

Tree Planting Standards, Details and Specifications - Downtown Area and Regional Streets

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1.0 Introduction

1.1 Purpose and Objectives

The purpose of this document is to provide guidance on the design and installation considerations for tree planting sites in the downtown area and along regional streets, with the objective of ensuring successful tree establishment and longevity of this natural infrastructure. This document is an update to the City of Winnipeg Tree Planting Details and Specifications Downtown Area and Regional Streets prepared by HTFC and McGowan Russell in 2009. The update is intended to incorporate current research into best practices as well as lessons learned from the following agencies and departments:

City of Winnipeg Public Works Department

- Urban Forestry Branch
- Parks and Open Space Division
- Engineering Division
- Streets Maintenance Division
- Transportation Division

City of Winnipeg Planning, Property and Development Department

- Urban Planning and Design Division

City of Winnipeg Assets and Project Management

- Universal Design Coordinator

City of Winnipeg Water and Waste Department

- Water and Waste Engineering

Public Utilities

- Manitoba Hydro – Hydro
- Manitoba Hydro – Gas
- BellMTS

Business Improvement Zones

- Downtown Winnipeg BIZ

1.2 Planning Principles

This document focuses on the technical aspects of tree planting along roadways, recognizing trees as natural infrastructure in rights-of-way.

Right Tree, Right Place

New tree plantings must be suited to local variations in the developed environment, and contribute to overall street-scape cohesiveness through appropriate scale, location, and character. Tree locations and planting techniques must also align with local growing conditions – ensuring adequate space, water, soil volume and quality, and light.

Assess the site to determine solar access during the growing season – full sun, partial sun, or shade, and identify other microclimate factors that could affect planting success, including high winds, high reflected heat load from adjacent surfaces, and extensive snow drifting. Where such factors are present, include mitigation strategies in the planting design or avoid those locations.

The anticipated height, canopy width, and extent of the root system of trees can vary considerably between species. The design of the urban environment must account for the need for above- and below-ground space that will be required as this natural infrastructure matures over time. Large-growing species that are native to our region are generally preferred as they are best suited to our environmental conditions and they provide the most benefit to the community in the form of shade and heat island mitigation. Small and medium-sized species offer flexibility on sites where space is limited and may have aesthetic or ornamental attributes that contribute to the diversity of the urban environment.

Safety and Accessibility

Trees must be installed in a manner that considers and is appropriate for roadway, sidewalk and utility operations, providing workable setbacks and clearances to allow for safe use and passage by pedestrians as well as access for regular maintenance, and other operations.

Tree grates can interfere with the trunk flare as the tree grows and should be avoided unless required for accessibility purposes. Mulch or porous rubber matting are preferred.

Sustainability

Roadside tree planting should be planned to maximize environmental benefits through integration with stormwater systems and accommodating passive watering wherever feasible, supporting biodiversity through species selection, and contributing to climate change resiliency through a healthy and extensive urban forest canopy.

Manitoba's climate has warmed by 1°C over the last 100 years. This value is seven times higher than the global average, and projections indicate our climate could be similar to Texas by 2080, which is well within the lifespan of trees being planted today.

Trees occupy a unique position within a changing climate. They serve as a key tool in mitigating the effects of global warming by absorbing and storing carbon, and moderating the effects of weather extremes. However, the urban forest is also vulnerable to these changing conditions, which are projected to include:

- Higher incidence of drought and heat stress
- Increased stormwater runoff and flooding
- Increased damage from winds and ice storms
- Variability in the growing season

While the warming trend will alter Winnipeg's plant hardiness zone and may allow for more species diversity, modeling in other cities casts some uncertainty on whether this benefit will be realized, suggesting that invasive species will be favoured, and the viability of present species may be at risk.

The following strategies help to maintain a healthy and resilient urban forest:

- Ensure species diversity
- Insist on tight quality control for selection of specimens
- Adhere to best practices in installation, soil quantity and quality, drainage and maintenance
- Monitoring performance and regularly update species lists, standards and maintenance regimes

It is important to recognize the urban canopy as infrastructure that changes over time and increases in value with age. Designers must consider the long-term effects and responsibilities associated with these installations with a goal of tree longevity to maximize the benefits provided by this natural asset. Many of the risks to longevity can be mitigated through ensuring supportive growing conditions, species diversification including hardy native or native-adapted species, ongoing care, effective protection measures during construction, and succession planning.

1.3 How and Where the Standards Apply

Application

The standards apply to all public tree plantings for Downtown and Regional Streets. For this document, the Downtown Area follows the boundaries of CentreVenture's mandate area. Regional Streets are designated by Council and listed in 'Schedule E' of the Streets By-law Maps. Copies of the Streets By-Law Maps from 2016 and the CentreVenture mandated area maps are included in the Appendix; contact Public Works for the most current designations or visit the City of Winnipeg Streets By-law No. 1481/77.¹

The standards will apply to the evaluation of tree planting design alternatives in capital street and streetscape construction projects, major street and streetscape renovation projects, downtown enhancement, image route and Business Improvement Zone (BIZ) enhancements, sidewalk replacement program and major tree re-planting projects. The standards are intended to be read together with the most current version of the following documents:

- Acceptable Tree Species for Boulevard Planting²
- Boulevard Tree Planting Guidelines as Required under Development Agreements³
- City of Winnipeg Tree Planting and Maintenance Specifications⁴
- City of Winnipeg Tree Removal Guidelines⁵
- Winnipeg Accessibility Design Standards (WADS)⁶
- Other applicable City standards, by-laws, policies and guidelines

Before planting and installing street trees in the Downtown and Regional Streets, a Qualified Tree Consultant must be engaged. Qualified tree consultants include:

- i) an arborist certified by the International Society of Arboriculture (ISA) who has a diploma (minimum) in arboriculture, urban forestry or related field;
- ii) a landscape architect who is a member in good standing of the Manitoba Association of Landscape Architects and who is certified by the International Society of Arboriculture (ISA).

The Qualified Tree Consultant will assist the designer in the interpretation and application of these standards.

Alternatives

To the maximum extent practicable and feasible, the standards contained in this document should be followed to preserve and create the conditions for street trees to thrive. Exceptions may be permitted based on specific grounds including historic, cultural, and environmental assets, and the significance and characteristics of the public space. The Urban Forestry Branch will be the final arbiter on these matters.

Project Review and Approval Process

The review and approval process for construction project proposals involving street tree planting on Downtown and Regional Streets is outlined below:

- I. Meetings for review and approval of conceptual design with:
 - a. City Project Manager and selected City stakeholders
 - b. Urban Forestry Branch

- II. Where required by local conditions, jurisdiction and/or design complexity, additional review and approval meetings may be required, as directed by the City Project Manager, including:
 - a. Parks, Open Space and Urban Initiatives - Park Superintendent (Parks and Open Space Division, Public Works) and Urban Designer (Urban Design Branch, Planning, Property & Development)
 - b. City Universal Design Coordinator
 - c. Downtown Design Review
 - d. Applicable Business Improvement Zone representative

- III. Submission of Construction Drawings for Review and Approval, with process and timeline to be confirmed by departments:
 - a. Underground Structures Branch
 - b. Urban Forestry Branch
 - c. Transportation Division
 - d. Engineering Division
 - e. Development Permit

- IV. For sites governed by a Development Agreement, refer to Section 2 of the Boulevard Tree Planting Guidelines as Required Under Development Agreements³

2.0 Design Standards and Constraints

Planting site design will be informed largely by the amount of available space the width of the boulevard. Decisions regarding the planting site design and associated hardscape solution to be employed should be guided by the site considerations listed below, which assume that pedestrian access is to be integrated into the boulevard hardscape:

- 2.1 Right-of-Way Accessibility Requirements
- 2.2 Adjacent Road Conditions
- 2.3 Street Elements
- 2.4 Utility Separation Requirements

The recommended setbacks and clearances identified in this section are intended to be used as general guidelines to assist the designer. Factors such as the presence of existing trees or other fixed objects in the right-of-way, the presence of curves in the roadway, operating speed, and collision history also should be considered when determining setback requirements. All setbacks on Downtown and Regional Streets are subject to review by the Urban Forestry Branch, and the Transportation and Engineering Divisions of the Public Works Department. Stamped designs should demonstrate the planting system's ability to provide structural stability for the road and sidewalk.

2.1 Right-of-Way Accessibility Requirements

2.1.1 Tree planting site designs must comply with the following requirements as well as other specifications in the most current edition of Winnipeg Accessibility Design Standards (WADS). These requirements are derived from WADS Section 1.1.2 Protruding and Overhead Objects, Section 1.1.3 Accessible Routes, 2.1.1 Exterior Ground Surfaces, Section 2.1.3 Streetscape, and Section 2.2.2 Plantings. The information provided below illustrates constraints and site considerations encountered on typical rights-of-way in the downtown area and on regional streets. Designs must be flexible to adjust for anomalies and unique site characteristics. All references to alternative surfacing are to be reviewed with the City's Universal Design Coordinator and the Streets Maintenance Division of Public Works.

Downtown:

2.1.2 Planting locations in the Downtown area must comply with required clearances for Accessible Routes including contrasting indicator strips delimiting the route. Where a tree site overlaps or is immediately adjacent to an Accessible Route, define the edge of opening using 'contrasting surface' (as defined in WADS 4.3.17) (Figure 1).

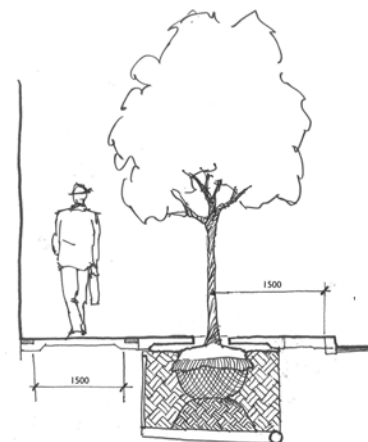


Figure 1

2.1.3 WADS-compliant tree grates are to be considered standard coverings for tree pits for pedestrian rights-of-way. Alternative surfacing options may be considered in place of tree grates for a tree pit overlapping or abutting an Accessible Route.

2.1.4 Where trees are placed at back of curb, locate within the 'Street Element Zone' (as defined in WADS 2.1.3) (Figure 2).

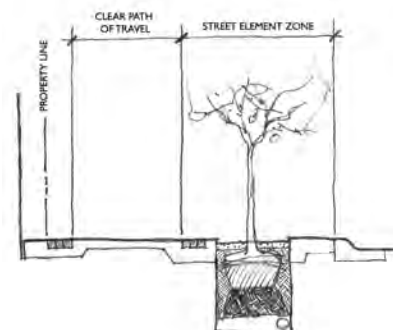


Figure 2

2.1.5 Planting is permitted at the back of sidewalks where the sidewalk width from back of curb is greater than 3.45m with softscape at the property line (Figure 3). WADS-compliant tree grates or alternative surfacing are required for rights-of-way less than 3.65m wide if tree is adjacent to the back of sidewalk.

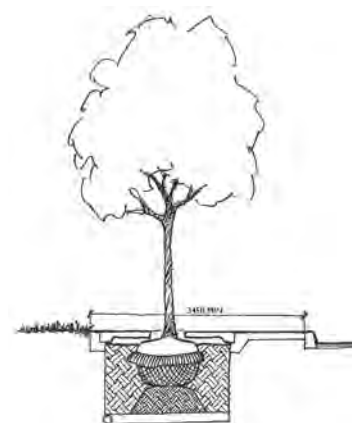


Figure 3

Regional Streets outside the Downtown Area:

2.1.6 Outside the Downtown area, tree planting is not permitted where overall right-of-way width is less than 3.35m. Sidewalks less than 3.35m wide have insufficient space to meet WADS requirements for clear path of travel, indicator strips, half the width of the minimum tree pavement opening (0.25m) and standard setback recommendations (1.5m) (Figure 4).

2.1.7 For any rights-of-way less than 3.9m, WADS-compliant tree grates or approved alternative surfacing (with integrated indicator strip) are required.

2.1.8 Planting is permitted at the back of sidewalks where the sidewalk width from back of curb is greater than 3.45m with softscape at the property line. WADS-compliant tree grates or alternative surfacing are required for rights-of-way less than 3.65m wide, if tree is planted at back of sidewalk.

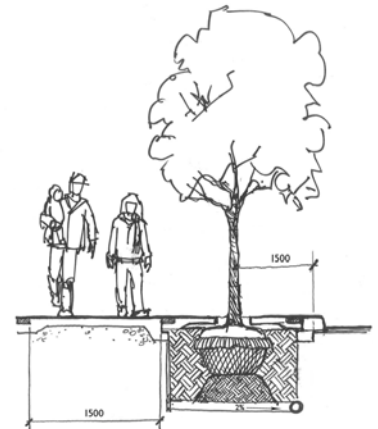


Figure 4

2.2 Adjacent Road Conditions

Setbacks are required along roadways so as to not impede snow storage or clearing operations. Setback requirements are influenced by type of planting infrastructure, road structure, posted speed limit, the number of lanes, and location, with special consideration given to roadways within the Downtown area.

Unless otherwise stated, standard setback distance is recommended to be 1.5 m from back of curb. In order to meet canopy targets and where opportunities exist for tree planting, setbacks may be modified on a case-by-case basis, with geotechnical solutions, and in consultation with the Streets Maintenance, Transportation and Engineering Divisions.

Downtown:

2.2.1 A minimum boulevard setback of 0.8m from back of curb to centre of tree or edge of raised planter shall be considered in the Downtown area on a case-by-case basis. Trees should be no closer to the street than other fixed object infrastructure such as hydro poles and fire hydrants. Maximizing the setback distance of trees from streets is always desirable, so this minimum setback should be increased wherever possible while meeting appropriate soil volume requirements.

Regional Streets outside of Downtown:

2.2.2 Trees are not to be planted where the boulevard is less than 2m wide. Exceptions may be considered where there is softscape beyond the width of the boulevard.

2.2.3 On streets with a posted speed limit of 50 km/h:

- a) with four (4) lanes or less, a 1.2m setback will be considered from back of curb to centre of tree or edge of raised planter (Figure 5).

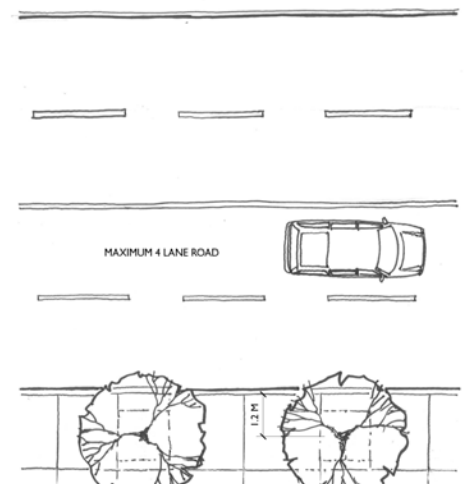


Figure 5

- b) with more than four (4) lanes, a 1.5m setback is required from back of curb to centre of tree or edge of raised planter (Figure 6).

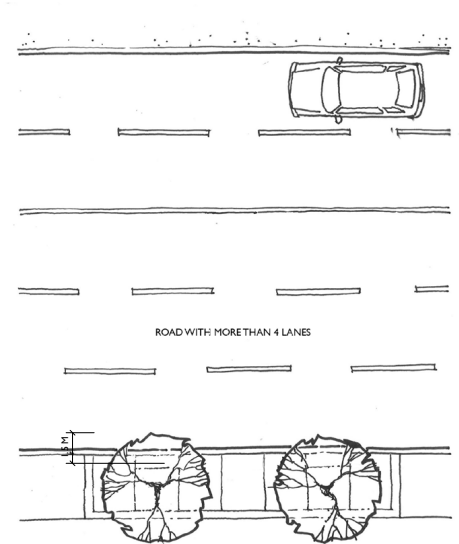


Figure 6

2.2.4 On streets with a posted speed limit of 60 km/h:

- a) Street trees should be set back as far as possible from the back of curb with a minimum 1.5m setback for street trees from back of curb to centre of tree.

2.2.5 On streets with posted speed limit of 70 km/h or higher:

- a) Setbacks from back of curb/paved edge of roadway/edge of shoulder to centre of tree should be a minimum of 6.0m to reduce the impact of salt spray and meet the City's 'clear zone' requirements for roadside obstacles.

