From: Switzer, Barbara <Barbara.Switzer@york.ca> **On Behalf Of** Regional Clerk
Sent: November 24, 2020 1:56 PM
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Subject: Regional Council Decision - 2020 Street Tree Health and Performance Update

On November 19, 2020 Regional Council made the following decision:

1. The Regional Clerk circulate this report to the Clerks of the local municipalities.

The original staff report is attached for your information.

Please contact Laura McDowell, Director, Environmental Promotion and Protection at 1-877-464-9675 ext. 75077 if you have any questions with respect to this matter.

Regards,

Christopher Raynor | Regional Clerk, Regional Clerk's Office, Corporate Services
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Our Mission: **Working together to serve our thriving communities – today and tomorrow**

The Regional Municipality of York

Committee of the Whole
Environmental Services
November 5, 2020

Report of the Commissioner of Environmental Services

2020 Street Tree Health and Performance Update

1. Recommendation

The Regional Clerk circulate this report to the Clerks of the local municipalities.

2. Summary

This report updates Council on the status of the street tree program and provides new information on the recent street tree health assessment.

Key Points:

- The Region's street tree population, valued at $421 million, continues to grow, increasing the environmental, social and economic benefits to residents
- The Region has made a substantial investment in street trees since adoption of the Streetscape Policy in 2001, and implementation of Great Regional Streets and VivaNext programs
- To address poor performance of street trees, significant program improvements have been implemented including regular street tree health assessments
- Street tree health assessments have shown a significant improvement in street tree performance from 29% of trees in healthy condition in 2003 to 87% in 2020
- Urbanization and limited boulevard space will require continued implementation of technologies and practices to ensure survival and long-term tree performance

3. Background

Street trees provide considerable environmental, social and economic benefits to our communities

Street trees, as a component of the urban forest, provide numerous benefits to residents including shade, energy conservation, improved air quality, prevention of soil erosion and stormwater management.

Regional streetscapes with trees help define the character of our communities and contribute to a sense of place. The Region has made a substantial investment in street trees since adoption of the Streetscape Policy in 2001, and implementation of Designing Great Streets and VivaNext programs.

Over 1,500 street trees are planted annually along Regional roads

The Streetscape Policy and subsequent guidelines set objectives and standards for street tree planting along Regional roads. Since 2001, the number of street trees has steadily increased as a result of annual planting efforts. Currently the Region plants an average of 1,900 street trees each year, with over 80% of tree planting occurring within existing urban areas. In recent years, planting projects have required more complex technologies such as engineered soil cells below sidewalks to ensure survival and long-term performance in urban settings including VivaNext corridors. Currently there are 69,000 street trees in the inventory with an estimated value of $421 million.

Street tree health assessments are completed once every five years to monitor street tree performance

In the early 2000s, it was evident that recently planted street trees were performing poorly. To identify factors contributing to this poor performance, the Region undertook a comprehensive street tree health assessment in 2003. Results of the study identified that only 29% of recently planted trees were in healthy condition. The assessment identified a number of factors that impacted street tree performance including lack of water during the establishment period, poor boulevard soil conditions, low quality nursery stock, and poor planting procedures and post-planting maintenance practices.

To address poor performance of street trees, the Region implemented significant program improvements which have resulted in a dramatic increase in street tree health over the past 20 years. A commitment was made to continue to undertake street tree health assessments every five years and report the findings to Council. Health assessments in 2010 and 2015 showed improvement in street tree performance with respectively 76% and 84% of street trees in good health.

