

CITY of MADISON
URBAN FORESTRY TASK FORCE
DRAFT-FINAL REPORT- FOR DISCUSSION AND REVIEW
(cover design tbd)

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URBAN FORESTRY TASK FORCE MEMBERS

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I. Madison Urban Forestry Task Force

Trees are a foundation for Madison’s community and ecosystem health, sustainability and resilience. Our urban forest plays a vital role in stormwater management, protecting our drinking water, and reducing energy costs and human stress. With this mind, our urban forest must be managed holistically and urgently as a potentially fragile resource. We must look to its future with a focus on the hard science and policies that affect its growth, decline, and composition. Yet, there are also inexpressible qualities of our urban forest. Poets write elegies to trees, not stoplights and sidewalks. Our trees shelter our community.

This document presents findings and recommendations intended to preserve and grow the Madison urban forest canopy. They have been prepared and are presented by the Madison Urban Forestry Task Force (UFTF) which was formed via a city council resolution to complete the following charges:

I. Review available research and best practices on promoting a vibrant, healthy and sustainable urban forest.

II. Review city policies, practices, programs, and operations that impact the urban forest (e.g. Zoning Code, Emerald Ash Borer Mitigation Plan).

III. Solicit input from local stakeholders with additional information on the issue as needed (e.g. WI DNR).

IV. Develop recommendations to the Mayor, Common Council, Committees or Commissions, and/or City agencies on the establishment of a Canopy Coverage Goal and action plan for the city covering both public and private trees.

V. Develop recommendations to the Mayor, Common Council, Committees or Commissions and/or City agencies to preserve and expand our urban forest resources through a well-planned and systematic approach to tree management.

VI. Develop recommendations to encourage private landowners to protect, preserve and promote a diverse and sustainable urban forest.

VII. Provide guidance for a long-term strategy to departments to promote the sustainability of a healthy urban forest.

The recommendations presented here are presented to address the Task Force’s stated mission and thus provide a basis for subsequent progress on issues facing our urban forest. The UFTF is one step in an ongoing process.

The UFTF has attempted to set a direction for a series of urban forest priorities and initiatives. It has concurrently considered both the complexities of enacting new policies and the existing expertise of staff that will initiate and strengthen the recommendations. The UFTF’s work is the next step in the necessarily continuous urban forest management process. Urban forests are dynamic and our relationship to it must be long-term and evolutionary.

In an attempt to document the “value” of trees we will look beyond the inexpressible qualities of our urban forest and look at some of the critical elements that are measurable.

Stormwater: Trees reduce stormwater runoff by capturing and storing rainfall in their canopy and the soils supporting their roots. Roots and leaf litter create conditions that promote the absorption of rainwater into soil.

Trees slow down and temporarily store runoff and reduce pollutants by nutrients, pollutants and water through their routes.

It is estimated that our current forest of street trees and parks intercepts 115 million gallons of rainfall in a year. This is equivalent to the additional (flood) water pumped by the Sewerage District on August 21-22, 2018 during the historic record rainfall. If we had no trees, it is possible we would have had twice as much stormwater flooding the city. Alternately, if we had many more trees, strategically located, the impact of the flood would have been diminished. (Illustration of flooded Madison.)

Energy: Trees reduce energy use by lowering air temperature by shading surfaces and when they transpire water through leaves. Trees shade buildings and streets in the summer and block winds in the winter. The shading of streets in the summer by a healthy tree canopy lowers temperatures by 5-10 degrees, reducing the effects of a heat island in our downtown and densely paved areas. Heat islands further warm the surrounding buildings and if the heat is extreme (above 90) it also makes walking or simply being outside uncomfortable. The reduction of energy use by the cooling effect of trees will help Madison achieve its goal of becoming carbon-neutral and save money on utility bills.

Reducing Carbon Dioxide: Trees remove carbon dioxide from the atmosphere and in the process return oxygen. Urban forests “clean the air” by intercepting small particulate matter and absorbing harmful gases on their leaf surfaces. It is estimated that our public urban forest removes 15,000 tons of carbon each year. That’s the equivalent carbon output of 4-6,000 cars each year.

Illustration of shaded trees and unshaded parking lot

Madison residents value and care about the trees around their home and neighborhood. They know that “trees cool my home in the summer” and that “having trees in a neighborhood makes it a better place to live.” They also know by experience or intuition that trees on either private land or public property can substantially increase property value. It is estimated that a large “shade tree” in a front yard adds approximately \$9,000 to the value of a home.

