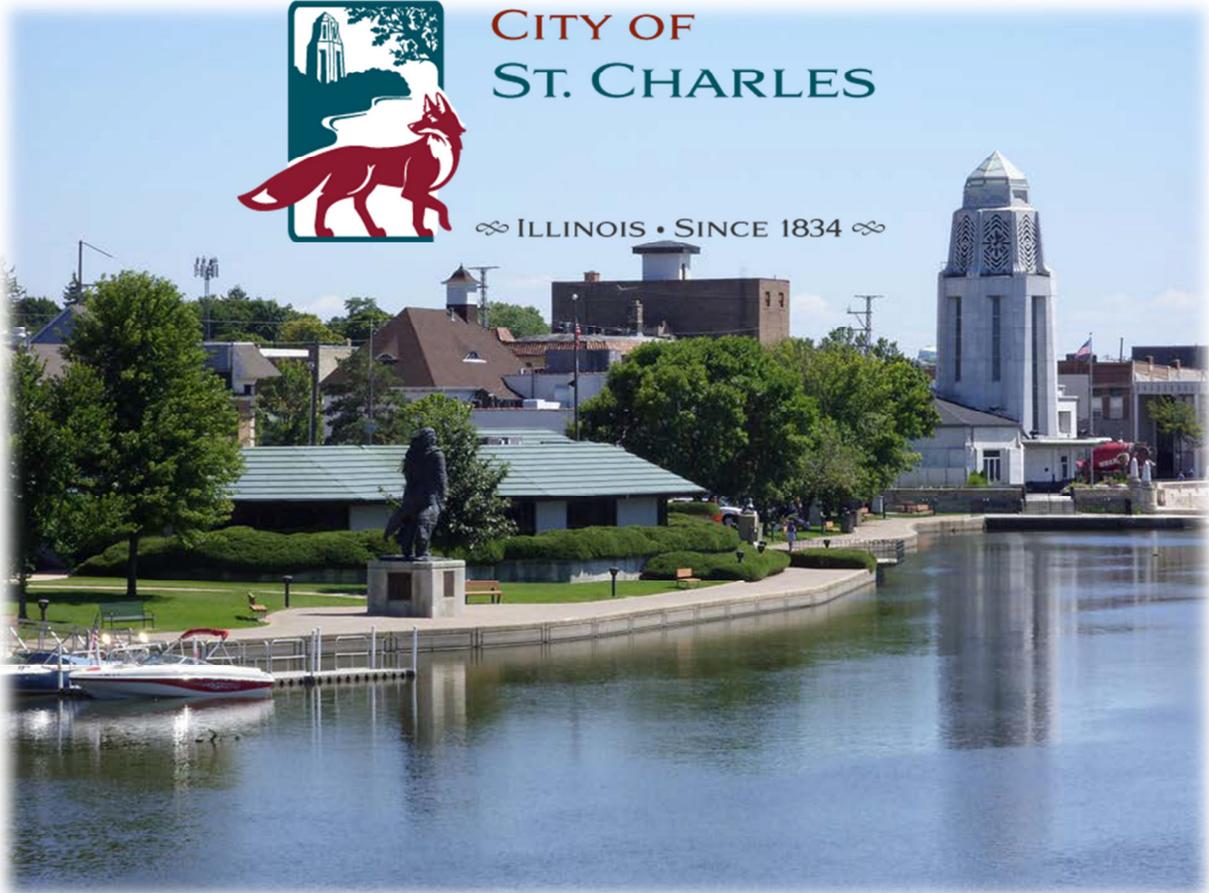


City of St. Charles

Urban Forestry Management Plan



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Forward and Acknowledgements

This Urban Forestry Management Plan was prepared over a number of years for use by the City of St. Charles in managing its urban forest. The creation of this document would not have been possible without input from the City of St. Charles Tree Commission as representatives of the City's residents. We would like to acknowledge and thank the Tree Commissioners for their contributions to this Urban Forestry Management Plan.

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All of the above-mentioned individuals provided insights and data which led to the creation of this Urban Forestry Management Plan, written to meet the specific needs of the City of St. Charles ("City"). Special thanks are owed to Commissioner Valerie Blaine for her thoughtful writing and editing through numerous drafts of this document. Without these invaluable contributions and hard work from the Tree Commissioners, this Plan would not be as form-fitting as it currently stands. It is these individuals, as well as future Tree Commission members and future City of St. Charles staff, who will be crucial in reviewing and maintaining the Urban Forestry Management Plan and its stated goals. This is a living, breathing document that is expressly meant to be adaptively managed. New pests and pathogens, changing climate, new arboricultural best management practices and techniques will all influence how the City manages its trees. The continued review of this Urban Forestry Management Plan will ensure its relevance and usefulness for years to come.

Section 1 – Mission Statement and Goals

MISSION STATEMENT

The mission of this Urban Forestry Management Plan is to outline goals and industry best management practices for the City of St. Charles' urban forest. The environmental and aesthetic benefits of the tree population will be maximized, while risk and costs are minimized in a financially and programmatically sustainable manner by the year 2040.

GOALS

The strategic goals of this Urban Forestry Management Plan (“UFMP” or the “Plan”) over the next 25 years are outlined as follows. Goals are written in five year increments for each section of the Plan through the year 2040. This time frame was selected to match the Chicago Metropolitan Agency for Planning “Go To 2040” initiative. Every attempt was made to make these goals realistic and achievable, such that they do not place an undue burden on the City of St. Charles, its residents or its resources. However, the Plan is also meant to be adaptive. New concepts, pests or pathogens, or changing climate (both social and meteorological) may all change the lens through which the urban forest is viewed. The goals of this document are subject to change based on the discovery of new knowledge, changing budgets or other circumstances. The Plan should be reviewed periodically by the City of St. Charles, its Tree Commission and other interested shareholders acting in the best interests of the City and its residents. The review process will include evaluation of progress made towards the goals of this Plan. Goals may be altered after review as conditions warrant.

Implement Arboriculture Best Management Practices “20-10-5” by 2040

Tree species diversity is important for the long-term health of the urban forest and the benefits it provides to residents. Current arboricultural best management practices set the ideal composition of the urban forest as not exceeding any more than 20% of one taxonomic family, 10% of one genus, and 5% of one species (see graphic page 6).

To illustrate the importance of biological diversity, consider the analogy of financial diversity. In financial management, a diverse investment portfolio is insulated against volatility of individual investment products. Similarly, a healthy urban forest is one which contains a mix of species, such that if they are exposed to risk, individual losses will be minimized. This is accomplished by setting diversity goals which are based on the current tree species composition of the urban forest. To ensure that no more than five to ten % of the tree population is lost in the event of future pest or pathogen invasions, no species, genus or family of tree should be over-represented in the City's tree population. Age-class diversity is also an important consideration. A healthy forest has trees of many different ages. Young, intermediate and mature trees allow for regeneration, replacement and vigor in the overall forest community. A mixture of tree species, tree locations and tree ages will lead to the greatest diversity and insulate the urban forest against pest and pathogen outbreaks.

Perform a New Inventory of All City Trees by 2020 / Conduct Partial Audits Annually

Managing an urban forest requires a clear understanding of the existing trees including their ages and locations. With nearly 19,000 trees on City property, the tree population management must begin with an accurate inventory that can be maintained with a high level of accuracy. Prior to the devastation caused by the Emerald Ash Borer, a baseline study was conducted as part of this Plan. After the mass Ash tree removal and replacement program, the tree inventory resulting from this study has an accuracy rating of approximately 70%. To improve the understanding of the City's trees, a full audit of the existing tree inventory is recommended. Alternately, the City may invest in a new inventory with an accuracy of 95% or higher. The City's tree inventory will be audited periodically and trees re-evaluated in order to ensure accurate estimates for tree pruning and removal costs, and to maintain a high level of public safety and tree risk management.

Create a Canopy Cover Assessment / Set Strategic Goals for Increasing Tree Canopy

The tree canopy represents the area physically covered by trees. In addition to the number of individual trees, the amount of canopy cover is an important aspect of managing the urban forest. To conduct a canopy cover assessment, Geographic Information System (GIS) technology will be utilized with various data layers to examine the tree canopy. The study will include canopy cover on City-owned land as well as private property. This will not only give an accurate depiction of the total tree canopy coverage, but can also be utilized to determine where increased tree planting will be most beneficial to City. Through the use of programs and strategic partnerships, the long term goal will be to increase tree canopy in St. Charles overall. The stocking density of street trees is quite high already, so the crucial element will be to incentivize residents, businesses and other landowners to plant trees.

Mulch All Parkway Trees Less Than 16 Inches in Diameter by 2040

An urban parkway is a difficult place for a tree to become established and to live a long, healthy life. Proper mulching can significantly increase a tree's ability to thrive. Currently the City mulches established trees sporadically. All new City plantings are specified to be mulched at the time of planting. A strategic outcome of the Plan will be to have all parkway trees less than 16 inches in diameter mulched by 2040. Another intended outcome of this initiative will be to educate residents about proper

mulching, and to notify residents when poor mulching techniques are observed. Of particular concern is the practice known as “volcano mulching” which is an improper mulching technique that can actually kill a tree.

Maintain Acceptable and Unacceptable Tree Species Lists

There are certain tree species which are appropriate for Municipal street tree plantings and those which are not. Unacceptable species are those which have very weak wood, are known invasive species, produce messy or foul-smelling fruits or create a public nuisance. Acceptable species are those which are adapted to the Midwest climate of the City, are non-invasive species and do not pose high risk. A full breakdown of the City’s present and projected future tree population is provided on page 27. This list will be adjusted as needed. Also included is an “acceptable” and an “unacceptable” species list. The City and its Tree Commission will review the list periodically in response to changes in species composition of the current urban forest, weather events and availability of new tree species. A City ordinance addressing the planting of acceptable/unacceptable species will be proposed. The City must be able to enforce the ordinance.

Incorporate Best Management Practices in Tree Care Operations and Educate Residents

The City’s Public Services Division forest crew and all contractors working for the City will be in compliance with the latest industry best management practices. The American National Standards Institute (ANSI) and International Society of Arboriculture (ISA) best management practices will be integral parts of requests for proposals (RFPs) and bid documents when seeking qualified contractors. The full text of all referenced standards will be made available to all City employees and contractors performing tree care operations within City limits. It is important that residents understand these practices as well to be able to accurately judge when staff and contractors are performing tree work in accordance with these standards. Public outreach and education will be performed by the City’s Tree Commission, and this UFMP will be part of the public domain as a reference for all residents.

Create, Utilize and Maintain a Tree Risk Assessment Policy

A risk assessment policy has been created for the City as part of this document. The risk assessment policy will aid in identifying, documenting and removing or mitigating trees in a timely manner that may pose a threat to public safety. This will reduce the overall level of risk posed by parkway trees, as well as exposure to liability from tree-related incidents by reducing their frequency. Basic risk assessment language and parameters are included in this document.

Preserve Quality Trees on Private Property and Within Construction Zones

One of the greatest green infrastructure assets the City has is its trees. Preserving the heritage and community that these trees represent is a cornerstone of this Plan. A tree survey should be conducted prior to issuing permits for construction activity, and a tree protection zone must be established and enforced during construction activities. In addition, trees of certain sizes and species should require a removal permit prior to being removed from private property. These are standard requirements in most municipalities, and are intended to preserve trees as a common resource when possible.

Reduce the Presence of Invasive / Aggressive Species

Invasive species refers to trees that are not native to our geographic area (the upper Midwest), that have a high reproductive rate and that may spread to nearby natural areas or manicured landscapes. When non-native species spread, they tend to out-compete native species and cause woodlands and open spaces to become degraded. Examples of invasive species include European Buckthorn and Asian Honeysuckle, which are currently destroying our native Oak ecosystems. Some popular landscape trees, such as Callery Pear and Amur Corktree, have shown high invasive potential. The City should encourage the removal of invasive species from private land through incentive programs, or by utilizing volunteer workdays for invasive species on City-owned property.

Increase Awareness of Urban Forest and Engage Residents

There are a wide range of opinions as well as knowledge regarding trees. By educating the public and business owners, the City will raise awareness and appreciation of the urban forest and best management practices, and the economic and environmental benefits of trees have to these stakeholders. An educated and invested citizenry is essential to the success of the UFMP. The City will educate residents and businesses and engage them in stewardship activities. These activities include the annual Arbor Day celebration, Langum Woods cleanup days and participation in other organized community forestry initiatives and activities.

Section 2 – Definitions / Normative References

Aerial Assessment: An assessment of all or part of the crown from a position aloft.

Aerial Patrol: An assessment of a tree or a population of trees conducted from a helicopter, fixed-wing airplane, satellite, or other means.

Arborist: An individual engaged in the profession of arboriculture who is educated, trained and licensed to provide for or supervise the management of trees and other woody plants.

Arborist Trainee: An individual who works under the direct supervision of an Arborist.

Balled and Burlapped: A tree, shrub or other plant prepared for transplanting by allowing the roots to remain covered by a ball of soil around which canvas or burlap is tied and secured with a basket.

Bare Root: Harvested plants from which the soil or growing medium has been removed.

Best Management Practices (BMP): Methods or techniques found to be the most effective and practical means in achieving an objective while making the optimum use of resources.

Biltmore Stick: A measuring stick used to quickly estimate tree diameter using parallax-adjusted inches.

Caliper: Standard nurseryman's measure of tree diameter (size). Caliper measurement of the trunk is taken six inches above the ground up to and including four-inch caliper size. If the caliper at six inches above the ground exceeds four inches, the caliper should be measured at 12 inches above the ground.

Certified Arborist: An individual who has sufficient experience in the field of Arboriculture, and who has been certified by the International Society of Arboriculture as Certified Arborist.

Compacted Soil: A high-density soil lacking structure and porosity, characterized by restricted water infiltration and percolation (drainage) and limited root penetration.

Containerized: A tree, shrub or other plant prepared for transplanting or grown in a solid-walled container such as a plastic pot or wooden box.

Controlling Authority: An agency, organization or corporate entity with the legal authority and/or obligation to manage individual trees or tree populations (i.e. the City of St. Charles).

Crown: The upper part of a tree, measured from the lowest branch, including all branches and foliage.

Critical Root Zone (CRZ): The minimum volume of roots necessary for the health and stability of a tree.

Cycle Pruning: The process of routine maintenance pruning of trees, not related to storm damage or other hazard or emergency related-pruning, that occurs on a set and predictable time schedule determined by the City.

Diameter Tape: A tape measure calibrated specifically to measure diameter, with each "inch" on the tape being 3.141 true inches.

Diameter: Also DBH (Diameter at Breast Height). A standard forestry measure of tree diameter (size), measured at 4.5' above ground level on the uphill side of a tree using a diameter tape or Biltmore stick.

Diseased: The status of a tree which has been negatively impacted by a pathogen, bacterial, fungal, viral or similar organism.

Drip Line: The soil surface delineated by the branch spread of a single plant or group of plants.

Drought: A period of two weeks or greater during which there is less than one inch of rainfall, when the average daytime temperature during that same period exceeds 75 degrees Fahrenheit.

Dying: A tree which is in the process of biological death due to senescence, disease, infestation or other such malady from which there is very little to no hope of long-term survival.

Establishment Pruning: The pruning of a young tree in order to establish proper form and branching habit.

Failure: Breakage of stem or branches, or loss of mechanical support in the root system.

Flush Cut: Either a pruning cut or final cut to remove a stump, for which the maximum acceptable distance from the ground or the branch bark ridge will be no greater than two inches.

Hardscape: Non-living or man-made fixtures of a planned outdoor area, such as sidewalks, retaining walls, street lamps, etc.

Infested: The status of a tree that has been negatively impacted by pests or pathogens.

Mitigation: The process of diminishing risk.

Parkway Tree: Any woody plant within the publicly owned right-of-way or any other property owned or managed by the City.

Private Tree: Any woody plant existing on land not owned or managed by City of St. Charles.

Right-of-Way (ROW): The publicly owned land on which a road, railroad line or utility is built.

Root Protection Zone (RPZ): The area of ground surrounding a tree where excavation, compaction and other construction-related activities should be avoided or mitigated.

Sanitation Pruning: The removal of tree limbs that have become diseased or infested, in order to prevent the spread of disease or infestation from spreading throughout the rest of the tree (e.g. Dutch Elm Disease, Black Knot Fungus and certain cankers).

Sound Wood: Structurally sound, non-decayed, non-compromised wood in the trunk or scaffold branches of a tree.

Tree Protection Zone (TPZ): The area surrounding a tree in which excavation and other construction-related activities should be avoided.

Tree Risk: The likelihood and consequences of failure of a tree or tree parts.

Tree Risk Assessment: A systematic process used to identify, analyze and evaluate tree risk.

Section 3 – State of the Urban Forest in St. Charles

At the time of this writing, according to the City’s tree inventory, the tree population totals 18,924 active standing trees. As the remaining Ash trees are removed and replaced, this number should hold steady or rise slightly. The City’s long term tree count is estimated to be 19,000 trees. Shown below is a summary of the current tree inventory as of August 1, 2016.

Total Number of Trees	18,924
Total Number of Species	94
Total Number of Genera	50
Total Number of Families	22
Total Diameter Inches*	124,953”
Average Tree Diameter	6.62”
Approximate Number of Open Planting Sites	1,800

There are several notable points in interpreting this data. First, there are over 750 trees in the standing inventory that are identified as “unknown species” or approximately 4% of the total inventory for which there is no species information. Additionally, the tree population was divided according to species and DBH range, but many of the tree diameters appear to be significantly misrepresented in the current tree population. The original inventory appears to have been conducted beginning in 1998 with no consistent upgrades to the inventory during the past 18 years. Therefore, the tree size data is likely inaccurate by an unknown margin.

TREE INVENTORY

Minor flaws in logistics should be rectified by a periodic review of existing stock in order to determine the actual inventory. An audit should be utilized to correct inaccuracies in inventory. To establish a background level of accuracy of the tree inventory, an audit of 200 randomly selected tree inventory sites was conducted. The results of the audit were as follows:

Status	Tree Count
All Data Correct	140
Incorrect Species	32
Multiple Incorrect Fields	12
Incorrect DBH (by > 6")	10
Incorrect Address / GPS Location	6

In this audit, 140 of 200 trees had no data errors. The accuracy level of the audit was approximately 70%. The audit proposed in this document will include a full inventory update with an accuracy level of $\geq 95\%$. A portion of this inventory should be audited and updated every year. The importance of an accurate, up-to-date inventory is multifold. Most tree care contractors charge for services based upon the diameter inch of a tree, therefore, without accurate tree measurement data, estimating costs is very difficult. Additionally, without accurate species data, a proper tree planting plan cannot be made. The City should have a fully updated tree inventory by the year 2020, either by a full audit of the existing data, or by the creation of a new inventory.

EMERALD ASH BORER

The City removed approximately 4,250 Ash trees since the Emerald Ash Borer (EAB) was first identified within city limits nearly a decade ago. Most removals were performed between 2010 and 2015 as the condition of standing Ash trees declined. During a 2015 audit of the remaining Ash tree population, it was found that only 245 standing Ash trees still exist in City parkways. Of these 245 Ash trees, approximately 75% are likely being treated by residents without the City's knowledge.



St. Charles has actively managed the EAB infestation since it was first identified within city limits, and has replanted trees at a nearly one to one ratio for each Ash tree removed. Though replacing mature tree canopy with much smaller nursery stock trees represents a significant reduction in the environmental benefits provided by the urban forest, the benefits of a mature tree canopy will be recouped with time as these replacement trees grow and mature.

DIVERSITY GOALS

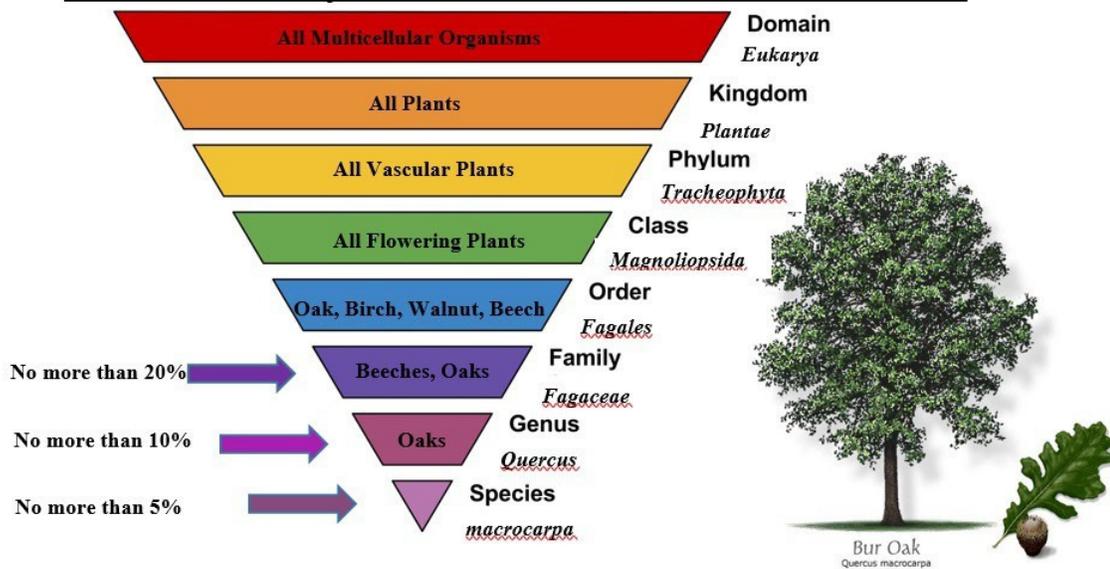
In prior decades the objective of urban forestry plans was to create tree lined streets and parks in which every tree was the same type, shape, age and height. This type of plan was thought to produce a symmetrical and uniform appearance. In studying past reforestation plans from the Chicago area from the 1960's, it was found that many area communities were originally designed in this manner. Urban foresters have since learned that once a pest or pathogen is introduced into a monoculture planting, the area turns into an epicenter of infestation that may cause serious damage, both ecologically and financially. Diversity in the urban forest helps to prevent and reduce the impact of pests and pathogens. There are three aspects of diversity in the urban forest: taxonomic, spatial and age-class diversity.

Taxonomic (Species) Diversity

Taxonomy is the classification of plants, animals and other life forms into distinct categories (species, genus, family, order, kingdom, etc.). Each species is unique; there is only one type in that category, such as Silver Maple (*Acer saccharinum*), which refers to only one specific type of tree. A genus is a group that may contain multiple species. All Maple trees, for instance, are in the genus *Acer*. There are over 1,500 known species of Maples. At the order level, Maples are part of a larger group (*Sapindales*) which contains other families, including Horse Chestnut, Sumac and Mahogany. The broadest category is known as kingdom. Maples, for example, are part of the *Plantae* kingdom which includes every type of plant on earth.

The more similar tree species are to each other, the higher the likelihood that an insect or pathogen would be able to exploit every species of that genus. EAB is a classic example of this, as it affected every tree species in the Ash genus. The best prevention we have is to limit the number of trees that could be impacted by a new pest or pathogen. While diversity of species is important (such as White Oak, Red Oak, Bur Oak and Pin Oak), it is also important to achieve diversity on the genus and family levels. The "20-10-5 rule" is recommended for City tree plantings, which specifies that no more than 20% of any one family, 10% of any one genus and 5% of any one species populate the urban forest. This level of taxonomic diversity is consistent with current arboricultural industry standards.

Taxonomy and the 20-10-5 Rule



Spatial Diversity

Spatial diversity involves mixing tree species evenly over an entire tree population rather than planting only a few species of trees in a given geographic area or neighborhood. Spatial diversity increases the distance between potential host organisms. The concept of diseases and the vectors (hosts) through which they spread is a cornerstone of modern epidemiology. The easiest way to slow the spread of any new pest or pathogen is to increase the distance between potential host trees. Every pest or disease, such as EAB or Dutch Elm Disease (DED), has a limited area where it can spread in a given time frame. The more difficult it is to get to the next host tree, the less of a problem the pest or pathogen becomes, and the easier quarantine becomes.

In addition to the functional benefits provided by increasing spatial diversity, communities that have implemented diverse plantings over the past several decades have demonstrated that such diversity yields an arboretum-like landscape that is both functional and aesthetically pleasing.

Age-Class Diversity

The former urban forestry paradigm promoted even-aged tree plantings, so that all trees were approximately the same size and age. However, once even-aged trees begin to decline, most will require removal and replanting almost simultaneously. This can leave an entire neighborhood without shade for a decade or more. The current approach of the urban forestry community is to strategically plant trees in neighborhoods over a longer timeframe. With this strategy, trees will grow to maturity in different stages and die at different times. When the dead trees are eventually removed, there will always be a variety of age classes on a block or in a neighborhood. This reduces the pressure to reforest an area immediately after removal, which can help to manage costs and maintain budget cycles. A mixed age-class stand planting ensures that mature trees are always present in a neighborhood. It also will allow for strategic planting of trees based on the existing canopy.

