**Chapter 5.**
**Weed Control Programs for Right-of-Way Vegetation Management**

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# Chapter 5.
# Weed Control Programs for Right-of-Way Vegetation Management

**Important Terms**

basal application
Bermudagrass release
bridges
curb
cut stubble
cut stump
delineator post
ditches
fence
foliage application
guide rail
headwall
herbicide injection
inlet
line-of-road
median barrier
median island
nonselective program
road crossing
road shoulder
seedhead suppression
selective program
side trimming
soil active
storage yard
structures
substation
tree growth regulator

The objectives of vegetation management programs can be grouped into nonselective and selective control. Each has its place in right-of-way vegetation management. Nonselective vegetation control is the control of all vegetation. Selective control means some plants are not targeted or are released to grow as a result of the treatment method chosen. Fire is usually nonselective because all the vegetation is affected. However, it can be used selectively because perennial plants will resprout and annual plants will not. Mechanical methods such as mowing are nonselective when all vegetation is cut. Mechanical methods may be used selectively when perennials can resprout or short plants not cut are released to grow.

## NONSELECTIVE VEGETATION CONTROL PROGRAMS

In the context of herbicide and plant growth regulator use, nonselective vegetation control typically means the control of all vegetation by chemicals. Usually some period of bare ground is associated with nonselective treatments. This period of residual weed control can be very short lived or could last throughout the growing season. Nonselective control can be obtained in different ways.

1. After weeds have emerged, total control can be obtained with nonselective, postemergence herbicides that do not have residual soil activity. If rainfall occurs throughout the growing season, this control will last only a short time. New plants or weeds will become established and start to grow soon after treatment. When conditions like rain do not occur after treatment, and new vegetation does not germinate, bare ground can be obtained even though the herbicide treatment does not have residual soil activity.

2. Total control can be obtained with soil-active herbicides that are applied before the weeds emerge. These herbicides must move into the soil before weeds begin to grow. We depend on rain to move the herbicide into the upper soil layer where weed seeds will begin to grow. Application must occur before weeds emerge but before adequate rainfall can move the herbicide into the soil. For much of the U.S., early spring application is common. In arid conditions, application may occur in the fall or winter to take advantage of the winter rain or snow.

3. If weeds are already present, total control can be obtained by combining nonselective herbicides, which are taken up by the leaves, with herbicides that have residual soil activity.

4. Total control can be obtained by using nonselective herbicides that are absorbed by both the roots and the leaves and have residual soil activity.

Since no single herbicide will control all plants, tank mixes (combinations of herbicides) are very important for nonselective weed control. The actual herbicide treatment, or combination, will be influenced by site conditions, weed species, herbicide costs, equipment available, climate, and duration of weed control desired.

## Guide Rails

Guide rails prevent cars from leaving the road where inadequate recovery space is available. They also provide a visual warning to the motorist that adequate recovery space is not available. Weeds must be controlled to ensure that guide rails are seen by motorists and inspected by maintenance personnel (Figure 1). Weeds growing around the guide rails also hold moisture, which causes the guide rails to rust. Guide rails are usually established in asphalt, gravel, or grass. Aggregates and winter-applied abrasives tend to accumulate under guide rails. These materials hold moisture that degrades the asphalt and promotes weed growth. Also, weeds grow in the crevices around the guide-rail support posts when they are set in asphalt.

Figure 1. Guide rails need to be seen by motorists as well as maintenance

Weed control treatments under and in front of the guide rails usually involve chemical and/or manual methods. Where the guide rails are anchored in asphalt, treatment of the cracks and crevices are necessary to provide residual weed control. Guide rails can be treated with a variety of techniques, such as a handgun, short boom with nozzles spraying each side of the guide rail, flood nozzles, or off-center nozzles treating in front of and under the guide rail. Mowing in front of guide rails is easily done but mowing behind them is usually difficult.

