

Tree Master Plan
for
The City of Schenectady, NY



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Executive Summary

Major Findings

- The empty position of forester renders crucial technical and organizational expertise unavailable to the City.
- The section of city code functioning as the tree ordinance dates from 1988 is no longer operational.
- Forestry equipment is sufficient to the crew's tasks, and is generally in good condition.
- One-half of the annual tree complaints remain unanswered on average.
- There are about 8,200 (+/- 200) trees in the public right-of-way.
- Maples make up more than 60% of the total population.
- One-half of the ROW trees are in good health, one-third in fair health, the remainder poor or dead.
- Stocking rate is 65%, meaning that about two-thirds of the available planting sites are filled.
- Available planting sites are mostly small and have overhead wires.
- Overall city tree cover is about average for NYS communities of similar populations, but street tree population is much lower than average.

Recommendations

- Review and enforce the tree ordinance.
- Manage high-risk trees on a pro-active basis, including private trees that threaten the ROW.
- Target full stocking in the ROW.
- Consider easements for set-back planting.
- Computerize the Parks Office staff gradually over the next two years, and create a web presence for forestry.
- Find opportunities to increase technical expertise of crew and foreman.
- Aim to become a Tree City, USA in 2004.



Photo 1. Silver maple roots over curb.

Acknowledgments

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Photo 2. A juvenile tree in Schenectady that is ready for training and raising.

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Introduction

The City of Schenectady has a large and valuable population of publicly maintained trees that grace its streets and parks. This urban forest provides a wide variety of benefits including:

- Stormwater capture
- Energy conservation through shading and wind shielding
- Diminution of urban heat island effects
- Wildlife habitat formation
- Erosion mitigation
- Economic enhancement of commercial and residential properties
- Reduction of public health threats through improved air quality from:
 - Oxygen production
 - Carbon sequestration
 - Ozone reduction
- Aesthetic enhancement of the community

The value of all of these benefits can quickly be offset by liabilities if the condition of city trees is allowed to deteriorate, or if the demands of reforestation are ignored—the former is heedless of our grandparents’ legacy, the latter neglects our grandchildren’s inheritance. On the other hand, the benefits of urban trees can far exceed the costs through proper planning and execution based on research and sound arboricultural practices. This Urban Forestry Master Plan provides goals, guidelines, and rationales that, once adopted by the City, will serve for a generation or more as a touchstone for the standardization and optimization of municipal arboricultural practices.

This plan relies on three types of information: site visits, interviews, and research. Here are highlights of that work:

- September 17 and 18, a 5% random sample was taken of the ROW trees covering 55 different street segments totaling 8.9 miles.
- October 17, in-person interviews with key personnel
 - Bill Seber
 - Betsy Henry
 - Forestry crew members
- Subsequent telephone interviews
 - Parks staff (repeatedly)
 - City Neighborhood Revitalization personnel
 - County GIS staff
 - Contractor for removals
 - Forestry foreman

In addition, research among published sources for comparative data and experiences was carried out. The Plan was read in draft by three other consulting foresters of Davey Research Group, and key portions were made available in draft to Betsy Henry and Bill Seber.

The Plan is structured in response to the four tasks imposed by the RFP:

- Part I: “The consultant will meet with representatives from ReTree Schenectady and the Schenectady Parks Department to review current urban forestry policy and practice in Schenectady. The consultant will compile this information and compare the approach to that of other cities with strong urban forestry programs.”
- Part II: “The consultant will conduct tree inventories sufficient to assess status and needs along thoroughfares and in representative areas of the neighborhoods. Data will be maintained in an easily accessible database. The data will be used to estimate the number of trees in Schenectady, their condition, and the level of effort required to address planting and maintenance.”
- Part III: “The plan will define goals and actions for management of the urban forest in Schenectady. ReTree Schenectady, the Parks Department, other city departments (e.g., Department of Public Works, Planning Department), and/or interested parties (e.g., Schenectady 2000, Synthesis Architects, neighborhood associations) may be consulted.”
- Part IV: “The plan will describe an implementation strategy for proposed actions [that] will include an estimated timeframe, the responsible party, and the estimated cost. The strategy will also prioritize actions to facilitate review and decision-making.”

The Plan concludes with bibliographic indications and an appendix.



Photo 3. Overmature silver maples on private property with the potential to impact the ROW.

Part I: Evaluation of Current Urban Forestry Policy and Practice in Schenectady

Task I: “*The consultant will meet with representatives from ReTree Schenectady and the Schenectady Parks Department to review current urban forestry policy and practice in Schenectady. The consultant will compile this information and compare the approach to that of other cities with strong urban forestry programs.*”

Current Policy

Urban forestry policy in the City of Schenectady is based on a “Tree Ordinance” (City of Schenectady Codebook, § 243) enacted in 1988. Highlights of that Ordinance include:

- Jurisdiction is given to the “Superintendent of Parks”
- Penalties for violation of the Ordinance: \$500 fine and wood-for-wood replacement
- Master Tree List: 9 species + 3 conifer species on pages copied from Michael Dirr’s *Manual of Woody Landscape Plants* (2nd ed.)
- Removal rights include private trees that threaten the public right-of-way (ROW)
- Utility work in ROW allowed by permit
- Annual review of ordinance by “Environmental Conservation Commission”

Of these highlights, apparently only the first is currently operational. I make this conclusion based on the following:

- A violation penalty seems to have been assessed once in the early 1990s, but no other can be recalled by current personnel
- The Master Tree List of 1988 is not being followed
- Though trimming private trees has gone on for signage, no one recalls a case of private tree removal
- No permit is being required for utility work
- The Environmental Conservation Commission no longer exists

This section of municipal code serves as the legal basis of urban forestry in the City. Since it is now apparently 15 years out-of-date and universally ignored, it needs to be made relevant through revision and enforcement.

Current Practice

Organization

Urban forestry in Schenectady is practiced by the Department of Parks, under the overall supervision of the Director of Parks who reports directly to the Mayor. (A new position of Forester was approved by City government in 2001, but has not been filled.) The Director oversees two foremen, who each are in charge of a crew. One crew is dedicated to forestry, and includes two tree trimmers as well as a medium equipment operator and a 3/4-time maintenance worker. Both crew and foreman commented that the forestry crew is frequently pulled from forestry work to carry out other tasks for which the Department of Parks is responsible. This is a common practice—and common problem—in other communities with urban forestry programs.

Personnel

The current Director has held the job since 1991. Foremen turn over frequently, while all tree trimmers have worked for the City for more than 20 years. No information was gathered concerning the equipment operator or the maintenance worker.

Arboricultural Training

Tree trimmers received their training in private professional tree employment in the 1970s before starting to work for the City. The current foreman of the forestry crew has had no arboricultural training.

Equipment

Type	Brand	Year	Comment
Bucket truck	Ford Skyworker	1985	
	Ford Skyworker	2000	
Chipper	Vermeer	1990	
	Morebark	2000	
Crane			Available as needed from outside
Dump truck	Chevrolet	1991	
Dump truck	Ford	1999	
Spade	Vermeer	1961	
Stumper	Vermeer	?	“Not in good shape”
Pickup	GMC	1988	
Winch truck	International	1970	

Source: City of Schenectady, Department of Parks

This equipment is fundamentally in good shape, according to all respondents who reported. It also matches what would be expected from a city the size of Schenectady, according to 10-year-old data (Tschantz and Sacamano, 1994), and is adequate to the type of work the forestry crew performs.

