bench if preferred; and
- Benches and seating are to colour contrast with the surrounding environment.

4.6.1.2 Tables

- Tables shall be located adjacent to the exterior *accessible* path of travel;



- At least one accessible picnic table will be provided in each instance where picnic tables are provided for use. Where there are more than 10 tables a minimum of 20% of the total tables provided on *site* shall be accessible;
- Exterior tables shall have a *clear* area of at least 2000 mm wide on all sides of the table, as illustrated in Figure 4. The *clear* area may be shared between two tables;
- Picnic tables shall have an extension of 500 mm on one end or on both ends to allow for a person using a wheeled mobility to be seated at the table; and
- Accessible table and picnic tables shall have a knee clearance of at least 735 mm high, at least 500 mm deep, and at least 900 mm wide, as illustrated in Figure 3.

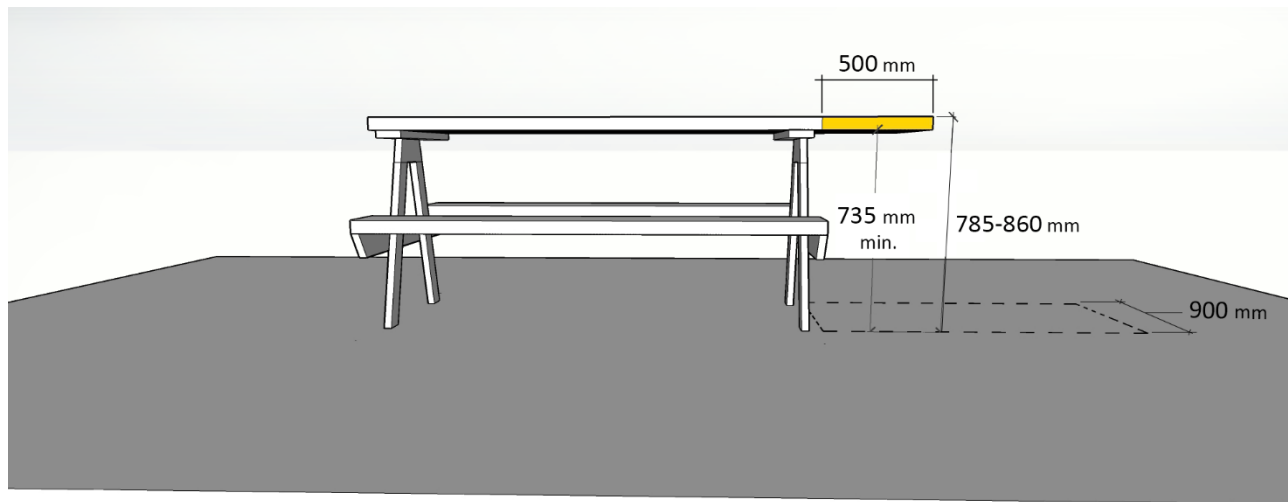


Figure 3

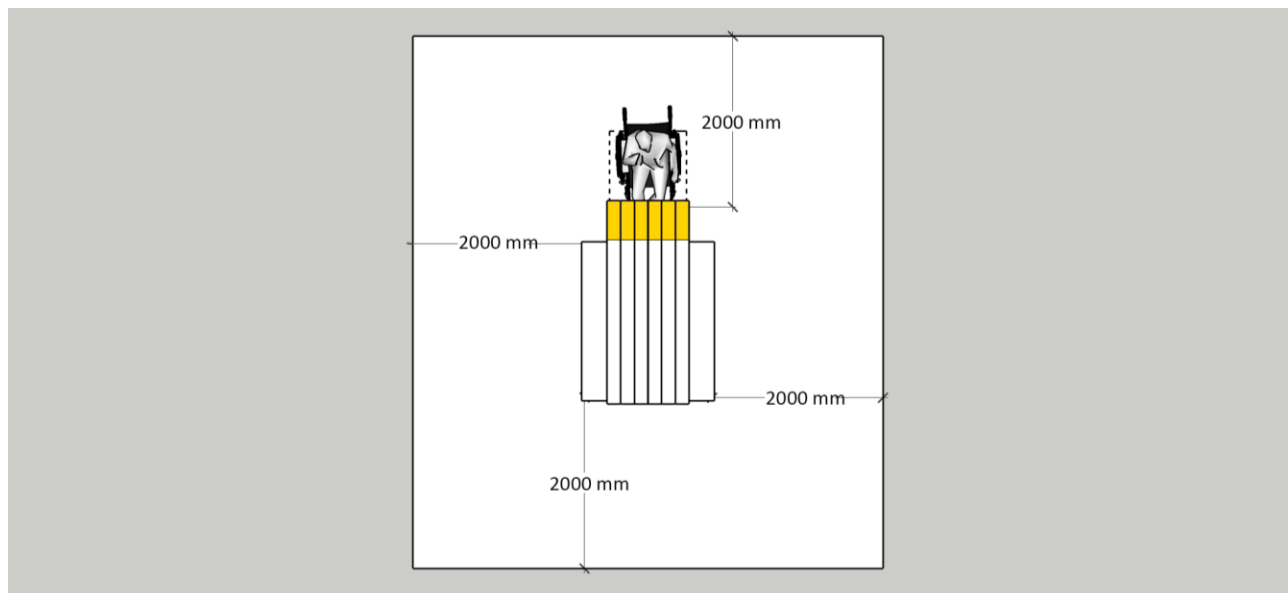


Figure 4



4.6.2 Service Animal Relief Areas

- *Service animal* relief areas shall be located along an *accessible route* and have unobstructed access to or from building accessible entrances and within 30 m of the accessible entrance or outdoor areas accessible from the building (such as publicly accessible patios or terraces);
- *Service animal* relief areas shall be located at each building or around each cluster of buildings;
- Provide *signage* at *service animal* areas to identify designated areas;
- Ensure surfaces have proper drainage, are permeable (grass is preferred) and easy to clean;
- *Service animal* relief areas are to be 3000 mm by 3000 mm minimum in size to accommodate large adult service dogs and allow for mobility devices to maneuver within the space;
- Provide an *accessible* waste receptacle;
- Provide *clear* sightlines from the tethering hooks to the intended amenity or service spaces being used by *service animal* owners;
- Mount tethering hooks at a height between 600 mm and 1050 mm above the ground surface; and
- Tethering hooks are to colour contrast against their background and surroundings.

4.6.3 Waste, Recycling, and Organics Bins

- Provide waste, recycling, and organics bins outside of, but adjacent to, the *accessible* path of travel;
- Locate on a firm, level, stable, slip resistant surface and orient openings to be perpendicular to the directional path of travel;
- Bins shall be provided with a self-closing lid;
- Openings shall be distinguishable in shape and colour whether they are single or combined;
- Openings shall be located at a height between 900 mm and 1050 mm; and
- Ensure bins are cane-detectable and are contrasted by colour from the surrounding environment.

4.7 Signage and Wayfinding

In addition to the requirements within this section, *signage* shall comply with *Div 10 – Dalhousie Interior Signage Guidelines*.

- Where an *accessible* entrance to a building is not obvious, *signage* shall be provided to indicate nearest *accessible* entrance and provided along the route of travel to the accessible entrance;
- *Signage* shall be visible from a distance and will contrast with its surroundings;

- *Signage* shall be a component of the landscape design and integrated into walls, structures, and planting plans where possible;
- Free standing signage shall be illuminated and placed away from traffic so they are not damaged or obscured by snow removal operations; and
- Signs to be situated within planting beds shall have their concrete footings set deeper than normal to allow sufficient growing medium to accommodate planting of groundcover around the base of the sign.

4.7.1 Branding and Wayfinding

- Follow theme (branding) for the campuses to strengthen and communicate a University identity;
- Coordinated an easy-to-read system of direction and information graphics that reflects the character and branding; and
- Provide free-standing consistent graphic *signage* near main entrances to all campus buildings.

4.7.2 Exterior Building Mounted Signage

- All buildings shall be equipped with a building identification sign that is visible from the approach;
- Building *signage* shall be illuminated and shall colour contrast against mounting surfaces; and
- *Signage* shall be consistently located, be on a glare-free surface.

4.7.3 Campus Maps

- Maintain up-to-date campus maps that are easily readable and support pedestrian orientation and *wayfinding*;
- Campus maps will consider illustrating the length of pathways, the location of *accessible* pathways, the location of *accessible* entrances, and parking areas; and
- Campus maps shall include *tactile* elements and be colour contrasted against surroundings and/or mounting surfaces.

5.0 Natural Landscape Guidelines

5.1 Plantings

- Use plant species that are native and adapted to the local climate;
- Substitute low maintenance salt and drought-tolerant groundcovers instead of high maintenance turf to reduce maintenance and irrigation costs;
- Consolidate soft landscape areas to enhance tree and plant growing conditions;
- Use plants to define spaces and make them climatically comfortable for people;
- Expand rooting zones of landscaped areas under adjacent hard paving surfaces. Techniques may include the use of structural soils or cells, continuous planting trenches and/or permeable paving;
- Combine stormwater management and planting where appropriate; and
- Planting programs will consider principles of Crime Prevention Through Environmental Design (CPTED), which can reduce the incidence and fear of crime on the campus.
- Planting programs are to be simplistic and maintainable.

5.1.1 Planting Bed Edges

- Utilize landscaping as a buffer between pedestrians and elements that are potential hazards (such as projections or obstacles, like gas meters, fire hydrants, and other utilities);
- Design to prevent ground cover or drainage from entering the pedestrian route; and
- Where softscapes adjacent to the pedestrian path of travel (such as shrubbery, grass, mulch or flower beds) that may present a hazard because they are below the level of the pedestrian route, provide colour contrasted edge protection at a height of 100 mm.

5.2 Trees and Shrubs

- Use a three-meter planting interval to maximize the value of campus trees;
- Select tree species that are native or adapted to Halifax and Truro/Bible Hill. Salt and drought tolerance help to ensure survivability (consult list in Appendix G);
- At gateway locations, special plantings and landscape features are encouraged;
- Where proposed development may impact significant mature tree species, they are to be assessed by a certified arborist or landscape architect and reported to Dalhousie's Environmental Services Manager and/or Supervisor;
- Provide a continuous soil trench for street trees to give tree roots more room to spread and access water thus improving growth;

- Trees and shrubs must be of good nursery stock that is not root-bound or stunted (held too long in nursery containers). Plants that have become root bound are not acceptable. Refer to the Canadian Nursery Trades Association standards for size and quality of plant stock;
- Trees and shrubs must have a strong fibrous root system free of disease, insects, defects, and injuries. The trees must have solid stems and a well-branched structure characteristic of the species. Plants must have been transplanted or root pruned regularly but not later than nine months prior to arrival on site;
- Trees and shrubs must have been grown in containers for an optimal amount of time to produce a root system that is able to hold soil when removed from container;
- In ‘balled and burlapped’ trees, the size of the ball shall be proportional to the caliper of deciduous tree and to the height of the conifer. The caliper shall be measured at 150mm (6”) above ground level. A tree with 75mm (3”) caliper required root ball of 1m (40”) diameter. Increase diameter of root ball by 250mm (10”) with each increase of 25mm (1”) in caliper. Root balls of proper size must include 75% fibrous and feeder root system. This excludes the use of native trees grown in light sandy or rocky soil. Secure root balls with burlap, heavy twine, and rope. Use hessian burlap. Frozen root balls will be permitted provided the root balls are sufficiently protected to prevent breakage. Protect root balls from sudden changes in temperature and exposure to heavy rainfall;
- Imported plant material must be accompanied by the necessary permits and import licenses. They must conform to federal and provincial phytosanitary regulations. Consider local plant producers as an alternative; and
- Plant material will be specifically suited to the planting location, in terms of toxicity (e.g., children’s centre) and thorns (e.g., near walkways and entrances).
- Refrain from flowering and fruiting trees or shrubs that will drop fruit or residues on walkways/people or vehicles. Plants with pungent fragrances or heavy pollen loads will be avoided near air intake ducting to buildings;
- Tree limbs and overhead plantings that overhang pathways and *accessible routes* do not impede the *clear* headroom of 2100 mm.
- Garden planters shall not reduce the *clear* width of an *accessible route*; and shall be *cane* detectable and colour contrasted with the surrounding environment.



5.2.1 Grates Around Trees

- Openings shall be 13 mm wide in one direction maximum;
- Long dimension of openings shall be perpendicular to the direction of travel; and
- Located outside of an *accessible* path of travel and ensure grate is slip-resistant.

5.2.2 Tree Protection

- In undertaking new construction and renovations the designer must preserve existing mature trees. Any project that will impact University owned or maintained trees must include a report completed by a certified arborist. The report will:
 - i. Assess the condition of the tree(s) before the project begins.
 - ii. Identify the species, condition and physical dimensions of the tree(s).
 - iii. Include a plan for the protection of the tree(s) during the project.

The report must be submitted, and the plan approved by Dalhousie's Environmental Services Manager and/or Supervisor before any work can begin. The plan will be used to assess any damage to the trees caused by the project;

- The Tree Protection Zone (TPZ) shall be outlined prior to commencement of the project. The arborist (or Dalhousie's Environmental Services Manager and/or Supervisor) shall define the area. In the case of construction concerns and required grading, this area may be decreased or increased at the discretion of the arborist and Dalhousie's Environmental Services Manager or Supervisor;
- Where trees are to be retained on a *site*, protection barriers must be installed. Trees inside the TPZ shall be cared for throughout the construction process. A fence shall be erected around the perimeter of the TPZ prior to the commencement of any demolition, grading work or construction. This fence shall not be removed until the completion of the project;
- Protection barriers may consist of plastic, wood, or metal fencing of suitable height and strength to prevent encroachment;
- The TPZ area is determined by one of three commonly accepted measurements:
 - i. Drip-line method: Protect the area under the drip-line for broad canopied trees or 50% further than the drip-line for narrow canopied trees (conifers, etc.).
 - ii. Tree height method: Protect a circular area with a radius equal to the height of the tree.
 - iii. Trunk diameter method: For every cm of DBH, allow 15cm of space from trunk.



- Signs shall be erected at the perimeter of the TPZ and shall not be removed until the completion of the project. The sign will read as follows:
“**TREE PROTECTION ZONE:** No grade change, storage of materials, or equipment permitted. Tree protection barrier must not be removed without written permission of Dalhousie’s Environmental Services Manager/Supervisor”
- TPZs shall not be breached in any way. Within the TPZ the following restrictions apply:
 - i. No grade change
 - ii. No storage of material or debris
 - iii. No dumping of wash water or concrete effluent
 - iv. No dumping of de-watering effluent, unless approved by the arborist, or Dalhousie’s Environmental Services Manager or Supervisor
 - v. No rigging cables shall be wrapped around or tied to the trees
- Mulching and irrigation of the TPZ prior, during and following construction can reduce negative construction impacts, improve soil conditions, and increase the likelihood of tree survival. Standard chemical fertilization may provide some benefit. However, ensuring good soil health typically reduces the need for chemical fertilization.

5.3 Plant Materials and Ground Cover

- All plant installations shall be carried out in the presence of a certified Horticultural Technician;
- Plant species shall be selected from the list in *Appendix G* to improve species diversity, age and size-class distribution, and overall long-term functioning of campus trees. Please refer to the planting priority map in the *Natural Environment Plan*;
- The campus design will incorporate design elements of texture, line, colour, form, and mass to enhance high quality campus landscapes;
- Plant material and landscapes at the perimeter of the campus are to connect to surrounding neighbourhoods;
- No new trees or vegetation are to be planted within 6 feet of a building, at the edge of their expected mature dripline. This is to avoid future tree removal if future construction work requires building staging;
- Primary plantings are to be established within all the major open spaces and campus entrances to define and accentuate the space, provide an appropriate sense of scale, and bring a high scenic character to the campus. Major open spaces shall be landscapes of landmark stature, distinct from plantings around buildings;

- The predominantly deciduous campus will be enhanced with the addition of both deciduous and evergreen species and other plants with seasonal interest;
- The location, layout and massing of the plants must have a regard for public and personal safety. Hedges will be avoided, or if they are to be provided, they will be low. Cedar hedges, Cotoneaster and any invasive plants must be avoided. Refer to *Crime Prevention Through Environmental Design* (CPTED) design standards;
- The landscape designer will consider using mass plantings of hardy and prolific blooming perennials as bold accent plantings rather than annuals;
- All new trees will be native and adapted species, as per the species list in *Appendix G*, unless special approval is granted by Dalhousie's Environmental Services Manager, Supervisor, or Gardener. Vegetation that is native to the Acadian forest is a valued University asset that will be promoted (*See LEED Canada EBOM SS Credit 3 and Credit 5 and STARS OP Tier Two Credit 19*);
- The landscape designer shall consider the incorporation of mass-plantings of drought-tolerant, salt-tolerant, and accent perennials to increase overall *site*-specific landscape interest and to reduce maintenance requirements;
- Consideration will be given to landscapes that provide habitat for native birds and animals (*See LEED Canada EBOM SS Credit 3 and STARS OP Tier Two Credit 20*);
- Design and construction activity occurring near the public and private right-of-way will be coordinated with both Dalhousie University and the HRM to ensure planting, design, material, and infrastructure guidelines are met;
- Parking structures and blank walls will be creatively screened with green walls, trees, or other greening alternatives; and
- Integrated Pest Management (IPM) will be central in a proposed maintenance strategy for campus vegetation (*See LEED Canada EBOM SS Credit 3 and STARS OP Credit 9*).

5.4 Planting Time

- Planting locations must be approved prior to excavation of planting pits; and
- Deciduous plants must be planted during a dormant period before buds have broken or at the end of the growing season prior to ground freeze. Plant material imported from a region with warmer climatic conditions may only be planted in early spring.

5.5 Excavation and Stakeouts

- The locations of all below grade utilities must be verified prior to excavating. The locations of utilities must be staked out in areas where excavation will occur;
- Where tree excavation is required around valued campus trees, excavation shall be done by hand or by air/water jet excavation systems;
- No root pruning is permitted within 1.5m of the tree trunk. For every 15 cm of tree diameter (DBH) add 30 cm to distance from trunk. No more than 25% of tree roots shall be pruned on one side of the tree and no more than 33% of the entire root system;
- All new tree planning and planting projects shall consider the amount of continuous soil volume required to maximize tree growth. In difficult planting environments, volume targets can be achieved with soil trenches, structural soil, and growth-cells. See *Appendix C* for the soil volume and tree-size relationship chart. See Dalhousie's Office of Sustainability *Natural Environment Plan* for greening opportunities that maximize tree volume in difficult urban *sites*;
- For large trees and conifers, the depth of the excavation must be at least 20 cm deeper than height of root ball. The planting pit must be excavated 3-5 times the size of the root ball. A wider pit is required for poor quality soil. Excavated soil is to be amended with good quality (texture, structure, and AFP) planting substrate. See *Appendix D* for tree planting details; and
- The bottom of the excavations must be properly drained to prevent freezing and waterlogging. The subgrades of the planting beds and tree pits must be scarified to 20 cm.

5.6 Planting Procedures

- Soil in planting beds and tree pits is to be amended with a 'triple-mix' planting mixture. Refer to the Landscape Nova Scotia Guidelines for soil amendments and fertilizers. Tree planting and soil amending will be done under favourable weather conditions;
- Orient trees and shrubs with the best side facing outward based on the individual location in relation to buildings, pedestrian spaces, and other plantings;
- All plant material shall be planted to allow for settling of the soil. The final depth will be equal to the depth originally grown in the nursery. No excessive mounding above root crown and stem collar;



- Ensure that tree root balls rest on a minimum of 20 cm (8") of planting mix; and
- Topsoil must be tamped around the root system in layers of 15 cm (6") to eliminate air pockets. Frozen or saturated topsoil is unacceptable. When 2/3 of topsoil mixture has been placed, the hole is to be filled with water. After the water has completely drained through the soil, completely backfill. Form a saucer around the top of the root ball.

