

# **THE REGINA URBAN FOREST**

## **MANAGEMENT STRATEGY**

May, 2000

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## EXECUTIVE SUMMARY

Trees make Regina a more desirable and healthy place to live. The city which was once a bald prairie now has an urban forest which includes 124,811 public trees with an estimated value of \$223.4 million. Since the urban forest is a growing asset which appreciates in value it is an investment with an increasing return. A cost-benefit analysis estimates that the average public tree in Regina returns 42 times what it cost to plant and maintain it in environmental, ecological, social and economic benefits to the community and larger ecosystem. However, trees are subject to increasing urban stresses and a healthy, sustainable urban forest can only be achieved with proper planning and resource commitment.

The Regina Urban Forest Management Strategy (RUFMS) provides a comprehensive strategy for managing Regina's urban forest in an arboriculturally sound and cost-effective manner. It builds upon the existing body of programs, standards and specifications used to manage the urban forest, and proposes new programs, policies and procedures as well as some modifications to current practices. The strategy was developed through extensive research and consultation. Work Groups were established to identify the current issues confronting the urban forest and develop the strategies to address the issues. In this manner, the functionally related components of the strategy were developed and formatted into appendices that form a Policies and Procedures Manual that can guide managers and field staff in their daily operations.

It is important to recognize that the components of the RUFMS form an operational system that is integrated and complementary. The RUFMS is not a static strategy but one that is capable of adjusting to change and incorporating modifications and improvements as new information becomes available.

The following programs, policies, standards, procedures and guidelines developed in the RUFMS are intended to address the issues currently confronting the urban forest.

- A policy on Plant Material requiring seedling stock and plant material to be propagated and grown within zone 3a or hardier.
- A policy on Species Diversity that sets a goal of no more than 25 per cent of any one genus per forestry sector; 20 per cent of any one genus in a park; 30 per cent of any one genus on residential streets per forestry sector; and 25 per cent for any one genus for the city as a whole.
- Planting Procedures and Specifications to be used by all civic divisions and private developers planting trees on public land.
- An up-dated Species Selection List for different site types to be included in *Zoning Bylaw #9250*.
- A Master Tree Planting Strategy that:



- 1) provides a comprehensive plan for new tree plantings and replacement plantings based on design principles for the City of Regina;
  - 2) prioritizes the order in which sites should be planted;
  - 3) provides projections for the quantity and species of trees required to assist the City nursery in determining its production plan.
- A policy on Priority Maintenance that establishes categories for prioritizing maintenance work and establishes a response time for each category.
  - Tree Spacing Standards to establish setbacks from various infrastructure elements.
  - Root Pruning Guidelines that explain when root pruning should be done, by whom it should be done and establishes a process for developing an inventory of existing problem sites.
  - A Tree Removal Policy that describes:
    - 1) the criteria for removing a tree;
    - 2) the process to be followed when removing a hazardous or infected tree or to accommodate a civic or private development;
    - 3) who is responsible for the costs and the penalties for failing to comply.
  - A policy on Tree Protection that establishes protective lanes, zones, hoarding, soil compaction and grade change requirements for protecting public trees during construction, maintenance and snow removal activities.
  - A Heritage Trees of Regina Program intended to locate, designate, catalogue and preserve the heritage trees of Regina.
  - An Urban Forest Storm Response Plan that establishes an early warning system for forecasting the magnitude of storms and procedures and mechanisms for coordinating and prioritizing the storm response and clean-up.
  - Threshold Indicators for responding to various tree pests and diseases.
  - A Tree Donation Program that encourages public involvement in enhancing the urban forest by making trees from the City nursery available to community organizations for planting.
  - Establishment of a Public Tree Inventory that will provide the basis for the development of an individual tree inventory.

- Identification of the training needs for employees involved in tree care.
- Safety Requirements that describe the responsibilities, the process and the safety procedures for employees involved in tree care.

Together these components comprise an operational strategy that is comprehensive, practical and future-oriented. They address the critical issues confronting Regina's urban forest and create a shared vision for the future.

## **1.0 BACKGROUND**

### **1.1 Introduction**

The urban forest is essential to the current and future health of our City and its residents. A healthy, well maintained urban forest does not come about without forethought, planning and resource commitment. It is created and maintained through a shared vision, cooperation and an ever-present focus on maximizing benefits and minimizing costs. The Regina Urban Forest Management Strategy (RUFMS) presents a strategy for the development of a sustainable urban forest that is capable of surviving into the future and maximizing the environmental, sociological and economic well-being of the citizens of Regina. The strategy addresses the critical issues confronting the city's urban forest and creates a shared vision for its future. It is not simply a strategy, but also a philosophy that adopts an integrated system of management that utilizes forestry principles, a tree inventory analysis, planting, maintenance and protection standards for tree care, a master tree plan, cooperation among the civic departments involved in tree care, and involvement of the public to achieve a sustainable urban forest. Together the programs, policies, standards, and procedures proposed in the RUFMS form a comprehensive strategy that will ensure the best use of available resources and optimize the benefits of the urban forest.

### **1.2 Definition of Urban Forestry**

“Urban forestry is the sustained planning, planting, protection, maintenance and care of trees, forests, greenspace and related sources in and around cities and communities for the economic, environmental, social, and public health benefits of people.”<sup>1</sup>

Proper management of the urban forest requires the integration of the fields of arboriculture, forestry, landscape architecture, ecology, pest management, economics, planning and sociology. The on-going support and involvement of the public is essential to the long-term vitality of the urban forest.

### **1.3 The Purpose and Objectives of The Regina Urban Forest Management Strategy**

#### **Purpose**

The purpose of the RUFMS is to provide the City with a comprehensive strategy for effectively managing, sustaining and ensuring the growth of Regina's urban forest in an arboriculturally sound and cost-effective manner.

## **Objectives**

To achieve the purpose the strategy encompasses the following thirteen objectives:

- 1) To provide a comprehensive inventory of Regina's public trees;
- 2) To formulate the philosophy, guidelines, criteria and standards for an affordable and sustainable urban forest;
- 3) To review the City's policies and programs related to tree planting, maintenance, replacement and removal and recommend potential changes;
- 4) To develop or update planting and maintenance procedures and incorporate them into a manual intended to ensure the best care of the urban forest;
- 5) To establish guidelines for the prioritization of work needs and service requests;
- 6) To review the current procedures for handling service requests and recommend potential changes;
- 7) To formulate urban forestry management guidelines addressing issues such as the responsibility of the City, the public and developers for planting and maintaining trees;
- 8) To review the role of the City nursery in providing suitable stock for the urban forest and recommend potential changes.
- 9) To review the integrated pest management program in relation to the urban forest and recommend potential changes.
- 10) To review the current urban forestry public participation and education programs and recommend potential changes.
- 11) To coordinate the needs of the RUFMS for a computerized tree inventory and management information system with the project group currently reviewing the feasibility of developing a computerized tree inventory management system.
- 12) To develop a Master Tree Planting Strategy that prioritizes sites for tree plantings and replacements; and
- 13) To review the current legislation related to the urban forest and recommend

potential changes.

## 1.4 The Benefits of the Urban Forest

Trees add aesthetic beauty and a natural richness to our lives. Communities with properly managed and maintained urban forests are more desirable and healthy places to live. The following are some of the long-term environmental, ecological, social and economic benefits the urban forest provides our city.

### 1) Environmental Benefits of the Urban Forest

#### (i) Trees Improve the Quality of Air

Trees trap airborne particles on the surface of their leaves and filter large quantities of gaseous pollutants such as carbon monoxide, sulphur dioxide and the nitrogen oxides from the air. They counteract the global "greenhouse effect" by absorbing carbon dioxide. Through the process of photosynthesis they convert carbon dioxide into oxygen. An average tree captures nearly half a ton of carbon dioxide over the first thirty years of its life. Researchers have found that tree-lined streets had up to 70 per cent less pollution in summer, and significantly less in winter as compared to streets without trees.<sup>2</sup>

#### (ii) Trees Improve the Quality of Water

Trees and vegetation act as a natural filter by intercepting fertilizers and other pollutants flowing into watercourses through ground and surface runoff. Soil erosion and siltation of urban watercourses is reduced by the placement of trees and vegetation along the banks of watercourses.

#### (iii) Trees Help Reduce the Negative Effects of Noise Pollution

Noise directly effects the quality of life in the city. Tree planting can be used to diminish the psychological effects of noise pollution by visually eliminating the source. Effective noise barriers can be created when trees are planted in combination with earth berms and specialized fencing.

#### (iv) Trees Reduce Wind and Protect Against Ultra-Violet Rays

The strategic placement of trees can moderate wind speed at ground level and protect against the sun's harmful ultra-violet rays.

#### v) Trees Reduce Temperature and Heating Costs

Because of heat-absorbing surfaces and land clearing, urban areas generate higher temperatures than the surrounding rural areas. Tree canopies can help to diffuse this effect which is known as "heat islands" by providing shade and evapotranspiration. Tree shelters reduce heating costs in winter.

(vi) Trees Reduce Stormwater Runoff

Trees can significantly reduce stormwater runoff. Their roots absorb the water while their leaves slow the impact of the rainfall thereby reducing the load on storm sewage systems. The resultant reduction in flood size translates into less damage to life and property. Studies show that the urban forest can reduce storm water runoff from 12 to 17 per cent.<sup>3</sup> For a moderate sized community the estimated savings are approximately \$600,000 annually.<sup>4</sup>

2) Ecological Benefits of the Urban Forest

City trees and urban natural areas provide ecological diversity and are an important habitat for a variety of flora, birds, small mammals and other wildlife. The urban forest also serves as a stopover point for migratory birds. Preserving this network of habitats and migration systems assists in promoting a natural form of pest control in the City.

3) Social Benefits of the Urban Forest

(i) Trees Impart a Distinctive Character to the City

The beauty which trees add to any landscape is especially appreciated in urban settings. They enrich the aesthetic experience of the city and establish a visual harmony and continuity along city streets.

(ii) Trees Soften and Screen Urban Development

Combined with good planning and design trees can help screen and meld various urban structures and uses with a green unity.

(iii) Trees Help Moderate the Stress of Urban Life

People have a need to maintain links to the natural environment. In the harsh environment of urban centres, the urban forest allows us to experience the natural world in a tangible form that seems to moderate the stress of everyday urban life. Trees provide privacy and a sense of peace and have a restorative effect that can improve physical well-being.

(iv) Trees Provide Passive Recreation Opportunities

As the city's population continues to age there will be an ever-increasing demand for more passive recreational opportunities in the form of treed parks and other green space.

(v) Trees Promote Understanding of the Natural World

Having an urban forest within our city provides an important opportunity for residents to appreciate and understand the natural world. Trees are a natural source for stimulating a child's imagination and sense of wonder.

(vi) Trees Promote Community Identity

Trees offer beauty and create a sense of place in the community. A healthy urban forest can be a great source of civic pride. Tree planting programs allow citizens to participate in creating a city they can be proud of. A study conducted in Chicago by the University of Illinois concluded that urban forests build stronger communities and in so doing contribute to lower levels of domestic violence.<sup>5</sup>

4) Economic Benefits of the Urban Forest

(i) Trees Promote Growth and Prosperity

A well maintained urban forest is a significant factor in promoting community prosperity and in attracting tourism and investment.

(ii) Trees Enhance Property Values

Public trees and trees on private property substantially increase property values and sales. Studies indicate that trees can enhance the marketability of a home and add 5 to 10 per cent to its market value.<sup>6</sup> The economic return to the City in the form of property, sales and taxes is substantial.

(iii) Trees Reduce Energy Costs

Effective windbreaks can reduce heating costs by 10 to 25 per cent in winter. In summer, properly located trees can reduce air conditioning costs up to 50 per cent (Moll 1989)<sup>7</sup>.

(iv) Trees Create Employment

Trees create employment and contribute to the local economy through their

production, importation, design, planting and maintenance.

(v) Trees Are A Community Asset

A properly maintained urban forest is an investment that appreciates in value. A 1985 study by the American Forestry Association (now called American Forests) estimated the annual economic value of a fifty-year old urban tree as follows:

- Reduction in air conditioning use: \$73
- Soil erosion and storm water control: \$75
- Wildlife shelter: \$75
- Air pollution control: \$50
- Total value in 1985 dollars: \$273
- Total value compounded at 5 per cent interest for 50 years: \$57,151<sup>8</sup>

While there are various opinions as to the economic value of a tree, all estimates support the basic contention that a tree's value far exceeds the costs of planting and maintaining it.

## 1.5 Tree Related Problems

While trees provide many benefits to the community they can also create problems. Split or broken limbs can pose a hazard to public safety or property. Hanging limbs can obstruct sightlines and traffic signs for motorists and pedestrians. The roots of certain tree species such as poplar and willow can invade leaky water or sewer pipes and cracked foundations causing additional damage. Roots can also invade storm sewers creating problems with storm water runoff. Interfering trees growing in inappropriate locations such as easements and dikes or trees inappropriately planted in parks, buffers or streets can create problems. These trees can restrict access to easements, impair the integrity of dikes, cause heaving or deterioration to sidewalks and roadways, as well as problems to foundations and underground services. Droppings from trees can clog storm sewers, catch basin grates and interfere with drainage along roadways. Leaf-fall creates water quality issues when leaves sink to the bottom of Wascana Creek, degrade and contribute to the build-up of sludge that will eventually require dredging to clean-up. In the winter trees can inhibit snow ploughing and removal activities and increase the costs associated with winter road maintenance.

Some of the problems associated with trees can be mitigated through proper species selection and planting locations. Other problems are an inevitable result of having an urban forest. However, people are attuned to cities with trees. Cities have an unequivocal need for coherence based on continuity, rhythm, repetition and linkage that trees can provide. Trees contribute to our quality of life and make our city a more enjoyable and healthy place to live.



## **2.0 THE DEVELOPMENT PROCESS**

### **2.1 The Steering Committee**

The Steering Committee was established to guide and direct the development of the RUFMS. The committee was comprised of the Policy Analyst, Planning and Design (Chairperson), the Manager of the Planning and Design Division, the Manager of Open Space Management Division, the Superintendent of Urban Forestry, the Supervisor of Integrated Pest Management, the Superintendent of Parks Maintenance, the Superintendent of Open Space Services, the Park Development Superintendent, the Forestry Technician, the Landscape Architect, the Coordinator of Landscape Design and Capital Planning, the Open Space Services Coordinator and a representative from the Wascana Centre Authority.

### **2.2 Involvement of the Internal and External Stakeholders in the Development Process**

Involvement of both the internal and external stakeholders in the development process was an important aspect in developing the RUFMS. As noted in section 3.4 Responsibilities, a number of City sections, divisions and departments are involved in caring for Regina's urban forest. Staff from the Urban Forestry Section, Parks Maintenance Section, Open Space Services Section, Support Services Department, Integrated Pest Management, Planning and Design Division, Urban Planning Division and Emergency Planning participated in the Work Groups that developed the various components of the strategy. Members of The Regina Urban Environment Advisory Committee also provided input into some of the Work Groups. The Public Works Department, Municipal Engineering Department, Bylaw Enforcement Division, Building Division, Real Estate Division and Legal Department were consulted on those aspects of the strategy that affected them.

In terms of the external stakeholders, a representative of The Wascana Centre Authority sat as a member of The Steering Committee. A draft of specific sections was discussed with the external stakeholders such as Sask Power, Sask Energy, Sask Highways, Sask Tel, The Regina Home Builders Association, Cable Regina, Regina's Market Square and The Regina Urban Environment Advisory Committee.

### **2.3 The Work Groups**

The following Work Groups were established to develop the major components of the RUFMS.

- 1) Design and Development
- 2) Tree Planting
- 3) Tree Maintenance
- 4) Tree Removal

- 5) Tree Protection
- 6) Pest Management
- 7) Staff Training and Development
- 8) Community Involvement and Education
- 9) The Management Information System
- 10) The Master Tree Planting Strategy

The Work Groups consisted of supervisory and field staff who possessed an expertise in the above areas together with the Policy Analyst to guide the process from a research standpoint. Each Work Group developed a work plan which identified:

- a) the objectives to be achieved;
- b) the key issues or problems to be overcome;
- c) the methodology to be employed in achieving the objectives;
- d) the internal and external persons and organizations who should be involved in the process;
- e) any financial implications involved; and
- f) the timelines for completing the tasks.

### **3.0 OVERVIEW OF THE URBAN FOREST PROGRAM**

#### **3.1 Goal Statement**

Regina's urban forest is essential to the current and future health of our City and its residents. The goal of Regina's Urban Forest Program is to proactively manage and sustain the City's forest in an arboriculturally sound and cost-effective manner that provides the greatest environmental, economic and social benefits to our residents. This goal will be achieved through the programs, policies, standards and specifications contained in the RUFMS.

#### **3.2 Objectives**

The objectives of the Urban Forestry Program are as follows:

- 1) To maintain a current inventory of all trees on public land required for the effective management of the urban forest.
- 2) To preserve a healthy urban forest through regular maintenance and monitoring.

- 3) To use a variety of proactive methods to protect trees from diseases and pests.
- 4) To protect people and property from potential tree hazards.
- 5) To remove trees that are dead, diseased, hazardous or in conflict with their surroundings.
- 6) To train and develop staff in the proper methods of planting and pruning trees.
- 7) To encourage other civic departments, the public and the private development industry to participate in the greening of Regina.

### **3.3 Statutory Authority**

*Forestry Bylaw #9607* provides:

- 1) protection for trees on public land;
- 2) authority for the Director of Community Services or his designate to enforce the provisions of *The Pest Control Act* on private property;
- 3) authority for the Director to require the owner of trees on private property which constitute an imminent danger to public safety or public property to take action to eliminate the hazard; and
- 4) fines for any person who contravenes the bylaw.

*Zoning Bylaw #9250* provides landscape and buffering regulations for the city including installation standards and a list of commonly used trees.

Servicing Agreements under *Subdivision Bylaw #7748* that controls and regulates the subdivision of land within the City of Regina including landscaping of parks and boulevards.

### **3.4 Operating Budget**

Figure 1 shows the Urban Forestry budget and that portion of the Integrated Pest Management budgets directed to the urban forest for 1998. Figure 2 shows these budgets in relation to the Community Services Department and City of Regina budgets.

Figure 1: The Urban Forestry and Integrated Pest Management Budgets for 1998.

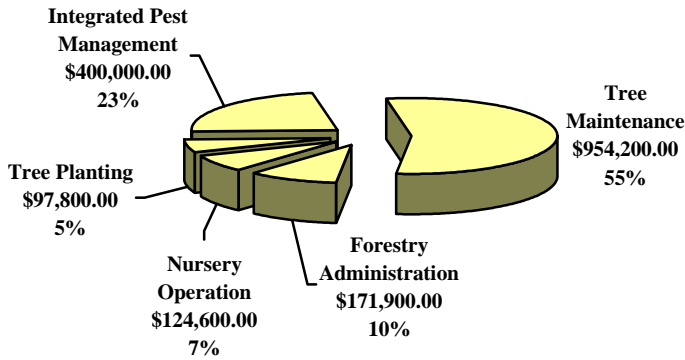
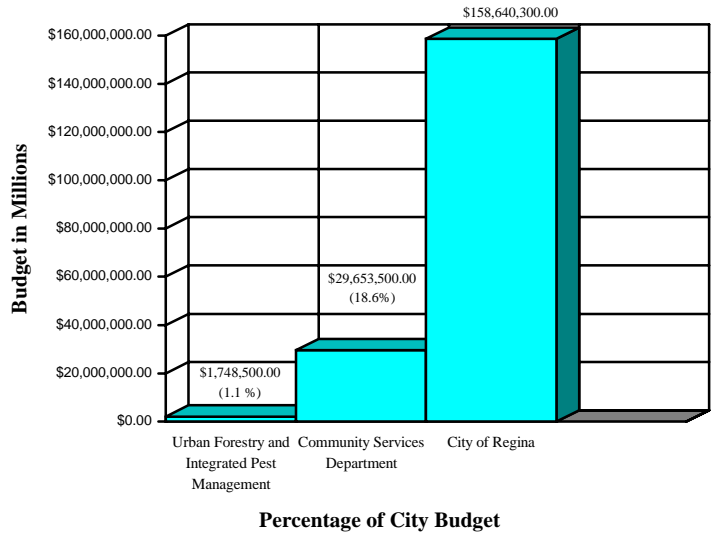


Figure 2: The Urban Forestry and Pest Management Budgets as a Percentage of the Community Services and City of Regina Budgets for 1998.



### 3.5 Responsibilities

Maintaining a healthy urban forest requires a variety of activities and a significant investment of resources. It also requires the active interaction and participation of several City divisions and sections as well as the Parks and Recreation Board, the development industry and the general public. The responsibilities of the various stakeholders in the urban forest are described below. A more detailed description of their responsibilities is provided in Appendix "A" Responsibility for the Urban Forest.

#### 3.5.1 Urban Forestry Section

The Urban Forestry Section is responsible for planting and maintaining trees on streets, roadways, traffic medians, easements, public parking lots and for selective work in naturalized areas. In addition the Urban Forestry Section is responsible for planting replacement trees in parks while the Parks Maintenance Section is responsible for watering the trees.

#### 3.5.2 The Parks Maintenance Section

The Parks Maintenance Section is responsible for the minor maintenance of small and medium sized trees in parks, cemeteries and for selective work in naturalized areas.

#### 3.5.3 The Open Space Services Section

The Open Space Services Section is responsible for planting and for the minor maintenance

of small and medium sized trees in golf courses and athletic fields.

#### **3.5.4 The Integrated Pest Management Section**

The Integrated Pest Management Section is responsible for monitoring the urban forest in order to identify and track insect populations and occurrences of tree diseases. The section is also responsible for implementing programs to manage pests and diseases that affect the health of the urban forest.

#### **3.5.5 The Planning and Design Division**

The Planning and Design Division is responsible for designing the urban forest and for providing planning expertise for developing programs, policies and standards necessary for managing and sustaining it.

#### **3.5.6 The Support Services Department - Park Development Division**

The Park Development Division is responsible for the installation of trees in parks and athletic fields when new construction or significant upgrades are involved. The division is also responsible for the maintenance of plant material until acceptance by the owner.

