SECTION 614
PRUNING, IMPROVING AND REMOVING EXISTING VEGETATION

I. General
For any question regarding the intended use of these items, contact the Regional Landscape Architect or Designer.

Review contract documents to determine if special notes apply. Check the “Hand-off Memo” (the transfer of project information to Construction, HDM Chapter 21, a.k.a. Notes to EIC) to see if the Designer has included additional information on the objectives for Section 614 pay items.

The Contractor shall coordinate with all utilities as necessary (§107-07).

The following discussions of DBH and stump treatment provide information needed to complete inspection for Section 614 pay items.

DBH – Diameter at Breast Height
DBH is a standard method of expressing the diameter of the trunk of a standing tree. DBH is the outside bark diameter at breast height. Breast height is defined as four and a half (4.5) feet above the ground on the uphill side of the tree. For the purposes of determining breast height, the ground includes the leaf layer that may be present, but does not include loose woody debris that may rise above the ground line.

The two most common instruments used to measure DBH are a D-tape (diameter or girthing tape) and calipers.

Measuring diameter using a D-tape: Stand next to the trunk of the tree and measure at four and a half feet (4.5 ft.) above ground. Wrap the diameter tape around trunk and make sure tape is level. Record the DBH as taken from the “diameter” side of the tape.

Figure 1: Example of a D-tape's front and back sides.

Figure 2: Make sure to measure DBH at four and a half (4.5) feet from ground level.

Figure 3: For an accurate measurement ensure the D-tape is taut and level.
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The caliper is a measuring tool that looks like the letter "F", with increments on the long arm of the tool. One of the cross arms slides across the long arm to measure the diameter of the tree. The caliper tool is opened wide and placed up to the tree trunk, and the cross arm is slid closed until it rests snugly against the bark. A tree is rarely symmetrical in cross section, so in order to obtain a more accurate measurement; the inspector should take three (3) measurements moving around the circumference of the tree and average them.

Figure 4 : Caliper for measuring tree size

Figure 5: Electronic caliper

Factors that affect DBH measurement

- **If there is some irregularity about the tree**, such as a protruding knot or ring of knots, swelling, or other deformity then DBH must be taken at another point. Generally, the point of measurement is moved higher on the tree trunk, to a point where the deformity is no longer affecting the measurement or estimate of DBH.

- **Tree has branches or bumps which interfere with DBH measurement.** Measure DBH below the branch or bump.

- **Tree leans.** Measure four and a half feet (4.5 ft) up the stem in the direction of the lean.

- **Tree forks AT four and a half feet (4.5 ft.) height.** The measurement is recorded at the narrowest part of the main stem below the fork. The height of the DBH measurement AND the fork should be noted on the DWR for record keeping purposes.
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- Tree forks BELOW four and a half feet (4.5 ft.). Measure each fork individually at 4.5 feet and treat each as a separate pay item.

- Tree forks ABOVE four and a half feet (4.5 ft.). Measure the tree as a whole at 4.5 feet.

- Tree splits into several trunks close to ground level. Measure DBH of each trunk separately at four and a half feet (4.5 ft.).

Tree Removal Equipment
Tree removals may include the use of chain saws, skidders, forwarders, chippers or other tree removal equipment.

Stump Treatment
- **Stumps Cut to Above Grade**
  The phrase “Stumps cut to above grade” is usually applied to trees in wooded areas. Stumps are typically cut to six (6) inches above grade. However, the contract documents may specify a different height or leave the stump “as is” for use as wildlife trees.

- **Stumps Cut Flush**
  Cut flush is an approximation and can be difficult to achieve on large trees. The intent is to leave nothing hazardous in the rights-of-way that could be struck or caught by a vehicle. A “flush” cut stump shall be cut as close to the surface of the surrounding soil as practicable, but no more than two (2) inches above the surrounding terrain.
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Figure 6: Stump cut reasonably flush

- **Stumps Cut to Below Grade**
  “Cut to below grade” typically requires stump grinding and the default depth is six (6) inches below grade. This treatment is used where it is desirable to leave the roots for soil stability, where it is not cost effective to remove the entire stump and/or where visible stumps will detract from the landscape aesthetic.