## Median Barriers

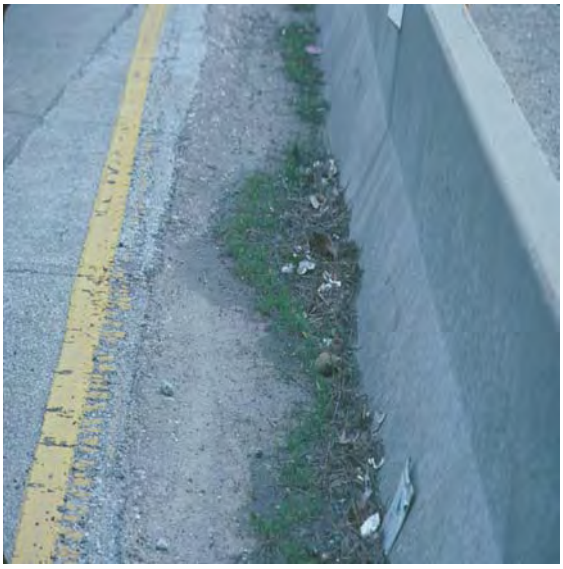

Figure 2. Weeds will grow in the aggregate that accumulates at the base of median barriers.

Median barriers prevent traffic from crossing into on-coming lanes. Median barriers, like guide rails, catch and accumulate aggregates and abrasives that support weed growth (Figure 2). These weeds are usually controlled manually or with herbicides. Herbicides are applied with a variety of methods including handguns, off-center, or straight stream nozzles. Treatments are commonly only spot applications. Because there is usually little soil and surface run-off can be excessive, herbicides with residual soil activity should be used carefully.

## Signposts and Delineators

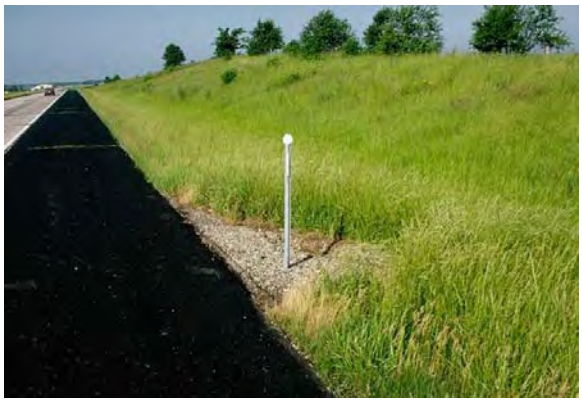

Figure 3. Total vegetation control around delineator posts facilitates mowing.

Like guide rails, signposts and delineators are anchored in soil or asphalt. They are also subject to rusting caused by weeds. Mowing next to these types of obstructions is not possible. If anchored in asphalt, treatment of the cracks and crevices at the base of the posts will be necessary. Removal of weeds with a nonselective herbicide treatment in an area around the posts large enough to overlap with mowers is usually done with handguns (Figure 3).

## Fences

Mowing around or next to fences is difficult. The ideal control is a banded residual weed control treatment (Figure 4). However, trees located on and off the right-of-way can be injured if their roots pick up soil active herbicides applied near the fence. This is an important consideration when near desirable trees. In these situations, a herbicide treatment without residual soil activity may be preferred. Weeds near fences are commonly treated with handguns or backpack sprayers.

Figure 4. Weed control under fences reduces maintenance costs.

## Structures, Abutments, Headwalls, and Inlets

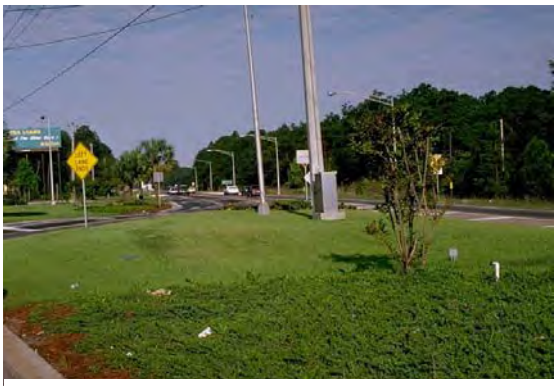

Figure 5. Weed control prolongs the life of structures on the right-of-way.

Vegetation degrades abutments and headwalls. However mowing around them is troublesome. Weed control around drain inlets is necessary for visibility and drainage maintenance (Figure 5). Weed control by manual or chemical methods is often required. Usually herbicides are applied with handguns or backpack sprayers. Care must be taken not to spray in the drain itself.

## Storage Yards

Weed control in storage yards provides a safe work area, enables workers to find parts and supplies when needed, and reduces equipment deterioration. Weed control with herbicides is commonly used because obstructions make mowing difficult, especially in areas other than the alleyways. If size permits, broadcast herbicide application equipment can be used in combination with handguns for inaccessible areas. Granular and pelleted formulations are convenient to use in storage yards.

