

RULE NO.: R161-21.22

NOTICE OF RULE ADOPTION

ADOPTION DATE: 9/15/2021

By: Denise Lucas, Director
Development Services

The Director of the Department of Development Services has adopted the following rule. Notice of the proposed rule was posted on 7/8/2021. Public comment on the proposed rule was solicited in the 7/8/2021 notice. This notice is issued under Chapter 1-2 of the City Code. The adoption of a rule may be appealed to the City Manager in accordance with Section 1-2-10 of the City Code as explained below.

A copy of the complete text of the adopted rule is attached to this notice.

EFFECTIVE DATE OF ADOPTED RULE

A rule adopted by this notice is effective on 9/15/2021.

TEXT OF ADOPTED RULE

R161-21.22: Notice of Adoption to Section 3 in the Environmental Criteria Manual contains no changes from the proposed rule. The text of the adopted rule is attached to this notice.

The proposed revision consolidates material that is located in multiple locations and eliminates outdated or inaccurate graphics. The following are examples of this proposed revision:

- Strike outdated graphics and reference to these graphics
- Rewrite and consolidate the material in Appendix P-2 into the main text body as ECM 3.6.0
- Consolidate tree protection requirements into a high-level table to aid in usability.

SUMMARY OF COMMENTS

The Department of Development Services did not receive comments regarding Rule R161-21.22.

AUTHORITY FOR ADOPTION OF RULE

The authority and procedure for adoption of a rule to assist in the implementation, administration, or enforcement of a provision of the City Code is provided in Chapter 1-2 of the City Code. The authority to regulate tree protection requirements is established in Section 25-8-603 of the City Code.

APPEAL OF ADOPTED RULE TO CITY MANAGER

A person may appeal the adoption of a rule to the City Manager. **AN APPEAL MUST BE FILED WITH THE CITY CLERK NOT LATER THAN THE 30TH DAY AFTER THE DATE THIS NOTICE OF RULE ADOPTION IS POSTED. THE POSTING DATE IS NOTED ON THE FIRST PAGE OF THIS NOTICE.** If the 30th day is a Saturday, Sunday, or official city holiday, an appeal may be filed on the next day which is not a Saturday, Sunday, or official city holiday.

An adopted rule may be appealed by filing a written statement with the City Clerk. A person who appeals a rule must (1) provide the person's name, mailing address, and telephone number; (2) identify the rule being appealed; and (3) include a statement of specific reasons why the rule should be modified or withdrawn.

Notice that an appeal was filed and will be posted by the city clerk. A copy of the appeal will be provided to the City Council. An adopted rule will not be enforced pending the City Manager's decision. The City Manager may affirm, modify, or withdraw an adopted rule. If the City Manager does not act on an appeal on or before the 60th day after the date the notice of rule adoption is posted, the rule is withdrawn. Notice of the City Manager's decision on an appeal will be posted by the city clerk and provided to the City Council.

On or before the 16th day after the city clerk posts notice of the City Manager's decision, the City Manager may reconsider the decision on an appeal. Not later than the 31st day after giving written notice of an intent to reconsider, the City manager shall make a decision.

CERTIFICATION BY CITY ATTORNEY

By signing this Notice of Rule Adoption R161-21.22, the City Attorney certifies that the City Attorney has reviewed the rule and finds that adoption of the rule is a valid exercise of the Director's administrative authority.

REVIEWED AND APPROVED



Denise Lucas, Director
Development Services

Date: September 13, 2021



Anne L. Morgan
City Attorney

Date: 9/13/2021

SECTION 3 - TREE AND NATURAL AREA PRESERVATION

3.1.0 - GENERAL

Trees enhance our community by their biological and societal values. Insomuch, City Council finds that:

- (1) The urban forest has social, ecological, cultural, economic, historical, and aesthetic benefits for the citizens of Austin.
- (2) A healthy urban forest enhances the health and welfare of the citizens of Austin.
- (3) The urban forest is an asset and important part of the City's infrastructure that city policy seeks to protect.
- (4) The health of the urban forest is entrusted to the City Council for the benefit of current and future citizens of Austin.
- (5) The potential for development to negatively impact the urban forest, including the largest and most significant trees, requires reasonable regulations.

The information in this section is intended to define the technical design criteria needed to achieve the tree and natural area preservation goals identified in Chapter 25-8, Subchapter B, Article 1 of the Land Development Code (LDC). These rules apply to all land located in the city limits and to the City's extraterritorial jurisdiction areas as identified in Section 3.3.1.

The site plan approval process is outlined in Chapter 25-5 of the LDC. Procedures for inspection and enforcement information are also found in Chapter 25-1.

3.2.0- APPEALS

Appeals concerning the enforcement of these rules shall be brought to the City Arborist.

3.3.0 - TREE SURVEYS

3.3.1 - Survey Requirements by Jurisdiction

A. **Zoning Jurisdiction**

Site Plan applications require a survey of all trees eight (8) inches in diameter and larger.

Applications for residential subdivisions and one and two unit residential development projects require a survey of all trees nineteen (19) inches in diameter and larger.

B. **Planning Jurisdiction**

City projects in any portion of the two (2) or five (5) mile extraterritorial jurisdiction areas must comply with tree survey requirements as if they were inside the city limits (see Section 3.3.1 A above).

C. **Hill Country Roadway Corridor Areas.**

In addition to the standard eight (8) inch tree survey, all Hill Country roadway projects require a survey of certain species of trees down to six (6) inches in diameter for individual trees and down to two (2) inches in diameter for tree clusters (see specific requirements in Section 3.3.4 below).

3.3.2 - General Tree Survey Standards

A. **Required Field Data.**

Tree data must be obtained from a ground survey. The data which must be obtained in the field are tree locations, trunk diameters and species. It is critical that the survey provides accurate measurements to ensure that the survey is complete and that both protected and heritage trees are clearly identified. The method of identifying crown area is discussed later (3.5.2.B Crown Impacts) and does not need to be field measured. A dated tree survey associated with subdivision and site plan applications must be certified by a surveying professional (a registered professional land surveyor in the State of Texas and conducted in accordance with the most current land surveying practice pertaining to topographic, easements and boundary surveys). Surveys for trees associated with residential building permits typically do not need to be certified. However city staff has the ability to require a certified survey from the applicant if the provided tree information is inaccurate or is insufficient for assessing impacts from proposed development. Tree surveys are only accurate for five years due to changes in tree health and trunk growth. The City Arborist will require a new survey if the survey information is no longer accurate. Failure to submit accurate and complete information at the time of application may result in delays in the permitting process, including the issuance and release of permits. Additionally the applicant is encouraged to conduct a tree evaluation to assist in the design and review processes (see 3.3.2.B Recommended Additional Field Data).

1. Location.

Tree surveys must be accurate. Levels of inaccuracy which will result in a failure to comply with the City tree preservation design criteria and construction specifications may necessitate new surveys and plan adjustments either prior to permit approval or project release. The location of all trees which are to be surveyed should be identified at the center point of the tree trunk at ground level.

Off-site trees whose Critical Root Zones enter the proposed development site shall be shown on the plan. If off-site trees cannot be accessed by the surveyor their location and diameter shall be approximated.

Heritage trees shall be identified with the letter "H" on the tree survey and tree list to clearly distinguish them as Heritage trees. Right-of-Way trees shall be identified with an asterisk.

2. Trunk Diameter.

Generally, tree diameters are measured at 4-½ feet above grade (diameter at breast height). The measurement provides the most accurate dimension of the tree's cross-sectional diameter. If the tree is on a slope, measure from the high side of the slope. Measure below unusual swells in the trunk (see Figure 3-1 in Appendix V of this manual) to avoid inaccurate measurements.

Diameter shall be accurate to the half inch. Measurements falling between half inch increments should be rounded down. For example, an 18.9 inch tree should be recorded as an 18.5 inch tree.

The diameter of a multi-trunk tree shall be determined by the total of the diameter of the largest trunk plus ½ the diameter of each additional trunk. All trunks with a diameter of one (1) inch or greater shall be included in this calculation, except in Hill Country Roadway Corridors as noted in Section 3.3.4. Identify multi-trunk trees within the tree inventory by listing the cumulative diameter with an M (multi-trunk). Identify each of the stem sizes when heritage trees are listed. A multi-trunked tree is differentiated from individual trees growing from a common root stock if there is a visible connection between the trunks above ground. Trunks of different species should be considered separate trees, no matter how closely aligned.

For Ashe juniper (*Juniperus ashei*), often referred to as cedar trees, only single-trunk trees with diameters eight (8) inches and greater or multi-trunk specimens with at least one such sized trunk need be surveyed. The intent of this provision is to encourage the preservation

of those mature cedars which provide valuable habitat for various species, while lessening the overall cost of the survey.

3. Tree Species.

Tree identification should be accurate to the species level (e.g. post oak, Spanish oak, cedar elm, etc.).

Trees may be identified by common names or botanical names (e.g. post oak or *Quercus stellata*).

B. Recommended Additional Field Data.

Additional information which would greatly aid project designers and reviewers in their efforts would include crown configuration, crown clearance, condition, spot elevation and tree number.

1. Crown Configuration.

If a tree has a crown which is skewed in one (1) direction, this information would be useful for surveyors to note. Project designers and plan reviewers need such information to more accurately assess design impacts on such trees.

The Critical Root Zone discussed in Section 3.3.2 D below supplants the "crown size" required by the LDC.

2. Crown Clearance.

This information is often critical in determining whether a given structure or vehicular use area can practically be placed within the dripline of a tree. If this information is recorded, the surveyor should consider the vertical distance to any major branches.

3. Condition.

This is one of the principle factors in determining whether a tree should or should not be preserved. Surveyors should not speculate about the condition of all trees unless they have the necessary credentials; however, if a tree is obviously in poor condition, it should be noted to prevent unnecessary expense in trying to design around it.

4. Spot Elevation.

Taking an elevation reading near the trunks of some trees will provide valuable information for project designers. Since grade changes are the most destructive impacts on trees, it is important to get the most accurate information possible.

5. Tree Numbers.

Tagging trees in the field with numbers corresponding to the trees shown on plans is extremely useful. Such numbered tags reduce time spent by project designers, plan reviewers, and contractors in determining the location of any given tree. Numbered aluminum tags are available from most survey and forestry suppliers.

C. Limits of Surveys.

If there is an area which is known at the time of the survey to be on the project site or easement but outside the buildable area, a limits of construction line may be established. Trees beyond this line need not be surveyed provided the following conditions are met:

- The limits of construction must be fenced throughout all phases of construction.
- A general description of the numbers, species and sizes of trees in the area beyond the limits of construction must be provided as a plan note (see Figure 3-2 in Appendix V of this manual).

D. Plan Graphics.

The standard tree graphics discussed below are important to provide consistent information in the most useful format for efficient plan review.

1. Trunk Location.

The tree trunk location on the plan must represent the center of the trunk at ground level, clearly identifying heritage and protected trees on the drawing and plan legend. If the tree leans substantially above that point, depict the direction of the lean with an arrow (see [Figure 3-2 in Appendix V of this manual](#)).

2. Critical Root Zone.

Trees are to be represented on plans by a circle centered on the trunk location, where the radius of the circle is a number of feet equal to the diameter in inches of the tree. The area within this circle is referred to as the Critical Root Zone (CRZ). The CRZ is used to determine compliance with design standards and construction specifications.

Trees proposed to be retained are to be represented by a solid circle.

Trees proposed to be removed are to be represented by a dashed circle.

Trees proposed to be retained but have not met preservation requirements (defined in ECM 3.5.2 Tree Preservation Design Criteria) are to be represented by a shaded circle.

Trees proposed to be planted are to be graphically differentiated from existing trees.

3. Diameters and Species.

Tree diameters and species must be shown. This information should be shown adjacent to each trunk location. For sites with many trees, this data may be shown in list form.

4. Tree Protection

Tree protection is required for all preserved trees consistent with ECM 3.6.1. All applications shall show tree protection on plans.

3.3.4 - Tree Survey Standards for Hill Country Roadway Corridors

A. Basic Survey.

All site plans for projects located in Hill Country Roadway corridors require a survey of all trees eight (8) inches in diameter and larger using the standards in Section 3.3.2 above (LDC Chapter 25-8 Subchapter B, Article 1).

B. Additional Survey Requirements.

In addition to the standard requirements, smaller individual trees or tree clusters of specified native species must also be surveyed. These species include those listed in the code along with other small native tree species which have been added to the list. (The code language "... for small native trees such as ..." allows for the addition of small native tree species not listed directly in the ordinance.) Species which are to be surveyed under this requirement are included in the chart in Appendix F.

For all the listed native species, the tree survey must include:

- All individual trees with trunk diameters greater than six (6) inches; and,
- All tree clusters with three (3) or more trunks (two (2) to six (6) inches in diameter) located within ten (10) feet of each other.

The method of surveying these small tree clusters is illustrated in Figure 3-4 in Appendix V of this manual.

3.4.0 - RESERVED

3.5.0 - DESIGN CRITERIA

The City Arborist must make the initial determination whether trees have been adequately considered in the design process. This requires:

- The identification of significant trees;
- An assessment of conformance with minimum design criteria for tree preservation;
- An analysis of design constraints and alternatives; and
- The negotiation of mitigative measures when necessary.

A discussion of each of these aspects of plan review follows.

3.5.1 - Significant Tree Identification

The Land Development Code addresses tree preservation in terms of saving "protected or heritage" trees (Tree Ordinance, 1983), designing around "significant" trees and vegetation (Comprehensive Watersheds Ordinance, 1986) or preserving the "natural landscape character" (Landscape Ordinance, 1979) of an area. In order to provide a standard for defining a significant tree or group of trees an evaluation method has been provided below. Not all "protected" trees are significant due to such factors as their species or condition. Conversely, some smaller trees may have significance due to their rarity, screening potential or other factors.

