

The City of Cartersville, Georgia

Community Forest Master Plan



August 31, 2008

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Prepared for the City of Cartersville by

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INTRODUCTION

This *Community Forest Master Plan* was developed for city-owned trees and properties, but it also contains recommendations for enhancing the largest component of the community forest—privately owned trees. The same strategies and standards for tree establishment, maintenance, protection, inspection and removal that are applied to city trees in this plan can be adopted by private property tree owners for their own benefit and that of their trees.

An overview of the plan, background information on this project and the plan's development, and a summary of existing conditions follow.

PLAN OVERVIEW

The City of Cartersville's *Community Forest Master Plan* proposes a comprehensive community forest management program. It was designed using data from the city's recent tree inventory and input from elected officials, staff, and community partners. It adds to existing activities the financial support, city-wide coordination, arboricultural standards, education and outreach, and additional management activities that will guide the city toward achieving its vision and reaching its goals for the city and the community forest.

The plan addresses city trees directly through an increased level of knowledge and data based management, and private property trees through a tree ordinance and education and outreach program. Specifically, the plan proposes the following:

- Ongoing tree inventory and detailed record keeping and reporting of program activities
- An approximately \$64,000 annual budget over the next 5 years for a comprehensive program to manage a city asset worth over \$3.4 million dollars.
- Designation of an existing Public Works Department employee as a city arborist to coordinate the tree management program with certification required as an ISA Certified Arborist.
- Certification of one (1) Planning and Development Department employee and one (1) Electric System employee as ISA Certified Arborists.
- Establishment of a comprehensive city tree management ordinance to protect city trees with incorporation of the current *Landscaping Ordinance* for trees on new private property developments.

- Adoption of arboricultural standards for tree care operations.
- Immediate, routine, comprehensive, and long-term management programs for the city's trees, including tree establishment, protection, maintenance, removal and replacement.
- A city-sponsored tree care education and outreach program to give city staff and private property owners the knowledge and skills to manage trees in a correct and cost-effective manner.
- An organized and consistent approach to tree management that distributes tree care activities throughout city departments and throughout the calendar year

In this plan, detailed program descriptions, management strategies, and annual plans are presented for the arborist, tree ordinance and arboricultural standards, field operations, education and outreach, budgets, and designation as a Tree City USA. The scope of this master plan is 5 years, but the management it proposes is sustainable long into the future.

Before the program details are presented, an introduction to the plan with background information and a discussion of existing conditions is presented.

PROJECT BACKGROUND

This *Community Forest Master Plan* is the second part of year-long project to inventory the city-owned trees in Cartersville and develop a plan for their management. All project activities are being conducted by an urban forestry consultant¹ working with the city planner. The consultant conducted the tree inventory during October through November 2007 and April through June 2008. Early in 2008 the development of the master plan began with the processes of defining existing tree management resources and exploring a vision and goals for the city's community forest.

In January 2008 the consultant sent a *Survey of Existing Resources and Activities* for the *Community Forest Master Plan* to the Planning Department for distribution to most city department directors. A copy of the survey is available from the Planning and Development Department. The survey was returned by directors or assistant directors from the Electric,

¹ Connie Head, Consulting Urban Forester, Technical Forestry Services

Planning and Development, Public Works, and Water departments². The consultant subsequently contacted some staff members to gather additional information and further discuss public tree management needs, preferences, and priorities. The results of the survey are summarized in the EXISTING CONDITIONS section.

On June 4, 2008, a Community Forest Strategic Planning Meeting was held in the conference room in the Planning and Development Department. The meeting, conducted by the consultant, was attended by 12 community leaders that included city staff and representatives of local agencies and the local newspaper. A representative of the Georgia Forestry Commission also attended. The purpose of the meeting was to brainstorm a community forest vision, explore current issues and needs related to trees, and to develop program goals.

This plan contains this introduction, a strategic plan that includes a community forest vision, goals, and management strategies, and a management plan that contains detailed program descriptions and annual plans.

The tree inventory and master plan projects were funded in part by an Urban and Community Forestry Assistance Program grant from the Georgia Forestry Commission³ and in part by city funds and in-kind services. Richard Osborne, City Planner with the Planning and Development Department administered the grant for the city. The tree inventory was conducted and this master plan developed by Connie Head, Consulting Urban Forester with Technical Forestry Services of Commerce, Georgia.

EXISTING CONDITIONS

COMMUNITY SUPPORT

A 2007 community survey⁴ showed that 84 percent of the respondents felt that the protection of trees and green space was very important or essential, indicating strong citizen support for a tree management program. The survey also showed that 82 percent of the respondents felt

² David Myers, Director, Electric System; Randy Mannino, Director, Planning and Development Department; Jeff Giesen, Assistant Director, Public Works Department; Jim Stafford, Director, Water Department.

³ Georgia Forestry Commission IS the statewide agency responsible for “providing leadership, service, and education in the protection and conservation of Georgia's forest resources” (from the Commission’s website at www.gfc.state.ga.us)

⁴ The City of Cartersville Citizen Survey, Summary Report 2007

that it was very important or essential for the city to improve older areas of the city including downtown. Throughout the development of this plan, elected officials and city staff demonstrated a high interest in and support for trees.

TREE MANAGEMENT PROGRAM

No one person has the responsibility for coordination of the city's existing tree management program, but field operations take place as necessary in a professional manner. The people within various departments providing tree care in the field have a good basic understanding of tree needs and correct tree care techniques, but they have expressed their desire for more information on how to better care for trees. They often consult with arboricultural professionals when a greater depth of information is needed for decision-making.

The existing policies, responsibilities, and activities related to tree management in place within the city were researched through a *Survey of Existing Resources and Activities*, during a strategic planning meeting held by Planning and Development, and through discussions with city staff. Details of the results of this research are provided in APPENDIX A: EXISTING TREE MANAGEMENT PROGRAM, and are summarized here.

Some elements of a city tree management program are already in place with tree-related activities taking place in the Electric, Planning and Development, and Public Works departments. Additionally, agencies such as Keep Bartow Beautiful and the Downtown Development Authority actively promote trees in the community.

Critically needed tree work is being done both routinely and as needs arise. Trees are pruned as needs are identified and after storm damage occurs. Some trees are planted every year and trees are mulched and watered for 90 days.

Trees located near overhead utility lines are pruned for clearance by contract crews hired by the Electric System through MEAG⁵. The department discourages the planting of trees within 15 feet of overhead utilities lines or over new or existing underground utilities.

Departments have adequate equipment on hand for tree maintenance, with the exception of Public Works. Their equipment needs include a chipper and replacement bucket truck. The assistant director stated that at the time of development of this plan he is waiting for a cost

⁵ Municipal Electric Authority of Georgia

estimate to repair the existing bucket truck before making a decision on whether or not it to get it repaired.

Tree management at the Cartersville City Schools is provided by a contract lawn care company, who does fertilization, application of insecticides, tree planting, tree pruning, and tree mulching.⁶ Plans are in place to plant a number of 'Princeton' American elm trees to line the entrance drive to the high school in late fall of 2008. The Director of Facility Operations for the schools stated that he would be interested in attending tree care educational programs and would encourage personnel from the lawn care company to do the same.

STAFF EDUCATION AND TRAINING

In the *Survey of Existing Resources and Activities*, staff clearly expressed their desire to learn more about trees and their willingness to take advantage of tree care educational opportunities on a regional and statewide basis. Results from the survey show that the topics of greatest interest are:

- Benefits of trees
- Tree species selection
- Tree health and hazard evaluation including identification of insect and disease signs and symptoms

Other topics of interest are tree biology, tree pruning, tree planting, tree mulching, tree irrigation, tree density requirement options, and ISA Certified Arborist training.

The educational program length most preferred ranges from 3 hours to a full day. The preferred days of the week are Wednesday and Friday. Winter is preferred by one respondent; any time of the year is suitable to the others.

⁶ Phone conversation with Ken Paige, Director of Facility Operations for the Cartersville City Schools

TREE INVENTORY

A city tree inventory was completed in the City of Cartersville during the summer of 2008. Only trees growing on city property were inventoried, and the specific properties to be inventoried were selected by the city. All trees and tree groups found in the city cemetery, around city offices and facilities, at city schools, in city parks and in the downtown business district were inventoried. Trees growing on street rights-of-way throughout the city that are 30 inches DBH or greater were also inventoried. In addition to individually growing trees and tree groups such as natural wooded areas, landscape groups of identical trees, and fence rows, some vacant tree planting sites were also inventoried.



A total of 1,917 data entries were made, representing 1,863 trees, 26 tree groups, and 28 vacant planting sites. The distribution of individual trees by property type is listed in Table 1.

Table 1. Number of Trees Inventoried by Property Type

Property Type	Number of Trees
<i>City Cemetery</i>	322
<i>City Offices and Facilities</i>	181
<i>City Parks</i>	651
<i>City Schools</i>	489
<i>City Street Rights-of-Way</i>	116
<i>Downtown Business District</i>	104
TOTAL	1,863

Table 2 provides an overview of the inventory results.

Table 2. Overview of City Tree Inventory Results

Data Description	Number or Percent	
<i>Total Number of Data Points</i>	1,917	
<i>Total Trees</i>	1,863	
<i>Total Tree Groups</i>	26	
<i>Vacant Planting Sites</i>	28	
Planting Recommendations		
<i>Vacant Sites</i>	28 sites and 130 trees	
Number of Small Trees	18	
Number of Medium Trees	21	
Number of Large Trees	91	
<i>Replacement Trees</i>	56 trees	
Small	14	
Medium	21	
Large	21	
<i>Total Tree Planting Recommendations</i>	186 trees	
Species Diversity		
<i>Number of Species</i>	80	100%
<i>Most Common Species</i>	Crapemyrtle	20%
	Oak, Willow	6%
	Dogwood, Flowering	6%
	Oak, Water	6%
	Pear, Bradford	6%
	Maple, Red	5%
	Pine, Loblolly	5%
Tree Size		
<i>Average DBH⁷</i>	11 inches	
<i>DBH Class Distribution</i>	1,863 total trees	100%
A (1 to 5 inches)	837	45%
B (6 to 11 inches)	347	19%
C (12 to 17 inches)	277	15%
D (18 to 23 inches)	146	8%
E (24 to 29 inches)	63	3%
F (30 to 35 inches)	98	5%
G (36 to 41 inches)	43	2%
H (42 to 47 inches)	28	2%
I (48 to 53 inches)	15	1%
J (54 to 59 inches)	7	<1%
K (60 to 65 inches)	2	<1%
Condition		
<i>Average Condition</i>	76% Good	
<i>Condition Class Distribution</i>	1,863 total trees	100%

⁷ DBH is a commonly used forestry term meaning diameter at breast height, a measurement of the trunk diameter of a tree at 4.5 feet above the ground.

