Unit of Competency CPCPCM5012 Design complex stormwater and roof drainage systems

Application

This unit specifies the skills and knowledge required to design complex stormwater and roof drainage systems for commercial, industrial and residential properties.

The role may involve interaction with architects, builders, suppliers, clients and relevant planning authorities and requires a sound understanding of applicable legislation, standards and codes.

This unit requirements are typically carried out by experienced people such as hydraulic design consultants or persons in a supervisory capacity in relation to plumbing services.

In some jurisdictions, this unit of competency may form part of accreditation, licensing, legislative, regulatory or certification requirements.

Prerequisite Unit

Nil.

Elements and Performance Criteria

1. Identify design parameters.	1.1 Determine design scope from plans, specifications and client brief. 1.2 Identify applicable regulatory and legislative requirements for the design of complex stormwater and roof drainage systems. 1.3 Apply sustainability principles and concepts as part of the design process. 1.4 Account for the safety of system users or building occupants. 1.5 Determine and estimate rainfall intensity and volume using measurements of different catchment areas. 1.6 Analyse overland flood path affecting the property and buildings. 1.7 Research and evaluate other information likely to impact the stormwater and roof drainage system design.
2. Plan system components.	2.1 Plan and evaluate strategies for harvesting and re-using rainwater. 2.2 Plan and evaluate methods of collection and disposal of roof surface run-off water. 2.3 Plan and evaluate stormwater detention and retention systems and first-flush stormwater systems. 2.4 Determine and specify the most suitable methods of preventing backflow of sub-soil and stormwater into buildings. 2.5 Plan and evaluate treatment and disposal options for stormwater discharge. 2.6 Plan layout of system components according to design parameters and site limitations and coordinate with other services.
3. Design and size systems.	3.1 Apply regulatory requirements, Australian Standards and codes to all aspects of the stormwater and roof drainage system design. 3.2 Calculate and specify storage volume, pump capacity and discharge pipe size required for stormwater pumping systems as necessary. 3.3 Design stormwater systems requiring pumping.

	3.4 Design, select, size and detail system components using appropriate calculations, software applications and approved materials. 3.5 Specify correct installation, laying and jointing procedures for approved materials and components.
4. Prepare documentation.	4.1 Prepare client brief of the preferred design. 4.2 Prepare plans and specifications. 4.3 Prepare testing and commissioning schedule. 4.4 Produce operation and maintenance manual, including information on how to properly and safely maintain the system.

Foundation skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Supersedes and is equivalent to CPCPCM5012A Design complex stormwater and roof drainage systems.

Links

Companion Volume Implementation Guide:
https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

Assessment Requirements for CPCPCM5012
Design complex stormwater and roof drainage systems

Performance Evidence

To demonstrate competency, a candidate must meet the performance criteria for this unit by:

- designing, sizing and documenting the layout details of a complex stormwater and roof drainage system for a site incorporating a high-rise mixed development building within a wide-span multiple building project (such as a school), including:
    - specification
    - access chambers
    - grade of drains
    - holding pits
    - collection sumps
    - detention, retention and harvesting systems
    - disposal methods for stormwater catchments to council or utility provider's drainage network or disposal on-site
    - other system components
- using appropriate design software to produce detailed drawings and layout plans, including long sections and cross-sections of the designed system
- applying sustainability principles and concepts throughout to achieve a star rating under the Green Building Council of Australia rating scheme
- evaluating health risks associated with stormwater and roof drainage systems and action as required within the system design.

Knowledge Evidence

To be competent in this unit, a person must demonstrate knowledge of:

- relevant codes, Australian standards and specifications:
    - Australian rainfall and run-off (ARR) guidelines
    - AS/NZS 3500 Plumbing and drainage set
    - manufacturer specifications
    - National Construction Code (NCC)
    - building codes
    - work health and safety (WHS) and environmental requirements
    - plumbing regulations
- terminology and definitions used in hydraulic design
- computer-aided design (CAD) software
- installation methods used in hydraulic systems

- hazards associated with devices and systems used in the hydraulic sector
- environmental requirements:
    - clean-up protection
    - stormwater protection
    - waste management
    - water quality management
- quality assurance requirements:
    - Environmental Protection Agency (EPA)
    - internal company quality assurance policy and risk management strategies
    - International Standards Organisation (ISO)
    - site safety plan
    - workplace operations and procedures
- safe work procedures relating to planning, sizing and documenting layout of pipework and fixtures
- local government requirements:
    - Integrated Planning Act (IPA)
    - standard drawings and details
    - town planning requirements
- treatment requirements such as:
    - screens
    - silt traps
    - solid removal systems
- plans and documentation relevant to the design:
    - site plans
    - cross-sections
    - details
    - elevations
    - sections
    - civil drawings
    - contour levels
    - existing services
    - reduced levels
    - manufacturer requirements and specifications
    - catchment area analysis
    - stormwater design
    - surveys
- system components:
    - access chambers (manholes)
    - channels
    - culverts
    - downpipes
    - fire rating of penetrations
    - grated pits

    - gullies
    - guttering
    - inspection chambers
    - inspection openings
    - kerbs
    - piping
    - pits
- treatment options for stormwater discharge:
    - grass and rock swales
    - lagoons
    - momentum diffusers
    - ponds
    - screens
    - silt traps
    - traps
    - other removal systems as determined
- disposal options for stormwater discharge:
    - connection to stormwater mains
    - creeks
    - harbour
    - kerb and street channels
    - lakes
    - on-site harvesting and reuse
    - rainwater collection systems, including tanks and dams
    - rivers
    - streams
- determining rainfall intensities by:
    - average rainfall intervals
    - roof, surface and subsurface calculations
    - site location
    - time and concentration
- catchment areas:
    - land surface catchment areas, including a variety of surface conditions such as grassed and paved areas
    - roof catchment areas
- stormwater drainage systems:
    - access chambers (manholes)
    - collection sumps
    - detention and retention
    - grade of drains
    - harvesting
    - holding pits
    - pump discharge

- approved piping materials:
    - concrete
    - earthenware or vitrified clay pipe (VCP)
    - fibre cement (FRC)
    - polyvinyl chloride (PVC)
    - other approved materials
- approved fittings:
    - bends
    - grates
    - gullies
    - junctions
    - non-return valves
- stormwater systems requiring pumping:
    - holding tanks
    - overflow provisions
    - pump and controls
    - rising main
- methods of applying sustainability principles and concepts:
    - selecting appropriate material to ensure minimal environmental impact
    - harvesting and reuse
    - efficient use of material
    - efficient energy usage/capital outlay comparison
    - effect on the environment due to overflow or leakage
    - consideration of the Green Building Council of Australia rating scheme
- specification and user manuals which include information on:
    - commissioning
    - bedding
    - support
    - concrete support and detailing specialised components
    - jointing
    - access chambers (manholes)
    - manufacturer requirements
    - materials
    - pumps
    - WHS
    - testing
    - workmanship.

Assessment Conditions

Assessors must satisfy the requirements for assessors listed in the Standards for Registered Training Organisations.

This unit must be assessed in the workplace or a close simulation using realistic workplace conditions, materials, activities, responsibilities, procedures, safety requirements and environmental considerations.

Links

Companion Volume Implementation Guide:
https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad