

Certification Training

Chapter 12

Tree Assessment and Risk Management

**Illinois Chapter
Arborist Certification
Training**

March 1, 2016



Risk Assessment and Management

Risk Assessment is the process of determining the potential of an event occurring and the consequences.

Risk Management is the process of implementing a risk reduction strategy based on your assessment and available resources.

Introduction

Tree Risk Assessment

Process of evaluating the likelihood of a tree, or tree part failing and causing a negative consequence.

We perform tree risk assessments:

1. Enhance public safety
2. Protect our employees
3. Promote tree longevity by anticipating failures.

Risk Assessment Basics

Tree Risk Assessment considers three factors:

1. The potential for a tree, or tree part to fail.
2. The environment that may contribute to the failure.
3. The potential to cause harm.

Introduction

Tree Risk Management

Developing long-term strategies that reduce negative consequences.

Risk management is carried out through tree risk assessments:

1. Identify acceptable levels of risk
2. Clear understanding of resource being managed
3. Evaluate resource limitations

Risk Assessment Basics

The **potential for failure** is determined by a number of factors:

- Species
- Size
- Structure
- Defects
- Root System Integrity
- External Factors



Photo Credit: Natural Path Urban Forestry, 2014

Risk Assessment Basics

Trees are adaptive organisms. A tree or branch fails when the load (demand) exceeds the capacity of the tree to counter the affects of loading.

Risk Assessment Basics

Environmental factors can have a substantial negative affect on a trees capacity to manage loads.

Factors include:

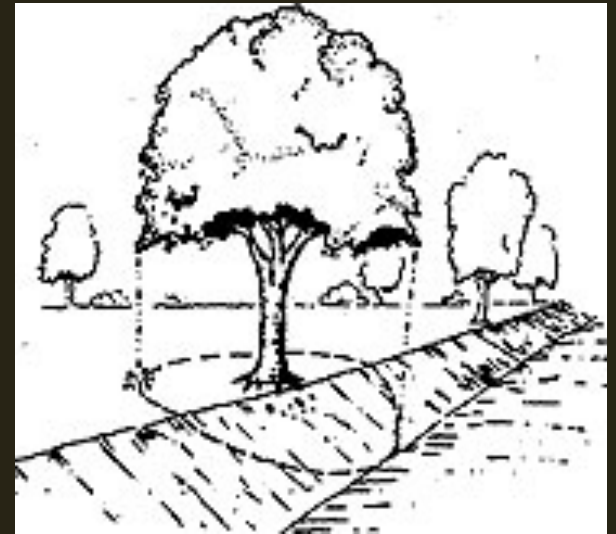
- ☞ Exposure to wind
- ☞ Snow and ice loading
- ☞ Lightening
- ☞ Rainfall



Risk Assessment Basics

Historical factors also play a role in the environmental contribution to failures

- ❧ Construction, grade changes
- ❧ Removal of adjacent trees
- ❧ Replacement of sidewalks
- ❧ Failure of adjacent trees
- ❧ Change in wind dynamics



Risk Assessment Basics

Targets are people or property that can be harmed or damaged from a tree part failure.



Restaurant Parking Lot – Wilmington, NC
Photo Credit: Natural Path Urban Forestry, 2014



School Playground – Bogota, Colombia
Photo Credit: Natural Path Urban Forestry, 2014

A tree is not considered a hazard if a target is not present.

Case Study

Owner of the tree determines the level of risk they are willing to accept.

Large Sycamore (*Platanus occidentalis*) over a house that the resident chose to keep after a risk assessment suggested removal

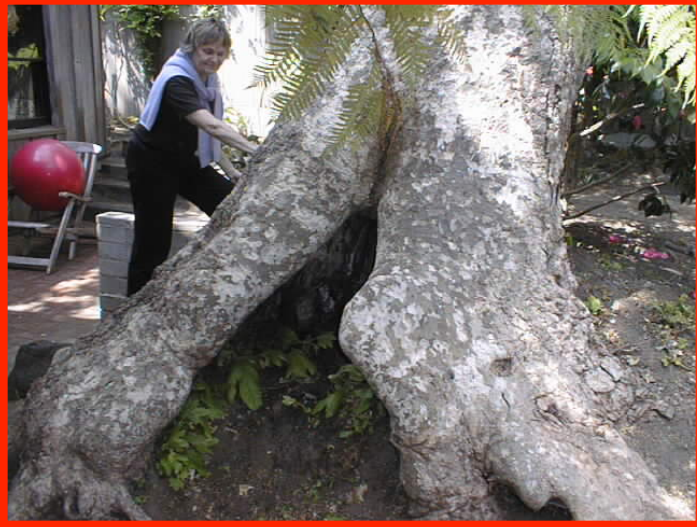


Photo Credits: Natural Path Urban Forestry, 2014



Tree Inspection

The ability to predict tree failure is limited, but with proper training, arborists can learn to identify characteristics that have been associated with failure.