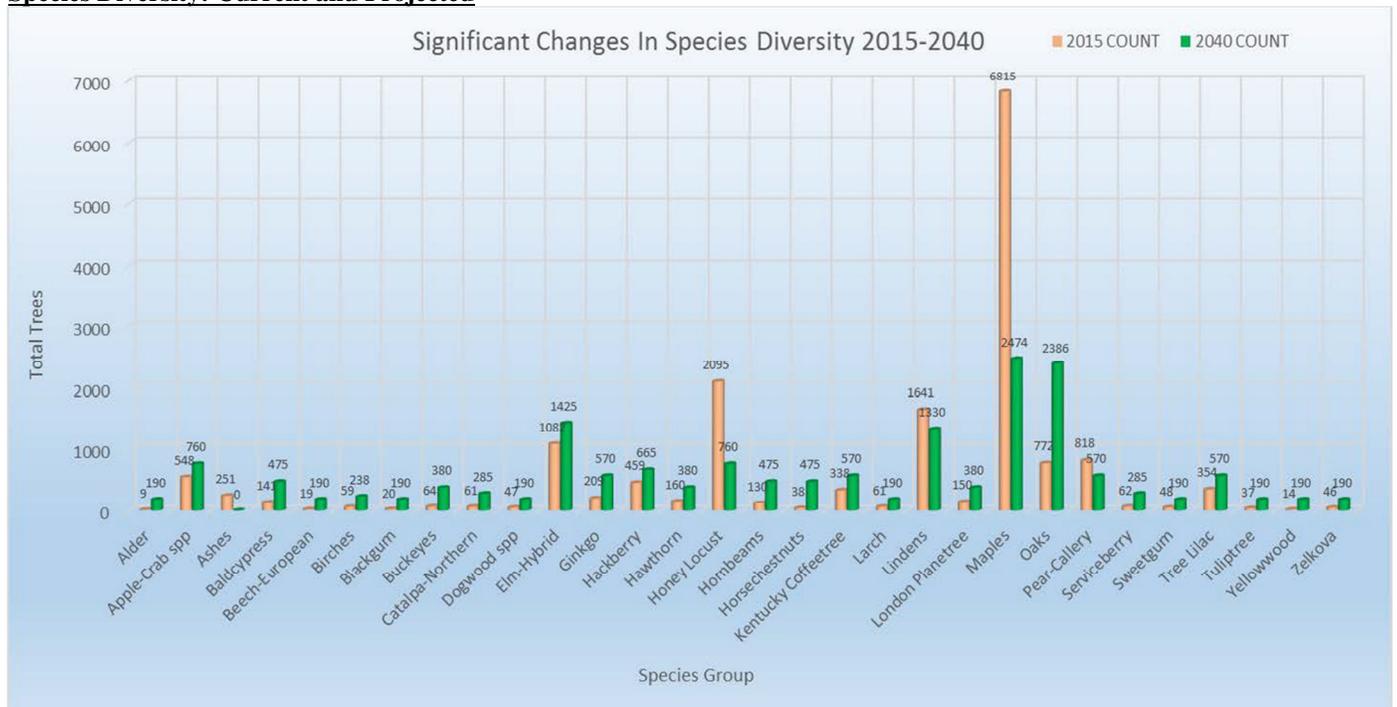
An additional benefit of mixed-age plantings is the ability to plant shade-loving trees as well as sun-loving trees. When a street or neighborhood is newly planted with trees of the same age, all the trees are essentially in full sun. This precludes the ability to plant shade loving trees, as they have a tendency to dry out in the summer sun. With mixed-age stands, shade-tolerant, medium height trees may be planted underneath a canopy of larger, mature trees.

CURRENT PARKWAY TREE SPECIES COMPOSITION

The table on the following page indicates how certain species and genera are currently over-represented in the City's tree population. Tree species such as Norway Maple and Honey Locust alone comprise over 10% of the tree population. Maples account for 36% of all parkway trees. As mentioned previously, over-represented trees are at risk of mass losses due to newly introduced pests and pathogens. Strategic tree removal and planting goals have been established for the next 25 years to establish balance in species composition, and an increase overall levels of diversity in order to insulate the urban forest. This document will outline how to reduce the population percentage of over-planted trees as well as increase the numbers of under-planted trees.

SPECIES	COUNT	% of TOTAL	SPECIES	COUNT	% of TOTAL	SPECIES	COUNT	% of TOTAL
Maple-Norway	2880	16.24%	Larch	61	0.34%	Beech-American	15	0.08%
Honey Locust	2095	11.81%	Spruce-spp	59	0.33%	Yellowwood	14	0.08%
Maple-Freeman	1701	9.59%	Elm-American	59	0.33%	Hickory spp	13	0.07%
Elm-Hybrid	1082	6.10%	Chokecherry-Canada Red	50	0.28%	Cherry-Ornamental	13	0.07%
Maple-Sugar	998	5.63%	Sweetgum	48	0.27%	Pine-Scotch	11	0.06%
Linden-Littleleaf	897	5.06%	Dogwood spp	47	0.27%	Cottonwood	11	0.06%
Pear-Callery	818	4.61%	Pine-Austrian	47	0.27%	Oak spp	10	0.06%
Maple-Red	752	4.24%	Zelkova	46	0.26%	Alder	9	0.05%
Linden-American	631	3.56%	Plum	44	0.25%	Poplar	9	0.05%
Apple-Crab spp	548	3.09%	Oak-English	43	0.24%	Pine spp	7	0.04%
Hackberry	459	2.59%	Birch-River	42	0.24%	Horsechestnut-Red	6	0.03%
Tree Lilac	354	2.00%	Oak-Chinquapin	42	0.24%	Amur Corktree	5	0.03%
Kentucky Coffeetree	338	1.91%	Spruce-Blue	40	0.23%	Walnut-White	4	0.02%
Maple-Miyabei	338	1.91%	Hornbeam-European	39	0.22%	Ash-Blue	4	0.02%
Apple-Edible	265	1.49%	Tuliptree	37	0.21%	Pecan	3	0.02%
Oak-Red	235	1.33%	Black Locust	36	0.20%	Maple-Japanese	3	0.02%
Oak-Swamp White	224	1.26%	Mulberry	36	0.20%	Magnolia spp	2	0.01%
Ginkgo	209	1.18%	Maple-Black	36	0.20%	Fir spp	2	0.01%
Ash-Green	163	0.92%	Oak-Pin	35	0.20%	Pine-Virginia	2	0.01%
Hawthorn	160	0.90%	Buckeye-Ohio	32	0.18%	Hemlock	2	0.01%
London Planetree	150	0.85%	Buckeye-Yellow	32	0.18%	Mountain Ash	2	0.01%
Baldcypress	141	0.80%	Horsechestnut	32	0.18%	Persimmon	1	0.01%
Linden-Silver	113	0.64%	Redbud	31	0.17%	Oak-Shingle	1	0.01%
Oak-White	92	0.52%	Cherry-Black/Pin	29	0.16%	Fringetree	1	0.01%
Hornbeam-American	91	0.51%	Maple-Hedge	26	0.15%	Willow-Weeping	1	0.01%
Oak-Burr	90	0.51%	Eastern Redcedar	22	0.12%			
Elm-Siberian	88	0.50%	Blackgum	20	0.11%			
Ash-White	84	0.47%	Box Elder	20	0.11%			
Pine-White	79	0.45%	Dawn Redwood	19	0.11%			
Sycamore	65	0.37%	Beech-European	19	0.11%			
Maple-Shantung	65	0.37%	Ironwood	18	0.10%			
Serviceberry	62	0.35%	Birch-White	17	0.10%			
Catalpa-Northern	61	0.34%	Maple-Amur	16	0.09%			
Walnut-Black	61	0.34%	Katsura	15	0.08%			

Species Diversity: Current and Projected



SPECIES	2015 COUNT	2040 COUNT	SPECIES	2015 COUNT	2040 COUNT	SPECIES	2015 COUNT	2040 COUNT
Alder	9	190	Golden Raintree	0	48	Mulberry	36	0
Amur Corktree	5	48	Hackberry	459	665	Oak spp	10	11
Amur Maackia	0	48	Hardy Rubber Tree	0	48	Oak-Burr	90	380
Apple-Crab spp	548	760	Hawthorn	160	380	Oak-Chinquapin	42	190
Apple-Edible	265	95	Hazelnut	0	48	Oak-English	43	285
Ash-Blue	4	0	Hemlock	2	0	Oak-Pin	35	190
Ash-Green	163	0	Hickory spp	13	95	Oak-Red	235	380
Ash-White	84	0	Honey Locust	2095	760	Oak-Shingle	1	190
Baldcypress	141	475	Hornbeam-American	91	285	Oak-Swamp White	224	380
Beech-American	15	95	Hornbeam-European	39	190	Oak-White	92	380
Beech-European	19	190	Horsechestnut	32	380	Pagodatree	0	95
Birch-River	42	190	Horsechestnut-Red	6	95	Pear-Callery	818	570
Birch-White	17	48	Ironwood	18	95	Pecan	3	48
Black Locust	36	76	Katsura	15	95	Persian Ironwood	0	48
Blackgum	20	190	Kentucky Coffeetree	338	570	Persimmon	1	48
Box Elder	20	0	Larch	61	190	Pine spp	7	0
Buckeye-Ohio	32	190	Linden-American	631	380	Pine-Austrian	47	0
Buckeye-Yellow	32	190	Linden-Littleleaf	897	570	Pine-Scotch	11	0
Catalpa-Northern	61	285	Linden-Silver	113	380	Pine-Virginia	2	0
Cherry-Black/Pin	29	0	London Planetree	150	380	Pine-White	79	0
Cherry-Ornamental	13	48	Magnolia spp	2	48	Plum	44	38
Chokecherry-Canada Red	50	95	Maple-Amur	16	0	Poplar	9	0
Cottonwood	11	0	Maple-Black	36	95	Redbud	31	95
Dawn Redwood	19	95	Maple-Freeman	1701	380	Serviceberry	62	285
Dogwood spp	47	190	Maple-Hedge	26	190	Smoketree-American	0	48
Eastern Redcedar	22	0	Maple-Japanese	3	4	Spruce-Blue	40	0
Elm-American	59	48	Maple-Miyabei	338	380	Spruce-spp	59	63
Elm-Hybrid	1082	1425	Maple-Norway	2880	380	Sweetgum	48	190
Elm-Siberian	88	0	Maple-Red	752	380	Sycamore	65	95
Fir spp	2	0	Maple-Shantung	65	285	Tree Lilac	354	570
Fringetree	1	10	Maple-Sugar	998	380	Tuliptree	37	190
Ginkgo	209	570	Mountain Ash	2	48	Walnut-Black	61	65
						Walnut-White	4	4
						Willow-Weeping	1	0
						Yellowwood	14	190
						Zelkova	46	190

Section 5 – Tree Removal

TREE REMOVAL ACTIVITIES

Safe Removal of a Tree to an Appropriate Flush Cut

Tree removal can be a very dangerous activity which puts people, property and workers in harm’s way. Tree removal should be performed under the guidance of a Certified Arborist, Arborist Trainees or experienced City staff members. The safe removal of a tree involves the removal of all portions of the secondary branches, followed by scaffold branches and finally the trunk. The stump must be flush cut such that the highest portion of the cut is no greater than two inches from the highest part of the ground surface.

Stump Grinding

Within a reasonable amount of time following tree removal, stumps and roots should be removed from the parkway using an approved stump grinding machine. No portion of the stump should be less than eight inches below the surrounding soil surface, with no surface roots visible to the naked eye. If the site is to be planted with a new tree, the depth of the stump should be increased to 24 inches below the soil surface. This will ensure that a new tree may be successfully planted near the site of the removed tree, and that no re-sprouting will occur from the old stump. The depth to which a stump is ground may be altered by the City depending on specific circumstances. Until the parkway is fully restored, the stump



hole should be filled and compacted to ground level using the debris from the stump removal.

Parkway Restoration

Once a tree has been safely removed and the stump has been ground, the parkway should be fully restored if a tree is not scheduled to be planted in or adjacent to the old hole within six weeks. Parkway restoration consists of removing a portion of the stump chips from the hole, mixing with a quality topsoil, tamping down to match the surrounding grade, spreading grass seed over the top of the topsoil and securing green turf blanket over the topsoil.

REASONS FOR TREE REMOVAL

Removal of trees in the City's ROW will always be at the discretion of the City in the best public interest. When the trunk, branches or roots fail, a standing tree can cause great harm or even fatality, and small dead trees can be an eyesore, reducing property values. Old trees can hold great sentimental value, and many people become attached to these neighborhood icons; however, there are times when the presence of a mature tree creates a public hazard. While it may be difficult emotionally to remove these trees, there are several health and safety reasons to do so.

Tree removal will be conducted based on the best available evidence collected by in-house staff, as well as third party review from consulting Arborists when necessary. Trees will not be removed in order to fill arbitrary removal quotas, or based on a removal request with no evidence of a need for removal.

Dead or Dying

If a tree is biologically dead or nearly dead, it will require removal. Trees which are standing dead, have approximately 70% dead crown or greater (as determined by ocular estimate), or have less than approximately 40% sound wood in the cross-section of the trunk (as determined by mallet sounding), will be removed as expediently as practical.



Diseased or Infested

Trees determined to be diseased or infested by the City will be removed at the discretion of the City as expediently as possible.

Diseases are caused by viral, fungal or bacterial pathogens.

Infestations are caused by insects or other small animals. Dutch Elm Disease, for example, is a fungal disease that kills Elm trees when they are infected. Emerald Ash Borer is an insect which kills Ash trees by infesting them. The prompt removal of diseased or infested trees limits the exposure of other nearby trees. The removal of one tree may save dozens of others.

High Risk

There is potential liability with high risk trees. Tree risk can be assessed in many ways, generally through the observations and measurements of a trained, qualified staff member or expert in the field of Arboriculture. If an assessment determines a tree to be "high risk" or "extreme risk," the City will remove the tree as soon as practical. Timely removal is critical because high risk trees expose the public or property to potential harm. A Risk Assessment Report will document the circumstances prior to removal. Often, risk can be mitigated by removing a portion of the tree at risk. If the entire tree is determined to be at high or extreme risk of failure, however, the entire tree will be removed.



Emergency / Storm Damage Removals

A tree will be removed if it has been severely damaged and/or compromised by lightning, wind or another type of natural disaster. "Severely storm-damaged" will generally be defined as a tree that has lost 33% or more of its crown due to wind damage, has a large crack or other wound in the trunk resulting from high winds, has a lean of greater than ten degrees from vertical or that has sustained a lightning strike.

Damage from Construction or Vehicle Strike

The City will assess trees that have been impacted by a vehicle strike or a large piece of construction equipment. If the tree has suffered physical damage or extreme root compaction and is likely to decline and become high risk, it will be scheduled for removal. The removal decision will be based on the best professional judgement of City staff.

Reasonable Resident Request

If a tree has non-terminal pest or pathogen issues, moderately poor structure or is in somewhat poor condition, a resident may request the removal of the tree. Resident requests will be reviewed by City staff on a case-by-case basis. If a tree shows significant potential to decline or pose a threat in the near term, the City may agree to the removal within the next five years. Note that young and/or healthy trees will not be considered eligible for this type of removal request.

