SHADE TREE
ORDINANCES, POLICY
AND GUIDE

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SHADE TREE ORDINANCES
SOUTH WHITEHALL TOWNSHIP CODIFIED ORDINANCE

Article 3

Shade Tree Commission

53 P.S. Section 58020 et. seq.

1.21 TITLE

The Commissioners hereby create the “Shade Tree Commission” of South Whitehall Township. (Ordinance No. 109, enacted March 10, 1969.)

1.22 GENERAL POWERS

The commission shall have exclusive custody and control of the shade trees in the Township, and is authorized to plant, remove, maintain, and protect shade trees on the public streets, and highways in the Township. (Ordinance No. 109, enacted March 10, 1969.)

1.23 COMMISSION MEMBERSHIP

The Shade Tree Commission shall be composed of three (3) residents of the Township, appointed by the Township Commissioners, who shall serve without compensation. The members of the Commission shall serve for terms of five (5) years or until their successors are appointed, except that the members of such Commission first appointed shall be appointed for the following terms: one (1) member for a term of three (3) years, one (1) member for a term of four (4) years, and one (1) member for a term of five (5) years. Vacancies in the Shade Tree Commission, occurring otherwise than by expiration of term, shall be filled for the unexpired term in the same manner as the original appointments. (Ordinance No. 109, enacted March 10, 1969.)

1.24 REPORT OF COMMISSION

The Shade Tree Commission shall annually report in full, to the Township Commissioners, its transactions and expenses for the last fiscal year of the Township. (Ordinance No. 109, enacted March 10, 1969.)

1.25 HIRING OF EMPLOYEES AND LEGISLATIVE POWER

The Commission may, with the approval of the Township Commissioners, employ and pay such superintendents, engineers, foresters, tree wardens, or other assistants, as the proper performance of the duties devolving upon it shall require. (Ordinance No. 109, enacted March 10, 1969, as amended by the Enacted Codification.)
1.26 NOTICE OF COMMISSION’S ACTIVITIES

Whenever the Shade Tree Commission proposes to plant, transplant or remove shade trees on any street or highway, notice of the time and place of meeting at which such work is to be considered shall be given in a newspaper of general circulation in the Township once a week for two weeks immediately preceding the time of the meeting. The notice shall specify in detail the streets or highways, or portions thereof, upon which trees are proposed to be so planted, replanted, or removed. (Ordinance No. 109, enacted March 10, 1969.)

1.27 LANDHOLDER’S LIABILITY FOR COSTS

The cost of planting, transplanting, or removing any shade trees in the streets or highways of the Township, of the necessary and suitable guards, curbing or grading for the protection thereof, and of the replacing of any pavement or sidewalk necessarily disturbed in the execution of such work, shall be paid by the owner of the real estate in front of whose property the work is done.

The amount each owner is to pay shall be ascertained and certified by the Commission to the Township Commissioners and to the Township Treasurer. (Ordinance No. 109, enacted March 10, 1969.)

1.28 REMOVAL OF DISEASED TREES

The Commission may, upon thirty (30) days’ notice in writing, sent by Certified Mail, Return Receipt Requested, to the occupant or the owner appearing in the records of the County Tax Assessor’s Office, require owners of property to cut and remove trees afflicted with the Dutch elm or other disease which threatens to injure or destroy shade trees in the Township under regulations prescribed by ordinance. Upon failure of any such owner to comply with such notice, the Township may cause the work to be done by the Township and levy and collect the cost thereof from the owner of the property. The cost of such work shall be a lien upon the premises from the time of the commencement of the work, which date shall be fixed by the Township Engineer and shall be filed with the Township Secretary. Any such lien may be collected by action in assumpsit or by lien filed in the manner provided by law for the filing and collection of municipal claims. (Ordinance No. 109, enacted March 10, 1969.)

1.29 ASSESSMENT LIENS

Upon the filing of the certificate with the Township Commissioners, the Township Secretary shall cause thirty days’ written notice to be given to the persons against whose property an assessment has been made. The notice shall state the amount of the assessment and the time and place of payment, and shall be accompanied by a copy of the certificate.

The amount assessed against the real estate shall be a lien from the time of the filing of the certificate with the Township Commissioners, and if not paid within the time designated in the notice, a claim may be filed and collected by the Township in the same manner as municipal claims are filed and collected. (Ordinance No. 109, enacted March 10, 1969.)
1.30 MAINTENANCE BY TOWNSHIP

The cost and expenses of caring for such trees after having been planted, other than those costs to be paid by the landowner pursuant to Section 1.27 hereof or those to be paid pursuant to a Maintenance Agreement with a developer, and the expense of publishing the notice hereuntofore provided, shall be paid the Township.

The needed amount shall each year be certified by the Shade Tree Commissioners to the Township Commissioners, and shall be drawn against as required by the Commission, in the same manner as money appropriated for Township purposes.

The Township Commissioners, instead of levying the tax authorized under the general tax levying powers of this act, may provide for the expense of caring for trees already planted and of publishing the notice, by appropriations equal to the amount certified to be required by the Shade Tree Commission. (Ordinance No. 109, enacted March 10, 1969, as amended by Ordinance No. 816, enacted July 6, 2005.)

1.31 VIOLATIONS AND PENALTIES

Except for removals required by the Township in accordance with Section 1.28, a Shade Tree Permit shall be secured from the Township prior to the planting, cutting or removal of a Shade tree. A permit shall be denied if the information submitted is incomplete, erroneous or otherwise unsatisfactory. Failure to secure a Shade Tree permit or to adhere to the conditions of approval of the permit within the specified timeframe shall constitute a violation of this Ordinance.

The willful injury or killing of a living Shade Tree by cutting, debarking, breaking, the use of herbicides, or any other manner, without a Shade Tree permit allowing for the same, shall constitute a violation of this Ordinance.

Any person violating the provision of this Ordinance shall, upon conviction before a District Justice of appropriate jurisdiction, be liable to pay costs of prosecution and a fine as follows:

(a) For willfully, without a Shade Tree permit, injuring or killing a living Shade Tree by cutting, debarking, breaking, by the use of herbicides, or in any other manner wherein it is determined by the District Justice that such damage or destruction was intentionally inflicted, a fine of not less than Two Hundred ($200.00) Dollars, nor more than Six Hundred ($600.00) Dollars. (Ordinance No. 109, enacted March 10, 1969, as amended by Ordinance No. 449, enacted February 7, 1989, as amended by Ordinance No. 816, enacted July 6, 2005.)

1.32 DISPOSITION OF PENALTIES

All penalties or assessments imposed under this article shall be paid to the Township Treasurer, to be placed to the credit of the Shade Tree Commission, subject to be drawn by the Commission for the purposes of the preceding section. (Ordinance No. 109, enacted March 10, 1969.)
1.33 SEVERABILITY

The provisions of this Ordinance are severable and if any of its provisions shall be held illegal, invalid or unconstitutional, the decision of the Court shall not affect or impair any of the remaining provisions of this Ordinance. It is hereby declared to be the legislative intent that this Ordinance would have been adopted if such illegal, invalid or unconstitutional provision or exemption had not been included herein. (Ordinance No. 109, enacted March 10, 1969.)
South Whitehall Township Subdivision and Land Development Ordinance

Section 11.38 Shade Trees

Except as otherwise provided in Subsection 11.38(c)(4) hereof, within the right-of-way of streets or street tree easements, as applicable, adjacent to or in new subdivisions, the developer shall plant shade trees meeting the specifications found in these regulations. Site locations, land use, topography, natural and historic features shall be considered by the developer and the Township Shade Tree Commission, in selecting and approving species.

(a) SPECIES OF TREES PERMITTED. Trees within street rights-of-way or street tree easements shall be deciduous hardwood types of varieties (including hybrids thereof) indicated within the South Whitehall Township Shade Tree Policy, as established by the Board of Commissioners from time to time, or other species approved by the Shade Tree Commission.

(b) TREE SPECIFICATIONS

(1) Trees shall be of nursery stock quality, grown under the same climatic conditions as at the location of the development.

(2) All planting shall be done in conformance with good nursery practice and to the standards established by the Landscape and Shade Tree Commission.

(3) Trees permitted shall be of symmetrical growth, free of insect pests and disease.

(4) TREE SIZE. The trunk diameter measured at a height of six (6) inches above ground level shall be a minimum of 2 to 2-1/2 inches. Trees shall have a minimum of a four (4) foot single straight stem to the first lateral branches, above ground level.

(A) Depending on good planting with reference to the particular species to be planted, the Landscape and Shade Tree Commission may modify the size requirements of trees.

(c) TREE LOCATION

(1) In all subdivisions, trees shall be planted within the street rights-of-way or street tree easements at uniform intervals between thirty (30) and forty (40) feet. The location of shade trees will be subject to the approval of the Landscape and Shade Tree Commission and the Board of Commissioners. If acceptable to the above two Boards, trees may be planted midway between the curb and sidewalk, providing the planting strip is a minimum of five (5) feet in width; or between the sidewalk and building restriction line, three (3) feet from the sidewalk. Should the latter location be chosen, additional street right-of-way shall be dedicated to the Township or a street tree easement established in lieu of. The size of the additional right-of-way or street tree easement shall be determined by the Township Engineer.
(2) In order to facilitate planting within street rights-of-way, the developer shall indicate grades on his final subdivision plans and shall grade each street right-of-way according to Section 11.32(a)(3) thereby providing a twelve (12) foot or fifteen (15) foot width (whichever is applicable), at a slope of three-eights (3/8) inches per foot, in order that a sufficient grade will exist for the planting of required shade trees.

(3) Prior to planting, the developer is to contact the Public Works Department to arrange a physical inspection of the trees to be planted and the marking of the planting locations of the shade trees by a representative of the Public Works Department. The developer shall not plant any shade trees until the approval of the inspecting Public Works Department representative has been obtained.

(4) Should the Board of Commissioners grant a waiver or deferral to the requirement to plant shade trees or should the developer, due to the physical characteristics of the land or the location of public utilities located thereon, be unable to plant every required shade tree as shown on the approved Landscaping Plan, the developer in lieu of planting such trees shall contribute a fee to the Township an amount as established by the Board of Commissioners, from time to time, per tree not so planted.

(d) MAINTENANCE.

An agreement between the developer and the Board of Commissioners and approved by the Landscape and Shade Tree Commission, shall be required to provide for the maintenance of all such trees planted.

(1) The term of the Maintenance Agreement shall be twenty-four (24) months from the day the Township Engineer and the Township Manager give the developer the final approval on all required improvements identified in the Subdivision Improvements Agreement. During this term the developer shall:

(A) Replace dead trees, or trees of sufficiently poor health so as to be deemed unacceptable by the Landscape and Shade Tree Commission.

(B) Control insects and diseases.

(C) Repair mechanical injury.

(D) Remove all dead branches.

(E) Within one month prior to the end of the Maintenance Agreement, the shade trees shall be pruned by the developer, in accordance with the South Whitehall Township Shade Tree Policy, unless otherwise directed by the Landscape and Shade Tree Commission.
(Ordinance No. 94, enacted August 12, 1968, as amended by Ordinance No. 232, enacted December 8, 1975, as amended by Ordinance No. 296, enacted February 12, 1979, as amended by Ordinance No. 814, enacted July 6, 2005.)
SOUTH WHITEHALL TOWNSHIP ZONING ORDINANCE

12.36 PROVISIONS FOR BUFFER STRIPS, SCREENING AND LANDSCAPING

(a) Buffer Strips.

(1) In general, a buffer strip shall be established and maintained along all lot lines which are not along public street right-of-way lines of developed lots for all uses except single family detached dwellings, semi-detached dwellings (twins), and single family attached dwellings (townhouses).

(2) Buffer strips in addition to those specified in Section 12.36(a) shall be required an necessary to screen any outdoor storage of material or finished or partly finished goods or rubbish or trash when permitted by other provisions of this Ordinance from view from adjacent residential properties or from public streets. However, automotive, truck and recreational vehicle sales agencies shall be permitted a display area not exceeding one hundred fifty (150) feet of frontage free of a buffer strip between the display area and the public street.

(3) Buffer strips shall be at least fifteen (15) feet in width except that those bordering the following uses shall be twenty-five (25) feet in width:

   (A) Rod and Gun Clubs
   (B) Mobile Home Park
   (C) Veterinary and Kennels
   (D) Equestrian Trails and Stables
   (E) Commercial Camps
   (F) Commercial Outdoor Recreation
   (G) Cemetery and/or Crematorium
   (H) Heliports
   (I) Quarries

(4) When two (2) adjacent lots are required to provide a buffer strip along the same lot line, a combined buffer strip with a total width not less than the minimum width of the largest buffer strip specified for the lots by other sections of this Ordinance may be provided. At least one-half (1/2) of the width required for the combined buffer strip shall be provided on each of the adjacent lots.
(5) Buffer strip requirements may be modified or waived by the Zoning Hearing Board when it is established that due to topography or the similarity and/or coordination of adjacent uses, no useful purpose will be served by the buffer strip.

(b) General Screening Requirements. Screening shall be provided and maintained in all buffer strips required in Section 12.36. Screening as a minimum shall consist of either:

(1) Dense hedges of deciduous, and at least fifty percent (50%) evergreen shrubbery. Plants shall be a minimum of five (5) feet above adjacent ground at the time of planting.

(2) A fence at least sixty percent (60%) solid, uniformly painted or of a naturally durable material such as cedar, cypress or redwood, not less than five (5) feet tall and open to the ground not more than twelve (12) inches above ground level, with a single row of planting as described in Section 12.36(b)(1) ten (10) feet on center and a minimum height of three (3) feet above adjacent ground at the time of planting.

(Section amended by Ordinance No. 506, enacted March 19, 1991.)

(c) Commercial Recreation Complex Screening Requirements.

(1) Buffer Strip Plantings - Two (2) coniferous trees of at least ten (10) feet in height shall be planted in the buffer strips required by Section 12.36(a) et. seq., for each new amusement in a recreation complex.

(2) Shade Trees - In addition to the shade trees required under Section 11.38 of the Subdivision and Land Development Regulations, one (1) deciduous tree of at least fifteen (15) feet in height shall be planted on developer’s property for each new amusement in a recreation complex. Said tree shall be planted adjacent to the street right-of-way line so as to augment the interval planting of required shade trees and shall be approved by the Township Board of Commissioners after recommendation from the Landscape and Shade Tree Commission.

(3) Additional Plantings - Additional coniferous or deciduous trees shall be added to the required buffer strips at a rate of one tree for each foot that a new commercial amusement, structure or building exceeds fifty (50) feet in height. The additional plantings and the locations thereof shall be approved by the Board of Commissioners after recommendation from the Landscape and Tree Commission. All plantings made pursuant to this section shall be ten (10) feet or more in height at the time of planting.

(4) Location of Plantings - The locations of all trees required by Section 12.36(c) et. seq., shall be as set forth on a landscaping plan submitted by the property owner, reviewed by the Landscape and Shade Tree Commission and approved by the Board of Commissioners.
(5) Limit on Plantings - The tree planting provisions of thin Section shall apply to each new commercial amusement and shall also be applicable where an existing commercial amusement is replaced by a new commercial amusement, further, the removal of a commercial amusement shall not be a basis for the elimination of diminution of plantings. Lastly, it is recognized that a full compliment of buffer trees will have been planted at some future date. The South Whitehall Township Board of Commissioners shall make a reasonable determination, after recommendation by the Landscape and Shade Tree Commission, as to when a commercial recreation complex has provided a sufficient amount of screening to meet the intent of this Ordinance.
(Ordinance No. 460, enacted June 20, 1989.)

