Tree Protection Guidelines

Introduction

Trees provide important environmental benefits and enhance the quality of life in our neighborhoods. They help clean the air we breathe by absorbing carbon dioxide and releasing oxygen. By shading our homes in the summer, trees keep us cool and reduce our cooling costs. Their greenery provides us with a visual link to our west coast environment and studies show that retention of trees can increase property values by more than 20 percent.*****

In recognition of the valuable contribution that trees make to our neighborhoods, City Councils throughout Texas passed Municipal bylaws to protect trees on single and multi-family lots. The Tree Bylaws respond to increasing community concern about the unnecessary removal of healthy trees on single and two family lots when construction of a new dwelling or demolition of an existing dwelling is proposed. These guidelines are intended to assist developers, designers, contractors and property owners to retain, relocate and replace trees on single and two family lots. They should be used in conjunction with the provisions of various Texas Tree Bylaws. Applicants for demolition and building permits should refer to the information "Tree Protection Bylaws", as well as these guidelines, in determining tree plan requirements for their sites.

***** Moll, G. and Ebenreck, S. 1989. Shading Our Cities. Washington: American Forestry Association.

The intent of these guidelines is to:

- provide a consistent technical framework, which will improve the quality of tree retention, relocation and replacement of new development.
- encourage significant tree retention through site planning that is responsive to existing vegetation.
- promote responsible management and maintenance of trees on private property within the context of the neighborhood and the community.

These guidelines:

- describe general design guidelines and site planning requirements
- outline efficient and sensitive construction management considerations to coordinate such things as access and storage to minimize damage to existing trees.
- illustrate protection fencing required for protected trees
- outline measures to be taken to avoid root damage in situations where excavation will take place close to existing trees.
- describe root pruning and branch pruning methods that provide for continued healthy tree growth, while enhancing views, improving safety and allowing more sun to the site where desired.
- provide planting guidelines for replacement and relocated trees.
- illustrate measures to avoid conflict with underground and overhead utilities on both private and public property.

General design considerations

The purpose of encouraging significant tree retention is to maintain the character and natural amenity values associated within Texas neighborhoods. Retained trees normally require special protective measures during construction to ensure their continued healthy growth. Selective branch pruning can modify existing trees in harmony with new development to enhance views and alleviate potential hazardous conditions. The adjustment of a proposed building's siting can also retain trees without incurring unnecessary costs of tree removal and replacement. The following drawings represent potential responses to tree retention, relocation and replacement opportunities as part of site planning and development. Selected replacement trees should be appropriate to the particular site. However, replacement trees need not be the same species as those being removed. In determining types and locations of replacement trees, an applicant should consider whether other properties along the street have a particular type or types of trees planted, or whether trees are located in any characteristic pattern to buildings or the street. In addition, consideration should be given to soils, topography,

drainage or other conditions such as overhead wires or underground services, and whether there is preference for a particular species of tree. For more detailed planning and landscape considerations concerning power lines, contact Texas Utilities or Houston Power and Light. Replacement trees should be high quality, nursery grown trees that meet the Texas Association of Nurseryman's Grading Standard(s). When considering tree retention, relocation, replacement, and other design decisions affecting the landscape, landscape professionals such as arborists, landscape architects, horticulturists and nursery representatives, as well as representatives of any utilities on or adjacent to the site, should be consulted to obtain the necessary expertise and information. Street trees must not be pruned, moved or otherwise disturbed without prior permission of Municipal Park Departments. Street trees should be protected during the construction process. When selecting replacement trees, applicants should ensure that the variety or varieties selected are available commercially. A list of tree suppliers is available from www.growit.com or, your local yellow page listings.

Landscape submission requirements

The following guidelines are designed to ensure that trees designated for retention, relocation, or replacement receive the treatment and protection they require for survival during the construction process.

Any encroachment into the tree protection zone by vehicles, excavation materials or other by-products of construction will cause soil compaction in the root zone, decreasing the amount of air space in the soil necessary to maintain the health, vigor and life of the tree. Any such damage can be irreversible but may not become evident, in terms of tree decline and eventual death, for one to three years.

