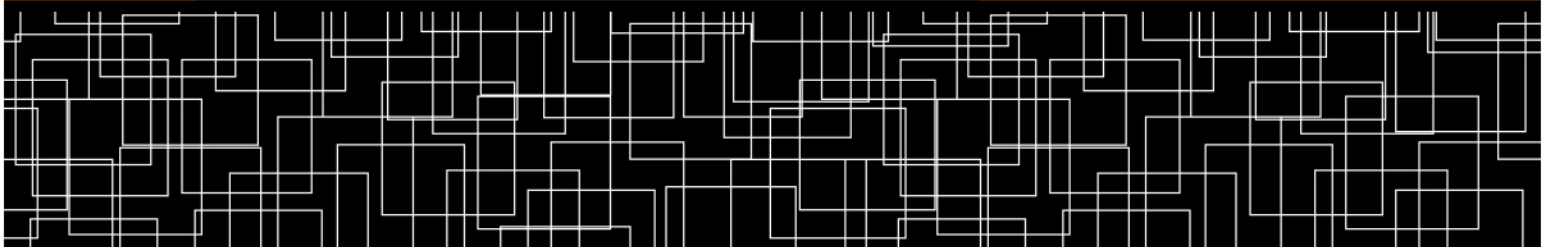


FEBRUARY, 2011

City of Helena Urban Forest Management Plan



URBAN FOREST MANAGEMENT PLAN

FOR

City of Helena Parks & Recreation Department
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Helena, Montana 59623

PREPARED BY:



Planning and Managing Urban Greenspace

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FEBRUARY, 2011

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EXECUTIVE SUMMARY

An Urban Forest Management Plan (UFMP) is intended to provide a framework for ensuring that the trees and forests of our city are appropriately cared for according to our community goals. It is a guide for city staff, elected officials, board members, landowners, utility companies, developers, and residents to follow when making decisions about community trees.

Helena's Urban Forest Management Plan (UFMP) was initiated by the City of Helena Parks and Recreation Department to facilitate the city's ongoing commitment to maintain, enhance, and preserve Helena's tree canopy.

A partial inventory of street and park trees, and comments and opinion from residents and city staff, along with industry and community stakeholders, shaped the direction of the overall plan, its objectives, and the implementation strategy.

Four primary methods of community outreach were used:

- Public opinion survey
- Interviews and group discussions with key stakeholders
- City staff survey
- Public forum information meetings

The UFMP provides detailed information and recommendations to improve Helena's community forest. Improving the community forest is no simple task. Trees are generally overlooked as an important and integral part of the urban infrastructure. Municipalities must be compelled to always include the aspects and needs of trees when they make decisions about transportation, water quality, energy costs, beautification, and climate mitigation. Urban trees are sometimes placed in poor locations in conflict with other city infrastructure and often suffer from long-term maintenance neglect. Community trees can only provide maximum benefits when coordinated with the complex city infrastructure. Improving Helena's street and park trees and conservation areas involves many objectives that will need to be funded and fulfilled if the community's vision for its trees is to be realized. The implementation of the UFMP will ultimately contribute to the quality of life in Helena through enhancements to the tree population.

The objectives of the management plan support the primary vision and mission of improving Helena's community through proper management of the city's most valuable asset – trees. The UFMP follows the program vision to retain a high quality of life by focusing on actions to increase the benefits and values of trees, and to improve on the responsible management of Helena's urban forest. City administrators, elected officials, city staff, and citizens must have this vision for the future of the Helena's urban forest:

Helena Urban Forestry Vision Statement

The City of Helena, recognizing the value of city trees as an equal part of the community's infrastructure, intends to manage, foster, and promote the maintenance of community trees using the best management practices to sustain a vibrant, healthy, and safe community forest resource for the benefit of Helena's residents, visitors, and ecosystem.

The primary goal is to assure that safe, healthy urban trees reach maturity, continue to thrive, and not create future problems or conflicts with other infrastructure. The UFMP supports these concepts and includes a program mission statement. The objectives were developed to address the challenges and issues that confront the city's trees and their stewardship. The objectives are dependent on one another and build upon the success of their implementation. Removing, pruning, planting, and preserving trees; educating stakeholders; and improving coordination and communication among citizens, stakeholders, city staff, and elected officials must be comprehensive for the UFMP to succeed.

Helena Urban Forestry Mission Statement

The City of Helena is dedicated to provide proactive management, maintenance, and preservation of trees within the municipality and to provide quality customer service, education resources, and volunteer opportunities to ensure the long term safety, health, viability, and aesthetic quality of trees in our community.

The UFMP guidelines promote considering city trees as major and important urban infrastructure. It outlines best practices to incorporate trees into the urban framework. The UFMP provides for the development of a progressive long-range urban and community forestry program that will result in a healthier and safer forest in Helena.

Acknowledging trees' major contribution to Helena, the goal of this management plan is to provide a strategic approach to sustaining community trees. Increasing knowledge of the measurable benefits of urban trees, combined with greater annual urbanization, and a greater number of people spending more time in Helena, forces the community to have a responsibility to ensure the success of their provision and care for urban trees. The UFMP is a tool to be used for guiding the tree program and garnering support, cooperation, and funding for the tree program.

MANAGEMENT GOALS

The UFMP establishes these management goals for the City of Helena.

- Accept and implement the Urban Forestry Management Plan.
- Increase urban forestry funding
- Continue to educate staff to meet industry work practices.
- Implement a cyclic five year pruning program for young and mature trees.
- Remove high-risk trees.
- Create a tree planting plan; promote proper planting of new trees and diversification of species.
- Complete the inventory of public trees.
- Create a tree ordinance to incorporate the recommendations and goals of the city's tree management plan, adopt the ordinance into the city code, and implement ordinance enforcement practices.
- Enhance the design of the downtown with tree plantings.
- Provide education and public awareness of the importance of the trees to the community; educate city staff and the community on proper tree care; and encourage greater participation in tree steward activities.

The recommendations made in this plan are intended to be considered and implemented over a period of five years. The results of the plan's implementation, in relation to the overarching goals and final measurable result of achieving these goals for the city may take 10 years or more.

Trees are long-lived organisms. Maintaining existing trees and planting trees today will provide benefits for future generations of citizens. However, by having systematic tree planting and maintenance programs in place, and by having adequate funding, staffing, regulations, and public education resources today, the future public tree population and overall urban forest will thrive, expand, and be sustainable.

These goals may change over time, both through completion of specific projects and through the changing nature and composition of the tree program and tree populations over the years.

MANAGEMENT RECOMMENDATIONS

These recommendations are based on program management goals and are preliminary steps to enhancing the urban forestry management program for the city of Helena. The following table contains a summary of the management goals contained in the UFMP.

TYPE	RECOMMENDATION	DESCRIPTION	PAGE
Program Objectives			
Management Information	Tree inventory	Inventory public trees to enhance short and long-term management of public trees.	23
	Management Plan	Utilize management plan to establish a clear set of priorities and objectives related to goal of maintaining a productive and beneficial community forest.	24
Program Planning	Effective administration	Responsibility for administration of community tree program	26
	Five-year management plans	Create five year plans that are first level of operational planning	28
	Annual operating plans	Create annual work plans to direct day-to-day operations.	29
	Communications strategy	Create a strategy to capture key stakeholders and broader community input to the vision and goals for the future management plan development.	30
	Education, outreach, and stewardship	Strategies to expand education, outreach, and stewardship of the urban forest.	33
	Urban forestry advisory tree committee	Engage tree committee in program development, annual operating plans, and community outreach.	34

TYPE	RECOMMENDATION	DESCRIPTION	PAGE
Risk Management	Risk tree management	Managing tree risk and reducing city liability	34
	Risk tree abatement	High risk trees should be inspected as soon as possible and removed to reduce risk to residents, visitors, and facilities.	36
	Tree inspections	Establish an inspection routine to inspect trees regularly for risk and maintenance treatments.	39
Maintenance	Tree maintenance	Establish tree maintenance program	40
	Tree Pruning	Implement arboriculture industry pruning standards and specifications	41
	Mature tree care	Establish a two to five year cyclic pruning program for mature trees	43
	Young tree pruning program	Implement a pruning program for new trees to establish structure and branch architecture	45
Tree Resource Expansion	Tree planting	Establish annual planting program	49
	Tree planting practices	Install new trees with root collar at grade level; treat circling and girdling roots at the time of installation.	51
	Mulching	Apply mulch in 10 foot diameter circles to all new tree installations and recently planted trees to avoid mower and weed eater damage.	52
	Diversification	Install many varieties of trees. No single genera should account for more than 10% of the population.	53
	Diameter distribution	Create a program that strives to increase the population of large stature trees.	54
Recycling Wood Waste	Recycle wood waste	Recycle tree residue for use as secondary products, mulch, biomass, fuel production or composting.	56
Tree Resource Protection	Tree preservation and conservation	Preservation and conservation of urban trees.	56
	Construction	Require developers and contractors to preserve trees and use best arboriculture practices to protect trees in construction areas	57

TYPE	RECOMMENDATION	DESCRIPTION	PAGE
	Vandalism	Use public outreach and education to reduce vandalism and accidental tree injury.	58
	Young tree protection	Educate public to prevent animal damage and vandalism.	58
Helena Tree Ordinance Review	Tree ordinance development	Write a tree ordinance with community input to reflect current arboriculture practices, address program goals, and meet community needs.	59
Downtown Trees	Design, planning, and planting	Design and develop sites conducive to tree planting and tree growth.	64
Operational Review	Develop and enhance program functions and funding	Improve program budget, leadership communication, staffing, staff training, and political support.	71
Program Actions	Program recommendations	Management actions for implementation in the next five years	80

The UFMP initiates an effort by the Parks and Recreation Department to form systematic management strategies for management of the public tree population of Helena. Short and long term goals are addressed in detail in the UFMP and listed below.

PROGRAM ACTIONS

There are program management elements that must be addressed on an annual basis: Risk Tree Abatement, Proper Tree Maintenance, Tree Planting, and Program Administration. Although each of these objectives is essential to the maintenance of the community forest, an annual plan should be established to determine where budget dollars will be spent. The UFMP recommendations have established public safety, responsible management of existing trees, and tree planting as highest priorities.

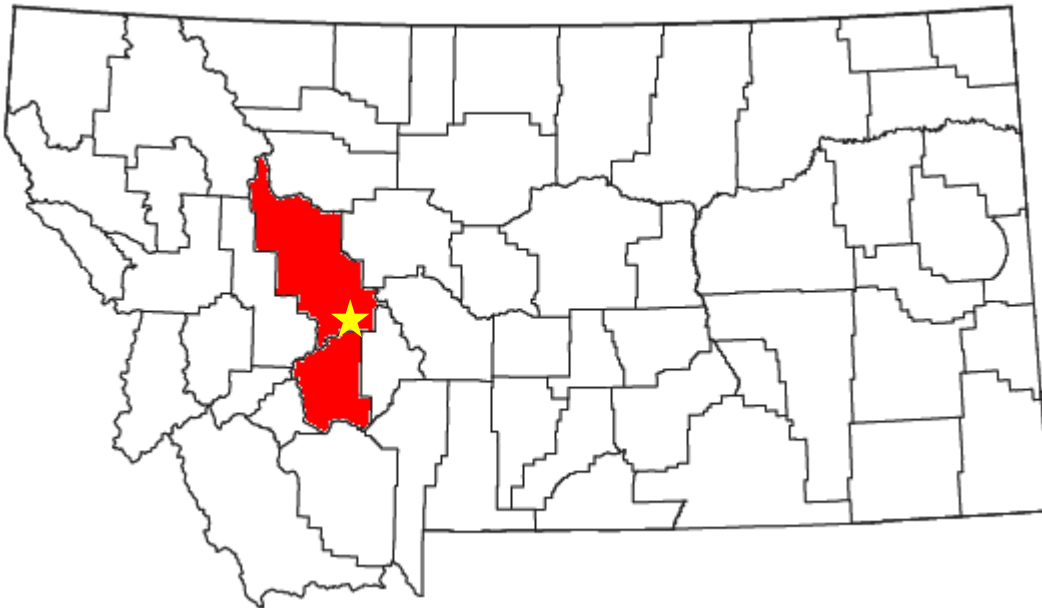
Long-range planning mainly concerns program enhancement and involves the completion of recommendations in the management plan. There are program management elements that must be addressed to sustain the community's tree program and trees: Community Forestry Management Plan Acceptance and Implementation, Increase Funds Spent on Community Trees, Community Outreach and Education, Tree Ordinance Revision, and Downtown Tree Design and Planting.

The recommendations and actions will help Helena's tree resource thrive and sustain the tree canopy for future generations. Although this commitment will come with costs, the long-term benefits are significantly greater and will result in a sustainable asset for the citizens of Helena today and tomorrow.

INTRODUCTION

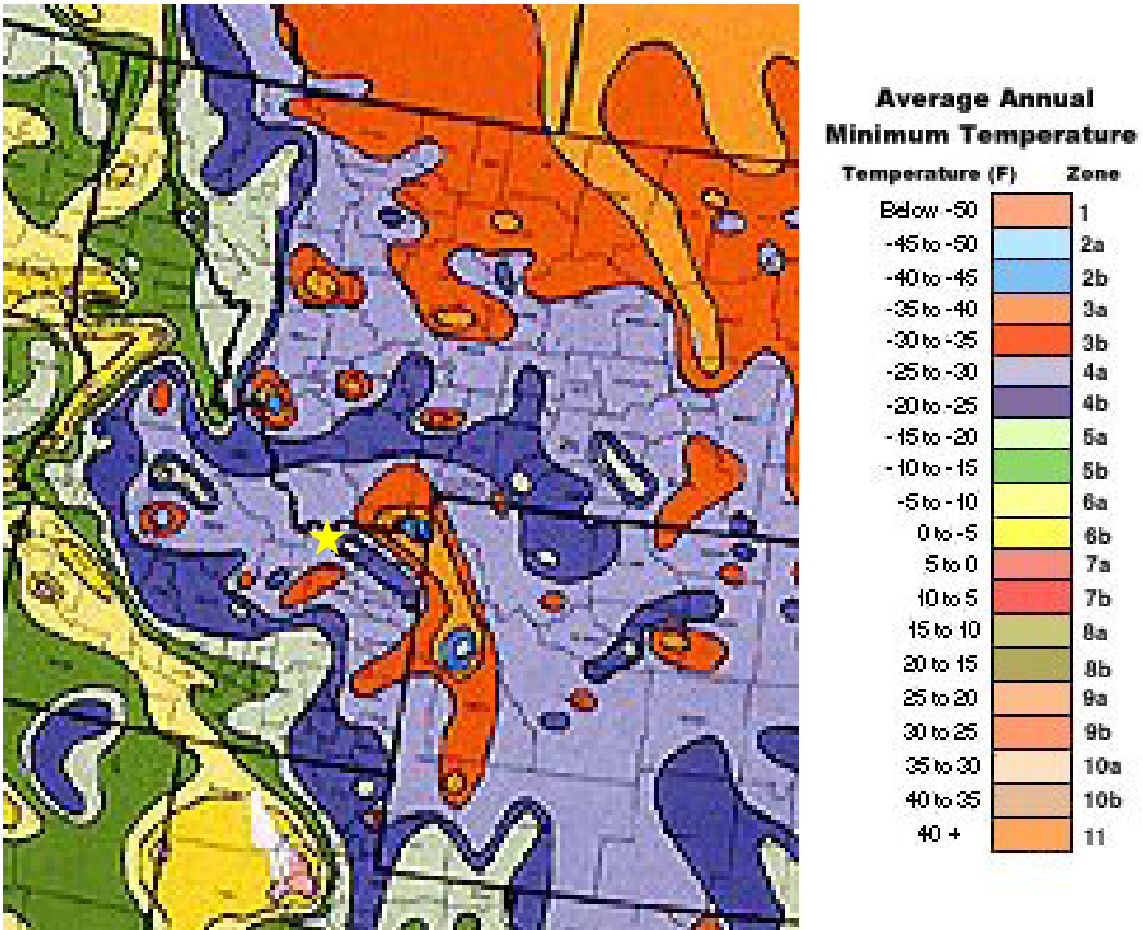
In 2010, the Montana Department of Natural Resources and Conservation (MDNRC) Community Forestry Program provided grant funding to assist the City of Helena to begin a public tree inventory. The city of Helena hired Community Forestry Consultants, Inc. (CFC) to develop an Urban Forest Management Plan using inventory data, surveys, stakeholder meetings, city document reviews, and other resources.

Helena, the capital city of Montana, was founded in 1864 as consequence of the discovery of gold by the Four Georgians. Helena is the largest and principal city in the Helena Micropolitan Statistical Area, which includes all of Lewis and Clark and Jefferson counties. Helena's population is about 30,000 and the combined county population is over 75,000.

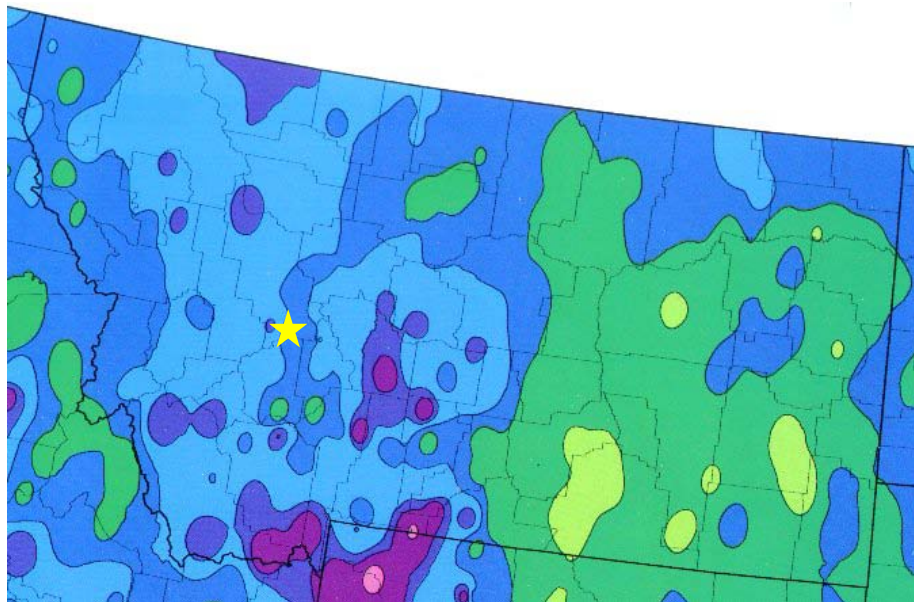


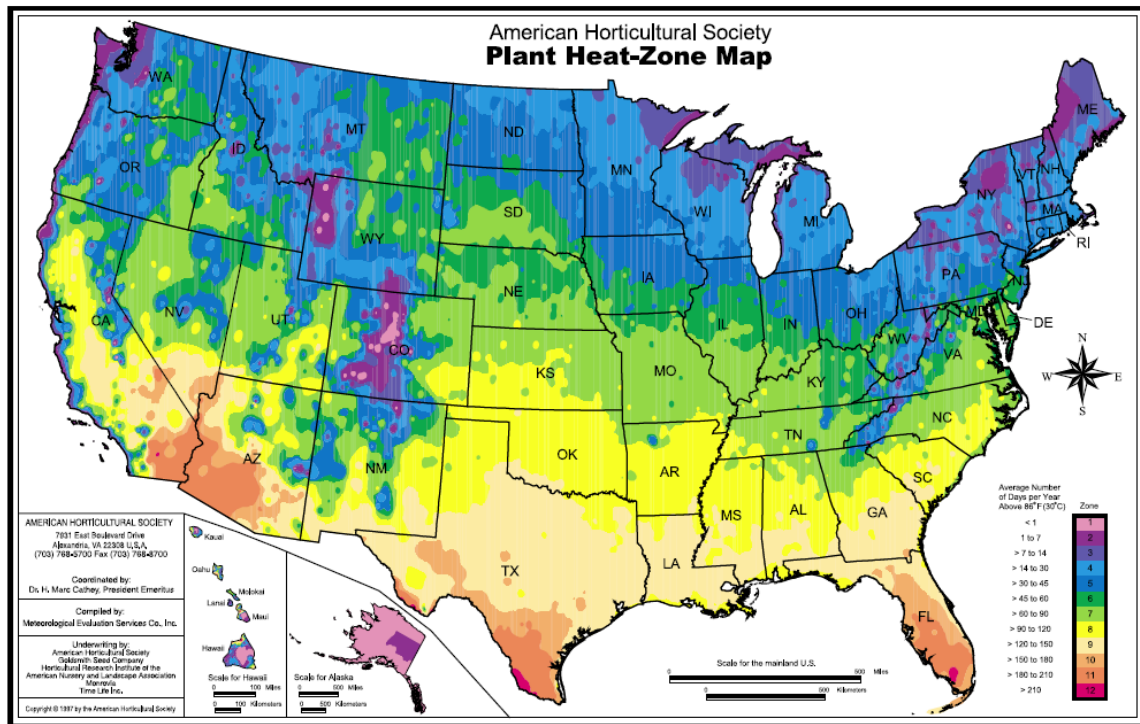
Helena has a semi-arid climate with long, cold, moderately snowy winters, very warm and dry summers, and short springs and autumns in between seasons. Monthly daily temperature means range from 20.2 °F (-6.6 °C) in January to 67.9 °F (19.9 °C) in July, with lows significantly cooler from April to October, due to the aridity and elevation. Snowfall has been observed in every month of the year, but is usually absent in May and September, accumulating normally in lightly amounts, partly due to warming influence from chinooks. Precipitation mostly falls in the warmer months and is generally sparse, averaging only 11.3 inches (287 mm) annually.

Zone	Fahrenheit	Celsius	Example Cities
3b	-35 to -30 F	-34.5 to -37.2 C	Sidney, Montana
4a	-30 to -25 F	-31.7 to -34.4 C	Helena, Montana



Helena is considered to be in the USDA plant hardiness zone 4a to 4b, - 30 to -20 degrees for minimum temperatures.





The average number of days above 86 degrees per year ranges from 1 to 14.

The official symbol of Helena is a drawing of "The Guardian of the Gulch", a wooden fire watch tower built in 1886, that still stands on Tower Hill overlooking the historic downtown district. **Helena is about to establish an urban forestry program, another guardian for the community's urban forest.**



Program History

The trees, landscapes, and open spaces now enjoyed were preserved or planted by early settlers, individuals, city staff, garden clubs, civic, and youth groups. These people worked to enhance the livability of Helena through tree planting and preservation, their donated money, and time.

Helena obtained the National Arbor Day Foundation's (NADF) TREE CITY USA status in 1985. Helena is the third Montana community with the tree city designation behind Great Falls and Billings yet lacks many of the urban forestry management functions found in these programs.

Tree maintenance has always been the responsibility of the Parks & Recreation Department. Before 1997, tree maintenance was funded by the general fund. There was the staff equivalent of 1 full-time employee (FTE) comprised of one full time staff person working on trees for 4 months and one seasonal employee for 4 months. Tree maintenance activities consisted of responding to action orders when they were submitted by the public.

In 1997 the Helena Commission voted to establish a tree maintenance district assessment of \$10.00 per parcel which was used by the Parks & Recreation Department staff for tree maintenance. The average revenue generated from the assessment over the last four years is \$118,000.00. Tree maintenance activities have been pruning primarily in response to public requests and reactive responses. Block pruning was performed on a limited basis. Over the last two years approximately 600 trees were pruned annually. There have been very few trees removed. Approximately 50 trees were removed annually over the last two years. New tree planting has largely occurred during Park & Recreation capital projects or through the efforts of the Growing Friends of Helena. About 100 tree plantings by city staff occur annually.

A formal resolution to change the tree maintenance district assessment to a tree management program and raise the assessment to \$20.00 was presented to the Helena Commission in November 2010. This assessment would generate approximately \$260,000.00 annually for an urban forestry program.

Organizational and Functional Overview

The tree maintenance program is housed within the Helena Parks & Recreation Department, which historically responded to tree-related issues and permit issuance. Currently, the equivalent of 1.5 FTEs performs tree maintenance part time, which serves more than 30,000 residents and over 20,000 street and park trees. There is no International Society of Arboriculture (ISA) Certified Arborist on the city staff. The parks superintendent oversees the tree maintenance staff. There is no urban forester managing the program.

As the tree program is currently structured and staffed, the range and complexity of administrative and arboriculture responsibilities exceeds the capacity of staff. As such, responsibilities for the management of the urban forest fall towards reactive rather than proactive management; **this reality illustrates a major limitation to the city's overall efficacy in managing, preserving, and expanding urban tree resources.**

Vision Statement

The vision statement describes how the community wants its landscapes to look and function in the future. This brief paragraph describes the desired outcomes of the plan. It includes sentiments about the importance of a community's trees and natural resources in terms of attractiveness, sustainability, people's health, safety, economic prosperity, and provisions for future generations.

Helena Urban Forestry Vision Statement

The City of Helena, recognizing the value of city trees as an equal part of the community's infrastructure, intends to manage, foster, and promote the maintenance of community trees using the best management practices to sustain a vibrant, healthy, and safe community forest resource for the benefit of Helena's residents, visitors, and ecosystem.

Tree Benefits

Few elements of the grey infrastructure of urban places can be said to boost property values, support retail activity, improve municipal health, protect water quality, reduce stormwater runoff, counter climate change, and ensure roadway safety—all at once. Communities looking for these benefits may be surprised to find a solution right in their own backyards, along their streets, and in their parks. The green infrastructure of trees, along with parks and open space, provide a wealth of benefits to Helena.

Trees have held a prominent role in discussions regarding environmental change, and more directly there have been a growing number of scientific studies in recent years specifically geared toward the role of trees in urban environments. Trees and urban forests provide environmental, ecological, economic, and social benefits to people living in urban and suburban areas. Environmental, economic, and social urban forest services and values are well documented in scientific and technical journals. A summary of key values and benefits, and some supporting sources, is provided below.

Water Quality & Stormwater Retention. Urban forests absorb rainfall, control surface water run-off, filter ground water and assist in ground water recharge. According to one study, 37,500 tons of sediment per square mile per year comes off of developing and developed landscapes, and urban trees could reduce this value by 95%. The Lake Helena Watershed has numerous problems, which will only multiply with continuing growth in the Helena Valley. The success or failure of the push to clean up the watershed, which includes the Prickly Pear, Tenmile, and Silver Creek drainages as well as man-made Lake Helena, in many ways will be determined by the amount of tree canopy associated with the city and region.

Urban tree canopy reduces stormwater runoff by intercepting and storing rainfall and increasing infiltration into the soil through improved soil structure. The US Environmental Protection Agency issued a report, *Using Smart Growth Techniques as Stormwater Best Management Practices*, which identified urban tree canopy as an innovative and sustainable means to dramatically reduce stormwater runoff and the costs associated with stormwater management. Trees contribute to water quality and quantity improvement through storm water control, attenuation of peak flows, maintenance of base flow, erosion control, and rainfall interception (Bernatzky 1983; Xiao et al 1998; Floyd 2002; American Forests 2007). Lake Helena is a critical watershed for the region and trees are a critical component in the management of the watershed and maintenance of water quality.

Air Quality Improvements. Trees absorb gaseous pollutants such as ozone, nitrogen oxides, and sulfur dioxide; and they filter particulate matter such as dust, ash, pollen, and smoke. Reductions in these pollutants results in improved public health and reduces the severity of ozone-induced asthmatic responses and other respiratory illnesses. Urban trees absorb carbon dioxide, a major greenhouse gas, at an approximate rate of 230-lbs per year per tree. According to the U.S. Department of Agriculture, "one acre of forest absorbs six tons of carbon dioxide and puts out four tons of oxygen. This is enough to meet the annual needs of 18 people."



Poor air quality day in the Helena Valley.



Tree canopy is a major weapon in use today to improve air quality. This photo illustrates the lack of tree canopy and the need for more and better maintained trees in Helena.

Trees improve air quality by producing oxygen, absorbing pollutants, and sequestering carbon (Rowntree and Nowak 1991; Nowak 1992; McPherson et al 1999; American Forests 2007). A regional ecosystem analysis specific to Helena using tree inventory data can estimate the monetary value of pollution removal services provided by the urban forest.

The Economics of Aesthetics. Improving aesthetics of Helena has tangible economic benefits. Networks of natural areas and trails give a community a reputation for being a good place to live and visit. Increased recreational and community activity attracts new businesses, fosters expressions of creativity, and stimulates tourism. Due to the changing nature of business needs and the move toward a service and technology based economy, businesses locate or re-locate based on a community's quality of life, including an abundance of open space, nearby recreation, and pedestrian friendly neighborhoods. Nationwide, easy access to parks and open space has become a new measure of community wealth – an important way to attract businesses and residents by guaranteeing both quality of life and economic health.

Aside from the potential price effect on residential property sales, trees in retail settings increase shoppers' willingness to pay for goods and services by 12%. Shoppers also indicate that they are willing to drive farther and stay longer if a retail district is well-landscaped with trees. Also, respondents consistently reported greater willingness-to-pay for goods and services in the landscaped mall at an overall rate of 8.8%. Urban forests create an appealing consumer environment in business districts (e.g., Wolf 2003, 2005).

Increases in land values or sale prices as a result of quality landscaping and the presence or retention of trees offers a secondary benefit to the local jurisdiction. The adjustments directly relate to additional revenue from sources such as real estate transfer taxes and property tax assessments (Behe et. al. 2005; Wolf, 2007).

Homes with trees are generally preferred to comparable homes without trees, with the trend across studies being a price increase of about seven percent. This figure can go higher on acreage development properties. Market price studies of treed versus un-treed lots show this range:

<u>Price Increase</u>	<u>Condition</u>
18%	building lots with substantial mature tree cover
22%	tree-covered undeveloped acreage
19-35%	lots bordering suburban wooded preserves
37%	open land that is two-thirds wooded

Trees and forest cover in development growth areas provide benefits to parcels and are often the reason people purchase wooded lots.

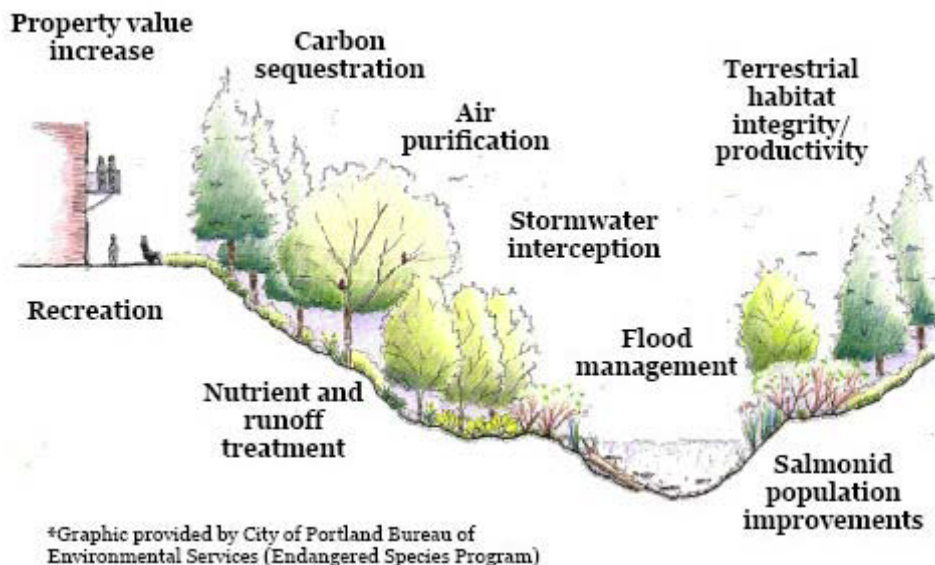
Health & Well-Being. Public spaces with trees receive more visitors, increasing the frequency of casual social interactions and strengthening the sense of community. Trees along transportation corridors narrow a driver’s field of vision, reducing traffic speeds, and increasing pedestrian safety by providing a natural, physical barrier. Studies have found that urban highways lined with trees decrease driver stress, resulting in fewer incidents of road rage. Trees foster safer, more sociable neighborhood environments and have been shown to reduce levels of crime, including domestic violence. Views of nature reduce the stress response of both body and mind when stressors of urban conditions are present. Hospital patients with window views of trees recover significantly faster and with fewer complications than comparable patients without access to such views. Overall, the service value of individual urban trees can be quantified as shown in the graphic below.

Average annual net benefits values per tree by size

Small	Medium	Large
\$1 - \$8	\$19 - \$25	\$48 - \$53

Source: *Society of American Foresters: Western Forester, January 2007*

The graphic below illustrates the various benefits of and the integrated functions provided by the urban forest.



While real costs must be borne by the city of Helena and its residents because of the urban forest (e.g., storm damage, removals, planting, care, leaf removal, infrastructure impacts, etc), the protection and expansion of the Helena urban forest will yield increased environmental, economic, and social benefits. This plan specifies a number of actions the city can take to maximize these benefits and engender community involvement and activism.

The impact that trees make on our communities is tremendous and although we can quantify some of their benefits, we cannot always quantify the social and psychological values. But we know they exist. People in communities mourn the loss of trees from storms or from other problems. People often rally around planting, protecting, and ensuring that trees are a part of their neighborhoods and communities.

Trees have many positive impacts on the Helena environment and community. Community forests convey a number of quantifiable benefits which can be enhanced through management. A well managed urban forest provides valuable services. Their primary benefits include:

Helena Tree Benefits and Values

The 2010 UFMP details nine distinct Elements that will individually and collectively help Helena achieve a better and balanced future. Public landscape trees and forest ecosystems support and enhance each of these Elements and can contribute greatly to their successful implementation.

1. UFMP Element: Natural Resources—The primary goal in this element is to encourage protection and restoration of ecologically valuable lands that protect water quality, wildlife habitat, and forest canopy by minimizing impacts of human activities. Benefits and values trees provide to the natural resource element are as follows:

- The erosion factor on urban developed lands is greater than forests. Trees can reduce the amount of sediment that runs off developed and developing land.

- Mature trees remove air pollutants and improve air quality.
- Store and sequester carbon dioxide.
- Mitigating climate changes by reducing green house gases.
- Reducing pavement temperature, which reduces the rate of asphalt deterioration.

2. UFMP Element: Parks and Recreation—The primary goal is to have a comprehensive park system that serves the recreational needs of the community. Benefits and values trees provide to this element are as follows:

- Trees make parks more desirable locations for recreation and leisure activities.
- Trees and forests offer educational and interpretive opportunities for park programs.
- Trees and open green space provide wildlife habitat.

3. UFMP Element: Heritage Resources—The UFMP intends to protect and restore heritage resources that are significant to the Helena’s identity. Benefits and values trees provide to this element are as follows:

- Individual mature trees on historic sites are markers and living witnesses of significant events and places.
- New tree planting can complement historic sites and preservation efforts.

4. UFMP Element: Community Design—Helena will have an attractive and functional community design. Benefits and values trees provide to this element are as follows:

- Trees and landscape are significant features of the Helena’s lasting contributions to community design, such as roads, downtowns, business corridors, public buildings, and parks.
- Trees balance the built environment within the natural world.

5. UFMP Element: Land Use—A complimentary range of land uses will be developed to encourage housing, employment, and preservation of the Helena’s green infrastructure. Benefits and values trees provide to this element are as follows:

- Trees and forests efficiently and effectively separate adjacent land uses.

6. UFMP Element: Housing—The primary goal is to provide a diversity of high-quality housing for future populations and workforce. Benefits and values trees provide to this element are as follows:

- Including street trees in landscape design increases property values.
- Homebuyer interest and homeowner satisfaction are increased when trees are preserved and major landscape elements are already established at the time of occupancy.
- Properly located trees reduce heating and cooling costs and reduce urban heat island effect.

7. UFMP: Economic Development—Helena’s goal is to have a strong, diverse economy that supports the community and a high quality of life. Benefits and values trees provide to this element are as follows:

- Development land values increase when trees are present.
- Trees and open space increase property values, tax revenues, income levels, real estate sales turn-around rates, jobs, worker productivity, the recruitment of buyers, and the number of customers in a given area and decrease unoccupied periods.
- Trees enhance business in downtown business districts.

8. UFMP Element: Transportation—Helena intends to have a safe, convenient, and efficient motorized and non-motorized transportation system. Benefits and values trees provide to this element are as follows:

- Trees enhance transportation routes—sidewalks, streets, and walking trails—by contributing beauty and functionality, such as shade and shelter.
- Trees absorb, filter, and moderate air pollution from vehicles on transportation routes.
- Trees screen roads and walkways from other adjacent land uses, creating visual and noise buffers.
- Creates micro-climates for humans along urban streets.

9. UFMP Element: Community Facilities and Services—Helena will serve its citizens with facilities and services in a cost-effective, equitable, and environmentally sensitive manner. Benefits and values trees provide to this element are as follows:

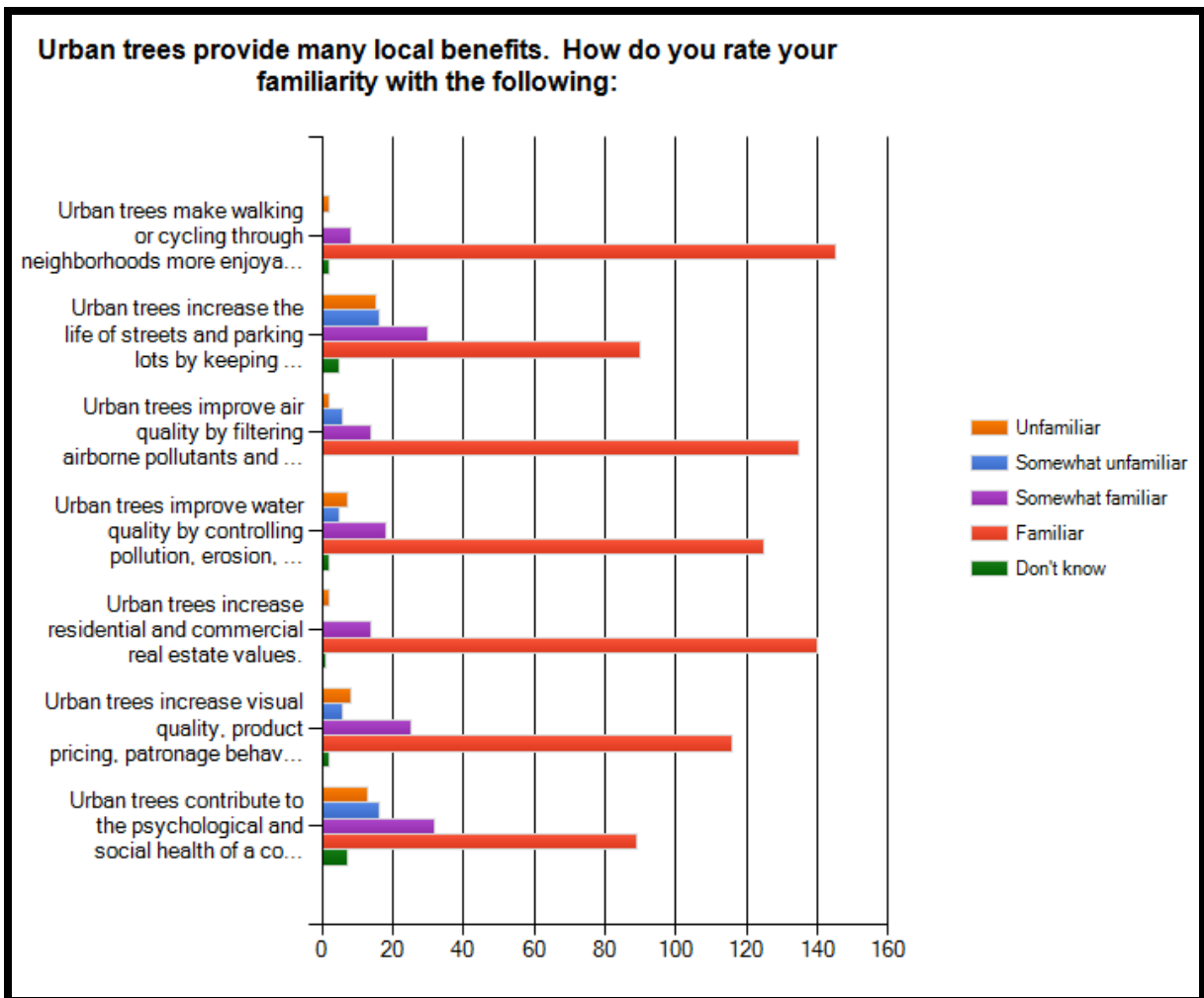
- Trees efficiently serve the community by providing energy conservation, facilitating stormwater infiltration/treatment, and pollution moderation services even after accounting for planting and future maintenance costs.
- A comprehensive urban forestry program adhering to current industry standards and performing routine and preventive tree maintenance uses municipal funds more efficiently than a reactive energy-based management system.
- Proactive urban forestry management programs increase public safety and decrease municipal liability for tree risk situations.
- Trees provide social and psychological benefits such as crime reduction and increased human health benefits

Environmental, economic and social urban forest services and values are well documented in scientific and technical journals. A summary of key values and benefits, and some supporting sources, is provided below.

- Trees provide benefits associated with physical, mental, and social human health (Dwyer et al 1992; Ulrich and Parsons 1992; Sorte 1995; Grahn and Stigsdotter 2003; Kuo 2003).
- Trees help to conserve energy by indirectly mitigating climatic effects through providing evaporative cooling, windbreak, and shading functions, thus reducing human dependence on power generation (Pouyat and McDonnell 1991; McPherson and Simpson 1994; Nowak 1994;).

- Trees improve air quality by producing oxygen, absorbing pollutants, and sequestering carbon (Rowntree and Nowak 1991; Nowak 1992; McPherson et al 1999; American Forests 2007).
- Trees contribute to water quality and quantity improvement through storm water control, attenuation of peak flows, maintenance of base flow, erosion control, and rainfall interception (Bernatzky 1983; Xiao et al 1998; Floyd 2002; American Forests 2007).
- Urban forests cool watercourses and mitigate noise and dust (Walton 1998).
- Trees provide habitat and food sources for wildlife such as fish, birds, insects, and small mammals (Tilghman 1987; Friesen et al. 1995).
- Urban forests create an appealing consumer environment in business districts (e.g., Wolf 2003, 2005).
- Trees increase property values (Behe et. al. 2005; Wolf, 2007).

Survey results indicate Helena residents are very familiar with the benefits tree provide to their community.



environmental asset to the community. Trees and forests are of vital importance to the environmental, social, and economic well-being of the city of Helena. Community trees are not just niceties, amenities, or disposable commodities but are necessities for the city of Helena. The city's community forest provides numerous benefits that are both tangible and intangible that can put money into the city pockets.

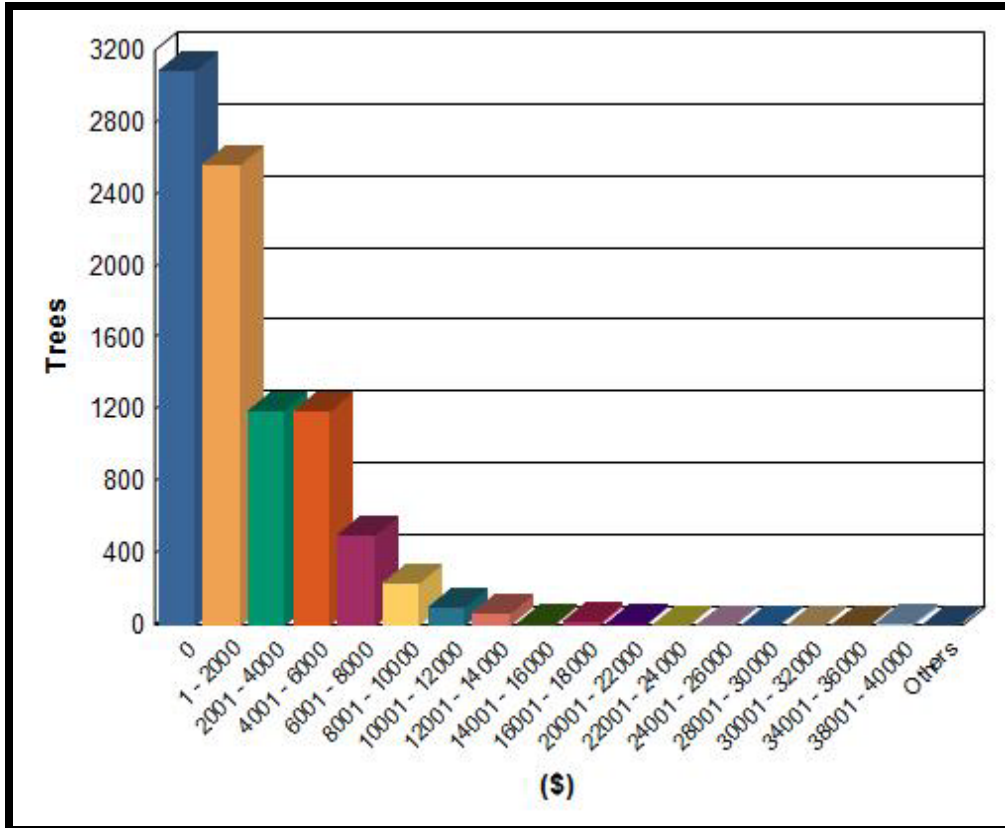
Appraised Value. Trees in urban areas are valued differently than their rural counterparts. Fire trucks have a monetary value (the cost of buying a new one) in addition to their immeasurable value when protecting citizens in the community. Trees, too, have an actual monetary value that is recognized by tree professionals, real estate experts, the judicial system, and the Internal Revenue Service.

Trees are a capital investment. Plant the right tree properly in the right place, maintain it, and it is an asset that will increase in value throughout its life. Trees in towns are like fire trucks and buildings. If no one cares for them, they lose value. If you don't change the oil in an engine, you save money, but eventually the truck quits running. If you don't maintain trees, you save money, but the trees decline, die, and along the way may become a risk to people and property. Deferring maintenance may save Helena money in the short run, but cost much more in the long run. In contrast, the elements of the gray infrastructure (fire trucks) look and function best when they are new. They decline in function and value as they get older.

Helena's tree population is an important financial asset of the community and has significant monetary value. Approximately 9,000 street and park trees were inventoried in the initial phase of the tree inventory project. The appraised value for those trees is described below.

Appraised Value

Total Number of Trees in Report:	9,031
Total Appraised Value:	\$19,319,030
Total Mean Appraised Value:	\$2,144
Median Appraised Value:	\$350
Minimum Appraised Value:	\$0
Maximum Appraised Value:	\$41,800



The appraised value of street and park trees was determined from the Council of Tree & Landscape Appraisers Guide for Plant Appraisal, 9th Edition.

Trees are of vital importance to Helena’s environmental, social, and economic well-being. The city’s community forest provides numerous benefits that are both tangible and intangible. Trees are the only asset owned by the city that increases in value as they age but only if they receive proper maintenance.

The appraised value of trees inventoried to date is lower due to the large number of removals, poor condition of the trees, and deferred maintenance. The appraised value for trees inventoried to date should be 25 to 30% higher.

Public Process

A crucial element of developing the UFMP was soliciting information from city staff, key stakeholders, and citizens of Helena. Stakeholder input was used to assist CFC in identifying opportunities, issues, elements, actions, and goals for the UFMP. Four methods of gathering public input were used and included holding stakeholders public meetings, green industry stakeholders meeting, conducting interviews with Parks & Recreation staff, and soliciting comments through city staff, and public opinion surveys.

Comments and opinion from residents, along with industry and community stakeholders, shaped the direction of objectives and strategy for the future of the Helena Urban Forestry program. In addition, an internal review of the draft plan has been initiated to allow various city departments opportunity to comment. Also, two administrative meetings were held with the Helena Commission to solicit additional feedback on and

support for the proposed plan. A public hearing is planned as part of the UFMP development process.

Survey Results

In collaboration with staff, CFC developed a survey instrument to gauge city staff and residents' attitudes and insights about an urban forestry program, city policies, and certain management options. The internet-based survey was made available to city staff online during the months of September/October 2010 and to residents during the months of October/November 2010. Additionally, over 50 private and public companies that work with city trees or impacts the urban forest were sent an electronic and hardcopy invitation to participate in the survey and focus group meetings.

The combined number of completed surveys (245) and the detail provided in open-ended responses surpassed expectations for the survey. Highlighted responses are discussed in UFMP sections relevant to the survey question content. The survey instrument and summary data are provided in Appendix A. It is important to note that survey results are derived from a partial random sample, and respondent results cannot directly be attributed to the broader Helena community.

S.W.O.T. Analysis

A Strengths, Weaknesses, Opportunities, and Threats (SWOT) assessment was completed as a means to organize input and comments provided by the public, program affiliates, stakeholders, and city staff. The lists included in Appendix B offer a synthesis of the range of insights, perspectives and opinions regarding the current and future state of the Helena Urban Forestry program; this information has helped inform the development of the program objectives and specific action steps in this plan. Please note that it is common for a specific issue to be identified in multiple, even contradictory, sections of the SWOT matrix because different perspectives yield different perceptions.

Relationship to Other Planning Documents

To supplement the public participation conducted in the development of this plan, two community-based plans were reviewed for past policy direction and goals as they pertain to the protection and management of the urban forest. Trees and urban forestry offer solutions for every objective defined in these plans.

The City of Helena Growth Policy: Acknowledged in 2001 and amended in 2010 as part of the Consolidated Planning Board project, the Growth Policy directs land use planning and development policies for the city. It also establishes specific policies related to housing, transportation, water quality, public facilities and services, and economic resources. The UFMP and the establishment of an urban forestry program have a direct bearing on the Helena Growth Policy. The UFMP should be mentioned, if not incorporated as a component of the Growth Policy for the community. Trees impact all components discussed in the Helena Growth Policy and are an important component to the successful implementation of the Helena Growth Policy.

Helena Climate Change Task Force Action Plan 2009: The climate change task force focused on energy, water, transportation, and recycling. The task force recommended programs such as "Lush and Lean" Landscaping Practices for Municipal Properties and Adopt A Green Blocks Program. Trees as described in the UFMP tree benefit section provide enabling solutions for every component of the Climate Change Task Force

Action Plan. Trees are connected to climate and implementation of the UFMP will complement objectives, goals, and recommendations described in the Climate Change Task Force Action Plan.

The UFMP specifically establishes the goal of a comprehensive management plan for public trees. The UFMP will act as a stand-alone management tool for the Urban Forestry program. Upon review and adoption by the City Commission, this plan will guide the protection, expansion, and management of the urban forest, while also complementing the guidelines of the other city plans and policies.

URBAN FOREST MANAGEMENT PLANNING

In natural forests trees in all stages of growth and decay are important to the functioning of the ecosystem, and even when left alone a forest will convey many benefits to humans. The same cannot be said of city and park trees. The term “City Trees” includes trees subjected to tough urban conditions including street and park trees and those planted along boulevards, in medians, in parking lots, in tree vaults, and other urban open spaces. Their health and vitality are compromised primarily through limited soil volume, compacted soils, restricted root space, and conflicts with other city infrastructure.

Other urban activities such as mowing, leaf collection, vehicle and pedestrian traffic, vandalism, and pollutants submit community trees to additional stresses. Intense citizen use necessitates pruning and prompt removal of high-risk trees to maintain high safety standards. A sustainable urban forest requires careful management in order to maximize the benefits of green infrastructure while addressing the direct and indirect human influences on the trees.

Community trees play an important role in the livability of the city. The community draws a wide range of benefits from the trees. The urban forest has been recognized as a visual amenity and for its environmental benefits for several decades, but has only recently begun to be considered as a vital component of a community’s infrastructure, and given the specific label of “green infrastructure” or “natural capital” (e.g., Benedict and McMahon 2002; Wilkie and Roach 2004; Ewing and Kostyack 2005). As a result, in Helena as in many municipalities, resource allocation for management of urban trees has been relatively limited, and staff has largely been occupied with responding to emergency situations and service requests rather than having the opportunity to pursue more proactive management practices.

As with any type of infrastructure, the urban forest requires regular maintenance and monitoring to ensure that it continues to function properly and provide benefits to its maximum capacity. Infrastructure such as roads and sewers that are neglected for many years can only be repaired at a great cost to the city and the people who live there. For the urban forest, this neglect typically comes in the form of failing to plant young trees to replace maturing populations, failing to adequately diversify tree species to protect against species-specific diseases, failing to prune trees early on to limit the risks posed by trees as they mature, and failing to maintain mature trees properly.

Fortunately in Helena there are many opportunities to improve the urban forest through well-planned active management over time. This is one key area in which green infrastructure differs from built infrastructure; trees in cities, like other infrastructure, require maintenance to remain safe and viable but their value to the community generally increases over time as they mature so that they become less and not more of a liability.

The City of Helena, like so many communities, values its trees but has not, until recently, recognized that it should have a proactive, practical plan to ensure that the urban forest is managed to provide maximum benefits to the residents now and in the decades to come.

Management, maintenance, and preservation of trees in the urban environment can only be achieved effectively through the development and implementation of a Strategic Urban Forest Management Plan that standardizes the policies and practices surrounding all activities related to trees. This report lays out the framework for and components of such a strategic plan, one that encompasses a long-term vision with short-term goals for the management of trees in the city. It is up to the city to provide the short and long-term support required to implement it. The goal is to provide specific guidance on managing, maintaining, and preserving trees within the urban and suburban infrastructure.

Employing the best management practices of the arboriculture and urban forestry industries, stakeholders' attitudes and insights about the urban forestry program, city policies, and certain management options, the following recommendations are for enhancing Helena's community forest program. Community Forestry Consultants, Inc. recommends the following management and maintenance recommendations to improve the health, quality, size, and diversity of the working forest of Helena. This section outlines the primary objectives of this urban forest management plan.

PROGRAM OBJECTIVES

The overall goal of strategic planning and management of the urban forest is to ensure a healthy, aesthetic, safe, and diversified tree cover that can provide a sustained supply of environmental, economic, and social benefit to society. Research shows the average city tree lives only 32 years (Moll and Ebenreck 1989) and the closer to the city's center, the shorter the life of the average tree. To help address issues like these, a long range plan is essential for management of a resource that is by its very nature a long-term matter.

Strategic plans define goals for the agency's urban forestry program. Management plans define how individual goals are achieved through action plans and timelines. Each goal must have an achievable and discernable outcome. The outcomes are the policy that the agency wishes to have representing their program. Both types of plans can define the overall program management goals of the agency.

The objective of this report is to provide a framework for a strategic management plan that will set the parameters for a standardized approach to urban forest management designed to promote the growth of healthy, functioning trees. The aim is to fulfill this vision over a five-year timeline.

Tree Inventory Benefits

Many communities have public street and park trees, a shade tree commission, and plant trees, but how many actually know what the resource looks like, the condition it is in, the benefits it is providing, and how effective their program has been? Whether you are managing a retail store or natural resources, an inventory is critical. Without an inventory of the resource, you don't know what you have, what condition it is in, and what kind of work is needed to maintain or manage it for the future. An inventory also helps you better document the many benefits that trees are providing the community.

Tree inventories are the foundation of an effective tree management program. Tree inventories help vegetation managers identify current and potential problems and plan for budgets, removals, pruning, planting, and other maintenance requirements. A tree inventory is a means by which an urban forester can acquire and retain pertinent information about the condition and value of Helena's tree resources. The inventory data supplies objective and quantitative information that can be used to document estimates for funding, personnel, and equipment. Using and regularly updating the tree inventory moves the urban forestry program into proactive management.



Inventory data collection

Street and park tree inventories provide information for the planning, design, planting, maintenance, and removal of trees. It provides useful

information to justify starting and managing a tree program and funding an existing program. An inventory of a community's public trees and planting spaces is a prerequisite for making sound decisions. A community that operates a tree program without an inventory may question the need for an inventory. Previous decisions may have been based on tradition rather than an accurate assessment.

A tree inventory can quantify the answers to many important questions. For example, an inventory can provide the location of risk trees, the number of trees located within the public right-of-way, the value of street and park trees, and the number of available planting sites. In addition, an inventory can help identify insect or disease problems, pruning needs, and work and budget priorities.

With this information, tree boards and staff can better plan and prioritize tree removals, maintenance work, and plantings. They can also determine the value of public trees, which can help emphasize the program's importance. An inventory can be used to monitor tree conditions and quickly and accurately answer management questions, such as where and how many trees should be planted in a year. Over the years, changes in a

community forest can be seen in the number, age, condition, and species of trees. A well-maintained inventory can be used in cases of liability to demonstrate that there was no negligence in the inspection or care of these trees. An inventory will also improve the chances of receiving grants and other assistance by providing documentation of the extent and worth of street and park trees.

The partial inventory and management plan is a starting point for continued active management of the working forest resource of Helena. To assist in the future implementation of the UFMP and development of the urban forestry program, a complete inventory of public trees is needed. The city has started collection of a city-wide inventory of public trees using TreeWorks™, an ArcGIS tree management software. **The following objective will enhance management of the urban forestry program.**

- Complete the inventory and assessment of the tree population using experienced arborists to obtain accurate, functional data necessary to manage the urban forestry program.

Completing the tree inventory and using TreeWorks™ to prioritize maintenance establishes a systematic tree maintenance program which actually reduces costs. This is primarily because systematic maintenance in general leads to healthier trees that require less expensive maintenance over the long run than unhealthy, high-risk trees. A computerized tree inventory aids in reducing the subjectivity of tree management decisions and stimulates proactive responses.

Management Plan Benefits

Traditional forestry is the management of trees or stands of trees for timber production and other values including wildlife, water quality, and ecological health. Urban forestry is the management of trees and other forest resources in urban ecosystems for the environmental, economic, social, health, and aesthetic benefits trees provide society.

Municipal tree plans provide policy and standards for implementing and managing tree programs. The principal purpose of a community tree plan is to guide the management and maintenance of a community tree program, including tree removal, pruning, planting, funding, volunteer opportunities, and other important work. Tree plans should be consistent with other municipal planning strategies and usually include a vision statement, goals, objectives, and strategies.

In any given city nationwide, buildings and roads receive careful planning and scheduled maintenance. It is widely recognized that neglect of infrastructure planning and maintenance can result in deterioration leading to numerous potential expenses and risks. Why should trees receive any less planning, attention and care? Tree management plans help cities proactively manage their tree resources to avoid risk, reduce liability, cut maintenance costs, and increase the value of trees.

A comprehensive plan helps promote the future health and sustainability of the community's street and park trees, while providing a framework to make difficult decisions about tree removal, preservation, pruning, and planting. Without a proactive approach to tree issues, Helena runs the danger of addressing tree issues reactively – and paying a steep price for maintenance, removal, and liability associated with tree failures.

The city of Helena, aided by a grant from the State of Montana Department of Natural Resources and Conservation (DNRC) Community Forestry program has undertaken an initial inventory. The City of Helena has taken the proactive step of creating a comprehensive UFMP. The UFMP was systematically developed by a review of existing city documents, specifications and standards, tree inventory data; through interviews with key staff and interested citizens, surveys, field observations, and by applying national arboriculture standards and best management practices. Field observations of trees along streets, in parks, and in the downtown corridor were conducted. This is a customized UFMP for the City of Helena based on local conditions, resources, and priorities.

The UFMP is intended to provide strategies, goals, policies, standards, and actions to protect, enhance, expand, and preserve the working forest for the benefit of the community. The UFMP provides program coordination and improves the city's tree management in an equitable, economic, and sustainable manner. Moreover, the UFMP will be a valuable strategic planning tool, serve as a road map to enhance the urban forestry program, and become a part of the 's comprehensive city plan.

The municipal tree plan will help the members of the tree commission, city staff, and other concerned citizens understand the current condition of the community forest and shape its future. Good tree management involves setting goals and objectives and developing specific management strategies to meet them. Implementations of the UFMP objectives are the foundation of an effective tree management program. It contains goals and objectives that will guide the City of Helena in its actions and decisions affecting public trees.

In developing the UFMP the following parts of a comprehensive municipal tree program are addressed.

- An inventory of street trees, park trees, and other open space areas.
- A community tree plan.
- A street and park tree ordinance.
- Administration by city staff and tree board.
- Sustainable funding.
- Tree maintenance, annual work plans, and budgets.
- Tree risk management.
- Consideration of trees in development review, planning, and other city projects.
- Opportunities for public participation and education.

This project follows a trend in urban forestry to move from reactionary management of individual trees—typically characterized by an emergency-response approach to problems and complaints—to a proactive, systematic, and strategic focus on an urban forest system as a whole. While limited municipal funds for forestry programs often constrain proactive tree care, management planning efforts can increase the efficacy and reach of scarce resources, and have significant impact on the landscape.

Sharing the UFMP could further educational efforts by showing staff, elected officials, and citizens how science informs tree management as well as promoting city pride. Knowledge gained from this UFMP should also be integrated into other city plans that

impact trees. Issues discussed in the UFMP can be used to educate the citizens about the value of trees to the community.

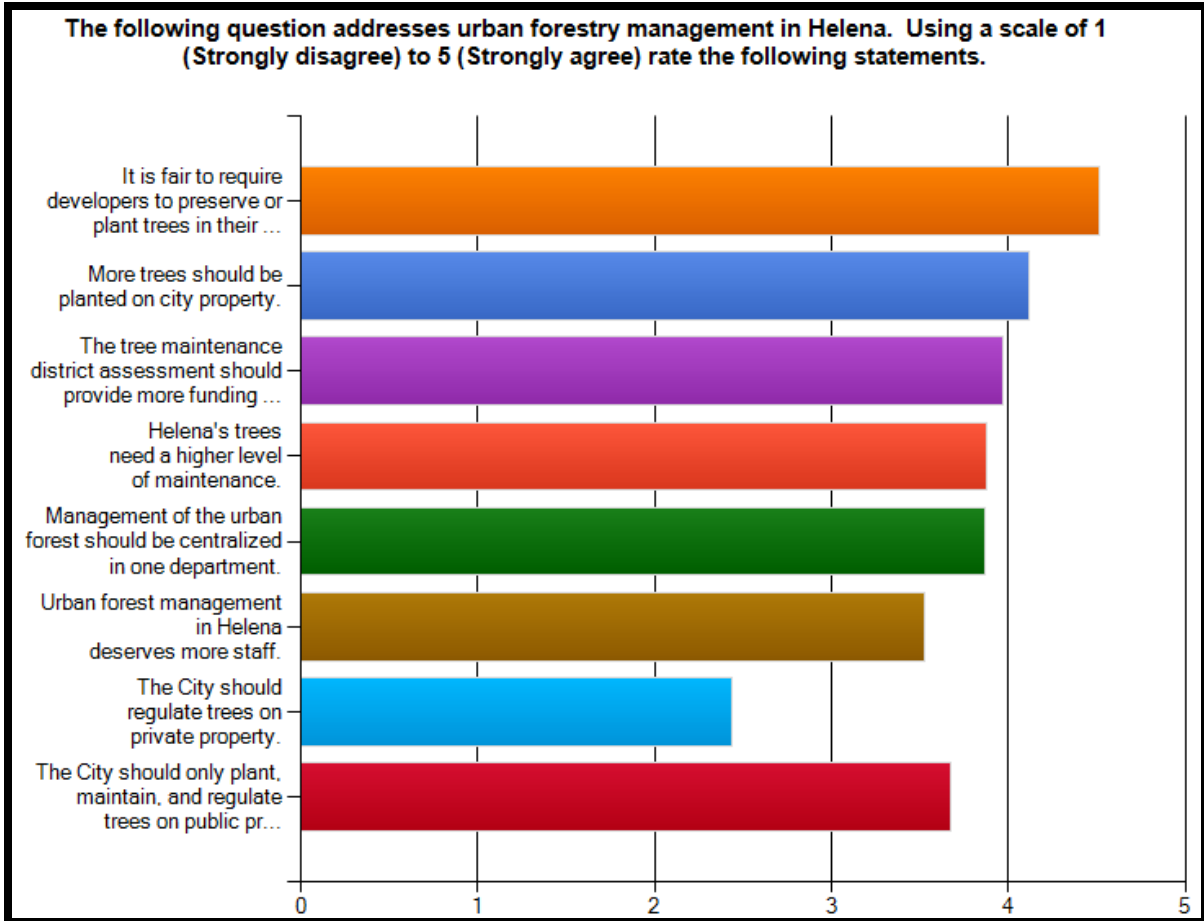
The UFMP will help raise citizen awareness of the benefits of a healthy, diverse and well-managed urban forest. A strong management plan will serve as tool to be used for garnering public support, cooperation, funds, and help the community sustain its trees for future generations.