A. Tree Evaluation Method.

Whenever there is a question about which trees in a project area should be preserved, the tree evaluation method discussed below can be useful.

A designer can walk the project area with these criteria in mind and perform a rough analysis of the tree situation. Some groups of trees as well as individual trees can be identified as potential design constraints early in the process. In situations where it is necessary to choose between two (2) or more significant trees, a more detailed analysis can be performed by competent professionals in order to assign numerical values to each. These relative values can enhance the decision-making process.

In addition to the benefits described above, this tree evaluation method can be used as a "finding of fact." This can be submitted to the Planning Commission in the rare situation where

no agreement can be reached over the removal of significant "protected" trees, or over the issue of whether the natural character of the site has been adequately preserved.

The method for evaluating trees for the purposes of this document is based on ten (10) factors: condition, type, size, aesthetics, energy conservation/heat abatement, safety, adjacent trees, water quality protection/soil conservation, wildlife habitat and historic significance. Each factor is graded on a scale from 1 to 4 (1 being low). Some of the factors are weighted to reflect greater importance in different situations. Weights which will be applied are as follows:

Sites - Aesthetics (2 x Score)

Waterway Alterations - Wildlife Habitat (2 x Score)

Utility Lines - Wildlife Habitat (2 x Score)

The sum of scores for all ten (10) factors determines the relative value of a tree or group of trees. Given the assigned weights, the range of possible scores is 11 to 44. To give some guidance to project designers and permit applicants, scores are categorized as follows:

11 to 22 - Low Value

23 to 32 - Medium Value

33 to 44 - High Value

A discussion of each factor follows:

1. Condition. In assessing a tree's condition, the arborist considers trunk condition, growth rate, tree structure, insect and disease problems, crown development and life expectancy. A score is assigned as follows:

1 = Poor

2 = Fair

3 = Good

4 = Excellent

2. Type.

The species of trees native to, naturalized in, adaptable to or frequently planted in the Austin area have been categorized based on overall quality. The chart in Appendix F indicates how each species fits in this general classification. A score is assigned as follows:

1 — Tree not included in Appendix F, 8 to 18.9 inches diameter

2 — Tree not included in Appendix F, 19 inches diameter and greater

3 — Tree included in Appendix F, 8 to 18.9 inches diameter

4 — Tree included in Appendix F, 19 inches diameter and greater

3. Size of tree trunk.

Tree sizes are divided into four (4) categories. A score is assigned for each size category as follows:

1 = Less than 8 inches diameter

2 = 8 to 13.9 inches diameter

3 = 14 to 18.9 inches diameter

4 = 19 inches diameter and larger

4. Aesthetics.

Trees located on the perimeters of a project area can serve to buffer or screen the project from roadways and adjacent tracts and therefore have a high aesthetic value. Trees may also score high in this category regardless of their location if they are in good condition and have exemplary form. Such trees should be preserved as aesthetic enhancements to the project. A score is assigned as follows:

1 = Poor

2 = Fair

3 = Good

4 = Excellent

5. Energy Conservation/Heat Abatement.

If a tree is shading a building, parking or pedestrian use area in its existing situation, it receives a high score under this category. The energy conservation/heat abatement potential is also considered even if there are no existing benefits. For example, large trees west of a buildable area will score high. A score is assigned as follows:

1 = Poor

2 = Fair

3 = Good

4 = Excellent

6. Safety.

If a tree is in a hazardous situation due to external factors related to man-made features (not inherent to the condition of the tree) such as its proximity to power lines, its location relative to a road intersection, etc., it receives a low score. Scores reflect the feasibility of mitigating the safety problems, and are assigned as follows:

1 = Hazardous; Low Mitigation Potential

2 = Hazardous; Medium Mitigation Potential

3 = Hazardous; High Mitigation Potential

4 = Not Hazardous

7. Adjacent Trees.

The proximity of other trees has a bearing on a tree's value. Everything else being equal, a lone tree has greater value than one (1) tree of many. The fate of other trees in the vicinity also affects this rating factor. A score is assigned as follows:

1 = Many trees; High Retention Potential of Adjacent Trees

2 = Many trees; Low Retention Potential of Adjacent Trees

3 = Few Adjacent Trees

4 = Lone Tree

8. Water Quality Protection/Soil Conservation.

Trees help reduce stormwater runoff and enhance ground water recharge by breaking the impact of raindrops and improving soil structure. A tree's effectiveness in this capacity is correlated with the size of the crown and root zone area. Large trees with full crowns and unrestricted root zones score highest in this category. A score is assigned as follows:

1 = Poor

2 = Fair

3 = Good

4 = Excellent

9. Wildlife Habitat.

This factor is rated on the basis of the intrinsic value of the type of tree as a provider of food and forage and general wildlife cover characteristics, or on the basis of field observations of a particular tree, whichever is greater. The chart in Appendix F provides the intrinsic values for the major genera of trees in the Austin area.

Regarding field observations, an individual tree may rate higher than the assigned intrinsic value of the genus due to such things as the presence of food bearing parasites or epiphytes (e.g., mistletoe or grapes) or due to the potential for or actual presence of wildlife nesting cavities. A score is assigned as follows:

1 = Poor

2 = Fair

3 = Good

4 = Excellent

10. Historical Significance.

The highest rating in this category is reserved for trees which fit one of the following criteria:

- The tree is on a registry of significant trees.
- The tree has been documented as historically significant.
- The tree is rare in the Austin area.
- Due to its location and size, the tree serves as a significant landmark on the landscape.

Since historical significance is largely a function of age, the arborist's estimate of the age of the tree also has a bearing on this value. Scores are assigned as follows:

1 = Less than 40 Years Old

2 = 40 to 80 Years Old

3 = Greater than 80 Years Old

4 = Registered, Rare or Landmark Tree

B. Ecosystem Services Evaluation Methods for Heritage Trees.

LDC 25-8-642(C)(2) and 25-8-643(A)(2) state: "removal of the heritage tree is not based on a condition caused by the method chosen by the applicant to develop the property, unless removal of the heritage tree will result in a design that will allow for the maximum provision of ecological service, historic, and cultural value of the trees on site." This code citation offers an option to applicants when attempting to demonstrate that a proposed development, which identifies removal of a heritage tree(s), results in a superior ecological service design. The following metrics establish ecological services to be measured. These metrics are not exhaustive, and additional metrics or methodologies will be considered by the City Arborist.

1. air pollution loading reduction
2. carbon storage and sequestration
3. stormwater runoff and nutrient retention
4. water quality
5. biodiversity

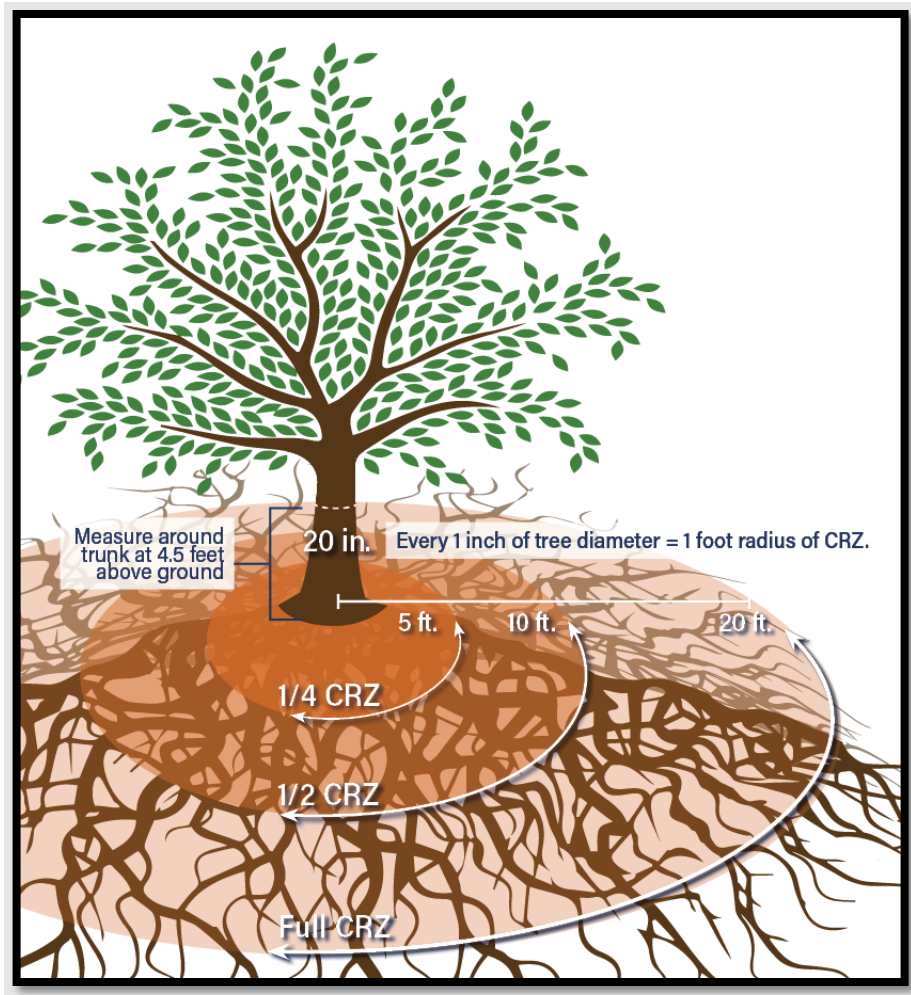
These tools are intended to assess vegetative community values, though some can be applied to individual tree assessments. Acceptable methods are to use the Urban Forest Effects (UFORE) model or I-Tree ECO from the United States Forest Service or CITYgreen the ecosystem services analysis software from American Forest. Other acceptable methods can be submitted to the City Arborist for review.

Biodiversity can be measured by providing the tree diversity and relative abundance data for the proposed site. It is recommended that pre and post conditions are assessed and alternative land plan options are assessed for biodiversity retention.

3.5.2 - Tree Preservation Criteria

A. Critical Root Zone Impacts.

While the full root system of the tree may extend three to four times the diameter of the dripline, the Critical Root Zone (CRZ) is an area surrounding the tree where root protection is important to tree survival. The CRZ is a circle centered on the tree where the radius of the circle is a number of feet equal to the diameter in inches of the tree. All ground within that circle is the CRZ. The Half Critical Root Zone and Quarter Critical Root Zone are also used by staff to evaluate the likelihood of tree survival. The Half CRZ is a smaller circle within the CRZ with a radius half that of the CRZ. The Quarter CRZ is a circle within the Half CRZ with a radius one quarter that of the CRZ. The figure below depicts the CRZ, Half CRZ, and Quarter CRZ.



Certain conditions may require a larger Critical Root Zone to expect tree survival. Staff may request a larger preserved area for species that are less resilient to the impacts of development, such as post oak (*Quercus stellata*), high value trees, rare trees, and trees in sensitive site conditions. This request could identify a CRZ 1¼ to 1½ times larger than the minimum standard.

The actual root structure may not always be aligned within the regulated Critical Root Zone. Examples of this include encroachment of existing code-compliant structures; retaining walls which have historically altered the grade; and compacted surfaces (e.g. driveways, road surfaces, parking lots, etc.), all within the regulated CRZ. In these types of situations, staff can exercise their professional judgment to determine the likelihood of impacts to the root structure. Other factors which may assist with minimizing tree impacts include an assessment of the existing natural conditions, low impact construction methods, and remedial tree care.

Design constraints, such as site conditions, often dictate that trees slated for preservation have some root zone disturbance.

Critical Root Zone impacts reduce a tree's likelihood of survival. Impacts include:

1. Digging, trenching, or excavating;
2. Soil compaction;

3. Grade changes:
4. Chemical exposure and spills.

Most trees can tolerate some Critical Root Zone impacts. Impacts may be allowed as long as the following Preservation Criteria are met: Weighing this fact with what appears to be an acceptable degree of risk to most trees, the following minimum design criteria (maximum allowable impacts) have been established (see Figure 3-6 in Appendix V of this manual):

1. At least fifty percent of the total area (square footage) of the Critical Root Zone must be preserved at natural grade, with natural ground cover.
2. The entirety of the Half CRZ must be protected, with the exception that cut or fill of 4" or less is allowed within the Half CRZ.
3. No cut or fill is allowed within the Quarter CRZ.

This standard requires that construction impacts associated with various design features be considered. For example, the installation of a curb typically requires excavation of two (2) feet behind the back of curb. In such a case, the line of impact on the CRZ will be two (2) feet behind the curb line shown on the plan. If the curb is shown exactly at the Half CRZ line, or if the curb cut as drawn impacts exactly fifty percent of the total area of the CRZ, the scenario is not compliant with preservation standards. This is because in either case the actual impact from the required excavation goes beyond what is shown on the plans and exceeds the maximum allowable impacts.

In order to assure that the remaining root zones are adequately preserved, tree protection fencing is required for all trees within the limits of construction. Project designers are required to show the specific locations of tree protection fencing on the grading and tree protection plan. Fencing should be indicated to protect the entire Critical Root Zone or as much of the CRZ as is practical. Fencing is required to be chain-link mesh at a minimum height of five feet. Any portion of the CRZ which is not protected by fencing and has not been approved for impacts must be covered by an 8 inch layer of hardwood mulch which must be maintained throughout the project.

