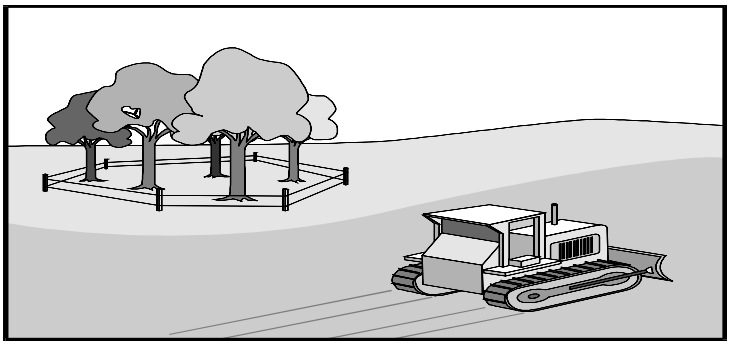
ACTIVITY: Preservation of Existing Vegetation

AM – 03



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

Description

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs and grasses that serve as erosion controls or otherwise stabilize soil or slopes. This practice will 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 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 where construction activity 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 wet weather springs, wetlands, marshes and protected habitats of endangered species.

Approach

Preservation of vegetation on a site must be planned before any site disturbance begins and must be done in accordance with the City of Knoxville Tree Protection Ordinance (included in Table AM-03-1). Preservation requires good site management to minimize the impact of construction activities on existing vegetation, which may adversely affect tree respiration, food processing, and growth. It is very inexpensive to preserve existing vegetation if properly planned during the project design, and it will yield aesthetic benefits that enhance property values.

The best way to prevent excessive erosion is to minimize disturbance of the land. On a construction site where extensive land disturbance is necessary, the engineer should design the site to protect sensitive areas such as streams and to incorporate particularly unique or desirable existing vegetation into the site landscaping plan. Clearly marked buffer zones are desirable to preserve these sensitive areas as well as take advantage of natural erosion prevention and sediment trapping in undisturbed areas.

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.

Saving existing vegetation and mature trees provides excellent aesthetics and will save money by reducing new landscaping requirements. Mature trees also increase property values, satisfy consumer aesthetic needs, reduce cooling costs in the proximity of homes, assist in the natural control of solar heat, soil conservation, flood control, air pollution and noise, and they provide citizens with psychological relief from the increasing complexities of the manmade urban environment.

Native vegetation typically requires much less maintenance than introduced vegetation. Consider mowing or trimming vegetation less frequently so that fewer clippings and cuttings are generated. If introduced vegetation is necessary, consider planting low-maintenance grasses and shrubs. An advantage of low-maintenance vegetation is that considerable water savings may be possible. Measures to improve disposition of grass clippings and cuttings are inexpensive and simple.

Application

Planning

- A complete plan for vegetation preservation should be prepared before clearing and construction begins. No vegetation should be destroyed or altered until the design of roads, buildings, and utility systems is finalized. Critical areas, such as floodplains, buffers, steep slopes, and wetlands, should be left in their natural condition unless disturbance is unavoidable and or if deemed necessary by 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
    - Aesthetic values
    - Wildlife benefits
    - Adaptability to the proposed project
    - Survival needs of the vegetation
    - Relationship to other vegetation

- Evaluate existing vegetation for species type when preparing landscaping plans. The use of natural vegetation is preferred. Non-native species or invasive species may be removed when appropriate.

- Buffer areas should be delineated in the field with flags or colored temporary construction fencing. All protected vegetation should be delineated and identified (species and size) on site plan and identified in field by a visible 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. 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. Temporary roadways should generally follow 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 areas, construction trailers, soil stockpiling, debris disposal, vehicle parking, and burning (by permit only) should be noted on the site plan, and located so that they do not cause root compaction or block water and air to the roots. For best efforts in retaining existing trees in areas to be paved, maintain 5 feet of ungraded ground beyond the drip line to help 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.

Tree and Shrub Protection

Clearing limits should be outside of the drip line of any retained tree, and at a minimum of 5 feet from the trunk regardless of the size of the tree. A protective barrier, such as a colored temporary construction fence, 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 operation.

Employees and subcontractors shall 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 areas with protected vegetation.

The following measures are alternatives for tree and vegetation protection:

- Board fencing on 4-inch square posts set securely at a maximum distance of 6 feet apart, and protruding at least 4 feet above the ground, placed at the clearing limits.

- A cord fence with 2 rows of brightly colored cord running between posts. Each post should be at least 2 inches thick set securely at a distance 6 feet apart, and protruding at least 4 feet above the ground, placed at clearing limits. Strips of colored surveyor's flagging should be tied securely to cord at intervals of 3 feet.

