

Chapter 1.
Why Right-of-Way Vegetation Control is Crucial

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Chapter 1. Why Rights-of-Way Vegetation Control is Crucial

Important Terms

clear zone	safety recovery zone
noxious weed	sight distance

The nation's rights-of-way provide a major conduit for the flow of goods and services vital to the American economy. Rights-of-way include lands set aside for roadside, electric utility, railroad, and pipelines, and total more than 20 million acres across the country. Since rights-of-way are related to supplies and services for people, most right-of-way acres are located in the heavily populated eastern U.S.

Right-of-way reliability and public safety are major concerns across all rights-of-way for controlling selected types of vegetation. The right-of-way must allow workers to perform their function without hazards to those that use and depend on them. The management of nearly all rights-of-way share common objectives, including motorist and worker safety, reduced fire hazard, and the ability to perform inspections. There are many issues unique to each type of rights-of-way.

Most rights-of-way managers are confronted with "noxious weeds." Many states have declared certain plants to be "noxious weeds" because they have a detrimental effect on public health, agricultural crops, natural ecosystem function, or animal production. State law may require their control. If the agency or company responsible for the property does not control these weeds, local governments can contract the work to an outside group and charge the negligent party. If a state has established a list of noxious weeds, applicators should know these weeds and be able to identify them at various stages of growth.

ROADSIDE

Maintaining the nation's roadside rights-of-way, the areas between the edge of the pavement and the outside right-of-way boundary, focuses on safe travel for the motoring public. These areas may be either constructed or natural, and they may include the median strips on multilane highways and interchange areas. Roadside vegetation is controlled for 1) safety concerns, 2) road structure maintenance, and 3) appearance or beauty (aesthetics). Safety requirements include maintaining a safe recovery or clear zone, sign visibility, and sight distance. Vegetation

control improves drainage and snowdrift control, slows roadbed degradation, reduces erosion and fire hazard, and prolongs the life of roadside hardware. Vegetation control also enhances the beauty of roadsides.

Safety Recovery Zone (Clear Zone)

Vehicles need a safe recovery or clear zone to stop when they accidentally leave the road. This area is called the safety recovery zone or clear zone. Roads designed for higher traffic speed and density have wider safety recovery zones than roads designed for slower speeds and less traffic. Cut slopes require narrower safety recovery zones than do flat areas. Steep fills require the widest safety recovery zones (Figure 1). Since many vehicles continue on to the bottom of steep slopes, a clear area beyond the edge of the slope is desirable. A wider recovery zone is necessary at curves because cars are likely to leave the road at a sharper angle.



Figure 1. The safety recovery zone is an integral part of the highway design.

Trees are the major vegetation problem in the safety recovery zone because they are the single greatest cause of fatalities from vehicle collisions with fixed objects. Individual state policies differ on the size and height of trees permitted in the recovery zone, ranging from no trees allowed at all to trees allowed that are less than four inches in diameter at one foot above ground. Shrubs that do not block visibility are usually acceptable. A vehicle leaving the road can be funneled along the ditch bottom, or onto the backslope. Therefore, trees should not be located in or near the bottom of a ditch or on the backslope near the ditch.

Sign Visibility

Signs along roadsides must be visible regardless of season, time of day, or weather conditions (Figure 2). Signs convey warnings, guidance, and information. They are an important part of road safety, and can prevent accidents and driver confusion. Hidden signs



Figure 2. Signs need to be visible for traffic safety and driving convenience.

are a safety hazard because their message is obscured. Undesired vegetation can be near the sign or between the sign and the point where the driver should see the sign.

Sight Distance

The length of road visible to the driver is the sight distance. Clear sight distance is needed for stopping and for making decisions about turning, changing lanes, passing, and entering the



Figure 3. The encroaching trees obstruct vision across the curve for motorists on the roadway.

roadway. As speed increases, greater sight distance is needed. Vegetation has its greatest affect on sight distance on two-lane, rural highways. Sight distance is often limited by hills and curves. Vegetation can block sight distance at intersections and across curves (Figure 3). During ice and snowstorms, overhanging limbs become heavier and reduce sight distance more than usual.

