Hazard Tree Assessment

What is a Hazard Tree?

A tree is considered hazardous when it has a structural defect that predisposes it to failure and the tree is located near a target.

- A target is an area where personal injury or property damage could occur if the tree, or a portion of the tree fails.
- Targets include sidewalks, walkways, roads, vehicles, structures, campsites, playgrounds or any other area where people are likely to gather.
- Structurally sound and healthy trees may also be hazardous if they interfere with utilities, roadways, walkways, raise sidewalks or obstruct motorist vision.
- Common hazards include dead trees, dead branches, stubs from topping cuts, broken branches (hangers), multiple leaders, tight angled crotches and an unbalanced crown.

Hazardous Situations

1. When a tree is in poor health and dying, we call it in “decline”.
2. A dead, dying or diseased tree can be an extreme hazard, no matter where it is located.
3. Some trees will never recuperate from the combined stresses placed on them, but will take months, even years to become fully dead. There comes a time when, no matter what you do, the tree will die, so being aware of the tell-tale signs of insect damage, diseases and decline will save you the risk of having a hazard tree in a public place.
4. Catching the signs early may prevent the loss of a valuable specimen.
5. Healthy trees are flexible and limber in storms, however, sick trees are much more brittle and limbs will snap and break with the wind instead of swaying with it. These limbs will snap, as might the entire tree, causing property damage, personal injury and possibly a cut in service.

Liability

Property owners / managers have a legal obligation to (1) periodically inspect trees for unsafe conditions, (2) correct unsafe conditions immediately upon detection or (3) contact the proper authority (City DPW) immediately upon detection.

- **Trees in Decline in Public Places:**
  - Follow the mechanism in place for contacting the DPW when a potentially hazardous situation is noticed.

By nature of their size, weight, miscellaneous structure, constant exposure to the weather and the elements, susceptibility to insect pests and decay organisms, use as homes to birds and animals and other reasons, trees always pose an inherent degree of hazard and risk from breakage, failure and other causes and conditions. The recommendations made are intended to minimize, reduce or eliminate hazardous conditions associated with trees.

Inspection

A thorough inspection of trunk, branches, branch unions, root crown / trunk flair and area around the root system is essential in detecting hazardous conditions. Use binoculars or telephoto lens to examine branches up in the canopy.

Identify where to start.

1. Trees along access roads; major storm routes
2. Pick out key access areas
    a. :Hospitals, DPW, Fire, Police, Highways
3. Urban areas – high population areas
    a. Identify potential problems and targets

Consider the following factors when inspecting trees:

1. **Tree health:** Trees in poor health may have many dead twigs, dead branches, or small, off-color leaves. Trees in good condition will have full crowns, vigorous branches, and healthy full sized leaves. Trees that appear healthy may have other structural defects that will render it unsafe.
2. **Tree species** – Certain tree species are prone to specific types of defects. Some species of maple, ash and pear often form weak branch unions, while some other fast growing species of maple, aspen, ailanthus and willow are weak-wooded and prone to breakage at a relatively young age (50 – 70 years).
3. **Tree age and size** – Trees are living organisms subject to constant stress. Pay close attention to older trees which may have developed multiple defects and extensive decay over the years.

Identifying Hazards:

Dead wood.

Dead trees and large dead branches are unpredictable and can break and fall at any time. Dead wood is often dry and brittle and cannot bend in the wind like a living tree or branch. Dead branches and tree tops that are already broken off (hangers or widow makers) are especially dangerous.

Take immediate action if...

- A broken branch or top is lodged in a tree.
- A tree is dead.
- A branch is dead and of sufficient size to cause injury (this will vary with height and size of branch).

Roots:

Start from the ground up. Trees with root problems may blow over in windstorms. They may even fall without warning in summer when burdened with the weight of the tree's leaves. There are many kinds of root problems to consider, e.g., severing or paving-over roots; raising or lowering the soil grade near the tree, parking or driving vehicles over the roots, or extensive root decay.

Soil mounding, twig dieback, dead wood in the crown, and off-color or smaller than normal leaves are symptoms often associated with root problems. Because most defective roots are underground and out of sight, aboveground symptoms may serve as the best warning.

Take action if...