- Plastic fencing of 40-inch high orange polyethylene webbing, secured to metal "T" or "U" posts driven to a depth of at least 18 inches on 8 feet maximum centers, placed at the clearing limits.

Because vegetation may be destroyed by carelessness during final cleanup and landscaping, protective fences and barriers should be removed last after all other work is complete.

Fires and open burning are expressly prohibited by ordinance within the City of Knoxville. Toxic or construction materials such as paint, acid, gypsum board, chemicals, fuels, and lubricants may not be stored within 50 feet of the drip line of any retained trees, nor disposed of in any way which would injure vegetation. Vehicle fueling or vehicle maintenance shall not occur within 50 feet of the drip line of any retained trees.

Grade Adjustment – Tree Wall

If the ground level is being lowered around an existing tree or tree group, construct a surrounding tree wall of large stones, brick, or block filled with topsoil. A professional arborist or landscape architect should be consulted before designing a tree wall. A tree wall must have good drainage in order to promote root growth and regeneration of tree roots. Some species will have little or no tolerance for root disturbance or certain construction methods. A tree presents additional considerations for a professional civil engineer to design a retaining wall. Such considerations include the effects of strong winds, ice accumulation on trees, and extent of maximum tree growth.

Grade Adjustment – Tree Well

If the ground level must be raised around an existing tree or tree group within the drip line, a tree well can be constructed. A professional arborist or landscape architect should be consulted, as some species will have little or no tolerance for root disturbance or certain construction methods. Construction of a tree well or a surrounding tree wall may affect the groundwater level. A tree well can be built halfway around a tree if the proposed grade change only occurs on one side.

The purpose of a tree well is to allow proper drainage, movement of air, and natural soils to remain in contact with the tree roots. Refer to Figures AM-03-1 and AM-03-2 (adapted from reference 155) and the following considerations for building a tree well:

- Remove vegetation and organic matter from beneath the retained tree to at least 3 feet beyond the drip line, loosening the soil to 3 inches depth without damaging roots. Apply fertilizer to the loosened soil at rates recommended by manufacturer.

- Construct a circular or square dry well at least 12 inches from the trunk of a mature tree or 24 inches from the trunk of a young tree. The well should be above level of proposed fill, sloping away from the trunk by 1 inch per foot of wall height. The dry well 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 outward from the trunk in a radial pattern. Drain lines are typically 4-inch drain tiles, sloping away from the well at a rate of 1 percent. A circumferential line of tiles should be located beneath the drip line; vertical tiles should be placed over the intersections of the two horizontal tile systems for fills greater than 24 inches

depth, held in place with stone fill. All tile joints should be tight. Drainage may be improved by extending radial tiles beyond each intersection and sloping sharply downward. Stones, crushed rock, and gravel may be used instead of vertical tiles.

- A layer of clean 2-inch diameter stone shall be placed over the entire area under the tree from the well outward at least to the drip line. For fills up to 24 inches deep, a layer 8 to 12 inches thick should be adequate. Deeper fills require thicker layers of stone to be built to a maximum of 30 inches.

- A 6-inch thick layer of 0.75-inch to 1-inch diameter stone covered by straw, fiberglass mat, or filter fabric is used to prevent soil clogging. Complete filling with porous organic 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 people from falling into well or to prevent leaves, debris, or dead animals from accumulating.

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 at least 18 inches below ground surface and not below the tree center to minimize impact on 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 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. Do not overcompact soil as this can smother and kill the tree by eliminating air spaces in the soil. To induce new root growth, peat moss should be added to fill material. Tree should be mulched to conserve moisture and fertilized to stimulate new root growth.

- Remove trees that are damaged seriously enough to affect their survival. If replacement is required, the new tree should be of similar species and at least 2 inches caliper, balled and burlapped nursery stock.

Maintenance

Grass

Mechanical control of grass vegetation includes mowing, bush-hogging, and hand cutting. Bush-hogging refers to tractor-mounted equipment with hydraulically-mounted cutting machinery. On smaller areas, lawn tractors or push mowers are 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. Maintenance of grass vegetation shall be not performed in the rain or before predicted rainfall.

Clippings and cuttings are the primary waste produced by mowing and trimming.

Minimize transportation of clippings and cuttings into the stormwater conveyance system. Compost piles are encouraged to create mulch and topsoil for landscaping. 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.

Clippings and cuttings which are carried into the stormwater system and receiving streams can degrade water quality in several ways. The amount of suspended solids will increase, causing turbidity problems. Since most of the constituents are organic, the biological oxygen demand will increase, lowering the amount of available oxygen to animal life. Nutrients are carried downstream to receiving waters.

