CITY of MADISON
URBAN FORESTRY TASK FORCE
FINAL REPORT
FOR DISCUSSION AND REVIEW
2019

URBAN FORESTRY TASK FORCE MEMBERS

Jeremy Kane, Chair, Resident

Jackie Suska, Vice Chair, Resident

Sheri Carter, Common Council, District 14 Alder

Keith Furman, Common Council, District 19 Alder (term April 2019 – May 2019)

David Ahrens, Common Council, District 15 Alder (term January 2018 – April 2019)

Julie Laundrie, Resident

Michael Rewey, Resident

Marla Eddy, City Forester

Dan McAuliffe, City Planning Division

James Wolfe, City Engineering Division (term July 2018 – May 2019)

Lisa Coleman, City Engineering Division (term January 2018 – July 2018)

Katie Crawley of the Mayor's Office and Liz Levy and especially Tesha Pittenger of the City of Madison Parks Division have also made significant administrative and organization contributions.

The reality of a developing urban community means tree loss from growth, infrastructure, invasive pests, diseases, and climate change. A tree canopy that is healthy for residents is 40% in an urban atmosphere; Madison is currently at 23%. To ensure the health and prosperity of our community, Madison must have thoughtful planning, active preservation, and increased planting of our urban forest.

Madison's developing urban forest can support the opportunity to thrive in every home.

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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 to preserve, enhance and expand Madison's urban forest. They have been prepared and are presented by the Madison Urban Forestry Task Force (UFTF) which was established by Common Council Resolution RES-17-00659 on August 1, 2017 to complete the following:

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 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 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.

The Value of Trees

Madison residents value and care about the trees around their home and neighborhood. The value of trees is so multi-faceted it may be impossible to capture every way which they improve the quality of life in Madison. Trees are the backdrop of neighborhoods and one of the most basic tools for placemaking, as is often demonstrated in the classic tree-lined street. They shape our experience of a place and time, announcing the arrival of spring with a vibrant green, shading us from the intense summer sun and coloring the autumn horizon. Trees are critical habitat to urban wild life.

Trees have other direct benefits to residents as well. That trees cool homes in summer and make neighborhoods better places is common knowledge in Madison. Residents know by experience or intuition that trees on either private land or public property can increase property value, with some estimates as high as an additional $9,000 in sales value.

Beyond the inexpressible qualities of our urban forest, trees should be recognized as pieces of public infrastructure. The value of this infrastructure is measurable and fiscal benefits are quantifiable.

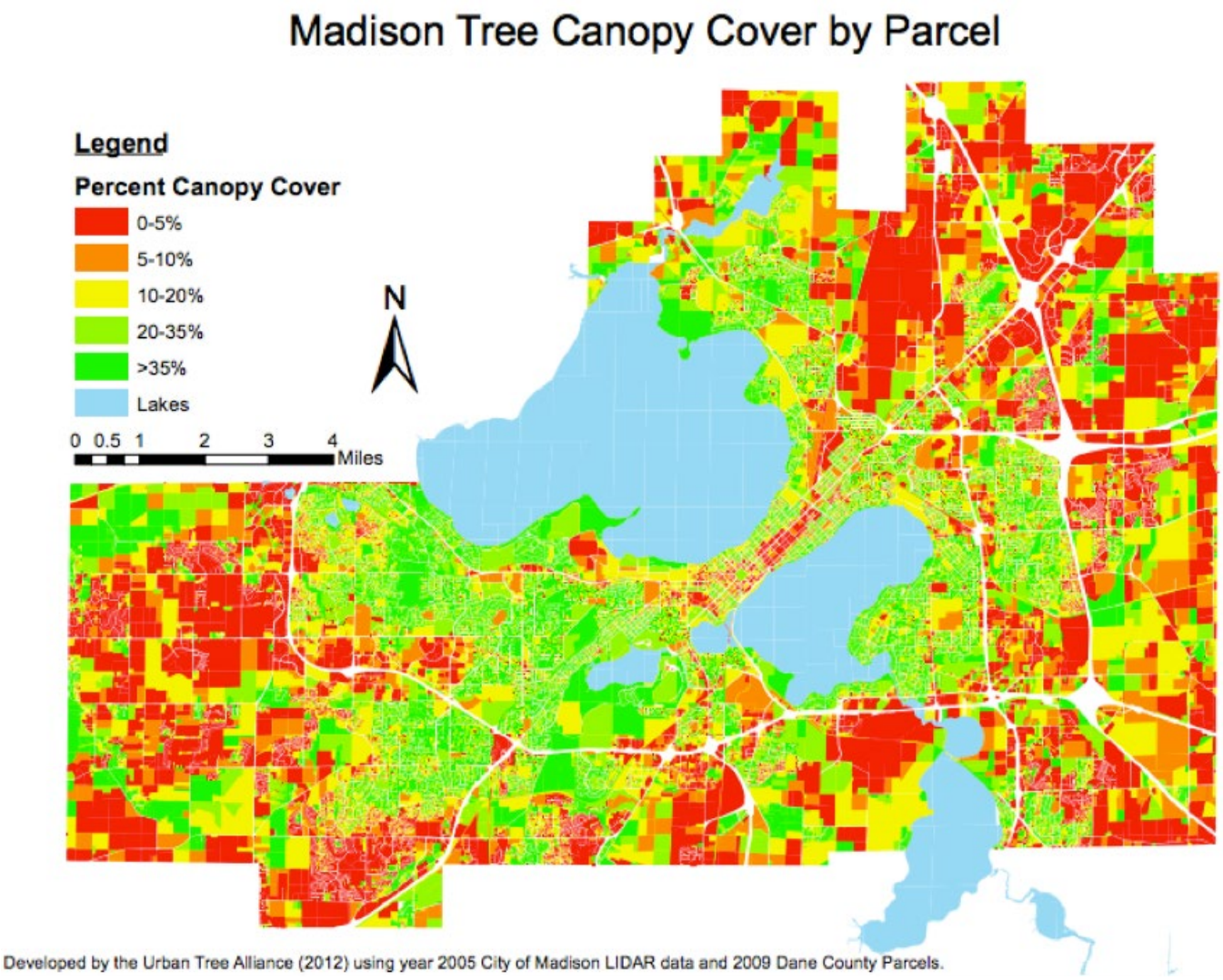
Stormwater: Trees reduce stormwater runoff by capturing and storing rainfall in their canopy and the soils supporting their roots. Trees and their root systems are also effective at slowing run-off and reducing erosion. It is estimated that our current forest of street trees and parks intercepts 115 million gallons of rainfall in a year. Trees help mitigate the effects of stormwater.

