Urban Forestry Management Plan

City of Walla Walla, Washington

Prepared for:

City of Walla Walla, WA
September 2021

Prepared by:

ArborPro, Inc.
22605 E. La Palma Ave Suite #509
Yorba Linda, CA 92887

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Executive Summary

ArborPro, Inc. developed this plan for the City of Walla Walla, Washington with a focus on both the present and future tree management needs of the City. ArborPro completed a street tree inventory to better understand the current state of the urban forest and to create a framework for future tree care and maintenance planning. This Urban Forestry Management Plan was developed by analyzing tree inventory data in relation to the City's current and future urban forestry goals. In addition to maintenance and planning needs, this report addresses the economic, environmental, and social benefits that trees provide to the city of Walla Walla.

Along with the newly updated and collected street tree inventory data this plan also incorporates data from parks, a golf course and cemetery in the calculation of environmental benefits. This data was supplied by the City and was not updated by ArborPro as part of the most recent inventory.

Significant Findings from the 2021 Inventory

The Winter 2021 tree inventory included trees, stumps, and vacant planting sites within the City along public street rights-of-way (ROW). A total of 10,332 sites were recorded during the inventory which included 7,965 trees (77.09%), 180 stumps and snags (1.74%), and 2,187 vacant sites (21.17%).

The five most common species found in Walla Walla are: Cornus florida/Eastern Dogwood (984 trees: 12.08%); Pyrus calleryana/Ornamental Pear (727 trees: 8.93%); Acer platanoides/Norway Maple (548 trees: 6.73%); Malus species/Crabapple Species (436 trees: 5.35%); Platanus x acerifolia/London Plane Tree (327 trees: 4.01%).

The three most common small trees (00-03" DBH) are: Cornus florida/Eastern Dogwood (238 trees); Pyrus calleryana/Ornamental Pear (and cultivars) (147); and Malus species/Crabapple Species and cultivar (62 trees).

The three most common large trees (over 25" DBH) are: Platanus x acerifolia/London Plane Tree (277 trees); Acer saccharinum/Silver Maple (190 trees); and Acer platanoides/Norway Maple (148 trees).

A total of 174 distinct species of trees were recorded during the inventory.

69 % of Walla Walla's tree population is in "good" or better condition.

Trees provide approximately $53,874.39 in annual environmental benefits.[1]*

Total Environmental Benefits

Tree Cover: 113.5 acres.
Stormwater interception: valued at $13,800/year.
Carbon sequestration: valued at $19,800/year.
Carbon Storage: valued at $1,860,000.
Pollution Removal: $20,300/year.

Total replacement cost for all trees is $40,800,000.

[1] Environmental Benefits are for trees inventoried in 2021 and Park, Cemetery and Golf Course data, supplied by the City of Walla Walla.

Tree Maintenance Needs

Maintenance recommendations recorded during the tree inventory were tree removal (2%), pruning (75%), stump removal (2%), and planting (21%).

While tree maintenance can be costly and time consuming, the benefits that trees provide justify the expense. Proper pruning and regular maintenance help ensure that trees are providing maximum benefits throughout their life span. In addition to maximizing benefits, regular maintenance mitigates tree-related risk by removing hazardous limbs; reducing future storm damage clean-up; removing limb conflicts with sidewalks and roadways; improving the overall appearance of urban trees; and promoting proper growth patterns in small trees. Trees that pose the highest risk (Priority 1 removals and Priority 1 prunes) should be addressed first to properly mitigate risk and prioritize maintenance. After all Priority 1 maintenance has been completed, the Priority 2 removals and Priority 2 pruning should be addressed.

Several high-risk trees (Priority 1 Prune and Priority 1 Removal) were recorded during the inventory. These should be pruned or removed soon to ensure public safety. Table 1 summarizes the number of removals and pruning recommended.

Tree Removal	Priority 1 Removal = 69 trees
	Priority 2 Removal = 152 trees
Priority Pruning	Priority 1 Prune = 44 trees
	Priority 2 Prune = 334 trees
Proactive Pruning	Routine Prune = 4,647 trees
	Training Prune = 2,725 trees

Table 1: Tree Pruning and Removal Totals

A routine pruning cycle ensures that trees are inspected and pruned on a regular basis. The length of this cycle may vary depending on budget and tree maintenance needs, but a five-year cycle is recommended for established trees. For small trees, a three-year, tree training cycle is recommended to improve the structure, form, and vitality of these trees. The City of Walla Walla has implemented a cyclical pruning strategy with a 5–7-year pruning cycle goal. All the information pertaining to priority and routine maintenance are recommendations that can be used to determine the cost and feasibility of completing the prescribed work.

Maintaining a proactive pruning and tree training cycle means that small trees are pruned every three years to correct structural issues and promote natural form while established trees are pruned every five years to encourage a natural tree form suitable for the species and address other issues such as deadwood or clearance conflicts. Walla Walla has a considerable number of small trees that would benefit greatly from a 3-year pruning cycle. Proper small tree pruning will reduce structural defects and maintenance needs as trees mature and become established. Investing the time and money to address these issues while trees are young and small will reduce future pruning costs and help ensure the longevity of newly planted trees. This report will later discuss long term planning and maintenance cycles.

In addition to regular maintenance, tree planting is an important part of a comprehensive Urban Forest Management Plan. Adding new trees to the landscape is necessary to promote canopy growth, offset loss of trees due to natural mortality and other causes, and to increase biodiversity.

Introduction

The City of Walla Walla is home to more than 34,000 full-time residents. The City is responsible for maintaining thousands of trees in parks, public spaces, and along street Rights-of-Way. The City of Walla Walla is rich in both cultural and natural resources. Walla Walla has been a Tree City USA for more than 28 years and continues to show a dedication to preserving and improving its urban forest.

Approach to Tree Management

The best approach to successfully managing an urban forest is to implement a proactive, organized program that sets goals and monitor's progress. The first steps in this process are to complete a tree inventory and prioritize maintenance to guide short and long term planning. The City can utilize these tools to establish tree care priorities; generate strategic planting plans; draft cost-effective budgets based on projected needs; and ultimately reduce to a minimum the need for costly, reactive solutions to emergency situations.

In the winter of 2021, The City of Walla Walla contracted with ArborPro to conduct a comprehensive street tree inventory update and develop an updated Urban Forest Management Plan. This plan considers the size characteristics, condition, and species distribution of the inventoried trees and provides a prioritized system for maintaining all trees within the survey area. The following tasks were completed:

Inventory of trees, stumps, and vacant sites along street ROWs. Analysis of tree inventory data. Development of a plan that prioritizes the recommended tree maintenance.

The Urban Forestry Management Plan addresses:

- **Results of the inventory.**
- **Benefits of a healthy urban forest.**
- **Prioritization of tree maintenance.**
- **Short and long term goals.**

Trees are an important part of a community's green infrastructure — as essential as roads, bridges, or sewer mains. But trees, unlike other types of infrastructure, perform better and gain value over time. They are the only infrastructure that improves with age. An Urban Forestry Management Plan, like a stormwater, street, or sewer management plan, protects an important infrastructure on which the City depends. The Urban Forestry Management Plan outlines how Walla Walla will protect and care for one component of its green infrastructure — its trees. The Management Plan is divided into three sections:

Section 1: Highlights and Results of Inventory Data
Section 2: Benefits of a Healthy Urban Forest and Community Survey Results
Section 3: Tree Management

Section 1: Highlights and Results of Inventory Data

In the winter of 2021, ArborPro, Inc. assigned ISA Certified Arborists to inventory trees and vacant sites along City street rights-of-way. A total of 10,332 sites were collected within the City of Walla Walla, which includes 7,965 trees (77.09%), 180 stumps and snags (1.74%), and 2,187 vacant sites (21.17%).

Methods of Data Collection

Tree inventory data were collected using ArborPro's proprietary software. The software, ArborPro version 3.5.1, is loaded on pen-based tablets, equipped with geographic information systems (GIS), and uses both aerial imagery and global positioning system (GPS).

The following data fields were collected at each tree location:

- address
- condition
- hardscape damage
- mapping coordinates
- notes
- observations
- tree diameter
- clearance
- parkway type and size
- tree height
- recommended maintanence
- side (front, side or rear)
- site number
- species

Assessment of Tree Inventory Data

Professional judgment based on experience and industry standards is used to determine maintenance recommendations during the data collection process. Data analysis is then used to summarize and generalize the state of the inventoried urban forest. Understanding and recognizing this information will help guide short and long term management planning. This section of the management plan summarizes the following criteria of the inventoried tree population:

Size characteristics
Tree condition
Species and genus distribution.

Size Characteristics

A tree's general size provides insight into its age and value as well as the overall age of the urban forest. The two industry-wide recognized size characteristics are height and diameter at breast height. While height is self-explanatory, diameter at breast height (DBH) is determined by the measuring the diameter of the tree at 4.5 feet above grade. DBH range distribution can be used as a proxy to analyze the relative age distribution of an urban forest. Due to the lack of data regarding the DBH growth rate of various species in any given location utilizing DBH as proxy for age is one approach. It is understood that while the age/diameter relationship is generally consistent within a species the relationship is not the same for all species. There are many factors affecting DBH growth rate and while not ideal, it is a metric from which age can be inferred. This allows the City to adjust their planting plans to ensure that there are enough young trees to replace aging and over-mature trees. It is important that all age classes are adequately represented throughout the urban forest to ensure a healthy, vibrant tree canopy for future generations. Figure 1 illustrates the distribution of the City of Walla Walla's trees by diameter class while Figure 2 shows the distribution of its trees by height class.

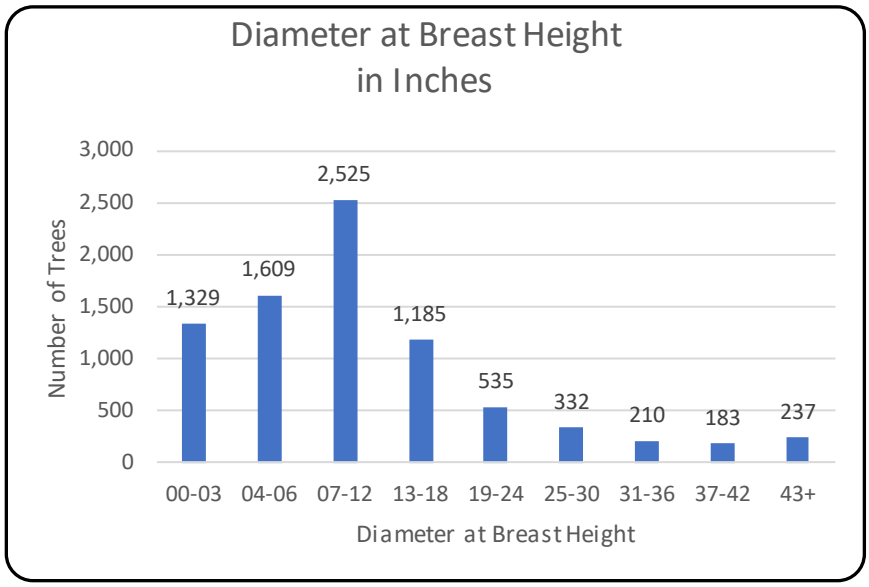


Figure 1: Diameter class distribution.

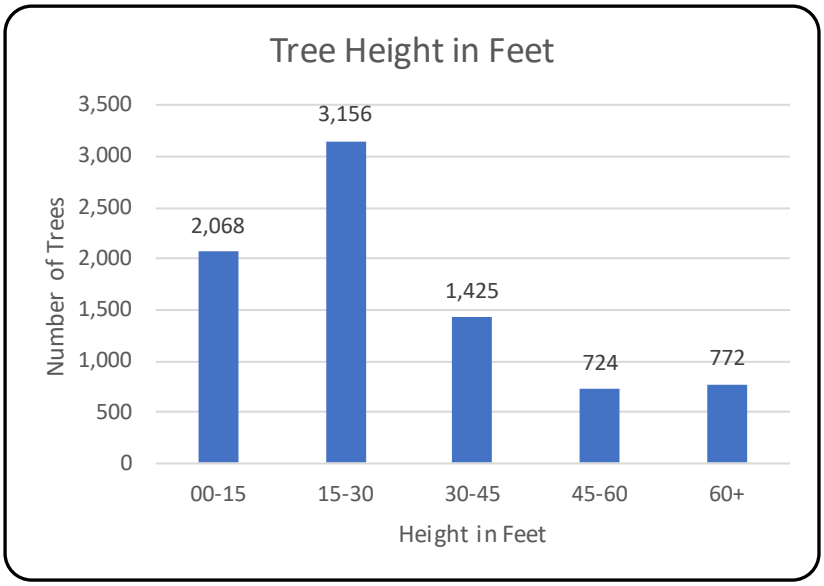


Figure 2: Height class distribution.

Discussion

As the above graphs show, Walla Walla has a desirable distribution of size classes within the street tree population. The diameter distribution is somewhat skewed towards small to semi-mature trees. While this is not entirely ideal, the smaller to semi-mature trees will grow over time to provide a healthy mature canopy, if effectively managed. While adding new trees will result in an increased ratio of small to larger trees ArborPro nonetheless recommends continuing to plant new trees to further improve canopy cover and air quality.

Tree Condition

Not necessarily about desirability, tree condition is a subjective, qualitative representation of overall health, vigor, and structure. Likewise, appearance is not a complete indication of overall condition. Table 2 and Figure 3 show the number of trees recorded in each condition category as well as the percentage of the total population that they represent.

Excellent – The tree has no structural problems, no damage from diseases or pests; no mechanical damage; a full, balanced crown; and normal twig condition and vigor for its species. Trees in this category are 95-100% healthy.

Very Good – The tree has no structural problems, no significant damage from diseases or pests; no mechanical damage; a full, balanced crown; and normal twig condition and vigor for its species. Trees in this category are 90-95% healthy.

Good – The tree has no major structural problems, no significant damage from diseases or pests; no significant mechanical damage; a full, balanced crown; and normal twig condition and vigor for its species. Trees in this category are 80-90% healthy.

CONDITION	COUNT	PERCENTAGE
Excellent	86	1.06%
Very Good	336	4.13%
Good	5,058	62.10%
Fair	1,985	24.37%
Poor	470	5.77%
Critical	5	0.06%
Dead	31	0.38%
Stump	174	2.14%

Table 2: Tree Condition & Percentage of Population.

Fair – The tree may exhibit the following characteristics: minor structural problems and/or mechanical damage; significant damage from non-fatal or disfiguring diseases; minor crown imbalance or thin crown; minor structural imbalance; or stunted growth compared to adjacent trees of the same species. Trees in this category are 60-80% healthy.

Poor – A tree can appear healthy but may have structural defects. This classification also includes healthy trees that have unbalanced structures or have been topped. Trees in this category may also have severe mechanical damage, decay, severe crown dieback or poor vigor/failure to thrive. Trees in this category are 40-60% healthy.

Critical – The tree is in a physical state that requires immediate attention. Generally, these trees are recommended for removal.

Dead – This category refers only to trees that are completely dead. Trees in advanced states of decline that are still alive are generally recorded as poor or critical, not dead.

Stump – Stumps included interfere with pedestrian traffic or pose a tripping hazard. Stumps are not included in dead tree count.

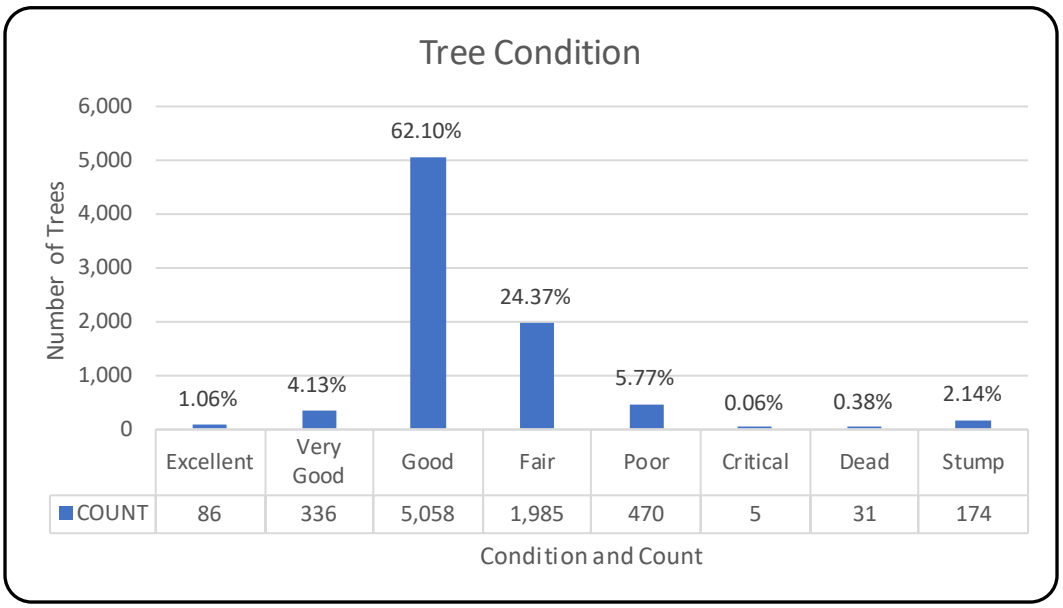


Figure 3: Tree condition by count and percentage.

Discussion

Most of the trees in Walla Walla (69%) were observed to be in Good or better condition at the time of the inventory. This number excludes stumps and vacant sites and is used only to compare the condition of trees recorded in the inventory. Therefore, the overall health and condition of the City's trees would be rated as Good. Additionally, approximately 6.1% of the City's trees are in poor condition; and less than another 1% are in critical or dead condition. Figure 4 shows the maintenance recommendations by condition.

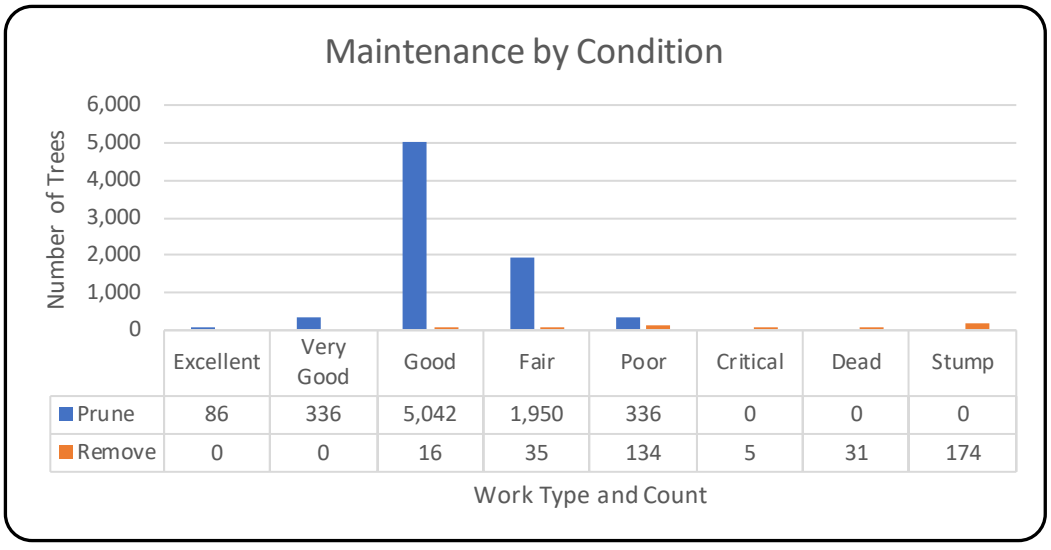


Figure 4: Maintenance recommendations by condition.

Species and Genus Distribution

Understanding species and genus distribution is important when determining which species should be planted and which ones are currently over-represented in the urban forest. Biodiversity is extremely important to the overall health and longevity of a tree population. The accepted guideline for urban biodiversity is the 10-20-30 rule. This means that no species should represent more than 10%, no genus should represent more than 20%, and no family should represent more than 30% of the total tree population. Figure 5 shows the distribution of trees representing 2% or more of the total tree population.