(d) Landscaping. Except in rural residential and agricultural districts or where land is being used for agricultural, horticultural, nursing, including raising and keeping of farm animals, all areas of any lot not occupied by buildings, pavement or other surfacing or otherwise improved or used in accordance with an approved site plan shall be landscaped by planting of grass and/or ground cover, shrubs and trees. The placement of the plant material shall be appropriate to enhancement of the property. Continuous maintenance shall be practiced on all such areas.

(e) Landscape Plan. The Zoning Hearing Board may require that the location and type of plant species to be used in buffer strip and for landscaping be shown on a landscape plan to be submitted for its approval. The Zoning Hearing Board may request recommendations from the Shade Tree Commission concerning the suitability of the plan and the plant species.
(Ordinance No. 226, enacted April 24, 1975.)

12.38 PROVISIONS FOR OFF-STREET PARKING

(c) Buffer Strips, Screening and Landscaping. All improved off-street parking areas required or specified in this Ordinance and not entirely contained in a garage or building shall:

(1) Have a buffer strip and screening between it and any adjacent residential lot in accordance with Sections 12.36(a) and 12.36(b). Such screening shall be augmented as necessary to prevent the glare of headlights from shining on adjacent residential properties.

(2) Provide one shade tree for every ten (10) parking spaces located in a planned manner within or adjacent to the parking lot areas.

(3) The area between the parking area and a public street shall be landscaped to include plantings at least thirty (30) inches in height. Said plantings shall be at least fifty percent (50%) evergreen shrubbery and shall average at least one (1) for every ten (10) feet of frontage.
(4) The planting and screening required by this section shall not be located so as to obstruct vision at intersections of driveways and streets as defined in Section 12.33(g). For purposes of this section, requirements for local streets shall apply to driveways and access aisles.
6.141 DEFINITIONS

The following words when used in this Ordinance shall have the meaning ascribed to them in this section except in those instances where the context clearly indicates otherwise.

(a) Notice. The serving of notice upon a person as provided by law or the sending of notice by Certified Mail, Return Receipt Requested, to the person’s last known address.

(b) Activity or condition against the public welfare. Shall be such activity, existence of a condition or state of being, which based upon actual conditions in the Township, is offensive and prejudicial to public life, health, safety, morals, general welfare, peace, decency, dignity, comfort or convenience of the inhabitants of the Township or to the reasonable use of property or the tranquility of the community, including but not limited to the following:

(1) The ownership, maintenance, inhabitation, use or offering for use any structure on public or private grounds which may be dangerous or detrimental to the public welfare.

(2) The willful making or causing to be made of any loud, boisterous, or unseemly noise or disturbance so as to disturb or annoy the peaceable public anywhere within the Township.

(3) Any act or conduct tending to cause riot, panic, violence or general disturbance.

(4) Any discharge without legal rights, except in authorized celebrations, of any gun, pistol, firearm, fireworks or other explosive.

(5) The unnecessary or unreasonable obstruction of any passageway in any public building or public place or business place, or any sidewalk, pavement, driveway, highway, street, lane, alley or thoroughfare.

(A) The depositing of snow and ice is restricted. No person or business shall deposit or cause to be deposited, any snow and/or ice on, against, or around a fire hydrant or any sidewalk, roadway, or loading and unloading area of a public transportation system.

(B) Every person or business in charge of any building or structure within South Whitehall Township, whether as owner, tenant, occupant, lessee, or otherwise, shall remove and clear away any accumulation of snow and ice on said building or other structure, which is liable to fall on any sidewalk, roadway, or other public way. Such work shall be
completed within four (4) hours after sunrise after the cessation of any fall of snow, sleet or freezing rain upon request of a Township official.

(6) The sale or offering for sale, the lease or offering for lease, gift or offering for gift, or distribution any unwholesome, impure or offensive food or drink or any other material intended for human or animal consumption.

(7) The participation in an unlawful gathering or the vexing, hindering, annoying or delaying any person whereby the public peace or comfort is broken or the public annoyed.

(8) The lounging or loitering upon any street, road, highway, street corner, curb, sidewalk, land, alley, park, square, common, or any public building, public place or business place, or private residence, store, shop, church entrance or exist, or passageway.

(9) The use of indecent, vile and profane language, audibly on the public streets, lanes, alleys, parks, squares, commons, public buildings, public places, business places, churches, schools or any public place within the Township.

(10) The congregating or assembling at, near or about a place where a fire is in progress, or where the Fire or Police apparatus have been summoned by an alarm of necessity, thereby hindering, delaying or obstructing any such apparatus, its men or equipment or rendering dangerous, by such assembly, the management of such apparatus.

(11) The neglect or refusal promptly to regard and obey the orders of any police officer or fireman in respect to the discharge of their duties in the enforcement of the laws and ordinances of the Township and at any place where a fire is in progress.

(12) The presence of stagnant water, marsh, bog or other condition which is conducive to the breeding of mosquitoes, flies, or other insects dangerous to public health.

(13) The discharge into any river, stream, creek, pond, or other body or Course of water any pollutant which is injurious to the health of the public or fish or other wildlife living in or around the water, or which is harmful to the natural plant life or vegetation in or near said water, or which causes a discoloration or unnatural odor in the water.

(14) The unauthorized interference with the flow or any river, stream, creek or other course of water or the alteration of the natural flow of water from a person’s land where such alteration is prejudicial to any public interest.

(15) The presence of trees or vegetation on private property or within the adjoining public street rights-of-way that present an imminent threat to private or public property, or to life safety.

(c) Person. Shall include any individual, organization, corporation, partnership,
governments or governmental subdivisions or the agency, business, trust, estate, association and any other legal entity.

(d) Structure. Shall include any building, permanent or temporary, fully erected or not, intended for shelter, housing or enclosure of persons, animals or property of any kind.

(e) Terms. The present tense shall include the future, singular shall include the plural, and the plural, the singular.

The Crimes Code already covers many of the practices set forth in this Ordinance in Section 6.

141(b):

(2) Unreasonable Noise 18 P.S. S5503(a)(2)
(3) Riot 18 P.S. S5501
(5) Obstructing Public Ways 18 P.S. S5507
(7) Harassment 18 P.S. 52709
(8) Loitering 18 P.S. 55506
(9) Obscene Language 18 P.S. 55503(a)(3)
(11) Failure to Disperse 18 P.S. S5502
(13) Discharge of Pollution 18 P.S. 5691.202

(Ordinance No. 129, enacted February 9, 1970, as amended by Ordinance No. 814, enacted July 6, 2005.)

6.142 VIOLATIONS

It shall be unlawful for any person to create or maintain an activity or condition against the public welfare as herein defined. Any person violating any provision of this Ordinance shall be subject to the penalties hereinafter provided. (Ordinance No. 129, enacted February 9, 1970.)

6.143 PENALTIES

For any and every violation of any provision of this Ordinance, the Township shall exercise any one or more of the following remedies:

(a) Make immediate arrest upon summary conviction, the person violating this Ordinance shall be subject to a fine of not less than One Hundred ($100.00) Dollars and not more than One Thousand ($1,000.00) Dollars, or undergo imprisonment for a period not to exceed thirty (30) days. (Ordinance No. 129, enacted February 9, 1970, as amended by Ordinance No. 449, enacted February 7, 1989.)

(b) Provide notice to the person violating said Ordinance to abate the activity or condition against the public welfare and upon failure of such person do so within a period of ten (10) days from the date of the service or the mailing of said notice, the Township shall arrest and fine such person as provided in Subsection (a) hereinabove and may take such steps as are necessary to abate the activity or condition against the public welfare and charge said person violating the Ordinance with all costs thereof together with a collection fee of ten (10%) per Cent, and upon failure to pay said costs within twenty (20) days of notice by the Township, the Township may file a municipal claim or an action in
assumpsit against said person or property together with a collection fee of ten (10%) per cent.

(c) If upon conviction or notice as herein provided a person shall fail or refuse to abate an activity or condition against the public welfare, the penalty shall be imposed and re-imposed for each and every day the violation continues.

(d) Institute proceedings in any court of equity having jurisdiction to enjoin the continuance of the activity or condition against the public welfare. (Ordinance No. 129, enacted February 9, 1970.)

6.144 VALIDITY

If any article, section, subsection, paragraph, clause, phrase or provision of this Ordinance be adjudged invalid or held unconstitutional, the same shall not affect the validity of the entire Ordinance as a whole or any part or provisions hereof other than a part so adjudged to be invalid or unconstitutional. (Ordinance No. 129, enacted February 9, 1970.)

6.145 REPEALER

All ordinances or parts of ordinances inconsistent herewith be and the same are hereby repealed. This act shall not be considered a repeal of any existing anti-pollution ordinance or resolution or act done pursuant to such ordinance or resolution. (Ordinance No. 129, enacted February 9, 1970.)

6.146 EFFECTIVE DATE

This Ordinance shall become effective ten (10) days after publication. (Ordinance No. 129, enacted February 9, 1970.)
SHADE TREE POLICY
1 Purpose

The purpose of this policy is to provide background and plain-English interpretation of the South Whitehall Township Ordinances and policies regarding shade trees in the Township.

2 Background

On August 12, 1968, South Whitehall Township revised their Subdivision and Land Development Ordinance to include the requirement for shade trees along streets in new developments. On March 10, 1969, South Whitehall Township established a Landscape and Shade Tree Commission, a 3-person citizen Board, to oversee the community forest that lines our streets and roads. The Pennsylvania Municipalities Planning Code states that “The commission shall have exclusive custody and control of the shade trees in the Township, and is authorized to plant, remove, maintain, and protect shade trees on the public streets, and highways in the Township.” The Landscape and Shade Tree Commission has been active ever since, ensuring that our existing communities maintain the trees that are an integral part of each neighborhood’s unique character and lending guidance to the greening of our new neighborhoods and commercial centers.

When dealing with the Township, trees are divided into several categories, each of which has its own regulations associated. “Shade Trees” or “Street Trees” refers to trees within the rights-of-way of public streets. These trees are most commonly known as the trees between the curb and the sidewalk along many public streets. Since the right-of-way of any given public street will generally extend beyond the edge of the roadway, it may not be easy to determine if a given tree is a “Shade Tree” in areas without sidewalks. Please call the Township if you have a question regarding the location of the right-of-way of a public street. “Parking Lot Trees” refers to those trees in and surrounding commercial parking lots as required by the Zoning Ordinance. “Buffer Strips” refers to trees and vegetation that serve as an attractive sound and light barrier around commercial uses as required by the Zoning Ordinance. Generally speaking, all other trees on private property are considered private property and may only be subject to Township concern should a situation regarding visibility along or access to a public right-of-way, danger to property, or public safety arise.

3 Legal Basis

As mentioned above, the Landscape and Shade Tree Commission is regulated by the Pennsylvania Municipalities Planning Code. South Whitehall Township adopted the code section dealing with the Landscape and Shade Tree Commission by Ordinance 109 on March 10, 1969. South Whitehall Township Codified Ordinance Article 3, Sections 1.21 to 1.33 deal specifically with the powers of the Landscape and Shade Tree Commission. South Whitehall Township has also adopted several other code sections that deal with specific issues regarding shade trees. Subdivision and Land Development Ordinance Section 11.38 deals with the planting of shade trees by developers. Zoning Ordinance Sections 12.36 and 12.38 deal with the requirements for parking lot trees and buffer plantings. Codified Ordinance Section 6.14 deals with hazardous vegetation within the right-of-way of a public street.
4 Property Owner and Township Responsibilities

Property Owner Responsibilities

According to Article 1, Section 1.27, “The cost of planting, transplanting, or removing any shade trees in the streets or highways of the Township, of the necessary and suitable guards, curbing or grading for the protection thereof, and of the replacing of any pavement or sidewalk necessarily disturbed in the execution of such work, shall be paid by the owner of the real estate in front of whose property the work is done.” This established the property owner’s responsibilities with regard to shade trees. Additionally, to plant or remove a shade tree, or to prune a shade tree to the extent that the tree’s health or the public safety would be affected, an approved Shade Tree Permit is required before the work is done. This permit allows the Township to review the proposed work to ensure that the health of the tree is maintained and that no underground utilities are disturbed.

Should a shade tree (or part of a shade tree) be in danger of falling into the street, it is the property owner’s responsibility to remove the danger in a swift manner as possible. A Shade Tree permit is still required, but may be submitted during or after the work is done. In some cases, the danger may come to the Township’s attention before it comes to the property owner’s attention. In these cases the Township may notify the owner of the danger posed by the shade tree and request, under paragraph 15 of the Personal Conduct section of the Codified Ordinance, that the property owner removes the danger. Should the property owner fail to do so, the Township may exercise the option of removing the danger and assessing the expense upon the property owner.

Township Responsibilities

On the other hand, Article 1, Section 1.30 states “The cost and expenses of caring for such trees after having been planted, and the expense of publishing the notice hereuntofore provided, shall be paid the Township.” This establishes the Township’s responsibilities. The Township will prune shade trees to a height of eight (8) feet over sidewalks and fourteen (14) feet over the street when necessary. This pruning is done to remove impediments to free use of sidewalks and streets. The above section, however, does not preclude the property owner from pruning the shade trees in front of his or her property. The property owner may do additional pruning to improve the aesthetics and health of the shade trees. As mentioned above, an approved Shade Tree Permit is required prior to the work commencing.

The Township is also responsible for maintaining the clear passage of traffic along streets and roadways. Should a shade tree (or part of a shade tree) fall into the street, the Township will remove the obstruction from the street right-of-way. Should a shade tree (or part of a shade tree) fall and bring down overhead utility wires, the Township will take appropriate measures to control the hazardous situation while the appropriate utility is dispatched to repair the damage. The Township is not responsible for the overhead utility lines and cannot repair them. Should a shade tree fall into the street, contact the Township at 610.398.0407 immediately. Should overhead utility lines be involved, notify the Township as well.
SHADE TREE GUIDE
1 **Introduction**

*Shade Tree Tips* *(Courtesy of Best Management Practices for Community Trees)*

Best Management Practices for Shade Trees

- Plant trees only where there is adequate room both overhead and underground for the mature size of the tree you are planting.
- Vary the spacing of trees along road right-of-ways to add interest and diversity to roadway plantings.
- Maintain sight lines so drivers can see pedestrians and vehicles when pulling out of driveways.
- Provide at least 14 feet of clearance for large vehicles such as buses and delivery along tree lined streets and drives.
- Provide at least 8 feet of clearance for pedestrians and bicyclists to avoid hazards created by low branches or trees too close to sidewalks and drives.
- Consider the impact of utility line maintenance along roadways.
- Avoid over-thinning a natural stand to reduce susceptibility to wind damage and uprooting.
- Remember that the closer you plant a tree to the street in a frontage area, the more difficult the situation for healthy tree growth.
- Tunnel or bore instead of trenching during utility line installation to avoid damaging tree roots.
- Avoid planting trees directly over property lines or corners.
- Consider the installation of root barriers along sidewalks and curbs to prevent tree roots from heaving and breaking payers, sidewalks, curbs, and road pavement.
- Plant trees behind the sidewalk utilizing tree planting easements, to increase above and below ground growing space and vehicular and pedestrian clearance.

