
Tree Inventory Report and Management Plan



Franklin, Michigan



TABLE OF CONTENTS

Urban Forestry Sample Report

Executive Summary.....	1
Methodology.....	2
Results.....	5
Size Classes.....	8
Genus and Species Distribution.....	10

Urban Forestry Management Plan

Urban Forestry Mission.....	12
Urban Forestry Goals.....	13
Goal 1: Maintain Safety in the Urban Forest.....	15
Goal 2: Maintain the Health of the Urban Forest.....	19
Goal 3: Perpetuate the Urban Forest.....	22
Goal 4: Establish Good Public Relations.....	27
Public Assistance Planting Programs.....	29
Public Advocacy.....	30
Resource Requirements.....	30

Tables and Figures

Figure 1: Condition ratings by percent.....	5
Figure 2: Maintenance needs by percent.....	7
Figure 3: DBH class totals.....	9
Figure 4: Genus distribution by percent.....	10
Figure 5: Species distribution by common name.....	11
Figure 6: Tasks necessary to address safety maintenance needs.....	16
Figure 7: Benefits of a routine pruning program.....	20
Figure 8: Benefits of mulching the root zone of trees.....	25
Table 1: Tree condition ratings.....	5
Table 2: Maintenance needs.....	6
Table 3: Size classes.....	8
Table 4: Budget Detail.....	31
Projected tree removal costs based on the 2005 sample inventory	
Table 5: Budget Detail.....	32
Projected priority pruning costs based on the 2005 sample inventory	
Table 6: Budget Projections.....	33
Projections for removing hazardous and potentially hazardous conditions for all inventoried street trees based on 2005 sample inventory results	

Appendices

Appendix A: Inventory by species.....A-1

Appendix B: Inventory by species and address.....B-1

Appendix C: Priority one removal (Removal 1).....C-1

Appendix D: Priority one prune (Prune 1).....D-1

Appendix E: Priority two prune (Prune 2)E-1

Appendix F: Low priority removals (Removal 2) F-1

Appendix G: Bureau of Plant Industry information.....G-1



EXECUTIVE SUMMARY

The urban forest represents a considerable historical, economic, and environmental asset to Franklin. Results of the sample inventory conducted by ACRT inc. will allow the Village to assess the condition of its public trees. This report will assist the Village in exploring avenues to preserve this resource while continuing to maintain public safety.

In the 2005 sample survey, a total of 806 trees were evaluated. Of these, 149 trees were inventoried within the Historic District, 186 trees were inventoried within the Cemetery, and 471 were inventoried within the public right-of-way.

Current Resource Conditions (2005)

- Projections from the sample inventory indicate that an estimated 2,355 trees are present along public streets in Franklin.
- 16.1% of the village tree population is in the genus *Ulmus* (elm) and 16.0% of the population is in the genus *Pinus* (pine). *Ulmus americana* (American elm), *Ulmus pumila* (siberian elm) and *Quercus rubra* (red oak) were the most common tree species. A total of 27 different tree species were identified within the Historic District, the Cemetery, and along the streets of Franklin.
- 54.5% of the village trees were equal to or less than 12 inches DBH and 45.5% were greater than or equal to 13 inches DBH. These figures and field observations indicate that the immature tree population is gradually becoming mature.
- Of the trees sampled, 10.4 % were in poor or worse condition and 89.6 % were in fair or better condition.
- Because of their age, size and good condition many trees in the village of Franklin were identified as having low priority maintenance requirements. Although, some high priority maintenance needs were identified as follows: 8.1 percent (65 trees) require priority one removal, 2.4 percent (19 trees) as priority two removal, and 6.0 percent (48 trees) as priority one prune. Lower priority maintenance needs were identified on the remainder of the sampled trees.

METHODOLOGY

ACRT conducted a random sample inventory of trees species with the potential of growing twenty feet or higher within the public right-of-way. Within this species constrictor, only trees in public right-of-way greater than four inches in diameter were inventoried. Five street miles were surveyed at eleven designated street sites. The streets selected by the Village of Franklin for the inventory are as follows: Apple Tree Lane, Scenic Drive, Franklin Road, Rosemond Drive, Oakleaf Lane, Franklin Park Drive, River Drive, Helmandale Drive, North Cromwell Drive, South Cromwell Drive, and Cromwell Drive. Whole blocksides were inventoried on both sides of the street in every case. Additionally, 10 acres of parkland were inventoried within designated areas of the historic district and local cemetery. All trees within the parkland regions were inventoried regardless of size.

Data was collected on every tree that met the size criteria and was growing within the village right-of-way or within ten feet from edge of street. Legal right-of-ways were obtained from Village Hall in Franklin, prior to the data collection. Each right-of-way was then measured in the field for an accurate means to identify the trees growing on village owned property. If any portion of the main trunk of a tree was within the right-of-way or within ten feet from edge of street, the tree was considered to be owned by the Village and therefore inventoried.

Using these specifications for selection, 806 trees were inventoried within the Village of Franklin. Each tree recorded received several observations. These observations include Species Identification, Condition Rating, Diameter at Breast Height (DBH), Utility Presence, Clearance Needs, and Maintenance Requirements.

Tree Identification

Each tree, within the assigned village right-of-way, was identified by genus and species. The computer software recorded each by species code, genus, species, and common name.

Condition Rating

ACRT used criteria adapted from the International Society of Arboriculture's Valuation of Landscape Trees, Shrubs, and Other Plants: A Guide to the Methods and Procedures for Appraising Amenity Plants (8th Edition) as the basis for the field condition rating. At least six different indications of tree condition were examined and rated, including trunk condition, growth rate, structure, insects and diseases, crown development and life expectancy. After the tree was evaluated, it was placed in one of the following condition categories: excellent, very good, good, fair, poor, and dead.

Diameter at Breast Height

The diameter at breast height (DBH) is a standard measurement, used in

forestry practices. This measurement is taken at 4.5 feet above ground level on the uphill side of the trunk. The diameter at breast height is used to categorize trees into a size class.

Utility Presence

This observation was recorded to locate utility wires which pose a potential danger. A distinction was made between high voltage and low voltage overhead wires. High voltage wires consist of the overhead wires that transport large voltages of electricity. Low voltage wires consist of communication wires and house drops off of the high voltage wires. These observations were recorded if one or both types of wires were present on the same side of the right-of-way as a tree that was being recorded.

Clearance Needs

This category includes trees requiring pruning to clear areas that have become obstructed to pedestrian or vehicular traffic. Sign Clearance includes all street trees obstructing traffic control signs or stop signs. Clearance includes all street trees not cleared to a height of 13 feet over streets and 8 feet over sidewalks.

Maintenance Requirements

Maintenance needs for each tree were determined to provide a basis to accurately budget for future maintenance activities. Judgments for maintenance requirements were made from the ground. Definitions of the maintenance categories used are given below.

- a. **Priority One Tree Removal:** Trees designated for removal has structural defects that cannot be cost effectively or practically treated. The majority of the trees in this category has a large percentage of dead crown, significant decay or other structural problems, and are potential safety hazards. Large dead and dying trees that are high liability risks are included in this category. These trees are the first ones that should be removed.
- b. **Priority Two Tree Removal:** Trees that should be removed but do not pose a liability as great as the first priority were identified in this category.
- c. **Priority One Prune:** Trees that require priority one pruning are recommended for trimming to remove hazardous deadwood, hangers or broken branches. These trees have broken or hanging limbs, hazardous deadwood and dead, dying, or diseased limbs or leaders greater than four inches in diameter.
- d. **Priority Two Prune:** These trees have dead, dying, diseased or weakened branches between two and four inches in diameter and are

potential safety hazards.