#### **3.5.7 Community Services – Urban Planning Division**

The Urban Planning Division is responsible for reviewing development plans with the purpose of providing minimum requirements for the landscaping of developed lots, street frontages, paved areas and open spaces, buffer areas and visual screens. The intent is to mitigate pollution, soften views, buffer incompatible land uses, conserve energy, improve the general appearance of the neighbourhood and provide an overall positive image of the City. The department is also responsible for the enforcement of *Zoning Bylaw #9250*.

#### **3.5.8 Community Services - The Bylaw Enforcement Division**

The Bylaw Enforcement Division ensures compliance with land use and property maintenance bylaws by providing inspection, public information and enforcement services. As regards the urban forest, Bylaw Enforcement Division enforces compliance with *Forestry Bylaw No. 9607*, the Dutch Elm Disease Control Regulations, the Tree Protection Policy and the Tree Removal Policy.

#### **3.5.9 Municipal Engineering Department**

Municipal Engineering is responsible for decisions relating to the safe and efficient movement of traffic and goods on city streets and therefore are concerned with the placement of street trees.

Where the urban forest is involved, the department is responsible for planning and designing municipal development projects in coordination with Planning and Design.

### **3.5.10 Public Affairs and the Horticultural Extension Officer**

The Horticultural Extension Officer, in concert with Public Affairs, is responsible for educating the general public regarding horticultural, forestry and pest control programs.

### **3.5.11 Parks and Recreation Board**

As concerns the urban forest, Parks and Recreation Board has the authority to advise, assist and make recommendations, review existing policies, recommend new measures and resolve public issues. It also has the authority to approve or deny all development and private requests for tree removals on public land which are not deemed a “hazard”.

### **3.5.12 The Development Industry**

The development industry is responsible for complying with civic bylaws and requirements intended to protect public trees during construction activities. They are also responsible for planting and landscaping in accordance with *Zoning Bylaw #9250*, *Traffic Bylaw* and the Open Space Development Standards Manual.

### **3.5.13 The Wascana Centre**

One of the most important and beautifully landscaped areas of Regina’s urban forest is the Wascana Centre. The Centre is a 930 hectare area in the heart of Regina that was established in 1962 by an act of the Saskatchewan legislature, *The Wascana Centre Act*. The Act unites the Province of Saskatchewan, the City of Regina and the University of Regina into a corporate body known as the Wascana Centre Authority. The Centre includes many of Regina’s government, education, culture, recreation and conservation facilities. Included is the Saskatchewan Legislative Building, the University of Regina, the MacKenzie Art Gallery, the Royal Saskatchewan Museum, the Saskatchewan Science Centre, Douglas Park and Sports Centre, Wascana Lake as well as many other facilities and features.

### **3.5.14 The General Public**

The general public is responsible for complying with all forestry statutes and bylaws. Homeowners are responsible for watering newly installed plantings on boulevards adjacent to their residences.

## **4.0 THE CURRENT STATUS OF REGINA'S URBAN FOREST**

### **4.1 The Urban Forest as a Growing Asset**

In Regina trees have long been recognized as a valuable community asset. The ability of the urban forest to appreciate rather than depreciate in value makes it unique among the City's assets. The tree maintenance budget is therefore an investment with an increasing return.

Based on the International Society of Arboriculture's tree valuation formula and the Agriculture Alberta Tree Replacement Value, the asset value of Regina's public tree population is estimated to be \$223.4 million. The value of an average tree in Regina is estimated to be \$1,790.00.

### **4.2 Cost-Benefit Analysis**

A 1994 study entitled "Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project" conducted a cost-benefit analysis to estimate the annual dollar value of costs and benefits over a 30 year period associated with planting and maintaining an urban tree. Costs included the initial cost of planting the tree (plant material and labour); the annual maintenance costs; and the administrative costs of supervising staff involved in the care of the urban forest. Benefits to the community included dollars saved or added with respect to energy savings, air pollution mitigation, hydrology, noise abatement, soil conservation, property values, recreation and wildlife habitat. The study estimated the annual benefits of a 30 year old tree to be \$402.00 (U.S.).

It is estimated that in 1998 the City of Regina spent \$15.18 (planting \$200.00 per tree ÷ 31 years average age of a public tree in Regina = \$6.45, maintenance \$7.65 and administration \$1.08 = \$15.18) annually per public tree. Based on the Chicago study the average public tree in Regina which is 31 years old would return \$632.00 (Cdn) in benefits annually to the community. This is a 4163 per cent return on the investment. A cost-benefit ratio of 41.6 indicates that the value of projected benefits is nearly 42 times the value of projected costs for a public tree in Regina. While the benefits to be derived economically, environmentally and socially in Chicago may differ somewhat from Regina, the study does provide valuable insight into the relative value of a tree in an urban setting. Allowing for the difference between cities, the analysis suggests that the benefits associated with trees in Regina far outweigh the planting and maintenance costs.

### **4.3 The Urban Forest Inventory**

An inventory of Regina's public trees was conducted in December, 1996. The tree inventory provides a portrait of the urban forest. The importance of the tree inventory in

managing the urban forest is based on the premise that the City must have a complete

picture of the tree population in order to ensure the proper care of existing trees, plan for the future and make the most effective use of available resources. The inventory provides basic information on the number of trees, age and species composition, tree removals and replacements, public hazards and maintenance needs that are the basis for planning and decision-making.

#### **4.4 Inventory Methodology**

A Tree Inventory Form was developed to ensure consistency in collecting the data. (See Appendix "B" Tree Inventory.) The form was pre-tested for efficacy on a test sample. A street tree inventory and a parks and open space tree inventory were undertaken by field staff. Tree information for each city block and each park was entered into hand-held computers during site visits. The information was aggregated by sector on the computer to create a database. See Map I Forestry Sectors on page 17a.

#### **4.5 The Benefits of the Tree Inventory**

The following benefits will be derived from the tree inventory.

- 1) **Species Composition**  
Knowledge of the over-all species composition will enable the city to pro-actively manage the tree population to achieve an acceptable species diversity.
- 2) **Tree Maintenance**  
Identification of trees requiring emergency work, priority prunes or removals will allow priorities to be established and resources allocated based on the needs of the trees.
- 3) **Tree Plantings**  
Identification of stumps and gaps will allow tree plantings to be prioritized.
- 4) **Master Tree Plan**  
The inventory provides the basis for planning and decision-making. It is a key planning tool in determining what species and locations should be planted in the future and in developing a master tree plan.
- 5) **Individual Tree Inventory**  
The tree inventory which identifies trees by blocks will form the basis for a future individualized tree inventory management information system. (See Section 10.0 The Management Information System.)



## **4.6 Limitations of the Inventory**

Certain limitations were imposed by the method in which the inventory was conducted.

- 1) The inventory was conducted in December 1996 when field staff were available. Because the leaves were not on the trees at that time, insect and disease problems were not visible. An attempt was made to overcome this problem by supplementing the data collected in the tree inventory with data previously collected by the Pest Management section on insect and disease problems.
- 2) The inventory was conducted by city block and is not an individualized tree inventory. This was due to the lack of manpower needed to conduct an individual tree inventory. The Open Space Management Division is currently developing an automated Tree Inventory System. It is intended that this system will provide an individual tree inventory with each tree located in the data base by street and address.
- 3) The inventory does not include trees on private property. The use of digital aerial photos to estimate the number of trees on private property and the over-all canopy coverage for Regina was considered but found to be cost prohibitive.
- 4) Because the inventory was conducted in the late fall and winter it did not provide data on the trees' crown development, foliage and root system necessary for judging the condition of the trees and assigning a qualitative score on the overall condition of the urban forest.

## **4.7 Public Trees Profiles**

The results of the public tree inventory were aggregated and profiles were developed for the city as a whole, street trees, park trees, cemeteries, golf courses and each of the 77 forestry sectors in Regina.

### **4.7.1 The City of Regina Profile**

- Number of Trees

Regina has a total of 124,811 public trees. Of this total 84,094 are street trees, 31,880 are park trees, 5,292 are trees located in the City's two cemeteries and 3,545 are trees in the City's three golf courses.

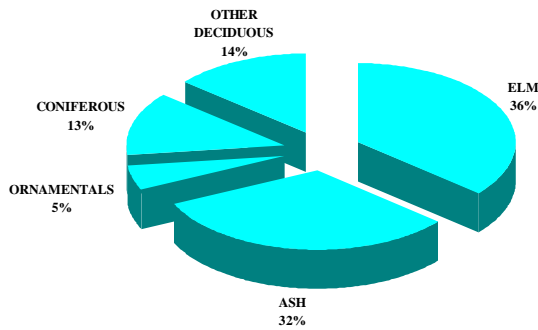
- Species Composition/Diversity

Elm is the most common group representing 36 per cent of the public tree population. This is followed by ash which constitutes 32 per cent, deciduous trees 14 per cent, coniferous 13 per cent and ornamentals 5 per cent.

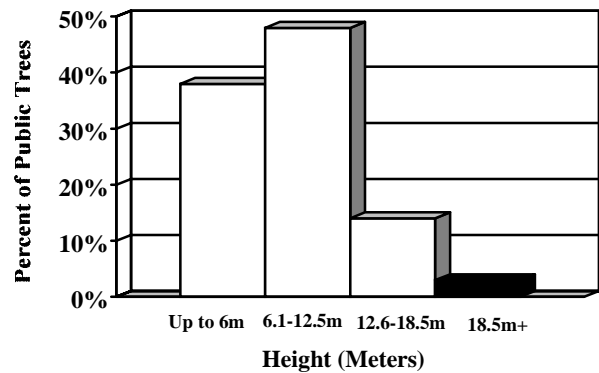
- Tree Height

The average mean height for a public tree in Regina is 7.64 meters. Thirty-eight per cent of the public trees are smaller trees up to 6 meters in height, 49 per cent are 6.5 to 12 meters, and 13 per cent are 12.5 to 18.5 meters.

**Figure 3: Species Diversity Overview**



**Figure 4: Height Profile**



- Age Distribution

The weighted average age of Regina’s public trees as determined by the International Society of Arboriculture’s method is 31.27 years. Elms have an average age of 38.54, coniferous 34.30 years, ash 28.90 years, other deciduous trees 20.57 years and ornamentals 11.87 years.

- Tree Diameter

The average mean diameter of Regina’s public trees is 23.76 cm. Sixty-six per cent of the public trees are larger than 18 cm in diameter, 11 per cent are medium sized trees 12 to 17 cm and 23 per cent are less than 12 cm in diameter.

- Emergency Prunes

Based on the inventory, 43 trees or .03 per cent of the public tree population required an

emergency prune because they had branches that were split, down, obstructed a traffic sign or posed a threat to public safety or property.

- **Priority Prunes**

The inventory identified 2,610 trees that required a priority prune because they had low or broken branches, disease or insects, were causing a sightline obstruction or contained over 30 per cent deadwood. These trees constituted 2 per cent of all public trees. The remaining 98 per cent of the public trees required only a routine prune during their next scheduled pruning cycle or were not rated because they are evergreens and do not require pruning.

- **Vacancies**

The inventory identified 7,129 vacant sites. This constitutes 5 per cent of the total tree planting sites in the city.

- **Removals**

There were 437 trees that required removal because they were dead, diseased, a hazard or a stump. The majority of the removals were located on the City's golf courses, with 332 trees identified as requiring removal.

#### **4.7.2 Street Trees Profile**

For the purpose of the inventory, trees on special use areas such as boulevards, buffer strips, public walkways, medians, traffic islands and storm water channels have been included with street trees.

There are a total of 84,094 street trees in Regina. Elms constitute 44 per cent of all street trees, ash 35 per cent, other deciduous 9 per cent, coniferous 7 per cent and ornamentals 5 per cent. The average mean height of a street tree is 7.15 meters. The average mean diameter is 26.59 cm. In terms of their maintenance needs 43 street trees or .05 per cent were identified as requiring an emergency prune, 1,569 trees or 2 per cent a priority prune and 82,482 trees or 98 per cent did not require a prune until their next scheduled pruning cycle. The most frequently cited reason (32) for an emergency prune was because the tree had a split branch that posed a threat to public safety. The most frequently cited reason (820) for requiring a priority prune was because the tree had low hanging branches. The second most frequently cited reason (320) for a priority prune was because the tree was contacting overhead wires. Twenty-eight street trees were identified for removal with the most frequently cited reason being the tree was dead.

#### **4.7.3 Park Trees Profile**

There are 270 parks in Regina which contain a total of 31,880 trees. Coniferous trees comprise 30 per cent of park trees, other deciduous 24 per cent, ash 20 per cent, elms 18 per cent, and ornamentals 8 per cent. The average mean height of a park tree is 6.96 meters. The average diameter is 13.92 cm. No park trees required an emergency prune for safety reasons, 195 or .61 per cent required a priority prune and the remaining 99.39 per cent did not require pruning until their next scheduled cycle. No trees were identified for removal. All the trees requiring a priority prune were because the trees had over 30 per cent deadwood.

#### **4.7.4 Cemetery Trees Profile**

There are a total of 5,292 trees in the City's two cemeteries. The trees consist of 3,026 ash which comprise 57 per cent of the tree population, 1,137 elms or 21 per cent, 945 coniferous or 18 per cent, 135 other deciduous or 3 per cent and 49 ornamental or 1 per cent. The average mean height of the trees is 10.40 meters. The average mean diameter is 33.09 cm. No cemetery trees required an emergency or priority prune. The inventory did not identify any cemetery trees for removal.

#### **4.7.5 Golf Course Trees Profile**

There are a total of 3,545 trees in the City golf courses located within the city limits. (The Regent Park Par 3, The Joanne Goulet and The Lakeview Par 3.) Other deciduous trees constitute 44 per cent of the total golf course trees, coniferous 23 per cent, elms 19 per cent, ash 12 per cent and ornamentals 2 per cent. The average mean height of the trees is 6.63 meters. The average mean diameter is 18.53 cm. No golf course trees required an emergency prune. Seven hundred and sixty-four trees or 22 per cent of the total golf course trees required a priority prune. Most of the trees identified for removal (332 of a total 437) in the inventory were located on the City's golf courses. One natural stand of trees on The Joanne Goulet Golf Course that had deteriorated, accounted for 232 of the total removals.

#### **4.7.6 Forestry Sector Profiles**

Appendix "C" Sector Profiles provides a profile of each of the city's 77 forestry sectors. Map I: Forestry Sectors on page 17a illustrates the location of the forestry sectors on a city map.

An overview of the Sector Profiles is provided below.

- Species Diversity

It is revealing to note that all 77 forestry sectors exceed the species diversity guideline proposed in Appendix "D" Tree Planting Priorities, Requirements, Procedures and Specifications which states that there should be no more than 25 per cent of any one genus in a sector. Furthermore, the inventory reveals that one species constitutes over 50

per cent of the tree population in 37 sectors (elms in 24 sectors, ash in 12 sectors and coniferous in 1 sector).

- Average Age of Species

The following table with the exception of the ornamentals is based on the Prairie Farm Assistance Administration estimates of the longevity of different tree species used for shelterbelt plantings in Saskatchewan. While the estimates are based on shelterbelt plantings and do not take into account the various urban stresses that impact the life of an urban tree, the estimates do provide valuable information on the longevity of various species based on our climate and soil conditions.

**Table 1: Tree Longevity**

Species	Longevity
ash	60 years
coniferous	70 – 80 years
deciduous	45 – 60 years with the exception of poplars (12 – 50 years)
elm	60 years
ornamental	25 – 40 years

When the above longevity estimates are compared to the average age of the different tree species in the various forestry sectors, it is possible to identify those trees that may need replacement in the next ten years.

**Table 2: The Average Age of Sector Trees**

Species	Sector	Number of Trees	Average Age
Ash	30	1,442	50 – 53
Total		1,442	
Coniferous	14	8	62.01
	16	56	62.01
	30	410	72.78
<b>Total</b>		474	

<b>Species</b>	<b>Sector</b>	<b>Number of Trees</b>	<b>Average Age</b>
Deciduous	1	75	54.09
	2	9	35.43
	4	350	35.43
	16	51	41.26
	30	26	42.69
	51	11	45.70
	63	31	37.06
	82	264	44.19
	86	14	37.96
<b>Total</b>		831	
Elm	16	669	51.27
	51	828	65.76
	53	1141	61.42
	63	984	50.33
	86	1183	53.26
<b>Total</b>		4,805	
Ornamental	6	39	21.65
	8	88	19.40
	9	31	16.60
	10	68	16.16
	14	1	32.48
	16	6	27.07
	17	31	27.74
	18	40	23.82
	20	29	15.47
	21	86	17.11
	30	15	17.32
	33	30	15.70
	36	27	15.34
	39	59	15.01
	51	2	21.65
	55	82	23.41
	62	18	19.85
	66	44	17.14
	67	12	16.24
	68	236	20.66
	70	91	15.02
	73	79	17.59
	74	11	15.16
80	56	18.14	
86	7	18.41	
88	18	23.55	
<b>Total</b>		1,206	

Species	Sector	Number of Trees	Average Age
<b>Grand Total</b>		8,758	

It is significant to note that the average age of 37 per cent of the city's elms is 40 years or older.

- Emergency Prunes

Forty-three trees required an emergency prune. Of these 42 are in the southeast quadrant that was hit by a storm just prior to the inventory. It should be noted that the tree inventory was conducted in December 1996 and the emergency prunes identified were corrected.

The following sectors required more than two emergency prunes.

Sector 59	-	18 emergency prunes
Sector 58	-	11 emergency prunes
Sector 57	-	7 emergency prunes
Sector 60	-	4 emergency prunes

- Priority Prunes

The following sectors required more than 100 priority prunes.

Sector 26	-	667 priority prunes
Sector 23	-	460 priority prunes
Sector 25	-	176 priority prunes
Sector 57	-	154 priority prunes
Sector 58	-	146 priority prunes
Sector 83	-	105 priority prunes
Sector 4	-	101 priority prunes

- Vacancies

Only 15 of the forestry sectors had more than 10 per cent of their total tree planting sites vacant. With the exception of sector 58 in Whitmore Park the sectors on the outer perimeter of the city in the new subdivisions have the greatest number of vacant tree planting sites. This can be explained by the fact it usually takes from 3 – 5 years in new developments before housing and landscaping is completed.

The following sectors had more than 300 vacant tree planting sites.

Sector 25	-	546 vacancies
Sector 38	-	481 vacancies
Sector 72	-	477 vacancies
Sector 69	-	402 vacancies

Sector 40	-	379 vacancies
Sector 23	-	378 vacancies
Sector 34	-	362 vacancies
Sector 58	-	349 vacancies
Sector 15	-	347 vacancies
Sector 39*	-	344 vacancies
Sector 27	-	333 vacancies
Sector 16	-	321 vacancies
Sector 62	-	307 vacancies
Sector 73	-	301 vacancies

\* This sector is primarily industrial.

- Removals

The following sectors required more than six tree removals.

Sector 26*	-	325 tree removals
Sector 4**	-	100 tree removals
Sector 57	-	12 tree removals
Sector 65	-	10 tree removals
Sector 8	-	10 tree removals
Sector 11	-	10 tree removals
Sector 18	-	9 tree removals
Sector 24	-	7 tree removals
Sector 32	-	7 tree removals
Sector 33	-	7 tree removals

\* These trees are located on the Joanne Goulet Golf Course

\*\* These trees are located on the Regent Park Par 3 Golf Course

#### 4.7.7 Other Public Trees

In addition to the public trees on City land, Regina also has a significant number of public trees on provincial and federal government lands and The Wascana Centre. (See section 3.5.13 The Wascana Centre).

The Wascana Centre is estimated to include over 40,000 trees. Ash is the dominant species comprising approximately 23 per cent of the trees. Elm, poplar and Colorado spruce each comprise about 12 per cent. White spruce and pine each comprise about 8 per cent while white maple and willow comprise about 5 per cent each. The remaining 15 per cent of the Centre's trees consist of species such as birch, linden, crabapples and tree lilacs.

Other public lands that include significant tree populations are Government House and the Royal Canadian Mounted Police Academy. Tree statistics are not available for these sites.



## **5.0 DESIGNING THE URBAN FOREST**

### **5.1 Context**

Regina is a city built on what was once a treeless mixed grass prairie. Before settlement by immigrants in the late 1800's, creek shorelines and floodplains were the only locations where trees grew in the immediate vicinity of the area now defined as Regina. Reginans are perhaps more attuned to the important role trees play in making our urban environment hospitable because surrounding us on all sides, what was once treeless prairie is now mostly treeless agricultural fields - except for shelterbelt plantings around farmsteads and between fields. The moment one leaves the city limits, the significance of tree planting on our flat, arid, windy plain becomes obvious.

Some areas close to Regina, particularly the Qu=Appelle Valley to the north, abound with trees. Green ash, black poplar, trembling aspen, and Manitoba maple are common. American elm is also found; burr oak is somewhat rarer. It is in these areas that we see the tree species native to the broader region, although not necessarily well suited to the demands of the urban environment. For example, Manitoba Maple, also known as Box Elder, (*acer negundo*) can be found growing throughout the prairies, but is only suitable to plant within a park or residential yard due to its low, broad branching habit and irregular form. Relative to other urban centres in North America, the difficulties encountered with tree planting in Regina are great: temperature extremes, a high evapotranspiration rate, frequent drought, disease, as well as heavy clay soils have an effect on the urban forest.

Planting trees is an act of faith and foresight. Looking at early pictures of Regina, one appreciates the impact and importance of tree planting to our present urban environment. Virtually every tree in Regina was planted by hand, however, they seem as if they were always here. We must remind ourselves that the Provincial Legislature was visible from all areas of the city when it was first built. It stood out in an ocean of grasses and cultivated fields. In contrast, late in the century, we view the Legislature, through vistas framed by elms, ash and willows from throughout the city. The tall spruce that line and define a significant portion of the east side of Albert Street in rows near the legislature were once a humble grouping of stubby trees. Victoria Park, now an oasis in the heart of the city, was once a treeless patch of dusty clay.

