Master Street Tree Plan
Lincoln, Nebraska

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Executive Summary

Trees are a crucial part of our city. A healthy community forest mirrors the community's environmental values and positively contributes to the quality of their daily lives through countless benefits in environmental infrastructure, which includes air pollution mitigation and storm water runoff reduction. These benefits afford enriching environments and improve the livability of Lincoln's neighborhoods. The continued responsibility of Community Forestry staff in the Parks and Recreation Department of Lincoln to maintain, preserve, and grow Lincoln's community forest remains a crucial component to the health and well-being of our community.

This Master Street Tree Plan provides a framework for long-term active stewardship of public trees including tree selection and planting specifications for new trees, ongoing management through pruning and maintenance, community engagement, and protection from threats such as pests, climate change, and construction damage. The guiding principles combine sound management strategies, ecosystem services, and social equity to focus the vision and mission statements, recommendations, and objectives of Community Forestry into an overall set of implementable goals. The following guiding principles drive the Master Street Tree Plan:

- Incorporating intentional efforts to increase tree diversity and achieve maximum representation of tree variety within the city of Lincoln
- Ensuring long-term and sustainable social equity through equal and accessible representation of tree diversity within all areas of Lincoln
- Select and plant trees based upon the Four Rs: **R**ight tree, **R**ight place to **R**educe maintenance and **R**ealize benefits over time
- Maximize ecological benefits of Lincoln's community forest

Community Forestry manages over 120,000 trees, operating on a budget of nearly $1.4 million. The community forest currently provides a net benefit of over $10 million in greenhouse gas, water, energy, air quality, and property benefits. Further, community initiatives such as 2 for Trees, Adopt-an-Ash, the Voucher Program, and the Citizen Pruning Program contribute to the care and funding of the community forest. Though Lincoln's community forest is impressive, it is not immune to pests and diseases. Dutch elm disease killed a large portion of Lincoln's trees in the 1960s, and today, the city budgets $400,000 annually for ash tree removal due to emerald ash borer.

The City defines five primary standards for the proper care of its public trees: health, structure, safety, pruning cycle, and future growth. Multi-scale planning – the practice of tailoring goals to specific areas across multiple spatial and temporal scales – can help the City attain these standards. In order to make informed decisions about

practices and policies affecting the future of the community forest, it is necessary to have a thorough understanding of the current state of the forest and the resources available to the City. Age diversity, size diversity, species diversity are integral to building a community forest resource that persists into the future and provides benefits for , . With knowledge of the proposed location, attention to species characteristics, two-stage pruning cycles and an emphasis on young tree care, Lincoln can reduce the cost and maintenance required as trees reach maturity.

The final section of the Master Street Tree Plan details recommendations for implementing policies relating to a tree risk management plan, tree protection ordinances, community engagement, pruning cycles, stocking rates, and storm response. The plan also includes recommendations for clarifying existing city ordinances pertaining to street trees. These recommendations will help Lincoln maintain and improve its community forest.

Introduction

1.1 Vision and Mission Statement

Lincoln Parks and Recreation manages several aspects of Lincoln's natural resources. The Master Street Tree Plan seeks to maintain and grow our community forest with contemporary practices as defined within this document to provide an improved quality of life and more livable neighborhoods in Lincoln.

Proposed Vision Statement:

It is the vision of the Lincoln Parks and Recreation Department, and therefore community forestry, to provide a quality connection to nature that enhances the quality of life in Lincoln by offering enriching environments, creating livable neighborhoods, and providing improved economic and environmental wellbeing. To ensure community forest infrastructure provides these daily benefits and remains an important resource for the health and well-being of our environment and community, the forest will be maintained and grown according to the best management practices outlined within the Master Street Tree Plan.

The mission statement aligns with the official Lincoln Parks and Recreation Core Values (Lincoln Parks and Recreation, 2019):

Mission Statement:

Lincoln Parks and Recreation is:

- Fundamental to youth development
- Fundamental to action living
- Fundamental to livable neighborhoods and family life
- Fundamental to environmental stewardship
- Fundamental to special places and events
- Fundamental to economic development

1.2 The Role of Community Forestry in Parks and Recreation

The responsibility of the community forestry staff in the Parks and Recreation Department is to maintain, preserve, and grow Lincoln's community forest over time. As the city of

Lincoln continues to develop and grow in both population and physical area so will the

expectations of nature within an increasingly urban lifestyle. The Lincoln's Parks and Recreation Department's existence is a reflection of the growing need for access to nature within the city and is responsible for the implementation of the Master Street Tree

Plan. The strategies and approaches detailed in the following management plan are designed as adaptable and responsive to changing needs of a complex community forest. As a result, Parks and Recreation Departments are typically responsible for the following tasks (Portland Urban Forestry, 2019):

- Implementation and enforcement Lincoln's Master Street Tree Plan
- Educate the community of Lincoln on the benefits of trees and encourage volunteer stewardship of the community forest resource
- Adapt the Master Street Tree Plan as best management practices for planting, maintenance, and removal of trees continually change
- Implementation of coordinated inspection and maintenance of public trees to ensure proactive management of valuable community forest infrastructure
- Assess and report to Lincoln's City Council and residents the state of the urban forest
- Respond to complaints on trees that pose potential risk

1.3 Objectives of the Master Street Tree Plan

Lincoln's community forestry supports the mission of The Parks and Recreation Department by designing the objectives below to meet the professional and research recommendation of maximizing the public benefit from trees while minimizing the public expense and risk involved with public trees (Miller, Hauer, & Werner, 2015). The Lincoln management plan incorporates this idea through objectives that consider numerous factors that affect tree benefit and liability including but not limited to: the present state of the community forest, benefits provided from trees, best management practices, environmental conditions.

1. **Objective:** Responsibly enhance the community forest through new plantings
    a. **Reasoning:** Maximize environmental benefits provided by trees, which include the following:
        i. Trees can reduce the number of air pollutants in urban environments (Nowak, 2018)
        ii. Urban trees provide energy savings to nearby buildings (Food and Agriculture Organization, 2016)
        iii. Community forestry can increase urban biodiversity, which provides pest control and pollination for green infrastructure (Food and Agriculture Organization, 2016)
        iv. Trees provide a screen for noise in areas with heavy traffic (Dzhambov & Dimitrova, 2014)
        v. Community forestry reduces erosion problems caused by construction and overuse (Miller, Hauer, & Werner, 2015)

vi. Properly planned street trees assist transportation systems through traffic calming strategies, which are shown to reduce vehicle risk associated with speeding (Miller, Hauer, & Werner, 2015)
vii. Landscape and urban vegetation increase property values and economic activity (Food and Agriculture Organization, 2016)

b. **Action:** Carry out the planting of street trees throughout the city, and educate Lincoln's communities on the benefits of the community forest resource through tree planting activities, workshops and educational talks, and activities with kids to promote new public tree planting (Community Forestry, 2019)

2. **Objective:** Regularly manage and inspect the community forest utilizing current science and industry best management practices specified by the International Society of Arboriculture (ISA)
    a. **Reasoning:** Ensure the health of the public tree population and minimize the risk associated with street trees.
        i. Potential risk involved with unmaintained street trees:
            1. If improperly maintained, street trees can obstruct public utilities as well as cover signs and lighting (Miller, Hauer, & Werner, 2015).
            2. Personal injury or property damage as a result of dead, dying, diseased, or broken branches (Miller, Hauer, & Werner, 2015).
            3. Infrequent maintenance can pose safety risks to forestry employees if larger structural tree adjustments are required (Miller, Hauer, & Werner, 2015).
    b. **Action:** Develop coordinated planning within The Parks and Recreation Department to improve their risk management by implementing inventory analysis, regular maintenance, and inspection of community forest infrastructure.

3. **Objective:** Avoid crisis management and foster proactive planning for the community forestry program.
    a. **Reasoning:** Crisis management can be demanding and immediate which draws time away from working toward long-term forestry goals (Miller, Hauer, & Werner, 2015)
        i. Urban forestry studies have concluded that responsive and crisis-oriented management is inefficient and expensive when used as an overall management system, and has been shown to cost an additional $5 million over a 15 year period when compared to preventive management (Callahan & Bunger, 1976).

b. **Action:** Identify the factors that limit the community forestry program's ability to manage the long-term goals defined in this management plan and develop strategies to reduce the impact of those factors (Miller, Hauer, & Werner, 2015).
c. Opportunities for improvement include:
    1. Analysis of street tree inventories to determine appropriate stocking rates
    2. Shift from crisis and request pruning to a two – stage pruning cycle
    3. Improvement to the language of existing street tree ordinances to mitigate design error
    4. Implementation of proper storm response programs to mitigate risk associated with street trees

4. **Objective:** Provide guidelines for tree protection on construction sites.
    a. **Reasoning:** Urban trees require protection from damage to maximize their health and provide benefits to the community.
    b. **Action:** Establish critical root zones and tree protection zones to incorporate into a tree protection plan for use of developers and contractors (Oregon State University, 2009).

5. **Objective:** Consider climate change when selecting tree species for new plantings to maximize the resilience of Lincoln's tree population (Wilhite & Morrow, 2016).
    a. **Reasoning:** 61% of rural Nebraskans agree that Nebraska should develop a plan for adapting to climate change, so its impact on communities, forestry, and natural resources can be mitigated (Wilhite & Morrow, 2016).
    b. **Action:** Collaborate with local research efforts, including The University of Nebraska and The Nebraska Forest Service, to determine accurate climate prediction models and select tree species that are appropriate for the projected future conditions at a site (Wilhite & Morrow, 2016).

6. **Objective:** Minimize the impact of current and future pest pressures on the community forest
    a. **Reasoning:** Emerald ash borer is a significant threat to community forests and as many as 14,000 public trees in Lincoln will likely be lost to the disease (Hicks, 2018).
    b. **Action:** Follow the instructions provided in the City of Lincoln Emerald Ash Borer Response and Recovery Plan as well as follow the recommended actions for tree diversity and pest management as outlined in this document.

1.4 Scope

The management plan, herein referred to as "the Plan," utilizes the term *community forest* to describe publicly managed trees within Lincoln's urban environment. Lincoln's Master Street Tree Plan provides standards for the long-term management and growth of public trees which includes street trees in the public right of way, park trees, and other vegetation such as green roofs or urban landscaping infrastructure. While the scope is limited to publicly owned street trees, this plan provides a best management practice guide for private enterprises and residential property owners as well, as these trees provide the bulk of the benefits from Lincoln's community forest.

Specifically, the management plan provides backgrounds and recommendations for numerous factors affecting the health of the community forest, including:

- Background information on the community forest to describe the history and context of the forest as well as its benefits and environmental limitations.
- Guiding principles to outline the management and growth of the community forest based on local conditions and resources. These principles are based upon implications of social equity, and how new planting affects the functional and ecological characteristics of Lincoln's communities.
- Tree selection and maintenance criteria which provide a guide for nursery stock, location and spacing recommendations, and pruning cycles based on funding and tree population.
- The current state of the community forest to summarize details on present staffing and budget constraints as well as policies on diversity, inspection, and planting.
- Deficiencies and recommendations present in the current state of the community forest to identify emerging needs in relation to policy, community awareness, hazard management / emergency response, and tree inventory.
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- Realizing the Parks and Recreation Department's mission and vision for the community forest will involve implementing the objectives of this management plan with the previously mentioned definition of public trees, and will ensure that forestry continues to play a positive role in community infrastructure.

1.5 Planning Process

Lincoln's Master Street Tree Plan was prepared with the help of the Parks and Recreation Department in an effort to create a sustainable future for the community forest of Lincoln. Lincoln's Parks and Recreation Department, arborists, landscape

architects and all other companies hired by the city shall follow guidelines set by the latest industry standards. The International Society of Arboriculture (ISA) and The American National Standards Institute (ANSI) should be referenced to make informed decisions and good management practices in respects to all tasks and responsibilities. This includes but is not limited to updated tree species lists, planting plans, pruning and expanding the role of trees as infrastructure within the city of Lincoln.

The city of Lincoln's master street tree plan will range involvement from multiple organizations and outside contractors in conjunction with the Parks and Recreation Department. In order to obtain stakeholder input and maintain clarification on existing challenges and future goals, stakeholders should meet on a consistent basis to understand how they can further involve themselves in the progress of expanding Lincoln's green infrastructure.

Background Information

2.1 History of Lincoln Forestry

The Community Forestry Program is one of the hallmarks of Lincoln's quality of life. The Arbor Day foundation, headquartered in Lincoln, has recognized Lincoln as a Tree City USA since 1976 (City of Lincoln, 2019b). The Tree City USA award encourages communities to celebrate their community forests while pushing for a more robust organizational structure and budget. The Urban Forest in Lincoln has an estimated value of 11.9 million dollars annually.

The University of Nebraska had been researching Lincoln's trees since 1902 (Foreman, 2017). In 1909, the university published a study of the street trees in Lincoln. This study sampled five different street segments that were one to four blocks in length. The sample was small, but covered a lot of the variety Lincoln's streets offered at that time (Nichols, 1909). Table 2.1 shows the percentage of the community forest canopy by genus, which shows how much the forest has changed over the last century. The most important part of the chart to note is the steep drop off in Elm since the 1909 study due to Dutch elm disease, which swept the U.S. in the mid-20th century wiping out a large portion of the species. While tree diversity has increased over the last century, it is important to continue to push this further to minimize the effects of other diseases and pathogens. Another part of the study detailed the condition of the trees, and how poor management and treatment of the trees attributed to almost 50% of them being diseased or damaged in some way. Of the diseased trees, it was determined that 81% of them were caused by poor pruning or lack of pruning (Nichols, 1909). This information would help to establish direct government intervention in the community forest to maintain street trees.

Table 2.1. Comparison of Common Street Tree Genera in 1909 and 2018

Genus	Common Name	Percent of total (1909)	Percent of total (1909)
Ulmus	Elm	32.6	3.4
Acer	Maple	34.2	16.1
Fraxinus	Ash	12.1	12.1
Catalpa	Catalpa	6.1	0.2
Juglans	Black walnut	4.6	0.3
Gleditsia	Honey locust	3.4	7.7
Populus	Carolina poplar	2.0	-
Populus	Cottonwood	1.7	0.6

Before the establishment of the Community Forestry program in the 1960's, the Parks and Recreation Department was responsible for managing the community forest. "In 1936 the Lincoln Municipal Code included a provision that remains today requiring a permit for planting of trees in the public right-of-way (street trees) from the Parks and Recreation Department." Today, the Community Forestry Program has a budget of $1,344,362, which includes about $400,000 for ash tree removal. The Forestry Program also has 19 full time staff members that manage 112,400 trees in the city (City of Lincoln, 2019b). With new technology, our Community Forestry Program can study and maintain trees efficiently, but budget constraints limit the potential growth of the urban canopy.

2.2 Benefits of Trees

Community forests provide various social, community, environmental, and economic benefits (Boland and Hunhammar, 1999). The following explains how community forests are valuable to urban areas and why it is important to maintain the community forests of Lincoln, Nebraska.

2.2.1 Social/community Benefits

Urban life can have negative effects on the health of humans and has been linked to increased mental stress levels but trees have been found to significantly improve the physical and emotional health of humans and time spent out in nature and around trees has been linked to reduced stress levels in the body (Nilsson et al., 2014).Trees and community forests provide myriad of benefits from increased home values to decreased

stressed while also providing an environment that fosters community (Jones, Davis, and Bradford, 2012). A well maintained community forest can increase the amount of time that people spend in an area whether it is a shopping center or a neighborhood park. More beautiful urban areas lead to happier residents and enhancement of the community as a whole (Wolf, 2009).

As people move from rural to urban areas, community forests provide a small source of nature. Community areas that have a high quantity of trees and higher quality landscaping increase the amount of time people spend outside. Time spent in green spaces generates physical and mental health benefits that are needed to combat the negative effects of urbanized living. (Karjalainen, Sarjala & Raitio, 2010). Residential community forests have been linked to reductions in crime and improvements in neighborhood quality (Nowak and Dwyer, 2009).The parks and vegetative areas of Lincoln can foster a sense of community in Lincoln and improve the well-being of the residents of the city. Pioneers park and other parks in Lincoln, residential community forests, and street trees are all examples of areas of community forests making an impact on the social and community health of Lincoln.

2.2.2 Environmental Benefits

The environment of the city of Lincoln gains a lot from the environmental benefits of trees. Salt Creek and Holmes Lake , bodies of water that contain endangered species, benefit from the improved water quality that comes from community forests. The air quality of the city, specifically in more urbanized areas, benefit from the air pollution control that trees provide as well.

- Community forests provide the following important benefits:

- Trees are able to improve air quality and help in controlling pollution in urban environments by capturing and taking in carbon dioxide, turning it into oxygen, which they then release back out into the atmosphere.
- Community forests have been found to contribute to the formation of ozone in urban areas (Nowak, Crane & Stevens, 2006).
- Trees improve water quality. Storm water runoff degrades stream and river water quality. Large volumes of runoff from rainfall can cause flooding, sewer system damage, and harm to surface and sub-surface water resources. Trees intercept rainfall before it hits the ground and are able to absorb and stop some rainfall from reaching streams and rivers by redistributions and storage of this runoff. Urban trees planted near streams and rivers provide flood control that grey infrastructure cannot. The city of Lincoln has several streams and creeks that benefit from the flood control capabilities that native riparian species provide (Berland et al., 2017).
- Community forests provide habitat for wildlife, food and shelter for many different species of animals and insects, and are even capable of maintaining entire ecosystems (Dwyer, McPherson, Schroeder & Rowntree, 1992).
- Trees in an urban setting help to reduce noise pollution, sound levels that are elevated enough to cause adverse effects in living organisms. Depending on the quality, quantity, and location of trees in a community forest, noise pollution costs can be reduced (Haq, 2011).

2.2.3 Economic Benefits

Community forests provide economic benefits in addition to environmental and social benefits. Property values are greatly influenced by the presence or absence of trees. Multiple studies have found that buyers are willing to pay more for properties with trees than those without. Studies have found that buyers were willing to pay 6-9% more for a home with good tree cover in a neighborhood (Wolf, 2007). Areas with more developed vegetative landscaping often attract buyers and visitors to the area that in turn increase property values and business income. Having trees in an area provides new recreation opportunities and community growth, therefore increasing visitors and business activities which can also stimulate tourist activity.

Retail shoppers are likely to spend more money in a business area that has aesthetically pleasing landscapes and trees than those without. Shoppers were also willing to drive farther distances to commercial areas with better landscaping. Perceptions of business districts and product quality have been linked to the presence of tree canopy, suggesting that it would be beneficial for businesses to prioritize trees and canopy size (Wolf, 2003).

The city of Lincoln economically benefits from community forest in more ways than one. Business districts in the area with well-maintained trees and vegetation have the capability to generate more business and more profit from shopper preference of green areas. Forestry projects in the city create more economic and community involvement in the community forests of the city.

Trees provide economic benefits by decreasing infrastructure costs in a community. Trees are able to provide shade, manage storm-water runoff, improve air quality, provide recreational areas, and help to control temperatures in urban areas, all things that would require more expensive grey infrastructure.

2.3 Limitations of Urban Environment

The urban environment may contain many limitations that prevent the planting, placement, and maintenance of public trees. Limitations such as:

- Soil composition/soil nutrient quality
    - Composition
    - Climate
- Available planting spaces
    - Stocking density

- City budgets
    - Maintenance staff
    - Nursery stock
- Urban infrastructure
    - Buildings
    - Streets/sidewalks
    - Right of way
    - Street light and sign obstruction
    - Utilities (powerlines, ground lines, sewers, fire hydrants)
- (Miller, Hauer, & Werner, 2015)

2.3.1 Soil Limitations

The quality of a tree's growth can be limited by certain soil characteristics. When large trees are planted in small spaces, the roots can be impeded by the sidewalk, street, parking lot, etc. causing the tree to have poor root support and may stunt the trees overall growth (Franzmeier, McFee, Graveel, & Kohnke, 2016). Other areas of infrastructure can limit plant life since there is little soil for the tree to grow in. Best management practices will provide enough room for the tree to establish itself with good rooting structures. Too much compaction of the soil, or not enough room for the tree to grow will cause future maintenance issues for the tree or the sidewalk/street it is next to (Franzmeier, McFee, Graveel, & Kohnke, 2016). Depth and space are not the only concerns, soil pH and available nutritients also effect of a tree growth. There are many challenges when it comes to managing soils. Most trees can tolerate a pH of 6.5-7.5, which is adequate for growing conditions (Franzmeier, McFee, Graveel, & Kohnke, 2016). There are many nutrients in the soil that trees utilize for their growth production. Nitrogen, phosphorus, potassium, and sulfur are a few of the many nutrients that reside within the soil structure (Franzmeier, McFee, Graveel, & Kohnke, 2016). Climates and climate change can limit what can grow in the soil. Lincoln resides in a temperate climate and is prone to droughts. These climate conditions can impede the type of trees that are desired for urban planting (Franzmeier, McFee, Graveel, & Kohnke, 2016). Utilizing trained and knowledgeable staff, the city of Lincoln would be better equipped with dealing with such limitation issues.