Temperature and Energy: Trees lower air temperature by shading surfaces and transpiring water through leaves, reducing energy usage. The shading of buildings and 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. Without trees, summer heat islands created by surrounding buildings and pavement make walking or simply being outside uncomfortable if the heat is elevated (above 90 degrees). 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.

Removing 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. Our public urban forest removes an estimated 15,000 tons of carbon each year, equivalent to the output of 4,000 to 6,000 cars.

Madison's Urban Canopy

Within Madison's 80 square miles, the urban forest canopy covers 23% of land area. However, such generalized statistics overshadow the complexities on the ground. Trees are not evenly distributed; sometimes there are logical reasons for this, sometimes it's as a result of past decisions that did not place sufficient value on trees and their benefits.



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

Our urban forest is comprised of trees in three major contexts:

- Private trees: trees owned and maintained on private property. Examples include the tree in front or back yards, in parking lots and other landscaped areas of associated with commercial buildings. 85% of the trees in Madison are on private property.
- Public trees: trees on public properties that are owned and cared for by the City. These are the trees found in parks, open spaces and on the grounds of City buildings such as police stations.

- Street Trees: trees located in public right of way, typically between the sidewalk and the curb. Although street trees comprise only a small percentage of the overall city forest, they are often the most visible, and as a result strongly define the character of a street, a neighborhood and the City as a whole. Madison has about 96,000 street trees, comprising 15% of the city's overall tree canopy. However, they have an outsized influence on many critical features of city-life such as moderating the climate, stormwater control and enhancing the appearance and character of our streets.

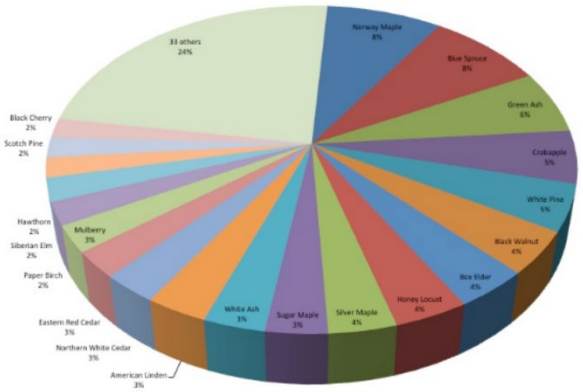
While each type of trees discussed above face unique challenges, all trees comprising our urban forest share common threats to their well-being, most notably the Emerald Ash Borer and climate change. Trees in urban environments have additional challenges including road salt applications and a competition for space that often results in cramped growing spaces. In order to preserve our urban forest and the benefits it brings to our city, it must be continually maintained and grown. Without this effort, the canopy will shrink with potentially disastrous results.

Composition of Urban Forest Species

The composition of urban forest species is always changing. However 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. New and historic threats, such as Emerald Ash Borer, Dutch elm disease, can dramatically alter the urban forest composition and visual character of the city.

A diverse forest is more resilient to various threats by incorporating species that responds better to future challenges. Over representation of individual species (e.g. maples, honey locusts, crab apples) creates long-term risks to the urban forest and can have devastating localized results. This is particularly visible now in neighborhoods where ash was extensively planted as street trees.

Current trends in species selection still tend toward minimal diversity, particularly with trees planted on private property. Private industry relies heavily on a relatively small selection of trees, a trend built on lack of market choice, professional familiarity and consumer taste. Nurseries are businesses and stock what sells; customers are generally content to buy what's in stock. The result is a market cycle does little to encourage a more diverse urban forest. To diversify publicly owned and manage trees, the City of Madison Forestry Division has adopted a policy of buying and planting no more than 10% of a genus for their total street tree program.



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

The single most influential force on the current composition of our urban forest is the proliferation of the Emerald Ash Borer (EAB). EAB was first found in Madison at Warner Park in 2013. An inter-departmental planning team was organized to establish the City's policies regarding ash tree treatment, removals and replacements, resulting in the Emerald Ash Borer Management Plan. In general, the EAB management plan called for treating ash trees over ten inches in diameter in good condition and removing ash trees in poor conditions, under power lines or that did not meet the 10" size criteria. The plan noted that 20,000 (22%) street trees were ash and a similar number were on City-owned properties, primarily parks.

