Proactive tree pruning program

Objectives

Of all municipal tree maintenance activities, pruning is the most essential for long-term tree safety and survival (Miller, Hauer & Werner, 2015). Pruning extends the functional benefits derived from trees and maintains amenity. Properly maintained trees develop fewer hazardous defects and pose less risk to public safety. Cyclic pruning programs allows tree crews to inspect all trees on a regular basis, which is an important risk management consideration.

Any pruning is to be carried out in-line with standards and best practice, including a formative pruning program to enhance form and improve structure, or to directionally shape the young tree.

A good pruning program can:

- Enhance the safety of the trees and the environment they reside in
- Direct growth appropriate for the site constraints
- Improve the health of the urban forest
- Reduce premature tree removals
- Lower the overall costs and increase the benefits of the urban forest and associate maintenance programs by getting the maximum useful lifespan out of each tree.

To ensure that pruning is appropriate for the species and tree/site conditions, it is important to have a clear understanding of the specific needs of the tree and the objectives for pruning.

Pruning objectives include the following:

- Improve structural strength and reduce failure potential (including dead branch removal)
- Improve aesthetic characteristics
- Provide clearance for pedestrians, vehicles, overhead services and structures
- Improve safety (visibility) and security for road users
- Repair structural damage from wind loading
- Reduce maintenance costs (i.e., when applied to young trees)
- Prevent or mitigate a pest problem.

Tree pruning is typically the most expensive maintenance item in municipal tree programs (Vogt, Hauer, & Fischer, 2015), and typically generates substantial customer requests annually. However, even though tree pruning typically receives the greatest budget allocation of all municipal tree maintenance activities, it is still often underfunded in comparison to needs (Vogt, Hauer, & Fischer, 2015). For this reason, efficient allocation of resources for pruning is important (Vogt, Hauer, & Fischer, 2015). The challenge is to capitalise on worker productivity by developing standards for different operations and collecting data that can be used to make appropriate and timely management decisions.

Pruning cycle

The most efficient method of pruning is "block pruning", where Council managed trees are pruned in a pre-determined area, precinct or zone within a scheduled period. This helps minimise travel, increases task efficiency and productivity and can educate the community about the City's tree management programs through notification times. Scheduled pruning programs also reduce the need to remove substantial proportion of live crown that could result in large pruning wounds.

The challenge for municipalities is determining the appropriate pruning cycle specific to their needs and resource availability.

The length of pruning cycles varies widely and is dependent on species (genetic and age diversity), climatic variations, available resources, workloads, and objectives. There is no one optimum pruning cycle that caters for all municipal areas. However, what is clear, is that systematic or cyclic pruning programs, particularly initiated early in the life of a tree, enhances tree health and structural condition (Matheny & Clark, 2008).

Miller and Sylvester (1981) found that the length of the pruning cycle has a significant effect on tree value. Longer pruning cycles may save the managing organisation in the short-term, however there will be a decline in tree value with an increase in tree hazards and associated risk potential.

Other than for electric lines clearances, pruning cycle of between four and five years was found to provide the best cost: benefit ratio (Miller & Sylvester, 1981). This finding was based on using marginal cost and return analysis on loss in tree value versus pruning cost savings from longer cycles.

This study found a significant correlation between a decrease in tree condition class and the number of years since pruning. Increasing the length of the pruning cycle, or the number of years between pruning events, is a way to reduce pruning costs up front. In the short term, deferring the cost of pruning solves the immediate problem of a limited budget. However, future costs will likely be greater from increased responses to resident requests, storm damage susceptibility, tree risk from deadwood, and development of poor structure that may require excessive pruning to rectify in mature trees. Structural defects, such as decay, poor branch attachments, deadwood, and cracked branches, become more frequent as the numbers of years since last pruned increases (Vogt, Hauer, & Fischer, 2015).

Deferring maintenance on younger trees would have long-term cost ramifications. According to Ryder and Moore (2013) formative pruning costs averaged $2.79 per tree, while structural pruning for a mature tree averaged $44.59 (Ryder and Moore 2013). By applying inflation rates of 3%–5%, the authors calculated that trees not formatively pruned today would cost $78 to $112 to structurally prune in 20 years (Ryder and Moore 2013). Therefore, the cost of not performing formative pruning on recently planted trees can be calculated as the difference between the costs of formative pruning plus normal structural pruning (~$48) and structural pruning for non-formatively pruned trees ($78–$112), or between $30 and $64.

There could be two separate tree pruning programs; one for younger, smaller trees that primarily concentrates on formative/structural pruning to develop good branch architecture and to shape trees to desired clearances, and a program for older trees that primarily undertakes crown maintenance as well as maintaining clearances. The larger the tree the longer it takes to prune it. A study by Churack, Miller, Ottman and Koval (1994) found a 6-minute increase in average pruning time for all species in the study for each 2.5 cm increase in diameter. Pruning cycles will extend or require more resources as trees grow larger.

Conversely, specific pruning requirements for all trees within a given area/zone could be undertaken during the scheduled pruning program.

The pruning cycles and resource requirements (size of crews and equipment) could be determined through analysis of the street tree inventory to determine species coverage, age and size over particular areas. This would allow the development of a specification for how the work will be performed (clearance requirements and other crown maintenance works that need to be undertaken during the cyclic pruning) and estimate how long it should take to prune each tree. From that information, it could be determined how much time each cycle will take.

Then, either request the necessary budget to perform the work or divide the hourly rate by the available budget to ascertain the number of hours funded and therefore, the number of trees that can be pruned. This may also require reallocation of other tree maintenance activities to divert to a programmed pruning program. In either outcome, a base pruning cycle will have been developed. To maintain the focus of higher-level arboricultural maintenance activities by in-house staff, proactive pruning activities could be contracted out.

Using contractors can improve flexibility and efficiency of tree care operations. A key to successful incorporation of private contractors is developing definitive specifications that are inspected for compliance and enforced by city arborists (Vogt, Hauer, & Fischer, 2015). To determine whether there would be cost savings in using contractors, Council needs to have a realistic understanding of its own program costs and productivity. Contractors could be engaged on a limited basis to provide a realistic cost comparison with the in-house teams.

Pruning programs in the CBA may be done annually, whereas clearance pruning over local roads may be undertaken every four to five years. Younger trees often need more frequent pruning to establish appropriate structure; formative pruning of newly planted trees could be done once every two or three years for a determined period. The cost of not maintaining trees early in life may translate to greater maintenance costs in the future; this is deferring maintenance (and its costs) to the future in order to save on maintenance costs today.

Another pruning program could be initiated for trees within parks and open space. This work could be based on risk assessments associated with the tree population and park activity levels and target ratings.

Funding will still be required for reactive pruning works such as request, emergency and storm event pruning. If a scheduled pruning program is implemented, then the costs of reactive pruning should decrease over time as pruning cycles completed.

References

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