

**ARBORICULTURAL SPECIFICATIONS AND STANDARDS
OF PRACTICE FOR THE CITY OF SPOKANE**

AUGUST, 2002

**URBAN FORESTY PROGRAM
CITY OF SPOKANE PARKS AND RECREATION DEPARTMENT**

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INTRODUCTION

The Arboricultural Specifications and Standards of Practice for the City of Spokane contains the regulations and standards for the removal, pruning, planting, and other maintenance of trees on public property. The purpose of the manual is to provide a detailed guide of proper arboriculture practices for developing and improving the tree resources of the community. The manual is to be used by arborists, property owners, engineers, landscape architects, landscape contractors, urban foresters and urban planners to ensure compliance with the City of Spokane street tree ordinance. This document has been adopted by resolution of the City of Spokane Parks and Recreation Board, thereby rendering it enforceable but at the same time easy to revise as industry standards and community goals change. The pruning illustrations are from the second edition of *Trees for the Urban and Suburban Landscapes, An Illustrated Guide to Pruning*, courtesy of Edward F. Gilman.

AREAS OF RESPONSIBILITY AND GENERAL REQUIREMENTS

The street tree ordinance provides the legal basis for the development of an Arboricultural Specifications and Standards manual for the proper care of trees in our urban forest. The ordinance places the supervisory responsibility of managing trees in the public rights-of-way and other public places under the Parks and Recreation Department. Additionally, the ordinance establishes the maintenance responsibilities of the abutting property owner. The management of our urban forest is a cooperative responsibility of public and private owners. It involves a combination of property owners, the Urban Forestry Program, private tree care firms, public utilities, tree nurseries and other city departments in a systematic maintenance program that considers the needs of individual trees and the urban forest as a whole.

These specifications and standards serve as principles for the proper care of all public trees. They will apply regardless as to whether the work is performed by contractor, by city staff, by landscape or tree industry firms or by property owners. The Arboricultural Specifications and Standards manual shall be adhered to at all times, but may be amended by Spokane Parks and Recreation Board at any time that experience, new research or laws indicate improved methods, or other circumstances that make it advisable. Exceptions to the specifications and standards manual must be by written approval of the Parks Department Director or designee.

It is the responsibility of the abutting property owner to protect the health of the street tree(s) through compliance with the street tree ordinance. Tree care performed directly by the property owner or through a hired contractor shall comply with the guidelines of the Arboricultural Specifications and Standards manual.

The Parks and Recreation Department shall maintain public trees located on planting strips adjacent to streets listed on the City maintenance responsibility list. The department shall not be responsible for street trees or other vegetation on streets not on the maintenance responsibility list (See Appendix A for list).

TECHNICAL REQUIREMENTS FOR REMOVALS, PRUNING, PLANTING AND OTHER MAINTENANCE

A. Tree Removal Specifications and Standards

1 Tree Removal Criteria

The urban forester may authorize, deny or order removal of or may remove trees and shrubs situated within the rights-of-way whenever one or more of the criteria listed in section 12.02.912 of the street tree ordinance are met or one of the following criteria are met.

- a. Any dead or dying tree.
- b. Any otherwise healthy tree that harbors insects or diseases that could not be controlled or removed and pose a risk to adjacent trees.
- c. Any tree determined to be a high risk to fail as determined by evaluation from an ISA certified arborist using the ISA twelve-point hazard rating system.
- d. Any tree currently classified as undesirable and thereby prohibited from being planted in the public right-of-way.
- e. Any tree that is designated as being a part of the scheduled city replacement program designed to upgrade the city's tree population.

The removal of a street tree or tree located on public property for the purposes of accommodating private facilities will not be sanctioned unless the following conditions have been satisfied.

- a. There are no other reasonable design alternatives.
- b. The value of the tree(s) in question has been determined by the Urban Forester in accordance with the latest edition of "Guide for Plant Appraisal" by the Council of Tree and Landscape Appraisers, published by the International Society of Arboriculture.
- c. The property owner shall compensate the City for the loss of the tree(s) before removal is undertaken.

Street closure and traffic control.

- a. Blocking of public streets shall not be permitted unless prior arrangements have been made with the City of Spokane and coordinated with appropriate departments. The permit holder is obligated to notify in writing homeowners in work area prior to commencing work. The permit holder is responsible for having the vehicles moved during arboriculture work.
- b. The permit holder shall provide adequate barricades, certified flagperson(s), signs and/or warning devices during the performance of the tree removal to protect tree workers, motorists and pedestrians. All placements of cones, signs and barricades must conform to the American Traffic Safety Standards. Yellow flashing lights mounted on a vehicle shall not be deemed as sufficient or adequate protection. Questions of

sufficiency shall be resolved to the satisfaction of Public Works Permit Coordinator, 625-6339. Refer to Section 05170 - Traffic Regulation for main specifications.

Site clean up.

- a. The permit holder shall clean up the site and remove and dispose of all debris at the end of each day's operation. Site cleanup shall include removal of sawdust, small twigs, chips, leaves, trunks and limbs from the street, curb, parkway, sidewalk, private lawns and driveways with appropriate tools for the job. The site shall be returned to the same state it existed in prior to the removal.
- b. Disposal of all logs, limbs, chips and debris generated by work shall be the responsibility of the permit holder. The permit holder shall remove all tree limbs and tree debris from the site and dispose of these limbs and debris in accordance with applicable ordinances and regulations of the City of Spokane, Spokane County and the State of Washington. If residents request logs, these shall be left on private property and not the boulevard. If residents request chips, these too will be left on private property.
- c. Limbs and trunks temporarily placed in the boulevard areas shall be placed in such a manner as to eliminate any obstruction to motor vehicles and pedestrians. Brush and limbs overhanging a curb or pavement shall not be acceptable and under no circumstances shall these materials be allowed to lay on the boulevard or in the park overnight.
- d. All infectious diseased trees or parts of dead trees possibly harboring vectors of infectious diseases shall be removed and it shall become the permit holder's responsibility to ensure destruction of the diseased or dead wood in accordance with the State statutes and local ordinances. Under NO circumstances shall logs from infectious diseased trees be left for homeowners. An example of an infectious disease is Dutch elm disease. Asian long-horned beetle is an example of an insect pest.

Protection of property.

- a. The permit holder shall take all necessary precautions to eliminate damage to adjacent trees and shrubs, lawns, curbs, walks, or other real or public property. Holes made in lawns, regardless of size, shall be filled with native topsoil and seeded with a turf grass lawn seed mix unless specified differently by the property owner. Equipment shall not enter upon private property unless the property owner consents. Vegetation surrounding a tree marked for removal shall be disturbed as little as possible.
- b. Sidewalks, curbs, streets irrigation heads and manhole structures shall always be protected from the impact of falling wood by use of the tree or limb ground supports. Ropes or other mechanical devices shall be used

to lower all limbs of sufficient size that may cause damage to other trees or surrounding public or private property.

Protection of overhead utilities.

Removal operations may be conducted in areas where overhead electric, telephone, and cable television facilities exist. The permit holder shall protect all utilities from damage, shall immediately contact the appropriate utility if damage should occur, and shall be responsible for all claims for damage due to his operation. The permit holder shall make arrangement with the utility for removal of all necessary limbs and branches that may conflict with or create a hazard in conducting the removal operations.

Removal of stumps.

The permit holder shall remove all tree stumps and buttress roots to a point twelve-inches (12") below the adjacent ground level. Additionally, the permit holder shall remove sufficient subsurface roots so as may be necessary to eliminate "humps" in the lawn area adjacent to the stump. The area then shall be restored with topsoil to the level of the adjoining grade and seeded unless otherwise specified by the property owner.

Removal of stump grindings and debris.

Within twenty-four hours after grinding (removal) of a tree stump and buttress roots, the permit holder shall remove all stump grindings and associated debris from the site. Grinding debris generated by stump removal work shall be the responsibility of the permit holder. Stumps, grindings and debris shall be placed away from the curb and gutter, street and sidewalk immediately to eliminate hazards to the motoring public and pedestrians and to eliminate damage to public property.

Backfilling.

All areas where stumps have been removed and areas disturbed by the removal operations shall be backfilled to the level of adjoining grade with pulverized topsoil the same day grindings are removed, otherwise the site shall be properly barricaded overnight to ensure the safety of the public. All holes must be filled with topsoil by the second day. The permit holders shall supply their own topsoil. The topsoil shall be properly leveled and compacted so as to ensure a minimum amount of settlement of the backfill material. If there is more than a one-day delay between the time of removal of grindings and refilling with soil, the disturbed areas shall be barricaded off for public safety and the Urban Forester notified. Stump grindings and debris shall not be used as backfill material. Topsoil: native; free of roots, rocks, subsoil, debris, large weeds, and foreign matter; acidity range (pH) of 6.5 to 7.0.

Seeding.

All adjacent disturbed areas and areas where backfill material was installed shall be seeded. The seed shall be of lawn mixture composed of 50% Kentucky Bluegrass, 30% Perennial Ryegrass, and 20% Creeping Red Fescue.

The permit holder shall delay seeding operations until after April 15, for stumps removed between October 1st and April 1st; however, seeding of those areas where stumps were removed within this period of time shall be completed during that period.

2. Permit Process

Permits are required for the removal of any tree within the public right-of-way or on public property. The applicant must be a licensed, bonded, insured and an ISA certified arborist in order to obtain a permit. Permit applications are obtained at the Construction Services Department, 3rd floor, City Hall Building, 808 W. Spokane Falls Boulevard. A permit is required for each work site address. There is a fee for a permit to remove trees. All work sites are subject to pre and post inspection of the work site and work procedures.

3. Specifications and Standards

- a** All equipment to be used and all work to be performed must be in full compliance with the most current revision of the American National Standards Institute Standard Z-133.1 and A300 or as amended.
- b** Removal shall consist of cutting down each tree in a safe manner to a point four inches above the adjacent ground level and grinding the stump and buttress roots to a point twelve inches below adjacent ground level. The Contractor shall remove all tree limbs and tree trunks from the site and dispose in accordance with applicable ordinances and regulations of the City of Spokane, Spokane County and the State of Washington. If residents request logs, these shall be left on private property and not the boulevard. If residents request wood chips, these too will be left on private property.

B. Pruning Specifications and Standards

There are many erroneous terms used by the public and individuals in the green industry in reference to the removal of tree parts. Shaping, trimming, shearing, tipping, topping, rounding over, hedging and flat topping are some of the terms used. These terms do not define pruning or the techniques used to prune plants. These terms represent removal of tree parts that often initiates decay or decline in trees. They are not biologically correct and do not enhance the health of the tree and often shorten the life of the tree.

Pruning is intentionally and permanently injuring a tree to meet a management objective in the landscape. It is a maintenance procedure that is performed to achieve a clear management objective. It is neither random nor performed because it is required every year. These guidelines are presented as working guidelines, recognizing that trees are individually unique in structure, form and growth response—not only between, but also within species and cultivars. The appropriate guidelines should be chosen and/or modified depending on species, age of the tree, time of the year, condition of the tree and the management objective.

1 Pruning criteria

The urban forester may authorize, deny or order pruning of or may prune trees and shrubs situated within the rights-of-way whenever one or more of the criteria listed in section 12.02.912 of the street tree ordinance are met or one of the following criteria is met.

- a. Any tree(s) that because of habit of growth, age, condition or disease becomes a public nuisance or risk to public safety.
- b. Any tree(s) that obstructs a clear view of streets, signs, signals, street lights, intersections or interferes with the safe use of the street or sidewalk (Fig. 1, Appendix B).
- c. Any tree(s) that does not meet an eight-foot clearance over sidewalks and a fourteen-foot clearance over streets.
- d. Any tree(s) that is damaging public improvements or public utilities.
- e. Any tree(s) that is designated as being a part of a scheduled city pruning program designed to upgrade the condition of the city's tree population.
- f. Any tree(s) on private property that overhangs the public right-of-way and interferes with established clearance and pruning criteria.

Street closure and traffic control.

- a. Blocking of public streets shall not be permitted unless prior arrangements have been made with the City of Spokane and coordinated with appropriate departments. The permit holder is obligated to notify in writing homeowners in work area prior to commencing work. The permit holder is responsible for having the vehicles moved during arboriculture work.
- b. The permit holder shall provide adequate barricades, certified flagperson(s), signs and/or warning devices during the performance of the tree removal to protect tree workers, motorists and pedestrians. All placements of cones, signs and barricades must conform to the American Traffic Safety Standards. Yellow flashing lights mounted on a vehicle shall not be deemed as sufficient or adequate protection. Questions of sufficiency shall be resolved to the satisfaction of Public Works Permit Coordinator, 625-6339. Refer to Section 05170 - Traffic Regulation for main specifications.

Site clean up.

- a. The permit holder shall clean up the site and remove and dispose of all debris at the end of each day's operation. Site cleanup shall include removal of sawdust, small twigs, chips, leaves, trunks and limbs from the street, curb, parkway, sidewalk, private lawns and driveways with appropriate tools for the job. The site shall be returned to the same state it existed in prior to the removal.
- b. Disposal of all logs, limbs, chips and debris generated by work shall be the responsibility of the permit holder. The permit holder shall remove all

tree limbs and tree debris from the site and dispose of these limbs and debris in accordance with applicable ordinances and regulations of the City of Spokane, Spokane County and the State of Washington. If residents request logs, these shall be left on private property and not the boulevard. If residents request chips, these too will be left on private property.