B. Crown Impacts.

Pruning is to be in accordance with the most recent ANSI A300 pruning standard. Not more than 25 percent of the foliage should be removed within an annual growing season. The percentage and distribution of foliage to be removed shall be adjusted according to the plant's species, age, health, and site. In situations where removal of more than 25 percent of the live canopy is intended, a permit is required. The intent of crown preservation is to allow for an adequate foliage area to sapwood area ratio to ensure that physiological processes, such as photosynthesis and transpiration, and exchanges of gas, water, and energy continue without impairment. The City Arborist will determine if the intent of crown preservation is met.

Construction methods must also be considered when implementing this design standard. For example, a building wall may only require the removal of 20 percent of the crown, but the scaffolding necessary to construct the building may require the removal of an additional 20 percent of the crown. This scenario is not compliant with preservation standards because the pruning required to construct the building, including the scaffolding needs, exceeds the twenty-five percent limit even though the pruning required to clear the line of the building wall does not.

C. Deviations from Minimum Criteria.

These criteria represent minimum standards for determining whether or not a tree is "preserved". Greater impacts may be allowed, provided that all design alternatives have been proven unfeasible and that some acceptable form of mitigation such as a remedial care program

is negotiated (see Section 3.5.4 C). Conversely, some cases may require that a larger area of root zone be preserved to increase the survival potential of particularly significant trees.

These criteria are enforced in the field as well as on the plan. Plan adjustments made during construction must be reviewed by the City Arborist.

3.5.3 - Design Constraints and Alternatives

In addition to the preservation of significant trees, other factors which affect plan design in Austin include such things as restrictions on building on steep slopes, in floodplains and near critical environmental features; cut and fill limitations; access and egress restrictions; parking requirements; landscape area requirements; building height limitations; and impervious cover limitations. Tree preservation is intrinsically less definitive than most of these restrictions, and requires that those constraints, as well as other issues such as public health and safety and reasonable and lawful use of the property, be considered in an evaluation of whether a project meets tree preservation requirements of the Land Development Code.

In order to best provide for the preservation of significant trees, the project designer should carefully consider different design alternatives in the initial planning of the project. Meeting with the City arborist in a preliminary consultation prior to submitting plans for review is advised when there appear to be conflicts between design constraints. Early resolution of such conflicts during the design phase is usually advantageous.

In the review of a proposed project, the first indicator of how well trees have been incorporated in the design process is, how will the proposal impact the medium to high valued "protected" trees (19 inch diameter and larger). These trees are considered on an individual basis and a proposal to remove any of them is carefully scrutinized. Removals which are not adequately justified may require major plan alterations.

Another indicator is, how will the proposal impact smaller, significant trees (less than 19 inch diameter). These trees are typically considered in mass as they relate to the overall preservation of the natural character of the site. Individual trees are examined to see whether minimum design criteria have been met, but recommendations for major plan alterations are reserved for cases where large numbers of these trees are to be adversely impacted without adequate justification.

An example of a major plan change might be to notch a proposed building in a manner which would result in a loss of the building's square footage. A less restrictive change might be to alter the configuration of the building, but maintain the same square footage.

The following sections include text and illustrations describing some design alternatives which can be used to preserve significant trees.

A. **Parking and Vehicular Use Areas.**

Figure 3-7 in Appendix V of this manual illustrates a parking peninsula which meets the minimum design criteria for critical root zone preservation. A few examples of ways to achieve the standards or otherwise preserve significant trees adjacent to parking areas are as follows:

- Use compact car parking space allotments in a manner which allows an expansion of peninsula or median sizes.
- Use minimum allowable dimensions of parking spaces.
- Reduce the number of parking spaces to the minimum required.
- Use angled parking to minimize parking aisle widths and expand peninsulas and medians.

- Consolidate nearby landscaped peninsulas and apply for alternative compliance to the 50 foot spacing requirement.
- Realign or alter sizes of drives to avoid trees.
- Shift parking medians.
- Reduce building sizes or change uses to reduce the number of required parking spaces.

1. Permeable Paving

Another design alternative which may be considered in some situations is the use of permeable paving. This alternative is less preferable than leaving 50 percent of the root zone natural. The qualities that make a good paving surface are in direct conflict with the qualities necessary to save tree roots. Permeable paving is permitted, however, provided the installation meets City of Austin Standards and City of Austin Standard Specifications and the following design criteria (see Figure 3-8 in Appendix V of this manual):

- Finished grade of the permeable paving surface must be a minimum of six (6) inches and a maximum of 18 inches above existing grade to provide room for base and paving material without cutting.
- A minimum distance of three (3) feet must be maintained between curb and tree to minimize potential for trunk scarring by vehicles.
- Minimum of 25 percent of the CRZ must remain at natural grade with a natural ground cover.
- The combined area of permeable paving and natural cover around a tree must be at least 75 percent of the CRZ.
- Permeable paving is only permitted in parking spaces and low traffic drives. It is not permitted in areas that are likely to be staging areas for fire ladder trucks.

These design criteria, as well as the construction specifications must be observed in the field. Deviations may be considered code violations.

B. Buildings.

Figure 3-9 in Appendix V of this manual demonstrates compliance with minimum design criteria. Other examples of **Some** alternatives to preserve significant trees are as follows:

- Provide a pier and beam foundation.
- Provide finished floor elevations which minimize required cut or fill.
- Notch buildings around significant trees.
- Design building to fit under crowns of adjacent trees.

To comply with the design criterion requiring preservation of a tree's crown, consideration must be given to the following:

- Providing adequate work space during construction;
- Providing a safe distance between limbs and walls (especially glass), eaves, roofs, etc.; and,
- Applying proper pruning techniques (see City of Austin Standard Specifications).

C. Sidewalks and Pedestrian Use Areas.

Sidewalks often appear innocuous on plans, but can be very detrimental to trees due to grading requirements. Some design alternatives which should be considered are:

- Move sidewalk as far from tree trunks as possible.
- Provide a finished grade above existing grade for sidewalks required in close proximity to a tree trunk.
- Route drainage under sidewalks where elevated grade is required.
- Reduce width of sidewalk (minimum of four (4) feet when adjacent to a street curb or three (3) feet otherwise).

D. Grading.

Tree preservation and grading requirements are two (2) design constraints which are most often in conflict. A grade change of a few inches can be detrimental to a tree, yet most sites require extensive cut and fill in order to manage drainage flow. Some design alternatives which can be used to preserve significant trees are as follows:

- Use berms or retaining walls instead of cutting to provide detention.
- Design detention ponds around significant trees, adding depth to minimize width where possible.
- Provide tree well and/or aeration systems for trees in fill areas (see City of Austin Standard Specifications and City of Austin Standards).
- Provide retaining walls to mitigate cuts and fills (see Figure 3-10 in Appendix V of this manual).
- Erosion and sedimentation controls shall be installed and maintained to not cause impacts that exceed preservation criteria.

E. Utilities.

Underground water and wastewater lines, storm sewers, irrigation lines and both underground and overhead electric and telephone lines have considerable impact on trees.

Some typical design alternatives which should be considered are as follows:

- Establish the utility easement where it will have the least impact on trees, if possible.
- Stack underground utility lines to reduce the number of trenches required.
- Bore or tunnel under trees to minimize root impacts (see Figure 3-11 in Appendix V of this manual).
- Prescribe methods to mitigate impacts on trees during construction not addressed in standard specifications and details (e.g., lifting lines over significant trees during stringing of power poles).

3.5.4 - Mitigation Measures

The emphasis on preserving existing trees is due in part to the adverse or unique growing conditions in the Austin area. In general, native trees have adapted to stresses associated with the physical, climatic,

and biological conditions of the Austin area, thus making preservation more critical in order to mitigate the long-term impacts of tree removal.

Mitigation is required when removal is authorized under 25-8-624(D), 25-8-642(D), or 25-8-643(B). The City Arborist shall recommend an appropriate mitigation program. A typical program would include one or more of the following mitigation measures:

- Planting replacement trees;
- Preserve or restore natural areas, ecosystems, or plant communities;
- Providing a maintenance program for trees to be retained; See C.O.A. "Remedial Tree Care Notes" - Appendix P-6.
- Requiring special construction techniques; and,
- Transplanting existing trees.
- Alternative mitigation proposals for enhancement of the urban forest (e.g. payment into a tree fund)

In considering the above mitigation measures, proposals which will enhance any aspect of the city's urban forest will be considered by the City Arborist. Proposals should be submitted in writing. When all feasible mitigation efforts have been exhausted, and upon approval of the City Arborist, funds may be provided to the Urban Forest Replenishment Fund (UFRF) as part of the mitigation requirements and managed in accordance with the most current City of Austin fiscal policies and procedures. Payments into the UFRF may be used for:

- (1) off-site tree planting and maintenance;
- (2) promoting tree care and preservation;
- (3) urban forest conservation;
- (4) enforcement of City tree protection and mitigation regulations.

A standard formula of one caliper inch of replacement value is equivalent to \$200.00, or \$75 for certified affordable developments and placed into the UFRF. (NOTE: This option is not intended to facilitate the excessive removal of trees.) Trees have varying values based upon numerous tree and site conditions (see ECM 3.5.1). The following mitigation rates apply for medium valued trees; however the City Arborist may raise or reduce these rates for high or low valued trees:

- Heritage - 300%
- greater than 19 inches diameter and located in Appendix F - 100%
- 8 to 18.9 diameter inches and located in Appendix F - 50%
- greater than 19 inches diameter and greater and not located in Appendix F - 50%
- 8 to 18.9 inches diameter and not located in Appendix F - 25%
- Sizes smaller than 8 diameter inches found in Appendix F (for example: development in Parks under ECM Section 5.3.0 and Hill Country Roadways under ECM Section 2.7.0) - 50%
- Sizes smaller than 8 diameter inches and not found in Appendix F (for example: development in Parks under ECM Section 5.3.0 and Hill Country Roadways under ECM Section 2.7.0) - 25%

- The following trees may require a permit but do not require mitigation in order to meet the objectives of the non-native, invasive species management efforts of the City of Austin:

Common Name	Latin Name
Tree of heaven	<i>Ailanthus altissima</i>
Mimosa	<i>Albizia julibrissin</i>
Paper Mulberry	<i>Broussonetia papyrifera</i>
White Mulberry	<i>Morus alba</i>
Russian Olive	<i>Elaeagnus angustifolia</i>
Chinese Parasol	<i>Firmiana simplex</i>
Golden Rain Tree	<i>Koelreuteria paniculata</i>
Ligustrum	<i>Ligustrum spp.</i>
Chinaberry	<i>Melia azedarach</i>
Nandina	<i>Nandina domestica</i>
Photinia	<i>Photinia spp.</i>
Chinese Pistache	<i>Pistacia chinensis</i>
Pyracantha	<i>Pyracantha coccinea</i>
Salt Cedar	<i>Tamarix spp.</i>
Chinese Tallow	<i>Triadica sebifera</i>
Siberian Elm	<i>Ulmus pumila</i>
Lilac chaste	<i>Vitex agnus-castus</i>

Non-compliant tree impact or removal may necessitate more extensive mitigation. This may include an assessment of the tree or situation which would identify a monetary and community value based upon replacement cost, trunk formula method, or cost of repair (see the most recent edition of the Guide for Plant Appraisal, Council of Tree and Landscape Appraisers). These mitigation measures may also be associated with fines, penalties, and time delays associated with corrective measures.

Mitigation measures are not intended to supplant good site analysis, or planning and design practices that consider all elements of the site, including existing trees and ecological features. In view of the emphasis on tree preservation requirements discussed above, mitigation for tree removals will be considered only after all feasible design alternatives to preserve trees have been exhausted. A discussion of each measure follows.

A. Replacement Trees.

The most common measure used to mitigate tree removals is the planting of replacement trees. The following factors affect tree replacement:

- The available planting area;
- The anticipated rate of survival of trees planted;
- The quantity of trees to be planted; and
- The types of trees proposed.

1. Available Planting Area.

Replacement trees should be planted on the site or easement from which existing trees are to be removed. If this is not feasible, a person may initiate a proposal to plant trees off-site. This may be acceptable if the planting site is in reasonable proximity to the project area.

2. Survival Potential.

Before agreeing to any replacement option, the City arborist will assess the probability that trees planted will survive. This typically requires that some type of irrigation capability be implemented for a minimum two (2) year period. Irrigation may not be required if it can be adequately demonstrated that, given the size and type of trees planted, the planting site and the time of year the trees are planted, the mortality rate is likely to be low.

3. Quantities of Replacement Trees.

Replacement tree values will be expressed in terms of caliper inches. For example, a plan must identify when a 20 inch diameter tree is allowed to be removed, and the required caliper inch replacement.

After completion of the tree evaluation, the City Arborist will determine if the tree mitigation plan is appropriate. The size of replacement trees are typically between one (1) and four (4) caliper inches. Trees greater than four (4) caliper inches may be permitted if the feasibility is adequately documented.

As an example, if the site in question could only support a few trees, and there was good irrigation available, then five (5) trees with a minimum caliper of four (4) inches would be acceptable. If there was ample planting space and minimal irrigation potential, then 20, one (1) inch caliper trees would be more acceptable.

In determining the total caliper inches of replacement trees acceptable as compensation for trees removed, the City Arborist can use the evaluation results. For the highest valued trees (for example, 33 and greater), replacement may be more than 300 percent of the diameter of the tree in question and lesser-valued trees may not require mitigation.

4. Types of Replacement Trees.

In order to enhance the general quality of the urban forest in Austin, certain restrictions will be placed on the types of trees which will be allowed to serve as replacement for trees removed. Unless site conditions prohibit it, 75 percent of the total caliper inches of replacement trees required must be represented by significant shade trees located in Appendix F. The remaining 25 percent of total caliper inches may be represented by a mixture of Appendix F tree species. All trees selected must be suitable for the environment of the immediate planting site (see Appendix F for specific categorization such as tree, soil, site, or regulatory qualities). Further, replacement trees should be representative of the plant community that were present prior to development or species typically associated with the forest type found at or near the project location.

