LAKESHORE DRIVE
TREE PROTECTION GUIDELINES

INTRODUCTION

Lakeshore Drive's trees are critically important to the aesthetic character and natural charm of the local community. In addition to beauty, the trees along Lakeshore Drive play an important role in capturing rainwater, improving air quality, and sequestering carbon. Further, particularly along the lake's edge, trees located top of or near critical dunes are vital to guarding against dune erosion.

While trees naturally senesce and die over time, the loss of a significant number of trees within a short time period could have substantial visual and environmental impacts to the area. In 2021, Lakeshore Drive will be undergoing a series of road improvement projects. The construction process necessitates the removal of a number of trees and construction activities are likely to impact numerous more.

Recognizing the importance of trees to Lakeshore Drive, the Lake Michigan Shore Association LMSA) and the Allegan County Road Commission (ACRC) undertook a tree survey in February 2020 to locate and assess trees near primary construction zones. This document is intended to provide further guidance on the retention and preservation of trees that are immediately outside the construction zone.

IMPACTS TO TREES

Trees are often far more fragile than credited. During construction projects trees may be damaged in several ways. These include:

- Physical damage to tree trunks, branches and roots caused by using equipment, storing construction materials or spilling chemicals (e.g. herbicides, equipment fluids) near trees.
- Compacting soil by driving, parking or storing equipment and materials in tree root zones. With the majority of a tree's root system in the top 18-inches of the soil, the compaction caused by these activities reduces soil pore space and decreases the ability of roots to access and take up oxygen, water and nutrients. This leads to poor tree growth, development and even death.
- Altering soil composition and hydrology through site grading. The removal of native soils around trees during construction reduces the soil's organic content and nutrient and water- holding capacity. This impacts the ability of tree roots to access water and nutrients. Grading can also change how much water a tree receives. Increasing or decreasing the amount of water reaching a tree's root system can cause significant health impacts and lead to death.
- Tree removals can change microclimates and alter the amount of sunlight or wind exposure around remaining trees.

PLANNING TO REDUCE IMPACTS TO TREES

At the outset of the project, LMSA and ACRC can take several steps to reduce impacts to trees throughout the construction area. First and foremost, open communication between ACRC, LMSA, and any contractors is critical. Explaining that trees within the construction area are valued, providing information on practices designed to reduce impacts, and helping educate how various construction impacts may harm trees can help crews on-the-ground limit or reduce practices that may harm trees.

During planning and design activities, trees should be located on site plans. This will help engineers and construction crews understand where trees are located and attempt to reduce impacts. Where possible, final plans should steer away from key or significant trees to provide as much undisturbed soil space as possible.

While this is often an extra step, it can help limit project costs by limiting how many trees must be removed.

Where trees cannot be given appropriate space, it is prudent to remove significantly impacted trees *before* construction begins. Many trees will not tolerate substantial impacts to their root zone. While they may not immediately show signs of stress, they will often die several years later. It is far more prudent to identify and remove these trees early, than wait until they become a public risk concern.

TREE PROTECTION GUIDANCE

The International Society of Arboriculture (ISA) and the American National Standards Institute (ANSI) A300 Committee have established numerous standards related to tree care, protection, and preservation. While not all standards apply to conditions LMSA and ACRC may encounter, several industry best practices and guidelines can help frame conversations around tree protection on Lakeshore Drive.

- Trees designated to be removed and those intended to be saved shall be clearly established on construction plans.
- Tree root zones should remain as intact and undisturbed as possible. A healthy tree can generally withstand some encroachment into its root zone. However, as much as possible disturbance should be limited to no more than the critical disturbance distance (see Appendix A) and only on one side of the tree. Any disturbance to a tree's root zone beyond these guidelines should be closely monitored and the tree's health carefully considered. In many cases, trees may need to be preemptively removed to avoid these trees becoming hazard several years after the project ends.
- Compaction of soil around trees can significantly damage tree roots. Construction activities should seek to limit equipment access to only those areas necessary to complete road construction. As much as possible, the movement of construction equipment should be restricted from the tree root zone. If construction traffic must transgress across a root zone, protective measures such as geotextiles or alternatively placing 8+ inches of shredded hardwood mulch and boards over the affected root zone can help minimize compaction.
- If excavation must occur within a root zone, care shall be taken to cleanly sever roots. As much as possible, major roots should be cut with a sharp saw, opposed to ripped with heavy machinery.
- The tree root collar (where the base of the tree meets the soil) shall not be covered or buried. If significant regrading or fill is required, trees should be considered for removal.
- Storage of materials, chemicals, parked cars, portable toilet facilities, or equipment should be discouraged within the tree root zones.
- Immediately beneath the tree's bark is the cambium, or growing tissue of the tree. Construction crews should not be permitted to physically damage trees or bark. In areas where crews are working close to tree trunks, construction fencing (e.g. 4' high orange snow fencing) should be installed 8-10 feet from the trunk to keep equipment and workers safe distances from tree trunks.
- Tree pruning may be necessary for the access of construction equipment. All pruning must be completed in accordance with best practices. Pruning cuts shall be made at the branch collar. Limbs shall be supported with a hand. For limbs that are too large to support by hand, the 3-cut method shall be employed. These terms and practices are common industry practices and recognizable to tree care professionals. Under no circumstance should limbs or branches be cut mid-branch or node. Limbs shall not be broken or torn. Under no circumstances should equipment be allowed to tear or break branches.
- Under no circumstance shall oak trees be pruned, removed, or otherwise damaged within the active oak wilt season. Oak wilt is a serious disease that if trees become infected, spreads underground to other oaks. One tree can result in the loss of many. General guidelines are not to damage oak trees

between April 15 and July 15, but activity of the disease is weather dependent and could occur outside of this window (http://www.michiganoakwilt.org). If an oak must be injured, judicious and immediate use of wound paint is critical to prevent disease.

