

FINAL STREET TREE MANAGEMENT PLAN

VOLUME I: EXECUTIVE SUMMARY

FOR

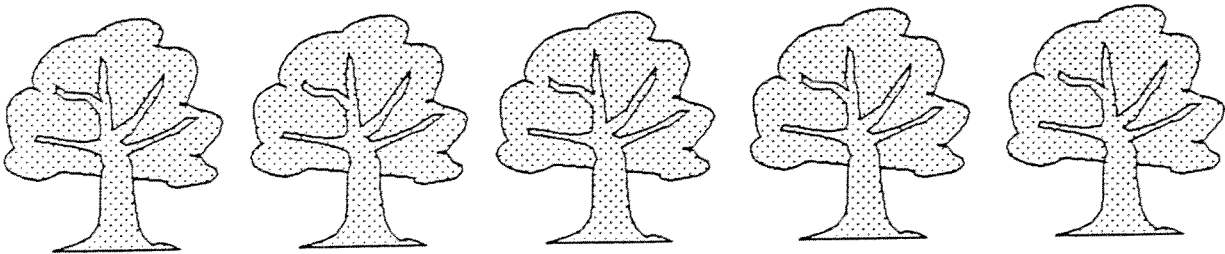
THE VANCOUVER BOARD OF PARKS AND RECREATION
VANCOUVER, BRITISH COLUMBIA
CANADA

Prepared by:

ACRT, INC., URBAN FORESTRY CONSULTANTS
152 E. Main Street
P.O. Box 219
Kent, OH 44240-0219
(216) 673-8272

1990

Project #1493



LIST OF VOLUMES

Volume I. Executive Summary (current volume)
Volume II. Policy, Management and Operations Recommendations
Volume III. Street Tree Survey Results and Analysis

TABLE OF CONTENTS

	Page
1.0 Introduction	1
2.0 Necessity for a Street Tree Management Plan.	1
3.0 Objectives of Street Tree Management Plan	2
4.0 Street Tree Inventory Results.	3
5.0 Model Street Tree Program.	4
6.0 Proposed Goal Statement for the Vancouver Street Tree Program.	5
7.0 Systematic Pruning	5
8.0 Priority Maintenance	7
9.0 Tree Planting	8
10.0 Root Pruning	9
11.0 Integrated Pest Management	10
12.0 Administration and Reporting System	11
13.0 Public Information	13
14.0 Tree Pruning for Utility Clearance	16
APPENDIX: Service Levels and Resources	17

LIST OF FIGURES

Figure 1: Species Diversity Overview	4
Figure 2: Size Class Profile	4
Figure 3: Planting Rate Comparisons	9
Figure 4: Planting Rate and Stocking Rate	9

LIST OF TABLES

Table 1: Street Tree Survey Results	3
Table 2: VPB Operation Budget Summary	17
Table 3: Budget Summary: Capital Costs.	18
Table 4: Street Tree Program Budget Comparisons	18
Table 5: Equipment Requirements (and Costs)	19
Table 6: Man-Hour and Personnel Requirements Summary.	20

EXECUTIVE SUMMARY

1.0 INTRODUCTION

The Vancouver Board of Parks and Recreation (VPB) contracted with ACRT, Inc., Urban Forestry Consultants, to perform a comprehensive review and analysis of their management and operation of the street tree maintenance and planting programs including policies and procedures. Phase I was a statistically significant 10 percent sample survey of street tree conditions and work needs. The sample data was a key informational component of a Preliminary Street Tree Management Plan prepared in 1989.

Phase II of the study included a 100 percent street tree inventory and revision of the preliminary plan to reflect a complete data set. This Final Street Tree Management Plan is a three volume document that reports the findings of the complete tree inventory and revised budget recommendations for the tree maintenance operations.

The other background data for this plan was gathered from August 1988 through March 1989 by a coordinated effort with VPB staff.

The purpose of this study was to evaluate the current VPB Arboriculture program and make recommendations for modifications, additions and improvements to current policies and operations.

2.0 NECESSITY FOR A STREET TREE MANAGEMENT STUDY

The VPB undertook this detailed study of the city's street tree program for these primary reasons:

- * A desire to respond to the citizens of Vancouver in a more proactive and positive manner regarding street tree planting and maintenance. The VPB recognized the current program could be improved to better meet the expectations of the citizens.
- * VPB wanted to compare the existing policies with those of other municipalities and jurisdictions; and
- * There was a desire to compare administrative and field practices with industry standards.
- * Most major progressive municipalities in North America utilize computerized tree inventory systems for day to day street tree management. VPB wanted to investigate that option as a potential management tool to enhance their productivity, effectiveness and responsiveness.

