CASTLEGAR
happily ever after

Street Tree Master Plan

Project #	2431.40402.01	**Client**	**Submitted by**
Date	2016	City of Castlegar	McElhanney Consulting Services Ltd. Kodiak Tree Service

McElhanney

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THE VISION

A thriving urban forest is a reflection of years of community pride, sustained investment based on a sound strategy, and faithful maintenance of this valuable resource.

The City of Castlegar, through a series of public engagement exercises, has chosen to make the planting and care of trees along its busy highway corridor, in key gateway areas, in expansive parking lots, and in residential neighbourhoods a high priority. As it is implemented, this Street Tree Master Plan will yield proven benefits, including:

- *Safer, shadier, more beautiful sidewalks and cycle routes*
- *Distinctive neighbourhood character*
- *Cleaner air, water, and land*
- *Increased climate-change resilience*
- *Enhanced property values and business revenues*

Imagine Castlegar's Future Forest...

Green

Shady streets and sidewalks in summer and vivid fall colour

Healthy

Mature trees thriving in well-designed sites

Attractive

Residents and visitors drawn to refreshing, liveable spaces

Diverse

Trees of different species and ages making neighbourhoods distinctive (and the urban forest resilient!)

"The best friend on earth of man is the tree. When we use the tree respectfully and economically, we have one of the greatest resources on the earth."

— Frank Lloyd Wright

"He that plants trees loves others beside himself."

— Thomas Fuller

Dan Burden, Glatting, Jackson and Walkable Communities, Inc.

This Vision for the City of Castlegar can be realized through broad community support and participation!

1. INTRODUCTION

HOW TO USE THIS PLAN

With the guidance of this Master Plan, the City of Castlegar will create a legacy for future generations consisting of a healthy, attractive, colourful, and manageable street tree population. Investment is needed to ensure trees thrive to maturity, and this Master Plan presents best practices for selection, planting, and maintenance to maximize return on that investment.

Many of the best potential tree planting sites in Castlegar are on private property. The standards set out in this Master Plan will apply to Development Permit Area (re)development, and can also guide planting on private residential property. Combined investment in high-quality tree planting in both public and private realms will maximize the benefits of Castlegar's green fabric over time.

This document sets out a vision developed by and for the community. It is designed to be used by:

- City Planning and Operations staff, Mayor, and Council as they set priorities and allocate funds for ongoing tree planting and maintenance (Section 6)
- City staff in communications with BC Ministry of Transportation and Infrastructure (MoTI) which shares jurisdiction of the Columbia Avenue/Highway 22 corridor south of Downtown
- City Planning staff as they evaluate private property owners' Development Permit (DP) applications for compliance with standards set out in this Master Plan (and relevant amended legislation, see Section 6 and Appendices 4 and 5)
- Private property owners along Columbia Ave. as they prepare DP applications complete with tree planting consistent with the distinctive District they lie within (Section 3) and the City's amended planning documents listed above
- Residential property owners as they select and plant street trees (Section 5)

There are far more trees on residential properties than on City land, meaning that there is a great opportunity for citizens of Castlegar to follow the principles and recommend-ations in this Master Plan. The References and Resources section (Appendix 3) of the report, as well as local nurseries and Certified Arborists, will help you with selecting, planting, and caring for trees that will contribute to a green, sustainable Castlegar.

CONTEXT

Nestled in the scenic valley where the Kootenay River joins the Columbia River, the City of Castlegar has a population of 7,816 (2011 Census) over an area of 19.6 km^2. The north-south Highway 22/Columbia Avenue corridor is the well-traveled heart of the community, and there is great potential to expand tree planting started downtown in the 1990s to create welcoming gateways and a lush, livable series of distinctive Districts, or neighbourhoods, along Columbia Ave.

Land uses in these Districts range from Residential and Light Industrial in the south to Commercial in the north, including Regional Commercial, Columbia Avenue Commercial, and Downtown. Images and descriptions of each district are presented in Section 3. Just south of the Regional Commercial District is a pivotal Transition Area where the City is promoting redevelopment of higher-density commercial, residential, and mixed uses where there are currently low-density light industrial and single-family residential sites. This District therefore represents a great opportunity to implement recommendations of this Street Tree Master Plan (STMP) and related City of Castlegar planning documents.

The STMP shall amend and be referenced by:

- Official Community Plan (OCP)
- Subdivision and Servicing Bylaw

The STMP shall build on and refer to:

- Millennium Park Master Plan (2011)
- Landscape Master Plan (2008)
- Pedestrian & Bicycle Master Plan (2007)
- Zoning Bylaw 800 (1999)

The STMP shall recognize and address through collaboration:

- BC Ministry of Transportation and Infrastructure jurisdiction and standards

This Street Tree Master Plan represents a powerful tool to achieve multiple objectives set out in the planning documents listed above...

- **expanding downtown revitalization,**
- **creating distinctive gateways and neighbourhoods,**
- **promoting environmental quality and resilience,**
- **supporting energy sustainability and active transportation, and**
- **guiding property owners so they can contribute to the vision.**

In order to plan for a future forest, we need to know where we are now. Details on the location, quantities, and condition of Castlegar's existing street trees will be given in Section 2, but the following two graphs show the current species mix (Figure 1) and size (age) distribution (Figure 2) of the 168 street trees surveyed in the City's Downtown. The overwhelming dominance of Red Maples (57.1% of all surveyed street trees) and general lack of species diversity is concerning from the perspective of pest and disease resilience (see Section 2). The community lacks large street trees: only 7.7% of trees have diameters at breast height (DBH) of greater than 30 cm. This age distribution bodes well for 15–30 years into the future, assuming that trees are healthy and growing unrestricted. Past planting standards used in Castlegar, and in many communities in the 1990s, provided very limited soil volumes, generally preventing trees from reaching a mature size at which they contribute maximum social, economic, and environmental benefits.

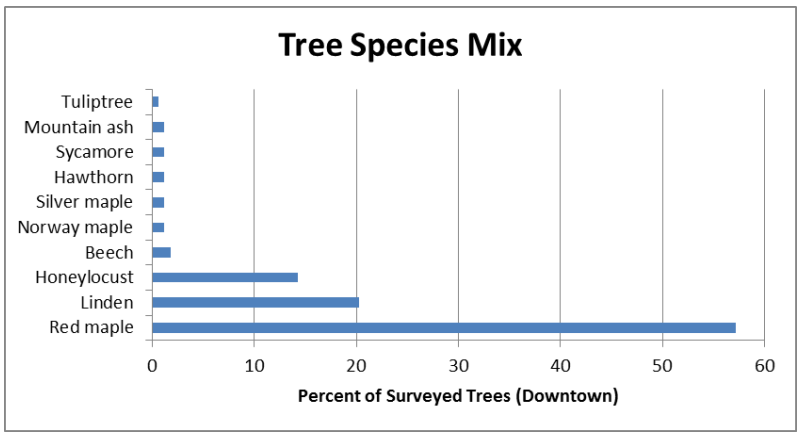


Figure 1. Percentage of existing downtown street trees by species.

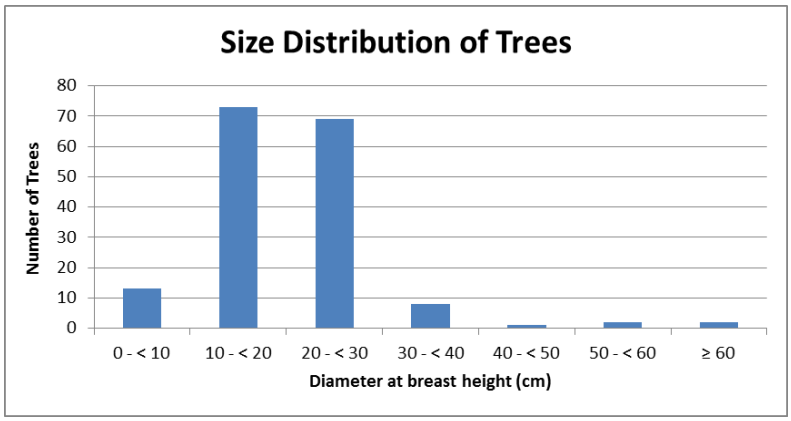


Figure 2. Number of existing downtown street trees in each diameter-at-breast-height (DBH) class.

BENEFITS OF STREET TREES

While the aesthetic benefits of trees in urban landscapes may be the most obvious, there are also health and safety, environmental, and economic advantages associated with urban forest cover (Burden, 2006).

Aesthetic

- Trees in boulevards, buffer strips, parking lots, and medians create a sense of place
- Lush tree canopies soften hard surfaces and mask noise and visual clutter
- Well-placed trees increase prominence of features like signs and lights

Health and Safety

- Traffic speeds have been shown to decrease along treed stretches of roadway
- Trees add definition, increasing actual and perceived pedestrian safety
- Attractive streetscapes are used more, creating security through "eyes on the street"
- Proximity to nature is known to improve emotional and psychological health (e.g., measurable reduction in blood pressure)
- Trees offer shelter from rain, sun, and heat, enhancing livability in all seasons

Environmental

- Trees reduce airborne pollutants as well as harmful ozone and CO_2 levels
- Tree canopies, roots, and soils can reduce stormwater runoff/flooding and improve water quality, provided that rainwater can be absorbed at a tree's base
- Vegetation provides valuable habitat for urban birds and wildlife

Economic

- Mature trees increase commercial and residential property values (and tax base)
- Business revenues are higher in urban neighbourhoods with trees
- Using tree soils to absorb/delay stormwater can reduce infrastructure costs
- Shading/sheltering of buildings by canopies reduces energy costs for cooling/heating

A study on the "Million Trees Los Angeles" initiative estimated that average benefits per new tree planted would range in value from $38 to $56 USD annually over 35 years (McPherson et al., 2011); this study considered aesthetic and property values, stormwater runoff reduction, energy savings, air quality improvement, and CO_2 reduction.

There is a growing recognition of the many ways in which street trees enhance urban life and urban environments. Compared to traditional urban tree management, we are actively striving towards a modern urban forestry model (adapted from City of Sydney, 2013) characterized by:

- **Trees viewed as critical infrastructure, not ornaments**
- **Focus on overall urban forest management vs. individual tree maintenance**
- **Recognition of trees' economic value**
- **Emphasis on larger, long-lived canopy trees vs. smaller ornamentals**
- **Ecologically based design vs. primarily aesthetic design**
- **Multi-jurisdiction collaboration to manage broader urban forest vs. piecemeal management limited by legal boundaries**

KEY OBJECTIVES

Urban Horticulture Institute, Cornell University

This Street Tree Master Plan represents a key OCP Implementation Action Step which will enable the City to achieve a range of environmental, transportation, and aesthetic objectives in the long term. This STMP addresses the following specific objectives:

Place-making

1) Through tree species, size, seasonal colour, and location/spacing, create a distinctive character for each District along the Columbia Avenue/Highway 22 corridor
2) Create welcoming, naturally inspired entrances to Castlegar
3) Create gateway routes to community attractions (specifically Millennium Park)
4) Encourage greening of parking lots, buffer strips between land uses, and residential frontages

Species Selection

5) Select appropriate tree species for OCP Land Uses, including residential areas
6) Select species with vibrant seasonal colours
7) Select diverse species to enhance the resilience of Castlegar's tree population to pests/disease

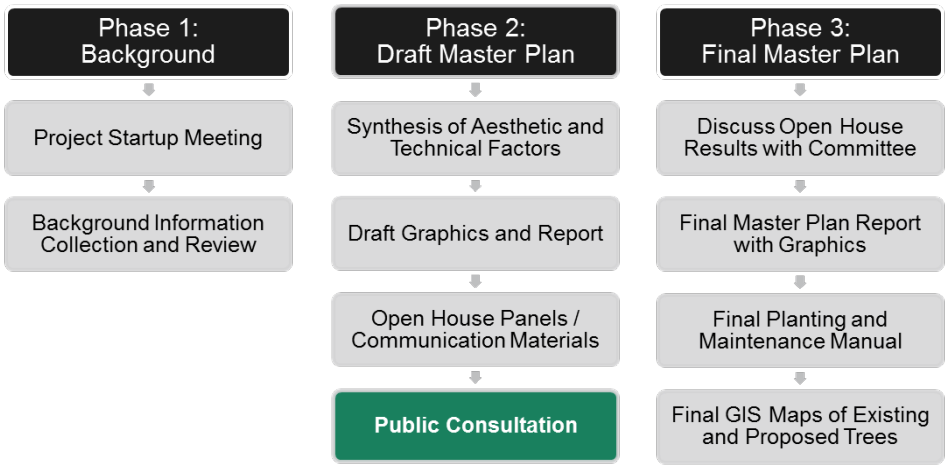
Updated Standards

8) Assess existing Downtown trees and recommend action to maintain/replace and address infrastructure conflicts (e.g., heaving sidewalks)
9) Recommend planting and establishment standards for new trees to improve survival to maturity (guidance for planting on City land as well as private property)
10) Provide details for inclusion of electrical, irrigation, and integrated stormwater management services
11) Recommend regular monitoring and maintenance standards for all trees

Public Engagement

12) Engage citizens of Castlegar through a Public Open House and Survey
13) Reflect public feedback and support in development of the STMP

MASTER PLAN DEVELOPMENT PROCESS AND OUTCOMES



WHAT WILL THE MASTER PLAN ENABLE THE CITY TO DO?

- **Strategic enhancement** of the urban forest over time, including succession planning and resilience through biodiversity
- **Access to funding** based on a sound, practical long-term Master Plan
- **Co-ordination of planting investments** by the City, businesses, and residents
- **Consistent planting and maintenance standards** to support trees through maturity for maximum benefits
- **Communication of the vision and standards** to current and prospective property owners
- **Further impressing tourists** drawn by Castlegar's spectacular natural setting
- **Demonstration of the City's commitment to Sustainability**

2. TREE SPECIES SELECTION

EXISTING STREET TREE INVENTORY: HIGHLIGHTS

As shown in Figure 1 in Section 1, three species comprise almost 92% of existing street trees in Downtown Castlegar: Red Maples (57.1%), Lindens (20.2%), and Honeylocusts (14.3%). An urgent priority of this Street Tree Master Plan will be to introduce a number of different species in each District to enhance genetic diversity and resilience.

Fewer than 8% of City trees are larger than 30 cm DBH, despite most of them being more than 20 years old. Consistent with this finding, frequently observed signs of stress, including leaf scorch due to drought, early defoliation, and branch dieback, indicate that some of these trees are not doing well in their current conditions. When trees are doing well, they often have access to greater than usual soil volumes (e.g., curb flare planters, landscaped areas at the back of the sidewalk).

Overall condition of the 168 street trees surveyed can be summarized as follows:

- 71% Good/Excellent Condition
- 20% Poor/Fair Condition
- 9% Very Poor Condition (Remove and Replace)

Various types of above- and below-ground conflicts were seen (often multiple conflicts):

- 8% Overhead Wires
- 33% Buildings/Business Signs
- 26% Freestanding Signs
- 13% Streetlights
- 23% Sidewalk Damage (ranging from minor to major)
- 52% Constrained Soil Volume (currently – root growth will intensify issues)

While drip irrigation was installed, and is still visible in some tree pits, not all trees are getting sufficient irrigation. This may relate to Castlegar's rapidly draining soils and the challenges of maintaining sensitive drip irrigation systems. Design of new planting sites, and retrofits of existing sites, shall include reliable, easy-to-maintain irrigation for tree establishment. Selection of drought-tolerant species reduces long-term irrigation needs.

As shown in Section 4, Panel 7, existing trees were given one of four recommendations (see flowchart, Figure 3 for details):

- 6% MON – Monitor annually to assess needs for pruning or other care
- 74% CP – Crown pruning for canopy structure and to minimize conflicts
- 5% RCP – Root and crown pruning to reduce sidewalk/overhead conflicts
- 15% REP – Replace with new tree per updated planting standards (includes some trees in good condition if site limits long-term health)
- 0% REM – Remove but do not replace tree (not applicable as all current sites could support trees planted per updated standards)

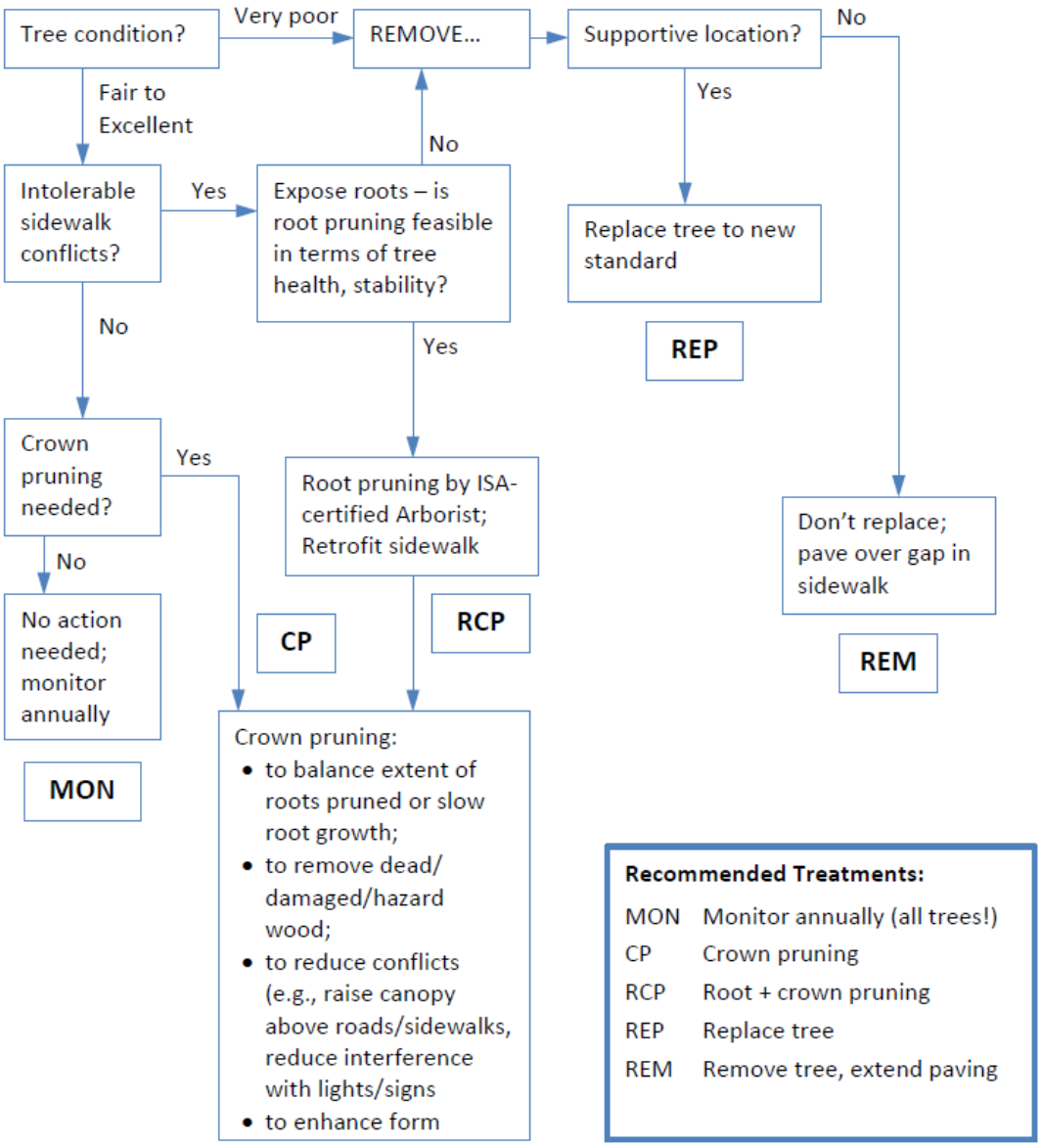


Figure 3. Flowchart providing rationale behind recommended treatments.

STREET TREE AND SITE SELECTION PROCESS

The urban environment, and particularly streetscape situations, present extreme challenges to street trees throughout their life. Trees, in turn, may be the source of conflicts above and below ground if they are not selected, planted, and maintained properly. Table 1 identifies key challenges and design responses to minimize their impact.

Table 1. Street tree-related challenges and design responses from the perspectives of trees and streetscape users.

Condition or Challenge – TREES	Design Response
Limited soil volume	Expand soil volume under sidewalk
Limited water and air	Divert stormwater to trees, use porous soils to resist compaction
Climatic extremes over pavement, pollutants from vehicles	Select highly tolerant species
Physical damage, especially when young	Sturdy, attractive stakes beyond establishment or adjustable tree guards
Susceptibility to pests/disease, especially when large numbers of one species	Diverse (yet attractive) mix of resistant species (biodiversity)
Condition or Challenge – USERS	**Design Response**
Infrastructure conflicts, e.g., sidewalks, overhead wires	Provide adequate soil and root barriers, ensure mature size appropriate
Obscured sightlines	Set trees back from corners, driveways
Mess due to fruit, branches, leaves	Select species with no or insignificant fruit, fund maintenance program
Hazard potential as trees age	Avoid species with weak wood, require regular monitoring by certified Arborist

The aim of streetscape design, including street tree selection, is to **maximize the benefits** of new and existing trees (by maximizing life expectancy of each individual) while **minimizing the risks and inconvenience** they may bring if improperly chosen or installed.

To realize the community-wide vision of this Master Plan, the principles set out below need to be reflected through planning, design, and construction. Given the importance of the planting site and its supportiveness to tree growth and health, the quality and potential of sites must be evaluated prior to specification of trees. Subsequent installation and maintenance of healthy trees of appropriate species for Castlegar's environment will result in a visible return on these incremental investments in the community's urban forest.

STREETSCAPE DESIGN PRINCIPLES

1) **Distinctive Districts along Columbia Ave.** – The scale and character of the Columbia Ave. corridor already varies as you travel from the pedestrian-oriented, narrow Downtown section through the more vehicle-oriented Commercial, Transition, and Residential Districts. **Over time, a distinctive character for each District can be reinforced using a dedicated palette of street trees with similar features such as shape, size, and fall colour**.

2) **Diversity Within and Between Districts** – At least three different trees, each from a different genus (e.g., *Acer* – maple, *Tilia* – linden), are recommended per District, and only a few are recommended in more than one District. This approach is primarily to **ensure genetic diversity**, thus reducing overall vulnerability of the urban forest to pests and disease. However, the chosen trees in a District are generally similar enough that **visual uniformity objectives can also be met** (Bassuk et al., 2002), while varying preferences/characteristics of the different species will allow site-specific design choices.

3) **Grouping and Mixing Species** – Small groupings of a given species may be appropriate, for example along a single lot or building frontage or on all four corners of an intersection. Where extended stretches of planting sites are available (e.g., longer medians or boulevards), it is recommended that at least two tree species are mixed in a regular rhythm.

4) **Accent Gateways and Intersections** – Gateways will be treated differently than the core Columbia Ave. corridor. Gateways from Highways 3 and 3A will represent a transition from the spectacular landscape surrounding Castlegar, incorporating rugged local rock with native tree species such as Trembling Aspen, Western Larch, and Douglas-fir. Other gateways may feature centre medians with one or more tree species.

5) **Prioritized "People Places"** – Without diminishing the importance of tree plantings to soften vehicle-dominated streetscapes, areas with high (or potentially high) pedestrian and cyclist densities should be top priorities for tree plantings.

6) **Integrated Public and Private Realms** – With both the City and private landowners making reference to these guidelines and specifications, this Master Plan promotes the collaborative implementation of a cohesive, shared vision for Castlegar's streetscapes. Careful planning, detailed design, and construction will create the impression of an expanded, seamless public realm to the benefit of both businesses and citizens.

7) **Integrated Engineering and Landscape Design** – Streetscapes may be viewed as "systems" whereby elements work together to maximize benefits of street trees and public spaces while minimizing impacts of urbanization. Diversion of stormwater into expanded structural soil volumes exemplifies this principle. Trees benefit from additional moisture in the rooting zone. Pedestrians enjoy expanded accessible sidewalk areas and the microclimatic benefits tree canopies bring. From a broader hydrology perspective, peak runoff flows can be both delayed and reduced; for more frequent, smaller events, absorption by soils may eliminate stormwater runoff from adjacent hard surfaces to the Columbia River, yielding significant cumulative water quantity and quality benefits.

CREATING OR ENHANCING PLANTING SITES

Availability/Properties of Soil Volume

Ideal planting sites have unlimited soil volumes for tree roots, soft landscaping at the surface (e.g., grass or mulched landscaping), and clear space for the canopy to occupy as the tree matures. In a streetscape situation, examples of these would be spacious landscaped buffer strips between sidewalks and buildings or wide grassed boulevards with continuous trenches of high-quality growing medium. Some such sites are or will be available in Castlegar, but most potential sites will be more constrained, calling for **collaboration between planners, landscape architects, and engineers to create the best possible conditions for trees**.

Where sidewalk widths are limited and open planter arrangements are not feasible, there are two general approaches to create adequate soil volumes for trees (Figure 4; City of Toronto, 2013):

1) **Pavement Bridge Systems** – Expanded soil volume beneath a concrete slab "bridge" between supports beneath edges of sidewalk

2) **Soil Cell Systems** – Expanded soil volume within structural cells supporting poured-in-place concrete slab or unit paver sidewalk

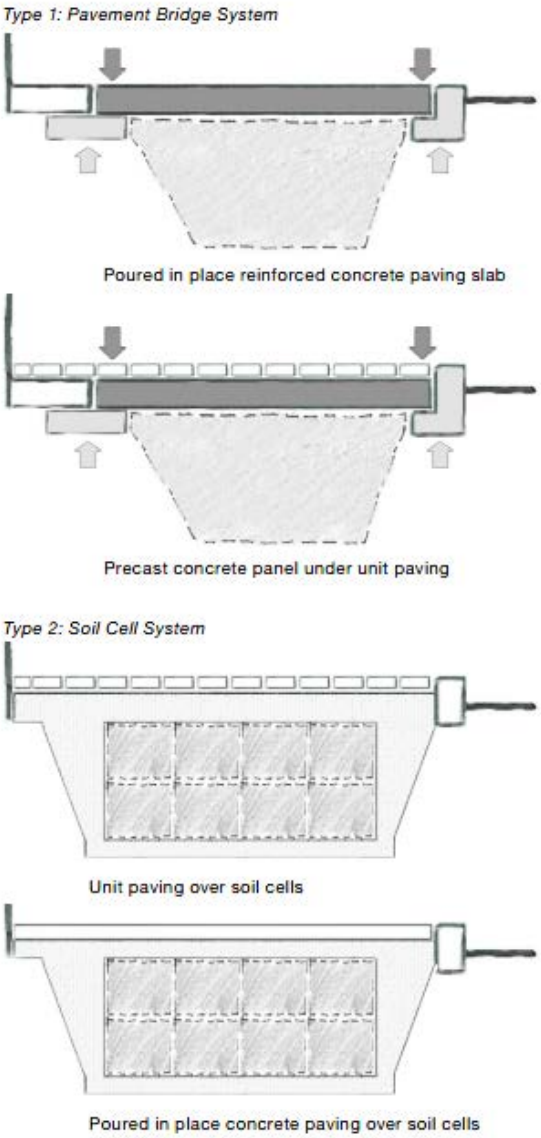


Figure 4. Conceptual approaches to increasing soil volumes beneath sidewalks (from City of Toronto, 2013).

Availability of Stormwater: Expanded soil volumes represent potential reservoirs for stormwater. Diverted water is available to tree roots and pollutant levels are reduced as it percolates through the soil. Tree species that may benefit from supplementary irrigation (beyond establishment) may be considered for locations that integrate stormwater harvesting from adjacent paved surfaces and/or building downspouts.

In-road Planting Opportunities: Landscaped centre medians are proposed for three specific gateway locations/corridors (Section 4, Panel 1) and for other locations identified in the 2008 Landscape Master Plan (Columbia Ave. Median drawings no. 1–4 in 2008 Plan; Section 4, Panel 7 in current Plan). To minimize maintenance and irrigation requirements, seeding with a drought-tolerant ground cover (e.g., micro-clover) is recommended (rather than higher-maintenance shrubs and groundcovers as shown in the 2008 Plan drawings).

Diversion of stormwater to soil volumes beneath medians would further reduce irrigation needs and benefit water quality, but would require drainage modifications to road surfaces. Tree species for these situations need to have extremely high tolerance of urban conditions, reliably straight trunks, and high branching habits (e.g., vase-shaped).

1) A treed median on Highway 22 just south of 32nd Street is intended to give a strong visual cue to northbound drivers that they are entering the community and need to slow down. Clear visibility to, and signage for, the existing crosswalk at this location will need to be maintained or enhanced. As the trees get larger, they will create a memorable gateway for drivers entering as well as leaving Castlegar.

2) Treed medians are proposed for two approaches from Columbia Ave. to Millennium Park: along 3rd St. and 6th St. then along 5th St. for the final connection to the Park. These east-west routes can be linked via 5th Ave., a north-south corridor better suited to boulevard tree planting. See Key Map, Section 4, Panel 1.

3) If roadway design allows, treed Columbia Ave. medians as proposed in the 2008 Landscape Master Plan may be considered for funding. These additional trees would enhance the aesthetic and environmental benefits of roadside vegetation.

OTHER CONSIDERATIONS

Overhead Wires: Smaller tree species must be selected if overhead lines are permanently in place. If redevelopment of a site (and burial of hydro and other lines) is anticipated within 5 years, it is recommended that tree planting be delayed and investments made where overhead utilities are not a limiting factor.

Underground Utilities/Structures: Required setbacks from buried utilities must be observed to minimize risk of damage from planting or from roots in the future. Features designed to prevent conflicts at the time of installation include 1) root barriers (or bioshields) to deflect roots away from utilities and protect roots from utility maintenance activities, and 2) ducts around vulnerable wires/pipes accessible through duct access chambers. As with overhead utilities, if existing conditions are too restrictive and cannot be modified, tree planting should be delayed until redevelopment of the site.

Setbacks from Other Streetscape Elements: Safety and minimization of conflicts are the prime motivators for reasonable spacing between street trees and other features. Recommended distances (in metres) listed in Table 2 below are adapted from standards set out in the City of Edmonton's (2013) Complete Streets Guidelines:

Table 2. Recommended setback distance from tree trunks to various site features.

Site Feature	Distance (m)
Corner	7.5
Light pole	3.5
Fire hydrant	3.5
Stop/Yield sign	3.5
Bus stop	3.5
Sign	3.0
Driveway	3.0
Building	3.0
Deep underground utilities	1.8

Clear Sidewalk Width and Clearance: Whether tree planting is done in a landscaped boulevard or within pavement, a clear, level, and **accessible sidewalk width of at least 1.5 m** must be provided. Selected trees' branching structure should facilitate pruning to maintain **clear heights of:**

- **1.8 m over sidewalks**
- **2.5 m over side streets, and**
- **3.5 m over highways.**

GUIDING PRINCIPLE: "RIGHT TREE, RIGHT PLACE"

Street trees are complex living organisms being planted in conditions that typically bear little resemblance to their native habitats. Species that have been widely planted (e.g., Ash, Maple, Elm) are those that have proven to be tolerant of a range of harsh urban environments. However, the risks of planting monocultures (large numbers of a single species) are now well-known; the predominance of Red Maples in Castlegar is an example of a concerning imbalance. Communities are striving to **increase the resilience of their urban forests through diversifying new plantings**. But which trees should be added to the mix? A combination of research on species thriving in other similar climates and conditions along with synthesis of local knowledge (e.g., garden clubs, nurseries) can guide choices. If a species is being tried as a street tree for the first time, we strongly recommend small-scale trial plantings and monitoring the species' performance – provided that planting and maintenance meets best practices as set out in this Master Plan, **general success or failure of a species can inform future selection or avoidance.**

ENVIRONMENTAL SELECTION CRITERIA

Climate: Climate is a critical limiting factor and can be the primary cause of failure if plants are not hardy to local winter temperatures. Castlegar's hardiness zone is 5 which means a wide selection of trees is available to choose from (i.e., zones 1–5).

Rainfall Regime: Adaptability to local rainfall regime is preferred to minimize the need for irrigation beyond establishment. Castlegar has a humid continental climate characterized by warm summers and no dry season; temperatures typically range from –5°C to 30°C. Native trees are ideally adapted but none of the indigenous deciduous species are suitable as street trees; however, using a mix of native conifers and deciduous trees is the preferred approach to naturalistic highway gateway plantings in grass. **The community's commitment to water conservation and uncertainties related to climate change mean that trees should not depend on long-term supplemental irrigation to survive occasional droughts**.

Microclimate: Attention to microclimate (e.g., sun/shade, nearby buildings/trees, wind exposure) is important in final tree selection for each site.

Soils: Castlegar is fortunate to have naturally "rapidly draining" sandy Glade soils (Jungen, 1980), though these may have been disturbed or removed during previous development. While soil specifications ensure that the immediate needs of newly planted trees are met, trees in Castlegar should not face the challenges of compaction and poor sub-drainage that are issues for long-term survival elsewhere. If anything, the **challenge will be amending local soils to provide sufficient nutrients and water during trees' early years**. Trees that depend on consistently moist, rich soils should be avoided.

Topography: Downtown Castlegar and the Columbia Ave. corridor, where the majority of street trees are located, lie on a relatively flat terrace. As residential neighbourhoods (and collector roads accessing them) either rise or fall with the contours of the Columbia River valley side, aspect and drainage patterns need to be considered when siting new street or residential trees.

Pest and Disease Resistance: Resistance to known diseases and pests is important in selecting species. To guard against current and future outbreaks, most communities are adopting **guidelines for genetic diversity**. Nina Bassuk et al. (2002) recommend that no species comprise more than 10% of an urban tree population. In addition to this 10% guideline, the City of North Vancouver sets a maximum of 20% for any genus and 30% for any family (City of North Vancouver, 2004). Pests of concern in other parts of Canada include Dutch Elm Disease and Emerald Ash Borer. While these are not limiting what can be planted in the Castlegar area at the moment, Elm (*Ulmus* spp.) and Ash (*Fraxinus* spp.) should be used sparingly in mixes with other species.

Pollution Tolerance: Vehicle exhaust is a constant source of airborne pollution that can cause damage to leaves/needles and woody parts of trees. Since deciduous trees lose their leaves annually, they generally have a higher tolerance to atmospheric pollution than conifers. Chemicals (often salts) used for winter de-icing of roads and sidewalks also damage trees, largely through the root system but also via spray from traffic. Some tree species are naturally salt-tolerant, and these should be favoured for roadside planting in northern climates provided that other selection criteria are met.

Urban Wildlife Habitat: Survey responses from attendees at this project's Public Open House indicate that **providing habitat for birds and wildlife is a highly valued benefit of the urban forest**, second only to creating a cleaner environment. "Bringing the forest in" to streetscapes reflects Castlegar's spectacular natural setting, but also increases the food, shelter, and connective value of these corridors for urban fauna. Where canopies will extend over public pavement, tree species with inconsequential or no fruit or nuts are preferable.

AESTHETIC / DESIGN CRITERIA

Distinctiveness of Districts: Distinctive character can be created at the block and neighbourhood scale by using a chosen palette of tree species with **fairly consistent size, shape, texture, and/or fall colour**.

Scale: Trees within each palette should be appropriate to the scale of the street and adjacent buildings. Working with at least three different species per District gives flexibility to choose the best one for a given site and microclimate. In general, to maximize aesthetic and environmental benefits, **select the largest-growing species that the site (including constraints like utilities, soil volumes, traffic sightlines) will accommodate at maturity**.

Form: Tree form varies naturally, but species have relatively predictable characteristics such as mature height and spread, a dominant trunk, upright branching, and potential to prune lower branches up for clearance. **Wise species choices will minimize conflicts and maintenance requirements over a tree's lifespan**.

Deciduous/Coniferous: Street trees adjacent to vehicular and pedestrian traffic must allow for below-canopy clearance and sightlines; species proposed for Castlegar's streetscapes are therefore deciduous. However, conifers have many year-round benefits, and a list of suggested tree species for highway gateways and wider buffer strips is provided in Table 3.

FUNCTIONAL CRITERIA

Availability: To stand up to vandalism and accidental damage, new trees should be at least 6 cm in caliper when planted. Tree species should only be specified if they are commercially available at this size.

Ease of Maintenance: Selected species should not create intolerable mess through shedding of bark, leaves, seed pods, or fruit. Clear height targets should be achievable through regular pruning.

Infrastructure Conflicts: Avoid species known to have aggressive root systems that can damage curbs, sidewalks, and other infrastructure. Select species with mature canopy spreads compatible with available space and sightlines.

Invasiveness: Avoid trees that are known to self-propagate and invade disturbed sites or nearby ecosystems (e.g., riparian corridors).

Structural Strength: Favour species known for strength and resilience (vs. brittleness) of their limbs.

Lifespan: Trees are significant investments. Select species that are naturally long-lived, are adapted to often-harsh urban conditions, and tend to have few issues in their maturity.

STREET TREE SPECIES LISTING

The following Tables present recommended tree species suited to Castlegar's climate and urban planting conditions. Table 3 indicates at least two species for use in each District or Gateway. Recommended trees for parking lots are included as well since the same criteria used to select street trees apply to them (e.g., high clearance, tolerance and adverse conditions, minimal mess). A native tree species mix for highway interchanges is also listed. Appendix 1 lists these species alphabetically and provides more detailed characteristics, including preferred growing conditions, for these species. Section 4, Panel 24 presents scaled images of proposed trees at maturity showing typical fall colour. Applied consistently over time, these guidelines will result in a distinctive look and feel for streetscapes in the various Districts and Gateways.

Table 3. Recommended Street Tree Species by District/Gateway

TREE SIZE	TREE SHAPE	FALL COLOUR	POTENTIAL SPECIES MEETING CRITERIA Common Name (*Latin Name*)	FALL COLOUR	HT. (m)	SPR. (m)
1 DOWNTOWN						
Small to Med.	Columnar	Red Columbia, Gold cross-streets	Navigator Ornamental Pear (*Pyrus* x 'DurPSN302')	Orange-Yell	12	6
			Ivory Silk Tree Lilac (*Syringa reticulata* 'Ivory Silk')	Not notable	6	5
			Northern Blaze White Ash (*Fraxinus americana* 'Jefnor')	Dark Red	15	7
			'Princeton Sentry' Maidenhair (*Ginkgo biloba* 'Princeton Sentry')	Gold	20	6
2 COLUMBIA AVE. COMMERCIAL						
Med. to Large	Vase	Gold	Discovery Japanese Elm (*Ulmus davidiana* japonica 'Discovery')	Gold	12	9
			Tuliptree (*Liriodendron tulipifera*) – if space	Gold-Or	18	12
			Admiration Hybrid Oak (*Quercus x jackiana* 'Jefmir'	Yellow-Gr	12	9
3 REGIONAL COMMERCIAL						
Med. to Large	Oval	Red	Autumn Blaze Freeman Maple (*Acer x freemanii* 'Jeffersred')	Orange-Red	12	9
			Gentry White Ash (*Fraxinus americana* 'Gentry')	Purple	15	9
			Red Oak (*Quercus rubra*)	Red	20	10
			Crimson Oak (*Quercus coccinea*)	Dark Red	20	10
4 TRANSITION DEVELOPMENT						
Med.	Round	Gold	Eyestopper Amur Corktree (*Phellodendron amurense* 'Longenecker') – male	Bronze-Yell	15	15
			Delta Hackberry (*Celtis occidentalis*)	Gold-Yellow	15	12
			Prairie Spire Green Ash (*Fraxinus pennsylvanica* 'Rugby')	Gold	18	9
5 RESIDENTIAL						
Med. to Large	Pyrimidal	Gold Columbia	Glenleven Hybrid Linden (*Tilia x flavescens* 'Dropmore')	Gold	18	12
			Northern Acclaim Honeylocust (*Gleditsia triacanthos* var. *inermis* 'Harve')	Gold	9	6
			Pin Oak (*Quercus palustris*)	Red-Bronze	20	8

Table 3. *(continued)* **Street Tree Species Recommendations by District**

TREE SIZE	TREE SHAPE	FALL COLOUR	POTENTIAL SPECIES MEETING CRITERIA Common Name (*Latin Name*)	FALL COLOUR	HT. (m)	SPR. (m)
6 SOUTH GATEWAY						
Large	Vase	Gold	Prairie Expedition American Elm (*Ulmus americana* 'Lewis & Clark')	Gold	20	12
			Emerald Green Ash (*Fraxinus pennsylvanica* 'Emerald')	Gold	20	10
7 MILLENNIUM PARK GATEWAY (1ST BLOCK)						
Small to Large	Vase	Gold	Ivory Silk Tree Lilac (Syringa reticulata '*Ivory Silk*')	None	6	5
			Prairie Expedition American Elm (*Ulmus Americana* 'Lewis & Clark')	Gold	20	12
			Emerald Green Ash (*Fraxinus pennsylvanica* 'Emerald')	Gold	20	10
8 MILLENNIUM PARK GATEWAY (RESIDENTIAL BLOCKS)						
Med. to Large	Vase	Gold	Prairie Expedition American Elm (*Ulmus Americana* 'Lewis & Clark')	Gold	20	12
			Emerald Green Ash (*Fraxinus pennsylvanica* 'Emerald')	Gold	20	10
			'Princeton Sentry' Maidenhair (*Ginkgo biloba* 'Princeton Sentry')	Gold	20	6
PARKING LOTS						
Med.	Round or broad oval (for shade)	Mix	Shademaster Honeylocust (*Gleditsia triacanthos* var. *inermis* ' Shademaster')	Gold	12	10
			Delta Hackberry (*Celtis occidentalis*)	Gold-Yellow	15	12
			Northern Blaze White Ash (*Fraxinus americana* 'Jefnor')	Dark red	15	7
			Autumn Blaze Freeman Maple (*Acer x freemanii* 'Jeffersred')	Or-red	12	9
HIGHWAY INTERCHANGES						
Med. to Large	Informal (group with rocks)	Gold	Trembling Aspen (*Populus tremuloides*)	Gold	18	7
			Western Larch (*Larix occidentalis*)	Gold	15	10
			Douglas-fir (*Pseudotsuga mensziesii*)	Evergreen	13	6

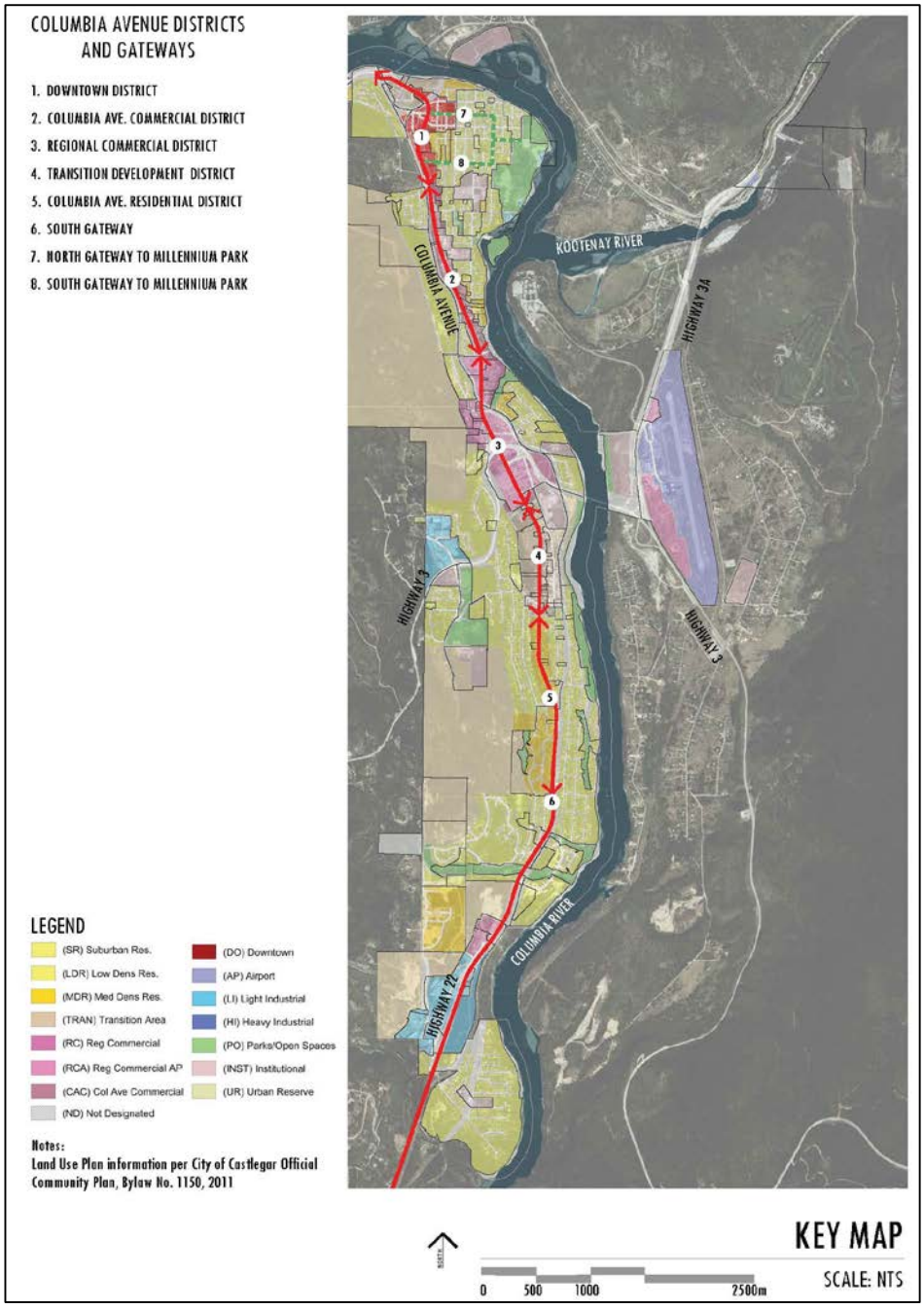
There are many other species of trees that are hardy and adaptable to conditions in Castlegar, but are better suited to soft landscaped areas which aren't subject to as much pedestrian or vehicular traffic. Some trees have lower branching habits, more vigorous root systems, or more substantial fruits or nuts, features which may be more acceptable in a park or residential setting than in a minimal-maintenance streetscape situation. Property owners can find information of this broader selection of trees at their local nursery or through the Castlegar Garden Club.

3. DISTRICT PROFILES

DISTRICT AND GATEWAY PROFILES

Figure 5 illustrates the relative location of Districts and Gateways along Highway 22/ Columbia Ave. and intersecting streets. District Concept Plans and representative Detailed Concept Plans for each District/Gateway profiled below are provided in Section 4.

Figure 5. Key Map. (See larger version, Panel 1 in Section 4).



Downtown

STREETSCAPE PROFILE

Character:	Castlegar's Downtown is a pedestrian-friendly area with retail frontages at or near the back of the sidewalk. Existing street trees range in size up to 13 m height and 12 m spread, providing shade and softening hard surfaces.
Extent:	North of 7th St.
Building setbacks:	No minimum (some on property line) Trees desirable within min. 2.0 m buffer strip
Sidewalks:	Continuous
Overhead wires:	No, almost all buried
Tree locations:	In sidewalk, some at back of sidewalk, some in curb flares
Parking:	On-street except where turning lanes
Lanes:	1 each direction + L/R turning lanes
Potential for median:	No

District-specific Street Tree Selection and Location Principles:

- Small to medium size
- Columnar canopies tolerant of lower-branch pruning
- Minimal fruit
- Non-aggressive root systems;
- Locate at back of curb to leave sidewalk/building frontage clear
- Observe setbacks from other site features per Table 2
- Avoid blocking building or freestanding signs (anticipate mature height/spread)

Columbia St. Commercial

STREETSCAPE PROFILE

Character:	For portions of this extensive District, mature trees from woodlots and some private properties greenery to the streetscape. On the east side, commercial buildings with associated parking dominate. Some properties are well-maintained and uses are mixed, but the overall vehicle-dominance of this District will make it uninviting for pedestrians until cohesive (re)development takes place.
Extent:	7th St. to 15th St.
Building setbacks:	4.5 m or 6.0 m (per Zoning Bylaw). Highly inconsistent currently, no contribution to defining streetscape edge; Trees desirable within min. 2.0 m buffer strip
Sidewalks:	Continuous concrete (east side, most of south portion of west side), discontinuous asphalt/concrete (north portion of west side)
Overhead wires:	Yes, both sides
Tree locations:	Occasional plantings on private property
Parking:	On-street in north of District (west side), otherwise beside buildings or between buildings and sidewalks
Lanes:	1 each direction + frequent L/R turning lanes (consistently 3 lanes in total in south of District)

Potential for median: Occasional

District-specific Street Tree Selection and Location Principles:

- Medium to large vase-shaped canopies tolerant of lower-branch pruning
- Minimal fruit, non-aggressive root systems;
- Locate at back of existing sidewalk in building setback
- Observe setbacks from other site features per Table 2
- Avoid blocking building or freestanding signs (anticipate mature height/spread)

Regional Commercial

STREETSCAPE PROFILE

Character:	
Extent:	15th St. to 20th St.
Building setbacks:	4.5 m or 6.0 m (per Zoning Bylaw). Highly inconsistent currently, no contribution to defining streetscape edge; Trees desirable within min. 2.0 m buffer strip
Sidewalks:	Both sides
Overhead wires:	Yes
Tree locations:	Occasional plantings on private property Back of sidewalk is best opportunity for future tree planting
Parking:	No on-street parking, typically parking in building front/side setbacks
Lanes:	2 lanes each direction plus occasional centre turn lane
Potential for median:	Limited sections

District-specific Street Tree Selection and Location Principles:

- Medium to large oval canopies tolerant of lower-branch pruning
- Minimal fruit, non-aggressive root systems;
- Locate at back of existing sidewalk in building setback
- Observe setbacks from other site features per Table 2
- Avoid blocking building or freestanding signs (anticipate mature height/spread)

Transition Development

STREETSCAPE PROFILE

Character:	Mix of single- and multi-family residential, commercial, light industrial of varying ages creates inconsistent streetscape rhythm; potential for improved character via application of Development Permit guidelines during redevelopment
Extent:	20th St. to 24th St.
Building setbacks:	4.5 m (per Zoning Bylaw) Trees desirable within min. 2.0 m buffer strip
Sidewalks:	West side only
Overhead wires:	Yes, both sides
Tree locations:	Private property though some canopies encroach into ROW
Parking:	Some opportunities on east side behind bike lane
Lanes:	1 lane each direction plus occasional turn lane
Potential for median:	No

District-specific Street Tree Selection and Location Principles:

- Medium round canopies tolerant of lower-branch pruning
- Minimal fruit, non-aggressive root systems;
- Locate at back of existing sidewalk in building setback
- Observe setbacks from other site features per Table 2
- Avoid blocking building or freestanding signs (anticipate mature height/spread)

Residential (Columbia Ave.)

STREETSCAPE PROFILE

Character:	Generally quite dense vegetation associated with low residences set well back from the street – buildings won't contribute to streetscape character in near future, but infilled street trees on private property would enhance it
Extent:	South of 24th St.
Building setbacks:	4.5 or 7.5 m (per Zoning Bylaw)
Sidewalks:	West side only
Overhead wires:	Yes, both sides
Tree locations:	Private property though some canopies encroach into ROW
Parking:	Some opportunities on east side behind bike lane
Lanes:	1 lane each direction plus occasional turn lane

Potential for median: No

District-specific Street Tree Selection and Location Principles:

- Medium to large pyramidal canopies tolerant of lower-branch pruning
- Minimal fruit, non-aggressive root systems;
- Locate at back of existing sidewalk in building setback
- Observe setbacks from other site features per Table 2
- Avoid blocking building or freestanding signs (anticipate mature height/spread)

South Gateway

STREETSCAPE PROFILE

Character:

Extent: On Hwy 22/Columbia Ave. just south of 32nd St.

Building setbacks: Retaining wall to west, rail ROW to east

Sidewalks: West side only

Overhead wires: Yes, both sides

Tree locations: Private property though some canopies encroach into ROW

Parking: No (intersection)

Lanes: 1 lane each direction plus occasional turn lane

Potential for median: Yes, south of intersection

District-specific Street Tree Selection and Location Principles:

- Large vase-shaped canopies tolerant of lower-branch pruning
- Locate in median planter
- Smaller, narrower trees for in-sidewalk planter if overhead wires removed
- Minimal fruit, non-aggressive root systems
- Observe setbacks from other site features per Section Table 2
- Avoid blocking building or freestanding signs (anticipate mature height/spread)

Highway 3 Gateways

STREETSCAPE PROFILE

Character:	Barren, main interest is views to surrounding mountains; Some detailed landscaping/sculptural features that deserve to be appreciated at lower speeds than are typical for highways
Extent:	Hwy 3 approaches to Castlegar from east and west
Building setbacks:	n/a
Sidewalks:	n/a
Overhead wires:	No, wires to new streetlights buried (contributes to urban character)
Tree locations:	On MoTI ROW, set back minimum 5 m from road edge, or as needed to ensure clear sightlines
Parking:	n/a
Lanes:	1 lane each direction + exit lane
Potential for median:	No

District-specific Street Tree Selection and Location Principles:

- Large native trees, mixture of deciduous and coniferous for contrast during fall
- Locate in naturalistic groupings with large local rocks
- Observe setbacks from highway signage and other site features per Table 2

Millennium Park Gateway (6th St.)

