



Australian Government

Department of Education, Employment and Workplace Relations

CPCCSV5005A Apply footing and geomechanical design principles to domestic scale buildings

Release: 1

CPCCSV5005A Apply footing and geomechanical design principles to domestic scale buildings

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit of competency specifies the outcomes required to apply footing and geomechanical design principles to domestic scale buildings or those of a similar loading, construction and size, such as small industrial, commercial or public buildings. It includes the evaluation and distribution of soil types, and identification of appropriate footing systems and maintenance requirements for foundation components of the project.

Application of the Unit

Application of the unit This unit of competency supports the attainment of the understanding and skills to apply footing and geomechanical design principles to domestic scale buildings within the context of relevant legislation, the Building Code of Australia (BCA) and Australian standards.

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units Nil

Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Evaluate geological formation of rocks and their subsequent weathering to form various soil types.	1.1. Formation of igneous, sedimentary and metamorphic rocks is identified and documented. 1.2. Mode of transportation, deposition and formation of sands, gravels and clays are identified and documented.
2. Read and evaluate both topographical and geological maps.	2.1. Topographical and geological maps are interpreted without error. 2.2. Maps of both types are interpreted by drawing sections indicating features. 2.3. Retaining structures and systems suitable for various situations are identified.
3. Identify soil types and their behaviour.	3.1. Cohesive and granular soils are identified from hand specimens without error. 3.2. Soil types and soil properties are identified and calculated with reference to standards, codes and industry literature. 3.3. Effects of depth on overburden and pore water pressure are estimated.
4. Determine suitability of foundation soils to support various types of structures.	4.1. Meaning of total and differential settlement of a building is interpreted without error. 4.2. Factors influencing settlement and the ultimate bearing capacity of the ground are interpreted. 4.3. Total and net pressure on foundation soils due to the load of a structure is calculated to determine suitable foundation systems .
5. Identify and apply the various methods and applications of soil testing.	5.1. Australian standard laboratory testing of permeability, strength, consolidation and point load tests (for rocks) is identified and interpreted. 5.2. Australian standard for carrying out sub-soil investigations and in situ testing is identified and interpreted. 5.3. Soil testing methods are selected and applied or accessed through competent agencies.
6. Determine footing systems for the site conditions and building type.	6.1. Mechanism of soil shrinkage and swelling is interpreted. 6.2. Site classification for the design and construction of a footing system for a single storey dwelling is in accordance with the BCA. 6.3. Application of footings and geomechanical principles for the footing system for a domestic scale building is determined in accordance with BCA and adherence to legislative requirements .

ELEMENT	PERFORMANCE CRITERIA
7. Determine site maintenance requirements necessary to minimise long-term damage to the structure.	7.1. Influence of moisture content changes in clay soils on <i>maintenance requirements</i> is determined. 7.2. Minimisation strategies for long-term damage to a structure with respect to the soil conditions found on a particular site where active clays are located are recommended.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- ability to respond to change and contribute to workplace responsibilities, such as current work site environmental and sustainability frameworks or management systems
- communication skills to:
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - written skills to report evaluations
 - read and interpret:
 - BCA
 - legislation
 - reports
 - specifications
 - working drawings
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication
- numeracy skills to interpret complex mathematical information
- planning and organisational skills to collect, organise and analyse information
- problem solving skills to carry out tests and calculations and to use and apply data for decision making
- technological skills to:
 - complete documentation and calculations
 - enable information gathering and analysis.

REQUIRED SKILLS AND KNOWLEDGE

Required knowledge

Required knowledge for this unit is:

- behaviour of structural members undergoing stress, strain, compression, bending or combined actions
- design principles and concepts for footings
- geomechanical engineering principles
- nature of materials and effect on performance
- nature of soil mechanics and effect of performance in problem soils
- processes for the interpretation of working drawings and specifications
- processes for the preparation of documentation
- relevant federal, state or territory legislation and local government policy and procedures
- research methods
- structural design principles in buildings.

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

This unit of competency could be assessed in the workplace or a close simulation of the workplace environment, provided that simulated or project-based assessment techniques fully replicate construction workplace conditions, materials, activities, responsibilities and procedures.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- comply with OHS regulations applicable to workplace operations
- apply organisational management policies and procedures, including quality assurance requirements where applicable
- assess the footing requirements for at least one domestic scale building project or equivalent, which includes advice on positioning and sizing
- analyse and report on the soil types and properties of at least two domestic scale building projects or equivalent
- provide reports to appropriate body/individual as determined by the project brief.

Context of and specific resources for assessment

This competency is to be assessed using standard and authorised work practices, safety requirements and environmental constraints.

Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Assessment is to comply with relevant regulatory or Australian standards' requirements.

Resource implications for assessment include:

- an induction procedure and requirement
- realistic tasks or simulated tasks covering the mandatory task requirements
- relevant specifications and work instructions
- tools and equipment appropriate to applying safe work practices

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- support materials appropriate to activity
- workplace instructions relating to safe work practices and addressing hazards and emergencies
- material safety data sheets
- research resources, including industry related systems information.

Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.

Method of assessment

Assessment methods must:

- satisfy the endorsed Assessment Guidelines of the Construction, Plumbing and Services Training Package
- include direct observation of tasks in real or simulated work conditions, with questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application
- reinforce the integration of employability skills with workplace tasks and job roles
- confirm that competency is verified and able to be transferred to other circumstances and environments.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice, with a decision on competency only taken at the point when the assessor has complete confidence in the person's demonstrated ability and applied knowledge
- all assessment that is part of a structured

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learning experience must include a combination of direct, indirect and supplementary evidence.

Assessment processes and techniques should as far as is practical take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed. Supplementary evidence of competency may be obtained from relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Soil types include:

- clay soils and rock
- saturated granular soils.

Soil properties include:

- bulk density
- degree of saturation
- dry density
- moisture content
- porosity
- void ratio.

Foundation systems must be suitable for:

- building type
- site conditions.

Application of footings and geomechanical principles includes:

- assessment of geomechanical and footing design for domestic scale buildings
- identification of the nature, composition, classification and distribution of soil type.

Adherence to legislative requirements is limited to:

- domestic scale buildings (similar in characteristics to those of residential dwellings in terms of loading, construction and size and

RANGE STATEMENT

Maintenance requirements
include:

- may include small industrial, commercial and public buildings).
- identification of surface water, ground water and tree root systems.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area