- c. Limbs temporarily placed in the boulevard areas shall be placed in such a manner as to eliminate any obstruction to motor vehicles and pedestrians. Brush and limbs overhanging a curb or pavement shall not be acceptable and under no circumstances shall these materials be allowed to lay on the boulevard or in the park overnight.
- d. All infectious diseased branches or parts of dead trees possibly harboring vectors of infectious diseases shall be removed and it shall become the permit holder's responsibility to ensure destruction of the diseased or dead wood in accordance with the State statutes and local ordinances. Under NO circumstances shall branches or debris from infectious diseased trees be left for homeowners.

Protection of property.

- a. The permit holder shall take all necessary precautions to eliminate damage to adjacent trees and shrubs, lawns, curbs, walks, or other real or public property. Holes made in lawns, regardless of size, shall be filled with native topsoil and seeded with a turf grass lawn seed mix unless otherwise specified by the property owner. Equipment shall not enter upon private property unless the property owner consents. Vegetation surrounding a tree marked for pruning shall be disturbed as little as possible.
- b. Sidewalks, curbs, streets and manhole structures shall always be protected from the impact of falling wood by use of the tree or limb ground supports. Ropes or other mechanical devices shall be used to lower all limbs of sufficient size that may cause damage to other trees or surrounding public or private property.

Protection of overhead utilities.

Pruning operations may be conducted in areas where overhead electric, telephone, and cable television facilities exist. The permit holder shall protect all utilities from damage, shall immediately contact the appropriate utility if damage should occur, and shall be responsible for all claims for damage due to his operation. If the permit holder does not employ certified line clearance tree pruners, it shall be the responsibility of the permit holder to make arrangements with the utility for removal of all necessary limbs and branches that may conflict with or create a hazard with utility lines in conducting the pruning operations.

2. Permit process.

Permits are required by commercial licensed tree firms for pruning of any tree within the public right-of-way or on public property regardless if the work is major or minor pruning. The applicant must be a licensed, bonded, insured and an ISA certified arborist in order to obtain a permit. Property owners may perform minor pruning without obtaining a permit. Permit applications are obtained at the Construction Services Department, 3rd floor, City Hall Building, 808 W. Spokane Falls Boulevard. A permit is required for each work site address. There is no fee for a permit to prune trees. All work sites are subject to pre and post inspection of the site and work procedures.

3. Specifications and Standards

- a. All equipment to be used and all work to be performed must be in full compliance with the most current revision of the American National Standards Institute Standard Z-133.1-2000 and A300-2000 or as amended.**
- b. All final cuts shall be made sufficiently close to the trunk or parent limb, without cutting into the branch collar or leaving a protruding stub, so that closure can readily begin under normal conditions. Excessively deep flush cuts that produce large wounds or weaken the tree at the cut shall not be made. Sharp pruning tools shall be used so that clean cuts will be made at all times. All pruning tools and saws shall be kept sharpened to result in final cuts with smooth wood surface and secure bark remaining intact. All trees six inches or less in diameter shall be pruned with hand and/or hydraulic pruning tools only (Fig. 2, 3, 4; Appendix B).**
- c. It is necessary to use the three step cutting technique on branches that are too heavy to handle to prevent splitting or peeling the bark. Where necessary, to prevent tree or property damage, branches shall be lowered to the ground by proper ropes or equipment (Fig. 5, Appendix B).**
- d. On trees known to be diseased, tools are to be disinfected with methyl alcohol at 70% (isopropyl alcohol diluted appropriately with water) or 10 % bleach solution after each cut and between trees where there is known to be a danger of transmitting the disease on tools.**
- e. Equipment that will damage the bark and cambium layer shall not be used on or in any tree.**
- f. Climbing spurs shall not be used when climbing trees, except to climb a tree to be removed or to perform an aerial rescue of an injured worker.**
- g. Ropes shall not come in direct contact with the crotch of the tree when tied into the tree. Friction or cambium savers are to be used when accessing and climbing the tree with rope and saddle. Rope injury from loading heavy limbs should be avoided.**
- h. Natural or mechanical rigging techniques shall be used to lower all limbs**

of sufficient size that may cause damage to other trees or surrounding public or private property.

Tree pruning specifications.

The word 'shall' indicates a practice is mandatory. The word 'should' refers to a practice that is highly recommended. Attention is to be given to develop and preserve tree structure, health and the final appearance of the trees. Appropriate pruning shall be done in order to maintain a tree form typical of the species (cultivar) of the tree being pruned.

1 General Procedures.

- a. Live branches less than 1.5 inches or greater than 3 inches should not be removed.
- b. Dead branches greater than .5 inches measured at the base of the branch shall be removed from the canopy of all trees.
- c. Remove no more than 20 percent of live foliage from any tree.

2. Procedures to Reduce High-risk Conditions in Trees and Improve Structure.

- a. Remove all dead, dying and diseased branches.
- b. Reduce the weight of branches or stems with included bark.
- c. Reduce the weight toward the ends of all but one codominant stem.
- d. Thin the outer edge of the canopy. When laterals are thinned from a branch, at least one-half of the foliage on laterals along the inner two-thirds of the branch should be retained. Excessive removal of interior laterals leads to lion's tailing (Fig. 6, 7, 8; Appendix B).
- e. Remove lower branches to permit clearance of approximately eight feet on the sidewalk or pedestrian area and fourteen feet on the street side. In lifting the bottom branches of trees for clearance, care should be given to the final appearance of the entire crown. The tree should have at least one-half of its foliage on branches that originate in the lower two-thirds of its crown to ensure a well-formed, tapered structure and to uniformly distribute stress within the tree. Excessive removal or 'bottoming' of the tree is prohibited (Fig. 9, Appendix B).
- f. Correct all interior or interfering branches, and one of all crossed or rubbing branches where practical so the removal thereof will not leave large holes in the general form of the tree. Excessive removal of interior branches as to cause a 'lion's tailing effect' is prohibited (Fig. 10, Appendix B).

3. Specific Procedures for Medium to Mature Age Trees.

- a. The weight on main scaffold limbs with included bark shall be reduced by approximately one-third by removing some secondary branches toward the ends of the limbs and/or by removing the end of the branch using a reduction cut (Fig.11, 12; Appendix B).
- b. If a tree divides into two or more codominant leaders of about equal size in the bottom two-thirds of the tree, reduce the end weight by approximately one-third using reduction and thinning cuts on all stems but the one you believe could become the strongest and most dominant leader. To accomplish this, remove the main portion of the codominant leaders growing upright or toward the center and leave those that are oriented outward. Use mostly thinning cuts, not drop-crotch cuts, on larger branches and trees. (Note: On some trees, you may not be able to perform all of this because you can not remove more than 20 percent of the foliage. Make a note of this tree and report to the City's Urban Forester.) (Fig. 13, Appendix B).
- c. Identify those trees that have included bark in the crotches between codominant stems. Make a note of these on the inventory list. The urban forester or designee will evaluate these trees for possible cabling, pruning or other treatments. Identify limbs and trunks with vertical cracks or other potentially hazardous conditions. The presence of any structural problem, disease, insect pest or decay should be reported in writing to the Urban Forester (Fig. 14, Appendix B).
- d. If less than 20 percent of the live foliage was removed on a mature tree following procedures 1 and 2 above, thin the canopy to allow more light to reach the ground under the tree and to help reduce damage from storms. The foliage removed shall be taken from the outer edge of the canopy, not from the interior. Interior branches shall be left on the tree. Do not remove water sprouts from the interior of the tree.
- e. Crowns of trees that were storm damaged or topped will be restored to improve structure and form. Remove or shorten all sprouts except one, which will become the dominant stem at that point. Thirty percent of the foliage may be removed when performing this work.

4. Specific Procedures for Young Trees

The primary purpose of pruning young trees is to improve the trunk and branch structure. Properly trained young trees will develop into structurally strong mature trees. The greatest structural concern in young trees is the establishment of a central leader and the reduction of codominant trunks or main leaders. Reducing one of the codominant branches is highly recommended if possible. If removal is required, it should be accomplished over several pruning cycles.

- a. The subordination or removal of one side of a codominant leader or stem, due to the recognized potential risk associated with codominant leaders,

is the primary objective. Branches, trunks or leaders not considered the main leader, two inches diameter or larger should be subordinated or removed. **The main leader shall not be subordinated or removed.** Codominant leaders are considered to be two or more branches, trunks or leaders of approximately the same size, originating in proximity to one another. If there is no stem considerably larger than others, subordinate all but one stem. Where there is included bark as part of the condition, preference should be given to the removal of one side, but only if such removal will not remove more than twenty percent of the canopy or destroy the aesthetic value of the canopy (Fig.15, 16; Appendix B).

- b. Some branches on young trees are considered temporary branches. These are branches that may be removed over time depending on the species, site use and management objectives. Temporary branches should remain on the tree as long as possible if they are not a structural problem. Selective removal should occur over several pruning cycles and no more than twenty percent of the live crown shall be removed in any one pruning cycle.
- c. Canopy raising should shorten branches over paved areas with a reduction cut back to a living side branch at least one-third the diameter of the removed portion to allow approximately eight feet of clearance for pedestrians and vehicles. Removal of the branch may be necessary, but preference shall be given to shortening of branches instead of removing, especially if the branch diameter is more than half the trunk diameter. When pruning is completed, approximately one-half of the live crown should originate from branches on the lower two-thirds of the tree (Fig. 10, 11; Appendix 14).
- d. Crown cleaning is the removal of dead, dying diseased, damaged, crowded, broken, weakly attached, low vigor branches, out-of-place branches and perhaps some water sprouts from a tree crown. Crown cleaning is not stripping out the interior canopy leaving only live foliage at the end of the branches. It will not be necessary to make cuts smaller than one inch in diameter, other than where branches may be shortened to accommodate clearance beneath the canopy. Canopy cleaning is to include the following:
 - 1 If two limbs are crossing or touch each other, shorten or remove one of them so they no longer cross or touch.
 - 2 If two limbs originate within twelve inches of each other on the trunk, shorten or remove one of them.
 - 3 Remove dead or broken limbs one-half inch in diameter or larger.
 - 4 Directional prune to establish a minimum of three feet or as practical of clearance from buildings, lights and other structures.

5. Restoration Pruning

Crown restoration is intended to improve the structure of trees that have been broken, topped or severely pruned using heading cuts. Many sprouts form from the cut ends of topped or broken trees. Some sprouts also develop below the cuts. They are poorly

attached to the tree and can break easily. Crown restoration may require several pruning cycles over a number of years.

Objective

The objective is to develop one sprout into the main stem and one as a branch no more than about half the diameter of the stem. The size range of parts to be removed, the location in the canopy and the percentage of sprouts to be removed will vary depending on the severity of the damage and the health and vigor of the tree.

Specific Procedures

One to four sprouts, on the main branch stubs, should be selected to form a natural appearing crown. The more vigorous sprouts may need to be thinned, cut to a lateral, or even headed, to control growth. Begin by removing some sprouts completely and shortening others using reduction cuts. Removing too many sprouts at one time can stress the tree and cause additional sprouting. This leaves one sprout to become the main stem and several to remain as branches. One sprout of moderate vigor is left to become the main stem. The remaining sprouts will be shortened again in the next few years (fig. 17, Appendix B).

C. Planting Specifications, Standards and Tree Selection

A beautiful, well-maintained tree adds environmental, economic and social value to the community. Trees are critical to the urban infrastructure. They provide shade, energy conservation, road conservation, erosion control, clean air, pollution, wind and noise abatement and habitat for urban wildlife. Planting the right tree in the right place is an investment in the future. Choosing the right tree and the best place to plant will help provide beautiful, healthy trees that require less maintenance. The temptation to plant a fast growing tree is great. However, these types of trees often develop problems prior to maturity because much of their energy is used in growth with little left over for defense of pests and diseases. Trees with slow to moderate growth rates are usually healthier, survive longer and able to tolerate attacks of pests and diseases. Good tree selection should accommodate site use and safety needs.

1 Planting Criteria

The urban forester may authorize, deny or order removal of or may remove trees and shrubs planted within the rights-of way whenever one or more of the criteria listed in section 12.02.910 of the street tree ordinance are met. Some factors to consider when selecting the right tree for the right place include:

- a. Mature height, width and shape of the tree
- b. Visibility and clearance near driveways, intersections, traffic signs and signals
- c. Future conflicts with overhead and underground utility lines
- d. Soil space for roots to avoid conflicts with sidewalks, driveways, streets, curbs, sewer and septic systems
- e. Cultural requirements of the tree-hardiness, light, soil and water requirements

- f. Susceptibility to disease or insect pests

2. Permit Process

Permits are required to plant any tree within the public right-of-way. Permit applications are obtained at the Construction Services Department, 3rd floor, City Hall Building, 808 W. Spokane Falls Boulevard. A permit is required for each work site address. There is no fee for a permit to plant trees. All work sites are subject to a pre and post inspection of the site and work procedures.

3. Plant Material

Plant material shall not be less than two inches in diameter, measured at six inches above the ground. The Urban Forester shall authorize variances on size. Plant material shall conform with and meet American Standard for Nursery Stock, ANSI Z60.1-1996 or as amended and the Standardized Plant Names adopted by the American Joint Committee on Horticulture Nomenclature.

Plant material may be balled and burlapped, containerized or bare root. A list of trees recommended for sites in Spokane is in the booklet, 'Recommended Street and Landscape Trees for Eastern Washington.'