4. Analysis

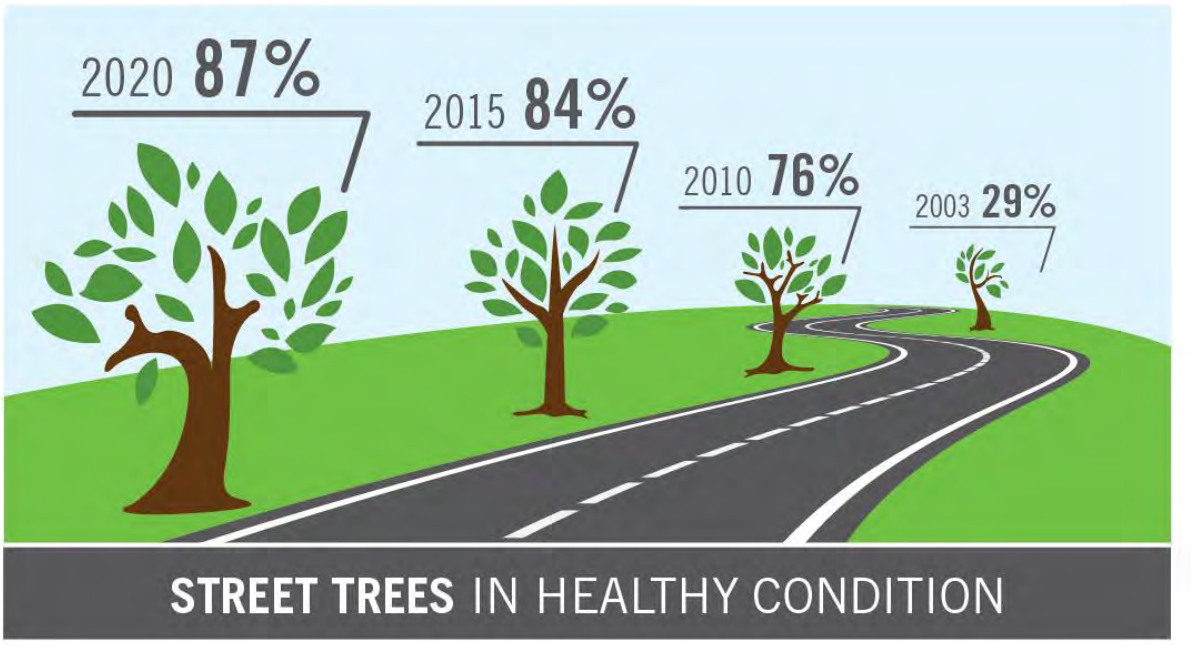
2020 street tree health assessment confirms investments have resulted in improved performance with 87% of trees in healthy condition

In 2020, a fourth street tree health assessment was completed to measure the effectiveness of program improvements. A detailed health assessment of 3,099 street trees planted over the last 5 - 10 years was completed to determine tree health and further assess factors affecting tree performance (Attachment 1). Results of the assessment show that 87% of recently planted trees were in satisfactory or good condition. This demonstrates continued improvement in tree health since 2003 and confirms investments made in program improvements are having a positive impact on street tree performance (Figure 1). These investments enable the Region to close in on the performance target of 90% of trees in

healthy condition. This target was established in previous health assessments through a review of industry best practices, experience and expectations for the harsh roadway environment.

Figure 1

Improvements in Street Tree Health 2003 to 2020



Improvements to current practices continue with increased focus on key factors including soil quality, soil quantity and planting locations

The 2020 street tree health assessment identified several key factors which continue to influence the performance of street trees along Regional roads including:

- Poor root development and function resulting from boulevard soil conditions
- Negative impact when planting trees near roadway edges
- Drying of trees subject to winter winds on open sites

Construction along and adjacent to Regional roads can disturb natural soils, creating compacted soils that are generally less biologically healthy and having poorer drainage. Tree health increases when soil quality is improved before tree planting using techniques such as installation of a soil trench with drainage. The 2020 street tree health assessment noted that 94% of trees planted within a soil trench are in a healthy condition.

Planting location and species selection are critical to a tree's success. Planting within three metres of the roadway should be avoided, unless measures such a raised planter beds are considered, and top performing tree species selected. Likewise, open windy sites are being avoided as this planting location has been linked to decreased tree health.

Urbanization of Regional corridors presents challenges that are being met through new technologies and practices

Street trees are recognized as a key component for successful urbanization of Regional corridors such as VivaNext rapidways. Urban centres and corridors present challenges for establishing and maintaining healthy trees. To provide adequate soil and water in these hardscaped environments, the Region has invested in new technologies including engineered soil cells, structural soils and water efficient irrigation systems.

The 2020 street tree health assessment examined the rooting behaviour of trees planted in hardscapes where below ground soil cells had been installed (VivaNext) and softscape boulevards where structural soils had been installed under sidewalks. In both cases, extensive rooting was found within the soil cells and under the sidewalks, improving tree health. Street trees perform better when they have access to large volumes of uncompacted, good quality soils, allowing for unrestricted root growth.

