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Forms Section

This section contains the following full-size versions of the forms that were discussed in this chapter.

Form 3.1 - Defective Trees Risk Management Guidelines
Form 3.2 - Hazard Tree Inspection Form
Form 3.3 - USDA Community Tree Risk Evaluation Form
Form 3.4 - Guide Codes for the USDA Community Trees Evaluation Form

Defective trees: Risk assessment guidelines

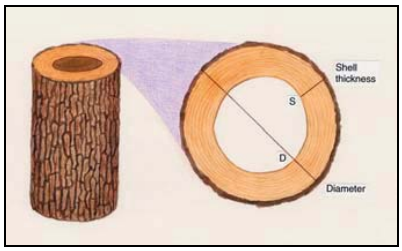
Tree defects	Moderate risk of failure	High risk of failure
Decay = Wood that has rotted or is missing. Indicators of advanced decay are rotten wood, fungal fruiting bodies, cavities, holes, open cracks or bulges in the wood.	• Indicators of advanced decay are found on 25% to 40% of the circumference of any stem, branch or root collar. • Shell thickness is >1 and < 2 inches of sound wood for each 6 inches of stem diameter and stem has opening < 30% of stem circumference.	• Indicators of advanced decay are found on ≥ 40% of the circumference of any stem, branch or root collar. *Note: In order to verify the extent of decay, you may want to use probes or drills to determine shell thickness.* • Stem has advanced decay and the shell thickness meets the following criteria: • Shell thickness < 1 inch of sound wood for each 6 inches of stem diameter, or, • Stem has an opening ≥ 30% of the stem circumference and shell thickness is ≤ 2 inches of sound wood for each 6 inches of stem diameter. • Any large branch with decay.
Crack = crack is a separation of the wood ; a split through the bark into the wood.	• Stem has a single crack and decay**.**	• Stem is split in two by a crack. • Stem segment has multiple cracks and decay. • Branch has a crack.
Root problems = inadequate anchoring by the root system, damaged roots or stem girdling roots.	• Roots within the area defined by the Critical Root Radius are ≤ 40% damaged, decayed, severed, or dead.	• Leaning tree with recent evidence of root lifting, soil movement or soil mounding. • Roots within the Critical Root Radius are ≥ 40% damaged, decayed, severed, or dead. • Girdling roots constrict ≥ 40% of the root collar.
Weak branch union = An epicormic branch or a branch union with included bark.	• Branch union has included bark.	• Weak union is also cracked, cankered or decayed. • Large epicormic branch on decaying stem.
Canker = An area where bark and cambium are dead.	• Canker or canker plus decay affect 25% to 40% of the tree's circumference.	• Canker affects ≥ 40% of the tree's circumference. • Canker plus decay affect ≥ 40% of the tree's circumference.
Poor architecture = growth pattern indicates structural imbalance or weakness in the branch, stem or tree.	• Branch has a sharp bend or twist. • Large, horizontal branch with several vertical branches on it.	• Tree with excessive lean (> 40°). • Leaning tree has a crack in stem. • Leaning tree has canker or decay on the lower stem. • Leaning tree has a horizontal crack on the upper side of the lean and/ or buckling bark and wood on the lower side.
Dead wood = A dead tree or dead branches.		• Any lodged branch. • Any dead tree, tree top or branch.

Defects : Defects are visible signs that a tree is failing or has the potential to fail. Defects predispose a tree to fail at the location of the defects.
Defective tree : A tree with one or more defects.
Risk of failure : Risk of tree or branch failure can be predicted because defects indicate which part of the tree is structurally the weakest. Since defect severity can change, the tree's risk of failure can change over time.
Moderate risk of failure : Currently, the tree's defects do not meet the threshold for failure. The defects may or may not result in eventual tree failure. "Moderate risk" trees need to be closely monitored to determine if the defects have changed since the last inspection.
High risk of failure : Currently, these defects indicate that the tree is in imminent danger of failing or has already partially failed. Corrective action should be taken as soon as possible.
Risk management : These guidelines are intended to provide the information needed to evaluate the failure potential of inspected trees. They are only guidelines. Absolute rules can not be made because of the natural variability of trees and their defects. ***All of the defective trees can not be detected, corrected or eliminated.*** However, by doing inspections and acting on them, we can successfully manage the risk of tree failure.

