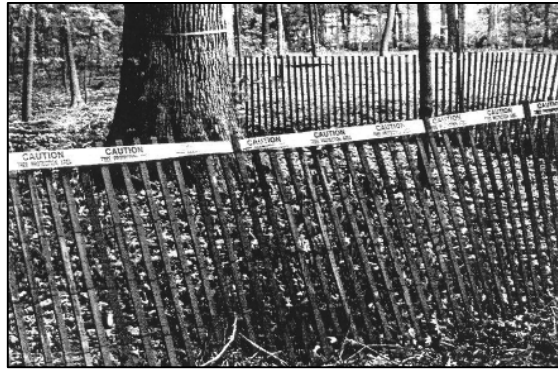


ILLINOIS URBAN MANUAL
PRACTICE STANDARD

TREE PROTECTION
In Moderately Urbanized to Open Space Areas

(each)
CODE 990A



(Source: IN Drainage Handbook)

DEFINITION

The protection of individual trees from damage during construction operations in moderately urbanized or open space areas.

PURPOSE

The purpose of this practice is to reduce damage and loss of individual trees during construction by implementing pre- to post-construction tree protection procedures.

CONDITIONS WHERE PRACTICE APPLIES

This standard should be used when no local ordinance exists or in tandem with local tree protection ordinances.

This practice applies on development sites containing individual trees and/or adjacent offset trees that may be affected by the onsite construction.

Refer to IUM Practice Standard Code 984 -TREE AND FOREST

ECOSYSTEM PRESERVATION for information on preserving stands of trees. Refer to IUM Practice Standard Code 990B TREE PROTECTION IN HIGHLY URBANIZED AREAS for areas where the green and gray infrastructure is highly intertwined.

CRITERIA

LOCAL AUTHORITY 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.

JULIE Before any construction work has begun, call JULIE- (Joint Utility Locating Information for Excavators) at 800-892-0123 at least 48 hours prior. Equivalent local authorities shall also be contacted, by the contractor.

DETERMINE THE TREE PROTECTION CRITICAL ROOT ZONE Tree Protection starts with determining the Tree

Protection Critical Root Zone (TPCRZ) or area where the majority of roots are located and where tree protection fencing shall be located. The TPCRZ is located one foot outside the Critical Root Zone (CRZ).

To determine the CRZ, one of the following two techniques shall be used. The first is by using the definition of CRZ or two feet outside the perimeter of the leaf canopy or drip line of the tree to be protected using the length of the longest branch as the radius of the circle. The second technique is to determine the CRZ by referring to Table 1. Guidelines for determining the tree protection zone (TPZ) radius for healthy, structurally sound trees per the International Society of Arboriculture (ISA) Best Practice for Managing Trees During Construction. This method measures the diameter in inches at 4.5 feet above ground (DBH diameter breast height) in combination with the trees age and tolerance to construction. See Table 2. for Species Tolerance Ratings.

The contractor shall use whichever method affords the greatest protection for the tree or whichever creates the larger CRZ area and then add an additional one foot to create the TPCRZ.

FENCING Protect trees identified in the approved construction plan or by local ordinance with fencing using IUM Standard Drawing IUM-690-A TREE PROTECTION – FENCING. The fencing shall be located at the TPCRZ edge. Protect this area from damage during construction operations.

For projects without highly significant or historical trees and that will last for less than six-month duration, a non-treated

wood lath snow fence or wire-mesh fencing shall be used and securely anchored to the posts.

For projects lasting over a six-month duration or for projects with trees that are considered significant or historical, install a chain link fence using IUM Construction Specification 91 CHAIN LINK FENCE or better (as approved by the local Professional Forester per local ordinances singularly or in tandem with the project Engineer). Per the IUM Standard Drawing IUM-690-A TREE PROTECTION - FENCING, the fencing shall be a minimum of 4 feet in height. For chain link fencing, metal posts shall be placed a maximum distance of 6 feet on center (OC) and the fencing securely anchored to the posts.

SIGNAGE Notices shall be posted on the fences prohibiting dumping and disposal of waste near protected trees. Signs shall be posted that identify the fenced areas as TPCRZ.

SOIL EROSION CONCERNS Outside the TPCRZ, erosion and sediment control measures shall be installed to prevent sediment reaching the TPCRZ. Per IUM Standard Drawing IUM-690-A, these measures shall extend out from the fence 10 feet and shall be continuous around the perimeter of the fence. These measures include, but are not limited to vegetative filter strip, rolled excelsior blankets and woodchip mulch three to five inches deep. Other methods may be used if approved by the Professional Forester, Certified Arborist or equivalent professional. Installation shall cause no disturbance to soils.

All foot or vehicular traffic or construction activities shall be kept

outside of the TPCRZ for the entire duration of the construction.

Woodchip mulch exceeding four inches must be removed from the TPCRZ once the threat of soil or root damage is passed. Any removal of vegetation or spreading of woodchip mulch materials within the TPCRZ shall be performed manually, and all efforts should be made to protect the soil.

ROOT/SOIL MANAGEMENT No construction activities, including the placement of topsoil, shall be permitted within the TPCRZ. Adding of woodchip mulch shall be done manually as specified in the contract, construction plan or equivalent document. All roadways, parking areas, and storage areas, parking, maneuvering of machinery, stockpiling of materials, or any other construction activities shall be located 10 feet outside any TPCRZ of trees and plants designated to be protected.

The contractor shall give sufficient notice to the appropriate authorities concerning any soil disturbance activities that would occur adjacent to the TPCRZ.

NO CHANGE IN CONTOUR Special care shall be taken to follow the natural drainage patterns to avoid unnatural flow to protected trees. Any changes to topography can cause the tree to receive reduced or increased moisture over time. Plans should consider the implications of changes in drainage. Changes in contour could also cause run-off with salt or herbicides that could kill or harm the trees and allow other pollutants moving or settling near the tree. Depending on tree species this may eventually kill the tree.

Water drainage patterns should remain the same. In drought years and subsequent years, (depending on ground water recharge), consideration should be given to avoid reductions in soil moisture and/or groundwater table changes or increases or reductions during and after construction.

Removal of topsoil around the tree is prohibited. The original grade should be maintained. Any woody vegetation to be removed around the trees to remain should be cut and not pulled out by equipment to avoid root injury to the remaining tree(s).

WHEN TO START PRACTICE 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 and the site has been inspected. If at any time fencing has been damaged, work shall be halted and fencing replaced at Contractor's cost. Once fencing has been replaced, work shall commence. At no point during site development shall protected trees be left without fencing. The protective signs and fences will be removed only after all construction work has been finished and the site inspected by a Professional Forester, Certified Arborist or equivalent for damages to the trees.

TRENCHING IS PROHIBITED Creating a trench through the tree roots within the TPCRZ is prohibited. The alternative to trenching is augering. See IUM Practice Standard Code 991 TREE PROTECTION - AUGERING.

**BRANCH/ROOT PROTECTION AND
BRANCH/ROOT PRUNING**

Branches or roots of protected trees impacted outside the TPCRZ shall be pruned according to the ISA Pruning Standard and associated American National Standards Institute (ANSI) A300 Standards. Sufficient advance notification of trenching activities needs to be given to the inspectors of the root pruning. All root pruning shall be done under the supervision of a Professional Forester or an ISA Certified Arborist. Pruning should meet or exceed ANSI A300 or approved ISA Tree Care Industry Standards. The appropriate pruning tool should be used to make a clean cut. The use of heavy equipment such as a backhoe for tree root pruning shall be prohibited. Axes, shovels, back hoes or other such potential severing devices not specifically engineered for tree root pruning shall not be used. Removal or breaking off branches of the protected trees will not be allowed.

All tree roots impacted during construction shall be properly pruned. All tree roots greater than one half inches (1/2") in diameter that are encountered in any construction process shall be cut cleanly with an appropriate saw or pruning shear or other tool specifically designed for cutting wood as defined by ISA and ANSI standards.

In situations where roots, extending outside the TPCRZ, are impacted or need root pruning or special tree care is required, all root pruning and associated tree care shall be done by a Professional Forester or Certified Arborist per industry standards. In these situations, root pruning, using an approved mechanical root pruning saw, shall be performed prior to digging as directed by the Professional Forester or

Certified Arborist in charge. The root pruned trees shall be noted on the plans by the Professional Forester or Certified Arborist.