Street tree management and tree maintenance programs are increasing tree health

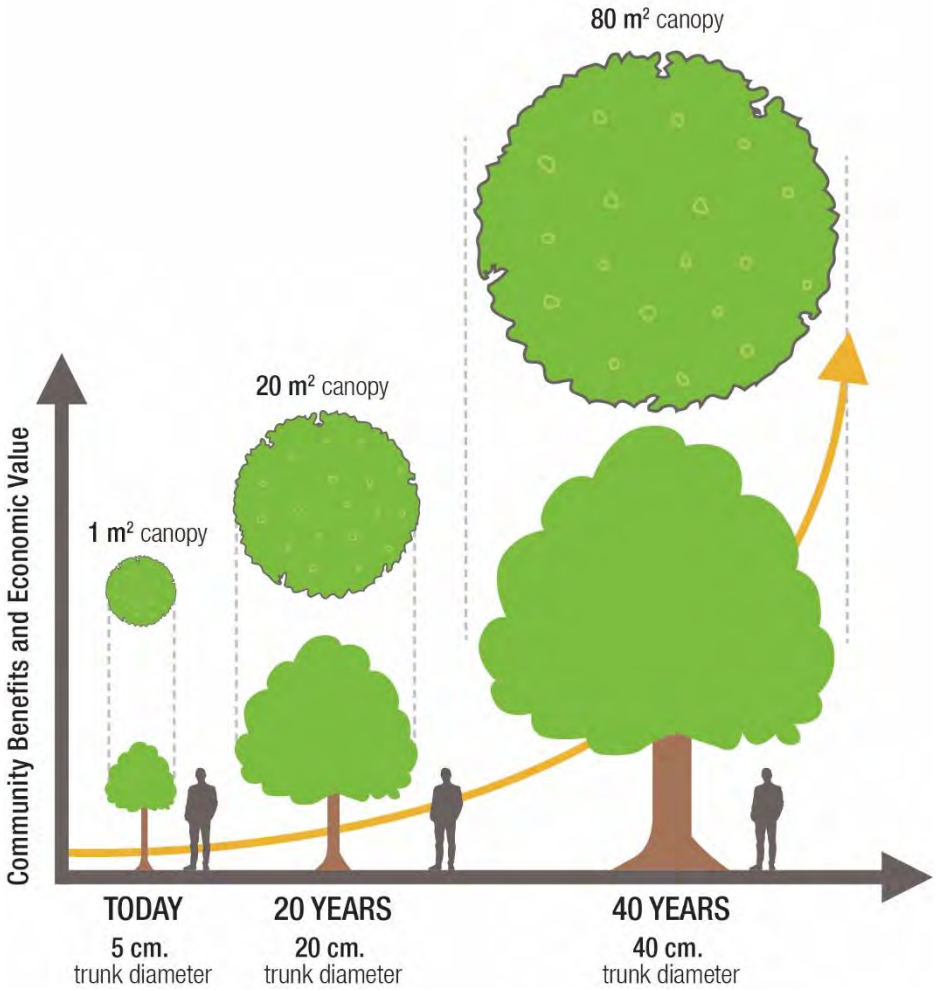
The Region's street tree population is continuing to grow in both number and tree size. With more trees surviving and performing well, the need to maintain these trees continues to increase. Once established, pruning street trees on a regular basis is required to maintain tree health and minimize hazards. The Region has implemented a proactive program to prune trees on a regular cycle. The 2020 street tree health assessment found a decrease in the number of trees with poor structure, 66% in 2015 compared to 5% in 2020, demonstrating the pruning program's positive impact.

Climate change impacts, particularly the frequency and intensity of storms, are a threat to street trees. Healthy, vigorous trees receiving proactive management including cyclical tree pruning, reduces susceptibility to damage from severe weather, minimizing impacts of storm events such as ice storms and extreme wind events. This has been demonstrated in recent storm events, where fewer reactive work orders have been required for comparable storms.

As healthy street trees grow their economic value and benefits increase significantly (Figure 2). In 2019 state of the infrastructure report the Region's street trees were valued at $421 million. Through investments in planting and maintenance of street trees we ensure they maximize their growth potential and associated benefits to our residents.

