



# Best Practices for Boulevard Tree Selection

Report # 2024RIC04



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# Introduction

Boulevards are the open space, located just behind the curb, along a roadway. Boulevards serve the essential functions of providing snow storage space for roads and sidewalks, a place for rain and runoff to soak into the ground, and attractive green space in the neighborhoods of our cities. Street trees, or trees planted in the boulevard along a roadway are valuable environmental infrastructure as they save energy and lower temperatures, reduce greenhouse gases, reduce stormwater runoff, and improve aesthetics.

Thoughtful planning ensures that the right tree is planted in the right place and with the right maintenance. However, boulevards are often a challenging location to plant trees because of the limited space, utility conflicts, and salt residue from winter maintenance among other factors. This guide will help evaluate the feasibility of the boulevard to support tree planting and suggest tree species with a higher survivability rate for use in the boulevard.

Residents and business owners may be concerned about who is responsible for the care and maintenance of trees planted in the boulevard and the cost. City staff and elected officials who support healthy tree lined neighborhoods seek communication resources to convey the many positive attributes of planting diverse tree species. The following best practices are recommended for the successful tree selection for planting in boulevard locations.

## Technical Advisory Panel

Daniel Wattenhofer <i>Hennepin County</i>	Jeff Haberman <i>City of Rochester</i>
Cari Pederson <i>City of Duluth</i>	Paul Sandy <i>WSB</i>
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Since 1959, the Minnesota Local Road Research Board has completed successful research and implementation products supporting local agencies. The secret of this success is the outstanding knowledge within the city and county communities and the willingness to share that expertise to address shared needs.

A special thank you to this outstanding Technical Advisory Panel!

# The Right Tree

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Communities seeking success in placemaking and improved green space in the boulevards are encouraged to develop a Street Tree Master Plan. In 2008, the Minnesota Local Road Research Board developed [The Road to a Thoughtful Street Master Plan: A practical guide to systematic planning and design](#) for communities to evaluate their goals and objectives along with the decision-making guidance to maximize investments in a successful street tree program. However, based on a survey of Minnesota's cities and counties, very few communities have the available resources to complete such a plan. Even without a full plan, communities can develop key elements to promote success. A perfect first step is developing an approved tree species list. Developers of a community's list might consider key design factors of a streetscape such as balance – creating symmetry or thinking about sequence, repetition, and diversity – by creating variation with continuation. Diversity is critical when developing a community tree species list to ensure a vibrant and healthy streetscape for generations to enjoy should specific genus become vulnerable. Understanding principles of designing a streetscape can create unique neighborhoods with an identifiable sense of place.



**Green tree-lined streets**  
reduce anxiety,  
making you feel  
more positive and calm,  
improving your attention  
and help with recovery  
from stressful situations