3.0 OBJECTIVES OF VANCOUVER STREET TREE MANAGEMENT STUDY

The objectives for the Street Tree Management Study were as follows:

- * To review and evaluate Vancouver street tree policies in relation to the industry standards and the practices of other comparable municipalities.
- * To determine the current number, condition and maintenance needs of Vancouver's street trees and present a prioritized vegetation maintenance program including budgets, record keeping procedures, and cost effective maintenance procedures.
- * To determine whether the current street tree maintenance organization and operations concepts should be retained and/or modified and identify alternatives for consideration.
- * To ensure that the current organizational and operational concepts are sound in principal, effective, efficient and adequate for meeting service needs as identified in the city-wide tree sample.
- * To identify the most economical management and administrative procedures and work methods and improvements which can be implemented immediately for enhancement of the current level of services being provided.
- * To recommend and justify appropriate street tree maintenance service levels and provide pruning standards.
- * To make recommendations for utilizing the computerized street tree inventory and management information system to cost effectively meet program goals and objectives.
- * To establish guidelines for prioritization of work needs and service requests.

The results of this study are reported in the STREET TREE MANAGEMENT PLAN in three volumes:

VOLUME I. EXECUTIVE SUMMARY (CURRENT VOLUME): A SYNOPSIS OF THE KEY POLICY ISSUES AND RECOMMENDATIONS ADDRESSED IN THIS STUDY.

VOLUME II. POLICY, MANAGEMENT AND OPERATIONS RECOMMENDATIONS: DETAILS POLICY, MANAGEMENT AND OPERATIONAL RECOMMENDATIONS FOR PLANTING, MAINTENANCE AND REMOVAL PROGRAMS AT VARIOUS FUNDING LEVELS. PUBLIC RELATIONS PROGRAMS AND PROPOSED RECORD KEEPING AND ADMINISTRATIVE GUIDELINES ARE PRESENTED.

VOLUME III. STREET TREE SURVEY RESULTS AND ANALYSIS: PROVIDES A QUANTITATIVE DESCRIPTION AND ANALYSIS OF THE INVENTORY DATA (COLLECTED IN 1989) INCLUDING SPECIES COMPOSITION, SIZE CLASS DISTRIBUTION, CONDITION RATINGS AND OTHER TREE AND SITE CHARACTERISTICS EXAMINED IN THE FIELD.

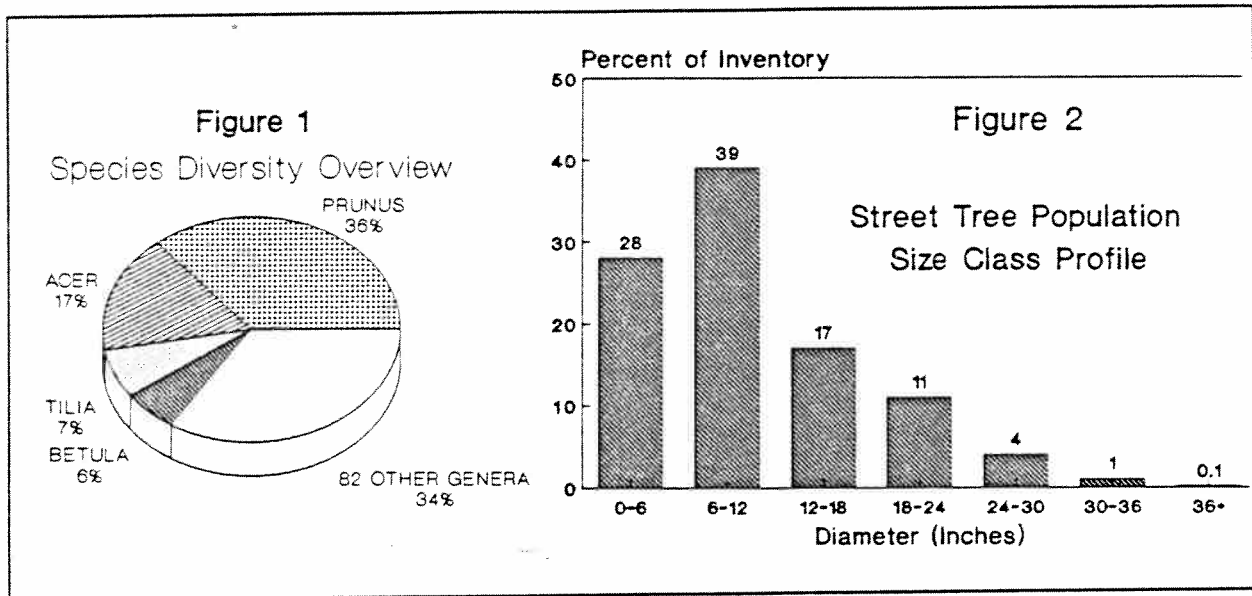
4.0 SAMPLE SURVEY RESULTS

Street tree and planting site information was collected by VPB personnel on all Vancouver city streets. The results of the inventory are summarized in Table 1 and Figures 1 and 2.

Table 1. Street Tree Inventory Results

- * **Numbers of Trees and Planting Sites.** A total of 88,664 street trees were inventoried. This indicates a tree density of 69 trees per kilometer (or 111 trees per mile) based on 1,287 kilometers (800 miles) of street. Based on the inventory and the number of potential planting sites on unimproved streets, there are an estimated 71,000 additional sites in the city that could be planted in the future.
- * **Tree Value.** The average Vancouver street tree is 13.5 inches in diameter (Figure 1) and has an estimated value of \$1,380 using the International Society of Arboriculture's tree valuation formula. The total value of all trees was estimated at \$122.6 million.
- * **Species Composition/Diversity.** Kwansan cherry was the most common species representing 12.6 percent of the population. This was followed by Thundercloud plum at 12.4 percent. Prunus genera (plums and cherries) collectively constitute 36 percent of the street tree population (Figure 2). There were 479 different taxa represented in the inventory.
- * **Tree Diameter.** About two-thirds (67 percent) of the tree population was less than 12 inches in diameter. Approximately 17 percent were medium size trees (12 - 18 inches DBH) and the remaining 16 percent were larger than 18 inches diameter.
- * **Tree Height.** Sixty-nine percent of the trees were less than 30 feet in height; 28 percent between 30 and 60 feet and 3 percent were taller than 60 feet.
- * **Maintenance Needs.** Based on the 1989 complete tree inventory, 1,024 trees needed removal, 2,815 trees required safety trimming. The remaining trees require routine horticultural pruning and were classified into larger trees that require a bucket truck (23,031 trees) and smaller trees that can be pruned from the ground (61,794 trees).
- * **Tree Condition.** The overall condition of Vancouver's street trees is good with about 80 percent of the trees rated in 'good' or better condition. Very good performers among the dominant species include Mazzard cherry, London plane tree, European beech, little leaf linden, red sunset maple and pyramidal European hornbeam

The appraised value of the street tree population based on the International Society of Arboriculture's tree valuation formula is \$122.6 million or an average of \$1,380 per tree.



5.0 MODEL STREET TREE PROGRAM

Urban trees are an integral component of the Vancouver landscape and contribute to the overall quality of city life. The benefits of urban trees are much greater than the traditional amenities of aesthetics and shade. Trees are a necessity in cities; they produce oxygen and reduce noise and glare. They provide visual screens and moderate temperatures. People like to have trees in their day to day urban environment.

A healthy and well maintained urban forest does not come about by accident. City trees can not naturally reproduce or self-prune out dead or dying branches without unacceptable safety risks. Instead, the health and stability of the city's urban forest can only be achieved through careful planning and systematic maintenance of the tree population.

A model street tree program is comprised of three primary operations: Planting, Maintenance and Tree Removal.

Tree planting programs are necessary to replace trees that die or must be removed due to other problems, and to continue to reforest the city's public spaces. Planting of new trees on the right of way is essential for cities to achieve the maximum potential of the urban forest.

Timely, proper tree maintenance is the key to all healthy, well managed urban forests. These programs must include routinely pruning all city trees on a regular cycle, and being prepared to handle emergency and priority maintenance in a timely and professional manner.

Tree removal programs are necessary to deal with natural or induced death or decline. Dead and condemned trees must be removed expeditiously to protect the public from hazardous conditions.

Practical, professional policies relating to these basic tree maintenance operations are the key to a successful street tree program.

6.0 PROPOSED GOAL STATEMENT FOR THE VANCOUVER STREET TREE PROGRAM

The goal of Vancouver's Street Tree Program is to proactively manage the municipal forest in a proper arboricultural and cost effective manner by providing to the taxpayers innovative leadership and services designed to preserve and improve the natural beauty of the urban forest.

The goal will be accomplished through the design, communication, and implementation of tree planting and maintenance policies and programs outlined in the Street Tree Management Plan which are consistent with Vancouver's environmental concept and objectives.

Vancouver's street tree program will respond to the needs and expectations of the taxpayers and local government agencies, and will improve the quality of life and increase the value of the trees and the real estate of the City of Vancouver.

This document highlights the policy recommendations for implementing an arboriculturally sound and progressive street tree planting, maintenance and removal programs to meet these program goals.

7.0 SYSTEMATIC PRUNING

7.1 Policy Recommendation: Vancouver street trees should be pruned on a systematic basis every five years.

Specific tree crews should be dedicated to systematically prune the street trees. A maintenance area grid system should be followed to ensure each tree is pruned once every five years. The current funding level does not provide adequate personnel and equipment resources to systematic pruning.

Vancouver's current pruning cycle is approximately 13 years, and it is unlikely that all trees are actually serviced during that cycle. Pruning cycles longer than five or seven years are not functional in ACRT's experience because a larger number of citizen service requests will require the crews' time and interfere with the implementation of the routine systematic pruning program. People do not want to wait 10 years or more to get their street tree trimmed. The result of

a citizen service request based tree maintenance program is that all trees in the city do not get pruned and those that do cost up to 40 percent more to prune than if work had been performed systematically.

FINANCIAL IMPACT: THE FINANCIAL IMPACT OF UNDERTAKING A FIVE YEAR PRUNING CYCLE IS A \$1.3 MILLION INCREASE IN ANNUAL OPERATING FUNDS. A SEVEN YEAR PRUNING CYCLE WOULD REQUIRE A \$950,000 INCREASE. ADDITIONAL EQUIPMENT WOULD REQUIRE A ONETIME CAPITAL EXPENDITURE OF \$1.75 MILLION FOR A FIVE YEAR CYCLE AND \$1.3 MILLION FOR A SEVEN YEAR CYCLE (SEE APPENDIX).

Justification for systematic routine pruning.

- * Decreased Cost per Tree Pruned
- * Reduced Requests for Special (Non-Routine) Service
- * Improved Safety and Decreased Tree Liability
- * Reduced Insect and Disease Problems
- * Improved Tree Condition and Tree Value
- * Increased Property Values
- * Enhanced Public Image
- * Arboriculture Employee Morale Boost

Wood Chip Disposal. Pruning on a systematic five year cycle will increase the volume of wood chips. Also, disposal fees at landfill sites could increase to \$52 per tonne. This could result in wood chip disposal costs of up to \$184,000 per year. Alternative methods of handling wood chip disposal, including the economics of re-cycling chips for horticultural soil amendment or mulch must be investigated further.

- 7.2. Policy Recommendation: The National Arborist Association Pruning Standards for Shade Trees (1989) should be adopted as a guideline for pruning practices.

Pruning should include complete horticultural pruning of the tree as well as any pruning for safety considerations. Medium and large trees should be pruned to NAA Class II specifications (medium prune), with all street and sidewalk clearance requirements being met. Small trees should be pruned to NAA Class I specifications (fine prune), including any clearance requirements.

- 7.3 **Policy Recommendation:** Street tree maintenance work should be categorized as either priority or routine based on the public safety considerations of the actual tree condition.

Trees with dead branches of 2 inches diameter or more should be pruned to remove these branches on a priority basis.

Trees with dead branches less than two inches diameter and requiring horticultural pruning should be identified for routine maintenance work and be pruned as part of the systematic pruning program when the crews are working in that maintenance area grid.

8.0. PRIORITY MAINTENANCE

Definition of priority maintenance: Priority maintenance includes the following:

- a. **Emergency work** - Tree work requiring immediate action for human safety and property protection.
- b. **Priority Pruning** - Safety pruning identified in a hazard tree survey or by citizen service request.
- c. **Removals** - Trees that are dead or dying or hazardous beyond repair.

- 8.1 **Policy Recommendation:** Vancouver's current policy of immediate correction of any tree hazard that endangers life or property should be maintained.

Emergency priority tree maintenance should be handled immediately.

Non-emergency priority pruning should be handled as quickly as possible within the limits of available manpower and equipment. This work should be performed by a two person crew that systematically works in each of the management areas of the city once per year.

- 8.2 **Policy Recommendation:** Hazardous tree conditions should be proactively identified and corrected to reduce liability.

Other municipalities have found that an effective method of accomplishing this objective is through an annual hazard tree survey. Every street in the city should be surveyed each year for dead trees requiring removal and for trees with hazardous conditions (dead or hanging limbs that pose potential harm to citizens or damage to property should they fall). The work identified in the hazard tree survey should be scheduled for completion by the priority maintenance crew.

9.0 TREE PLANTING

- 9.1 Policy Recommendation: The street tree population should be managed so that no more than 20 percent of the population consists of one tree genus and no more than 10 percent consists of one tree species or cultivar.

The genus Prunus (including the flowering cherries and flowering plums) comprises 36 percent of the street tree population based on the 1989 street tree inventory.

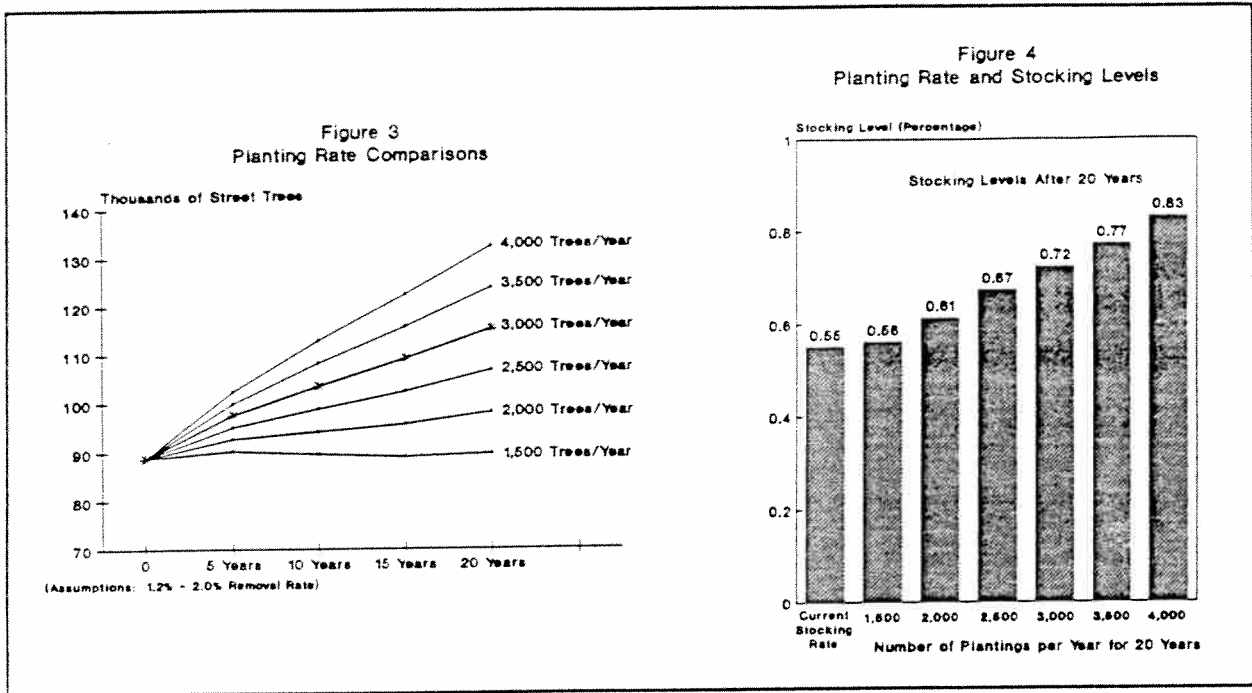
Clearwing moth borer problems were observed on the maturing cherries and plums by ACRT in October 1988. This pest, if allowed to develop to epidemic proportions, could prove as devastating as the Dutch elm disease on the American elms in other North American cities.

