Australian Government

CPCCST3017A Construct stone arches

Release 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

CPCCST3017A Construct stone arches

Modification History

New unit based on superseded unit BCG3056A Construct stone arches
This version first released with CPC08 Construction, Plumbing and Services Training Package Version 9.
Not equivalent to superseded BCG unit

Unit Descriptor

This unit of competency specifies the outcomes required to build stonemasonry arches of different types, using regular and irregular stone, and according to detailed job drawings and specifications.

Application of the Unit

This unit of competency supports the work of stonemasons who build internal or external stonemasonry arches, working individually or in a team.

Licensing/Regulatory Information

Check with relevant state and territory licensing and regulatory authorities. State and territory jurisdictions may have different regulatory requirements for work carried out on heritage structures.

Pre-Requisites

CPCCOHS2001A	Apply OHS requirements, policies and procedures in the construction industry

Employability Skills Information

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

Elements and Performance Criteria

1	Plan and prepare for work.	1.1	Work instructions are obtained from relevant ***information***, confirmed and applied to ***planning and preparation***.
		1.2	***Work health and safety (WHS) requirements*** are followed according to safety plans and policies.
		1.3	Signage and barricade requirements are identified and implemented.
		1.4	Plant, ***tools and equipment*** selected to carry out tasks are consistent with job requirements, checked for serviceability, and faults are rectified and reported before work begins.
		1.5	Material quantity requirements are identified and calculated according to plans, specifications and ***quality requirements***.
		1.6	***Materials*** appropriate to the work application are obtained, prepared, safely handled and located ready for use.
		1.7	***Environmental requirements*** are identified for the project according to environmental plans and ***statutory and regulatory authority*** obligations.
		1.8	Scaffolding is erected according to job and WHS requirements.

2	Set out and prepare arch work.	2.1	Location of ***arch*** is set out on base or footing for stone construction according to job drawings and specifications.
		2.2	Wall or columns are constructed according to job drawings and specifications up to level of springing line of arch.
		2.3	Supports are designed and constructed for ease of release without jarring stonework.
		2.4	Arch centring is raised according to specified height, located level across springing line and crown, and supported according to workplace requirements.
3	Construct arch with regularly cut stone.	3.1	Stones are cut according to job drawings and specifications.
		3.2	Pre-cut stones are checked for conformity with job specifications.
		3.3	Mortar is mixed according to job specifications and relevant standards as required.
		3.4	Central keystone is established and stones are laid to form arch according to job drawings and specifications.
		3.5	Regular stone is laid to form courses, and bond is maintained according to job drawings and specifications.
		3.6	Stones are cut, or pre-cut stones are used, to complete courses and abut arch stones.
		3.7	***Joints*** are made within specified tolerance while maintaining alignment and plumb of stone face.
4	Construct arch with irregular voussoirs forming stepped extrados.	4.1	Voussoirs/wedge stones that are delivered pre-cut are checked for conformity to design and order.
		4.2	Keystone of archway is positioned centrally and designed voussoirs are laid around centre to form arch.
		4.3	Regular stones are laid where voussoirs are designed to correspond with courses.

		4.4	Random regular stones are laid where voussoirs are not designed for regular gauged courses.
5	Construct arch with irregular stones.	5.1	Stones are pre-cut, or set out and cut, to suit shape of designed arch.
		5.2	Keystones are laid at crown and other arch stones are laid over centre to form arch to specifications.
		5.3	Wall is constructed of random rubble or random squared ashlar to match curved extrados according to arch specifications.
		5.4	Joints are made with mortar, with stones selected and matched close to abutting stones, and bond strength is maintained.
		5.5	Joints are made to specifications with wall maintained in alignment and plumb.
		5.6	Mortar joints are struck and finished according to specifications for finish.
6	Clean up.	6.1	Stonework is cleaned, area cleared of waste, and materials and equipment are removed.
		6.2	Waste and unwanted materials are disposed of safely.
		6.3	Unused materials are stored or stacked.
		6.4	Tools and equipment are cleaned, maintained and stored.

Required Skills and Knowledge

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

Required skills

- communication skills to:
  - enable clear and direct communication
  - use questioning to identify and confirm requirements
  - share information
  - follow instructions
  - use and interpret non-verbal communication
  - use language and concepts appropriate to cultural differences
- innovation skills to select appropriate tools and equipment, respond to workplace challenges and put ideas into action
- numeracy skills to apply measurements and calculate material requirements and mortar mixture
- planning and organising skills to identify requirements, apply relevant resources and sequence tasks
- problem-solving skills to recognise and take action to rectify minor faults and problems
- reading skills to read and interpret drawings and specifications
- self-management skills to work safely, including safely handling materials
- teamwork skills to work with others to action tasks
- technical skills to:
  - erect scaffolding
  - identify and select materials specific to requirements
  - select and use appropriate plant, equipment, hand and power tools

