



Australian Government

Department of Education, Employment and Workplace Relations

CPPSIS5023A Manage advanced surveying computations

Release: 1

CPPSIS5023A Manage advanced surveying computations

Modification History

Not Applicable

Unit Descriptor

Unit descriptor

This unit of competency specifies the outcomes required to solve a range of surveying and basic engineering-related problems. It requires the ability to identify, analyse and evaluate data to perform surveying computations. Functions would be carried out within organisational guidelines.

Application of the Unit

Application of the unit

This unit of competency supports the application of accuracy, communication, organisational and problem-solving skills; interpreting technical documentation; the ability to demonstrate initiative and enterprise; human resource management; and a sound 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
<p>1 Prepare to perform advanced traverse computations.</p>	<p>1.1 Task <i>objectives</i> are defined.</p> <p>1.2 <i>Pertinent standards</i> are identified, considered and adhered to according to <i>project specifications</i>.</p> <p>1.3 <i>Principal work activities</i> and <i>constraints</i> in relation to advanced <i>traverse</i> computations are defined and documented according to <i>client</i> requirements.</p> <p>1.4 Information on identified risks, <i>contingencies</i>, <i>risk management processes</i> and required resources are included in task objectives.</p> <p>1.5 Requirements of the job and the computations are clarified with <i>relevant personnel</i> according to <i>organisational guidelines</i>.</p> <p>1.6 Work is allocated to appropriate personnel and <i>supervisory processes</i>, checks and measures are implemented to ensure work is completed within <i>time available</i>.</p> <p>1.7 <i>OHS</i> requirements are planned for and adhered to.</p> <p>1.8 Skills and knowledge are updated to accommodate changes in surveying computations.</p>
<p>2 Arrange for the task to be executed.</p>	<p>2.1 <i>Arrangements</i> are made for computations to be performed on angles and bearings.</p> <p>2.2 Requirements for conversions between polar and rectangular modes are communicated to relevant personnel and performed.</p> <p>2.3 Computations performed on the coordinates of a simple closed traverse, and the missing elements and adjusted coordinates of a traverse, are supervised.</p> <p>2.4 Arrangements are made for traverse information to be reduced from field notes.</p> <p>2.5 Traverse misclose computations adjustment process is supervised.</p> <p>2.6 <i>Computation problems</i> involving linear figures of constant width are communicated to relevant personnel and solved.</p> <p>2.7 <i>Organisational documented and undocumented practices</i> are communicated to relevant personnel and adhered to.</p>
<p>3 Arrange for the computation of surveying problems involving circular</p>	<p>3.1 Computations are performed on all elements of circular curves.</p> <p>3.2 Problems involving circular curve missing elements are communicated to relevant personnel and solved.</p>

ELEMENT**PERFORMANCE CRITERIA**

curves.

- 4 Supervise the completion of the task.**
- 4.1 All *required documentation* is communicated to relevant personnel and completed promptly, accurately and according to organisational guidelines.
- 4.2 *Spatial data* is archived according to project specifications.

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
- 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 complete business documentation and apply surveying software
- create, extract and output information from engineering plans
- create road design and output road design details
- literacy skills to:
 - assess and use workplace information
 - locate and interpret legislation and other written documentation
 - prepare and manage documentation
 - read and write technical reports
 - research and evaluate
- numeracy skills to:
 - conduct image analysis
 - interpret and analyse statistics
 - perform mental calculations
 - record with accuracy and precision
 - undertake high level computations
- organisational skills to:

REQUIRED SKILLS AND KNOWLEDGE

- coordinate technical and human resource inputs to research activities
- prioritise activities to meet contractual requirements
- pass information and practical work skills onto others
- spatial skills to:
 - exercise precision and accuracy in surveying computations
 - 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
- supervisory skills.

Required knowledge and understanding:

- apply the basic principles of algebra, geometry and trigonometry
- computing traverse data from field information
- data formats
- data management
- industry requirements and standards
- interaction of surveying software with surveying equipment
- management principles
- organisational policies and guidelines, such as OHS guidelines
- planning and control processes
- road design software
- safe work practices
- spatial reference systems
- standard plan design and presentation conventions
- training principles
- understanding and application of significance in calculations
- vocational issues involving survey computations.

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 unit CPPSIS5024A Perform geodetic surveying computations.

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:

- applying known solutions to a range of problems
- performing calculations following a logical progression and presenting clearly visible results
- assessing and recording computations from varied sources
- demonstrating operational knowledge in a broad range of areas relating to surveying computations
- applying mathematical principles and skills to a range of advanced surveying-related problems
- understanding mathematical concepts and techniques
- performing a range of tasks where choice between a substantial range of options is required
- understanding the purpose of numerically solving advanced surveying problems
- understanding the requirement for accuracy in surveying calculations
- defining terms used in calculations
- taking responsibility for team 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	<p>Holistic: based on the performance criteria, evidence guide, range statement, and required skills and knowledge.</p>
Method of assessment	<p>Demonstrated over a period of time and observed by the assessor (or assessment team working together to conduct the assessment).</p> <p>Demonstrated competency in a range of situations, that may include customer/workplace interruptions and involvement in related activities normally experienced in the workplace.</p> <p>Obtained by observing activities in the field and reviewing induction information. If this is not practicable, observation in realistic simulated environments may be substituted.</p>
Guidance information for assessment	<p>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.</p> <p>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).</p> <p>Supplementary evidence may be obtained from relevant authenticated correspondence from existing supervisors, team leaders or specialist training staff.</p> <p>All practical demonstration must adhere to the safety and environmental regulations relevant to each State or Territory.</p> <p>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.</p> <p>In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge.</p> <p>Assessment processes will be appropriate to the language and literacy levels of the candidate and any</p>

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.

- Objectives*** may include:
- agreed client requirements
 - written survey data specifications.
- Pertinent standards*** are standards essential to the accuracy of:
- calculation of horizontal and vertical information
 - measurement
 - recording.
- Project specifications*** refer to:
- detailed technical descriptions of the survey data and its requirements.
- Principal work activities*** may include:
- activity and sequence of activity determined to be appropriate in order to meet project objectives.
- Constraints*** may include:
- coverage
 - datum
 - environmental factors
 - industry requirements
 - legal and statutory
 - financial
 - resource availability
 - time.
- Traverse*** refers to:
- a method of surveying in which lengths and directions of lines between points on the earth are obtained by or from field measurements and are used in determining positions of the points.
- 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.
- Contingencies** may include:
- equipment failure
 - injury to personnel
 - personnel turnover
 - observation errors
 - obstructions to tasks
 - weather.
- Risk management processes** may include:
- adhering to budget
 - anticipating external influences
 - contingency planning
 - guidelines for the selection of contractors
 - effective communication and consultation
 - effective project management
 - internal and external audit processes
 - milestone review and evaluation
 - realistic timelines
 - targeted activity.
- Relevant personnel** may include:
- managers
 - site personnel such as field hands
 - supervisors
 - surveyors.
- Organisational guidelines** may include:
- code of ethics
 - company policy
 - legislation relevant to the work or service function, including equal employment opportunity (EEO)
 - manuals
 - OHS policies and procedures
 - personnel practices and guidelines outlining work roles and responsibilities.
- Supervisory processes** may include:
- delegating
 - implementing
 - meeting deadlines
 - monitoring
 - overseeing practices
 - planning
 - targeting.
- Time available** may involve estimates for time duration of project, including:
- client instructions
 - consideration of contingencies
 - consideration of past project experiences
 - experience of project personnel

- location of project
 - methods to be employed
 - resources and equipment to be used.
- 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.
- Arrangements*** may include:
- allocation of work to staff
 - breaking down tasks into logical processes and allocating appropriately
 - performing tasks or components of tasks alone
 - supervising
 - training relevant staff.
- Computation problems*** may include problems involving:
- adjustment of angular and linear observations in a network
 - adjustment of height observations in a network
 - linear figures of constant width
 - maintaining areas of closed figures.
- Organisational documented and undocumented practices*** may include:
- appropriate timelines
 - data processing requirements
 - final product formats
 - formal design parameters
 - teamwork.
- Required documentation*** may include:
- field records
 - final product reports
 - survey plots.
- Spatial data*** may:
- include data from:
 - echo sounder
 - global positioning system
 - level
 - photogrammetry
 - remote sensing
 - total station
 - relate to:
 - depth
 - dimension
 - direction
 - height

- position.

Unit Sector(s)

Unit sector

Spatial information services