- **Stumps Grubbed**
  “Grubbed” applies to areas where heavy equipment can be used to do the stump removal and all tree parts are excavated. This type of removal is recommended when:
  - the site’s proposed use is roadway pavement,
  - grading is required
  - it’s cheaper to grub than to grind.

Safety Message: In general, bleach, pesticides and compost meet strict guidelines set forth by Federal and State Agencies. It is important for users to read all instructions and abide by safety precautions listed on the product label and SDS (Safety Data Sheet) to avoid complications. At a minimum, wash your hands with soapy water after handling or applying the product(s). Users should avoid inhaling or ingesting the product(s), and limit exposure to skin, eyes and clothing. The product(s) should be stored in a cool, dry area in a closed container, kept away from food storage areas and out of reach of children.
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II. CARE OF TREES – PRUNING (614.04xy)
The most common reasons for pruning are safety, plant health, appearance, structural integrity, storm or physical damage, and maintenance of views. Pruning can remove hazards to transportation users. Pruning items are often included when construction activities are anticipated to damage existing trees and shrubs that are scheduled to remain.

When the Care of Trees - Pruning item is used on a contract in which Section 201, Clearing and Grubbing, also appears, the removal of branches interfering with clearance over the roadway or sight distance, as well as the removal of branches which have been broken or injured during construction, should be accomplished under Section 201, Clearing and Grubbing, and not included under Item 614.01, Care of Trees.

Do not prune unless there is a good reason to do so. Random pruning cuts can lead to the injury or death, rather than encouraging the intended growth or healing, and can create future hazardous trees.

Accepted Tree Climbing Methods means safe methods that will not cause injury or spread diseases to tree. (e.g. no climbing spurs)

Tools and Methods
Tools and methods shall be in accordance with the specification and ANSI A300. Do not allow other pruning methods. Examples of pruning methods not allowed include “anvil” pruning shears, “brush hogs”, rotary brush cutters, over the rail cutters, etc.

Figure 8: Tree climbing spurs such as those shown in the picture are not allowed. Note also the work boots appear to have a build up of sap and debris. Photo from bangordailynews.com

Tree climbing spurs can cause damage to the tree, allowing insects and disease to attack.
The cutting surfaces of all tools and all other objects (soles of workers shoes, ropes, etc.) shall be disinfected before the start of any work on a tree. A 2% bleach solution is required by the specifications, to prevent the spread of plant diseases. Look for clean blades with no build up of sap or debris.

![Bleach bottle](image)

**Figure 10:** Disinfecting tools before work begins. Photo from hgtv.com

A 2% bleach solution is a mild disinfectant. Chlorine and Chlorine Compounds have a broad spectrum of antimicrobial activity, do not leave toxic residues, are unaffected by water hardness, are inexpensive and fast acting, and have a low incidence of serious toxicity.

**Safety Notes:** CAUTION: When working with bleach, at a minimum, wear the appropriate PPE (Personal Protective Equipment) and use in a well ventilated area. The concentration used in household bleach (5.25-6.15%) may cause burns of the mouth, throat and gastro-intestinal tract if swallowed. Inhaled vapors may also be harmful (bleach can give off toxic chlorine gas fumes which can be deadly). If contact or splash back occurs, bleach may also burn eyes or skin.

**NEVER mix bleach with any of the following:** ammonia, some cleaners, rust removers, lye, or vinegar.

The Contractor may propose to use another mild disinfectant. Carefully read the SDS sheets and the Manufacturer’s label (of the proposed material) to ensure the product is appropriate for the intended use and applied efficiently.

**Pruning**

ANSI A300 Part 1 Standard Practices is the Department’s reference for pruning practices.