Interference with Utility or Signage

A tree will be removed if it is interfering with the function or visibility of official traffic control devices, or has negatively impacted above or below ground utilities in a manner that cannot be mitigated by pruning or other cost-effective measures.

Overplanted and Underperforming

No healthy tree should be removed for the sole reason of over-planting. The City is adopting industry best management practices for diversity in its urban forest with the goal of building a diverse urban forest by the year 2040. Over-planted species determined to be in “poor condition” during the most recent visual assessment will be assessed for further decline or recovery. Those trees in noticeable decline will be removed at the discretion of the City. Removal of declining trees will be utilized as a preventative measure so these trees do not decline to a point where they become hazardous, not used as a reason to remove an otherwise healthy tree.

OBJECTIVES AND GOALS



As shown above, the City can anticipate planting 9,296 trees (approximately 371 trees per year) over the next 25 years, while removing 8,046 trees (approximately 321 per year). This will result in a net increase of 1,250 trees on City owned ROWs. Since the City currently has 18,900 trees and 1,800 planting spaces, this will leave the City with 550 open planting sites. This is a desirable stocking density as there are approximately 775,000 linear feet of streets in St Charles and 18,900 trees, equating to a stocking density of 41 feet between trees, which is slightly high. When the number of planted trees reaches 20,150 (as shown above) the stocking density will be 38 feet between trees. Typically, ideal tree pacing is between 35-40 feet which allows trees enough space to develop good architecture, while not appearing “sparse” even when young. Additionally, the decision to leave 500 planting sites unplanted accounts for those sites which should not have a tree planted, therefore, therefore only high quality planting sites are being considered. It should be noted that St. Charles can expect a much younger tree population by 2040.

REQUIREMENTS AND STANDARDS

The following requirements and standards will be met during tree removal activities:

City of St. Charles

1. All personnel directly involved in chainsaw operation, climbing, bucket truck operation and rigging limbs will be have sufficient training and experience to perform such duties while employed by the City.
2. Only qualified utility arborists may perform tree removal operations within ten feet of an electric utility line. City employees may complete trunk removal and stump grinding only if the remaining portion of the tree is greater than ten feet from a transmission line.
3. The City will not remove healthy trees in order to meet diversity goals, unless the tree poses risk to persons or property.
4. The City of St. Charles will not perform or assist, programmatically or financially, with the removal of trees on private property. If a private tree falls into the ROW, the portion of the tree impacting the ROW will be removed to the property line(s) by City staff.

ANSI Z133.1 Arboriculture Safety Standards

ANSI Z133.1 safety standards will apply to all tree care operations outlined in the remainder of this Plan. The full text of the ANSI safety manual will be made available to all City employees and contractors involved with tree care operations.

1. All tools and equipment utilized for tree care operations, including those not specifically mentioned below, will be inspected and maintained by qualified personnel in accordance with the manufacturer's care instructions.
2. All staff will be trained in the proper use, inspection and maintenance of tools and equipment utilized for tree care operations.
3. Certified Arborists or Arborist Trainees will conduct job briefings daily prior to tree care operations of any kind and the information will be communicated to all workers.
4. All activities performed on any job site for any activity outlined in this Plan will comply with all applicable OSHA guidelines and standards.
5. Traffic and pedestrian control will be established around a job site prior to the beginning of tree care operations.
6. Emergency contact information and a safety kit conforming to the ANSI Z308.1 standards will be made available to all workers. All employees will have basic instruction on the use of CPR and First Aid.
7. Personal Protective Equipment (PPE) will be required when there is a reasonable probability of injury or illness on the job site as determined by the Certified Arborist or Arborist Trainee prior to the beginning of tree care operations each day. PPE will be made available and will be well-maintained in accordance with the manufacturer's requirements.
8. Head protection will conform to ANSI Z89.1, face and eye protection will conform to ANSI Z87.1, respiratory protection will comply with ANSI Z88.2, leg protection will always be worn when using a chainsaw.
9. Flammable liquids will be kept a minimum of ten feet from open sources of flame or high heat and will be stored in approved containers.
10. All City staff and contractors working near electrical hazards will be qualified to do so and will be educated on ANSI standards for Electrical Hazards and Line Clearance.
11. Vehicles and mobile equipment will be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements and will be equipped with all standard safety devices, decals and instructions, and will be operated in accordance with all federal, state and local motor vehicle codes and ordinances.
12. Aerial devices will be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and will be equipped with all standard safety devices, decals and instructions.
13. Aerial devices will be stabilized by wheel chocks, outriggers or stabilizers as necessary for the device, and will never be used to lift, hoist or lower logs or equipment unless specifically designed to do so.

14. Aerial devices will be equipped with fall protection devices and permanent load ratings, in accordance with ANSI/SIA 92.2 or 92.5, as applicable to the specific aerial device.
15. No aerial device will be allowed to make contact with electrical conductors, and minimum safe distances will be maintained in accordance with the ANSIZ133.1 standard.
16. All brush chippers will be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and will be equipped with all standard safety devices, decals and instructions.
17. Sprayers and related plant health care equipment will be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and will be equipped with all standard safety devices, decals and instructions.
18. Sprayer tanks or other similar enclosed spaces will not be entered unless performed in accordance with a confined-space entry plan in compliance with OSHA 1910.46 requirements, including air-quality testing, training and PPE.
19. Chain saws and other similar portable power tools will not be operated unless the manufacturer's safety devices are in proper working order. Manufacturer's safety devices will not be removed or modified.
20. Forestry staff will have a minimum of two points of attachment to a tree or aerial device while operating a chainsaw at all times, unless the hazard posed by the second point of attachment poses a greater hazard than utilizing one point of attachment.
21. A visual hazard assessment, including a root collar inspection, will be performed by a Certified Arborist or Arborist Trainee prior to climbing, entering or performing work in or on any tree, and a second crew member will be within visual or voice communication at all times during arboricultural operations that are in excess of 12 feet from the ground surface.
22. All ropes, saddles, carabiners and other similar climbing equipment will be: A) approved for use in the tree care industry by the manufacturer, B) have a minimum breaking strength or load capacity of 5,000 pounds, C) be inspected before each use and D) equipment will be removed from service when it shows signs of excessive wear or deterioration.
23. No work will be performed from a ladder or other similar support device unless the employee is tied in or has a minimum of two points of attachment to the tree.
24. All pruning, removal and rigging operations will have a designated drop zone where limbs, trunks and tools can be dropped from aloft without impacting pedestrians or passersby. A visual or verbal communication system between the employee aloft and the employee(s) on the ground will be established to determine when the employee aloft can safely drop tree parts or tools.
25. Any tree parts which cannot be safely dropped or controlled from aloft will have a separate rigging line tied to them to help control their fall. The tree will be inspected for structural stability prior to the establishment of a rigging system in the tree. When trees appear to have defects that could jeopardize the ability to safely use a rigging system to drop or control a limb, an alternate plan will be implemented.
26. All equipment utilized in rigging will meet the load ratings for the limb being rigged, and a qualified employee, trained in proper rigging procedure will determine the rigging procedure and equipment to be utilized. Any equipment that has been damaged or overloaded will be removed from service.
27. When removing a tree, a crew leader will determine what equipment is necessary and how many crew members will be directly involved in drop zone operations. A well-established escape route will be planned prior to the beginning of removal operations. Any non-involved workers will be away from the drop zone at a distance of twice the height of the trunk or tree being removed.
28. Notches will be used on all trees and trunks greater than five inches in diameter during removal operations, and should conform to the standards of ANSIZ133.1 Standard.
29. Loose clothing, ropes, lanyards and saddles will not be worn during any tree care activity where the risk of entanglement with tools or machinery is possible, particularly with brush chippers.

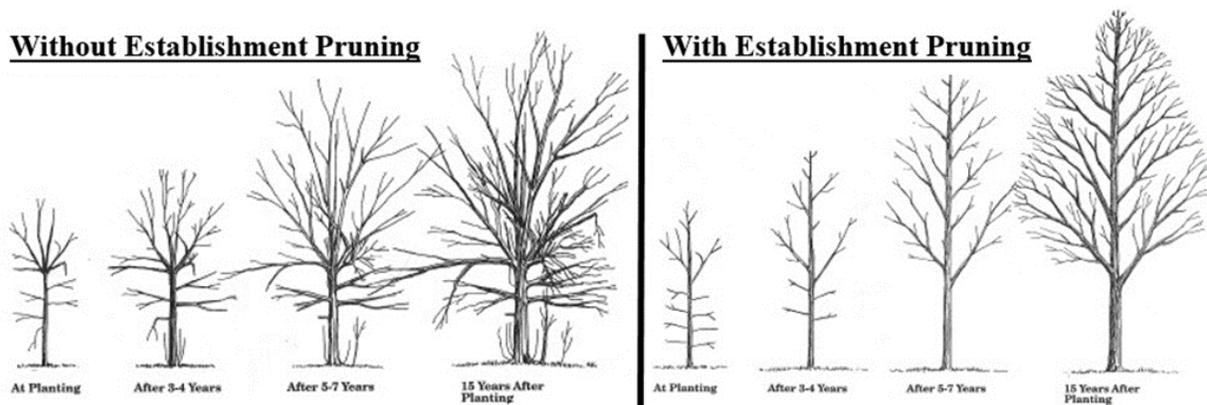
Section 6 – Tree Pruning and Standard Maintenance

Tree pruning accomplishes several very important things for a tree. Pruning reduces the risk of failure, provides clearance for utilities or other structures, reduces shade, reduces wind resistance and wind damage, maintains overall tree health and improves overall aesthetics. Activities related to tree pruning, as well as several other basic maintenance tasks are detailed below.

MAINTENANCE ACTIVITIES

Pruning Young Trees

A young tree is generally considered to be six to eight inches in diameter or less. There are exceptions for very slow-growing and very fast-growing species. Young trees are still trying to acclimate to their sites, and pruning young trees has different goals and outcomes than pruning larger, mature trees. The standard nursery stock sold in stores has been meticulously pruned for four to ten years to have a single trunk, and the branching patterns common to the various tree species. Without proper establishment pruning, these trees might have multiple trunks, poor branch structure and overall poor form and architecture. Pruning young trees to establish proper form is one of the most cost-effective maintenance activities. It is an inexpensive procedure that does not require a great amount of man-hours, and saves thousands of dollars in pruning and maintenance costs later in the life of a tree.



Pruning Mature Trees

Depending on the species, a mature tree is generally considered to be greater than six to eight inches in diameter. Mature trees are established in and acclimated to their sites. The pressure these trees face from their environment generally comes from above-ground factors such as pests, pathogens, man-made structures, other trees, windstorms or lightning strikes. Pruning is performed for these above-ground issues. Natural aging and/or death are additional reasons mature trees are pruned. Pruning mature trees may mitigate short-term risk, such as storm damage, or pruning may be done to maintain a tree's long-term health and structure. In the wild, trees lose limbs to wind and disease frequently; this is known as self-pruning. Allowing trees to self-prune over time is not advisable in an urban forest. Safety factors may arise, and the process of self-pruning may bring up aesthetic issues in an urban environment.



Watering

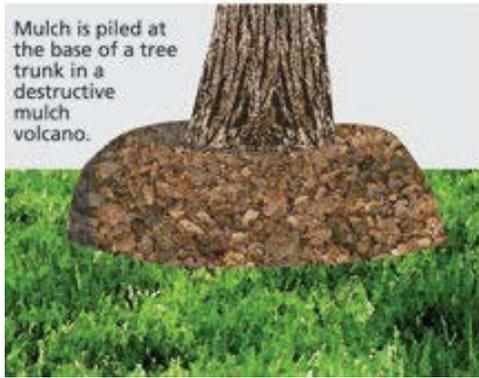
Water is one of the most important substances required by all living things. The importance of water in the establishment, growth, and survival of trees cannot be overstated.

Most trees adapted to our climate zone (USDA Zone 4) are also adapted to the amount of moisture we have in an average year. However, younger trees with less expansive root systems are susceptible to prolonged drought. Young trees often need additional watering, which is an essential maintenance activity and can increase the likelihood of the survival of newly planted or younger trees on the parkway.

Mulch / Parkway Repair

Parkway maintenance and proper applications of mulch are cost-effective maintenance activities. Mulch has many benefits, including eliminating weed growth in the root zone, allowing water to percolate into the soil, reducing evaporation rates and creating a naturally acidic and fertile soil environment. Turf grass often seen on parkways competes for resources such as water and nutrients, and mulch eliminates this competition. Volcano mulching is the poor practice of piling mulch against the trunk of the tree in excess of 3 inches deep. Volcano mulching causes moisture buildup against the trunk and can cause severe decay of the trunk tissue and ultimately tree death.

Improper Mulching



Proper Mulching



Chemical Applications

When practicable and applicable, chemical control for common pests or pathogens may be utilized as a preventative or curative method. Generally, the cost of chemical treatment is more expensive than removal of the tree. In rare circumstances, the City may decide to treat trees chemically. Residents must notify the City Arborist before they attempt to treat their parkway trees. Chemical treatment may be allowed by residents at their own expense, as long as treatments are performed by a Certified Arborist or staff member with an Illinois Pesticide Applicator license.



REASONS FOR MAINTENANCE

Establishment Pruning

Establishment pruning is the single most cost-savings measure in tree care as it establishes good form and branch structure for the life of the tree. Establishment pruning of newly planted trees should be performed a minimum of one time prior to the tree reaching six inches in diameter. Once established, the tree will only require periodic cycle pruning to maintain an appropriate form for the urban forest.