STREETSCAPE PROFILE

Character:	On block closest to Columbia Ave., urban feel with buildings close to back of sidewalk; east of that, residential properties both sides with variable levels/quality of tree planting
Extent:	6th St. east of Columbia Ave.
Building setbacks:	Minimal 1st block (back of sidewalk in sections); east of 11th Ave. 4.5 m or 7.5 m to houses
Sidewalks:	Discontinuous, differing materials in first block; consistently on north side of 6th St. east of 11th Ave.
Overhead wires:	Start part way along block, continue on residential blocks
Tree locations:	Median planters
Parking:	Currently where sidewalk should be, otherwise off street in first block; parallel on south side of 6th east of 11th Ave.
Lanes:	1 lane each direction

Potential for median: Yes (constrained in first block)

District-specific Street Tree Selection and Location Principles:

- Large vase-shaped canopies tolerant of lower-branch pruning, accent with columnar-form trees on median ends
- Locate in median planters
- Minimal fruit, non-aggressive root systems
- Observe setbacks from other site features per Table 2

Millennium Park Gateway (3rd St.)

STREETSCAPE PROFILE

Character:	On blocks closest to Columbia Ave., urban feel with buildings close to back of sidewalk
Extent:	3rd St. between Columbia Ave. and 12th Ave.
Building setbacks:	Minimal (back of sidewalk in sections)
Sidewalks:	Both sides
Overhead wires:	Start part way along 2nd block (beyond angle parking)
Tree locations:	Curb flare planters (existing, more possible in first 2 blocks) Median planters can start east of 10th Ave.
Parking:	Angle parking on south side 1st two blocks – constrains ability to fit median planters; parallel parking both sides east of 10th Ave.
Lanes:	1 lane each direction

Potential for median: Yes (east of 10th Ave.)

District-specific Street Tree Selection and Location Principles:

- Large vase-shaped canopies tolerant of lower-branch pruning, accent with columnar-form trees on median ends
- Locate in median planters
- Minimal fruit, non-aggressive root systems
- Observe setbacks from other site features per Table 2

Residential (Subdivision)

STREETSCAPE PROFILE

Character:	New! Lack of trees prevents neighbourhood from having an established, inviting character
Extent:	Various subdivisions of differing ages throughout Castlegar
Building setbacks:	4.5 m or 7.5 m (per Zoning Bylaw)
Sidewalks:	One side only
Overhead wires:	Varies – buried in newer subdivisions (e.g., Grandview Heights)
Tree locations:	Trees planted within 4.5 m setback (but minimum 2.5 m from back of sidewalk) will greatly contribute to streetscape character in the future
Parking:	Street widths typically allow for on-street parking, but most cars are parked in driveways
Lanes:	1 travel lane in each direction

Potential for median: No

District-specific Street Tree Selection and Location Principles:

- Mix of canopy shapes and sizes
- Locate in lawn approx. 5 m from curb (provided this places the tree on private property) to contribute to consistent canopy presence along street in future
- Observe setbacks from other site features per Table 2
- Avoid blocking infrastructure such as lights, signs (anticipate mature height/spread)

Parking

STREETSCAPE PROFILE

Character:	Vehicle-dominated, barren of greenery and shade
Extent:	Large parking lots most common in Regional Commercial and Columbia Ave. Commercial, but recommendations apply to all areas
Building setbacks:	n/a
Sidewalks:	Along buildings and perimeter, but rarely within lots
Overhead wires:	Varies, typically at perimeter
Tree locations:	Perimeter buffer zone is often most practical; columnar trees can enhance building frontage without blocking signs; biggest visual and shade impact can be realized by integrated trees and walkways between rows of parking (also potential for stormwater infiltration)
Parking:	Dominant element
Lanes:	n/a

Potential for median: Yes, island planters in conjunction with walkways

District-specific Street Tree Selection and Location Principles:

- Medium round/spreading canopies for shade, tolerant of lower-branch pruning
- Locate in planter parallel to walkway connecting parking to buildings
- Minimal fruit, non-aggressive root systems
- Observe setbacks from other site features per Table 2
- Avoid blocking lights or freestanding signs (anticipate mature height/spread)

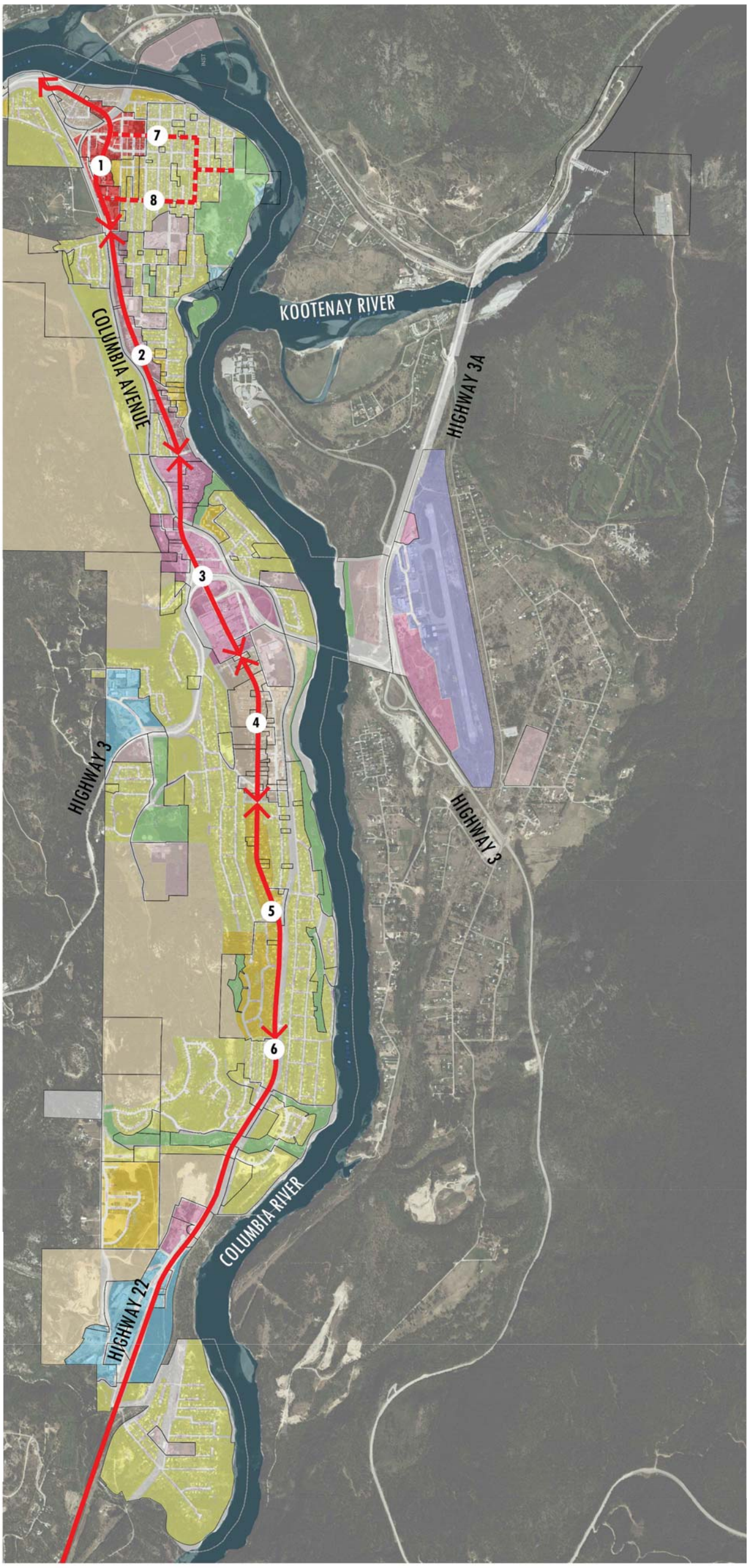
4. DISTRICT AND GATEWAY DRAWINGS

The following **District Overall Tree Location Maps** and **District Representative Concepts** illustrate the extent of potential street tree planting along the high-profile Columbia Ave. corridor as well as along gateways from highways and to Millennium Park. Final locations and species selection are directly dependent on the form of site renovation or redevelopment, and will need to take into account the selection criteria outlined in Section 2 and technical guidelines provided in Section 5.

The **District/Gateway Concepts**, and related **Cross-Sections** and **Artist's Renderings**, illustrate potential layouts that reflect existing conditions and application of selected technical and aesthetic design principles, but they do not represent detailed designs. ***In-depth site surveys must be undertaken to verify property boundaries, utility locations, and other relevant opportunities and constraints before planning, design, and approvals of street trees and related infrastructure can be confidently undertaken.***

COLUMBIA AVENUE DISTRICTS AND GATEWAYS

1. DOWNTOWN DISTRICT
2. COLUMBIA AVE. COMMERCIAL DISTRICT
3. REGIONAL COMMERCIAL DISTRICT
4. TRANSITION DEVELOPMENT DISTRICT
5. COLUMBIA AVE. RESIDENTIAL DISTRICT
6. SOUTH GATEWAY
7. NORTH GATEWAY TO MILLENNIUM PARK
8. SOUTH GATEWAY TO MILLENNIUM PARK



LEGEND

- (SR) Suburban Res.
- (LDR) Low Dens Res.
- (MDR) Med Dens Res.
- (TRAN) Transition Area
- (RC) Reg Commercial
- (RCA) Reg Commercial AP
- (CAC) Col Ave Commercial
- (ND) Not Designated
- (DO) Downtown
- (AP) Airport
- (LI) Light Industrial
- (HI) Heavy Industrial
- (PO) Parks/Open Spaces
- (INST) Institutional
- (UR) Urban Reserve

Notes:
Land Use Plan information per City of Castlegar Official Community Plan, Bylaw No. 1150, 2011

NORTH

0 500 1000 2500m

KEY MAP

SCALE: NTS

CASTLEGAR
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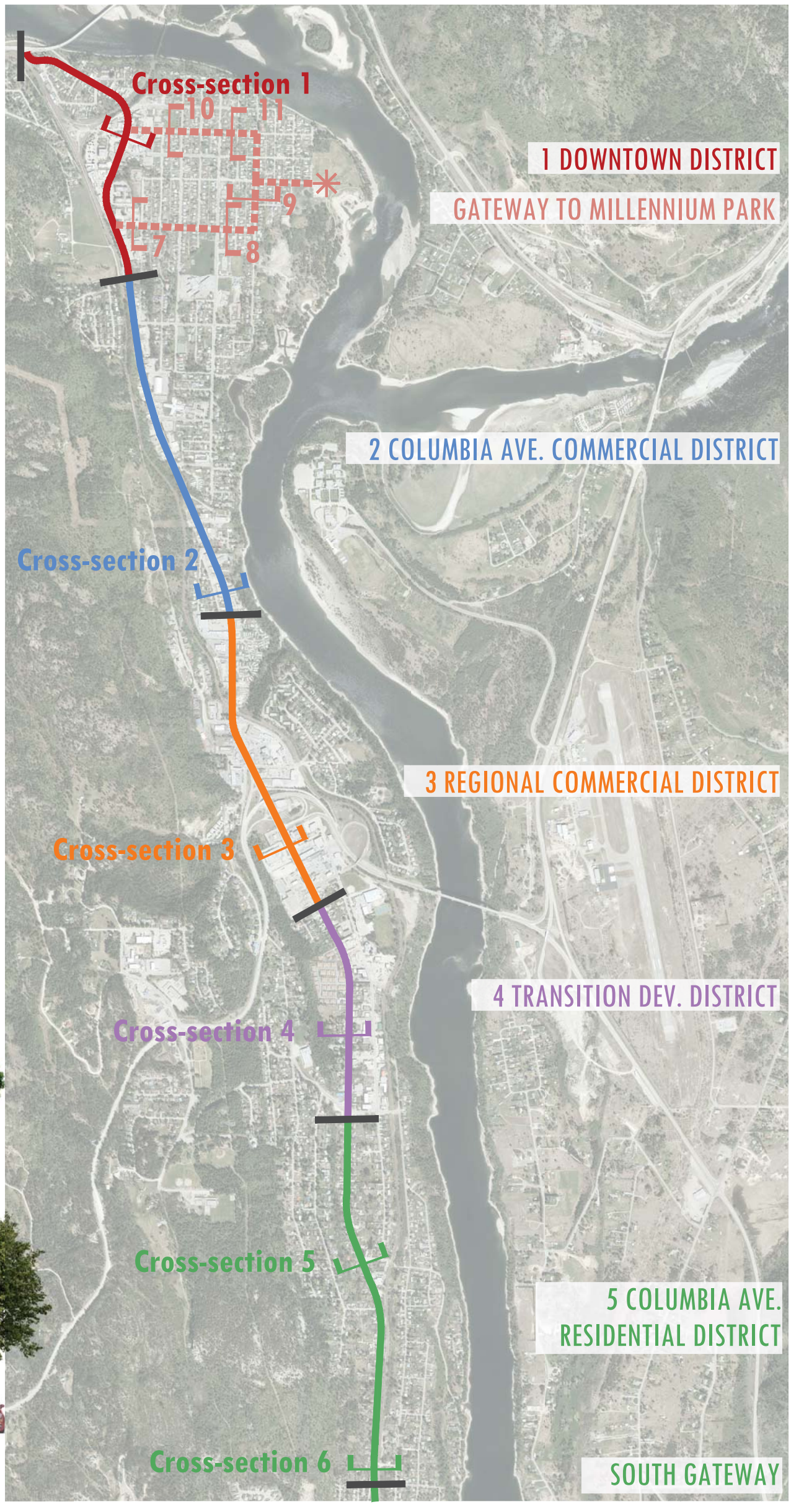
STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

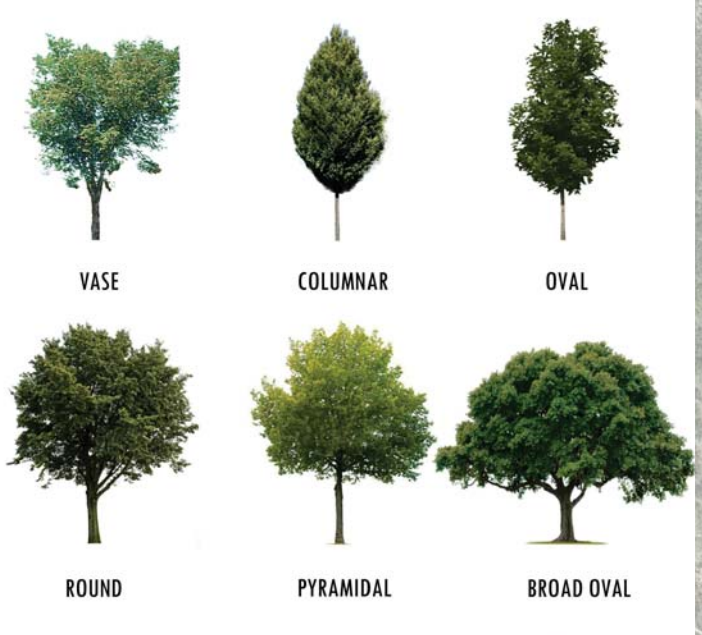
1

DISTRICT & GATEWAY KEY MAP

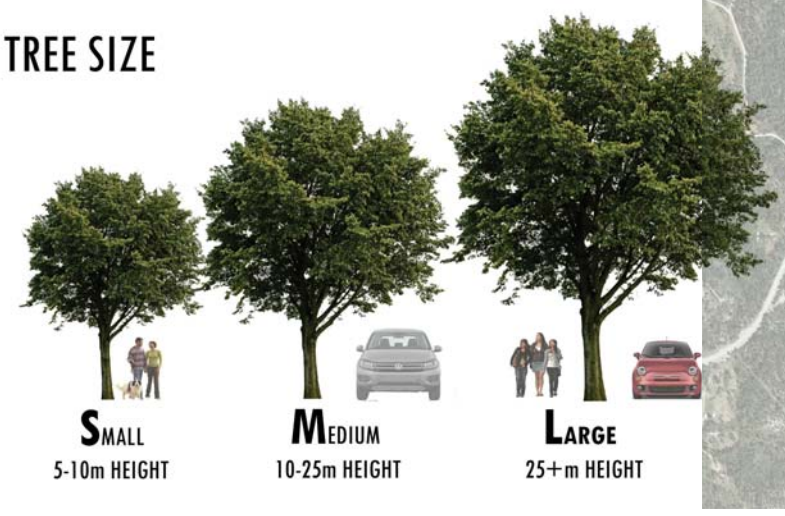


LEGEND

TREE SHAPE



TREE SIZE



Key Map and Tree Legend

SCALE: NTS

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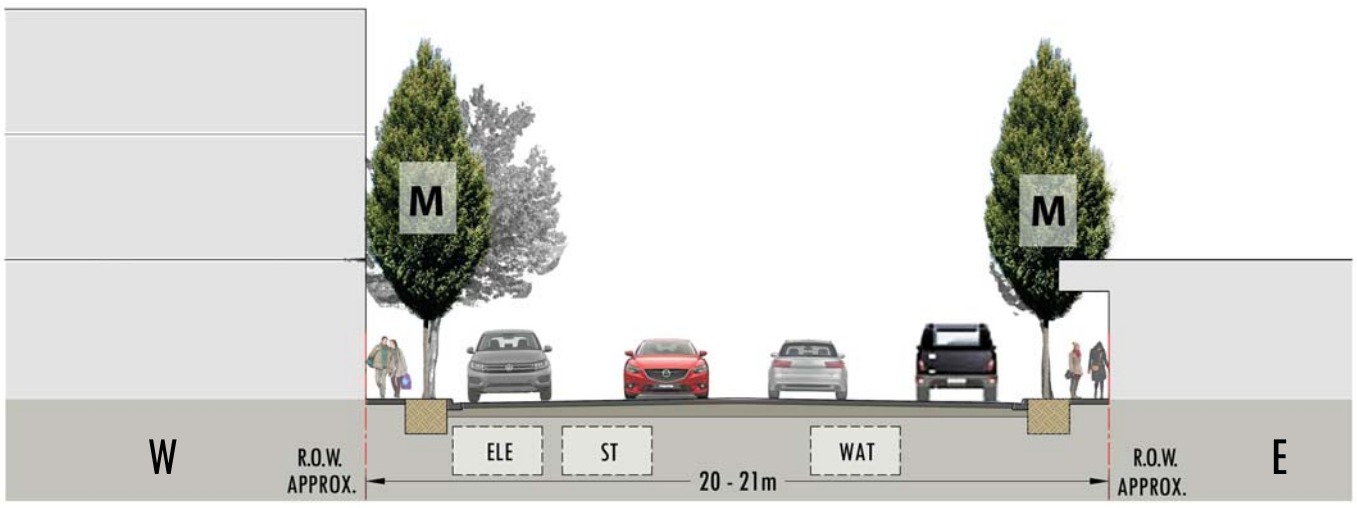
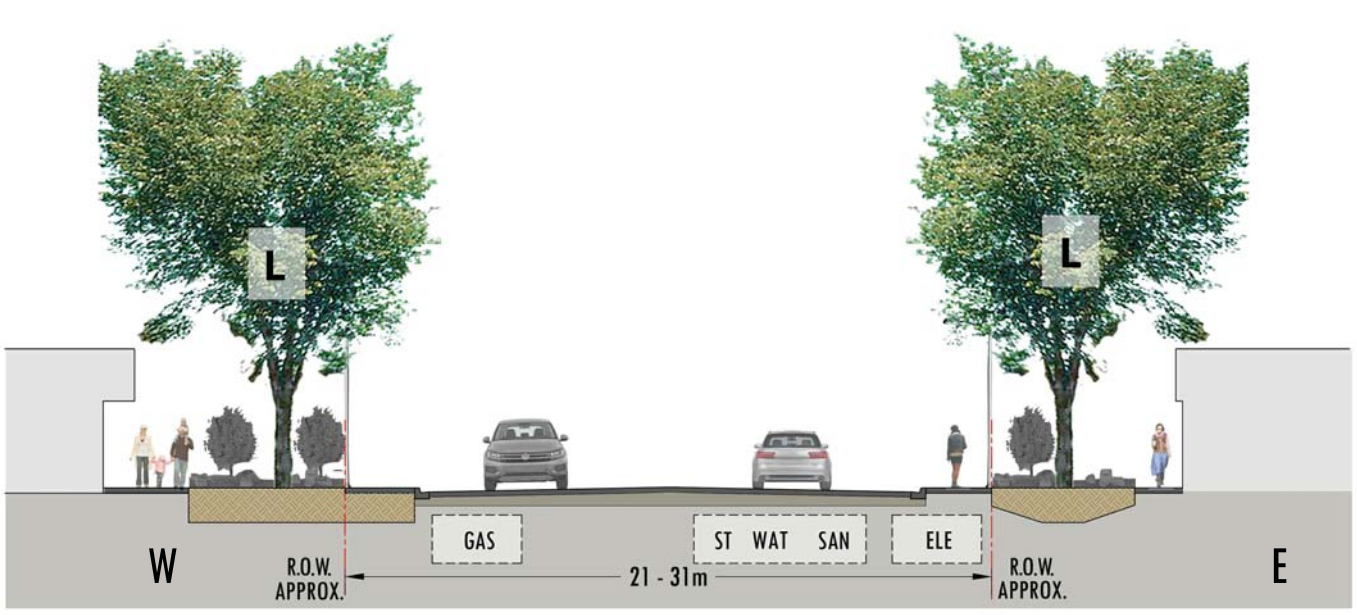
PROJECT NO. 2431-4040201