Budget and Salaries

Position	Count	2002 Budget Amount
[Forester]	1	[not filled]
Park Supervisor	1	\$36,381
Tree Trimmer	2	\$57,833
Medium Equipment Operator	1	\$27,185.60
Maintenance Worker	0.75	\$13,239
TOTAL	4.75	\$134,638.60
Contracted work (est.)	1	\$35,000
Total Forestry Budget		\$169,638.60

Source: City of Schenectady, Department of Parks

Expressed as a rate, the City of Schenectady spent in 2002 about \$2.60 per capita for forestry. This is probably well below the national average for communities of this size, since in 1993 the average was \$2.63 per capita for 73 US communities between 50,000 and 99,000 in size (Tschantz and Sacamano, 1994), which would be about \$3.25 in 2002 dollars if budgets remained flat across that period. That implies that Schenectady may be spending about 20% less on forestry than other communities its size. The significance of that shortfall is lessened somewhat by the reduced size of the forest (see below).

The average tree trimmer in 1993 was making \$11.91/hr in those same U.S. communities, about \$14.50 in 2002 dollars if salaries remained flat across the period; 2002 Schenectady salaries quoted above translate to \$13.90/hr, or only about 4% lower than the national average.

Operations - Office

Urban forestry in Schenectady is driven by reaction to complaints and requests for service. This means that the secretarial staff of the Parks office is critical to the daily operations of urban forestry. Therefore, this operations review starts with them.

The secretary of the Park office receives phone calls about tree problems from citizens and municipal officials, and transfers them manually to a "Complaint Report" (Appendix). After numbering the Report, she copies and files it, sending the original to the foreman of the forestry crew. She keeps a complaint log of all incoming calls as well. If another complaint later comes in from the same person, a "Tree Complaint Follow Up" slip is filled out and filed with the original complaint report. After the complaint has been investigated and action determined, the foreman sends back the top (white) copy of the Complaint Report, indicating what "disposition" was taken, and files the bottom (yellow) copy.

Records are filled out and maintained without the aid of a computer. Every record is written by hand or typed, and any reports must be tabulated by hand before being typed. These office procedures are said to be traditional, dating from about 50 years ago. It is perhaps for this reason that no annual reports are made about forestry operations, since it would require a large amount of time to collate the data that is simply not available to the limited resources of the staff.

These observations do not reflect on the quality of the staff or its work. It became obvious during the operations review for this plan that the secretary does an excellent job of organizing work and records. When asked for specific data, she produced them readily and accurately—a tribute to her excellent record keeping. One cannot help, however, wondering to what extent office work could be facilitated if more modern techniques were used.

Operations -Field

The stack of complaint forms drives daily forestry work. The foreman selects a complaint off the top of the pile, and sets up the crew and equipment for the task. The foreman is also responsible for investigating complaints as they come in, determining the appropriate response to them.

Everyone involved acknowledges that there is a large backlog of complaint reports, and it is growing. The data for 2000-2002 reveal the extent of the problem:

<i>Year</i>	<i>Complaints</i>	<i>Completed</i>	<i>Percent</i>
2000	324	213	66%
2001	274	116	42%
2002	406	188	46%

Source: City of Schenectady, Office of Parks and Recreation

Figure 1. Percent of Completed Complaints

This chart shows that, based on Parks records, one-half of the annual complaints on average remain unanswered. This raises a very large problem, because the number of unanswered complaints gets larger each year. The problem can be illustrated with the above data. If we assume for the sake of argument that there was no backlog from 1999, then we can graph the accumulation of unanswered complaints over the last three years and project for the rest of the decade.

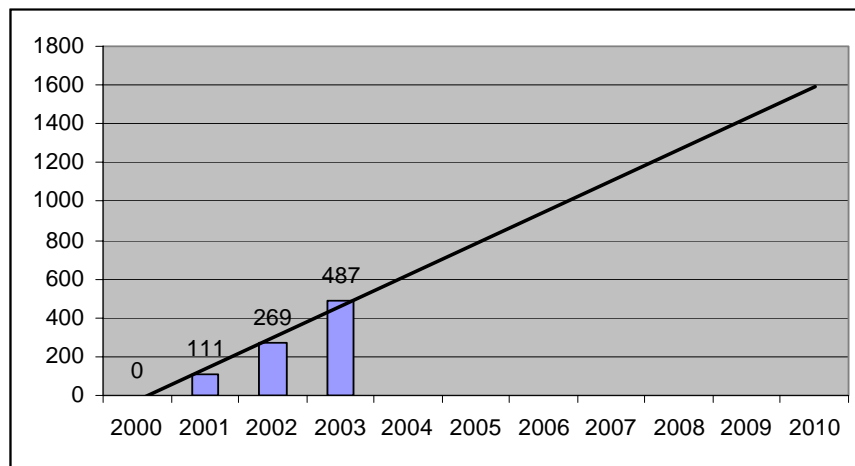


Figure 2. Accumulation of Unanswered Complaints

At the current rate, the volume of unanswered complaints will pass 1,000 within 4 years, and be above 1,500 by the end of the decade. Clearly, this situation cannot continue.

Trimming

The forestry crew of the Department of Parks carries out smaller (<24" in 2002) tree removals and most tree trimming. There are no easily accessible data on the annual work except from the completed complaints as reported above.

Removal

Removals of larger trees are contracted out to private tree companies. In 2002-03, the contract was awarded to Donovan Tree Service, Inc. of Mechanicville, which removed 45 trees; this number was reported as larger than usual, due to severe weather events. The average DBH of the trees removed was 36" (calculated from contractor's report) at an average cost of about \$450, including stump removal. In most regions, this would be a very competitive price. No data on species were kept.

Planting

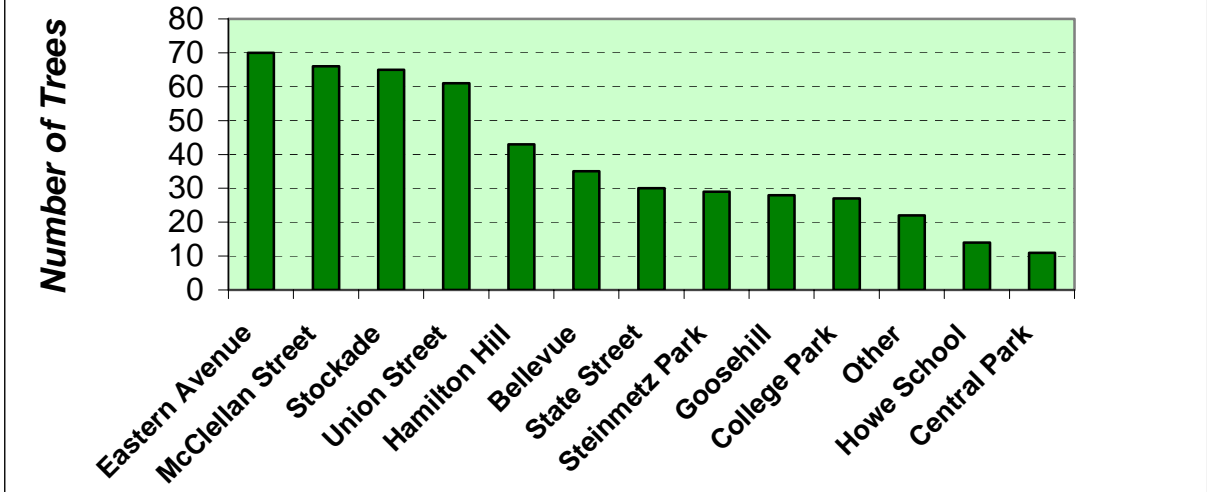
ReTree Schenectady, a volunteer organization founded in 1991, now does all tree planting on city streets, except for those involved in a municipal construction project of some kind, where a private Landscape Architect is used. The Parks office generates a list of planting sites each year based on homeowners' requests and available funds.

