

The intent of this Part is to protect, conserve, preserve and replace trees in order to enhance community character, provide wildlife habitat, maintain air and water quality, decrease stormwater runoff, prevent soil erosion, provide noise buffers, and enhance property values. This Part is also intended to provide several alternative means to the Planning Commission to further the goals and objectives of the Comprehensive Plan by providing for flexible tree canopy requirements subject, however, to specified standards and findings. Tree canopy standards shall be met on site to the maximum extent feasible and tree preservation is the preferred means of accomplishing canopy objectives.

The following terms relating to Tree Canopy are included in the Definitions (Chapter 1 Part 2): Caliper, Dripline, Tree Canopy, Tree, Type A, Tree, Type B, Tree, Type C

10.1.1 Relationship to the Comprehensive Plan

The tree canopy regulations prescribed by this Part are intended to implement the following Cornerstone 2020 Comprehensive Plan Goals and Plan Elements.

Goals	Plan Elements
Livability Strategy Goals F2; F3; F4; G4	Guidelines 3, 10, 13

10.1.2 Applicability and Basis of Calculation

- A. The requirements of this Part shall apply to all new residential subdivisions creating more than five (5) buildable lots and to all new multi-family and nonresidential development. New single-family residential construction shall provide tree(s) in accordance with the residential design standards found within chapter 5.
- B. Expansion or reconstruction of an existing nonresidential building or development shall be subject to the requirements of this Part as follows:
 - 1. Any development site on which there is an increase in building area or impervious surface area by **more than fifty (50) percent** or where a structure has been demolished and a new structure has been built in its place shall fully comply with the tree canopy requirements set forth in this Part.
 - 2. Any development site on which there is an increase in building area or impervious surface area by **more than twenty (20) percent and less than fifty (50) percent** shall provide one-half (1/2) the tree canopy required by this Part.

- 3. Any development site on which there is an increase in building area or impervious surface area by twenty (20) percent or less shall not be required to provide the tree canopy required by this Part.
- C. The requirements of this Part shall apply to the entire area shown on a development plan and the required canopy may be equally distributed throughout that area or be concentrated in certain parts or portions of that area.

***Note:** This provision (10.1.2, C) allows residential subdivisions and multi-lot commercial developments to group trees in clusters throughout the development rather than meeting the canopy requirements on a lot-by-lot basis.*

10.1.3 Alternatives for Compliance

The tree canopy requirements of this Part may be satisfied at the applicant's discretion by any combination of the following means.

- A. Preservation of existing trees or tree stands on the development site.
- B. Planting new trees on the development site or as street trees on adjacent rights-of-way.
- C. Planting new trees on an alternative site approved by the Planning Commission, at the applicant's expense.

The Planning Commission may approve an alternative site for the planting of an equivalent number/amount of trees that meets any one of the following criteria: (1) a site within a public park approved by the Metropolitan Parks Department; (2) a site on a public road right-of-way, not adjacent to the development site, approved by the Director of Works or by the appropriate state or federal official in the event that the site is on a state or federal road; (3) a privately developed site upon which affordable housing has been constructed or is to be constructed; and (4) a site of existing development where the Planning Commission finds that additional tree canopy would be in the public interest. In any such case, the Planning Commission may condition its approval of an alternative site upon the agreement of the applicant to plant a tree or trees of a type that is deemed appropriate for the site. It should be noted that using an alternative site to meet the tree canopy requirements is an option available to developers that must be approved by the Planning Commission. In no case shall the Planning Commission require the off-site planting of trees to meet the requirements of this Part.

10.1.4 Tree Canopy Standards

- A. The tree canopy on a development site shall meet the applicable standards according to the site's form district, proposed land use and the amount of tree preservation, as set forth in Tables 10.1.1 and 10.1.2, below. (Percentages refer to the relation of tree canopy to gross site area in square feet.)

