

CHAPTER C2

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C2.00 Introduction

This chapter is divided into three sections. Section 1 provides controlling legal requirements, background regarding the development of the Caltrans Vegetation Control Program, a description of that policy, and requirements for district implementation. Section 2 provides guidance for vegetation control of native plants in non-landscaped areas. Section 3 includes legal requirements and directions for the use of pesticides.

There are four appendices to this chapter: a list of approved herbicides, a list of approved adjuvants, a form used for spray equipment being repaired, and illustrations of pruning methods.

Refer to the Maintenance Manual, Volume 2 for planning, scheduling, administrative controls, and charging practices that apply to this program.

SECTION 1: Legal Requirements, Background, and Policy

C2.01 Laws Regarding the Care of Vegetation in California

(A) The Penal Code, Section 384(a):

This section of the Penal Code relates "... to the protection of native trees, shrubs, ferns, herbs, bulbs, cacti, flowers, huckleberry, or redwood greens." This law prohibits negligence including cutting and removing plants growing upon State or county highway right of ways, public land, and land not owned by persons performing such acts without written permission from the owners.

(B) Streets and Highways Code, Section 730.5

This section relates to the destruction of trees and shrubs on State highways. It allows the State of California to recover \$10,000 for each tree damaged and \$1,000 for each shrub damaged.

(C) Streets and Highways Code, Section 1495

Section 1495 relates to injury to trees on highways.

(D) Streets and Highways Code, Section 670

This section relates to removal or planting of trees and shrubs on State highways.

(E) The California Environmental Quality Act (CEQA)

This law requires that any project that has a significant impact on the environment requires an Environmental Impact Report (EIR). The annual Vegetation Control Plan may be considered to be a project under CEQA.

In preparing an EIR, alternatives and mitigation measures must be considered. Once an EIR is prepared, it is reviewed by the public and other agencies, and a decision is then made by the agency issuing the permit for the project as to whether or not to proceed with the project.

Laws and regulations regarding pesticide use are outlined in detail in Section C2.16 of this chapter.

C2.02 Public Agencies Involved With Cooperative Enforcement of Vegetation Control Practices

The following public agencies enforce regulations that affect vegetation control:

(A) California Department of Health Services (DHS)

DHS develops regulations for worker safety and hazardous material disposal. They cooperate in pesticide illness investigations and monitor domestic water supplies.

(B) United States Environmental Protection Agency (EPA)

This is the federal agency responsible for pesticide control. The EPA reviews State pest control programs for compliance with federal requirements.

(C) California Environmental Protection Agency (Cal-EPA)

California EPA, and agencies under their direction, may provide additional requirements or regulations not required by the Federal EPA.

(D) Department of Pesticide Regulation (DPR)

The Department of Pesticide Regulation (DPR) is the regulatory arm of California EPA that oversees pesticide regulations in California.

(E) State Water Resources Control Board and Regional Water Quality Control Board.

The regional boards (RWQCB) regulate pesticide container disposal sites and water quality standards.

(F) Air Resources Control Board and Regional Air Pollution Control Districts

The board and regional districts regulate dust control and burning.

(G) United States Occupational Safety and Health Administration (OSHA)

This is the federal agency that enforces worker safety and protection.

(H) Division of Occupational Safety and Health Administration

This division, known as Cal-OSHA, is charged with worker safety and protection when mixing, loading, and applying pesticides.

(I) California Department of Fish and Game

California Department of Fish and Game (DFG) cooperate in fish and wildlife loss investigations that may have been caused by pesticides.

(J) University of California

The University of California (UC) system is charged with pest control research and providing education to growers and licensees.

(K) U.S. Fish and Wildlife Service

This is the federal agency that enforces and protects rare and endangered plant and animal species.

Further information regarding pesticide regulation is outlined in detail in Section C2.16 of this chapter.

C2.03 Development of the Caltrans Vegetation Control Policy

“Vegetation control” refers to the Integrated Vegetation Management (IVM) treatment of all plants growing within highway right of way, whether native, naturalized or in landscaped areas. Caltrans controls vegetation on State highway roadsides to maintain clear recovery zones, maintain clear areas around bridge supports, maintain visibility of traffic control devices, to reduce the risk of fires starting along the roadside, to protect pavement surfaces, to control noxious weeds, to prevent erosion, to limit stormwater pollution, to protect sensitive species, and to improve aesthetics.

The IVM methods include chemical, thermal, biological, cultural, mechanical, structural and manual control.

Caltrans vegetation control policy was developed by a statewide committee in 1987. This policy called for a narrow clear strip (4 to 8 feet) next to pavement edges to control risk of fire, to provide for visibility, to provide space for emergency use, and to preserve the pavement. The policy strongly emphasized use of pre-emergent chemicals to suppress weed growth in the cleared strips.

The 1987 policy was the subject of a 1992 Environmental Impact Report (EIR). (Refer to Section C2.01 [E].) The Caltrans policy had been founded on using chemicals to develop fire control bare strips adjacent to shoulder edges. The EIR concluded that integrated vegetation management (IVM) principles should be incorporated in the Caltrans Vegetation Management Program. The EIR study gave new direction to Caltrans vegetation control philosophy. New policies were implemented as a result of the EIR.

Although the EIR established that chemicals could be used for vegetation control without compromising public, employee, and environmental safety, some public opinion expressed the desirability of reducing or eliminating the need to do vegetation control on highway roadsides.

This lower level of vegetation control would reduce herbicides in roadside environments. The Department set goals for reducing herbicide use 50 percent by the year 2000, and to achieve an 80 percent reduction by the year 2012.

The 50 percent goal was met July of 2000. Design changes will be required to meet the 80% goal by 2012.

Designs, strategies, and policies are being developed which will reduce the need for vegetation control. Research on alternative plant species for establishment along road edges is being conducted. Meanwhile, the guidelines for controlling vegetation contained in the “Caltrans Vegetation Control Policies” (green pamphlet) summarize the vegetation control policy of 1987. These policies are subject to district modification where an IVM strategy achieves control objectives.

The treatment widths recommended in the general policy section below are guides only and are to be adjusted to reflect fire risk and other conditions existing in each segment. Control decisions are to be documented by the Landscape Specialist in the Caltrans Vegetation Control Plan.

C2.04 Caltrans Vegetation Control Considerations

Caltrans Vegetation Control policy encourages the growth of native vegetation along highway roadsides. Safety of the traveling public, aesthetics, environmental laws, and compatibility with adjacent land use are the prime considerations in the proper maintenance of vegetation.

It is desirable to retain native vegetation and trees on roadsides compatible with the surrounding environment, safe highway use, aesthetics, erosion, and dust control. Vegetation helps to reduce driver fatigue, improves storm water quality, helps control erosion, maintains slope stability, and enhances aesthetics.

Vegetation should be controlled where necessary for fire prevention, safety, reduction of noxious/invasive weeds, and bridge inspection needs. Removal of vegetation is generally restricted to a narrow band adjacent to shoulder and median edges, which is necessary to provide sight distance and protection of highway appurtenances such as guardrails and signs. Seedlings and established trees must also be removed from clear recovery zones. Integrated Vegetation Management control alternatives should be considered on a site-specific basis.

Refer to District VegCon Plan in IMMS.

Districts are restricted in the use of herbicides as per the Caltrans Approved Herbicide List (refer to Appendix C2-A). Districts are also restricted to the use of adjuvants, as per the Caltrans Approved Adjuvant List (refer to Appendix C2-B). Contact your local District Landscape Specialist to obtain the most current approved lists.

The use of herbicides on Forest Service land is currently restricted. Future use of chemicals on Forest Service land is uncertain, but negotiations are in progress to clarify the environmental issues applicable to forest easements. Vegetation control work in National Forests should be coordinated with the local Forest Supervisor.

Roadsides should be managed on a site-specific basis using IVM methods. This provides the flexibility to adequately adjust treatments to the wide variety of roadside conditions.

C2.05 Statewide and District Vegetation Management Teams

The Roadside Vegetation Management Committee (RVMC) was established to research and recommend design changes that reduce vegetation control needs. It also seeks to identify species of vegetation that can be established on highway roadsides to reduce vegetation control needs. The RVMC is assisted by a Public Advisory Liaison (PALS) committee, with membership from a cross section of vegetation control interests.

The RVMC has been assigned the following tasks:

- (A) Explore design changes that can be established in new and retrofit projects that will eliminate or reduce the use of pesticides.
- (B) Make recommendations for vegetation that will be low, slow growing, require less maintenance, and once established, reduce the need for pesticides.
- (C) Develop a database of sensitive resources along highway roadsides that must be considered in management strategies.
- (D) Recommend short-term strategies while new design standards are being developed.

The RVMC established the “Segment Specific” concept for planning vegetation control and recommended roadside management teams be established in each district to implement this concept. District Vegetation Management Teams (DVMT) meet to review new designs and recommend changes to achieve minimum vegetation control, consider life cycle maintenance commitments, and other consequences of planned vegetation regimes.

The district team also meets to consider the annual vegetation control plan (VegCon) proposed by the Deputy District Director, Maintenance.

District DVMT reviews both the annual plan and the mitigation checklist required by the EIR. The checklist implements the EIR’s programmatic feature and identifies further environmental studies which may be necessary. Should further statewide environmental studies be identified by District DVMT’s, the RVMC should take appropriate action.

The EIR is kept current by annual consideration of program components by the DVMT, using the mitigation checklist.

C2.06 Annual Plans

Each district prepares an annual plan for vegetation control (VegCon Plan). The VegCon Plan is part of the Integrated Maintenance Management System (IMMS). This plan shall be derived from segment specific decisions which should consider fire risk management, safety, aesthetics, stormwater runoff, environmental laws, and community concerns. The plan is prepared each spring, and is the reference document for planning and scheduling Maintenance operations and for budget planning.

During the development of the annual VegCon Plan, districts shall consider vegetation control strategies that have been determined appropriate for the terrain and neighboring land uses. Strategies should provide minimum vegetation control necessary to maintain roadside visibility, drainage and drainage structures, sight distance for traffic visibility, and fuel load reductions appropriate for site conditions. Strategies should not compromise safety or the integrity of the highway surfaces.