Table 2. Overview of City Tree Inventory Results

Data Description	Number or Percent	
Excellent (90% to 100%)	440	24%
Very Good (80% to 89%)	423	23%
Good (70% to 79%)	429	23%
Fair (60% to 69%)	409	22%
Poor (50% to 59%)	94	5%
Very Poor (1% to 49%)	24	1%
Dead (0%)	44	2%
Trees at Risk for Failure (partial or whole)	81	4%
Tree Management Recommendations		
Aerate CRZ	287	15%
Cable/Brace	23	1%
Fertilize	32	2%
Irrigate	21	1%
Mulch	486	26%
Inspect Regularly	135	7%
PRUNING RECOMMENDATIONS		
Clearance Pruning	193	10%
Corrective Pruning	405	22%
Crown Cleaning Pruning	326	17%
Risk Reduction Pruning	23	1%
Training Pruning	384	21%
Utility Clearance Pruning	5	0%
Tree Removal Recommendations and Priorities		
Live Trees	76	4%
High Priority	11	1%
Standard Priority	63	3%
Low Priority	2	0%
Dead Trees	45	2%
High Priority	4	0%
Standard Priority	41	2%
Low Priority	0	0%

The inventory data show that the greatest management needs currently are to:

- Remove 121 trees, including 45 dead and 76 live.
- Eliminate whole tree failure risk by removing 28 trees with hazard ratings of 8 to 11⁸.
- Reduce risk of failure of large limbs and co-dominant stems on 23 trees through pruning and installation of cabling and bracing.
- Conduct regular inspections of 135 trees in marginal condition.

⁸ Hazard ratings of 1 to 4 are assigned using methodology in *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas*, 2nd Edition, by Nelda P. Matheny and James R. Clark, for three (3) components: size of part, failure probability, and target rating; the highest possible hazard rating is 12.

- Prune 326 trees to clean the crown of deadwood.
- Prune 193 trees to improve clearance above vehicles and pedestrians and around buildings and utility lines.
- Stop the practice of topping crapemyrtles.
- Prune crapemyrtles on all sites to correct structure resulting from topping.
- Begin a training pruning program for 384 trees, and for all recently planted and young trees.
- Plant a minimum of 186 trees in vacant planting sites and as replacements for trees removed.
- Increase species diversity by limiting or avoiding the planting of new crapemyrtles on city property and by choosing high quality native and non-native tree species that are proven performers in the Cartersville and in urban environments.
- Aerate the CRZ⁹ for 287 trees to alleviate soil compaction and improve tree health and longevity.
- Mulch 486 trees, using correct techniques and quality materials; mulch every tree where possible to improve tree health and survival.

TREE VALUE

A conservative estimate of the total value of the city's 1,863 trees using a modified trunk formula method from the 9th Edition of the *Guide for Plant Appraisal* is \$3.4 MM dollars, or an average of \$1,840 per tree.

BUDGETS AND FUNDING

A review of the City of Cartersville's Fiscal Year 2007-08 Budget¹⁰ reveals the following:

- A total budget of \$169,489,120
- No line item specifically for trees or tree management in any departmental budget
- Line item in the Public Works Department budget for Buildings and Grounds maintenance of \$8,000 and for Plantings, Baskets, etc. of \$14,000
- Line item in the Parks & Recreation Department budget for Buildings & Grounds maintenance of \$83,450 and for Botanical and Agricultural Supplies of \$4,200

⁹ CRZ = critical root zone, an area around the tree trunk with a radius of 1.25 feet for every 1 inch DBH

¹⁰ Viewed at www.cityofcartersville.org

- No line item for tree pruning or removal in the Electric System budget, but \$147,500 line item for Overhead Electric Mains of \$147,500 which includes cost of utility line clearance

Over the last several years the amount budgeted for large tree removal using contract services has ranged from \$7,000 to \$8,000. The average cost per tree of the last three (3) large trees that were removed is \$2,400.

LANDSCAPING ORDINANCE

The existing *Landscaping Ordinance* has been in effect since December 22, 1995. It regulates trees on all real property within the city limits, but only in cases of new development or renovations greater than 51 percent of the building's appraised market value. It does not otherwise regulate trees on existing developments or on established single-family residential lots.

The ordinance requires tree conservation only to the extent that no hardship exists that would require the removal of all trees from a site. It requires landscaped areas, which must include trees, in perimeter and frontage landscape strips, parking lots, and buffers strips, or across 12 percent of the total available area, whichever is greater.

No requirements for trees of a specific mature height, and no requirements for species diversity, are included in the ordinance. Trees planted to meet the requirements must be maintained. Protection during construction is required for existing trees retained on the site. No standards for tree planting or maintenance are included, but standards for tree protection are.

Two (2) tree species lists are included in the ordinance, one with 12 small tree species and the other with 34 large tree species. The trees included in the lists are primarily native trees of Georgia and the southeastern United States.

A detailed analysis of the city's existing *Landscaping Ordinance* is included in APPENDIX B: REVIEW OF EXISTING LANDSCAPING ORDINANCE.

PARTNER ORGANIZATIONS

Keep Bartow Beautiful, the Cartersville Downtown Development Authority, and the Georgia Forestry Commission are the primary partner organizations that support and promote Cartersville's community trees.

Keep Bartow Beautiful organizes Arbor Day programs and tree plantings in February and April. They provide education programs on recycling, litter and community cleanups, trees, and water resource protection.

The Downtown Development Authority is an advocate for the preservation of the downtown business district and protection of the historic center of Cartersville. They coordinate the Main Street program and have demonstrated strong support for trees in the business district.

The Georgia Forestry Commission provides technical expertise and advice to the city in all tree-related issues.

CITY AND DEPARTMENT MISSION, VISION, AND GOALS

The programs, plans, and schedules outlined in this plan support the mission, vision and goals of the city and the various departments and boards within the city. The city's mission, vision and goals¹¹ are incorporated into this plan in the following ways:

- The city's mission statement describes a place with **an exceptional quality of life**. Trees are integral to quality of life within a community; they provide many unique environmental, social, and economic benefits.
- The plan prescribes a **sustainable** and **dependable** city tree management program.
- The plan fits a **progressive community** in that it takes control of this valuable resource and pro-actively manages it using best practices for the good of the community.
- The increase in tree maintenance and planting will result in a **more attractive community**. The presence of trees brings people outdoors and there they make stronger connections with one another.
- The city's goals include **development of plans** for utilization of City Hall, and the Public Works, Electric and Gas offices and shops. The results of the tree inventory and this plan will serve as a guide for tree management on these sites as development plans are created.
- Another of the city's goals is the **development of a tree ordinance**. The plan recommends the development of a comprehensive city tree ordinance.
- The plan recommends tree planting in Sam Smith to be incorporated into the **continued development** of the Park, another city goal.

¹¹ Five Year Goals 2008-2013 dated 3/6/2008

The plan directly supports the focus of the Public Works Department “to provide an environmentally sound, visually attractive and safe place to live, work, and enjoy life” by increasing the level of management of the tree resource, reducing the risks associated with trees, and increasing the health and extent of the city’s tree canopy.

In a similar way, the plan supports the Parks and Recreation Department’s mission “to provide quality park facilities and recreational programs for our community where participation and enjoyment are achieved in a safe and family oriented environment.” The plan promotes the quality and safety of the tree resource.

The plan also supports the Cartersville City School’s *Strategic Plan*. Trees at the schools can be used as a tool for teaching and interesting students in biology, math, chemistry, and other biological and physical sciences, as well as art and literature, helping to meet the Cartersville City School’s goals of excellence.

The presence of tree canopy on a site, if appropriately placed, can reduce energy costs for heating and cooling; by protecting, maintaining, and expanding the existing tree resource and tree canopy cover, energy costs at city offices, city schools, and for private landowners will be reduced. This will lead to a healthier environment and better quality of life for all of Cartersville’s nearly 20,000 residents.



STRATEGIC PLAN

The City of Cartersville's *Community Forest Strategic Plan* has been developed with input from city staff and community partners. The vision, goals, and implementation strategies that follow are intended to guide overall program direction.

VISION

The City of Cartersville community forest welcomes residents, business owners, visitors and trees contribute substantially to the city's historic and inviting character. Trees are valued for their cooling shade, seasonal color, and contributions to the city's economy. The city's tree management program promotes a healthy, functional, safe, and ecologically balanced forest that consists of a diverse mix of predominately native tree species. While mature and historic trees are highly valued, the considerable diversity of tree ages results from an ongoing tree planting program driven by strong public/private partnerships.

GOALS

The following goals were developed to address community forest management issues identified during a strategic planning meeting and during research and discussion with city staff. A detailed list of the issues and goals for the community forest and the input from which they were derived is located in APPENDIX C: TREE MANAGEMENT ISSUES AND GOALS.

COMMUNITY FOREST MANAGEMENT GOALS

- I. *Designate an existing staff member in the Public Works Department as the city arborist responsible for coordinating community forest management activities; require ISA Certified Arborist credentials within six (6) months of designation.*
- II. *Maintain up-to-date information on the character, extent, and maintenance needs of city trees.*

- III. *Implement programs for routine tree maintenance including mulching, irrigation, fertilization, and pruning, and for non-routine maintenance such as soil aeration, cabling and bracing, and the installation of lightning protection systems.*
- IV. *Stockpile wood chips and other non-contaminated organic materials to produce high-quality mulch for use on city properties.*
- V. *Explore street tree placement options and gain a consensus among city departments on the preferred locations for trees along city street rights-of-way.*
- VI. *Implement an annual tree planting program to increase species and age diversity; replace all trees removed with at least two (2) new trees on an annual basis; develop an Adopt-A-Tree program to involve community partners and citizens in the tree planting effort.*
- VII. *Adopt arboricultural standards for tree care practices and maintain all city trees according to standards; require compliance with standards for trees conserved and planted to meet requirements of the Landscaping Ordinance.*
- VIII. *Provide, promote, and support continuing tree care educational opportunities for staff, landscape and building contractors, tree service owners and employees, business owners, and citizens.*
- IX. *Adopt and implement a comprehensive tree ordinance by December 2009.*
- X. *Develop sustainable annual budgets and funding sources that allow basic operations to be completed in addition to regular program improvements.*
- XI. *Become certified as a Tree City in February 2010 for calendar year 2009 and recertify annually.*

Additional goals that the city is encouraged to adopt in the near future for the community forest are a minimum overall tree canopy cover and minimum tree canopy cover by zoning district. A measurement of existing tree canopy cover across the city is currently underway and should be completed by the end of calendar year 2008.

IMPLEMENTATION STRATEGIES

Community forest management in the City of Cartersville is guided by the following strategies:

- I. Manage city trees in a pro-active manner and commit the resources necessary for a prudent and sustainable level of tree management.
- II. Utilize existing city staff, staff knowledge and experience, equipment, and materials to the greatest extent possible to minimize tree management expenses.
- III. Utilize education as a primary tool to improve tree health and longevity, and to reduce tree maintenance costs.
- IV. Accomplish tree management activities in a high quality manner according to arboricultural standards to maximize long-term tree health and longevity and minimize annual per tree costs.
- V. Preserve old, large existing trees for as long as possible while maintaining public health and safety.
- VI. Actively maintain young and middle aged trees to improve their health and chance of reaching their potential.
- VII. Plant additional trees of diverse species on a regular basis to gradually increase species and age diversity and the health and extent of the city's tree canopy cover.
- VIII. Eliminate future conflicts between trees and infrastructure such as sidewalks, streets, and overhead and underground utilities by through careful tree selection and placement.
- IX. Extend program potential and increase overall cost effectiveness by securing grants to fund educational and non-routine tree management projects.
- X. Maintain detailed records of tree care operations to improve accuracy of planning and budgeting processes.
- XI. Communicate program goals, results, and accomplishments to decision makers on a regular basis.