Some of the common mistakes made when planting or conserving shade trees include:

- Planting in tree lawns (the buffer strip between curb and sidewalk) too narrow to support tree growth
- Planting too close to buildings and structures
- Planting medium or large trees under utility lines
- Planting too many of one species of tree along a street or within a neighborhood
- Removing trees from a stand and leaving a single specimen with disturbed roots, a small crown, and a tendency to blow over
- Over-thinning the canopy or removing the understory in tree save areas
- Grading and filling soil within tree-save areas
- Severing tree roots and increasing their risk for failure
- Leaving trees with root and trunk damage from construction activities that will decline and die
Our Community Trees

Our community trees are part of our infrastructure and are a valuable asset. Trees perform many essential biological functions that benefit all of us and our environment in substantial, measurable ways. But unlike other assets, trees are living entities and have basic biological requirements for survival and growth. As such, this unique asset must be actively managed and protected to maintain its health, function, safety, beauty, and value.

There is a shared community responsibility for tree management that results in considerable costs and risks associated with owning trees. To maximize the benefits we gain from our trees and minimize the costs and risks associated with them, we must have a good understanding of their benefits, costs, structure, and growth requirements, and we must be pro-active in their management.

The Benefits of Trees

Shade trees contribute the following benefits:

- Shade street pavement increasing its useful life
- Shade and cool homes and neighborhoods
- Create a pleasant and comfortable sidewalk environment
- Create an attractive presentation of property and buildings
- Screen the view of parking lots and utility areas from public streets
- Buffer noise, dust, fumes, and light
- Enhance the beauty of public thoroughfares

Trees provide you, and our community, with many environmental, social, and economic benefits. Many of these benefits are tangible and measurable. Some of the more important benefits are highlighted below:
Trees improve air quality. Their leaves absorb carbon dioxide during the process of photosynthesis, and produce as a by-product the oxygen we need to breathe. Tree leaves also absorb other pollutants and particulate matter from the air.

A large, healthy tree can produce enough oxygen each day for 18 people. Trees reduce pollution and absorb carbon monoxide, sulfur dioxide, nitrogen dioxide, and particulates. Deciduous trees remove up to 9% of particulates and evergreen trees can remove up to 13% of particulates in the air.

Trees can absorb and store a yearly average of 13 pounds of carbon each. A community forest can store as much as 2.6 tons of carbon per acre per year. Community trees across the United States store 6.5 million tons per year, resulting in a savings of $22 billion in control costs. The value associated with the removal of each pound of carbon is $1.70. Therefore, each tree creates a savings through carbon storage of $22 per year.

To grow a pound of wood, a tree uses 1.47 pounds of carbon dioxide and gives off 1.07 pounds of oxygen. An acre of trees might grow 4,000 pounds of wood in a year, using 5,880 pounds of carbon dioxide and giving off 4,280 pounds of oxygen in the process. For every pound of wood that decays (or is burned), the process is reversed: 1.07 pounds of oxygen are used, and 1.47 pounds of carbon dioxide are released.

By providing a cool, shady spot for us to park our cars, trees also reduce the amount of volatile organic compounds (VOC’s) that are released from them. In the sun and heat, parked cars continue to release VOC’s from the gas tank, so tree canopy can significantly reduces the level of emissions.

Trees save energy. They shade our homes and offices, and the streets, parking lots, and other pavement that surrounds them. They cool the air as their leaves evaporate water.

Leafy green tree crowns create a canopy of shade, reducing the amount of sunlight reaching our streets, lawns, and parking areas, resulting in lower summer temperatures. If properly placed for optimal shading of buildings (south and west sides) and air conditioners, trees can provide a 17% to 75% decrease in summer cooling costs. The presence of a thick evergreen canopy can increase winter heating costs in some areas, but trees generally decrease winter heating costs if properly placed to buffer a home against cold winter winds (north and west sides).

The 200,000 leaves on a healthy 100-foot tree can take 11,000 gallons of water from the soil and breathe it into the air in a single growing season. The cooling effect of all that water going into the air is the equivalent of air conditioning for 12 rooms.

Trees reduce stormwater runoff. Their leaves and branches intercept rainfall and release it slowly, thereby reducing runoff and helping to maintain water quality.

The many leaves, branches, and stems of trees intercept rainwater, hold it, and then release it slowly so that it can be absorbed by the soil. Tree roots also actively remove water from the soil.
The amount of overland flow of water and non-point source pollution that occurs during and after heavy rains is decreased by trees.

The value of trees can be measured as the reduction in construction and material costs for storm water control structures and systems because trees intercept 7% to 22% of precipitation. One study has shown that for every tree 2 cents in water control costs are saved for every gallon of water intercepted during a twelve-hour storm. In a medium sized city, this equates to a 17% reduction of 11.3 million gallons, and a savings of $226,000!

Trees improve water quality and reduce soil erosion. Their roots hold the soil, reduce erosion, and decrease the amount of sediment that enters our creeks, streams, rivers, and lakes.

Riparian, or ‘streamside’, forests are important to the stream environment. They control fluctuations in water temperature and maintain varied, but stable light levels. Light levels control the type and amount of algae present in a stream, a major food source for many macro-invertebrate animals. Litterfall contributes food energy to stream inhabitants. Aquatic habitat depends in large part on the woody debris available to streams, and the decay of woody debris as it releases nutrients into the aquatic system.

Without a streamside forest stream channels become unnaturally wide as stream banks erode. When the dimension, pattern, and profile of a channel are fundamentally changed habitat loss results. Riparian forests remove, hold, or transform nutrients from fertilizers, sediments, and other pollutants. Even before water reaches the riparian forest, trees can reduce sediment movement off a site by 95%. This keeps our lakes, rivers, and streams cleaner and healthier. In a medium sized city, the amount of soil saved annually can be as much as 10,886 tons!

Trees provide wildlife food and habitat. Their flowers, fruits, leaves, buds, and woody parts are important to the survival of birds, mammals, insects, and other wildlife. The decay of these tree parts caused by bacteria and fungi also increases the fertility and structure of the soil.

Many birds, mammals, reptiles, amphibians, insects, and microorganisms depend upon trees and the forest for food and shelter. Songbirds eat the fruit of black cherry and sumac; deer, turkey, and squirrels eat acorns of white oak, northern red oak, water oak, and willow oak. Cavities and branches in many trees, such as oak, sycamore, river birch, American holly, and black willow, are used for cover and nesting sites.

Trees growing along streams contribute to the health of aquatic ecosystems, providing shade and reducing water temperatures. Woody debris that falls into the stream provides habitat for turtles, otters, beavers, and fish.

Trees enhance recreational opportunities and attract visitors and residents to our community. They create an aesthetically pleasing and comfortable place in which to live, work and shop. Trees also create a natural setting for recreational activities such as walking, jogging, bicycling, golfing, and bird watching. The value of community trees is also reflected in increased property values.
For a single home, trees can provide an owner with a 4% to 27% increase in property value. A single tree can add up to 9% to the value of a residential property. One study has shown that each hardwood tree on a site adds $333 to the property value and each pine adds $257. Trees also attract more residents and visitors to a community, adding value by increasing the community’s tax and economic base.

**The Cost of Trees**

While trees provide us with many benefits and are a valuable community asset, there are costs associated with their conservation, establishment, and maintenance. And if neglected, unprotected, abused, or poorly maintained tree health suffers and trees can have an increased risk for failure and additional liability for the tree owner. Some of the ways in which trees directly or indirectly cost money are described below.

**Trees cost money to establish, maintain, and protect.**

Planning for trees and conducting tree evaluations and surveys requires extra time and costs during project planning and design. However, good design can result in a more successful and valuable project with high income.

Good quality planting stock is expensive, but by purchasing good quality trees, future replacement and maintenance costs can be reduced.

Tree maintenance, especially pruning, must be done regularly to insure tree health, safety, and longevity.

Trees must be constantly monitored and protected from damage that may result from construction activities, utility line installation or repair, and pest problems.

When trees decline beyond the point of improvement or when they die they require removal which can be expensive for large trees.

**Trees can grow larger than expected and may outgrow the space available.**

When tree branches grow into clear zones for utility lines, pedestrian walkways, buildings, streets, and vehicle and equipment travel lanes they reduce clearance and sight distance and cause increased costs to maintain public safety.

Without adequate growing space, trees will not achieve their potential for size, health, and longevity and will require more maintenance and will need to be replaced more often.

**Trees can be hazardous.**

Many trees, either today or in the future, tower over our property and us. When whole trees or their parts fail and fall, they can cause utility service outages, damage to vehicles, homes, fences, and pavement, and personal injury.
Tree roots that surface above ground can be a tripping hazard, and can cause damage to lawn mower blades. Trees left unpruned over walkways can cause personal injury.

**Tree roots can cause damage to infrastructure.**

Tree roots, attracted to favorable soil moisture conditions, will penetrate underground water and sewer lines through small cracks or pipe joints where they proliferate and cause problems.

Tree roots can cause cracking and heaving of sidewalks, curbs, and street pavement.

While there are many costs associated with trees, in most cases the benefits far outweigh the costs. The ratio of benefits to costs can be much improved with the implementation of the BMPs.

**Tree Structure**

A tree is defined as a woody plant that grows to 15 or more feet in height, usually with a single trunk, growing to more than 3 inches in diameter at maturity, and possessing an upright arrangement of branches and leaves. Trees are commonly referred to by their size, specifically their mature height. In this Guide, tree heights are divided into small, medium, or large height classes and are defined as follows:

- **Small Trees**: Less than 25 feet tall at maturity
- **Medium Trees**: 25 to 40 feet tall at maturity
- **Large Trees**: 40 to 100 feet tall or more at maturity

Trees, like people, are complex living organisms made up of many types of cells arranged into tissues and organs. Unlike people, they are only generating systems, and cannot regenerate new cells in the place of damaged or destroyed cells. Because trees generate new wood each year during the growing season, they can get to be very large and achieve a huge volume (size) and mass (weight).

The three main parts of a tree are its crown, trunk, and roots.

The crown is the woody and leafy component of the tree. It is composed of large, scaffold limbs that support smaller branches, twigs, leaves, and buds. The leaves absorb carbon dioxide and in the presence of sunlight produce food—carbohydrates—in a process called photosynthesis. As a by-product, the trees’ leaves produce and release oxygen. Tree growth occurs at the tips of the branches, which can extend a few inches to several feet a year, depending upon the species and growing conditions. Tree crown size is measured as diameter in feet of the width of the branches at their greatest extent.

The horizontal projection of the tree crown onto the ground or the square foot area the crown covers, is defined as the tree canopy. Tree canopy cover is calculated by multiplying the width of the crown in the north-south direction by the width of the crown in the east-west direction. For example, a tree with a crown width of 40 feet in the N-S direction and a width of 30 feet in the
E-W direction has a canopy cover area of 1200 square feet. Estimates of mature crown canopy size categories for trees growing in urban areas are listed as follows:

Very Small Canopy: 150 square feet (approximately 12 x 12 feet)
Small Canopy: 400 square feet (20 x 20 feet)
Medium Canopy: 900 square feet (30 x 30 feet)
Large Canopy: 1600 square feet (40 x 40 feet)

The trunk is the main woody stem of the tree and supports the crown. While most trees normally have one stem or trunk, other trees are characteristically multi-stemmed. Carbohydrates and other substances necessary for tree growth are stored in the trunk, roots, and other woody portions of the tree. Water is transported up through the trunk to other parts of the tree. Tree size is often measured as dbh or “diameter at breast height” which is the diameter of the trunk at 4.5 feet above ground. For a tree forked at or below 4.5 feet, diameter is measured at the narrowest point below the fork.

You can calculate trunk diameter by measuring trunk circumference at 4.5 feet above the ground with a standard tape measure and dividing by pi or 3.14, a constant.

\[
\text{Diameter} = \frac{\text{Circumference}}{\pi}
\]

Knowing the cross sectional area of the trunk may also be useful; the cross sectional area of the trunk at 4.5 feet above the ground is also referred to as a tree’s basal area. Basal area is often used to describe the stocking of trees (number and size) per acre of land. Cross sectional area is calculated by first dividing the tree diameter in half to get the radius, and then multiplying the radius times itself and then by 3.14.

\[
\text{Area} = \pi \times \text{Radius}^2
\]

Beneath the bark—the outer protective layer that covers the trunk, limbs, branches, and roots—there is a very thin layer of specialized cells known as the cambium layer. The cambium layer is where growth in trunk and root diameter takes place each year when both a layer of wood (xylem) is produced to the inside, and a layer of inner bark (phloem) and bark are produced to the outside. The cambium layer functions as the food transport system for the tree.

The roots are the underground structures that anchor the tree and absorb water and nutrients essential for tree survival and growth. The anchoring roots are large, rope-like, and woody and usually number from 4 to 11. Tree roots grow out from the trunk for a distance of at least 2 to 3 times the radius of the tree’s crown, or at least 2 times the height of the tree. However, they taper rapidly as they move away from the tree trunk.

While the large roots grow out from the tree trunk, many small, fibrous absorbing roots arise from the woody roots and generally grow up and into the top layers of soil and leaf litter—layers rich in organic material. Attached to the fine root hairs on fibrous roots are beneficial fungi that combine with the root hairs to form mycorrhizae, structures of benefit to both the fungus and the
These structures increase the surface area that absorbs water and nutrients. Whether woody or fibrous, 85% of tree roots are located in the top 18 inches of soil.

**Tree Growth**

Trees require a certain amount of basic substances and a specific combination of environmental conditions to function, survive and grow. Each individual tree species, like all plant species, has a range of soil moisture, soil volume, soil nutrient and acidity levels, air temperature, humidity, and sunlight in which it will grow.

Under optimal conditions, trees will achieve their genetic potential for size, age, and form characteristic of their species. Under less than optimal conditions, trees will grow slower, be smaller at maturity, become easily stressed, have more dead wood, and will be more vulnerable to attacks by insects and disease organisms.

As stated earlier, trees cannot regenerate or replace cells damaged or destroyed with new cells in the same location. Because trees can only “seal” their wounds and cannot “heal” their wounds, any physical damage done to a tree’s roots, trunk, or crown affects it for the rest of its life. This is important to understand before we cut or damage a tree’s roots, wound its trunk, break its limbs, or prune it incorrectly.

The amount of energy that a tree is able to store has an effect on its ability to withstand unfavorable conditions and resist attacks by insects, fungi, bacteria, and other harmful organisms. This energy storage capacity is an important factor to consider when working around trees. Trees most affected by injury or stresses are those that store little energy, are fast growing, have inadequate soil volume and growing space, have been adversely affected by weather conditions, have been repeatedly wounded, or are at a critical point in their seasonal or life stage development.

**The Critical Root Zone and Tree Protection Zone**

Because trees contribute so much to our quality of life and because they can be a potential liability, they must be actively conserved, wisely selected, well placed, well planted, routinely maintained, and constantly protected. One of the most critical steps in planning for trees and cost effective ways of managing trees is to maintain adequate growing space for each tree’s roots, trunk, and crown throughout the tree’s life. Remember that as a tree gets older it gets larger and the growing space it requires increases accordingly.

For existing trees, there is a minimum amount of area, above (for the trunk and crown) and below ground (for soil health and the root system) that is required to protect trees and preserve tree health. This area has been identified as the critical root zone (CRZ) or tree protection zone (TPZ) by various experts and is generally agreed to be equivalent to the soil area below ground and the space above ground defined by the tree’s dripline, or the greatest extent of the branches. This is depicted in Figure 1.
However, for small trees, newly planted trees, and trees with narrow crowns, the dripline defines an area that is too small for proper protection. So it is best to define both the critical root and tree protection zones as the circular area above and below ground with a radius equivalent to the greater of 6 feet or 1.5 feet for every inch in trunk diameter at 4.5 feet above the ground. For example, a tree with a trunk diameter (dbh) of 20 inches has a CRZ and TPZ of 30 feet (20 inches x 1.5) around the tree. While the radius of the CRZ (and TPZ) is 30 feet, the diameter of the entire CRZ (and TPZ) is 60 feet.

