Title | Explain, perform, and record angular field measurements using standard surveying instruments
---|---
Level | 4
Credits | 6

Purpose

This unit standard is for people working, or who intend to work, in the surveying profession as a survey technician.

People credited with this unit standard are able to: explain the accuracy capabilities and ranges of standard surveying instruments for measuring horizontal angles; explain standard methods for measuring angles in surveying; explain errors and reductions on angular measurements using standard surveying instruments; prepare to take angular field measurements for surveying using standard surveying instruments; perform direct angular observations for surveying using standard surveying instruments; and record and reduce field observations for angular measurements.

Classification | Surveying > Survey Practice

Available grade | Achieved

Guidance Information

1. The following legislation and documentation must be complied with:
   - Cadastral Survey Act 2002;
   - instrument specifications;
   - job specifications;
   - instrument manufacturer’s instructions.

2. Evidence for this unit standard must be provided without using a Global Positioning System. Instruments such as theodolites and total stations may be used.

3. Definitions
   - *Angle* refers to the difference subtended between two directions as measured in degrees, minutes and seconds.
   - *Bearings* refer to angles from a known reference direction, usually north.
   - *Standard surveying instruments* refer to surveying instruments such as tape, steel bands, levels, sextants, theodolites and total stations, and exclude data receivers for global navigational satellite systems.
Workplace procedures refer to documented procedures specific to an enterprise which set out the quality management requirements for the business practice and activities of that enterprise.

Outcomes and performance criteria

Outcome 1

Explain the accuracy capabilities and ranges of standard surveying instruments for measuring horizontal angles.

Range  theodolite, total station.

Performance criteria

1.1  The accuracy and range of surveying instruments for measuring horizontal angles are explained in accordance with instrument specifications.

1.2  The appropriateness of surveying instruments is explained in terms of achieving specified accuracies in measurements for horizontal angles.

Range  angular accuracy – one minute, twenty seconds, one second.

Outcome 2

Explain standard methods for measuring angles for surveying.

Range  double face readings, multiple sets, zero settings, repetition, included angle, angles left, angles right.

Performance criteria

2.1  Methods are explained in relation to the instruments used and, where relevant, in accordance with instrument manufacturer’s instructions.

Outcome 3

Explain errors and reductions on angular measurements using standard surveying instruments.

Performance criteria

3.1  Angular measurement is explained in terms of potential errors.

Range  error types – systematic, gross, random; potential errors include but are not limited to – misidentification, recording, centring, instrument, phase, parallax, bisection, grazing rays.
3.2 The importance of using independent checks to find and remove errors in angular measurement is explained and methods for finding them are demonstrated in accordance with instrument manufacturer’s instructions.

Range three errors.

3.3 Reductions on angular measurements are explained in terms of adapting raw measurements to refined data.

Range reductions relating to – geometrical orientation, mean.

**Outcome 4**

Prepare to take angular field measurements for surveying using standard surveying instruments.

**Performance criteria**

4.1 Instruments for, and methods of, angular measurement are selected for a variety of jobs that match the required degree of accuracy in accordance with job specifications.

Range for land surveying jobs – Class I cadastral survey, gridlines for a construction site, pile positioning, as-built survey, engineering survey set-out; for hydrographic jobs – triangulation, establishing shore control for hydrographic surveying, instrument calibration; evidence is required for either land surveying or hydrographic jobs.

4.2 The selected survey equipment is checked for calibration requirements in accordance with the Surveyor-General’s Rules.

Range horizontal collimation, plate bubble, circular bubble, trunnion axis; may include – supplier or service centre documentation.

**Outcome 5**

Perform direct angular observations for surveying using standard surveying instruments.

**Performance criteria**

5.1 Direct angular observations are performed to ensure that specified accuracy is achieved.

Range accuracy – 5” per km, 20” per 100 m, 1’ per 10 m.

5.2 Equipment and instruments are used in accordance with instrument manufacturer’s instructions.

Range total station, theodolite.
5.3 Environmental and topographical constraints are recognised and are controlled to facilitate the observation process in accordance with workplace procedures.

Range constraints – refraction, atmospheric, heat shimmer, grazing rays.

Outcome 6

Record and reduce field observations for angular measurements.

Performance criteria

6.1 Angular measurements and field data are recorded in accordance with job specifications.

Range field book, or data recorder.

6.2 Recorded angular measurements are verified and reduced in accordance with the Surveyor-General’s Rules and workplace procedures.

Range bearing adjustments, angle adjustments.

6.3 Reduced angular measurements are verified as correct in relation to a known angular dimension.

Range precision – 5" per km, 20" per 100 m, 1’ per 10 m.

Replacement information

This unit standard replaced unit standard 8776.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

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<th>Process</th>
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Consent and Moderation Requirements (CMR) reference

0101

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.