ReTree Schenectady, currently headed by Betsy Henry, Ph. D., uses the list of urban trees published by Cornell University's Urban Horticulture Institute. That list is revised periodically, and is available for download at the following website:

<http://www.hort.cornell.edu/department/faculty/bassuk/uhi/urbantrees1.html>

The organization also follows recommendations posted by Cornell for bare root planting, thus enabling it to carry out its planting using volunteer labor without the aid of machinery. Three years after the trees go into the ground, volunteers return to train the tree and do whatever other maintenance is necessary. Stock is purchased from Schichtel's nursery (Springville, NY, 716-592-9383), which specializes in bareroot trees. About 150-200 trees/year are being planted, distributed throughout the city as seen in Figure 3.

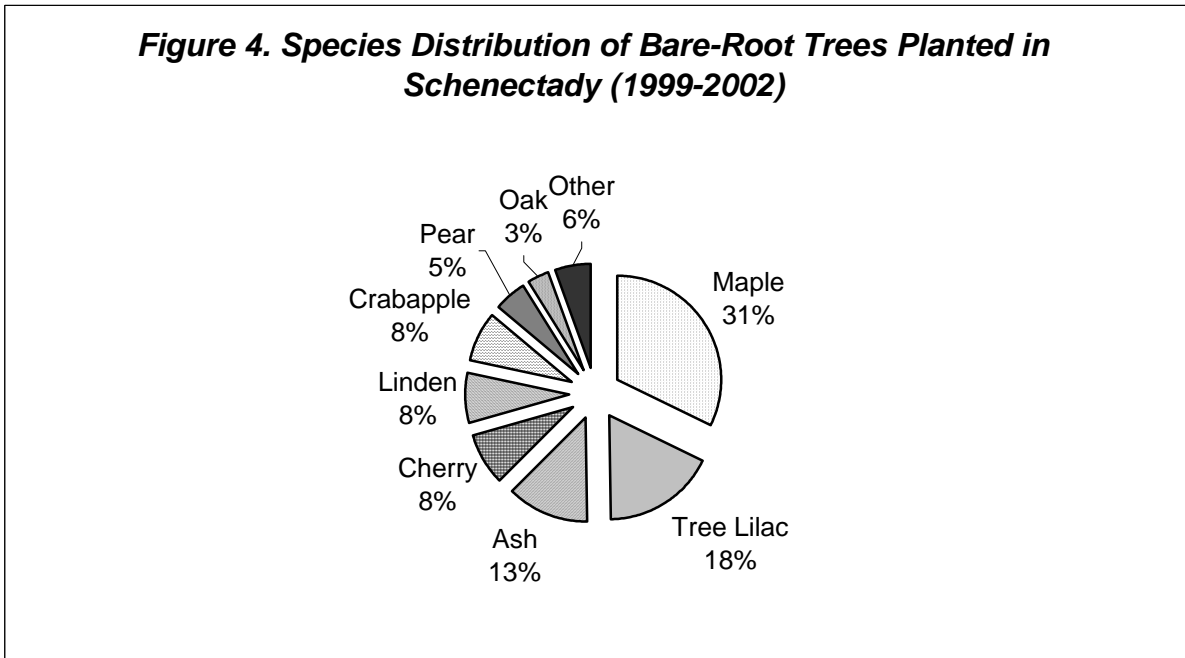
Figure 3. Geographic Distribution of Bare-Root Trees Planted in Schenectady (1999-2002)



Source: Betsy Henry, ReTree Schenectady

The mixture of species planted by ReTree is also important, as shown by Figure 4.

Figure 4. Species Distribution of Bare-Root Trees Planted in Schenectady (1999-2002)



Given the existing domination by maples in the forest (greater than 60%), ReTree might want to consider reducing that genus’s preponderance in their future planning.

Information about number, species, or specifications of planting by private landscape architects for municipal projects was unfortunately unavailable.

Part II. Assessment of Current Status and Needs of the Urban Forest

Task II: *“The consultant will conduct tree inventories sufficient to assess status and needs along thoroughfares and in representative areas of the neighborhoods. Data will be maintained in an easily accessible database. The data will be used to estimate the number of trees in Schenectady, their condition, and the level of effort required to address planting and maintenance.”*

Inventory Methodology

The street tree population was inventoried using a random sample methodology. Local Highway Inventory data were obtained from the NYS Department of Transportation and a random 5% sample of the street mileage (177 miles was given by the NYS DOT, possibly because state roads were omitted from its database) was selected. This amounted to 55 street segments totaling 8.9 miles. The segments were mostly single blocksides—edge of a block from corner to corner, or corner to dead end—scattered throughout the City of Schenectady.

A data collection form was developed in Pendragon Forms 3.2 for use on a personal digital assistant (PDA) for the field inventory. The following parameters were measured:

- Street segment number
- Tree Species (botanical name)
- Diameter at Breast Height by 6” size classes
- Number of stems
- Health: good, fair, poor, dead
- Treelawn size class: < 4’, 4-8’, >8’
- Presence of overhead electrical wires

Data were collected on September 17 and 18, 2002, by means of a vehicle windshield survey. The public Right-of-Way (ROW) was assumed to end at the back of the sidewalk; where sidewalks were lacking, standard rod multiples (16.5’, 33’, 49.5’, etc.) were used. Leaves were still present on the trees, although many trees were visibly showing drought stress symptoms, or were even senescent.

Planting sites were also recorded in the survey. They were identified as suitable empty locations that were a sufficient distance from competing vegetation, driveways/corners, and signage.

The data were then uploaded from the PDA into an Excel 2000 spreadsheet for analysis. Data file for the random selection and analysis is included with this report.

