Urban and Community Forest Master Plan

City of Saratoga Springs, New York
DRAFT Issued for Public Comment 5/07/2013

City of Saratoga Springs
Mayor Scott Johnson
Public Works Commissioner Anthony Scirocco
Finance Commissioner Michele Madigan
Commissioner of Public Safety Chris Mathiesen
Commissioner of Accounts John Franck

Cardinal Direction
Landscape Architecture, PLLC
Sustainable Landscape Management
55 Catherine Street
Saratoga Springs, New York 12866
518.581.0762
Cardinal.Direction.LMS@gmail.com
www.cardinaldirection.net

Sustainable Saratoga

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A RESOLUTION AUTHORIZING APPLICATION TO THE NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION FOR GRANT ASSISTANCE TO PREPARE AN URBAN AND COMMUNITY FORESTRY PROGRAM

(Passed unanimously by the Saratoga Springs City Council, June 3, 2008)

WHEREAS, the City Council of the City of Saratoga Springs recognizes the inherent value and benefits of preserving, maintaining and improving its urban forest, and

WHEREAS, the City Council of the City of Saratoga Springs proposes to develop a comprehensive Urban and Community Forest Master Plan designed and intended to guide the preservation, maintenance, improvement, expansion and long term stewardship of the City's tree cover and canopy within the urban core, and

WHEREAS, this City Council finds and declares that the preservation and expansion of the Urban Forest will serve the public interest by improving the community's physical, social, cultural and economic environment, and

WHEREAS, the project has the following specific objectives: air quality improvement, expansion of the clean air shed, reduction of storm water runoff, mitigation of urban 'heat island' effects, streetscape and structure heating & cooling improvement, reduction of energy use and urban noise abatement, and

WHEREAS, this City Council also finds and declares that the development and implementation of a sustainable community level urban forestry program will positively impact climate change and promote Environmental Justice, and

WHEREAS, the NYS Department of Environmental Conservation has invited communities to seek up to $20,000 in grant assistance to prepare and administer an urban and Community Forestry Program, and

WHEREAS, said communities must provide an equal match in cash and/or in-kind services, and

WHEREAS, a proposed application has been prepared, now therefore,

BE IT RESOLVED, that the Mayor be authorized to submit, consistent with state and City requirements, said application for assistance in an amount not to exceed $20,000, and

BE IT FURTHER RESOLVED that up to $10,000 in matching funds be made available from City contingency funds and up to $10,000 in City matching services be authorized upon application approval.

" the timber is good and in great abundance."
– Gideon Putnam 1789

At Congress Spring, "there was not shade enough to shelter a dog."
– Abigail May 1800

"…among the improvements which have taken place in this village since the last year, is the lining of most of the sidewalks with maples and elms from our forests. These are generally of a good size and will, in a short time, render the walks delightful cool and refreshing, and give to the village an elegant rural appearance."
– Saratoga Sentinel 1829

"…so perfect [was] the shade of Saratoga's tree-lined avenues, that midsummer weather is robbed of its terrors when it crosses her threshold."
- NY Times 1890

"With shade trees Saratoga is very well provided….Here there are long avenues almost arched with grand old elms, while graceful maples and sturdy oaks abound."
- NY Times 1884

During the 1974 Plan of Action, "hundreds of individuals [worked] in digging 4' by 4' holes and breaking up cement in order to plant those trees over 8 separate weekends. We now established a base of individuals, who saw downtown as their own."
– Joe Dalton 1986
"Downtown Redevelopment History"

"Take away the tree-lined streets, community flower gardens, protected spring areas and Congress Park, and the city would quickly lose much of its charm and appeal."
– Open Space Plan 1994

"The development of a truly comprehensive Urban and Community Forest Master Plan will […] serve as a guide to future investment in this essential resource."
- Mayor Scott Johnson,
Letter to DEC, June 4 2008

"The preservation and expansion of the Urban Forest will serve the public interest by improving the community's physical, social, cultural and economic environment."
– "City Council resolution, June 3 2008

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Urban and Community Forest Master Plan Saratoga Springs, New York

I. Introduction

The Urban and Community Forest Master Plan will guide the expansion and preservation of the City of Saratoga Spring's urban forest, with the goal of maximizing the benefits that trees provide to Saratoga Springs. In the context of this report the definition of the Urban Forest is limited to all trees on the City's property or Rights-of-Way for which the City has maintenance responsibilities. This plan builds on the vision outlined by the City Council in its June 3, 2008 resolution, in which they declared that "the preservation and expansion of the Urban Forest will serve the public interest by improving the community's physical, social, cultural and economic environment." This Master Plan elaborates on the 2008 goals by committing Saratoga Springs (the City) to factor the contributions of the urban forest into all infrastructure planning and development decisions. As Mayor Scott Johnson observed in his 2008 cover letter to the DEC grant that supported this plan's creation, "The development of a truly comprehensive Urban and Community Forest Master Plan will complement and support the objectives of the City's adopted Comprehensive Plan, *Open Spaces Resources 2002*—the City's Open Space Plan—and serve as a guide to future investment in this essential resource." The Plan specifies planning, regulatory, and enforcement policies that the City will engage to encourage the preservation and expansion of the urban forest on public land, in order to maximize the City's benefits.

Since 2008, the City has adopted other progressive policies, notably Climate Smart and Complete Streets, in which the trees and the urban forest play pivotal roles. No serious plan for reducing greenhouse gases could ignore trees as among the most cost-effective tools to work with. Nor can one imagine designing pedestrian-friendly streets or neighborhoods without trees. The Urban and Community Forest Master Plan provides an opportunity to weave these strands of the City's planning and design efforts into a promising big picture for Saratoga's future.

1. The Vision

The City Council resolution ratifying the grant application in June of 2008 "recognizes the inherent value and benefits of preserving, maintaining and improving its urban forest," and therefore the City Council "declares the preservation and expansion of the Urban Forest will serve the public interest by improving the community's physical, social, cultural and economic environment."

To realize this vision, the City of Saratoga Springs will integrate trees into all planning, zoning, development and infrastructure projects as an overarching tactic. To support this goal the City commits to the following actions:

- Appoint a city arborist
- Protect and preserve existing trees, and develop a strong tree removal ordinance
- Increase the number of trees planted yearly, and plant more large species trees
- Maintain existing trees to increase survival rates and improve the conditions for new trees when appropriate
- Improve the design of urban planting spaces to increase tree survival rates
- Integrate street trees into the stormwater infrastructure and complete streets objectives of the City
- Eliminate the installation of non-native invasive species and begin to selectively remove invasive species

- Increase diversity of the urban forest
- Continue to maintain the street tree inventory
- Increase citizen involvement in projects that expand or maintain the urban forest
- Increase funding for the street tree program through public, private or grant funded opportunities
- Strengthen requirements for the establishment and protection of trees in all development projects.
- Establish a heritage tree program to recognize Saratoga's greatest trees.
- Educate the public about the values of trees and the requirements of Saratoga's urban forest management program.

Preservation and expansion are easy concepts to understand, but accomplishing them will require dedication to the goal and an understanding that current policies and practices will need to be strengthened or altered. Preservation relies on two chief strategies: first, caring for existing trees to ensure long life and second, limiting the removal of the healthy, mature trees that provide ecosystem services. Expansion of the urban forest, on the other hand, requires a net annual increase in either the number of trees or their size (biomass), and preferably an annual increase in both number and number of trees that reach large sizes at maturity. When considering either preservation or expansion, it is important to remember that mature, large-species trees are exponentially more beneficial than small-species trees or immature trees because, among other things, they absorb more pollutants, mitigate more stormwater run-off, provide more shade, and store more carbon.

Saratoga Springs is committed to the following five Actions:

1. **Use planning and legislation to integrate trees more fully into Saratoga Springs' infrastructure.** Review and strengthen provisions regarding trees and the urban forest in all appropriate City ordinances, regulations, and planning documents. Enforce these provisions, and limit exemptions and variances granted by land-use boards.
2. **Appoint a City Arborist and update inventory information regularly and review plans and adjust tactics annually.** The City needs a point person with proper education in silvaculture to bring modern forestry techniques to the management of our urban forest. Routine maintenance of a data-base of information will allow the City to monitor the changing condition of the urban forest, and to make adjustments to ensure that steady progress with our goals for the urban forest.
3. **Develop and implement Best Management Practices.** Ensure that trees are planted and maintained properly for maximum tree health and survival.
4. **Identify, commit, and leverage more resources for the urban forest**. Recognizing that the benefits from trees far outweigh the costs, mobilize financial and human resources, public and private, to preserve and expand our urban forest.
5. **Promote & cultivate citizen involvement.** Engage the citizens in the care and stewardship of our urban forest. Build public-private partnerships to achieve the City's goals.

2. The DEC Grant

In 2008, the City applied for a New York State Department of Environmental Conservation (DEC) urban forestry matching grant. Seeking DEC funding to formalize the City's street tree program had been a goal since the 1994 Open Space Plan. The grant application was authored by Lew Benton and authorized on June 3, 2008 by unanimous Council resolution. DEC awarded the grant in August, 2008.

In its resolution authorizing the application for grant funding, the City Council recognized "the inherent value and benefits of preserving, maintaining and improving its urban forest," and committed to the development of "a comprehensive Urban and Community Forest Master Plan designed and intended to guide the preservation,

maintenance, improvement, expansion and long term stewardship of the City's tree cover and canopy within the urban core." Among the rationales presented, the Council noted that "a sustainable community level urban forestry program will positively impact climate change and promote environmental justice."

The State would reimburse the City up to $20,000 for its expenses, while the City was to provide its 50 percent match through a combination of $10,000 cash and $10,000 in the services of City staff. The intention was for the City to produce the tree inventory as a major part of its match. Unfortunately due to budgetary constraints thrust upon the municipal government, the City had to abandon its commitment to the Grant. In 2010 Sustainable Saratoga offered to manage the Street Tree Inventory as the city's match, a pro-bono service valued in the grant budget at $23,600. This action saved the grant funding.

3. The Benefits of Trees

Trees provide the City and its residents with numerous benefits. It has been documented that shoppers in verdant business districts are willing to pay more for parking, goods and services; and shop longer. Additionally trees reduce stormwater discharge, a large canopy mature tree can retain up to 1000 gallons of water in their canopy over the course a year. Large trees raise property values and workers with views of trees are known to have a reduced incidence of illness and a higher level of work satisfaction.

Some Noted Benefits of Trees

- *The net cooling effect of a single, large, healthy tree can be equivalent to ten room-sized air conditioners operating 20 hours a day.*
- *A well-planted property and its surrounding street and neighborhood can raise property values by as much as 15 percent.*
- *Trees reduce stormwater run-off and retain water in their canopies.*

Well placed and appropriately selected trees reduce energy use. The shade given by trees reduces air-conditioning costs. In urban environments trees reduce the urban heat island effect by shading parking areas, roadways, exterior building walls and other masses that retain the heat from the sun. These same urban trees provide additional environmental contributions such as reducing ground level ozone, reducing particulate matter in the air and improving urban air quality. Trees reduce noise pollution and store significant amounts of carbon.

Natural settings and exposure to nature and the out-of-doors provide important social and cultural contributions. It is known in the health literature that views of nature, including trees located in urban environments, reduce stress levels and risk of chronic disease. In areas where trees and access to nature are present crime is reduced, and hospital patients or those recovering from illness recover faster. Trees also create outdoor environments that are more inviting, which encourage people to get outdoors, walk and bike and stay more active – all of which help curb obesity, depression and auto-immune syndromes.

In 2008 the city council recognized these benefits when it adopted the DEC grant. It was stated that the Saratoga Springs Urban and Community Forest Master Plan will preserve, expand and improve the urban forest in ways that will support the following objectives:

- Reduce stormwater runoff.
- Mitigate urban heat island effects.
- Improve streetscape and structure heating and cooling.
- Reduce energy use.
- Abate urban noise.
- Incorporate good urban forest planning into all aspects of the city's development planning procedures and regulations.
    - Enhance the urban forest as green infrastructure, important for its many valuable environmental services.

    - Incorporate green infrastructure as a utility in City's budgeting and planning systems
    - Comprehensive plan
    - Zoning ordinance
    - Subdivision regulations
- Improve the city's likelihood of receiving future urban forestry grants.
- Increase species diversity to reduce exposure to future forest insect and disease threats.
- Eliminate the planting of exotic invasive species on public lands
- Reduce the occurrence of exotic invasive species on private lands.
- Promote native and near-native species.
- Preserve historic trees, large trees, or other trees identified as significant by the community.

4. The Master Plan Process

Following the completion of the Street Tree Inventory by community volunteers coordinated by Sustainable Saratoga's Urban Forestry Project, Saratoga Springs hired Cardinal Direction Landscape Architecture, PLLC to orchestrate the production of the Urban Forest Master Plan. The process began with a public presentation where the findings and analysis of the street tree inventory were presented. Public comment was taken at this meeting with the intention of gathering general opinions about street trees and ideas for the development of the master plan. Public comment was also invited by the City who set-up a dedicated email address where individuals could send comments (no comments were received through this portal.) Lastly a survey was available on-line through the SurveyMonkey.com service to help gather public sentiment in regards to street trees and street tree management. All public comments are collected in Appendix I.

To facilitate the collaborative development and review of the master plan the Mayor's office set up a Process and Policy group. This group consisted of:

- Brad Birge, the City's Director of Planning and Economic Development
- Anthony Scirocco, Commissioner of the Department of Public Works
- Josh Dulmer, Public Works employee
- Shauna Sutton, Deputy Mayor
- Rayna Caldwell, Tom Denny, Rick Fenton, and Casey Holzworth, members of the Urban Forestry Project,;
- Mike Ingersoll, Professional Landscape Architect and representative of the Downtown Business Association and land development interests
- Lynn Bachner, Deputy Finance Commissioner

This group reviewed the outline and the draft master plan and set the agenda prior to it being released to the public or the other City Council members.

Public presentations and comment periods were on the following dates:

November 27, 2012 – Public presentation of the Tree Inventory and Existing Conditions

November 28, 2012 – Public Survey opened on SurveyMonkey.com

December 4, 2012 – Presentation of the Tree Inventory and Existing Conditions to City Council

December 5, 2012 - City email address set-up to accept public comment

May 7, 2013 – Draft Urban and Community Forest Master Plan released for public comment

May 21, 2013 – Public Presentation to City Council (pending)

II. The Urban Forest of Saratoga

1. Saratoga's Urban Forest: A Brief History

Gideon Putnam is considered the founder of Saratoga Springs. When he arrived in 1789, he said to his wife, "This is a healthy place, the mineral waters are valuable, and the timber is good and in great abundance." Putnam took full advantage of Saratoga's good and abundant timber. Initially manufacturing staves and shingles which he rafted down the Hudson River and marketed in New York, he soon was operating a highly profitable sawmill. In 1800, two years before Putnam built his first tavern, a traveler remarked in her diary on how barren Congress Spring was: "there was not shade enough to shelter a dog."[1]

Putnam went on to lay out a plan for a new village with a central "Broad Street" (now Broadway) as its defining feature. At the time of his death in 1812, Broadway was still an almost treeless avenue and it remained that way for another sixteen years (Image 1). In 1828, "a wise, politic act" by the Village board of trustees set Saratoga on the path where trees would become "the crowning glory of the city." In that year, Dr. John Steele, Village trustee, proposed and passed legislation that allowed "sixty two and a half cents to be reduced from the highway tax against the person planting the trees."[2] By May of 1829, the *Saratoga Sentinel* trumpeted that "among the improvements which have taken place in this village since the last year, is the lining of most of the sidewalks with maples and elms from our forests."[3]

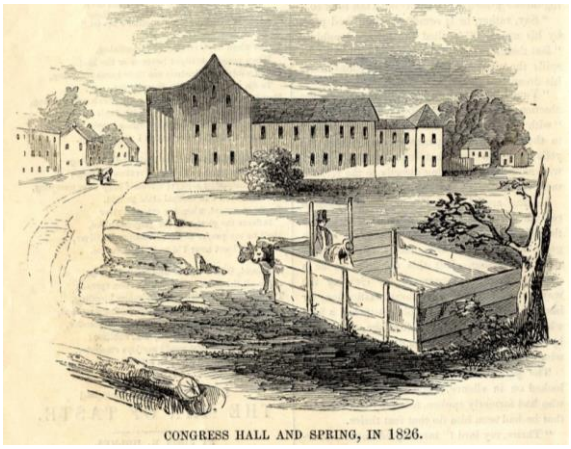

Image 1: Broadway in 1851 was lined with large-species shade tree, closely spaced. View looking north from Congress Springs

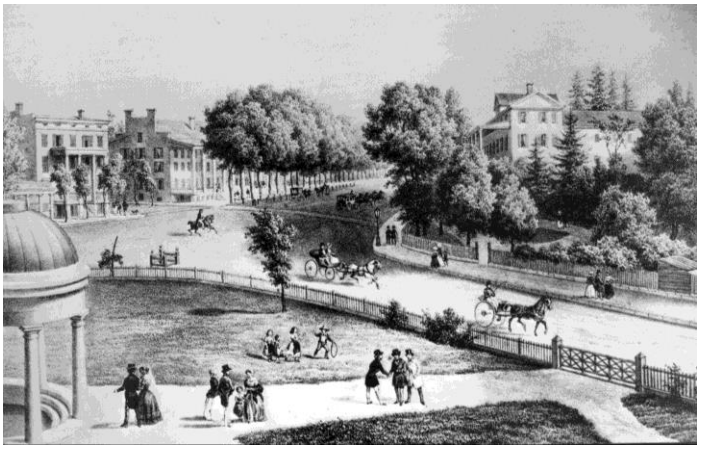

Image 1: Broadway in 1851 was lined with large-species shade tree, closely spaced. View looking north from Congress Springs

By 1851, twenty some years later, mature trees had already established Broadway's famous tree-lined character (Image 1). Travelers to Saratoga in its "golden age" mentioned its shade trees almost as lovingly as they did its spectacular hotels and the waters. "With shade trees Saratoga is very well provided….Here there are long avenues almost arched with grand old elms, while graceful maples and sturdy oaks abound." (NY Times, August 21, 1884) During one heat wave, a visitor to Saratoga noted that "so perfect [was] the shade of Saratoga's tree-lined avenues, that midsummer weather is robbed of its terrors when it crosses her threshold." (NY Times, July 20, 1890)

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[1] Abigail May, quoted from Field Horne, *A Saratoga Reader*. Saratoga Springs, [N.Y.]: Kiskatom Publishing, 2004, p. 28.

[2] Cornelius E. Durkee, *Reminiscences of Saratoga*. Reprinted from the Saratogian, 1927-28.

[3] Quoted from Field Horne, *A Saratoga Reader*. [fn 75]

During the 20th Century the trees of Saratoga were heavily damaged by blights, infestations and lack of funding to properly replant and maintain the forest infrastructure. Dutch elm disease was discovered in the US in 1928. By the 1950's the vast majority of elm trees had been killed. This was on top of Chestnut blight, which had begun wiping out chestnut trees starting around 1900 and maple blights that had weakened a wide variety of species in the Acer family.

At least partly in response to this impacted tree infrastructure, tree planting played a large role during the 1970s Plan of Action Saratoga Springs had reached an economic low point and Broadway was almost as barren as it had been in the 1820's. A group of citizens hatched a revitalization plan and hoped their grass roots campaign could "convince the local government to become involved in redevelopment." [4]

In spring, 1974 tree "planting was planned as a joint venture between volunteers and the Dept. of Public Works." Two-hundred and Fifty trees were planted in the central business district. "Hundreds of individuals [worked] digging 4' by 4' holes and breaking up cement in order to plant those 8 separate weekends (Image 3)."

Image 3: Plan of Action tree planting, 1974.

Today, Broadway continues to define the community's character and serve as its north-south axis. Though most of the stately American elms planted during the 19th century along Broadway and other city streets succumbed to the Dutch elm disease, a few magnificent specimens are still thriving. Some of these trees may have witnessed Gideon Putnam's arrival. A large red oak on the lawn of the Empire State College offices on Union Avenue that fell in a windstorm in May, 2012 had more than 200 annual rings. This tree was within a grove of equally old oaks on Spring Street and in Congress Park along Circular Street.

In 2013, Saratoga Springs again finds itself at a crossroads with its street tree infrastructure in decline. Many older mature trees are dying. The Department of Public Works replaces trees when it can, but in many cases there is no replacement. The 4'x4' tree pits built during the Plan of Action effort have proven to offer inadequate soil, moisture, oxygen and protection to trees in an urban environment; and many have been paved over.

[4] All quotations in this paragraph from Joseph Dalton, *Downtown Redevelopment History*, July 1986, typescript in Saratoga Room, Saratoga Springs Public Library

2. Saratoga's Urban Forest: Today – The Tree Inventory

Sustainable Saratoga took responsibility for the tree inventory in 2009 and in late 2011 assembled a leadership team, the Urban Forestry Project, to organize a community volunteer effort. They recruited and trained over 125 volunteers to count and catalogue each street tree within the boundary of the study area (Phases I & II - Figure 1). The inventory was divided into thirty-six geographic zones and each zone was then broken into street segments. A street segment was a short stretch of a single street, ranging in length from one to a few blocks that served as the basic unit of data collection, entry, and analysis. The inventoried area included 58.15 miles of the City's right of way; Railroad Run, Congress Park and High Rock Park. This accounts for approximately 25% percent of the City owned right of way. Following the initial survey by community volunteers, volunteers from Sustainable Saratoga with specific forestry expertise double-checked the original inventory data to ensure accuracy. A sample data sheet is provided in Appendix A.

Image 2: Tree Inventory launch event volunteers gathered under a heritage elm. April 21, 2012

As late as April 2012, Sustainable Saratoga intended to inventory solely within the boundary as defined by the areas of Phases I and II (Figure 1). The number of volunteers who stepped forward, and their enthusiasm, led to the expansion of the inventory area into the region defined as Phase III, another 12.26 miles of roadway. The Phase III area was partially surveyed by volunteers, but not part of the DEC grant, and the inventory and data analysis remain incomplete. The City of Saratoga Springs and Sustainable Saratoga should discuss how to proceed with completion of the Phase III inventory, along with data entry and analysis, in order to fold this additional area into the database for future planning of the urban forest.

Key Inventory Facts

- 4800 street trees were inventoried in the Phase I and Phase II areas. A conservative estimate, based on the expected street tree spacing, brings the total number of tress under control of the city to about 15,000 trees.
- Sustainable Saratoga's 125 volunteers performed most of the Street Tree Inventory. Sustainable Saratoga's 125 citizen volunteers performed a preliminary inventory of Phase 1 and Phase 2 areas. Members of the Urban Forestry Project—including professional foresters, ecologists, and landscape professionals—reviewed all of the volunteers' data, completing forms where necessary, making corrections, and ensuring consistency.
- 52% of streets trees inventoried are maples (including Norway, sugar, red, silver, and boxelder). Because we have many large mature maples, this genus accounts for 67% of the street tree biomass.
- 30% of our street trees are of a single species, Norway maple, now classified as invasive.

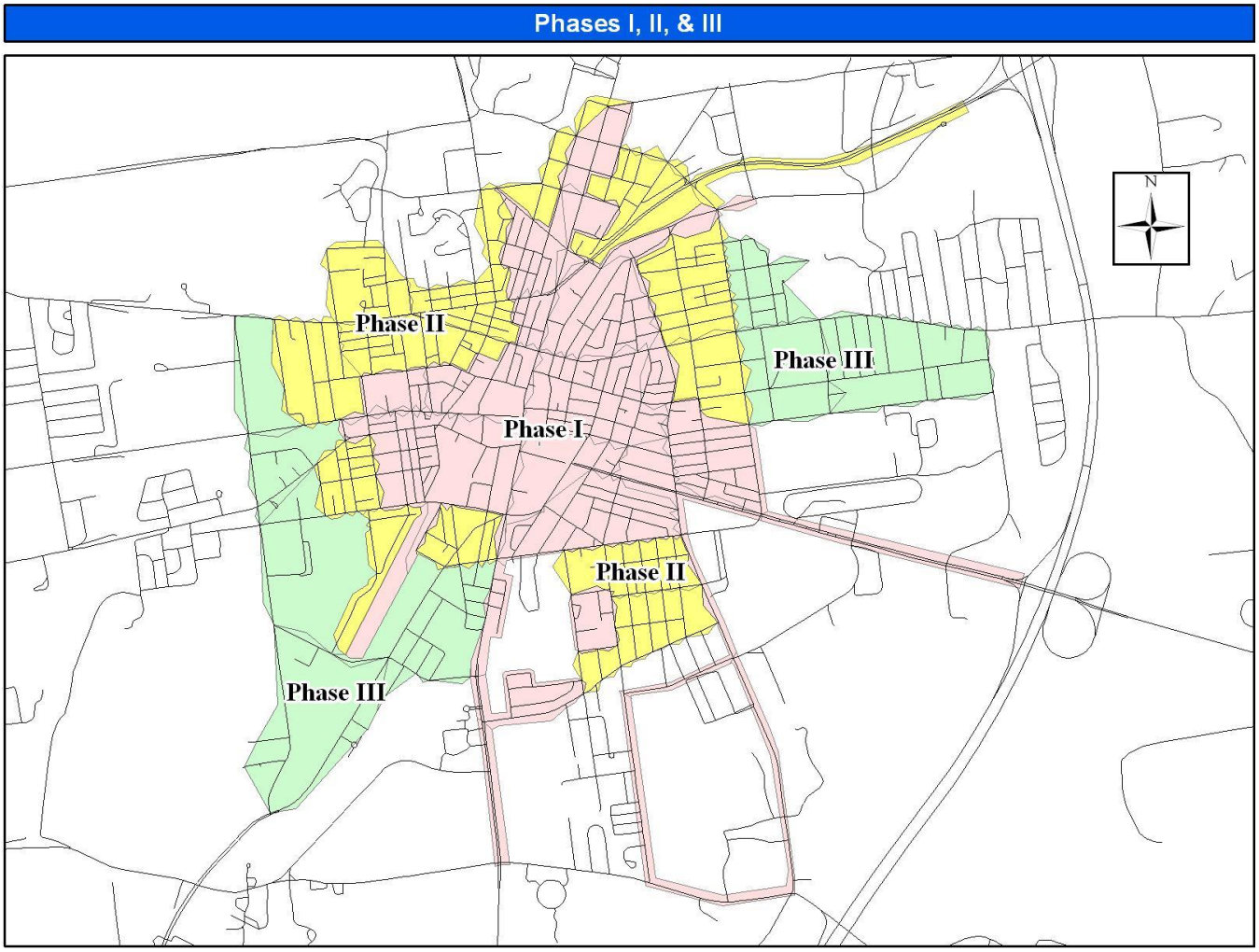

Figure 1: The inventory area for the DEC grant Includes Phase I and Phase II, which were both surveyed. Phase III is partially complete but has not been folded into the data for analysis it is identified as the next area of focus for future inventory work.

3. Saratoga's Urban Forest: The Condition in 2012 — Analyzing the Tree Inventory Data

Data provided by the inventory was entered by Sustainable Saratoga into a database and analyzed using the *i-Tree Streets* software.

i-Tree Streets is part of a software suite developed by the US Forest Service that uses tree inventory data to quantify the dollar value of annual environmental and aesthetic benefits. The software uses modeling based on years of field data to generate values for energy conservation, air quality improvement, CO2 reduction, stormwater control, and property value increase. i-Tree Streets allows any community to conduct and analyze a street tree inventory. Baseline data can be used to effectively manage the resource, develop policy and set priorities. Using a sample or an existing inventory of street trees, this software allows city foresters to evaluate current benefits, costs, and management needs.

The information collected for every tree in the tree inventory is location, species, diameter at breast height (dbh), crown diameter, and the general condition or health of the tree (See Appendix A). Using *i-Tree*, it is possible to aggregate these data into a wide range of analyses of the overall urban forest, including:

- Number of individual trees
- Number of trees of each species (and percentage of each species).
- Total biomass for each species (and percentage each species represents in the total forest).
- Cost-benefit analysis in five categories of benefits (energy savings; CO2; air quality; stormwater; aesthetic/commercial impact)
- Condition of the urban forest

Using the inventory data, it is also possible to calculate the anticipated future structure and configuration of the canopy or the biomass over time by projecting the potential maximum size of each tree and tee species.