4. Specifications and Standards

Balled and burlapped tree installation specifications

- a. Protection of existing features. During construction, protect all existing trees, shrubs and other vegetation, site features, and improvements, structures and utilities specified herein and/ or on submitted drawings. Removal or destruction of existing plantings is prohibited unless specifically authorized by the owner.
- b. Applicable specifications and standards. *Principles and Practices of Planting Trees and Shrubs*. 1997. International Society of Arboriculture, P.O. Box 3129, Champaign, IL 61826-3129.
American Standard for Nursery Stock. 1996. American Association of Nurseryman, Inc. 1250 I Street, N.C. Suite 500, Washington, D.C. 20005.
Standardized Plant Names. 1942. American Joint Committee on Horticulture Nomenclature, Horace McFarland Company, Harrisburg, PA
- c. Transportation, storage and handling of plant material. Take all precautions customary in good trade practice in preparing plants for moving. Dig, pack, transport, and handle plants with care to ensure protection against injury. Protect all plants from drying out. Plants, once removed from the holding medium, must be planted immediately. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be lifted and handled with suitable support of the soil ball to avoid damaging it. During transportation of plant material, the permit holder shall exercise care to prevent injury and drying out of trees. Should roots or root balls be dried out, large branches broken, soil balls broken or loosened, or areas of bark torn, the City may

reject the injured tree(s) and order them replaced by the permit holder. Cover plants transported on open vehicles with a protective covering to prevent wind burn.

d. Accessories and soil amendments

- 1** **Bark mulch:** Hemlock or Fir bark, shredded medium grind size, free from noxious weed seed, debris, and all foreign material. Applied at a 3" depth in a 9-foot diameter circle around tree, but mulch must stay 6" from base of tree.
- 2.** **Water:** Free of substances harmful to plant growth.
- 3.** **If specified by the city, amend the backfill soil by adding five percent (by weight, 20-35 percent by volume, depending on materials) composted organic matter.**

Tree planting operations

- a.** **Work Area.** During work keep areas being landscaped and adjacent areas clean. Water, mud, dirt, trash, papers, cans, and other materials are to be kept off walks, driveways and streets so as not to impede normal traffic. Perform cleaning during installation of the plant material and upon completion of the work. Remove from site all excess materials, soil, debris and equipment. Repair damage resulting from planting operations.
- b.** **Excavation.** Excavate the planting hole 3 to 5 times wider than the diameter of the root ball. If the soil is compacted, the hole should be 5 times the width of the root ball. The hole must be wider at the top than at the bottom, with shallow sloped walls. The planting hole shall not be deeper than the root ball, and the bottom of the hole shall be undisturbed soil so that it will give solid support to the bottom of the root ball. The top of the **root collar** shall be level with the existing finish grade at the planting site. Plants shall not be planted deeper than they were at their former location. See attached planting diagram.
- c.** **Plant Protection.** Protect all plants at all times during planting operations to prevent roots from drying out. No planting is to be done during freezing weather or other highly unfavorable planting conditions. If plants are planted later than April 1st and before October 1st, use an anti-desiccant to help prevent the drying out of foliage and plant during first year.
- d.** **Setting the plants in the hole.** A balled and burlapped plant should be positioned so that its weight keeps the tree in a perpendicular position before backfill is added. Plants should be transferred directly from the storage site to the planting hole. The tree should be oriented in the hole so it faces the same direction as it did when it was dug. If branches were tied in at the nursery they must be released prior to final orientation in the planting hole to achieve the best landscape affect.

- e. Remove wire baskets. After the root ball is oriented in the hole, balled and burlapped trees in wire baskets shall have the upper two-thirds of the wire basket cut and removed from the ball.
- f. Remove burlap. After the root ball is in the hole, the burlap should be removed from the top and sides of the ball but not from beneath the ball. If removal of the burlap will result in the soil crumbling, the burlap should be rolled back only from the top and slit along the sides with a sharp knife. If natural burlap is not used, the burlap will have to be removed entirely at planting. All non-biodegradable twine or ropes tied around the trunk of the tree or the root ball must be removed. Natural fiber ties, if tied around the trunk, shall be removed.
- g. Backfill and Water. Backfill shall be native topsoil, reasonably free of roots, rocks, subsoil, debris, large weeds, and foreign matter. The backfill should be worked around and beneath the ball so no air pockets remain. Firm the soil near the base of the rootball so that the tree is vertical and adequately supported, but do not pack the soil. The addition of soil alternating with tamping should continue until the hole is half full. Water is then added to partially fill the hole. After the water has soaked into the soil, backfill with soil should be completed and a soil dike raked around the hole to facilitate watering later. Water is then added following final backfilling.

Basin construction. Construct around the perimeter of each root ball a shallow rain basin consisting of a ridge or berm of earth 3 to 4 inches high and slightly larger than the outside diameter of the root ball.

Mulching. Mulch tree planting pits and shrub beds with bark mulching material three inches deep immediately after planting. Thoroughly water mulched areas. After watering, rake mulch to provide a uniform finished surface.
- k. Pruning. The tree should be pruned to eliminate branches that are damaged, diseased, or that interfere with the natural structure in the tree. No healthy branch shall be removed unless the above criteria are met. Pruning cuts shall be made in compliance with International Society of Arboriculture pruning standards. No application of wound dressings shall occur.

Watering. The permit holder shall water thoroughly at the time of installation, as required, to maintain vigorous and healthy tree growth. The permit holder shall provide water when irrigation systems are unavailable and continue to water the tree during the next two years.
- m. Staking. This treatment is not a standard treatment and should be used judiciously as in cases of damaged rootballs or other conditions that have compromised the rootballs.
- n. Tree wrap. This treatment is not a standard treatment and should be used with justifiable benefits.

Inspection and acceptance

- a. Planted areas will be inspected at completion of installation and accepted subject to compliance with specified materials and installation requirements. To be acceptable, plants shall be in compliance with all planting specifications contained herein. The permit holder shall be obligated to make necessary modifications to plants in order to comply with stated specifications.
- b. The property owner will assume plant maintenance.

D. Other Maintenance Specifications and Standards

1 Maintenance Criteria

- a. Fertilization. Tree fertilization shall be done in accordance with ANSI 300 (Part 2)-1998 standards and specifications.
- b. Cabling and Bracing. The installation of cabling and bracing tree support systems is a specialized practice in the field of arboriculture. Proper training and field experience are necessary to perform these treatments successfully and without damaging the tree. These treatments shall be done in accordance with ANSI 300 (Part 3)-2000 standards and specifications.

STREET TREES AND PARK TREES

A. Street Trees

The street tree ordinance states, "The city council and park board recognize that the design of the urban environment must ultimately be for the benefit of the quality of life of the human inhabitants, and that a healthy urban forest is a key component of the quality of life." A focus of the urban forestry program is to advocate for the establishment and retention of adequate planting spaces while considering the community desire for urban aesthetics. Large trees with overhanging canopies of branches are especially desirable. Streets with a cathedral of trees overhead provide many benefits; they provide a traffic calming effect, extend the life of roads, provide a separation between streets and sidewalks, reduce pollution, noise, erosion and wind and cool our community.

Pedestrian buffer strips, or planting strips, vary greatly in size. Street trees with large canopies require space to grow in order to provide full, long-term benefits to the community. The Olmsted Brothers in the report to the Board of Park Commissioners in 1909 state, "In Spokane some progress has already been made in the matter of reducing the width of roadways and increasing the width of parking strips in existing streets, but much that is desirable remains to be accomplished." The statement is more applicable now than ever. Wide planting strips are important, if we want large street trees to reach maturity without damaging sidewalks, curbs and streets. Street system design should provide sufficient space to accommodate large trees.

The principles set forth in the Arboriculture Specifications and Standards manual shall be applied to all street trees in the City of Spokane.

B. Park Trees

Parks constitute one of the best means of drawing people outdoors, and the significant feature of parks is trees. The care of trees in public parks is easily on par with the most enlightened activities that may be done for the community. The cause of public parks is public health and park trees represent the city's lungs, sweeping the city's air of impurities and filling it with life sustaining oxygen.

The maintenance of trees in developed parks and trees on conservation parkland should be more extensive than has yet been the case.

The principles set forth in the Arboriculture Specifications and Standards manual shall be applied to all park trees in the City of Spokane.

SPACING, LOCATION AND TREE SELECTION REQUIREMENTS

Trees are living organisms that grow larger each year increasing in height, crown width and size of root system. Plan for trees to have room to grow in height and width by considering their mature size and shape. Tree canopies may be rounded, pyramidal, vase-shaped, broad (wider than tall) or oval. Trees require space to reach their full size without crowding buildings, sidewalks, overhead utility lines, neighboring properties and other plants.

Large trees growing in limited space along city streets cost cities and utilities millions of dollars each year in needed repairs to streets, sidewalks and sewers, and in pruning for road and overhead clearance. Large, fast growing trees with invasive root systems, such as poplars, cottonwoods and willows can cause damage to sidewalks, driveways, sewer and septic systems, underground utilities and foundation and basement walls. This is not only expensive to repair, but can also create serious hazards for pedestrians. Trees with low, spreading branches are appropriate for screens but not for placement along streets where good visibility and clearance is essential. Tree limbs can obscure streetlights, traffic signs and signals, and dangerously restrict views of oncoming traffic. Trees that conflict with power lines increase pruning and maintenance costs, can cause power outages and affect the aesthetics of the tree.

Good tree selection should accommodate site use and public safety needs without compromising other infrastructure improvements. When choosing and planting a tree, the following criteria shall be applied.

- 1** At the intersection of roadways, no plant material with a mature height greater than thirty-six inches and less than eight feet shall be planted within the sight triangle along the boundary of each of the intersecting curb lines. Sight triangles vary depending upon the type of street. No plant shall be planted in such a location so as to create a conflict with the sight obstacle triangle (Fig. 1, Appendix B).

2. No tree planting is permitted where the distance between a curb and detached sidewalk is less than five feet. If the parking strip width is less than five feet wide, other alternatives for planting may be considered. However, these alternatives should be used judiciously in order to comply with the Manual on Uniform Traffic Control Devices. These alternatives include: 1) plant the tree behind the sidewalk; 2) construct an arc in the sidewalk to create a planting space; or 3) selection of tree, shrub or perennial flower species appropriate for the limited space.
3. No tree or shrub shall be planted within fifteen feet of any driveway, alley, streetlight, utility pole, street sign or fire hydrant. The potential placement of street signs, street lights and utility poles shall be evaluated to lessen the conflict with the growth of existing street trees.
4. No tree other than those designated as small (Class I) trees shall be planted under any overhead utility lines.
5. Class I trees shall be planted in parking strips five feet wide and in all parking strips with overhead utility lines. Class II trees shall be planted in parking strips five to eight feet wide. Class III trees shall be planted in parking strips eight to twelve feet wide. Class IV trees shall be planted in parking strips greater than twelve feet wide.
6. Spacing between trees within the parking strip shall be no closer than 25 feet for Class I trees, 35 feet for Class II trees, 50 feet for Class III trees and 70 feet for Class IV trees.
7. No tree shall be closer than five feet behind the sidewalk whenever a sidewalk is attached or abutting the curb (integral curb and sidewalk). The tree shall be located in the public right-of-way. If a public right-of-way does not exist behind the sidewalk, the property owner may grant an easement to the City of Spokane for the new tree installation.
8. Trees shall be planted in the center of parking strip between the curb and sidewalk when a detached sidewalk is present or when sidewalk plans specify a detached sidewalk.
9. All policies developed by the Urban Forestry Program, as authorized through the Urban Forestry Committee and the Spokane Parks and Recreation Board in effect at the time of permitting shall be adhered to during the planting of trees and shrubs.

TREES NOT RECOMMENDED FOR RESIDENTIAL, STREET SIDE PLANTING OR UNDER UTILITY LINES.

The following trees are not recommended for planting on any public rights-of-way in Spokane, Washington. These trees exhibit characteristics including, but not limited to:

Fast growing trees having weak, brittle wood that are subject to decay. These trees are often associated with damage to curbs, sidewalks, and driveways.

Common Name

Botanical Name

Cottonwoods, Aspen, or Poplars
Willows
Silver Maple
Tree of Heaven
Boxelder
Black Locust

Populus sp.
Salix sp.
Acer saccharinum
Ailanthus altissima
Acer negundo
Robinia pseudoacacia

Severely attacked by insects or diseases that weaken or defoliate branches, decrease tree vigor and shorten lifespan.

Boxelder
Black Locust
Elms
Birches
American Sycamore
Russian Olive

Acer negundo
Robinia pseudoacacia
Ulmus sp.
Betula sp.
Platanus occidentalis
Elaeagnus angustifolia

Produce and drop large or messy fruit that may cause hazardous conditions for pedestrians and extra clean-up work for the homeowner/resident.

Common Horsechestnut
Mountain Ash
American Sweetgum
Oaks
Flowering Crabs
Flowering Cherries

Aesculus hippocastanum
Sorbus sp.
Liquidambar styraciflua
Quercus sp.
Malus sp.
Prunus sp.

Trees that experience chlorosis problems. or a yellow color in the leaves due to nutrient unavailability in alkaline soils.

Pin Oak
Scarlet Oak

Quercus palustris
Quercus coccinea

Do not plant all conifers in these taxa trees along street sides, but they may be planted in residential yard areas - Very large, obstruct travel ways, reduce visibility, continuously dropping needles and/or cones which include most large conifers.