By 2017, 10,724 ash trees were treated with TREE-äge, a tree-safe pesticide effective against EAB for three years. On-going reapplication cycles will be required to maintain effectiveness over time. Due to budget constraints only street trees were subject to treatment, although some trees in parks were treated with funds raised by neighborhood associations and other private sources.

By 2018, approximately 8,630 ash trees were preemptively removed, and 1,370 trees are planned for removal.

Replacement trees are scheduled to be planted within three planting seasons of the removal. By the end of 2017, 1,386 trees were planted to replace previously removed ash trees, accounting for roughly half of all street trees planted for the year (3,065).To accomplish the replacement goal and ensure effective species diversity, the forestry section plants a minimum of three species per block.

In 2019, as Madison enters the fifth year of EAB infestation, approximately 32% of all untreated ash trees will likely show significant decline.

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

Shape of the Urban Forest Canopy

Madison's large overstory trees, including oaks, hackberries, elms and ashes, have thick shade-providing canopies or foliage coverings. Tree branches and leaves both absorb and deflect sunlight that pours downward, allowing limited sunlight through the foliage. Large trees help regulate both regional and global climate by reducing urban heat islands, cooling costs and air pollution. They also support a wide variety of animal 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 and Social Justice

Although the estimated canopy coverage of the City of Madison was 23% prior to the arrival of EAB, it is not evenly distributed. Large commercial, employment uses, and schools appear to have the strongest correlation to lack of canopy coverage. The residential uses surrounding commercial areas, often more affordable rental units, face a greater share of impacts associated with lack of canopy. As a result, low income residents may not experience the benefits trees can provides including reduction of air pollution, moderation of temperatures, improved neighborhood character, and health benefits.

Trees are a public asset. As such, it is incumbent upon city to determine if they 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 of Madison departments, public utilities and institutions. Even within the City, multiple committees, boards, and commissions set and implement municipal policy impacting the overall health and viability of the tree canopy.

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

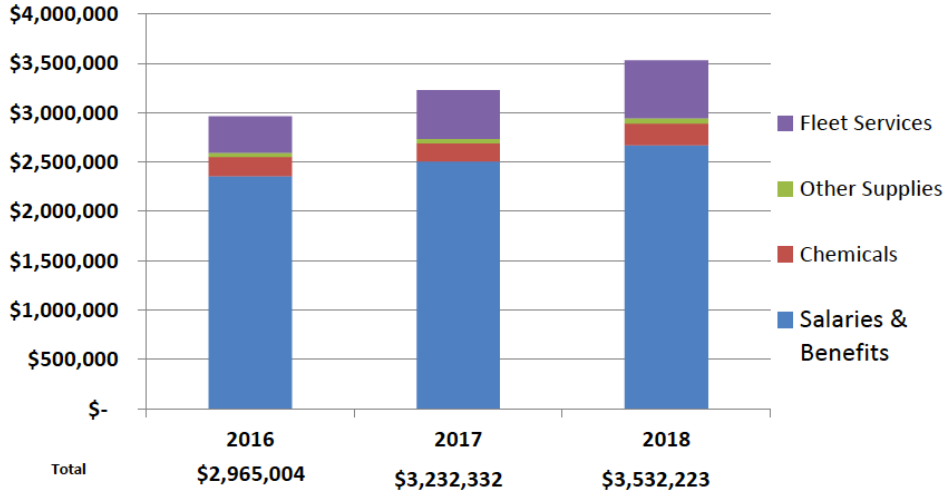
- **Forestry Section:** A section of the Parks Division, Forestry is responsible for the planting, maintenance, and removal of street trees and trees on many City-owned properties. It manages city-wide urban forestry health initiatives, such the addressing oak wilt. It reviews private development proposals and coordinates with other City agencies on how development projects impact street trees. It also plays an enforcement role in private property violations.
- **Parks Division:** Parks plants, maintains, and removes trees within the park system and sets long-term policy goals through the five year Parks and Open Space Master Plan.
- **Planning Division:** Planning leads the review of private developments requiring discretionary approvals, such as conditional uses, rezoning and subdivision, in accordance with City zoning

and subdivision ordinances. Planning also guides future growth for both existing and proposed neighborhoods through long range plans such as the citywide Comprehensive Plan and smaller supplemental plans.