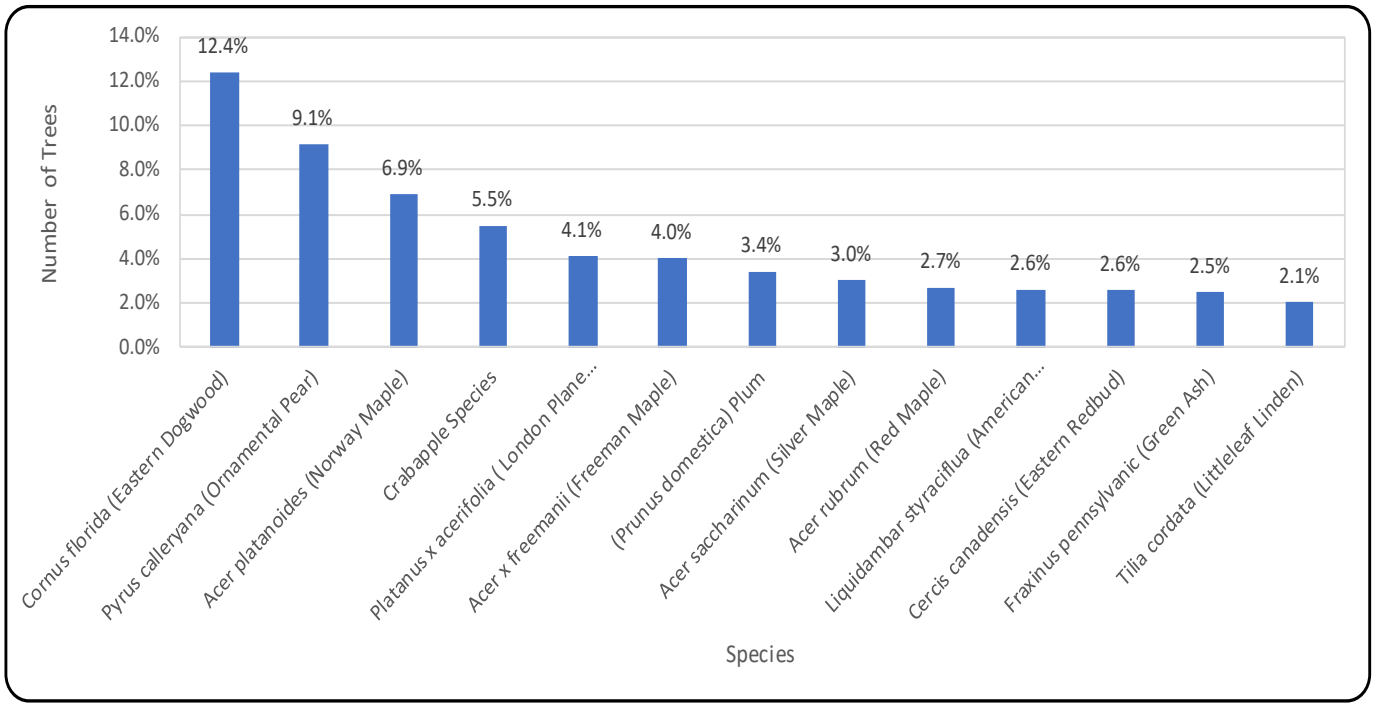


Figure 5: Tree distribution by percentage over 2%.

Table 3 contains the top ten genera distribution of trees recorded in Walla Walla by count and percentage of the total tree population. A full species frequency report can be found in Appendix A.

Rank	Genera Common Name	Percentage	Count
1	Maple/Acer	21.9	1,744
2	Dogwood/Cornus	13.7	1,091
3	Pear/Pyrus	13.23	815
4	Ash/Fraxinus	7.29	581
5	Cherry/Prunus	6.99	557
6	Apple/Malus	5.52	440
7	Sycamore/Platnaus	4.13	329
8	Sweetgum/Liquidambar	2.62	209
9	Redbuds/Cercis	2.57	205
10	Serviceberry/Amelanchier	2.35	187

Table 3: Ten most common genera by percentage and count of total population.

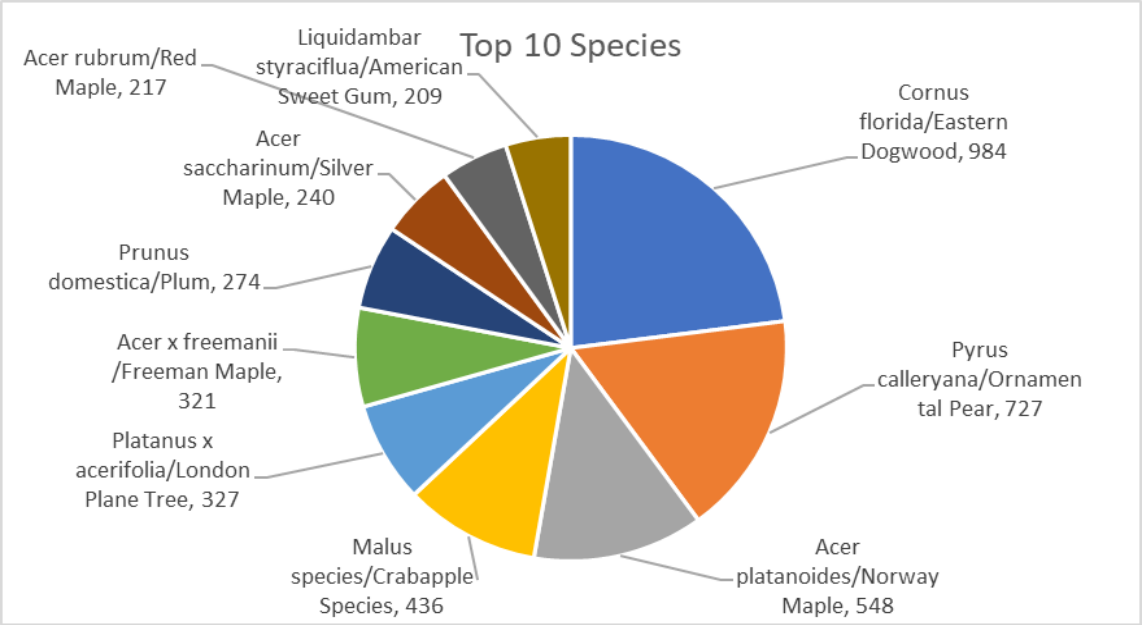


Figure 6 Top Ten Species.

Discussion

The City of Walla Walla maintains 174 distinct species of street trees. The distribution of these trees across species, genus, and family trends toward ideal and could be improved over time. ArborPro recommends the City of Walla Walla reduce or discontinue the planting of dogwoods (Cornus) as they exceed the recommended 10% threshold for a particular species. Approaching the 10% limit are Ornamental pear (Pyrus) and these trees also should be of limited use. Additionally, the genus Acer (maples) can be considered overrepresented throughout the City. Maples make up 22% of the total tree population, exceeding the recommended limit of 20% for a particular genus. While it is common for most cities to have an excess of certain species, it leaves Walla Walla susceptible to future outbreaks of insects and diseases. This risk can be mitigated by analyzing the current list of species being planted by the City and focusing on species that do well in the area while actively promoting biodiversity in the landscape. A list of recommended tree species developed by the city for future plantings can be found in Appendix B.

Clearance and Hardscape Analysis

Many of the street trees encroach on clearance envelopes and these were documented as part of the inventory. A total of 1,597 trees were in violation of clearance criteria at the time of the inventory. Two categories make up most clearance issues those being “Vehicle” and “Pedestrian and Vehicle” with a total of 1,233 trees.

Hardscape damage is a common occurrence in urban tree populations. Walla Walla has its share of trees that are adjacent to damaged hardscape. More than 16% of trees were identified as causing hardscape damage.

Below figure 7 and table 4 summarize clearance conflicts, while figure 8 and table 5 summarize hardscape conflicts.

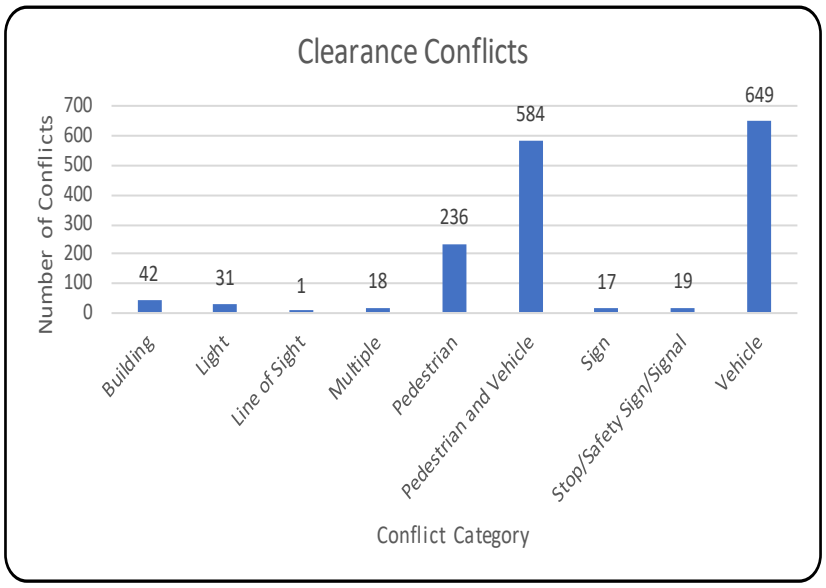


Figure 7: Count of Clearance by Category.

Clearance	Count	% of Pop
Building	42	0.53%
Light	31	0.39%
Line of Sight	1	0.01%
Multiple	18	0.23%
Pedestrian	236	2.96%
Pedestrian and Vehicle	584	7.33%
Sign	17	0.21%
Stop/Safety Sign/Signal	19	0.24%
Vehicle	649	8.15%
Totals	1,597	20.05%

Table 4: Clearance Count and Percentage.

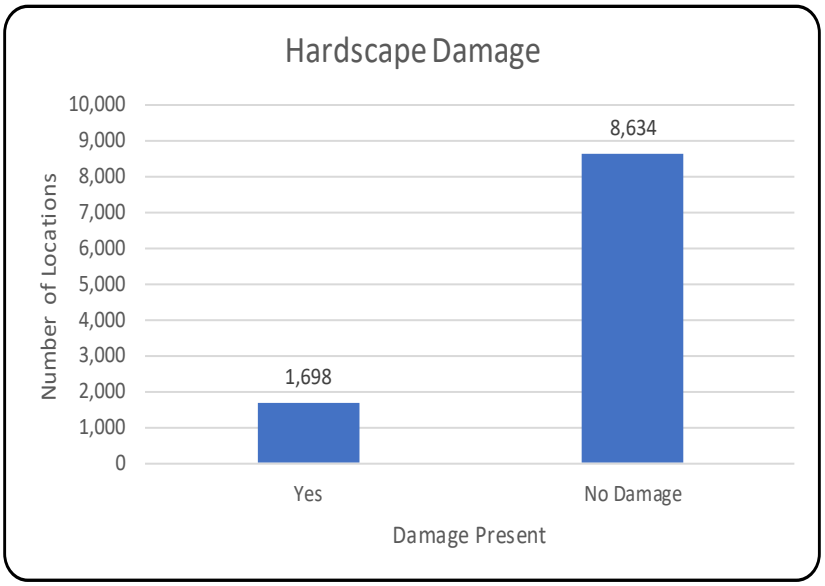


Figure 8: Hardscape Damage Count.

Hardscape	Count	% of Pop
Yes	1,698	16.43%
No Damage	8,634	83.57%
Totals	10,332	100.00%

Table 5: Hardscape Count and Percentage.

Observations

There are times when the typical data collected benefits from an additional observation. These are situations that do not fit into the traditional data fields and additional information would be helpful to the tree manager. A total of 2,845 trees warranted an observation during the inventory. Trees that have been topped and trees needed deadwood removal are the most numerous observations with 308 topped trees and 227 needing deadwood removed. Table 6 and Figure 9 below provide counts multiple categories.

Rank	Observation	Count
1	Previously Topped	308
2	Deadwood/Clean	227
3	Raise	169
4	Remove Stub(s)	147
5	Decay	138
6	Pruned for Utilities	100
7	Sheared/Shaped	98
8	Leaning	91

Table 6: Observations.

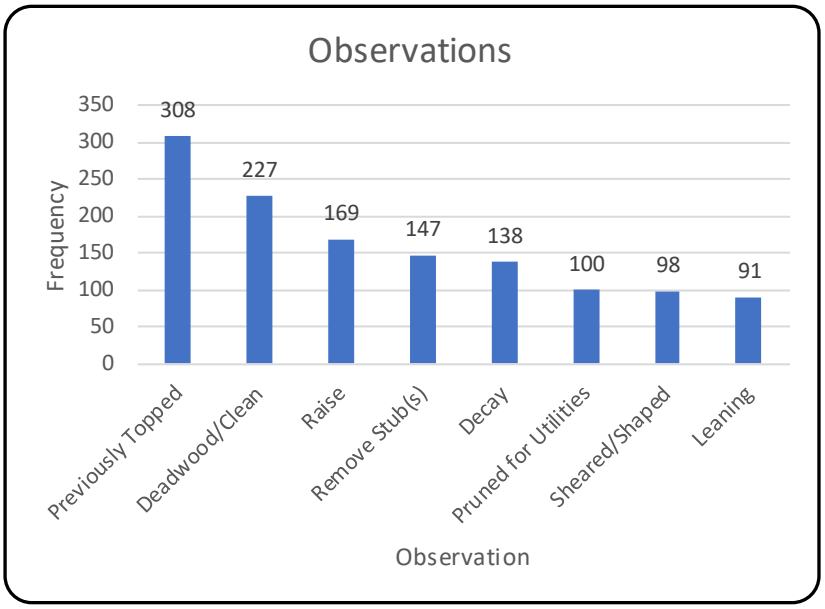


Figure 9: Observations.

Section 2: Benefits of a Healthy Urban Forest

Trees provide a host of environmental, social, and economic benefits in urban areas. When properly maintained, trees can reduce pollution, divert stormwater runoff, and lower energy costs. The benefits trees provide can offset the cost associated with tree maintenance. A properly implemented tree maintenance program will maximize tree benefits in the urban setting, allowing trees to provide benefits that meet or exceed the time and money invested in maintenance activities.

The i-Tree Eco application was used to quantify the benefits provided by Walla Walla's trees. This application uses growth and benefit models designed around predominant urban trees to calculate the specific benefits that trees provide in dollar amounts. The benefits calculated by i-Tree Eco include air quality improvements, carbon dioxide (CO_2) sequestration, carbon dioxide (CO_2) storage, stormwater control, and structural value. The i-Tree annual benefit reports demonstrate the value urban trees provide to the surrounding community.

Air Quality

Trees improve air quality by removing several pollutants from the atmosphere, including ozone, nitrogen dioxide, and particulate matter. The estimated value of pollutant removal by the inventoried tree population each year is $20,269.

Carbon Dioxide Sequestration

It is well known that trees absorb carbon dioxide and release oxygen into the atmosphere as a product of photosynthesis. Carbon absorbed during this process is ultimately stored in the wood of trees. The amount of carbon sequestered by the inventoried tree population is valued at $19,793 annually.

Stormwater Control

Trees reduce the costs associated with diverting stormwater by intercepting rainfall before it hits the ground and enters the storm runoff system. This greatly reduces the strain placed on public stormwater runoff systems. This can represent a significant monetary savings; the amount of infrastructure needed to divert stormwater throughout the City is reduced. The estimated savings for the City in the management of stormwater runoff is $13,812 annually.

Total Replacement Value

In addition to environmental benefits, the City can consider the total replacement value for its urban forest. Total replacement value is the amount of money it would take to completely replace the existing urban forest with trees of the same size. While this is a scenario that will likely never happen, it gives the City the specific dollar value of its trees in their current state. Replacement value differs from environmental benefits in that it shows how much the trees are worth instead of the dollar values that they provide in benefits. For example, Platanus x acerifolia trees provide $6,950.00 in annual environmental benefits and store $336,177.00 of carbon and the total cost of replacing the Platanus x acerifolia trees would be $6,290,907. According to i-Tree Eco, the total replacement cost for Walla Walla's trees is $40,800,000. Table 7 shows the breakdown of replacement value for the top ten valued species.

Species	Count	Structural Value
Acer platanoides/Norway Maple	1,039	6,440,807.41
Platanus x acerifolia/London Plane Tree	407	6,290,907.11
Robinia pseudoacacia/Black Locust	456	4,158,044.08
Acer saccharum/Sugar Maple	199	3,373,519.09
Acer saccharinum/Silver Maple	352	2,315,113.90
Tilia cordata/Littleleaf Linden	377	1,061,950.61
Cornus florida/Eastern Dogwood	1,112	1,032,501.15
Liquidambar styraciflua/American Sweet Gum	282	977,951.78
Pyrus calleryana/Ortrnamental Pear	727	855,306.32
Malus species/Crabapple Species	551	854,816.87
Total	5,502	27,360,918.32

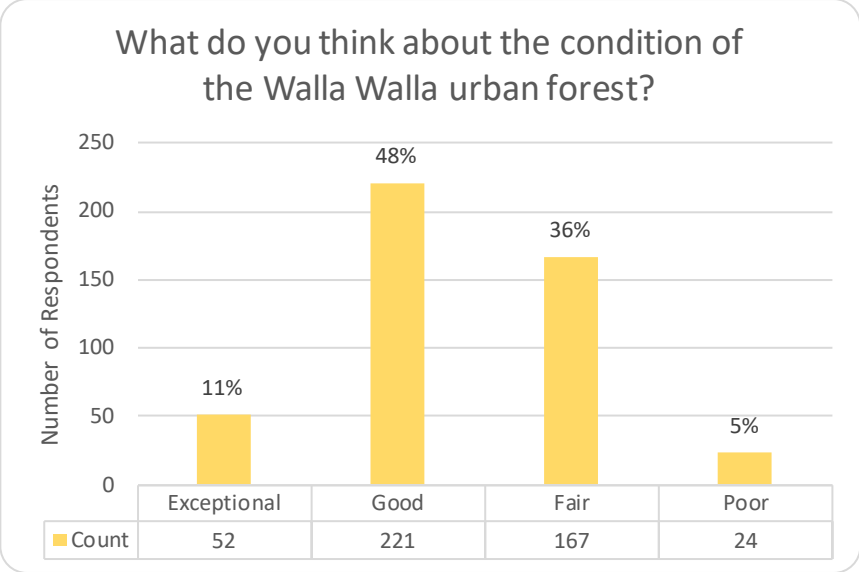
Table 7: Top 10 Replacement values by species.

Community Survey

Community input and feedback is important to the city of Walla Walla. A 17-question online survey was created to gather information from the residents. The survey ran for approximately 8 weeks in April and May 2021. There were over 400 responses for many of the questions. Please note not all respondents replied to all questions. The survey results are shown in the charts and tables below.

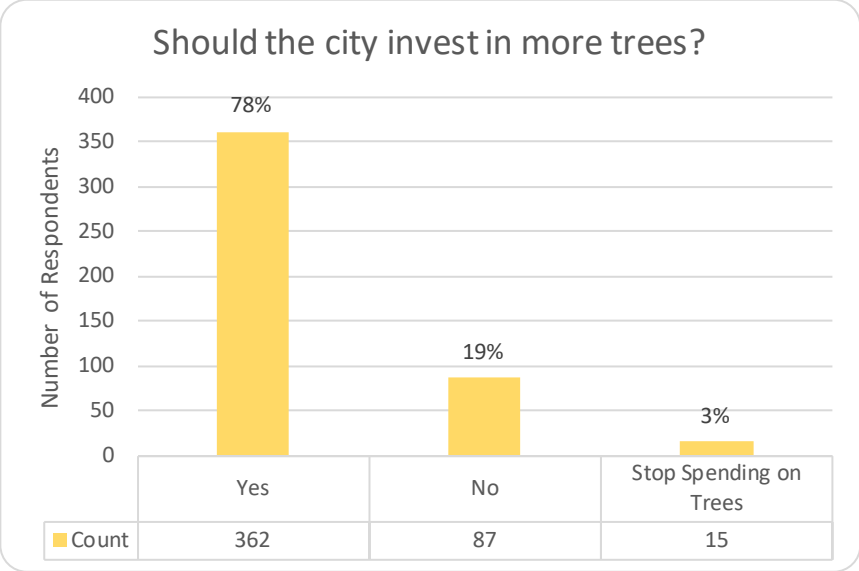
Question 1.

What do you think about the condition Walla Walla urban forest?



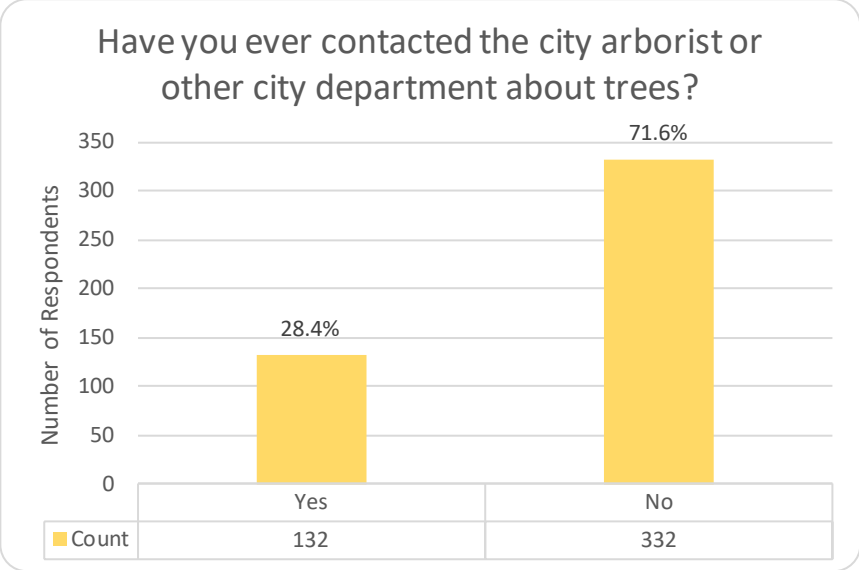
Question 2.

Should the city invest in more trees?



