


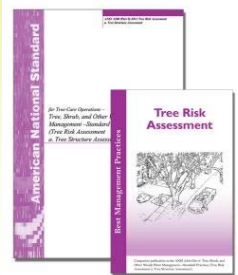

Tree Risk Management in Urban Tree Care

Jim Clark



Tree Risk Management


- ANSI Standards
 - Z133
 - A300
- ISA Best Management Practices

Tree Risk Management


- ANSI Standards
 - Z133
 - A300
- ISA Best Management Practices

Standards are the limits on **what to do**
BMPs are **how to implement** the Standard






Tree Risk Standard & BMP

- Restore the balance between safety and benefits provided by trees
- Risk to human safety is extremely low


Levels of Assessment


- Level 1 – Limited Visual
- Level 2 – Basic
- Level 3 – Advanced


Level 1: Limited Visual Assessment

- Limited, specified perspective:**
 - Drive-by
 - Walk-by
 - Aerial patrol
- Stationary target



 **Level 1: Limited Visual Assessment**

- **Failure potential either imminent or probable**
- **Obvious defects**
 - Dead
 - Failed tree/branch
 - Cracks
 - Fruiting bodies
 - Lean
 - Cavities



 **Level 1: Limited Visual Assessment**


- **Tree inventories**




 **Level 1: Limited Visual Assessment**


- **Single inspection (after storm)**



 **Level 1: Limited Visual Assessment**

- **Routine, scheduled inspections**
- **Change**
 - Health
 - Orientation
 - Out of ordinary



 **Level 1: Limited Visual Assessment**


- **Users**
 - Municipal & County Roads & Public Works
 - State Highway
 - USDA Forest Service
 - USDI National Park Service




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 **Level 1: Limited Visual Assessment**

- **Utilities**



 **Level 1: Limited Visual Assessment**


- **Document findings & action**
 - Abatement
 - Trees / areas needing follow-up



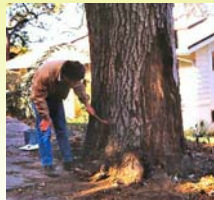
 **Level 2: Basic Assessment**


- **360° ground-based visual inspection**
- Traditional, common, routine inspection.




 **Level 2: Basic Assessment**


- Crown, trunk, above-ground roots & site conditions
- In relation to surrounding targets
- Simple tools




 **Level 2: Basic Assessment**

- Synthesis of observations
- Mitigation options & residual risk
- Inspection period




 **Level 3: Advanced Assessment**

- **When information from visual inspection is insufficient**
- Everything in basic assessment
- Detailed information




Level 3: Advanced Assessment

- Aerial inspection
- Root collar inspection
- Internal decay assessment
- Target analysis
- Soil profile investigation
- Wind speed/pattern analysis



Levels of Assessment

- Level 1 – Limited Visual
- Level 2 – Basic
- Level 3 – Advanced



Tree Risk Categorization

Risk → Likelihood & Consequences

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Tree Risk Categorization

Risk → Likelihood & Consequences


↓

Likelihood of tree failing & Likelihood of impacting target

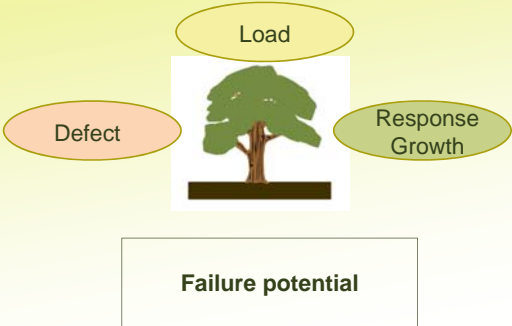
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Tree Risk Categorization: Failure modes

- “All of the main risk targets should be considered when conducting a risk assessment” (p34)
 - Road
 - Street parking
 - Sidewalk
 - Residence
 - Yard



Likelihood of Failure



Load

Defect

Response Growth

Failure potential


Likelihood of Failure

Categorized based on a specific time period

- **Improbable** – the tree is **not** likely to fail even in severe weather conditions
- **Possible** – failure could occur, but it is unlikely during normal weather
- **Probable** – failure is expected under normal weather conditions
- **Imminent** – failure has started or is most likely to occur in the near future, even if there is no wind or increased load

Likelihood of Failure

- **BMP Appendix 3.**
- Structural defects & likelihood of failure
- E.g. cracks: probable or imminent



Likelihood of Striking Target




Target Zone

Is the target?