Table 10.1.1 Tree Canopy Categories by Form District

Land Use	Form District			
	Downtown, Traditional Marketplace Corridor, Traditional Workplace	Traditional Neighborhood	Regional Center, Town Center, Suburban Marketplace Corridor, Neighborhood, Suburban Workplace, Campus	Village
Single-Family Residential	Class A	Class B	Class C*	Class D
Multi-Family and Office	Class A	Class B	Class C	Class D
Institutional	Class A	Class B	Class C	Class D
Commercial	Class A	Class A	Class C	Class C
Industrial	Class A	Class A	Class C	Class C

* Docket No. 9-26-03; see website for adoption status outside Louisville Metro

Table 10.1.2 Minimum Tree Canopy Coverage

Class Canopy Requirement per Table 10.1.1	Preserved Tree Canopy Coverage Area	New Tree Canopy Coverage Area	Total Tree Canopy Coverage Area Required
Class A	5%	0%	5%
	4%	2%	6%
	3%	4%	7%
	2%	6%	8%
	1%	8%	9%
Class B	0%	10%	10%
	10%	0%	10%
	8%	3%	11%
	6%	6%	12%
	4%	9%	13%
Class C <u>If site is 76%-100% covered in existing tree canopy</u>	2%	12%	14%
	0%	15%	15%
	15%	0%	15%
	12%	6%	18%
	9%	12%	21%
Class C <u>If site is 41%-75% covered in existing tree canopy</u>	6%	18%	24%
	3%	24%	27%
	0%	30%	30%
	15%	0%	15%
	12%	5%	17%
Class C <u>If site is 0%-40% covered in existing tree canopy</u>	9%	10%	19%
	6%	15%	21%
	3%	20%	23%
	0%	25%	25%
	15%	0%	15%
Class D	12%	4%	16%
	9%	8%	17%
	6%	12%	18%
	3%	16%	19%
	0%	20%	20%
	20%	0%	20%
	15%	6%	21%
	10%	12%	22%
	5%	18%	23%
	0%	24%	24%

B. Developments shall be entitled to a reduction in the tree canopy requirement prescribed in Tables 10.1.1 and 10.1.2 as follows:

1. Any residential subdivision receiving at least 3.5 points for the provision of diversity housing in accordance with Chapter 4 Part 5 (Alternative Development Incentives) of the Land Development Code shall receive a 33% reduction.
2. Any development located in the Downtown, Traditional Marketplace Corridor, Traditional Workplace and Traditional Neighborhood Form Districts shall receive reductions as follows:

a. Tree Canopy Reduction for Nonresidential Development:

Development Floor Area Ratio (FAR)	Total Tree Canopy Reduction
FAR 0.29 or Less	No Reduction
FAR 0.30 to 0.49	33% Reduction
FAR 0.50 to 0.99	66% Reduction
FAR 1.0 and Greater	100% Reduction

b. Tree Canopy Reduction for Multi-Family Residential Development:

Development Density (Dwelling Units per Acre)	Total Tree Canopy Reduction
12.00 Du/Acre or Less	No Reduction
12.01 to 16.00 Du/Acre	33% Reduction
16.01 to 22.00 Du/Acre	66% Reduction
22.01 Du/Acre and Greater	100% Reduction

c. Tree Canopy Reductions for Single Family Residential Developments:

Development Density (Dwelling Units per Acre)	Total Tree Canopy Reduction
4.4 Du/Acre or Less	No Reduction
4.41 to 5.5 Du/Acre	33% Reduction
5.51 Du/Acre and Greater	66% Reduction

Note: All reductions shall be based on the total square feet of tree canopy needed on a site to meet the requirements of Tables 10.1.1 and 10.1.2.

NOTE: These reductions in the tree canopy requirements have been created in an effort to support a more compact and efficient urban form and to support infill development opportunities.

Note: Any trees or tree stands that are being preserved to meet the minimum requirements of this Part shall also be subject to the requirements of Chapter 10 Part 4 (Implementation) of the Land Development Code.

