



CAMPUS TREE CARE PLAN

Principia College is located on limestone bluffs overlooking the Mississippi River and the Historic Village of Elsah, Illinois. The campus is nestled in more than 2,500 acres of mostly forested land. The college's Land Stewardship Office is responsible for a comprehensive Forest Management Plan that includes provisions for identifying and protecting ecosystem services; rare, threatened, and endangered species; economic and social impacts; and environmental impacts. Forested acreage on college property has increased more than 20% in recent decades. In addition, the college hosts an organic vegetable farm, a 14-acre native food forest, several Conservation Reserve Program (CRP) parcels, and a sustainable forestry program.



For its strong commitment to sustainability forestry practices, Principia has earned Forest Stewardship Council™ (FSC) Forest Management certification from Scientific Certification Systems, one of the world's leading FSC certifiers and one of FSC's founding members. FSC provides third-party certification confirming that materials sold as FSC certified are harvested from well-managed forest operations. Principia's FSC certified products include logs, firewood, and maple syrup.

Our land stewardship ethic extends beyond our forested lands. In Illinois, less than 0.01% of historic prairies remain intact today, mainly due to agricultural conversion. However, in some areas – such as steep, south-facing bluffs unsuitable for tilled agriculture and too hot and dry for native forests to thrive – prairie grasses still grow. Principia College is fortunate in that its four miles of bluff-front property include many of these rare prairie remnants. Restoring and preserving these remnants is a high priority, and to that end they are tended, seeded, and burned on a regular basis.

The entirety of our campus environment, including our forested lands, campus trees, and native prairies, is as important to us as is our built environment, which, in 1993, was designated a National Historic Landmark in recognition of our unique architecture – the legacy of Bernard Maybeck, recognized by the American Institute of Architects as one of the ten greatest architects in America.

Purpose Statement

In the context of Principia College's enduring commitment to its uniquely integrated natural and built environs, the purpose of this Campus Tree Care Plan (CTCP) is to provide stakeholders with a mechanism and framework to manage trees on the main campus which are not specifically included in the Principia Forest Management Plan. With the overall goal of ensuring a safe, attractive, healthy and sustainable campus tree population, this CTCP identifies policies and procedures related to tree care, including planting, landscaping, watering, maintenance and removal, pruning, mulching, fertilizing, protection, damage assessment, species selection, and so on. These guidelines provide designers, construction managers, landscaping personnel and other members of the college community with the tools needed to minimize any potentially negative impacts that their programs may have on the College's tree population.



TREE CAMPUS USA STANDARD 1: Campus Tree Advisory Group

While responsibility for the campus trees ultimately lies with the Facilities Department, the Campus Tree Advisory Group (CTAG) is established to assist in providing guidance for the development, implementation, and ongoing evaluation of this CTCP, education of the campus population as to the benefits of the campus trees, and a venue for connectivity to the community.

The CTAG, in cooperation with the Facilities Department, Lands Stewardship Program, and Center for Sustainability, is responsible for this CTCP and has defined the Campus Tree Protection Policy contained in this document (see page 3). The CTAG is also tasked with organizing Arbor Day activities and Service Projects related to campus trees.

To preserve needed flexibility and efficiency, individual tree decisions, such as whether to plant or remove – and especially in emergency situations – will remain the discretion of the Facilities Department, which has a long history of making professional and sustainable decisions regarding our campus tree population. The role of the CTAG is to identify policies related to tree planting and removal in principle and not specifically. Any new policies (beyond those articulated in this CTCP), or modification of existing policies, are subject to discussion within the CTAG and can be vetoed by the Director of Facilities, the Director of the Center for Sustainability, or a college Dean.

The CTAG consists of students, faculty, facility representatives, and community partners with membership as follows:

- Facility Management: Director, Facilities Department
- Facility Management: Landscape Supervisor, Facilities Department
- Faculty: Director, Center for Sustainability
- Faculty: Forestry/Land Stewardship Manager
- Student Representative(s): Sustainability Club
- Community: President (or representative), Great Rivers Land Trust

CTAG members serve on a volunteer basis for an academic year with no limitation on term renewals. To serve on the group, a qualified individual should submit a letter to the Director of Facilities requesting to join.

The Director of the Center for Sustainability is responsible for convening the CTAG on an as-needed basis and new group members will be approved with a simple majority vote of members present. Whenever possible, the CTAG will conduct its business over email, including reviews/updates and planning for Arbor Day event(s). Meetings can be called by any CTAG member on any issue.

Date of Group Establishment: July 10, 2013
Meeting Dates of the Past Year: July 15, 2013

TREE CAMPUS USA STANDARD 2: Campus Tree Care Plan

Recognizing that our college community values campus trees both for their beauty and for their essential ecological services (e.g., erosion control, temperature moderation), the CTAG views as important the safeguarding of trees from unnecessary damage. As a rule, every effort is made to preserve and nurture campus trees; however, during the course of necessary construction or maintenance, some trees may be compromised or lost. Such loss would be expected only when no viable alternatives are present. To emphasize the importance of these issues, the Group agrees to the following points of guidance, which are articulated below in our Campus Tree Protection Policy and further articulated in our Campus Tree General Care Guidelines.

Campus Tree Protection Policy

- All required tree protection measures (e.g., construction fencing or an approved equivalent) will be installed prior to the commencement of any construction and shall remain until all construction has ceased or the surrounding area has been stabilized, as is required for compliance with the Illinois Natural Resources Conservation Service (INRCS) Urban Manual practice [standard Code 984](#) “Tree and Forest Ecosystem Preservation” (see Appendix 2)¹
- Contractors shall be provided with specific information about which trees require protection and which are expendable
- Every effort to safeguard a mature tree should be made (e.g., can the tree be pruned in such a way as to accommodate the construction and allow the tree to stand?)
- Within the context of any construction project, trees to be removed (or act as bumpers) and trees to be protected should be identified beforehand
- Contractors are expected to make every effort to protect the Critical Root Zone (CRZ) (see “Definition of Terms”) by not driving trucks or heavy equipment within the drip line of the canopy; if driving is required in other than dry conditions, placement of a weight-displacement mat is recommended
- Should underground construction involve the area in or around a tree’s CRZ, or should situations arise where it is not feasible to avoid impacting the CRZ, contractors will adhere to the INRCS Urban Manual practice [standard Code 991](#) “Tree Protection–Auguring” (see Appendix 3)

¹ The Campus Tree Care Plan (CTCP) recognizes that Principia College is not only a heavily forested property, but the core 100 acres (less than 5% of the property) upon which the built infrastructure largely resides is riddled with steep ravines and towering limestone river bluffs. Moreover, mature trees are very often rooted in close proximity to electrical conduits, water mains, manhole access points, phone pedestals, and historic building foundations – the legacy of nearly a century of tree growth and recruitment, sometimes in remote areas of campus where greater vigilance may have removed the seedlings prior to their becoming established, but in general this was not done. Today an experienced landscape and engineering staff maintains the essential functions of the college in the context of a challenging environment where augering and trenching must be conducted in ways that reflect site realities – and where requirements that, for example, “there be no trenching within the CRZ”, might mean that we either forgo maintaining the delivery systems for water and power, or we routinely slate mature trees for removal. Neither of these is acceptable. Therefore, while our CTCP respects the intentions of standard practice Codes 984 and 991 and prioritizes augering over trenching, when trenching is unavoidable it will be undertaken in the context of every practicable precaution.

- The locations of construction areas, traffic patterns and roadways, storage areas, truck clean-out areas, and parking pads will be clearly articulated during pre-project discussions with contractors
- Contractors are expected to make every effort to avoid driving or parking off-road when conditions are wet; if driving off-road is unavoidable, give trees a wide berth (e.g., never park immediately beneath a mature tree)
- Contractors are expected to avoid using trees as parking breaks for heavy equipment
- Contractors are expected to avoid bumping into trees that are meant to be kept standing during a construction project
- When site soil resources have been greatly impacted, a soil restoration strategy will be implemented which may include scarifying compacted areas, adding top soil in areas of extreme erosion, and/or adding native vegetative ground cover
- No campus tree will be topped without the explicit permission of the Facilities Department
- Active construction sites will be inspected every seven (7) days for compliance with this Campus Tree Protection Policy and repairs made as needed



Campus Tree General Care Guidelines

Planting: Trees will be planted with the expectation that they may live more than 100 years, growing larger each year. Site selection should be based on the growth requirements of the species (i.e., shade tolerance, moisture conditions, soil type, proximity of infrastructure, proximity of other trees and plants). Planting stock should be high quality and not subject to self-girdling, which is often found in large planted trees with tight root balls. Any tree planting should be accomplished according to the International Society of Arboriculture (ISA) New Tree Planting Guidelines or the Illinois Department of Natural Resources (IDNR) Urban and Community Forestry Tree Planting standards and should follow the 10-20-30 rule; i.e., no more than 10% of one species, 20% of one genus, and 30% of one family. See Appendix 1 for a list of recommended (and not recommended) species for this area.

Landscaping: Landscaping designs should seek to accent and highlight the natural features of the land. Noxious weeds should be eliminated when identified. Staking, fertilizing, watering, and using weed barrier will be applied when necessary to promote strong, vigorous, and healthy trees.

Watering: Newly planted trees should receive weekly watering for the first 2-3 years to assist the tree in becoming established. Thereafter, no irrigation is used aside from indirect watering received during in-ground or sprinkler irrigation of lawns. Trees in elevated boxes or other confined spaces on campus should be included in weekly irrigation with a water truck or hose during summer or otherwise when local drought conditions exist.

Maintenance and Removal: Trees with signs of damage will be assessed, if necessary by a certified arborist, to determine the appropriate next steps. If the tree shows promising signs of recovery, then an attempt will be made to save the tree. However, if the tree has displayed a trend of decline and could cause damage to infrastructure or to people, then removal may occur. When assessing a tree for risk, a checklist to consider can be found in the [Recognizing Tree Risk](#) pamphlet published by the ISA (see Appendix 4), which can be found through the IDNR website. Additional, useful information regarding tree risk (i.e., assessing the structural integrity of the tree) can also be found in the Recognizing Tree Risk pamphlet.

Recognizing that the CTAG plays more of a policy/advisory role and not an operational role, the Group would not expect to be consulted on routine decisions regarding individual trees. For example, damaged trees or trees in the way of approved construction projects may be removed, in accordance with best practices, in order to protect infrastructure or facilitate construction (please see below for procedures related to tree protection during construction projects).

Pruning: Pruning trees must follow published guidelines by the ISA and ANSI A300. Pruning standards are to be implemented for worker and citizen safety, health of the tree, and finally for aesthetics. Proper pruning to remove dead, dying, and defective branches will help reduce hazards while promoting healthy trees. Newly planted trees should not be pruned within the first two to three years of planting. When a newly planted tree is ready to be pruned, it should be pruned with the intention of establishing a strong scaffold structure.