When clippings and cuttings are generated, the main concern is to avoid transport of this material to the storm drainage system and to natural streams. In particular, it is necessary to pick up and properly dispose of clippings and cuttings on slopes and within stormwater detention facilities. Clippings and cuttings near catch basins should be avoided by either using bagging equipment or manually picking the material up. Clippings and cuttings on flat surfaces are generally not transported by stormwater runoff unless the event is particularly intense. Therefore, it may not be necessary to pick up or bag clippings and cuttings on flat or nearly flat surfaces. Operators should be trained to use good judgement in determining whether clippings and cuttings should be left in place or collected for disposal or composting.

Trees, Shrubs and Vines

Irrigation or maintenance of existing vegetation should conform to the requirements in the landscaping plan. Any damage to the crown, trunk, or root system of a retained tree should be repaired immediately using the following guidelines:

- If a tree's root zone has been compacted, the soil should be aerated by punching holes 12 inches deep with an iron bar, and moving the bar back and forth until the soil is loosened. Holes should be placed 18 inches apart throughout the area of compacted soil under the tree drip line.

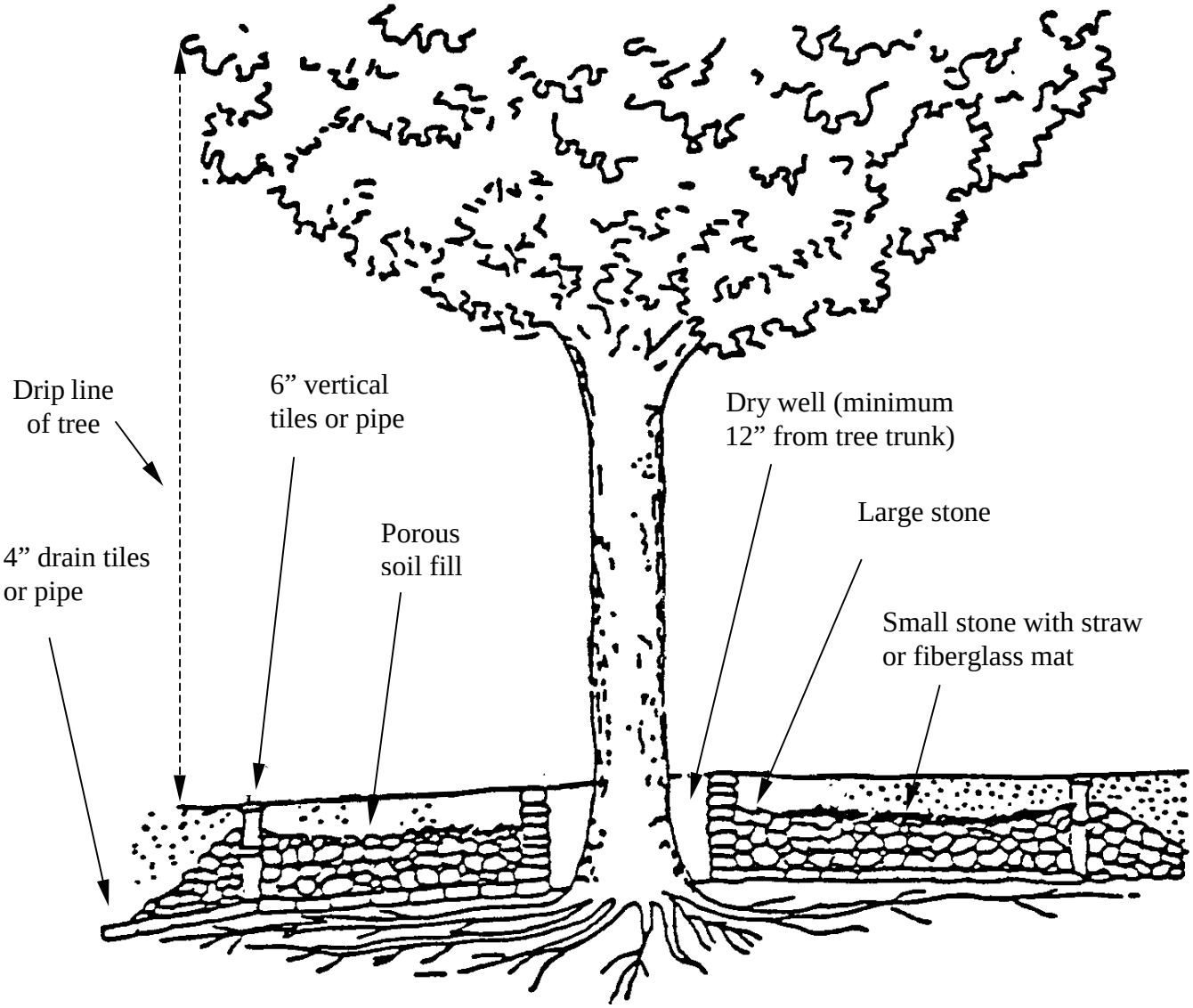
- Damaged roots should be immediately cut cleanly inside the exposed area and surfaces painted with approved tree paint, and moist soil or soil amendments should be spread over this area.