2.2.6 Intersections - Trees shall be planted at a minimum distance from the nearside back of curb for the following intersections:

- a) Street Intersections – 6.0m
- b) Backlane Intersections – 3.0m
- c) Private Approaches – 1.5m

2.2.7 Medians - Trees are permitted in medians that are a minimum of 5.0m wide (as measured from back of curb to back of curb) (Figure 7). Medians narrower than 5.0m may be considered for tree planting on streets with 50 km/h posted speed limits. Streets with 60 km/h and 70 km/h posted speed limits may be considered on a case-by-case basis by Urban Forestry - considerations include but are not limited to width of median, orientation of street, and surrounding conditions.

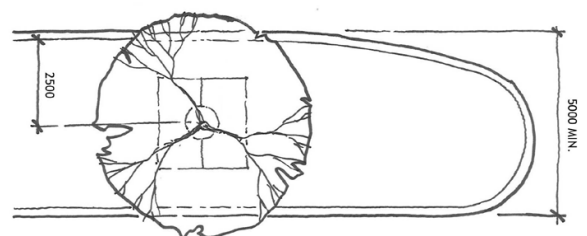


Figure 7

2.3 Street Elements

2.3.1 On-street Parking - WADS-compliant tree grates required where street parking is permitted. Raised planters must be located to permit WADS-compliant access to on-street parking.

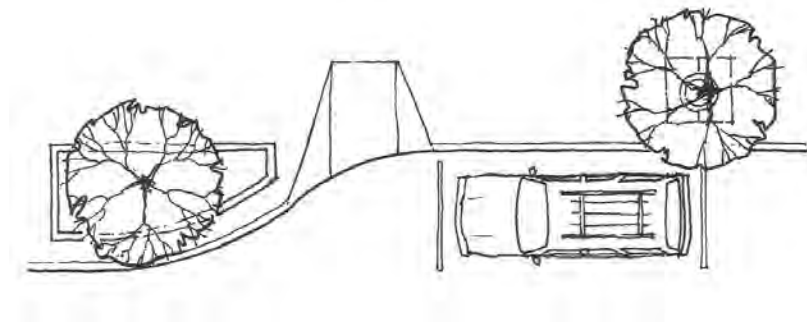


Figure 8

2.3.2 Approval for ornamental street lighting to be obtained by the Transportation and Engineering Divisions of Public Works. Coordinate spacing with tree planting and installation.

2.4 Utility Separation Requirements

2.4.1 Natural Gas⁷

- a) A minimum horizontal separation of 1.0m must be maintained between the edge of the excavation required to plant the tree and any existing natural gas main, if this minimum separation cannot be maintained contact Manitoba Hydro to discuss site specific options (Figure 9).
- b) A minimum depth of cover shall be maintained in all areas where equipment will be crossing, traveling or compacting over natural gas mains. The required depths of cover are:
- 900mm over pressure gas mains
 - 600mm over distribution mains
- c) If equipment must cross, travel, or compact over a natural gas main with less than the minimum depth of cover, earth bridging, or steel plates shall be placed over the main and extend a minimum of 1.0m on either side at each crossing location.

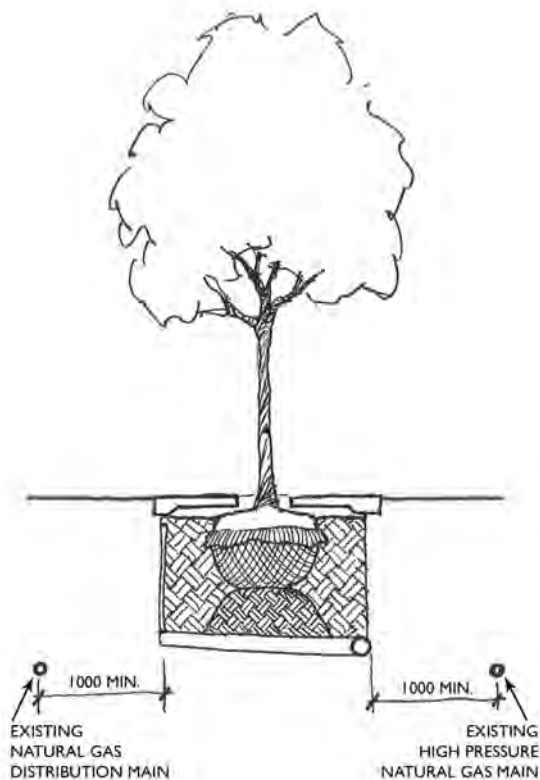


Figure 9

2.4.2 Underground Power Lines (Figure 10)⁸

- a) A minimum horizontal separation of 1.0m must be maintained between the edge of the excavation required to plant the tree and any existing underground electrical distribution (i.e. underground cables, ducts, etc.)
- b) A minimum horizontal separation of 3.0m must be maintained between the edge of the excavation required to plant the tree and any existing electrical manholes.
- c) A minimum separation of 3.0m must be maintained between the centre of the tree and any streetlight or hydro pole.
- d) A minimum depth of cover of 300mm should be provided between the bottom of the tree vault and any underground distribution plant.

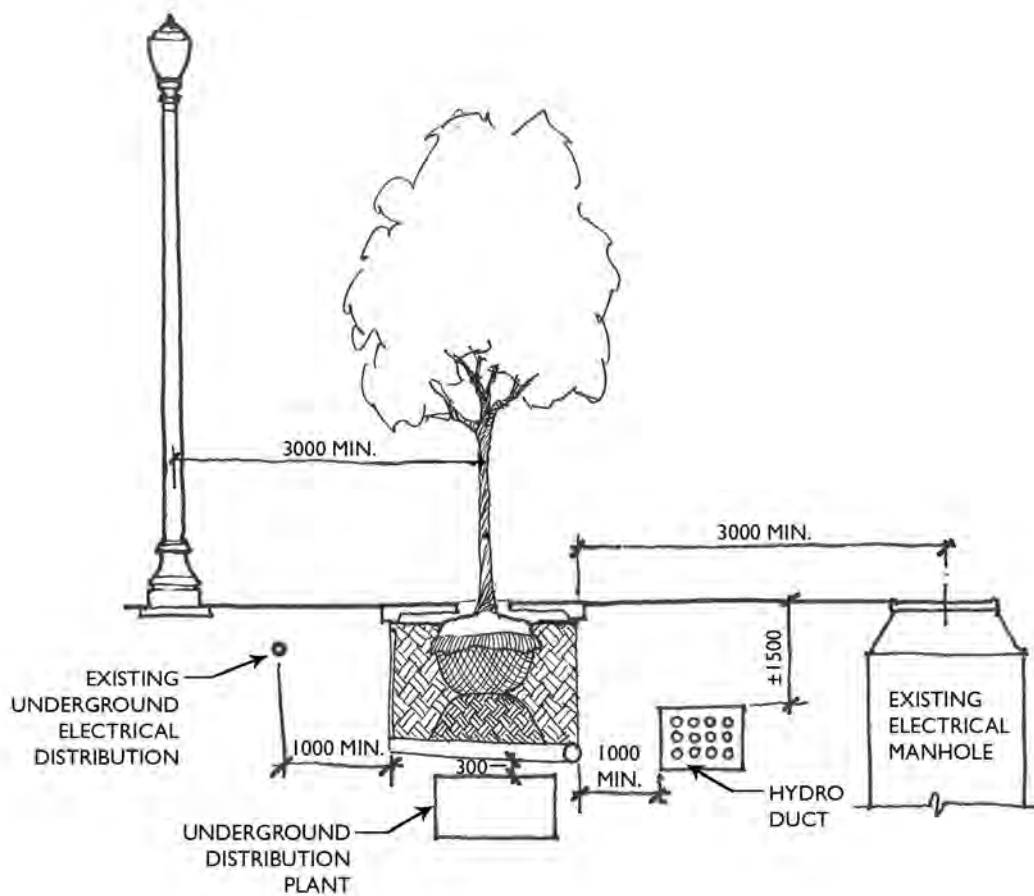


Figure 10

2.4.3 Communication Utilities (to be verified by service supplier) (Figure 11)

- a) A minimum horizontal separation of 1.0m must be maintained between the edge of the excavation required to plant the tree and any existing communication utilities, if this minimum separation cannot be maintained, contact service supplier⁹ to discuss site specific options.
- b) A minimum depth of cover shall be maintained in all areas where equipment will be crossing, traveling or compacting over communication utilities. The required depth of cover is 600mm.
- c) If equipment must cross, travel, or compact over a communication utilities with less than the minimum depth of cover, earth bridging or steel plates shall be placed over the main and extend a minimum of 1.0m on either side at each crossing location.

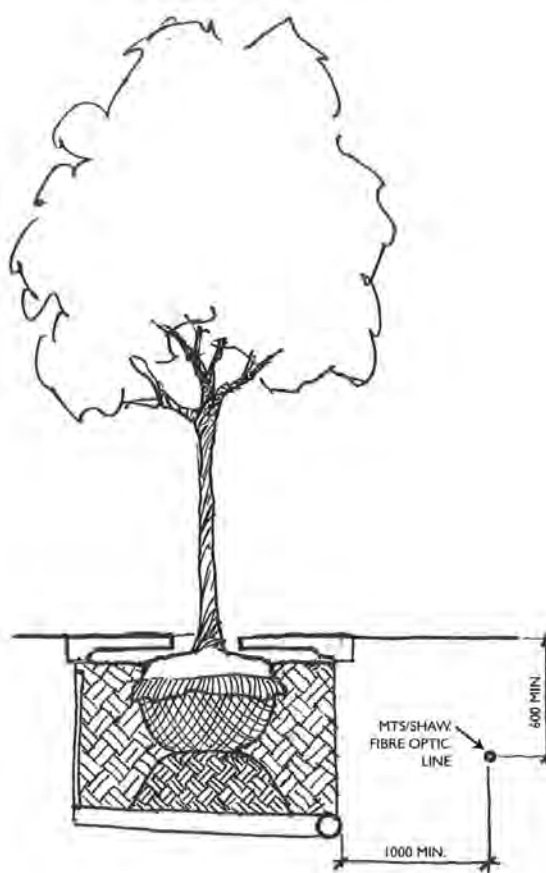


Figure 11

2.4.4 Watermains, Waste Water Sewer, Land Drainage Sewer

- a) A minimum horizontal separation of 3.0m must be maintained between the centre of the tree and any existing fire hydrant (Figure 12).

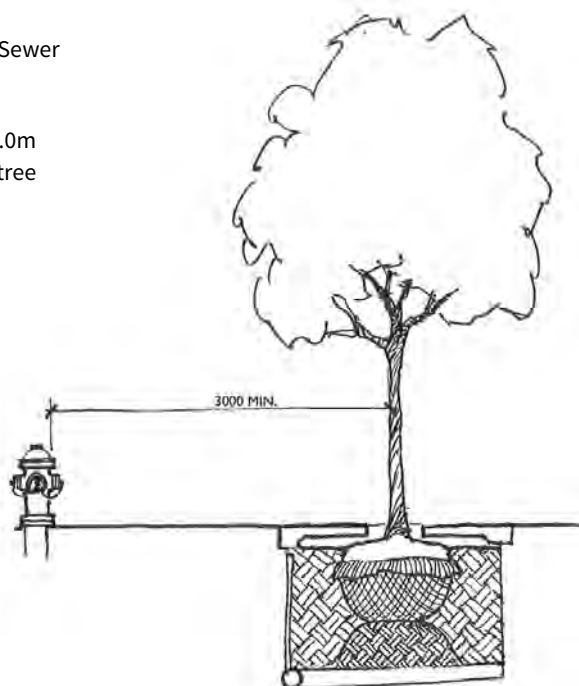


Figure 12

2.4.5 Overhead Power Lines and Utilities

- a) When siting plantings, adhere to clearances required by the utility that has jurisdiction, and obtain approval for any planting proposed to be located directly under wires or within their easements.
- b) Ensure planting setbacks take into consideration cable swing and maintenance access to poles.

2.4.6 Strategies for Shared Utility and Tree Roots

- a) In areas with restricted planting space, utilities can be aligned to run through root and soil zones.
- b) New utility installation can be stacked vertically (vertical zoning) to maximize space for soil volumes.

2.5 Tree Planting Site Systems and Installation

2.5.1 Street Tree Planting Soil

Many urban centres across Canada are increasing the required soil volumes for new urban street tree plantings. Scientific research of James Urban, Nina Bassuk, Jason Grabosky, and Peter Trowbridge (1999), shows the urban forest's social, environmental and economic benefits are most significant when trunk diameter exceeds 40 cm.¹⁰ Trees require a minimum soil volume to allow for adequate root development, which contributes to structural stability, as well as access to water, air, and nutrient uptake. The volume of soil required varies according to the expected size of the tree at maturity. Attaining these volumes may be challenging in urban settings, requiring case-by-case decision-making on the part of the designer and City Project Manager. The planting soil standards outlined below describe the minimum acceptable soil volume for typical tree planting sites encountered on downtown and regional streets. Designs and the planting system to be employed may need to be flexible to accommodate individual site conditions.

2.5.1.1 Planting soil volumes should be shared wherever feasible so trees can share rooting space and resources.

2.5.1.2 Small-growing trees are to be allocated a minimum of 8 cubic metres of soil per tree for individual planting sites, and a minimum of 6 cubic metres of soil per tree where planting sites are shared.

2.5.1.3 Medium-growing trees are to be allocated a minimum of 20 cubic metres of soil per tree for individual planting sites, and a minimum of 15 cubic metres of soil per tree where planting sites are shared.

2.5.1.4 Large-growing trees are to be allocated a minimum of 35 cubic metres of soil per tree for individual planting sites (Figure 13a), and a minimum of 30 cubic metres of soil per tree where planting sites are shared (Figure 13b).

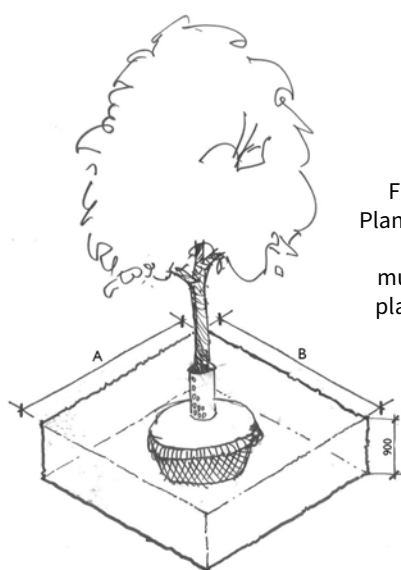


Figure 13a

Figure 13 a/b note:
Planting site dimensions
A x B x 900
must meet minimum
planting soil volumes
noted above.

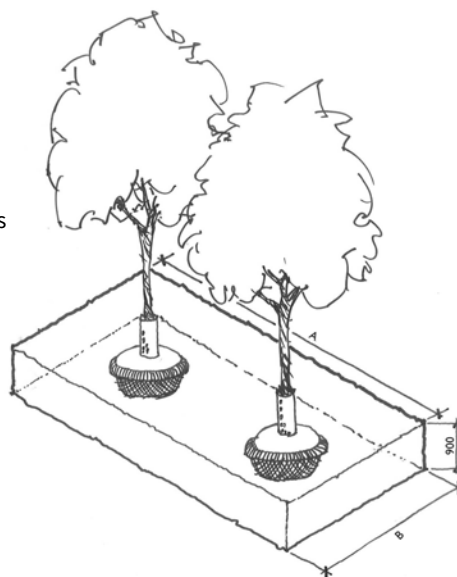


Figure 13b

2.5.1.5 Planting soil depth: 900mm (36 inches).

2.5.1.6 Objective is to plant fewer trees in proper soil volumes rather than numerous, densely packed trees with insufficient soil volume.

2.5.1.7 Soil volume should provide for oxygen and water.

2.5.1.8 Where feasible, preserve in-situ soil quality. Limit clearing and grading to protect good quality soils at the site.

2.5.1.9 Refer to City of Winnipeg Soil Specifications for information on soil requirements.

2.5.1.10 In addition to the requirement to provide adequate soil volume, the structure and fertility of the soil is critical. In general, soil must be specified to suit local conditions and the planting system employed. Refer to Section 5.3.

2.5.2 Tree Planting System Selection

Based on a review of the performance of existing tree planting details in Downtown Winnipeg and Regional Streets, specifications and details for recommended tree planting systems have been prepared. The planting system that allows for the greatest soil volume while conforming to accessibility standards and other site constraints is the system that shall be used.

Soil Cells

System of modular frames and decks designed to be filled with growing medium for tree rooting while supporting vehicle-loaded (AASHTO H-20) pedestrian pavements. Also known as suspended pavement systems.