As can be seen in Figure 2 and Figure 3, the existing species distribution is skewed very heavily toward the genus Acer (Maple). Five species of maple—Norway maple, red maple, sugar maple, boxelder, and silver maple—accounted for 52% of the street trees by number (Figure 1) and 67% of the street tree biomass (Figure 2). Such concentration of a single genus puts the street tree canopy at risk from disease or pest decimation.

Using Geographic Information Systems (GIS), mapping and database technology inventory data can be translated into maps that can have value in the planning process - detailing the street trees, their location, size, and species down to the neighborhood level. Examples of the types of maps that can be generated and used as planning tools include:

- A map of the City (or sections of the City) with a circle representing the location of every street tree (Figure 4). Using larger circles to represent larger trees and smaller circles for smaller trees produced an image of the urban forest, street by street and tree by tree. The size of the trees was measured by diameter at breast height (dbh); the standard widely used in forestry to measure tree size.
- A map showing the relative density of tree cover on each street segment. Using thick green lines for heavily treed street segments, thin green lines to represent sparsely treed street segments, and red lines for treeless street segments, this map provides a quick comparison of street tree cover that will be a useful tool for determining planting priorities. (Figure 5)
- A map showing the distribution of native trees and trees classified by DEC as invasive species. (Figure 6)

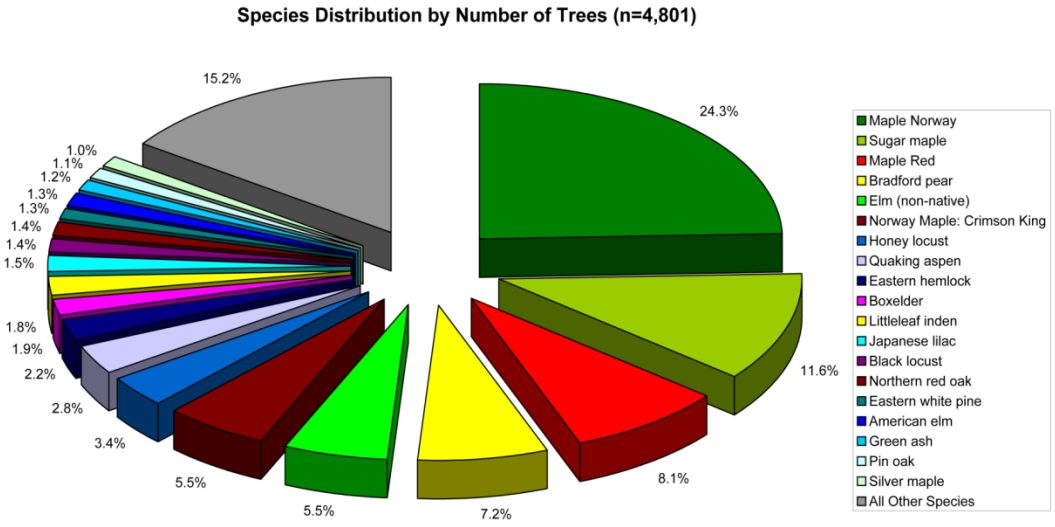

Figure 2: A graph that illustrates the distribution of inventoried street trees by species.

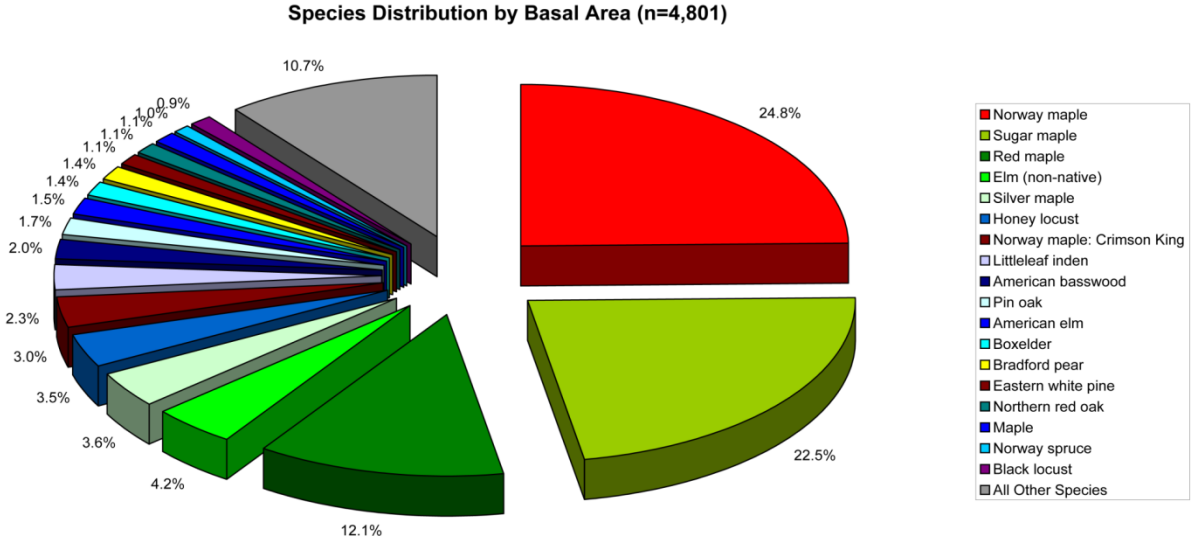

Figure 3: Street tree inventory analysis shows the distribution of trees by percentage of basal area (a measurement of biomass.) represented by each species.

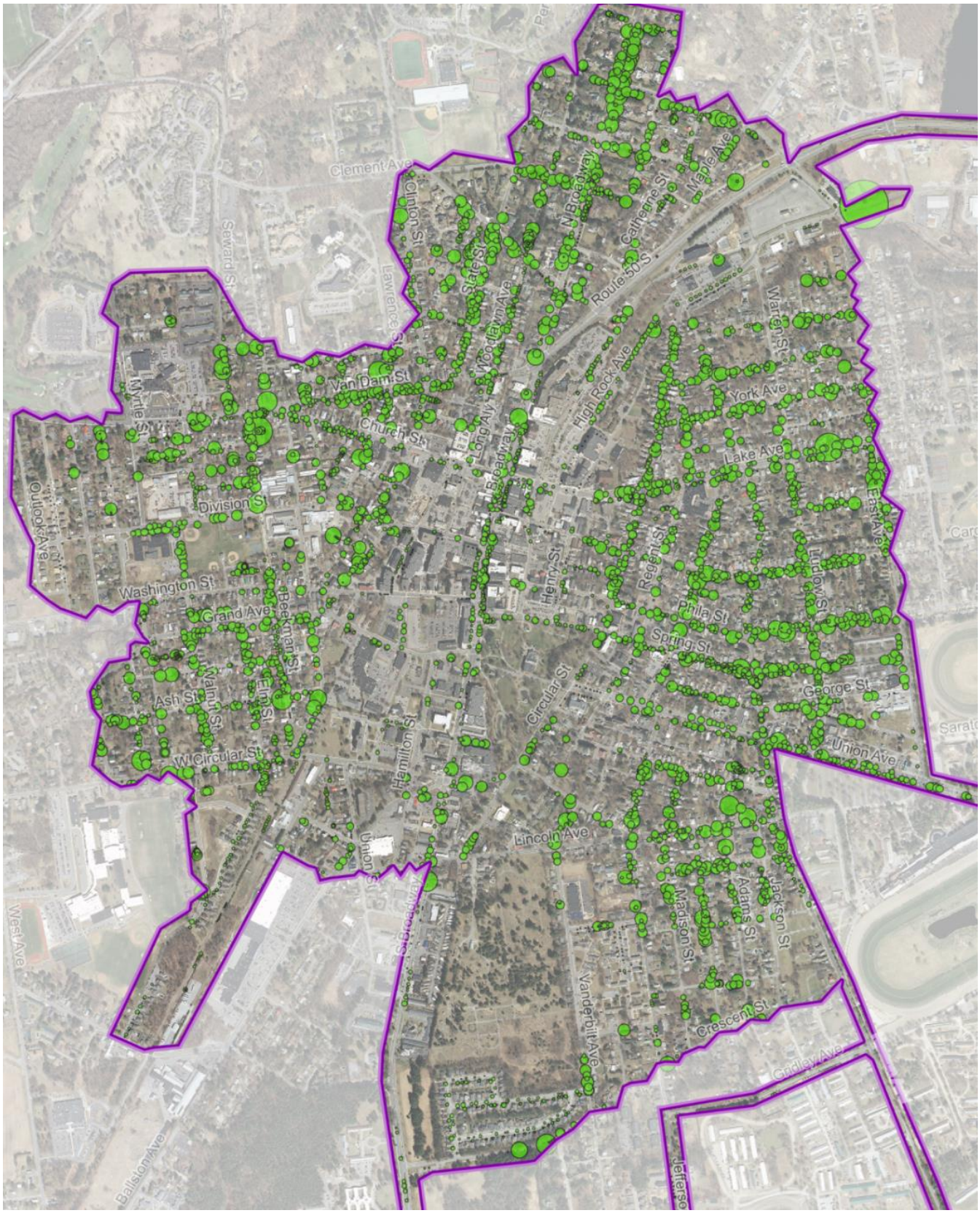

Figure 4: This map displays the location and relative size of each street tree (trees within parks are not included) in the inventory area. Size of each circle is based on the tree's diameter at breast height (dbh)

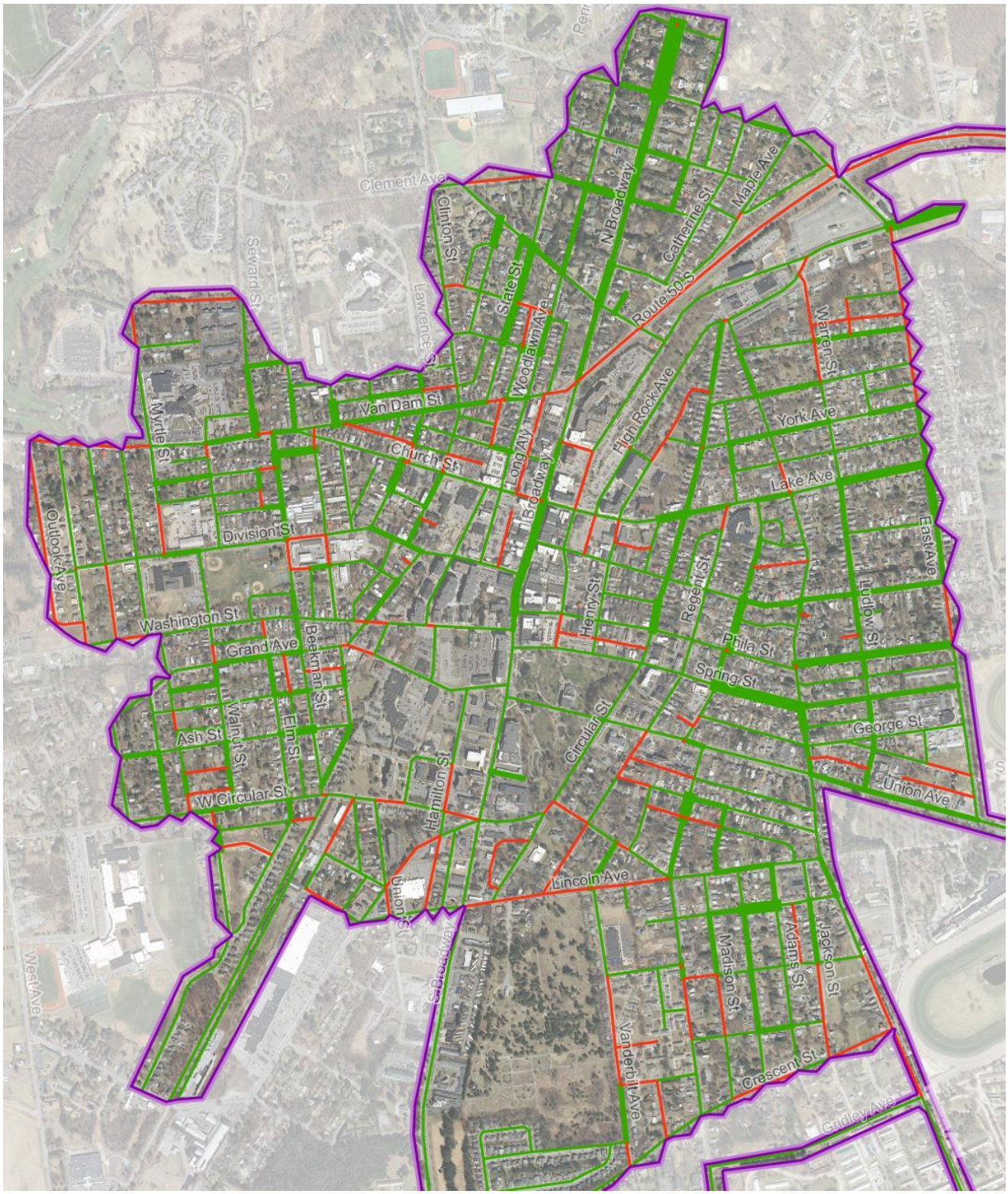

Figure 5: Map of the basal area of the existing street trees compared to linear feet of roadway by street segments. Thick green lines indicate streets with more tree biomass, thin green lines represent streets with little biomass and red lines mark treeless streets. Field checking is required when using this tool to determine target planting areas. The heavy green line (representing a heavily treed street) on Excelsior Blvd, east of East Ave is the result of one single large linden tree.

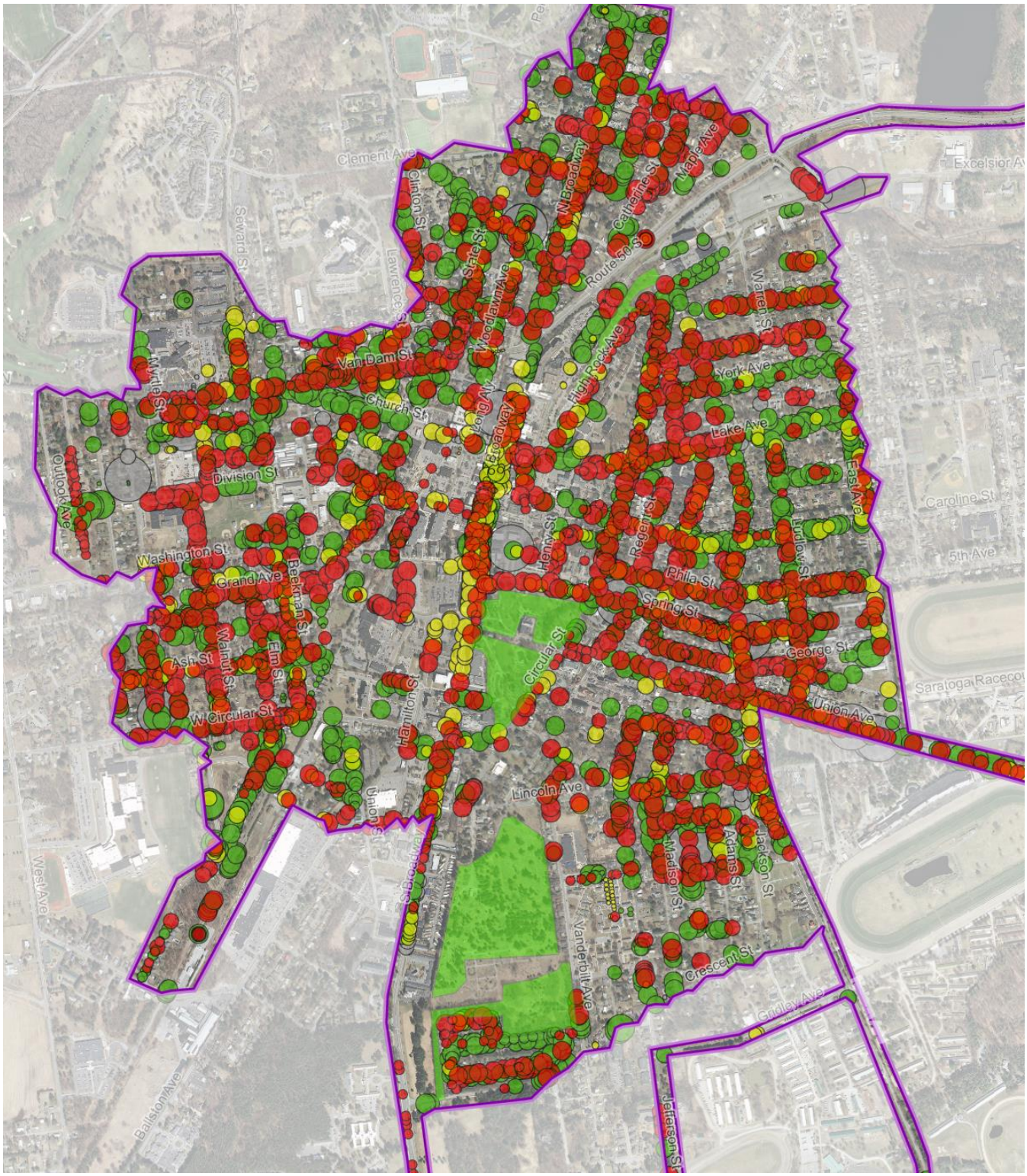

Figure 6: Map illustrating the distribution of invasive trees planted as street tree. The circles represent individual trees, and the size of the circle correlates to the relative size of the tree. Red circles represent invasive species, yellow circles represent trees of non-native status that are not known to be invasive and the green circles represent native trees.

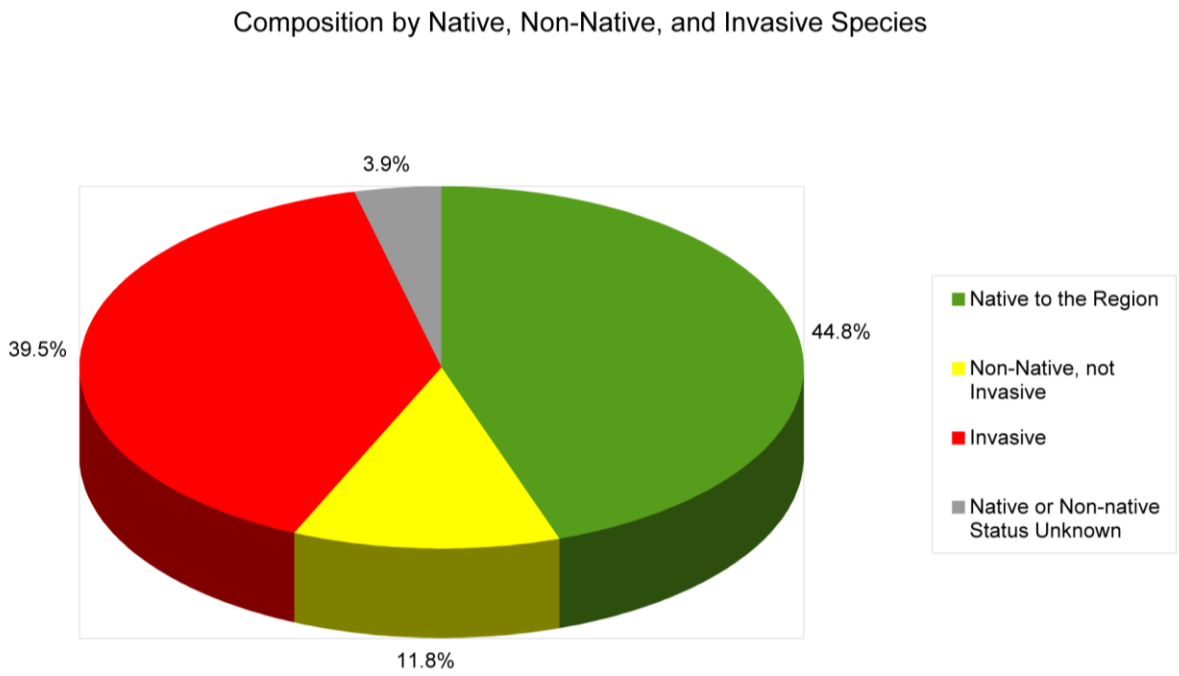

Figure 7: The red piece of the graph shows the prevalence of non-native invasive trees on the City's streets.

Two tree species that have been planted almost exclusively in recent years, the Norway maple and Callery Pear, are both classified by the New York DEC as invasive species. These two species account for a total of 37% of our street trees, by stem count and 28.5 % of the total street tree biomass. Figure 7 displays the prevalence of all non-native invasive species, by total biomass. The State of New York is passed legislation in 2012 to phase out these species from sale within the state. Currently state agencies are developing a regulatory framework for enforcing the legislation. For these purposes, "invasive" was defined by reference to the assessment report from the New York State Invasive Species Council, "a species that is: (a) non-native to the ecosystem under consideration; and (b) whose introduction causes or is likely to cause economic or environmental harm or harm to human health." Following an educational campaign and technical support from Sustainable Saratoga, the Department of Public Works removed invasive species from the list of street trees the department is willing to plant for citizens. The recommended tree list is included in Appendix H.

Many additional maps and analyses could be generated, including graphics that show which streets in the City have a predominance of old trees or young trees, or the distribution across the city of a particular species. A map correlating density of tree cover with neighborhood income demographics could be useful for addressing environmental justice concerns. A map showing the City's "Heritage Trees," the largest or most important trees in the city, ones that are candidates for some form of preservation, protection, or special care could also be useful as a planning tool.

In short, the inventory data will prove a rich resource for future planning. Analysis of the data can shed light on areas that should be targeted for planting or even tree removals. It can be used to identify the number of trees and the existing or potential tree biomass or canopy cover on any given street. Also, as urgent questions arise about particular tree issues (for example, disease or progress toward increased canopy cover) an up-to-date tree inventory can be accessed to aid action. An example of how the inventory may help with protecting trees from the spread of disease or other threats is listed in the sidebar in Section IV.2 Management Strategy Two.

4. Costs and Benefits of the City's Trees

Trees provide quantifiable economic benefits for the built environment and the surrounding natural ecosystems and pay us back many times for the investment. Trees also offer a positive impact on commercial activity and real estate values. From this perspective, the budget for trees is best viewed as an investment rather than an expense. To quote Mayor Johnson's 2008 letter, budgetary items allocated toward trees are an "investment in this essential resource." The tree inventory and *i-Tree Streets (i-Tree)* analysis provides Saratoga Springs with its own cost-benefit numbers that bear this out. The total benefits provided by the 4800 street trees and other city owned trees, which were surveyed is estimated at nearly $610,000 per year. Considering that there are between 13,000 and 15,000 trees owned and maintained by the City on can conservatively extrapolate the benefits provided the community by City owned trees to be valued at several million dollars per year. This is a good payback for an investment that in 2012 was $128,699.

i-Tree is able to establish how the $610,000 worth of benefits is provided by the 4800 inventoried street trees. It comes from an energy savings of $216,000, $37,000 of value in improved air quality, stormwater benefits of $46,000, CO2 contributions of $115,000, and aesthetic/commercial value of $195,000. On average each tree provides about $127 worth of benefits annually.

How Many Trees?

Based on scientific research (*Trends in street tree survival, Philadelphia, PA, University of Pennsylvania*), the best case scenario for average street tree lifespan is approximately 28 years. For very urban environments many cities consider 10-12 years to be the average life expectancy for trees. That means that just to maintain (replace) the estimated tree canopy that currently exists (15,000 trees) an optimistic average of 535 trees will need to be planted each year. Currently, the city plants between 60-80 trees each year. It's clear that at the current rate of planting, the street tree canopy will continue to decline. The current budget for tree planting is insufficient to achieve the City's goal of maintaining the urban forest, much less expanding the urban forest.

III. Review of Current Tree Management and Planning - Practices and Regulations

1. 2001 Comprehensive Plan

Trees are mentioned six times in the 2001 amended Comprehensive Plan. The word "forest" does not appear in the Plan. Three uses of "trees" occur in the same sentence, repeated three times (pp. 39, 41, 43) in discussions of West Ave and South Broadway: "Buffer commercial and warehousing activities from neighboring residential areas by screening with fences, berms and trees at rear of lots." "Tree plantings" are mentioned as a beautification strategy for South Broadway (p. 43), while "tree planting" is seen as a traffic calming device for Marion Ave., between Route 50 and the Greenfield line. Finally, in a discussion of Conservation Development Districts, developers are to identify the site resources, including "significant tree stands" (p. 46). Trees are not identified as important community investments or important pieces of the City's infrastructure.

As the Comprehensive Plan is the guidance document that provides the long-term vision for the Saratoga Springs, the City will charge the 2013 Comprehensive Plan Committee to include more specific guidance to preserve and enhance Saratoga Spring's urban forest.

2. Open Space Plan, 1994 (*The City in the Country*), And Open Spaces Resources 2002 (an update to the 1994 plan)

Early in the introduction to the 1994 plan, the author observed: "Take away the tree-lined streets, community flower gardens, protected spring areas and Congress Park, and the city would quickly lose much of its charm and appeal." Trees were later highlighted among tactics that would improve the entrance ways to the city, "Developed entranceways could be improved by planting trees or flowers; installing curbs, sidewalks and landscaped median strips; burying overhead electric, telephone and cable television lines; controlling commercial on-premise signs and repaving of highways."

The most important mention of trees, however, came in Recommendation 24 (of 25); Formalize the Community Shade Tree Program.

> "Street trees are an important environmental and aesthetic resource. The shade they provide also offers energy savings. The shade tree program initiated by Department of Public Works (DPW) should be strengthened and institutionalized. The program should ensure that shade trees of appropriate types and diversity continue to grace the streets and parks of Saratoga Springs. Continued proper maintenance, replacement and planting of trees are integral to the program.
>
> A shade tree commission should be established to prepare a shade tree master plan in cooperation with the DPW and to provide advisory assistance to the agency. The City should support and expand the tree nursery established by the DPW. This plan also recommends that the city take advantage of the Urban Tree Program administered by the State DEC."

The update, Open Spaces Resources 2002, is far more narrowly focused. It concentrates chiefly on opportunities and strategies for preserving significant areas of open space, and makes no direct mention of street trees

The City will appoint an Advisory Tree Board (Management Strategy Three).

3. City Code, Chapter 220: trees

Chapter 220 of the City Code clearly states that the Department of Public Works (DPW) is responsible for the City's trees. It regulates all activity that might negatively impact the trees, including damage, poisoning, poorly executed pruning, removal, and controlling pests and disease. It requires a permitting process from DPW for a

private entity to perform virtually any activity affecting city owned trees, from planting and maintenance and to removal. And, it places the financial responsibility for all tree work (pruning, treatment of disease, and removal) firmly on the property owner of the adjacent land. It is clear from the responses from the online tree survey, that the public does not understand this. The results of the public survey in Appendix I offer good insight into the public's opinion of responsibility for tree care. Question sixteen states, *"The city is responsible for planting, maintaining and preserving street trees*." Eighty-two percent of respondents agreed. Question seventeen then states, *"Adjacent private land owners should be responsible for maintaining and preserving street trees."* Interestingly the responses were more spread out with 19% disagreeing, 32% of respondents were neutral and 49% agreed. Question twenty-three also alludes to the individual responsibility for tree care, *"Private land owners have a responsibility to maintain and replace adjacent street trees."* Thirty-three percent disagreed, while thirty-eight percent felt neutral and twenty-seven percent of respondents agreed.

The regulatory framework discussed in the current Chapter 220 and actual practices for tree related activities do not correspond. City practices evolved so that DPW now bears the expense of much of the tree work. Permitting for tree work is not commonly practiced, and there is no routine permitting process, although some property owners do contact DPW in advance of planting or removal. The common practice for tree planting or removal is for an adjacent property owner to request tree planting, care or removal, the service is then delivered by the DPW.

The City's tree ordinance, Chapter 220 of the City Code, is in need of revision. The City will review and revise Chap 220 to make it an effective tool for accomplishing the goals of this Master Plan. Appendix B provides an example of a model ordinance that the City could adopt.

4. City Charter: Title 5. The Commissioner of Public Works

Title 5 of the City Charter defines the responsibilities of the department of public works, each of the four sections is focused on a different type of infrastructure responsibility: 5.1 Streets and highways; 5.2 Buildings and grounds; 5.3 Utilities; and 5.4 Office of the City Engineer. There is no mention of the department's responsibility for street trees in section 5.1 or of the park trees in section 5.2, nor any explicit reference to the urban forest as a key infrastructure responsibility.

Because the Department of Public Works is committed to preserving and expanding the street tree infrastructure and the City recognizes that the urban forest is a sufficiently important part of the City's infrastructure the Charter should be revised to reflect the responsibility of Public Works for this subject.

The update to Title 5 will include the description of the City Arborist position with reference to access to a trained tree crew and continuing professional arborist education. Any summary of the responsibilities of DPW will include those for the urban forest. The most appropriate place to discuss DPW's responsibility for the urban forest in an expanded version of "The Maintenance and Inventory of the City's Infrastructure."

5. Zoning Ordinance

Trees appear in the Zoning Ordinance in various contexts, the most significant references are listed below (see Appendix J for all references in the Zoning Ordinance.)

(1) **Transect Zone Design** (Section 3.1)

The City's Transect Zones require street trees as a streetscape element, spaced on average 40 feet apart. Height and caliper requirements are included. Screening from vehicle-related features is emphasized.

Streetscape design features will be reviewed to reflect best practices in urban forestry techniques, green infrastructure and "complete street" standards.

(3) **Public Water Supply and Wetland Protection District** (Section 3.5), and

(4) **Watercourse Protection District** (Section 3.6)
Both the Public Water Supply and Wetland Protection District and the Watercourse Protection District are intended to protect water resources and adjacent lands in order to provide for water quality, flood control, pollution control, enhanced flora and fauna, and open space benefits.

These provisions will be reviewed and amended to reflect best practices regarding watercourse vegetation and wetland management and the role played by street trees as part of the City's vital infrastructure.

(5) **Special Use Permit** (Section 7.1)
Although trees are not specifically mentioned in the Special Use Permit section of the Zoning Ordinance, one of the six evaluation criteria for the approval of a Special Use Permit is "The environmental and natural resources of the site and neighboring lands including any potential erosion, flooding or excessive light, noise, vibration, and the like."

The City will review and make specific references to trees and the function they serve in mitigating the impacts listed.

(6) **Site Plan Review** (Section 7.2)
The subsection entitled "Evaluation Criteria for Site Plan Review" (Section 7.2.4) contains this provision: "Adequacy, type, size, and arrangement of trees, shrubs and other landscaping. Parking, service areas, and loading and maneuvering areas shall be reasonably landscaped and screened from neighboring areas" (#9).

This section will be reviewed and expanded to include more generalized areas that would benefit from the preservation of existing trees and the planting of new trees for environmental, social and economic benefits as part of site plan review.

(7) **Land Disturbance** (Section 7.3)
This section describes the permit application process that is required when land disturbance activities are undertaken in certain circumstances. It is intended to protect the City's natural environment by minimizing the adverse effects of site preparation and construction activities. The removal of more than 15% of trees over four inches in diameter (dbh) invokes a permit application process if, in the Rural Residential District, the activity affects 1.5 acres or more, and, in any other district, if the activity affects .5 acres or more.

This section will be reviewed and considered in the context of updated site preparation and construction best practices and current DEC stormwater guidance. Special provisions should be made for protecting any trees within the City's public right-of-way

(8) **Historic Review** (Section 7.4)
One of the Historic Review objectives is "To prevent the demolition or destruction of significant structures, terrain, landscape or scenic views" (Section 7.4.5).
The extent to which the Historic Review section potentially affects existing trees in the City's historic district should be clarified and specified.

In addition, there are numerous other sections of the Zoning Ordinance that contain references to "open space," "landscaping," "clearing," "natural resources," or similar phrases that clearly have implications for trees located within that area or district; especially in

the sections on Parking Requirements and Planned Unit Developments. The City will review the Zoning Ordinance for such references and determine the merits of clarifying and enhancing specific requirements regarding trees.

6. Subdivision Regulations

The Subdivision regulations contain numerous references to trees and their conservation. For example, the Conservation Subdivision checklist contains this item to which applicants must give consideration: "Trees uncommon by virtue of size, age or species (specify)."

On the recommendation of Sustainable Saratoga, in 2012 the City Council adopted revisions to the subdivision regulations that included revised and expanded lists of the trees to be planted in subdivisions. The lists are composed of locally and regionally native trees. The revised regulations explicitly prohibit the planting of any tree, shrub or other plant species whose invasiveness has been rated as very high, high, or moderate on the current non-native plant species invasiveness assessment list, maintained by the Cornell Cooperative Extension Invasive Species Program and the New York Invasive Species Clearinghouse (http://www.nyis.info/?action=israt).

Appendix H of the Subdivision Regulations sets forth standards for the preservation and planting of trees in subdivisions.

Within the Subdivision Regulations trees are addressed with the following recommendation;

1. Planting list for developers to use (revised in 2012 on the advice of Sustainable Saratoga; the list was expanded and invasive species were prohibited, using an unambiguous criteria in the DEC invasiveness standards).
2. Planting requirements (at specific average distances along the frontage and size of trees, caliper and height, at time of planting).
3. ROW standard design with specified widths for the overall ROW, for the paved area for traffic and parking, and for the tree lawn and sidewalks.

The entire document will be reviewed and revised where appropriate to incorporate the goal of preserving and expanding the urban forest. The regulations will be consolidated with the provisions of the zoning ordinance so that a consistent set of requirements will apply to subdivisions as well as major development projects that do not involve subdivision.

Enforcement and compliance with the subdivision regulations will be reviewed and clarified. Additionally the City's standards for Rights of Way development with new subdivisions will be reviewed to determine if there is an optimal method for preserving trees in the right of way during land development operations.

In addition, the requirement that trees in districts outside of the Transect Zone districts should be planted at 100 foot intervals will be re-evaluated.

The subdivision regulations will be revised to give clearer guidance to the planning board by providing more specificity in the requirements for preserving existing and planting additional trees. Trees with medium or large mature height should be required, with exemptions allowing small trees only in the case of overhead obstacles or severe space restrictions. Requirements will include protection for trees that are to be retained from construction damage, such as fencing to prevent the use and parking of vehicles and the storage of materials over a tree's roots.

Appendix C provides proposed revisions to Appendix – H of the Subdivision Regulations. These guidelines will be consolidated with provisions in the zoning ordinance to apply as well to major development projects that do not involve subdivision.

7. Land-Use Board discretion

The Planning Board exercises considerable discretion during the application process, sometimes waiving or adjusting various regulatory requirements. Trees are primarily considered from the perspective of post-construction planting, and less frequently from that of preserving existing mature trees.

The City will enacted strong legislative guidelines for development and construction practices that clarifies and limits the grounds for discretionary waivers by the land use boards.

8. Standard Details - Construction Practices, Section L-01

As well as maintaining standard planting practices the City of Saratoga Springs has standard planting and pavement design details available in the engineering department. The details provide private developers and landscape contractors with the information to plant trees in a way that meets the expectation of the Department of Public Works. Unfortunately these details are outdated and do not provide information for proper tree planting, nor do the details address strategies to provide adequate soil volume for healthy and robust tree growth, the strategies to protect pavement from heaving and cracking caused by root growth or strategies for integrating green infrastructure systems with urban street tree plantings.

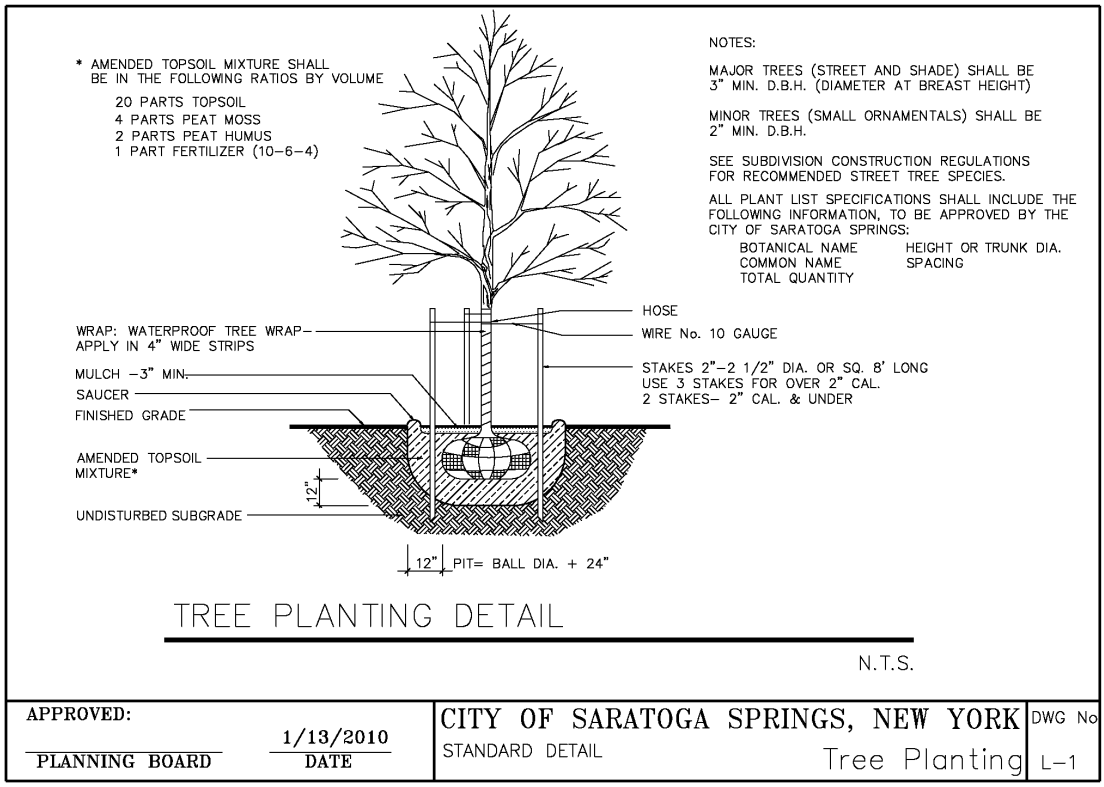

Figure 8: Standard City tree planting detail is not developed to current modern horticultural standards.

Above is the standard detail, provided by the City to communicate the expectation for properly planting street trees. This detail is based on outdated forestry practice and should be updated to incorporate the best practices of today.

See Management Strategy Three for general improvements that can be made to City Standard details and Appendix D further details recommended best management practices (BMP's) and changes to details and specifications to promote a vigorous street tree growth. The goal of these amendments is to provide standards for planting the appropriate tree with the appropriate planting technique, proper amount of soil, proper protection from the urban environment.

9. Operating Budget: Line 8560, Trees

For the four years 2009-2012 the average investment that Saratoga Springs has made for all tree related work including general maintenance, equipment, and labor is $111,488 per year. In 2013 the budget has been

increased to $149,779. This 35% increase in the overall budget illustrates the City's commitment to expanding and preserving the urban forest. It includes approximately $7,000 for labor expenses and an additional $13,000 for purchasing new trees. .

In the past approximately $8000 a year was allocated for purchasing new trees. This purchased approximately 60-70 trees. The $20,000 allocation for street trees will purchase over 160 trees, but could be used to fund many more tree plantings if successfully used as matching funds for upcoming grant opportunities!

10. Climate Smart

The City council adopted the Climate Smart policy in 2012, becoming the 100th city in New York to sign on to this State initiative. The Climate Smart commitment made by the municipality, commits the City to take steps toward reducing the greenhouse gas emissions from City operations.

Trees are among the most cost-effective and powerful tools available for reducing the City's carbon impact. Well-sited trees can be "climate smart" in terms of lower energy use at City facilities, residences, and businesses. In addition, trees absorb large amounts of storm water, which saves energy by reducing the amount of water undergoing costly water treatment. Moreover, every tree in the City's entire urban forest stores carbon by actively removing C02 from the atmosphere as part of their normal respiratory activity. The City should promote the "preservation and expansion of the urban forest" as an integral part of its Climate Smart actions.

11. Complete Streets Policy

The City Council adopted the Complete Streets Policy in 2012. It refers to the elements of "complete streets" as including, among other features, "street trees and benches" (p.7) that will encourage bicycle, pedestrian, and transit use of the street system. Such use, in turn, will positively impact the community's health and safety, environmental quality, and economic vitality.

The Shared Access Advisory Board, which was formed to guide actions identified in the Complete Streets Policy, should be informed of the City's urban forestry goals, and given periodic updates on progress with the City's urban forestry planning and legislation. Coordination and communication between these two related efforts is desirable. Additionally other land-use boards require training and individuals who serve on citizen advisory boards such as the Shared Access Advisory Board or a Tree Board should be required to complete training.

IV. Action Strategies for Preserving and Expanding the Urban Forest

In order to achieve its goals of preserving and expanding the urban forest, the City commits to the following five action strategies.

1. ACTION STRATEGY ONE. Use planning, legislation, and enforcement to integrate trees more fully into Saratoga Springs' infrastructure

A. Review and strengthen provisions regarding publicly owned trees in all appropriate City ordinances, regulations, and planning documents. Enforce these provisions and limit exemptions.

- Update the City Charter, Title 5 to define the Department of Public Works responsibility and role of stewardship toward municipally owned trees.
- Update the Zoning Ordinance, and the Subdivision Regulations to strengthen and prioritize the City's regulatory stance in favor of preserving and expanding the street tree canopy of Saratoga Springs.
- Revise Chapter 220 into an effective tree ordinance (Appendix B).

B. Preserve mature trees

- Enact a clear Tree Removal Policy (as part of Chapter 220) that will protect the City's tree infrastructure from removal for reasons such as convenience and personal taste. Develop a DPW tree removal protocol that relies on professional arborists to determine the risks the tree poses and limits removal to situations of "danger to public safety" or "health of the tree."
- Identify the City's "Heritage Trees," trees of particular significance and value due to their age, size, rarity, location, aesthetic impact, or historic connections. Plan for their preservation through education, careful maintenance, and protection from threats. Register some with the State lists of big or great trees and educate the public to celebrate these great specimens. For more detail see Appendix G.

Image 3: This is an example of tree protection at a construction site. While the trees are protected and the disturbed roots were not torn, but cleanly cut; it could be argued that all disturbance to these trees could have been avoided if the site was accessed from the rear alley only.

C. **Revise standard details, City Code (Chapter 203-23) and other appropriate documents to establish design standards that will allow for greater flexibility in sidewalk design:** options for sidewalk construction exist that can preserve more trees while repairing sidewalks or building sidewalks, Appendix D (reduced sidewalk widths, deep root barriers, alternative pavement designs, alternative pavement materials, CU structural soils, and the integration of stormwater BMP's.) The City Arborist should be charged to work with the City Engineer to develop every possible alternative to tree removal in cases of sidewalk conflicts.

Heritage Tree Preservation

In 2012, three heritage elms in the City—one City-managed street tree on Court Street, one state-owned tree in Saratoga Spa State Park, and one on private property on Clark Street—developed Dutch elm disease. Fighting the disease is possible but not inexpensive. Saratoga Spa State Park is working to salvage the infected tree on their property. The City should prioritize which elms to save and find public or private resources to save the most important elms.

D. **Require the planting of large-species trees throughout the City, except where physical constraints limit the maximum mature size of the tree.** Large species trees provide proportionately more benefits. Small-species trees should only be planted as street trees when there are no other solutions.

E. Reclaim and increase growing space for trees (further detail in Appendices B and D):

- Set and enforce standards to increase the use of full tree belts and enlarge the sidewalk tree wells throughout the City;
- Clarify and exercise the City's authority over the public ROW: enforce the prohibition against the paving of tree belts by private entities and limit exemptions and variances; enforce the laws against private removal;
- Halt the practice of paving over tree wells in the commercial core; open up wells that have been paved over and replant
- Look for opportunities to plant large trees on city owned land or vacant lands. Explore public/ private partnership opportunities to convert under-used parcels, barren plains of asphalt and vacant lands into neighborhood parks or pocket parks.
- Explore possibilities to create phyto-remediation programs on brownfield or toxic sites.
- Provide an option to build reduced width sidewalks in low traffic residential neighborhoods to give trees in tree belts more room to grow
- Properly design parking areas to accommodate large species trees as shade structures

F. **Incorporate Trees fully into the City's Comprehensive Plan.** Beginning with the 2013 Comprehensive Plan revision process, lay out a vision of how Saratoga would look with a better preserved and expanded urban forest. Set planting targets (beginning with number of trees and canopy cover) and strategic priorities for where to concentrate planting within the different areas and/or land-use types in the City.

G. Integrate trees into all infrastructure planning and project development in ways that preserve and expand the urban forest,

- Integrate street trees with Complete Streets development and stormwater mitigation design
- Ensure that all appropriate street tree preservation and expansion measures are adhered to in City and City Authority development projects

H. Ensure that new land development projects preserve and expand the urban tree canopy

- Enforce conformity to ROW standards in Zoning Ordinance and Subdivision Regulations, to provide for ample tree belt and vertical room for large trees. Enforce tree belt plantings in proposed residential subdivisions.
- Review subdivision regulations and ROW standards to encourage preservation of existing trees during land clearing operations. In particular trees within roadway ROWs that will be turned over to the City should be preserved.
- Develop legislation and zoning language to limit driveway access from a main residential street across a tree belt, when alley access exists in the rear of the property.
- Require a tree inventory and tree preservation plan for all trees over 6" dbh on City land or within future City rights of way, as part of the site-plan review process, and enforce them.
- Enact policies and regulations to place a cost on removal of City owned trees. Fees for removal would go into a compensatory planting fund.
- Limit damage to existing trees during construction by providing protection language in Chapter 220; educating City workers, developers, the design community, and the public about threats to trees during construction; enforce.

The value of existing trees is often underestimated

A tree's value should be reflected in our efforts to maintain and conserve it. However, as the city continues to grow and undergo land use changes, the value of a tree is not always understood or acknowledged during the development process. The value of an existing mature tree is exponentially higher than a smaller, younger tree, when one considers ecological services, property values and other measures. However, an existing tree is often only valued for its appearance, making it a difficult case for keeping it in new construction and development. Tree replacement is seen as the most convenient option, undermining the City's ability to expand canopy cover.

I. **Provide City Board members with training on tree preservation and expansion topics.**

- Ensure that Planning Board members, as well as members of the Shared Access Advisory Board and the proposed Tree Board are provided education on the City's goals for the urban forest.
- Particular attention should be paid to emphasizing the importance of limiting variances that reduce the overall number of trees, allow for small species trees to be planted in areas without space limitations, and diminish growing space for large-species trees in the public right-of-way.

J. Establish citizen advisory Tree Board

- Appoint a community based advisory Tree Board to partner with DPW on annual and long-term tree plans. This sort of annual planning, jointly done by the DPW and a citizen Tree Board, is central to the Tree City USA philosophy. Tree City USA suggests two possible approaches to constituting the Tree Board: 1) chartering a non-profit with expertise, or 2) appointing a Tree Board.

K. Commit to gaining Tree City USA status

- Becoming a designated Tree City USA community commits Saratoga Springs to maintaining the publicly owned urban forest

- Through Tree City USA educational opportunities and funding is available for staff and community volunteers

L. Commit the City of Saratoga Springs and related municipal entities to the same standards of review processes as applied to private developments – even though municipal projects are exempt by law.

M. Explore how the City and its utility partners can creatively integrate both utility wires and more large-species trees

- In reconstruction projects, the cost to bury power lines or acquiring planting easements of the private property adjacent to sidewalks, should be weighed against the benefits gained from the ability to plant larger trees as well as the savings in repair costs and reduction if lost work hours and business when storms knock out power to the city.
- Develop a strategic, planned approach to relocating utility poles to open up tree planting areas, especially on the south and west sides of buildings
- In areas where overhead utilities conflict with City's goal of planting more large-species trees, consider the use of tree easements or other mechanisms to move the City's street trees onto the private side of the sidewalk (i.e., onto private land); develop agreements by which DPW will assume responsibility for maintenance and ultimate removal of approved large-species plantings in these locations. Over the long term, the practice of planting small-species trees under utilities should be viewed as a forestry solution of last resort.
- Work with the utility companies to establish a formal mechanism for the pruning or removal of city trees by utilities. An annual permit would be the best approach. It would include conditions regarding the approach to maintenance, how to dispose of the refuse, notification requirements for city staff and the public, and how decisions to remove a tree rather than prune it are made.
- Planting small trees below power lines should be used as a last resort strategy. It does little to fix the visual and maintenance problems of overhead utilities and small trees offer reduced benefits of shade and stormwater mitigation.

2. ACTION STRATEGY TWO. Appoint City Arborist, Update inventory information regularly and review plans and adjust strategy annually.

Create a position for someone with proper education in silvaculture to bring modern forestry techniques to the management of our urban forest. Routine maintenance of a data-base of information will allow the City to monitor the changing condition of the urban forest, and to make adjustments to ensure that steady progress with our goals for the urban forest.

A. Appoint a full-time, certified City Arborist

- Successful stewardship of a thriving urban forest requires the in-house expertise of a certified arborist who has clearly defined responsibility at DPW for overseeing the urban forest (planning, training and supervision, scheduling, developing BMP protocols, etc.)
- The Arborist will lead a DPW crew specifically trained to provide the necessary work force to improve the trees of Saratoga Springs.
- Provide training opportunities to ensure that the arborist stays current regarding the BMPs of green infrastructure.
- Coordinate tree planting and tree care performed by the City Arborist with the standard detail and green infrastructure development tasks initiated by the City Engineering Department.

B. Update the tree inventory and maintain an up-to-date database:

- Develop a process for regularly sharing information, between DPW & Sustainable Saratoga regarding plantings, removals, and trends in tree conditions.
- Charge the appointed Tree Board with developing a process (to be approved by the city arborist) that will use the public or coordinated citizen volunteers to help gather information on tree status.
- Undertake periodic sampled inventories, beginning no later than five years from the adoption of this plan, perhaps focused on a particular planning issue or concern

C. Set planting targets (annual, mid-term, long-term) for progress on the urban forest:

- The Department of Public works will work with the Advisory Tree Board to set planting targets and priority planting areas.
- Determine the metrics that will be used to measure progress towards goals for an expanded urban forest (for example; canopy, number of trees, overall biomass, number of streets in compliance with city ordinances, large species trees percentage; native species vs. invasive species; environmental, social, & economic benefits) and adopt targets for those metrics.

Using the Inventory Data

Mature native maples have been suffering in recent years. A concerned citizen contacted DEC forestry researchers and DEC in turn contacted Sustainable Saratoga's Urban Forestry Project for assistance. The inventory database had data on the relative condition of every maple in the City. Sustainable Saratoga was able to send DEC a list of all the maples rated as a poor and location of these trees. This data enabled the DEC quickly tour the declining maples and assess the causes of the trees' health. One can readily imagine the value of the inventory during a replay of this scenario with ash trees, or elm trees, or with any other tree species that comes under threat from a pest.

- Currently, just to maintain the existing urban forest in the inventoried area (4800 trees with average lifespans of 28 years) 171 trees will need to be planted in the inventoried area . Currently 60-80 trees are planted, city-wide.

D. Promote planting native species and near-native species trees and shrubs on all land, public and private

- This strategy adds resiliency to the City's urban forest in anticipation of Global Climate Change
- Encourages wildlife and pollinator habitat

E. Base our forestry practice on current scientific information

- Draw on local or regional resources for expert recommendations (Cornell Cooperative Extension, Sustainable Saratoga, NYS DEC, Skidmore College, and others)

3. ACTION STRATEGY THREE. Develop and Implement Best Management Practices.

Ensure that trees are planted and maintained properly for maximum tree health and survival.

A. **Select trees best suited to planting conditions** (Appendix E and Appendix F). Conditions of note include:

- Soil pH, density, compaction, texture
- Drainage
- Sun/shade
- Utility constraints
- Growing space/rooting volume

Image 4: North Broadway with the symmetrical, double allee of American Elms.

Tree selection needs to take into account the popular and historic visual aesthetic of symmetry. As Image 4 illustrates the symmetry of the old elm lined streets created a feeling of order and predictability that cohesively brought the neighborhood together. To balance this aesthetic desire with the need for species diversity, the DPW arborist can select trees of similar form along a street or even plant a street section in monoculture, with the overall forest diversity goals in mind.

B. Select trees that will improve the diversity, resiliency, and function of the urban forest

- Work towards the goal of no more than 10% of any one species, no more than 20% of any one genus, and 30% of any one family
- Balance the aesthetic desire for symmetrical street tree cover with need for species diversity
- Select trees that are native or near-native because they are adapted to local conditions, support indigenous wildlife
- The Recommended Trees in Appendix H offer a selection that will aid the urban forest adapt to the demands of Global Climate Change.

C. Plant trees in continuous planting beds whenever possible.

- Large continuous planting beds or large root zones created by using porous pavements, silva-cells or structural soils increase rooting volume.

D. Explore opportunities to re-use tree material withdrawn from the City's urban forest to mitigate the environmental and economic costs of tree removal.

E. Update the Standard Planting Details to reflect BMPs for Tree Planting Practices. See Appendix D for additional details

- Utilize the planting checklist for each planting to help insure proper installation (Appendix F)
- Expand the size, number, and quality of tree wells and tree belts;
- Integrate CU Structural Soils, Silva Cells or other technology for increasing the available volume of soil for root growth into City Standards;
- Increase the use of porous paving and structural soils to improve tree health and survival rates;

- Alternative sidewalk designs, involving potential layout, width and material alternatives should be evaluated and permitted where appropriate to increase growing space for trees;
- Use vertical root barriers adjacent to sidewalks to protect them from root heave;
- In urban areas tree pits should measure a minimum of 40sf in size;
- Provide guidance regarding soil volume calculations, or increased tree well sizes to account for root mass;
- Develop, use, and enforce city standard tree grate and tree guard details;
- Develop long term strategies for integrating large species trees with overhead utilities, such as burying utility wires, acquiring planting easements on private land side of sidewalks, or designing lines to cross the street multiple times in order to open up overhead spaces for large species trees;
- Develop inter-department coordination for standards development, education and enforcement.
- Develop planting details to create shady canopy over city owned parking facilities.

Image 6: The street trees in Saratoga Spring's urban core hare planted in a wide array of planters and conditions; these should be enlarged and standardized.

Image 5: The typical "mulch volcano" (left) causes bark rot, irregular root growth and early death. The image on the right displays one of the many types planting locals that Saratoga trees cope with.

Give Trees Their Best Shot Against the Urban Environment

Life is harsh for trees in an urban environment. They are assaulted by road salt and other chemicals, while facing air pollution. They are banged around and have construction equipment leaned up against them. But probably the harshest challenges they face are those of getting adequate moisture and to a lesser degree nutrients. Small tree wells (tree planting boxes located in sidewalks) and the solid, watertight (impervious) surfaces around them sharply limit the amount of water and oxygen available for the tree roots. Confined underground areas, full of urban infrastructure (like water and sewer lines) and construction debris, limits the room for their roots as well as the quality of the nutrients available. Heavy foot traffic, and even vehicular traffic, can compact the soil, further limiting access to water and the nutrients it carries.

Technology exists to provide increase rooting volume for trees beneath pavement. CU Structural Soils and Silva Cells are two examples of this technology. Both systems are designed to support vehicular loads and provide the same structural support to the finish pavements that standard crushed gravel sub-grades provide. However systems such as these also allow roots to penetrate and expand out from the confined tree wells. When coupled with porous pavements or block pavers these sub-base technologies can offer a tree massively increased access to moisture and oxygen, promoting vigorous tree growth.

The City Arborist will coordinate with the City Engineer to update all BMPs and standard details to ensure that trees have the best care possible from siting and planting, through maturation and continuing for a long, healthy life. There is some great local expertise, including that from Sustainable Saratoga's foresters, from Cornell Cooperative Extension, and from the DEC. There are also resources on the world-wide-web, including the following from Cornell's renowned forestry school. The compendium of information can be found in the widely used and respected booklet Recommended Urban Trees: Site Assessment and Tree Selection for Stress Tolerance. It can be downloaded at the following website and provides all of the information decisions when selecting trees for a specific planting location.
http://www.hort.cornell.edu/uhi/outreach/recurbtree/pdfs/~recurbtrees.pdf

4. ACTION STRATEGY 4. Identify, commit, and leverage more resources for the urban forest.

With the knowledge that the benefits from trees far outweigh the costs, mobilize financial and human resources, public and private, to preserve and expand our urban forest.

A. Leverage City funds whenever possible by applying for matching grants. The DEC and the Arbor Day Foundation are two likely possibilities for matching grant opportunities.

- Apply for the next round of DEC funding, for a grant to fund tree planting
- Research and apply for other federal, state, foundational or private environmental stewardship grants

B. Impose a fee permit to remove a tree from within the City's current or future Right of Way. Such fees should go directly into a funding the Urban Forestry program.

C. Share the expense for preserving and expanding the urban forest with homeowners by developing cost share programs for tree planting.

D. Engage civic partners such as Yaddo Gardens, Skidmore College, the New York Racing Association, the Chamber of Commerce, the Downtown Business Association, or Saratoga Spa State Park to participate in planting programs or campaigns (150 trees in 2013 to celebrate the City's Sesquicentennial.

E. Find creative ways to incentivize citizens, developers, business owners, and homeowners to expand and preserve the urban forest.

F. Continue to build a partnership with and negotiate with National Grid to plant and maintain large species trees wherever possible – only planting small species when necessary.

Public-Private Partnerships – How Things Get Done in the 21st Century

The Mayor highlighted this theme in his 2013 State of the City address. The past year's activity has given ample evidence that the citizens of Saratoga are interested in their trees. The partnership between the City and Sustainable Saratoga's Urban Forestry Project has served the public well, and the City should cultivate this relationship and consider formalizing it. For many aspects of the urban forestry program, it would make sense to consider how Sustainable Saratoga's technical expertise, understanding and control of the inventory data and mapping, fund-raising potential, and ability to mobilize volunteers can be deployed to the benefit of the community and our urban forest.

One cost effective proposal for planting large numbers of trees in a short time frame is to develop community planting days sponsored by a private group or local company. The DPW could identify planting locations, order the trees, and dig planting holes and have volunteers at the ready to manually plant bare-root trees that are purchased by their community group or corporation.

G. **Use Sustainable Saratoga's not-for-profit status to channel private funding into the City's urban forest.**

H. **Formalize the "Meet the Trees" program in Congress Park and establish ways for individuals to donate, plant, and care for trees throughout the City.**

I. **Engage community volunteers to help plant, inventory and "track" trees.**

Good tree policy does not always require City budget outlays

The 2012 changes to the tree lists—both at DPW and in the Subdivision Regulations—did not cost a penny, yet they will enhance the diversity and the resilience of our City's urban forest for generations to come. This is just one example of how changes in City culture and practices, without any budget outlay, can help to achieve the City's goals of preservation and expansion. Promoting shifts in our planning, design, and development expectations, by, shifting towards the idea that all designs will provide space for large-species trees to thrive, would cost the city nothing. Other policy changes with no budget impact could include the development and enforcement of standards to protect mature trees, both during construction and during infrastructure projects, and eliminating permits to pave tree belts in the public right-of-way.

There are also ways to stretch current dollars to have greater impact. Planting more trees, but moving to younger, smaller trees, can expand the urban forest for the same cost. This can be achieved because smaller trees can be planted as bare-root trees, which can be done easily by community volunteers overseen by DPW staff. Also, mounting evidence points to the planting of smaller trees as a wise choice because they overcome transplant stress much faster and begin to add significant above-ground growth much quicker than lager caliper trees. This allows smaller trees to catch-up to larger trees in size and stature. Changing the caliper specs in our land-use regulations could be combined with a revision of the spacing requirements for street tree planting in new development.

In some cases, changed policies may actually save money. Developing a strong tree removal policy in Chapter 220, one that limits tree removal to cases of dead trees and of trees posing danger to the public, would save DPW the costs of needless removals and preserve more mature trees, a precious city asset. Shifting some resources to nurturing young trees (irrigation, early formative pruning, etc.) is generally cost effective when compared to the costs of later intervention, whether replacing a tree lost through neglect or the higher costs of doing remedial pruning on mature trees. Creativity and smart policy can often be a great substitute for lavish spending.

Image 7: Bare root tree planting is an effective way to get many trees into the ground, engage citizen volunteers, and build community support for street trees while keeping the budget low.

5. ACTION STRATEGY 5. Promote & cultivate citizen involvement.

Engage the public in the care and stewardship of our urban forest. Build public-private partnerships to achieve the City's goals.

A. Raise awareness—through education, collaboration, and the exchange of information—among stakeholders about the value and needs of the urban forest.

- Engage with the downtown property owners of the Special Assessment District, the business leaders of the Downtown Business Association, the developers and the design community, and its own land use boards to promote its goals for the urban forest
- Educate the public about the rationale behind the tree lists (the DPW planting list and that in the Zoning Ordinance for developers to use); use maple trees only when necessary or appropriate to reduce their predominance and gradually diversify our urban forest (with the goal of no more than 20% form the genus Maple). See Appendix H for the recommended tree list.
- Bring focus to City tree plantings by bundling them into campaigns that will attract the public's interest. Plant 150 trees to celebrate the 2013 sesquicentennial of the race track. In anticipation of the centennial of the City's charter in 2015, plant 100 trees a year. Generate energy and interest by announcing planting or greening campaigns such as "1000 trees for Saratoga". Invite public participation. Use street festivals (Caroline St. block party) as occasions to have the public join in some symbolic tree planting.

Different People See Trees in Different Ways

The past year in Saratoga Springs has demonstrated that there is a large segment of the public that loves and values the City's trees. Trees have been found to reduce air pollution, increase property values, enhance the commercial vitality of a business district, decrease energy costs when properly sited, and generally improve human health and well-being. Yet some residents nonetheless see city trees as more nuisance than asset. Some residents have difficulty seeing past the seasonal messiness from the seeds or the fall leaf drop. Some simply have an aesthetic preference for a landscape without trees. Some find trees are in the way, whether it be of construction, development, progress, or just snowplowing. And others may think of trees as easily replaceable.

The City, has officially acknowledged the benefits provided by more trees and is publicly committed to "preserving and expanding" the urban. With this in mind, and as an essential part of nurturing stewardship, the City must explain and advocate to the public on behalf of the urban forest, to raise awareness about the benefits of trees.

B. Educate the public about the value and needs of the urban forest

- Produce and distribute information through educational brochures and web-based media
- Develop user-friendly sources of tree information for the DPW to distribute
- Encourage the public to value diversity and to eliminate invasive species trees and shrubs from the City
- Plan future tree plantings to anticipate the demands of global climate change.

C. Encourage direct citizen stewardship

- Encourage and incentivize private planting & maintenance and planting or maintenance partnerships with the City (for example in large parking areas.)
- Organize community planting days and trained citizen pruning teams

- Train volunteers to assist DPW with care of young trees and, monitoring the health of the urban forest. Build on the Congress Park model and that used by Sustainable Saratoga in the tree inventory. Overcome fear of liability by consulting with other cities who have used citizen volunteers successfully
- Utilize citizen scientists and researchers to inform and support City practices
- Solicit citizen input for planning, prioritizing
- Solicit citizen help in updating the tree inventory

D. Determine and formalize the ongoing role of a partnership with Sustainable Saratoga's Urban Forestry Project:

- Possible roles for Sustainable Saratoga might draw on its forestry expertise, its database management & mapping skills, its grant writing abilities, its capacity to raise funds as a 501c3 not-for-profit organization, and its ability to recruit and supervise volunteer stewardship.

The Community Forest goes beyond City hall and the City Right of Way

The City should encourage individual citizens, landowners and key stakeholder groups to work actively toward preserving and expanding of the urban forest. Only a small percentage of the urban forest is within the City right-of-way or park land. If Saratoga Springs is to reap the greatest benefits from our trees, we need individual property owners to take on the tasks of preserving and expanding the urban forest on their land as well. The City can provide guidance and resources, but individual landowners can help by preserving, planting and nurturing trees on their property.

Other individuals can respond to the need for community involvement by volunteering with the City as citizen tree stewards. Many cities in New York, including Ithaca, , Binghamton, Syracuse, and New York City, have programs to involve citizens as certified tree pruners, or engage them in citizen planting days. Saratoga Springs should use the volunteer programs of these cities to determine how best to enlist the citizenry in voluntary tree care. These strategies will build a stronger relationship between the residents and their urban forest.

Saratoga's business community has first-hand experience with becoming engaged in street tree planting efforts. They were pivotal in replanting Broadway during the "Plan of Action" of the 1970's. That effort recognized the important role streets trees play in the vibrancy of a successful downtown. Like during the 1970's "Plan of Action", the knowledge, enthusiasm, and organizing skills of stakeholder groups such as the Special Assessment District and the Downtown Business Association should also be involved in the re-greening of the downtown core.

V. Implementation Timetable: Goals to be accomplished in the short term, medium term, and long term

SHORT-TERM ACTIONS

The City of Saratoga Spring's goals to accomplish within one-year of adopting the urban and Community Forest Master Plan include:

Action Item	Action	Target Date	Collaborative Partners	Notes
IV.5	Invite public input to Master Plan	May 2013	DPW, City Council	
IV.2	Appoint City Arborist	May 2013	DPW; City Council	Presentation of Urban Forest Master Plan to CC provides good moment
IV.4	Contact DEC and prepare to apply for planting grant; apply for grant	April-May 2013; June '13	Planning Office	
	Adopt final version of Urban Forest Master Plan	June 2013	City Council	
IV.1	Revise/amend Title 5 of City Charter to include DPW responsibilities for the tree infrastructure	June 2013	DPW; City Attorney; Mayor's office	legislation that can have immediate beneficial impact
IV.2	Establish a team to refine plans for citywide planting priorities (locations) and planting targets (number per year)	June 2013	DPW (City Arborist) Planning Office Sustainable Saratoga	With no Tree Board yet on line, citizen input still a valuable part of planning
IV.2	Establish a team to explore the inventory data as a planning tool	June 2013	Planning Office Sustainable Saratoga	
IV.5	Organize a kick-off Tree Campaign uniting civic partners, to plant 150 trees to celebrate the 2013 City's sesquicentennial	Fall 2013	DPW, Mayor's Office, Sustainable Saratoga	
IV.1	Draft legislation to strengthen City Code (Chap. 220 & Chap. 203-23 [sidewalks]), Zoning Ordinance, Subdivision Regulations, and Standard Details	Summer 2013	Mayor's Office DPW Planning Office Sustainable Saratoga	
IV.3	City Arborist and City Engineering Department begins work on BMPs and updated Standard Details to promote the for trees	Summer 2013	City Arborist & City Engineer	Simple engineering task with immediate impact

Action Item	Action	Target Date	Collaborative Partners	Notes
IV.2	Devise a system for updating the inventory data on a regular basis & coordinating it with other planning tools	Summer 2013	City Arborist Sustainable Saratoga Planning Office	
IV.2	Standardize a process for maintaining, updating and completing the City's Street Tree Database	Fall 2013	Mayor's Office, DPW, City Arborist, and Sustainable Saratoga	Use the street tree inventory as a starting point
IV.5.	Improve DPW educational Tree Brochure	Fall 2013	City Arborist	
IV.3	Re-establish City's tree nursery and prepare for spring planting	Fall 2013	City Arborist, DPW City Council will pass resolution	
IV.5	Outreach to Special Assessment District, Downtown Business Association, private land owners and the design community to promote goals of urban forest	Fall 2013	Mayor's office and Planning Department	
IV.1	Provide training to joint session of the land use boards. Train them regarding the City's goals for the urban forest, and about provisions of the new legislation.	December 2013	Planning Office City Arborist	
IV.5	Begin to plan for citizen planting days	February 2014	Sustainable Saratoga City Arborist	
IV.1	Appoint citizen advisory Tree Board	February 2014	City Council	

MEDIUM-TERM ACTIONS

The City will work to accomplish these actions within three years of adopting the urban and Community Forest Master Plan includes:

Action	Target Date	Collaborative Partners	Notes
Begin to remove illegally or unpermitted tree-belt pavement	2014	City Arborist	
Remove illegally paved or unpermitted tree belts	2014	Department of Public Works	
Rewrite Chapter 220 as an effective Tree Ordinance and bring revised and strengthened City Code (Chap. 220 & Chap. 203-23 [sidewalks]), Zoning Ordinance, Subdivision Regulations, and Standard Details to City Council for consideration & adoption	2014	City Council	Include a Tree Removal Policy, Legacy Tree Policy, Tree Banking and Improved tree protection standards
Set target planting areas and planting numbers for the next three years	2014	City Arborist	
Develop City standard details and design guidelines to maximize tree survival	2014	City Engineer and City Arborist	Include tree planting, sidewalk sub-base design, drainage, pavement design, planting, maintenance and tree protection standards
Continually update and maintain existing tree inventory with additions and deletions	2014	Tree Board and City Arborist	
Anticipate the City's Centennial by planting 100 ADDITIONAL trees a year until 2015	2014	Tree Board and City Arborist	Involve Special Assessment District or Downtown Business Association in project
Develop Tree planting Campaigns	2014	Tree Board and City Arborist	"Tree Toga's Core" or "Green Toga's Gut" or "1000 trees for Saratoga"
Develop demonstration road construction plans to showcase integration of "green streets" and "complete streets" design into one square block or roadway segment	2015	City Engineering and City Planning Dept.	
Expand existing tree inventory with using the DEC approved "sample" method	2015	Tree Board and City Arborist	
Uncover paved tree wells, improve root zones and replant on all street within one block of Broadway between Congress Park and the City Center	2015	City Arborist and City Engineering	
Become designated a Tree City USA	2015	Tree Board, City Arborist, Planning Department	
Deferred tree maintenance completed	2016		

LONG-TERM ACTIONS

The City will accomplish these within six years of adoption of this Plan

- **Continue to work toward a policy of planting 500 trees per year**
- **Complete the five-year review of the Urban and Community Forest Master Plan and assess progress that has been made toward the goals and actions the City is committed to.**
- **Set a date for additional review five years hence.**

VI. Planting Priorities

Setting planting goals and selecting target areas requires that we identify a suitable metric for measuring the results. Canopy cover, sometimes used, is a complicated and difficult metric to use and quantify, but it is worth exploring. An easier metric to apply would be the number of trees on our streets. If the targets are set for future planting by estimating tree numbers as determined in the Subdivision Regulations and current zoning law then an average spacing of 40 feet between trees in the transect zones and an average of 100 feet in residential subdivisions is required.

Applying this formula suggests that 19,000 trees should be present on the City's streets. It is estimated that 13,000-15,000 currently exist. Over a twenty year period, just to close this gap without replacing dead or damaged trees 200-300 trees would need to be planted every year. As described earlier an additional 500 trees will need to be planted per year simply to sustain the current tree population.

Planting at these high rates can only occur with a planned and coordinated effort. Priority areas should be identified using the street tree inventory data and associated maps as guidance. Four priority areas, which are determined to have a low level of planting by the street tree inventory, are discussed in the following pages. These areas include the commercial core, Congress Square, Vanderbilt Terrace neighborhood, and the Southwest Neighborhood.

The Commercial Core

Trees are known drivers of positive commercial activity. In recent decades, Broadway is no longer a narrow band of activity that thins out sharply as one moves a block or two from it. Broadway is now the core of a broadening band of commercial and retail activity, condos and apartments, and new additions such as an 11-screen movie theater. Yet the streetscapes on most of the intersecting and adjacent streets around Broadway's core stretch are surprisingly barren of trees. Currently a great deal of construction is underway or being considered throughout this area. This presents a great opportunity to beautify the central district, benefit from the trees ecosystem services, and enhance the business environment in the area. The City should consider opportunities to create improved growing conditions for trees and require public/private partnerships to re-plant this area of the City. Because of the extensive need to rebuild sidewalks, integrating green infrastructure, CU Structural Soils and overall urban design into a revitalized street tree population in the urban core, a sample planting plan is not part of this report.

Figure 9: According to the tree inventory, within the downtown core only Broadway has significant tree cover.

It is well known that the pressure on tree survival in this downtown core is intense. Small tree pits, limited access to water, physical abuse by people, dog urine, and compacted, alkaline soils are all significant stressors. Measures to mitigate these environmental stresses are well tested in more urban environment than Saratoga Springs, where trees populate the center of the largest and most bustling cities. There are examples, right on Broadway, of some very large planting areas with healthy and mature street trees growing in them. Clearly, in the past Saratoga Springs has adequately designed for trees and can again do so in the future. Some of these strategies are more thoroughly discussed in Appendix D and include selecting the right tree for the right location, providing adequate soil volume, and protecting the tree with tree grates and guards.

Image 8: In Portland Oregon, Stormwater infrastructure and street trees are integrated in large planters.

Image 9: NYC is giving trees a better growing environment by increasing rooting volume and integrating stormwater management systems with the planters.

The following photographs and photo simulations display what some of the streets in the downtown core could look like if the street trees were given more priority.

Image 11: If the tree pits on Caroline Street were replanted, and the growing conditions improved by expanding the rooting volume for the trees, it could be a very different looking street and functioning street. Photo simulation courtesy of Anne Diggory.

Image 12: This underused and desolate portion of Putnam Street should be improved with the presence of street trees. Photo simulation courtesy of Anne Diggory.

Image 10: South facing masonry building facades, such as this one on City Hall absorb a great deal of solar radiation and contribute to the "urban heat island effect." Large trees planted adjacent to this structure would shade it, lowering the buildings cooling needs.

Washington Street and Congress Square Neighborhood

Image 13: Washington Street as it approaches the Franklin Street intersection is nearly devoid of trees but offers ample tree lawns for planting.

Image 14: Washington Street approaching the Federal Railroad Place intersection may be a place to integrate innovative design solutions for integrating sidewalks, trees, and tight property lines.

The Washington Street and Congress Plaza Neighborhood is primarily a commercial area that extends west of Broadway. Today much of the area is dominated by the large parking lot in the center block between Washington Street Federal Street and Congress Street. But this area is growing in commercial importance and will likely see a burst of development over the coming decade. This area of the City offers a good opportunity for the City to demonstrate alternative designs and planting techniques to maximize tree survival. Along the north side of Washington large tree wells could be integrated into the sidewalk with green infrastructure stormwater management solutions. Similar solutions could be used on Congress to improve the tree canopy and integrate pedestrian space with green infrastructure. On the Following page is an example planting plan of how the area could be improved with street trees.

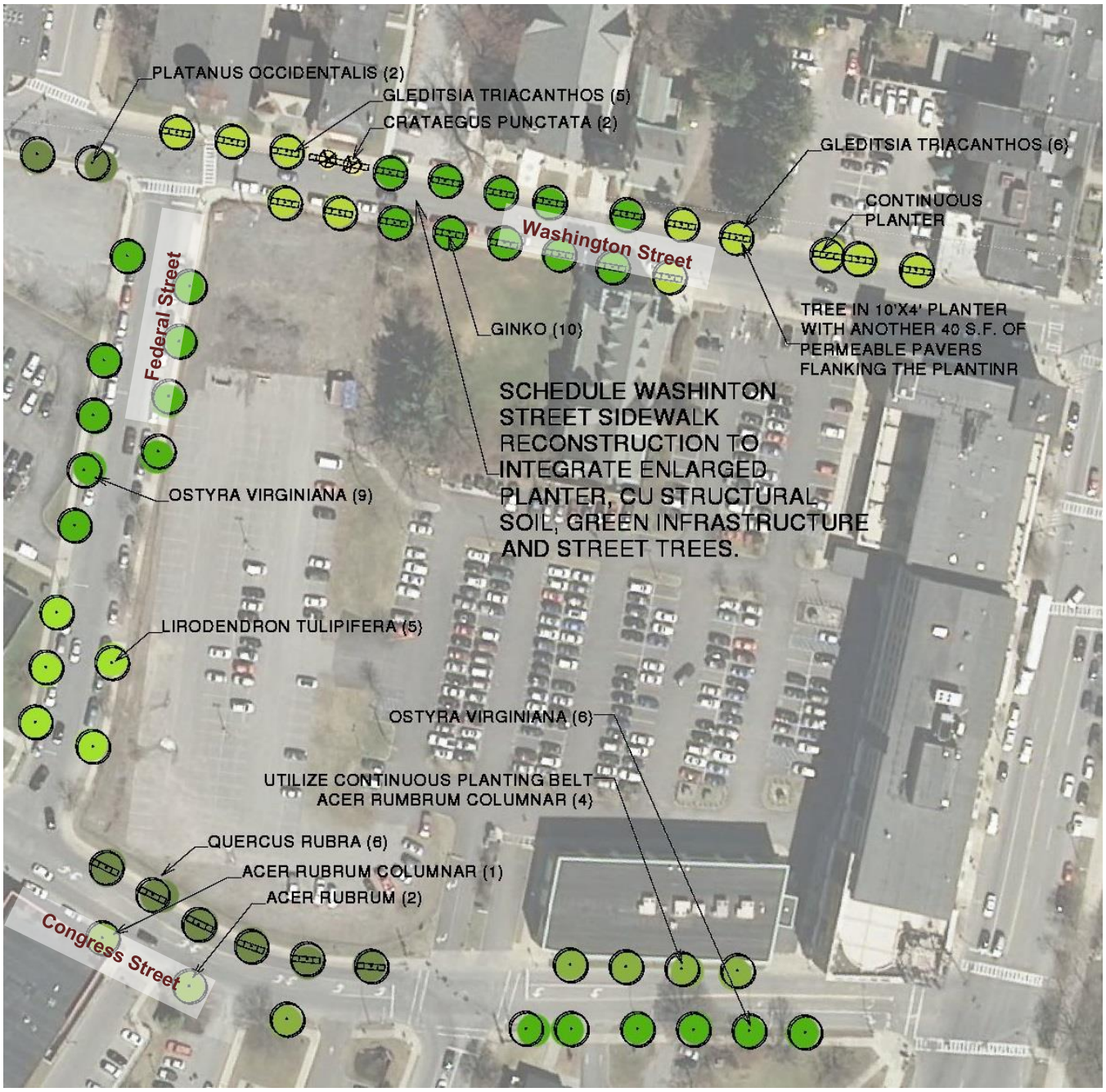

Figure 10: A sample planting plan of the Washington Street and Congress Street Block, including Federal Street. Congress Street and Washington Street are good opportunities to demonstrate the integration of pedestrian space, tree planting, and green infrastructure stormwater management techniques. Additionally these large parking areas offer a good opportunity for the City to engage in a public/ private venture by adding trees in and around these parking facilities.

Vanderbilt Terrace

Figure 11: The streets around Vanderbilt terrace are noticeably devoid of trees. In the spirit of environmental justice, this area should be a priority planting area for the City

As a means to begin rectifying the sense of environmental justice as described in the original DEC grant application and raise the standard of living in some of Saratoga Springs' lowest income neighborhoods, a sample planting plan is proposed for Vanderbilt Terrace (Figure 13). Today Vanderbilt is almost completely devoid of street trees, while Jefferson is lightly treed. The internal roads of the development are also sparsely planted. The plan on the following page illustrates a potential planting plan for these streets, using trees from the recommended tree list as outlined in Appendix H.

Most of this land, and all the internal parking and roads is actually owned and maintained by the Federal Government, which would require a partnership with the land owner but may also offer environmental improvement grant funding opportunities. Figure 13 illustrates a potential tree planting plan for the neighborhood that introduces a variety to add diversity to the urban forest.

Note, the trees in this illustration do not reflect specific soil conditions such as moisture and pH that will need to be clarified prior to planting.

Southwest Neighborhood

Figure 12: This neighborhood is bordered by some of the major City gateway corridors but is virtually treeless.

The southwest neighborhood remains virtually treeless. The area is bound by Ballston Ave (Route 50) on the east , West Congress on the north, Aletta Street on the west, and South street on the south.

With the proposed reconstruction of the Ballston Avenue, this area is primed for replanting and full reconstruction integrating stormwater utilities with tree supporting green infrastructure.

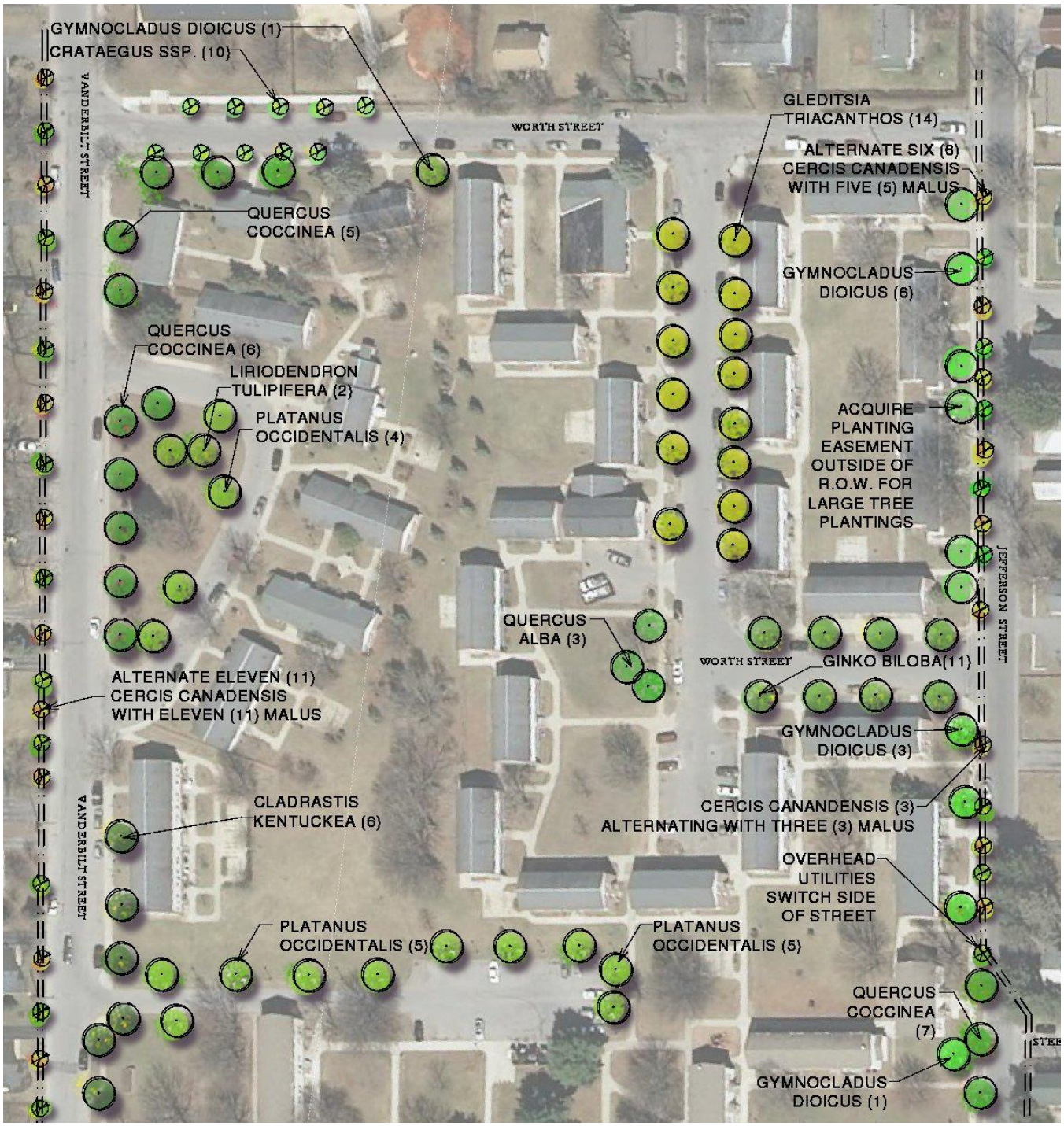

Figure 13: Vanderbilt Terrace neighborhood is virtually devoid of tree cover. This illustration displays a potential planting plan that recognized overhead wires and other planting constraints and proposes a diverse selection of trees. Opportunities exist to partner with the Federal Government to acquire grants and plant on Federal land.

APPENDIX A – Tree Inventory Data Sheet

Saratoga Springs Street Tree Inventory Form (rev. 9 April 2012)
Survey one entire side of the street segment. then survey the other side (DO NOT criss-cross street). Mark cross streets w/ an "X" & street name; then skip to next line. 1 hour

Surveyor(s) Name(s): _____ E-mail or Phone: _____ Date: June 11a Time out: _____ Time in: _____

Zone: 19 Street: Phila Street Start Cross Street: Nelson Ave End Cross Street: Court St

Forester(s) Name(s): _____ E-mail or Phone: _____ Date: _____ Time out: _____ Time in: _____

ID #	Street (side)	Street #	GPS Coordinates Latitude (nn.nnnnn)	GPS Coordinates Longitude (nn.nnnnn)	Species	Circum (in)	Crown Diam. (ft)	Location Code	Required Pruning None	SP	SSP	DL	Conflicts Wire	Side	Cond (1-5)
1	S	180	43.07278	73.77592	black maple	101	28	2	✓						1
2		168	07919	77750	[illegible]	25	16	2	✓				✓		2
3		158	07933	77805	beech	62	20	2	✓				✓		3
4		156	07935	77824	green norway maple	47	20	2	✓				✓		2
5		156	07938	77831	norway maple	33	20	2	✓				✓		2
	Cross over N														
6		153	07951	77820	norway maple	47	25	2	✓						3
7		153	07944	77809	sugar maple	48	17	2	✓						1
8		159	07941	77794	poplar pear ✓	38	16	2	✓						1
9		163	07938	77770	elm var.	27	12	2	✓						4
10		165	07932	77760	norway maple	49	17	2	✓				✓		2
11		165	07930	77751	sugar maple	65	21	2				✓			3
12		173	07923	77718	norway maple	48	24	2	✓					✓	2
13		side	07912	77663	norway maple	47	26	2				✓			4

ID #: sequential number starting at 1 for each street
Street (side): Street name with direction of side (E, W) *or* cross street encountered (no ID # or Street # for cross streets)
Street #: nearest house/building number
GPS Coordinates: in Decimal Degrees, *not* Degrees/Minutes/Seconds
Species: choose from valid species list
Circum (in): measured circumference, in inches, at 4-1/2 ft. height
Crown Diam. (ft): width of leafed crown parallel to street (ft)
Location Code: 1=Planter Box, 2=Next to Sidewalk, 3=No Sidewalk (tree within 8ft. of street)
Required Pruning: place check in appropriate column(s) SP=prune for sidewalk clearance; SSP=prune for street sign visibility; DL=prune dead limb
Conflicts: place check in appropriate column(s) Wire=conflict with overhead wires Side=conflict with sidewalk
Cond (1-5): health condition of tree 1=excellent; 5=dead

APPENDIX B - Chapter 220 Update – Sample Tree Ordinance

Chapter 220: Trees
Saratoga Springs City Code
Draft version (2013)

Discussion: Chapter 220 of the Code of the City of Saratoga Springs appears to date largely from around 1970. This early attempt at establishing a tree ordinance contains a number of provisions that protect the city's publicly-owned trees, including:

- Placing the planting, removal, care, maintenance and protection of trees, plants and shrubs on public highways and public places under the jurisdiction of the Department of Public Works (DPW).
- Requiring a written permit from the DPW for removal, pruning or destruction of any city-owned tree, plant or shrub.
- Requiring a written permit from DPW for the planting of any tree on city streets or city land.
- Prohibiting the application of substances that may kill a tree, plant or shrub, or the attachment of signs, wires, chains, etc.
- Requiring landowners to trim trees if their branches protrude into streets or sidewalks and, if a landowner refuses, requiring DPW to do it.
- Authorizing DPW to trim or otherwise treat city trees, plants or shrubs if necessary to protect their health, and to remove them if necessary to protect public safety.
- Authorizing DPW to require landowners to treat or remove trees on private property to protect public trees from the spread of insects or diseases or other sources of injury.
- Providing for penalties for violations.

Many of the goals of the draft Urban Forest Master Plan could be promoted through adherence to the provisions of the existing ordinance. For instance, occasionally well-meaning homeowners plant trees in the city tree belt. Often, they choose inappropriate trees for that location invasive species, species that will grow tall and interfere with power lines, or small trees where a large tree would thrive. The enforcement of the existing requirement of a DPW permit for planting would involve the city arborist, who would assure that only trees of appropriate species and size would be planted in approved locations. Enforcement of the requirement of a permit for pruning or tree removal would allow the city arborist to educate landowners about proper pruning practices and prevent unnecessary removal.

While the existing Chapter 220 provides a starting point, many important provisions of a modern, comprehensive tree ordinance are missing and actual DPW practices differ from it on many key points. The following draft both revises and expands the scope of the current Chapter 220, in order to make it a more effective vehicle for the implementation of the city's Urban Forest Master Plan.

Besides Chapter 220 of the city code, legal requirements affecting trees are also contained in the city's Zoning Ordinance and Subdivision Regulations. These also should be revised and expanded to accomplish the City's goals for the urban forest. To make it easy for city employees and the public to find all legal requirements affecting trees, these provisions should either be consolidated into a single tree ordinance or cross-referenced between Chapter 220 and the Zoning Ordinance.

This draft tree ordinance draws on many sources.

1. The International Society of Arboriculture provides excellent, detailed guidance about tree ordinances in their *Guidelines for Developing and Evaluating Tree Ordinances*, available at http://www.isa-arbor.com/education/resources/educ_TreeOrdinanceGuidelines.pdf
2. The New York State DEC webpages about designing tree ordinances are also useful, if far less comprehensive, and can be viewed at http://www.dec.ny.gov/lands/5276.html
3. This draft for a new tree ordinance makes some use of the current Chapter 220, but other tree ordinances from small cities in New York and Massachusetts were consulted and provided new language in the draft ordinance. Among the most useful were ordinances from Middletown, Auburn, North Tonawanda, Mount Pleasant, Glen Cove, and Rye in New York and from Chicopee, Granby, and Orleans in Massachusetts.

The following table compares the contents of the draft Chapter 220 to the recommendations for content and structure from the ISA and from DEC, as well as to the content of the current Chapter 220.

Draft Chapter 220 (2013)	DEC recommended contents	ISA recommended contents	Current Chapter 220 (1970 & amended)
CHAPTER 220: Trees (2013 draft)		1. Title	CHAPTER 220: Trees (1970 ordinance)
220-1. Finding & Intent; Purpose	I. Purpose	2. Findings 3. Purpose and intent	NOT in CHAP 220
220-2. Definitions	II. Definitions	4. Definitions 5. Determination of Definitions	NOT in CHAP 220
220-3. Establishment of a Tree Board	III. Establishment of a Tree Board	16. Establish a tree board	NOT in CHAP 220
220.4. Municipal Authority & Responsibility	IV. Municipal Authority and Responsibility	6. Jurisdiction	CHAP 220-1 - clarification required
220.5. Clarification of Title to & Responsibility for Trees	V. Clarification of Title to and Responsibility for Trees	6. Jurisdiction	CHAP 220-1 & 220-6 – clarification required
220.6 – Policies regarding trees – draw from Urban Forest Master Plan		7. Policies regarding trees -- draw from Urban Forest Master Plan	NOT in CHAP 220
220.7 – Local govt. disclaims liability		8. Local govt. disclaims liability	NOT in CHAP 220

220.8 – Tree Welfare: protection, removal, planting, permits and petitions, prohibited activities	VI. Planting, Maintenance and Removal – IX. Prohibited Activities X. Tree Protection XI. Permits	29. Harming public trees forbidden 30. Permit required for activities that may damage public trees 31. Permit required for activities re: protected private trees	Some of this is in current CHAP 220, but much of this is not; see esp. the current 220-2, 220-3, 220-4, 220-5, 220-6
220.9 – Interference with city officials		9. Interference with city officials	NOT in CHAP 220
220.10 - Trees on Private Property Trees	VII. Trees on Private Property Trees –		CHAP 220-6.B, C, D – clarification required
220.11 - Requirements of Professionals	VIII. Requirements of Professionals –	28. Licensing of professionals	NOT in CHAP 220
220.12 - Enforcement, Penalties and Appeal	XII. Enforcement, Penalties and Appeal -		See 220-7 & 220-8
220.13 – Severability	XIII. Severability –		NOT in CHAP 220
220.14 – Other	XIV. Other -		NOT in CHAP 220
Separate, appended document: Standards & Regulations	APPENDED: Standards & Regulations		

Chapter 220: Trees
Saratoga Springs City Code
Draft version (2013)

220.1 Finding & intent; Purpose

There is no such section in Chapter 220.

DEC: A clear statement of purpose or intent of this ordinance will help avoid ambiguity in interpretation.

Finding & Intent & Purpose

A. http://ecode360.com/12113512 - 12113512The City of Saratoga Springs hereby finds that the preservation and expansion of the urban forest will serve the public interest by improving the community's physical, social, cultural, and economic environment. Trees are a valuable asset, a cost-effective component of our urban infrastructure. They abate noise, provide welcome and energy-saving shade to people, reduce greenhouse gas emissions, enhance air quality, and reduce stormwater runoff and pollution. They also enhance the beauty of our City and provide a natural habitat for birds and other wildlife. Finally, trees contribute to the profitability of our retail, restaurant, and tourism businesses and increase real estate values in our neighborhoods. Since the benefits derived from the urban forest generally increase as tree size and canopy cover increase, it is in the best interest of our community to protect its existing tree assets and limit the removal of existing trees. Increasing the number of trees in our city (and the number of large-canopy trees in particular) will lower municipal and citizen costs in many areas, benefit the commercial viability of the city, and enhance the health, safety and general welfare of our citizens and visitors which municipalities are authorized to protect.

B. It is the purpose and intent of this law to preserve and expand our urban forest by means of regulating the planting, maintenance and removal of trees on both public and private property, thereby maximizing the benefits trees provide to our community. To accomplish this, the law will establish the means to expand the urban forest through planning and planting, and to preserve the urban forest through regulation of the removal of trees within the City and through standards that insure the replacement of trees removed. By these means, we will promote the ecological, commercial, and aesthetic environment necessary for a healthy and prosperous community.

This ordinance establishes policies, regulations, and standards necessary to ensure that the city will continue to realize the benefits provided by its urban forest. The provisions of this ordinance are enacted to:

A. Establish and maintain the maximum sustainable amount of tree cover on public and private lands in the city;

B. Maintain city trees in a healthy and nonhazardous condition through good arboricultural practices;

C. Establish and maintain appropriate diversity in tree species and age classes to provide a stable and sustainable urban forest.

220.2 Definitions

There is no such section in Chapter 220.

DEC: Definitions of terms used in the ordinance such as street tree, adjacent property owner, drip-line, nuisance, etc., will prevent confusion in interpretation and enforcement of the ordinance.

DEFINITIONS [NOTE: this list includes terms not found in the current draft. When the draft is finalized, the list of definitions should be tailored to explain the key terms in the ordinance, adding those necessary and deleting those not needed.]

A. For the purpose of this article, the following terms, phrases, words and their derivations shall have the meanings given herein:

ABUTTING LANDOWNER The owner of property that touches, borders on, or is contiguous to the tree-lawn or public right-of-way.

CANOPY TREE PROTECTION ZONES All lands, whether public or private, within 25 feet of the curb line of any street or way.

CITY ARBORIST (or COMMISSIONER OF PUBLIC WORKS) The City Arborist or other qualified designated official of the City of Saratoga Springs assigned to carry out the enforcement of this article.

CROWN All portions of a tree excluding the trunk and roots, such as branches, leaves, flowers and other foliage.

CRITICAL ROOT ZONE (CRZ) The minimum area beneath the canopy of a tree which must be left undisturbed in order to preserve a sufficient root mass to give a tree a reasonable chance of survival. The CRZ is represented by a concentric circle centering on the tree's trunk and extending outward towards the tree's drip-line. The minimum area of the CRZ shall be dependent on the required minimum radius of the CRZ; the required minimum radius of the CRZ shall be determined by multiplying a tree's dbh (in inches) by eighteen (18) inches, with the resulting product constituting the minimum radius of the CRZ. EXAMPLE: A tree with a dbh of twenty (20) inches shall have a CRZ with a minimum radius of 360 inches or 30 feet (20" x 18" = 360" or 30').

dbh (DIAMETER AT BREAST HEIGHT) The tree trunk diameter measured in inches at a height of 4 1/2 feet above the ground. If a tree splits into multiple trunks below 4 1/2 feet, then the trunk is measured at its most narrow point beneath the split.

DFS (DENSITY FACTOR SITE) The required density factor for the site.

DRIP-LINE - The area surrounding the tree from the trunk to the outermost branches. This area is distinguished from, and not to be confused with Critical Root Zone.

EDF (EXISTING DENSITY FACTOR) The number of trees remaining on site and protected during the construction phase.

LARGE TREES Those attaining a height of 45 feet or more. MEDIUM TREES Those attaining a height of 30 feet to 45 feet.

MUNICIPALITY The City of Saratoga Springs, County of Saratoga, State of New York.

PARK Includes all public parks having individual names.

PARKS DEPARTMENT The designated department of the municipality under whose jurisdiction the administration of the article falls.

PERSON Any person, firm, partnership, association, corporation, company or organization of any kind.

PRIMARY TREE PROTECTION ZONE That portion of a building lot constituting the front, side and rear yard setbacks. In cases where the building setbacks appearing on the Zoning Map are greater than indicated in Chapter 218, Zoning, they shall be the controlling dimension.

PRINCIPAL THOROUGHFARE Any street upon which trucks are not prohibited.

PROPERTY LINE The outer edge of a street or highway.

PROPERTY OWNER The person owning such property as shown by the Tax Maps or assessment rolls of the City of Saratoga Springs.

PROTECTED TREES Any tree or tree species that shall be deemed protected or significant by the City Council.

PUBLIC PLACES Includes all other grounds owned by the City of Saratoga Springs.

PUBLIC TREES Includes all shade and ornamental trees now or hereafter growing on any street or any public area where otherwise indicated.

RDF (REPLACEMENT DENSITY FACTOR) The number of trees that must be planted on site to replace those that are removed or cut down.

RIGHT-OF-WAY City-owned or -controlled area of ground between the private property line and the edge of the curb or street.

TREE BELT That part of the street or highway not covered by sidewalk or other paving, lying between the property line and that portion of the street or highway usually used for vehicular traffic.

TREE PROTECTION & MITIGATION PLAN - A plan submitted to the Building Department for review prior to the commencement of demolition and/or construction on a property on which a Protected Tree is located. This plan may be either part of a landscape plan and/or a separate plan.

TREE PROTECTION ZONE All tree belts, parks and other City-owned property, and all land within any right-of-way of any street or highway.

SMALL TREES Designated as those attaining a height of 20 feet to 30 feet.

SPECIMEN TREE

(1) Any tree in fair or better condition which equals or exceeds the following diameter sizes:
   (a) Large hardwoods, e.g., oaks, hickories, sweetgums, etc.: 30 inches dbh.
   (b) Large softwoods, e.g., pines, etc.: 36 inches dbh.
   (c) Small trees, e.g., dogwoods, redbuds, sourwoods, etc.: 12 inches dbh.

(2) A tree in fair or better condition must meet the following minimum standards:
   (a) A life expectancy of greater than 15 years.
   (b) A relatively sound and solid trunk with no extensive decay or hollow and less than 20% radial trunk dieback.
   (c) No more than one major and several minor dead limbs (hardwoods only).
   (d) No major insect or pathological problem.

(3) A lesser-size tree can be considered a specimen if it is a rare or unusual species, of exceptional quality or of historical significance.

(4) A lesser-size tree can be considered a specimen if it is specifically used by a builder, developer or design professional as a focal point in a project or landscape.

SPECIMEN TREE STANDS A contiguous grouping of trees which has been determined to be of high value. Determination is based upon the following criteria:

(1) A relatively mature even-aged stand.

(2) A stand with purity of species composition or of a rare or unusual nature.

(3) A stand of historical significance.

(4) A stand with exceptional aesthetic quality.

STREET OR HIGHWAY The entire width of every public way or right-of-way when any part thereof is open to the use of the public, as a matter of right, for purposes of vehicular and pedestrian traffic.

TDF (TREE DENSITY FACTOR) A unit of measurement used to prescribe and calculate tree coverage on a site. Unit measurements are based on tree size.

TREE Any woody plant having at least one well-defined trunk at least four inches in diameter measured at a height of four feet above the natural grade and having a clearly defined crown.

TREELAWN That part of a street or highway, not covered by sidewalk or other paving, lying between the property line and that portion of the street or highway usually used for vehicular traffic.

TREE PROTECTION, PRESERVATION AND REFORESTATION PLAN A plan identifying and showing the location, type, size and health of trees, stating the ultimate disposition of the trees, showing the type, size and location of any trees to be planted and setting forth measures to protect trees before, during and after construction.

TREE PROTECTION ZONE

TREE REMOVAL Any act which causes a tree to die within two years after the commission of said act, including but not limited to damage inflicted upon the root system or trunk as the result of: (1) Improper use of machinery on the tree. (2) Storage of materials in or around the tree. (3) Soil compaction. (4) Altering the natural grade to expose the roots or cover the trunk, permitting the infection or infestation of the tree by pests, fungus or harmful bacteria. (5) Excessive harmful pruning. (6) Paving with concrete, asphalt or other impervious surfaces within such proximity as to be harmful to the tree. (7) Application of herbicides or defoliants to any tree without first obtaining a permit from the approving agency.

5. When not inconsistent with the context, words used in the present tense include the future, words in the plural include the singular, and words in the singular include the plural. The word "shall" is mandatory and not merely directory.

220.3 Establishment of a Tree Board

There is no such section in Chapter 220.

Note: One of the requirements of the National Arbor Day Foundation for the recognition of a city as a Tree City USA is the establishment of a tree board or department legally responsible the management of city trees. The establishment of a volunteer advisory tree board, along with the designation of city arborist, would provide a solid foundation for effective management of the urban forest. Establishment includes defining membership, terms, powers, duties, and meetings.

A. There is hereby created and established a Tree Board for the City of Saratoga Springs, New York, which shall consist of seven members who shall be residents of the City. Three board members shall be nominated by the Mayor and each other commissioner shall nominate one member to the Tree Board. All members shall be confirmed by vote of the full City. Members of the Tree Board will serve without compensation.

B. To help coordinate the work of this Board with the other departments of government, the Commissioner of Public Works will designate the City Arborist or another employee of the Public Works Department to work with the Tree Board on an advisory basis. At the request of the Commissioner of Public Works, the Mayor can appoint a member of the Planning Office to this role. Lacking the appointment of such a member, the Tree Board will keep the City Council appraised of its activities by providing minutes of all meetings to all Commissioners.

C. Term of office. The term of the seven persons appointed to the Tree Board shall be five years, except that the term of office of two of the members appointed to the first Board shall be for only three years, and the term of two members of the first Board shall be for two years. In the event that a vacancy shall occur during the term of any one member, his successor shall be appointed for the unexpired portion of the term. Two of the members of the Tree Board shall be trained in, or have considerable experience in, in forestry, botany, horticulture or landscape design.

D. Duties and responsibilities.
   (1) The Tree Board, working with the City Arborist, develops an annual written plan for the care, preservation, planting, replanting, and removal of trees and shrubs along streets and in parks and other public areas. Such plan will be presented annually to the City Council and, upon its acceptance and approval, shall constitute an addendum to the Urban Forest Master Plan for the City of Saratoga Springs, New York.
   (2) The Tree Board advises the City Arborist on updates to the arboricultural manual;
   (3) The Tree Board, working with the City Arborist, reviews petitions for the removal of street and park trees publicly at regular Board meetings, and approves or denies the petitions based on the criteria as defined in Section VI (Tree Welfare: protection, removal, planting, permits and petitions);

   (4) The Tree Board reviews City plans and policies which contain matters relating to urban forestry, community values, arboriculture, and horticulture;
   (5) The Tree Board recommends and reviews legislation regarding the urban forest;
   (6) The Tree Board develops a program for identifying and maintaining trees in the city which have significant historical, cultural, environmental or public significance and makes recommendations to the City Council on adopting such a program;
   (7) The Tree Board disseminates news and information emanating from its work to the City Council;
   (8) The Tree Board may provide educational programs and information regarding the protection, maintenance, removal and planting of trees in the City.
   (9) The Tree Board shall choose its own officers, make its own rules and regulations and keep minutes of its monthly meetings to be filed with the Department of Public Works. A majority of its members shall be a quorum for the transaction of business.

220.4 Municipal Authority and Responsibility

DEC: Who within the municipal government is responsible for administration of the ordinance? Is there a City Arborist? Does this person have authority for enforcement action? This section also defines and designates who is responsible for planting, care and protection of the urban trees.

There is no such section in Chapter 220.

§ 220-1. Jurisdiction of Department of Public Works.

The Department of Public Works shall have exclusive jurisdiction, authority, control and supervision of all trees, plants and shrubs planted or growing in or upon the public highways and public places of the City of Saratoga Springs and the planting, removal, care, maintenance and protection thereof.

This section will need to be expanded to define the authority of the City Arborist and of the Tree Board.

220.5 Clarification of Title to and Responsibility for Trees

No such section in Chapter 220.

DEC: This section clarifies which trees are publicly owned and which are privately owned. This section may also describe a process by which adjacent landowners may work on a street tree abutting their property within the standards set by the municipality.

Note: While the existing code describes the responsibilities of adjacent landowners to trim city-owned trees, it should be revised to clarify the standards to be met by landowners doing tree work under permit from DPW, and the involvement of the city arborist in education and enforcement of those standards. American National Standard Institute tree care standards (ANSI A300) should be incorporated.

220.6 Policies regarding trees

There is no such section in the current Chapter 220.

Note: Look for guidance on this topic from the ISA booklet, and draw the policies directly from the Urban Forest Master Plan that is adopted.

220.7 - Local government disclaims liability

No such section in Chapter 220.

A. Nothing contained in this section shall be deemed to impose any liability upon the city, its officers or employees, nor to relieve the owner of any private property from the duty to keep any tree, shrub or plant upon any street tree area on his property or under his control in such condition as to prevent it from constituting a hazard or an impediment to travel or vision upon any street, park, pleasure ground, boulevard, alley or public place within the city.

220.8 TREE WELFARE: protection, removal, planting, permits and petitions

This section replaces several sections of Chapter 220, covering such issues as planting [220-5], maintenance requirements [220-4 & 220-6], and permits [220-2]. It is adapted from ordinances of several comparably sized cities in New York and Massachusetts.

DEC: Adjacent landowners may want to plant trees and work on trees on the public right-of-way abutting their property. This section describes how a landowner may do this in accordance with the forest management practices recommended in the City's ordinance. Be aware that if the process or cost of obtaining a permit is considered excessive, citizens will be less likely to comply with the ordinance.

220.8.1. Activities Requiring a Permit

A. Construction activities, including sidewalk construction, repair, or replacement, within the drip line of a public tree that may be damaging to the tree.

B. Planting a tree on public property or right-of-way

Sidewalk conflicts. Every effort must be made to protect the major root systems of mature trees during sidewalk construction, repair, and replacement. The City Arborist and the City Engineer will work with property owners to determine the best design for all sidewalk work, including curved sidewalks, narrow sidewalks (following ADA standards), and the use of sidewalk surfaces other than concrete.

220.8.2. Activities Requiring a Petition to the City Arborist

A. Removal of a public tree

B. Pruning of a public tree, including root pruning or disturbance

220.8.3. Prohibited activities

A. Carving

B. Breaking of limbs

C. Poisoning

D. Cutting or digging of roots

E. Girdling, nailing

F. Posting of signs

G. Paving of tree belts

H. Topping or otherwise damaging

I. Injuring or otherwise putting public trees at risk, including injuring the major roots of public trees

Topping. Trees severely damaged by storms or other causes, or trees under utility wires or other obstructions where other pruning practices are impractical shall be exempted from the topping prohibition at the determination of the Department of Public Works.

Injuring or putting public trees at risk. No stones, cement, blacktop or other substances which will impede the passage of water and air to the roots of a tree in or on any street, park or public property shall be placed or maintained unless an open space of at least 12 square feet is left outside and around the trunk of the tree, except with the written permission of the Department of Public Works.

Excavation, including sidewalk construction, repair, and replacement within the street right-of-way for the purpose of compliance with this section shall not be undertaken without a permit from the City Engineer.

220.8.4. Department of Public Works responsibilities.

Costs of tree planting, maintenance, removal, and replacement. Unless stated explicitly otherwise, the city is responsible for the costs of planting, maintenance, removal, and replacement of public trees. Exceptions to this, where the costs will be the responsibility of the property owner, are noted below.

Pruning. It is the responsibility of the Department of Public Works, with input from the Tree Board, to prune any street tree for the following reasons:

(1) Tree branches are obstructing light from a street lamp or obstructing the view of street intersections, traffic control devices or signs.

(2) To provide a clear space of eight feet above the surface of a sidewalk.

(3) To provide a clear space of 13 feet above the surface of a street.

Removal and replacement. It is the responsibility of the City Arborist, with input from the Tree Board, to determine if trees or shrubs on City-owned property are hazardous and to remove dead or hazardous trees or shrubs from City-owned property. The City shall replace the tree or shrub within one year of removal. Property owners shall have the right to replace removed trees at their own cost and upon prior approval of the City Arborist.

Wherever it is necessary to remove a tree or shrub from a public right-of-way in connection with the paving of a sidewalk or the paving or widening of a street, the City or responsible agency or person shall replant such tree or shrub or replace it. If conditions prevent planting in the right-of-way, this requirement may be satisfied by planting on the adjoining property if the property owner agrees or contributing to the City "Tree Bank".

220.8.5. Emergencies

Pruning or removal is allowed without a permit for any public tree which is determined by utility or emergency response officials to create a public hazard so as to immediately endanger the public health, safety or welfare or cause an immediate disruption of public services. A written record shall be completed within a reasonable time and kept on file with the City Arborist.

220.8.6. Permit and Application process

A person who wishes to initiate any activity affecting a public tree for which a permit is required shall make application to the City Arborist. Applications are available at the Public Works Department. There is no fee for filing an application.

220.8.7. Petitioning for Removal or Pruning

Removal. An abutting landowner seeking removal of a dead, diseased, healthy or live tree from a public right-of-way shall file a petition with the Department of Public Works requesting removal. All such petitions will require public notification. At least two weeks prior to each Tree Board meeting, the City Arborist shall cause a notice of tree removal petitions to be considered on that meeting's agenda to be placed on the City's website. Notice shall include size, species, and location of the trees. Residents may request automatic email notification of the Tree Board agendas. Neighbors within 200 feet of any tree being considered for removal shall be notified by letter at least two weeks before the Tree Board meeting.

Pruning. Any citizen may petition the City Arborist to prune a public tree, by communicating this need to the Department of Public Works. The City Arborist will review such requests and determine a course of action for the tree.

A property owner may perform, without petition, minor trimming (branches less than one inch in diameter) from the ground on street trees in front of his/her property where his/her intent is to maintain the tree and not to damage, mar or injure it. Tree pruning standards shall comply with ANSI A300, "Trees, Shrubs, and Other Woody Plant Maintenance – Standard Practices," unless more stringent requirements are indicated.

220.8.8. Approval Criteria for Removal

Petitions for removal of a healthy or live tree must demonstrate that removal will be of greater benefit to the inhabitants of the City than the existing tree or trees sought to be removed. Street tree plantings shall first be considered from the standpoint of the people using or passing along the streets and in terms of the broader community benefit. Of secondary consideration is the benefit, embellishment, or enhancement of the properties abutting the street?

