



Targeted Constituents

● Significant Benefit		▸ Partial Benefit		○ Low or Unknown Benefit	
● Sediment	○ Heavy Metals	● Floatable Materials	● Oxygen Demanding Substances		
● Nutrients	○ Toxic Materials	○ Oil & Grease	○ Bacteria & Viruses	○ Construction Wastes	

Implementation Requirements

● High		▸ Medium		○ Low	
○ Capital Costs	○ O & M Costs	○ Maintenance	○ Suitability for Slopes >5%	○ Training	

Description

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs and/or grasses that serve as erosion controls or otherwise stabilize soil or slopes. This management practice is likely to create a significant reduction in sediment, nutrients, floatable materials, and oxygen demanding substances.

Suitable Applications

This technique is applicable to all types of construction sites. Areas where preserving vegetation can be particularly beneficial are floodplain, buffers, wetlands, streambanks, steep slopes, and other areas where erosion control would be difficult to establish, install, and maintain, or areas where there are critical resources downstream.

Preservation of existing vegetation should be practiced in the following locations:

- Areas within site where construction activity is not permitted (such as buffers) or does not occur or occurs at a later date.
- Sensitive areas where natural vegetation exists and should be preserved, such as: steep slopes, watercourses, and building sites in wooded areas.
- Areas where local, state and federal government requires preservation, such as: vernal pools, wetlands, marshes, certain oak trees, etc.

Installation/ Application Criteria

Preservation of vegetation on a site should be planned before any site disturbance begins. Preservation requires good site management to minimize the impact of construction activities on existing vegetation, which may adversely affect their respiration, food processing, and growth.

- During a pre-construction conference, vegetation preservation and protection measures for that project should be reviewed with the contractor and any subcontractors.

Planning

The following planning steps should be taken to preserve existing vegetation:

- A plan for vegetation preservation should be completed before clearing and construction begins.
- Critical areas, such as floodplains, buffers, steep slopes, and wetlands should be left in their natural condition unless disturbance is unavoidable and permitted by buffer and floodplain/floodway requirements.
- Decisions on which vegetation to save should be based on the following considerations:
 - Life expectancy and present age
 - Health and disease susceptibility
 - Structure
 - Cleanliness
 - Aesthetic values
 - Comfort relative to site temperature variations and wind
 - Wildlife benefits
 - Adaptability to the proposed project
 - Survival needs of the vegetation
 - Relationship to other vegetation
- Areas for buffers where construction is not permitted should be delineated in the field with flags or colored temporary construction fencing.
- All vegetation to be retained should be delineated and identified (species and size) on the site plan and identified in the field by an easily seen colored flag.
- Plans should include the maintenance of existing grade around vegetation to be preserved. Most vegetation damage due to construction activities is to the root zone, which can result in the vegetation dying within a few years. Raising the grade can suffocate roots, and lowering the grade may expose roots.
- Plans for tree preservation should: avoid compaction of the soil within the drip line of a tree which can block off air and water from the roots and avoid changes in soil chemistry that can result from refuse of chemicals deposited on the soil surface.
- Temporary roadways should be located to minimize damage to shrub and tree stands, following contours to reduce cutting and filling.
- Locate multiple utilities in the same trench to minimize trenching. Excavations should be outside the drip line of trees.
- Construction material storage and crew parking should be noted on the site plan and located where they will not cause root compaction. They can eventually kill a tree.

- For retention of existing trees in paved areas, at least 5 ft. (1.5 m) of ungraded ground beyond the drip line should be left to help ensure tree survival.
- Soil stabilization measures should be located at the limits of clearing to prevent sediment deposition within the area where vegetation is being preserved.
- Wind damage can result from exposure of vegetation to increased wind velocities, therefore this must be considered when removing adjacent vegetation.
- Equipment must be kept away from trees to be preserved to avoid trunk damage caused by equipment nicking or scarring the trunk.

Timing

The following timing considerations should be taken to preserve existing vegetation:

- Preservation of existing vegetation should be planned before any site disturbance begins. Preservation of existing vegetation should be planned during the design stages by the design engineer and the contractor should meet onsite with the design engineer.
- No vegetation should be destroyed or altered until the design of roads, buildings, and utility systems is finalized.