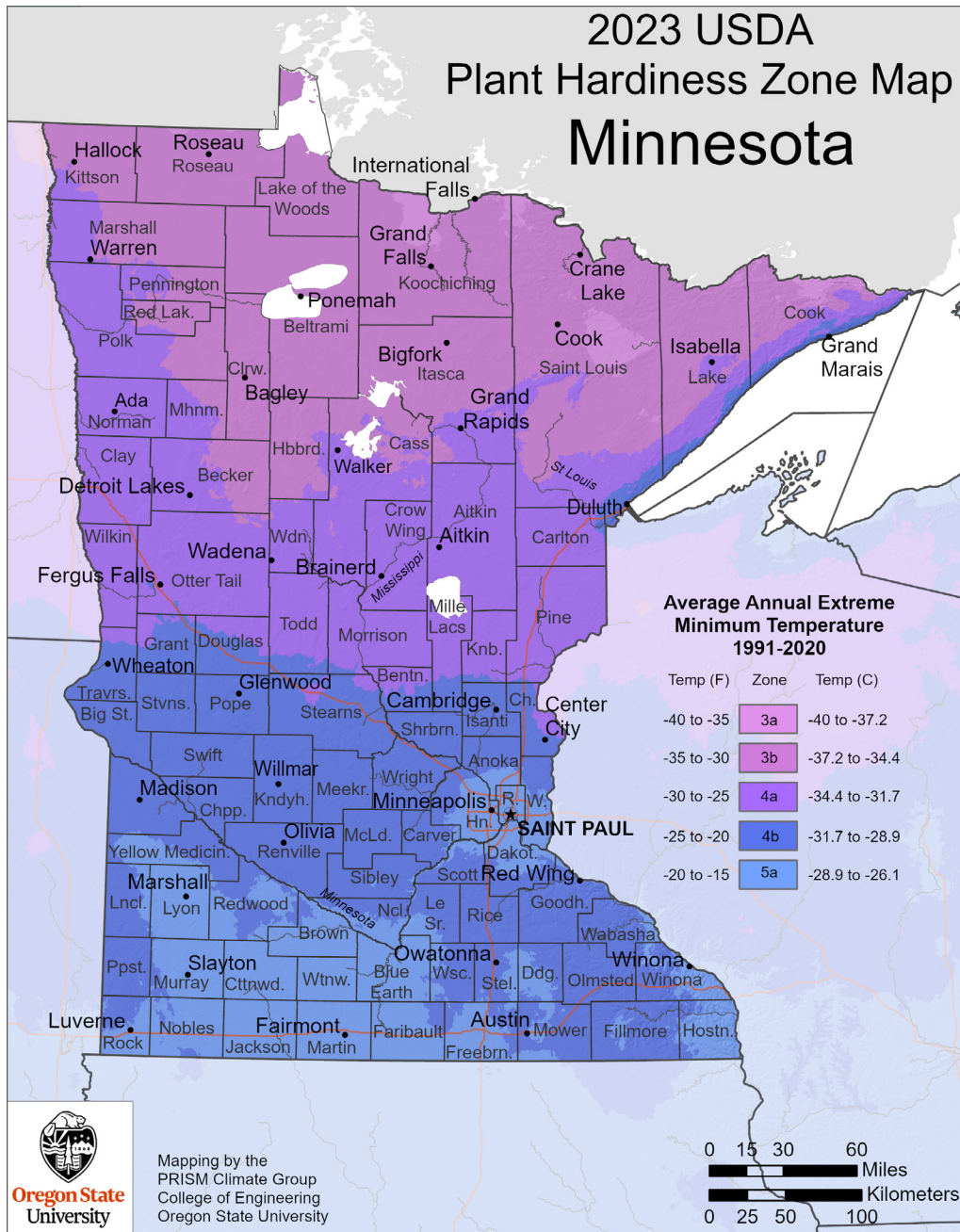
Source: <https://www.everywomanover29.com/blog/green-tree-lined-streets-reduce-anxiety-making-you-feel-more-positive-and-calm-improving-your-attention-and-help-with-recovery-from-stressful-situations/>

Each community should reflect on what key factors represent their city for boulevard tree selection. Hardiness, foliage, tree height and spread of the canopy, vulnerability to disease and Minnesota's changing climate are reviewed as key considerations. Ultimately, selection priorities will focus on those species that demonstrate favorable growth and limited vulnerabilities from disease, climate, and infrastructure conflicts.



## HARDINESS

Selecting varieties hardy to a community must be the top priority in developing a tree species list. In the fall of 2023, the USDA Plant Hardiness Zone Map (PHZM) was updated. The map indicates a warming trend over the last 30 years. This does not mean a community should immediately add or eliminate any species for boulevard planting, but city foresters and arborists are encouraged to explore other possibilities or vulnerabilities for the specific area.



Many tree species can gradually acquire cold hardiness in the fall when they experience shorter days and cooler temperatures. Extremely cold weather early in the fall might injure plants even though the temperatures may not reach the average lowest temperature for your zone. Similarly, warm weather in midwinter followed by a sharp change to seasonably cold weather may cause injury to plants as well. This has been experienced in Minnesota and should be considered when using the updated USDA PHZM as part of the boulevard tree species selection for your area.