General Pruning Tips:

- When removing branches, use the three cut method and avoid damage to the branch collar
- Remove branches that rub or cross another branch
- Favor branches with strong, U-shaped angles less than 90 degrees from the trunk
- Do not remove more than 25% of the tree canopy at a time.
- Do not prune healthy trees following pruning of diseased trees unless the tools have been disinfected (Lysol disinfectant works well and is recommended)
- Guidelines available [here](#)

Mulching and Prevention of Mower Damage: Tree mulching with wood chips and/or other appropriate materials should be done every two years in the spring, aiming for a thickness of 4-6 inches. Aim for mulching to the drip line of each tree, avoid “volcano mulching”, and pull mulch back from the trunk a few inches to prevent excess moisture around the trunk. Mowing around trees that are not mulched will not be done within 12 inches of the trunk.

Fertilization: Soils should first be tested to determine the need for fertilization. Additional soils data would lead to improved matching of trees to different sites on campus, and provide clues concerning how to improve tree growth and health (e.g., with soil amendment and/or fertilization).

Pests and Diseases: Trees should be monitored for known and potential insect and disease problems and treated appropriately.

Managing for Destructive Events: In the case of severe storms where many trees are damaged, affected limbs will be chipped or used for firewood and the stems will be used for milling or firewood. Often, milled wood is used for custom made benches found in the quiet spots on campus. If the tree is currently an undesirable species, then the opportunity should be used to safely remove the tree and plant a tree from the recommended tree list.

Campus Tree Plan Goals and Targets

Tree Canopy Cover: The Principia College core campus enjoys a 50% tree canopy cover (calculated using Image Classification in ArcGIS, see insert) surrounding its built environment. Our goal is to retain this as a minimum percentage. The goal will be evaluated biennially, using Image Classification in ArcGIS, by students enrolled in the college's Environmental Mapping & GIS (GEOL 301) course. See also "2013 Service Learning Project".

Campus Forest Ecology: The proportion of native to non-native tree species is not known, nor can we accurately characterize the ecological services (e.g., provision of essential habitat for endangered species) provided by our trees. Our goal is to ground truth our ArcGIS data to complete a tree species inventory, research and identify ecological services provided by our trees (and potential threats posed by invasive/exotic trees), and make species-level recommendations to inform and guide tree planting and replacement efforts.

Best Practices: The CTAG will review on an ongoing basis the Association of Illinois Soil and Water Conservation District's ([AISWCD](#)) best practices – specifically the INRCS Urban Manual practice standard Code 984 "Tree and Forest Ecosystem Preservation" (Appendix 2) and INRCS Urban Manual practice standard Code 991 "Tree Protection-Auguring" (Appendix 3) – to evaluate the best approaches for our campus setting.

Campus Tree Damage Assessment

Enforcement: The preservation and protection of trees under the terms of the Campus Tree Protection Policy shall be the responsibility of the Facilities Department.

Penalties: The penalty associated with the removal or destruction of a tree that was meant to be preserved and protected is a verbal warning and a review and explanation of our Campus Tree Protection Policy. Repeated offences or egregious violations could result in a fine equal to the cost of replacement.

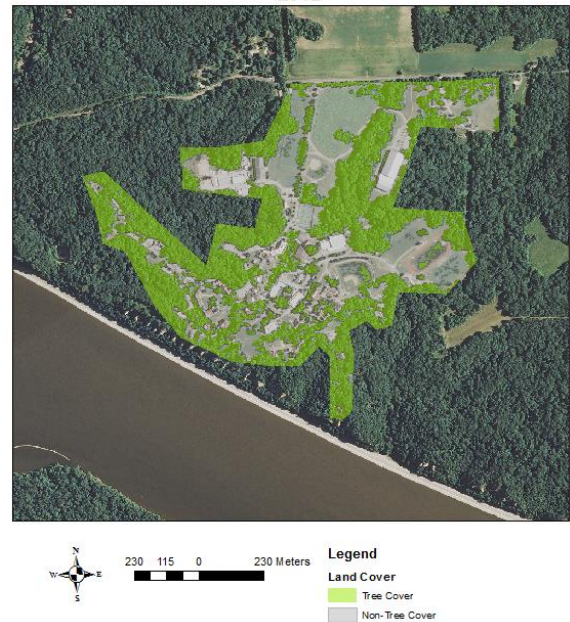
Appeals: Violators of the Campus Tree Protection Policy may appeal their penalty by discussing the conditions that required them to cause this damage without first receiving approval from the Facilities Department. As needed, the advice of the CTAG will be solicited.

Prohibited Practices

Tree Planting: No tree shall be planted on the developed campus without the consultation and approval of the Facilities Department. No tree shall be planted in the undeveloped regions of the campus without the consultation and approval of the Land Stewardship Program.

Tree Removal: No tree shall be removed from the developed campus without the consultation and approval of the Facilities Department. No tree shall be removed from the undeveloped regions of the campus without the consultation and approval of the Land Stewardship Program.

Campus Tree Cover at Principia College
2012



Memorial Trees: No tree shall be designated as a Memorial Tree without the approval of the Dean of Administration or the President of the College.

Definition of Terms

Damage: Tree injury related to the roots, bark, trunk, and/or crown that exposes the inner workings of the tree. Such damage can leave the tree vulnerable to pests, disease, or debilitation and also compromise the aesthetic qualities of the tree.

Drip Line: The zone around a tree that contains vital roots. The drip line is the area directly below the crown of the tree.

Girdle: Girdling is the practice of removing a strip of bark around the circumference of a tree, which causes it to die. Girdling damages the bark of a tree and disrupts the transport of the nutrients.