Inspections : Be systematic and complete. Inspect annually, except where policy indicates otherwise. Additional inspections should be done after severe storm events. Common sense, experience and professional judgment are required of the trained tree inspector.
Tree species, age, size and condition : These all play a role in the type, extent and severity of defects. Certain species are consistently prone to certain defects. Old trees tend to have more defects. Trees in good condition have the capacity to create more wood which can reduce the severity of some defects over a period of years.
Exposure and crown size : Open-grown trees with full crowns have a higher exposure to winds than trees growing in groups or stands. Recent change in wind exposure or crown size can affect the severity of defects.
Documentation : ALWAYS document inspections and actions. Use a form that records inspection date, tree species, tree location, defects and their severity, recommended actions, action taken and date. It's helpful to map the area. Remember to document the "Low Risk" trees.
Treatment : Correcting defective trees can be as creative as your imagination and resources allow. Treatments include: moving the target, rerouting traffic, closing off or fencing off the site, pruning the defective branches, reducing the crown weight/ exposure and, ultimately, removing the tree.

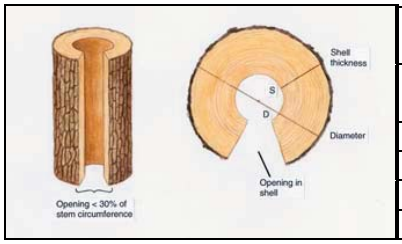
Epicormic branch : Epicormic branches are new, younger branches that replaced injured, pruned or declining branches. They form weak unions because they are not attached all the way to the center of the stem.
Decay : Decay is generally limited to the column of wood present at the time of wounding. Measure shell thickness to determine if enough sound wood remains to support the tree. The risk of failure increases when decay columns expand into the new wood because there is no sound shell of wood near those defects. Continuously expanding columns of decay are the result of inrolled cracks (rams-horning), girdling roots and canker-rot infections.

Minimum amount of sound wood in shell needed:



Need 1" of sound shell for each 6" of diameter	
Stem Diameter	Shell thickness
6"	1"
12	2
18	3
24	4

For stem without openings or cracks.

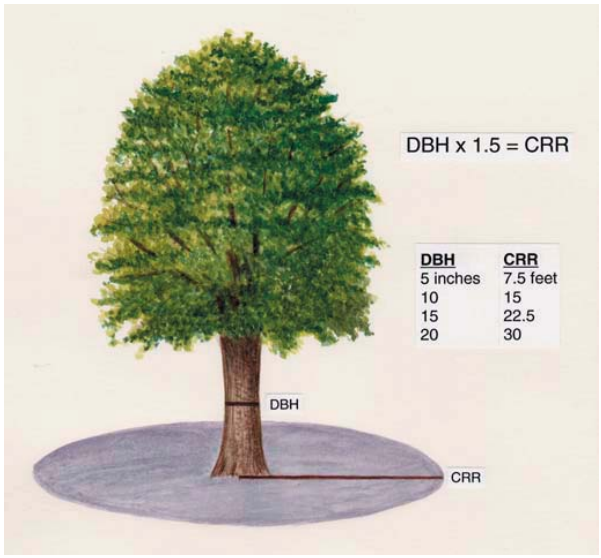


Need 2"of sound shell for each 6" of diameter	
Stem Diameter	Shell thickness
6"	2"
12	4
16	6
24	8

For stem with openings < 30% of stem circumference.

Critical root radius : The CRR is used to define the portion of the root system nearest the stem that is critical for stability and vitality of the tree. This area is usually <u>beyond</u> the dripline of the tree. The radius of this circular area is defined as

CRR (in feet) = DBH x 1.5.



