# AHCARB803 Edaphic Interactions of Trees and Structures Form

Arboriculture Australia™

| **Prerequisite competency completion** | | |
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| Has the candidate successfully completed the **required prerequisite unit** requirements of AHCARB803 Analyse edaphic interactions of trees and structures? | **Yes/No (Y/N)** | **Signed (Initialled)** |
| AHCARB701 Analyse tree biomechanics | | |
| **Required reports completion** | | |
| Has the candidate successfully completed the **required reports**? | **Yes/No (Y/N)** | **Signed (Initialled)** |
| Structural damage and stability report | | |
| Glossary of construction, architecture and engineering terminology | | |
| **Mandatory Equipment (as a minimum)** | | |
| Has each of the mandatory equipment items been used to gather evidence for assessment? | **Yes/No (Y/N)** | **Signed (Initialled)** |
| computer | | |
| word processing software | | |
| internet connection | | |
| digital camera with macro | | |
| diagnostic tools including sounding hammer, trowel, probe, cordless drill | | |
| soil testing equipment | | |
| digital dissection microscope 10–100x | | |
| compound microscope | | |
| microtome, staining and slide mounting equipment | | |
| slides and coverslips | | |
| temporary/permanent mountant | | |
| histochemical stains | | |
| **Knowledge Evidence** | | |
| Has the candidate successfully completed the **Knowledge Evidence** requirements by demonstrating knowledge of each of the line items below? | **Yes/No (Y/N)** | **Signed (Initialled)** |
| repose angle of soil materials | | |
| soil plasticity | | |
| soil moisture content | | |
| field capacity of soil | | |

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| effects of soil moisture on soil cohesion and plasticity | | |
| modes of soil liquefaction | | |
| soil texture | | |
| soil cohesion | | |
| shear strength of the soil | | |
| load bearing capacity | | |
| mass of soil plate | | |
| root morphology | | |
| root division | | |
| root distribution | | |
| buttressing | | |
| species development of tap root systems | | |
| anatomical features of tree roots | | |
| identification of tree roots based on anatomical features | | |
| research, experimental modelling and demonstration methods | | |
| forces and pressures exerted into or through the soil, directly and indirectly by trees | | |
| estimation and measurement of dimensions of roots exerting a force on a structure | | |
| calculation of the total surface area of the roots exerting a force on a structure | | |
| calculation of the force exerted by roots per unit of surface area of structure | | |
| calculation of the total force exerted by roots of a given surface area | | |
| measurement of volume of structures | | |
| calculation of the mass of structures | | |
| impact of gravity on mass | | |
| affect of leverage on the forces exerted by tree roots onto structure | | |
| factors of root–soil matrix interactions | | |
| area of contact between root and soil | | |
| elasticity of roots | | |
| tensile strength of roots | | |
| breaking stress of roots | | |
| root cross-sectional morphology | | |
| extent of root plate damage | | |
| extent of root plate deficiencies | | |
| extent of root plate defects | | |

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| impact of static and dynamic testing for root plate stability | | |
| likelihood of root failure by root breakage | | |
| likelihood of anchorage failure by soil breakage or slippage | | |
| effects of increasing mass | | |
| effects of use of curved structures | | |
| effects of soil mass and friction | | |
| effects of, increasing the modus of rupture | | |
| effects of use of anchors, braces and props | | |
| portfolio of research | | |
| personal annotations and calculations | | |
| report preparation | | |
| test results and assumptions | | |
| relative stability of tree | | |
| whole tree failure | | |
| design suggestions for mitigation of damage and whole tree failure | | |
| harm by roots on structures | | |
| expert witness reports | | |
| expert witness report on harm by roots on structures | | |
| construction language terminology | | |
| engineering language terminology | | |
| installation and protection measures | | |
| concepts, basic science and technology of structural engineering | | |
| concepts, basic science and technology of construction | | |
| concepts, basic science and technology of architecture | | |
| **Performance evidence** | | |
| Has the candidate successfully demonstrated the **Performance Evidence** requirements of the unit of competency AHCARB803 Analyse edaphic interactions of trees and structures**, and as per listed line items below?** | **Yes/No (Y/N)** | **Signed (Initialled)** |
| researching repose angle of soil materials | | |
| researching soil plasticity | | |
| measuring soil moisture content and field capacity of soil | | |
| researching the effects of soil moisture on soil cohesion and plasticity | | |
| researching modes of soil liquefaction | | |
| determining soil texture | | |