Results

Inventory and Street Tree Population

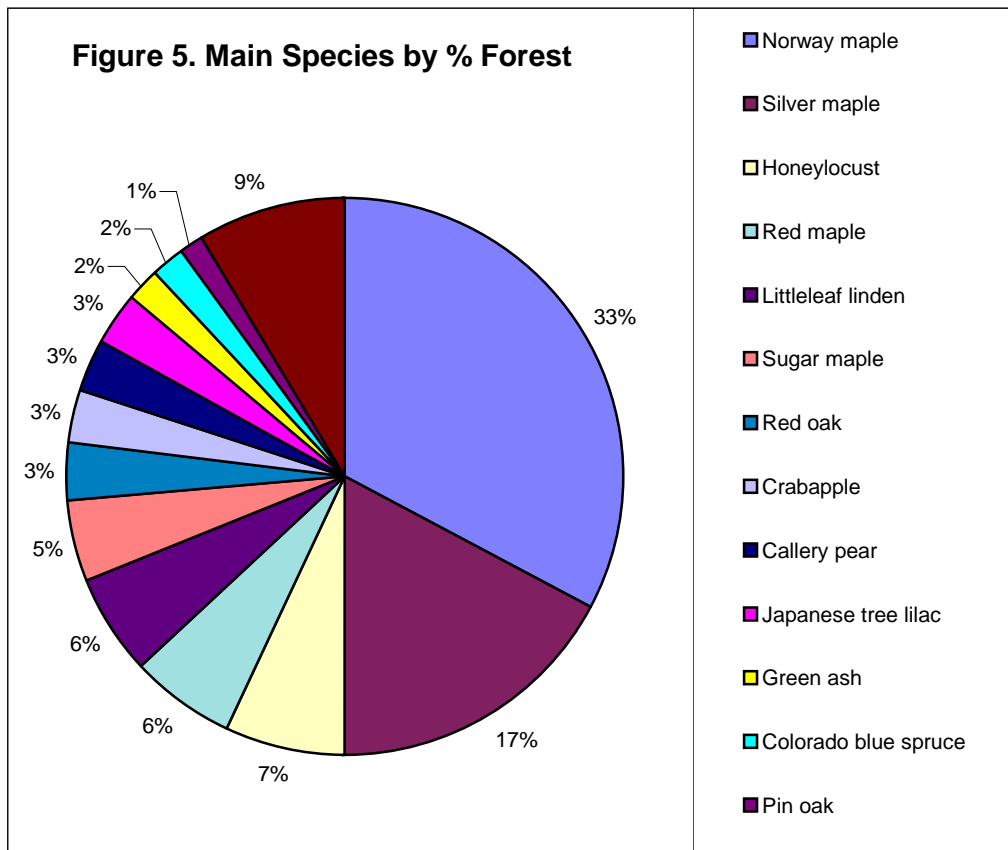
The sample turned up 475 trees in the ROW, translating to a citywide rate of about 44 trees/mile. For the entire city the projection from this sample scales up to a total population of 8,196, using City of Schenectady mileage (185). About **8,200 trees plus or minus 200** seems thus to be a reasonable estimate from the sample.

Street Tree Population Attributes

Species Distribution. Based on the sample inventory, the following attributes emerge (full data in Appendix II):

- 13 species make up around 91% of the forest
- Another 18 species make up the remaining 9%
- About half of the species represented are native to the U.S.
- Maples make up more than 60% of the population
- Norway maple is the most common species in the city at about 33%
- Silver maple is the second most common species (17%)

These numbers can be visualized by means of the pie chart Figure 5.

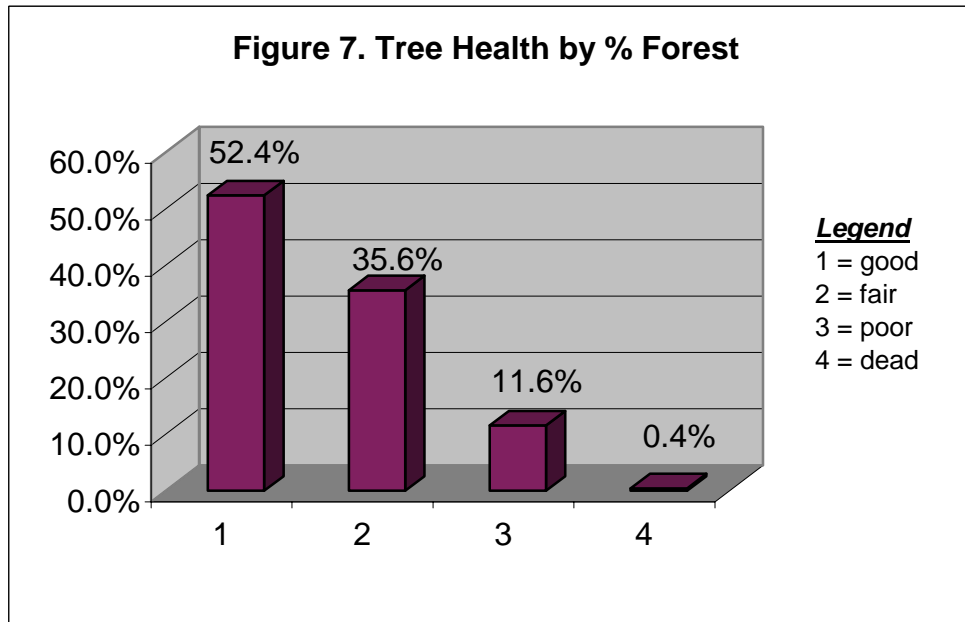


Size Distribution. The sample shows a negative and nearly linear relationship between size class (multiples of 6”) and percent forest, as shown by Figure 6.



Almost one-third of the trees in the sample are less than 6” in diameter, and over 80% are 24” or less.

Tree Health. The overall condition of the trees in Schenectady’s ROW can be gauged from the sample. About one-half of the trees are estimated to be in good health, one-third or so in fair health, and the remaining 12% in poor health or are dead. Figure 7 shows the overall picture:



Planting Site Population.

Scaling up from the 276 planting sites found in the sample, we estimate that there are about 4,502 planting sites in the ROW city-wide. This number allows us to calculate what is called the stocking rate. Stocking rate is the percent of sites occupied by trees, so

$$\text{Stocking Rate} = \frac{\# \text{ sites with trees}}{\# \text{ sites with trees} + \# \text{ empty sites}} = \frac{8,196}{8,196 + 4,502} = 64.5\%$$

This indicates that the City currently has nearly two-thirds of its planting sites in the ROW occupied by trees.

Planting Site Attributes

For future planning and plant selection, it is obviously not enough to know that there are planting sites available. The characteristics of these sites will determine the species available for selection. In the sample taken, two major limiting factors were recorded: treelawn width and the presence or absence of electrical distribution wires. Soil characteristics such as pH were not measured, although they are also important in species selection. The probable distribution of site attributes in the City is shown in Figure 8.

	Wires	No Wires	Total	%Total
LARGE	40	359	398	8.9%
MEDIUM	219	996	1215	27.0%
SMALL	2151	737	2888	64.1%
Total	2410	2092	4502	100%

Figure 8. Attributes of Projected Available Planting Sites in the ROW

Discussion

Street Tree Population

The ROW tree population rate in Schenectady is estimated at 44 trees/mile, less than one-half the national average of 102 trees/mile. This stocking is even lower than the average of about 130 trees/mile recently found for 79 Illinois communities with a population over 25,000 (Miller, 1997; Green and Schroeder, 2002).

There are a number of possible explanations for such a low figure:

- This is the historical stocking rate maintained by the City
- A higher rate than the current one never existed
- A higher rate once existed, but no longer operates because trees died at a higher rate than usual
- A higher rate once existed, but no longer operates because trees were planted at a lower rate than usual
- Some combination of the above

The sample data indicate that the stocking rate is about 65%. The maximum stocking level of street trees possible in the city seems to be about 69 trees/mile based on the limited number of available planting sites. This indicates that the street tree population in the City of Schenectady will always be less than that of similarly sized communities.

Yet street trees account only for 2-10% of urban trees, the urban forest picture is different if we widen the perspective. In terms of the all the trees inside municipal boundaries, the tree cover for Schenectady is about 26% (Dwyer et al, 2000). That figure may appear low, but the City is just above the average (24%) of NYS communities with similar populations, as shown by Figure 9. This suggests that there is adequate space for trees outside the ROW in the City.