### **5.2 Design Philosophy**

Trees are indispensable not only for their intrinsic beauty and capacity to improve air quality, provide shade, and screen visual clutter, and mitigate winds, but also for their ability to unify the city as a spatial structure, to provide coherence and a sense of well-being. Trees should be recognized as an essential part of the infrastructure of the city and not merely as a decoration or embellishment. Imagine Regina without trees; would we want to live here, regardless of whether or not good roads, clean water and electricity were

provided?

In the past the City of Regina has embraced a design-philosophy typical of other North American centres: a few species of trees have been used over a majority of the city; grander streets and avenues of the greatest civic/social importance were planted more densely and consistently; and commercial and industrial areas have less intensive planting or no planting at all. As is also typical of other cities, the greatest diversity of tree species is found in residential areas. For the most part, this philosophy and aesthetic practice, imported mostly from Great Britain, Ireland and Europe (the homelands of the majority of immigrants who settled the city) has served us well.

American elm and green ash dominate the urban forest in Regina. One of the greatest challenges to the health of urban forests in North America is Dutch elm disease. This disease attacks our most significant urban forest species - American Elm. One can criticize the monocultures of species across North America, but in fact these were, and in some cases still are, the species of tree most suited to planting in our cities. To its credit, the City of Regina has avoided the extensive planting of fast-growing, but "problem" trees like poplar and Siberian elm that are seen in other prairie cities. Dutch Elm Disease (DED) now threatens our elm population. With diligent maintenance and education, losses from this disease can be kept to a minimum. In the future, efforts must be made to diversify the species used, so that no one disease can threaten so much of the urban tree population.

As in any other city, trees are planted in Regina for their ability to create useful, beautiful and meaningful outdoor space. Attention is given to the fact that tree planting within the city plays an important functional role. Tree planting and landscape design in the urban context should not be interpreted as an act of decorating spaces, but rather as creating spaces using the architecture of trees. The urban forester, the landscape architect and others who are directly involved with tree planting and design think of trees as the raw material for building space, much like bricks and mortar. In fact, trees often outlive buildings and hard infrastructure, and over time have a far greater impact on the way urban space is used, modified and perceived.

The bosque, the allee, and the circle are all traditional ways of structuring trees to create outdoor urban open space. This type of structuring of trees should be utilized to compliment, enhance or, at least, respect the existing built environment. However, acceptance of the urban grid as a design consideration is often resisted in the organization of plantings. This may result in spotty, contrived looking groupings of trees along streets which appear chaotic. Attempts to create a classic English pastoral landscape or boreal forests along Regina's streets have proven misguided. "Naturalistic" plantings are more appropriate in open space such as parks where the size and context of the space allows for this type of design approach.

Applying the principles of shelterbelt planting, used by farmers on the prairies to reduce

wind velocity and soil erosion and trap snow for moisture, is worthy of consideration during the design process. The Prairie Farm Rehabilitation Administration (PFRA) is a valuable source of information for the selection and organization of tree species suited to our region for these purposes. Modified, this planting technique can be applied as a general approach throughout the city along major corridors and within parks and would provide a unifying element and mitigate against harsh environmental conditions.

In *Trees in Urban Design*, the definitive text on the design of the urban forest, Henry F. Arnold outlines eight important design characteristics of tree use:

- 1) “Transparency at the pedestrian’s eye level permits the visual grasp of extensive areas of the city. The emphasis is on spatial continuity that extends and broadens views.
- 2) In each view, a discrete pattern or rhythm is discernible flowing from the arrangement, spacing and structure of trees, expressing the particular site.
- 3) Each landscape conveys a scale that is sympathetic to the movement and perception of pedestrians.
- 4) The great diversity and intricacy of individual trees is subordinated to an established repetitive composition that acts as a counterpoint in unifying the individual parts into a single whole.
- 5) There is a homogeneity of texture, pattern, light and shade, resulting from the use of a single species that makes the collective impact more important than the individual trees.
- 6) Trees are related to their surroundings sometimes by bold geometry and sometimes by subtle rhythms. In each case, there is a consistency between tree pattern and the surrounding order.
- 7) The ground surface, whether flat or undulating, is visually unobstructed to permit a clear expression of trees rising out of the ground. This clarity is amplified when there is a crisp, smooth ground surface.
- 8) Trees modulate space vertically to create a ceiling with great variability in transparency and height.” (p39)<sup>9</sup>

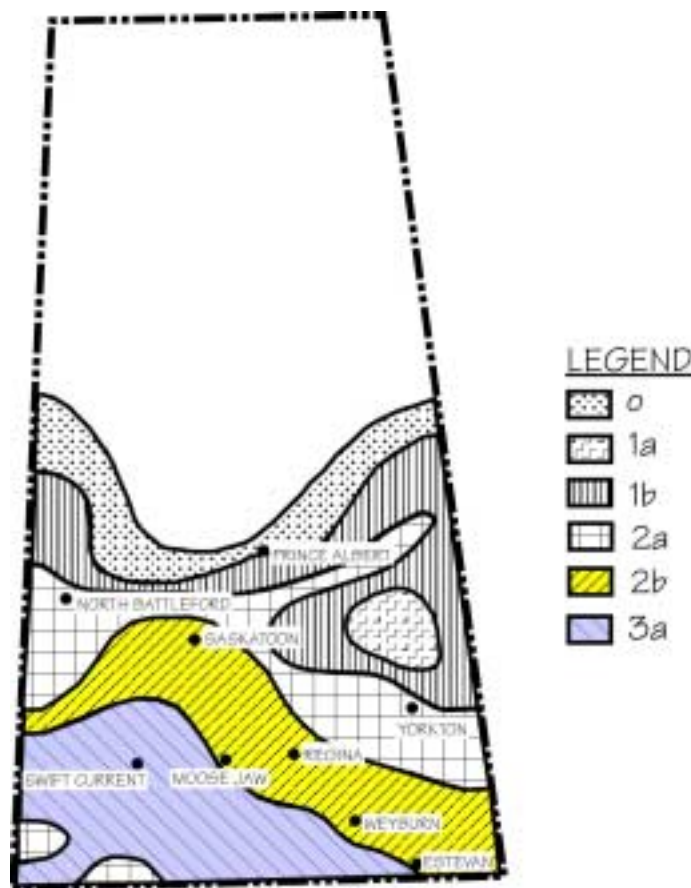
### **5.3 Design Guidelines**

Selecting tree species suitable for the site and for the spatial/functional/aesthetic goals of the project is an important design consideration. Conditions specific to each site must be considered including the presence of road salts, irrigation, wind, soil condition (compaction/drainage/fertility), spatial limitations, snow removal/storage and pedestrian use. A detailed list of tree species and their suitability for various site types are referenced in Appendix "D" Tree Planting Priorities, Requirements, Procedures and Specifications - Section 3.0 Table 2: Tree Species and Site Suitability.

Tree species must be selected based upon their hardiness. Map 2 on the following page, developed by the Soil Research Institute, Research Branch Department of Agriculture

illustrates the hardiness zones in Saskatchewan. Some trees are very hardy and can survive almost anywhere; others can only live within certain temperature or humidity ranges. Plant hardiness is based on three factors: temperature, availability of water, and soil conditions. Of these, temperature is by far the greatest factor. Most tree selection reference catalogues include information related to hardiness characteristics and categorize trees within these hardiness zones.

Map 2: Hardiness Zones of Saskatchewan



Regina falls within Zone 2b and therefore trees should be selected which are hardy within this zone. However, trees not generally considered hardy in this zone may be tried where the micro-climate is favourable. Several small horse chestnut trees can be found growing on Regina's residential street near the General Hospital, but this species is not considered hardy in this zone. The process of sourcing tree stock must also consider tree hardiness zones. Tree nursery stock grown in the interior of British Columbia (Zone 6b) is not a

suitable source for trees in Regina. Native trees such as green ash, American elm, plains cottonwood, Manitoba maple, chokecherry, black poplar and trembling aspen, or those adapted to this region, should be planted. Note that only green ash, American elm and plains cottonwood are suitable as street trees. Master plans and planning documents should be constructed and consulted to ensure that all plantings not only enhance the existing built environment, but also do not compromise future development.

The long winter is a fact of life on the Canadian prairies. Although generally not suitable as street trees, the importance of coniferous trees cannot be overemphasized. Their persistent colour and foliage and also their superior ability to act as a wind barrier, to trap

snow and provide wildlife a habitat are indispensable. Some pines, especially scots pine, may be suitable as street trees, due to their higher branching habit. It has been shown that coniferous tree plantings at the northwest corner of buildings can reduce wind speed during winter and reduce heating costs. Other desirable characteristics for tree selection with respect to adding winter interest are the persistence of fruits/seeds, bark colour/texture and branching form.

Winters are long in Regina, but summers can be quite hot. For this reason it is important to plant shade trees in public open space. Shade produced by deciduous tree plantings on the south side of buildings can reduce air conditioning costs, while still allowing sunshine to penetrate through the branches in the winter months.

Experiencing wildlife first hand is preferable to learning about it through television or books. Plantings for wildlife are considered in locations where such habitats will not be compromised by future human developments. Food, water, shelter and space are essential considerations when designing for habitat. Regina's urban forest can provide shelter and sustenance for several animal species, especially birds. Trees and shrubs that retain their fruit above the snow line, throughout the winter, can be an important source of food. The density of shrub branching habits and coniferous plantings provides a protective cover for all species throughout the seasonal and reproductive cycles. The determination of habitat requirements varies in scale depending on the wildlife species that the habitat is intended to attract. The PFRA's information on "Designing Tree Planting for Wildlife" is a useful resource when considering such developments.

Temporary plantings such as potted trees may become an important part of the tree planting strategy in the future in areas of the city such as the downtown where the hardscape does not allow plantings. Trees may be planted in concrete planters that can be removed for the winter season, allowing for easy snow removal. The trees will be planted in the fall and new trees planted in the planters for the spring.

#### **5.4 The Criteria for Reviewing Landscape Design**

It is impossible to create a landscape design without first clearly enunciating the criteria

that should govern landscape development. The following criteria express the philosophy and beliefs that should guide the landscape design process.

- 1) Public open space shall be designed with an integrated vision that incorporates public safety and security into the landscape design elements.
- 2) The landscape design shall adhere to other related regulatory.
- 3) The functional relationship of the landscape design to the existing and proposed land uses shall be resolved with a view to maximizing social benefits and maintaining environmental integrity.
- 4) The selection of trees shall encompass the basic principles of design such as line, form, diversity, scale, colour, unity and balance.
- 5) Consideration shall be given not only to the capital costs of the landscape design but also to the level of maintenance required to sustain it.
- 6) The satisfaction of human needs including recreational, social, perceptual and educational shall be a prime consideration in designing public open space.
- 7) The proposed landscape development shall be suitable to the site and the existing and future uses of the adjacent land.
- 8) The landscape design shall take into account the age, socio-economic status, ethnicity, cultural diversity and abilities of the intended users.
- 9) The principles of conservation shall be applied to the landscape design of open space including the reduction of water use, CO<sup>2</sup> emissions, chemical pesticides and fertilizers.
- 10) The landscape design shall facilitate public access and circulation and to the extent possible attempt to accommodate persons having cognitive or mobility constraints.
- 11) Preservation of the natural environment and biological ecosystems shall be promoted in the design of public open space.
- 12) Whenever possible the landscape design shall facilitate winter use of the open space.
- 13) All stakeholders shall be given the opportunity to influence in the design of public open space.

Based on the above landscape design criteria, the Community Services Department has developed design standards for the development of public open space. These standards reside in Chapter 12 of the Development Standards Manual.

## 5.5 Design Standards

Several City documents outline policies, guidelines and standards for the design of the urban forest. These include:

*Zoning Bylaw No. 9250* includes Landscape and Buffer Regulations that outline the requirements for landscaping including minimum acceptable tree size and the tree canopy (deciduous) for landscaping on all sites for new buildings and land uses.

The City of Regina's **Open Space Development Standards Manual (OSDSM)** outlines Design Criteria (including some criteria for tree planting) with respect to: Buffer Strips, Public Walkways, Traffic Islands, Boulevards and Medians, Pipeline Rights-of-Way, Utility Parcels and Flood Plains, Storm Water Channels/Watercourses, Storm Water Retention/Detention Areas, Municipal Reserves and Athletic Surfaces. The OSDSM also provides guidelines with respect to Plant Materials (section 12.4.5) for public recreational open space: the minimum crown cover to be provided by a balanced mix of shade trees, evergreen trees, ornamental trees and shrubs; and the size of trees to be used in areas of concentrated pedestrian traffic or play activity.

**The Discussion Paper on the Urban Environment 1990** and The Development Plan for the City of Regina (Oct. 1994) outline the need for major entries into Regina and ceremonial routes to reinforce its identification as the capital city of Saskatchewan. As mentioned under the Design Guidelines, consideration should be given to maintaining views of the dome of the legislature building from entry points.

*City of Regina Traffic Bylaw No. 9900* (Section 22 Schedule L) provides the standard setback for sight line control at intersections, driveways, walkways and alleys.

*City of Regina Forestry Bylaw No. 9607* outlines the restrictions and precautions that are to be taken into consideration with regard to existing or proposed trees on public or private property.

**The City of Regina Noise Attenuation Policy** defines acceptable standards for community noise levels originating from roadway traffic standards and provides implementation strategies, standards, guidelines and procedures.

**The Provincial Department of Highways and Transportation Policy for Setback of Existing Obstacles, 1989** pertains to tree planting within provincial road rights-of-way and is intended to provide assistance in judging the desirable clearance between the edge of the driving lane and existing roadside obstacles having due regard for snow

clearance, safety and appearance.

## **5.6 The Landscape Development Process**

The landscape development process varies according to whether it is funded by the City through its capital development process, a private land developer; or a non-profit organization. In each case, however, the landowner, the design team and the public are involved in the creative process.

The following charts describe each process.



## 6.0 THE TREE PLANTING PROGRAM

A program for planting trees on public land and replacing trees that die or that must be removed due to other problems is essential for Regina to achieve the maximum benefits of the urban forest. Planting trees involves establishing planting priorities, scheduling workers, and arranging for equipment. The species and size of trees most suitable to the location must be determined. Proper planting methods are essential to tree survival. The planting of trees also requires coordination with other municipal and provincial departments to prevent conflicts with utilities and roadways. Effective coordination begins in the planning phase and continues through planting and maintenance.

### 6.1 Planting Levels

The City of Regina plants trees along streets that have not been previously planted. These trees are additions to the current street tree inventory. The City also replaces trees that have been removed over the years as a result of disease, accident or vandalism.

Table 3 shows the estimated number of trees planted by the City during the past eight years.

**Table 3: Tree Planting**

Program Area	1991	1992	1993	1994	1995	1996	1997	1998	Total
1. Parks and Open Space	552	1,006	908	1,824	475	379	180	840	6,164
2. New Subdivision Development	224	376	61	165	168	63	13	112	1,182
3. Streetscape									
a) Replacements	304	389	487	274	389	711	737	565	3,856
b) New	142	1,013	1,057	1,432	892	470	1,457	680	7,143
4) Golf Courses	141	322	344	72	114	32	0	0	1,025
5) Cemeteries	32	203	191	111	0	5	3	0	545
6) Special Interest Planting	-	-	-	-	-	-	-	125	125
<b>TOTAL</b>	<b>1,395</b>	<b>3,309</b>	<b>3,048</b>	<b>3,878</b>	<b>2,038</b>	<b>1,660</b>	<b>2,390</b>	<b>1,757</b>	<b>20,040</b>

### 6.2 Species Diversity

A major concern of the tree planting program is species diversity. Monocultures create unfavourable conditions that contribute to tree disease and insect problems in Regina. It is recommended that Regina set a goal of no more than 25 per cent of any one genus per

sector. (See Appendix “D” Table 1: Species Diversity).

Note that all of the 77 forestry sectors in the city currently exceed this guideline. While the composition of the existing urban forest cannot be easily modified, application of the guideline will have an immediate impact on future development projects or subdivision plantings and over a period of years on replacement plantings in existing sites.

### **6.3 Species Selection**

Selecting the most appropriate species of trees for a particular location and function will have a significant impact on Regina’s urban forest. Planting decisions will have an ongoing impact on future tree care needs and maintenance costs.

### **6.4 Plant Material**

To create the ultimate control of the longevity and health of a tree, plantings must be chosen which are tolerant to the local growing conditions. The investment in installation and several years of care far exceed the cost of the tree. It makes no sense therefore to install a genetically inferior specimen.

Trees must be chosen that are:

- Tolerant to local growing conditions (weather and soil) and urban environmental conditions.
- Less susceptible to local tree diseases and insect pests.
- As a minimum, all plant material must be nursery grown and meet the specifications set out in the latest Guide Specifications for Nursery Stock prepared by the Canadian Nursery Trade Association, (C.N.T.A.) and the International Society of Arboriculture (I.S.A.) for size, height, spread, grading, quality and method of cultivation.
- Propagated and grown from seedling stock and plant material within zone 3a or hardier. The only exceptions to this requirement are those trees identified in Appendix “D”, Table 2: Tree Species and Site Suitability as experimental trees to be tried on a limited, trial basis only.

### **6.5 Summary of Tree Planting Issues**

The following issues were identified by the Tree Planting Work Group.

#### **Issue**

- There is a need to identify where the City should and should not plant trees.

#### **Strategic Action**

- Appendix “D” Tree Planting Priorities, Requirements, Procedures and Specifications provides tree spacing standards which identify the distance trees should be planted from infrastructure elements and those areas where trees should not be planted.

**Issue**

- There is a need to establish planting density standards and species distribution and diversity for various site types (ie. street trees, parks, boulevards and special use areas).

**Strategic Action**

- Appendix “D” Tree Planting Priorities, Requirements, Procedures and Specifications provides a species selection list for various site types and tree spacing standards.

**Issue**

- There is a need to establish tree planting standards and specifications for civic departments and private developers working on public land.

**Strategic Action**

- The tree planting standards and specifications proposed in Appendix “D”, Tree Planting Priorities, Requirements, Procedures and Specifications apply to both civic departments and private developers contracted to work on public land.

**Issue**

- There is a need for greater consistency in the tree planting procedures employed by civic departments and private developers working on public land.

**Strategic Action**

- Planting procedures that that would apply to all civic departments and private developers involved in planting trees on public land are proposed in Appendix “D” Tree Planting Priorities, Requirements, Procedures and Specifications.

**Issue**

- There is a need to establish a policy and procedures relating to:
  - street light interference;
  - signage interference; and
  - obstructed sightlines.

**Strategic Action**

- Appendix “D” Tree Planting Priorities, Requirements, Procedures and Specifications provides guidelines for the distance trees should be planted from various infrastructure elements including underground utilities, street lights, street signs and traffic signals.

**Issue**

- The need to ensure the RUFMS is properly referenced with other forestry documents, ie: *Zoning Bylaw*, *Development Standards Manual*.

**Strategic Action**

- Those documents affecting the urban forest have been referenced within the RUFMS.

## 6.6 The City Nursery

The City of Regina owns and operates a tree nursery located on Dewdney Avenue West by the City Sewage Treatment Plant. Previously the City had operated two nurseries, but in 1997 the Riverside nursery was closed and its operations consolidated with the Dewdney Avenue site as recommended in the 1994 Review of the Nursery Operations. The objective of the City nursery is to provide the City of Regina with most of its tree and shrub requirements for boulevards, parks and new subdivisions. The total annual budget for the nursery in 1998 was \$120,000. It is staffed by one permanent person and 0.7 casual person years. The nursery incorporates fifty acres and in 1998 contained approximately 7,340 units of useable stock ranging in various sizes. Table 4 shows the number of trees provided by the City nursery for various civic projects during the past five years in relation to the total tree plantings.

**Table 4: Trees Provided by the City Nursery for Civic Projects**

<b>YEAR</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
City Nursery	2,256	1,791	1,359	943	1,338*
Private Sources	1,622	247	301	1,447	419
<b>Total Plantings</b>	<b>3,878</b>	<b>2,038</b>	<b>1,660</b>	<b>2,390</b>	<b>1,757</b>

\* An early snow storm cancelled the fall planting in 1998. This figure includes 125 trees provided to private organizations through The Tree Donation Program.

The Comprehensive Audit Report – Forestry, Horticulture, New Construction – March, 1988 and the Review of the Nursery Operation in April, 1994 both identified the need for the civic divisions involved in tree planting to provide the nursery with estimates of their tree and shrub needs for the foreseeable future. Difficulties in providing tree estimates to the City Nursery may be explained in part by the fact that a decision was made to shut down the nursery operation in 1992. At this time there was a push to use as much of the existing inventory as possible. Then in late 1994, after a review of the nursery operations, it was recommended that the nursery continue operating. This recommendation was approved by City Council in 1995. Since the decision to continue was made the nursery has begun lining out a number of trees and shrubs in anticipation of the future requirements for new plantings and replacements. However, the years 1992 – 1995 have left the nursery with a limited number of mature species until the future liner stock matures.

For the City nursery to be economically viable in the future the following is required:

- 1) civic divisions involved in tree planting must provide the nursery with estimates of their tree and shrub requirements;

- 2) the nursery must produce this stock and meet the appropriate specifications; and
- 3) the divisions must be required as a matter of policy to use the City nursery as their first source for trees and shrubs. Enforcing these basic requirements should considerably enhance the economic viability of the City nursery.

### **6.6.1 Summary of City Nursery Issues**

The following issues were identified by the Nursery Work Group.

#### **Issue**

- There is a need to provide the City nursery with projections of the species and quantities of trees the City will require over the next several years.

#### **Strategic Action**

- Section 12.0 The Master Tree Planting Strategy describes in general the estimated number of trees and the preferred cultivars to be considered for new plantings and replacements over the next fifteen years. These projections can be used by the nursery to develop a Five Year Production Plan.

#### **Issue**

- The divisions involved in tree planting frequently acquire their planting stock from private sources and do not necessarily use the City nursery as their primary source.

#### **Strategic Action**

- Civic divisions should be required to use the civic nursery as their primary source of planting stock. If the City nursery is unable to provide the quantity or quality of plant material designated for a specific project, then and only then, should the plant material be purchased from an outside source. This recommendation is consistent with both the recommendations and intent of the 1988 and 1994 nursery audits where it was stated “Unless there is justifiable reason to do otherwise, operating sections in the City should use current nursery stock as much as possible”. Now that the tree planting budget is consolidated under the Urban Forestry Section and the Master Tree Planting Strategy provides a detailed description of the number of trees and specific cultivars required by the various civic divisions involved in tree planting, the problem of the nursery having relevant planting stock should be alleviated in the future.