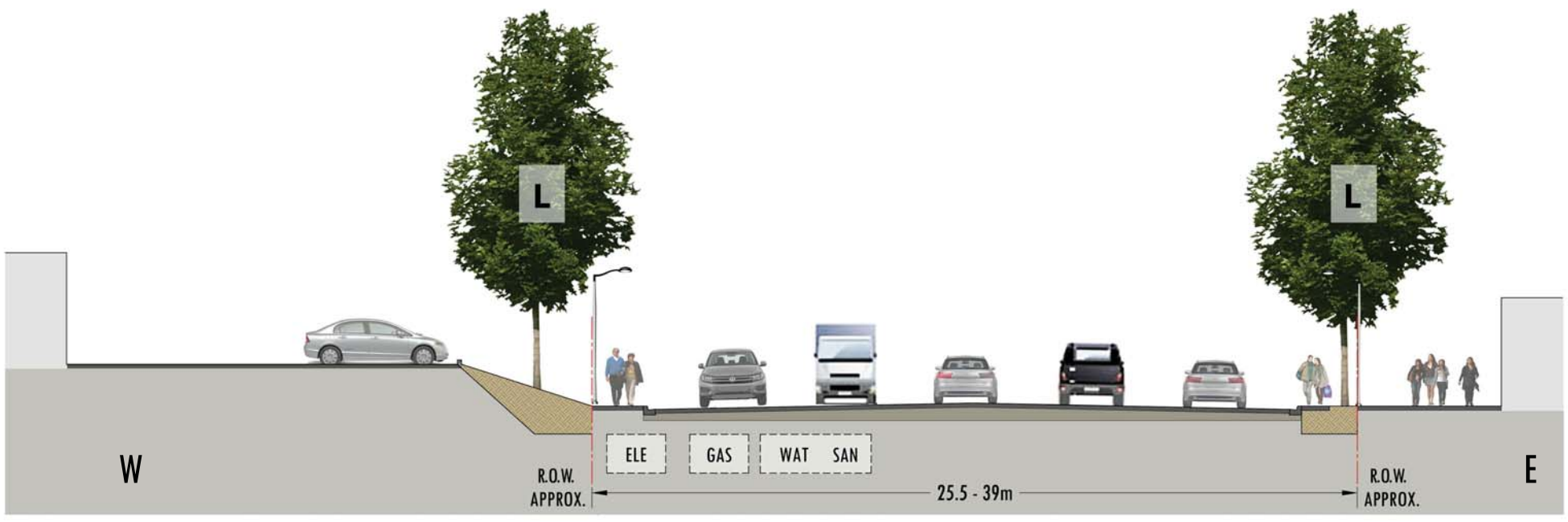
2



1 Cross-section 1. Downtown District

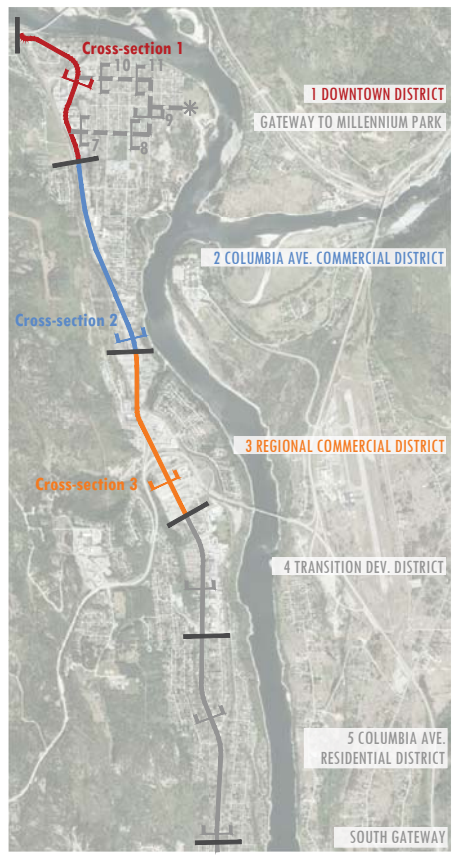


2 Cross-section 2. Columbia Avenue Commercial District



3 Cross-section 3. Regional Commercial District

KEY MAP



DISTRICTS ALONG COLUMBIA AVENUE CORRIDOR

NORTH

LEGEND

ELE	POWER MAIN	GAS	GAS MAIN	WAT	WATER MAIN	ST	STORM MAIN	SAN	SANITARY MAIN

Cross-sections

SCALE: 1:100

0 2 4 10m

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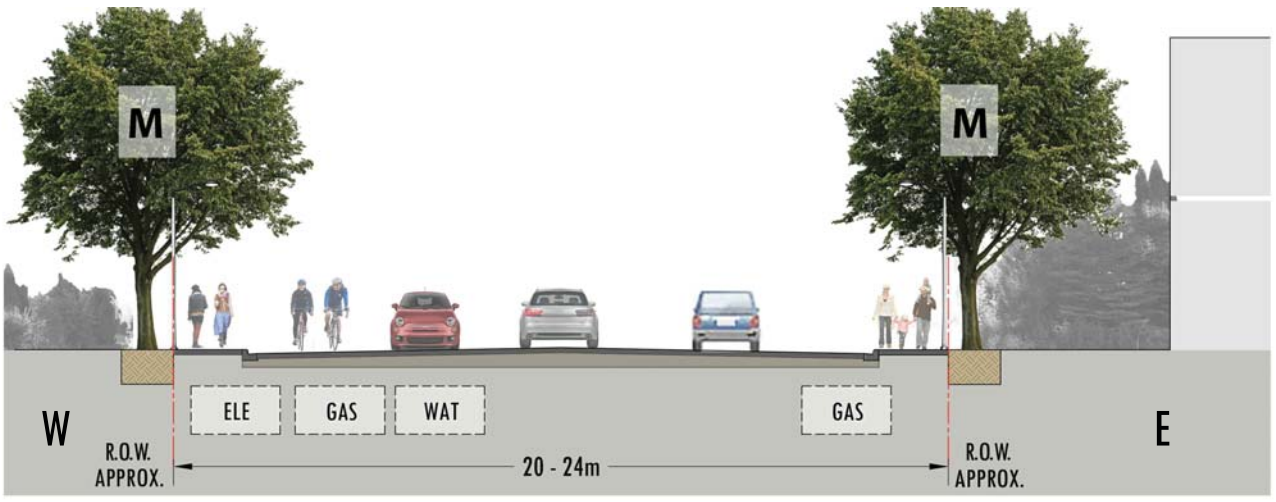
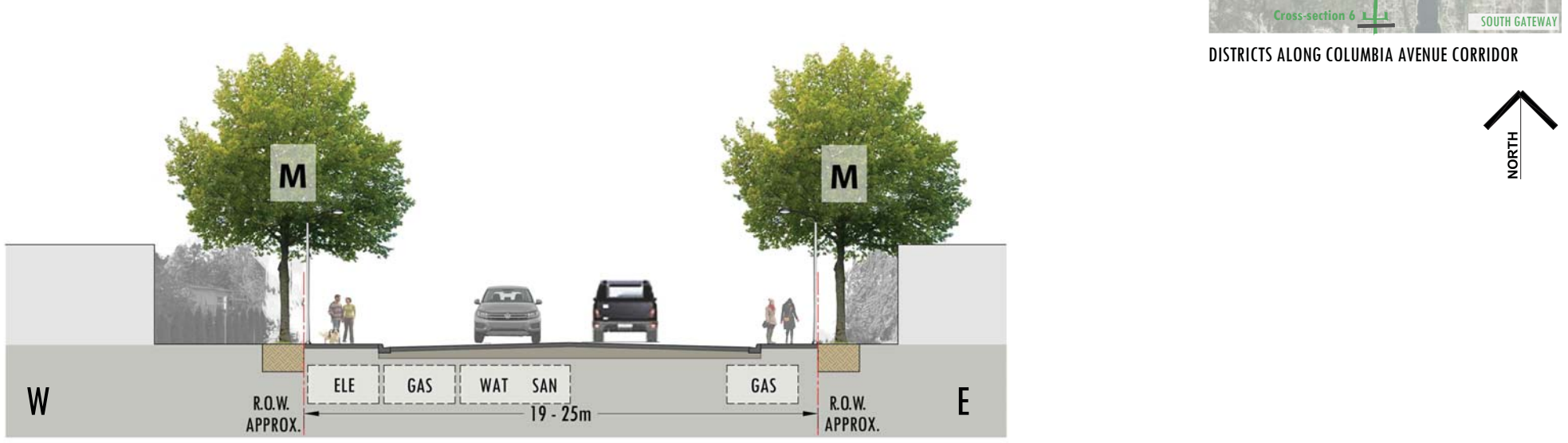
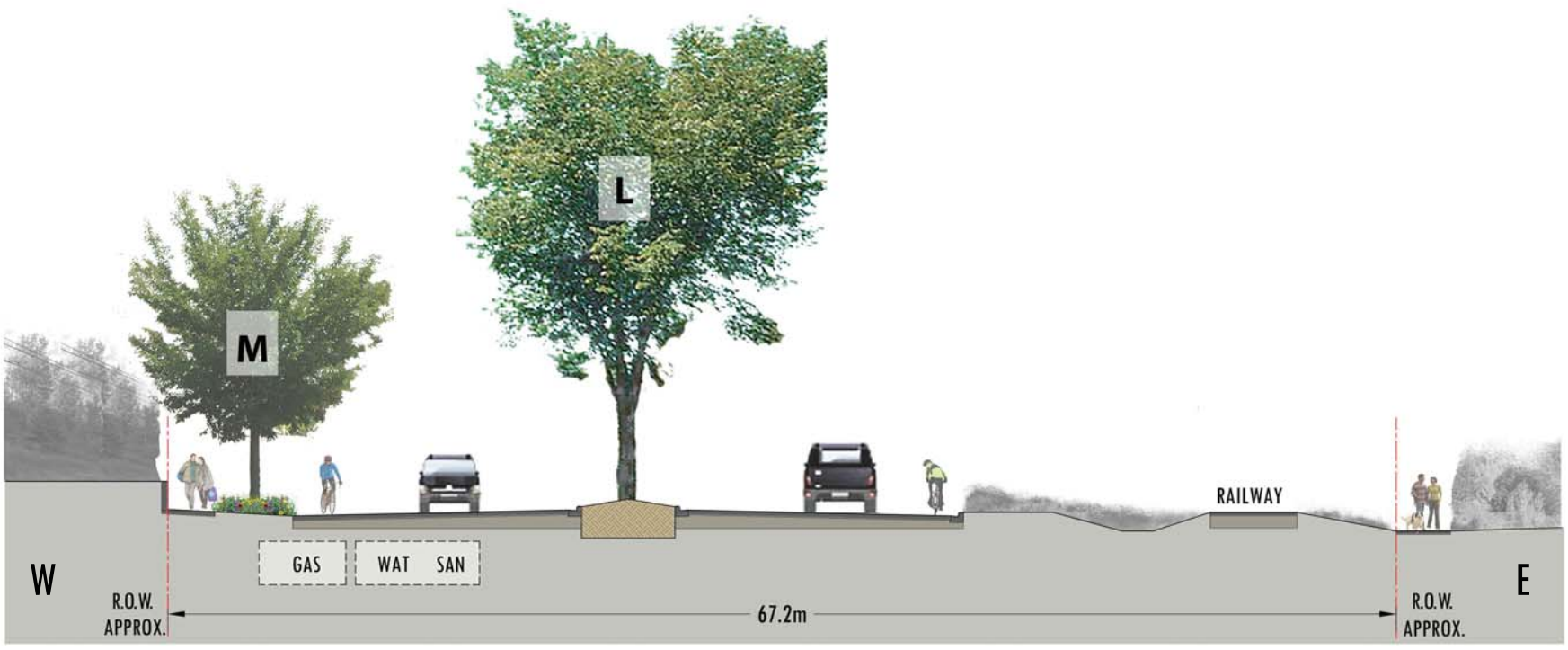
PROJECT NO. 2431-4040201



4 Cross-section 4. Transition Development District

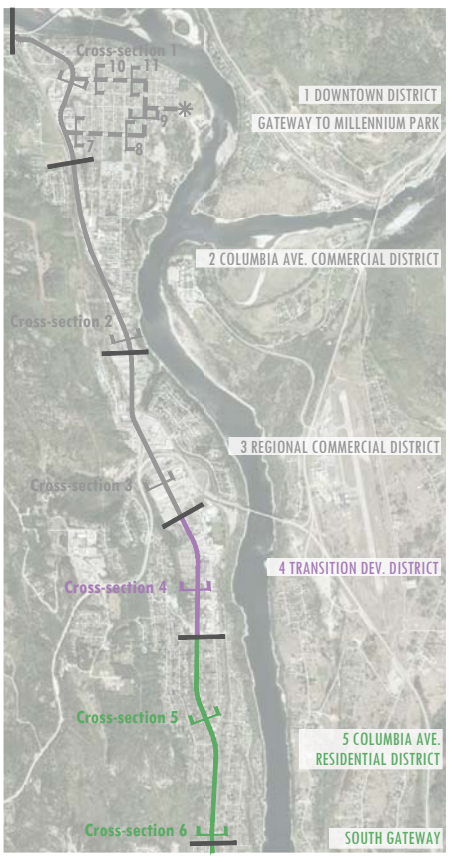


5 Cross-section 5. Columbia Ave. Residential District



Cross-section 6. South Gateway with Centre Median

KEY MAP



DISTRICTS ALONG COLUMBIA AVENUE CORRIDOR

NORTH

LEGEND

ELE POWER MAIN
GAS GAS MAIN
WAT WATER MAIN
ST STORM MAIN
SAN SANITARY MAIN

Cross-sections

SCALE: 1:100

0 2 4 10m

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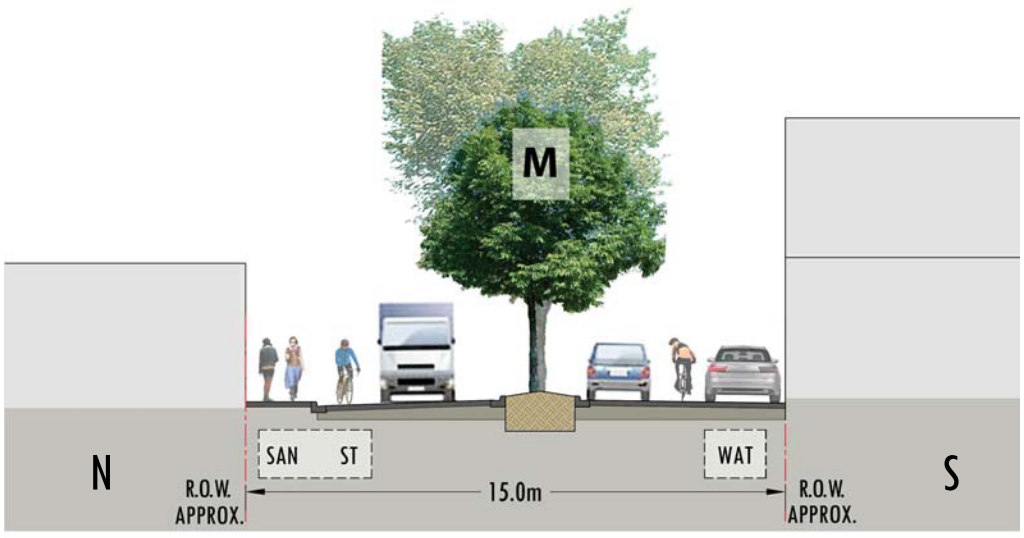
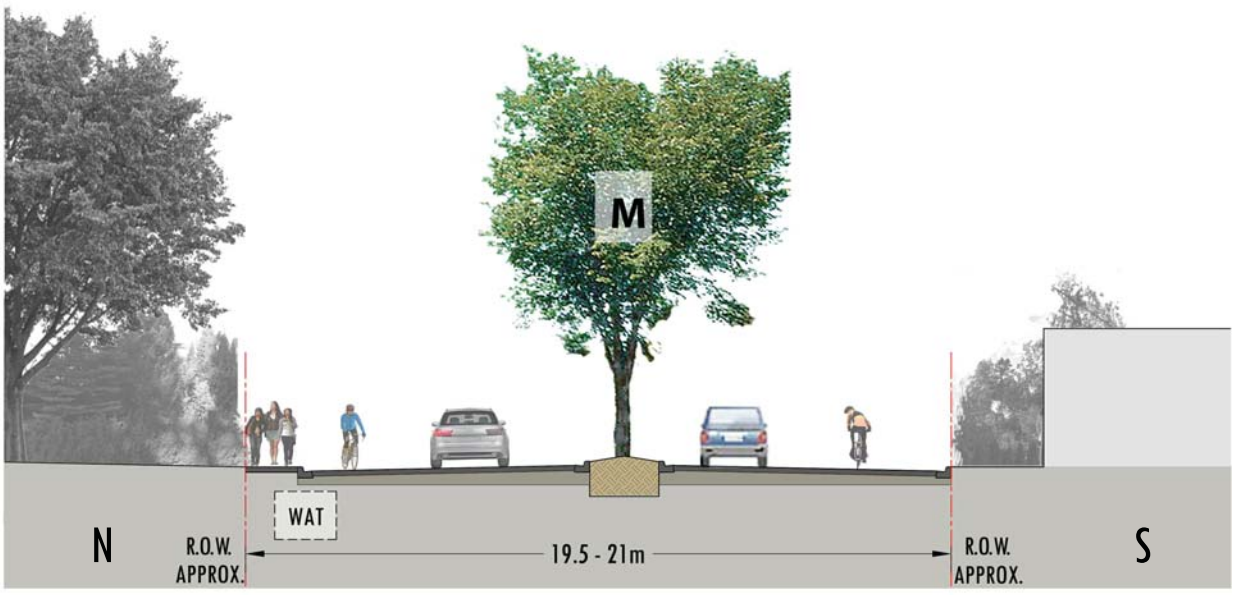
STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

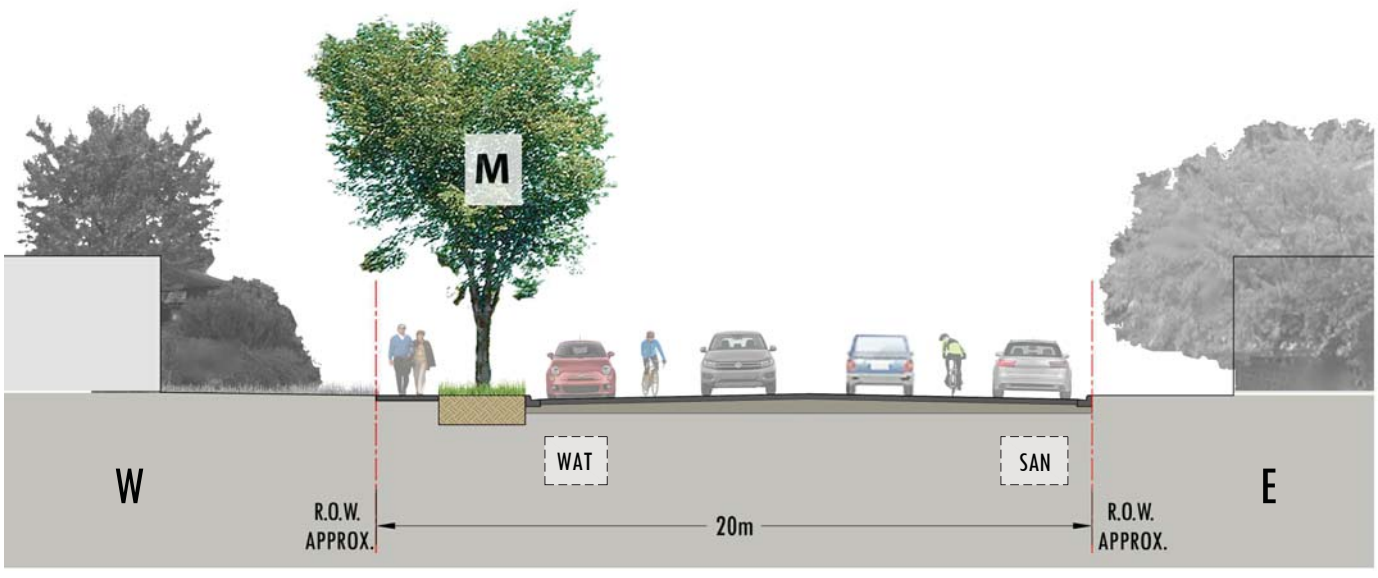
4



Cross-section 7. 6th Street Gateway to Millennium Park - 1st Block

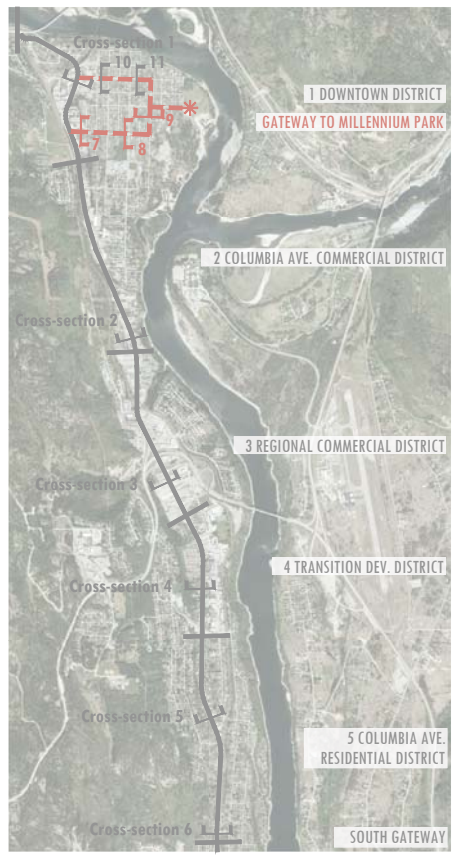


Cross-section 8. 6th Street Gateway to Millennium Park - East of 11th Avenue



Cross-section 9. 5th Avenue Gateway Connector to Millennium Park

KEY MAP



DISTRICTS ALONG COLUMBIA AVENUE CORRIDOR

NORTH

LEGEND

ELE	POWER MAIN	GAS	GAS MAIN	WAT	WATER MAIN	ST	STORM MAIN	SAN	SANITARY MAIN

Cross-sections

SCALE: 1:100

0 2 4 10m

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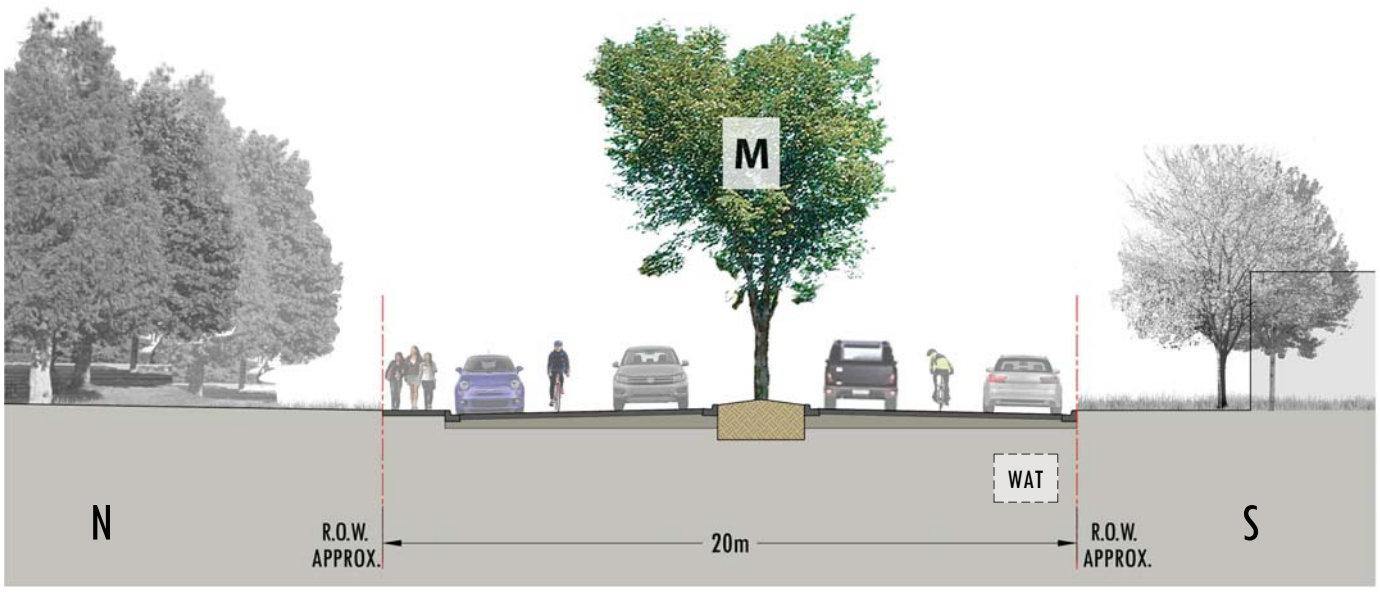
McElhanney

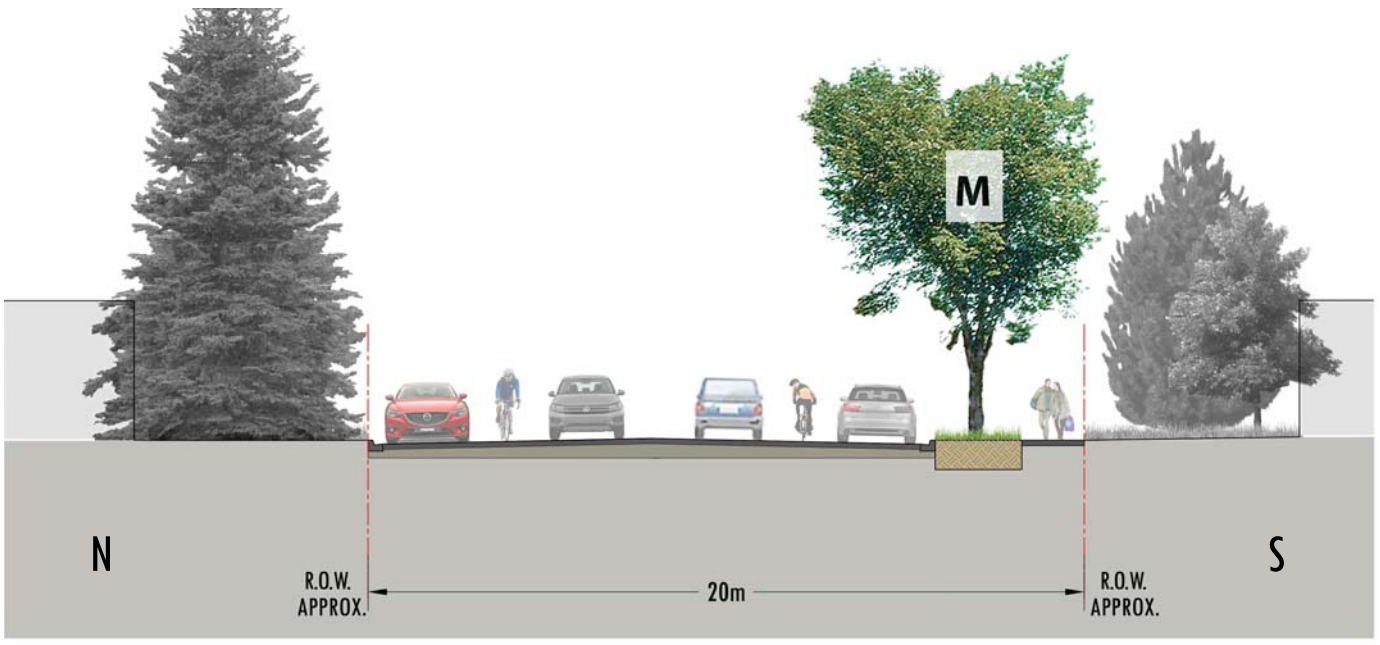
STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

5

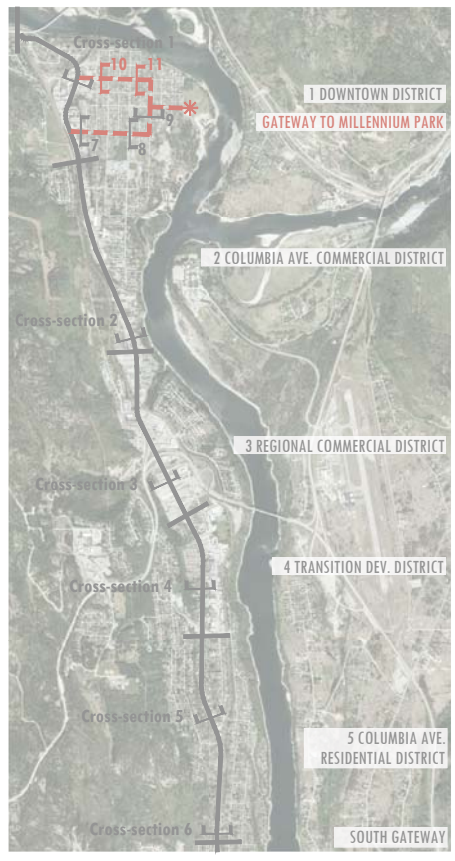


Cross-section 10. 3rd Street Gateway to Millennium Park (West of 7th Avenue)



Cross-section 11. 3rd Street Gateway to Millennium Park (East of 7th Avenue)

KEY MAP



DISTRICTS ALONG COLUMBIA AVENUE CORRIDOR

NORTH

LEGEND

ELE	POWER MAIN	GAS	GAS MAIN	WAT	WATER MAIN	ST	STORM MAIN	SAN	SANITARY MAIN

Cross-sections

0 2 4 10m

SCALE: 1:100

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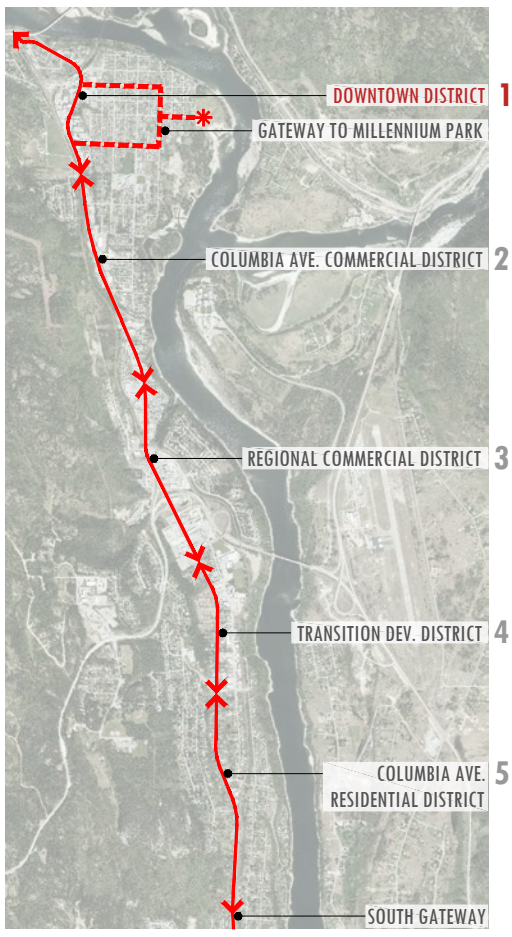
STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

6

KEY MAP



COLUMBIA AVENUE DISTRICTS AND GATEWAYS

SEE DOWNTOWN DISTRICT REPRESENTATIVE CONCEPT - PANEL 12

SEE GATEWAY TO MILLENNIUM PARK REPRESENTATIVE CONCEPT - PANEL 18

SEE GATEWAY OVERALL TREE LOCATION MAP FOR ROUTING - PANEL 11

LIMIT OF DOWNTOWN DISTRICT

LEGEND

EXISTING TREES

- MON (Monitor Annually)
- CP (Crown Pruning)
- RCP (Root + Crown Pruning)
- REP (Replace Tree)
- EX-NA (Existing tree, not assessed)