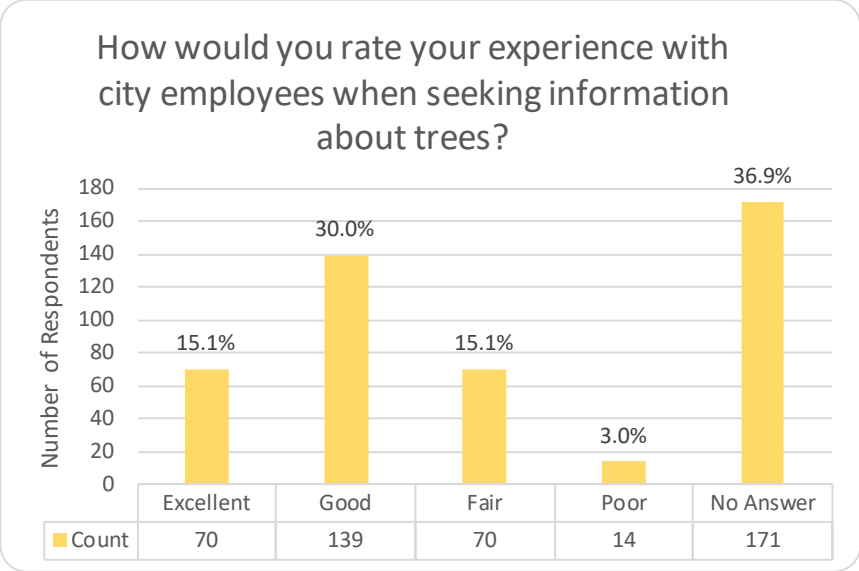
Question 3.

Have you ever contacted the city arborist or other city department about trees?



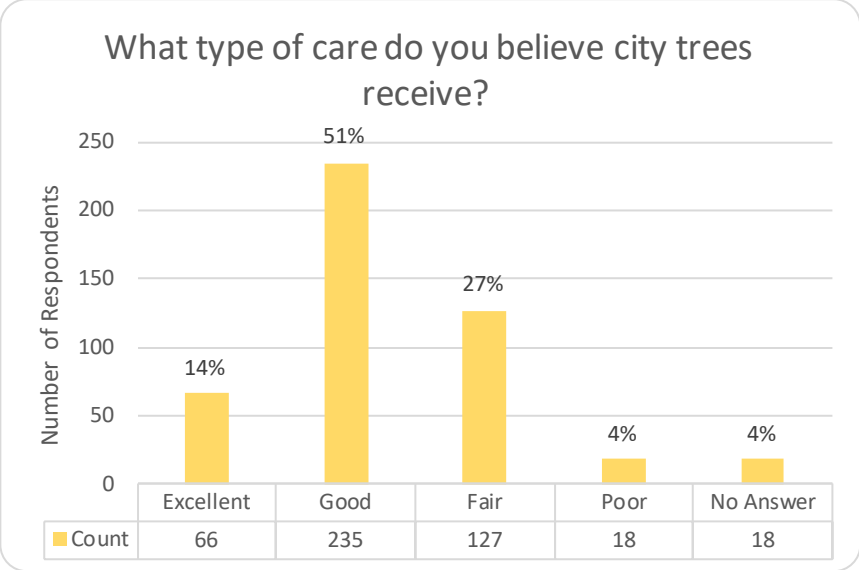
Question 4.

How would you rate your experience with city employees when seeking information about trees?



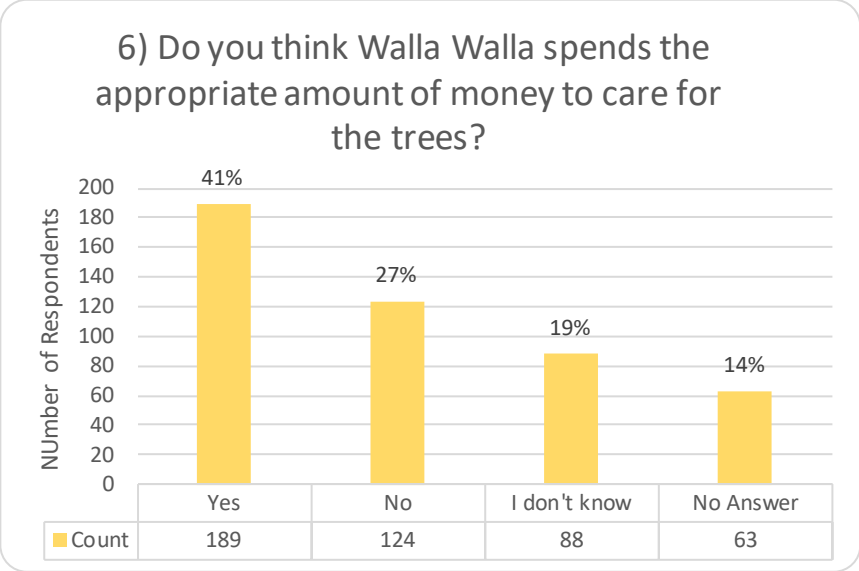
Question 5.

What type of care do you believe city trees receive?



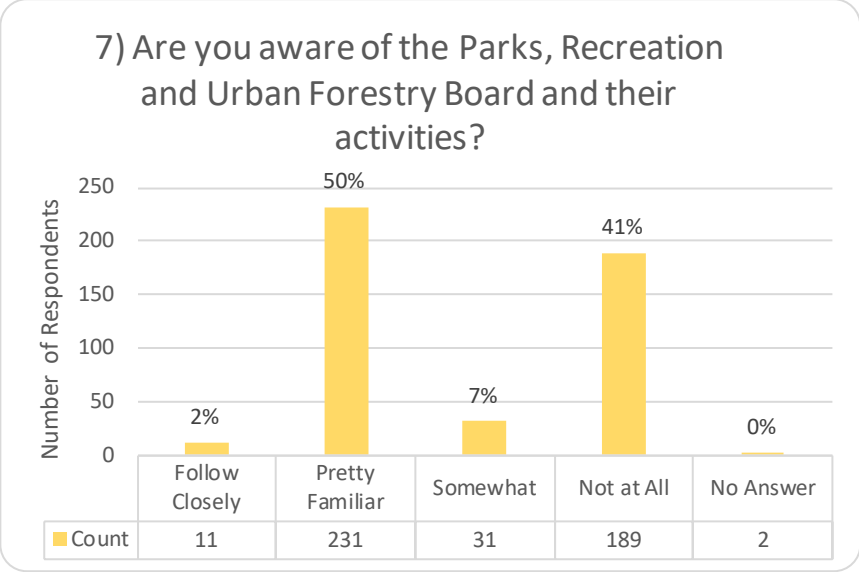
Question 6.

Do you think Walla Walla spends the appropriate amount of money to care for the trees?



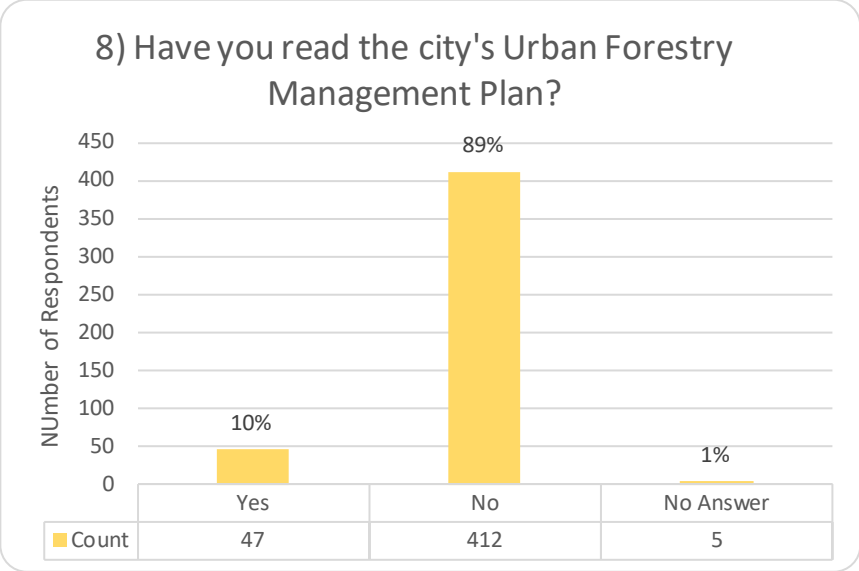
Question 7.

Are you aware of the Parks, Recreation and Urban Forestry Board and their activities?



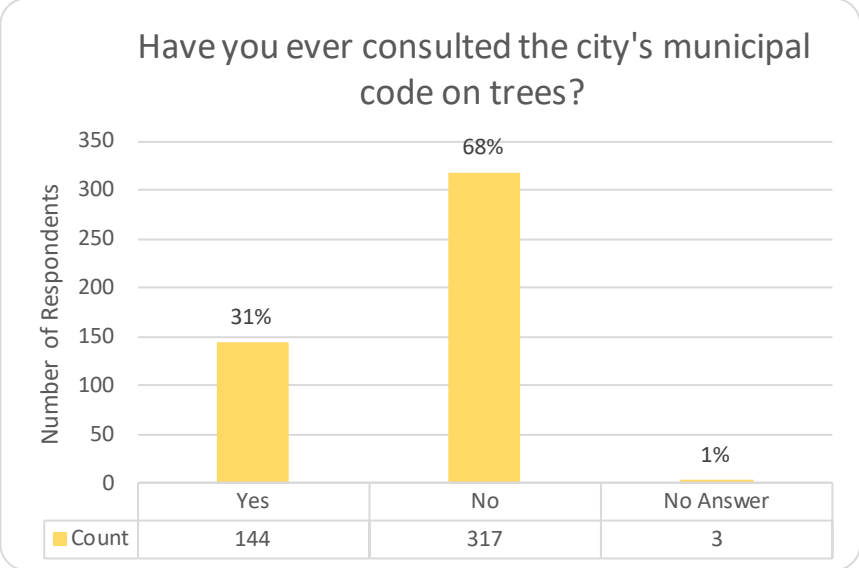
Question 8.

Have you read the city's Urban Forestry Management Plan?



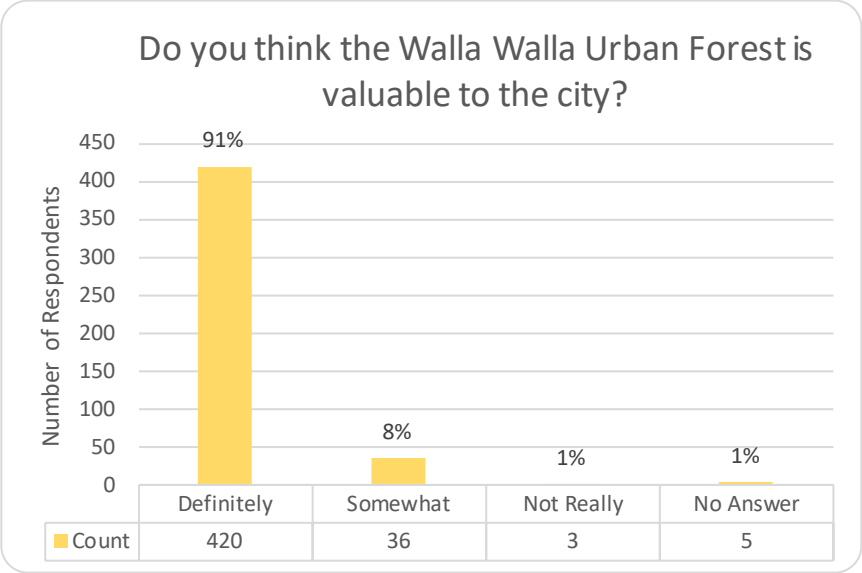
Question 9.

Have you ever consulted the city's municipal code on trees?



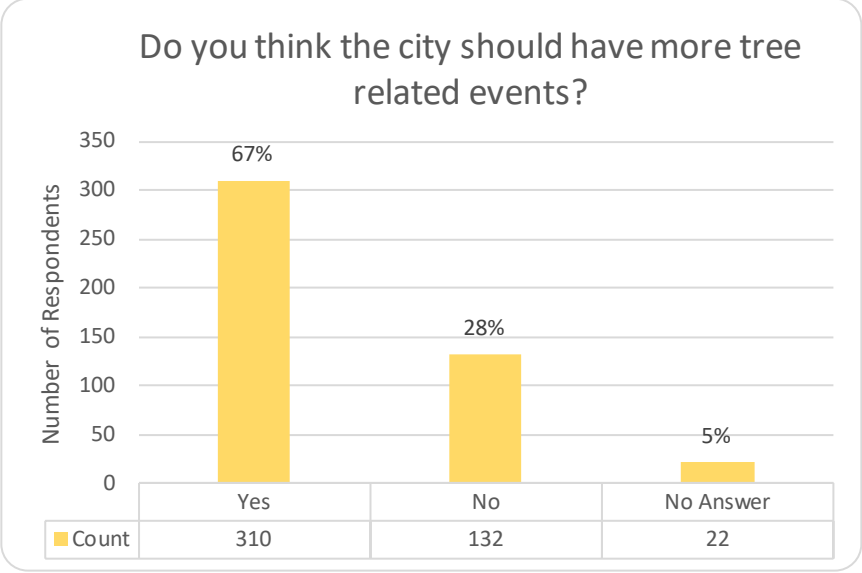
Question 10.

Do you think the Walla Walla Urban Forest is valuable to the city?



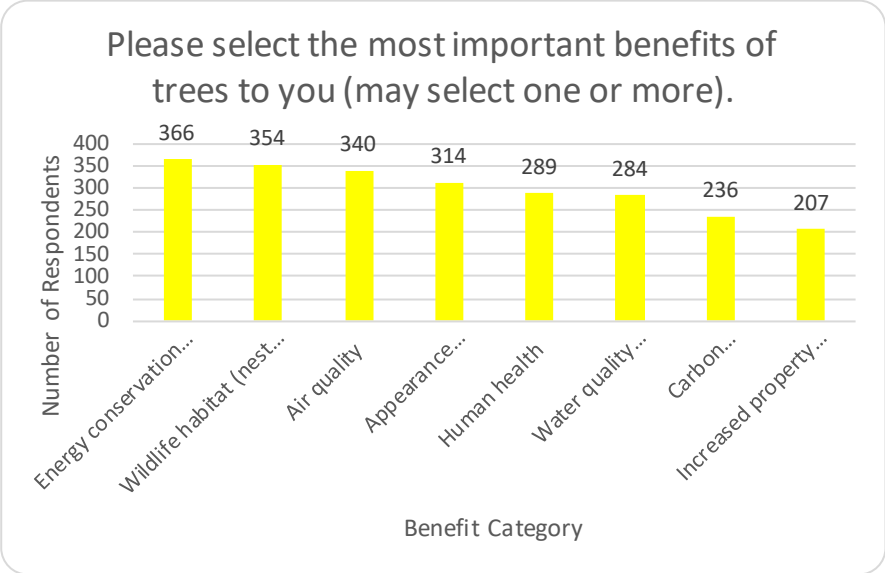
Question 11.

Do you think the city should have more tree related events?



Question 12.

Please select the most important benefits of trees to you (may select one or more).

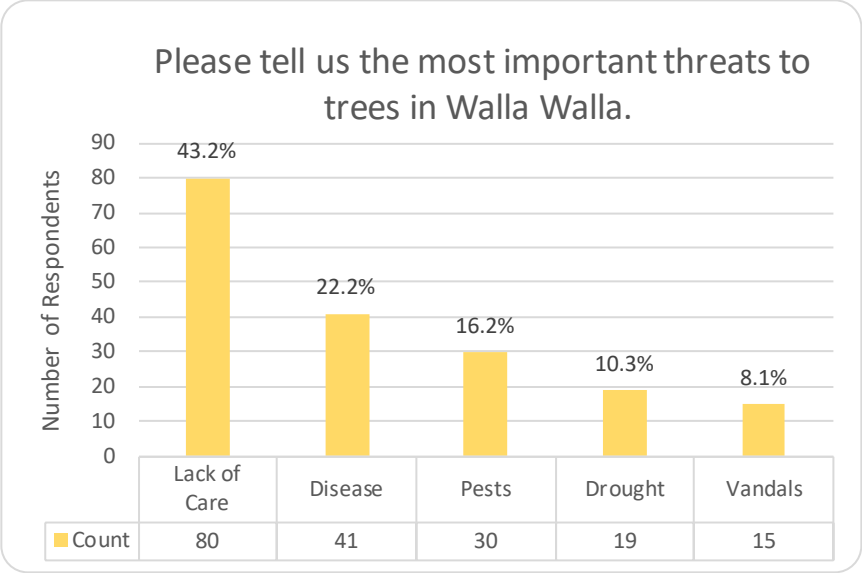


Energy conservation (shade)	366
Wildlife habitat (nest sites,food, cover)	354
Air quality	340
Appearance /Community enhancements	314
Human health	289
Water quality improvement (rainfall interception, reduced erosion)	284
Carbon Sequestration and climate change benefits	236
Increased property value	207

Question 13.

Please tell us the most important threats to trees in Walla Walla (i.e., Lack of care, drought, pests, disease, vandals, etc.)

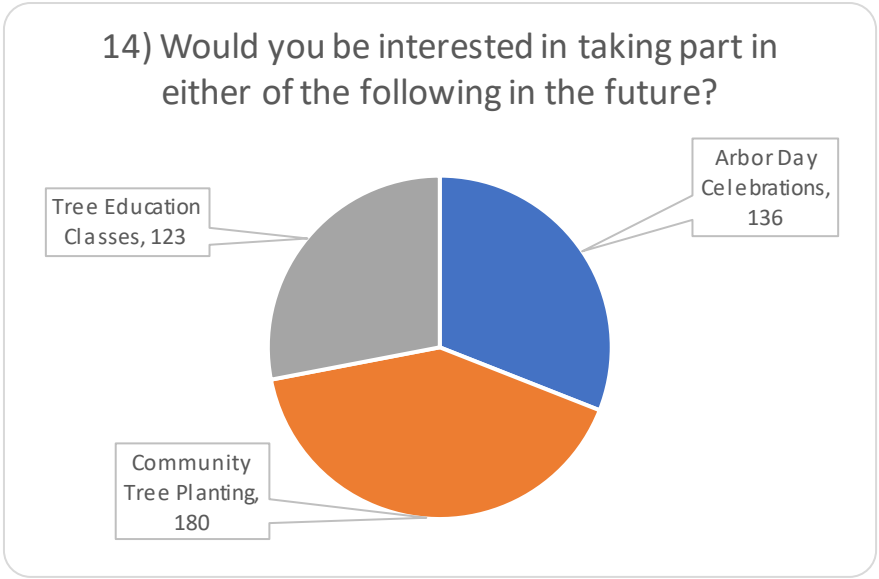
As can be seen below, the residents who responded believe that “lack of care” is the most important threat to the Urban Forest in Walla Walla. This is a good indication that residents realize trees require regular attention and that investments made in tree care are worthwhile. This sentiment dovetails nicely with the replies in questions Nos. 2, 5 and 10 all of which relate to the importance and value of the Urban Forest to the people of the City of Walla Walla.



Question 14.

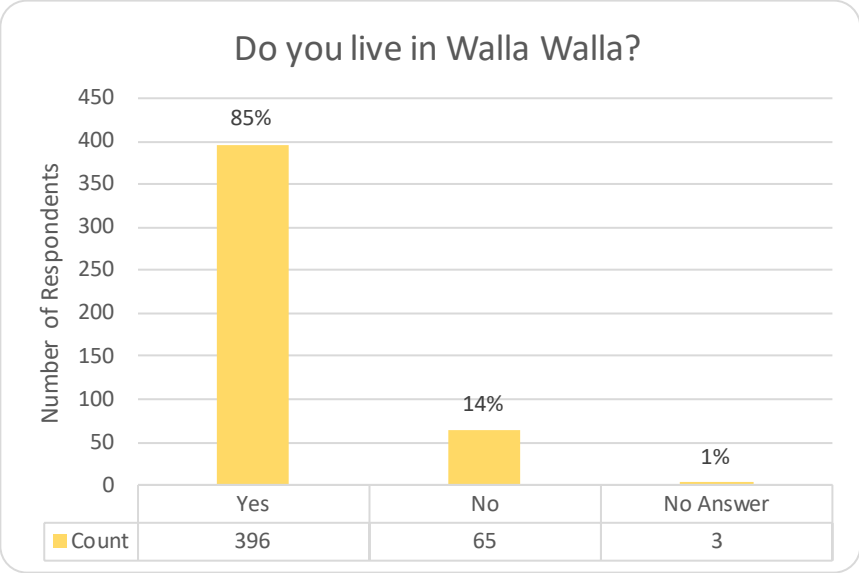
Would you be interested in taking part in either of the following in the future?

There was a total of 268 responses to question 14. Respondents could choose more than one answer. As seen in the chart below many residents would like the opportunity to plant trees.