II. Madison and the Urban Forest Canopy

Within the approximately 17 sq. miles that account for Madison's land mass, measurements of the city's urban forest canopy coverage have ranged between 23-27%, that is, approximately one-quarter of Madison's land is covered by trees. However, such generalized statistics overshadow the complexities on the ground. Several categories within our urban forest better define the state of our forest:

- "Private" Trees: These are the trees owned and maintained on private property. It's the tree in your front or backyard, in the parking lot at work, a small ornamental tree on the side of building and the trees in the UW's Arboretum. Most of the trees in the city are on private property.
- "Public" Trees: These trees are owned and cared for by the City. There are two general groups of public trees, "street trees" and "park trees." Although street trees comprise only a small percentage of the overall city forest, they are the most visible and as a result, strongly define the character of a street, a neighborhood and indeed, the city as a whole.
- Street Trees: Madison has about 96,000 street trees- that's more than 100 trees per street mile. Although the street trees comprise only 15 % of the overall tree canopy, it has an outsized influence on many critical features of city-life such as moderating the climate, stormwater control and enhancing the aesthetic quality of our streets.

Street trees are, as is the rest of the city forest, facing numerous threats to their well-being most notably, the Emerald Ash Borer and climate change. Street trees have additional significant threats of winter salt and the shrinking size of street terraces in which to grow and underground infrastructure of pipes and cables that block tree roots. As we will later discuss, street trees as well as the entire urban forest must be continually maintained and grown or the canopy that helps sustain us will shrink with potentially disastrous results.

- Park Trees: How many? In addition to EAB, other threats.

Composition of Urban Forest Species

The composition of urban forest species is always changing; the number of ash trees are diminishing, new species are being introduced that are more conducive to warming climates, while both future and known pests are a continual concern. In general the types of species and relative distribution of species across Madison, are typical of Midwestern urban areas and reflect decades long trends in taste and selection by public agencies and private property owners. There are threats due to both over representation of individual species (e.g. maples, honey locusts, crap apples) and gaps in the age of the canopy, which are more difficult to measure.

A recent survey suggests that current trends still tend toward sameness in species selection; i.e. maples, honey locusts, and crab apples are still the most commonly planted species. In response, the Forestry section has adopted a policy of buying and planting no more than 10% of a genus for their total street tree program.

Private industry, however, still relies heavily on a relatively small selection of trees, a trend built on consumer tastes, lack of market choice, and professional familiarity.

2010 Forest Composition. This diagram displays the results of a random species sampling of 200 plots in 2010. It includes both public and private properties.

Emerald Ash Borer: Certainly, the single most influential force on the current composition of our urban forest has been the proliferation of the Emerald Ash Borer (EAB). The EAB was first noted in the Warner Park in 2013. At that time, an inter-department planning team was organized to set the city's policies regarding ash tree treatment, removals, and replacements through the Emerald Ash Borer Management Plan.

In 2014, the City estimated that 20,000 or 22% of all city street trees were ash and about the same number of ash trees were in city parks. By 2017, 10,724 ash trees were treated (and will continue to be treated) on three-year cycles. 6,200 ash trees have been preemptively removed, leaving 4,500 trees still slated for removal. Due to budget constraints only street trees were subject to treatment.

Replacements are planned for installation within three planting seasons from the time of the removal. By 2017, 3,065 were successfully planted. Further, in 2017 1,386 ash tree replacements accounted for half of the street trees planted for the year. To accomplish the replacement goal and ensure effective species diversity, the forestry division has. In 2019, as the city enters the sixth year of the infestation, approximately 32% of all ash trees will show significant decline.

The effects of the EAB are clearly evident across the city. These trees were photographed on Madison's north side in 2016.

Shape of the Urban Forest Canopy

Large overstory trees, also called shade trees, are large trees with thick canopies or foliage coverings. Some common large trees in Madison include oaks, birches, elms and ashes.

Canopy branches and leaves both absorb and deflect sunlight that pours downward, allowing limited sunlight through the foliage. Although some large trees can be hundreds of feet, such as a redwood, large tree in our area are xx feet tall at the highest. In the Great Lakes region of the United State, large trees can live from 50 to 150 years or more. Older hardwood forest trees can have a lifespan of 200 to 400 years Because large trees have a high rate of photosynthesis, plants under large trees produce more seeds, fruits, leaves and flowers. This results in a wide range of animal life. Large trees help regulate both regional and global climate. A viable tree canopy reduces the urban heat island effect, reduces heating/cooling costs, reduces air pollution, increases property values, and provides aesthetic enjoyment and an overall improved quality of life.

Small and medium-sized trees provide most of these benefits, however, they do so at a fraction of the scope of their larger counterparts. While yearly maintenance costs of a large tree are greater than for a small tree, the immediate and long-term benefits of a large tree are many multiples of the small tree.

Trees and Racial Equity

Although estimates of canopy coverage rates for the City of Madison range between 24 – 27%, the value of the urban forest canopy is not evenly distributed. Neighborhoods with lower canopy coverage seem to correlate to higher population densities, lower household incomes, and newer development. As indicated in Figure xx below, District 12 on the east and northeast parts of the city includes both Warner Park and Truax Airport has a relatively low level of 17% canopy coverage.