Pines
Douglas fir
Spruce
Firs
Cedars

Pinus sp.
Pseudotsuga menziesii
Picea sp.
Abies sp.
Thuja sp.

TREE PRESERVATION DURING CONSTRUCTION AND DEVELOPMENT

A. Introduction

Construction damage and development are some of the most common causes of tree death and decline in urban areas. It is possible to preserve trees on construction sites if the right measures are taken. The most important step is to be sure that Spokane's urban forestry professional is involved early in the project—during the planning stages.

Where trees exist on public land that is to be developed, it makes good sense economically, socially and environmentally to preserve these natural assets. Tree preservation requires an understanding of tree biology, as well as of construction techniques and their impact on tree health and structure. A systematic approach and proper tree management techniques can protect trees during construction and into the future. Successful tree preservation results in higher property values and a livable community.

B. Protection and Preservation Specifications and Standards

Tree preservation efforts shall comply with sections 12.02.914 and 12.02.916 of the street tree ordinance and as outlined by the following criteria.

1. The urban forester shall review all projects involving tree(s) on public property when the project is conceived and continue through the planning, design, construction and maintenance phases. Decisions to preserve and remove specific trees can be discussed and determined at the same time, as are decisions about site layout, grading requirements and construction techniques.
2. Tree protection and preservation shall adhere to established arboriculture practices as determined in 'Trees and Development. A Technical Guide to Preservation of Trees During Land Development.' – 1998 or as amended.

GLOSSARY

ANSI A300 standards – Industry developed standards of practice for tree care; acronym for American National Standards Institute

ANSI Z133.1 – safety standards for tree care operations
Arboriculture - the study of trees and other plants

Backfill – soil put back into the hole when planting a tree

Balled and burlapped (B & B) – having the root system and soil wrapped in burlap for moving and planting a tree or other plant

Bare root – tree or other plant taken from the nursery with exposed root system, without soil

Bottoming – excessive removal of the lower branches

Bracing – installation of metal rods through weak sections or portions of a tree for added support

Branch bark ridge – top area of a tree's crotch where the growth and development of the two adjoining limbs push the bark into a ridge

Branch collar – area where a branch joins another branch or trunk created by overlapping wood tissues

Cabling – installation of hardware in a tree to help support weak branches or crotches

Central leader – the main stem of a tree

Codominant branches/stems – forked branches of nearly the same size in diameter and lacking a normal branch union (or containing a branch union with included bark).

Crown – the aboveground portions of a tree.

Crown cleaning – removal of watersprouts and dead, dying, diseased, crossing and high-risk branches from a tree.

Crown raising – removal of the lower branches of a tree in order to provide clearance for buildings, vehicles and pedestrians.

Crown reduction – pruning to reduce the height and/or spread of a tree by cutting to a lateral branch or limb at least one-half the diameter of the cut being made.

Crown restoration – a method of restoring the natural growth habit of a tree that has been topped or damaged in any other way.

Crown thinning – selective removal of laterals from branches and limbs to provide light and air movement through the crown or to lighten the weight of the remaining branches.

Deadwooding – removal of dead and dying limbs from a tree.

Decay – decomposition of woody tissues by fungi or bacteria.

Dieback – condition in which the ends of the branches are dying.

Drop-crotch pruning – see crown reduction

Heading back – topping; cutting of limbs back to buds, stubs or lateral branches not large enough to assume apical dominance.

Included bark – bark that becomes embedded in a crotch between branch and trunk or between codominant stems and causes a weak structure.

Internode – the region of the stem between two successive nodes.

Leader – the primary terminal shoot or trunk of a tree.

Lion tailing – the poor pruning practice in which the limbs are thinned from the inside of the crown to a clump of terminal foliage.

Node – the slightly enlarged portion of a stem where leaves and buds arise.

Occupational Safety and Health Act (OSHA) – the United States legislative act dealing with health and safety in the work place.

Pruning – cutting away unwanted parts of a plant.

Raising (Elevating) – the removal of lower limbs from a tree to provide clearance.

Reduction – pruning to decrease height and /or spread of a branch or crown.

Restoration – pruning to improve the structure, form and appearance of trees that have been severely headed, vandalized, topped or damaged.

Scaffold branches – the permanent or structural branches of a tree.

Species – a group of organisms composed of individuals of the same genus.

Staking – supporting a newly planted tree or leaning tree with stakes.

Stress – factors that negatively affects the growth and health of a tree.

Structural defects – flaws, decay or other faults in the trunk, branches, or root collar or a tree that may lead to failure of the tree.

Structural pruning – pruning to establish a strong scaffold branch system.

Subordinate – pruning to reduce the size and growth of a branch in relation to other branches or leaders.

Sucker – shoot arising from the roots.

Thinning cut – removes a branch at its point of attachment.

Topping – cutting back a tree to buds, stubs or laterals not large enough to assume the role of leader.

Undercut – a cut on the underside of a limb to be removed to prevent tearing as the limb falls.

APPENDIX A

Maintenance Responsibility List

AREA	ACREAGE	CLASSIFICATION	CONTROL
Developed Parks			
Audubon	26.57	Community	Park Board
A.M. Cannon	8.00	Community	Park Board
B.A. Clark	9.92	Neighborhood	Park Board
Cannon Hill	13.11	Neighborhood	Park Board
Chief Garry	10.78	Neighborhood	Park Board
Cannon Pool	0.50	Pool	Park Board
Comstock	24.75	Community	Park Board
Comstock Pool	0.50	Pool	Park Board
Corbin	11.50	Neighborhood	Park Board
Corbin Art Center	0.50	Center	Park Board
Corbin Community Center	0.50	Center	Park Board
Courtland	3.70	Neighborhood	Park Board
Cowley	2.08	Neighborhood	Park Board
Dutch Jake's	0.43	Mini	Park Board
Emerson	3.50	Neighborhood	Park Board
Finch	56.65	Arboretum	Park Board
Franklin	43.35	Community	Park Board
Friendship	12.00	Neighborhood	Park Board
Glass	3.47	Neighborhood	Park Board
Glover	2.29	Neighborhood	Park Board
Grant	12.62	Neighborhood	Park Board
Grandview	5.65	Neighborhood	Park Board
Harmon	10.65	Neighborhood	Park Board
Hays	7.83	Neighborhood	Park Board
Heath	1.00	Neighborhood	Park Board
High Bridge	7.00	Neighborhood	Park Board
Hillyard Pool	1.00	Pool	Park Board
Indian Trail	3.50	Neighborhood	Park Board
Jim Hill	1.58	Neighborhood	Park Board
Liberty	22.13	Community	Park Board
Liberty Pool	0.50	Pool	Park Board
Lincoln	5.00	Neighborhood	Park Board
Logan	0.64	Mini	Park Board
Loma Vista	5.70	Neighborhood	Park Board
Manito	90.00	Major	Park Board
Loren Kondo	2.00	Mini	Park Board
Minnehaha	7.00	Neighborhood	Park Board
Mission	13.33	Neighborhood	Park Board
Nevada	8.60	Neighborhood	Park Board
Northpoint	4.00	Neighborhood	Park Board
Pacific	5.00	Neighborhood	Park Board
OPS	2.00	OPS	Park Board
Parkwater	2.00	Mini	Park Board
Peaceful Valley Maple	1.00	Mini	Park Board
Peaceful Valley Community	0.50	Center	Park Board

Center			
Pioneer	9.00	Neighborhood	Park Board
Polly Judd	2.00	Neighborhood	Park Board
Riverfront	100.00	Major	Park Board
Rochester	4.00	Neighborhood	Park Board
Ruth	1.68	Neighborhood	Park Board
Shadle	40.00	Community	Park Board
Sinto Center	0.50	Center	Park Board
Sky Prairie	25.00	Neighborhood	Park Board
Southside Senior	0.50	Center	Park Board
St. Patrick's	2.00	Neighborhood	Park Board
Thornton Murphy	8.00	Neighborhood	Park Board
Underhill	19.20	Neighborhood	Park Board
Webster	2.33	Neighborhood	Park Board
Whitter	3.50	Neighborhood	Park Board
Wild Horse	2.72	Neighborhood	Park Board
Witter Pool	1.50	Pool	Park Board
Your Place	0.50	Mini	Park Board

CONSERVATION AREAS

Cliff Drive	9.00	Conservation	Park Board
Downriver	95.00	Conservation	Park Board
Drumheller Springs	12.00	Conservation	Park Board
Downriver Canoe Access	3.00	Conservation	Park Board
Hamblen	6.71	Conservation	Park Board
Hamblen Conservation Area	63.00	Conservation	Park Board
Hangman	294.00	Conservation	Park Board
High Drive	177.00	Conservation	Park Board
Indian Canyon	129.00	Conservation	Park Board
Latah Creek	20.00	Conservation	Park Board
Liberty Freeway	3.00	Conservation	Park Board
Meadowglen	16.00	Conservation	Park Board
High Bridge/People's	163.00	Conservation	Park Board
Upper Lincoln	46.00	Conservation	Park Board
Minnihaha Conservation	31.00	Conservation	Park Board
Boulder Beach	4.00	Conservation	Park Board
Camp Sekani	124.98	Conservation	Park Board
Palisades	426.64	Conservation	Park Board
Peace Valley Shore line	4.00	Conservation	Park Board
Summit	11.00	Conservation	Park Board
Skeet-so-mish	0.50	Conservation	Park Board
South Riverton	4.50	Conservation	Park Board
Sterling Heights	8.27	Conservation	Park Board
Three Springs	3.00	Conservation	Park Board
Upriver Drive	4.00	Conservation	Park Board
35th Blvd.	6.50	Islands	Park Board
Upriver Drive	1.50	Islands	Park Board

ISLANDS

Garfield Islands	2.00	Islands	Park Board
High Drive Park Way	3.50	Islands	Park Board
Manito extension	1.50	Islands	Park Board
Misson Strip	3.00	Islands	Park Board

Park Blvd.	4.00	Islands	Park Board
Riverside Strip	0.40	Islands	Park Board
Rockwood Blvd.	3.00	Islands	Park Board
Skyview	1.10	Islands	Park Board
Coure d' Alene Strip	1.00	Islands	Park Board
T.J. Meenach	6.00	Islands	Park Board
21st. Blvd.	2.00	Islands	Park Board

TRAILS (IN MILES)

Ben Burr	1.00	Trail	Park Board
Centennial	26.00	Trail	State
Fish Lake	10.50	Trail	Park Board
Tuffy's	4.00	Trail	Park Board

GOLF COURSES

The Creek at Qualchan	225.00	Golf Course	Park Board
Downriver	168.90	Golf Course	Park Board
Esmeralda	170.00	Golf Course	Park Board
Indian Canyon	208.30	Golf Course	Park Board

APPENDIX B

Pruning Techniques

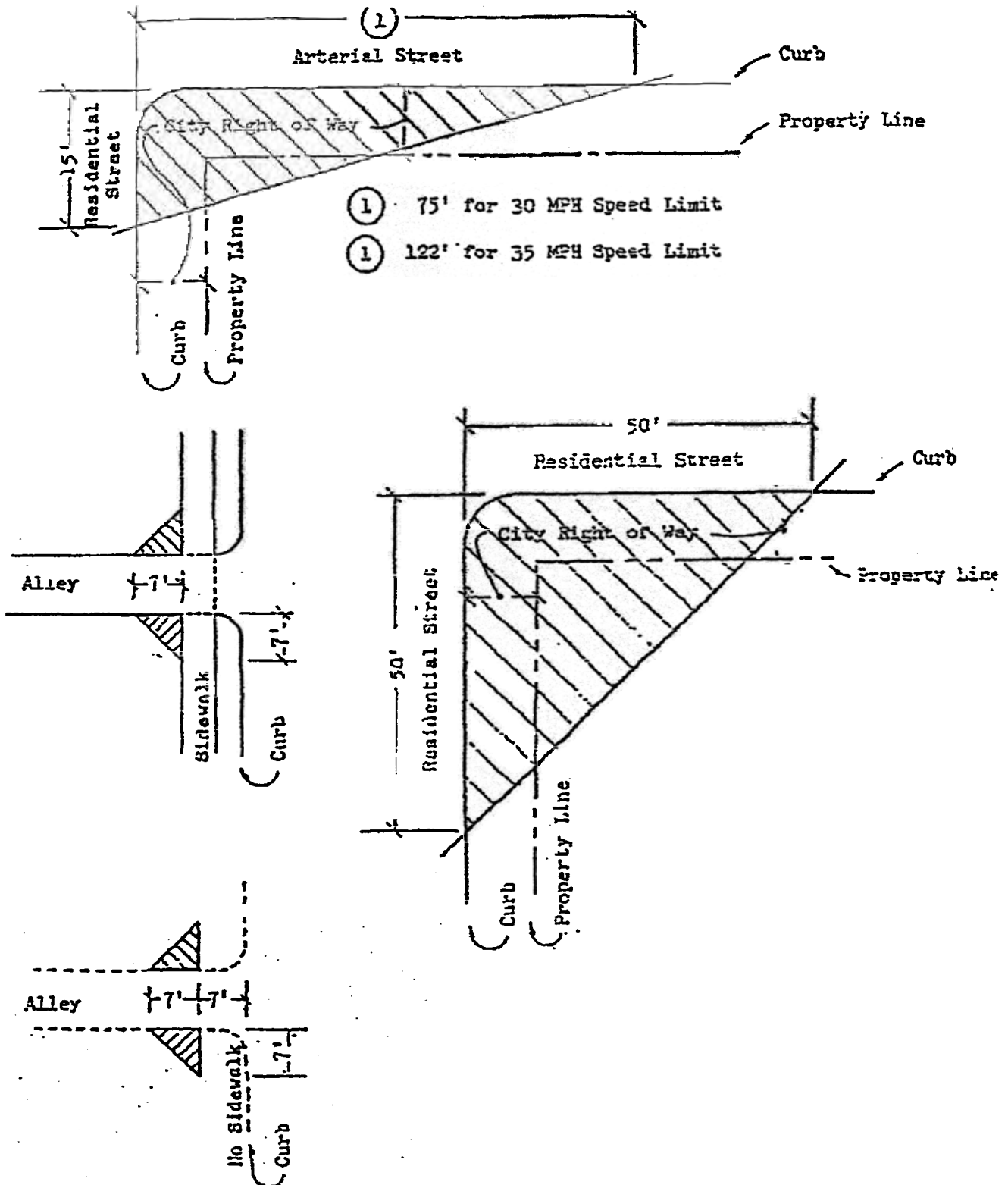


Fig. 1. Clear view intersection requirements.