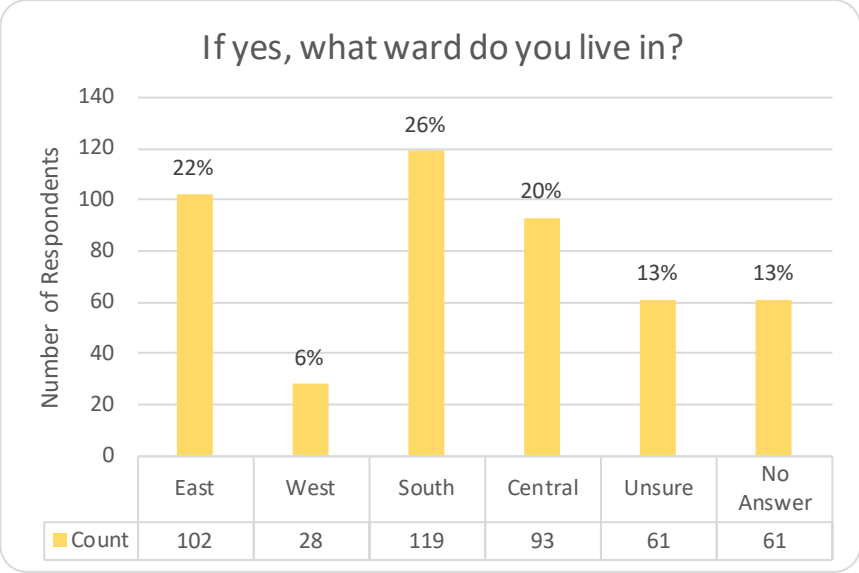
Question 15.

Do you live in Walla Walla?



Question 16.

If yes, what ward do you live in?



Question 17.

Is there anything else you would like to tell us?

There were over 160 responses to question 17. Most responses were positive in nature with many people stating that they really enjoyed the trees in the community. It is quite clear that many of the residents in the city appreciate trees and all they add to the community. Below are a few quotes from some of the residents.

"I lived in Walla Walla for many years and its trees were my favorite part of this beautiful city. Please keep up the good work. I especially love the Chestnut Street corridor of flowering almond in the spring, the grand sycamores in Pioneer Park, and the wonderfully pruned Tietan Park trees. I had a lovely large maple in my small bungalow home front yard. It kept my home cool and comfortable on hot summer days. I also had a lovely pink dogwood which I loved! The flowering dogwoods were delightful all over town. I came back this past weekend to see the flowering trees!"

"Our trees set us apart from other communities. They give the neighborhoods charm and other benefits like beauty and environmental benefits. People from other areas say they love Walla Walla.

"Many of Walla Walla's streets are named after trees. Please allow and encourage them to flourish. Some are a century or more old. They speak at night in the wind, in the morning at dawn and provide a solid continual presence I think to all who open themselves to their amazing contributions."

"Do you accept squirrels for relocation?"

"It's always better to have more trees!"

The survey seems to have been well received and should be helpful in planning events and activities for the citizens of Walla Walla. Many communities have planting events where families create lifelong memories around trees. It is often said that when we plant trees, we are planting them for the benefit of our children's children.

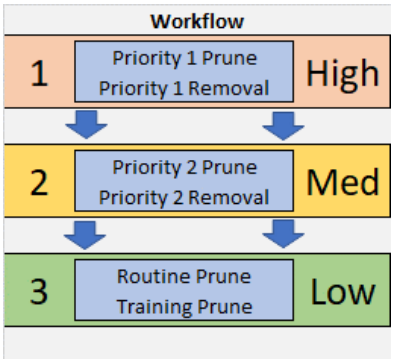
Section 3: Tree Management

The purpose of this Urban Forest Management Plan is to provide a framework for the short and long term maintenance of Walla Walla's urban trees. The City has implemented a 5–7-year pruning cycle for its trees. This section of the Management Plan will detail the maintenance recommendations from the inventory to prioritize the recommended work. The information contained within this section can be used to justify funding requests, and to understand the current general maintenance requirements of Walla Walla's trees.

It is also important to recognize that the tree inventory data provides a snapshot of Walla Walla's trees' current condition and maintenance needs. Prioritized tree maintenance will help reduce the overall risk of tree related incidents. However, because conditions can change drastically, routine maintenance should be coupled with the identification and monitoring of trees that may become high risk in the future. The focus of this report is to identify and mitigate the trees that were deemed maintenance prioritizations at the time of the inventory while planning through proactive maintenance.

Recommended Maintenance and Tree Risk

A description and summary of the maintenance recommendations for the entire inventory follows below. As the names imply, Priority 1 pruning, and removals pose the highest risk and should be dealt with first. Priority 2 pruning and recommended removals should be considered after all Priority 1 pruning and removals have been completed. The remaining trees will be assigned to either routine pruning or small tree training activities, i.e., proactively pruned on a five-year and three-year basis respectively. The following more thoroughly describes each maintenance recommendation.



The workflow for the initial plan implementation is based on which trees pose the greatest risk at the time of the inventory. Once these trees have been addressed, the workflow process can be adjusted to reflect that the new high priority has become Training and Routine pruning with perhaps stump removal being designated as a low priority activity. The workflow priority is a dynamic process based on the needs of the community. For instance, storm damaged trees will be a higher priority than routine or training pruning.

Priority 1 Prune – Trees that require Priority 1 pruning are recommended for trimming to remove hazardous deadwood, hangers, or broken branches. These trees have broken or hanging limbs; hazardous deadwood; and dead, dying, or diseased limbs or leaders greater than four inches in diameter.

Maintenance	Count	Percentage
Priority 1 Removal	69	0.67%
Priority 1 Prune	44	0.43%
Priority 2 Removal	152	1.47%
Priority 2 Prune	334	3.23%
Routine Prune	4,623	44.74%
Training Prune	2,749	26.61%
Stump Removal	174	1.68%
Total	8,145	100.00%

Table 8: Recommended Maintenance.

Priority 1 Removal – Trees designated for removal have defects, which cannot be cost-effectively or practically treated. Most trees in this category have a large percentage of dead crown and pose an elevated level of risk for failure. Any hazards that cannot be mitigated with pruning could be seen as potential dangers to persons or property. Large dead and dying trees that are high liability risks are included in this category.

Priority 2 Prune – Trees that require Priority 2 pruning are recommended for trimming to remove deadwood, correct structural problems, or resolve clearance issues. These trees do not pose as much risk as "Priority 1" trees.

Priority 2 Removal – Trees that should be removed but do not pose a liability as great as the "Priority 1" trees will be identified here. This category would need attention as soon as "Priority 1" trees have been addressed.

Routine Prune – These trees require routine horticultural pruning to correct structural problems or growth patterns, which may eventually encroach on established clearance envelopes.

Training Prune – Small, up to 20 feet in height and typically a DBH of less than 8", that will grow to be large trees must be pruned to correct or eliminate weak, interfering, or objectionable branches to minimize future maintenance requirements. A person standing on the ground can prune these trees with a pole-pruner.

Stump Removal – Typically located in high use areas, stumps that interfere with pedestrian traffic and pose a tripping hazard should be removed. This also includes "snags" which are tall stumps.

Plant Tree – The default recommendation for Vacant Planting sites is "Plant Tree."

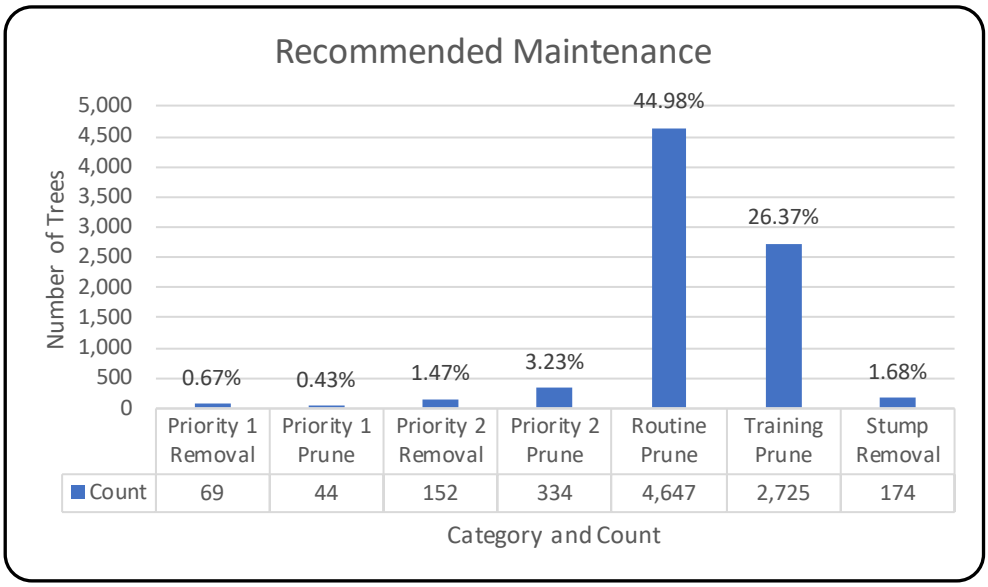


Figure 10: Recommended Maintenance.

Priority and Proactive Maintenance

The City of Walla Walla has recognized the value of its trees to the community. A proactive maintenance schedule has been instituted to maintain that value. The proactive program systematically reduces risk while improving the overall health of urban trees. A proactive program will also help stabilize maintenance budgets and improve long-term planning.

In this plan, we chose to use a five-year cycle for routine tree trimming and a three-year cycle for small tree training. As previously explained, this involves pruning each tree assigned a routine prune recommendation every five years while conducting structural pruning on small trees every three years. These activities are considered proactive maintenance while trees in the Priority 1 and Priority 2 categories are priority maintenance.

Priority Maintenance

Prioritizing maintenance is one of the tree inventory's main objectives. It allows tree work to be assigned based on observed risk at the time of the inventory and eventually over multiple years. Once prioritized, the work can be approached systematically to mitigate risk by addressing the highest priority trees first. In this plan, all trees designated as Priority 1 prunes and removals will be considered first. Priority 2 prunes and removals will be considered after all Priority 1 trees have been addressed. Trees in the Routine Prune and Small Tree/Training Prune category will be entered into the proactive maintenance schedule.

Priority Removals

While tree removal is often a last resort, in some situations it cannot be avoided. In parks and other high-use areas, creating a safe environment is more important than preserving hazardous trees that may have a social or cultural significance. Priority removals include Priority 1 and Priority 2 removals identified during the inventory. Figure 11 shows the trees and their respective diameter classes for these two categories. As there are only two removal categories smaller trees are assigned a priority removal if they are dead or have decay. It is a judgement call by the data collector at the time of collection as to whether assign a Priority 1 or Priority 2 removal.

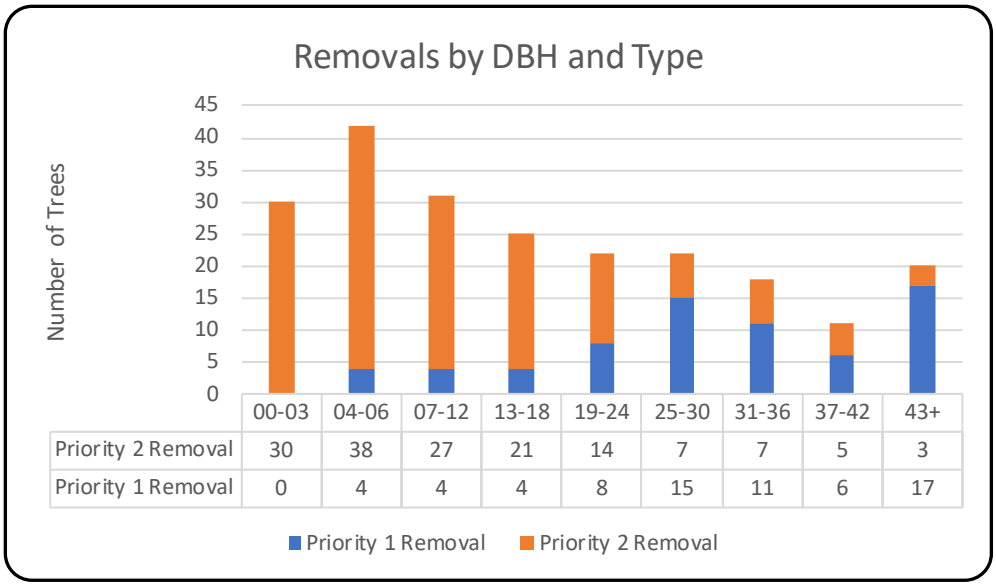


Figure 11: Priority removals by diameter class.

Trees in the Priority 1 removal category pose a risk that cannot be mitigated through pruning. ArborPro recommends removing these trees in the first year of the five-year maintenance plan. The inventory found a total of 69 trees that were assessed to be Priority 1 Removals. Figure 12 shows a breakdown of the number of Priority 1 removals by diameter class.

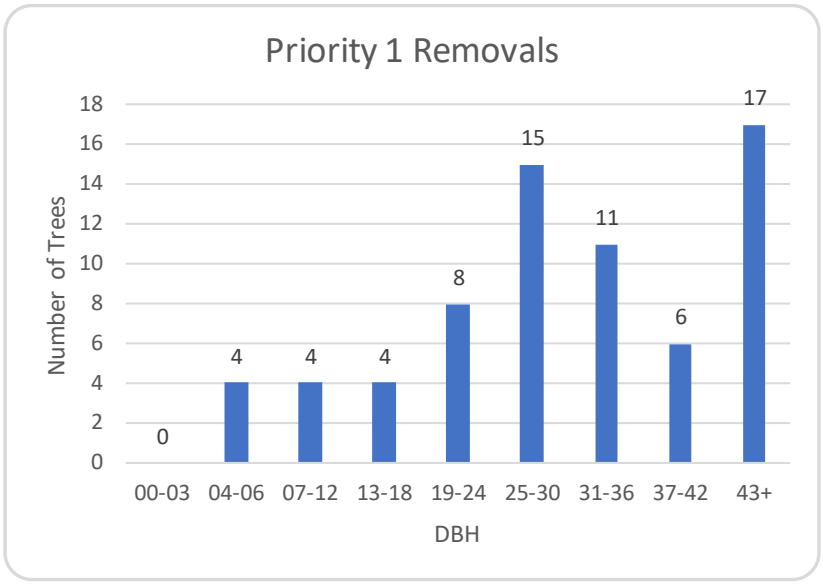


Figure 12: Priority 1 removals by diameter class.

Priority 2 Removals do not pose significant risk to people or property and should not be addressed until all Priority 1 Removals have been completed. ArborPro recommends removing these trees in the second year of the five-year maintenance plan. The inventory found a total of 152 Priority 2 Removals. Figure 13 shows a breakdown of Recommended Removals by count and diameter class.

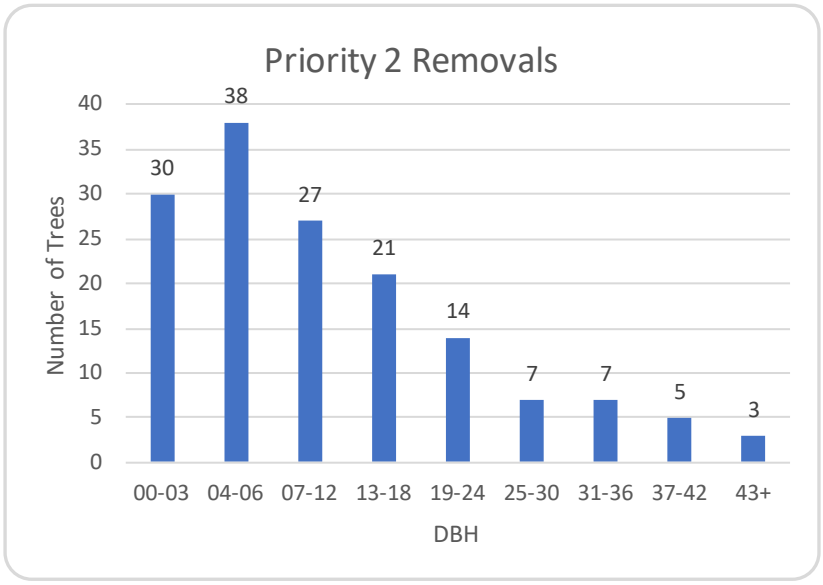


Figure 13: Priority 2 Removals by diameter class.

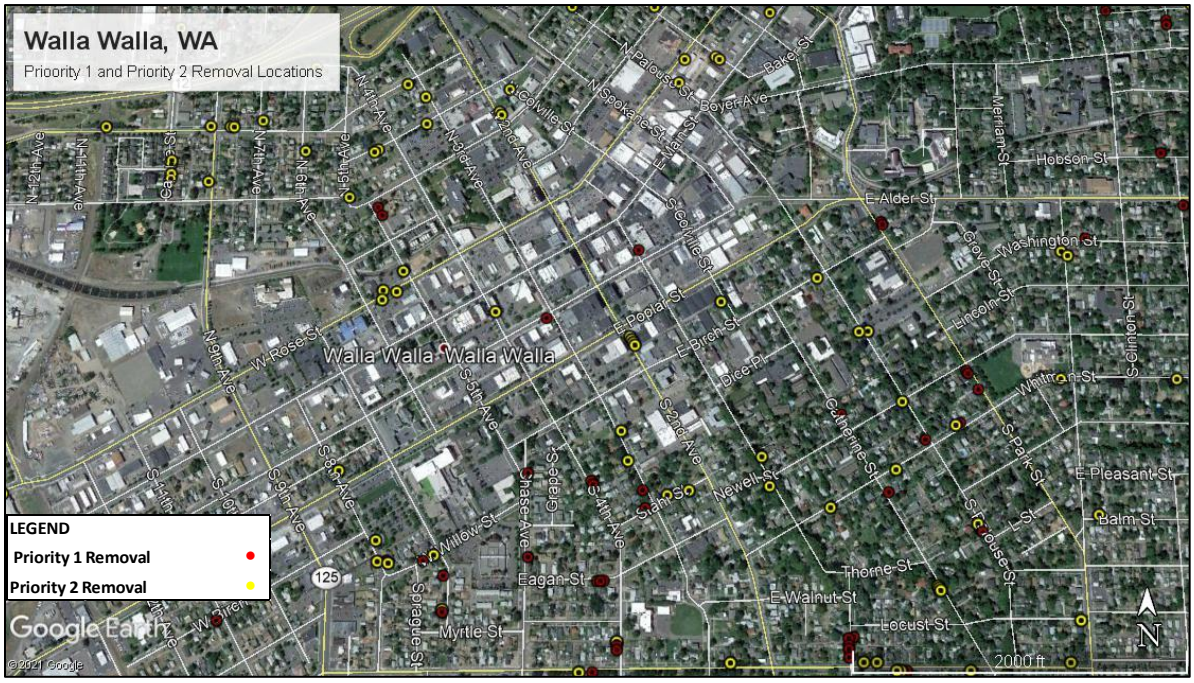


Figure 14: Location of priority removals.

Priority Pruning

Priority pruning includes trees in the Priority 1 and Priority 2 category that need to be pruned to mitigate risk and remove obstructions to sidewalks, roads, etc. Figure 15 shows all the trees and their respective diameter classes for these two categories.

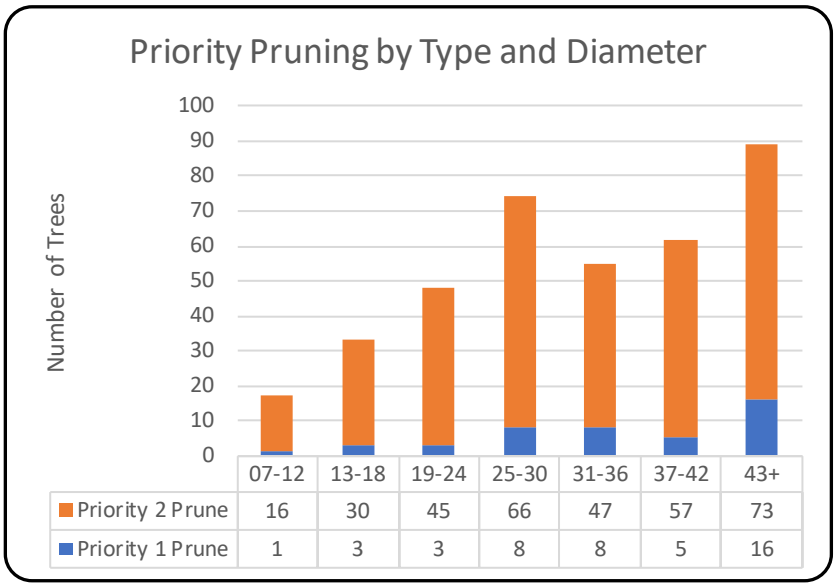


Figure 15: Priority pruning by diameter class.

Trees in the Priority 1 Prune category pose a risk to public safety that can be mitigated through pruning. ArborPro recommends pruning these trees in the first year of the five-year maintenance plan. The inventory found a total of 44 Priority 1 Prunes. Figure 16 shows a breakdown of Priority 1 Prunes by diameter class and count.