Neighborhoods with higher canopy cover are more likely to have lower population densities, higher income and older development. In some areas, concentrations of forest such as the UW Arboretum may sharply increase the reported percentage of canopy. Districts 5, 11 and 19 cover much of the near west and northwest sections of the city are among the wealthiest sections of the city with predominately single family lots with mature trees and have a canopy coverage of 38%, 43% and 36% respectively.

Trees are, among other attributes, public assets. As such, it is incumbent upon city to determine if the assets (trees) are distributed equitably on streets, parks and public spaces. Trees planted on private property benefit neighbors and the whole community and thus, the whole community should provide support for tree growth and maintenance wherever possible within reach.

Decision Making Landscape

Decisions affecting the management of urban trees is complex and dispersed. Policies, programs, and funding sources affecting trees are spread through multiple city departments, public utilities, and institutions. Even within the city, multiple committees, boards, and commissions set and execute municipal

Urban Forest Canopy. The image above was produced using LIDAR data from 2009.

policy that directly or indirectly may affect the viability of elements of the tree canopy.

Arguably, the largest single constituency affecting the future of the urban forest canopy is the public itself. The majority of the urban forest lies on thousands of private residential and commercial properties and accordingly, the decisions affecting trees on those properties are made by thousands of property owners.

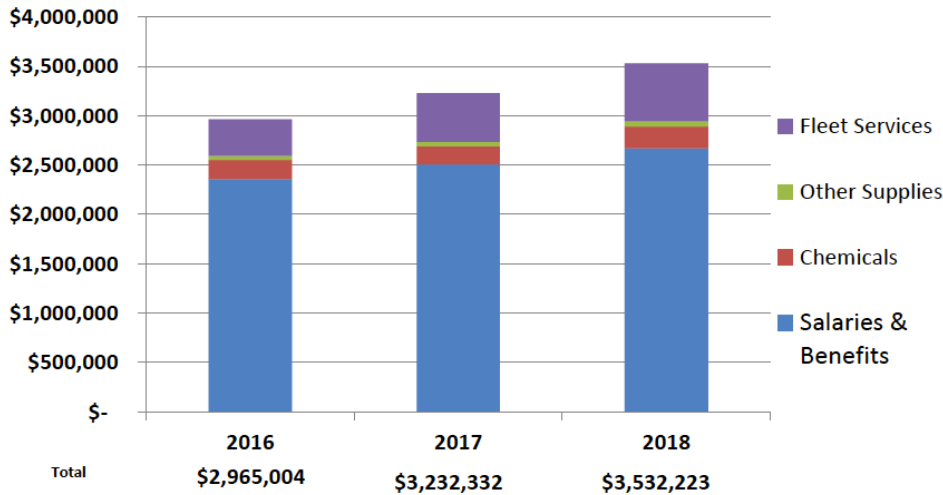
A brief overview of the primary municipal agencies that shape our urban forest follows:

- **Division of Forestry**- A division of the Parks Dept., Forestry is responsible for the planting, maintenance, and removal of street trees. It also reviews private development proposals as they relate to publics, plays an enforcement role in private property violations, and manages city-wide urban forestry health initiatives such the gypsy moth suppression program.
- **Department of Parks**- The Department Parks plants, maintains, and removes trees within the park system and sets long-term policy goals through the 5-year Parks and Open Space Masterplan.
- **Planning Division**- Located within the Department of Planning, Economic and Community Development, the Planning leads the review of private developments according to the city's zoning and subdivision codes. Planning also conducts long-term plans for both existing and proposed neighborhoods as a decennial Comprehensive Plan.
- **Department of Engineering**- The Department of Engineering is responsible for the design of public infrastructure projects (such as road construction, road reconstruction, storm water facilities, and traffic signaling and signage), reviews private development proposals, and manages public lands designated as Greenways.
- **Fire Department**- the Madison Fire Department reviews the placement of public and private trees adjacent to buildings to ensure emergency access.
- **Streets Department**- The Streets Department is responsible for the removal stumps for street trees, management of brush and waste, and fleet maintenance.
- **City Boards, Committees and Commissions:** - The land use decisions and general policies regarding trees are made by the Habitat Stewardship Committee, Sustainable Madison Committee, Urban Design Commission, and Plan Commission
- **Madison Gas and Electric (MGE)**- MGE maintains tree clearance around primary electric lines through contracts with private arborists and coordination with the city's Division of Forestry.
- **Division of Building Inspection**- The Division of Building Inspection enforces property maintenance laws in cases where private trees become hazardous.
- Traffic Engineering:

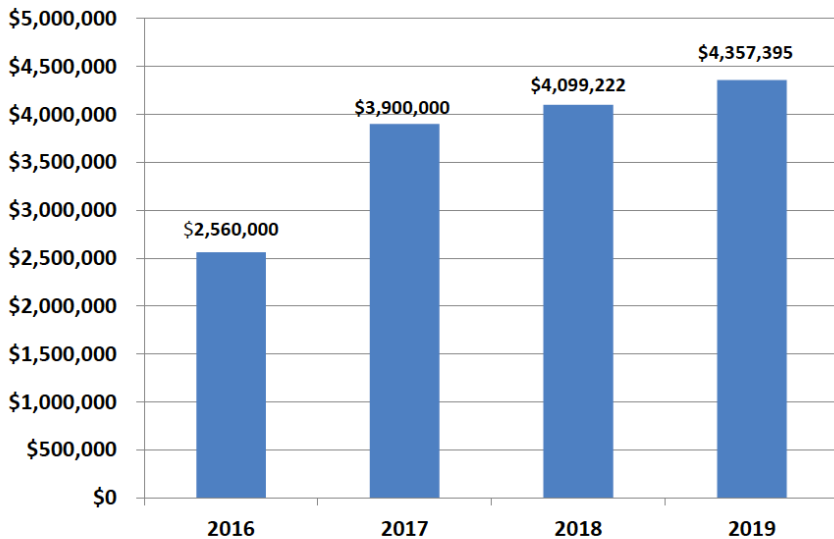
City Funding for Forestry

Funding for forestry operations accounts for approximately 2% of the city’s operating budget. Forestry funding is supported through the Urban Forestry Special Charge, which was established in 2015 to allow the City to recover its extraordinary costs associated with the activities related to the Emerald Ash Borer Mitigation Program.

As indicated in Chart X, funding for the Forestry Division has increased by about 10% each year



Forestry Division Expenses by Year. These graphs demonstrate the rate of growth and categories of spending for the Forestry Division’s expenses.



Revenue from Urban Forestry Special Charge. Rises in yearly expenses have been matched by rises in revenues gathered from the Urban Forestry Special Charge.

A Contest for Space

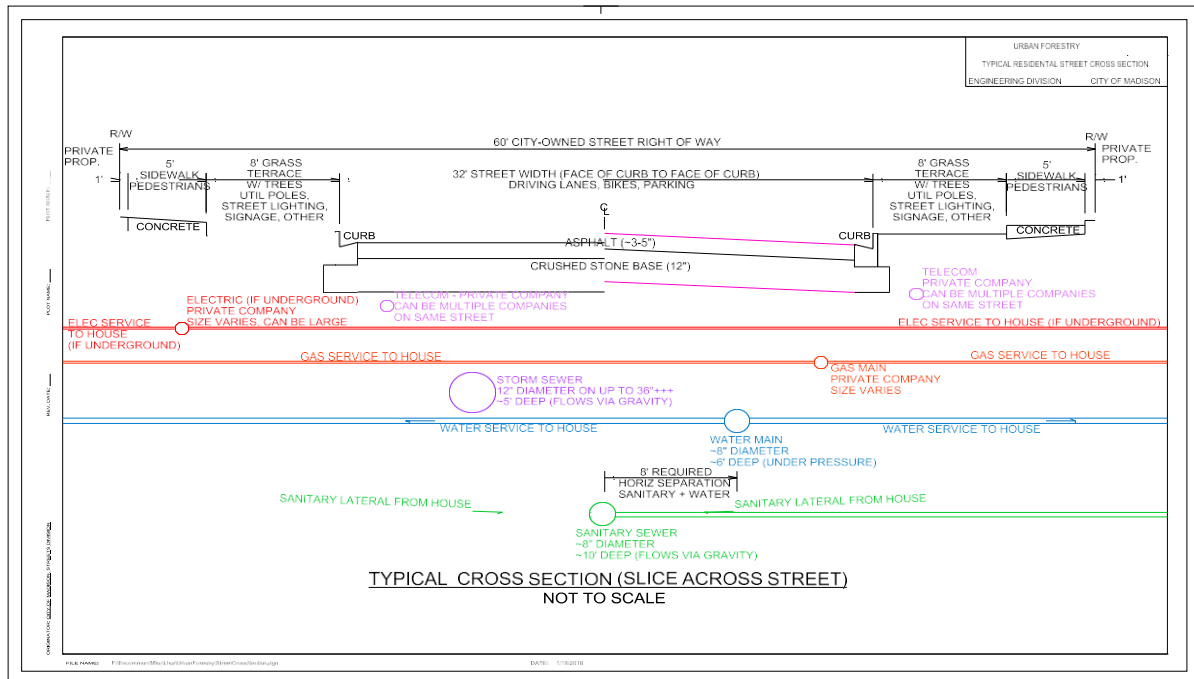
Most Madisonians taking a walk down the street see a building on one side, the sidewalk before them and the grassy terrace on the other side. They are unaware that each foot of space above and below ground have been negotiated, planned and apportioned.

