Chapter 31
Tree Maintenance and Removal

31-1. References.

a. ANSI/International Society of Arboriculture (ISA) Z133, American National Standard for Arboricultural Operations – Safety Requirements (https://wwv.isa-arbor.com/store/shop) (31-1.a)

b. ANSI/SAIA A92.2, Vehicle-Mounted Elevating and Rotating Aerial Devices (https://shop.saiaonline.org) (31-1.b)

c. ANSI/Tree Care Industry Association (TCIA) A300, American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Management – Standard Practices (https://www.tcia.org/TCIA/SHOP/Shop_Products/TCIA/Shop/Shop_Products.aspx?hkey=bf11ffce-3697-4665-9760-9f2d37127c9c) (31-1.c)

d. 29 CFR 1910.266, Logging Operations (https://www.govinfo.gov/content/pkg/CFR-2022-title29-vol5/pdf/CFR-2022-title29-vol5-sec1910-266.pdf) (31-1.a)

e. 29 CFR 1910.269, Electric Power Generation, Transmission, and Distribution (https://www.govinfo.gov/content/pkg/CFR-2022-title29-vol5/pdf/CFR-2022-title29-vol5-sec1910-269.pdf) (31-1.e)

31-2. Definitions.

a. Arborist. A professional in the practice of arboriculture, which is the cultivation, management, and study of individual trees, shrubs, vines, and other perennial plants. Arborists generally focus on the health and safety of individual plants and trees. Arborists typically climb trees using ropes and have special training in this type of climbing. (31-2.a)

b. Barber Chair. A circumstance where a tree trunk splits vertically while it is being cut down. (31-2.b)

c. Bucking. The act of sawing a felled tree or limbs into smaller sections. (31-2.c)

d. Conventional Notch. A directional felling notch cut into the tree on the same side that the tree is to fall. The notch starts with a horizontal cut approximately one third the tree's diameter. The second cut is sawed at a 45-degree angle from a height of 2.5 inches (6.4 cm) per 1 foot (0.3 m) of diameter above the base of the notch. (31-2.d)

e. False Crotch. A pulley, block, sling, lashing, or metal ring affixed to a tree's leader or limb, through which a load line is passed to raise or lower limbs or equipment. (31-2.e)

f. Gaffs. Spurs used to assist in climbing utility poles or trees. (31-2.f)

g. Humboldt Notch. A directional felling notch cut into the side of a tree. The completed notch faces the intended direction of fall and consists of a horizontal face cut and an angled cut below it, creating a notch of approximately 45-degrees. A Humboldt notch is usually reserved for larger trees on steep slopes. (31-2.g)

h. Leader. The upper portion of the primary axis of a tree. (31-2.h)

i. Limbing. To cut limbs from a tree trunk. (31-2.i)

j. Open-Faced Notch. Two sequential cuts into the side of a tree that results in either a conventional notch or Humboldt notch. (31-2.j)

k. Qualified Line-Clearance Tree Trimmer. A tree worker who, through related training and on the-job experience, is familiar with the line-clearance hazards and has demonstrated ability in the performance of the special techniques involved. (31-2.k)

l. Qualified Line-Clearance Tree Trimmer Trainee. Any worker undergoing line-clearance tree trimming training who, in the course of such training, is familiar with line-clearance hazards and has demonstrated ability in the performance of the special techniques involved. (31-2.l)

m. Qualified Tree Worker. An individual who, through related training and on-the-job experience, is familiar with the equipment, techniques, and hazards of tree maintenance and removal and has demonstrated ability in the performance of the special techniques involved. (31-2.m)

n. Tied In. When a tree climber's climbing line has been properly crotched and attached to the saddle and taut-line hitch is tied. (31-2.n)

31-3. Personnel Required Qualification/Training.