- static
- mobile
- moveable


Occupancy

- occasional
- intermittent
- frequent
- constant



Target Zone
Area where a tree or branch is likely to land if it were to fail

Target Zone



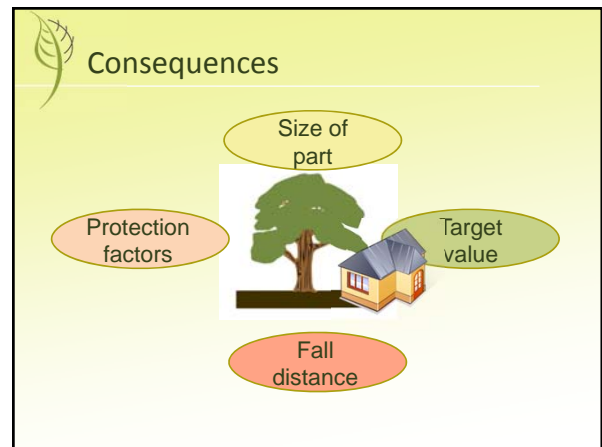
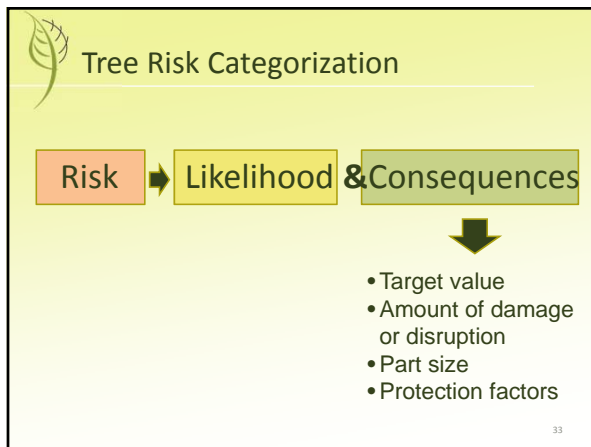
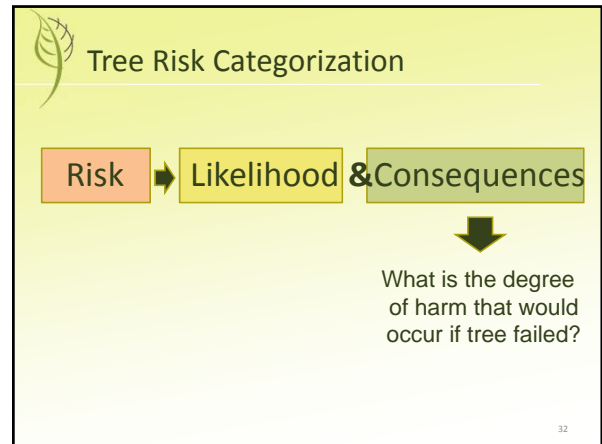
- **Target....**
 - Stage
 - Play structure
 - Truck
 - Person on stage
 - Person on play structure
 - Person in truck