In developing annual VegCon plans, districts shall take all applicable factors into consideration, including the following:

- Safety (maintaining clear recovery zones see Highway Design Manual 309.1, 902.2, and 902.3)
- Sight distance
- Fire Risk
- Erosion
- Integrity of highway surfaces.
- Presence of environmentally sensitive resources:
 - Endangered Species
 - Sensitive plants
 - Archaeological Sites
 - Native American gathering sites
 - Mitigation sites
- School and Public stops
- Opportunities for design improvements to reduce the need for vegetation control.
- Aesthetic appeal

C2.06.1 Minimum Vegetation Control: Reduction of Chemical Use

Management decisions should identify the minimum vegetation control necessary to ensure adequate safety and system preservation. Decisions should take future needs and resources into consideration, as well as addressing short-term needs.

Long-term conditions most likely will require physical changes such as hardscaping or structural control methods to the pavement edge. These changes should be anticipated, documented and discussed with your District Landscape Specialist and Landscape Architect to ensure they are considered when the highway is reconstructed or rehabilitated. Refer to this manual, section E.12.7 for more information on structural weed control.

Short-term decisions should ensure that vegetation control is planned with chemical reduction goals in mind. The level of vegetation control should reflect an appropriate management decision that minimizes risks to safety requirements, visibility, fire risk, or the integrity of structural surfaces. When considering fire reduction strategies, the key is to assess the risk of fire starts in the right of way and the consequences of that fire escaping to surrounding terrain. Proper fire risk management cannot guarantee elimination of all fires. However, it should recognize the likelihood that a fire may start; the risk to people, property and the environment; and the difficulty of controlling fires.

C2.06.2 Fire Risk

A site specific fire risk plan is prepared by the District Landscape Specialist for the Deputy District Director, Maintenance. This plan establishes specific fire control measures for road edges, while considering the likelihood of a fire occurring and the consequences of a fire to the roadside and to adjacent properties.

Fire potential varies with the type of roadside vegetation and the configuration of the pavement edge. For example, grasses on a cut slope with a dike at its base are less likely to be ignited by a cigarette or spark than grasses on a flat traversable roadside. Similarly, perennial or low growing annual grasses present fewer fire risks than tall annual grasses.

The chance and consequences of a fire escaping vary widely with conditions. The consequences of fire spreading to an adjacent forest may be more serious than fire spreading to desert, chaparral or grasslands. Likewise, the consequences of a roadside fire where there is a containment barrier such as a frontage road or sound wall are less than if the fire can spread unimpeded into adjacent terrain.

The VegCon Plan must consider fire risk in sufficient detail to reflect changing vegetation types along highway edges, differing adjacent land uses, highway configurations, and annual rainfall impacting expected vegetation growth which may increase/decrease fire risk, and urban interface. Refer to District VegCon Plan in IMMS.

C2.06.3 Edge Treatment

Vegetation management should begin at the planning or preliminary design stage of a new project. The design of the shoulder edge as it transitions to the roadside is the most important factor affecting the need for vegetation control. Details of this transition affect the need for vegetation control. Such details may include whether the edge is flat, fill or cut; slope steepness and vehicle traversability; paved and unpaved shoulder widths; and drainage requirements. Edge treatments are determined by the District Landscape Specialist, and are part of the Caltrans Vegetation Control Plan.

The design should carefully consider pavement edge transition details that will minimize the need for vegetation control and provide positive, long-term relief from this maintenance responsibility. The designer should take into consideration future maintenance strategies. For example, if mowing will be required, the roadside should be graded and kept obstacle free to protect equipment and people while also reducing fire starts. Roadsides to be landscaped should be designed to accommodate landscaping features and provide safe access for personnel and equipment. Careful attention to design should minimize vegetation maintenance expenditures over the life of the project, facilitate the appropriate vegetation concept, reduce the need for pesticides, and minimize public concern for vegetation control methods.

C2.06.4 Vegetation Control Plan (VegCon Plan)

The VegCon Plans should be completed in IMMS by April 1 of each year. It shall contain details for vegetation control on roadsides (C Family), landscaped areas (E Family), vista points, Park and Ride lots, and Safety Roadside Rests Areas (G Family) This should also includes Bridges (H Family), access around all structural supports is need for inspections. In addition, Vegetation such as ivy should not be allowed to grow on structures as a quick assessment of the structure cannot be made after earthquakes

The VegCon Plan will consist of site-specific vegetation control methods as outlined below:

- (A) Chemical vegetation control noting planned usage with chemicals separated into “C”, “E”, and “G” Families, including pounds of active ingredient (A.I).
- (B) Mowing Program (also known as mechanical vegetation control) separated into “C”, “E”, and “G” Families.
- (C) Other non-chemical IVM control (manual, biological, cultural, thermal and structural) separated into “C”, “E”, and “G” Families.
- (D) Listing of sensitive areas.
- (E) Pounds of A.I. needed for noxious weed control in the district.
- (F) Other chemical pest control (insects, snail, rodent, etc.) separated into “C”, “E”, and “G” Families.
- (G) Fertilizer needs separated into “C”, “E”, and “G” Families
- (H) Hardscaping 3 feet around bridge supports to prevent vegetation growth adjacent to structures.

The VegCon Plan shall also contain planned control by permit.

SECTION 2: Control of Native Plants (Non -Landscaped Areas)

C2.07 Non-Landscaped Vegetation Control

General non-landscaped vegetation control refers to the Integrated Vegetation Management (IVM) treatment of all vegetation growing naturally within the highway rights of way. The control methods include chemical, biological, cultural, mechanical, thermal, structural, and manual.

C2.08 Disease and Insects

Corrective actions should be taken where trees and shrubs growing naturally are affected by disease or insect infestations that are detrimental to the health of the trees or create a significant nuisance to the traveling public or adjacent landowner.

Prior to use of chemical means of control, districts should consider use of natural or biological controls as described in this section.

Some level of disease and insect infestation is natural, and does not impair the health of the plants. Control measures should be employed when the infestation threatens the viability of the plant, or when it threatens adjoining properties. No attempt should be made to keep all plants free of all insects by spraying.

If it is determined that it is necessary to use chemical means of control, refer to Section 3 of this chapter, "Use of Pesticides."

C2.08.1 Biological Control

Biological control will frequently keep a potential insect infestation under control with only a minimum loss of foliage.

Biological control of pests is accomplished by releasing predators and/or parasites. The predators consume unwanted pests, and the parasites use the pest insect body as an egg-depositing site. After the egg hatches, the larvae feed on the host insect. Weeds are controlled in the same manner, with the biological agent either eating the weed, or laying an egg and the larva eating the weed from the inside.

The biological agents are typically insects, fungi, or microbes. An advantage of this concept is that once the predatory agent becomes established, it continues to exist at a population level that is in balance with the availability of the host.

Biological control agents such as *Bacillus Thuringiensis* (BT) are being used successfully on California oak moth and red humped caterpillars. BT is a bacteria that paralyzes the stomach of

feeding larvae (or worm stage of development) of certain moths and butterflies. Successful control of puncture vine by weevil, pepper tree psyllids by wasps, and eucalyptus long-horned beetle by wasps are other examples of natural control. Research for predators for other pests, for example yellow star thistle and Russian thistle, is ongoing.

It is possible to improve the level of natural control by improving the environment for the predators. Where natural methods are being employed for the control of a pest, chemical pesticides should only be used when an infestation becomes acute. Biological control of pests is often the most satisfactory method of eliminating or reducing pests because of the long lasting control which normally results in lessening the workload.

C2.09 Pruning of Vegetation

Prune vegetation to preserve the health and structure of trees and native shrubs, to prevent damage to Caltrans and adjacent property, and to provide safety for vehicular and non-motorized travelers.

Use the following guidelines when developing a pruning program:

(A) Required Clearance for Visibility

Trees and shrubs should be trimmed to maintain visibility of highway signs and safety devices, and to provide 17 feet of clearance over the traveled way and shoulder.

Trees may be trimmed by encroachment permit for purposes of providing visibility to outdoor advertising signs or business property frontage. Refer to the guidelines for evaluating visibility improvement requests from the Office of Landscape Architecture or the District Encroachment Permit Office.

Visibility improvement guidelines require median planting (oleanders) to be pruned not lower than five (5) feet.

(B) Vegetation Control to Prevent Accumulation of Snow and Ice

Whenever feasible, prune or remove trees and shrubs where snow and ice creates slippery conditions. Pruning or removal in such cases reduces ice by permitting exposure of the pavement to wind and sun.

(C) Removal of Plants or Trees

Follow your district's policy on proper approvals. Signatures or approvals from the Landscape Specialist and above may be required prior to the removal of live trees.

Dead plants or trees within the right of way should be promptly removed when required for safety or protection of adjacent property.

(D) Pruning

Pruning shall be conducted in conformance with ANSI Standard A300-1995. Refer to Chapter “E” of this manual.

(1) Directional Pruning

Most utility companies encourage directional pruning of trees adjacent to utility lines. Trees pruned in this manner are generally healthier and have stronger limbs.

Trees subjected to severe canopy reduction associated with conventional pruning methods are often weakened. However, directional pruning may result in a less pleasing appearance. Overall maintenance costs are lower with directional pruning. Trees with high appearance value should not be directionally pruned.

C2.10 Tree Inspections

This section pertains to tree inspections and required Annual Tree Inspections (ATI) performed by Tree Risk Assessment Qualified (TRAQ) personnel. ATIs began in 2010 to improve and standardize Caltrans tree management.

C2.10.1 Tree Inspections

Conduct, to the extent reasonable, a visual surveillance to detect trees and limbs that may be predisposed to failure and possibly impact traffic including motorists, pedestrians and bicyclists, highway appurtenances, or adjacent property.

It is often difficult to detect conditions such as loss of root support, interior rotting and split limbs. Trees disturbed in construction areas may require a thorough inspection to determine appropriate actions. Report any tree with obvious structural deficiencies to your supervisor. Consult your Tree Maintenance Supervisor or District Landscape Specialist when further clarification or direction is needed.