Required knowledge

- arch design and construction principles
- Australian standards as they relate to the construction of stonemasonry arches, including:
  - AS1316 Masonry cement
  - AS2699 Wall ties for masonry construction
  - AS3700 Masonry structures
- methods for constructing stonemasonry arches
- mortar mix composition for different types of stone
- National Construction Code as it applies to the construction of stonemasonry arches
- procedures for measuring, levelling and calculating
- procedures for the safe use of scaffolding

- range and application of mortar additives
- safe operation of tools, plant and equipment relating to arch construction
- types and characteristics of stone
- types and safe operation of relevant lifting equipment
- workplace and equipment safety requirements, including relevant statutory regulations, codes and standards

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 simulated workplace setting. Assessment shall be while tasks are undertaken either individually or as part of a team under limited supervision.

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

A person should demonstrate the ability to build two different types of stone arches and provide evidence of:

- complying with work health and safety requirements applicable to workplace operations
- complying with organisational policies and procedures
- selecting and using tools and equipment to carry out arch construction process
- applying organisational quality procedures and processes within the context of constructing stone arches to walls or columns
- adopting and using safe and effective procedures to set out and set up arch centre to specification
- giving particular attention to support of centre and method of lowering when arch is complete
- identifying and, where applicable, marking each cut stone for arch location
- using safe and effective procedures to handle and place each stone
- forming arch to specification and, where applicable, applying mortar to joints
- identifying typical faults and problems that occur and taking necessary action to rectify them
- communicating with others to ensure safe and effective workplace operations
- completing arch construction, including finish to specifications.

Context of and specific resources for assessment

Assessment of this unit:

- must be in the context of the work environment
- may be conducted in an off-site context, provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills
- must meet relevant compliance requirements.

Resource implications for assessment may include:

- drawings and specifications relevant to proposed activity
- hand and power tools, plant and equipment appropriate to construction processes
- materials relevant to proposed activity
- scaffolding appropriate to construction processes
- site location for proposed activity.

Method of assessment

Assessment for this unit must verify the practical application of the required skills and knowledge, using one or more of the following methods:

- direct observation of tasks in real or simulated work conditions
- questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application
- review of relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.

Guidance information for assessment

This unit could be assessed on its own or in combination with other units relevant to the job function.

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.

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.

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.

Information may include:

- diagrams or sketches
- instructions issued by authorised organisational or external personnel
- memos

- regulatory and legislative requirements
- current Australian standards relating to the construction of stone arches
- plans and specifications
- quality requirements
- safe work procedures
- safety data sheets (SDS)
- signage
- verbal, written and graphical instructions, including manufacturer specifications and instructions where specified
- work bulletins
- work schedules, plans and specifications.

Planning and preparation may include:

- assessing conditions and hazards
- determining work requirements and safety plans and policies
- identifying equipment defects
- inspecting work sites.

Work health and safety requirements must comply with state and territory legislation and regulations and project safety plan and may include:

- emergency procedures, including extinguishing fires, organisational first aid requirements, and evacuation procedures
- hazard control
- hazardous materials and substances
- personal protective equipment (PPE) prescribed under legislation, regulations and workplace policies and practices
- safe operating procedures, including operational risk assessment and treatments associated with:
  - concealed services (water, power and gas)
  - lighting
  - restricted access barriers
  - traffic control
  - working at heights
  - work site visitors and the public
  - working in proximity to others
- use of firefighting equipment
- use of tools and equipment
- workplace environmental requirements and safety.

Tools and equipment may include:

- chisels
- concrete mixers
- gin poles
- hammers
- hand saws
- masonry saws
- measuring tapes and rules

- mortar boards
- power leads
- power saws
- shear legs
- shovels
- spirit levels
- squares
- straight edges
- string lines
- trowels.

Quality requirements may include:

- attention to specifications of work
- control of handling procedures
- finishing of stone surfaces
- quality of materials
- relevant regulations, including:
  - Australian standards
  - internal organisational quality policy and standards
  - manufacturer specifications where specified
  - workplace operations and procedures.

Materials for arches:

- may include:
  - granite
  - limestone
  - marble
  - sandstone
- may be:
  - ashlar
  - pre-cut stones
  - regular
  - random regular
  - coursed
  - uncoursed.

Environmental requirements may include:

- clean-up management
- dust and noise control
- vibration management
- waste management.

Statutory and regulatory authority includes:

- federal, state and local authorities administering applicable Acts, regulations and codes of practice.

Arches may be designed for walls of:

- regular gauge
- random regular
- random rubble.

Joints in stone arches may be:

- cement mortar
- dry.

Unit Sector(s)

Construction

Custom Content Section

Not applicable.