The objectives of the municipal tree plan include:

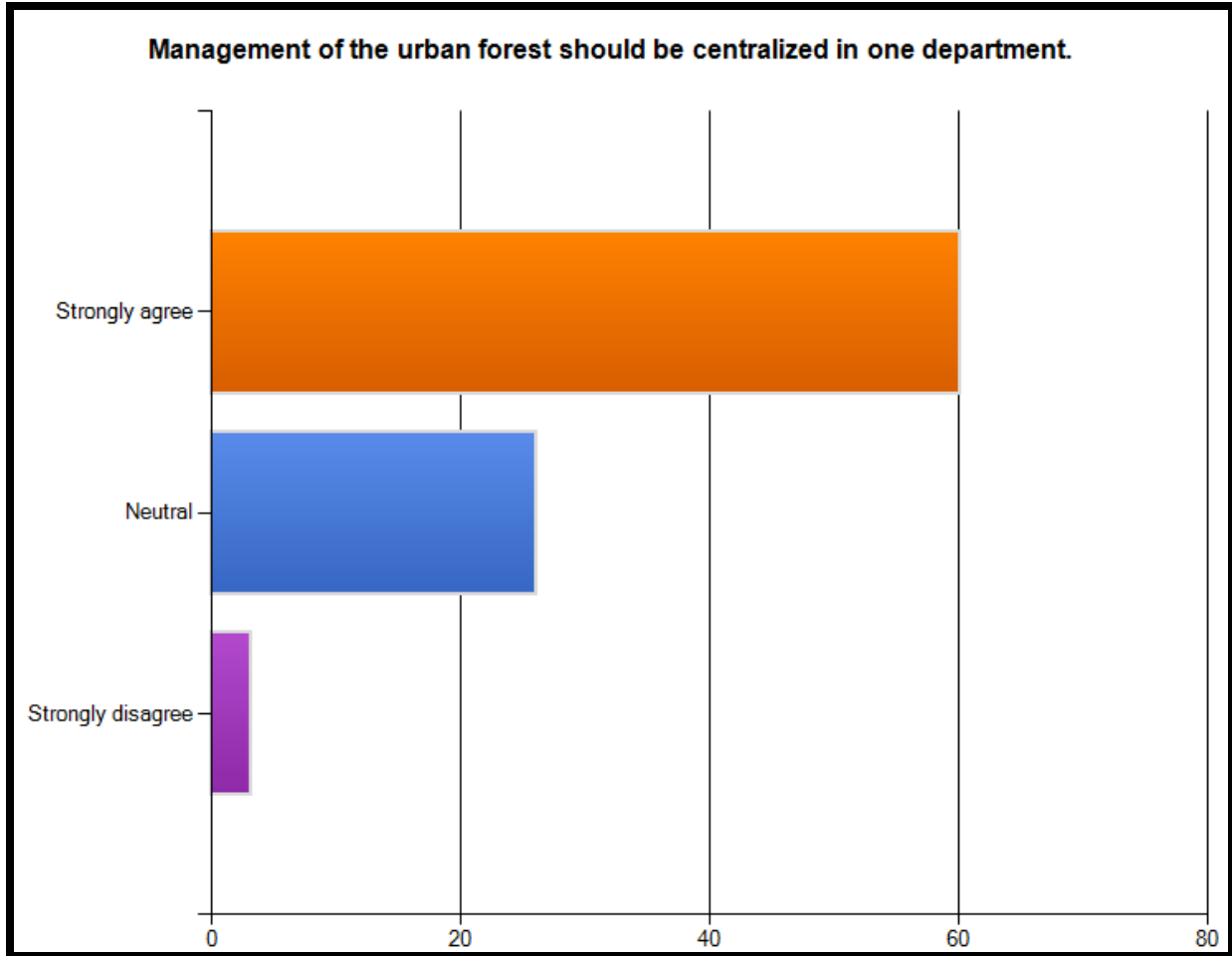
- Effective administration
- Annual analysis and removal of risk trees
- Proper tree selection and purchase
- Proper tree planting
- Proper tree maintenance
- Adequate funding
- Community education, participation, and collaboration

Effective Administration

Like the gray infrastructure of streets and utilities, trees are an essential part of a community's green infrastructure and should be administered effectively. The responsibility for administering a community tree program must be clearly defined and carried out on a regular basis. These responsibilities often are divided among elected officials, a tree commission, and municipal employees in various departments.



The size and complexity of a municipality will determine how to organize the tree program. In Montana cities similar to Helena, the community employs an urban forester to manage the tree program and to coordinate work among a tree commission, municipal departments, and the public. ISA certified arborists are employed to perform tree maintenance. Consulting arborists are often used for projects. Many variations of these organizational structures are possible. To ensure good program administration, the community should hire an urban forester to develop strategies that clearly designate department responsibility, assign responsibilities, and define procedures. Survey responses provide some direction for program establishment, funding, and implementation.



Community tree plans provide overall guidance to the long-term administration of public trees, which then must be translated into effective actions. Annual work plans for tree removal, tree maintenance, tree planting, periodic inspections, task scheduling, securing funding, and public education and involvement should be used to schedule the work required to meet plan's objectives and goals. By using an annual work plan and a budget based on this plan to prioritize and schedule tasks for the upcoming year, a tree program can become more efficient and avoid crisis management.

Framework for the 5-year Strategic Management Plan (2010 – 2015)

The plan is intended to primarily provide guidance to the Park and Recreation Department using a tree information database, in conjunction with a management cycle approach which will monitor short to long term trends, and serve as a tool for proactive management of the various issues and factors affecting Helena's trees.

This plan is also intended to provide guidance for the ongoing education of and coordination with the various stakeholders with whom city urban forestry staff must work for effective protection of the urban forest. This is intended to be an adaptive and "living" plan, creating a clear critical path for planning and activity, while still accommodating changes in priorities related to economic and/or environmental conditions.

Five-Year Management Plans

Five-year management plans are the first level of operational planning. The goals and objectives of strategic planning are incorporated into these plans as well as the immediate needs that are determined by reviewing the success or challenges of the previous five years of operations.

Each 5-year management plan will outline objectives for the relevant period, which will direct the annual operating plans. Figure 1 illustrates the contextual structure and indicates the components that repeat throughout each plan (shaded). Those areas exist as a working document and will be revised accordingly based on the previous year’s 5-year management plan review; any revisions will be done in the fifth year of each plan.

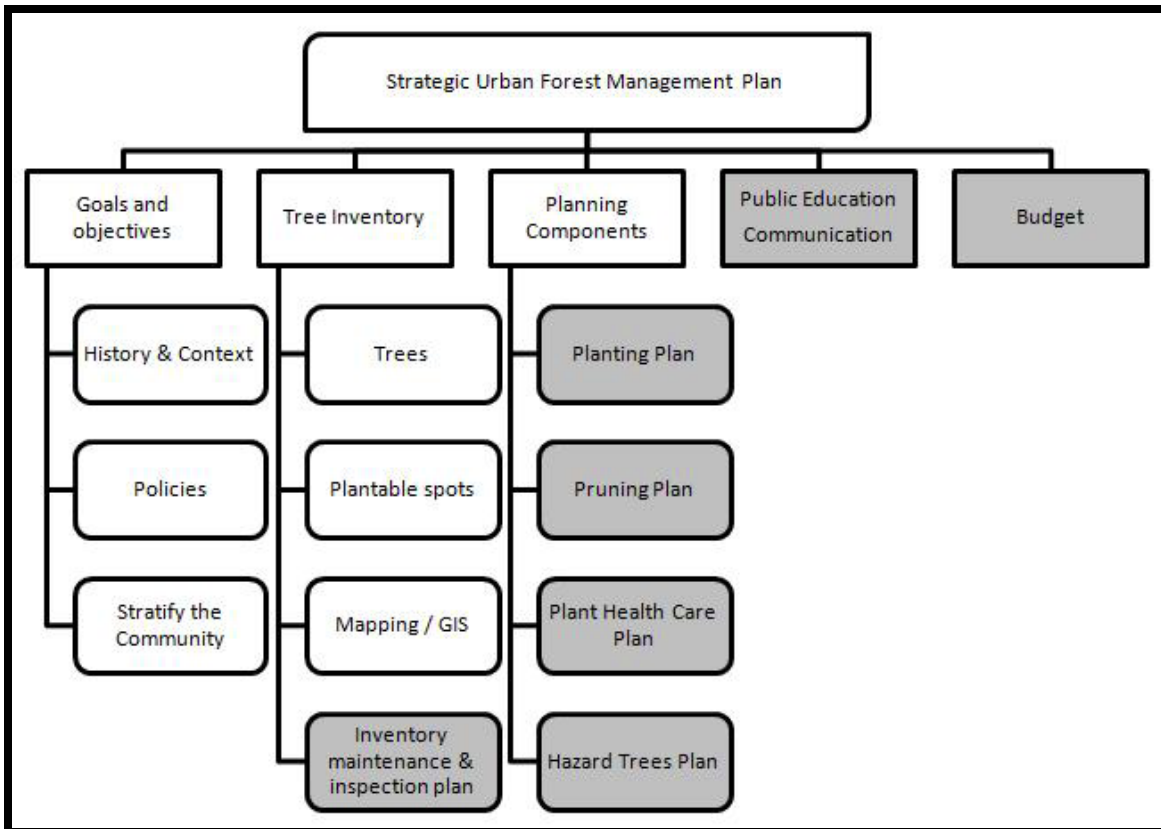


Figure 1: Contextual structure of the Strategic Urban Forest Management Plan (Bardekjian-Ambrosii).

Annual Operating Plans

Annual operating plans (AOP) will direct the day-to-day operations and can be used to project budget requirements for all aspects of maintaining the urban forest. The annual plan will include plans for planting, pruning, removals, inspections, plant health care, and maintenance of the inventory. Initially, the annual plan will need to address priorities derived from the inventory, but eventually will be focused on proactive management objectives. The preparation of AOPs is the responsibility of the City of Helena urban forestry staff. An example is provided in Table 1.

PROGRAM ACTIVITY	J	F	M	A	M	J	J	A	S	O	N	D
PLANNING												
Work priorities												
Organize activities												
Modification												
TREE REMOVALS												
Review inventories												
Field inspections												
Conduct removals												
Permit inspections												
TREE PRUNING												
Review inventories												
Field inspections												
Conduct tree pruning												
Permit inspections												
TREE PLANTING												
Review inventories												
Survey neighborhoods												
Purchase trees												
Install trees												
Water trees												
Permit inspections												
COMMUNITY EDUCATION AND OUTREACH												
Education programs												
Arbor Day Festival												
Tree Board												
STAFF TRAINING												
Professional development												
Safety training												

Table 1 – Example of an Annual Work Plan Chart

Communications Strategy

The communications strategy is comprised of three distinct but interrelated components that if effectively implemented and pursued on an ongoing basis will support the city’s overall community forest vision and mission. These components are: **(1) consultation, (2) education and engagement** and **(3) stewardship and hands-on involvement**, and are discussed in more detail below.

Effective implementation of this UFMP will require the “buy-in” and support from as broad a base as possible. This will include, but is not limited to: City staff (particularly those departments who need to work with, or around, trees), City Commission, Montana DNRC Community Forestry, local arborists, individuals, green industry trade groups, and COMMUNITY FORESTRY CONSULTANTS, INC. URBAN FOREST MANAGEMENT PLAN CITY OF HELENA, MONTANA February, 2011

groups involved in the protection and restoration of Helena's trees, private landowners, local green industries, and local institutions with trees on their properties or properties where trees could be planted.

Consultation: Once the strategic plan is complete, there will be a need to refine the goals and objectives through consultation with those considered key stakeholders in the development of a municipal urban forestry plan, as well as a need for periodic review of the status of the plan with these key stakeholders. The recommended components of the community consultations are described below, in order of priority:

- Soliciting community and key stakeholder input to establish *Five Year Plan* goals and objectives at the outset of the process.
- Creation of an urban forestry **citizen's advisory committee** to provide input to the *5-year management plans* on an ongoing basis.
- Conducting **public information sessions** to present the components and status of the five year management plans, provide updates on the plan's implementation over time, maintain interest, and solicit input.

The primary objective of the consultations process is to gather support and input from stakeholders who have been directly involved in the development of the strategic plan, as well as interested parties who have not. The second objective of this process is to monitor the successes and failures of the plan and to provide input into the adaptive management process. While unanimous agreement is usually not attainable, general consensus around key issues should be the objective of the various consultations. Where this is not attainable, the staff in charge of urban forestry will need to make decisions since they are ultimately the ones directing and managing the work being undertaken. A third objective of these consultations should be to point private landowners to resources (e.g., information, technical support), and possibly incentives, for planting and properly maintaining trees on their own property.

Ongoing consultations not only provide a mechanism for gathering input, but they are also a vehicle for engaging and sustaining the involvement of individuals and groups who can contribute to the plan's success. Community involvement in the urban forest is a primary instigator for the development of this study, and continued collaboration between various members of the community and the city is essential for its success.

Of the three recommended components of community consultations, public information sessions is the only one that is to be undertaken strictly at the initial stages of the strategic planning process. Once a draft *Urban Forest Management Plan* has been developed, key stakeholders should have an opportunity to provide input to the plan's goals and objectives. This input could be solicited through facilitated group visioning sessions, from the city's website, and through broader public information sessions. Representatives of the tree board should be specifically invited to such events.

The purpose of these events will be to capture key stakeholder and broader community input to the vision and goals for the UFMP, and provide an opportunity to create or re-establish relationships with individuals and groups interested in being involved with ongoing implementation and review of the strategic plan. Results of these sessions should be documented and integrated into plan development.

Education and Engagement: Education is one of the best tools available to keep staff and citizens of Helena informed of the benefits of trees and the proper care of trees. The citizens of Helena have a strong sense of community and take an active interest in city programs and projects. The community forest is linked to the people of the city. Education and personal involvement of as many community members as possible is critical to the success of a sustainable community forest. Education about proper tree care and participation in the community tree program can translate into more tree benefits for the city and a willingness to support the tree program in the future. There are a variety of professionals in the region that can offer technical advice, literature, workshops, and other assistance.

The entire community benefits from an extensive, healthy, and safe forest. Yet without an informed, involved populace, such a forest is difficult to attain. Individual trees require proper care in order to thrive, while the community forest as a whole, benefits from long-term planning. Community involvement is essential because of all that is required for quality care of the urban forest.

Stewardship: Support from elected officials and the citizens are critical to implement and maintain an effective comprehensive urban forest management program. The citizens own both the public and private community forests, and without greater political support and increased citizen understanding and commitment, urban forest management in Helena may not reach its full potential.

With hundreds of visitors using Helena's downtown district and parks at the height of the summer season, there are many opportunities to involve the community in the management of Helena's trees. The parks are full of trees and streets are lined with trees, not in the best condition, but trees are one reason why people visit and enjoy Helena parks.

Through a range of projects from increasing the potential for passive awareness (signs), to active recruitment for tree care through stewardship programs, the city can continue to focus on bringing street and park trees, the benefits they provide and the maintenance needed to the attention of residents and patrons. **Objectives of public involvement initiatives include the following:**

- Utilize the tree board to provide an on-going opportunity for citizen input into the planning and implementation of the community tree program.
- Reach out to existing groups. Community groups such as the Growing Friends of Helena, Lake Helena Watershed Group, Air Quality Protection District, Helena Garden Club, Montana Federation of Garden Clubs, Montana Audubon Society, Tizer Botanic Gardens/Arboretum, Chamber of Commerce, civic groups, Future Farmers, 4-H, neighborhood councils, and local businesses are usually very active and interested in community projects. Many of these groups would undoubtedly be interested in projects relating to forest health, and city administrators should make an effort to reach out to them.
- Encourage non-technical tree projects that benefit the street and park trees. Interns or summer teen employees from local high schools or colleges could be recruited and ensure that course credit or work study support is offered

when they work on community trees. This benefits the community and strengthens ties to local schools.

- Offer a forum for community participation in park and street tree design decisions. Hold workshops for public input into planting decisions and street and park design.
- Use signage for education and increased awareness. Increase and improve signage around the parks, whether relating to tree species identification, self-guided tours, information on tree protection, and other useful and informative subjects.
- Develop a “Tree Walk” brochure for trees of Helena that highlights the city’s most significant trees or new and unique species along with their natural and cultural requirements and history.
- Encourage stewardship. Promote a Stewards for Young Trees program within the community, setting up regular workshops for steward training and allowing civic or school groups to “adopt” newly planted trees (see Young Tree Maintenance).
- Link community needs to solutions provided by community trees. E.g. Stormwater abatement, air quality, watershed protection.
- Celebrate Arbor Week with a series of plantings at schools and parks hosted by elected officials.

Building a connection between citizens and street and park trees is the foundation for long-term stewardship and sustaining the community forest.

Education, Outreach and Stewardship

There are many opportunities to involve the community in the management of Helena’s trees. Through a range of projects from increasing the potential for passive awareness (signs), to active recruitment for tree care through stewardship programs, the city can continue to focus on bringing street and park trees, the benefits they provide and the maintenance needed to the attention of residents and patrons. **Objectives of education, outreach, and stewardship initiatives include the following:**

- Promote proper tree care to increase tree health and longevity, reduce hazard potential, and minimize storm damage.
- Provide education about the benefits of trees, proper planting, proper tree maintenance and species diversity.
- Design, maintain and update promotional and technical information, in multiple media, about urban forestry using staff contributions or program partner materials.
- Elevate the prominence of and expand content of the city’s web page regarding urban forestry content; develop internet address mailing lists to enhance communication and marketing efforts with the public.
- Expand community-based volunteer and stewardship opportunities, such as volunteer planting or pruning programs, as a way to inform and engage residents about urban forestry issues, such as tree planting, tree care and management and expanding the tree inventory database.
- Host events and festivals to promote the benefits of trees, such as Arbor Day and Earth Day celebrations, and recognize forestry community advocates and volunteers.
- Maintain the NADF’s “Tree City USA” status and qualify for NADF Growth Awards.

- Coordinate with schools and other organizations to develop and/or promote youth education and outreach materials related to urban forestry.
- Coordinate with Montana DNRC urban forestry program and local schools, community colleges, and universities in support of the development of urban forestry training programs for mentorship, internship and research opportunities for students.
- Increase communication with city decision-makers, including City Commission and boards, about the benefits of trees and the urban forestry program's objectives and performance.
- Promote professional development opportunities to strengthen the core skills and engender greater retention of and commitment from volunteers, tree board members, commissioners and staff.

The purpose of these objectives will be to capture key stakeholder and broader community input to the vision and goals for the UFMP, and provide an opportunity to create or re-establish relationships with individuals and groups interested in being involved with ongoing implementation and review of the community tree program.

Urban Forestry Advisory Committee

An Urban Forestry Advisory Committee (UFAC) is a very useful resource for busy municipal staff working to develop and implement a management plan since it provides additional opinions from individuals who are interested in, and typically knowledgeable about, the subject at hand, and also helps maintain relationships with groups and individuals that may be able to assist with implementation.

The primary role behind a UFAC in the city's UFMP, and the related *5-year Management Plans* would be to periodically (e.g., once a year) review the plans, and to track the status of the various recommendations. Tree committees can gain support for a tree program by involving the public in program activities. **Objectives for a tree committee can gain support for a tree program by involving the public in various important endeavors:**

- Work with urban forester to develop a community tree plan.
- Work with urban forester to develop an annual work plan and budget for tree care.
- Designing tree plantings.
- Holding public hearings and reviewing permit requests.
- Soliciting funds, including grants and donations.
- Developing or reviewing a street tree ordinance.
- Organizing and coordinating Arbor Day celebrations, other events, and education programs.

The UFAC should report to and be overseen by the urban forester for direction and overseeing the implementation of the UFMP.

Tree Risk Management

While most community trees cause few problems, there are situations that pose significant liability concerns. These include hazardous trees or limbs that could damage property and cause injuries or even death, trees that block required traffic site lines, or tree roots that raise sidewalks or invade segmented pipes. In other states, the

legislatures limit the amount of damages for which a municipality can be liable. Ultimately, however, a municipality has the responsibility for maintaining a safe public right-of-way once it has created one. The human and financial impact of these problems can far outweigh the costs that a municipality would have incurred in providing proper, proactive tree care.

The liability associated with trees can best be avoided by clearly assigning the responsibilities for tree inspection and care and then documenting that this responsibility is regularly met. Municipalities and other property owners are expected to conduct annual work, including yearly tree inspections, removal, pruning, and other maintenance. Some communities attempt to divert all liability of street trees to adjacent property owners while retaining regulatory authority over anything done to the trees. While this may reduce municipal costs, it does not entirely eliminate municipal liability for tree or branch failure. Because a municipality is responsible for a safe right-of-way, it is the opinion of some solicitors that a municipality cannot “hide” behind a street tree ordinance that makes it the duty of a homeowner to keep the right-of-way safe. At most, the property owner shares liability with the local government. Other communities choose to do nothing regarding their community trees, perhaps not realizing that inaction may not be a successful defense against negligence. **The following objectives written in the UFMP or tree risk management plan creates proactive tree management, reduces exposure to liability, and strengthens court cases:**

- A tree inventory will be completed and maintained. Dates of inspection, condition of inventoried trees, and pruning and other maintenance needs will be recorded.
- Annual inspections of community trees should be completed and accurate inspection records should be kept.
- Hazardous tree branches should be removed as they become known.
- Only trained, ISA certified, and insured tree care professionals who follow arboriculture industry practices should be hired for any tree maintenance work on public trees.
- City personnel will be trained in safe arboriculture procedures, first aid, and safe equipment use.
- Visual clearance for intersections, traffic signs, and signals shall be maintained.
- Requests by city departments, property owners, and others should be responded to promptly.
- Implement a priority based risk tree removal action plan.
- Provide tree risk training for staff.
- Implement a cyclic pruning program.

Tree risk assessment can also be used as an educational tool to demonstrate the necessity for urban forest planning. With proper planting and aftercare combined with regular pruning and periodic inspections, there is less chance for weaknesses or defects to become hazardous. Proper management will lead to permanent reductions in liability.

The mitigation of high risk trees is an essential component of any municipal forestry program. There were over 9,000 trees inventoried. An audit inventory of the 9,000 trees indicated over 35% is removals. This is a very high quantity of removals. A challenge for Helena is to develop a comprehensive tree risk mitigation program that will increase the safety for the residents, Helena city staff, and visitors to the community. Public

safety is the major concern for urban forest managers and the primary objective for all city officials.



The municipal government has a legal duty to exercise reasonable care to protect the public from foreseeable risks. City managers, administrators, staff, and elected officials must demonstrate reasonable care to minimize the risk associated with trees in public areas. It is imperative for all city departments to follow established risk management policies.

Risk Tree Abatement

Risk tree abatement of high risk trees includes inspection and evaluation of the trees, pruning, and new tree plantings. To manage risk effectively communities must address difficult questions. While fear of liability may ultimately be the force driving the formation of risk management policy, professional assessment and correction of hazardous

situations should be its foundation. The city has collected data for 9000 plus trees using TreeWorks but very little information on risk trees and tree maintenance requirements.

Once the inventory is completed, there will also be a need for the continued assessment of risk trees. Assuming that all trees with some risk factor will not be immediately removed, trees that are retained should be inspected on a scheduled basis. The determination of which trees should be inspected and how often should be part of the development of a tree risk program once the tree inventory is completed. Dedicated and qualified staff or consulting arborists will be required for tree inspections. Tree risk inspections should be performed by a PNW certified tree risk assessor.

With the initiation of cyclic pruning program, at a minimum, each tree will be re-inspected once every five years. Pruning crews will systematically work through the community and when they are assessing pruning needs they can also evaluate risks. Any new risks can be added to the database and then further inspections can be requested if required. Simple risk abatement through pruning can be addressed as part of the cyclic pruning program.

Once a tree has been identified as having a failure-prone defect and a target is present, there are a variety of approaches to managing the risk associated with that defect. In general, serious defects are more likely to be found in large trees than in small trees.

Recognizing that large trees with large canopies provide exponentially more benefits than small trees, efforts should be made to maintain large trees through techniques such as cabling, bracing, and corrective pruning rather than removing them. This will allow time for younger trees to develop the mature canopies that can maintain the stream of benefits for the community. Some of the most common approaches for hazard abatement are:

1. **Remove dead wood** - Trees with this recommendation have large pieces of deadwood over a sidewalk, road, front yard, trail or other high-use area. These large pieces of deadwood should be taken out of the trees before they fall out.
2. **Bracing and Cabling** – Bracing stabilizes larger tree components such as scaffold branches with included bark. Cabling of trees can be used to stabilize parts of the crown that could be prone to failure. Trees that have been cabled require a commitment by the city to a frequent inspection cycle. Generally, these trees should be inspected once a year to ensure the integrity of the cabling system and that the risk level of the tree has not changed.
3. **Crown reductions** – The aim of crown reductions is to shorten the height of tall crowns or to shorten the length of long horizontal limbs with too much weight at the ends. By reducing the length or the height, the safety of the pruned part will be increased. This prescription is used for older trees to try to keep them standing while new trees can be planted to replace them. Crown reduction cuts should be made back to a healthy side branch that is at least one-third the diameter of the reduced part. This may not always be possible for some trees and a smaller side branch may have to be selected. It should be noted that for many older trees this is the last maintenance that can be performed before the tree is finally removed. Crown reductions are often undertaken in conjunction with cabling.

4. Tree removal – If there is no corrective action that can be taken then some trees will have to be removed.

Risk reductions are best accomplished by reducing the number of poor quality species and eliminating high risk features such as trunk splits, trunk, basal and root decay, and included bark crotches. By removing these species when the opportunity arises, the municipality minimizes expenses by avoiding the greater cost of removal once the trees are in an advanced stage of structural decline.

The municipality should develop specific guidelines for when and under what conditions trees may be removed. An ISA publication entitled “A photographic guide to the Evaluation of Hazard Tree in Urban Areas” by Matheny and Clark is a source of information for risk management guidelines. The rating system used in the PNW-ISA TRACE course provides a numeric scale for rating tree risk.

The municipality may wish to follow the criteria listed below for tree removals. The four situations in which tree removal are appropriate are

- if the tree is dead
- if the tree is irreversibly affected by disease or insects (particularly epidemic diseases such as spruce bark beetle) or in significant decline
- if the tree or tree parts represents a risk to fail
- or if there is unavoidable conflict between tree(s) and construction.

Trees exhibiting high-risk external features such as death; cracks; splits; trunk, root or crown decay; included bark and other weak branch unions; poor tree architecture; and major crown dieback should be mitigated before the tree or parts of the tree fail.

The primary management priority for the city in the short term is the reduction of high risk trees in public areas.

Currently in Helena, as in many other United States municipalities, the assessment of risk is the responsibility of parks staff. The parks staff inspects trees drawn to their attention, reported by the public, or identified through operational activities. There is no systematic inspection process or trained staff available to identify trees at risk largely due to the current lack of staff training and resources.

Taking a city-wide tree inventory and implementing an urban forest management strategy creates an opportunity to develop a more comprehensive risk tree program to address the city’s responsibilities with respect to “duty of care”. **CFC recommends the following steps for the development of that plan:**

- Contract for risk tree inspections by a PNW-ISA certified tree risk assessor qualification.
- Complete the municipal tree inventory.
- Query the TreeWorks database to determine the numbers and locations of low, medium, and high risk trees.
- Determine an acceptable level of risk with input from certified tree risk assessor and decision-makers such as city managers, council, mayor, legal department, risk manager, and others.
- Determine the staff and resources available to address tree risk issues.

- Develop a tree risk program and plan of action to mitigate risk trees.

Tree Inspections

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Tree inspection is a systematic process of assessing the tree or parts for potential to fail and injure or for potential maintenance needs. Inspections are the first line of defense in proactive risk management and maintenance programs. The city should answer these questions regarding tree inspections.

- Who is performing the inspections?
- Who is qualified to perform the inspections?
- What is to be inspected and in what area?
- What is the frequency of inspection?
- When should the inspections occur?

The city can prioritize tree inspections and corrective actions needed based on a process that divides the city into zones; establish inspection methods and schedules according to the zones; and implement corrective actions in a reasonable and timely manner.

The evaluation cycle or inspection interval may be annually or two per year, one during the summer to include leaves and one during the dormant season. Mature trees and species with known failure histories may need to be inspected more frequently. Occurrence of tree or branch failures between inspections will indicate the adequacy of the interval between inspections. Additional inspections should be made following storm events.

The city will benefit and reduce the possibility of structural defects being missed by using a certified tree risk assessor for tree inspections. Inspections should follow consistent protocol established by the arboriculture industry and described in this management plan; the problems should be documented and appropriate arboriculture recommendations made or future monitoring as necessary.

