

Grand Valley State University Bulletin No. 285

Construction around trees on campus.

As our campuses expand, it is unavoidable that somewhere trees will be near the construction site. Our buildings are constructed in the midst of trees to take advantage of the aesthetic and environmental value of the wooded area. Wooded properties can be worth as much as twenty percent more than those without trees, and people value the opportunity to live among trees. Unfortunately, the processes involved with construction can be deadly to the nearby trees. Further, unless the damage is extreme, the trees may not die immediately, but could decline over several years. With this delay in symptom development, you may not associate the loss of the tree with the construction.

It is possible to preserve trees on building sites if the right measures are taken. The most important step is to consult our professional arborist during the planning/deployment stage. Our arborist can help you decide which trees can be saved, and can work with the builder to protect the trees throughout each construction phase.



How trees are damaged during construction

Physical injury to the trunk and crown

Construction equipment can injure the above-ground portion of a tree by breaking branches, tearing the bark and wounding the trunk. These injuries are permanent, and if extensive, can be fatal.

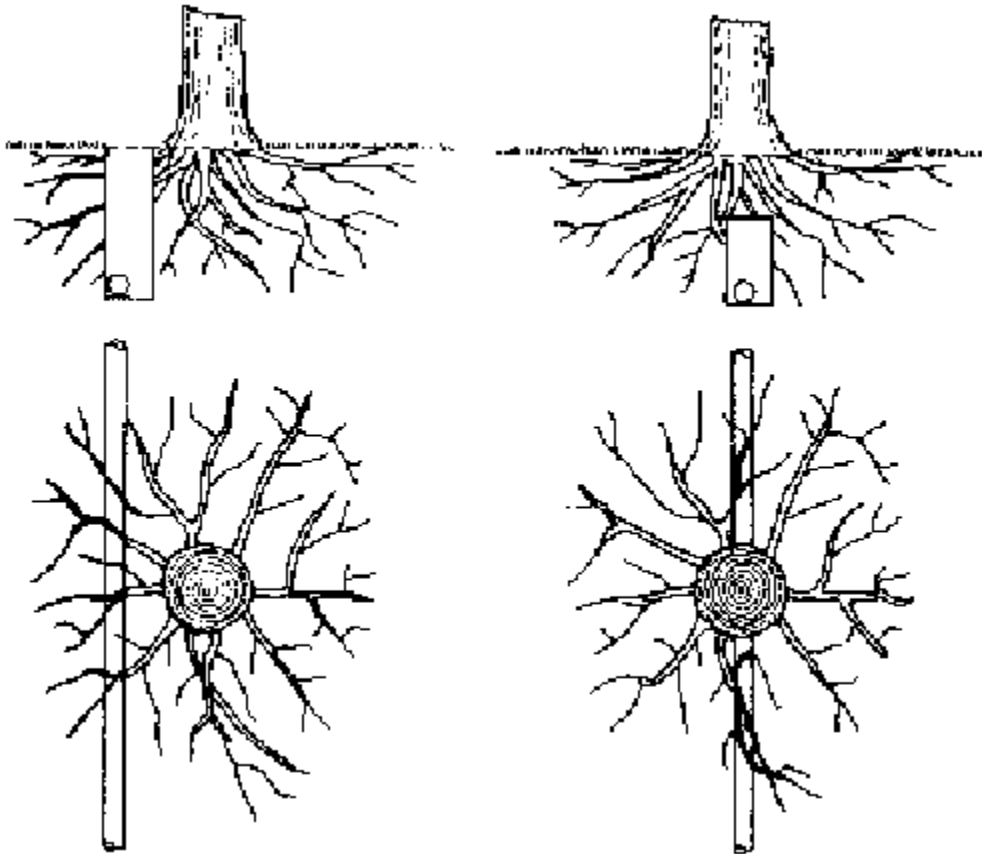
Cutting of roots

The digging and trenching that are necessary to construct a building and install underground utilities will likely sever a portion of the roots of many trees in the area. It is easy to appreciate the potential for damage if you understand where roots grow. The roots of a mature tree extend far from the trunk of the tree. In fact, roots typically will be found growing a distance of 1-3 times the height of the tree. The amount of damage a tree can suffer from root loss depends, in part, upon how close to the tree the cut is made. Severing one major root can cause the loss of 5 to 20 percent of the root system.



The roots of a tree will extend far from the trunk and will be found mostly in the upper 6 to 10 inches of soil.

Another problem that may result from root loss due to digging and trenching is that the potential for the trees to fall over is increased. The roots play a critical role in anchoring a tree. If the major support roots are cut on one side of a tree, the tree may fall or blow over.



Less damage is done to tree roots if utilities are tunneled under a tree rather than across the roots.

Soil compaction

An ideal soil for root growth and development is about fifty percent pore space. These pores, the spaces between soil particles, are filled with water and air. The heavy equipment used in construction compacts the soil, and can dramatically reduce the amount of pore space. This not only inhibits root growth and penetration, but also decreases oxygen in the soil that is essential to the growth and function of the roots. It is even more critical on our campus due to the amount of clay soil we have here. Soil compaction in this clay soil type can make it as hard as concrete for years down the road, severely hindering any roots recovering in that area.

Smothering roots by adding soil

Most people are surprised to learn that 90 percent of the fine roots that absorb water and minerals are in the upper **6-12 inches of soil**. Roots require space, air and water. Roots will grow best where these requirements are met, which are usually very near the soil surface. Piling

soil over the root system or increasing the grade will smother the roots. It only takes a few inches of added soil to kill a sensitive, mature tree.



Getting advice

Consult our professional arborist in the early planning stage. Many of the trees on our property may be saved if the proper steps are taken. We can assess the trees on our property, determine which are healthy and structurally sound, and determine measures to preserve and protect them.

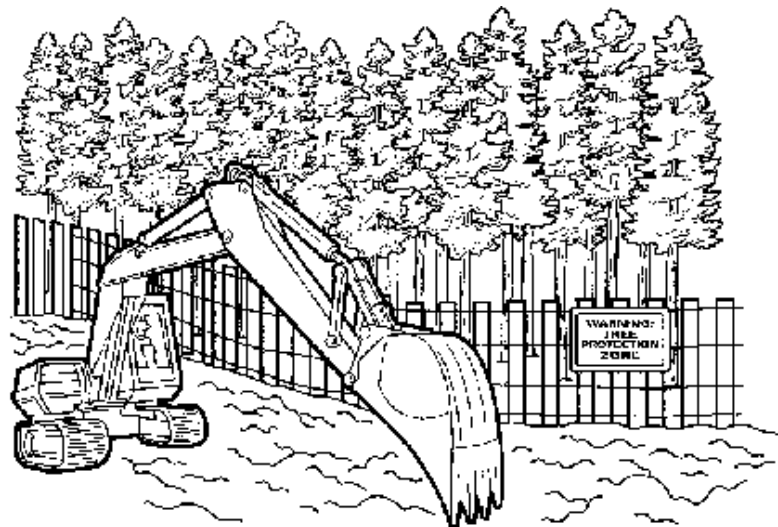
One of the first decisions is determining which trees are to be preserved, and which should be removed. We consider the species, size and maturity, location and the condition of each tree. The largest, most mature trees are not always the best choices to preserve, which means they might need extra pre-cautions during construction. Younger, more vigorous trees can usually survive and adapt to the stresses of construction better. Our arborist can advise you about which trees are more sensitive to compaction, grade changes and root damage.



Erecting barriers

Because our ability to repair construction damage to trees is limited, it is vital that the trees be protected from injury. The single most important action you can take is to set up construction fences around all of the trees that are to remain. The fences should be placed as far out from the trunks of the trees as possible. As a general guideline, allow one foot of space from the trunk for each inch of trunk diameter. The intent is not merely to protect the above-ground portions of the trees, but also the root systems. Remember that the root systems extend much farther than the driplines of the trees.