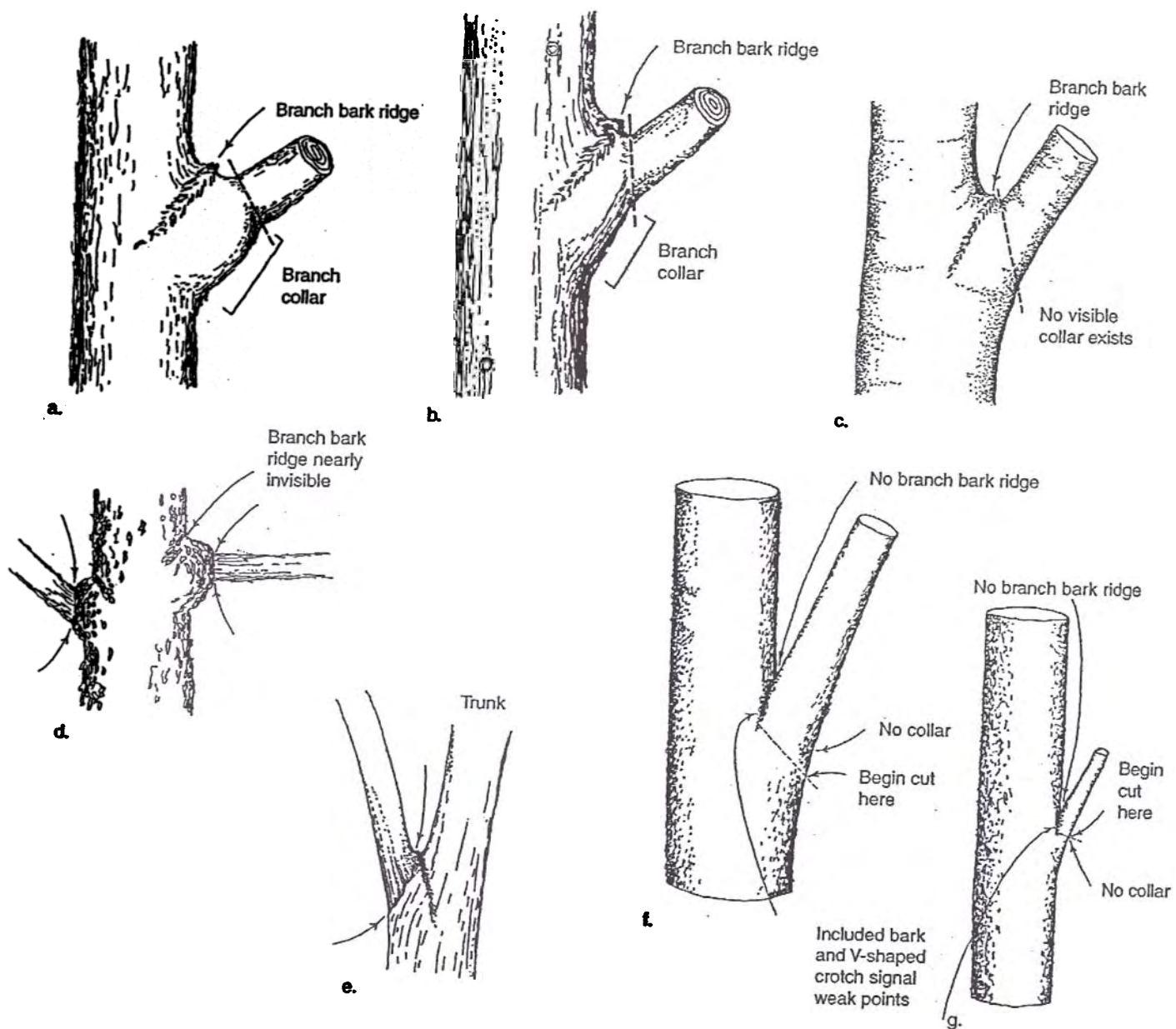
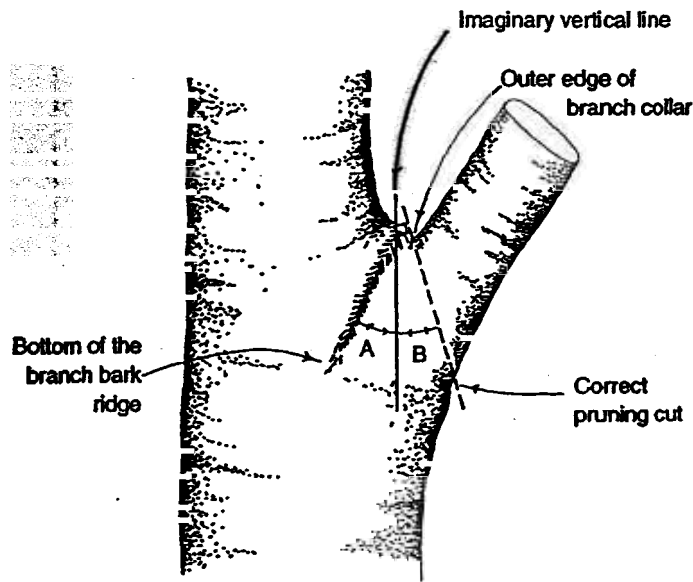


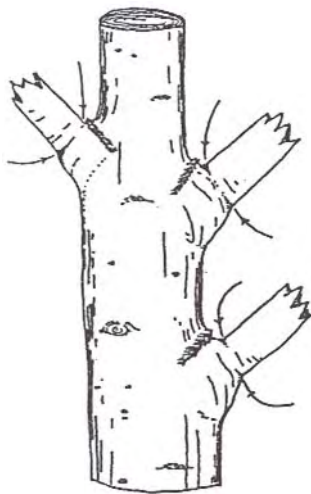
Fig. 2. Branch collars and branch bark ridges occur in a variety of shapes and sizes on different species and ages of trees. When removing a branch from the trunk, cut along the dashed line on the branch side of the swollen collar tissue (a and b). Many branches do not form a distinct collar so there is a smooth transition from trunk onto the branch (c).



Making the proper cut when there is no visible branch collar

Fig. 3. Making the cut branch collar absent. The final cut is made so that angle B is greater than or equal to angle A.

Side view of correct cuts



Before pruning



After pruning

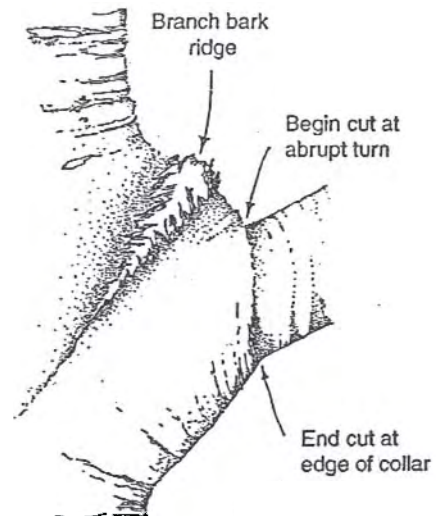


Fig. 4. Making the cut branch collar present. To remove a branch over one inch in diameter, make the first cut on the underside of the branch to a depth of $\frac{1}{4}$ of the diameter of the branch. Make the second cut through the branch at point one to two inches beyond the first cut. The final cut is made outside the branch bark ridge and branch collar.

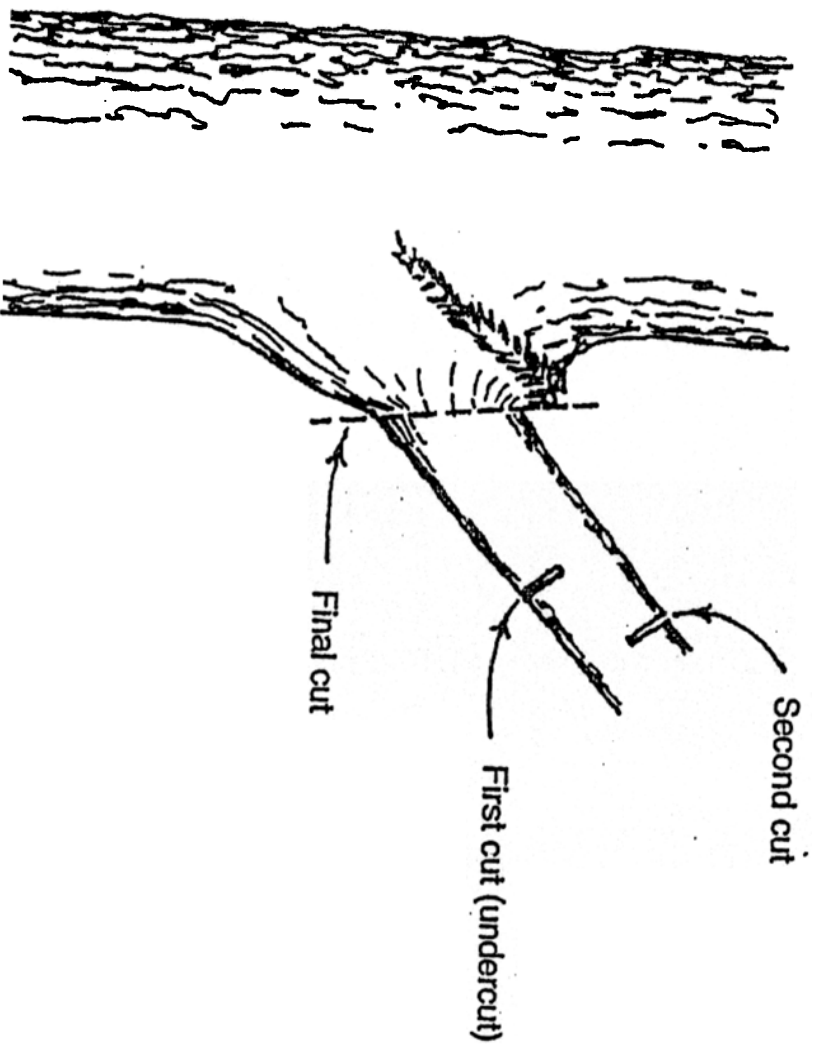
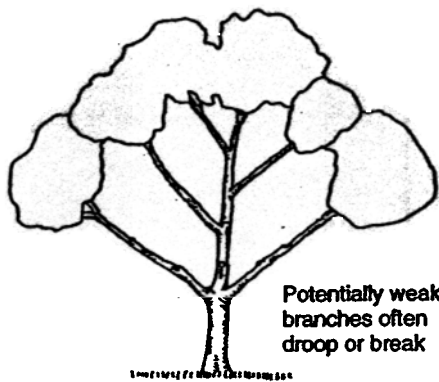
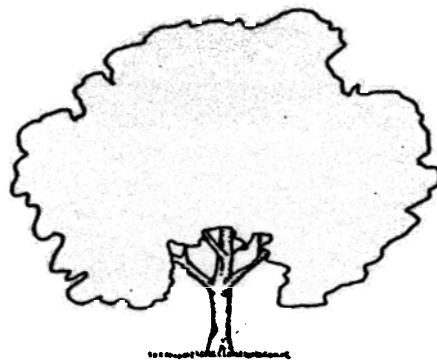


Fig. 5. The three step cutting method is used for branches larger than one inch diameter.

Improperly thinned tree has few if any secondary branches along main branches



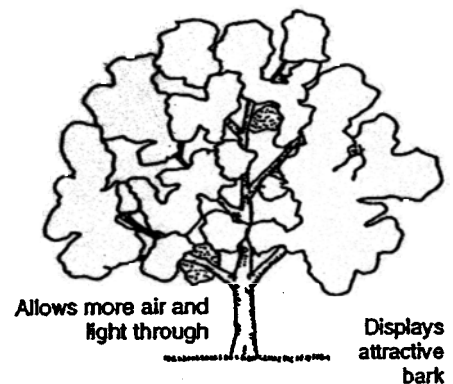
Improper thinning



Unpruned tree with foliage

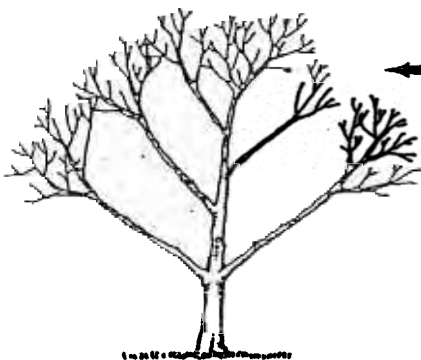
Start here

Properly thinned tree has secondary branches and twigs along main branches

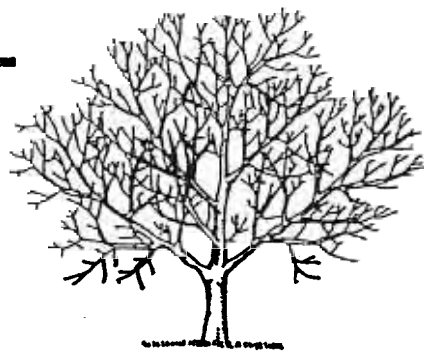


Proper thinning

Tree looks odd, all branches are at tips

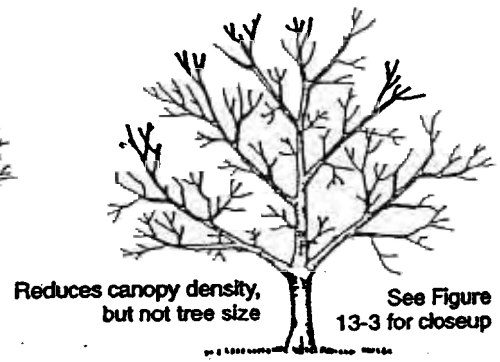


Improper thinning



Unpruned tree without foliage

Nicely formed canopy



Proper thinning

Fig. 6. Thinning the canopy. Appropriate thinning removes small branches from the edge of the canopy (right). Inappropriate thinning removes only interior and lower branches (left).

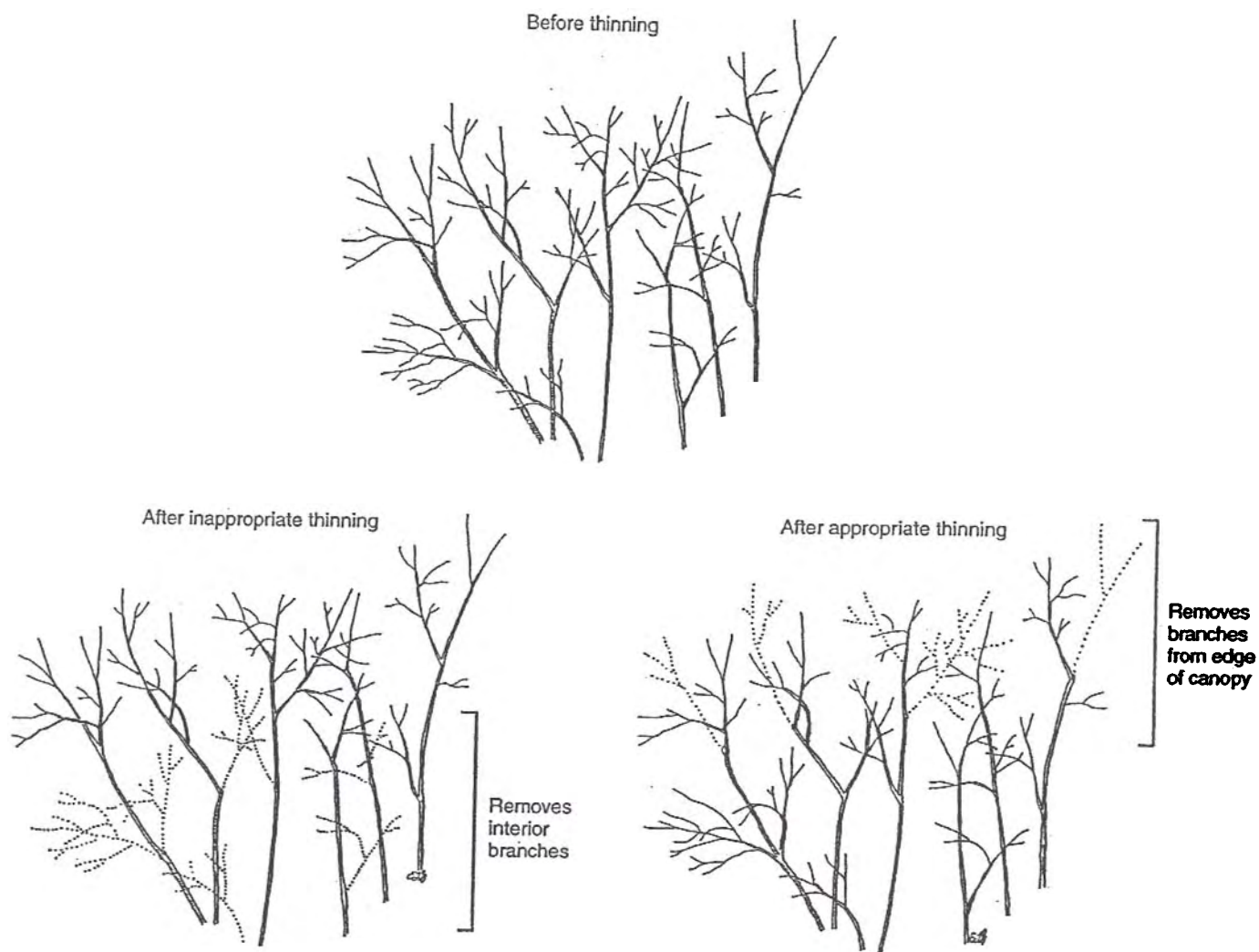


Fig. 7. Thinning trees at the edge of the canopy.

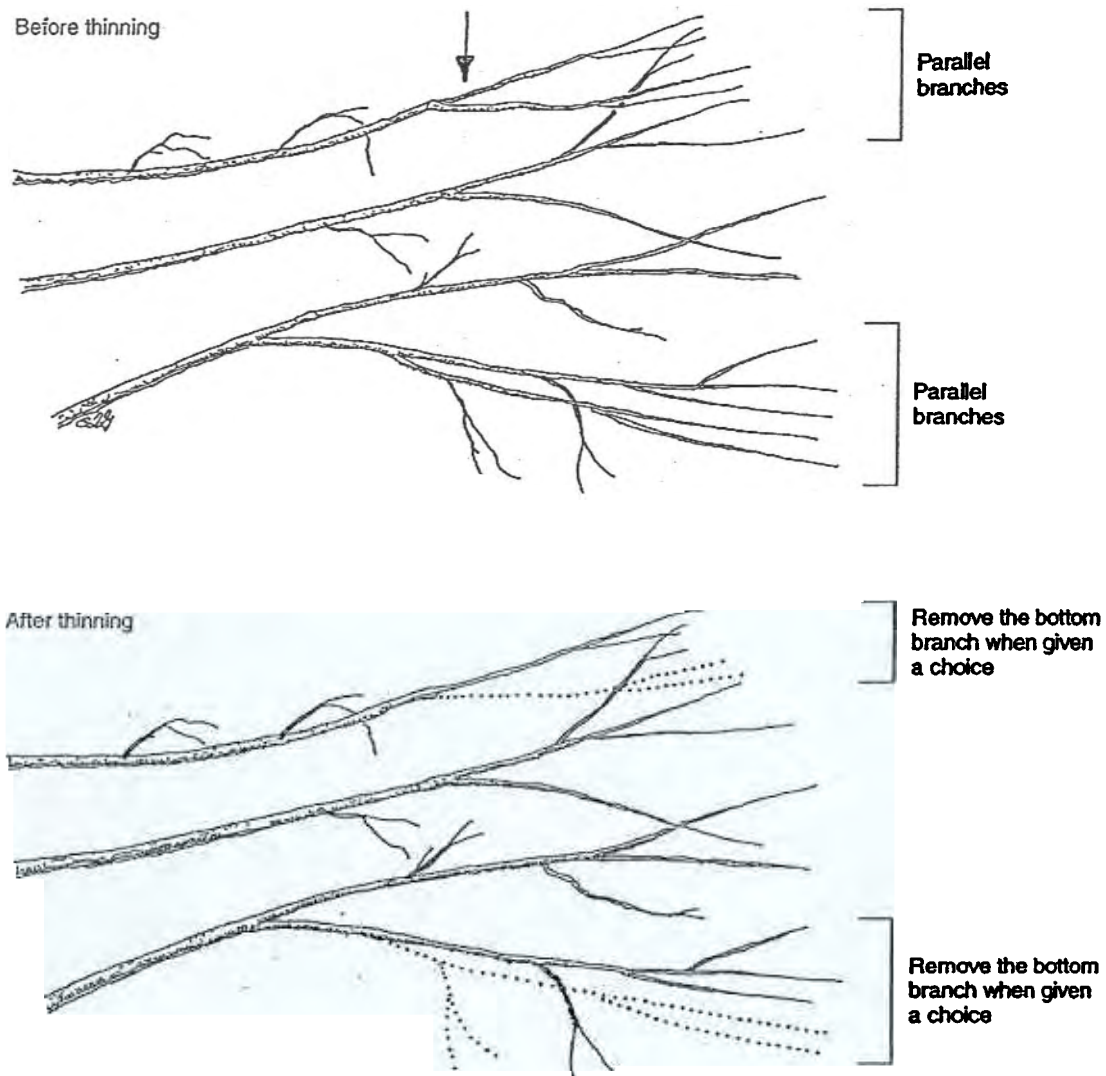


Fig. 8. Thinning removes branches growing parallel to each other.

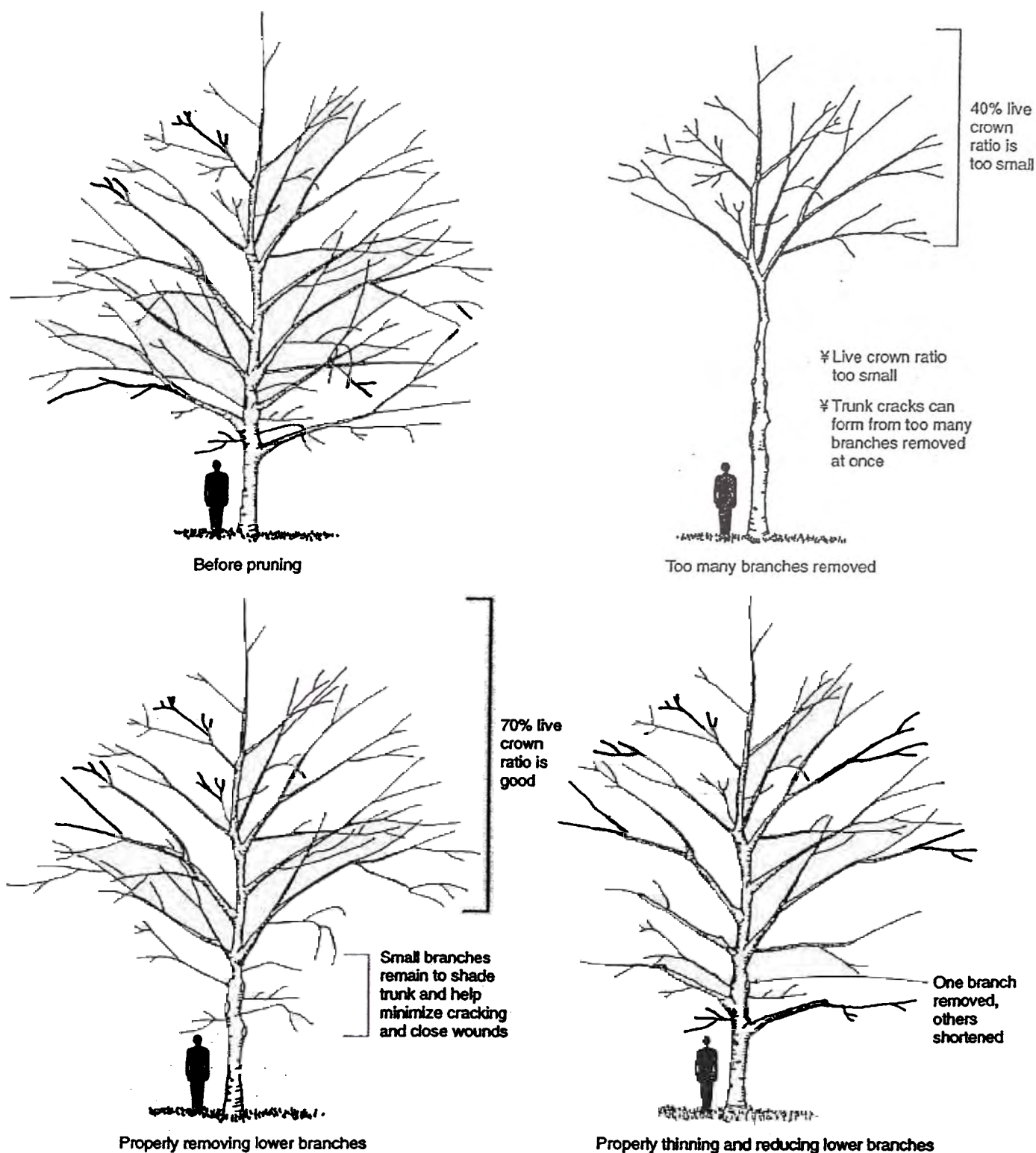
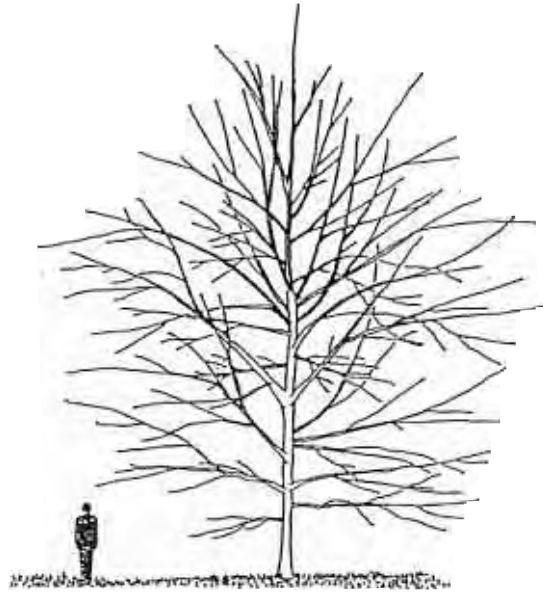
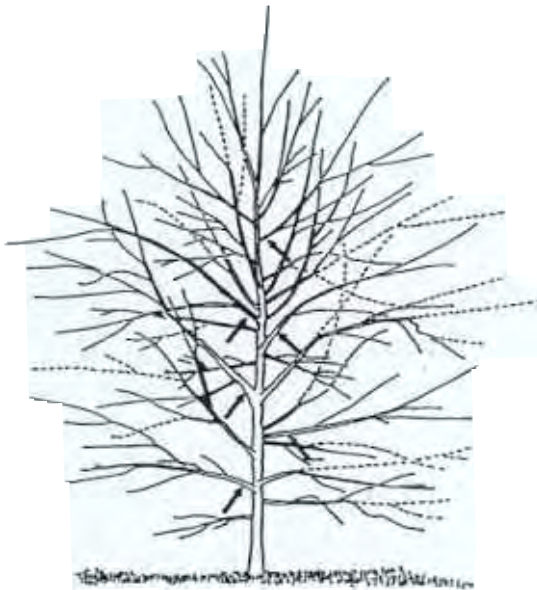


