ACCESS MINNEAPOLIS
Design Guidelines for Streets and Sidewalks

Chapter 9: Street Tree and Boulevard Design, Policy and Resource Manual

Guidance for Designing, Selecting, Installing, and Caring for Street Trees and Boulevards in Minneapolis

WORKING DRAFT

TABLE OF CONTENTS

9.0: Introduction
9.0.1 Purpose, Goals and Values
9.0.2 General Roles and Responsibilities
9.0.3 Definitions and Abbreviations

9.1: Planting Locations
9.1.1 Quantity, Canopy and Spacing
Quantity of Trees
Canopy
Spacing Between Trees

9.1.2 Clearances and Conflicts
9.1.2.1 Clearance to Surface Elements
Infrastructure at the Street Surface
Visibility at Corners
Street Furniture
Transit Stops
Sidewalk Cafes
Overhead Lighting
Signs
9.1.2.2 Clearance to Overhead Wires
Overhead Utility Wires
9.1.2.3 Clearance to Below Ground Elements
Underground Utilities and Conduit
Clear Space
Below-grade Conduit Work
Sewer/Water Laterals and Gas/Electric Service Construction

9.1.3 Boulevard Zone
9.1.3.1 Design Elements Common to all Boulevard Zones
9.1.3.2 Planted Boulevards
9.1.3.3 Paved Boulevards
9.1.3.4 Curb Extensions

9.1.4 In-Street Planted Areas

Design Elements Common to all In-street Planted Areas

Median Islands

Roundabouts, Traffic Circles, Diagonal Diverters and Cul-de-sac Islands

9.1.5 Incorporation of Stormwater Features into Planting/furnishing zones and In-street Planted Areas

Design Elements Common to all In-street Planted Areas

Rain Gardens

Rain Swales

Pervious Pavements

9.2: Vegetation Guidelines

9.2.1 Soil Properties and Soil Amendments

Areas with Turf

Areas with Low Shrubs and Perennials

Areas with Street Trees

9.2.2 Street Trees

Soil Volumes for Street Trees

Quantity of Trees

Species Selection

Installation and Establishment

9.2.3 Other Types of Vegetation

Species Selection

Installation and Establishment

9.2.4 Warranty and Establishment Period Maintenance

City Projects

Special Service Districts

Other?

9.3: Construction Process Requirements

9.3.1 Gopher State One Utility Locates

9.3.2 Permits

Types of Permits for Boulevards

Illegally Planted Trees

9.3.3 Variances

9.4: Maintenance Guidelines and Responsibilities

9.4.1 Supplemental Watering and Weeding If Needed

Boulevard Plantings

In-street Planting Areas

9.4.2 Pruning and Inspection

Pruning Authority

Pruning Guidelines

Arborist Certification for Tree Servicing

Service Standards

Trees under Power Lines

9.4.3 Tree Health and Maintenance

Maintenance Responsibility

Root Health

Wires Damaging Trees

9.4.4 Managing for Snow and Ice Control Practices

Sidewalk Snow Removal
Snow Storage
Spring Flushing

9.4.5 Root Protection during Street, Sidewalk or Utility Work

Protected Root Zone
Root Removal
Root Protection Threshold
Tree Protection Plan

9.4.6 Pest and Disease Prevention

Inspection
Emerald Ash Borer Prevention
Dutch Elm Disease
Emergency Response Plan

9.4.7 Interference to Traffic Movement and Visibility of Traffic Signs Visibility

9.4.8 Expandable Pavement Openings and Tree Grates

9.4.9 Tree Removal

Requests and Approval
Removal Costs
City Initiated Removals
Public Notice
Commercial Signage
Driveway Aprons and Other Construction
Sewer Lines
Sidewalks
Utility Lines
Views or Vistas

9.0 Introduction

The urban forest is an integral part of the City's green infrastructure. Properly planned and managed, the urban forest provides significant ecological, social and economic benefits. These include improved air and water quality, reduced erosion and stormwater runoff, conserved energy, improved health, enhanced livability, traffic calming, reduced noise, and increased property values.

9.0.1 Purposes, Goals and Values

Purposes of this document:

- Guidance to PROJECT MANAGERS, CONSULTING and STAFF ENGINEERS, and LANDSCAPE ARCHITECTS for street or streetscape projects
- Guidance to DEVELOPERS and PROPERTY OWNERS, and THEIR REPRESENTATIVES, having projects that will affect street trees and boulevards
- Guidance to UTILITY REPRESENTATIVES having projects that will affect street trees and boulevards
- Guidance to COUNCILS, COMMISSIONS and STAFF that review and approve projects
- Guidance to RESIDENTS, PROPERTY OWNERS, NON-PROFIT ORGANIZATIONS, ADVOCACY GROUPS, BUSINESS ASSOCIATIONS and the GENERAL PUBLIC with questions about street trees and boulevards
- Guidance to MINNEAPOLIS PARK and RECREATION BOARD (MPRB) and CITY STAFF with responsibilities associated with street trees and boulevards

This document will be posted to the City's website and will be frequently updated to include more graphics, photographs of examples, and clarification.

Goals:

Excerpts from City's comprehensive plan *The Minneapolis Plan For Sustainable Growth*

Environment Chapter -- Urban Tree Canopy

An important aspect of overall improvements to the quality of the air, water, neighborhoods and public spaces is the presence of mature, healthy trees, gardens, and wetlands in the city. The urban forest serves many purposes and provides many economic and ecological benefits. Strategic tree planting on a citywide basis is a proven complementary approach to environmental conservation and urban living.

Policy 6.8: Encourage a healthy thriving urban tree canopy and other desirable forms of vegetation.

6.8.1 Enforce and educate the public on the City's Urban Forest Policy.

6.8.2 Achieve, at a minimum, no net loss of the urban tree canopy by maintaining and preserving existing trees and planting new trees on public and private property.

6.8.3 The city's built infrastructure will support a healthy thriving urban tree canopy through street and sidewalk guidelines and other means.

6.8.4 Protect the city's critical ecosystems.

6.8.5 Continue to invest in the health of the urban forest and other vegetated areas by avoiding monocultures and planting a variety of native and other hardy, non-invasive species.

6.8.6 Continue to recognize the functions and values of the urban forest and tree canopy which provide many economic and ecological benefits such as reducing storm water

runoff and pollution, absorbing air pollutants, providing wildlife habitats, absorbing carbon dioxide, providing shade, stabilizing soils, increasing property values and increasing energy savings.

Water Resources Appendix -- Management Policies -- Urban Tree Canopy

7.4 Encourage the planting and preservation of trees and other vegetation.
Increased area of total tree canopy in the City will increase transpiration and decrease the rate and volume of stormwater runoff.

Minneapolis Sustainability Indicators and Numerical Targets

Tree Canopy Indicator:

- Maintain the city's 26 percent tree canopy level through 2015 and increase the urban tree canopy to 30 percent by 2030.
- Plant at least 4,000 trees on public land in 2010 and gradually increase to 6,000 trees annually by 2015.

Urban Forest Policy Goals and Values

- Preserve, protect and improve the health and general welfare of the public by promoting the public benefit of saving, maintaining, and planting trees.
- Provide standards, guidelines, and recommended practices that result in a safe, healthy urban forest that contributes to a quality environment, and that also minimize conflicts and potential for problems.
- Promote and facilitate the communication and coordination of City departments, Minneapolis Park & Recreation Board, University of Minnesota, Minneapolis Public Schools, developers, contractors, public utilities, and non-government organizations in the respective interactions affecting public trees and the urban forest.
- Establish guiding principles, standards and recommended practices for city staff, agencies, contractors, and others doing business in Minneapolis.
- Mitigate tree loss and tree damage caused by construction activities, improper pruning practices, and tree diseases and pests.
- Promote sustainable, green streetscapes that provide an amenable pedestrian environment.
- Explore cost-effective options to increase and sustain the tree canopy in Minneapolis.
- Tree cover and green space benefit and enhance the community.
- When people work together to create a healthy urban forest, they develop neighborhood and community partnerships that benefit participants both sociologically and psychologically.
- Proper management of the urban forest can lessen the impacts of drought, tree diseases and inspect pests, construction, storm damage, and additional adverse consequences of a changing climate.
- Good stewardship of trees and green space on both public and private property benefits the entire community.
- The ecological integrity of the community's lakes, wetlands, streams and the Mississippi River, along with their watersheds, is benefited by preserving and protecting the City's green infrastructure.

- Planted boulevards and pervious surfaces that allow stormwater to soak into the ground help to mitigate stormwater runoff issues.
- Planting the right tree in the right place and creating proper planting environments for urban trees can avoid future tree health and management problems.
- Trees are good for business. Research has demonstrated that consumers respond positively to shopping environments having a healthy urban forest.

9.0.2 General Roles and Responsibilities

Will incorporate, as appropriate,

- *Minneapolis Park & Recreation Board (MPRB) Forestry Division*
- *Minneapolis Public Works*
- *CPED*
- *Reg. Services Environmental Management*
- *Minneapolis Development Review*
- *Others?*

9.0.3 Definitions and Abbreviations

For the purposes of this manual, the following terms should be interpreted as follows:

Boulevard
Street right-of-way zone located between the street curb and the pedestrian sidewalk. It may be planted or paved. Street furniture and transit amenities are typically located in the boulevard zone. This zone may be expanded into the parking zone by the use of curb extensions.

- **Paved Boulevard**

  Boulevards predominantly covered with paved surfaces, such as concrete sidewalk, pavers, or stone. Paved boulevards are typically located in commercial districts.

- **Planted Boulevard**

  Boulevards predominantly vegetated. Most commonly planted with trees and turf, can incorporate perennials and other plantings. Planted boulevards are standard and expected in most residential areas of Minneapolis.

- **Planting/Furnishing Zone**

  The planting/furnishing zone is another term for the boulevard area, whether the boulevard is planted or paved. It is the zone that typically contains trees, other plantings, benches, signs, bike racks, transit shelters. For the purposes of [this document], the Planting/Furnishing Zone will typically be referred to as "boulevard."

MnDOT Standard Specifications
[to be added]

MPRB Minneapolis Park and Recreation Board

[other definitions and abbreviations to be added]

9.1 Planting Locations

Trees are strategically planted for maximum public benefit within the often limited space of the street right-of-way. They provide a "sense of place" critical to the vitality of our neighborhoods,

commercial nodes, and corridors. Locating trees and other vegetation within street right-of-way should be based on:

- maximizing the functional benefits of trees
- site context
- tree and vegetation health
- pedestrian and vehicle safety

Trees should be located in areas that will sustain tree health and longevity, minimize tree stress, and provide adequate sunlight for tree growth. Along street types categorized as local, neighborhood, community connector, activity area, and commerce with residential uses, street trees are placed in a *planted boulevard* located between the curb and sidewalk. In typical commercial districts, trees are placed within a *paved boulevard* with a surface material that can accommodate higher volumes of pedestrian traffic, although occasionally in commercial districts there are also non-paved boulevards that are planted with vegetation such as turf grass, shrubs and perennials. In constrained conditions, street trees can be placed behind the sidewalk, provided space is available for the tree trunk within the street right-of-way.

In addition to boulevards, street trees can be placed in median islands, curb extensions, diagonal diverters, cul de sac islands, roundabout islands, and traffic circle islands. Additionally, while not a replacement for street trees, opportunities exist for the placement of trees on private parcels (e.g., plazas, pocket parks, residential lawns) to provide shade and canopy cover for the street right-of-way.

9.1.1 Quantity, Canopy and Spacing

Quantity of Trees. Careful project planning is encouraged to maximize the number of trees, potential leaf area and shade coverage along a street or site.

Canopy. Use trees to shade streets and sidewalks. A continuous and overlapping street tree canopy provides a distinct sense of place. Favor should be given to broad-canopied trees versus narrow-canopied trees for the associated shading and stormwater management benefits that broad canopied trees provide.

Spacing Between Trees. Spacing of trees and other vegetation in the street right-of-way depends on many factors including, but not limited to, the tree's mature size, adjacent architecture, size of the planting area, utility and other conflicts, available sunlight, and sightlines. No tree should be planted if another public or private tree is growing so close to a potential planting site that it will hinder the development of a new tree's structural integrity, form or aesthetics, or if the tree is unlikely to survive in the planting site.

Often spacing of street trees has followed a tradition of uniform spacing (for example, every 30 feet), especially along residential streets. Yet, there are conditions that may allow more flexibility in the placement of street trees, such as working around driveway aprons, bus stops or overhead wires, that call for variable tree spacing or clustering of trees. Advantages of clustering street trees include:

- Maximizing the environmental benefit of the space available for street tree planting.
- Improving the feasibility of tree trenches instead of tree pits, and of using mulched or planted tree openings versus tree grates in commercial areas. Mulched or planted tree openings are better for plant health than tree grates.

Tree spacing must be reviewed and approved by a MPRB Forestry Division representative.

9.1.2 Infrastructure Clearances and Dimensions

When possible, trees should be planted to allow them to grow to their mature height and girth without conflicting with other elements in the right-of-way or on adjacent properties: sidewalks and other concrete structures, utilities, street lights, buildings, or pedestrian and vehicle sightlines. Clearances, or the spacing between streetscape elements, are necessary to provide an organized streetscape, while also making it possible to include, in a constrained area, the many and sometimes competing visible and non-visible infrastructure elements.

9.1.2.1 *Clearance to Surface Elements*

Infrastructure at the Street Surface. Infrastructure at the street surface must be placed with the following minimum spacing from street trees:

- 10 feet for fire hydrants
- 6 feet for intersecting streets, alleys and driveways (to end of radius)
- 10 feet for utility poles
- 20 feet for stop signs and traffic signals
- 10 feet for street lights (both pedestrian-scale and high street lights)

For overhead pedestrian-scale lighting, the desire is to have the tree canopy above light being thrown from the light fixture once the tree is of sufficient size.

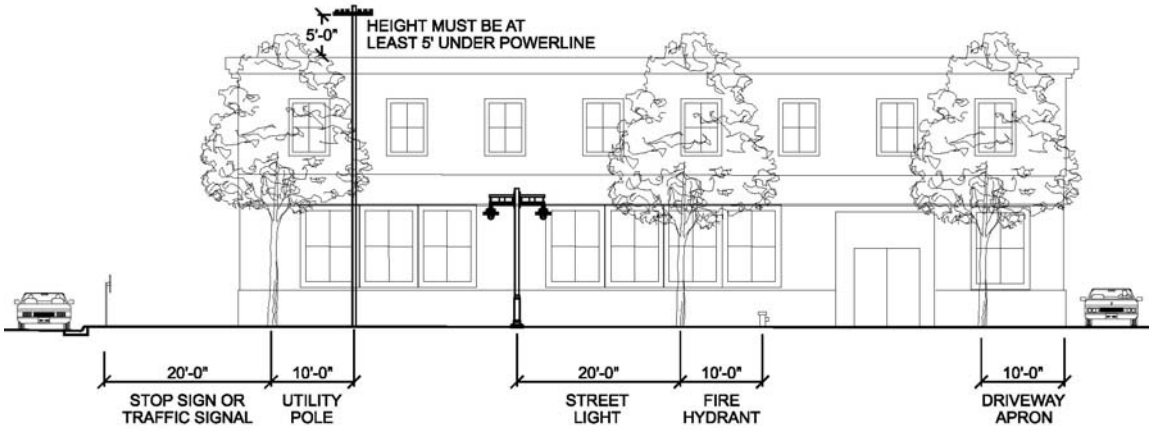


Figure 1: Clearance to Street Surface Infrastructure

Visibility at Corners. Adequate planning and design can insure visibility of traffic signals, stop signs and intersections while still providing the maximum number of street trees. To maintain clear visibility at intersections, trees should not be placed within 20 feet of an intersection. Within 50 feet of an intersection, trees should be pruned to maintain a 14' clearance of the lowest branch. (Except at intersections, trees should typically be pruned to 7' to avoid conflicts with pedestrians. Note that trimming may need to be done over a period of years.)