Prunus and other flowering ornamentals have a great deal of public appeal, but if overplanted creates a potential risk. Prunus should still be planted, but only in limited quantities in high visibility areas to ensure a wide range of tree ages.

Langley Tree Nursery inventory includes a very significant proportion of Prunus tree species. In order to diversify the species composition of the street tree population the city should:

- * Maintain a list of approved tree species and cultivars for planting on the city right of way;
 - * Continue with alternate arrangements for purchase of liner tree stock for Langley Tree Farm and caliper tree stock for direct boulevard planting; and
 - * Utilize a Species Selection Procedure and develop a Master Street Tree Plan.
- 9.2 Policy Recommendation: The rate of annual tree planting should be increased to 3,000 trees per year to ensure that a street tree stocking level of 70 percent can be achieved within a 20 year period. The stocking level is defined as the ratio of planted tree sites to total available tree sites.

Vancouver currently has only 55 percent of their potential planting sites filled; or a 55 percent stocking level. By increasing the planting rate from 1,500 trees per year to 3,000 trees per year, a tree stocking level of 70 percent could be achieved by the year 2010. A 70 percent stocking rate has been found to be an attainable goal by progressive municipal urban forestry programs in North America (See Figures 3 and 4 below).



NOTE: Park Board programs would provide for 2,800 tree plantings and Engineering programs would provide for 200 tree plantings.

FINANCIAL IMPACT: THE FINANCIAL IMPACT OF THE ACCELERATED PLANTING PROGRAM (VPB CAPITAL PLANTING) IS AN ADDITIONAL \$528,000 PER YEAR OF CAPITAL FUNDS. REFER TO APPENDIX.

- 9.3 **Langley Tree Farm.** The VPB should continue to operate the Langley Tree Farm as long as the cost of tree production is less than wholesale purchase price of comparable size and species.

The accounting system should be upgraded to assure that all costs of operation and administration are accounted for. A wholesale nursery grower/agent should be retained on a professional services contract to arrange purchase of liner stock at wholesale prices in quantity and species desired.

10.0 ROOT PRUNING

- 10.1 **Policy Recommendations:** Root pruning should be performed to ensure public safety and to avoid damage to private property without compromising the viability of the street tree.

Root pruning for the Engineering Department sidewalk levelling program should be the joint responsibility of the Engineering Department and the VPB.

Engineering should continue to clear tree roots from sewer pipes. VPB should only be involved when more than 20 percent of a tree's roots would need to be removed.

Shaving of surface roots should be performed only when other alternatives (such as ground cover or a thin layer of soil) are not acceptable to the resident. The aesthetic and economic benefits of the tree, in spite of the surface roots, should be emphasized when dealing with the public.

11.0 INTEGRATED PEST MANAGEMENT (IPM)

11.1 Policy Recommendation: VPB should proactively manage pest populations through the use of Integrated Pest Management practices.

The city should establish an IPM monitoring program for specific pests that could be potential threats to the street tree population. Approximately 5,000 trees should be inspected every year representing species and genera most potentially at risk. An IPM technician should be hired on a contract basis for this work. This person should work closely with the proposed VPB IPM coordinator.

VPB should utilize cultural practices to the maximum possible extent to control insect and disease pests of street trees. These practices include:

- * Greater species diversity
- * Implementing a five year systematic pruning program
- * Sanitation of leaf material (on certain species in high risk locations)
- * Rotation planting to disperse species and prevent concentrated areas for pest breeding
- * Prune certain tree species at appropriate time of year
- * Investigation of use of biological controls
- * Introduction of sterile individuals to control insect populations
- * Removal of diseased trees and replacement with another species

FINANCIAL IMPACT: THE FINANCIAL IMPACT OF AN INTEGRATED PEST MANAGEMENT PROGRAM FOR STREET TREES IS AN ANNUAL EXPENDITURE OF \$55,000.

12.0 ADMINISTRATION AND REPORTING SYSTEM

12.1 Operations Management System. Management information systems are required to plan and schedule work, as well as to monitor costs and performance. Important components of this system are:

- * Clearly understood definitions of the arboricultural maintenance activities to assist in work activity analysis;
- * A time keeping system that reports man-hours per maintenance activity; and
- * Reporting system to keep the 1989 complete street tree inventory maintained and up-to-date.
- * Regular evaluation of performance levels in man-hours per tree for different work types based on industry standards and city goals.