Tree and Vegetation Marking and Protection

Clearing limits should be outside of the drip line of any retained tree, and at a minimum of 5 ft (1.5 m) from the trunk regardless of the size of the tree. A protective device, such as a colored temporary construction fence, to guard against damage to roots, trunk, and tops of trees, should be placed at these limits.

Individual trees, stands of trees, and areas of vegetation to be retained should be marked before construction at a height visible to equipment operators. Orange-colored plastic construction fencing or other suitable material should be used. Within 40 ft (12 m) of a proposed building or excavation, however, retained trees should be protected by fencing. The following are alternatives for tree and vegetation protection:

- Board fencing on 4-in. (100-mm) square posts set securely and 6 ft (1.8 m) apart, and protruding at least 4 ft (1.2 m) above the ground, placed at clearing limits.
- A cord fence with 2 rows of cord at least 3 in. (6 mm) in thickness running between posts. Each post should be at least 2 in. (50 mm) thick set securely and 6 ft (1.8 m) apart, protruding at least 4 ft. (1.2 m) above the ground placed at clearing limits. Strips of colored surveyor's flagging should be tied securely to the cord at intervals of no more than 3 ft (90 cm).
- Plastic fencing of 40 in. (1.0 m) high orange polyethylene webbing, secured to metal "T" or "U" posts driven to a depth of at least 18 in. (450 mm), on 6 ft. (1.8 m) minimum centers, placed at the clearing limits. The posts should be chemically inert to most chemicals and acids.

- An earth berm constructed according to specifications, but only if its presence does not conflict with drainage patterns. The base of the berm on the tree or vegetation side should be located at the clearing limits.
- Leaving a buffer zone of existing trees between the trunks of retained trees and the clearing limits. Trees in this buffer zone should be a maximum of 6 ft (1.8 m) apart so that equipment and material cannot pass. These trees should be re-examined before construction is completed to check for and ensure survival or be removed.
- As a last resort, a tree trunk may be armored with burlap wrapping and 2-in. (50-mm) studs wired vertically, no more than 2 in. (50 mm) apart encircling the trunk to a height of 5 ft (1.5 m). No nailing should ever be done to a retained tree. The root zone, however, will still require protection.

Employees and subcontractors should be instructed to honor protective devices. No heavy equipment, vehicular traffic, or storage piles of any construction materials should be permitted within the drip line of any tree to be retained. Removed trees should not be felled, pushed, or pulled into any retained trees. Fires should not be permitted within 100 ft. (30 m) of the drip line of any retained trees. Any fires should be of limited size, and should be kept under continual surveillance. No toxic or construction materials including paint, acid, nails, gypsum board, chemicals, fuels, and lubricants should be stored within 50 ft. (15 m) of the drip line of any retained trees, nor disposed of in any way which would injure vegetation. This also precludes vehicle fueling or maintenance in these areas.

Grade Protection

If the ground level must be raised around an existing tree or tree group, a tree well can be constructed. A professional arborist should be consulted if a tree well appears to be warranted or desired. A well may be created around the tree slightly beyond the drip line to retain the natural soil in the area of the feeder roots.

If the grade is being lowered, trees can be protected by constructing a surrounding tree wall of large stones, brick, or block, filled with topsoil. Fertilizer and water should be applied thoroughly and drainage provided so that water does not accumulate.

- Remove vegetation and organic matter from beneath the retained tree(s) to at least 3 ft. (1 m) beyond the drip line, loosening the soil to at least 3 in. (75 mm) in depth without damaging roots.
- Apply fertilizer to the loosened soil at rates not to exceed those recommended by the fertilizer manufacturer.
- Construct a dry well to allow for trunk growth. Provide 12 in. (300 mm) between the trunk and the wall for older, slow-growing trees, and at least 24 in. (600 mm) for younger trees.
- The well should be just above the level of the proposed fill, and the wall should taper away from the trunk by 1 in./ft. (80 mm/m) of wall height.