PROPOSED TREE

- PROPOSED TREE
- MEDIAN TREES PROPOSED IN 2008 LANDSCAPE MASTER PLAN

NORTH

1 Downtown District Overall Tree Location Map

0 100 200 500m

SCALE: 1:5000

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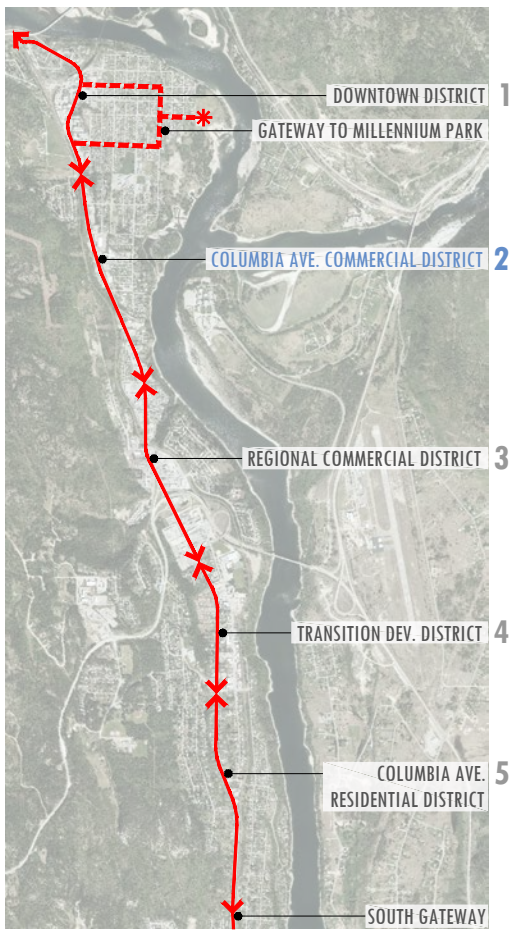
STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

7

KEY MAP



COLUMBIA AVENUE DISTRICTS AND GATEWAYS

LEGEND

- PROPOSED TREE
- MEDIAN TREES PROPOSED IN 2008 LANDSCAPE MASTER PLAN

SEE COLUMBIA AVENUE COMMERCIAL DISTRICT REPRESENTATIVE CONCEPT - PANEL 13

LIMIT OF COLUMBIA COMMERCIAL DISTRICT

NORTH

2 Columbia Commercial District Overall Tree Location Map

0 100 200 500m

SCALE: 1:5000

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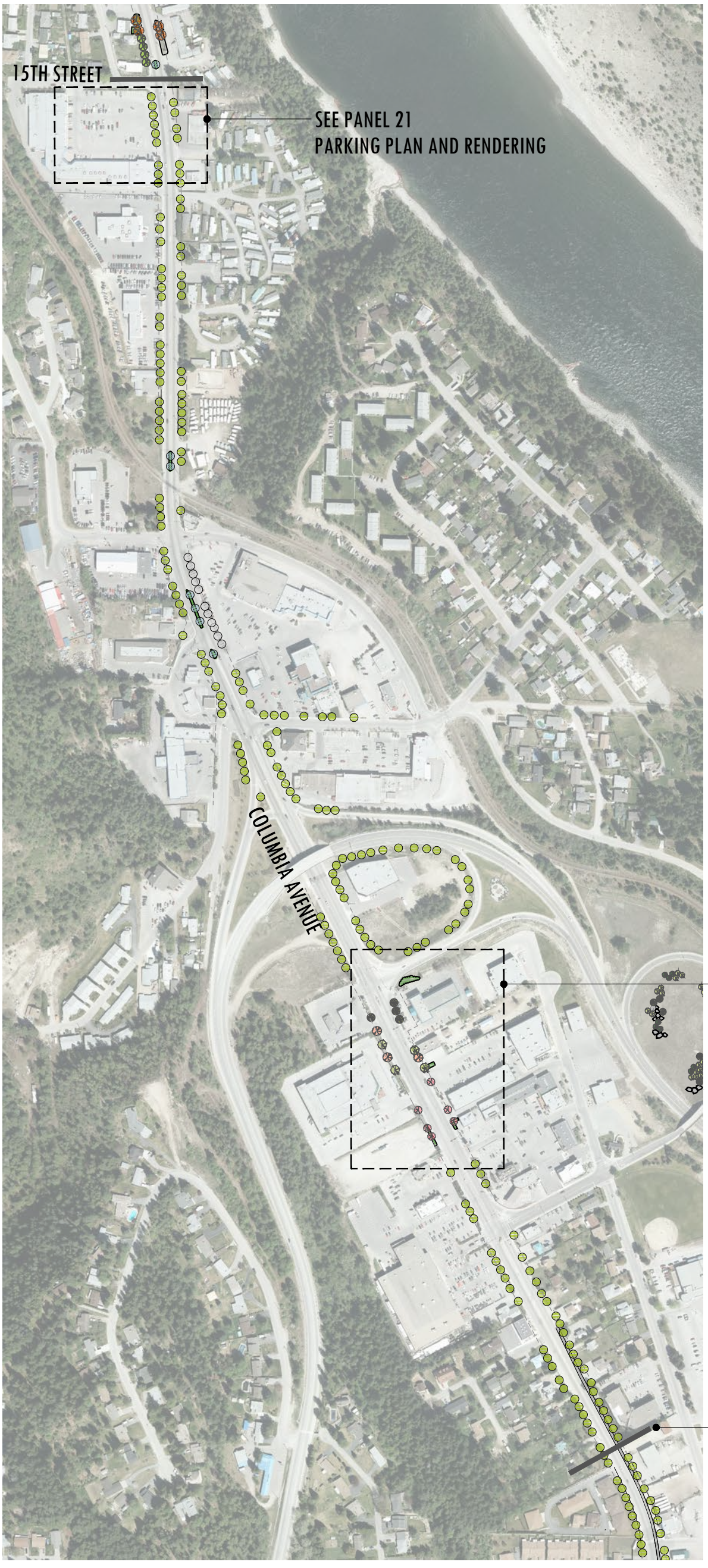
STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

8



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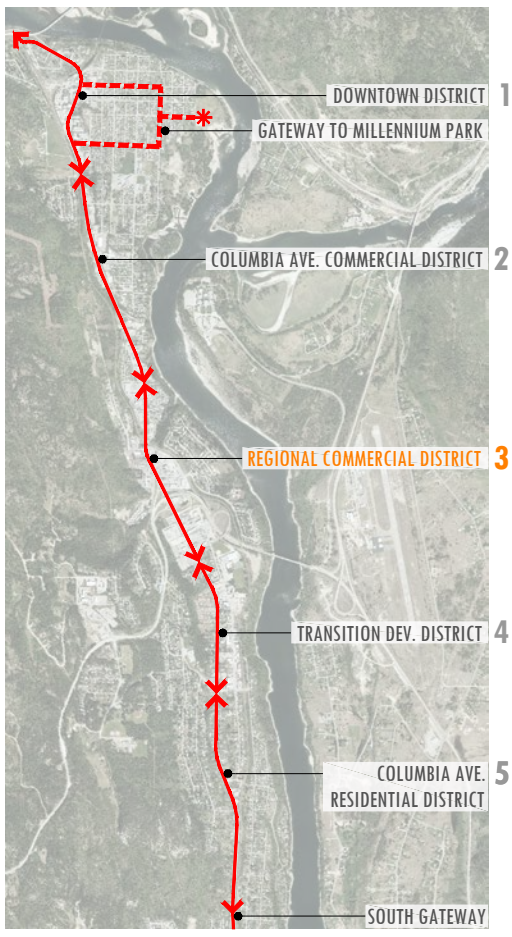

COLUMBIA AVENUE DISTRICTS AND GATEWAYS

LEGEND

- PROPOSED TREE
- MEDIAN TREES PROPOSED IN 2008 LANDSCAPE MASTER PLAN

NORTH

3 Regional Commercial District Overall Tree Location Map

0 100 200 500m

SCALE: 1:5000

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STREET TREE MASTER PLAN

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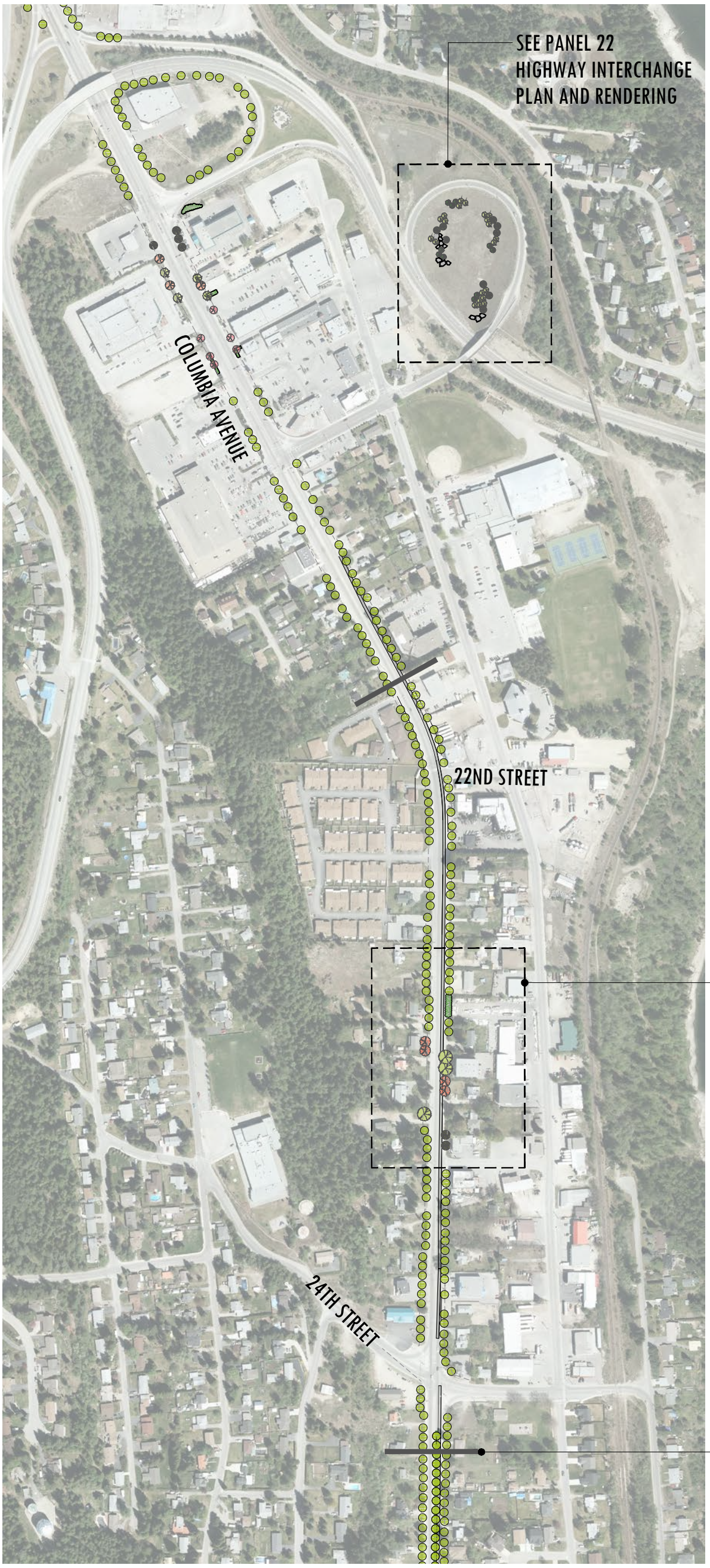

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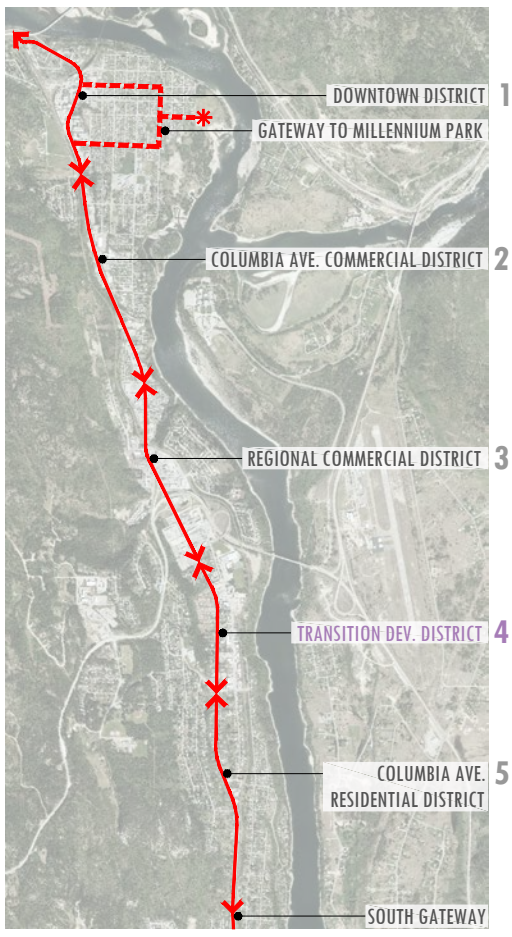

COLUMBIA AVENUE DISTRICTS AND GATEWAYS

LEGEND

- PROPOSED TREE

NORTH

4 Transition Development District Overall Tree Location Map

0 100 200 500m SCALE: 1:5000

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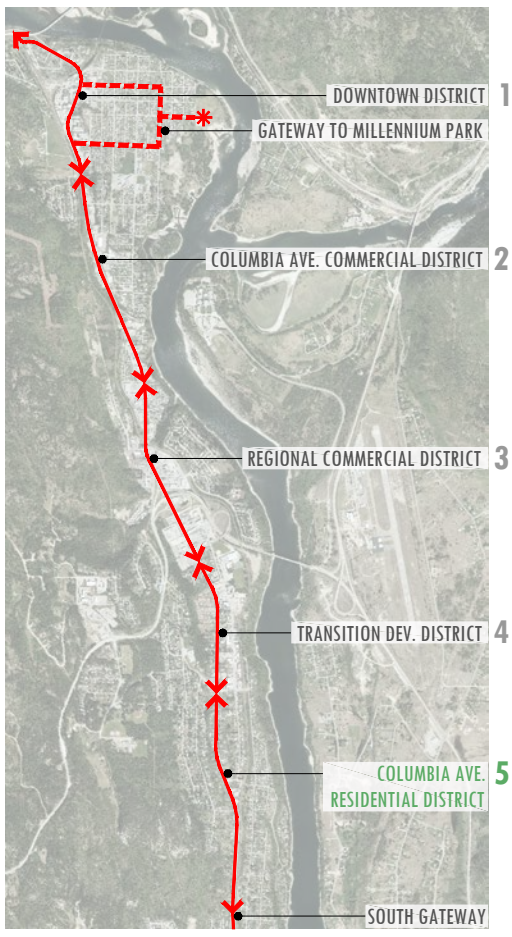
STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

10

KEY MAP



COLUMBIA AVENUE DISTRICTS AND GATEWAYS

LEGEND

- PROPOSED TREE

SEE COLUMBIA AVE. RESIDENTIAL DISTRICT REPRESENTATIVE CONCEPT - PANEL 16

SEE SOUTH GATEWAY CONCEPT - PANEL 17

LIMIT OF COLUMBIA AVE. RESIDENTIAL DISTRICT

NORTH

5 Columbia Ave. Residential District Overall Tree Location Map

0 100 200 500m

SCALE: 1:5000

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STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

11

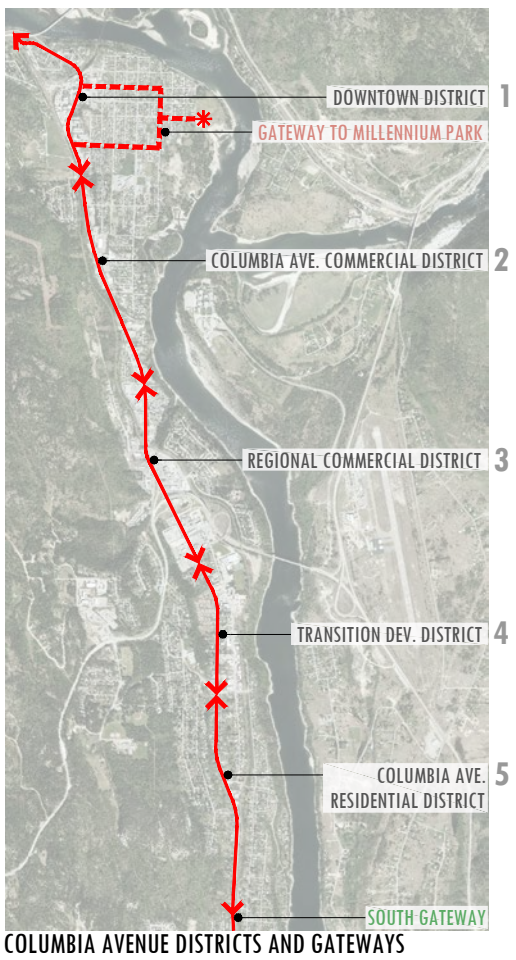
Gateways to Millennium Park

South Gateway

LEGEND

- PROPOSED TREE
- MEDIAN TREES PROPOSED IN 2008 LANDSCAPE MASTER PLAN

KEY MAP



COLUMBIA AVENUE DISTRICTS AND GATEWAYS

NORTH

Gateway Overall Tree Location Maps

0 100 200 500m

SCALE: 1:5000

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STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

12

NOTE

1. SELECT SPECIES SUITED TO PLANTING SITES.
2. GROUP SPECIES WHERE POSSIBLE, MATCHING OR ALTERNATING WITH SPECIES ON OPPOSITE SIDE.
3. ALTERNATE SPECIES WHERE ROWS OF MORE THAN 5 TREES.
4. WIDTH, LENGTH AND GRADIENT OF BUILDING FRONTAGE TREE PLANTERS VARY TO SUIT SITE. SEE DETAIL.
5. AVOID CONFLICTS WITH SIGNS, STREETLIGHTS AND UTILITIES.
6. SEE MASTER PLAN FOR SETBACKS FROM INTERSECTIONS, DRIVEWAYS AND OTHER STREETSCAPE ELEMENTS.
7. PLANT TREES ON PUBLIC RIGHT OF WAY WHEN SETBACKS allow.

COLUMBIA AVE

1 SR

3RD ST

1 SR

2 FA
BUILDING FRONTAGE
TREE PLANTING
- SEE DETAIL

3 PY
NEW TREE IN
SIDE WALK
- SEE DETAIL

4TH STREET

1 FA

LEGEND

EXISTING TREES

- MON (Monitor Annually)
- CP (Crown Pruning)
- RCP (Root + Crown Pruning)
- REP (Replace Tree)
- EX-NA (Existing tree, not assessed)

PROPOSED TREE

- PY = PYRUS (NAVIGATOR ORNAMENTAL PEAR)
- SR = SYRINGA (IVORY SILK TREE LILAC)
- FA = FRAXINUS AM. (NORTHERN BLAZE WHITE ASH)
- FP = FRAXINUS PENNSYLV. (EMERALD GREEN ASH)

NORTH

Downtown District - Representative Concept

0 5 10 25m

SCALE: 1:500

TO 13TH STREET

3 QJ
ALL BACK OF
SIDEWALK

3 QJ

5 UD
BUILDING FRONTAGE
TREE PLANTING
- SEE DETAIL

COLUMBIA AVE

5 UD

2 LT IN NEW GRASS
BUILDING FRONTAGE
TREE PLANTING
- SEE DETAIL

2 LT IN GRASS
BUILDING FRONTAGE
TREE PLANTING
- SEE DETAIL

4 QJ

1 UA MEDIAN PLANTING
- SEE DETAIL

LEGEND

PROPOSED TREE

- UD = ULMUS DAVIDIANA (DISCOVERY JAPANESE ELM)
- QJ = QUERCUS JACKIANA (ADMIRATION HYBRID OAK)
- LT = LIRIODENDRON TULIPIFERA (TULIPTREE)
- UA = ULMUS AMERICANA (PRAIRIE EXPEDITION AMERICAN ELM)

NOTE

1. SELECT SPECIES SUITED TO PLANTING SITES.
2. GROUP SPECIES WHERE POSSIBLE, MATCHING OR ALTERNATING WITH SPECIES ON OPPOSITE SIDE.
3. ALTERNATE SPECIES WHERE ROWS OF MORE THAN 5 TREES.
4. WIDTH, LENGTH AND GRADIENT OF BUILDING FRONTAGE TREE PLANTERS VARY TO SUIT SITE. SEE DETAIL.
5. AVOID CONFLICTS WITH SIGNS, STREETLIGHTS AND UTILITIES.
6. SEE MASTER PLAN FOR SETBACKS FROM INTERSECTIONS, DRIVEWAYS AND OTHER STREETSCAPE ELEMENTS.
7. PLANT TREES ON PUBLIC RIGHT OF WAY WHEN SETBACKS ALLOW.

NORTH

Columbia Ave. Commercial District - Representative Concept

0 5 10 25m

SCALE: 1:500

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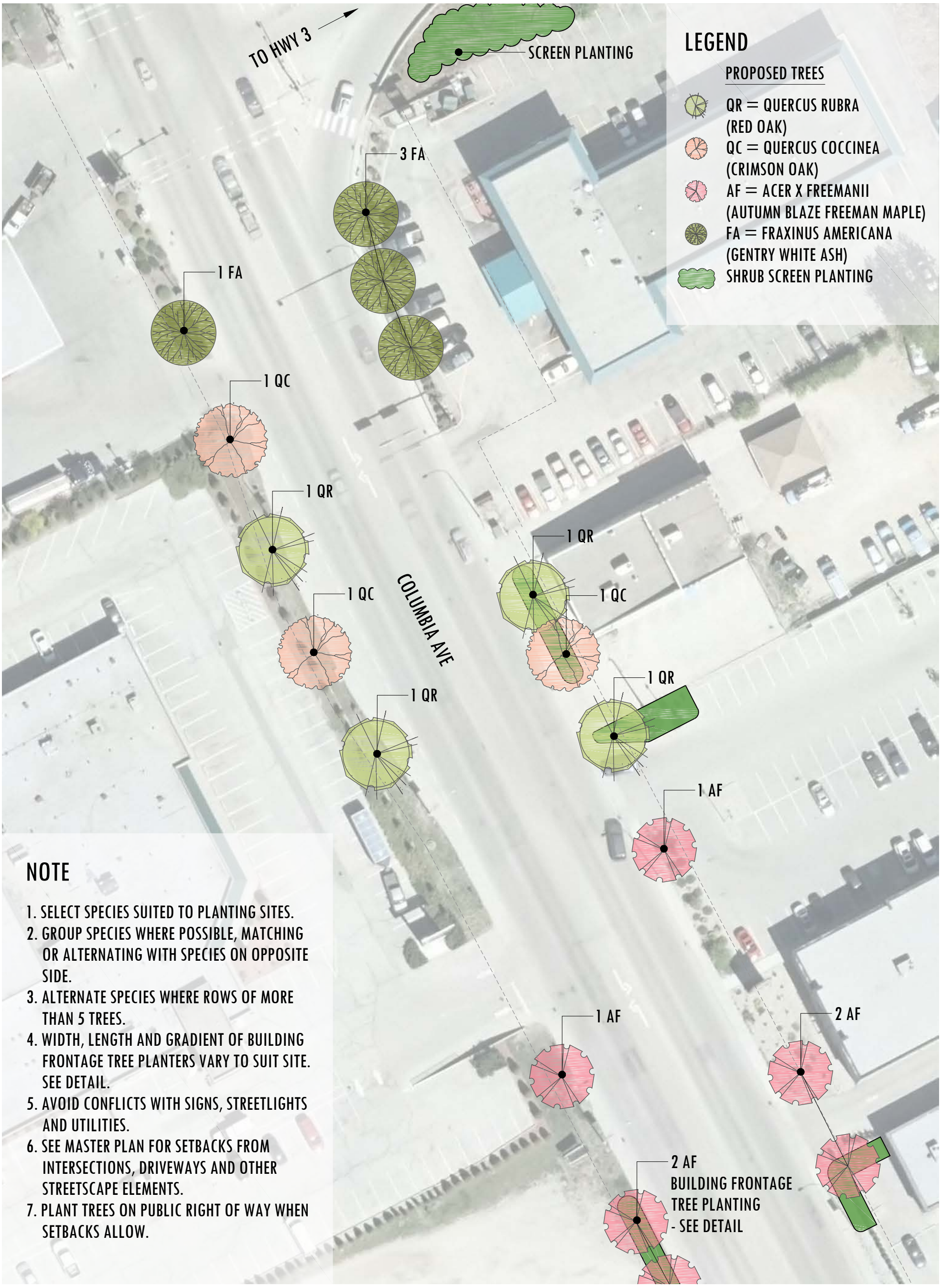
STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201



NOTE

1. SELECT SPECIES SUITED TO PLANTING SITES.
2. GROUP SPECIES WHERE POSSIBLE, MATCHING OR ALTERNATING WITH SPECIES ON OPPOSITE SIDE.
3. ALTERNATE SPECIES WHERE ROWS OF MORE THAN 5 TREES.
4. WIDTH, LENGTH AND GRADIENT OF BUILDING FRONTAGE TREE PLANTERS VARY TO SUIT SITE. SEE DETAIL.
5. AVOID CONFLICTS WITH SIGNS, STREETLIGHTS AND UTILITIES.
6. SEE MASTER PLAN FOR SETBACKS FROM INTERSECTIONS, DRIVEWAYS AND OTHER STREETSCAPE ELEMENTS.
7. PLANT TREES ON PUBLIC RIGHT OF WAY WHEN SETBACKS ALLOW.

NORTH

Regional Commercial District - Representative Concept

0 5 10 25m

SCALE: 1:500

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STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

LOW SCREEN PLANTING TO AVOID BLOCKING SIGN

2 PA

2 FP

2 FP

2 CO

COLUMBIA AVE

2 PA

1 PA

2 CO

1 PA
BUILDING FRONTAGE
TREE PLANTING
- SEE DETAIL

2 CO

TO 23RD STREET

2 FP

2 FP
BUILDING FRONTAGE
TREE PLANTING - SEE DETAIL

LEGEND

PROPOSED TREES

PA = PHELLODENDRON AMURENSE (EYESTOPPER AMUR CORKTREE)

CO = CELTIS OCCIDENTALIS (DELTA HACKBERRY)

FP = FRAXINUS PENNSYLV. (PRAIRIE SPIRE GREEN ASH)

SHRUB SCREEN PLANTING

NOTE

1. SELECT SPECIES SUITED TO PLANTING SITES.
2. GROUP SPECIES WHERE POSSIBLE, MATCHING OR ALTERNATING WITH SPECIES ON OPPOSITE SIDE.
3. ALTERNATE SPECIES WHERE ROWS OF MORE THAN 5 TREES.
4. WIDTH, LENGTH AND GRADIENT OF BUILDING FRONTAGE TREE PLANTERS VARY TO SUIT SITE. SEE DETAIL.
5. AVOID CONFLICTS WITH SIGNS, STREETLIGHTS AND UTILITIES.
6. SEE MASTER PLAN FOR SETBACKS FROM INTERSECTIONS, DRIVEWAYS AND OTHER STREETSCAPE ELEMENTS.
7. PLANT TREES ON PUBLIC RIGHT OF WAY WHEN SETBACKS ALLOW.

NORTH

Transition Development District - Representative Concept

0 5 10 25m

SCALE: 1:500

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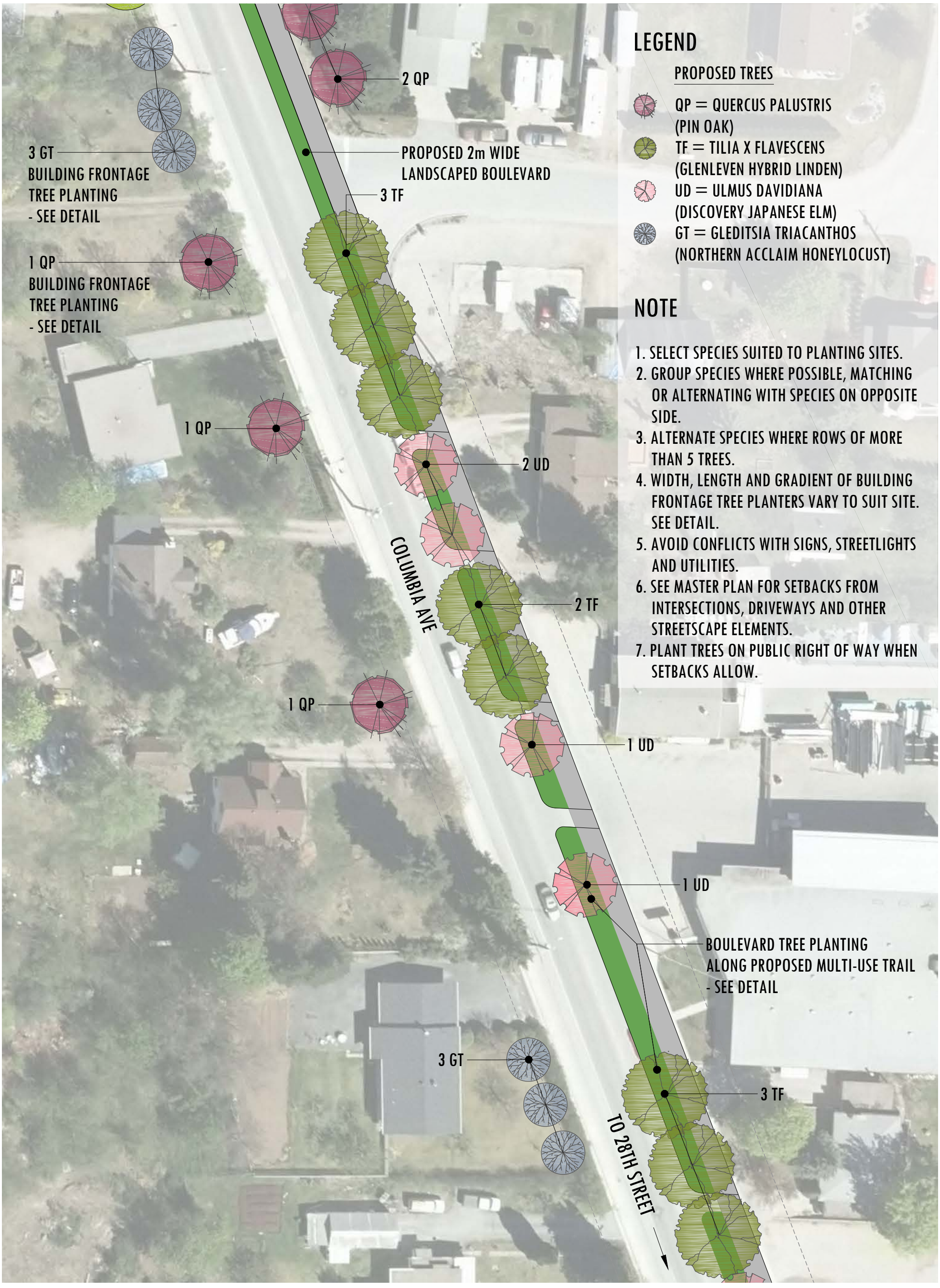
STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201



LEGEND

PROPOSED TREES

- QP = QUERCUS PALUSTRIS (PIN OAK)
- TF = TILIA X FLAVESCENS (GLENLEVEN HYBRID LINDEN)
- UD = ULMUS DAVIDIANA (DISCOVERY JAPANESE ELM)
- GT = GLEDITSIA TRIACANTHOS (NORTHERN ACCLAIM HONEYLOCUST)

NOTE

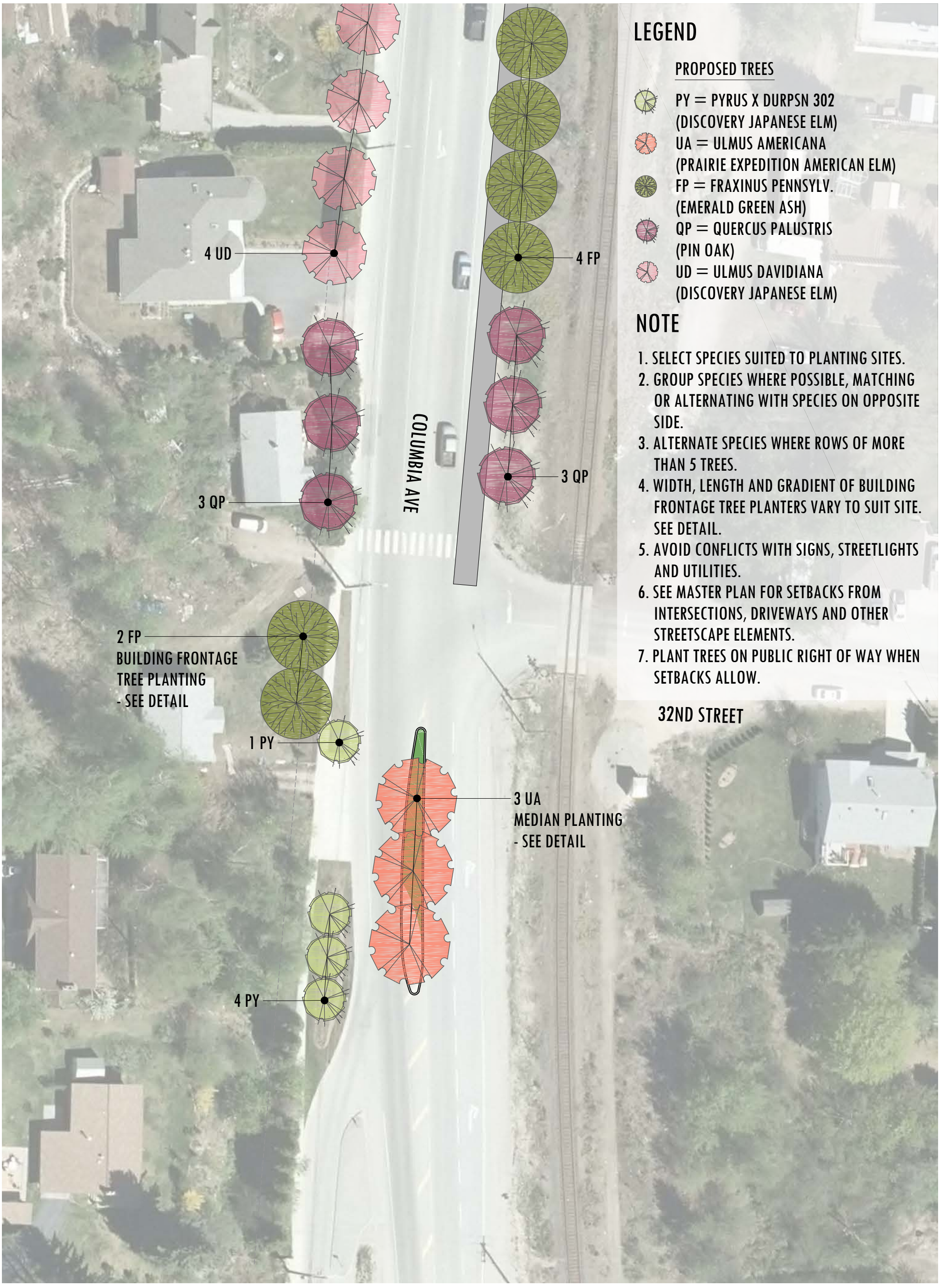
1. SELECT SPECIES SUITED TO PLANTING SITES.
2. GROUP SPECIES WHERE POSSIBLE, MATCHING OR ALTERNATING WITH SPECIES ON OPPOSITE SIDE.
3. ALTERNATE SPECIES WHERE ROWS OF MORE THAN 5 TREES.
4. WIDTH, LENGTH AND GRADIENT OF BUILDING FRONTAGE TREE PLANTERS VARY TO SUIT SITE. SEE DETAIL.
5. AVOID CONFLICTS WITH SIGNS, STREETLIGHTS AND UTILITIES.
6. SEE MASTER PLAN FOR SETBACKS FROM INTERSECTIONS, DRIVEWAYS AND OTHER STREETSCAPE ELEMENTS.
7. PLANT TREES ON PUBLIC RIGHT OF WAY WHEN SETBACKS ALLOW.

Columbia Ave. Residential District - Representative Concept

NORTH

0 5 10 25m

SCALE: 1:500



LEGEND

PROPOSED TREES

- PY = PYRUS X DURPSN 302 (DISCOVERY JAPANESE ELM)
- UA = ULMUS AMERICANA (PRAIRIE EXPEDITION AMERICAN ELM)
- FP = FRAXINUS PENNSYLV. (EMERALD GREEN ASH)
- QP = QUERCUS PALUSTRIS (PIN OAK)
- UD = ULMUS DAVIDIANA (DISCOVERY JAPANESE ELM)

NOTE

1. SELECT SPECIES SUITED TO PLANTING SITES.
2. GROUP SPECIES WHERE POSSIBLE, MATCHING OR ALTERNATING WITH SPECIES ON OPPOSITE SIDE.
3. ALTERNATE SPECIES WHERE ROWS OF MORE THAN 5 TREES.
4. WIDTH, LENGTH AND GRADIENT OF BUILDING FRONTAGE TREE PLANTERS VARY TO SUIT SITE. SEE DETAIL.
5. AVOID CONFLICTS WITH SIGNS, STREETLIGHTS AND UTILITIES.
6. SEE MASTER PLAN FOR SETBACKS FROM INTERSECTIONS, DRIVEWAYS AND OTHER STREETSCAPE ELEMENTS.
7. PLANT TREES ON PUBLIC RIGHT OF WAY WHEN SETBACKS ALLOW.

NORTH

South Gateway Concept

0 5 10 25m

SCALE: 1:500

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STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

NOTE

1. SELECT SPECIES SUITED TO PLANTING SITES.
2. GROUP SPECIES WHERE POSSIBLE, MATCHING OR ALTERNATING WITH SPECIES ON OPPOSITE SIDE.
3. ALTERNATE SPECIES WHERE ROWS OF MORE THAN 5 TREES.
4. WIDTH, LENGTH AND GRADIENT OF BUILDING FRONTAGE TREE PLANTERS VARY TO SUIT SITE. SEE DETAIL.
5. AVOID CONFLICTS WITH SIGNS, STREETLIGHTS AND UTILITIES.
6. SEE MASTER PLAN FOR SETBACKS FROM INTERSECTIONS, DRIVEWAYS AND OTHER STREETSCAPE ELEMENTS.
7. PLANT TREES ON PUBLIC RIGHT OF WAY WHEN SETBACKS ALLOW.

LEGEND

EXISTING TREES

- MON (Monitor Annually)
- CP (Crown Pruning)
- RCP (Root + Crown Pruning)
- REP (Replace Tree)
- EX-NA (Existing tree, not assessed)

PROPOSED TREE

- SR = SYRINGA (IVORY SILK TREE LILAC)
- UA = ULMUS AMERICANA (PRAIRIE EXPEDITION AMERICAN ELM)
- FP = FRAXINUS PENNSYLV. (EMERALD GREEN ASH)

2 SR
CENTRE MEDIAN
TREE PLANTING
- SEE DETAIL

1 FP

6TH ST

5 UA
CENTRE MEDIAN
TREE PLANTING
- SEE DETAIL

1 FP

COLUMBIA AVE

2 FP
BOULEVARD TREE
PLANTING - SEE DETAIL

3 UA
MEDIAN PLANTING
- SEE DETAIL

1 SR
NEW TREE IN SIDEWALK
- SEE DETAIL

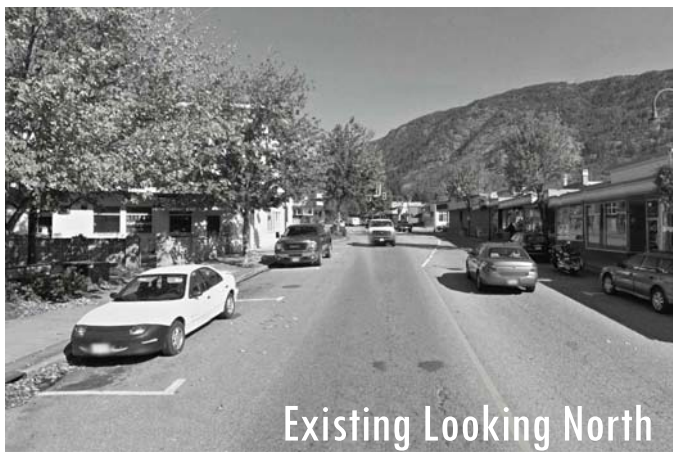
NORTH

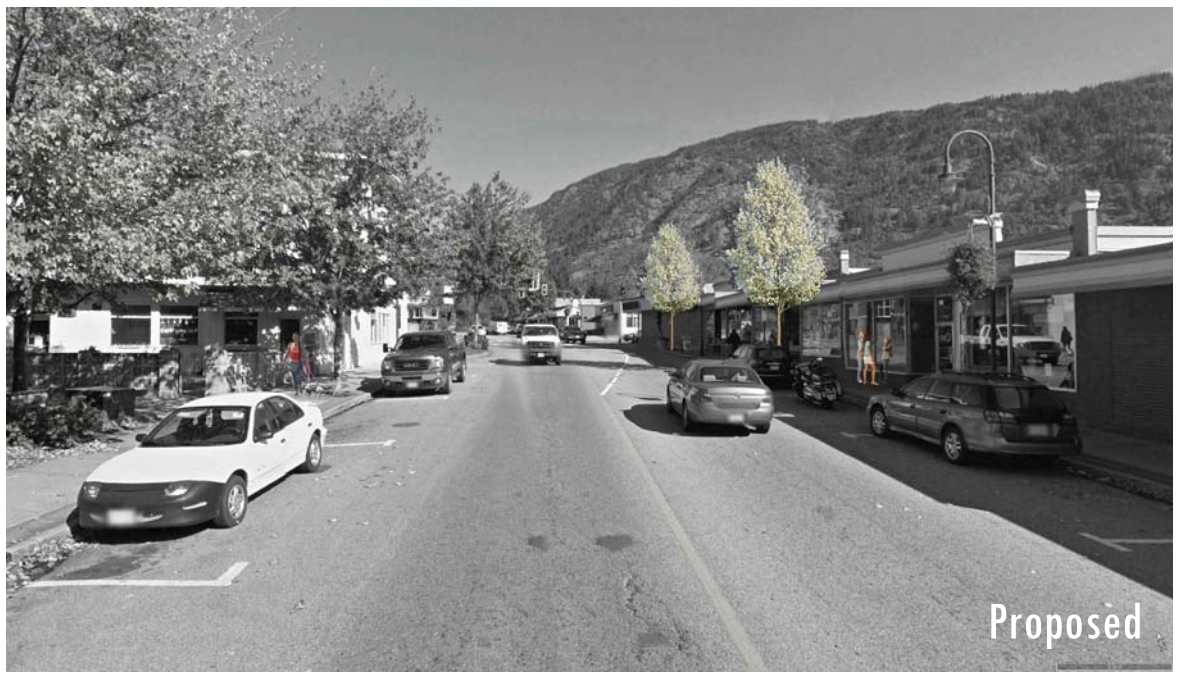
Gateway to Millennium Park - Representative Concept

0 5 10 25m

SCALE: 1:500

1 Downtown





2 Columbia Ave. Commercial

3 Regional Commercial

4 Transition Development

District Character Renderings

5 Col. Ave. Residential

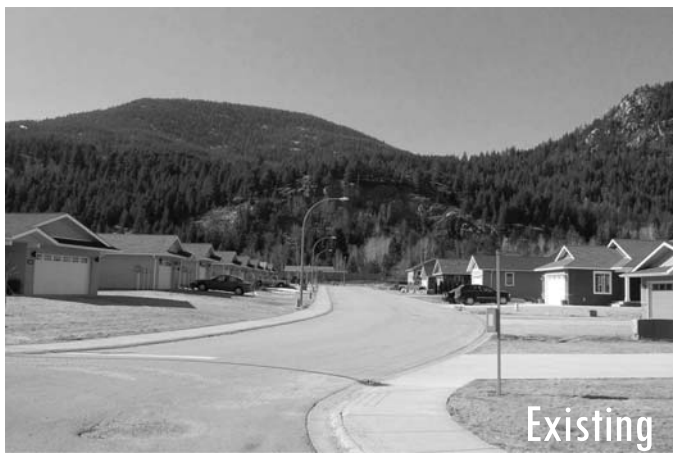
Gateway with Centre Median

Gateway to Millennium Park

Gateway to Millennium Park

District & Gateway Character Renderings

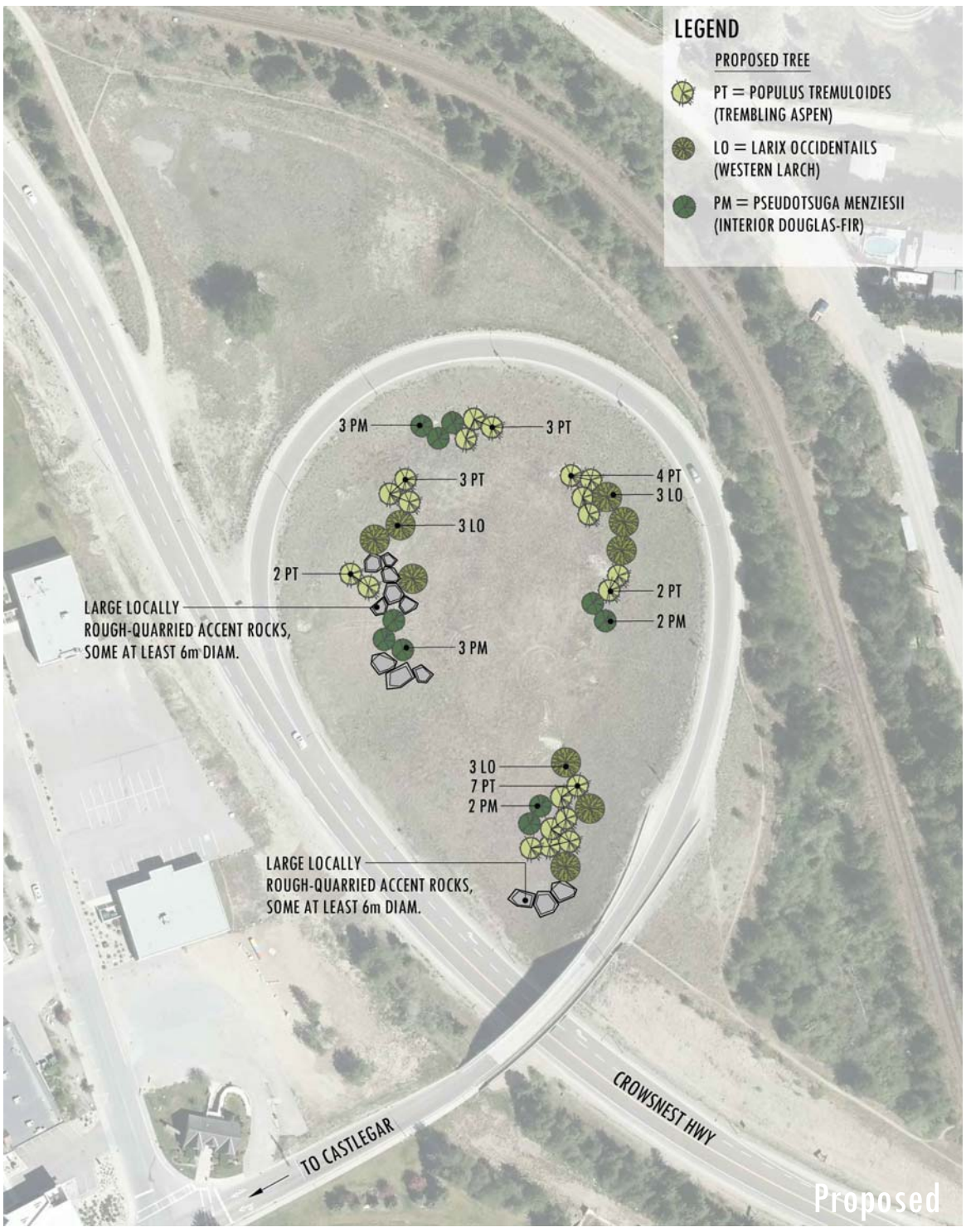
Residential



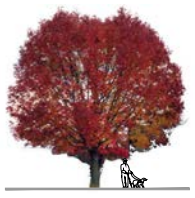
Collector

Parking Lot

Streetscape Character Renderings



Highway Interchange Plan and Rendering

				
Autumn Blaze Freeman Maple Acer x freemanii 'Jeffersred'	**Delta Hackberry** Celtis occidentalis	**Gentry White Ash** Fraxinus americana 'Gentry'	**Northern Blaze White Ash** Fraxinus americana 'Jefnor'	**Emerald Green Ash** Fraxinus pennsylvanica' Emerald'
				
Prairie Spire Green Ash Fraxinus pennsylvanica 'Rugby'	**'Princeton Sentry' Maidenhair** Ginkgo biloba 'Princeton Sentry'	**Northern Acclaim Honeylocust** Gleditsia triacanthos var. inermis 'Harve'	**Shademaster Honeylocust** G. triacanthos var. inermis' Shademaster'	**Western Larch** Larix occidentalis
				
Tuliptree Liriodendron tulipifera	**Eyestopper Amur Corktree** Phellodendron amurense 'Longenecker'	**Trembling Aspen** Populus tremuloides	**Douglas-fir** Pseudotsuga menziesii	**Navigator Ornamental Pear** Pyrus x 'DurPSN302'
				
Crimson Oak Quercus coccinea	**Admiration Hybrid Oak** Quercus x jackiana 'Jefmir'	**Pin Oak** Quercus palustris	**Red Oak** Quercus rubra	**Ivory Silk Tree Lilac** Syringa reticulata 'Ivory Silk'
				
Glenleven Hybrid Linden Tilia x flavescens 'Dropmore'	**Prairie Expedition American Elm** Ulmus americana 'Lewis & Clark'	**Discovery Japanese Elm** Ulmus davidiana japonica 'Discovery'		

Recommended Street Trees

0 5 10 25m

SCALE: 1:500

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STREET TREE MASTER PLAN

PROJECT NO. 2431-4040201

24

5. TECHNICAL GUIDELINES

"If a tree is treated as a living organism, with an understanding of its vital functions, it will be a constant source of profit and pleasure to men."

— N.T. Mirov

STREET TREE PLANTING GUIDELINES

1. Reflect streetscape design principles as described in Section 2
2. Contribute to Distinctiveness of Districts and Gateways
3. Promote diversity within and between Districts
4. Group and mix species to avoid monocultures
5. Enhance Gateways through intensified tree plantings
6. Prioritize "People Places"
7. Aim for seamless public and private realms
8. Integrate stormwater management to add value to green infrastructure

Select the most appropriate District-specific tree species for each planting site from Table 3 (Section 2). If more tree planting sites are feasible in the proposed (re)development, property owners are strongly encouraged to incorporate more trees than shown on Plans, keeping in mind mature spread of each species.

Trees shall be installed to the most appropriate of the following standards (see Details in Appendix 5):

Sidewalk Scenarios

- Typical Structural Cell Tree Trench (Detail 01)
- Typical Structural Concrete Tree Trench (Detail 02)
- Typical Storm Water Distribution in Tree Trench (Detail 03)

Boulevard and Median Scenarios

- Typical Boulevard Tree Trench (Detail 04)
- Typical Median Tree Trench (Detail 04)

Notes (please see Details for further Notes)

- These are typical details that are strictly schematic and are not to be used for cost quoting or construction.
- All dimensions and depths are suggestive and subject to specific site conditions, geotechnical and structural engineering review.
- Plans for proposed street tree installations shall be submitted to the City of Castlegar Civic Works department for review and approval to confirm compliance with City engineering standards.

INTEGRATED STORMWATER MANAGEMENT GUIDELINES

Water Quantity Management

Planting soils include about 20% air in pore spaces that can store significant volumes of storm runoff, but only if that stormwater is diverted into planting trenches rather than into traditional storm sewer systems. Detail 03 in Appendix 5 indicates the following components:

- Catch basin to capture as much runoff as possible from roads and sidewalks (also facilitating collection and periodic clean-out of larger suspended solids)
- Perforated pipe to distribute runoff throughout soil volume
- Pipe clean-out and monitoring well between soil cells

Overflow mechanisms built into such systems (including required overflow to the municipal storm system) are specific to anticipated storm regimes, stormwater catchment areas, and total volume of available soil (systems can be isolated to a single trench or can be connected under driveways to create a chain of reservoirs).

Water Quality Management

Beyond volume and peak flow reduction, diverting stormwater into tree soil planting trenches can achieve significant reduction in levels of common urban pollutants such as metals, sediments, hydrocarbons, salts, and nutrients. The number of soils cells depends on volume reduction and water quality targets as well as other factors such as soils infiltration rates. New development shall maximize the catchment area diverted into tree soil trenches or equivalent bioretention facilities. Regular maintenance of such facilities is critical to ensuring their ongoing water quantity and quality benefits.

Towards achieving Castlegar's vision of clean land and water, a target of removing 85% of total suspended solids (TSS) is recommended as it would indicate reduction of other pollutants that are also important but more challenging and costly to monitor.

STREET TREE INSTALLATION AND MAINTENANCE GUIDELINES

Supplementary to the above standards, which are specific to the Street Tree Master Plan, a set of peer-reviewed Planting Details and Specifications is available on the International Society of Arboriculture (ISA) website (link in Appendix 3) in the following categories:

- Tree Protection
- Planting Soils
- Planting
- Staking
- Correction
- Irrigation
- Observation

It is also recommended that the City adopt the guidelines and recommendations set out in the 2012 edition of the BC Landscape Standard (co-authored by the BC Society of Landscape Architects and BC Landscape and Nursery Association, see Appendix 3). The BCLS Table of Contents is listed in Figure 6 and includes standards relating to installation and care of a tree (and other landscaping) over its full life-cycle.

1. For street trees on **public property**, tree-related work, and activities likely to impact trees' health, shall meet the standards set out in this Master Plan and, beyond those, the BCLS guidelines at a minimum. We recommend that scheduled and as-needed City tree maintenance be performed by an ISA-Certified Arborist (either on staff or as a Contractor).
2. For street trees on **private property**, development proposals and subsequent construction of works including street trees shall meet the standards set out in this Master Plan and, beyond those, the BCLS guidelines at a minimum. We recommend that the City of Castlegar require involvement of a Registered Landscape Architect (RLA) in street tree-related design.