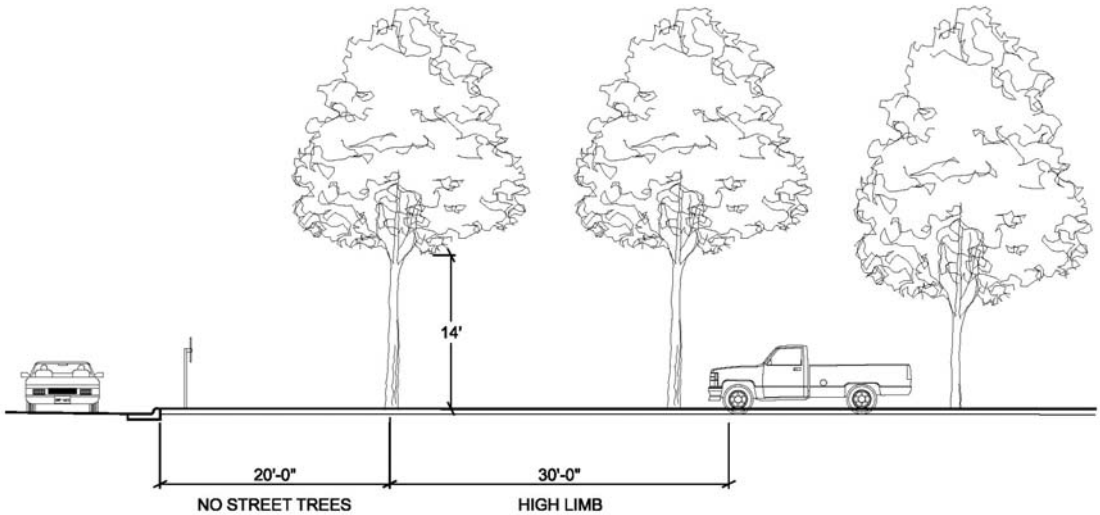


Figure 2: Visibility at Street Corners

Street Furniture. The value of street furniture to the urban environment is enhanced by street trees, as they provide opportunities for people to stop and enjoy the shade of a tree while sitting on a bench or admiring public art. Furniture should be placed to avoid damaging tree roots or branches.

Transit Stops. See Chapter 5, Section 5.9, Transit Stops.

Sidewalk Cafés. Sidewalk cafés are an important urban amenity found in activity centers, commercial corridors, and neighborhood nodes. A sidewalk café must be located in a manner that will not harm street trees. Curbside seating should be placed to avoid damaging tree roots, bark or branches. For additional information regarding sizing and placement of sidewalk cafés see Chapter 10.

Traffic Signs.
(Insert Text)

9.1.2.2 *Clearance to Above Ground Wires*

Overhead Utility Wires. When possible, new utilities must be placed to not adversely affect street trees at their expected mature size. Existing tree crowns may be thinned, but not topped, to accommodate existing overhead wires. Likewise, utility hardware and connections should be placed as to not damage or harm street trees or prohibit the growth of a mature canopy. Where new trees need to be located below overhead wires, design or specify species that when mature will provide adequate vertical clearance (five feet minimum) from the wire to the tree's structure and canopy. Every effort will be made to offset the placement of trees under wires so they are not planted directly beneath them.

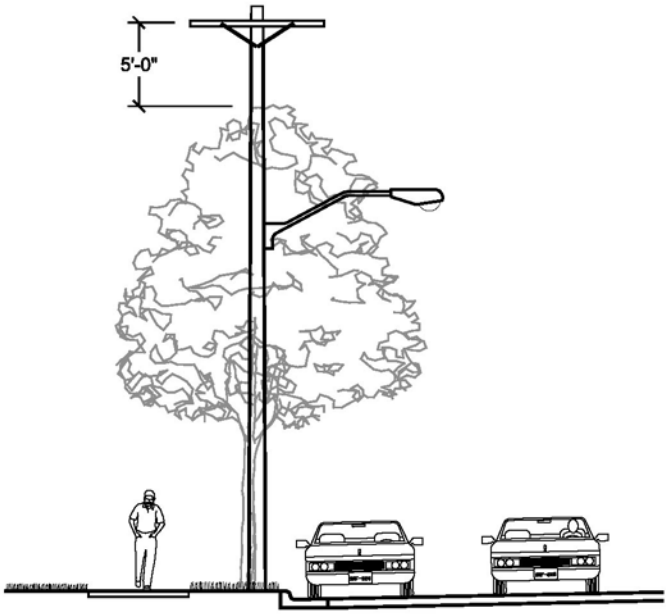


Figure 3: Overhead Utility Clearance

9.1.2.3 *Clearance to Below Ground Elements*

Underground Utilities and Conduit. The primary use of the planted boulevard is for trees and tree roots. To create rooting space for street trees, new underground utilities are not allowed behind the curb with the exceptions of conduit for lights and signals which should be in a common trench as close to the back of curb as possible in order to leave maximum space for plantings, irrigation lines if used, and lateral service lines. When feasible, existing below-ground utilities should be relocated out of the boulevard.

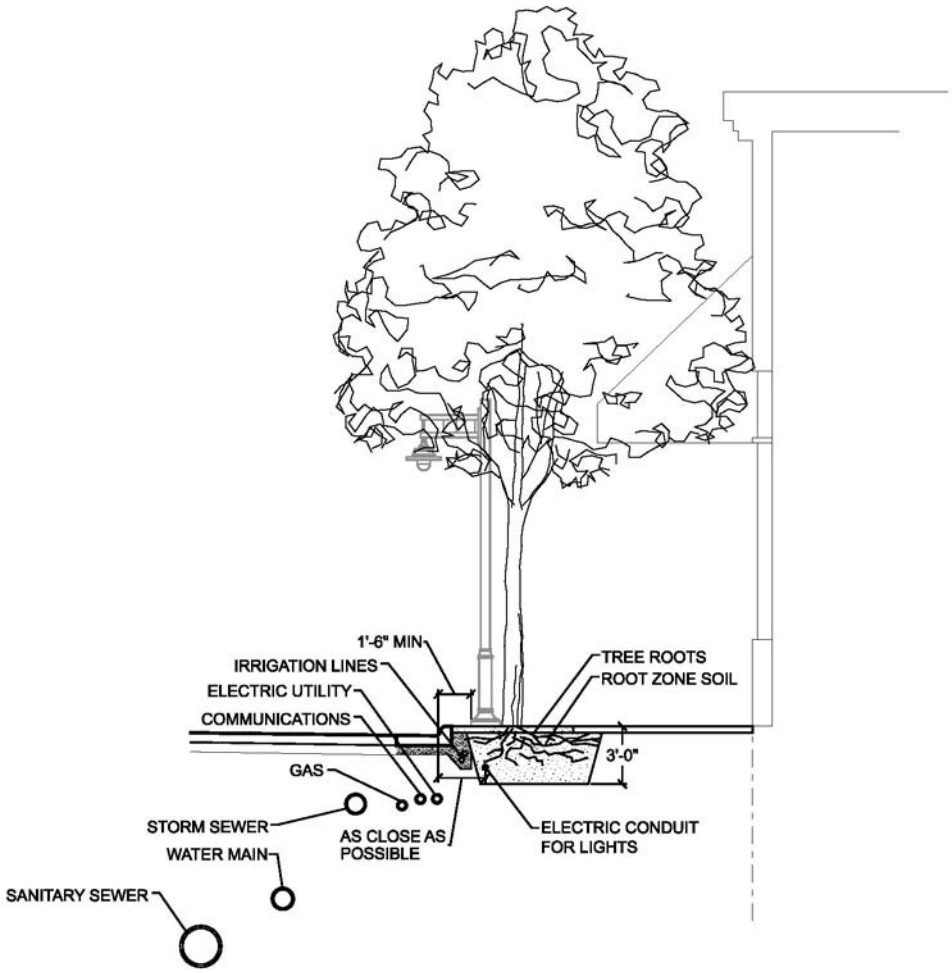


Figure 4: Example of Competing Needs (Specific utility locations can vary greatly from this)

The design of the boulevard must allow for service access to future or previously installed underground utilities. Likewise, new utility placement should locate clean-outs and access points away from trees and allow for tree placement, spacing, growth, and maintenance.

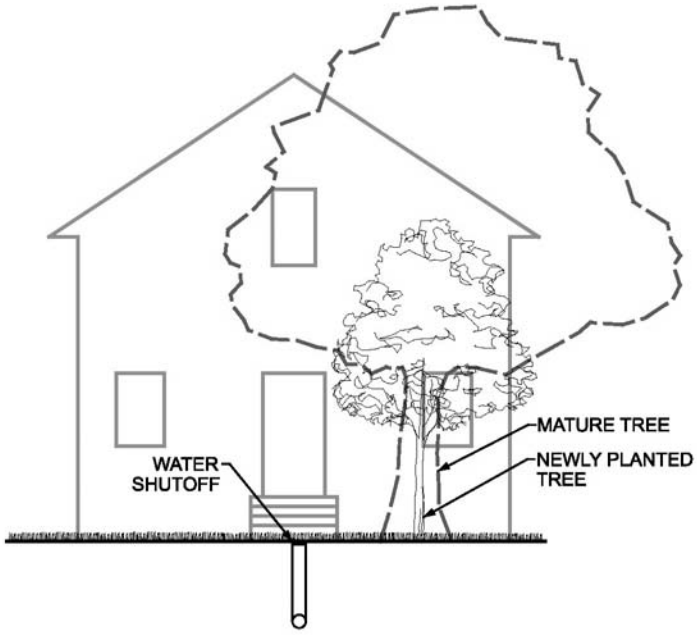


Figure 5: Utility Placement Anticipates Tree Growth

<u>Clear Space</u>. The minimum horizontal clearance from street trees to lateral underground utilities including water, sewer, and gas is 6 feet, from the tree trunk root flare when mature to center of the utility line.

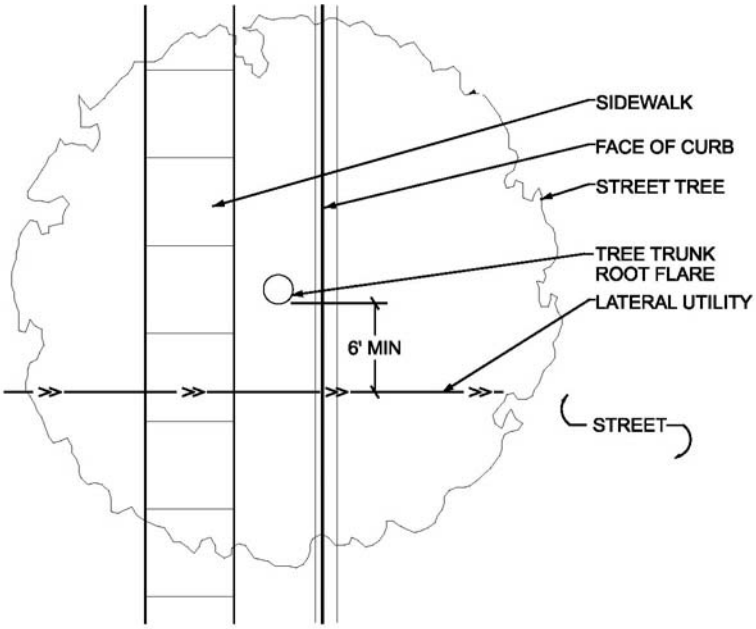


Figure 6: Clearance from Underground Lateral Utilities

<u>Below-grade Conduit Work.</u> Whenever below-grade conduit work is performed in the vicinity of established trees within the boulevard, contractors and city forces should use directional boring at a minimum depth of 36 inches immediately behind the curb instead of trenching procedures to avoid major damage to tree roots.

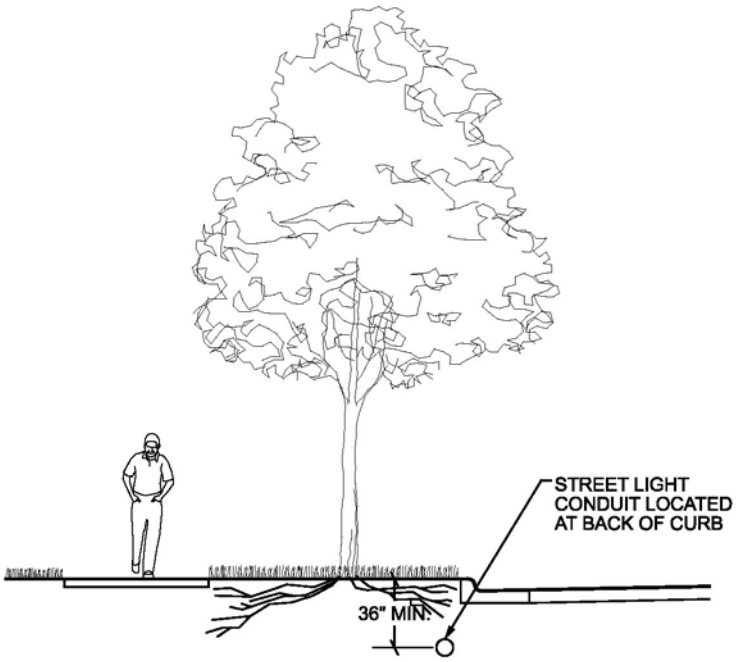


Figure 7: Utility Boring

<u>Sewer/Water Laterals and Gas/Electric Service Construction.</u> Registered contractors must contact the MPRB Forestry Division (phone 612-370-4900) at least five working days in advance of non-emergency sewer construction or repairs that will result in excavation within:

- 6 feet of any tree in the boulevard, or;
- The inner 2/3 of any tree's drip-line in the boulevard, if the result is greater than 6 feet.

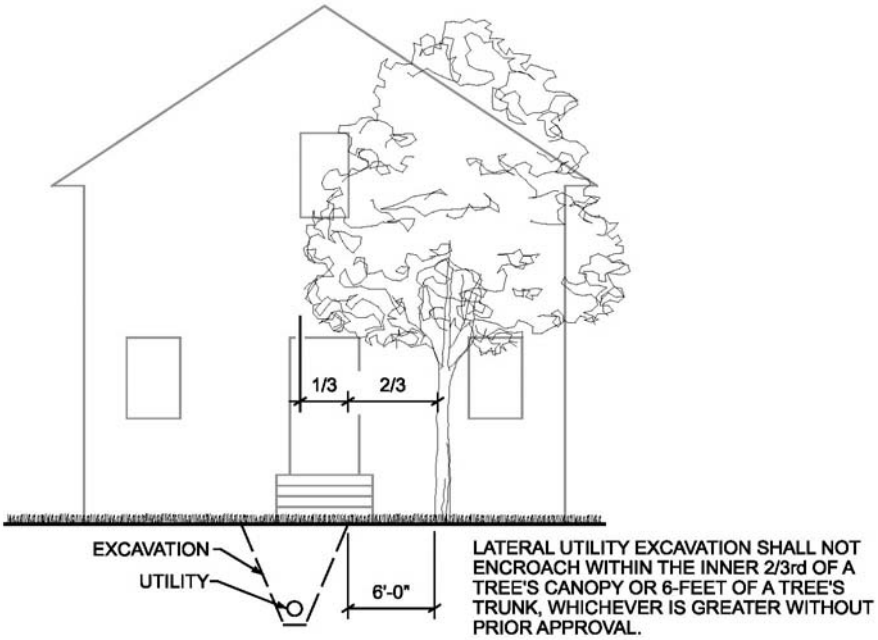


Figure 8: Utility Excavation Criteria

TABLE 1: INFRASTRUCTURE CLEARANCES AND DIMENSIONS TABLE

A. Horizontal Clearances from Above Ground Elements to Street Trees				
Minimum Clearance Distances	**4-feet**	**6-feet**	**10-feet**	**20-feet**
Parking Meter	X			
Transit Shelter	X			
Street, Alley and Driveway Radii (to end of radius)		X		
Lights (both low level pedestrian-scale and high level)			X	
Utility Pole			X	
Fire Hydrant			X	
Stop Sign				X
Traffic Signal				X

B. Horizontal Clearances from Below Ground Elements to Street Trees	
Minimum Clearance Distances	**6-feet**
Lateral utilities (e.g. water, sewer, gas) - from mature tree trunk root flare to center of utility line Note: Lateral utility excavation shall not encroach within the inner 2/3rd of a tree's canopy or 6-feet of a tree trunk, whichever is greater without prior approval from MPRB Forestry Division.	X

C. Vertical Clearances from Above/Below Ground Elements to Street Trees		
Minimum Clearance Distances	**3-feet**	**5-feet**
Overhead Utility Wires (e.g. electric, telephone, cable lines)		X
Conduit located at back of curb (Directional boring required in vicinity of existing tree)	X	

D. Tree Limb Clearance		
Minimum Clearance Distances	**7-feet**	**14-feet**
Over Sidewalks	X	
Over Street	X	
Within 50-feet of an intersection		X

9.1.3 Boulevards

Large, healthy street trees provide many ecological, social and economic benefits to a city. A street tree's ability to grow and stay healthy is largely dependent on the tree's ability to access adequate

soil, air and water. Yet, in dense urban areas, soils in and adjacent to both planted boulevards and paved boulevards are often compacted. Tree roots cannot penetrate highly compacted soil and will not grow in soil that lacks air and water. Roots of street trees frequently grow in the space between the compacted soil and the overlying or adjacent pavement, where air and water are present. As these roots grow, they lift and pavement and cause sidewalk heaving. Therefore, creating spaces that provide trees with adequate soil volume, air and water will not only ensure better tree health, but will minimize damage to, and extend the life of, paved surfaces.

9.1.3.1 Design Elements Common to all Boulevards

- **Passageways under Paved Surfaces for Roots.** In some cases there are open areas on parcels adjacent to the right-of-way that can provide additional root zone area for the street trees. If there is a sidewalk between the tree and the parcel's open area, often the soil is too compacted for the tree roots to penetrate. Therefore it is advantageous to provide passageways constructed from structural soil or other material under sidewalks to allow the tree roots to access the adjacent soil area. This strategy may also minimize upheaval of the sidewalk, because the tree roots will not be starved for oxygen.

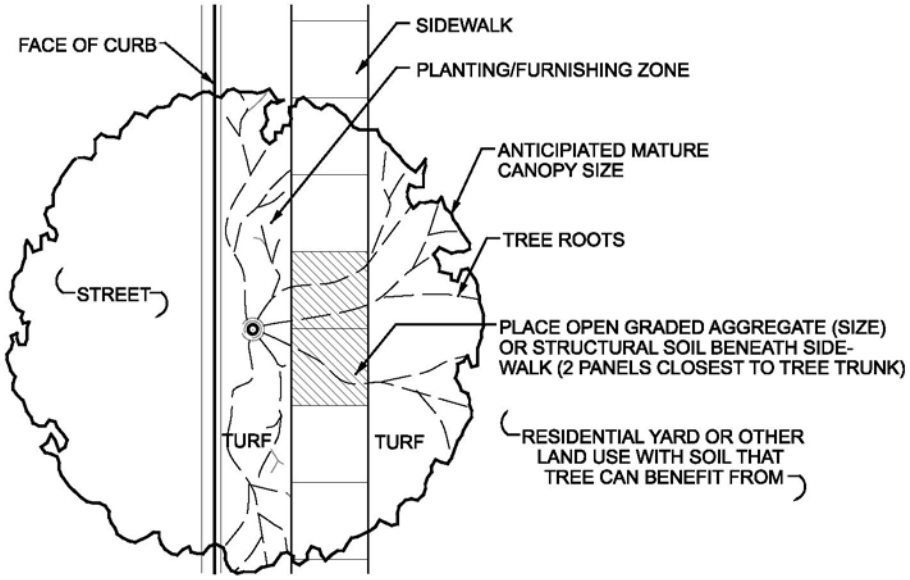


Figure 9: Soil Passageways

Irrigation Systems. Irrigation systems can increase the health and vitality of vegetation. The cost of ongoing monitoring and maintenance of the irrigation system may be offset by environmental and economic benefits of trees.

Conditions for Irrigation. An encroachment permit or Special Service District is required for installing an irrigation system within the street right-of-way..

Smart Control Systems. Consider using a smart irrigation system with a centralized control system, which maximizes water use efficiency. Set controllers to irrigate plantings with only as much water as required for the specific soil type, species, location, and climate and with no excess water going to impervious surfaces. Adjust the controller programs at least every two weeks for seasonal climate conditions.

Calibrate irrigation systems to complete watering during the early AM to reduce evaporation.

Species-specific watering. Zone trees separately by water requirements and use separate watering zones to allow trees to receive appropriate irrigation levels. Appropriate watering assures better plant health and assists with integrated pest management.

System Maintenance, Roles and Responsibilities

Maintenance. Irrigation systems should be designed for minimal maintenance and for easy access to the irrigation hardware, as access to the equipment may be difficult due to traffic and repairs may be prohibitively expensive if street work is required.

Roles and Responsibilities. The encroachment permit holder (such as special service district or adjacent property owner) is responsible for proper function and maintenance of the irrigation system.

9.1.3.2 Planted Boulevards. Most commonly planted with trees and turf, planted boulevards can also incorporate perennials and other plantings.

Boulevard Width without Street Trees. The minimum width for planted boulevards without a street tree is 2.0 feet.

Boulevard Width for Street Trees. The desired minimum boulevard width for tree-planting is 5.5 feet (measured from back of curb to edge of sidewalk). Any additional boulevard width will provide additional benefits to plants. In areas with constrained conditions, a four foot width is sometimes permissible for tree planting. However, this may require soil amendments, special attention to decompaction of soils and/or the use of trees with smaller mature sizes. Widths less than 5.5 feet require prior approval from the MPRB Forestry Division.

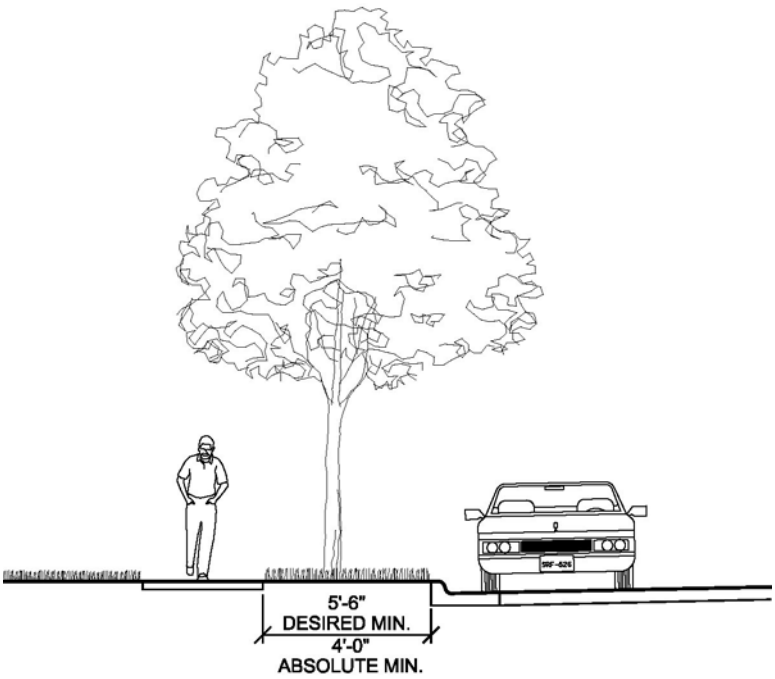


Figure 10: Standard Boulevard Width for Street Trees

Tree Placement between Curb and Sidewalk. Trees installed in planted boulevards should generally be placed midway between the back of curb and edge of sidewalk. See Section x.x for Table with additional guidance.

Plantings. Provide a clear edge between planting beds and turf to facilitate maintenance and contribute to a tidy appearance. When trees and turf are planted together, their roots compete with one another. Provide a 2-foot to 3-foot radius mulch area around trees planted in turf to support tree growth, particularly during establishment. See Section 9.2 for additional vegetation guidance.

Grading. The final grade of soil surfaces in boulevards must accommodate runoff from sidewalk surfaces. Topsoil should be kept low enough that when sod is placed it is 1-inch below the top of sidewalk so that the sod does not act as a barrier to runoff from sidewalk surfaces.

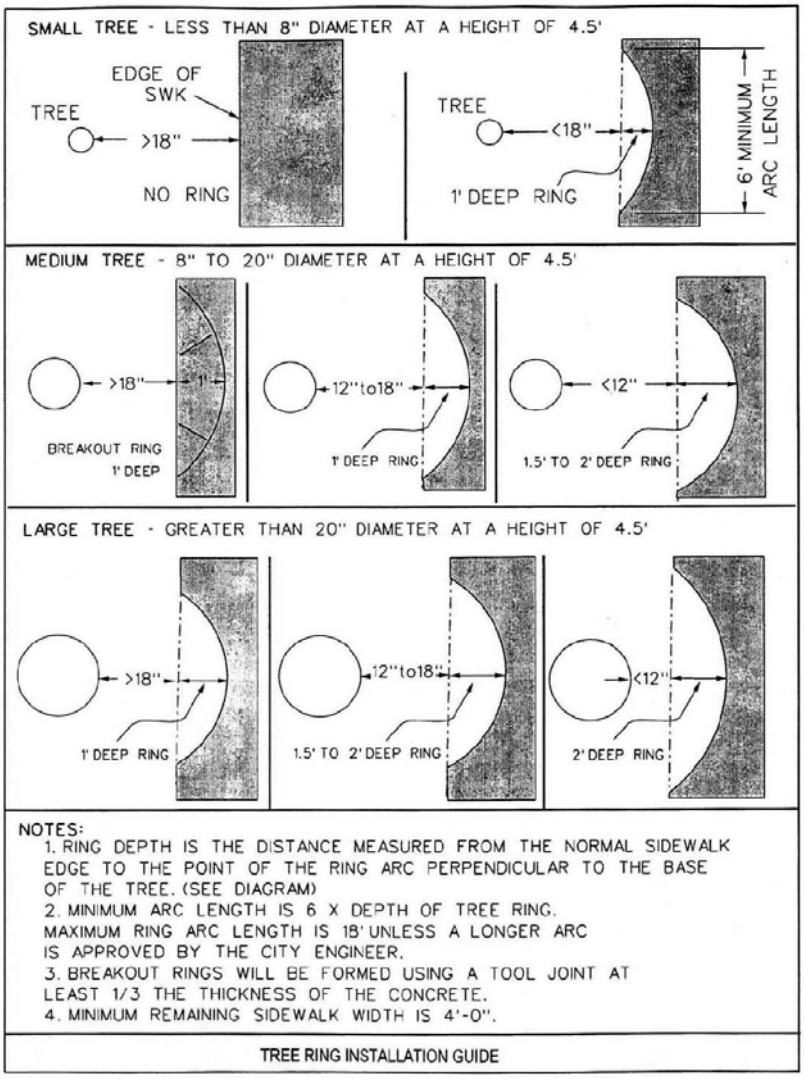
Erosion (Avoidance of). Soil erosion can become a problem if the site is not properly designed or maintained. Areas of bare soil should be avoided by proper maintenance. Keep the surface of the planted boulevard, whether sod or mulch, 1-inch below the top of sidewalk or curb to avoid soil or mulch washing into the street. This also retains more water on site for use by trees and other vegetation.

Boulevard Walks. A boulevard walk or carriage walk is located within the boulevard and perpendicular to the street. It typically functions as an extension of a walkway between the building entrance and the sidewalk, making a connection to the curb edge. Boulevard walks help to define access points to street parking and are encouraged in high pedestrian traffic areas with metered parking.

Permit. A permit is required to construct or place a walk within a planted boulevard. (See Section 437.20 of the Minneapolis City Code of Ordinances) [add hyperlink]. In no event shall any person use blacktop, asphalt or any similar material to pave over or cover any portion of the boulevard. Paving is not allowed in areas of the boulevard which would cut off the air and water from any established tree. The boulevard walk shall not encroach within 6 feet of a new or existing tree.

Paved Boulevard Rain Swales Rain swales can be easily be retrofitted in boulevards when not constrained by utilities and if soils are suitable. However if there are existing trees, See Section 9.1.5 Stormwater Facilities for additional guidance on rain swales.

Tree Rings. Tree rings provide a pavement opening that is expandable to accommodate the future buttress roots of the mature tree. Width of the sidewalk cutout for trees in or near the sidewalk (tree ring or tree arc) is specified based upon the diameter of the tree and the distance of tree to the edge of the sidewalk. The maximum tree ring depth of arc into the sidewalk is two feet, and the minimum remaining sidewalk width is four feet. For additional detailed tree ring construction requirements see http://www.ci.minneapolis.mn.us/sidewalks/specs.asp



TREE RING INSTALLATION GUIDE

Figure 11: Tree Ring

9.1.3.3 Paved Boulevards. In activity centers, neighborhood nodes and community and commercial corridors the boulevard is often paved instead of planted. This allows space to accommodate higher volumes of pedestrian activity moving parallel to the roadway or crossing from parked vehicles to the pedestrian zone. Paved boulevards provide opportunities for sidewalk cafes and street furniture that contribute to an inviting pedestrian environment, as well as street trees and planters. However, there are considerable challenges to growing mature, healthy trees within paved boulevards because trees thrive best in conditions that provide ample root zone area with plenty of access for the roots to water and oxygen.

Tree Trenches, Tree Pits and Raised Planting Beds. As used in this document, the first two terms apply to trees planted at grade, whereas the third term applies to trees planted in an enclosed, raised planter. Of the three types, tree trenches are the most beneficial for trees, tree pits are less beneficial, and enclosed, raised planters are the least beneficial. Tree trenches provide a continuous, underground planting basin for multiple trees, whereas tree pits are underground planting basins for single trees. Raised planters position the trees above ground and create a harsher climate for trees.

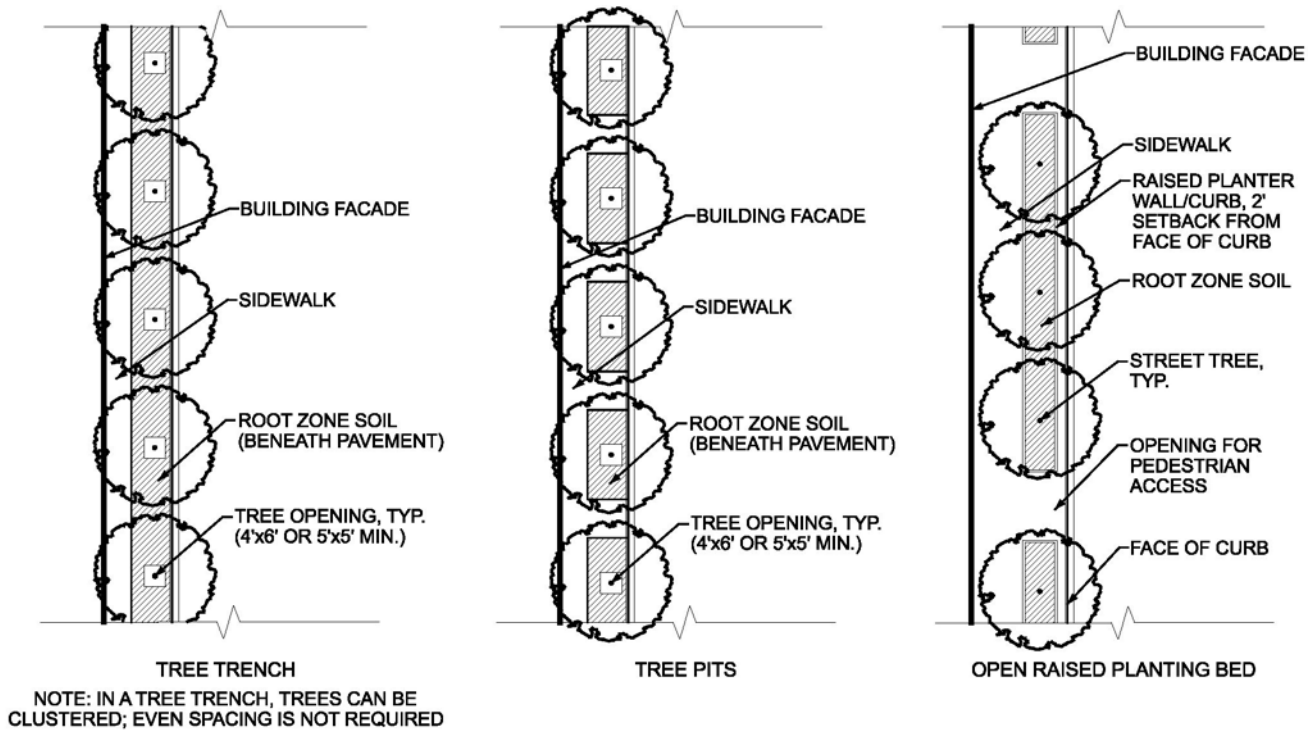


Figure 12: Comparison of Tree Trenches, Tree Pits and Raised Planting Beds

Tree Trenches.

Tree trenches generally provide the most volume of root zone area, and the roots of multiple trees can intermingle in the same root zone area.

Tree trenches should adhere to the following guidelines:

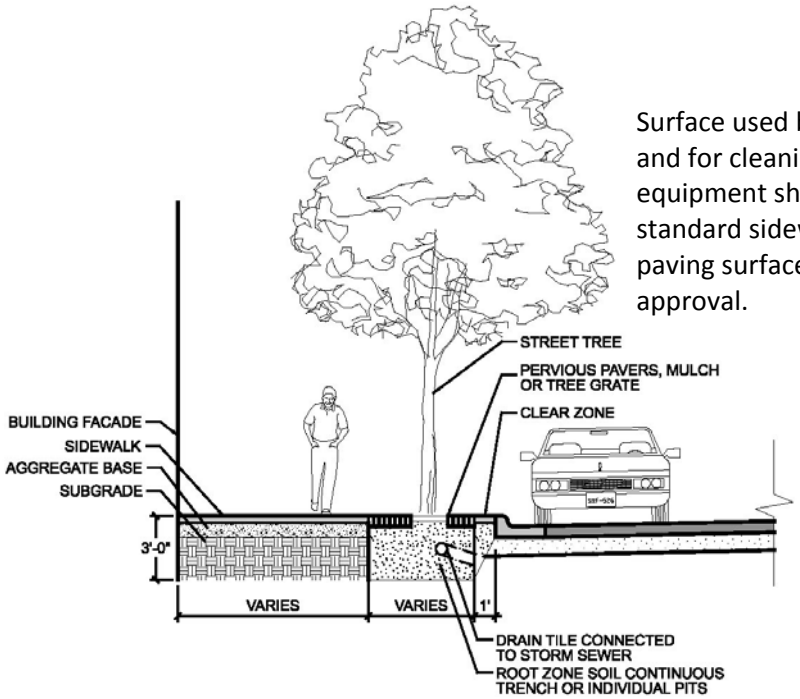
- Tree trenches can be used to form a cluster or copse of trees, or can be used for regularly spaced trees. Trees clustered into one large soil area usually perform

better than trees placed individually in a location surrounded by concrete and asphalt. The roots are able to spread out and share the large soil space instead of being confined to a small planting pit.