- e. **Large Tree Routine Prune:** These trees require routine horticultural pruning to correct structural problems or growth patterns that would eventually obstruct traffic or interfere with utility wires or buildings. Trees in this category are large enough to require bucket truck access or manual climbing.
- f. **Small Tree Routine Prune:** These trees require routine horticultural pruning to correct structural problems or growth patterns that would eventually obstruct traffic or interfere with utility wires or buildings. These trees are small growing, mature trees that can be evaluated and pruned from the ground

Results

A. Condition

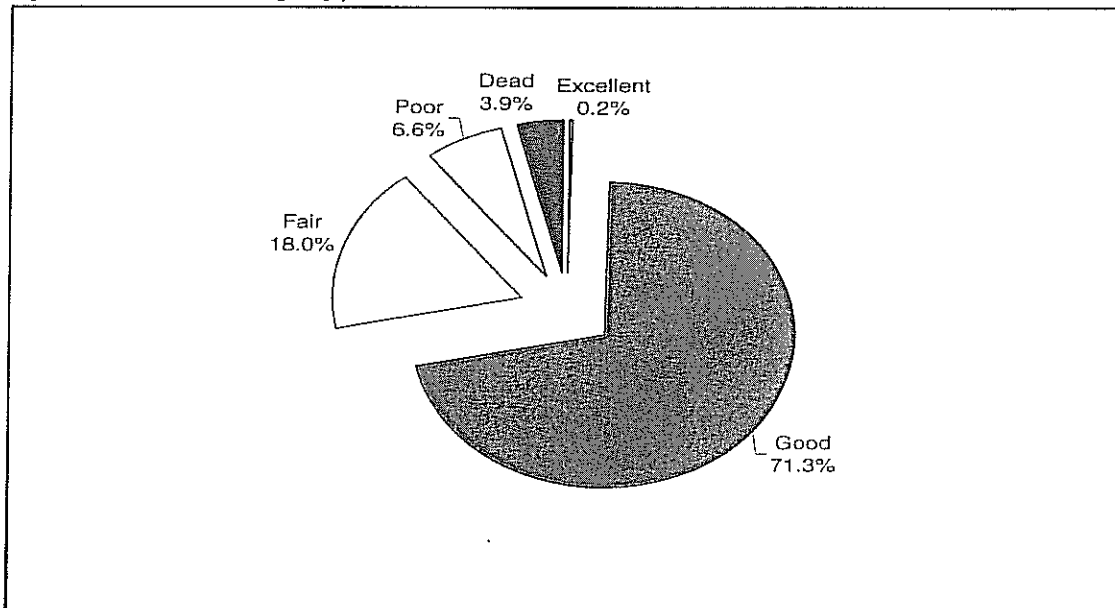
Of the 806 trees inventoried 2 are in excellent condition, 575 are in good condition, 145 are in fair condition, 53 are in poor condition, and 31 are dead.

Condition ratings of actual trees inventoried and corresponding percentages are found below in Table 1. Percentages of actual totals are also found below in Figure 1.

Table 1. Tree condition ratings

Condition	Inventoried	Percentage
Excellent	2	0.2%
Good	575	71.3%
Fair	145	18.0%
Poor	53	6.6%
Dead	31	3.9%

Figure 1. Condition ratings by percent



The trees in Franklin show a high percentage of trees in good condition. This is the result of a gradually maturing, well maintained population and lack of urban obstructions such as sidewalks, driveways, compacted soils, and building foundations. Furthermore, most trees found in good condition were located a suitable distance from the street edge and utilities.

Many scotch pines (*Pinus sylvestris*) were found in poor condition within the Village of Franklin. The pines found in poor condition have evidence of an infestation from a boring insect. The Zimmerman pine moth (*Dioryctria zimmermani*) is considered to be a primary pest of pines in the Midwest and scotch pines are preferred hosts. Damage to the trees such as bore holes, branch dieback, and pitch mass found on the trunk were some indicators of infestation. It is recommended that the Village of Franklin contact the local county university, Michigan State University department of entomology at 517-355-4663, or experts that may aid in the proper identification of the pest.

B. Maintenance

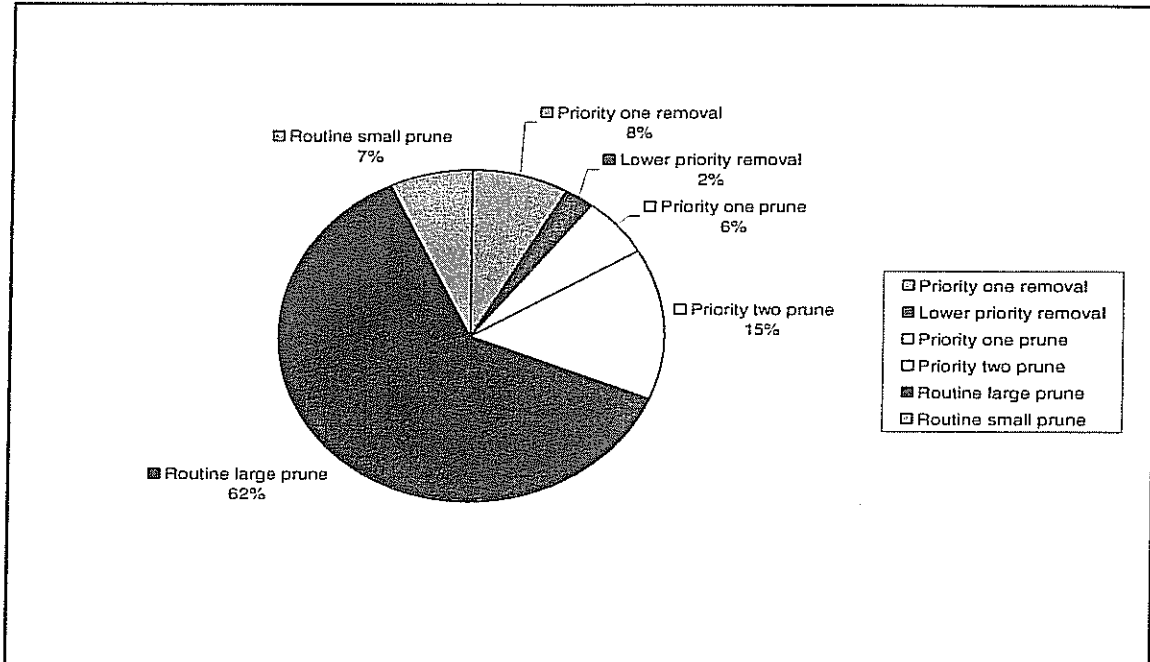
Of the 806 trees inventoried 65 trees require priority one removal, 19 trees require lower priority removals, 166 trees require priority pruning, 556 trees listed as needing routine pruning.

Maintenance needs of actual village trees inventoried and corresponding percentages are found below in Table 2. Percentages of actual totals are also found below in Figure 2.

Table 2. Maintenance needs

Maintenance	Inventoried	Percentage
Priority one removal	65	%8.1
Lower priority removal	19	%2.4
Priority one prune	48	%6.0
Priority two prune	118	%14.6
Routine large prune	500	%62.0
Routine small prune	56	%6.9

Figure 2. Maintenance needs by percent



The City of Franklin has a moderately high number of priority removals. The maintenance need of priority removal may be assigned for a number of reasons. These can include, but are not limited to:

- High percentage of deadwood in crown
- High percentage of exposed roots
- Structural faults in main stem
- Tree has exceeded grow space
- Damage causing excessive exposed wood
- Uncorrectable structural defects in main scaffold branches

Maintenance needs will be discussed in more detail and prioritized in the management plan section of this document.