A generalized requirement for the minimum amount of open soil surface area by tree canopy size category is listed below:

<table>
<thead>
<tr>
<th>Canopy Category</th>
<th>Open Soil Surface Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Small Canopy</td>
<td>25 square feet (5 x 5 feet)</td>
</tr>
<tr>
<td>Small Canopy</td>
<td>100 square feet (10 x 10 feet)</td>
</tr>
<tr>
<td>Medium Canopy</td>
<td>225 square feet (15 x 15 feet)</td>
</tr>
<tr>
<td>Large Canopy</td>
<td>400 square feet (20 x 20 feet)</td>
</tr>
</tbody>
</table>

Figure 1. Location of the Critical Root Zone and Tree Protection Zone

Courtesy of Best Management Practices for Community Trees
The minimum depth of soil required for adequate root growth is 2 feet, or 24 inches and the maximum required is 3 feet or 36 inches. The minimum soil volume (in cubic feet) required for each tree canopy size listed above can be calculated by multiplying the minimum open soil surface area by 2.0 feet. For example, the minimum soil volume required for a tree with a large canopy is 400 square feet x 2 feet, or 800 cubic feet.
2 Shade Tree Selection

2.1 Preferred Species

In open areas (areas where structures, driveways and light standards are generally greater than 30 feet from planting locations) Plant at 35-40 foot intervals

**Aceraceae Family**
- Red Maple *Acer rubrum*

**Caesalpinaceae Family**
- Thornless Honey Locust *Gleditsia triacanthos Inermis (susceptible to mimosa webworm infestation)*

**Euphorbiaceae Family**
- Hardy Rubber Tree *Eucommia ulmoides*

**Fabaceae Family**
- Kentucky Coffeetree (males only) *Gymnocladus diocus*

**Fagaceae Family**
- American Beech *Fagus grandiflora (seeds are poisonous if ingested)*
- White Oak *Quercus alba*
- Scarlet Oak *Quercus coccinea*
- Shingle Oak *Quercus imbricaria*
- English Oak *Quercus robur*
- Northern Red Oak *Quercus rubra*

**Ginkgoaceae Family**
- Gingko or Maidenhair Tree (males only) *Gingko biloba*

**Hamamelidaceae Family**
- Sweet Gum (seedless only) *Liquidambar styraciflua*

**Nyssaceae Family**
- Black Gum or Black Tupelo *Nyssa sylvatica*

**Platanaceae Family**
- London Plane *Plantanus acerifolia*

**Tiliaceae Family**
- Little Leaf European Linden *Tilia cordata (susceptible to Japanese Beetle infestation)*
- Crimean Linden *Tilia euchlora*
- Silver Linden *Tilia tomentosa*

**Ulmaceae Family**
- Hackberry *Celtis occidentalis*
- Japanese Zelkova *Zelkova Serrata*
In tight areas (areas where structures, driveways and light standards are generally less than 30 feet from planting locations) Plant at 30-35 foot intervals

**Betulaceae Family**
- American Hornbeam *Carpinus caroliniana*
- Upright European Hornbeam *Carpinus betulus*

**Corylaceae Family**
- Turkish Filbert *Corylus colurna*

**Sapindaceae Family**
- Goldenraintree *Koelreuteria paniculata*
- Columnar varieties of other preferred species

**Under overhead wires Plant at 30-35 foot intervals**

**Aceraceae Family**
- Hedge Maple *Acer campestr*
- Paperbark Maple *Acer griseum*
- Tatarian Maple *Acer tataricum*

**Betulaceae Family**
- American Hornbeam *Carpinus caroliniana*

**Cornaceae Family**
- Kousa Dogwood (tree form only) *Cornus kousa* ①

**Fabaceae Family**
- Eastern Redbud (tree form only) *Cercis canadensis*

**Oleaceae Family**
- Japanese Tree Lilac (tree form only) *Syringa reticulate*

**Rosaceae Family**
- Serviceberry (tree form only) *Amelanchier x grandiflora* or *Amelanchier laevis* ①
- Hawthorne *Crataegus* – (including Ohio Pioneer, Winter Green, Thornless Cockspur, Lavalle, Washington, Winter King, Crimson Cloud English) ①
- Crabapple (disease resistant only) *Malus*
- Ornamental Pear (except Bradford) *Pyrus calleryana* cultivar ①

**Parking Lot Trees**
- Any preferred variety of Maple *Acer*
- Any preferred variety of Oak *Quercus*
- Japanese Zelkova *Zelkova Serrata*
- Thornless Honey Locust *Gleditsia Triacanthos Inermis*

**Note ①:** *This species is resistant to Verticillium Wilt*
2.2 Prohibited Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ash  <em>Fraxinus</em></td>
<td>Subject to borers</td>
</tr>
<tr>
<td>Birch, Paper <em>Betula papyrifera</em></td>
<td>Intolerant of stress</td>
</tr>
<tr>
<td>Box Elder <em>Acer negundo</em></td>
<td>Weak wood, weak limb attachment</td>
</tr>
<tr>
<td>Catalpa <em>Catalpa speciosa</em></td>
<td>Messy fruit</td>
</tr>
<tr>
<td>Cottonwood <em>Populus deltoides</em></td>
<td>Weak, messy cotton, too large</td>
</tr>
<tr>
<td>Coniferous Evergreens, such as Fir, Hemlock, Pine, Spruce</td>
<td>Clearance problems</td>
</tr>
<tr>
<td>Elm, American <em>Ulmus americana</em></td>
<td>Disease</td>
</tr>
<tr>
<td>Elm, Chinese</td>
<td>Weak, surface rooting</td>
</tr>
<tr>
<td>Elm, Siberian <em>Ulmus pumila</em></td>
<td>Weak wood</td>
</tr>
<tr>
<td>Horsechestnut <em>Aesculus sp.</em></td>
<td>Messy fruit</td>
</tr>
<tr>
<td>Larch</td>
<td>Clearance problems</td>
</tr>
<tr>
<td>Locust, Black <em>Robinia pseudoacacia</em></td>
<td>Insects, borers on poor sites</td>
</tr>
<tr>
<td>Maple, Norway</td>
<td>Surface rooting, dense shade</td>
</tr>
<tr>
<td>Maple, Silver <em>Acer saccharinum</em></td>
<td>Weak wood, weak limb attachment</td>
</tr>
<tr>
<td>Mulberry <em>Morus alba</em></td>
<td>Messy fruit</td>
</tr>
<tr>
<td>Pear, Bradford</td>
<td>Weak wood, weak limb attachment</td>
</tr>
<tr>
<td>Poplar, Lombardy &amp; any variety or hybrid</td>
<td>Weak wood, short lived</td>
</tr>
<tr>
<td>Russian Olive <em>Elaeagnus angustifolia</em></td>
<td>Disease problems, weak wood</td>
</tr>
<tr>
<td>Sycamore <em>Platanus sp.</em></td>
<td>Too large, messy, disease problems</td>
</tr>
<tr>
<td>Tree-of-Heaven <em>Ailanthus altissima</em></td>
<td>Weak wood, invasive</td>
</tr>
<tr>
<td>Willow <em>Salix sp.</em></td>
<td>Too large, messy</td>
</tr>
</tbody>
</table>

Any species listed on the current Pennsylvania Department of Conservation and Natural Resources Invasive Species List

2.3 Tree Diversity

To promote species diversity and minimize impact of disease on the shade tree population, use the following table to determine the number of different species to be planted:

<table>
<thead>
<tr>
<th>Number of Trees Proposed</th>
<th>Minimum Number of Families</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>1</td>
</tr>
<tr>
<td>11-20</td>
<td>2</td>
</tr>
<tr>
<td>21+</td>
<td>3</td>
</tr>
</tbody>
</table>

So as to minimize the potential impact of species-specific disease or pests, developers should avoid grouping trees of the same family together.

2.4 Selecting Quality Trees

The selection of the trees is one of the most important decisions when planting shade trees. The selection of the proper species for the location and context will increase the probability that the tree will grow to maturity without conflicting with the surrounding...
infrastructure and without suffering from stunted growth or early death from environmental hazards. Selection of strong, healthy trees of the proper species may initially incur greater expense, but is more likely to require fewer, if any, tree replacements in the future.
3 Planting Shade Trees

3.1 Best Planting Practices

Site Preparation

Always call the PA ONE Call for utility locates before you dig to install trees.

- Till, harrow, or break up compacted soils in an area 5 to 10 times the width of the new tree’s root ball or container.
- Dig a planting hole that is at least 2 times and as much as 5 times the width of the new tree’s root ball or container.
- Dig the planting hole no deeper than the height of the new tree’s root ball.
- Do not add soil amendments such as peat moss or fertilizer to the planting hole.

Tree Planting

- Move the tree using only the root ball or container; avoid using the tree trunk as a “handle” to move trees, which can break tree roots and damage the trunk.
- Plant the root ball at or slightly above ground level, never below.
- At planting the root ball wraps should be cut away from the top 1/3 of the root ball. All rope or twine securing the wraps should be cut away from the trunk to prevent girding. All non-biodegradable root wrapping (plastic, nylon or metal) and the twine are to be removed before planting.
- Backfill the planting hole with the original soil.
- Do not add fertilizer or other soil amendments to the planting hole.
- Water once when the planting hole is halfway full of soil, and again thoroughly when full to eliminate air pockets.
- Do not create a watering ring around the tree unless soil conditions are very dry; remove rings after one year.
- Do not stake the tree unless it is unable to stand upright on its own; always remove stakes and guy wires after 1 year. Staking of planted trees is generally not required, as the natural movement of the tree in wind will strengthen the root system. Only stake trees in areas where sidewalks or other obstructions will not allow the roots to spread and strongly anchor the tree.
New Tree Maintenance

- Mulch newly planted trees with leaves, pine straw, or other organic materials to 3-4” in depth and in a 5-foot radius around the tree, or as wide as possible; keep the mulch at least 5 inches from the tree trunk.
- Prune only dead, broken, crossed, or rubbing branches; prune annually thereafter.
- Water in the amount of 1” per week in the absence of adequate rainfall.
- Establish tree protection zones (TPZs) around new trees during construction activities.
Inspect newly planted trees regularly to evaluate their condition and maintenance needs.
Remove tree watering rings after one year.
Remove stakes and guy wires after one year.

3.2 Acceptable Planting Locations

The Subdivision and Land Development Ordinance Section 11.38(c)(1) stipulates the planting locations for new subdivisions. For replacing shade trees, the Landscape and Shade Tree Commission will review all Shade Tree permit applications to approve the planting locations. See the sections below for guidance.

Site Selection

Place trees where they have plenty of room to grow to maturity without their health or form being compromised by conflicts with infrastructure.
Provide trees with an adequate amount of soil volume for tree growth and stability.
Make sure there is now and will be at tree maturity adequate clearance from overhead utility lines, pedestrian and vehicular traffic, buildings, signs, and streetlights.

Between Sidewalk and Curb

This is the traditional location for shade trees. In existing subdivisions this is the preferred planting location.

Between Sidewalk and Property Line

This is the preferred location for shade trees in new subdivisions, as it allows the trees more room in which to grow, allows better sight distances for street traffic, presents fewer conflicts with underground and overhead utilities, and will require less pruning to keep branches from the cartway of the street. Ensure that there is at least five (5) feet of green space available between the sidewalk and the building restriction line. The trees are to be planted three (3) feet from the sidewalk. Additional street right-of-way or a shade tree easement will have to be dedicated so that the Township may exercise some control over the new shade trees, should this option is chosen.

In tight areas with many driveways, light poles and underground utilities

Ensure that shade trees are planted at least ten (10) feet from driveways and underground utilities and twenty (20) feet from light poles. Smaller shade tree species should be chosen in these locations.
In more open areas with few driveways, light poles and underground utilities

Ensure that shade trees are planted at least ten (10) feet from driveways and underground utilities and twenty (20) feet from light poles. Larger shade tree species should be chosen in these locations.

Under overhead wires

Every effort should be made to keep the trees as far from the wires as possible. Trees should not be planted directly under the wires unless no other alternative is possible. Smaller shade tree species should be chosen in these locations.

In areas without sidewalks

Ensure that shade trees are planted at least ten (10) feet from driveways and underground utilities and twenty (20) feet from light poles. The shade trees should be planted approximately two (2) feet inside of the street right-of-way.
4 Pruning and Maintenance

As mentioned earlier, while pruning is the responsibility of the Township, the property owner is encouraged to properly prune the adjoining shade trees to maintain the health and aesthetics of the trees. When pruning shade trees, please follow the guidelines below:

4.1 Pruning

(Portions courtesy of Best Management Practices for Community Trees)

Penn State produced an excellent pruning guide. A copy has been provided in the chapter appendix.

Pruning is the deliberate removal of tree branches and limbs to achieve a specific objective in the alteration of a tree’s size, spread, health, and form. Regular inspections to determine a tree’s pruning needs should be a part of every tree maintenance program. Always determine your objective before beginning pruning.

The American National Standards Institute (ANSI) and the International Society of Arboriculture publish tree pruning and safety standards, known as ANSI A300-1 995 Standards for Tree Care Operations.

The benefits of regular and correct tree pruning are:

- Better tree form, health, and structural integrity
- Removal of decaying and diseased wood
- Decrease in overall risk of limb failure

Some of the common mistakes made in tree pruning include:

- Improper techniques such as topping, stub cuts, flush cuts, and stripping the bark beneath the pruning cuts
- Using spikes to climb trees for pruning
- Waiting until limbs get large to prune them
- Pruning trees on a crisis only basis
- Pruning to reduce tree size as a substitute for proper tree selection and placement

Best Management Practices for Tree Pruning

- Hire only experienced professionals to prune trees; arborists certified by the International Society of Arboriculture are required to pass a written test of basic arboricultural knowledge and to attend continuing education courses to maintain their certification.
- NEVER “top” trees. This is an unacceptable practice and greatly decreases tree health, safety, and longevity.
NEVER use climbing spikes or spurs while pruning trees, except during an emergency rescue.

Trees should be inspected before climbing to determine the amount and extent of hazards, and the tree owner should be notified of potentially hazardous or harmful conditions.

Keep pruning equipment sharp, clean, and in good operating condition.

When pruning limbs that show evidence of disease, clean pruning equipment between trees.

Always prune trees back to the parent branch or a lateral that is at least \( \frac{1}{3} \)rd the diameter of the branch being pruned.

Prune just outside of the branch collar.

At time of planting, prune only to remove dead, broken, crossed, or rubbing branches.

Prune trees when young to develop branch structure, strength, and form.

Prune off one of two leaders on trees with co-dominant (forked) stems.

Prune trees regularly throughout their life to maintain vehicular, pedestrian, and sight clearance, and to remove deadwood and broken branches.

Make proper pruning cuts using the 3-cut method, avoiding stub cuts, flush cuts, and wounds to remaining limbs and trunk (see Figure 3).

Do not remove more than \( \frac{1}{4} \) of the foliage of a mature tree in any one growing season.

Do not remove more than \( \frac{1}{3} \) of the foliage of a young tree in any one growing season.