The construction personnel will be required to keep the fenced area clear of building materials, waste, and excess soil. No digging, trenching or other soil disturbance should be allowed in the fenced area.



Protective fences should be erected as far out from the trunks as possible in order to protect the root systems.



Maintaining good communications

It is important to work together as a team. We will share clear objectives with you and it is up to you to relay those objectives to your construction workers and sub-contractors. One sub-contractor can destroy our prudent efforts. Construction damage to trees is often irreversible.

We will visit the site through the construction phase and will bring to your attention any infractions that we see. Your vigilance will pay off as workers learn to take your wishes seriously. Take photos at every stage of construction. If any infraction of the specifications does occur, we will hold you liable. The photos will help you in your decision if it was your men or a sub-contractor.



Final stages

It is not unusual to go to great lengths to preserve trees during construction, only to have them injured during landscaping. Installing irrigation systems and rototilling planting beds are two ways the root systems of trees can be damaged. Remember also those small increases in grade, as little as 2-6", which place additional soil over the roots can be devastating to our trees. Careful planning and communicating with landscape designers and contractors is just as important as avoiding tree damage during construction.



Post-construction tree maintenance

Our trees will require several years to adjust to the injury and environmental changes that occur during construction. Stressed trees are more prone to health problems such as disease and insect infestations. This makes all the more important to talk to our arborist in deciding which trees need that extra care during construction, to help them along in years to come.



Your requirements

It is your responsibility to construct barrier fencing around all trees designated by the arborist at the construction site. Amount of fencing will be determined following this guideline: allow one foot of space from the trunk for each inch of diameter at breast height (DBH). In the cases where the required amount of fencing will be restricted due to proximity to a structure, consult with the Grand Valley State University (GVSU) arborist for alternatives. Alternatives could or not include fencing, wood chips, or plywood or combination thereof.

It is your responsibility that construction personnel keep the fenced area clear of building materials, waste, and excess soil. No digging, trenching or other soil disturbance should be allowed in the fenced area, nor shall parking of vehicles.

Violations of this bulletin will be noted by GVSU personnel, and a formal letter drafted and given to the general contractor for the project. The general contractor has 1 day to come into compliance with this bulletin or be fined 10% of the assessed value of said tree(s), per day that the violation exists. This violation in no way releases the contractor from further obligation if the event damages the tree. If the tree(s) becomes damaged or dies from such an event, Contractor shall be responsible for three (3) times the appraised value of the tree(s).



Four Factors in Professional Evaluation of Trees and Other Plants:

1. *Tree size.* Sometimes the size and age of a tree are such that it cannot be replaced. Trees that are too large to be replaced should be evaluated by professionals who use a specialized appraisal formula.
2. *The kind of tree (or its classification).* Choose the species for its utility and its adaptability. Tree values vary according to your region, the "hardiness" zone, and even state and local conditions. If you are not familiar with these variables, be sure your advice comes from a competent source.
Trees which are hardy, durable, highly adaptable, and free from objectionable characteristics are worth the most. They require less maintenance; they have sturdy, well-shaped branches and pleasing foliage.
3. *Condition of the tree, shrub or plant.* The professional also will consider the condition of the plant. Obviously, a healthy, well-maintained plant will have a higher value. Roots, trunk, branches and buds need to be inspected before determining tree condition.
4. *Location of the plant.* There are functional considerations as well as aesthetic. This is where location enters into the evaluation. A tree in your yard may be worth more than one growing in the woods. One standing alone will often value higher than one in a group. A tree near your house or one which is a focal point in your landscape tends to have more value. The site, placement, and contribution of a tree help determine the overall value of the plant attributable to location.
All of these factors can be measured in dollars and cents, and can determine the value of a tree, specimen shrubs or evergreens, whether for insurance purposes, court testimony in lawsuits, or for tax deductions.

The value of trees for their aesthetic functions is obvious. Many other less obvious functions contributing to the value of trees are illustrated here:

