CONDUCT MATERIAL TESTING

UNIT CODE: CON/OS/CET/CR/01/6/A

UNIT DESCRIPTION

This unit specifies the competencies required to Conduct Material Testing. It involves preparing for material testing, sampling construction materials, performing tests on alignment soils, concrete, structural steel, bitumen materials and timber. It also includes documenting test results.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the **key outcomes** which make up workplace function (to be stated in active)	**PERFORMANCE CRITERIA** These are **assessable statements** which specify the required level of performance for each of the elements (to be stated in passive voice) ***Bold and italicized terms are elaborated in the Range***
1 Prepare for material testing	1.1 Preliminary site investigations are conducted as per contract document 1.2 Material laboratory is provided and maintained according to contract document 1.3 Material testing manuals and contract documents are obtained based on project requirements 1.4 ***Material testing equipment*** are acquired according to contact document and material testing manual 1.5 Material laboratory personnel are identified according expertise and qualifications 1.6 Sampling procedures are developed according to standard tests procedures 1.7 Types of material tests are determined according to test procedures and requirements 1.8 Testing equipment are operated and maintained as per the SOPs
2 Sample construction materials	2.1 ***Sources of road construction materials*** are identified based on contract document 2.2 Sample procedures and manuals are obtained as per standard sampling procedures 2.3 Sampling tools and equipment are identified and assembled according to standard procedures 2.4 Sampling is carried out as per standard sampling procedure 2.5 Samples awaiting analysis are stored based on test requirements

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	2.6 Testing equipment are operated and maintained as per the SOPs
3 Undertake tests on the alignment soils	3.1 ***Soil tests*** are identified according to contract document 3.2 Standard manuals and procedures are obtained in accordance with test requirement 3.3 Soil testing tools and apparatus are identified and gathered based on test requirements 3.4 Alignment soil samples are obtained according to test requirement 3.5 ***Soil tests*** are conducted as per standard procedures 3.6 Results are recorded and analysed according to standard procedures 3.7 Report is prepared and presented based on contract document requirement 3.8 Testing equipment are operated and maintained as per the SOPs
4 Perform concrete tests	4.1 ***Concrete tests*** are identified according to contract document 4.2 Standard manuals and procedures are obtained in accordance with test requirement 4.3 Concrete testing tools and apparatus are identified and gathered based on test requirements 4.4 Samples are obtained as per test requirement and contract document 4.5 Samples are prepared according to standard test procedures 4.6 Cubes are casted as per standard test procedures 4.7 Cubes are cured as per standard test procedures 4.8 Cubes are tested, and results are obtained and recorded according to standard procedures 4.9 Analysis of test result is carried out and reported according to standard procedure and contract document 4.10 Testing equipment are operated and maintained as per the SOPs
5 Carry out structural steel tests	5.1 Structural steel sample is obtained based on structural designs 5.2 Tensile testing machines are identified, obtained and calibrated as per test requirement and manufacturers manual 5.3 Test is conducted according to standard test procedures

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	5.4 Results are recorded and analysed as per standard procedures 5.5 Report is prepared and presented according to the contract document 5.6 Testing equipment are operated and maintained as per the SOPs
6 Perform bitumen tests	6.1 ***Bitumen tests*** are identified according to contract document 6.2 Standard manuals and procedures are obtained in accordance with test requirement 6.3 Testing tools and apparatus are identified and gathered based on test requirements 6.4 Samples are obtained as per test requirement and contract document 6.5 ***Samples are prepared*** in accordance with test procedures. 6.6 Test are conducted according to standard procedures and contract document 6.7 Test results are recorded and analysed according to standard procedures 6.8 Report is prepared and presented as per contract document 6.9 Testing equipment are operated and maintained as per the SOPs
7 Perform timber tests	7.1 ***Timber tests*** are identified according to contract document 7.2 Standard manuals and procedures are obtained in accordance with test requirement 7.3 Testing tools and apparatus are identified and gathered based on test requirements 7.4 Samples are obtained as per test requirement and contract document 7.5 Samples are prepared in accordance with test procedures. 7.6 Test are conducted according to standard procedures and contract document 7.7 Test results are recorded and analysed according to standard procedures 7.8 Report is prepared and presented as per contract document 7.9 Testing equipment are operated and maintained as per the SOPs

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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

VARIABLE	RANGE
1 Material testing equipment may include but not limited to:	• Moulds • Tamping rods • CBR test machine • Rammer • Ruffle box • Casa grande apparatus • Penetrometer • Weighing machine • Oven • Measuring cylinder • Cone cups • Bowl • Stirring stick • Crushing machine • Moisture bags • Funnels • Standard sieves
2 Sources of road construction materials may include but not limited to:	• Borrow pits • Quarries • River beds • Timber yard • Manufacturers
3 Soil Tests may include but not limited to:	• CBR • Atterberg limit • Liquid limit • Plastic limit • Proctor/compaction • Field density • Particle size distribution
4 Concrete Tests may include but not limited to:	2.1 Compressive strength 2.2 Slump 2.3 Cleanliness 2.4 Particle size distribution
5 Steel tests may include but not limited to:	• Tensile/Strength

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6	Bitumen Test may include but not limited to:	• Penetration • Cleanliness • Viscosity • Ductility • Flash and Fire Point • Float Test • Loss on Heating • Specific Gravity • Softening Point • Spread Rate
7	Samples are prepared may include but not limited to:	• Weighing • Drying/burning • Mix
8	Timber tests may include but not limited to:	• Tensile/Strength • Compressive • Shear • Size

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REQUIRED SKILLS AND KNOWLEDGE

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

Required Skills

The individual needs to demonstrate the following skills:

- Technical
- Interpretation
- Reporting
- Analytical
- Sample handling
- Interpersonal
- Observation
- Time management
- Leadership
- Numeracy
- Computer

Required Knowledge

The individual needs to demonstrate knowledge of:

- Material testing laboratory
- Sampling procedures
- Standard manuals and procedures

- Contract documents
- Material testing equipment
- Road construction materials
    - Types
    - Sources
    - Properties
- Material sampling
- Test parameters
- Analysis and interpretation
- Sample preparation
- SOPs

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1 Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Prepared for material testing 1.2 Identified and obtained required tools and equipment 1.3 Sampled test materials 1.4 Tested alignment soils 1.5 Performed concrete test 1.6 Carried out structural steel tests 1.7 Prepared samples for analysis 1.8 Performed bitumen test 1.9 Prepared and presented test reports 1.10 Demonstrate ability to use different testing tools and equipment 1.11 Performed timber tests
2 Resource Implications	The following resources should be provided: 2.1 Workstation 2.2 Well-equipped material testing laboratory 2.3 Test samples 2.4 Standard manuals 2.5 PPEs 2.6 Stationery 2.7 Computer
3 Methods of Assessment	Competency in this unit may be assessed through: 3.1 Observation 3.2 Oral 3.3 Projects 3.4 Written 3.5 Third party report

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		3.6 Case study 3.7 Portfolio
4	Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment or during industrial attachment.
5	Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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