Critical Root Zone: As defined by the Illinois Department of Natural Resources, the Critical Root Zone (CRZ) is one foot outside the perimeter of the leaf canopy of the tree. The CRZ is considered to be the most sensitive area of the tree's roots. Special care should be taken to avoid exposing the CRZ to heavy surface machinery.

Communication Strategy

Community: The community will be informed of campus tree issues by advertising of events on Prinweb (an internal website) and campus flyers posted in common spaces. The Pilot (student newspaper) will be encouraged to cover significant stories (e.g., Arbor Day events) and assist in spreading awareness of the Campus Tree Care Plan. Webpages for the college's Center for Sustainability and Facilities Department will feature the Tree Campus USA certification and post relevant supporting documents.

Contractors: Prior to construction, Project Manager(s) shall meet on site with contractors to review project-specific tree concerns and reach a clear understanding with the contractor as to how best to meet the spirit of the Campus Tree Protection Policy.

Students: As a largely wooded rural campus, students are represented on the CTAG, participate in the Land Stewardship Student Work Crew, enroll in a variety of classes that utilize our forested lands for academic research, enquiry, and contemplation, join the Sustainability Club (e.g., where they become involved in tree planting and landscape design), enjoy the fruits of campus trees (e.g., shade, apples), and generally come to value the campus tree landscape. As such, students are a vital part of communicating to their peer the importance of trees, including the Campus Tree Care Plan.

TREE CAMPUS USA STANDARD 3: Dedicated Annual Expenditures (FY2012-13)

Tree Planting and Initial Care: \$5,250 and 84 hours of labor – includes tree purchases, labor and equipment for planting, planting materials, staking, watering, mulching, competition control, and so on.

Campus Tree Management: \$10,660 and 81 hours of labor – includes costs such as pruning, public education, professional training, association memberships, campus tree inventory, pest management, fertilization, tree removals with associated costs, and so on.

Volunteer Time: \$660 and 30 hours of labor – value of volunteer labor (hours x \$22) and other contributions from student and civic organizations were estimated using online tools available at www.independentsector.org

In total, the FY 2012-13 campus tree care program achieved the following:

- 70 trees planted
- 62 trees removed (dead, storm damaged, or removed for construction)
- 40 trees pruned

TREE CAMPUS USA STANDARD 4: Arbor Day Observance (2013)

Each year, near Arbor Day, the Campus Tree Advisory Group will endeavor to host an Arbor Day event to raise awareness of the benefits of living trees to the campus landscape. This event may include tree plantings on campus or in the area, sustainable harvest and processing of tree products, or student-led research or conservation initiatives.

Event Activity: As a precursor to the October event (see below), pecan trees were planted by students, in collaboration with the Lands Stewardship Office, in a field near Eliestoun House. Date Observance Held: May 17, 2013

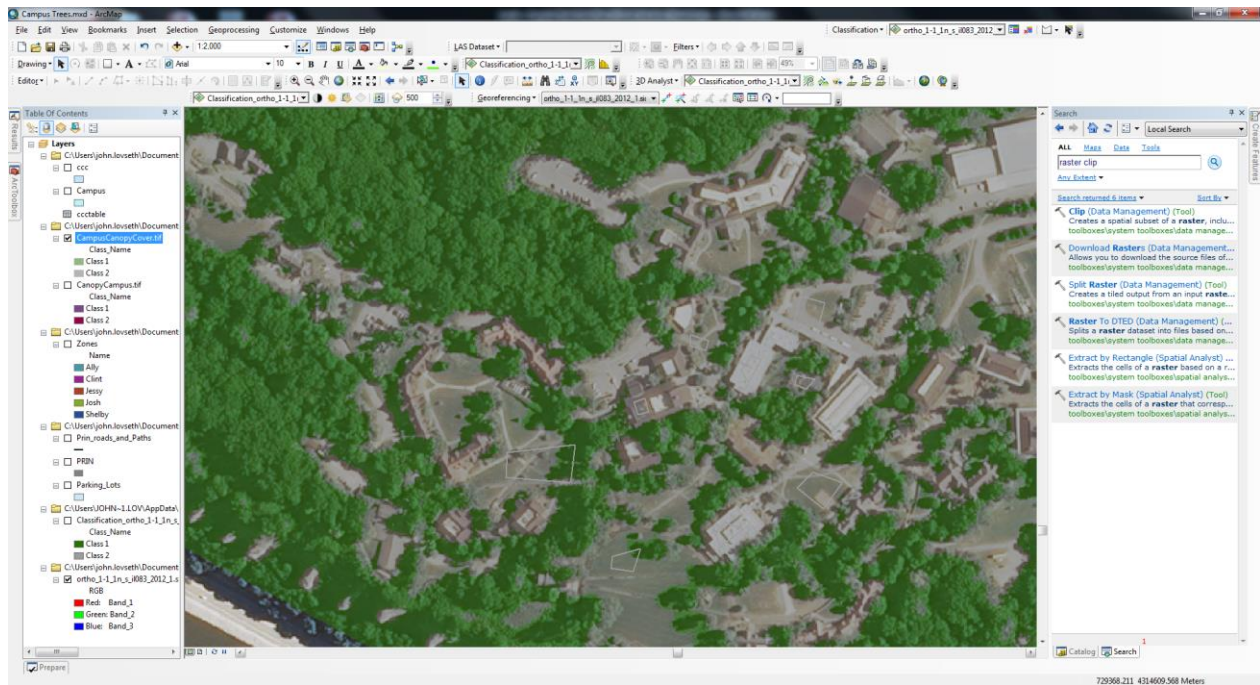
Event Activity: A tree planting activity was open to the community with an aim to establish the Principia Food Forest comprised of fruit- and nut-producing native trees. The area was selected due to its proximity to existing *sugarbush* (syrup producing sugar maple trees) and black walnut groves. More than 600 native pecan, persimmons, pawpaw, chestnut, mulberry, and elderberry trees were planted in a 14-acre field near the historic Eliestoun Estate and Arboretum on campus. The event emphasized the benefits that all trees provide to our campus. As it matures, the Food Forest will support academic courses and Sustainability Club activities. Date Observance Held: October 12, 19, and 26, 2013