Depth perception on the right side of the vehicle is difficult for many drivers. Vegetation encroaching from the shoulders often forces or subtly directs drivers to the center of the road on two-lane highways. This can reduce driver safety. Encroaching vegetation affects driver behavior most when weeds occur in short, isolated sections. Long, continuous stretches of vegetation have less affect on drivers. Tall vegetation and overgrown shrubs should be kept far enough from the roadside so as not to influence driver behavior.

Drainage Enhancement

Vegetation growing on the road shoulder and in ditches can prevent water from draining off the road rapidly (Figure 4). Water on the road surface can cause automobile hydroplaning or become ice patches in winter. Water can speed the degradation of pavement and road surfaces, soften and reduce the supporting ability of subgrades and



Figure 4. Controlling tall growing weeds facilitates water movement off the roadway.

shoulders, and deposit sediment in ditches and drainage structures. Cut plant material left after mowing can block drainage inlets, particularly during heavy rains when drainage is most critical. Weeds growing around or over the inlets can slow water drainage. The area around drainage inlets should be kept free of weeds.

Tall and thick growing plants such as trees, ragweeds, and cattails reduce water flow in drainage ditches by catching and holding debris. Low-growing grass is desirable because it controls erosion, and it minimizing interference with flowing water. Grass buffers can also act as biofilters by trapping sediment. Vegetation control promotes rapid drainage and often improves the appearance of the ditch. Shoulders should be maintained weed free to prevent drainage problems and damage to the roadway pavement because of shoulder deterioration. Weeds in the shoulder restrict subgrade drainage. This causes the soil to become "soft." The internal pumping action causes sorting of the aggregate and the road loses its weight-bearing capability. Gravel shoulders need to be maintained weed free so the shoulder is clearly defined to the motorist.

Road Surface Degradation

Weeds can destroy paved shoulders by growing through cracks and accelerating deterioration. Once established in the crack where the shoulder meets the road surface, roots or creeping rhizomes can punch through the road surface. The surface of roads shaded by trees dries slower, and ice and snow take longer to melt. Water reduces the life of the surface, especially asphalt.

Snow Drift Control

Snowdrifts occur on the downwind side of any obstacle that slows the wind. Tall vegetation, either trees or weeds, can cause drifts as the snow piles up behind the vegetation. Fences, barriers, median plantings, and guide rails clogged with weeds or overgrown with vines can cause snow to drift. Narrow bands of vegetation upwind from the road and downwind from wide-open spaces increase snowdrifts on the road. Since an obstacle has an influence distance of 15-20 times its height, vegetation some distance from the roadside may require control in areas susceptible to snow drifting.

Fire Hazard Reduction

Fires can occur when vehicles pull off the road. Hot catalytic converters and mufflers can ignite dry vegetation. In regions where plants complete their life cycle with the onset of drought, particularly annual grasses such as wild oats and cheatgrass in western U.S, weed-free areas wider than the normal road shoulders are maintained so vehicles can pull off the road without risk of igniting a fire (Figure 5).



Figure 5. Roadside fires can be serious problems in dry areas.

Erosion Control

Soil stability is important to the maintenance of roadbeds and surfaces. Dense vegetation is effective in reducing erosion. However, vegetation growing at the road edge can prevent water from draining off the road after a rainfall event. Water that does not run off the road often collects or runs down the pavement. The flowing water gathers force and eventually breaks over the edge. Increased water pressure causes erosion of the shoulder at that point. Weed dams are a particular problem under guide rails where machine grading is not possible.

Increased Life of Roadside Hardware

Controlling weeds around the variety of roadside hardware, such as guide rails, posts, delineators, metal inlets, and drains increases the useful life of this hardware. Weeds growing over and around roadside hardware hold moisture that causes rust and deterioration.



Figure 6. Vegetation management improves appearance and road delineation.