Key Characteristics:

- Unlimited volume – System allows for very large soil volumes under pavement
- Modular – System can accommodate any shape and individual frames can be removed (destructively if needed) for emergency access.
- Can be accommodated with minimal underground utility conflict.
- Airspace in cells provides good aeration
- Completely subterranean system – Offers flexibility in paving cover appearance and materials
- High strength H-20 loading Protects soil from compaction – Allows flexibility in soil specification.
- Can be part of stormwater bioretention system.

Vaults

Cast-in-place underground concrete tree well (poured as separate curb or integral with sidewalk) designed to support a series of precast concrete sidewalk panels and tree vault covers which span an enlarged tree soil volume and support standard snow clearing vehicle loading.

Key Characteristics:

- Suitable for most sidewalk widths, high volume of pedestrian activity and streetscape development areas
- Protects soil from compaction and salt spray
- Sidewalk panels can be removed for utility repairs
- Soil volume limited by span of vault covers.
- Air space in vault provides good aeration.
- Completely subterranean system - offers flexibility in paving cover appearance and materials
- Protects soil from compaction
- Can be part of stormwater bioretention system

Raised Planters

Standard City of Winnipeg tree planting soil medium is contained partially above grade using minimum 450mm height, 1500mm inside width insulated planter walls designed to suit the streetscape context.

Key Characteristics:

- Reduces depth of soil required below sidewalk grade
- Protects trees from mechanical damage and salt spray
- Planter curb vulnerable to damage during utility repairs, snow storage and removal operations
- Can be a barrier between street parking and clear path of travel
- Wide boulevard required to maintain clear path of travel and snow storage requirements, refer to WADS Section 2.13 Streetscape
- Suitable for wide, intensively used street element zones and where shallow, buried utilities limit the use of other tree planting options
- Planter structure may integrate seating, which must comply with WADS Section 1.3.5 Seating

2.5.3 Irrigation Systems

2.5.3.1 Identify water source for use during establishment and source for supplemental ongoing maintenance during dry periods (e.g. watering truck, hydrant).

2.5.3.2 Where passive watering of trees through integrated stormwater management does not occur, consider including water-efficient automatic irrigation systems where operational capacity and budget permits. Refer to Specification 3.1.6 Micro Irrigation System Requirements.

2.5.3.3 In all cases, plan for and provide access for supplementary manual watering vehicle. The spatial requirements for watering vehicles will vary by location (i.e., BIZ zones may have compact ATV).

2.5.4 Drainage Solutions

2.5.4.1 Assess overland drainage conditions prior to selecting tree planting sites. Avoid areas that are excessively wet or dry, unless it can be demonstrated that new grading and drainage infrastructure will provide the proper balance of stormwater to the planting areas.

2.5.4.2 Coordinate with City engineers on opportunities to incorporate tree planting areas into stormwater management strategies for the site, for example encouraging passive watering or using soil cells for bioretention.

2.5.4.3 In all cases, ensure subdrainage is incorporated into the planting system to remove excess moisture from planting sites.

2.5.4.4 Identify water source for use during establishment and source for supplemental ongoing maintenance during dry periods (e.g. watering truck, hydrant).

2.5.5 Species Selection

2.5.5.1 Select trees that suit site conditions and design context from the approved species listed in Acceptable Tree Species for Boulevard Planting.² Alternates must be approved by the Urban Forestry Branch.

2.5.5.2 Adhere to species diversity guidelines in Boulevard Tree Planting Guidelines as Required Under Development Agreements.³

2.5.5.3 Select plant materials that comply with the Canadian Nursery Stock Standard and Landscape Standard,¹¹ most recent edition, and refer to those standards for quality and acceptance criteria in the specifications.

2.5.5.4 Inspect trees at the nursery to ensure they are free of defects, pests and disease. If trees cannot be inspected at the nursery, they must be inspected upon arrival at the site, and prior to planting to allow for examination of the trunk flare and root ball.

2.5.5.5 Select species that are adapted to existing solar conditions. Trees are not to be planted in sites that receive no direct sunlight.

2.5.5.6 Select species with drought/moisture tolerance to match site conditions.

2.5.5.7 Planting design must respect existing or planned streetscape character and scale. Tree placement and selection should consider appropriate scale in relation to surrounding buildings, existing signage and other important streetscaping features, through the lifespan of the tree.

2.5.5.8 Trees should be carefully inspected throughout the pre-construction and post-construction period for signs of insect and disease establishment to ensure viability. Refer to the International Society of Arboriculture publication "Best Management Practices - Tree Planting", most recent edition, for tree planting and establishment guidelines.

2.6 Planting System Installation Procedures

2.6.1 Utility Protection

2.6.1.1 All natural gas pipelines and service lines must be properly located and marked by Manitoba Hydro personnel. Construction operations are not to commence unless these conditions are adhered to. Contact "Click Before You Dig Manitoba" to obtain locates prior to tree planting.

2.6.1.2 All electrical distribution must be properly located and marked by Manitoba Hydro personnel. Construction operations are not to commence unless these conditions are adhered to. Contact "Click Before You Dig Manitoba" to obtain locates prior to tree planting.

2.6.1.3 All communication utilities must be properly located and marked by applicable personnel. Construction operations are not to commence unless these conditions are adhered to.

2.6.2 Tree Protection and Installation

2.6.2.1 No publicly-owned tree may be pruned or removed without the written consent from the Urban Forestry Branch or designate. This includes pruning and removals due to construction activities. Section 5.3 includes the City's detailed requirements for the protection and preservation of trees during construction.

2.6.2.2 When planting in the vicinity of existing trees, hydro-excavate to expose existing root systems and thereby minimize damage. Refer to Section 5.3: Specifications for Tree and Root Zone Protection.

2.6.2.3 Plant trees in accordance with the details and specifications.

2.6.3 Maintenance

2.6.3.1 Perform ongoing maintenance in accordance with the specifications.

3.0 Specifications and Details

3.1 Specifications

3.1.1 Street Tree Planting Soil

1. DESCRIPTION
 - 1.1 General
 - .1 This Specification outlines the supply and placement of soil for street tree planting on downtown and regional streets.
 - 1.2 Referenced Standard and Draft Construction Specifications
 - .1 CW 3540 – Topsoil and Finish Grading for Establishment of Turf Areas
 - .2 3.1.2 – Tree Planting – Downtown and Regional Streets
 - .3 3.1.3 – Soil Cells
 - .4 3.1.4 – Raised Tree Planters
 - .5 3.1.5 – Tree Vaults
 - .6 City of Winnipeg Tree Planting and Maintenance Specifications (Section 4.0 Sources)
 - 1.3 Related Details
 - .1 3.2.1 – Tree Planting Using Soil Cells
 - .2 3.2.2 – Raised Concrete Planter Tree Planting for Regional Streets
 - .3 3.2.3 – Tree Vault Planting for Downtown and Regional Streets
 - .4 3.2.4 – Turf Boulevards/Medians Tree Planting for Regional Streets
2. MATERIALS
 - 2.1 General
 - .1 Delivery, storage and testing requirements to Specification CW 3540 – Topsoil and Finish Grading for Establishment of Turf Areas.
 - 2.2 Street Tree Planting Soil
 - .1 The soil shall be a blend that complies with CW 3540, Section 5.2.
 - i. Further to CW 3540 Section 5.2, soil shall contain maximum ten percent (10%) organic matter (peat, rotted manure or composted material).

.2 At the discretion of the Contractor Administrator, soil may be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity), and volume of organic matter, by a testing laboratory designated by the Contract Administrator.

.3 The Contract Administrator reserves the right to reject soil not conforming to the requirements of these Specifications.

3. CONSTRUCTION METHODS

3.1 Inspection and Approval of Tree Planting System

.1 Prior to placing street tree soil in soil cells (Specification 3.1.3), raised tree planters (Specification 3.1.4), tree vaults (Specification 3.1.5) or tree pits (Specification 3.1.2) verify the following:

(a) all construction debris, broken concrete, and excess granular material has been removed.

(b) all geotextiles, root barriers, insulation and drainage are installed in accordance with relevant Drawings and Specifications.

.2 Prior to placing street tree soil in turf areas (Specification 3.1.1, figure F3), verify the following:

(a) all construction debris, broken concrete, and excess granular material has been removed.

(b) excavation depth and extent is as specified and without damaging lateral roots of existing trees.

(c) sides of excavation have been scarified.

.3 Obtain approval from Contract Administrator before proceeding.

3.2 Installing Soil

.1 Place street tree soil in accordance with Specification 3.1.2: Tree Planting – Downtown and Regional Streets.

3.3 Acceptance

.1 Contract Administrator will inspect soil in place and determine acceptance of material, depth of planting and finish grading.

3.4 Surplus Material

.1 Dispose of unused materials off site in accordance with CW 1130.

END OF SECTION

3.1.2 Tree Planting – Downtown and Regional Streets

1. DESCRIPTION
 - 1.1 General
 - .1 This Specification covers the supply and installation of nursery-grown trees within the downtown and along regional streets, in turf or paved locations. It is supplementary to, and should be read in conjunction with, the drawings and specifications contained in the most recent version of City of Winnipeg Tree Planting and Maintenance Specification.
 - .2 The Contract Administrator shall consult the Urban Forestry Branch on matters that do not conform to, or that are not addressed by, these Specifications.
 - 1.2 Related Details
 - .1 3.2.1 – Tree Planting Using Soil Cells
 - .2 3.2.2 – Raised Concrete Planter Tree Planting for Regional Streets
 - .3 3.2.3 – Tree Vault Planting for Downtown and Regional Streets
 - .4 3.2.4 – Turf Boulevards/Medians Tree Planting for Regional Streets
2. MATERIALS
 - 2.1 Testing
 - .1 All materials supplied by the Contractor under these Specifications shall be subject to random inspection and testing by the Contract Administrator.
 - .2 The Contract Administrator may reject any material(s) that do not comply with this Specification.
 - .3 There shall be no charge to the City for any material samples taken for testing by the Contract Administrator.
 - .4 The Contractor shall test in situ soil around tree pit for clay content, permeability, nutrient levels, pH level, E.C. (salinity), etc. using a testing laboratory designated by the Contract Administrator. All tests shall be paid for by the Contractor. Tests are required to confirm width and depth of tree pit, amendments for adjacent in situ soil and/or new soil volume requirements and need for alternative drainage system.
 - 2.2 Tree Supply
 - .1 The Contractor shall be responsible for the safe handling, pick up and delivery of trees to the planting sites.

2.3 Trees

.1 Trees shall be of the species and sizes noted in the [City of Winnipeg Acceptable Tree Species for Boulevards](#). Plant material which does not have the minimum caliper or root ball diameter specified in Appendix 5.4 Tree Size Categories will be rejected.

.2 All tree material shall be nursery stock produced and supplied in accordance with the most current edition of *The Canadian Nursery Stock Standard* published by the Canadian Nursery Landscape Association¹¹.

.3 The Contract Administrator reserves the right to inspect the plant material at their original source, and to instruct the supplier on root and branch pruning requirements.

.4 Plants larger than specified may be used only if approved by the Contract Administrator.

2.4 Protection of Stock

.1 All nursery stock shall be well protected from damage and drying out from the time of digging until the time of planting on site.

.2 All nursery stock is to meet the requirements of this specification regardless as to whether it is supplied by the City or the Contractor.

2.5 Planting Soil

.1 Delivery, storage, and testing requirements for soil shall comply with Specification 3.1.1: Street Tree Planting Soil.

2.6 Water

.1 The Contractor shall provide a water supply, and all costs to provide water for the watering operation and all associated costs shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.

.2 Further to clause 3.7 of CW 1120-R1, the Contractor shall pay for all costs associated with obtaining water in accordance with the Waterworks By-law. Sewer charges will not be assessed for water obtained from a hydrant.

.3 Water shall be free of oils, acids, alkalis, salts and other substances that may be detrimental to plant growth. Water suitable for human consumption shall be acceptable without testing.

.4 Water from rivers and streams shall not be used without prior approval of the Contract Administrator.

.5 Should the Contract Administrator determine that water quality testing is necessary, an approved testing laboratory shall perform the test at the sole expense of the Contractor.

2.7 Trunk Protection Collars

.1 Corrugated high density polyethylene (HDPE) pipe shall be installed around the base of tree trunks after planting to protect base of trees from mechanical damage - with the exception of tree installations in raised planters. Alternative materials to be first approved by the Contract Administrator.

2.8 Staking

.1 Staking of newly planted trees is to be provided using:

- (a) T-rail iron stakes 40 x 40 x 5 x 1540 mm long, primed with 1 brush coat of zinc rich paint, uniform in style and colour, or approved equal, or;
- (b) Sharpened round wood stakes, 75 mm diameter, length as indicated on the Drawings.

2.9 Guying Materials

.1 Flat non-abrasive woven polypropylene strapping and non-abrasive rubber tree staking ties shall be used; alternative materials to be approved by the Contract Administrator.

2.10 Mulch

.1 Unless otherwise indicated on the Drawings, mulch shall be a clean bark or wood chip free of leaves, branches and other extraneous matter, consisting of chips not less than 15 mm nor larger than 75 mm in size and not more than 20 mm thick, or approved alternate.

2.11 Granular Drainage Course and Sub Drain

.1 Granular drainage material in accordance with Specification CW3120 – Installation of Sub Drains.

.2 Sub drain to specification CW3120 – Installation of Sub Drains.

3. CONSTRUCTION METHODS

3.1 Planting Period

.1 The Contractor shall not plant trees during periods of extreme heat, at the discretion of the Contract Administrator.

3.2 Pre-planting Care of Trees

.1 The Contractor shall coordinate the shipping of trees and excavation of tree pits to ensure no more than a maximum of a 24 hour time lapse has occurred between the plant material arriving on Site and the installation of that plant material.

.2 Trees shall be transported with care taken to prevent damage:

- (a) Protect trees against abrasion, exposure and extreme temperature change during transit;

- (b) Avoid binding of trees with rope or wire that would damage bark, break branches or destroy natural shape of tree;
- (c) All points of contact with equipment shall be padded;
- (d) Balled specimens shall be supported and handled with sufficient care, so that the root balls shall not be broken. Broken root balls or root ball consisting of loose soil will not be accepted and shall be replaced. Broken plant material shall be pruned prior to planting.

.3 Trees with broken or damaged trunks or branches will not be accepted.

.4 Keep roots moist and protected from sun and wind. Trees that cannot be planted immediately shall be well protected against damage and drying out; if necessary, trees shall be heeled-in in a shaded area and watered well.

3.3 Tree Pit Excavation

3.3.1 General

- (a) Tree pits shall be excavated using a backhoe or other method as approved by the contract administrator, and not a tree spade..
- (b) The bottom of all excavations shall be protected against freezing
- (c) Tree pits shall not be left open for more than 24 hours.
- (d) Pits that are left open overnight must be covered with a sheet of plywood and be marked with a minimum of one (1) safety cone. Plywood shall be a minimum thickness of 5/8".
- (e) Stumps that exist above or below grade in the designated planting location shall be removed entirely. Immediately after each stump is removed, the grindings and debris must be removed from the hole and the Work Site, including adjacent sidewalk, street and gutter.
- (f) Tree pit diameters shall be a sufficient diameter to accommodate the entire root ball with a minimum of 15 cm and maximum 30 cm space between outer edge of root ball and internal edge of tree pit for backfill soil application.
- (g) Depth of tree pit shall be such that the root flare is at or slightly above the finished grade of the pit. Scarify pit edges to the depth of one shovel blade.

3.3.2 Turf Areas

- (a) Tree pit diameters in turf areas shall be sufficient diameter to accommodate the entire root ball and a minimum 15 cm and maximum 30 cm space between outer edge of root ball and internal edge of tree pit for backfill soil application.
- b) Depth of tree pit shall be such that the root flare is at or slightly above the finished grade of the pit. Scarify the top 30 cm of pit edges (i.e. with a shovel blade) to allow for root penetration of the surrounding soil.

3.3.3 Paved Areas

- (a) Tree pits in paved areas shall be sized to suit the selected planting method. Refer to the Drawings and Specifications 3.1.3 for Soil Cells, Specification 3.1.4 for Raised Tree Planters, and Specification 3.1.5 for Tree Vaults.

3.4 Planting

- .1 Set trees plumb in the centre of the tree pit. Ensure setting of the tree will result in the trunk being centered in tree grate or cover, where used.
- .2 Trees shall be placed on planting soil compacted to approximately 85% Standard Proctor Density or undisturbed soil, to a depth at which the root flare is even with existing grade.
- .3 Once the tree has been set in its final position, burlap on the root ball shall be cut and removed from the top 1/3 of the root ball.
- .4 If a wire basket has been used, it shall be cut off and removed from the top 1/3 of the root ball.
- .5 Remove all twine from the root ball.
- .6 Fill tree pit with planting soil to top of root ball, in layers of 150 mm depth. Compact the independent layers of soil by tamping to eliminate air voids. Do not cover top of root ball with soil
- .10 No material shall be piled around the tree trunk.
- .11 Planting areas in turf shall be levelled, raked and edged to give a neat appearance.