2.3.2 Available Planting Space Limitations

Planting space throughout the city can limit the amount and size of the trees that are to be planted. Depending on the trees size at maturity, there are spacing requirements placed by the city of Lincoln. Larger trees to be placed away from

overhead utilities, distance of planted trees from existing trees, streets, and intersections (City of Lincoln, 2019a). Each tree that gets planted, must have adequate room for the growth of the tree and the spread of its roots. These limitations require management and planning. The city can maximize tree planting by knowing the stocking density of existing trees and calculating the number of available tree space. With achieving this goal in providing enough space for tree growth and proper planning, the amount of maintenance costs on the tree and the surrounding infrastructure will be mitigated (Miller, Hauer, & Werner, 2015).

2.3.3 Infrastructure Limitations

The infrastructure of the city can yield potential issues for tree growth. While some buildings are tall, this can limit the amount of sun that the tree receives; resulting in stunted tree growth (Miller, Hauer, & Werner, 2015). Other areas of infrastructure can limit plant life since there is little soil for it to grow in. The city can implement soil plots or strips of land for trees, but this usually can cause tree growth issues since there is not adequate space for the tree to grow (Franzmeier, McFee, Graveel, & Kohnke, 2016). That is not always the case, smaller sized trees could be a better fit in a city than a larger size tree. Public trees grow better in yards or parks since there is more room for growth and less infrastructure that can impede the trees growth.

2.3.4 Budget Limitations

Each public tree that resides along the street or in parks and yards, all cost money. Pruning, planting, tree removal, and treatments are all considered in the city's budget plan for trees. The budget consists of paying its trained staff and the ability to maintain the public trees that reside in the city limits (Miller, Hauer, & Werner, 2015). Nursery stock availability may limit the type of available trees for planting. Nursery budgets can limit the cities tree diversity or amount of trees for planting (Miller, Hauer, & Werner, 2015). A city's community forestry budget can have substantial impacts on the quality and care for its trees. Larger cities tend to have more money towards planting and tree maintenance while smaller cities tend to have less (Miller, Hauer, & Werner, 2015). As for Lincoln, the city has to have enough money to support and maintain the amount of trees within the city limits. These limitations require management and planning to maximize tree utilization within the city of Lincoln.

Guiding Principles

The guiding principles are a set of statements that tie the vision and mission statements, recommendations, and objectives of the Parks and Recreation Department into the Master Street Tree Plan. The guiding principles combine science, ecosystem services, social equity, and management strategies as the foundation of the Master Street Tree Plan. These principles include:

- Incorporating intentional efforts to increase tree diversity and achieve maximum representation of tree variety within the city of Lincoln
- Ensuring long-term and sustainable social equity through equal and accessible representation of tree diversity within all areas of Lincoln
- Select and plant trees based upon the Four Rs: **R**ight tree, **R**ight place to **R**educe maintenance and **R**ealize benefits over time
- Maximize ecological benefits of Lincoln's community forest

3.1 Diversity recommendations

Diversity is an essential factor influencing the characteristics of a community forest. Important factors in community forest diversity include: climate, soil conditions, pest and disease susceptibility, size, hardiness, canopy coverage, environmental benefits, functional and aesthetic purpose within designated area, and the overall benefits and opportunities it will provide the community. The presence and successful development and implementation of diversity within a community forest ensures the long-term production of benefits. Incorporating street tree diversity into management will allow Lincoln to provide the citizens and the surrounding environment with a sustainable and dependable community forest.

Tree diversity should include multiple characteristics including genus, species, size, function, and age. These characteristics will have significant impact on the overall diversity and success of a community forest, including building and expanding upon the resiliency of Lincoln's community forest. The ability of a community forest to react appropriately and timely to a natural disaster, pest, disease, or other external threat, in terms of rejuvenation and regrowth, is based directly upon the diversity that exists within the environment.

For example, the recent disruption caused by the Emerald Ash Borer (EAB) has devastated the ash tree population in 33 states, and has been confirmed in Nebraska in 2016. The EAB has cost Urban Forestry Departments across the country millions of dollars to treat, remove, and dispose of infected ash trees, as well as compensate for incredible loss and impact to the urban environment (Nebraska Department of

Agriculture). As such, the city of Lincoln must take proactive and intentional steps to diversify and variegate tree stock for the future, to ensure disease and pests such as the EAB do not devastate and threaten the health of the community forest. For further suggestions and plans for addressing EAB presence within Lincoln's community forest, reference the EAB plan in section 5.

3.2 Social Equity

Social equity is the ability to provide, distribute, and implement equal, fair, and consistent access to resources and opportunities throughout an entire society (University of San Francisco). The city of Lincoln is not immune to the challenge of creating social equity through the presence and accessibility of natural resources. To frame this multifaceted issue in terms of urban tree management, all areas of Lincoln should have access to ample and healthy tree presence, including proper species placement. An equitable community forestry plan provides the people and community of Lincoln with a healthy and productive atmosphere for equitable growth and living. Apart from this primary goal, this plan will also provide a framework for future social and communal benefits accompanying the presence of social equity in the form of urban tree management.

Trees are a tool for improving social equity, and thus this plan aims to use this tool as a means to provide a more responsible and fair community within the city of Lincoln. By devoting intentional emphasis to the under-served communities of Lincoln, such as those inhabited primarily by minority groups, progression of social equity will provide the people, schools, businesses, and other facets of its community with extended availability and opportunity for growth and development. Developing and implementing a citizen engagement program with such under-represented groups could create opportunity for growth and begin to address the issues surrounding social equity within Lincoln. General recommendations for developing and accomplishing such a program would include reaching out to all members of underrepresented communities through flyers, door-to-door marketing, and other physical posting visible to the community. Holding such a program in a neutral and easily-accessible location such as a park, library, or other community location would allow optimal participation and results from the community. According to a study conducted by the University of Delaware, community engagement can greatly enhance the perspective that members of a community have on their living environment, and therefore improve the investment they have in such an area. By strengthening community member's investment and dedication to an area, the future

health, wellbeing, success, and value of a community and its members is also strengthened (University of Delaware).

An example of inequitable distribution of street trees can be found in lower socio-economic neighborhoods where tree diversity is not as vast or successfully implemented as it may be in wealthier neighborhoods. The lack of tree diversity, as well as the degraded quality and health of the trees, in lower-status neighborhoods significantly contributes to the issue of social inequity. Access to diverse, healthy, and well-maintained trees can provide a community with psychological, recreational, and health benefits, as well as the opportunity for community-growth and engagement.

To tackle this complex and increasingly present subject, the city of Lincoln must identify the groups and entities that are directly affected by the presence of inequity. Within Lincoln, the target area of implementation for this topic will be North Lincoln, between the Highlands and downtown. This area has been identified as an area that has historically struggled with social equity, due to lack of resources and opportunity for growth. The population of people that exist within these boundaries is dominated by a large variety of minorities. Some of the most-identified minorities within the Lincoln area include, but are not limited to: Hispanic, African American, Asian (refugees), Sudanese, Congolese, Vietnamese, and Irani (Data USA). To provide a comprehensive and inclusive response to the issue of social equity within Lincoln, it is recommended that reference be made to specific census block groups as discussed in Section 7.

3.2.1 Achieving social equity through tree diversity

By diversifying these areas' urban forests, optimistic results would provide that the health and wellbeing of community members will begin to improve, as well as a reduction in crime and vandalism. Nurturing and fostering respect and care within a community, via the presence of healthy and diverse trees, can have drastic improvements on the overall connection between people and their living environment. In efforts to achieve this concept on social equity via community tree management, it is encouraged and highly recommended to increase involvement of community members regarding education about tree species, planting, suggestions for care and protection, conservation, advantages, and overall benefits of trees within their specific community. To identify and increase community involvement with diverse groups, the Lincoln Parks and Recreation department shall help to provide information and additional resources, as available, to underserved Lincoln residents. By providing all citizens and members of a community the ability and opportunity to engage in their regional development and planning, the overall improvement and benefits to the community and those who live

there are significantly increased. These benefits include building a foundational and supportive link between citizens and the government, as well as increasing the quality of public projects (including community forest management) and the overall existence and experience of those inhabiting the community (Association, 2014).

3.3 Design Implications

Design within the urban tree environment should be approached with intentional thought and meaning. Done well, design can accomplish diversity, social equity, aesthetics, opportunity for ample recreation and natural spaces, and an overall healthy quality of life for the citizens of Lincoln. Design elements of this plan aim to actively engage the Lincoln community with the outdoors by offering extended opportunities for recreation within all areas of the city. Other objectives for design implications within Lincoln's community forest include improving social equity (Section 3.2.1) through diversifying tree stock, enhancing aesthetics, and improving health and wellness of a community by increasing the number of trees present within the city of Lincoln. A brief objective statement for various design locations within the city of Lincoln can be found below.

- When designing within industrial areas, it is recommended that tree presence be intentional and serve functional roles for filtering water, waste, and pollution provided by industrial processes. Areas of industry should contain tree varieties that are suited for and acclimated to the possible particulates, emissions, and pollution that can accompany such areas of development. By incorporating new and resilient species into the tree stock of Lincoln's industrial areas, designers aim to improve the flexibility and response of Lincoln's tree population to inevitable changes in climate and the environment
- When approaching design elements within downtown Lincoln, best practice would include trees that provide ample shade for cooling cars, citizens, and cement. Improving and increasing tree canopy coverage due to intentional efforts of design will allow availability and presence of shade in areas that previously did not have access to this resource. Downtown infrastructure designers are also encouraged to include tree diversity that will contribute to the aesthetic and practical purposes of the area.
- Historic areas are highly recommended to include trees with historical relevancy, but do not increase the vulnerability of a community forest deprived of diversity. Such trees should contribute to the historical value and overall attraction of the area for visiting members of the community and the general public.

- Residential areas are highly recommended to incorporate a large variety of tree genus. Due to the high volume of citizen traffic and inhabitation, residential areas have the most potential and ability to influence, affect, and motivate citizens of Lincoln. Residential areas are thus recommended to focus on and contribute great diversity within tree presence. By focusing on tree diversity in residential areas, the anticipated result will be an increase in canopy coverage and citizen satisfaction with their community.

3.4 Functional and Ecological Implications of Planting

Trees provide a number of ecological impacts that include, but are not limited to: watershed benefits, energy benefits, air quality benefits, and greenhouse gas reduction (Livesley, McPherson, & Calfapietra, 2016; Riikonen, 2016; Watts, 2019).

- Native tree species should be considered on streets along streams and natural areas. Native species are better adapted to the conditions of natural areas such as soils and climate, they often require less water and fertilizer, they may be more tolerant or resistant to native insects and disease, and wildlife have adapted to use food sources native tree species provide (Slattery, Reshetiloff, & Zwicker, 2003).
- Trees planted near streams and natural areas provide numerous watershed benefits including reducing runoff, reducing soil erosion, removal of excess nutrients, and removal of heavy metals. (McPherson & Geiger, 2005; McPherson & Geiger, 2005; Livesley et al., 2016).
- Trees to provide shade to reduce the amount of radiant heat absorbed by streets and buildings in the urban environment which can significantly reduce the urban heat island effect (Livesley et al., 2016).
- Trees are often thought of as "lung of our cities" because of their ability to remove contaminants from the air and improve air quality (McPherson & Geiger, 2005).
- Urban trees are capable of reducing carbon emission by sequestering CO_2 as woody and foliar biomass during growth and can reduce heating and cooling costs, thus reducing emission associated with electric power production (McPherson & Geiger, 2005). As carbon credit markets grow it could become a resource to fund urban forestry programs.

3.5 Street Sequencing

Select and plant trees based upon the Four Rs: **R**ight tree, **R**ight place to **R**educe maintenance and **R**ealize benefits over time (Johnson & North, 2016). Diversity selection

and sequencing of street trees should take site factors such as microclimate, available space, utilities, structures, surface cover, and pollution tolerance into consideration (Martin, Simmons, & Ashton, 2016; R. W. Miller, Hauer, & Werner, 2015). Site factors combined with the implementation the principals of the Four Rs will reduce excessive maintenance associated with utility conflicts, reduce damage to sidewalks and other structures, better tolerate pollution, and promote resiliency and longevity of the community forest (Martin et al., 2016; Maurer Braun, Read, & Ricklin, 2016; K. L. Miller, 2012; R. W. Miller et al., 2015).

While considering diversity, social equity, and the 4R principles careful consideration should be used while developing a planting plan. Neighborhood planting plans should incorporate multiple species on each street. Complimentary species increase diversification and lessens the effect of pests and disease. This type of urban forestry management can greatly reduce maintenance activities and improve quality of life for all Lincoln residents.

3.6 Street Types Defined

In the Lincoln/Lancaster County 2040 Comprehensive Plan (LPlan 2040) the Lincoln Metropolitan Planning Organization (MPO) has developed a functional classification system according to traffic service (Figure 3.1). This classification system should be used to define tree species and tree spacing appropriate to each level of traffic service. For more information, see Section 4.2.3 of this document. Consider pairing tree types and street types when developing a street tree planting plan. Trees along interstates, freeways, and arterial streets should be considered for traits such as salt tolerance, noise abatement, and green screen to buffer views between streets and land uses (Martin et al., 2016; Maurer Braun, Read, & Ricklin, 2016; K. L. Miller, 2012; R. W. Miller et al., 2015). Consider trees for traits that provide shade to buildings and sidewalks and promote traffic calming in residential and mixed-use commercial areas (Martin, Simmons, & Ashton, 2016; R. W. Miller, Hauer, & Werner, 2015).

Metropolitan Planning Organization (MPO) functional classification system according to traffic service.

- **"Urban/Rural Interstate, Freeways and Expressways**"
  - These roads can only be accessed at interchanges and are capable of carrying a large number of vehicles at high rates of speed for long distances. (Baker et al., 2016)
- **"Principal Arterials" & "Minor Arterials"**
  - "Major Streets" in the "Design Standards for Land Subdivision Regulations".
  - These roads have posted speeds of 35 to 45 miles per hour (mph) and carry traffic to and from population or activity centers across town. Traffic is controlled by traffic signals and roundabouts. (Baker et al., 2016)
- **"Collector Streets"**
  - Collector streets have a design speed of 30 mph and typically move traffic from neighborhoods to arterial streets. (Baker et al., 2016)
- **"Local Streets" or "Residential Streets"**
  - Residential streets have a design speed of 25 mph and provide access to adjacent properties. (Baker et al., 2016)

Source: Lincoln/Lancaster County 2040 Comprehensive Plan (LPlan 2040)

Figure 3.1 MPO functional classification system according to traffic service (Baker et al., 2016).

Tree Selection and Maintenance

4.1 Introduction

Lincoln's trees more than aesthetic value; they provide economic, social, environmental, and psychological benefits as well (Section 2). To maintain a sustainable forest resource that survives, persists, and benefits future generations, the city must establish a community forest that is diverse in age, size, and genera of trees.

The city is not treated as a homogenous unit; it is organized into different districts that are managed in different ways. Likewise, management of the city's trees should be adjusted across various scales. The practice of multi-scale planning — tailoring goals to specific districts rather than applying a single goal to the whole city—can help protect the city's investment in its tree population (Borgström et al., 2006). Spatial scales range from city blocks (Section 4.2.3) to land use categories (Section 3). Temporal scales become useful for planning programmed maintenance (Section 4.3.1), pruning cycles (Section 4.3.2), and age diversity (Section 4.2.1.1). The following selection, planting, and maintenance recommendations represent overarching goals and benchmarks which should be adjusted across spatial and temporal scales.

4.2 Tree Selection

The selection of trees for planting along Lincoln's streets, in its parks and on its public lands requires considerations at various scales, including species diversity, age diversity, and spatial diversity. Urban foresters have long used "Right tree, right place" as a maxim for appropriate, multi-scale tree selection and planting (Minckler, 1941; Santamour, 1990). Choosing the right species, for example, requires knowledge of the proposed location—including available space, existing structures, planned infrastructure changes, and potential environmental stressors (Section 3)—as well as general species characteristics. Johnson and North (2016) propose an expansion of this maxim that incorporates the benefits of the original two Rs, for a total of 4 Rs: "The right tree, in the right place, reduces maintenance and realizes benefits over time."

4.2.1 Species Diversity

Best practices in the field of urban forestry management emphasize genus-level diversity over species-level diversity (Moll 1989). Lincoln's Community Forestry Advisory Board (CFAB) approved Street Tree Diversity Recommendations in 2018 (Appendix A) and set a measurable, achievable goal: a street tree population in which no more than 10% of its trees are from a single genus. Pests and pathogens will typically affect many species within a genus due to the species' genetic similarities, which means that species-

level diversity alone is not sufficient for mitigating losses from pests and diseases (Niemelä & Mattson, 1996; Raupp et al., 2006).

The current target of 10% or less per genus should be the first goal, especially for the most abundant genera. Ash trees (genus *Fraxinus*) currently make up 14% of Lincoln's street tree population and will soon suffer catastrophic losses due to emerald ash borer (*Agrilus planipennis*). Maples (*Acer spp.*) and oaks (*Quercus spp.*) are also over the 10% target, making up 20.2% and 14.9% of the street tree population, respectively. Lindens are within a few percentiles at 8.6%. (See Section 5 for more details). These percentages will continue to rise until additional funding for tree replanting can be secured. Currently, the city only plants 3 out of 5 trees that are removed. Furthermore, *Fraxinus* is not the only genus under serious threat. The Asian longhorn beetle (*Anoplophora glabripennis*), which affects maples, elms, horsechestnuts, and other hardwoods as well as ash, has spread throughout Canada and the northeast United States, and has been present as near as Chicago (Wiedenmann, 2001; Nowak et al., 2001). Spotted lanternfly (*Lycorma delicatula*) is mostly restricted to eastern states at this time, but it has the potential to spread despite quarantines (Dara et al., 2015; USDA, 2019). Orchard trees such as apples, grapes, and cherries are particularly threatened by spotted lanternfly, as are maples, oaks, walnuts, sycamores, and even hops. Should the spotted lanternfly spread to Nebraska, significant economic impact can be expected.

The emergence of new threats makes increasing diversity an ongoing effort. The overarching goal of diversification should be to reach the lowest genera limit that is practical for the city to sustain. As funding increases and abundant genera percentages approach 10%, the target maximum percentage should continue to decrease (first to 8%, then to 5%, for example) to better safeguard against future losses. In the meantime, reducing the number of new plantings selected from *Acer*, *Quercus*, and other common genera to reach the current goal would be a significant step toward a more stable community forest resource.

4.2.1.1 Inclusion and exclusion lists

A diversity framework was drafted and approved by the CFAB's Street Tree Diversity Committee in 2018. The Street Tree Diversity Recommendations (Appendix A) offer Community Forestry staff a flexible framework for assembling their list of approved and prohibited species (Appendix B), which is made available to the public on their website. The Approved Trees for Streets document is mainly targeted at developers and contractors, who require a list of approved street tree varieties and cultivars for planning purposes. Homeowners and other property managers can access this document, but

their participation in the tree voucher program (Section 5) requires them to select a species specific to the street on which it will be planted.

Future iterations of the approved and prohibited species lists shall reflect the information in the Street Tree Diversity Framework. Species that become invasive can be added to the prohibited species list, but it will not prevent them from being planted on private property. Other midwestern states have banned the sale and planting of invasive species in recent years, including several of the species on Lincoln's prohibited species list (Ohio Department of Agriculture, 2017). Lincoln should pursue similar restricted species policies at the municipal level or push for statewide adoption; a partnership with the Lancaster County Weed Control authority, which is tasked with education and enforcement of the county's Noxious Weeds list, could prove beneficial.

The Approved Species for Street Trees and any restricted or prohibited species lists shall be reassessed every 1-2 years by considering several scales: environmental and cultural constraints, economic factors, and social factors, ideally in that order. The approved species list currently organizes trees by size and primary shape, then focuses on aesthetic qualities (flowering and fall color). The list should take into the account the four R's of Total Infrastructure Planning (Johnson & North, 2016), noting which species are especially well-suited (or ill-suited) to particular environments – whether because of the characteristics already included in the document, or because of their root depth, soil preferences, moisture requirements, and tolerance to stressors like heat, cold, high winds, salt spray, and high or low pH.

4.2.2 Age diversity

Though pests and diseases are an important consideration, trees decline and die for less dramatic reasons. The average lifespan of a street tree is 19-28 years due to the harsh conditions they endure in urban environments (Roman & Scatena, 2011). For this reason, age diversity (and, as a proxy, size diversity) is another important factor in the stability of the community forest. This is primarily accomplished through staggered planting. To stagger plantings, for example, two nearby cohorts of trees can be planted years apart. By the time the older first cohort needs to be removed, the younger second cohort – if timed correctly – will be full-grown. Then, a third cohort can be planted in place of the first to continue the cycle. Staggered cohorts are most effective when planned with spatial scales in mind. Purposeful placement of staggered cohorts in adjacent locations can help mitigate the sudden drop in canopy cover that occurs when mature trees are replaced with immature ones.

4.2.3 Spatial diversity

An additional diversity consideration is spatial distribution by neighborhood, by block or by street. Lincoln's Design Standards for new subdivisions align with the best practices identified by Simons & Johnson (2007) requiring 5 blocks between streets planted with the same species (Figure 4.1). This example from Simons & Johnson represents sequenced combinations of multiple species, however, and not entire streets with homogenous tree populations. In its next iteration, the Design Standards shall be clarified to specify combination plantings of compatible species from different genera instead of the use of a single species per block. Further information on spatial diversity and sequencing is available in Section 3.