Cycle Pruning

Mature trees are pruned on a cyclical basis, dependent on the management strategy employed and based on the size of the tree population and the capacity of the controlling authority to manage that tree population. Cycle pruning ensures that dead branches, storm damaged limbs or unsightly growth are removed before becoming hazardous or unsightly. Cyclical pruning also ensures the proper leaf to stem ratio which provides structural support for the tree.

Following the removal and replanting of the Ash tree population as a result of the EAB, the City is striving to implement a six-year cycle pruning program in order to balance the tree population, anticipated budgets and manpower. When the six-year cycle pruning program is fully implemented, every tree in the City will be inspected and/or pruned once every six years.

The City is currently divided into 13 zones for various Public Works operational programs including asphalt maintenance and snow removal. The City will use these zones as a basis for its cycle pruning program with approximately two zones to be pruned each year.

Emergency / Storm Damage Pruning

Emergency pruning is nearly always necessary in order to mitigate severe risk, such as fallen limbs that are blocking traffic, have impacted a structure, are interfering with a utility or are hanging and in imminent danger of any of the above. Emergency and storm damage pruning will be conducted at the discretion of the City with the best interests of the public in mind.

Sanitation Pruning

When a tree has been diagnosed as diseased or infested, sanitation pruning may be utilized to maintain the tree while removing the diseased or infested portions. This technique is only effective when the host tree is infected or infested with certain pests and pathogens. Generally, removal will be the most cost-effective and safest option to avoid endangering other nearby trees.

Drought

When a drought occurs, the City encourages residents to institute a watering program for all trees planted within the last two years. Residential watering should be in compliance with the City's Water Conservation Ordinance. A watering program should encourage residents to provide approximately five gallons of water for each tree, once per week, until the drought has subsided.

Pest or Pathogen Outbreak

Removal will generally be the response to a diseased or infested tree. Pruning the diseased or infested portions of a tree may also be possible. These measures are less expensive than attempting chemical treatment.

REQUIREMENTS AND STANDARDS

City of St. Charles

1. All activities directly related to the operation of a chainsaw, bucket truck, limb rigging, or tree climbing will be performed by a qualified employee, or under the supervision of a Certified Arborist or Arborist Trainee.
2. No pruning or maintenance activity that takes place within ten feet of a power transmission line will be performed by a City employee unless certified as a qualified Utility Arborist.
3. No cabling, bracing or other support systems will be installed in City-owned trees, either by the City, its residents or any contractors. Exception may be made by obtaining prior written approval of the City.
4. No heading, pollarding or espalier pruning will be conducted on City-owned trees, and no wound dressings will be used under any circumstances without a permit and prior written approval of the City.
5. Residents of the City may perform chemical applications on parkway trees, such as treatment for EAB, DED, Apple Scab or other common maladies with prior permission from the City. The City will not bear any financial responsibility associated with the costs of such treatments, and treatments must be performed by a Certified Arborist who holds an Illinois Pesticide Applicators license. Additionally, trees being treated by residents may still be removed at the discretion of the City for any of the reasons stated above. The City may deny or revoke permission for chemical treatment of parkway trees if an unqualified contractor is utilized, if potentially hazardous chemicals are involved or for any other reason at the discretion of the City.
6. The need for pruning and maintenance of individual trees and parkways will be at the discretion of the City and its designated contractors.

ANSI A300 - Part 1

1. A designated Arborist or Arborist Trainee will visually inspect each tree before beginning work. If any condition is observed above and beyond the original scope of work, the condition will be reported to the controlling authority before any work begins.
2. Pruning tools will be sharp before and during use.
3. Pruning cuts which remove a branch at its point of origin will be made close to the trunk or parent branch without cutting into the branch-bark collar or leaving a stub.
4. Pruning cuts made to reduce the length of a limb or parent stem will be made at a slight angle relative to the remaining stem, and not damage the remaining stem. If pruning to a lateral branch, the lateral should be large enough to assume the terminal role.
5. Final cuts will be made that result in a flat surface with the adjacent bark firmly attached.
6. Not more than 25% of the foliage will be removed during an annual growing season, depending on the tree species, size, age and condition. If more frequent pruning is necessary due to utilities, vistas or health considerations, removal of the tree should be considered as an alternative to pruning.

ISA BMP Manual

1. All employees or contractors directly involved with tree pruning will be familiar with the following pruning types and how they are to be used in conjunction with one another.
 - A. Pruning to Clean: Selective removal of dead, diseased, detached, cracked and broken branches.
 - B. Pruning to Thin: Selective removal of small live branches to reduce crown density.
 - C. Pruning to Raise: Selective removal of branches to provide vertical clearance.
 - D. Pruning to Reduce: Selective removal of branches and stems to decrease the height or spread of a tree or shrub.
 - E. Structural Pruning: Selective removal of live branches and stems to influence the orientation, spacing, growth rate, strength of attachment and ultimate size of branches and stems.
 - F. Pruning to Restore: Selective removal of branches, sprouts and stubs from trees and shrubs that have been topped, severely headed, vandalized, lion-tailed, storm damaged or otherwise damaged.

2. Every effort will be made to time pruning of individual tree species in accordance with best management practices for the tree species in question. All pruning work will be conducted at the discretion of the City and its approved contractors.

OBJECTIVES AND GOALS

	2015 Milestone 1	2020 Milestone 2	2025 Milestone 3	2030 Milestone 4	2035 Milestone 5	2040 Final Goals
Cycle Pruning	Prune 1,700 trees/year	Prune 2,000 trees/year	Prune 2,300 trees/year	Prune 2,600 trees/year	Prune 2,900 trees/year	Prune 3,200 trees/year
Mulching Parkway Trees >16"	10% of all City Owned trees properly mulched	30% of all City Owned trees properly mulched	50% of all City Owned trees properly mulched	70% of all City Owned trees properly mulched	90% of all City Owned trees properly mulched	~100% of all City Owned trees properly mulched

Section 7 – Tree Planting

This Plan exists to educate the public and set strategic goals for tree planting and canopy cover assessment. The Plan is intended to be reviewed and amended as necessary throughout the course of its effective lifecycle. The exact numbers of trees to be planted are not fixed. As trees are planted, removed, replaced and evaluated, the goals of this Plan are subject to change, at the discretion of the City, its Tree Commission and residents.

TREE PLANTING ACTIVITIES

Diversity and Canopy Cover Assessment

The tree canopy will be reviewed to determine how much canopy exists in the City at present. Strategic goals to increase the canopy will be set. Utilizing several software suites, along with data available from the Morton Arboretum, the canopy assessment and goals will be determined by the year 2020. Canopy cover goals will not only include street trees, but also trees on private property and in natural areas as well. This Plan includes recommendations for several potential incentive programs to increase canopy cover on private property. Once canopy data is assessed, the City will utilize GIS software and available analysis programs to determine where the greatest need for increased tree planting is on both public and private land, and determine the best methods of incentivizing increased tree planting.

Planting Site Assessment

The success of a tree depends on where and how it is planted. The City will assess planting sites before trees are purchased and installed to ensure the correct tree is planted for the correct site. Assessments may include soil conditions, grow space, adjacent tree species and other criteria. The City is committed to a strategic and targeted approach to tree site and selection assessment. Each tree planted represents a 25 - 100 year commitment, and due diligence will be performed before making that commitment.

Nursery Stock Procurement

Nursery stock quality is also key to a tree’s long-term success. The City will visually inspect and select every tree from nurseries, planting contractors and consultants that will be planted on City-owned property in order to minimize the possibility of installing poor quality nursery stock.



Nursery Stock Recommendations

Maples, Lindens and Honey Locusts are over-represented in the City's population (and in Illinois as a whole). In order to bring the overall diversity of the tree population back into a sustainable balance, a diverse array of other species will be planted over the next 25 years. Over the next five to ten years, many species of trees will be in high demand and low supply. In order to mitigate this shortage, the following recommendations are offered for consideration:

- Change current nursery stock standard from 2.5 inches balled and burlapped (B&B) stock to 2 inches B&B stock. This will allow the City to purchase younger trees, which will take less time to produce, thus shortening the time it takes to obtain trees.
- Partner with one or more local nurseries, and consider contract growing some of the more difficult to locate stock, so that it will be available when it is needed.
- Partner with the St. Charles Park District or private landowners to establish a small propagation nursery on City property, in order to produce a portion of its own nursery stock.

Tree Transport and Planting

Proper transport and planting procedures determine a tree's success after planting. Trees planted too deeply will suffer from root compaction and trunk decay. Trees planted without properly dug holes may suffer from stunting.

Trees planted without proper removal of packaging materials may develop girdling roots. Trees planted too high may have surface root desiccation. Trees improperly staked or with improper trunk protection may suffer from trunk wounds or girdling of the entire trunk. The standards and best management practices for tree transport and planting are detailed below.



Challenges of Parkway Planting

Urban parkways are a difficult environment for trees to thrive in, and approximately 10% of new plantings fail each planting cycle. The City's contracts for tree planting generally include a one to two-year replacement warranty for any new trees that fail to thrive in their new environment. In general, it should be understood that planting on a narrow strip of soil between the street and sidewalk is an uphill battle in many ways due to limited soil volume, salt runoff, airborne pollutants and other factors. New planting mortality is to be expected, despite best efforts to prevent failure.

REQUIREMENTS AND STANDARDS

City of St. Charles

1. Planting sites will be determined and monitored using the City's tree inventory, in conjunction with staff input.
2. New planting sites will ideally be ten feet away from utility structures and a minimum of six feet from manholes and utility structures, driveways and hardscapes.
3. Choice of species for planting over the next 25 years will be done according to the City's existing taxonomic, spatial and age-class diversity goals. A diverse and resilient urban forest will be created to minimize exposure to financial, environmental and health risks while maximizing aesthetics, environmental benefits and ecosystem benefits.
4. Nurseries and planting contractors employed by the City should have at least one Illinois Certified Nursery (ICN) professional on staff. Planting projects should be overseen by an ICN professional at least one day per work week. For in-house planting, a staff member with horticultural training will oversee all planting activities.
5. All planting stock will be grown within 150 miles of the City and planting sites.
6. Acceptable nursery stock will conform to the following standards:
 - A. Minimum of 2 inch caliper, measured at six inches from the trunk flare.
 - B. Root ball conforms to ANSI Z60.1 Standards for Nursery Stock.
 - C. Less than 10% deadwood in the crown.
 - D. Architecture consistent for the species, cultivar or variety in question.
 - E. No included bark or other narrow branch attachments, unless consistent with species or variety.
 - F. Free of pests or pathogens.
 - G. Approved species list for the City.

7. Planting and digging of certain species will only occur at certain times of year in accordance with nursery industry best management practices and professional judgement. These times and species are listed in a table below, but are subject to the professional opinions of both the City and its approved contractors.
8. Residents will not be permitted to plant trees on the City ROW even if purchased independently. Any unauthorized plantings are subject to removal by the City.
9. JULIE will be contacted and all utilities located a minimum of three days before planting is scheduled to begin.
10. A minimum one-year replacement guarantee will be provided by approved nurseries and plantsmen for all new plantings rated to hardiness Zone 5 or lower.

ANSI Z60.1

1. All root ball and container sizes for all balled and burlapped stock will conform to the Z60.1 standards for width and depth, and encompass enough of the fibrous root system as necessary for the full recovery of the plant upon installation.
2. All bare root stock will conform to ANSI Z60.1 standards for minimum root spread.
3. All containerized stock will conform to ANSI Z60.1 standards for plant and container size, as specified by the City, and will be healthy, vigorous, well-rooted and established in the container in which it is growing. The root system will reach the sides of the container, but will not have excessive growth encircling the inside of the container.
4. All collected plants (those grown on unmanaged land) will be designated and considered to be nursery-grown stock when they have been successfully reestablished in a nursery row and grown under regular nursery cultural practices for a minimum of two growing seasons.
5. The trunk or stem of the plant will be in the center of the ball or container, with a 10% overall variance in location.
6. The use of digging machines, in both the packaging and installation of trees, is considered an acceptable nursery practice.

ANSI A300 – Part 6

1. Planting sites and work sites will be inspected for hazards by the City prior to the beginning of work each day. If portions of the work site are outside of the original scope of work, the controlling authority will be notified immediately.
2. Location of utilities, obstructions and other hazards above and below ground will be taken into account prior to planting and transplanting operations. These include, but are not limited to, gas, electric, sewer, communication, drainage and signage.
3. The following criteria will be considered prior to transport and planting: requirements of individual trees, compass orientation of field-grown trees, site feasibility assessments, soil assessment and drainage assessment.
4. Tools for planting and transplanting will be properly labeled or purchased for their intended use, and be maintained in accordance with the manufacturer's recommendations.
5. The system used to move and store the plant will minimize desiccation and other damage to the crown, trunk or root ball and the health and vigor of the plant will be maintained during these periods.
6. The hole to be dug for all new plantings will be a minimum of 150% larger than the root ball or container diameter, as deep as the root flare of the tree to be planted and will have sides from which soil has been loosened in order to aid in root penetration.
7. For balled and burlapped trees, all root ball supporting materials will be removed from the upper third of the root ball and removed from the planting hole prior to final backfilling.
8. Prior to planting, container root balls will be managed by approved methods such as shaving the root ball, slicing the root ball and redirecting or removing encircling roots.
9. Backfill will comprise of either the same soil created during excavation of the planting hole or a similarly amended mixture to meet a specific objective, and will be applied in a layers to reduce future settling and prevent air pockets.