3.5 Mulch

- .1 Install mulch to a depth of no more than 75mm or as indicated on the Drawings. No mulch shall not be placed within 10cm of the trunk.
- .2 Mulch shall be raised at the outside edge of the planting hole to form a watering dish or as indicated on the Drawings.
- .2 In a turf median, where the width between splash strips does not allow minimum 600mm sod between edge of mulched area and splash strip, mulch to extend full width between splash strips.

3.6 Staking

- .1 Stake only where it is deemed necessary by Contract Administrator (e.g. windblown tree).
- .2 Place stakes at the outside of the root ball to avoid damaging roots.
- .3 Where hose-covered wire is used, ensure ends are twisted tight. Protruding wire ends are not acceptable.

3.7 Watering

- .1 Water trees immediately upon being planted with a minimum of 20 litres of water.
- .2 All newly planted trees shall be watered on a weekly basis between spring (May 1) continuing through to fall (October 31), for the first year and two-year maintenance period thereafter to keep the soil in and around the root ball moist.
- .3 Adjustments to the watering schedule may be required upon the direction of the Contract Administrator depending on soil type, weather, drainage, tree species, and weekly amounts of rainfall.
- .4 Watering shall be done slowly to ensure that water does not wash away from the root zone and so the top 300 mm of the soil in and around the root system of the tree are saturated.
- .5 Use a low-pressure open flow nozzle and hose (turf boulevards, open pits and raised planters) or deep root feeder (hard surface boulevards). It is the responsibility of the Contractor to secure all necessary utility clearances when watering using a deep root feeder.
- .6 The water stream must not disturb the soil or mulch.

3.8 Trunk Protection Collars

- .1 If using corrugated pipe, slice vertically and wrap around the base of each tree trunk, where indicated on the Drawings.

3.9 Site Clean Up

- .1 During the planting operations, all sidewalks, streets, approaches, driveways and properties near or about the planting operations, shall be kept clean at all times by the Contractor.
- .2 All clay and in-situ material shall be removed from the Site by the Contractor by the end of the Working Day (if piled in the street or on the sidewalk) or within 48 hours (if piled on boulevards or in parks).
- .3 Upon completion of the Work, the Contractor shall immediately remove all excess material and debris from the Work Site and shall leave the Site in a clean and orderly manner.

3.10 Acceptance

- .1 Thirty (30) days after the planting has been completed, the Contract Administrator shall perform an inspection of planted material.
- .2 Planted material shall be accepted to start warranty when installation in accordance with the Drawings and Specifications is complete and there is no sign of wilting, chlorosis, pest infestation, transplant shock or any conditions deleterious to longevity and appearance. Defective plants shall be replaced within thirty (30) days of notification to the Contract Administrator and shall be further maintained for a period of two years from date of subsequent acceptance.

.3 The Contractor is responsible for maintaining trees in accordance with Specifications within the Contract from the date of planting to the end of the warranty period, unless otherwise specified.

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.4 The Contractor is responsible for submitting maintenance records for watering from May1 to October 31 on a monthly basis to the Contract Administrator for the duration of the maintenance period.

END OF SECTION

3.1.3 Soil Cells

1. DESCRIPTION
 - 1.1 General
 - .1 This Specification outlines the supply and installation of soil cell suspended pavement systems for tree planting on downtown and regional streets, including cells, geotextile, geogrid, granular sub-base, backfill, drainage system, soil, mulch, and granular base for paving.
 - .2 Suspended pavement systems provide high volumes of uncompacted soil to support tree growth, stormwater management, and utility integration under vehicle-loaded pavements.
 - 1.2 Referenced Standard & Draft Construction Specifications
 - .1 CW 1120 – Existing Services, Utilities and Structures
 - .2 CW 3110 – Sub-grade, Sub-base and Base Course Construction
 - .3 CW 3120 – Installation of Sub Drains
 - .4 CW 3130 – Supply and Installation of Geotextile Fabrics
 - .5 CW 3170 – Earthwork and Grading
 - .6 CW 3325 – Portland Cement Concrete Sidewalk
 - .7 CW 3330 – Installation of Interlocking Pavement Stones
 - .8 3.1.1 – Street Tree Planting Soil
 - .9 3.1.2 – Tree Planting – Downtown and Regional Streets
 - .10 3.1.6 – Micro Irrigation System Requirements
 - .11 3.1.7 – Tree Grates
 - 1.3 Referenced Details
 - .1 3.2.1 – Tree Planting Using Soil Cells
 - .2 3.2.4 – Turf Boulevard with Sidewalk Tree Planting for Regional Streets
 - 1.4 Quality Control
 - .1 Submit soil cell manufacturer's letter of review and approval of the project, plans, details and specifications for compliance with product installation requirements prior to commencing Work.
 - .2 Installer Qualifications: A qualified installer with not less than 5 years of successful experience installing specified Silva Cell systems or related products and

materials, and whose work has resulted in successful installation of underground piping, chambers and vault structures, planting soils, and planter drainage systems of a similar scope and scale in dense urban areas.

.3 Utilize quality control tests to determine the acceptability of the sub-grade, sub-base and base course layers, as placed and compacted before the succeeding layer may be applied.

.4 The frequency and number of tests will be as directed by the Contract Administrator.

.5 Promptly fill holes made by the removal of samples from the layers with appropriate material and thoroughly compact so as to conform in every way with the adjoining material.

2. MATERIALS

2.1 Soil Cells

.1 Polyethylene and fiberglass structures including frames and decks engineered to support vehicle loads (minimum AASHTO H-20) and designed to be filled with soil for the purpose of growing tree roots.

2.2 Anchors and Hardware

.1 Matched to soil cell system, as recommended by the manufacturer.

2.3 Sub Drain in a Soil Cell System

.1 To City of Winnipeg Specification CW 3120 - Installation of Sub Drains.

2.4 Inspection Riser and Cap

.1 Inspection riser shall consist of a rigid, Schedule 40 non-perforated PVC pipe, 63.5mm in diameter. Cut slots in the bottom to allow water access for inspection risers that extend to the sub-base aggregate.

.2 Cap shall be PVC solid threaded cleanout or removable inlet grate designed to fit standard PVC schedule 40 pipe fittings.

2.5 Geogrids, Geotextiles and Root Barriers

.1 Matched to soil cell system, as recommended by the manufacturer.

2.6 Granular Sub Base Course (Below Cell Frame)

.1 Gravel Granular A Base Course material in accordance with CW3110.

.2 Crushed limestone shall not be used with the exception of the use of 2" down crushed limestone between back of curb and the soil cell system.

2.7 Granular Base Course (Above Cell Deck)

.1 Gravel Granular A Base Course material in accordance with CW3110.

.2 Crushed limestone shall not be used.

- 2.8 Backfill Material (Adjacent to Soil Cells)
 - .1 In accordance with Specification CW2030, Backfill class to suit application.
- 2.9 Street Tree Planting Soil
 - .1 Refer to Specification 3.1.1: Street Tree Planting Soil
- 2.10 Mulch
 - .1 Refer to Specification 3.1.2: Tree Planting – Downtown and Regional Streets.
- 2.11 Construction Mats
 - .1 Construction mats to be used to prevent soil compaction as determined by the Contract Administrator.
 - .2 Mud-Traks as distributed by SEV Sales, Charlotte, NC 28216, 800 762 8267 or approved alternate. Mat strength shall be as required for the vehicle loading application.
- 2.12 Tree Grate
 - .1 Refer to Specification 3.1.7: Tree Grates.
- 3. CONSTRUCTION METHODS
- 3.1 Layout Approval
 - .1 Prior to the start of work, layout and mark the limits of excavation and horizontal and vertical control points sufficient to install the soil cells, backfill and required drainage features in the correct locations.
 - .2 The layout shall be calculated to include shift in layout locations due to depth and the slope of the cells.
- 3.2 Protection
 - .1 Ensure that all construction traffic and the public are kept away from the limits of the soil cells until the final surface materials are in place. No vehicles shall drive directly on the soil cell deck or aggregate base course.
 - .2 Provide fencing and other barriers to keep vehicles and the public from entering into the area with soil cell supported pavement.
 - .3 When vehicle must cross soil cells that does not have final paving surfaces installed, use construction mats designed to distribute vehicle loads to levels that would be expected at the deck surface once final paving has been installed.
- 3.3 Excavation
 - .1 Excavate in accordance with Specification CW 3170, to the depths and limits indicated on the Drawings. Base of excavation shall be smooth soil, free of lumps or debris, sloped toward sub drain as indicated on the Drawings.
 - .2 Do not over-excavate existing sub-grade beside or under the limits of

excavation required for the installation. If sub-grade is over-excavated, fill over-excavation to required elevation with compactible material as directed by the Contract Administrator and compact to at least 95% Standard Proctor Density.

.3 Confirm that the excavation will accommodate the depths and thickness of materials required throughout the extent of the excavation.

.4 Confirm that the width and length of the excavation is a minimum of 150mm in all directions beyond the marked-out edges of the soil cells.

3.4 Sub-Grade Compaction

.1 Compact sub-grade below the soil cells to a minimum of 95% standard Proctor Density, in accordance with Specification CW 3110.

3.5 Installation of Geotextile Over Sub-Grade

.1 Where adequate sub-grade compaction cannot be attained, install geotextile over the compacted sub-grade material with a minimum joint overlap of 450mm between sections of material as directed by Contract Administrator.

3.6 Installation of Sub Drains in Soil Cell System

.1 Lay out the location of the subdrains within the planting system as depicted in the Drawings. Adjust the alignments to conform to the final locations of sleeves and risers. Do not locate drain lines within 150mm of the edge of any soil cell post.

.2 Ensure positive drainage toward intended outfalls. Excavate a trench a minimum of 300mm wide to a depth required to provide positive drainage from the high points of the system to the outfall or connection point to storm sewer. Eliminate dips or rises that will trap water. Minimum slope shall be 1%.

3.7 Installation of Inspection Risers

.1 Install inspection risers to finish grade, where indicated on the Drawings.

.2 Install manufacturer's PVC solid "T's," elbows, and reducers as per Drawing. Use the proper sized "T's" and reducers.

.3 Extend risers into sub base aggregate and or make connections to drain lines where indicated on the Drawings.

.4 Where inspection risers are indicated to be placed on top of the soil cell deck, assemble riser and fittings to dimensions requires such that the rim of the riser is flush with the paving. Set the rim top with a slope consistent with the slope of the pavement. In all cases, ensure risers present no hazard to pedestrians or equipment.

.5 Brace all risers while backfill and paving is being installed to secure its location and elevation.

.6 Install clean-out caps on top of each riser flush with finish grade or pavement surface.

3.8 Installation of Irrigation Sleeves

.1 Where irrigation sleeves are required, coordinate timing and location with other work phases and so as not to disrupt soil of trees already planted. Install in accordance with Specification 3.1.6 – Micro Irrigation System Requirements.

3.9 Installation of Granular Sub Base (Below Cell Frames)

.1 Install granular sub base to the depths indicated on the Drawings, under the first layer of soil cell frames.

.2 Compact sub base layer to a minimum of 95% standard Proctor Density, in accordance with CW 3110.

.3 Grade surface in a plane parallel to the grades of the paving above.

.4 The tolerance for dips and bumps in the aggregate under soil cells shall be a 9mm deviation from the plane in 3m and 3mm in 1200mm.

.5 The grade and elevations of the base under the soil cells shall be approved by the Contract Administrator prior to proceeding with the installation of the soil cells.

3.10 Mock Up

.1 Prior to the installation of all soil cells, construct a mock up of the complete installation at the site. The installation of the mock up shall be in the presence of the Contract Administrator.

.2 The mock up shall be a minimum of 100 square feet in area and include the complete soil cell system installation on compacted sub-base, drainage installation, base course aggregate and geotextile as required, geogrids, backfill, planting soil with compaction, decks, and top geotextile. Indicate location of trees as part of the mock up.

.3 The mock up area may remain as part of the installed work at the end of the project provided that it remains in good condition and meets all the conditions of the Specifications.

3.11 Installation of Soil Cell System

.1 Install and anchor soil cell system, including all specified geotextiles and geogrids in accordance with manufacturer's instructions and as indicated on the Drawings.

.2 Install soil cells around, over, or under existing or proposed utility lines, as indicated on the Drawings.

3.12 Installation of Tree Planting Soil and Geogrid

.1 Install tree soil and backfill per manufacturer's instructions.

.2 Compact backfill to density indicated by manufacturer or by Contract Administrator. Soil directly under the root ball of the tree within the planting pit shall be compacted to 90% proctor density.

3.13 Irrigation

.1 Where indicated in the Drawings, install irrigation lines and heads in accordance with Specification 3.1.6 – Micro Irrigation System Requirements.

3.14 Installation of Granular Base (above Cell Frames)

.1 Depth of granular base course above cell decks: per manufacturers' written instructions. Note depth may vary for poured concrete and unit pavers.

.2 Place the granular base material using approved equipment working from outside the limits of the excavated area. Work over material already in place.

.3 For large or confined areas, where aggregate cannot easily be placed from the edges of the excavated area, obtain approval for the installation procedure and types of equipment to be used in the installation from the soil cell manufacturer.

.4 Compact aggregate base course, in lifts not to exceed 150mm in depth, to 95% of maximum dry density. Utilize a roller or plate compactor with a maximum weight matched to the capacity of the soil cell system, as determined by the manufacturer.

.5 Notify Contract Administrator when aggregate base has been compacted to allow for testing. Obtain approval prior to proceeding with paving.

3.15 Installation of Paving and Thickened Tree Well Edge

.1 Place paving material over soil cell system in accordance with applicable City of Winnipeg specifications.

.2 Take care when placing paving or other backfill on top of soil cell system not to damage the system components.

.3 Prevent concrete form stakes from penetrating cells.

.4 Install thickened edge paving at tree well as indicated on the Drawings. Size of tree well as specified.

3.16 Installation of Planting Soil within the Tree Planting Area

.1 Prior to planting trees, install planting soil, to the depths indicated, within the tree opening adjacent to paving supported by soil cells.

.2 Remove all rubble, debris, dust and silt from the top of the planting soil that may have accumulated after the initial installation within the soil cells.

.3 The planting soil under the tree root ball shall be compacted to 90% Proctor Density to prevent settlement of the root ball.

.4 The planting soil within the tree opening shall be the same soil as in the adjacent soil cells.

3.17 Tree Planting

- .1 Plant tree in accordance with Specification 3.1.2 Tree Planting – Downtown and Regional Streets.
- .2 Backfill tree planting soil between rootball and cells, tamping to eliminate large air pockets and minimize settlement.
- .3 When backfilling is two thirds complete, saturate well to eliminate large air pockets.
- .4 Fill all gaps between the soil in the cells and that in the tree well with tree planting soil.
- .5 Install mulch to depth indicated on the Drawings.

3.18 Surface Finishings (Tree Grates, Mulch)

- .1 Where indicated on the Drawings, install tree grate or specified surface covering in accordance with Specification 3.1.7 Tree Grates.

3.19 Clean Up

- .1 Perform clean-up during the installation of work and upon completion of the work. Maintain the site free of soil, sediment, trash and debris during installation and upon completion of the work. Remove from site all excess soil materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

3.20 As Built Plan

- .1 Upon completion of the work, submit an as-built plan showing exact location of all components of system.

END OF SECTION

3.1.4 Raised Tree Planters

1. DESCRIPTION
 - 1.1 General
 - .1 This Specification shall cover the installation of raised cast-in-place concrete tree planters, including excavation, planter sub drainage, concrete forming, installation and finishing, planter insulation, geotextile, soil and mulch.
 - .2 Refer to Design Standards for soil volume requirements.
 - 1.2 Referenced Standard & Draft Construction Specifications
 - .1 CW 1120 – Existing Services, Utilities and Structures
 - .2 CW 3110 – Sub-grade, Sub-base and Base Course Construction
 - .3 CW 3120 – Installation of Sub Drains
 - .4 CW 3130 – Supply and Installation of Geotextile Fabrics
 - .5 CW 3170 – Earthwork and Grading
 - .6 CW 3310 – Portland Cement Concrete Pavement Works
 - .7 3.1.1 – Street Tree Planting Soil
 - .8 3.1.2 – Tree Planting – Downtown and Regional Streets
 - .9 3.1.6 – Micro Irrigation System Requirements
 - .10 3.1.7 – Tree Grates
 - 1.3 Referenced Details
 - .1 3.2.2 – Raised Concrete Planter Tree Planting for Regional Streets
 - .2 3.2.4 – Turf Boulevard with Sidewalk Tree Planting for Regional Streets
2. MATERIALS
 - 2.1 Granular Drainage Course
 - .1 Granular drainage material in accordance with Specification CW 3120 - Installation of Sub Drains.
 - 2.2 Sub Drain
 - .1 To Specification CW 3120 - Installation of Sub Drains.
 - 2.3 Insulation
 - .1 Insulation to be rigid Styrofoam SM 50mm thick or approved equal.

2.4 Geotextile and Filter Cloth

- .1 Geotextile in accordance with Specification CW3120.
- .2 Filter cloth to be UV stable, black, woven cloth.

2.5 Concrete Materials and Accessories

- .1 Concrete materials and accessories in accordance with Specification CW 3310 – Portland Cement Concrete Pavement Works, to suit loads designed by engineer.

2.6 Street Tree Planting Soil

- .1 Refer to Specification 3.1.1: Street Tree Planting Soil

2.7 Mulch

- .1 Where specified, refer to Specification 3.1.2: Tree Planting – Downtown and Regional Streets.

2.8 Submittals

- .1 Prior to installation, submit to the Contract Administrator samples of the following materials:
 - (a) Geotextile
 - (b) Filter cloth
 - (c) Mulch: 500 g

3. CONSTRUCTION METHODS

3.1 Layout Approval

- .1 Prior to the start of work, layout and mark the limits of excavation and horizontal and vertical control points sufficient to install the raised planter, backfill and required drainage features in the correct locations.

3.2 Excavation and Backfill

- .1 The Contractor must ensure that all buried utilities and services are located and if necessary, protected and exposed prior to any excavation in accordance with Specification CW 1120.
- .2 Excavate the tree pits to the dimensions and depth shown on the Drawings. Soft dig/ day lighting process to be used in area of existing underground utilities. Ensure base of tree pit slopes to drain to roadway drainage system (min 2% slope).
- .3 If pavement has been constructed, roadway base and sub-base extending more than 450mm from the edge of roadway pavement may be removed where required to achieve planter width as specified on Drawings.

.4 Clear excavation of all construction debris, trash, rubble and any foreign material. Excavate and remove oil spills and other soil contamination sufficiently to remove the harmful material. Fill over excavations with approved fill and compact to the required subgrade compaction.

.5 All excavated material shall be disposed of off site as per CW 1130.

.6 Backfill between roadway base gravel and tree pit edge with compacted granular where required.

3.3 Sub Drains and Irrigation

.1 Supply and place sub drain in accordance with Specification CW 3120 and as shown on the Drawings. Ensure pipe has minimum 25mm cover of drainage course above and below.

.2 Coordinate installation of all irrigation sleeves, lines, heads and equipment with irrigation contractor. Make provisions and ensure proper timing of operations.

3.4 Planter Construction

.1 Construct cast-in-place concrete planter in accordance with Specification CW 3310 – Portland Cement Concrete Pavement Works and the Drawings.

.2 Install rigid insulation around inside perimeter of planter, using approved fasteners.

.3 Cover drainage course and sides of tree pit with geotextile. Fix edges of geotextile to interior planter wall, below the mulch line.

3.5 Planting Soil Placement

.1 Clear all construction related debris from planter prior to placing soil.

.2 Scarify subgrade and backfill with soil, compacting sufficiently to provide good soil consistency for tree planting and to minimize settlement.

.3 Plant trees in locations shown on the Drawings in accordance with Specification 3.1.2: Tree Planting – Downtown and Regional Streets.

.4 Pull mulch away from trunk as indicated on the Drawings.

3.6 Site Clean Up

.1 Perform clean-up during the installation of work and upon completion of the work. Maintain the site free of soil, sediment, trash and debris during installation and upon completion of the work. Remove from site all excess soil materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

3.7 As Built Plan

.1 Upon completion of the work, submit an as-built plan showing exact location of all component systems

END OF SECTION

3.1.5 Tree Vaults

1. DESCRIPTION
 - 1.1 General
 - .1 This Specification outlines the installation of cast-in-place concrete tree vaults with precast concrete tree covers, sidewalk panels and related excavation, tree vault sub drainage, geotextile, soil and mulch. Refer to Design Standard 2.5.1 Street Tree Planting Soil for soil volume requirements.
 - 1.2 Referenced Standard & Draft Construction Specifications
 - .1 CW 1120 – Existing Services, Utilities and Structures
 - .2 CW 3110 – Sub-grade, Sub-base and Base Course Construction
 - .3 CW 3120 – Installation of Sub Drains
 - .4 CW 3130 – Supply and Installation of Geotextile Fabrics
 - .5 CW 3170 – Earthwork and Grading
 - .6 3.1.1 – Street Tree Planting Soil
 - .7 3.1.2 – Tree Planting – Downtown and Regional Streets
 - .8 3.1.6 – Micro Irrigation System Requirements
 - .9 3.1.7 – Tree Grates
 - 1.3 Referenced Details
 - .1 3.2.3 – Tree Vault Planting for Downtown and Regional Streets
 - .2 3.2.4 – Turf Boulevard with Sidewalk Tree Planting for Regional Streets
2. MATERIALS
 - 2.1 Granular Drainage Course
 - .1 Granular drainage material in accordance with Specification CW 3120 - Installation of Sub Drains.
 - 2.2 Sub Drain
 - .1 To Specification CW 3120 - Installation of Sub Drains.
 - 2.3 Geotextile
 - .1 Geotextile in accordance with CW 3120.

2.4 Root Barrier

- .1 DeepRoot UB 18, 450mm x600mm panels or approved equal.

2.5 Concrete Materials and Accessories

- .1 Concrete materials and accessories in accordance with Specification CW 3310 – Portland Cement Concrete Pavement Works, to suit loads designed by engineer.

2.6 Precast Concrete Vault Covers

- .2 Do not install vault cover around trunk of tree. At tree opening, install WADS-compliant tree grate in accordance with 3.1.7 Tree Grates.
- .3 Sidewalk panel to be min. 150mm thick reinforced precast concrete panel to accommodate AASHTO HS-20 loading. Manufacturer to supply shop drawings stamped by a structural engineer.
- .4 Where indicated on the drawings, vault covers to incorporate mounting holes for accessories, lifting holes, and/or Winnipeg Accessibility Design Standards (WADS)-compliant accessibility features such as indicator strips.

2.7 Planting Soil

- .1 In accordance with Specification 3.1.1: Street Tree Planting Soil.

2.8 Submittals

- .1 Prior to installation, submit to the Contract Administrator samples of the following materials:

- (a) Geotextile
- (b) Root barrier: 1 panel

- .2 Prior to installation, arrange for inspection and approval of the following materials:

- (a) Sidewalk panel: 1 panel

3. CONSTRUCTION METHODS

3.1 Layout Approval

- .1 Prior to the start of work, layout and mark the limits of excavation and horizontal and vertical control points sufficient to install the raised planter, backfill and required drainage features in the correct locations.

3.2 Excavation and Backfill

- .1 The Contractor must ensure that all buried utilities and services are located and if necessary, protected and exposed prior to any excavation in accordance with Specification CW 1120.

- .2 Excavate the tree vault to the dimensions and depth shown on the Drawings.

Soft dig/ daylighting process to be used in area of existing underground utilities. Ensure base of tree pit slopes to drain toward roadway drainage system (min 2% slope).

.3 Remove sidewalk base and sub base where required to achieve tree pit width indicated on the Drawings. Do not remove any base or sub-base material within 450mm of back of curb without authorization from City's project manager.

.4 Clear excavation of all construction debris, trash, rubble and any foreign material. Excavate and remove oil spills and other soil contamination sufficiently to remove the harmful material. Fill over excavations with approved fill and compact to the required subgrade compaction.

.5 All excavated material shall be disposed of off site as per CW 1130.

3.3 Subdrains and Irrigation

.1 Consider passive watering and stormwater management benefits when designing tree planting subdrainage.

.2 Supply and place 150 mm depth granite drainage course with perforated pipe in accordance with Specification CW 3120 – Installation of Sub Drains and as shown on the Drawings. Ensure pipe has minimum 25mm cover of drainage course above and below.

.3 Coordinate installation of all irrigation sleeves, lines, heads and equipment with irrigation contractor. Make provisions and ensure proper timing of operations.

3.4 Construction of Tree Vault

.1 Construct cast-in-place concrete tree vault in accordance with Specification CW 3310 – Portland Cement Concrete Pavement Works and the Drawings.

.2 Where indicated, install root barrier along roadway edge of tree pit or as directed by the Contract Administrator.

.3 Cover drainage course and sides of tree pit with geotextile in accordance with Specification CW 3120 – Installation of Sub Drains and as shown on the Drawings.

3.5 Planting Soil Placement

.1 Remove and dispose of all construction related debris from tree vault prior to placing soil.

.2 Backfill with street tree soil, tamping sufficiently to eliminate large air pockets and minimize settlement. The planting soil under the tree root ball shall be compacted to 90% proctor density to prevent settlement of the root ball.

.3 Plant trees in locations as per the Drawings, in accordance with Specification 3.1.2: Tree Planting – Downtown and Regional Streets. Ensure tree trunk is centred on opening of tree grates.

.4 After tree planting, ensure that the finished soil level is 100 mm below bottom edge of tree grate and 25mm below bottom edge of sidewalk panel.

3.6 Finishing

.1 Install sidewalk panels and tree grates ensuring edges are supported by tree well.

.2 Where indicated on the Drawings, install tree grates in accordance with Specification 3.1.7: Tree Grates.

3.7 Site Clean Up

.1 Perform clean-up during the installation of work and upon completion of the work. Maintain the site free of soil, sediment, trash and debris during installation and upon completion of the work. Remove from site all excess soil materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

3.8 As Built Plan

.1 Upon completion of the work, submit an as-built plan showing exact location of all component systems

END OF SECTION

3.1.6 Micro Irrigation System Requirements

1. DESCRIPTION
 - 1.1 General
 - .1 This Specification outlines the requirements for the supply, installation and maintenance of a micro-irrigation system for tree planting on downtown and regional streets. It is supplementary to Specification CW 3530 – Manual Irrigation System.
 - 1.2 Referenced Standard & Draft Construction Specifications
 - .1 CW 1120 – Existing Services, Utilities and Structures
 - .2 CW 3530 – Manual Irrigation System
 - .3 3.1.1 – Street Tree Planting Soil
 - .4 3.1.2 – Tree Planting – Downtown and Regional Streets
 - 1.3 Related Details
 - .1 SD-241A – Typical Dual Check Backflow Preventer and Meter in C.S.P. Enclosure
 - .2 SD-241B – Typical Double Check Valve Assembly and Meter in C.S.P. Enclosure
 - .3 3.2.1– Tree Planting Using Soil Cells
 - .4 3.2.2 – Raised Concrete Planter Tree Planting for Regional Streets
 - .5 3.2.3 – Tree Vault Planting for Downtown and Regional Streets
 - .6 3.2.4 – Turf Boulevard with Sidewalk Tree Planting for Regional Streets
2. MATERIALS
 - 2.1 HDPE pipe
 - .1 Pipe shall conform to the requirements of CW 3530.
 - 2.2 Fittings for HDPE pipe
 - .1 Approved saddle fittings at head connections. Socket fusion fittings at pipe connections. Fittings to be approved by pipe manufacturer for fusion with pipe.
 - 2.3 Risers
 - .1 Galvanized steel pipe and fittings or approved alternate.
 - 2.4 Sleeves

.1 Series 160 PVC pipe of sufficient diameter to allow clear passage of irrigation pipe and control wires.

2.5 Manual Isolation Valves

.1 In accordance with Specification CW 3530. Sizes as indicated on the Drawings or as required to suit application.

2.6 Battery operated automatic zone control valves

.1 150 psi rated, normally closed, 24 VAC electric solenoid valve with manual operation capability and flow control adjustment. Glass reinforced nylon body and bonnet or other approved durable material. Valve serviceable from top without removal from line. Control module to operate on 9 volt battery and provide scheduling features suitable for the intended installation.

2.7 Valve and Meter boxes

.1 High density polyethylene or fibreglass reinforced prefabricated plastic boxes complete with locking cover and stainless steel bolt. Size to suit valve clusters and meters as indicated.

2.8 Sprinklers

.1 Flood bubbler: bodies constructed of heavy-duty ABS plastic. Pressure compensating low flow system.

.2 Submit flow calculations and nozzle sizes with Shop Drawings for approval by Contract Administrator.

.3 Provide check valves to risers of all sprinklers not equipped with an internal check valve.

2.9 Backflow Prevention

.1 To Specification CW 3530.

2.10 Rain Sensor

.1 Wired or wireless. Long-life battery. Matched to system and manufacturer.

3. CONSTRUCTION METHODS

3.1 System Requirements

.1 Performance Criteria

(a) Design automatic tree watering system to provide 30 gallons of actual precipitation per week per tree within a 5 hour per day watering window. Provide one third of the water at an interval of three times per week.

(b) System to provide complete wetting of the entire root area.

(c) Over-spray on hard surface areas beyond the tree pit is not acceptable.

- (d) Provide system for winterization.

3.2 System Design, Layout and Inspection

- .1 Provide detailed layout plan showing zoning, pipe layout and valve locations for approval by Contract Administrator.
- .2 All work shall be laid out by the Contractor in conformance to the layout shown on their approved plan. The Contractor shall be fully responsible for the accuracy thereof.
- .3 Mark locations of heads and valves and receive approval from the Contract Administrator prior to excavation and installation. Use stakes or other approved non-permanent marking method.
- .4 Install main lines and laterals and receive approval from Contract Administrator prior to backfilling.
- .5 Upon completion of the installation, the entire system shall be tested and balanced. The Contractor shall notify the Contract Administrator for a final test to allow the Contract Administrator to be on site to consult. All components shall then be checked for proper operation and the system shall not be accepted by the Contract Administrator until all portions are operating as intended and all deficiencies have been corrected. Contractor shall provide all pumps, gauges and fittings required for testing.
- .6 Notify Contract Administrator a minimum of 24 hours prior to testing inspection. Do not proceed to subsequent work without the approval of Contract Administrator.

3.3 Protection

- .1 Prevent damage to fencing, trees, landscaping, natural features, benchmarks, existing buildings, existing pavement, surface or underground utility lines which are to remain. Make good any damage.
- .2 The Contractor must ensure that all buried utilities and services are located and if necessary, protected and exposed prior to any excavation in accordance with Specification CW 1120.

3.4 Coordination

- .1 Coordinate work with other contractors who may be working concurrently on site.

3.5 Water Source

- .1 Connect to supply as indicated on the Drawings, in accordance with Specification CW 2210. Provide complete hydraulic calculations indicating flow and pressure loss at representative zones around the site.

3.6 Meter Enclosure

- .1 Construct meter enclosure, complete with gravel sump, meter, backflow protection, quick couple and all other appurtenances in accordance with Specification CW 3530 and Standard Details SD-241A or SD-241B.

.2 Use di-electric fittings at connection of galvanized pipe or fittings to copper irrigation mains as required.

3.7 Installation of Pipe

.1 Install pipe in accordance with Specification CW 3530.

.2 Use lateral boring to install sleeves under major roads and sidewalks.

3.8 Polyethylene Waterline:

.1 Install pipe in accordance with Specification CW 3530.

3.9 Control System

.1 Locate controllers at location as indicated on the Drawings or as approved by the Contract Administrator.

.2 Incorporate rain sensor to reduce waste. Locate to reduce accidental damage and vandalism.

3.10 Single Valve Controllers:

.1 Install single valve controllers according to manufacturer's instructions, in valve box set plumb and flush with the finished grade.

.2 Provide 6" (150 mm) depth of pea gravel sump below the valve.

.3 Provide isolation valve on pressure side of control valve.

3.11 Bubblers

.1 Install all bubblers on risers firmly fixed in place to avoid toppling.

3.12 Testing and Adjustment

.1 Upon completion, test irrigation system for proper operation in accordance with Specification CW 3530.

3.13 Maintenance Data and Demonstration Procedures

.1 Provide maintenance data for operation and maintenance of irrigation system and equipment.

.2 The maintenance manual shall include all original manufacturers' warranty certificates, controller operation and programming instructions, servicing and replacement procedures for all sprinklers and valves, and procedures for blowing out the system in the fall and charging the system in the spring.