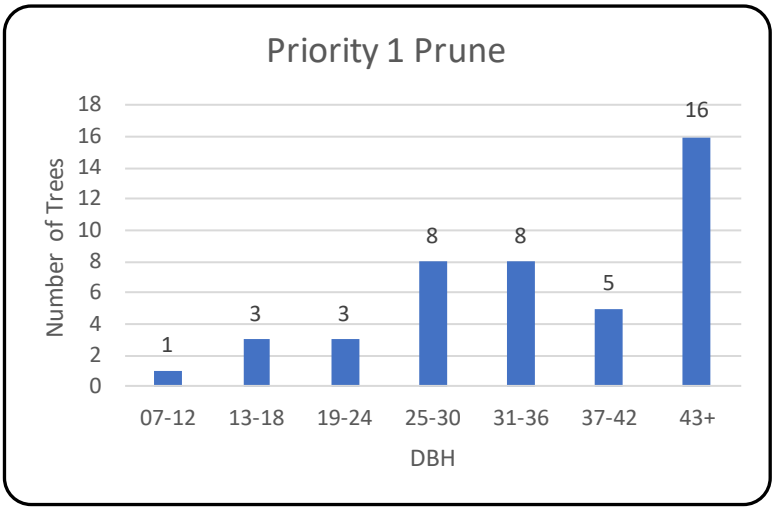


Figure 16: Priority 1 Prunes by diameter class.

Trees in the Priority 2 Prune category pose a limited risk to public safety that can be mitigated through pruning. ArborPro recommends pruning these trees in the second and third year of the five-year maintenance plan. The inventory found a total of 334 Priority 2 Prunes. Figure 17 shows a breakdown of the number of Priority 2 Prunes by diameter class.

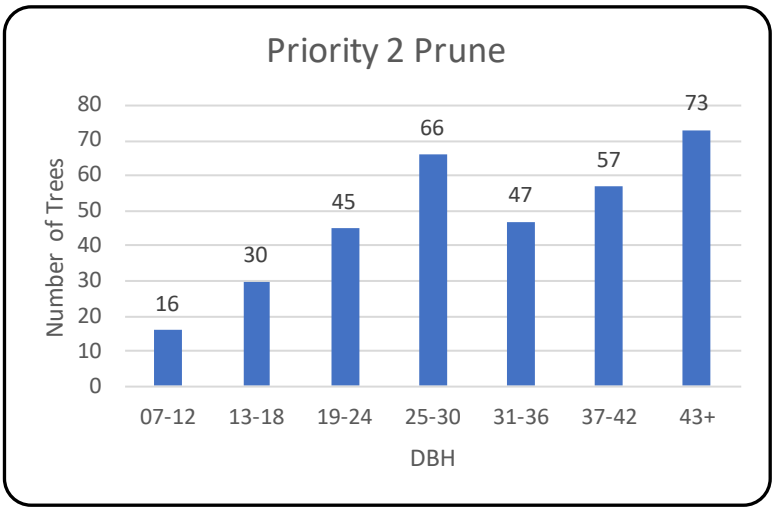


Figure 17: Priority 2 Prunes by diameter class.

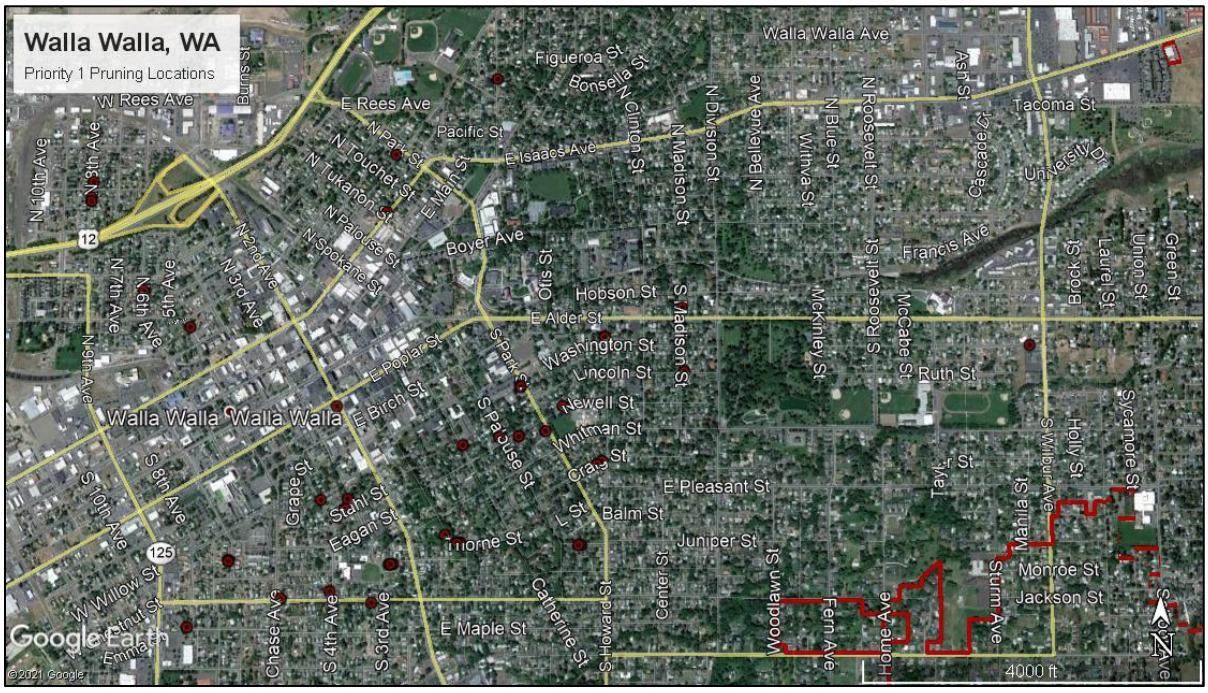


Figure 18: Location of Priority 1 Prunes.

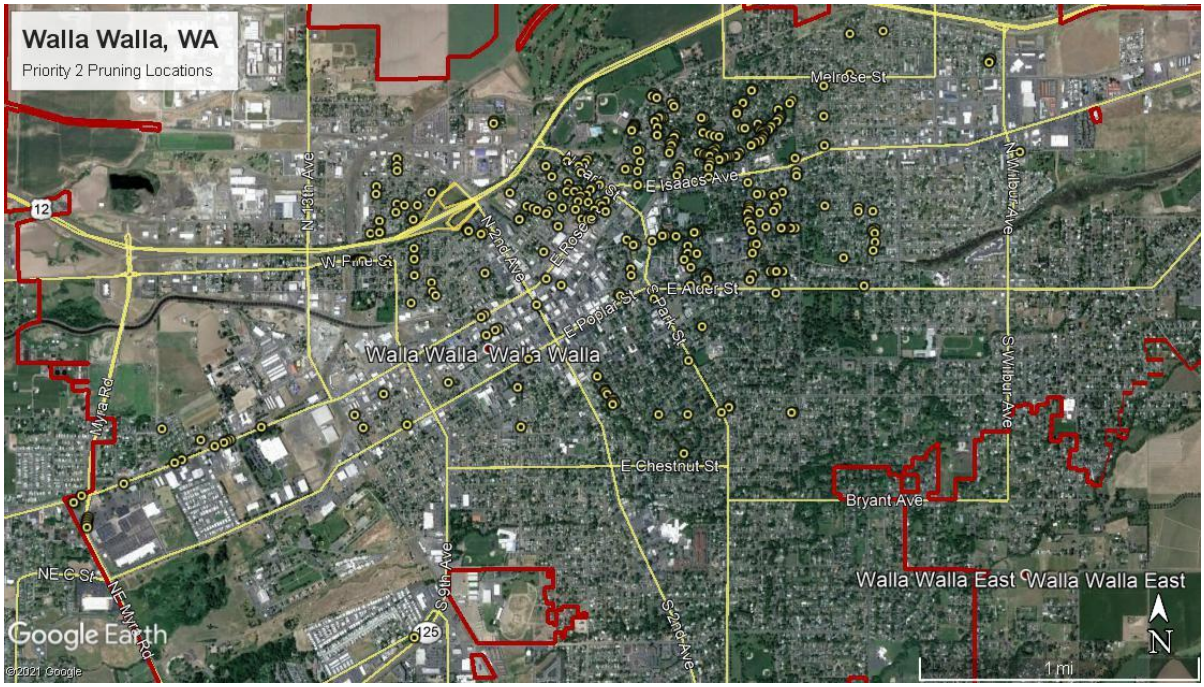
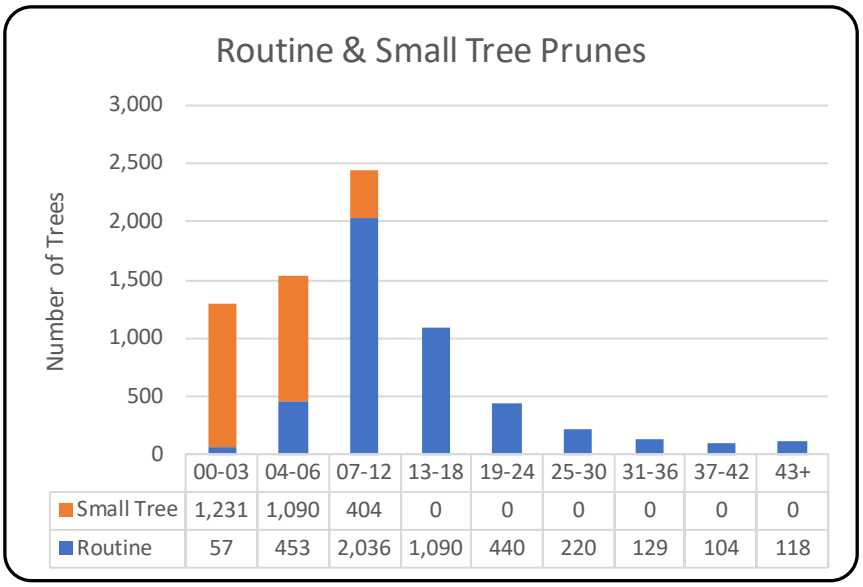


Figure 19: Location of Priority 2 Prunes.

Proactive Maintenance

Proactive tree maintenance requires that trees be systematically managed over time. To accomplish this, trees are placed in a pruning cycle that routinely addresses tree health and form. While it may be costly to implement a routine pruning cycle, it will reduce both risk and maintenance costs over time. Maintaining a routine pruning cycle will allow the City to address minor maintenance needs on a regular basis. Over time, this will reduce the number of emergency situations and will allow the City to regularly monitor potential problem trees.



	00-03	04-06	07-12	13-18	19-24	25-30	31-36	37-42	43+
Small Tree	1,231	1,090	404	0	0	0	0	0	0
Routine	57	453	2,036	1,090	440	220	129	104	118

Figure 20: Proactive maintenance by diameter class.

Routine Pruning Cycle

The routine pruning cycle includes all trees entered as a Routine Prune during the inventory. These trees pose little to no risk but could benefit from regular pruning to mitigate tree-related risk and promote the form natural for the species. By removing hazardous limbs, the City can reduce future storm damage clean-up; remove limb conflicts on sidewalks and roadways; improve the overall appearance of urban trees; and promote proper growth patterns in young trees.

The length of a routine pruning cycle depends on the size of the tree population. ArborPro recommends a five-year cycle for the trees included in this inventory, i.e., prune approximately one-fifth of the tree population each year. This number will fluctuate as the City plants and removes trees and completes priority maintenance, and as young trees grow into maturity. This report and five-year maintenance plan will only consider trees in the Routine Prune category at the time of the inventory for the routine pruning cycle.

The 2021 tree inventory found a total of 4,647 trees that would benefit from routine pruning. Therefore, approximately 929 trees (one-fifth of the total population) will need to be pruned each year, starting in year four of the five-year maintenance plan. Figure 21 shows a breakdown of Routine Prunes by diameter class and count.

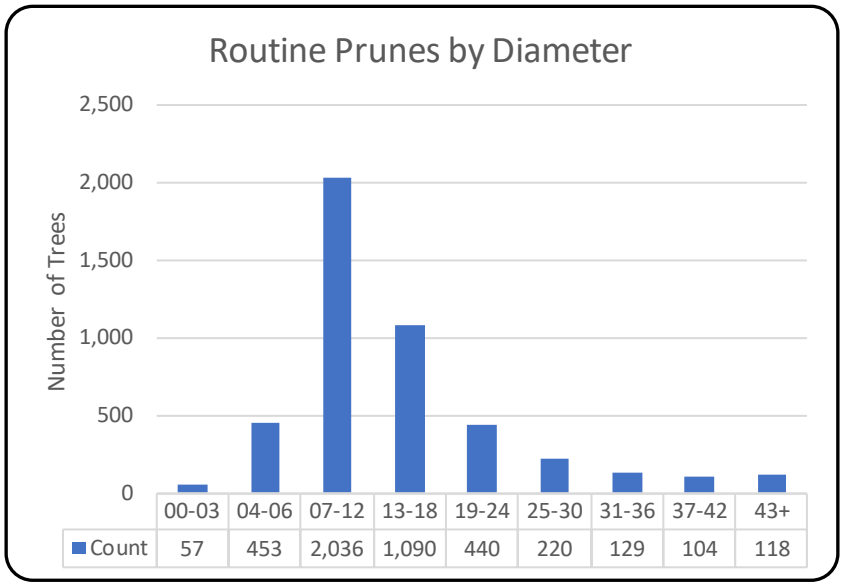


Figure 21: Routine Prunes by diameter class.

Small Tree Training Cycle

Planting trees is necessary to increase canopy cover and to replace trees lost to natural causes (expected to be 1–3% per year).

Although the City of Walla Walla has an adequate number of newly planted trees, planting additional trees will help promote a healthy urban forest for years to come. It is also important to remember that older, more mature trees provide the most benefits to the community. The City must promote tree preservation and proactive tree care to ensure older trees survive as long as possible. A typical Urban Forestry objective is to have an uneven-aged distribution of trees at the street, neighborhood, and citywide levels. ArborPro recommends that Walla Walla support a strong planting and maintenance program to ensure that young, healthy trees are in place to fill gaps in tree canopy and provide for gradual succession of older trees. Tree planting and tree care will allow the distribution to normalize over time.

Trees included in the Small Tree Training Cycle are typically less than 8 inches DBH (though sometimes larger DBH trees are included) and will benefit from structural pruning and pruning to promote form true to the species. Young trees tend to have higher growth rate and therefore require a shorter pruning cycle than mature trees. For this reason, ArborPro recommends a three-year cycle for young tree training.

Establishing a training cycle for young trees is equally important for Walla Walla's parks. A significant amount of money has been spent to plant new trees in many of the parks. Investing time and money to properly prune these trees will greatly reduce future structural problems and maintenance issues. Figure 22 illustrates the number of trees that would benefit from young tree training.

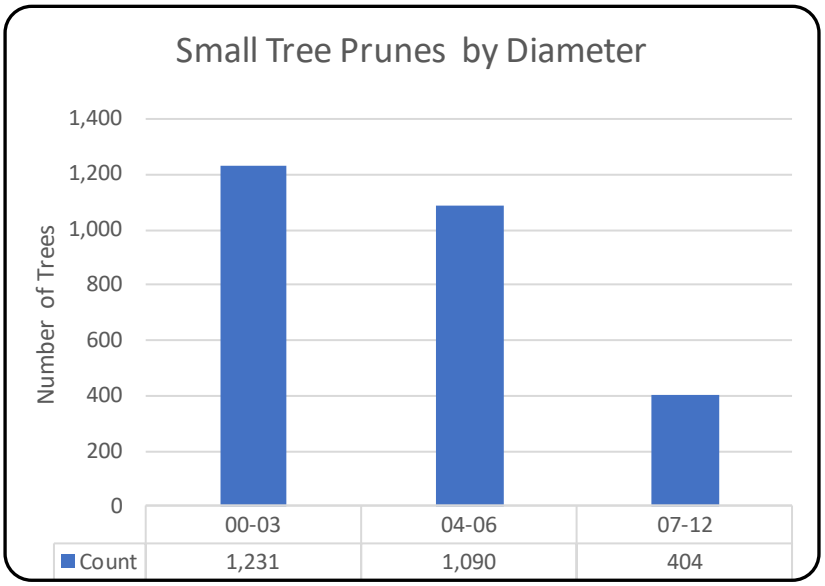


Figure 22: Number of trees in the Small/Young Tree Training Cycle.

The three-year Young Tree Training Cycle should begin on year four of the maintenance plan. For the sake of this management plan, it will only include existing young trees. One-third of young trees should be structurally pruned each year. The number of trees in the training cycle will fluctuate as new trees are planted and as older plantings become established and no longer require training. Therefore, the amount of money spent and the number of trees in the training cycle will not remain constant. The budgetary impact of new trees is discussed in the vacant planting section.

The inventory found a total of 2,725 trees that would benefit from training pruning. Therefore, approximately 908 trees (one-third of the total population) should be trained each year beginning in year three of the five-year maintenance plan. However, if budget allows, the Small Tree Training Cycle could be moved to year one to benefit all recently planted trees.

Relatively inexpensive, small young tree training can easily be performed by trained City staff. Pruning young trees helps to reduce future maintenance costs by improving the structure and health of young trees. This type of proactive maintenance also works towards maximizing the eco-benefits discussed earlier. ArborPro recommends that the City of Walla Walla consider a modification to its 5-7 year cycle by creating an additional cycle of 3 years for young/small trees. This young/small tree training program should be enacted as soon as possible. This program will also present a good opportunity to interact with the community to stress the importance of trees and their regular care.

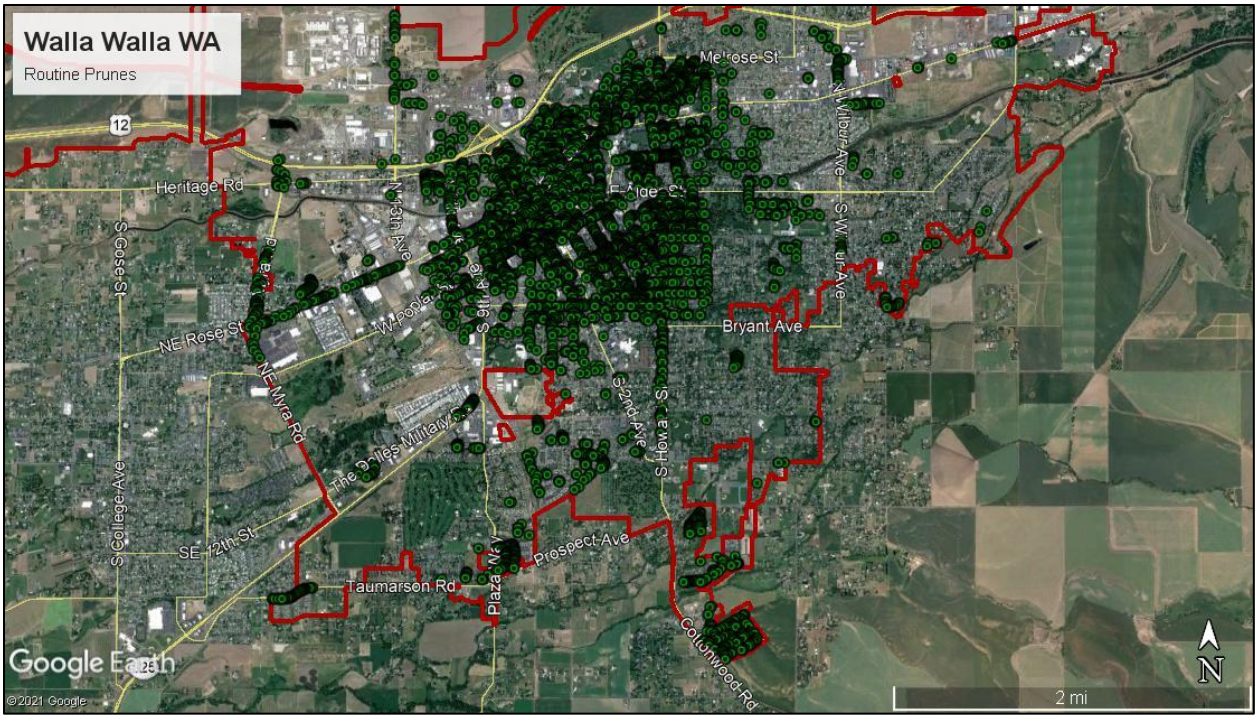


Figure 23: Location of Routine Prunes.

Importance of Tree Maintenance

Trees are naturally occurring, organic organisms. Often, they are treated as though they do not need human assistance to thrive. While this may be true in undisturbed forests, it is certainly not true for urban trees. Urban trees require regular maintenance to maximize the benefits they provide. When maintenance is neglected, trees can pose a serious risk to people and property. In addition, trees in urban environments are subject to many more stressors than trees in forests or rural areas. Urban trees grow in restricted spaces; are exposed to pollutants and road salt; are subject to soil compaction; and can be easily damaged by mowers or other maintenance activities.

Proactive pruning and hazard mitigation greatly reduce the risk of tree failure and subsequent damage. In addition, proactive maintenance will prolong the life of a tree and reduce future maintenance costs. A well-maintained urban forest will be less susceptible to disease and disaster. When trees are pruned on a regular basis — or removed when they become diseased or hazardous — it eliminates some of the pathways for potential pests and diseases. Many of these pests and diseases attack stressed trees. Therefore, a well-maintained urban forest will be less likely to succumb to pest infestations. In addition, species selection is an important part of maintaining a healthy urban forest. Careful species selection will increase biodiversity and reduce the risk of a catastrophic pest infestation. Most pests have preferred hosts (Emerald Ash Borer for example). Increasing biodiversity will limit the number of species that are susceptible to individual pests.