### Road Shoulders

Total vegetation control eliminates the deteriorating effect of weeds growing through the edge of the asphalt. It provides a clear area for motorists to stop, and it reduces the risk of fire (Figure 6). Weeds growing through the shoulder loosen the soil. A weed free shoulder stays compacted, making it safer for vehicles to stop and start. Maintaining a compacted shoulder reduces soil erosion and the need for mechanical grading operations to smooth and dress the shoulder area. A nonselective herbicide treatment is used for maintaining this weed-free zone without disturbing the shoulder. In most cases, shoulder treatments are applied with a moving vehicle equipped to treat the shoulder area.

Figure 6. Vegetation on the road shoulder increases maintenance problems.

### Curbs, Gutters, and Median Islands

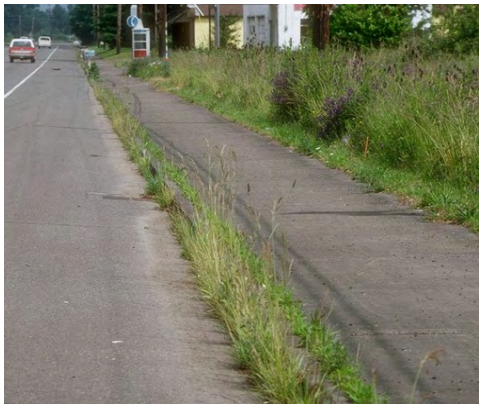

Figure 7. Cracks and crevices support vegetation on roadsides.

Curbs, gutters, and median islands have a variety of surface materials, including soil, concrete, asphalt, gravel, or brick. The non-soil surfaces have cracks where weeds can grow (Figure 7). Weeds attract litter and harbor rodents. A residual soil active herbicide treatment is applied to these cracks and crevices to prevent weed growth, and is usually applied with a backpack or handgun.

### Ditches

Sometimes roadside drainage ditches are maintained weed free to facilitate rapid water movement after storms, particularly in the western U.S. The presence of vegetation slows water flow and traps soil in the ditch. Over time the ditches accumulate soil that must be mechanically removed to maintain the ditch. Residual soil active herbicides are applied on

these drainage ditches during dry periods. When selecting a herbicide for ditch work, consideration must be given to how the water is used after it leaves the right-of-way.

## Bridges

Railroad bridge treatments involve the use of residual soil active herbicides applied early in the growing season to prevent vegetative growth around the supports of wooden bridges. Vegetation control for the length of the growing season is desired. Bridges can be treated by hand with granular spreaders or sprayed with special "bridge booms" on a hi-rail truck, or with regular flat fan nozzles on a fixed boom. Bridge booms usually use two clustered off-center (OC) nozzles that spray in opposite directions (Figure 8). They are attached to a flexible boom that can be raised and lowered. One boom is mounted on each side of the hi-rail truck and the equipment speed is reduced over the bridge while the application takes place, and care must be used to leave a buffer strip before and after any watercourse.

Figure 8. Bridge booms are used to control weeds under wooden bridges.

## Yards

Railroad yard treatments use residual soil active herbicides applied early in the growing season to prevent weed and grass growth around yards, switches, buildings, and storage areas. Long-term vegetation control is desired. The equipment most often used is a fixed boom sprayer equipped with flat fan or off-center nozzles mounted on a hi-rail truck or railroad car.

Off-center (OC) nozzles are used to supplement the fixed boom in order to treat adjacent tracks in a single pass. A hand-held spray gun may be needed around buildings or on “stub” tracks and other areas inaccessible to a track mounted vehicle.

### Line-of-Road

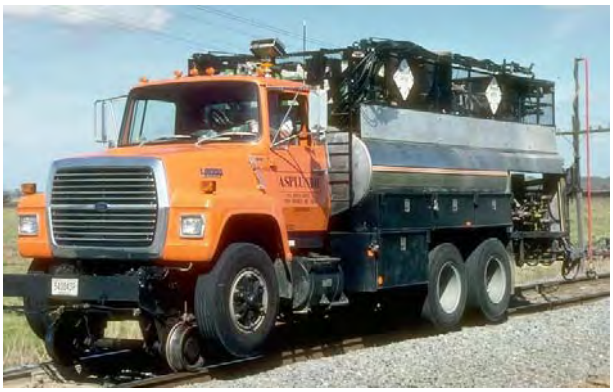

Figure 9. Trucks with the ability to run on road or rail are commonly used to treat railroad ballast.

