



Australian Government

CPPSIS6036A Monitor complex engineering surveying structures

Release 1

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Modification History

Unit revised and not equivalent to CPPSIS6016A Monitor complex engineering surveying structures

Element structure, performance criteria, and critical aspects reviewed to reflect workplace requirements

Skills and knowledge requirements and the range statement updated

Unit Descriptor

This unit of competency specifies the outcomes required to observe, monitor and process observation data for complex engineering surveying structures. It requires the ability to demonstrate highly specialised technical skills and to plan and execute project activity according to job specifications. Functions will entail complying with, and developing or amending, organisational guidelines.

Application of the Unit

This unit of competency supports the application of planning, organisational, communication, sound problem-solving and accuracy skills; error analysis; designing and interpreting technical documentation; and a high-level understanding of technology. The skills and knowledge acquired upon completion of this unit would support the needs of employees in surveying.

Licensing/Regulatory Information

Licensing, legislative, regulatory and certification requirements may impact on this unit. Incorporate these requirements according to state, territory and federal legislation.

Pre-Requisites

Nil

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 | Organise project resources. | <p>1.1 Characteristics of the <i>operating environment</i> and any special equipment or resource requirements are identified according to <i>organisational guidelines</i>.</p> <p>1.2 Details of technology and <i>techniques</i> to be used to collect data are noted in <i>project specifications</i>.</p> <p>1.3 <i>Equipment</i> is checked to be in good working order.</p> <p>1.4 <i>Manufacturer specifications</i> with regard to the use of equipment are complied with.</p> |
| 2 | Develop the project plan. | <p>2.1 Project objectives, deliverables, <i>constraints</i> and <i>principal work activities</i> are defined and documented according to written spatial data <i>specifications</i> and <i>client requirements</i>.</p> <p>2.2 Information is included in the plan relating to identified risks and <i>contingencies</i>, resources, technology details and techniques to be used to collect data in the specified format.</p> <p>2.3 Information on the validation process is specified in the plan to verify the integrity of required spatial data.</p> <p>2.4 <i>Design</i> is interpreted to identify <i>surveying data components</i> to be controlled or monitored.</p> <p>2.5 <i>Hazards</i> and risks in the work site are identified according to organisational guidelines and <i>OHS</i> and <i>legislative requirements</i>.</p> <p>2.6 Pertinent <i>legal and statutory standards</i> are considered</p> |

- and adhered to.
- 2.7 Organisation of appropriate resources, equipment, materials and transport required for the project is designated to **relevant personnel**.
- 3 Manage the project.
- 3.1 Identified spatial components are measured.
- 3.2 Measured spatial data is reduced to a project spatial reference system for comparison with design.
- 3.3 **Measurements** are validated, recorded and processed according to project specifications.
- 3.4 Work is scheduled to be completed within time available.
- 3.5 Work is allocated to appropriate personnel and **supervisory processes**, checks and measures are implemented.
- 4 Monitor the project.
- 4.1 **Project management mechanisms** are implemented to measure, record and report progress of activities in relation to agreed schedule and plans.
- 4.2 Contingencies and constraints are managed to ensure project meets specifications.
- 4.3 Progress is reviewed throughout the project life cycle, with agreed changes implemented to ensure consistency with **client** needs, project scope, objectives and constraints.
- 4.4 **Quality assurance processes** are implemented based on the project plan.
- 5 Complete the project.
- 5.1 Completed work is checked against specifications.
- 5.2 **Required documentation** is completed according to organisational guidelines.
- 5.3 Relevant personnel and project team are informed of results according to organisational guidelines.
- 5.4 Spatial data is archived according to project specifications.

- 6 Review the project.
 - 6.1 Project is reviewed against objectives.
 - 6.2 Project review findings are reported to *stakeholders*.

Required Skills and Knowledge

This section describes the essential skills and knowledge and their level, required for this unit.