- The well wall should be constructed of large stone, brick, building tile, concrete blocks, or cinder blocks, with openings left in the wall for the flow of air and water. Mortar should be used only near the top of the well and above the porous fill.
- Drain lines beginning at the lowest point inside the well should be built extending outward from the trunk in a radial pattern with the trunk as the hub. They should be made of 4-in. (100-mm) drain tiles, sloping away from the well at a rate of 0.125 in./ft. (10 mm/m). A circumferential line of tiles should be located beneath the drip line; vertical tiles or pipes should be placed over the intersections of the two tile systems for fills greater than 24 in. (600 mm) in depth, held in place with stone fill. All tile joints should be tight. Drainage may be improved by extending a few radial tiles beyond each intersection and slope sharply downward. Coarse gravel may be substituted for tile in areas where water drainage is not a problem. Stones, crushed rock, and gravel may be added instead of vertical tiles or pipes, so the upper level of these porous materials slopes toward the surface near the drip line.
- Tar paper or an approved equivalent should be placed over the tile or pipe joint to prevent clogging, and a large stone placed around and over drain tiles or pipes for protection.
- Layer 2 in. (50 mm) to 6 in. (150 mm) of stone over the entire area under the tree from the well outward at least to the drip line. For fills up to 24 in. (600 mm) deep, a layer 8 in. (200 mm) to 12 in. (300 mm) should be adequate. Deeper fills require thicker layers of stone to be built to a maximum of 30 in. (760 mm).
- A layer of 0.75-in. (19-mm) to 1-in. (25-mm) stone covered by straw, fiberglass mat, or filter fabric should be used to prevent soil clogging between stones. Do not use cinders as fill material.
- Complete filling with porous soil (to sustain vegetation) until the desired grade is reached.
- Crushed stone should be placed inside the dry well over the openings of the radial tiles to prevent clogging of the drain lines. Vertical tiles should also be filled with crushed rock and covered with a screen.
- The area between the trunk and the well wall should be covered by an iron grate or filled with a 1:1 mixture of crushed charcoal and sand to prevent anyone from falling into the well or to prevent leaves, debris, rodents, or mosquitoes from accumulating.

One-half of these systems may be constructed if the grade is being raised on only one side of the tree(s).

Trenching and Tunneling

- Trenching should be as far away from tree trunks as possible, usually outside of the tree crown. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When

trenching and/or tunneling proximate to trees to be retained, tunnels should be at least 18 in. (450 mm) below the ground surface, and not below the tree center to minimize impact on the roots.

- Tree roots should not be left exposed to air; they should be covered with soil as soon as possible, protected, and kept moistened with wet burlap or peat moss until the tunnel and/or trench can be completed.
- The ends of damaged or cut roots should be cut off smoothly and protected by painting them with a tree-wound dressing.
- Trenches and tunnels should be filled as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots. Be careful not to over-compact as this can smother and kill the tree.
- To induce and develop root growth, peat moss should be added to the fill material.
- The tree should be mulched to conserve moisture and fertilized to stimulate new root growth.
- Remove any trees intended for preservation if those trees are damaged seriously enough to affect their survival. If replacement is desired or required, the new tree should be of similar species and of at least 2-in. (50-mm) caliper balled and burlapped nursery stock, unless otherwise required by the contract documents.
- Because protected trees may be destroyed by carelessness during the final cleanup and landscaping, fences and barriers should be removed last, after all other work is complete.

Vegetation Control

- Mechanical control of vegetation includes mowing, “bush-hogging”, and hand cutting. Large scale mowing is typically done by tractor-type mowers similar to farm machinery. “Bush-hogging” usually refers to tractor mounted mowing equipment with hydraulically mounted cutting machinery. On smaller areas, lawn tractors or push mowers may be used. In areas that are inaccessible by machinery, such as steep grades and rocky terrain, hand cutting using gas powered weed trimmers and scythes may be used.
- Clippings and cuttings are the primary waste produced by mowing and trimming. Clippings and cuttings are almost exclusively leaf and woody materials. Minimize transportation of clippings and cuttings into the stormwater conveyance system. Compost piles are encouraged to create mulch and topsoil for landscaping.
- Clippings/cuttings carried into the stormwater system and receiving streams can degrade water quality in several ways. Suspended solids will increase causing turbidity problems. Since most of the constituents are organic, the biological oxygen demand will increase causing a lowering of the available oxygen to animal life. In areas where litter and other solid waste pollution exists, toxic materials may be released into receiving streams with a resulting degradation of water quality.