5.7 Irrigation

- The university as a policy does not irrigate on an ongoing basis, just in the plant establishment phase. For this phase, the proposed irrigation design must be reviewed and approved by Dalhousie's Environmental Services Manager or Supervisor;
- The proponent shall explore slow-drip tree bags or other low-water-use irrigation alternatives for vegetation establishment;
- Grey water and stormwater will be used whenever possible for irrigation purposes; and
- All irrigation components shall be either Rainbird or Toro brand of irrigation systems.

5.8 Stormwater Management

- New development shall not increase the flow of stormwater from project *sites* and retrofit projects shall decrease the amount of stormwater run-off by the methods listed below (i, ii, iii). Stormwater can no longer be discharged into a sanitary sewer. (*See LEED Canada EBOM SS Credit 6, STARS OP Credit 23, Halifax Regional Municipality Charter, Item 348, and HRM Stormwater Management Guidelines*). Vegetative solutions for stormwater management on the Dalhousie campus include:
 - i. Vegetated swales to direct and channel water, allow for water infiltration, and provide *site* aesthetics.
 - ii. Rain gardens for on-*site* stormwater retention, infiltration, evaporation, and the addition of amenity value to the landscape (Appendix F).
 - iii. Green roofs to intercept rainwater that would otherwise be channeled into the municipal stormwater system.
- Stormwater management systems shall be planted with vegetation that is proven to perform well in wet, low oxygen environments, which will take-up and transpire water, stabilize soil, filter water and soil pollutants, and encourage on-*site* water infiltration. Green roof systems shall be planted with vegetation that is from certified plant producers. Vegetation shall be selected to perform in a myriad of temperature and precipitation extremes; and
- Contractors are to explore non-vegetated storm water solutions:
 - i. Permeable paving encourages slow infiltration and release of surface water from the paved *site*. See *Appendix F* for a permeable paving detail.



- ii. Rainwater storage and re-use will divert stormwater for internal grey- water use or for landscape irrigation.

5.9 Sod

- Sod shall be weed-free number one Kentucky Bluegrass-Fescue, nursery grown in compliance with the specifications outlined by the Nursery Sod Growers Association of Canada;
- The sod is to be laid during the growing season. Sodding at freezing temperatures or on frozen ground is unacceptable. Sodding during dry weather will be avoided. However, if there is no alternative it will be acceptable only if sufficient and continuous watering is assured;
- The sod is to be laid with joints butted even with adjoining areas and the rows shall have staggered joints. The sections are to be butted closely without over- lapping or leaving gaps between sections. Irregular or thin sections are to be cut out with a sharp tool;
- The sod is to be rolled with a light roller to ensure close contact between sod and soil. The sod is to be thoroughly watered; and
- Grassed areas will be designed strategically; it is not encouraged as a dominant landscape feature.

5.10 Soil and Additives

- The soil used for landscaping must be purchased from a reputable supplier and be screened; triple mix; weed-free; friable natural loam; free of stones, roots, lumps, and other solid material.

5.11 Plant Accessories

- Tree wrappings for trunks shall be first quality burlap;
- The anchors for the support of large shrubs and trees up to 65mm (2.5") in caliper shall be new metal "T" bars 38mm x 5mm (1.5" x 1.5" x 3/16") painted black;
- Eye Bolts and Turnbuckles shall be zinc coated. Turnbuckles shall be 10mm (3/8") diameter bolts for trees for 75mm (3") caliper and 76mm (0.25") diameter bolts for less than 75mm;
- Anchoring hoses shall be two-ply reinforced, new black rubber hose 12.7mm (0.5") in diameter;
- Mulch shall be shredded bark mulch;
- Tie back wires shall be zinc coated pliable steel wire, #9 gauge;
- Stakes shall be T-rail iron stakes 37mm x 1.5 x 3/16") primed with on brush coat of black zinc rich paint to CGSB 1-GP-181; and
- Rodent Protection shall be round, metal or plastic extending 60 cm above grade.

5.12 Paving

- All paving projects will be reviewed and approved by Dalhousie's Environmental Services Manager and/or Supervisor.
- In the design and future reconstruction of streets within the campus, the designer will work with the University and the Municipality to establish a palette of materials;
- In the landscape design of central open spaces and in special areas of the campus, natural stone paving in combination with poured in place concrete, will be used. The chosen natural material shall be available in suitable quantities, over an extended period of time, and sourced locally.
- Pavers / paving stones will not be used on vehicular driveways, streets, and parking surfaces.
- Appropriate testing (e.g. proctor, compaction) will be completed by the Consultant for all paved surfaces.
- Consider paving stones and porous paving as part of a stormwater management program. When properly graded and laid, porous paving encourages the recharge of groundwater. See *Appendix F* for a permeable paving detail;
- Foundations at minimum are to be 20 cm of properly compacted screening. The sand or stone must be clean and free of deleterious materials. A steel edge will be used around the perimeter of the paving stones. The steel edge shall be 0.6 cm and pre-punched to accept a mechanical fastener;
- Paving material are to have sufficient surface texture that will help prevent slipping and will assist in reducing the need for winter salting;
- Walkways shall be drained on either side to avoid waterlogged margins and ice build-up along the walkway due to compaction;
- Consider paved surface cover for stormwater control and to reduce heat absorption (See *LEED Canada EBOM SS Credit 7.1*); and
- Asphalt will only be used for temporary repairs and are not to be used as a permanent material for pedestrian walkway systems.

5.13 Walls and Fences

- New walls and fences will be reviewed and approved by Dalhousie's Environmental Services Manager and/or Supervisor.
- New walls and edges will be attractive and of durable materials, preferably natural stone and will specifically exclude timbers, logs, and dry set pre-cast blocks. Wherever possible, walls shall include integral seating to animate the spaces;
- Free standing walls will be designed to define spaces. Walls will not obstruct visibility or create secluded corners that may compromise personal safety; and
- Fences are not be installed as features in the redesign of major open spaces.
- New walls and fences will aim to limit obstructions to snow removal operations.

5.14 Green Roof

- All applied roofing and green roof components shall be provided by one manufacturer;
- The various components comprising the green roof assembly shall be under the jurisdiction of, and be the responsibility of, the roofing membrane manufacturer;
- The product and material manufacturers and suppliers shall review and oversee the labor for the installation and placement of the green roof assembly; and
- Design and provide a lightweight growing medium that will retain water and sustain plant growth.

(See LEED Canada EBO&M SS Credit 5, Credit 7.2).

Acknowledgements

We would like to thank and recognize the resources and contributions of:

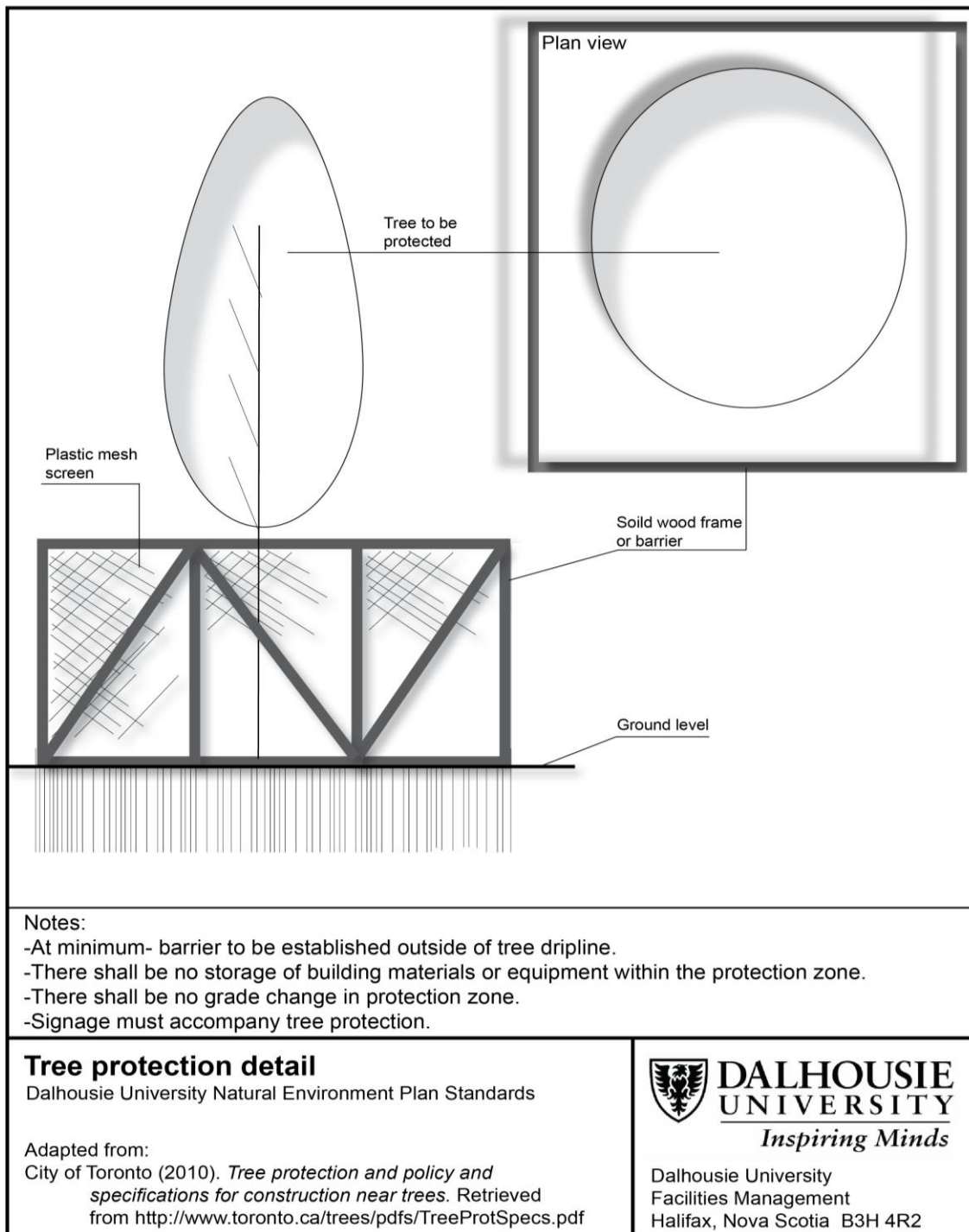
- Those with lived experience of *disability* who have shared their stories, experiences, and recommendations.
- Campus and community members providing expertise on natural environment and planning elements.
- The University of Toronto Facility Accessibility Design Standard – January 16, 2023
- Toronto Accessibility Design Guidelines 2021
- International best practices
- Level Playing Field Inc. of 800, 322 11th Avenue SW, Calgary, Alberta, T2R 0C5 (Tel: 403-472-4375), who contributed work related to physical assessments, stakeholder engagements, and universal design-focused content to the development of accessible Exterior Environment and Natural Landscape Guideline solutions.