## HEIGHT, CROWN SPREAD and TRUNK DIAMETER

Several responding communities categorize their tree species list by height or crown spread (otherwise labeled canopy) which aids the selection process given the location. Trees classified as shade trees generally have a large canopy. Ornamental trees might be listed to provide visual interest through texture or form and may be focal points or signature trees of a community or a neighborhood. When ornamental trees are planted close together (15-20 feet apart) forming a continuous canopy, they provide some of the canopy benefits of a larger stature tree.

Crown spread and height can be considerations for interference with street lighting as well as other overhead utility conflicts.

An additional consideration is the production of fruit or seed pods for certain species. Some trees may not be desirable where keeping the sidewalk clear is a priority.

Some cities noted that the minimum distance from the back of the curb is dependent on the trunk diameter with a minimum of 3 feet then increased by 1 foot for every 12 inches of mature trunk diameter at breast height. As an example, a red oak tree with a typical diameter of 36 inches should be planted 6 feet from the back of the curb minimum.

Understanding the diameter of the trunk at full maturity for each species will also aid in selection for locations in the boulevard. In the example above, the boulevards with adequate space for red oaks are limited. Success of your tree species selection will reflect regional success and low mortality varieties. Likewise, mature trunk diameter and flare will vary by region and should be monitored for each community to adjust their species list or at a minimum, to better identify location limitations such as narrow boulevards with utility, sidewalk, or curb conflicts.

### An Expert Note about DBH – Diameter at Breast Height

*I wish there was such a thing that listed all of the mature diameter at breast height or DBH sizes of different tree species, but it doesn't exist. I will explain why: it depends! It depends on the growing site (rich, organic, moist soil vs. urbanized soil soaked in with deicing salts), the amount of soil the tree is growing in (field situation vs. a 4' wide boulevard), and region.*

*One of the things I recommend is for a community to identify the trees most common to the community or the trees the community would like to grow. Then, conduct some random sampling either in the community or in the region. Look for the biggest in the boulevards, parks, campuses and measure them. Then average it and you'll get an idea of what to expect.*

**Gary Johnson**

*Professor Emeritus  
University of Minnesota*

## Setbacks from curbs and sidewalks

Mature Trunk Diameter	Recommended Minimum Setback	Minimum Boulevard Width*	Example Species
<12"	2 1/2'	5'	Japanese Tree Lilac, Crabapple (sp.)
12"+	4'	8'	Ohio Buckeye, River Birch, Red Maple
24"+	5'	10'	White Ash, Thornless Honeylocust, Northern Pin Oak, Black Ash
36"+	6'	12'	Red Oak, White Oak, Hackberry, Kentucky Coffeetree, Sugar Maple
48"+	7'	14'	American Linden, Bur Oak

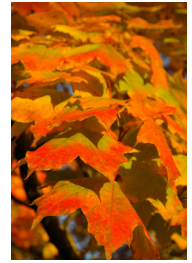
\* Based on positioning tree in center of boulevard strip.

Source: Johnson, G. (n.d.). Road to a Thoughtful Street Tree Master Plan. [https://trees.umn.edu/sites/trees.umn.edu/files/2021-07/The%20Road%20to%20a%20Thoughtful%20Street%20Tree%20Master%20Plan\\_2008.pdf](https://trees.umn.edu/sites/trees.umn.edu/files/2021-07/The%20Road%20to%20a%20Thoughtful%20Street%20Tree%20Master%20Plan_2008.pdf)



## FOLIAGE TEXTURE & COLOR

Communities seek visual characteristics as a significant determinant for tree species selection. Trunk and leaf texture and foliage color along with seasonal variations desired as with the brilliant fall foliage color like Freeman Maples become desirable, but then can become overrepresented. Several communities responding to the survey have removed maples as a planting suggestion due to over representation and intention for a healthy and diverse tree population. While aesthetics may guide choices, function and adaptability to the site must also be a key consideration.