Appearance

Roadsides are highly visible to the public. Vegetation management enhances the appearance of the roadside and gives the road a definite delineation to motorists (Figure 6). Their appearance varies from rough turf to manicured lawns and from planted flowers to native vegetation. Although there can be a cost in the initial establishment of native wild flowers, their presence

can reduce other maintenance costs and increases the aesthetic value for the motoring public. Managing roadsides to meet the requirements of native vegetation can maintain their dominance. When roadside vegetation management meets the functional requirements for transportation (safety recovery, sight distance, sign visibility), improved appearance can be a low-cost fringe benefit.

ELECTRIC UTILITY

Electric utilities control vegetation to keep electricity flowing through the conductors, allow inspection of the infrastructure, to insure emergency access, and maintain equipment operation.

Conductor clearance

Tall growing trees, such as oaks and maples, may interfere with electric transmission and distribution. Trees that touch the electrical conductors create a safety hazard for the public, especially children that could come into contact the conductors by climbing the trees, as well as people working to remove the tree (Figure 7).

When trees touch the conductors, temporary outages occur as electricity is rerouted into the ground. These interruptions can cause problems with household electrical appliances. When a tree or limb breaks and falls on or across electrical wires, prolonged outages can occur. Vines can climb poles and guy wires creating outages and possibly a public safety risk.

Structures

Both wooden and steel structures should be free of vegetation so structures and conductors can be inspected for preventative maintenance (Figure 8). Inspection can be done from aerial (helicopter) or ground surveillance. Structures need to be free of vegetation to permit maintenance and repair.



Figure 7. Trees and people should not reach the electric conductors.



Figure 8. Structure inspection and maintenance is made easier with vegetation control.

Emergency Line Service

Electric rights-of-way need to be free of large vegetation so crews have access to sites for emergency line service. Lines free of overhanging vegetation are less likely to be taken down during storms because the limbs will not fall on the transmission and distribution lines.



Figure 9. Substations are maintained free of weeds for safety and aesthetics.

Substations and Storage Yards

Total weed control is important in substations and storage yards (Figure 9). Vegetation poses a fire hazard, harbors insect pests and rodents, disrupts the equipment in substations, and is an aesthetic problem. It is important that these areas are kept weed free because it prevents tripping and falling when employees are working with the electrified equipment.

RAILROADS

Railroads need to control vegetation for the similar reason as electric utilities and roadsides. The areas of control falls into five broad groups: yards, bridges, line-of-road, road crossings, and brush.

Yards

Weed control in yards is done to provide the safe work place required by the Federal Railroad Administration (FRA); to prevent fires around buildings, outside storage, and the general yard area; to prevent wheel slippage; to facilitate maintenance and inspection; and to improve appearance (Figure 10).



Figure 10. Vegetation in yards is a serious hazard to railroad employees.

Bridges

Vegetation control around bridges, especially wooden bridges, is necessary to reduce fire hazard and to facilitate structure inspection and maintenance (Figure 11).



Figure 11. Vegetation around wooden bridges is a serious fire hazard.

Line-of-Road

Vegetation control is needed to protect the roadbed by maintaining proper drainage, to allow track inspection, to improve visibility of signals, switches, signs, and crossings, and to reduce fire hazard along the rights-of-way. The line-of-road phase of railroad vegetation control refers to main lines and branch lines. It usually has the greatest number of treated acres compared to the other phases of railroad vegetation management (Figure 12).



Figure 12. Vegetation control in roadway ballast preserves ties and track stability.

Road Crossings

Road crossing treatments are applied to the areas on either side of highway grade crossings. Weed control at road crossings is needed to comply with legal requirements and to improve visibility by both the automobile and the train engineer (Figure 13).



Figure 13. Both trains and traffic need to be seen at road crossings.