A minimum of five (5) different species of trees must be planted if more than 100 caliper inches of trees are required, not to exceed more than 50% of one species to be planted. A diversity of tree species is shown to reduce the chances of disease and pest epidemics .

5. Hill Country Roadway Corridor Replacement Tree Provisions. In accordance with code requirements, replacement trees for Hill Country Roadway projects must come from the approved list of Hill Country trees found in Appendix F.

6. Enforcement Criteria.

The location, size and type of all replacement trees must be shown on approved plans in a manner which will allow verification of their installation at the time of inspection for Certificate of Occupancy or project release.

Optimum planting times do not always correspond to project completion. For that reason, replacement tree plantings may take place after the project is released provided, that before project release, a person posts fiscal security in an amount for installed trees with a one (1) year guarantee, plus 15 percent to cover administrative costs.

In areas where no irrigation system is available, irrigation may be supplied by water truck. In such cases, prior to project release, a person must submit:

- A signed water truck service contract for review and approval by the City arborist; and,
- Fiscal security in an amount equal to the going rate for the approved service plus 15 percent to cover administrative costs.

B. Natural Area Preservation.

Another form of mitigation for trees removed which may be considered is the preservation of areas containing significant trees and other vegetation which might normally be destroyed during the construction process. Examples are areas within the normal limits of construction such as parking medians, landscape areas adjacent to proposed buildings, etc. which contain trees and vegetation that are not required to be surveyed and are not normally subject to protective measures.

In order to qualify as a mitigative measure, these areas must be delineated on the plan in the same manner as any limit of construction (see Section 3.3.2 C). The area must also be protected in accordance with City of Austin Standard Specifications and City of Austin Standards for tree protection.

C. Tree Maintenance.

This mitigation measure is most appropriate in cases where the minimum design criteria established in Section 3.5.2 cannot be met for individual trees. Deviations from those criteria

increase the chances of a tree's death or greatly reduced longevity. A remedial care program can increase the survival potential to an acceptable level in many cases.

A good maintenance program is beneficial for all trees subjected to changes in micro-climate conditions resulting from development activities even when all feasible design criteria and protective measures have been met. For this reason, a tree maintenance program for all remaining trees on a site may serve as mitigation for trees destroyed in lieu of replacement trees in some cases.

The City arborist must review the remedial care program to ensure that it will accomplish what is necessary to maintain the viability of any affected trees. A complete and effective remedial tree care program may include the following:

- 1) have a qualified arborist conduct an initial inspection and assessment,
- 2) treatment of any trunk or crown injuries,
- 3) monitoring plan for irrigation and drainage around trees,
- 4) ensure mulch is placed in appropriate locations and depths to maximize root zone protection,
- 5) improve aeration to tree root zones*,
- 6) assessment of nutrient limitations and amend soil for tree optimization*, and
- 7) monitor for decline and hazards.

*Appendix P-6 provides recommendations for aeration and soil amendments.

To ensure compliance, the program must be documented by a plan note at the time of plan approval. In addition, prior to release of the project, a person must submit:

- A signed service contract for review and approval by the City arborist; and,
- Fiscal security in an amount equal to the going rate for the approved service plus 15 percent to cover administrative costs.

These measures are necessary because the remedial care program must typically extend over a minimum 18 month period after completion of the project.

D. Special Construction Techniques.

In conjunction with remedial care, mitigation for trees removed may include special construction techniques not normally required in standard specifications. Some of these techniques include the following:

- Prior to excavation within tree driplines or the removal of trees adjacent to other trees that are to remain, make a clean cut between the disturbed and undisturbed root zones with a rock saw or similar equipment to minimize root damage.
- In critical root zone areas that cannot be protected during construction with fencing and where heavy vehicular traffic is anticipated, cover those areas with a minimum of 8 inches of organic mulch to minimize soil compaction. In areas with high soil plasticity Geotextile fabric, per standard specification 620S, should be placed under the mulch to prevent excessive mixing of the soil and mulch. Additionally, material such as plywood and metal sheets, could be required by the City Arborist to minimize root impacts from heavy equipment. Once the project is completed, all materials should be removed, and the mulch should be reduced to a depth of 3 inches.
- Perform all grading within Critical Root Zones by hand or with small equipment to minimize root damage.

- Water all trees most heavily impacted by construction activities deeply once a week during periods of hot, dry weather. Spray tree crowns with water periodically to reduce dust accumulation on the leaves.
- When installing concrete adjacent to the root zone of a tree, use a plastic vapor barrier behind the concrete to prohibit leaching of lime into the soil.

E. Transplanting.

Another form of mitigation may be to transplant existing trees especially when anticipated development impacts cannot be alleviated. Due to the inherent difficulties of this type of operation, a comprehensive feasibility report prepared by a qualified arborist (and with proven experience with successful large tree transplanting) must accompany any such request.

The feasibility report must contain such things as:

- Suitability and condition of tree(s) proposed for transplanting;
- Digging and root ball stabilization method;
- Relocation sites;
- Method of transport;
- Time of year transplanting will take place;
- Storage methods (if any); and,
- Maintenance programs before and after transplanting.

3.6.0 TREE AND NATURAL AREA PROTECTION

3.6.1 Tree Protection Requirements

A. Duration of Tree Protection

1. Installation

Tree protection shall be installed prior to the start of any site work, including demolition or site preparation, and maintained continuously throughout the project.

2. Removal

Tree protection shall be removed at the end of the project after all construction and final grading is complete, but before final inspection. Any premature removal or failure of tree protection can lead to Critical Root Zone impacts as described in ECM 3.5.2 and may require remedial tree care. It is the permit holder's responsibility to avoid damage to preserved trees where tree protection has been removed or not installed.

B. Fencing Specifications

1. Material Requirements

Fencing is the primary method of tree protection. Fencing is intended to prevent access to the Critical Root Zone. Tree fencing shall be chain-link mesh with a minimum height of 5 feet. Fencing shall be installed on steel t-posts with a maximum spacing of 10 feet between the posts. More robust or existing permanent fencing may

be approved as an alternative to chain-link fencing. Plastic fencing material shall not be used as tree protection.

2. Location of Fencing

Fencing shall be installed around or beyond the Critical Root Zone of all preserved trees or any natural areas designated for preservation. Fencing must be continuous and create a closed, inaccessible area of root zone protection.

3. Maintenance of Fenced Areas

Fencing shall not be temporarily moved or removed during development without prior authorization. There shall be minimal slack or sagging in the fence. The fenced Critical Root Zone shall not be used for tool or material storage of any kind and shall be kept free of litter.

4. Exceptions to Fencing Requirements

Any section of the Critical Root Zone not protected by fencing or covered by existing hardscape requires mulch (see ECM 3.6.1.C). Exceptions to the CRZ fencing requirement shall be justified by site-specific considerations. Some exceptions are for areas:

- i. that have been approved for impacts, such as the footprint of a building;
- ii. covered by existing hardscape, such as a patio or driveway (note: if hardscape is removed the exposed soil beneath becomes subject to tree protection requirements);
- iii. required for access to the work area; and
- iv. approved for use as a staging area.

Within the Half CRZ, fencing requirements will only be modified for existing hardscape or to allow an access path adjacent to approved structures (see ECM 3.6.1.C.3). CRZ fencing modifications shall be shown on the development plans or approved by the inspector.

C. Mulch Specifications

1. Material Requirements

Mulch is required in any section of the Critical Root Zone that is not protected by fencing or under existing hardscape and has not been approved for impacts (such as building footprint or driveway). Mulch used for tree protection shall be any natural wood type. Rough single grind mulch, which resists compaction better than double grind and is usually less expensive is preferred but any natural wood type is acceptable. Dyed mulch or mulch made from non-biological material such as rubber or stone shall not be used as tree protection.

2. Depth of Mulch

Mulch shall be installed to a minimum depth of 8 inches. Mulch may need to be periodically replenished depending on the duration of the project. Since excessive mulch is harmful to trees, mulch shall not be installed to a depth greater than 12 inches. Mulch used for tree protection shall be removed at the end of the project.

Mulch shall never be piled against tree trunks.

3. Mulch Within the Half CRZ

When mulch is used as alternative protection within the Half Critical Root Zone it shall be topped by decking to provide additional protection against compaction.

4. Exceptions to Mulch Requirements

Mulch is not required within fenced sections of the Critical Root Zone where existing turf or ground cover is present and undisturbed. Sections of bare or disturbed dirt within the fenced CRZ shall be covered by a three-inch layer of mulch.

D. Trunk and Branch Wrapping

1. Trunk Wrap

Wrapping is not required or recommended for most preserved trees. When necessary, trunk wrap shall be installed to protect the first 8 feet of tree height whenever protective fencing is located 5 feet or less from the trunk or when fencing cannot be placed around the tree. This will usually only be the case when existing hardscape provides Half Critical Root Zone protection or a structure has been approved for construction within the Half CRZ using an existing historical footprint. These circumstances can result in fencing closer to the trunk than would otherwise be allowed. Because trees vary in form, 8 feet is a general guideline rather than an absolute standard. More or less height of protection may be appropriate.

2. Branch Wrap

Branch wrap may be required when a major limb is over an access route or close to a proposed structure. Proximity of scaffolding or other necessary construction equipment needs to be considered.

3. Material Requirements

Dimensional lumber, such as 2x4s, shall be oriented parallel to and continuously around the trunk or branch and secured in place by tightening wires run around the outside of the lumber. Wrapping shall never be secured directly to the tree by screws or other means. Wrapping shall be loosened and retightened every six months to prevent the tree from being damaged as it grows outwards.

E. Protection for Natural Areas

Natural areas indicated for preservation on plans shall be protected by fencing that meets the standards for tree fencing in this section. Alternative protection allowed for trees is not acceptable for natural area preservation. Fencing shall be installed at the Limit of Construction line shown on plans.

3.6.2 Standard Plan Note

The following plan note summarizes the contents of the Environmental Criteria Manual as it relates to tree protection on sites with active permits.

BEFORE CONSTRUCTION

All trees and natural areas shown on plan to be preserved shall be protected per ECM 3.6.1.

Tree protection shall be installed prior to the start of any site work, including demolition or site preparation. Refer to ECM 3.6.1.A.

Fencing for tree protection shall be chain-link mesh with a minimum height of 5 feet and shall be installed around or beyond the Critical Root Zone except as allowed in ECM 3.6.1.B.4.

Unfenced sections of the Critical Root Zone shall be covered with mulch at a minimum depth of 8 inches and a maximum depth of 12 inches per ECM 3.6.1.C.

Where fencing is located 5 feet or less from the trunk of a preserved tree, trunk wrapping shall be installed per ECM 3.6.1.D.

Erosion and sedimentation controls shall be installed and maintained so as not to cause impacts that exceed preservation criteria listed in ECM 3.5.3.D.

DURING CONSTRUCTION

Trees approved for removal shall be removed in a manner that does not exceed preservation criteria for the trees to remain. Refer to ECM 3.5.2 A.

Fencing may not be temporarily moved or removed during development without prior authorization. The fenced Critical Root Zone shall not be used for tool or material storage of any kind and shall be kept free of litter. Refer to ECM 3.6.1.B.3.

Pruning shall be in compliance with the current ANSI A300 standard for tree care.

AFTER CONSTRUCTION

Tree protection shall be removed at the end of the project after all construction and final grading is complete, but before final inspection. Refer to ECM 3.6.1.A.

Landscape installation within the CRZ of preserved trees, including irrigation, soil and plantings, shall not exceed preservation criteria listed in ECM 3.5.2.

Documentation of tree work performed must be provided to inspector per ECM Appendix P-6

THIS LIST IS NOT EXHAUSTIVE.
REFER TO APPROPRIATE ECM SECTIONS FOR FULL REQUIREMENTS.

3.7.0 - PUBLIC TREES

3.7.1 - Standard of Care for Trees and Plants on Public Property

Public trees, as defined in § 6-3-1, shall be managed according to the latest of standards and associated best management practices contained in the American National Standards Institute A300, published and updated by the Tree Care Industry Association.

Source: [Rule No. R161-14.20, 8-25-2014](#).

APPENDIX P-2: ~~CITY OF AUSTIN STANDARD NOTES FOR TREE AND NATURAL AREA PROTECTION~~ RESERVED

1. ~~All trees and natural areas shown on plan to be preserved shall be protected during construction with temporary fencing.~~
2. ~~Protective fences shall be erected according to City of Austin Standards for Tree Protection.~~
3. ~~Protective fences shall be installed prior to the start of any site preparation work (clearing, grubbing or grading), and shall be maintained throughout all phases of the construction project.~~
4. ~~Erosion and sedimentation control barriers shall be installed or maintained in a manner which does not result in soil build-up within tree drip lines.~~

5. Protective fences shall surround the trees or group of trees, and will be located at the outermost limit of branches (drip line) , for natural areas, protective fences shall follow the Limit of Construction line, in order to prevent the following:
 - A. Soil compaction in the root zone area resulting from vehicular traffic or storage of equipment or materials;
 - B. Root zone disturbances due to grade changes (greater than 6 inches cut or fill), or trenching not reviewed and authorized by the City Arborist;
 - C. Wounds to exposed roots, trunk or limbs by mechanical equipment;
 - D. Other activities detrimental to trees such as chemical storage, cement truck cleaning, and fires.
6. Exceptions to installing fences at tree drip lines may be permitted in the following cases:
 - A. Where there is to be an approved grade change, impermeable paving surface, tree well, or other such site development, erect the fence approximately 2 to 4 feet beyond the area disturbed;
 - B. Where permeable paving is to be installed within a tree's drip line, erect the fence at the outer limits of the permeable paving area (prior to site grading so that this area is graded separately prior to paving installation to minimized root damage);
 - C. Where trees are close to proposed buildings, erect the fence to allow 6 to 10 feet of work space between the fence and the building;
 - D. Where there are severe space constraints due to tract size, or other special requirements, contact the City Arborist at 974-1876 to discuss alternatives.

