

Fact Sheet:

Landing Zone/Drop Zone Precautions for Tree Trimming & Removal Operations

This guidance covers the potential hazards created by:

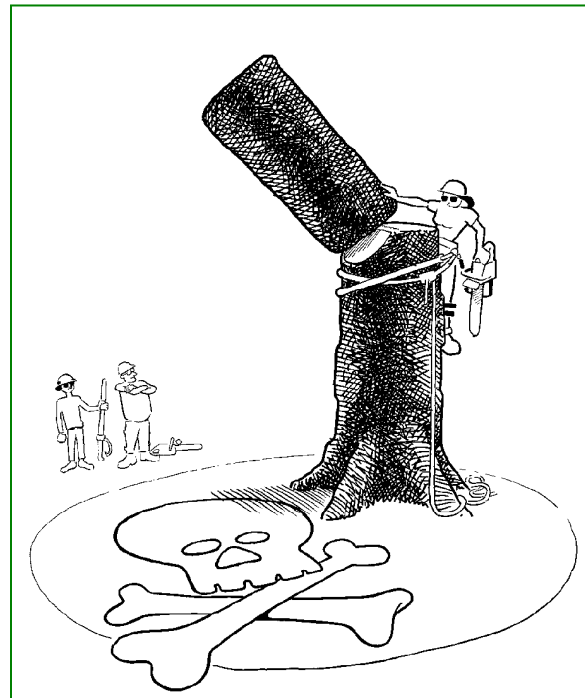
- Falling trees, tree limbs or “hangers”
- Danger trees
- Falling hand tools

Background

According to data derived from OSHA accident reports for tree trimming operations (SIC 0783) in calendar years 2006 and 2007, 39 percent of all fatal accidents were categorized as “struck-by’s”, mostly caused by falling trees, tree sections or tree limbs. Even relatively small objects falling great distances can impact with enough force to cause serious or even fatal injury.

Common sense and communication are key when avoiding “struck-by” injuries. The most common “struck-by” injuries occur when a ground worker is hit by falling limbs, branches or tools. Other “struck-by” injuries occur when:

- Tree workers are hit by falling objects;
- hangers are inadvertently dislodged;
- falling trees hit crew members;
- ground workers cut spring poles or branches bent under tension without taking precautions.



Examples of preventable incidents

A tree company was removing a tree in the back yard of a private residence. The climber removed all of the limbs and had begun to cut sections of wood and let them drop to the ground. A ground worker walked into the “drop zone” while a 4-foot long piece of wood weighing approximately 50 pounds was being dropped. It struck him on the head, killing him.

A ground worker was killed when he was struck by a branch that had previously been cut by the climber. The “hanger” had been in the tree for some time before, without warning, it became dislodged and fell on the worker.

OSHA Requirements

OSHA requirements related to tree felling can be found in 29 CFR Part 1910.266, *Logging Operations*. Per OSHA Directive CPL 02-01-045, the Logging operations standard covers some, but not all, tree removal operations; however, tree trimming (i.e., the removal of limbs and branches from a tree without the removal of the tree itself or the tree trunk) does not come within the scope of 1910.266. Individuals or crews performing tree removals should be familiar with the entirety of this federal OSHA standard. Portions are excerpted below.

OSHA defines "danger tree" as a standing tree that presents a hazard to employees due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree. (Arborists typically refer to this same tree as a "hazard tree.")

1910.266(d)(6)(ii): Work areas shall be assigned so that trees cannot fall into an adjacent occupied work area. The distance between adjacent occupied work areas shall be at least two tree lengths of the trees being felled. The distance between adjacent occupied work areas shall reflect the degree of slope, the density of the growth, the height of the trees, the soil structure and other hazards reasonably anticipated at that work site. A distance of greater than two tree lengths shall be maintained between adjacent occupied work areas on any slope where rolling or sliding of trees or logs is reasonably foreseeable.

1910.266(h)(1)(iv): No employee shall approach a feller closer than two tree lengths of trees being felled until the feller has acknowledged that it is safe to do so, unless the employer demonstrates that a team of employees is necessary to manually fell a particular tree.