POST CONSTRUCTION CARE

Trees which are impacted by construction activities yet retained on-site may benefit from post-construction maintenance and care to improve probability of survival. Of most importance is adequate watering. Homeowners adjacent to impacted trees may choose to water or irrigate within the root zone to improve survival. Deep watering (e.g. leaving a hose running at the base of a tree for an hour or using a soaker hose) is more effective than dispersed watering (e.g. sprinklers) which has a tendency to run off or soak only into the top layer of soil.

Where soil has been exposed, it is recommended to apply an appropriate ground-cover (e.g. grass, sod). Ground-cover will help keep soil in place and minimize the exposure of any roots.

Fertilizer is not recommended unless specific soil or tree tissue nutrient concerns have been diagnosed. After an initial season, trees showing signs of poor nutrient (e.g. discoloration, small leaves) may benefit from micronutrient applications to augment any root loss. Likewise additional pruning is not recommended. Trees produce hormones in their branches that encourage root growth. Pruning trees may reduce the production of this hormone and limit root growth.

Trees with minor damage to trunk or stems should be left alone. Trees will naturally seal over wounds and continue growing. Wound paint is not recommended. Trees with significant damage to trunks or stems should be observed or considered for removal.

It is prudent to perform a post-inspection of trees within the construction area 6 months to 2 years following construction. It is common for some trees to succumb to construction impacts. Identifying and removing these trees before they become a public risk concern is crucial to responsible urban forest management.

APPENDIX A. TREE ROOT ZONE DETERMINATION

Arborists use several terms and guidelines to establish tree root zones. It is fairly common for arborists to specify that for each inch of diameter of a tree, a root protection zone should extend 1 foot in radius from the tree center. Other specifications indicate the critical root zone is the area immediately beneath the tree's canopy. In forested settings, the latter may be insufficient. These guidelines are based on the former.

A healthy tree may withstand some impacts within its root zone. A tree that is in poor health is unlikely to survive any impacts within its root zone. However, under no circumstances should disturbance be greater than the critical disturbance distance, and this may only be exceeded on one side of the tree.

Tree size (diameter at breast height)	**Root zone (radius - distance from tree)**	**Critical Disturbance Distance (distance from tree)**
12 to 18 inches	18 feet	9 feet
18 to 22 inches	25 feet	12 feet
22 to 28 inches	31 feet	18 feet
28 to 32 inches	38 feet	23 feet
32 to 36 inches	43 feet	30 feet
36 to 40 inches	48 feet	33 feet
40 inches or greater	50+ feet	38 feet

APPENDIX B. SPECIES SPECIFIC CONCERNS

Tree Species INTOLERANT of Construction Impacts

Sugar Maple (*Acer saccharum*)
Hemlock (*Tsuga canadensis*)
Basswood (*Tilia americana*)
American Beech (*Fagus grandifolia*)

Tree Species TOLERANT of Construction Impacts

Black Locust (*Robinia pseudoacacia*)
Boxelder (*Acer negundo*)
Eastern red cedar (*Juniperus virginiana*)
Northern white cedar (*Thuja occidentalis*)
Eastern cottonwood (*Populoides grandidentata*)
Red maple (*Acer rubrum*)
Silver maple (*Acer saccharinum*)
Norway spruce (*Picea abies*)
Sycamore *(Platanus occidentalis*)
Sassafras (*Sassafras albidum*)
Black walnut (*Juglans nigra*)

APPENDIX C. ADDITIONAL RESOURCES

1. Coder, Kim. 2014. Conserving Trees During Site Development. 2014. University of Georgia. Warnell School of Forestry. May, 2014. Available online at: https://www.warnell.uga.edu/sites/default/files/publications/Tree%20Conservation%20During%20Construction%20pub_14-5.pdf

2. Fisette, Paul and Dennis Ryan. 2002. Preserving Trees During Construction. University of Massachusetts, Amherst. Department of Environmental Conservation. 2002. Available at: https://bct.eco.umass.edu/publications/articles/preserving-trees-during-construction/

3. Matheny, Nelda and James Clark. Trees and Development: A Technical Guide to Preservation of Trees During Land Development. International Society of Aboriculture. June 1, 1998. 183 pages. Available for purchase at www.isa-arbor.com.

4. Pennsylvania State University. 2017. A Guide to Preserving Trees in Development Projects. September 12, 2017. Available at: https://extension.psu.edu/a-guide-to-preserving-trees-in-development-projects