References

- Canadian Standards Association B651, Accessible Design for the Built Environment
- CNIB Foundation, Clearing Our Path
<https://clearingourpath.ca/index.php/resources/glossary/>
- Leadership in Energy and Environmental Design (LEED) v4.1, Section LT, P99-101

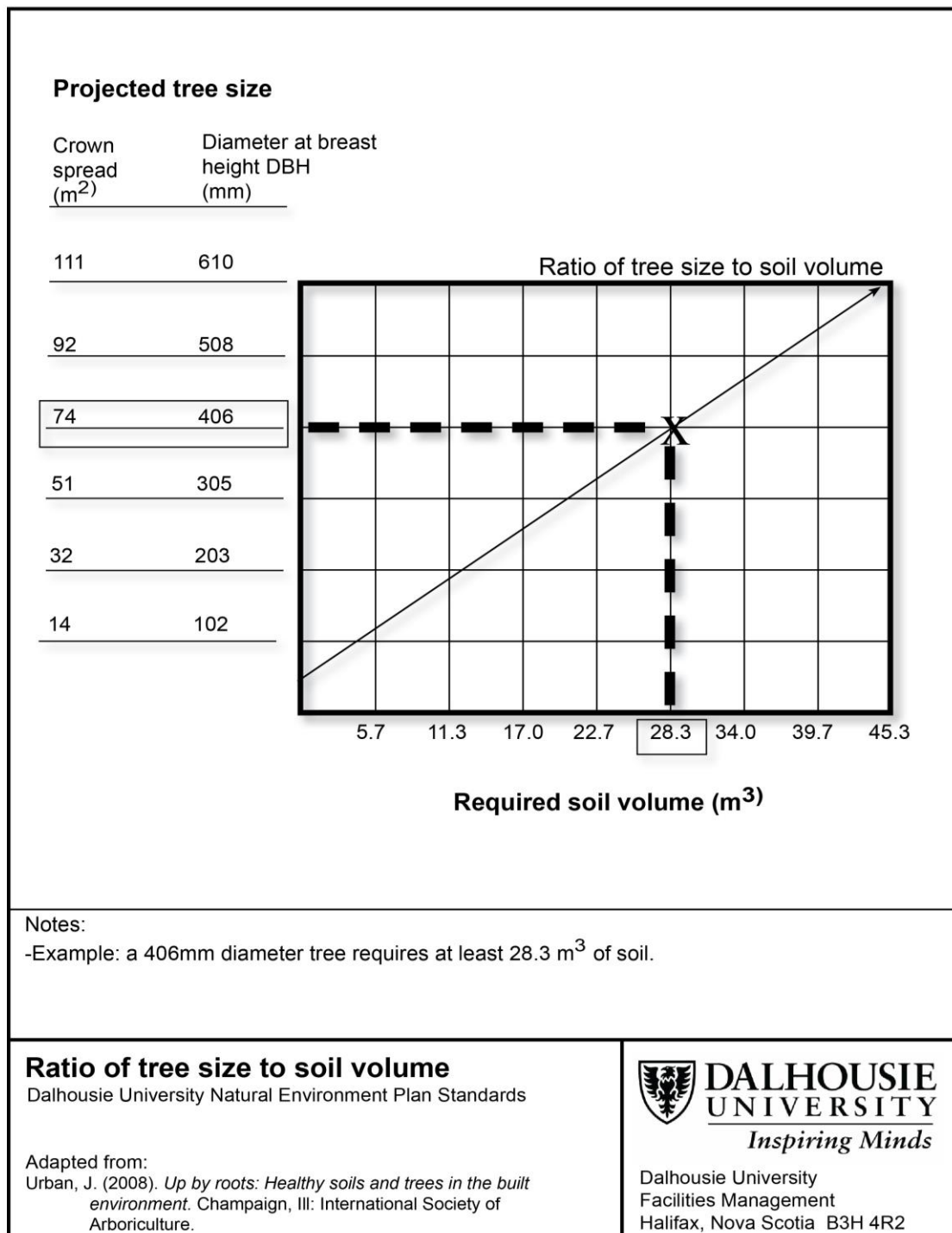


Appendix A: Construction protection details



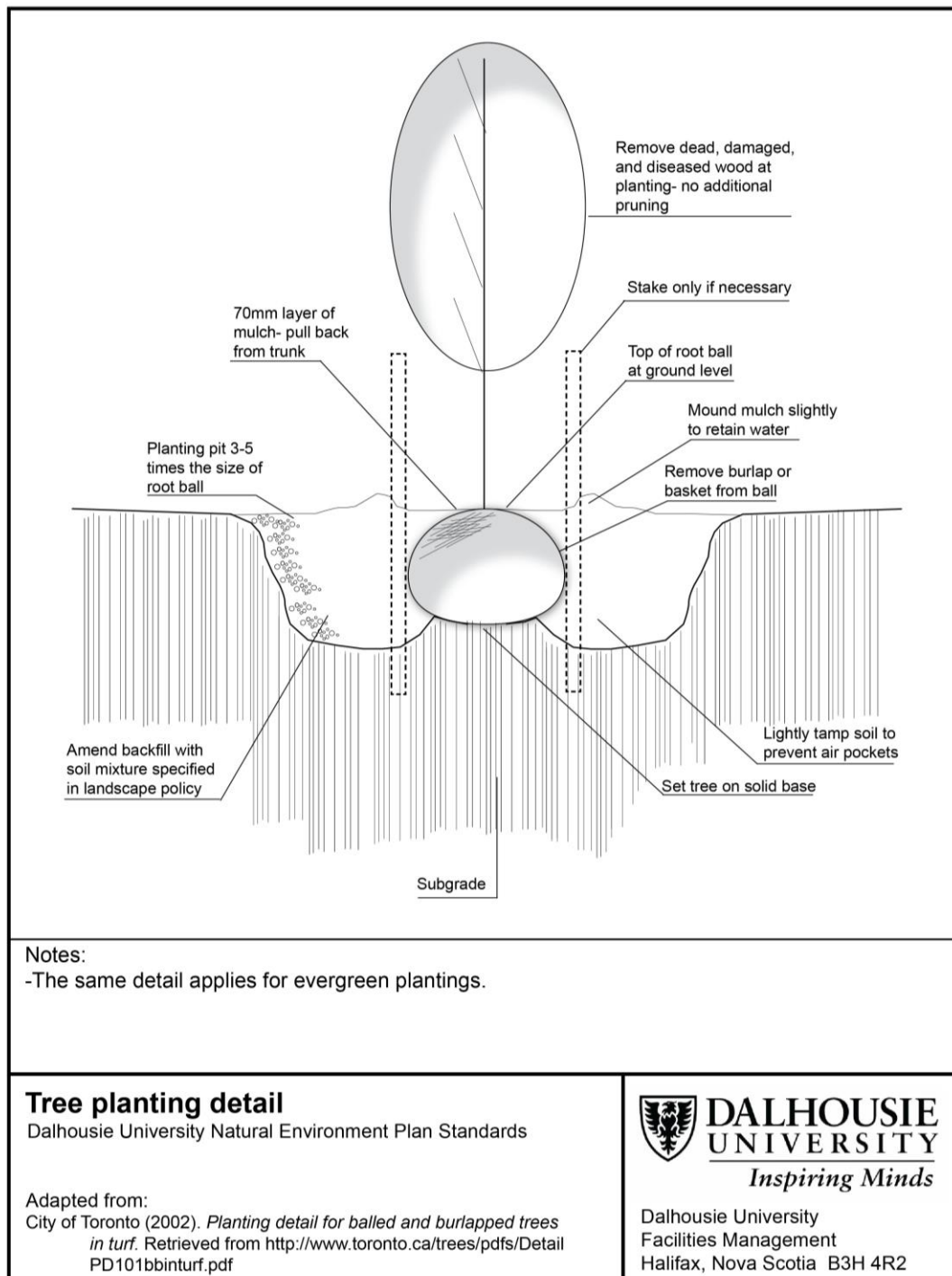


Appendix B: Soil volume targets for tree planting



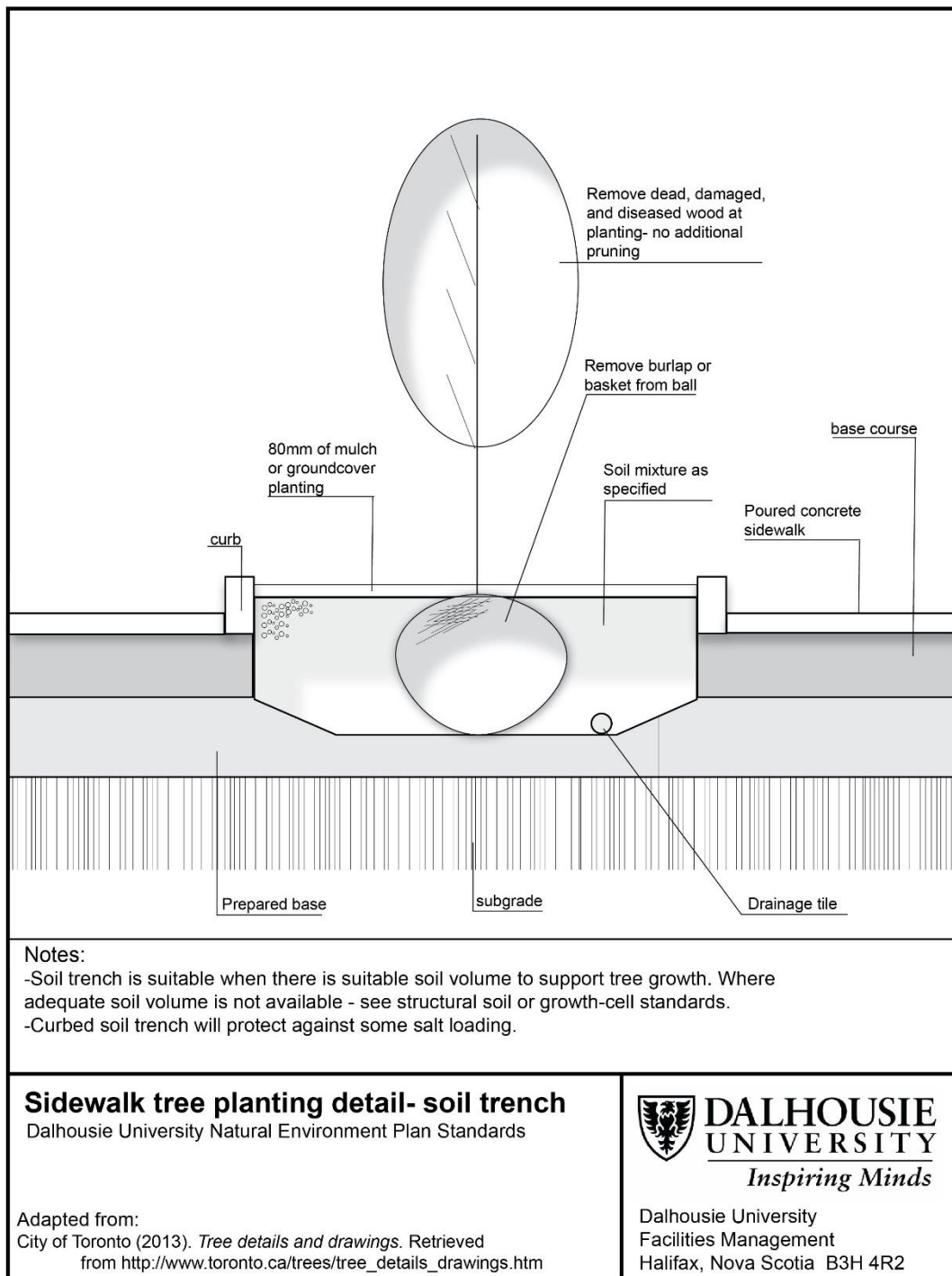


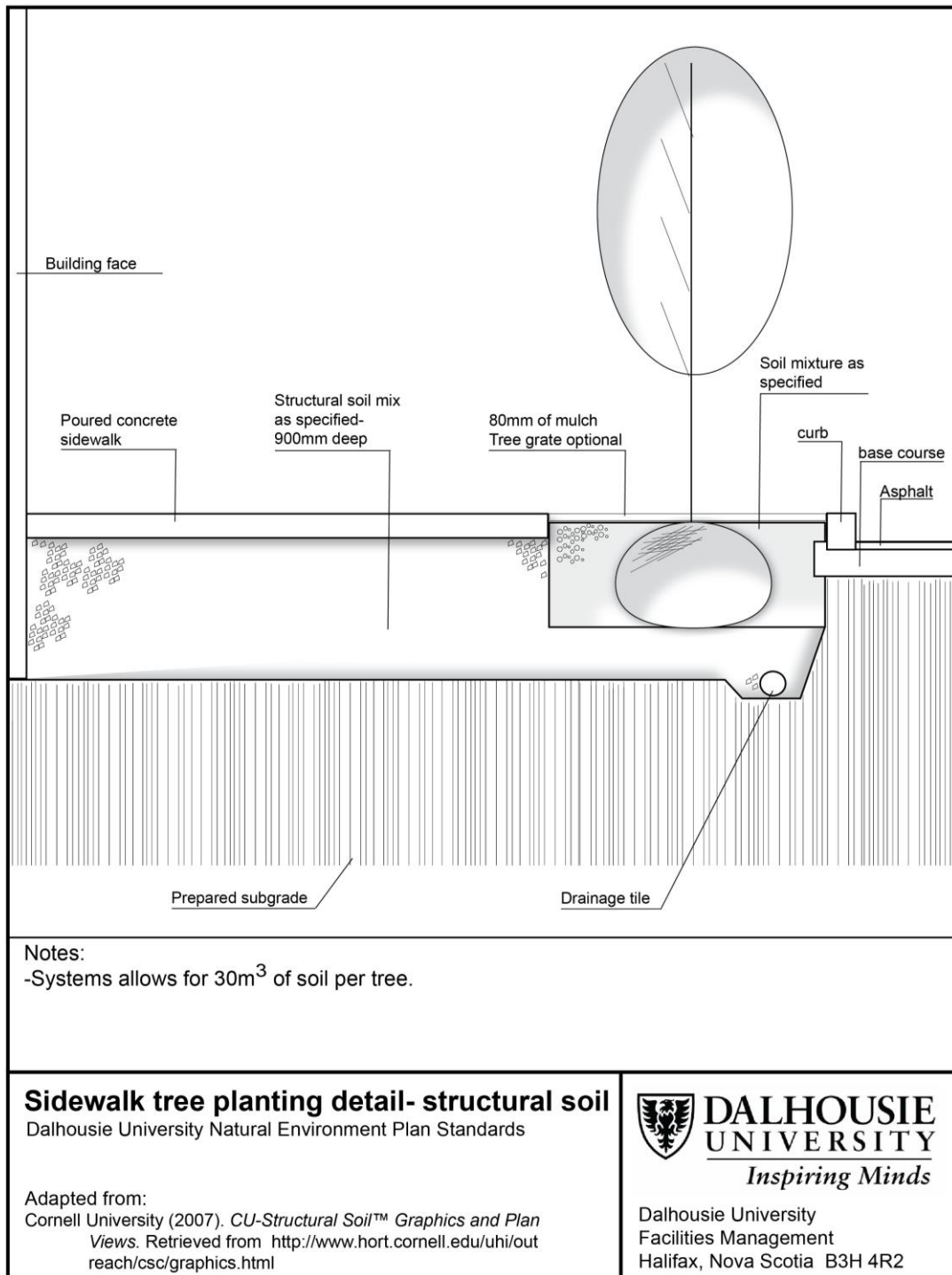
Appendix C: Tree planting detail

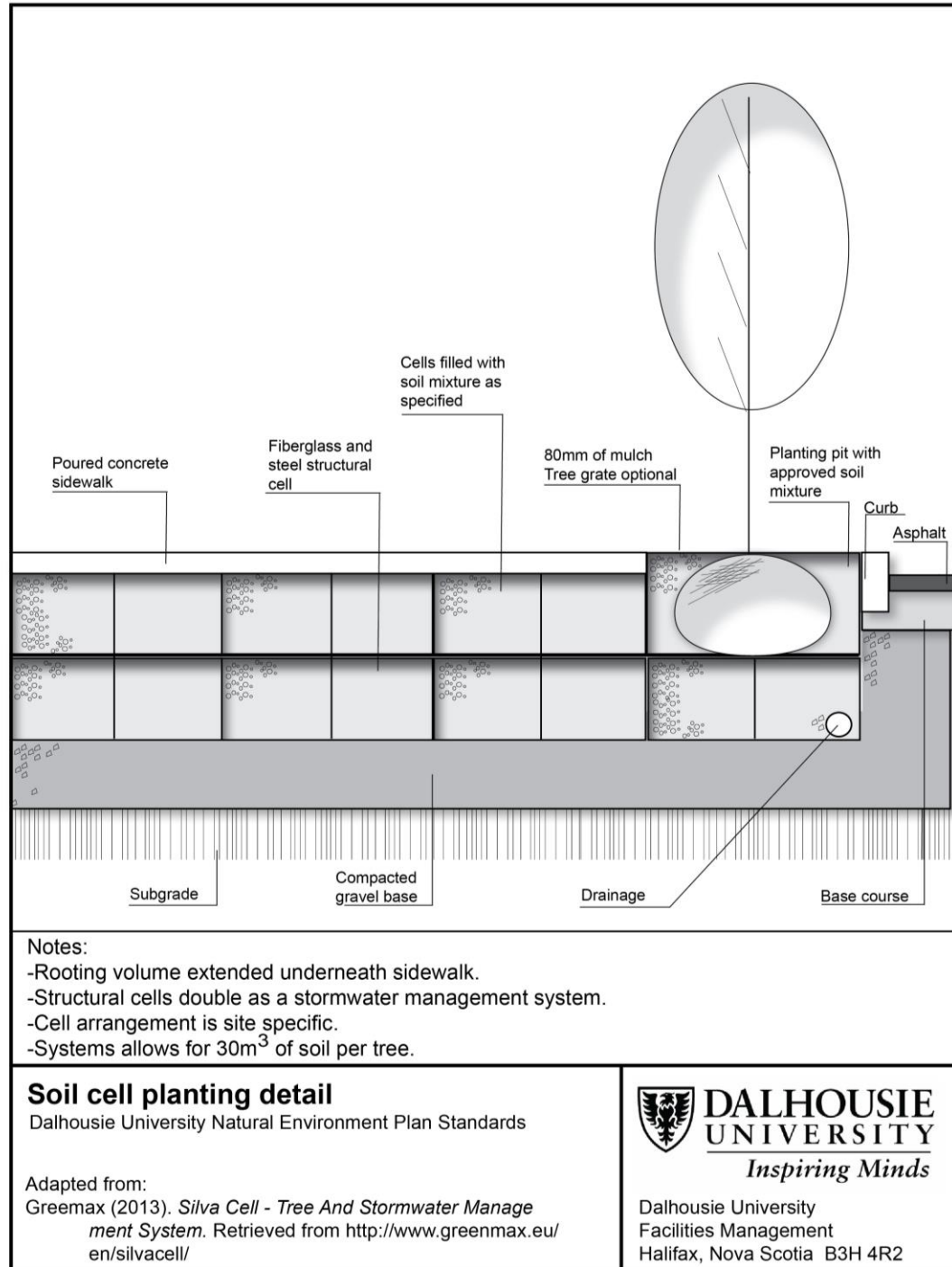


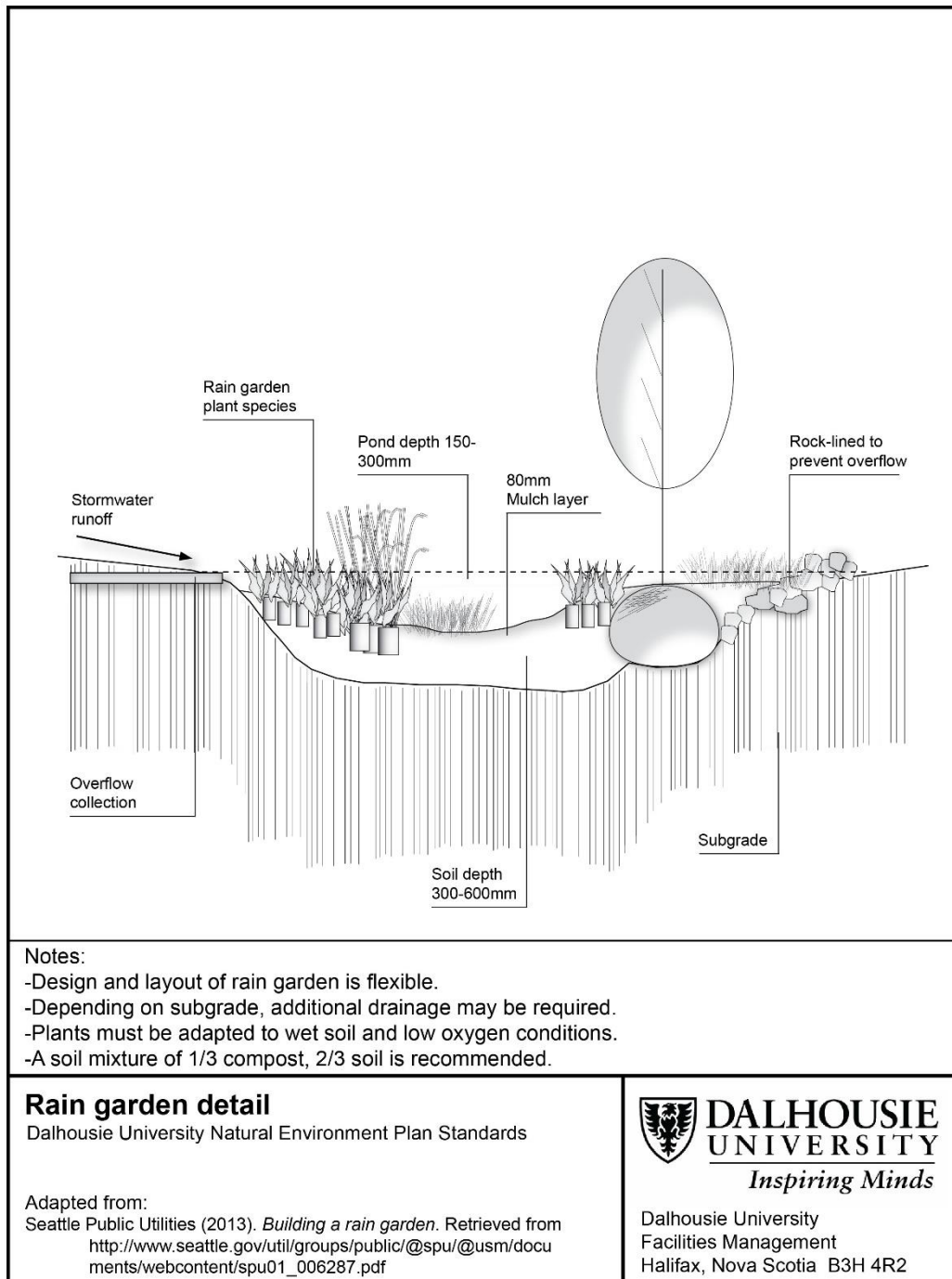


Appendix D: Planting details for paved environments



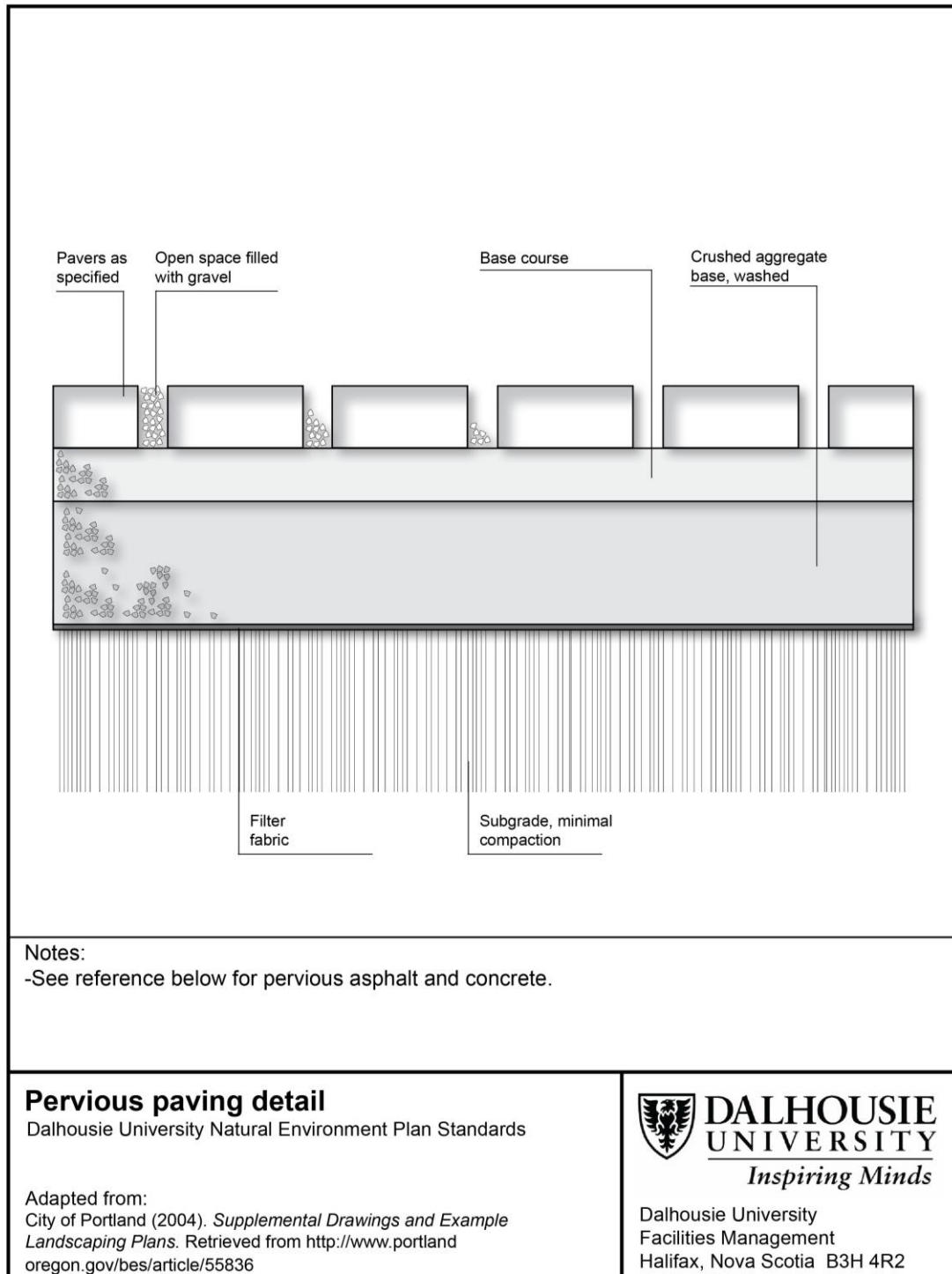








Appendix E: Stormwater management details



Appendix F: Tree, shrub, and perennial species

Natural Environment Plan- Approved species

Tree species list

name	height (m)	spread (m)	hardiness zone	form	planting site street(s), park (p), woodland (w)	native species	drought tolerance	salt tolerance	soil adaptability	pollution tolerance	light requirements	moisture demands	notes
<i>Abies balsamea</i>	12	6	5a	conical	p		✓		✓	✓	sun	moderate/low	no serious pests
<i>Acer x freemanii</i>	16	14	4a	oval	s, p, w		✓	✓	✓	✓	sun/part shade	moderate	urban tolerant, intense fall colour
<i>Acer ginnala</i>	5	5	4a	rounded	s, p		✓	✓	✓	✓	sun/shade	moderate/low	performs well in planters
<i>Acer nigrum</i>	14	9	5b	rounded	p	✓	✓		✓	✓	sun/shade	moderate	heat tolerance
<i>Acer pseudoplatanus</i>	15	10	5b	rounded	s, p		✓	✓	✓	✓	sun/part shade	moderate	few serious pests
<i>Acer rubrum</i>	15	13	4a	rounded	s, p, w	✓	✓		✓		sun/part shade	moderate	best to grow from local seed source
<i>Acer saccharinum</i>	20	14	4a	upright	p, w	✓	✓	✓	✓	✓	sun/part shade	moderate/high	urban tolerant, weak branching
<i>Acer saccharum</i>	20	24	4b	rounded	p, w	✓					sun/shade	moderate	shade tree, not stress tolerant
<i>Amelanchier alnifolia</i>	4	3	5a	rounded	s, p, w		✓		✓	✓	sun/part shade	moderate	white blooms, showy fruit, wildlife
<i>Betula alleghaniensis</i>	20	15	4a	upright	p, w	✓					shade	high	attractive peeling bark
<i>Betula papyrifera</i>	15	10	3a	pyramidal	p, w	✓	✓		✓		sun	low	stress susceptible, best planted B&B
<i>Carpinus caroliniana</i>	8	8	4b	irregular	s, p, w	✓	✓		✓		sun/shade	moderate	naturalizing, slow to establish