TREE MANAGEMENT PLAN

Considering the existing tree management program, the current condition of the city tree resource, the community's vision and goals, and the boundaries of the implementation strategies, the following *Tree Management Plan* program elements are proposed and have been combined to create a framework for the city's comprehensive tree management program:

- City Arborist
- City Tree Ordinance
- City Tree Board
- Arboricultural Standards
- Field Operations
- Education and Outreach
- Information Management
- Tree City USA
- Budget
- Community Tree Management Calendars

A discussion of each program element follows. Management strategies, annual plans, and other details are included for each element where appropriate.

CITY ARBORIST

The designation of a city arborist to coordinate the community tree management program is proposed in this master plan. Strategies for the designation of the arborist include:

1. Take advantage of interest and experience of existing personnel to fill the role of city arborist, preferably in the Public Works Department.
2. Provide city-wide and departmental support for certification and continuing education of city arborist.
3. Consolidate tree management program administration and coordination with city arborist but continue tree management roles as currently exists in the Planning and Development Department and Electric Department.

The minimum qualifications of the city arborist are:

- Interest in trees and their care
- Working knowledge of Microsoft Word, Excel, and PowerPoint or interest and ability to learn these programs
- Commitment and ability to become an ISA Certified Arborist
- Ability to communicate and work effectively with staff, local agencies and organizations, and individual citizens to accomplish tree management goals

The city arborist would be responsible for the following typical activities and tasks:

- Maintain ISA arborist certification
- Staff technical support
- Public tree evaluations
- Coordinate field operations
- Attend monthly tree board meetings and serve as liaison between the tree board and the city
- Serve as a community tree care education and public information resource (staff, local agencies, non-profit organizations, general public, individual citizens)
- Consult with other certified arborists, foresters, landscape architects, horticulturists, and other allied professionals as necessary to make informed and fair tree management decisions
- Enter changes into the tree inventory database on a weekly basis or as soon as changes occur; update the complete inventory on a periodic basis
- Complete the inventory of city trees; include trees at other city offices and facilities and those on the street rights-of-way less than 30 inches DBH; continue tree inventory on an ongoing basis
- Maintain standards for tree pruning, protection, removal, placement, planting and other arboricultural practices and augment established practices as necessary
- Schedule and supervise routine tree pruning and removal
- Develop city tree protection plans and supervise their implementation
- Approve tree and site selections for trees to be planted on the city street right-of-way by citizens, businesses, or city staff
- Consult with Parks and Recreation Department to evaluate trees for condition and management needs
- Assist with annual Arbor Day celebration
- Develop annual budgets

- Report program results to mayor and council and provide regular program information to the public via established media outlets
- Update the *Community Forest Master Plan* as necessary

In addition to these typical activities, the city arborist could also be assigned the following tasks if so desired by the city administration.

- Respond to citizen requests for tree information and evaluate trees growing on private property by request
- Develop a permit system for right-of-way encroachment within the CRZ of city trees, review permit applications, and issue and monitor permits

The city arborist should achieve arborist certification within six (6) months of being designated. To begin the process of studying for the test, the arborist should purchase from ISA the *Arborists’ Certification Study Guide*, along with other ISA publications as listed later in the Education and Outreach program outline. All of these educational materials can be shared between staff in the Public Works, Planning and Development, and Electric departments.

The first priorities of the city arborist will be to become certified under the ISA Certified Arborist program, begin the development of a city tree ordinance, and develop recordkeeping systems for tree management programs and field operations. Continuing education and networking at local, regional, and statewide workshops and conferences is also a priority. Table 1 outlines the annual activities proposed for the city arborist.

Table 1. Annual City Arborist Plans

YEAR	ACTIVITIES
Year 1	<p>NEW</p> <ul style="list-style-type: none"> • Become an ISA Certified Arborist • Develop city tree ordinance in conjunction with Planning and Development Department • Provide technical expertise as necessary • Develop record keeping systems for tree management programs and maintenance operations • Coordinate field operations • Attend GUFC Annual Conference & Awards Luncheon • Attend GUFC Quarterly Meetings • Provide public information via external city newsletter and local access

	<p>TV</p> <ul style="list-style-type: none"> • Report program results to mayor and council
Year 2	<p>NEW</p> <ul style="list-style-type: none"> • Begin inventory of street trees less than 30 inches DBH • Organize city tree board • Attend monthly tree board meetings • Provide technical expertise as necessary <p>ONGOING</p> <ul style="list-style-type: none"> • Coordinate field operations • Maintain program records • Attend GUFC Annual Conference & Awards Luncheon • Attend GUFC Quarterly Meetings • Attend ISA Southern Chapter Annual Conference, or other regional conference, or a national conference such as those held by the National Arbor Day Foundation, ISA, or American Forests • Provide public information via external city newsletter and local access TV • Report program results to mayor and council
Year 3	<p>NEW</p> <ul style="list-style-type: none"> • Maintain city tree board records • Coordinate and conduct tree care educational programs for citizens <p>ONGOING</p> <ul style="list-style-type: none"> • Provide technical expertise as necessary • Coordinate field operations • Conduct ongoing tree inventory • Attend monthly tree board meetings • Attend GUFC Annual Conference & Awards Luncheon • Attend GUFC Quarterly Meetings • Attend ISA Southern Chapter Annual Conference, or other regional conference, or a national conference such as those held by the National Arbor Day Foundation, ISA, or American Forests • Provide public information via external city newsletter and local access TV • Report program results to mayor and council
Years 4, 5, and ongoing	<p>ONGOING</p> <ul style="list-style-type: none"> • Provide technical expertise as necessary

	<ul style="list-style-type: none"> • Coordinate field operations • Attend monthly city tree board meetings • Maintain tree board records • Conduct ongoing tree inventory • Coordinate and conduct tree care educational programs for citizens • Attend GUFC Annual Conference & Awards Luncheon • Attend GUFC Quarterly Meetings • Attend ISA Southern Chapter Annual Conference, or other regional conference, or a national conference such as those held by the National Arbor Day Foundation, ISA, or American Forests • Provide public information via external city newsletter and local access TV • Report program results to mayor and council
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The arborist's activity level grows through Year 3 and then stabilizes. In Years 4, 5, and beyond the city arborist responsibilities are ongoing as in previous years.

CITY TREE ORDINANCE

A city tree ordinance currently does not exist. The development of a comprehensive city tree ordinance is proposed. The ordinance would include the establishment of a city tree board, arboricultural standards for tree care operations, the city's right to plant, maintain, and remove trees on city property, the requirement for the city to have an annual work plan for the management of the community trees, and would establish the city's right to prune or remove trees on private property when a public nuisance exists. This comprehensive city tree ordinance should also incorporate a revised *Landscaping Ordinance* to create a single document containing all tree-related regulations.

The existing *Landscaping Ordinance* requires the establishment of a minimum density of trees on new development sites, and prescribes the types and locations of trees that must be planted for tree density credits. The city's buffer standards require the planting of trees in along the perimeter of property where dissimilar land uses abut one another. A detailed analysis and recommendations for revision of the existing *Landscaping Ordinance* are located in APPENDIX B: REVIEW OF EXISTING LANDSCAPING ORDINANCE.

Strategies for the development of the tree ordinance include:

1. Combine the city tree ordinance and landscaping ordinance into one comprehensive document.
2. Set an example for tree management by consistently following and enforcing the tree ordinance and the arboricultural standards it includes on city property.
3. Gather information on the effectiveness of the current *Landscaping Ordinance* and revise for improved effectiveness at creating and maintaining a health tree canopy cover prior to incorporation into the city tree ordinance.
4. Complete tree canopy cover measurements and set a tree canopy cover goal for the city overall and tree canopy cover requirements for each zoning district.
5. Use the city tree ordinance as a tool to establish tree management standards and policies and to achieve the community forest vision and goals.

Before a comprehensive tree ordinance is developed, the question of how well the current landscaping regulations are working in terms of providing tree canopy cover and benefits should be answered. To provide the answer, it is recommended that the Planning and Development Department conduct an assessment of new developments completed under the current *Landscaping Ordinance* over the last several years. These assessments should gather the following information:

- Number and condition of trees planted and growing on the site by species
- Number of dead trees needing replacement
- Area in square feet of existing, healthy, conserved trees
- Degree and quality of maintenance taking place on the site
- Current maintenance needs

The number and species of trees currently growing on the site should be compared with approved site plans to determine if there has been any substantial change from what was approved. The results of the development assessments should be considered in making changes to the current *Landscaping Ordinance* or in developing the comprehensive city tree ordinance.

Additionally, tree canopy cover goals should be established by zoning district, and regulations revised on tree density to insure that these goals can be met in the future.

The development of a city tree ordinance should be led by the city arborist and city planner. The same group of staff and citizens that participated in the Community Forest Strategic

Planning Meeting could be asked to provide input into the content of the tree ordinance. The city tree board should also be included in the development of the city tree ordinance.

The administration of the city tree ordinance is assigned to the Public Works Department and the city arborist, however the Planning and Development retains responsibility for administering the tree ordinance regulations that pertain to new development on private property.

Table 2. City Tree Ordinance Plans

YEAR	ACTIVITIES
Year 1	NEW <ul style="list-style-type: none"> • Conduct development assessments • Complete tree canopy cover study • Establish city-wide and zoning district tree canopy cover goals • Create city tree species list • Revise <i>Landscaping Ordinance</i> and incorporate into city tree ordinance • Complete comprehensive city tree ordinance
Years 2, 3, 4, 5, and beyond	ONGOING <ul style="list-style-type: none"> • Monitor and enforce city tree ordinance • Evaluate outcomes and results of tree ordinance regulations • Revise city tree ordinance as necessary to ensure intended outcomes

CITY TREE BOARD

This plan recommends the establishment of a city tree board that would act as a liaison between the community and elected officials and staff and provide advice and recommendations on all tree-related issues.

The first option for appointing members to the tree board is to have the mayor and council members appoint people to the tree board who represent various interests within the city, and to include people with expertise in tree management. These interests should include:

- Citizens-at-large
- Keep Bartow Beautiful
- Cartersville Downtown Development Authority
- Development community
- Community groups, such as the Cartersville Garden Club

- Professionals in the field of arboriculture, forestry, landscape architecture, or horticulture

The number of voting members of the tree board should be at least five (5) but no more than (9). The number of ex-officio members of the tree board does not need to be limited, but they should include, at a minimum:

- City Arborist
- City Planner
- Georgia Forestry Commission forester
- Electric Department staff representative

The second option available for appointing members to the tree board is to have the mayor and council members each appoint a community representative from their ward or as a citizens-at-large. This would create a 7-member board. Then, representatives of community groups, agencies, and staff would all be considered ex-officio members. Of course, council members could appoint someone from their ward who also represents one of the groups or professions listed previously.

The tree board should be assigned the following responsibilities:

- Consider, investigate, make findings, report and make recommendations on any tree-related issue to the mayor and council.
- Provide input to the city arborist on the *Community Forest Master Plan* and annual work plans.
- Provide input on the city tree ordinance and tree species list.
- Lead the effort to develop, in conjunction with community partners, an Adopt-A-Tree program for planting trees in honor or memory of individuals and groups.
- Organize educational programs on tree care.
- Collect sponsorships and donations for tree care projects.
- Provide a forum for citizens to voice their concerns about tree-related issues at regular tree board meetings.
- Provide a forum for the exchange of tree-related information among staff members and for the tree board members to become familiar with staff activities.