- C. Preservation of existing tree canopy in excess of the cover specified in Tables 10.1.1 and 10.1.2 and retention of trees in sensitive natural areas are encouraged. However, removal of existing tree canopy that covers a greater percentage of the site than stipulated in the minimum standards set forth above is permissible unless restricted by an approved development or subdivision plan or by other applicable provisions of this Land Development Code.
- D. Any tree preserved or planted to meet the minimum requirements of this Part shall be maintained in healthy condition and shall be replaced if it becomes diseased or dies.
- E. The Planning Director may require that any trees and/or tree stands preserved to meet the requirements of this Part be inspected and found to be healthy and free of disease by a certified arborist or registered landscape architect if, upon inspection of the site, he/she or his/her designee sees evidence that indicates that some or all of said trees may be unhealthy and may not be appropriate for preservation.
- F. When trees are planted off-site or on private property to meet the requirements of this Part, the applicant shall provide the Planning Director with documentation that sufficient measures have been taken to ensure the preservation and, when necessary, the replacement of said trees. Examples of such measures would include, but not be limited to, including preservation and replacement provisions in a subdivision's deed of restrictions or within a development's binding elements or by placing all of the required trees within a conservation easement or a Woodland Protection Area (WPA).
- G. What trees are not protected?

All known invasives are not protected and will not be considered toward meeting the tree canopy requirements. However, tree canopy credit will be received (see Table 10.1.3 and 10.1.4 for credit square footage) for the removal of the invasive if it is replaced by a 1 3/4" caliper Type A or Type B tree.

Note: Invasive Species means "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." (Executive Order 13112 signed by President William Clinton on February 3, 1999).

10.1.5 Calculation

- A. Any development site greater than two acres in size shall be permitted to determine the area of existing tree canopy coverage to be preserved by ground checking, aerial analysis, or any other method determined to be accurate by DPDS staff. If ground checking is utilized, then each individual tree (i.e. a tree not grouped with other trees or a part of a tree stand) intended to be retained and used to meet the tree canopy requirements herein shall be measured to determine its caliper and the credit given for that tree shall be in accordance with Table 10.1.3, below.
- B. For any development site two acres or less in size the area of tree canopy coverage for any group of trees to be retained in order to meet

the tree canopy requirements of this Part shall be determined by ground checking. Credit for existing trees intended to be retained may be calculated in either of two ways:

1. measurement of the trunk to determine its caliper and the credit given for that tree shall be in accordance with Table 10.1.3, below; or
 2. the dripline may be plotted on the site plan and tree canopy credit given for the percentage of the site within the dripline.
- C. New trees planted to meet the requirements of this Part shall be given credit in accordance with Table 10.1.3, below. Such trees must meet the standards of Chapter 10 Part 4 at the time of planting.
- D. Street trees planted in accordance with Section 10.2.8 shall qualify for a 25% bonus in the amount of credit listed in Table 10.1.3. This credit shall apply to street trees that are mandated as well as those planted on a voluntary basis.
- E. All approved WPAs shall qualify for a 10% bonus in the amount of credit listed in Table 10.1.3.
- F. In calculating the required number of trees, fractions less than .5 shall be dropped and greater than or equal to .5 shall be rounded up.

NOTE: *Street tree bonus: for example, a development that provides three Type A trees two inches in caliper shall receive credit for 2,250 sq ft of tree canopy.*

Note: *Table 10.1.3 gives credit for 50% of the mature canopy size when a 1 3/4" – 3" caliper tree is planted.*

Table 10.1.3 Deciduous Tree Canopy Credit

Caliper	Tree Type**	Amount of Credit (per tree)
10 inches or greater	Type A	1,200 sq. ft. (100% mature canopy size)
	Type B	720 sq. ft. (100% mature canopy size)
	Type C	177 sq. ft. (100% mature canopy size)
Greater than or equal to 3 inches and less than 10 inches	Type A	960 sq. ft. (80% mature canopy size)
	Type B	576 sq. ft. (80% mature canopy size)
	Type C	142 sq. ft. (80% mature canopy size)
Greater than or equal to 1 3/4 inches and less than 3 inches	Type A	720 sq. ft. (60% mature canopy size)
	Type B	432 sq. ft. (60% mature canopy size)
	Type C	106 sq. ft. (60% mature canopy size)
Greater than or equal to 1 inch and less than 1 3/4 inches*	Type A	600 sq. ft. (50% mature canopy size)
	Type B	360 sq. ft. (50% mature canopy size)
	Type C	89 sq. ft. (50% mature canopy size)

“Caliper” - *The diameter of a tree trunk, measured 6 inches above the ground for newly installed trees and at 4 feet-6 inches above the ground (breast height) for existing trees.*

* See Chapter 10, Part 4 for criteria to plant trees less than 1 3/4 inch caliper.