Fig. 9. Raising the canopy. After proper canopy raising, a goal is to have foliage on branches in the upper 2/3 of the tree (bottom diagrams). Live crown ratio should be at least 60%.

Before pruning



Remove indicated branches



After pruning

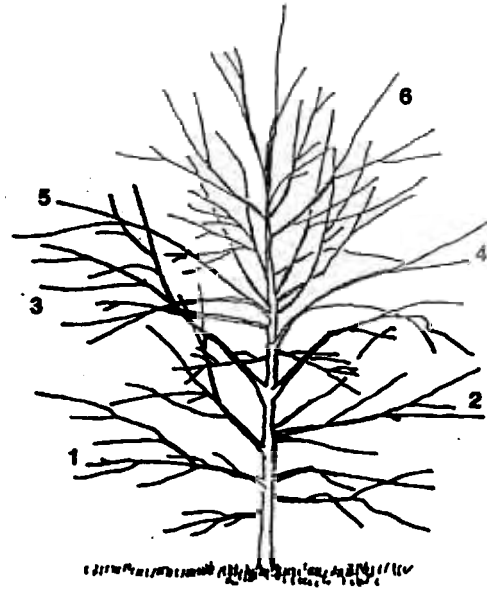


Fig. 10. Reducing the length of branches competing with scaffold limbs. The distance between scaffold limbs should be at least 5% of the ultimate tree height.

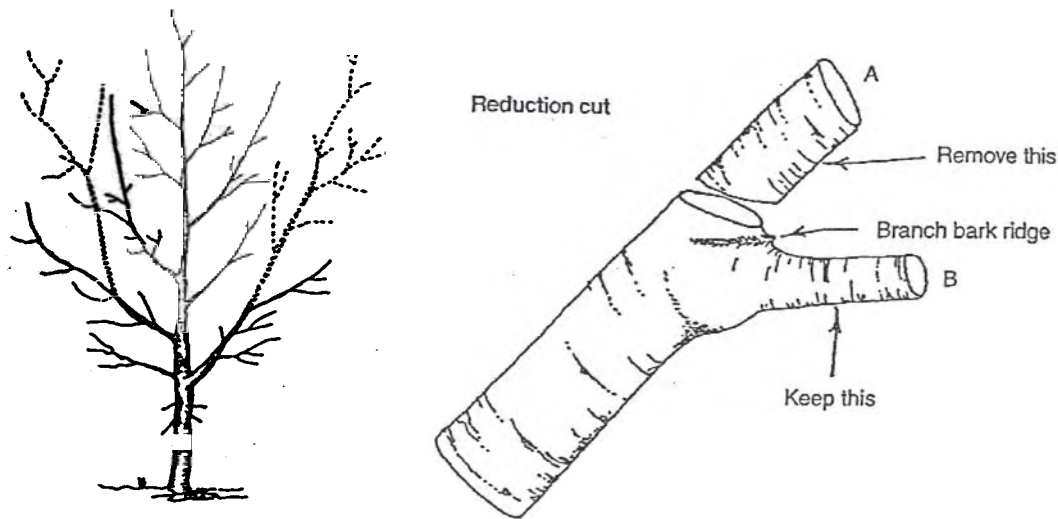


Fig. 11. Reduction cut is made back to a branch (B) no smaller than about $\frac{1}{2}$ the diameter of the cut stem.

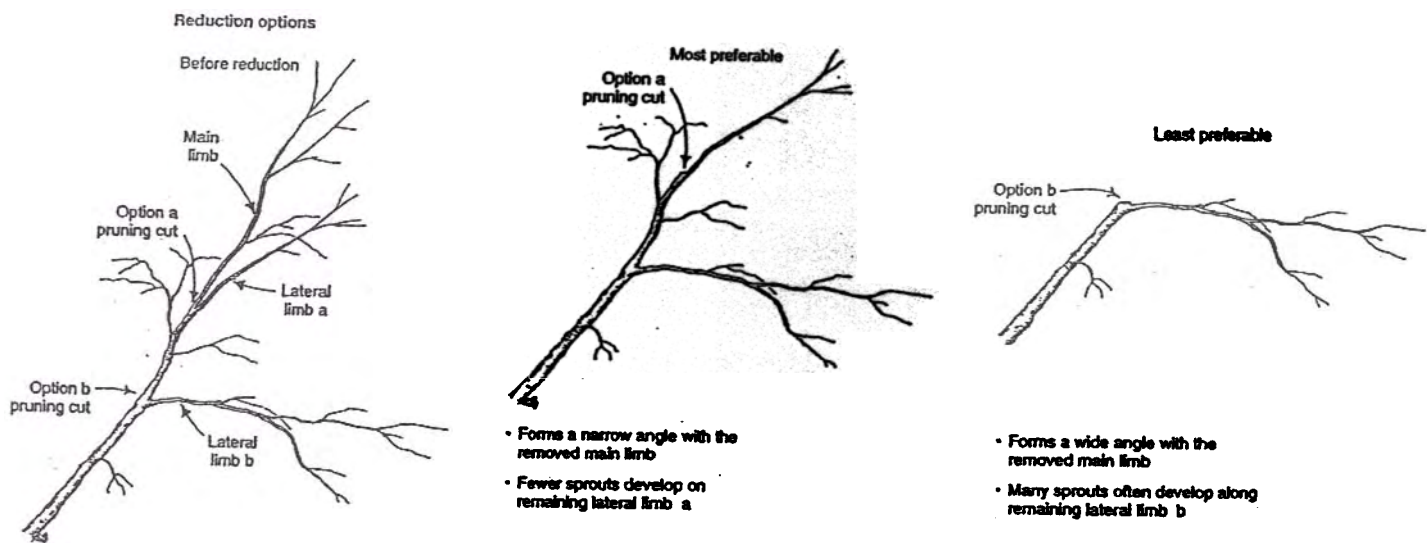


Fig. 12. Reduction options. Shortening a main limb or stem back to a lateral branch with a narrow angle (lateral limb 'a' – option 'a') is better than shortening back to a branch with a wider angle (lateral limb 'b' – option 'b').

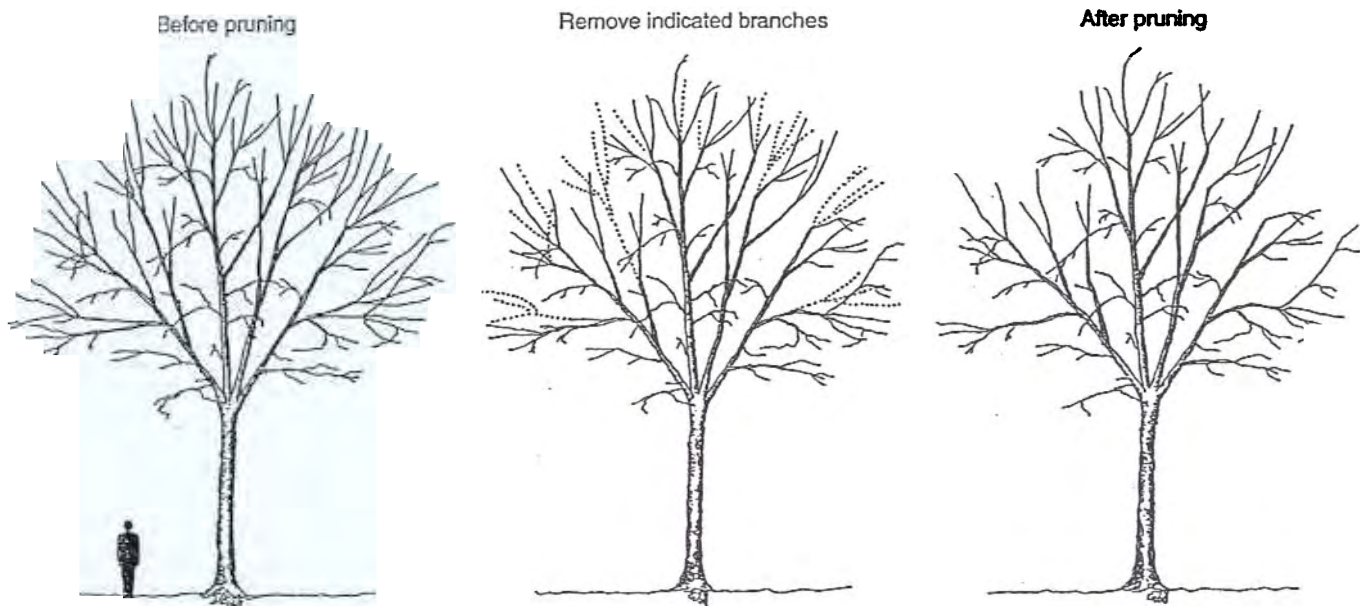


Fig. 13. Subordinate codominant stems so that one can dominate. Many prunings over a period of years may be required to significantly influence structure.

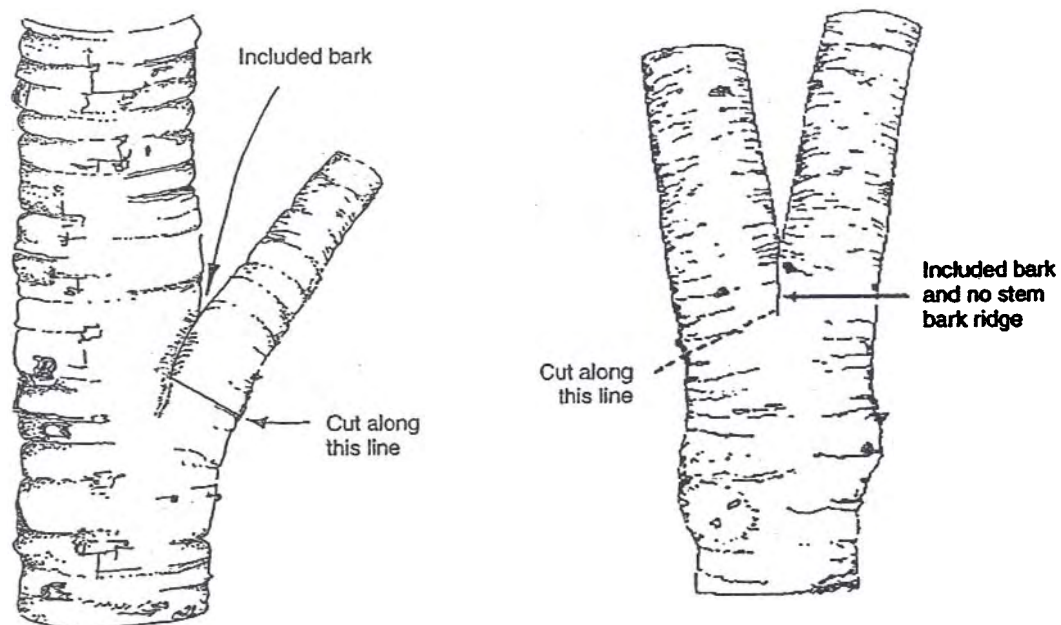


Fig. 14. Remove a branch or stem with included bark by cutting into the union without injuring the trunk that will remain.