Size Classes

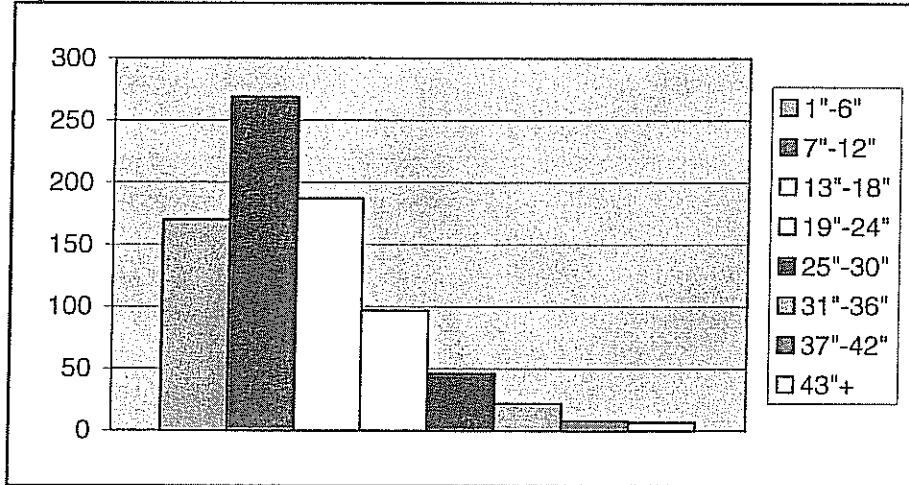
Trees are commonly broken up into size classes. Each size class is made up of a six inch diameter category. All trees greater than 4 inches in the village right-of-way were inventoried at the Village request with the exception of recently planted trees. As a result analysis of size class and population maturity is limited.

Size classes of actual trees inventoried and corresponding percentages are found below in Table 3. Percentages of actual totals are also found below in Figure 3.

Table 3. Size classes

DBH	Inventoried	Percentage
1"-6"	170	%21.1
7"-12"	269	%33.4
13"-18"	187	%23.2
19"-24"	97	%12.0
25"-30"	46	%5.7
31"-36"	22	%2.7
37"-42"	8	%1.0
43"+	7	%0.9

Figure 3. DBH class totals.



DBH Classes as represented above suggest that the Franklin has an immature but gradually maturing tree population. Any new tree planting should be considered low priority in the Village management program.

Stocking levels, recommended species and specifications will be discussed in more detail in the management plan portion of this document.

Genus and species distribution

Genus

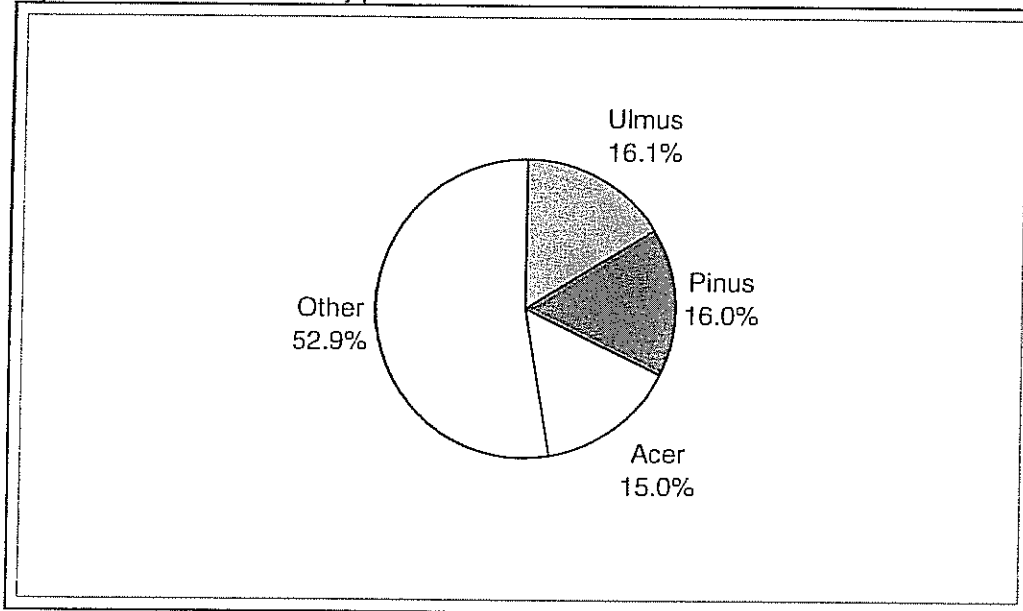
Trees inventoried were all identified as being in one of the 21 genera found in Franklin.

The three most common genera are *Ulmus* (Elms) 16.1%, *Pinus* (Pines) 16.0% and *Acer* (Maples) 15.0%. The remaining 52.9% are distributed throughout 19 other genera, as shown below in Figure 4.

Species

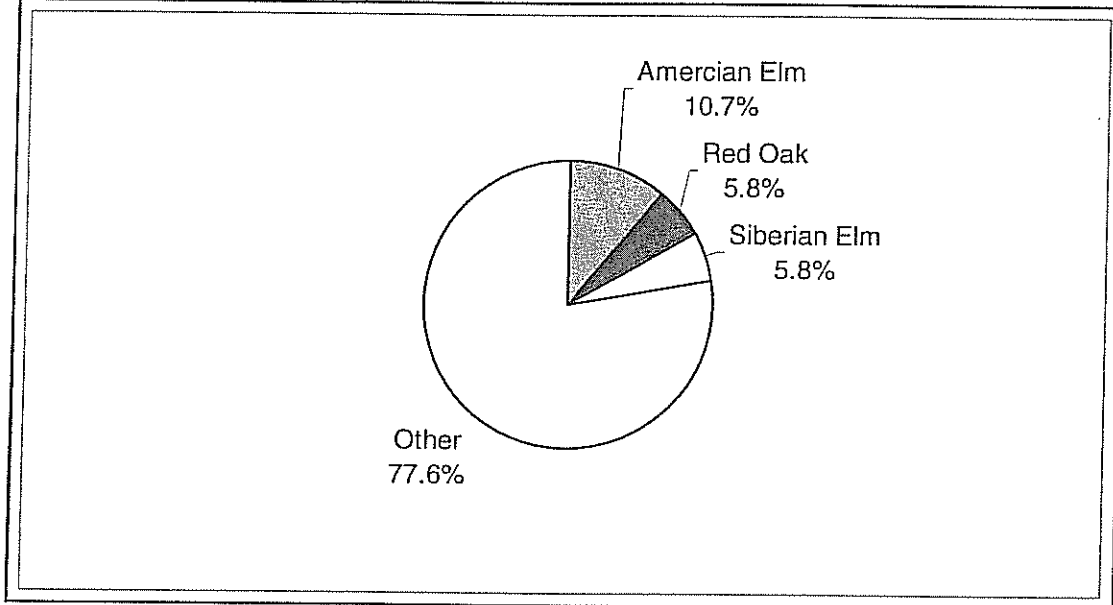
A total of 27 species were identified in the sample inventory. The most common species are (by common name) American Elm 10.7%, Red Oak 5.83% and Siberian Elm 5.58% as shown in Figure 5 below.

Figure 4. Genus distribution by percent



One genus should not make up more than twenty percent of the total population to aid in the control of pests and diseases. All genus specific trees are under the twenty percent population threshold although care should be taken to avoid overstocking of Elms, Pines and Maples in the future.

Figure 5. Species distribution by common name.



One species should not exceed ten percent of any given population to aid in the control of pests and diseases. American Elm should not be planted in great quantity or not at all until diversity improves. The other more common species (Red Oak and Siberian Elm) do not exceed the population threshold therefore future planting of these species is acceptable.