Required skills

- communication skills to:
 - consult effectively with clients and colleagues
 - impart knowledge and ideas through oral, written and visual means
- initiative and enterprise skills to:
 - interpret project requirements and translate them into design
- literacy skills to:
 - assess, develop and use workplace information
 - read and write key performance reports, including technical reports
 - research and evaluate to source surveying and spatial information services educational information
- numeracy skills to:
 - analyse errors
 - conduct image analysis
 - estimate costs
 - interpret and analyse statistics
 - perform mental calculations
 - record with accuracy and precision
 - undertake computations, such as road alignment design and associated computations
- organisational skills to:
 - plan and coordinate technical and human resource inputs to research activities
 - plan and prioritise activities to meet contractual requirements
- project-management skills to monitor designated features of engineering surveying structures within designated timeframes
- spatial skills to:
 - exercise precision and accuracy in relation to complex engineering surveying
 - archive and retrieve spatial data
 - manage and manipulate spatial data
 - manage files
 - solve problems relating to height, depth, breadth, dimension, direction and position in actual operational activity and virtual representation
 - understand implications of height, depth, breadth, dimension and position to actual operational activity and virtual representation

- technology skills to:
 - use computers to develop documentation
 - use specific high-level precision instruments

Required knowledge

- abilities of work teams
- advanced data reduction, manipulation and processing
- calibration of specialised surveying equipment
- data formats
- guidelines of projects
- industry standards
- limitations of equipment, measuring and analysis guidelines
- organisational policies and guidelines, such as OHS guidelines
- planning and control processes
- processes to establish and use high-level survey control
- project review and reporting procedures
- project zone design
- relevant engineering-related tasks and associated computations
- safe work practices
- surveying computation processes
- surveying reference systems
- surveying data capture and data set out methodologies
- understanding of errors, accuracy and precision in engineering tasks
- understanding, use and application of network/traverse adjustments

Evidence Guide

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

Overview of assessment This unit of competency could be assessed on its own or in combination with other units relevant to the job function, for example CPPSIS6032A Conduct an advanced GNSS control survey, and CPPSIS6035A Conduct complex engineering set out surveys.

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:

- accessing and interpreting design information to identify the components to be measured and monitored
- documenting and reporting
- managing a team
- performing measurements
- planning resources
- reducing and manipulating survey data
- recording and reporting non-conformity aspects
- knowledge of engineering-related tasks and associated computation.

Specific resources for assessment Resource implications for assessment include access to:

- assessment instruments, including personal planner and assessment record book
- assignment instructions, work plans and schedules, policy documents and duty statements
- registered training provider of assessment services
- relevant guidelines, regulations and codes of practice
- suitable venue and equipment.

Access must be provided to appropriate learning and assessment support when required.

Where applicable, physical resources should include equipment modified for people with disabilities.

Context of assessment Holistic: based on the performance criteria, evidence guide, range statement, and required skills and knowledge.

Method of assessment Demonstrated over a period of time and observed by the assessor (or assessment team working together to conduct the assessment).

Demonstrated competency in a range of situations, that may include customer/workplace interruptions and

involvement in related activities normally experienced in the workplace.

Obtained by observing activities in the field and reviewing induction information. If this is not practicable, observation in realistic simulated environments may be substituted.

Guidance information for assessment

Assessment requires that the clients' objectives and industry expectations are met. If the clients' objectives are narrowly defined or not representative of industry needs, it may be necessary to refer to portfolio case studies of a variety of surveying and spatial information services requirements to assess competency.

Oral questioning or written assessment and hypothetical situations (scenarios) may be used to assess underpinning knowledge (in assessment situations where the candidate is offered a preference between oral questioning or written assessment, questions are to be identical).

Supplementary evidence may be obtained from relevant authenticated correspondence from existing supervisors, team leaders or specialist training staff.

All practical demonstration must adhere to the safety and environmental regulations relevant to each State or Territory.

Where assessment is for the purpose of recognition (recognition of current competencies [RCC] or recognition of prior learning [RPL]), the evidence provided will need to be authenticated and show that it represents competency demonstrated over a period of time.

In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge.

Assessment processes will be appropriate to the language and literacy levels of the candidate and any cultural issues that may affect responses to the questions, and will reflect the requirements of the competency and the work being performed.

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 in the performance criteria is detailed below. Add any 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.

Operating environment:

- may be any surveying project work site.