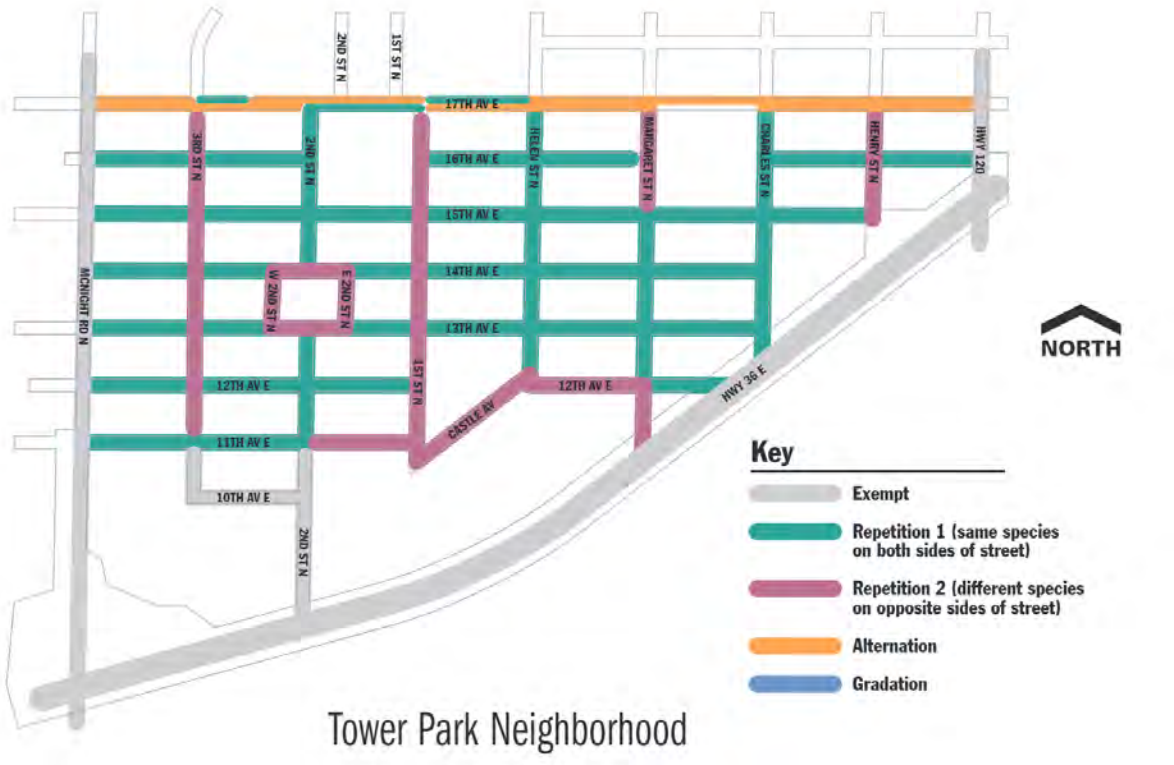


Figure 4.1 Diversified Planting Plan Example for Minneapolis, Minnesota (Simons & Johnson, 2008)

4.2.4 Standards for Nursery Stock

Obtaining diverse trees for planting can be a challenge. Fortunately, Lincoln's current practice of contract nursery growing enables the city to request species that are

not usually grown for retail. The less abundant genera on the approved species list should guide which species are requested from contract growers, as well as which species are approved for subdivision plans and other contract plantings.

As set forth in Section 10 of Lincoln's Design Standards for Street Trees (Lincoln Design Standards § 2.35), selection criteria for nursery stock should be consistent with the American Standard for Nursery Stock, ANSI Z60.1 (2014). Section 10 shall be expanded to include crown, foliage, branch, trunk, and root standards for nursery stock. These nursery stock standards include, but are not limited to: a single, straight, vertical trunk that has a diameter of at least 1" in caliper and no more than a 5 degree bow at any point; a full, dense crown typical for its species with leaves or needles that are not dead, discolored, wilted, or shriveled; strongly-attached branches that are equally dominant, evenly distributed, and no larger than two-thirds the trunk diameter; and roots that are of appropriate size, number, and distribution for the age and size of the tree. All parts of the tree shall be free of physical damage, deformities (such as doglegs), and signs of pests, diseases, and nutrient deficiencies. Once approved, the nursery stock specifications in the updated Design Standards should be incorporated into contracts with nursery growers. Contracts should enable the city to reject trees that do not meet the stated specifications.

4.2.5 Planting Specifications

The Design Standards for Street Trees present general requirements for siting new trees; minimum distances between the planting location and existing infrastructure are assigned, as are minimum distances between trees according to their size at maturity and the speed limit of the adjacent street. Sections 6-8, which address species sequencing, shall be updated to reflect the species sequencing and block repetition discussed in Section 4.2.3 of this document.

Detailed planting specifications (Appendix C) serve as safeguards for investment in new trees and promote health and good structure into the future. Successful planting involves attention to site preparation as well as tree installation, including an appropriately sized and shaped planting hole, proper handling of the tree and its container materials, a ring of raised soil to direct water to the root and mulch to preserve moisture and prevent grass and weeds from encroaching on the tree. Planting specifications govern the planting of trees by outside entities as well as the city itself. Contracts signed with outside entities should allow the city to nullify the contract and refuse payment if minimum planting specifications are not met.

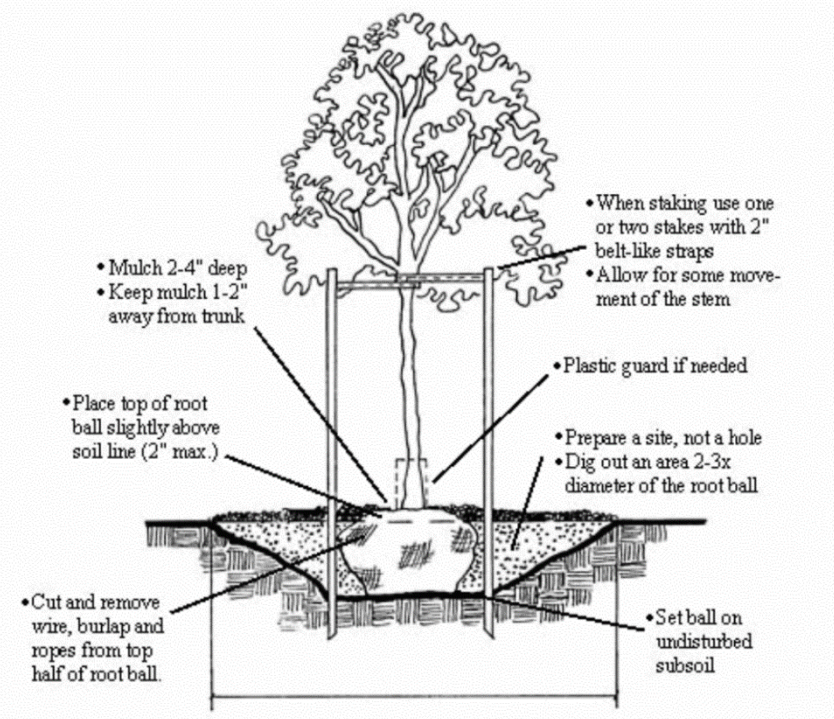


Figure 4.2 Planting specification diagram (Nebraska Forest Service, 2006).

4.3 Pruning and Maintenance

Due to Community Forestry's budget and staffing, the city currently relies heavily on request pruning. Request pruning is performed after a citizen contacts the city with a request to prune a particular street tree (typically a tree adjacent to their property). This sometimes overlaps with crisis pruning, which is performed under the city's direction when hazard trees are identified. Calls for service and request pruning have been on the rise in Lincoln (Johnson & Grueber, 2019), but can be reduced through the use of programmed maintenance and two-stage pruning cycles.

4.3.1 Programmed Maintenance

An emphasis on scheduled pruning over request pruning, also known as programmed maintenance, is of immediate benefit to the city. Pruning a tree on request takes at least twice the amount of time as pruning a similar tree during scheduled maintenance and can cost over twice as much. An analysis of pruning time in the city of Santa Maria, CA found that scheduled pruning took an average of 1.03 hours per tree, while request pruning took an average of 2.83 hours due to the additional travel and setup time (Miller et al., 2015). Shifting away from reactive request pruning to proactive programmed maintenance is gradual process and should be a continual area of emphasis for Community Forestry as it works toward a more adequate maintenance program.

4.3.2 Pruning Cycles

To maximize the value of the tree population for each dollar expended, Community Forestry shall determine an optimum pruning cycle unique to Lincoln based on its budget, available staff resources, and current tree inventory. Optimum pruning cycles can vary from one area to another based on regional climate as well as the age, condition and species of the trees present. The optimum pruning cycle may be one-stage or two-stage, but ultimately depends on budget and the total employee FTE devoted to pruning.

To determine the optimum pruning cycle for Lincoln, program records should be compiled to compare the marginal cost of pruning to the marginal return. Marginal cost represents the decline in tree condition and subsequent decrease in value based on the number of years since the last pruning (Figure 3). Marginal return refers to the amount of money saved when the pruning cycle increases by one year. The work of Miller and Sylvester (1981) illustrates this comparison using data from a portion of Milwaukee, Wisconsin. Data from Lincoln's inventory and records should be used to chart the marginal cost and marginal return as demonstrated in Figure 4. The point where the two

lines intersect indicates optimal pruning cycle length in years (the x axis) and the estimated annual pruning cost (the y axis).

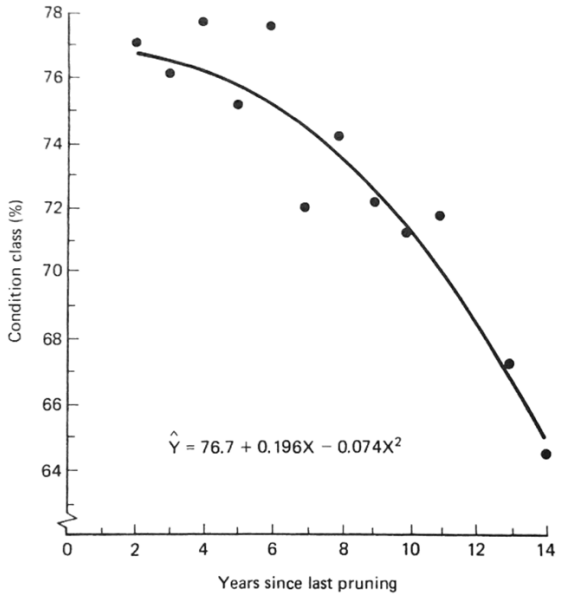


Figure 4.3 Relationship between average tree condition class and number of years since last pruning (Miller & Sylvester, 1981)

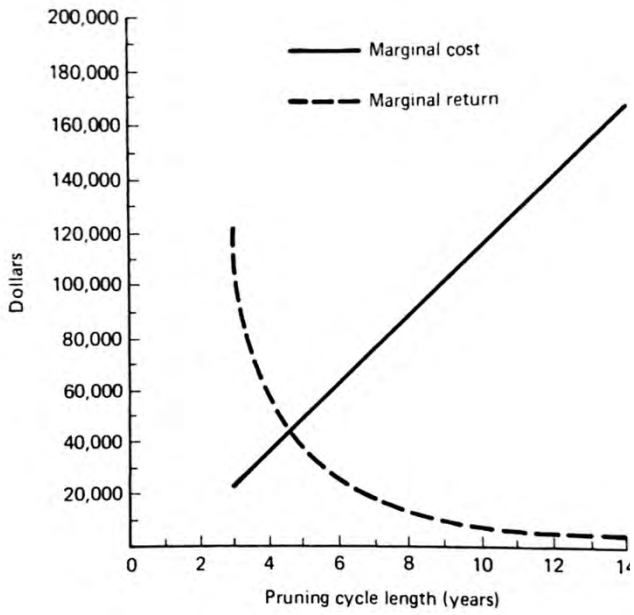


Figure 4.4 Comparison of loss in tree value versus savings in pruning costs for various pruning cycles in Milwaukee, Wisconsin (Miller & Silvester, 1981)

Longer pruning cycles can be supported with less funds, but tree condition—and thus value—declines exponentially as cycle length increases. Two-stage pruning cycles address this problem by dividing the street tree population into two groups and applying a shorter running cycle to smaller (typically newer) trees. In another example from Milwaukee, Wisconsin, the city shifted to a two-stage pruning cycle in which trees less than 12" in diameter were pruned on a 3-year cycle, and all other trees were pruned on a 6-year cycle (Griffith and Associates, 1993).

Two-stage pruning cycles can reduce request pruning by as much as 50% (Miller et al., 2015), though exact numbers vary (Luley et al., 2002). Additionally, attending to younger trees on a shortened pruning cycle increases their chances of growing into large, healthy, mature trees, which provide the bulk of community forest benefits (Johnson & North, 2016). Pruning of newly planted trees mainly entails structural pruning – the removal of smaller codominant stems to encourage strong growth in a single, central leader (Gilman & Lilly' 2008). Structural pruning can also include shortening the

largest branches at planting, which results in stronger growth higher up in the crown and reduces the need for clearance trimming later (Gilman, 2015). These factors, combined with the higher mortality rates of trees during the establishment period, form a strong argument for two-stage pruning cycles that provide more frequent pruning for young trees.

The most direct way to shorten pruning cycles, though, is to secure funding for additional staff. Miller et al. (2015) provide a formula for determining pruning cycles based on available staff (Figure 4.5), allowing forestry departments to model the effects of staffing changes on pruning cycles.

$$Pruning\ cycle = \frac{T \times P}{S \times H}$$

Where T is the total number of trees maintained by the city, P is the average number of person hours it takes to prune a tree, S is the number of arborists (or the total FTE spent on pruning), and H is the number of hours each person works in one year.

Figure 4.5 Formula for length of pruning cycle (Miller et al. 2015)

In the 2018-19 fiscal year, the city's Community Forestry budget increased in response to the arrival of emerald ash borer. 9 new staff members were added who will help the city work toward more frequent pruning cycles once their treatment and removal duties are complete. As the total FTE spent on pruning increases, the ratio decreases and pruning cycles become shorter in length.

4.4 Community Involvement

The city of Lincoln has established several programs to involve citizens in the replanting of Lincoln's dead or removed street tree (Section 5). Like planting, pruning is not always performed by the city; private parties can apply for a permit to do work on street trees (Section 5.2.2). Permit holders are held to the specifications set forth in the American National Standard for Tree Care Operations section on pruning trees, shrubs, and other woody plants (ANSI 300.1, 2017). More specific planting specifications, once amended to Lincoln's Design Standards for Street Trees, can be used in place of or in addition to ANSI standards.

Investing in community involvement results in valuable returns. Some benefits are readily apparent – such as those resulting from planting vouchers or the 2 for trees program - while others are harder to measure but are backed by recent studies. A survey of Sacramento, CA found that residents involved in planting were more satisfied with the outcome than residents on streets where the trees were selected and replaced wholly by the city (Sommer et al. 1994). Involving citizens in tree care also increases the community's awareness of urban forestry through education and visibility (Ball 1986), which is instrumental in obtaining additional funds and garnering public support for the community forest. Cities and other organizations can offer incentives for citizens who volunteer for tree inventories or tree care operations. The Minnesota non-profit Brewing a Better Forest, for example, partner with local brewers to reward citizens with a free beer when they adopt and water a tree throughout a growing season (Brewing a Better Forest, 2019).

Citizen pruners also bring value to urban forestry programs. In Lincoln the Community Outreach Forester oversees the city's citizen pruner program as part of their public education and engagement duties. By assisting arborists with smaller and easily accessible issues, program volunteers can support a two-stage pruning cycle by devoting time to the shorter of the two cycles. Pruning small trees rarely involves the heavy machinery needed for pruning large trees, and engaging citizens in structural pruning represents an economic benefit for the city and an educational benefit for the volunteers. Structural pruning includes pruning competing leaders to encourage strong growth in the central leader, as well as removing branches below permanent scaffold limbs to strengthen the tree's structural integrity and achieve the appropriate street or sidewalk clearance. Citizen pruners for the city of Ann Arbor, Michigan, for example, attend a 5-hour training to learn how to encourage strong growth through pruning, then sign up for scheduled, supervised work days and assist the city in caring for its street trees (City of Ann Arbor Forestry, 2019).

Partnerships with educational institutions and community organizations help bolster volunteer programs when city resources are limited. Participants in Minnesota's Citizen Pruner Program are trained by the Department of Forest Resources at the University of Minnesota, where they learn safe pruning methods for removing deadwood, suckers, and sprouts (Minnesota Tree Care Advocate, 2016). In New York City, on the other hand, a non-profit organization called Trees New York trains and certifies volunteers to perform structural and corrective pruning throughout the city (Trees New York, 2018).

Additional maintenance tasks for young trees can be incorporated into citizen pruners' work. In the first 2-3 years after transplanting—referred to as the establishment period— are characterized by markedly higher mortality rates (Nowak et al., 2004). Once a tree is planted correctly (Section 5.2.6), citizen pruners could further increase its chances of survival by assessing stakes and guy lines, removing weeds and debris, replenishing displaced mulch, and assisting with watering (Struve, 2009).

Current State of the Forest

This section contains information about the current state of the forest in Lincoln, which contains over 120,000 trees. Outlined are planting guidelines, community programs, and diversity and maintenance standards in addition to descriptions of the forestry budget, tree board, benefits provided by the community forest, and City ordinances.

Having a thorough understanding of a city's organization and resources, such as an inventory, programs, and policies surrounding public trees, is instrumental for community forest management. These resources can aid in the efficient management of a huge piece of a city's infrastructure, the community forest, to ensure its quality and sustainability for the years to come.

5.1 Planting

Currently, the ratio of tree planting to removal is 3 trees planted to every 5 that are removed in Lincoln. There are several programs that have been put in place to help with this negative ratio. These programs range from volunteer work to cost share assistance programs. There also is a donation program which aids in the budget the city of Lincoln uses for tree planting.

5.1.1 Planting Ordinances

Lincoln Parks and Recreation lays out planting guidelines, ordinances and design standards for the planting of public trees. Several such guidelines are listed below (Lincoln Design Standards 2019), in addition to those in the Section 5.7 of this document. Refer to the Lincoln Parks and Recreation Community Forestry website for a list of City-approved trees.

- Large form trees and small form trees shall not be planted on same street because of differences in height, and growing space requirements. The only exception stated is that small shade tolerant understory type trees (redbud, serviceberry) can be planted beneath large overstory shade trees, give there is plenty of room to accommodate the mature growth of the understory tree.
- Trees may no longer be planted under power lines.
- List of approved trees for planting (Appendix B).
- Residential Street Trees planted via the Voucher Program (Section 5.1.2).

5.1.2 Voucher Program

The voucher program is a cost-share program for homeowners in residential neighborhoods to purchase trees to be planted on the City right-of-way adjacent to their property. Property owners interested in the voucher program may contact the Parks and

Recreation forestry department to participate in the program. A City Arborist will decide whether there is adequate space in the right-of-way for a tree to be planted and issues a no-cost Street Tree Planting Permit and a Tree Voucher ($100.00) will be given. The voucher can be redeemed at any participating nursery (Johnson, Lincoln Parks and Recreation, 2019).

5.1.3 Voucher Program participation requirements:

- Voucher applicant must own property and reside in Lincoln.
- Voucher must be signed by nursery and homeowner, and the nursery must then submit it to the Parks and Recreation Forestry Department for compensation.
- The tree purchased must be larger than 1" in trunk diameter.
- Vouchers may not be combined to purchase a single tree.

5.2 Street Tree Pruning

5.2.1 Pruning

The City has five standards for pruning public trees:

1. Health: removing dead or decaying branches.
2. Structure: weakly attached branches, or branches conflicting with each other.
3. Safety: provide safe right of way for pedestrians, motorists, and clear view.
4. Pruning cycle: 127,000 trees (1) can take as long as 11 years for a tree to be revisited.
5. Future growth: Trees are pruned to promote growth, as they may not be revisited for another 11 years (Johnson, Lincoln Parks and Recreation, 2019).
6. Most of the City's pruning is done primarily at the request of homeowners and citizens (Johnson, Lincoln Parks and Recreation, 2019), though homeowners may prune the public trees located in the right-of-way in accordance with the ANSI A300 pruning standard.

5.2.2 Citizen Pruning

Citizen pruning was developed to help the City. If homeowners wish to prune trees in the right-of-way, they must prune in accordance of ANSI A300 pruning standard. Training and permits are available through the Parks and Recreation Department (Johnson, 2019).

5.2.3 2 for Trees

2 for Trees is a donation program which allows homeowners using the Lincoln Water System to voluntarily add $2 to their water bill to plant and care for public trees (Gardler, 2018).

5.3 Pest and Pathogen Response

A general pest and pathogen response plan is currently unavailable, but a response plan for emerald ash borer (EAB) was adopted in 2018. The City and Community Tree Advisory Board have developed criteria pertaining to diversity in public trees planted in order to mitigate the spread of and damage caused by pests and pathogens (Appendix A).

5.3.1 Emerald Ash Borer

The plan states to begin the process by removing smaller caliper trees and gradually moving to larger trees. There will be new staff allocated for the ash operations (see Table 5.2). The new staff will be tasked with regular pruning once the quota of 1,050 ash trees removed and replaced is reached annually. The projected cost for EAB over a 15-year period is $22.8 million (Johnson, 2019). A summary of the City's ash and the EAB response plan are laid out below (Parks and Recreation, 2018).