More information regarding diversity and species selection will be outlined in the management plan section of this document.

URBAN FORESTRY MANAGEMENT PLAN

Urban Forestry Mission

A comprehensive tree management program requires a commitment to meet defined goals in order to achieve cost-effective benefits and maximum results. ACRT recommends that Franklin adopt the following mission:

The City of Franklin is committed to:

- provide effective leadership and innovative services that will improve urban forest health, composition, and structure
- manage its municipal forest in a cost-effective manner
- provide residents with new tree plantings and with systematic, quality maintenance for existing trees
- respond to the needs and expectations of the taxpayers
- follow established tree care practices in its urban forestry activities

The benefits of the program for the citizens of Franklin are

- an enhanced quality of life
- increased real estate value
- healthier and more valuable trees
- improved public safety
- a more attractive urban environment
- conservation of energy



Trees in urban areas face a considerable amount of stress, different from trees in the forest. Urban soils are usually compacted and low in nutrients. Water availability is reduced around paved or cemented surface areas. Ambient temperature is increased from the reflection of solar energy by asphalt, concrete and brick surfaces. Air pollution, physical damage on tree trunks, and competition for space within the village infrastructure all make it difficult for trees to survive.

Franklin will achieve the goals defined for its tree management program and will satisfy its responsibility to the taxpayers by implementing the recommendations of the plan of action outlined below.

Urban Forestry Goals

ACRT recommends that Franklin adopt four principal goals for its comprehensive urban forestry program:

Goal 1. Maintain Safety in the Urban Forest

Regular maintenance of the trees in the urban/community forest will protect the safety of the residents, their homes and businesses, and city property. This goal will be accomplished by removing dead and dying trees, pruning trees to provide clearance for traffic control, and pruning or removing public trees that exhibit potential problems.

Goal 2. Maintain the Health of the Urban Forest

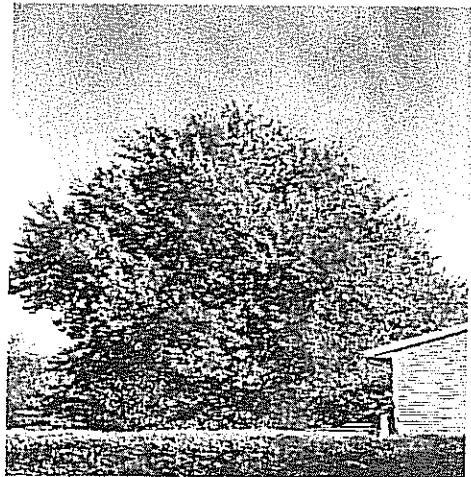
Maintaining the health of all public trees will preserve a substantial urban/community forest for the future. Routine pruning will help to create trees that are structurally sound and to realize the benefits associated with healthy trees. This goal will be accomplished by instituting and adhering to a pruning cycle that will include periodic, routine maintenance on every tree.

Implementation Schedule for Goals One and Two.

The implementation of goals one and two need to be scheduled in a realistic fashion for the community. Implementation goals are described throughout the document, but it is important to note that these schedules are suggestions and a description of a best-case scenario. *Meeting the requirements of any timetable is dependent upon the availability of manpower and funding.* Cost reviews of initiating and sustaining a routine maintenance program are important for clarifying the scope of the work that lies ahead.

Goal 3. Perpetuate the Urban Forest

The urban/community forest is one of the most valuable natural resources in the urban infrastructure. It is also the only component that has the potential to increase in value if it is cared for properly. New and replacement tree planting is required to perpetuate the urban forest.



Goal 4. Establish Good Public Relations

Urban forest management requires the use of policies, ordinances and budgets acceptable to city administration and residents. It also requires professional expertise to manage and protect a dynamic biological population.

Providing services to residents is a major task of municipal government. The urban forestry program will be service-oriented. It will provide public education and assistance to residents and will promote the development of citizen advocacy for urban trees.

Disclaimer: ACRT Inc. performed a sample inventory of approximately twenty percent of the existing tree population. Specific goals in management planning are going to be based on assumptions that the twenty percent sampled is an accurate representation of the overall urban forest. Furthermore, ACRT is unable to create tree/address specific work plans for the entire community. Advanced maintenance planning can only be done with a complete inventory.

Portions of this plan are regarding specific maintenance tasks for the 806 trees evaluated by ACRT staff only. Other portions of the plan are more directed to overall policies and procedures based on projections from the sample.

The city should strongly consider completing the inventory in order to maximize the effectiveness of management planning and most effectively plan and follow through with tree removal and maintenance on a community-wide basis. This can be done using existing staff, qualified seasonal staff, well qualified volunteers or consultants.

If completing the inventory is not possible, a systematic hazard survey should be performed to identify those trees not inventoried that are in need of priority maintenance.

In addition, the reader should also consider budget projections to be approximate. Some budgetary figures may be in reality tens of thousands of dollars above or below the figures provided depending on the actual full inventory statistics.

Goal 1. Maintain Safety in the Urban Forest

During the tree inventory, certain maintenance needs were identified that are required for maintaining public safety in the urban/community forest. These needs include sign clearance, tree removals, and priority pruning.

Results of the 2005 sample inventory indicate that there is a moderate amount of priority work to be completed. In addition, the forest will constantly change, and there will be additional trees to remove in future years. ACRT's experience has shown that the number of removals in a managed urban/ community forest generally varies from 0.5% to 3% *or more* of the population annually.

The first major object of Franklin's management plan should be to complete the removal of all identified potential hazards as soon as possible. The tasks necessary to address priority maintenance needs are listed in Figure 1.

The Village of Franklin should first perform all sign clearance pruning, removals and priority pruning specifically noted in the inventory. After this work is accomplished, the remainder of the tree population should be inventoried and all additional work should be scheduled.

After this is accomplished, the village should conduct a hazard tree survey every year that identifies future removals, hazard pruning, and sign clearance problems, and then should proceed to correct these conditions. This phase is most effective if timed for when the foliage has fallen. As this work is completed, systematic pruning and tree planting programs can be considered.

Figure 6. Tasks necessary to address safety maintenance needs

Task 1.	Sign Clearance Pruning	<ul style="list-style-type: none">• Prune trees that obscure or interfere with signs and other traffic control devices.
Task 2.	Removals	<ul style="list-style-type: none">• Removal trees classified as Removal Priority One• Begin monitoring for developing sign clearance problems.
Task 3.	Prune Priority One	<ul style="list-style-type: none">• Prune trees classified as Prune Priority One• Begin monitoring for developing safety conditions in trees that may require pruning or removal• Continue sign clearance monitoring activities as noted above.
Task 4.	Prune Priority Two	<ul style="list-style-type: none">• Prune trees classified as Prune Priority Two• Continue monitoring activities as noted above.

Task 1. Sign Clearance Pruning

Trees that obstruct traffic control signs (stop signs, yield signs, and stoplights) are the most important safety concerns for the village. Signs that are partially or completely concealed by tree limbs create an increased chance of a vehicular accident and potential municipal liability. The recent sample inventory did not identify any trees that impede sign visibility. The remainder of the village should be inspected and trimmed for clearance when the inventory is completed.

In addition, the village should initiate an annual survey to identify trees that interfere with traffic control devices and signs. Village personnel, including public safety representatives, should conduct this survey by systematically driving streets and identifying problems. This survey should be conducted while the leaves are present on deciduous trees.

