DCSSUR614: Use Surveying in Engineering

UNIT CODE		**DCSSUR614**	
UNIT TITLE		**Use surveying in engineering**	
APPLICATION		This unit describes the performance outcomes, skills and knowledge required to use current survey equipment to perform basic measurement and layout tasks on construction sites. The unit of competency is applied by technicians using survey equipment when measuring and laying out construction projects. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.	
ELEMENTS		**PERFORMANCE CRITERIA**	
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	Establish levelling traverse procedures.	1.1	Explain the terms Australian Height datum, level surface, horizontal surface and coordinate systems.
		1.2	Determine the horizontal collimation error of a level by using the two-peg test.
		1.3	Outline adjustment procedures for the most common types of levels.
		1.4	Identify the main sources of error in levelling operations.
		1.5	Calculate the results of a closed traverse to third order precision.
		1.6	Reduce levels in a closed traverse using the rise and fall method and the collimation height method.
		1.7	Outline levelling observations incorporating intermediate sight and inverted staff readings.
		1.8	Complete reduction methods for both intermediate sight and inverted staff readings.
		1.9	Apply mathematical checks to intermediate sight and inverted staff readings.
		1.10	Outline the procedure for traversing levels in single and two-storey buildings.
2	Determine bearings for the sides in a traverse.	2.1	Outline correct setup procedure for survey equipment over a ground mark.
		2.2	Apply the repetition method to observe horizontal angles in a traverse and reduce the measured angles.

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		2.3	Calculate the angular misclosure in a closed traverse, as well as the adjusted angle calculated.
		2.4	Determine and reduce vertical angles in a closed transverse.
3	Determine short distances according to industry standards for engineering surveys.	3.1	Describe the major sources of error in distance measuring operations.
		3.2	Outline correct procedure for using a band or tape to measure distances of up to 100m to engineering survey accuracy.
		3.3	Describe sources of errors when performing distance measurement with a band or tape.
		3.4	Calculate reduced horizontal distance for a taped line allowing for temperature, tension, sag and slope correction.
		3.5	Use an electronic distance measurement (EDM) device to measure the distance of a line previously measured by tape or band.
		3.6	Compare results obtained via tape and EDM measurements.
4	Perform detail surveys using the grid levelling method.	4.1	Describe an appropriate procedure for laying out a grid at a specified interval over a given area.
		4.2	Determine levels on grid points to obtain spot heights for contouring.
		4.3	Produce a contour plan from spot heights.
5	Perform simple detail surveys.	5.1	Perform a detail survey by distance and offset measurements along a base line.
		5.2	Plot a site plan from distance and offset measurements along a base line.
		5.3	Describe the use of a site plan to set out works by distance and offset measurements along a base line.
FOUNDATION SKILLS Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.			
UNIT MAPPING INFORMATION No equivalent units.			
TITLE		**Assessment requirements for DCSSUR614 Use surveying in engineering**	

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PERFORMANCE EVIDENCE	To achieve competency in this unit, a person must satisfy the requirements of the elements and performance criteria, foundation skills and range of conditions included in the unit. The person must also: • produce a basic contour plan. • set out a typical works using simple site plans. Note: If a specific volume or frequency is not stated, then evidence must be provided at least once for each criterion.
KNOWLEDGE EVIDENCE	To achieve competency in this unit, a person must demonstrate knowledge of: • Key principles in surveying for engineering, including: – Australian Height Datum – UTM grid referencing – local and national grid systems – referencing systems i.e. GPS – bearings – spot heights – methods of site set-out – surveying set-out techniques – survey calculations for height, distance and bearing – surveying equipment types and their accuracies – limitations of surveying equipment – interpolation of contours from spot heights – measure distance and height. – performing levelling operations. – performing and closing a traverse. • work drawings, details and specifications • industry accepted standards and practices • acquisition of surveying data

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ASSESSMENT CONDITIONS	**Assessment Conditions:** All assessment must be completed in accordance with work health and safety standards. When assessments are conducted remotely, invigilation software must be used to ensure authenticity of work completed. Model answers or marking guides must be provided for all assessments to ensure reliability of assessment judgements when marking is undertaken by different assessors. Assessors must gather a range of evidence that is valid, sufficient, authentic, and current. Questioning techniques must not require language, literacy and numeracy skills beyond those required in this module. The candidate must have access to all tools, equipment, materials and documentation required. **Assessor Requirements:** Assessment must be conducted only by persons who: • hold vocational competencies at least to the level being delivered and assessed • maintain current industry skills directly relevant to the training and assessment being provided • hold a tertiary qualification in engineering or a related field • meet the assessor requirements specified in the current Standards for Registered Training Organisations (RTOs) • undertake ongoing professional development in vocational training, learning, and assessment, including competency-based training and assessment, as required by their RTO. The RTO must also ensure that trainers and assessors keep their industry knowledge up to date through ongoing professional development. The RTO must take appropriate steps, as an ongoing procedure, to verify information about trainer and assessor's qualifications. Assessors must also hold a tertiary qualification in engineering or related field.