- 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 feet to the trunk. The fertilized area should be increased by one-fourth of the crown area for conifers that have extended root systems.

References **30, 33, 34, 35, 43, 90, 114, 144, 155** (see BMP Manual Chapter 10 for list)



CROSS SECTION DETAIL

NOT TO SCALE

Figure AM-03-1
Typical Tree Well Section

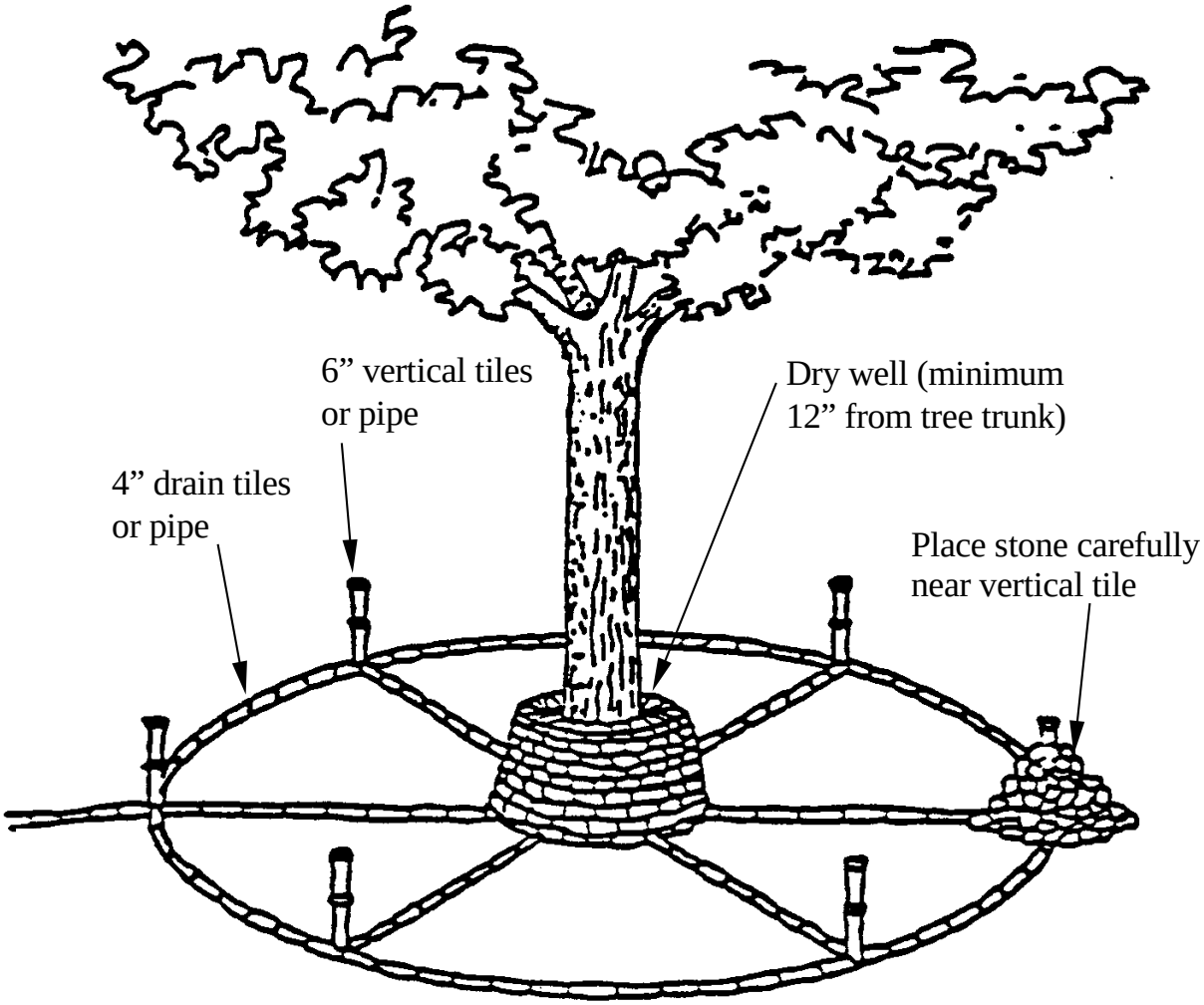


Figure AM-03-2
Typical Drainage Pipe Layout