Completing a city-wide tree inventory and implementing an urban forest management strategy creates an opportunity to develop a more comprehensive risk tree program to address the city's responsibilities with respect to "duty of care". **Until a city staff person becomes a certified tree risk assessor we recommend the following objectives for city staff engaged in the tree risk evaluation:**

	A	B	C	D
	HIGH	MODERATE	LOW	REMOVE
	Trees whose retention is most desirable	Trees whose retention is desirable	Trees which could be retained	Trees which should be removed
1	Vigorous healthy trees, of good form, and in harmony with proposed space and structures;	Trees that might be included with the high category, but because of their numbers or slightly impaired condition, are downgraded in favor of the best individuals	Trees in adequate condition, or which can be retained with minimal tree surgery, but are not worthy for inclusion in the high or moderate categories	Dead, or structurally dangerous trees.
2	Healthy young trees of good form, potentially in harmony with the proposed development	Immature trees with potential to develop into the high category	Immature trees or trees of no particular merit.	Unstable trees
3	Trees for screening or softening the effect of existing structures in the near vicinity, or of particular visual importance to the locality			Trees with significant fungal decay at the base or on the main bole.
4	Trees of particular historical, commemorative or other value, or good specimens of rare or unusual species			Trees with a cavities or cavities of significance to safety.
5				Trees that will become dangerous after removal of other trees for reasons given in 1-4

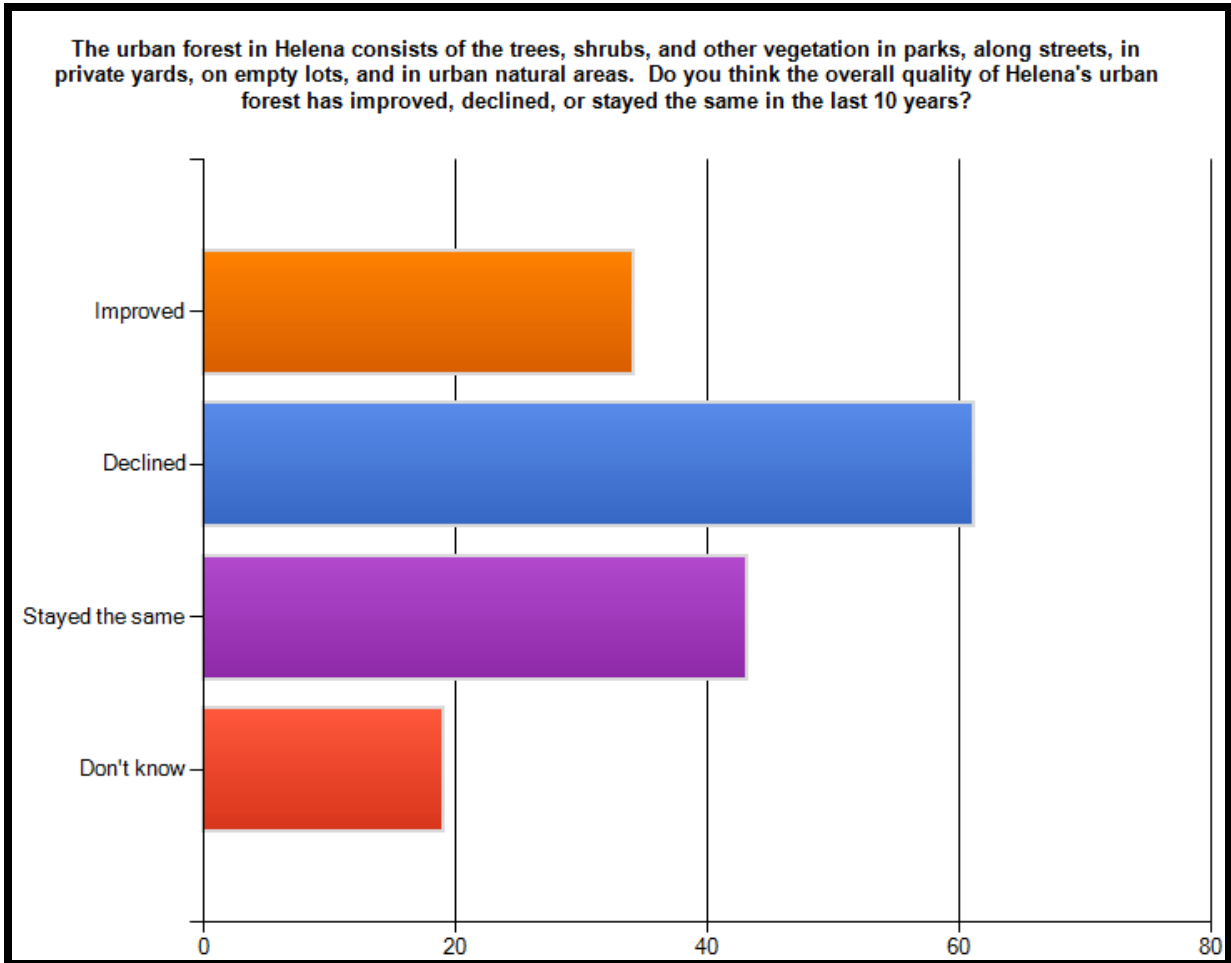
For a more comprehensive approach the city should refer to a recent publication by the USDA Forest Service titled “Urban Tree Risk Management: A Community Guide to Program Design and Implementation”. This publication is available at: <http://www.na.fs.fed.us/spfo/pubs/uf/utrrm/>.

Tree Maintenance and Care

Pruning plans are essential, not only to ensure healthy, aesthetically pleasing trees but also to increase public safety and to decrease public or private liability. A variety of requirements can inform pruning plans, some more desirable than others. Common factors that determine pruning priorities are residential or business requests and emergency pruning. This kind of “reactive management” is most common in jurisdictions where no planning exists. Scheduling pruning based on these factors may actually increase liability for damages because many hazards remain unidentified until a failure occurs.

Healthy trees confer numerous benefits, yet poorly maintained trees can pose a considerable risk to the surrounding community. Broken branches and even entire trees can fall down, especially during inclement weather. In paved areas roots can cause cracks and buckles in pavement which may be tripping hazards. Leaves can clog gutters and fruits can rot and smell. While the benefits of trees far outweigh the costs, careful maintenance is needed to manage risks that are often predictable, detectable, and preventable. Excluding immediate, acute problems (blow downs, pest outbreaks, and extreme vandalism) tree maintenance should be performed following a

two to five year pruning cycle based on a management plan developed by the city urban forester or consulting arborist.



The majority of survey respondents believe the quality of Helena's community forest has declined in the last ten years.

Tree Pruning

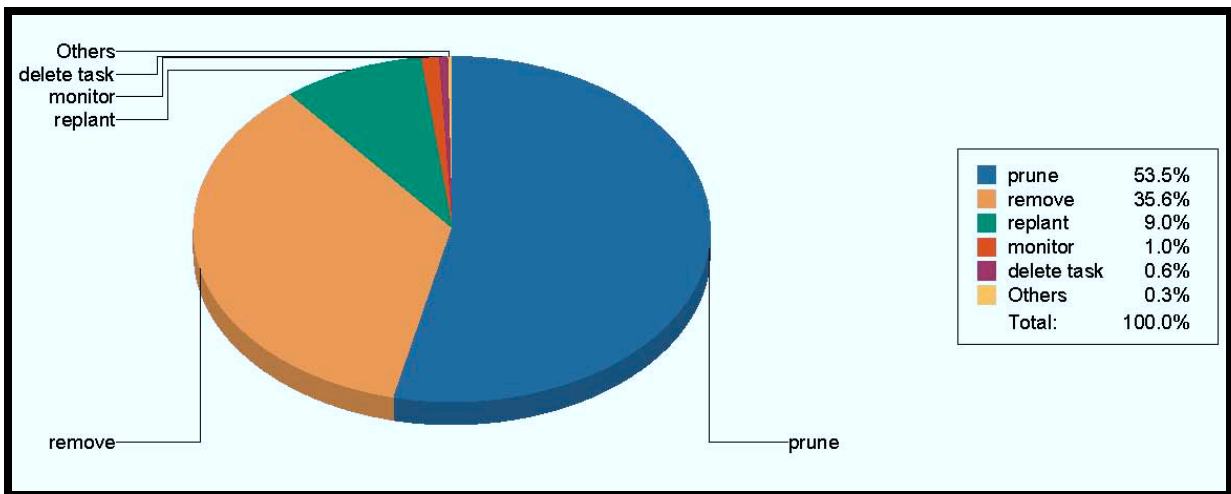
As trees mature, branches grow and thrive while others naturally decline and die. In a natural forest, this branch dieback goes relatively unnoticed. In a municipal setting, safety and aesthetic concerns demand a higher level of maintenance. Young trees may need live wood removed or pruned to create a strong branching structure as the tree grows. Large dead branches must be pruned from a mature tree's canopy. Other branches may be pruned to preserve or create views.

Tree health can be greatly increased by regular pruning, especially when the tree is young. Immature trees that are not pruned can develop many structural problems such as weak branch structure, crossing branches, and co-dominant leaders (International Society of Arboriculture 2005). If corrected early, the tree can develop a strong support structure with a healthy canopy. This in turn will reduce the necessity of more expensive and often intrusive corrective pruning during the normal life of the tree. If tree condition

is improved at a young age and maintained during the tree’s life, there will be less need for a reactive approach to pruning.

Over 50% (4,900) of the trees determined from inventory extrapolations require some form of pruning maintenance. Currently, Helena staff arborists have pruned about 600 trees annually over the last two years or approximately an 8-year pruning cycle. Many of the tree issues are dealt with on a reactive basis. For the most part, crews respond to departmental or citizen requests that public trees be pruned due to safety concerns. As this is not the most efficient or effective way to maintain tree health, we recommend the city shift towards a more proactive approach to enhance the health of the urban forest, including both street trees and those located in parks. To develop an effective tree pruning program, the city needs to build capacity to be able to prune all public trees in a systematic manner as well as responding to emergency pruning and safety concerns in good time. Emergency response must be coordinated with other city emergency response planning.

Planned Maintenance



Task	Count	Percent
Prune	4,900	53.5%
Remove	3,100	35.6%

Most communities try to implement a two to five year pruning cycle. The ability to implement a cyclic pruning program is limited by the staff and financial resources of the city and most cities and towns cannot afford to contract services for all trees. There are options available to deal with budget constraints. For example, contract pruning of trees with diameters larger than 16 inches near high use areas may be an initial management recommendation while small tree pruning is performed by city staff or trained volunteers. The objective is to start and maintain a cyclic pruning program within the fiscal and personnel resource constraints of the city.

Industry standards such as ANSI 300, 133.1, or 60.1 define the standards and terms of arboriculture; specifications and best management practices determine how the agency applies the standards to manage its trees. The standards and specifications are applied universally to all public trees regardless of who is doing the work – staff or contractor.

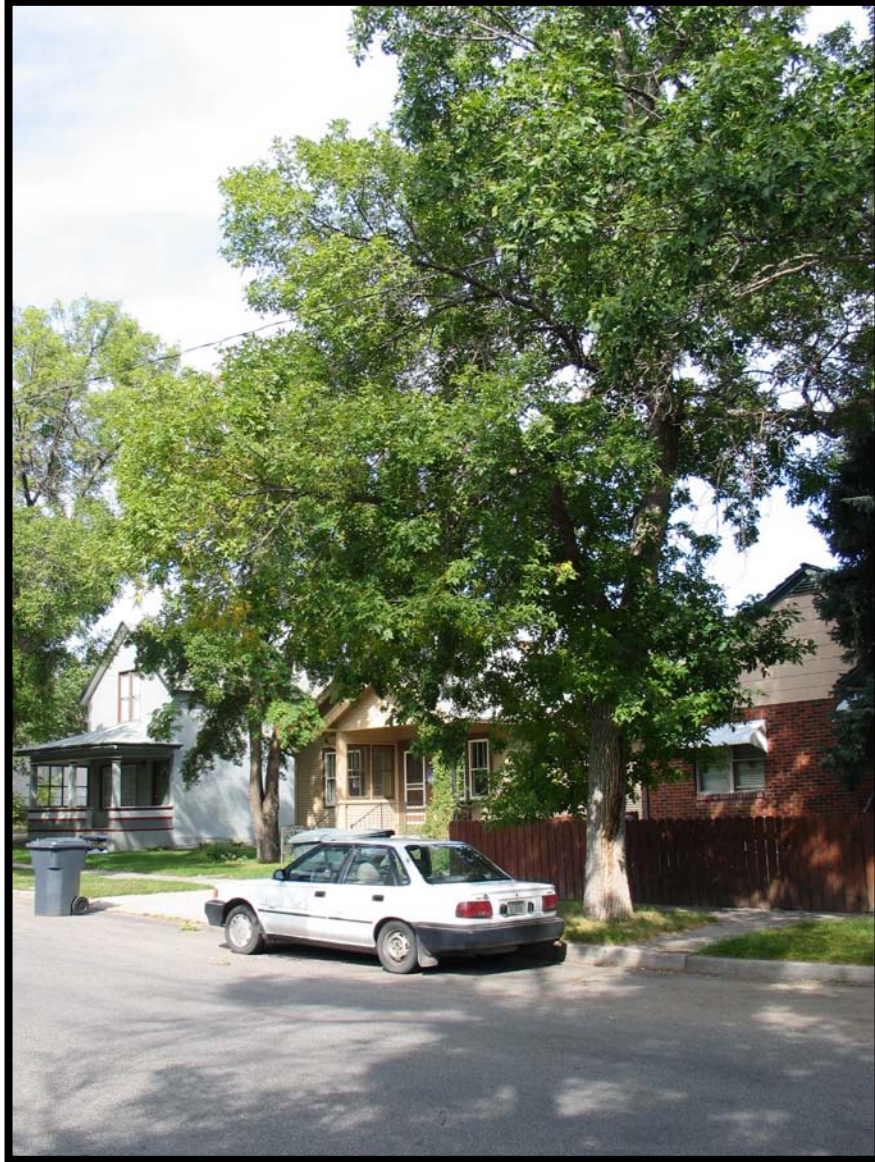
The standards and specifications guarantee that, if invoked, a healthy, structural sound urban forest will be perpetuated. The standards and specifications also demonstrate the agency is implementing currently accepted practices by the urban forestry and arboriculture professions. The arboriculture specifications should, at a minimum, include specifications for removal, pruning, planting, species, tree preservation, risk rating system and inventory methodology. **The following objectives for tree care maintenance should be applied for city staff and contractors.**

- Implement a cyclical 5-year pruning rotation for street and park trees.
- Pruning treatments should follow the best management practices established by the ISA, ANSI Z133.1 and ANSI A300 standards and employ ISA certified arborists or certified tree workers to perform tree maintenance. In addition to ANSI standards, the city should develop pruning specifications that serve to define treatments for different species, ages of trees, pruning techniques, and other tree maintenance issues.

Proper pruning adds value to the landscape and is one of the few active management techniques that helps a landscape appreciate in value while minimizing liability concerns. Proper pruning, with an understanding of tree biology, can maintain good tree health and structure while enhancing the aesthetic and economic value the community forest creates for Helena.

Mature Tree Care

The benefits and values of trees are maximized when trees reach maturity and become established in their growing location. To maintain this high level of benefits for a longer period, the city should commit to providing regular scheduled maintenance to its mature trees and prepare for other, non-routine arboricultural treatments as needed. A comprehensive mature tree care program primarily centers on routine or preventive pruning, and the ability to provide fertilization, irrigation, insect and disease control, and cabling and bracing when necessary.



One of the many pruning tasks for street trees are clearance issues.

Routine pruning should occur on a cyclical basis for the entire tree population once all priority maintenance removal and pruning activities have been completed. If funds do not exist, the routine pruning program can begin after the priority tasks have been completed. This activity is extremely beneficial for the overall health and longevity of street and park trees. Through routine pruning, potentially serious problems can be avoided because the trees can be closely inspected during these pruning cycles. Proper decisions can be made on declining trees, and any trees that become potential hazards can be managed appropriately before any serious incidents occur.

If regular pruning is planned in a systematic manner, crews and equipment can work much more efficiently than if pruning is only done by request. The cost difference can be dramatic. The ISA has compared efficiencies of both methods and found planned pruning to be at least twice as productive. When crews examine the urban forest

regularly for possible risks and tree health problems, there is a reduction in citizen calls for emergency pruning (Luley et al. 2002). Additionally, the crews often find problems that would not have been reported by residents. Regular pruning cycles can also focus on certain species that may require more attention; this is common when a pest needs to be controlled, for example. Regular, cyclic pruning maintains a greater safety level in the urban forest and can decrease liability for the municipality (McGauley et al 2000).

A regular pruning cycle is a critical component of an effective community forestry program. Regular pruning of the city's trees will improve the condition rating of a large number of trees, reduce the potential for storm damage to trees, reduce the risk associated with community trees and demonstrates proactive management of the city's tree resources.

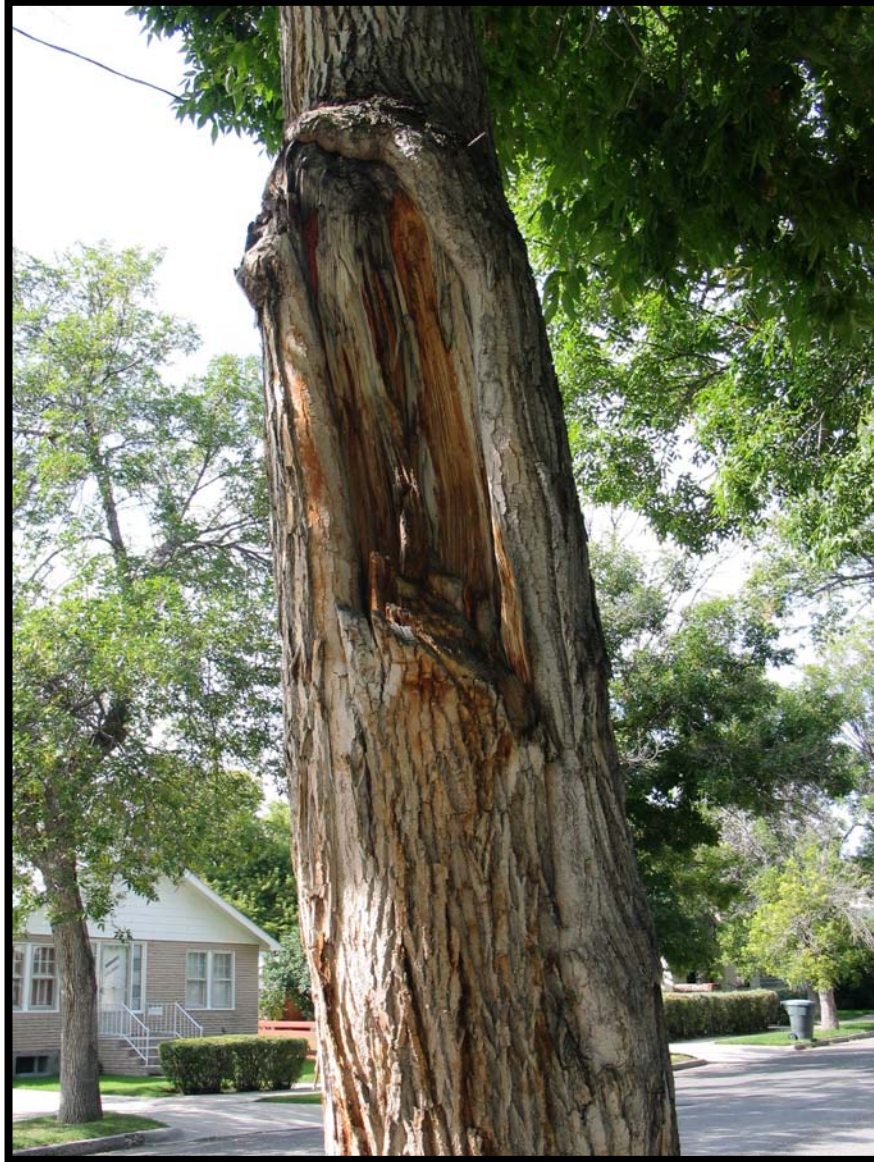
Young Tree Pruning Program

There are newly planted or young trees in Helena. More new trees will be added as high-risk trees are removed and to diversify the existing tree population. It is critical then to understand the proper maintenance techniques required to ensure the longest and safest service life of these trees. The major components of a young tree care program are pruning, mulching, and watering.

Training pruning is used to develop a strong structural architecture of branches so that future growth will lead to a dominant central leader, strong branch attachment and proper branch spacing along the trunk. It also consists of the removal of dead, dying, diseased, interfering, conflicting, and/or weak branches.

Many young trees may have branch structure that can lead to potential problems as they grow, such as double leaders, many limbs attaching at the same point on the trunk, or crossing/interfering limbs. When trees are small, these problems can be remedied easily and inexpensively.

If structural problems are not corrected while trees are young, they can lead to poor branch attachment. Trees with poor branch attachment can become safety risks as they grow larger and could create potential liability for Helena in the near future.



The branch failed because of a co-dominant stem defect that could have easily been fixed when the tree was young.

All newly planted trees should receive their first training pruning the third year following planting. Training pruning should not be done when a tree is planted, because it is already under stress from transplanting and needs as much of its leaf canopy as possible in order to manufacture food and increase root growth for proper establishment in its new site. Only dead or broken branches should be removed at the time of planting, and in the next two years.

The training pruning program would also be accomplished on a cyclical basis, but the work would be scheduled during a three year cycle rather than the two to five year cycle for the routine pruning of larger established trees. As mentioned above, newly planted trees should receive their first training pruning three years after planting. This work can be accomplished throughout the year.

Proper training in young tree structural pruning would be required for Helena staff or volunteers responsible for this task. Additionally, these workers would require an understanding of the growth-habits of the various species being planted, as well as an understanding of tree biology, anatomy and physiology.

This type of work is also highly suitable for properly trained summer interns, part-time employees, and/or volunteers. Since no bucket truck is required, city staff or volunteers can perform this work at any time. Training pruning can be accomplished from the ground with a minimum amount of equipment. The city should develop an organized, documented approach to cyclical tree maintenance that can be easily managed by city staff and properly trained volunteers, if budgetary issues are a concern.

An optimum time to perform this pruning is late winter–early spring prior to bud break. The leaves are gone allowing clear visibility of the branches and trees will react positively to pruning at this time of year. Also it is usually a time of the year when city work loads are less demanding.

The following objectives will promote stewardship, longevity, structural integrity, and health of the community forest.

- Complete the GIS-based inventory to better understand the composition, character and distribution of the urban forest.
- Establish a long-term tree care and management program for public trees to enhance urban forest and ecosystem health and function, that includes structural pruning of young trees, cyclical pruning and crown cleaning of older trees, line-of-sight and height clearance pruning of street trees, removal and replanting efforts, risk identification for street and park trees.
- Coordinate with City Planning and Public Works to identify and address serious and persistent tree-related infrastructure conflicts, to include street, sidewalk and utility impacts along with maintenance and installation impacts within utility easements.
- Consider opportunities to expand the use and marketing of wood waste bi-products from various Urban Forestry programs and activities.
- Maintain industry-appropriate storm and risk tree response protocols.
- Maintain, promote, and apply industry-appropriate pruning and planting standards through staff and volunteer training and reference in city codes and outreach materials.
- Review and update the Urban Forest Management Plan on a 5-year cycle, or as needed, to adjust to changing circumstances.

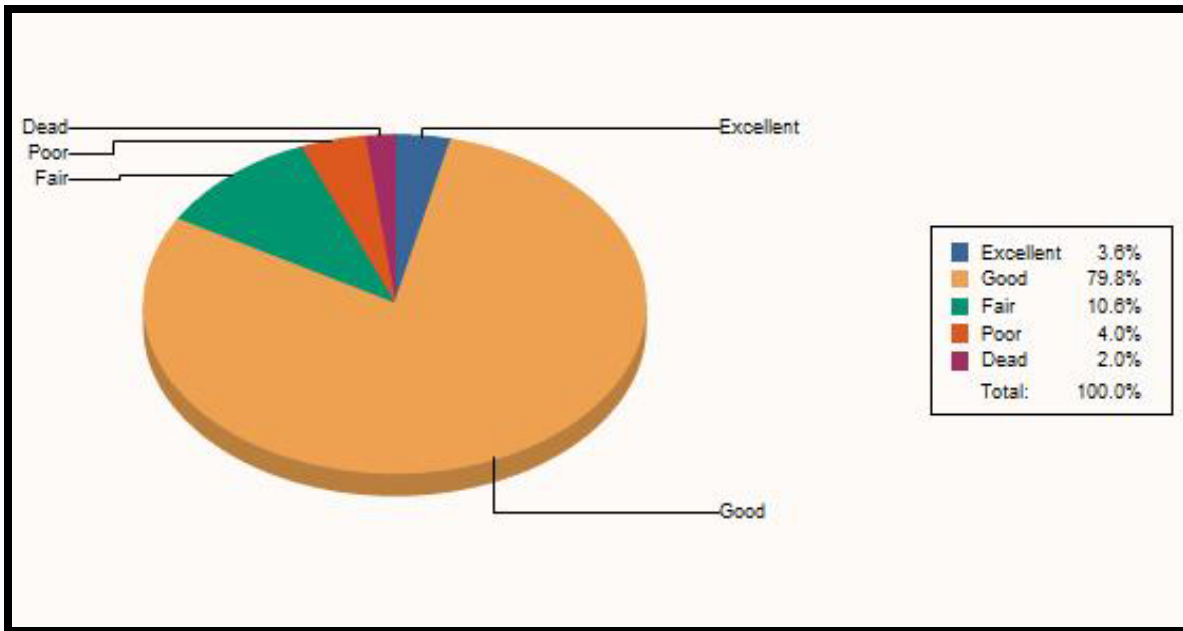
Tree condition and maintenance of trees found during inventory data collection are summarized in the following charts.

Condition is one of the primary factors used in the evaluation of trees. The health, vigor, life expectancy, structural integrity and growth rate all factor into establishing the condition rating. The condition rating of trees is evaluated on two factors: structural integrity and plant health. The structural integrity condition rating is determined by an assessment of the scaffold branches, trunk and roots. The presence of trunk splits, trunk, root or crown decay, previous failures, co-dominant stems, cavities and dead

tissues are all indicators of structural compromises. Plant health in terms of general vigor, annual twig growth, canopy density, leaf size and color are assessed.

Overall vigor, canopy density, dieback and deadwood, history of failure, pests, cultural problems and extent of decay are general factors considered in the evaluation of trees to determine their condition rating. A tree with severe decline, less than 20% canopy, a large amount of dieback or dead scaffold branches, a history of failure, severe pest infestations or major cavities, cracks or decay would have a very poor rating (Curry, 2000).

Condition Distribution



<i>Top 20 Species</i>		
<u>Condition</u>	<u>Percent</u>	<u>Count</u>
Excellent (81 - 100)	3.6%	321
Good (61 - 80)	79.8%	7,211
Fair (41 - 60)	10.6%	953
Poor (21 - 40)	4.0%	365
Dead (0)	2.0%	181
Total		9,031

While the vast numbers of trees fall into the good category, many are rated on the low side of the good rating. There are very few trees in excellent condition and far too many trees in the poor and dead categories. Little or no regular maintenance will see a steady decline in the conditions of trees leading to good trees transitioning to fair trees, fair trees transitioning to poor trees as long as current maintenance practices continue.

Tree Resource Expansion

The opportunity to plant trees exists in every park and on every street. Each year communities are transformed by planting tens of thousands of trees in parks, landscapes and along city streets. It is a common activity promoted by cities, local and national trade, and professional and citizen organizations. These new trees are the future environmental, economic and social workhorses for our communities.

An annual planting program will maintain a healthy and sustainable community forest. A comprehensive planting plan that identifies the planting needs throughout the city should be developed. The plan will provide a systematic means and criteria for consistent direction to determine types and frequencies of tree plantings. The plan should include available planting spaces, recommended species, planting specifications, and maintenance requirements for new trees. The ultimate mature size of trees should be considered when selecting species planted near buildings, utilities, monuments, downtown corridors, and active recreation areas.

Trees can impact these built features both positively and negatively through shading, dropping flowers or fruits and framing. The key to maintaining a healthy, sustainable community forest is the implementation of regular, annual tree plantings, regardless of grant money or catastrophic events. A large number of trees do not need be planted, but a consistent annual addition of trees to the community forest is critical to maintain a perpetual canopy. **The annual quantity of trees to plant is directly dependent on the quantity of trees the city can maintain.**

There is a clear need for a tree planting plan to guide the arboriculture future of Helena's community trees. Such plans will minimize the unintended but gradual degradation of the urban forest over time, as well as maximize the potential for a sustainable and diversified tree canopy and the associated benefits. The trees in Helena—a relatively young, even-aged, limited, and undiversified population—are not only significant design elements but also represent the future canopy cover at this stage in their growth.

A challenge for the city is to plant enough new and replacement trees each year to increase the canopy cover. Without a clear plan to guide tree plantings, the city may gain trees but not achieve a net increase in tree canopy.

Tree planting plans include input from local citizens, state agencies, organizations, businesses, city staff, affiliated green industry professionals, developers, and elected officials. They are integrated with other comprehensive agency plans and create a blueprint for administration and management of the street and park tree planting program.

The goal is to provide specific guidelines on locating, planting, and caring for trees within the urban and urban/rural interface. Removing, pruning, planting, and preserving trees; educating stakeholders; and improving coordination and communication among citizens, tree committee, city staff, and elected officials are critical components in the development of the tree planting plan. A tree planting plan will help department managers quickly determine how best to apply funding that often becomes available in small and unpredictable amounts. A plan should not only specify what (species) and where (location) but when (timeframe) and why (underlying goals).

The community tree plan should address some important questions about landscape design, including the kinds of neighborhood and other landscapes that are present, their function, and their attractiveness; how the landscapes should look and function in the future; and how the landscapes should be protected or modified to create the desired result. **Design objectives can include the following:**

- Increase tree and shrub planting on city-owned property, including parks, natural areas, and riparian corridors.
- Promote additional street tree plantings to maximize future tree canopy coverage, while considering infrastructure (i.e., utility) limitations.
- Review new site development proposals to maximize tree planting and preservation opportunities.
- Encourage tree planting and preservation on private property; partner with property owners on project design and implementation.
- Develop guidelines for reviewing tree selection and/or location with regard to the aesthetics of specific architectural and development projects in community core.
- Consider the development of a Master Street Tree Plan as a means to express unified visions and themes for street trees across the city.
- Explore options for protecting existing canopy through the review and modification of development and management policies in the urban fringe area, in partnership with other agencies, to manage the interface between rural and urban lands.
- Important landscapes, such as business districts, neighborhoods, and main entrances and exits, will be identified and considered in tree and flower planting.
- Traditional landscapes, such as neighborhoods with large trees, will be preserved through tree planting. An overall image of the city will be developed through the coherent planting of trees along streets.
- The final selection of trees and their placement for a landscape shall be made in the field while considering the many elements of that landscape.
- The tree species chosen for planting, besides meeting design criteria, must be biologically adapted to site conditions and well suited for the level of care it will receive.

Implementing a tree planting plan and using inventory data to prioritize planting and maintenance establishes a systematic program which actually reduces costs. This is primarily because systematic maintenance in general leads to healthier trees that require less expensive maintenance over the long run than unhealthy, high risk trees. A healthy and well maintained forest does not come about by accident. The health and stability of Helena's trees can only be achieved through careful planning and systematic maintenance of the tree population. Maintenance practices and standards for new tree plantings should be a component of the tree landscaping plan as well as strategies for funding maintenance programs. Developers should be encouraged and expected to use creative design strategies to achieve the intent of the tree planting plan.

Tree planting in a city can significantly impact that community's landscape for years to come. Yet planting decisions, including the selection of species and location, are often made without the benefit of a long-term strategy or plan. Tree planting might occur as part of a larger capital construction project, or be driven by a donor request or the need for a volunteer project. Each of these common scenarios can occur in Helena—as it has in many cities and towns—over the years.

As the inventory of existing trees continues, places where trees could be planted should also be noted. These sites are potential spots where the urban forest can be enhanced and where the first possibilities lie for increasing the number of trees in the community. Knowing the number of available planting sites can also help when the community is budgeting for, and ordering new trees.



For every dollar spent on tree planting and establishment, a 250% return on investment is provided back to the city in terms of the total services provided at tree maturity.

The opportunity to plant trees exists in every park and on every street. Each year communities are transformed by planting tens of thousands of trees in parks, landscapes and along city streets. It is a common activity promoted by cities, local and national trade, and professional and citizen organizations. These new trees are the future environmental, economic and social workhorses for our communities.

The key to maintaining a healthy, sustainable community forest is the implementation of regular, annual tree plantings, regardless of grant money or catastrophic events. A large number of trees do not need be planted, but a consistent annual addition of trees to the community forest is critical to maintain a perpetual canopy. **The following objective will guide the tree planting program.**

- The annual quantity of trees to plant is directly dependent on the quantity of trees the city can maintain.

Tree Planting Practices

Across the country we are striving to restore our community forests but the road from nursery to working forest is arduous. The sight of new trees struggling rather than thriving in the landscape is common whether the site is residential or commercial, public or private.

The current installation practices used in Helena are planting trees too deeply. Root collars are buried and trees are dying or declining rather than thriving. Installation practices need to change to reduce mortality and increase longevity at the outset.

In general, the tree-planting holes should be relatively shallow (typically slightly less deep than the measurement between the root collar and the bottom of the root plate) and quite wide (three to five times the diameter of the root system). Care should be taken so that the root collars of the new trees are at the same level or slightly higher than the surrounding soil grade.

In most situations, it is not recommended to add soil amendments to the planting holes, as this can lead to differences between texture and structure of soils inside the planting holes and the surrounding soil. Such differences can lead to either water being wicked away from or accumulating in the planting holes.