- Ideally, the tree trench would run the full length of the block and occupy the full depth of the zone between curb and building face. This is because, in many cases, using space under the sidewalk for root growth is the only place for trees to find adequate soil.
- Depending on soil and site characteristics, a drainage system at the appropriate depth, connected to the storm drain system, may be needed to ensure that trees do not sit in water for extended periods.
- If the soil in the trench needs to support pavement above it, the use of structural soil or other approved structural approach is required. The goal is to 1) provide a structural base that can support a sidewalk while 2) providing a growing medium that allows for root growth and movement of air and oxygen to tree roots.

Tree Pits. Tree pits should adhere to the following guidelines:

- The recommended minimum size of an in-ground planting pit is 300 cubic feet, e.g., 10 feet x 10 feet x 3 feet deep.
- Depending on soil and site characteristics, a drainage system at the appropriate depth, connected to the storm drain system, may be needed to ensure that trees do not sit in water for extended periods.



Surface used by pedestrians and for cleaning/snow removal equipment should be a standard sidewalk. Alternative paving surface requires City approval.

Figure 13: Tree Trench and Tree Pit Section

Surface Openings over Tree Trenches or Tree Pits, and Types of Covering for Openings

- The surface opening is to be no less than 5 feet by 5 feet, or 4 feet by 6 feet, meaning that the surface opening will be smaller than the width and length of the pit or trench underground.
- The volume of underground root zone area is a much more important factor than the size of the surface opening for tree health and longevity. For volume guidelines, see Section 9.2.2.
- The tree opening covering must allow for water and oxygen to easily reach the roots.
- The area around the base of the tree should be designed to permit constant enlargement of the trunk flare.
- Low metal fences to mark the edge of the bed help keep pedestrians away from the tree and increase the range of places where groundcover plantings may be effective.
- Bark mulch is the best material to protect the soil at the base of the tree. Low maintenance ground cover plants are also effective.
- Preferred coverings include mulch, and low ground cover plants, and pervious pavements. Metal grates are also allowed in some situations. See below for notes on each type.

Notes on Mulch or Ground Cover Plants for Openings

- □ Bark mulch is the best material to protect the soil at the base of the tree.
- □ If ground cover plants are used, it is essential to plant carefully so that tree roots are not damaged. An advantage of planting under trees is that people will recognize much more quickly the need to water, and therefore the tree will be often be better watered as well.
- □ **Rock Mulch.** The use of loose rock mulch is problematic and not recommended because it can become a public safety issue.

Notes on Pervious Pavements for Openings

- □ In some locations, flexible sand set paving materials such as gravel, stone dust or loose laid stone or brick pavers may be reasonable alternative to metal tree grates where ground cover may not be acceptable.
- □ If pervious pavements are used they must be ADA compliant.
- □ No paver should be placed within a foot of the base of the trunk to allow plenty of space for growth.

Notes on Metal Grates for Openings

- □ The use of metal tree grates to cover and protect the root zone soil is discouraged because tree grates may damage the tree base if not enlarged as the tree grows, because the grates may fill with trash and debris that over time interferes with air and water needed by the tree roots, and because they can become a tripping hazard.

- □ For locations where metal grates are considered due to space or maintenance constraints or other factors, they may only be installed with the mutual consent of the MPRB Forestry Division and Public Works.
- □ Grates should only be considered for the downtown Central Business District or within a full block east-and-west or a half-block north-and-south of areas where community corridors intersect with commercial corridors or where commercial corridors intersect with one another. However, an open boulevard or alternatives to tree grates should be considered first.
- □ The grate must be ADA compliant, including narrow openings and rough, non-slip surface.
- □ The grate needs to have a hole for the tree 18 inches in diameter or a knock-out for an 18-inch diameter hole.
- □ For installation, a frame is to be used. A one-piece frame is recommended. If a multiple piece frame is used, a jig must be used to maintain the grate in one plane during installation with the sidewalk. Thicken the sidewalk to 6 inches within 12 inches of the frame.
- □ Install filter fabric on top of planting soil and cover with either mulch (preferred) or pea gravel to bottom of tree grate. Grates must not be allowed to fill in over time with debris or soil that would keep water or oxygen from easily reaching the roots.

Raised Planting Bed. Raised planting beds provide a defined vegetated area with hard vertical edges. Raised planting beds are areas where the planted area's finish grade is above the sidewalk finish grade, typically defined by hard vertical walls or curbs. Raised planting beds are not appropriate in all areas, especially in constrained conditions where the space could better serve pedestrian zone uses such as movement, transit or outdoor dining. Raised planting beds should adhere to the following guidelines:

- They should be considered in situations where existing utility or soil conditions do not allow for at-grade plantings.
- Small ornamental trees, low shrubs and perennials are appropriate planting material for raised planting beds, as opposed to large overstory trees, unless the planter can provide enough soil to adequately support an overstory tree. See Section 9.2 for additional vegetation guidance.
- Provide a 2-foot clear zone between the planting bed edge and the face of curb.
- Raised planting beds must be located and designed to accommodate conveniently spaced access for pedestrians traveling between parked cars and the sidewalk, or for emergency access and equipment.
- Piped irrigation and winter insulation should be incorporated into the planting bed area.
- Provide a drainage system connected to the storm drainage system at an appropriate depth to ensure that trees do not sit in water for extended periods.

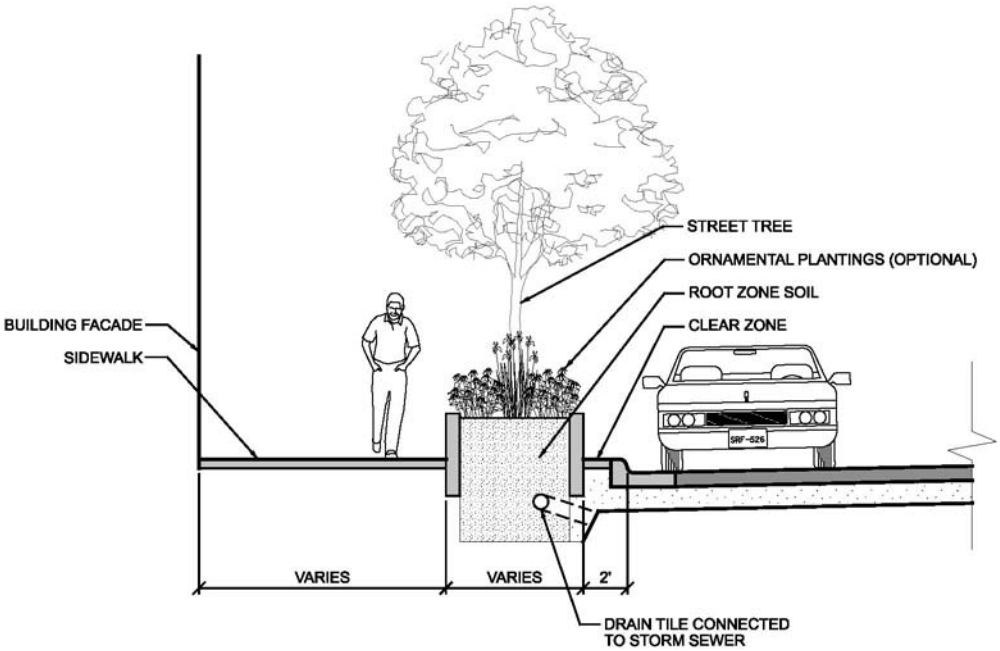


Figure 14: Raised Planting Bed Section

<u>Other Elements To Consider.</u>

- **<u>Paved Boulevard Rain Swale.</u>** A variation on an at-grade planting area, a rain swale can be incorporated into the paved boulevards by using hard vertical edges to create a formal edge or raised safety border.

(An illustration of a Paved Boulevard Rain Swale is being developed.)

- **<u>Hanging Baskets.</u>** Hanging baskets generally have high maintenance and resource requirements, however, they can add unique detail and identity to a street or neighborhood. An Encroachment Permit would be required.

- **<u>Sidewalks Made of Pervious Pavement</u>**. When underlying soil conditions and utility conditions allow for its use, consider using pervious paving for sidewalks to reduce stormwater runoff and allow the trees and landscape to benefit from the available water. Pervious paving such as permeable pavers or porous concrete allows for "at-the-source" stormwater treatment through infiltration and bioretention which benefits street trees, reduces stormwater runoff and may reduce puddling and slip hazards.

- **<u>Curb Extensions</u>.** A curb extension is created when a boulevard is widened at the intersection or at specific mid-block locations to incorporate the approximate width of the on-street parking lane. Curb extensions can be used to define parking bays. Curb extensions can be nearly all vegetated, nearly all paved, or a combination, however one of the main reasons for installing curb extensions is to add green

space. Trees, plantings, and shallow boulevard swales are allowed in curb extensions provided the extension is not needed for pedestrian capacity and they do not interfere with bus stops or visibility at intersections. Plants and swales in curb extensions are subject to the same requirements of boulevards. Standard 20-foot street tree spacing from intersections applies to curb extensions. As such trees are appropriate in mid-block curb extensions, and also in intersection curb extensions if they are longer than 20 feet.

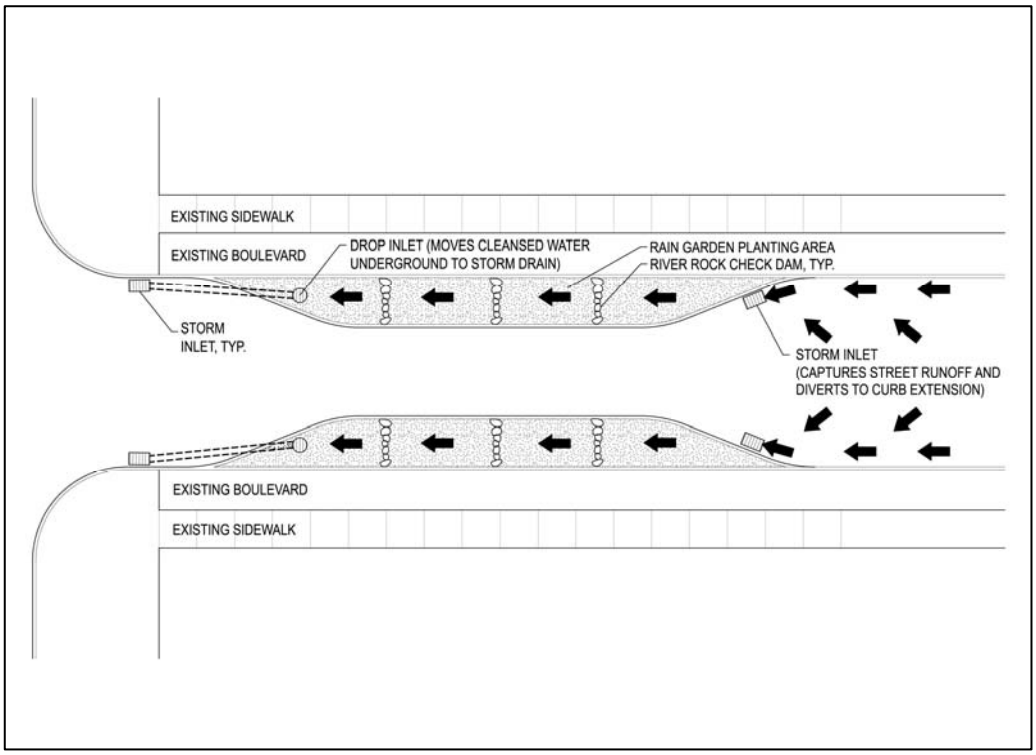


Figure 15 DRAFT: Curb Extension with Rain Swale

9.1.4 In-Street Planted Areas

In-street planted areas are areas that are located within median islands, diagonal diverters, cul-de-sac islands, traffic circles or roundabouts. Trees and landscaping in these areas is strongly encouraged wherever site conditions allow.

9.1.4.1 Design Elements Common to All In-Street Planted Areas

Grading/Slope Create a depressed rain garden or rain swale instead of a raised mound or crown, in order to retain and use the rain that falls on the planted area.
Inlets for Stormwater. For in-street planting areas, in addition to retaining and using the rain that falls on the planted area, consider techniques that direct additional stormwater into them from the street, in order to provide water for trees and plants and to manage or reduce stormwater rate or volume.

Curbing Considerations. To protect vegetation from salt spray, do not plant directly behind the back of curb – instead install a paved 1-foot maintenance strip around the perimeter of the median island, cul-de-sac island, or traffic circle/roundabout island.

9.1.4.2 Median Islands. Median islands are constructed within the roadway in areas not needed for vehicular or bicycle movement or parking. Median islands are typically raised and can be planted or paved. Medians can provide additional space for street trees and other plantings.

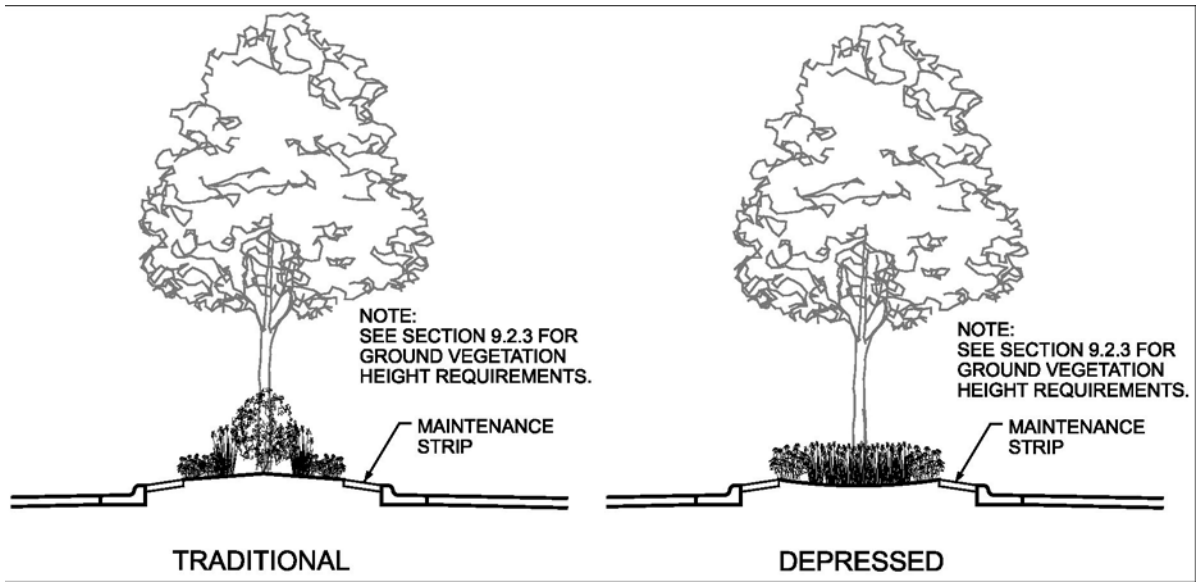


Figure 16: Median Island/Traffic Circle/Cul-de-sac Island

Planting Area Minimum Size. Planted medians shall have a minimum 10 foot wide planting area for trees, measured from curb face to curb face.

Medians larger than twenty feet are spaces unto themselves. Develop planting character that takes on different qualities, including larger groupings of trees, or water quality features. Combine plantings of turf, trees, shrubs, groundcovers, and native grasses and perennials, in many kinds of combinations.

Plantings. Trees planted in medians should have either arching canopy structures that provide visibility without excessive pruning, or be upright and columnar in form. See Section 9.2 for additional vegetation guidelines. Provide a clear edge between planting beds and turf to facilitate maintenance and contribute to a tidy appearance.

Clearance. Trees in medians must follow the same clearance requirements as those in the boulevard. Within 50 feet of an intersection, trees should be pruned to maintain a 14' clearance of the lowest branch.

Rain Swales. Rain swales can be installed in new or easily retrofitted medians when not constrained by utilities. See Section 9.1.5 Stormwater Facilities for additional guidance on rain swales.

9.1.4.3 Diagonal Diverters, Cul-de-Sac Islands, Roundabouts, and Traffic Circles. Diagonal diverters, cul-de-sac islands, roundabouts and traffic circles provide additional tree locations and

promote traffic calming. All of these techniques benefit from having vertical elements such as trees because users are provided a visual cue that the roadway alignment changes. There are opportunities for unique expression within these areas that relate to the overall city vision and unique neighborhood character.

Planting Area Minimum Size. Diagonal diverters shall have a minimum 10 foot wide planting area for trees, measured from curb face to curb face. Cul-de-sac islands and traffic circle islands must be at least 14 feet (this dimension is still being researched) in diameter, measured from curb face to curb face, to support a tree. All roundabouts are typically large enough to support a tree. Multiple trees are permitted on roundabouts and diagonal diverters through review and approval process.