The Tree Board and the City Arborist will approve petitions for removal of a public tree for the following reasons only:

A. The public tree is damaging public property and such damage cannot be permanently repaired save for tree removal.
B. The public tree is damaging abutting private property and such damage could result in liability to the City and such damage cannot be permanently repaired save for tree removal;
C. The public tree interferes with a proposed necessary improvement to public or private property, and the City Arborist determines there is no alternative to removal. In cases where the tree interferes with an improvement to private property, the property owner will pay for removal and replacement;

D. The public tree is dead, diseased, injured, in danger of falling, or presents a hazard to pedestrian or vehicular safety. In rating the level of hazard, the Tree Board and the City Arborist will apply the standards of the International Society of Arboriculture's hazard evaluation system[5];

Sidewalk conflicts. Trees will not be removed for sidewalk conflicts unless and until the City Arborist has determined that there is no alternative to removal. In

220.8.9. Appeals: Property owners seeking the removal of a tree may appeal a Tree Board denial to the Commissioner of Public Works. In cases where the Commissioner approves a petition for removal denied by the Tree Board and the City Arborist, removal and replacement will be at the expense of the petitioner.

220.8.10. Tree replacement

The removal of a public tree shall require its replacement by one or more trees, which shall be provided as follows.

A. The replacement tree shall be of a species determined by the City Arborist

B. A removed tree will be replaced with a tree or trees based on the size of the removed tree. One replacement tree will be planted for every eight inches in dbh of the removed tree. That is, one tree if dbh is less than eight inches, two trees if dbh is between eight and sixteen inches, etc.

C. The replacement tree(s) shall be placed at locations determined by the City Arborist, and may include locations not abutting the petitioner's property. With owner's approval, a replacement tree can be planted near to, but outside, the city's right-of-way, particularly in cases where conflicts with utility wires or other infrastructure makes this desirable.

220.8.11. Tree protection: during construction, etc. - Not in current Chapter 220.

DEC: Protecting trees is always a challenge. This section is used to protect against insect or disease epidemics, during construction, and those of historic or sentimental value. Sometimes this section may create conflicts if any of the trees covered in this section pose a safety hazard. It helps to plan for this possibility.

Note: The existing ordinance should be expanded to include requirements for the protection of city-owned trees from paving and construction activities on public or private lands conducted by city employees, private companies or landowners. Protection measures should include fencing around trees to protect roots from damage or compaction during construction, and standards to assure that paving, the siting of buildings, and the installation of sidewalks, curbs and other infrastructure will minimize damage to tree trunks and roots.

A. Persons conducting regular maintenance work on trees or shrubs in the tree protection zones may be granted general permits by the City of Saratoga Springs Department of Public Works to regulate their work on a yearly basis.

B. All trees and shrubs in any tree protection zone within 15 feet of any excavation or construction of any building, structure or street work shall be guarded through the length of the project as follows:

(1) For trees or shrubs with a crown spread of eight feet or less, a good substantial fence, frame or box, which prevents work or storage inside such structure, not less than four feet high and eight feet square, shall surround the tree or shrub.

(2) For trees or shrubs with a crown spread of over eight feet, a good substantial fence, frame or box, which prevents work or storage inside such structure, not less than six feet high and placed at the drip-line of the tree or shrub, shall surround the tree or shrub.

(3) All equipment, building materials, chemicals, dirt or other debris shall be kept outside the above barriers at all times and shall not be allowed to leach into barriers that are on grades.

[5] http://www.isa-arbor.com/education/resources/educ_TreeHazardForm.pdf

C. No person shall excavate any ditches, tunnels or trenches, or lay any drive, or substantively alter any grade within a radius of 10 feet of any tree in a tree protection zone without first obtaining the approval of the Department of Public Works.

D. No person shall damage, cut, or carve any tree or shrub in a tree protection zone; attach any rope, wire, nails, advertising posters or other contrivances to any tree or shrub; allow any gas, liquid, or solid substance which is harmful to trees or shrubs to come in contact with any such tree or shrub; lean tools or other objects; or set fire or permit any fire to burn when such heat of the fire thereof may injure any portion of any such tree or shrub, without first obtaining a written permit from the Department of Public Works, said permit to be valid for only the time period indicated thereon.

E. No person or City agency shall deposit, place, store or maintain upon any tree protection zone any stone, brick, sand, concrete or other materials which may impede the free passage of water, air or fertilizer to the roots of any tree or shrub growing thereon, except by written permission by the Commissioner of Public Works.

F. No person shall drive, park, haul or store any automobile, truck, trailer, boat, motorcycle, snowmobile or other motorized vehicle within 25 feet of any tree or shrub in any tree protection zone, except while within the clearly delineated travel or parking zones of any roadway, alley or parking lot, without first obtaining permission from the Department of Public Works. This shall not be construed as to preclude parking on any gravel, concrete or bituminous driveway or entryway or operating a motor vehicle on any gravel-surfaced roadway within 25 feet of such a tree.

220.8.12 Protecting trees by prohibiting the paving of the tree belts

A. Tree belts are not to be paved as off-street parking areas. Any person wishing to pave the tree belt for a driveway or a sidewalk must consult with the City Arborist and get written approval.

220.9 – Interference with city officials

Taken from current Chapter 220-7

It shall be unlawful for any person or persons or firm or corporation to prevent, delay or interfere or cause or authorize or procure any interference of delay with the Commissioner of Public Works or any of his employees or agents, or the City Arborist, while he is engaged in and about the planting, cultivating, mulching, pruning, spraying or removing of any trees, plants or shrubs in or upon any public highway or public place or upon any private ground as authorized in the previous section.

220.10 Trees on Private Property

No such section in Chapter 220.

DEC: Trees on private property may pose threats to public safety or other private property. This section provides the authority to inspect private trees and require action by the owner to eliminate any problems, if necessary.

A. The Commissioner of Public Works shall also have the power to order and require property owners in the city to spray or otherwise treat any tree, shrub or plant located on private grounds or property which has become infected or infested by any parasite or insect pest when it shall be necessary, in his opinion, to do so to prevent the breeding or scattering of any parasite or animal pests and to prevent danger therefrom to trees or shrubs planted in the public streets or other public places. The Commissioner of Public Works shall also have the power to order property owners to trim, treat or remove any tree, plant or shrub located on private grounds or property whenever it shall be deemed wise to do so for the protection of other trees, plants or shrubs planted in the public streets or other public places. [from current Chap 220-6]
B. Notice of an order of the Commissioner of Public Works, as provided for herein, shall be given by publication twice in the official newspaper of the city or by registered mail directed to the owner of property at his last known place of residence.
C. Upon failure of the property owner to spray or otherwise treat any tree or shrub located on private ground which has become infected or infested by any parasite or insect pest, in compliance with an order of the Commissioner of Public Works promulgated in accordance with Subsection A of this section, the Department of Public Works shall enter upon the private ground and spray or otherwise treat or cause or order to be sprayed or otherwise treated any tree or shrub or plant infected or infested by any parasite or insect pest and shall assess the cost of doing said work against the property benefited.

220.11 Requirements of Professionals –

Not in current Chapter 220.

DEC: This section protects homeowners and the community forest from inadequately trained and unscrupulous people who claim to be professionals.

Note: The ordinance should be expanded to require that tree care companies use trained personnel who will abide by the tree ordinance and ANSI A300 standards, and have sufficient liability insurance.

A. **Arborist's license and bond.** It shall be unlawful for any person or firm to engage in the occupation of pruning, treating or removing street or park trees within the city without a license. All persons or firms so engaged shall abide by the tree ordinance, follow ANSI A300 standards, and have sufficient liability insurance.

No license shall be required of any public service company, including electric utilities and their agents and contractors, or city employees doing such work in the pursuit of their normal endeavors.

220.12 Enforcement, Penalties and Appeal

DEC: This section designates who is responsible for enforcement. Without penalties, enforcement of any ordinance is difficult. In addition, penalties need to be sufficient to deter violations. Depending on the length and complexity of the ordinance, penalties for

violations may be listed in a single provision or in several different parts of the ordinance, and the penalties may be simple or complex. Appeals provide checks against the authority of the tree program manager.

Note: This section should designate who is responsible for enforcement. Penalties for violating the tree ordinance should be sufficient to deter violations, and should include requirements to remove trees illegally planted and to replace trees illegally removed. Without penalties, enforcement of any ordinance is difficult. In addition, penalties need to be sufficient to deter violations. A mechanism for appealing decisions by the permitting and enforcement authority should be added.

Taken from current Chapter 220-8. Should be clarified.

A. *Editor's Note: Amended at time of adoption of Code; see Ch.* ***1****, General Provisions, and Art.* I. Any person, firm or association, partnership or corporation who himself or itself or by his agent or employee shall violate any of the provisions of this chapter shall, upon conviction thereof, be subject to the penalties set forth in Chapter **1**, General Provisions, Article **III**, of this Code.

220.13 Severability

Not in current Chapter 220.

DEC: A statement protecting the validity of the rest of the ordinance if any part of it is found to be invalid by a court. For instance, "Should any part or provision of this ordinance be declared by a court of competent jurisdiction to be invalid, the same shall not affect the validity of the ordinance as a whole or any part thereof other than the part held to be invalid."

A. Should any part or provision of this ordinance be declared by a court of competent jurisdiction to be invalid, the same shall not affect the validity of the ordinance as a whole or any part thereof other than the part held to be invalid.

220.14 Heritage Trees

Not in current Chapter 220.

See Appendix G (Of this document) for discussion

220.15 Tree Restoration Fund

Not in current Chapter 220.

Tree restoration fund

A. The Commissioner of Finance is hereby directed to establish a separate line item under the City's general fund which will be designated as the Tree Restoration Fund. All permit fees and other fees which are required pursuant to this chapter to be paid into said fund shall be delivered to the Commissioner of Finance and segregated into said separate line item of the general fund. The money in the Tree Restoration Fund shall be used for the planting and maintaining of new trees by the City, as directed by the City Council in consolation with the Commission.

B. For every and all trees approved by the Commission to be removed due to new construction at any given site, a fee of $125 per tree shall be collected for the Tree Restoration Fund.

220.16 Other

DEC: Because circumstances can vary greatly between municipalities, other sections may need to be added. The ordinance should fit your individual community.

Appendix 1: Standards & Specifications

DEC: It is recommended that an appended "standards and specifications" document be created. This document lists up-to-date detailed tree planting and maintenance standards and specifications. Standards change as more knowledge is gained in the field. It is better to reference this document in the ordinance so the ordinance does not need to be amended as standards change. The International Society of Arboriculture is a professional organization that sets standards and specifications for planting and care. The American Association of Nurserymen's American Standard for Nursery Stock is also a good reference.

APPENDIX C – Proposed Revisions to Subdivision Regulation *Appendix H*

These guidelines should be consolidated with provisions in the zoning ordinance to apply as well to major development projects that do not involve subdivision. Recommendations are added in ***bold italics*** text.

Q. ***Street*** Tree Plantings:

1. Street trees shall be planted along streets throughout residential ***subdivisions,*** ~~which do not have major existing trees and when curbs and sidewalks are included in the design.~~ as necessary to attain an average spacing between existing and planted trees of 40 feet.

2. ~~The *Board* may require additional *street* tree plantings in areas of residential *subdivisions*, which are void of major trees. On block faces up to one hundred feet (100') in width one tree shall be planted. On block faces over one hundred feet (100') in width, one (1) tree shall be planted at one hundred foot (100') intervals~~

3. The developer of any residential ***subdivision*** shall preserve and protect the existing major trees ***[define major needs to be defined]*** located within the required setback areas (front, side, and rear yards).

4. The developer of any commercial or industrial ***subdivision*** shall provide ***buffer*** and/or screen plantings in addition to ***street*** tree plantings.

5. The standards for the location and design of ***buffer*** areas are intended to provide flexibility in order to provide effective screens. The location and design of ***buffer*****s** shall consider the proposed use of the property, the distance between the use and the adjoining property lines or ***subdivision*** lines, differences in elevations, etc.

6. The developer of any commercial or industrial ***subdivision*** shall preserve and protect the existing major trees located on the property, which do not interfere with the ~~building area.~~area within 20 feet of buildings, access roads, and designated storage areas.

7. ***Street*** tree plantings (either natural occurring or planted) shall be broken at points of vehicular and pedestrian ingress and egress to assure a clear sight triangle at all ***street*** and driveway intersections.

8. Street trees shall be at least two and one-half inch (2 1/2") ~~caliber~~ caliper when planted, free of disease and insect pests and hardy within Zone 4. Any planted ~~*street*~~ tree, which ~~does not live, shall be replaced within one (1) year~~. Dies within one year of planting will be replaced within one year of tree death. ***Exceptions may be granted for smaller, bare root trees if volunteer, and citizen involvement is used to plant the trees.***

9. Recommended *Street* Trees: ~~The developer shall use small *street* trees in situations where there are overhead utility wires or other space restrictions.~~ Where trees are to be planted, the developer shall use medium or large trees, except where there are overhead utility wires or other overhead obstacles, or where severe space limitations cannot be addressed through a program of periodic pruning of medium or large trees. Other conditions that may warrant the use of smaller trees include but are not

necessarily limited to: the scale and/or character of the surrounding environment, maximizing sunlight exposure, and maximizing views from adjacent building windows, patios, and/or balconies.

APPENDIX D –Best Management Practices Summary

Selecting Street Trees

Each and every planting location is unique and the tree selected for each location should match the site conditions. Most individuals are aware of the importance of selecting small trees that will be placed under low utility wires. However other factors that need to be considered include rooting volume, underground obstructions, soil compaction, salt tolerance, pH adaptability, tolerance of drought, shade tolerance etc. As the City of Saratoga Springs moves to expand and preserve the urban forest it will be important that appropriate trees are chosen for each planting situation. Improperly selecting a tree for the given site is the most common cause for tree mortality in the urban environment. Soil compaction, under-watering, overwatering and vandalism also contribute to the death of urban trees. A list of trees determined to be acceptable street trees for the City of Saratoga was developed by Sustainable Saratoga and integrated into the subdivision regulations in 2012. The list is expanded with a few additional species is provided as Appendix H.

Planting in monoculture or near monoculture has proven to be a poor solution to long-term forest and urban forest sustainability. The settlement of North America by Europeans introduced the Chestnut Blight, which wiped out nearly all of the native chestnut trees on the continent. Today, due to the blight, chestnuts are a genuine rarity. During the mid-twentieth century most of the elm trees and many native maple trees succumbed to blight and disease as well. The urban forest of Saratoga Springs is just one example of city infrastructure destroyed by Dutch elm disease. The native flowering dogwood has also struggled against an invasive disease, anthracnose. Currently the state is under siege from the Emerald Ash Borer beetle and the Asian Long-horned beetle. Both of these pests will likely have a serious impact on tree population within the state. The Emerald ash borer obviously targets ash trees while the Asian Long-Horned Beetle appears to prefer Maple species. Additionally, it is also predicted that native sugar maples will suffer greater incidence of blight and will be reproductively less successful as our yearly average temperature continues to climb with global climate change. As a result of these challenges is more important than ever to maintain a diverse forest infrastructure.

The City will diversify the urban forest to add longevity and resiliency to it. However, tree selection needs to take into account the popular and historic visual aesthetic of tree symmetry along a street corridor. The symmetry of the old elm lined streets created a feeling of order and predictability that cohesively brought the neighborhood together. A uniform tree lined corridor blends social and economic divisions and eases the transition from commercial to residentially dominated areas.

By proactively planning ahead, a balance can be struck between the haphazard appearance created by streets planted with a vast array of species and a city planted in monoculture. Using the street tree inventory data, streets identified for target plantings can be assessed for the site conditions and trees can be chosen that are suitable to the particular conditions and have similar or complimentary form. It may even be appropriate to plant certain streets in near monoculture to highlight civility and communicate a sense of democracy but maintain a wide biodiversity across the entire street tree population.

For areas that are highly restrictive, have high bedrock or too many adverse environmental factors to allow for street tree the City will develop a program of "tree banking." This system will provide a location identified as suitable for exceptionally dense plantings to receive the trees that are restricted from other

locations. The tree bank could be built into the City's large, untree'd parking areas or possibly even as shading structures for private parking lots.

The City should maintain a goal of having no species exceed 10% of the total street tree population. Additionally no genus should represent more than 20% and no botanical family should represent more than 30% of the street tree population.

Landscape Architecture research professors and horticultural scientists at Cornell University have performed a vast amount of research on the success of various tree species in an array of urban environments. The compendium of information can be found in the widely used and respected booklet Recommended Urban Trees: Site Assessment and Tree Selection for Stress Tolerance. It can be downloaded at the following website and provides all of the information required to make good decisions when selecting trees for a specific planting location.
http://www.hort.cornell.edu/uhi/outreach/recurbtree/pdfs/~recurbtrees.pdf

Additional links and urban tree resources can be found in Appendix K.

Appendix E is a sample checklist that can anyone, with the basic information required to select a tree suitable for a particular planting location. This checklist, used in conjunction with the recommended planting list in Appendix F will help guide the city toward selecting a diverse urban forest as the City expands its tree infrastructure.

Standard Planting Details and Practices

As was discussed in Section IV the City will adopt modern urban tree establishment planting techniques as standard practice and will reflect that adoption with updates to the city standard details and subdivision regulations.

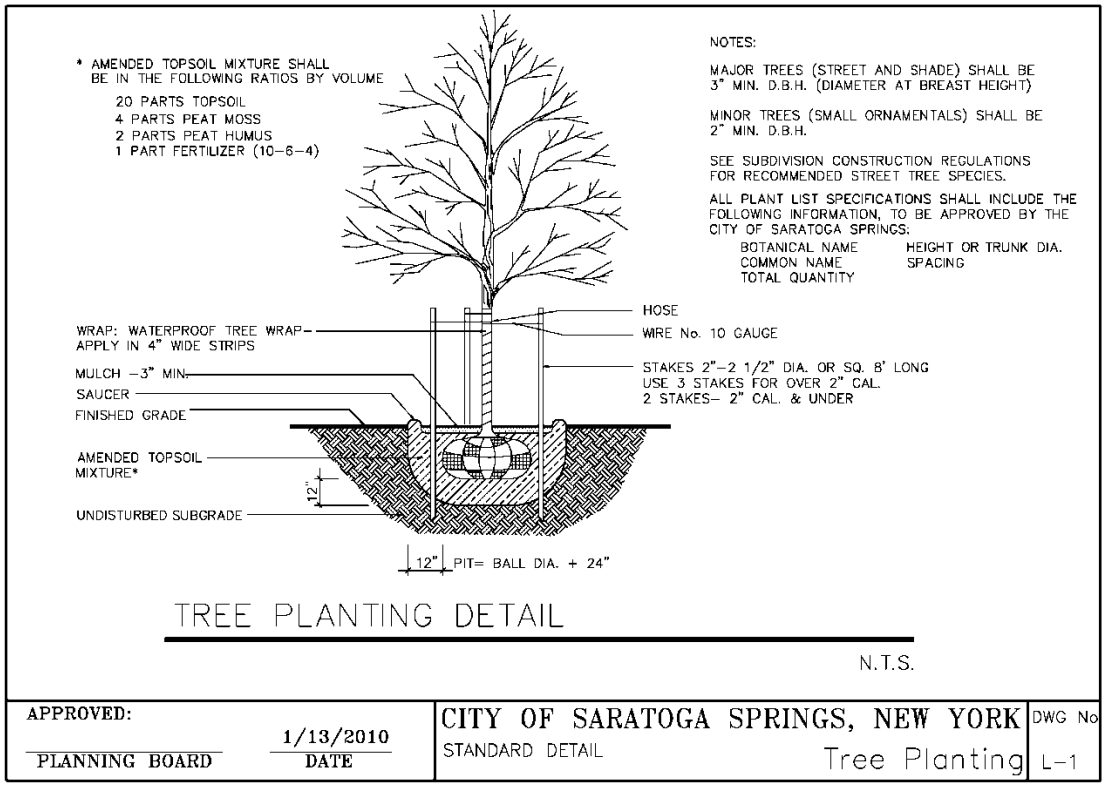

Figure 14: Standard City tree planting detail is not developed to current modern horticultural standards.

The City Standard Tree Planting detail is provided by the City to communicate the expectation for properly planting street trees. This detail is based on outdated forestry practice and should be updated to incorporate the best practices and standards known today. The recommended updates should include amendments to all planting details as well as DPW standard practices for planting trees, tree care, sidewalk design, subbase design and tree-box or tree planter design. As an example, the drawing above should address the following:

1. Provides guidance for the removal of all synthetic, string, burlap and other man-made material from the root ball. The wire basket should be folded down several inches as long as this does not damage the root ball.
2. Remove tree wrap if any exists on the tree at the time of delivery. Do not add tree wrap if the tree is without wrap.
3. The tree pit will be dug to 3x the diameter of the installed root-ball where practical or at a minimum of 2x the rootball diameter.
4. Direct the installer to remove all construction debris, rocks and large sticks from the tree hole before and during backfilling operation.
5. The root crown will be planted in the same relationship to finish grade as it was in nursery, the root crown shall not be buried by soil or mulch, or set in a depression when planting
6. Direction should be given to fill the tree pit with water, and allow it to completely percolate before planting or backfilling.

7. Backfilling will occur in 4"-6" lifts, each lift should be watered before additional fill is added.
8. Backfill soil will be the soil that was removed from the pit (unless planting in heavy clay or using structural soils). In the event that the removed soil can't be used the imported fill will be sandy loam with a pH that matches that of the surrounding soil and is appropriate for the proposed tree. Peat moss will be avoided as a soil amendment (as it is not a renewable resource) and fertilizer is not necessary if the soil is of good quality. A soil Test will direct the use of any soil amendments.
9. In areas adjacent to sidewalks, all tree limbs should be trimmed to allow ease of movement and prevent conflicts between pedestrians and trees limbs (8' of recommended clearance between the sidewalk and overhead limbs.)
10. For urban sites and sidewalk pits underdrains should be included in the detail.

The goal of these changes is to provide standards for planting the appropriate tree with the appropriate planting technique, proper amount of soil, proper protection from the urban environment. Appendix D further details recommended best management practices (BMP's) and changes to details and specifications to promote a vigorous street tree growth.

Additionally, the city's Engineering Department or an outside consultant should develop standard details or guidelines to reflect current industry knowledge and best management practices for urban tree establishment. This includes integration of "Complete Streets" design parameters and innovative green infrastructure technology into every roadway project. The details and procedures should address the number one limitation to street tree growth, access to adequate soil moisture as a function of limited soil volume for root growth. The updated specifications should therefore detail tree plantings in sidewalk tree pits that provide adequate soil volume for growth, root protection and soil protection with the use of tree grates, tree guards, porous pavements or pavement strips and CU Structural Soil. These details and planting practices will be promoted as the city standard and integrated in to all municipal or municipally approved projects.

Image 16: Shows a comparison of how some sidewalk tree pits in Saratoga Springs are constructed, versus an example of how a tree pit is ideally constructed. The larger protected tree pit offers more rooting volume, access to moisture and oxygen for the tree, which will likely cause less damage to the sidewalk.

Image 17: The image above shows the construction of integrated planters with stormwater. The image to the right is the new recommended standard for tree pit design in NYC; integrating stormwater management, street trees and tree protection.

Cornell Cooperative Extension provides access to the work of Nina Bassuck and Peter Trowbridge; both professors of Landscape Architecture and Horticulture at Cornell University and both are leading researchers in the field of urban tree establishment. The work that they conducted in urban tree establishment leads the industry and provides solutions to nearly every urban tree establishment hurdle. The work is available on-line. Please refer to Appendix H for urban tree establishment references.

In urbanized locations sidewalk tree boxes should be design to provide the required cubic feet of root zone soil at a three-foot depth. This can be accomplished by incorporating the following tree planting techniques.

1. CU-Structural Soils
2. Larger boxes to accommodate root volume of a mature tree
3. Protection for urban trees

Tree Size

The consideration of tree size includes several discussions;

1. Size of tree at the time of planting
2. Mature tree size
3. Shape of tree (form)

Planting larger trees provide more immediate impact. But is that the best solution? Smaller trees are known to usually be easier to transplant than larger more mature trees of the same species. Research has shown that in the time it takes for larger trees to re-establish their roots, smaller trees will often catch up in stature. This is because, in general, the same amount of biomass that a tree maintains above ground also needs to be maintained below ground. During the transplanting process about 90% of the tree roots are removed. The first few years after transplanting a tree uses most of its resources to re-establish its roots. Because smaller trees loose less of their total root-mass during transplanting, their root system can recover quicker. As a rule of thumb, a freshly transplanted tree will take one year for every inch of its trunk diameter to re-establish its root system and no longer suffer from transplant shock. Trees are also significantly more susceptible to drought stress during the time of that roots are re-establishing. Drought stress further limits above ground growth and may even lead to die-back. Therefore a 1.5" diameter tree will begin adding above ground biomass at the expected rate in its second summer, while a 4" caliber tree will not begin to add significant above ground growth until its fourth or fifth season in the ground. This means that the smaller tree will have two-three growing seasons to "catch-up" to the 4" diameter tree.

Planting smaller trees is an advantage because the tree costs less to purchase and install, trees overcome transplant shock quicker, and they are less prone to drought stress. Small bare-root plantings are very inexpensive to plant because the trees don't have heavy soil-filled root balls attached to them. Rather, the roots are preserved in a slurry of water saturated bio-gel and wrapped in a plastic bag. These trees can easily be planted by a small work crew or a team of volunteers in a very efficient fashion. There is an across the board savings planting bare root trees. The trees cost less, shipping costs less, excavation and planting location preparation costs less, planting costs less, and maintenance costs less. In short the limited funds for tree planting go much further when planting bare-root trees. In Section IV.4 the advantage that bare root planting has for involving neighborhood or community groups in planting efforts is discussed.

The other primary consideration for tree size is simply the limitations to height or breadth imposed by utilities and structures. This will help guide the decision of what tree to plant where. The issue of planting large or small species trees under utility lines is a complex problem and the City's goal is unambiguously to find creative solutions and funding sources that allow us to have our utility infrastructure as well as large-canopy trees on as much of our streetscape as possible.

Tree form is as important as mature height when selecting a tree for a particular location. Species with broad spreading forms should be cautiously considered where adjacent buildings will obstruct growth. Early and carful pruning can guide tree growth, but if not done properly the trees can be a hazard. Columnar varieties of recommended species may be considered for urban situations where buildings or overhead utilities are close but not directly obstructing and. However it should be noted, that more broad spreading trees offer greater environmental benefits and can often fit into the urban environment, with selective pruning of branches.

Tree Care, Mulching, Watering, Fertilization

If a suitable tree is located in an adequate location and given proper protection it should do well; however regular care is required in an urban environment. A mulched tree ring should be installed around all new plantings, the diameter of the original tree pit or extending 18" form the exterior of the tree, whichever is larger. This reduces weed growth; reduces competition for moisture and nutrients between the tree and grasses or weeds; helps to retain soil moisture and protects the tree from mechanical damage by mowers and weed whackers. A mulch ring also reduces soil temperature fluctuations, which helps to protect trees against frost damage to tree bark.

Care should be taken so that mulch never exceeds 3 or 4 inches of depth, and mulch should not be piled on top of a newly planted root ball. The root crown of a tree should always remain exposed. Mulch build-up around the base of the tree can cause mold and fungus growth, and can disfigure a tree's natural root growth, which can strangle or girdle a tree. As the original root crown becomes buried by the widely misused "mulch volcano" roots begin to grow in a circular pattern from the trunk; if left unpruned these roots can girdle the tree.

Though technically not mulch, porous pavements, unit pavers and gravel can offer some of the benefits of mulch. These surfaces protect against compaction, and permit water and oxygen to circulate. Porous pavements used in conjunction with CU Structural soil can provide urban trees room for tree roots to spread-out and find needed moisture.