- Approximately 12% of the public trees are ash
- An estimated 40,000 to 50,000 additional privately owned ash
- Recovery and response plan
- 3 phase process
    - Chemically treat ash to allow management of the declining population
    - Remove 1,050 ash trees per year
    - Plant 1,050 replacement trees per year and replace with diverse tree species

5.3.2 Adopt-an-Ash

Adopt-an-Ash allows a homeowner to adopt a healthy ash tree in the right-of-way adjacent to their property and pay for treatments to keep the tree safe from EAB. Ash trees qualifying to be adopted must have a minimum diameter breast height (DBH) of 14 inches and no overhead utilities. The adoption permit is in for two years, after which the homeowner can decide to continue or stop treating the tree. If EAB treatments are discontinued, the tree is scheduled for removal (Johnson, Lincoln Parks and Recreation, 2019).

5.3.3 Street Tree Diversity

The city's diversity goal is set at 10% per genus to help reduce the negative impacts of pests and pathogens (Grueber, 2019). Currently, the City has greater than 10% maple, oak, and ash. The 15 most frequently occurring street trees are listed in Table 2.1, though over 70 genera are represented among Lincoln's public trees.

Table 5.1. Proportion of Public Trees by Genus in Lincoln, Nebraska.

Genus	Common Name	Public Tree Count	Percent of Total Public Trees
Acer	Maple	19690	16.1
Quercus	Oak	17893	14.6
Fraxinus	Ash	14815	12.1
Gleditsia	Honey locust	9361	7.6
Pinus	Pine	8894	7.3
Tilia	Linden	8197	6.7
Malus	Crabapple	7446	6.1
Pyrus	Pear	6475	5.3
Celtis	Hackberry	5233	4.3
Ulmus	Elm	4194	3.4
Picea	Spruce	3665	3.0
Juniperus	Juniper	3574	2.9
Gymnocladus	Coffeetree	1669	1.4
Morus	Mulberry	865	0.7
Cercis	Redbud	840	0.7
Total Public Trees of Known Genera		121009	
Total Public Trees		122525	

Percent of public trees was calculated using the public tree count for each genus and the total public trees. These percentages may vary slightly as approximately 1.237% of the trees inventoried were not identified.

5.4 Community Forestry Advisory Board

The Community Forestry Advisory Board, often referred to as the Tree Board, is tasked with providing advice and recommendations to the Parks and Recreation Department, the City Council, and the Mayor pertaining to the community forest and vegetation on City property. The Tree Board assists in the development of

management plans, policy recommendations, and projects pertaining to the community forestry, and historic and notable trees (Johnson, 2019). Additionally, the Tree Board is involved with Arbor Day celebrations, encouraging donations, and public education. Members may form sub-committees to focus on specific issues, such as diversity recommendations for street trees.

See Lincoln Municipal Code (LMC) Chapter 4.54 in Appendix E for a full outline of the responsibilities and organization of the Community Forestry Advisory Board.

5.5 Budget

The City of Lincoln contains and funds 14 distinct departments and divisions, one of which, is the Parks and Recreation Department. The Parks and Recreation Department contains and sets the budget for the Community Forestry Department. In the 2018-2020 adopted budget, the Forestry Department received $938,281 (17.40 FTE's) out of the General Fund for the 2017-2018 fiscal year. This increased in the subsequent years by approximately 8.5 FTE's and $400,000 in anticipation of costs created by EAB. The Parks and Recreation Department upped the budget for the Community Operations Forester after 2018, while increasing both the FTE's and budget allotted for Arborist I and II positions (Rec, Budget, 2019).

Currently, the City primarily uses cost-share and volunteer programs to fund the planting of new public trees. Some of these programs include the Voucher Program, Adopt-an-Ash, the Citizen Pruning Program, and 2 for Trees. 2 for Trees provides the City with $50-60,000 per year for the maintenance and planting of public trees. Additionally, private groups, such as the Arbor Day Foundation and Lincoln Parks Foundation, plant many public trees and hold events advocating for the care of the community forest.

Table 5.2. Adopted Forestry Budget, 2018-2020

	2017-2018		2018-2019		2019-2020	
Allocation	**FTE's**	**Budget**	**Adopted FTE's**	**Adopted Budget**	**Adopted FTE's**	**Adopted Budget**
Arborist I	9.00	$416,329	14.00	$610,746	14.00	$626,682
Arborist II	5.00	$277,787	6.00	$345,385	6.00	$349,615
Community Operations Forester	1.00	$77,827	1.00	$81,473	1.00	$81,473
Forestry Budget	17.40	$938,281	25.93	$1,344,362	25.93	$1,398,939

The funds in Table 5.2 are allocated from the Parks and Recreation General Fund and represent an increase in staff and budget for the 2018-2020 years in anticipation of EAB.

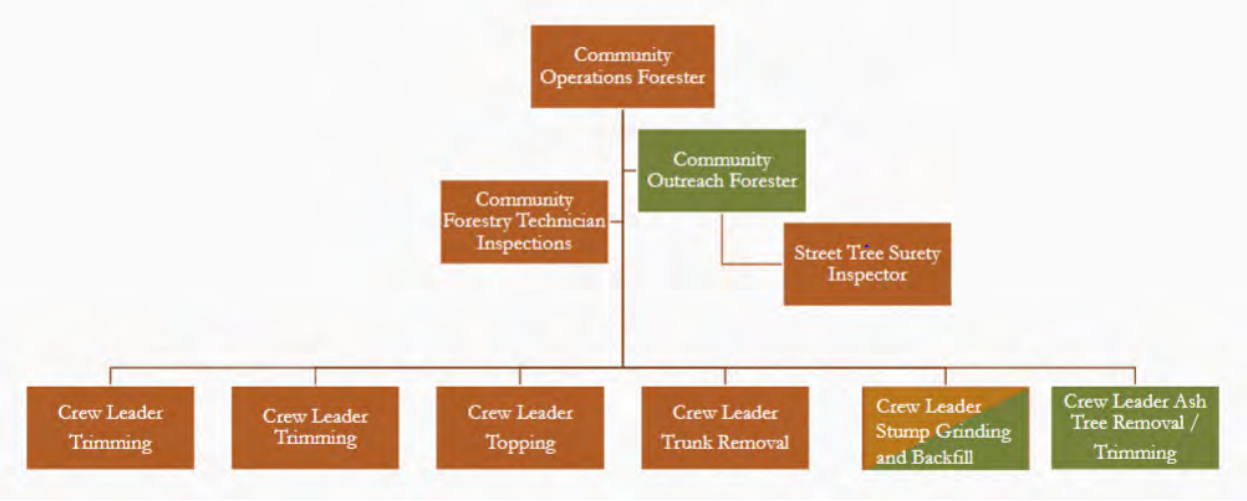


Figure 5.1 Community Forestry Personnel Structure

The flowchart in Figure 5.1 represents the staff structure within the Community Forestry Department (Johnson, 2019). The Director of Parks and Recreation oversees the Community Forestry Department with the council of the Community Forestry Advisement Board.

5.6 Public Tree Benefits

The City of Lincoln's 121,737 public trees provide annual ecosystem benefits in the realm of $11,895,804.34 (The Davey Tree Experts Company, 2019). While many of these benefits are not immediately apparent, they positively impact both the City's resources and its inhabitants. The benefits can fluctuate from year to year (Table 5.3) as trees are planted and removed.

Table 5.3 Annual Ecosystem Benefits of Public Trees in Lincoln, Nebraska.

Benefit Type	Greenhouse Gases	Water	Energy	Air Quality	Property Benefits
Annual Benefits	$40,363.64	$1,883,552.81	$4,291,475.31	$79,767.18	$5,600,645.40
Additional benefits	2,395,343.43 lb CO_2 avoided 3,230,500.22 lb $C0_2$ sequestered	69,503,793.84 gallons saved	20,443,346.98 kWh saved 2,795,740.08 Therm saved	25,666.63 lb pollutants saved	23,151,124.89 ft^2 leaf surface area

5.7 Ordinances

The Lincoln Municipal Codes (LMC) and Design Standards outline the responsibilities of the City of Lincoln, homeowners, and Arborists pertaining to the maintenance and development of the community forest. Additionally, it details the importance of these protocols to the safety, wellbeing, and overall appearance of the City, its residents, and the community forest. See Appendix D: Design Standards and Appendix E: Lincoln Municipal Code.

There are no ordinances relating trees and construction as of March 2019. Specifically, Ordinance 5.06.020 states that there is no regulation of tree removal during the construction process. Additionally, the terminology used in the LMC does not adequately reflect how trees are living and require adaptive management. Public trees are addressed as one-size-fits-all, without any division between street trees in, for example, residential, industrial, and business districts.

Table 5.4 Community Forestry Definitions (Lincoln Municipal Code, 2019)

Term	Definition
Director	The Director of Parks and Recreation of the City of Lincoln, Nebraska, or his authorized deputy, agent, or representative
Pruning	An operation performed on a tree for the removal of any branches, alive, diseased or dead, in order to prevent or suppress diseases or to balance or shape the tree for any reason whatsoever
Removal	The removal operation performed to eliminate a diseased, dead or hazardous tree.
Sidewalk space	The space between the lot line and existing or projected curb line on each side of every street in the city
Tree	A perennial plan having a woody supporting main stem or trunk, ordinarily growing to definite heights and usually developing branches at some distance from the ground.

Chapter 2.35 Design Standards for Street Trees

These design standards give a detailed overview of where trees should be planted in relation to their surroundings, minimum stocking level, diversity requirements, encouragement of solar power, and how nurseries should manage their stock. Exceptions may be made, so long as they are approved by the City Arborist. For example, street trees are to be spaced based on the speed limit of the adjacent roadway, and buildings with solar access, approved trees of a smaller size may be used (Lincoln Municipal Code, 2.35, 2019).

Chapter 4.54 Community Forestry Advisory Board

This chapter outlines the selection, term lengths, and responsibilities of the Community Forestry Advisory Board and its members. The board consists of seven individuals who act as an advisory committee on issues regarding the community forest and associated vegetation to the Director of Parks and Recreation, City Council, and the Mayor. All meetings are open to the public, and record of all meetings and decisions must be kept on file with the City Clerk.

The Board has many responsibilities which include assisting in the development of regulations and policies surrounding trees and vegetation on public property as well as a comprehensive community forestry management plan. Outside of their advisory role, the Board is charged with including encouraging and soliciting donations for forestry

causes, assisting with Arbor Day celebrations and activities, identifying potential landscaping projects and providing educational materials to promote landscaping on private and public property (Lincoln Municipal Code, 4.54, 2019).

Chapter 5.06 Arborists

Arborists are expected to have a diverse knowledge of planting, culture, repairing of damage, and pest control. An arborist's certificate and identification card are required of anyone hired to prune, remove, treat, repair, or otherwise maintain a tree, apart from trees to be removed for construction work. These may be obtained through the Director and entitles its holder to be hired to maintain public or private trees or to directly supervise the maintenance of trees by employees without arborist certificates.
Arborists must have the proper insurance on file with the City Clerk and maintain their certification as outlined by the renewal standards. Arborists must also follow all rules and regulations, as set and enforced by the Director. In the event of violation of these regulations, the individual may file for a hearing of an appeal, after which the mayor will issue a written order with a final decision (Lincoln Municipal Code, 5.06, 2019).

Chapter 12.20 Trees and Shrubbery

The Director of Parks and Recreation is responsible for the development and maintenance of a publicly available "Master Street Tree Plan", to which all trees planted in public ways within the city must conform. In accordance with this plan, landscape and tree plantings within sidewalk space and on private property are subject to guidelines set forth by this chapter. Approval, maintenance, responsibility for and liability relating to landscape plantings in the sidewalk space are described and set apart from that of street trees. The maintenance of street trees, permits for actions such as removal and planting of street trees, work done and ordered by the City, and the protocol for noncompliance by homeowners are detailed in this ordinance (Lincoln Municipal Code, 12.20, 2019).

21.05.320 Section 304.19 Added; Maintenance of Buildings and Premises

This ordinance refers mostly to maintenance of private property outside of tree care, specifying that the owner of the building is responsible for any dead and decaying trees on the premises as well as any natural growth or storm damage. It impresses the importance of having a well-maintained property for the safety of the public and occupants and to avoid any further property damage or blighted appearance (Lincoln Municipal Code, 21.05.320, 2019).

Section 26.19.035 Additional Information Required

With a final plat submittal, the developer is required to submit a statement with information on any proposed landscape screens and trees adjacent to the subdivision, including a formal recognition that a Parks and Recreation Department-approved landscape contractor will handle the installation of any street trees. Location, design, materials and species must be included (Lincoln Municipal Code, 26.19.035, 2019).

Recommendations

Urban forests are a valuable natural resource that provide a variety of benefits as detailed in previous sections of this management plan. In Lincoln, only three trees are currently planted for every five street trees that are removed (personal communication, Lynn Johnson; Director of Parks and Recreation). To maintain and improve Lincoln's community forest, the following provides recommendations for implementing best management practices. Currently, the City of Lincoln is working to educate the city's residents about their community forest. However the city should work towards developing a tree risk assessment plan, tree protection ordinance, and a proactive pruning policy.

7.1 Risk Management

7.1.1 Risk Management Terms

- **Crisis Management**: A management program that is based on reacting to day-to-day issues rather than managing toward a long-term goal (Miller et. al 2015).
- **Hazard Tree**: A tree that has a high risk of striking a target when it falls (ANSI 2017).
- **Likelihood of Failure**: The likelihood that a tree or its branches will fall (U.S. Forest Service, 2003).
- **Risk**: The probability of a tree failing and impacting a target (U.S. Forest Service, 2003).
- **Target**: People or objects that are close to a tree with a high probability of failure (U.S. Forest Service 2003).

While Lincoln has recently completed a tree inventory, it only includes information on tree species, diameter at breast height (DBH), and location. The limited inventory information is useful for basic tree management task, but is difficult to prioritize management based only on species, DBH, and location. Currently, Lincoln's community forestry ordinances do not require information about tree condition and risk to be included in tree inventories. Tree condition and risk ratings play an important role in community forestry management by helping to prioritize management decisions. Tree condition includes factors such as rooting, branching, damage, and any evidence of pest infestation. These factors help determine an individual trees health or vitality (Purdue Extension 2018).

Risk is the potential for trees to cause personal injury or to damage property (U.S. Forest Service 2003). To reduce risk, it is important to know which trees pose the highest

probability of failure. There is always some level of risk associated with trees in the urban environment, but managers of urban trees should take reasonable steps to reduce risk and the probability of failure. If the city does not record data related to tree risk during tree inventories they may not be safe from liability in the event of a tree failure (Pietz v. City of Oskaloosa 1958). Hazard trees are trees that possess structural defects that could potentially cause the tree to fail and cause property damage or injury (US Forest Service 2003). Cities can expect several benefits from a robust risk management plan, including fewer and less severe accidents, lower legal expenses, improve tree health, and fewer tree removals in the long term (US Forest Service 2003)

When surveying trees to determine risk, surveyors shall follow the ANSI Tree Risk Assessment Standards (ANSI 2017). Surveyors shall be completed by arborists with experience completing tree risk assessments. The ANSI standards break tree risk assessment into different levels. Level 1 is a limited visual risk assessment of trees in an area. Windshield surveys can be used by surveyors to complete Level 1 assessments. Windshield surveys are more affordable than other survey methods (Rooney et. al 2005). Level 2 assessments includes a 360-degree inspect of the tree. During a Level 2 assessment, the International Society of Arboriculture Basic Tree Risk Assessment form shall be used to evaluate trees (ISA 2017). The matrices on the form will help to prioritize the management of hazard trees. Level 3 assessments include aerial assessments and root crown examinations.

Level 1 assessments shall be used annually or after a major storm, in order to quickly gather data about tree risk. Any potential hazard trees that are identified during the Level 1 assessment shall be subject to a level 2 assessment. Following the Level 2 assessment, tree maintenance should be prioritized based off of what trees pose the greatest risk. Level 3 assessments should be used sparingly, due to increased cost.

Table 7.1 The likelihood matrix should be used to determine the likelihood that a tree will fail and impact a target (ISA 2017).

Likelihood of Failure	**Likelihood of Impact**			
	Very low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very High
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Table 7.2. The risk rating matrix should be used to prioritize the maintenance of hazard trees based off of what trees have the highest consequences of failure (ISA 2017).

Likelihood of Failure & Impact	Likelihood of Impact			
	Negligible	**Minor**	**Significant**	**Severe**
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Failing to address high risk trees may lead the general public to mistrust the Parks and Recreation Department. This could potentially lead to decreases in tree plantings, if the public is unwilling to plant street trees because they believe that the city will not care for them (Carmichael and McDonough, 2018). Once the city has addressed the trees that pose the greatest hazard, they can begin to focus on establishing a regular tree maintenance schedule focused around regular pruning cycles (see Section 4.3.2), rather than pruning crisis pruning hazard trees. The schedule would move the city towards Scheduled maintenance is approximately half the cost of crisis management in the long term (World Forestry Center, 1993).

7.2 Tree Ordinances

Lincoln's Tree ordinances lay the groundwork for Lincoln's community forestry policy. However, the language in these ordinances can sometimes be vague, leaving certain areas open to interpretation. This section will identify issues with current ordinances and recommend changes.

1. **Issue**: Vague language regarding the enforcement of street tree ordinances.
   Recommendation: Fines should be used to enforce street tree ordinances. The fines can then be used to help fund the city's community forestry program (Miller et. Al 2015).

2. **Issue**: In Chapter 2.35 of the Lincoln Municipal Code, Design Standards spacing requirements for small medium and large trees are listed, but the chapter does not define what trees are considered small, medium, or large.
   Recommendation: The ordinance should state specific sizes for these classifications or link to a list of tree species in these classifications.

3. **Issue**: In Chapter 5.06 , Arborists, the ordinances states that it is illegal to remove or prune a tree without an arborist certification.
   Recommendation: The ordinance should clearly state whether or not this illegality applies to both public and privately owned trees in the city.

4. **Issue**: In ordinance 19050, the ordinance states that "no whips shall be planted", but does not specify what a whip is.

Recommendation: Put language in place that defines a whip as a young unbranched tree. (American Nursery and Landscape Association 2004).

7.3 Tree Protection

The removal of trees during construction is sometime unavoidable; however, steps can be taken to reduce tree damage and the need for tree removal. A tree protection plan implemented by the city will help to reduce tree loses during construction (Bardon et. al 2007). Protecting trees during construction can help to maintain some of the benefits provided by urban trees, such as reduced temperatures (Sung 2013). A critical root zone (CRZ) shall be established around trees that are not to be removed. The CRZ shall be at least 1.25 feet for every inch in DBH (Bardon et. al 2007). Around the CRZ, a tree protection zone (TPZ) shall be installed to protect the tree from heavy equipment. The TPZ will consist of a fence or other physical barrier. A policy of planting one diameter inch of trees for every diameter inch of trees removed would help to ensure that Lincoln's residents will benefit from the community forest for decades to come.

Proposed City of Lincoln Tree Protection Plan

1. Developers and city arborists meet to discuss the tree protection plan
2. Create a map that designates which trees will be protected and which trees will be removed.
3. The Director of Lincoln Parks and Recreation issues a permit for tree removal during construction.
4. Define the TPZ and CRZ for trees remaining on the site
5. Install TPZ around the CRZ of trees that are not being removed
6. Assign someone to care for trees during construction. Tree care during construction shall include but not be limited to watering, mulching, and fertilizing.
7. Prune any damaged trees following construction

8. For every diameter inch of tree that is removed, the developer must plant one diameter inch of new trees in the new development or an area that was predesignated by the city arborist.

7.4 Public Outreach

Since 1976, Lincoln has been recognized as a Tree City USA. A requirement for the Tree City USA status is the establishment of a city tree board. Currently, the Tree Board helps with the planning of the annual Arbor Day celebration and several other community outreach events throughout the year (Lincoln Parks and Recreation 2018). Programs such as 2 for Trees and the city's volunteer pruning program (see Section 5.2.3) are good first steps for getting citizens involved in the management of Lincoln's community forest. Public awareness of Lincoln's community forest is important for the resources continued sustainability. The majority of the trees in Lincoln's community forest are located on private land (personal communication, Lorri Grueber, Community Outreach Coordinator), because of this, it is important to make the public aware of the impact that they can have on the community's forest.

In order to determine the interest that Lincoln's residents have in their community forest, it would be beneficial to send out a survey every year to determine how the residents in Lincoln view our community forests. The 2 for Trees program currently provides broad information about the public's support for the community forest. However, it would be beneficial to get more specific information about the public's support, in order to determine the best way to move forward with community engagement programs (personal communication, Lorri Grueber, Community Outreach Coordinator). Because Lincoln residents already receive information about the 2 for Trees program with their water bill, the survey will also be sent out with residents' water bills annually. If the survey reveals that the residents of Lincoln are largely unaware of the city's community forest or if they view it in a negative light, more resources should be allocated towards community outreach.

Questions for survey

- Were you previously aware of Lincoln's community forestry program?
- Are you satisfied with the current state of Lincoln's community forest?
- If you are not currently satisfied with Lincoln's community forest, please state why.
- How many trees are located on your property?
- Do you intend to plant more trees on your property?
- What are your concerns about trees in Lincoln?

7.4.1 Community Education

Once the data from the surveys is analyzed, the results can be used to shape the city's community forestry outreach program. The outreach program should include presentations and workshops at local schools and community organizations that are organized by city employees and the Lincoln tree board. These presentations would include, but not be limited to tree identification classes and presentations that would point out management practices that could potentially damage trees. Citizen science projects could also be started to help monitor the community forest. It has been shown that volunteers can effectively be used to monitor urban forests (Ball et. al 2007). Groups of volunteers could be created based off of neighborhood. Members of the Lincoln Tree Board would help to organize these groups. The groups would then periodically visit sites and record the genera present, DBH, and tree risk.

