

Vegetation Management Of Overhead Lines

W-OH-0020

Scope

This standard describes the procedures for trimming of trees and other vegetation adjacent to conductors, poles, and towers that are maintained by TACOMA POWER.

In this Standard

The following table lists the location of different parts of this standard.

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Definitions

These are Definitions of Terms and Abbreviations used in this Standard

Abbreviations The following abbreviations will be used in this standard

| Abbreviation | Definition |
|--------------|--------------------------------------|
| WAC | Washington Administrative Code |
| ANSI | American National Standard Institute |
| kV | kilo-Volt, 1000 Volts |
| ROW | Right-of-Way |
| T&D | Transmission and Distribution |

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Purpose

Vegetation trimmed per this standard is meant to provide public safety and reliable electric service. The techniques applied by *Tacoma Power* encourage growth to be away from the conductors, poles, and towers. As a result the techniques described in this standard are likely to require limbs and/or tops to be trimmed further than the minimum clearances listed in this standard.

Overhead Clearances

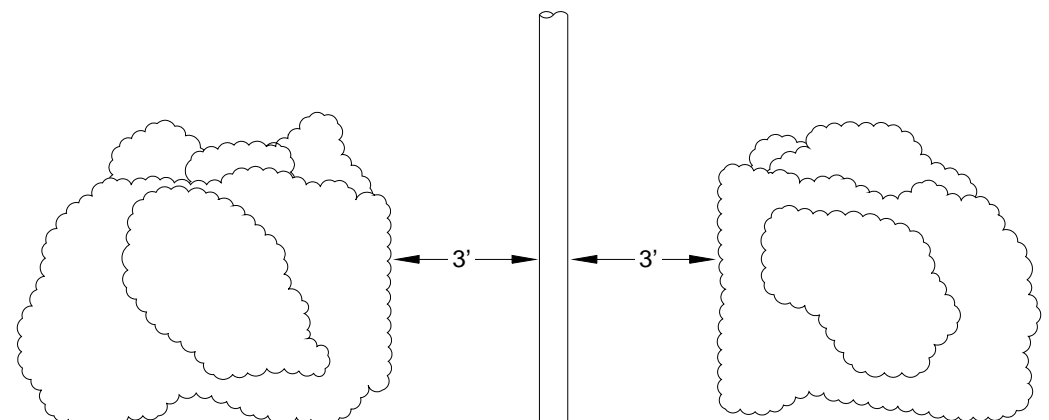
Vegetation trimmed and/or cleared per this standard **shall** follow the minimum clearances listed below.

Climbing Space

In order to ensure safe and usable climbing space for all workers of utilities that have pole attachments all vegetation will be cleared for a minimum of 3 feet from the surface of the pole in all directions. Refer to Figure #1.

Note: Ivy growing on a pole or structure shall be removed when encountered. Ivy is a climbing hazard and may become an electrical hazard if allowed to grow into the electrical utility space.

Figure #1 Climbing Space



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Clearances from Electrical Conductors

The operating voltage of the conductors determines clearances from the electrical conductors. These clearances are intended to accomplish 2 primary goals:

- Keep tree limbs from falling onto the conductors which result in outages to our customers and potential damage to equipment.
- Keep non-qualified workers and others far enough from the conductors when in the trees to meet the minimum approach distances set by WAC 296-155 and WAC 296-45.

Refer to Figures #2 & #3.

Clearances from Low Voltage Conductors & Communications Cables

Tacoma Power trims low voltage conductors (0 to 750 Volts) and communications conductors that extend from pole to pole.

