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STATUS REPORT - STREET TREE PROGRAM

The Transportation and Works Committee recommends:

1. The presentation by Ian Buchanan, Manager of Natural Heritage and Forestry be received; and

2. The recommendations contained in the following report, December 14, 2005, from the Commissioner of Transportation and Works be adopted:

1. RECOMMENDATIONS

It is recommended that:

1. Staff facilitate a "Street Trees - Our Green Infrastructure" symposium to be held in 2006, to raise awareness, encourage interdepartmental and inter-municipal collaboration, and improve science and technology transfer to enhance tree survival on our Regional streetscapes.

2. Staff be directed to review and refine the Regional Road Design Guidelines including the standard cross-sections to improve street tree survival.

3. Staff report back to the Transportation and Works Committee in 2007, on the details of the Region wide street tree inventory completed in 2006.

2. PURPOSE

At its meeting on September 7, 2005, the Transportation and Works Committee requested staff to report back on the status of the health of the Region's street trees. The purpose of this report is to update Council on the status of the Street Tree Program, which is an integral component of streetscaping and the Region's Urban Forestry Program. This report identifies the extent of the Street Tree Planting Program, and provides information on tree planting practices, maintenance, health assessment, inventory and asset management. In addition, this report promotes the recognition of street trees as a Regional asset with significant value.

3. BACKGROUND

This report provides some background and context on the subject, and presents what is being done to improve the survival of the trees planted within the Regional road right-of-way (ROW).

3.1 Urban Forest

Street trees are recognized as providing considerable environmental, social, and economic benefits to the residents of York Region. Trees provide shade, moderate the local climate, conserve energy, improve air quality, prevent soil erosion and contribute to stormwater management. These trees also help define the character of our communities and provide a positive contribution to the overall urban forest. The Region has made a substantial investment in liveable streets where well treed boulevards are an integral part of our communities. York Region's Urban Forestry Programs are consistent with the vision presented in the Canadian Urban Forest Strategy 2004-2006.

3.2 Tree Requirements

Healthy trees require adequate growing space both above and below ground, quality soil, nutrients and water. The ROW presents an extremely harsh environment for tree establishment and growth. The combination of drought conditions, wind exposure, road salt, soil quality and compaction, poor air quality, and other factors make tree survival an ongoing challenge. Trees planted in these conditions typically are impacted by transplant shock and undergo a state of limited growth or decline for the first three years after planting, while the roots grow and the trees become established.

Understanding what trees require to grow, and balancing competing interests within the limited space of the ROW requires a multidisciplinary approach to road and ROW design. Important to the cost effective implementation of the Street Tree Planting Program is inter-departmental collaboration including Transportation and Works, Planning and Economic Development, and Health Services.

3.3 Regional Tree Planting Programs

Natural Heritage and Forestry Services staff implements the Street Tree Planting Program within the ROW. Street tree planting compliments a broad range of tree planting initiatives including a variety of public and private tree planting programs. The combination of tree planting programs contribute to increasing our forest cover, urban tree canopy cover and restore or enhance our natural environment as part of the implementation of the Greening Strategy.

3.4 Street Tree Planting History

Since the late 1800's, it has been determined that tree planting along roadways is an effective way to enhance the aesthetics while improving the local environment. Although documentation of the early plantings is scarce, it is evident by the presence of majestic trees that line many of our rural roads today.

In 1982, the Region initiated its first Street Tree Planting Program. The program matured through the 1990's and in 1996 street tree planting became a Transportation and Works, Roads Operations Program. In 2001, Regional Council adopted a Regional Streetscape Policy which provided a policy context for the street tree planting mandate. The Streetscaping Policy includes:

- Standards identifying street tree planting at ten metre intervals along boulevards.
- Provisions for tree protection and compensation for trees impacted in the ROW.
- Direction to review and consider improvements to the long term health, survival and sustainability of street trees.

The Greening Strategy adopted by Council in 2001 further embraced the implementation of the Street Tree Program, and identified the benefits of planting trees on the Region's boulevards to enhance the urban forest.

To maximize survival and provide an instant visual benefit, 1.5 - 4 metres tall, 50mm trunk diameter trees with a root ball wrapped in burlap and held in a wire basket are planted in the boulevard. Approximately 95% of the trees planted are deciduous trees and 5% are coniferous. Since 1996, York Region has planted almost 20,000 trees within the ROW (*see Table 1*). The majority of these trees have been planted in conjunction with capital road projects. In addition, through the development approval process, a significant number of street trees have been approved for planting in or adjacent to the ROW by the development community and local business interests.

Table 1
Number of Trees Planted Along Regional Roads by the Region

Year	Number of Trees Planted in the ROW
1996	293
1997	175
1998	1,579
1999	928
2000	1,713
2001	2,980
2002	3,577
2003	2,337
2004	2,129
2005	3,518
TOTAL	**19,229***

* Excludes numbers of street trees planted within the ROW by others.

York Region has recognized the importance of maintaining and enhancing the urban forest, and is striving to ensure that our green infrastructure, including street trees, is an integral part of our local communities.

4. ANALYSIS AND OPTIONS

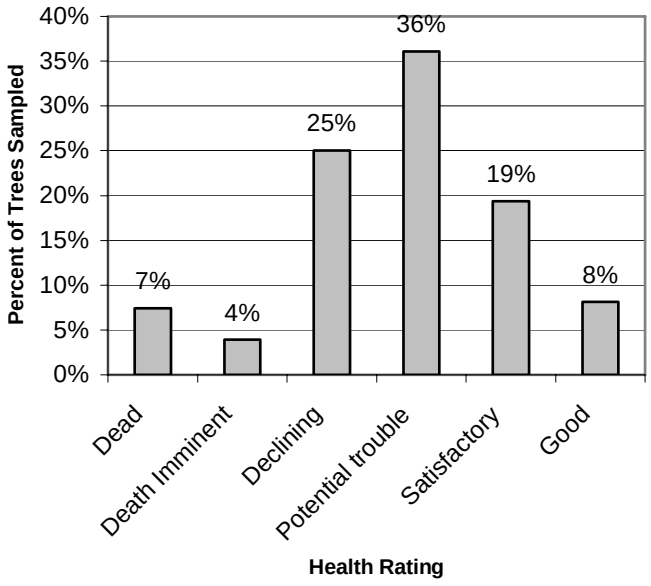
This section provides information on the assessment of street tree health, and describes the nature of tree planting and maintenance activities. In addition, asset management including monitoring and assessment is discussed.

4.1 Street Tree Health Report

In 2003, based on concerns about poor health and performance of street trees, a professional forestry consultant was commissioned to assess York Region's street tree health. Extensive field work was conducted, including a detailed assessment of 1,094 trees or 8% of the trees planted in the previous eight years. Sites were selected to represent a reasonable cross section of planting locations and circumstances.

The results of this work raised considerable concerns about tree health. It was concluded that 72% of the street trees were in potential trouble or worse (*see Figure 1*), with many of the trees (44%) having poor leaf condition or crown form.

Figure 1
2003 Health Rating of Street Trees (Sample Size 1094 Trees)



A number of concerns were identified within the report including:

- An indication that trees remain dormant or are in shock for a three year period following planting.
- Stem damage relating to planting practices, boulevard maintenance and rodent feeding.
- Planting hole was too small.

- Lack of sufficient mulch.
- Indication of poor pruning practices.
- Exposed burlap or twine from the root ball.
- Staking damage.
- Compacted soils.
- Salt damage.
- Trend towards declining health closer to the road edge or curb.
- Poor performance of trees planted in rural areas.

In summary, the consultant concluded that the major causes of declining street tree health could be attributed to:

1. Environmental conditions – primarily drought (lack of water).
2. Soil compaction in the boulevard.
3. Salt spray (proximity to the edge of curb).

The Region has taken significant steps to address these concerns and improve the overall performance of our street trees. Improvements in our planting and maintenance practices are highlighted in the following sections.

4.2 Tree Planting

Regional street tree planting is achieved through two streams of delivery. These include:

1. Regional implementation under an annual tree planting contract, which includes:
    - Capital road projects – tree planting occurs as part of the delivery of roads infrastructure projects (approximately 2000 trees per year). These plantings either conform to the Streetscaping Policy or are the result of mitigation, compensation or an enhancement initiative.
    - Retrofit and infill – Staff assess planting locations along boulevards as part of an annual cycle or based on requests (approximately 500-1000 trees per year). These are reviewed on a case by case basis.

2. External implementation associated with adjacent development.
    - Regional staff review and approve development applications with landscape drawings which propose street tree planting within the Regional ROW. These landscape plans are reviewed in accordance with our Tree Planting Design Guidelines. The number of trees planted each year associated with adjacent development has not been tracked in the past, however staff will be developing a system to track numbers and locations.

4.2.1 Tree Planting - Contract Specification

As a direct result of poor tree performance, and the results and conclusions of the 2003 Street Tree Health Assessment, staff revised the Tree Planting contract planting specifications in 2004. Revisions included enhancing the size of the planting pit, soil

amendment and an increase in the mulching specification. The Region's Area Foresters, who are Registered Professional Foresters and Certified Arborists, are now responsible for assessing the potential tree planting locations within the boulevard, marking locations and ensuring the right tree species are planted in appropriate locations.

Forestry staff administer the tree planting contract for the Regional street tree planting activities. The current cost to plant one tree is approximately $250 (range $200 - $400 per tree) depending on the species.

4.2.2 Tree Planting - Design Guidelines

To enhance street tree survival, assist with consistency in terms of assessing sites for tree planting, and to provide other interested parties with direction on tree planting within the Regional ROW, staff completed a set of Tree Planting Design Guidelines in 2004. These guidelines are part of the Transportation and Works Road Design Guidelines. These guidelines include technical information on tree species selection and boulevard planting location criteria and specifications. The adoption and implementation of these guidelines help to ensure that consideration is given to the right tree being planted in the right location in the design process. In addition, a broad variety of trees are planted to maintain biodiversity and offset the vulnerability to disease or invasive species (i.e. Asian long-horned beetle, emerald ash borer, Dutch elm disease).

As a general practice, the guidelines present the following as priorities to enhancing tree survival: (1) selection of hardy, salt tolerant, non invasive varieties where appropriate, while maintaining biodiversity, (2) consider the location and provide space for trees, both above and below ground, during design and construction, and (3) improve or replace soils.

4.2.3 New Initiatives and Technologies

Consistent with consideration and implementation of initiatives such as the Streetscaping Policy, the "Towards Great Regional Streets – a path to improvement" initiative, urban intensification and a commitment to sustainable development, it is important that the Region explore new technologies for ensuring tree survival in a variety of urban road cross sections. Such technologies or design treatments include the use of 'structural' soils, tree pits, soil cells and cantilevered sidewalks. In addition retrofit techniques such as soil trenching, soil amelioration and other measures should be considered to enhance site specific tree health. It is also critically important for staff to understand the science and available technology to improve tree health in compromised locations.

Interdepartmental multidisciplinary collaboration is also critically important to the implementation of the Street Tree Planting Program. It is proposed that staff host a street tree symposium "Street Trees - Our Green Infrastructure", to help identify the needs of trees, present emerging science and technology, and encourage interdepartmental collaboration to enhance the long term street tree survival. Professional staff including engineers, foresters, biologists, urban design specialists, landscape architects and planners need to update and maintain a core competency to be able to plan for and sustain

trees in our urban environments. It is proposed that the Region organizes and hosts this symposium for key staff.

4.3 Maintenance Program

Effective maintenance through both the trees critical establishment period, and later on in a tree's life, is vitally important to the long term health and well being of a tree. Street tree maintenance is operationally divided into immature tree maintenance and mature tree maintenance, based on the size and age of the tree.

4.3.1 Immature Tree Maintenance

Trees that have been planted within the last decade are maintained by staff on an annual cycle. When initially planted, the trees are mulched, watered and pruned by the planting contractor. Trees are assessed within two years of planting as part of the warranty inspection. Following the warranty period, trees are generally maintained by Forestry staff. The Tree Maintenance Program includes; mulching, fertilizing, watering and pruning. The trees are mulched, fertilized and pruned every three years after planting.

To enhance tree survival the size and depth of the mulch bed has been increased. This enhancement improves moisture retention and soil quality. Pruning and mulching activities are conducted through summer student work force. Since 2004 Forestry students have received increased training on tree pruning techniques both in class and in the field. Area Foresters also provide training and follow up with monitoring and reinforcement.

Contracted tree watering services were initiated in 2004 as a direct result of repeated summers of drought conditions and declining tree health. The Watering Program was enhanced in 2005 to include delivery through three programs:

- Retrofit of the road anti icing brine trucks for street tree watering.
- Forestry summer students delivering water from a trailer with portable water tank.
- Contractor watering – as assigned at approximately $4 per tree per single watering.

During the summer of 2005 14,404 watering units (40 litres per tree) were deployed on street trees between June and September on trees that had been planted between 2001 and 2005. This program was initiated in response to the spring drought conditions and was considered a pilot scale project to assess and evaluate the cost benefit and logistics of alternate water delivery mechanisms.

Lack of water for street trees has been identified as the greatest maintenance deficiency and impediment to street tree survival. This watering is critical to the establishment of trees particularly in the first three years after planting. It is proposed that, as identified in the 2006 Capital Tree Planting budget, $100,000 be directed from tree planting to support a watering program. This program will ensure all newly planted trees are watered once every two weeks over a ten-week cycle for the first two years. Staff may have to reduce

the quantities of trees planted on Regional roads to support the watering program and enhance tree survival.

Immature tree maintenance is directed by the Area Foresters and implemented by Forestry summer students over a four month period. The delivery of these services, particularly pruning, has been identified as being more cost effective when implemented by permanent technical staff over a 12-month cycle.

In addition, as street trees grow, different arboricultural techniques and maintenance practices will be required. It is proposed that two Forestry Technician positions be hired to deliver more cost effective routine maintenance. One position (FTE) is proposed in the 2006 budget cycle and one for 2007. These positions will be cost neutral as they are offset by a decrease in the student work force.

4.3.2 Mature Tree Maintenance

Mature tree maintenance includes the following contractor delivered activities on the larger established trees which grow within the ROW: tree removal, tree pruning, and stump removal. This program is considered a hazard tree management program.

These tree maintenance services require specialized equipment (e.g. bucket trucks, cranes) and often manpower with specialized tree climbing capabilities. The delivery of these services includes:

- Routine maintenance – assessed and delivered over a four year cycle
- Requests – customer service requests
- Emergency works – as required

It is important to recognize that this is a hazard tree program which needs to be complimented with a proactive structural pruning program for the growing street tree population. It is anticipated that within the next five years, as street trees continue to grow and mature, that a more comprehensive block pruning or preventative maintenance program will need to be developed and deployed.

4.4 Asset Management

Street trees are a considerable asset with economic, cultural and social value. There is a move towards a better understanding and shift to appreciating and managing these assets in the context of sustainable development.

4.4.1 Street Tree Inventory

In 2004, staff initiated the development of a Street Tree Inventory using Global Positioning System (GPS) and Geographic Information System (GIS) technology. The resulting system and data base will help inventory and track the status of Regional street trees. The system will be populated by 2006, and will be updated on an annual cycle. Inputs include tree species, tree size, location, health and condition. This will provide a proactive tool to allow us to:

- Assess threats to street trees - e.g. susceptibility to insect pests and disease.
- Model tree planting priority areas – identify gaps.
- Model future tree maintenance – operational maintenance and budget forecasting.
- Identify the value of the Regional asset and quantify benefits.
- Assess compensation costs for development, utility and construction impacts.
- Evaluate site specific stresses, monitor health trends and modify practices.

4.4.2 Value of Street Trees

The literature on the direct and indirect benefits of street trees is quite extensive. The documented benefits include:

- Increased traffic safety – calming.
- Carbon sequestration.
- Improved air quality and water protection.
- Improved economic sustainability.
- Positive impacts to public perceptions, behaviours and other sociological benefits.
- Positive aesthetic benefits with improvements to real estate values.
- Extended life of paved surfaces – shading by mature trees.

Consideration for street trees requires balancing the needs of the trees with practical engineering and urban design. During the planning and design stages there is a need to prioritize the ‘compromises’ within the limited space in our existing ROW’s. Trees need to be considered as part of the infrastructure, not as an after thought. As much emphasis should be placed on the locations and needs of trees during planning, design and construction as with street lights, hydro poles or other utilities. It should be recognized that trees are the only Regional asset within the ROW which actually increases in value over time.

4.5 Best Practices and Considerations

4.5.1 Protection, Mitigation and Compensation (no net loss)

Efforts are being made to protect trees that exist within the ROW. Protection includes the mitigation of direct or indirect impacts such as construction within the boulevard or associated with adjacent development. It is important to recognize the investment which has been made in an established tree. The Region pursues compensation for unavoidable loss of trees. Compensation is based on an International Society of Arboricultural standard, taking into consideration the age, size, species, location and health of the tree. A principle of ‘no net loss’ of trees guides staff in making decisions about compensation and impacts to street trees.

The consideration of a public tree by-law to further protect the street tree assets and assist with compensation claims, is currently under review. Some local municipalities already have public tree by-laws in place.

4.5.2 Road Width (ROW Width)

Space requirements of trees are critically important to tree health and survival. The Regional Official Plan (ROP) defines the planned basic road widths, and sets the maximum width that may be necessary to construct the roadway and support ancillary utilities. The Region also takes direction from "Regional Streets: Standards for Rights of Way and Boulevards", which matches road widths to their expected function and use.

The Region strives to minimize the footprint of road corridors while maximizing the combination of functions which these corridors support. This challenge often leads to unrealistic expectations about the performance of trees, as they are often provided poor or inadequate planting locations and conditions. In some instances consideration should be given to alternate considerations, such as: allowing for a wider ROW, placing utilities under the paved surface or establishing a 'tree planting reserve' within the ROW.