The tree board should choose a chairperson, vice-chairperson, treasurer, and secretary. The board should develop its own rules of operation, regulations, and keep minutes of all its

proceedings, including meetings of the full board and the officers. A majority of the members should constitute a quorum for the official conduct of business.

Meetings of the tree board should be held monthly for timely sharing of information on tree-related activities. The city arborist, city planner, and Electric Department staff representative should provide the tree board with reports and updates on current activities involving community trees at each meeting. The meetings should be held at a regular time during normal business hours if possible to facilitate attendance by city staff. Tree board meeting dates and times should be announced on the city website, in the external and internal city newsletters, and on the local access cable television station.

Tree board records should be maintained in the office of the city arborist. The mayor and council should receive copies of all meeting announcements, agendas, and minutes, and announcements for all events sponsored or attended by the board.

Annual plans for the city tree board are listed in Table 3.

Table 3. Annual City Tree Board Plans

YEAR	ACTIVITIES
Year 1	<p>NEW</p> <ul style="list-style-type: none"> • Establish city tree board by ordinance • Appoint tree board members • Create city tree ordinance • Revise <i>Landscaping Ordinance</i> and incorporate into city tree ordinance • Assist partners in organizing and conducting the city's annual Arbor Day celebration
Year 2	<p>NEW</p> <ul style="list-style-type: none"> • Develop, with partners, an Adopt-a-Tree program for new trees on public and private property • Report tree board activities to mayor and council <p>ONGOING</p> <ul style="list-style-type: none"> • Conduct regular tree board meetings • Assist partners in organizing and conducting the city's annual Arbor Day celebration
Year 3	<p>NEW</p> <ul style="list-style-type: none"> • Coordinate and conduct tree care education programs for citizens • Administer the Adopt-a-Tree program

	<ul style="list-style-type: none"> • Attend GUFC Annual Conference & Awards Luncheon <p>ONGOING</p> <ul style="list-style-type: none"> • Conduct regular tree board meetings • Assist partners in organizing and conducting the city’s annual Arbor Day celebration • Report tree board activities to mayor and council
Years 4, 5, and beyond	<p>ONGOING</p> <ul style="list-style-type: none"> • Coordinate and conduct tree care education programs for citizens • Administer the Adopt-a-Tree program • Conduct regular tree board meetings • Assist partners in organizing and conducting the city’s annual Arbor Day celebration • Attend GUFC Annual Conference & Awards Luncheon • Report tree board activities to mayor and council

Activities will be ongoing in Year 6 and beyond.

ARBORICULTURAL STANDARDS

The city, and each department responsible for some aspect of tree care, should adopt and implement professional arboricultural standards for tree care operations. These standards should also be required of all persons planting, maintaining, and conserving trees to satisfy the requirements of the *Landscaping Ordinance*.

Fortunately, the International Society of Arboriculture has developed standards for tree care operations for most maintenance activities described in this plan. These standards have been adopted by the American National Standards Institute (ANSI) and are published by ISA, along with best management practices that supplement many of the standards.

Strategies for the adoption of arboricultural standards include:

1. Adopt a single set of standards for both city and private property tree management.
2. Adopt existing professional arboricultural standards and best management practices for tree care to increase tree health and longevity, and to minimize annual per tree costs.
3. Develop standards for activities for which existing professional arboricultural standards are not published.
4. Reference published standards and describe additional standards in the tree ordinance.

The following standards should be purchased in Year 1 by the city¹², referenced in the city tree ordinance, and copies kept on file in the offices of the city clerk, city arborist, and city planner.

- ANSI Z133.1 American National Standard for Arboricultural Operations – Safety Requirements (2006)
- ANSI A300 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Pruning) (2001)
- ANSI A300 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Tree Lightning Protection Systems) (2002)
- ANSI A300 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Fertilization) (2004)
- ANSI A300 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Transplanting) (2005)
- ANSI A300 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Integrated Vegetation Management a. Electric Utility Right-of-way) (2005)
- ANSI A300 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Management of Trees and Shrubs During Site Planning, Site Development, and Construction) (2005)
- ANSI A300 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Supplemental Support Systems) (2006)

Two (2) copies of the following best management practices published by ISA should be purchased in Year 1 and copies kept in the offices of the city arborist and city planner.

- Tree Pruning
- Integrated Pest Management
- Tree Support Systems: Cabling, Bracing, Guying, and Propping (Revised)
- Utility Pruning of Trees
- Tree and Shrub Fertilization
- Tree Lightning Protection Systems
- Tree Planting

¹² Available at www.isasouthern.org, the website of the Southern Chapter of the International Society of Arboriculture, or at www.isa-arbor.com, the international organization's website

- Tree Inventories
- Integrated Vegetation Management

The following standards and best management practices should be purchased by the Electric Department in Year 1.

- ANSI A300 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Pruning) (2001)
- ANSI A300 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Integrated Vegetation Management a. Electric Utility Right-of-way) (2005)
- Best Management Practices: Utility Pruning of Trees
- Best Management Practices: Integrated Vegetation Management

Compliance with these standards and best management practices should be required of contract line clearance crews. The staff responsible for monitoring contract crews for compliance should become familiar with these standards and practices.

The following additional standards should be adopted by the city in Year 1:

- Tree placement
- Tree mulching
- Tree removal

Basic standards recommended for each of these activities are outlined below.

TREE PLACEMENT

Recommended standards for the placement and spacing of trees in relation to each other and to infrastructure are listed in Table 4.

Table 4. Minimum Distances Required from Trees to Infrastructure

Infrastructure Component	Minimum distance in feet from infrastructure to trunk of trees of mature size...		
	Small Trees (<25 ft height)	Medium Trees (25 to 40 feet)	Large Trees (>40 feet)
<i>Other Small Trees</i>	15 feet	15 feet	15 feet
<i>Other Medium Trees</i>	15 feet	25 feet	25 feet
<i>Other Large Trees</i>	15 feet	25 feet	40 feet
<i>Street Corners</i>	35 feet	35 feet	35 feet
<i>Overhead Electric Lines</i>	0 feet	25 feet	40 feet

<i>Fire Hydrant</i>	10 feet	10 feet	10 feet
<i>Mailbox</i>	15 feet	15 feet	15 feet
<i>Sign</i>	10 feet	10 feet	10 feet
<i>Driveway</i>	15 feet	15 feet	15 feet
<i>Utility Pole</i>	10 feet	20 feet	30 feet
<i>Utility Equipment</i>	15 feet	15 feet	15 feet
<i>Building</i>	10 feet	20 feet	30 feet

Clearance over roadways for vehicular traffic should be maintained at 16 feet. Clearance above sidewalks for pedestrians should be maintained at 8 feet.

TREE MULCHING

Trees should be mulched to retain soil moisture, improve soil aeration, and provide some nutrients. The following are acceptable mulch materials:

- Wood chips, aged at least 3 months
- Composted leaves and organic matter of medium texture
- Pine straw

Grass clippings, pine bark, stones, shredded rubber and plastic are not recommended as mulch.

Mulch should be applied in an even layer, 3 to 4 inches deep, from 6 inches outside the tree trunk to the tree's dripline, or within the CRZ, whichever is larger. If the entire CRZ or dripline cannot be mulched, then the mulch should be spread out as far as possible. The mulch ring around newly planted trees should increase in size as the tree grows.

Combine adjacent mulch rings into a single mulch bed where possible.

TREE REMOVAL

Standards for tree removal are intended to guide tree removal decision. The following are approved reasons for the removal of trees on city property:

- Tree is in conflict with infrastructure, is causing or has the potential to cause damage to infrastructure, and removal is the only way to resolve the conflict.
- Tree is in poor condition and no longer has a positive value as a community asset.
- Tree has a high risk of whole tree failure and there is no cost-effective means to reduce the risk.
- Tree produces a large amount of litter that results in a public nuisance.
- Tree has a structural defect that cannot be eliminated or corrected.

Removal of city trees should not be approved under the following conditions or for the following reasons:

- Tree in good condition
- Tree without an elevated risk of whole or partial tree failure
- Normal amount of leaf litter
- Sign clearance

TREE PROTECTION

The entire tree—roots, trunk, and crown—whether newly planted or already established in the landscape, should be protected from damage to maximize tree health and longevity, and to minimize per tree costs. Protection can be passive, achieved through the avoidance of damage to a tree’s roots and rooting zone, its trunk, and its large limbs, branches and leaves, or it might be active, involving the installation of tree protection structures, such as fencing or trunk wraps.

ANSI standards for the management and protection of trees during development exist, but a critical root zone (CRZ) where tree roots and the soil in which they grow are to be protected should also be defined for all city trees as the area equivalent to 1.25 feet for every 1 inch DBH, or the farthest extent of the trees branches, *whichever is greater*. A CRZ to protect all trees planted to meet the requirements of the *Landscaping Ordinance* should also be established.

The CRZ will increase annually for newly planted trees and for all trees that are still adding trunk diameter. The rate of increase in the CRZ for a newly planted, fast growing tree is more dramatic than for an older, slower growing tree. To provide a good quality rooting zone for a tree throughout its life, one that is free from compaction, impermeable hardscape, and other restrictions, the potential mature size of a tree must be considered when selecting a planting location.

Refer to the ANSI standards for further information on tree management on development sites and tree protection.

FIELD OPERATIONS

The strategies and annual work plans for tree establishment, maintenance, pruning, inspections, and removal are designed to create a predictable and manageable work load and regular progress toward reaching tree management goals.

The two (2) most important activities that need to take place in Years 1, 2, and 3 are pruning and removal to reduce risks associated with the city's larger, older trees. To assist the current tree care manager in accomplishing this risk reduction, two (2) fields, titled "Remove Management Year" and "Prune Management Year", were added to the tree inventory database just before the final data field—Point ID. For individual large trees and high priority removal recommendations, and for high priority or risk reduction pruning recommendations, the recommended management year, from 1 to 3, has been entered in these fields. A 1 indicates Year 1, a 2 indicates Year 2, but a 3 indicates removal should begin in Year 3 but may continue through Years 4 and 5. The city arborist should use the tree inventory database information on tree size, condition, and hazard rating, and these management year fields to identify the individual trees with high priority needs.

To facilitate planning and field operations, City staff should print out and have available the following lists:

- Trees recommended for removal, sorted by condition and hazard rating, with management year
- Removal recommendations for chains, stakes and guy wires, poison ivy, and vines/woody saplings
- Trees recommended for risk reduction pruning, sorted by site, street, and address, with management year
- Trees recommended for all types of pruning, sorted by site, street, and address
- Trees recommended for inspection, sorted by site, street, and address

These lists will need to be reprinted as tree inventory data is updated in the database. Updates should be made to the tree inventory data as trees are pruned, removed, and otherwise maintained.

TREE PRUNING

Strategies for pruning include:

- Reduce risk to public health and safety first by pruning trees in hazard condition in Years 1, 2, and 3.
- For large trees, transition from primarily risk reduction pruning to routine pruning in Year 3 or 4 after risk reduction pruning is completed.
- Begin routine pruning of large trees in Year 4 on a site-by-site basis.
- Limit the removal of live wood from large, mature and over-mature trees; remove deadwood and structurally weak limbs only.
- Utilize a contractor for large tree pruning and City crews for small tree pruning.