Task 2. Removals – Priority One

Removals are the next priority. A total of 84 trees were identified for removal. Removal of these trees will increase both safety and aesthetics in Franklin's urban/community forest. Upon completion of the inventory, the additional trees designated as priority removals should be removed systematically. Projections imply that there are approximately 420 trees (10%) throughout the community that require priority removal.

The average life of an urban tree varies from 7 to 50 years. Species that normally have long life spans, such as maples and oaks, may survive 20 to 30 years less under the stresses of the urban environment. Dead and dying trees occur regularly, and timely maintenance provisions must be in place to identify and remove them.

Trees that require removal can be removed either by city / village personnel or by contractors. Many cities arrange to have small trees removed by city personnel and have the larger, more difficult trees removed by a contractor.

The causes for tree decline and death may be natural or human-induced. Natural (biotic) causes include disease, insects, drought, maturity, and frost. Human-induced causes (abiotic) include physical injury due to vehicles, vandalism, poisoning, soil compaction, and root disturbance. There are three principal advantages to removing unhealthy trees:

- Reduction of potential for injury to people and property
- Elimination of breeding sites for insects and diseases
- Maintenance of the attractive appearance of the urban forest

Many decayed trees appear healthy to the untrained observer. As part of Goal 4: *Establish Good Public Relations*, ACRT recommends that the village educate the public about the reasons for removal, stress that removals are part of a long-term management plan, and assure residents that tree planting is planned to offset the

tree being removed. When work starts on a tree in the front of a resident's house, it should not be a surprise to the owner of the property.

Task 3. Prune Priority One

Pruning for safety is the next task to be started as soon as possible. Trees that require Priority One Pruning have major deadwood, broken branches, structural defects that can be corrected through pruning, or hangers in the crown that are four inches (4") in diameter or greater and could cause bodily injury or property damage.

Pruning of trees identified as Priority One should be started as soon as possible after the removals are completed.

All public trees should be pruned to the ANSI A300 Standard Practices for Trees, Shrubs, and Other Wood Plant Maintenance available through the National Arborist Association, International Society of Arboriculture or ACRT. When a tree is trimmed, the entire tree should be trimmed to minimum specifications. If trees are pruned according to specifications and in a timely manner, the village will realize major benefits: These include improved condition of all trees, greater longevity of already mature trees, and an increase in both property values and appraised dollar values of trees.

Pruning of the 48 street trees identified as Priority One should be started as soon as possible after the removals are completed. The village may need to do contract pruning of most large trees during this phase of the work, because specialized equipment and skills will be required. Again, the village should realize that the inventory indicates that there is a total of 240 trees throughout the community that require Priority One pruning. These trees should be identified as the inventory is completed or as the hazard tree survey is performed.

Task 4. Prune Priority Two

The category of Priority Two continues the task of pruning for safety. Trees designated as Priority Two present potential safety issues because they have dead, dying, diseased or weakened branches that measure between two and four inches (2" – 4") in diameter. The sample inventory identified 118 trees as requiring Priority Two pruning. Projections indicate that 590 trees throughout the community require this type of maintenance.

Goal 2. Maintain the Health of the Urban Forest

Advantages of Routine Pruning

The need to maintain urban trees continues to increase as the rest of the infrastructure develops and negative environmental impacts increase. Systematic tree care maintenance includes routine pruning schedules and as-needed insect and disease management. These activities will create stronger, safer tree structures, reduce future expenditures for correction or removal of hazardous branches or trees, and help ensure the health and longevity of the urban forest.

Most trees that require street or sidewalk clearance trimming should be taken care of during routine pruning operations. (There may be exceptions where branches in the vehicle zone are large enough to warrant attention on a priority basis.) Routine maintenance also helps alleviate the stress effects that reduce the life spans of urban trees. Improved tree vigor will benefit the village by extending the duration of environmental benefits produced by trees (**Figure 7**) and by increasing the value of the entire urban forest resource.

Establishing Pruning Cycles

The trees in the Village of Franklin should be placed on a periodic pruning schedule in order to realize the benefits of routine pruning. These benefits are listed and explained in **Figure 7**.

Each tree should be pruned according to an organized cycle. The length of the pruning cycle may vary based on factors that include tree age, species, and village budget restrictions. ACRT's experience has been that a pruning cycle of more than eight years is ineffective in any situation. During the first cycle, the village should perform Priority Two removals.

ACRT recommends a five-year cycle for the Village of Franklin's management plan. Budget restrictions may require the village to use an alternative pruning cycle. Whatever the length of the cycle, ACRT recommends that immature trees be pruned twice as frequently as mature trees. For example, a four-year cycle of pruning young trees would lead to an eight-year cycle of pruning the remainder of the trees.

All trees should be pruned to specifications. If no work is required to meet the specifications, no resources should be expended. In other words, a tree classified as a routine prune does not automatically need maintenance. ANSI A300 standards for young tree pruning should be followed for small trees in the "Train" maintenance category. Large trees should be pruned according to either Hazard Reduction Pruning or Maintenance Pruning, depending on the overall condition and life expectancy of the tree.

Figure 7. Benefits of a routine pruning program.

- Improved cost-effectiveness by pruning trees when they are smaller and can be pruned at minimal cost.
- Lower municipal liability from potential tree-related injuries or damages resulting from hazardous conditions.
- Fewer priority service requests.
- Improved overall condition of trees resulting in higher appraised dollar value.
- Increased property values due to improved condition and higher dollar values for tree populations.
- Lower cost per tree trimmed, compared to pruning only for sign clearance and storm damage on an emergency basis.
- Reduced potential storm damage to trees and possibility of power outages caused by failure of weak or dead limbs.
- Improved tree appearance and enhanced aesthetic value to the Village.
- Fewer tree mortalities through early identification and correction of disease and insect problems.
- Improved urban environment including maximum amounts of shade and cooling, noise and glare reduction, and pollution control.
- Improved public relations.

When to prune

Ideally, routine pruning should take place in mid- to late-winter, before buds begin to swell in early spring. Dead, dying, diseased, or broken branches can and should be pruned away at any time of year. Routine pruning should be avoided during spring and early summer when sap flow is at a peak. If routine pruning is undertaken while leaves are on deciduous trees, it should be restricted to mid-summer through fall. The majority of annual growth has taken place by this time, and pruning will be less stressful to the trees.

Pruning young trees

A routine pruning program should begin as soon as financially possible and should concentrate on training the young trees. Skilled train-pruning of young trees prevents the development of future structural problems and is also cost-effective.

Small trees can be pruned at a much lower cost than larger trees because of equipment requirements; large trees in the routine prune category require a bucket truck or climbing equipment for routine trimming. Routine pruning of small trees reduces future maintenance on them. It helps limit the village's potential liability as well, by decreasing the number of safety hazards that could develop as the trees mature. Many problems can thus be avoided by trimming small trees at regular intervals.

Pruning to train young trees produces mature trees with raised symmetrical crowns that do not interfere with traffic or pedestrians. Pruning larger, previously untrained trees to remove clearance problems frequently results in unbalanced crowns. This is yet another reason why pruning to train young trees should be a component of a systematic maintenance program.

Training personnel to prune young trees

Several options exist for pruning small trees. ACRT can conduct programs to train municipal personnel to prune trees from the ground, using hand tools. Several communities, including New York City and Ithaca, have instituted citizen pruner programs to do the train pruning of young trees. (For more information, see the contacts listed in this report on Pages 39, 40, and 41.) Experienced arborists from ACRT or from the community can provide volunteers with tree trimming knowledge adequate for this purpose, after two days of training and guidance. These volunteer pruning programs offer the significant advantages of both cost savings and citizen involvement in tree protection.

Implementation

The single largest limiting factor of implementing a routine pruning program is cost. After safety objectives have been met, a routine pruning program should be initiated immediately and in a manner that allows the village to maintain trees in a responsible format.

