



Australian Government

Department of Education, Employment and Workplace Relations

PMLTEST511B Supervise earthworks inspection, sampling and testing operations

Release: 1

PMLTEST511B Supervise earthworks inspection, sampling and testing operations

Modification History

Unit Descriptor

This unit of competence covers the ability to supervise and direct earthworks operations based on observation and testing. This competency is typically performed by experienced technicians or para-professionals, who often supervise or direct less experienced technical personnel.

This unit of competency has the following prerequisites:

PMLTEST403B Assist with geotechnical site investigations

or

PMLSAMP400B Obtain representative samples in accordance with a sampling plan, and PMLTEST406A Perform physical tests.

This unit of competency is applicable to technical officers working in the construction industry sector.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These can be found at the end of this unit of competency under the section This competency in practice.

Application of the Unit

Licensing/Regulatory Information

Pre-Requisites

Employability Skills Information

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance Criteria describe the level of performance required to demonstrate achievement of the element.

Elements and Performance Criteria

Elements and Performance Criteria

Element	Performance Criteria
1 Prepare for on-site operations	1.1 Identify the job, consult with the client and obtain relevant information, including the level of supervision required, drawings and specifications 1.2 Select equipment and materials required for the job 1.3 Identify site hazards and the personal protective equipment and safety procedures specified for job 1.4 Organise site induction for support personnel as required 1.5 Record description of the job to be undertaken, compare with specification and resolve any variations 1.6 Select suitable transport for site access 1.7 Brief support personnel on job-specific requirements
2 Establish on-site operations	2.1 Consult with the site superintendent to determine methods of communication, roles, responsibilities and expectations of each party, including identification of potential problems and conflicts 2.2 Set up facilities for supervision, testing and sample storage 2.3 Inspect the site to determine the characteristics of the project, including survey control points 2.4 Design inspection, sampling and testing program in accordance with specifications
3 Supervise earthworks operations	3.1 Conduct inspection, sampling and testing in accordance with project requirements 3.2 Direct and advise the site superintendent based on test results and observations 3.3 Record test data and observations in accordance with enterprise practices

- 3.4 Remit samples to the base laboratory for testing as required
 - 3.5 Ensure cleaning of equipment does not cause environmental damage
 - 3.6 Supervise the removal of equipment and materials from site
- 4 Analyse project data and report to client
 - 4.1 Analyse project data and report to client
 - 4.2 Report test results to site superintendent at specified frequency
- 5 Maintain enterprise records
 - 5.1 Record observations, data and results in accordance with enterprise practices
 - 5.2 Maintain security and confidentiality of enterprise information
 - 5.3 Prepare and issue a final project report detailing supervision and testing carried out, statement of compliance and relevant tables and plans as required.

Required Skills and Knowledge

Evidence Guide

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competence must be demonstrated in the ability to perform consistently at the required standard. Candidates must be able to direct earthworks operations, as well as sampling and testing of materials. In particular the assessor should look to see that the candidate:

reads and interprets maps, drawings, specifications and Codes of Practice

identifies and locates sampling and testing sites

measures and estimates elevations, lengths, areas and volumes

determines sampling and testing frequencies

takes representative samples

identifies and describes materials

records project details in writing, by sketching and photography

handles and transports samples correctly

records sampling and testing information

compares test results with specifications and draws valid conclusions on compliance

uses tools and equipment effectively and efficiently

observes, interprets and reports atypical situations

communicates problems to appropriate personnel

records and communicates work results

works safely

resolves problems constructively.

Underpinning knowledge

Competency includes the ability to apply and explain:

engineering properties of soil and rock materials

techniques used in civil construction

plant and equipment used in earthworks

in-situ and laboratory test methods and their application to various materials

roles and responsibilities for different levels of supervision

relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

It is strongly recommended that assessment is conducted through observation over time. The timeframe must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

inspection of workplace documents completed by the candidate

review of work outputs over a period of time to ensure accuracy, consistency and timeliness

feedback from peers and supervisors

use of suitable simulation and/or a range of case studies/scenarios.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

PMLORG500B Schedule laboratory work for a small team

PMLCOM500B Provide information to customers

PMLDATA500B Analyse data and report results.