Growth habit of the tree species means the natural "habit" or shape of that particular tree. The specification is referring to the general mode of plant growth. Growth habit is used to describe the overall shape of a tree.

Do not allow pruning to occur within the branch bark ridge or branch collar; refer to ANSI A300 Part 1 (Branch Attachment)
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Figure 11: A Branch Bark Ridge is the raised strip of bark at the top of a branch where it joins the trunk. This zone stops the natural decay of the dead/diseased branch from extending into the tree trunk.
traversotree.com (Photo by Gary R. Johnson)

Figure 12: Note that the overall shape or growth habit of this tree is single leader/stem and a generally upright pattern of branches. When pruning the dead branches from the left side of the tree the Inspector should expect to see the right side of the tree pruned also to result in a naturally shaped tree.

Figure 13: A woody branch collar appears as a swollen area where the branch joins the trunk. Leaving the branch collar promotes healing. (Photo by T. Hale)

Inspection

- Check that the diameter field measurement of the trees to be pruned corresponds to the contract documents (field measured at 4.5 ft. above the ground (DBH)).

- Verify that cutting surfaces of all tools, all other objects (soles of workers shoes, ropes, etc.) and all equipment coming into contact with the trees are disinfected and dried before the start of any work.

- Ensure that pruning tools, methods and objectives are in accordance with ANSI A300 Part 1 Standard Practices. Check that cuts were cleanly made with sharp tools.

- Ensure that the Contractor takes reasonable care to avoid damage to newly established and existing vegetation.
III. IMPROVEMENT OF VEGETATED AREAS (614.05)

The work for this item will be described in the contract documents by special note. This information is the base information for the marking requirements.

§614-3.02 calls for the vegetation to be removed to be designated by "separate marking" or "marking sample areas". Marking can be by painting or flagging the individual trees or shrubs or by marking off the area to be treated. If the marking or sample areas were completed by the Designers before the contract was advertised for bidding, all areas should be verified prior to the commencement of work.

Stumps shall be cut six inches (6") above the ground unless otherwise specified. Begin the measurement from the ground surface and do not measure from the top of a root flare.

Unless otherwise specified in the contract documents, an approved herbicide shall be applied to all live stumps. The herbicide shall meet the requirements of §713-13 Pesticides and shall be applied according to the manufacturer’s recommendations. When an herbicide is delivered, it shall be accompanied by a Bill of Lading stating the quantity.

Verify that the material:
- has been supplied in the manufacturer's standard containers,
- the containers are marked with:
  - the name of the material,
  - the name of the manufacturer,
  - the net quantity contained therein, and
- meets all the other requirements of the specifications.

An approved dye in this context means one that is compatible for use with the herbicide and meant for marking vegetation. The dye makes it easier to tell which stumps have received the application. The dyes may be various colors. The herbicide inhibits sprouting and is usually applied at the time of cutting. Refer to the product labeling.

Figure 14: Small stumps treated with herbicide; the entire cut surface should be saturated.
theadventitiousroot.blogspot.com
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Figure 15: Larger tree stump with outer cambial layer treated with herbicide.

The method of herbicide application may vary according to the size of the stump. Follow the manufacturer’s label for application instructions.

**Inspection**

- Review the contract documents for a description of the work required (e.g.: all poison ivy to be removed from designated area(s)).

- Ensure that individual plants, work area(s) or sample area(s) are clearly designated.

- Verify that the area has been satisfactorily treated as per the contract documents.

- Verify that the Contractor has removed or treated any stumps as per the specifications.

- When stump removal is specified:
  - Verify that the Contractor has backfilled the stump hole(s) with topsoil, unless otherwise specified in the contract documents. The topsoil type shall be as specified in the contract documents.
  - Verify that the Contractor has compacted and graded the backfill.

- Verify that the Contractor has established turf or applied alternative surface treatments, as specified. Turf establishment is paid for separately.