7.5 Pruning Cycles

Pruning and training of trees is an important management tool to improve condition, health and overall longevity of community trees. Trees left unmaintained and not pruned can quickly present a threat to safety, and will no longer display monetary benefits for the community.

As stated in Section 4.3, the city of Lincoln currently relies heavily on request pruning, in addition to crisis pruning. These two methods ultimately cost more money in the long-run. The city should transition from these pruning methods, to more programmed maintenance. The steps below lay out how to initially incorporate this.

1. Determine a reasonably pruning cycle
2. Educate the community on benefits of the programmed maintenance
    i. Increased crew productivity
    ii. Decreased transportation costs
    iii. Ultimately, more trees being serviced in a year
    iv. Smaller pruning cuts = smaller wound, less healing
    v. Reduces amount of request and crisis pruning
3. Inform pruning crews of benefits of the programmed maintenance
4. Begin implementation (Miller 2015)

It is important to understand that incorporating a new process such as this will take several years and depending on how long the pruning cycle is determined, the benefits may seem far out of sight.

7.5.1 Pruning Young Trees

Pruning of young trees can be important for the proper long-term establishment of the tree. Selecting some branches and limbs for removal early on can help eliminate future overcrowding and various other implications. Pruning is important for maintaining safe environments for citizens. For young or newly planted trees, pruning should be assessed and managed on a yearly basis. The first visit to newly planted trees should be after one year of the planted date. In this time, removal of any stakes or other tree stabilizing tools should be done, as well as minimal pruning as need on mainly only dead material to minimize stress (International Society of Arboriculture, 2004). Future visitation should be done around every two years in order to promote proper and safe growth for the future. The time and money spent pruning the trees while they are young will exponentially save money and risks/hazards later on in the trees life

7.5.2 Pruning Older Trees

For older trees, visitation should be done every four to five years to maintain balanced growth and safe environments for citizens (International Society of Arboriculture, 2004). It is necessary for removing dead, infected or decaying parts of the tree. Once this pruning system is being implemented, if done properly the city should see lower pruning maintenance cost and time for their older trees. This is the long-term potential benefit of structurally pruning young trees.

7.6 Stocking Rates

The street tree inventory provides the city with valuable information on the current state of the community forest. A few important pieces of information it provides, is the city's current street tree number and species and vacant spaces. This can then be used to determine where new trees can be planted and what species should be selected. In order to maximum, the stocking rates and canopy cover levels for the city, analysis of the city inventory should be completed in order to review and determine areas where more tree plantings could be done, but more importantly should be done. Furthermore, the city should not plant the maximum number of trees as available spaces or as current available funding. The reason for this being, future maintenance costs. The city should factor in the cost of planting and the projected future maintenance cost of the tree. If the city has the budget to accommodate this, then planting of tree shall be done (Miller et al., 2015).

One recommendation for planning and determining the appropriate stocking rates and species selection is by having the city dividing into sectors or zones with specific goals for each zone. Zones could be determined through a wide range of options and criteria. However, one simple option is by zip code. The city inventory

would be able to show the available spaces in a zone and show the surrounding tree species. Different tree species could be chosen to improve diversity within those specific zones. In the event, of a potential threat to a particular genus or species of trees, diversity within the smaller zones in the city could help maintain a better balanced and proportional canopy cover for all areas. Having such a plan, would eliminate or reduce the chances that one or more areas within the city would be fully wiped out of trees if a threat passed through.

7.7 Storm Response

The weather in Nebraska can be fairly taxing and damaging to trees. The city of Lincoln should always have one or more crews on-call for storm response twenty four hours a day. In the following days to these storms and weather, all pruning and removal crews should be diverted to clean-up work in order to efficiently regain control. Once this process is completed, crews should return to their regularly scheduled duties and plans (Burban et al., 2004). In the event that a crew were to encounter tree damage either on or near power lines, the locate power utility company shall be contacted in order to safely aid in the clean of that site.

In more extreme circumstances, three different crisis level shall be assigned according. Level One crisis would be defined as normal or manageable clean-up for the city employed arborist teams. Level Two crisis would be defined as more severe, where additional tasking of state-licensed arborists are required to provide quick and efficient cleanup. The would require the city to maintain an up-to-date contact list of certified arborists willing to be employed and aid in the cleanup response. Level Three crisis would be reserved for the most devastating storms, e.g. severe tornadoes; these events would be deemed a "major disaster" or perhaps even an "emergency". In these circumstances, the city shall apply for assistance from the Federal Emergency Management Agency (FEMA). In these situations, having a plan on-hand to follow accordingly to allows for a smoother and ultimately quicker response to the damage and needs of the city. In order for the city to apply and be considered for funding or aid, the city must be able to prove their devotion to the community forest. Cities can demonstrate this through have a tree ordinance, management plan, inventory, staff forester, or have Tree City USA status (Burban et. al 2004).

In the event of a disaster the following chain of command is followed in order to determine whether an event should be deemed a "major disaster" or "emergency":

1. Event occurs
2. City forestry crews, and other local authorities respond to the immediate needs
3. Decision by city government and local authorities on whether or not to contact State government for assistance, funding and/or other aid. (SEMA)

4. If further assistance is required, SEMA will recommend further aid from FEMA
5. If FEMA approves/agrees the area should be deemed a “major disaster” or “emergency”, then FEMA will pass recommendation onto the President of the United States
6. Upon presidential approval, the necessary government parties and groups are notified and appropriate action is taken (Burban et. al 2004)

References

American Nursery and Landscape Association. (2004). *American Standard for Nursery Stock.*

American National Standards Institute (2014). AZ60—Part 1. American National Standard for Nursery Stock. Columbus, OH: American Horticulture Industry Association.

American National Standards Institute (2017). A300—Part 1. American National Standard for Tree Care Operations—Tree Shrub and Other Woody Plant Management—Standard Practices (Pruning). Londonderry, NH: Tree Care Industry Association.

American National Standards Institue (2017). A300- Part 9. American National Standard for Tree Care Operations- Tree Shrub and Other Woody Plant Management- Tree Risk Assessment.

Association, I. C. (2014, June 11). Three Strategies for Advancing Social Equity and Increasing Community Sustainability.

Baker, B., Cornelius, M., Ernstmeyer, S., Esseks, D., Francis, W., Baird, L. G., & Weber, K. (2016). *LPlan 2040, 2016 Update Lincoln/Lancaster County 2040 Comprehenshive Plan*.

Ball, J. (1986). Urban Forestry and Volunteer Management. *Journal of Arboriculture 12*(7):182-184.

Ball, J., Mason, S., Kiesz, A., D. McCormick, D., & Brown, C. (2007). Assessing the Hazard of Emerald Ash Borer and Other Exotic Stressors to Community Forests. *Arboriculture & Urban Forestry*, 33(5), 350-359

Bardon, R., Miller, K., Megalos, M., & Graul, A. (2007). Construction and Tree Preservation. North Carolina State Extension.

Berland, A., Shiflett, S., Shuster, W., Garmestani, A., Goddard, H., Herrmann, D., & Hopton, M. (2017). The role of trees in urban stormwater management. *Landscape and Urban Planning 162*:167-177.

Bolund, P. and Hunhammar, S. (1999). Ecosystem services in urban areas. *Ecological Economics*, 29(2), pp.293-301.

Borgström, S. T., Elmqvist, T., Angelstam, P., & Alfsen-Norodom, C. (2006). Scale mismatches in management of urban landscapes. *Ecology and Society 11*(2).

Burban, Lisa L., and John W. Andresen. (2004). *Storms over the Urban Forest*. USDA Forest Service, Northeastern and Southern Region.

Callahan, J. C., & Bunger, T. P. (1976). Economic Costs of Managing Street Trees on a Crisis Basis. *Trees and Forests for Human Settlements*, 245-262.

Carmichael, C. E., & McDonough, M. H. (2018). Community Stories: Explaining Resistance to Street Tree-Planting Programs in Detroit, Michigan, USA. *Society & Natural Resources*, 1-18.

City of Lincoln, Nebraska (2019) *Codes and Regulations.* Retrieved March 13, 2019, from http://online.encodeplus.com/regs/lincoln-ne/

Citizen Pruner Program (2019). Department of Forestry, City of Ann Arbor, Michigan. Retrieved from https://www.a2gov.org/departments/forestry/Pages/Citizen-Pruner-Program.aspx

Dara, S. K., Barringer, L., & Arthurs, S. P. (2015). *Lycorma delicatula* (Hemiptera: Fulgoridae): a new invasive pest in the United States. *Journal of Integrated Pest Management 6*(1):20.

Data USA (2019). Lincoln,. Retrieved from https://datausa.io/profile/geo/lincoln-ne/#demographics

Davey Tree Expert Company. Ecosystem Benefits. Retrieved March 12, 2019, from https://univoflincolnne.treekeepersoftware.com/

Design Standards for Street Trees, Lincoln, N.E. Design Standards 2.35 § 1 (2007).

DeWalle, D. R. (1978). Manipulating urban vegetation for residential energy conservation.

Dwyer, J., McPherson, E., Schroeder, H., & Rowntree, R. (1992). Assessing the benefits and costs of the community forest. *Journal of Arboriculture 18*(5):227-234.

Dzhambov, A., & Dimitrova, D. (2014). Urban Green Spaces Effectiveness as a Psychological Buffer for the Negative Health Impact of Noise Pollution: A Systematic Review. *Noise and Health*, 157-165.

Food and Agriculture Organization. (2016, April 22). Benefits of Urban Trees. Retrieved from http://www.fao.org/resources/infographics/infographics-details/en/c/411348/

Foreman, T. (2017). *The Greatest Undertaking: The unique history of the Nebraska Forest Service*. Lincoln, NE: University of Nebraska, Nebraska Forest Service.

Franzmeier, D. P., McFee, W. W., Graveel, J. G., & Kohnke, H. (2016). *Soil Science Simplified*. Waveland Press Inc. *5*:5-34, 121-143, 161-180.

Gardler, F. (2018). Lincoln's volunteer tree-pruning program. *Lincoln Journal Star*.

Gillman, E. F., & Lilly, S. (2008). *Best Management Practices: Pruning* (2nd ed.). Champaign, IL: International Society of Arboriculture.

Griffith and Associates (1993). *Comprehensive Review of the Services, Operations, Organization, Financing, Management, and Staffing of the Bureau of Forestry.* Milwaukee, WI: Griffith and Associates.

Haq, S. (2011). Urban Green Spaces and an Integrative Approach to Sustainable Environment. *Journal Of Environmental Protection 2*(5):601-608.

Hicks, N. (2017, December 22). Lincoln's community forest. *Lincoln Journal Star*. Retrieved February 19, 2019, from https://journalstar.com/news/local/lincoln-s-urban-forest-street-trees-worth-billion-cost-m oney/article_e0976659-516e-51da-8a08-6e784dca7b9b.html

Hicks, N. (2018, December 4). Lincoln's Emerald Ash Borer Plan Should Look at Loss of 50,000 Private Trees, Council Told. *Lincoln Journal Star*.

International Society of Arboriculture. (2004). *Pruning Mature Trees*.

International Society of Arboriculture. (2004). *Pruning Young Trees*.

International Society of Arboriculture (2017). Basic Tree Risk Assessment Form, Retrieved April 14, 2019, from https://wwv.isa-arbor.com/education/resources/BasicTreeRiskAssessmentForm_Print_2017.pdf

Johnson, G., & North, E. (2016). Total infrastructure planning: Mind the four Rs for successful street landscapes. *Arborist News*, *25*(3), 69.

Johnson, L. & Grueber, L. (2019). Overview of City of Lincoln Community Forestry Program. Lecture presented at University of Nebraska-Lincoln.

Jones, R., Davis, K. and Bradford, J. (2012). The Value of Trees: Factors Influencing Homeowner Support for Protecting Local Urban Trees.

Karjalainen, E., Sarjala, T., & Raitio, H. (2010). Promoting human health through forests: overview and major challenges. *Environmental Health and Preventive Medicine 15*(1):1-8.

Lincoln Design Standards (2019). Lincoln, NE.

Lincoln Municipal Code (2019). Lincoln, NE.

Lincoln Parks and Recreation. (2019). Community Forestry. Retrieved March 14, 2019, from https://www.lincoln.ne.gov/city/parks/communityforestry/index.htm

Livesley, S. J., McPherson, G. M., & Calfapietra, C. (2016). The Urban Forest and Ecosystem Services: Impacts on Urban Water, Heat, and Pollution Cycles at the Tree, Street, and City Scale. *Journal of Environment Quality 45*(1):119.

Luley, C. J., Sisinni, S., & Pleninger, A. (2002). The effect of pruning on service requests, branch failures, and priority maintenance in the city of Rochester, New York, U.S. *Journal of Arboriculture 28*(3):137-143.

Martin, M. P., Simmons, C., & Ashton, M. S. (2016). Survival is not enough: The effects of microclimate on the growth and health of three common urban tree species in San Francisco, California. *Urban Forestry & Urban Greening 19*:1–6.

Maurer Braun, L., Read, A., & Ricklin, A. (2016). The Benefits of Street-Scale Features for Walking and Biking. *American Planning* Association, 1–15.

Miller, K. L. (2012). Phosphorus Ban. *OLR Research Report*, *2012-R-007*.

Miller, R. W., Hauer, R. J., & Werner, L. P. (2015). *Urban forestry: planning and managing urban greenspaces* (3rd ed.). Long Grove, IL: Waveland Press.

Miller, R. W., and Sylvester, W. A. (1981). An economic evaluation of the pruning cycle. *Journal of Arboriculture 7*(4):109-112.

Minckler, L. S. (1941). The Right Tree in the Right Place. *Journal of Forestry 39*(8):685-688.

Minnesota Tree Care Advocate (2016). Minnesota Citizen Pruner Manual. University of Minnesota and Minneapolis Park and Recreation Board. Retrieved from http://www.mntca.umn.edu/citizen-pruner

Moll, G. (1989). Improving the health of the community forest. In G. Moll and S. Ebenreck (Eds.), *A Resource Guide for Urban and Community Forests* (pp. 119-130). Washington, DC: Island Press.

Nebraska Department of Agriculture. (2018) Emerald Ash Borer. Retrieved March 28, 2019 from http://www.nda.nebraska.gov/plant/entomology/eab/

Nichols, T. B. (1909). *Forest Club Annual: A study of the Street Trees of Lincoln*. Lincoln, NE: University of Nebraska.

Niemelä, P., & Mattson, W. J. (1996). Invasion of North American forests by European phytophageous insects. *Bioscience 46*:741-753.

Nilsson, K., Sangster, M., Gallis, C., Hartig, T., Seeland, K., de Vries, S., & Schipperijn, J. (2014). *Forests, trees and human health*. Springer.

North, E. (2017). Standards for Infrastructure Construction in Proximity to City Managed Trees. City of Lincoln, NE.

Nowak, D. J. (1994). Air pollution removal by Chicago's community forest. *Chicago's community forest ecosystem: Results of the Chicago community forest climate project*, 63-81.

Nowak, D. J. (2018). The Effects of Urban Trees on Air Quality. *USDA Forest Service*.

Nowak, D. J., Crane, D., & Stevens, J. (2006). Air pollution removal by urban trees and shrubs in the United States. *Urban Forestry & Urban Greening 4*(3-4):115-123.

Nowak, D. J. & Dwyer, J. (2009). Understanding the Benefits and Costs of Urban Forest Ecosystems.

Nowak, D. J., Kuroda, M., & Crane, D. E. (2004). Tree mortality rates and tree population projections in Baltimore, Maryland, USA. *Urban Forestry & Urban Greening 2*(3):139-147.

Nowak, D.J., Pasek, J.E., Sequeira, R.A., Crane, D.E. & Mastro, V.C. (2001) Potential effect of *Anoplophora glabripennis* (Coleoptera: Cerambycidae) on urban trees in the United States. *Journal of Economic Entomology 94*:116–122.

Ohio Department of Agriculture (2017). Invasive Plant Species, Rule Number 901:5-30-01.

Oregon State University. (2009). Tree Protection on Construction and Development Sites. *OSU Extension Catalog*.

Pietz v. City of Oskaloosa, 250 Iowa 374, 379 (1958)

Portland Urban Forestry. (2019). Portland, OR. Retrieved February 17, 2019 from https://www.portlandoregon.gov/parks/38294

Purcell, L. (2018) *Tree Appraisal*. Purdue University Department of Forestry & Natural Resources.

Raupp, M., Cumming, A., & Raupp, E. (2006). Street tree diversity in eastern North America and its potential for tree loss to exotic borers. *Arboriculture & Urban Forestry 32*(6):297–304.

Riikonen, A. (2016). *Some Ecosystem Service Aspects of Young Street Tree Plantings* (Doctoral dissertation). Retrieved from http://urn.fi/URN:ISBN:978-951-51-2628-3

Roman, L. A., & Scatena, F. N. (2011). Street tree survival rates: Meta-analysis of previous studies and application to a field survey in Philadelphia, PA, USA. *Urban Forestry & Urban Greening 10*(4):269-274.

Rooney, C. J., Ryan, H. D. P., Bloniarz, D. V., & Kane, B. C. P. (2005). The reliability of a windshield survey to locate hazards in roadside trees. *Journal of Arboriculture 31*(2), 89-94.

Santamour, F.S. (1990). Trees for urban planting: Diversity, uniformity, and common sense. *Proceedings of the 7th Conference of the Metropolitan Tree Improvement Alliance 7*:57–65.

Simons, K. & Johnson, G. R. (2008). *The Road to a Thoughtful Street Tree Master Plan: A practical guide to systematic planning and design.* Retrieved from https://lrrb.org/the-road-to-a-thoughtful-street-tree-master-plan/

Slattery, B. E., Reshetiloff, K., & Zwicker, S. M. (2003). Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed. U.S. Fish & Wildlife Service.

Sommer, R., Learey, F., Summit, J., & Tirrell, M. (1994). The Social Benefits of Resident Involvement in Tree Planting. *Journal of Arboriculture 20*(3):170-175.

Street Tree Diversity Committee, Community Forestry Advisory Board, Lincoln, N.E. (2018). Tree Diversity Recommendations for Lincoln Parks and Recreation.

Struve, D. K. (2009). Tree Establishment: A Review of Some of the Factors Affecting Transplant Survival and Establishment. *Arboriculture & Urban Forestry 35*(1):10–13.

Sung, C. Y. (2013). Mitigating surface urban heat island by a tree protection policy: A case study of The Woodland, Texas, USA. *Urban Forestry & Urban Greening 12*(4), 474-480.

Trees New York (2018). 2018 Year in Review: 40 Years and Growing. Retrieved from https://treesny.org/

United States Department of Agriculture Animal and Plant Health Inspection Service (2019). Hungry Pests: Spotted Lanternfly. Retrieved from https://www.aphis.usda.gov/aphis/resources/pests-diseases/hungry-pests/the-threat/spotted-lanternfly/spotted-lanternfly

United States Forest Service. (2003). *Urban Tree Risk Management: A Community Guide to Program Design and Implementation*.

University of Delaware Institute for Public Administration. *Benefits of Community Engagement.* Delaware, United States. Retrieved from https://www.bidenschool.udel.edu/ipa

Nebraska Forest Service (2019) Trees to Plant in Nebraska. Retrieved from https://nfs.unl.edu/trees-to-plant

University of San Francisco. The Importance of Social Equity in Public Administration. Retrieved from https://onlinempadegree.usfca.edu/news-resources/infographics/the-importance-of-social-equity-in-public-administration/

Urban and Community Forestry Program. (2019). United States Department of Agriculture. Retrieved March 11, 2019 from https://www.fs.usda.gov/detail/iitf/spforestry/?cid=fseprd519405

Urban Forest Plan. (2019, March 13). Retrieved from San Francisco Public Works: https://sfpublicworks.org/services/urban-forest-plan

Watts, A. (2019). More trees, please. *Planning 83*(6):1–10.

Wiedenmann, R. N. (2001). The siege of invasive species in Midwestern ecosystems. *Proceedings of the USDA Interagency Research Forum on Gypsy Moth and Other Invasive Species*. Retrieved from https://www.fs.fed.us/nrs/pubs/gtr/gtr_ne285.pdf#page=12

Wilhite, D. A., & Morrow, K. (2016). The Implications of Climate Change for Nebraska: Summary Report of Sector-Based Roundtable Discussions. Lincoln: University of Nebraska School of Natural Resources.

Wolf, K. (2003). Public Response to the Urban Forest in Inner-city Business Districts.

Wolf, K. (2007). City Trees and Property Values. *Arborist News 16*(4):34-36.

Wolf, K. (2009). Strip Malls, City Trees, and Community Values.

World Forestry Center. (1993). *A technical guide to urban and community forestry.* Portland, OR.

Appendices

Appendix A: Street Tree Diversity Recommendations for Lincoln Parks and Recreation

Prepared by: Street Tree Diversity Committee, Community Forestry Advisory Aboard

Community forests are a vital component a city's green infrastructure and species diversity is a desirable management object to limit the impact of exotic pests and climatic changes that negatively affect a community. Lincoln Parks and Recreation maintains a list of approved street trees for planting in the right-of-way along city streets. The Community Forestry Advisory Board (CFAB) and the Community Forestry Staff of Lincoln Parks and Recreation periodically review the list of approved street trees. The projected management costs and losses of the City of Lincoln's green infrastructure due to invasive pests (currently emerald ash borer) and changes in climate highlight the need for continued efforts to maintain a diverse community forest. To address issues of street tree diversity and make recommendations regarding appropriate street tree species the CFAB created Street Tree Diversity Committee at a special meeting held on April 5, 2018 under authority of municipal code 4.54.020.