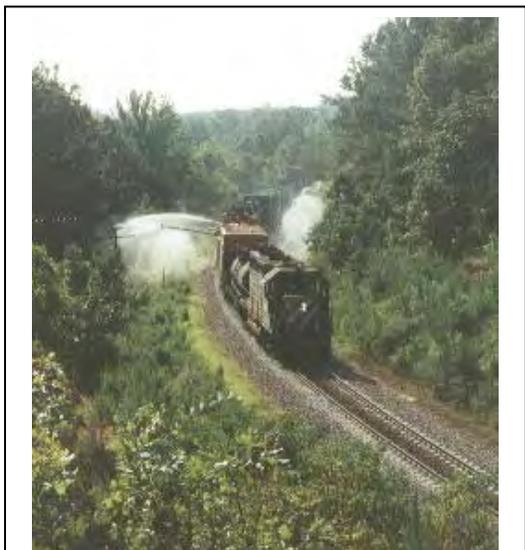


Figure 14. Woody plant control with herbicides last longer than mechanical methods

Brush Control

Brush control is necessary to prevent fouling of communication and signals lines, to maintain visibility around signs, signals, switches, and crossings. Brush control keeps woody plants from encroaching and becoming a clearance problem by striking railcars or employees as they pass (Figure 14).

PIPELINES

Vegetation management issues for pipelines parallels electric utilities in many respects. Vegetation control on the pipeline right-of-way is necessary for inspection, access, and safety. Rights-of-way free of brush can be inspected to spot warning signs of leaks (Figure 15). Open rights-of-way enable crews to conduct maintenance and emergency repairs. Total vegetation control around pumping stations and storage tanks is important for reducing fire hazard.



Figure 15. Vegetation control enables pipeline inspection and maintenance.

SUMMARY

Rights-of-way vegetation management is necessary for adequate safety, infrastructure maintenance, and improved appearance. All contribute to safe and reliable operations. Vegetation management performed for fire prevention, employee and public safety, facilities inspection, as well as noxious weed law compliance, are important for all rights-of-way. The goals remain the same – protect people, move goods and services, and protect the environment.

Chapter 1 Example Test Questions

1. Compared to a flat roadside, the safety recovery zone will be wider for:
 - A. Fill slopes
 - B. Cut slopes
 - C. Curves
 - D. Both A and C

2. The primary problem weeds in the safety recovery zone are:
 - A. Wildflowers
 - B. Trees
 - C. Tall grasses
 - D. Shrubs

3. The single greatest cause of fatalities resulting from vehicles hitting fixed objects is:
 - A. Bridge abutments
 - B. Parked autos
 - C. Telephone poles
 - D. Trees

4. Since an obstacle slows the wind for a distance of _____ times its height, vegetation some distance from the roadside may require control to prevent snowdrifts.
 - A. 2
 - B. 5
 - C. 10
 - D. 15-20

5. Total vegetation control is important in:
 - A. Railroad yards
 - B. Pumping stations
 - C. Electric substations
 - D. All of the above

6. Brush control, road crossings, yards, and line-of-road are phases of vegetation control for:
 - A. Roadsides
 - B. Electric lines
 - C. Railroads
 - D. Pipelines

7. Structure inspection, conductor clearance, and emergency service are reasons for controlling vegetation on:
 - A. Roadsides
 - B. Electric lines
 - C. Railroads
 - D. Pipelines

8. Aesthetics, drainage enhancement, sign visibility and sight distance are reasons for controlling vegetation on:
 - A. Roadsides
 - B. Electric lines
 - C. Railroads
 - D. Pipelines

9. Noxious weeds:
 - A. Vary from state to state
 - B. Do not have showy flowers
 - C. May require control
 - D. Both A and C

10. Right-of-way vegetation control is generally required to provide:
 - A. System reliability
 - B. Public safety
 - C. Noxious weed control
 - D. All of the above

Answers:

- | | | | | | | | | | |
|----|---|----|---|----|---|----|---|-----|---|
| 1. | A | 3. | D | 5. | D | 7. | B | 9. | D |
| 2. | B | 4. | D | 6. | C | 8. | A | 10. | D |

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