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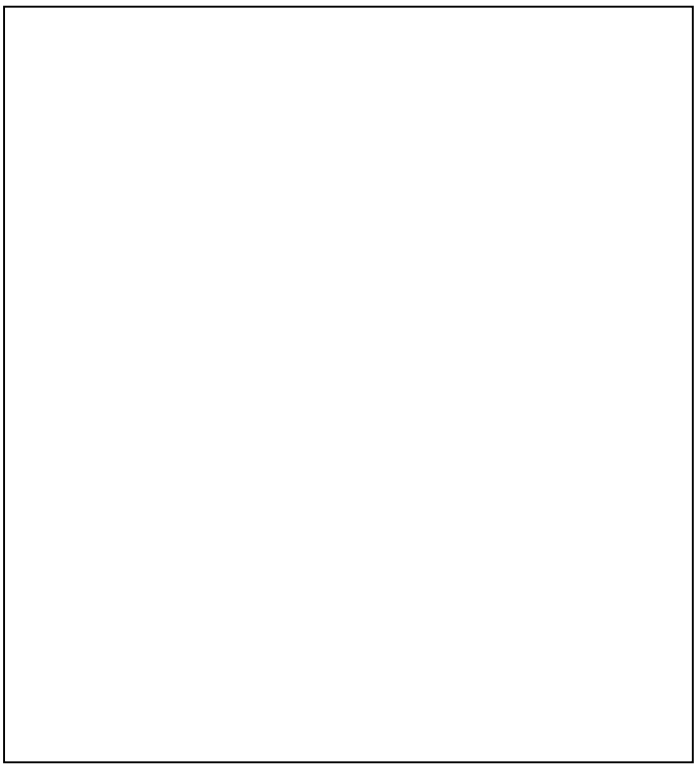
HAZARD TREE INSPECTION FORM



MAP

Unit _____

Subunit _____

Inspectors _____

_____

_____

Date _____

Remarks _____

_____

_____

_____

Tree location or map number	Tree species	Defect(s)	Hazard potential H or M	Remarks	Recommended action	Action taken/date

Local Manager _____ Date _____

Source: MN DNR

USDA COMMUNITY TREE RISK EVALUATION FORM
Example Form *

Location:_____ Date:_____ Inspector(s):_____

Tree #	Species	DBH	Location (Street Address)	Defect Code(s)	1 Probability of Failure	2 Size of Defective Part(s)	3 Probability of Target	4 Other Risk Factors (Optional)	Description of Other Risk Factors	Risk Rating (Sum of Columns 1-4)	Corrective Action Code(s)	Action Completed	
					1-4 pts	1-3 pts	1-3 pts	0-2 pts		3-12 pts		Date	Initials

* This is an *example* form adapted from various sources by the US Forest Service, Northeastern Area Hazard Tree Training Team. The US Forest Service assumes no responsibility for conclusions derived from the use of this form. Managers should construct their own forms, based on need and experience.

Revised: 4/03

Guide to Risk Rating Codes

(companion guide to the Community Tree Risk Evaluation Form)

PROBABILITY OF FAILURE: **1-4 points**

1. **Low:** some minor defects present:
   - minor branch/ crown dieback
   - minor defects or wounds

2. **Moderate:** several moderate defects present
   - stem decay or cavity within safe shell limits: shell thickness > 1 inch of sound wood for each 6 inches of stem diameter
   - crack(s) without extensive decay
   - defect(s) affecting 30-40% of the tree's circumference
   - crown damage/breakage: hardwoods up to 50%; pines up to 30%
   - weak branch union: major branch or codominant stem has included bark
   - stem girdling roots: <40% tree's circumference with compressed wood
   - root damage: < 40% of roots damaged within the CRR