** Trees are categorized as A, B and C—Large, Medium and Small; refer to Appendix 10A for species that fall within each category.

Table 10.1.4 Evergreen Tree Canopy Credit

Height	Tree Type*	Amount of Credit (per tree)
15 feet and greater	Type A	1,200 sq. ft. (100% mature canopy size)
	Type B	720 sq. ft. (100 % mature canopy size)
	Type C	177 sq. ft. (100% mature canopy size)
Greater than or equal to 9 feet and less than 15 feet	Type A	960 sq. ft. (80% mature canopy size)
	Type B	576 sq. ft. (80% mature canopy size)
	Type C	142 sq. ft. (80% mature canopy size)
Greater than or equal to 6 feet and less than 9 feet	Type A	720 sq. ft. (60% mature canopy size)
	Type B	432 sq. ft. (60% mature canopy size)
	Type C	106 sq. ft. (60% mature canopy size)

* Trees are categorized as A, B and C—Large, Medium and Small; refer to Appendix 10A for species that fall within each category.

10.1.6 Tree Preservation Plan Requirement

- A. All applicants for development proposals which seek credit for existing tree canopy to attain the minimum canopy coverage specified in this Part shall submit a Tree Canopy Preservation plan. All tree preservation, tree canopy protection and woodland protection areas shall be in accordance with the Tree Preservation Policies of Louisville Metro Planning and Design Services. The content of such a plan is dependent upon the means by which the existing tree canopy is to be calculated as follows:
1. A tree inventory will be required for plans that show Tree Canopy Preservation Areas. The tree inventory shall be submitted as part of the tree preservation plan review process and shall be only for the trees shown in the TCPA. The tree inventory shall include but not be limited to the following information: Date of inventory, person(s) preparing the inventory, location of trunk and drip line, size, CRZ, health, and species of all existing trees on the property for all trees 4" diameter and greater. A completed tree inventory list shall accompany the plan documenting all existing trees located on the inventory.
 2. Sites that are preserving more than one acre of continuous TCPA shall inventory a 50' X 50' sample area or 2,500 sf area. The applicant shall work with staff on choosing a sample area representative of the species distribution found in the TCPA. Dead, diseased, or dying trees may not be included as part of the inventory. For enforcement purposes the sample area will be used to determine tree replacement regardless of where the tree removal actually occurred.

NOTE: Refer to 10.4.8 for requirements relating to tree protection during construction.

Note:

Example of an area inventory:

4- 9' ht Cedar @ 576 sf of credit each =2,304 sf

3- 4" caliper Hackberry @ 960 sf of credit each =2,880 sf

3- 24" caliper Maple @ 1,200 sf of credit each =3,600 sf

5- 10" caliper Hackberry/Maple @ 1,200 sf of credit each =6,000 sf

1- 8" caliper Oak @ 960 sf of credit each = 960 sf

Total square footage =15,744 sf

TCPA on plan is 2.68 acres or 116,957 sf

116,957 sf - 2,500 sf (sample area) = 114,457 sf

114,457 sf + 15,744 sf (total sample area credit) =130,201 sf

Total preserved tree canopy =130,201 sf

The tree canopy calculations could appear as follows:

Gross site area: 1,085,008 sf

Total tree canopy preserved: 130,201 sf (12% of total site)

Total tree canopy required: 173,601 sf (16% of total site on a site that has 0-40% existing canopy coverage)

Total required new canopy: 43,400 sf (4% of total site)

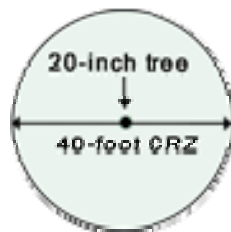
Total canopy provided: 174,121 sf (16%)

If preserved trees are removed from the TCPA, the total number of tree to be replaced would be 58 minimum 3" caliper trees.

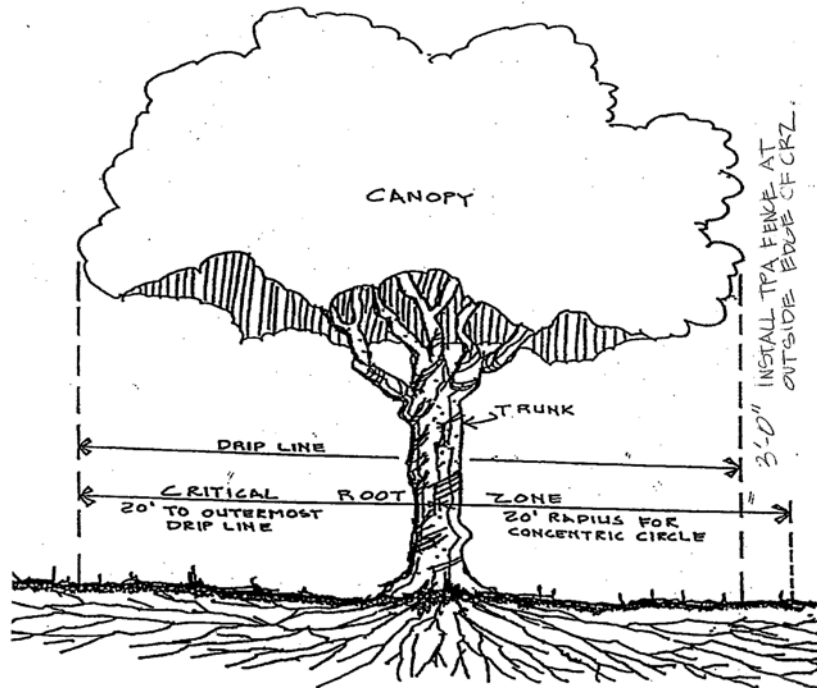
B. Standards for Tree Canopy Preservation Areas

1. Tree Canopy Preservation Areas (TCPA) are those areas where tree preservation has been provided to meet the tree canopy requirements of this part.
2. The site shall be developed in accordance with the Tree Canopy Preservation Plan. The location of the TCPA boundary delineates the limit of disturbance associated with the TCPA. The limit of disturbance shall indicate the location of the tree protection fencing.
3. No clearing, grading, construction or other land disturbing activity shall take place within the TCPA beyond pruning to improve the general health of the tree or to remove dead or declining trees that may pose a public health and safety threat. As trees are lost through natural causes, new trees shall be planted in order to maintain minimum tree canopy as specified in this part.
4. Location of Structures and Parking
 - a. no structure (exception: fences, walls, retaining walls) shall be closer than 15 feet to the Limit of Disturbance (Tree Protection

- Fence).
- b. No vehicle use area (VUA) shall be closer than 10 feet to the Limit of Disturbance (Tree Protection Fence).
 - c. No retaining walls shall be closer than 10 feet to the Limit of Disturbance (Tree Protection Fence) except for retaining walls approved by PDS staff to be used in the preservation of existing trees.
5. During all construction activity (includes clearing, grading, building construction and VUA construction) a copy of the approved Tree Canopy Preservation Plan shall be on-site.
 6. For sites larger than two acres, tree preservation plans shall be stamped by a KY licensed landscape architect or a certified arborist.
 7. Establishment of the Critical Root Zone – The LDC requires that proposed developments demonstrate that trees are preserved to the maximum extent reasonable and feasible. Tree preservation is effectively defined as root system preservation; a Critical Root Zone Area (CRZ) will be assigned to each tree, based on trunk diameter size. In order to be considered as TCPA, a minimum of 50% of the CRZ is required to be left undisturbed around the tree. Trees are to be depicted on tree inventory and tree preservation plan with a CRZ circle centered on the tree base location (i.e. a twenty inch diameter tree is represented by a 40 foot diameter circle). The formula is: Tree in inches X 2, then convert to feet = CRZ diameter. The CRZ circles will be shown on the tree inventory and tree preservation plan so that review staff can discern the extent of disturbance proposed near existing trees.