- A tree is leaning with recent root exposure, soil movement, or soil mounding near the base of the tree.
- More than half of the roots under the tree's crown have been cut or crushed. These trees are dangerous because they do not have adequate structural support from the root system.
- Advanced decay is present in the root flares or "buttress" roots.

Trunk

1. ***Cracks****:* A crack is a deep split through the bark, extending into the wood of the tree. Cracks are extremely dangerous because they indicate that the tree is already failing.
    a. Split trees. Take it down. A liability
    b. Note cracks or swollen areas of tree.
    c. Frost cracks or other cracks may not heal properly will weaken the tree.

2. **Decay Fungus or Open Cavities**
    a. Rams horns heartwood will decay. Cambium is pushed together addition of more cambium will force the tree to crack.
    b. If 1/3 of the base of the tree has rot or if decay is present, needs to be removed.
    c. Decaying trees can be prone to failure, but the presence of decay, by itself, does not indicate that the tree is hazardous. Advanced decay, i.e., wood that is soft, punky, or crumbly, or a cavity where the wood is missing can create a serious hazard. Evidence of fungal activity including mushrooms, conks, and brackets growing on root flares, stems, or branches are indicators of advanced decay.

A tree usually decays from the inside out, eventually forming a cavity, but sound wood is also added to the outside of the tree as it grows. Trees with sound outer wood shells may be relatively safe, but this depends upon the ratio of sound to decayed wood, and other defects that might be present. Evaluating the safety of a decaying tree is usually best left to trained arborists.

Take action if...

- Advanced decay is associated with cracks, weak branch unions, or other defects.
- A branch of sufficient size to cause injury is decayed.
- The thickness of sound wood is less than 1" for every 6" of diameter at any point on the stem.

3. **Girdling**.
    a. Hoses or supports left on tree too long will create girdling.
    b. String trimmers will cut through thin bark and cambium layer of young trees, disrupting water and nutrient flow from root system into canopy. The tree dies from starvation.

4. **Leaning trees**.
Mass of tree leans over. A leaning tree may be a hazard. Because not all leaning trees are dangerous, a professional arborist should examine any leaning tree of concern.
    a. Conifers put on compressional wood at the base.
    b. Deciduous trees add tensional wood near the top.
    c. Look at root flair for mounding, problems in tree or cavities.
    d. Look at the windward for larger roots to assess.

    Take action if...
    - A tree leans excessively.
    - A large branch is out of proportion with the rest of the crown.

5. **Poor Architecture**:
Poor architecture is a growth pattern that indicates weakness or structural imbalance. Trees with strange shapes are interesting to look at, but may be structurally defective. Poor architecture often arises after many years of damage from storms, unusual growing conditions, improper pruning, topping, and other damage.

6. **Taper**;
A pole like structure is bad. A tree needs a wide base and gets narrower at the top.
    a. These trees are often found in wooded lots. In the woods, all trees support each other. Clear these lots and most trees will not survive. Trees need good taper to survive

Canopy

1. **Crotch angle**.
A tight angle is a weak one. Wide angle is a strong attachment.

2. **Included bark** causes branch or trunk failure
    a. Size of branch could be a factor
    b. Co-dominant stems have included bark that often rots in the center. This is a weakness in the tree structure. Unusual winds or microbursts will often break them apart. Also: wind, weight of snow, ice and heavy rains.

3. **Co – dominant stems**. Too many stems coming out at once may have included bark.

4. **Other weak structure / attachments**:

a. Topped trees promote sucker growth. Sucker growth comes out of sapwood and is poorly attached.
b. Pollarding causes sucker growth. Not good, especially around power lines.
c. Lions tailing. Branch tips put on excess growth. The weight is on the branch tips, rather than being properly distributed. These branches will fall apart.
d. Bradford Callery Pears have poor branch attachments; a very dense crown
    i. All branches come out of the same place.
    ii. As branches grow, tree canopy gets heavy and falls apart or acts as a sail in a windstorm, often breaking tree apart.

5. **Distribution of branches**; balance and uniformity. An even distribution of branches on either side of tree to equalize the weight

6. **Proper cuts**: Just before the branch collar to allow cambium to grow over wound
    a. When a cut is too deep, bark can crack and tree is weakened.
    b. Bad cuts promote sucker growth and poor sap flow.