Refer to Table 2." Tree Species Tolerance to Root Severance and Soil Compaction."

SEEK PROFESSIONAL ADVISEMENT

On construction sites where green and gray infrastructure are highly intertwined, use IUM Practice Standard Code 990B TREE PROTECTION In Highly Urbanized Areas With Existing Green and Gray Infrastructure Conflicts in consultation with a local Professional Forester or Certified Arborist concerning species tolerance to disturbance.

REMOVALS Trees not identified to be protected per local ordinance or construction plans may be removed per the advisement of the local Professional Forester or Certified Arborist in charge.

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

CONSIDERATIONS

Consideration should be given to post construction protection of trees that were designated as "protected trees" during the construction activities. One example is to create a Conservancy Easement to preserve the trees that were protected during construction activities.

For highly significant trees consider increasing the Tree Protection Critical Root Zone (TPCRZ) to 2 to 3 times to further minimize impact to tree roots. Also consider protecting the

tree trunk using IUM Standard Drawing IUM-690-C TREE TRUNK PROTECTION. Operations of the equipment should not break the plane of the fencing regardless of the type of tree trunk protection installed.

A Professional Forester or Certified Arborist should be consulted for any clearing of trees and any actions that deviate from criteria within this standard. On-site supervision is recommended.

The dripline/leaf canopy shall be shown on the plan sheet to scale to provide a better basis for site development evaluation.

Consider the following when evaluating trees to be saved:

1. Species and condition (maintain a diversity of moderate to slower growing trees in good condition),
2. Above the minimum inches of tree diameter as designated by local ordinance,
3. Long-term suitability of the tree for its present location,
4. Length of time to mitigate losses,
5. Cost of mitigating tree losses,
6. Expected long-term maintenance costs for the tree compared to other trees of the same age/size,
7. Soil erosion prevention and reduction of storm water runoff,
8. The number of other trees growing under the same conditions and the precedent that would be set by removing the tree in question,

9. Impact on property value and aesthetic,
10. Ability to screen noise and visual improprieties or ability to enhance privacy,
11. Ability to moderate temperature changes, provide shade and reduce wind forces,
12. Per local ordinance and consultation with the local Professional Forester and/or Certified Arborist, determine if the tree(s) within the project area has historic, big, unique or protected designation.

Trees to be removed should be evaluated using the following criteria:

1. In the opinion of the Professional Forester or Certified Arborist, there is a clear and reasonable risk of failure that could cause injury or property damage including existing utility service and no corrective measures are feasible.
2. Tree is dead.
3. The tree is in poor condition with several dead branches or major crack(s).
4. Contiguous and fatal disease is present as diagnosed by a trained Entomologist, Plant Pathologist or Professional Forester.
5. The tree is below the minimum inches in diameter as designated by local ordinance.
6. Current tree damage is beyond repair or the tree is in extremely

poor shape due to storm damage or previous mechanical injury.

7. There is a potential of the tree to damage existing or future hardscape features such as driveways or sidewalks and there is no gray infrastructure alternative.
8. There is no feasible way to avoid disturbing the soil around, grading over or placing a hardened surface within the TPCRZ and the tree is an oak, hickory, red bud, horse chestnut, Kentucky coffee tree, larch, honey locust, or conifer and after consultation with a Professional Forester there is agreement that the tree would not survive the impact of the disturbance. Consultation is required prior to using these criteria for tree removal.
9. Tree has a greater than 45-degree lean toward traffic or another target or it creates an unsafe clearance or visual barrier/sight line for pedestrians or vehicular traffic.
10. Tree is a fast growing or a weak wooded tree that is invasive such as box elder, silver maple, tree of heaven, Russian olive or black cherry. Exceptions may be made for large healthy specimens of these species.
11. Tree is within five feet of a structure or, when mature, will have a canopy spread that will overlap the structure. Consult with a Professional Forester or Certified Arborist.

12. The tree could be successfully transplanted with a tree spade.

13. Trees that are non-native species or invasive.

A mitigation plan for damaged trees and removed trees should be prepared in consultation with a Professional Forester or Certified Arborist and included with construction plans and contract documents. A one for one tree replacement policy or greater should be implemented.