a. Employees must be instructed in the safe and proper use of all equipment provided to them according to the manufacturer's instructions. (31-3.a)

b. Tree climbers must be medically cleared for unlimited tree climbing every two years by a Health Care Provider (see chapter 3). The examination must identify predisposing factors and mitigation measures for prior heat/cold injuries, address the ability to work on uneven surfaces at heights, and identify any allergies to expected environmental allergens. Additionally, it must address medical conditions and the use of medications that could affect balance, the ability to communicate with others, level of

consciousness, extremity sensation, fine motor movement, and gross motor movement, and the ability to physically lift or lower oneself. (31-3.b)

c. Qualified line-clearance tree trimmers must be trained and qualified by the employer according to 29 CFR 1910.269. (31-3.c)

d. Employees using brush chippers must be trained according to the manufacturer's instructions to include safe operation procedures. (31-3.d)

e. The services of other licensed or credentialed professionals may be necessary to properly address the required maintenance to be performed and/or hazards that may be encountered. Examples of credentialed professionals include but are not limited to: Certified Arborist, Licensed Tree Expert, Certified Tree Care Safety Professional, Certified Crane Operator, Rigger, or Certified Utility Safety Professional. (31-3.e)

f. Employers of workers using chainsaws, see paragraph 13-3.c. (31-3.f)

31-4. Roles and Responsibilities. Qualified Tree Worker.

a. Develop a Tree Maintenance and Removal Plan according to paragraph 31-7. (31-4.a)

b. Conduct inspections according to paragraph 31-5. (31-4.b)

c. Identify and verify all safety precautions have been met prior to commencement of work. (31-4.c)

31-5. Inspection Requirements.

a. Test electrically rated aerial devices with approved test methods and equipment according to ANSI/SAIA A92.2, annually. (31-5.a)

b. Inspect, maintain, repair, and use equipment according to the manufacturers' instructions. (31-5.b)

c. Prior to beginning tree maintenance and/or removal activities, a Qualified Tree Worker must inspect the tree and surrounding areas to include the following: (31-5.c)

(1) Tree hazards, including the following:

(a) Tree hangers.

(b) Broken, loose., or dead branches or tops.

(c) Entanglement with adjacent or downed trees.

(d) Shape and lean of the tree.

(e) Tree damage from wind, lightning, or disease.

(f) Vines or interlocking limbs.

(g) Species of the tree, bees, or other wildlife habitation

(h) Root mass stability.

(i) Ice or snow load.

(j) Throw-back or bounce-back potential.

(k) Lodged trees or dead snags.

(l) Barber chair potential.

(m) Foreign objects (for example, nails, wire fence, concrete).

(2) Location of obstacles and adjacent structures, including septic lines, tanks, and other potential at-grade or below grade utilities that could be impacted.

(3) Environmental hazards, including weather conditions (for example, wind force and direction), poisonous plants, water.

(4) Overhead hazards, including electrical lines, conductors, or other wires.

(5) Potential for flying debris from tree impact.

31-6. Activity Hazard Analysis (AHA) Requirements.
Develop AHAs according to paragraphs 1-6 or 2-6, as applicable.

31-7. Minimum Plan Requirements.
Tree Maintenance and Removal Plan. A Tree Maintenance and Removal Plan is required when tree maintenance and/or removal activities are performed. The plan must be developed by and under the direction of a Qualified Tree Worker and include the following. Submit plans to the USACE supervisor for approval or to the KO or COR for acceptance prior to performing work.

a. Detailed description of the activity being performed, including the tools, resources, and PPE required. (31-7.a)

(1) For tree felling/removal, include the identification of tree sizes, selected direction of fall, and landing zone.

(2) For tree climbing, identify climbing techniques and equipment to be used.

b. Description of anticipated hazards or concerns, include size and terrain characteristics or limitations of the work area. (31-7.b)

c. Assignment of personnel and their roles and responsibilities. Include necessary information to support qualification/training of such persons. (See para 31-3) (31-7.c)

d. Identification of a retreat path. (31-7.d)

e. Access control to the work site. (31-7.e)

f. Inspection and oversight methods to ensure adherence to the plan. (31-7.f)

31-8. General Requirements.

a. Personal Protective Equipment (PPE). PPE, as outlined in this chapter, is required when there is a reasonable probability of injury or illness that can be prevented by such protection. (31-8.a)

(1) Wear a hardhat and eye protection during all tree maintenance and removal operations.

(2) Additional PPE for chainsaw use includes protective leg chaps made of cut-resistant material, safety boots, and hearing protection.

(3) When flush cutting stumps with a chainsaw, everyone assisting the chainsaw operator must wear the same level of PPE that is required of the chainsaw operator.

