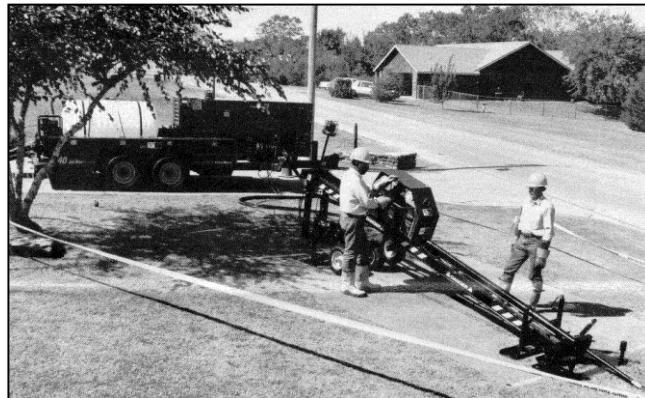


ILLINOIS URBAN MANUAL PRACTICE STANDARD

Tree Protection – Augering (each) Code 991



Source: Tree City USA Bulletin No. 35

Definition

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

Purpose

The purpose of this practice is to preserve trees with the use of augering in place of trenching where green and gray infrastructure conflict with vegetation. By restricting trenching around trees and mandating augering around tree roots as a way to reduce damage to and loss of individual trees due to root severing.

It is to be applied where underground construction involves a tree's Critical Root Zone (CRZ) both above and below ground.

Conditions Where Practice Applies

This practice is to be applied to areas of development that are in close proximity with infrastructure and trees and where these elements are in direct conflict.

Criteria

This standard is to be used with the Practice Standard [TREE PROTECTION IN MODERATELY URBANIZED TO OPEN SPACE AREAS 990A](#), [TREE PROTECTION IN HIGHLY URBANIZED AREAS WITH EXISTING GREEN AND GRAY INFRASTRUCTURE CONFLICTS 990B](#), or [TREE AND FOREST ECOSYSTEM PRESERVATION 984](#).

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

JULIE – Before any work has begun, call JULIE (Joint Utility Locating Information for Excavators) at 800-892-0123 at least 48 hours prior to any work being done. Equivalent local authorities shall also be contacted, where applicable.

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 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 in feet as the radius of the circle. The second technique is to determine CRZ by referring to Table 1 Guidelines for determining 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 – 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.

Distance for Augering – Augering shall be done at the TPCRZ or according to the augering requirements distance per Table 3 using the distance and augering depth that best protects the tree roots. The TPCRZ area shall be protected from damage during construction operations using Standard Drawings [TREE PROTECTION – FENCING \(MODERATELY URBANIZED TO OPEN SPACE AREAS\) IUM-690A](#), [TREE PROTECTION – FENCING \(HIGHLY URBANIZED AREAS\) IUM-690B](#), [TREE TRUNK PROTECTION IUM-690C](#), and [TREE ROOT PROTECTION FOR AUGERING PRACTICES IUM-690D](#).

Per Practice Standards [TREE PROTECTION IN MODERATELY URBANIZED TO OPEN SPACE AREAS 990A](#), [TREE PROTECTION IN HIGHLY URBANIZED AREAS WITH EXISTING GREEN AND GRAY INFRASTRUCTURE CONFLICTS 990B](#), and [TREE AND FOREST ECOSYSTEM PRESERVATION 984](#), all required tree protection measures including fencing and tree trunk protection, shall be installed prior to the commencement of any site development activity and shall remain in working, functional order until all site construction work has been finished and the site inspected by a Professional Forester for damages to trees.

Protection measures, including fencing and signage, shall follow criteria in Practice Standard [TREE PROTECTION IN MODERATELY URBANIZED TO OPEN SPACE AREAS 990A](#) or [TREE PROTECTION IN HIGHLY URBANIZED AREAS WITH EXISTING GREEN AND GRAY INFRASTRUCTURE CONFLICTS 990B](#).

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

Roots must not be removed from more than one side of the tree in any given year.

All excavation holes are to be covered in a wet tarp or wet burlap and kept moist for the duration of the construction project to protect the roots from desiccation (roots drying out). In some situations, it may be necessary to hand dig trenches, employ water excavation or an air spade to locate and preserve the roots.

All trees located where there is insufficient space to bypass the TPCRZ 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 3.

Table 1
Auguring Requirements

Tree Diameter (in.)	Distance of Augering from Tree Trunk – Each Side (ft.)	Depth of Augering (ft.)
1 – 4	3	2.5
5 – 9	5	3
10 – 14	10	3.5
15 – 19	12	3.5
20 or more	15	4

Root Care

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 10 feet of the TPCRZ

If any roots are impacted during the construction process, they shall be properly pruned. Consultation with a Professional Forester

or Certified Arborist is required on all tree roots greater than one-half inch ($\frac{1}{2}$ ") in diameter that are encountered in any construction process because of future potential liability.

The tree roots shall be cut cleanly with an appropriate saw or pruning shear or other tool specifically designed for cutting wood. Axes or other such chopping tools shall not be used. Shovels or other tools designed for digging shall not be used. All roots impacted shall be properly pruned according to the ISA pruning standard and associated ANSI A300 standards Part 1. The use of heavy equipment such as a backhoe for tree root pruning shall be prohibited.

Considerations

In some situations, hand digging of roots or the use of an air spade or hydro excavation tool is needed. In these cases, burlap should be used to cover up the exposed roots to help keep them alive and from drying out.

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

1. Scarifying compacted areas,
2. Adding top soil in areas of extreme erosion,
3. Adding about 12 inches of well-rotted leaf compost, and
4. Adding ground cover using herbaceous vegetation or young shrub vegetation. 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 TPCRZ.

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.
5. 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.

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

Operation and Maintenance

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

It is recommended that on-site inspections be conducted during construction. The requirements that apply to field revisions notification and approval process of changes to augering type, size, and location shall be monitored to determine compliance with augering specifications.

References

Website

<http://www2.champaign.isa-arbor.com/catalog/publications.html>

Publications

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 Trenching and Tunneling Near Trees, The National Arbor Day Foundation, Nebraska City, NE

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

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

Smiley, E. Thomas and Kelby Fite. October 2016. Preserving Trees During Construction Arborist News Volume 25 Number 5. 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.

Table 2
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.

*Consult with a local Professional Forester or Certified Arborist

**Table 3
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
Box Elder	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
Honey Locust	Tolerant	Intermediate
Ironwood	Sensitive	Sensitive
Black Locust	Tolerant	Intermediate
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