Special Note: For the protection of natural areas, no exceptions to installing fences at the Limit of Construction line will be permitted.
7. Where any of the above exceptions result in a fence being closer than 4 feet to a tree trunk, protect the trunk with strapped-on planking to a height of 8 ft (or to the limits of lower branching) in addition to the reduced fencing provided.
8. Trees approved for removal shall be removed in a manner which does not impact trees to be preserved.
9. Any roots exposed by construction activity shall be pruned flush with the soil. Backfill root areas with good quality top soil as soon as possible. If exposed root areas are not backfilled within 2 days, cover them with organic material in a manner which reduces soil temperature and minimizes water loss due to evaporation.

10. Any trenching required for the installation of landscape irrigation shall be placed as far from existing tree trunks as possible.
11. No landscape topsoil dressing greater than 4 inches shall be permitted within the drip line of trees. No soil is permitted on the root flare of any tree.
12. Pruning to provide clearance for structures, vehicular traffic and equipment shall take place before damage occurs (ripping of branches, etc.).
13. All finished pruning shall be done according to recognized, approved standards of the industry (Reference the National Arborist Association Pruning Standards for Shade Trees available on request from the City Arborist).
14. Deviations from the above notes may be considered ordinance violations if there is substantial non-compliance or if a tree sustains damage as a result.

APPENDIX V - FIGURES AND DIAGRAMS

FIGURES FROM SECTION 3

Figure 3-1 Measuring Tree Diameters

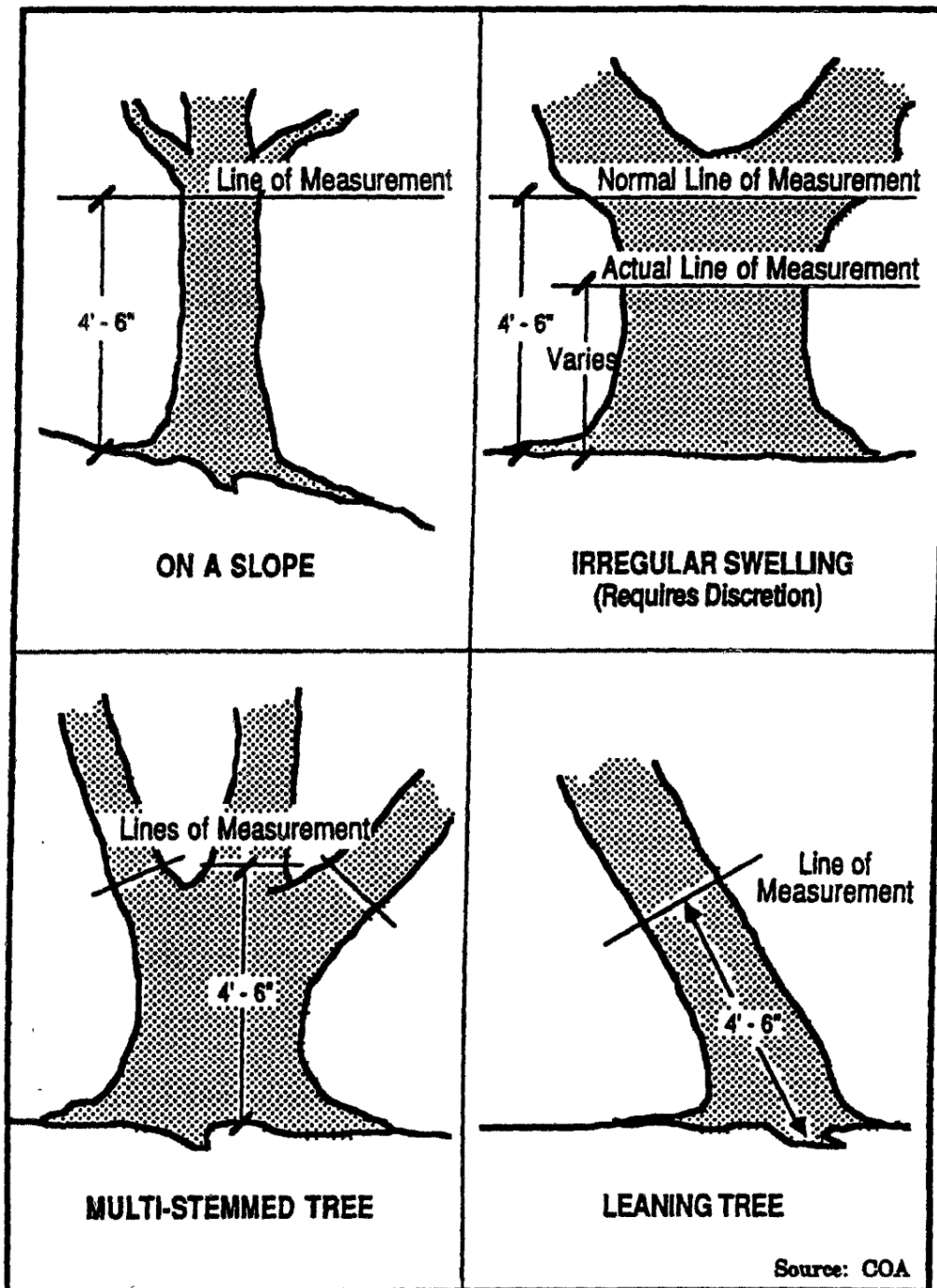
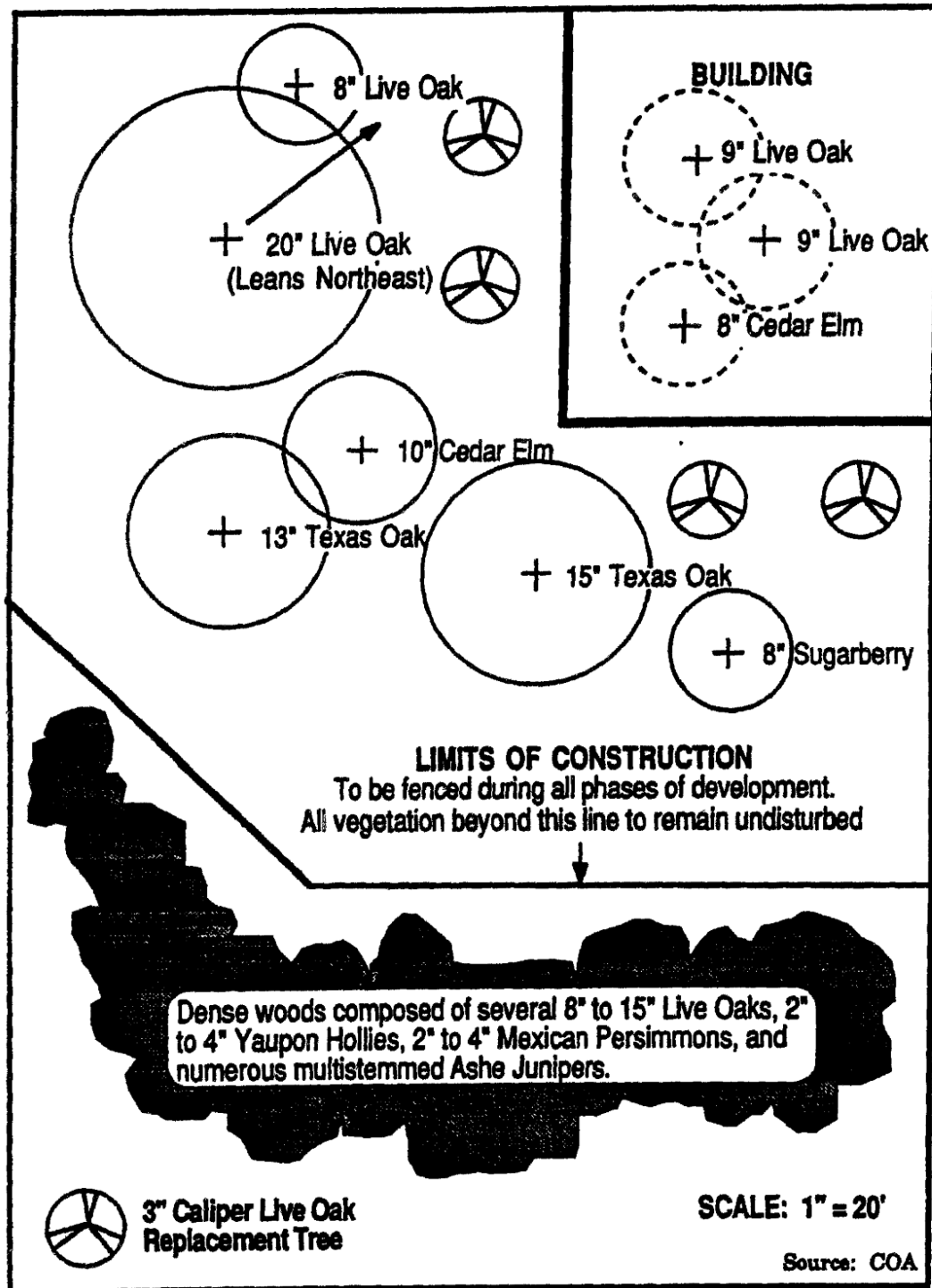
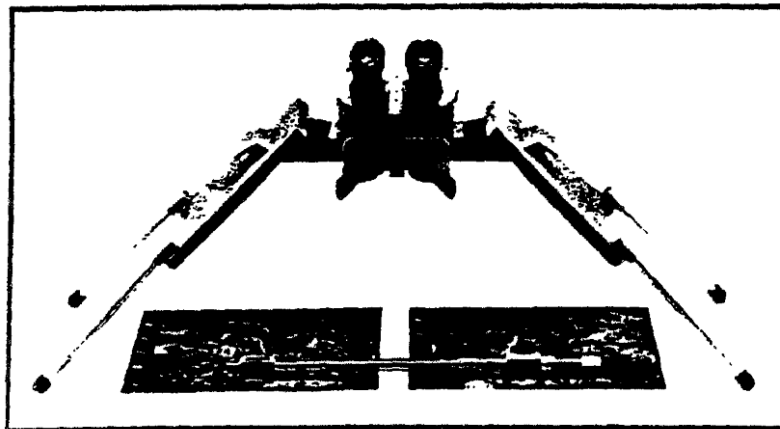


Figure 3-2 Plan Graphics and Notes for Tree Surveys Figure 3-2 Deleted





Stereoscope Used With Stereophotographs to Locate Trees and Delineate Tree Cover-types



Example of Plan Data for Aerial Photography Interpretation

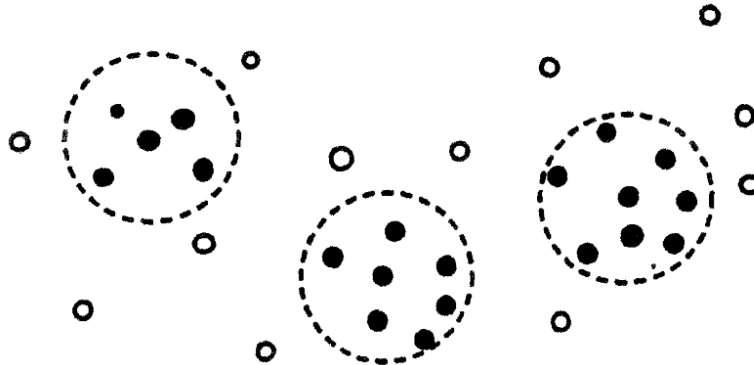
- | | |
|----|---|
| DW | Dense woods generally occurring on steep slopes dominated by Ashe Juniper, Texas Oak, Live Oak, Black Cherry, and Cedar Elm, ranging in size from approximately 8 to 20 inches in diameter. |
| S | Oak/Juniper/Elm savannah generally occurring on plateaus and gentle slopes, with a scattered overstory of Live Oak, Ashe Juniper, and Cedar Elm, ranging in size from approximately 6 to 25 inches in diameter. |
| G | Grasslands occurring throughout the project site, primarily on plateaus with occasional Live Oak, Cedar Elm, and scattered Agave, Texas Persimmon, and Ashe Juniper brush. |
| oo | Individual large tree or cluster of large trees with crown diameter greater than or equal to 40 feet. |

Example of Legend for Aerial Photography Interpretation

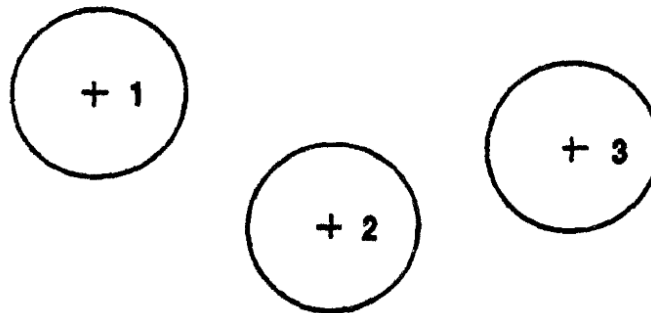
Source: COA

Figure 3-4 Tree Cluster Survey Techniques for Hill Country Roadway Sites

To survey small tree clusters as required for Hill Country Roadway projects, select one tree which represents the approximate center of a group of three (3) or more trees within a circle having a radius of approximately 10 feet.