(4) Refer to chapter 5 for additional PPE requirements.

b. Working Near Electrical Equipment and Systems. Before tree maintenance or removal activities begin, a Qualified Tree worker must make visual inspection to determine whether any electrical hazards exist. (31-8.b)

(1) Employees must consider all electrical equipment or conductors in the proximity of the work to be energized. If electrical lines or equipment cannot be safely avoided, make arrangements with the power company to mitigate the electrical hazard. Mitigation options should include the power company de-energizing, testing, isolating, and grounding the electrical conductors as well as following all OSHA-compliant and practical work methods. The Qualified Tree Worker and designated power company representative must confirm that protective ground(s) have been installed as close to the work to be performed to prevent hazardous differences in electric potential.

(2) When electrical equipment and conductors cannot be de-energized, only a Qualified Line-Clearance Tree Trimmer or Line-Clearance Trainee under the direct supervision of a Qualified Person, Electrical may be assigned to work in close proximity to electrical hazards. See chapter 11 and 29 CFR 1910.269 for additional electrical safety requirements.

(3) A second Qualified Line-Clearance Tree Trimmer/Trainee must be aloft and within normal voice communication range during the clearing operations whenever the following conditions exist:

(a) When the Qualified Line-Clearance Tree Trimmer/Trainee must approach any closer than 10 feet (3 m) to any conductor or electrical apparatus energized in excess of 750 volts.

(b) When branches or limbs being removed cannot first be cut (with a pole pruner or pole saw) sufficiently clear of the equipment or conductors so as to avoid contact.

(c) When roping is required to remove branches or limbs from electrical equipment or conductors.

(4) Qualified Line-Clearance Tree Trimmers/Trainees must maintain the distances from energized conductors according to table 11-3. All other tree workers must maintain a minimum separation distance of 10 feet (3 m) or greater according to table 11-4.

(5) Aerial devices that are electrically rated above the electrical voltages of adjacent power lines are exempt from the 10 feet (3 m) rule and can follow table 11-3 if operators, in addition to being Qualified Line-Clearance Tree Trimmers/Trainees, have been electrically qualified (see chapter 11). Inform operators that insulated aerial devices do not protect them from other potentially fatal electric paths to the ground, such as paths through trees, guy wires, or from phase-to- phase contact.

c. Tools. (31-8.c)

(1) Use tool handles when raising and lowering tools.

(2) Carry tools used for cabling, bark tracing, cavity work, etc. in a bag, belt, or sheath designed to hold tools. Do not put tools in clothing pockets or stick in the top of a boot.

d. Elevating Aerial Work Platforms (AWPs). Provide AWPs with fall protection anchor(s) meeting design requirements of ANSI/SAIA A92.2 to secure approved personal fall protection system(s) (for example, full body harness with an energy-absorbing lanyard). All occupants of the AWP must utilize personal fall protection systems whenever aloft. (31-8.d)

(1) The AWP occupants may use a climber's belt and lanyard in place of a full body harness to transfer from the AWP to the tree. The employee must be secured to the tree prior to removing the lanyard attached to the basket. Do not perform any work while secured to both the tree and the basket.

(2) Refer to chapter 21 for additional fall protection requirements.

e. Tree Climbing. (31-8.e)

(1) When tree climbing is performed, persons must not work alone. A secondary climber, who could assist in rescue, if necessary, must be immediately available.

(2) Tree Climbing Techniques. Climbers may apply a variety of climbing techniques. Identify climbing techniques to be used in the Tree Maintenance and Removal Plan according to paragraph 31-7.

(3) Do not use rope access unless other means of accessing the tree or undertaking the work, such as aerial devices or pole saws, are not practical. See chapter 23 for rope access requirements.

(4) Climbers must not ascend above their tie-in point. Locate tie-in points well above the climber to prevent an uncontrolled pendulum swing in the event of a slip.

(5) Climbers must tie-off at two points while working or using a chainsaw. This includes attaching the primary support with the access line or climbing line and the secondary support with a second climbing line or the flip line/lanyard/buck strap.

(a) Climbers may ascend or descend solely by the access line by using approved single rope techniques.

(b) Once the climber is at the tie-in point, they must install a secure climbing system.

