



## Minimizing Construction Damage to Street Trees

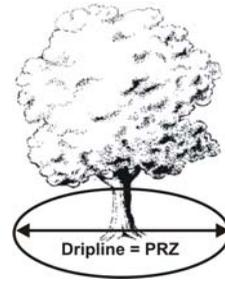
The City of Marietta considers the many trees located within city right-of-ways a valuable asset. Contractors performing construction activities within the City right-of-way must take all reasonable precautions to protect city trees in the work zone, so as not to leave the trees in an unhealthy and potentially hazardous condition.

Each construction site has a unique set of soil, tree species, and construction conditions. For this reason we recommend that you get advice from a professional urban forester or arborist with experience in protecting trees from construction damage. The Marietta Tree Commission or the City's ODNR, Division of Forestry, consultant, can help you evaluate and minimize the impacts of construction activities.

A wide variety of construction activities can damage or kill trees, and create hazardous conditions. The worst damage creates a hazardous condition hidden underground. Roots are one of the most vital parts of a tree and it is critical that you protect roots that lie in the path of construction.

Typically, approximately 90-95 percent of a tree's root system is in the top three feet of

soil, and more than half is in the top one foot. The part of this root system in which construction damage should be avoided is called the Protected Root Zone (PRZ). One common method used to identify the PRZ is to define it as the "dripline" (see Figure 1).



**Figure 1.** The protected root zone (PRZ) can be considered to be the roots that lie below its branches, an area known as the *dripline*.

Unfortunately, space is often very limited when working in the lawnstrip of the city right-of way, and the PRZ cannot always be fully protected. To avoid liability for needless or excessive damage to city trees, contractors should follow city guidelines and recommendations.

Trees growing in city lawn strips typically have a very restricted root distribution. Therefore, root removal or damage during construction is often a more significant loss compared to trees growing in more open areas. Root loss not only affects the health of these trees but also their stability. A street tree that experiences significant root loss will have a different center of gravity and diminished anchoring to the ground. Improperly pruned roots are also more prone to decay. These changes often result in less

stable trees--especially the large, mature ones - and leaves them more vulnerable to toppling during severe weather. Commonly, the condition of an affected tree declines progressively, resulting in a hazardous condition several years after construction was performed.

The first step to protecting tree roots is to erect a construction limit fence (see Figure 2) around the PRZ, or as far from the tree trunk as possible. This provides a visual guide of the area within which no construction activity should occur.

### Minimize Root damage

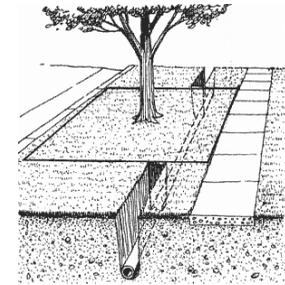
The number of cuts near street trees may be reduced by a variety of methods and compromises. Trenches should be dug outside of the tree PRZ, or as far from the tree trunk as possible.



**Figure 2.** Protect the tree from damage by erecting construction limit fencing around the protected root zone.

When work in the immediate vicinity of the trunk of a large tree cannot be avoided,

tunneling under the root systems may be necessary (see Figure 3).



**Figure 3.** Protect roots from damage when laying utility lines by tunneling rather than trenching.

Hand dig initially to identify the size of impacted roots. Many large trees have large, broad roots, called shield roots, that flair out directly from the base of the tree. Cutting of these roots, in particular, can destabilize the tree; and thus tunneling should be applied. Tunneling may also be necessary if trenching would sever several roots eight inches in diameter or larger.

For all digging operations, exposed roots should be cut cleanly to promote quick wound closure and regeneration. Construction machinery, such as a backhoe, should not be used to pull and sever roots. Vibratory plows, chain trenchers, and hand tools do a better job, and roots ends should be cut cleanly with a saw to facilitate wound healing and regrowth. It is also important to cover exposed roots with soil, mulch, or damp burlap as soon as possible.