The placement and allocation of street trees is determined by the disparate policies of city agencies. Some of the dimensional restrictions on placement can be characterized by the following considerations of city operations that are **above the ground**:

- Trees must be six feet from driveways.
- Trees must be at least 20 feet from a street light
- Trees must be at least 10 feet from a fire hydrant.
- Trees must be at least 10 feet from a traffic sign
- Trees must generally be at least 20 feet from a corner to protect “line of sight.”
- Height and design of trees must allow the placement of aerial ladders on buildings taller than 30 feet.
- and design of trees must take into consideration placement of utility poles and overhead cables. They must also be at least 10 feet from utility poles.

(Add Jim’s diagram of above the ground restrictions.)

Restrictions Underground: In addition to the restrictions on trees, there are substantial and numerous restrictions to tree planting due to underground infrastructure. The schematic diagram below is a cut-away of the underground view of a typical street. As indicated, in addition to the utility poles, street lights and signage above the ground, the placement of the electrical service, gas mains, sewerage laterals and water mains must be considered as part of the process of siting trees.



KEY: Red = Task Force has reviewed/no changes to original
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III. GOALS AND RECOMMENDATIONS

Most street trees grow and live in a hostile urban environment. In more densely built areas, trees are often shadowed for much of the day by buildings. Trees along power lines are subject to the loss of major limbs if they might threaten the viability of a power line. They are subject to higher-than-normal temperatures and drought in the summer and stronger winds in the winter (also without other trees to buffer the wind). During and after rainstorms they are subject to floods and in the winter they are covered by road salt and sand. Underground, their roots are stunted or stymied by a multitude of infrastructures and periodically threatened by road reconstruction. They are also peed on by dogs.

Any one of the above-mentioned environmental conditions in and of itself could be sufficient to stunt the growth, misshape or kill a tree. However, often the most challenging condition we create for trees on street terraces is the insufficient space, soils, nutrients and water to grow. Trees must have rooting space to grow and stay healthy. Cramped spaces with little available soil will result in a tree with a short life-span and a shrunken canopy. Highly compacted soil and impervious spaces deprive the tree of air and water.

The following recommendations, organized into four categories, are focused on addressing some of the major factors that adversely affect tree planting and favorable growing conditions:

- **Land Use Planning and Design**
- **Outreach and Education**
- **Canopy Coverage and Growth**
- **Forestry Operations and Public Lands**

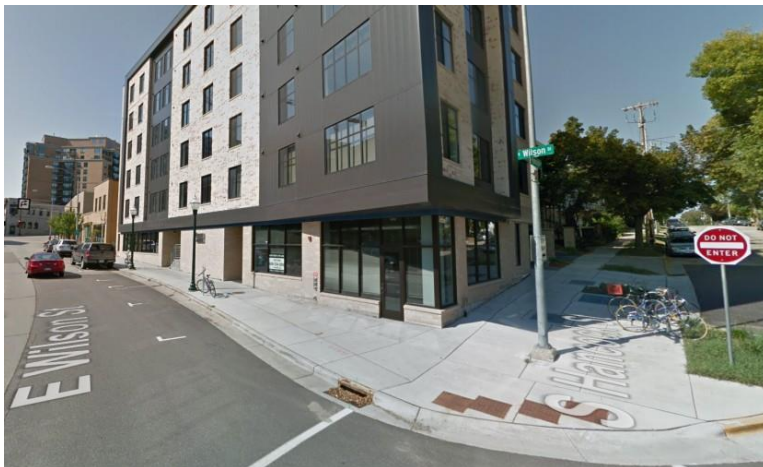
PLANNING & DESIGN

Trees and the impact on their health are affected throughout the planning, design, and construction phases of public infrastructure projects and private developments. Multiple departments and municipal committees also administer the policies, standards, and processes that influence decisions regarding tree preservation, removal and planting. These dynamics can lead to contradictory policies and ill-timed decisions affecting the fate of the urban canopy. However, for trees to thrive, they must be comprehensively integrated in to the City of Madison’s infrastructure and building practices.

These images illustrate a mixed-use redevelopment project where the site was cleared of all trees (including several in the right of way). Although a new terrace and trees were included in the initial site plan approvals, it was later determined that underground infrastructure would limit their implementation. Better planning for retaining trees and accounting for the value of existing canopy are critical decision points in the planning process. This would include expanding the scope of site plan review to the right-of way thus, tree retention or planting. All too frequently, trees will be removed during development but the loss, to the community as a whole, is not documented.

Mature trees lost during construction reduce the public benefit of Madison’s urban forest canopy. A required replacement of mature with new trees is not an equal exchange. Even when new trees are planted, it can be several decades until they can provide the value of mature trees. In such cases where existing canopy value is lost or diminished, the city should develop a more equitable metric than “one mature for one sapling” when seeking measures to **remediate losses** even if those measure are outside of the project bounds.

Building set back allowances have been reduced in urban areas to increase density. These policies have likewise reduced areas for potential tree plantings in critical areas. The city should consider the loss of potential trees due to this zoning condition as a detriment to the public value of the city streets. The city should develop zoning policies that encourage, not prevent, the provision of street trees or trees on privately developed properties.



Trees in densely developed areas suffer multiple space and material constraints. However, these are precisely the areas where thriving trees can provide the most value. The development scale and tight relationship to the street in this recent project, precludes the possibility of street tree and represents a loss of potential for the urban forest canopy.

Goals

- The decision-making process regarding land uses planning and design should engaged in earlier and more comprehensive consideration of the tree canopy. Issues affecting trees and tree health should be integrated as early as possible into the land use decision-making process. This decision-making process should account for tree benefits and value in both qualitative and quantitative terms.
- The quality of the physical environment in which trees are planted is elemental to their future health. City policies and standards should insure improved growing conditions for large trees, including maximizing soil volumes for tree rooting zones and removing overhead impediments.
- The values of trees multiply as they mature. Accordingly, those existing values should be formally considered, and often preserved, when assessing design decisions.
- Individual projects and the city as a whole will benefit in proportion to which the canopy can be grown. Policies and practices should seek to maximize species diversity, canopy coverage, and landscape aesthetics.

Street Design Recommendations

- Add to Madison General Ordinances: “In new developments, terraces shall have the following optimal minimum widths:
 - Local streets – 10’
 - Collector streets – 10’
 - Arterial streets – 12’
- During the public planning and design phases of street re-construction projects, **alternative design scenarios**, such as **engineered soil volume construction methods and terrace support systems**, should be investigated for street reconstruction projects in order to provide a more optimal environment, in consultation with the City Forester. Public works design specifications should be updated to allow for such innovative methods and standardized details. These methods should be further identified with educational signage to raise awareness of the methods.
- Explore requiring zones free of laterals (e.g., water, sanitary) and parallel utilities for redevelopments at the beginning of the process in order preserve open and contiguous areas used to maximized soil volumes for tree plantings.
- The Undergrounding of Overhead Utility Lines policy criteria should be amended to account for the impact of overhead utility lines on city terrace trees. The criteria should include but may not be limited to: ability to underground, terrace width, availability of space for private trees adjacent to the right-of way, ability to improve canopy coverage, availability of cost-share funding source (e.g., TIF), potential for place-making, etc.
- Appropriate annual funds for full or partial underground projects as a separate budget line item.
- Amend MGO 16.23.8(g) to clarify that existing trees should not be removed for the purposes of solar panel installation. Planting trees, planting location, and species would only be in effect if the building plan includes using solar.

Lighting, Solar, Traffic Vision....

- Private development proposals subject to city review should create and provide a **Tree Management Plan**. The Tree Management Plan should include, but not be limited to:
 - An **inventory** that identifies the locations and species of trees larger than 5" DBH for both private trees and possibly affected public trees within the adjacent public right-of-ways.
 - A **statement** describing the impacts of the development on the all tree resources that includes a description (size, species) of trees to be preserved and removed.
 - A **construction plan** illustrating how practices may affect existing trees and details physical tree preservation measures such critical root zones protection, locations for materials storage, site access, and prescribe tree measures such as pruning.
- Include Forestry in the final approval process for any development in regards to the public right-of-way. Any street tree preservation plan shall be considered as part of the evaluation for approval at the Board of Public Works (BPW). If a tree needs to be removed that was not otherwise indicated on the plan to be removed, the plan will need to be re-submitted to the BPW and the developer will need to be present to describe the plan.
- Public trees that are proposed and approved for removal should be replaced in enhanced conditions. Public trees that removed without approval should carry a fine of \$1000 per inch, as measured at diameter breast height.
- City Forester should consult with Engineering Division to identify long-term plans for collectors and arterials.
- Larger development project represent the potential for both increased canopy growth and loss. It is recommended that **landscape requirements and canopy coverages** increase from their current level as the physical size of proposed private developments increases. In particular, parking lot landscape requirements should be amended to increase both the density of tree and the soil volume of planting areas. Incentives should be established for private developments that exceed landscape requirements.
- Forestry should partner with Traffic Engineering to work with the developer on dedication needs to enhance the terrace.
- In consultation with the City Forester, soil volume requirements should be included within landscape zoning requirements for parking lot trees and general landscape plans. It is further recommended that a policy for site plans that increases canopy coverage density in proportion to increases in impervious surface (particularly for parking lots) be developed, i.e. larger impervious surfaces should have greater coverage requirements.

Neighborhood Planning & Long-Term Planning Recommendations



This concept plan illustrates the type of spatial planning completed within the City's neighborhood planning process. The resulting neighborhood development plans are intended to provide a framework for the growth and development of the City's peripheral urban expansion areas where development is expected to occur in the foreseeable future.