7. **Premature leaf drop**
    a. Is canopy getting enough nutrients? Look for girdling. Look for other signs of disease or decay.
    b. Drought. Drought stress will often affect trees 2 – 3 years later.

Corrective Actions

Corrective actions begin with a thorough evaluation. If a hazardous situation exists, there are three recommended options for correcting the problem: move the target, prune the tree, or remove the tree.

1. Move the Target

Removing the target is often an inexpensive and effective treatment for correcting a hazard tree. Easily moved items like play sets and swings, RV's, and picnic tables can be placed out of the reach of the hazardous tree with little effort and expense.

If the target cannot be moved and a serious hazard exists, consider blocking access to the target area until the hazard can be properly eliminated.

2. Prune the Tree

A defective branch or branches may cause a hazardous situation, even though the rest of the tree is sound. In this case, pruning the branch solves the problem.

Prune when...

a. A branch is dead.
b. A branch of sufficient size to cause injury is cracked or decayed.
c. A weak branch union exists and one of the branches can be removed.
d. Branches form a sharp angle, twist, or bend.
e. A branch is lopsided or unbalanced with respect to the rest of the tree.

f. A broken branch is lodged in the crown. Remove the branch and prune the stub.

Pruning a tree properly early in its life is a good way to effectively avoid many potential problems when the tree is older and larger. When done correctly, routine pruning of trees does not promote future defects. If done improperly, immediate problems may be removed, but cracks, decay, cankers, or poor architecture will be the ultimate result, creating future hazards.

3. Remove the Tree

Before cutting a tree down, carefully consider the alternatives. The effects of removing a tree are often pronounced in landscape situations and may result in reduced property values. Tree removal should be considered as the final option and used only when the other two corrective actions will not work. Tree removal is inherently dangerous and is even more serious when homes and other targets are involved. Removal of hazardous trees is usually a job for a professional arborist.

a. **Cabling and Bracing**
Cabling and bracing does not repair a hazard tree, but when done correctly by a trained arborist, it can extend the time a tree or its parts are safe. Done incorrectly, it creates a more serious hazard. We do **not** recommend cabling or bracing as treatment for a hazard tree unless the tree has significant historic or landscape value.

b. **Topping and Tipping--Poor Pruning Practices**
Topping is the practice of pruning large upright branches at right angles to the direction of growth, sometimes used to reduce the height of the crown. Tipping is the cutting of lateral branches at right angles to the direction of growth to reduce crown width. Both of these practices are harmful and should **never** be used. The inevitable result of such pruning wounds is decay in the remaining stub, which then serves as a very poor support to any branches that subsequently form. Trees that are pruned in this manner are also misshapen and esthetically unappealing.

Conflicts with Infrastructure

1. Overhead Wires

- Only a professional arborist with certification may work in and around public utility lines. It is best to plant trees, in such a way, that conflicts with overhead wires are minimized.

2. Sidewalks

§ **Conflicts and Alternatives**

- Plant on the other side of the sidewalk
- Move / curve sidewalk around trees
- Eliminate mow strips where possible in urban areas
    - Mow strips were created prior to electricity and overhead wires.

- Streets were not paved, but were often cobbles or dirt, which are considered porous pavement, allowing water to seep through, giving street trees ample space for root growth and moisture.
- They were planting areas for trees created to keep pedestrian cool and provided protection from run-away horses.

Prevention:

- **Things that Weaken trees**
  a. Strapping trees
  b. Filling with concrete
  c. Mulch or fill around the root collar allowing insects and rot to invade the tree at this point.
  d. Wires, tree wrap, nylon cord or burlap left on the tree, which will cause eventual girdling, decline and death.

- **Root and bark girdling**
  a. Plant at correct depth. Remove excess soil, mulch from around base of tree.
  b. Make sure plant is not pot bound. If so, separate and spread out roots when planting.
  c. Remove all supports, wires and cording from around trunk to prevent eventual girdling and poor sap flow.

References:

USDA site **http://www.na.fs.fed.us/spfo/pubs/howtos/ht_haz/ht_haz.htm**

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Suggested Reading

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