Maintenance of existing street trees on private property is the responsibility of the property owner. Responsibility for establishment maintenance of street trees in new developments will be defined by terms of the construction Contract. Involvement of an RLA in design, along with inspection of new trees by an RLA or an ISA-certified Arborist at expiry of the relevant Warranty period, will give the City assurance that street trees are installed to standards set out in this Master Plan.

Maintenance Best Management Practices for Long-term Tree Health

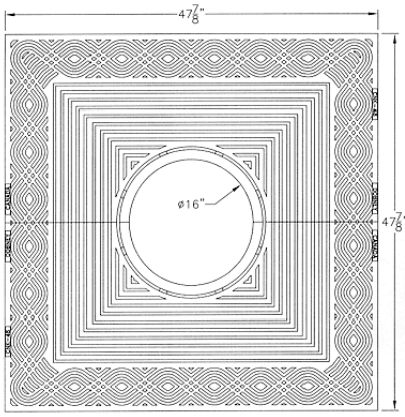
Many maintenance issues associated with urban trees have their origins before and during planting. L. Peter MacDonagh (2015) outlines critical proactive measures that can enhance the quality and longevity of our urban forests, including minimum soil volumes, genetic diversification, irrigating with stormwater, tree grate openings that can expand as trees grow (Figure 7), pruning roots and young trees for later health, mulching generously, and minimizing disturbance of the root zone.

Streetscape operations and maintenance can adversely impact trees, but damage can be limited through decisions that consider trees' needs. For example:

- **Build awareness** among City staff and contractors as well as the general public that **tree trunks are alive and vulnerable**, and should not be abused
- **Strictly avoid disturbance** or further compaction of soil within the dripline via tree protection fencing/signs (e.g., excavation for buried utilities or roadworks)
- Carefully select **road/sidewalk de-icing products** and ensure application by trained personnel using methods/equipment capable of precise delivery
- **Use separators/clean-outs at catchbasins** to decrease pollutant load and avoid clogging perforated stormwater distribution pipes in soil volumes
- **Incorporate snowplow-friendly side inlets** to protect curbs (Figure 8)
- Co-ordinate with **BC Hydro or other utilities** that need to prune City of Castlegar trees for clearance (clarify common objectives, avoid duplication)

Table of Contents

Figure 6 (above). Table of Contents for BC Landscape Standard (2012)



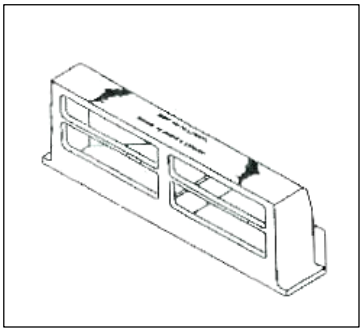


Figure 7 (far left). Example of highly expandable tree grate (Trojan Industries, model CNK-48)

Figure 8 (left). Example of snowplow-friendly side-inlet catchbasin (Titan Foundry)

6. IMPLEMENTATION

POLICY INSTRUMENTS

This Street Tree Master Plan forms the foundation for future management of Castlegar's street tree assets. The document provides guidance and reference for the City, MoTI, and private landowners, but there is a need for clear policy that the City can enforce to promote growth and renewal of its urban forest in the near and distant future.

The Street Tree Master Plan shall therefore amend and be referenced by:

- Official Community Plan (OCP) – see Appendix 4
- Subdivision and Servicing Bylaw – see Appendix 5: Schedule J Street Tree Planting

Preserving an existing tree, particularly a mature one, yields greater benefits immediately than planting a young tree. Currently there is no legislation limiting removal of trees on **private property**. Developers could be encouraged (or required) to assess the value of existing trees on their properties; awareness of the increased market value associated with mature trees may motivate their retention through site planning. Discussions at the STMP Open House suggested that the public values the right to remove trees on private property. Public education may be enough to discourage unwarranted removals, but the City may wish to explore a tree protection policy if needed in the future. The ISA website listed in Appendix 3 has guidelines related to Tree Ordinances.

The following descriptions illustrate three communities' approaches to protecting their mature urban forest asset. The City of Calgary Tree Protection framework is very user-friendly, and is highly recommended as a precedent for the City of Castlegar to consider.

Tree Preservation/Protection Bylaw approaches – Existing trees

Development Permit (e.g., Dublin, Ohio)

- Intent to encourage responsible design and minimize impact on existing trees over a certain size (e.g., 15 or 20 cm DBH)
- Specific requirements re: protection (roots, limbs), removal, and replacement
- Tree surveys and protection plans to be submitted prior to development
- Protection devices maintained throughout the entire construction period
- If trees die, they must be replaced
- Inspections by City during and following construction to ensure compliance and maintenance
- In addition to other DP new landscaping requirements
- Demands high standards at all stages – can make it more expensive to replace trees than to preserve them (effective disincentive)

Tree Protection Plan (e.g., City of Calgary, AB)

- Intent is to proactively plan site work to minimize impact on preserved trees
- Tied to DP process; no fee to submit TPP, but fines up to $10,000 for removing or pruning a tree without authorization
- Requires a Tree Protection Plan (drawing, report, and Communication Plan) showing measures to protect canopy, trunk, and roots (including fencing)
- Addresses storage/staging of construction materials/equipment as well as methods/timing of works
- Identifies changes to grading/drainage affecting tree
- Locates existing/proposed utilities

Tree Removal Permit (e.g., City of Vancouver, BC)

- Intent to discourage unwarranted removal of trees on private property
- Permits issued for removal of dead, diseased, or hazardous trees > 15 or 20 cm DBH, or for trees within a new building footprint (building permit first)
- Need report from ISA-certified Arborist
- Landscape plan, letters of permission if shared ownership/strata
- May or may not be fee (1st may be same/different from subsequent trees)

Tree Donation Policy – New or existing trees

Many municipalities accept donations and commemorative gifts towards tree planting and maintenance. Funds collected in this way may not fully cover the costs of planting, depending on whether the tree is installed in soft or hard landscaping, but a program could be considered as an element in a sustainable street tree implementation plan.

Integrated Stormwater Management/Green Infrastructure Framework

We recommend that the City of Castlegar develop a regulatory system of guidelines, requirements, and/or incentives to promote systematic investment in such green infrastructure towards cleaner land, water, and air. These regulations would also support watershed-scale goals, including protection of local aquifers and downstream receiving water bodies. Such a framework needs to:

- Address the **full life-cycle of green infrastructure**, including planning, design, construction, maintenance, and renewal
- Reflect **buy-in by all parties** with a stake in successful implementation over time (e.g., City of Castlegar, MOTI, developers, contractors)
- Describe **achievable Best Management Practices** associated will all stages (e.g., detail design of curb cuts/grates with snow plowing in mind, specification of road salt/sand to minimize impacts on landscaping)

The *Compendium of Best Urban Forest Management Practices* (Canadian Urban Forest Network, 2015) is a valuable resource for City staff, Mayor & Council, and residents as the community implements this Master Plan and responds to issues and opportunities related to its growing urban forest.

PRIORITIES AND PHASING RATIONALE

While the Open House survey respondents generally ranked planting, replacement, and maintenance of trees on Columbia Ave. as the highest priorities, the City must also consider the following needs and opportunities in determining the sequence in which it implements the recommendations of this Master Plan:

- **Pedestrian Safety and Accessibility – HIGH priority**
  Uneven sidewalks, raised or cracked concrete tree collars, and lifted tree grates represent a tripping hazard for pedestrians downtown (and liability concern for the City), particularly when sidewalks are narrow. Unless root pruning will be relatively minor, replacement of the tree to new standards is recommended.
- **Tourism Promotion and Wayfinding – HIGH priority**
  Attractive and memorable gateways to Castlegar are an economic development investment, promoting stop-overs, return visits, and subsequent spending in the community.
- **Redevelopment Opportunities – HIGH priority**
  Throughout Castlegar, but especially in the Transition Development zone, the City has an opportunity to "set the standard" for street tree planting in building frontage tree planting sites between buildings and the sidewalk, and to ensure that DP guidelines are consistently followed. The net result in these cases is that the public streetscape benefits from trees installed by the developer.
- **Landscaping with Transportation Infrastructure Upgrades – HIGH priority**
  Castlegar is actively pursuing grant funding for a multi-use pathway along Columbia Ave. between 21st St. and 32nd St. This is just one example of an infrastructure upgrade that creates an opportunity for tree planting (in this case, wherever the landscaped median is at least 3 m wide).
- **Replacing Dying Trees on City Property – HIGH priority**
  Dying, unsightly trees are inconsistent with the revitalized, attractive image that Castlegar wishes to project to visitors and residents. Replanting in these locations means that servicing (water, electricity for decorative lights) and other streetscape infrastructure is typically in place and the City has jurisdiction.

To successfully implement this Master Plan, the City will need to budget for some **one-time costs** (mostly in the next 5 years) as well as **annual expenses** related to phased tree planting, maintenance of the growing street tree population, occasional replacements, and monitoring and repair of sidewalk damage. Phasing of recommended initiatives is provided in Tables 4a, 4b, and 4c below. Opinions of Probable Cost based on standard tree planting details in Appendix 5 are presented in a companion report to the City.

Following adoption of this Street Tree Master Plan, both replacement and new tree planting shall be done to standards recommended in this Plan.

IMPLEMENTATION PLAN

Table 4a. Priority of Identified Initiatives – City Capital Works

	INITIATIVE	HIGH	MED	LOW	NOTES
1	New trees along Columbia Ave.				
1.1	Infill in Downtown streetscapes		✓		
1.2	Additions on public property south of Downtown		✓		
2	Replace dying trees Downtown				
2.1	Replace visibly declining trees and those that cannot grow further in constrained conditions	✓			24 trees within Downtown; number will increase as root systems of other trees reach limits of soil volumes
3	New trees in Gateways				
3.1	Crowsnest Highway 3 Interchange	✓			Concept Plan has been submitted
3.2	Columbia Ave. South End (21st - 32nd)	✓			Grant in for 3-lane section, landscaped boulevard, and multi-use path
3.3	Millennium Park via 6th St.		✓		
3.4	Millennium Park via 3rd St.			✓	
4	Repair root-damaged sidewalks				
4.1	Expose shallow roots, pruning by ISA-Certified Arborist, repair sidewalk to eliminate trip hazards	✓			8 trees within Downtown; feasibility and affordability to be confirmed
5	Maximize opportunities to benefit from infrastructure projects				
5.1	Layer street tree planting into municipal infrastructure projects	✓			Example: Multi-use Pathway proposed for Columbia south of 24th St.
5.2	Require street tree planting to STMP standards for new/redevelopment by private property owners	✓			Buffer strip landscaping critical to overall streetscape character, function

Table 4b. Priority of Identified Initiatives – City Operations

	INITIATIVE	HIGH	MED	LOW	NOTES
1	Maintain street tree asset				
1.1	Crown pruning for tree health, safety, visibility	✓			Per Street Tree Inventory initially (136 trees Downtown); Annual inspection, prune as needed
1.2	Minor root pruning and sidewalk repair to reduce conflicts	✓			As identified by annual inspection; See Section 5 re: factors in decision to leave as is/root prune/replace tree
1.3	Pest/disease treatments as recommended by ISA-Certified Arborist	✓			As identified by annual inspection

Table 4c. Priority of Identified Initiatives – Policy Implementation/Public Education

	INITIATIVE	HIGH	MED	LOW	NOTES
1					
1.1	Investigate legislation related to Tree Protection/Preservation and Removal			✓	May not be necessary if public education initiatives reduce incidence of unwarranted tree damage/removal
1.2	Develop and implement a public education program on the value of Castlegar's urban forest		✓		Direct to diverse ages, sectors; Provide links to resources to guide homeowners on tree selection, care
1.3	Investigate collaborations, regulations, and Best Management Practices related to stormwater/ green infrastructure	✓			Example: Discuss physical design and maintenance standards relevant to integrated stormwater management
1.4	Investigate funding programs and mechanisms for Capital and Operational expenses		✓		Tree Donation program, e.g., memorial TD Green Streets program (criteria now less onerous)

NEXT STEPS

- Adopt Street Tree Master Plan; amend OCP and Subdivision and Servicing Bylaw
- Proceed with design and construction (City resources) of Crowsnest Highway 3 Interchange landscaping (2016)
- Have ISA-Certified Arborist assess feasibility/cost of root pruning at hazard sites; proceed with pruning or remedial surface measures until tree can be replaced (2016)
- Explore funding programs, grant applications requirements/timing for high-priority initiatives (regular activity)

APPENDICES

APPENDIX 1
DETAILED TREE DATA

Profiles for individual tree species recommended in Table 3, Section 2 are presented here to inform selection and siting of trees as detailed design is undertaken during streetscape projects on City or private property. These profiles represent an update and supplement to tree and shrub species recommended in the 2008 City of Castlegar Landscape Master Plan. Listed species are all hardy to Castlegar (zone 5b and lower), are at least moderately pest- and disease-resistant, and have minimal maintenance and litter issues. Trees are listed alphabetically by botanical name, and an image of each tree to a common scale is provided in Section 4, Panel 24.

DISTRICT CHARACTER AND TREE QUALITIES

LATIN NAME	COMMON NAME	HEIGHT (M)	SPREAD (M)	FALL COLOR	LIGHT S–PS–SH	SOIL	MOISTURE D–M–W	SALT TOLERANCE H–M–L	DISTRICT(S)
Acer x freemanii 'Jeffersred'	Autumn Blaze Freeman Maple	12	9	Mix	S–PS	Sand, loam	M–W	L	– Parking Lots – Regional Commercial
Celtis occidentalis	Delta Hackberry	15	12	Mix	S–PS	Loam, clay	D–M–W	H	– Parking Lots – Transition Development
Fraxinus americana 'Gentry'	Gentry White Ash	15	9	Red	S	Sand, loam	M	H	Regional Commercial
Fraxinus americana 'Jefnor'	Northern Blaze White Ash	15	7	Mix	S	Sand, loam	M	H	– Parking Lots – Downtown
Fraxinus pennsylvanica 'Emerald'	Emerald Green Ash	20	10	Gold	S	Sand, loam, clay	M	H	– Millennium Park Gateway (1st Blocks) – South Gateway
Fraxinus pennsylvanica 'Rugby'	Prairie Spire Green Ash	18	9	Gold	S	Sand, loam, clay	M	H	Transition Development
Ginkgo biloba 'Princeton Sentry'	'Princeton Sentry' Maidenhair	20	6	Gold	S	Sand, loam	D–M	H	– Millennium Park Gateway (Residential Blocks) – Downtown
Gleditsia triacanthos var. *inermis* ' Shademaster'	Shademaster Honeylocust	12	10	Mix	S	Sand, loam, clay	D–M–W	H	Parking Lot
Gleditsia triacanthos var. *inermis* 'Harve'	Northern Acclaim Honeylocust	9	6	Gold Columbia	S	Sand, loam, clay	D–M–W	H	Residential
Larix occidentalis	Western Larch	15	10	Gold	S–PS	Sand, loam	M	H	Highway Interchanges
Liriodendron tulipifera	Tuliptree	18	12	Gold	S	Loam	M	L	Columbia Ave. Commercial
Phellodendron amurense 'Longenecker'	Eyestopper Amur Corktree	15	15	Gold	S	??	D–M–W	H	Transition Development
Populus tremuloides	Trembling Aspen	18	7	Gold	S	Sand, loam, clay	M	H	Highway Interchanges
Pseudotsuga mensziesii	Douglas–fir	13	6	Gold	S	Sand, loam, clay	M	L	Highway Interchanges
Pyrus x 'DurPSN302'	Navigator Ornamental Pear	12	6	Red Columbia, Gold cross–streets	S	Sand, loam, clay	D–M–W	H	Downtown
Quercus coccinea	Crimson Oak	20	10	Red	S	Sand	D–M	H	Regional Commercial
Quercus x jackiana 'Jefmir'	Admiration Hybrid Oak	12	9	Gold	S	Sand to loamy clay	D–M	H	Columbia Ave. Commercial
Quercus palustris	Pin Oak	20	8	Gold Columbia	S	Loam, clay	D–M	H	Residential
Quercus rubra	Red Oak	20	10	Red	S–PS	Sand to loamy clay	D–M	H	Regional Commercial
Syringa reticulata 'Ivory Silk'	Ivory Silk Tree Lilac	6	5	Gold	S–PS	Sand, loam, clay	D–M	H	– Millennium Park Gateway (1st Blocks) – Downtown
Tilia x flavescens 'Dropmore'	Glenleven Hybrid Linden	18	12	Gold Columbia	S	Sand, loam, clay	M	L	Residential
Ulmus americana 'Lewis & Clark'	Prairie Expedition American Elm	20	12	Gold	S	Loam, toler. sand, clay	D–M–W	H	– Millennium Park Gateway (1st Blocks) – South Gateway – Millennium Park Gateway (Residential Blocks)
Ulmus davidiana japonica 'Discovery'	Discovery Japanese Elm	12	9	Gold	S	Loam, toler. sand, clay	D–M–W	H	Columbia Ave. Commercial

APPENDIX 2
OPEN HOUSE MATERIALS AND SURVEY RESULTS SUMMARY

A Public Open House was held at the Community Forum on March 12, 2015. Materials included the following items, and of the 26 people (including City Councillors and Staff) who registered their attendance, 13 completed the survey.

- Overview (1 page)
- Open House Panels as Presented (9 pages)*
- Presentation Slides (13 pages)*
- Survey (2 pages)

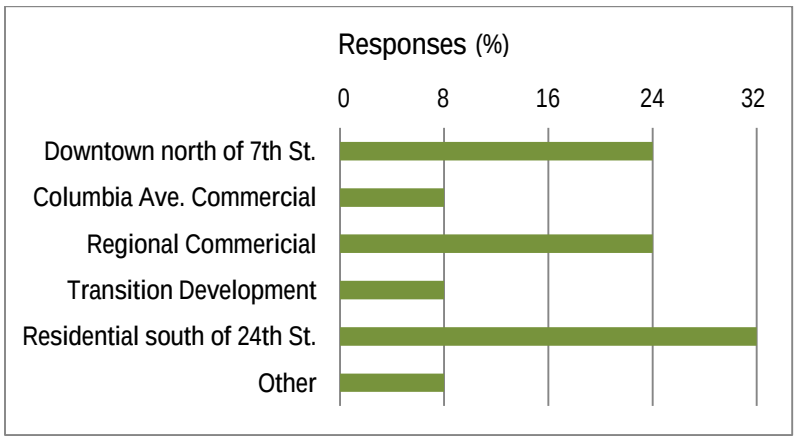
*available on the City's website at: www.castlegar.ca/streettreeplan

A Summary of Survey Responses, with questions as posed, is presented below, and provides information on:

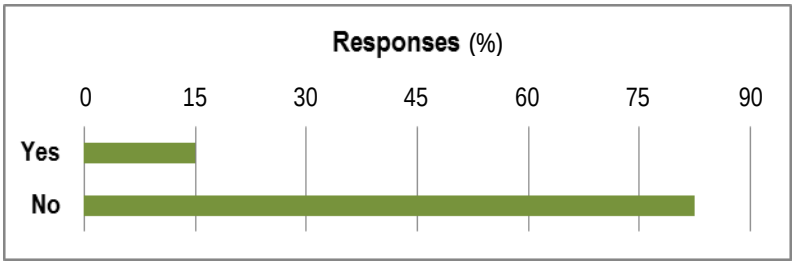
- the neighbourhoods in which respondents live
- whether they own businesses along Columbia Ave.
- which benefits of street trees they most value
- their priorities for spending on existing and new street trees
- their willingness to see dollars invested in urban forest improvements
- perceived disadvantages of street trees
- preferences for proposed tree species
- valued existing trees within Castlegar
- general comments

Public Open House Survey Results Summary

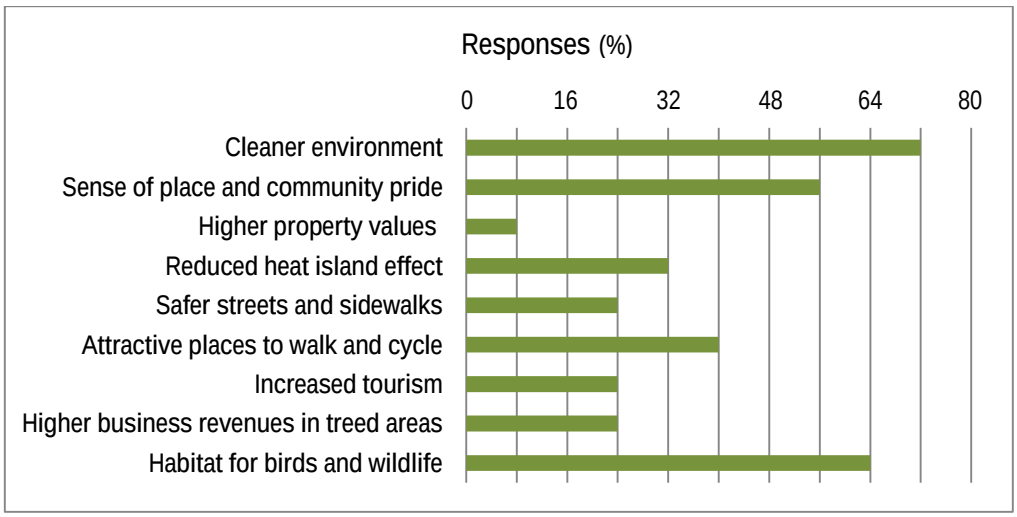
Question 1. Which neighbourhood/district do you live near?



Question 2. Do you own a business on Columbia Ave.?



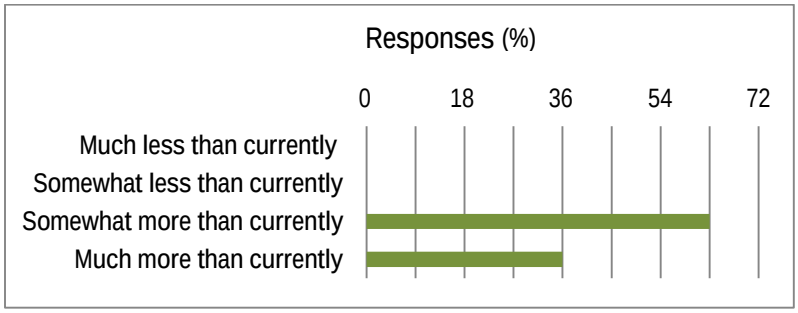
Question 3. Which benefits of street trees do you value the most? Please choose your top 3.



Question 4. Given budget constraints, what should be the highest priorities? Rank these from first to last (1 to 8), using each rank only once. (Order shown is based primarily on number of rankings from 1 to 4.)

Priorities ranked high to low	1	2	3	4	5	6	7	8
1 Plant NEW trees along Columbia Ave.	••••	••	••	••				
2 Replace DYING trees Downtown	••	•••	•	•••	•	•		
3 Maintain EXISTING trees	•••	•	•••		•	•••		•
4 Plant NEW trees in Gateways	•	•	••	•		••	•••	•
5 Repair root-damaged SIDEWALKS	•	••			•		•••	••
6 Divert STORMWATER into tree soils			•••	•••	••	•	•	•
7 Promote COMMERCIAL tree planting	•			••	•	•••	•	••
8 Promote RESIDENTIAL tree planting		••		•	•••		••	•••

Question 5. Planting trees to a higher standard is essential to their survival, but costs more. Given the benefits described on your handout, how much do you think the City of Castlegar should invest in street trees?



Question 6. Which disadvantages of street trees should this Plan address? List up to 3.

- Overheight trees / power lines (2)
- Lack of attention to them
- Vandalism of them
- Disrupted sidewalks which are a safety hazard to walkers, strollers, children
- Narrowing of sidewalks due to trees; ensure enough space (2)
- Need to protect newly planted trees – they are easy to break when young (2)
- Trees are good!
- Fall clean-up/too many leaves (3)
- Mowing around trees on Strata land
- Extra watering that private property owners will have to pay for
- Blocking traffic sightlines
- There are none. World is warming, we need as much shade and water retention as possible.

Question 7. Which 3 tree species from Panel 9 are your favourites?

- Red Oak (4)
- Crimson Oak
- Pin Oak
- Ivory Silk Tree Lilac (3)
- Gentry White Ash
- Prairie Spire Ash
- Northern Blaze White Ash
- Tuliptree (3)
- Eyestopper Amur Corktree (2)
- Glenleven Hybrid Linden (2)
- Navigator Ornamental Pear
- Red Maples (for the fall colour)

Favourites, but not on Panel 9:

- Dogwood
- Mountain Ash
- Flowering Plum
- Cherry
- Amur Maple
- Native trees which do not need additional water and care (or at least less than non-native trees)
- Trees that do not need too much tending – mixes of evergreens and some others, blossoming maybe?

Question 8. Are there trees in Castlegar that are special to you? List them by species and location or use a post-it note to identify them on the large airphoto.

- Huge Ponderosa Pines below King's Chair on (and around) Woodland Dr. (non-car road) are magnificent
- Trees at Millennium Park have been removed. Stop removing trees. How silly and expensive to remove healthy trees and replant others.
- Maples (2), Magnolias, Dogwood
- Monkey Puzzle tree – a couple of blocks from library (2)
- Tuliptrees (2)
- Oaks
- Linden trees on 10th behind Tararicco (?)
- Male Ginkgo
- Tall Junipers
- Beautiful old Pine trees along Millennium
- Wonderful Yew grove on Zuckerberg Island

Question 9. General comments are welcome...

- More trees are better, habitat trees and shrubs with berries and nuts for birds, bees, etc.
- Thank you for the opportunity to voice my opinion
- People remove trees, the City removes trees. I'm surprised to hear there's tree master plan – plan is a good idea so that expenditures are mindful. Trees take a lot of resources. Instead, maintain existing trees.
- Wonderful plan
- Thank you for this, I look forward to seeing positive outcomes!
- Great to see a gathering of info for the public on trees!
- Less trees downtown
- Time to improve uptown commercial – Castlegar Plaza with Safeway trees
- Pictures of Nelson in fall make me envious – we could be much more colourful as a town!

APPENDIX 3
REFERENCES & RESOURCES

Bassuk, N, P Trowbridge, and C Grohs. 2002. Visual similarity and biological diversity: Street tree selection and design. Invited paper presented at the European Conference of the International Society of Arboriculture, Oslo. 18-21 June, 2002. http://www.hort.cornell.edu/uhi/outreach/pdfs/visually_compatible_trees.pdf

BC Society of Landscape Architects & BC Landscape and Nursery Association. 2012. British Columbia Landscape Standard. Available for purchase at: http://bclna.com/bclna-resource/bc-landscape-standards

Burden, D. 2006. Urban Street Trees: 22 Benefits Specific Applications. Glatting Jackson, Walkable Communities, Inc. http://www.michigan.gov/documents/dnr/22_benefits_208084_7.pdf

Canadian Urban Forest Network. 2015. Compendium of Best Urban Forest Management Practices. http://www.cufn.ca/#!best-urban-forest-management-practices/c1whv

City of Calgary. 2015. Tree Protection Bylaws (including link to Tree Protection Plan Guide). http://www.calgary.ca/CSPS/Parks/Pages/Planning-and-Operations/Tree-Management/Tree-protection-bylaws.aspx

City of Castlegar. 2009. Arboriculture Manual (proposed) – Eric Clough, BCSLA.