TREE CAMPUS USA STANDARD 5: Service Learning Project (2013)

Students enrolled in the college's Environmental Mapping & GIS (GEOL 301) course learned tree identification and used GPS devices to map the location of campus trees (see insert, next page). The species and diameter of each tree were recorded and entered into a Geographic Information System (GIS) database, along with geo-referenced photographs of the trees. Date of Service Learning Project: April 15 – April 20, 2013



Contacts

General Information

Contacts: Ed Goewert, Director, Facilities Department
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College President

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Appendix 1. Tree Species Selection List for Principia College

Recommended and Not Recommended Species: The list of recommended species does not restrict new plantings to only these varieties, but rather acts as a guide for encouraging the use of native trees with favorable growth and appearance characteristics. These native species complement the surrounding forest ecosystem and reduce the threat posed to the Principia Forest by exotic species, as such species may become invasive and degrading to the ecosystem.

Not all native species are suitable for planting near built infrastructure. For example, silver maple and cottonwood are fast growing but weak trees, prone to breakage and rot. The campus currently contains all the species found on the Not Recommended List and as these trees age and die, they should be replaced with trees on the Recommended Species List.

Recommended Species

[(*) indicates salt-tolerant species]

White Oak (*Quercus alba*)
Post Oak (*Quercus stellata*)
Chinquipin Oak (*Quercus muhlenbergii*)
Sugar Maple (*Acer saccharum*)
Eastern Redbud (*Cercis canadensis*)*
Flowering Dogwood (*Cornus florida*)*
Pecan (*Carya illinoensis*)
Allegheny serviceberry (*Amelanchier laevis*)
Shortleaf Pine (*Pinus echinata*) [native pine]
White fir (*Abies concolor*)
Black maple (*Acer nigrum*)
Sycamore maple (*Acer pseudoplatanus*)
Ohio buckeye (*Aesculus glabra*)
Yellow buckeye (*Aesculus flava*)
River birch (*Betula nigra*)*
Bitternut hickory (*Carya cordiformis*)*
Shellbark hickory (*Carya lasiniosa*)*
Pignut hickory (*Carya glabra*)
Mockernut hickory (*Carya tormentosa*)
Shagbark hickory (*Carya ovata*)
Northern Catalpa (*Catalpa speciosa*)*
American Yellowwood (*Cladrastis kentukea*)
Common Persimmon (*Diospyros virginiana*)
American beech (*Fagus grandifolia*)*
Copper beech (*Fagus sylvatica*)

Kentucky Coffeetree (*Gymnocladus dioica*)
Silverbell (*Halesia tetraptera*)*
Black walnut (*Juglans nigra*)*
Cucumber magnolia (*Magnolia acuminata*)*
Dawn redwood (*Metasequoia glyptostroboides*)*
Ironwood (*Ostrya virginiana*)*
Quaking aspen (*Populus tremuloides*)*
Japanese flowering cherry (*Prunus serrulata*)*
Swamp White oak (*Quercus bicolor*)
Scarlet oak (*Quercus coccinea*)
Hill's oak (*Quercus ellipsodalis*)
Shingle oak (*Quercus imbricaria*)
Burr oak (*Quercus macrocarpa*)
Red oak (*Quercus rubra*)
Chestnut oak (*Quercus prinus*)
American Linden (*Tilia americana*)

Not Recommended Species

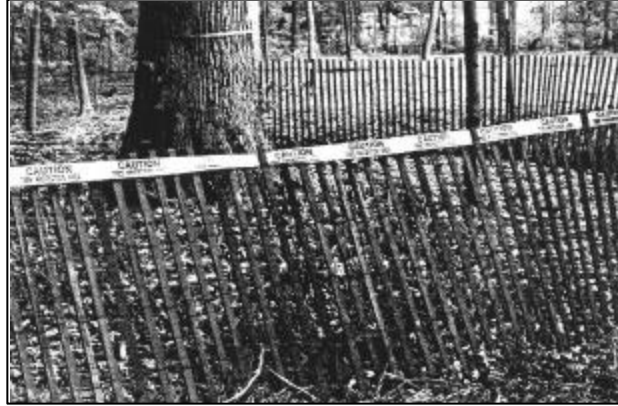
Ginko (*Ginkgo biloba*)
Princess Tree (*Paulownia tomentosa*)
Silver Maple (*Acer saccharinum*)
Bradford Pear (*Pyrus calleryana*)
Eastern Cottonwood (*Populus deltoides*)
Sweetgum (*Liquidambar styraciflua*)
Asian/Amur Honeysuckle (*Lonicera maackii*)

Appendix 2. Illinois Natural Resources Conservation Service (INRCS) Urban Manual practice standard Code 984 “Tree and Forest Ecosystem Preservation”

NATURAL RESOURCES CONSERVATION SERVICE
ILLINOIS URBAN MANUAL
PRACTICE STANDARD

TREE AND FOREST ECOSYSTEM PRESERVATION

(acre or sq. ft.)
CODE 984



(Source: IN Drainage Handbook)

DEFINITION

The preservation of contiguous stands of trees from damage during construction operations.