.3 Demonstrate procedures for Owner as directed by the Contract Administrator.

3.14 As Built Plan

.1 Upon completion of the work, submit an as-built plan showing exact location of all components of system.

.2 Provide a control schedule that balances system hydraulics and watering requirements.

3.15 Maintenance

.1 Blow-out all irrigation water lines prior to freeze-up and reconnect the irrigation system in the spring of the following year.

.2 Emergency repairs may be required to protect property or permit operation of the work. The Owners shall notify the Contractor immediately, who shall make all necessary repairs. The cost of such emergency repairs shall be paid by the Contractor. Maintenance not of an emergency nature shall be brought to the attention of the Contractor in writing and he shall take the necessary action to correct the faulty work.

.3 The Contractor shall provide on-site orientation as directed by the Contract Administrator to familiarize the maintenance personnel with the proper operation of the irrigation system and locations of control equipment.

3.16 Clean Up

.1 Clean site in accordance with Specification CW 3530.

3.17 Quality Control

.1 Inspection, access, and warranty requirements shall be in accordance with Specification CW 3530.

.2 End of warranty inspection will be conducted.

END OF SECTION

3.1.7 Tree Grates

1. DESCRIPTION
 - 1.1 General
 - .1 This Specification outlines the supply and installation of tree grates where indicated on the Drawings.
 - 1.2 Referenced Standard & Draft Construction Specifications
 - .1 CW 3310 – Portland Cement Concrete Pavement Works
 - .2 CW 3540 – Topsoil and Finish Grading for Establishment of Turf Areas
 - .3 3.1.2 – Tree Planting – Downtown and Regional Streets
 - .4 3.1.3 – Soil Cells
 - .5 3.1.5 – Tree Vaults
 - 1.3 Related Details
 - .1 3.2.1 – Tree Planting Using Soil Cells
 - .2 3.2.3 – Tree Vault Planting for Downtown and Regional Streets
2. MATERIALS
 - 2.1 General
 - .1 Submit shop drawings for tree grates and other accessories, in accordance with Specification CW 1110. Indicate dimensions, assembly, materials, finishes, anchorage and installation details.
 - 2.2 Tree Grates
 - .1 Size and style to suit project-specific conditions. Consultant to name size, model and finish
 - .2 All grates must have adjustable trunk opening to accommodate tree growth.
 - .3 Preferred maximum width of all other openings: 6 mm (1/4") or in accordance with Winnipeg Accessibility Design Standards.
 - .4 Material and finish to be durable and low maintenance. Ductile iron or approved alternate. Avoid powder-coated grates as this finish has not proven durable.
 - .5 Design to accommodate sidewalk snow clearing equipment loads.
 - .6 Supply grate complete with matching corrosion-resistant frame unless otherwise directed by Contract Administrator.

.7 Submit shop drawings. Indicate dimensions, sizes, assembly, material, finishes, anchorage and installation details.

2.3 Gasket

.1 Where grate and frame are dissimilar metals, provide neoprene gasket or approved alternate to prevent galvanic corrosion.

3. CONSTRUCTION METHODS

3.1 Schedule

.1 Coordinate order and delivery of frames to coincide with concrete pour.

3.2 Setting Tree Grate Frame

.1 Where frame is specified, assemble frame and grate and set assembly on concrete header (tree well) formwork. Adjust height and alignment of forms as required to match grate elevation and grade with adjacent paving elevation and grade.

.2 Ensure concrete headers (tree wells) are located, sized and aligned to suit control joint pattern. Obtain approval of locations.

.3 Where no studs are supplied with the frame, install 10M rebar through lugs on the frame and support where indicated.

3.3 Tree Grates Without Frame

.1 Where no frame is specified, ensure tree well header is formed/fabricated so that grate is square to the header at matches the elevation and grade of adjacent paving.

.2 Ensure concrete headers (tree wells) are located, sized and aligned to suit control joint pattern. Obtain approval of locations.

3.4 Concrete

.1 Pour and finish concrete in accordance with Specification CW 3310. Do not remove tree grate until concrete is set up.

3.5 Protection

.1 Cover open tree wells to prevent injury.

.2 Protect installed tree wells and grates from damage from subsequent construction operations. Time operations to minimize risk of damage.

.3 Remove protection materials upon Substantial Performance of Work, or when risk of damage is no longer present.

END OF SECTION

3.1.8 Long Term Maintenance of New Tree Planting

1. DESCRIPTION
 - 1.1 General
 - .1 The Contractor shall be responsible for the maintenance of all plant material for a period of two (2) years from date of acceptance. Refer to Specification 3.1.2: : Tree Planting - Downtown and Regional Streets for acceptance requirements.
 - .2 The Contractor shall furnish all labour, materials, equipment and services necessary to perform ongoing care of the plant material, which shall include but not be limited to:
 - (a) Mulching
 - (b) Watering
 - (c) Weed Control
2. MATERIALS
 - 2.1 Mulch
 - .1 Refer to Specification 3.1.2: Tree Planting – Downtown and Regional Streets.
 - .2 Or approved alternate.
 - 2.2 Water
 - .1 Use potable water, free from impurities injurious to vegetation.
3. METHODS
 - 3.1 General
 - .1 Program the timing of operations to plant growth, weather conditions and use of the Site.
 - .2 Do each operation continuously and complete within a reasonable time period.
 - .3 Store equipment and materials off-site.
 - .4 Add additional mulch as required to maintain minimum constant depth of mulch.
 - .5 Clean up edges and contain mulch within the designated area.
 - 3.2 Watering
 - .1 The Contractor shall provide a water supply, and all costs to provide water for the watering operation and all associated costs shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.

.2 Further to clause 3.7 of CW 1120-R1, the Contractor shall pay for all costs associated with obtaining water in accordance with the Waterworks By-law. Sewer charges will not be assessed for water obtained from a hydrant.

.3 Water shall be free of oils, acids, alkalis, salts and other substances that may be detrimental to plant growth. Water suitable for human consumption shall be acceptable without testing.

.4 Water from rivers and streams shall not be used without prior approval of the Contract Administrator.

.5 Should the Contract Administrator determine that water quality testing is necessary, an approved testing laboratory shall perform the test at the sole expense of the Contractor.

3.3 Weeding

.1 Maintain surface of tree pit by hand weeding.

.2 Do not allow weeds to establish for a period longer than two (2) weeks.

.3 Do not use any herbicides for weed control near trees unless authorized by the Contract Administrator.

3.4 Tree Protection/Support

.1 Ensure trunk protection collars and tree supports are maintained in good condition, not damaging the bark or trunk, serving their intended function and posing no threat to public safety.

.2 The trunk protection collars shall be left on trees after the maintenance period is completed.

.3 Tree supports shall be removed or left in place at the end of the warranty period as directed by the Contract Administrator.

3.5 Reporting

.1 The Contractor must inform the Contract Administrator of watering progress and schedule by 9:00 AM each day of watering.

.2 The Contractor must inform the Contract Administrator immediately of any equipment breakdown or delay in watering and maintenance. Once a watering cycle is completed, submit a log-sheet to the Contract Administrator identifying the following:

- (a) the location where maintenance Work is carried out; and
- (b) preventative or corrective measures required which are outside Contractors' responsibility.

.3 The Contractor is responsible for submitting maintenance records for watering on a monthly basis from May 1 to October 31 for the duration of the maintenance period.

3.6 Site Safety and Traffic Control

.1 Site Safety and Traffic Control measures shall be carried out in all areas on or adjacent to roadways in accordance with Specification 3.1.2: : Tree Planting - Downtown and Regional Streets.

3.7 Damage to Property

.1 The Contractor shall take every precaution not to damage, injure or mark any existing structures or landscaping on the street allowance or adjacent properties.

.2 Should any damage be caused by the Contractor, their employees or equipment, it shall be restored or replaced at the Contractor's expense and to the satisfaction of the Contract Administrator. This applies even if damage results from work done in the process of correcting deficiencies.

3.8 Tree Mortality – City Supplied Trees

.1 If a City-supplied tree dies and the Contractor has not provided maintenance to the satisfaction of the Contract Administrator and/or submitted the regular maintenance records in accordance with these Specifications, then the cost to supply, plant and maintain a replacement tree as originally indicated in the contract document, shall be at the sole expense of the Contractor.

.2 If a City-supplied tree dies and the Contract Administrator is satisfied that the tree has been maintained in accordance with this Specification, that tree will be added to the Contract at the originally specified bid price to be replanted and maintained by the Contractor in accordance with these Specifications.

.3 Replacement trees shall receive 2 years maintenance as outlined in the contract document, from the date of replacement.

.4 Inspections of replacement trees will be conducted by City of Winnipeg staff.

3.9 Tree Mortality – Contractor Supplied Trees

.1 If a Contractor-supplied tree dies and the Contractor has not been submitting the regular maintenance records in accordance with these specifications, then the cost to supply, plant and maintain a replacement tree as originally indicated in the contract document, shall be at the sole expense of the Contractor.

.2 If a Contractor-supplied tree dies and the Contract Administrator is satisfied that the tree has been maintained in accordance with these specifications, that tree will be added to the Contract at the originally specified bid price to be supplied, planted and maintained by the Contractor in accordance to this specification.

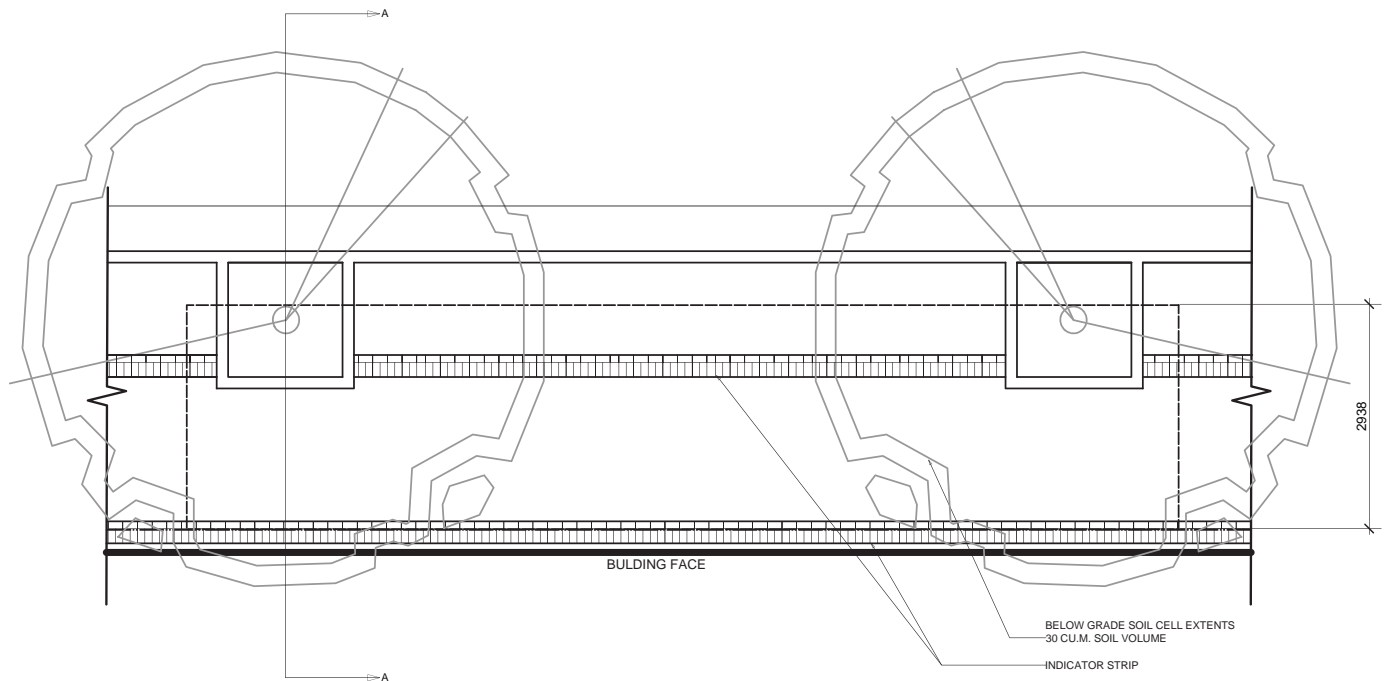
.3 Replacement trees shall receive 2 years maintenance as outlined in the contract document, from the date of replacement.

.4 Inspections of replacement trees will be conducted by City of Winnipeg staff.

END OF SECTION

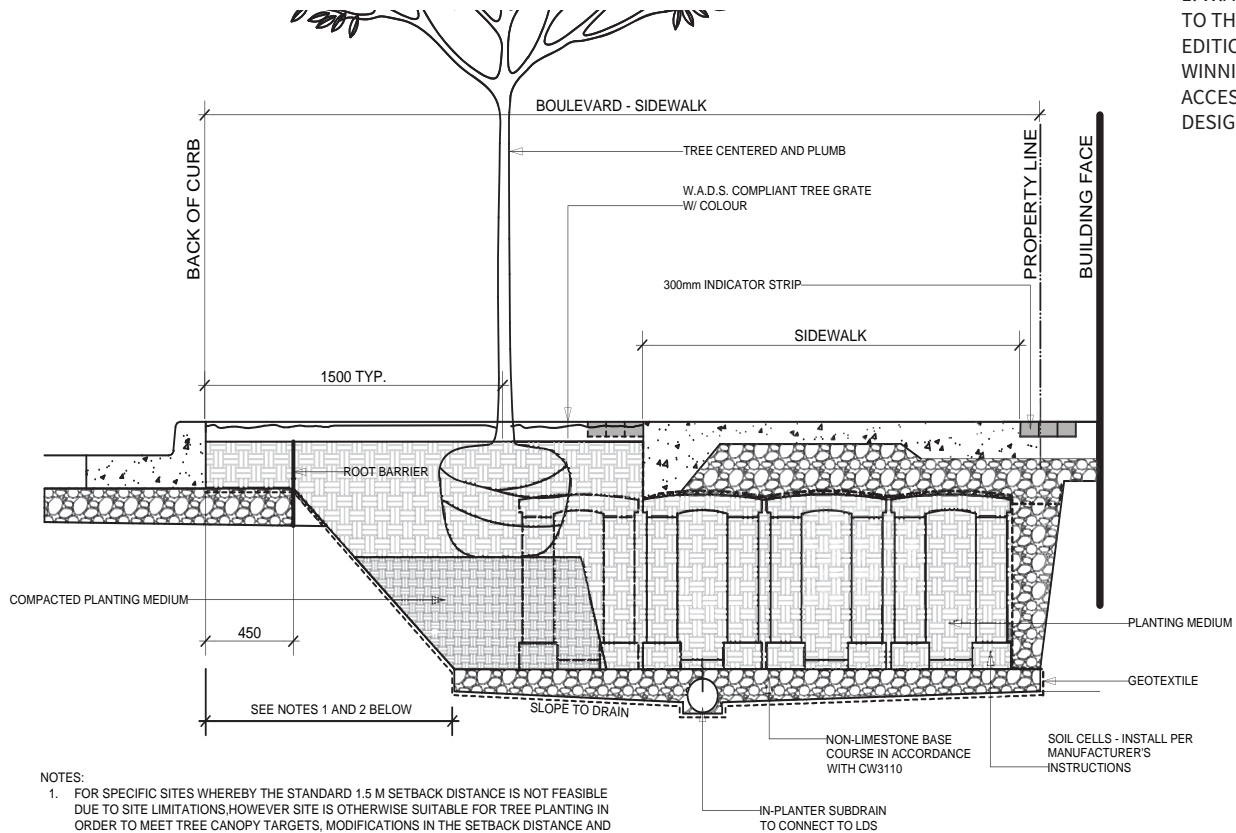
3.2 Details

3.2.1 Tree Planting Using Soil Cells



TYPICAL SIDEWALK / BOULEVARD
30 cu.m soil volume with two trees

GENERAL NOTES
1. W.A.D.S. REFERS TO THE LATEST EDITION OF WINNIPEG ACCESSIBILITY DESIGN STANDARDS



NOTES:

1. FOR SPECIFIC SITES WHEREBY THE STANDARD 1.5 M SETBACK DISTANCE IS NOT FEASIBLE DUE TO SITE LIMITATIONS, HOWEVER SITE IS OTHERWISE SUITABLE FOR TREE PLANTING IN ORDER TO MEET TREE CANOPY TARGETS, MODIFICATIONS IN THE SETBACK DISTANCE AND ANGLE OF REPOSE MAY BE CONSIDERED AT THE TREE PLANTING SITE PROPER WITH ASSOCIATED GEOTECHNICAL SOLUTIONS AND WITH THE APPROVAL OF PWD ENGINEERING
2. WHERE LESS THAN 450 OBTAIN CIVIL ENGINEER'S REVIEW FOR ROAD SAFETY AND ROADBED INTEGRITY

TYPICAL SIDEWALK / BOULEVARD SECTION A-A

TREE PLANTING USING SOIL CELLS

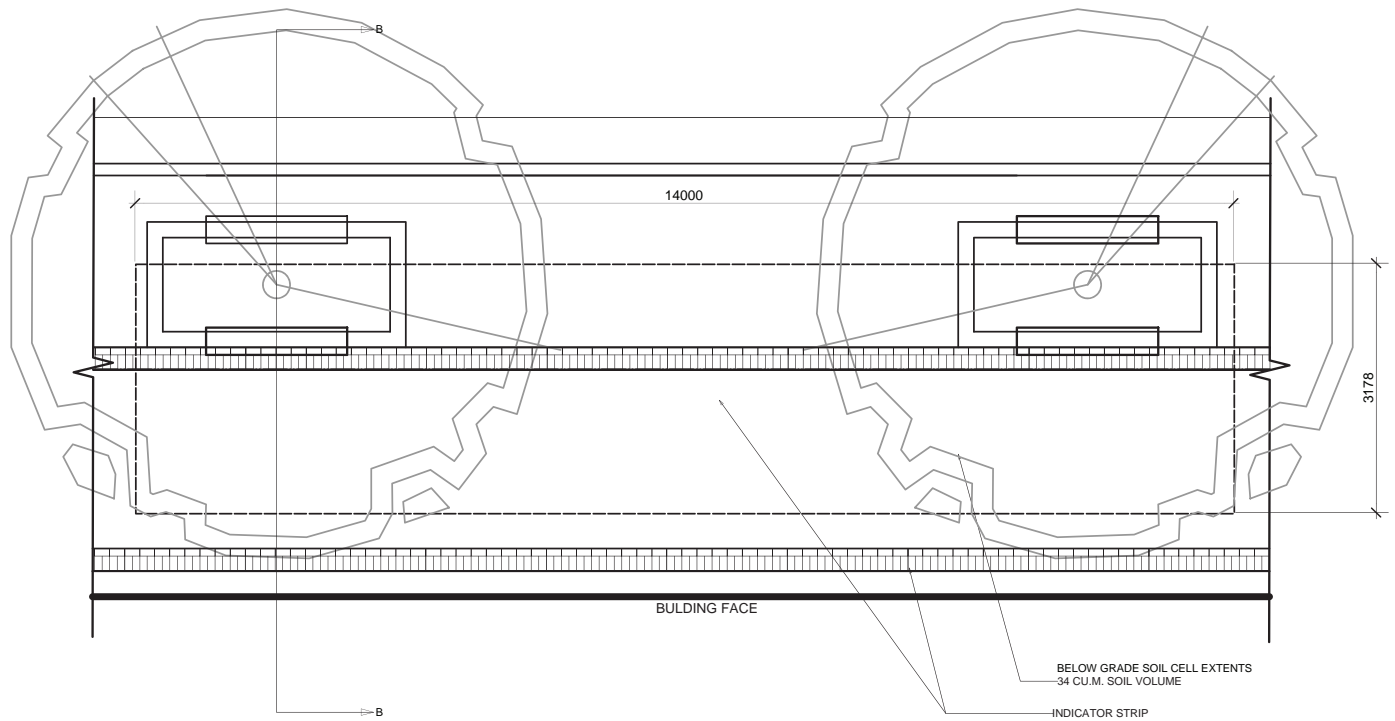
THIS DRAWING TO BE READ IN CONJUNCTION WITH SPECIFICATION SECTION 3.1.3.

SCALE:
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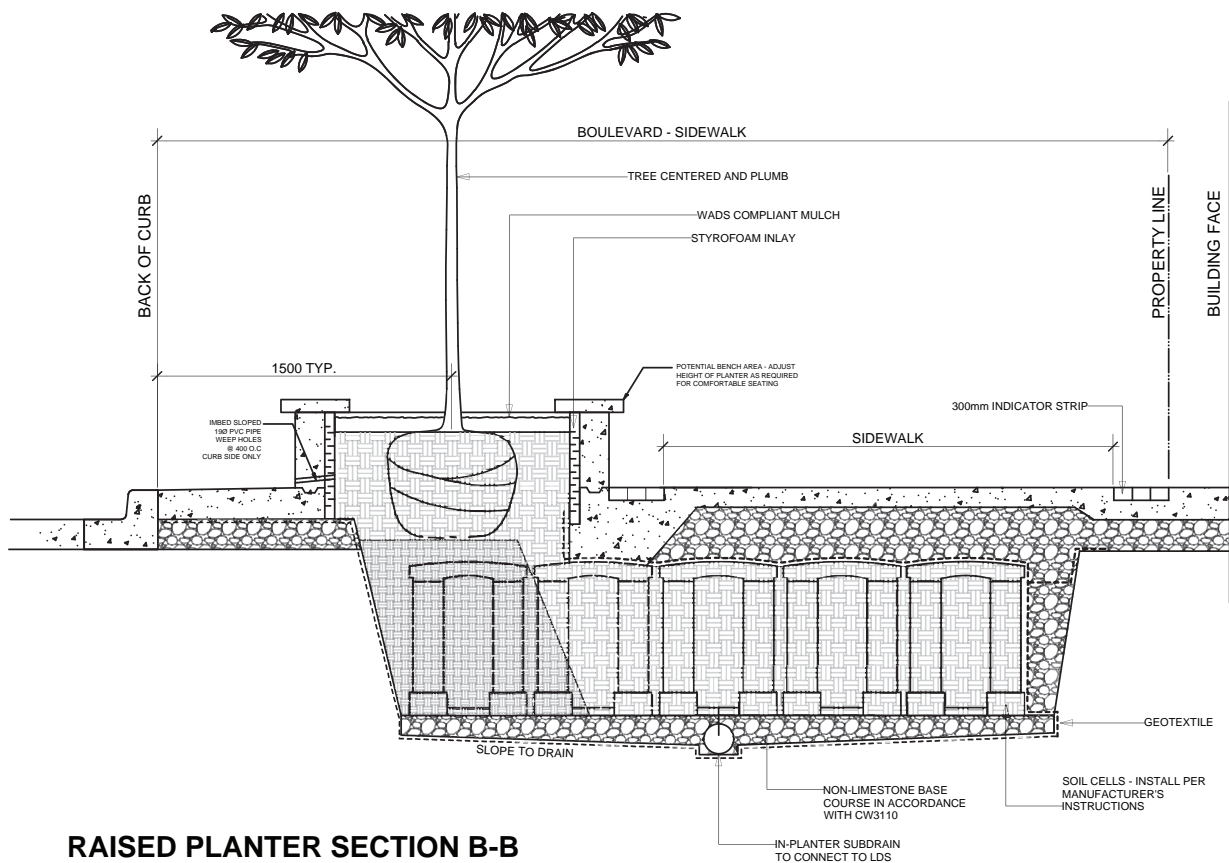
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2022-07-28

SHEET NO.
3.2.1

3.2.2 Raised Concrete Planter Tree Planting for Regional Streets



RAISED PLANTERS



RAISED PLANTER SECTION B-B

RAISED CONCRETE PLANTER TREE PLANTING FOR REGIONAL STREETS

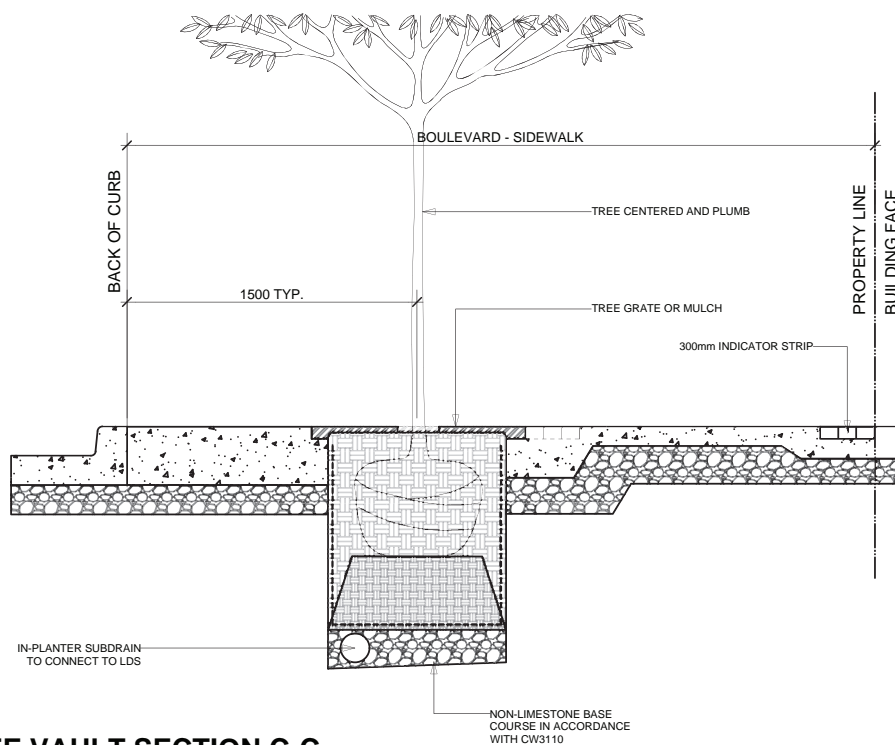
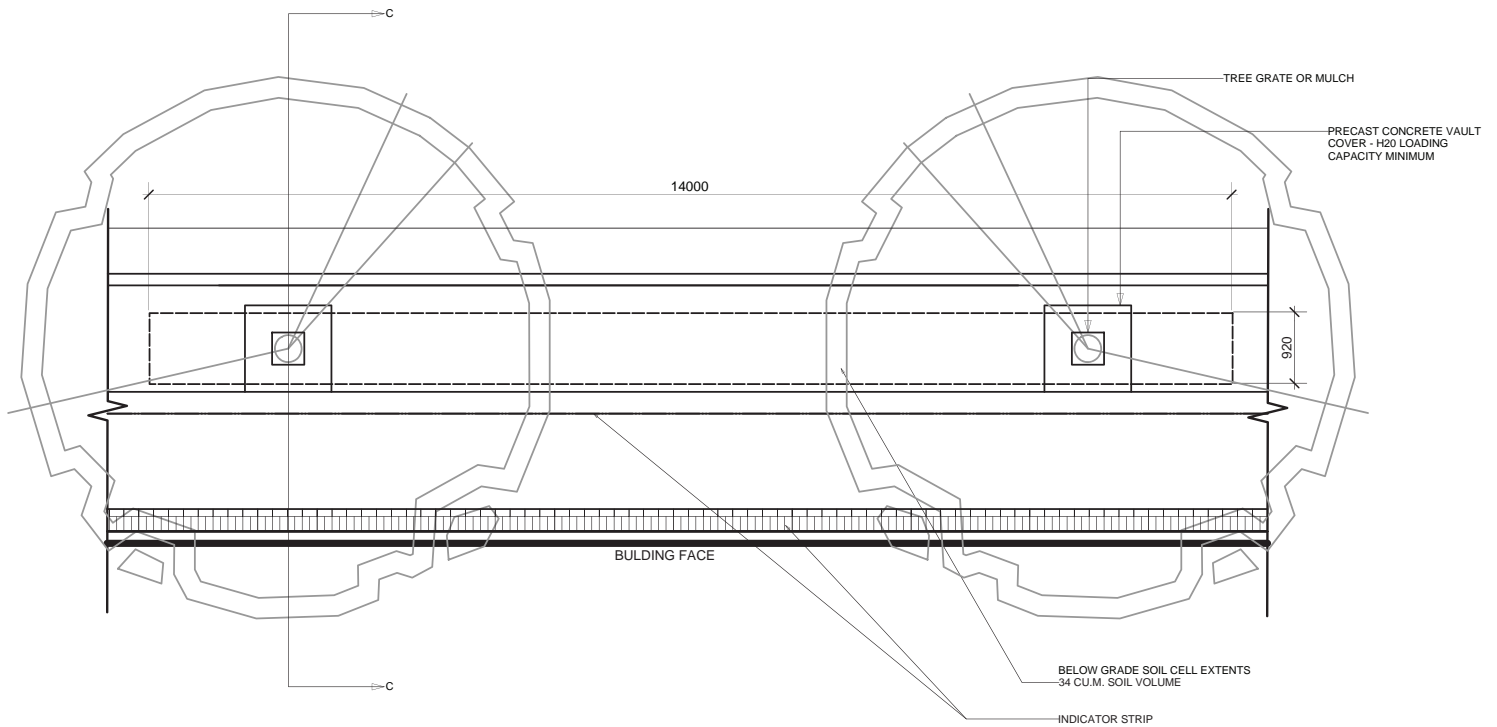
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SCALE:
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DATE:
2022-07-28

SHEET NO.
3.2.2

3.2.3 Tree Vault Planting for Downtown and Regional Streets



TREE VAULT SECTION C-C

TREE VAULT PLANTING FOR DOWNTOWN AND REGIONAL STREETS

THIS DRAWING TO BE READ IN CONJUNCTION WITH SPECIFICATION SECTION 3.1.5

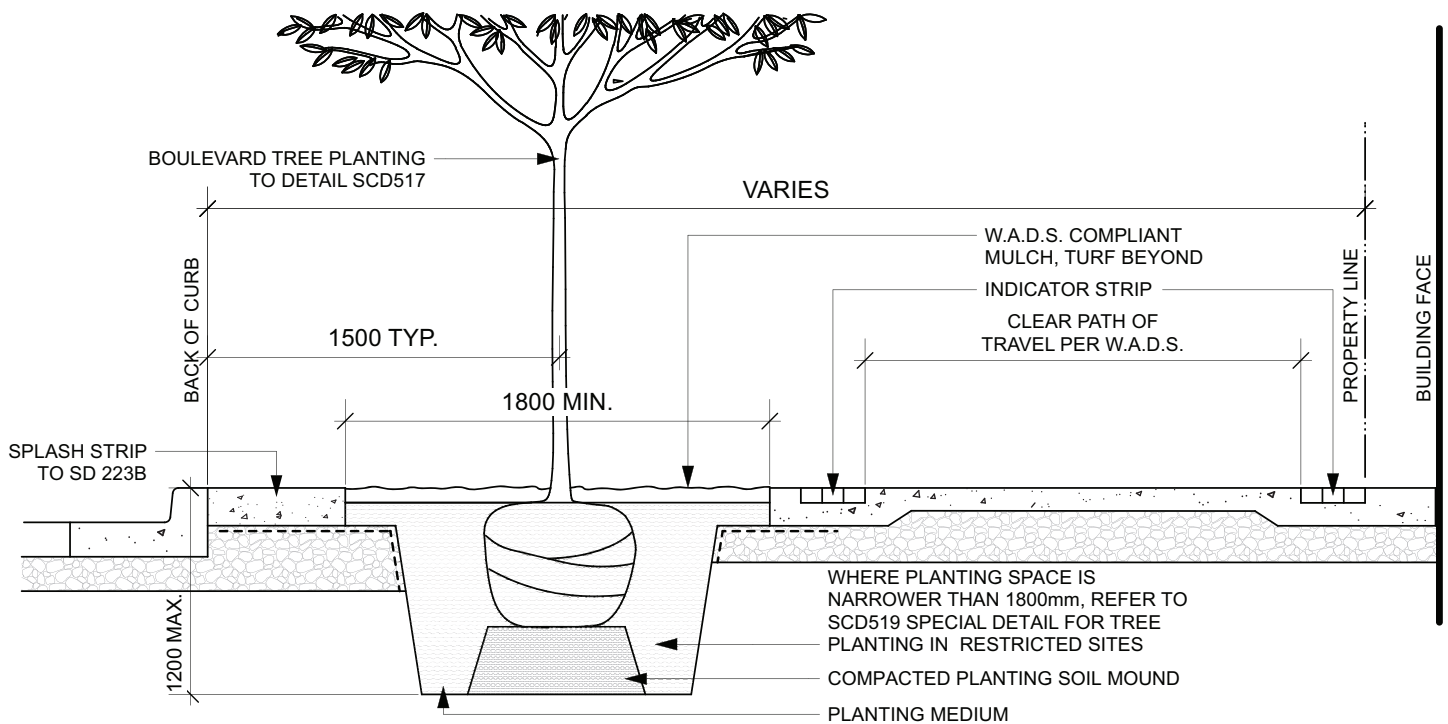
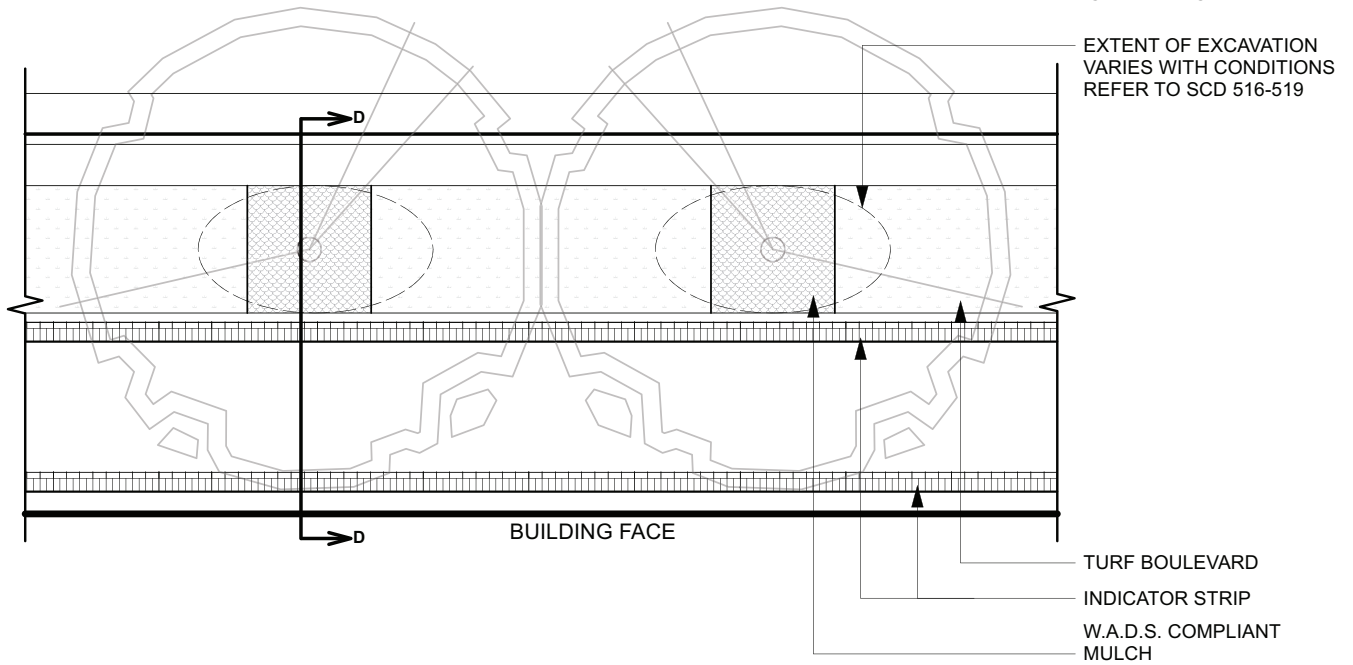
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DATE:
2022-07-28