When site soil resources have been greatly altered, it is recommended a soil restoration strategy be implemented by non-mechanical methods such as:

1. Scarifying compacted areas,
2. Adding top soil to the original grade in areas of extreme erosion.
3. Adding about 12 inches of well-rotted leaf compost,
4. Adding ground cover using herbaceous vegetation, shrubs, and trees. Use of native species is encouraged.
5. When trees are to be within 25 feet of gray infrastructure, consider using pervious paving materials or installing aeration vents in impervious paving. Use paving materials requiring a minimum amount of excavation such as reinforced concrete vs. asphalt. Design traffic patterns to avoid heavy loads adjacent to trees. Specify minimum subgrade compaction under pavement near dripline.

For areas with mixed forest with

moderately or highly developed areas, multiple standards may need to be used.

PLANS AND SPECIFICATIONS

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

1. Identify all existing trees by species, location, diameter in inches (at 4 ½ feet above the ground) and condition. Clearly indicate the trees and/or branches to be removed and those to be saved including their TPCRZ. Pruning shall be done by a Professional Forester or Certified Arborist.
2. Contact JULIE during the planning and design stages so that utilities and their placement near trees can be accurately placed on the plans.
3. Identify locations of roadways, storage areas, truck clean-out areas and parking pads, in relationship to the trees to be protected.
4. Determine the TPCRZ and draw it to scale on the plan sheet.
5. Identify location, type and height of fencing to be used to protect trees, including the distance for placing the fencing around the TPCRZ.
6. Provide signage details including verbiage to be used, type of materials for signs and location of signage on fencing.
7. Designate the TPCRZ and trunk

protection on the plan.

8. Identify soil sedimentation and protection for outside the TPCRZ.
9. Include the installation, inspection, and maintenance schedules with the responsible party identified in all plans.
10. Fees for non-compliance per local ordinance should be noted.
11. IUM Standard Drawing IUM-690-A TREE PROTECTION - FENCING and other Tree Protection Standards (Tree Trunk Protection and Auguring) may be used as detailing on the plan sheets.

OPERATION AND MAINTENANCE

The protective signs and fences can be removed only after all construction work has been finished, which includes a final grading, shaping and stabilization of the site, and a site inspection by a Professional Forester for damages to the trees.

On active construction sites, it is recommended that trees be inspected every 7 days for compliance.

Inspections shall include a listing of trees with:

1. Damage to trunks,
2. Damage to branches,
3. Mounding of soil around the trunk,

4. Evidence of root damage,
5. Evidence of improper pruning,
6. Notice of unauthorized changes to the topography, including trenching mishaps and or augering location revisions, and
7. Other infractions to the site around the trees such as chemical spills and soil compaction.

REFERENCES

Websites

International Society of Arboriculture
<http://www.isa-arbor.com/store/category.aspx?cid=91>

USDA FS How to Prune Trees
<http://na.fs.fed.us/pubs/detail.cfm?id=2602>

Illinois Department of Natural Resources – Urban and Community Forestry Website – Technical References et. al.
<https://wwwnr.partner.illinois.gov/Conservation/Forestry/UrbanForestry/Pages/TRTreeProtectionMeasures.aspx>

Morton Arboretum. 2015. Selecting and Planting Trees. The Morton Arboretum, Lisle, IL
<http://www.mortonarb.org/trees-plants/tree-and-plant-selection-0>
Publications

American National Standards for Tree Care Operations – Trees, Shrubs, and Other Woody Plant Maintenance - Standard Practice (Pruning) ANSI A300 (Part 1)

American National Standards for Institute, Inc. Safety Requirements for Tree Care Operations, Z133.1 most current version.

American Association of Nurserymen, 2014. American Standards for Nursery Stock. American National Standards Institute, Inc., Washington D.C.

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

Fazio, J.R., ed., 2011. How to Save Trees During Construction. Tree City USA Bulletin #7. The National Arbor Day Foundation, Nebraska City, NE

Fazio, J.R., 2010. A Systematic Approach to Building With Trees. Tree City USA Bulletin #20. National Arbor Day Foundation, Nebraska City, NE

Fazio, J.R., ed., 2013. How to Manage Community Natural Areas. Tree City USA Bulletin #27. The National Arbor Day Foundation, Nebraska City, NE

Fazio, J.R Trenching and Tunneling Near Trees, The National Arbor Day Foundation, Nebraska City, NE

Gilman, Edward and Sharon Lilly. 2008. Best Management Practices – Tree Pruning. International Society of Arboriculture.