## VULNERABILITIES (disease & climate change)

Selecting diverse species and sequencing through interplanting can reduce the vulnerability from insect and disease.

Climate change has become a factor impacting insect proliferation and disease as well as introducing climate-related stressors such as droughts, increasing temperatures, and the intensity of tree damaging storm events challenging tree vitality. Choosing the best urban trees remains a difficult task in an era of increasing climate change, insects and pests, and urban pressures. The species of a tree is a statistically significant factor related to the likelihood of mortality. The research by Wattenhofer and Johnson in 2021, Understanding Why Young Urban Trees Die Can Improve Future Success, identified several species whose adjusted average mortality remained under 10 percent. Appendix A includes this list as well as examples from several communities.

Many communities are planning today for adaptability of urban forests through diversity. Hennepin County follows the “20-10-5 rule” to ensure diversification. The “20-10-5 rule” incorporates canopy diversity goals into planning requiring no more than 20 percent of one family, 10 percent of one genera, or 5 percent of one species be planted in a given geographic area. In addition, some communities have also established a “DO NOT PLANT” list due to invasive properties, offensive characteristics, over planting, or susceptibility to insects or diseases.

City of Robbinsdale	
Scientific Name	Common Name
<i>Acer freemanii</i>	Freeman Maple
<i>Acer negundo</i>	Boxelder
<i>Acer saccharinum</i>	Silver Maple
<i>Celastrus orbiculatus</i>	Oriental Bittersweet
<i>Frangula alnus</i>	Glossy Buckthorn
<i>Fraxinus spp.</i>	Ash (Black, Green, White)
<i>Ginkgo biloba</i>	Ginkgo (female only)
<i>Populus deltoides</i>	Eastern Cottonwood
<i>Populus nigra italica</i>	Lombardy Poplar
<i>Rhamnus cathartica</i>	European Buckthorn

Hennepin County	
Scientific Name	Common Name
<i>Acer ginnala</i>	Amur Maple
<i>Acer platanoides</i>	Norway Maple
<i>Ailanthus altissima</i>	Tree of Heaven
<i>Alnus glutinosa</i>	Black Alder
<i>Elaeagnus angustifolia</i>	Russian Olive
<i>Elaeagnus umbellata</i>	Autumn Olive
<i>Fraxinus americana</i>	White Ash
<i>Fraxinus pennsylvanica</i>	Green Ash
<i>Morus alba</i>	White Mulberry
<i>Phellodendron amurense</i>	Amur Corktree
<i>Pyrus calleryana</i>	Callery Pear
<i>Rhamnus cathartica</i>	Common Buckthorn
<i>Rhamnus frangula</i>	Glossy Buckthorn
<i>Ulmus pumila</i>	Siberian Elm

A temporary ban on certain overrepresented tree species in a community may be necessary to encourage diversity and a resilient urban streetscape. The City of Austin conducted a recent tree inventory that indicated 38% of all boulevard trees are maple and are therefore now temporarily restricted.

## SELECTION OF TREE SPECIES

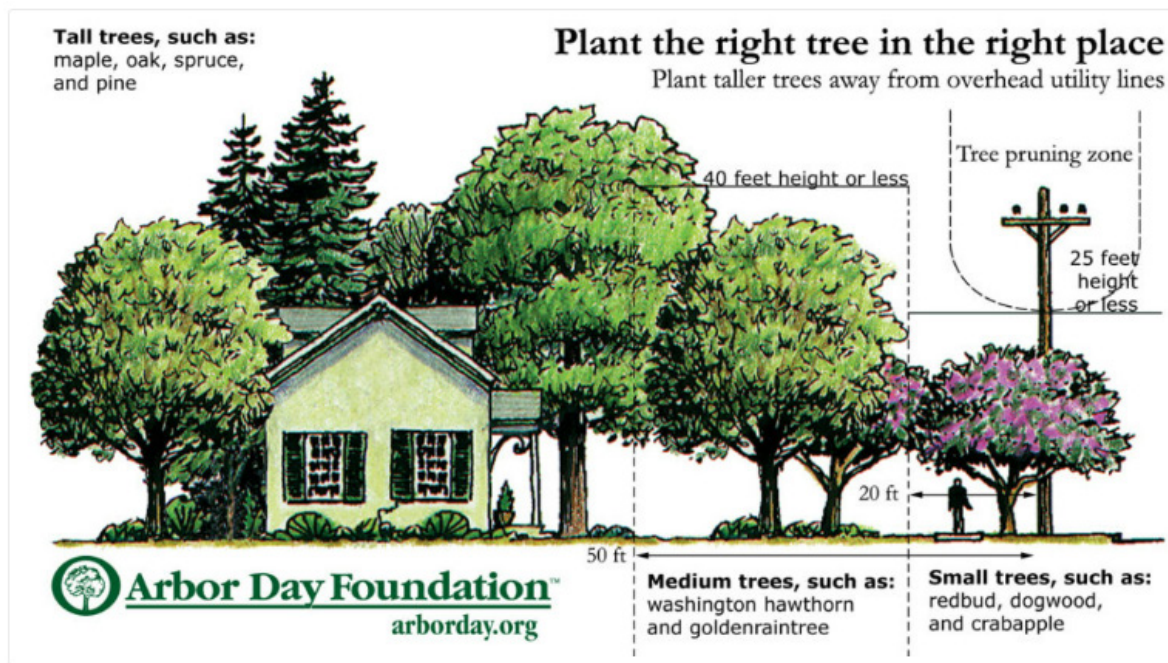
Using the [MnDOT Plant Selector](#) as a starting point, the list below uses the filters in the tool for roadside setting of Boulevard with Salt Spray less than 25 feet from the road.

Common Name	Scientific Name	SALT Tolerant*
<i>Autumn Brilliance Serviceberry</i>	<i>Amelanchier x grandiflora</i> (Autumn Brilliance)	
<i>Autumn Spire Maple</i>	<i>Acer rubrum</i> (Autumn Spire)	
<i>Black Maple</i>	<i>Acer nigrum</i>	
<i>Boulevard Linden</i>	<i>Tilia americana</i> (Boulevard)	
<i>Bur Oak</i>	<i>Quercus macrocarpa</i>	
<i>Burgundy Belle Maple</i>	<i>Acer rubrum</i> (Magnificent Magenta)	
<b>Cleveland Norway Maple</b>	<b><i>Acer platanoides</i> (Cleveland)</b>	<b>YES</b>
<i>Columnar Sugar Maple</i>	<i>Acer saccharum</i> (Columnare)	
<i>Common Hackberry</i>	<i>Celtis occidentalis</i>	
<b>Crimson King Norway Maple</b>	<b><i>Acer platanoides</i> (Crimson King)</b>	<b>YES</b>
<i>Crimson Sentry Maple</i>	<i>Acer platanoides</i> (Crimson Sentry)	
<i>Crimson Spire Oak</i>	<i>Quercus robur</i> (Crimschmidt)	
<i>Dakota Pinnacle Birch</i>	<i>Betula platyphylla</i> (Fargo)	
<i>Deborah Maple</i>	<i>Acer platanoides</i> (Deborah)	
<b>Emerald Lustre Maple</b>	<b><i>Acer platanoides</i> (Pond)</b>	<b>YES</b>
<b>Emerald Queen Norway Maple</b>	<b><i>Acer platanoides</i> (Emerald Queen)</b>	<b>YES</b>
<i>Espresso Coffeetree</i>	<i>Gymnocladus dioicus</i> (Espresso)	
<i>Frontier Elm</i>	<i>Ulmus</i> (Frontier)	
<i>Golden Colonnade Ginkgo</i>	<i>Ginkgo bilboa</i> (JFS-UGA2)	
<i>Heritage Oak</i>	<i>Quercus x macdanielii</i> (Clemons)	
<b>Kentucky Coffeetree</b>	<b><i>Gymnocladus dioicus</i></b>	<b>YES</b>
<i>New Harmony Elm</i>	<i>Ulmus americana</i> (New Harmony)	
<i>New Horizon Elm</i>	<i>Ulmus x</i> (New Horizon)	
<i>Northern Pin Oak</i>	<i>Quercus ellipsoidalis</i>	
<i>Northern Red Oak</i>	<i>Quercus rubra</i>	
<i>Norway Spruce</i>	<i>Picea abies</i>	
<i>Prairie Sentinel Hackberry</i>	<i>Celtis Occidentalis</i> (JFS-KSU1)	
<i>Presidential Gold Ginkgo</i>	<i>Ginkgo bilboa</i> (The President)	
<b>Princeton Gold Maple</b>	<b><i>Acer platanoides</i> (Princeton Gold)</b>	<b>YES</b>
<i>Red Rocket Maple</i>	<i>Acer rubrum</i> (Red Rocket)	
<i>Regal Prince Oak</i>	<i>Quercus x warei</i> (Long)	
<i>Royal Red Maple</i>	<i>Acer platanoides</i> (Royal Red)	
<i>Scarlet Jewel Red Maple</i>	<i>Acer rubrum</i> (Scarlet Jewel)	
<b>Schwedler Maple</b>	<b><i>Acer platanoides</i> (Schwedleri)</b>	<b>YES</b>
<i>Swamp White Oak</i>	<i>Quercus bicolor</i>	
<i>White Oak</i>	<i>Quercus alba</i>	