While it is impossible to predict when a natural disaster will strike, a high level of disaster preparedness can be achieved through regular maintenance. Trees that have been pruned to remove dead or hanging limbs will be less likely to experience branch failure in high winds, thus reducing storm damage clean-

up. Also, removing diseased or declining trees from the landscape will reduce the risk of whole tree failure in major storm events. The importance of urban tree maintenance cannot be understated. A well-maintained urban forest will provide maximum benefits to the community while reducing the inherent risk of tree failure.

Importance of Updating Inventory Data

Trees are living organisms that change with time. Inventory data, however, is static and will not reflect the current state of an urban forest unless it is continually updated. Whenever a tree is removed, inspected, pruned, or planted it should be updated in the inventory. If inventory data is not properly maintained, it will quickly become obsolete and will ultimately be of little use. Significant time and money have been invested in surveying Walla Walla's trees. The only way to protect this investment is to continually update the inventory.

Vacant Sites and Tree Planting

During the inventory, a total of 2,187 vacant sites were recorded in areas that were suitable for planting new trees. Budgetary constraints limited the total number of newly identified vacant planting sites. There may be many more locations suitable for tree planting. The dynamic nature of an Urban Forestry Management plan allows for the addition of more vacant planting sites as funds become available to identify the sites, and plant and maintain trees. The size of the vacant planting sites roughly correlates to the class requirements detailed in the city's street tree listing in Appendix B.

Vacant sites were broken down into four categories based on the size of planting space.
Vacant Planting Site - Small 4'to 6' planting space or any vacant site under electric utilities
Vacant Planting Site - Medium 6' to 8' planting space
Vacant Planting Site - Large Vacant Site – 8' to 12' planting space
Vacant Site - Very Large 12'+ planting space

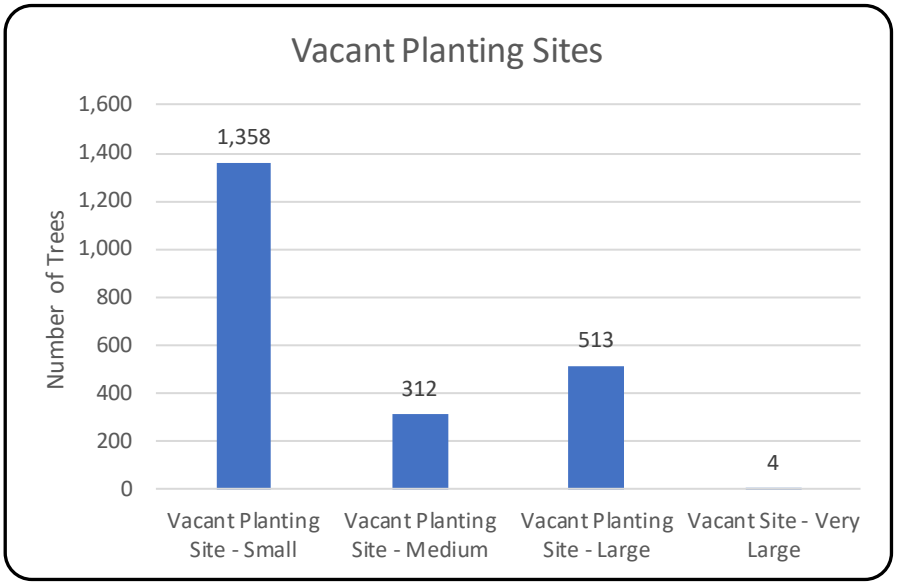


Figure 24: Vacant Planting Sites by size.

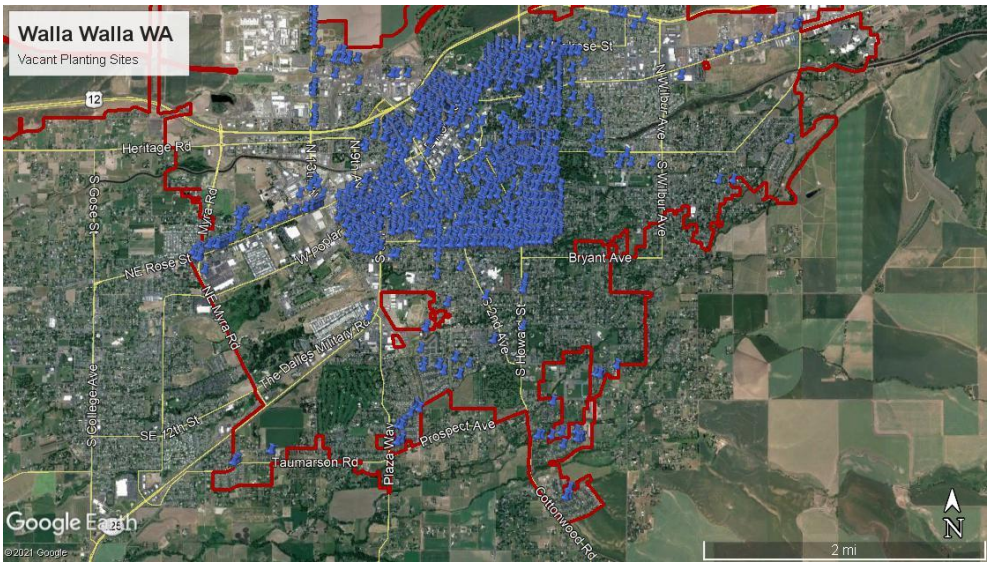


Figure 25: Vacant Planting Site locations

It is important that the City of Walla Walla implement and support a comprehensive planting plan. Planting new trees greatly benefits individual neighborhoods and will increase the overall canopy cover of the entire City.

The number of trees planted each year depends on available funds and can vary from year to year. The City of Walla Walla currently plants at least 50 to100 trees per year to offset the loss of trees due to natural mortality while gradually increasing canopy cover and biodiversity. This should be considered the minimum number of additions to maintain or slightly increase the tree count. To increase biodiversity, trees should be carefully selected and planted in areas according to the size classes in the street tree list in Appendix B which addresses power lines as well. If trees grow into the power lines, they will require severe pruning or topping, to prevent them from impacting the lines, or removal before the full eco-benefits can be realized. The result will be a tree that is visually unappealing and in poor health.

ArborPro recorded a total of 2,187 vacant sites during the inventory. This indicates that roughly 22% of Walla Walla's potential urban forest remains unplanted. If 220 trees are planted each year, the City will annually increase the total tree population by just shy of 3%. At this rate, it will take approximately 10 years to fill all the vacant sites. Newly planted trees that increase the total number of trees will require additional maintenance funds. Using an average of $50.00 per year per tree will, for instance, require an additional $50,000 per year for each 1,000 trees planted. Once all vacancies are planted it should be anticipated that approximately $110,000 annually in additional funding will be needed for the tree care budget.

There are 517 vacant planting sites categorized as "large" or "very large". It is recommended that these site classifications be focused in the West and East Wards during the first 2 years of plan implementation. Once the largest sites in these Wards have been planted, focus future plantings in less forested neighborhoods with the largest available planting sites. This is because they can accommodate the largest trees and this will lead to the fastest increase in tree related benefits such as carbon

sequestration, storm water run-off aversion and an increase in canopy cover. Canopy cover is a commonly used metric and one of its main benefits is reduced energy usage which was cited as the most important benefit in the community survey (Question 13).

When the East and West Ward's vacant sites have been planted the remaining vacant sites in the other Wards can be scheduled for planting. It is suggested that the schedule be designed so that trees are planted in the Wards that have the fewest trees in recognition that tree equity is important and is a goal of the city. This should be scheduled to be completed in years three to ten so that at the end of ten years the city is essentially fully stocked (10,152 total trees) based on the current inventory.

Species diversity is an important consideration when choosing which trees to plant. It is tempting to specify the same species in neighborhoods and new developments to create a uniform look. History has shown that a tree population with a lack of diversity can lead to problems when a new pest or disease arises. If too many of one species is planted (a monoculture), then those are the same trees that may succumb to the pest or disease and devastate the urban forest. This was the case in Syracuse, New York in the 1950's and later. Dutch elm disease was introduced and essentially wiped out the elm population in Syracuse and other cities. These trees were chosen for their adaptability to the climate and indeed performed well in service to the citizens for many decades. However, the monoculture was eventually the undoing when the disease made its way into the United States.

The species palate for Walla Walla is somewhat limited due to its geographic location. This is more reason to be cognizant of species selection. The City has created an excellent list of suggested species based on the likelihood of performing well in the Walla Walla climate. It can also be anticipated that this species list will change in the coming years as climate change creates a different environment for trees and plants to grow.

State foresters throughout the country are conducting research trials on trees to determine which species may be suitable for the long term in the face of climate change. As the results of these studies are published the recommended species list should be updated.

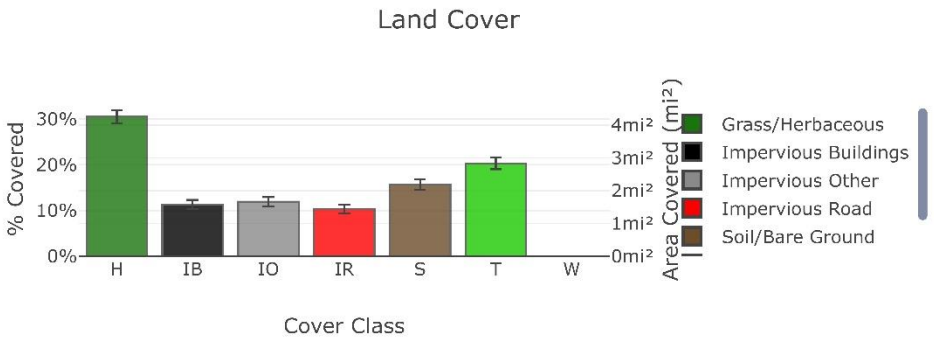
Table 9 is a recommended planting budget for the next five years based on information contained in the plan. The budget represents the city's current annual tree plantings and recommended additional plantings.

	Count	Activity	Estimated Cost
2022	222	New Tree Planting	$44,400
	75	Replacement Tree Planting	$15,000
	Total Cost		**$ 59,400**
2023	222	New Tree Planting	$45,732
	75	Replacement Tree Planting	$15,540
	Total Cost		**$ 61,272**
2024	222	New Tree Planting	$47,104
	75	Replacement Tree Planting	$15,914
	Total Cost		**$ 63,018**
2025	222	New Tree Planting	$48,517
	75	Replacement Tree Planting	$16,391
	Total Cost		**$ 64,908**
2026	222	New Tree Planting	$49,973
	75	Replacement Tree Planting	$16,883
	Total Cost		**$ 66,856**
Total Five Year Cost			**$ 315,454**

Table 9: 5 Year Sample Planting Budget

Canopy Cover

Canopy Cover is the percentage of the ground in a defined area that is covered by tree canopy when viewed from above. The i-Tree Canopy software is used to quantify the total canopy cover within the City limits. This software uses a series of random sampled points that are visually designated as either Tree or Non-Tree to calculate the canopy cover for the entire survey area. After analyzing a total of 1,000 sample sites the City of Walla Walla's canopy cover was determined to be 20.3%, with a standard error of +/- 1.27%. This survey samples data from both public and private properties and is therefore considered a complete estimate of canopy coverage for the entire city.



Abbr.	Cover Class	Description	Points	% Cover ± SE	Area (mi²) ± SE
H	Grass/Herbaceous		305	30.53 ± 1.46	4.26 ± 0.20
IB	Impervious Buildings		113	11.31 ± 1.00	1.58 ± 0.14
IO	Impervious Other		119	11.91 ± 1.02	1.66 ± 0.14
IR	Impervious Road		103	10.31 ± 0.96	1.44 ± 0.13
S	Soil/Bare Ground		156	15.62 ± 1.15	2.18 ± 0.16
T	Tree/Shrub		203	20.32 ± 1.27	2.83 ± 0.18
W	Water		0	0.00 ± 0.00	0.00 ± 0.00
Total			**999**	**100.00**	**13.94**

Tree Benefit Estimates: Carbon (English units)

Description	Carbon (kT)	±SE	CO_2 Equiv. (kT)	±SE	Value (USD)	±SE
Sequestered annually in trees	2.47	±0.16	9.07	±0.57	$422,041	±26,441
Stored in trees (Note: this benefit is not an annual rate)	62.15	±3.89	227.87	±14.28	$10,599,025	±664,036

Currency is in USD and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Amount sequestered is based on 0.874 kT of Carbon, or 3.203 kT of CO_2, per mi^2/yr and rounded. Amount stored is based on 21.940 kT of Carbon, or 80.446 kT of CO_2, per mi^2 and rounded. Value (USD) is based on $170,550.73/kT of Carbon, or $46,513.84/kT of CO_2 and rounded. (English units: kT = kilotons (1,000 tons), mi^2 = square miles)

Tree Benefit Estimates: Air Pollution (English units)

Abbr.	Description	Amount (T)	±SE	Value (USD)	±SE
CO	Carbon Monoxide removed annually	1.02	±0.06	$1,366	±86
NO2	Nitrogen Dioxide removed annually	5.66	±0.35	$2,472	±155
O3	Ozone removed annually	43.70	±2.74	$113,525	±7,112
SO2	Sulfur Dioxide removed annually	2.78	±0.17	$372	±23
PM2.5	Particulate Matter less than 2.5 microns removed annually	2.23	±0.14	$237,665	±14,890
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	12.40	±0.78	$77,747	±4,871
Total		**67.80**	**±4.25**	**$433,146**	**±27,137**

Currency is in USD and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Air Pollution Estimates are based on these values in T/mi^2/yr @ $/T/yr and rounded:
CO 0.362 @ $1,333.50 | NO2 1.997 @ $436.94 | O3 15.428 @ $2,597.84 | SO2 0.982 @ $133.85 | PM2.5 0.788 @ $106,459.48 | PM10* 4.379 @ $6,268.44 (English units: T = tons (2,000 pounds), mi^2 = square miles)

Tree Benefit Estimates: Hydrological (English units)

Abbr.	Benefit	Amount (Kgal)	±SE	Value (USD)	±SE
AVRO	Avoided Runoff	15.02	±0.94	$134	±8
E	Evaporation	337.21	±21.13	N/A	N/A
I	Interception	339.41	±21.26	N/A	N/A
T	Transpiration	319.31	±20.01	N/A	N/A
PE	Potential Evaporation	2,168.67	±135.87	N/A	N/A
PET	Potential Evapotranspiration	1,788.59	±112.06	N/A	N/A

Currency is in USD and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Hydrological Estimates are based on these values in Kgal/mi^2/yr @ $/Kgal/yr and rounded:
AVRO 5.301 @ $8.94 | E 119.049 @ N/A | I 119.823 @ N/A | T 112.729 @ N/A | PE 765.624 @ N/A | PET 631.442 @ N/A (English units: Kgal = thousands of gallons, mi^2 = square miles)

Canopy cover percentage is a good metric for setting goals and monitoring the total canopy growth in the City. Many major cities use the goal of 40% canopy cover as their guideline for canopy growth. ArborPro recommends that the City of Walla Walla meet or exceed this metric in conjunction with available vacant sites to guide an annual planting plan.

Tree Planting

Tree planting is an important component of maintaining and cultivating a healthy urban forest. Newly planted trees will become the foundation of the urban tree canopy as older trees start to die and are removed from the landscape. However, tree planting is only a worthwhile activity when trees are properly selected, properly planted, and properly cared for as they become established. If trees are not properly planted and cared for, they will become a future problem and not provide the benefits associated with healthy, mature trees.

When planting new trees:

Consider the purpose of the tree that is being planted.
Assess the site conditions. Note any growth limitations or space requirements e.g., overhead utilities, proximity to buildings, existing tree canopy, etc.
Select the best species for the site conditions.
Ensure that the tree is properly planted and have a plan in place for follow-up tree care.
Monitor and record how newly planted species react to the site conditions. Incorporate this information into future planting plans.

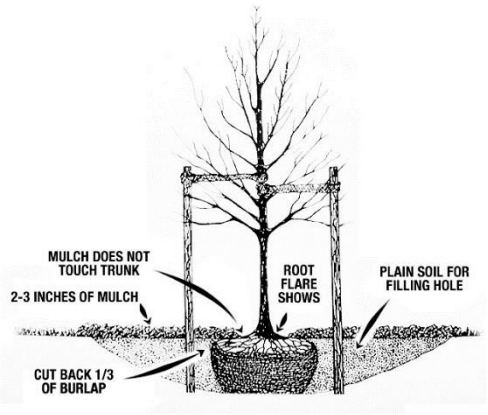


Figure 26: Planting Detail

Tips for Planting Trees

To ensure that newly planted trees will survive the planting process:

Handle trees with care during transportation. Avoid damaging the trunks or branches when loading and unloading.
Avoid storing trees for lengthy periods before planting. Make sure the root ball is kept moist if they are not being immediately planted.
Dig the hole 2 to 3 times the size of the root ball using hand tools when possible. When augers are used, the sides of the hole can become compacted or glazed, which negatively affects root growth.
Fill the hole with native soil when possible. If the native soil is undesirable, add soil amendments to improve soil structure. Gently tamp down the soil. Add water to promote a proper mixture of air, water, and soil.
Stake trees for the first year of growth to both protect against wind and provide a barrier against mechanical damage from mowing.
Add a thin layer of mulch. Make sure not to let mulch build up around the trunk. Over mulching is extremely common and will do irreversible damage in the long run.

Newly Planted Tree Maintenance

Proper young tree maintenance is just as important as proper planting techniques. If trees are not cared for after planting, they have little chance of surviving and becoming established. Newly planted trees will require maintenance for several years after planting.

Water

Watering newly planted trees is the most important key to their survival. Typically, it takes at least two months of watering for a new tree to become established. The time of year and tree species will dictate how much water should be applied after this period. The general rule is to keep soil moist to promote root growth.

Mulching

Applying mulch to newly planted trees has many benefits. Mulch will help retain soil moisture and regulate temperatures around the root ball. Because over-mulching will have devastating effects on the long-term health of a tree, it is extremely important to avoid piling mulch around the trunk. **Spread 3 to 4 inches of mulch around newly planted trees while ensuring the root flare is visible and mulch is not touching the trunk**.

Caring for Established Young Trees

After planting, trees will take a few years to become established. The general rule: trees take one year for each inch in caliper when planted to become established. (Caliper is the trunk diameter at 6 inches above ground.) For example, if you are planting a 2-inch caliper tree, it will take 2 years for the roots to become fully established. Established trees still require regular watering and will need structural pruning as they begin to grow. Structural pruning establishes a central leader; removes dead or diseased branches; removes crossing limbs; and creates an overall structure that will benefit the tree into maturity.

Maintenance Cycle

Utilizing data from the 2021 tree inventory, ArborPro developed an annual maintenance schedule detailing the number and types of tasks to be completed each year. Budget projections were made using average cost of tree work based on diameter class. These costs were supplied by the City of Walla Walla, which represent average costs based on recent work in Walla Walla. Please note that the projected budget is based on all work being performed by contractors. Currently the city uses the expertise of its in-house staff to perform much of the needed tree work.

Maintenance Plan

This summary will include tree data collected within the City limits during the inventory. It represents the total cost of priority maintenance and the recurring cost of proactive maintenance. A summary of the maintenance schedule is presented here. The complete table of estimated costs for this five-year plan can be found in Appendix C.

In addition to the five-year maintenance plan, it is important to understand the total cost of priority maintenance and the recurring cost of proactive maintenance. It may not be possible to implement a five-year maintenance plan, but it is very important to understand what it would cost to maintain all of Walla Walla's trees. Priority maintenance is the one-time cost of Priority 1 and Priority 2 pruning and removals. Proactive maintenance is the recurring cost of routine pruning and young tree training.

The breakdown of cost for all priority maintenance is:

Priority Maintenance	Cost
Priority 1 Removal	$137,600
Priority 1 Prune	$102,700
Priority 2 Removal	$109,800
Priority 2 Prune	$705,200
Total	**$1,055,300**

Table 10: Cost of priority maintenance.

The recurring cost of proactive maintenance is:

Proactive Maintenance	Cost per Year
Routine Prune	$757,050
Young Tree Training	$36,540
Total	**$793,590**

Table 11: Recurring cost of proactive maintenance.

The costs used for development of the suggested budget are based on data provided by the City of Walla Walla and is representative of recent costs for the associated work. There are situations where access is limited or presents other challenges (such as power lines or drop lines from cable tv etc.) that will alter the pricing. For the purposes of the suggested budget in this plan access is considered typical. Also please note that the stump removal pricing is based on the diameter inch of the stump. So, for instance a 10” stump would be priced at $40.00 for removal.

To implement the recommended maintenance schedule, the maintenance plan budget should be no less than $253,721 for Year One; $417,750 for Year Two; $397,250 for Year Three; $793,590 for Year Four; and $793,590 for Year Five.