Low voltage service conductors (Services) that extend to the customer weatherhead on their property are to be trimmed by the customer or their contractor.

| Voltage of Conductors | Feet |
|-----------------------|-------------|
| 0 to 750 Volts | 3 to 5 feet |

Minimum Horizontal Clearances to High Voltage Conductors

Trees and/or limbs shall be trimmed to meet the following minimum horizontal clearances.

| Voltage of Conductors (Kilovolts, Phase to Phase) | Feet |
|--|---------|
| 751 V to 50 kV | 10 feet |
| 72.6 kV to 121 kV | 15 feet |
| 230 kV to 242 kV | 18 feet |

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Minimum Vertical Clearances from High Voltage Conductors

Tree limbs that extend above the conductors shall be cleared to a minimum clearance as listed below:

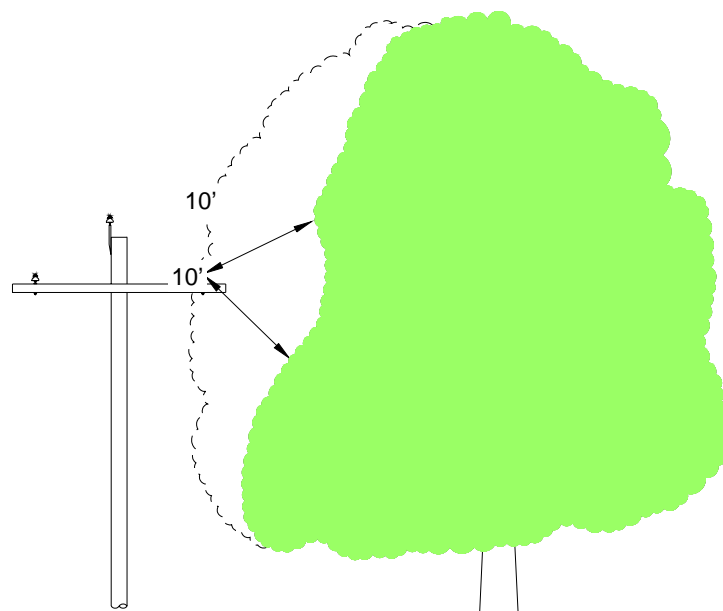
Limbs above the minimum clearance shall be cut back in order to support normal snow load, reduce wind whipping, and any other unnecessary hazards.

| Voltage of Conductors (Kilovolts, Phase to Phase) | Feet |
|--|--------------------------------|
| 750 V to 50 kV | 10 feet |
| 72.6 kV to 121 kV | No Overhanging Branches |
| 230 kV to 242 kV | |

Note: Transmission and distribution feeder conductors may have large variations in sag due to the temperature of the conductors. Additional vertical clearance may be required when the conductors are heavily loaded. If there are questions concerning the sag contact T&D Engineering.