PURPOSE

The purpose of this practice is to preserve contiguous forested areas and stands of trees that have present and future value for erosion protection, wildlife habitat, landscape aesthetics, and other economic and environmental benefits.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on development sites containing stands of trees.

CRITERIA

The Critical Forest Edge Zone (CFEZ) is one foot outside the perimeter of the leaf canopy of the stand of trees to be protected. The area within the CFEZ

shall be protected from damage during construction operations.

All required protection measures shall be installed prior to the commencement of any site development activity and shall remain in place and in working, functional order until all site development activities have ceased or the surrounding area has been stabilized.

No construction activities shall be permitted within the CFEZ. In addition, all roadways, parking areas, and storage areas shall be located outside the CFEZ.

Construction fencing (florescent polyethylene laminar safety netting), wooden snow fence, or approved equivalent with a minimum height of 40 inches shall be installed around the CFEZ of all forested areas to be preserved, prior to pruning. The fencing shall be secured to ground-mounted metal or wood posts spaced a maximum of 6 feet apart and maintained to

prevent clearing, grading and development activities from encroaching within the CFEZ.

If a higher degree or more permanent protection is desired, a chain link fence following criteria in Construction Specification 91 CHAIN LINK FENCE, a wire fence following criteria in Construction Specification 92 FIELD FENCE, or a comparable wooden structure may be used.

Signs shall be posted which identify the enclosed areas as the CFEZ.

Appropriate soil erosion and sediment control measures shall be installed outside of the CFEZ to prevent sediment from reaching the CFEZ.

When utilities or other development features necessitate underground movement of the soil within the critical root zone, follow criteria in practice standard TREE PROTECTION - AUGERING 991. There shall be no trenching within the critical root zone of any tree within the protected area of the CFEZ. The critical root zone is defined as being one foot outside the perimeter of the dripline or leaf canopy of an individual tree.

Measures must be installed according to a site-specific plan and in accordance with all applicable local, state, and federal laws and regulations.

CONSIDERATIONS

Preserving and protecting trees and other natural plant groups often result in more stable soil and aesthetically pleasing development.

When working within the boundary of a municipality, local authorities such as

the Urban Forester, City Arborist, Municipal Forester or Horticulturist, or Public Works officials should be contacted to determine locally enforced tree protection/preservation standards.

Tree surveys should be required for all parcels that contain mature woodlands, groves, young woodlands or significant trees. Tree surveys should identify the location, size (caliper), species, and condition health rating of all trees having a diameter at breast height (DBH) of 12 inches or more. Property line and hedgerow trees should be included in the tree survey. Required tree surveys and inventories should be conducted by a certified arborist or a professional forester.

It is recommended that a professional forester review the pre-construction plan; supervise/inspect the on-site tree protection operation; and review the site for compliance during the post-construction phase.

It is recommended that a professional forester, licensed landscape architect, or an agency designee with biological, natural resource or environmental credentials select the trees to be preserved before siting roads, buildings or other structures.

If trees are to be removed, it is recommended that a professional forester should be present to supervise the tree removals to make recommendations to ensure the dropped trees minimize damage to protected trees. All trees to be removed will be recorded by stem diameter so that responsible party can conduct natural area mitigation by planting enough trees to replace the trees on at least one for one replacement schedule.

Complete removal of all the trees on site followed by total site compaction well beyond the project perimeter is not recommended.

For sites greater than 15 acres in size that are unique examples of biodiversity as identified by authorized agencies/commissions, or where the area will be greatly impacted by the project and no other viable option exists, a natural resources team consisting of a forester, soil scientist, and botanist should be formed to determine the alternative that least damages the resource.

The following features should be considered when developing sites in and around wooded areas:

1. Rare and endangered species
2. Historical or archeological significance
3. Quantity and quality of forested area in the county or local governmental area
4. Frailty of resources without existing trees
5. Potential for soil erosion with the absence of the forest cover
6. The loss of aesthetic quality of the site; existence of critical areas (such as flood plains, steep slopes, and wet lands)
7. Unique flora and fauna
8. Health and condition of the individual trees and the forest ecosystem
9. Loss of habitat and flora and fauna species diversity
10. Groups of trees to be saved on the erosion control plan

A mitigation plan for damaged trees should be prepared in consultation with a professional forester or certified arborist and included with construction plans and contract documents.

PLANS AND SPECIFICATIONS

Plans and specifications for tree and forest ecosystem preservation shall be in keeping with this standard and will describe the requirements for applying the practice. At a minimum include the following items:

1. Forested areas to be preserved.
2. Location and type of fencing to be used to protect the trees.
3. Locations of construction areas, traffic patterns and roadways, storage areas and parking pads, and the construction project in relationship to the CFEZ to be preserved.
4. Types and locations of signs.

All plans shall include the installation, inspection and maintenance schedules with the responsible person clearly identified.

Standard drawing IL-690 TREE PROTECTION - FENCING may be used as the plan sheet.

OPERATION AND MAINTENANCE

On active construction sites protected areas should be inspected at least every 7 days for compliance and any repairs made as needed.

The protective signs and fences shall be removed only after all construction work has been finished, including final grading and shaping of the site, and the site has been inspected by a professional forester for damages to the trees.

Inspections shall include a listing of trees with damage to trunks, mounding of soil around the trunk, evidence of root

damage, and evidence of improper pruning.

and John Hartman. University of Kentucky Agricultural Communications.