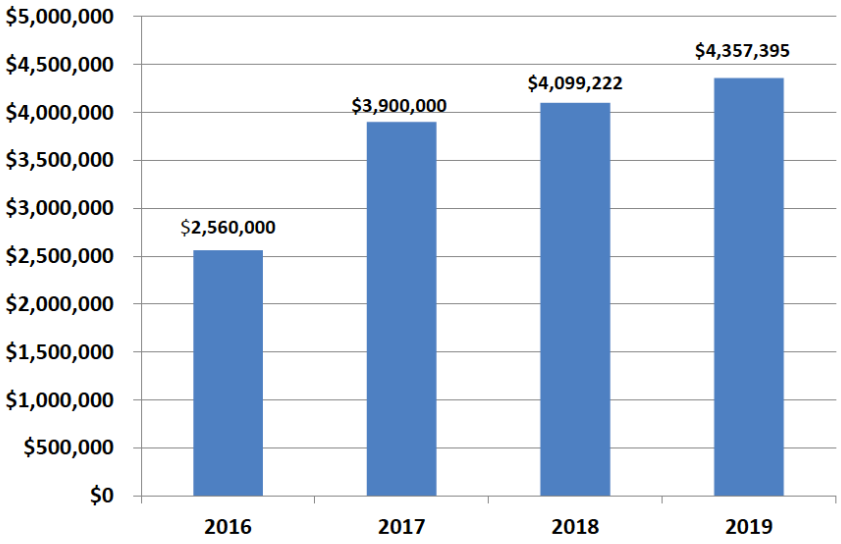
- **Zoning:** Zoning reviews site plans of proposed development to ensure compliance with Madison's zoning ordinance, including any required landscaping. Zoning also ensures compliance with approved site plans through field inspections after development activities are complete.
- **Engineering Division:** Engineering is responsible for the design, construction, and maintenance of public infrastructure (such as road construction, road reconstruction sanitary, and storm water facilities,); reviews and designs ROW for private development proposals; and manages public lands designated as Greenways.
- **Traffic Engineering Division:** Traffic Engineering works closely with Engineering on the design of streets, traffic signals, signage, street lights and multi-use paths, all of which require a dimension buffers for trees.
- **Fire Department:** the Madison Fire Department reviews the placement of public and private trees adjacent to buildings to ensure emergency access and consistency with relevant fire safety codes.
- **Streets Division:** The Streets Division is responsible for the removal stumps for street trees and management of brush and waste.
- **Building Inspection:** Building Inspection enforces property maintenance ordinances in cases where private trees create safety hazards.
- **City Boards, Committees and Commissions:** The Common Council delegates certain decision-making authority and relies on advisory policy recommendations related to trees from several boards, commissions and committees, including but not limited to the Sustainable Madison Committee, Urban Design Commission, Board of Parks Commissioners, and Plan Commission.
- **Utilities:** Utilities including Madison Gas and Electric and Alliant Energy maintain tree clearance around primary electric lines through contracts with private arborists and coordination with the City Forestry. ATC maintains clearance for larger transmission lines on public and private properties with easements.

City Funding for Forestry

Funding for forestry operations accounts for approximately 2% of the City's annual operating budget. Forestry funding is supported through the Urban Forestry Special Charge, established in 2015 to allow the City to recover its costs in performing the services associated the City's urban forestry program. Funding for the Forestry Section has increased by about 10% annually since 2016.



Forestry Section 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.

Private Trees

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

Landscape requirements in the zoning code have significant impacts on the quantity and location of trees on private property. Looking around Madison, some may question if the zoning code requires enough trees, particularly in parking lots. Many buildings and associated parking areas were approved when landscape requirements were minimal: up until 1984, the zoning code required parking areas be screened from view, but did not require any landscaping within them or specific tree requirements. As a result, many parking areas are legally non-conforming (commonly known as being grandfathered).

In 2013, the zoning code was completely rewritten, with significant updates to the landscape section. The new (current) code is far more prescriptive on location and quantity of required trees and other landscape features in parking areas and between the street and developed areas, generally requiring more trees in larger growing areas than previous codes. The 2013 zoning code update included triggers to bring existing sites up to current landscape standards, but this generally requires a significant redevelopment or addition. Minor renovations or changing tenants does not require installation of new landscaping.

The zoning code also specifies minimum building setbacks in all zoning districts. Certain districts, such as mixed use or downtown districts, require little or no setback to bring buildings closer to the street. While this has many benefits, it may prevent trees from being planted between the buildings and the street.

Single family and two family homes are specifically exempted from landscape requirements in the code for a variety of reasons. However, this means there isn't a tree requirement for nearly 30% of the City's land area (excluding right of way). While most single family homes have one or more trees planted by current or pervious owners, these properties may be easiest and most cost effective way to add tree canopy to Madison's neighborhoods.

Tree on Public Properties

For the purpose of trees, Madison has three types of City-owned property: buildings/facilities, parks and stormwater management areas. Like all other properties, City buildings and facilities must be in compliance with landscape standards in the zoning code, and planted trees on the ground now generally reflect the standards in place at the last approval. Additionally, all public buildings must receive an additional approval by the Urban Design Commission, which may require trees or landscaping beyond what is required in the zoning code.

The Parks Division manages the City's 5,600 acres of parks. A place of active and passive recreation for the City and all of its residents, it may be hard to imagine a park without trees. However, as a result of the many types of recreation parks must accommodate, parks cannot be just trees. Athletic fields, sledding hills, community gardens plots, play grounds and splash pads all appropriately exist in Madison's parks and limit tree planting. Still, there may be opportunities to add trees in appropriate locations in parks.

While trees may play a role in stormwater management, often they can create issues on City properties dedicated to stormwater management. Trees are generally incompatible with ponds and other areas designed to store large volumes of water, though some may be planted around the edge. Greenways are wide corridors which are typically dry but can contain moving water during rain events. Historically, the City's greenways have been planted with prairie grasses and are often accompanied by a bike and pedestrian paths. Trees planted in greenways in the past has led to significant issues with erosion: shade from trees inhibits the growth of grasses, leading to bare soil and soil loss during rains.

Street Trees - A Contest for Space

Most people walking down a street see a relatively simple arrangement of elements: a building on private property, the sidewalk, the grassy terrace, followed by the curb and remaining street elements. What is not visible is that each foot of space in the public right of way, above and below ground, have been negotiated, planned and apportioned to accommodate a variety of needs. Historically, these competing interests led to the design of the street, including underground elements. Once the street (and often surrounding new development) was constructed, Forestry was then tasked with determining where street trees could be planted. Forestry generally will not plant trees in the terrace if the width is below four feet, and eight feet is preferred for larger canopy trees.