There are 51 trees that require pruning for risk reduction or are otherwise considered a high priority for pruning. In Year 1, 17 of these trees will be pruned, and in Year 2, 32 of these trees will be pruned. The workload in Year 2 may need to extend into Year 3, when only 10 additional trees are scheduled for pruning. Non-routine large tree pruning is estimated at 10 trees per year thereafter. Large tree pruning will be completed by contract crews.

Routine large tree pruning begins in Year 3 with 30 trees per year and continues in subsequent years at that same level. Small and young tree pruning can be completed by city crews, and is planned at a level of 50 trees per year.

Young tree training pruning is essential and a high priority for all recently planted trees in the DBD, at city parks, around city offices and facilities, and at city schools. City crews should be trained in the proper techniques for pruning young trees prior to beginning this pruning program. If more than 50 trees can be pruned per year, then this number should be increased as appropriate.

TREE REMOVAL

Strategies for tree removal include:

- Reduce risk to public health and safety first by removing trees in hazard condition in Years 1 and 2.
- Where there are an abundance of large oak trees that are over-mature and in decline such as the parking lot on Public Square, develop a landscape and tree replacement plan, then remove and replace trees at the same time as a site renewal project.
- For large trees, transition from risk reduction removals to removals on an as-needed basis in Years 3 or 4.
- Begin removal of trees less than 18 inches DBH in Year 3 and on a site-by-site basis
- Utilize contractors to remove large trees.

- Utilize city crews to remove small trees.

There are 121 individual trees recommended for removal as a result of the tree inventory and 6 more within tree groups. Of these 127 trees, 32 have a DBH of 18 inches or greater. Another 34 have a DBH between 6 and 18 inches, and the remaining 55 have a DBH less than 6 inches. Trees 18 inches and greater recommended for removal are scheduled for removal in Years 1, 2, and 3 based upon their size, hazard rating, and removal priority given during the inventory. Some small trees less than 18 inches DBH have also been scheduled for removal in Year 1 because they are in high visibility locations, such as the DBD. Removal of the dead and dying trees in the planters in Friendship Plaza in the Downtown Development District is assigned the highest priority and is scheduled in Year 1.

Trees between 6 and 18 inches are generally scheduled for removal in Year 3 and beyond as city staff time and budgets allow. City staff will need to judge which of these trees can be removed by staff and which have to be removed by a contractor. The city may decide to remove all trees recommended for removal on a single site during a single visit rather than leave some for later years. This same approach of removing all trees recommended for removal on a single site at one time should be adopted for planning the removal of trees less than 6 inches in diameter.

TREE MULCHING

Strategies for mulching include:

- Mulch all recently planted trees to retain soil moisture, improve health and chance of survival.
- Mulch according to standards.
- Utilize local sources of wood chips from tree service contractors and from city operations to develop a good quality supply of mulch.
- Use only aged wood chips (at least 3 months old) or other high quality organic material such as pine straw for mulching city trees.

Sources of mulch should be identified as quickly as possible and Public Works should begin to stockpile high quality city mulch. All young and recently planted trees at city parks, city offices and facilities, and the city schools should be mulched in late winter of Year 1 and the mulch refreshed every year thereafter. The initial mulching of all currently un-mulched trees may take up to 5 years.

Mulching plans should include:

- Develop stockpile of high-quality city mulch.
- Mulch all trees at the city schools.
- Mulch all recently planted trees at Clearwater Street Park and Sam Smith Park.
- Mulch all trees where possible in the city cemetery.
- Mulch all newly planted trees immediately after planting and annually thereafter.

TREE ESTABLISHMENT

When a tree is planted the city is making a 25 to 100 year commitment to maintain the tree in a healthy and safe condition. Getting the tree in the ground, however, is only one part of the entire process of establishing the tree in the landscape. This process, which lasts at least 3 years and up to 5 years, includes the following activities:

- Planting site selection and selection of appropriate species
- Tree selection, ordering, and delivery
- Site preparation
- Tree planting
- Mulching
- Watering
- Protection
- Inspection

Since the inventory shows that there are a substantial number of trees, both large and small, that need to be removed each year, an overall goal of the city's tree establishment program is to replace each city tree removed with 2 new trees, if seasonal planting conditions are favorable. This results in a modest goal of planting 50 trees each year. The level of tree planting will have to be adjusted, of course, to climatic conditions, especially soil moisture and current rainfall patterns. A lower level of tree planting, 25 or less trees annually, is more appropriate in years of severe drought.

Strategies for tree establishment include:

- Plant two (2) trees for every one (1) tree removed to increase the city's tree canopy cover.
- Replace recently planted trees that are dead or in advanced decline in locations with high visibility and visitor traffic, such as Friendship Plaza and the Downtown Business District, Civic Center Complex.

- Focus on tree quality and planting site quality to maximize the cost-effectiveness of tree establishment efforts.
- Develop a landscape plan for each park or site that requires a substantial number of new or replacement trees to ensure an organized, cohesive, and successful planting effort.
- Take advantage of community interest in tree planting through the development of an Adopt-A-Tree program.

Tree establishment plans are outlined in Table 5.

Table 5. Tree Establishment Plans

YEAR	ACTIVITIES
Year 1	<ul style="list-style-type: none"> • Replace redbud trees in planters in Friendship Plaza with a drought tolerant species • Replace declining, recently planted oak trees at the Library on the Civic Center Site
Year 2	<ul style="list-style-type: none"> • Plant trees at Clearwater Street Park
Year 3	<ul style="list-style-type: none"> • Plant trees at Sam Smith Park
Years 4, 5, and beyond	<ul style="list-style-type: none"> • Continue routine tree planting of approximately 50 trees per year • Develop plans for replacement of large oak trees in Public Square parking lot; implement plans when the majority of large oak trees on this site are removed
Years 2, 3, 4, 5, and beyond	<ul style="list-style-type: none"> • Continue routine tree planting of approximately 50 trees per year

The city tree board, in conjunction with Keep Bartow Beautiful and the Downtown Development Authority, should develop an Adopt-A-Tree program that would solicit donations for memorial and honorary trees to be planted in city parks and on the grounds around city facilities. The program could be extended to facilitate the planting of trees on private property on the lawns surrounding commercial sites and businesses, where many tree planting opportunities exist.

TREE INSPECTION

The inventory showed that 135 city trees are in marginal condition and should be inspected on a regular basis. These trees should be inspected at least once per year. A record of the inspection should be made along with changes to the original management recommendations.

Strategies for routine tree inspections include:

- Inspect trees recommended for regular inspection during other routine field operations as time permits.
- Inspect large trees that are scheduled for removal at least once per year prior to their removal.
- Inspect all trees during routine field operations for current management needs.
- Inspect all newly planted trees in the first, second, and third growing seasons after planting to assess survival and management needs.

CABLING AND BRACING AND LIGHTNING PROTECTION

There are 23 trees found during the inventory that may benefit from cabling and bracing to improve their structural integrity, reduce their risk for failure, and increase their longevity. These trees may, or may not, be good candidates for these procedures. Inspection by an ISA Certified Arborist with experience in the installation of tree support systems should be done as a first step in this process. If budget funds are available from other unused line items, cabling and bracing systems should be installed in two (2) trees and a lightning protection system should be installed in one (1) tree annually. The old, large and very tall trees growing in the cemetery have the greatest need for lightning protection.

EDUCATION AND OUTREACH

The primary goal of the city's education and outreach program is to make as many people as possible aware of the valuable functions that trees provide, the place trees hold as part of the city's infrastructure, tree tolerances and growing requirements, and correct tree maintenance techniques. The more knowledgeable people are about trees and their maintenance, the greater the contribution they can make to maintaining and improving overall community forest health.

Strategies for education and outreach activities include:

- Take advantage of local and statewide programs offered by the Georgia Forestry Commission and the Georgia Urban Forest Council (GUFC).
- Purchase a library of educational materials that can be used to for staff training, contractor training, and citizen education.
- Take advantage of free local and regional forestry and arboricultural speakers to provide tree care training for staff.

- Conduct short tree education programs at regular meetings of community organization and agencies.

There are at least three (3) organizations in the region that regularly provide educational programs that the city should take advantage of. These include:

- Georgia Urban Forest Council, Inc.
- Georgia Forestry Commission
- Southern Chapter of the International Society of Arboriculture

Table 6 contains an outline of the basic components included in the city's education and outreach program, and the suggested management year for implementation.

Table 6. Education and Outreach Program Outline

TOPIC/ACTIVITY	TARGET AUDIENCE	SUGGESTED FORMAT AND MEDIA	COORDINATOR	MANAGEMENT YEAR
<i>Certified Arborist Training Classes</i>	City staff Local tree service employees	12-week program conducted in Cartersville; 1 domain per week; speakers invited with expertise on each domain	City staff, Georgia Forestry Commission, Bartow County Cooperative Extension Service	Year 1
<i>General Tree Maintenance</i>	Citizens Businesses Developers Construction Contractors	ISA INTRODUCTION TO ARBORICULTURE TREE MAINTENANCE CD ISA BROCHURES GFC SPEAKER	City Arborist Tree Board	Year 2
<i>Tree Planting and New Tree Care</i>	Public Works Department Citizens Developers Landscape Contractors	ISA INTRODUCTION TO ARBORICULTURE TREE IDENTIFICATION AND SELECTION CD, and PLANTING & EARLY CARE CD ISA BROCHURES GFC SPEAKER	City Arborist Tree Board	Year 2
<i>Mature Tree Care</i>	Public Works Department Parks and Recreation Department Landscape Contractors Citizens	ISA INTRODUCTION TO ARBORICULTURE DIAGNOSIS & DISORDERS CD GFC SPEAKER	City Arborist Tree Board	Year 2
<i>Pruning</i>	Electric System	ISA INTRODUCTION	City Arborist	Year 2

Table 6. Education and Outreach Program Outline

TOPIC/ACTIVITY	TARGET AUDIENCE	SUGGESTED FORMAT AND MEDIA	COORDINATOR	MANAGEMENT YEAR
<i>Techniques and No Tree Topping</i>	Public Works Department Landscape Contractors Citizens	TO ARBORICULTURE PRUNING CD REGIONAL SPEAKERS	Tree Board	
<i>Tree Protection</i>	Electric System FiberCom Department Gas Department Parks and Recreation Planning and Development Public Works Developers General Contractors Landscape Contractors Citizens	Annual training program to learn and review basics	City Arborist Tree Board	Year 3
<i>Evaluating Trees for Failure Risk</i>	Public Works Electric Parks and Recreation Planning and Development	ISA Southern Chapter, GUFC, or other sponsored program as available	Professional Organizations	As available
<i>Public Tree Management</i>	Department Representatives from Electric, Gas, Parks and Recreation, Planning and Development, Public Works	Monthly, Bi-Monthly, or Quarterly Tree Management Information Session ISA INTRODUCTION TO ARBORICULTURE TREE BIOLOGY CD INTRODUCTION TO ARBORICULTURE TREE WORKER SAFETY CD	City Arborist	Year 3
<i>New Topics in Community Forest Management</i>	City staff, agency representatives	VARIOUS	City Arborist	Years 4, 5, 6 and beyond

INFORMATION MANAGEMENT

Communication between city departments, with the mayor and council, with the tree board, and with the city's many tree care partners is essential to the success of the tree management

program. Detailed recordkeeping, regular reporting, and gaining citizen support for the tree management program are included in the information management component of this plan.