12.2 Tree Inventory-Based Reporting System. The complete street tree inventory and Tree ManagerTM computer software system should be the basis for the Arboriculture's work reporting and time reporting system. It should be used daily by Arboriculture management to manage the operations and plan for budgets and personnel requirements. Following are benefits that will be derived from the computerized inventory-based reporting system.

Population Management. Vancouver should be pro-actively managing the species composition of their street tree population to attain an acceptable species diversity. For example, nearly 40 percent of the current population is one genus, Prunus. An inventory that is maintained and kept up-to-date will allow for monitoring of species composition. Progress can be measured towards the goal of no one genus representing more than 20 percent and no one species representing more than 10 percent of the population.

Master Street Tree Planting Plan. The inventory can also be the basis of the Master Street Tree Planting Plan which will lead to better decisions on which species should be planted and where. This will prevent over planting of particular species and ensure the appropriate type of tree is planted in each site.

Accurate Information for Management Decisions. Arboriculture management should provide administrators who approve budgets with information regarding the consequences of their funding decisions. Administrators need to routinely receive information showing the results of budget decisions (i.e., number of new trees planted, the trim cycle length, etc). The effects of funding decisions can be seen on trim cycle length and tree population size; trim cycle length will decrease as funding increases for systematic pruning and tree population size will increase as new plantings are added. Both trim cycle length and population size can be determined from Vancouver's new inventory database if it is continually used and kept up-to-date.

Reporting of Work Completed. The street tree inventory should be the basis for the reporting of work completed. Currently, work being completed in the field is manually written on a list by the foreman. These totals are then manually added to produce a monthly report.

Now it is possible for crews to work from a work order printed out from the inventory and record work history information as it is performed.

Liability Identification. The Vancouver inventory identified trees that may be a liability and had not been noticed by the city or residents. In many cities, this is the sole justification for performing an inventory. Vancouver's tree population is generally a very healthy tree population without a great number of large, hazardous trees (based on the 1989 inventory). With the inventory and an annual hazardous tree survey the liability factor will be decreased significantly in Vancouver.

IPM and Insect and Disease Control. The complete inventory provides the opportunity to readily identify species and locations for special monitoring and treatment programs. User specified listings (species by diameter by location, for example) can be produced directly from the inventory database.

Long Term Species Evaluation and Costing. Vancouver is currently facing problems with its species composition. ACRT is recommending major changes in the species being planted. As new species are planted, some will be more expensive to maintain, some will perform above average, some will require less maintenance than others. The current inventory and work reporting system will be very important in evaluating species performance and maintenance needs.

Pro-active Work Reporting. With a complete inventory, almost all work scheduled should be completed from computer generated lists. This will greatly simplify work reporting. It could be as simple as a date and a check mark for the crew foreman when the work is actually completed.

12.3 Periodic Program Evaluation. Arboriculture should perform both in-house and outside evaluations of the Arboriculture program on a periodic basis. These reviews should include:

- * Evaluation of quantities of trees trimmed, removed and planted in comparison with established goals;
- * Evaluation of man-hours per type of work performed in comparison to production expectations (standards);
- * Revision of production standards (if necessary);
- * Evaluation of work procedures to determine need for better equipment/tools or improved skills among workers;
- * Determination of actual trim cycle length and effectiveness of systematic pruning program; and
- * Evaluation of production rates of manual systematic trim crews with bucket systematic trim crews to determine if aerial lift crews can be cost justified.

These evaluations should be performed at least every six months from tree work history and time card data maintained in the Tree Manager™ inventory-reporting computer system. A more comprehensive evaluation by an outside consultant should be performed within five years to document progress and provide recommendations for fine-tuning and improving the Arboriculture program.

13.0 PUBLIC INFORMATION

13.1 Policy Recommendations: A public information program should be established to promote urban forestry programs and policies, and to encourage community support.

ACRT has seen technically proficient, competent programs that provided significant benefits to the community cancelled when the political environment changed and there was no citizen support group present. This happened to some urban forestry programs in the United States during the mid to late 1970's. The programs that survived and flourished had very strong public relations components, with Minneapolis and Milwaukee being prime examples.

Other municipalities have found that public relations specialists can provide valuable expertise in the development of the tree promotional outreach programs.:

- * Arbor Day Tree Plantings
- * Promotional Literature
- * Urban Forestry Displays and Mascot
- * Billboards
- * Newspaper Columns and Radio Shows
- * Resident Watering Programs for Newly Planted Trees

Citizen advocacy groups have been valuable allies in the promotion of progressive urban forestry programs in other major municipalities in North America. Residents are especially enthusiastic about promoting and assisting with tree planting programs.

Timely, personalized response to citizen service requests through the inspection process is strongly correlated with resident satisfaction with arboriculture programs. A polite, timely response to all requests is a key aspect of urban forestry public relations.

FINANCIAL IMPACT: A PROACTIVE PUBLIC INFORMATION SYSTEM WILL REQUIRE AN ESTIMATED \$40,000 ANNUALLY TO IMPLEMENT.

- 13.2 Policy Recommendations: Specialty maintenance should only be performed by the Vancouver Park Board at the cost of the petitioner(s) and with the consent of the adjoining resident(s) or property owner(s) when the work will not compromise accepted arboricultural standards for tree care.