Street Tree Diversity Committee Members:

- Eric North – Committee Chair, -CFAB chair
- Mark Canney – Lincoln Parks & Recreation Staff
- Emily Casper – CFAB member
- Lorri Grueber – Lincoln Parks & Recreation Staff
- Mary Sweeney – CFAB member
- Kendall Weyers – CFAB member

The purpose of the recommendations is to provide a flexible tree diversity framework that allows Community Forestry Staff of Lincoln Parks and Recreation to select tree species that meet a standard of diversity designed to minimize management costs and maximize benefits regarding the City of Lincoln's community forest.

Street Tree Diversity Framework:

1. Diversity should focus on genus over species
    a. Genus is the taxonomic unit that includes species. Example: The maple genus includes approximately 125 different species of maple (red maple, sugar maple, silver maple, etc.)

    b. Reason -many pests or pathogens operate at the genus level. Example: the emerald ash borer affects all North American species in the ash genus. Diversity at the genus level can reduce total losses and management costs due to pests and pathogens.
    c. The use of tree varieties and cultivars contribute little or nothing to tree diversity and should not be considered as adding diversity. Example: Autumn Blaze maple and Sienna Glen maple are nearly genetically identical cultivars. Where cultivars are used they should be selected to reduce management costs: disease resistance or drought tolerance as examples.
2. The level of genus diversity should not exceed 10%
    a. No more that 10% of city trees should be comprised of species from any one genus. Example: Species in the genus maple contribute to approximately 16% of Lincoln's current tree inventory, which is over the recommended level for a diverse community forest.
    b. Appropriate levels of diversity as a percent of street and park tree plantings should be periodically reviewed.
3. Species selection criteria:
    a. Specific genus recommendations based on the 2017 public tree inventory. The three genera of maple (16%), oak (15%), and ash (12%) represent approximately 43% of Lincoln's street and park trees. New plantings of maple or oak species should be temporarily restricted to replacement of existing maple or oak until their contribution falls below the l 0% level of genus diversity. Ash should be removed from planting entirely until such time that suitable emerald ash borer resistant cultivars are developed.
    b. Honeylocust and linden are both close to, but below the l 0% level and new plantings for species in these genera should be limited.
    c. Based on the 2017 public tree inventory there are over 40 genera currently planted that can serve as a suitable starting point for genus and species selection.
    d. Preference for genus and species that provide wildlife and pollinator habitat should be considered.
    e. Tree species known to be invasive in Nebraska or adjacent states should be removed from planting lists. While city environments are not native environments the City of Lincoln should strive to reduce the negative impacts its planting decisions have on the surrounding natural environments.

f. Callery pear has special consideration detailed in the document: Lincoln Parks and Recreation Statement Regarding Planning of Callery (Flowering) Pear on Public Lands
g. The CFAB recommends the forestry staff establish a list of restricted trees that have been poor performers or have undesirable attributes.

4. Spatial diversity
    a. Community Forestry Staff should seek to maximize genus level diversity at the block, neighborhood, and city level to reduce disproportionate negative effects of pests or pathogens on any one neighborhood.
    b. Where new plantings of street trees are needed selection, of new genera not represented on the block or in the immediate neighborhood should be preferred over existing genera. Example: If a street is lined with maples, new plantings should be selected from a genus other than maple.
5. Purchasing trees for diversity
    a. Where possible trees should be purchased from locally grown sources and nurseries.
    b. As local nurseries may not have plant stock available to achieve desired diversity levels, Lincoln Parks and Recreation should pursue contract growing with local nurseries to achieve a sustainable level of diverse for its community forest.

Approved by the Community Forestry Advisory Board on 9/11/2018

Chair, Eric North

Appendix B: Approved Trees for Streets

Prepared by: Street Tree Diversity Committee, Community Forestry Advisory Board
Revised: June 2018

Tree Shape Approximations

Vase	Pyramidal	Round	Columnar	Broad
				

Large Trees

Genus	Common name	H	W	Shape	Color
Gleditsia	Shademaster honeylocust	45	35	broad	yellow (F)
Quercus	Black oak	50	35	broad	yellow-brown (F)
Quercus	Burr oak	55	45	broad	yellow-brown (F)
Quercus	Chinkapin oak	45	45	broad	yellow-brown (F)
Quercus	Heritage oak	80	45	broad	yellow (F)
Quercus	Hill's oak	40	35	broad	yellow-brown (F)
Quercus	Shumard oak	75	60	broad	red (F)
Celtis	Sugar hackberry	60	60	broad	yellow (F)
Gymnocladus	Kentucky coffeetree	50	40	broad	yellow (F)
Gymnocladus	Espresso Kentucky coffeetree	50	35	broad	yellow (F)
Acer	Autumn Spire red maple	50	25	columnar	red flowers (S) red (F)
Acer	Autumn Blaze Freeman's maple	50	30	columnar	red (F)
Quercus	Crimson spire oak	40	15	columnar	red (F)
Quercus	Regal Prince oak	45	18	columnar	yellow (F)
Ginkgo	Princeton Sentry ginkgo	50	25	columnar	yellow (F)
Carya	Bitternut hickory	70	35	columnar	yellow (F)
Tilia	Greenspire linden	40	30	pyramidal	yellow (F)
Platanus	Bloodgood London planetree	60	40	pyramidal	yellow (F)
Platanus	Columbia London planetree	60	40	pyramidal	bronze (F)
Ulmus	New Horizon elm	40	25	pyramidal	yellow (F)

Gleditsia	Skyline honeylocust	45	35	pyramidal	gold (F)
Tilia	American linden	60	40	pyramidal	white/yellow flowers (S) yellow (F)
Tilia	Redmond linden	40	25	pyramidal	yellow (F)
Tilia	Sterling Silver linden	60	35	pyramidal	yellow (F)
Acer	Black sugar maple	80	40	pyramidal	yellow/orange/ red (F)
Acer	Redpointe maple	45	30	pyramidal	red (F)
Acer	Legacy sugar maple	50	35	pyramidal	red-orange (F)
Acer	Celebration Freeman's maple	45	25	pyramidal	yellow (F)
Acer	Marmo Freeman's maple	55	45	pyramidal	red-orange (F)
Acer	Sienna Glen maple	45	35	pyramidal	red-orange (F)
Quercus	Nuttall oak	50	35	pyramidal	red/tan (F)
Quercus	Shingle oak	50	50	pyramidal	brown to rust (F)
Quercus	Scarlet oak	60	40	pyramidal	scarlett (F)
Ginkgo	Autumn Gold ginkgo	50	40	pyramidal	yellow (F)
Ginkgo	Saratoga ginkgo	50	40	pyramidal	yellow (F)
Ginkgo	Windover Gold ginkgo	40	25	pyramidal	yellow (F)
Corylus	Turkish filbert	60	30	pyramidal	yellow (F)
Liriodendron	tuliptree (yellow poplar)	80	40	pyramidal, oval	yellow flowers (S) yellow (F)
Catalpa	northern catalpa	60	40	pyramidal, irregular	white flowers (S) yellow (F)
Ulmus	Pioneer elm	50	50	round	yellow (F)
Ulmus	Vanguard elm	45	40	round	yellow (F)
Acer	State Street Miyabe maple	45	35	round	yellow (F)
Acer	Table Rock sugar maple	70	45	round	red (F)
Acer	Bonfire maple	50	35	round	orange/red (F)
Acer	Commemoration maple	50	35	round	red/orange (F)
Acer	Fall Fiesta sugar maple	60	60	round	red/orange/yellow (F)
Acer	Green Mountain sugar maple	60	40	round	red/orange/yellow (F)
Acer	Red Sunset maple	45	30	round	red/orange (F)
Acer	Burgundy Belle red maple	45	30	round	red (F)
Quercus	Kimberly oak	40	40	round	yellow-brown (F)
Quercus	Overcup oak	60	45	round	yellow-brown (F)
Quercus	northern red oak	50	45	round	red (F)

Quercus	swamp white oak	45	45	round	bronze-red (F)
Quercus	white oak	60	60	round	bronze-red (F)
Quercus	chestnut oak	60	60	round	yellow-brown (F)
Celtis	common hackberry	40	35	round	yellow (F)
Cladrastis	yellowwood	50	50	round	white flowers (S) yellow (F)
Carya	shagbark hickory	100	40	round	yellow/golden brown (F)
Ulmus	Accolade elm	70	60	vase	yellow (F)
Ulmus	Allee elm	60	45	vase	yellow (F)
Ulmus	Valley Forge elm	70	60	vase	yellow (F)
Ulmus	New Harmony elm	50	50	vase	yellow (F)
Ulmus	Prospector elm	50	40	vase	yellow (F)
Ulmus	Cathedral elm	50	50	vase	yellow (F)
Ulmus	Triumph elm	55	45	vase	yellow (F)
Ulmus	Discovery elm	45	35	vase	yellow (F)
Gleditsia	Northern Acclaim honeylocust	45	35	vase	yellow (F)
Gleditsia	Moraine honeylocust	45	40	vase	yellow (F)
Zelkova	Greenvase zelkova	70	45	vase	red/copper (F)

Medium Trees

Genus	**Common name**	**ht.**	**wd.**	**Shape**	**Color**
Quercus	sawtooth oak	35	45	broad	yellow (F)
Acer	Green Column maple	40	20	columnar	yellow (F)
Acer	Pacific Sunset maple	25	25	pyramidal	red-orange (F)
Ulmus	Frontier elm	35	15	pyramidal	burgundy-purple
Gleditsia	Imperial honeylocust	35	35	pyramidal	yellow-gold (F)
Acer	Trident maple	35	30	round	red/orange/yellow (F)
Acer	shantung maple	30	30	round	red/orange/purple (F)

Quercus	Lyrata oak	40	40	round	copper (F)
Carpinus	ironwood (hornbeam)	30	30	round	yellow (F)
Koelreuteria	golden raintree	40	35	round	yellow flowers (S)
Aesculus	Ohio buckeye	40	35	round	yellow/red-brown (F)
Maclura	Whiteshield Osage orange	35	35	round	yellow (F)

Small Trees

Genus	**Common name**	**ht.**	**wd.**	**Shape**	**Color**
Malus	Donald Wyman flowering crabapple	20	20	broad	white flowers (S) yellow (F)
Malus	Sargent flowering crabapple	8	15	broad	white flowers (S) yellow (F)
Zelkova	Wireless zelkova	25	35	broad	red (F)
Malus	Tschonoskii flowering crabapple	15	10	columnar	white flowers (S) red (F)
Acer	Sun Valley red maple	20	10	pyramidal	red (F)
Malus	Camelot flowering crabapple	10	8	round	white/pink flowers (S)
Malus	Centurion flowering crabapple	20	15	round	rose flowers (S) yellow (F)
Malus	David flowering crabapple	15	15	round	white flowers (S) yellow (F)
Malus	Golden Raindrop flowering crabapple	18	12	round	white/yellow flowers (S) orange (F)
Malus	Indian Summer flowering crabapple	20	20	round	red flowers (S) orange-red (F)

Malus	Professor Springer flowering crabapple	20	20	round	white flowers (S) yellow (F)
Malus	Purple Prince flowering crabapple	18	18	round	rose red flowers (S) yellow (F)
Malus	Royal Raindrops flowering crabapple	20	15	round	pink flowers (S) red-yellow (F)
Malus	Sugar Tyme flowering crabapple	18	15	round	white flowers (S) yellow (F)
Malus	Adams crabapple	20	20	round	pink flowers (S)
Malus	Indian Magic crabapple	15	15	round	pink flowers (S)
Malus	Prairiefire crabapple	20	20	round	pink/red flowers (S) red (F)
Acer	Paperbark maple	25	15	round	red (F)
Acer	Flame Amur maple*	20	20	round	orange-red (F)
Acer	Embers Amur maple*	20	15	round	orange-red (F)
Acer	Tartarian maple*	20	20	round	red-yellow (F)
Syringa	Ivory Silk tree lilac*	20	15	round	white flowers (S)
Syringa	Peking Japanese tree lilac*	20	15	round	white flowers (S)
Syringa	Japanese tree lilac	25	20	round	white flowers (S)
Cercis	eastern redbud	20	20	round	pink flowers (S) yellow (F)
Amelanchier	Cole's Select serviceberry*	20	15	round	white flowers (S) red-orange (F)
Amelanchier	Autumn Brilliance serviceberry	25	18	round	white flowers (S) red-orange (F)

Malus	Adirondack flowering crabapple	10	6	vase	white flowers (S) yellow (F)

Key

H = height in feet
W = crown width in feet
* = single trunk
(F) = fall
(S) = summer

Appendix C: Planting Specifications for Street Trees

1.0 Introduction

The following guidelines govern the purchase of nursery stock by the city of Lincoln and the planting of trees on city land. The city has the right to reject contract-grown trees that do not meet these specifications. Entities planting trees on city land shall adhere to these specifications or be subject to fines covering the cost of removal and replanting. The city also reserves the right to terminate a contract if these specifications are repeatedly not met.

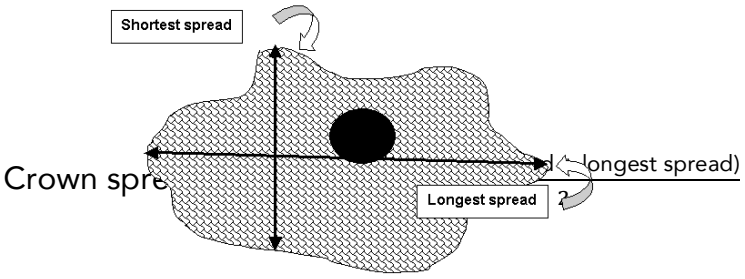
Unless otherwise noted, figures and diagrams are based on open source images provided by the Urban Tree Foundation (2014).

2.0 Tree Condition and Structure

2.1 Crown

The tree shall have a full crown of the typical form and density for its species. The crown spread diameter shall be calculated by measuring the longest spread and shortest spread at as close to a right angle as possible, and then dividing their sum by two as shown in Figure 1. Crown spread diameter shall not be less than the minimum diameter for its height, root ball diameter, and container volume as set forth in the ANSI Standards for Nursery Stock (AZ60-1).

Figure 1 Measuring crown spread (Blozan, 2004)



2.2 Foliage

Leaves or needles shall be of the normal size, color and appearance for the specimen's growth stage and time of year. Trees shall not exhibit signs of moisture stress, such as dead, wilted, or shriveled leaves.

2.3 Branches

The tree's branches shall be equally dominant and shall not extend vertically in relation to the trunk (Figure 2). Branches shall be no larger than two-thirds the diameter of the trunk, with at least 6" between major branches along the trunk and no instances of included bark (Figure 3). The tree shall be free of branches that are dead, diseased, injured, or distorted. Branches that have been pruned shall not exhibit branch stubs, open injuries, or flush cuts.

Figure 2 Accepted branching versus codominant or vertical branches

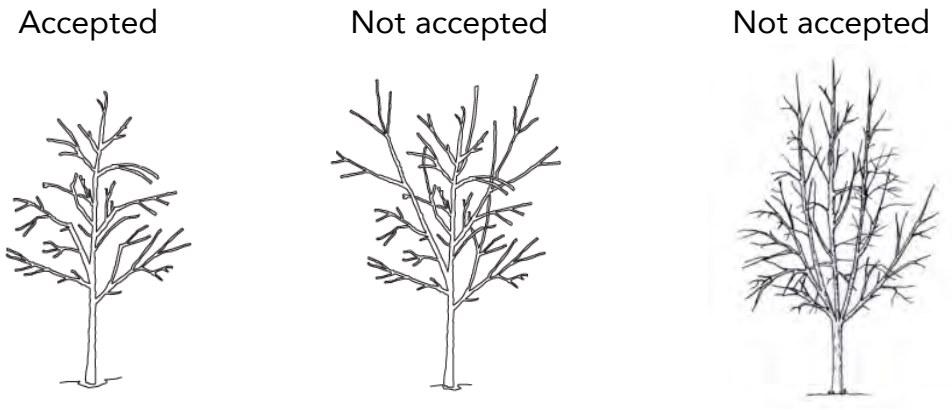
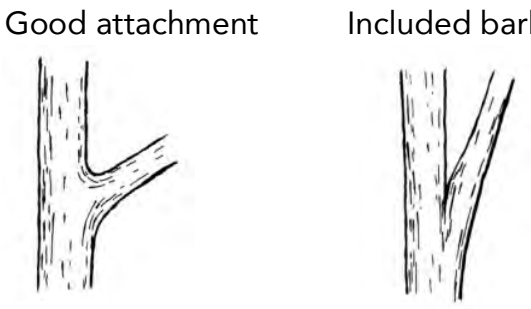


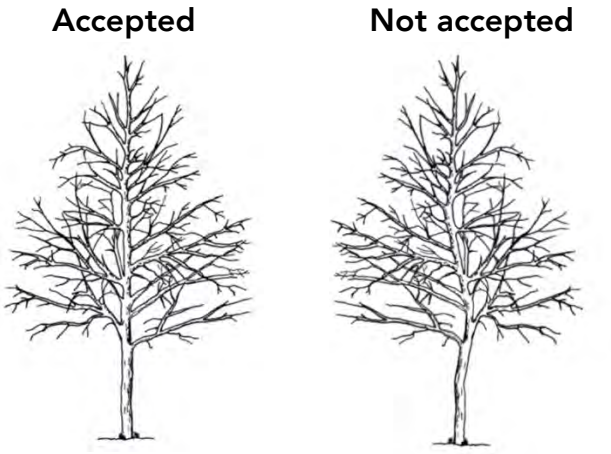
Figure 3 Accepted branch attachment versus included bark



2.4 Trunk

The tree shall have a single, straight, vertical trunk with an intact terminal bud at the highest point of the crown. The trunk shall not be less than 1" in caliper and meet ANSI Z60 for root ball size. The trunk shall not bow more than 5 degrees at any point (Figure 4). The trunk and bark shall be free of physical damage, deformities such as doglegs, or signs of pests, diseases, or nutrient deficiencies.

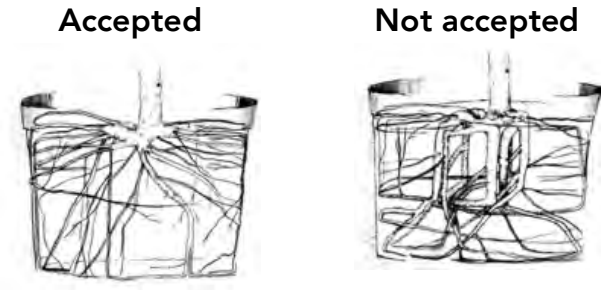
Figure 4 Straight trunk versus bowed trunk



2.5 Roots

The roots and root ball shall be of the appropriate size, number, and distribution for the age and size of the tree. Root ball diameter shall not be less than the minimum diameter for its height, crown spread diameter, and container volume as set forth in the American Standard for Nursery Stock (2014). The root ball shall be free of circling roots, girdling roots, and other defects (Figure 5). The roots shall be distributed evenly throughout the substrate. Roots on the bottom and periphery shall no greater than 1/4 inch in diameter. Preference will be given to stock grown in air-pruning pots and containers that are not solid plastic-sided.

Figure 5 Accepted root structure versus circling roots



3.0 Tree Planting and Installation

3.1 Tree selection

The species of tree to be planted must be one of those listed in the most recent Approved Trees for Streets document (Lincoln Community Forestry Advisory Board, 2018) and shall be approved by the city prior to planting. The selected tree must be appropriate for the space at the mature form and size typical of its species. The tree shall be selected and planted such that it will not conflict with neighboring trees, buildings, sidewalks, overhead utilities, or other existing or planned infrastructure. The site and availability of future maintenance shall be appropriate for the tree's root depth, soil preferences, and moisture requirements throughout its life cycle. Present and potential environmental stressors should also be considered—these may include excessive heat, high winds or salt spray, as well as soil salinity, acidity, or alkalinity.

3.2 Site preparation

Prior to digging, the root ball shall be measured from the bottom of the trunk flare to the bottom of the root ball to determine root ball depth. The depth of the planting hole shall be approximately the depth of the root ball but adjusted for root ball firmness and site characteristics such that the top of the root ball flare will with be even with the soil surface when planted. The bottom of the planting hole shall be firm and flat-bottom, with the soil either undisturbed or recompacted depending on site characteristics (Figure 6). The sides of the planting hold shall slope outward from the base to an opening three times the width of the root. The soil along the sloped sides shall be loosened with a fork or shovel.

3.3 Installation

The tree shall be prepared for planting by removing roots and soil above the root collar. Any encircling roots shall be pruned by shaving away the outer 1-2" of the root ball with a saw, knife, or pruners (Figure 7). The tree shall be placed onto the firm, flat bottom of the hole and positioned so that the root collar is level with the surface. While positioning the tree, hands and equipment should come into contact with the trunk as little as possible. All tags, labels, string, twine, containers, grow bags, and other synthetic materials shall be removed from the tree and planting hold. Wire baskets and/or burlap shall be removed to at least the bottom edge of the root ball.