Show the cluster on a plan with the location of the central tree as the center point of a 10 ft. radius circle.



Describe the cluster as follows:

Cluster #1: 5 Cedar Elms, 2" to 4" dia.

Cluster #2: 4 Live Oaks and 3 Cedar Elms, 3" to 6" dia.

Cluster #3: 3 Yaupons and 5 Shin Oaks, 2" to 5" dia.

Source: COA

Figure 3-5 Deleted

Figure 3-6 Relationship Between Maximum Allowable Impacts of Critical Root Zone and Typical Root System ~~Figure 3-6 Deleted~~

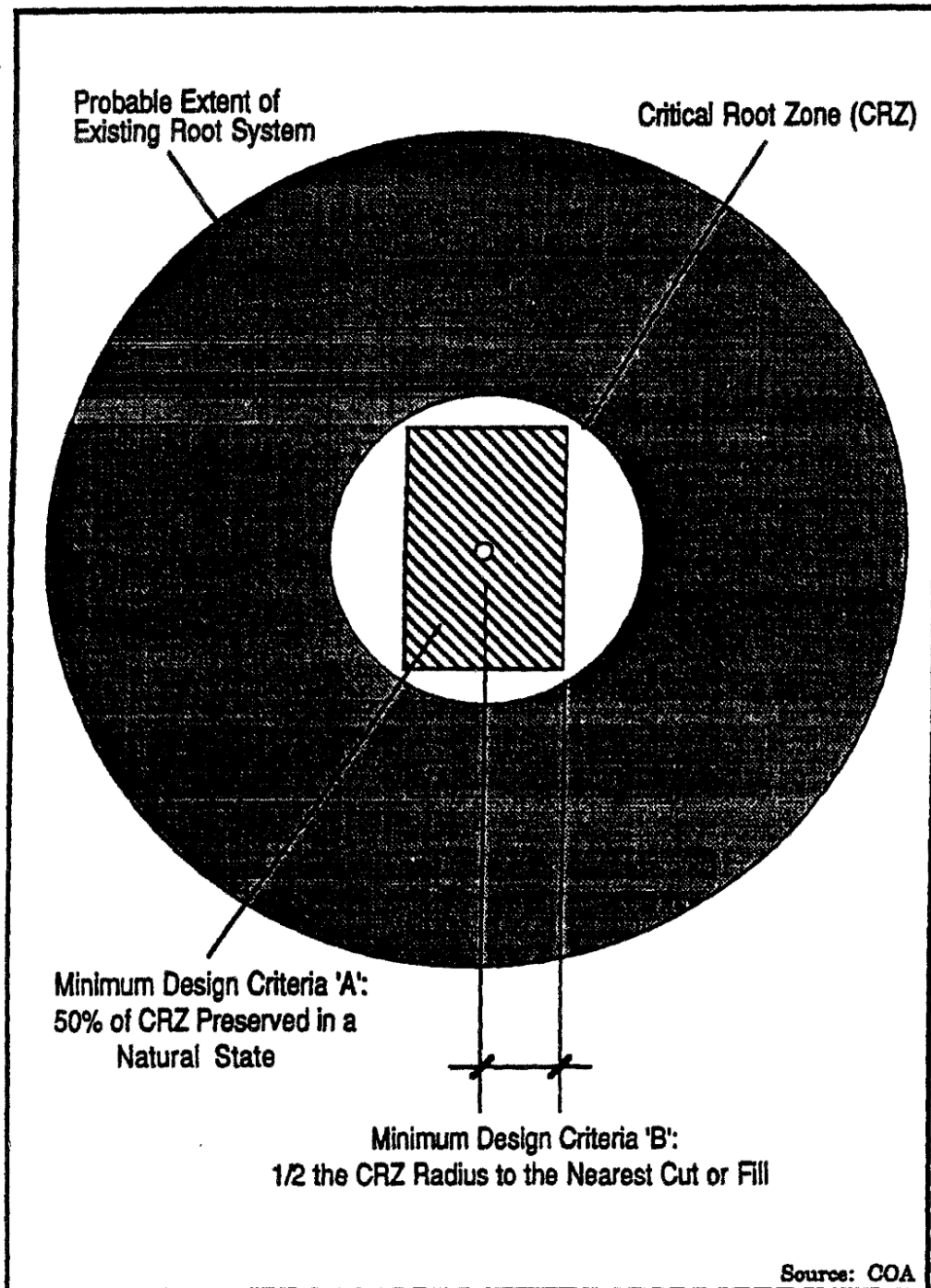


Figure 3-7 Example of Minimum Design Criteria Applied to a Parking Peninsula ~~Figure 3-7 Deleted~~

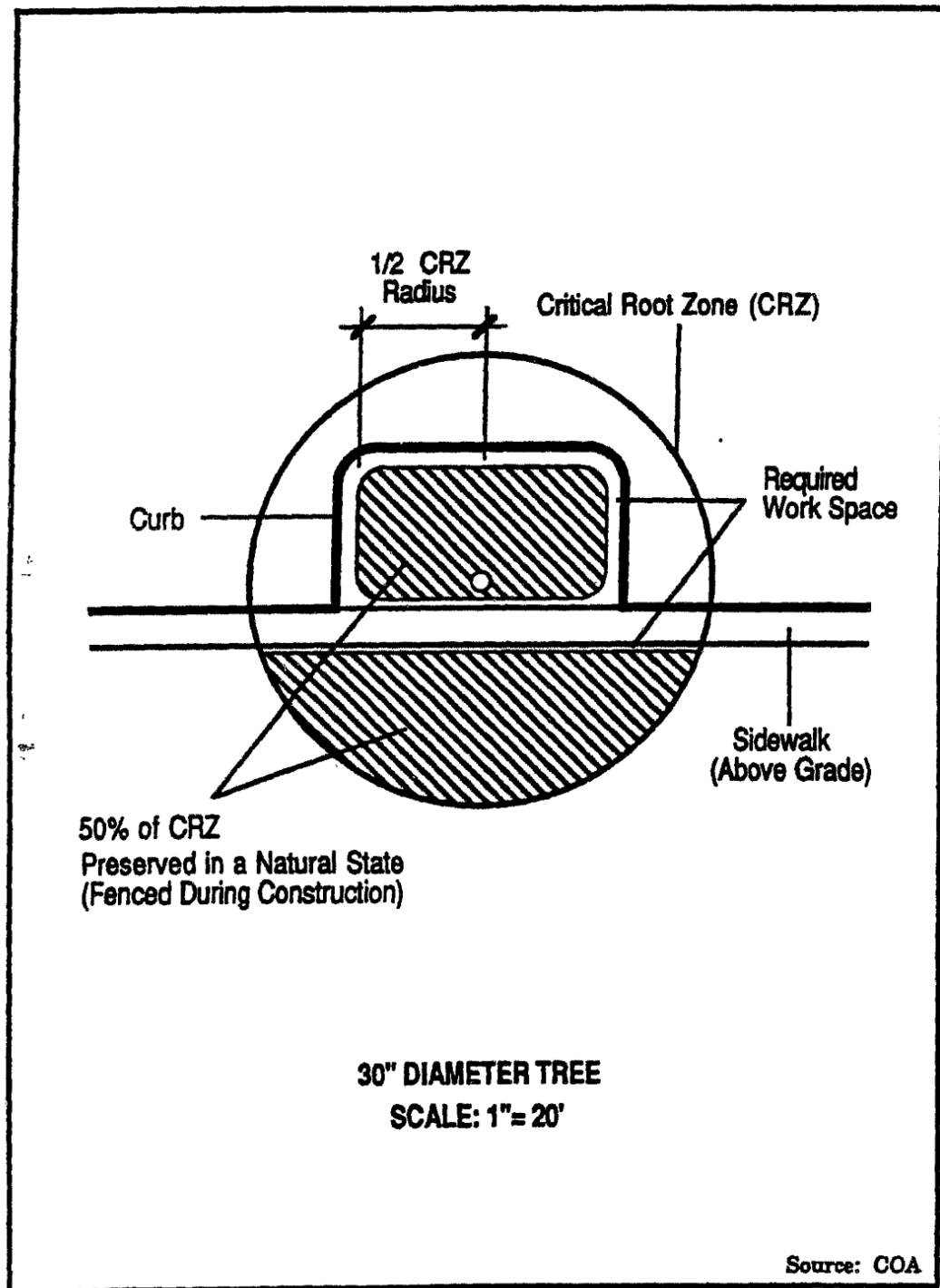


Figure 3-8 Example of Minimum Design Criteria Applied to Permeable Parking [Figure 3-8 Deleted](#)

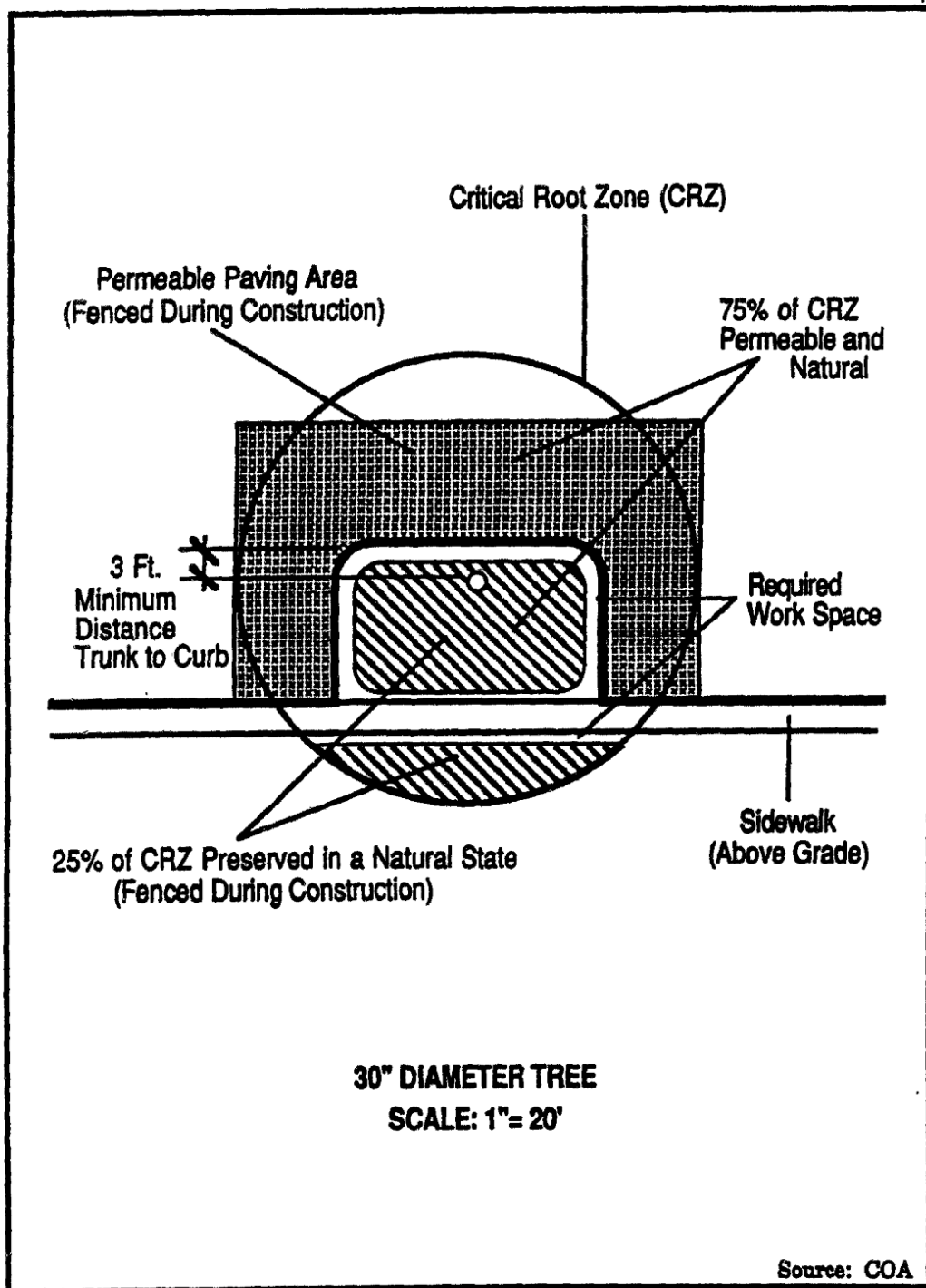


Figure 3-9 Example of Minimum Design Criteria Applied to a Building ~~Figure 3-9 Deleted~~