- Ensure that any plants to remain that are damaged are repaired in accordance w/ ANSI A300 Standard Practices Pruning & ANSI Z133.1 Arboricultural Operations Safety.

**IV. TREE REMOVAL (614.06xynn)**

Trees shown in the contract documents or listed for removal must be approved by the EIC prior to cutting. The Contractor field measures all trees for removal before they are cut. The Department uses these measurements to field check tree removal items. Any discrepancies should be resolved by the EIC prior to tree removal. Some trees may have grown and moved from one size range to another since the initial survey.

Trees less than four inches (4") in size will be paid under Clearing and Grubbing.
Tree removal is a dangerous operation. Unnecessary personnel; including inspection staff should be completely out of the work area.

Figure 16: Tree Removal with chain saw. Note operator wearing PPE. www.picturenation.co.uk

The last two digits of the pay item indicate the stump treatment for each tree removed under this item. Four options are available:

- 01 – stumps cut to above grade
- 02 – stumps cut flush
- 03 – stumps cut to 6 inches below grade
- 04 – stumps grubbed

Ruts, or stump holes, should be backfilled with topsoil and compacted, unless special notes in the contract documents indicate a different treatment. Topsoil is included in the tree removal pay item.

Grass is typically established on the stump holes but the contract documents could specify another treatment. Turf establishment is paid for separately.

Definitions
Felling is the process of downing individual trees. The Contractor may hand fell, chainsaw or use a mechanized method.

Topping reduces the tree size by cutting the upper portion of a standing tree. This limits the area of impact of the felling operation.

Limbing means cutting branches off downed or standing trees.
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Inspection

- Verify that the trees to be removed have been field measured at four and a half feet (4.5 ft.) above the ground (DBH) and that this information is verified by the EIC.

- Check that the field measurement of the trees to be removed corresponds to the contract documents. Any discrepancies should be referred to the EIC for resolution prior to tree removal work.

- Check that trees have been topped & limbed prior to felling, unless the Contractor has approval from the EIC for another method of removal.

- Ensure that any plants to remain that are damaged are repaired in accordance w/ ANSI A300 Standard Practices Pruning & ANSI Z133.1 Arboricultural Operations Safety.

- Verify that the Contractor has removed or treated the stump.

- Verify that the Contractor has backfilled the stump hole with topsoil, unless otherwise specified in the contract documents. Topsoil type shall be as specified in contract documents.

- Verify that the Contractor has compacted and graded the stump hole and that turf has been established, unless otherwise specified. Turf establishment is paid for separately.

V. PRE-EXISTING STUMP REMOVAL (614.070x)

Stumps include all roots and wood visible above grade.

Stumps shall be ground to six inches (6") below grade unless otherwise indicated in the contract documents. Notes in the contract document may require the stump to be grubbed. This work would be part of the pay item.

Ruts, or stump holes, should be backfilled with topsoil and compacted, unless special notes in the contract documents indicate a different treatment. Topsoil is included in the cost of the stump removal pay item.

Grass is typically established on the stump holes but the contract documents could specify another treatment. Turf establishment is paid for separately.

**Figure 17:** Measure the height of the stump from the ground level, not from the top of a root flare.

**Figure 18:** Measure six inches (6") up from ground level.
VI. TREE ROOT ZONE TREATMENT - VERTICAL MULCHING/AERATION (614.08)

This specification calls for holes on a grid starting three (3) feet from the trunk of the specified tree and extending to the tree’s drip line or root zone as specified in the contract documents. The depth should be at least twelve (12) inches.

Tree dripline, the area defined by the outermost circumference of a tree canopy where water drips from and onto the ground.

Root zone refers to an approximate circumference from the tree trunk/stem where the tree’s roots grow. Tree roots extend beyond the longest branches a distance equal to two or more times the height of the tree.

The specification includes four methods for filling holes that include various combinations of mortar/coarse sand, compost and/or mycorrhizal fungi.