(c) The climber must establish a new tie-in point before disconnecting from the access line.

(6) Use of the three-point contact climbing is recommended, if possible. Climbers may use ground personnel to help them up the tree.

(7) Climbers must have a climbing line and at least one other means of being secured on their person at all times (for example, climbing line and a work positioning lanyard).

(a) Climbers must be tied in with an approved type of climbing line and safety saddle while ascending the tree, including when using climbing spurs or gaffs.

(b) Climbers must be tied in once the work begins and remain tied in until the work is completed and they have returned to the ground.

(c) Climber must be secured when repositioning the climbing line.

(d) Climbers may not perform work while standing on a ladder unless they are properly tied in or secured.

(e) Safety, secondary, belay or back-up line(s) must not be used alone for tree climbing. The use of a secondary line (safety line) may pose additional risks and increased difficulties. Careful consideration to the impact of secondary line use should be considered before making a decision on use in tree climbing operations.

(8) To prevent any binding of the safety line, locate the climbing line as high above the ground as possible and pass it around the trunk of the tree using branches with a wide crotch. The selected crotch should be located as close as possible to directly above the work area and in such a way that a slip or fall would swing the climber away from any electrical conductor. Pass the line around the main leader or an upright branch, using the limb as a stop. Keep feet, hands, and ropes out of tight V-shaped crotches.

Note. Exception: Palms and other trees with similar growth characteristics that will not allow a climbing line to move freely.

(9) Climbers must tie a stopper knot (for example, figure-eight knot) in the end of the line to prevent accidentally pulling the climbing line through the climbing hitch and possibly falling. The stopper knot is critical when climbers work at heights greater than half the length of the climbing line.

(10) If it is necessary to re-crotch the climbing line in the tree, the climbers must re-tie in or use the safety strap before releasing the previous tie.

(11) Climbers working from a stem or spar without a suitable natural crotch must select tie-in points or a tie-in method that positively prevents the climbing line from sliding down, up, or off the stem.

(12) Do not place a climbing line around a stem in an area without a lateral limb unless the climbing line is cinched or choked around the stem or runs through a double-wrapped or adjustable false crotch that is also is secured or cinched around the stem.

(13) The selected tie-in point must be able to withstand the forces being applied during pruning and removal operations.

(14) Climbers must not carry tools in their hands while climbing, except during topping or removing operations. Use a line to raise and lower chainsaws and tools one at a time.

(15) Climbers must carry a hand saw. When carried aloft, secure the hand saw in a scabbard attached to the climbing saddle.

(16) Do not climb dead or dying trees unless there are no safer and more feasible alternatives to removing the trees. Do not use dead branches to support weight. If possible, break off dead branches on the way up while placing hands and feet on separate limbs.

(17) Do not climb live trees with spurs when pruning or otherwise maintaining them unless done according to ANSI/TCIA A300 tree care management standards.

(18) Gaff lengths must be suitable for the tree being climbed. For thick bark trees use spurs with longer gaffs, such as 2¾ inches (7 cm). Gaff lengths of 1¾ inches (4.4 cm) are intended only for pole climbing.

(19) Whenever possible, remove debris and other objects from beneath the climber.

f. Felling. (31-8.f)

(1) Prior to felling operations, clear the work area to permit safe working conditions and plan an escape route. Ensure that homes and structures are evacuated where trimming and felling operations are in close proximity.

(2) Establish felling paths that are at least twice as long as the height of the tree to account for limbs and debris being thrown after hitting the ground. Where this distance cannot be secured or maintained, limbing may be required. Drop or deenergize power lines when necessary.

(3) Instruct workers on the exact tasks to be performed. Workers not directly involved in the operation must keep clear of the work area.

(4) Before starting to cut, the chainsaw operators must secure their footing and clear away brush, fallen trees and other materials that might interfere with cutting operations.

(5) When felling trees over 5 inches (12.7 cm) in diameter (measured at breast height), use a notch and back cut. Do not fell trees with “slicing” or “ripping” cuts.

(a) Do not cut through the apex (that is, the point where two cuts that form the notch meet).

(b) Use only a conventional notch, an open-face notch, or a Humboldt notch.

