

Text to Accompany Slides for
Construction Activities That Affect Tree Health
Wisconsin 2026 Landscape and Grounds Maintenance Short Course

Slide Number	Text
2	Not all construction related activities that impact tree health are the same. Some cause more harm than others. So predicting the activity and damage is a critical first step.
3	Admittedly, there are more activities that cause damage than these listed, but these are the most common. Ironically, the most obvious – mechanical injury – is the least damaging. The most subtle – changes to the rhizosphere, that area of soil where the tree roots and associated microorganisms reside – is eventually the most damaging.
5	Six changes to rhizospheres that result in the most damage to trees.
6	Typically when foundations are dug, the soil layers that were once 8-12 feet (or more) deep end up on the graded surface, and the good surface soil layers are mixed and/or buried deeper. What's the big deal? The majority of the soil organic matter, nutrients, and beneficial microorganisms used to be in the upper soil layers.
7	Self-explanatory. Prairie soils typically have deep A (organic layer) horizons before the B layer (layer of deposition, i.e., the clay layer) is reached. The C horizon (parent material) is often several feet deep from the surface. The urbanized soil is completely mixed. Forest soils typically have very shallow A and B layers, often less than 12 inches, which makes them the most vulnerable to changes.
8	Soil compaction, in particular with clay soil, is extremely damaging to tree health. It denies roots of normal oxygen and moisture, Sandy soils cannot be compacted to the point where they are damaging to tree health. Storing a pile of soil as in this photo is one of the more subtle ways of compacting the underlying soil. Don't believe it? Let me pile soil 5 feet deep over your chest and then let me know how you feel about it.
9	Vehicles, construction materials, dumpsters all cause soil compaction.
10	When landscapes are graded prior to construction, the A horizon, the layer with the good organics is removed. This make it harder to hold soil moisture as well as soil nutrients. Why is it removed? Organic layers cannot be compacted enough to meet engineering standards for footings, roads, sidewalks.
11	When wooded areas are opened up, sometimes simply by cutting in roads and foundation footprints, the rhizosphere is suddenly exposed do drying winds and sun.

- 12 Especially in previously wooded landscapes, if the landscape is cleaned up of fallen leaves and organic debris, the soil microorganisms that depended on that sensitive rhizosphere is thrown into chaos often to the point of elimination of the characteristic soil fungi, bacteria. So, what's the big deal?
- 13 All trees...I'll repeat that...all trees rely on a healthy population of soil microorganisms in order to thrive. Soil fungi, bacteria, nematodes, worms, etc. All are critical as part of the healthy soil/tree system.
- 14 Chemical pollution is usually very subtle and takes place long before you enter the landscape. Buried construction materials, especially concrete, mortar and paint; concrete mixer shute clean-out areas; and in the case of this photo, extra asphalt piled over the rhizosphere cause long term and subtle harm to tree roots and microorganisms.
- 15 Grade changes can cause damage in several ways: 1) removal of structural and feeder roots; 2) changes in water run-off and pooling patterns; 3) loss of topsoil.
- If tree wells are built around existing trees to save them from grade changes, follow the specifications provided on the right side of this frame. For each inch of tree trunk diameter, built the wells one foot away to protect the roots and tree stability. For instance, a tree with a 10 inch trunk diameter should have the wells constructed 10 feet away from the trunk.
- 16 That rule of thumb wasn't honored on this construction site. Those trees are left with very small root pads, perched well above the grade changes. Health-wise, they can often make it. Stability-wise, they have become liabilities.
- 17 Plan ahead when building house footprints, decks, patios, etc. If that desired distance from existing trees can't be honored, change the plans or remove the unstable trees.
- 18 No grade changes here but something very damaging to tree health. The entire area around the existing tree has been roto-tilled to a depth of 6 inches in order to establish a new lawn. The fine roots that trees rely upon for water and nutrients were in that top foot of soil, so many were lost.
- 19 A good example of how little engineers know about trees and tree stability. That tree is now a standing hazard.
- 20 Research published in 2019 (Johnson, et al, Boulevard tree failures during wind loading events. *Arboriculture & Urban Forestry* 45(6)) showed that when lifted sidewalk panels were replaced (after removing the roots that caused the lifting), adjacent trees were 2.4 times more likely to tip over in windstorms for the next 5 years.

21 Patio construction around this tree severed structural roots and this large oak is
already leaning. Would you want to be dining on this patio when the winds pick up?

22 Mechanical injuries are the most obvious. Most of the time if the trees are healthy,
they can recover...unless they are prone to decay.

23 Now, Step 2 is predicting how the trees might react to the damage.

24 Two reactions: 1) to health; 2) to stability.

25 Self explanatory slide, except for “reduction of cytokinins.” Cytokinins promote
plant growth. When they are retarded for any reason, plants become stunted.

26 A common symptom of damage, especially root loss, is dieback of major branches.

27 Also, when roots and rhizospheres are altered, trees cannot receive normal nutrients
and they become nutrient deficient and stressed since they cannot photosynthesize
normally.

28 Disease pathogens and opportunistic insect pests are more likely to invade stressed
or wounded trees.

29 Scale insects in particular are drawn to stressed trees.

30 Eventually, trees go into a health decline and die prematurely, often several years
after the construction damage.

31 Trees that decay easily or are unhealthy are more prone to extensive decay that
eventually affects their stability.

32 When you see fungal fruiting structures like these from the fungus *Ganoderma*, the
internal decay is extensive and that tree is a standing hazard.

33 Trees that have had their root cut during construction are less stable. This is a
particular problem with trees near homes, electrical lines, cars, people.

34 Decay is the #1 pre-existing condition that leads to tree failures during wind and ice
storms.

35 Not all trees are identically vulnerable. So the next step is recognizing which tree
species will be most affected.

36 Some species are very tolerant of changes, especially if they are healthy, such as
these honeylocusts and bur oaks.

37 Others, not so much.

38 The healthier a tree is, the more tolerant of construction activities it is.

40 Consider options that cause less damage. Instead of replacing lifted sidewalk panels
and cutting tree roots, consider filling the trip hazards with asphalt.

- 41 Or, build paths above the roots on piers or posts when possible/practical.
- 42 Protect trees during construction with fencing. After construction, repair compacted soils with trenching and soil replacement tactics.
- 43 Consolidate all buried utilities in common trenches rather than individual trenches.
- 44 Avoid soil compaction by using equipment that doesn't compact soil.
- 45 Build sensitively around trees, minimizing damage by planning ahead and using alternative techniques.
- 46 Work with engineers to inform them of practices that lead to subtle injuries to trees and how to avoid them.
- 47 Rather than trench in utilities with practices that cut roots, open up trenches with tools like Air Spades or Air Knives that don't cut roots.
- 48 When possible, advocate for boulevards/tree lawns at least 10 feet wide. This simple design tactic prevents a lot of tree root loss when buried utilities need to be repaired or replaced.
- 49 Building around or within trees can be done without killing the trees.