#### **Issue**

- The diversity of species to be grown at the City nursery should be identified. The question whether the nursery should attempt to produce all the various species the divisions require or whether it should concentrate on growing certain basic species and have the divisions acquire any additional needs from outside sources.

#### **Strategic Action**

- The City nursery should concentrate on producing the species most frequently used by the City (See Section 12.4.2).

**Issue**

- A large portion of the City Nursery is overgrown with mature trees and shrub material. This plant material is unsuitable for planting projects and requires a significant portion of the program budget to maintain.

**Strategic Action**

- A work plan that identifies funding and completion time frames needs to be developed to clear-dispose-recycle the overgrown plant material. If the land is not required for nursery purposes, consideration should be given to retaining the trees for a wildlife shelter, windbreak, snow barrier or for water conservation purposes.

**Issue**

- There is a need to review the operational procedures for requisitioning plant material from the City nursery with a view to ensuring a quality product.

**Strategic Action**

- A Work Group should be established to review the operational procedures for requisitioning plant material from the City nursery and make recommendations for facilitating the process and ensuring a quality product.

**Issue**

- The access road to the City nursery is often impassable during rainy weather.

**Strategic Action**

- Consideration should be given to improving the road to ensure the accessibility of the City nursery.

**Issue**

- Should the nursery consider growing Dutch Elm resistant cultivars?

**Strategic Action**

- Because the Dutch Elm Disease has been discovered at Sherwood Forest and the nursery's location is midway between Sherwood Forest and the city, growing elms at the civic nursery is not advisable. However, the Wascana Centre Authority is willing to work with the City on a cooperative venture to grow Dutch Elm Disease resistant elms in their nursery located in the city for use in Regina's urban forest.

**Issue**

- A decision should be made as to whether the nursery should be charging its customers for the stock they remove.

**Strategic Action**

- If the decision is made to have the nursery "charge" its customers, an appropriate pricing mechanism should be determined for the stock taken out of the nursery. The chargeout rates should be sufficient to enable the nursery to meet its financial goals but remain competitive with the private sector.

## **7.0 THE TREE MAINTENANCE AND PROTECTION PROGRAMS**

Timely, proper tree maintenance is the key to a healthy and well managed urban forest. Tree maintenance includes pruning, surgery, watering, fertilizing, tree well cleaning, damage clean-up and disease and insect control. An effective tree maintenance program must have the capacity to prune all public trees on a regular cycle and be able to respond to emergency and potential safety hazards in a timely manner.

### **7.1 The Systematic Tree Pruning Program**

Trees are pruned for four different reasons: to preserve their health; to remove limbs that pose a safety hazard to people or property; to remove limbs that obstruct traffic signs or sightlines; to change their appearance; and to prevent storm damage in our windy conditions. Ground crews prune small trees, while medium to large trees are pruned with aerial lifts. Pruning cycles vary according to tree type. Systematic pruning is the orderly pattern or scheduling of tree pruning and surgery. The City of Regina has operated a systematic pruning program for the past fifteen years. The City is currently on a 6 to 7 year cycle for elms and a 5 year cycle for all other trees over 9 meters in height. Each year approximately 12,000 trees are pruned requiring about 18,000 man hours.

The following are the benefits of systematic pruning.

#### **1) Cost Savings**

Systematic pruning enables trees to be pruned in a planned systematic fashion. Crew efficiency and productivity are significantly increased because work operations can be performed more effectively and residents can be advised in advance to remove their vehicles.

The cost savings that result from a systematic pruning program can be considerable. Analysis of municipal systematic pruning programs in Santa Maria, California and in Ohio showed a 5.1 and 22 percent decrease, respectively, in man-hours per tree when pruning was done on a systematic basis. Additional cost savings are also realized since systematic pruning reduces the number of reactive emergency evening and week-end call outs and related overtime.

#### **2) Reduced Requests for Service**

Systematic pruning reduces the number of service requests from the public because the trees have fewer dead, broken and other types of hazardous limbs.

#### **3) Improved Safety and Decreased Liability**

Citizen safety is a prime consideration for systematic pruning. Pruning on a 5 to 7

year cycle reduces the possibility of dead or hazardous wood developing in trees. Systematically pruning for sightlines and traffic signs for pedestrians and vehicles results in fewer accidents and damages.

A systematic pruning program decreases the City's exposure to liability by reducing the hazardous conditions that could result in bodily injury or property damage.

4) Reduced Insect and Disease Problems

Systematic pruning is an important aspect of Regina's Integrated Pest Management Program. The number of potential disease and insect problems are reduced because less deadwood will exist and the trees will be healthier and less susceptible to infestations.

5) Improved Tree Condition and Tree Value

Systematic pruning improves the condition of trees. This improves their condition rating and value.

6) Increased Property Values

Property values are increased by healthy, well-cared for trees. Trees on the property to be sold, as well as adjacent street and neighbourhood trees, are considered a definite selling point.

7) Enhanced Public Image

The public image of Regina is enhanced by a well-cared for urban forest.

8) Employee Pride

Staff morale is affected by the City's overall approach to tree care. Employees respond favourably to an organized, systematic approach that produces positive results. Systematic pruning also allows attainable production objectives to be set and crew performance to be evaluated and recognized.

## 7.2 Priority Maintenance

Maintenance needs shall be categorized and prioritized as follows:

- 1) Emergency Work - Trees that pose a safety hazard that could result in bodily injury or property damage. This includes any tree that is split, down, has broken or hanging limbs, or is obstructing a traffic sign (stop, yield, etc.).



Response time – The goal is to respond to an emergency tree situation as soon as possible depending on the availability of staff and resources and the magnitude of the problem. While the expectation is that staff would respond to an emergency situation as soon as they become aware of it, this may not always be possible. For example, if the request for service occurs after hours or on weekends, it may take time to locate staff to respond to the situation. After a major storm has struck the city there could be several emergency situations at the same time. In these situations staff would respond to life threatening situations first. Appendix “I” The Urban Forest Storm Response Plan describes the criteria for prioritizing work assignments as a result of a storm.

- 2) Priority Prune - Trees receiving this rating have the potential of becoming safety hazards if not corrected in the near future. Included is man made damage, broken or hanging branches, obstructing sightlines, interference with overhead wires, sign obstruction, (no parking, etc.) or trees with over 30 per cent deadwood. Tree diseases or insects that do not pose an immediate threat would be included in this category.  
Response time - Trees in this rating should be responded to within two weeks.
- 3) Regular Prune - Trees in this rating have minor dead or dying branches or other incipient problems that are judged not to need immediate maintenance attention and pose little threat of becoming serious problems before their next regular pruning cycle.  
Response time - Trees in this rating should be pruned during their next regular pruning cycle.
- 5) Tree Removals - Trees designated for removal have one or more defects that cannot be cost effectively or practically treated. These trees fall into four categories:
  - i) Trees that are structurally damaged and weakened and pose a threat to public safety or property.  
Response time - Trees in this category will be removed within 48 hours.
  - ii) Smaller trees (0 - 6 inches DBH) that have died as a result of transplant shock, vandalism, poor cultural practices, or other causes.  
Response time - Replacements will be prioritized and completed as the operational tree planting budget allows.
  - iii) Trees infected with a disease or insect that have deteriorated to the point that they are a hazard to spread the infestation.  
Response time – As outlined in Appendix “F” Tree Removal Policy.
  - iv) Trees removed to accommodate civic and private development projects.

Response time – as outlined in Appendix “F” The Tree Removal Policy.

### 7.3 Pruning Guidelines and Standards

Trees shall be pruned according to the International Society of Arboriculture "Tree –Pruning Guidelines “and the National Arborist pruning standards.

### 7.4 Summary of Tree Maintenance Issues

The following issues were identified by the Tree Pruning and Maintenance Work Group.

#### Issue

- Staff expressed concern about their ability to maintain current workloads in relation to the staff complement. It was further explained that the City has a sufficient compliment of aerial lifts and aerial lift trained staff as well as chippers and the associated equipment to perform various tree functions. Where it may lack resources is in the maintenance of trees under ten metres. At present this work is done when either equipment is down, it’s too cold to aerial prune or when there is extra summer staff. The City is currently pruning these trees on a 2 – 4 year cycle when they should be pruned every 1 – 2 years to provide adequate care.

#### Strategic Action

- The RUFMS will result in a more efficient use of both capital and manpower resources. Since the issue of the pruning cycle for trees under 9 meters, was identified there has been a change in the use of aerial lifts during the winter months. Whereas aerial lifts were previously employed during the winter unless it was too cold to operate them, now there is a scheduled down-time of two to two and a half months during the winter. During this period, staff who usually aerial prune now assist in ground pruning. This change has resulted in lowering the pruning cycle for trees under 9 metres to an acceptable frequency.

#### Issue

- The use of pruning to control insects and diseases versus chemical controls.

#### Strategic Action

- Section 8.2 Non-Chemical Control Measures states that an effective measure for controlling insects and diseases involves keeping trees healthy through fertilization, irrigation and pruning. Pruning may also be used to remove the infected limbs of a tree. While Integrated Pest Management does not preclude the judicious use of chemicals, it operates on the premise that if all other non-chemical control measures are implemented successfully the usage of chemicals should be minimized.

#### Issue

- Within the open space maintained by the City there exists a large number of “interfering trees”. These are trees that:

- 1) are growing in inappropriate locations such as easements and dikes and impede access or interfere with public maintenance work;
- 2) cause or have the potential to cause damage to the public infrastructure; or
- 3) species of trees such as poplar and willow that have aggressive root systems that can cause problems to foundations and underground services.

**Strategic Action**

- Appendix "F" Tree Removal provides a policy for dealing with interfering trees that include:
  - 1) a definition of an interfering tree;
  - 2) the statutory authority for removing interfering trees;
  - 3) the criteria for identifying an interfering tree; and
  - 4) the process for removing an interfering tree on public or private land.

## **7.5 Root Pruning**

Root pruning may be required to eliminate safety hazards and damage caused by tree roots to sidewalks, streets, paving and foundations. The Urban Forestry Section must determine when root pruning can be safely done without injuring the tree. The decision to root prune is based on the vigour of the tree, the proportion of roots that must be cut and the particular species involved. Indiscriminate root pruning will not only damage the health and appearance of trees, it often weakens their stability and creates a serious hazard. When roots are cut, trees lose their resistance to wind and snow and can become a public hazard.

### **7.5.1 Summary of Root Pruning Issues**

The following issues were identified by the Root Pruning Work Group.

**Issue**

- The need to develop guidelines outlining when root pruning should be done, how it should be done and by whom.

**Strategic Action**

- Appendix "E" Root Pruning explains when root pruning should be done and by whom, establishes a process for developing an inventory of existing problem sites, and provides guidelines to follow when root pruning.

**Issue**

- Damage to tree roots as a result of construction and public works activities.

**Strategic Action**

- Appendix “G” Tree Protection establishes protective lanes, tree protection zones and excavation and trenching requirements to protect and/or mitigate the impact on tree roots during construction and public works activities.

**7.6 Tree Removal**

Eventually all trees in the urban forest will have to be removed due to old age or deterioration as a result of landscape destruction. Hazardous trees must be removed immediately to protect the public from dangerous conditions. Similarly infected trees must be removed to prevent the spread of disease. Lastly, some public trees are approved for removal by the Parks and Recreation Board to accommodate civic or private development projects. Table 5 shows the number of trees and stumps removed annually by the city during the past five years.

**Table 5: Tree and Stump Removals**

<b>YEAR</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
Number of Trees	560	484	825	451	658
Number of Stumps	223	421	175	208	174
<b>Total</b>	<b>783</b>	<b>905</b>	<b>1000</b>	<b>659</b>	<b>832</b>

**7.6.1 Summary of Tree Removal Issues**

The following issues were identified by the Tree Removal Work Group.

**Issue**

- The need for a policy to establish the criteria and the process for removing hazardous trees, infected trees or those approved for removal to accommodate civic or private development projects.

**Strategic Action**

- Appendix “F” Tree Removal describes the authority, the criteria for the removal, the process to be followed, who is responsible for the costs and the penalty for failing to comply when removing hazardous or infected trees or those to accommodate civic or private development projects.

**Issue**

- A considerable amount of Parks and Recreation Board and staff time is taken up considering requests from private landowners to have public trees removed to accommodate private development.

### **Strategic Action**

- Only those cases where there is a dispute between the City and the private landowner or in cases where the removal of a tree or trees could impact the surrounding residents should be forwarded to the Parks and Recreation Board for their consideration. This would significantly reduce the number of cases heard by the board. Trees which may be removed by a tree spade and relocated to another area for planting should be considered a relocation and not a removal.

## **7.7 Tree Protection**

A healthy urban forest is the principal goal of the forestry program. Preservation of the city's existing trees is essential to this goal. Without guidelines to protect trees during construction work, maintenance activities, and snow removal operations, their survival would be threatened. All activities around public trees should be carried out with the aim of protecting trees against unintentional damage from equipment. This includes damage to the roots and root zone, branches or the bark of trees.

Construction damage is thought to be the number one cause of premature tree mortality in urban centres. While modifying the urban environment through building, renovating and removal of physical and landscape features is ongoing, a proactive approach to managing construction activities around trees is essential for preserving Regina's tree assets and minimizing the liability risks. Because decisions about construction projects are made in the planning and design phases, it is critical that tree preservation be included in these discussions.

Through the Save-A-Tree Program the City relocates trees that would otherwise be destroyed from private property to public open spaces. Only those trees whose value is more than the cost to relocate and maintain are considered. Six trees were saved through the program in 1998.

### **7.7.1 Summary of Tree Protection Issues**

The following issues were identified by the Tree Protection Work Group.

#### **Issue**

- There is a need for a policy to protect trees on public land during construction.

#### **Strategic Action**

- Appendix "G" Tree Protection establishes a protective lane, a tree protection zone, soil compaction, hoarding, and grade change requirements for protecting trees on public land during construction. The policy also provides for enforcement of the requirements, cost recovery and penalties for violations for damaged trees.

#### **Issue**

- There is a need to establish tree protection practices for turf maintenance around the base

of public trees.

**Strategic Action**

- Appendix “G” Tree Protection section 6.2 describes the practices to be followed to protect trees on public land during turf maintenance.

**Issue**

- There is a need for Regina to recognize and protect its landmark trees.

**Strategic Action**

- Appendix “H” The Heritage Trees of Regina Program establishes a program to locate, designate, catalogue and preserve the heritage trees of Regina.

## **7.8 Storm Response**

Storms can have a major impact on the urban forest. High velocity winds, tornadoes, hail and ice storms can break branches, uproot trees and threaten citizen safety and property. Downed trees can pose a hazard to traffic movement through the city and obstruct emergency vehicles access to injured people.

Through proper planning and preparation a municipality can mitigate or minimize the damage caused by severe storms. Careful species selection and location of trees together with proper planting and maintenance activities will better enable trees to withstand the severity of a storm's impact. A storm response plan will enable the City to mobilize its resources rapidly and efficiently in response to a severe storm.

The three action phases of a storm response plan are:

- 1) Preparation - planning and early warning activities. This includes establishing equipment lists, call-out procedures and a pre-planning meeting to coordinate the overall response to a storm. An effective early warning system for impending severe storms is essential. The lead time gained before a severe storm strikes is crucial for mobilizing staff and resources. Information on when a severe storm may strike and the magnitude of the storm can be obtained from Environment Canada's Atmospheric Environment Program.
- 2) Response - immediate activity prior to and after a severe storm. Roles and responsibilities for all staff involved in the storm response should be clearly defined. A process for receiving and responding to public requests for service should be established. Response priorities (ie: life threatening situations, trees blocking arterial streets and general clean-up) for responding to public requests for service should be prioritized.
- 3) Recovery - activities to return the damaged areas to pre-storm conditions. Included in this phase are damage assessment and replacement of damaged trees after a storm.

### 7.8.1 Summary of Storm Response Issues

The following issue was identified by the Tree Protection Work Group.

#### **Issue**

- There is a need for a storm response plan that will enable the City to respond to severe storms or natural disasters rapidly and efficiently.

#### **Strategic Action**

- Appendix “I” the Urban Forest Storm Response Plan provides a comprehensive action plan for responding to storm damage to the urban forest. The plan provides an early warning system for forecasting the magnitude of storms. It establishes procedures and mechanisms for coordinating the storm response and prioritizes the clean-up priorities.

### 7.9 Safety Requirements

Maintenance of the urban forest often involves danger to personnel. Sharp cutting instruments, power equipment, above ground work in trees and heavy lifting are often required and sometimes carried out near vehicular traffic. Following proper safety procedures will protect the health and safety of city crews and reduce potential liability problems for the City. In order to provide for the safety of City tree care employees safety requirements are necessary for those engaged in pruning, trimming, repairing and removing trees and cutting brush on public land. Appendix “J” Safety Requirements describes the responsibilities, the process and the safety requirements for civic employees involved in tree care.

### 8.0 THE INTEGRATED PEST MANAGEMENT SECTION

The goal of The Integrated Pest Management Section is to proactively manage tree diseases and insect pests by utilizing the safest, most economical and effective combination of cultural, biological, genetic and chemical control methods. The emphasis is on "integrated" whereby the treatment strategies are focused on specific tree diseases or insect pests while preserving the integrity of the landscape ecosystem. While The Integrated Pest Management Section does not preclude the judicious and restricted use of chemicals, it operates on the premise that if all other aspects of the control program are implemented successfully the usage of chemicals should be minimized. The main activities of the program are monitoring, data collection and sampling, assessment, treatment and public education and awareness. There are 3 permanent and 10.3 casual person years of staff involved with these activities.

### 8.1 Statutory Authority

*The Pest Control Products Act* governs the sale, use, distribution and handling of pesticides in Saskatchewan. Every substance that is registered under *The Pest Control Products Act*

(Canada) is covered by the Act.

*The Pest Control Act* is administered by the Sustainable Production Branch of Saskatchewan Agriculture and Food. The Minister of Agriculture and Food may declare any animal, insect, or disease to be a "pest" if it is considered destructive or dangerous to crops, grain, livestock or other property. Currently, there have been four declared pests. Norway rats were declared in 1956, grasshoppers in 1957, the Warble Fly in 1971 and Dutch Elm Disease in 1977.

*The Environmental Management and Protection Act* and its regulations are administered by Saskatchewan Environment and Resource Management. The Act regulates the prevention of environmental pollution and the restoration of the environment when pollution occurs. The disposal of pesticides and pesticide containers are also regulated through this Act.

*The Dutch Elm Disease Control Regulations* are the enabling regulations that provide the authority to manage the disease on private property.

*Forestry Bylaw #9607* provides the authority and protection for the city's urban forest.

## **8.2 Non-Chemical Control Measures**

The following are cultural practices that are utilized operationally to the maximum extent possible to control diseases and insect pests. While points 1 and 2 are the responsibility of the Planning and Design Division, the Urban Forestry Section is responsible for points 3 to 7. The Integrated Pest Management Section can identify problems in these areas and make recommendations for their correction in relation to controlling tree diseases and insect pests.

### 1) Species Selection

Species and cultivars should be selected based on their suitability to the site and proven resistance to local tree diseases and insect pests.

### 2) Species Diversity

From the perspective of the long-term health and appearance of the urban forest, maintaining a diversity of tree species and ages is vital. A diverse urban forest like a natural ecosystem or a diversified economy, is likely to be more stable than a simple one, with change occurring gradually as trees die and are replaced.

Monocultures create unfavourable conditions. Some species such as elms are threatened by virulent diseases like Dutch Elm Disease. A large stand of elms in a single location can support the rapid spread of disease if an insect pest or disease should strike (ie: cankerworms), single-species plantings are particularly vulnerable. Diversification provides insurance against the kind of wholesale defoliation of the forest cover that took place in some cities with the invasion of Dutch Elm Disease.



### 3) Tree Vigor

Maintaining tree vigor through fertilization, irrigation, pruning and pest management, not only enhances the appearance of trees, but also promotes a healthy tree that is less susceptible to infection. For this reason the most effective insect and disease control measure involves keeping trees in optimum health.

### 4) Systematic Pruning

Systematic pruning of trees has a definite positive effect toward reducing many insect and disease problems in the urban forest. Pruning on a periodic basis will open the canopy, reduce the amount of weak and dead wood on trees and eliminate crossing or rubbing branches. There will be fewer entry wounds and broken branches which are breeding sites for insects and diseases. Once a tree is infected, pruning can be utilized in some cases to remove the infected branches and prevent further spread.

### 5) Rotation Planting

Rotation planting is similar to crop rotation in agriculture. When an infected tree is removed the replacement species should not be susceptible to the same problem. The rationale being that the particular insect or disease that infected the previous tree could still be present after the tree is removed.

### 6) Remove and Replace

*The Pest Control Act and Forestry Bylaw #9607* provide for the removal of trees that exhibit symptoms of disease or insect infestation. All alternative forms of control including pesticides will be explored before removing and replacing a tree.

### 7) Inspection and Certification of Imported Plant Materials

One reason Regina is beginning to see insect pests and diseases which have traditionally not been a problem is because of new tree species imported into the city from other areas. Most people are aware that Dutch Elm Disease can be transported and spread through the transportation of elm materials. However, other tree species may also carry disease and insect populations. This includes fireblight, black-knot, gypsy moths, borers, beetles and eggs which can quickly become established under the right conditions.

Discovering plant materials that are infected before they are planted prevents the disease from spreading through the urban forest and reduces maintenance costs due to mortality. The Superintendent of The Urban Forestry Section is responsible for inspecting and certifying imported plant material. For this purpose he may utilize either Urban Forestry or Integrated Pest Management Section staff to act as his agents.

## 8) Sanitation

Sanitation which involves removing infected, dead and fallen branches and leaves in many cases can effectively eliminate or destroy the breeding refuge of various insects and diseases.

## 9) Alternative Pest Control Measures

Not all insects are harmful and require control measures. In many cases the presence of insect populations may be beneficial. Insect species that prey on other insect populations are a natural form of control. The control of insect populations by natural enemies can be effective, long-lasting, economical and less disruptive on the ecosystem than some control products.