Figure 20: Example of Dripline and Root zone.
Figure 21: Note the detail shows work beyond the dripline, extending into the wider root zone of the specified tree.

Mycorrhizal Fungi used for tree root zone treatment is a dry granular powder specifically designed for vertical mulching. Application rate is specified in the standard specifications; follow all other Manufacturer’s recommendations.

Safety Note Mycorrhizal Fungi: Read the Safety Data Sheets and wear PPE. In general, handle with nonporous gloves; wear dust mask and safety glasses. Avoid breathing dust. Avoid contact with eyes, mouth and open wounds. Follow good hygiene practices.

Inspection

- Verify that materials meet §703-03 Mortar Sand, §713-09 Mycorrhizal Fungi and §713-15 Compost, as appropriate.
- Check that holes are drilled starting three feet (3’) from trunk and in a two foot by two foot (2’ X 2’) grid.
- Ensure the holes extend out to the dripline or wider root zone (as specified in contract documents).
- Check that the holes are approximately two inches (2”) in diameter by twelve inches (12”) deep (min.) and are backfilled to grade using the method indicated in the contract documents.

Figure 22: Example label of a commercially available product suited to tree root zone treatment/vertical mulching application.
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Figure 23: Sample Label. Note information regarding: suited to purpose, appropriate ingredients, expiration date and safety information.

VII. TREE ROOT PRUNING (614.09)
Because of their location, roots are easily wounded. Fifty percent (50%) of the root system is in the top one foot of soil and over ninety percent (90%) of the root system is in the top three (3) feet. The root system extends well beyond the tree's dripline, often extending a distance equaling two to three times the tree’s height.

Roots of the trees designated in the contract documents shall be pruned within 24 hours of the time they have been damaged by construction activity.

Root pruning must be done with sharp tools or blades.

The cutting surfaces of all tools and all other objects (soles of workers shoes, ropes, etc.) that come in contact with the tree roots shall be disinfected and completely dried before the start of any work. Some of the disinfectants commonly used are:

- Denatured alcohol or rubbing (isopropyl) alcohol
- Listerine
- Diluted bleach solution
- Lysol
- Commercial disinfectant marketed for tree root pruning

Prune all severed roots greater than one inch showing at the edge of excavation. The Contractor may need to go just slightly beyond the face of excavation area (approximately one inch) into undisturbed soil in order to prune past the damaged root section.

If the Contractor proposes a method of cleanly pruning roots prior to the excavation, the EIC may consider it.

Pruning with a backhoe or trenching machine is unacceptable and will cause extensive ripping and tearing damage to the roots of the affected tree(s) because these tools are not designed for the purpose and will not cleanly cut the roots.

If the area is not backfilled within 24 hours of the excavation, the roots must be kept moist until backfill can occur.

**Inspection**

- Check that existing tree roots, greater than one inch (1") in diameter, are pruned within 24 hours of the time they have been damaged by construction activity.

- Check that roots have been pruned at the edge of excavation, or one inch (1") beyond if necessary.

- Verify that pruning is in accordance with ANSI A300 Part 1 Standard Practices Pruning and ANSI Z133.1 Arboricultural Operations Safety.

- Ensure that the excavated area around the existing tree roots is backfilled as soon as construction activities permit with the specified or approved materials.

- Ensure that all roots not backfilled within 24 hours are kept moist.
Figure 24: Note that for the example on the left only one pay line is needed as only one side of the trench requires pruning of live roots. The example on the right needs pay lines on both sides of the trench as there are live trees & roots remaining on both sides of the excavation.

Figure 25: Note that the face of excavation is typically ragged and the roots to be pruned are at varying setbacks. Pruning only required on left side (one payment line) where the live roots exist.

**Measurement**
- Along the edge of excavation where live roots are being pruned.

**Payment**
- Tree roots have been measured by linear feet to the nearest whole foot along the excavation line.