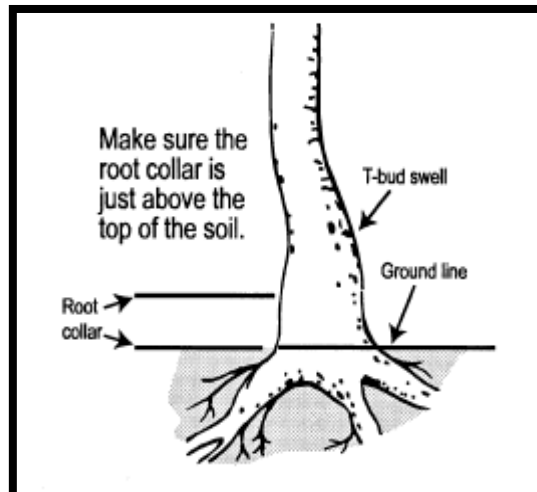
Tree staking or guying should be the exception and not the rule. Tree staking hardware should only be installed when necessary to keep trees from leaning (e.g., windy sites) or to prevent damage from pedestrians and/or vandals. Stakes should only be attached to trees with a loose, flexible material, and all staking material must be removed as soon as the root system anchors the tree.



The root collar is planted below grade.

Mulching

Mulch should be applied to the surface of the soil around each newly planted tree. Mulch should never be piled up around the root collar (creating mulch volcanoes), but rather should be pulled away from the root collar. Mulch that buries the root collar provides shelter for insects, fungi, and mammals that could damage the tree. Mulch should be applied to an area three times the diameter of the root system to a depth of two to four inches. Mulch not only suppresses competition from grass and weeds, but also provides a zone where turf maintenance is not needed, thereby keeping lawn mowers and string trimmers safely away and thus preventing mechanical damage. Mulch also helps to hold moisture in the surface of the soil where most of the absorbing roots are located.



The root collar is planted at grade level.

Diversification

The 2010 inventory of selected street and park trees included over 9,000 trees. Trees in parks and trees in the public right-of-way were included in the data collection. There are more than 80 different species found in the tree population of Helena.

This appears to be a diverse population but species distribution figures indicate the population is dominated by a few species. Over 60 percent of the tree species are represented by one species. The species is green ash.

Species diversity in new plantings should be a primary concern. The dangers (*e.g.*, disease and insects) of planting monocultures have proven to be devastating throughout the United States. The goal should be to maintain species diversity throughout the city. A common guideline for maintaining species diversity in urban settings is the 10-20-30 rule. That is, no one species should make up more than 10 percent of the trees in a population, no more than 20 percent of any one genus, and no more than 30 percent of one family in the total tree population (Santamour, 1990).



Incorrect mulch applications can degrade trunk tissue causing tree decline and death.

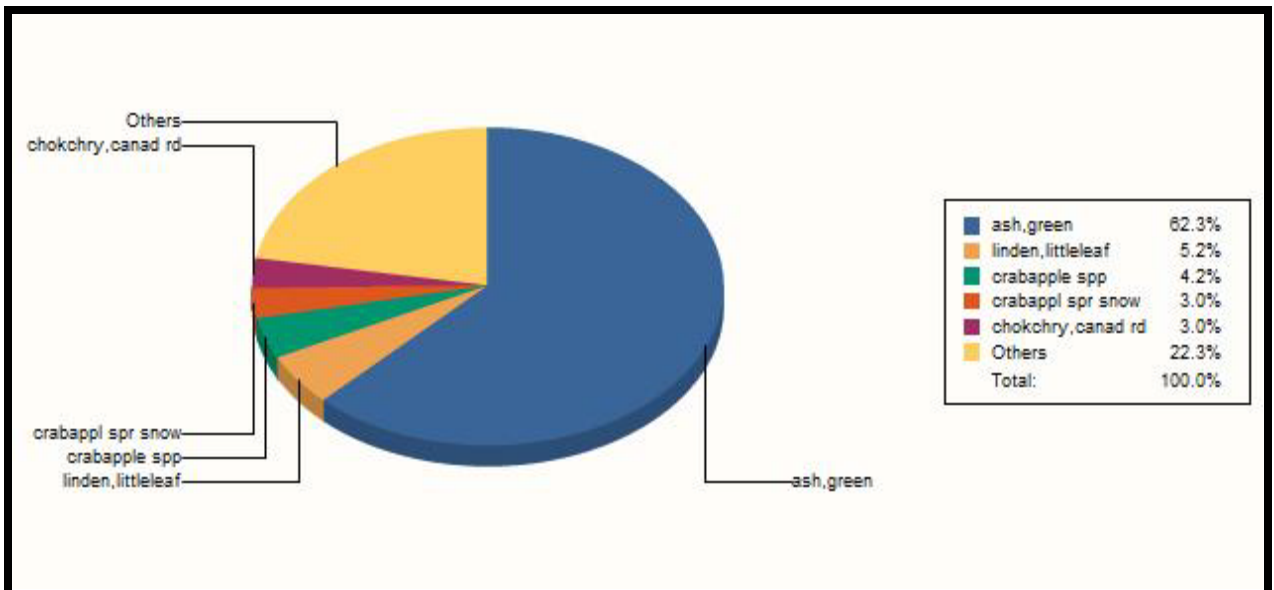
Different species offer different amenities for the city and parks. Some trees grow very large and provide a great deal of shade, others grow tall and narrow, and still others remain small. Some trees flower profusely (“showy ornamentals”), others have tiny, almost invisible flowers. Some trees stay green year round; others drop their leaves in the fall. Trees may attract birds and insects by providing food or habitat. There are very rare species which can become “specimen species” in a park or along a city street. New landscape plans should consider a balance of all these offerings. Biological and environmental site characteristics, maintenance needs, historic plantings, staff and community input should be considered in the landscape planning process.

Diversity is an important measure of a forest’s resilience. A more diverse forest, both in total number of species represented and in their relative abundance, is better able to adapt to environmental changes as well as disease and insect infestations. When just a few species dominate the composition of a tree population, these changes or

infestations will significantly impact the entire population. **The following objectives will increase species diversity.**

- The city should adopt a more aggressive diversity guide that states that no more than 10% of any one genus as a guiding principle.
- The city should emphasize a diversity of species in the planting program. Many species should be avoided that have high maintenance costs, invasive characteristics, high storm damage potential or a history of failure. These should be designated in city documents.
- Review tree list in Appendix E for potential trees to expand species diversity.

Species Distribution



Species	Count	Percent
Ash, green	5,621	62.3%
Linden, littleleaf	469	5.2%
Crabapple, sp	378	4.2%
Crabapple, spring snow	274	3.0%
Chokecherry, Canada red	273	3.0%
Spruce, Colorado	201	2.2%
Cherry, European bird	186	2.1%
Cottonwood, eastern	186	2.1%
Linden, American	123	1.4%

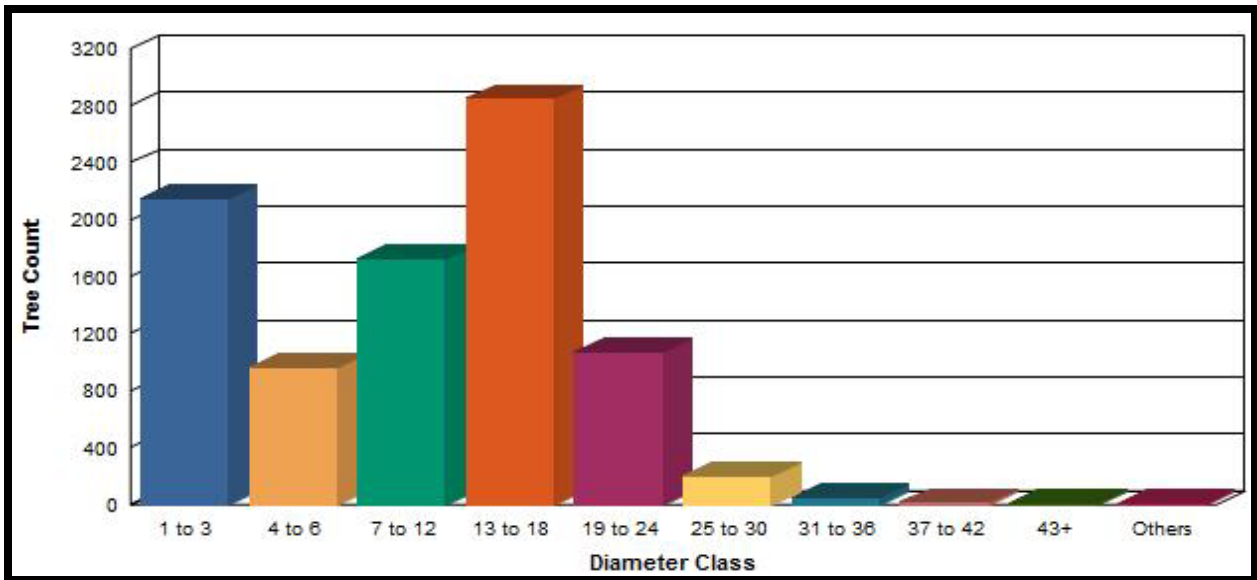
Diameter Distribution

The graph below depicts the diameter distribution for the majority of trees inventoried from the city tree population in graph form. A population exhibiting the diameter distribution characteristics would indicate the city had planted trees in the recent past.

The optimum diameter distribution for trees considered for retention in the population has the largest number of trees in the smallest diameter classes. As each group of trees

within a specific diameter class matures, the numbers within the group diminish through attrition. To perpetuate a specific species, the largest representation must be in the smaller diameter classes. Generally, for any given species, twice as many trees need to be planted as are removed in any one year in order to maintain the exponential shape of this graph. Species that the city wants to preserve in perpetuity should mimic the ideal diameter distribution.

Diameter Distribution



Diameter Class	Percent	Count
1 to 3	23.8%	2,152
4 to 6	10.7%	965
7 to 12	19.0%	1,720
13 to 18	31.5%	2,849
19 to 24	11.8%	1,067
25 to 30	2.2%	203
31 to 36	0.5%	44
37 to 42	0.2%	14
43+	0.1%	10
Others	0.1%	7
<i>Total</i>		9,031

A well distributed age-class helps maintain a stable canopy cover. If all the trees within a particular area or neighborhood are approximately the same age they will mature and decline more or less at the same time, leaving that area with a deficient urban forest canopy. In many parts of the city, young trees of similar age class dominate the landscape. To mitigate the impacts of an even age canopy maturing at the same time, the city should take steps to increase the age class and species distribution where possible.

For example, the City of Davis, CA established the following standard for desired age structure:

- 40% young (< 6 inch DBH)
- 30% maturing (6 – 12 inch DBH)
- 20% mature (12 – 24 inch DBH)
- 10% old (> 24 inch DBH)

Helena's population ranges for the same categories of desired age structure are:

- 34% young (< 6 inch DBH)
- 19% maturing (6 – 12 inch DBH)
- 43% mature (12 – 24 inch DBH)
- 3% old (> 24 inch DBH)

Management activities should strive to improve Helena's tree population distribution to reflect current industry standards.

Recycling Wood Waste and Chip Disposal

Tree removal is typically the most expensive tree maintenance operation on a per tree basis. Other costs associated with tree removal include stump removal and wood waste disposal.

The wood generated from tree removals brings little economic return to city tree management budget. The growing concern about the environment and over burdened landfills, coupled with an opportunity to augment the forestry budget, should prompt the city to the possibility of processing waste wood as a revenue generating activity.

There are many opportunities today to recycle tree residue. The following options are available for agency use.

- Mulch (new tree installation, trails, landscape beds)
- Biomass fuel production
- Small scale sawmill operators (building materials)
- Secondary product production (park benches, furniture, wood sculptures)
- Woodworker associations (knotted and twisted wood pieces)
- Composting
- Firewood

Green ash trees will constitute the largest quantity of wood waste. Ash wood has many commercial uses. The city should seek alternative uses for the wood other than delivery to a landfill or chipping. **All revenues generated from wood recycling or product sales through the urban forestry program should be allocated directly back the urban forestry program.**

Which option(s) to apply and implement will depend on city laws, agency policies, and resources. An internal review and revisions of existing laws and policies governing agency wood waste utilization can improve the agency's ability to sell this material (USDA, NA-TP-02-94).

Tree Resource Protection

The primary goal of tree protection is the long-term survival and stability of a tree or group of trees. It is not about trying to save every tree during development and

construction because some trees are not salvageable due to structural problems or poor quality species. It is about preserving and protecting trees that add value to the property or because the community demands trees be preserved and protected.

Arboriculture practices cannot repair construction damage or vandalism to a tree or reverse degradation of its growing environment. Our industry has a limited ability to cure these injuries or accumulated stresses to trees. The focus to reach our goal of tree protection is to prevent injury to trees. **Implementing the following objectives can prevent canopy loss and sustain the tree population in Helena.**

- Develop approaches to protect larger tracts of privately held forest lands via conservation easements and acquisition, property tax reduction, or other means.
- Develop and promote a nomination-based, voluntary Memorial/Heritage Tree program to recognize and protect unique, landmark or notable private trees.
- Promote tree-friendly development and land use practices by reviewing and reinforcing policies to preserve mature, significant trees and planning for appropriate replanting.
- Promote stewardship of native plant communities on private and public property.
- Prevent unnecessary tree removal on single-family residential lots through property owner education.

Tree Protection – Construction

Construction in and around trees can lead to chemical and physical injury to tree trunks, soil compaction in the root zone, severed roots, smothered roots, split or broken branches, and new exposure to the wind and sun. When construction is necessary it is important for everyone involved in designing, contracting, and managing a project to understand tree preservation and to use best practices in tree protection.

The best way to protect trees from construction damage is to prevent damage to the tree and the surrounding soil. Identify arboriculture treatments such as pruning, irrigation, fertilization, mulching, and pest management that may be needed prior to construction activities and to invigorate trees (Matheny and Clark, 1998).

A tree protection zone should be established and fenced off and contractors should be prohibited from moving or working within the fences. In order to prevent soil compaction and root injury, the fence should be placed at least as wide as the tree canopy's drip line but often wider. If the rooting area cannot be off limits, mulch the soil under the tree canopy heavily to reduce compaction.

Driving near trees should be minimized; site access and equipment storage areas should be clearly delineated prior to the start of construction. Trenching near trees should be eliminated and trees should be protected from physical mechanical damage with tree wrap or tree guard.

Monitor trees during construction to evaluate and treat any damage or change in health to trees that occur and to document any conditions that result from construction damage. If trees are injured during construction they should be tended to immediately.

Tree Protection – Vandalism

It is impossible to constantly police every street and park tree. It is possible, however, to raise awareness in the community about tree health and to increase people's respect for the trees in the community. Educating residents, park patrons, and school children about street trees or trees in the parks may reduce incidents of tree vandalism (such as girdling and peeling bark, and snapping branches) and encourage reporting of observed tree damage.

Accidental tree damage is also primarily a matter of education. Most people do not realize that slamming a car door (or fender) into a tree, urinating on a tree, hammering a nail into a trunk, or dumping hot coals at the base of a tree may all cause irreparable damage that can eventually lead to hazardous conditions and tree mortality. Even walking on a tree's roots, when done by hundreds of people a day, can seriously compromise the biological and structural integrity of a tree.

Programs that raise the public's awareness of the trees in the community through emphasizing their benefits they provide can help influence resident and visitor behavior. See the education and outreach sections of this UFMP for more information on this topic.

Tree Protection – Young Trees

As more young trees are planted along streets or in the parks, the need for a young tree maintenance program will rise. Young trees require more frequent care than older trees. Depending on conditions they may need to be watered, mulched, pruned, and/or protected with temporary fencing, as they are more susceptible to vandalism and adverse environmental conditions.

Humans and large animals are literally the biggest tree pests in the region. Fencing is the only practical, long-term solution for larger pests. Trunk protectors used during the winter season will avoid damage from smaller rodents and beaver. It is worth the investment, as a year's worth of new tree planting losses from large and small animals can quickly exceed the cost of fencing, trunk protectors, maintenance, and upkeep. Planting larger caliper trees from the onset may alleviate some problems with deer.

Education and volunteerism are the best cure for human pests. Encourage volunteers to adopt young trees in the parks and their neighborhood. Volunteers trained in basic tree maintenance, and watering techniques, provided with tools (a hose, trowels, garbage bags, gloves, etc.) and are given the responsibility for the care of the adopted tree. This program promotes citizen involvement in tree care and awareness of the urban forest. This program could be implemented in Helena for street or park trees – individuals, families, or school groups could adopt newly planted trees. The city should attempt to organize a 'Tree Stewards' program and utilize the opportunity this group provides for more volunteer hours.

ORDINANCE REVIEW

Enacting laws and policies that make public prohibitions and direct action in a certain way is not a popular way of influencing behavior. However, sometimes an issue is so important and complex that legislation and official policies are appropriate tools for local governments to use to protect its citizens and property. Managing urban forests is an important complex issue.

In recognition of the many benefits conferred by trees, hundreds of local governments are adopting street and park tree ordinances. Street and park tree ordinances apply mostly to publicly owned trees, as well as nuisance trees on private property.

Tree ordinances reflect the values of a community and the worth of a community's trees. A tree ordinance encourages tree maintenance to secure the beautification, air purification, noise and dust abatement, stormwater management, water quality, property value enhancements, public health and safety benefits trees provide.

The key benefits to revising the tree ordinance are:

- Helps establish the tree management program;
- Provides reference to permanent procedures and legal authority;
- Legalizes a tree program through authorization of a tree commission;
- Establishes a permit review, approval, and appeal process for tree removal, planting, and pruning;
- Establishes the nature and degree of public responsibilities to community's trees according to specific standards and specifications;
- Establishes an official tree policy for the community;
- Specifies and ordines arboriculture standards for tree planting, pruning, and other tree work;
- Identifies standards and regulations for arboriculture practices;
- Ensures that the people who perform work on the trees are well qualified.

Street and park tree ordinances must resolve two key issues. First, the tree ordinance should identify municipal (and private property owner, if desired) responsibilities for planting, pruning, removing, and maintaining trees. Second, the tree ordinance should establish a tree committee and provide the committee with authority to guide the management of public street and park trees.

It is apparent some common elements are not present in Helena's tree ordinance, are too vague, or address arboriculture practices that should be contained in separate documents. The city's tree ordinance requires major revisions to existing components to align with goals and objectives of the UFMP and to address issues missing in most city and city tree ordinances. The following additions or revisions are examples of proposed revisions and additions:

The Helena tree ordinance lacks provisions recommended and found in other city tree ordinances. To ensure that public trees will be properly cared for, street tree ordinances usually contain most or all of the sections listed below. The comments and examples are intended to help in revising the city tree ordinance. Municipalities should understand and plan for their own particular needs and abilities and not rely only on model

ordinances from other places. The common elements and a brief description of each element follow on page 61 in Table two. Table three on page 62 shows the common elements in selected ordinances from other cities in the Northwest United States.

The following are examples of proposed revisions and additions to the Helena tree ordinance:

1. The code lacks a purpose section. It does not clearly state the mission and objectives of the urban forestry program or the program ordinance. It does not mention the intent of the ordinance is to address public tree management. A purpose section defines the intent and objectives of the ordinance.
2. The definitions section should be expanded to include definitions for industry terms such as species, pruning or street tree and public terms such as right-of-way or planting strip. The definition section needs expansion to cover more industry terms not familiar to the public.
3. A recommended species list and a prohibited species list section should be referred to by a document name to clarify the use and ability to update the list as industry planting standards and specifications change.
4. The permit sections could be consolidated into one section that clarifies the permit process for all public tree maintenance activities.
5. The ordinance should be expanded to include other pest infestations or disease infections that are considered incurable and epidemic such as bark beetle or clear wing ash borer.
6. Ban maintenance treatments such as topping.
7. A tree ordinance provides an opportunity to establish policy and back it with force of law if necessary. The infraction and damages section should address mutilation, damage, vandalism, illegal removals, and improper pruning, etc. Penalties, fines and other levies should be based on the appraised value of the tree(s) as determined using the Guide to Plant Appraisal, 9th Edition.
8. As a general rule the fundamental program guidelines such as tree committee establishment and other more static items should be included in the ordinance. Industry standards and specifications that are subject to change as the arboriculture industry evolves should be placed in separate documents which can be cited in the ordinance.
9. Industry standards and specifications that are subject to change as the arboriculture industry evolves should be placed in separate documents which can be cited in the ordinance. An Urban Forestry Specifications and Acceptance Criteria for Nursery Trees documents dealing with planting, pruning, and removing standards or specifications should be written and referenced in the ordinance. Neither of these documents is cited in the ordinance. A separate document such as "The Helena Arboriculture Specifications and Standards" could capture the content of both these documents and consolidate the standards and specifications into one concise document. Separation of these documents from the ordinance allows for incorporation of changes in industry standards and best management practices without revisions to the ordinance.
10. The incorporation of a Risk Management Policy in the tree ordinance is strongly recommended as part of the city's tree risk management program. A risk management policy ensures continuity in the risk management program despite changes in the political and administrative components of the city.

Appendix C contains suggested provisions, common elements, and language of tree ordinances for incorporation into the revisions of Helena's tree ordinance. Appendix D contains resources for writing tree ordinances.

Table 2 – COMMON ELEMENTS FOR ORDINANCE EVALUATION

Element	Explanation
Location	Defines section in municipal code where ordinance should be placed (public works, parks and recreation, zoning, or planning departments)
Purpose	The goals and objectives of the ordinance. These are crucial to implementation, enforcement, and defense of the ordinance if challenged.
Authority	The source of the local government's authority to regulate – usually its own police powers and relevant state statutes (enabling legislation).
Definitions	Terms and phrases with special meaning within the body of the ordinance. Clear, concise definitions are important to ordinance comprehension.
Designation of Administrative Responsibility	The specification of a position, department, or committee responsible for enforcing the ordinance and carrying out specified duties. Ideally, limits of authority and responsibilities are clearly defined.
Plan and/or Permit Review Process	Explanation of how a new/proposed development or other action will be reviewed. Should detail information to be submitted with permit or platting requests, such as site survey of trees and proposed building locations.
Incentives	The methods that can be used to achieve conservation & compliance with ordinance (e.g. preserved trees credited to required project landscaping).
Preservation	What is to be preserved and how it is to be accomplished. There are many approaches to this, such as retaining ≥30% of existing tree canopy.
Construction Protection Measures	Specific measures required to protect trees during construction activities. Usually involves providing a protective zone for trunk and root structures.
Nuisance Trees	Provides authority to remove trees on private property that are diseased or threaten public safety.
Maintenance After Development	Specification of required maintenance of trees and vegetation after project has been completed, often including replacement for damage-killed trees.
Appeals	Provides for possible flexibility with a process for appealing decisions, which serves as a check on authority, but can potentially undermine management.
Enforcement	Provision for enforcement, and penalties for ordinance violations. May include fines, imprisonment, withholding of permits, work stoppage, etc.

Table 3 – COMMON ELEMENTS PRESENT IN SELECTED ORDINANCES

City	Purpose	Authority	Definitions	Designation of administrative responsibility	Permit Review Process	Incentives	Preservation	Construction Protection Measures	Maintenance after Development	Appeals	Enforcement
Bellevue	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Bellingham	✓	✓	✓	✓	✓					✓	✓
Bothell	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Helena		✓	✓	✓	✓					✓	✓
Clarkston	✓	✓									
Colville		✓	✓	✓					✓		
Covington	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ellensburg		✓	✓	✓	✓					✓	✓
Enumclaw	✓	✓	✓	✓	✓					✓	✓
Grandview		✓	✓	✓	✓					✓	✓
Kelso	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Lacey	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Olympia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Omak	✓	✓	✓	✓				✓			✓
Port Townsend	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pullman	✓		✓	✓	✓	✓	✓	✓	✓		✓
Redmond	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Spokane	✓	✓	✓	✓	✓	✓			✓	✓	✓
Vancouver	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Walla Walla	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Woodinville	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

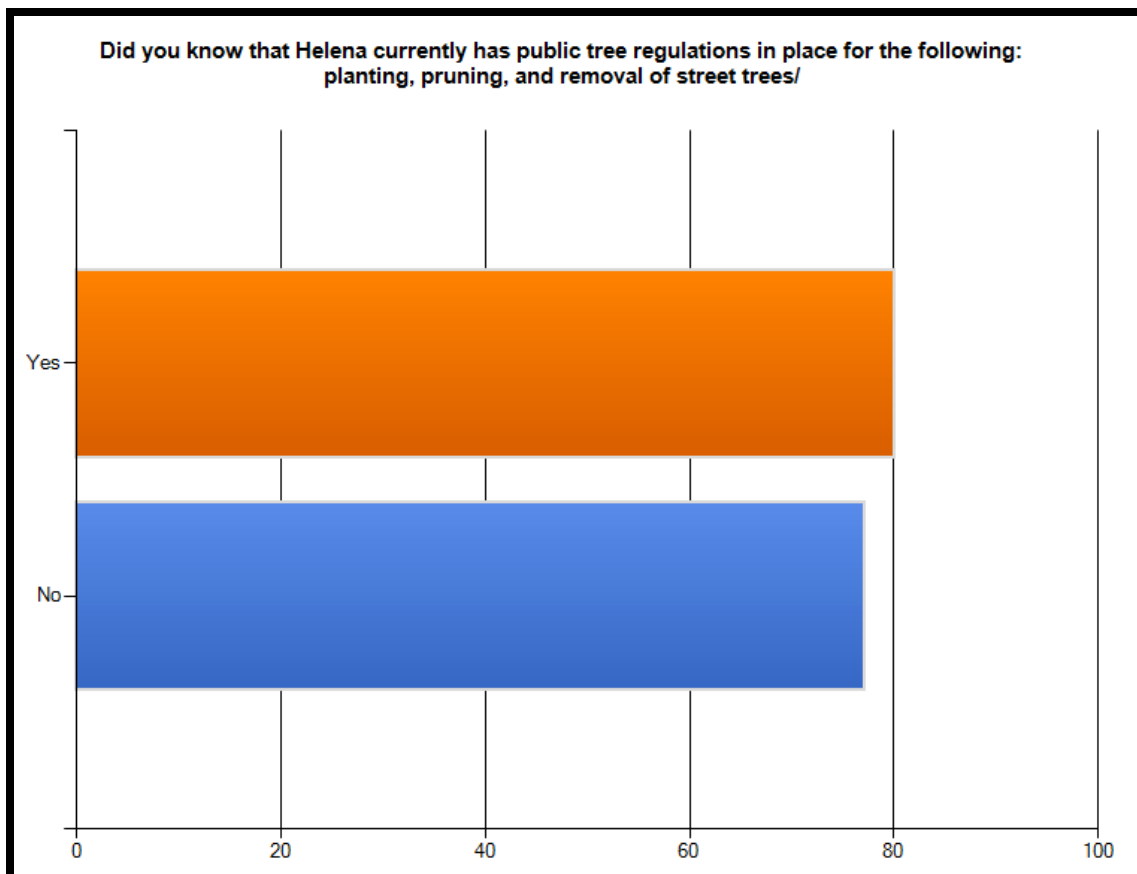
Tree ordinances provide the city an opportunity to set policy and back it with the force of law when necessary. It provides clear guidance for planting, pruning, removing, and other maintenance on street, park, golf, and other public trees.

The ordinance should be flexible enough to fit the needs and circumstances of the city. The inventory data can provide the quantitative evidence for ordinance policy development.

Arboriculture and tree care maintenance and operations are very specialized fields of work. Many years of education and training are required to perform competently in the field and without harm to the trees. **Tree care performed to Helena’s public trees should be accomplished by International Society of Arboriculture (ISA) certified arborists or ISA certified tree workers. The language of the ordinance should reflect this standard of tree care.**

There are many existing tree ordinances and tree ordinance-writing resources. For a detailed listing of provisions for tree ordinances, see *How to Write a Municipal Tree Ordinance* by the National Arbor Day Foundation or contact your Montana Community Forestry Coordinator for other resources.

It is apparent many residents are not aware of tree regulations in the City of Helena. This probably arises from several factors, one being the absence of an urban forestry manager on staff to educate, support, and enforce when necessary an effective ordinance.



DOWNTOWN TREES

City streets are not just thoroughfares for motor vehicles. They often double as public spaces where people walk, shop, meet, and generally participate in many social and recreational activities that make urban living enjoyable. Urban foresters, designers, and planners encourage streetscape tree planting to enhance the livability of urban streets. Large, high quality trees play important roles in community improvement. Trees are as much a part of the city infrastructure as roads, buildings, and street lights. Extensive research has documented the environmental, social, and economic benefits of large trees for communities, municipalities, and regions.

Trees in small city business districts influence retail and shopping behavior in positive ways. The results of several studies suggest that trees are good for business. Shoppers prefer trees and consider trees an important amenity. They spend more, shop longer, and are willing to pay more for goods in business districts with mature, healthy trees.

Trees, especially large canopy trees, located at the source of pollution provide the most benefit in mitigating air pollution and sequestering carbon dioxide. Therefore, trees on busy streets and in downtown corridors sequester the carbon as the cars produce it, and provide cleaner air where high pedestrian and bicycle traffic occurs.

One of the biggest challenges for arborists, urban foresters, city planners, landscape architects, soil specialists, engineers, and public works staff is to provide sufficient soil space for root growth and tree health, in a situation where space is at a premium. The trend is to downsize the urban forest and plant smaller trees.

The Helena's downtown business corridor has very few trees. The downtown is under constant competition for space. Many infrastructure items must share the same space and co-exist. The key site condition factor to consider in resolving downtown tree conflicts is to integrate trees into the infrastructure design up front. The fundamental solution to most city tree problems is simple: Give each tree access to more and better soil.

The downtown business district is the heart of Helena. As might be expected in the downtown, several organizations, property owners, and tenants are stakeholders in the management of trees. Most of the downtown is not planted with trees. If trees are present in the downtown corridor they are in sidewalk cutouts. Development and redevelopment of property in the downtown can mean additional planting opportunities or it can mean facing the loss of opportunities to incorporate trees into the fabric of the downtown corridor.



Trees in sidewalk cutouts in the downtown corridor have limited growing resources and rarely survive beyond 10 years.



This is a street in the downtown corridor that is a main pedestrian artery for residents and visitors. Note the lack of trees.

An American Forests article published in the early 80's stated that an oak or maple tree is capable of living up to 400 years in the forest, up to 80 years on a college campus, up to 30 years in a heavily used park, up to 20 years along a city street and about 4 years in a downtown planting pit. Thirty years after the article was published, the same design mistakes are still being made in cities across the United States. There are several challenges when planting trees in any downtown area:

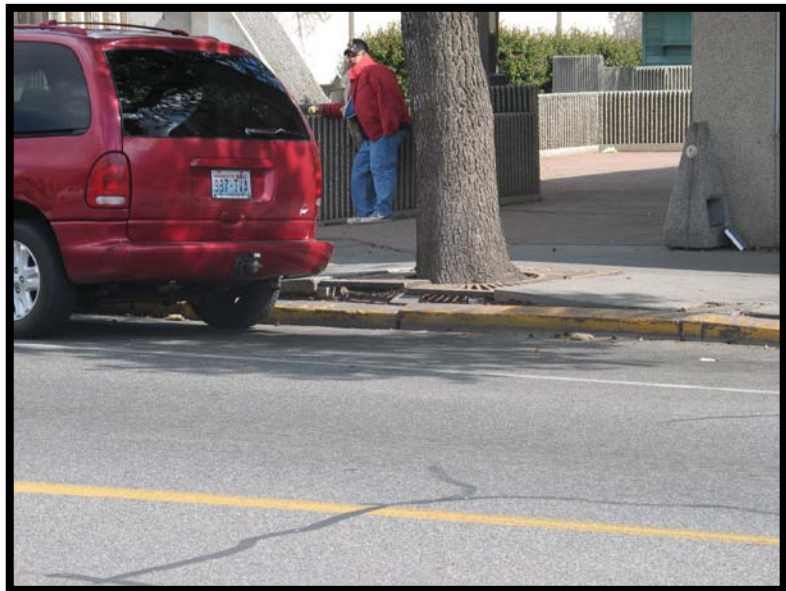
- **Limited Planting Space.** This is one of the greatest challenges to maintaining a healthy urban forest in the downtown district. Small tree wells are the norm in downtowns. These are typically concrete walls on all sides; four feet square and leave little space for root expansion necessary for vigorous tree growth.



Trees located in small tree pits are not conducive to long-term tree survival.