Birds are another form of natural control. Some species will feed on large numbers of insects. To assist in increasing the number of beneficial bird populations, bird houses have been placed at various locations throughout the city. Houses have been placed for American Kestrel, Tree Swallows and Purple Martins. In addition, bats feed heavily on flying insects. The City has produced a brochure for home owners on how to attract wildlife to their yards and has worked cooperatively with Nature Saskatchewan, the Wascana Centre Authority and Ducks Unlimited to attract beneficial wildlife to Regina.

Pheromone traps are another non-toxic or alternative control method. Pheromone or synthetic scent attractants are used to attract insect species as a monitoring tool. For the past several years The Integrated Pest Management Section has used pheromone traps as a control strategy for the control of ash borers. The insects are attracted to the traps and once trapped are not able to reproduce, thereby reducing the number of borers affecting ash trees. This method of control has replaced the use of moderately toxic chemical control products.

## 10) Tree Banding

Tree banding for cankerworm control is an effective non-toxic control. Female cankerworms are wingless and must crawl up the tree to lay their eggs. By constructing a tree band that the female must crawl across, she becomes trapped on the sticking agent and is unable to lay egg masses in the trees where damage will result. A public awareness campaign to encourage home owners to band their trees has been active in Regina for many years. In areas where all the trees have been properly banded cankerworm damage has been much less severe than in areas where few trees are banded.

### **8.3 Monitoring Diseases and Insect Pests**

The Integrated Pest Management Section monitors insect population levels and tree diseases.

The monitoring program determines if insect populations or diseases are increasing, decreasing or remaining constant. This enables The Integrated Pest Management Section to identify the areas of the city which have higher levels of infestation or infection and determine the appropriate control measures. These areas are then targeted for control strategies which may include tree spraying with biological, cultural or chemical control products. In some cases the monitoring programs acts as the control program. Pheromone or synthetic scent lures attached to sticky traps will attract and catch insect pests. In the case of ash borers, pheromone traps are used as the control method. In other cases the biological control may be the release of predator insect species to target or attack insect pests in the tree.

Analysis of historical records has enabled The Integrated Pest Management Section to establish a list of insect pests to consider for control initiatives. Insects which are monitored include aphids, leaf rollers, plant bugs, pear slugs, leaf miners, bronze birch borers, cankerworms, ash borers, ash plant bugs, spider mites, boxelder bugs, tent caterpillars, elm bark beetles and other insect populations that may cause harm. The monitoring program determines the population levels and the insects' stage of development. Control products can then be applied when the insect pests are most vulnerable. The Integrated Pest Management Section is currently using a number of biological or non-toxic control products including insecticidal soaps, pheromone or synthetic scent attractants as well as tree banding to control insect pests.

Tree diseases also have an impact on the urban forest. Among those monitored are Dutch Elm Disease, dothiorella wilt, verticillium wilt, bacterial wetwood infection, fireblight, anthracnose, blights, canker growths, chlorosis, environmental stress and a host of other diseases which affect the urban forest.

#### **8.4 Chemical Insect Control**

Traditionally pest control operations have relied upon chemical control measures. Chemical control remains a common practice for many cities. The City of Regina currently operates on the belief that chemical controls should be implemented only when other control strategies have been unsuccessful or when other options are not available as is the case with elm bark beetles. The implementation of control strategies which have resulted in the discontinuation of the use of chemicals include cankerworm control where tree banding assists in reducing cankerworm populations and spray applications are done with the biological control product *Bacillus thuringiensis* var. *kurstaki* rather than using moderately toxic chemicals. Control of aphid populations is another program where the use of a chemical control product has been discontinued. Insecticidal soap is currently being used to manage aphids. These initiatives have had a positive impact on the urban environment by allowing a mode of action specifically targeted to insect pests. Residents, pets, birds and other wildlife are not harmed by exposure to these products.

The judicious and prudent use of chemicals to control specific insect pests that pose

significant economic and aesthetic losses to the city should continue to be an option. This option will be necessary in the event of a major disease or insect pest outbreak that can only be effectively stopped with the use of chemical control products.

## **8.5 The Dutch Elm Disease Program**

### **8.5.1 The Biology of Dutch Elm Disease**

The highly destructive Dutch Elm Disease (DED) is caused by the fungus *Ceratocystis ulmi*. When introduced into elms, the fungus produces spores which block the water conducting vessels of the sapwood and causes the tree to die. The disease is vectored by three possible routes:

- By the native American elm bark beetle (*Hylurgopinus*), and European Elm bark beetles (*Scolytus multistriatus*). The former is a native to Saskatchewan, with the latter coming in as a transient.
- Through intraspecific root grafts between adjacent elm trees.
- On pruning tools used on healthy elms after dead and diseased elms are pruned or removed.

The early symptoms of the disease appear from the latter part of June to the middle of July when the leaves on the tree begin to wilt, droop and curl. The later symptoms appear from mid-July when the leaves begin to droop, turn yellow and fall off prematurely. All these symptoms are accompanied by brown streaks in the sapwood that can be seen by removing the bark of the infected branch. Since other wilt diseases may show similar symptoms, laboratory culturing is required to confirm DED.

### **8.5.2 The History of Dutch Elm Disease in Regina**

In Regina where elms comprise 36 per cent of the public tree population, DED poses the greatest threat of all tree diseases. DED may kill an elm in as little as three weeks. The disease was first detected in Regina in 1981. As a result of this discovery, the City implemented a DED monitoring program. In 1990 DED was found to have infected a large natural stand of elm trees in the Souris River Valley. In 1991, the disease was confirmed at Sherwood Forest, just northwest of the city limits. The presence of the disease on our doorstep resulted in the City expanding the DED program. Since then isolated cases of DED have been found in Regina in 1994, 1995 and 1997.

### 8.5.3 The Dutch Elm Disease Program

The DED Program consists of seven components.

#### 1) Monitoring and Surveillance

During the growing season, when symptoms of DED may appear, a systematic monitoring program is implemented. The program involves visually inspecting all elm trees within the city. This inspection process includes all City owned and privately owned elm trees. Staff conduct thorough street by street, alley by alley inspections. The goal of the monitoring program is to detect DED infected trees as early as possible. Early detection allows the City to initiate corrective measures to remove the infected tree and thereby prevent or reduce the number of additional trees which could become infected. All elms are currently inspected approximately every two weeks during the growing season. The monitoring program has proven successful. Without a monitoring program it is unlikely that the loss of elm trees could have been held to a single tree in these years. The prompt removal of infected trees has prevented the disease from becoming firmly established within city limits and prevented the potential loss of thousands of elms.

In 1999 Integrated Pest Management received a grant in cooperation with the Federal Urban/Rural Habitat Renewal Program and the Saskatchewan Dutch Elm Disease Association to conduct an inventory of privately owned elm trees in Regina. The inventory will be used to assist in the management of DED.

#### 2) Sanitation

Elm bark beetles are a major threat to the spread of the fungus which causes DED. Bark beetles breed in dead and dying elm wood. A critical component of the DED Program is the removal of dead and dying tree limbs and branches. Under the City of Regina *Forestry Bylaw #9607– Hazard Tree Removal* – trees that have greater than 50 per cent deadwood and can provide a habitat for elm bark beetles are removed. The Urban Forestry Section is responsible for the pruning and maintenance of 43,615 elm trees. The section is currently on a 6 - 7 year pruning cycle. This means all City-owned elm trees are pruned every 6 - 7 years depending upon their age and growth rates. The Urban Forestry Section prunes approximately 7,000 elm trees each year.

#### 3) Firewood

As previously mentioned, elm bark beetles colonize dead and dying elm wood for brood galleries to rear their young. Elm wood stored for use as firewood provides an ideal habitat for this purpose. Local residents bringing infected firewood into the city pose a major threat to the urban forest. A single piece of elm wood could carry thousands of infected beetles. With more and more of the province becoming infected each year, the chances of DED occurring are increasing. When inspecting elm trees, surveillance crews

are also on the look out for elm firewood. Provincial regulations prohibit the storing of elm wood for any purpose. When located, homeowners are requested to immediately dispose of elm wood at the City's landfill site. This reduces the risk that beetles could use this wood to produce a new generation and infect additional elm trees. If homeowners fail to remove the elm wood, a city crew is dispatched to clean-up and dispose of the material.

#### 4) Bark Beetle Spray Program

Since bark beetles provide the major threat for the spread of the DED fungus, the control of their populations is a critical component of the maintenance program. Bark beetles construct their brood galleries at the bases of elm trees. Each year The Integrated Pest Management Section targets select areas of the city for the control of bark beetle populations. Pheromone traps and regular inspection of elm trees and prunings are used to identify areas of the city containing high population levels. These areas are then sprayed to control beetle populations. All City-owned elm trees are sprayed on a two year cycle.

#### 5) Infill Planting

As elm trees are removed they are replaced in most instances with trees of a different species. Alternative tree species such as Ash, Schubert, Linden and Maple are among the trees now planted to reduce the dependence on elms.

#### 6) Public Awareness and Education

Education of the public and community organizations is key to the management of DED. In recent years the department has spent as much as \$25,000.00 per year toward the promotion of public awareness of the disease. The marketing campaign raises the awareness of DED and provides information about when to and when not to prune elm trees and what steps can be taken to improve the health of elm trees. The campaign discusses the threat caused by elm wood and lets residents know who to contact and what steps home owners may take to assist in maintaining their private trees. The threat of elm wood transported into the city for use as firewood is a specific issue being addressed.

#### 7) Research

The City is currently involved with a number of research initiatives that are considering alternative strategies for managing DED. One of the projects under the auspices of the University of Toronto involves conducting genetic research into elm tree resistance to the DED pathogen. The Integrated Pest Management Section is assisting this research by conducting field trials involving the injection of elm trees with a substance which may provide some resistance to the fungus. If this research proves successful, it may be possible to protect the majority of the mature elms within the city.

The Supervisor of The Integrated Pest Management Section is a representative on the Saskatchewan Dutch Elm Disease Management Advisory Committee and also participates on the research sub-committee. Research initiatives have included:

- 1) two year study on the elm bark beetle life-cycle;
- 2) a project to survey elm trees throughout the province utilizing remote sensing with satellite imagery; and
- 3) the sampling and testing of beetles and elm samples to determine the various strains of DED.

## **8.6 Public Awareness**

The annual budget provides \$25,000.00 for a public awareness and education program. The funding is used for radio, television and print advertising. Brochures and signage have also been a regular component of the awareness campaign. In addition, a display board has been developed and is set up at the Home and Garden Show, the Exhibition, at schools and various conferences and trade shows. Tree ribbons were featured once to raise awareness and assist residents in identifying elm trees.

Radio, television and print media coverage have added to the efforts. Utilization of the news media allows the City to reach a large audience with no additional cost. Eleven media interviews were conducted in 1998, 27 in 1997 and 25 in 1995. The Integrated Pest Management staff have made group presentations to school groups, government departments, other civic departments and the general public. Each year The Integrated Pest Management Section takes thousands of phone calls requesting information on the care and control of insect pests and tree diseases.

## **8.7 Statistical Information**

The following table shows the activities of The Integrated Pest Management Section during the past five years in combating tree diseases and insect pests.

**Table 6: Integrated Pest Management Statistical Information**

ACTIVITY	YEAR				
	1994	1995	1996	1997	1998
<b>Invertebrate Pests</b>					
Cankerworm Control					
Dipel WP (kilograms)	166	165	272	194	260
Foray (Litres)	n/a	n/a	80	69	138
Number of Monitoring Traps	500	500	500	400	400
Number of Trees Treated	10,141	9,757	18,428	15,762	26,717
Aphid Control					
Volume of Control Products					
Insecticidal Soap (Litres)	1,017	1,055	1,447	1,299	2,043
Number of Trees Treated	7,711	6,221	8,409	9,022	14,529
General Insects					
Number of Clear Wing Borer Traps	500	500	500	500	500
<b>Dutch Elm Disease Control Program</b>					
Elm Trees					
Inventory of City Owned Trees	44,000	43,900	43,800	43,615	43,554
Trees Removed	91	22	44	168	161
Hazard Trees Identified	118	45	223	78	50
Trees Inspections – Frequency	5	6	7	9	10
DED Infected Trees Removal	1	-	1	1	0
Tree Samples Taken	n/a	530	411	206	55
Trees Fertilized	-	-	-	2,406	111
Elm Bark Beetle Control					
Volume of Control Product					
Dusban Turf (Litres)	159	200	211	203	213
Number of Pheromone Traps	150	212	200	200	200
Number of Trees Treated	31,193	19,917	20,244	20,546	25,353
Elm Firewood Enforcement	49				
Elm Firewood Notices Issued	49	121	57	102	13
Elm Firewood pick up and disposal actioned	22	80	28	52	2
Elm Firewood action by owner	27	41	29	50	12
Total Elm Firewood Removed	n/a	n/a	n/a	3.2 tonnes	1.09 tonnes
<b>General Tree Inspections at Sites (private and City)</b>	1,238	915	854	266	212
<b>Tree Injections</b>					
Mauget Injections	n/a	n/a	n/a	12	40
University of Toronto Research	n/a	n/a	n/a	48	48

## 8.8 Summary

An integrated approach to managing insect pests and tree diseases provides a more effective, safer and less expensive control program. To be effective an Integrated Pest Management Program must be a community effort involving a combination of



maintenance and control measures.

## 8.9 Summary of Integrated Pest Management Issues

The following issues were identified by The Integrated Pest Management Section Work Group.

### Issue

- There is a need to identify a process for removing Dutch elm infected trees on private property (ie: the notification period required, who removes, who pays, the liability issue and the use of private contractors).

### Strategic Action

- Appendix “F” Tree Removal provides a detailed description of the process for removing Dutch elm infected trees on private property including the method of notification for removal, the notice period, who is responsible for removing the tree and the course of action to follow if the homeowner fails to complete the work within the specified time.

### Issue

- There is a need to establish a policy for protecting public trees during snow removal activities, sidewalk repairs and sewer replacements and construction projects undertaken by City departments.

### Strategic Action

- Appendix “G” Tree Protection proposes a proactive tree protection policy that provides guidelines for protecting public trees during construction, maintenance work and snow removal activities.

### Issue

- There is a need to ensure that contractors who import plant material for landscaping public land notify The Integrated Pest Management Section to inspect and certify the material is free of pests and diseases.

### Strategic Action

- The requirement for contractors to have The Integrated Pest Management Section inspect and certify imported plant material prior to planting on public land is included in Appendix “D” Tree Planting Priorities, Requirements, Procedures and Specifications and distributed.

### Issue

- There is a need to more actively enforce the protection of trees on public land during construction involving private developers.

### Strategic Action

- The Requirement for Construction Near Trees on Public Land outlined in Appendix “G” Tree Protection shall be incorporated into *Forestry Bylaw No. 9607* and distributed to developers when they apply for a building permit. Forestry will monitor

the construction site for compliance and Bylaw Enforcement will enforce the provisions of the bylaw.

**Issue**

- There is a need for threshold indicators for tree diseases and insect pests that will indicate when a corrective action is required such as: 1) pruning; 2) non-chemical control measures; 3) tree removal; or 4) chemical spraying if necessary. Without threshold indicators it is difficult to rationalize when Integrated Pest Management should or should not spray or when additional funds may be required for spraying.

**Strategic Action**

- Vancouver and Lethbridge have established threshold indicators for tree diseases and insects pests relevant to their cities. Appendix “K” Pest Management Threshold Indicators establishes threshold indicators for those tree diseases and insect pests common to Regina. These threshold indicators should be used to determine when The Integrated Pest Management Section should or should not spray and when additional funds may be required to prevent a possible infestation.

## **9.0 PUBLIC EDUCATION AND INVOLVEMENT**

As is the case with most cities, trees that grow on private land comprise the majority of Regina’s urban forest. Since the actions of individual homeowners will collectively have a significant impact on the health of our City’s trees, the cooperation and involvement of the public is vital to the success of any urban forest strategy.

Educational and participatory programs are an investment in the long-term vitality of our urban forest, since a tree educated public results in a healthier forest. The following programs and special events are offered by the City of Regina to encourage public awareness and participation in enhancing and preserving the city’s urban forest.

### **9.1 Participatory Programs**

1) Adopt-A-Greenspace

The program provides an opportunity for citizens to enhance the quality of public green space in Regina by volunteering their time to do light maintenance tasks.

2) Gifts and Memorials Program

The program provides individuals, groups and organizations the opportunity to purchase trees for planting in public open space in remembrance, observance or acknowledgement of a special event such as birth, marriage, anniversary or bereavement.

3) Public Requests for Boulevard Trees

Each year the City receives approximately 300 requests from the public to plant boulevard trees. Where possible the City attempts to accommodate these requests and include them in their tree planting schedule.

## 9.2 Educational Programs and Services

1) Arbor Day

Arbor Day is held each year. It is generally alternated between the public and separate school systems and includes activities such as a tree planting ceremony. Information on Arbor Day and the Tree Tour as well as tree care brochures are provided to the schools to educate the students about the urban forest. In 1996 and 1997 Weyerhaeuser has sponsored Arbor Day Colouring Books for distribution to all grade three classes in Regina. On occasion other opportunities present themselves and are incorporated into the program. For example, in 1996 Census Canada provided 5,000 seedlings that were distributed to all grade three classes in Regina. In 1997 Regina hosted the Provincial Arbor Day in conjunction with Saskatchewan Environment Resource Management. The Lieutenant Governor and Smoky the Bear were in attendance. Three classes were invited to attend and each narrated a poem about trees and were taken on a tree tour. A public service announcement and media invitation accompanies these events. In 1998 the City participated in an Arbor Day event at the Science Centre in conjunction with Saskatchewan Forestry Association and the Wascana Centre Authority.

2) Trees For The Millenium

In 1999 the City approved a Trees For Millenium planting contest in which a maximum of 10,000 burr oak seeds would be distributed to contestants and planted along the Wascana Creek, Pilot Butte waterways and selected residential and park areas. Distribution of the seeds is to begin in January 2000. Contest winners receive a cash prize.

3) The Tree Tour

The Tree Tour invites residents to learn more about the trees in their city. The tour begins in Rotary Park and continues through Kiwanis and Les Sherman Parks. It is promoted through various means such as the Program Guide, literature distributed in schools, community newsletters, the City information page, Arbor Day and the Home Show.

4) Xeriscape Classes

Information on tree species and tree care is provided in a workbook.

5) Tree Care Brochure Series

The City made available for public distribution brochures on tree planting, tree care and tree pests. Included are brochures on Cankerworms, Birch Dieback and Bronze Birch Borer, Dutch Elm Disease, Wetwood, Fireblight, Aphids, Colorado Spruce and Tree and Shrub Planting.

6) Community Partnerships and Shelterbelts

In 1999 the Public Works Department in cooperation with the Community Services Department established a program to identify suitable locations for shelterbelt plantings and provide an opportunity for community and resident participation. The program provides for written submissions to be received from individuals or community groups interested in cooperating with the City to establish shelterbelts of mutual benefit to the City and the community. The Public Works Department has identified \$5,000.00 annually from its Winter Road Maintenance budget for this purpose.

7) Home Show

The City's Enviro Group which is comprised of representatives of those divisions that have an interest in promoting environmental programs provides a display at the Home Show that includes tree related brochures and display.

8) Dutch Elm Disease Communication Plan

For the past ten years the City has, as noted in Section 8.0 the Integrated Pest Management Program, conducted a DED public awareness campaign.

9) Cankerworms

Public service announcements and City information page advertisements are placed in the local newspaper in the spring and fall when it is time to band and de-band.

10) Pruning Schedule

City information page advertisements are placed twice a year to indicate which areas of the city are being pruned. The advertisement includes information on how the schedule works and highlights from the bylaw.

11) Tree Care Series

In 1997 the City provided information on the City information page and the radio regarding tree care and City programs.

12) Yellow Page Advertisement

In 1998 and 1999 a Tree Care Notice was placed in the yellow pages providing residents with information regarding the care of public trees on the city owned portion of their property.

13) Newsletter Information

Each spring information on tree care and tree pests is sent to the community associations for inclusion in their newsletters.

14) The Program Guide

Timely tree care and pest information is placed in the Program Guide.

15) Tree Information Brochure

A brochure entitled “Almost Everything You Wanted To Know About Regina’s Trees” is available to the public. The brochure contains the answers to questions frequently asked by the public such as getting a city tree planted in their yard or pruned, how to prune and keep a tree healthy, and how to identify DED.

While the above programs and services may be offered in any given year the emphasis may vary depending on budget constraints and the need.

### **9.3 Conclusion**

A more educated and aware public will result in greater support for urban forest programs. Since the majority of the urban forest is privately owned, public support is crucial for promoting a healthy and sustainable urban forest.

### **9.4 Summary of Public Education and Involvement Issues**

The following issues were identified by the Public Education and Involvement Work Group.

#### **Issue**

- There is a need to formalize the current City practice of providing excess trees from

the civic nursery to community organizations for planting.

**Strategic Action**

- Appendix “L” The Tree Donation Program encourages public involvement in enhancing the urban forest by making trees from the City nursery available to community organizations for planting.

**Issue**

- The need to protect Regina’s heritage trees was identified by the Tree Protection Work Group.

**Strategic Action**

- Since many of the city’s heritage trees are on private property, The Heritage Trees of Regina Program proposed in Appendix “H” Tree Protection requires the involvement and support of the general public.

**10.0 THE MANAGEMENT INFORMATION SYSTEM**

The public tree inventory conducted by the City in December, 1996 was done on a block by block basis. In other words, the data was aggregated by block and not by each individual tree. It is the intention of The Open Space Management Division to add to this information and develop an individual tree inventory which would contain specific information on every public tree in Regina.

A management information system which has as its basis an individual tree inventory is required to plan and schedule work as well as to develop budgets and personnel requirements and monitor costs and performance.

**10.1 The Benefits of an Individualized Tree Inventory**

The following are the benefits of an individualized tree inventory.

1) Work Management

An individual tree inventory will enable managers to allocate manpower and equipment based on the actual species, size, condition and maintenance requirements of the tree. Daily work schedules will be based on the priorities derived from the inventory, grouped into efficient combinations of tasks and geographic areas.