Survey Plan- A tree plan must be submitted at the time an application is made for a demolition or building permit. A tree plan must include a survey plan prepared by a Licensed Surveyor showing the legal boundaries and dimensions of the site. When a site survey is conducted, a numbered identification tag must be securely attached to each tree greater than 20 cm (8 in.) in diameter on the site. Identification tags are generally available from the Building Department. The survey plan should also show the following information:

a) all trees greater than 20 cm (8 in.) in diameter measured 1.3 m (4 ft) above the ground, including adjacent property trees within 2 m (6.6 ft) of the boundary of the site, and trees on any City street or lane allowances adjacent to the site

b) the location of any tree stump greater than 20 cm (8 in.) in diameter on the site.

c) the number of each tagged tree;

d) tree grades (existing tree base elevations) for trees greater than 20 cm (8 in.) in diameter; and

e) the drip line (extent of tree branches) and species (type) of all trees greater than 20 cm (8 in.) in diameter measured 1.3 m (4 ft) above the ground.

Tree Plan- The Tree Plan should show:

- all trees greater than 20 cm (8 in.) in diameter to be retained, relocated and removed (species and diameter);
- the location of any tree stump greater than 20 cm (8 in.) in diameter on the site.
- the number of each tagged tree;
- the location, species and size of all proposed replacement trees;
- protective fencing, required by Municipal Tree Bylaws, (to be installed prior to any site work),

to protect trees to be retained during construction; and

- trees greater than 20 cm in diameter on adjacent properties within 2 m (6.6 ft.) of the property line, including City street trees, as well as appropriate protective measures.

Typical tree plan-Construction Management Plan for Tree Retention- It is recommended that a Construction Management Plan be completed prior to issuance of a demolition or building permit to ensure the protection of trees during site work. The Plan should consider the following:

a) storage of excavation/building material away from retained trees. All excess excavation material beyond what is required for backfilling should be removed immediately from the area. Storage of construction materials on the street allowance is generally not permitted.

b) marking the access roadway to the excavation by flagging tape to avoid tree damage. It is further recommended that a 15 cm layer of wood chip mulch or similar material be used where the access road will impact existing tree roots. Temporary and permanent access must be approved by the Engineering Department.

c) locating concrete washout areas away (and preferably down-slope) from retained trees as well as existing and proposed planting areas. These washout areas are not permitted on City property.

Professional Consultation

As part of an application for a tree cutting permit, the Director of Planning and Building may require that a professional arborist, certified by the International Society of Arboriculture, prepare a report providing the following information:

a) the condition and size of trees proposed to be cut down, retained or relocated;

b) an assessment of the health, hazard potential and feasibility of retention of any trees proposed to be cut down;

c) the impact of a proposed development on the health (and potential hazard) of trees to be retained;

d) development limitations and recommended construction practices to protect trees during and after construction.

Technical guidelines

Tree Retention- Where trees are to be retained on a site, protection fencing must be installed before any work begins on the site and remain in place until all demolition or construction work is completed. A protection fence must be:

a) 1.2 m (4 ft.) in height;
made of plastic snow fencing securely mounted on wooden posts or wooden or chain link fencing mounted on wooden or metal posts; erected on or outside the drip line (extent of branches) of the protected tree.

b) Any required excavation in or around the protection fence to accommodate underground services, footings, etc. should be indicated on the plan and done by hand.

c) Trees inside the protection fence should be cared for throughout the construction process, e.g., they must be watered sufficiently, particularly if a portion of the tree's root system has been disturbed by excavation.

d) Root and branch pruning, where necessary, must be done in accordance with Sections 4.3 and 4.4.

Excavation Adjacent to Retained Trees

In cases where the proposed building excavation will affect existing trees to be retained, special attention should be given to proper root pruning and care for the remaining root system. Alternatively, a post and beam structure for the building can retain the rooting space (see diagram, Alternative 2). It is important to note that most roots are in the top 60 cm of soil, with the major roots for water and nutrients absorption in the top 20 to 30 cm.

a) In order to minimize root damage, soil erosion and tree disturbance, a temporary root curtain* should be wrapped around the root zone to retain and protect the exposed area. The root curtain should consist of heavy wire mesh or similar material lined with burlap (to retain moisture) and supported by posts. Backfill should be used as required to ensure that none of the roots are left exposed. Only hand excavation should be used in the root zone area.

b) It is critical that the root zone system (or roots of the tree) be kept moist by watering as required throughout the construction process.

c) Once the foundation is ready to be backfilled, the root curtain can be carefully removed. It is of utmost importance that the area surrounding the tree is kept free of building materials, as well as pedestrian and vehicular traffic, to avoid soil compaction.

d) Tunneling rather than trenching should be considered when installing underground utilities and drainage lines to minimize damage to existing trees. This technique entails boring a hole under or through the root system with minimum disturbance. To ensure that the work is undertaken in the appropriate manner, a certified arborist or similarly qualified landscape professional should be consulted if the applicant decides to use this technique.

root curtain is a material such as wire mesh that helps retain the roots and soil in place.

Root Pruning

Root pruning is the practice of removing a portion of a tree's root system. As a first alternative, adding soil and reseeding is recommended to prevent the removal of key structural roots. However, root pruning sometimes becomes necessary in order to accommodate landscape features such as walks, retaining walls, drains or utilities. Root pruning may also be necessary when existing roots begin to interfere with the routine maintenance of surrounding lawns and shrub beds. For example, it would be better to remove a surface root, which is continually wounded by a lawn mower blade, rather than to increase potential for disease through open wounds in the root. Other reasons for root pruning may include transplanting and undesirable growth patterns.

The circumstances necessitating root pruning vary, but the objective of the tree root pruning is always to ensure the health, stability and longevity of the tree. Therefore, major root pruning should only be done by, or in consultation with, an arborist or other qualified landscape professional.

The following general guidelines for root pruning are provided for your convenience:

a) A tree should be root pruned only if removing less than 33 percent of the tree's roots, with no more than 25 percent from one side, can solve the problem.

b) For trees 30 cm (12 in.) in diameter and less, roots should not be removed within 1.2 m (4 ft) of the outer edge of the tree base. Trees with diameters over 30 cm (12 in.) should be allowed an additional 30 cm (12 in.) for every extra 7.5 cm (3 in.) of trunk diameter measured at a point 1.3 m (4.3 ft.) above ground. For example, a tree with a 37.5 cm (15 in.) diameter trunk would require a minimum 1.55 m (5 ft.) allowance around it. The accompanying Root Pruning Table provides a guideline for root pruning different tree sizes.

Root Pruning Table – next page

Tree Diameter - (Measured 1.3m (4.3 ft) above ground

	Minimum	**Preferred**
15 cm (6 in.)		
22.5 cm (9 in.)	1.2 m (4 ft)	1.5 m (5 ft)
30 cm (12 in.)	1.2 m (4 ft)	1.8 m (6 ft)
37.5 cm (15 in.)	1.5 m (5 ft)	2.1 m (7 ft)
45 cm (18 in.)	1.8 m (6 ft)	2.4 m (8 ft)
52.5 cm (21 in.)	2.1 m (7 ft)	2.7 m (9 ft)

c) Cut roots cleanly after excavation with clean, sharp tools, to promote callus formation and wound closure. Wounds may be dressed with a tree rooting hormone compound that is available at garden centers.

Backfill the excavation as soon as possible and water the soil around roots to avoid leaving air pockets.

Mix soil improvements (e.g. peat moss) with fill soil to promote new root growth, especially if the existing soil is of poor quality. The soil quality can be easily determined by using a basic soil testing kit, which is readily available at most nursery supply stores. Do not add fertilizers until improved tree growth is noticed, generally after 6 to 8 weeks during a growing season. Soil testing will better determine soil deficiencies and additional amendment requirements if necessary.