Strategies for managing community tree program information include:

- Maintain accurate records of all program activities, work hours, costs, and results to continually improve planning and budgeting.
- Report program results regularly to elected officials and the tree board to encourage their interest, involvement, and support.
- Keep citizens informed on tree program activities and results using established media outlets to encourage their interest, involvement, and support.

Maintenance of all program records as listed in Table 7 should begin in Year 1 and continue through subsequent years, and should be the responsibility of the city arborist. City staff and tree board members are responsible for providing some information to the city arborist where indicated.

Table 7. Records Maintenance

PROGRAM	RECORDS
<i>Tree Establishment</i>	<ul style="list-style-type: none"> • Planting date, location, species, cultivar, size, cost and source for every tree planted by year • Work hours (number of employees multiplied by average hours on task) spent to plant trees • Equipment and equipment hours involved in tree planting • Contract cost for planting (if applicable) • Location, planting date, species, cultivar, size, cost, and source of Arbor Day tree
<i>Tree Maintenance</i>	<ul style="list-style-type: none"> • General locations of trees, type and date of maintenance, source of materials (i.e., mulch), and work hours for maintenance by city crews (number of employees multiplied by average hours on task)
<i>Tree Protection</i>	<ul style="list-style-type: none"> • Tree locations and descriptions, bid specifications, vendor, installation date, and cost for installation of cabling, bracing, and lightning protection systems
<i>Tree Pruning</i>	<ul style="list-style-type: none"> • Tree locations and descriptions, pruning date, and work hours for pruning by city crews (number of employees multiplied by average hours on task) • Tree locations and descriptions, bid specifications, vendor, pruning date, and cost for all emergency and routine tree pruning by contract crews • Annual cost of utility line clearance pruning provided by Electrical Department
<i>Tree Inspections</i>	<ul style="list-style-type: none"> • Maintain list of trees in marginal condition • Tree locations and descriptions, last inspection date, inspector's name, management recommendations
<i>Tree Removal</i>	<ul style="list-style-type: none"> • Tree locations and descriptions, reason(s) for removal, removal date, work hours for removal by city crews (number of employees multiplied by

Table 7. Records Maintenance

PROGRAM	RECORDS
	average hours on task) <ul style="list-style-type: none"> • Tree locations and descriptions, reason(s) for removal, bid specifications, vendor, removal date, and cost for all emergency and routine tree removal by contract crews • Annual cost of tree removals for associated with electric lines provided by the Electrical Department
<i>Tree Board</i>	<ul style="list-style-type: none"> • Current member roster provided by tree board secretary • Meeting announcements, agendas, minutes, financial reports provided by tree board secretary and treasurer • Event announcements, number of participants, volunteer hours provided by tree board secretary
<i>City Arborist</i>	<ul style="list-style-type: none"> • Monthly activity reports • Number of hours by activity type
<i>Program Events and Accomplishments</i>	<ul style="list-style-type: none"> • Date and description of major program events and accomplishment • Newspaper articles related to tree program activities • Correspondence related to tree program activities

The Electrical Department should keep detailed records on the number of trees pruned and removed by the Department, including their locations, descriptions, and the date of action, as well as the work hours (number of people multiplied the average number of hours spent on the tasks). This information should be provided to the city arborist on an annual basis to be incorporated into overall tree management program cost summaries.

The cost of community tree management should be calculated on an annual basis as dollars per capita and dollars per tree using actual expenditures. These costs can be compared from year to year and used to measure program effectiveness over the long term.

TREE CITY USA DESIGNATION

Designation of Cartersville as a Tree City USA is one of the tree management program's main goals. This designation by the National Arbor Day Foundation¹³ will raise the visibility of the city's community forest management program with signage placed at city entranceways and annual events. There are currently 118 cities in Georgia designated as a Tree City.

¹³ More information is available at the National Arbor Day Foundation's website, www.arborday.org

This designation can be achieved by Arbor Day 2010.¹⁴ There are four (4) standards that must be met to become a Tree City under the National Arbor Day Foundations program guidelines.

1. Tree Board or Department. This master plan proposes the establishment of a city tree board. The plan also proposes the designation of a city arborist with responsibility for community forest management.
2. Tree Care Ordinance. This plan proposes the creation of a city tree ordinance that establishes the city tree board and the city's right to manage their trees. The ordinance should also assign the responsibility for the implementation of the master plan to the city arborist.
3. Annual Community Forestry Budget of \$2 Per Capita Minimum. The forest management budgets proposed in this plan result in an average expenditure of dollars per capita between \$3.41 and \$3.66.
4. Arbor Day Observance and Proclamation. The city has had annual Arbor Day celebrations that are coordinated by Keep Bartow Beautiful. In the future the city tree board will partner with Keep Bartow Beautiful and the city arborist in organizing the annual Arbor Day celebration and getting an Arbor Day proclamation.

TREE MANAGEMENT BUDGET

An increase in the city's budget and expenditures for community forest management are essential to the success of this plan and the achievement of the city's community forest vision and goals. The budgets proposed for the next 5 years range between approximately \$61,000 and \$66,000, an amount equivalent to less than .04 percent of the city's total annual budget of approximately \$169.5 million dollars.

Strategies for defining and gaining approval of a community tree management budget include:

1. Provide enough resources to get basic, necessary management done while having some resources to continually improve the quality of trees and the tree management program.
2. Maintain detailed records of tree related expenses to better predict future expenses.

¹⁴ Georgia's Arbor Day is the 3rd Friday in February; National Arbor Day is the last Friday in April

3. Pro-actively manage tree health and safety at a sustainable level that results in high tree value and predictable annual management costs.
4. Diversify funding sources, using state, federal, and private entity grants for special tree management and education projects.

The approach to the development of the city budget was to use tree inventory information to schedule risk reduction and routine field operations and then estimate the amount of money it will take to complete those operations. Added to these operational costs are the costs for other program elements proposed in this plan, such as education and outreach. Beginning in Year 1, the City should apply for grants to purchase educational materials and pay for training, workshops, and conference registration fees.

A summary of the proposed total annual budgets prepared for the city is shown in Table 8.

Table 8. Annual Tree Management Budget Summary

Year	Total Amount	Per Capita Amount	Per Tree Amount
1	\$64,243	\$3.57	\$34.03
2	\$65,829	\$3.66	\$34.47
3	\$62,911	\$3.50	\$32.77
4	\$62,836	\$3.49	\$32.56
5	\$61,336	\$3.41	\$31.62
6 and beyond	\$64,336	\$3.57	\$32.66

The annual budgets, dollars spent per capita, and per tree costs remain relatively stable over the years. In fact the dollar values per capita and per tree will decrease gradually as the city population increases and more trees are planted each year than are removed.

A spreadsheet that contains line item details for these annual budgets is part of this plan and has been provided to the city on the project CD.

MANAGEMENT CALENDARS

A calendar that summarizes tree management activities for the next 5 years and beyond is incorporated into the annual budget and work plan spreadsheet located on the project CD. A *Seasonal Tree Management Activity Calendar* to summarize activities that will take place on an annual basis has also been developed. This seasonal calendar is located in Appendix D.

APPENDICES

APPENDIX A: EXISTING TREE MANAGEMENT PROGRAM

Table A1 and A2 contain information about the city’s existing tree management program obtained from the *Survey of Existing Resources and Activities*, phone and e-mail contacts with city staff and agency representatives, the city website and current publications obtained from the city. An entry of N/A indicates no answer, not applicable, or no activity.

Other comments received from department directors answering the survey were:

- A tree management program is needed
- Personal property rights should be protected

Table A1. Existing Tree Management Program Policies, Responsibilities, and Activities

Responsibilities and Activities		Electric System	Parks & Recreation Department	Planning & Development Department	Public Works Department	Water Department
General Areas of Responsibility		Electric lines and facilities; utility line clearance pruning	Park sites and facilities	Administers <i>Landscaping Ordinance</i> and Buffer Standards which regulate trees on private property	Street rights-of-way, city offices and facilities	Water lines, sewer line easements, water department property
Planting	Public Trees	It’s against city ordinance to plant trees on the street right-of-way; tree planting on utility easements or right-of-way, or within 15 feet of an existing overhead line is not permitted; some “low-growing, slow-growing” trees may be permitted if required for other reasons	No routine planting program although some has been done over the years	<i>Landscaping Ordinance</i> sets standards for tree placement	Yes, 0-10 trees planted per year as determined by Division Supervisors Responsible for tree purchases	Does not want trees that will grow large over existing or new utilities because they entangle utilities underground and may pull the utilities out if they come down for any reason

Table A1. Existing Tree Management Program Policies, Responsibilities, and Activities

Responsibilities and Activities		Electric System	Parks & Recreation Department	Planning & Development Department	Public Works Department	Water Department
	Private Trees	N/A	N/A	Administers the <i>Landscaping Ordinance</i> and Buffer Standards Ordinance which requires tree planting Tennessee Street Corridor Survey 2008 is underway to obtain public opinion to help shape future efforts to encourage quality new development and redevelopment, including the planting of trees	N/A	N/A
Mulching	Public Trees	N/A	No routine mulching is being done in parks	N/A	2 times per year; mulch is of poor quality	N/A
	Private Trees	N/A	N/A	<i>Landscaping Ordinance</i> requires maintenance of trees planted to satisfy requirements	N/A	N/A
Watering	Public Trees	N/A	N/A	N/A	3 times per week for 90 days after planting	Communicates and enforces current drought level and watering restrictions
	Private Trees	N/A	N/A	<i>Landscaping Ordinance</i> requires property owners to maintain new trees	N/A	Provides information on current drought level and watering restrictions
Protection	Public Trees	Trees pruned using directional pruning techniques according to standards	Trees inspected at Dellinger Park	N/A	Responsible for city trees and their health	N/A

Table A1. Existing Tree Management Program Policies, Responsibilities, and Activities

Responsibilities and Activities		Electric System	Parks & Recreation Department	Planning & Development Department	Public Works Department	Water Department
	Private Trees	Trees pruned using directional pruning techniques according to standards	N/A	<i>Landscaping Ordinance</i> requires landscaping to be protected from encroachment by vehicles; also requires protection during construction of existing trees retained on the site	N/A	N/A
Pruning	Public Trees	Trees near power lines are trimmed 10 feet from un-insulated high voltage conductors, and 3 feet from insulated low voltage conductors Pruning is done by contract crews through MEAG	Public Works, Grounds Division responsible for tree pruning in parks	N/A	Grounds Division prunes as needed	N/A
	Private Trees	Trees near power lines are trimmed 10 feet from un-insulated high voltage conductors, and 3 feet from insulated low voltage conductors Pruning is done by contract crews through MEAG	N/A	<i>Landscaping Ordinance</i> requires property owners to maintain new tree		
Removals	Public Trees	N/A	Public Works, Grounds Division, or contractor removes trees in parks	N/A	Consult with a Certified Arborist for tree evaluation prior to removal Citizens informed by personal contact by Public Works Director Contractor removes large trees located	Supervisors make the decisions; removed if in the way, dying, or hazardous with failure potential

Table A1. Existing Tree Management Program Policies, Responsibilities, and Activities

Responsibilities and Activities		Electric System	Parks & Recreation Department	Planning & Development Department	Public Works Department	Water Department
	Private Trees	N/A	N/A	Administers the <i>Landscaping Ordinance</i> and Buffer Standards Ordinance	N/A	N/A
Arborist		One employee In training for Certified Arborist	N/A	N/A	Staff members interested in becoming Certified Arborists	N/A
Partners		N/A	N/A	N/A	Public Works Ground Crew Public Works Solid Waste Crew	City Planner Senior Code Enforcement Officer Developers General Contractors Property Owners
Education	Staff Training	N/A	N/A	Would attend tree care educational programs	Minimal training; GUFCC workshops held but no one sent Would attend tree care educational programs	Used to work in the landscaping business Would attend tree care educational programs
	Public Informatio	N/A	N/A	N/A	Grounds Supervisor provides a limited amount of information to residents	N/A

Table A1. Existing Tree Management Program Policies, Responsibilities, and Activities

Responsibilities and Activities		Electric System	Parks & Recreation Department	Planning & Development Department	Public Works Department	Water Department
Funding		Budget includes cost of pruning trees for utility line clearance	N/A No line item specifically for tree care or removal	Received \$12,500 from a 2007/2008 Urban and Community Forestry Assistance Program grant to complete a City tree inventory and community tree management plan City provided \$10,590 as a cash match for the	\$7,600 budgeted for contract tree removal in FY2006 No line item specifically for tree care or removal	Estimated 80 staff hours per year dedicated to tree management Pruning \$1,000 Mulching \$200

Existing tree care equipment and equipment needs submitted in the survey are summarized in Table A2.