- Difficult Growing Conditions. In any location tree growth is limited by the conditions present in its surroundings. In the downtown, limited growing space, poor soil, heat and exposure to sun and wind impose stress on trees. Incorporating new designs that find more growing space for trees and selecting trees more tolerant of harsh growing conditions will definitely help.
- Owners and Tenants. Some business and property owners perceive trees to be an obstacle to business operations because trees create litter, block visibility of signs and displays and be difficult to maintain. The latest research indicates that trees in downtown corridors increase business, increase shopping time spent, and increase the amount spent per visit (Wolf 2005). Trees and business owners in downtown corridors can co-exist and provide benefits to each other.
- Poor Maintenance. Many people do not understand how trees grow or how to best care for them. Trees in downtown areas often go without any regular care. Some trees are topped to clear signs and they become a liability to the adjoining property and the city. Education is crucial to helping owners, tenants and contractors understand proper pruning and tree care can create assets rather than liabilities.
- Tree Grates and Guards. As trees grow and mature, their trunks can come into conflict with the grates covering the planting hole. Roots from the trees often grow into the soil under the sidewalk, cracking and heaving the concrete. Grates can girdle trunks in a short time without maintenance. If left in place, the grates can damage the trees they were meant to protect. The grates are also trip hazards. Their use should be limited and temporary.

Often, the downtown and other business districts are selected as high priority areas to increase the beauty and attractiveness. Traditionally, downtown trees were installed according to traffic engineering design standards that did not consider the biology and culture requirements of trees.



Tree grates girdle trunks and create trip hazards.

Tree plantings in the Helena downtown business district add greatly to the economics and aesthetic appeal of the city. Trees are critical elements of the urban infrastructure and should not be an afterthought relegated to incidental open spaces or planter boxes. They should be given a high priority in the urban fabric and be given prime consideration with other infrastructure in the downtown corridor and along city streets. A concerted effort must be made to consider suitable locations for trees at the beginning of downtown

design and development. Strategies must be employed to increase available soil mass, water, and air to ensure trees thrive.

Helena can design, select, and use construction techniques that:

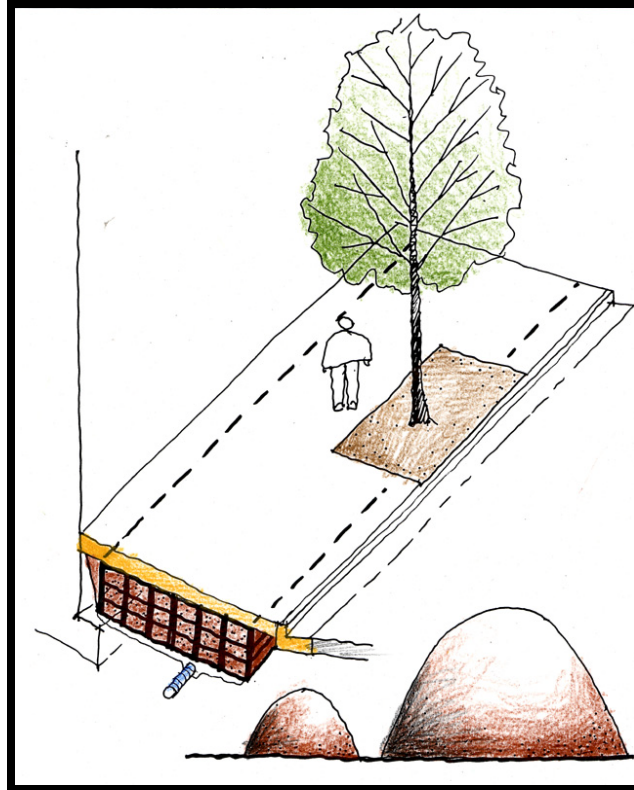
- Allow for continuous tree rows along streets with overlapping canopies forming distinct urban forest cover when practical and possible.
- Relate tree size with street width (traffic volumes) – as the street width increases so should the tree canopy.
- Relate tree size with development density (population and building height) – as the density increases so should the tree size and its canopy.
- Provide adequate space to accommodate the tree's mature structure and crown without adversely affecting other infrastructure.
- Locate trees in areas that are most favorable in sustaining tree health and longevity, minimizing tree stress, and providing adequate sunlight.
- Locate trees in site soils and microclimates most favorable to their long-term health.
- Locate trees to allow for heat gain in the winter.

Consider the use of bump-outs, traffic circles, and roundabouts to accommodate a greater number of trees nearer the source of pollution.

Balance planting trees in small groups (copses) as in the downtown center on Last Chance Gulch. These designs provide trees enough space to allow them to near their full growth potential. Copses of trees are healthier than trees in sidewalk cutouts in a downtown urban environment. These trees can provide beauty, a look of uniformity, and a formal appearance to the shopping district.



Last Chance Gulch pedestrian mall is an excellent example of a copse where the trees, shrubs, perennials, and other plants are thriving because of adequate soil volume, water, and air.



Silva cells utilize a modular framework of interlocking cells. An underground planter is constructed which is backfilled with a large volume of high quality, uncompacted soil. The cells meet load bearing standards and can also help manage storm water on site.

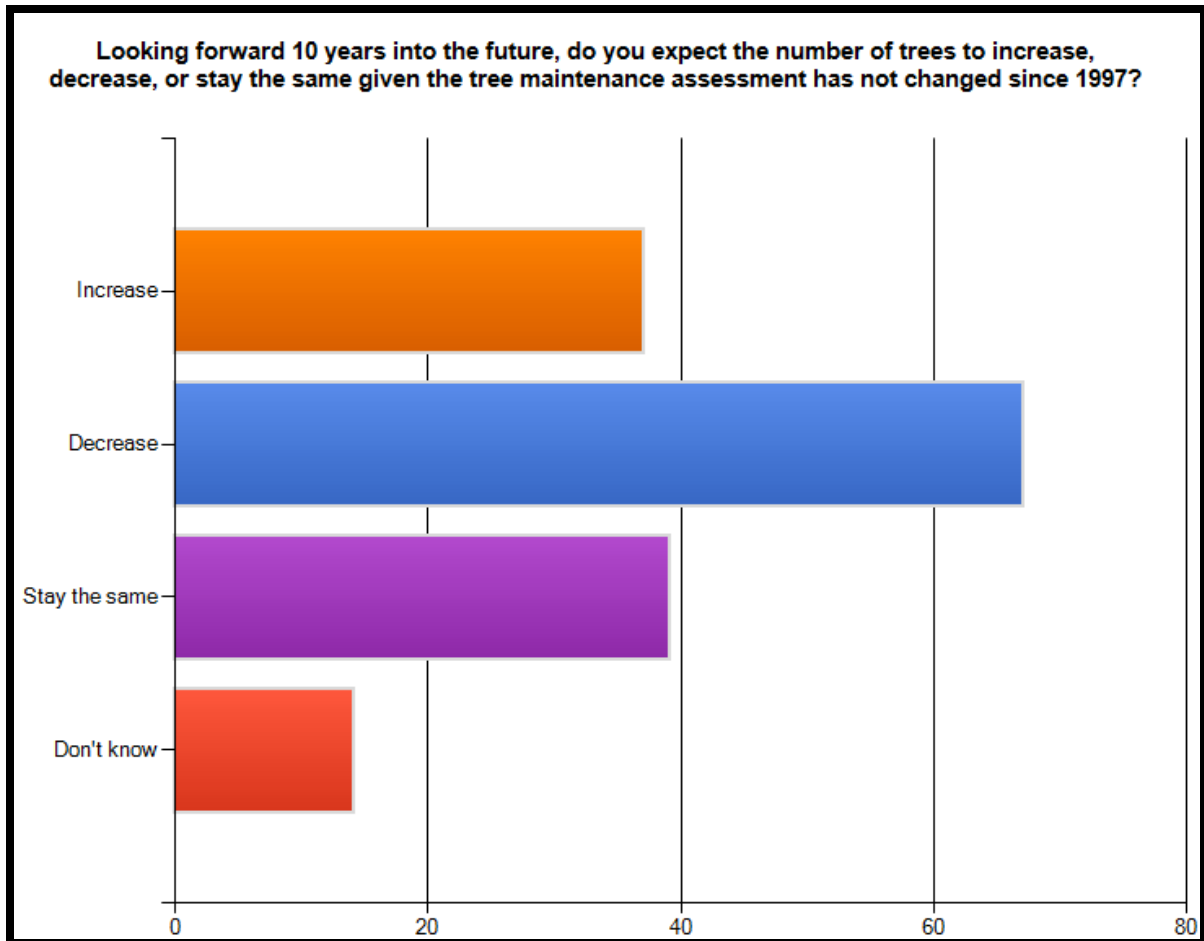
Several new practices are being used in conjunction with construction and renovation occurring in downtowns (E.g. Silva cells, structural soils, large raised planters, and moveable planters for trees in places they can't be planted). Tree grates are beginning to be removed, trees in pits are being raised to grade level, mulch installation, and planting a greater variety of species is happening in downtown corridors currently. In each of these scenarios it is critical to start with quality nursery stock and plant the tree correctly. Without these first steps an accurate assessment of these practices cannot be made. It is important to assess each of these tree planting treatments under conditions that have followed the best management practices of the arboriculture industry consistently. It provides information about which treatments or combination of treatments succeeds in their downtown corridor.

The diversity of street types within a municipality calls for a diversity of design treatments. These guidelines apply specifically to the conditions found along most major streets.

- Create “gateways” to welcome those entering the city on major thoroughfares.
- Use a repetition of dominant species to make a strong, lasting impression on motorists. Consistent use of species for major streets will also reinforce the distinct character of each street.
- Mark major intersections with special plantings.
- Use informal, naturalistic tree groupings along highway and other open/rural corridors rather than straight-line planting.
- Use large trees to create a canopy of foliage over head and bring wider roads to human scale. With repetition, fall color and attractive branching patterns are appropriate for higher-speed streets where subtle effects are not noticeable by drivers.
- Protect views of surrounding open space, historic or memorable structures, and other important elements.
- Trees can be used to frame views of signs and other structures but should not obstruct them.
- Screen objectionable views, including large parking lots, with trees.

OPERATIONAL REVIEW

Helena's goal is to have a safe, larger, healthy, diverse, and functional urban forest and thriving residential and business communities. The dynamics of balancing urban forest management and other infrastructure needs, responsibilities, and assets are diverse and complex and suggest a dedicated, interdisciplinary, flexible approach and organization. However, the current constraints for comprehensive and effective urban forest management city can be considered formidable. Survey respondents see a decline in the community tree population if the tree maintenance assessment remains the same.



Budget

The lack of adequate financial resources for tree management and maintenance precludes making significant improvements to the community trees. Currently, the tree maintenance district assesses \$10.00 per property per year charge since August 25, 1997. The district was created to plant, protect, maintain, preserve, and care for trees in public parks, city rights-of-way, and on open space land. The rate has not changed since 1997.

Existing public funds for urban forest management are provided from the maintenance district funds for various maintenance tasks, and are often expended only on an emergency basis, by limited citizen requests, for individual capital projects, or for limited aspects of public tree management, such as pruning maintenance. There is no management authority over dedicated funds for comprehensive urban forest management activities, nor control and input on the expenditures made by other departments.

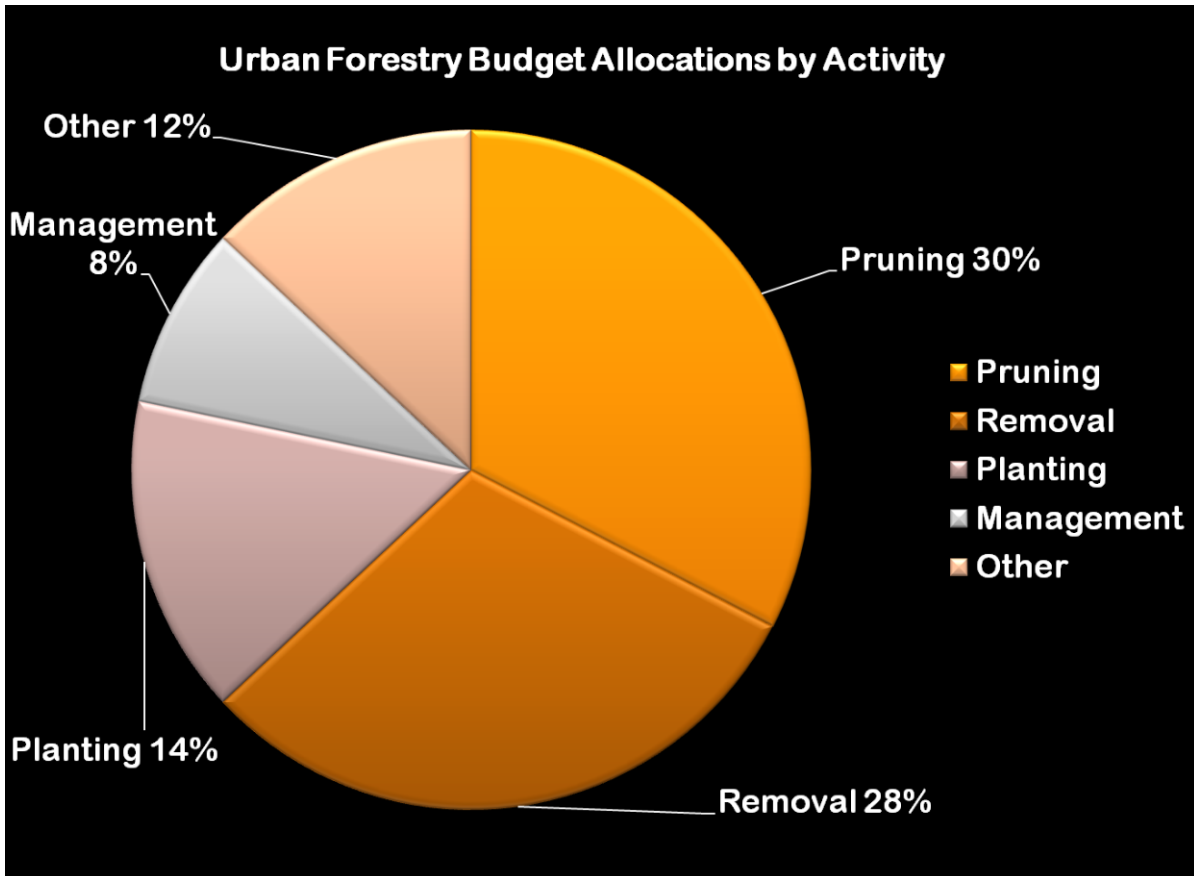
A community tree program will be in competition for funding with other important municipal projects and services. To compete successfully, a proposed budget should accurately estimate the program's annual costs. It should also clearly justify the need for annual and long-term funding for the program. Obtaining funds from municipal leaders can be difficult. Here are some points to remember:

- Budgeting happens every day of the year. Communicate the good things you do to elected officials regularly and include them in tree planting and other positive opportunities. Key decision makers and the public should be kept well informed about the program's accomplishments and needs.
- Citizens are reluctant to support new programs or increased taxes. Without an increase in revenues, municipal managers cannot provide new services unless they cut others. To obtain funding, the officials must be persuaded that a community tree program is a wise investment. Most municipal officials are not familiar with the benefits or technical details of community forestry, so the budgeting process should be educational as well.
- Sound information is crucial in developing good budgets. Annual work plans should be used to calculate the program's costs. You must understand the financial reality of your request as it fits the constraints of the municipal budget.
- A cost-effective community tree program will better compete for scarce budget dollars. The program's costs can be reduced through sound administrative practices such as employee training, accurate record keeping, preventive maintenance, and selection of well-adapted trees for planting. Contracting out services can also be cost effective. For instance, a consulting arborist or community forester can be hired part time, on a retainer, or on a cost-sharing basis with surrounding municipalities. These costs could be lower than paying a full-time salary.
- Remember to include the public in your program. Grassroots public support can help generate funding. Clearly document the value of the community forestry program by developing good relations with the press and service organizations.
- Accurate records of work and expenditures can provide convincing information on the need for funding. The budget for a tree program should adapt to the changing needs of a program as work is accomplished and the program becomes established. New programs may need larger proportions of a budget dedicated to tree maintenance, tree removal, and public education. Established programs may dedicate more funding for tree planting as progress is made in the removal and maintenance of trees neglected in the past.

The following suggestions can be used when developing annual budget plans. The percentages, which are samples from established programs, should be modified for the particular needs of a community's street or park trees.

- About 20 percent of the budget should be allocated for tree removal. If there are trees that need to be removed, this should be made a budget priority.
- About 40 percent should be allocated for tree maintenance activities such as pruning, watering young trees, mulching, or controlling insects and diseases.
- Public safety and caring for existing trees should take priority over planting new trees. Too many communities make the mistake of planting new trees while neglecting older, more valuable trees. Only about 20 percent of the annual budget of an established program should be allocated for new tree plantings.

- Administrative activities are an integral part of every tree program and should receive about 20 percent of the budget. When starting a program, much more of the budget should be dedicated to obtaining authorization, gaining legislative and public support, and educating the public.



Typical fund use in urban forestry tree budget allocations

Projected Multi-Year Maintenance Budgets

Typical tree budget allocations found in urban forestry programs across the United States allocate funding in these areas. These are approximations but provide an accurate representation of fund allocations. The priority should be to take care of what you have before substantially adding to the street tree population.

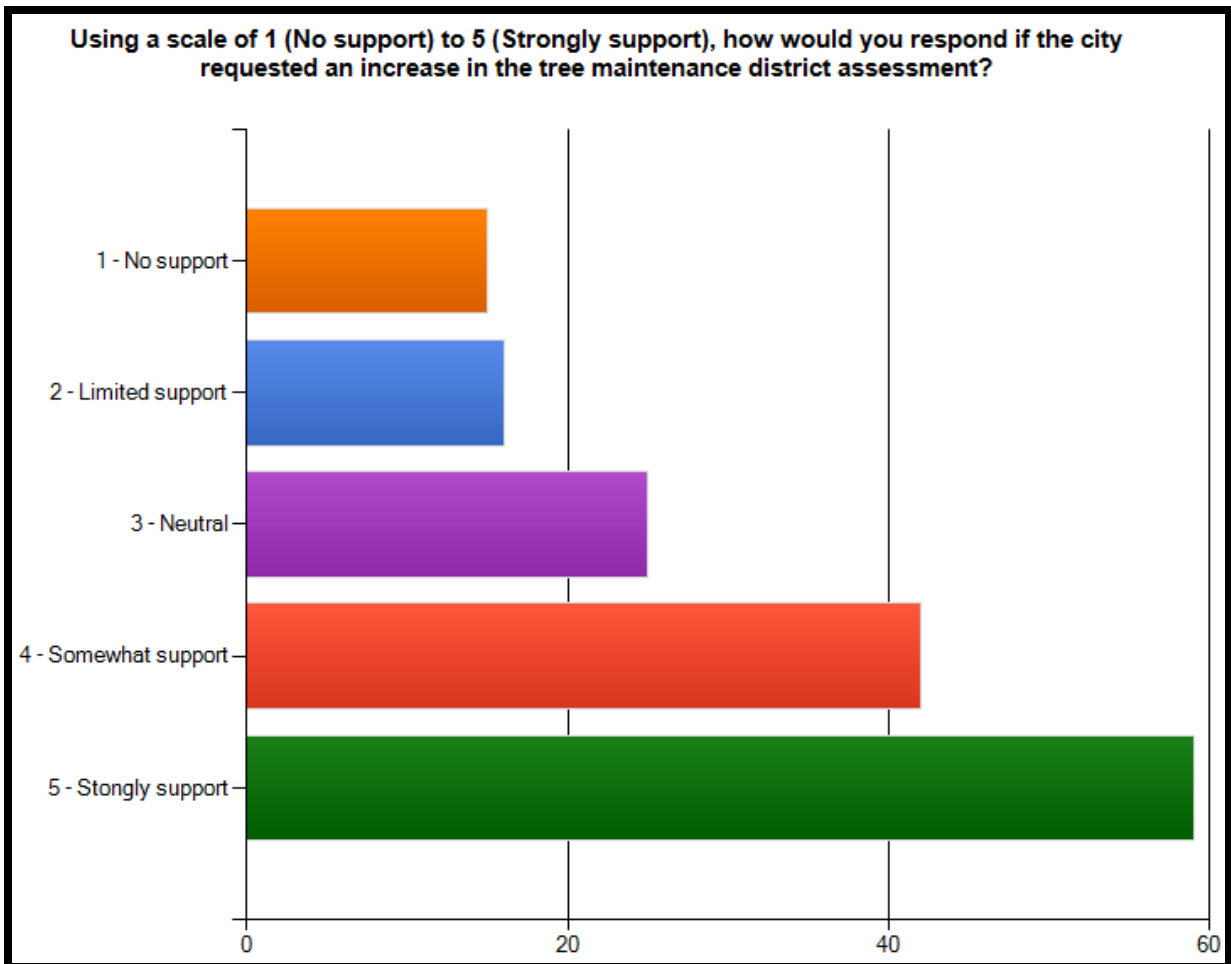
One thing many municipalities have in common is a limited budget. Traditionally, the budgets for public trees and parks are the first to be cut when money becomes tight. Many municipalities simply cannot afford a community tree program. As a result, creativity and energy are needed to find funds to support public trees and landscapes. Below are some strategies to ensure funding for urban forestry programs:

- An annual report, work plan, and budget will be used to inform elected officials of the tree board's work and funding needs (Table 4).
- An annual meeting will be held to discuss the tree board's work and funding needs.

- News articles and releases will be used to explain worthy activities, including planting, tree removals, pruning, and funding needs.
- A “memorial or heritage tree” program will be used to raise money for tree planting on streets and in parks.
- Local civic organizations and businesses will be contacted annually to discuss their participation and support of commission activities.
- Community, family, and corporate foundations will be identified and considered for support of commission activities.
- State and other government grants will be identified and considered for support of commission activities.
- Emphasize the solutions to community problems that trees offer such as stormwater abatement.

The following budget objective is recommended:

- Establish annual operating plans and annual budgets based on UFMP goals.



Over 60% of survey respondents support an increase in the annual tree assessment.

Annual Community Tree Budget Worksheet		
_____ MUNICIPALITY AND YEAR _____		
Materials		
Trees (Multiply number of trees _____ by the average cost per tree \$_____.)	\$ _____	
Stakes, soil, mulch, fertilizer	\$ _____	
Pesticides/herbicides	\$ _____	
Computer inventory software	\$ _____	
Administrative and public education materials (paper, copies, brochures, educational books)	\$ _____	
Other	\$ _____	
Materials subtotal		\$ _____
Equipment and buildings use		
(Divide total cost by years of service life and add maintenance, utilities, and fuel costs.)		
Office space	\$ _____	
Equipment storage/building	\$ _____	
Climbing gear	\$ _____	
Pruning tools, chain saws, handsaws	\$ _____	
Trucks/aerial lifts, backhoe/front-end loader, leaf collection equipment, chipper, stump grinder	\$ _____	
Spray equipment	\$ _____	
Equipment rental (types _____)	\$ _____	
Other	\$ _____	
Equipment and building subtotal		\$ _____
Services (municipal, volunteer, and contracted)		
Salaries and fringe benefits (based on % of employees' time spent working with trees)	\$ _____	
Tree board volunteer time	\$ _____	
Labor (paid or volunteer) or total cost of services		
(When using volunteer labor, estimate the wage based on task.)		
Planting (Multiply hours _____ by average wage \$_____.)	\$ _____	
Pruning (Multiply hours _____ by average wage \$_____.)	\$ _____	
Removal of trees and stumps (Multiply hours _____ by average wage \$_____.)	\$ _____	
Tree inventory (Multiply hours _____ by average wage \$_____.)	\$ _____	
Emergency storm damage cleanup (Multiply hours _____ by average wage \$_____.)	\$ _____	
Mulching, watering, fertilizing (Multiply hours _____ by average wage \$_____.)	\$ _____	
Leaf and branch cleanup (Multiply hours _____ by average wage \$_____.)	\$ _____	
Leaf composting (Multiply hours _____ by average wage \$_____.)	\$ _____	
Insect control (Multiply hours _____ by average wage \$_____.)	\$ _____	
Utility pruning and other services (Obtain estimate from company and pro-rate per year.)	\$ _____	
Consultant services	\$ _____	
Educational programs	\$ _____	
Delivery/transportation charges	\$ _____	
Administration: (permit review, grant writing, Arbor Day planning, site inspection, etc.)	\$ _____	
Memberships in tree organizations (state council, ISA, etc.)	\$ _____	
Other	\$ _____	
Services subtotal		\$ _____
Other		
Unpaid insurance claims for damaged trees	\$ _____	
Grant funds expended, if not included above	\$ _____	
Total expenditures (Use this amount in Tree City USA formula.):		\$ _____

Table 4 – An annual budget, no matter how small, should be presented to the Helena commission by the tree committee.

Levels of Service (LOS) and Extrapolated Maintenance Costs

There are 9,000 trees inventoried in the partial inventory conducted in the summer of 2010. An inventory audit to assess data accuracy and maintenance requirements was conducted in September 2010. The inventory audit was used to generate maintenance requirements, maintenance cost estimates, and staffing requirements. There are approximately 4,900 trees that require some form of pruning and 3,100 trees that need to be removed.

The following assumptions are made for the purpose of forecasting staffing and budgets. An industry average of \$500.00 using an ISA certified arborist is required to complete a crown prune for each tree. Pruning specifications assumed a fine pruning standard to treat the maintenance issues associated with each tree. Fine pruning consists of removal of dead, diseased, interfering, co-dominant branches or weak branches, one half inch in diameter or greater. The Level of Service (LOS) 1 figure represents current funding levels available for all tree maintenance activities (planting, pruning, and removals).

- **LOS 1 – Prune trees on a request/reactive basis, \$130,000.00**
- LOS 2 – Prune trees on 5 year pruning cycle (1000 trees/year); \$500,000.00
- LOS 2 – Prune trees 10 year pruning cycle (500 trees/year); \$250,000.00
- LOS 3 – Prune trees 20 year pruning cycle (250 trees/year); \$125,000.00

Municipal arboriculture standards recommend a 5-year pruning cycle for street and park trees. A 5-year pruning cycle means each tree is pruned every 5 years. The annual tree district maintenance assessment does not provide adequate funding for a 5-year pruning cycle.

The removal of trees is a necessary component of any urban forestry program. Public safety warrants removal of high risk trees. There are several thousand street trees that need to be removed. An industry average of \$1,000.00 using ISA certified arborists is required for each tree removal. The Level of Service (LOS) 1 figure represents current funding levels available for all tree maintenance activities (planting, pruning, and removals).

- **LOS 1 – Remove risk trees on a request/reactive basis; \$130,000.00**
- LOS 2 – Remove risk trees in 5 years (600 trees/year); \$600,000.00
- LOS 3 – Remove risk trees in 10 years (300 trees/year); \$300,000.00
- LOS 4 – Remove risk trees in 20 years (150 trees/year); \$150,000.00

At current funding levels tree maintenance activities are not fulfilled at minimum levels of service. Current levels of funding does not consider equipment preparation, supporting grounds staff personnel, travel, on-site set up, pre-work tree inspections, and other preparation before arboriculture work begins.

There is a proposal before the commission to change the tree maintenance assessment to a tree management program assessment and raise the assessment to \$20.00 per property per year. This is a positive step to deal with a large quantity of trees in need of pruning and/or removal yet still does not raise the LOS to municipal arboriculture industry standards. **The following recommendation will elevate the Helena urban forestry program to meet industry standards and insure the city is proactively managing the public tree population.**

- Raise the tree management assessment to \$50.00 per property per year.

Agency Staffing and Equipment

The current forestry field staff is composed of a two person (1.5 FTE) tree maintenance crew and Supervisor – (.25 FTE). The position description definitions provided by city staff are similar to other communities' municipal arborist classifications. Salaries,

(\$35,000.00 annually) including administrative overhead are comparable to industry standards.

Some of the **minimum** standards established by the municipal arboriculture industry include:

- Program management and direction by an urban forester.
- All trees should be pruned at least once every 5 years.
- No more than 10,000 trees per climbing ISA certified arborist on staff.
- Each climber receive a minimum of 20 hours of arboriculture and pesticide training per year, including training in aerial rescue, CPR, first responder training, and attending courses on all subjects related to arboriculture certification.
- A street and park tree master plan.

It is clear that current Helena resources are not sufficient to address tree issues in a reasonable, timely, and safe environment if the maintenance requirements and tree conditions found in the sample inventory were extrapolated to the entire community tree population.

The personnel, equipment resources, and budgets of the forestry operations are not sufficient to meet the management and maintenance needs of the Helena street, park, trail, and forest system. A review of tree maintenance needs, maintenance schedules, crew configurations, personnel, equipment and training required to manage and maintain the thousands of trees in the system finds city resources insufficient. Current resource levels have placed Helena in a reactive management position that increases the liability of the agency and exposes staff to an increased risk of accidents attempting to deal with high-risk trees.

Helena tree maintenance crews are operating in reactive mode. Many agencies operate under a mode of crisis management when it comes to tree care maintenance and correcting/removing high risk trees. Information from many U.S. cities shows that the cost per unit of maintenance is generally twice as high with crisis management that it is when maintenance is performed on scheduled or programmed basis (World Forestry Center 1993). In addition to higher maintenance costs, relying on crisis management may lead to injuries or deaths to park users and hazardous work environments for crews that eventually remove high risk trees.

For example, we can assume there are approximately 20,000 trees located along streets, in parks, and near trails in the Helena system. Municipal arboriculture standards recommend one climbing arborist for every 10,000 trees. Helena would need to employ two ISA certified arborists to meet minimum municipal arboriculture standards and one additional ground support person. The annual wage cost for two ISA staff arborists would be \$70,000.00.

One three-person arboriculture crew, equipped with an aerial lift truck and chipper would provide a LOS for public trees to meet municipal arboriculture industry standards. Aerial lift trucks, chippers, and stump grinders cost approximately \$150,000.00, \$40,000.00, and \$30,000.00 respectively.

Staffing estimates require a complete tree inventory, analysis of workload versus available resources (staff, contractor costs, equipment, budget, training, support services, etc.) in order to provide an accurate assessment of agency needs. The data collected in the sample inventory is not sufficient to develop long-range staffing recommendations.

However, the sample inventory data is sufficient to recommend the agency create an arboriculture crew to improve efficiency and initiate proactive risk mitigation and pruning programs. The crew composition, equipment, and budget are listed in Table 5. The budget includes onetime capital equipment purchases and annual wages based on costs mentioned previously in the UFMP.

URBAN FORESTRY	CREW TYPE	EQUIPMENT	BUDGET
Helena Urban Forestry Department – Urban Forester	Management	Administrative budget, office space	\$55,000.00 annual salary
Helena Urban Forestry Department	1 – 3 person aerial lift/climb crew and ground support	Aerial lift truck with dump box, chipper, stump grinder	\$100,000.00 annual salaries
Helena Urban Forestry	Administrative Assistant	Office Space	\$30,000.00
TOTAL STAFF BUDGET			\$185,000.00

TABLE 5

The following objective is recommended to establish and implement a proactive urban forestry program:

- Add additional urban forester management position equivalent to park superintendent position to manage, direct, and operate urban forestry program.
- Augment current tree maintenance positions to establish one full time 3-person ISA certified arboriculture crew.
- Add additional administrative assistant or additional duties to existing staff to provide administrative support for urban forestry program.

Staff Training

The City of Helena staff and residents recognize the importance of trees to their community. Proper tree maintenance is critical to public safety, tree value, and realizing the benefits of trees. It is important that staff be properly trained in tree maintenance to perform duties that are assigned. Proper tree maintenance by city staff illustrates city leadership and reinforces the objectives of the urban forestry program.

Arboriculture and tree care maintenance and operations are very specialized fields of work. Many years of education and training are required to perform competently and safely in the field and without harm to the trees. Tree care performed by city staff or contractors to Helena’s public trees should be accomplished by ISA certified arborists or certified tree workers.