It is important to note that meeting these requirements and completing priority tree maintenance work will be directly dependant on availability of personnel and funding.

The village has an estimated \$45,910 in priority pruning and removals to complete before a routine program should be initiated. This figure is detailed later in the document and assumes that the village uses contract labor, not its in-house staff to perform priority maintenance. Once this work has been accomplished, priority prunes will be corrected and can be reclassified as routine prune maintenance categories.

Goal 3. Perpetuate the Urban Forest

Establish a Planting Program

The future of the urban/community forest in Franklin depends upon an active, progressive program both for replacing removed trees and for planting new ones. The planting program should include public participation and support. Home-owners and businesses should be notified of tree planting operations and encouraged to assist in watering newly planted trees throughout the first one or two growing seasons. Proper planting techniques and a post-planting tree care program are required to ensure the survival and continued health of newly planted trees.

Creating a plan

A street tree planting program for Franklin should increase the stocking level of the urban/community forest. Franklin has an estimated 25 miles of streets, and an estimated 2,355 street trees. Many communities have a stocking rate of 60 to 80 trees per mile. Based on these figures, Franklin has the potential of having 1,500 to 2,000 or more street trees. While a full stocking level may not be desirable to the village, there is a potential to nearly double the current tree population.

Tree planting will have the greatest impact if it is part of a long-term urban forestry plan developed by the village. Random planting or over-planting individual tree species, without considering street architecture, existing trees, utilities, and drainage ditches, seldom produces the desired long-term impact.

The appropriate authorities (planning, public works, utilities, etc.) should evaluate planting plans and sites for suitability. A qualified official should monitor all village planting that occurs on both public and private property, and should provide residents with planting guidelines. All planting should be contracted to a reputable firm. Nursery stock should be carefully selected using the ANSI Standard for Nursery Stock.

Planting should be done systematically and distributed evenly throughout the entire village to minimize the possibility that any portion of the village may be neglected. This is important to help minimize complaints of bias. It is recommended that the first major planting be done by homeowner request using a weighted lottery system. The village can be divided using wards or sections, each ward or section receiving the same number of trees. Homeowners apply for a tree, and the site is evaluated for suitability prior to adding their name to the lottery. Locations can be selected within the areas by holding a drawing of those names of owners that requested a new tree. Those owners who did not receive a tree the first year have a greater chance (with multiple entries) to receive a tree the following planting.

If plantings are being made by street or block side, the city should contract for the entire planting. There should be contract provisions that:

- allow inspection before and after trees are delivered.
- guarantee that the trees will be alive and growing after one year.

- require a maintenance bond.
- guarantee replacement of any trees that die within one year.

Species selection

Species selection should be performed carefully. Site considerations including curb lawn space, site clearance, traffic clearance and maximum height growth space should all be considered.

As illustrated in the report portion of this document, it is not recommended that the village continue to plant elms for the purpose of improving diversity within the tree population and the species is susceptible to dutch elm disease and many other diseases and insects.

Site selection

The Village of Franklin chose not to have planting spaces inventoried during the tree inventory. As a result, ACRT cannot provide specific site recommendations for tree species and placement. ACRT also cannot statistically analyze the the number of vacant planting spaces and establish a schedule for filling them.

Regardless of the planting program, the village will need to inspect all new potential planting spaces physically to determine if the site is suitable and also to determine what species should be used in that site.

The following is a list of recommended specifications for planting site designation:

Sites on the public right-of-way that are vacant and can support a tree in the future will be identified as planting sites. Field judgment and the following specifications will be used to determine planting sites:

- A tree lawn width of three feet is required for small planting sites, five feet for medium planting sites and eight feet for large planting sites.
- The minimum distance to any tree is 20 feet for small planting sites, 30 feet for medium planting sites or 40 feet for large planting sites.
- All planting sites are at least 35 feet away from intersection of curbs.
- All planting sites are at least 10 feet away from fire hydrants, driveways, utility poles and streetlights.
- All planting sites are at least 10 feet away from any visible or identifiable underground utilities.
- All small planting sites have an overhead clearance of at least 25 feet.
- No large or medium planting sites are located underneath wires, but they can be located adjacent to wires if there is an offset of at least 10 feet from the vertical plane of the nearest wire.
- The largest possible classification is recorded for each planting site.

Street tree planting rate

To account for failed plantings, damage and vandalism, the street tree planting rate must exceed the rate at which dead or damaged trees are removed. ACRT recommends that the planting rate be at least 1.2 times the removal rate in order to maintain the current population of street trees. This planting rate will not increase the size of the overall street tree population; it will merely maintain the current level. Obviously, if the Village of Franklin wishes to increase its urban forest population, a higher planting rate should be considered.

Without specific planting site statistics, it is difficult for ACRT to recommend specific forest stocking rates for Franklin. Only a simple statistical analysis of the sample data would indicate that street tree planting site availability is significant, and the village has a lot of room for planting.

Size selection for new tree plantings

The size of new street trees should be 1.2 to 2 inches in diameter, unless survival or vandalism becomes more of a problem. In this case, larger stock should be considered. Trees that are at least 2 inches in diameter at the time of planting are less likely to be broken by accident or vandalism.

Larger-diameter trees, however, have drawbacks worth considering. First, they are considerably more expensive to purchase, transport, and install than smaller-diameter trees. Second, a lower percentage of roots remains in the root ball of larger trees at the time of transplanting. In general, larger trees will experience more transplant shock, have higher rates of failure, and exhibit slower growth rates in the five years following planting than smaller trees. Since smaller-diameter trees adapt to transplanting more easily, they may catch up to or exceed the size of larger-diameter transplanted trees within five to ten years.

Ensure Post-Planting Maintenance

Tree mortality occurs after planting when trees are improperly installed or not given adequate follow-up care. The most important aspects of post-planting care are discussed below.

Stakes and trunk wrappings

If staking is used, it should be removed after one growing season. Staking left in place longer than one season may injure and begin to girdle trees. The most recent research advises that it is not necessary to stake newly planted trees at all, unless they are sited where they are subject to high winds, or where they may need protection from jostling by pedestrians or vehicle interference.

Trunk wrappings should be removed after one year to avoid girdling the bark and to eliminate the dark, moist breeding environment they offer for insects and disease. If trunk wrapping removal is not scheduled as one-year regular maintenance, the wrapping should be removed at the time of the planting.

Mulch

Mulch is an extremely important tool in the arsenal of strategies to protect the health of urban trees. Large medians and parks are optimum sites for mulching areas around trees. One of the most effective strategies available, the numerous benefits of mulch are listed below in **Figure 8**. In addition to these benefits, wood chips are plentiful and inexpensive in many areas. The ample availability and low cost of wood chip mulch should facilitate its use around newly planted trees and as protection around large older trees growing in turf areas.

Figure 8. Benefits of mulching the root zone of trees

- Suppresses competing grass and weeds.
- Lowers the competition for nutrients caused by grass and weeds growing over the critical tree root zone.
- Eliminates the labor-intensive need to trim around trees.
- Protects the trunk from lawnmower and weed-whacker damage.
- Retains soil moisture and prevents drying out and cracking.
- Protects the soil around the tree from temperature extremes.
- Prevents soil compaction.

ACRT recommends that mulch be used around all newly planted trees and maintained to a consistent level for three years. Mulch should be no more than four inches deep and should not be piled against the stem of the tree. If space allows, a diameter of five feet of mulch is recommended for each tree.

There can be too much of a good thing, however, and it is extremely important to avoid mounding the mulch so that it is either too deep or piled directly against the bark. These “mulch volcanoes” actually harm the tree. Mulch volcanoes:

- rot the bark and thus interfere with the flow of nutrients and water.
- provide insects and disease with a moist growth environment.
- smother the many important feeder roots of the tree that grow close to the soil surface.

Water

The biggest survival problem that new trees have is with water. Too little or too much water can greatly reduce the survivability rate of new plantings. Deep, infrequent watering should be used to saturate the soil to a depth of two to three feet. Several communities have successfully used soft plastic tree irrigator bags, sometimes called "alligators" because of their green color. These bags are attached around the trunk base of newly planted trees and filled with water from a truck on a regularly scheduled maintenance cycle throughout the first growing season.

Goal 4. Establish Good Public Relations

ACRT recommends that the village's tree program include expanded public education, assistance, and advocacy programs in addition to the public safety, systematic maintenance, and planting programs discussed above.

Public Education

In order to ensure the long-term success of its urban forestry program, the village will need continued public support. It is essential that public education officials recognize the importance of trees as an integral part of the village's infrastructure. The economic values and environmental benefits of trees justify expenditures for their installation and care. Educating residents about these values and benefits is one way to marshal support for the urban/community forest.

Arbor Day programs are successful in introducing elementary school students to tree planting and care. Programs such as Project Learning Tree, a national educational program that brings educators and natural resource managers together, might be useful in elevating the profile of Franklin's urban forest. New programs could be introduced to promote urban forestry awareness among Franklin's citizens, such as a village register for large or historical trees.

An ongoing public education program will further define the value of Franklin's urban/community forest, the benefits derived from trees, the necessity of professional management, the importance of tree planting, and safety issues surrounding tree removals.

A well-designed education program can help educate residents to:

- understand the environmental benefits of trees
- understand why removals are sometimes necessary
- learn how to apply for replacement tree plantings
- avoid planting undesirable species
- avoid planting trees in unsuitable locations (such as under utility wires)
- avoid topping trees

A list should be made available of reliable tree care professionals who can provide advice and tree care. Citizens should be encouraged to plant and maintain trees on private property. Trees on private property provide many of the same benefits as public trees, with the advantage that they cause minimal maintenance expense to the village.

A large amount of previously developed (and often free) educational material is available for the village to tailor to its specific needs. These materials can be used to prepare newspaper articles and press releases, presentations for neighborhood meetings, speeches to organizations such as garden clubs and conservation groups, and for many other uses. Some of the excellent resources available to help

communities build their urban forestry programs are provided in the list below and on the next page.

- The National Arbor Day Foundation
Nebraska City, NE
(402) 474-5655
www.arborday.org

Conducts Tree City USA program to provide direction, technical assistance, public attention, and recognition for urban and community forestry programs nationwide. Also publishes Tree City USA informational bulletins that are excellent tools for public education.

- American Forests
910 17th St., NW #600
P.O. Box 2000
Washington, DC 20013
(202) 955-4500
www.americanforests.org

The nation's oldest nonprofit citizen conservation organization, helping people improve the environment with trees and forests. Among its many activities is the Global ReLeaf planting program (see next section), which has a goal of planting 20 million trees for the new millennium.

- Alliance for Community Trees
www.actrees.org

A national support network for grassroots, citizen-based nonprofit organizations dedicated to urban and community tree planting, care, conservation and education.

- The National Tree Trust
www.nationaltreetrust.org

The NTT mobilizes volunteer groups, promotes public awareness, provides grants, and unites civic and corporation institutions in support of local tree planting and education projects throughout the United States.

- Trees New York
51 Chambers Street, Suite 1412A
New York, NY 10007
www.treesny.com

Trees New York has instituted a Citizen Pruner Tree Care Course to train and use volunteers to prune young trees.



Public Assistance Planting Programs

The Village of Franklin might consider establishing a 50/50 cost share public assistance program that helps citizens plant trees on the private property side of the sidewalk. Such programs are usually successful from several standpoints. Homeowners can purchase quality trees for half the cost. The village benefits by having its tree acquisition expenses substantially reduced. Since many of the trees are planted on the homeowner's property, as opposed to the tree lawn adjacent to the street, the tree usually benefits from a better growing site. The resident benefits from the cooling shade cast by a tree planted closer to the home. Finally, the utility companies benefit by avoiding conflicts between trees and wires, and electricity consumers benefit from fewer power outages.

Continued communication with the homeowner after the planting has taken place is important. Homeowners should occasionally be reminded to water their trees. Informational material on proper pruning techniques may also be made available. A survey in following years could be useful in gauging the success of the program. The survey may ask the homeowners to measure the diameter or height of the tree, comment on its condition, and share their impressions on the value of the 50/50 planting program.

Any public assistance planting program must include underground and above-ground utility safety as a primary concern. Electric and communication wires, gas, water and sewer pipes may easily be within the area where trees are to be planted. Serious injury or death can result from contact with underground utilities. If it cannot be determined that utilities are safely out of the way, they must be located by the appropriate authority. The public must understand that planting trees where they conflict with hardscape or utilities should be avoided, and that tall-growing trees planted under electric wires will inevitably result in tree/wire conflicts that cannot be satisfactorily resolved.

Mature large trees are the most effective at maximizing carbon sequestration (storage) and energy reduction benefits in the urban forest. While maintaining large trees frequently extends their life, it is also necessary to plan for the next generation of community trees through an effective planting and young-tree-care maintenance program. A stocked urban/community forest (less than 8% vacant planting sites) that is well maintained is one way to "think globally and act locally."

One of the largest organizations for planting assistance is American Forests Global ReLeaf, a program that promotes tree planting worldwide to slow the buildup of carbon dioxide and its effects on global warming. Another organization, the National Arbor Day Foundation, administers the "Tree City USA" program to assist communities to plant and care for trees and to recognize their efforts. The National Tree Trust is another potential grant source. Contacts for these organizations are found in the previous section. In addition, a local utility company may offer a removal and replacement planting program.

Public Advocacy

ACRT recommends that the village establish an Internal Revenue Service (IRS) 501-C-3 not-for-profit organization fund, in order to accept tax-deductible donations from citizens that will be targeted for tree planting and tree care. Such donations may be made in lieu of flowers, in memory of, and in honor of specific people. Citizens may also make legacies in their wills. Such funds build surprisingly quickly and offer another cost-effective means to fund urban forestry activities. Ann Arbor, Michigan and Waukesha, Wisconsin have 501-C-3 corporations that use the interest from invested principal to fund a significant portion of annual tree maintenance budgets.

Resource Requirements

Tables 3, 4, 5, 6, 7, and 8 detail the proposed budget for Franklin's tree maintenance and removal needs. This budget assumes that all work is done by contract labor. There is a possibility of completing some work at a lower cost, by using city personnel to assume all tree maintenance activities that can be accomplished from ground level. These would include small tree pruning and training, and post-planting tasks. Other assumptions made for this budget include:

- A. The cost estimates for removal and priority pruning are detailed in Tables 3, 4, 5, and 6.
- B. Contract labor rates are estimated at \$42 per work-hour for pruning and \$45 per hour for removal.
- C. Small tree pruning production is one-half hour per tree.
- D. Large tree pruning production is 2.2 hours per tree.
- E. Sign clearance pruning production is .75 hours per tree.
- F. Tree planting costs are assumed at \$200 per 1.2 to 2 inch balled and burlapped tree.
- G. No adjustments are made for increases in the size of the tree population.
- H. Sign clearance figures were taken from the 2005 inventory. Future years were estimated assuming a program of systematic pruning.
- I. Removals in 2005 are from the inventory. Following years assume a 1% mortality rate for large trees and a 1% mortality rate for small and immature trees.
- J. Systematic pruning costs should be calculated for the recommended cycle: five years for large trees and three years for small trees.

