Australian Government

Department of Education, Employment and Workplace Relations

MSL975023A Supervise geotechnical site investigations

Revision Number: 1

MSL975023A Supervise geotechnical site investigations

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to supervise and direct geotechnical site investigations based on observation and testing. The unit involves confirming the scope of the investigation, liaising with site personnel and coordinating geotechnical sampling and testing activities, collecting reliable data and reporting results. Personnel are also expected to interpret results in the field, provide reliable advice to clients, recognise and rectify obvious errors or unexpected results and troubleshoot common problems.

Application of the Unit

Application of the unit	This unit of competency is applicable to technical officers working in the construction materials testing sector. This unit of competency is typically performed by experienced technicians or engineering paraprofessionals, who often supervise or direct less experienced technical personnel. 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'.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		
	MSL974002A	*Conduct geotechnical site investigations*
	MSL973012A	*Assist with geotechnical site investigations*

Employability Skills Information

Employability skills	This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan geotechnical investigation	1.1. Identify the job, consult with stakeholders and obtain relevant information, including the purpose and scope of the investigation 1.2. Conduct desktop study of existing site information 1.3. Inspect the site to determine the characteristics of the project 1.4. Design inspection, sampling and testing program in accordance with specifications 1.5. Select human and physical resources required for the job 1.6. Identify site hazards and conduct risk assessment 1.7. Organise site induction for support personnel, as required 1.8. Brief support personnel on job-specific requirements 1.9. Ensuring ongoing liaison with stakeholders during project
2. Establish on-site operations	2.1. Consult with project personnel to determine methods of communication, roles, responsibilities and expectations of each party, including identification of potential problems and conflicts 2.2. Arrange deployment of personnel and resources to site 2.3. Arrange for the physical location of services, as required, and reconcile test locations
3. Coordinate geotechnical sampling and testing	3.1. Ensure sampling and testing is conducted in accordance with project requirements 3.2. Ensure test data and observations are recorded in accordance with enterprise practices 3.3. Review the progress of sampling and testing against the project schedule and provide any feedback to client as required 3.4. Review samples and field data and schedule testing as required 3.5. Ensure the finalisation of site operations according to project brief or relevant standard
4. Analyse project data and report to client	4.1. Report test results to site superintendent at specified intervals 4.2. Analyse project data and provide regular reports to the client using the agreed format

ELEMENT	PERFORMANCE CRITERIA
5. Maintain enterprise records	5.1. Ensure site results are documented in accordance with enterprise practices 5.2. Maintain security and confidentiality of enterprise information 5.3. Prepare and issue a final project report in accordance with client requirements
6. Promote a safe work environment	6.1. Promote the use of safe work procedures and protective equipment 6.2. Minimise environmental impacts of testing/sampling and generation of waste 6.3. Promote the collection and disposal of all waste in accordance with enterprise procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills include:

- interpreting maps, site plans and drawings
- planning and managing projects
- identifying and locating site services, sampling and testing sites (e.g. using global positioning system (GPS))
- identifying soil, rock and fill materials
- observing, interpreting and reportingsite features and geotechnical conditions
- maintaining accurate and complete records
- interpreting test data
- resolving problems appropriately
- seeking advice about problems beyond technical competence from appropriate personnel
- driving safely on- and off-road
- working safely on construction sites aroundheavy equipment and earthmoving plant
- report writing
- using computer software to create/maintain databases and produce detailed reports

Required knowledge

Required knowledge includes:

- the purposes and principles of geotechnical site investigation
- identification and classification of materials
- principles of planning and project management
- engineering properties of soil and rock materials
- representative sampling and testing (both in situ and laboratory)
- uses of engineering materials in civil construction
- civil construction techniques
- relevant health, safety and environment requirements

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, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors should ensure that candidates can: • liaise with stakeholders at various levels of complexity • plan, coordinate and monitor a diverse range of geotechnical activities • analyse, collate and report geotechnical investigation findings.
Context of and specific resources for assessment	This unit of competency is to be assessed in the workplace or simulated workplace environment 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. This unit of competency may be assessed with: • *MSL915001A Provide information to customers* • *MSL915002ASchedule laboratory work for a small team* • *MSL935001A Monitor the quality of test results and data*. Resources may include: • access to sites, tools and equipment • enterprise procedures, sampling plans, test methods and equipment manuals.
Method of assessment	The following assessment methods are suggested: • review of work outputs over a period of time to ensure accurate and consistent work is obtained within required timelines • examples of completed workplace documentation • feedback from peers and supervisors • oral or written questioning. In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess

EVIDENCE GUIDE	
	directly. Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability. Access must be provided to appropriate learning and/or assessment support when required. The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work like environment.
This competency in practice	Industry representatives have provided the case study below to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. **Construction materials testing** The materials laboratory of a large local authority has been requested to investigate a 10 km section of road pavement that shows varying degrees of distress. As the road is to be rebuilt and upgraded, the supervising engineer requires information to identify the reasons for the distress and to inform the design of the new pavement. The investigation will require test pits at 500 m intervals to allow examination of the underlying strata, in situ testing and sampling of existing pavement and sub-grade materials. The work will be performed by an experienced technician and a testing assistant, with supervision by a senior technician. The Council's Works Department will provide a backhoe with an operator and traffic management team. The engineer briefs the senior technician on the scope, purpose and requirements of the investigation and provides himher/ with the available documentation including maps, drawings and previous reports on the project. They refer to relevant ARMIS data, Falling Weight Deflection testing and surface defect mapping data. They carry out an on-site reconnaissance to confirm the available data and initial assumptions. The senior technician conducts a desk study to ensure that he/she understands the full requirements of the project. He/she plans the on- and off-site activities including locating the relevant services and utilities,

EVIDENCE GUIDE	
	arranging for the necessary permits and preparing a health and safety management plan. He/she also plans the excavations, sampling and in situ testing and the laboratory testing regime. Finally, he/she prepares a GANTT chart showing all activities and the critical control points. The project is expected to take one week to complete. He/she conducts a briefing session with the relevant stakeholders to nominate job roles and explain the required timelines. The scope of testing requires coring of UCS samples, cutting of asphalt slabs for MATTA testing, Material Quality testing (i.e. gradings, atterbergs and CBR's) as well as in situ DCP and moisture content testing. PAVSET data is also to be collected onsite. On completion of the field activities, the senior technician checks the samples and then, if required, adjusts the testing schedule so as to capture enough relevant test data. Once all required testing has been completed and checked, the senior technician collates the test data and summarises it into a report for the project engineer. He/she then meets with the engineer who, after reviewing the report, finds that a 1 km section of the road needs further sampling and testing because this section is in a known flood plain. The engineer issues a new test request specifying that this section of road requires a sample and test pit every 100 m. Previously collected data is to be collated with these new samples. The senior technician then organises for the added sampling and testing to be included into the laboratory's work schedule, mindful of any new time constraints. After completing the additional testing, he/she collates all the data into a final report for the engineer.

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, if used in the performance criteria, is detailed below. 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) may also be included.	
Codes of practice	Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used

Standards, **codes**, **procedures and/or enterprise requirements**	Standards, codes, procedures and/or enterprise requirements may include:
	• Australian and international standards, such as:
	  • AS ISO 1000-1998 The international system of units (SI) and its application
	  • AS ISO 17025-2005 General requirements for the competence of testing and calibration laboratories
	  • AS/NZS ISO 14000 Set:2005 Environmental management standards set
	  • AS/NZS ISO 9000 Set:2008 Quality management systems set
	• calibration and maintenance schedules
	• enterprise recording and reporting procedures
	• environmental legislation and regulations
	• equipment manuals
	• equipment startup, operation and shutdown procedures
	• industry codes of practice
	• laboratory schedules
	• material, production and product specifications
	• National Association of Testing Authorities (NATA) documents regarding construction materials testing
	• occupational health and safety (OHS) national standards and codes of practice
	• production and laboratory schedules
	• project management methodology
	• quality manuals
	• standard operating procedures (SOPs)

RANGE STATEMENT	
Site hazards may include:	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 and slopes • vehicular and pedestrian traffic
Safety procedures	Safety procedures may include: • location of site services before investigations commence • use of material safety data sheets (MSDS) • use of personal protective equipment, such as hard hats, hearing protection, sunscreen, gloves, masks, goggles, coveralls, safety boots and 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 and traffic control
Tools and equipment	Tools and equipment may include: • excavation equipment, hand and power augers • consumables, including sample bags and labels • documentation, including maps, plans, contract documents and worksheets • field test equipment, including sand replacement apparatus and dynamic cone penetrometer • still/video camera • communication equipment, such as two-way radio and mobile telephone • levelling equipment (dumpy and automatic levels)
Common site problems	Common site problems may include: • caving of the excavation • drilling difficulties • not knowing the requirements of the design

RANGE STATEMENT	
	engineer • not understanding the nature of the item being designed (e.g. retaining wall, piled structure and earthworks) • sample loss during retrieval • knowing when to stop a hole, or what and when to test and sample • misidentification of samples and sampling locations • equipment breakdown and breakage • environmental problems and issues, including site access, inclement weather, traffic, wildlife, vegetation and construction activities
Occupational health and safety (OHS) and environmental management requirements	OHS and environmental management requirements: • all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these requirements must not be compromised at any time • all operations assume the potentially hazardous nature of samples and require standard precautions to be applied • where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health

Unit Sector(s)

Unit sector	Testing

Competency field

Competency field	

Co-requisite units

Co-requisite units		