1910.266(h)(1)(vi): Each danger tree shall be felled, removed or avoided. Each danger tree, including lodged trees and snags, shall be felled or removed using mechanical or other techniques that minimize employee exposure before work is commenced in the area of the danger tree. If the danger tree is not felled or removed, it shall be marked and no work shall be conducted within two tree lengths of the danger tree unless the employer demonstrates that a shorter distance will not create a hazard for an employee.

ANSI Z133.1-2006 recommended safe work practices

Struck-by hazards shall be identified; and work plans for struck-by avoidance shall be communicated to all workers in a job briefing before commencing work.

A visual hazard assessment, including a root collar inspection, shall be performed prior to climbing, entering, or performing any work in a tree. A "root collar inspection" means a visual inspection of the above-ground root collar or root flare for signs of decay or defect that could lead to failure. The purpose of a visual hazard assessment is to check the stability of the tree for climbing, rigging or otherwise working in the tree.

This requirement implies that a root collar is evident. One might have to clear vines, snow, or debris away from the tree base in order to perform the root collar inspection. If defects are found or no root collar is evident; i.e., it is below the soil grade, then further investigation may be required to ensure that the tree is sufficiently stable for working in the tree.

When dropping limbs or branches, climbers must always assume that ground workers could be under the canopy of the tree. Communications shall be established between workers aloft and on the ground, before starting or otherwise using any portable power hand tools, or before dropping debris out of the tree. The command "stand clear" from aloft and response "all clear" from the ground are terms that may be used for this purpose. Pre-arranged, two-way hand signals may

also be used. Arborists and other workers returning to the work area shall be acknowledged by arborists aloft.

When possible, coordinate ground operations with climbing operations. Example: Periods when climbers are repositioning themselves are good times for ground workers to remove brush from under the canopy. Ground workers must always be aware of climber and other crew member activity. They must assume that a branch, hand saw, or other tool could slip out of the hands of a climber at any time. In addition, all crew members should be wary of hangers. They may dislodge at unexpected times as a result of climbing, pruning, or removal operations.

When climbing into a tree, arborists shall not carry hand tools and equipment in their hands unless the tools are used to assist them in climbing. Tools other than ropes shall not be thrown into a tree or between workers aloft.

Arborist climbing lines or hand lines should be used for raising and lowering hand tools and equipment. Arborists should raise or lower hand tools and equipment in a manner such that the cutting edge will not contact the arborist climbing line or hand line.

Pole tools, when hung on tree branches, shall be securely positioned to prevent dislodgment. Pole pruners or pole saws shall not be hung on electrical conductors or left in a tree unattended.

Workers on the ground shall not stand under the work area of a tree when cabling or lightning protection hardware is being installed.

A landing zone shall be established prior to the start of tree rigging and crane removal operations. Workers not directly involved in the rigging operation shall stay out of the landing zone until a worker involved in the rigging operation who is authorized and qualified to do so communicates that it is safe to enter.

Workers shall be positioned and their duties organized so that the actions of one worker will not create a hazard for any other worker.

Crane Removals

OSHA's crawler locomotive and truck cranes standard prohibits hoisting an individual on the crane load or hook (§1910.180(h)(3)(v)). This requirement applies even though ANSI Z133.1-2006, §5.7.9, allows the hoisting of personnel into position with a crane. An employer's reliance on the ANSI is therefore not a defense to a violation of §1910.180(h)(3)(v). An employer may, however, assert that compliance with the OSHA standard is either impossible/infeasible or presents a greater hazard to the employee. As with other affirmative defenses, the employer bears the burden of proof.

1. Impossibility/infeasibility is established when compliance is functionally impossible or would prevent performance of the required work; and there are no alternative means of employee protection.
2. A greater hazard defense exists when compliance with the standard results in greater hazards to the employee than noncompliance and there are no alternative means of employee protection.

Consider whether any of the following non-exclusive alternative methods could be used:

- a. Can an aerial lift be used to position employees?
- b. Is the tree safe to climb? Climbing decayed or damaged trees could be hazardous. If the tree is not damaged or decayed to the extent that climbing would be unsafe, then climbing is normally considered safe using the appropriate climbing equipment and practices.

c. Can a personnel platform (man basket) be suspended from a crane? Personnel platforms are available in several designs. These platforms are required to be designed to minimize tipping caused by personnel movement through the use of an appropriate suspension system. Obviously, when a personnel platform is attached to the crane, the crane's use is restricted to hoisting workers and a second crane must be used to lower tree sections. Consider whether there is sufficient space to set up two cranes. Consider also whether maneuvering the platform through the tree canopy as well as performing the necessary work from the platform will add risk to the overall job.