Table A2. Existing Equipment and Equipment Needs

Equipment Description	Electric System	Public Works Department	Water Department
<i>Hand pruners (bypass)</i>	0	5	0
<i>Loppers</i>	0	4	1
<i>Pruning saws, hand</i>	0	1	0
<i>Chainsaws</i>	2	6	3
<i>Bucket truck</i>	1	1 – 55 foot reach	0
<i>Brush chipper</i>	1	0	0
<i>Water tank</i>	0	2	0
<i>Watering tubes</i>	0	0	0
<i>Air Spade or Air Knife</i>	0	0	0
<i>Chipper dump truck</i>	0	0	0
<i>Equipment Needed</i>	None	Replacement 55 foot reach bucket truck Chipper	None

APPENDIX B: REVIEW OF EXISTING LANDSCAPING ORDINANCE

The consultant reviewed the city's existing *Landscaping Ordinance* (ARTICLE IV. MINIMUM LANDSCAPING REQUIREMENTS) adopted December 22, 1995 as part of the inventory of existing resources. The ordinance is compact, clearly and concisely written, and contains enough flexibility for the city to administer the ordinance in a practical but consistent manner. Several suggestions came to mind during the review that the city may want to consider to increase the success of the ordinance in maintaining a health and diverse tree canopy cover. These recommendations include:

- Add definitions for critical root zone, tree conservation, tree preservation, and tree protection zone, and
- Emphasize the elevated contribution trees make in providing environmental, social, and economic function and benefits, as compared to turf, groundcover, and shrubs; one way this can be accomplished is to change the ordinance title to “Tree and *Landscaping Ordinance*”
- Require large canopy trees wherever growing space allows
- Revise tree species list to include a greater variety of native and non-native trees
- Include utility locations on the sample site plan included at the end of the ordinance

A public tree ordinance is recommended in the city's *Community Forest Master Plan*. Also recommended is combining these landscape requirements with the public tree ordinance to create one comprehensive city tree ordinance.

A section-by-section analysis of the existing *Landscaping Ordinance*, with detailed recommendations, follows.

Sec. 17-61. Application

The regulations apply to all property, which includes that which is publicly owned as well as privately owned, and it applies to all trees growing on these properties. No changes are recommended.

Section 17-62. Definitions

The definitions are concisely and clearly written. The definition of a tree is consistent with the variety of tree definitions found in tree ordinances throughout Georgia. The consultant recommends increasing the minimum single trunk diameter size of a plant to be considered a tree to 3 inches, and keeping the minimum mature height at 15 feet.

There is no definition describing a tree's critical root zone or tree protection zone. Tree protection requirements should state that tree roots in the critical root zone and the entire tree including the critical root zone, or collectively called the tree protection zone, must be protected from damage, with the types of damage spelled out.

Sec. 17-62. Purpose

The ordinance includes trees as landscaping material and in this section trees, and their benefits, are not highlighted. Because of their size and longevity trees provide the majority of the benefits outlined and their management needs are significantly greater than that of groundcovers and shrubs. Therefore, the consultant recommends that the protection of existing trees and the planting of trees for the benefit of the community have a stronger focus in this ordinance.

Section 17-64. Exemptions

While single-family residential development are exempt in this ordinance, the consultant spoke with several residents during the inventory that recommended that the removal of trees on existing single-family residential properties be regulated to reduce tree canopy cover loss in residential neighborhoods.

The exemptions included in the ordinance are consistent with those found in many of Georgia's tree ordinances.

Sec. 17-65. Landscaped area general requirements.

The amount of landscaped area required is small, only 12 percent of the available area (total area minus the building, parking, and other impervious surfaces).

It is recommended that only good quality organic mulch be allowed beneath the dripline of a tree conserved or planted to satisfy the ordinance requirements.

Sec. 17-66. Landscaping requirements for parking lots and vehicular use areas.

The ordinance does not require a specific mature height¹⁵ of tree to be planted satisfy the requirement of one (1) tree for every 12 parking spaces. The tree only has to be 8 feet in height at time of planting. The result of this omission could be a lack of significant shade on the site if all small maturing trees are planted. The planting island size of 160 square feet is not large enough to support more than one (1) small maturing tree. However, an island 320 square feet in size is large enough to support one (1) medium or one (1) large maturing tree. The use of structural soils or permeable pavement support systems beneath the pavement is recommended to increase the available rooting space for trees, and their health and longevity.

The same omissions of a requirement for mature tree height appear in the requirements for trees in the planted landscape strips parallel to the rights-of-way (10 feet wide) and abutting adjoining property (5 feet wide). The consultant suggests that at least medium trees be required in the 10 foot strips if growing pace permits. If medium trees are planted, the density requirement could be decreased to every 35 feet. If large trees are planted, the density requirement could be decreased to every 40 feet. These decreased density requirements provide some incentive to plant larger trees.

The density requirement for the 5-foot wide tree planting strips is one (1) tree for every 75 feet. The tree height required in these strips would depend on the character of the strip; that is, the amount of pervious surface area available or the extent of impervious surface surrounding the landscape strip. Most importantly, tree size should be matched to the available growing space below and above ground, and if adequate space is available for large maturing trees, then they should be planted before medium or small trees are planted.

The most important factor to consider in making the decision on which size trees to plant in both these strips is the amount of growing space available overhead and to all sides for the trunk and crown and underground for root growth. Site design should take into account the growing space needs of trees, and design infrastructure to create adequate space. If there are overhead utility lines in no case should trees greater than 25 feet in mature height be planted. To avoid tree and utility line conflicts, dedicated areas for utilities and for trees should be prescribed.

¹⁵ Small tree = maximum mature height of 25 feet; medium tree = minimum mature height of 25 feet and maximum mature height of 50 feet; large tree = minimum mature height of 50 feet. Please see the list of *Species Suitable for Planting in Cartersville, Georgia* included in Appendix B for mature height class information for recommended tree species.

The ordinance contains no requirements for species diversity. Many ordinances limit the amount of a single species, and sometimes a single genus, to a maximum percent, often 30 or 33 percent. Species diversity is important to ensure long-term tree canopy health and to maintain tree cover.

Sec. 17-67. Planting, maintenance and removal.

(a) Installation.

The International Society of Arboriculture is another good reference on proper tree installation and care during establishment and could be cited in addition to the Georgia Forestry Commission. The reference to the Commission and Extension Service should be corrected to read "Georgia Forestry Commission" and "Georgia Cooperative Extension Service."

The installation of trees (and landscaping materials) should be monitored and inspected in the field by the code enforcement officer or city planner since much of the evidence of poor planting can be "buried". Basically the complete removal of all straps and twine from the root ball should be required, along with the removal of burlap and wire baskets to the greatest extent and as far down into the planting hole as possible. All tree wrap, flagging, twine, bamboo stakes, grafting tape and tags and other potentially harmful materials should be removed from the planting hole, root ball, and tree.

(b) Maintenance.

A couple of statements describing the specific tree conditions that would require replacement in order to satisfy the requirement of maintaining the landscape in such a way that it is "at least equal to the original installation" would provide all parties involved in ordinance compliance with clearer standards. Trees with less than 50% of their original crown present and thriving, trees with greater than 50% of the circumference of the bark removed anywhere along the trunk, trees that are in conflict with surrounding infrastructure, or trees with a high risk of failure should be removed and replaced.

(c) Removal and protection.

While there are restrictions on tree removal prior to development, there are no restrictions on tree removal *for* development. This section could be strengthened to require that 12% of the total area be landscaped with *existing* trees and vegetation, and then additional landscaping should be required in parking lots and vehicular use areas. If existing trees are not used to satisfy the 12% requirement, the city should request that reasons be submitted in writing for

why existing trees and landscaping cannot be retained. The city could list in the ordinance the conditions for approval of the removal of existing trees, and reasons why approval would be denied for the removal of existing trees.

Regarding tree protection, subsection (c)(3)b, the restriction on paving or grading should be extended from 15 feet to within the CRZ.

Sec. 17-68. Submission of site plans.

The term “buildable area” is used but not defined in the definitions sections at the beginning of the ordinance. The term “yard area” is used here, but is not used anywhere else. Does this refer to the landscaped area? If so, the term “landscaped area” should be used instead.

In subsection (5), instead of the “maintained”, the word “conserved” should be used. Along with the location of all trees, the circular outline of the CRZ for any tree planted or conserved should be added.

Sec. 17-69. Enforcement, violations and penalties.

In the penalty section, clarify if each tree constitutes a separate violation.

Sec. 17-70. Appeal.

No changes recommended.

Sec. 17-71. Small trees.

The chart of small trees is an excellent resource for those implementing the *Landscaping Ordinance*. The chart contains important and useful information on tree characteristics and is well-organized.

Cassine holly and redbay, however, are better planted farther south and should be deleted from the list. The following additions should be made:

- Red buckeye (*Aesculus pavia*), native, limited use
- Redbud, Chinese Avondale (*Cercis chinensis* ‘Avondale’), non-native
- Redbud, Oklahoma (*Cercis reniformis* ‘Oklahoma’), non-native, urban tolerant
- Redbud, Forest Pansy (*Cercis canadensis* ‘Forest Pansy’), native cultivar

- Dogwood, Kousa (*Cornus kousa*), non-native, urban tolerant
- Witchhazel (*Hamamelis virginiana*), native
- Holly, Foster (*Ilex x attenuata* 'Fosters'), hybrid, urban tolerant
- Plum, Purpleleaf (*Prunus cerasifera*), non-native, limited use

Sec. 17-72. Large trees.

The chart of large trees is again an excellent resource for those implementing the *Landscaping Ordinance*. The city should consider combining both the small and large tree charts into one list that would then become the City of Cartersville's official "Tree Species List". This one list would then be used for planting trees on private property to satisfy the *Landscaping Ordinance* and as the city's official list for planting on public property as well. The small and large tree sections of the ordinance could be combined into a single section, "Sec. 17-71. Tree Species List.". The list should be revised as necessary to incorporate local experience, long-term results, and city preferences.