During street reconstructions, this contest for space is clearly visible. Reasonable desires to better accommodate transit, include bike lanes and on-street parking, in addition to drive lanes and sidewalk all take up a very finite amount of space, often as small as 60 feet across. The terrace width was often the dimension that shrank as other needs grew, leaving less space and soil volume for trees to grow. Where terraces already are too small to support tree growth, it can be very difficult to increase this width as it often requires removal of on-street parking lanes or bike facilities, both of which may have vocal supporters in the design process. The process surrounding the Winnebago Street reconstruction is a perfect example of these competing interests.

Above Ground Restrictions

The placement and allocation of street trees is not as straightforward as terrace width and minimum tree spacing. Some of the dimensional restrictions established by varying City agencies impact street tree placement as a result of the following **above the ground features**:

- Trees should be six feet from driveways (Traffic Engineering).
- Trees should be at least 25 feet from a street light (Traffic Engineering).
- Trees should be at least six feet from a fire hydrant (Water Utility).
- Trees should be at least 10 feet from a traffic sign (Traffic Engineering).
- Trees should generally be at least 20 feet from a corner to protect "line of sight" (Traffic Engineering).
- Height, shape, and location of trees generally should allow the placement of aerial ladders on buildings taller than 30 feet (Fire Department).

- Trees should be at least 10 feet from utility poles, and the canopy should not be within five feet of overhead electric wires (Utility Companies).

Current guidelines for Forestry also impact tree spacing.

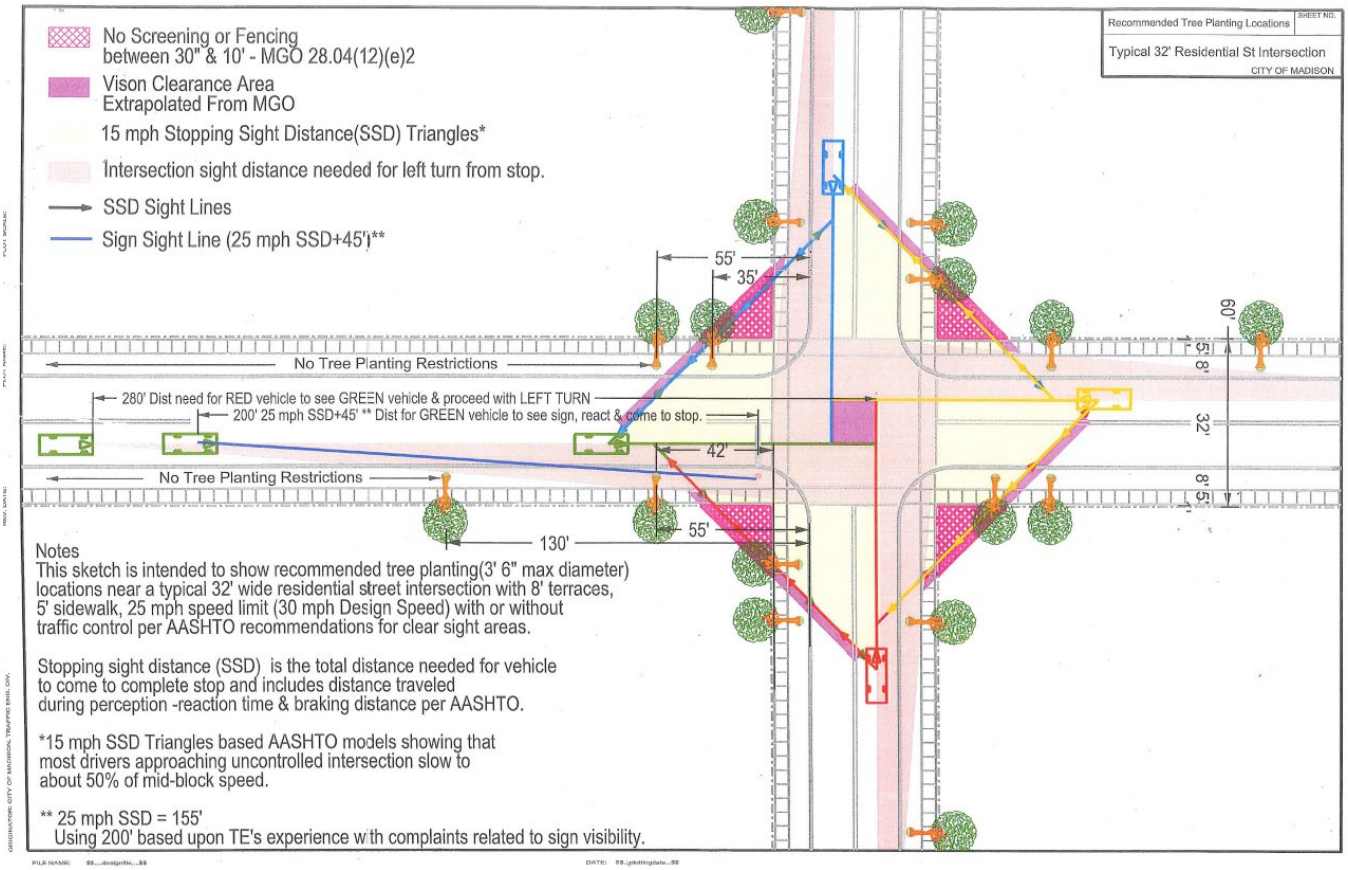
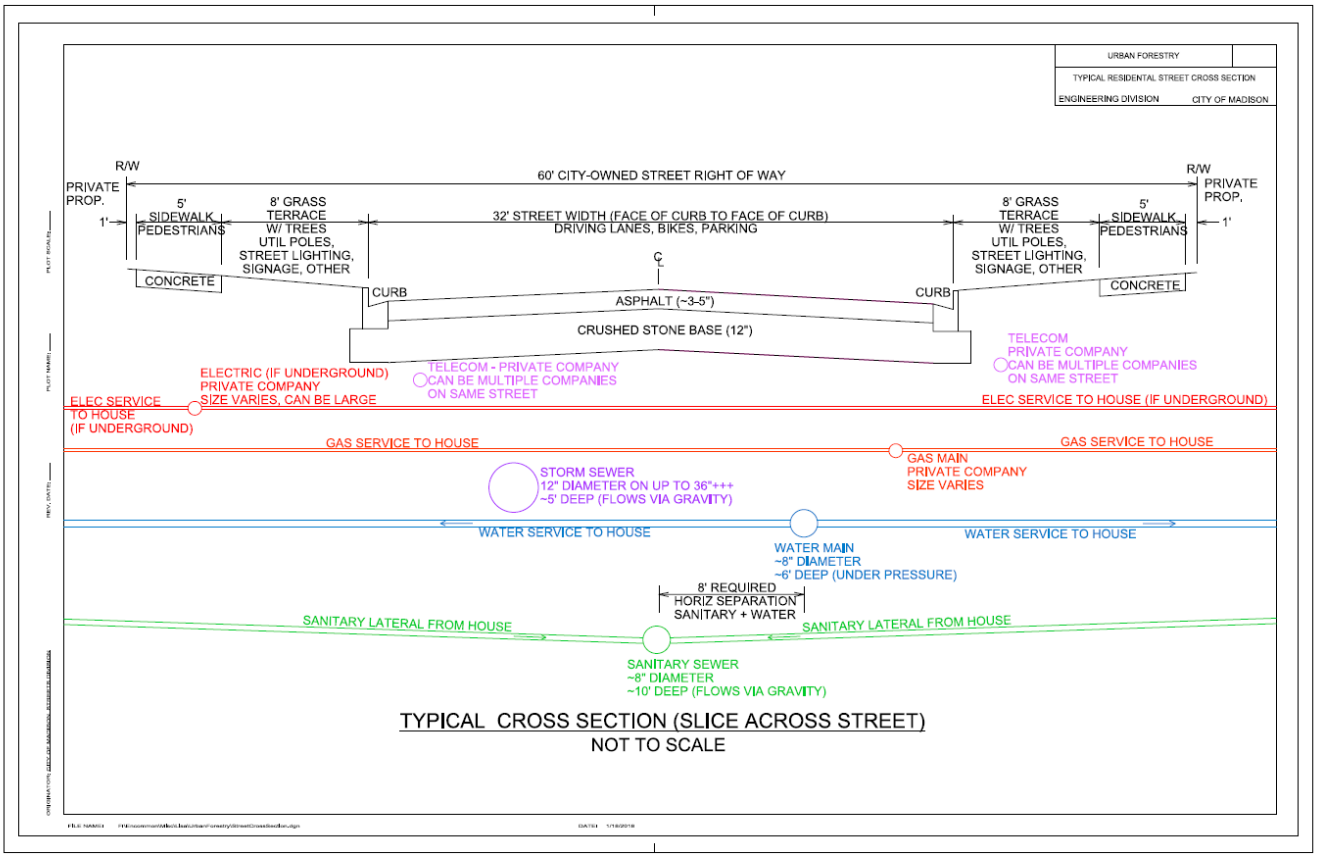