Examples of tree species master lists and plant selection guides are included in Appendix A for communities that have tailored their own approved species list.



# The Right Place



Source: Arbor Day Foundation

## LOCATION KEYS

There were several key takeaways from the city/county survey regarding the location of where to plant a boulevard tree as noted:

- Boulevard width of **five feet or more**. Almost half the agencies surveyed had no minimum boulevard width.
- Buffer from overhead or underground utilities including fire hydrants and water valves that may require repair excavations.
- Does not obstruct overhead street lighting or visibility of driveways and intersections.

Some agencies have crafted ordinances, like this example from the City of Victoria, outlining specific setbacks and other local criteria. Other policy and ordinance examples are included in Appendix B.

### **Sec 33-8 Boulevard (Street) Trees**

The following requirements shall be applicable to all newly constructed streets or redevelopment adjacent to existing streets within the city.

A. Boulevard trees shall be planted according to the following minimum requirements along a city street:

Zoning District Type	Type of Adjacent Yard	Spacing Between Trees	Distance from Intersection
Residential, All	Front or Rear	45 feet	25 feet
Residential, All	Side or Secondary Front Yard	35 feet	25 feet
CBD	All	35 feet	20 feet
Other Commercial and Industrial Districts	All	45 feet	25 feet

B. All boulevard trees shall be deciduous overstory with a minimum trunk diameter of three inches, measured at one foot above the grade unless otherwise approved by the city.

C. The city may consider waiving the placement of individual trees meeting the minimum spacing requirement if determined to conflict with sight lines into and/or out of individual properties based upon a known driveway or intersection location.

(Ord. No. 415, § 3, 5-22-2017)

Other agencies have developed planting guidelines that can be used internally or shared with the public. Appendix C provides a brochure template that can be customized for specific tree species and guidance.