Tree removal & felling

The same guidance applies whether a tree is being removed entirely in one piece from its base (felling) or in sections. In the latter case, the standing trunk (spar, stem) is "felled" much like a whole tree would be.

Before beginning any tree removal operation, the chain-saw operator and/or crew leader shall carefully consider the tree and the site and shall take appropriate actions to mitigate associated hazards of relevant factors such as but not limited to:

- the area surrounding the tree to be removed, including nearby trees;
- species and shape of the tree;
- lean of the tree;
- loose limbs, chunks, or other overhead material;
- wind force and direction;
- decayed or weak spots throughout the tree; and
- size and terrain characteristics or limitations of the work area.

Workers not directly involved in the removal operation shall be clear of the work area, where practicable, beyond the length of the tree, unless a team of workers is necessary to remove a particular tree. When a pull line is being used, workers involved in removing a tree or trunk shall be clear by a minimum of one tree length.

A planned escape route for all workers shall be prepared before cutting any standing tree or trunk. The preferred escape route is 45 degrees on either side of a line drawn opposite the intended direction of the fall. Obstructions shall be cleared along the escape path. The chain-saw operator shall use this path for egress once the cut has been completed.

Felling aids such as wedges, block and tackle, rope, or other appropriate devices shall be used when there is a danger that the tree or trees being removed may fall in the wrong direction or damage property. All limbs shall be removed to a height and width sufficient to allow the tree to fall clear of any wires and other objects in the vicinity.

Workers returning to the landing zone shall not enter until the chain-saw operator has acknowledged that it is safe to do so.

Directional felling techniques

Notches shall be used on all trees and trunks greater than 5 inches (12.7 cm) in diameter at breast height.

Notches and back cuts shall be made at a height that enables the chain-saw operator to safely begin the cut, control the tree or trunk, and have freedom of movement for escape.

Notch openings shall be 45 degrees or greater and large enough to guide the fall of the tree or trunk to prevent splitting.

Notch depth should not exceed one-third the diameter of the tree.

The back cut shall not penetrate into the predetermined hinge area.

With a notch opening of 45 to 70 degrees, the back cut shall be 1 to 2 inches (2.5 to 5 cm) above the apex of the notch, creating a platform to prevent kickback of the tree or trunk. With a notch greater than 70 degrees, there is no need for such a platform and the back cut should be at the same level as the apex of the notch.

The two cuts that form the notch shall not cross at the point where they meet.

Before making the back cut, there shall be a command such as “stand clear” from the arborist operating the chain saw and a response such as “all clear” from the workers supporting the removal operation. Pre-arranged, two-way hand signals may also be used. Only designated persons shall give such signals. All workers in the vicinity shall be out of range when the tree or trunk falls. Visual contact should be maintained with the tree or trunk until it is on the ground.

Hazards to the public

When drop zones/landing zones interfere with pedestrian and/or vehicular traffic, appropriate preventative measures must be taken to protect the public. Keep in mind that young children or pets may not be able to read signs or understand the meaning of traffic cones.

Where brush may fall upon or be carried across a sidewalk, signs SHALL be placed on either side of the work area so as to close off the sidewalk to pedestrians. In such cases, it may be necessary to assign a crew member to assist pedestrians around the work site.

References

OSHA Standards and Guidance

1910.266 - *Logging Operations.*

OSHA Directive number CPL 02-01-045, effective 8/21/2008, *Citation Guidance Related to Tree Care and Tree Removal Operations*

ANSI Z133.1-2006, *American National Standard for Arboricultural Operations – Safety Requirements.* Secretariat: International Society of Arboriculture, PO Box 3129, Champaign, IL 61826-3129.

Through the OSHA and Tree Care Industry Association (TCIA) Alliance, TCIA developed this Fact Sheet for informational purposes only. It does not necessarily reflect the official views of OSHA or the U.S. Department of Labor. (Aug. 2010)