C2.10.2 Annual Tree Inspections (ATI)

ATIs are performed by TRAQ personnel along all District/County/Routes every Fiscal Year. All roadside and landscape areas, safety roadside rest areas, vista points, park and ride lots and Caltrans facilities require ATIs. TRAQ personnel must pass Module 7 of the Tree Safety and Aerial Rescue Guide prior to performing ATIs. Tree Maintenance Supervisors document ATIs in IMMS. ATI findings help with planning and scheduling mitigation measures. ATIs also determine District Tree Inspection LOS scores.

TRAQ personnel identify structural tree conditions which predispose a tree to failure and may affect a target such as the traveling public (including motorists, pedestrians and bicyclists), or damage highway appurtenances (including structures and safety devices) and adjacent property. ATIs identify tree conditions such as decay, leaners, codominant stems, multiple branches, hangers, cracks, splits, dead trees and branches. ATIs also identify tree encroachments and sight distance concerns.

Performing and completing ATIs is an important element to manage the Department's trees.

C2.11 Vegetation Control of Specific Areas

Vegetation control considerations should include:

(A) Traversable Slopes (4:1 and flatter)

- (1) A control strip up to eight (8) feet wide for maintenance along the paved shoulder edge of both two lane and multi-lane roadways should be considered. Wider strips may be dictated by extreme fire control needs.
- (2) Medians wider than thirty-six (36) feet should maintain a control strip up to eight (8) feet wide from the pavement edge of both sides of the median. The presence of glare screen plantings or median barriers may warrant the total control of median vegetation from pavement edge to plantings/barrier for safety, appearance, or fire control.
- (3) Medians less than thirty-six (36) feet in width may be considered for vegetation control of the entire width for appearance or fire control.

(B) Slopes (Steeper than 4:1)

From the paved shoulder edge, a control strip up to four (4) feet wide along fill or cut slopes should be considered.

(C) Miscellaneous Areas

- (1) Control vegetation within two (2) feet of guardrails, delineator posts and other safety hardware where they are not included in shoulder treatment.
- (2) Control vegetation in dirt ditches and culvert inlets and outlets to facilitate drainage. Minimize and control runoff into drainage pathways and waterways. Please refer to the Maintenance Staff Guide, Appendix C.23.1 – Vegetated Treatment Systems (Bio filtration Swales and Strips).
- (3) Mowing entire interchange areas may be desirable for aesthetics or fire control in urban or developed areas.

- (4) Mow, as needed, for visibility and sight distance on horizontal curves, ground mounted signs and intersections.
- (5) Clearing of vegetation around buildings may be necessary for fire prevention.
- (6) Vegetation control within city limits should be agreed upon by Caltrans and the city, and should be consistent with the control methods of the community.
- (7) Do not mow vegetation to a height of less than six (6) inches. Mowing at a lower height risks scalping the ground which may encourage unwanted weeds, increase the chance of throwing rocks, cause fire starts, and could damage mowers. A taller cut may be recommended by the District Landscape Architect or Landscape Specialist for specific areas.

The timing of mowing is critical to minimize or reduce the spread and proliferation of noxious weeds such as yellow star thistle or Russian thistle (tumbleweed). It is important to understand the growth habits of the native vegetation and invasive weeds to minimize the spread of noxious weeds. It is best to work with a local subject matter expert and a biologist that understands the particular issue with the roadside environment in order to develop a mowing strategy that will optimize the growth of native self-sustaining vegetation.

- (8) Except as provided above, avoid mowing beyond control strips in rural areas. Such mowing increases the incidence of fires due to hot mufflers igniting stubble. Mowing also encourages broad-leafed weed growth by diminishing competition from the grasses.
- (9) Treat noxious/invasive weeds where requested by the County Agricultural Commissioner and weed management areas. Caltrans will cooperate in an area wide control of noxious/invasive weeds if established by local agencies. The desire by adjacent farmers to control weedy pests doesn't meet the requirements of above. Farmers/landowners who request weed control on State right of way that is not identified in the VegCon plan should be encouraged to submit a permit request application for weed control, identifying weeds and control method desired.
- (10) Control vegetation within 3 feet of all bridge supports.

Refer to Section 3: Use of Pesticides.

(D) Brush And Tree Control

Native brush and seedling trees naturally occur on roadsides, encroaching into the roadway, and obstructing safety hardware and drainage. Control brush and seedling

trees as necessary to provide sight distance on curves and clear unpaved shoulder areas, safety hardware, and drainage. All brush and seedling trees should be controlled nine (9) feet from the pavement edge. All seedlings shall be removed from clear recovery zone, see Highway Design Manual 309.1, 902.2, and 902.3.

In heavy brush areas, trim and remove brush selectively to avoid a straight or carved edge, and to encourage a more natural meandering appearance. Seedling trees should not be allowed to become established in a clear recovery area. See Highway Design Manual 309.1, 902.2, and 902.3

Brush and seedling trees may be removed with a brush mower or by hand work. When necessary, treat stumps to prevent growth resurgence. Do not allow seedling trees to grow in locations where they can grow to become a hazard such as the clear recovery zone.

Heavy-duty mechanical brush cutters are effective for brush control, and when used, cutting should be close to the ground. Limbs on the underside of trees should not be cut with a brush mower. The quality of work should be professional and equal to that required by encroachment or utility permit specifications. Follow arboricultural standards and procedures.

Brush trimmings may be chipped or hauled away. Chips may be spread over the ground in forest areas and other locations. Pay particular attention to the possibility of the chips floating into gutters and clogging drains, or becoming a fire hazard when dry. There are locations where chips should be hauled away for these reasons. In some locations, excess chips can be taken to cogeneration plants. Wood chips can be used as effective mulch in landscaped plantings. Avoid chipping poison oak. Take special care not to spread poison oak chips in landscaped areas. It is also important not to spread pests with chipped material. For example, pine pitch canker and Sudden Oak Death syndrome can be spread with chipped material.

Mechanical brush removal operations have potential to start fires in dry conditions. Keep a source of water and fire suppression tools nearby. Consider suspending work when extremely high fire risk conditions exist.

Refer to Section C2.26.6: Brush Spraying.

(E) Burning of Roadside Vegetation

Burning of roadside vegetation is a valid IVM method of vegetation control to renew soils, remove unwanted species, and encourage the growth of native species which depend on fire for seed germination. Planned burns shall be included in the VegCon Plan.

Any burning of roadside vegetation and slash shall be done in conformance with local burning and air quality regulations. Fire officials shall be notified in advance of planned burns. Burning shall be conducted only when weather conditions are favorable for good smoke dispersion.

See Chapter 1, Section 1.23.5 of this manual: Air Quality.

C2.12 Vegetation Control By Others

Caltrans may issue permits to individuals or organizations for control or harvesting of vegetation, in addition to Adopt-A-Highway vegetation control permits. The permittee must comply with all applicable laws and Caltrans policies.

C2.13 Shoulder Grading and Disking

Shoulder grading is not an acceptable method of vegetation control. Grading shall be performed for the purpose of restoring lateral support to the pavement edge, and should be limited to the actual area necessary to correct the lateral support problem. It may be necessary to provide a higher quality material to retain lateral support if repetitive grading is necessary.

Disking is not an acceptable method of vegetation control. Disking could be considered adverse to the Department's storm water permit. However, disking to prepare for a seed bed followed by seeding and re-compacting the soil could provide long-term benefits, such as erosion control and improved establishment of desired vegetation.

C2.14 Variances

California has many variations of climate, terrain and native species of vegetation. No single policy can be applicable for all prevailing conditions. Consequently, deviations from stated policies may be appropriate. Exceptions shall be justified in the District VegCon Plan.

C2.15 Highway Tree Maintenance

Highway trees are to be maintained in a safe and aesthetic manner at all times. Districts shall employ the best standards of arboriculture, consistent with the practices outlined in publication: American National Standard (ANSI) A300-1995, and the ISA tree pruning guidelines.

Keep trees free of weak or dead limbs. When there is time and available resources, thin and shape trees as needed to provide for safety, health, and beauty of the tree.

There is a distinction between shrubs, seedlings and trees. A “tree” is a woody perennial plant with a diameter of four (4) inches or greater (when measured 4 feet from the ground) with a total height greater than twenty (20) feet.

Only qualified personnel are authorized to fell trees. Maintenance personnel who are not in a current Caltrans Tree Maintenance classification must be qualified by a Caltrans Tree Maintenance Supervisor before they may fell trees.

Maintenance employees who have non-Caltrans training and experience in felling trees may become qualified through the Tree Feller Qualification Program. Contact Headquarters Maintenance Division, Office of Roadside, for assistance if your district does not have a Caltrans Tree Maintenance Supervisor.

C2.15.1 Working in Trees

(A) Laws, Regulations and Policy Pertaining to Tree Work

The California Code of Regulation, Title 8, Article 12, regulates worker safety in tree trimming operations. The American National Standard, (ANSI) Z133.1-1994, provides standard practice for work in trees. In the event of any conflicts between ANSI guidelines and Cal/OSHA regulations, the Cal/OSHA regulations shall take precedence.

See Chapter 8 of this manual: Protection of Workers. Also refer to the Code of Safe Practices (COSP) for work in trees, and the COSPs for the specific equipment employed in the work.

There are different requirements for working around and maintaining clearances to high voltage lines (600 volts and greater) and low voltage wires. Check the above policies and regulations for further information.

It is Caltrans policy that all overhead conductors including guy wires, phone wires, cable TV and other lines (whether energized or not) shall be considered live. Such lines shall not be touched by personnel directly or with equipment. Trimmings shall not be allowed to come in contact with wires. Caltrans crews shall not engage in line clearance operations.

(B) Qualifications for Working in Trees

Only qualified tree trimmers or trainees are to perform work in trees. The safety of tree workers depends upon adherence to the following established regulations, guidelines, safety orders and policies.

While tree trimming operations involving climbing are in progress, there shall be a qualified climber on the ground to direct the operations and to assist in rescue operations if necessary.

(C) Clothing

Clothing must be appropriate for the work. Clothing should be close fitting and untorn to prevent the possibility of it being drawn into power or hand tools. Boots or high shoes with full composition soles and heels should be worn. Oxfords and light sports shoes, such as running shoes or cross-training shoes, shall never be worn by climbers in trees.

(D) Climbing Gear

Climbing ropes shall be a minimum of ½ inch first grade, synthetic tree surgeon's rope. The rope shall be approved by the Tree Maintenance Supervisor. It shall be checked frequently by the Tree Maintenance Worker and his or her supervisor for cuts or weakened areas. Ropes shall be kept in separate boxes on the truck where they are dry and not mingled with tools or exposed to fuel. Limbs shall not be lowered with the climbing rope. Separate ropes shall be available for other purposes than climbing.

A tag line must be attached to the safety saddle. The tag line shall be used by the tree climber at all times when the climber rope is not secured to the tree and saddle.

Safety saddles must be ANSI approved. Saddles shall be checked frequently for weakened parts, and repaired or discarded when not safe to use.

Climbing spurs shall not be used in highway trees either by State forces or others who are working under permit, except in the removal of dead or dying trees, or in the tops of extremely high eucalyptus, palms or some coniferous trees. Spurs will conform to ANSI standard 2133 or A-300.

(E) Use of Brush Chippers

Brush chippers are important tools for tree workers. It is important that they be used properly and safely in accordance with applicable safety instructions. Only employees that are qualified are to operate brush chippers. See section for brush removal above regarding proper disposal of chips.

Prior to use of brush chippers, review the operating instructions, the COSP, and Best Maintenance Practices (BMPs).

(F) Chain Saws

Chain saws are frequently used by tree workers. They may be very hazardous if used improperly. Only operators formally qualified by Caltrans training are allowed to use chain saws. Operators must adhere to appropriate safety instructions outlined in the COSP and the operator's manual.

Prior to use, chain saws must be inspected to ensure a sharp and balanced chain, proper chain adjustment, and proper lubrication, overall tightness of bolts and parts, and cleanliness.

Only qualified tree workers and approved trainees shall use chain saws in trees. Two (2) workers are necessary for operations with chain saws in trees. One (1) worker must be on the ground. The worker on the ground shall be qualified in aerial rescue, and must stay in the immediate vicinity to assist the worker in the tree in case of accident.

Pole mounted, hydraulic chain saws should only be used by formally qualified workers. Such qualification is given in addition to the Caltrans chain saw qualification course.

Apply the following when using chain saws:

- (1) Operators shall not use chain saws until they have received instructions on use and care of the saw, and training regarding safety rules.
- (2) The chain saw operator should not walk with chain moving.
- (3) Saws shall not be operated while alone. Someone must be close by.
- (4) The chain must be kept sharp.
- (5) The saw should never be forced. The chain should be allowed to do the cutting.
- (6) The saw must be kept in adjustment so it will idle without chain moving.
- (7) Operators must have a good footing and a firm hold when starting the saw.
- (8) Hard hats and eye protection shall be worn at all times when operating a saw.
- (9) Ear plugs or muffs, or both, shall be worn when operating a saw.
- (10) The chain saw operator or another responsible person must warn others when felling limbs or trees.
- (11) The chain saw should be hoisted to the tree worker on a separate line once the tree worker is in the tree and the climbing line is attached to the safety belt.
- (12) Chain saws weighing more than 20 pounds (service weight) that are used in trees should be supported by a separate line, except when working from an aerial lift device, or during topping or removal operations.

- (13) Chain saws weighing less than 20 pounds (service weight) may be carried on the tree worker's belt after being hoisted into the tree. This can be accomplished by attaching a short safety line to the chain saw handle and the tree worker's belt. The safety line should be of sufficient size and length to allow the saw to drop below the worker's body in case of an accident.
- (14) Chain saws in use in trees should be shut off when changing working positions.
- (15) Only safety type chains (anti-kickback) should be used on chain saws. These have fewer tendencies for kickback than do cross cut chains.
- (16) Workers using chain saws on the ground are required to use industry approved leg protection (chaps). Such protection is optional for workers in the trees.

(G) Personnel Hoists and Hydraulic Tools

Operators of personnel hoists must be qualified by the Maintenance Division and must follow safety procedures in the COSP.

ANSI Z-133.1-1994 provides guidelines for clearances that should be maintained from electrical wires. Cal/OSHA requires line clearances for wires containing 600 volts or greater.

Caltrans workers shall avoid contact with all electrical lines carrying over 600 volts. Even when a line carries less than 600 volts, workers shall work no closer than within three (3) feet of the wire.

C2.15.2 Topping (Heading) Highway Trees

Highway trees may be topped only if extreme height has made them a hazard to traffic or property. Consideration should be given to removal of the tree before topping or thinning. Tree topping may be an alternative option to removal in some cases. Live tree removal must be approved by the District Director.

Topping of trees shall be done by drop-crotching to healthy, strong lower crotches and laterals in accordance with ANSI A-300 standards. Cut to laterals no less than one-third (1/3) of the diameter of the original limb, and remove no more than one-quarter (1/4) of the total leaf surface. A topping job shall result in a well-balanced and proportioned tree of natural shape for the species. The sides must be reduced in spread in proportion to the amount of top cut off. Directional pruning is an exception to this policy and shall be approved by the District Landscape Specialist.

No stub or ledge cuts shall be left after the removal of limbs. Undercut all limbs before removal to prevent breaks or tearing of the bark (refer to Illustrations in Appendix C2-D). Final cuts shall be made nearly flush with the parent branch or trunk, leaving a callus ring but not a stub.

See Appendix C2-D: Illustrations in Pruning Methods

C2.15.3 Tree Removal

When removing a tree that is outside the limits of blading or mowing operations, cut the trunk level with the surrounding ground. Either remove the stump or cut it off eight (8) inches below the surface when it is within the limits of blading or mowing operations. The recommended method of stump removal is grinding.

Stumps of species of trees which continue to sucker after tree removal shall be treated chemically or the stump should be removed by grinding. Glyphosate and triclopyr are suitable chemicals for treating cut stumps. The District Landscape Specialist must provide a Pesticide Use Recommendation prior to use of stump treatment.

C2.15.4 Arboricultural Practices

Tree surgery procedures are rarely performed on trees in highway right of way. If it is required, it should be performed in accordance with appropriate ANSI standards.

C2.15.5 Tree Removal in National Forests

The State may remove trees within the easement boundary that are deemed hazardous by the State. In addition, the State may remove small trees that encroach on lines of sight or for safety purposes as specified in the approved plan. Removal and disposal of these trees will be coordinated between the District Ranger and the Maintenance Manager.

SECTION 3: Use of Pesticides

C2.16 Laws and Regulations Regarding Use of Pesticides

The terms used in the laws and regulations sometimes have a different meaning than words in common usage.

The words “shall” and “may” are used extensively in laws and regulations. Their meanings are quite different. “Shall” is mandatory; “may” is permissive.

The term “pesticide” means any material used to control pests. Some examples are insecticides (control insects), herbicides (control vegetation), rodenticides (control rodents), and avicides (control birds).

The terms “pesticides” and “economic poison” have the same meaning in the law.

(A) Food and Agriculture Code

This code defines the roles and responsibilities of county agricultural commissioner’s and the Department of Pesticide Regulation (DPR) in relation to the use of herbicides. Section 11501.1 relates to the field of pesticide regulation. The control of economic poisons rests with Cal/EPA and not local agencies. This law does not change in any way the present relationship between the County Agricultural Commissioner and Caltrans for pesticide purchases and application within each county. This division is not a limitation on the authority of any State agency or department to enforce or administer any law or regulation when they are given that authority.

Sections 5501-5509 (AB 1245) provides for the control of roadside vegetation by adjoining landowners under permit.

(B) Penal Code

This code lists penalties for not complying with State pesticide regulations and laws. Caltrans may be held liable for the actions of its employees. Employees who negligently or intentionally misuse pesticides may be held criminally liable for their actions. An employee is “negligent” if he or she does not use reasonable care. An employee “intentionally” misuses pesticides when he/she knows that he/she is breaking the law, but acts in an illegal manner.

(C) Streets and Highways Code

Section 862 describes the liability of public entities for injuries caused by the use of pesticides.

Where there is an intentional violation of the law which creates, or could have reasonably created, a hazard to human health or the environment, the convicted person shall be punished by imprisonment not to exceed one (1) year or by a fine of not less than \$5,000 nor more than \$50,000, or by both.

(D) General Industry Safety Orders (GISO)

GISO Section 3204 (known as “Employee Right to Know”) provides employees the right of access to relevant exposure or medical records. Each employee has the right and opportunity to examine and copy any data in the employee’s medical and exposure records. An employee may also give written authorization to a designated representative for access to the information.

C2.17 Certification for Applicators of Restricted Materials

The amended Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) have two key provisions:

- The U.S. Environmental Protection Agency (EPA) is required to classify all pesticide products for “general” or “restricted” use.
- Restricted use pesticides may be used only by, or under the direct supervision of Certified Applicators.

California Department of Pesticide Regulation maintains a list of restricted materials that includes pesticides and any material that USEPA or CAL EPA has designated as restricted.

(A) General Use Pesticides

“General Use Pesticides” are those that will not ordinarily cause unreasonable adverse effects to the user or the environment when used in accordance with their registered labeling instructions. Such products are available to the public without further restrictions other than those specified in the labeling.

(B) Restricted Use Pesticides

“Restricted use pesticides” are those which may cause adverse effects to the environment or the applicator unless applied by competent individuals who have demonstrated their ability to use these products safely and effectively.

(C) Pesticide Applicator Certification

Federal law states that no person shall apply restricted use pesticides unless that person is certified or is supervised by a certified or licensed applicator.

The law recognizes two types of pesticide applicators:

(1) Private Applicators

Private applicators include farmers, ranchers, orchardists, or other applicators that use or supervise the use of restricted materials to produce an agricultural commodity on property they own or rent.

(2) Commercial Applicators

Commercial Applicators are those who apply or supervise the use of restricted materials on any property other than as provided by the definition of “private applicators.”