Tree Inspection

Systematic and consistent process:

- Crown dieback and decline
- Branch attachments
- Leans
- Trunk taper
- Root collar inspection



Photo Credit: Natural Path Urban Forestry, 2014

Tree Inspection

Familiarity with:

- Tree species and typical modes of failure
- Normal growth traits
- Structure and form
- Signs of decay



Tree Inspection

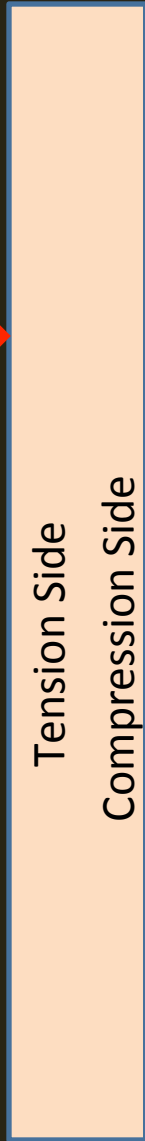
Visual Tree Assessment (VTA) is a systematic inspection from the ground.



Photo Credits: Natural Path Urban Forestry, 2014

Tree Inspection

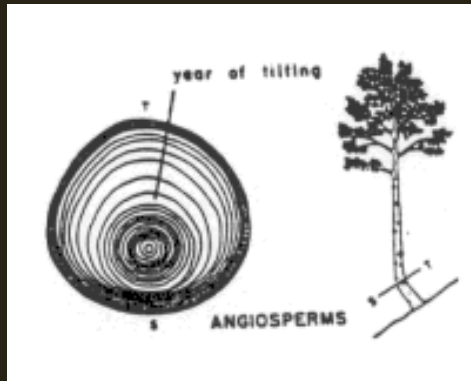
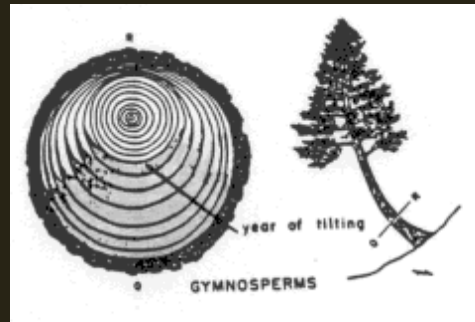
The words tension and compression are used in two ways within arboriculture. The first is to identify areas of stress. In these images, depending on how the structure is supported and where forces are applied the structure either stretches (tension) or compresses (compression)



Tree Inspection

The second use of these words is to identify two types of reaction wood.

Gymnosperms form compression wood on the compression side of a tree to compensate for a lean or suspended branch.



Angiosperms form tension wood on the tension side of a tree to compensate for a lean or suspended branch.

Tree Inspection

Reaction wood – wood developed by the tree to compensate for external loading such as a lean or gravity.

Tension Wood
Compression Wood

Indicators of Decay

Positive Indicators:

- Fruiting Bodies
- Open cavities
- Visible decay



Potential indicators:

- Cracks
- Bulges
- Old pruning wounds
- Carpenter ants



Photo Credits: Natural Path Urban Forestry, 2014

Tree Inspection

Taper – develops in reaction to movement from wind.

Taper allows a tree to absorb stresses from external loads by efficiently transferring loads into the trunk and root system.



Tree Decay

Significant amounts of decay in load-bearing portions of the tree reduce structural strength and increase failure potential.

Positive indicator of decay means that decay is present.

Potential indicators of decay are symptoms or signs that decay may be present.

Case Study

Branch failure from a Norway Maple (*Acer platanoides*) resulting in a fatality.

Defect was a shear crack caused by opposing stresses from alternating tension and compression



Photo Credits: Natural Path Urban Forestry, 2014



Tree Decay

Brown Rot – Primarily affects cellulose, leaving behind stiff lignin...reduces bending strength (*Laetiporous*).

White Rot – Primarily affects lignin, leaving behind flexible cellulose (*Ganoderma*).



