



Australian Government

Department of Education, Employment and Workplace Relations

CPPSIS6016A Monitor complex engineering surveying structures

Release: 1

CPPSIS6016A Monitor complex engineering surveying structures

Modification History

Not Applicable

Unit Descriptor

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

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

Licensing/Regulatory Information

Refer to Application of the Unit

Pre-Requisites

Prerequisite units Nil

Employability Skills Information

Employability skills The required outcomes described in this unit of competency contain applicable facets of employability skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged, will assist in identifying employability skills requirements.

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

ELEMENT	PERFORMANCE CRITERIA
1 Organise project resources.	1.1 Characteristics of the operating environment and any special equipment or resource requirements are identified according to organisational guidelines. 1.2 Details of technology and techniques to be used to collect data are noted in project specifications. 1.3 Equipment is checked to be in good working order. 1.4 Manufacturer specifications with regard to the use of equipment are complied with. 1.5 Skills and knowledge are updated to accommodate changes in engineering project requirements.
2 Develop the project plan.	2.1 Project objectives, deliverables, constraints and principal work activities are defined and documented according to written spatial data specifications and client requirements. 2.2 Information is included in the plan relating to identified risks and contingencies, resources, technology details and techniques to be used to collect data in the specified format. 2.3 Information on the validation process is specified in the plan to verify the integrity of required spatial data. 2.4 Design is interpreted to identify surveying data components to be controlled or monitored. 2.5 Hazards and risks in the work site are identified according to organisational guidelines and OHS and legislative requirements. 2.6 Pertinent legal and statutory standards are considered 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.

ELEMENT	PERFORMANCE CRITERIA
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

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills:

- ability to relate to people from a range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities
- analytical skills (high level)
- ability to translate requirements into design
- communication skills to:
 - consult effectively with clients and colleagues
 - impart knowledge and ideas through oral, written and visual means
- computer skills (high technical user level) to develop business documentation
- interpersonal skills (high level)
- interpreting project requirements

REQUIRED SKILLS AND KNOWLEDGE

- instrument use (specific high-level precision)
- literacy skills to:
 - assess, develop and use workplace information
 - locate and interpret legislation and other written documentation
 - prepare and manage documentation and information flow
 - read and write key performance reports, including technical reports
 - research and evaluate (high level) in order to source spatial information services educational information
- negotiation skills
- 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 planning
- project management skills
- spatial skills to:
 - exercise precision and accuracy in relation to complex engineering surveying
 - perform spatial data archival and retrieval and train others in this task
 - perform spatial data management and manipulation and train others in this task
 - perform file management and train others in this task
 - 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
- team leadership.

Required knowledge and understanding:

- abilities of work teams
- advanced data reduction, manipulation and processing
- data formats
- errors, accuracy and precision in engineering tasks
- guidelines of projects

REQUIRED SKILLS AND KNOWLEDGE

- high-level, relevant engineering-related tasks and associated computations
- 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
- road alignment design and associated computations
- safe work practices
- surveying computation skills (high level)
- surveying reference systems (high level)
- surveying data capture and data set out methodologies (high level)
- understanding, use and application of network/traverse adjustments
- use and calibration of specialised surveying equipment.

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, 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 units CPPSIS6012A Conduct an advanced GPS control survey, and CPPSIS6015A 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:

- matching objectives with resources to ensure project proceeds in an organised and timely manner
- ensuring that achievement of required accuracy has been attempted by:
 - accessing and interpreting design information to identify the components to be measured and monitored
 - applying solutions to a range of problems
 - documenting and reporting
 - managing a team

	• organising and prioritising activity • performing measurements • planning resources • reducing and manipulating survey data • ensuring that non-conformity aspects are recorded and reported • taking responsibility for outputs in work and learning.
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 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

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*** may include:
- appropriate timelines
 - code of ethics
 - 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 positioning system (GPS)
 - level
 - photogrammetry
 - remote sensing
 - tide gauge
 - total station.
- Manufacturer***
- equipment specifications

- specifications** may include:
- 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
 - equal employment opportunity (EEO)
 - 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
 - GPS
 - 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)

Unit sector Spatial information services