The principle is for balancing interests within the ROW and matching form to function. Trees are often perceived as a final stage in road design. However, this approach often presents a conflict given the actual above and below ground space requirements of trees, and the special soil and drainage requirements. Trees, as part of our green infrastructure need to be given appropriate consideration as a design element in the early stages of planning and design. As such, it is proposed that staff will review and refine the Regional Road Design Guidelines, including road cross sections and tree planting standards, to improve street tree survival. Further collaboration and technology transfer during the road planning and design stages will help to raise awareness on this matter.

4.5.3 Partnership initiatives

The "Towards Great Regional Streets – a path to improvement" initiative makes reference to the need for a private land tree planting partnership in the context of our streetscapes. Staff are pursuing partnerships at or just beyond the ROW to maximize tree planting opportunities and benefits to the ROW. Planting trees at or beyond the property line will be considered only where there is direct benefit to the ROW. Maintenance responsibilities will be reviewed on a case by case basis to maximize efficiency and the cost benefit of the program. It should be noted that the priority planting locations will be those within our property limits, and that alternate partnership opportunities will only be explored in unique or exceptional circumstances.

As design standards and available technologies to support trees within the boulevard become more complex, alternate tree planting design elements (e.g. planting boxes, tree pits, trenches, grates and other specialized tree planting treatments) are proposed by local municipalities. Often these treatments have unique maintenance requirements such as soil flushing or replacement, winter maintenance, and frequently come with planting details supporting annual or perennial planting beds. For these specialized enhancements the Region ensures that maintenance agreements are in place with the local municipalities.

4.6 Relationship to Vision 2026

Improvements to the street tree planting and maintenance practices as part of the Urban Forestry program will continue to support Vision 2026 and such key goal statements as:

"In 2026, York Region will have grown at a pace that supports healthy communities, economic vitality, sustainable natural environment and effective human services."

The study strengthens the Region's commitment to focus on Vision 2026 actions areas including:

- Securing a Green York Region.
- Ensuring clean water, air and promoting conservation.
- Attracting and supporting business.
- Creating well designed and liveable communities.
- Developing an integrated transportation network.

5. FINANCIAL IMPLICATIONS

The greatest deficiency in the current street tree planting and maintenance program is the lack of a base tree watering program. In any year, watering will provide the greatest tree health benefit for boulevard trees. It is proposed that, as identified in the 2006 capital tree planting budget, $100,000 be directed from tree planting to support a street tree watering program. The program will water newly planted street trees for their establishment period during the first two years. Staff will continue to administer additional waterings as required on more mature trees.

The Region has made a considerable investment in the street tree component of streetscaping. The replacement value of street trees planted along Regional roadways since 1996 is conservatively estimated at $6 to $8 million. The operational maintenance of this standing inventory increases considerably as the trees grow. The addition of Forestry Technicians to assist with the increasing maintenance responsibilities and proposed preventative maintenance will require additional staffing support. It is proposed that one Forestry Technician (FTE) be supported for 2006 and a second for 2007, to protect and preserve this Regional investment. These positions will be revenue neutral as they are offset by a decrease in the student work force.

6. LOCAL MUNICIPAL IMPACT

It is recognized that street trees often help to define the character of the local communities. Improvements identified in this plan will help to ensure that the street trees are recognized as a positive contribution to the streetscape.

7. CONCLUSION

Street trees are subject to a number of significant pressures and stresses within the Region's ROW. The street tree planting program has implemented significant changes in the last three years to enhance survival. In summary these changes include:

- Monitoring and assessment of street tree health.
- Improved specifications, criteria and guidelines to direct tree planting activities.
- Improvements to soils, tree mulching and pruning.
- Tree watering - initial assessment and provision for a base tree watering program.
- More strategic and cost effective tree maintenance delivery.
- Increased education of the needs of street trees from a design and capital implementation standpoint.
- Raised awareness of trees as a valuable Regional asset.

It is hoped that these changes, coupled with an increasing investment in our tree assets, will have direct positive results on improved survival and performance. Through an adaptive management approach, using the street tree inventory and monitoring programs, we will be able to track progress and continue to improve on past experiences. The early indication is that these changes, including the adoption of the Tree Planting Guidelines, are having a positive effect on tree survival and health.

Recognition of street trees as a significant Regional asset which increases in value over time is critical. The Region must continue to move towards a more balanced appreciation of the requirements of trees through planning, design, construction and maintenance of our Regional Road network. Healthy street trees as a viable component of the urban forest, need to be managed and recognized for their contributions both economically and aesthetically to our communities.

The Senior Management Group has reviewed this report.