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| assessing level of soil cohesion | | |
| determining shear strength of the soil of concern | | |
| researching load bearing capacity of soil of concern | | |
| determining mass of the soil plate | | |
| determining root morphology, division and distribution | | |
| determining amount of buttressing of tree | | |
| determining species development of tap root system | | |
| researching identifying anatomical features of tree roots | | |
| identifying tree roots based on anatomical features | | |
| researching, experimentally modelling or demonstrating forces and pressures exerted into or through the soil, directly and indirectly by trees | | |
| estimating and measuring dimensions of roots exerting a force on a structure of concern | | |
| calculating total surface area of the roots exerting a force on a structure of concern | | |
| calculating force exerted by roots per unit of surface area of structure | | |
| calculating total force exerted by roots of a given surface area | | |
| measuring and determine volume of structure of concern | | |
| researching and calculate mass of the structure and adjacent structures | | |
| considering the impact of gravity on mass | | |
| determining affect of leverage on the forces exerted by tree roots onto structure of concern | | |
| determining factors of root–soil matrix interactions | | |
| considering area of contact between root and soil | | |
| considering elasticity, tensile strength and breaking stress of roots | | |
| investigating root cross-sectional morphology | | |
| assessing extent of root plate damage, deficiencies or defects | | |
| estimating impact of static and dynamic testing for root plate stability | | |
| evaluating the likelihood of root failure by root breakage | | |
| evaluating the likelihood of anchorage failure by soil breakage or slippage | | |
| researching and considering effects of increasing mass | | |
| researching and considering methods for, and effects of, increasing the modus of rupture | | |
| researching and considering effects of use of curved structures | | |

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| researching and considering effects of soil mass and friction | | |
| researching and considering effects of use of anchors, braces and props | | |
| compiling a portfolio of above research including personal annotations and calculations | | |
| preparing report on likelihood of tree causing damage to structure of concern including all test results, assumptions and calculations | | |
| providing design suggestions to mitigate likelihood of damage to a similar replacement structure | | |
| preparing report on relative stability of tree as a result of a defective or damaged root plate | | |
| providing design suggestions to mitigate likelihood of whole tree failure as a result of defective or damaged root plate | | |
| preparing expert witness report on harm by roots on structures; or on stability of tree with a defective or damaged root plate, as required | | |
| reviewing construction and engineering language terminology | | |
| discussing installation and protection measures to non-arboricultural team members | | |
| resolving issues in construction and engineering terminology | | |
| communicating in the language, concepts, basic science and technology of construction, architecture and engineering allied professions | | |
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| **Assessment conditions** | | |
| It is an industry requirement that competency in this unit requires the preparation of a minimum of **two (2) different** reports:<br>• a report on harm by roots on structures<br>• a report on stability of tree with a defective or damaged root plate | | |
| Have the assessments incorporated the assessment conditions and met the industry requirements for competency in this unit **as per listed line items below?** | **Yes/No (Y/N)** | **Signed (Initialled)** |
| Has the assessment confirmed the completion of a report on the harm by roots on structures? | | |
| Has the assessment confirmed the completion of a report on the stability of tree with a defective or damaged root plate? | | |
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| Assessment may be conducted in a simulated or real work environment; however, determination of competency requires the application of work practices under work conditions. | **Yes/No (Y/N)** | **Signed (Initialled)** |
| Have assessments been demonstrated consistently over time? | | |

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| Have assessments been demonstrated in a suitable range of contexts? | | |
| Have assessments been demonstrated with a productivity-based outcome? | | |
| Have assessments been demonstrated with multiple assessment events and reports? | | |

**Assessor Declaration**

| **Assessors must satisfy current standards for RTOs in the assessment of arboriculture units of competency.**<br>**Has assessment been conducted only by persons who have:** | **Yes/No (Y/N)** | **Signed (Initialled)** |
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| • **tree biomechanics vocational competencies at least to the level being assessed?** | | |
| • **current tree biomechanics skills directly relevant to the unit of competency being assessed?** | | |

| **Assessor name** | **Assessor qualification** | **Year** | **Full Signature** |
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**Competency Determination**

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| This section determines the skills and knowledge required to analyse the edaphic interactions of trees and structures. | **Competent /Not yet competent** |
| **The candidate is competent in analysing the edaphic interactions of trees and structures.** | |

**Competency Assessment Completion**

| **Assessor name** | **Date** | **Full Signature** |
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