Likelihood of Impact

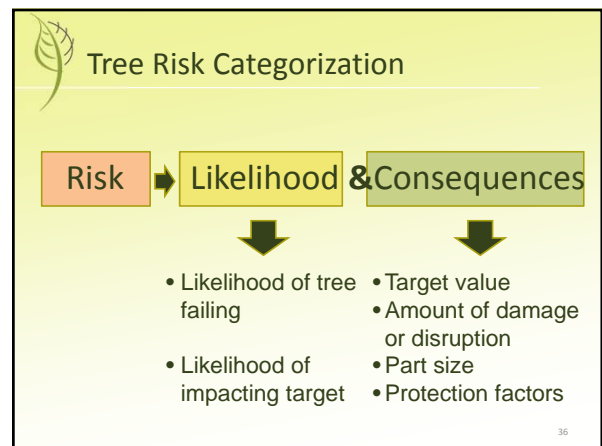
- **Very Low** – The chance of impacting a target is remote
- **Low** – It is not likely that the target will be impacted
- **Medium** – The target may or may not be impacted
- **High** – The target is likely to be impacted

Likelihood Summary

Likelihood of Failure	Likelihood of Impact Target			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely



- ### Consequences
- **Negligible** – low value property damage; personal injury is unlikely
 - **Minor** – low to moderate value property damage; personal injury is unlikely
 - **Significant** – moderate to high value property damage; people could be injured
 - **Severe** – high value property damage; one or more people could be injured or killed



Risk Rating Matrix

Likelihood of Failure & Strike Target	Consequences of the Tree Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Residual risk

- Risk remaining after abatement treatment...
- Level needs to be acceptable to client



ISA Tree Risk BMP

- Reports
 - Inspection level
 - Likelihood of failure
 - Likelihood of impact
 - Consequences
 - Risk
 - Abatement treatments & residual risk



ISA Tree Risk B

- Reports
- Explanation of method as enclosure

Tree Risk Assessment – ISA BMP Definitions

Risk: the likelihood for conflict or tree failure occurring and affecting a target, and the severity of the associated consequences – personal injury, property damage, or disruption of activities. Categorized as Low, Moderate, High, Extreme.

Hazard: situation or condition that is likely to cause harm (injury, damage or disruption).

Hazardous tree: one identified as a likely source of harm.

Residual risk: risk remaining after mitigation.

Likelihood of Failure: The probability that the tree or branch will fail within a specified time frame. Based on species, extent of decline, anticipated loads and response growth. Categorized based on the tree frame established in the report as:

- Very likely:** failure will occur in the next 5 years.
- Likely:** failure will occur within 5 to 10 years.
- Somewhat likely:** failure will occur within 10 to 20 years.
- Unlikely:** failure will occur in more than 20 years.

Likelihood of Impact: The probability that the failed tree or branch will impact a target. Based on target location, occupancy use, anticipated fall direction, and target protection factors. Categorized as:

- Very low:** cannot or unlikely to impact.
- Low:** may impact.
- Medium:** may or may not impact the target, with evenly equal likelihood.
- High:** will most likely impact the target.

Consequences: effects or outcome of an event, including personal injury, property damage, or disruption of activities. Based on: target value, tree part size, fall distance, and target protection. Categorized as:

- Negligible:** low-value property damage (replace or repair), and do not involve personal injury.
- Minor:** moderate property damage, small disruption of traffic or utility, or very minor injury.
- Significant:** high-value property damage, considerable disruption, or personal injury.
- Severe:** serious personal injury or death, high-value damage, or disruption of important activities.

Matrix 1: Likelihood matrix

Likelihood of Failure	Likelihood of Impacting Target			
	Very low	Low	Medium	High
Very likely	Low	High	Very High	Extreme
Likely	Low	High	Very High	Extreme
Somewhat likely	Low	High	Very High	Extreme
Unlikely	Low	High	Very High	Extreme

Matrix 2: Risk rating matrix

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Written: Chapter 164 Florida Administrative Code on Tree Risk Assessment
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Tree Risk Standard & BMP

- Inspection level
- Risk rating:
 - Likelihood of failure
 - Likelihood of impact
 - Consequences
- Residual risk
- Reporting/document ation