- Mowing should be performed at optimal times (e.g., when it is dry). Mowing should not be performed if significant rain events are predicted.
- Mulching mowers may be recommended for certain areas. Mulching mowers should be encouraged for homeowners in flat areas. Mulching mowers have the added benefit of reducing the fertilizer demand through reuse of organic material. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs. Alternatively, the grass clippings can be bagged and used in composting.

Requirements

- Costs
 - There is little cost associated with preserving existing vegetation if properly planned during the project design, and may yield aesthetic benefits which enhance property values.
 - Measures to improve the disposition of clippings/cuttings are simple and inexpensive. For the most part, the solution to this problem involves behavior modification through education.

Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should conform to the requirements in the landscaping plan.

If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Soil, which has been compacted over a tree's root zone, should be aerated by punching holes 12 in. (300 mm) deep with an iron bar, and moving the bar back and forth until the soil is loosened. Holes should be placed 18 in. (450 mm) apart throughout the area of compacted soil under the tree crown.
- Any damage to the crown, trunk, or root system of a retained tree should be repaired immediately.
 - Damaged roots should be immediately cut cleanly inside the exposed area and surfaces painted with approved tree paint, and moist soil or soil amendments should be spread over this area.
 - If bark damage occurs, all loosened bark should be cut back into the undamaged area, with the cut tapered at the top and bottom, and drainage provided at the base of the wound. Cutting of the undamaged area should be as limited as is possible.
 - Serious tree injuries should be attended to by an arborist, forester or tree specialist.
 - Stressed or damaged broadleaf trees should be fertilized to aid recovery.
 - Trees should be fertilized in the late fall or early spring.
 - Fertilizer should be applied to the soil over the roots and in accordance with label instructions, but never closer than 3 ft. (1 m) to the trunk. The fertilized area should be increased by one-fourth of the crown area for conifers that have extended root systems.

Limitations

Protecting existing vegetation requires detailed planning, and may constrict the area

available for construction activities.

It is appropriate to evaluate the existing vegetation for species type for use in landscaping plans. Natural vegetation and invasive or “alien” species should be delineated. The use of natural vegetation is preferred.

Additional Information

The best way to prevent excessive erosion is to minimize the disturbance of the land. On a construction site, where extensive land disturbance is necessary, a reasonable BMP would be to not disturb land in sensitive areas of the site which need not be altered for the project to be viable (e.g., natural watercourses, steep slopes), and to design the site to incorporate particularly unique or desirable existing vegetation into the site landscaping plan. Clearly marking and leaving a buffer area around these unique areas will both help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping in naturally vegetated areas. Saving existing vegetation and mature trees on-site, beautifies the area and may save money by reducing new landscaping requirements. Mature trees also increase property values and satisfy consumer aesthetic needs.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, slope and erosion protection. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion and contributing to slope stabilization. Also, vegetation helps to keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Preserving and protecting existing vegetation can often result in more stable soil conditions during construction. Careful site planning and identification of plantings to preserve can provide erosion and sedimentation controls during construction, and contribute to the aesthetics of the development.

For new developments in particular, the easiest and least expensive measure is to leave the existing vegetation in place. Native vegetation typically requires much less maintenance than introduced vegetation. Consider mowing or trimming vegetation, both native and introduced, less frequently, thereby generating less waste. If introduced vegetation is necessary, consider planting low maintenance grasses and shrubs. Another advantage to these strategies is considerable water savings.

Once this vegetative waste is generated the main concern is to avoid transport of clippings/cuttings to receiving water bodies. It is necessary to pick up and properly dispose of clippings/cuttings on the slopes and bottom of drainage facilities, including stormwater detention/retention facilities. In addition, the presence of clippings/cuttings in and around catch basins should be avoided by either using bagging equipment or manually picking the material up. Clippings/cuttings on flat surfaces are generally not transported by stormwater runoff unless the event is particularly intense. Therefore, it is not necessary to pick up or bag clippings/cuttings on flat or nearly flat surfaces. Operators should be trained to use good judgement in determining whether clippings/cuttings should be left in place or collected for disposal or composting.

**Primary
References**

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**Subordinate
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