	Count	Activity	Estimated Cost
2021	69	Priority 1 Removal	$137,600
	44	Priority 1 Prune	$102,700
	174	Stump Removal	$13,421
	Total Cost		**$ 253,721**
	Count	Activity	Estimated Cost
2022	79	Priority 2 Removal	$60,450
	169	Priority 2 Prune	$357,300
	Total Cost		**$ 417,750**
	Count	Activity	Estimated Cost
2023	73	Priority 2 Removal	$49,350
	165	Priority 2 Prune	$347,900
	Total Cost		**$ 397,250**
	Count	Activity	Estimated Cost
2024	929	Routine Prune	$757,050
	908	Young Tree Train	$36,540
	Total Cost		**$ 793,590**
	Count	Activity	Estimated Cost
2025	929	Routine Prune	$757,050
	908	Young Tree Train	$36,540
	Total Cost		**$ 793,590**
Total Five Year Cost			**$ 2,655,901**

Figure 27: Five-year maintenance plan

Policies and Objectives

Introduction

The following information is presented as a short summary of the plan document. It is a collection of thoughts and suggestions made throughout the plan document. It is intended to clarify and simplify the execution of the plan both short and long term.

Pruning, removal and planting

To create and follow as consistent a budget as possible it is suggested that a cyclical pruning program be followed as closely as possible. The city has implemented a cyclical program that is currently utilizing a 5-7 year cycle. As time goes on it may be determined that some species can be pruned on an 8 to 10 year cycle. This will depend on the pruning objectives, the tree growth rate, and financial resources. This of course has implications on the total amount of trees the city can plant and maintain as each new tree increases the budgetary requirements for the service life of the tree.

Throughout the course of the inventory the Inventory Arborists identified trees that based on their observations at the time should be designated a higher priority for both tree pruning and removal. There are 599 trees that fall into the Priority 1 (P1) and Priority 2 (P2) Pruning and Removal categories. This represents 5.8% of the trees inventoried. These trees should be scheduled for work before any other trees are scheduled for work. If there is budget available after scheduling the P1 and P2 work the remaining funds can be allocated to small tree pruning for training and for routine pruning that are on cycle.

In addition to the pruning priorities a strategy should be implemented that recognizes some trees are in less than optimal locations. Many large trees are growing in planting strips that were not intended to accommodate a large species. It is suggested that the trees in this category that have the highest vitality be retained if fiscally and physically possible. This will result in maintaining the culmination of the benefits such as carbon sequestration and carbon storage. As these trees begin to lose vitality they can be scheduled for removal and replacement. The treatment for these trees should be pruning the least amount possible to retain the tree. This process is sometimes referred to as retrenchment or restoration.

The time and effort required to properly manage a tree population is not trivial. To that end it is important that all work be tracked (including costs), this can be easily accomplished with the use of an inventory management system. Work can be scheduled and once completed this can be memorialized in the program. The system can also track citizen service requests which can be a good indicator of which species are the most problematic among other information. The tracking component is an invaluable tool for the current staff to help determine budget requests and for future staff to understand how the tree population was maintained and the fiscal requirements to do so.

Coordination and Cooperation

Many different departments and organizations encounter trees and tree parts in the execution of their work. It is suggested that the city create a type of information clearing house that summarizes the city's goals and objectives relative to trees and tree care. This information should contain instructions on how to contact the city arborist and under what situations such contact would be desirable. Realizing that many of these departments and contractors do not work with trees on a regular basis it may be prudent to publish information directed at the various entities involved. This can take the form of a short newsletter or memo. However, the information is conveyed it is important to realize that much of the damage to trees caused by some of the other departments and trades is not intentional but more because of a lack of knowledge. The relationship with utility companies and contractors and is and can continue to be proactive and beneficial to the community.

Community Education

In order to carry out many aspects of the Urban Forestry Management Plan, it is important that the City provide educational information and learning opportunities for the community regarding the many benefits of a healthy urban tree canopy. The educational information should provide guidance on how to effectively select, plant and maintain trees; this is especially important in neighborhoods with low canopy cover. The Parks & Recreation Department should continue to host its annual Arbor Day event in partnership with Walla Walla Public Schools. Regular information regarding urban forestry, including the many benefits that trees provide and how to properly care for trees, should be distributed through City communication methods. Staff time should be dedicated to educating the citizens of Walla Walla regarding the health and environmental benefits that trees provide. Partnerships with local non-profits should be fostered to assist staff with this effort.

Planting

An important component of the management plan is the new tree planting strategy. It is estimated that the annual tree mortality rate is around 2.5% for all cities in the United States. This equates to approximately 199 trees per year, in Walla Walla, to maintain the current population (7,965 inventoried in 2021 and not including the additional 4,000~ park and cemetery trees). Walla Walla has done an exemplary job in maintaining its trees and as such has a mortality rate considerably lower than the national average. The average tree removal rate of 33 per year for the last five years equates less than ½ of 1%. The city is currently planting between 50 and 100 trees per year (75 average) which is in keeping with the previous goal of planting 2 trees for each 1 tree removed. Additionally, 2,187 sites suitable to plant trees were identified during the 2021 inventory. It has been suggested as part of this plan that these sites be planted at a rate of 220 per year to fill the vacant sites in the next 10 years. It must be remembered that as new sites are planted the tree care budget will also have to be increased as well. The plan document is intended to be dynamic so in the event of a budget shortfall tree planting can be deferred to a future date.

Many civic minded local non-profits nationwide participate in tree planting programs in their respective regions. The city of Walla Walla has an opportunity to partner with multiple organizations to plant trees. The city should continue to maintain partnerships with the Walla Walla Noon Notary Club and

Commitment to Community and any other organizations that have demonstrated an interest in tree planting. A formal tree planting instructional training program will help ensure trees are properly planted. Tree planting is a great opportunity for the community to come together and have a positive impact on the city and its residents.

Plan Vitality

The management plan is intended to be a dynamic document. This means that as circumstances change the plan can be adapted to the new opportunity or challenge. If for instance there is a budgetary windfall more trees can be planted. On the other hand, if a new pest or disease is introduced, planting or other maintenance activities can be deferred while the situation is addressed.

It is recommended that each year a "State of the Urban Forest" report be generated. This can be a simple one page document that details the previous year's pruning and removal work and planting. The report should include a short description of what was intended to be accomplished in the previous year. This is then compared to what was accomplished and adjustments can be made for the upcoming year.

Additionally, a complete plan review should be scheduled for every three years. This would involve participation of the City Arborist, the Parks and Recreation Director and the Parks, Recreation and Urban Forestry Advisory Board. This "working group" should review the plan and determine if any changes should be made. Once the review is complete a report should be presented to the City Council where changes (if warranted) can be suggested.

Tree City USA

As of this writing the city of Walla Walla has maintained Tree City USA status with the Arbor Day Foundation for 28 consecutive years. It should be a goal of the city to continue to maintain the Tree City USA status and promote the designation whenever possible.

Conclusions

The City of Walla Walla has placed a high degree of importance on its Urban Forest. Approximately 20 years ago a tree inventory was conducted. This was at a time when tree inventories were not as commonplace as they are today. Many of the suggestions and recommendations from that inventory were implemented by the city.

The creation of the Parks, Recreation and Urban Forestry Advisory Board was an important step in the management of the urban forest. This allows the citizens to have a voice and provide important input into the success of the urban forest. The recent storm water management plan further demonstrates a long term commitment to maintaining and growing the tree population of Walla Walla.

Recognizing the value of current information, a new inventory was conducted and the data from that process has been used in the creation of this Urban Forestry Management plan. The inventory results reveal an urban forest that is in good condition and can be improved by following the recommendations in this plan for pruning, removal and planting.

In addition to the inventory, the city reached out to the community in the form of an online survey. The survey was well received and is a good indication that the people of Walla Walla trust those in charge of tree care and tree care decisions. This vote of confidence is not easily earned, and the city should be applauded for the accomplishment.

There is an excellent opportunity for the city to increase the canopy coverage by filling the vacant planting sites currently available. Canopy coverage leads to shade and shade was cited as the main benefit desired by the residents of Walla Walla. Planting events also create opportunities for the community in general and families to bond over common likes and desires.

Another good indication of the City of Walla Walla's commitment to its trees is the fact that the city has met the standards to be designated a Tree City USA by the Arbor Day Foundation for more 28 years. Walla Walla can be considered a leader in high quality Urban Forest management and provides an excellent model for cities around the country.

Appendix A – Species Distribution

Botanical Name	Common Name	Count	%
Abies balsamea	Balsam Fir	1	0.01%
Abies grandis	Grand Fir	2	0.02%
Acer campestre	Hedge Maple	56	0.54%
Acer griseum	Paperbark Maple	49	0.47%
Acer macrophyllum	Bigleaf Maple	1	0.01%
Acer negundo	Box Elder	2	0.02%
Acer palmatum	Japanese Maple	78	0.76%
Acer platanoides	Norway Maple	548	5.30%
Acer platanoides 'Crimson King'	Crimson King Maple	27	0.26%
Acer platanoides 'Crimson Sentry'	Crimson Sentry Norway Maple	8	0.08%
Acer pseudoplatanus	Sycamore Maple	84	0.81%
Acer rubrum	Red Maple	217	2.10%
Acer rubrum 'Armstrong'	Armstrong Red Maple	91	0.88%
Acer rubrum 'October Glory'	October Glory Red Maple	2	0.02%
Acer saccharinum	Silver Maple	240	2.32%
Acer saccharum	Sugar Maple	11	0.11%
Acer species	Maple Species	1	0.01%
Acer truncatum	Purple Blow Maple; Shantung Maple	8	0.08%
Acer x freemanii	Freeman Maple	321	3.11%
Aesculus hippocastanum	Common Horsechestnut	12	0.12%
Ailanthus altissima	Tree of Heaven	57	0.55%
Albizia julibrissin	Mimosa; Silk Tree	1	0.01%
Alnus glutinosa	European Alder	2	0.02%
Alnus rhombifolia	White Alder	3	0.03%
Alnus serrulata	Hazel Alder	2	0.02%
Amelanchier canadensis	Canadian Serviceberry	31	0.30%
Amelanchier species	Serviceberry Species	134	1.30%
Amelanchier x grandiflora 'Autumn Brilliance'	Autumn Brilliance Serviceberry	22	0.21%
Asimina triloba	Pawpaw	1	0.01%
Betula nigra	River Birch	1	0.01%
Betula papyrifera	Paper Birch	9	0.09%
Betula pendula	European White Birch	91	0.88%
Calocedrus decurrens	Incense Cedar	2	0.02%
Carpinus betulus	European Hornbeam	20	0.19%
Carpinus betulus 'Fastigiata'	Upright European Hornbeam	115	1.11%
Castanea dentata	American Chestnut	16	0.15%
Catalpa speciosa	Western Catalpa	69	0.67%
Cedrus libani	Cedar-of-Lebanon	1	0.01%
Celtis occidentalis	Common Hackberry	17	0.16%

Botanical Name	Common Name	Count	%
Celtis species	Hackberry	12	0.12%
Cercidiphyllum japonicum	Katsura Tree	39	0.38%
Cercis canadensis	Eastern Redbud	205	1.98%
Chamaecyparis pisifera	Sawara False Cypress	1	0.01%
Cladrastis kentukea	American Yellowwood	5	0.05%
Cornus alternifolia	Alternate-Leaf Dogwood	4	0.04%
Cornus florida	Eastern Dogwood	984	9.52%
Cornus kousa	Kousa Dogwood	94	0.91%
Cornus mas	Cornelian Cherry	2	0.02%
Cornus sericea	Red Osier Dogwood	1	0.01%
Cornus species	Dogwood Species	6	0.06%
Corylus colurna	Turkish Filbert	5	0.05%
Corylus species	Filbert	1	0.01%
Cotinus coggygria	Smoke Tree	5	0.05%
Crataegus laevigata	English Hawthorn	39	0.38%
Crataegus species	Hawthorn Species	42	0.41%
Crataegus viridis 'Winter King'	Winter King Hawthorn	8	0.08%
Cryptomeria japonica	Japanese Cedar	1	0.01%
Cupressus species	Cypress	1	0.01%
Diospyros kaki	Japanese Persimmon	1	0.01%
Fagus sylvatica	European Beech	27	0.26%
Fagus sylvatica 'Tricolor'	Tricolor Beech	12	0.12%
Fraxinus americana	White Ash	109	1.06%
Fraxinus americana 'Autumn Purple'	Autumn Purple Ash	124	1.20%
Fraxinus americana 'Junginger'	Autumn Purple Ash	14	0.14%
Fraxinus angustifolia subsp. oxycarpa	Raywood Ash	131	1.27%
Fraxinus pennsylvanica	Green Ash	198	1.92%
Fraxinus pennsylvanica 'Patmore'	Patmore Ash	2	0.02%
Fraxinus quadrangulata	Blue Ash	3	0.03%
Ginkgo biloba	Maidenhair Tree	53	0.51%
Gleditsia triacanthos	Honey Locust	50	0.48%
Gleditsia triacanthos f. inermis	Thornless Honey Locust	122	1.18%
Gymnocladus dioica	Kentucky Coffee Tree	2	0.02%
Halesia tetraptera var. monticola	Mountain Silverbell	4	0.04%
Hibiscus species	Hibiscus	3	0.03%
Hibiscus syriacus	Rose-of-Sharon	4	0.04%
Juglans nigra	Black Walnut	19	0.18%
Juglans regia	English Walnut	21	0.20%
Juglans species	Walnut Species	1	0.01%
Juniperus scopulorum	Rocky Mountain Juniper	2	0.02%

Botanical Name	Common Name	Count	%
Juniperus virginiana	Eastern Red Cedar	5	0.05%
Koelreuteria bipinnata	Chinese Flame Tree	5	0.05%
Koelreuteria paniculata	Goldenrain Tree	12	0.12%
Laburnum anagyroides	Goldenchain Tree	5	0.05%
Lagerstroemia indica	Crape Myrtle (including hybrids)	1	0.01%
Larix laricina	Tamarack	1	0.01%
Liquidambar styraciflua	American Sweet Gum	209	2.02%
Liriodendron tulipifera	Tulip Tree	33	0.32%
Maackia amurensis	Manchurian Maackia	13	0.13%
Magnolia liliiflora 'Galaxy'	Galaxy Magnolia	9	0.09%
Magnolia species	Magnolia Species	2	0.02%
Magnolia stellata	Star Magnolia	19	0.18%
Magnolia x soulangeana	Saucer Magnolia	13	0.13%
Malus domestica	Edible Apple Species	1	0.01%
Malus species	Crabapple Species	436	4.22%
Malus 'Spring Snow'	Spring Snow Crabapple	3	0.03%
Metasequoia glyptostroboides	Dawn Redwood	3	0.03%
Morus alba	White Mulberry	8	0.08%
Nyssa sylvatica	Sour Gum	21	0.20%
Parrotia persica	Persian Parrotia	17	0.16%
Picea abies	Norway Spruce	9	0.09%
Picea glauca	White Spruce	3	0.03%
Picea pungens f. glauca	Colorado Blue Spruce	53	0.51%
Picea species	Spruce Species	4	0.04%
Pinus monticola	Western White Pine	1	0.01%
Pinus nigra	Austrian Black Pine	9	0.09%
Pinus ponderosa	Ponderosa Pine	4	0.04%
Pinus resinosa	Red Pine	1	0.01%
Pinus species	Pine Species	1	0.01%
Pinus sylvestris	Scotch Pine	5	0.05%
Pinus thunbergiana	Japanese Black Pine	2	0.02%
Platanus occidentalis	American Sycamore	2	0.02%
Platanus x acerifolia	London Plane Tree	327	3.17%
Populus alba	White Poplar	2	0.02%
Populus deltoides	Cottonwood	1	0.01%
Populus grandidentata	Bigtooth Aspen	2	0.02%
Populus species	Poplar/Cottonwood Species	7	0.07%
Populus tremuloides	Quaking Aspen	10	0.10%
Populus tremuloides 'Erecta'	Columnar Quaking Aspen	3	0.03%
Populus trichocarpa	Black Cottonwood	10	0.10%

Botanical Name	Common Name	Count	%
Prunus armeniaca	Apricot	4	0.04%
Prunus avium	Sweet Cherry	4	0.04%
Prunus cerasifera	Purple-Leafed Plum	35	0.34%
Prunus cerasifera 'Thundercloud'	Thundercloud Purple-Leafed Plum	4	0.04%
Prunus domestica	Plum	274	2.65%
Prunus persica	Peach	11	0.11%
Prunus persica var. nucipersica	Nectarine	1	0.01%
Prunus sargentii	Sargent Cherry	40	0.39%
Prunus serrulata	Japanese Flowering Cherry	5	0.05%
Prunus serrulata 'Kwanzan'	Kwanzan Flowering Cherry	35	0.34%
Prunus species	Stone Fruit Species	55	0.53%
Prunus subhirtella 'Pendula'	Weeping Higan Cherry	4	0.04%
Prunus x blireiana	Double-Flowering Plum	77	0.75%
Prunus x yedoensis	Yoshino Cherry	8	0.08%
Pseudotsuga menziesii	Douglas Fir	21	0.20%
Pyrus calleryana	Ornamental Pear	727	7.04%
Pyrus calleryana 'Aristocrat'	Aristocrat Pear	12	0.12%
Pyrus calleryana 'Bradford'	Bradford Pear	17	0.16%
Pyrus calleryana 'Capital'	Capital Ornamental Pear	38	0.37%
Pyrus calleryana 'Chanticleer'	Chanticleer Pear	20	0.19%
Pyrus communis	Edible Pear	1	0.01%
Quercus bicolor	Swamp White Oak	1	0.01%
Quercus coccinea	Scarlet Oak	38	0.37%
Quercus macrocarpa	Bur Oak	16	0.15%
Quercus palustris	Pin Oak	16	0.15%
Quercus robur	English Oak	11	0.11%
Quercus rubra	Red Oak	6	0.06%
Quercus velutina	Black Oak	1	0.01%
Rhus typhina	Staghorn Sumac	1	0.01%
Robinia pseudoacacia	Black Locust	103	1.00%
Salix babylonica	Weeping Willow	5	0.05%
Salix caprea 'Pendula'	Weeping Pussy Willow	1	0.01%
Salix discolor	Pussy Willow	2	0.02%
Salix matsudana 'Tortuosa'	Corkscrew Willow	6	0.06%
Snag	Snag	6	0.06%
Sorbus americana	American Mountain Ash	8	0.08%
Sorbus aucuparia	European Mountain Ash	2	0.02%
Stump	Stump	174	1.68%
Styphnolobium japonicum	Japanese Pagoda Tree	2	0.02%
Syringa reticulata	Japanese Tree Lilac	54	0.52%

Botanical Name	Common Name	Count	%
Syringa vulgaris	Common Lilac	8	0.08%
Taxodium distichum	Bald Cypress	1	0.01%
Thuja occidentalis	American Arborvitae	8	0.08%
Thuja plicata	Western Red Cedar	9	0.09%
Tilia americana	American Linden	1	0.01%
Tilia cordata	Littleleaf Linden	164	1.59%
Tilia cordata 'Greenspire'	Greenspire Linden	3	0.03%
Tilia tomentosa	Silver Linden	13	0.13%
Tsuga heterophylla	Western Hemlock	2	0.02%
Ulmus americana	American Elm	6	0.06%
Ulmus glabra	Scotch Elm	1	0.01%
Ulmus pumila	Siberian Elm	27	0.26%
Ulmus species	Elm Species	3	0.03%
Ulmus x species	Hybrid Elm	7	0.07%
Unidentifiable Tree	Unidentifiable Tree	2	0.02%
Vacant Planting Site - Large	Vacant Planting Site - Large	513	4.97%
Vacant Planting Site - Medium	Vacant Planting Site - Medium	312	3.02%
Vacant Planting Site - Small	Vacant Planting Site - Small	1358	13.14%
Vacant Site - Very Large	Vacant Site - Very Large	4	0.04%
Zelkova serrata	Sawleaf Zelkova	62	0.60%

Appendix B
Recommended Species

Street Tree Listing

City of Walla Walla Parks & Recreation

TREE CITY USA

KEY

FLOWERING **COLUMNAR TREE**

CLASS I

SMALL TREES

Heights up to 25', for planting strips 3' to 5' wide. Tree marked *PL* will have application for wider planting strips located under power lines

Cherry (*Prunus*) (PL) Available in a variety of shapes, sizes, and flowering colors. Be sure to check the hardiness rating for colder climates. Some cultivars are suitable for planting under power lines in larger planting strips. Following is a sampling of varieties.

- **Pink Flair Cherry (*Prunus sargentii 'JFS-KW58'*)** Narrow upright in shape with dark green foliage turning to orange-red in fall. 25'H X 15'W. Single pink flower in clusters.
- **Yoshino Cherry (*Prumus yedoensis*)** Upright spreading branches, rounded crown in shape. 25'H X 25'W. Bright green glossy foliage to yellow in fall. Singe, fragrant light pink to white flower.

Dogwood *(Cornus)* (PL) Many nice cultivars of this tree. The Florida varietals *(Cornus florida)* are very popular. They are upright and spreading, eventually developing a flat top. Foliage is green turning to rosy red in fall. Flowers are shades of pink and white. 20'H X 20' W. Nice tree for wider strips under power lines. Common varieties include *Cherokee Chief and Cloud 9'.*

Hawthorn *(Crataegus)* (PL) Hardy tree with dense growth habit. Flowers mostly in shades of pink and white. Most fruit is showy but persistent and not always desirable on pavement. Appropriate for larger parking strips under power lines.