2) Requests for Service

An individualized tree inventory with each tree located by address in the computerized data base will expedite requests for services by providing a detailed service history of each tree that will enable staff to respond in a timely and

professional manner.

3) Insect and Disease Control

A computerized inventory is necessary for tracking infected trees and recording treatments for The Integrated Pest Management Program.

4) Accurate Information for Management Decisions

Data on maintenance performed, condition and size of the tree population can be summarized to prioritize resources and develop well-grounded annual budget requests.

5) Accurate Cost Analysis

Work completed is recorded by each individual tree. This will allow a cost analysis of the manpower, equipment and material including the extent and frequency of services. Resource expenditures identified by tree serviced would provide more accurate data for future manpower and equipment budgeting.

6) Continuous Inventory

A computerized tree inventory that is updated using daily work reporting for Regina's Market Square will provide up-to-date data on the status of the urban forest on an on-going basis.

7) Prioritizing Tree Maintenance and Tree Plantings

An individualized tree inventory will identify the maintenance requirements of each tree in the urban forest and the sites for future plantings. This will allow priorities to be established and resources allocated based on accurate and current information.

8) Species Performance

Valuable knowledge about the response of a species to different growing conditions and maintenance treatments can be obtained from an individual tree inventory.

9) Tree Values

The individual tree inventory will allow each tree to be assigned a monetary value which can be used for cost recovery purposes in the event of damage.

10) Risk and Liabilities

Trees that pose a public hazard can be identified for immediate inspection and care. By documenting that the City exercised reasonable care in detecting and correcting problems, the inventory can provide a valuable defence against claims that might arise.

11) Evaluation

The inventory will allow the City to evaluate its success in meeting goals and policies and the resources required for the next fiscal year.

12) Master Tree Planting Strategy

The individual tree inventory provides a profile of existing trees which will be used as an analytical tool in selecting species for replacements or new plantings in associated areas. The intent is to allow for consideration of existing plantings which may influence decisions on species selection for diversity and location.

13) Staff Safety

An individual tree inventory will enable the City to maintain a listing of trees with bolts/cables and reduce the change of staff being injured by contacting a hidden bolt.

## 10.2 Summary of Management Information Issues

The following issue was identified by the work groups.

### Issue

- There is a need for an individualized tree inventory that can be accessed and updated by both The Urban Forestry Section and The Integrated Pest Management Section.

### Strategic Action

- The Open Space Management Division is currently developing a computerized individual tree management information system that would serve as a base inventory for those divisions involved in tree care.

## 11.0 STAFF TRAINING AND DEVELOPMENT

An important consideration in maintaining a healthy urban forest is ensuring employees have the skills and knowledge needed to do their jobs. Currently an orientation is conducted annually to update and refresh staff in pruning, planting and tree removal. During the course of developing The RUFMS several of the Work Groups identified the need for additional training for employees involved with the care of the urban forest



## **11.1 Summary of Staff Training and Development Issues**

### **Issue**

- There is a need for Parks Maintenance and Open Space Services staff to receive training in tree maintenance.

### **Strategic Action**

- It is recommended that civic employees involved in tree pruning attend both the tree pruning seminar offered by The Urban Forestry Section and the tree pruning course offered by the Saskatchewan Institute of Applied Science and Technology.

### **Issue**

- Urban Forestry, Parks Maintenance, Open Space Services and Support Services staff who are involved in caring for the urban forest should in addition to their regular training receive additional specialized training to identify tree diseases and insect pests.

### **Strategic Action**

- Pest Management staff should provide staff who care for the urban forest with training to enable them to identify common pests and insects.

## **12.0 THE MASTER TREE PLANTING STRATEGY**

### **12.1 Background and Purpose**

A tree planting program should be a function of a community's master tree plan. A master tree plan brings together the various elements that must be considered in establishing a healthy, sustainable urban forest.

The purpose of the Master Tree Planting Strategy (MTPS) is threefold:

1. To provide a comprehensive plan for new tree plantings and replacements for the City of Regina.
2. To prioritize the order in which sites should be planted.
3. To provide projections for the quantity and species of trees that will be required.

These projections will assist the City nursery and private nurseries from whom the City purchases plant material in determining their production plans. It should be noted that the MTPS is a conceptual plan and the specific number of trees or species for each site is subject to change when a site specific analysis is conducted and design plans are developed.

It is also important to note that the Master Tree Planting Strategy accounts only for tree planting on each designated site although detailed design plans (particularly for Ceremonial Routes, Gateways and Regina's Market Square) may include lighting, site furnishings, architectural

elements, artwork, signage, etc.. The tree numbers associated with the MTPS and the associated Nursery Production Plan are based upon an annual budget for Streetscaping. Should any of these funds be directed towards design elements other than plant material, the tree numbers previously identified will require adjustment. Furthermore, projected timelines for nursery production and tree planting installations will be also require adjustment according to funding re-allocation.

## **12.2 The Criteria for Prioritizing New Tree Planting Projects**

Each year an effort will be made to install plantings within more than one of the following location categories, with the intent being a planting cross-section of the six main categories.

In general new tree planting projects should be prioritized in the following order:

- 1) Ceremonial Route – The key ceremonial routes include:
  - a) airport to legislative ground
  - b) downtown (Victoria Park) to legislative ground
  - c) downtown to Exhibition Park
  - d) territorial administration area (RCMP and Government House) to legislative ground.Gateway – A street that is a main entrance point to Regina. This would include Albert Street, Victoria Avenue, Pasqua Street North, Lewvan Drive and Arcola Avenue.
- 2) Gateway – A street that is a main entrance point to Regina. This would include Albert St., Victoria Avenue, Pasqua Street, Lewvan Drive and Arcola Avenue.
- 3) Regina’s Market Square – A designated business improvement district located in the heart of the city. Refer to section 12.3.5 for a more detailed discussion.
- 4) Major Arterial Intersection (Priority One) – The intersection of two priority one major arterials (see definition below).
- 5) Major Arterial (Priority One) – A street that carries major traffic flows between traffic generators and communities. Residential frontage is not allowed. Direct access is not desirable and median openings are not permitted except at intersections. No parking on the street is permitted. For the purposes of this strategy, the major arterials identified for study have been selected according to the Public Works Snow Removal and Maintenance Pioritization Map.
- 6) Residential Street\* – A street designed primarily to provide access to abutting property. For the purposes of this study, the following two roadway types will be referred to as "residential street":
  - a) Local Street - A street designed primarily to provide access to abutting

property.

- b) Collector Street - A street designed to intercept, convey and distribute traffic between local and arterial streets with direct access to properties permitted.

\* Residential Streets are prioritized according to a different set of criteria defined by the Urban Forestry Division. The plantings proposed for these streets will be addressed through vacancy assessment and new development and therefore will not appear on the Master Tree Planting Plan. Refer to section 6.0 for a more detailed discussion.

The following criteria shall also be applied in prioritizing each project. Each criteria should be weighed and projects prioritized based upon the sum total of all the criteria.

- 1) Those sites which have the greatest public visibility should be assigned a higher priority.
- 2) The adjacent land use to the proposed development should be considered. Those projects adjacent to residential areas should be given priority over those adjacent to commercial areas. Similarly projects adjacent to commercial areas should be prioritized over those adjacent to industrial areas.
- 3) The availability of the appropriate species and size of tree at the City nursery for a particular site should be taken into account.
- 4) The possibility of securing funding partners for a particular project should be weighed.
- 5) The possibility of maximizing the City's capital investment by coordinating the landscape design with other capital projects planned for the site should be explored with other civic divisions and departments.
- 6) The context in which the planting is to occur is also a consideration. Is the site a special attraction? Is it a major intersector for vehicles, pedestrians or bicycles? Does it have unique features?
- 7) The functional purpose of the planting, whether it is intended to provide visual screening, framing for a vista, spacial organization or a buffer is an important consideration.
- 8) Potential conflict with other civic projects planned for the site such as municipal engineering works should be considered.
- 9) While recognizing the need for species diversity consideration should be given to

maintaining the continuity of the streetscape by relating the design elements of each project as opposed to a haphazard planting of trees.

### **12.3 Landscape Design Philosophy**

The following discussion describes the general design principles, site evaluations and thought processes that guided the development of the Conceptual Master Tree Planting Strategy. This section is divided into the following five design location categories: Ceremonial Routes, Gateways, Major Arterial Intersections (Priority One), Major Arterials (Priority One) and Regina's Market Square. Each category will be discussed with reference to:

- a) the existing site context,
- b) the potential for landscape enhancement,
- c) suggested landscape design strategies.

Although each category lends itself to specific design strategies, the overall intent of the conceptual tree planting plan applies to all locations. The design guidelines are intended to create harmony within the urban landscape while defining a unique streetscape character that can aid in developing a city-wide wayfinding system. Within this system it is important to note and emphasize Regina's role as the capital city of Saskatchewan. This should manifest itself in the design strategies implemented in new streetscape and landscape developments. These design strategies could include identifying and highlighting points of interest unique to Regina, focusing and maintaining views to the legislature and other special attractions, and developing themes and images across the city that refer to the unique physical, social and cultural aspects of the city. Eventually, these streetscapes will provide a series of visual cues and boundaries that contribute to the form of the urban landscape and help to create a sense of place unique to Regina. This strategy refers primarily to plant material, but it should be noted that in many areas hardscape and architectural elements must be integrated into the landscape. This can include such elements as site furniture, information signage, paving, lighting and other related structures.

The seasonal aspect of each design exercise must also be carefully considered. Thoughtful selection of plant material in combination with architectural elements can create a successful landscape that displays well in all seasons, offering visual relief and interest in winter months as well as the growing season.

While not always visually apparent, there are a number of functions road right-of-ways serve that can conflict with potential landscape development. These include: the required setback for roadway safety and visibility; allowances for snow removal equipment access, snow storage and drifting, services and utilities (underground and overhead); drainage courses; salt spray radii; and safety fencing. These functions often limit the available planting space significantly. In some instances, the space available for

planting is limited to a narrow strip along the outside edge of the right-of-way. A good example of such a roadway is the Ring Road. In this situation, some sections of the road right-of-way have no suitable space for planting because there are numerous underground utilities, deep drainage ditches, underpasses and safety fencing. In addition, due to the high traffic speeds and volumes, greater setbacks are required for visibility, safety, and snow drifting.

Although this section of the strategy focuses primarily on tree planting in road right-of-ways, it should also be noted that parks and open space comprise a substantial portion of the urban forest. This type of landscape demands a different approach to design and planning as the function, aesthetics, constraints and opportunities of these spaces differ considerably from road right-of-ways. In passive and active recreational parks and open spaces there can be numerous features and uses, which must be organized according to compatibility and successful circulation. Plant material is often used to direct circulation internally and to help organize and define the space. Design strategies within parks can vary greatly; the space can be organized to give a naturalistic appearance and a pastoral quality or it can be organized geometrically and intentionally appear to be a built construct. There are endless design theories that can be put into practice to design a parkspace. Plant material plays a dominant or supporting role in most park space design and serves a variety of functional and aesthetic goals. There is a potential to use a greater variety of species, form, colour, and texture in parks as the concern for visual clutter and traffic safety is of less concern. The City of Regina Development Standards Manual provides some guidance in these matters.

At this stage the conceptual MTPS is a general interpretation of the following ideas; site specific exploration and design detailing are required before implementation is considered. Appendix "M", The MTPS provides a preliminary interpretation of this conceptual plan and projects a Tree Nursery Production Plan to respond to an anticipated need. Based on the knowledge of this strategy, the City Nursery Production Plan will serve to guide the nursery in growing the basic recommended tree species.

### **12.3.1 Ceremonial Routes**

Ceremonial routes refer to street circuits within the city that link important locations or points of interest that are used for state, parade, or other ceremonial occasions. There are four Ceremonial Routes identified in the Development Plan for the City of Regina (City of Regina, 1994): Airport to Legislative Grounds, Downtown (Victoria Park) to Legislative Grounds, Downtown to Exhibition Park and Territorial Administration Area (RCMP and Government House) to Legislative Grounds. These routes should be reviewed for intention and purpose prior to any development in order to ensure that landscape treatment responds to the contemporary use of the corridor. There are a number of factors to be considered in the development of these routes as discussed in the Development Plan for the City of Regina (City of Regina, 1994). They include:

- a) "roadway design,
- b) boulevard landscaping including provision for flags, banners, lighting, etc.
- c) treatment given to key nodes such as entrances to legislative grounds
- d) traffic control plans and security during ceremonial functions
- e) supporting facilities along the route such as viewing area and assembly areas
- f) architectural and signage control."

### **12.3.1.1 Site Context**

**Note: The following routes are illustrated in Map 3 of Appendix "M" Conceptual Master Tree Planting Plan**

#### **12.3.1.1 A: Airport to Legislative Grounds**

This route runs along Regina Avenue from the airport to Albert Street and then south to the Legislature. There is a substantial planting scheme along the roadway into the airport that consists of a variety of ornamental, shade and coniferous trees and shrubs. The majority of the route travels through established residential neighbourhoods with stately homes and mature landscaping, including American Elms as street trees. The Legislative grounds themselves are ornately landscaped with extensive traditional annual beds and a view to Wascana Lake.

#### **12.3.1.1 B: Downtown (Victoria Park) to Legislative Grounds**

This route runs through the heart of Regina's prominent business and government district. Its starting point, Victoria Park, is an historical highlight of the city with war memorials and other historical monuments set in a classical 'urban green' parkspace. Other significant landmarks along the route include the Hotel Saskatchewan, City Hall, an historic apartment building, the Provincial Law Courts and the Royal Saskatchewan Museum. As the route runs south down Albert Street toward the legislature it crosses the Albert Street bridge. This structure boasts an international claim to fame as the longest structure to cross the narrowest waterway. The structure itself is an architectural gem with ornately detailed ceramic pilasters and obelisks. The view the bridge affords to Wascana Lake is perhaps the most celebrated view in the city. Mature elms line the route as it passes through the residential neighbourhood of Lakeview with elegant older homes.

\* A portion of this route follows the southern boundary of Regina's Market Square, refer to Regina's Market Square design discussion.

#### **12.3.1.1 C: Downtown to Exhibition Park**

As noted above, this route passes by numerous landmarks in the downtown area. The remainder of the route (north along Albert Street, west on Saskatchewan Drive and north on Elphinstone Street, north on Lewvan Dr.) is relatively nondescript. Portions of the route pass through an unsightly light industrial zone along the railway. There is little landscape enhancement along this route once it leaves the Regina's Market Square district (with the exception of landscaping along the Lewvan Dr. portion and the very western end of Saskatchewan Dr.). The space available for landscape enhancement is limited along much of this route as the road right-of-way is narrow and the majority of the area is hard-surfaced.

#### **12.3.1.1 D: Territorial Administration Area (RCMP and Government House) to Legislative Grounds**

This route passes through a wide variety of areas with many different adjacent land uses. A large section of the route runs through residential neighbourhoods with traditional bungalows, corner stores and mature street tree planting. Other sections of the route pass through commercial areas with undistinguished office and retail buildings lining the roadway and little landscape development to note. The section of the route that runs south down Albert to the legislature has been described above.

#### **12.3.1.2 Potential for Landscape Enhancement**

The majority of the roadways that these routes follow either have existing street tree planting or the narrow road right-of-way and extensive hardscape may not allow for additional tree planting. One obvious deficiency in tree planting has been noted along a portion of Elphinstone Street. This deficiency is reflected in Map 3: Conceptual Master Tree Planting Plan on page 2 of Appendix "M". The identified lack of available planting locations does not preclude the potential for replacing or renovating existing landscapes to respond to a new design strategy. Also, as noted previously, the Ceremonial Route landscape should include other elements and features in addition to tree planting.

A cursory review of existing plantings along ceremonial routes indicates the potential opportunity to plant approximately 40 ornamental flowering deciduous trees. (Refer to Appendix "M" The MTPS for more detailed projections). This number reflects only an obvious deficiency in existing planting, as discussed in section 12.1; a detailed site analysis and comprehensive design is required for all ceremonial routes. A separate funding distinct from the annual Streetscaping budget may be required to cover the significant costs that will be incurred in developing the Ceremonial Route landscape.

#### **12.3.1.3 Design Strategy**

The following points describe a general approach to creating the Ceremonial Route landscape:

- use distinct plant material from other street tree plantings, i.e.: different colour, form or texture
- tighter spacing /lower spreads (6 m)
- potential shrub use, highly decorative/ornamental planting
- flowering trees
- patterns should follow dynamics of the ceremony i.e.: have point and line patterns that respond to direction of movement and stopping points
- draw attention to city highlights/attractions with more intense planting schemes at these nodes
- allow for combination with hardscape elements and site furnishings
- possible use of temporary items such as planters/flags/signs/etc.

### **12.3.2 Gateways**

There are six vehicular entries to the city defined as “Gateways to Regina” that greet traffic from the north, south, east and west. An additional gateway from the airport introduces air travelers to the city. All seven gateways lack true definition and a sense of entry. There are limited identifying features, landmarks or landscape treatments that appropriately identify these spaces as entry points. Regina’s geophysical location on the open plains ensures that any built structures or vertical elements feature prominently from a distance. There is potential to capitalize on this environment and create distinct physical gateways to the city that stand proud on the prairie landscape and announce the city to its audience. These gateways will require a combination of landscape architecture, architecture, traffic planning, lighting and signage to create a space that truly functions as a gateway. The major arterial segments that intersect at each gateway should be considered an extension of the gateway corridor landscape. The gateways should be designed to function successfully at night as well as in the daylight, and during the cold, leaf-less months as well as those seasons of full-leaf and blossom.

#### **12.3.2.1 Site Context**

##### **12.3.2.1 A: Pasqua Street and Highway #11 (jurisdiction of Saskatchewan Department of Highways)**

A major renovation of this intersection is currently underway to create an overpass over Highway #11. This structure will define a threshold of entry into Regina as it rises conspicuously from the surrounding prairie landscape. The prominent views at this location are the Regina skyline in the near distance and farmland in the immediate vicinity. These views are closely associated with the character of Regina and help to define the city's identity. The physical structure of the overpass provides an opportunity to build upon the impression of "sense of entry", or transition from one environment to another. Large, bold plant groupings can be installed in contrast to the open prairie, indicating a change in the nature and use of the landscape. With the cooperation of the



Saskatchewan Department of Highways, this intersection can act as a functional, aesthetically pleasing and well-defined physical introduction to the City of Regina.

#### **12.3.2.1 B: Albert Street North and Ring Road**

There is some existing tree planting in this area, some of the plantings are organized in large informal groupings and others are rather scattered individual plantings. There is a mix of coniferous and deciduous plantings. On Albert Street south of Ring Road there is extensive commercial strip development while the north side of Ring Road opens onto the edge of the city to the northernmost extents of existing residential developments. The residential developments are separated from Albert Street by broad right-of-ways and chain link fences.

#### **12.3.2.1 C: Victoria Avenue and Prince of Wales Drive (Jurisdiction of the Saskatchewan Department of Highways)**

This intersection has recently undergone significant redevelopment and is now a controlled intersection with Prince of Wales Drive widened to four lanes both north and south of Victoria Avenue. An interchange was originally planned for this area and plant material was located with the future configuration of the roadway determining the layout of the plantings. A large number of trees have been relocated in response to the new roadway configuration. Further plant relocations from the original "ramplands" area will be required as land is sold and developed. The surrounding context of the site is wide open views to open fields. This will change significantly as planned development occurs including 'Big Box' commercial centres and extensions of new residential developments. At this time, the intersection will become a more defined entrance to the city as development expands in an easterly direction.

#### **12.3.2.1 D: Albert Street South and Highway #1 Bypass (Jurisdiction of the Saskatchewan Department of Highways)**

This interchange is open to views in all directions. There are expansive views to the fields surrounding the city. The only built development that is in obvious view is a car dealership on one corner and residential development on the north side of the intersection that is far removed from the roadway. The road right-of-ways are broad and covered in coarse grass. There is some existing mature tree and shrub plantings scattered within and around the cloverleaf. The plantings do not relate to the roadway alignment. The residential developments on the north side are sheltered from the roadway with some existing mature tree planting. This planting relates to the residential lots and has little direct relevance to the roadway.

There is little sense of entry to the city and limited reference to Regina's unique identity or distinguishing features.

### **12.3.2.1 E: Lewvan Drive and Highway #1 (Jurisdiction of the Saskatchewan Department of Highways)**

This intersection is the first entry to the city for all traffic travelling from the west along the Trans Canada Highway. The relatively high speed intersection is controlled by a stop sign on Lewvan Drive. At this point the built development of the city is still fairly far removed from the intersection; there is more a sense of being in a rural setting than of approaching a major urban centre. Dominant views are open fields in all directions. One or two individual tree plantings dot the area and accentuate the grand horizontal scale of the prairie landscape. The dominant features on the landscape are the power poles and overhead lines.

There is little sense of entry to the city and limited reference to Regina's unique identity or distinguishing features.

### **12.3.2.1 F: Arcola Avenue at Southeast City Limits**

This location, roughly at the intersection with Woodland Grove Dr., marks the current limit of residential development in this direction. Considerable traffic enters the city at this point from the southeast travelling along Highway #33. There is a very definite edge to the city as residential development borders both sides of the roadway and subdivision fences define the boundaries of distinct neighbourhoods, it is a very abrupt transition from the previously rural landscape. There is an obvious lack of any landscape enhancement along this corridor as the adjacent subdivisions are relatively new and offer no landscaping mature enough to read from Arcola. There appears to be ample opportunity for tree planting and other landscape enhancement. Currently, the dominant features on the landscape are the subdivision fences that frame Arcola as it heads northwest.

Other than the abrupt beginning of residential development, there is little sense of entry to the city and limited reference to Regina's unique identity or distinguishing features.

### **12.3.2.1 G: Regina Avenue and Lewvan Drive**

This intersection is the primary entry to Regina from the airport. There is a substantial planting on the northeast corner that provides a backdrop to a "Welcome to Regina" sign. The planting is a large grouping of coniferous and deciduous trees. There appears to be some linear organization to this planting but no actual pattern or form determinant is evident. The other three corners of the intersection have minimal scattered plantings that are displaying limited growth. There is potential here to significantly enhance the intersection and better introduce visitors to the city with improved signage and landscape development. The road to the airport has a well established planting scheme that enhances the roadway.