REFERENCES

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Website

urbst984.doc

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Videos

Root Injury and Tree Health. Illinois Arborists, the Morton Arboretum, the USDA Forest Service and the International Society of Arboriculture.

Effects of Construction Damage to Trees in Wooded Areas. Mark Timmons and John Hartman. International Society of Arboriculture.

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**Appendix 3. Illinois Natural Resources Conservation Service (INRCS) Urban Manual practice standard Code 991
“Tree Protection–Auguring”**

NATURAL RESOURCES CONSERVATION SERVICE
ILLINOIS URBAN MANUAL
PRACTICE STANDARD

TREE PROTECTION - AUGERING

(no.)
CODE 991



(Source: Tree City USA Bulletin No. 35)

DEFINITION

Underground construction such as utility work by augering (tunneling) through an individual tree's Critical Root Zone (CRZ).

PURPOSE

The purpose of this practice is to reduce damage to and loss of individual trees where underground construction involves a tree's CRZ.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on development sites containing trees, infrastructure including utilities, and a construction project that has limited space and where these elements are in direct conflict.

CRITERIA

The CRZ is one foot outside the perimeter of the leaf canopy of the tree to be protected. This area shall be protected from damage during construction operations.

All required protection measures shall be installed prior to the commencement of any site development activity and shall remain in working, functional order until all site development activities have ceased or the surrounding area has been stabilized. Protection measures, including fencing and signage, shall follow criteria in practice standard TREE PROTECTION 990.

Open trenching in the root zone of a tree is prohibited except when the trenching falls outside the CRZ.

All trees located where there is insufficient space to bypass the CRZ must be augered. Augering activity shall not occur on more than one side of the tree and shall follow distance and depth requirements in Table 1.

**TABLE 1
AUGERING REQUIREMENTS**

Tree Diameter (in.)	Distance of Augering from Tree Trunk - each side (ft.)	Depth of Augering (ft.)
1-4	3	2 ½
5-9	6	3
15-19	10	3 ½
20 inches or more	15	4

The following shall be avoided:

1. Making deep cuts that sever a large portion of the root system, depriving the tree of water and increasing the tree's chance of wind throw.
2. Compacting the soil within the area not designated for augering.
3. Any other actions, such as depositing concrete wash, which hardens the surface area within 25 feet of the CRZ.

CONSIDERATIONS

When working within the boundary of a municipality, local authorities such as the Urban Forester, City Arborist, Municipal Forester or Horticulturist, or Public Works officials should be contacted to determine locally enforced tree tunneling or augering requirements.

It is recommended that a professionally qualified individual check the area work plan and site for environmental soundness and evaluate the techniques for protecting the trees.

A mitigation plan for damaged trees should be prepared in consultation with

a professional forester or certified arborist and included with the construction plans and contract documents.

When site soil resources have been greatly altered, it is recommended that a soil restoration strategy be implemented. The strategy may include:

1. Scarifying compacted areas
2. Adding top soil in areas of extreme erosion
3. Adding about 12 inches of well-rotted leaf compost
4. Adding ground cover using herbaceous vegetation, shrubs, & trees. Use of native species is encouraged.

PLANS AND SPECIFICATIONS

Plans and specifications for augering operations shall be in keeping with this standard and will describe the requirements for applying the practice. At a minimum include the following items:

1. The individual trees to be protected and the location of the proposed auger tunnel.
2. The location and type of fencing to be used to protect trees indicating the distance for placing the fencing around the CRZ.
3. Locations of roadways, storage areas, truck clean-out areas, and parking pads, in relationship to the trees to be protected.
4. Types and locations of signs

All plans shall include the installation, inspection and maintenance schedules with the responsible person clearly identified.

OPERATION AND MAINTENANCE

NRCS IL April 2000

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The protective signs and fences will be removed only after all construction work has been finished, including final grading and shaping of the site, and the site has been inspected by a professional forester for damages to the trees.

It is recommended that on-site inspections be conducted to determine compliance with augering specifications.

REFERENCES

Website

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Clark and Metheny, 1998. Trees and Development: A Technical Guide to Preservation of Trees During Land Development. International Society of Arboriculture, Champaign, IL

Watson, G. and E.B. Himelick, 1997. Principles and Practices of Planting Trees and Shrubs. International Society of Arboriculture, Champaign, IL

Videos

Root Injury and Tree Health. Illinois Arborists, Morton Arboretum, USDA Forest Service, and the International Society of Arboriculture.

Trenching and Tunneling: A Video Guide for Excavating Around Trees. Davey Resource Group, International Society of Arboriculture, and the Utility Arborist Association.

Appendix 4. International Society of Arboriculture (ISA), “Recognizing Tree Risk”

Recognizing Tree Risk

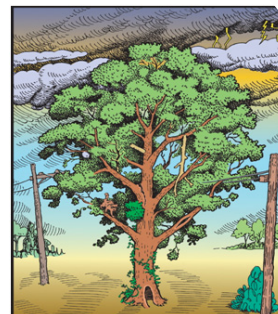
Learn to identify common tree defects that may indicate tree risk and understand how tree risk can be managed.

Trees provide significant benefits to our homes and cities, but when trees fall and injure people or damage property, they are liabilities. Understanding and addressing the risks associated with trees makes your property safer and prolongs the life of the tree.

Trees are an important part of our world. They offer a wide range of benefits to the environment and provide tremendous beauty.

However, trees may be dangerous. Trees or parts of trees may fall and cause injury to people or damage to property. It is important to assess trees for risk. While every tree has the potential to fall, only a small number actually hit something or someone — a target. There is no such thing as a completely “safe” tree.