Consolidate utilities into common trenches and tunnels whenever possible. Often it is possible to run several utilities in a common trench, minimizing the number of trenches and root cuts.

If sidewalks or curbs are to be constructed, hand-form the curbs adjacent to tree roots, rather than cutting the large shield roots. Alternatively, sidewalks can be gently graded over elevated roots to avoid cutting unnecessarily.

Moving large amounts of soil within the PRZ usually kills a tree. Except where absolutely necessary, avoid disruptions to the natural contour of the site. Do not excavate to recontour the surface of the lawnstrip in the PRZ. This cuts and removes roots, usually the fine roots that absorb most of the water and nutrients for the tree. Likewise, do not recontour the surface by layering new soil, which will choke off the air supply to the surface roots. If necessary to recontour, remove the turf and replace it with mulch and landscape plantings.

### **Avoid Soil Compaction**

Soil compaction is the single largest killer of urban trees. Tree roots need loose soil to grow, obtain oxygen, and absorb water and nutrients. Stockpiled building materials, heavy machinery, and excessive foot traffic all damage soil structure. Lacking good soil aeration, roots suffocate and tree health declines (Figure 4).



**Figure 4.** Avoid running heavy equipment over the protected root zone, which damages sensitive tree roots.

If you cannot reroute traffic, bridge the root system with steel plates or spread several inches (six inches or more) of wood chips on the soil within the PRZ.

Avoid changes in soil pH (acidity). Increases in pH are particularly dangerous to many species. Alkaline clays or limestones should not be used for fill or paving, and concrete waste or waste water should not be discharged in the city right-of-way. Mixing trucks should never be rinsed out on the site.

### ***Maintain the Health of the Trees During and After Construction***

As long as the soil drains water adequately, water, water, water the trees. Adequate water before, during, and after construction is the most critical requirement for street trees if they are to tolerate construction damage. Place soaker hoses over their root systems and soak them a minimum of one time per week during construction and immediately after, allowing two to three hours per soaking.

Roots that are left exposed for more than two days are subject to desiccation. The damage should be minimized by layering dampened cloth or burlap over the roots.

When significant root damage is unavoidable, the City may recommend compensatory pruning of the tree crown. This serves to reduce the demands placed on the roots by the aerial parts of the tree for water and nutrients. This pruning must be done by a licensed pruning company.

## **Tree Protection Guidelines**

1. No construction activities, including trenching, excavating, boring, or any other earth-disturbing activity, are to be performed within the drip-line of a tree without an approved permit.
2. The protected area around a tree shall be designated by work limit fencing and maintained in place throughout the construction project.
3. No construction activities are to occur within the protected root zone (PRZ) defined by the drip-line of the tree. Where it is not practical to protect the entire PRZ, the largest possible protected area is to be designated.
4. Appropriate measures are to be used to minimize damage to the trunk, limbs and roots of each tree as follows. Required measures may include:
  - a. *When work within the PRZ is necessary, the trunk is to be temporarily wrapped or boarded around to protect against damage*

*from construction equipment. Protective materials shall not be nailed to the tree.*

- b. *Major roots (4 inch diameter or larger) are not to be severed unless authorized in the permit. All roots that must be severed are to be clean cut with a saw.*
  - c. *Tunneling under major roots is to be practiced when trenching will cause significant damage to the health and stability of the tree.*
  - d. *Roots exposed for more than 2 days are to be protected from desiccation.*
  - e. *Where necessary, measures should be taken to avoid compaction of the soil in the PRZ. Heavy machinery should not be driven over unprotected areas in the PRZ.*
  - f. *Soil in the PRZ is not to be altered by waste disposal or recontouring.*
  - g. *Tree limbs are not to be pruned unless authorized in the permit.*
5. Any contractor, utility, corporation or individual who fails to comply with the policies outlined herein during construction in the vicinity of a tree in City right of way may be subject to the cost of repair or replacement of the tree according to the provisions of Marietta City Code, Chapter 947.99.