	<i>1990 Population</i>	<i>Tree Cover</i>
Utica	68,637	42.3%
Troy	54,269	31.3%
West Seneca	47,866	29.3%
White Plains	48,718	27.6%
Schenectady	65,566	25.7%
Yonkers	188,082	23.7%
Syracuse	163,860	23.0%
Albany	101,082	22.9%
Rochester	231,636	21.8%
Cheektowaga	84,387	17.8%
Upper Nyack	68,637	17.3%
Tonawanda	65,284	17.1%
Binghamton	53,008	17.0%

Source: Dwyer et al, 2000

Figure 9. Communities with Similar Populations

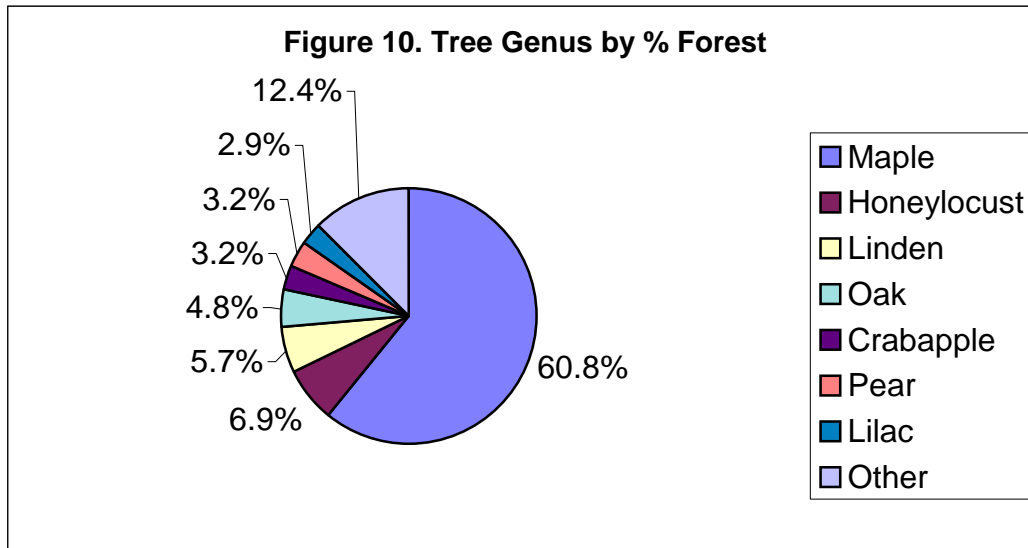
Evidently trees on private land and in the parks, particularly Central Park, overcome Schenectady’s low rank in street trees per mile. Photograph 4 shows the combination of abundant trees on private land with sparse trees on public land that characterizes the City.

Discussion of Forest Attributes

Species composition. The species composition of the trees in the public ROW is typical of that of many other cities of the same size. The domination by maples is common in NE United States cities, though it may be undesirable for a number of reasons. Species diversity is the only safeguard against devastating attacks by native and exotic pests; in fact, the most serious exotic pest of urban forests in the United States at the moment, the Asian Longhorned Beetle, prefers to attack (and kill) maples! Urban forest monocultures typically represent a high risk of catastrophic loss from pests or violent weather events. In an effort to ensure species diversity, one helpful guideline is the limit any one genus (say, maple) to 20% of the forest, and any one species (like Norway maple) to 10%. Though this guideline cannot be treated as a rigid rule, it does help bring the concept of species diversity to a local and quantifiable level. Figure 10 shows the situation in Schenectady, where the dominance of maples is evident.



Photograph 4. Aerial photograph showing a typical section of City of Schenectady, showing dense tree cover (red in color) behind houses but little along the streets (intersection of Brandywine and State in upper left corner).



At the species level, Norway maples predominate with 33% of the sample. This situation is also common in many other northeast cities, because Norway maple was often the standard replacement as the street-tree elms died in the 50s and 60s. Originally touted in this country as a sort of wonder tree for urban planting, Norway maple is now recognized as having strengths and weaknesses, like every other tree.

- Tar spot, a disfiguring but not lethal foliar disease, has caused extensive early season defoliation in many cities in New York.
- Many urban forest managers are concerned about its invasiveness, and have stopped planting it for that reason; the Invasive Plant Council of New York State (www.ipcnys.org/) lists it as one of the top 20 invasive species.

For two reasons—diversity to resist pest and catastrophic loss, and invasiveness—it would be prudent to severely restrict planting Norway maple in the future.

Size distribution. The size distribution of Schenectady’s ROW trees reflects the results of three different factors:

1. The gradual dying off of large trees due in part to the ravages of Dutch elm disease
2. The reported lack of planting 1970-1990 (Bill Seber, personal communication)
3. The planting work of ReTree Schenectady since the early 1990s

The first factor, common to many NE cities, has produced the steady drop of larger diameter trees at the right end of the curve in Figure 6. These large trees, many of them silver maples, are near the end of their useful life in this environment. They are very costly at this age and size to maintain and remove. Silver maple, in particular, is a species that often becomes hazardous in its old age and can cause a great deal of harm when it fails.

The second factor—the failure to replace trees for two decades—accounts for the constant decline across the middle of the curve in the same Figure. This is where trees planted in the 70s and 80s would show up, and their absence is highly visible, since this part of the curve would normally be relatively flat due to the low mortality rate of younger established trees. Finally, the planting of nearly 2,000 trees over the last decade by ReTree Schenectady is responsible for the high population in the lower size classes.

Tree condition. The condition of the existing trees as indicated by the windshield survey carries two messages. The good news is that one-half the trees are in good condition. The bad news is, one-half are not. The large number of poor condition trees is likely from trees in the large size classes; this is based on observations made during the sample inventory, and on the fact that a very high proportion of young trees are usually in good condition.

Planting site population

The projected sites shown in Figure 8 give an idea of the potential for the urban forest to increase from tree planting in the public ROW. It seems unlikely from simple observation that the number could be much higher the estimated 4,500 empty sites, simply because the lack of planting sites in the ROW is striking to even casual observers. Further sites for public trees along streets with inadequate treelawns can be found through easements for setback planting, as already mentioned, and potential sites can probably be identified throughout the city.

Planting site attributes

There is room for about 1,350 large- and medium-growing trees to go into the large and medium planting sites without overhead wires. The remaining 3,150 or so sites, however, either have overhead wires or a treelawn less than 4' in depth from the curb to the sidewalk. These sites are adequate for a small-growing tree in order to avoid costly and harmful clearance pruning for overhead utilities. ReTree Schenectady has already been following good practice here, as Photograph 5 illustrates.



Photograph 5. Japanese tree lilac planted under utility lines.

The appropriate match of adult tree size to tree lawn width and presence of overhead wires is crucial to a healthy forest in the future.