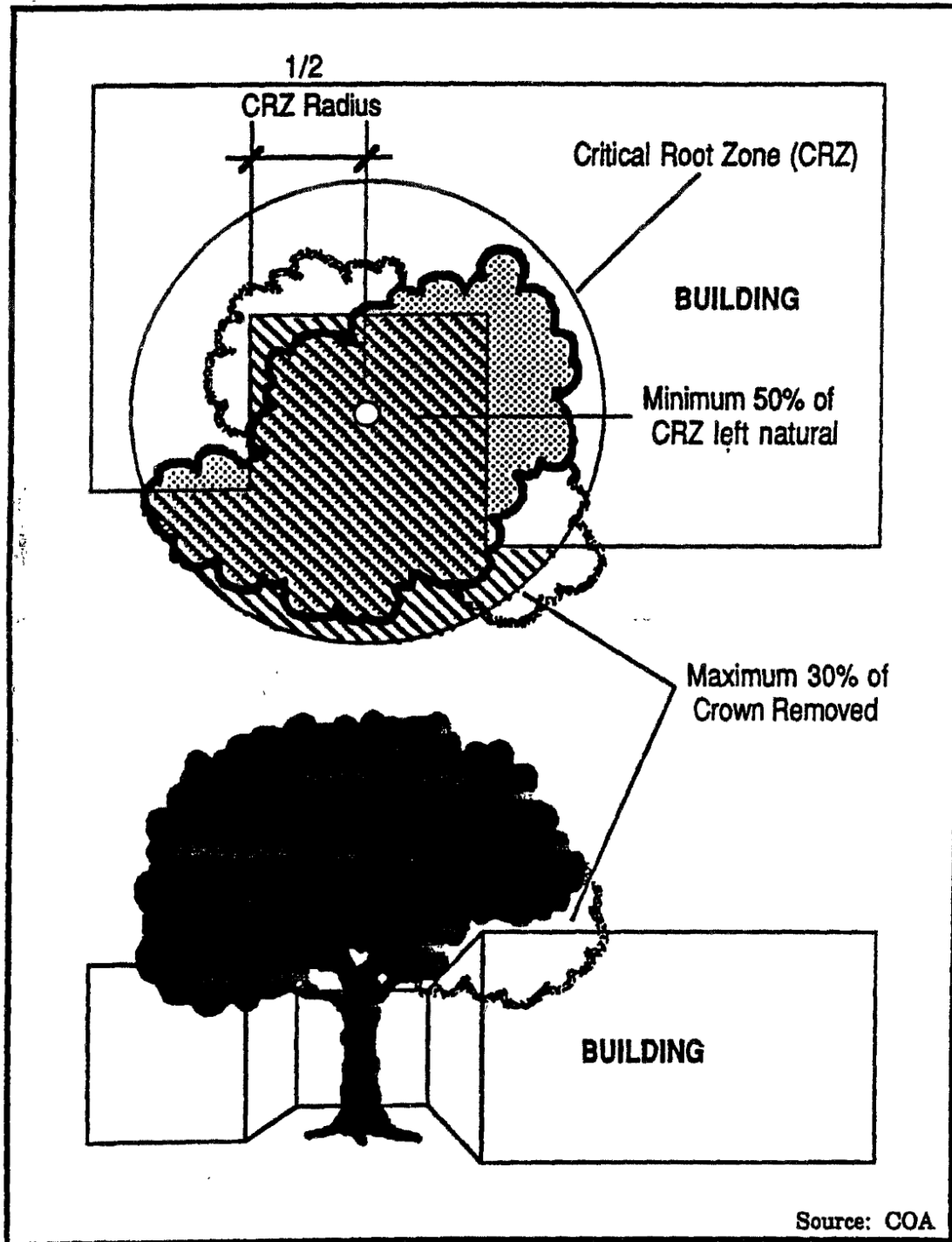


Figure 3-10 Methods to Minimize Grade Change Impacts ~~Figure 3-10 Deleted~~

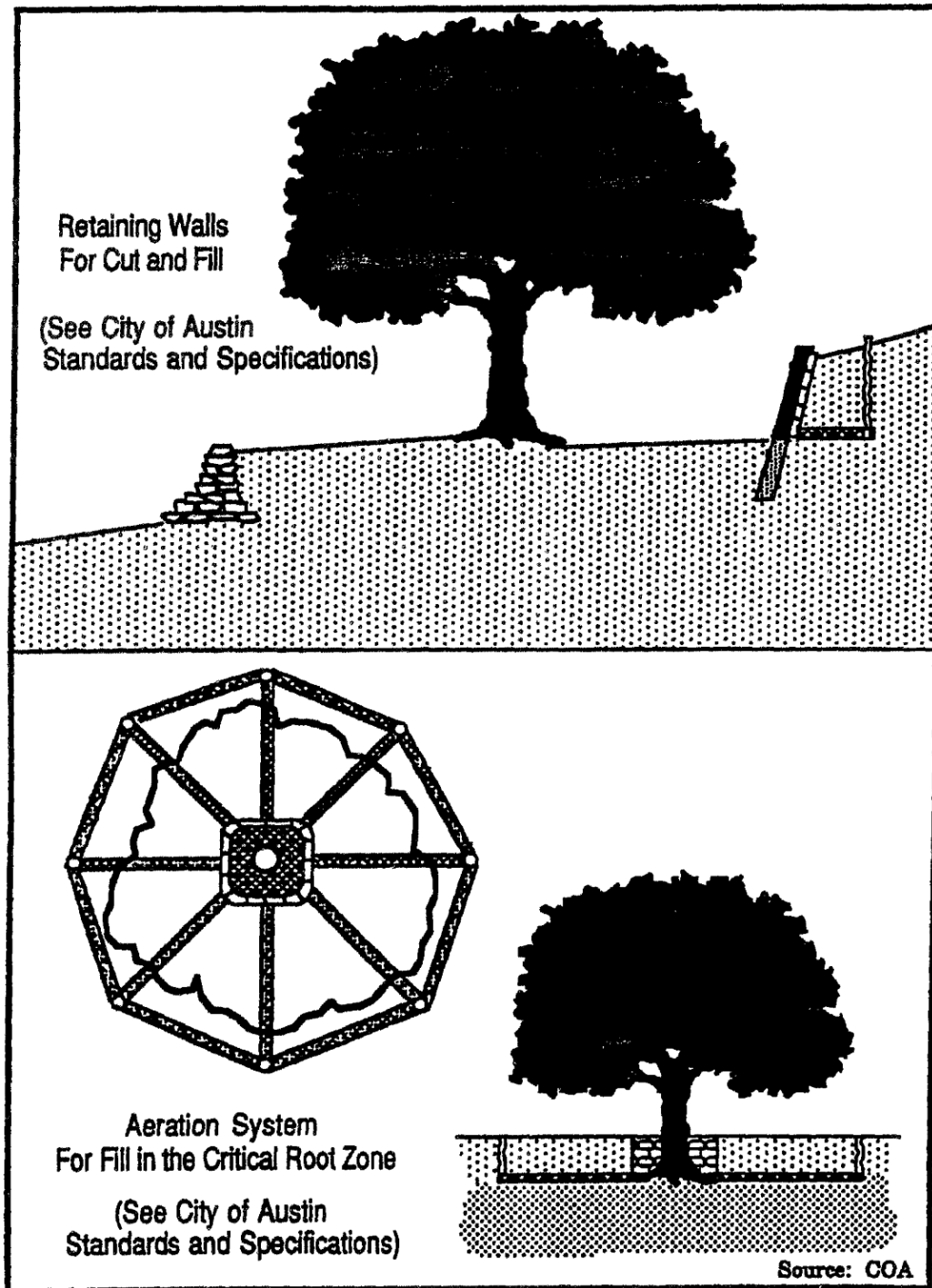


Figure 3-11 Impact on Tree Root System — Trenching vs. Boring Figure 3-11 Deleted