(c) Notches must be 45-degrees or greater for conventional and Humboldt notches, 70-degrees or greater for open-face notches and large enough to guide the fall of the tree or trunk.

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

(e) The hinge width should be 80 percent of the tree's diameter, as measured at the hinge.

(f) When saw cuts are made to form the notch and back cut, leave suitable amounts of hinge wood to adequately control the directional fall of the tree.

(g) With a conventional notch or Humboldt notch, the back cut must be 1 to 2 inches (2.5 to 5.1 cm) above the apex of the notch to provide an adequate platform to prevent kickback of the tree or trunk. With an open-face notch, the back cut should be at the same level as the apex of the notch.

(6) If sections of the tree are to be removed, limit section lengths to one-third the distance to the nearest structure (for example, if the tree is 30 feet (9.1 m) from the structure, sections must be no more than 10 feet (3 m) long).

Note. The chainsaw operators must use discretion. In some instances, it will be safer to fell a large trunk away from the structure rather than to remove it in small sections, especially where the tree has grown very close to the structure. Use a tag line and the appropriately placed notch and back cut to guide the direction of the fall.

(7) The chainsaw operator must work from the uphill side whenever possible. When tag lines are used to help guide the direction of the fall, the workers on the tag line must be well clear of the fall path, at least twice the distance of the fall area.

(8) Just before the tree or limb is ready to fall, give an audible warning to all those in the area. All persons must be safely out of range when the tree falls.

(9) If there is danger that a tree may fall in the wrong direction or damage property, use wedges, block and tackle, rope, or wire cable (except when an electrical hazard exists). Remove all limbs from trees to a height and width sufficient to allow the tree to fall clear of any wires and other objects in the vicinity.

(10) Take special precautions when roping rotten or split trees due to the potential for falling in an unexpected direction even when the cut is made on the proper side.

(11) Workers must move away and keep back from the butt of a tree that is starting to fall.

g. Brush Removal and Chipping. (31-8.g)

(1) Keep sites clear of brush and logs so no hazards are created at the work site.

(2) Brush Chippers.

(a) Operate and maintain brush chippers according to the manufacturer's instructions. All employees using brush chippers must be trained according to paragraph 31-3.

(b) Where rotary drum and disk-type tree or brush chippers are not equipped with a mechanical infeed system, install an in-feed hopper not less than 85 inches (216 cm) long and a flexible anti-kickback device on the in-feed hopper. These additional devices will protect the operator and other persons in the machine area from the hazards of flying chips and debris. The length for the in feed-hopper is the sum of the horizontal distance from the chipper blade out along the center of the chute to the end of the chute plus the vertical distance from the chute down to the ground.

(c) Where disk-type tree or brush chippers are equipped with a mechanical in-feed system, install a quick stop and reversing device on the in-feed. Locate the activating mechanism for the quick stop and reversing device across from the top, along each side of, and as close as possible to the feed end of the in-feed hopper and within easy reach of the operator.

(d) The feed chute or feed table of a chipper must have sufficient height on its side members to prevent operator contact with the blades or knives during normal operation.

(e) Brush chippers must be equipped with a discharge chute of sufficient length or design to prevent contact with the blade.

(f) Brush chippers must be equipped with a locking device on the ignition system to prevent unauthorized starting of the equipment.

(g) Keep brush chipper cutting bars and blades sharp, properly adjusted, and otherwise maintained according to the manufacturer's recommendations.

(h) Chock or otherwise secure trailer brush chippers detached from trucks.

(i) All workers feeding brush into chippers must wear eye protection. Workers must not wear loose clothing, gauntlet-type gloves, rings, or watches.

(j) Never place hands, arms, feet, legs, or any other part of the body on the feed table when the chipper is in operation or the rotor is turning. Use push-sticks that can be consumed by the brush chipper or long branches to feed material into the chipper.

(k) Feed brush chippers from the side of the centerline. The operator must immediately turn away from the feed table when the brush is taken into the rotor. On roadways, feed chippers from the curbside whenever possible.

(l) Do not feed material such as stones, nails, sweepings, etc. into brush chippers.

(m) Do not raise or remove the brush chipper discharge chute or cutter housing cover while any part of the chipper is turning or moving.

h. Other Operations and Equipment. (31-8.h)

(1) Pruning and Trimming.