Caltrans personnel who apply restricted use pesticides are considered “Commercial Applicators” and shall either be certified through an applicator certification program, or supervised by a Certified Applicator.

(D) Requirements for Qualified Applicators Certification (QAC)

Commercial Applicators will be certified by the California Department of Pesticide Regulation after passing examinations designed to meet EPA competency standards.

The following are the categories of pest control established by the California Department of Pesticide Regulation for applicator certificates:

<u>CATEGORY</u>	<u>CERTIFICATION</u>
A	Residential, Industrial and Institutional
B	Landscape Maintenance
C	Right-of-Way
D	Plant Agriculture
E	Forest
F	Aquatic
G	Regulatory
H	Seed Treatment
I	Animal Agriculture
J	Demonstration and Research
K	Health Related
L	Wood Preservation
M	Antifouling Paints or Coatings Containing Tributyltin
N	Sewer Line Root Control
O	Field Fumigation
P	Microbial Pest Control
Q	Maintenance Gardener

Categories B and C are applicable for Caltrans roadsides.

C2.18 Recordkeeping

Pesticide applicators are required to keep adequate records. These records shall be kept by the supervisor in charge of the operation.

State law requires that the information on this report be kept for 30 years. Pesticide use is presently reported to HQ on a daily basis via electronic time sheets approved by supervisors. At the end of the month, this pesticide use summary is electronically sent to DPR.

The following information shall be included:

- (A) Location of application (include county, route, post mile limits nearest 1/100th mile, width of application, and description of location relative to roadway, e.g., right shoulder or median).
- (B) Name of chemical(s) used (include percent of active ingredient and the formulation, such as "DF" for dry-flowable or "W" for wettable powder).
- (C) Rate of chemical(s) applications per acre.
- (D) Purpose of treatment.
- (E) Total acres treated.
- (F) Total gallons sprayed.
- (G) Actual time of spraying.
- (H) Approximate wind speed and direction.
- (I) Personnel, safety gear, and equipment involved. Respirator use is recorded separately.
- (J) Remarks that clarify any unusual circumstance or happening relating to the use of the chemical.

C2.19 Pesticide Use Recommendations

Herbicides can only be used when authorized by a Pesticide Use Recommendation prepared by a licensed Pesticide Control Advisor (PCA). Field work should be supervised by person who has a valid Qualified Applicator's Certificate (QAC). When using restricted pesticide materials, a QAC is required. These requirements are for work performed on all Caltrans right of ways.

C2.20 Requirements for Safe Handling and Storage of Pesticides

The following are legal requirements for pesticide handling and storage.

C2.20.1 Medical Care

For all activities involving the use of pesticides, the employer (supervisor) shall make prior arrangements for emergency medical care.

The name, address, and telephone number of the physician, clinic or hospital emergency room providing care shall be posted in a prominent place at the work site or in the application vehicle if there is no designated work site.

When the employer (supervisor) has reasonable grounds to suspect that an employee has a pesticide illness, or when an exposure to a pesticide has occurred that might reasonably be expected to lead to an employee's illness, the employer shall take the employee to a physician immediately, along with an uncontaminated pesticide label and MSDS (if possible).

C2.20.2 Personal Washing Facilities

Regulations require that clean water, soap, and single-use towels be available at the work site for washing of hands and face, and for emergency washing of the entire body a minimum of 10 gallons of water for one employee, and a minimum of 20 gallons for two or more employees. Regulations also require that a clean change of clothes be available at the work site in case work clothing or protective clothing becomes contaminated. An extra pair or two of disposable coveralls shall be carried with spray crews. Extra coveralls should be large enough to fit the largest person on the crew.

C2.20.3 Storage of Chemicals

The California Health and Safety Code require each facility that stores hazardous materials to develop a "Business Plan." This Business Plan lists the types of chemicals, including pesticides that are on the premises, the amounts, and storage locations.

Hazardous materials storage areas must be placarded. Post the proper signs on pesticide storage buildings and in outside storage areas. These signs are required by law, and must be placed so they will be readily visible to firefighters or emergency response personnel entering each area.

Chemical pesticides must be stored in well-ventilated rooms. Fertilizers must not be stored in the same room with pesticides. Storage areas must be kept locked when not in use. Pesticide storage warning signs, written both in English and Spanish, must be posted on all sides of approach where pesticides are stored.

Chapter "F" of this manual provides additional guidelines for storage of pesticides and other hazardous materials.

C2.20.4 Disposal of Empty Chemical Containers

Pesticide regulations require special attention be given to the disposal of empty pesticide containers.

Pesticide containers that hold less than 28 gallons of a liquid pesticide must be rinsed and drained (when empty) by the user at the time of use. The containers shall be triple rinsed, with the rinse solution from the container drained into the spray tank.

Pesticide containers shall be allowed to drain 30 seconds into the spray tank after each rinsing.

The rinse solution shall be placed into the mix tank and then applied onto the roadside, in the “target area.”

Empty, rinsed pesticide containers shall be perforated, crushed, or broken to eliminate the possibility of their reuse for any purpose. Plastic containers may be recycled by the County Agricultural Commissioner.

Contact the County Agricultural Commissioner for information on proper disposal areas.

Properly rinsed empty containers shall be taken to these sites.

C2.20.5 Labeling of Spray Rigs and Tanks

A warning decal, “Warning, Not Drinking Water”, shall be placed on the rear and both sides of the tanks of all spray units.

A “Do Not Drink” decal shall be placed near each of the fresh water tank valve outlets so that it can be easily seen.

Two placard holders shall be mounted, side by side, near the main outlet of the tank so that it is easily visible from the rear of the unit. Placards with the name of the chemical being used and containing appropriate warnings will be in place during spray operations. Placards may be obtained from Material Operations.

C2.21 Environmental Concerns

When preparing the district VegCon Plan, special consideration shall be given to the possible chemical contamination of surface and ground water. Maintenance operations shall be conducted with full consideration for potential effects on water quality, air quality, sensitive species and other environmental resources.

Refer to Chapter “F” of this manual for further information for water quality issues.

Refer to Chapter “D5” for procedures to be followed in the event of spills of hazardous materials on highways.

C2.22 Toxicity of Chemicals

Toxicity is the capacity of a material to cause injury or death. Toxicity ratings are expressed for each chemical used in pesticide work. These toxicity ratings are expressed as Oral or Dermal LD 50. LD 50 is the lethal dose that will kill 50 percent of a group of laboratory animals. It is expressed in terms of milligrams of material for each kilogram of body weight. The lower the number on this scale, the more hazardous the material to human health.

In general, pre-emergent herbicides pose a greater hazard to aquatic life than post-emergent herbicides, and some adjuvants have been shown to be toxic to aquatic organisms. It is therefore important to minimize the potential for vegetation control products to enter watercourses and thus prevent harm to aquatic wildlife and prevent degradation of water quality. Buffer zones of up to 20 feet or greater should be maintained from surface water (oceans, bays, lakes, rivers, streams, creeks and canals) or drainage ditches (when water is flowing) when applying any pre-emergent herbicide. Buffers of five (5) feet or greater should be maintained from surface water when applying post-emergent herbicides. When it has been determined that the use of herbicides is the best IVM method in close proximity to surface waters, consider using material that the Department of Pesticide Regulation has approved for aquatic applications. Due to changing regulation with regard to threatened or endangered aquatic wildlife, greater buffers may be required when using specific herbicides.

Refer to the VegCon plan in IMMS with regard to sensitive resources. This portion of the plan provides site-specific information on school bus stops, certified organic farms, well locations, and biological resources.

Pesticides may enter the body by one or all four (4) of the following routes: skin absorption (dermal), ingestion (oral), respiratory (lungs), or ocular (eyes).

Maintenance personnel shall not use any material with an LD 50 lower than 100. Use the pesticide with the lowest toxicity (the highest LD 50 number) adequate to do the job.

The following scale is provided for judging the toxicity of pesticides:

COMMONLY USED	LD 50	PROBABLE LETHAL DOSE FOR
Extremely Toxic	less than 1	A taste or grain
Highly Toxic	1 to 50	1 pinch to 1 teaspoon
Moderately Toxic	50 to 500	1 teaspoon to 2 tablespoons
Slightly Toxic	500 to 5,000	1 ounce to 1 pint
Practically Non-Toxic	5,000 to 15,000	1 pint to 1 quart
Relatively Harmless	15,000 or more	Greater than 1 quart

These toxicity values are expressed as LD 50 in terms of milligrams of the chemical per kilogram of body weight of the test animal milligrams/kilograms (mg/kg).

Although LD 50 ratings may not appear on pesticide labels, the following terms are set by law, and can be used to judge the acute hazard of the material:

SIGNAL WORD	WHEN REQUIRED
“DANGER - POISON” (If “Poison” then label contains skull and crossbones)	All highly toxic compounds with an LD 50 range of 0 to 50 mg/kg
“WARNING”	Moderately toxic compounds with an LD 50 range of 50 - 500 mg/kg
“CAUTION”	Slightly toxic compounds with an LD 50 range of 500 to 5,000 mg/kg

No special words are required for compounds with an LD 50 greater than 5,000 mg/kg. However, they must have the statement “Keep out of reach of children.”

There are four (4) general categories of pesticides based on these toxicities. Knowledge of the meaning of the signal words and symbols forewarns the pesticide user of potential hazards associated with the chemicals.

CATEGORY	SIGNAL WORDS and SYMBOL	NOTES
1	“DANGER - POISON” if “Poison” then label contains skull and crossbones symbol	Some pesticides carry only the signal word “Danger” without “Poison” or the skull and crossbones symbol. They are in Category 1 due to a specific hazard, such as potential for skin or eye injury, and are highly toxic.
2	“WARNING”	Moderately toxic compounds.
3 & 4	“CAUTION”	Slightly toxic.

C2.23 Annual Pesticide Worker Safety Training

State law requires annual Pesticide Worker Safety Training for all employees who work with pesticides or may be exposed to their residues. The training is designed to teach safe work practices for employees who mix, load, apply, store, or otherwise handle pesticides.