Diagram of vision triangle.

Underground Restrictions:

Underground infrastructure presents numerous restrictions to street tree planting. In addition to the utility poles, street lights and signage above the ground, the placement of the electrical service, gas and water mains, sewers and all required laterals must be considered as part of the process of siting trees. The diagram below is a cut-away of the underground view of a typical street.

Together, the above and below ground restrictions often result in fewer trees planted, smaller species and less optimum growing environments.



Underground schematic. These are competing factors for trees.

Development Impacts on Existing Street Trees

Once streets are planted and established, different challenges emerge. Much of Madison's growth is occurring through redevelopment of properties on existing streets, often with existing mature street trees. Since most redevelopment is occurring in central areas with better transit access, higher densities are generally encouraged and proposed buildings often occupy more of their sites. Physically constructing these redevelopments can be challenging, as they are surrounded by streets and other buildings leaving little available space for staging areas for construction materials.

Often the staging area is permitted to extend over the sidewalk and into the street, as there are few reasonable alternatives. This can result in removal of trees to accommodate cranes or other equipment and as a result of potential damage sustained by trees during the construction process. If a street tree is removed, developers are responsible for costs associated with replanting a new tree,

approximately $250. Few people would argue that replanting an 8-10' young tree is an even exchange for removal of a mature tree, yet it is allowed by City policy and relatively common with redevelopments. Redevelopments and associated construction are allowed to remove street trees; however, increasing costs associated with removal of this infrastructure may encourage developers to investigate other staging options.

GOALS AND RECOMMENDATIONS

Most street trees exist in an urban environment that ranges from non-optimal to hostile. In more densely built areas, trees are often shadowed for much of the day by buildings; when not shaded, they are subject to higher-than-normal temperatures that can be magnified by reflections off primarily glass buildings. The often insufficient soil volume and impervious pavement can lead to drought in the summer, and poorly drained tree pits can drown trees. Overuse of road salt by residents, businesses and contractors and dog urine can change the chemistry of the soil, further threatening already challenged trees. Trees along power lines are routinely and significantly pruned, and major limbs can be lost. Underground, their roots are stunted or stymied by a multitude of infrastructures and periodically threatened by road reconstruction and sidewalk repair.

