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Assessing Extent & Severity of Mechanical Injuries to Trees on Development Sites

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Determine & record the following items in the field —

1. Diameter of stem or branch at site of recent injury:
   - A. If the stem / branch area including the injury has little or no taper along its longitudinal axis then measure mid-injury diameter of the stem / branch. (midDIAMETER)

     OR

   - B. If the stem / branch area including the injury area has significant taper along its longitudinal axis, from injury top to bottom, then measure the diameter of the stem / branch at the top and bottom of injury. (topDIAMETER & bottomDIAMETER)

2. Dimensions of injury:
   - A. Total linear height or length (along longitudinal axis) of injury on stem / branch. (injuryHEIGHT)
   - B. Total linear width (perpendicular to longitudinal axis) of injury — not circumference of injury area. (injuryWIDTH)
   - C. Depth of injury at deepest point (as best as can be determined or estimated). (injuryDEPTH)

3. Estimate number of annual rings and tissue types breached with injury.

4. Location of injury section in tree.

5. Species of tree —
   attempt to gauge effectiveness & efficiency of tree's reaction to injury.

steps in determining tree injury

Damage Assessment Value

STEP 1A: Determine stem / branch whole segment volume (no taper) =
injuryHEIGHT X 0.785 X (midDIAMETER)^2

OR

STEP 1B: Determine stem / branch whole segment volume (taper) =
injuryHEIGHT X 0.262 X (topDIAMETER)^2 +
0.785 X (bottomDIAMETER)^2 +
SQUARE ROOT of [0.616 X
(topDIAMETER)^2 X (bottomDIAMETER)^2].

STEP 2: Determine injury segment volume (ellipsoidal shape factor) =
0.5 X injuryHEIGHT X injuryWIDTH X injuryDEPTH.

STEP 3: Determine DAMAGE EXTENT SCORE =
((VOLUME of injury segment (STEP 2) /
VOLUME of whole segment (STEP 1)) X 100

STEP 4: Determine DAMAGE SEVERITY SCORE.
Estimate number of annual rings & tissue types breached in injury.

Select one description that most fully matches the depth of the injury:

1. Bark to xylem (score = 0)
2. Expanded growing points, one, or two year old xylem (score = 1)
3. Three to seven year old xylem -- 100% sapwood (score = 2)
4. Seven year old xylem to end of sapwood -- 100% sapwood (score = 5)
5. Heartwood (score = 11)
6. Existing damage-modified heartwood and discoloration / decay columns (score = 23)

STEP 5: Determine DAMAGE LOCATION SCORE.

1. Root collar / stem base area — two feet out and four feet up (score = 7)
2. Root plate area -- structural rooting zone supporting tree under compression (score = 6)
3. Stem base of the live crown (score = 5)
4. Stem / trunk (score = 4)
5. Injury into reaction wood on basal 1/4 of the length of primary scaffold branches -- upper side tension wood in angiosperms & lower side compression wood in non-angiosperms (score = 3)
6. Ground contact / rain splash / direct irrigation wetting area (score = 2)
7. South and Southwest exposure with full sun (score = 1)

Locations numbers 1-5 above are unique positions and are non-additive.
Locations numbers 6 & 7 are additive with other location scores.

STEP 6: Determine DAMAGE ASSESSMENT VALUE.

DAMAGE ASSESSMENT VALUE =
EXTENT SCORE +
SEVERITY SCORE +
LOCATION SCORE

Species and individual tree differences play a critical role in setting management objectives for an area, for risk acceptance levels, and for tree removal decisions using the DAMAGE ASSESSMENT VALUE.

For long-term tree quality, suggested DAMAGE ASSESSMENT VALUES generated where managerial notice should particularly occur are at 15, 22.5, and greater than 30. Removal should be considered at a DAMAGE ASSESSMENT VALUE of 31 and above.