The line-of-road phase of railroad vegetation control refers to main lines, branch lines, and includes signs and other trackside fixtures. Line-of-road operations usually require a postemergence treatment for short-term weed control. Weeds are present when the treatment is made and new weeds may begin growing before a killing frost. The equipment usually used is the same as that used in the yard treatment -- a hi-rail truck or spray train usually equipped with fixed booms and OC nozzles (Figure 9).

### Substations and Pumping Stations

Season long vegetation control is necessary in substations and pumping stations for fire hazard reduction and facility reliability. Handgun applications are most common around the actual equipment and facilities. Some areas with substantial open ground can be treated with short booms on light trucks or ATVs.

## SELECTIVE VEGETATION CONTROL PROGRAMS

Much of the roadside treatments use selective herbicides to control broadleaf weeds and release grasses. Nonselective herbicides or methods that direct the herbicide to specific target plants are used for special problem areas or problem plants.

### Broadleaf Weeds

The presence of tall growing broadleaf weeds gives the roadside an unkempt appearance. Control of these weeds is the major effort of many vegetation management programs. This has historically been accomplished with auxin growth regulator herbicides. More recently, however, there is a wider selection of herbicides that will control broadleaf weeds without injuring grasses. Broadleaf weed control can be done throughout the growing season. If treatments are conducted in the spring while the weeds are small and hidden by the grass, the results will be less noticeable. Fall applications are effective for controlling germinating winter annuals and biennials in the rosette stage. Herbicides that control broadleaf weeds can be

combined with plant growth regulators that suppress grass seedhead production in a single application if the timing is appropriate. Treatments to control broadleaf weeds can be applied as a spot or a broadcast treatment by a variety of methods, including boom and boomless spray equipment. Drift is a special concern because 1) treated areas are usually long and can pass by a variety of sensitive crops, 2) a large number of acres are often treated, 3) wide spray swath widths are possible, and 4) roadside traffic is adjacent to spraying operations.

### Ditches

Drainage ditches in the eastern U.S. are usually managed in a selective manner, where grass cover is encouraged (Figure 10). Woody plants and other plants that restrict water flow, such as cattails, are the main problem in these ditches. The labels of many herbicides may restrict the products' usage in or around drainage ditches.

Figure 10. Grasses are encouraged in some ditches to reduce soil erosion.

### Special Grass Control

Special grass-control programs include Johnsongrass, fescue, or wild oat control, and Bermudagrass release (Figure 11). Controlling one grass species in another grass can sometimes be accomplished by 1) careful control of application rate or treatment timing, 2) using directed application, or 3) taking advantage of the difference in plant heights. These treatments are applied by broadcast, spot, or wiping equipment.

Figure 11. Winter annuals can be controlled while Bermudagrass is dormant in the winter.

### Road Crossings

Road crossing treatments are applied to the areas on either side of highway/rail grade crossings to improve visibility. Road crossing treatments are usually applied after weeds have emerged, and are usually intended to suppress the vegetation on the railroad right-of-way rather than to eliminate it. Treatments vary with conditions on or adjacent to the

right-of-way. To reduce drift hazard under these conditions, crossing treatments are usually applied as higher volume (large droplet) applications. Off-center tips with large orifices, handguns, or specially constructed straight stream nozzle configurations are used for this purpose.

Crossing treatments can be applied by hi-rail trucks or spray trains. They are frequently conducted at the same time as line-of-road treatments and usually with a different herbicide mixture. Crossings can also be treated with off-track equipment and herbicides chosen specifically for the problem weed species.

## WOODY PLANT CONTROL

All rights-of-way managers in the eastern U.S. and the Pacific Northwest contend with trees. Trees also occur in other regions of the U.S., but are notably sparser or slower growing. Usually the objective is to selectively control some trees. Typically control is directed at the tall woody species with the goal of releasing lower growing vegetation that will occupy the site and hinder tree species establishment. Because of their size, woody plants can be treated individually or collectively.