Any one of the above-mentioned environmental conditions in and of itself could be sufficient to limit growth or kill a tree. However, often the most challenging condition on street terraces is insufficient space and soil volume required for healthy and sustainable tree growth. Compacted rock and soils required for sidewalks and streets can result in cramped root environments, smaller canopy and a shorter life span.

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:

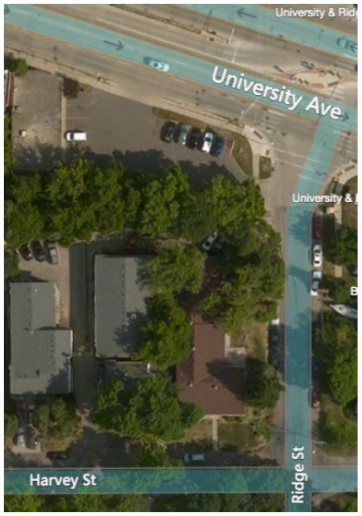
- Land Use Planning and Design
- Outreach and Education
- Canopy Coverage and Growth
- Forestry Operations and Public Lands

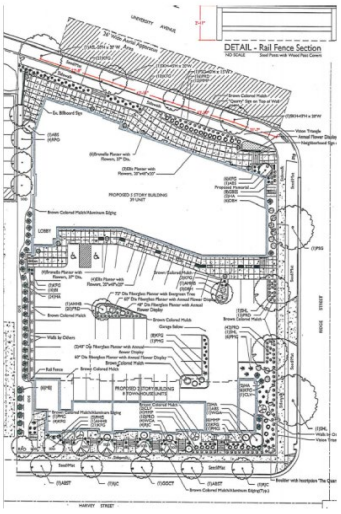
PLANNING & DESIGN

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.

Goals

1. The decision-making process regarding land use 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.
2. The quality of the physical environment in which trees are planted is elemental to their future long-term 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.
3. The values of trees multiply as they mature. Accordingly, those existing values should be formally considered, and often preserved, when assessing design decisions.
4. 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.





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.

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.

Zoning & Site Plan Review Recommendations

1. 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:
    a. 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.
    b. 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.
    c. 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.
2. 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 change in the plan.
3. 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 tree for one sapling" when seeking measures to **remediate losses** even if those measures are outside of the project bounds.
4. The City should increase costs associated with public tree removal related to house moves and private development projects, such as $500 to $1,000 per inch of diameter at breast height. This would create a financial incentive for developers to avoid public street tree removal while

providing Forestry funds that could be used for improve growing environments to speed future tree growth.

5. Public trees that are removed should be replaced in enhanced growing conditions, at the cost of the developer, in consultation with the City Forester. Forestry should partner with Traffic Engineering and Engineering on redevelopment projects for dedication needs to enhance the terrace and sidewalk.
6. **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.
7. In the zoning code, amending landscape applicability standards should be considered to bring more legal nonconforming site plans up to current landscape standards.
8. Incentives should be established for private developments that exceed landscape requirements.
9. The City Forester should recommend an adequate soil volume to be included within landscape zoning requirements for parking lot trees and general landscape plans.

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.

1. Neighborhood-scaled canopy coverage assessments should be developed and conducted in order to set goals and strategies for canopy growth within those areas.
2. Planning documents, such as Neighborhood Development Plans and Neighborhood Plans, should include an existing tree canopy inventory and identify areas for tree preservation. As appropriate, it is recommended that existing plans be amended to address these issues.
3. Neighborhood development plans should consider developing connected greenspaces, environmental corridors, etc. Whenever possible, efforts should be taken to link existing forested lands.

Subdivision Recommendations

1. Planning Division should investigate how new single-family lots, which are exempt from landscape standards in the zoning ordinance, can have a tree planting requirement. Strategies 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.

These pre- and post- development photos illustrate the potential for new subdivisions to grow the canopy. Through the provision of trees on public and private property, development on the city's periphery represents new opportunities to expand the urban forest.

Street Design Recommendations

1. Add to Madison General Ordinances: "In new developments, terraces shall have the following optimal minimum widths:
    a. Local streets – 10'
    b. Collector streets – 10'
    c. Arterial streets – 12'
2. 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.
3. 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.
4. 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.

5. Appropriate annual funds for full or partial underground projects as a separate budget line item.
6. 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.
7. Existing policies impacting street trees, such as Complete Streets, Rural to Urban Roads, Madison in Motion, and Comprehensive plan, should be reviewed in order to ensure consistency in tree policy.