Resource implications

Resources may include:

access to construction sites, tools, equipment and materials

enterprise procedures, sampling plans, test methods and equipment manuals.

This competency in practice

Construction materials

A geotechnical consultancy company has been contracted to provide level one supervision for a commercial development in accordance with **AS3798 - Guidelines on earthworks for commercial and residential developments**. This will involve the construction of roadways, building pads and parking areas for heavy vehicles. A senior technician has been placed in charge of the project with an experienced tester to assist with routine testing and supervision. The principal contractor has provided copies of specifications, drawings and local authority requirements for this type of project. The project will involve clearing and stripping, setting-out (by contract surveyors), cut-to-fill, drainage, sewer lines and other services and construction of roadways and building pads.

The supervision will be carried out in accordance with local authority requirements. Testing will involve measuring in-situ densities of fill (including trench backfill) and road base materials. California Bearing Ratio (CBR) tests will be used as an aid in determining pavement thicknesses. Additional tests will be used to monitor the quality of pavement materials supplied from a local quarry. This will involve both on-site and off-site testing and require liaison with off-site personnel to ensure that the testing is timely and as specified. Based on test results and direct observations, the technician is able to direct and advise the contractor's operators so that the materials are correctly placed and compacted. Test locations are marked on drawings and sketches and photographs used to record details of the project. Detailed daily records are used to prepare monthly reports for the contractor, accompanied by test certificates. Office staff use this information to invoice the client. The technician monitors the project to avoid exceeding the project budget. When the project is finished, the technician prepares a completion report, including all test results, site observations and a scale drawing showing all filled areas and reviews the information as a guide to planning and costing future projects.

Key Competencies

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Collecting, Communic Planning Working Using Solving Using

analysing and organising information	ating ideas and information	and organising activities	with others and in teams	mathematic al ideas and techniques	problems	technology
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Level 3	Level 3	Level 3	Level 3	Level 2	Level 3	Level 2
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Range Statement

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

This unit of competence describes the work conducted by experienced technicians and engineering para-professionals.

Operations are performed in accordance with laboratory and/or enterprise procedures and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry Codes of Practice
- environmental legislation and regulations
- standard operating procedures (SOPs)
- equipment manuals
- equipment start-up, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

Tools and equipment used may include:

- hand and power augers
- hand tools, including shovels, crowbars, scoops, spanners, wrenches, tape measure
- consumables, including sample bags, labels
- documentation, including maps, plans, contract documents, worksheets
- field test equipment, including sand replacement apparatus, nuclear soil moisture/density gauge, dynamic cone penetrometer
- still/video camera
- two-way radio, mobile telephone
- levelling equipment (dumpy, automatic levels).

Site hazards may include:

- solar radiation, dust and noise
- manual handling of heavy materials and equipment
- working in/on trenches, confined spaces, wet and uneven surfaces, heights, slopes
- vehicular and pedestrian traffic.

Safety procedures may include:

- location of site services before investigations commence
- use of material safety data sheets (MSDSs)
- use of personal protective equipment, such as hard hat, hearing protection, sunscreen, gloves, masks, goggles, coveralls, safety boots, high visibility clothing
- handling, and storage of hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations
- regular cleaning of equipment and vehicles
- machinery guards
- signage, barriers, flashing lights, traffic control.

Typical skills may include:

- working safely with equipment and around earthmoving plant

driving safely on- and off-road
working safely in field conditions
setting up and maintaining tools and equipment
using tools and equipment to perform sampling and in-situ testing
cleaning equipment before leaving site in compliance with environmental authority requirements
reading site plans, specifications and codes to determine sampling locations and frequencies
measuring and estimating elevations, lengths, areas and volumes
identifying of soil and rock materials
observing and recording project information
handling and storing samples appropriately
comparing test results with specifications
resolving problems without creating confrontational environments
using computer software to create/maintain databases and produce detailed reports.
Typical problems include:
uncooperative site personnel
non-conformances leading to confrontation with other personnel
delays in obtaining test results
damage to services, materials and site conditions
displaced, missing and inaccurate survey markers
misidentification of samples and sampling locations
equipment breakdown and breakage
environmental problems and issues, including site access, inclement weather, traffic, wildlife, vegetation, construction activities.

Health, safety and environment

All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence.

All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

Unit Sector(s)