Figure 2

Tree Growth and Associated Increase in Benefits



Street trees and other green infrastructure elements are a significant capital asset

In 2018, the Region updated the Corporate Asset Management Policy, which details principles for a consistent and coordinated approach for managing Regional assets to ensure long-term sustainability and to demonstrate fiscal stewardship. Green infrastructure, including street trees and systems that support them have been identified as an asset. To meet the goals of the Corporate Asset Management Policy, Environmental Services developed a Green Infrastructure Asset Management Plan.

This award-winning plan has provided insights to maximize the assets lifecycle and its benefits through financial modelling, evaluating risk, determining levels of service and identifying opportunities for continuous improvement. The Green Infrastructure Asset Management Plan will be updated in 2021 leading to further improvements in the management of these critical green assets.

Healthy street trees support the Strategic Plan by enhancing and preserving green space

Development and implementation of best practices related to planting and maintenance of street trees are identified as actions in the York Region Forest Management Plan. Improving street tree health contributes to increasing canopy cover and progress towards the 35% Regional canopy cover target. Growing the Region's canopy cover supports the Strategic Plan priority to build sustainable communities and protect the environment, and the objective of enhancing and preserving green space. Progress on achieving canopy and woodland cover targets will be reported to Council in the 2021 State of the Forest report.

5. Financial

Street tree health improvements will be achieved through program optimization

Recommendations from the 2020 street tree health assessment report will be reviewed and advanced on a priority basis. Program changes (e.g. increased watering) and use of new technologies (e.g. soil trenches and engineered soil cells) has already been implemented in previous years. Further street tree health improvements will be achieved through program optimization and implemented as part of ongoing adaptive management (e.g. refinement of soil quality specifications). Any financial impacts will be addresses through the multi-year budget process.

In 2019, the Region was successful in securing $10.1 million in Federal funding for a natural infrastructure project through the Disaster Mitigation and Adaption Fund. Included in this project is the planting of 12,500 street trees over nine years to mitigate the impacts of extreme heat.

Growth and urbanization of Regional corridors is presenting additional pressure on operating budgets

Green infrastructure in an urbanized streetscape provides a sense of place and community, and contributes toward achieving the vision of walkable and liveable cities. Maintenance needs associated with these streetscapes increase based on the road typology and landscaping treatment (Table 1). Maintenance requirements along urbanized roads are more complex and intensive, and include activities such as, weeding and pruning planting beds, irrigation of plant material and regular application of mulch. These maintenance activities along with proactive tree maintenance ensure green infrastructure assets remain in a good state of repair and achieve expected levels of service over the long term.

Table 1

Impact to Forestry Landscape Maintenance Budgets by Road Typology

Road Typology	Description of Landscape Treatments	Annual cost per centerline km
4 lane cross section	Trees planted in sod boulevards	$1,600
6 lane cross section	Raised Centre median with shrub and perennials, trees planted in sod boulevards	$44,000
Urban Centre - Rapid way	Raised Centre median with shrub and perennials, raised boulevard planter beds with shrubs and perennials	$136,000

6. Local Impact

The Region's street trees continue to play a significant role in defining the character of our local communities. Healthy trees contribute to healthy communities. Improvements identified in this report will help to ensure street trees provide expected benefits to the environment, communities and residents. Street tree health assessments, continuous improvement measures and new technologies are also of interest to local municipalities and partners. This information will be shared with local municipal staff through the York Region Urban Forestry Forum to assist with program delivery and improvements in street tree health.

7. Conclusion

Street trees are a significant Regional asset providing many benefits to residents. They are an asset that appreciates in value over time. To achieve expected benefits, trees require resources to ensure their growth and long-term performance.

The 2020 street tree health assessment confirms the Region's investment in the street tree program has made a positive impact on the performance of street trees. Evidence-based decision making, and monitoring are key to advancing performance improvements. The assessment identifies opportunities for further improvement to help meet performance targets. By leveraging knowledge gained and continuing to innovate as conditions change, we will be able to meet the challenges of growing street trees on Regional roads, contributing to healthy communities across York Region.

For more information on this report, please contact Laura McDowell, Director, Environmental Promotion and Protection at 1-877-464-9675 ext. 75077. Accessible formats or communication supports are available upon request.

Recommended by: **Erin Mahoney, M. Eng.**
Commissioner of Environmental Services

Approved for Submission: **Bruce Macgregor**
Chief Administrative Officer

October 15, 2020
Attachments (1)
EDocs# 11617674

ATTACHMENT 1

2020 STREET TREE HEALTH ASSESSMENT SUMMARY

NOVEMBER 2020

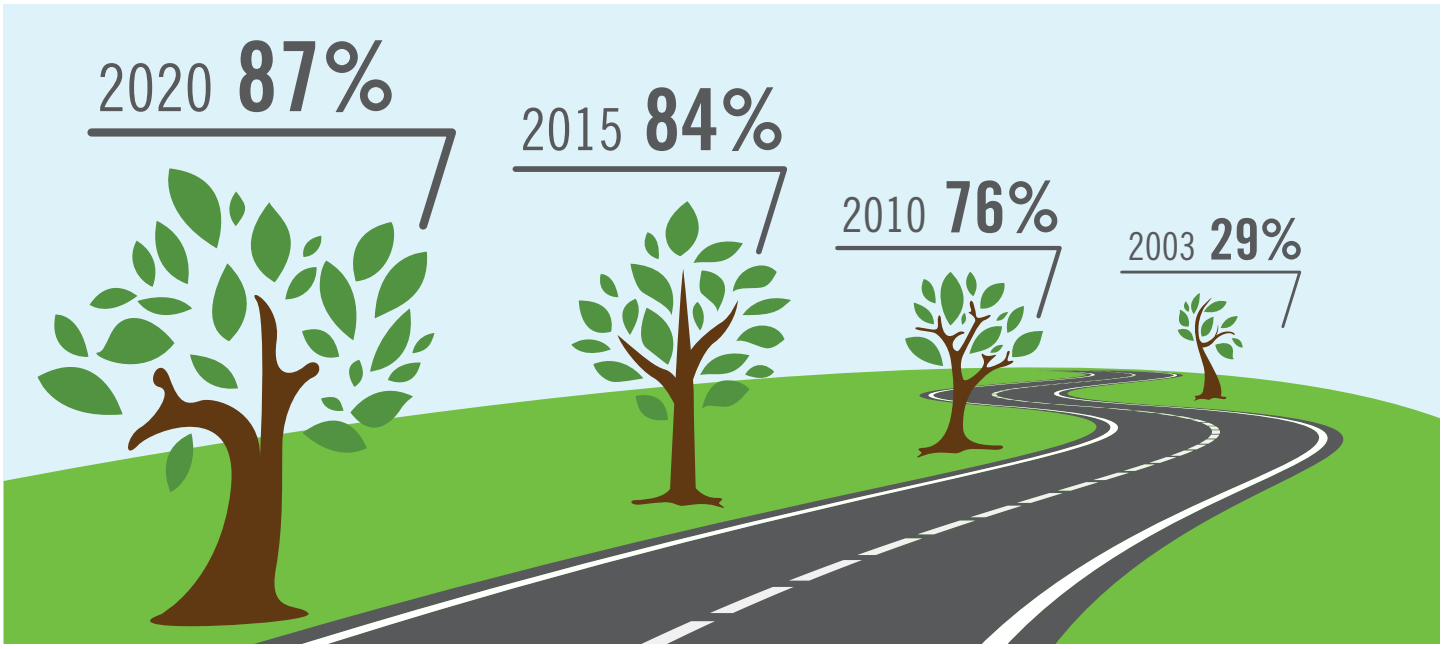
This document summarizes the 2020 York Region Street Tree Health Assessment Report, which is available by emailing accessyork@york.ca

York Region

2020 STREET TREE HEALTH ASSESSMENT SUMMARY | NOVEMBER 2020

Since York Region began planting trees in boulevards in the mid-1990s, its population of street trees has grown to become a key part of the Region's green infrastructure.

The Region monitors the health of street trees every five years to check on the success of its planting and maintenance programs. The most recent assessment, in 2020, confirms a strong and steady upward trend in health, measured by the percentage of trees in satisfactory or good condition: from 29% in 2003, to 76% in 2010, 84% in 2015 and 87% in 2020.