Do not remove more than \( \frac{1}{4} \) of the foliage from a branch unless you are removing the entire branch.

Always wear personal protective safety equipment while pruning, including safety glasses.

NEVER prune (or remove) trees located near energized electrical service or other utility lines; to have a tree growing beneath utility lines pruned or removed, contact your utility service provider.

Talk to your utility provider about their needs for clearance and their pruning techniques designed to maintain that clearance.

Employ natural target pruning and crown reduction pruning when pruning trees for line clearance instead of “topping”.

When removing a branch, make your cut back to the trunk or parent limb, just outside the branch collar, at an approximately 45 degree angle to the branch bark ridge. In Figure 3, Cut I is made first, then Cut 2 is made just outside of Cut 1. At this time the majority of the branch begins to fall, breaks at Cut 1, and is removed without stripping the bark below Cut 1. Cut 3 is then made just outside the branch collar or swelling at the base of the branch and the remainder of the branch or limb is removed.
4.2 Topping

Topping shade trees is not acceptable. Topping weakens a tree and will likely lead to the tree’s early death.

4.3 Mulching

(Courtesy of Best Management Practices for Community Trees)

Mulching is the application of organic material on top of the ground over a tree’s root system to improve soil moisture and fertility and to enhance root and tree growth. The objective in mulching is to recreate the conditions found in undisturbed, natural woodlands. Mulching the around the trunk of a tree is encouraged, as it retains moisture for the roots. However, when
applying mulch, do not pile the mulch against the tree’s trunk. Mulch against a tree’s bark can
trap moisture against the bark and cause it to rot. Mulch against the trunk can also encourage
insect infestation of the bark surrounding the trunk. Form a “donut” of mulch around the tree.
This will direct moisture toward the tree and keep the bark dry.

Mulching provides benefits to trees because it:

- Retains soil moisture
- Moderates soil temperatures
- Suppresses weed growth
- Improves soil fertility and structure over time
- Recreates the natural conditions under which trees grow in the forest, conditions which
  includes a thick layer of leaves and composted organic matter
- Eliminates the need for mowing and weed trimming around the base of trees

When mulching, these common mistakes are often made:

- Lack of regular mulch applications
- Mulch ring is much too small and covers very little of the root zone of the tree
- Mulch is piled up in a “volcano” fashion around the tree trunk
- Mulch is touching the tree trunk
- Black plastic, pine bark, or other impermeable materials are used for “mulch”
- String weed trimmers are used to cut weeds within mulch beds, often damaging tree trunks in
  the process

Best Management Practices for Tree Mulching

- Use organic materials such as pine straw, leaves, aged wood chips, and compost; avoid grass
  clippings, pine bark, plastic, and rocks.
- For newly planted trees, mulch an area at least six feet around the tree.
- For established trees, mulch out to the dripline or as far out as practical.
- Spread mulch in an even layer, 3-4” deep; avoid mounding the mulch around the tree trunk.
- Keep mulch at least 5 inches from the tree trunk to avoid creating favorable places for pests.
- Mulch twice per year, in the late spring and in fall during leaf fall.
- Use a tree’s own leaves for mulch.
- Avoid using string weed trimmers around the base of trees to remove weeds within mulch
  beds; hand pull weeds or use a contact herbicide to kill weeds.

As simple as mulching can be, if done improperly it can cause problems for the tree such as
insect, disease, and rodent damage, or a decrease in soil aeration or moisture. Use Figure 4 as
a guide for recommended mulching methods.
Soil Health Maintenance is the preservation of natural soil conditions that are conducive to plant growth. Preserving soil health is essential to preserving tree root health, which in turn promotes whole tree health. While it seems that some trees will grow anywhere, most trees are particular about the soil conditions under which they will thrive.
Soil consists of basic components—mineral matter, organic matter, soil organisms, and pore spaces that hold water and oxygen. Both the texture of the soil (relative components of sand, clay, and loam) and the structure of the soil (arrangement of soil particles) are important factors in determining how much water and oxygen a soil can hold.

Soil fertility is also important, and can be evaluated using standard tests that measure the amount of phosphorous, potassium, calcium, magnesium, zinc, and manganese in the soil. The availability of these elements is affected by soil pH and organic matter content. Soil tests can determine the soil pH (acidity/alkalinity) and the amount of organic matter present by weight. The Penn State Cooperative Extension Service provides free soil sampling advice and soil sample analyses for a nominal fee.

Maintaining soil health and adequate soil volume provides the following benefits:

- Improved tree survival, growth, and longevity
- Maintenance of structural integrity of the root system and reduction in the probability of whole tree failure
- Allows for root development without intrusion of roots into sewer lines, reduced soil erosion and improved water quality

To maintain healthy soil and tree roots avoid these common mistakes within (and as far as possible beyond) the tree’s critical root zone (CRZ):

- Compacting soil with foot, vehicle, and equipment traffic and materials storage
- Cutting roots by trenching for utility line installation or repair
- Grade changes, including cuts and fills
- Change in water drainage patterns and water levels
- Removal of topsoil without replacement
- Soil contamination from equipment washouts, vehicle and lawn maintenance chemicals
- Lack of adequate soil volume within and around hardscapes such as tree wells, plazas, and parking lots
- Fertilization without testing
- Heavy applications of fertilizer
- Heavy applications of weed and feed products to turf within the root zones of trees

Trees require adequate volumes of soil in which their roots can expand, allowing for tree growth. How much is enough? The amount of soil volume required by a tree varies with the species. An “adequate” volume of 920 cubic feet of healthy soil is recommended per square foot of tree trunk cross sectional area at dbh (per Kim D. Coder). Optimally, this volume is calculated for the potential, future diameter of the tree, and not its current size. The minimum soil depth recommended is 2.0 feet and the maximum soil depth is 3.0 feet.

It is very important to recognize that a tree’s requirement for growing space and soil rooting volume increases as tree age and size increases. At the time they are planted, trees should be provided with enough growing space for their future, mature size. If adequate soil
volumes are not available throughout a tree’s life, then much more intensive management is required and the tree will be reduced in size, condition, and useful life span.

**Best Management Practices for Soil Health Maintenance**

- Maintain favorable soil conditions for root and tree growth at all times.
- Maintain adequate soil volumes for root growth throughout the life of the tree.
- Sample soil to provide baseline information on nutrient availability, organic matter content, and pH.
- Fertilize trees only as necessary and based upon the results of soil tests.
- Maintain a pH of 5.0 to 6.0 for optimal tree growth for evergreen conifers, and 6.0 to 7.0 for most broadleaf trees; know the pH requirements of your trees.
- Maintain a soil organic matter content of 5%.
- Mulch trees to increase soil nutrient levels and organic matter content and improve soil structure.
- Consider applications of mycorrhizae forming fungi (beneficial, naturally occurring) to improve water and nutrient uptake of trees in soils with low fertility.
- Use trees with non-aggressive root systems near underground sanitary and storm sewer pipes; plant trees as far from pipes as possible.
- Use root barriers to encourage roots to grow deeper near sidewalks, driveways, and walkways.
- Preserve native soils; if topsoil must be removed for construction or site grading, store on site and outside of the CRZ of protected trees, and replace after grading is complete.
- Maintain soil bulk densities below 1.4 glcc in clay soils, and 1.8 glcc in sandy soils.
- Maintain macro-pore space between 12 to 21% of soil volume.
- Avoid soil compaction within the CRZ; compaction decreases the amount of available water and oxygen and can injure or kill tree roots.
- Avoid parking vehicles or heavy equipment, or storing construction materials, beneath trees.
- Use vertical mulching techniques to improve soil aeration.
- Consider the use of “structural soils” to improve root penetration while achieving soil compaction standards.

**4.5 Tree Irrigation**

( Courtesy of Best Management Practices for Community Trees)

Irrigation involves the regular application of water to the root systems of a tree in the CRZ to supplement rainfall. Water is essential to tree growth, the absorption of elements and nutrients, and the production of food energy. Irrigation may be done simply using a hose, sprinkler, or bucket, or may be accomplished with a large capacity water tank or installed irrigation system.

Irrigation provides benefits such as:

- Better tree growth with fewer periods of stress and less susceptibility to insect and disease infestation
Better tree survival, less replanting, more economical tree establishment costs
Requires visits to the tree which can also serve as a time for regular tree inspections

When watering trees, avoid these common mistakes:

- Newly planted or damaged trees are not watered regularly during hot and dry periods
- Too little water is applied during each irrigation period, or water runs off and does not penetrate the soil
- Small amounts of water are applied too often, encouraging shallow rooting
- Trees are watered too much and too frequently, keeping roots and soil “waterlogged”
- Tree trunks are “watered” and remain wet for prolonged periods of time
- Watering rings created at planting are not removed after one year

Best Management Practices for Tree Irrigation

- Plant trees at or slightly above ground level to avoid creating a place where excessive water accumulates.
- Match tree species to soil moisture conditions, utilizing upland and drought resistant trees where soil moisture is typically low, and lowland and flood tolerant species where soil moisture is typically high or where the site is frequently flooded.
- Mulch trees to conserve water.
- Water trees before they show signs of water stress.
- In the absence of adequate rainfall, apply 1 inch of water per week during the growing season throughout the root zone of newly planted trees, damaged trees, or trees under stress.
- Water during the hours of 10 p.m. to 8 a.m.
- Water less often with greater amounts of water rather than more often with smaller amounts of water.
- Apply water evenly throughout the outermost 75% of the CRZ.
- Apply water slowly to avoid runoff outside of the CRZ.
- Water during winter droughts, especially evergreen trees, but only if the soil surface temperature is greater than 40 degrees.

The amount of water required for a tree depends upon its age, trunk diameter, and the size of its root zone. To determine the amount of water to apply to your tree’s root zone, first calculate the radius of the CRZ. Then, calculate the number of seconds it takes you to fill a 5-gallon bucket of water with the hose or water delivery system you are using. Match that time to the closest number of seconds listed in Table 6 and to the radius of your CRZ to find the total application time required to water your tree. These numbers assume that you are watering the outermost 75% of the CRZ.
Table 6. Approximate Watering Time to Apply One Inch of Water Across Various Sized Critical Root Zones

<table>
<thead>
<tr>
<th>Radius of CR2 (ft)</th>
<th>Volume of Water (gals) to Equal 1”</th>
<th>Total Application Time (minutes and hours) at a Delivery Rate of 5 Gallons Per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 sec</td>
<td>15 sec</td>
</tr>
<tr>
<td>5</td>
<td>37</td>
<td>1 min</td>
</tr>
<tr>
<td>10</td>
<td>147</td>
<td>3 min</td>
</tr>
<tr>
<td>15</td>
<td>330</td>
<td>6 min</td>
</tr>
<tr>
<td>20</td>
<td>587</td>
<td>10 min</td>
</tr>
<tr>
<td>25</td>
<td>917</td>
<td>15 min</td>
</tr>
<tr>
<td>30</td>
<td>1,322</td>
<td>22 min</td>
</tr>
<tr>
<td>35</td>
<td>1,799</td>
<td>30 min</td>
</tr>
<tr>
<td>40</td>
<td>2,349</td>
<td>39 min</td>
</tr>
<tr>
<td>45</td>
<td>2,973</td>
<td>50 min</td>
</tr>
<tr>
<td>50</td>
<td>3,670</td>
<td>1 hr</td>
</tr>
</tbody>
</table>

4.6 Pest Management

(Courtesy of Best Management Practices for Community Trees)

Pest Management is the control of weeds, insects, fungi, bacteria, or other tree pests through a variety of techniques and at a level that meets your management objectives. The best approach to pest management is an integrated one that utilizes prevention, biological controls, and--when warranted and absolutely necessary--chemical controls.

The benefits of timely pest management include:

- Increase in knowledge of impact and life cycle of tree pests
- Reduction in the number of trees affected
- Increased tree health with timely pest identification and management

Some common mistakes made in managing tree pests include:

- Trees are planted that are highly susceptible to common pests
- Changes in tree condition and pest symptoms and signs are ignored
- Pest problems are allowed to reach catastrophic proportions before treatment is considered
- Pesticides are over-used or are selected as the first option
- Pesticides are applied at a stage when they are ineffective or do not reach the pest
- Tree trunks are painted white to defend against insects (this is not effective)

Best Management Practices for Pest Management

- Plant trees where their needs will match the site conditions to prevent stress and predisposition of trees to pest attacks.
- Mulch to relieve soil moisture stress and to suppress weeds; pull weeds by hand where necessary around the base of trees.
Protect tree roots, trunks, and limbs from wounds. Wounds are entry points for insects and diseases.

Learn the habits and life cycle of the pests affecting your trees, and know when to apply pesticides for the greatest effect.

Hire only experienced and knowledgeable professionals to apply pesticides.

Do not apply any soil active herbicides or weed-and-feed lawn formulations over the root systems of trees.

Contact the Penn State Cooperative Extension Service for instructions on collecting insect and disease organisms or signs for analysis and identification.
5 Protecting Shade Trees

(Courtesy of Best Management Practices for Community Trees)

5.1 Overview

Tree Protection is any activity designed to preserve tree health by avoiding damage to tree roots, trunk, or crown. All trees should be protected throughout their lives from damage to maximize their health, useful life, function, and benefits. Small, newly planted trees need as much protection as large, mature trees. Tree protection can be passive or active.

Passive tree protection involves simply avoiding any disturbance or harmful activity near the tree. Active tree protection is required during land development, building construction and maintenance, infrastructure installation and maintenance, and other landscape changes that will have a major impact upon trees. For successful tree protection to occur, a good understanding of the concepts of the critical root zone (CRZ) and tree protection zone (TPZ) is required (see Section 1). Basically, both the CRZ and the TPZ extend out from the tree trunk 1.5 feet for every 1-inch of trunk diameter. A 20-inch diameter tree has a TPZ of 30 feet (radius around the tree).

Benefits

- Reduced long-term tree maintenance and replacement costs
- Reduced site preparation and grading costs
- Larger trees and greater canopy cover providing instantaneous benefits
- Positive feedback from neighbors and good public relations
- More diverse native plants and animals; many native trees are unavailable in nurseries and are difficult to re-establish
- Healthier trees, forest ecosystem, and environment

Common Mistakes

- No one knowledgeable about trees is involved in the planning and protection processes
- Tree conservation and protection are not considered in development planning
- Tree protection and “preservation” measures are attempted only after damage has occurred
- Tree protection zones are not established around trees on construction sites
- Tree protection zones are not clearly marked
- Tree protection zones are not large enough
- Fencing around tree protection zones is not sturdy enough
- Tree trunk and crown are protected, but soil and roots are not
- Tree protection is not monitored or enforced

In addition to avoiding the above mistakes, avoid these harmful activities and types of damage within the CRZ and TPZ:

- Removing topsoil during grading without replacing it before planting trees
- Trenching for utility line installation or repair
- Trenching for irrigation system installation
Grade changes including both soil cuts and soil backfill
Root damage by grading or grubbing
Compacting soil with equipment, vehicles, material storage, and foot traffic
Soil contamination from equipment washouts (especially concrete) and vehicle maintenance
Installation and paving of parking lots, driveways, and walkways
Placing nails, screws, and spikes in trunks to attach mail boxes, signs, lighting, or other structures
Trunk wounds and broken limbs from vehicles and heavy equipment
Trunk wounds from string weed trimmers and lawn mowers
Fire injury or excessive heat

Some tree species and some individual trees of the same species are more tolerant than others to these activities and damage. A tree’s tolerance depends not only upon the species but also upon the conditions present prior to and at the time of the damage. Tree health, soil aeration and moisture, the time of year the damage occurs, how long the damage lasts, its severity, and the weather conditions prior to, during, and after the damage all contribute to the tree’s response.