Once the tree is positioned, the planting hole should be backfilled with the soil that was dug away for planting. If different soil must be used, the backfill shall be similar to

the soil at the planting site. If the backfill must be amended, amendments shall be organic and shall not add up to more than 10% per volume. There shall be no excess soil above the trunk flare or transport roots. A berm of soil 8" wide and 4" high shall be built up around the circumference of the root ball to direct water through the roots (Figure 6). Once planted, the tree shall be mulched (Section 3.4), watered (Section 3.6), pruned (Section 3.7), and staked if necessary (Section 3.8).

Figure 6 Planting specification diagram

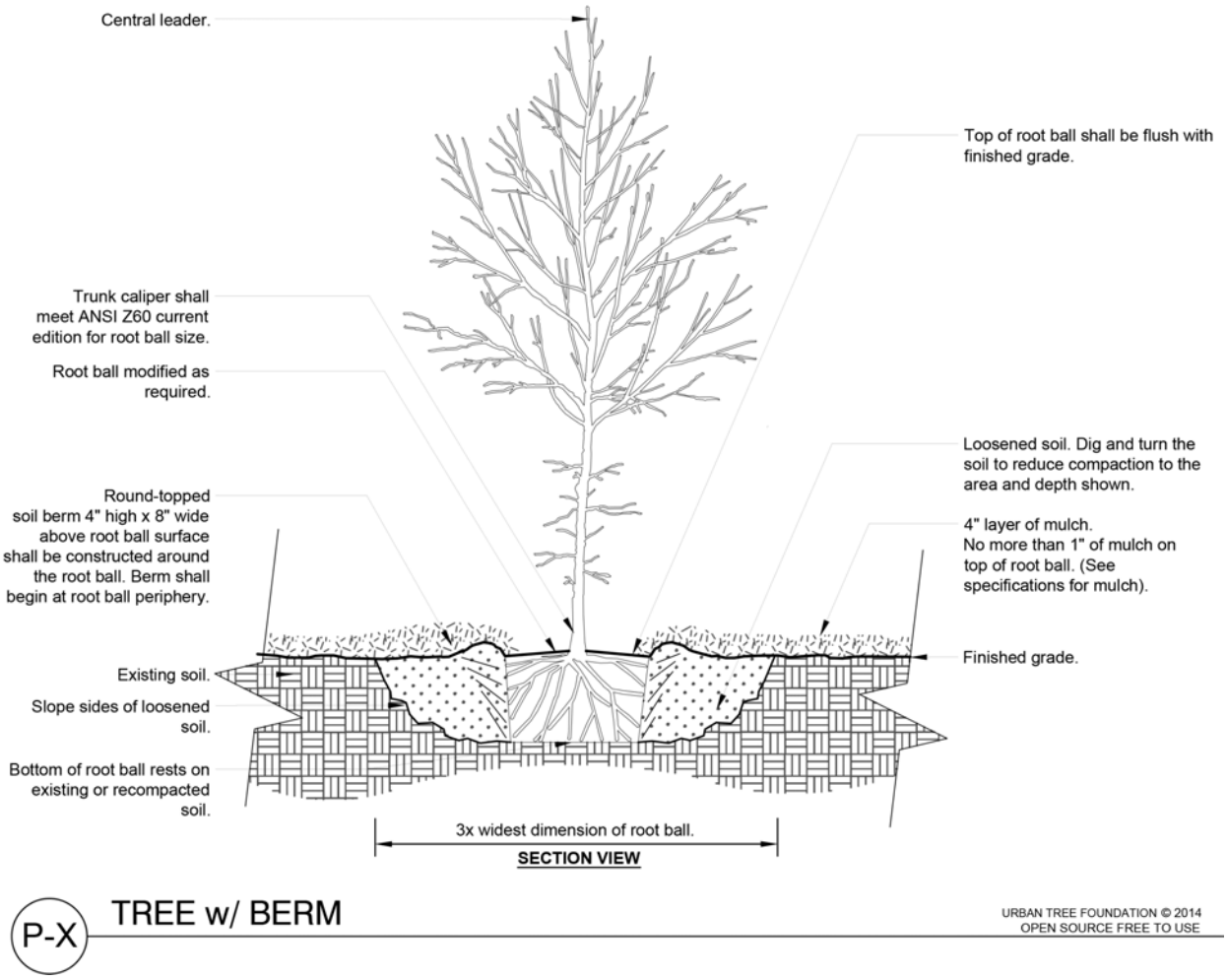
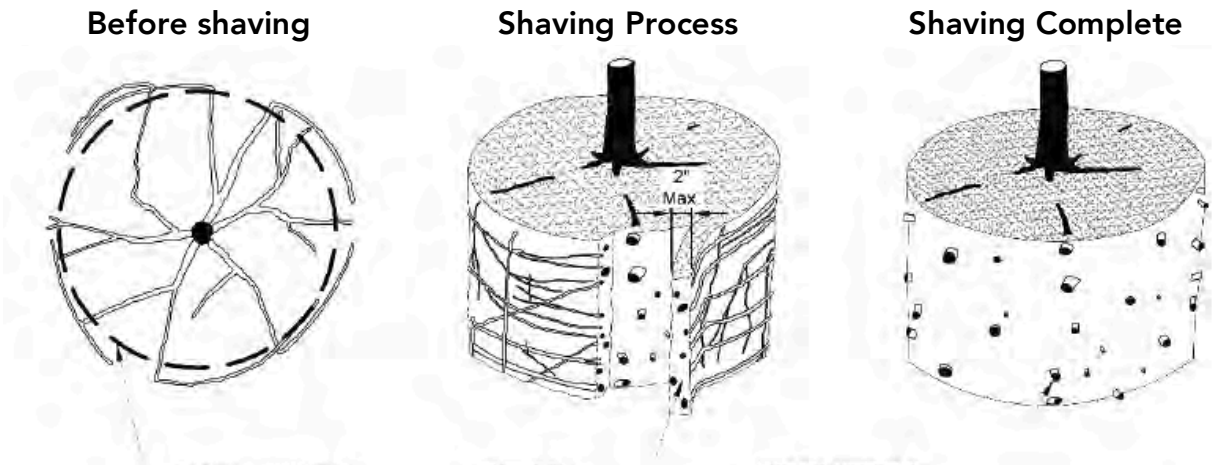


Figure 7 Shaving root ball to remove encircling roots



Examine root ball to identify roots growing on outer edge.

Shave away 1-2" of outer edge of root ball.

Root tips should be exposed at edge of root ball.

3.4 Mulching

The surface of the root ball shall be covered with a 1" deep layer of woodchips with 2-4" around the trunk kept free of mulch. Grass and weeds shall be removed from the soil surface in a 5' diameter circle around the trunk, and a 4" layer of mulch shall be applied to prevent grass and weeds from encroaching on the planted area.

3.5 Staking

Trees at risk of damage by high winds can be staked for protection during their first year of establishment. Stakes shall be set into the ground 6-8" from the root ball to a depth of at least 12" (Figure 8). If a single angled stake is used, it shall not come into contact with the trunk and should be at least 3" away at all points. Materials that come in contact with the tree shall be flexible, loose, and at least 2" wide to allow the tree to flex. All staking materials shall be removed within 1 year of planting.

3.6 Irrigation

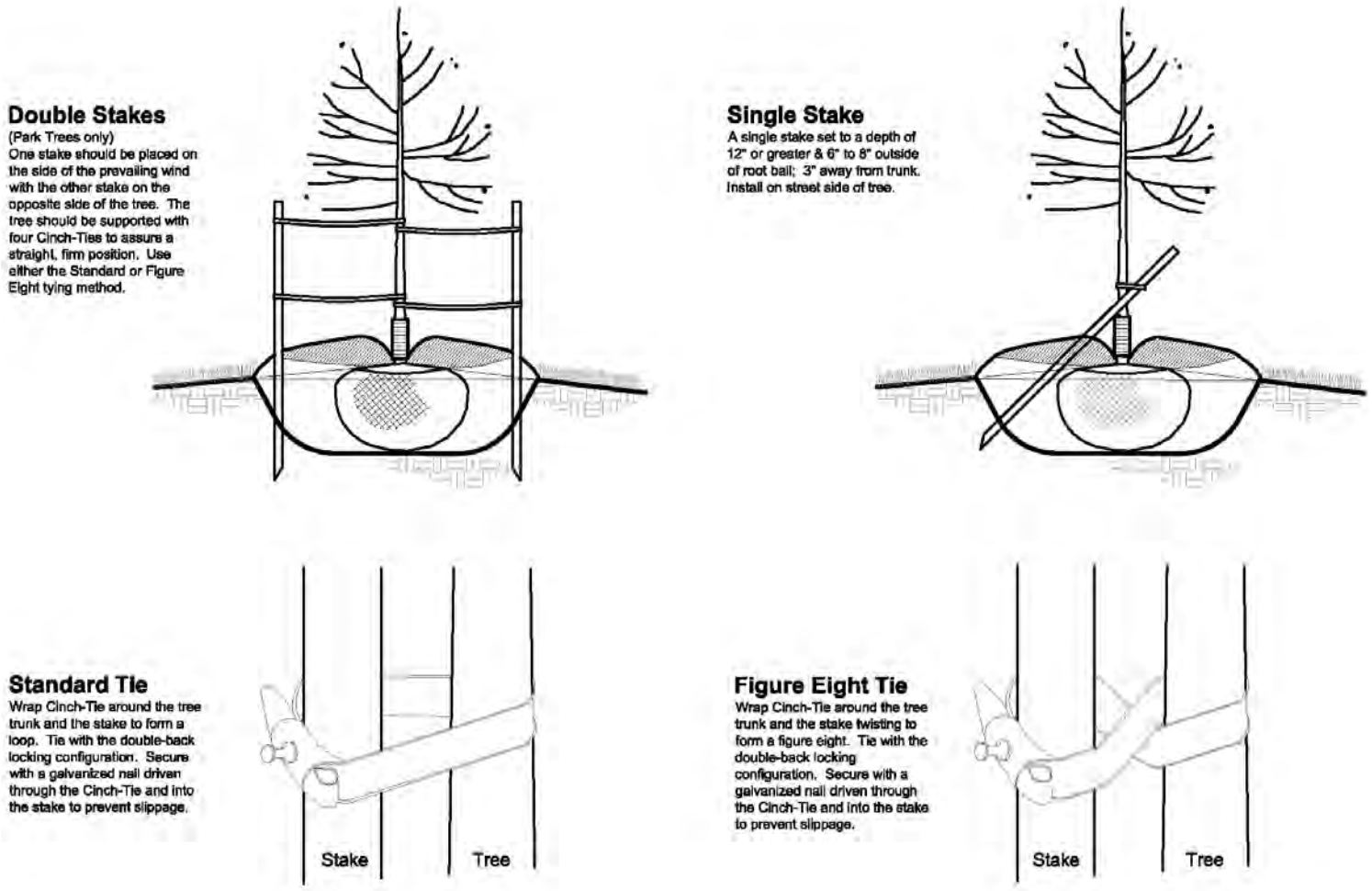
Trees shall be watered immediately following planting to fill air pockets and prevent drying of the roots. Water shall be applied at low pressure from a hose or soaker hose and not through the use of a lawn sprinklers. Add water slowly just within the established berm and continue watering long enough to saturate the root ball. Initial

watering shall be completed by the entity planting the tree. Thereafter, the owner of the adjacent property shall be responsible for watering.

3.7 Pruning

Newly planted trees shall be pruned to promote good tree architecture and reduce the risk of future structure problems and weakness. Codominant leaders shall be removed or reduced in length by at least 20% to prevent competition with the central leader. Any broken and dead branches shall be removed. Temporary branches below the lowest structural limbs should be pruned for clearance. The entity responsible for planting the tree shall be responsible for its initial pruning. Failure to perform basic pruning at the time of planting may result in fines or terminate of contract at the city's discretion.

Figure 8. Specifications for staking (City of Lincoln, 2009).



Appendix D: Design Standards for Street Trees

TITLE 2 DESIGN STANDARDS FOR LAND SUBDIVISION REGULATIONS

CHAPTER 2.35 DESIGN STANDARDS FOR STREET TREES

The Department of Parks and Recreation is assigned responsibility for administration of these design standards.

Section 1. GENERAL REQUIREMENTS

The selection, planting, maintenance and removal of trees, shrubs and hedges along the public ways within the City of Lincoln substantially affect such matters as pedestrians and vehicle safety, the location and maintenance of utility services, tree maintenance costs, the incidence of tree diseases, and the general appearance of the cityscape; therefore, it is hereby found and determined that such selection, planting, maintenance and removal are matters of city-wide concern over which the city must exercise the control set forth in the following standards and specifications.

1. Street trees planted on City right-of-way (i. e. between the curb and sidewalk, behind the sidewalk, behind the curb with no sidewalk) shall generally be located as follows to avoid conflicts with traffic control signs, sight triangles, above- and below-ground utilities, and existing trees:
    a. Street trees on corner lots shall be located 25 feet from the property corner adjacent to the street intersection.
    b. Twenty-five (25) feet from stop signs.
    c. Fifteen (15) feet from street light poles.
    d. Ten (10) feet from fire hydrants.
    e. Five (5) feet from driveways.
    f. Five (5) feet from storm sewer inlets
    g. Five (5) feet from manholes
    h. Four (4) feet from water shut-off boxes
    i. Three (3) feet from gas shut-off valves
    j. Five (5) feet from underground utility service lines going from utility mains to homes/buildings. The location of the service lines shall be considered, for distance purposes, to be the surface of the ground above the service line.
    k. Five (5) feet from traffic control signs

l. Four (4) feet from sidewalks where parking areas are greater than eight (8) feet wide.

If the street tree cannot be planted in compliance with the above requirements, an alternate location for the street tree may be approved by the Parks and Recreation Department.

Spacing between street trees to be determined by the Parks and Recreation Department.

2. Planting locations will be marked by the City. Installation of street trees shall be coordinated with the City Arborist prior to any street tree being planted.
3. The subdivider shall contact the Parks and Recreation Department Forestry Division for the species of street trees for each street.
4. All street trees, when planted, shall not be less than one inch in caliper.
5. There shall be at least one (1) street tree per lot unless the lot is less than 50 feet in width in which case the trees would be spaced for major streets according to Traffic Sight Distance Standards and Street Design Speed as follows:
6.

Major Street Tree Spacing	Design Speed Feet
25 mph	35-40
30 mph	40-45
35 mph	45-50
40 mph	55-60
45 mph	60-70
50 mph	70-75
55 mph	80+

For non-major streets, the trees would be spaced as follows:

a. Small Trees: Thirty (30) to thirty-five (35) feet from the nearest existing trees, public or private and spaced forty (40) feet from each other, unless otherwise approved by the City Arborist.
b. Medium Trees: Forty (40) to forty-five (45) feet from the nearest existing trees, public or private, and spaced forty (40) to forty-five (45) feet from each other, unless otherwise approved by the City Arborist.
c. Large Trees: Forty-Five (45) to fifty-five (55) feet from nearest existing trees, public or private, and spaced fifty (50) to fifty-five (55) feet from each other, unless other-wise approved by the City Arborist.

Corner lots shall require two or more street trees depending on the length of frontage on each street for such lots.

Lots with 100 to 150 feet of frontage shall require two (2) street trees and for each additional 50 feet of frontage one (1) additional street tree.

1. The same species of tree should not be used on streets which are generally parallel and within five (5) blocks apart, unless otherwise approved by the City Arborist.
2. If a species of tree has been approved on a temporary dead end street, the same species of tree should be used on the extension of the street into the new subdivision.
3. More than one species of tree may be allowed to be planted on the same street provided the designated street tree for that same street is according to the Master Street Tree Plan and other compatible species are those identified as an approved grouping of street trees from the most current approved trees for streets for Lincoln, NE.
4. In order to encourage solar access, where subdivision or community unit plans have easements, covenants, or other controlling regulatory measure to protect solar access to building envelopes then the design standards may be modified to allow approved smaller or dwarf variety trees of the same genus on the north side of east-west streets, provided however that trees of the same species be used if possible.
5. Plants shall be nursery grown, first class material, straight single stemmed and must meet the standards set forth in "American Standard for Nursery Stock" (ANSI Z60.1-2004 or most current edition) and as further specified herein. Plant Material shall be obtained from established commercial licensed nursery growers and installed by licensed nursery and/or landscape contractors.

(Resolution A-84549, September 24, 2007).

Appendix E: Lincoln Municipal Code

TITLE 4 BOARDS AND COMMISSIONS

Chapter 4.54 Community Forestry Advisory Board

4.54.010 Community Forestry Advisory Board; Created.

There is hereby created a seven-member advisory committee to be known as the Community Forestry Advisory Board. The Mayor shall appoint, with the approval of the City Council, seven individuals who shall be citizens of the City of Lincoln to serve as voting members of said Board. It shall be desired, but not required, that Board members reside in different locations throughout the City of Lincoln, to create as broad a geographical representation as possible.

Of the seven individuals initially appointed, three shall initially be appointed for a term of three years; two shall be initially appointed for a term of two years; and two shall be initially appointed for a term of one year. Thereafter, all appointments to the Board shall be for a term of three years unless such appointment is to fill an unexpired term, in which case such appointment shall coincide with the expired term to be filled. Any voting member of the Board may be removed for good cause by the Mayor with the approval of the City Council. (Ord. 18994 §1; September 17, 2007: prior Ord. 18646 §1; November 28, 2005: Ord. 16107 §1; May 11, 1992).

4.54.020 Organization.

The Community Forestry Advisory Board shall annually elect its chair and vice chair from among the voting members, but no voting member shall serve more than two consecutive terms as chair. The Board is hereby empowered to appoint committees and subcommittees when appropriate to consider and make recommendations on matters which are presented to it.

The Board shall meet monthly and all meetings of the Board shall be held in the City Hall or in some other public place supported by public funds and open to the general public. All convened meetings shall be open to the public and minutes of such meetings shall be kept as public record on file with the City Clerk. Special meetings of the Board may be called by the chair or, in the absence of the chair, by the vice chair, or by any three members of the Board. Four voting members shall constitute a quorum for the transaction of business, and four affirmative votes by voting members shall be required for final action on any matter acted on by the Board. (Ord. 16107 §2; May 11, 1992).

4.54.030 Duties of the Community Forestry Advisory Board.

The Community Forestry Advisory Board shall act in an advisory capacity to the Mayor, the City Council, and the Director of Parks and Recreation on issues regarding the planting, maintenance, and preservation of publicly owned arboreal resources and associated vegetation.

The Community Forestry Advisory Board shall have the following responsibilities:

To assist in the development of a comprehensive community forestry management plan, and to review and make recommendations on proposals concerning public arboreal resources when requested by the Mayor, City Council, or the Director of Parks and Recreation;

To assist in the development of policies and regulations regarding the planting, maintenance, and removal of trees and other vegetation on City property;

To recommend to the Mayor and City Council policies regarding trees and other vegetation on private property in those cases where open space or landscaping is required as a condition for approval for development under the City's land use regulations;

To assist in promoting the installation and maintenance of landscaping on public and private property by providing information to the public through educational campaigns, published materials, and other methods;

To identify potential landscaping projects that will improve the existing community forest, and to recommend policies to identify, publicize and preserve historic and notable trees on both public and private property;

To assist the City Arborist in planning and implementing Arbor Day celebrations and other activities;

To encourage and solicit donations and other funding for the community forestry program or for special projects. (Ord. 16107 §3; May 11, 1992).

4.54.040 Secretarial and Staff Assistance.

Secretarial and other staff assistance for the Community Forestry Advisory Board shall be provided by the Department of Parks and Recreation. (Ord. 16107 §4; May 11, 1992).

TITLE 5 LICENSES AND REGULATIONS

Chapter 5.06 ARBORISTS

5.06.010 Definitions.

For the purpose of this chapter the following definitions shall prevail:

Pruning shall mean an operation performed on a tree for the removal of any branches, alive, diseased or dead, in order to prevent or suppress diseases or to balance or shape the tree for any reason whatsoever.

Removal shall mean the removal operation performed to eliminate a diseased, dead or hazardous tree.

Tree shall mean a perennial plan having a woody supporting main stem or trunk, ordinarily growing to definite heights and usually developing branches at some distance from the ground. (Ord. 19578 §1; July 25, 2011: prior Ord. 15455 §1; March 5, 1990: P.C. §12.16.010: Ord. 9956 §1; April 6, 1970: prior Ord. 8287 §1; December 23, 1963).

5.06.020 Arborist's Certificate Required.

It shall be unlawful for any person, for hire or other valuable consideration to trim and cut or prune limbs or branches of trees; to perform tree surgery; to cut into and excavate cavities or remove rotten, dead or diseased wood from any tree or to remove any tree; to fill or treat in any manner any cavity in a tree; to repair any broken or injured tree; to treat in any manner, any tree without first having obtained an arborist's certificate so to do as hereinafter provided. Nothing herein contained is intended to apply to trees required to be removed to allow construction work to be accomplished. (Ord. 19578 §2; July 25, 2011: prior Ord. 15455 §2; March 5, 1990: P.C. §12.16.020: Ord. 8287 §2; December 23, 1963).

