



Australian Government

Department of Education, Employment and Workplace Relations

CPCBC4011B Apply structural principles to commercial low rise constructions

Release: 1

CPCBC4011B Apply structural principles to commercial low rise constructions

Modification History

Not Applicable

Unit Descriptor

Unit descriptor

This unit of competency specifies the outcomes required to apply structural principles to the erection or demolition of low rise projects of a more complex nature than single residential dwellings, which are typically commercial structures classified in the Building Code of Australia (BCA) as Classes 2 to 9 with a gross floor area not exceeding 2000 square metres but not including Type A or Type B construction.

Knowledge of the application of structural principles in accordance with Australian standards is essential.

Application of the Unit

Application of the unit

This unit of competency supports the needs of builders, site managers, forepersons and other managers in the building and construction industry responsible for overseeing and managing the erection or demolition of low rise structures.

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. Apply structural principles to the planning of the erection or demolition of a structure.	1.1. Main <i>structural principles</i> that apply to erection or demolition of a <i>low rise</i> commercial structure are identified. 1.2. Structural performance of a structure is described in terms of the effect of section properties on various <i>materials and their related construction methods</i> . 1.3. Structural performance characteristics of slabs, beams, columns and retaining walls are explained and applied to planning of the construction work. 1.4. Demolition of existing structures is coordinated in accordance with safe work practices and legislative, environmental and planning requirements.
2. Analyse and plan for the structural integrity of Class 2 to 9 buildings.	2.1. Relevant <i>industry professionals</i> are consulted as required to provide advice regarding the design process and structural integrity of proposed commercial low rise building. 2.2. <i>Project documentation</i> is collected and analysed to assist in the analysis of plans and specifications. 2.3. Project documentation is analysed for compliance with BCA requirements for bushfire, high wind, earthquake and alpine environments. 2.4. New and emerging building technologies are assessed for application to the construction process and their compliance with BCA requirements and Australian standards. 2.5. Pre-commencement site inspection is conducted to confirm analysis.
3. Plan, coordinate and manage laying of footing systems.	3.1. <i>Footing systems</i> are set out in accordance with building's plans. 3.2. Structural integrity of the footings specified in building's plan is assessed for compliance with relevant codes and accepted industry construction principles. 3.3. Footings specified in building's plan are laid and checked for compliance with project documentation. 3.4. Damp coursing and provision of termite barriers and other relevant techniques are planned, implemented and checked in accordance with codes, standards and industry practice.
4. Plan, coordinate and manage laying of floor system.	4.1. Floor system components specified in building's plan are assessed for structural integrity and compliance with relevant codes and accepted industry construction principles.

ELEMENT**PERFORMANCE CRITERIA**

4.2. Laying of *structural floor system* specified in building's plan is supervised and checked for compliance with project documentation.

ELEMENT	PERFORMANCE CRITERIA
5. Plan, coordinate and manage the building of structural wall systems and wall cladding systems.	<p>5.1. Technical construction principles and performance characteristics of <i>structural wall systems</i> and <i>wall cladding systems</i> are identified and analysed in the planning of the building and construction project.</p> <p>5.2. Processes for erecting wall systems and wall cladding systems are identified, implemented and checked for compliance with manufacturer specifications and relevant Australian standards and codes.</p> <p>5.3. Building plans and relevant standards and codes are identified and implemented to ensure appropriate allowances have been made for <i>relevant services</i> to be installed.</p> <p>5.4. Windows and external doors are installed in compliance with relevant codes, manufacturer specifications and accepted industry construction principles.</p>
6. Plan, coordinate and manage the building of structural roof systems and roof cladding systems.	<p>6.1. Structural integrity of the <i>structural roof system</i> and <i>roof cladding system</i> components specified in building's plan is assessed for compliance with relevant codes and accepted industry construction principles.</p> <p>6.2. Construction of roof system and roof cladding system, including details of service penetrations, skylights and roof ventilators, is planned, implemented and checked in accordance with building plan's requirements, type of roof being constructed, relevant codes and accepted industry construction principles.</p> <p>6.3. Processes are put in place and managed to ensure quality of finished roof system.</p>

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:

- analytical skills and the capacity to foresee potential problems
- apply Australian standards, codes and manufacturer specifications

REQUIRED SKILLS AND KNOWLEDGE

- apply structural principles to a variety of low rise structures
- construction management and planning techniques
- coordination of the work and advice of internal and external professionals
- communication skills to:
 - consult with industry professionals
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - read and interpret project documentation
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication
- identify and analyse relevant information
- low rise construction building problem solving
- numeracy skills to apply calculations
- select structural members based on project or specification requirements
- work safely to OHS regulations and site requirements.

Required knowledge

Required knowledge for this unit is:

- building and construction industry contracts
- new and emerging building technologies, techniques and materials
- relevant state or territory building and construction codes, standards and government regulations
- underlying principles related to structural analysis
- workplace safety requirements.

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 by the effective application of structural principles and concepts for erection and demolition in accordance with the range of variables and application in a low rise building project. This unit of competency can 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:

- assess structural integrity of a variety of structures found on building and construction sites
- apply structural principles behind the safe erection and demolition of low rise structures classified within the BCA as Classes 2 to 9 with a gross floor area not exceeding 2000 square metres but not including Type A or Type B construction
- apply technical construction principles to the appropriate selection, integration and building in of construction elements and components
- coordinate, plan, implement and check building of a low rise structure.

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:

- documentation that should normally be available in either a building or construction

EVIDENCE GUIDE

office

- relevant codes, standards and government regulations
- office equipment, including calculators, photocopiers and telephone systems
- computers with appropriate software to view 2-D CAD drawings, run costing programs and print copies
- technical reference library with current publications on measurement, design, building construction and manufacturers' product literature
- suitable work area appropriate to the construction process.

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

EVIDENCE GUIDE

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 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.

Structural principles include:

- loads and loading
- section properties
- behaviour of structural materials
- performance of beams
- performance of columns
- performance of roof trusses
- principles of formwork
- solution of force systems
- wind bracing.

Low rise commercial buildings as

- Classes 2 to 9
- with a gross floor area not exceeding 2000

RANGE STATEMENT

described within the BCA are: square metres, not including Type A or Type B construction.

RANGE STATEMENT

Materials and their related construction methods may include:

- brick veneer and cladding over timber-framed and lightweight section steel-framed construction
- cavity brick construction
- earth-wall construction
- lightweight concrete construction, such as construction of autoclaved aerated concrete (AAC)
- pole frame construction
- portal frame construction
- post and beam construction
- post and truss construction
- single-leaf (reinforced) masonry construction
- tilt-slab construction.

Industry professionals include:

- architects
- draftspersons
- engineers
- quantity surveyors
- surveyors.

Project documentation includes:

- building approval plans
- contract plans
- design and specifications
- engineer's footing design and specifications
- original contour survey plans
- registered plans
- retaining walls and tanking design and specifications
- site plans
- soils investigation reports
- structural floor systems, wall systems and roof systems
- underpinning, rock anchors and shoring design and specifications.

Footing systems include:

- concrete slab floors
- drilled or driven piles
- mass concrete piers
- reinforced concrete piers and beams
- screw piles
- waffle pod slabs.

Structural floor system includes:

- brick bases
- engineered timber products

RANGE STATEMENT

- Structural wall systems*** include:
- panel systems of concrete and AAC
 - suspended and slab-on-ground concrete slab floors
 - timber and steel floor construction.
 - composite walls featuring tilt-slab, post and beam, pole and truss and portal frame
 - earth walls, including rammed earth and mud brick
 - framed walls incorporating timber, engineered timber products and lightweight section steel
 - masonry walls incorporating cavity brick, single-leaf masonry and lightweight concrete (AAC).
- Wall cladding systems*** include:
- boarding
 - coatings over base materials
 - sheeting
 - tilt-slab
 - unfired, fired and autoclaved masonry.
- Relevant services*** may include:
- ducting for heating and cooling
 - electrical, electronic and communication systems
 - extractive vacuum and exhaust systems
 - passive and active fire detection and prevention systems
 - plumbing and drainage
 - powered systems for operating doors and windows
 - smoke control and containment systems.
- Structural roof system*** includes:
- for roof types including:
 - gable including dual pitch
 - hip
 - north light
 - rafter and purlin
 - skillion
 - prefabricated and site fabricated trussed roof framing.
- Roof cladding system*** includes:
- concrete, clay and metal tiles
 - shakes and shingles
 - short and long run metal sheeting.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area