Street trees in healthy condition

The poor assessment results in 2003 reflect the condition of trees before planting, how they were planted, and their early care. Evidence-based practices adopted by the Region to address these concerns include:

- Creating a short list of acceptable tree species – called Proven Performers – that are appropriate to growing conditions along Regional roads
- Selecting trees at the nursery for vigour and structure, inspecting them before they are planted, and checking that contractors planted them correctly
- Mulching around a tree's base and weeding regularly when the tree is young to discourage competition from other plants
- Watering newly planted trees on a regular schedule during the first three growing seasons to reduce stress from transplanting and drought

The 2020 assessment confirmed the value of continuing these existing practices.

WHAT'S MEASURED AND HOW

Each street tree health assessment looks at a sample of street trees, defined as trees planted by the Region along roads in urban and suburban areas.

In 2020, this involved evaluating 3,099 trees, or 8% of 38,000 street trees in total. A focus was on trees planted in the past six years, many in conjunction with the building of Viva bus rapidways.

WHY HEALTHY STREET TREES ARE A VALUABLE INVESTMENT

"From Athens to Melbourne and Seoul to New York, big cities are increasingly turning to trees to help protect them from heatwaves and floods, and to boost people's physical and mental health…"

- World Economic Forum Agenda

Trees in cities help clean the air, shade buildings in summer and shelter them from cold winds in winter, absorb stormwater, beautify streetscapes and encourage people to go outside, provide habitat for birds and pollinators, and store carbon to help mitigate climate change. Many of the benefits increase in relation to the tree's size and leaf density, which are markers of its health.

And because trees provide these benefits far more cost-effectively than built infrastructure could, their long-term economic benefits outweigh the costs of planting, nurturing and protecting them.

The Region's 2017 Green Infrastructure Asset Management Plan put the value of its green infrastructure, including street trees, at close to $488 million. These assets store more than 155,000 tonnes of carbon and provide roughly $5.5 million in services each year by sequestering additional carbon, managing runoff and capturing pollution.

The environment around a tree is also an important determinant of its health. The healthiest trees in the 2020 assessment were located where there is good drainage and shelter from strong winds, roots have room to grow, and high-quality soil provides the right nutrients.

For street trees, the surrounding built environment is of equal or greater importance. Since 2003, York Region's built environment has undergone significant changes:

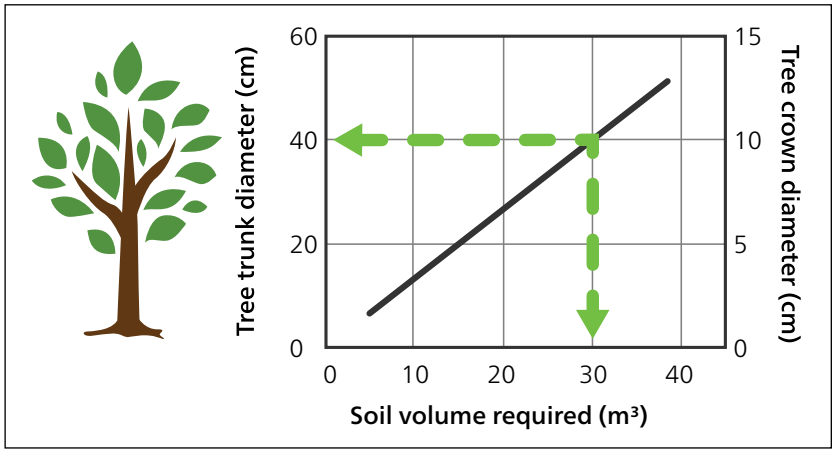
- Many Regional roads have been widened
- Sidewalks, separate cycle paths, and other infrastructure have been installed or upgraded on roads in urbanized areas
- Trees and other plants have been used to enhance the streetscape along Viva bus rapidway network

The first two factors tended to intensify known concerns. Construction typically removes topsoil and compacts the poorer soil that's left. Smaller planting spaces and compacted soil make it harder for roots to grow and limit the ultimate size and benefits the tree can provide. Trees are also exposed to more road-related stresses, such as winter road maintenance, collision risk, and heat from the roadway. In addition, many trees in the Viva network had to be placed in raised concrete planters or tightly integrated into hard surfaces like sidewalks.