<i>Carya cordiformis</i>	25	20	5a	cylindrical	p, w	✓					sun	moderate	edible nut, attractive bark, slow to establish
<i>Carya ovata</i>	25	20	5a	oblong	p, w	✓	✓		✓		sun/part shade	moderate	edible nut, attractive bark, slow to establish
<i>Fagus sylvatica</i>	20	10	5a	pyramidal	p, s						sun/part shade	moderate	specimen
<i>Fraxinus nigra</i>	25	20	5b	rounded	p, w	✓			✓	✓	sun	moderate/high	separate male and female trees
<i>Fraxinus pennsylvanica</i>	20	15	2	rounded	s, p, w	✓	✓		✓		sun	moderate/low	great campus tree, monitor for EAB
<i>Gleditsia triacanthos</i>	15	15	4	spreading	s, p, w			✓	✓	✓	sun	moderate/high	casts dappled shade
<i>Juglans cinerea</i>	25	15	4a	spreading	p, w	✓	✓		✓		sun	moderate/high	intolerant of shade
<i>Juglans nigra</i>	20	15	4	rounded	p, w						sun	moderate/high	difficult to transplant
<i>Larix laricina</i>	25	5	2a	pyramidal	p, w	✓					sun	moderate/high	intolerant of shade
<i>Liriodendron tulipifera</i>	25	20	5	pyramidal	s, p, w						sun	moderate/high	avoid dry, hot sites
<i>Magnolia acuminata</i>	25	25	4	pyramidal	s, p, w				✓		sun/part shade	moderate/high	difficult to transplant
<i>Malus spp.</i>	7	7	4a	upright	s, p		✓	✓	✓	✓	sun	moderate/low	very showy, many pests
<i>Nyssa sylvatica</i>	20	8	4	pyramidal	s, p, w						sun	moderate/high	taproot, difficult to transplant

tree selection

EXTERIOR ENVIRONMENT AND NATURAL LANDSCAPE POLICY AND GUIDELINES 2023

name	height (m)	spread (m)	hardiness zone	form	planting site street(s) park (p), woodland (w)	native species	drought tolerance	salt tolerance	soil adaptability	pollution tolerance	light requirements	moisture demands	notes
<i>Ostrya virginiana</i>	8	5	4b	rounded	s, p, w	✓	✓		✓		sun/part shade	moderate	fairly tolerant, leggy in drought, slow to establish
<i>Picea glauca</i>	25	5	1a	conical	s, p, w	✓	✓	✓	✓	✓	sun	moderate/high	wind tolerant, short-lived
<i>Picea rubens</i>	25	5	2a	conical	p, w	✓					sun	moderate/low	pollution intolerant
<i>Picea mariana</i>	25	5	2a	irregular	p, w	✓						moderate/high	shallow rooting
<i>Pinus resinosa</i>	25	15	3a	irregular	p, w	✓	✓		✓		sun	low	wind tolerant, shade intolerant
<i>Pinus strobus</i>	30	10	4a	irregular	p, w	✓			✓		sun	moderate/low	susceptible to wind
<i>Platanus occidentalis</i>	25	20	4	rounded	s, p, w		✓	✓	✓	✓	sun	moderate	tolerant of city conditions