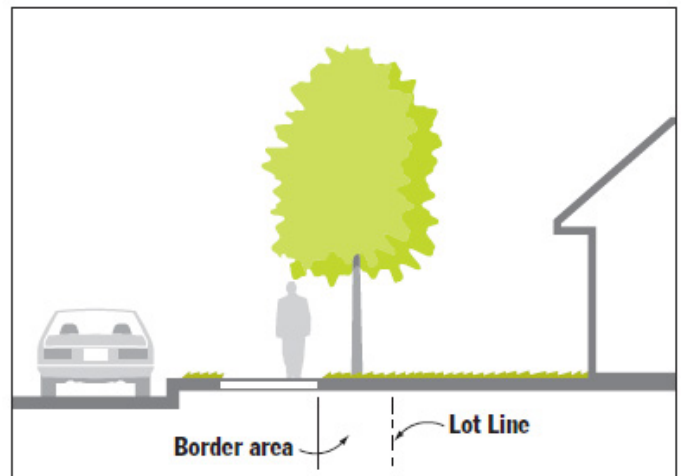
### Example of Boulevard Planting Guidelines

1. At least 30 feet from street intersection
2. At least 10 feet from alleys and driveways
3. 15 - 25 feet from a utility pole or street light poles
4. 10 - 15 feet from a fire hydrant
5. At least 10 feet from private sewer and water services
6. At least 6 feet from street signs and cross walks
7. A minimum distance of 3 feet from the back side of the curb (typical residential road w/no sidewalk 8 - 10 feet from back side of the curb). When the sidewalk is present, the tree shall be centered between the back side of the curb and sidewalk.

### Example diagrams for tree placement



Source: Road to a Thoughtful Street Tree Master Plan





# The Right Installation & Maintenance

There are additional considerations to ensure tree vitality with the right tree selected for the right place.

## BEST PLANTING PRACTICES

Most cities and counties will use trained and supervised volunteers or their own staff for planting. Tree vitality does not appear to be impacted if guided by experienced forestry staff. There are also times when contractors may be used such as in the case of street reconstruction. MnDOT has standard specifications that can ensure healthy tree planting. Consider including the following specifications: [MnDOT Standard Specification](#) “2571 Plant Installation and Establishment,” “2572 Protection and Restoration of Vegetation,” and “3861 Plant Stock” when utilizing a contractor. The Minnesota Department of Natural Resources also has planting guidance at [https://www.dnr.state.mn.us/treecare/residential\\_plant.html](https://www.dnr.state.mn.us/treecare/residential_plant.html)

## ROOT TYPE

As noted, quality planting stock should be hardy (for the zone planted), healthy and vigorous to increase success in transplanting. Tree stock is often categorized as illustrated below.



### Bare-Root Seedlings

- Roots should be moist and fibrous.
- Deciduous seedlings should have roots about equal to the stem length.



### Balled and Burlapped Trees

- Root ball should be firm to the touch, especially near the trunk.
- Root ball should be adequate for the tree's size.



### Container-Grown Trees

- Container should not contain large, circling roots.
- Pruned roots should be cut cleanly, none wider than a finger.
- Soil and roots should be joined tightly.

Source: Arbor Day Foundation

All three types of planting stock are used in Minnesota per the survey of city and county staff. Cost is one consideration, but it is also important that the installation method must be tailored to the root type to protect the investment in the tree stock. Communities see greater success with balled and burlapped or container trees, which have a higher survival rate than bare root trees (Wattenhofer and Johnson, 2021).

## SOIL CONDITIONS

The vitality of the tree species selected is reliant on good, compatible soil conditions. Often soils in the road right of way have been modified and may not be ideal organic material for promoting tree health. While some agencies have experimented with commercial soil modifiers, this is very limited due to expense and feasibility. If trees are being planted in an area with compacted or poor soil, the planting hole should be made wider than normal, and compost can be incorporated into the original soil to improve the soil conditions. A limiting factor for tree growth in highly urban sites is the soil volume. A best practice for streetscapes is a design that ensures there is at least 1,000 cubic feet of soil available for trees.

*“Those who plant a tree plant hope.”*

Lucy Larcom

## CARE & MAINTENANCE

The establishment period for the first several years after planting is critical for protecting the investment in boulevard trees. Watering is the most critical task to promote the health and vitality of the newly planted urban trees. Mulching also serves to prevent weed and disease as well as preserving valuable moisture. Communities take varying approaches to maintenance of newly planted tree stock ranging from city or county forestry staff to contracted care to assigned responsibility to the adjacent homeowner.