10. Mulch will be applied at a depth of two to four inches near, but not touching, the trunk of the tree, and extending to the perimeter of the planting.
11. Support systems such as guy-wires or stakes will not be installed except where needed.

ISA BMP Manual – Tree Planting

1. Timing of planting will be determined based on the species and the best professional opinion of the employees of or contractors working for the City.
2. All employees and contractors employed by or working for the City will be familiar with the following planting types, and when it is appropriate to use each:
 - A. **Bare-Root:** Field-grown and dug without soil during the dormant season.
 - B. **Ball and Burlap:** Field grown and packaged with a soil ball using burlap, twine and a retaining basket of some kind.
 - C. **Tree Spade:** Transplanted using a mechanical tree spade to hold the soil ball during transport.
 - D. **In-Ground Fabric Bag:** Field grown with the root mass contained in a semi-permeable fabric bag.
 - E. **Container Grown:** Grown above ground in containers of various shapes, sizes and materials.
3. Trees packaged with root balls must have their first structural root within two inches of the soil surface. Trees with deeper structural roots will not perform well when transplanted and should be avoided when selecting nursery stock.
4. Trees with root balls will be handled by the ball, not the stem, to ensure no damage occurs to the root-soil interface or to the stem itself.
5. Trees with leaves will be transported with a fabric tarp to minimize desiccation, and have had their root balls wetted prior to transport.
6. Sites will be tested for drainage, nutrient levels and pH prior to planting or prior to species selection, if possible.
7. Container stock will be removed from its container. For balled and burlapped trees, wrappings will be left on until the tree is in the hole; wrapping will then be removed from the third to fourth of the wire basket and burlap from the top of the ball. For all types, ensure any encircling (girdling) roots are removed and root ball is shaved as necessary.
8. As soil is added, wet and tamp each layer down to ensure good moisture and reduction of air bubbles.
9. Do not prune trees at time of planting, unless to remove dead, dying, diseased or cracked branches, as it may take away from root development as the tree attempts to heal these above-ground wounds.
10. The use of trunk wrap may be considered in areas with harsh winters, specifically on trees with thin bark, such as London Planetree and certain Maple species.

Section 8 – Tree Inspections and Risk Management

Trees provide ecosystem and aesthetic benefits. Whether they are healthy, unhealthy, structurally sound or in imminent danger of failing, all trees pose some degree of risk. Determining the acceptable level of risk, along with effective risk management, is a key priority for municipal forestry operations. As a tree manager, the City and its agents always assume some degree of risk. It is up to the City to ultimately decide how to manage trees which pose such risk in a manner which is responsible both economically as well as in the interest of public safety. This section of the Plan will deviate from the above format in order to appropriately address various facets of managing risk in an urban forest.



LEVELS OF RISK ASSESSMENT

The following Risk Assessment Levels are based on the International Society of Arboriculture (ISA) Tree Risk Assessment Qualification (TRAQ) protocols, as well as the ANSI A300 Part 9 Tree Risk Assessment Standards. The Levels are general guidelines and may be open to a certain degree of interpretation

Level 1 Assessment

Also known as “limited visual assessment” which is the typical “tree inventory assessment” of obvious physical defects and condition. During Level 1 assessment, the assessor walks to or drives by the tree, assesses it for defects, evaluates the risk posed by the subject tree and reports the results of the assessment to the tree owner. Often, prior to a recommendation, more detailed, Level 2 or Level 3, assessments are required to gather additional data.



Level 2 Assessment

A Level 2 assessment, also called a “basic assessment”, is a synthesis of the information collected during a detailed visual inspection of the tree and the surrounding site. A Level 2 inspection requires a 360 degree walk around, and may include the use of simple tools, such as binoculars, magnifying lenses, mallets, probes and trowels or shovels. The goal is to get a more complete picture of the tree in its environment.

Level 3 Assessment

A Level 3 assessment, also called an “advanced assessment,” provides detailed information about specific tree parts, targets, and risk associated with each potential interaction. It typically requires specialized training and equipment, such as bucket trucks, resistographs, tomographs and other equipment. This is the most detailed and time-intensive level of assessment.



CONSIDERATIONS IN ASSESSING RISK

Likelihood of Tree Failure Impacting a Target

A large part of determining the likelihood of a tree failure impacting a target is ascertaining the occupancy rate, or the amount of time that targets are within the Target Zone with the potential to be impacted by a tree failure. A large tree in the middle of a corn field could fail with little impact, but the same tree in a playground will have significant impact. In many roadways, motor traffic is present day and night. Most of the City’s 19,000 trees are in the ROW adjacent to roads. The failure of a tree located in the ROW not only impacts motor traffic, but also has a potential effect on pedestrian traffic and utilities within ROW.

Consequences of a Tree Failure Impacting a Target

The potential consequences of a tree failure impacting a target are a cumulative function of the value of the target, the characteristics of the tree and the type of failure it is likely to experience. While “Likelihood of Tree Failure Impacting a Target” addresses occupancy rates of an impact area, “Consequences of a Tree Failure Impacting a Target” addresses the consequences of the impact on a target and assumes that the target is always present (occupancy rate is *not* considered).

To follow the example above, if a parkway tree were to fail, a car, utility line and person (anything that likely could be there) are all underneath the tree at the time of failure, and the consequences to those targets are evaluated. Consequences are generally considered to be “minor” for targets that can be easily replaced or repaired, such as outbuildings, tool sheds and other similar targets. When a tree failure can cause injury, fatality, power outage or other similar outcomes, the consequences are considered to be “severe” (see the table below).

It should be noted that for the consequences of failure to be considered as part of this risk assessment system, specific to the City of St. Charles, the tree branch must have a minimum of a 3 inch diameter at the base. A smaller requirement would present an unrealistic and burdensome standard for inspection.

Weather

Every tree, no matter how healthy, can fail from wind velocity or other impacts such as lightning damage, ice loading or soil saturation. Predictable weather events generally cause tree failures or tree part failures for trees which have pre-existing defects. Extreme weather events, by contrast, can cause the failure of healthy trees. For all tree risk assessments, risk will be assessed assuming “normal” weather conditions. Abnormal weather conditions causing tree failures may be considered an “Act of God,” and the City will not be held liable for any damage or claims of negligence resulting from such events.

CITY OF ST. CHARLES RISK ASSESSMENT POLICY

The City created this policy to maintain an acceptable level of risk from its street tree population. In order to maintain a high level of public safety, while mitigating undue burden, the City will conduct the following risk assessment protocols:

1. The City maintains a tree inventory detailing the species, size and condition of all trees on the public ROW. This Plan recommends that the inventory be audited within the next five years. After completing the full inventory audit, approximately 17% of the new updated inventory will be audited each subsequent year, so that the oldest tree data will be six years old, at most. These inventory updates and audits will be considered a Level 1 limited visual risk assessment, and will identify high risk trees. A tree considered to be a high or extreme risk will be mitigated, either by pruning, bracing or removal, as soon as is practical following the assessment.
2. During routine work, the City’s Public Services forestry crew will look for defects which could create a high risk situation. Additionally, the forestry crew may be given the task of driving through the City to look for high risk trees. These activities will be considered a Level 1 limited visual assessment, and will identify any obvious high risk trees. Any high risk trees identified will either be scheduled for a more detailed risk assessment (Level 2 or 3), or will be mitigated, either by pruning, bracing or removal, as soon as practical following the assessment.
3. Upon notification from a resident regarding a concern about a potentially high risk tree on the public ROW, the City will send a qualified employee or qualified contractor to perform a Level 2 or Level 3 risk assessment within five business days of the notification from the resident. The qualified employee or contractor will either hold an ISA TRAQ qualification or have sufficient professional experience. If the tree is determined to have a risk rating above “low” (as determined by TRAQ and ANSI A300 Part 9 Standards), a decision will be made by the City as to the appropriate mitigation measures, if any.
4. All trees determined to be in need of mitigating actions (removal, pruning, etc.) will be documented in writing by the assessor. A work order will be created within 48 hours of completion of the assessment. The documentation will include, but not be limited to, the assessor’s name, the date of the assessment, the tree species, size, condition, a brief narrative detailing which parts of the tree are likely to fail, the likelihood of failure, the likelihood of impacting a target, the consequences of tree or tree part failure and the overall tree risk rating according to the ISA’s TRAQ system of risk assessment.
5. The City will not assess privately owned trees for risk, nor assume any liability for privately owned trees. If a resident expresses concern about a tree on private property, the City will refer them to a list of qualified contractors.
6. A minimum branch diameter of three inches, by ocular estimate, will be the standard to which this risk assessment policy applies. Assessing all branches smaller than three inches represents an undue burden to the City.

TRAQ TREE RISK ASSESSMENT MATRICES

Likelihood of Tree Failure Impacting Target

<u>Likelihood of Tree Failure</u>	Likelihood of Impacting Target			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Risk Rating Matrix

<u>Likelihood of Failure and Impact</u>	Consequences			
	Negligible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Section 9 – Tree Preservation and Management During Construction

Ordinances pertaining to trees exist, in part, to protect trees and shrubs from construction activities with the intent to protect the benefits trees and shrubs provide to the common good. Trees and shrubs may be privately owned, but are also community resources that provide many benefits including carbon sequestration, increased property values and enjoyment, helping to retain storm water runoff and energy savings. Therefore, tree and shrub protection and preservation during construction activities represents an investment in the community. Ensuring the protection and preservation of these assets, while minimizing burdens to businesses, developers and residents, is essential. The requirements and standards documented in this Plan are consistent with many similar communities in Illinois. There are no strategic timing goals for implementation.



REQUIREMENTS AND STANDARDS

City of St. Charles

1. A tree survey will be performed by a qualified individual prior to the beginning of any development activities. The survey will detail the size, species and condition of each tree six inches DBH and greater or each managed landscape tree (intentionally planted, non-volunteer tree) of any size.
2. The tree survey and a tree protection plan will be submitted to the City and all relevant architects, engineers and workers with the following information:
 - A. Trees to be removed
 - B. Trees to be preserved
 - C. Location and size of the Tree Protection Zone (TPZ) for each tree
3. The Tree Protection Zones for each tree will be visibly delineated by the site engineer, using orange snow fencing or other high visibility exclusion material. When delineation is not possible, all workers on site will be made aware of the TPZ verbally.

ANSI A300 – Part 5

1. Tree management plans and specifications for tree management will be written and administered by a Certified Arborist, qualified in the management of trees and shrubs, during site planning, development and construction. These may include, but are not limited to: demolition, grading, building construction, walkway or roadway construction, excavation, trenching and boring or other activities having the potential to negatively impact trees.
2. The management of trees and shrubs will be incorporated into the following phases of the site development process:
 - A. Planning
 - B. Design
 - C. Pre-Construction
 - D. Construction
 - E. Landscape
 - F. Post-Construction
3. During the planning phase, an assessment of tree and shrub resources on the site will be performed by a Certified Arborist. The assessment will identify the species, condition and size of each tree and will be incorporated into the site design. Trees to be retained or protected will appear on site design maps. Trees on neighboring property which could also be impacted should also be considered.

4. During the design phase, a tree management report will be developed for trees to be conserved on the site and will be included in the construction plans and specifications, which may include, but are not limited to:
 - A. Trees to be retained
 - B. Tree and Root Protection Zones
 - C. Tree Protection Zone barriers
 - D. Tree Protection plans
 - E. Soil erosion control
 - F. Soil compaction controls
 - G. Staging and storage areas
 - H. Other relevant on-site activities
5. Grading and demolition plans will include all trees to be retained and removed, as well as the tree protection plans for working around retained trees. Plans will also include equipment routes for avoiding the tree protection zones. Consequences for non-compliance will be specified.
6. During the pre-construction phase, all tree protection plans will be effectively communicated to all parties involved with the site development. Tree protection zone barriers will be in place prior to the beginning of any construction activities.
7. Tree protection zones will be delineated around all trees to be protected during construction, and will be based on the size, species and condition of the tree and its root system. Generally 6 to 18 times the diameter of the tree is considered to be acceptable. Deviations from this diameter may be made at the discretion of a Certified Arborist. Activities which could damage tree roots or compact soil should be avoided in the TPZ.
8. Fencing or other visible barriers to the TPZ will be installed prior to site clearing, grading and demolition, and will be maintained throughout the construction and landscaping phase. When this is not feasible, alternate methods may be considered.
9. During the construction phase, compliance with tree protection plans will be monitored by a Certified Arborist, and any damage to tree barriers or trees, or non-compliance will be reported to the project manager or owner, or other controlling authority.
10. When removing vegetation or pavement during demolition, equipment used adjacent to TPZ will be specified to avoid damage to the tree and the surrounding soil. Soil protection measures will be in place prior to vehicle or heavy traffic in or near the TPZ.
11. Storage or disposal of construction materials or hazardous materials will not occur in the TPZ.
12. Fill within the TPZ will not be permitted without mitigation to allow for proper air and water availability to existing roots. If fill cannot be avoided in the TPZ, compaction of fill will be avoided, and consideration will be given to a permanent well installation to protect the tree and its roots.
13. During the landscape, irrigation and lighting phase, levels of compliance will be documented and reported by a Certified Arborist. Non-compliance will be reported to the project manager.
14. During the post-construction phase, a remedial and long-term maintenance plan will be specified for existing and new landscaping to ensure the success of preservation efforts and newly planted landscaping.
15. Pruning will be considered to reduce wind sail when necessary. It should not be considered to compensate for root loss.
16. Mulch will be applied to as much of the TPZ as possible in order to create a favorable soil environment for root recovery after construction activities.