Surrounding views are open to the airport and the Craig Golf Course and residential development on the west side. The change in the character of the landscape and built structures from west to east does help to provide a sense of entry to the city. Wide, shallow ditches border Lewvan drive on both sides and form part of the south storm channel. Preliminary discussions have taken place regarding potential future development of an additional storm channel in this area.

Long range plans for this intersection include an interchange, these plans are currently under review through the Transportation Strategy.

### **12.3.2.2 Potential for Landscape Enhancement**

The majority of these gateways offer broad open spaces with limited existing landscape treatments. This allows ample opportunity to create a series of unique gateways around the city that relate both to their individual locations as well as to each other. The definite geometry of the roadways and interchanges provides clear form determinants to guide landscape development.

A cursory review of existing plantings in the gateway locations indicates the potential opportunity to plant approximately 2200 trees. (Refer to Appendix “M” The MTPS for more detailed projections.)

### **12.3.2.3 Design Strategy**

The following points describe a general approach to creating the Gateway landscape:

- very large scale plants/tall trees
- bulk/mass planting in bold patterns
- follow geometry of surrounding roadway systems (both existing and planned)
- combine with architectural or hardscape elements
- distinct form, pattern, colour or texture from surrounding roadways
- design elements or organization thereof that impress upon the audience a sense of entry
- design elements that imply or carry themes or images which refer to the unique identity of Regina –
  - Capital of Saskatchewan
  - RCMP Training Headquarters
  - Historic role of the railway
  - “Pile of Bones” legend
  - Wascana Centre Authority

### **12.3.3 Major Arterial Intersections (Priority One)**

Major Arterial Intersections are locations where there is a confluence of two or more streams of large volumes of traffic. There are traffic control signals at most of these intersections (others are interchanges with an overpass system), thus the vehicular audience is often stopped for a period of time at these particular locations. These two factors combine to offer a large audience that, while stopped, is momentarily relieved of the need to pay close attention to the road. This provides an opportunity to create landscapes that can be appreciated at both high speeds and while stopped, allowing for a layering of scale and geometry. The landscape treatment can also be used to alert the driver of an approaching intersection by providing visual cues with a change in the form, colour and spacing of plant material. Care must be taken to complement a wayfinding system while not creating visual clutter. There are important safety considerations to be included in any landscape design for an intersection; sitelines and setbacks become particularly important in these locations.

### **12.3.3.1 Site Context**

#### **12.3.3.1 A: 9<sup>th</sup> Avenue North and McCarthy Boulevard**

The dominant feature of this intersection is the Normanview Mall which sits fairly removed from the actual intersection. There is very little soft landscaping around the mall, the visual emphasis is on a large expanse of asphalt parking and the mall façade. The rest of the intersection is primarily coarse turf grass before the residential development starts. There is minimal tree planting on the road right-of-way, the primary landscaping is a broad expanse of coarse turf. Wood fences separate the residential development from the road right-of-way, there is mature landscaping associated with the residential area.

There is excess land in the north west, north east and south east sectors of this intersection which is open to development that is compatible with adjacent residential development. Future landscape design should address the possibility of such development.

#### **12.3.3.1 B: 9<sup>th</sup> Avenue North/Ring Road and Pasqua Street**

The dominant features of this intersection are the two water reservoir tanks on the northwest and southwest corners. Chain link fences surround the tanks and separate the residential areas from the road right-of-way. There is mature landscaping associated with the residential areas. There are several scattered tree plantings in coarse turf that dot the intersection. The trees are struggling with the competition from the turf. There is a wide turfed median on 9<sup>th</sup> Avenue North at this intersection.

Long range plans for the configuration of this intersection are still under review.

### **12.3.3.1 C: Argyle Street and Ring Road**

The west half of this intersection has no landscaping other than coarse turf. There is some tree planting on the eastern right-of-ways. Currently, there is a broad right-of-way of coarse turf adjacent to residential development.

The topography of this intersection has attracted snowboarders and toboganners in the winter, causing a serious safety concern. Future landscaping could help alleviate this problem.

### **12.3.3.1 D: Rochdale Boulevard and Pasqua Street**

There are plans underway to widen Pasqua Street to the city limits and Rochdale Boulevard to its intersection with Pasqua Street. There is a large scale commercial development planned for this corner. The surrounding context at this point in time is open fields with some new residential development. There is limited existing landscaping but the current road construction offers an opportunity to begin with a clean, open site. Views are open to the prairie beyond the city limits and Highway #11 is in visual and audible proximity.

### **12.3.3.1 E: Arcola Avenue and Ring Road**

This interchange has some minimal scattered tree planting in the southeast quadrant. All other quadrants are devoid of vegetation other than coarse turf. The landscape buffers on all four corners have some mature trees that have nominal visual impact on the access lanes and the adjacent residential development. The residential developments that abut this intersection are separated from the roadway with chain link fences. The remainder of the area is covered in coarse turf that is on a low maintenance regime. A bike path runs along the south side of Arcola.

### **12.3.3.1 F: Victoria Avenue and Ring Road (Jurisdiction of the Saskatchewan Department of Highways)**

As Ring Road passes over Victoria Avenue at this intersection the structure defines a point of transition from newer, more sprawling development to a denser, more established area of the city. The nature of the streetscape appears to change accordingly. The road right-of-ways narrow and the buildings move closer to the road. The interchange itself has some existing scattered plantings within the cloverleaf. There are more organized street tree and shrub plantings on Victoria west of Ring Road. Surrounding land uses on the west side of Ring Road include hospitality institutions such as hotels, motels, restaurants, other services and apartment residential. There is also a large religious institution. On the east side of Ring Road there is a trailer park and a large scale commercial development. Traffic lights force vehicles to slow and stop in this area.

The nature of the vehicular traffic audience in this intersection will change when a new Highway No.1 Bypass is built.

#### **12.3.3.1 G: Ring Road and Wascana Parkway** (jurisdiction of the Wascana Centre Authority)

The character of this intersection is pastoral and park-like as Ring Road passes through the Wascana Centre Authority greenspace. There is a variety of mature landscaping including coniferous and deciduous trees and shrubs. The plantings are organized in large informal groupings and appear well maintained. The intersection offers sweeping views of the The Saskatchewan Institute of Applied Science and Technology, the University of Regina in the distance, Wascana Park and the prairie landscape beyond the city limits. There is one quadrant of the interchange, the southeast, where existing plantings are minimal and the potential for plant material augmentation is greatest.

#### **12.3.3.1 H: Albert Street North and Highway #11** (partial jurisdiction of the Saskatchewan Department of Highways)

The prominent feature at this intersection is the overpass connecting Highway #11 to Albert St.. Views from this point include the Ipsco steel manufacturing plant, adjacent agricultural fields and residential development in the distance at the city's edge. There is a limited amount of scattered plant material bounded by the access ramp to the overpass. An organized roadway planting scheme begins several hundred metres to the south of this intersection.

#### **12.3.3.2 Potential for Landscape Enhancement**

There is a significant area of open or undeveloped land in the right-of-ways of several of the above noted intersections. This offers room for some moderately scaled landscape developments that could begin to define some of our major intersections.

A cursory review of existing plantings at major arterial intersections indicates the potential opportunity to plant approximately 1800 trees. (Refer to Appendix "M" The MTPS for more detailed projections.)

#### **12.3.3.3 Design Strategy**

The following points describe a general approach to creating the Intersection landscape:

- introduce a new colour, texture, or form that distinguishes it from adjacent street trees
- retain simple, geometric patterns
- potential for shrub use if it does not interfere with vehicle/pedestrian sight lines
- create a visual/physical separation between vehicular, pedestrian and bicycle traffic

### **12.3.4 Major Arterials (Priority One)**

The general intent of the major arterial streetscaping is to define the physical extent of the roadway and enhance its aesthetics. The major arterials direct a majority of the traffic in the city and as such have a wide vehicular audience. There is also a significant amount of pedestrian and bicycle traffic that uses these roadways. The landscaping should attempt to enhance the driving experience, potentially create some climate mitigation, offer some buffer effects to adjoining neighbourhoods as well as playing an important role in fixing air and soil pollutants.

A significant amount of travel time is spent on these roadways, demanding that the roadways function efficiently. Although not an integral aspect of the roadway's functionality, the sensory experience of driving can be enhanced significantly through landscape development.

#### **12.3.4.1 Site Context**

##### **12.3.4.1 A: Albert St.**

Albert Street is the primary north south arterial in Regina that links the northern and southern entrances to the city. The segments of this roadway that abutt a designated gateway should be considered an extension of the gateway corridor landscape. At both its north and south ends, the roadway runs through prime commercial areas of strip mall development and varied commercial enterprises. Landscaping varies from minimal tree and shrub planting as required through bylaws for private development to some fairly extensive landscape improvements of tree, shrub and annual planting in wide medians and boulevards.

\* Albert Street forms the western boundary of Regina's Market Square, refer to Section 12.3.5.3 Regina's Market Square design discussion.

##### **12.3.4.1 B: Arcola Avenue**

Noise attenuation has been frequently requested by residents adjacent to this roadway and noise levels have been evaluated. Future landscaping of the right-of-way should consider land form and planting combinations to help alleviate this issue.

Arcola Avenue is a primary arterial that runs through a series of residential developments that are set back significantly from the roadway. The segments of this roadway that abutt a designated gateway should be considered an extension of the gateway corridor landscape. Some of these residential developments have concrete fences and/or berms which, among other functions, attenuate the noise levels coming from the roadway. No houses face directly onto the road. There is a wide grass median in some sections of the roadway, in other sections only a concrete strip. The landscaped boulevard on either side

of the roadway varies in width. In the newer developments to the east, the boulevard is broad and open but narrows significantly as the arterial moves west into the centre of the city. In this area the adjacent land uses change from residential to commercial including gas stations, convenience stores, and restaurants with direct access off the roadway. The boulevard has some existing tree planting. In some areas the plantings are organized in a linear fashion and relate to the geometry of the roadway. In other areas the tree plantings are more scattered. To the north of Victoria the character of Arcola changes significantly; there is little or no landscaped boulevard and numerous commercial enterprises have direct access to the roadway. There is some adjacent residential development that does not directly face Arcola. Long range plans may include roadway configuration changes between Victoria Avenue and Winnipeg Street.

#### **12.3.4.1 C: Broad Street**

In the south Broad Street begins at the end of the Wascana Parkway where the character of the streetscape changes from a parkway to an urban arterial. As it runs through the downtown area the street is bordered by office buildings and apartment blocks with some spotty tree planting or other soft landscaping. A concrete median runs through this section of Broad Street. Other sections of the roadway are lined with older stock residential developments with some established tree planting. Certain portions of the roadway pass through an industrial and commercial development where there is little or no soft landscaping and most ground surfaces are concrete. The north end of Broad Street runs through a residential suburb with a maturing landscape. In this section of the roadway, houses face directly onto the street and traffic diminishes giving Broad Street a more residential character. Broad Street has been designated as a future location for a bicycle route.

- Broad Street forms the eastern boundary of Regina's Market Square, refer to Section 12.3.5.3 Regina's Market Square - Design Strategy.

#### **12.3.4.1 D: Dewdney Avenue**

Portions of Dewdney Avenue (to the west of Broad Street) have been designated an historic corridor and should be treated as a unique streetscape within the City of Regina, refer to the Heritage and Tourism Significance of Dewdney Avenue, Regina, Saskatchewan (City of Regina, 1995).<sup>12</sup>

The character of Dewdney Avenue changes significantly as it crosses the city from east to west. In some sections, the street runs through a dense industrial corridor where there is no landscaping and the majority of the ground surface is covered in concrete and asphalt. In one distinct section the surrounding context is commercial and light industrial in redeveloped historic buildings; an emerging area known as Regina's Old Warehouse District. The far western portion of the corridor is primarily residential development with some minor commercial establishments. Many of the houses date back 60 years or more



and face directly onto Dewdney with mature street trees lining the roadway. Significant establishments along this corridor include the CPR Intermodal Transfer Station, the RCMP National Training Headquarters, the historic Governor General's Residence and the historic Territorial Administration Buildings. The far eastern portion of the roadway passes through a variety of retail, strip commercial, light industrial and residential developments. Dewdney Avenue has been designated as a location for a bicycle route.

#### **12.3.4.1 E: Lewvan Dr.**

Lewvan Drive is a high volume arterial that runs north/south through the west side of the city. It is a primary connector for the airport and to Highway #1. The segments of this roadway that abutt a designated gateway should be considered an extension of the gateway corridor landscape. There is limited residential or commercial development that is accessed directly off the Lewvan. In some sections of the roadway there is a wide turfed median and chain link fencing preventing pedestrian access along the boulevards. There is a significant amount of mature landscaping along the roadway.

Noise attenuation has been frequently requested by residents adjacent to this roadway and/or noise levels have been evaluated. Future landscaping of the right-of-way should consider land form and planting combinations to help alleviate this issue.

#### **12.3.4.1 F: McCarthy Blvd.**

This arterial runs along the edge of the city with wide boulevards in some locations which narrow as the roadway passes through residential development that faces the roadway. There are two creek crossings where views on either side of the road open up to linear greenspaces. The majority of the roadway has existing street tree planting excluding the north end of the street and one the intersection with 9<sup>th</sup> Avenue N.. The speed limit varies as the character of McCarthy changes from residential to arterial/commercial. In some sections of the roadway there is a landscaped median. McCarthy Boulevard is currently designated as a bicycle route.

#### **12.3.4.1 G: 9<sup>th</sup> Avenue N.**

9<sup>th</sup> Avenue North is the terminus of the Ring Road in the west end. The roadway has a wide boulevard that is primarily turf with little or no tree and shrub planting. This arterial divides residential developments to the north and south. This roadway is currently undergoing improvements to increase its ability to carry larger volumes of traffic. Adjacent residential developments are separated from the roadway by a wide boulevard and fencing. 9<sup>th</sup> Avenue North has both short term and long term roadway reconfiguration plans.

Noise attenuation has been frequently requested by residents adjacent to this roadway and

noise levels have been evaluated. Future landscaping of the right-of-way should consider land form and planting combinations to help alleviate this issue.

#### **12.3.4.1 H: Pasqua St.**

Pasqua St. connects with Lewvan Drive at Sherwood Drive. At this point the roadway changes character significantly. The street right-of-way narrows, the speed limit decreases and there is some residential and commercial development that access the street directly. The north end of the roadway has wider boulevards and the residential development is more removed from the street. The north end is currently being widened to accommodate for traffic entering the city from Highway #11. The segments of this roadway that abutt a designated gateway should be considered an extension of the gateway corridor landscape.

#### **12.3.4.1 I: Prince of Wales Dr.**

Prince of Wales Dr. runs north/south connecting Assiniboine Ave. to Dewdney Ave.. The roadway will extend to the north following development. Future plans for this roadway also include widening to two lanes in each direction as development demands. Prince of Wales cuts through residential developments on either side that range in character from brand new housing to housing stock that is approximately 35 year old. There is commercial development at major intersections. The road right-of-way is relatively wide and the residential development is fenced and does not address Prince of Wales. A significant portion of the west side of Prince of Wales Drive has been landscaped. The existing plantings include a mix of coniferous, deciduous and ornamental in organic-shaped beds. A pathway runs through these plantings.

#### **12.3.4.1 I: Ring Road (Partial jurisdiction of the Saskatchewan Department of Highways)**

Ring Road creates a significant boundary/barrier around the city as it is an enclosed entity for the most part, accessed only through large interchanges and access ramps. As such it creates a physical barrier to any surrounding land uses. No property is directly accessed off the Ring Road. Most of this arterial has fences and/or berms that act as buffers to the adjacent land uses in order to prevent direct access to the roadway and provide visual separation. There is a wide landscaped buffer on both sides of this roadway. In some instances this is course turf and in others it has some tree and shrub planting. Conditions for plant material are harsh as the speeds on this roadway are high and salt spray extends far into the landscaped buffer. The significant levels of high speed traffic also likely contribute to the pollution levels imposed on the surrounding landscape. Drainage swales frame the roadway to direct water flow into the sewer system. In some instances the slope off the road edge and across the landscaped buffer is extreme as Ring Road either rises over or ascends below perpendicular roadways to allow for flow of traffic. In some locations, development is on both sides of the roadway, in other locations it borders the edge of the city and open fields lie on the other side.

Noise attenuation has been frequently requested by residents adjacent to this roadway and noise levels have been evaluated. Future landscaping of the right-of-way should consider land form and planting combinations to help alleviate this issue.

#### **12.3.4.1 J: Rochdale Blvd.**

Rochdale Boulevard is a short arterial that runs through the newer residential subdivisions in the northwest corner of the city. The majority of the roadway is landscaped with trees, shrubs and turf. There is some commercial development along the road, primarily concentrated on the corner of Rochdale and McCarthy where there is a large retail mall. Some sections of the roadway have a landscaped median that disappears at the very eastern end that is not yet fully developed.

#### **12.3.4.1 K: Saskatchewan Drive**

The section of Saskatchewan Dr. from Winnipeg to Arcola is primarily industrial/commercial strip development with little or no landscaped boulevard. The general character of the space is predominantly a hard-surfaced environment with little visual relief and several unsightly commercial operations. As Saskatchewan Dr. passes through Regina's Market Square it changes character significantly. This section encompasses Casino Regina, a major hotel, Cornwall Centre and the main Post Office, among others. The landscaping varies at each location but closer attention has been paid to tree and shrub planting around the Casino. In some instances the sidewalk or associated hardscape is directly adjacent to the building façade. The section of Saskatchewan Dr. from Albert to Elphinstone passes through mixed commercial/industrial uses. There is little or no landscaped boulevard and little available space for planting. From Elphinstone to the Lewvan there is a wide landscaped buffer between the rail line to the north and a fenced parkspace to the south. There is an existing successful landscape on this boulevard that includes a variety of tree and shrub plantings. There are plans to widen portions of this roadway in the future.

- Saskatchewan Drive forms the northern boundary of Regina's Market Square, refer to Section 12.3.5.3 Regina's Market Square – Design Strategy.

#### **12.3.4.1 L: Victoria Ave.**

Victoria Avenue is a primary east west arterial through the city and a main entryway into the downtown area. The segments of this roadway that abutt a designated gateway should be considered an extension of the gateway corridor landscape. This roadway changes character significantly; in some sections it runs through “Big Box” commercial development, in other sections it runs through old, established residential neighbourhoods with mature street trees, narrow boulevards and a landscaped median also lined with mature street trees. This creates a special streetscape in the city where the mature elms

reach across the entire roadway and their canopies meet over the street. There are few of these streetscapes remaining in the city, particularly few along major arterials. This type of mature landscaping with the majestic elm trees has been a defining image in prairie cities, one that is endangered by the effects of Dutch Elm Disease.

Where Victoria Avenue enters the downtown, high rise apartment, office and hotel towers dominate the landscape. The narrow boulevards are primarily hard-surfaced with street trees planted in tree wells in the sidewalk. Victoria Avenue also passes by Regina's oldest urban park with significant historical significance and monuments. There are many notable buildings of historic and development values that line Victoria Avenue in the downtown area.

- Victoria Avenue forms the southern boundary of Regina's Market Square, refer to Section 12.3.5.3 Regina's Market Square – Design Strategy.

#### **12.3.4.1 M: Wascana Parkway (jurisdiction of The Wascana Centre Authority)**

The name of this arterial accurately describes the character of the roadway. This is a winding road with a wide median and wide boulevards. Extensive tree, shrub and groundcover plantings of pastoral nature cover the area with a variety of plant material. The median and the boulevards are fully landscaped for the entire length of the parkway as it runs through Wascana Centre and the University of Regina Campus. The south end of the parkway borders residential developments where noise barrier fencing and planting attempt to alleviate the traffic noise levels. Wascana Parkway is currently designated as a bicycle route.

#### **12.3.4.2 Potential for Landscape Enhancement**

There is an abundance of possibilities and potential locations for landscape enhancement along Regina's major arterials. The variety of locations and different site conditions makes it difficult to discuss the enhancements in a general manner.

A cursory review of existing plantings along major arterials indicates the potential opportunity to plant the following approximately 9,000 trees. (Refer to Appendix "M" The MTPS for more detailed projections.)

#### **12.3.4.3 Design Strategy**

The following points describe a general approach to creating the landscape:

Arterials with significant pedestrian traffic, speeds 50 km/hr or less

- Deciduous canopy/shade trees, point and line patterns
- linear alignments

- simple/repetitive patterns
- double row if possible/desirable

Buffer areas with high volume traffic faster than 50 km/hr, little or no pedestrian traffic.

- deciduous/coniferous mix
- simple, geometric groupings
- follow alignment cues from roadways, interchanges, property lines
- bold groupings, greater spacing
- multiple rows if possible

### **12.3.5 Regina’s Market Square**

#### **12.3.5.1 Site Context**

Regina's Market Square has the greatest volume of activity in the city with the greatest mix of land uses. Regina's Market Square is the hub of shopping, entertainment and professional services in the city. There is a desire to increase the amount of residential development which will increase the 24 hour, 7 days a week population to the area. These activities are housed in a great variety of built structures including a mall, historic office and apartment buildings, modern glass and steel office towers, rows of small shop-front structures, and large institutional buildings. A large work-week population bustles through the streets on daily business and generates a unique environment where travel by foot is often the choice mode of transportation. In combination with this, there are two major public transit transfer areas within Regina's Market Square and a significant number of bicycle commuters.

Located within Regina's Market Square is the Victoria Park Heritage Conservation District, designated as such for the following reasons:

- “ a) Victoria Park dates back to the founding of Regina, having been set aside as public open space in the original townsite plan;
- b) The 1800 Block Scarth Street contains the highest concentration of early commercial architecture in Regina;
- c) Many of the buildings in the district were designed by prominent local architects, for example, F. Chapman Clemesha, Storey and Van Egmond, and Francis Portnall.”<sup>13</sup>

This designation demands that any proposed development responds in a carefully considered manner to the heritage character of the area. Any further development of the urban forest, an integral part of the physical environment, must also be required to respond accordingly.