- Neighborhood-scaled canopy coverage assessments should be developed and conducted in order to set goals and strategies for canopy growth within those areas.
- Planning documents, such as Neighborhood Development Plans and Neighborhood Plans, should include an urban tree canopy statement that details a canopy coverage percentage for focus areas and identifies localized issues that impact the health of the canopy. It is further recommended that these planning documents identify areas for canopy preservation and growth. As appropriate, it is recommended that existing plans be amended to address these issues.
- Existing planning documents and policies as Complete Streets, Rural to Urban Roads, Madison in Motion, and Comprehensive plan should be reviewed in order to insure consistency in tree policy.

Subdivision Recommendations

- Planning Division should investigate how new single-family lots can have a requirement of a minimum of one tree per lot. The city should develop strategies to grow trees on newly developed single-family lots. These may include, but not be limited to, incentives for developers and/or homeowners to plant and maintain trees, the use of neighborhoods covenants to require trees, or direct planting programs focused on private properties. It is further recommended that the city provide guidance on best practices regarding the location of trees of lots and species selection to encourage diversity and large trees.

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OUTREACH & EDUCATION

An engaged and empowered citizenry is crucial to the future preservation, growth, and sustainability of the local urban forest canopy. Because the urban forest is a public resource, its future relies on broad public commitment and support. Strategies designed to increase knowledge about our trees and to involve people in stewardship activities diverse can increase the social and environmental value of our urban trees.

Goals

- Outreach strategies should be designed and implemented by a coalition of interested groups and managed in a comprehensive program.
- Outreach strategies should be tailored to diverse groups such as developers, home owners, apartment owners and dwellers, neighborhoods with low canopy levels and environmental groups to increase support and understanding about our urban forest and convey technical knowledge.

Recommendations

- Create a position for a Forestry outreach and education specialist, who would combine education/communication and an arborist background. This position would help develop an Urban Forest Outreach Initiative that would provide public education; coordinate events; and create a program similar to Tree Tender, Tree Keeper, or Adopt-a-Highway, in conjunction with the City Forester. The Initiative would partner with interested groups maintain and grow the urban forest.
- Create a grant program that includes the City providing trees to be planted on private property.
- An advisory board to the outreach program should be created that will partner with groups such as the Arboretum, UW-Extension, the Urban Tree Alliance, Wisconsin Arborist Association and others to guide an outreach program.
- Multi-year programs intended to plant trees in areas not covered by the city's operations such as private homes, schools, and multi-family housing should be designed and supported. Such a program is key to planting more trees and providing direct outreach in the city.
- Among other activities, the outreach program should organize volunteer tree planting and tree maintenance programs should be developed for private property and city parks in order to include citizens in a program of tree stewardship.

Race Equity and Social Justice and CANOPY

COVERAGE

Researchers estimate that average tree canopy cover in urban and across the U.S. is approximately 27%. Because of the well-established relationships between higher tree populations and improved human and environmental health, canopy coverage goals have been set in cities in order to measure and spur canopy growth. For example, Pittsburgh has to sough to increase its canopy coverage from 42% to 60%. Baltimore is committed to increasing its canopy from 28% to 40% by 2040. Arid Phoenix has set a goal of 30% by 2025 and Charlotte with a tree canopy of 32 % is working to increase its canopy to 50% by 2050. New York City has met a goal of planting 1,000,000 trees in the period of 2010-2015 and now has a canopy of 21%.

However, the practicality and effects of broadly stated goals can be misleading since existing canopies and canopy growth is not evenly distributed. As noted previously, there are substantial differences in tree canopy by area.

For example, downtown Madison and the UW-Madison campus areas have only 8-13% of canopy. Areas on the far east (District 17) have only 17% canopy and far west (District 9) have 16% canopy. Other areas of the city have canopy levels of 40% and higher. As noted previously, other than the downtown/campus areas, communities with higher levels of canopy are far more likely to be of higher socio-economic status. Given these differences, a general goal based on, what is often a “random” number would not address the deficiencies at the neighborhood level where the absence of trees is most acutely experienced.

[These maps were produced with I-Tree Landscape, and web-based modeling program to assess tree planting priorities according to census districts. The top map illustrates areas for tree planting based on existing canopy coverage and population](#)

Goals

- Canopy growth strategies should be directed at the neighborhood level in order to account for variations in land uses and development densities and patterns.
- Canopy growth and maintenance strategies should address the substantial disparities in specific neighborhoods and communities.
- Canopy strategies should be associated with actionable programs and results.
- Canopy growth should be pursued in coordination with canopy preservation.

Recommendations

- The City of Madison tree canopy coverage should be 40%, consistent with the American Forests Association current recommendations. Currently, Madison tree canopy coverage is estimated at 25%.
- Create a Tree Preservation Ordinance by 2020 in order to preserve, expand, and protect canopy coverage overall in our Madison urban forest.