Chapter “C2”, Section 3, of this manual is the Department’s written pesticide safety program. As a minimum, the annual pesticide safety training shall include the following points:

(A) Pesticide Labels

The directions on pesticide labels are enforceable by law. It is a violation of the law to use a pesticide inconsistent with its label. Supervisors who have Qualified Applicator Certification or equivalent shall review specific pesticide labels and MSDS’s (SDS) with their employees prior to them using the material, and annually thereafter. In the event the Maintenance Supervisor does not have a Qualified Applicator Certification or equivalent, he/she shall delegate the training to someone in possession of a PCA or QAC that is qualified to give the label and MSDS (SDS) review.

Employees shall be taught how to read pesticide labels. They shall be able to recognize signal words, determine the hazards of the material, and select the types of required personal protective gear.

See Section C2.22: Toxicity of Chemicals.

(B) Storing, Transporting, and Disposal of Pesticides

New employees shall be instructed in the proper storage of pesticides, provided specific information on how to secure and transport pesticides, and how to properly dispose of empty pesticide containers. Review N-2 of the Pesticide Safety Information Series.

See Section C2.20.3 – Storage of Chemicals and Section C2.20.4 – Disposal of Empty Chemical Containers.

(C) Closed Systems, Enclosed Cabs and Water Soluble Packaging

Although the Department does not use closed systems, the use of enclosed cabs and soluble packaging should be discussed with employees, and how these safety features reduce exposure. Review N-3 of the Pesticide Safety Information Series.

(D) Emergency Medical Care

Employees shall review the arrangements for emergency medical care for workers involved in activities with pesticides. Medical facility location information must be posted at the worksite. Review N-3 of the Pesticide Safety Information Series and Section C2.20.1 – Medical Care.

(E) Respiratory Protection

Supervisors should inform employees when to wear a respirator and what kind of respirator is required during safety meetings. Review N-5 of the Pesticide Safety Information Series and Chapter 15 of the Caltrans Safety Manual for more information on respirator use.

(F) Specific Safety Procedures

The trainer shall advise all employees of specific safety procedures they should follow in handling, mixing and applying pesticides. Employees shall also receive training on the use of specific safety equipment required by pesticide labels. Employees have a right to know if any pesticides they use are on the “Prop 65 List.” Zero exposure equates to zero risk. As always, wear and care for personal protective equipment (PPE) that are provided. Review and post N-8 of the Pesticide Safety Information Series.

(G) Hygiene

Personal washing facilities are available at the work site, and should be used before eating or smoking, or in case of contact with the pesticide before leaving at the end of the work shift. Employees should be cautioned to not let safety awareness slip as the day progresses. When washing work clothes, avoid contaminating family clothing. Review N-7 of the Pesticide Safety Information Series.
Refer to Section C2.24: Proper Use and Handling of Pesticides.

(H) Servicing Pesticide Equipment

Employees who service pesticide equipment (including mechanics) shall be properly informed of the potential pesticide hazards and advised of the proper protective measures to employ while working on that equipment.

See Section C2.24.4: Preparing Pesticide Application Equipment for Repair.

(I) Training Documentation

In addition to recording of training in the Learning Management System (LMS), the trainer and the employee shall sign the Pesticide Safety Training Record at the completion of the training. One copy is given to the employee, one shall be kept in the employees work location, and one copy shall be sent to the District Landscape Specialist.

The Pesticide Safety Training shall cover all topics outlined in the “Pesticide Safety Information, N Series,” published by the California Department of Pesticide Regulation. Further, Series N-8 must be completed and posted at the work place where employees normally report to work.

C2.24 Proper Use and Handling of Pesticides

Pesticides shall always be used with care. The following guidelines for the use and handling of pesticides will help minimize the likelihood of injury to people and animals from exposure to such chemicals.

C2.24.1 Labels

Always read the pesticide label before using the products. Carefully read warnings and cautions before opening the container. Repeat this process every time, no matter how often a pesticide is used, or how familiar the directions are to the user.

C2.24.2 Pesticide Control Recommendation

A licensed Pesticide Control Advisor (PCA) is required to prepare a Pesticide Control Recommendation for each compound used. Pesticides shall be applied only in the areas and at the amounts and times specified in the Recommendation.

See Appendix C2-A: Caltrans Approved List of Herbicides and Appendix C2-B: Caltrans Approved List of Adjuvants.

C2.24.3 Safety Requirements in Loading and Using Pesticides

- (A) Personnel involved in spray operations shall be knowledgeable of the material(s), hazards, methods, and purpose of the particular operation. All pesticide applications should be supervised by someone holding a valid Qualified Applicator Certificate (QAC). Applications of all restricted materials must be supervised by someone holding a valid QAC.

See Section C2.17: Certification for Applicators of Restricted Materials.

“Supervision” does not mean the civil service rating of the person, but refers to the oversight control by someone who may or may not be present when the work is actually performed. Contact with the crew by the supervisor must be sufficiently frequent to assure adequate control of the work.

- (B) Protective clothing and proper eye and respiratory protection shall be worn as required by Caltrans policy and the label. Pesticides are more hazardous when in their concentrated form.

The Department of Pesticide Regulation (DPR) requires the mandatory use of gloves by pesticide handlers unless the label states that gloves are not to be worn. Pesticide labels may also require a specific glove type. Employees shall be provided clean gloves each workday. Clean gloves shall be either unused gloves or previously used gloves that have been thoroughly washed in soap and water (both inside and outside). DPR also requires eye protection as mandatory protection, even if not mentioned on the label. As a minimum, eye protection shall provide brow protection, including side shields. A face shield is acceptable eye protection and goggles are to be worn when mixing powders.

Refer to Maintenance Manual Volume 2 for Caltrans guidelines for label interpretation of protective clothing requirements.

- (C) Workers shall wear respiratory protection when required by the pesticide label. In addition to label and policy requirements, respiratory protection may become necessary due to the application method. Spray operations shall be discontinued or a respirator shall be used when spray mists cannot be eliminated from entering the breathing zone. Employees shall be medically evaluated, trained in the use of respiratory protection, and fit tested before they will be allowed to use a respirator.

Refer to Caltrans Safety Manual, Chapter 15: Respiratory Protection.

- (D) Workers shall attend training prior to handling pesticides. Training must be completed before the employee is allowed to handle pesticides and at least annually thereafter.

Refer to C2.23: Annual Pesticide Workers Safety Training.

- (E) Employees shall not smoke, eat, chew gum, and use chewing tobacco or snuff when mixing or applying pesticides.
- (F) Employees shall never use their mouth to siphon liquids from containers or to blow out clogged lines or spray nozzles.
- (G) Pesticide applications must be confined to the target area. When weather conditions are not favorable and spray drift may move outside the target area, spray operations shall be discontinued immediately.
- (H) Spray operations are to be stopped immediately if there are any leaks in the equipment. This includes, but is not limited to; spray tanks, leaking hoses, or faulty connections.
- (I) Remove clothing immediately if contaminated with spilled pesticides.
- (J) If pesticide contaminates skin, wash the area thoroughly with cool water and soap. Follow the pesticide label directions for additional instructions.

C2.24.4 Preparing Pesticide Application Equipment for Repair

Prior to delivering pesticide equipment for repair to an equipment shop, vendor, or field mechanic, workers shall conduct the following decontamination and notification procedures:

- (A) Spray tanks shall be flushed with clean water and an appropriate cleaner to remove pesticide residue before servicing or repairing.
- (B) All pipes, hoses, screens, and other locations that may contain pesticides shall be thoroughly cleaned and flushed to prevent any pesticides from draining back into the spray tanks.
- (C) The supervisor responsible for delivering the equipment to the shop or field mechanic shall provide written information for the last pesticide used in the tank. As a minimum, the following shall be provided:
 - (1) Name of last material used;
 - (2) Recommended protective devices or equipment necessary; and
 - (3) Poisoning symptoms.

Equipment Service Center employees who may come into contact with pesticide residues should attend Pesticide Safety Training. Any person who works on pesticide application equipment is considered a pesticide handler. The Pesticide Safety Training is for their protection.

See “Pesticide Application Equipment,” Appendix C2-C at the end of this chapter.

C2.25 Considerations in Planning a Chemical Vegetation Control Program

Prior to selecting an herbicide for vegetation control, alternative control methods should be considered and adopted if feasible, practical, and economically sound.

The success of a chemical vegetation control alternative is dependent upon a number of factors. The omission of any one factor can seriously affect the program.

See Section C2.08.1: Natural and Biological Controls.

If it is determined that chemical means of control are best for controlling vegetation, districts must carefully plan their programs. This section provides a list of considerations for planning chemical vegetation control.

(A) Considerations in the Planning Stage

Districts should consider the following when planning their chemical vegetation control programs:

- (1) Determination of the problem and the final desired result.
- (2) What types of vegetation need to be controlled.
- (3) The soil
 - (a) Types
 - (b) Slope grade in the target area.
- (4) The area's rainfall and climate.
- (5) Whether vegetation removal will be selective or non-selective.
- (6) Whether a goal is growth regulation rather than elimination of vegetation.
- (7) Determine if there is a need for fuel load reduction for fire prevention.
- (8) Characteristics of the target plants.
- (9) Adjacent land use.
- (10) Environmentally sensitive areas.
- (11) Stormwater concerns

(B) Criteria for selection of herbicides used on highway right of way are, in order of importance:

- (1) Safety
- (2) Performance
- (3) Economy

(C) Timing of Application

Timing of application most often is a determining factor of final results. The timing depends on the type of herbicide used. The following lists basic considerations:

- (1) Application of a pre-emergent herbicide prior to germination of seed will prevent a vegetative cover. Most pre-emergent herbicides require soil moisture prior to application. Depending on existing vegetative cover, in some cases a post-emergent herbicide may need to be added to the tank mix.
- (2) If roots are wanted, but not a top growth, spraying is performed after germination when the vegetation is small enough to leave minimal fire hazards when dry.
- (3) Systemic herbicides must be applied when vegetation is actively growing and when foods are moving downward to the roots. This usually coincides with optimum soil moisture conditions.
- (4) Temperature and moisture dictate timing of application. Some herbicides require warm temperatures, others humidity, and some act only when the temperature is cool. Rain after application is required with some, whereas it would defeat the purpose with others.