Plantings. Plant trees in the center of cul-de-sac islands, traffic circles and roundabouts. Trees planted in these areas should have either arching canopy structures that provide visibility without excessive pruning, or be upright and columnar in form. See Section 9.2 for additional vegetation guidelines. Provide a defined edge between planting beds and turf to facilitate ease of maintenance and contribute to a tidy appearance.

Rain Gardens. Rain gardens can be installed in new roundabouts, traffic circles, cul-de-sac islands when not constrained by utilities. See Section 9.1.5 Stormwater Facilities for additional guidance on rain gardens.

9.1.5 Incorporation of Stormwater Features into Boulevards and In-street Planted Areas

Rain falling on hard surfaces such as streets, sidewalks, rooftops and parking lots accumulates as stormwater 'runoff' instead of being absorbed into the ground. As the runoff passes over surfaces it collects whatever pollutants are present, including chemicals, oil, metals, bacteria and other by-products of urban life. Left untreated, this polluted runoff contaminates lakes, creeks and rivers. In addition, high quantities of runoff may also cause flooding and erosion during large storm events.

Providing planted areas where stormwater can soak into the ground where it falls, or directing it to stormwater features such as rain swales and rain gardens designed to capture and infiltrate the rainwater into the soil or release it slowly to storm drain inlets, reduces runoff problems and also creates opportunities to add interest and habitat in the right-of-way. Stormwater features can help mitigate environmental problems by reducing and/or delaying stormwater runoff and treating associated pollutants before stormwater is discharged into storm drains and ultimately lakes, creeks and the Mississippi River. In addition to the ecological benefits, and within the range of street types, these stormwater features can be used to make the city's streets more beautiful and enjoyable places to be.

There is occasional interest by individuals or neighborhood groups in planting and caring for rain gardens or rain swales in public boulevards or other geometries that create space for landscaping. The heightened interest in "greening" and managing stormwater where it falls is beneficial, however t here are a number of considerations for determining whether a boulevard or in-street rain garden or rain swale is suitable and feasible in a particular location. An Encroachment Permit application process is used to work through suitability and feasibility issues and to lay out maintenance responsibilities. Common issues include utility conflicts, soil compaction, soil type, impact on existing trees, location of carriage walks, and adequate space for gradual slopes necessary for a safe design. If there are existing trees, there may not be room for a rain garden or swale, because the depth of soil where it meets the trunk should be neither raised nor lowered.

Most trees will not tolerate standing water, so adequate drainage is essential for both existing and new trees. If not properly designed, installed and maintained, the rain garden or swale may not continue to function well over time.

Note that 'blooming boulevards' are allowed by ordinance and do not require an Encroachment Permit, however removing soil and changing drainage is not allowed without an Encroachment Permit.

Rain gardens should be designed to drain stormwater within 48 hours (and preferably 24 hours) after a rain event to avoid concerns about perceived functional and public health risks. In right-of-way areas, ponding depths should be limited to 6 inches or less for aesthetics, safety, and rapid drawdown within that time frame, except in unusually large areas. For pedestrian safety, surface side slopes should be as gradual as possible, with a maximum slope of 1:5 (vertical:horizontal). Deep-rooted water tolerant plantings are encouraged to improve infiltration and nutrient control benefits.

Design Elements Common to all Stormwater Features

Species Selection. Vegetation helps improve infiltration functions, protects soil from rain and wind erosion, and enhances aesthetic conditions. Infiltration benefits can be substantially improved by planting deep-rooted perennials.

- **Turf.** Turf grass may be used to cover the entire stormwater feature surface area.
- **Low shrubs, perennial plants and ground cover plants.** If low shrubs or perennials are planted in the swale, space plants for full coverage in five years.
  - Recommended minimum plant installation size for shrubs is one gallon container
  - Recommended minimum installation size for perennial plants is 4-inch pot.
  - Mature plant heights must comply with requirements of Section 9.2.3, Other Types of Vegetation.

Maintenance.

- **Turf.** Turf grass must receive frequent mowing.
- **Low shrubs, perennial plants and ground cover plants.** Plants within stormwater features must be mulched with hardwood mulch that meets MnDOT specifications (will make these specifications available on City web site). Finished grade of mulch must be 1-inch below top of curb to prevent mulch from migrating into the street during storm events.

Construction. Stormwater feature areas should be clearly marked before site work begins to avoid soil disturbance and compaction during construction. It is common for urban soils to need decompaction and soil amendments. Construction of stormwater features should not damage existing sidewalks, curbs and existing street trees, including tree roots.

Rain Gardens. Rain gardens are shallow, landscaped depressions that provide initial treatment of stormwater runoff. These planted areas improve water quality by reducing sediment, nutrient runoff, and temperature impacts through natural treatment. Rain gardens can slow down the runoff and delay discharge, thus reducing and attenuating peak

runoff rates within the city storm drains. Furthermore, they can provide groundwater recharge, thereby reducing total runoff volume.

During minor storm events, runoff temporarily ponds in the facility and then slowly infiltrates downward through a permeable soil into the ground. Increased water quality is achieved by filtering pollutants through soil particles that trap pollutants and plant material, which take up pollutants. In most locations, ponding depths increase during larger storms until runoff overflows an elevated weir or drain outlet for discharge to the city storm network.

Rain Swales. Boulevard rain swales are shallow linear planted (turf or perennials) depressions between the curb and sidewalk that collect and convey stormwater runoff, allowing pollutants to settle and filter out as the water infiltrates into the soil in small storm events. In large storm events excess water overtops the curb and drains into the street and is collected in the traditional storm drain system. In addition to providing pollution reduction, flow rates and volumes can also be managed with these shallow 2 to 6-inch rain swales. Rain swales hold more stormwater on site for use by trees and other vegetation.

Existing Trees. If there are existing trees, swales may not be feasible because modifying grade may damage tree roots and result in eventual tree decline and/or death. If swales are able to be used, they must be installed carefully with consideration of the existing trees and the protected root zone, see Section 9.4.5, Protected Root Zone.

Boulevards without Trees. For planted boulevards without pre-existing trees, swales can create an excellent environment for newly planted trees, provided the soils will allow for adequate infiltration or there is an underdrain installed.

Pedestrian Access. Rain swales must safely accommodate pedestrian crossings between the street and sidewalk. For this reason the rain swale shall have a maximum grade of 5:1 for pedestrian safety.

Mowing. If turf is placed in rain swales, provide for ease of mowing by creating a 2-foot wide flattened swale bottom.

Sizing. The minimum width for a rain swale is 3 feet from back of curb to sidewalk.

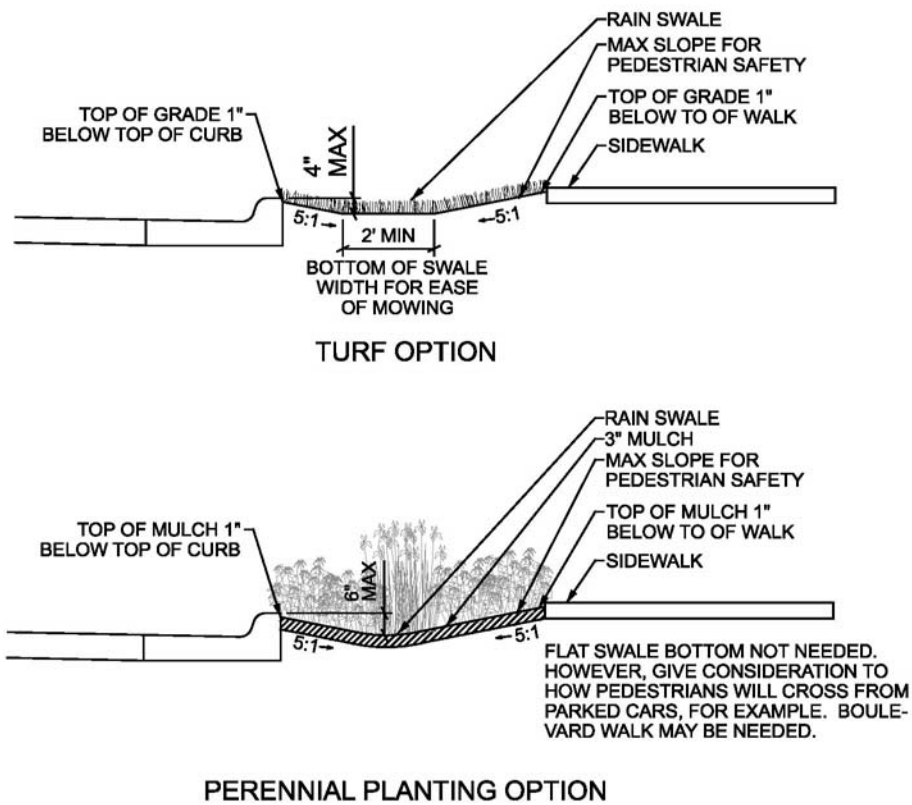


Figure 17: Rain Swale

Drainage. To allow stormwater to flow off of the sidewalk and into the swale, finished grade of mulch or turf must be 1-inch below the top of the sidewalk.

Pervious Pavements. When underlying soil conditions allow for its use, consider using pervious paving for boulevard walks to reduce stormwater runoff and allow the trees and landscape to benefit from the available water. Pervious paving such as permeable pavers or porous concrete allows for "at-the-source" stormwater treatment through infiltration and bioretention which benefits street trees, reduces stormwater runoff and may reduce puddling and slip hazards.

9.2 Vegetation Guidelines

9.2.1 Soil Properties and Soil Amendments. Streetscape plantings require high quality soils (i.e., well-drained yet able to retain adequate moisture) to provide favorable establishment conditions. An initial investment in soil preparation and mulch helps to ensure long-term survival of trees and plants, reducing the need for fertilizers, pesticides and irrigation requirements, and promoting integrated pest management.

Areas with Turf. Place three inches of Topsoil Borrow (Mn/DOT 3877.2A) over areas that are to receive turf grass. Place topsoil borrow so that when sod is placed, the finished grade of the sod is 1 inch below the top of sidewalk and top of curb. (Too often, sod is placed too high, creating a barrier to water running across the sidewalk.) Amend soil to be

fertile, friable, well-drained, of uniform quality. Remove stones over 1" in diameter, sticks, oils, plaster, concrete and other harmful materials.

Areas with Low Shrubs and Perennials. Soil depth is dependent upon the individual plants and their rooting requirements. In general, a planting bed depth of 10-inches may be adequate. Place PremiumTopsoil Borrow (Mn/DOT 3877.2C) at the required depth over areas to receive shrub and perennial plantings. Mass cultivate by tilling the planting bed areas prior to planting. Place topsoil borrow so that finish grade is 4-inches below the adjacent top of sidewalk or curb, so that when mulch is placed, the top of the mulch is 1-inch below the top of curb.

Areas with Street Trees.

Planted Boulevards and In-Street Planted Areas. As deemed necessary by the MPRB Forestry Division, amend soil to help retain moisture yet still allow adequate soil oxygen, in order to support vigorous tree growth. Incorporate Compost Grade 2 (Mn/DOT 3890.2B) into the excavated soil in the amount of 3-5 percent of the tree planting hole volume. Backfill the planting hole with this amended soil.

Drainage for Trees. MPRB Forestry Division may require testing of soils for adequate drainage. If testing is required (and after utilities have been marked through the Gopher State One Call process), dig approximately one-foot deep holes at locations designated by Forestry Division staff and fill with water. If these potholes do not drain within 24 hours, include supplemental approved draining methods. Alternatively, it may be possible to make amendments to the planting pit and re-test for proper drainage.

Paved Boulevards.

Tree Trenches and Tree Pits. Tree trenches and tree pits will require either structural soil or engineered soil within a structural support system in order to provide a sustainable growing environment for street trees. Soil types and soil volumes for tree pits and trenches on public property are subject to review and approval by the MPRB Forestry Division.

Engineered soils, as defined in this guide, are intentionally designed soil mixtures that promote the rapid infiltration of water while also absorbing a portion of the water within the soil for future uptake by plant materials. If engineered soils are placed beneath pavement, a subsurface structural support system is needed. (This may be structural soils, or may be another type of system.)

Structural Soils. as defined in this guide, are intentionally designed soil mixtures that can safely bear pavement loads after compaction and still allow root penetration and the movement of air and water to tree roots. A 20-inch minimum structural soil depth is required. The preferred structural soil depth is 36-inches. Ensure there is proper drainage to remove excess water from the root zone.

Stormwater Management Biofiltration. Use pervious pavements over structural soil or engineered soil within a structural support system to allow stormwater runoff to pass through the pervious surface and reach the tree roots.

Raised Planting Beds. Street trees within raised planting beds required a planting soils that is well-drained yet able to retain adequate moisture.

9.2.2 Street Trees

Proper site and species selection is paramount to providing the many economic and ecological benefits of the urban forest such as reducing stormwater runoff and pollution, absorbing air pollutants and carbon dioxide, providing wildlife habitat, providing shade, stabilizing soils, increasing property values and increasing energy savings.

Soil Volume for Street Trees. A growing tree will send roots far into the surrounding soil. In uncompacted soil, the roots of a mature tree can spread to more than twice the width of the tree's canopy. Trees get nutrients from soil, but roots also need the air and water that occupy voids between soil particles. In uncompacted soil, these voids are abundant. Many trees growing in urban areas are surrounded by compacted soil or provided minimal soil for roots to expand into. If the tree roots cannot expand into the surrounding soil, they will continue to grow until they have filled up the available space. When the needs of the tree exceed the capacity of the soil, the health of the tree will begin to decline and it will eventually die. Trees in urban areas with inadequate soil volumes to support the tree rarely reach their full growth potential and cannot provide the wide range of benefits that mature, healthy trees offer.

For all street tree locations, determine the soil volume available and/or provide additional available soil to reach the recommended amount per tree based on Figure 18: Tree Size to Soil Volume Relationship.

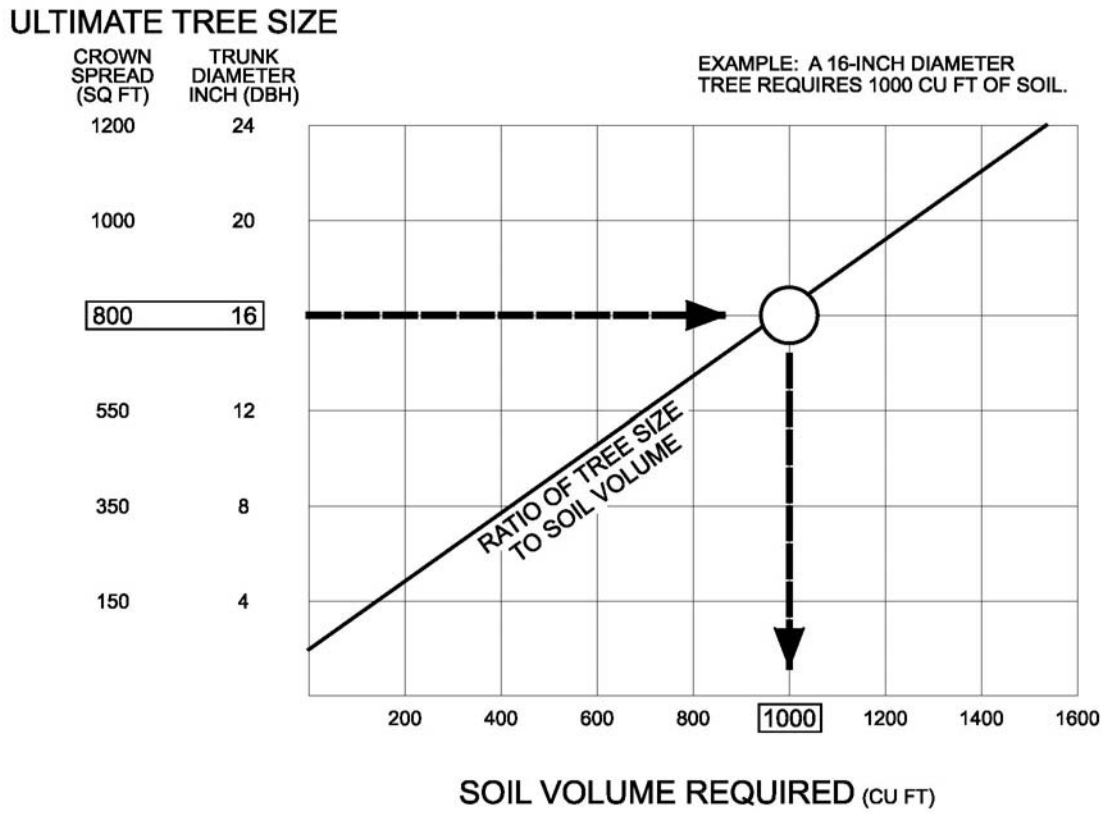


Figure 18: Tree Size to Soil Volume Relationship (Urban 1992) Table 1

In highly urban areas, Table x in combination with Figure 18 can be used as a guide in determining soil volumes that may be available for street trees, based on sidewalk widths.

Table 2: Tree Space Soil Volume DRAFT

Edge + Planting/Furnishing + Through Walk Width (feet)	Tree Space Soil Volume (cubic feet)	Minimum Tree Space Width* (feet)	Minimum Open Soil Area* (square feet)	Curb Walk?
8	400	4	cover	no
9	400	4	cover	no
10	500	4	cover	no
11	500	4	cover ok	no
12	600	4	cover ok	recommended
13	600	4	cover ok	recommended
14	700	4	70	recommended
15	700	5	75	recommended
16	800	5	80	yes
17	800	6	85	yes
18	900	6	90	yes

Edge + Planting/Furnishing + Through Walk Width (feet)	Tree Space Soil Volume (cubic feet)	Minimum Tree Space Width* (feet)	Minimum Open Soil Area* (square feet)	Curb Walk?
19	900	7	100	yes
20	1000	8	110	yes
21	1000	8	120	yes
22	1100	8	130	yes
23 and greater	= sidewalk width x 50	8	= sidewalk width x 7	yes

*For sidewalk widths of 10 feet or less in areas of high pedestrian traffic, the soil area should be completely covered. For sidewalks between 10 and 14 feet in areas of high pedestrian traffic, the soil area may be almost completely covered.

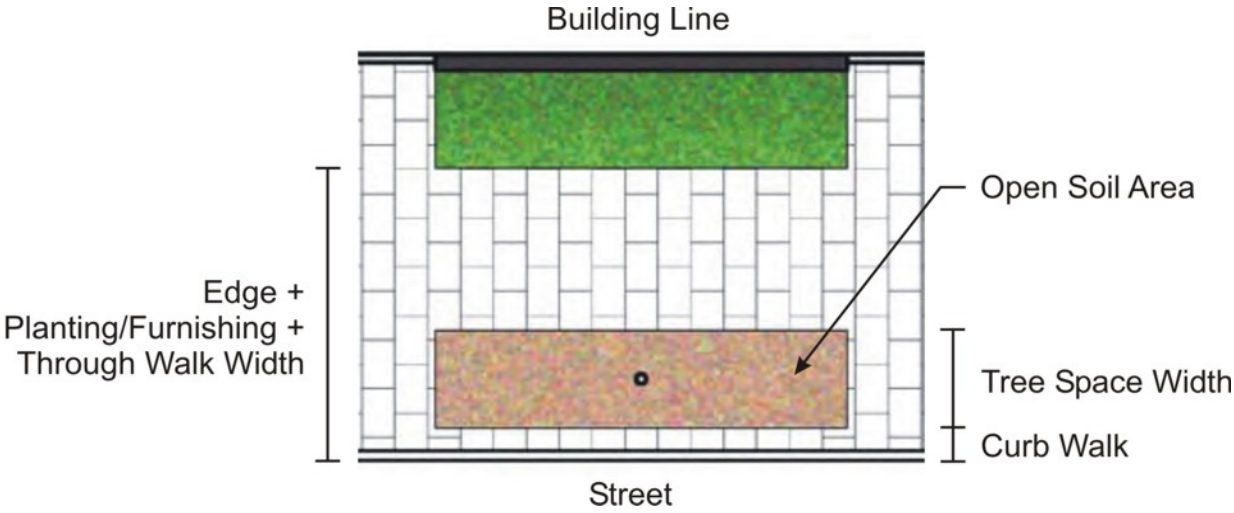


Figure 19: Tree Space Soil Volume

Quantity of Trees.

Species Selection. By planting a variety of climate and environment appropriate species (e.g., native and other hardy non-invasive species), monocultures of one species can be avoided, which is a key factor in maintaining the health of the urban forest.

Tree Diversity. The planting of street trees should promote species diversity. To avoid a monoculture or over-dependence upon one tree species, the different species should be purposely distributed throughout the City. This reduces the threat of an insect or disease infestation that can devastate one or two species within a geographical area.

Tree Maturity. Anticipated mature tree sizes should be coordinated with planted boulevard width to reduce the potential for utility clearance problems or other conflicts. Generally,

plant the largest tree the site can support. It is generally desirable to have street trees be proportional to the width of the street (e.g., large trees for multi-lane roads).

Context. The selection of tree and plant species should consider characteristics that complement the surrounding area as well as the potential for seasonal interest. Regular repetition of some streetscape elements, such as street trees, helps to create a visually engaging environment.

Environment. All trees should fit the microclimate, soils, sun, moisture budget, and maintenance environment in which they are planted. This is a major concern in areas with high levels of pollution, salt, snow storage or automobile and pedestrian damage.

Tree Characteristics. Consider these characteristics when selecting a tree species:

- Choose the largest (mature) tree for the site taking in consideration site conditions. Select trees that will fit when they are mature. Be aware of space available for mature canopies and select appropriately shaped trees to match site conditions (e.g., columnar canopy in narrow areas, appropriate branching structure under overhead wires or cables).
- Choose trees with salt tolerant characteristics that match their expected exposure to chlorides in stormwater runoff, snow melt and above-ground spray.
- Trees should be consistent with the local environmental plant community especially when located immediately adjacent to a water body.
- Avoid invasive tree species.
- Select disease- and pest-resistant species.
- Choose trees with sun requirements appropriate for the location.
- Consider using drought-tolerant and/or low water-consuming species with water needs to match annual rainfall and available water.
- To the extent possible, select trees with a high relative leaf area to maximize stormwater runoff management functionality.
- To the extent possible, select trees with a large canopy to maximize shade coverage.
- To the extent possible, select trees that are long-lived and provide high carbon storage and carbon sequestration.
- Choose trees that minimize potential sidewalk heaving to maintain good pedestrian accessibility.

  Choose trees that are resistant to branch breakage during storms.

Installation and Establishment. Proper installation and establishment practices will reduce tree mortality and will promote plant health and vitality. Urban street trees in harsh environments rarely reach maturity. However, if sites are properly designed, and if trees are installed properly and provided with adequate care and water, especially during the initial establishment period, even downtown trees can thrive and provide the many environmental benefits of mature trees.

Tree Selection. When selecting a healthy tree, look for these characteristics:

- Strong, well-developed leader with good trunk taper

- Bright, healthy bark
- Healthy buds
- Trunk and limbs free of insect or mechanical injury
- Branches well distributed around trunk and of considerably smaller caliper than trunk
- Ideal spacing between branches of at least 8”-12” for most species
- Wide branch angle with no included bark for strength
- Low branches are good for aiding taper development and promoting trunk caliper growth. Low branches should be removed from street trees, however, to meet clearance requirements and to avoid vandalism.
- If bare root, look for abundant root growth, with numerous fibrous roots.
- If balled and burlapped, look for firm soil with trunk securely tied. Do not accept a tree with a broken or loose soil ball.

Tree Size. New trees must have a trunk diameter of at least one and three-quarters (1 ¾) inch, measured 6-inches above the ground, to be acceptable for planting. Under selected circumstances, trees with a smaller diameter may be planted after first receiving approval from the MPRB Forestry Division. Smaller diameter trees (e.g., 2 inch diameter) have been found to “catch up” in size with larger trees (e.g., 4 inch diameter) within a few years and have more vigor because they experienced less stress in the transplant process. Further, fewer trees will die in the transplanting process. In some circumstances, to avoid vandalism, larger diameter trees are installed. Additional care will be required during the establishment period of larger trees to enhance their survival rates.

Planting Times. Plant during temperate periods of the year, in spring or fall. Avoid planting during the extreme heat of summer.

Tree Roots. For spring planting, attempt to use bare root stock. Using bare root trees has several benefits, such as being less expensive than other trees and having retained most of their root mass, which is important for the tree to grow successfully. Unlike balled and burlapped (B&B) stock, bare root trees are easily planted and do not require expensive machinery to move them.

For balled and burlapped or containerized trees, the first main order root depth within the root soil mass should be determined. If the roots are found to be 4-inches or more below the soil, the tree should be considered unacceptable and not planted. If the roots are found to be less than 4-inches below the soil line, the excess soil above the roots should be removed prior to planting. This limits the potential for future stem-girdling roots to develop, which ultimately can lead to premature tree decline and death.

Important: it is necessary to keep tree roots hydrated before they are planted (bare root, B&B, and containerized). For bare root stock, consider dipping roots in hydrogel prior to transport to the planting location. Hydrogel is a potassium based copolymer that absorbs water and adheres to the delicate roots of the bare root trees protecting them from desiccation.

Planting Hole Dimensions. In order to provide favorable conditions for initial tree establishment in planted boulevards and in-street planting areas, an excavated planting

hole of 53 cubic feet (e.g., 7’-0” x 4’-6” x 1’-8”) is desired. Keep in mind that in addition to the 53 cubic foot planting hole , the tree still needs access to a much larger volume of soil as per Figure 18.

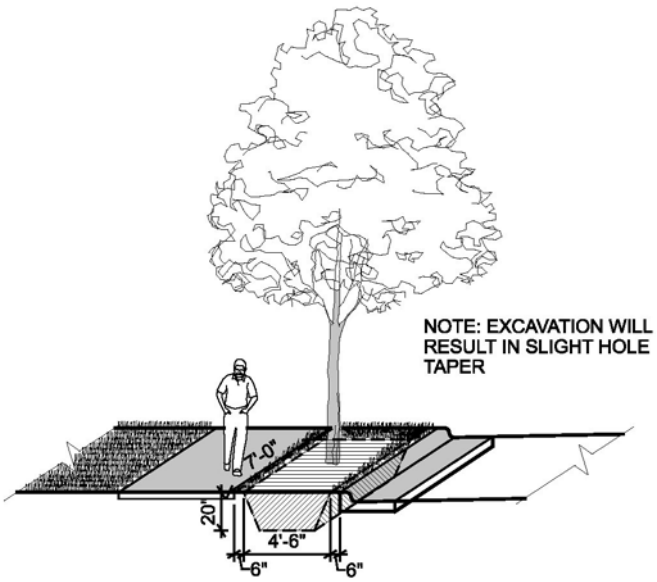


Figure 20: Planting Hole Dimensions

<u>Planting Depth.</u> The ultimate planting depth is determined by depth needed to place the tree root flare slightly above the finished grade. At this depth, the first main order roots should have less than 1-inch of soil coverage.

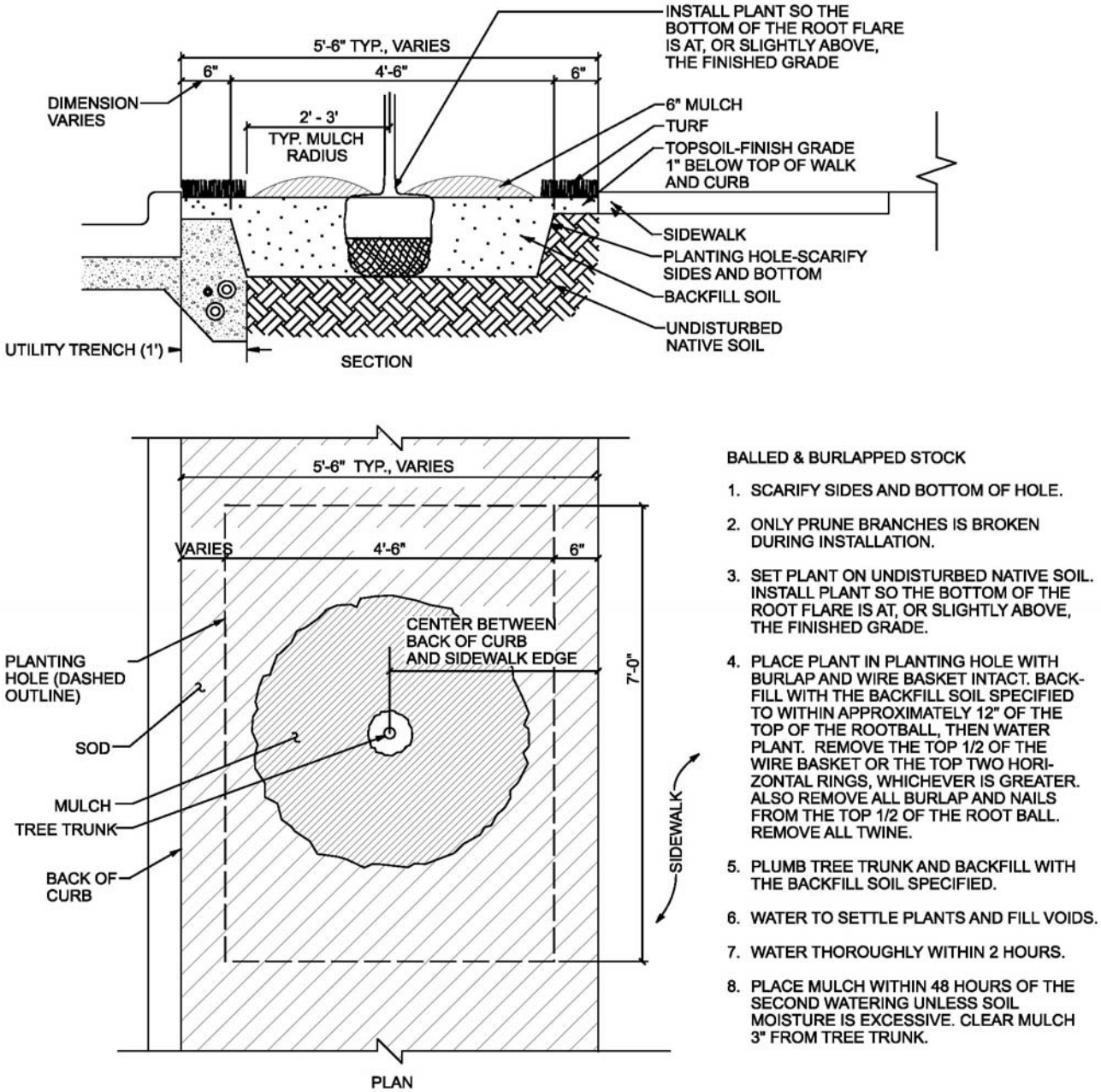


Figure 21: Boulevard Tree Planting Details (Balled & Burlapped)

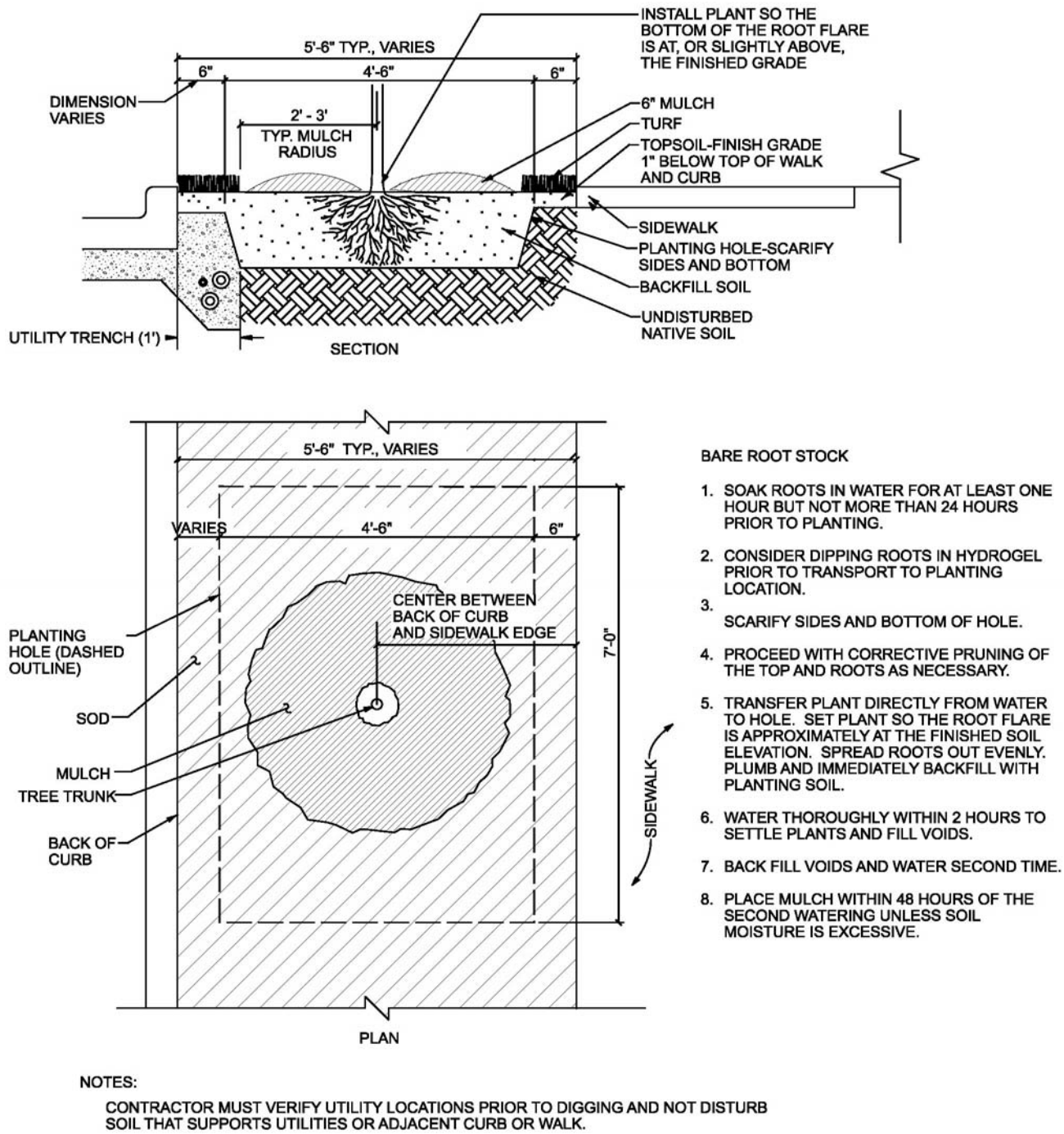
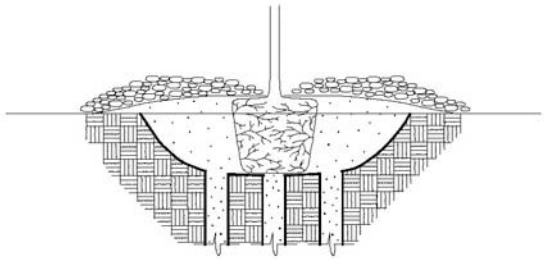


Figure 22: Boulevard Tree Planting Details (Bare Root)

<u>Drainage.</u> The greatest permeability must be immediately around each tree (*100 square feet minimum recommended, of open and/or planted surface area*). For trees planted in tree pits or tree trenches, the use of pervious pavements is recommended to increase permeability adjacent to the tree. Ensure water will drain completely from root zone to allow ample air supply. MPRB Forestry Division may require testing of soils for adequate drainage. If testing is required (and after utilities have been marked through the Gopher State One Call process), dig one-foot deep holes at locations designated by Forestry staff and fill with water. If these potholes do not drain within 24 hours, include supplemental

approved draining methods or make soil amendments to the planting pit and re-test for proper drainage.



