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Protection Recommendations for Common Construction Related Impacts Causing Tree Injury

Typical construction-related activities may cause permanent and often fatal physical injury to the trunk, crown or branches of a tree or roots. Soil compaction is one example that can cause root damage, or more significant injuries leading to tree removal. Typical construction-related activities that impact existing trees include:

- Soil compaction in root-sensitive areas;
- Alteration and/or excavation of existing grades;
- Hydrological alterations to surface drainage and the water table; and
- Alterations to microclimate, exposing sheltered trees to sun and wind.

A detailed discussion of these conditions, their impacts on existing trees and some general recommendations for each condition follows.

Soil Compaction

Soil compaction is a leading cause of tree decline. Soil compaction reduces the pore spaces in soil where oxygen and water are stored and support growth, suffocating tree roots as a result and leading to a decline in tree health. The soil in the absorbing root layer (the sensitive feeder roots in the ground immediately below the surface) will suffer the greatest impacts from soil compaction. This area must be protected from disturbance and compaction. Storage of materials or debris on top of the root system can also result in soil compaction. Rutting is an intense form of compaction where the tires of construction equipment can sever roots through their actions within a tree protection zone (TPZ). Other impacts from soil compaction include reduced infiltration capacity, leading to increased runoff, increased erosion and reduced rates of groundwater recharge.

Recommendation: The movement and storage of construction equipment and materials across root zones will be diverted as far away as possible from TPZ areas to avoid soil compaction.

Alteration of Existing Grades

Changes to existing grades can impact the long term viability of a tree. Raising the grade by placing fill on top of a trees rooting zone causes soil compaction (refer to "Soil Compaction" discussion above). Lowering the grade by as little as 150 mm can expose sensitive feeder roots, and result in their removal and lead to the subsequent decline of the tree. Preventing damage by minimizing grade changes within and near to a TPZ is less expensive and more effective than trying to repair damages that have already occurred. The Arborist may recommend terracing supported by retaining walls, aeration, installation of weeping tiles or tree wells, and/or the application of approved mulch or fertilizer once grade alteration works are completed.

Recommendation: Any proposed change to grades within the TPZ requires the guidance and recommendations of the Arborist. Consideration of any alteration of grade within the TPZ requires review and approval by the Town prior to implementation. Any approved alterations to existing grades within a TPZ area will be completed gradually and by hand whenever possible.

Excavation in Root-Sensitive Areas

Injuries to roots can significantly impact the health of a tree. The majority of roots are found in the upper 15-30 cm of soil. Excavations may cut roots and destabilize a tree if anchor roots are cut; causing safety issues.

Recommendations: Wherever excavation within a TPZ is unavoidable, root-sensitive excavation methods will be undertaken with the guidance of the Arborist and the following considerations:

Prior to Proposed Excavation:

- Contractors are required to adhere to the recommendations, direction and supervision, where required, of the Arborist and obtain the approval of the Town;
- The area of excavation, grading and/or removals will be minimized to the greatest extent possible, and include the use of excavation shoring, smaller excavation equipment, and/or rubber-tired machinery;
- Exploratory excavation using a high-pressure pneumatic (air) tool, hydrovac system, hand digging, or low-pressure hydraulic (water) excavation or equivalent method will be performed by an experienced operator under the direction and observation of an Arborist, where required. To minimize tearing of roots and facilitate proper pruning, water pressure must be low enough when using hydraulic excavation that root bark is not damaged or removed; and

- Where excavation may cause potential damage to structural roots (sometimes beyond the TPZ), root pruning under the direction of the Arborist will be undertaken where required.

General Excavation Requirements:

- Traditional trenching methods for utility installation will cause significant damage to roots. Underground utilities will be routed around TPZ areas wherever possible;
- Unavoidable disturbance to facilitate utility connections will be bored or tunneled beneath the root zone of existing trees to be protected where possible. A minimum depth of 1.6 metres is required; and
- Exposed roots will be watered throughout excavation to maintain optimal soil moisture until backfill operations are completed. The use and application method for anti-desiccants will be at the discretion and direction of the Arborist.

At the Completion of Excavation:

- An Arborist that is Tree Risk Assessment Qualified is recommended to provide an assessment of the impacted tree and provide recommendations for plant health care;
- Any exposed roots that are damaged or frayed will be properly pruned in accordance with proper arboricultural methods performed by the Arborist; and
- Excavated areas will be backfilled with soil and watered immediately.

Hydrological Alterations

Development may propose diversion of surface drainage patterns or alteration of the groundwater table.

Recommendation: Alterations to existing hydrology will be included in the review by the Arborist to ensure the impacts of these changes are a consideration in the identification and protection of existing trees or other vegetation to remain.

Alterations to Microclimate

Trees growing in groupings or in a woodlot or forest function as a whole unit, protecting each other from weather impacts such as wind and sun. Removal of trees located in edge locations, or opening up of the canopy exposes remaining trees to the impacts of reduced humidity and more sunlight, frost and wind. Higher levels of sunlight may cause heat stresses like sunburn on trunks and branches with thin bark, increased drought. Additional exposure may increase susceptibility to winds, breakage and the impacts of ice-loading. These types of impacts are chronic stresses that are expressed in slower growth, dieback, and increased susceptibility to disease, insects and failure.

Recommendation: Impacts from clearing need to be highlighted early in the planning process and will require monitoring and recommendations from an Arborist to best manage these stresses.

For more information, contact

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