### Cut Stump

Cutting down trees has an immediate visual effect of removing the problem. But, regardless of how the tree is cut, there is a high probability that, without a herbicide treatment, the stump will resprout if it is a hardwood species. A water-soluble formulation, such as an amine salt, can be used if the stump is treated soon after cutting. The herbicide should be applied to the area where the bark and wood meet, the cambium area. It is not necessary to treat the entire stump (Figure 12). If the stump has been cut for several days, it should be treated with an oil soluble formulation in an oil carrier. The entire stump should be wet with the mixture, but run-off is not necessary. Backpacks and hand sprayers are effective for treating cut stumps.

Figure 12. Only the outer part of fresh cut stumps need be treated with a water-soluble, translocated herbicide.

### Basal

Basal application is a low-volume treatment that uses a high concentration of herbicide and a low amount of oil carrier. Low-volume basal treatments use a herbicide concentration of 20-30% by volume. Treat the lower 12-24 inches of the stem to wet the bark surface, but not to the point of run-off (Figure 13). This treatment can be applied with backpack sprayers. Basal treatments are effective year round. This treatment is most effective on small trees or shrubs with green stems or stems lacking well developed bark.

Figure 13. Basal applications of the herbicide in an oil carrier enables woody plant control to be done during the dormant season.

### Foliage

Foliar applications are an easy way to control dense stands of woody plants. The largest selection of herbicides is available for this method of control. These applications can be made with a hose and handgun for spot or broadcast treatments, or other broadcast equipment (Figure 14). The brown foliage that results from many herbicide treatments (brownout), particularly for tall trees, may create a visual problem for the public. Brown foliage on small trees is not as noticeable. When brush control treatments are applied in late summer or early fall, the brown foliage blends better with natural leaf senescence.

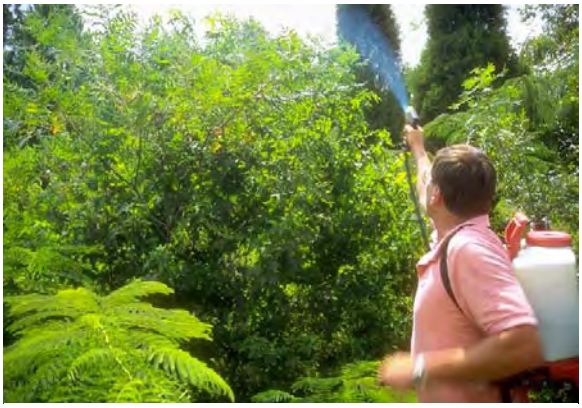

Figure 14. Low volume, foliage applications with backpack sprayers is a quite, effective technique.

### Soil Active Treatments

Some herbicides have enough soil activity to be used for woody plant control. They are applied in spots on the soil surface so that tree roots growing in the treated zone can absorb the herbicide. These treatments can be applied relatively fast and require little special application equipment. Since plants with roots extending into the treated area can also take

up the herbicide, off-site injury is possible when the right-of-way is alongside woods or other desirable plantings. The treatment should not be applied on steep slopes, frozen ground, or water saturated soils.

### Chemical Side Trimming

Side trimming is removing part of the tree's crown by treating only that portion of the crown with a herbicide. It is particularly useful on two-lane roads in wooded areas where the tunneling effect is undesired. Herbicides that translocate are generally used at an extremely low rate so that only the sprayed portion of the tree is affected.

### Cut Stubble

Cut-stubble treatments involve the application of a herbicide with soil activity at the time of or soon after a brushy area has been mowed. Resprouting stumps are controlled when their roots take up the soil active herbicide. The right-of-way is not left with large standing dead trees.

### Herbicide Injection

Spaced cuts are made around the stem and small amounts of herbicide are added to the cuts. The cuts do not have to overlap. The cuts, approximately 1-2 inches wide, are applied around the tree at about a one-inch spacing, edge to edge. A small amount of herbicide, 1-2 milliliters, is added to each cut. The "hack-and-squirt" method using a hatchet and squirt bottle is very effective and there are specialized tools (Figure 15). Tree injection is faster and requires less labor than girdling and frilling. Irregularly spaced cuts will result in incomplete control, and injection during periods of rapid sap flow may be less effective than during other times of the year. Large trees are more easily treated than small ones. However, their size, coupled with the dead leaves, makes the treatment effects very visible.

Figure 15. Tree injection can be done year round and requires no special equipment.

## PLANT GROWTH REGULATORS

### Roadside Turf

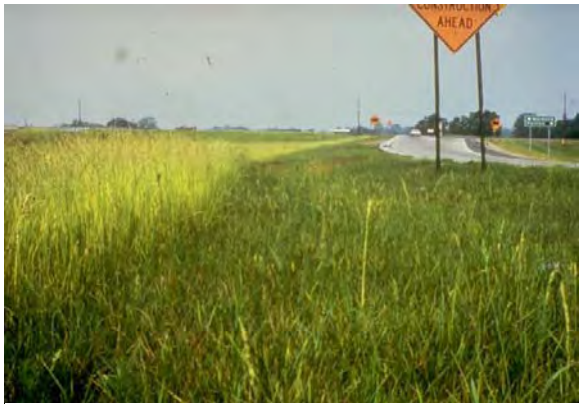


Figure 16. Seedhead suppression reduces the number of mowings needed to keep the vegetation from obstructing visibility.

Plant growth regulators are used to alter the growth of roadside grasses. They control, or suppress, seedhead production, and/or reduce plant height. This can reduce the number of mowing cycles needed for roadside maintenance (Figure 16). A side benefit on some species is a delaying of plant maturity so that plants remain green longer in the season. This reduces the risk of fire. Timing of the application for suppressing seedhead production is critical. It should be done early in the growing season. If the treatment is too early, there is no effect. If applied too late, the risk of a grass fire increases. Treatments for foliage reduction and grass stunting should occur after the first mowing. If the grass is thin, weeds can grow through the turf.

Growth regulators are effectively used in areas where mowing is hazardous and difficult, such as around guide rails, signs, median islands, and bridge cones. It is not uncommon to combine broadleaf control with grass growth regulation in a single application.

### Tree Growth Regulator

The tree growth regulator paclobutrazol (Profile 2SC) slows vegetative growth. It is applied as a basal drench or by soil injection and is used to reduce resprouting of trees after they have been trimmed. By slowing the resprouting process, trimming cycles can be extended.

## SUMMARY

Some areas of rights-of-way are universally managed for elimination of all weeds, and other areas are managed to promote specific types of plant cover. Each right-of-way manager will have objectives and programs that reflect the types of vegetation, climatic conditions, budget, available equipment, and local public perception of acceptable management.

Controlling rights-of-way vegetation requires the use of a variety of methods. Each control method has advantages and disadvantages, and no single method can be used for all weed

control problems.  It is through the integration of these control methods that the most cost effective program with the least environmental disturbance can be achieved.

## Chapter 5 Example Test Questions

1. Applying a herbicide solution to the lower 12-24 inches of the stem of a woody plant is what type of treatment?
   A. Foliage
   B. Cut stump
   C. Injection
   D. Basal

2. Selective weed control programs usually include:
   A. Release of grasses
   B. Control of all vegetation
   C. Control of broadleaf weeds
   D. Both A and C

3. Sites where nonselective weed control programs are important include:
   A. Storage yards
   B. Substations
   C. Wooden bridges
   D. All of the above

4. Sites where selective weed control programs are important include
   A. Median barrier
   B. Line-of-road
   C. Guide rails
   D. None of the above

5. Plant growth regulators are used to:
   A. Suppress seedhead production
   B. Reduce sprout growth
   C. Reduce the number of mowing
   D. All of the above

6. Methods of controlling woody plants include:
   A. All of the following
   B. Foliage spray
   C. Basal application
   D. Cut stump treatment

7. Steep slopes, frozen ground, or saturated soils should not be treated by what method?
   A. Broadcast foliar
   B. Soil active treatment
   C. Cut stump
   D. Low volume basal

8. The specific treatment for nonselective weed control can be influenced by
   A. Weed species
   B. Herbicide cost
   C. Duration of control desired
   D. All of the above

9. Nonselective weed control is important where:
   A. Inspection is necessary
   B. Fire prevention is critical
   C. Concern for litter and rodents is high
   D. All of the above

10. Sites where selective weed control programs are important include:
   A. Roadside turf
   B. Railroad brush
   C. Railroad crossing
   D. All of the above

Answers:

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

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