



Australian Government

Assessment Requirements for AHCARB701 Analyse tree biomechanics

Release: 1

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Modification History

Release	TP Version	Comment
1	AHCv1.0	Initial release

Performance Evidence

The candidate must be assessed on their ability to integrate and apply the performance requirements of this unit in a workplace setting. Performance must be demonstrated consistently over time and in a suitable range of contexts.

The candidate must provide evidence for and demonstrate:

- determining existing physical loads affecting trees
- identifying areas of high stress on trees and the factors that affect these areas of high stress
- assessing root plate environment including depth and consistency of soil, spatial limitations and history of site excavations
- assessing prior tree pruning operations to branches and roots
- determining extent of decay and damage of trunk and root system
- assessing strength and material properties of structural wood, particularly in areas of high stress
- determining wind environment of tree
- determining surface area of structure exposed to wind
- determining crown surface area exposed to wind
- assessing aerodynamic drag factor of tree crown in relation to trunk diameter and extent of hollowness
- estimating primary loads occurring in seasonal climatic events
- determining wind-load of prevailing storms
- determining load associated with saturated foliage
- considering additional drag associated with saturated foliage
- determining appropriate static load on trees for structural integrity testing as an estimate of a wind equivalent load
- calibrating static load testing instruments so loads are accurately applied and maintained within limits of structural safety during a static test
- carrying out a static test that loads the tree, measures the trunk strength and assesses root plate anchorage in the ground
- monitoring loads and forces electronically
- monitoring tree to ensure loads are kept within safe limits and damage is avoided to tree

- maintaining accurate records of all data from static test.
- comparing data with benchmarks obtained from stable tree populations
- documenting a report on structural integrity testing of tree from the static load test.
- researching tree biomechanics studies using dynamic methods of analysis
- understanding simple models of tree dynamics
- reviewing complex models and finite element analyses that provide multimodal approaches representing dynamics of branches on trees
- calculating the existing mass of branches
- determining degree of open-grown form of tree by calculation the of branch mass
- calculating the vector of force on the tree
- determining the tree dynamic response in defined wind velocity and direction
- researching the level of contribution of material properties in tree dynamics
- researching the dynamic effect of branches on frequency and damping
- determining the level of contribution of form and morphology in tree dynamics
- reviewing suitability of invasive and non-invasive methods of testing
- evaluating and determining likelihood of structural failure
- confirming level of anchoring potential of root system and stability of tree
- documenting a structural integrity report and provide to client.

Knowledge Evidence

The candidate must demonstrate knowledge of:

- physical loads affecting trees
- areas of high stress on trees
- root plate environment including depth and consistency of soil, spatial limitations and history of site excavations
- prior tree pruning operations to branches and roots
- extent of decay and damage of trunk and root system
- assessment of strength and material properties of structural wood
- wind environment of tree
- surface area of structure exposed to wind
- crown surface area exposed to wind
- aerodynamic drag factor of tree crown in relation to trunk diameter and extent of hollowness
- estimation of primary loads occurring in seasonal climatic events
- wind-load of prevailing storms
- load associated with saturated foliage
- additional drag associated with saturated foliage
- static load
- static load test
- appropriateness of a static load on trees for structural integrity testing as an estimate of a wind equivalent load
- calibrating static load testing instruments

- limits of structural safety during a static test
- measurement of trunk strength
- assessment of root plate anchorage in the ground
- monitoring loads and forces electronically
- monitoring of tree to ensure loads are kept within safe limits
- avoidance of damage to tree
- maintenance of accurate records of all data from static test
- benchmarks obtained from stable tree populations
- reporting on structural integrity testing of tree
- researching tree biomechanics studies using dynamic methods of analysis
- simple models of tree dynamics
- complex models and finite element analyses
- multimodal approaches representing dynamics of branches on trees
- calculations of existing mass of branches
- open-grown form of tree
- vector of force on trees
- tree dynamic response
- wind velocity and direction
- material properties in tree dynamics
- dynamic effect of branches on frequency and damping
- form and morphology in tree dynamics
- of invasive and non-invasive methods of testing
- likelihood of structural failure
- level of anchoring potential of root system
- stability of tree
- structural integrity reporting.

Assessment Conditions

It is an industry requirement that competency in this unit requires the assessment of:

- five (5) static load tests, and
- five (5) dynamic load analyses.

Assessment must be demonstrated consistently over time in a suitable range of contexts and have a productivity-based outcome. No single assessment event or report is sufficient to achieve competency in this unit.

Assessment may be conducted in a simulated or real work environment, however determination of competency requires the application of work practices under work conditions.

The mandatory equipment and materials used to gather evidence for assessment include:

- equipment:
 - computer

- word processing software
- internet connection
- wind environment statistics
- static load equipment
- models of tree dynamics
- materials:
 - structural integrity report

Assessors must satisfy current standards for RTOs in the assessment of arboriculture units of competency.

Assessment must be conducted only by persons who have:

- tree biomechanics vocational competencies at least to the level being assessed
- current tree biomechanics skills directly relevant to the unit of competency being assessed

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72>