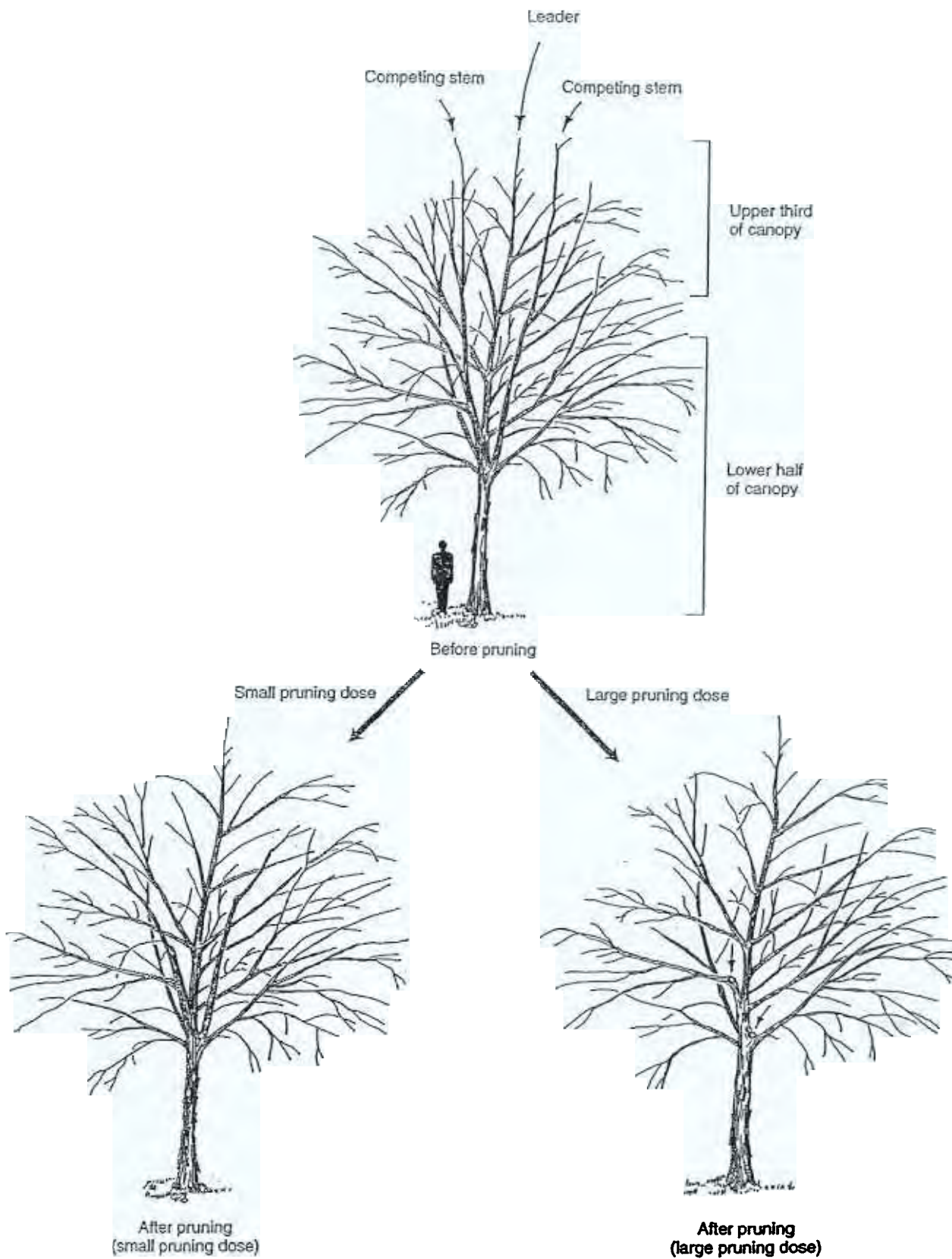


Fig. 15. Subordination of stems and branches competing with the leader.

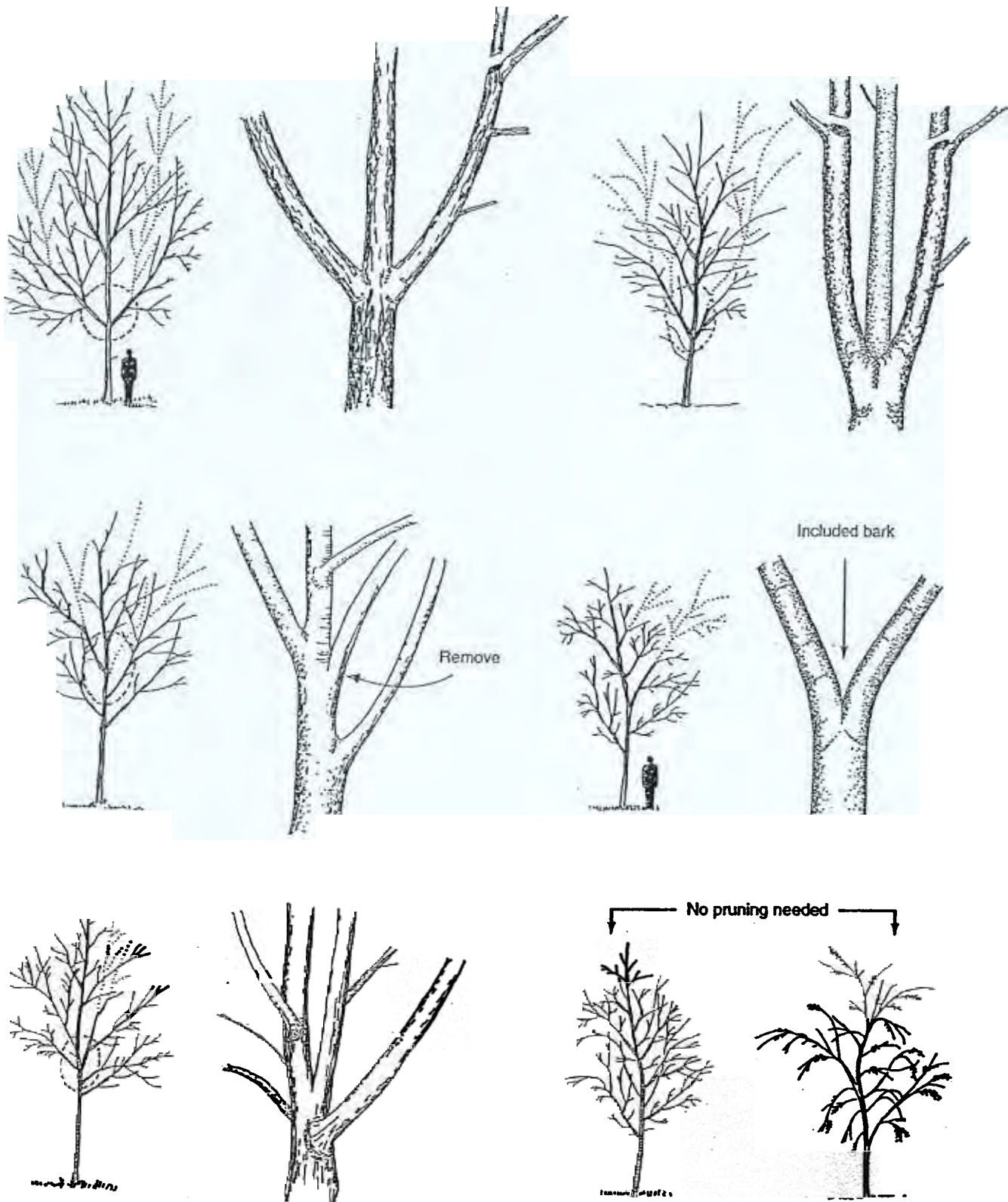
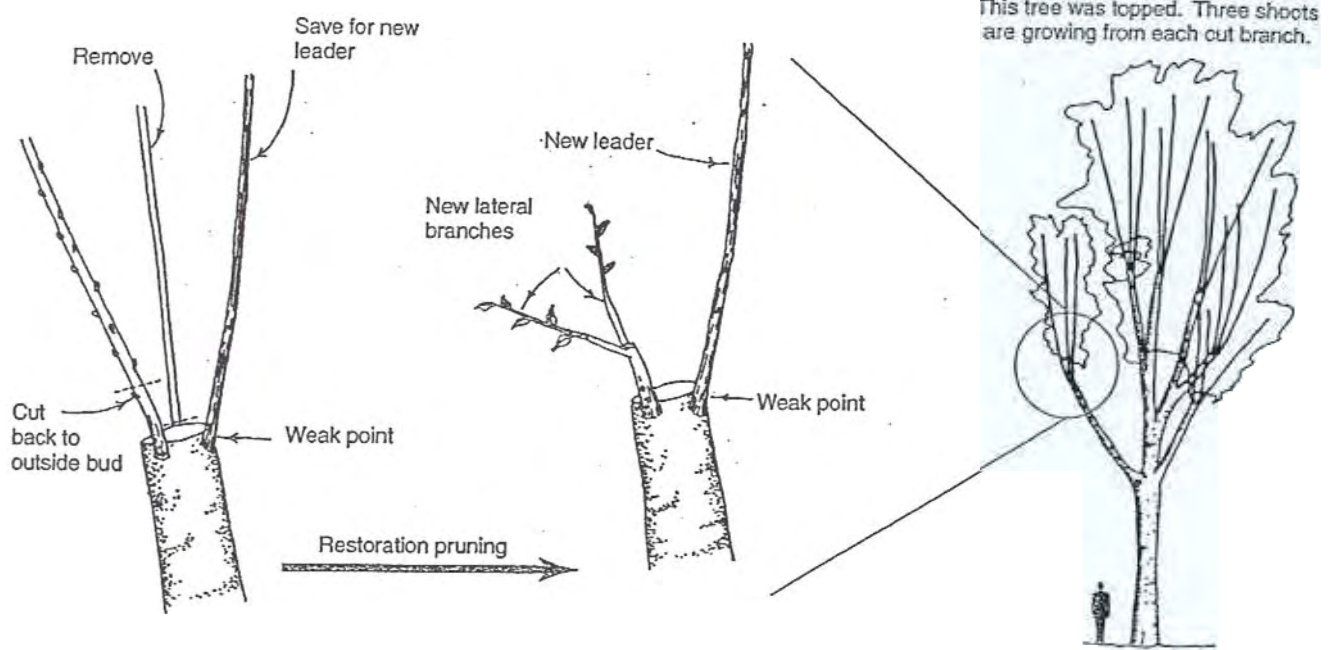
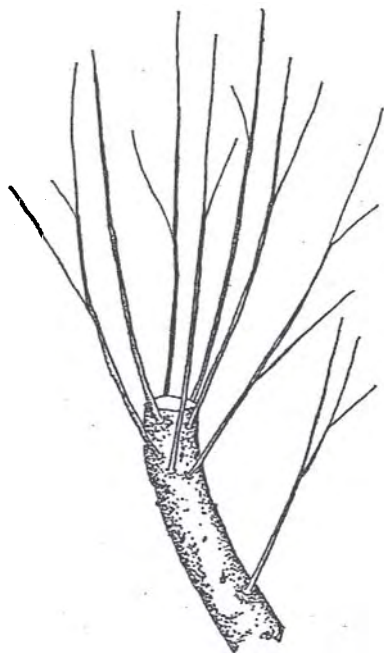


Fig. 16. Maintaining a dominant leader. Circled area on each full tree drawing is shown in the detailed view to the right of each tree.

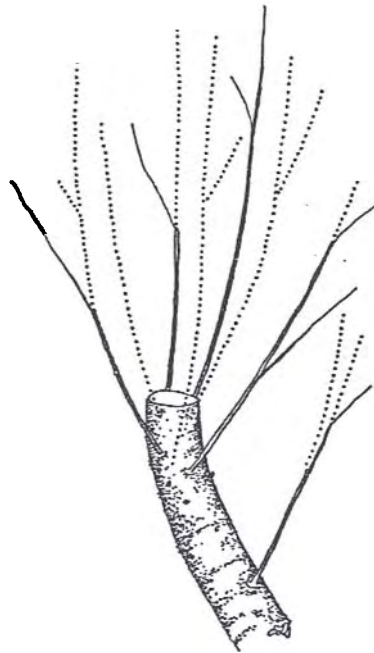


Before restoration pruning



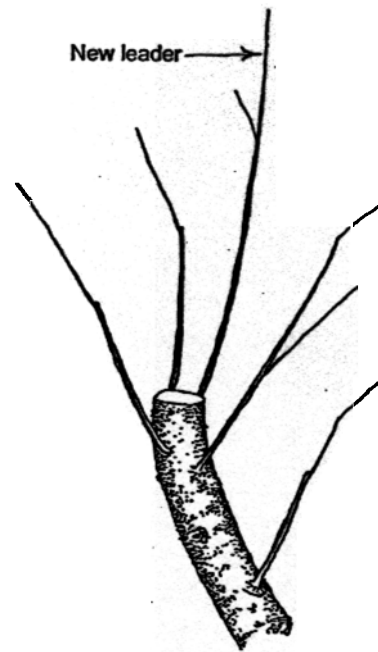
- Too many sprouts at one location

Remove indicated sprouts



- Remove some sprouts
- Shorten other sprouts

After restoration pruning



- New leader has room to develop lateral branches

Fig.17. Crown restoration of a topped tree.

REFERENCES

American National Standards Institute Z133.1- 2000; A300 (part 2 and 3).

Arboriculture. Integrated Management of Landscape Trees, Shrubs and Vines.

Illustrated Guide to Pruning

International Society of Arboriculture Arborists' Certification Study Guide

Manual of Woody Landscape Plants