5.06.030 Issuance and Classification of Arborist's Certificates.

a. The Parks and Recreation Director shall issue an arborist's certificate and an identification card, which shall not be transferable, to any applicant who passes an examination for such certificate.
b. A first-class arborist's certificate shall entitle the holder thereof to work for hire or other valuable consideration, to trim and cut or prune limbs or branches of trees; to perform tree surgery; to cut into and excavate cavities or to remove rotten, dead or diseased wood from any tree or to remove any tree; to fill or treat in any manner any cavity in a tree; to repair any broken or injured tree; to spray or otherwise treat for pests or diseases any tree, or to treat in any other manner any tree as described in Section 5.06.020, subject to the requirements hereinafter set forth.

Nothing herein contained shall prohibit the work being performed by employees of a holder of an arborist's certificate, provided that all work shall be under the personal supervision and direction and in the presence of a holder of an arborist's certificate.

(Ord. 19578 §3; July 25, 2011: prior Ord. 15455 §3; March 5, 1990: P.C. §12.16.030: Ord. 8287 §3; December 23, 1963).

5.06.040 Certificate of Compliance.

It shall be unlawful for any firm, partnership, or corporation to do any act made unlawful in Section 5.06.020 until such firm, partnership, or corporation has been granted a certificate of compliance by the Parks and Recreation Director. The issuance of such certificate of compliance shall be conditioned upon the following:

One or more persons of such firm or partnership, or in the case of corporation, one or more officers, including the manager or any other individual designated and registered to accept service of summons in the name of the corporation, shall be a holder of an arborist's certificate and, provided further, that all work shall be under the personal supervision and direction and in the presence of a holder of an arborist's certificate. (Ord. 19578 §4; July 25, 2011: prior Ord. 15455§4; March 5, 1990: P.C. §12.15.040: Ord. 8287 §4; December 23, 1963).

5.06.050 Application for Arborist's Certificate.

Every applicant for an arborist's certificate shall make application to the Parks and Recreation Director. Applicants shall be at least eighteen years old. (Ord. 19578 §5; July 25, 2011: prior Ord. 15455 §5; March 5, 1990: P.C. §12.16.050: Ord. 8287 §5; December 23, 1963).

5.06.060 Examination Fee.

Each applicant for an arborist's certificate shall, upon making application therefor, pay to the Parks and Recreation Department a fee for the certificate for which such applicant is applying, which fee apply to the costs of examination and shall not be returned. The examination fee shall be established from time to time by executive order of the Mayor. (Ord. 19578 §6; July 25, 2011: prior Ord. 17600 §1; January 31, 2000: Ord. 16104 §1; May 4, 1992: Ord. 15455 §6; March 5, 1990: P.C. §12.16.060: Ord. 8287 §6; December 23, 1963).

5.06.070 Examination.

a. All examinations shall be oral or written in the discretion of the Parks and Recreation Director and the applicant shall also be required to pass a practical test. A grade of seventy-five percent shall be required to pass. The written examinations shall be kept on file by the Parks and Recreation Director.

b. Any applicant who fails to pass the examination herein provided for, shall be required to wait at least ten business days after the date of such examination before again making application for such certificate. The applicant shall be required to pay the same fee as for the original examination. (Ord. 19578 §7; July 25, 2011: prior Ord. 15455 §7; March 5, 1990: P.C. §12.16.070: Ord. 8276 §7; December 23, 1963).

5.06.080 Scope of Examination.

The examination for a first-class arborist's certificate shall require a knowledge of arboriculture and the principles and practice of planting, preservation, culture, pruning and shaping of trees, repairing of damage to same and measures necessary to control and exterminate insects, other pests, and diseases from trees. (Ord. 19578 §8; July 25, 2011: prior Ord. 15455 §8; March 5, 1990: P.C. §12.16.080: Ord. 8287 §8; December 23, 1963).

5.06.090 Liability Insurance.

Unless otherwise provided by applicable law, including this code or an ordinance of the City, whenever insurance is required of a permittee under this title, such permittee shall:

a. At all times maintain applicable worker's compensation insurance.
b. At all times maintain public liability insurance in the form of a commercial or comprehensive general liability policy, or an acceptable substitute policy form as permitted by the City Attorney, with a minimum combined single limit of $500,000 aggregate for any one occurrence. The coverages required herein shall be subject to review and approval by the City Attorney for conformance with the provisions of this section.
c. At all times keep on file with the City Clerk a current certificate of insurance specifying "trimming and removal of trees."

Before an arborist's certificate is granted or renewed, applicants and certificate holders shall comply with the insurance requirements set forth in Section 5.58.060 of the Lincoln Municipal Code. (Ord. 19578 §9; July 25, 2011: prior Ord. 15455§9; March 5, 1990: P.C. §12.16.090: Ord. 12013 §2; June 27, 1977: prior Ord. 8287 §9; December 23, 1963).

5.06.100 Expiration of Certificates.

All certificates, unless revoked for cause, shall be valid up to and including the thirty-first day of December next subsequent to the date of issuance and shall be renewed from year to year thereafter upon payment of a renewal fee to the Parks and Recreation Department. If not renewed within one year from the date of expiration, a new application and reexamination shall be required. The renewal fee shall be established

from time to time by executive order of the Mayor. (Ord. 19578 §10; July 25, 2011: prior Ord. 17600 §2; January 31, 2000: prior Ord. 16104 §2; May 4, 1992: Ord. 15455§10; March 5, 1990: P.C. §12.16.100: Ord. 8287 §10; December 23, 1963).

5.06.110 Identification.

a. It shall be unlawful for any holder of an arborist's certificate to use any vehicle in the conduct or maintenance of such business permitted hereunder, unless such vehicle shall have placed upon it in a conspicuous place an insignia furnished by the Parks and Recreation Director, identifying such vehicle as the vehicle of a holder of an arborist's certificate. It shall be unlawful for any person to display such insignia on any vehicle unless he or she has a valid arborist's certificate in force. The fee for such insignia shall be established from time to time by executive order of the Mayor. Trailers attached to such vehicle shall not be required to be equipped with such insignia.
b. Every holder of an arborist's identification card is required to show such card to the person from whom he or she is soliciting business or for whom he or she is performing a service, and to any law enforcement officer of the city upon their request. (Ord. 15455 §11; March 5, 1990: P.C. §12.16.110: Ord. 13310 §1; February 8, 1972: prior Ord. 8287 §11; December 23, 1963).

5.06.120 Rules and Regulations.

The Parks and Recreation Director is hereby authorized to promulgate rules and regulations for the proper administration of this chapter which shall include methods of good arboriculture practices which all arborist's certificate holders are required to follow. Such rules and regulations shall be furnished each arborist's certificate holder and shall be filed in the office of the City Clerk and become effective on the date of such filing. (Ord. 15455 §12; March 5, 1990: P.C. §12.16.120: Ord. 8287 §12; December 23, 1963).

5.06.130 Revocation of Certificate.

The Parks and Recreation Director may revoke the certificate of any holder of an arborist's certificate for violating any of the provisions of this chapter or any rules and regulations promulgated pursuant thereto. (Ord. 15455 §13; March 5, 1990: P.C. §12.63.130: Ord. 8287 §13; December 23, 1963).

5.06.140 Enforcement.

It shall be the duty of the director, or such person as the director may designate, to enforce the provisions of this chapter. (Ord. 15455 §14; March 5, 1990: P.C. §12.16.140: Ord. 9079 §1; August 22, 1966: prior Ord. 8287 §14; December 23, 1963).

5.06.150 Appeals.

Any person whose application for an arborist's certificate under this chapter has been denied or who has been affected by any notice which has been issued in connection with the enforcement of any of the provisions of this chapter, any request and shall be granted a hearing on the matter before the Mayor; provided, that such person shall file in the office of the City Clerk a written petition requesting such hearing within ten days after receiving notice of such denial, revocation or other ruling or order. Upon receipt of such petition, the Mayor shall set a time and place for such hearing and shall give the petitioner written notice thereof. The petitioner shall be given an opportunity to be heard on the appeal. After such hearing, the Mayor shall make findings as to compliance with the provisions of this chapter and any rules and regulations promulgated pursuant thereto and shall issue an order in writing sustaining, modifying or withdrawing the denial or notice. (Ord. 15455 §15; March 5, 1990: P.C. §12.16.150: Ord. 8287 §15; December 23, 1963).

TITLE 12 PARKS

Chapter 12.20 TREES AND SHRUBBERY

12.20.010 Statement of Intent.

The selection, planting, maintenance, and removal of trees and ornamental plantings along public ways within the City of Lincoln substantially affect such matters as pedestrian and vehicle safety, the location and maintenance of utility services, tree maintenance costs, the incidence of tree diseases, and the general appearance of the cityscape; therefore, it is hereby found and determined that such selection, planting, maintenance, and removal are matters of city-wide concern over which the city must exercise the control set forth in this chapter. (Ord. 18168 §1; April 28, 2003: P.C. §12.20.005: Ord. 10129 §1; March 22, 1971).

12.20.020 Master Street Tree Plan; Director Defined.

The Director shall prepare and maintain a "Master Street Tree Plan" for the city, showing thereon the genus, species, and variety of trees which may hereafter be planted in or

upon any street, parkway, sidewalk space, or other public way within the city, and all such tree planting shall conform to such plan. A current copy of such plan shall be made available for inspection by the public at the office of the Director.

The term "Director" whenever used in this chapter shall mean the Director of Parks and Recreation of the City of Lincoln, Nebraska, or his authorized deputy, agent, or representative. (P.C. §12.20.007: Ord. 10129 §2; March 22, 1971).

12.20.021 Landscape Plantings Within the Sidewalk Space.

The space between the lot line and existing or projected curb line on each side of every street in the city (hereafter known as the sidewalk space) shall be used only for the location of approved street trees in accordance with Section 12.20.020, turf grass, shrubs, perennial and annual flowering plants, ornamental grasses, vegetable gardens, and ground covers. Shredded wood mulch may be placed around street trees and landscape plantings within the sidewalk space. (Ord. 18168 §2; April 28, 2003).

12.20.025 Street Trees on Private Property.

The Director may, subject to approval of the Mayor, request permission to enter upon and plant one or more street trees on property adjacent to public right-of-way pursuant to an easement agreement when there is insufficient land available for the planting and proper growth of the street tree or trees in the public right-of-way. Such easement agreement shall be conditioned upon the owner of the property agreeing to assume ownership and liability for the street tree and the responsibility for its proper maintenance which shall include watering as often as required by necessity, cultivating, mulching, and trimming, or its removal if dead, dying, diseased, or hazardous.

The determination of insufficiency of available land shall be based upon existing roadway width, except in those cases where design work is underway or completed for a roadway project to be constructed within the next year, in which case the new curb location shall control. The Parks and Recreation Department shall prepare a report for the City Council detailing where trees have been planted on private property and the reasons for such plantings at the request of a City Council member. (Ord. 19819 §8; December 17, 2012: prior Ord. 17741 §1; October 9, 2000).

12.20.030 Maintenance of Street Trees.

Except as may otherwise be provided by the City Council for council-created street tree planting districts, the trimming, spraying, removing, and destroying of all trees now existing, the selecting, planting, trimming, spraying, removing, and destroying of all

street trees hereafter planted in or upon any street, parkway, sidewalk space, or other public way within the city, shall be done by and at the expense of the city and at its discretion and by no other person; provided, the Director may, in accordance with the provisions of this chapter, issue a permit to any applicant therefor, allowing such person to plant, remove, or destroy any such tree. (Ord. 18168 §3; April 28, 2003: P.C. §12.20.010: Ord. 10129 §3; March 22, 1971: Ord. 3489 §30-601, as amended by Ord. 7145; May 2, 1960).

12.20.035 Maintenance of Landscape Plantings Within the Sidewalk Space.

The owner of the property abutting the sidewalk space shall be responsible for the routine care of such landscape plantings within the sidewalk space, including watering, mowing, raking and disposing of leaves, twigs, and other debris, weed control in accordance with Chapter 8.46, and the trimming and pruning of shrubs and other ornamental landscape plantings. (Ord. 18168 §4; April 28, 2003).

12.20.040 Application for Permit.

Any person desiring to plant, treat with pesticide, or remove any street tree in or upon any street, parkway, sidewalk space, or other public way within the city shall first make a written application in a form provided by the Department and receive a permit from the Director. Such application shall set forth the name and address of the applicant, the name and address of the person, firm, or corporation doing the work, and such other information as the Director may require. At the time of making such application, the applicant shall agree in writing to save the city harmless and to protect the city and the public at all times in connection with such work under such permit, and to do such work in conformance with specifications set forth by the city. Also at the time of making such application, the applicant shall furnish the Director with the written consent to the issuance of such permit from the owner of the property abutting the public property upon which such work is proposed to be done. (Ord. 20725 §1; December 10, 2018: prior Ord. 18168 §5; April 28, 2003: P.C. §12.20.020: Ord. 10129 §4; March 22, 1971: Ord. 3489 §30-602, as amended by Ord. 7154; May 2, 1960).

Effective on: 12/25/2018

12.20.050 Issuance of Permit; Requirements Pertaining to Planting, Maintaining, Removal, and Destruction.

After inspection of the location in question, if in his opinion it is desirable that such tree be planted, removed, or destroyed, the Director shall issue a permit therefor. Such

permit shall set forth the name and address of the owner of the property abutting the public property upon which such work is to be done; the name and address of the person who will perform such work; and the location at which such work will be performed. The permittee shall furnish any such street tree to be planted. After planting, such street tree shall be and remain the property of the city, and subject to the provisions of this chapter. The cost of any such street tree and the cost of all such permitted planting, removing, and destroying shall be and remain the permittee's; provided, the Director may, in accordance with the Tree Voucher Program, issue a voucher towards the purchase of any such street tree. Such permit shall be subject to the following conditions, which shall be made a part of said permit, and failure to comply therewith shall constitute a violation of this chapter:

a. Any street tree to be planted shall be planted at the location designated by the Director. All trees when planted shall be not less than one inch in diameter at one foot above the ground surface. No whips shall be planted;
b. When a street tree is being removed or destroyed, the stump shall also be removed. All removed trees, including limbs and debris therefrom, shall be removed from the street, parkway, sidewalk space, or other public way within forty-eight hours after being cut, and the ground shall be raked clean of all chips, branches, and debris;
c. When a street tree is being felled, it shall be felled away from the roadway or parallel with the roadway, when possible, and the sidewalk and street shall be guarded as to protect pedestrians and vehicles thereon;
d. All damage to curbs, sidewalks, and other public property occurring in the performance of any such work shall be promptly and properly repaired at the permittee's expense. (Ord. 19050 §1; March 10, 2008: prior Ord. 18168 §6; April 28, 2003: Ord. 16951 §90; March 11, 1996: P.C. §12.20.030: Ord. 10129 §5; March 22, 1971: Ord. 3489 §30-603, as amended by Ord. 5893; October 25, 1954).

12.20.060 Work Ordered or Done by the City.

No permit shall be required for any street tree, shrub, or ornamental landscape planting, removing, or destroying ordered or done by the city; however, all such work shall be done in conformance with the requirements of subparagraphs (a), (b), (c), and (d) of Section 12.20.050 of this chapter. Further, the city may trim all trees in or upon any street, parkway, sidewalk space, or other public way so that there is a clearance of ten feet over sidewalks and fourteen feet over the portion of public streets and alleys used for vehicular traffic. (Ord. 18168 §7; April 28, 2003: Ord. 16111 §1; May 11,

1992: P.C. §12.20.035: Ord. 11310 §1; March 24, 1975: Ord. 10129 §6; March 22, 1971).

12.20.070 Height and Spread Limitations for Landscape Plantings Within the Sidewalk Space; Special Assessment for Failure to Maintain.

Shrubs, perennial and annual flowering plants, ornamental grasses, and ground covers planted within the sidewalk space, or abutting a sidewalk, shall be maintained so that they do not extend over curbs, sidewalks, driveways, or alleys. Such landscape plants located between the curb and sidewalk, or within twelve feet of the curb if no sidewalk exists, shall be maintained to have a maximum height of no more than thirty inches above the height of the adjoining curb. Landscape plants located behind the sidewalk, or beyond twelve feet from the curb if no sidewalk exists, shall be maintained to have a maximum height in conformance with the Lincoln Municipal Code. Upon the failure, neglect, or refusal of an owner of the property abutting the sidewalk space upon which landscape plants have been planted to maintain such plants in accordance with the requirements of this section, after at least five days' notice, by publication at least once in a daily newspaper of general circulation in the City of Lincoln and by postage prepaid certified mail has been given such person of such failure, neglect, or refusal, the city may treat such plants or growth thereof as weeds or worthless vegetation and forthwith trim, remove, or destroy the same. The Director shall annually prepare and file with the City Clerk a report of all such work, together with the cost thereof, done by his/her Department during the preceding twelve months. Upon receipt of such report, the City Clerk shall present it to the City Council for consideration. The City Council shall fix a time, date, and place for hearing said report, and any protests or objections thereto. The City Clerk shall cause notice of said hearing to be published once in a newspaper of general circulation in the city, and served by certified mail, postage prepaid, addressed to the owner of such abutting property as his/her name and address appears on the last equalized assessment roll of Lancaster County, Nebraska, if such so appears, or as known to the City Clerk. Such notice shall be given at least ten days prior to the date set for hearing and shall specify the day, hour, and place the Council will hear and pass upon the Director's report, together with any objection or protests which may be made thereto, and assess such abutting property with such cost. Such assessment shall be certified by the City Clerk to the appropriate taxing official for the city, and shall be collected in the manner provided by law for the collection of general real estate taxes. Such assessment shall be a lien upon such property from the date of assessment, shall become delinquent December 1 after the date of assessment, and shall draw interest

from said date until paid at the same rate as provided by law for delinquent general real estate taxes. (Ord. 18168 §8; April 28, 2003: P.C. §12.20.040: Ord. 13156 §1; June 22, 1981: Ord. 10129 §7; March 22, 1971: Ord. 9079 §2; August 22, 1966: Ord. 7730 §1; May 7, 1962: Ord. 3489 §30-605, as amended by Ord. 5893; October 25, 1954).

TITLE 21 HOUSING

Chapter 21.05 PROPERTY MAINTENANCE CODE OF THE CITY OF LINCOLN

21.05.320 Section 304.19 Added; Maintenance of Buildings and Premises.

Section 304.19 is added to the International Property Maintenance Code to read as follows:

304.19 Maintenance of Buildings and Premises. All buildings, or portions thereof, shall be adequately maintained so as to be free of deterioration that endangers or is likely to endanger the life, limb, health, property, safety, or welfare of the public or occupants thereof. All exposed exterior surfaces, windows and doors of buildings, structures and the premises upon which they are located shall be adequately maintained so as to not present a deteriorated or blighted appearance.

Inadequate maintenance of buildings shall include but not be limited to the following:

1. Any building or portion thereof which is determined to be an unsafe building in accordance with the International Building Code as adopted by the City.
2. Buildings which for a period of three months or more are boarded up, left in a partial state of destruction, or left in a state of partial construction after expiration of a building permit for such construction.
3. Broken windows constituting hazardous conditions.
4. Unpainted buildings which have begun to dry rot, warp, or become infested with termites.
5. Buildings which have substantial and noticeable conditions of blight or deterioration.
6. Buildings which have cracked, chipped, flaking, peeling, or missing paint over 25% or more of any wall or face of the building.
7. Buildings which have upholstered or other furniture which is designed or manufactured primarily for indoor use with no original outdoor weatherproofing qualities including, but not limited to, upholstered chairs, upholstered couches, and mattresses used or left on unenclosed exterior porches, balconies, or in an

exposed open area including, but not limited to, decks, patios, roofs, yards, driveways, or walkways.

Exterior porches shall not include any porch completely covered by a roof, when located at and attached to a building and completely enclosed by fully intact glass and/or fully intact screens which are designed to keep out insects and allow air flow.

Inadequate maintenance of the premises shall include, but not be limited to the following:

1. Accumulation of debris, litter, rubbish, rubble, solid waste, and similar materials or conditions.
2. Dead and dying trees and limbs or other natural growth which by reason of rotting or deteriorating condition or storm damage constitute a health or safety hazard to persons in the vicinity thereof.
3. Sources of infestation.
4. Premises which have substantial and noticeable conditions of blight or disrepair.

(Ord. 19349 §32; March 1, 2009).

TITLE 26 LAND SUBDIVISION

Chapter 26.19 FINAL PLAT

26.19.035 Additional Information Required.

Accompanying the final plat submittal, the following information shall be submitted:

a. A statement from the subdivider indicating:
    1. Any interest the subdivider has in the land surrounding the final plat and the nature of such interest.
    2. All requests to be submitted to the city for use permits, special use permits, planned unit developments, changes of zone, and vacations which are required to complete the development.
    3. The name, telephone number, mailing address of the subdivider, record owner, and any other person the subdivider may want informed of the final plat process, and any person who has the authorization to act on behalf of the subdivider.
b. Street profiles that show existing ground surface elevations based on a current field survey, the curb grades, and the lengths of all vertical curves of the streets within the final plat which are to be dedicated to the public. The grades shall be

in accordance with the minimum standards of the city and, upon acceptance by the city, shall become the official established grades.

c. The proposed species and location of trees for each street and private roadway within and adjacent to the subdivision, including the common and botanical name, size at planting, method of handling, and the quantity of each species. The landscape plan shall have a note stating a certified landscape contractor as approved by the Parks and Recreation Department shall be used to install street trees.

d. The proposed location, design, and materials to be used in all required landscape screens. (Ord. 18502 §17; February 14, 2005: prior Ord. 18230 §11; August 18, 2003: Ord. 13956 §14; September 17, 1984: Ord. 13157 §41; June 29, 1981).