Annual training is a mandatory element in keeping staff updated on the current tree maintenance practices, risk assessment, and safety methods and practices in the arboriculture industry. Staff training is essential for working safe, efficient, following the best management practices of the arboriculture industry, and for advancing Helena's urban forestry program into the future. **The following objectives should be incorporated into Helena's urban forestry program.**

- All urban forestry city staff should obtain and maintain ISA certification.
- Annual training for urban forestry staff.

PROGRAM ACTIONS

Actions required to fulfill the management goals recommended in the UFMP are described in this section and should be undertaken by the Parks & Recreation staff working in concert with inventory data, an urban forestry advisory board, the City Commission, and citizens of Helena.

There are program management elements that must be addressed on an annual basis: Risk Tree Abatement, Proper Tree Maintenance, Tree Planting, and Program Administration. Although each of these programs is essential to the maintenance of the community forest, an annual operating plan should be established to determine where budget dollars will be spent. Survey respondents and city staff have established public safety, responsible management of existing trees, and tree planting as priorities.

Long-range planning mainly concerns program enhancement and involves the completion of recommendations in the management plan. There are program management elements that must be addressed to sustain the community's tree program and trees: Increase Funds Spent on Community Trees, Community Outreach and Education, and Tree Ordinance Revision Development.

Priority: Risk Tree Abatement

High-risk tree management is the removal of dead or dying trees and trees that have structural issues that may cause the tree or tree parts to fail. This is the highest budget priority due to potential public safety concerns. Trees with a high risk of failure or risk of losing major branches may cause property and/or personal injury.

Situations where injury or property damage has occurred from falling trees are not isolated and are well documented in the media on a regular basis. In addition to the potential for personal injury or property damage, the probability of the responsible parties being held liable for any injuries or damages increases. Such lawsuits can and have resulted in costly judgments against the defendants.

Public safety must be the primary concern in Helena. Tree removals and pruning are a vital part of safety risk mitigation. The general tree population in Helena is in fair condition; there are large trees with varying degrees of risk factors existing in the scaffold limbs, trunks, and roots. Many of these trees have developed structural defects. Consideration must always be made of area usage and the risk of falling limbs or trees to persons and property when putting a removal and pruning plan into action.

External indicators of increased risk trees, such as obvious root zone activity, decay fungi, or included bark, require special attention to meet the public's safety needs. Trees that display decay fungi or obvious signs of wood decay should be carefully monitored and evaluated for safety concerns and risk management. Trees with poor structure, such as those with co-dominant leaders or multiple trunks, can pose a greater failure risk than trees with good structure. All public trees in Helena (especially trees in the large-size diameter class) with signs of decay and/or poor structure should be examined annually for signs of impending failure.

Priority: Acceptance and Implementation of the Urban Forestry Management Plan.

The UFMP is straightforward and comprehensive, contains appropriate goals, and activities for this community. The objectives of the UFMP are clear and far-sighted. The goal is to change the forest as it is today into one that reflects the goals of the management plan. The five year plan should be reviewed annually to determine progress, review the activities accomplished, aid in the development of annual operating plans, and plan for future activities to complete the UFMP recommendations. This ensures important components of the UFMP are accomplished and progress is made towards achieving a sustainable tree program. Long-range planning time horizons can be several years or a decade, but five years is most commonly used and is a realistic time frame for implementation of the goals and recommendations of the UFMP.

Priority: Tree Inventory Completion

A significant component of an urban forest program is a professional analysis of the tree population. Using the TreeWorks software, the inventory of all public trees should be completed by experienced arborists to provide an accurate accounting of public trees. Using accurate, consistent inventory data and professional interpretation and planning, leads to healthier, safer, trees with lower maintenance costs and increased benefits to the community provided by public trees.

Priority: Proper Tree Maintenance

After planting an appropriate species at a site that can support adequate growth, maintenance practices such as mulching, watering, and pruning should be employed for three to five years. If trees are pruned properly three or four times during the first twenty years, they will need less frequent and less costly pruning in later years. Pruning promotes sound structural development of a tree's trunk and branches. The most important period for pruning occurs when the tree is young. Pruning large trees is costly and usually consumes a large part of any tree program's budget. By prioritizing the proper planting and pruning of young trees, a substantial savings can be realized by the entire tree program.

Early pruning performed properly will lead to long-lived healthy and safe mature trees. Pruning young trees properly produces substantial cost savings to the city. Training young trees can provide a strong branching structure that requires less frequent pruning as the tree matures. Improved stewardship to increase the health and survival of recently planted trees is one strategy for increasing cost-effectiveness.

Proper training in young tree structural pruning would be required for Helena staff responsible for this task. Additionally, these workers would be required to understand the growth-habits of the various species being planted, as well as tree biology, anatomy,

and physiology. This training can be received through several sources, including urban forestry consultants, the state's Community Forestry Program, and the regional chapter of the International Society of Arboriculture. The tremendous aesthetic and financial benefits to be gained in the years to come from proper pruning of young trees are a strong incentive for educating tree crew personnel concerning proper pruning techniques. The added knowledge gained by the individuals could augment the sense of professionalism in their jobs.

Large trees are the most significant component of the city's community forest. They form a canopy over streets, parks, and private properties. A mature tree is a costly management element, but it is important element because of safety and tree health issues. The consequences of lack of care for large trees are the creation of more risk trees and poor tree health.

Enforcing standards for pruning and other tree care is crucial in providing correct and consistent plant health care. The International Society of Arboriculture has developed pruning standards for trees. The standards are divided into four categories: crown cleaning, crown thinning, crown raising, and crown reduction.

Crown restoration, pruning for views, and other pruning are considered specialty pruning. Other helpful sets of standards to consider and include are the ANSI Standards for Arboricultural Operations—Pruning, Trimming, Repairing, Maintaining, and Cutting Brush—Safety Requirements (ANSI Z133.1, 2000) and the ANSI Standards for Tree Care Operations—Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices, Pruning (ANSI A300(Part 1), 2001, Pruning). These safety and pruning standards are designed specifically for tree care operations and should be incorporated into your standards for tree care.

Systematic pruning of large trees reduces maintenance costs, increases the value of the trees, sustains the benefits of trees, and is a clear demonstration the city is exhibiting reasonable care in maintaining its trees. Cyclic pruning shifts tree management from reactive to proactive. The overall condition of Helena's trees will be increased by improving the quality of pruning, storm damage will be greatly reduced, and the cost to prune trees will decrease as problems are addressed before they become costly. The city should establish a pruning cycle of two to five years.

Priority: Tree Planting

New tree planting is an essential part of the community tree management. The health and stability of the city's future forest depends in large part on judicious tree selection, location, and tree planting today, as well as regular maintenance of young public trees.

The key for successful tree planting is to plant quantities the city has the ability to maintain. If you cannot maintain 100 new trees, don't plant 100 new trees. Increase new plantings each year, but in quantities that match the maintenance abilities of staff and city resources.

To ensure the health of newly planted trees and that planted trees thrive, standards and specifications should be provided in the tree plan for planting techniques. These can best be expressed as general guidelines with references to technical publications. A great deal of information about the size of planting pits, staking, and other planting practices has been developed by International Society of Arboriculture. The DNRC

Forestry Program can provide other resources and training programs to ensure successful tree planting programs.

Priority: Program Support and Administration

The city's concern for and level of dedication to urban forestry is exemplified by the recent tree inventory, management plan project, tree assessment, and the existence of some public tree maintenance.

The elected officials are keys to the growth and success of the Helena's urban forestry program. As the ultimate policy-making group and representatives of the citizens, the mayor and commissions can have direct influence over the current and future management of the urban forest. They can approve new and improved tree ordinances, support increases in program funding, support additional staffing levels, and generally make urban forestry issues a priority for the city.

Support from elected officials and the citizens are critical to implement and maintain an effective comprehensive urban forest management program. The citizens own both the public and private urban forests, and without greater political support and increased citizen understanding and commitment, urban forest management in Helena may not reach its full potential.

Program administration refers to the supervision, scheduling, coordination, planning, and education for the city's tree program. These tasks are varied and numerous and should be addressed through the coordinated effort of city administration, staff and an advisory tree committee. Much of the field work will be performed through contractual agreements with consultants and commercial tree care firms. It is the responsibility of the city administration, city staff, tree committee, and residents to ensure that the best management practices are used for treatments to the city's trees.

Priority: Increase Staff and Funds Spent On Community Trees

Helena's urban forestry needs have reached a point where the future management of the city trees requires an urban forester, ISA certified arborists positions, support staff, and funds for contractors or consultants with the ability to augment the services provided by the Parks & Recreation staff. A job analysis could be performed to determine if new or existing job classifications should be created, whether existing staff could be trained and reassigned or if new hiring is needed, and what level of funding is needed to support the positions.

An adequate complement of professionals who, individually or collectively, understand the technical, operational, and administrative factors in urban forest management is needed to prescribe and monitor the city's urban forestry activities, enforce policies and regulations, apply technical standards and practices, and review plans that affect the forest resource. Without this professional component in sufficient numbers, urban forest management decisions and actions often default to inadequately prepared decision-makers, which can have long-term, negative consequences for the forest resource.

Community trees are a local responsibility. Federal assistance, state assistance, donations and special grants provide important help for community tree activities. However, no source of funds should be considered a substitute for including trees in the city's budget. Abundant, healthy trees are of value to the entire city. A tree program is as much a city responsibility as streets, water and fire protection. Incorporating trees

into the mainstream of the city's fiscal responsibility should be a goal in Helena's strategic planning for the future.

The lack of dedicated and adequate financial resources for the community trees precludes making significant improvements to the tree population. Currently, there is no designated regular general funding for tree planting, preventive tree maintenance, risk management, cyclical pruning, staff training and support personnel, or equipment.

The resources for urban forest management should be increased. A truly proactive and comprehensive urban forest management program requires trained and dedicated staff to oversee management and operational activities. The important duties of tree planting, tree maintenance, risk assessment, site inspections, project management, contract administration, citizen education, and public outreach require a competent staff, equipment, and other program resources.

Priority: Community Outreach and Education

Collaboration is necessary for a tree program to serve the physical, social, and ecological needs of the city's infrastructure and contribute to the community. The citizens of Helena will need to be informed and educated to ensure the success of a tree program and to carry out and accomplish the recommendations of the management plan. Education is one of the best investments to garner support for the tree program. Workshops, stewardship programs and collaboration with volunteers, schools, and other civic groups can serve as a conduit for support of the program.

Methods of educating the public and encouraging participation by volunteers are important parts of a community tree plan. Examples of strategies for public education and participation for a tree plan include the following:

- Residents, civic organizations, and environmental groups will be offered opportunities to participate in tree planting and maintaining public flower beds.
- Educational materials concerning trees and other natural resources will be provided to schools, particularly grades three through ten.
- Arbor Day and Earth Day will be celebrated—with the involvement of public officials and school children—as reminders of the importance of the community forest.
- Workshops on tree planting and care and other educational programs will be provided for community residents.
- Contacts with commercial arborists and the utility company will inform them of community expectations for the quality of work on public and private trees.

Identify and involve local movers and shakers, decision makers, and other people in your community. The number one reason people volunteer is because they are personally asked.

Identify community and nonprofit groups, churches, and schools that could provide support in the form of people and meeting space. Seek and publicly acknowledge support from local banks, utility companies, and other organizations for special projects.

Identify and contact assembly members, state legislators, and city departments using the city's resources as leverage to attract additional funds, influence, skills, and other resources.

Priority: Tree Ordinance Development

A review of the city's documents exposed several issues not addressed in city code regulations. Tree ordinances to be effective must provide three functions: provide authority, define responsibility and establish minimum standards for management and maintenance. The tree ordinance suited to Helena, and most likely to be approved in Helena, is written with a thorough understanding of the natural resource, ethnic tradition, political-economic climate, legal framework of the community, and the need to manage with an ecological perspective the supports the green infrastructure.

Most forestry programs exist as a reflection of community interest in trees and operate as specified in the tree ordinance. Passage or revision of an ordinance can be a complex issue. There are many diverse groups that have a stake in tree ordinances. I recommend a broad base of community support be developed prior to attempting to develop the ordinance. The tree inventory and UFMP can provide the basis for support and the need to develop the current ordinance.

Priority: Downtown Tree Design and Planting

The urban forest can and does have a great impact on the long-term economic viability of Helena. Many recommendations in the UFMP will improve tree structure and health and provide better management of the urban forest to support businesses in Helena.

Well-planned tree planting in retail districts would improve the visual and physical experience of being in Helena by providing unity, screening undesirable views, and providing shade and beauty for customers.

Trees and landscaping would be a primary element for creating a hierarchy of gateway treatments that will define and designate distinct areas of Helena for visitors. Tree-lined streetscapes, especially those planted with large canopy trees where possible, are currently limited in Helena, but are needed to celebrate and preserve the character of the city.

Work with property owners, tenants, city officials, tree committee members, and traffic engineers to create a downtown planting plan that considers tree diversity, maintenance limitations, microclimate constraints, aesthetics, and business concerns. Establish designs that ensure trees thrive in the downtown core and assess new planting designs and techniques tried recently.

CONCLUSION

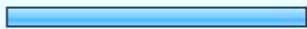

Community Forestry Consultants, Inc. has completed its assignment of evaluating and making recommendations regarding the community forest of Helena. This management plan provides the city with the framework to implement the best management practices for the community forest. The management and maintenance needs for a successful urban forestry program have been determined from the best management practices available in the urban forestry and arboriculture industry.






Timely action needs to be taken to prevent tree failures, preserve tree resources and maintain the trees of Helena. Trees are valuable assets to the community. The healthier the trees are in the community the more the city's livability is improved. To realize these benefits, tree planting, pruning and removing; increased education, preservation and volunteerism is needed. The focus goes beyond the individual tree to trees throughout the city.....to the working community forest.

The recommendations will help conserve Helena's tree resource and sustain the tree canopy for future generations. Although this commitment will come with costs, the long-term benefits are significantly greater and will result in a sustainable asset for the citizens of Helena today and tomorrow.





APPENDIX A – SURVEY RESULTS

The following represents the summary results for the Helena Urban Forestry survey.





1. Were you aware that Helena has an urban forestry program dedicated toward managing, maintaining, and preserving public tree resources throughout the city?			Response Percent	Response Count
Yes			64.3%	101
No			35.7%	56
answered question				157
skipped question				0

2. How would you rate the overall quality of street and park trees in Helena?			Response Percent	Response Count
Very good			7.6%	12
Good			35.0%	55
Average			43.9%	69
Poor			12.1%	19
Very poor			1.9%	3
answered question				157
skipped question				0





3. The urban forest in Helena consists of the trees, shrubs, and other vegetation in parks, along streets, in private yards, on empty lots, and in urban natural areas. Do you think the overall quality of Helena's urban forest has improved, declined, or stayed the same in the last 10 years?

		Response Percent	Response Count
Improved		21.7%	34
Declined		38.9%	61
Stayed the same		27.4%	43
Don't know		12.1%	19
answered question			157
skipped question			0





4. Over the past 10 years, do you think the number of trees in Helena has increased, decreased, or stayed the same?

		Response Percent	Response Count
Increased		31.2%	49
Decreased		29.3%	46
Stayed the same		21.7%	34
Don't know		17.8%	28
answered question			157
skipped question			0










5. Looking forward 10 years into the future, do you expect the number of trees to increase, decrease, or stay the same given the tree maintenance assessment has not changed since 1997?



		Response Percent	Response Count
Increase		23.6%	37
Decrease		42.7%	67
Stay the same		24.8%	39
Don't know		8.9%	14
answered question			157
skipped question			0

6. Do you think the overall health of the urban forest has improved, declined, or stayed the same in the last 10 years?






		Response Percent	Response Count
Improved		10.2%	16
Declined		58.6%	92
Stayed the same		20.4%	32
Don't know		11.5%	18
answered question			157
skipped question			0



7. Urban trees provide many local benefits. How do you rate your familiarity with the following:							
	Unfamiliar	Somewhat unfamiliar	Somewhat familiar	Familiar	Don't know	Rating Average	Response Count
Urban trees make walking or cycling through neighborhoods more enjoyable.	1.3% (2)	0.0% (0)	5.1% (8)	92.4% (145)	1.3% (2)	3.92	157
Urban trees increase the life of streets and parking lots by keeping paved surfaces cooler in the summer.	9.6% (15)	10.3% (16)	19.2% (30)	57.7% (90)	3.2% (5)	3.35	156
Urban trees improve air quality by filtering airborne pollutants and dust.	1.3% (2)	3.8% (6)	8.9% (14)	86.0% (135)	0.0% (0)	3.80	157
Urban trees improve water quality by controlling pollution, erosion, and flooding during stormwater runoff.	4.5% (7)	3.2% (5)	11.5% (18)	79.6% (125)	1.3% (2)	3.70	157
Urban trees increase residential and commercial real estate values.	1.3% (2)	0.0% (0)	8.9% (14)	89.2% (140)	0.6% (1)	3.88	157
Urban trees increase visual quality, product pricing, patronage behavior, and shopper experiences in central business districts.	5.1% (8)	3.8% (6)	15.9% (25)	73.9% (116)	1.3% (2)	3.62	157
Urban trees contribute to the psychological and social health of a community by reducing stress, crime, and other social issues associated with cities.	8.3% (13)	10.2% (16)	20.4% (32)	56.7% (89)	4.5% (7)	3.39	157
answered question							157
skipped question							0

8. Where do you get your tree care advice (mark all that apply)?			
		Response Percent	Response Count
Books and/or magazines		53.5%	84
Internet sites		54.1%	85
Nurseries or garden centers		73.9%	116
Arborists certified by the International Society of Arboriculture		19.1%	30
Montana Department of Natural Resources		9.6%	15
Montana extension agent		31.2%	49
Helena city forester		6.4%	10
Non-certified tree worker or landscape contractor		16.6%	26
Other (please specify in comment box)		10.2%	16
		Comments	21
answered question			157
skipped question			0

9. Do you have street trees along your street frontage?			
		Response Percent	Response Count
Yes		61.1%	96
No		38.9%	61
answered question			157
skipped question			0

10. Were the tree(s) planted in the last five years?			
		Response Percent	Response Count
Yes		12.7%	20
No		87.3%	137
answered question			157
skipped question			0

11. Who performs pruning and other tree maintenance on your street tree(s)?			
		Response Percent	Response Count
Myself or a friend, neighbor, or family member		46.5%	73
Other (please specify)		14.0%	22
Nobody		33.8%	53
A non-certified tree worker or landscape contractor		7.0%	11
An arborist certified by the International Society of Arboriculture		9.6%	15
Comments			46
answered question			157
skipped question			0

12. Did you know that Helena currently has public tree regulations in place for the following: planting, pruning, and removal of street trees/			
		Response Percent	Response Count
Yes		51.0%	80
No		49.0%	77
answered question			157
skipped question			0

13. Below is a list of programs and services provided by the Urban Forestry Program. Please rate each of the following using a scale of 1 to 5, with 1 being "very low priority" and 5 being "very high priority."

	1 - Very low priority	2	3 - Neutral	4	5 - Very high priority	Rating Average	Response Count
Review of new development projects for tree retention and re-planting to ensure compliance with land development codes.	5.1% (8)	1.9% (3)	16.6% (26)	31.2% (49)	45.2% (71)	4.10	157
Risk tree assessment for street trees and for private trees when requested by code enforcement.	5.1% (8)	4.5% (7)	27.6% (43)	41.7% (65)	21.2% (33)	3.69	156
Coordinate street tree planting and pruning projects using volunteers and volunteer organizations.	4.5% (7)	4.5% (7)	22.4% (35)	42.3% (66)	26.3% (41)	3.81	156
Coordinate the memorial tree program.	7.1% (11)	9.6% (15)	43.6% (68)	32.1% (50)	7.7% (12)	3.24	156
Coordinate street and park tree planting with Growing Friends of Helena.	5.1% (8)	2.5% (4)	15.3% (24)	43.3% (68)	33.8% (53)	3.98	157
Review and issue permits for the planting, pruning, and removal of street trees in compliance with city code.	9.1% (14)	7.8% (12)	30.5% (47)	36.4% (56)	16.2% (25)	3.43	154
Host Arbor Day and other tree-related educational events.	5.8% (9)	8.4% (13)	33.5% (52)	35.5% (55)	16.8% (26)	3.49	155
Manage natural forest land within the city limits.	5.2% (8)	1.3% (2)	10.5% (16)	32.7% (50)	50.3% (77)	4.22	153
					answered question		157
					skipped question		0

14. Using a scale of 1 (No support) to 5 (Strongly support), how would you respond if the city requested an increase in the tree maintenance district assessment?			
		Response Percent	Response Count
1 - No support		9.6%	15
2 - Limited support		10.2%	16
3 - Neutral		15.9%	25
4 - Somewhat support		26.8%	42
5 - Strongly support		37.6%	59
answered question			157
skipped question			0

15. The following question addresses urban forestry management in Helena. Using a scale of 1 (Strongly disagree) to 5 (Strongly agree) rate the following statements.

	1 - Strongly disagree	2	3 - Neutral	4	5 - Strongly agree	Rating Average	Response Count
It is fair to require developers to preserve or plant trees in their projects.	1.3% (2)	3.8% (6)	6.4% (10)	19.7% (31)	68.8% (108)	4.51	157
More trees should be planted on city property.	1.3% (2)	4.5% (7)	20.0% (31)	29.0% (45)	45.2% (70)	4.12	155
The tree maintenance district assessment should provide more funding for tree care and maintenance.	3.2% (5)	9.0% (14)	15.5% (24)	32.3% (50)	40.0% (62)	3.97	155
Helena's trees need a higher level of maintenance.	3.8% (6)	5.8% (9)	27.6% (43)	24.4% (38)	38.5% (60)	3.88	156
Management of the urban forest should be centralized in one department.	1.3% (2)	4.5% (7)	34.0% (53)	26.3% (41)	34.0% (53)	3.87	156
Urban forest management in Helena deserves more staff.	5.8% (9)	5.2% (8)	42.9% (66)	22.1% (34)	24.0% (37)	3.53	154
The City should regulate trees on private property.	23.9% (37)	31.0% (48)	28.4% (44)	11.0% (17)	5.8% (9)	2.44	155
The City should only plant, maintain, and regulate trees on public property.	5.9% (9)	9.8% (15)	23.5% (36)	32.7% (50)	28.1% (43)	3.67	153
What additional services would you like the Urban Forestry Program to provide, if any.							33
					answered question		157
					skipped question		0

16. Please prioritize the following urban forestry management actions using priority) to 12 (highest priority).										
	1 - Lowest priority	2	3	4	5	6	7	8	9	10
Better enforce existing regulations and ordinances.	7.9% (8)	7.9% (8)	10.9% (11)	6.9% (7)	12.9% (13)	8.9% (9)	7.9% (8)	9.9% (10)	9.9% (10)	6.9% (7)
Create a master tree-planting plan and plant more trees on public property.	1.0% (1)	4.0% (4)	7.9% (8)	8.9% (9)	5.9% (6)	6.9% (7)	8.9% (9)	5.0% (5)	9.9% (10)	8.9% (9)
Require developers to better preserve more trees and plant more trees on private residential and commercial property development projects.	1.9% (2)	3.8% (4)	2.9% (3)	3.8% (4)	5.7% (6)	3.8% (4)	7.6% (8)	12.4% (13)	11.4% (12)	9.5% (10)
Review, update, and strengthen City regulations and guidelines for tree maintenance, planting, removal, and preservation on private property.	9.5% (9)	6.3% (6)	7.4% (7)	13.7% (13)	11.6% (11)	12.6% (12)	6.3% (6)	6.3% (6)	5.3% (5)	12.6% (12)
Secure more funding for the urban forestry program.	2.0% (2)	5.0% (5)	4.0% (4)	9.0% (9)	9.0% (9)	13.0% (13)	6.0% (6)	6.0% (6)	20.0% (20)	12.0% (12)
Achieve more inter-departmental cooperation.	12.1% (13)	8.4% (9)	15.0% (16)	1.9% (2)	4.7% (5)	15.0% (16)	12.1% (13)	6.5% (7)	1.9% (2)	8.4% (9)
Increase and improve maintenance (prune, remove, mulch, fertilize, etc.) for all public trees.	0.0% (0)	0.9% (1)	1.9% (2)	0.9% (1)	4.7% (5)	8.5% (9)	13.2% (14)	12.3% (13)	8.5% (9)	10.4% (11)
Review, update, and strengthen Town regulations and guidelines for tree maintenance, planting, removal, and preservation on public property.	6.8% (6)	6.8% (6)	2.3% (2)	9.1% (8)	12.5% (11)	9.1% (8)	12.5% (11)	11.4% (10)	8.0% (7)	9.1% (8)
Hire more staff to perform tree maintenance and inspection work.	12.6% (14)	8.1% (9)	10.8% (12)	12.6% (14)	11.7% (13)	2.7% (3)	3.6% (4)	14.4% (16)	9.0% (10)	6.3% (7)
Create a marketing campaign aimed at citizens and businesses to promote awareness of the value of Helena's urban forest and its urban	8.4% (9)	12.1% (13)	8.4% (9)	11.2% (12)	8.4% (9)	12.1% (13)	4.7% (5)	10.3% (11)	6.5% (7)	7.5% (8)

APPENDIX B – S.W.O.T. Analyses

Nov. 9, 2010 – Industry Stakeholders

Strengths

- New trees- subdivisions
- Growing friends
- Tree inventory
- Mature tree- values
- Economic boost/industry
- Tree benefits
- Commission support
- Tree population

Weaknesses

- Monoculture
- Even-aged
- Tree ownership
- Vague ordinance
- Enforcement
- Tree list
- Lack of funding
- Lack of CA
- Poor design/ downtown
- Risk trees
- Tree condition
- Tree maintenance-lack of/ old practices
- Budget
- Planting space allocation
- Tree board

Opportunities

- Diversification
- Tree list
- Group/public & private involvement
- Other cities/towns programs
- New trees
- Educate public/industry/affiliated green industry
- Elevate up to peer status with other city departments
- Risk trees
- Contract work opportunities
- Distribution of park space
- Improved park maintenance
- Traffic board
- Working with civic groups and other agencies
- Grants

Threats

- Clear wing borer
- Lack of funding
- Mower blight

- H2O quantity/time
- Risk trees-removal
- More government-more taxes
- Site triangles-autos-road design
- Vandalism- cars, animals, etc...

Nov. 9 2010 – Public

Strengths

- Lots of trees
- Public interest in trees
- Growing friends
- Wildlife habitat
- Local resources-Audubon
- Beautify city with trees
- Livability
- Education- public/city staff
- Tree benefits-Air, H2O quality, temperatures, and shade
- Buffer zone- streets
- Historical trees/culture
- Emotional attachment
- Memorial trees
- Civic- Pride

Weaknesses

- Monoculture
- Even-aged
- Street tree maintenance
- Adjoining property owner maintenance
- Sidewalk conflicts
- Budget
- Education

Opportunities

- Diversification- age, sp.
- Age
- Replacement plan
- Development requirements
- Planting and preservation
- Education
- Partner with various civic groups

Threats

- Monoculture
- Risk trees
- H2O mower blight
- Fire
- Insect/disease
- Vandalism/auto/animal
- Enforcements

APPENDIX C – Suggested Sections for the Helena Tree Ordinance

24.70 PURPOSE.

- A. The Helena Commission recognizes that the design of the urban environment must ultimately be for the benefit of the quality of life of the human inhabitants, and that a healthy urban forest is a key component of the quality of life. The focus of the urban forestry program will be on balancing the needs of the community with the needs of the urban forest. The purpose of this article is to promote and protect the public health, safety and general welfare by:
 - 1. providing for the supervision of the planting, pruning, removal and maintenance of trees, shrubs and other plants within the public rights-of-way and public places of the Helena and
 - 2. education of and assistance to citizens to promote a healthy urban forest.
- B. It is also the intent of the Helena Commission that the City of Helena
 - 1. promote the restoration and preservation of desirable trees and shrubs;
 - 2. advocate for the establishment and retention of adequate tree planting spaces while considering the community desire for urban aesthetics; and
 - 3. protect residents from damage caused or threatened by the improper planting, maintenance, or removal of trees and shrubs.

24.70 ENFORCING AUTHORITY.

- A. Establishment.
The urban forestry program is established within the Parks & Recreation Department, which exercises jurisdiction over trees and shrubs within the public rights-of-way, parks, and other public places.
- B. Responsible Official.
The director of Parks & Recreation is designated as the responsible official for administering the urban forestry program. The director may designate an employee as the urban forester to perform the duties to administer the program.
- C. Authority.
 - 1. The director regulates and permits the planting, pruning, removal, replacement, and maintenance of all trees and shrubs within the public right-of-way and other public places.
 - 2. The director with the advice and assistance of the tree board will prepare five-year management plans, annual operating plans, and will present the plans to the Helena Commission for adoption.
 - 3. The director with the advice and assistance of the tree board will prepare the Helena Arboriculture Standards and Specifications Manual and will present the UFMP to the Helena Commission for adoption.

4. The director or assigned agent examines all trees and shrubs in the City of Helena to determine whether they are contagiously diseased, dead or hazardous, obstructing the right-of-way, or posing a threat to public safety, having the right to take samples from trees and shrubs for laboratory testing.
5. The director with the advice and assistance of the tree board will develop a plan for assisting property owners with their trees within the rights-of-way, which plan includes educational programs and criteria for financial assistance.
6. The director will develop educational programs for the public promoting proper urban forestry practices.
7. The director will facilitate and foster the citizen advisory committee to enhance citizen participation in the urban forestry program.

24.70 DEFINITIONS

Arboriculture Manual” Defined.

“Arboriculture manual” means the Arboriculture Specifications and Standards of Practice for the City of Helena which contains regulations and standards for the planting, pruning, removal and maintenance of trees and shrubs on public property and a program for developing and improving the tree, shrub, and other plant resources of the community.

“Commercial Tree Work” Defined.

“Commercial tree work” means any work performed on street or public trees by a person retained by the property owner or public utility.

Director” Defined.

“Director” means the director of the public works/parks management department or his or her designee.

“Risk Tree” Defined.

“Risk tree” means any tree or tree part that poses a high risk of damage to persons or property.

“Pruning” Defined.

A. “Major pruning” means the pruning or cutting out of branches two inches in diameter or greater; root pruning; or cutting out of branches and limbs constituting greater than fifteen percent of the tree’s foliage bearing area. The work shall retain the natural form of the tree.

B. “Minor pruning” means pruning or cutting out of water sprouts, suckers, twigs, or branches less than two inches in diameter, or which constitutes less than fifteen percent of the tree’s foliage bearing area. The work shall retain the natural form of the tree. Removal of dead wood, broken branches and stubs are included within the definition of minor pruning. Minor pruning may be performed by the property owner without obtaining a permit from the City of Helena.

“Public Place” Defined.

“Public place” means property owned in fee by the City of Helena.

“Public Utility” Defined.

“Public utility” means any organization that has a franchise to utilize the public rights-of-way.

“Right-of-Way” Defined.

“Right-of-way” means that strip of land

- A. dedicated to, or over which is built, public streets, sidewalks or alleys, or
- B. used for or dedicated to utilities installation within the right-of-way.

The “right -of- way” is an easement over the land of the adjoining property owner.

“Topping” or “Severe Crown Reduction” Defined.

“Severe crown reduction” means the specific reduction in the overall size of a tree and/or the severe internodal cutting back of branches or limbs to stubs within the tree’s crown to such a degree as to remove the normal tree canopy and disfigure the tree. Severe crown reduction is not a form of pruning.

“Street Tree” Defined.

“Street tree” means any tree or shrub located within the public right-of-way.

“Planting Strip” Defined.

“Planting strip” means the area within the right-of-way easement, generally the lawn between the curb and sidewalk; also known as the “parking or tree lawn strip”.

24.70. ABUTTING PROPERTY.**Maintenance Responsibilities.**

- A. By the Abutting Property Owner.