It is an owner’s responsibility to provide for the safety of trees on his or her property. This brochure provides some tips for identifying the common defects associated with tree risk. However, evaluating the seriousness of these defects is best done by a professional arborist. Regular tree care will help identify trees with unacceptable levels of risk. Once the risk is identified, steps may be taken to reduce the likelihood of the tree falling and injuring someone.



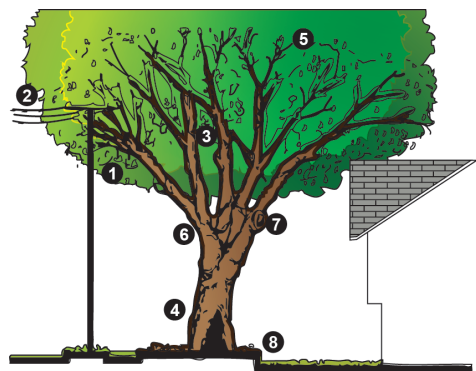
Trees and Utility Lines

Trees that fall into utility lines have additional serious consequences. Not only can they injure people or property near the line, but hitting a line may cause power outages or surges, fires, and other damage. Downed lines still conducting electricity are especially dangerous. A tree with a potential to fall into a utility line is a very serious situation.

Tree Risk Checklist

Consider these questions:

- Are there large, dead branches in the tree?
- Are there detached branches hanging in the tree?
- Does the tree have cavities or rotten wood along the trunk or in major branches?
- Are mushrooms present at the base of the tree?
- Are there cracks or splits in the trunk or where branches are attached?
- Have any branches fallen from the tree?
- Have adjacent trees fallen over or died?
- Has the trunk developed a strong lean?
- Do many of the major branches arise from one point on the trunk?
- Have the roots been broken off, injured, or damaged by lowering the soil level, installing pavement, repairing sidewalks, or digging trenches?
- Has the site recently been changed by construction, raising the soil level, or installing lawns?
- Have the leaves prematurely developed an unusual color or size?
- Have trees in adjacent wooded areas been removed?
- Has the tree been topped or otherwise heavily pruned?



Defects in Urban Trees

The following are defects or signs of possible defects in urban trees (see figure):

1. Regrowth from topping, line clearance, or other pruning
2. Electrical line adjacent to tree
3. Broken or partially attached branches
4. Open cavity in trunk or branch
5. Dead or dying branches
6. Branches arising from a single point on the trunk
7. Decay and rot present in old wounds
8. Recent change in grade or soil level, or other construction

Defects in Rural Trees

The following are indicators or signs of possible defects in rural trees (see figure):

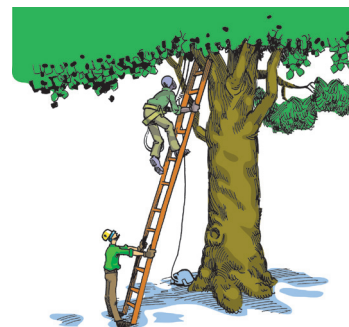
1. Recent site construction, grading and tree removal, clearing of forests for development
2. Previous tree failures in the local area
3. Tree leaning near a target
4. Forked trunk; branches and stems equal in size
5. Wet areas with shallow soil



Managing Tree Risk

An arborist can help you manage the trees on your property and can provide treatments that may help reduce the risk associated with certain trees. An arborist familiar with tree risk assessment may suggest one or more of the following:

- Remove the target. While a home or a nearby power line cannot be moved, it is possible to move picnic tables, cars, landscape features, or other possible targets to prevent them from being hit by a falling tree
- Prune the tree. Remove the defective branches of the tree. Because inappropriate pruning may weaken a tree, pruning work is best done by an ISA Certified Arborist.
- Cable and brace the tree. Provide physical support for weak branches and stems to increase their strength and stability. Such supports are not guarantees against failure.
- Provide routine care. Mature trees need routine care in the form of water, nutrients (in some cases), mulch, and pruning as dictated by the season and their structure.
- Remove the tree. Some trees with unacceptable levels of risk are best removed. If possible, plant a new tree in an appropriate place as a replacement.



Recognizing and reducing tree risk not only increases the safety of your property and that of your neighbors, but also improves the tree's health and may increase its longevity!

Ensuring Quality Care for Your Tree

Trees are assets to your home and community and deserve the best possible care. If you answered "yes" to any of the questions in the tree risk checklist or see any of the defects contained in the illustrations, your tree should be examined by an ISA Certified Arborist.

For a list of ISA Certified Arborists in your area, please visit www.treesaregood.org. If your tree is located near a power line, contact your local electrical utility.

This brochure is one in a series published by the International Society of Arboriculture as part of its Consumer Information Program. You may have additional interest in the following titles currently in the series:

Avoiding Tree and Utility Conflicts

Mature Tree Care

Pruning Mature Trees

Trees and Turf

Avoiding Tree Damage During Construction

New Tree Planting

Pruning Young Trees

Tree Values

Benefits of Trees

Plant Health Care

Recognizing Tree Risk

Why Hire an Arborist

Buying High-Quality Trees

Proper Mulching Techniques

Treatment of Trees Damaged by Construction

Why Topping Hurts Trees

Insect and Disease Problems

Palms

Tree Selection and Placement

E-mail inquiries: isa@isa-arbor.com

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Developed by the International Society of Arboriculture (ISA), a non-profit organization supporting tree care research around the world and dedicated to the care and preservation of shade and ornamental trees. For further information, contact: ISA, P.O. Box 3129, Champaign, IL 61826-3129, USA.

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