Photo Credit: Natural Path Urban Forestry, 2014

Soft Rot – is similar to brown rot but has characteristics of both

Tree Decay

Basal Rot – decay located at the base of the tree.

Heartwood Rot– decay found in the center of the tree.



Sapwood Rot – decay found in the outer shell of the tree. Significance is that it compromises strength of the tree column shell.

Further Investigation

Numerous, more advanced, assessment tools exist to assist risk assessment diagnosis.

- Root Collar Investigation
- Root Excavation Device
- Sounding
- Increment Borer
- Decay Detection Device
- Tomography



Photo Credit: Natural Path Urban Forestry, 2014

Further Investigation

Resistance drilling is one example of a decay detection device. With a 2 mm flexible shaft, it records resistance while drilling into the tree.



Photo Credits: Natural Path Urban Forestry, 2014

Further Investigation

Tomography is another method of a decay detection. In this instance, it provides a cross sectional image of a tree using sound waves.

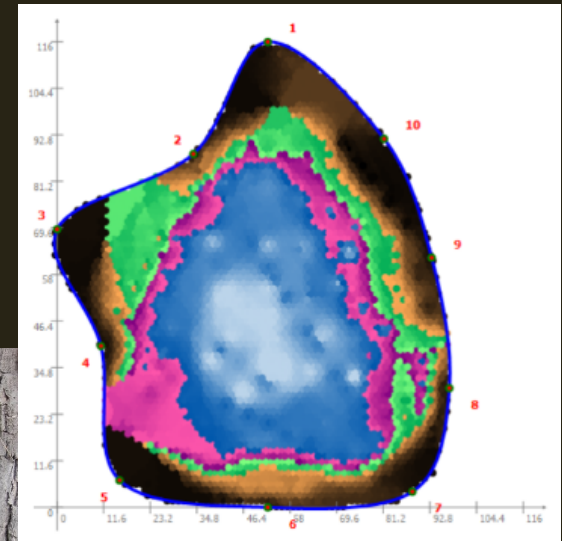
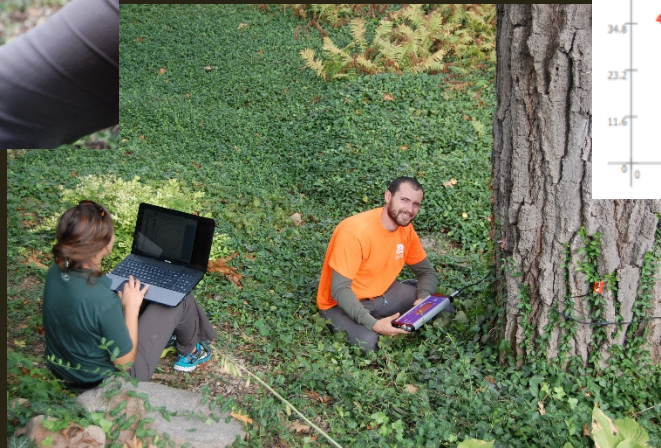


Photo Credits: Natural Path Urban Forestry, 2014



Mitigation Options

Mitigation is the process of reducing failure potential. It involves strategies to reduce risk to an acceptable level.

- Crown Cleaning
- Crown Reduction
- Support Systems
- Moving Target
- Reducing or Eliminating Access
- Removal

Mitigation Options

Support Systems



Mitigation Options

Support Systems



Source: Natural Path Urban Forestry, 2014



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Liability and Negligence

Duty of Care – Exhibit due diligence in inspecting and caring for the trees under their care.

Liability – Defines legal responsibility

Negligence – Failure to exercise due care

Standard of Care – Degree of care that a reasonably prudent person should exercise in the same or similar circumstances.

Case Study

Municipal owned tree failed and crushed a vehicle parked on the road.

Town was sued for damages and the judge allowed the damages because:

1. The town did not have a regular inspection program,
2. The town did not have a regular maintenance program,



Photo Credits: Natural Path Urban Forestry, 2014

3. the resident called numerous times voicing concerns for the tree
4. the decay column was visually obvious, and
5. The tree was marked for removal but it was not removed in a timely fashion.

Case Study

Municipal owned tree failed and crushed a car on private property.

Town was sued for damages and the judge dismissed the case because the town was able to demonstrate:

1. that they had a regular inspection program,
2. a regular maintenance program,



Photo Credits: Natural Path Urban Forestry, 2014



3. the resident did not call in any concerns for the tree, and
4. the cavity was not visually obvious when the tree was still standing.