As noted above, Regina's Market Square features two unique public spaces within the city; Victoria Park and The Frederick Hill Mall (1800 Block Scarth Street). Victoria Park is the oldest park in the city; identified as “Victoria Square” in the original townsite plan for Regina registered in 1884. Initially designated as a market area for farmers to sell their produce; today Victoria Park offers six shaded acres of greenspace with seating, pathways, a playground and historic memorials, all within Regina’s urban core. The park also hosts several cultural and artistic events throughout the summer and acts as a gathering place that attracts people from across the city. The Frederick Hill Mall is an open-air pedestrian mall in the heart of downtown that guides pedestrian traffic from Victoria Park and its surroundings to the Cornwall Centre. Intimate pedestrian-scaled spaces such as these offer unique opportunities and constraints with respect to the urban forest.

This diversity of activity, population, mode of transportation, and infrastructure provides both an opportunity and a challenge in urban design. The life and energy of the area combined with the existing infrastructure provide interest and excitement unequalled in any other sector of the city, but space limitations and expansive areas of hard surfaces may pose some difficulties for enhancement strategies. Special technical consideration is required to protect plantings and provide for the requisite metabolic needs of the plant material. Plant material selection in Regina's Market Square demands thoughtful consideration of the needs of the pedestrian, bicycle, car, bus and truck while responding to the particular challenges posed by the urban infrastructure.

#### **12.3.5.2 Potential for Landscape Enhancement**

A cursory review of existing plantings in Regina's Market Square indicates no immediate vacancies apparent. This may be due to the fact that there is a rapid response to tree vacancies in this district and replacements are installed expeditiously. There are, however, approximately 10,000 linear meters of roadway and pedestrian paths of travel that have potential for planting augmentation with the purpose of achieving a unique “plantscape”. There are certain design elements in the area that have been installed in an attempt to highlight the area. These include light standards, paving patterns and site furniture colour schemes distinct to Regina's Market Square. There remains significant potential to explore further enhancement schemes that augment the function and enrich the aesthetics of the space. Special attention should also be paid to the roadways that form the physical boundaries of Regina's Market Square in order to define the limits of the area as a unique area within the city, introduce the area and create a sense of entry while announcing the local attractions.

Although no obvious deficiency in existing planting has been identified in Regina’s Market Square, as discussed in section 12.1; a detailed site analysis and comprehensive design is required for this area. In order to address these issues, discussions will be required with Regina’s Market Square representatives and separate funding distinct from the annual Streetscaping budget will be necessary.

### 12.3.5.3 Design Strategy

The downtown area in Regina produces very specific technical, logistical and operational challenges with respect to streetscaping and landscape development. The dense urban infrastructure and extensive hardscape creates conditions adverse to plant growth. There are numerous techniques and products that can be applied as possible solutions to planting challenges. These include:

- explore alternate planting options i.e.: in planters, tree grates, raised beds, structural soils, porous paving, sub-surface wicks for drainage, watering and transporting nutrients
- use high headed canopy deciduous trees suitable for walking under
- pedestrian scale and spacing (5 m)
- use species suitable for close proximity to hardscapes (no poplars)
- follow routes of movement, simple linear patterns to define pedestrian and vehicular zones
- plan for shade in summer and protection from wind in winter
- standard specifications must be determined for size, species, and form
- clear or appropriately framed views to all businesses should be considered
- clear paths of travel, focused on pedestrian comfort, shall be maintained throughout the district.

### 12.3.6 Conclusion

Almost a hundred years ago, the City of Regina was built on an open treeless prairie along a meandering creek within the vast landscape of the great plains grasslands. Designated the capital of Saskatchewan, the city grew and became the home to an established population. During the times of extreme hardship, through the Great Depression and two world wars, the citizens of Regina had the foresight and commitment to plant trees throughout the city; along the expanding roadway system, along Wascana Creek and within public and private yards and greenspaces. As we approach our centennial, the trees that have been planted have grown to create a living, thriving urban forest that covers the majority of our city with 124,811 public trees. At this time in our history, as we enter the next millennium and move into our provincial and municipal centennaries, it is appropriate that we reflect on this accomplishment and consider our responsibility to this inheritance.

The urban forest has become the most prized asset in our municipal infrastructure. The trees within our built environment provide many healthful, functional and aesthetic benefits. This monumental accomplishment of Regina's pioneers and citizenry demands that the urban forest be cared for, maintained, protected, enhanced and augmented with careful consideration, ensuring that the integrity of the plantings are maintained and that the forest expands in an appropriate and meaningful manner as the city continues to grow.

## **12.4 The City Nursery Production Plan**

The MTPS provides a comprehensive conceptual plan for new tree and replacement plantings for the City of Regina. The plan will allow tree planting to occur in a more systemic manner based upon design principles and criteria for prioritizing site development. Since the MTPS is a conceptual plan the specific number of trees or cultivars may change for new tree plantings when a detailed design plan is developed for each site. While the plan will provide the city nursery with general projections regarding the quantities and species of trees required, there are a number of specific issues that must be addressed before the nursery can develop a production plan.

### **12.4.1 Space Requirements**

Based on a five year production cycle, trees planted in the year 2000 would be harvested in 2006 and the land placed back in production. Planting 1500 trees each year would require two acres of land. Allowing an extra two years in the five year production cycle for variables such as the longer growing cycle of some species and weather would mean an additional four acres of land would need to be prepared for planting space.

Before preparing any additional land The Urban Forestry Section should meet with Municipal Engineering Department to determine what areas, if any of the nursery are in its future expansion plans for the Sewage Treatment Plant.

### **12.4.2 Species to be Produced at the City Nursery**

The City nursery will concentrate on growing the basic species most frequently used by the City. This would include the ash species ( Black ash, Patmore, Bergeson, Manchurian), the linden species (American, Little-leaf, Dropmore, Norlin), coniferous (Colorado spruce and Blackhills), ornamentals (Schubert chokecherry and crabapples), poplar species (Plains cottonwood and Trembling aspen) and willow species (Laurel-leaf and white willow ‘Vitellina’). The exact percentage of each species to be grown each year will depend on the projects projected for the year the stock matures.

### **12.4.3 Quality Control**

Plant specifications provided by The Design Section can be used to set a standard, which determines the level of quality expected of stock produced, by the City nursery. The standards should reference plant size, cultivar, form, vigour, health and hardiness. Specific project requirements can vary according to design and location, out-sourcing of plant material may be required accordingly.

### **12.4.4 Tree Removal Process**



It will not be possible to remove the estimated 1500 trees per year from the City nursery by tree spade alone. The use of ball and wire basket will be required to meet the annual harvest projection. There are approximately 15 days in the spring and 25 days in the fall available for digging trees. It is estimated the City's three tree spades would be able to remove 960 trees each year. The remaining 540 trees would have to be ball and wire. At the rate of 45 ball and wire trees per day it would take approximately 12 days to prepare 540 trees. In order to ball and wire trees it is necessary that the nursery be given sufficient notice. Other growing methods such as the grow bag method could be considered to help alleviate this problem.

#### **12.4.5 Tree Purchasing – Tendering Process**

The proposed policy described in section 6.4 Plant Material that would require the City to purchase seedling stock and plant materials sourced, propagated and grown in zone 3a or hardier will have an impact on the availability of trees for purchase. This policy should be brought to the attention of the Canadian Nursery Trades Association and in particular the nurseries in the three western provinces. In order to ensure that the appropriate plant material is available for purchase, tenders could be extended over a few years with an option to renew. This would enable suppliers to line out appropriate stock knowing that their stock is committed and would ensure the City of Regina a source of supply.

#### **12.4.6 Requisitioning Trees From The Nursery**

To ensure that requisitions are filled out correctly, the person requisitioning the trees should walk through the nursery with the Nurseryman and tag the trees that are to be removed. Any substitutions to the requisition should be approved by the person requisitioning the trees.

#### **12.4.7 Summer Planting by Support Services**

Due to the timelines for completing capital projects, Support Services have been planting trees during the summer non-planting season. The City nursery adheres to the planting periods of approximately May 15 to June 30 and September 15 to October 31. In order to reduce the mortality rate of trees planted during this period and still accommodate Support Services timelines demands, the City nursery will provide balled and burlapped trees to Support Services for summer planting. To enable the City nursery time to undertake the necessary preparatory work, The Design Section must advise them in March of each year which trees should be balled and burlapped for planting that summer.

#### **12.4.8 The Existing Inventory**

The City nursery began laying out liner stock again in 1996. Some of this stock will be available for sites identified in The Master Tree Planting Strategy in the year 2000. Every effort should be made to utilize as much of this stock as possible. Both the new capital

planting and the replacement tree plantings identified in the MTPS have attempted to utilize the current inventory where appropriate. However, some flexibility in applying the criteria for prioritizing the order sites should be developed may be required in the first five years so that liner stock currently at the nursery can be removed as it matures. In other words from a cost-effectiveness standpoint it is important to utilize as much of the existing inventory at the City nursery as possible even if this requires some relaxation of the criteria for prioritizing the order in which sites should be developed.

### **13.0 A MODEL OF URBAN FOREST SUSTAINABILITY**

Urban forests are essential to the sustainability of modern cities. Sustainability of the urban forest should be viewed as a process rather than a goal. It involves managing our urban forest in an aboriculturally sound manner to meet the needs of the present without compromising the benefits for future generations. Management of a sustainable urban forest requires: a comprehensive management strategy; community support and involvement, and a viable resource base.

The RUFMS provides a model for sustainability.

#### **1. A Comprehensive Management Strategy**

The RUFMS contains the programs, policies, standards and guidelines which together form a comprehensive strategy for managing the urban forest.

- An inventory for planning and managing the urban forest.
- Species diversity requirements.
- Species and site selection criteria.
- A policy for purchasing plant material.
- Tree spacing standards that provide the appropriate degree of canopy cover.
- Standards for tree care.
- A policy for protecting existing trees.
- Tree planting priorities, requirements, procedures and specifications.
- Root pruning guidelines.
- Criteria and processes for removing hazardous or infected trees or those approved for removal to accommodate development projects.
- Integrated Pest Management services.
- A storm response plan.
- Safety requirements for protecting personnel involved in tree care and the general public.
- A Master Tree Planting Strategy.
- Cooperation and interaction among civic departments and divisions involved in tree care.

#### **2. Community Support and Involvement**

The RUFMS contains several programs designed to educate the public and elicit their support in preserving and enhancing the urban forest.

- Participatory and educational programs and services to educate the general public and involve them in preserving and enhancing the urban forest.
- Protection of trees on public and private property from Dutch Elm Disease and hazardous trees that pose a threat to the public.
- A Tree Donation Program to encourage public involvement in enhancing the urban forest.
- A Heritage Trees of Regina Program to locate, designate, catalogue and preserve the heritage trees of Regina.

### 3. A Viable Resource Base

The RUFMS contains several recommendations that should help maximize the benefits of both the City's financial and manpower resources.

- The guidelines, specifications, priorities, standards, policies and programs proposed in the RUFMS form a comprehensive strategy that will enable the optimum use of available resources.
- Establishing consistent planting procedures for the divisions involved in tree planting should reduce tree mortality rates and the additional costs associated with replacing the trees.
- The MTPS will enable the nursery to develop a five year production plan that should better meet the planting needs of the City and make the nursery more economically viable.
- Establishing a charge-out inventory value for trees transferred out of the nursery could make the nursery more cost efficient.
- The tree maintenance and root pruning policies described in the RUFMS should contribute to a healthy urban forest which is less susceptible to tree diseases and insect pests.
- The tree protection policy described in the RUFMS should reduce the cost of damage to trees as well as the potential public liability that could result.
- Annual in-service seminars on tree planting, tree maintenance and identifying tree diseases and insect pests for all staff involved in the care of the urban forest should contribute to greater efficiency and the early detection and prevention of infestations.
- Establishing threshold indicators for those tree diseases and insect pests common to Regina should enable the Integrated Pest Management Section to utilize its resources where they are most needed and rationalize the need for additional resources to prevent an infestation if indicated.

## 14.0 IMPLEMENTATION

The final stage in the process is the development of an implementation plan to ensure that the RUFMS is implemented, evaluated and updated in a coordinated manner.

#### **14.1 The Policies and Procedures Manual**

Each of the appendices attached to the RUFMS deals with a major program area necessary for sustaining the urban forest. The appendices have been written and formatted to serve as practical working documents to assist staff and contractors involved in tree care on public land in their day-to-day operations. Together the appendices form a Policies and Procedures Manual. It is important to recognize that the standards, procedures and specifications contained in the RUFMS should be reviewed regularly and revised as new information becomes available.

#### **14.2 Orientation of Staff**

An orientation for those staff involved in caring for the urban forest is critical to the success of the strategy. Urban Forestry Section should assume responsibility for ensuring that staff involved in tree care are familiar with The Policies and Procedures Manual.

#### **14.3 Distribution to Internal and External Stakeholders**

The Urban Forestry Section should ensure that the relevant sections of the RUFMS are distributed to both the internal and external stakeholders impacted by the strategy. For example, the Tree Protection, Root Pruning, Tree Removal and Safety Requirements policies should be distributed to City staff or contractors undertaking construction work near trees on public land. The Tree Planting Priorities, Requirements, Procedures and Specifications should be distributed to the civic divisions and private developers involved in tree planting on public land.

#### **14.4 Bylaw Changes**

*Zoning Bylaw #9250* and *Forestry Bylaw #9607* should be reviewed to ensure they are in alignment with the RUFMS.

#### **14.5 The Implementation Plan**

A number of steps are involved in implementing the RUFMS. It is therefore useful to develop an implementation schedule. Urban Forestry Section shall be responsible for developing an implementation plan for the RUFMS that specifies the task to be performed, the person responsible for completing the task, and the time frame within which the task should be completed. The tasks would include but are not limited to the following:

- 1) Orienting staff to the RUFMS;

- 2) Redrafting *Forestry Bylaw #9607*;
- 3) Including the species selection list in *Zoning Bylaw #9250*;
- 4) Establishing a Work Group to review the operational procedures for requisitioning plant material from the City nursery;
- 5) Annually reviewing the City nursery production plan with The Design Section to identify more specifically the species and quantities of plant material that will be required in five years;
- 6) Publicizing The Heritage Trees of Regina Program and The Tree Donation Program;
- 7) Developing an inventory of the heritage trees of Regina;
- 8) Integrating the standards, the plant material requirements, the species selection list and species diversity requirements into the Open Space Development Standards Manual;
- 9) Developing on-going monitoring techniques to ensure that the RUFMS is implemented and revised when necessary based on new information.

Specific to the implementation of the Master Tree Planting Plan; the Design Section has developed an implementation matrix that, in general, competitively adjudicates each target site using a predetermined set of criteria. Each criteria category is eligible for a range of values that, when tallied, result in a ranked list of prioritized target sites. Some categories are discretionary in order to respond to the dynamics of land development, funding opportunities or other emerging variables. Consideration is also given to the development of a cross section of the six design location categories discussed in Section 12.2. For the purposes of this matrix, the target sites located along Ceremonial Routes and within Regina's Market Square have been removed. The Ceremonial Route landscape, as discussed in Section 12.3.1, is expected to cost significantly more than simple tree plantings associated with typical arterial roadway streetscaping. The issues associated with properly developing the ceremonial routes (seating, vistas, banner poles, hard surfacing, etc.) will be analyzed and presented within the budget process on the merit of each individual project. Streetscaping opportunities within Regina's Market Square (discussed in Section 12.3.5) are categorized separately because of its unique context. The determination of projects within Regina's Market Square would be subject to approval processes and funding sources that are distinct from the other streetscape target areas.

## **14.6 Monitoring and Evaluation**

Even a successfully implemented management strategy must be monitored to ensure that progress is being made and standards are being met. Evaluation provides the feedback necessary to determine if the strategy is working. Providing for periodic evaluation as part of the management process means that problems can be identified and changes made before a crisis develops.

The Urban Forestry Section shall assume responsibility for monitoring and evaluating the RUFMS.

The purpose of the monitoring is to:

- 1) Ensure that the various components of the RUFMS are implemented by the divisions involved in tree care.
- 2) Regularly review and revise the standards, procedures and specifications contained in the RUFMS as new information becomes available.
- 3) Identify problems in the strategy and take correction action.
- 4) Collect the information needed to conduct a formal evaluation of the strategy.
- 5) Ensure that the relevant sections of the RUFMS are incorporated into:
  - i) The Open Space Management Division Action Plan
  - ii) The Capital Budget Program
  - iii) The Tree Management Information System

The RUFMS should be annually evaluated by The Urban Forestry Section in order to:

- 1) Determine if the strategy is meeting its stated objectives.
- 2) Assess whether the strategy is being applied consistently by divisions involved in tree care.
- 3) Identify any changes required to the strategy.
- 4) Annually review the MTPS with The Design Section to update and if necessary revise the projections for new tree plantings.

Performance indicators are tangible goals that the RUFMS seeks to achieve. To be realistic the indicators must be:

- 1) Quantifiable so that progress toward the goal can be monitored and measured.
- 2) Achievable in the sense that the goal is practical and within the City's means to

achieve.

- 3) Affordable in that the City has the resources both financial and human to accomplish the goal.

The following performance indicators shall be used to assess the performance of the RUFMS:

- 1) Pruning Cycle

The City of Regina is currently on a 6 to 7 year pruning cycle for elms. All other trees over 9 meters in height are on a 5 year cycle and trees under 9 meters are on a 1 - 2 years cycle.

Evaluation Method

Adherence to the pruning cycle can be measured by maintaining work records that indicate the number of trees pruned annually in each category and the time required. Once this information is tabulated the average time required to prune a tree in each category can be established and this figure used to determine whether staff are on track to achieve the pruning cycle.

- 2) Dutch Elm Disease

The Saskatchewan Dutch Elm Disease Association has established an annual goal of keeping losses from DED to less than 2 per cent of the elm population.

Evaluation Method

Statistics shall be kept on the number of public and private elm trees in Regina lost annually to DED. This percentage should be compared to the acceptable goal of 2 per cent.

- 3) Monitoring Elm Trees

The Integrated Pest Management Section has established a goal of monitoring all public and private elm trees in Regina every two weeks during the period when leaves are on the trees which is usually from middle of June until the end of September.

Evaluation Method

This goal can be evaluated by maintaining records of whether all elm trees were monitored during each of the two week cycles. If this goal was not achieved it should be explained what percentage of the elm trees were monitored and what the reason was for failing to achieve the goal.

4) Species Diversity

The RUFMS establishes a preferred species diversity percentage for parks and open space and residential sites based upon the number of trees to be planted in each type of site.

Evaluation Method

Statistics of the number of trees and percentage of genus planted annually in each type of site shall be maintained in order to determine whether the plantings adhere to the preferred species diversity percentages.

5) Net Planting Level

The City's total tree planting from all resources is projected to be about 2,000 annually. During the period 1994 to 1998 the City removed an average of 595 trees a year. Therefore the net planting increase is estimated to be about 1,405 trees per year. Because the total tree plantings may vary from year to year depending upon when new development projects occur, it is more realistic to consider variances in achieving the net planting level of 1,400 over a five year period.

Evaluation Method

Statistics shall be maintained of the number of trees planted and the number of trees removed each year. If the City falls below the net planting level of 1,400 over a number of years consideration should be given to increasing the annual planting rate.

6) Response Times For Pruning Priorities

The RUFMS establishes response times for responding to situations requiring emergency or priority pruning. Emergency prunes or situations that pose a threat to life or property should be responded to as soon as possible depending upon the availability of staff and resources and the magnitude of the problem. Priority prunes or trees that have the potential to become safety hazards if not corrected should be responded to within two weeks.

Evaluation Method



Records should be kept of the number of requests each year for emergency or priority prunes and the response time (the time from when the request was received until the problem was corrected) to correct the situation.

7) Nursery Production

Based on the estimated planting rate of 2,000 trees per year it is anticipated that approximately 1,500 trees will be provided by the City nursery and 500 purchased from private nurseries.

Evaluation Method

Statistics shall be maintained of the total number of trees planted annually including the number provided by the City nursery and those acquired from private sources. If the number of trees provided by the City nursery consistently falls below the 1,500 level or if the number of trees being purchased from private sources consistently exceeds the 500 level the situation should be reviewed.

8) Tree Mortality

Tree mortality is dependent on a variety of factors. Mortality may vary according to the hardiness zone or the particular site where the tree is to be planted. Trees planted in hardscape where they are subjected to the urban stress of vehicular and pedestrian traffic will have a higher mortality rate than those planted in parks. Selecting the appropriate species of trees for the hardiness zone and the site as well as employing proper planting and maintenance procedures are important factors in reducing tree mortality. Natural phenomena such as storms, severe cold or insect pests and tree diseases can also affect the life span of urban trees. Because there are so many variables there are no recognized standards for tree mortality. However, it would be useful to maintain annual statistics on tree mortality so that any significant increases or decreases in the mortality rate can be identified and corrective action taken.

Evaluation Method

Statistics on the number of trees lost annually shall be maintained and any significant increase or decrease in the mortality rate should be reviewed with a view to determining the underlying cause and initiating corrective action.

A report included in the annual budget concerning the above noted performance indicators shall be provided annually to the Parks and Recreation Board.

The Planning and Design Division shall undertake a comprehensive evaluation of the RUFMS to update and improve it every five years.

## 15.0 CONCLUSION

The adoption of a comprehensive urban forest management strategy is an important event for the City of Regina. The RUFMS proposes a body of programs, policies, standards, procedures and specifications designed to enable the effective management of Regina's urban forest. It is intended to guide managers in setting priorities and in allocating human and financial resources to achieve sustainability of the urban forest. It is important to recognize that the RUFMS is a continual planning process and as such its standards, procedures and specifications may require change as new information becomes available. It is also important to recognize that the cooperation and commitment of a broad range of civic divisions involved in tree care, as well as the general public and the private sector, is essential to the success of the strategy. Without a community commitment to preserving and enhancing our urban forest, the strategy's goal of sustainability will not be achieved. While civic ordinances play a role in managing and protecting the urban forest, community commitment cannot be legislated, it is more a function of public education and awareness. This represents our most serious challenge – acquiring the commitment of the general public and the private sector to protecting and enhancing Regina's urban forest.

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