ISA BMP Manual

1. A cost-benefit analysis will be conducted during the planning phase. In some cases money may be better invested in tree planting post-construction.
2. The species and age of trees will be evaluated by a Certified Arborist, so that trees in good condition with desirable characteristics are preserved, but those in poor condition or with undesirable characteristics are not.

3. A tree inventory and tree management report will be conducted during the planning phase, and a Certified Arborist will work closely with developers to ensure best management practices are being met for both parties.
4. Effort will be made to retain groups of trees to ensure there is a wind and solar buffer around the highest quality trees, if possible.
5. The Critical Root Zone (CRZ) is the area around the tree trunk where roots essential for tree health and stability are located. A Tree Protection Zone (TPZ) is an arborist-defined area around the tree which should include the CRZ, as well as additional area to ensure future stability and growth. The TPZ is subject to the professional opinion of the Certified Arborist.
6. An attempt will also be made to preserve native soil for landscape planting as native soil with horizons and development is preferred over fill or blackdirt.
7. If a sufficient TPZ cannot be established, a 6 - 12 inch layer of hardwood mulch, 3/4 inch plywood mat over a 4 inch layer of hardwood mulch or other similar measures will be temporarily installed over the CRZ in order to prevent root and soil compaction.
8. Trunk protection will be installed on trees very close to construction activities, and should consist of 2x4 or 2x6 planks strapped snugly to the tree trunk with wire or other strapping, preferably with closed-cell foam between the trunk and the planks.
9. When roots over one inch cannot be avoided, they will be pruned, not left torn or crushed. Acceptable methods of pruning are:
 - A. Excavation using supersonic air tools, pressurized water or hand tools, followed by selective root cutting
 - B. Cutting through the soil along a predetermined line with a tool specifically designed to cut roots
 - C. Mechanically excavating the soil (backhoe or similar) and selectively pruning remaining roots
10. Wells, tree islands, retaining walls, and other such structures or strategies will be considered as alternatives to any cut/fill work in the CRZ or TPZ.
11. Monitoring will take place during construction and post-construction phases, and any non-compliance should be reported to the proper controlling authority immediately, so that timely remediation or mitigation efforts may be undertaken.

Summary / Conclusion

The City of St. Charles has always had an effective and well-maintained Urban Forestry program, as evidenced by its vibrant tree population, an active Tree Commission and public interest and involvement. Due to the Emerald Ash Borer, the face of the urban forest in St Charles and many similar communities is changing rapidly, with many trees having been removed and replaced in the first two decades of the second millennium. Though this has been very expensive and damaging to our environment, it has also provided St. Charles and other communities with an opportunity to start fresh with many facets of their Urban Forestry programs.

This Plan has been created to educate the public, provide guidance for the City and to establish standards for the City's forestry staff, forestry Contractors and interested home and business owners. The Plan, in conjunction with the City's tree and landscaping ordinances, will create a reasonable level of protection and care for the City's urban forest, now and in the foreseeable future. The Plan will be adaptively managed by the Tree Commission and City as necessary and in consideration of new data about trees, forestry and other factors.

Appendix A: Acceptable and Unacceptable Species

Species not appearing on this list can be approved or disallowed by consensus of the Tree Commission, acting under the supervision of the City of St Charles

ACCEPTABLE SPECIES	ACCEPTABLE SPECIES	UNACCEPTABLE SPECIES
Alder	London Planetree	Apple-Edible
Amur Corktree	Magnolia spp	Ash-Blue
Amur Maackia	Maple-Black	Ash-Green
Apple-Crab spp	Maple-Freeman	Ash-White
Baldcypress	Maple-Hedge	Box Elder
Beech-American	Maple-Japanese	Cherry-Black/Pin
Beech-European	Maple-Miyabei	Cottonwood
Birch-River	Maple-Red	Eastern Redcedar
Birch-White	Maple-Shantung	Elm-American
Black Locust	Maple-Sugar	Elm-Siberian
Blackgum	Mountain Ash	Fir spp
Buckeye-Ohio	Oak spp	Hemlock
Buckeye-Yellow	Oak-Burr	Maple-Amur
Catalpa-Northern	Oak-Chinquapin	Maple-Norway
Cherry-Ornamental	Oak-English	Mulberry
Chokecherry-Canada Red	Oak-Pin	Pine spp
Dawn Redwood	Oak-Red	Pine-Austrian
Dogwood spp	Oak-Shingle	Pine-Scotch
Elm-Hybrid	Oak-Swamp White	Pine-Virginia
Fringetree	Oak-White	Pine-White
Ginkgo	Pagodatree	Poplar
Golden Raintree	Pear-Callery	Spruce-Blue
Hackberry	Pecan	Spruce-spp
Hardy Rubber Tree	Persian Ironwood	Walnut-Black
Hawthorn	Persimmon	Walnut-White
Hazelnut	Plum	Willow-Weeping
Hickoryspp	Redbud	
Honey Locust	Serviceberry	
Hornbeam-American	Smoketree-American	
Hornbeam-European	Sweetgum	
Horsechestnut	Sycamore	
Horsechestnut-Red	Tree Lilac	
Ironwood	Tuliptree	
Katsura	Yellowwood	
Kentucky Coffeetree	Zelkova	
Larch		
Linden-American		May not be planted in any quantity
Linden-Littleleaf		May be planted in very limited quantities
Linden-Silver		May be planted in limited quantities
		May be planted in relatively high quantities
		May be planted in very high quantities

Appendix B: ISA TRAQ (Tree Risk Assessment Qualification) Form

ISA Basic Tree Risk Assessment Form

Client _____ Date _____ Time _____
 Address/Tree location _____ Tree no. _____ Sheet _____ of _____
 Tree species _____ dbh _____ Height _____ Crown spread dia. _____
 Assessor(s) _____ Time frame _____ Tools used _____

Target Assessment

Target number	Target description	Target zone			Occupancy rate 1 – rare 2 – occasional 3 – frequent 4 – constant	Practical to move target?	Restriction practical?
		Target within drip line	Target within 1 x Ht.	Target within 1.5 x Ht.			
1							
2							
3							
4							

Site Factors

History of failures _____ Topography Flat Slope _____ % Aspect _____
 Site changes None Grade change Site clearing Changed soil hydrology Root cuts Describe _____
 Soil conditions Limited volume Saturated Shallow Compacted Pavement over roots _____ % Describe _____
 Prevailing wind direction _____ Common weather Strong winds Ice Snow Heavy rain Describe _____

Tree Health and Species Profile

Vigor Low Normal High Foliage None (seasonal) None (dead) Normal _____ % Chlorotic _____ % Necrotic _____ %
 Pests _____ Abiotic _____
 Species failure profile Branches Trunk Roots Describe _____

Load Factors

Wind exposure Protected Partial Full Wind funneling _____ Relative crown size Small Medium Large
 Crown density Sparse Normal Dense Interior branches Few Normal Dense Vines/Mistletoe/Moss _____
 Recent or planned change in load factors _____

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown LCR _____ % Cracks _____ Lightning damage
 Dead twigs/branches _____ % overall Max. dia. _____ Codominant _____ Included bark
 Broken/Hangers Number _____ Max. dia. _____ Weak attachments _____ Cavity/Nest hole _____ % circ.
 Over-extended branches Previous branch failures _____ Similar branches present
Pruning history
 Crown cleaned Thinned Raised Dead/Missing bark Cankers/Galls/Burls Sapwood damage/decay
 Reduced Topped Lion-tailed Conks Heartwood decay _____
 Flush cuts Other _____ Response growth _____

Main concern(s) _____

Load on defect N/A Minor Moderate Significant _____
Likelihood of failure Improbable Possible Probable Imminent _____

— Trunk —

Dead/Missing bark Abnormal bark texture/color
 Codominant stems Included bark Cracks
 Sapwood damage/decay Cankers/Galls/Burls Sap ooze
 Lightning damage Heartwood decay Conks/Mushrooms
 Cavity/Nest hole _____ % circ. Depth _____ Poor taper
 Lean _____ ° Corrected? _____

Response growth _____
 Main concern(s) _____

Load on defect N/A Minor Moderate Significant
Likelihood of failure Improbable Possible Probable Imminent

— Roots and Root Collar —

Collar buried/Not visible Depth _____ Stem girdling
 Dead Decay Conks/Mushrooms
 Ooze Cavity _____ % circ.
 Cracks Cut/Damaged roots Distance from trunk _____
 Root plate lifting Soil weakness

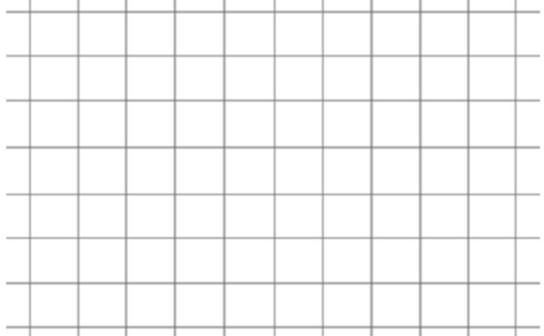
Response growth _____
 Main concern(s) _____

Load on defect N/A Minor Moderate Significant
Likelihood of failure Improbable Possible Probable Imminent

Risk Categorization																					
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood								Consequences				Risk rating of part (from Matrix 2)		
							Failure				Impact				Failure & Impact (from Matrix 1)						
							Improbable	Possible	Probable	Imminent	Very low	Low	Medium	High	Unlikely	Somewhat	Likely	Very likely		Negligible	Minor
1																					
2																					
3																					
4																					

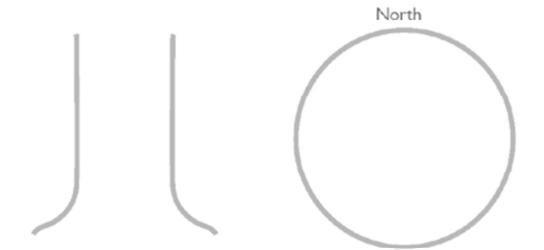
Matrix 1. Likelihood matrix.

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



Matrix 2. Risk rating matrix.