Alphabetize the list by genus common name, i.e., oak, maple, and then by species, i.e. oak, water, oak, white, oak willow, or maple, red, then maple, sugar, etc., for ease of use. Latin names should be included to positively identify the species since common names vary from region to region and user to user.

Many of the large trees listed on the large trees chart are really medium trees and they should be designated as such in the list, in a separate field. The tree species list should include the following additional fields—

- Tree height (small, medium, and large)
- Planting preference (A for preferred tree species, B for good quality tree species, C for species recommended for only limited use; and, if desired, D for trees not recommended for planting in Cartersville)
- Urban tolerant (yes, no)

Additional species notes can be added to the existing "Remarks" column. Additional notes would include reasons why a species is preferred, or why planting should be limited, or sites for which a tree is best suited.

The following tree species that are included in the large tree chart should be removed:

- Live oak (native to Georgia, but out of range, better choices available)
- Redcedar, Eastern (host to cedar apple rust; very slow growing)
- Hemlock, Canada or Carolina (extremely susceptible to hemlock woolly adelgid)
- Maple, silver (poor quality wood; susceptible to numerous insects and diseases)
- Cypress, Leyland (short-lived; susceptible to various canker diseases)

Add the following medium tree species. Those listed as native are native to Georgia, not necessarily to Cartersville.

- Maple, Trident (*Acer buergeranum*), non-native, preferred, urban tolerant
- Maple, Chalk (*Acer leucoderme*), native
- Hornbeam, American (*Carpinus caroliniana*), native
- Catalpa (*Catalpa bignonioides*), native, limited
- Yellowwood (*Cladrastis kentukea*), native
- Persimmon (*Diospyros virginiana*), native, male preferred
- Holly, Savannah (*Ilex x attenuata* 'Savannah'), hybrid
- Goldenraintree (*Koelreuteria paniculata*), non-native, preferred, urban tolerant
- Magnolia, Southern Little Gem (*Magnolia grandiflora* 'Little Gem'), native cultivar
- Hophornbeam, American (*Ostrya virginiana*), native, preferred
- Oak, Georgia (*Quercus georgiana*), native
- Sassafras (*Sassafras albidum*), native, limited
- Elm, Chinese (*Ulmus parvifolia*), non-native, preferred, urban tolerant

And, add the following large tree species to the list:

- Ash, Green (*Fraxinus pennsylvanica*), native, limited
- Ginkgo (*Ginkgo biloba*), non-native

- Sweetgum, Fruitless (*Liquidambar styraciflua* ‘Rotundiloba’), native cultivar
- Redwood, Dawn (*Metasequoia glyptostroboides*), non-native, urban tolerant
- Oak, Nuttall (*Quercus nuttallii*), native, preferred
- Oak, Overcup (*Quercus lyrata*), native, preferred
- Oak, Northern Red (*Quercus rubra*), native
- Oak, Black (*Quercus velutina*), native
- Baldcypress (*Taxodium distichum*), native, urban tolerant
- Elm, Winged (*Ulmus alata*), native, preferred
- Zelkova, Japanese (*Zelkova serrata*), non-native, urban tolerant

These additions provide more choices for landscape designers and their use will increase the diversity of trees planted to satisfy the landscape regulations.

Supplement: TREES THAT ARE URBAN HARDY AND HAVE FLOURISHED IN ATLANTA

This supplement should be removed and the species and cultivar information added to the tree species list. These species and cultivars could be given a higher planting preference if so desired as described previously.

Supplement: TREES...Their Symbolic Forms

This is an excellent graphic representation of tree form and should be kept with the ordinance. It should be noted somewhere in the *Landscaping Ordinance* that small trees with spreading crowns should be avoided in narrow, frontage landscape strips to avoid conflicts with pedestrian and traffic clearance.

Supplement: SAMPLE SITE PLAN (FOR ILLUSTRATION PURPOSES ONLY)

The sample site plan is an excellent and useful addition to the *Landscaping Ordinance*. It presents a lot of information on a single page. It readily illustrates the intent of the ordinance—to locate trees throughout the site.

The sample site plan also illustrates the need to require larger growing spaces for trees. The 5 foot wide landscape strip forces the planting of only small trees if the strip abuts impervious surfaces. If it abuts permeable areas, then larger trees can theoretically be planted.

The 10 foot wide landscape strip in the front is wide enough for large trees if there are no overhead utility lines. In most instances, however, this is where the overhead utility lines will be placed, so only small trees can be planted in these locations, too. The locations of all utilities should be illustrated on the sample site plan, and required on the applicant's site plan, as a reminder to consider and plan around utility locations.

And, only small trees should be planted in the small tree planting islands in the single parking rows where there is only 160 square feet of open soil surface area. The only places for large trees, then, are in the double planter islands; large trees should be required here.

The reasons for requiring trees on a site and in parking lots is to provide shade, reduce temperatures, reduce stormwater runoff, and reduce air and water pollution. These goals will be realized most effectively with trees with large canopies. However, without adequate growing space for medium and large trees, small trees are the only choice. Much of this dilemma may currently be resolved as planners discuss the intent of the *Landscaping Ordinance* with applicants and negotiate for larger trees wherever spaces exist.

APPENDIX C: TREE MANAGEMENT ISSUES AND GOALS

The issues and goals listed in the Table C1 result from the input, data, and research gathered during the master plan development process.

Table C1. Community Tree Management Issues and Goals

ISSUE/GOAL	INPUT/DATA/RESEARCH
<p>ISSUE: Insufficient knowledge of character and extent of tree canopy cover and the maintenance needs of city trees; no documentation of special trees (memorial trees and honorary, trees planted for Arbor Day)</p> <p>GOAL: <i>Maintain up-to-date information on the character, extent, and maintenance needs of city trees.</i></p>	<p>An inventory of city trees on street rights-of-way, in the DBD, in parks, in the cemetery, and around city offices and facilities has been completed and summarized</p> <p>Tree canopy cover study is underway</p>
<p>ISSUE: Insufficient funding for tree management; no budget for new tree planting; no tree department or division line item for trees.</p> <p>GOAL: <i>Develop a sustainable annual budget and funding sources that allow basic operations to be completed in addition to regular program improvements.</i></p>	<p>Surveys, Strategic Planning Meeting, Tree Inventory</p>
<p>ISSUE: No designated tree care manager</p> <p>GOAL: <i>Designate an existing staff member in the Public Works Department as the city arborist responsible for coordinating community forest management activities; require ISA Certified</i></p>	<p>Strategic Planning Meeting</p>

Table C1. Community Tree Management Issues and Goals

ISSUE/GOAL	INPUT/DATA/RESEARCH
<i>Arborist credentials within six (6) months of designation.</i>	
<p>ISSUE: Infrastructure conflicts exist between trees and utilities, and trees and pavement; lack of dedicated tree planting locations along streets; conflict between trees and utilities in new developments</p> <p>GOAL: <i>Explore street tree placement options and gain a consensus among city departments on the preferred locations for trees along city streets.</i></p>	Survey, Strategic Planning Meeting, Tree Inventory
<p>ISSUE: Trees along streets and in parks need to be protected; citizens need to know what type of landscape and tree care activities are allowed and discouraged; citizens need tree care education.</p> <p>ISSUE: Lack of tree care educational opportunities for staff or support for sending staff to tree care workshops</p> <p>ISSUE: Very few tree services in the area have an ISA Certified Arborist on staff</p> <p>GOAL: <i>Provide, promote, and support continuing tree care educational opportunities for staff, landscape and building contractors, tree service owners and employees, business owners, and citizens</i></p>	Strategic Planning Meeting, Tree Inventory
Become a Tree City under the National Arbor Day	Strategic Planning Meeting

Table C1. Community Tree Management Issues and Goals

ISSUE/GOAL	INPUT/DATA/RESEARCH
<p>Foundations Tree City USA program</p> <p><i>GOAL: Become certified in February 2010 as a Tree City for calendar year 2009 and recertify annually.</i></p>	
<p>ISSUE: Some tree maintenance is not being done according to arboricultural standards; no standards exist for tree care practices</p> <p><i>GOAL: Adopt arboricultural standards for tree care practices and maintain all city trees according to standards; require compliance with standards for trees planted to meet the requirements of the Landscaping Ordinance</i></p>	<p>Tree Inventory, <i>Landscaping Ordinance</i> Evaluation</p>
<p>ISSUE: Tree maintenance is only being done as needs arise; no routine tree maintenance, other than mulching, is currently being done.</p> <p><i>GOAL: Implement programs for routine tree maintenance including mulching, irrigation, fertilization, and pruning, and for non-routine maintenance such as soil aeration, cabling and bracing, and the installation of lightning protection systems.</i></p>	<p>Strategic Planning Meeting, Tree Inventory, Staff Input</p>
<p>ISSUE: Want corridors of trees coming into town; DOT requirements restrict tree planting on State rights-of-way</p> <p><i>GOAL: Implement an annual tree planting program to increase species and age diversity; replace all</i></p>	<p>Strategic Planning Meeting, Tree Inventory, Staff Input</p>

Table C1. Community Tree Management Issues and Goals

ISSUE/GOAL	INPUT/DATA/RESEARCH
<i>trees removed with at least two (2) new trees in the general area; of the removal; establish an Adopt-A-Tree program to involve community partners and citizens in tree planting efforts</i>	
<p>ISSUE: Mulch available from the city is of poor quality</p> <p>GOAL: <i>Stockpile wood chips and other non-contaminated organic materials to produce high-quality mulch for use on city properties</i></p>	Strategic Planning Meeting
<p>ISSUE: No city tree ordinance exists; trees are only regulated in new developments on private property; no official protection of or standards for city trees exist</p> <p>GOAL: <i>Adopt and implement a comprehensive tree ordinance by December 2009.</i></p>	Strategic Planning Meeting, <i>Landscaping Ordinance Review</i> , Staff Input

APPENDIX D: SEASONAL TREE MANAGEMENT ACTIVITY CALENDAR

Table D1. Seasonal Tree Management Activity Calendar

MONTH	ACTIVITIES
WINTER MONTHS December through February	<ul style="list-style-type: none"> • Tree removal • Tree planting • Small tree pruning • Large tree pruning • Tree mulching (late winter) • Tree inspections • Arbor Day program • Attend quarterly GUFCA meeting and educational program
SPRING MONTHS March through May	<ul style="list-style-type: none"> • Tree mulching (early spring) • Tree irrigation (newly planted trees) • Tree inspections • Tree educational programs • Submit application for Urban and Community Forestry Assistance Program Grant • Attend quarterly GUFCA meeting and educational program • Attend Southern Chapter ISA Annual Conference and Trade Show
SUMMER MONTHS June through August	<ul style="list-style-type: none"> • Tree inventory • Small tree pruning • Large tree pruning • Tree inspections • Complete previous year's grant project • Notification of approval or denial of new U&CF grant application • Attend quarterly GUFCA meeting and educational program
FALL MONTHS September through November	<ul style="list-style-type: none"> • Begin new grant project • Tree planting site selection • Tree species selection • Tree selection and purchase • Utility location at tree planting sites • Georgia Urban Forest Council Annual Conference and Awards Luncheon • Attend quarterly GUFCA meeting and educational program
AS NECESSARY	<ul style="list-style-type: none"> • Emergency tree pruning • Emergency tree removal • Tree inspections
ANNUALLY	<ul style="list-style-type: none"> • Review and revise <i>Community Forest Master Plan</i> • Review and revise city tree ordinance • Review and revise city tree species list