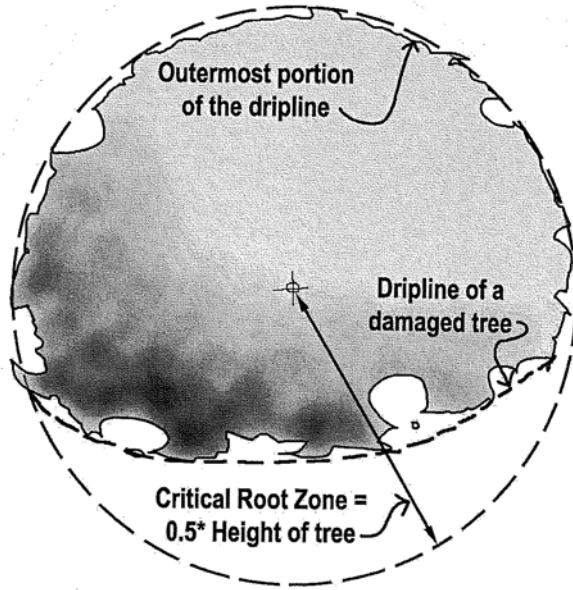
CRITICAL ROOT ZONE AREA



CRITICAL ROOT ZONE AREA (CRZ): The area of undisturbed natural soil around a tree defined by a horizontal circle drawn at grade with the center of the trunk of the tree and a radius equal to the distance from the trunk to the outermost portion of the drip line.

DRIP LINE: Whichever of the following encompasses the greatest area: (1) the irregular shape formed around a tree by a series of vertical lines that run through the outermost portion of the canopy of the tree and extend to the ground, or (2) a circular area with a radius of one-half ($\frac{1}{2}$) the height of the tree extending outward from the center point of the tree.

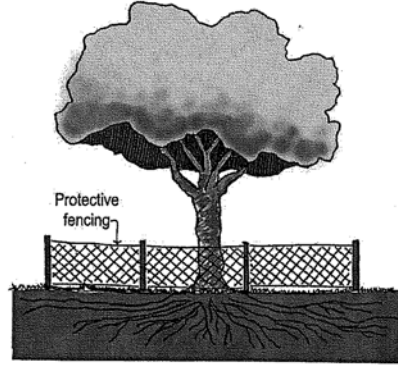
CRITICAL ROOT ZONE AREA & DRIP LINE



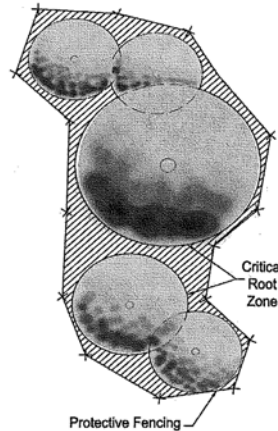
showing Critical Root Zone and Drip Line measurement for a damaged or deformed

TREE PROTECTION FENCING Examples of appropriate protective fencing

Protective fencing for a single tree



Protective fencing for multiple trees



- C. TCPA Exceptions – Sites which present unique development constraints will have opportunities to preserve existing trees as TCPA as determined by the Planning Director or designee. Such situations are described below.
1. Utilities - A proposed development which requires underground utilities shall avoid the installation of said utilities within the drip line and critical root zone of existing trees whenever possible. In the event that this is unavoidable, all trenching shall be done by directional boring taking extreme caution to avoid damage to the root structure. *(Note: LWC contractors are trained to use directional boring where applicable)*
 2. Trunk Protection (Limited Application) - Tree trunk protection shall be provided in accordance with detail. Tree trunk protection shall consist of any 2 x 4-inch or 2 x 6-inch planking or plastic strapping
 3. Tree Wells for Raised Grades - When existing grades are raised by more than 6 inches, the tree root system shall be protected by the installation of tree wells in accordance with detail (to be provided). Building materials (brick, stone, timber, etc.) similar to those utilized on site shall be used for the separator wall of the