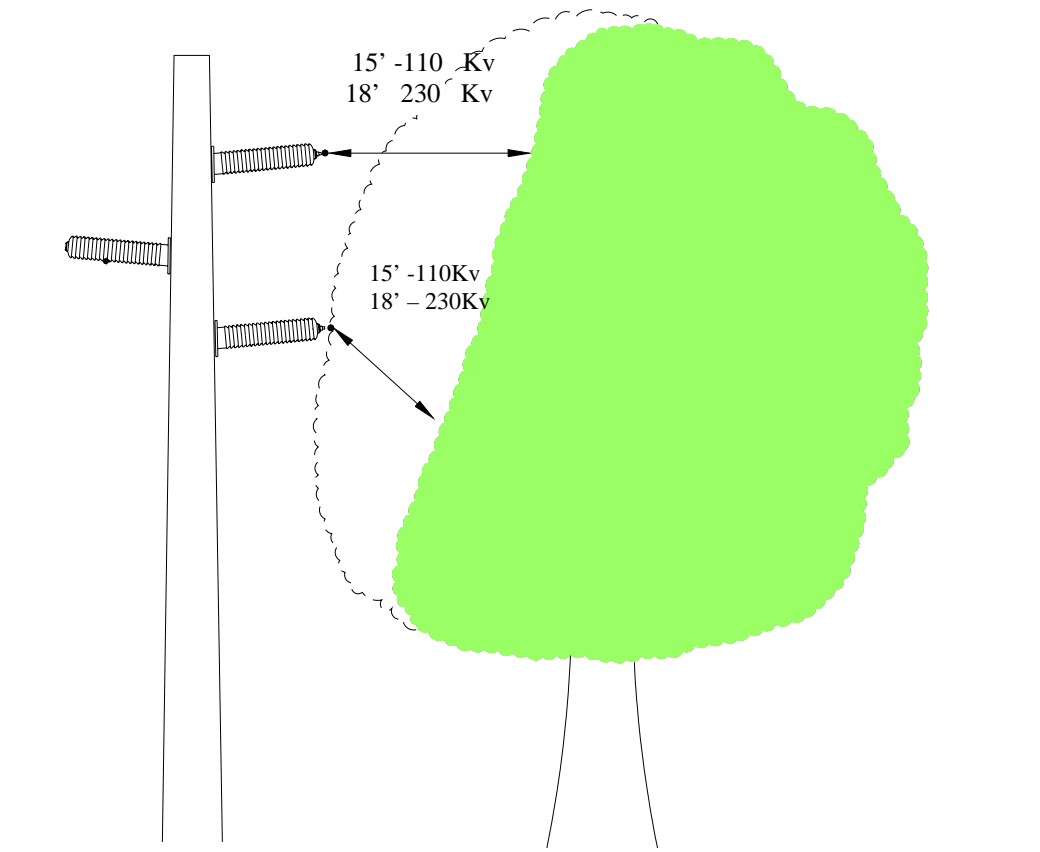
Figure #2

Clearances to Primary Distribution Conductors (System Voltages of 12,470 volts and 13,800 volts).



Clearances

Figure #3 Clearances to Transmission Conductors



Pruning Techniques

Tacoma Power uses the most recent pruning techniques including those shown in the ANSI standards 133 and 300 on tree trimming. This includes the drop crotch pruning techniques.

Undesirable Techniques

The following techniques are not practiced by Tacoma Power.

| Technique | Reason |
|-------------------------|---|
| Through or V Trimming | This technique results in trees that are hard to maintain as the trees get bigger |
| Pollarding and Shearing | This technique promotes excessive sucker growth. |

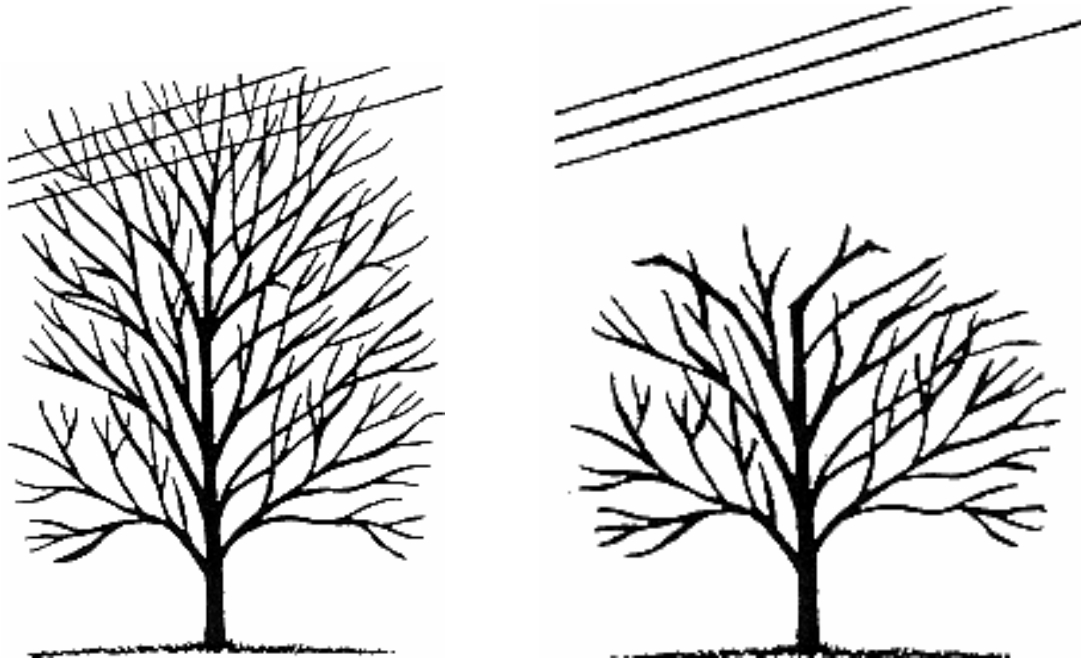
Trimming Plans

The following portions of this standard describe how trees are trimmed in different circumstances.