City of Edmonton. 2013. Complete Streets Guidelines. http://www.edmonton.ca/city_government/documents/RoadsTraffic/Edmonton-Complete-Streets-Guidelines_05062013.pdf

City of Sydney. 2013. Urban Forest Strategy. http://www.cityofsydney.nsw.gov.au/__data/assets/pdf_file/0003/132249/Urban-Forest-Strategy-Adopted-Feb-2013.pdf

City of Toronto. 2013. Tree Planting Solutions in Hard Boulevard Surfaces. Best Practices Manual. https://www1.toronto.ca/city_of_toronto/parks_forestry__recreation/urban_forestry/files/pdf/TreePlantingSolutions_BestPracticesManual.pdf

International Society of Arboriculture.
1) Tree Ordinance Guidelines: http://www.isa-arbor.com/education/onlineresources/treeordinanceguidelines.aspx
2) Planting Details and Specifications: http://www.isa-arbor.com/education/onlineresources/cadplanningspecifications.aspx
3) Pruning Trees (Young & Mature): http://www.treesaregood.org/treeowner/pruningyourtrees.aspx

Jungen, JR. 1980. Soil Resources of the Nelson Map Area (82F). RAB Bulletin 20, Report No. 28, British Columbia Soil Survey. http://sis.agr.gc.ca/cansis/publications/surveys/bc/bc28/bc28_report.pdf

City of North Vancouver. 2004. Urban Forestry Master Plan Phase II. Street Tree Master Plan. http://www.cnv.org/~/media/C97820B68C5045C2BAB1D6720FB2D36E.pdf

MacDonagh, L.P. 2015. Rethinking Maintenance of Urban Trees. DeepRoot Blog. http://www.deeproot.com/blog/blog-entries/rethinking-maintenance-of-urban-trees

McPherson, EG, JR Simpson, Q Xiao, and C Wu. 2011. Million trees Los Angeles canopy cover and benefit assessment. Landscape and Urban Planning 99(1):40-50. doi:10.1016/j.landurbplan.2010.08.011

APPENDIX 4
PROPOSED AMENDMENT TO OFFICIAL COMMUNITY PLAN

It is proposed that the City of Castlegar's Official Community Plan (Bylaw 1150) be amended as follows to make reference to the Street Tree Master Plan following its adoption by Council.

The City of Castlegar Street Tree Master Plan (2016) addresses the following Official Community Plan objectives:

- enhancement of **urban biodiversity** through planting of a wide range of tolerant species
- contribution to the **character of commercial, industrial, and multiple family residential developments** along Columbia Ave., throughout downtown, and along dual gateway corridors to Millennium Park
- promotion of **energy conservation**, reduction of **greenhouse gas emissions**, and management of **urban water quantity and quality** through expansion of the urban forest and integration of associated green infrastructure elements

The content and recommendations of the Street Tree Master Plan are relevant to the following **Land Use designations**:

DO	Downtown
CAC	Columbia Avenue Commercial
RC	Regional Commercial
TRAN	Transition
MDR	Medium Density Residential
LDR	Low Density Residential
SR	Suburban Residential

The content and recommendations of the Street Tree Master Plan are applicable to the following **Development Permit Areas** (relevant Guideline sections in parentheses):

25.3 Regional Commercial/Light Industrial Development Permit Area
(Landscaping, Parking)

25.4 Airport Development Permit Area
(Landscaping, Parking)

25.5 Columbia Avenue Commercial Development Permit Area
(Landscaping, Parking)

25.6 Transition Development Permit Area
(Landscaping, Parking)

25.7 Downtown Development Permit Area
(Landscaping, Parking)

25.8 Multiple Family Development Permit Area
(Landscaping, Parking)

25.9 Energy, Water and GHG Reduction Development Permit Area
(Layout and Design Features, Stormwater Management, Water Conservation, Energy Conservation)

APPENDIX 5
PROPOSED SCHEDULE J – STREET TREE PLANTING DETAILS
(SUBDIVISION AND SERVICING BYLAW NO. 1018)

It is proposed that the City of Castlegar's Subdivision and Servicing Bylaw No. 1018 be amended as follows to make reference to the Street Tree Master Plan following its adoption by Council.

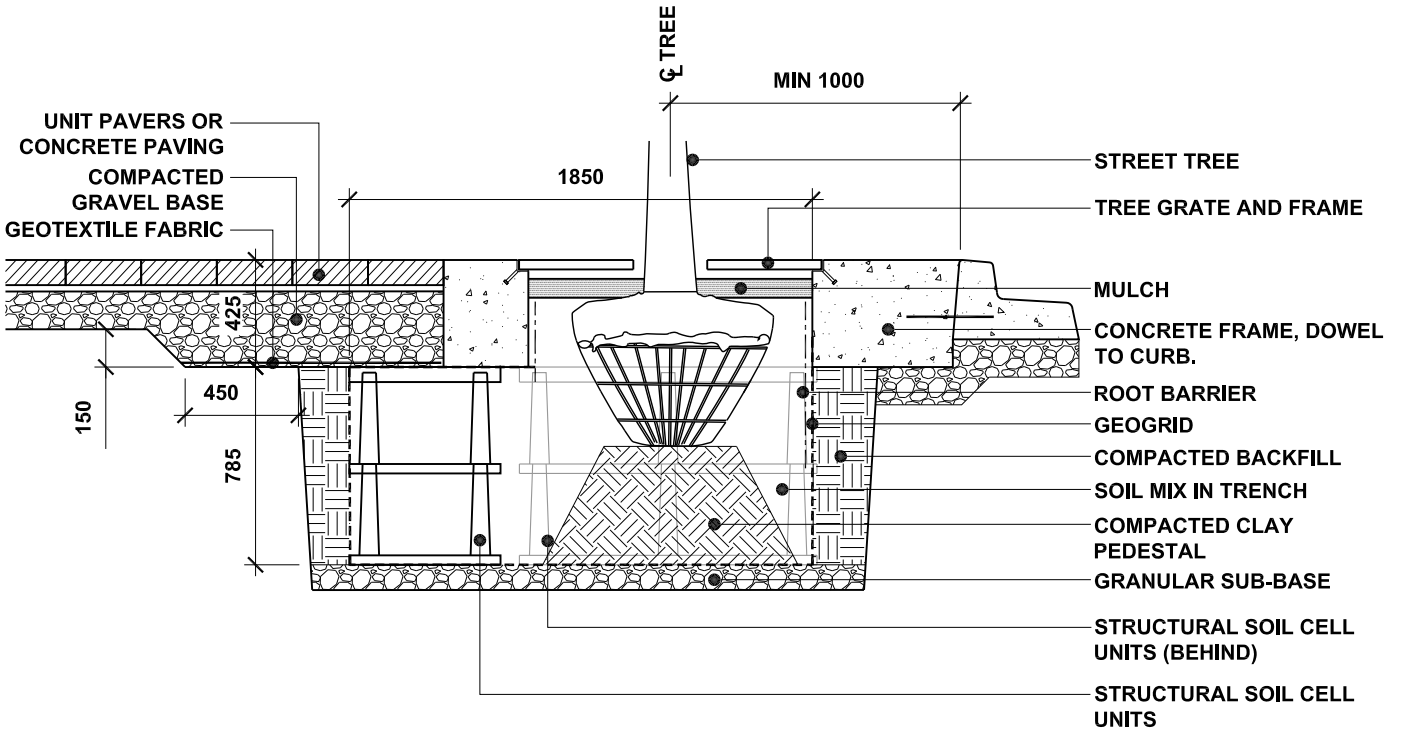
The content and recommendations of the Street Tree Master Plan, including the following details, are applicable to installation of street trees and associated hard and soft landscaping within the City of Castlegar. Relevant guidelines, standards, and detail(s) shall be referenced at all appropriate stages of planning, design, and construction, and will form the basis of site inspections by the City of Castlegar or its representatives.

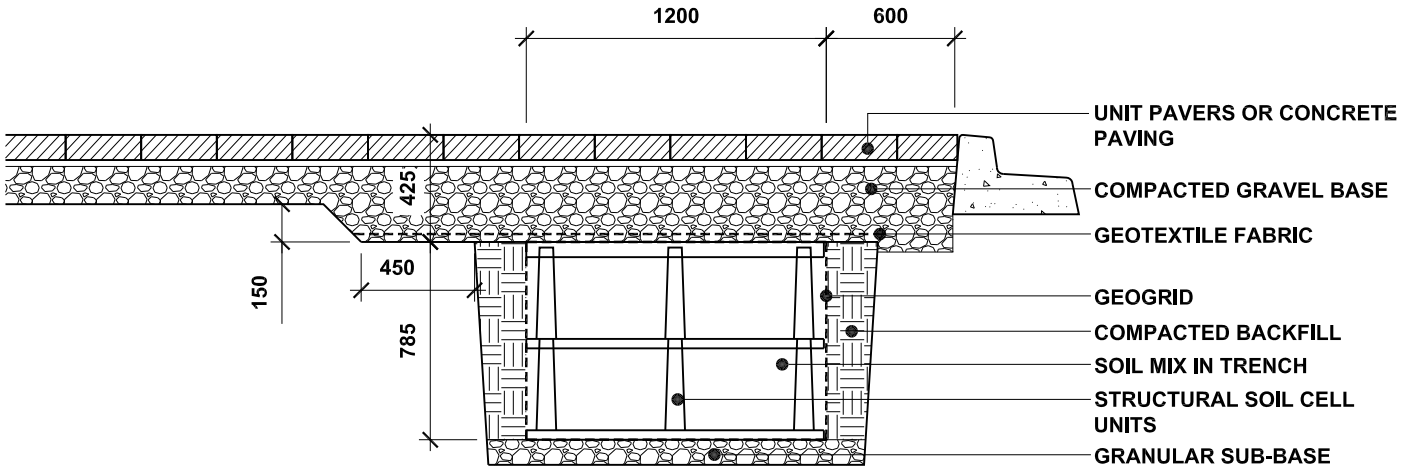
Sidewalk Scenarios

- Typical Structural Cell Tree Trench (DTL 01)
- Typical Structural Concrete Tree Trench (DTL 02)
- Typical Storm Water Distribution in Tree Trench (DTL 03)

Soft Landscape Scenarios

- Typical Boulevard Tree Trench (DTL 04)
- Typical Median Tree Trench (DTL 04)





NOTE:

- ***These typical details display tree trenches adjacent curb and gutter applications. Tree trenches for building frontages (away from curb alignments) may be constructed in similar fashion, taking into account site specific constraints and with approval from local jurisdiction holding authority.***
- ***All street trees to be irrigated; City of Castlegar to confirm need for electrical servicing for decorative lights.***
- ***These are typical details that are strictly schematic and are not to be used for cost quoting or construction.***
- ***All dimensions and depths are suggestive and subject to specific site conditions, geotechnical and structural engineering review.***
- ***Plans for proposed street tree installations shall be submitted to the City of Castlegar Civic Works department for review and approval to confirm compliance with City engineering standards.***

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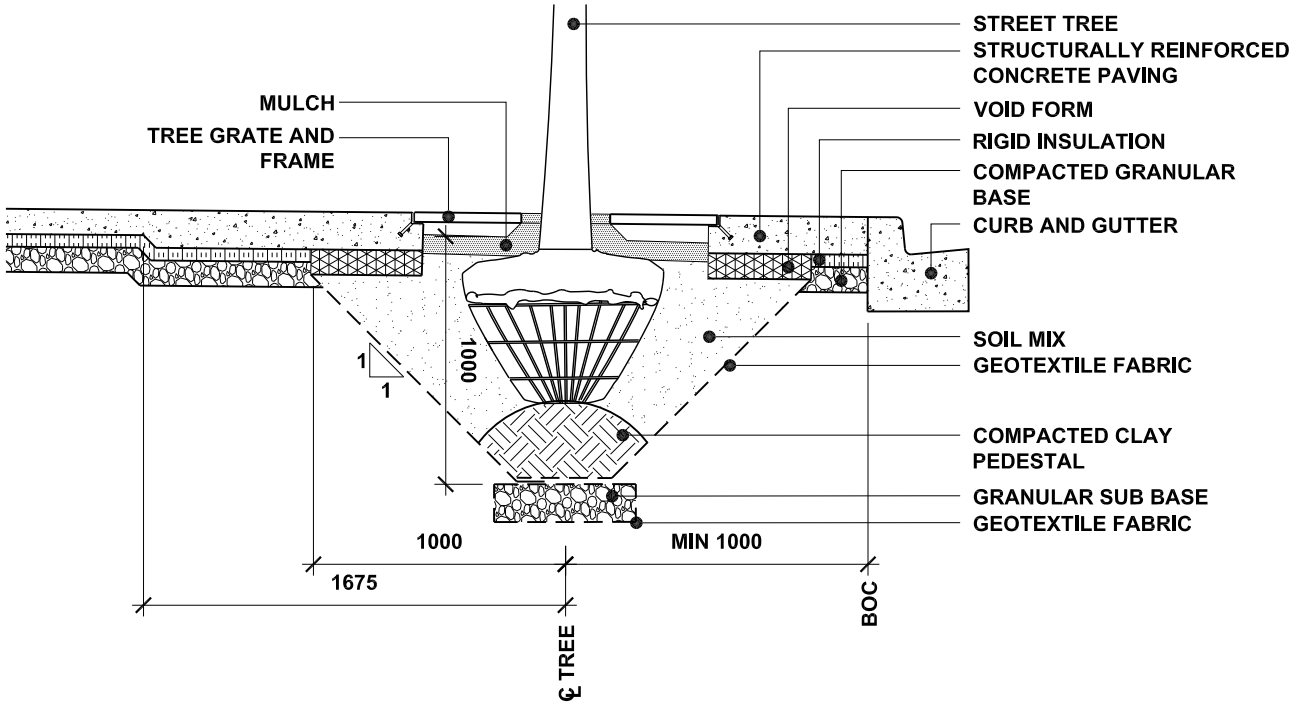
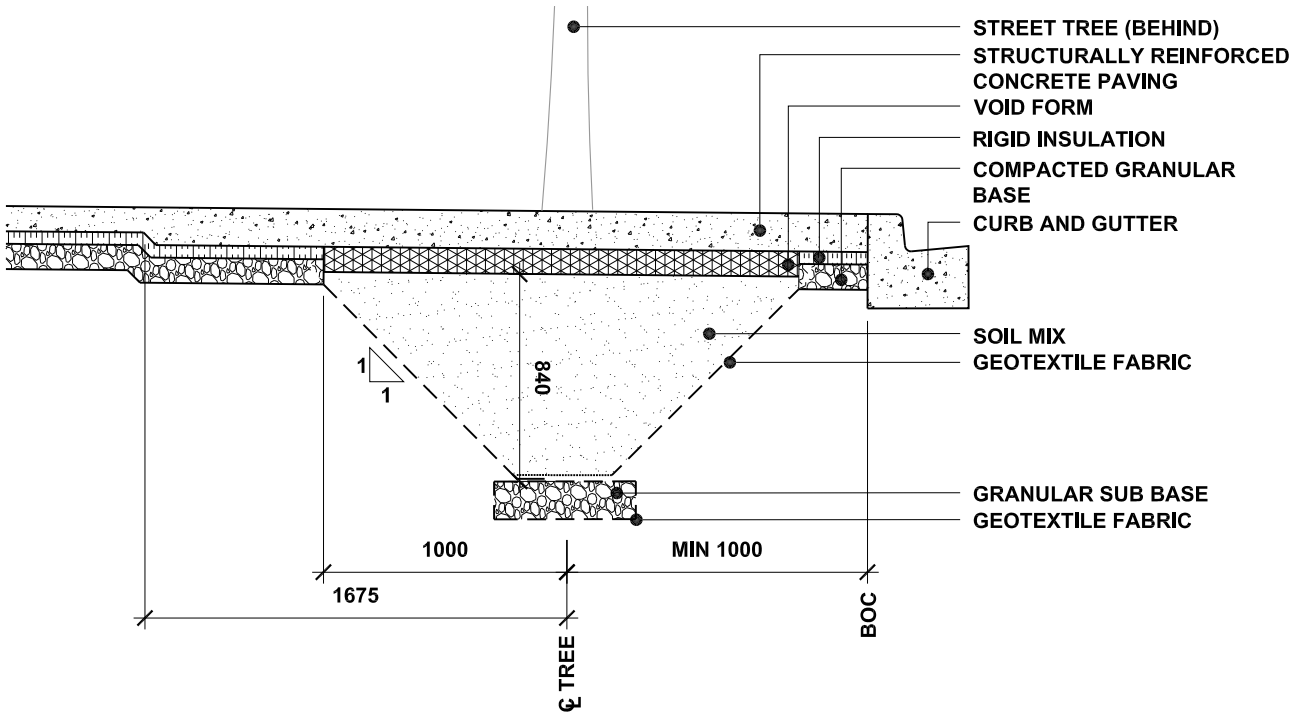
TYPICAL STRUCTURAL CELL TREE TRENCH **DTL 01**

CITY OF CASTLEGAR STREET TREE MASTER PLAN

NTS 01 DEC 2015





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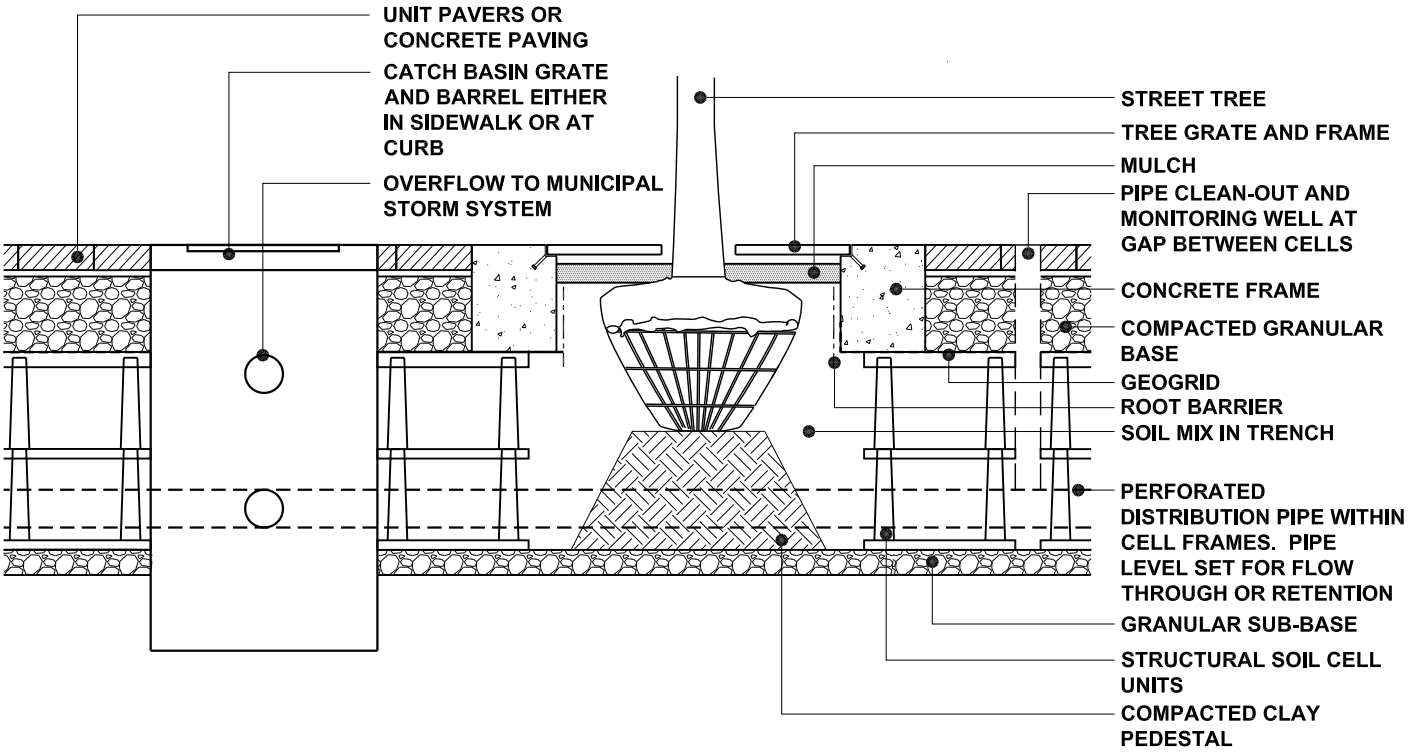
TYPICAL STRUCTURAL CONCRETE TREE TRENCH **DTL 02**

CITY OF CASTLEGAR STREET TREE MASTER PLAN

NTS

01 DEC 2015



NOTE:

- ***All street trees to be irrigated; City of Castlegar to confirm need for electrical servicing for decorative lights.***
- ***These are typical details that are strictly schematic and are not to be used for cost quoting or construction.***
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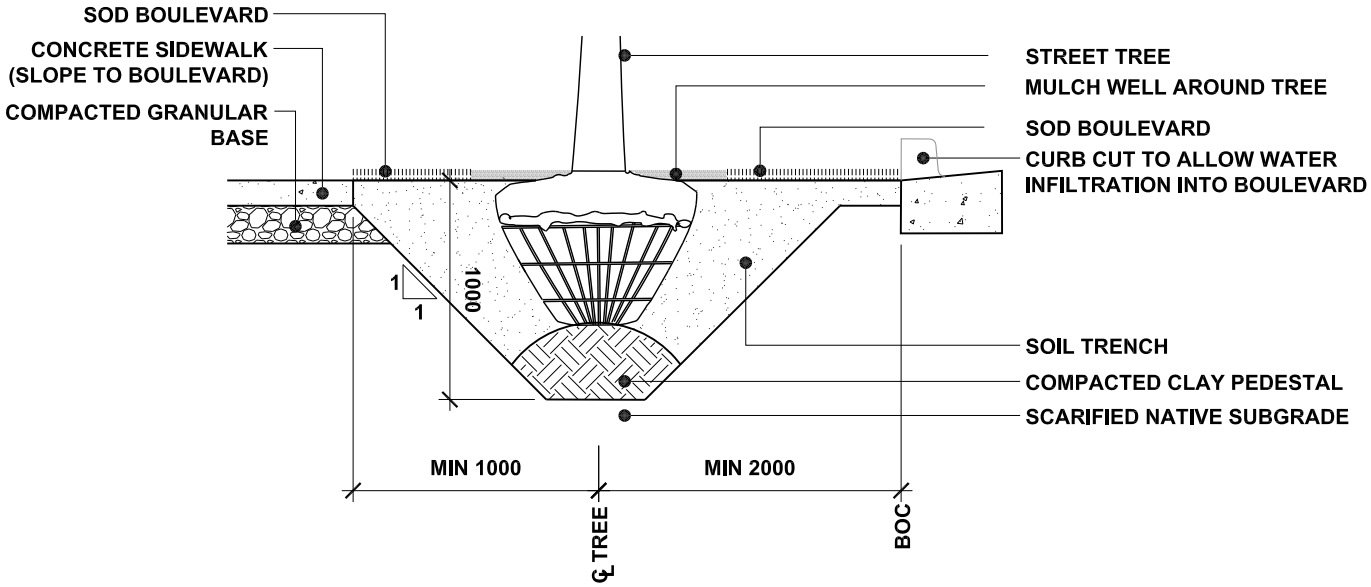
TYPICAL STORM WATER DISTRIBUTION IN TREE TRENCH **DTL 03**

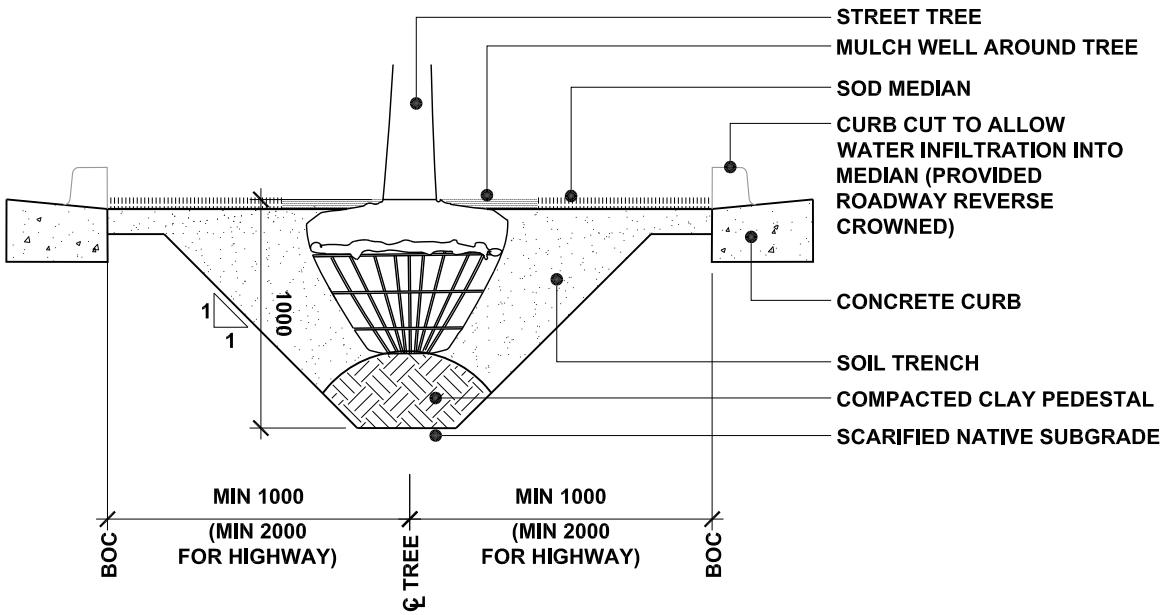
CITY OF CASTLEGAR STREET TREE MASTER PLAN

NTS

01 DEC 2015



TYPICAL BOULEVARD TREE TRENCH



TYPICAL MEDIAN TREE TRENCH

NOTE:

- All street trees to be irrigated; City of Castlegar to confirm need for electrical servicing for decorative lights.

- These are typical details that are strictly schematic and are not to be used for cost quoting or construction.

- All dimensions and depths are suggestive and subject to specific site conditions, geotechnical and structural engineering review.

- Plans for proposed street tree installations shall be submitted to the City of Castlegar Civic Works department for review and approval to confirm compliance with City engineering standards.

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TYPICAL BOULEVARD AND MEDIAN TREE TRENCH **DTL 04**

CITY OF CASTLEGAR STREET TREE MASTER PLAN

NTS

01 DEC 2015