Part III: Definition of Goals and Proposed Actions

Task III: “*The plan will define goals and actions for management of the urban forest in Schenectady. ReTree Schenectady, the Parks Department, other city departments (e.g., Department of Public Works, Planning Department), and/or interested parties (e.g., Schenectady 2000, Synthesis Architects, neighborhood associations) may be consulted.*”

Recommendation #1: Review the Tree Ordinance

The “Tree Ordinance” (City of Schenectady Codebook, § 243) reviewed earlier sets the law, policy, and penalty structure for tree management in the City of Schenectady; this document needs to be taken seriously by the City if it is to be taken seriously by the Community. The following steps are suggested:

- Revise the reviewing process
 - Establish regular review (every five years, say) by ReTree Schenectady in conjunction with the Director of Parks
 - Submit proposals for change through the Director of Parks to the Mayor’s office for vote into law

- Add new sections
 - Consider setting reasonable guidelines for tree preservation during construction and development
 - Determine appropriate use of native species
 - Limit use of invasive trees and shrubs
 - Adopt policy of species diversity
 - Consult national guidelines at
 - <http://www2.champaign.isa-arbor.com/tree-ord/index.htm>
 - <http://www.cce.cornell.edu/monroe/cfep/factsheets/sampleordinance.htm#top>

- Define planting sites, and coordinate with mature tree sizes
 - Distance from signage, driveways, competing foliage
 - Minimum width curb-sidewalk
 - Add option of set-back planting under certain conditions
 - Incorporate definition into ordinance

- Establish standards
 - ANSI A300 for pruning, fertilization, and cabling
 - Watson/Himelick 1997 for planting
 - *Architectural Graphic Standards*, 10th ed, for design
 - Matheny/Clark 1998 for preservation

- Maintain the Master Tree List
 - Update through review when ordinance is reviewed
 - Set species through cooperative work of ReTree Schenectady and landscape architect(s) specifying trees for municipal projects
- Require permits for utility work
 - Insist that subcontractors obtain permit
 - Inspect work soon after begun for proper methods
 - Enforce ANSI A300 pruning standards where applicable

Recommendation #2: Become Proactive on Older Trees in Poor Condition

Schenectady’s current reactive management policy runs into serious difficulties when dealing with an older forest with such a condition profile. In the first place, non-professionals do not see many serious hazards until too late, since casual drive-by looking often misses serious defects. Second, as we have noted, even the complaints that do come in are only being answered at a 50% rate. A proactive policy for older trees would put the work of risk assessment directly into the hands of Parks, where it belongs, rather than in the hands of untrained persons. Also, it would set a rational basis that would maximize the use of resources and minimize the threat to public safety. There are two central components to such a proactive policy:

- Systematically survey city streets for trees in critical condition or with significant defects and targets
 - Identify large hazardous trees in the public ROW
 - Devise a system of survey that ensures reasonable coverage of the forest
 - Address the highest risk trees first (see Matheny and Clark, 1994)
 - Identify projected budgets to answer high risk needs in reasonable time
- Take action on private trees that threaten the ROW
 - Identify large hazardous trees
 - Use standard municipal practices for code enforcement



Photograph 6. Large black oak on private property on Crane Street, with massive deadwood overhanging the street and sidewalk.

As these maintenance issues are addressed, the overall condition and benefits provided to the city by the street tree population will improve. However, it is frequently difficult to increase budgets for tree removals and pruning. ReTree Schenectady and the City will have to put in considerable effort into identifying and prioritizing maintenance work in order to have the most impact with limited budgets.

Recommendation #3: Work Toward Full Stocking

Full stocking is an elusive goal, since tree mortality of the young and old continue to open up planting sites. Nevertheless, it is worth the effort, because the goal of working toward full stocking can help make more palatable other less glamorous aspects of urban forestry, especially removals. The general formula for determining the planting rate for such a goal can be written thus (Miller, 1997):

$$N = \frac{R + V/G}{S}$$

where

- N = number of trees annually planted
- R = number of trees annually removed
- V = existing vacant sites
- G = years left to achieve full stocking goal
- S = assumed planting survival

It was already estimated from the sample that there are about 4,500 available planting sites across the city. If it is assumed that the 2002 removal rate (about 40 trees) continues, that the City wants full stocking in 10 years, and that planting survival over that period is 80%, the result is:

$$N = \frac{40 + 4,500/10}{0.80} = 613 \text{ trees/year}$$

Planting 613 trees a year would be obviously difficult for any city the size of Schenectady, since even at \$50/tree for bareroot planting, that means that the annual planting budget would have to be \$30,000 for the stock alone! The City of Schenectady, in cooperation with ReTree Schenectady, will have to decide the appropriate levels by assessing goals and resources.

A more modest goal might assume a lower stocking rate (90%, say) and the current moderate planting rate (200 trees/year). Solving the original equation for G (years to achieve goal) and plugging in these values, one obtains:

$$R + V/G = S*N$$

$$90\% G = \frac{V}{S*N - R} = \frac{3,200}{0.80*200 - 40} = 26$$

$$G = \frac{26}{0.9} = 30$$

This means that at the current planting and removal rates, it will take about 30 years to reach 90% stocking rate. The Parks and ReTree Schenectady should decide their desired stocking rate and level of planting and removal in order to set their specific goal.

Recommendation #4: Consider Planting Easements for Set-back Sites

Given the predominance of small planting sites, many of them with overhead wires, viable alternatives to the usual strategy of planting between the sidewalk and the street ought to be considered. Many communities facing such limitations have opted for some form of “setback planting,” i.e., planting public trees on private land behind the sidewalk.

The advantages of setback planting are numerous:

- Planting sites are created. This is especially valuable on streets where there would otherwise be no trees, or only a few small ones.
- Rooting volume is increased. Trees behind sidewalks can explore the entire front yard with their roots without running into hardscape limitations to growth.
- Damage is lessened. Because trees set back are further away from urban services such as utility, snowplowing, garbage removal, etc., they are less likely to be seriously damaged during their lifetime.
- Stress is reduced. Because of the greater rooting volume and lower rate of damage, setback trees are healthier and less stressed, and this means that their useful lifespan is increased.

The City of Schenectady should consider setback planting as a viable option for areas with few trees and narrow sites.



Photograph 7. Street showing combination of setback planting and underplanting.

Recommendation #5: Computerize the Parks Office

For all the excellent organization and management skills of the current office staff, they are clearly being hampered by the complete lack of computer assistance. The following recommendations are made:

- Get a computer into the Parks staff office
 - Can start with hand-me-down machine from City
 - Train existing staff in use of Word, Excel, e-mail, and internet
 - Move at a speed that staff can accommodate
- Keep records of trees and work that can be easily used for reports
 - Create a simple spreadsheet in Excel to track and analyze forestry work
 - Eventually move to a full inventory based on these data
- Set up the complaint forms as Word templates
 - Ease the filing, sending, and recording of complaints
 - City staff can probably provide training and guidance here
- Create an e-mail account for Parks and a link on the City web page
 - Enable citizens to contact the department via the web
 - Parks staff could thus easily respond to inquiries or complaints

The sum of these changes will be to automate processes that are now manual, facilitate analysis and reporting of forestry work, and increase public access without straining current staff time or resources.

TREE#	SPECIES NAME (SCIENTIFIC)	SIZE CLASS	COND	FAIL	PART SIZE	TARGET	HAZARD	REMY	PRUNE	OTHR	COMMENTS
101							0				
102							0				
103							0				
104							0				
105							0				
106							0				
107							0				
108							0				
109							0				
110							0				
111							0				
112							0				
113							0				
114							0				
115							0				
116							0				
117							0				
118							0				
119							0				
120							0				
121							0				
122							0				
123							0				
124							0				
125							0				
126							0				
127							0				
128							0				
129							0				
130							0				
131							0				
132							0				
133							0				
134							0				
135							0				
136							0				
137							0				
138							0				
139							0				

Figure 11. Example of Free Downloadable Basic Tree Inventory Based on an Excel® spreadsheet

Recommendation #6: Increase the Forestry Crew's Productivity

The field crew is trying to do a huge amount work with limited resources. Steps must be taken now to deal with the constantly increasing backlog of work requests, on the one hand, and the aging large trees in poor condition. As one interviewee put it: "We have an aging tree population on one end, and a decreasing budget on the other." **At issue over the next few years is nothing less than public safety and community well-being.** The following steps are recommended:

- Protect the forestry crew from being pulled away from their work for other Parks duties as much as possible
 - Everyone interviewed commented on this problem
 - Substitute part-time or volunteer labor if possible for such work
- Move to a rotational survey and pruning system
 - Ample research to show savings
 - Average savings: 50% (Miller 1997)
 - Time is saved from logistics rather than trimming itself
 - Equipment and men in one location for work
 - Follow existing municipal structure. Given the limited resources, doing one neighborhood at a time might be most appropriate.
 - Scout first unit in Year 1, then trim that same unit in Year 2; scout next unit at end of Year 2, trim in Year 3; etc.

Rotational pruning concentrates resources, improves public safety, improves coverage, and sets a rational program to tree management that is important. Rotational pruning is usually limited to crown cleaning, clearance pruning, and correction of structural defects.



Figure 12. The five garbage collection areas.

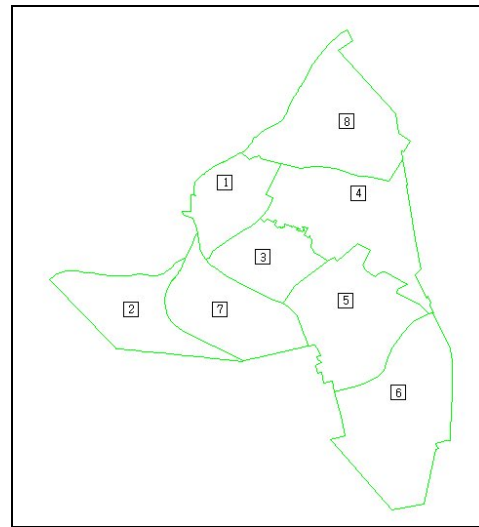


Figure 13. The eight neighborhoods.

Recommendation #7: Increase the Department's Technical Expertise

The current forestry crew had its formal training in the 1970s, while the foreman has had none. The filling of the forester position would be of enormous help in this area. The following steps are recommended:

- Continue to lobby City government to fill the position of forester
 - Technical knowledge and tree management experience required
 - Addition of manpower would help forestry crew
- Provide the means for additional training for the crew through attendance at events by New York State Arborists or New York ReLeaf in such topics as
 - Risk mitigation
 - A300 Standards
 - Mechanics of trees
 - Pest management
 - Risk assessment tools
- Find training for the foreman on such topics as
 - Risk assessment
 - Decay detection
 - Target evaluation
- Enable at least one crew member to become an ISA Certified Arborist
 - Brings recent research to crew
 - Establishes credentials of Parks to public
- Identify, train, and promote a younger crew member for the future

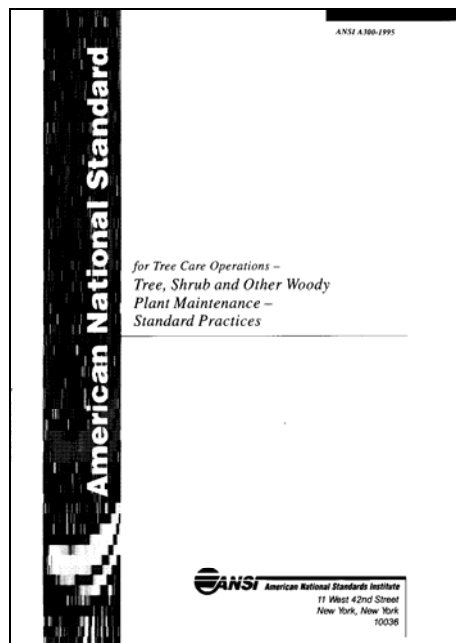


Figure 14. A300 pruning standards.

Recommendation #8: Aim to Become a Tree City, USA

The National Arbor Day Foundation supports community forestry through a variety of ventures, especially its Tree City, USA program. The advantages of being a Tree City, USA, include: civic pride, promotion of urban and community forestry, visibility of programs, etc.

The designation of Tree City, USA, depends upon meeting four criteria:

- A Tree Board or Department
- A Tree Care Ordinance
- A Community Forestry Program With an Annual Budget of at Least \$2 Per Capita
- An Arbor Day Observance and Proclamation

(Details can be found at <http://www.arborday.org/programs/TreeCityStandards.html>).

As this Plan has demonstrated, the City of Schenectady already meets the first three standards. All that would remain would be to inaugurate an Arbor Day celebration and make the application using the on-line form:

<http://www.arborday.org/programs/treecityapplication.html>

This step would benefit urban and community forestry in Schenectady, and seems easy to accomplish without undue cost or effort.

Part IV: Implementation Strategy

Task IV: “*The plan will describe an implementation strategy for proposed actions [that] will include an estimated timeframe, the responsible party, and the estimated cost. The strategy will also prioritize actions to facilitate review and decision-making.*”

Overview of Recommendations

In the last section, a number of recommendations were made, some of which contained multiples steps. How should the City of Schenectady choose among them? Here is a list of proposed deadlines, responsibilities, costs, and priority that is intended to suggest guidelines that will have to be reviewed within the local context before being adopted.

Recommendation	Deadline	Responsibility	Cost	Priority
Ordinance	2003	RTS, Parks	[Time]	1
Computerize	2004	Parks	2,000	1
Forester	ASAP	Parks, City	[Salary]	1
Protect Crew	STAT	Parks	0	1
Master List	2003	RTS	[Time]	2
Easements	2003	RTS, Parks	0	2
Inventory	2006	Parks, RTS	[Time]	2
Rotation	2004	Parks	[Savings]	2
Training	2005	Parks	1,000	2
Stocking	2010	RTS, Parks	[Depends]	2
Work History	2006	RTS, Parks	[Time]	3
Tree City	2004	RTS	[Time]	3

Implementation

Much of the work of implementation depends on local political and governmental structures and decisions that lie beyond the scope of an outside consultant. The following strategies might prove helpful, however, in mapping out future courses of action.