| | |
|-----------------------------------|---|
| General Plan | <p>The trimming of trees will follow the criteria below:</p> <ul style="list-style-type: none">• Trees will be trimmed in such methods as to direct new growth away from electrical conductors, poles, and towers.• When possible trees that will pose continual maintenance or hazard to the electrical facilities will be removed. |
| Customer Requests | <p>At times customers may request specific trimming of trees that are to be trimmed. Tacoma Power will consider such requests however the minimum clearances will not be compromised.</p> |
| Danger Trees | <p>Danger trees are trees that are located within falling distance to our power lines and pose imminent danger to the electrical facilities due to tree health, ground conditions, or any other condition that leaves the tree unstable.</p> <p>When these trees are identified TACOMA POWER will notify the owner and work with the owner on a case by case basis to have the trees removed.</p> |
| Diseased Vegetation | <p>Tacoma Power will identify and remove diseased portions of trees during routine tree trimming activities. Limiting the spread of tree disease is a concern of Tacoma Power.</p> <p>Dutch Elm Disease: Tacoma Power will not plan on trimming Elm trees between the months of March and October to reduce the potential of Dutch Elm Disease.</p> |
| Crown Reduction or Topping | <p>Crown reduction is cutting back large portions of the upper portion of the tree. Crown reduction is often required when a tree is located directly beneath electrical conductors. The main leader or leaders of the tree are cut back to a suitable lateral branch. Whenever possible the lateral branch should be at least 1/3rd the diameter of the leader limb(s) being removed.</p> |

Trimming Plans continued.