Image 18: Mulching with compost is a more effective soil amendment than simply using fertilizer. Compost improves soil water holding capacity and balances pH. These two factors are more likely to limit tree growth more than a lack of soil nutrients.

The first year a newly planted street tree is in the ground it should be watered regularly and should not experience a field dry or drought condition. This will help the tree overcome transplant shock quicker. Regular watering may also prevent the loss of the tree during drought. Transplanting a tree removes upwards of 90% of the root mass; if a full leaf canopy is transpiring and releasing water, the remaining 10% of the original root mass will not be able to supply sufficient water causing early leaf drop or die-back. The use of tree gators or other slow drip bag systems is discouraged as a watering technique. The cost of the purchasing and maintaining the bags could simply be offset by a progressive and active watering campaign during times of drought.

Unlike watering, fertilization may not be necessary for the first growing season unless specific nutrient amendments are recommended by soil testing. Fertilizers can be applied to the root zone if nutrients are lacking, again this is determined by testing the soil. Soil analysis, particularly when combined with a foliar analysis, can determine when other elements are in short supply. Slow-release fertilizers applied in autumn will help root growth and will still be available the following spring.

Fertilization should be understood as essentially replacing soil elements or minerals that are lacking or in short supply for a variety of reasons. The presence of nutrients within the soil does not mean they will be used by a tree. In fact soil pH has a stronger effect on nutrient uptake than availability of nutrients within the

soil. Therefore application of more nutrients may not give an energizing boost to a tree. Rather actions should be taken to adjust pH to match a tree's optimum range or the tree should be removed and replaced with one more suited to the soil conditions.

Regular Tree Maintenance

During the initial street tree inventory the volunteer recorded tree condition on a scale of 1-5 as well as noted any significant dead limbs or obstructions with the sidewalk, curbs, powerlines or other infrastructure.

The City arborist can use the data gathered in the 2012 tree inventory as a starting point for identifying critical trees and critical areas that need to be further assessment or maintenance attention. The designated City arborist will have the authority to engage in activities to improve the health of trees including, but not limited to fertilization, tree removal, pruning, root pruning, curb removal, sidewalk replacement, viral inoculations, mulching, and soil aeration.

One major component of the maintenance protocol that is currently missing from the DPW's tool kit is the ability to apply pesticides or inject trees with inoculations to fight disease. In order to prioritize Heritage Trees and maintain the health of the existing heritage elms and other old trees applications of this sort will need to occur in the future. The appointment of a city arborist is an important step in this process. Allocating funds for properly maintaining trees is vital too. The last piece of the puzzle will be the availability of adequate professional development opportunities to stay current with modern practices.

The current procedures and budget allocation do not allow for a regular and systematic maintenance program for existing trees. DPW staff has estimated that with current funding rates it will take three-five years just to catch-up with deferred tree maintenance. If the City wants to prioritize street trees and maintain a robust urban forest it will need to develop a funding strategy to allow the DPW and the designated City arborist to accomplish the task preserving and expanding the urban forest.

Tree Removal and Replacement

The Current process for tree removal involves the City taking action to remove dead or dying trees that pose a public safety risk or removing trees at the request of a landowner. This latter justification appears to happen as frequently for trees that pose a risk as it does for trees, which adjacent landowners wish to remove for personal reasons. Under the direction of the City arborist, the City will institute a policy and process of only removing trees that pose a risk to life or property as determined by a qualified arborist or forester. Many cities penalize property owners for harming trees in a way that leads to the eventual removal of trees within the public right of way. It is proposed that a fine is instituted for killing, removing or harming a tree that is a publically owned asset. The fine could be on a sliding scale based on the tree's size, with a minimum fine of $300 being imposed for intentionally harming a tree.

It will be the City Arborists discretion to weigh the assets against a tree's liabilities and determine the appropriate action. As the City Arborist performs routine maintenance on the City's street trees non-native invasive species trees will be preferentially removed and replaced suitable native species. The City arborist will not remove mature healthy trees indiscriminately. However if maintenance is needed on a tree that is of an invasive species it may simply be removed instead of maintained.

The process for tree removal needs to be integrated with the process of planting new trees. This will require that a tree plan is developed that targets particular areas for planting plus provides the replanting of trees in every location where removals occur.

Lastly the process of tree removal needs to be coordinated with updates to the tree inventory. A sample tree removal policy is included in Appendix B.

APPENDIX E - Site Assessment for Tree Selection

Planting Location (Address)

_____

Latitude _____

Longitude _____

Soil pH: _____

Sun Exposure Ranking (1Full Shade – 6 Full Sun) _____

Soil Texture

_____ Clayey
_____ Sandy
_____ Loam
_____ Gravel/ Construction Debris

Soil Compaction

_____Severely compacted
_____Moderately compacted
_____Somewhat compacted
_____Uncompact

Drainage Characteristics

_____ Presence of mottled soil
_____ Low-lying topography
_____ Indicator plants suggest site drainage: wet well-drained dry

Percolation test results (in./hr.)

_____ poorly drained (< 4"/hr.)
_____moderately drained (4"- 8"/hr.)
_____excessively drained (> 8"/hr.)

Micro Climate Factors

___ Frost Pocket
___ Reflected Heat
___ Wind

Structural Limitations

___ Overhead wires (height:_____)
___ Proximity to buildings/structures (Clearance: _____)
___ Underground Utilities (Distance _____)
___ Adjacent Sidewalks, driveways and Curbs (Distance _____)
___ Area of known high bedrock

Approximate Available Rooting Volume

___ Length * ___ Width * ___ Depth = _____ FT^3

Tree Diversity in the Neighborhood – List Species:

_____
_____
_____
_____
_____
_____

Are there know conflicts or issues with adjacent property owners?

_____
_____
_____
_____
_____
_____

APPENDIX F - Planting Checklist

Location

Site characteristics such as utilities, soil pH, soil compaction, distance to structures and soil moisture properties will all be considered before selecting a tree for a particular planting location.

Minimum Distance Standards

The following minimum distances are recommended for street trees. These should be codified within the zoning ordinance.

- Place tree centered between curb and sidewalk with at least 24" from the curb to the center of the tree.
- At least 6' feet from driveways, wheelchair ramps, and fire hydrants
- At least 5' from underground utilities
- At least 10' from streetlights
- At least 15' from storm sewer inlets
- At intersections trees should not obstruct sight distances.

Planting Pit (for both continuous tree belt and sidewalk tree well plantings)

- The planting pit should be a three times the diameter of the root ball
- Planting pit will not be deeper than the depth of the root-ball or container
- Rough-up or score sides of the hole to prevent glazing or compaction of the planting hole and potential obstruction of lateral root growth.
- In sidewalk planting the tree well will measure a minimum of 40 square feet.
- Soil removed from the hole makes the best backfill unless the whole planting area can be amended uniformly. There is no apparent benefit from root stimulants, water absorbing gels, mycorrhizae or fertilizer at planting. Planting site should be fertilized according to soil test recommendations for long term health of the tree.

Planting Procedure

- Inspect roots of container trees and remove any large roots that are circling over 1/3 of the root ball especially in the upper 2 to 3 inches of the root ball. Removing very large roots can result in excessive stress and possible death of the tree.
- Most urban soils are compacted and poorly drained resulting in low oxygen for the roots. Plant the tree with the root ball top at least 1 to 3 inches above the soil line with the trunk flare/root flare and uppermost roots at least level with the backfill surrounding the tree.
- Water before and during backfill operations, do not fill on top of root-ball. Gradually straighten the tree as backfill is added.
- Slice a shovel or spade around the backfill to settle the soil and remove air pockets. Break up heavy clay clods. Do not step firmly on the backfill which may cause excessive compaction.
- Do not bury the root crown with either soil or mulch.
- Apply 2 to 3 inches of mulch to the edge of the root ball extending to the edge of the excavation. A thin layer of mulch (1/2 inch) can be applied to the root ball area for aesthetics. Do not pile much against the trunk of the tree.
- Remove synthetic wraps, rope, twine from the tree and ball. Wire baskets should be removed when possible but research and practical application allows for removing at least the top 2 to 3 rungs of the basket. Although wire does not deteriorate, roots grow to encapsulate wire without apparent damage.
- Stake the tree if the planting is in a windy area or an area of high traffic. If the tree is leaning due to lack of taper or strength, tree selection was improper. Many trees with heavy root balls do not need staking.

APPENDIX G– Heritage Tree Program Overview

Heritage Trees are part of the historical fabric of a great city. They are treasured for their beauty and for the way in which they evoke the past. They are a great educational resource, a tangible legacy that inspires the imagination.

The following is a sample of a Heritage Tree policy designed to protect trees on public land and private lands if a land owner chooses to join the program.

Within the city, there are a number of individual trees and groves of trees that are outstanding for their size, age, beauty and historical associations. The establishment of a heritage tree program as a part of the city's tree ordinance would provide a mechanism for recognizing and protecting the outstanding trees in the city for future generations. The following heritage tree ordinance provisions were adapted from ordinances in place for Palo Alto, California; Kennebunk, Maine; Springfield, Massachusetts; Portland, Oregon; Arlington and Williamsburg, Virginia; and Madison, Wisconsin.

The City of Saratoga Springs hereby establishes a Heritage Tree Program to officially recognize outstanding trees for their aesthetic, environmental and cultural values. The goals of the program are to designate individual trees or groves of significance, to educate and inform the public about the values and history of trees, and to maintain and protect these trees as important living symbols of the past, present and future of the city.

Chapter 220 Saratoga Springs Tree Ordinance
Section 220.14 Heritage Tree Program

Designation of Heritage Trees

a) Upon nomination by any person, the tree board, in consultation with the city arborist, may designate a tree or trees as a heritage tree. A tree situated on private land will not be designated without the written consent of the landowner. [However, the consent of the property owner shall bind all successors, heirs and assigns.]
b) A tree may be designated as a heritage tree upon a finding that it is unique and of importance to the community due to one or more of the following factors:
    a. It is an outstanding specimen of a desirable species;
    b. It is one of the largest or oldest trees in Saratoga Springs;
    c. It possesses distinctive form, size, age, location, and/or historical significance.
c) The tree board may establish standards to facilitate consistency in making its decisions.
d) After approval of a heritage tree designation, the city arborist will notify the property owner(s) in writing. A listing of trees so designated, including the specific locations thereof, will be kept on hand and up to date by the departments of public works and planning and economic development for reference during the review and planning of construction and maintenance projects in the city.
e) Once designated, a heritage tree will be subject to the provisions of this chapter [unless removed from the list of heritage trees by action of the tree board. The tree board may remove a tree from the list by unanimous vote upon its own motion or upon written request by the property owner. Request for such action must originate in the same manner as nomination for heritage tree designation.]

Recognition, Maintenance and Removal of Heritage Trees

(a) When a tree is designated as a heritage tree, the city arborist shall place a plaque so signifying near the tree if it is situated on public land, and near the tree if it is situated on private land, with the consent of the landowner. With permission of the owner, the City will include a description and picture of the tree in publications and on the City website. The city arborist shall maintain all heritage trees located on City property or on public rights of way within the City.

(b) Subject to the requirements and limitations of subsections (c), (d) and (e) of this section, it shall be the duty of every owner of property upon which a heritage tree is standing to maintain that tree. As time and funding allow, the city arborist will give advice and assistance to private property owners regarding proper maintenance of heritage trees.
(c) If, in the judgment of the city arborist, a heritage tree, whether standing on public or private property, is dead, has become irreversibly diseased or damaged, or presents a hazard to public or private property or safety, the city arborist shall have the authority to effect its removal, subject to the requirements of Subsection (e) of this Section. A heritage tree also may be removed if there is an overriding need for public improvements, or a severe hardship exists for reasonable use of a site. Should the tree board determine to permit removal, the tree board must issue a written report specifying the action permitted, the tree and its location, and the findings justifying the permission, and may require that the tree be replaced with a similar tree or trees to approximate the canopy lost.
(d) It shall be unlawful for any person, without a prior written permit from the city arborist, to remove, destroy, cut, prune, break, or injure any heritage tree, to injure, misuse or remove any device set for the protection of any heritage tree, [even if such person is the owner of the fee in the land on which such tree is situated,] or to cause or authorize or procure any person to do so. The city arborist shall report to the tree board all such permits issued.
(e) No heritage tree shall be removed without the consent of the tree board after a public hearing.

Exceptions

The provision of this Article shall not apply (a) to work conducted on federal or state property; (b) to emergency work to protect life, limb or property; (c) to routine installation, maintenance and repair of cable and wires used to provide cable television, electric, gas or telephone service.

Appeals

A person who is aggrieved by the provisions of this section and for cause shown may apply directly to the tree board for a permit to cut, trim, or remove in whole or in part, any significant tree, which is otherwise protected under this section so long as such board in the exercise of its discretion is satisfied that such applicant would sustain a hardship, financial or otherwise, which outweighs any detriment to public interest that would result in the application of this section. For purposes of this section, "hardship" is the loss of an advantage. It may include, but not be limited to, a monetary advantage or the advantage to put property to particular use.

Penalties

Any person or entity who violates any provision of this Article by causing, contributing to, or permitting injury to or removal or destruction of a heritage tree shall be subject to a civil penalty not to exceed $2,500 for each violation, or in the case of the destruction or removal of a tree, the value of the tree, as determined by appraisal methods described in *Valuation of Landscape Trees, Shrubs, and Other Plants: A Guide to the Methods and Procedures for Appraising Amenity Plants,* published by the International Society of Arboriculture. Civil penalties shall be imposed by the issuance of a civil summons by the city arborist.

Potential Heritage Trees

The following list focuses on the street trees that were inventoried. Sustainable Saratoga has been building a database of other great trees, not on the City's right of way. The City will encourage citizens to nominate particularly significant trees, will establish criteria for designating Great Trees of Saratoga, and will implement measures to care for and protect them.

Surviving Heritage Elms for Nomination

- 176 So. BROADWAY (south of Lincoln, near Turf and Spa) [dbh=48 inches (47.1)] – This was already a large tree in the 1930s photos of South Broadway
- 519 BROADWAY (opp. City Center at Roohan Realty) [dbh=42 inches]

- 563 No. BROADWAY (at Arterial) [dbh=38 inches]
- Court St (south of Phila = corner of 150 Phila) [dbh=33 inches] – *sick in 2012;some removed by DPW*
- 368 BROADWAY (corner, Phila) [dbh=30 inches]
- 704 North Broadway (above First St.) [dbh=28 inches]
- Nelson at North [dbh=28 inches]
- 20 Circular St (Batcheler Mansion) [dbh=26.4 inches]
- 541 BROADWAY (at Forno Toscano) [dbh= 25.47] – this tree was topped at some point?
- 39 Benedict St [dbh=25.4 inches]
- Willow Lane (renamed in 2012, previously called Maple Lane) [dbh=24 inches]
- 743 North Broadway (corner of Third St.) [dbh=22.6 inches]
- 489 BROADWAY (is this an American elm or an X-vase elm?) [dbh=21.65 inches]

Provisional List of Heritage Trees for Nomination (with diameter at breast height or dbh)

MOUNTAIN ASH - Spring St – dbh 34.3"
WHITE ASH - Greenfield Ave – dbh 30.5"
WHITE BIRCH - Van Dam – dbh 26"
RIVER BIRCH - Walworth – dbh 31.8"
HONEY LOCUST - Van Dorn St – dbh 46.1" - Spring St – dbh 45.8" - At Post Office on Broadway – dbh c28" (a candidate for Great Tree because of its contribution to the City's main intersection)
SILVER MAPLE - Lake Ave – dbh 65"; Ash St – dbh 47.8"; Hyde St – dbh 45.8"
RED MAPLE - Court St – dbh 44.25"
SUGAR MAPLE - Fifth Ave – dbh 46.5"
RED OAK – Crescent St – dbh 46.8"; East Ave – dbh 45.5"
LITTLE LEAF LINDEN – Excelsior Boulevrd, est of East Ave. Seven Leaders between 47" and 53" dbh.
WHITE OAK - Cherry Street – dbh 37.2" –
PIN OAK - Broadway – 34.4"
NORWAY SPRUCE - McNeary – dbh 28.6"
TULIP TREE - Avery St. – dbh 37.2"
BLACK WALNUT - Greenfield Ave – dbh 33.4"

There are some amazing great tree candidates that are not street trees, so were not inventoried. Knowledge of these is more haphazard, although Sustainable Saratoga has a pretty strong list of candidates for protection that were collected informally from citizen volunteers.

APPENDIX H – Recommended Tree List

Use Chart for Recommended Small Street Trees

Species	Common Name	Straight Species (Cultivars vary)	Height Potential	Soil pH Preference	Moisture Range - See Chart	Sun Shadow	Urban Establishment Notes	Structural Soil Success*	Transplant Notes
Amelanchier canadensis	Serviceberry	Upward-Oval	20'	5.0-7.0	4 to 10	FS-PSd	adaptable	not adaptable	
Amelanchier laevis	Shadblow	Upward-Oval	20'	5.0-7.0	3 to 10	FS-PSd	adaptable	not adaptable	
Carpinus caroliniana	American Hornbeam	Round-Spreading	30'	5.0-8.0	3 to 9	Shadey		not adaptable	
Cercis canadensis	Eastern Redbud	Irregular	20'-30'	7-8.5	4 to 10	FS-PSd	Single stem selections	Proven	B&B preferred - use northern seed source
Cornus alternifolia	Pogoda Dogwood	Round-Spreading	20'	<6.8	4 to 6	Shade to partial shade	intolerant of urban conditions - use in Suburban locations, with deep rich soils.	not adaptable	requires moist organic soils and partial shade, cool soils
Cornus florida	Flowering Dogwood (resistant varietiesor seedless hybrids only)	Irregular to Round-Spreading	20'-30'	<6.8	4 to 6	Morning sun afternoon shade	wide tree-lawns, needs acidic soils, well drained, moist. Does not tolerate compacted soils, or prolonged drought	not adaptable	B&B preferred - use northern seed source, acid, moist, cool soils
Crataegus crus-galli v. Inermis	Thornless Coskspur Hawthorn	Round	20'-25'	5.0-8.2	4 to 10	FS-PSd	adaptable	proven	Spring
Crataegus punctata 'intermis'	Thornless 'Ohio Pioneer Hawthorn	Round	20'-30'	5.0-8.2	4 to 11	FS-PSd	adaptable	proven	Spring
Crataegus viridis	Green Hawthorn - Thornless varieties	Oval	20'-30'	5.0-8.2	3 to 11	Full Sun	adaptable	proven	Spring
Malus species	Crabapple	Varies	small	5.0-8.2	4 to 11	FS-PSd	adaptable	Proven	Spring/ Fall

* Success with structural soils as documented by Cornell Cooperative Extension (Proven), or assumed to be possible based on pH and drought adaptability (Possible).

Moisture Chart

1 2 3	4 5 6	7 8 9	10 11 12
Occasionally saturated or very wet	Consistently moist, well drained	Occasional peridos od dry soil	Prolonged periods of dry soil

Use Chart for Recommend Medium and Large Street Trees

Species	Common Name	Form	Height Potential	Soil pH Preference	Moisture Range - See Chart	Sun Shadow	Urban Establishment Notes	Structural Soil Success*	Transplant Notes
Acer rubrum	Red Maple	Varies by cultivar	40'-60'	5.0-7.0	3 to 8	FS-PSd	Sensitive to Stress	not adaptable	Spring
Acer saccharum	Sugar Maple	Varies by cultivar		7.5	4 to 8	FS-PSd	Sensitive to Stress	not adaptable	
Betula nigra	River Birch	oval to arching	50'-80'	5.0-7.0	2 to 8	FS	adaptable	Possible	Spring
Celtis occidentalis	Hackberry	Pyramidal to arching	40'-60'	5.0-8.2	3 to 11	FS	tolerant of urban conditions Terminal bud kill by salt spray	Proven	Spring, Proven bare root
Cladrastis kentukea	Yellow wood	Round	30'-50'	5.0-8.2	4 to 7	FS	Trouble Free - broad and low spreading, limb-up when young	Possible	Spring Only, prune only in the summer
Ginko biloba	Ginko (Male Only)	Pyramidal	60'-100'	5.0-8.2	4 to 12	FS	Male Only	Proven	Spring/ Fall
Gleditsia triancanthos v. inermis	Thornless Honeylocust	Open spreading	40'-100'	5.0-8.2	2 to 12	FS	Male preferred, needs space, most salt tolerante Chicago street tree	Proven	Large pit in lawn area
Gymnocladus dioicus	Kentucky Coffeetree (Male only)	Oval spreading	70'-80'	5.0-8.2	3 to 12	FS	Male preferred, needs space	Proven	Needs space for spreading habit
Liriodendron tulipifera	Tulip Poplar	broad pyramidal	80'-120'	5.0-8.2	3 to 7	FS	Not a tree for constrained locations	Possible	Northern seed source, fast growth
Nyssa sylvatica	Black Tupelo	varied, irregular	40'-70'	5.5-6.8	2 to 10	FS-PSd	prefers deep, acidic soils	not adaptable	transplant small trees B&B - Spring
Ostrya virginiana	hophornbeam	Oval	30'-50'	5.0-8.2	4 to 7	FS-PSd	cool, moist, acidic soils, salt sensitive	Possible	Slow growth
Platanus occidentalis	American Sycamore	Irregular, wide spreading	75'-100'	5.0-8.2	2 to 11	FS-PSd	Very adaptable	Possible	Needs space
Quercus alba	White Oak	Pyramid to wide spreading	50'-80'	5.5-6.5	4 to 11	FS	Trasplant B & B - small tree, not tolerant of compacted soils, iron chlorisis problems in high pH	not adaptable	prefers forested lands with rich mycorrhizal associations
Quercus bicolor	Swamp White Oak	Broad oval	50'-60'	5.0-7.0	1 to 9	FS	Trasplant B & B - small tree, Iron chlorisis problems in high pH	not adaptable	
Quercus coccinea	Scarlet Oak	Rounded	60'-80'	5.0-7.0	4 to 9	FS	Trasplant B & B - small tree, Iron chlorisis problems in high pH	not adaptable	Fast Growing
Quercus palustris	Pin Oak	Strong pyramidal	50'-70'	5.5-6.0	4 to 10	FS	Shallow root system, Iron chlorisis problems in high pH	not adaptable	Easily transplanted
Quercus rubra	Northern Red Oak	Rounded	60'-80'	5.0-7.5	4 to 10	FS	Shallow root system, Iron chlorisis problems in high pH	not adaptable	Fast Growing
Tilia americana	American Basswood	Pyramidal	60'-80'	6.5-8.2	3 to 9	FS-PSd	Adaptable	proven	Transplants readily
Ulmus americana	American Elm (resistant varieties only)	Arching vase	60'-80'	6.5-8.2	2 to 11	FS	Adaptable - disease resitant varieties only	Possible	Transplants readily

* Success with structural soils as documented by Cornell Cooperative Extension (Proven), or assumed to be possible based on pH and drought adaptability (Possible).

Moisture Chart

1 2 3	4 5 6	7 8 9	10 11 12
Occasionally saturated or very wet	Consistently moist, well drained	Occasional peridos od dry soil	Prolonged periods of dry soil

APPENDIX I – Public Comments

Received Via Email Correspondence

Via email: November 1, 2012
Saw an article in The Spotlight recently on your Saratoga Springs City tree project, where both of you were named as key people. I think it's a great project, and I thank you both for your efforts. I couldn't help but respond with a few ideas. Trees have been a passion of mine for many years. I have planted, harvested and observed trees since I was a small child— considering it was a hobby of my father's as well. Below are a few of my thoughts—not in any particular order.

1) I support the idea of planting native species only. I spend many hours every year weeding Norway maple seedlings from my property on Warren St. While they may be hardy they are also very aggressive. Two trees that should be put on the nuisance list are the Norway maple and black locust.

2) I think it's not hard to see a future where the city "forest" will be a preserve. I have a number of American beeches on my Warren Street property. They are healthy (and beautiful) whereas in the Adirondacks the older beech trees are blighted and dyeing. Similar to the American elm and American chestnut, someday people may come to the Cities to see beech trees. The same is true of sugar maples. Though I have l lost a few sugar maples to disease (I think it's viral), mostly mine are healthy and vigorous. I understand the warming trend will be a detriment to sugar maples in the northeast. Sugar Maples are also stunning in the fall and are an attraction for tourists during fall foliage— something that's not true of the Norway maple.

3) I also have shag bark hickory and pignut or smooth bark hickory. I would think they would be a good city hardwood since they grow straight and tall with very few branches. Their tap root could be a problem in that they are hard to transplant. I find that I can only transplant a hickory when it's about 18" tall, because the root gets too deep to dig after that.

4) Oaks are an excellent tree for Saratoga. Red oak is easily transplanted and grows well. White oak is also native to the area, though I have none at my house.

5) I have also transplanted birch with good results. The bark and foliage are both attractive on the white birch, though I don't know how strong they are in terms of withstanding storm damage.

6) The black cherry is also a beautiful tree—interesting bark and leaves.
And all of these hardwoods contribute fruit and nuts for city wildlife.
Thanks for listening.
Dick Cooley

Via email: November 27, 2012
I'm sorry not to be able to attend tonight's meeting, yet want you & Bill to know I have great interest in this project. A couple of thoughts to contribute, perhaps already well-thrashed out.(?)

In my experience, there are all too common mistakes in public tree programs, which can be easily avoided. The key is the consistent application of expertise! Some basics:

- The right species for the right spot. Soil, exposure, and drainage all have to be seriously considered for each tree selection. And of course climate. Too often people fall in love with a species, and plant it because they want to look at it; rather than asking, "does that species naturally prefer this spot"?

- Correct planting. Complete removal of all wire cages, pots, burlap wrapping, and any string holding these on. Bigger is not better. Often, the smaller the specimen, the better it will overcome transplant shock and start vigorous growth. Staking is important. No fertilization.
- First season watering. Especially in an urban environment, where it's extra hot & dry. Newly transplanted trees should be deep-watered once a week through the entire first growing season! (Unless there is poor drainage, or especially wet weather.)
- Physical protection. Urban trees are in high traffic areas. Vehicle collisions, dog 'markings', and especially ground compaction from human feet, can doom trees. Even well-meaning weed whacking can do serious damage. There are numerous barrier systems to effectively keep everyone away from tree trunks and root areas. 'Tree lawns' are the best solution, but often space is not available.

All of the above, and more, is well-known, and not rocket science. The critical course of action is to run a long term, consistent, expert, tree care program. This means hiring a professional, most probably a City employee attached to a Parks or Public Works Department. Such an Arborist can train and direct work crews to do the right things. A great example of a professional tree care program is on the Cornell University campus, where each tree is actually given its own identifier tag. Everything ever done to each tree is then documented. This constructs an 'institutional memory', to compensate for the fact that the people involved will come and go. Surely other institutions with a long term focus do similar things, and would be willing to offer advice.

So. The strongest recommendation I can make is that long term, scientific, professional care for Saratoga's public trees be institutionalized, though maintaining the position of a City Arborist. The response to any complaint about the expense can easily be answered. Putting a professional in charge produces a much better final result, with healthy, long-lived trees. And it avoids the ugly, wasteful results of planting the wrong trees, in the wrong places, with the wrong methods, with inadequate care, and with inadequate protection. Money spent without proper direction is simply wasted because the trees live a short and ugly existence; and then have to be soon replaced.

Think like an elephant. We should set a goal of having a greater percentage of 50 year old, and older, street trees, than any other city in the State. Saratoga could show leadership, by running a Statewide contest to inspire other cities!

Peter Brooks
(Cornell Ag College '73)

Via email: December 5, 2012
Monstrous, dangerous to life and property trees are being allowed to grow on the properties of home owners who don't seem to care whether they topple on neighboring homes in the event of a good wind.
An ordinance should include the specie and height of trees that should be not planted, and for those that are currently at a dangerous height, taken down. A fine would be in order.