Organisational guidelines

- appropriate timelines
- code of ethics

may include:

- company policy
- final product formats
- formal design parameters
- legislation relevant to the work or service function
- manuals
- OHS policies and procedures
- personnel practices and guidelines outlining teamwork, work roles and responsibilities
- requirements for data processing.

- Techniques** may include:
- indoor
 - outdoor
 - special operating methods to suit legislative or industry requirements.
- Project specifications** may include:
- operational goals
 - agreed client requirements
 - short or long-term organisational functions
 - written survey specifications.
- Equipment** may include:
- any equipment required for survey project, including:
 - computer-aided design (CAD)
 - current meter
 - echo sounder
 - global navigation satellite system (GNSS)
 - laser technologies
 - level
 - photogrammetry
 - remote sensing
 - theodolite
 - tide gauge
 - total station.
- Manufacturer specifications** may include:
- equipment specifications
 - operator manuals.
- Constraints** may include:
- coverage
 - datum
 - environmental factors
 - industry requirements
 - legal and statutory
 - financial
 - resource availability
 - time.
- Principal work activities** may include the survey design of:
- bridge construction
 - building construction (domestic and commercial)
 - railway construction
 - road construction
 - sewerage systems
 - stormwater systems.
- Specifications** may include:
- detailed technical descriptions of survey data and its requirements
 - preparation of cross-sections and plans with all information included.

Client requirements refer to description of outputs and may be contained in:

- contracts
- memos
- tender briefs
- verbal instructions
- written instructions.

Contingencies may include:

- equipment failure
- injury to personnel
- personnel turnover
- observation errors
- obstructions to engineering activity
- weather.

Design may include:

- digital information
- hard copy plans
- maps
- written instructions.

Surveying data components may include:

- depth
- dimension
- direction
- flow rates
- position
- slope.

Hazards may include:

- broken glass and other sharp surfaces
- damaged or inappropriate equipment
- dust and fibres
- electrical problems arising from cables, electrical fittings (switches and lights) and untested electrical equipment
- environmental impact
- extremes of heat and temperature
- fatigue
- fire
- gas
- heights
- awkward and repetitive postures
- mobile vehicle problems around plant and vehicles
- moving and unguarded machinery and equipment
- noise
- occupational violence and bullying
- poor manual handling techniques
- poor personal hygiene practices
- repetitive motion, force and vibration
- syringes or other sharp objects

- ultraviolet light
- underfoot conditions e.g. slippery, uneven and rough surfaces
- unrestricted people access
- work in isolated and remote environments.

- OHS*** may include:
- Australian standards
 - development of site safety plan
 - identification of potential hazards
 - inspection of work sites
 - training staff in OHS requirements
 - use of personal protective clothing
 - use of safety equipment and signage.
- Legislative requirements*** may include:
- Australian standards
 - award and enterprise agreements
 - certification requirements
 - codes of practice
 - quality assurance requirements.
- Legal and statutory standards*** may include:
- local government requirements
 - national standards
 - state statutes and regulations.
- Relevant personnel*** may include:
- colleagues
 - registered surveyors
 - site personnel
 - staff or employee representatives
 - supervisors or line managers
 - suppliers
 - users.
- Measurements*** may include use of:
- equipment required for survey project
 - GNSS
 - level
 - tape
 - total station.
- Supervisory process*** may include:
- planning
 - targeting
 - delegating
 - implementing
 - monitoring
 - overseeing practices
 - finalising activity
 - review.
- Project management mechanisms*** may include:
- communication with stakeholders
 - dispute resolution guidelines
 - monitoring and adjusting key milestones
 - progress reports.
- Client*** may include:
- customers with routine or special requests
 - external to organisation

- internal to organisation
- regular and new customers, including:
 - business enterprises
 - government agencies
 - members of the public
 - suppliers.

Quality assurance

processes may be internal and external and include:

- product or service measurement against set criteria
- standard verification
- target monitoring.

Required documentation may include:

- electronic or paper-based correspondence with client
- field records
- final report
- records of conversation
- survey plots
- organisational work activity sheets.

Stakeholders may include:

- human resource personnel: internal or external
- procurement agency: internal or external management.

Unit Sector(s)

Surveying and spatial information services

Custom Content Section

Not applicable.