SHEET NO.
3.2.3

3.2.4 Turf Boulevard Tree Planting for Regional Streets

GENERAL NOTES
 1. W.A.D.S. REFERS TO THE LATEST EDITION OF WINNIPEG ACCESSIBILITY DESIGN STANDARDS



TURF BOULEVARD WITH SIDEWALK TREE PLANTING FOR REGIONAL STREETS SECTION D-D

TURF BOULEVARD TREE PLANTING FOR REGIONAL STREETS

THIS DRAWING TO BE READ IN CONJUNCTION WITH SPECIFICATION SECTION 3.1.4

SCALE:
 NTS

DATE:
 2022-07-28

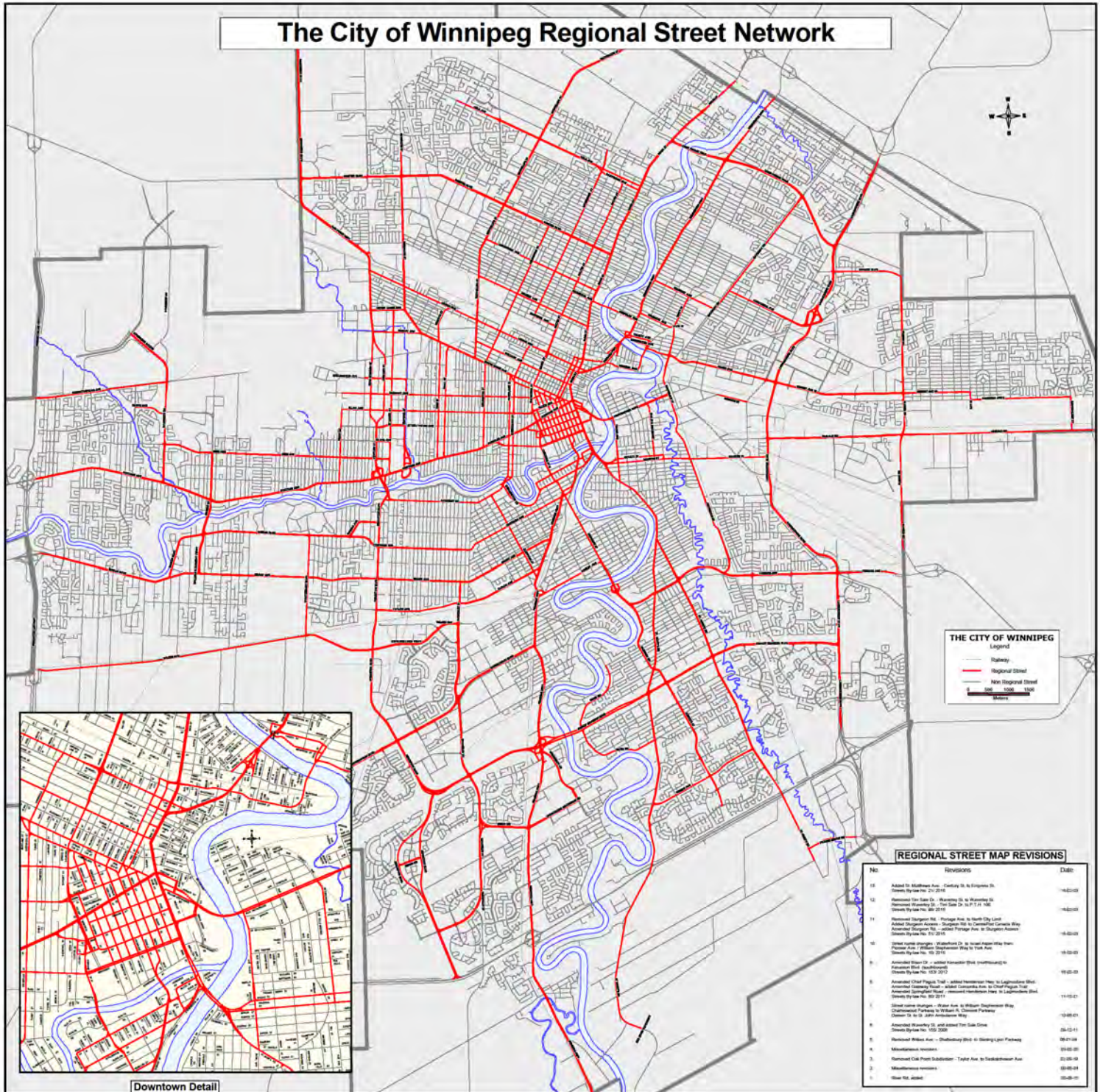
SHEET NO.
 3.2.4

Appendix

5.1 CentureVenture Mandated Area Map



5.2 Streets By-Law Schedule 'E' – Regional Streets Map



5.3 Specifications for Tree and Root Zone Protection

3.19 Specifications for Tree and Root Zone Protection

DEFINITIONS

Access Routes: A route that is required for access to the construction site or is otherwise required for work to commence.

CA: Contract Administrator

City Forester or Designate: As represented by a person employed by the City of Winnipeg as an Urban Forester, Supervisor of Urban Forestry Technical Services, or Forestry Technician authorized to provide Consulting Services.

Construction Area: The entire area of site disturbance, including excavation, construction traffic, equipment and materials storage, staging and parking areas, and access points.

DBH: Diameter at Breast Height – a measurement of the tree trunk, in centimeters, taken at 1.4m above grade.

Impervious Surface: An area with an existing paved surface such as concrete, asphalt surface, brick, or compacted granular.

Qualified Arborist: An arborist that holds a valid arborist certification with a certification number with the International Society of Arboriculture (ISA) and meets the general contractor requirements for the City of Winnipeg.

TPZ: Tree protection zone. This includes the soil inside the TPZ and the entire tree including roots, as calculated in Section 3.19.5.

TPZ Barrier: A physical barrier at the edge of the TPZ to ensure protection of the TPZ.

Tree Protection Plan: Is a report that outlines how construction work is to be done and the steps to be taken to protect trees within and adjacent to the construction site.

- | | |
|--------|---|
| 3.19 | Tree Protection |
| 3.19.1 | No public tree may be pruned, damaged, or removed, without the written consent from the City Forester or Designate. |
| 3.19.2 | Where trees are to be preserved, a Tree Protection Plan is required to be submitted to the CA before any construction begins. |

3.19.3 Specification for Tree Protection Zone applies to all public trees where the TPZ intersects with the Construction Area.

3.19.4 Tree Protection Zone (TPZ)

A TPZ shall be established by surrounding all Tree and Root Zones that are to be protected.

- a) No activity is permitted inside the TPZ, including any traffic, construction excavation, change of grade, or disposal/storage of materials, chemicals.
- b) No accumulation of water or other substances as a result of activities associated with construction is permitted within the TPZ.
- c) No parking of vehicles or equipment.
- d) The outside of the boundary of the TPZ shall be delineated by a physical barrier as specified in 3.19.5 and 3.19.6.

3.19.5 TPZ Setback Distance

- a) The following chart identifies the required distance for a TPZ. Distance is to be measured from the outside edge of the tree trunk, 30 cm above grade.

| <u>Trunk Diameter (DBH)</u> | <u>Minimum Protection Distances Required</u> |
|---------------------------------|--|
| <10.1 cm | 2.0m |
| 10.1 – 40.0 cm | 2.4m |
| 40.1 – 50.0 cm | 3.0m |
| 50.1 – 60.0 cm | 3.6m |
| 60.1 – 70.0 cm | 4.2m |
| 70.1 – 80.0 cm | 4.8m |
| 80.1 – 90.0 cm | 5.4m |
| 90.1 – 100.0 cm | 6.0m |
| >100.0 cm | 6.0 cm for each 1.0 cm of trunk diameter |

- b) A physical TPZ barrier shall be constructed prior to the commencement of any disturbance on the Site by erecting a barrier as described in 3.19.5 and 3.19.6.

- i) The Contractor shall obtain approval from the CA for placement and installation of barriers prior to commencing any construction activities.
- ii) Barriers are to remain in place and be fully functional throughout the duration of the project until all work is completed to the satisfaction of the CA.
- iii) Where the TPZ is interrupted by an impervious surface, the TPZ barrier will be installed at the edge of the hard surface area.

3.19.6 Materials for the TPZ Barrier shall meet the following specifications:

- a) Fence to consist of chain link construction fencing anchored or held in place to the satisfaction of the CA.
- b) Where fill or excavation material must be stored within 1m of the outside of the TPZ, a barrier of ¾" thick plywood must be securely installed along the outside of the fencing and must be long enough to accommodate the full extent or fill or excavated material to ensure that no material enters the TPZ.
- c) The fence must be minimum 1.2 m in height to a maximum 2 m in height. Adjustments may be made where height interferes with the normal branching habit of the tree and as accepted by the CA.
- d) A "Tree Protection Zone" sign must be mounted on any side facing foot and vehicular traffic, including construction traffic. The sign shall be produced in colour and be 45X60cm in size and made of white coroplast. A template for the sign will be provided by the CA. Only the provided design shall be used.

3.19.7 Pruning of Tree Branches

- a) Branch pruning shall be performed prior to the start of the work to avoid anticipated conflicts between tree branches with construction activities or structures and are only to be performed by a Qualified Arborist with the written consent of the CA.
- b) Branch pruning shall be in accordance with practices found in the latest edition of the American National Standards Institute (ANSI) A300 and the latest edition of the companion publication "Best Management Practices – Tree Pruning".
- c) No above-ground pruning work shall be permitted on elm trees for the period April 1st to July 31st in accordance with the Manitoba Forest Health Protection Act and Regulations unless deemed a safety hazard by the CA.
- d) Wood handling, transport, and disposal, shall be in accordance with Provincial and Federal legislation.

3.19.8 Pruning of Tree Roots

- a) Root pruning shall be performed prior to start of the work to avoid anticipated conflicts between tree roots and construction activities or structures and are only to be performed with the written consent of the CA.
- b) Root pruning shall be done in accordance with practices found in the latest edition of the American National Standards Institute (ANSI) A300 and the latest edition of the companion publication "Best Management Practices – Root Pruning".

- c) All exposed or surface roots greater than 40mm diameter damaged at the edge of the TPZ shall be cut cleanly by sawing. Severing or crushing roots by excavator or other mechanical device is not acceptable.
- d) Wood handling, transport, and disposal, shall be in accordance with Provincial and Federal legislation.

3.19.9 Activities within the TPZ Subject to Approval

Specific activities that must occur within the TPZ are subject to approval by the CA and may be permitted under the following conditions:

- a) When access to the site must transect the TPZ because no alternative access routes are available, the access route shall be constructed using either:
 - i) A layer of wood chips 100 mm (4 inches) high covered with 50mm (2 inch) thick plywood, at minimum.
 - ii) Compaction mats of sufficient size and weight-bearing capacity for the planned work.
- b) Where work must be performed within the TPZ Barrier to install or repair underground utilities, tunneling or directional boring is preferred to open trenching across the roots as defined in CW2110 and CW 2130. All work must be in accordance with the latest edition of the American National Standards Institute (ANSI) A300 and the latest edition of the companion publication “Best Management Practices – Managing Trees During Construction”.

If excavation is the only acceptable means of access to utilities then the contractor must arrange for Qualified Arborist to be on site to minimize risk to the public, workers, and tree(s).

3.19.10 Tree Protection Plan Violations, Tree Damage, and Compensation

- a) Any damage that occurs to the above-ground parts of the tree, the roots, or soil within the TPZ is subject to assessment by the City Forester or Designate.
- b) Damaged branches, roots, or any part of the tree that may pose a safety risk is to be reported immediately to the CA.
- c) Where damage is deemed to be reparable, all remedial pruning or soil amendment activities must be performed by a Qualified Arborist.
- d) The contractor shall be responsible for the cost of any work required to repair damages to the tree or soil found within the TPZ.
- e) In cases where the City Forester or Designate determines that damage to:
 - i) any public tree(s) not authorized for pruning or removal as part of the Work; or

- ii) any tree identified for preservation within the Construction Area and included on the Tree Protection Plan
results in an irreparable risk to public safety, affected trees shall be removed by a Qualified Arborist, and the expense of the Contractor.
- f) Damage to any public tree(s) not authorized for pruning or removal as part of the Work, or failure to adhere to the approved Tree Protection Plan shall result in compensation requirements for the appraised value for damage to any part or whole tree(s); as determined by the City Forester or Designate.
- g) Financial compensation shall be paid to the City of Winnipeg Urban Forestry Branch and submitted to 1539 Waverley Street, R3T 4V7.
- h) Compensation will be calculated as follows:
 - i) For trees 10cm DBH and less, compensation values will be determined by the Urban Forestry's Branch current cost of replacement (for the same or similar tree species).
 - ii) For trees greater than 10cm DBH, compensation values will be determined by using the method described in the latest edition of "The Guide for Plant Appraisals" by the Council of Tree and Landscape Appraisers.

5.4 Tree Size Categories

| Size Category | Average Height at Maturity (m) | Average Crown Width at Maturity (m) |
|---------------|--------------------------------|-------------------------------------|
| Large | 15 or greater | 10 to 12 |
| Medium | 9 to 15 | 8 to 10 |
| Small | Less than 9 | 5 to 7 |

4.0 Sources

Notes:

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2. [Public Works Department. *Acceptable Tree Species for Boulevard Planting*. City of Winnipeg, 2017.](#)
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9. Service supplier is subject to change, but may include BellMTS/Shaw/Fibre Optic.
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[Trees Winnipeg, 2021.](#)

[Urban Forestry. The Seattle Department of Transportation Street Tree Manual. City of Seattle, 2014.](#)