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

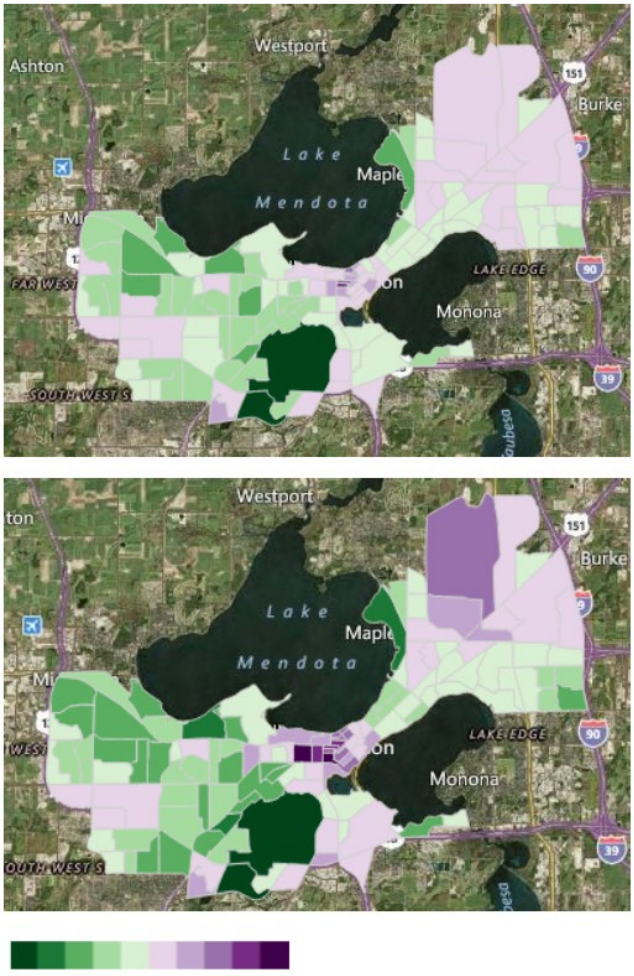
- Outreach strategies should be designed and implemented by a coalition of interested groups and managed in a comprehensive program.
- Outreach strategies should be tailored to diverse groups such as developers, homeowners, apartment owners and dwellers, neighborhoods with low canopy levels and environmental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

Recommendations

1. 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 and individuals to maintain and grow the urban forest.

2. Create a grant program that includes the City providing trees to be planted on private property.
3. 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.
4. 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.



Tree Priority Scale from Low (Green) to High (Purple)

CANOPY COVERAGE

Researchers estimate that average tree canopy cover in urban areas 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 sought to increase its canopy coverage from 42% to 60%, Baltimore from 28% to 40% by 2040 and Charlotte from 32% to 50% by 2050. The American Forests had recommended achieving a 40% optimal canopy coverage for a healthy urban area.

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.

Given these differences, a general citywide goal may 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 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

1. The City of Madison should achieve an optimal tree canopy coverage goal of 40% overall, consistent with the American Forests Association current recommendations. Currently, Madison tree canopy coverage is estimated at 23%.
2. The City Forester and Sustainable Madison Committee should create a Tree Preservation Ordinance in order to preserve, expand, and protect canopy coverage overall in Madison.
3. The city should institute a range of policies and program designed to increase canopy coverage at the neighborhood level. In conjunction with neighborhood groups, staff should develop strategies for increasing tree population. Canopy trends should be evaluated with particular attention paid to rates of coverage in neighborhoods of higher poverty and greater concentrations of persons of color.
4. Public plantings along streets, in parks, and within greenways should be prioritized 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 and neighborhoods that have not historically had street trees.
5. The city should support multi-year programs to support tree planting for private homes in neighborhood 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

1. 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).
2. Update and upgrade the process of inventorying street trees to include up-to-date information.
3. Inventory trees on all City-owned 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.
4. Forestry should work cooperatively with other City agencies to identify opportunities to enhance green space (e.g., pocket parks) in areas with low canopy cover, like downtown.
5. Create a canopy tree planting program for city-owned bike path corridors and other city-owned transportation corridors that are currently rented for parking.
6. Dedicate additional resources to Forestry for more frequent pruning and maintenance of new and existing street trees. The current approximately 21-year **pruning cycle** of street trees should be evaluated in order identify methods and resources needed to shorten the cycle.
7. The Park Commission should prepare a policy of and develop methods for **canopy growth within parks by planting 2,000 more trees above the replacement rate each year for the next five years** and how it could interact with other park uses (e.g., no mow areas). 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. In addition, a tree preservation plan or criteria should be developed for Parks.
8. 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.
9. Revise urban design district ordinances MGO 33.24 (8-15) to remove list of allowable trees species and grant this authority to the City Forester.
10. Develop a Tree Technical Manual to create new standards and review existing standards for improvement, to increase tree canopy. This 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 review the relationships between trees and street lights, review the need for vision corner restrictions, and review fire department requirements (whether policy, code, etc.).

11. Forestry should obtain the appropriate software licenses and permissions to coordinate more extensively with other agencies involved in Public Works projects and permits.
12. When planting on arterial and collector streets, City Forester should consult with Engineering Division to identify long-term plans for street design (e.g., bike lanes).
13. Property owners should not have the ability to veto a planting site identified by the Forestry section as an appropriate site.
14. An assessment of the **street tree inventory** should 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.
15. The Common Council should develop an urban forest board with regular meetings or revise the responsibilities of the existing Habitat Stewardship Subcommittee to include this work, in order to advise on the recommendations made by the Urban Forestry Task Force and to address future urban forestry needs.

Emerald Ash Borer Response

Efforts related to preserving the urban canopy against the Emerald Ash Borer will not end once all impacted trees are either treated or removed and replanted. More than 20,000 new replacement trees will need regular pruning, watering, and other maintenance and will require more trained staff. The longer-term effect of the ash borer on private properties is unknown, however it is estimated that 30,000 trees will die 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:

1. 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.
2. It will be necessary to gear up enforcement of regulations pertaining to dead trees.
3. The city pursue strategies to encourage tree planting to replace ash tree losses on private property.

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

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