(a) Pole pruners, pole saws, and similar tools must have wood or nonmetallic poles. Actuating cords must be of a non-conducting material.

(b) Before limbs are dropped, give an audible warning.

(c) Attach a separate lowering or rigging line to limbs that cannot be safely dropped or are too heavy to be controlled by hand. Control the lowering or rigging line from the ground unless safer from up the tree. Avoid using the same crotch for both the climbing line and the lowering or rigging line.

(d) Do not use ropes/climbing lines to lower limbs or other parts of trees or to raise or lower equipment, with the exception of hand tools.

(e) When handling limb removal ropes, ground personnel must not wrap the rope around their hands or waist and keep the rope away from their feet to prevent entanglement.

(f) Do not leave cut branches overnight in trees.

(g) Install a service line for operations lasting overnight. Use the service line to bring the climbing line back into position at the start of the next day's work.

(h) When not in use, carry each handsaw in a scabbard or sheath that is hooked to the climbing belt.

(i) When not in use, securely hang pole pruners and pole saws in a vertical position with the sharp edges away from employees. Do not hang on utility wires or cables or leave overnight in trees.

(2) Limbing and Bucking.

(a) When more than one worker is limbing or bucking the same tree, organize the tasks and position them so that the actions of one worker will not create a hazard for any other worker.

(b) Consider all branches bent under tension as hazardous.

(c) Operate chainsaws with the bar outside of the legs and never make cuts between the legs. Whenever possible, keep the tree limb or similar barrier between yourself and the saw blade, while ensuring proper balance. The preferred working position is from the uphill side of the work on the opposite side of the tree trunk.

(d) Block the trunk or logs to prevent rolling, when necessary. Before bucking or limbing wind-thrown trees, take precautions to prevent the root ball or butt log from striking a worker.

(e) When bucking, use wedges, as necessary, to prevent binding of the guide bar or chain.

(f) Workers must have stable footing and stand in a balanced position that allows freedom of movement before and during limbing and bucking. Do not stand on loose chunks or logs that could roll when a cut is completed.

(3) Stump Removal. Equip stump cutters with enclosures or guards that effectively protect the operator.

(4) Cabling.

(a) Bring branches together to the desired distance by means of a block and tackle, a hand winch, a rope, or a rope with a come-along.

(b) No more than two persons may be in a tree when installing cables.

(c) If an old cable system is being replaced, the old system must not be removed until after the new system is installed.

(d) When the block and tackle is released, workers in trees must position themselves off to one side in order to avoid injury in case the lag hooks pull out under the strain.

(e) Ground persons must not stand under the tree when cable is being installed.

(5) Topping/Lowering Limbs.

(a) When topping a tree, determine whether the tree and individual branches can support the strain of the topping procedures. If the stresses are too great, then use some other means to lower the branches.

(b) If large limbs are lowered in sections, the worker in the tree must be above the limb being lowered.

(6) Trucks.

(a) Provide a steel bulkhead (or equivalent) to protect the occupants of vehicles from load shifts.

(b) Logs or brush must be securely loaded onto trucks to ensure the running, brake, and head lights are not obscured, the driver has a full view out the windshield and side windows, and the load does not overhang the sides.

(c) Do not store wood chips in trucks or trailers for extended periods to avoid spontaneous combustion or the production of undesirable byproducts from piled wood chips.

(7) Power Saws.

(a) Secure chainsaws from falling. Climbers may attach chainsaws weighing less than 15 lbs. (6.8 kg) to themselves by means of a saw lanyard. When more than 15 lbs. (6.8 kg), support by a separate line crotched in the tree. Use a false crotch where there are no lateral branches on which to crotch a separate support line.

(b) Do not use corded electrical power saws or other corded electric tools in the vicinity of overhead power lines. Hydraulic or electric power saws may be used.

(c) Do not run chainsaws while ascending, descending, or moving any considerable lateral distance in the tree.

(d) Refer to chapter 13 for additional chainsaw requirements.

(8) Chopping Tools.

(a) Do not use chopping tools that have loose or cracked heads or splintered handles.

(b) Never use chopping tools while working aloft.

(c) Swing chopping tools away from the feet, legs, and body, using the minimum power practical for control.