- **Lavalle Hawthorn *(Crataegus lavallei)*** Vase shaped with irregular shape. 25'H X 20'W. Foliage is green changing to bronze in fall. White flowers in clusters producing orange 5/8" fruit.
- **Paul's Scarlet Hawthorne *(Crataegus laevigata 'Paul's Scarlet)*** Dense upright, spreading, oval in shape. 25'H X 20'W. Small deeply lobed in green leaf. Double scarlet flowering producing deep red 3/8" fruit.
- **Washington Hawthorn *(Crataegus Phaenopyrum)*** Broadly oval to rounded in shape. 25'H X 20'W. Deep green foliage to multi color red, orange, and purple in the fall. White flowers in clusters. Bright glossy red 1/4" persistent fruit.

Hornbeam (*Carpinus*) (PL) Native to eastern U.S.. Shape varied by cultivar. Class one cultivar would be the American Hornbeam (Carpinus caroliniana) which is oval in shape. Foliage is dark green changing to yellow in fall. 25'H X 20'W. Good for wider strips under power lines.

Japanese Snowbell (*Styrax japonicus*) (PL) Broadly pyramidal in shape with dark green fine foliage turning yellow in fall. 20'H X 20'W. Small clusters of white bell shaped flowers. Nice tree for under power lines in wider planting strips.

Lilac (*Syringa retuculata*) also know as Silk tree. Upright spreading, becoming rounded in shape with dark green foliage. 20'H X 15'W. Heavily covered with white plume-shaped flower clusters.

CLASS I Continued

SMALL TREES

Maples *(Acer)* There are a few good small varieties of maples that can be used in a parking strip setting. Especially nice for wider strips under power lines.

- **Paperbark Maple *(Acer griseum)* (PL)** Upright spreading with rounded crown in shape. Trifoliate, dark green foliage turning to red in fall. 25'H X 20'W.
- **Japanese Maple *(Acer palmatum)* (PL)** Standard small maple. Cultivars vary in height, width, shape and leaf color. Tend to be slow growing, prefer part sun to shaded areas. Better planted in wider strips under power lines. Nice cultivar is the ***Bloodgood*** which is 20'H X 20'W.

Persian Parrotia *(Parrotia persica)* Broadly pyramidal to rounded in shape with green foliage turning yellow, orange, and red in fall. 30'H X 20'W. Flower reveals showy red stamens.

Plum *(Prunus)* The purple leafed plums are nice trees for under power lines in wider planting strips.

- **Newport Plum *(Prunus 'Newport')*** Upright spreading, broadly oval in shape with purple-red foliage. Light pink flower. Good in colder climates. Will volunteer some fruit.

Serviceberry *(Amelanchier)* Good zone tolerances, prefers moist soil, can be multi-stemmed or single leader. Green Foliage changing to orange red in fall. Most have white flowers.

Snowcloud Serviceberry *(Amelanchier laevis 'Snowcloud')* Good single leader variety. 25'H X 15'W. Produces 5/8" purplish blue fruit.

Zelkova *(City Sprite)* Most cultivars are compact to vase shaped with bright green foliage to yellow in fall. 24'H X 18'W. Nice clean tree for planting strip.

Street Tree Listing

City of Walla Walla Parks & Recreation

TREE CITY USA

KEY

FLOWERING **COLUMNAR TREE**

CLASS II

MEDIUM TREES

Heights from 25’ - 50’, for planting strips 5’ to 8’ wide, without overhead power lines.

ASH (*Fraxinus)* Fairly fast growing tree. Takes heat well and tolerates various soil conditions. There are some columnar cultivars. Has compound leaf.

- **Raywood Ash (*Fraxinus oxycarpa ‘Raywood’)*** Oval in shape with dense crown. Green leaf to reddish purple in fall. 45’H X 30’W. Fast growing and maturing at shorter height than many ashes. Leaf texture and fine branches give this tree a delicate look.
- **Blue Ash *(Fraxinus quadrangulate)*** Broadly oval in shape with dark green foliage to yellow in fall. 40’H X 30’W. Has particularly good symmetry.
- **European Mountain Ash *(Sorbus aucuparia)*** Upright and oval becoming rounded in shape with dark green leaves to rusty orange in fall. 35’H X 25’W. White flowers in clusters. Supports small orange-red fruit.

Beech (*Fagus)* While many beech are larger trees there are a few varieties that fit this medium range. Some columnar forms are also available. Most tend to be slow growers. Following is a sample list.

- **Dawyck Purple Beech *(Fagus sylvatica ‘Dawyck Purple’)*** Columnar, fastigiated in shape habit with purple foliage. 40’H X 12’W. Tight narrow form makes this an outstanding columnar tree.
- **Tricolor Beech *(Fagus sylvatica ‘Roseo-marginata’)*** Oval shape. Variegated, purple leaf, with rose pink and cream colored margins. 30’H X 20’W. The foliage on this plant gives it a unique look in the landscape.

Birch *(Betula jacquemontii) (Jazquemonti Birch)* Upright oval shape with dark green foliage to yellow in fall. 40’H X 30’W. Nice white bark. This cultivar is said to be somewhat resistant to leaf miner.

Ginkgo *(Ginkgo biloba)* Medium growing. Broadly pyramidal in shape with medium green fan shaped leaf to yellow in fall. 40’H X 35’W. Can exceed this height under right conditions. One of common cultivars is *‘Autumn Gold’.*

Katsura *(Cercidiphyllum japonicum)* Upright and pyramidal in shape when young to rounding with age. 40’H X 40’W. Foliage is delicate looking bluish green to yellow orange in fall.

Linden *(Tilia)* There are a few good varieties of Linden. Some are columnar in form. A couple of sample cultivars are listed.

- **Redmond Linden (*Tilia Americana ‘Redmond’)*** Pyramidal in shape with large light green foliage to yellowish in fall. 35’H X 25’W. Grows fast and develops heavy caliper.
- **Chancellor Lindon *(Tilia cordata ‘Greenspire’)*** Pyramidal. Symmetrical in shape with dark green foliage to yellowish in fall. 40’H X 30’W. This cultivar has become a standard among the varieties. Has strong central leader and very uniform branching.

CLASS II Continued

MEDIUM TREES

Maple *(Acer)* The red maples fit this category best. They tend to be medium in height from 20' to 40' and very hardy. Fairly fast growing to medium as they mature, and they come in a variety of fall foliage colors. There are also a few good columnar cultivars. The following is a sample list.

- **Armstrong maple (*Acer rubrum 'Armstrong'*)** Narrow, fastigiated shape with light green foliage to yellow-orange-red in fall. 45'H X 15'H. Fast growing tree with ascending branches make this a good selection for narrower spaces. *'Bowhall'* is another columnar form.
- **October Glory Maple *(Acer rubrum 'October)*** Broadly oval to round shape with medium green to reddish-purple fall foliage. 40'H X 35'W. Tends to color up later in fall. *'Red Sunset' is similar but more hardy.*

Oak *(Quercus Robur Fastigiata)* Commonly called Skyrocket Oak this is a columnar form of English Oak. Narrow in shape with dark green leaves to yellow in fall. 45'H X 25'W. Very uniform in shape.

Pear *(Pyrus)* Flowering pears are reasonable hearty and there are a few columnar cultivars. They have good fall colors and support white flowers in clusters early mid spring. The following is a sample of cultivars.

- ***Aristocrat* Pear *(Pyrus calleryana 'Aristocrat')*** Pyramidal with open, spreading branches in shape with narrow glossy green foliage to deep red in fall. 40'H X 30'W. This cultivar has a more open branching habit which makes it more resistant to storm damage. Supports white flowers.
- ***Capital Pear (Pyrus calleryana 'Capital')*** This is a good columnar form with glossy green leaves to reddish-purple in fall. 35'H X 12'W. Supports white flowers.

Yellowwood *(Cladrastis kentukea)* Rounded shape with bright green leaves to yellow in fall. 40'H X 40'W. Flowers in late spring with long clusters of white fragrant blooms. Medium grower and performs well in urban areas.

Street Tree Listing

City of Walla Walla Parks & Recreation

TREE CITY USA

KEY

FLOWERING **COLUMNAR TREE**

CLASS III

LARGE TREES

Heights from 50’ - 70’, for planting strips 8’ to 15’ wide.

ASH (*Fraxinus)* American Ash or white ash are fairly large trees. Many of the green ash also fall into this category of large street trees. A sample of each is listed.

- **Autumn Purple Ash (*Fraxinus Americana ‘Junginger’)*** Rounded in shape with green textured foliage to reddish purple in fall. 50’H X 40’W. This ash has become a standard for comparison. Nice tree.
- **Green Ash *(Fraxinus Pennsylvanica)*** More compact form of ash, dense branching with oval shape some cultivars will be larger trees. 50’H X 40’W. Green leaves to yellow in fall. Has gray brown bark. There are many nice cultivars of this tree.

Hackberry *(Celtis Occidentalis)* Broad topped in shape with ascending then arching branches. 50’H X 40’W. Foliage is light green to yellow in fall. Tolerates harsh climate well and is deeply rooted. Bark is corky and adds interest to this tree.

Linden *(Tilia)* Many varieties of linden will fall into this category. American Linden can be referred to as basswood. The following is a sample of varieties.

- **Sentry Linden *(Tilia Americana ‘Sentry’)*** Pyramidal, symmetrical in shape with medium green foliage to yellow in fall. 50’H X 30’W. Nice form and hardy tree. Well branched and uniform canopy.
- **Littleleaf Linden *(Tilia Cordata)*** Broadly pyramidal in shape with medium green foliage to yellow in fall. 50’H X 35’ W. There are various cultivars of this variety. Some may exceed this height.

Maple *(Acer platanoides) (Acer Saccharum)* The Norway Maples and Sugar Maples are larger maples with spreading growth habit. However there are a few columnar forms. These trees come in a variety of leaf colors as well. In the right area they can become quite large. A few sample varieties are listed below.

- **Cleveland Maple *(Acer Platanoides ‘Cleveland’)*** Upright oval in shape, dense with medium green foliate to yellow in fall. 50’H X 35’W. This is a good planting strip tree as it is somewhat more upright than most.
- **Crimson King Maple *(Acer Platanoides ‘Crimson King’)*** Oval when young becoming rounded in shape with deep purple foliage to maroon or reddish bronze in fall. 50’H X 40’ W. Holds its color well until fall. There is also a columnar form called ‘Crimson Senty’ which is 25’H X 15’W.
- **Emerald Queen Maple *(Acer Platanoides ‘Emerald Queen’)*** Dense, oval in shape with upright spreading branches. Foliage is deep green with reddish tint in spring to yellow in fall. 50’H X 40’W. Very popular green leafed maple.
- **Sugar Maple *(Acer Saccharum)*** Upright oval to rounded in shape with medium green foliage to orange red in fall. 50’H X 40’W. Can be somewhat slow growing.

Zelkova *(Serrata)* Most cultivars are compact to vase shaped with bright green foliage to yellow in fall. 70’H X 60’W. Nice clean tree for planting strip.

Street Tree Listing

City of Walla Walla Parks & Recreation

TREE CITY USA

KEY

FLOWERING  **COLUMNAR TREE** 

CLASS IV

VERY LARGE TREES

Heights from 70’ or more. For planting strips 15’ wide or more without overhead powerlines.

Beech (*Fagus*) Nice large shade tree. These are some columnar cultivars. Most Beeches are flow growers. The foliage will vary in color by variety.

- **American Beech (*Fagus Grandiflora*)** Broadly oval in shape with glossy green leaves turning to golden bronze in fall. 70’H X 50’W. Bark is smooth and light gray. Has good branch structure.
- **European Beech *(Fagus Sylvatica)*** Broadly oval in shape with purplish green leaf. 70’H X 50’W. Slow growing. Has small seed pod. There are various cultivars of this variety some weeping and some columnar. Bark is smooth and light gray. *‘Asplenifolia’* or fern leaf Beech has fine leaf.

Linden *(Tilia)*  The larger varieties of this tree tend to be dense with compact crowns. They bear small fragrant flowers that are white to cream in color. They tend to grow at moderate rate. There are some columnar varieties available. Listed are a couple of common varieties.

- **American Linden *(Tilia Americana)***  Sometimes known as Basswood. Broadly pyramidal in shape with dense crown. Foliage is medium green and almost heart shaped turning yellow in fall. 70’H X 40’W. Loose cluster of fragrant cream colored flowers in early summer.
- **Silver Linden *(Tilia Tomentosa)***  Dense growth with erect branching, rounded crown in shape. 70’H X 50’W. Foliage is semi-heart shaped dark green on top and gray below. Has cream colored flowers in loose clusters in mid summer. Provides heavy shade.

Oak *(Quercus)* Many varieties of mostly large shade trees. Will form acorns that drop in fall. Most varieties are fast growing at first then slowing to moderate. The following is sample listing of the larger trees.

- **Scarlet Oak *(Quercus Coccinea)*** Upright spreading, open broadly oval in shape with dark green foliage turning to reddish to brown. 70’H X 50’W. This variety shows the brightest fall foliage.
- **English Oak *(Quercus Robur)*** Broad, rounded in shape with open headed crown. Foliage is green turning to yellow brown in fall. 70’H X 50’W. Larger sturdy tree. Adaptable to various soil types.
- **Bur Oak *(Quercus Macrocarpa)*** Broadly oval, irregular and open in shape with dark green foliage to yellow brown in fall. 70’H X 50’W. Large native type Oak with thick trunk. Does well in alkaline soils.

Plane Tree *(Platanus Acerfolia)* The American Sycamore is also in this genus. Broad spreading, and rounded in shape with large green Maple like leaves to yellowish to brown in fall. 80’H X 50’W. Nice large tree with strong branching habit. Best known by the ball like seed clusters that are persistent.

CLASS IV Continued

VERY LARGE TREES

Tulip (*Liriodendron Tulipifera*)  Oval in shape with medium green leaves turning to yellow in fall. 70'H X 40'W. Large cream colored tulip shaped flower in early summer. Fairly fast growing.

Zelkova *(Zelkova Serrata)* Upright vase shaped in growth habit with dark green leaf to multicolored in red. 70'H X 60'W. Fast growing at first, slowing to medium. Some have used this tree as a substitute for Elm.

Appendix C
5 Year Pruning and Removal Budget

Year			2021		2022		2023		2024		2025		Five-Year
Activity	DBH	Cost/Tree	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	Cost
	00"-03"	$50.00	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Priority 1 Removal	04"-06"	$200.00	4	$800	0	$0	0	$0	0	$0	0	$0	$800
	07"-12"	$400.00	5	$2,000	0	$0	0	$0	0	$0	0	$0	$2,000
	13"-18"	$800.00	4	$3,200	0	$0	0	$0	0	$0	0	$0	$3,200
	19"-24"	$1,500.00	8	$12,000	0	$0	0	$0	0	$0	0	$0	$12,000
	25"-30"	$2,000.00	15	$30,000	0	$0	0	$0	0	$0	0	$0	$30,000
	31"-36"	$2,300.00	10	$23,000	0	$0	0	$0	0	$0	0	$0	$23,000
	37"-42"	$2,600.00	6	$15,600	0	$0	0	$0	0	$0	0	$0	$15,600
	43+	$3,000.00	17	$51,000	0	$0	0	$0	0	$0	0	$0	$51,000
Total			**69**	**$137,600**	**0**	**$0**	**0**	**$0**	**$0**	**$0**	**0**	**$0**	**$137,600**
	00"-03"	$50.00	0	$0	15	$750	15	$750	0	$0	0	$0	$1,500
Priority 2 Removal	04"-06"	$200.00	0	$0	19	$3,800	19	$3,800	0	$0	0	$0	$7,600
	07"-12"	$400.00	0	$0	14	$5,600	13	$5,200	0	$0	0	$0	$10,800
	13"-18"	$800.00	0	$0	11	$8,800	10	$8,000	0	$0	0	$0	$16,800
	19"-24"	$1,500.00	0	$0	7	$10,500	7	$10,500	0	$0	0	$0	$21,000
	25"-30"	$2,000.00	0	$0	4	$8,000	3	$6,000	0	$0	0	$0	$14,000
	31"-36"	$2,300.00	0	$0	4	$9,200	3	$6,900	0	$0	0	$0	$16,100
	37"-42"	$2,600.00	0	$0	3	$7,800	2	$5,200	0	$0	0	$0	$13,000
	43+	$3,000.00	0	$0	2	$6,000	1	$3,000	0	$0	0	$0	$9,000
Total			**0**	**$0**	**79**	**$60,450**	**73**	**$49,350**	**0**	**$0**	**0**	**$0**	**$109,800**
Stump Removal	00"-03"	$4	11	$116	0	$0	0	$0	0	$0	0	$0	$116
	04"-06"	$4	24	$504	0	$0	0	$0	0	$0	0	$0	$504
	07"-12"	$4	37	$1,304	0	$0	0	$0	0	$0	0	$0	$1,304
	13"-18"	$4	37	$2,296	0	$0	0	$0	0	$0	0	$0	$2,296
	19"-24"	$4	25	$2,148	0	$0	0	$0	0	$0	0	$0	$2,148
	25"-30"	$4	16	$1,748	0	$0	0	$0	0	$0	0	$0	$1,748
	31"-36"	$5	8	$1,330	0	$0	0	$0	0	$0	0	$0	$1,330
	37"-42"	$5	6	$1,215	0	$0	0	$0	0	$0	0	$0	$1,215
	43+	$5	10	$2,760	0	$0	0	$0	0	$0	0	$0	$2,760
Total			**174**	**$13,421**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$13,421**
	00"-03"	$50.00	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Priority 1 Prune	04"-06"	$200.00	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	07"-12"	$400.00	1	$400	0	$0	0	$0	0	$0	0	$0	$400
	13"-18"	$800.00	3	$2,400	0	$0	0	$0	0	$0	0	$0	$2,400
	19"-24"	$1,500.00	3	$4,500	0	$0	0	$0	0	$0	0	$0	$4,500
	25"-30"	$2,000.00	8	$16,000	0	$0	0	$0	0	$0	0	$0	$16,000
	31"-36"	$2,300.00	8	$18,400	0	$0	0	$0	0	$0	0	$0	$18,400
	37"-42"	$2,600.00	5	$13,000	0	$0	0	$0	0	$0	0	$0	$13,000
	43+	$3,000.00	16	$48,000	0	$0	0	$0	0	$0	0	$0	$48,000
Total			**44**	**$102,700**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$102,700**
Priority 2 Prune	00"-03"	$50.00	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	04"-06"	$200.00	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	07"-12"	$400.00	0	$0	8	$3,200	8	$3,200	0	$0	0	$0	$6,400
	13"-18"	$800.00	0	$0	15	$12,000	15	$12,000	0	$0	0	$0	$24,000
	19"-24"	$1,500.00	0	$0	23	$34,500	22	$33,000	0	$0	0	$0	$67,500
	25"-30"	$2,000.00	0	$0	33	$66,000	33	$66,000	0	$0	0	$0	$132,000
	31"-36"	$2,300.00	0	$0	24	$55,200	23	$52,900	0	$0	0	$0	$108,100
	37"-42"	$2,600.00	0	$0	29	$75,400	28	$72,800	0	$0	0	$0	$148,200
	43+	$3,000.00	0	$0	37	$111,000	36	$108,000	0	$0	0	$0	$219,000
Total			**0**	**$0**	**169**	**$357,300**	**165**	**$347,900**	**0**	**$0**	**0**	**$0**	**$705,200**
Routine Prune	00"-03"	$50.00	0	$0	0	$0	0	$0	11	$550	11	$550	$1,100
	04"-06"	$200.00	0	$0	0	$0	0	$0	92	$18,400	92	$18,400	$36,800
	07"-12"	$400.00	0	$0	0	$0	0	$0	409	$163,600	409	$163,600	$327,200
	13"-18"	$800.00	0	$0	0	$0	0	$0	217	$173,600	217	$173,600	$347,200
	19"-24"	$1,500.00	0	$0	0	$0	0	$0	87	$130,500	87	$130,500	$261,000
	25"-30"	$2,000.00	0	$0	0	$0	0	$0	42	$84,000	42	$84,000	$168,000
	31"-36"	$2,300.00	0	$0	0	$0	0	$0	26	$59,800	26	$59,800	$119,600
	37"-42"	$2,600.00	0	$0	0	$0	0	$0	21	$54,600	21	$54,600	$109,200
	43+	$3,000.00	0	$0	0	$0	0	$0	24	$72,000	24	$72,000	$144,000
Total			**0**	**$0**	**0**	**$0**	**0**	**$0**	**929**	**$757,050**	**929**	**$757,050**	**$1,514,100**
Young Tree Training	00"-03"	$20.00	0	$0	0	$0		$0	400	$8,000	400	$8,000	$16,000
	04"-06"	$40.00	0	$0	0	$0		$0	371	$14,840	371	$14,840	$29,680
	07"-12"	$100.00	0	$0	0	$0		$0	137	$13,700	137	$13,700	$27,400
Total			**0**	**$0**	**0**	**$0**		**$0**	**908**	**$36,540**	**908**	**$36,540**	**$73,080**
Cost Grand Total				**$253,721**		**$417,750**		**$397,250**		**$793,590**		**$793,590**	**$2,655,901**