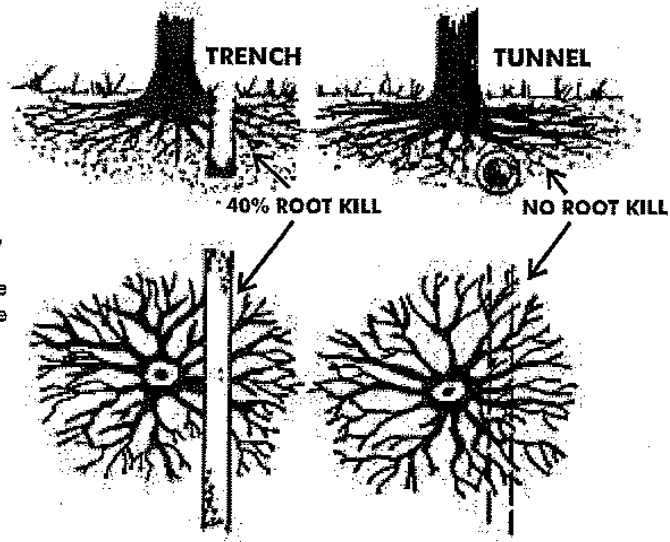
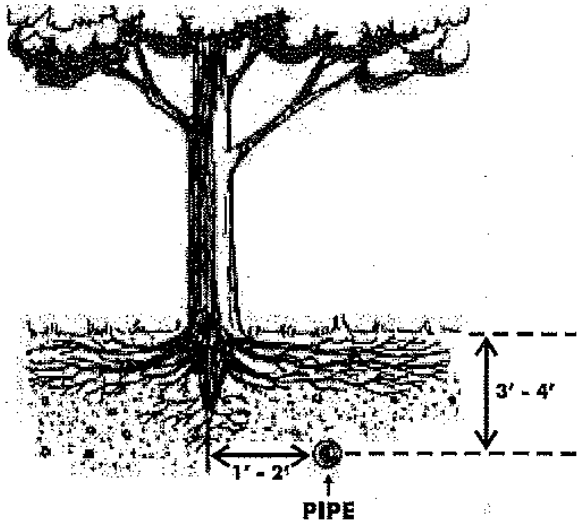
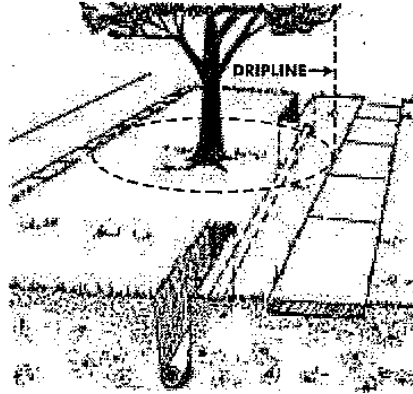
well and PVC conforming to ASTM D-2729, SDR-35 shall be used for the aeration systems in fill areas.

4. Cutting and Filling Around Trees - When the depth of an excavation or embankment exceeds 6 inches within the drip line or CRZ of any tree with a diameter greater than 4 inches, a tree well shall be constructed to protect the tree as indicated on the tree preservation plan.
 5. Paving Around Trees - Where paving within the drip line of any tree greater than a 4 inch diameter is necessary, a permeable pavement and aeration system must be installed as indicated on the tree preservation plan, except for street construction. Permeable segmented pavers in conjunction with PVC pipe aeration system or concrete on gravel base with cored holes shall be used to protect existing tree root zones.
 6. Other techniques as described by applicant and approved by the Planning Director or designee.
- D. Percent change in TCPA - A threshold of change from development plan to construction plan will be considered as there are many unknowns at development plan stage (unforeseen site constraints, rock, utilities etc.). Percentage of change must be in keeping with the original intent of the TCPA shown on the plan. Percent of change from development plan to construction plan shall be no more than 10% of the original TCPA shown on the approved development plan. A change greater than 10% will require Planning Commission or designee approval.

Other techniques as described by applicant and approved by the Planning Director or designee.

APPENDIX B. Tunneling (How to Save Existing Trees When Tunneling)

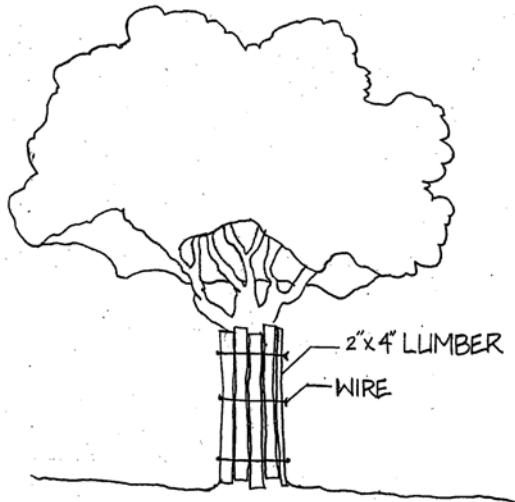
Use tunneling for underground utilities such as cable, electric, and natural gas instead of cutting an open trench. This method will help preserve existing trees or smaller tree save areas.