Carefully follow label instructions and the instruction provided with the Pesticide Control Recommendation. Refer to the following Section C2.26: Selection of Herbicides.

C2.26 Selection of Herbicides

C2.26.1 Contact Herbicides

Contact herbicides may be used to control existing weeds within landscaped areas where a chemical soil treatment might not be desirable. Contact herbicides destroy the portions of plants on which they are sprayed. Their prime use is to destroy annual plants that will not grow from the roots when the top is dead.

They may be used to “knock down” or kill top growth on perennial plants, but the root system of perennials is not destroyed by single applications of contact sprays.

Contact herbicides may be used to control vegetation where a future roadside planting is anticipated since they leave no serious toxic residue. They may also be used for edging ground covers.

C2.26.2 Pre-emergent Herbicides

Pre-emergent herbicide materials should be applied to the soil before the unwanted weed seeds germinate. They may be selective or nonselective in the plants they control. Most pre-emergent herbicides are best applied when there is soil moisture present, and require irrigation or rainfall soon after application to activate the herbicide and/or move it to the soil profile. Selective pre-emergent herbicides are useful for landscape and roadside applications, depending on desired results. Some pre-emergent materials may be used in varying quantities to produce either a selective or a non-selective result when applied.

Higher rates of these soil acting (pre-emergent) herbicides are used chiefly where no vegetative cover is desired. Fire prevention strips, under guardrails, signs, and delineators are examples of where non-selective herbicides would be used.

Pre-emergent soil acting herbicides are applied in liquid or granular form to the soil before the end of winter rains and before new vegetation has emerged. A suitable translocating herbicide may be added to the spray mix to control existing vegetation, or to control deep rooted perennial plants that are resistant to the pre-emergent herbicide.

A good VegCon Plan will alternate between different pre-emergent products every few years to reduce the tendency of weeds becoming resistant to specific herbicides.

C2.26.3 Translocating Herbicides

Translocating or systemic herbicides function by absorption through the foliage or root system of plants. The herbicide circulates to all plant parts, damaging cells or disrupting vital physiological functions within the plant leading to its demise.

Translocating herbicides are generally used to control perennial weeds, shrubs, and trees that may not be adequately controlled with other types of herbicides due to their extensive root systems.

Application rates are critical when using translocating herbicides. High concentration rates of herbicides can damage plant cells, shutting down plant physiology to the point that further products can no longer be absorbed by the plant.

C2.26.4 Herbicide Combinations

Herbicide combinations approved on their labels and the EIR can be used to remove multiple plant species in one spray application. For example, it may be possible to eliminate resistant perennials by combining low rate pre-emergent herbicides with translocating herbicides.

C2.26.5 Growth Regulators

Growth regulators are chemical formulations intended to physically alter the growth of plants.

Growth of shrubs, trees, ground covers, and other plants can be effectively controlled by use of these chemicals. This extends the periods between pruning, edging, or mowing.

Results are dependent on many factors such as plant material, location, weather conditions, time of year, and desired result. Consult label information of various products prior to use. Experiment with materials to determine their effects before general use.

C2.26.6 Chemical Brush Control

Growth regulators may be used to maintain brush at a desired size.

Use selective translocating herbicides to control new brush growth annually or when needed. Do not spray large vegetative woody brush material before mowing, leaving the material to become an unsightly fire hazard. Small re-growth under 12 inches in height may be sprayed without further removal.

Roadside brush may be effectively removed and controlled with chemical sprays. Brush which is more than one (1) foot in height should be cut and removed before spraying. The stumps may then be painted or sprayed with a "basal" treatment of glyphosate and triclopyr, or an alternate material registered for basal treatments. Any new shoots may be treated the following summer with a foliar translocating herbicide. Brush which is less than one (1) foot in height may be killed with foliar translocating herbicides. Roadside brush and small trees which are sprayed with translocating herbicides should be sprayed over their entire surface areas. Spraying a portion of such plants leaves an unsightly plant that is partly dead and partly alive.

See Section C2.27: Pesticide Spraying Operations.

C2.26.7 Adjuvants

Adjuvants are designed to alter the spray mixture to enhance the effectiveness of the herbicides. An example is one that increases herbicide effectiveness by reducing surface tension of the carrier and thereby providing greater contact of the chemical with the plant.

Some adjuvants buffer pH, provide penetration of waxy plant coatings, aid translocation, or alter the sticking ability of the solution. Others control evaporation, drift, or the release of the chemical in the solution.

Adjuvants are not added to some products by the manufacturer because they are not compatible with the herbicide in the container. In this case they must be combined just prior to use.

The amount of adjuvant to use is determined by the spray rate and volume. Carefully follow the PCA Recommendation. Not all of these materials act the same, so the proper material must be chosen for the specific job.

C2.26.8 Chemical Injection Systems

The 1,000-gallon spray truck with chemical injection system is considered standard equipment for roadside spray operations. Larger or smaller spray units with injection equipment will require special justification before being purchased. All Equipment Budget Requests (EBR's) for spray equipment will be approved by the Office of Roadside Maintenance before being purchased.

Chemical injection units should be used by crews that have large areas to be sprayed and large volumes of chemicals to use. This equipment provides the best control of spray rates and provides maximum flexibility for adjusting spray combinations.

Chemical injection units are very expensive to purchase, only perform as designed when kept clean and well maintained, and are operated by trained personnel.

C2.27 Pesticide Spraying Operations

Successful herbicide application depends on a number of factors including careful product selection, economy of the application (minimum acre rate necessary to control the target pest), timing of the application, environmental conditions (temperature, humidity, wind speed, and presence of an inversion), and soil conditions at the target site. Herbicide selection will also dictate other factors, such as application method, and whether adjuvants will be added. Specific to pre-emergent herbicides, irrigation or rainfall is a factor of when and where applications will be made.

Planning is required to ensure that spray operations are safe for the applicator, the support crew, and the traveling public. During spray operations, the applicator shall also consider the residual qualities of herbicides being used, constantly evaluating adjacent land use, and making conscious decisions during applications to avoid adversely impacting crops, livestock, and the environment. In addition, good planning must include proper rate and method of application to assure good results.

Care must be exercised in filling spray tanks and washing equipment to ensure that pesticides do not move off target and harm desirable plant and animal life, or cause environmental damage. Good stewardship shall always be foremost in the Caltrans IVM approach.

(A) Pressure

Common pressure for spraying of herbicides is 40 psi at the nozzle to avoid drift and turbulence. In some instances, pressures up to 200 psi may be used to obtain better coverage when spraying brush, cattails, Johnson grass and other large or dense growths.

(B) Rate of Spray

The rates of systemic or contact herbicides must be adjusted to compensate for the total leaf area when applied to dense stands of tall vegetation or brush. Perform periodic visual checks during the spray operation to ensure chemicals applied match the desired application rate per acre. The quantity of carrier must be sufficient for thorough wetting of the plants.

It is common practice to use varying rates of the active ingredient per acre, reflecting the density of foliage. For example, 100 gallons of spray may be required to thoroughly wet an acre of low grasses on which four (4) pounds of the active ingredient of an herbicide is required. An acre of taller grass, however, might require 300 gallons of mix containing 12 pounds of the active ingredient to cover the additional leaf area.

(C) Adjuvants

Adjuvants can increase herbicide effectiveness. They can decrease surface tension of the carrier allowing faster absorption of the chemical by the plant or they may increase the ability of the spray to adhere to the plant.

See Section C2.26.7: Adjuvants.

(D) Travel Speed

Herbicide effectiveness may be reduced if spray vehicle travel speed is not coordinated with the planned treatment rate, and if the pressure and nozzle size are not correct. Too much speed for the calculated rate and pressure could result in an ineffective application, while slower than calculated speed could result in over application.

Speed of travel, together with nozzle output, shall be calibrated to attain desired rate of application.

(E) Nozzle output should be calibrated at least twice each working day. Because of the potential for wind drift caused by reduced droplet size, operators shall exercise extreme caution with the higher pressures.

(F) Agitation

Equipment shall be adjusted to ensure proper agitation. Proper agitation within the spray tank prevents settling of suspended herbicidal materials and an ineffective spray operation.

(G) Always check equipment for safe and proper operation prior to spraying. Equipment, including hoses and spray wands or guns, shall be cleaned prior to being used.

(H) Pesticides shall be accurately measured to assure correct rate of use.

(I) Wettable powders shall be premixed into a slurry form before adding to the spray tank.

C2.28 Guidelines for Ordering Pesticides

Each district should keep an adequate supply of frequently used chemicals and allow for the time required to purchase additional material. This is not a blanket approval to warehouse excess quantities of chemicals. Order only what is needed, and specify delivery dates before the season of planned use. This will ensure timely delivery and eliminate warehousing large quantities for long periods of time.

Chemicals should be ordered in the largest containers practical to the operation. Materials purchased in drums are usually less costly per gallon than materials packaged in one (1) gallon containers. The problem of disposal of empty containers is reduced by the recyclable larger containers. Smaller containers may be justified if there will be economy of operation. Truck or carload lots of fertilizers are less expensive per ton when purchased in this quantity.

If no other product will do the job or if there are compatibility problems with other chemicals, this information shall be included with orders for chemicals to justify purchasing a specific material.

All pesticide purchases must be approved by the District Landscape Specialist in the district, or by the Maintenance Division, Office of Roadside Maintenance. There are a variety of purchasing methods to provide for quick receipt of material with a minimum of warehousing.

The following purchasing methods may be used:

(A) Incidental Purchases

Contract Delegation Purchase Orders (CDPOs) can be used for non-contract purchases up to \$24,999.99, before tax and freight (this amount may change - however the process will stay the same). Two quotations are required. Purchase Requests that limit the bidding to one brand or product must have a Sole Source/Limit to Brand Justification Form completed and attached to the file for documentation purposes.

(B) Contracts

Chemicals on State Contract may be ordered on a Contract Delegation Purchase Order without regard to monetary limitation.

(C) Emergency Purchases

If emergencies arise, chemicals exceeding \$24,999.99 may be purchased on a Contract/Delegation Purchase Order Form 42. Standard procedures for using the Form 42 emergency purchase process is to be followed.

Personnel not familiar with the emergency purchase process should contact the Office of Procurement and Contracts prior to calling vendors for bids.

As stated above, purchase requests that limit the bidding to one brand or product must have a Sole Source/Limit to Brand Justification Form completed and attached to the file for documentation purposes.

C2-A Caltrans Approved Herbicide List

C2-B Caltrans Approved Adjuvants List

For the current approved herbicide and adjuvant lists, please use this link:

http://onramp.dot.ca.gov/hq/maint/roadside/IVMP_Approved_Products.shtml

Appendix C2-C PESTICIDE APPLICATION EQUIPMENT

Before servicing or repairing this equipment, check the following:

C No. _____ ITEM No. _____

Cleaned and flushed on _____, by _____,

At _____ Maintenance Station.

The chemical(s) last used was _____

Toxicity Rating: CATEGORY I, II, or III (Circle One)

Maintenance employee delivering equipment to Shop _____

Maintenance Supervisor responsible for equipment _____

Telephone No. _____

Shop employee receiving equipment _____

Shop Supervisor of employee assigned to make repairs _____

Telephone No. _____

Observe the following precautions (from pesticide label):

Poisoning Symptoms:

Weakness, headache, sweating, sick stomach and vomiting, uncontrollable drooling, pinpoint pupils that affect vision, dizziness, rapid heart rate, stomach cramps, diarrhea, difficulty in breathing, loss of ability to use muscles, loss of ability to control bowels, unconsciousness. The last four symptoms are seen only in advanced or severe cases of poisoning.

If you experience any of the above symptoms, inform your supervisor and get medical assistance.

Date released from Shop: _____ Repairs completed _____

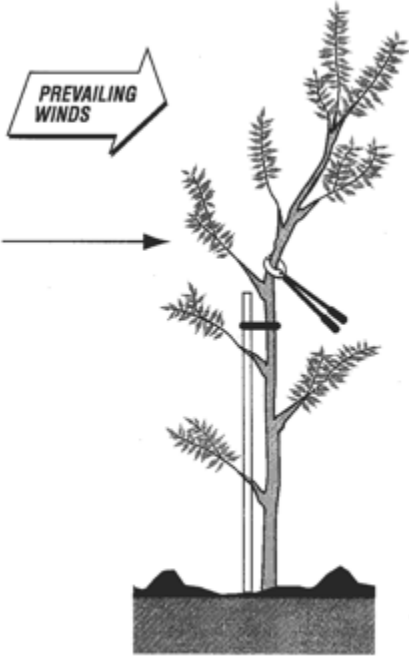
Shop Mechanic _____

Appendix C2-D

**TRIMMING YOUNG EUCALYPTUS TREES IN
AREAS OF PREVAILING WINDS**

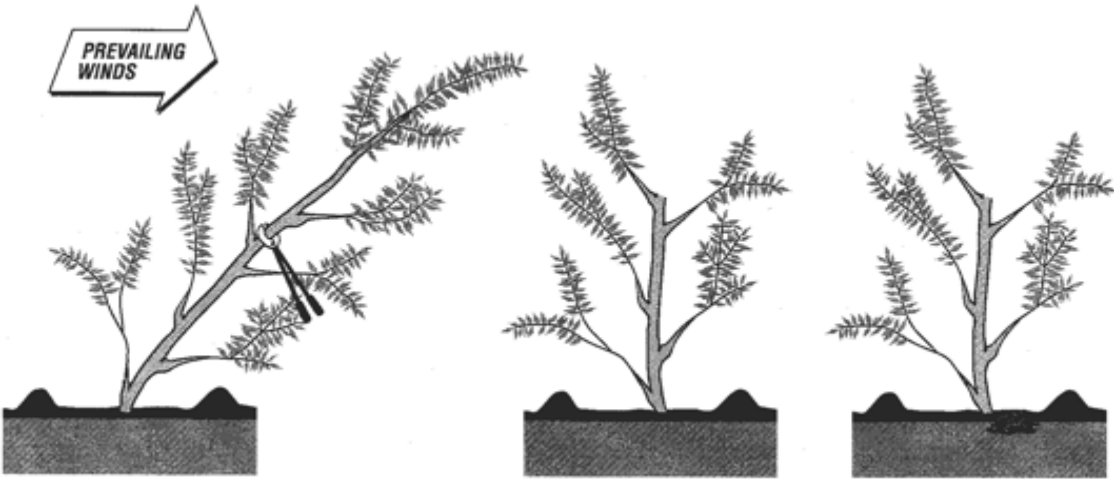
TRUNK NOT AFFECTED

If tree trunk is not affected,
cut to an upright lateral. Place
stake on upwind side. Use
multiple stakes if necessary.



TRUNK IS AFFECTED

If the tree trunk is affected, the tree
can be brought to an upright position
using the following steps:

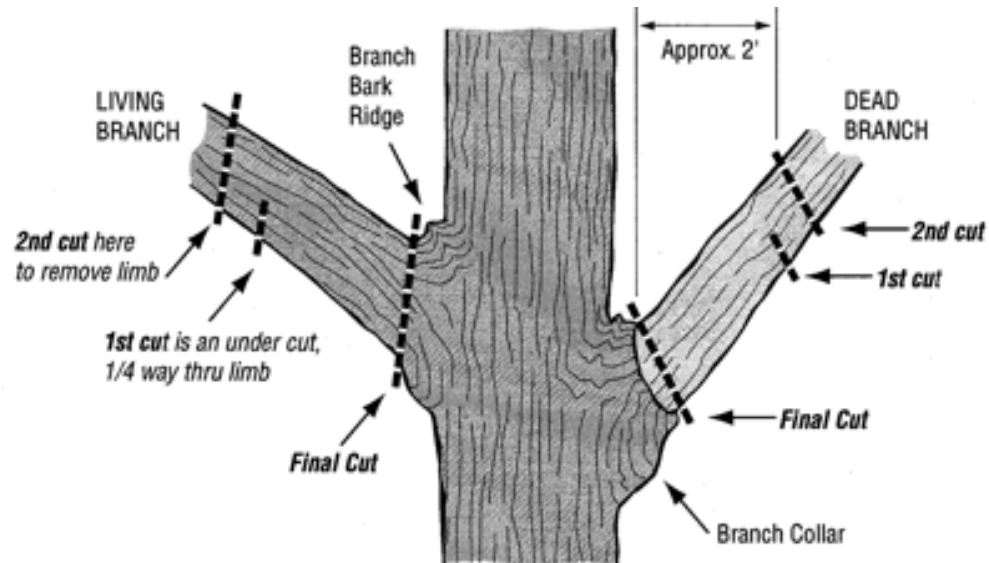


Remove excess weight
by cutting the tree to an
upright lateral

Straighten tree
trunk when *soil is*
wet and tamp well

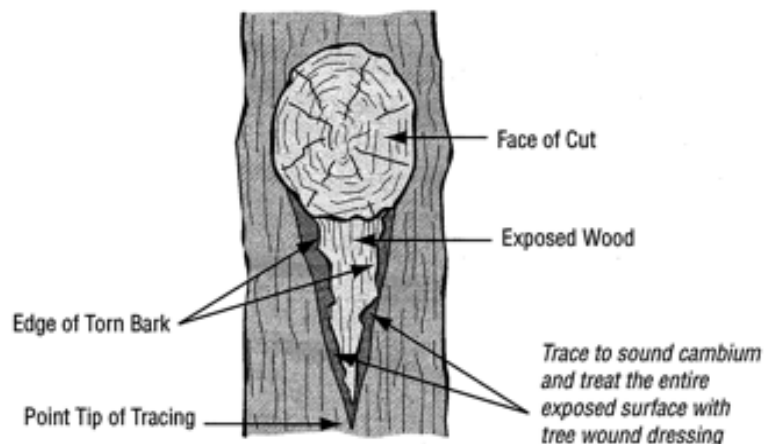
If the soil is unstable,
sand or crushed rock
may be added on the
side, toward the
direction, which the
tree was leaning

REMOVING LARGE LIMBS



When removing a large tree limb, use the three-step process illustrated above in order to avoid bark injury. The same process is used on both dead and live limbs. A proper *final* cut begins just outside the branch bark ridge and angles down away from the trunk of the tree. Make the cut as close as possible to the trunk, but outside of the branch bark ridge and the branch collar, so that trunk tissue is not injured and the wound can seal in the shortest time possible. If the cut is too far from the trunk, leaving a branch stub, the branch tissue usually dies and woundwood forms from the trunk tissue. Wound closure is delayed because the woundwood must seal over the stub that was left.

TREATING STRIPPED BARK

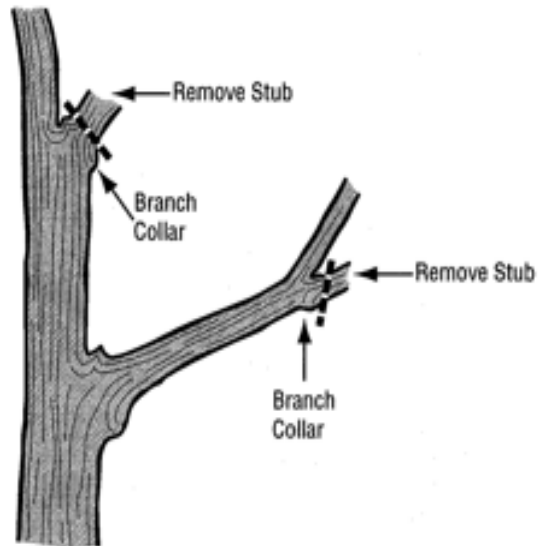


METHODS USED IN TREE TRIMMING

STUBS:

When removing to a leader or lateral, make the cut at the same angle or direction of growth of the remaining portion of the tree.

Avoid injury to the branch collar.



HEAVY BRANCHES:

Remove growth from under limbs to lighten heavy branches