Specialty maintenance is defined as any operation which is beyond the scope of work required for public safety or horticultural reasons, including such operations as pruning for view enhancement, pruning for commercial sign clearance, or pruning because a tree excessively shades a resident's property in the opinion of the resident.

The city is required to maintain trees for public safety and for the health of the tree. Horticultural pruning and safety trimming are obligations of the city. Pruning or other tree maintenance strictly for aesthetics as requested by citizens is not the obligation of the city. For this reason, any tree maintenance in this non-obligatory category must be approved by the city and adjacent property owners and paid for by the person(s) requesting the work.

Standard arboriculture standards must not be compromised in performing specialty pruning. Accepted National Arborist Association (NAA) pruning standards must be followed. No more than one-third of the crown may be removed and topping, shearing and framing are not acceptable practices.

The procedure for individuals, agencies or organizations (herein-after referred to as 'petitioner') to follow for requesting specialty maintenance follows:

- * Petitioner(s) must write a letter to the VPB requesting that a specific tree or trees be pruned.
- * The General Manager (or designee) must meet with the petitioner(s) at the site and inspect the trees.
- * The General Manager (or designee) determines the cost of the specialty maintenance. This quotation can be provided to the petitioner(s) at the time of inspection or mailed at a later date. The General Manager must also determine which residents must sign consent forms for the requested work (based on which property falls under the canopy of the trees in question and abutting property owners).

- * The petitioner(s) requesting the special services must obtain consent signatures and send the forms and the money designated on the quotation to the VPB.
- * The specialty maintenance work will be scheduled as soon as practical following receipt of the money from the petitioner(s).

13.3 Policy Recommendation: Trees may be removed in order to provide reasonable access to private property or to allow for the redevelopment of a streetscape in relation to new building construction. The cost of tree removal and replacement with tree(s) of equal value will be born by the petitioner(s). Tree removal will be approved by the General Manager only if there is no viable economic alternative or if there is a measurable benefit to the city.

The city will not allow removal of a boulevard tree for strictly aesthetic reasons such as view enhancement, excessive shade or blockage of commercial signs. Resident concerns regarding these issues should be addressed by requests for specialty pruning maintenance.

Tree removal will be considered where necessitated in order to provide reasonable access to private property or to allow for the redevelopment of a streetscape in relation to new building construction.

The recommended procedure for tree removal approval is as follows:

- * The petitioner (individual, agency or organization) requesting tree removal must contact the VPB and file a written plan for removing and replacing the street trees in question.
- * The General Manager (or designee) must meet with the petitioner(s) and inspect the site. The trees to be removed must be appraised using the International Society of Arboriculture's tree valuation formula. This can be done by a qualified tree appraiser or by the General Manager (or designee). The City will charge the cost of the appraisal to the petitioner(s) if performed by City staff.
- * The petitioner(s) must replace the trees with trees equal in value to the trees being removed. The location and species of the replacement trees must be approved by the General Manager (or designee).
- * The petitioner(s) must absorb all costs involved with the proposed tree removal and replacement project.

14.0 TREE PRUNING FOR UTILITY CLEARANCE

- 14.1 Policy Recommendation: Street trees that co-exist with utilities should be pruned for public safety to acceptable arboricultural standards.

The line clearance pruning performed by BC Hydro contractors (inspected by ACRT staff and video taped in 1988) were excessive in many cases. There was no operational, regulatory, safety, engineering or practical requirement for the extent of tree clearance from wires being obtained. As a result of this concern by ACRT and VPB, BC Hydro revised their line clearance specifications in 1989. These revised standards are based on specifications recommended to the utility by ACRT and VPB and are acceptable.

VPB should be compensated for trees that die or are damaged as a result of improper arboricultural procedures performed by utilities or their line clearance contractors.

VPB Arborist-Inspector should monitor line clearance contractors to ensure specification compliance.

Only compatible (low growing) species of trees should be planted under wires in the future to reduce possible tree-wire conflicts.

**APPENDIX
SERVICE LEVELS AND RESOURCES**

Budgets were developed based on the recommended five year pruning cycle and a planting rate of 3,000 trees per year. Alternative work practices and new equipment were factored into the projections (see Table 2).

Table 2. Budget Summary of Arboriculture Operating Budget and Langley Tree Farm Budget.

Operations and Capital Expenses	Number of Trees	FIVE YEAR PRUNE CYCLE Recommended Budget (\$CAN)
Arboriculture Operating Budget:		
Systematic Small and Medium Tree Pruning	11,556	772,200
Systematic Large Tree Pruning	4,422	582,700
Systematic X-Large Tree Pruning	560	70,900
Priority Pruning (from residents and hazard tree survey)	900	96,400
Young Tree Cultural Pruning	3,000	33,000
Dead and Hazardous Tree Removal	1,064	117,300
All Stump Removals	1,064	78,600
Emergency Services	100	52,300
Tree Maintenance Subtotal		1,803,400
Dead/Hazardous Tree Replacement Planting	660	164,700
Watering and Fertilizing	660	44,300
Tree Planting Subtotal		209,000
Inspection Services and Vehicles		119,600
Office Operations		83,900
Saw Filer and Small Tool Maintenance		93,000
Public Relations Support		40,000
Arboricultural Technician		46,800
Two Foreman and Two Subforeman		247,300
Integrated Pest Management/Starling Control		55,000
Training and Travel		40,600
Wood Chip Disposal		22,000
Miscellaneous Services/Supplies Subtotal		734,500
Arboriculture Operating Budget		2,760,600
Langley Tree Farm Budget:		
Operating Expenses		225,000
Chargeback Revenues		(310,000)
Langley Tree Farm Budget		(85,000)

Note 1: A seven year pruning cycle would require an Arboriculture Operating budget of \$2,398,800.