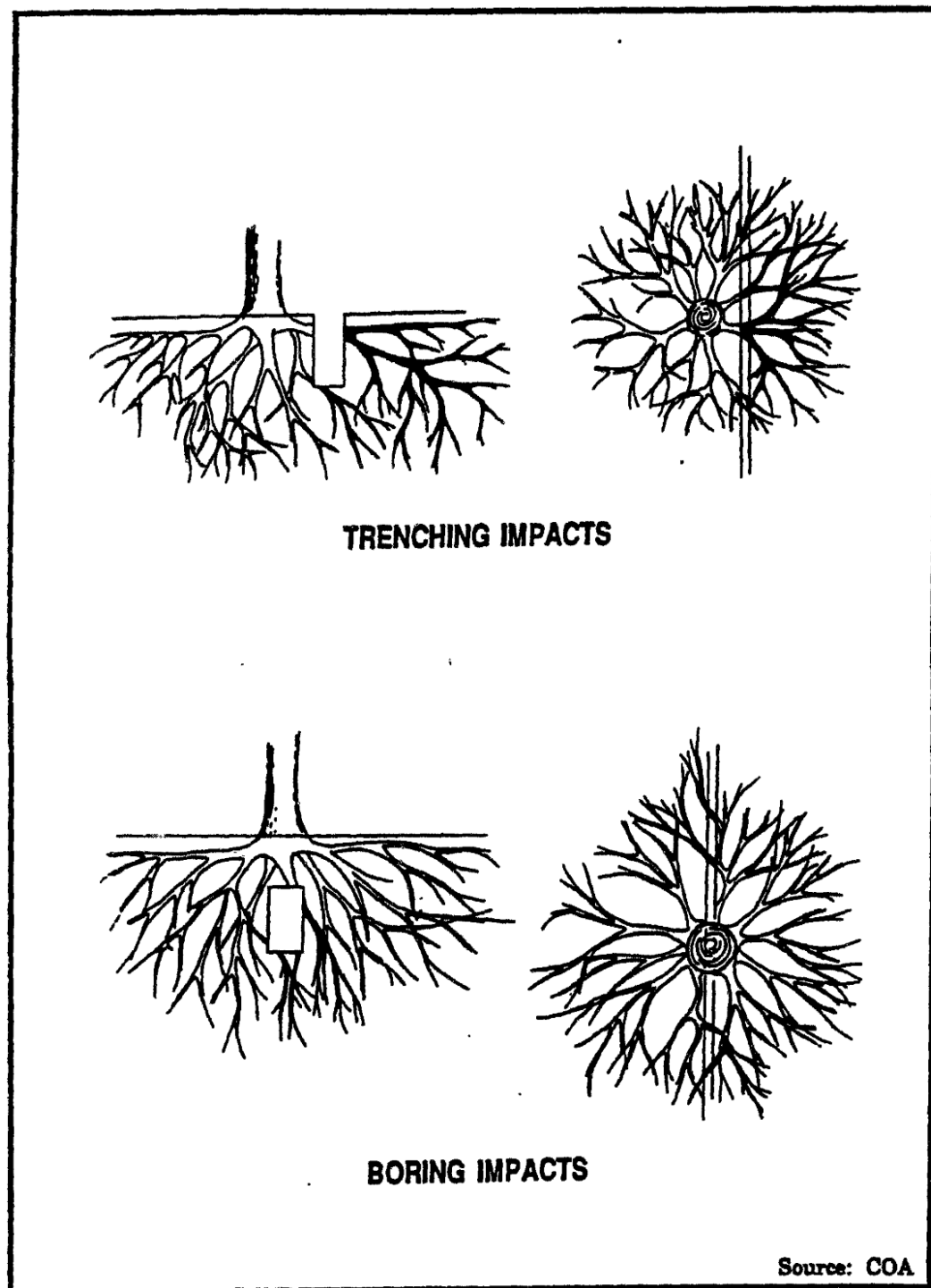


Figure 3-12 Alternative Designs for Channel Improvements ~~Figure 3-12 Deleted~~

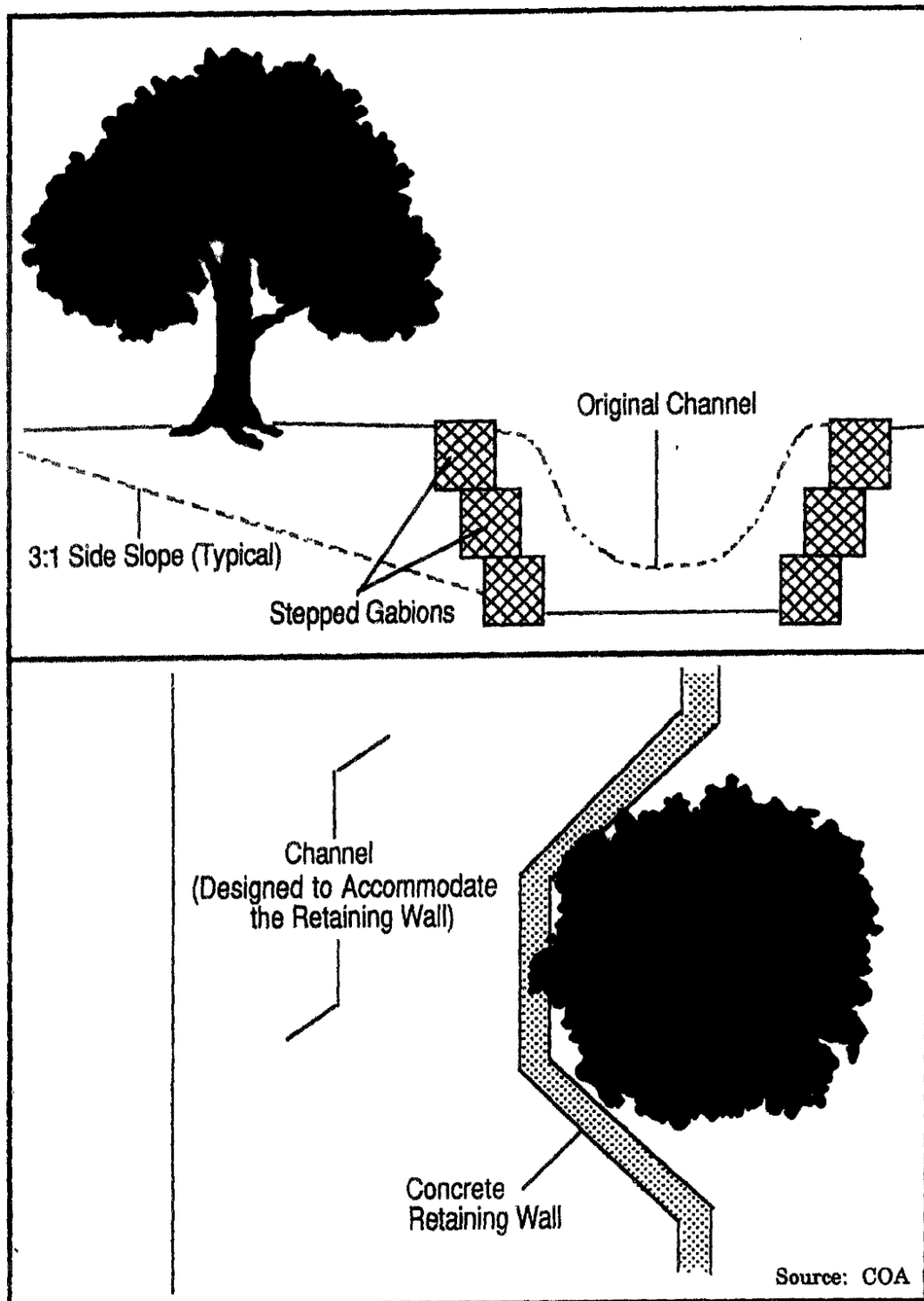


Figure 3-13 Low Impact Driveway Detail, Page 1 of 2

FIGURE 3-13 (1 OF 2) LOW IMPACT DRIVEWAY DETAIL

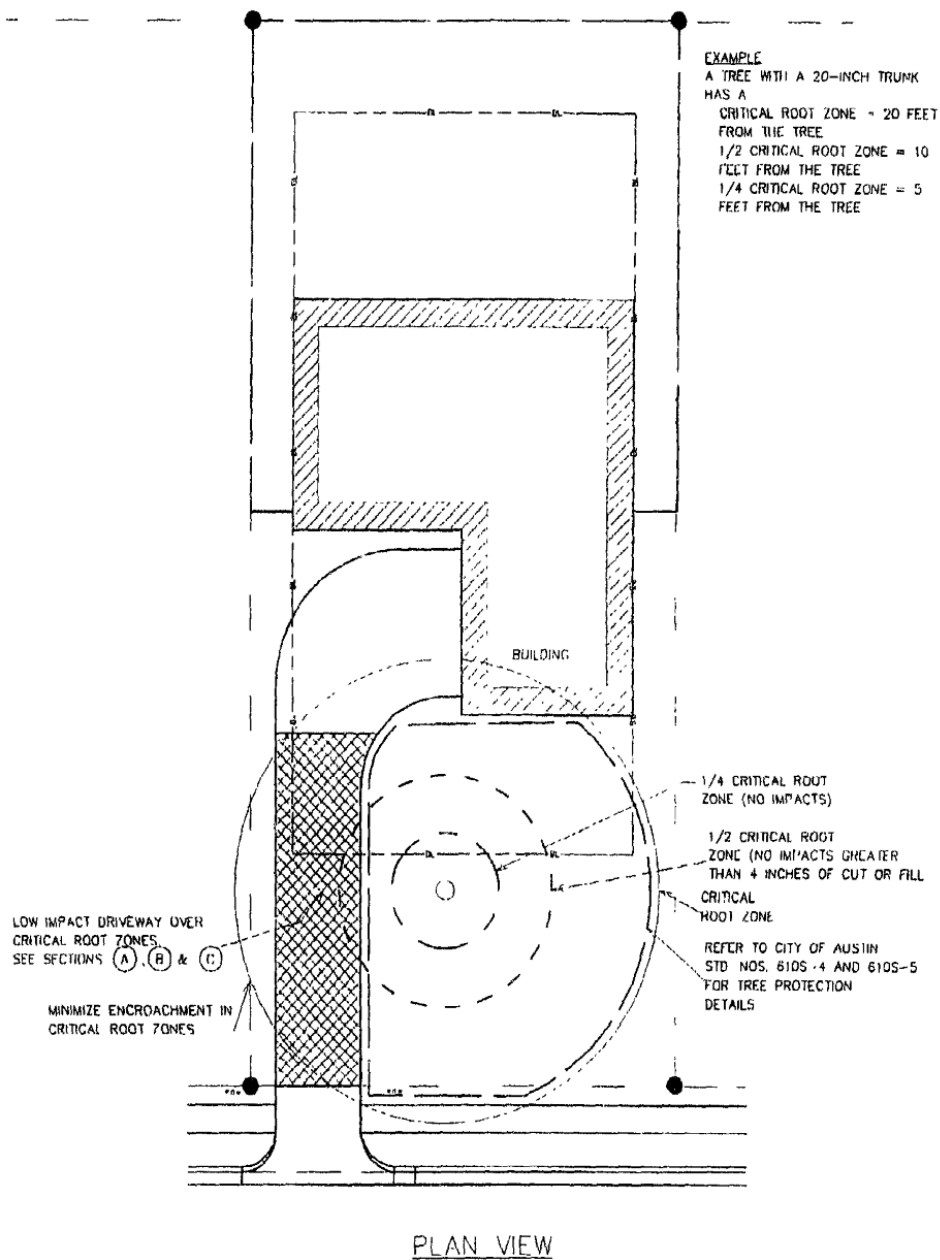
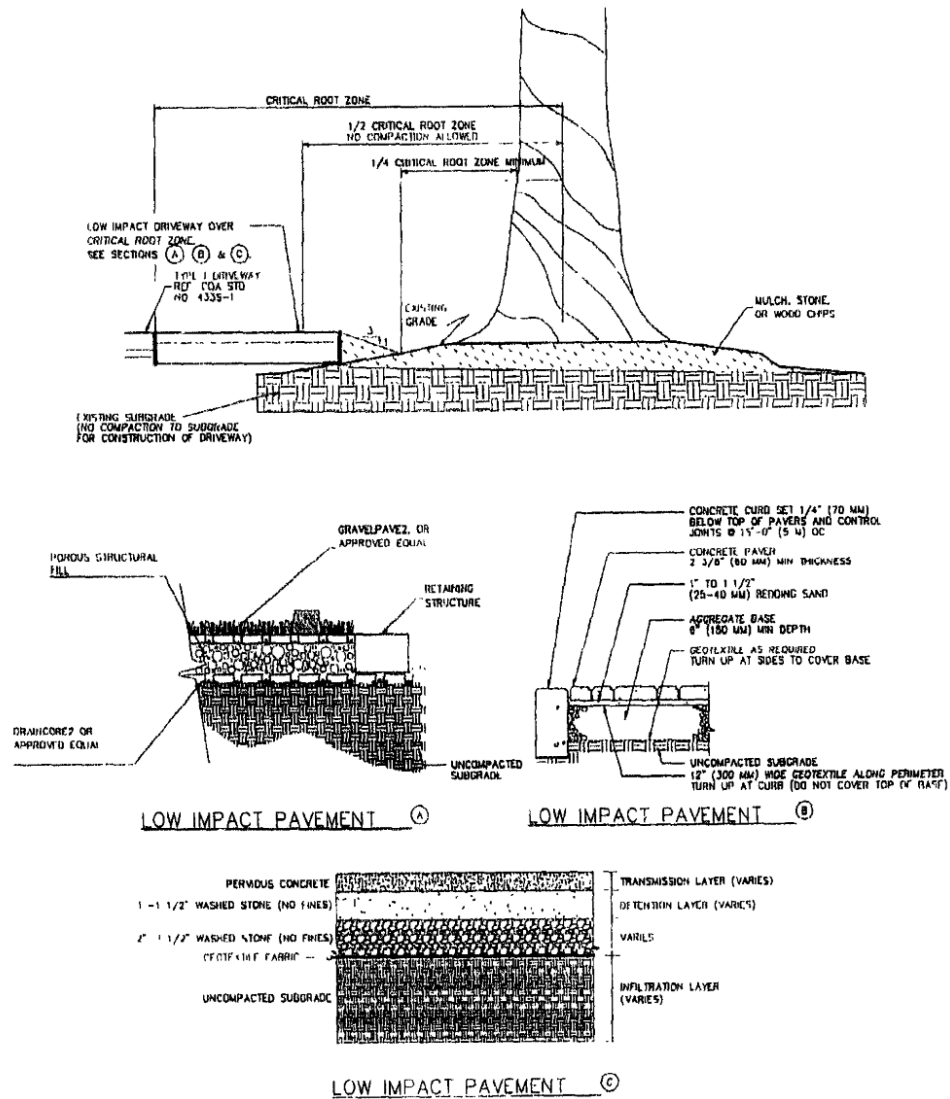


Figure 3-13 Low Impact Driveway Detail, Page 2 of 2

FIGURE 3-13 (2 OF 2) LOW IMPACT DRIVEWAY DETAIL



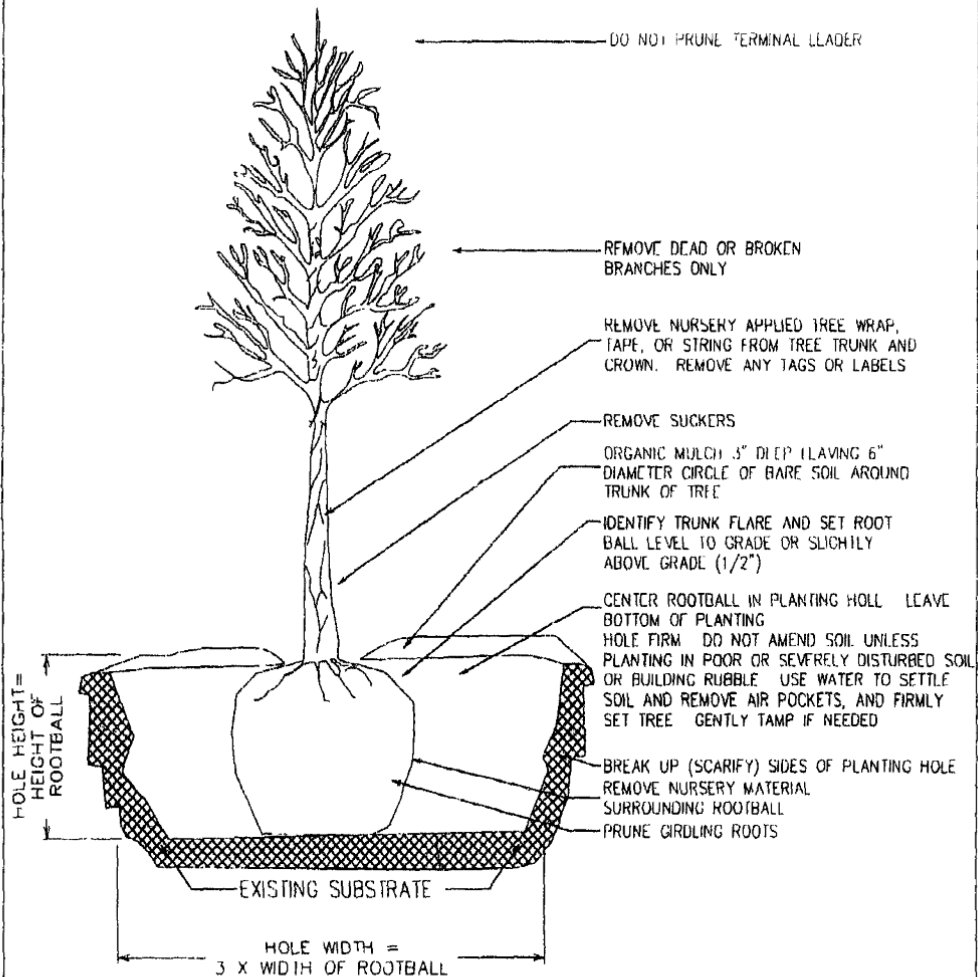
* THESE ARE POTENTIAL DESIGN ALTERNATIVES AND OTHER DESIGNS MAY BE REVIEWED AND APPROVED

* NO CUT OR FILL GREATER THAN 4" IS ALLOWED IN 1/2 CRITICAL ROOT ZONE. NO CUT OR FILL ALLOWED IN 1/4 CRITICAL ROOT ZONE. IF NEEDED, DETAILS ARE TO BE ALTERED TO LUNIMATE CUT > 4"

* COMPACTION SUBGRADE WITHIN THE 1/4 CRITICAL ROOT ZONE IS NOT ALLOWED. ALTER DETAILS AS NEEDED TO MEET THESE REQUIREMENTS

Figure 3-14 Tree Planting Detail

FIGURE 3-14 TREE PLANTING DETAIL



* ALTERNATIVE DETAILS CAN BE REVIEWED BY THE CITY ARBORISTS

* STAKING MAY BE USED AT THE DISCRETION OF THE APPLICANT. POST AND TIES ARE TO BE ESTABLISHED WITHOUT HARMING THE TREE (E.G. NON-BINDING STRAPS, POSTS ESTABLISHED OUTSIDE OF ROOTBALL) BUT ENSURE THAT ALL STAKING MATERIAL IS REMOVED AFTER ONE YEAR

* SEE ANSI A300 (PART 1) FOR ADDITIONAL INFORMATION REGARDING PRUNING STANDARDS

* SEE ANSI 260.1 FOR NURSERY STOCK STANDARDS

Figure 3-15 Tree Protection Signage



TREE & ROOT PROTECTION ZONE

Per City of Austin code (Chapter 25-8, Subchapter B, Article 1) this protective device is to remain in place for the entirety of the development project and illegal removal is subject to fines and work suspensions. Additional information can be obtained at the:

City Arborist (512-974-1876)
web site (<http://www.ci.austin.tx.us/trees>).

Zona de Protección del Árbol y las Raíces: el dispositivo protector debe quedarse en el lugar para la totalidad del proyecto de la construcción. Para información adicional, contacta la Arborista Municipal (512) 974-1876 o http://www.ci.austin.tx.us/trees/trees_spanish.htm.