Citation:

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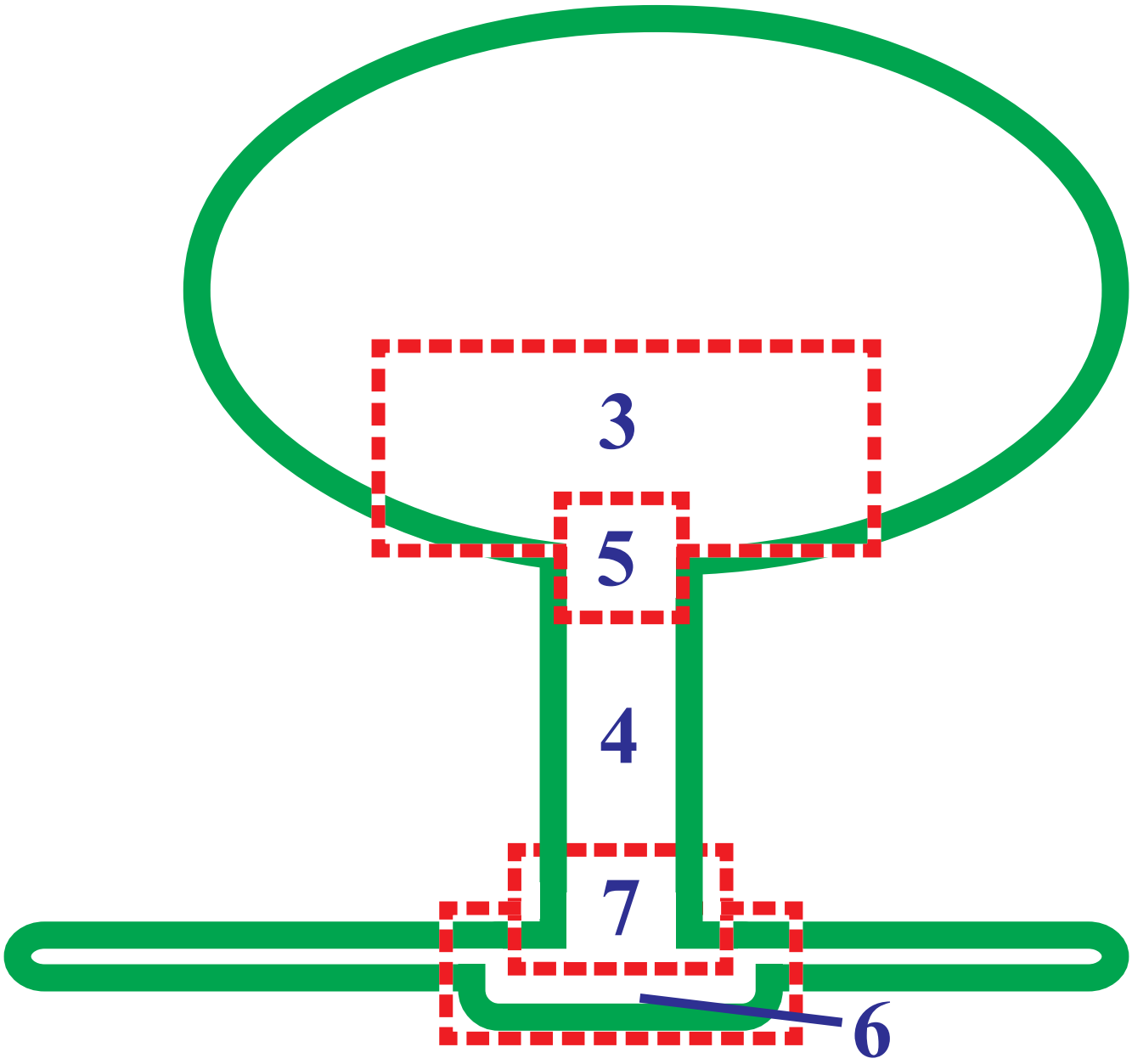

Figure for STEP 5 -- **DAMAGE LOACTION SCORE**
Score values for different injury locations within critical tree structural zones for use in assessing injury damage.