Note 2: The historical Arboriculture Operating Budget was \$1.45 million.

(Vancouver, 1990)

Capital budget requirements for both the Park Board and Engineering are summarized in Table 3 below:

Table 3. Capital Budget Requirements for Arboriculture and Engineering for the Street Tree Program.

Park Board Capital Budget (Recurring Expenses)	
Park Board Capital Planting	534,000
Watering and Fertilizing	143,500
Park Board Capital Budget (Recurring)	677,500

Park Board Capital Budget (One Time Expenses)	
Miscellaneous Equipment ¹	160,400
Periodic Program Evaluation	30,000
Park Board Capital Budget (One Time Expenses)	190,400

Engineering Capital Budget:	
Beatification Planting	41,000
Street Widening and Left Turn Bay Planting	30,300
Watering and Fertilizing	13,400
Engineering Capital Budget	84,700

¹ Hydraulic pruning equipment, power digging equipment, water tanks pumps and chainsaws	

The recommended operating budget of \$2.76 million for Vancouver Arboriculture would result in maintenance expenditures of \$31.00 per tree, comparable to cities with recognized excellent programs. By increasing the Arboriculture staff, the trees per employee would be reduced to about 2,111 (from nearly 5,000). This would be comparable to many of the cities interviewed by ACRT (see Table 4).

Table 4. Urban Tree Maintenance Budgets: Comparison of Several Cities

	Population	Number of Trees	Street Tree Budget	Full Time Employees	Dollars per Capita	Dollars per Tree	Trees per Employee
CANADIAN CITIES							
Toronto, ONT	680,000	100,000	3,500,000	80	5.14	35.00	1,250
VANCOUVER, BC	430,000	88,700	1,450,000	18	3.37	16.34	4,928

UNITED STATES CITIES							
Minneapolis, MN	365,000	140,000	6,700,000	104	18.40	47.90	1,346
Milwaukee, WI	640,000	325,000	5,900,000	110	9.20	18.15	2,954
Washington, DC	700,000	110,000	4,020,000	52	5.74	36.50	2,115
Cleveland, OH	570,000	70,000	2,200,000	49	3.86	31.40	1,428

NOTE: All budget figures are in Canadian dollars.

Equipment.

Large equipment purchases that are required to meet the recommended service levels include aerial lifts, disk chippers, two yard dumps, low boy trailers and pick up trucks. This is summarized below in Table 5:

Table 5. Equipment Requirements for Recommended Street Tree Service Levels (for a five year trim cycle).

Equipment	Number of New Purchases	Costs
Aerial Lift Trucks	6	780,000
Disk Chippers	10	250,000
Two Yard Dumps	11	418,000
Two Yard Dump with Vacuum	1	65,000
Low Boy Trailer	6	30,000
Pick Up Truck (light)	2	30,000
Pick Up Truck (Heavy Duty)	1	18,000
Total		1,591,000

Vancouver, 1990

Crew Requirements. Crew requirements for meeting the recommended levels of maintenance and planting are shown in Table 6. A five year cycle would require 42 full-time workers; a seven year cycle would require 36 workers.

EXISTING STAFF IS COMPRISED OF 18 FULL TIME PERSONNEL AND NINE SEASONALS.

Table 6. Man-hour and Personnel Requirements for Systematic Pruning, Removal and Planting of Vancouver's Street Trees.

Crew Type	Five Year Prune Cycle	Seven Year Prune Cycle
Pruning:		
Large and Extra Large Trees (Systematic)	9-10 People (16,166 Man-hours)	6-7 People (11,495 Man-hours)
Small/Medium Trees With Bucket (Systematic)	3 People (4,800 Man-hours)	3 People (4,800 Man-hours)
Small/Medium Trees Manual (Systematic)	11-12 People (19,112 Man-hours)	8-9 People (13,952 Man-hours)
Priority Pruning/Emergency	1-2 People (3,140 Man-hours)	1-2 People (3,140 Man-hours)
Young Tree Cultural Pruning	< 1 Person (990 Man-hours)	< 1 Person (990 Man-hours)
Removal:		
All Tree Removals/Stump Removals	3-4 People (5,270 Man-hours)	3-4 People (5,270 Man-hours)
Planting:		
All Tree Planting	17 People, 6 months (13,701 Man-hours)	17 People, 6 months (13,701 Man-hours)
Watering and Fertilizing	10 People, 4.5 months (6,300 Man-hours)	10 People, 4.5 months (6,300 Man-hours)
TOTAL FULL TIME WORKERS REQUIRED	42	36