<i>Populus grandidentata</i>	20	10	4a	oval	w	✓	✓		✓		sun/part shade	moderate	naturalized plantings
<i>Populus tremuloides</i>	25	10	2	rounded	w	✓	✓		✓	✓	sun	moderate/low	short lived, naturalized plantings
<i>Prunus serotina</i>	22	15	4a	oval	p, w	✓	✓		✓		sun	moderate	naturalized plantings
<i>Prunus virginiana</i>	8	3	2a	rounded	p, w	✓	✓	✓	✓	✓	sun/part shade	moderate/low	fruit edible, susceptible to 'black knot'
<i>Quercus alba</i>	20	20	4	pyramidal	p, w						sun	moderate	difficult to move and establish
<i>Quercus macrocarpa</i>	15	15	3b	spreading	s, p, w	✓	✓	✓	✓	✓	sun	moderate	no serious pests, difficult to transplant
<i>Quercus rubra</i>	25	25	4a	rounded	s, p, w	✓	✓	✓	✓	✓	sun	moderate/low	few pests, good urban performer, slow to establish from bare root
<i>Quercus velutina</i>	18	15	3	irregular	p, w						sun	moderate	intolerant of disturbance
<i>Robinia pseudoacacia</i>	20	25	5a	narrow	s, p		✓	✓	✓	✓	sun	low	tolerant, brittle branches
<i>Sassafras albidum</i>	15	10	5	pyramidal	p, w						sun	moderate/low	use in naturalization
<i>Sorbus americana</i>	11	7	2a	rounded	p, w	✓			✓	✓	sun/part shade	moderate/high	intolerant of maritime exposure
<i>Sorbus decora</i>	10	6	2a	rounded	p, w	✓		✓			part shade/ shade sun	moderate/high	berries attractive to wildlife
<i>Thuja occidentalis</i>	15	5	4a	pyramidal	p, w	✓	✓		✓		sun/part shade	moderate/high	naturalizing, storm damage
<i>Tilia americana</i>	22	10	4b	ovate	p, w	✓			✓		sun/part shade	moderate	not as ornamental, naturalizing
<i>Tsuga canadensis</i>	20	9	4b	pyramidal	p, w	✓					sun/shade	moderate	naturalization, tolerates shade
<i>Ulmus americana</i>	25	20	4a	upright	w	✓	✓	✓	✓	✓	sun	moderate	*DED susceptible, naturalizing

tree selection

EXTERIOR ENVIRONMENT AND NATURAL LANDSCAPE POLICY AND GUIDELINES 2023

Natural Environment Plan- Approved species

Shrub species list

name	height (m)	spread (m)	hardiness zone	form	planting site street(s), park (p), woodland (w)	native species	drought tolerance	salt tolerance	soil adaptability	pollution tolerance	light requirements	moisture demands	notes
<i>Alnus incana</i>	15	7	2a	pyramidal	p, w						sun/part shade	moderate/high	good for erosion control
<i>Alnus serrulata</i>	3	2	4b	rounded	p, w						sun/part shade	moderate/high	tolerant of compaction
<i>Amelanchier arborea</i>	8	5	4a	variable	s, p, w						sun/part shade	moderate/high	showy cultivars