Carl DeMarco...Contact Info Withheld

Public Comment Summary

Saratoga Springs Public Library, Dutcher Community Room, November 27, 2012, 7:00 pm

The City of Saratoga Springs held a public meeting to discuss the development of the first urban forest master for the city on November 27, 2012 in the Saratoga Springs Public Library. Approximately 60 people attended. The meeting began with an introduction by Brad Birge, Administrator of Planning and Economic development. Then the city's consultant, Bill Sprengnether of Cardinal Direction Landscape Architecture, made a slide presentation reviewing the history of Saratoga's urban forest, and presenting the results of the inventory of City-owned street and park trees spearheaded by Sustainable Saratoga. He concluded by highlighting issues to be addressed by the master plan and giving an overview of the planning process and schedule. Bill will make a presentation to the city council on December 4. A draft plan will be released later this winter, and a final plan is scheduled for adoption by the city council in the spring. The public may provide written comments to: streettrees@saratoga-springs.org. A survey of public opinion about Saratoga's urban forest and the city's urban forest management programs has been posted at www.surveymonkey.com/s/ss-street-tree.

Following his presentation, Bill opened the floor to questions and comments from the members of the public in the audience. Here is a summary.

- Will the city re-establish the historic double row of trees between the sidewalk and street along both sides of North Broadway? Response: The issue could be addressed in the master plan.
- Only part of the funding originally sought in the DEC grant is being applied to the urban forest master plan project. Can that funding be restored? Response: While additional funding will not be available from the current grant, additional funding for the purchase of trees has been included in the city's 2012-2013 budget.
- Commissioner Madigan expressed her support for the urban forestry project, and indicated that future funding would depend on fiscal conditions and the level of future funding requests from DPW.
- While conceptual drawings of the proposed building on Railroad Place showed a large number of large trees, the project as built included only a few small trees. How can the planting of more and larger trees in future development projects be assured? Response: Fewer trees were included in the approved plans than in the conceptual drawings. The issue could be addressed in the master plan. Existing regulations include standards for tree planting. The city's subdivision regulations recently were revised to change the list of recommended trees to include more species and remove invasives. The master plan could include recommendations to revise or add to existing regulations, if the public supports such changes.
- Perhaps the city could apply a small tax to pay for more trees planting and better maintenance. There was a small tax credit in the early 1800s for landowners who planted street trees.
- How will areas of the city be prioritized for tree planting? Do you complete tree planting on a partially-treed block, or plant a few on a block with no trees? Response: The master plan will include recommendations for prioritizing tree planting.
- Why are no conifers included in the list of recommended street trees? Response: Generally they have many low branches, which can impede sidewalks and reduce highway visibility.
- Some alleys in the city have been widened with pavement, but no trees have been planted. Where is the right-of-way boundary in relation to the edges of pavement? Commissioner Scirocco said that someone from DPW could come out if requested to locate a specific right-of-way boundary on an alley.
- Investment in new trees is self-defeating if they aren't properly taken care of. National Grid doesn't prune properly. The flower crew has created "mulch volcanoes," piles of mulch that bury the bottom sections of trees. That causes problems. Commissioner Scirocco said that DPW is reviewing its mulching practices and other aspects of the street tree program. DPW just planted 70 trees of a variety of species included in a list provided by Sustainable Saratoga's urban forestry project. They're not planting invasive species any more. They are planting trees species under power lines that don't grow into the lines and require extensive pruning.
- People who receive trees from the city should be educated about how to take care of them. Commissioner Scirocco said that DPW already does that.
- Ice storms can cause severe damage to trees. Species selection should take that into account.
- The city's rights-of-way along streets should be better protected. There should be rules about what can be planted and where. Aesthetics, safety, the potential to block lights should be considered. The right-of-way is being paved for parking,

and that shouldn't be tolerated. Both city employees and residents should be educated about the rules and proper procedures. There should be better enforcement.

- The master plan should provide guidelines for the size and shape of trees along streets in designated historic areas. Trees should be complimentary to architecture.
- There are a number of large, old, unique trees in the city. Special efforts should be made to maintain and preserve them.
- Rather than planting short trees or no trees under power lines, the city should investigate easements allowing larger trees to be planted on the house-side of sidewalks. The trees would be planted and maintained by the city.
- Jim Zack of Sustainable Saratoga asked if anyone had pictures showing street trees in the 1960s or 1970s. He could prepare a photographic comparison between then and now. Brad Birge mentioned www.historicaerials.com as a source for historic imagery.
- Tom Denny of Sustainable Saratoga said he is looking for historic photographs showing Broadway in the early years after Dutch elm disease killed most of the city's elms.
- Could the street tree inventory be made available to the Preservation Foundation? It would be good to identify older trees and the remnants of Saratoga's historic forest in relation to designated historic areas. The Preservation Foundation would like to participate in planning to guide recommendations about street tree management in historic areas.
- There are many issues facing the city that cost money. Budgets are limited. Will proposed actions be prioritized? Response: Yes. The public should weigh in on the master plan's recommendations when the draft plan is released.
- The master plan should deal with the downtown area. Some business owners are concerned that trees hide their businesses from the road. Trees need to be placed and maintained in ways that maintain visibility. Outreach and education are essential.
- Commissioner Mathiesen said that Saratoga Springs is known nationally for its tree-lined streets. The loss of the elms was a tragedy for the city. Downtown merchants should know that street trees draw business.
- Street trees are important. They cool streets and add beauty. Sometimes new trees planted in new developments aren't maintained. Perhaps groups could adopt trees in specific areas to assure they are maintained, especially in the early years after planting. Public spaces should be maintained.
- It is hard for DPW to keep up with all the tree maintenance work that is needed. However, good pruning is important for proper tree form and good health. The public can be trained to help, as they have in other cities.
- Supervisor Yepsen suggested that existing rules governing street trees be highlighted on the city's website. Partnerships are good, and there are good ways to address issues of liability. The planning for the urban forest should coordinate with the Climate Smart Communities Task Force.

The Public Survey Results

Saratoga Springs Street Tree Public Survey

SurveyMonkey

1. Trees make the City a better place to live and work.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	0.0% (0)	0.6% (1)	8.7% (15)	**90.7% (156)**	4.90	172
						AnsweredQuestion	**172**
						SkippedQuestion	**2**

2. Trees provide effective screening and block unpleasant views.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	0.6% (1)	3.5% (6)	13.5% (23)	**82.5% (141)**	4.78	171
						AnsweredQuestion	**171**
						SkippedQuestion	**3**

3. Trees increase property values and residential ownership

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	0.0% (0)	5.9% (10)	17.2% (29)	**76.9% (130)**	4.71	169
						AnsweredQuestion	**169**
						SkippedQuestion	**5**

4. Trees decrease energy use and consumption by shading and cooling

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCoun
	0.0% (0)	0.0% (0)	0.0% (0)	14.2% (24)	**85.8% (145)**	4.86	169
						AnsweredQuestion	**169**
						SkippedQuestion	**5**

5. The presence of trees in business and commercial districts attract visitors and customers

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCoun
	0.0% (0)	0.0% (0)	4.7% (8)	18.1% (31)	**77.2% (132)**	4.73	171
						AnsweredQuestion	**171**
						SkippedQuestion	**3**

6. Trees decrease stormwater runoff and erosion

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCoun
	0.0% (0)	0.0% (0)	2.3% (4)	18.1% (31)	**79.5% (136)**	4.77	171
						AnsweredQuestion	**171**
						SkippedQuestion	**3**

7. Trees reduce smog and dust and filter air pollutants

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCoun
	0.0% (0)	0.6% (1)	2.4% (4)	17.3% (29)	**79.8% (134)**	4.76	168
						AnsweredQuestion	**168**
						SkippedQuestion	**6**

8. Trees decrease noise from roads, industries and other sources.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCoun
	0.0% (0)	0.6% (1)	4.7% (8)	19.4% (33)	**75.3% (128)**	4.69	170
						AnsweredQuestion	**170**
						SkippedQuestion	**4**

9. Trees and forests are a defining character of Saratoga Springs and improve the overall quality of life.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCoun
	0.0% (0)	0.6% (1)	3.6% (6)	18.3% (31)	**77.5% (131)**	4.73	169
						AnsweredQuestion	**169**
						SkippedQuestion	**5**

10. Trees mitigate light pollution.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	0.6% (1)	10.8% (18)	22.8% (38)	**65.9% (110)**	4.54	167
						AnsweredQuestion	**167**
						SkippedQuestion	**7**

11. Trees Provide shade and comfort for rest and play.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	0.0% (0)	0.0% (0)	14.8% (25)	**85.2% (144)**	4.85	169
						AnsweredQuestion	**169**
						SkippedQuestion	**5**

12. Trees protect water quality.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	0.0% (0)	8.3% (14)	21.4% (36)	**70.2% (118)**	4.62	168
						AnsweredQuestion	**168**
						SkippedQuestion	**6**

13. Street trees are important to me.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCoun
	0.0% (0)	0.0% (0)	1.2% (2)	12.0% (20)	**86.7% (144)**	4.86	16
						AnsweredQuestion	**16**
						SkippedQuestion	****

14. Street trees play an important part in Saratoga Spring’s quality of life.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCoun
	0.0% (0)	0.0% (0)	2.4% (4)	17.7% (29)	**79.9% (131)**	4.77	16
						AnsweredQuestion	**16**
						SkippedQuestion	**1**

15. Street trees provide measurable economic and environmental benefits that justify planting and maintenance costs.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCoun
	0.0% (0)	1.2% (2)	2.4% (4)	19.5% (32)	**76.8% (126)**	4.72	16
						AnsweredQuestion	**16**
						SkippedQuestion	**1**

16. The city is responsible for planting, maintaining and preserving street trees.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.6% (1)	1.2% (2)	15.2% (25)	32.7% (54)	**50.3% (83)**	4.31	165
						AnsweredQuestion	**165**
						SkippedQuestion	**9**

17. Adjacent private land owners should be responsible for maintaining and preserving street trees.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	1.8% (3)	17.6% (29)	**32.1% (53)**	30.9% (51)	17.6% (29)	3.45	165
						AnsweredQuestion	**165**
						SkippedQuestion	**9**

18. Old large trees give neighborhoods “Character”.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	0.0% (0)	3.6% (6)	18.7% (31)	**77.7% (129)**	4.74	166
						AnsweredQuestion	**166**
						SkippedQuestion	**8**

19. Street trees are equal in value to other city infrastructure investments such as street lights, benches and sidewalks.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	1.2% (2)	2.4% (4)	2.4% (4)	22.3% (37)	**71.7% (119)**	4.61	166
						AnsweredQuestion	**166**
						SkippedQuestion	**8**

20. Street trees create a mess with leaves, seeds and twigs.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	19.8% (32)	**37.0% (60)**	27.2% (44)	10.5% (17)	5.6% (9)	2.45	162
						AnsweredQuestion	**162**
						SkippedQuestion	**12**

21. Street trees are a problem because they conflict with land and economic development.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	64.8% (105)	30.2% (49)	4.9% (8)	0.0% (0)	0.0% (0)	1.40	162
						AnsweredQuestion	**162**
						SkippedQuestion	**12**

22. Non-native invasive trees should be avoided when selecting street trees for Saratoga Springs.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	3.1% (5)	2.5% (4)	8.6% (14)	34.0% (55)	**51.9% (84)**	4.29	162
						AnsweredQuestion	**162**
						SkippedQuestion	**12**

23. Private land owners have a responsibility to maintain and replace adjacent street trees.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	3.1% (5)	32.3% (52)	**37.9% (61)**	19.9% (32)	6.8% (11)	2.95	161
						AnsweredQuestion	**161**
						SkippedQuestion	**13**

24. I am personally willing to invest a small amount of time and money to maintain and improve street trees in my neighborhood.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	3.8% (6)	17.5% (28)	**45.0% (72)**	33.8% (54)	4.09	160
						AnsweredQuestion	**160**
						SkippedQuestion	**14**

25. I am willing to pay a few dollars more in taxes to have new street trees installed with technology that protects sidewalks from future potential damage.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	1.2% (2)	3.7% (6)	8.0% (13)	40.7% (66)	**46.3% (75)**	4.27	162
						AnsweredQuestion	**162**
						SkippedQuestion	**12**

26. Street trees should not be planted because they cost too much to maintain and preserve.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	75.2% (121)	21.1% (34)	3.1% (5)	0.0% (0)	0.6% (1)	1.30	161
						AnsweredQuestion	**161**
						SkippedQuestion	**13**

27. It is appropriate to require developers to preserve and plant street trees as part of their project.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.6% (1)	0.0% (0)	2.5% (4)	15.8% (25)	**81.0% (128)**	4.77	158
						AnsweredQuestion	**158**
						SkippedQuestion	**16**

28. Trees should not be planted along streets because they conflict with underground and overhead utilities, streetlights, and street signs.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	51.6% (80)	40.6% (63)	5.8% (9)	1.3% (2)	0.6% (1)	1.59	155
						AnsweredQuestion	**155**
						SkippedQuestion	**19**

29. Should there be more trees along City streets and on public property.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.7% (1)	0.7% (1)	15.9% (24)	27.2% (41)	**55.6% (84)**	4.36	151
						AnsweredQuestion	**151**
						SkippedQuestion	**23**

30. The City should regulate the removal of trees on private property.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	16.6% (26)	**31.2% (49)**	28.0% (44)	14.0% (22)	10.2% (16)	2.70	157
						AnsweredQuestion	**157**
						SkippedQuestion	**17**

31. Street trees should be removed or replaced when they interfere with underground or overhead utilities.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	9.7% (15)	24.5% (38)	29.7% (46)	**32.3% (50)**	3.9% (6)	2.96	155
						AnsweredQuestion	**155**
						SkippedQuestion	**19**

32. Street trees should be removed or replaced when they cause damage to sidewalks and curbs.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	13.9% (22)	**33.5% (53)**	22.8% (36)	27.8% (44)	1.9% (3)	2.70	158
						AnsweredQuestion	**158**
						SkippedQuestion	**16**

33. When installing new street trees, extra money should be spent to protect sidewalks from future potential damage.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	1.9% (3)	14.0% (22)	**52.9% (83)**	31.2% (49)	4.13	157
						AnsweredQuestion	**157**
						SkippedQuestion	**17**

34. Trees should not be planted along streets because their roots crack sidewalks and pavements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	46.8% (74)	**47.5% (75)**	4.4% (7)	1.3% (2)	0.0% (0)	1.60	158
						AnsweredQuestion	**158**
						SkippedQuestion	**16**

35. Under current practices street trees are well maintained.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	7.1% (11)	25.6% (40)	**48.7% (76)**	17.9% (28)	0.6% (1)	2.79	156
						AnsweredQuestion	**156**
						SkippedQuestion	**18**

36. Trees should not be planted in business districts because they block store sign access and create debris.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	50.6% (80)	44.3% (70)	3.8% (6)	0.6% (1)	0.6% (1)	1.56	158
						AnsweredQuestion	**158**
						SkippedQuestion	**16**

37. A diversity of native trees provides resiliency to pests and weather fluctuations.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.6% (1)	0.6% (1)	9.6% (15)	28.0% (44)	**61.1% (96)**	4.48	157
						AnsweredQuestion	**157**
						SkippedQuestion	**17**

38. The cost of managing street trees outweigh the economic, social and environmental benefits they provide.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	56.1% (88)	21.7% (34)	3.8% (6)	3.8% (6)	14.6% (23)	1.99	157
						AnsweredQuestion	**157**
						SkippedQuestion	**17**

39. There is a need to create a street tree master plan and plant more trees along City streets.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	1.3% (2)	1.3% (2)	8.3% (13)	34.6% (54)	**54.5% (85)**	4.40	156
						AnsweredQuestion	**156**
						SkippedQuestion	**18**

40. The city should increase and improve maintenance for all public trees.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.6% (1)	2.6% (4)	9.6% (15)	36.5% (57)	**50.6% (79)**	4.34	156
						AnsweredQuestion	**156**
						SkippedQuestion	**18**

41. The City should review, update and strengthen regulations, guidelines, and processes for tree care, planting, and preservation on public property and along streets.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	1.3% (2)	0.6% (1)	7.1% (11)	42.3% (66)	**48.7% (76)**	4.37	156
						AnsweredQuestion	**156**
						SkippedQuestion	**18**

42. The City should review, update, and strengthen City regulations for tree care, planting and preservation of private properties.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	8.3% (13)	12.2% (19)	23.1% (36)	**31.4% (49)**	25.0% (39)	3.53	156
						AnsweredQuestion	**156**
						SkippedQuestion	**18**

43. The Street Tree Master Plan should create clear processes for tree planting, maintenance and removal on City property and within the City right-of-way.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.0% (0)	0.6% (1)	5.1% (8)	42.9% (67)	**51.3% (80)**	4.45	156
						AnsweredQuestion	**156**
						SkippedQuestion	**18**

44. The City should promote and increase public awareness of the value of Saratoga Spring's street trees and its urban forestry program development.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.7% (1)	0.0% (0)	3.9% (6)	30.9% (47)	**64.5% (98)**	4.59	152
						AnsweredQuestion	**152**
						SkippedQuestion	**22**

45. The City, the Urban Forestery Project and the Street Tree Master Plan should provide educational opportunities and resources to the public about proper tree planting, maintenance, and selection.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	RatingAverage	RatingCount
	0.6% (1)	0.6% (1)	1.9% (3)	31.6% (49)	**65.2% (101)**	4.60	155
						AnsweredQuestion	**155**
						SkippedQuestion	**19**

APPENDIX J – References to Trees in Zoning Ordinance

Saratoga Springs Zoning Ordinance

2.3
C. Intersection Obstructions
At all street intersections, there shall be no obstruction to vision exceeding thirty (30) inches in height (other than an existing building, post, column or tree) within the triangle formed by the edge of pavement at the intersection and measuring thirty (30) feet along each street.

3.1.2 All Transect Zones
B. Streetscape Design
1. Streetscape elements should include on-street parking, curbs, street trees, sidewalks and streetlights.
2. Street trees should be spaced on average 40 feet on center, depending on site conditions. At the time of planting, street trees should measure 15 to 20 feet tall, have a minimum caliper of four inches measured at a point 12 inches above the root ball, and have a minimum branching height of eight feet.

3.2.7 Vegetation
B. Within Zone A, street tree plantings should be a consistent species planted geometrically. Landscaping in Zone B should consist of a mix of species and be planted in clusters.

3.3.6 Traffic Calming
For properties within the Gateway Design District-2, special considerations should be given to design measures that reduce travel speeds on Marion Avenue. Traffic calming measures include reducing the width of road shoulders and installing curbs, adding street trees, sidewalks and street lighting; and installing bump outs or pedestrian refuge areas at pedestrian crossing points.

3.6.3 Activities within District
B. Activities exempt from permit
3.c. Tree and shrub care

6.1.3 General Regulations
A. Placement
5. No signs shall be placed upon trees, manmade or natural features (excluding buildings) or on utility poles, bridges, culverts, towers or similar structures.

6.3.2 Telecommunications Facilities and Towers
B. Additional Requirements ...
5. Site Plan Review
c. Existing on-site vegetation shall be preserved to the maximum extent possible. An inventory may be required to document existing vegetation. No trees, measuring more than 4 inches in diameter at a height of 4 feet off the ground, shall be cut prior to approval. Additional plantings may be required to screen the facility from neighboring areas

6.4.8 Solar Access
Except as otherwise provided by this Chapter, no property owner may erect a structure or allow a tree or other flora

to cast a shadow upon a solar collector greater than the shadow cast by a hypothetical wall six feet high located along the property line between 8:00 a.m. and 4:00 p.m. Eastern Standard Time from September 21 to March 21.

7.2.4 Evaluation of Criteria for Site Plan Review
9. Adequacy, type, size, and arrangement of trees, shrubs and other landscaping. Parking, service areas, and loading and maneuvering areas shall be reasonably landscaped and screened from neighboring areas

7.3.1.2 Activities Requiring Permit and Exemptions
A. Activities subject to Permit
1. Within the Rural Residential-1 district: any activity affecting 1.5 or more acres that changes the natural topography, removes or disturbs the topsoil, or removes more than 15% of trees over 4 inches in diameter at breast height (dbh).
2. Any other district: any activity affecting 0.5 or more acres that changes the natural topography, removes or disturbs the topsoil or removes more than 15% of trees over 4 inches in diameter.

B. Exempt Activities
The following activities shall be exempt from permit:
1. Agricultural activities directly related to the production of crops or livestock, excluding timber harvesting
2. Forest management practices or noncommercial tree cutting for firewood that does not remove more than 15% of trees over 4 inches in diameter

7.3.1.3 Permit Application Process
D. A Soil Erosion and Sediment Control Plan shall include a sketch plan that fully identifies the proposed activity, extent of soil and vegetative alterations or tree harvesting, and the land protection and structural soil conservation measures to minimize soil erosion and sediment loss. Such plan should be at a scale of 1" = 100' and include the following:

7.4.7 Action Subject to Review
E. Within a front yard setback
2. Installation or removal of architectural, sculptural or vegetative screening that exceeds 3 feet in height.

7.4.8 Actions Exempt from Review
2. Installation of accessory freestanding objects including but not limited to sculpture, tree houses, play equipment, clocks, fountains, flagpoles, basketball hoops, and the like.

10.2.3 Planned Unit Development Objectives
6. Prevent soil erosion and enhance the preservation of trees, outstanding natural topographical and geological features.

Appendix A Definition of Terms
NURSERIES: Any place where trees, bushes or plants are raised for wholesale and/or retail sale; includes greenhouses.

Appendix B Site Plan Review Submission Requirements
B. Submission Requirements for Formal Site Plan Review
2. Site Plan Drawings

f. Landscaping and lighting details
i. A landscape plan delineating the existing and proposed plant material shall be provided. Existing wooded and/or natural landscaped areas shall be shown and noting whether they shall remain or be removed. Existing specimen or individual trees, shrubs and all shrub masses shall be shown and labeled with the botanical and common name and noting whether they shall remain or be removed. All trees and shrubs to be removed must be approved by the Planning Board prior to any clearing and grubbing of the project site. This plan shall include a planting schedule listing all proposed plants (trees and/or shrubs), their size at initial planting, their ultimate maximum size at maturity and the quantity of each plant material specified.

D. Post-construction ("as built") Plan Submission
2. Light poles, parking spaces, curbing, trees, sidewalks, bench marks, retention/detention areas, berms, retaining walls, dumpsters, etc.

Appendix C: 4. Water's Edge/Woodlands on Saratoga Lake PUD
Section XI: Development Standards
5. The developer, or its successor, shall install street trees, street signs and parking control signs pursuant to City standards for PUD site plan approvals granted after the effective date of this ordinance.

6. The developer, or its successor, in cooperation with the City, shall provide and install street signs and street lights as required by the City and pursuant to City standards in the previously approved and developed Phases 1 and 2, no later than December 31, 1998. The City shall provide street trees to the developer for planting in the previously approved and developed Phases 1 and 2 which the developer shall install upon receipt of said trees from the City. One tree for each approved lot in Zone B which does not have a tree in the right-of-way at the date of this Ordinance shall be provided by the City and installed by the developer.

Appendix C: 8. Village at Saratoga PUD
Section XI - Off-site Improvements
c. The developer shall not be responsible for any curbs, pavement improvements, street trees, street lighting within the existing public rights of ways of that portion of Crescent Street and Vanderbilt Avenues that have frontage on the PUD.

Appendix C: 9. Green Acres PUD
Section XI - Off-site Improvements
The developer, or its successor, shall not be responsible for any curbs, pavement improvements, street trees, street lighting within the existing public rights of ways of that portion of Crescent Street or Kaydeross Park Road that has frontage on the PUD.

Saratoga Springs Subdivision Regulations

p. 55
(4.) Site building envelops so that treetops and crest lines of hills as seen from public places and roads will screen future buildings. Use vegetation as a backdrop to reduce the prominence of the structure. Wherever possible, open up views by selective cutting of small trees and pruning lower branches of large trees, rather than by clearing large areas or removing mature trees.
(5.) Group building envelopes in clusters or tuck them behind tree lines or knolls rather than spreading them out

across the landscape in a "sprawl" pattern.

p. 85
Application for Conservation Subdivision Plan - Table
Seeking info on:
- wooded areas of 1 acre or more
- trees uncommon by virtue of size, age or species.

p. 108

Q. Street Tree Plantings
Street Tree Plantings:
1. Street trees shall be planted throughout residential subdivisions, which do not have major existing trees and when curbs and sidewalks are included in the design.

2. The Board may require additional street tree plantings in areas of residential subdivisions, which are void of major trees. On block faces up to one hundred feet (100') in width one tree shall be planted. On block faces over one hundred feet (100') in width, one (1) tree shall be planted at one hundred foot (100') intervals.

3. The developer of any residential subdivision shall preserve and protect the existing major trees located within the required setback areas (front, side, and rear yards).

4. The developer of any commercial or industrial subdivision shall provide buffer and/or screen plantings in addition to street tree plantings.

5. The standards for the location and design of buffer areas are intended to provide flexibility in order to provide effective screens. The location and design of buffers shall consider the proposed use of the property, the distance between the use and the adjoining property lines or subdivision lines, differences in elevations, etc.

6. The developer of any commercial or industrial subdivision shall preserve and protect the existing major trees located on the property, which do not interfere with the building area.

7. Street tree plantings (either natural or planted) shall be broken at points of vehicular and pedestrian ingress and egress to assure a clear sight triangle at all street and driveway intersections.

8. Street trees shall be at least two and one-half inch (2 1/2") caliber when planted, free of disease and insect pests and hardy within Zone 4. Any planted street tree, which does not live, shall be replaced within one (1) year.

9. Recommended Street Trees: The developer shall use small street trees in situations where there are overhead utility wires or other space restrictions. Other conditions that may warrant the use of smaller trees include but are not necessarily limited to: the scale and/or character of the surrounding environment, maximizing sunlight exposure, and maximizing views from adjacent building windows, patios, and/or balconies.

*In situations with narrow space restrictions, columnar or upright cultivars of the recommended medium to large street trees above shall be used.

10. The planting of any tree, shrub or other plant species whose invasiveness has been rated as Very High, High, or Moderate on the current Non-Native Plant Species Invasiveness Assessment list, maintained by the Cornell Cooperative Extension Invasive Species Program and the New York Invasive Species Clearinghouse (http://www.nyis.info/?action=israt), is not permitted.

Appendix I
2. Required Improvements
A. 7. Street trees

6. Acceptance of Streets by the City
A. General Provisions
5. a. [...] In addition, the drawing must show light poles, curbing, trees, sidewalks, bench marks, monumentation, retention/detention areas, berms, retaining walls, parking and traffic control signs, etc.

APPENDIX K – New York Urban Tree Resources

Cornell University Urban Tree Booklet
http://www.hort.cornell.edu/uhi/outreach/recurbtree/pdfs/~recurbtrees.pdf

New York City Tree Planting Standards
http://www.nycgovparks.org/permits/trees/standards.pdf

New York State Flora Atlas
http://newyork.plantatlas.usf.edu/

Urban Tree Establishment Textbook
Trowbridge, Peter J., and Nina Bassuk. *Trees in the Urban Landscape: Site Assessment, Design, and Installation*. Hoboken, NJ: J. Wiley & Sons, 2004. Print.

CU Structural Soil
Cornell University Department of Horticulture houses the world's premier research department that is specifically dedicated to improving the horticulture practices common in the urban environments. Publications and how-to DVD's and manuals can be accessed at the following website.
http://www.hort.cornell.edu/uhi/outreach/index.htm
Titles include:

- *Using CU Structural Soil in the Urban Environment*
- *CU-Structural Soil: An Update after More than a Decade of Use in the Urban Environment*
- *Using Porous Asphalt and CU-Structural Soil™*
- *Managing Stormwater for Urban Sustainability Using Trees and Structural Soils*
- *CU-Structural Soil™ Graphics and Plan Views*

Street Tree Volunteer Training and General Info
http://www.treesny.org/

NYS DEC Invasive Species List
http://www.dec.ny.gov/animals/65408.html

Arbor Day Foundation & Tree City USA
http://www.arborday.org/