Why Tunneling Saves Trees

Trenching near a tree can kill as much as 40 to 50 percent of the tree's roots. This will almost certainly lead to stress, poor health, lack of firmness against wind, or outright death. A tunnel in the same place will do virtually no damage to the tree.

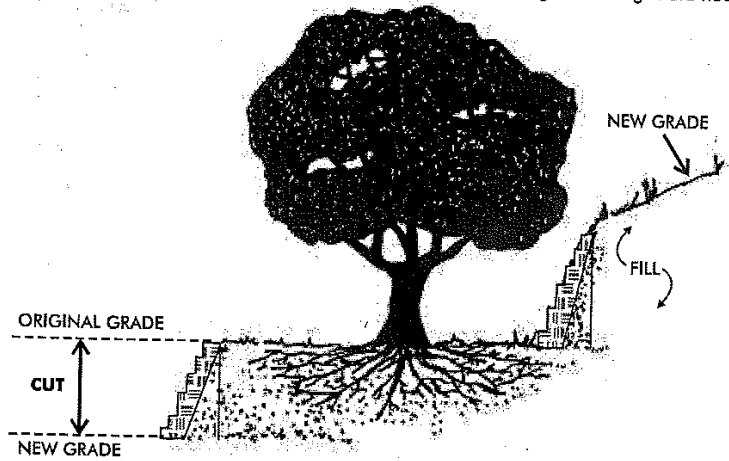
BARK PROTECTION



In situations where a protected tree remains in the immediate area of intended construction and the tree may be in danger of being damaged by construction equipment or other activity, the contractor or subcontractor shall protect the tree with 2"x4" lumber encircled with wire or other means that do not damage the tree. The intent is to protect the trunk of the tree against incidental contact by large construction equipment.

APPENDIX C. Grade Changes

How to preserve existing trees with the use of retaining walls when grade changes are necessary

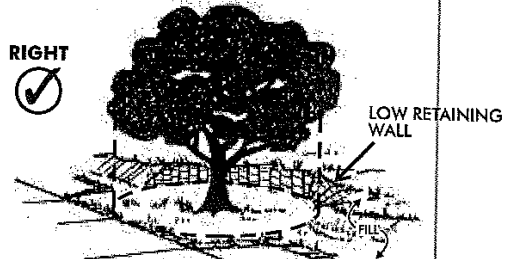


Grade Change Examples - Methods of preventing root suffocation from fill dirt when changing grade

WRONG



RIGHT



10.1.7 Landscape / Buffer Credit

Any existing trees on a site or street trees planted on an adjacent right-of-way that are used to meet the requirements of this Part shall be credited towards fulfillment of any landscaping, screening, or buffering provisions of this Chapter.

10.1.8 Waivers

- A. The Planning Commission shall have the authority to grant waivers or modifications of the tree canopy requirements contained in this Part in accordance with Chapter 11 Part 8 of the Land Development Code.
- B. The Planning Commission's designee may waive the requirement for a public hearing and take action on requests for reduction of five (5) or fewer trees or a reduction constituting less than ten (10) percent of the total tree canopy requirement, whichever is greater. Notice shall be sent in accordance with Chapter 11 Part 8 stating that a waiver request has been filed and that the Planning Commission's designee may waive the public hearing requirements and take action on the request.
- C. Required Findings; In granting a waiver the Planning Commission's designee must find that:
 - 1. The waiver is in compliance with the Comprehensive Plan.
 - 2. The applicant made a good faith effort to provide as many trees as possible on the site, on the adjacent right of way, or on an alternative site as specified in 10.1.3; and
 - 3. There are other mitigating circumstances affecting this site which do not generally apply to sites developed for the same use and in the same form district.