Figure #4 Crowning of Trees



Before Trimming

After Trimming

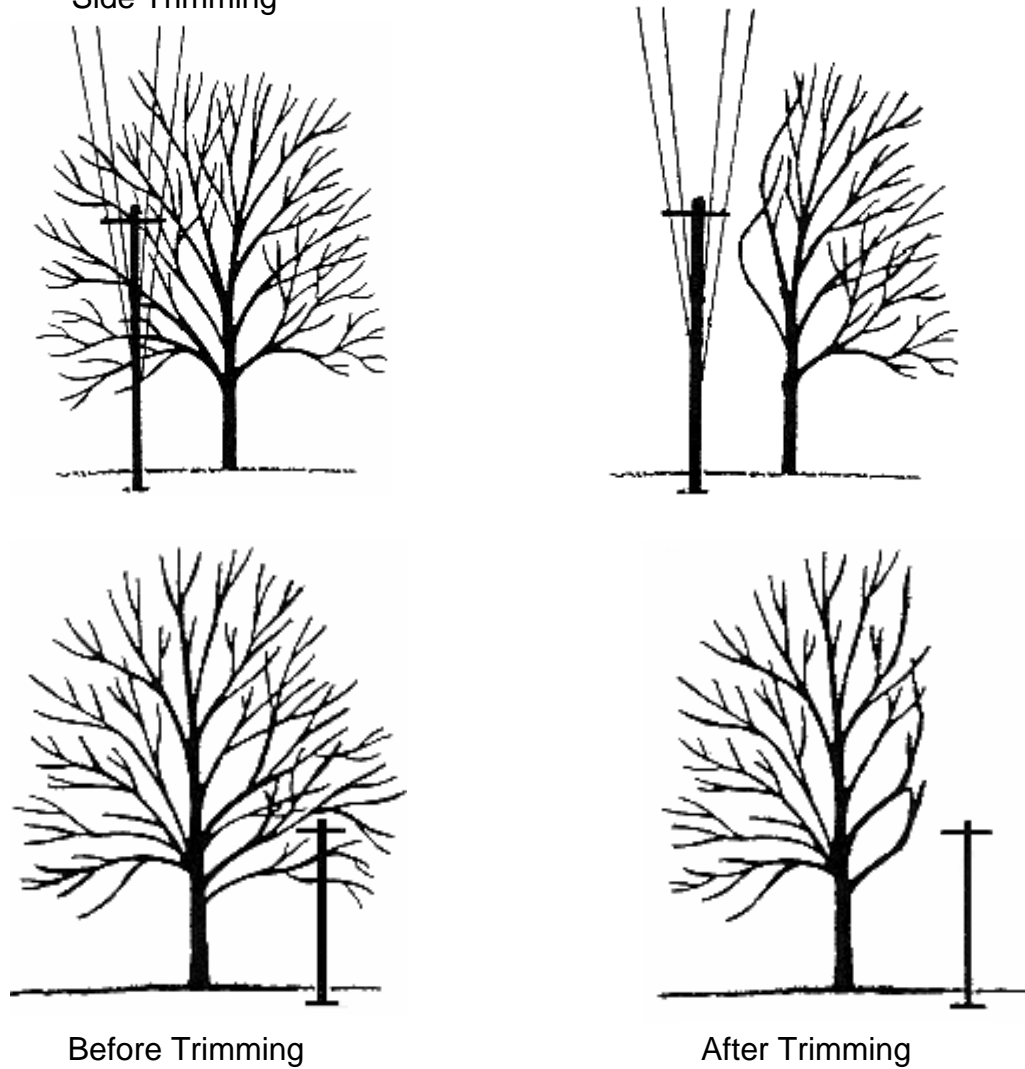
**Side
Trimming**

Side trimming is the removing of limbs or portions of limbs that are too close to the electrical conductors from the side. Limbs are removed at a lateral branch at least 1/3rd the diameter. Unsightly notches should be avoided when possible. Balancing the appearance of the tree by trimming branches above, below, and on the opposite side of the tree is encouraged.

Dead limbs above the electrical conductor are removed to reduce the potential of them falling on the electrical conductors.

Trimming Plans continued.

Figure #5 Side Trimming



Vegetation Control

The following methods and techniques may be used to control vegetation growth in and around Tacoma Power's facilities.

Tree Replacement

Trees adjacent to and/or beneath power lines that are likely to become clearance problems within 3 years after trimming are strongly suggested to be replaced by other species of trees.

TACOMA POWER will work with the property owners, and/or other agencies to identify the most appropriate species of trees to plant in place of the problem trees. Refer to the following publication for a list of alternative trees to be planted near power lines: **Tacoma Power's Guide for Planting the Right Tree in the Right Place.**

Wetlands & Environmentally Sensitive Areas

Selective trimming or removal of trees within wetlands and other environmentally sensitive areas will only be conducted where a hazard to the power lines has been identified.

Note: Tacoma Power will contact The City of Tacoma Natural Resources Department, Pierce County Department of Public Works, and/or the State of Washington Department of Natural Resources prior to any work within wetland designated areas.

Herbicide Spaying

Herbicides are used to control growth in difficult, selected areas, or in unusual circumstances as determined by the T&D Construction Office. On utility right-of-ways where root stems and sprouts flourish from cut stumps and fallen logs, stump spraying has shown good results.

Note: Caution shall be used when spraying near valuable plants, trees, and maintained properties so as not to effect them. Herbicides will not be used within wetland designated areas.

Growth Regulators

Growth regulators may be used to help extend clearance cycles in difficult areas when appropriate as determined by the T&D Construction Office.



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**Vegetation
Mowing**

When it is environmentally and economically feasible Tacoma Power may choose to use right-of-way-mowing equipment to clear vegetation adjacent to and under conductors.

Typically this method is used in rural transmission rights-of-ways.

**New
Techniques**

Tacoma Power will continue to pursue new techniques for controlling vegetation around its facilities.