3. **High:** multiple or significant defects present:
   - stem decay or cavity at or exceeding shell safety limits: shell thickness < 1 inch of sound wood for each 6 inches of stem diameter
   - cracks, particularly those in contact with the soil or associated with other defects
   - defect(s) affecting > 40% of the tree's circumference
   - crown damage/breakage: hardwoods >50%; pines >30%
   - weak branch union with crack or decay
   - girdling roots with > 40% of tree's circumference with compressed wood
   - root damage: > 40% of roots damaged within the CRR.
   - leaning tree with recent root breakage or soil mounding, crack or extensive decay
   - dead tree: standing dead **without** other significant defects

4. **Extremely High:** multiple **and** significant defects present; visual obstruction of traffic signs/lights or intersections:
   - stem decay or cavity exceeding shell safety limits **and** severe crack
   - cracks: when a stem or branch is split in half
   - defect(s) affecting > 40% of the tree's circumference or CRR **and** extensive decay or crack(s)
   - weak branch union with crack **and** decay
   - leaning tree with recent root breakage or soil mounding **and** a crack or extensive decay
   - dead branches: broken (hangers) or with a crack
   - dead trees: standing dead **with** other defects such as cracks, hangers, extensive decay, or major root damage
   - visual obstruction of traffic signs/lights or intersections
   - physical obstruction of pedestrian or vehicular traffic

SIZE OF DEFECTIVE PART(S): **1-3 points**

1. Parts less than **4** inches in diameter
2. Parts from **4 to 20** inches in diameter
3. Parts **greater than 20** inches in diameter

PROBABILITY OF TARGET IMPACT: **1-3 points**

1. **Occasional Use:**
   - low use roads and park trails; parking lots adjacent to low use areas; natural areas such as woods or riparian zones; transition areas with limited public use; industrial areas.

2. **Intermediate Use:**
   - moderate to low use school playgrounds, parks, and picnic areas; parking lots adjacent to moderate use areas; secondary roads (neighborhoods) and park trails within moderate to high use areas; and dispersed campgrounds.

3. **Frequent Use:**
   - emergency access routes, medical and emergency facilities and shelters, and handicap access areas; high use school playgrounds, parks, and picnic areas; bus stops; visitor centers, shelters, and park administrative buildings and residences; main thoroughfares and congested intersections in high use areas; parking lots adjacent to high use areas; interpretive signs, kiosks; scenic vistas; and campsites (particularly drive-in).

OTHER RISK FACTORS: **0-2 points**

- This category can be used if professional judgment suggests the need to increase the risk rating.

- It is especially helpful to use when tree species growth characteristics become a factor in risk rating. For example, some tree species have growth patterns that make them more vulnerable to certain defects such as weak branch unions (silver maple) and branching shedding (beech).

- It can also be used if the tree is likely to fail before the next scheduled risk inspection.

Table 1. Defect Codes

Code	*Defect*
D	**D**ecay
CR	**CR**ack
Root	**R**oot **P**roblems
RSG	**S**tem **G**irdling
RS	**S**evered
RPD	**P**lanting **D**epth (too deep)
RGC	**G**rade **C**hange
RSB	**S**idewalk **B**uckling
WBU	**W**eak **B**ranch **U**nion
CA	**CA**nker
PTA	**P**oor **T**ree **A**rchitecture
PTA:LT	**L**eaning **T**ree
PTA:TT	**T**opped **T**ree
EE	**E**xcessive **E**picormics
DEAD	**DEAD** tree, tops or branches
VO	**V**isible **O**bstruction
PO	**P**hysical **O**bstruction

Table 2. Corrective Action(s) Codes

Prune	
PD	**D**eadwood
PW	**W**eakwood (defective part(s))
PC	for **C**learance
PT	to **T**hin crown or reduce crown weight
PR	to **R**educe crown height
Target	
TM	**M**ove
TEV	**E**xclude **V**isitors from Target Area
CB	**C**able/**B**racing
CWT	**C**onvert to **W**ildlife **T**ree
RT	**R**emove **T**ree
Monitor	**M**onitor regularly
NA	**N**o **A**ction Required