<i>Amelanchier bartramiana</i>	2	1	5	variable	p, w				✓		sun/part shade	moderate/high	can be confused with Choke Cherry
<i>Amelanchier canadensis</i>	4	2	3a	variable	p, w			✓			sun/part shade	moderate/high	attractive to wildlife, edible
<i>Amelanchier laevis</i>	7	4	4	variable	p, w			✓			sun/part shade	moderate	attractive to wildlife, edible
<i>Amelanchier sanguinea</i>	3	2	4	variable	p, w			✓			shade	moderate/low	attractive to wildlife, edible
<i>Comptonia peregrina</i>	1.5	1	2	spreading	p, w	✓	✓		✓		sun/part shade	moderate/low	plant fixes nitrogen, edible fruit
<i>Cornus alternifolia</i>	8	8	4	spreading	p, w						part shade/ shade	moderate/high	specimen plant, attractive to wildlife
<i>Cornus racemosa</i>	4	4	3	irregular	p, w						sun/shade	moderate	attractive to wildlife
<i>Cornus sericea</i>	2	3	3	rounded	p, w			✓	✓		sun/part shade	moderate/high	landscape shrub, winter interest
<i>Crataegus chrysocarpa</i>	5	3	4b	pyramidal	s, p, w		✓		✓	✓	sun/part shade	moderate/high	tolerant of wind, compaction, Juglone
<i>Crataegus mollis</i>	8	7	3	rounded	s,p,w		✓		✓	✓	sun/part shade	moderate	tolerant of wind, compaction, Juglone
<i>Gaylussacia baccata</i>	1	1	5	rounded	p, w				✓		sun/part shade	adaptable	edible fruit, attractive blooms
<i>Gaylussacia dumosa</i>	0.5	0.5	5	rounded	p, w				✓		sun/part shade	adaptable	acid loving, woodland garden
<i>Ilex verticillata</i>	3	2	3	rounded	p, w	✓			✓		sun/part shade	moderate/high	woodland plant, showy fruit (female)
<i>Juniperus communis</i>	3	4	2	spreading	p, w	✓		✓	✓		sun	moderate/low	low maintenance when established
<i>Lonicera canadensis</i>	1.5	0.5	3	upright	p, w				✓		sun/part shade	moderate/high	woodland planting, attracts wildlife
<i>Lonicera oblongifolia</i>	1.5	0.5	3	irregular	w						part shade/ shade	high	bog plant
<i>Myrica pensylvanica</i>	2	2	2	spreading	s, p, w	✓		✓			sun/part shade	low	seaside plant, soil stabilization
<i>Rhododendron canadense</i>	1	0.7	2a	rounded	s, p, w	✓					sun/part shade	moderate	showy flowers
<i>Rhus glabra</i>	3	3	2	spreading	s, p, w				✓	✓	sun/part shade	moderate/low	edible fruit , site naturalization
<i>Rhus typhina</i>	5	5	3	spreading	s, p, w				✓		sun/part shade	moderate/low	colonizes landscape, quickly growing
<i>Ribes americanum</i>	1	0.5	2	upright	w				✓		sun/part shade	moderate/high	edible fruit