1. EXCAVATE HOLE OR BED TO ALLOW PLACING THE TOP OF ROOT MASS 1"-3" HIGHER THAN FINISHED GRADE.
2. AUGER A GRID OF 8" DIAMETER HOLES (4 HOLES PER TREE MINIMUM) ENTIRELY THROUGH IMPERVIOUS OR POORLY DRAINED HARD PAN SOIL LAYER TO ADEQUATELY DRAIN SUBSOIL.
3. THOROUGHLY BACKFILL AUGER HOLES WITH A UNIFORM INCORPORATED MIXTURE OF 50% SAND AND 50% EXCAVATED SOIL.
4. TEST FOR POSITIVE DRAINAGE. DISCUSS NEXT STEPS WITH FORESTRY, IF HOLE STILL DOES NOT DRAIN ADEQUATELY.
5. COMPLETE PLANTING ACCORDING TO INSTALLATION OF PLANTS.

Figure 23: Planting Detail for Poorly Drained Soil

Ongoing Watering. Water newly planted trees thoroughly once every seven to ten days during dry periods in the spring, summer, and fall. Trees less than five years old need at least 5-10 gallons of water slowly absorbed into their roots once every seven to ten days. Water trees during dawn, dusk, and/or night to avoid losing water to evaporation.

> ***Drip Irrigation Bags.*** Consider using drip irrigation bags to improve the efficiency of watering. Drip irrigation bags provide a slow release of water over the root zone of the tree.

Tree Mulch. Mulch is important because it simulates a natural setting by holding moisture, improves water infiltration, reduces stormwater runoff, enriches soil fertility and texture, inhibits the growth of weeds, assists integrated pest management, reduces erosion and also acts as a barrier to lawn mower damage. Planting is not considered finished until the new tree has been mulched. Street trees installed by MPRB will be mulched as needed by MPRB for five years.

Mulch trees with three to six inches of shredded or chipped wood mulch. Keep mulch away from tree trunks to prevent molds and pests from invading the tree. Never mound mulch at the base of plants. Place mulch in a 2 – 3 foot radius around the tree bases to eliminate root competition with turf and allow trees to take advantage of all water and nutrients within that zone. Set the top of mulch 1 inch below the sidewalk. This keeps mulch from being blown or watered out of the boulevard. Do not use weed barrier fabric in planted boulevards unless directed by the MPRB Forestry Division.

Tree Guards. Tree guards are generally discouraged, but may be appropriate on heavily traveled sidewalks for the protection of newly planted trees. They may also be appropriate adjacent to heavily used bus and light rail stops, around school buildings, and adjacent to other land uses with associated activities that may be considered detrimental to tree health and safety. Tree guards will need to be removed as trees mature.

Tree guards should be of an attractive design, not possess any sharp edges, and made of durable material. Tree guards should be a minimum of 18 inches in diameter, and provide a minimum distance of 9 inches from the tree trunk at the time of planting. Tree guards are an opportunity to provide a special design and incorporate public art.

[possibly add illustration of tree guard]

9.2.3 Other Types of Vegetation

This section covers other plant types that occur in planted or paved boulevards or in-street planting areas, such as low shrubs, perennials and grasses. To prevent erosion, all areas with exposed topsoil must be planted with vegetation.

Species Selection. As with street trees, proper site and species selection is paramount to providing the many economic and ecological benefits of vegetation such as reducing stormwater runoff and pollution, providing wildlife habitat, and stabilizing soils. By planting a variety of climate and environment appropriate species (e.g., native and other hardy non-invasive species), monocultures of one species can be avoided, which is a key factor in maintaining environmental health.

Plant Selection. Planting choices should be salt-tolerant, drought-tolerant, low maintenance and should consider micro-climate, specific site conditions, and their aesthetic value. Species should be indigenous or proven adaptable to the local climate and should not be invasive on native species. These plantings in particular need frequent weed control, as well as correct watering and pruning to remain attractive and healthy. It should be noted that all plants compete with street trees for air and water. Native grasses are the most complimentary plant to street trees. Perennials are preferred over annuals. Planting annual flowers or plants in boulevards is discouraged as it badly disturbs shallow tree roots, which are the majority of a tree's roots.

All landscapes require maintenance, especially new plantings during their establishment period, which can extend several years.

Vegetation Permitted. Most planted boulevards are planted with mown turf grass. Turf grass may be planted without a city permit. Salt-tolerant sod should be used. (Refer to Mn/DOT 3878.2C for specification). [Will add web site address.]

Other plant types that are allowed are perennial and annual flowering plants, shrubs, groundcovers, and native grasses. However, planting new vegetation shall not disturb the roots of existing trees. The plants must not be taller than 18 inches if they are installed within 20 feet of an intersection, driveway, or alley, or within five feet of a public utility fixture, such as a fire hydrant. Otherwise, the plants must not be taller than 36 inches. The height limitations are in place to maintain good sight lines.

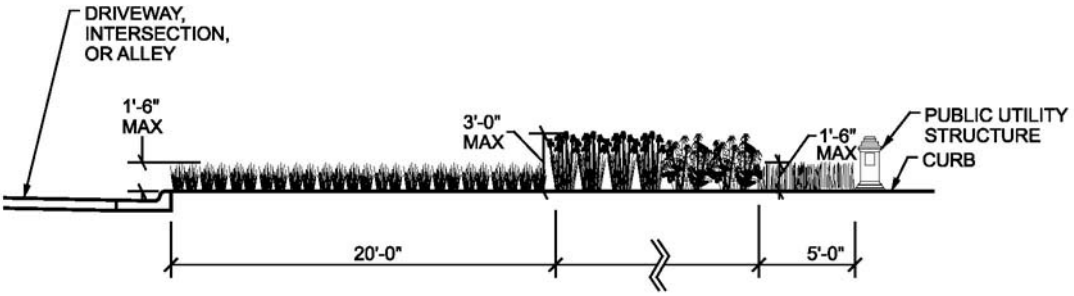


Figure 24: Ground Vegetation

Installing perennial and annual flowering plants, shrubs, groundcovers and native grasses is allowed without a permit, provided it is done in compliance with Minneapolis Code of Ordinances 427.10 and no excavation for rain gardens is involved. For guidelines about excavating for rain gardens, see Section 9.1.5.

Context. The selection of plant species should consider characteristics that complement the surrounding area.

Employ Good Design. Be aware of all site constraints and plan accordingly. Consider plant form, mature height, spread, and seasonal color. Simple designs and masses of a few plants often work better than very diverse and complicated designs.

Installation and Establishment. Proper installation and establishment practices will reduce plant mortality and will promote plant health and vitality.

Planting Times. Plant during temperate periods of the year, in spring or fall. Avoid planting during the extreme heat of summer.

Spacing. The following spacing guidelines provide a starting point for determining quantity of plants needed per 100 square feet of area, but spacing may vary by species. For best results consult with a landscape architect, horticulturalist, master gardener or equivalent.

- Perennials, 1.5-foot spacing on center (45 plants)
- Ground cover, 1' spacing on center (100 plants)
- Small shrubs, 2' spacing on center (25 plants)

Mulch. Mulch is important because it simulates a natural setting by holding moisture, improves water infiltration, reduces stormwater runoff, enriches soil fertility and texture, inhibits the growth of weeds, assists integrated pest management, reduces erosion and also acts as a barrier to lawn mower damage. Planting is not considered finished until mulch has been applied.

Mulch shrubs and perennials with two to four inches of shredded or chipped wood mulch. Keep mulch away from stems to prevent molds and pests from invading the plant. Never mound mulch at the base of plants. Place mulch in a 2 – 3 foot radius around plants. Set the top of mulch 1 inch below the sidewalk. This keeps mulch from being blown or watered

out of the boulevard. Do not use weed barrier fabric in planted boulevards unless directed by the MPRB Forestry Division.

Erosion. Keep the surface of the boulevard, whether sod or mulch, 1–inch below the top of sidewalk and top of curb to avoid soil or mulch washing onto the street or sidewalk. This also keeps more water on site for use by trees and other vegetation.

Existing Trees. Planting new vegetation shall not disturb the roots of existing trees. Rototilling within 6 feet of young trees or beneath a tree's dripline, whichever is greater, shall not be permitted. New plants must be installed in a manner that tree roots are not severed during the process.

9.2.4 Warranty and Establishment Period Maintenance -- Trees. During the first five years after installation it is critical for trees to receive adequate watering and care. The warranty period is typically not longer than two years. Therefore, each project needs forethought as to who will be responsible for watering, weeding and other maintenance activities after the warranty period.

Warranty. Installation contractors should be required to provide a two-year warranty and establishment period that includes a watering schedule, inspection for pests, keeping trees plumb, mulch replenishment and necessary tree replacement. Contractors will submit watering records to the project's construction inspector on a bi-weekly basis during the growing season (April – November) during the two year establishment period.

Establishment Period Maintenance. During the two-year establishment period, the installation contractor shall be responsible for all maintenance operations associated with the newly installed plant material. Maintenance operations shall include inspecting and reporting, watering, mulching, weeding, staking and guying (if necessary), performing corrective pruning of damaged tree branches, and necessary tree replacement. Additional maintenance requirements of the contractor shall be outlined in the contract documents.

9.2.4 Warranty and Establishment Period Maintenance – Plants other than Trees. [text to be added]

9.3. Construction Process Requirements

9.3.1 Gopher State One Call Utility Locates. All existing underground utilities need to be located and marked by utility companies prior to street tree planting through the Gopher State One Call Utility Locate process. Street trees should not be installed until a review has been performed of all utility requirements (e.g., easement requirements) that may affect tree planting or siting.

9.3.2 Permits. Requests for a tree planting permit in the street right-of-way must be made to the MPRB Forestry Division, which has the authority to approve or deny a permit request if it is in the public's best interests. Locations that require one or more sidewalk panels to be removed must have an approved permit from the Department of Public Works – Sidewalks Section.

Types of Permits. There are two types of permits governing the planting of trees on public property in the City of Minneapolis, property owner permits and non-property owner permits:

Individual Property Owner Permits:

- Requested by an individual property owner or someone representing the property owner.
- Typically involves one to five trees at a specific address.
- If a permit is issued, Forestry Division may provide the applicant with written instructions on proper preparation, conditions and planting techniques.
- The applicant is responsible for notifying the Forestry Division after the planting is complete.
- If conditions of the permit are not adhered to, the property owner will be notified of the problem and required to rectify the situation. Failure to do so will result in corrective action being taken by Forestry Division at the expense of the property owner.

Non-property Owner Permits:

- Requested by an organization such as a neighborhood association, a corporation or a not-for-profit group.
- Typically involves more than five trees at various addresses.
- In order for a permit to be issued, the MPRB Forestry Division will require the name of an individual who is representing the organization and must be involved in the planning and publicity of the planting event. The extent of this involvement will be detailed in the permit and is designed to promote partnerships with the community. This ensures that the plantings are done properly and that the MPRB Forestry Division, acting in the public's best interest, maintains control over the project.
- If a permit is issued, the MPRB Forestry Division may provide the cooperator with instructions on proper preparation, conditions and planting techniques.
- If conditions of the permit are not adhered to, the cooperator will be notified of the problem and required to rectify the situation. Failure to do so will result in corrective action being taken by Forestry at the expense of the cooperator.

Other Permits: [Yet to come]

Illegally Planted Trees. Because a permit is required prior to planting a tree within a street or alley right-of-way, the MPRB Forestry Division will review illegal plantings to determine if they should be removed. If removal is necessary Forestry will notify the property owner and require the tree's removal or transplant onto private property by a specified date. If the deadline has not been met the MPRB Forestry Division will remove the illegally planted tree or transplant it to a new location.

9.3.3 Variances
[Describe process used to apply for a deviation from design criteria included in the manual.]
[Yet to come]

9.4 Maintenance Guidelines and Responsibilities

All landscapes require maintenance, especially during the first few years as the plants' roots become established. These plantings in particular need frequent weed control, as well as correct watering and pruning to remain attractive and healthy.

9.4.1 Supplemental Watering and Weeding If Needed

Boulevard Plantings. Vegetation within the boulevard, including curb extensions, outside of Special Service Districts, are the maintenance responsibility of the abutting property owner.

Watering Needs of Trees. Each tree that the MPRB plants on boulevards receives two initial waterings, after which watering becomes the responsibility of each property owner. A new tree requires the following watering needs:

- **Newly planted trees** Water thoroughly once every seven to ten days during dry periods in the spring, summer, and fall. The dose per watering would be approximately 2 gallons per inch of trunk diameter.
- **Trees less than five years old.** Water slowly once every seven to ten days with at least 5 - 10 gallons of water. Alternatively, water trees for an hour, with a gently running hose under the crown of the tree.
- **Rainfall requirements.** Generally, trees require an inch of water each week. Additional watering is not needed when rainfall has been adequate.

Spring Flushing. Annual spring flushing helps rid soils of salt (not applicable in clay soils) while the tree is mainly dormant.

Weed Removal. Weeds can be unsightly and can compete with trees for essential moisture. Remove weeds from the mulched area by hand, not with herbicide, and try to keep the mulch from mixing with the surrounding soil.

***In-street Planting Areas*.** Plantings within medians, traffic circles, roundabouts and cul-de-sac areas are the maintenance responsibility of the City, sometimes undertaken by other parties through agreements.

Watering Needs.

- **Newly planted trees** Water thoroughly once every seven to ten days during dry periods in the spring, summer, and fall. The dose per irrigation would be approximately 2 gallons per inch of trunk diameter.
- **Trees less than five years old.** Water slowly once every seven to ten days with at least 5 - 10 gallons of water. Alternatively, water trees for an hour, with a gently running hose under the crown of the tree.
- **Rainfall requirements.** Generally, trees require an inch of water each week. Additional watering is not needed when rainfall has been adequate.

Weed Removal. Weeds can be unsightly and can compete with plants for essential moisture. Remove weeds from the mulched areas by hand, not with herbicide, and try to keep the mulch from mixing with the surrounding soil.

9.4.2 Pruning and Inspection

Pruning Authority. General pruning maintenance of trees within the street right-of-way is the responsibility of the MPRB Forestry Division. Pruning of street trees by others/adjacent property owner is only allowed on a permit basis. The MPRB Forestry Division will prune trees in the urban forest for the following reasons:

- To remove limbs which either may or are rubbing a building.
- To remove dead limbs that could fall and cause damage or injury.
- To remove low limbs interfering with pedestrian or vehicular traffic.
- To remove branches that block traffic signs and signals.
- To remove branches that block street light illumination over the traffic corridor.
- To improve tree health by removing diseased limbs, reducing wind resistance and correcting growth defects.
- To improve the aesthetic appearance of the tree.
- To reduce the potential for criminal activity by eliminating hiding places and increasing visibility.

***Pruning Guidelines*.** Proper pruning and maintenance of trees should allow trees to develop healthily and retain their natural form. The following pruning criteria should be followed:

- On the pedestrian side of the sidewalk, the lowest tree branch that extends over the path of travel should provide a 7-foot minimum vertical clearance.