Recommendation	Implementation strategy
Enforce the Tree Ordinance	<ul style="list-style-type: none"> • Lies within capability of the Director of Parks • Ordinance should be sent to all players <u>after review</u> • Internal procedures should be set for enforcement
Review Ordinance	<ul style="list-style-type: none"> • Every five years, ReTree Schenectady should be invited to review, along with other appropriate persons • Report back within six months • Director sends to Mayor for enactment of changes
Computerize office staff	<ul style="list-style-type: none"> • Gradualism is key • Begin with finding hardware, set up e-mail and web access • Get Word training within City if possible • Introduce Excel in 2004
Pursue forester	<ul style="list-style-type: none"> • Lay out argument to City government again • Stress factors of liability, cost, and accountability • Contract to consulting forester as interim solution
Create inventory	<ul style="list-style-type: none"> • Use free software (Excel or Access) at first • Collect data ahead of rotational pruning • Volunteer labor for basic data • Contract out risk assessment if forester not in place
Protect crew	<ul style="list-style-type: none"> • Lies within capability of Director of Parks • Prevent forestry crew being used for non-forestry work • Communicate this to other departments and personnel
Rotation pruning	<ul style="list-style-type: none"> • Establish maintenance units in accord with neighborhoods • Begin complete survey of first unit in fall of Year 1 (2003) Complete work winter spring and summer of Year 2 • Survey second unit fall of Year 2, etc.
Training	<ul style="list-style-type: none"> • Get risk assessment training for foreman • Update training of main crew • Encourage and pay for ISA certification • Identify and train next generation from internal candidates
Master tree list	<ul style="list-style-type: none"> • Formalize status of Cornell list • Review every five years
Easements for setback planting	<ul style="list-style-type: none"> • RTS consider use of easements • Use random sample to determine availability • Explore agreements with Parks and City Counsel • Alter tree ordinance, spelling out rights and obligations
Stocking rate	<ul style="list-style-type: none"> • Decide target stocking rate • Settle on removal rate • Establish 25-year goal
Proactive maintenance	<ul style="list-style-type: none"> • Commit to change in policy • Work with electric utility to have hazardous trees that threaten electrical service removed • Put out list to competitive bidding for winter work • Consider alternative funding possibilities to get priority work done

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- Watson, Gary, and E. B. Himelick. 1997. *Principles and Practices of Planting Trees and Shrubs*. Savoy, IL: ISA.



Photograph 8. Norway maple showing problems from utility pruning.

Appendix A. Complaint Report

COMPLAINT REPORT DEPARTMENT OF PARKS AND RECREATION

Name of Complainant _____ Date _____ Time _____
Verbal _____

Address of Complainant _____

Rec'd by _____ Phone _____ Written _____

Property Owner _____

Address _____

Nature of Complaint _____

To Whom Referred _____

DISPOSITION OF COMPLAINT _____

Date _____
(white - Office) - (yellow - Foreman)

Reported By _____

Appendix B. 5% Sample

START	END	LENGTH	% MILEAGE	SUM	#TREES	TREES/MI
BARRETT ST	PARK PL	0.08	0.05%	0.05%	0	0.0
CONGRESS ST	THIRD AVE	0.23	0.13%	0.18%	0	0.0
WATT ST	HOUSE 269	0.03	0.02%	0.19%	0	0.0
SANTA FE ST	CHRISLER AVE	0.18	0.10%	0.28%	0	0.0
UNION ST	RUGBY RD	0.15	0.08%	0.36%	41	273.3
ALTAMONT AVE	TWENTY FIRST S	0.11	0.06%	0.42%	2	18.2
GIFFORD RD	CLEMENT AVE	0.09	0.05%	0.47%	1	11.1
TORRINGTON AVE	TOP OF HILL	0.17	0.10%	0.57%	1	5.9
BRANDYWINE AVE	MCCLELLAN ST	0.06	0.03%	0.60%	0	0.0
MICO BUILDING	LOWER BROADWAY	0.18	0.10%	0.71%	0	0.0
ELEANOR ST	CITY LINE	0.11	0.06%	0.77%	0	0.0
STATE ST	ALBANY ST	0.13	0.07%	0.84%	0	0.0
RAILROAD	TENTH AVE	0.07	0.04%	0.88%	0	0.0
KINGS RD	BRADFORD RD	0.24	0.14%	1.02%	0	0.0
VAN DYKE ST	CONSAUL ST	0.27	0.15%	1.17%	7	25.9
ONEIDA ST	ULSTER ST	0.06	0.03%	1.20%	0	0.0
BROADWAY	THIRD AVE	0.33	0.19%	1.39%	1	3.0
STATE ST	BRADLEY ST	0.49	0.28%	1.67%	26	53.1
BEND	HULLET ST	0.16	0.09%	1.76%	0	0.0
CHELTINGHAM AV	DEAD END	0.04	0.02%	1.78%	0	0.0
NOTT TER	1ST DRIVEWAY	0.03	0.02%	1.80%	0	0.0
GROSVENOR SQ	DEAD END	0.12	0.07%	1.86%	26	216.7
CAMPBELL AVE	DEAD END	0.05	0.03%	1.89%	0	0.0
OLEAN ST	TURNER AVE	0.06	0.03%	1.93%	5	83.3
PARK ST	CUTLER ST	0.14	0.08%	2.01%	7	50.0
RR	WASHINGTON AVE	0.40	0.23%	2.23%	73	182.5
STATE ST	ALBANY ST	0.13	0.07%	2.31%	3	23.1
SUMMIT AVE	PAIGE ST	0.10	0.06%	2.36%	2	20.0
VAN VRANKEN AV	NOTT ST	0.11	0.06%	2.42%	3	27.3
FAIRVIEW AVE	BROADWAY	0.13	0.07%	2.50%	9	69.2
ALBANY ST	STATE ST	0.09	0.05%	2.55%	0	0.0
UNION ST	THE PLAZA	0.35	0.20%	2.75%	41	117.1
EASTERN PKWY	UNION ST	0.08	0.05%	2.79%	11	137.5
ROBIN ST	CITY LINE	0.13	0.07%	2.86%	0	0.0
UNION ST	THE PLAZA	0.37	0.21%	3.07%	22	59.5
UNION ST	RUGBY RD	0.09	0.05%	3.12%	3	33.3
UNION ST	FRONT ST	0.23	0.13%	3.25%	34	147.8
CRESSE AVE	HENDRICKSON AV	0.05	0.03%	3.28%	7	140.0
CRANE ST	CHRISLER AVE	0.09	0.05%	3.33%	1	11.1
WING AVE	CHRISLER AVE	0.07	0.04%	3.37%	0	0.0
SIXTH AVE	FOURTH AVE	0.15	0.08%	3.46%	0	0.0
ERIE BLVD	FULLER ST	0.05	0.03%	3.49%	0	0.0
COLUMBIA ST	END	0.07	0.04%	3.53%	4	57.1
REGAL AVE	GERLING ST	0.13	0.07%	3.60%	0	0.0
CITY LINE	END	0.09	0.05%	3.65%	0	0.0

START	END	LENGTH	% MILEAGE	SUM	#TREES	TREES/MI
CRAIG ST	AVERY PL	0.20	0.11%	3.76%	6	30.0
INTERSECTION	WENDELL AVE	0.11	0.06%	3.82%	11	100.0
GILLESPIE	BRIERWOOD BLVD	0.27	0.15%	3.98%	54	200.0
GARNER AVE	CITY LINE	0.40	0.23%	4.20%	11	27.5
OAKWOOD AVE	MICHIGAN AVE	0.41	0.23%	4.44%	12	29.3
MICHIGAN AVE	TEN EYCK AVE	0.11	0.06%	4.50%	6	54.5
CRANE ST	BROWER ST	0.18	0.10%	4.60%	11	61.1
ATHOL RD	ROSA RD	0.18	0.10%	4.70%	23	127.8
MAIN ST	DEAD END	0.15	0.08%	4.79%	3	20.0
BRADFORD RD	LEROY ST	0.40	0.23%	5.01%	8	20.0
		8.90	5.03%		475	44.3