Successful, active tree protection involves three phases. The first phase is planning for tree protection activities prior to the beginning of construction and meetings with all parties assigned responsibility for tree protection. The second phase is implementation and monitoring of the agreed upon tree protection measures. The third phase is follow-up tree maintenance after the activity is complete. Then, ongoing protection should be practiced for all trees on a daily basis.

5.2 Best Management Practices

Planning

Plan and budget for tree conservation and protection as part of the development process.
Plan for tree protection at least one growing season prior to the beginning of construction activities, where possible.
Employ the services of a professional arborist, urban forester, or other tree care professional to assist in tree protection planning, implementation, monitoring, and follow-up maintenance.
Plan for and protect trees located on adjacent property, protecting that portion of the roots, trunk, and crown growing into or over your property.
Evaluate soil health and past site damage and incorporate into tree protection measures.
Evaluate existing trees and select trees that will be conserved and protected based upon their location, species quality, health, and benefits.
Remove trees within 30 feet of the proposed building or structure.
Remove trees that cannot be protected, those having less than 15%-25% of their total height composed of tree crown, or those with more than one-third of the trunk wounded.
Do not remove the best trees and conserve the poorest quality trees during thinning.
Do not save trees that will not be protected.
Conserve and protect trees in groupings where possible to facilitate their protection and maintenance and to keep the forest structure intact.
Establish substantial penalties for tree damage and non-compliance with tree protection requirements.

Complete pre-construction tree maintenance, which should include mulching of the CRZ, fertilization, supplemental irrigation as necessary, and pruning to remove dead, structurally weak, and low hanging branches.

**Implementation and Monitoring**

Educate all workers on site about tree protection techniques and requirements.

Establish a TPZ equal to a tree’s CRZ.

Establish TPZs early, prior to construction, using barriers or sturdy fencing around individual trees or groups of trees.

Protect high value trees not only with barriers, but also with stem, branch, and root padding or wraps.

Clearly identify the perimeter of TPZs with high visibility signs.

Establish one access route into the site and one exit route out of the site.

Confine construction offices, vehicular parking, worker break sites, and material storage to places outside of TPZs.

Alter the route of underground and overhead utility lines that would require trenching or severe pruning of protected trees.

Do not trench or excavate the soil within CRZs. Tunnel or bore at least 18 inches beneath CRZs to install utility lines.

Where tree roots must be cut, make only sharp, clean cuts to promote root regeneration.

Remove badly damaged trees that can attract insect and disease pests.

Monitor compliance with tree protection requirements and tree health regularly during construction.

**Follow-up Maintenance**

Complete post-construction tree maintenance, including pruning, mulching, fertilization, irrigation, and soil aeration where necessary.

Apply at least 1 inch of water per week by deep watering in the absence of adequate rainfall.

Fertilize trees with phosphorus, potassium, calcium, magnesium, and other macro- and micro-nutrients as indicated by a soil test, but wait at least one year to apply any nitrogen.

Fertilize lightly with nitrogen after 1 year, and then make annual light nitrogen applications for the next 3 to 5 years.

Inspect trees annually for at least 3 and up to 5 years after construction to look for changes in condition and signs of insects or disease, and to determine maintenance needs.

Remove trees that are badly damaged or in irreversible decline.

Continue to protect not only the large, established trees on the site but also those newly planted in the landscape.

**Ongoing Protection**

Maintain an invisible passive TPZ (at the future, maximum CRZ) around all trees throughout their lives.
Avoid damage to tree trunks and bark from mowers and string weed trimmers.
Avoid trenching in the CRZ for utility line and irrigation system installation.
Avoid damage to tree limbs and trunks during home maintenance and repair projects.
Avoid soil contamination from oil, gasoline, paint, paint thinner, or other chemical washouts.
Avoid crown (leaf) contamination from airborne particles from sanding, plaster repair, etc.
Avoid digging within the CRZ to plant shrubs, flowers, and turf that will compete with the tree for water and nutrients.
Avoid attaching wires, cables, conduit, mailboxes, or other objects to trees.
Do not park or drive cars, trucks, or heavy equipment within the CRZ.
Avoid placing paved walkways and driveways within the CRZ of valuable, large, and mature trees.
Keep the CRZ mulched at all times.
Increase a tree’s CRZ and TPZ as the tree gets older and grows larger.
6 Shade Tree Conflicts

6.1 Sidewalk

One of the most common side effects of shade trees is roots displacing sidewalk. There are many solutions to this problem. Should the problem be minor in nature, the section of sidewalk can be lifted, smaller roots removed and the sidewalk reset into position. Concrete patch material may be used to bridge any gaps between separated sidewalk sections, or remove tripping hazards caused by elevated or depressed sidewalk sections. Should the problem involve larger roots, more radical measures may be required. The sidewalk may have to be removed and rebuilt completely to better accommodate the tree, or the tree may have to be removed to accommodate the sidewalk. Should the tree be removed, it will be likely that a replacement shade tree will have to be planted in its place. In any event, for sidewalk and/or curbing replacement, a Driveway/Sidewalk/Curbing Permit will be required. For a shade tree removal, a Shade Tree permit will also be required. During the review process, the Landscape and Shade Tree Commission will determine if a replacement tree is to be required. Property owners are welcome to meet with the Landscape and Shade Tree Commission to discuss the problems.

Lifted Sidewalks

When tree roots lift a sidewalk, the best solution is…

If you are installing a new sidewalk, you can go around a tree, or create a large tree pit covered with bricks that can be removed as the tree grows.

If you have room...to reduce the width of the sidewalk.

courtesy of Pottstown’s Shade Tree Program
If you don’t have room to go around tree roots, you can “shave” the roots with a hatchet by removing small roots and notching large ones about 3 inches below ground level to allow room for a new sidewalk over the roots.

6.2 Curbing

Larger shade trees can push curbing into the street, sometimes to the extent of destroying the curbing itself. The property owner is responsible for the maintenance of the curbing. The remedy to the situation is similar to that of sidewalk. If a single large root is the problem, notch, do not cut, the offending root. If the problem is more than a single root, the concrete curbing may be replaced by a steel curb as shown below. In extreme cases, the tree may have to be removed entirely. If any work is to be done on the curbing or street, please contact Public Works Department. A Driveway/Curbing/Sidewalk permit will also be required for the work in the right-of-way of a public street.
6.3 Surface Rooting

Surface rooting is a situation where the roots of a tree run close to or at the surface of the ground. The subsurface roots may cause the ground and/or turf above to be elevated. Exposed roots may cause tripping hazards or may be easily struck by lawn mower blades. Some tree species will send up shoots, or “suckers”, from exposed roots. Surface rooting is a tendency of certain tree species. Short of removing the tree itself, there is little that can be done to deter a species that will surface root. Care should be taken with damaged roots, as an open wound can allow pests to attack and damage the tree.

6.4 Underground Utilities

Ninety percent of a tree’s roots grow in the top 30 inches. Even so, the only way tree roots can enter a sewer pipe is if there is a break or leak, just as the only way rain can enter a surface building is through a leaky roof.

Tree roots will not penetrate a sound sewer line. If tree roots enter a sewer line, it is because the pipe is faulty. When a sewer pipe breaks or leaks because of age or improper installation, nutrients and water ooze into the surrounding soil. This will attract any nearby roots, which will thrive and may even enter the defective pipe and block the passage.

Modern sewer pipe is made of iron or plastic. Problems can be prevented by:

* Proper construction of new sewer lines, including tight joints and a firm soil base.
* Repair or replacement of defective sewers. Repeated blockage may indicate a damaged pipe.

Courtesy of Pottstown’s Shade Tree Program

6.5 Above-Ground Utilities

Branches cause many conflicts with above-ground utilities. In the case of a tree/utility conflict, contact the owner of the utility—usually the electric, phone or cable company. The Township does not own, nor have responsibility for, overhead utilities. Contact the Township only in cases where downed lines may present a hazard to residents. PPL will trim trees so as to minimize conflicts with overhead power lines. If you have questions regarding their pruning procedures, contact PPL.
7 Removing and Replacing Shade Trees

Tree Removal and Replacement are activities that will have to occur for every tree at some point. The overall goals of tree removal and replacement are to maintain public safety and community forest health while also preserving tree canopy cover.

There are many reasons why trees must be removed. They may be growing in the wrong location, without adequate growing space, and are in conflict with hardscape (driveways, walkways, etc.) or other infrastructure (buildings, roadways, overhead utility lines). They may be old trees that are at the end of their normal life span. They may be dead or in poor or hazardous condition and require removal to protect the safety of the owner or the public in general. Whatever the reason for removal, the site should be evaluated to determine if another tree can be planted in the same or a nearby location to maintain tree canopy cover in the area.

The benefits of timely tree removal and replacement include:

- Reduced risk of failure with the prudent removal of trees
- Reduced risk of pest infestations and damage to other trees
- Additional space for new, vigorously growing trees
- Dynamic, diverse community forest
- Maintenance of tree stocking levels

Common mistakes made in tree management that cause tree removals include:

- Trees are not provided with adequate space to grow to maturity
- Large maturing trees are planted beneath utility lines
- Trees are neglected and not routinely maintained
- Tree preservation activities are undertaken only when a tree is in poor condition
- Trees in poor condition without reasonable chances for improvement or repair are left to fall apart instead of being removed
- Trees are planted that have a characteristic unsuitable for their location

Best Management Practices for Tree Removal and Replacement

- Have an experienced arborist evaluate tree health and risk for failure before removing old, large, landmark, or historic trees, or trees damaged in a storm.
- Hire only experienced professionals to remove trees.
- Reduce the number and frequency of necessary tree removals through proper tree selection, placement, protection, and maintenance.
- Evaluate trees at risk for failure using standard methods which include the assessment of the probability of failure, size of part that may fail, and the targets that may be affected should the tree fail.
- Remove trees in irreversible health decline and poor condition.
Removes trees creating a hazardous situation that cannot be remedied with pruning, cabling and bracing, or removal of the target.
Remove trees with characteristics in conflict with the site (oak with large acorns planted in a parking lot).
Remove trees located where growing space is inadequate.
Remove trees with unattractive form, or messy, hazardous, or noxious flowers or fruit.
Replace trees wherever and whenever possible, planting large canopy trees if space permits.
Request the local power company to remove trees located near or beneath utility lines; do not attempt to remove these trees yourself.
To preserve landmark or historic trees with an increased risk of partial or whole tree failure as long as possible, consider removing the target by restricting public access or moving valuable structures.
Positively identify ownership before authorizing tree removal.

7.1 Removal

All trees eventually die. Removal of a shade tree is an eventuality that most property owners will have to face. Shade trees shall be removed when they die, become diseased or infested with parasites, or when they become a hazard to life or property. In most situations, it is the property owner that first becomes aware of problems with a shade tree’s health. As noted earlier, the Public Works Department will prune trees to keep the street and sidewalk clear of branches, but the property owner may prune shade trees to improve the aesthetics and the health of the tree. Should the tree’s health deteriorate to a point where it becomes a danger to the property and community, the property owner is responsible for the removal and replacement of the tree. Only in an emergency situation, such as a fallen tree blocking a street, will the Public Works Department remove a shade tree. In such an event, the property owner shall still be responsible to submitting a Shade Tree permit application to the Township to determine if a replacement shade tree is warranted.

When the property owner decides to remove a shade tree, the first step should be to determine who will do the work. There are a number of tree services in the area that can be contracted to do the work, or the property owner may remove the tree him or herself. Please be advised that the property owner should consider all aspects of the removal, including equipment requirements, expertise, disposal methods, liability, and the safety of neighboring people and property, before deciding to remove a tree on his or her own. Once the means of removal is determined, either the property owner or the contractor may submit a completed Shade Tree Permit application to the Township. The cost is free and the processing of the permit generally takes about two weeks. During the review process, the Public Works Department, the Zoning Officer and the Landscape and Shade Tree Commission review the permit application. The applicant may contact any or all of these reviewers to discuss any problems or concerns that he or she may have. Once the permit is approved, the work may be completed.
The property owner should also determine the extent to which the tree will be removed. Most property owners prefer to have no stump remain, but no requirement to remove the stump exists in South Whitehall Township. The tree may be cut flush with the surface of the soil for a neater appearance. If a replacement tree is to be planted nearby, the property owner may wish to consider grinding out the stump. This removes the largest piece of the stump and allows the smaller roots to decompose on their own. This will also reduce the chances that roots will sprout new shoots. Chemical methods of stump removal are also available commercially. Please consult an expert before applying. Attempting to burn a stump is not allowed in South Whitehall Township. Please contact a Fire Marshall if you have questions.

7.2 Replacement

Generally, when a shade tree is removed, it should be replaced. This keeps our neighborhoods green and well-shaded. Occasionally, there will be situations in which a shade tree should not be replaced. It is the Landscape and Shade Tree Commission that determines whether a tree should or should not be replaced. The property owner is free to discuss the situation with the Commission. In many cases, the Landscape and Shade Tree Commission can recommend alternatives to removal of a shade tree, or can recommend replacement with a more appropriate tree species. Within many of the neighborhoods in the Township, inappropriate shade tree species were planted, resulting in problems in later years. Norway Maples have caused surface rooting and Bradford Pears have tended to split under snow and ice load. These and other species have been removed from the Township approved species list in an effort to ensure that the best tree species are planted in the Township.

When planting new shade trees or replacing shade trees, follow the requirements of the Subdivision and Land Development Ordinance Section 11.38 listed on page 11. Please contract the Community Development Department of South Whitehall Township if you have questions.
APPENDICES
Chapter 2  Community Forestry Education Project Fact Sheet

Buying Quality Community Trees

What does that mean?

- Buying trees is like buying anything else: you need 1) to write detailed specifications before seeking bids, and 2) to check over the actual trees on delivery.

Why is it important?

- The first step in avoiding future hazard trees is to plant high quality stock.
- Poor stock will end up costing you much more money in the long run because of:
  - increased rates of maintenance
  - shorter life span.
- The best insurance:
  - deal with a reputable nursery
  - establish careful specifications
  - reserve the right to reject upon delivery
  - get a two-year warranty if possible

But can’t you save a lot of money by buying cheap trees?

- If you have a knowledgeable and critical eye, it is possible to save money.
- But trees are usually cheap for a reason:
  - they may be an undesirable species
  - they can have diseases
  - they often show poor structure
  - they may have dried out

What do you look for?

- **OVERALL**
  - health and vigor (at least 4-6" between the old bud scar and the end of the twig)
  - symmetrical general form, with a balance between height and spread
  - freshly dug trees grown for your particular use in a climate similar to yours

- **CROWN**
  - a single and undamaged central leader (except for certain ornamental trees)
  - well-spaced branches that are evenly distributed around the trunk
  - no branches with a narrow angle to the trunk (except for trees like Japanese zelkova)
  - no sign of insects or diseases (egg masses, leaf problems, grubs, etc.)

- **TRUNK**
  - a straight trunk, with no damage except minor scrapes and cuts
  - the caliper size you need (in an urban situation, at least 2" is often specified)
  - no recent pruning wounds
  - no signs of insects (e.g., borer holes) or disease (e.g., sunken areas)

- **ROOTS**
  - a well developed root system, but not a dense mass from being pot-bound
  - no girdling roots--make sure to look, or at least reach your hand down
  - if balled and burlapped, only natural burlap or wire baskets
  - a rootball sized to the height of the tree (see *American Standard for Nursery Stock*)

How can I be sure we plant high-quality trees?

- Deal with a reputable nursery
- Inspect all stock carefully
- Be sure all your specifications state: "All plants must conform to the current edition of the *American Standard for Nursery Stock ANSI Z60.1*"
TREE ROOT DAMAGE

Why does this topic matter?

- The survival of urban trees depends critically on the health of the roots.
- Roots and shoots are linked through a kind of circulatory system: what hurts the one, hurts the other.
- Roots supply water and nutrients to the shoots, and get back sugar and other compounds they need to live.
- Roots also store food, synthesize hormones, and provide support.
- Most tree roots lie in the top 6-18” of the soil, and usually extend far out from the trunk.

When does damage happen?

- When something cuts the roots, stops them from growing, or prevents them from breathing, it causes damage and threatens the life of the tree.

- Common urban activities that often damage roots include:
  - building construction
  - road widening
  - utilities repair
  - sidewalk replacement
  - lawn parking
  - patio or paving installation
  - grade change
  - stockpiling on the ground

- Damage to the root system can often be detected from discoloration, reduced size, or death of part or all of the tree’s crown.

How do these acts hurt the tree?

- **Loss of support.** When the big buttress roots are cut close to the tree, the tree has no support on that side and is prone to windfall.
- **Loss of water.** Cutting the roots that supply water makes the tree vulnerable to drought, and also to pests that attack water-stressed trees.
- **Loss of nutrients.** Roots must grow to take up many nutrients, and when the soil is compacted by traffic or other loads, roots are unable to penetrate it.
- **Loss of food.** Roots, like people, must be able to breathe to use the food they get from the leaves. When roots are smothered, they die from starvation.

How can the roots be protected?

- Fence off the ground underneath the tree’s crown *before* construction begins. If traffic must go through that area, first put down 12” of gravel or coarse mulch.
- Work with your utility company to tunnel under tree roots, when appropriate.
- When replacing sidewalks, lay them around (or up and over) the roots of older trees.
- Don’t raise the soil grade over roots more than a few inches without special precautions to make sure they can get the oxygen they need.
- Set paving blocks in sand, and don’t mortar them together.
- Mulch wide and 2-6” deep, especially younger trees trying to establish their roots.
Community Forestry Education Project Fact Sheet

Staking Trees

What is it?

• Staking is a technique used to protect, anchor, and support recently transplanted trees.

Do I need to stake trees?

• **NOT USUALLY.** Most young trees can stand unsupported, and will be stronger without stakes.
• **Staking actually delays the creation of a strong tree.**
• Trunk movement signals the lower trunk and roots to produce increased growth. A better trunk taper and root system results.
• Research shows that bare-root trees can stand unstaked as well as B&B or containerized ones.

When is staking recommended?

• There are certain situations where staking can be advisable:
  - very large tree size
  - fall-planted evergreens
  - high wind conditions
  - very weak trunk
  - high population pressure

What are the potential drawbacks of staking?

• Poor trunk development at the base of the tree.
• Increased trunk caliper near the support ties, which produces a negative trunk taper and restricts the vascular tissue conducting water, nutrients, and sugars.
• Wounding or girdling from ties too tight against the trunk, especially when they are left on too long. 
  ○ concentrated pressure from narrow ties (e.g. elastic webbing, wire, or even wire through a hose) will crush or cut through the bark.
• More wind throw and wind damage later, particularly when the tree is staked rigidly.
  ○ most susceptible are shallow-rooted evergreens and trees with a large "sail."

What are the current recommendations?

• **Don’t stake if you don’t have to.**
• **Remove stakes and ties within 1 year.** The problems start when they are left on.
• **Use flexible ties with a broad, smooth surface.**
• *If* vandalism is a consideration: instead of staking, try planting larger caliper trees, or encircling the tree with heavy posts, wire, or metal grill work.
• *If* protecting from mowers and foot traffic: sink three 4’ stakes halfway into the ground, 15” or so from the tree, and run a line between them to make a triangle.
• *If* follow-up maintenance within 1 year is unlikely: use 2” x 2” pine stakes, and UV degradable ties. The stakes and ties will fall off by themselves.

*If* staking because the trunk is too weak: place the ties 6” above the lowest point where, when you hold the trunk, the top will still return upright after being bent to the side.
Chapter 4

Pruning Landscape Trees

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Why Should Trees Be Pruned?

Proper pruning of landscape trees improves their structural strength, maintains their health, enhances their beauty, and increases their value. Pruning is advisable if:

- trees have crossing branches, weak crotches, or other defects
- branches are dead, dying, decayed, or hazardous
- lower branches interfere with people or vehicles, or block visibility of signs
- branches are growing into buildings or utility wires
- limbs have been broken by storms
- trees have grown too large and might injure people or damage property

Landscape trees not only make homes and communities more beautiful, but they also improve our environment and can increase the value of a property up to 20 percent. Trees are truly assets that need to be enhanced and protected. Proper pruning is definitely a worthwhile investment!

Who Is Qualified to Prune Trees?

Simple types of pruning, such as cutting lower branches from small trees, can be done by anyone who understands plants and has the proper tools. But only qualified arborists should train young trees or climb into larger trees to prune them. That type of tree work requires knowledge of scientifically based pruning techniques, tree physiology, and safety practices, as well as working experience with various tools and tree species. Because proper pruning is complicated and examples of shoddy and unsafe work abound, national standards have been developed for the best methods and safety. Any potentially hazardous activity associated with climbing trees, using power tools, and especially working near electric lines should be left to qualified professionals who follow the national tree safety standards.

This circular offers guidance for those who want to prune young trees. It also can help you find a qualified tree professional, understand proper pruning practices, and recognize signs of work that is damaging to trees.

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Thinning a tree removes unwanted branches, reduces weight, and allows light and air penetration.
Selecting a Tree Care Professional

A qualified and reputable person or company should be hired to perform tree work, not an individual with a chainsaw trying to make a fast buck. It is very difficult, if not impossible, to repair damage that has been done by poor pruning. In tree work, the old adage “you get what you pay for” is usually true. Tree care practices have changed in the last ten years based on the latest research, and will continue to change. It is important to hire a qualified arborist, preferably a Certified Arborist, who keeps up with proper, safe tree care techniques and will provide high-quality work at a fair price. The following guidelines can help you to select a qualified arborist and ensure proper tree care.

Always have at least two or three tree care firms examine and bid on your tree work. Usually, these firms will do so at no cost. For referrals, contact a local municipal arborist, the cooperative extension office in your county, the International Society of Arboriculture (ISA), or the National Arborists Association (NAA). Tree care professionals are members of professional organizations such as the ISA and the NAA. (See the concluding section For More Information.). Reputable tree service companies generally do not solicit door to door, as they rely mainly on repeat customers. If possible, include a Certified Arborist among those whom you contact to examine your trees. Arborists certified by the ISA have passed a test of their knowledge and must continue their education to maintain competency.

Ask for a written estimate detailing the work to be done from everyone who examines your trees. Terminology used on bids should match the tree pruning guidelines and standards explained later in this publication. If terms like topping or rounding-over are used, be wary of improper pruning and consider another firm. Do not blindly accept the lowest bid. Remember, in tree work a good job can be slightly more expensive. Try to schedule work in fall or winter, when rates may be lower. Ask to be shown proof of liability insurance and worker’s compensation insurance.

Ask the bidders where you can see trees they have pruned and examine their work firsthand. The following are indicators that proper pruning has been done:

- use of thinning cuts, rather than topping, heading, or stub cuts, so that the natural form and branching habit of the species is preserved
- cuts placed just outside the branch collar, not flush cuts
- absence of torn bark where branches have been cut, and no sign of bark punctured by climbing spurs
- no “lion-tailing,” or clumps of foliage at the ends of branches caused by removing all or most of the inner foliage
- cut surfaces untreated with wound dressing or tree paint, which can injure trees

Once you have decided on an arborist, demand a written contract that briefly but clearly states all of the following:

- type and amount of work to be completed and the techniques to be used, with reference to the ANSI A300 Tree Pruning Standards or International Society of Arboriculture Tree Pruning Guidelines
- total cost of work to be done, not just total cost per tree
- who will be responsible for clean-up work and to what extent
- who will receive any firewood or other products
- starting and completion dates

Do not pay in advance, but wait until all terms of your contract have been fulfilled.

Use the following information to ensure that your trees will be pruned in the proper manner and for the right reasons. Familiarity with pruning methods will help you hire a qualified arborist who will do the job right.

Types of Pruning Cuts

A thinning cut removes a branch at its point of origin on the trunk, or shortens a limb to a lateral branch large enough to resume the growth of the pruned limb (Fig. 1). Thinning cuts leave no stubs. They are used to remove damaged, dead, or weak branches, reduce the length and weight of heavy limbs, or reduce the height of a tree. Thinning cuts are placed so as to distribute ensuing growth throughout a tree and retain or enhance a tree’s natural shape. In almost all cases, thinning cuts are the proper type of cut to use in tree pruning.

Fig. 1. When using thinning cuts, always remove or shorten a branch to a side branch that is at least one-third the size of the one being cut. A branch that is 3 inches in diameter would be pruned back to a side branch that is at least 1 inch in diameter. Do not remove more than 25 percent of a mature tree’s foliage in any year.
Thinning cuts on larger branches can be referred to as drop crotch pruning.

— A heading cut trims a branch back to a bud, or trims a branch or leader back to a small branch not large enough to assume the growth of the pruned branch. Heading cuts are only appropriate for specific reasons that apply to some species. Heading cuts should only be used when pollarding trees or shaping terminal flowering plants such as roses; they should not be used for topping trees. Topping has been described as the “ultima destruction practices,” and in almost all cases it permanently damages a tree’s health, structure, and appearance.

— A stub cut is like a heading cut but is made indiscriminately to a point on a branch or leader where no bud or branch exists. A stub cut, like a heading cut, is used when a tree is topped. Topping is only appropriate when sections of limbs are cut off during the removal of a tree.

**Tree Topping**

Topping of trees using stub cuts and heading cuts should not be done for several reasons. Topping reduces the ability of a tree to produce food. Shock and long-term declining health resulting from topping can make a tree more susceptible to insect and disease problems and can lead to its death. By removing the branches that protect a tree’s crown, topping can lead to sun scalding of remaining branches. The stubs and sun scalds resulting from topping cuts are highly vulnerable to insect invasion and the spores and actions of decay fungi. Numerous water sprouts resulting from topping are weakly attached and grow so rapidly that a tree can regain its original height in a short time with a more dense and unwieldy crown. With their natural form and beauty disfigured, topped trees are ugly to most people. Topping can reduce the value of a large ornamental tree by thousands of dollars. Although tree topping may cost less and take less time and knowledge than using thinning cuts (the proper pruning technique), you would be paying for an inferior service.

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**Training Young Trees**

Before pruning a young tree, it is important to consider the natural form and desired future growth of the tree. Some trees like pines and sycamores have strong central trunks and require little pruning. Others, such as oaks and maples, branch out more. Pruning should accentuate the natural branching habit of a tree and should also correct structural problems. By correcting any defect in the structure of a young tree, pruning helps develop a mechanically stronger and healthier tree.

A few minutes of thoughtful pruning spent on a young tree can eliminate hours of costly future maintenance and corrective pruning on mature trees. Ideally, pruning should be done over several years, whether it is to provide clearance or to train a young tree. Prune as little as possible in the first two years after a tree has been planted, so there will be enough temporary branches and leaves to produce food for the growth of roots, trunk, and branches. Newly planted trees will gradually restore the balance between roots and branches; excessive pruning can be detrimental and delay the return to normal growth. When a tree is planted, prune only broken, malformed, or diseased branches. Remove any double leader so that one dominant trunk is maintained.

When you prune a branch, do not leave a stub or cut flush against the trunk. To remove a branch, make a slanting cut just outside the branch collar (the swollen area at the base of the branch next to the trunk depicted in Fig. 2). Removing branches before they exceed 1 inch in diameter will keep pruning wounds small.

**Clearance requirements are an important consideration.** Street trees or trees along walkways and driveways must have limbs high enough to safely accommodate pedestrians and vehicular traffic, signs, and lights. Branches that grow 6 feet off the ground will always remain at that height and may droop as they grow longer. Trees grow from the tips and the tops, not from the bottom. If clearance is not a problem, keep branches on the tree to help the tree grow. The need to prune for clearance can be minimized by purchasing trees that have been nursery grown to street tree specifications.

About two or three years after planting a tree, examine it closely and prune any broken, malformed, or diseased branches. Also, remove any suckers from the base of the tree. Step back and look at the tree from all sides to select the permanent branches.

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![Fig. 2. To promote closing of a pruning wound by wound wood, always use the three-step or natural target pruning method when removing a branch. This pruning method protects the branch collar (the shoulder rings and swollen base of a branch) and prevents the tearing of bark. Do not leave a stub when you prune a branch, and do not cut flush against a trunk. Thinning cuts should be made with sharp tools and should be kept as small as possible, clean and smooth.](image-url)
branches and branch structure that the tree will have for its lifetime. When deciding which branches to remove, consider the following (see Fig. 3):

- Thin or prune back any unusually long branch that competes with the leader for dominance.
- Remove any branch that crosses or rubs another, keeping the branch that conforms to the natural form of the tree. Thin out excessively crowded branches.
- Wide angles between the limb and trunk are stronger than narrower ones. Remove branches that have much narrower angles between branch and trunk than are typical for the species.
- Remove the lower branches to provide safe clearance and visibility, gradually over several years.
- Branches should be well spaced along and around the trunk of a tree.
- To correct defects or to thin out an overly dense crown, a young, vigorous tree can have as much as 35 percent of its foliage removed while the tree’s structure is being established.
- Avoid pruning trees from the time of bud break until leaves have grown to full size.
- Prune hawthorns, crabapples, pears, and other flowering trees immediately after flowering, thus allowing a tree to develop flower buds for next spring.

When the tree is four to six years old, take another close look at its structure. Again, prune the tree as already described. The ideal mature tree will have lateral branches that are 18 to 24 inches apart on the trunk and one strong leader. However, some trees differ, such as Japanese maple and other ornamentals, which are meant to have a more bushy appearance. It may take repeated pruning efforts over a number of years to attain an ideal structure. Remember to retain enough branches on the tree to keep it healthy and vigorous.

Some types of trees have better branching habits than others. Branching also can be affected by nursery pruning practices. Many problems can be avoided by purchasing a high-quality tree of the right species that is suited to its purpose and to the site where it is to be planted. Properly prune your young tree to lower future maintenance costs and to create a beautiful and safe mature tree.

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Fig. 3. This figure shows examples of branches that should be pruned from newly planted trees. To promote good structure and lessen the need for future pruning, trees should be properly pruned during the first one to five years. Balance between roots and branching will be restored naturally, which is preferable to compensatory pruning. To promote root establishment and growth, as many branches as possible should remain.
Pruning Mature Trees

Not all mature trees need to be pruned. Some only require pruning every 5 to 10 years. The need for pruning can be reduced by planting the right type of tree in the proper place and by properly pruning a tree when it is young. Pruning a mature tree excessively or incorrectly causes more damage than good. When a vigorous branch is cut from a tree, part of the tree's ability to produce food is removed and a wound is created where decay organisms may enter.