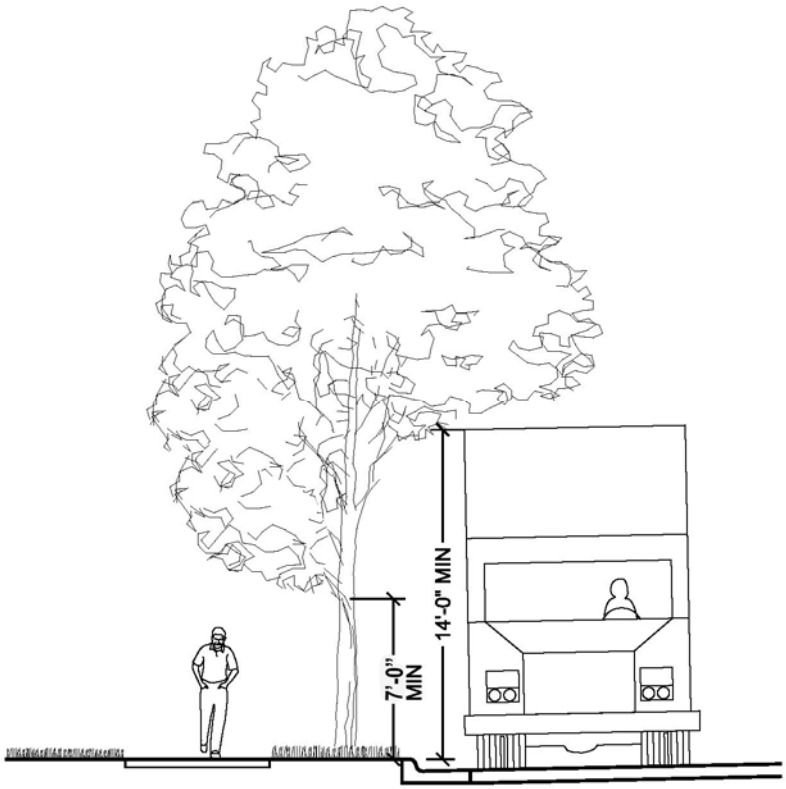


Figure 25. Street Tree Clearance

On the vehicular traffic side, the lowest branch should provide a 14-foot minimum clearance, where branches extend beyond the curb.

- Newly planted trees should not have branches that extend beyond the perimeter of the tree basin below the 8-foot minimum vertical clearance.

***Arborist Certification for Tree Servicing*.** An applicant for a Tree Servicing license in Minneapolis must provide proof that at least one employee of the tree servicing business is currently recognized by the International Society of Arboriculture (ISA) as a Certified Arborist at the time of their license application or renewal.

***Service Standards*.** Tree servicing companies must comply with American National Standards Institute (ANSI) Standard A300 when pruning or otherwise servicing trees on public property. The practices of tree-topping and using spikes for anything other than tree removals or emergency rescues are prohibited as tree care practices on public trees.

***Trees under Utility Wires*.** Trees that are currently growing beneath overhead utility lines and interfere with them need to be pruned by the utility company in order to preserve their function and integrity. Utility companies must obtain permission from the MPRB Forestry Division prior to pruning. The utility company may be required to provide a map of the area where the pruning will occur. If the Director of Forestry determines that it is necessary, Forestry may meet with representatives of the utility company and instruct them in the manner in which the trees are to be trimmed.

9.4.3 Tree Health and Maintenance

***Maintenance Responsibility*.** The area between the curb and property line, including sidewalks, is the maintenance responsibility of the abutting property owner. Property owners (or their tenants) should keep watch over city-owned trees on their boulevard and property, to help prevent problems. Property owners (or their tenants) should maintain mulch around street trees. New trees should be checked on once a week to look for any diseases or other problems. Report any insect, fungal, or other noticeable damage to the MPRB Forestry Division at 612-379-4600 and the tree will be inspected.

Root Health. Applying mulch as a tree grows can help preserve root health. It is best to maintain a 4" - 6" layer of mulch around trees. Coarsely shredded bark or wood chips are good mulch materials. The coarser the mulch, the better, because finely shredded mulch can bury the tree base, possibly causing death. Keep the mulch a few inches away from the trunk of the tree. This will reduce the potential for damage due to excessive moisture and rodent damage. As the tree grows, the mulched area should expand with the tree.

***Wires or Other Materials Damaging Trees*.** Wire, strings of lights, plastic ties, or other materials that encircle, burn, cut or chafe any part of any tree, whether trunk, root or branch should not be placed on street trees, nor should electricity outlet boxes be mounted on trees. A loose draping of lights in tree branches is typically allowed. When found, adjacent property owners will be given a written notice from the MPRB to remove such elements in three (3) days. If not appropriately

addressed in the designated timeframe, the MPRB Forestry Division has the authority to remove them.

[add graphics to illustrate, for example, difference between loose draping and encircling branches]

9.4.4 Managing for Snow and Ice Control Practices

***Sidewalk Snow Removal*.** The area between the curb and property line, including sidewalks, is the maintenance responsibility of the abutting property owner.

***Snow Storage*.** Boulevard areas provide snow storage for snow removed from the sidewalk.

***Spring Flushing*.** Trees should be flushed with water in the spring to wash away salt and debris from street snow removal.

9.4.5 Root Protection During Street, Sidewalk or Utility Work

The health of street trees is directly related to the condition of their roots. Root loss is the most common cause of tree decline, either direct root loss from trenching or regrading, or indirectly from roots dying in compacted, poorly drained or dry soils. Over 90 percent of a tree's root system is in the top three feet of soil and over 50 percent is in the top foot. The Critical Root Zone is the area underground that contains the most important types and amounts of roots.

Each year, the MPRB must be provided with the City's sidewalk improvement plan for that year, prior to commencement of construction of sidewalk improvements. Sidewalk contractors are to attend pre-construction training with MPRB staff. MPRB inspects sites and provides guidance and direction regarding root protection.

***Protected Root Zone* (*PRZ*).** The Protected Root Zone (PRZ) is the minimum area of root mass beneath a tree that must remain undisturbed during construction to give a tree a reasonable chance of survival. The PRZ must be protected from soil compaction, root damage, chemicals spills, soil excavation, and other construction-related activities. Soil compaction is a common tree killer and is caused when soil pore space is reduced due to stockpiled construction materials, heavy machinery, foot traffic, and other intensive surface activities within the PRZ. This action results in root suffocation that slowly kills the tree, sometimes years after the construction work has been completed.

THIS PARAGRAPH NOT READY Maintain the PRZ around each tree where construction equipment and materials cannot be placed or piled, to avoid soil compaction and damage. The PRZ is delineated by the greater of two measurements. The first measurement is determined by measuring the tree's diameter in inches at 4.5 feet (chest height) above the ground, then multiplying that number by 1.5 feet. The resulting product expressed in feet is the radius of the PRZ. (*Example:* 8 inch circumference; 8 in. x 1.5 ft. = 12 feet. PRZ radius). The second measurement is to the tips of the outermost branches, or dripline. The PRZ extends to the greater of the two measurements (diameter at chest height times 1.5 feet, or dripline). Usually the first measurement results in the greater distance. Once the PRZ is determined, it must be delineated by erecting a temporary fence along the perimeter, minimum 3' height. The PRZ for boulevard trees

typically runs into the street, but in cases when fencing cannot extend into the street, the protective fencing must run along the curb line.

Figure 26: Protected Root Zone [figure to be added]

***Root Removal*.** The contractor may shave the roots within the area defined as six and one half (6-1/2) inches below the top of the new finished sidewalk grade, by grinding them off using a root grinding machine. They are not to be broken off with a backhoe or similar equipment. If necessary to sever roots, they must be severed cleanly with a sharp axe.

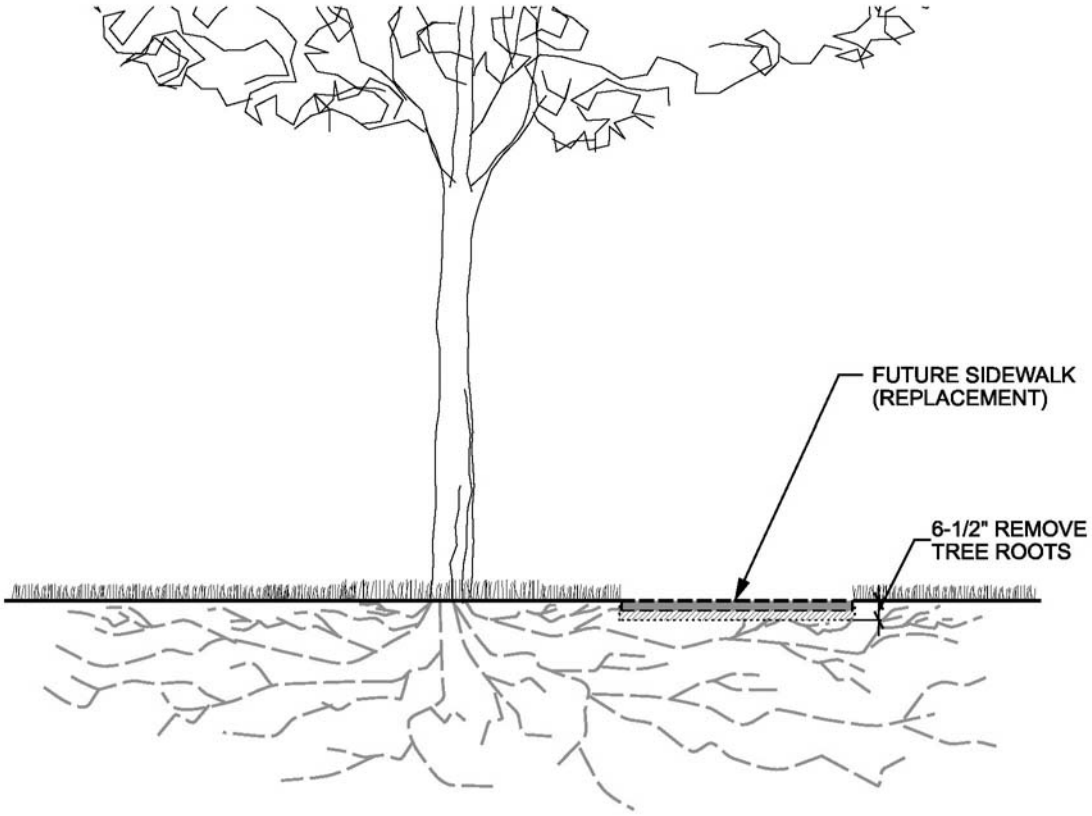


Figure 27: Root Removal

***Root Protection Threshold*.** During excavation, when it becomes necessary to expose or cut tree roots that are greater than one (1) inch in diameter or are within the PRZ of any tree, the contractor has a duty to protect the roots in accordance with City and MPRB policies and specifications. [More specificity needed here]

***Tree Protection*.**

- Install and enforce protective barriers or fences (3' minimum) and signage to designate the Protected Root Zone around each tree where construction equipment and materials cannot be placed or piled, to avoid soil compaction, damage to roots, or damage to trunk;
- No dumping of petroleum products, herbicides or other chemicals;

- Construction debris shall not be deposited, left or buried within a PRZ;
- The area inside the barricade should be cleared or worked with hand tools;
- Don't allow trees to stand in water;
- Cement/concrete mixers, paint containers, and solvent containers shall not be rinsed out in the PRZ.

9.4.6 Pest and Disease Prevention

***Inspection*.** Residents should keep watch over city-owned trees, to help prevent problems.

- Check new trees once a week to look for any diseases or other problems. [describe what to look for]
- Report any insect, fungal, or other noticeable damage to the MPRB Forestry Division (612-379-4600) and the tree will be inspected.

***Emerald Ash Borer Prevention*.** The destructive potential of emerald ash borer is enormous because there is no known cure. On public property, Minneapolis may lose approximately 38,000 ash trees growing on boulevards. The cost of removal, stump grinding and replanting of these trees would exceed $26 million, not including the cost of replacing the tens of thousands of ash trees growing in parks and natural areas such as along the Mississippi River corridor. Transporting infested firewood poses the biggest risk of introduction, so the simplest way to slow the spread of emerald ash borer is to not move firewood. [need to update RE recent ordinance changes]

***Dutch Elm Disease*.** The MPRB Forestry Division inspectors begin looking for signs of Dutch Elm Disease in the spring, usually yellowing and wilting of foliage. Trees that show signs of the disease are tested and diseased trees on public property are removed. Infected trees need to be removed promptly to avoid spreading the disease to other trees. Trees are marked with a red "X" when they are to be removed.

Planting a replacement tree after diseased tree removal is dependent upon funding and typically takes place in the spring. Diseased trees measuring 6 inches in diameter or less are automatically scheduled for replacement. Otherwise, residents are encouraged to call to be considered for a new tree. Residents wanting to plant their own tree need to request a permit from the MPRB Forestry Division.

***Emergency Response Plan*.** The MPRB and the City's Environmental Services Division coordinate an Invasive Insect Pest Emergency Response Plan. The Plan includes education and public awareness for potential infestations, and examination of City ordinances regarding applicability for not only Dutch Elm Disease, but also Emerald Ash Borer, Asian Long-horned Beetle, Gypsy Moth, Sudden Oak Death, or other potential tree pests or diseases.

9.4.7 Interference to Traffic Movement and Visibility of Traffic Signs and Signals

Citizens can contact the MPRB Forestry Division to request that certain trees interfering with traffic movement or blocking sight lines to traffic signals or signs be pruned.

Trees may be pruned by the MPRB Forestry Division to remove branches interfering with traffic movement and/or blocking sight lines to traffic signs and signals.

9.4.8 Expandable Pavement Openings and Tree Grates

Maintenance is need when grates or pavement sidewalk have settled, heaved, are broken or are uneven, creating a potentially hazardous situation.

Grate rings must be removed when trunk is within 1.5 inches of the smallest removable ring.

Expandable pavement and tree grate maintenance are the responsibility of the Minneapolis Department of Public Works Sidewalk Division.

9.4.9 Tree Removal

***Requests and Approval*.** The MPRB Forestry Division, acting in the best interest of the public, determines whether a tree on public property must be removed. Requests for tree removal must be made to the MPRB Forestry Division. Keep the following in mind with regard to Tree Removal Permits:

- The MPRB Forestry Division has the authority to deny a permit request if it is in the public's best interests for a tree to remain.
- In the event that a removal permit is permissible then the property owner must compensate the MPRB for the tree before the request can be accommodated. This compensation must be for the value of the tree to be removed and/or the cost of the work.
- The Director of Forestry has the authority to negotiate the rate and amount of compensation.
- If the tree can be transplanted to a new public location then the property owner may be required to arrange and pay for the transplanting as specified and coordinated by the MPRB Forestry Division.
- Permitted removals or transplanting must be done contractually by a company that is licensed by the City of Minneapolis to do tree work.
- The cost of a removal shall be the responsibility of the permit applicant.
- If a permit is required, the conditions of the permit must be adhered to. Failure to do so will result in corrective action being taken by the MPRB Forestry Division at the expense of the property owner.

***Removal Costs*.** The MPRB is responsible for costs associated with tree removal for trees growing:

- On boulevards
- In the public right of way of streets or alleys
- On easements behind sidewalks
- On park land
- On city-owned property
- On other municipal public property

***City Initiated Tree Removals*.** In addition to permitted tree removal, the MPRB removes trees on public property for the following reasons:

- Disease

- Dead and/or declining
- Structurally hazardous
- Undesirable species
- Threat to the health and well being of the public and/or urban forest

When asked to do so, the MPRB Forestry Division will explain the rationale behind the decision to remove a tree. However, the final decision as to whether a tree is removed rests with the MPRB Forestry Division.

***Public Notice*.** The public is notified by the MPRB Forestry Division that removal is pending by:

- A painted orange ring around the tree (indicates diseases)
- A painted orange X (indicates other reason for removal such as being hazardous)
- A door hanger (when possible) to inform the resident that the tree is scheduled for removal

***Commercial Signage*.** Requests for removal in order to provide visual clearance for commercial signage or other signage of an advertising nature will be reviewed by the MPRB Forestry Division on an individual basis.

***Driveway Aprons and Other Construction*.** Requests for tree removal in order to accommodate the construction of driveway aprons or other projects will be reviewed by the MPRB Forestry Division on an individual basis.

***Sewer Lines*.** [language under review]

***Sidewalks*.** The MPRB Forestry Division will not remove trees for the purpose of sidewalk repair. In situations where tree roots are lifting a sidewalk, it is the property owner's responsibility to repair the sidewalk. Enforcement of this procedure is the responsibility of the Minneapolis Department of Public Works Sidewalk Section. Minneapolis Public Works assesses adjacent property owners for the cost of sidewalk repairs. The PRZ is applicable for sidewalk repair around street trees.

***Underground Utility Lines*.** [language under review]

***Views or Vistas*.** Requests for removal in order to provide or enhance a view or vista will be reviewed on an individual basis by the MPRB Forestry Division.

[END]