Surface roots, which interfere with other elements in the landscape, can be removed under the supervision of an arborist or other qualified landscape professional. Each tree has a different root system and requires individual analysis and treatment.

Branch Pruning

Branch pruning can perform a number of functions. Most importantly, it is critical to the long-term health and vigor of the tree. Periodic pruning can cut away dead or diseased wood that is limiting growth. It can also contribute to enhancing views and limiting potential hazardous conditions.

Branch pruning should generally be undertaken during the dormant or less active periods of the year, during winter or summer, depending on the tree species (type). Pruning should be avoided if possible during spring, due to new growth, and fall, due to potential disease.

Branches should be cut cleanly with a proper saw or shears, depending on the size of the branch. The cut should be located adjacent to a node (swelling) in branch. Along the tree trunk, branches should be cut at the swelling at the base of the branch (e.g., branch collar), not flush to the tree trunk, to avoid unnecessary tissue damage.

Pruning should provide for attractive tree form and not create unnecessary stress on the trunk. The branches should be adequately spaced along and around the tree trunk. In the instance of large trees, one tree trunk should normally be used as the major support for the tree to avoid potentially hazardous situations. Tree paints on cut branches are no longer considered necessary but the application of tree pruning hormones, in certain instances, can prevent excess growth of new stems.

Contact Texas Utilities or Houston Lighting and Power if pruning is required close to power lines.

Trees on City property must not be pruned without prior approval of the Parks Department.

Transplanting Trees

In cases where tree retention is not practical or desirable, transplanting trees should be considered as an alternative. It is important to consider the special conditions required to relocate trees. Size, time of year, preparation and post-transplanting care are critical to ensure a higher survival rate. Generally, a 10 cm (4 in.) diameter tree can be moved without special equipment. A tree spade* can be used to move trees up to a 50 cm (16 in.) in diameter.

Even larger trees with significant historical or site value can be successfully transplanted; however,

special procedures and equipment must be properly utilized by a practicing Arborist. Local tree nurseries might also be interested in acquiring specimen trees and relocating them at their own cost. The following procedures should be used as guidelines for transplanting trees:

a) All trees can be successfully Transplanted the Year-round provided however, that skilled Arborists perform the work. Nurserymen generally transplant during the least active or dormancy period since they often lack the specialized equipment or proficiency to perform the task. Therefore, most nurserymen profess that: deciduous trees should only be transplanted when their leaves are absent from the tree, normally in late fall, winter or early spring. Further, that Coniferous trees are best moved only in late fall or winter. However, adequate water uptake prior to dormancy is critical to the coniferous tree surviving winter transplantation. Broadleaf evergreen trees are generally best moved as growth begins in spring. **Again, *ALL trees can be successfully Transplanted the Year-round provided however, that skilled Arborists perform the work*.**

b) The soil should be irrigated to a depth of 50 cm (20 in.) two to three days prior to digging and the soil should not be soaked. One additional day for the tree to absorb the moisture and excess water to drain away from the roots should be allowed. Penetrating the soil area with a bar or similar implement within the drip line (extent of branches) of the tree at 30 cm (12 in.) intervals will aid in water penetration, especially in grassed areas. Specific transplanting fertilizers may be used in consultation with an Arborist to reduce dehydration and other potentially damaging factors associated with transplanting.

c) As a general rule, root ball diameter for transplanting should be 30 cm (12 in) per 2.5 cm (1 in.) diameter of tree trunk measured at 1.3 m (4.3 ft) above the ground. For example, a 10 cm (4 in.) diameter tree should have at least a 1.2 m diameter root ball. Roots should be cut by hand using an axe, chain saw or tree spade, depending on the size of the root ball. Do not use a backhoe or similar type of equipment to sever roots, as this implement will cause unnecessary damage to the root system. If root damage such as root splitting occurs, ensure proper repair (e.g., pruning) is undertaken prior to transplanting.

d) Before transplanting a tree to a new site, the prepared ground should be made moist but not wet. Stake or guy the tree only if it is unable to stand on its own. The planting area should be irrigated, but avoid applying fertilizers until new growth is evident.

* A tree spade is a mechanized tree mover normally attached to a truck

Replacement Trees

a) Refer to information "Suggested Replacement Trees" for information on species selection and minimum size of replacement trees.

b) When selecting replacement trees, consideration should be given to ultimate size, form and habit of replacement trees as well as to specific site aspects including soils, topography and drainage. Replacement trees should also respect the building architecture, surrounding buildings, landscape elements, space restrictions and general neighborhood character.

c) In determining what type of tree or trees to choose as replacement trees, the following are some very basic considerations for the homeowner or developer:

- What overall landscape character is desirable for the property? For the street or neighborhood?
- What functions will trees fulfill? Provide shade? Frame views? Screen undesirable views? Or attract birds?
- Is maintenance (e.g. raking leaves, pruning, etc.) a concern?

- Are flower blossoms, fruit or nuts desirable?
- Are native species appropriate?

Tree Planting- The following tree planting guidelines are based on the most recent recommended practice by the American Forestry Association.

a) Select the location of replacement trees to ensure that the trees will be able to develop their natural form and ultimate size without creating a negative impact on the tree, its surroundings or any overhead or underground utilities.

b) Ensure that the root ball is uniformly watered one day prior to planting, if possible. Water the newly planted tree once a week, soaking thoroughly the cultivated area.

c) The area surrounding the planting site should be prepared and cultivated 50 cm (20 in.) deep, or the depth of the root ball if deeper, and 2.5 m (8 ft) wide. Cultivate the planting area with a rototiller or shovel. Set the tree in the center of the planting area on firm ground.

d) Soil composition should generally be approximately 50% loam, 30% decomposed organic matter, and 20% sand. Soil testing kits are normally available through local nurseries. The Department of Agriculture or private laboratories will also test soil samples.

e) A unique soil composition and planting might require an alternative treatment.

f) The root ball should be set slightly higher than it was growing in the nursery or tree farm. Where drainage is poor, it may be beneficial to plant the tree 2.5 cm to 5 cm (1 in. to 2 in.) higher than the surrounding ground. Under no circumstances should the top of the root ball be buried.

g) Soil should be compacted with a water sprinkler or hose and heavy foot traffic around the planting area should be avoided.

h) A 5 cm to 7.5 cm (2 in. to 3 in.) layer of mulch (peat, mushroom manure, leafmold, etc.) may be applied to the planting area but must be kept 15 cm (6 in.) away from the tree trunk.

i) A tree should only be staked if it is unable to stand on its own. When staking, the stake should be placed on the windward side of the tree avoiding damage to the trunk and root ball. The stake should not be driven through the root ball. The tree should be tied to the stake, allowing for natural movement of the trunk. The stake should be fastened to the tree with a figure-eight loop tie of a soft elasticized material, e.g., rubber tubing, or similar fastener, that is appropriate to the size, type and condition of the tree. The stake should be removed after one year or when the tree is established.

j) A regular maintenance program should be adopted for one year after planting to ensure survival and establishment, including pruning, watering, and cultivating the planting area. Do not fertilize until late spring of the second year following planting.

e: The accompanying tree detail illustrations characterize a generally flat site condition in an estricted area. Special planting considerations are required in sloped conditions, roof decks or other que situations.

Additional Sources of Tree Information

- B.C Hydro. Planting Near Power Lines. (Pamphlet)
- C.M.H.C. 1979. Roof Decks Design Guidelines
- Harris, Richard W. 1983. Arboriculture: Care of Trees, Shrubs and Vines in the Landscape. Englewood Cliffs, N.J.: Prentice-Hall.
- Shigo, Alex L. 1986. A New Tree Biology. Durham, N.H.: Shigo and Trees, Associates.
- Shigo, Alex. L. 1989. Proper Pruning of Trees. Durham, N.H.: Shigo and Trees, Associates.
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