Mature trees should only be pruned for specific purposes and in a manner that protects and preserves the tree's natural form. Pruning should focus on maintaining tree structure, shape, health, and safety. Types of pruning recommended by the American National Standards Institute and the International Society of Arboriculture are described below:

**Crown cleaning**—removes dead, dying, diseased, crowded, weakly attached, or low-vigor branches and water sprouts.

**Crown thinning**—selectively removes branches to increase light penetration and air movement and reduce the weight of heavy limbs.

**Crown raising**—removes lower branches to provide clearance for buildings, vehicles, pedestrians, and signs.

**Crown reduction**—reduces the size and spread of crowns using thinning cuts, resulting in fewer sprouts than heading or stub cuts, and maintaining the structural integrity and natural form of the tree (Fig. 4).

**Crown restoration**—improves the structure and appearance of trees that have been storm-damaged or deformed by heading or stub cuts.

**Vista pruning**—thins selectively to open a specific view of an object or scenery.

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**Utility Pruning**

Trees that can grow or fall into utility wires require special pruning practices. Utility pruning is designed to prevent interruption of electric service, improve public safety, and protect utility workers. Only specially trained line clearance tree trimmers are permitted to prune trees close to electrified lines that carry more than 750 volts, according to regulations of the U.S. Department of Labor Occupational Safety and Health Administration and the American National Standards Institute. If you plan to prune or remove a tree requiring a person, tool, equipment, or any part of the tree to reach within 10 feet of an electrified line exceeding 750 watts, the work must be performed by a qualified line clearance tree trimmer, or the utility company must be notified several days in advance so that proper safety precautions can be arranged.

Wires leading from a pole-mounted transformer to a residential electrical meter generally carry less than 750 volts, but to be safe, check with your local utility company.

Utility companies determine the amount of clearance that is needed between trees and electric lines to maintain reliable and safe service, based on their experience and studies. Clearances between trees and wires depend on voltages that vary among primary and secondary conductors, and growth rates that differ among tree species. Professional tree service contractors are employed by utilities to prune periodically to specific clearances.

Utility pruning practices have changed greatly during the 1990s. Research has shown that tree wounds do not heal, but are compartmentalized both physically and chemically to prevent the spread of decay and closed by wound wood. Accordingly, utilities specify the placement of pruning cuts to utilize natural defense mechanisms of trees and promote faster closure of pruning wounds. Directional pruning, or drop crotch pruning, is used because it is better for tree health and structure than topping trees or leaving branch stubs (Fig. 4). In directional pruning, growth of branches is directed away from wires by pruning those that can grow too close, while allowing extension of branches that will not interfere with electric lines. Topping of trees with heading cuts is avoided wherever possible, as it damages tree health and encourages vigorous sprouting that increases the frequency of pruning cycles. Also, the tunnel or side-wall effect of clearing a row of trees to a uniform distance sometimes can be softened by pruning some branches back various distances, even to the trunk.
Some trees will appear to be disfigured by the pruning practices of utility companies (Fig. 5 and Fig. 6). In particular, trees that previously were topped or rounded-over will be difficult to reshape with directional pruning. Any tall-growing tree that is under or close to electric wires cannot retain a completely natural shape and should be considered for removal if severe pruning is required or has been done in the past.

Two alternatives can be used to reduce unattractive aspects of utility pruning and to lower line clearance costs. Both involve the replacement of large trees, either gradually or in groups, depending on the circumstances and preferences of people in the neighborhood. A formal street tree design with uniformly spaced trees of the same kind and size requires removal and planting all at the same time. An informal planting design can be implemented over several years, with less disruption in the appearance of the neighborhood.

Trees that are replanted should be smaller species that will not grow into wires at maturity. The right tree for planting under utility wires should be no taller than 20 to 30 feet at maturity. Adequate space for root growth also is an important consideration in relation to tree size and placement. Low-growing trees are most appropriate if the space for roots between a sidewalk and the street is less than 4 feet wide. Medium-size trees, up to 45 feet at maturity, can be planted near utility lines if they are offset at least 15 feet from the nearest wire. Consider other open spaces away from utility lines for the placement of larger trees, being careful to plant them far enough away from buildings. Street Tree Factsheets, a publication available from Penn State, can help you choose the right tree to plant near or beneath utility lines.

Many communities have developed constructive relationships with their utility company to optimize pruning practices and tree removals. Good communication between communities and utility companies will help reduce any problems, and a notification requirement can alert an official, tree commissioner, or municipal arborist of impending tree pruning or removal. A community representative then can talk with the utility forester to address any concerns, and thus improve pruning quality that meets community standards.

Fig. 5. Trees under these wires were topped improperly several years ago. Vigorous regrowth of slender branches from the stubs of thicker branches grew into the wires, requiring pruning for clearance.

Fig. 6. After directional pruning of the same trees, branches directed away from the wires were retained, instead of removing all of these branches according to previous practices. Much of the regrowth will now occur on those retained branches, without interfering with the wires. Although the shape of the trees appears unnatural in the winter, they will be more normal in appearance when covered with foliage and will be healthier throughout the year.
For More Information


Modern Arboriculture. Shigo and Trees, Associates, 4 Denbow Road, Durham, NH 03824-3105.

How to Prune Young Shade Trees. (Other publications on tree care and maintenance are also available.) The National Arbor Day Foundation, 100 Arbor Avenue, Nebraska City, NE 68410.


Street Tree Fact Sheets. Publications Distribution Center, 112 Agricultural Administration Building, The Pennsylvania State University, University Park, PA 16802-2602.

Tree-Pruning Guidelines. (Other publications on tree care and maintenance are also available.) International Society of Arboriculture, PO Box GG, Savoy, IL 61874. Phone: 217-355-9411.

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Don’t Top Trees!

Never cut main branches back to stubs. The sight of topped trees is all too common in the communities and along the roadways of America—trunks with stubby limbs standing naked in the landscape, trees stripped of all dignity and grace. Trees are often topped because they grow into utility wires, interfere with views or solar collectors, or simply grow so large that they worry the landowner. But, as one arborist has said, “Topping is the absolute worst thing you can do for the health of your tree.”

Why NOT to “Top:” 8 Good Reasons

1. Starvation: Topping removes so much of the tree’s leafy crown that it dangerously reduces the tree’s food-making ability.
2. Shock: By removing the protective cover of the tree’s canopy, bork tissue is exposed to the direct rays of the sun. The resultant scalding can cause the tree’s death.
3. Insects and Disease: The exposed ends of topped limbs are highly vulnerable to insect invasion or decay fungi spores.
4. Weak Limbs: New branches that grow from a stubbed limb are weakly attached and more liable to break from snow or ice weight.
5. Rapid New Growth: Instead of controlling the height and spread of the tree, topping has the opposite effect. New branches are more numerous and often grow higher than before.
6. Tree Death: Some tree species can’t tolerate major branch loss and still survive. At best, they remain weak and disease-prone.
7. Ugliness: A topped tree is a disfigured tree. Even with new growth it never regains the grace and character of its species.
8. Cost: The true cost of topping is often hidden — lower property values, expense of removal and replacement if the tree dies.

Proper Pruning — The Alternative to Topping

When a decision is made to reduce the size of an older tree, it can be topped, or it can be pruned properly. Although the speed and nature of regrowth will depend on species and local factors, any comparison between irresponsible topping and competent pruning will be dramatic.

• **Year 1:**
The topped tree is an ugly stub and a remnant of a once lovely tree. If pruned properly, the tree’s size is reduced but form and beauty are retained.

• **Year 3:**
Vigorous sprouts have sprung out of the topped tree in large numbers and are growing with abnormal rapidity. The pruned tree adds growth, but it does so more slowly and distributes it more normally.

• **Year 6:**
In a relatively short time, the topped tree is as tall — and far bushier and more dangerous — than it was to begin with. The properly pruned tree is safer, more beautiful, and its size is better controlled.
Community Forestry Education Project Fact Sheet

Mulching Trees

What is that?

- Mulching refers to the placement of any material on the ground around plants.
- Mulches can be divided into organic and inorganic materials.
- Organic mulches break down over time and become part of the soil, inorganic ones do not.

What good is it?

- There are so many benefits to mulching trees, it is hard to even count them.
- Almost all mulches make significant contributions:
  - protect trunk from mowers, weedwhackers, etc.
  - conserve soil moisture
  - impede weed growth
  - reduce soil erosion
  - restrict soil cracking
  - limit salt build-up
- Most organic mulches add further features:
  - protect the roots from traffic
  - cut down soil compaction
  - improve soil fertility & structure
  - moderate soil temperatures
- “Green mulch” such as pachysandra or vinca also brings many of these benefits, although it will compete with the tree to some extent for water and nutrients.
- When possible, do not grow grass beneath trees, especially young trees, because it is highly competitive against them and will restrict their growth.
- And, oh yes, all mulch looks good.

What problems can mulch cause?

- Except for needing to be renewed now and then, mulches give very few problems.
- Avoid fresh organic mulches, i.e., those that have not been leached or composted. They often 1) deplete soil nitrogen, especially if small in size and thickly applied, and 2) can be toxic, especially mulch made of conifer (cedar, for example) sawdust and bark.
- Many mulches, if put on too thick or against the trunk, actually tend to increase stress, disease and insect troubles, especially on poorly drained clay soils.
- Geotextile fabrics can lead to higher temperatures, and it is hard to get weeds out of them. If you use them, be sure to cut slits for air and water movement.
- Black plastic and peat moss should be avoided altogether as tree mulch.

What is the best mulch to use?

- There is no single best mulch, but organic mulches such as composted bark, branches, and leaves are much better for the tree and often cheaper as well.

How do you put it on?

- To the tree’s dripline, if possible. Remember, the dripline moves out as trees grow.
- No higher than the heel of your hand. Anything from 2-6” will benefit the tree.
- Not against the trunk. The mulch should look like a donut when you are through.
Chapter 6
Community Forestry Education Project Fact Sheet

TREES AND SIDEWALKS

What’s the problem?

- **Trees often ruin sidewalks, and sidewalk repair often kills trees.**
- This conflict comes from the fact that sidewalks and trees have competing needs.
  - Trees need a soil that is moist and loose, and that they can push aside as they grow.
  - Sidewalks need to be smooth (but not flat) on a soil that will not shift with a load.
- Trees and sidewalks are costly and valuable, so both needs must be taken seriously.

How do they damage each other?

- **Most of the damage to sidewalks** is caused as roots become thicker through secondary growth.
  - Sidewalk damage is often caused by the soil in its expansion and contraction.
  - The buttress roots supporting the tree cause the worst damage.
  - Roots often follow cracks, because there they find the water and air they need.
- **Most of the damage to trees** comes when the main roots are cut close to the trunk.
  - When larger roots are cut, trees lose mechanical support from that side, and become more likely to cause harm from windthrow.
  - Main root cutting also heavily reduces the flow of water and nutrients to the crown, causing especially older trees to die in 3-5 years.

How can I avoid cutting the roots?

- **If a tree is in poor condition, it is best to remove the tree and replace the sidewalk.**
- For trees in good condition, a sidewalk can be curved around the trunk (at least 2-3').
- In some cases, a raised edge can simply be ground down, or smoothed over with asphalt.
- The new sidewalk may be ramped up and over the roots by starting further away.
- You can also do minimal excavation, and then pour asphalt directly over the roots.
- Gravel, mulch, pavers set in sand, or asphalt can be used instead of concrete.

If I decide I have to cut the roots, how can I least harm the tree?

- **The farther you cut from the trunk, the less threat to the tree’s health, and the less danger of creating a hazard.**
- **Try not to cut roots over 2” in diameter.**
- Roots recover better from being severed when you
  - cut them cleanly with a saw instead of breaking them with a backhoe
  - protect them from drying out while work is going on
  - mulch and water well afterwards
  - provide slow-release fertilizer in early fall or spring

How can future damage to sidewalks be avoided?

- **Provide enough space for the species you want to plant.**
- Try to keep large-growing trees in tree lawns 10’ wide or greater, medium trees in lawns 6-10’ wide, and small trees in 4-6’ lawns. Plant no trees in lawns under 4' wide.
- Give species with many large surface roots (like Norway maple) lots of room.
- Don’t rely on root barriers--the roots do grow down, but then come right back up!

Consider experimenting with a **structural soil mix** that will better tolerate root growth.
Chapter 7
Community Forestry Education Project

HOW TO KILL A TREE STUMP

What is this about?

• You often can’t kill a tree just by cutting it down.
• Sprouting from the stump or the roots is a fundamental strategy by trees (and even more by shrubs) for survival and reproduction.
• In a natural setting, sprouting is an effective guard against the repeated loss of stems—e.g., through deer browsing of seedlings, or destruction by fire of mature trunks.

Why is it important?

• **In urban settings, stump sprouts are a significant maintenance problem. It can be costly to remove young sprouts, and hazardous to let them grow.**
• Young stump sprouts must be removed annually by mechanical or chemical means. If the stump is cut at ground level, sprouts can be controlled by mowing.
• If allowed to grow, such sprouts routinely produce multiple large trunks leaning away from each other that can pose a hazard.

Which common urban species cause the most trouble?

• Cottonwood and other poplars, boxelder and the "soft" maples, lindens, tree-of-heaven, willow, beech, red oak, crabapples and other trees in the rose family, and green ash.
• Some species (like black locust) pose particular problems because of their ability to sprout from roots, even well away from a tree whose stump has been ground out.

What mechanical means are effective in urban settings?

• **Stump removal.** Grinding out the stump and large roots sharply reduces basal sprouting. A few species will still continue to sprout from smaller roots.
• **Accelerated decay.** Cut at soil level, add slow-release fertilizer, and mound with soil.

What about chemical means?

• **Growth regulators.** Some forms of 2,4-D have proven effective when applied during the later part of the growing season by "frilling" (squirting into fresh trunk cuts), "cut-stumping" (painting or spraying on fresh stumps), or injection. Multiple applications may be required. Follow label directions.
• **Phloem-transported compounds.** Concentrated glyphosate-based herbicides are very effective during the later part of the growing season when applied by frilling, cut-stumping, or injection. Follow label directions. Phloem-transported compounds sometimes pass to other nearby trees—especially when same species—through root grafts ("backflash"), so be careful.

PLEASE NOTE: Consult the appropriate state office for registered pesticides that are labeled in your region for use on woody plants. All pesticides are subject to varying restrictions. Furthermore, changes in pesticide regulation occur constantly and human errors are still possible.
Recommended Resources

American Standard for Nursery Stock


ANSI A300 (Part 2) — 1998 American National Standard for Tree Care Operations—Standard Practices (Fertilization)

ANSI Z133.1-1994 American National Standard for Tree Care Operations—Safety Requirements


“Drought Damage to Trees”, Kim D. Coder; University of Georgia School of Forest Resources Athens, GA, 1999

“Flood Damage to Trees”, Kim D. Coder; University of Georgia School of Forest Resources Athens, GA, 1994


“Pruning Effects on Tree Growth: Growth Regulation Consequences” by Dr. Kim D. Coder, University of Georgia School of Forest Resources, Athens, GA 1998

"Pruning Trees Near Electric Utility Lines: A Field Pocket Guide For Qualified Line-Clearance Tree Workers" by Dr. Alex L. Shigo, National Arbor Day Foundation


"Trenching and Tunneling Near Trees: A Field Pocket Guide for Qualified Workers" by Dr. James R. Fazio, National Arbor Day Foundation


www.arborday.org
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“Pottstown’s Shade Tree Program”
Pottstown Shade Tree Commission, Borough of Pottstown, PA