Gulick, Jennifer, Senior Urban Forester. 2015. Major Construction Impacts and Methods to Minimize Damage. Davey Resources Group.

Hightshoe. G.L.1988. Native Trees and Shrubs and Vines for Urban and Rural

America. Van Nostrand Reinhold, New York, NY 10003. 819 P.

Illinois Department of Natural Resources, Division of Forest Resources, 2015. Urban and Community Forestry Program Tree Planting Standards, Springfield, IL

International Society of Arboriculture. ISA's Best Management Practices: Managing Trees During Construction. International Society of Arboriculture, Champaign, IL

Miller, Nancy, David M. Rathke and Gary R. Johnson. 1999. Protecting Trees from Construction Damage: A Homeowner's Guide. University of Minnesota Extension.

Morton Arboretum. 2015. Selecting and Planting Trees. The Morton Arboretum, Lisle, IL

Pirone's Tree Maintenance. 7th Edition

Smiley, E. Thomas and Kelby Fite. October 2016. Preserving Trees During Construction Arborist News Volume 25 Number 5. International Society of Arboriculture, Champaign, IL

Standard Specifications for Road and Bridge Construction. 2012. Illinois Department of Natural Resources.

Tree Care Industry Association. 2015. ANSI A300 Pruning Standards – Part 1. Tree Care Industry Association.

Tree Care Industry Association. 2012. ANSI A300 Construction Management – Part 5. Tree Care Industry Association.

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

Wenger, K, 1996. The Forestry Handbook. Society of American Foresters, Bethesda, MD

Videos

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

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

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Table 1. Guidelines for determining tree protection zone (TPZ) radius for healthy, structurally sound trees per the ISA Best Management Practices: Managing Trees During Construction.

Species Tolerance	Relative Tree age*	TPZ Multiplication Factor
High	Young	6
	Mature	8
	Overmature	12
Medium	Young	8
	Mature	12
	Overmature	15
Low	Young	12
	Mature	15
	Overmature	18

DBH (inches) x TPZ Multiplication Factor = TPZ radius (inches)

Note: TPZ is the same as the CRZ in this standard.

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- Consult with a local Professional Forester or Certified Arborist
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TABLE 2. Tree Species Tolerance to Root Severance and Soil Compaction

TREE SPECIES	ROOT SEVERANCE Tolerance	Soil Compaction Tolerance
Basswood	Intermediate	Sensitive
Blue beech	Sensitive	Sensitive
Butternut	Sensitive	Intermediate
Paper birch	Intermediate	Sensitive
River birch	Tolerant	Tolerant
Boxelder	Tolerant	Tolerant
Ohio Buckeye	Intermediate	Intermediate
Catalpa	Intermediate	Tolerant
Kentucky Coffeetree	Intermediate	Intermediate
Eastern Cottonwood	Tolerant	Tolerant
Red-Osier Dogwood	Tolerant	Intermediate
American Elm	Tolerant	Intermediate
Slippery Elm	Tolerant	Intermediate
Hackberry	Tolerant	Intermediate
Hawthorn	Intermediate	Intermediate
Bitternut Hickory	Intermediate	Intermediate
Honeylocust	Tolerant	Intermediate
Ironwood	Sensitive	Sensitive
Black Locust	Tolerant	Sensitive
Red maple	Tolerant	Tolerant
Silver maple	Tolerant	Tolerant
Sugar Maple	Intermediate	Sensitive
Mountain ash	Tolerant	Intermediate

Black oak	Sensitive	Sensitive
Bur oak	Moderately Tolerant	Intermediate
Northern Pin Oak	Sensitive	Sensitive
Red Oak	Moderately Tolerant	Sensitive
Bicolor or Swamp Oak	Intermediate	Tolerant
White Oak	Sensitive	Sensitive
Wild Plum	Tolerant	Sensitive
Serviceberry	Intermediate	Sensitive
Black Walnut	Sensitive	Intermediate
Black Willow	Tolerant	Tolerant