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



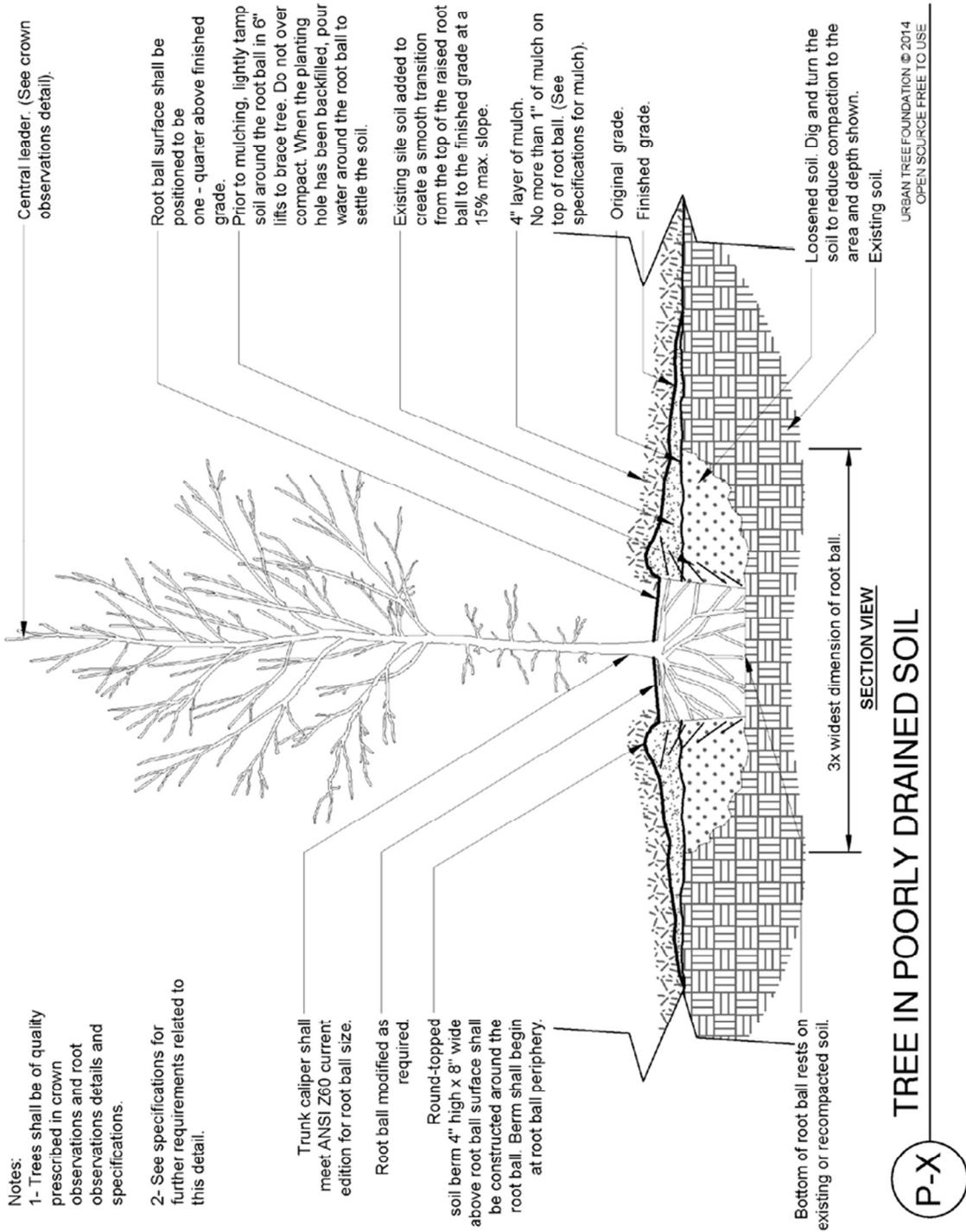
Notes, explanations, descriptions _____

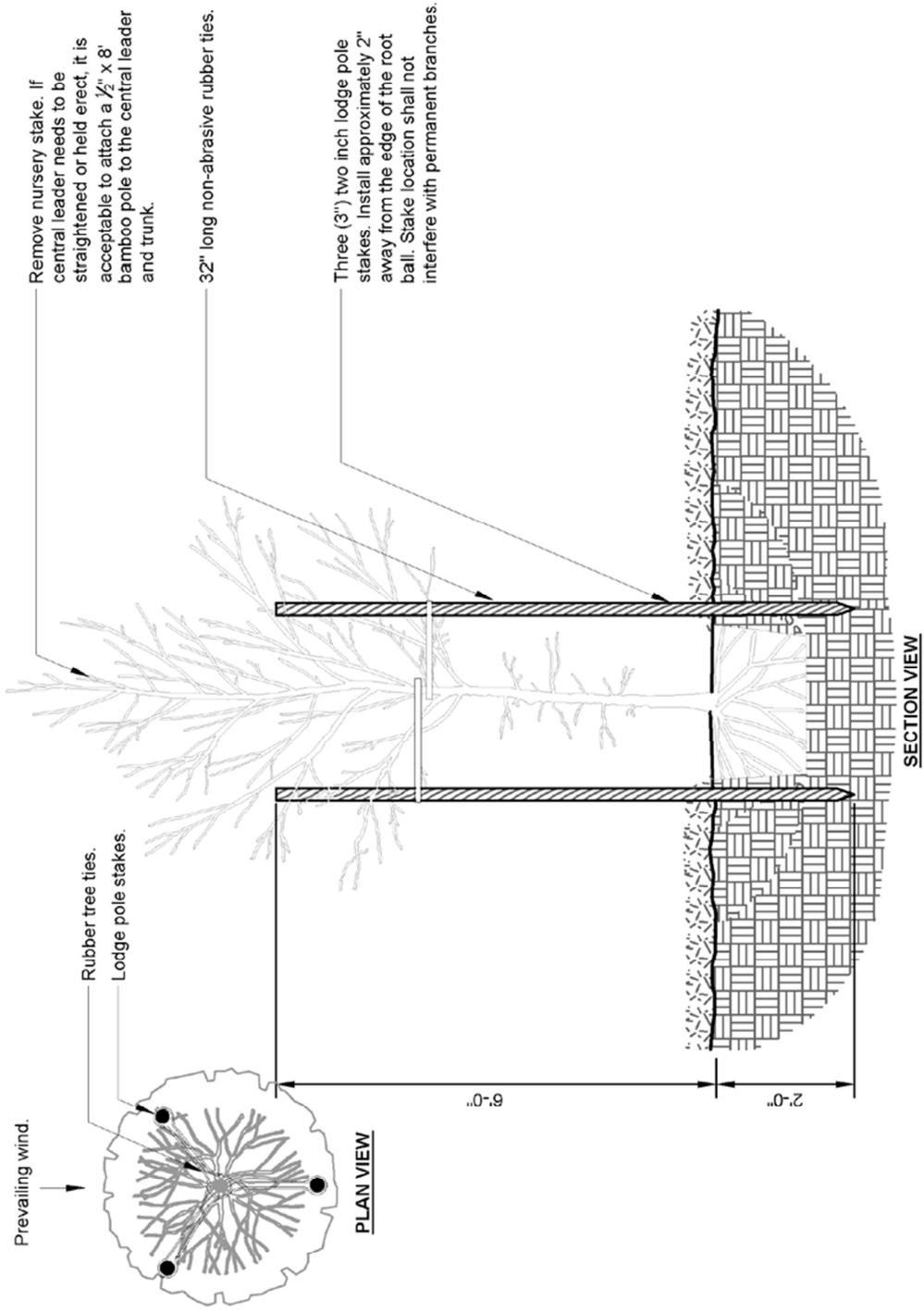
Mitigation options _____ Residual risk _____
 _____ Residual risk _____
 _____ Residual risk _____
 _____ Residual risk _____

Overall tree risk rating Low Moderate High Extreme Work priority 1 2 3 4
 Overall residual risk Low Moderate High Extreme Recommended inspection interval _____
 Data Final Preliminary Advanced assessment needed No Yes-Type/Reason _____
 Inspection limitations None Visibility Access Vines Root collar buried Describe _____

This datasheet was produced by the International Society of Arboriculture (ISA) and is intended for use by Tree Risk Assessment Qualified (TRAQ) arborists - 2013

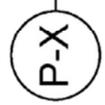
Appendix C: Tree Planting / Staking Details



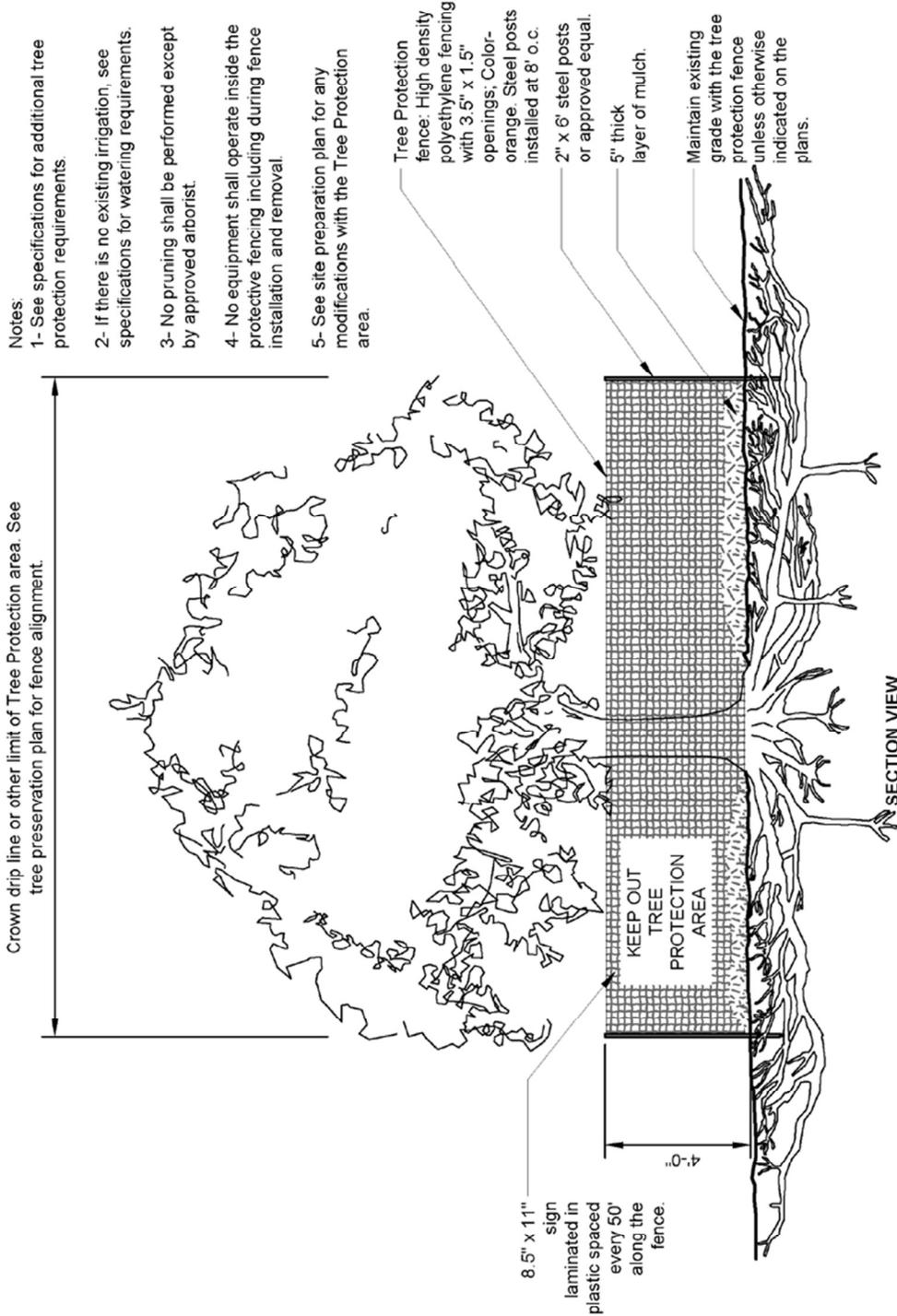


TREE STAKING - LODGE POLES (3)

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Appendix D: Tree Protection Details



Notes:

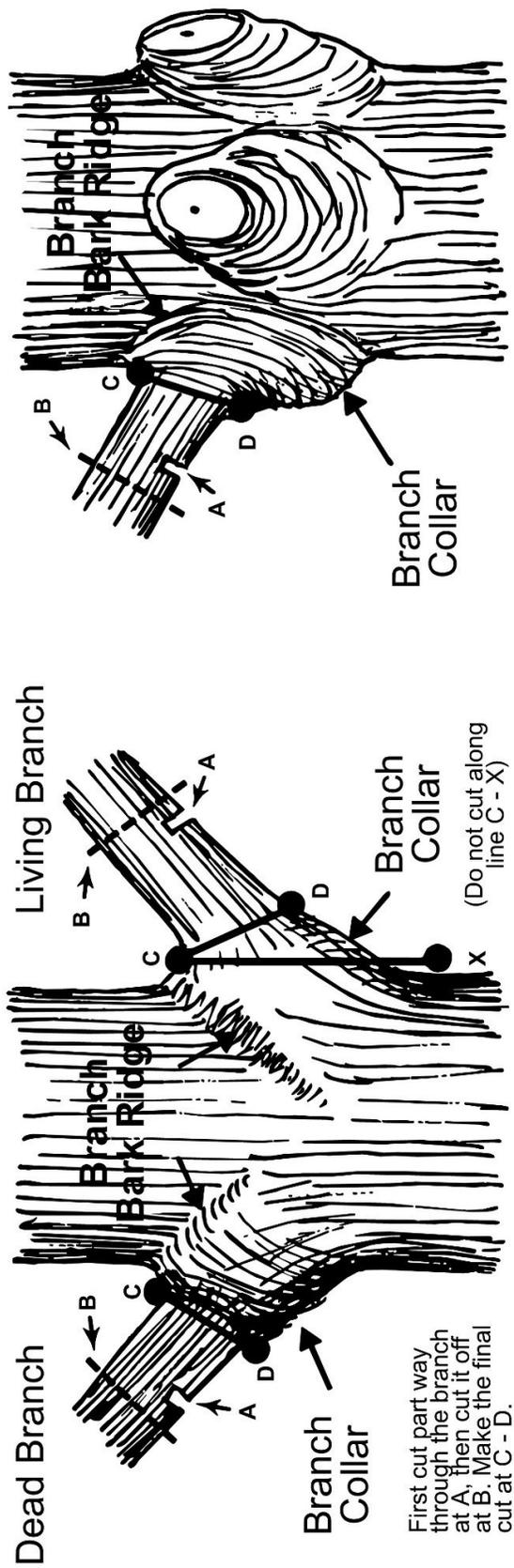
- 1- See specifications for additional tree protection requirements.
- 2- If there is no existing irrigation, see specifications for watering requirements.
- 3- No pruning shall be performed except by approved arborist.
- 4- No equipment shall operate inside the protective fencing including during fence installation and removal.
- 5- See site preparation plan for any modifications with the Tree Protection area.

TREE PROTECTION



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Proper Pruning Principles



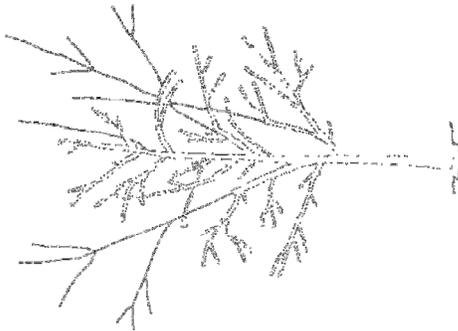
Conifers

Hardwoods

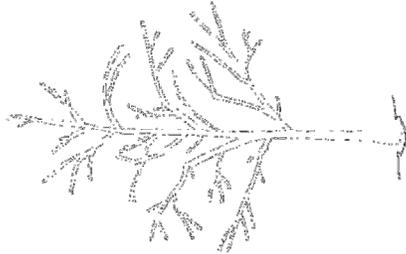




Existing planting, tree has three co-dominant stems. The stems compete with one in the center should be pruned to preserve their growth.



Two competing stems were reduced substantially, in this case removing about 70% of their foliage using reduction cuts.



After pruning, tree has only one dominant stem.

- Notes:
- 1- All trees shown are injectable unless they are biggs recommended treatment.
 - 2- Tree shall meet crown observation after following correction.

CROWN CORRECTION DETAIL



UNLESS TO BE INDICATED BY THE CONTRACT DOCUMENTS, THIS IS TO BE USED