shrubselection

EXTERIOR ENVIRONMENT AND NATURAL LANDSCAPE POLICY AND GUIDELINES 2023

name	height (m)	spread (m)	hardiness zone	form	planting site street(s), park (p), woodland (w)	native species	drought tolerance	salt tolerance	soil adaptability	pollution tolerance	light requirements	moisture demands	notes
<i>Rosa carolina</i>	1.5	2	3	rounded	p, w	✓		✓	✓		sun	moderate/high	showy flowers, attracts wildlife
<i>Rosa palustris</i>	2	2	2	rounded	p, w	✓		✓			sun	moderate/high	showy flowers, attracts wildlife
<i>Rosa virginiana</i>	1.5	2	3	upright	s, p, w	✓		✓	✓		sun	moderate/low	showy flowers, attracts wildlife
<i>Rubus allegheniensis</i>	3	2	3	spreading	w	✓			✓		sun/part shade	moderate/low	will colonize rapidly , edible fruit
<i>Rubus flagellaris</i>	1	3	3	spreading	w				✓		sun/part shade	moderate/high	spreading species, edible fruit
<i>Rubus idaeus</i>	2	1.5	3	upright	w				✓		sun/part shade	moderate	will colonize rapidly , edible fruit
<i>Rubus odoratus</i>	2.5	2.5	3	spreading	p, w				✓		sun/part shade	moderate/high	full-season bloomer, attracts wildlife
<i>Rubus pubescens</i>	0.5	0.5	3	spreading	w	✓					sun/part shade	moderate/high	trailing shrub, attracts wildlife
<i>Sambucus canadensis</i>	4	4	3	rounded	p, w	✓			✓	✓	sun/part shade	moderate/high	wind tolerant, attracts wildlife
<i>Sambucus pubens</i>	4	4	2	rounded	p, w				✓		sun/part shade/ shade	moderate/high	showy fruit, attracts wildlife
<i>Sambucus racemosa</i>	2.5	2.5	2	rounded	p, w	✓			✓		sun/part shade/ shade	moderate/high	showy fruit, attracts wildlife
<i>Spiraea alba</i>	2	2	3	rounded	p, w						sun/part shade	moderate/high	fragrant flowers
<i>Spiraea latifolia</i>	1.5	1.5	3	rounded	p, w						sun/part shade	moderate/high	naturalized aesthetic
<i>Spiraea tomentosa</i>	1	1	3	rounded	p, w						sun/part shade	moderate/high	attractive mass planting
<i>Symphoricarpos orbiculatus</i>	2	2	2	rounded	s, p, w		✓		✓	✓	part shade/ shade	moderate	showy fruit, edible
<i>Taxus canadensis</i>	1	2.5	2	spreading	s, p, w	✓					sun/part shade	moderate	best used in mass
<i>Vaccinium angustifolium</i>	0.5	0.5	2	compact	p, w	✓					sun/part shade	moderate/high	edible fruit, showy fall colour
<i>Vaccinium corymbosum</i>	2	2	3	irregular	p, w	✓					sun/part shade	moderate/high	edible fruit, showy fall colour
<i>Viburnum lantanoides</i>	3	2	3	rounded	p, w	✓			✓		sun/shade	moderate/high	showy flowers
<i>Viburnum opulus</i>	3	4	3	rounded	s, p, w				✓		sun/part shade	moderate/high	showy flowers
<i>Viburnum recognitum</i>	3	3	3	rounded	p, w						sun/part shade	moderate/high	naturalized plantings

shrubselection

Natural Environment Plan- Approved species

Perennial species list

name	height (m)	spread (m)	hardiness zone	form	planting site street(s) park (p), woodland (w)	native species	drought tolerance	salt tolerance	soil adaptability	pollution tolerance	light requirements	moisture demands	notes
<i>Agalinis neoscotica</i>	0.3	0.3	6	upright	w	✓	✓				sun	high	naturally occurring in a small pocket of south-west Nova Scotia and Maine effective as a mass planting
<i>Agrostis scabra</i>	0.5	0.3	4	clump	p, w		✓		✓		sun	moderate	
<i>Andromeda polifolia</i>	0.5	0.3	3	rounded	p, w	✓					sun/part shade	moderate/high	thrives in acidic soil
<i>Arisaema triphyllum</i>	0.75	0.75	3	upright	w	✓					part shade	moderate/high	attractive form, all parts poisonous
<i>Asarum canadense</i>	0.3	0.4	3	spreading	p, w						sun/part shade	moderate	medicinal, groundcover
<i>Asclepias incarnata</i>	1.2	0.75	2	upright	s, p, w	✓			✓		sun/part shade	moderate	attracts wildlife, showy blooms
<i>Asclepias syriaca</i>	1	1	2	upright	s, p, w				✓		sun/part shade	moderate/low	fragrant, attracts wildlife
<i>Asclepias tuberosa</i>	0.75	0.75	3	rounded	s, p, w		✓				sun/part shade	moderate/low	bright showy flowers, attracts wildlife
<i>Aquilegia canadensis</i>	0.8	0.3	3	upright	s, p, w		✓		✓		sun/part shade	moderate	attracts wildlife, suitable for low soil environment
<i>Campanula rotundifolia</i>	0.5	0.5	2	spreading	s, p, w		✓		✓		sun/part shade	moderate/low	suitable for low soil, dry environment
<i>Clematis occidentalis</i>	2	0.5	3	climbing	p, w						part shade	moderate/low	vine, poisonous parts
<i>Cornus canadensis</i>	0.2	0.3	1	spreading	s, p, w	✓					sun/part shade	moderate/high	ground cover, showy flowers and fruit
<i>Dryopteris intermedia</i>	0.7	0.7	2	upright	p, w	✓					sun/part shade	moderate/high	clumping fern
<i>Echinacea purpurea</i>	0.75	0.6	3	upright	s, p, w				✓		sun	moderate/low	attracts insects, showy blooms
<i>Elymus virginicus</i>	1	0.3	2	upright	s, p, w	✓			✓		sun/part shade	moderate	attractive in mass
<i>Festuca rubra</i>	0.4	0.3	3	spreading	p, w		✓		✓		sun/part shade	moderate/low	maritime shore grass, turf species
<i>Hierochloa odorata</i>	0.6	0.2	3a	spreading	p, w			✓			sun	moderate/high	notable species used by aboriginal communities
<i>Iris versicolor</i>	0.6	1	5	spreading	s, p, w	✓			✓		sun/part shade	moderate/high	attractive in mass
<i>Lilium canadense</i>	1.5	0.3	5	upright	p, w						sun/part shade	moderate/high	edible bulb
<i>Lupinus polyphyllus</i>	1.5	0.6	3	upright	s, p, w		✓		✓		sun/part shade	moderate/high	nitrogen fixer, rapid colonizer
<i>Maianthemum racemosum</i>	0.9	0.6	3	spreading	p, w						part shade	moderate/high	attractive flowers, doesn't like disturbance
<i>Matteuccia struthiopteris</i>	1.5	0.9	1	upright	s, p, w	✓			✓		sun/part shade	moderate/high	attractive in mass
<i>Monarda didyma</i>	0.9	0.5	4	upright	s, p, w			✓			sun	moderate/high	attracts wildlife, medicinal
<i>Monarda fistulosa</i>	1	1	3a	upright	s, p, w			✓			sun	moderate/high	attracts wildlife, medicinal
<i>Onoclea sensibilis</i>	0.9	0.9	4	spreading	p, w						part shade/ shade	moderate/high	edible
<i>Panicum virgatum</i>	2	0.6	3	upright	s, p				✓		sun/part shade	moderate	multi-season interest, attracts wildlife

perennial selection

EXTERIOR ENVIRONMENT AND NATURAL LANDSCAPE POLICY AND GUIDELINES 2023

	height (m)	spread (m)	hardiness zone	form	planting site street(s), park (p), woodland (w)	native species	drought tolerance	salt tolerance	soil adaptability	pollution tolerance	light requirements	moisture demands	
name													notes
<i>Spartina pectinata</i>	2	2	4	clump	s, p, w				✓		sun/part shade	moderate/high	prairie grass
<i>Symphotrichum laevis</i>	1	0.5	3a	upright	s, p	✓	✓		✓		sun	low	suitable for xeriscape
<i>Trillium erectum</i>	0.4	0.3	4a	clump	p, w	✓					part shade/ shade	moderate	woodland plant
<i>Trillium undulatum</i>	0.3	0.3	4a	clump	p, w	✓					part shade/ shade	moderate	woodland plant
<i>Viola spp.</i>	0.2	0.2	4	clump	s, p, w						part shade/ shade	moderate	heat intolerant, many colours
<i>Vitis labrusca</i>	15	-	3	spreading	s, p, w	✓					sun/part shade	moderate/high	vine

perennial selection

Natural Environment Plan- Approved species

Annual species list

	height (m)	spread (m)	hardiness zone	form	planting site street(s), park (p), woodland (w)	native species	drought tolerance	salt tolerance	soil adaptability	pollution tolerance	light requirements	moisture demands	notes
<i>Helianthus annuus</i>	3	0.3	7	upright	s, p				✓		sun	moderate	self-seeding, attracts wildlife, edible

annual selection