Example of a door hanger outlining residential care of newly planted tree stock:

# NOTICE

## Boulevard Tree Replacement

Due to the road construction there were tree(s) removed from the boulevard along your property.

As part of this project, boulevard tree(s) will be replaced when the environment and tree location is suitable to plant a new tree based on the City's *Boulevard Tree Planting* guidelines.

Within a week of receiving this notice, to request a new boulevard tree(s) call:

Project Inspector at  
(612) XXX-xxxx

Once a new boulevard tree is planted the resident is required to water the tree once a week during dry periods in the spring, summer and fall.

Trees younger than (5) years old need one inch of rainfall each week to stay healthy. If there is not enough rain you should water your tree(s). Slowly pour at least (4) five-gallon buckets of water over the tree roots or put a hose under the tree and let it run gently for (1) hour.

See back side for boulevard tree care guidelines.

## Boulevard Tree Care

For your new boulevard tree(s), the following guidelines are recommended by the City of Anoka. With normal weather, for the first and second week the tree(s) shall be watered daily. For the next three (3) months the tree(s) shall be watered every other day. After this the tree(s) needs one inch of rainfall each week to stay healthy and establish proper root growth for two to four or more seasons. If there is not enough rain you should water your tree(s).

To water your tree(s), slowly pour at least three five-gallon buckets of water over the tree roots, or put a hose under the tree and let it run gently for approximately one hour.

The mulch at the base of your tree(s) holds in the moisture, reduces weeds and prevents damage from your lawn mower. You should remove any weeds that may grow in the mulch with your hand (not with chemicals). We recommended to maintain four to six inches of mulch and to keep the mulch a few inches away from the tree trunk.

Tree care should include timely pruning to strengthen and improve tree health in the urban tree program. There is guidance and pruning standards as part of the A300 Pruning Best Management Practices which can be found here at <https://www.isa-arbor.com/store/product/4645>



# Project Resources

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This guidebook and related educational materials produced by the LRRB are available at [Boulevard Tree Selection - Best Practice](#).

## Additional Resources

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- [The Road to a Thoughtful Street Master Plan: A practical guide to systematic planning and design](#), MnDOT Local Road Research Board. Ken Simons and Gary R. Johnson. LRRB 2008-32.
- [Plant Selector Program](#), Minnesota Department of Transportation
- [Understanding why young urban trees die can improve future success](#); Urban Forestry & Urban Greening 64 (2021). Daniel J. Wattenhofer and Gary R. Johnson. 1272247.
- [Urban Tree Risk Management: A Community Guide to Program Design and Implementation](#), USDA Forest Service, Jill D. Pokorny. NA-TP-03-03
- [US Department of Agriculture \(USDA\) Plant Hardiness Zones](#)
- [MnDOT Standard Specification](#) “2571 Plant Installation and Establishment,” “2572 Protection and Restoration of Vegetation,” and “3861 Plant Stock”
- <https://forestadaptation.org/learn/resource-finder/tree-species-projections-ecological-sections-minnesota> for more information on what to plant in Minnesota with the climate change predictions
- For guidance with pruning, please see ANSI A300 Standards <https://www.isa-arbor.com/store/product/4645>
- Proper planting is crucial to the tree’s establishment. Container, bare root, and balled and burlap trees each require different methods of planting. Refer to the Minnesota Department of Natural Resources guide for proper planting at [https://www.dnr.state.mn.us/treecare/residential\\_plant.html](https://www.dnr.state.mn.us/treecare/residential_plant.html)





[lrrb.org](http://lrrb.org)











# APPENDIX A

## EXAMPLES OF TREE SPECIES LISTS







# APPENDIX B

## TREE ORDINANCE & POLICY EXAMPLES







# APPENDIX C

## BROCHURE TEMPLATE for COMMUNICATION







# APPENDIX D

## CITY/COUNTY SURVEY RESULTS