Replacement plantings are calculated from 1.2 times the total of all removals.

Table 4. Budget detail: projected tree removal costs based on the 2005 sample inventory

Removal Priority One					
	1-6	6	2.1	\$45	\$567
	7-12	29	3.2	\$45	\$4,176
	13-18	17	5.1	\$45	\$3,902
	19-24	7	7.7	\$45	\$2,426
	25-30	3	10.2	\$45	\$1,377
	31-36	1	12.5	\$45	\$563
	Over 36	2	26.3	\$45	\$2,367
Subtotal:		65			\$15,378
Removal Priority Two					
	1-6	12	2.1	\$45	\$1,134
	7-12	3	3.2	\$45	\$432
	13-18	3	5.1	\$45	\$689
	19-24	0	7.7	\$45	\$0
	25-30	1	10.2	\$45	\$459
	31-36	0	12.5	\$45	\$0
	Over 36	0	26.3	\$45	0
Subtotal:		19			\$2,714
Total:					\$18,092

Table 5. Budget detail: projected priority pruning costs based on the 2005 sample inventory

Priority One Prune	1-6	0	1	\$42	\$0
	7-12	2	1.4	\$42	\$118
	13-18	12	2.8	\$42	\$1,411
	19-24	12	3.5	\$42	\$1,764
	25-30	6	5.1	\$42	\$1,285
	31-36	10	6.3	\$42	\$2,646
	Over 36	6	6.3	\$42	\$1,588
Subtotal:		48			\$8,812
Priority Two Prune	1-6	3	1	\$42	\$126
	7-12	36	1.4	\$42	\$2,117
	13-18	39	2.8	\$42	\$3,235
	19-24	22	3.5	\$42	\$3,234
	25-30	11	5.1	\$42	\$2,356
	31-35	3	6.3	\$42	\$7,938
	Over 36	4	6.3	\$42	\$1,058
Subtotal:		118			\$20,064
Total:					\$28,876

Table 6. Budget projections for removing hazardous and potentially hazardous conditions for all inventoried street trees based on 2005 sample inventory results maintenance

	Quantity	Dollars	Quantity	Dollars	Quantity	Dollars
Sign Clearance	0	\$0				
Removal	84	\$18,092				
Priority Pruning			166	\$28,876		
Subtotal	84	\$18,092	166	\$28,876		
Total					250	\$46,968

- *1st Priority: Hazardous conditions requiring immediate action include sign clearance pruning and Priority One removals. These tasks should be completed within six months.
- *2nd Priority: Hazardous conditions requiring prompt action include Priority One Pruning. These tasks should be completed within one year.
- *3rd Priority: Potentially hazardous conditions include Priority Two Pruning. These tasks should be completed within two years.

Writing and Administering Contracts

Contracting tree work to qualified, reputable tree care companies is an efficient street tree maintenance approach, but it requires careful administration to obtain the desired results.

Contracting operations can be administered by city personnel or by an independent contractor such as ACRT. Administration costs are approximately 5 to 10 percent of the budget. Seasonal timing of contracts and favorable contract guidelines can save the village from 10 to 15 percent of the typical contract costs. Basic contracting procedures and guidelines follow:

- A. Define scope of work (planting, removal, trimming, stump removal), type of contract, and time frame.
- B. Identify involved parties (contractor, contract administrator).
- C. Define material specifications (work procedures, standards such as National Arborist Association trimming standards, ANSI Standards for Nursery Stock, etc.).
- D. Define procedures to follow in the event that there is a discrepancy in the scope of work (such as the need to substitute the defined planting stock in the planting contract).
- E. List inspections to be performed (on nursery stock, pruning cuts, cleanup, etc.).
- F. List situations where rejecting work could occur (improper planting depth, improper pruning cuts, etc.).
- G. List trees to be planted, removed or trimmed by address and block side. For accuracy and to avoid confusion, planting lists should include the scientific name and qualifications regarding acceptable size of stock.
- H. Outline bid sheet and bonding requirements.

There are several ways to improve the cost-effectiveness of a contracting program. Arrange contracts for tree trimming and removal to take place in the fall or winter, traditionally the "slow time" for tree care companies. Also, competitive prices can be obtained by specifying a longer time frame for completing the scope of work.

Tree planting contracts need to have a three- to four-month lead time to give the contractors time to locate and obtain the appropriate planting stock. The actual time for planting the trees needs to be specified in the bid package to ensure that trees be planted at the appropriate planting time for the area.

Stumps should be ground to four to six inches below grade and excess materials removed. Soil and chips can be piled in the hole and mounded four to eight inches above ground level to allow for settling.

Utility Wires

Serious conflicts have developed between utilities and street trees. More than two billion dollars spent annually by U.S. utilities on tree pruning are passed on as costs to consumers. Too often, trees have been disfigured by improper pruning and injured by excavation for underground wires and pipes. Pruning to clear overhead wires has left many trees misshapen and made many people irate.

Many of these problems can be reduced through better understanding and planning. Improved arboricultural methods such as natural pruning instead of topping trees, and underground tunneling instead of trenching, can minimize adverse effects on the health and appearance of trees. The preferred, long-range solution, however, is to avoid conflicts entirely by selecting compatible trees and positioning them so they will not grow into utilities.

Electric service distributed through overhead wires is subject to interruption when branches touch the wires, or when storms cause trees to blow or fall into the wires. Utility companies are required to prune trees to prescribed distances, which vary with different line voltages and types of construction (American National Standards Institute 1995). The purpose of pruning is to ensure public safety to minimize interruptions or outages caused by trees, especially during storm emergencies. A major concern is the safety of children or others who may climb trees and be shocked or even electrocuted. Overhead electric wires are usually not insulated.

Electric wires can be recognized by the insulators, which fasten them to the poles or crossarms, typically at heights of 25 to 40 feet. Other wires lower on the same poles may include insulated telephone or cable TV lines, which must be protected only from branches that rub against them. Federal law requires that tree workers, other than qualified line clearance tree trimmers, maintain 10 feet of clearance from wires energized over 750 volts.

Some people complain strenuously when trees are disfigured by pruning or when they hear of a proposal to remove large trees, especially several at a time. Topping of trees, sometimes called stubbing or rounding, not only destroys their natural form but also may adversely affect their health. Some of these concerns can be minimized by training workers to place pruning cuts so that they preserve the natural branching pattern. However, where large trees are too close to wires, large portions of their limbs must be pruned off. When trees deteriorate with age or urban stress and become hazards, they must be removed.

Why not bury wires? That is feasible only in new developments, where it has become commonplace. The expense usually would be prohibitive in older residential neighborhoods, and excavation would damage roots of the very trees that one wants to preserve. A better alternative is to gradually remove hazardous and

disfigured trees, and to replace them with smaller trees that will not conflict with wires.

Underground electric installations require maintenance, too. Excavation for repairs can damage tree roots. Therefore, trees should be planted far enough away to permit access by equipment and to keep most roots clear of any trenches that may be dug in the future. Transformer boxes indicate where underground lines may be located.

A working relationship should be developed between those responsible for tree maintenance in the village and the utility. There are benefits for both through cooperation. The utility benefits by eliminating large-growing species under power and communication lines, pruning existing street trees under wires to avoid future problems, and removing problem street trees under wires. The village would benefit from a cooperative program with goals including:

- Removal of trees that are disfigured and/or potentially hazardous
- Planting of healthy and well-shaped low-growing trees under wires
- Creation of a street-tree replacement program (paid for in part by the utility) to remove the problem maintenance street trees and replace them with low-growing species