



Australian Government

CPPSIS5057 Conduct precision surveys

Release: 1

CPPSIS5057 Conduct precision surveys

Modification History

Release 1.

Replaces superseded equivalent CPPSIS5057A Carry out a precision survey.

This version first released with CPP Property Services Training Package Version 3.

Application

This unit of competency specifies the outcomes required to conduct a precision survey, including techniques for precise levelling, precise setting out and industrial measurements, and detecting structural deflection and deformation. The unit covers preparing for precision surveying by analysing project specifications and information, and identifying and controlling risks and contingencies. The unit also covers selecting and using specialised equipment, attachments and instruments necessary for precise levelling and setting out, and checking horizontal and vertical movement of structures. The unit requires the ability to apply high level surveying computations to surveying problems, including conducting statistical analysis of measurements and errors to achieve specified accuracies and tolerances.

The unit supports those who work under limited supervision in a surveying team.

No licensing, legislative, regulatory, or certification requirements apply to this unit of competency at the time of endorsement.

Pre-requisite Unit

Nil

Unit Sector

Surveying and spatial information services

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the range of conditions.

- | | |
|----------------------------------|---|
| 1. Prepare for precision survey. | 1.1. Project specifications, precision survey objectives, and accuracy requirements are identified in consultation with <i>appropriate persons</i> . |
| | 1.2. Risks are identified and controlled, and contingencies managed according to organisational requirements. |

- 1.3. Specialised equipment and attachments for precise levelling and setting out are determined and selected according to project specifications.
 - 1.4. Precise levelling run is carried out and results are calculated and recorded according to organisational requirements.
2. Apply techniques for precise setting out.
 - 2.1. Applications of specialised surveying techniques used for precise setting out are determined according to project specifications.
 - 2.2. **Remote measuring systems** to be used for industrial measurements are determined according to project specifications.
 - 2.3. Set-out and observations are conducted according to project specifications, using instruments and attachments suitable for precise setting out.
3. Detect structural deflection and deformation.
 - 3.1. Survey methods used to check horizontal movement of engineering structures and instruments used to monitor verticality of tall structures are determined.
 - 3.2. Survey methods used to check vertical movement due to settlement of engineering structures caused by tunnelling and mining are determined.
 - 3.3. Precision survey of an accuracy that will detect and monitor deformation or deflection of engineering structure is carried out according to project specifications.
4. Finalise precision survey.
 - 4.1. Precision survey is finalised and checked according to project specifications and organisational requirements.
 - 4.2. Appropriate persons are notified of survey results according to organisational requirements.
 - 4.3. Survey documentation is completed and data archived according to organisational requirements.

Foundation Skills

This section describes the language, literacy, numeracy and employment skills essential to performance in this unit but not explicit in the performance criteria.

Skill	Performance feature
Planning and organising skills to:	• plan and prioritise work to meet survey timeframes.
Numeracy skills to:	• analyse measurements between two or more points to achieve accuracy and precision in calculations • conduct error analysis relating to angle, distance and height difference, observations, values and positional results.
Oral communication skills to:	• ask questions to clarify survey requirements • report details of survey results.
Reading skills to:	• analyse graphical and technical information in construction and engineering plans.
Writing skills to:	• prepare technical reports • record technical information in organisational documentation.
Technology skills to:	• calibrate specialist instruments and attachments.
Problem-solving skills to:	• apply risk control and contingency strategies to anticipated and identified problems.

Range of Conditions

This section specifies work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included. Bold italicised wording, if used in the performance criteria, is detailed below.

Appropriate persons • client

must include at least one of the following:

- colleague
- engineer
- manager
- registered or qualified surveyor.

Remote measuring systems must include at least one of the following:

- precise intersection techniques
- robotic instruments
- terrestrial photogrammetry.

Unit Mapping Information

CPPSIS5057A Carry out a precision survey

Links

Companion Volume implementation guides are found in VETNet -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=6f3f9672-30e8-4835-b348-205dfcf13d9b>

Assessment Requirements for CPPSIS5057 Conduct precision surveys

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Performance Evidence

A person demonstrating competency in this unit must satisfy the requirements of the elements, performance criteria, foundation skills and range of conditions of this unit. The person must also conduct two different precision surveys.

While conducting the above precision surveys, the person must:

- analyse standards, specifications and information in plans and drawings to determine surveying and precision requirements
- apply precision surveying techniques, measurements and error analysis to achieve specified accuracies and precision tolerances
- carry out precise levelling run, using two of the following pieces of specialised equipment and attachments:
 - global navigation satellite system (GNSS)
 - gyro-theodolite
 - optical and digital level
 - optical reading instruments
 - total station (reflectorless)
 - total station (theodolite function)
- carry out precise setting out using one of the following instruments and attachments:
 - auto collimation and laser eyepieces
 - total stations
 - zenith and nadir auto plumb instruments
- carry out precise setting out using one of the following remote measuring systems:
 - precise intersection techniques
 - robotic instruments
 - terrestrial photogrammetry
- use industry-accepted survey methods to detect and monitor deflection and deformation of structures
- communicate clearly with others to clarify and report project information
- comply with organisational and legal requirements for:
 - completing records and documentation
 - recording, storing and filing data

- using, checking and storing surveying equipment
- working safely and using personal protective equipment (PPE)
- plan and implement risk management and contingency strategies.

Knowledge Evidence

A person demonstrating competency in this unit must demonstrate knowledge of:

- accuracy standards and field procedures for high-precision horizontal and vertical control surveys
- basic application of electromagnetic measuring principles and techniques
- common terms used in precision surveying calculations
- data reduction techniques
- basic concepts of algebra, geometry and trigonometry
- industry-accepted methods for error analysis
- legislative, statutory and industry requirements and standards relating to work tasks
- methods for computing three-dimensional (3-D) coordinates and coordinate changes by intersection
- organisational policies and procedures relating to:
 - health and safety relating to survey activities
 - reporting and documentation
 - using specialised surveying equipment, attachments and instruments
- standard plan design and presentation conventions
- surveying methods used to detect horizontal and vertical movement of structures.

Assessment Conditions

The following must be present and available to learners during assessment activities:

- equipment:
 - PPE
 - specialised surveying equipment, attachments and instruments selected from those listed in the performance evidence
 - remote measuring system selected from those listed in the performance evidence
- specifications:
 - survey specifications, including relevant plans and drawings
 - organisational policies, procedures and documentation relating to work health and safety
- relationships with team members and supervisor:
 - working in a team.

Timeframe:

- as specified by project requirements.

Assessor requirements

As a minimum, assessors must satisfy the assessor requirements in the Standards for Registered Training Organisations (RTOs) current at the time of assessment.

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