The property owner is responsible for the following:

1. Protection of tree health by obtaining all permits as required by this article for planting, removal, or pruning of street trees. The property owners may perform minor pruning of street trees on their property without obtaining a permit;
2. Care and maintenance of the planting strip to ensure proper health of the trees;
3. Removal and replacement of street trees which are topped or improperly pruned if the director determines that a tree’s health is severely degraded;
4. Care and maintenance of trees on his or her own property in such a way as to not cause a hazard to the public safety or to the health of public, landmark, or street trees.
5. Removal of trees located on the owner’s property that have been declared a public nuisance or hazard.

- B. By the Parks & Recreation Department Urban Forestry Program.

The Urban Forestry program shall maintain all street trees located on planting strips adjacent to streets listed on the Helena maintenance responsibility list which shall be developed by the director and the tree committee. The department shall not be responsible for maintenance or replacement of street trees or other vegetation on streets not on the maintenance responsibility list.

Commercial Tree License.

- A. Any person retained to prune, plant, or remove a street tree or shrub, must be licensed to perform commercial tree work by the City of Helena unless such person is supervised by the holder of a license.
- B. A license to perform commercial tree work is issued to each applicant who meets the following qualifications:
 - 1. is an arborist certified through the International Society of Arboriculture;
 - 2. has not been found in violation of any requirements of City of Helena tree ordinance within the preceding year;
 - 3. maintains liability insurance in the amount established by the director of risk management.
- C. The license expires one year from the date of issuance, or sooner if the liability insurance lapses.
- D. Licenses required by this section are city business licenses under the City of Helena Municipal Code.
- E. The City of Helena may revoke the license when the licensee commits any of the following acts or omissions:
 - 1. knowingly violates any of the provisions of city tree ordinance or any of the standards established in the arboricultural manual;
 - 2. knowingly combines or conspires with another person by permitting one's license to be used by such other person unless employed by the licensee.

Revocation shall be for a period of one year for the first violation, two years for the second violation, and permanent for the third violation.

24.70 ISSUANCE OF PERMIT.**Street Tree Permit Required.**

- A. **Pruning and Removal of Trees.**
No person may perform major pruning of trees, or cause or authorize any person to prune or remove trees, in planting strips, rights-of-way, or other public places without first filing an application and obtaining a street tree pruning/removal permit from the City of Helena.
 - 1. **Application Data.**
The application must state the location, number and kind of trees to be pruned or removed; the kind of maintenance or other work to be done and such other information as the director may find reasonably necessary to a fair determination of whether a permit should be issued.
 - 2. **Standards for Issuance.**
The director issues the permit if in his or her judgment the proposed work is consistent with the ordinance and the proposed method and workmanship are satisfactory.
 - 3. **Time.**
Any permit issued shall contain a date of expiration and the work must be completed in the time allowed on the permit.
 - 4. **Major Pruning.**
The City of Helena requires that the pruning be performed by a person licensed by the Helena pursuant to Section on Commercial Licensing.

- B. Planting of Trees.
No person may plant a tree in any city right-of-ways without first obtaining a street tree permit from the City of Helena.
- C. Notice of Completion.
A notice of work completion concerning tree planting, removal, or major pruning must be given by the permit holder within five days to the director for inspection. Inspection shall be completed within ten working days.
- D. Annual Permit for City of Helena Departments and Utilities with Easements or Franchises within the Rights-of-Way. City of Helena departments and utilities may apply for an annual permit to perform pruning, planting, or removal of trees within the rights-of-way. The permit application must include an annual plan that identifies work that will be done during the year. The permit holder must file quarterly reports which will identify all work done on street trees and trees in public places.
- E. Emergency Pruning and Removal.
If immediate removal or major pruning is required to protect the health and safety of the public, tree work to mitigate the immediate hazard may be performed without a permit. The director must be notified on the first working day after the tree work is begun and a permit must be obtained. In the case of a declaration of emergency notification may be made within a reasonable time.
- F. The director may decline to issue a permit, or revoke a permit issued, to any person who refuses or neglects to comply with any of the provisions of this code.

24.70 REMOVAL OF TREES AND SHRUBS - PROCEDURE.

Removal of Trees and Shrubs.

- A. The director may authorize removal of or may remove trees and shrubs situated within the rights-of-way whenever one or more of the following criteria are met.
 1. The tree or shrub is hazardous or is otherwise in violation of this section.
 2. The tree or shrub is damaging public improvements or public utilities and removal is necessary because of the installation of or potential or actual damage to, a sidewalk, parkway, curb, gutter, pavement, sewer line, underground utility, or other municipal improvement.
 3. There is infection or infestation of trees or shrubs with a disease or pest detrimental to the growth, health, or life of such trees and which infection or infestation cannot be controlled or removed.
 4. The vegetation obstructs rights-of-way.
 5. The tree's health is severely degraded because of improper pruning, including severe crown reduction.
- B. When the construction services department determines that vegetation obstructs a public right-of-way, it notifies the director. Unless an emergency requires immediate abatement by the City of Helena, the director follows the procedures in Section for pruning or removal.
- C. As a condition of removal, the director requires replacement with trees or shrubs that are appropriate for the location, unless replacement is not possible.

- D. If a tree is to be removed at the order of the director, unless immediate removal is necessary to protect public health and safety, he or she notifies the property owner and tenants thirty days prior to the proposed date of removal. The notice states the reason(s) for the removal and the proposed date of the removal.
- E. For Helena projects which will require removing one or more trees, the Parks & Recreation Department will notify the property owner and tenants thirty days prior to the proposed date of removal. A copy of the notice shall also be delivered to the office of neighborhood services within the same time frame.

Tree Risk Management Policy.

The City of Helena has an active policy to maintain the safety of people and public lands from potentially high risk trees. The City of Helena will strive to eliminate, in a timely fashion, any tree or shrub deemed high risk. When resources limit the Helena's ability to remove high-risk trees, the City of Helena will prioritize trees based upon the risk. The standard for rating the degree of risk of a tree will be the Pacific Northwest International Society of Arboriculture tree risk evaluation system. Initial strategies will focus on removal of high-risk trees.

Tree Protection, Conservation, and Preservation.

- A. All street and public trees near any excavation, demolition, or construction of any building, structure, street, or utility work, must be sufficiently guarded and protected by those responsible for such work as to minimize potential injury to trees and to maximize their chance for survival. When street and public trees are near the project, any construction permits issued by the Helena must be approved by the director, who may require protective measures as specified in the Arboriculture Manual.
- B. No person may destroy, injure, or deface any street tree or tree on public property by any means, including, but not limited to the following methods:
 1. impede the free passage of water, air, or fertilizer to the roots of any tree, shrub, or other plant by depositing vehicles, concrete, asphalt, plastic sheeting, or other material detrimental to trees or shrubs on the tree lawn or on the ground near any tree;
 2. pour any toxic material on any tree or on the ground near any tree;
 3. cause or encourage any fire or burning near or around any tree;
 4. severely reduce the tree crown except when pruning of trees under utility wires or obstructing the right-of-way as allowed by a permit issued by the director. Removal or replacement is preferred to severe crown reduction;
 5. carve, or attach any sign, poster, notice, or other object, on any tree, or fasten any rope, wire, cable, nails, screws, staples or other device to any tree except as used to support a young or broken tree; however, nothing in this section shall be construed in such a manner that it forbids lighting of a decorative or seasonal nature, provided that such lighting is not attached in such a way as to cause permanent damage to the tree;
 6. Plant trees reaching an expected mature height of twenty-five feet or more under utility lines.

- C. No person may prevent, delay, or interfere with the director, or his or her designee, or any Helena employee in the execution or enforcement of the provisions of this article.
- D. Any person responsible for a violation of this section must pay the cost of repairing or replacing any tree or shrub damaged by the violation. The value of trees and shrubs is to be determined in accordance with the latest revision of the Guide for Plant Appraisal as published by the International Society of Arboriculture (ISA).
- E. In addition to remedies under section XX.XX PENALTY, violation of this section is a Class 1 civil infraction. The director has the discretion to issue a warning for a first-time violation.

XX.XX PENALTY. Violation of or failure to comply with any of the provisions of this chapter shall be subject to a fine not to exceed five hundred dollars **in addition to the appraised value or cost to repair or cure or method of valuation as determined in the current edition of the Guide for Plant Appraisals.** When violations are of a continuing nature, each day the violation continues shall be a separate violation.

APPENDIX D – Tree Ordinance Writing Resources

Guidelines for Developing and Evaluating Tree Ordinances

Bernhardt, E.A. and Swiecki, T.J.
California Dept. of Forestry and Fire Protection
<http://www.isa-arbor.com/tree-ord/ordintro.htm>

Tree Ord Software

Unique software for cities is available to help them develop ordinances that will ensure the future of their community forests. TreeOrd, an interactive CD-ROM, was developed by the Tree Trust with a grant from the USDA Forest Service. The cost is \$60 plus shipping and handling. http://www.mnstac.org/RFC/tree_order_form.PDF

Tree Ordinance Development Guidebook

Georgia Forestry Commission
<http://www.gfc.state.ga.us/CommunityForests/documents/2005TreeOrdinance-100.pdf>

Landscape Ordinances Research Project

A resource home page for urban design, city planning, urban forestry, site design, landscape architecture, architecture, site engineering, land use law and land development--highlighting legal standards and technical requirements for site development plan
<http://www.greenlaws.lsu.edu/sitemanager.htm>

U.S. Landscape Ordinances: An Annotated Reference Handbook

by Buck Abbey, D. Gail Abbey
This comprehensive reference brings together and explains the planning ordinances which govern the landscapes of 300 U.S. cities. In it, the author demystifies the complex planning laws that regulate such areas as the design of parking lots, vehicular use areas, landscape buffers, and tree plantings.

Guide to Developing a Community Tree Preservation Ordinance

Presented by the Community Tree Preservation Task Force of the Minnesota Shade Tree Advisory Committee, this guide describes the planning process, typical ordinance elements, and resources available for the task.
<http://www.mnstac.org/RFC/preservationordguide.htm>

Guide to Writing a City Tree Ordinance – Model Tree Ordinances for Louisiana Communities

<http://www.greenlaws.lsu.edu/modeltree.htm>

Research Article – Kathleen Wolf

http://www.cfr.washington.edu/research.envmind/Roadside/Trees_Parking.pdf

Developing a Successful Urban Tree Ordinance

Charles C. Weber, Alabama Forestry Commission

Tree City USA Bulletin #9 How to Write a Municipal Tree Ordinance

National Arbor Day Foundation
<http://www.arborday.org/programs/treecitybulletinsbrowse.cfm>

Tree City USA Bulletin # 31 Tree Protection Ordinances

National Arbor Day Foundation

<http://www.arborday.org/programs/treecitybulletinsbrowse.cfm>

Guidelines for developing urban forest practice ordinances Bell, P.C., Plamondon, S., and Rupp, M. Oregon Department of Forestry, Forest Practices Program, Urban and Community Forestry Program. This guide is designed to assist cities and counties in the development of urban forest practice regulations.

http://www.oregon.gov/ODF/URBAN_FORESTS/docs/Other_Publications/UrbanFP.pdf

Urban and community forestry: A guide for the Northeast and Midwest United States

Ascerno, M. et al. U.S. Forest Service, Northeastern Area State and Private Forestry. 216 pp. + appendix. 1992. This manual updates a 1990 edition which focused on the interior western region of the U.S. Includes chapters on history, benefits (aesthetic, social, recreational, wildlife, economic, and physical), programs, inventories, planning, ordinances and policy, site evaluation, tree selection and planting, soils, and maintenance. Undated; probable publication date, 1992.

Municipal tree manual. Hoefler, P.J., Himelick, E.B., and DeVoto, D.F., Urbana, IL, International Society of Arboriculture. 42 pp. Prepared in cooperation with the Municipal Arborists and Urban Foresters Society. The purpose of this manual is to be a guide for preparing new, or revising old, municipal tree ordinances.

General Code Publishers

www.generalcode.com/webcode2.html

LexisNexis Municipal Codes

<http://municipalcodes.lexisnexis.com>

American Legal Publishing Corporation

<http://www.amlegal.com/library>

Municipal Code Corporation

www.municode.com

http://www.municode.com/resources/code_list.asp?statelD=49

APPENDIX E – Potential Landscape Plant List

The plant list provides options to try. It is not finite and merely represents some potential choices to increase diversity in Helena. The plant list below is composed of many species not in the tree population of Helena or in limited quantities. These trees may be hardy to Helena and are not natives but will adapt to the area. Diversification and willingness to try new species are the keys to a successful planting program. Another source of cold hardy plant material is available at http://www.ndsu.nodak.edu/forestservation/comm_forestry/doc/08-09/TreesforND1-08.pdf

Small Trees – Less than 25' mature height for narrow parking strips and under utility lines

Hedge Maple

Acer campestre

Height: 25-35'
Spread: 20-30'
Hardiness: -25

Tree with a dense, round canopy. Leaves are deep green with a yellowish fall color. Extremely adaptable, tolerant of dry soils and compaction. Excellent street tree in residential areas and for use under power lines. Noted for its corky, ridged and furrowed bark.

Amur Maple (treeform)

Acer ginnala

Height: 20'
Spread: 20'
Hardiness: -50

A small, hardy tree with rounded outline, glossy green leaves changing to shades of yellow and red in fall. Fragrant, but not showy flower. Very adaptable to a wide range of soils and tolerant of some shade.

Miyabe Maple

Acer miyabei

Height: 25-30'
Spread: 20-30'
Hardiness: -30

An upright oval to rounded tree. The leaves are 3 to 5 lobed, dark green with a pale yellow fall color. Tolerates some dryness and prefers full sun. No serious pests and a good choice for a small shading tree.

Pacific Sunset

Shantung Maple

Acer truncatum x A. platanoides 'Warrenred'

Height: 25'
Spread: 25'
Hardiness: -30

An upright, spreading, rounded crown tree with a regular branching pattern having dark green, glossy leaves and an outstanding yellow-orange to bright red fall color. A hardy tree that has great potential for urban areas. Red

Autumn Brilliance Serviceberry

Amelanchier x grandiflora 'Autumn Brilliance' (treeform)

Height: 20'
Spread: 15'
Hardiness: -30

Tree form of serviceberry with an upright spreading crown, white flowers and a reliable, bright red fall color. The fruit is edible. Tolerates some drought.

Cumulus Allegheny Serviceberry

Amelanchier laevis 'Cumulus' (treeform)

Height: 25'
Spread: 20'
Hardiness: -30

A serviceberry with a distinct upright and oval tree habit, fleecy white flowers in spring

and a yellowish to orange-scarlet fall color. Smooth gray bark.

American Hornbeam

Carpinus caroliniana

Height: 25'
Spread: 25'
Hardiness: -40

A small tree with an irregular spreading habit, with a rounded outline. Dark green leaves change to yellow, orange and scarlet in the fall. Smooth, gray, irregular twisting bark adds interest in winter. Will grow in heavy shade and wet soils.

Lavalle Hawthorn

Crataegus x lavallei

Height: 25'
Spread: 20'
Hardiness: -40

A small, dense oval canopy tree with shiny dark green foliage turning to bronzy copper-red in the fall. Usually thornless or with small one inch thorns. Quite free of rust and very adaptable.

European Euonymus

Euonymus europaeus

Height: 15-30'
Spread: 10-20'
Hardiness: -30

A narrowly upright tree in youth broadening as it ages with a rounded outline when mature. Early leaf out with a flat dark green color turning from yellow to reddish purple in fall. Fruits ripen pink to red

in September and are quite attractive.

Amur Maackia **Maackia amurensis**

Height: 25'

Spread: 25'

Hardiness: -25

A small round headed tree. Leaves emerge a silvery gray and gradually become dark green. Fragrant pale white flowers light the tree in July and August. Bark peels with maturity exposing a shiny amber to brown color, becoming curly in texture. Prefers moist, well drained soil, but is quite adaptable to environmental conditions.

Merril Loebner

Magnolia

Magnolia x loebneri

'Merrill'

Height: 30'

Spread: 30'

Hardiness: -30

An upright habit becoming round with age. Leaves are thick and rigid, dark green and turn yellow in fall. Flowering peaks in April, where the tree resembles a white cloud covered with fragrant snowy blossoms. A vigorous grower and cherished landscape tree.

Yulan magnolia

Magnolia denudata

Height: 35'

Spread: 30'

Hardiness: -20

Tree with spreading branches somewhat irregular, producing an informal outline. Leaves are thick and resilient turning yellow in fall. Flowers are fragrant, white and 4-6 inches wide, blooming in spring. New nursery stock.

Galaxy Magnolia

Magnolia x 'Galaxy'

Height: 20 - 25'

Spread: 15'

Hardiness: -20

A tree form magnolia with a strong central leader and

pyramidal to oval shape. The foliage is lustrous green and flowers are large, 8 to 10 inches wide, blooming in spring on bare stems, pink outside and white inside. Good selection for a landscape or street where space is limited or confined.

Royal Star Magnolia

Magnolia stellata

'Royal Star'

Height: 20'

Spread: 15'

Hardiness: -30

A hardy, compact, rounded tree with deep green foliage and yellow fall color. The large fragrant flowers bloom in early spring, before the leaves break. An excellent ornamental tree for small sites in urban landscapes.

Flowering Crabapples

Malus sp. (Red Flowers)

Hardiness: -20 (-30)

'Adams'

Height: 20'

Spread: 20'

Dense and rounded symmetrical habit. Pink flowers, red persistent fruit.

'Amazam' American

Masterpiece

Height: 25'

Spread: 18 - 20'

Pyramidal habit. Bright red leaves emerge and mature to dark maroon. Brilliant red flowers change to unique pumpkin orange fruits in fall that persist through winter.

'Bechtel' Klehm's

Improved Crab

Height: 15 - 20'

Spread: 15 - 20'

Rounded form, dense dark green foliage, turning orange to orange red in fall. Large double pink flowers cover the tree in spring. Improved strain for disease resistance. Seldom fruits, very tidy tree.

'Centzam' Centurion

Crabapple

Height: 20'

Spread: 15'

Narrow upright habit, spreading slightly with maturity. Purple emerging leaves changing to bronze-green. Rose-red flowers ripen to bright red fruits persisting through the winter.

'Prairifire' Prairifire

Crabapple

Height: 20'

Spread: 20'

Upright spreading habit becoming rounded. Reddish stems with foliage changing from purple to red hued green. Excellent color change from crimson buds to dark pink flowers to deep red fruits which persist through winter.

Flowering Crabapples

Malus sp. (White Flowers)

Hardiness: -20 (-30)

'Adirondack'

Height: 18'

Spread: 10'

Densely upright inverted cone shape. The cut of this cultivar combined with an overabundant white flowers in spring makes this a "standard" to which other flowering crabs are compared. Bright red fruits carry interest through winter.

'Hargozam' Harvest

Gold Crab

Height: 25'

Spread: 15'

Upright, moderately columnar habit. White flowers in spring are but a precursor to the golden fruits which adorn this tree through winter making it a show stopper in the landscape.

Professor Sprenger'

Height: 20'

Spread: 20'

Stark upright habit makes for a larger more stately looking tree than other crabs. Red buds bloom white with pink tones ripening to orange-red fruits and endure on the noble frame through winter.

'Sentinel'

Height: 20'

Spread: 12'

Vase shaped, an unusual form for a crab makes its mark as an excellent street tree under power lines. Flowers are white with a touch of pink, fragrant, with bright red fruits that carry through the winter.

like drops of rain from this elegant tree.

Persian Parrotia **Parrotia persica**

Height: 20 - 30'
Spread: 15 - 25'
Hardiness: -20

Small single stemmed tree with upright to wide spreading branches, oval outline. Pink to purple emerging leaves blend to glossy green and turn a beautiful succession of yellow to orange to red in fall. An excellent selection for streets and landscapes, given size, color display and remarkable resistance to pests and disease.

Sargent Cherry **Prunus sargentii**

Height: 30'
Spread: 30'
Hardiness: -30

Upright spreading branches forming a rounded crown. Pink flowers clusters usher in spring, followed by large dark green leaves which, in fall, change to a striking mix of bronze and orange-red. The bark is a beautiful mahogany color and holds year round interest. One of the hardier ornamental cherries.

Columnar Sargent Cherry **Prunus sargentii** **'Columnaris'**

Height: 35'
Spread: 15'
Hardiness: -30

Upright, columnar to narrowly vase shaped at maturity. Flowers, foliage and bark with the same attractive qualities as the species. The narrow habit lends itself for street tree use.

Prairie Gem Pear **Pyrus ussuriensis** **'Mordak'**

Height: 25'
Spread: 20'
Hardiness: -30

Densely branched and compact tree with a round canopy. Leaves are bright green, thick and leathery turning golden yellow in fall. White flowers blanket the tree in early spring. Excellent pear for urban Plantings.

Ivory Silk Lilac **Syringa reticulata** **'Ivory Silk'**

Height: 25'
Spread: 15'
Hardiness: -20

Tree form lilac, oval and compact with upward curving branches. Foliage is dark green, flowering when young. Displays large white flower clusters in early July.

Medium Trees – 25 to 50' mature height

Fairview Maple **Acer Plantanoides** **'Fairview'**

Height: 45'
Spread: 35'
Hardiness: -30
Upright oval form, slightly tapered. An improved 'Schwedler' (red-leaf) type, more narrow and upright. Leaves emerging garnet purple and mature to bronze-green. Care should be taken not to encourage diseases and pests by overuse of Maple cultivars.

Parkway Maple **Acer Plantanoides** **'Columnarbroad'**

Height: 40'
Spread: 25'
Hardiness: -40
Narrow oval form with a good central leader. Leaves are dark green and turn yellow in fall. Very hardy Norway cultivar and an excellent maple for city use due to its narrow shape and well behaved branching. A healthy tree performs well along wide streets and corridors of green. Be cautious about overuse.

Emerald Queen Maple **Acer Plantanoides** **'Emerald Queen'**

Height: 50'
Spread: 40'
Hardiness: -30
Forms a well shaped, dense, oval habit with upright spreading branches. A excellent green-leafed cultivar for Urban Planting. Can tolerate environmental extremes and has consistent yellow fall color.

Superform Maple **Acer Plantanoides** **'Superform'**

Height: 45'
Spread: 40'
Hardiness: -30

Broadly oval to rounded form. As the name suggests this tree was selected for its symmetrical and uniform growth. Leaves are green with yellow fall color. The trunk is straight and develops an excellent branch structure, very formal and solid looking maple.

Sycamore Maple **Acer pseudoplatanus**

Height: 40'
Spread: 30'
Hardiness: -30
Upright spreading branches and a slightly irregular rounded crown. Leaves are dark green with no discoloration on the lower surface. Adaptable to a variety of environmental conditions, poor soils and exposed sites. Makes an excellent, informal street tree.

Armstrong Maple **Acer rubrum** **'Armstrong'**

Height: 45 - 55'
Spread: 15'
Hardiness: -30
Rapidly growing columnar tree. Leaves light green turning orange in fall. The bark becomes a beautiful silver-gray as the tree matures. Widely utilized in urban Plantings where space is limited for spreading types.

Bowhall Maple **Acer rubrum** **'Bowhall'**

Height: 40'
Spread: 15'
Hardiness: -30
Tightly formed columnar cultivar. An excellent selection for street Plantings. Nice contrast to broader species with medium green foliage. Smaller and slower to mature than 'Armstrong' with better fall color.

Northwood Maple **Acer rubrum**

Height: 40'
Spread: 35'
Hardiness: -40
Broadly oval to rounded shape. Foliage is medium green. The tree can tolerate harsher winters than most, but fall color is not as reliable as other Red Maples. The trunk is rectilinear with strong branch connections. Selected from the University of Minnesota.

Red Sunset Maple **Acer rubrum** **'Franksred'**

Height: 45'
Spread: 35'
Hardiness: -30
Hailed as one of the best Red Maple cultivars. Trees have vigorous and symmetrical growth, developing into pyramidal to oval forms. Good branch angles display dark green leaves transforming to brilliant shades of red and orange in Fall.

Black Alder **Alnus glutinosa**

Height: 40 - 50'
Spread: 30 - 35'
Hardiness: -30
Fast growing tree with a broadly pyramidal habit, somewhat irregular. Dark green leaves change to yellow in the fall. These trees thrive near water and perform well in poor soils. Good tree for an alternative to willows and other poplars. The 'Pyramidalis' cultivar has an excellent narrow form and recommended for confined space areas.

European Hornbeam **Carpinus betulus**

Height: 25 - 40'
Spread: 25 - 35'
Hardiness: -20
Pyramidal shape, quite dense with dark green leaves. Fall color is usually yellow but

during cold winters can turn dark red. Heat and drought resistant.

'Fastigiata', a columnar cultivar, is taller, but only spreads 15', making it preferable for confined urban spaces.

European Beech **Fagus sylvatica**

Height: 40 - 50'
Spread: 15 - 40'
Hardiness: -20

Stately tree, narrowly compact to densely pyramidal to broadly oval, branching close to the ground. Leaf color varies dramatically between cultivars. It is said that the right cultivar of this tree can enhance any landscape. Care should be used with planting lower branching trees to avoid creating a traffic nuisance.

'Fastigiata'

Fastigate Beech

Trees deep green, tight form makes it one of the most striking columnar trees.

'Riversii' Rivers

Purple Beech

Broadly oval habit, foliage has striking purple shades, spring through summer.

'Zlatia'

Golden Beech

Upright pyramidal habit, young leaves are yellow maturing to golden green.

Maidenhair Tree **Ginkgo Biloba**

Height: 40 - 55'
Spread: 15 - 35'
Hardiness: -25

Young trees are irregularly shaped, but finish broadly symmetrical. Usually all marketed trees are male due to the offensive smell of the female trees in fruit. The leaves are uniquely lobed and bright green on both sides, changing to bright to golden yellow in fall. Having outlived most of its enemies Ginkgo is a fine specimen for urban planting.

'Autumn Gold'

Very uniform and balanced pyramidal tree. Spreading at maturity.

'Magyar'

Narrow pyramidal form with a strong central leader. Well spaced branches.

'Princeton Sentry'

Narrow tapering growth almost columnar. Tallest of the three.

Honeylocust **Gleditsia**

Height: 35 - 45'
Spread: 35 - 40'
Hardiness: -20

Usually a tree with a squat trunk and open spreading branches. Cultivars are thornless, or have very few thorns. Often overused in landscapes which can promote pest and disease problems.

'Halka'

Heavy caliper and full even crown with an oval form. Yellow in fall.

'Moraine'

Rapid growth with a vase shape and rounded outline. Golden fall color.

'Shademaster'

Irregular vase with rectangular outline. Good form for street use. Yellow in fall.

'Skyline'

Broadly pyramidal, good branch angles. Form lends itself to urban design.

American **Hophornbeam** **Ostrya virginiana**

Height: 30 - 45'
Spread: 25'
Hardiness: -30

Rounded oval shape made up of slender branches, sometimes arching up or down. Leaves are bright green turning yellow to brown in fall often persisting adding winter interest along with the hop like fruits. Tolerates dry conditions and free of major disease and insect problems.

Amur Corktree **Phellodendron** **amurense**

Height: 30 - 45'
Spread: 40 - 50'
Hardiness: -30

Broadly spreading tree, leaves deep to lustrous green with a brief display of yellow or bronze in fall. The bark of mature trees is unusual and quite striking. Remarkably free of pests, pH adaptable, tolerant to drought and pollution making it a great urban tree if given enough space to fill out.

'His Majesty'

Male, free of seed litter. Thick leathery leaves on stout branches.

Korean Mountainash **Sorbus alnifolia**

Height: 40 - 50'
Spread: 20 - 30'
Hardiness: -30

Form changing from pyramidal to rounded outline at maturity. Leaves differing from other mountain ashes, look more beech like, as does the trunk. Striking tree with an excellent combination of form, foliage, flowers, fruit and bark. Considered the best of the Mountain Ashes.

American Linden **Tilia americana**

Height: 35 - 50'
Spread: 20 - 35'
Hardiness: -40

Tall stately trees, cultivars generally smaller in size especially when used in urban areas. Leaves are generally 4 to 8 inches long and about as wide in a range of green shades. Bark is gray to brown with narrow lateral furrows. The wood is soft and easily pruned, but is elastic enough to handle most weather extremes. These trees will entirely block the sun in their shadow so place them appropriately.

'Boulevard'

Dense, narrow pyramidal habit with ascending branches. Yellow in fall.

'Legend'

Rounded pyramidal habit, yellow fall color.

'Lincoln'

Slender, upright and compact form with light green leaves, 25' by 15' in 25 years.

'Redmond'

Full pyramidal form, uniform with large leaves and red branches, winter interest.

Littleleaf Linden

Tilia cordata

Height: 40 - 45'

Spread: 45'

Hardiness: -30

Trees are pyramidal, rounding with maturity. Leaves are generally smaller, 2 to 3 inches long and wide, (except Glenleven) finely serrated and turn yellow in fall. Trunks are usually straight and bark smooth. Likes well drained alkali soils, but pH adaptable and tolerates pollution well. Makes an excellent selection for any urban planting.

'Chancellor'

Fastigate in youth, becoming pyramidal with age. Good branch development.

'Corzam' Corinthian Linden

Narrowly pyramidal, 15' spread. Yellow in fall. Excellent tree for limited space.

'Glenleven'

Glenleven Linden

Fast growing with a straight trunk, leaves twice the size of 'Greenspire'

'Greenspire'

Single straight leader, good branch angle. Tolerates difficult conditions.

'Olympic'

Very symmetrical pyramid form, better branching than some other cultivars.

Kentucky Coffeetree

Gymnocladus dioicus

Height: 50 - 65'

Spread: 40 - 50'

Hardiness: -30

Sharply ascending branches, rising to form a narrow oval crown. The bark is unique, developing on young stems.

Spring leaves are late to emerge, their pinks and purples are a nice contrast to greening trees. Seldom bothered by pests or disease, pollution tolerant and strong, upright growth make this an excellent street tree.

'Stately Manor'

Male selection, no seed pods.

Butternut

Juglans cinerea

Height: 40 - 60'

Spread: 30 - 50'

Hardiness: -30

Round topped tree with wide spreading crown of large horizontal branches and stout laterals. Leaves are dark green and woolly, white ridges and gray furrows make up the mature bark. Fruit debris may be a nuisance. Performs well in the rocky, dry and limestone based soils, a prevalent soil type in Spokane. Usable as Boulevard and Park tree.

LARGE TREES – 50’ OR LARGER AT MATURE HEIGHT

Catalpa **Catalpa speciosa**

Height: 60 – 90’
Spread: 60 – 75’
Hardiness: -30
Narrow, oval-upright, open and irregular habit with light to medium green foliage. Coarse texture in all seasons. Showy, white flowers in June. Drought tolerant tree.

Hackberry **Celtis occidentalis**

Height: 50 - 75’ (100’)
Spread: 40 - 50’
Hardiness: -50
Cold tolerant tree will uncommonly obtain heights of 100 feet, but in urban settings usually does not exceed 60’.

Rounded or vase shaped crown with graceful splaying of the branches. No spectacular foliage or flower display, more the trees unique character and ability to tolerate adverse conditions that make it an excellent choice for a Park or Boulevard.

White Oak **Quercus alba**

Height: 60 - 80’
Spread: 50 - 70’
Hardiness: -30
Juvenile shape is pyramidal maturing with a broad and majestic crown. Leaves are bluntly lobed, dark green to blue-green. Autumn color varies from brown to red. A challenge to transPlant and establish, but worth the effort.

Bur Oak **Quercus macrocarpa**

Height: 55 - 80’
Spread: 50 - 70’
Hardiness: -40
Weakly pyramidal or oval to start, developing into a large broad-rounded tree with a massive trunk. Foliage is partially lobed, dark green above and grayish below, turning yellow-brown to purplish in fall. Corky bark on smaller branches adds interest. Adapts to a wide range of soil types, drought and pollution tolerant, makes an excellent tree for urban areas where acorn debris can be managed.

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