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- City staff/consultants should analyze the sources of different levels of canopy coverage in neighborhoods such as street tree coverage, tree density in parks and trees on residential and commercial property.
- In conjunction with neighborhood groups, staff should develop strategies for increasing tree population.
- Rather than set a city-wide forest canopy coverage goal in terms of a percentage, the city should institute a range of policies and program designed to increase canopy coverage at the neighborhood level.
- Neighborhood based spatial canopy trends should be analyzed in order to understand rates of canopy change and the relative distribution of the canopy across the city.
- Public plantings along streets, in parks, and within greenways should be prioritized according to neighborhoods identified according to a need-based neighborhood analysis. The city should consider subsidies for street or private (?) trees in neighborhoods or census districts with household incomes below the area mean.
- The city should support multi-year programs to support tree planting for private homes in neighborhoods with low canopy coverage, apartment/rental housing, schools, and other areas not currently covered with existing municipal plantings.

FORESTRY OPERATIONS & PUBLIC LANDS

The City Madison maintains hundreds of thousands of trees along streets, in parks, and along greenways. Accounting for approximately 20% of the total urban forest, public trees are essential to the health of our landscape. Their vitality sets a tone and direction of the whole urban forest eco-system.

Goals

- The constraints for planting on public land may be fewer compared to private lands. The city should make use of this opportunity by increasing municipal planting rates.
- The management of public lands and trees is complex and labor intensive. Management practices should integrate and invest in technologies in order to increase efficiency and leverage investments.

Recommendations

- Write a biennial urban forest report. This would accomplish the same goals as a Forestry Master Plan (e.g., assessing the current state of the urban forest, reviewing the UFTF recommendations, and evaluating the success of those goals).
- Update and upgrade the process of inventorying street trees to include up-to-date information.
- Inventory trees on all city-wide properties, including parks and greenways, in order to maintain and add new trees. The inventory would be used to mitigate and respond to threats to the urban forest as well as prioritize growth of the forest.
- Dedicate additional resources to Forestry for more frequent pruning and maintenance of new and existing street trees.
- Public parks should evaluate a policy of **canopy growth** and how it could interact with other park uses. An assessment for park properties should be completed in order to identify preliminary tree locations, set consistent design goals, and project both priority areas and rates for tree planting. The replacement of trees is a first step towards increasing total park plantings on an annual basis. Tree preservation is essential to the development of old growth and mature forests; a preservation should be developed for Parks.
- The City Forester and Engineering Division should work cooperatively to develop standards for tree plantings in greenways and other stormwater management areas and identify strategies to minimize erosion from shaded exposed soil that can result with trees and moving stormwater while maintaining the inherent functions of the greenways.

	2017
Preemptive ash park/golf tree removals	1,310
Replanting	348
Adopt- a – Tree Program	254*

These statistics from the 2018 Emerald Ash Borer Plan update indicate the potential for tree planting on public land in order to keep up with the pace of ash tree removal.

Add 2018 data

- **Revise urban design district ordinances to remove list of allowable trees species and grant this authority to the City Forester.**
- Develop a Tree Technical Manual that would include a detailed guide as to the currently used and recommended spacing requirements. The rationale for spacing standards and opportunities for reduction in spacing should be documented. For example, the Technical Manual should address vision corners, fire department policies and requirements (e.g., aerial apparatus), spacing with street lights, etc.
- Forestry should obtain the appropriate software licenses and permissions to coordinate more extensively with other agencies involved in Public Works projects.
- City Forester should consult with Engineering Division to identify long-term plans...

When the Emerald Ash Borer “runs its course” as an invasive agent, the work of restoring our urban forest will not be finished. More than 20,000 new saplings will need to be maintained through regular pruning, watering and other maintenance. This unprecedented project of caring for a forest of young sapling will require more trained staff than the previous project of tree removal. What is unknown is the longer-term effect of the ash borer on private properties. We estimate that 30,000 trees have died or will die off as a result of the pest during its most active phase. These are important operational and policy issues that should be addressed before they become urgent.

We recommend:

- Additional staff will be needed to care for (prune, water, etc.) 20,000 new trees. These trees require more frequent pruning and care than older, mature trees.
- It will be necessary to gear up enforcement of regulations pertaining to dead trees.
- The city pursue strategies to encourage tree planting to replace ash tree losses on private property.

Needs:

Pie chart on % of parks, street and private trees.

Is the goal of 20,000 “new trees” additional trees above and beyond the number of replacement trees for the ash trees?

KEY: Red = Task Force has reviewed/no changes to original

Black = Changes have been made and the Task Force has not yet reviewed

- An assessment of the **street tree inventory** should be prioritized in order to assess current and future needs. The assessment should include, but not be limited to, opportunities for public access to data, mobile applications for fieldwork orders and data editing, and strategies for a comprehensive update.
- The current approximately 21-year **pruning cycle** of street trees should be evaluated in order to identify methods and resources needed to shorten the cycle.
- An **urban forest board** with regular meetings should be formed in order to advise on the recommendations made by the Urban Forestry Task Force and to address future urban forestry needs.

IV. APPENDIX