Raised concrete planters along Viva Rapidway

The Region's approach to managing street trees evolved in line with these developments, as well as with research studies and the findings of earlier health assessments. As a result, the Region is placing increasing emphasis on soil health, volume and drainage:

- The Region's target is to provide street trees in "hardscaped" locations with at least 30 cubic metres of well-drained, good quality soil. As well, these trees are planted using soil prepared to the Region's standards
- In these locations the Region may install soil cells under adjacent hard surfaces, such as sidewalks, to achieve minimum soil volume targets. These cells are engineered frames filled with planting soil that provide uncompacted soil for tree roots underground while supporting pavement, interlocking stones or other load-bearing materials on the surface
- In other locations structural soil, a mix of topsoil and angular chunks of rock that lock together so they can bear weight, is used under hard surfaces to create a path for roots to connect to the soil beyond
- A further success factor for trees in raised planters appears to be building the walls higher on the road side to protect plantings from salt and other risks
- The area around a tree that gets mulch, which is eventually incorporated into soil, has been increased, and mulch beds have been deepened
- Soil around existing trees in difficult locations is being rejuvenated by adding a high-organic-matter blend to the soil, watering and applying fresh mulch



Distribution of tree size in relation to available soil volume

Tree inspection using tablet

Installation of a soil cell system

The Region has also been addressing challenges from broader environmental and biological factors, such as more frequent and extreme winds and ice storms and the spread of pests and diseases:

- Starting in the fourth year after planting, trees are pruned on a regular cycle to encourage development of a strong structure that better resists high winds and ice build-up
- Pruning is also used to control black knot, a fungal disease that attacks cherry trees

With the overall total at 87%, the Region is now close to its goal of ensuring at least 90% of its street trees are in satisfactory or good condition. This target was established in previous health assessments through a review of industry best practices, experience and expectations for the harsh roadway environment. The assessment nonetheless highlighted issues that must be managed effectively for the 90% goal to be reached and maintained:

- With the loss of planting space in boulevards, trees are closer to the roadside and the winter threat zone, where road salt is splashed and ice and snow are thrown up by plows. The assessment showed tree health decreased with proximity to a roadside
- Trees need good drainage, and Regional standards call for a soil that provides that. Drainage can be a problem, however, in sites where the planting soil is good but drainage is poor beyond it, allowing water to collect around roots

These concerns tend to go hand in hand with the Region's increasing growth and urbanization, which are triggering higher density development and the need for an expanded transportation network.

Focusing growth in Regional centres and along corridors to better manage growth is already a priority. In line with provincial direction, the Region recently designated 72 major transit station areas to support bus rapidways, GO Transit and subways, including the planned extension of the Yonge Street subway line. This brought higher density targets to some new areas.

While intensification and public transit are key to sustainable growth, urban areas that lack trees and other landscaping can feel harsh and unwelcoming. At the same time, more intense growth makes it challenging to provide conditions in which trees and plants can thrive.

Raised median before installation of Region designed soil

Street trees and landscaping

What the Region has learned from its success to date will help address these and other challenges:

- The health of plantings along the Viva bus rapid transit routes shows the value of a well-thought-out approach to planting in difficult urban environments like planters and grates in sidewalks. The assessment found that trees in these settings benefit from the use of soil cells under hard surfaces, provision of ample, high-quality soil, and attention to drainage, in addition to ongoing watering, other maintenance and monitoring. This experience will be helpful in creating attractive growth centres, transportation corridors and major transit station areas
- The Region is completing updates to its design guidelines to deal with the impacts of smaller planting spaces generally, including increased winter threats, along both suburban and urban roads
- Regular pruning is resulting in healthier trees with stronger structure, which will reduce the threat of damage from extreme weather and some diseases
- The Region is continuing to select trees using its Proven Performer list of species and will consider adding species to improve diversity

Street trees are more critical than ever for York Region. In crowded urban centres, they provide refuge, shade and a visual contrast to the built environment, making public spaces more welcoming and attractive.

So that residents, communities and wildlife can enjoy these benefits, the Region will continue to monitor tree health and growing conditions regularly to understand performance and identify future challenges, and use evidence-based practices to improve tree health.

By leveraging the knowledge gained over the past years and continuing to innovate as conditions change, the Region will enjoy the increasing social, environmental and economic benefits of healthy and abundant street trees in the decades to come.

Tree grate installation

Tree Gator being filled with water